Howard County Health Department

APPLICATION

FOR PERCOLATION TESTING AND SITE EVALUATION

TEST DATE(S) _____ TEST TIME _____ AP 530961

AGENCY REVIEW: _____ DATE 4/7/09

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:
- [x] CONSTRUCT NEW SEPTIC SYSTEM(S)
- [ ] REPAIR/ADD TO AN EXISTING SEPTIC SYSTEM
- [ ] REPLACE AN EXISTING SEPTIC SYSTEM

CHECK AS NEEDED:
- [x] NEW STRUCTURE(S)
- [ ] ADDITION TO AN EXISTING STRUCTURE
- [ ] REPLACE AN EXISTING STRUCTURE

CHECK ONE:
- [ ] CREATE NEW LOT(S)
- [x] BUILD ON AN EXISTING LOT IN A SUBDIVISION
- [ ] BUILD ON AN EXISTING PARCEL OF RECORD

IS THE PROPERTY WITHIN 2500' OF ANY RESERVOIR?
- [ ] YES
- [x] NO

THE TYPE OF STRUCTURE IS:
- [x] RESIDENTIAL WITH 4 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) STEVE ALLNUTT

DAYTIME PHONE 240 295 6023 CELL 410 336 7787 FAX _____

MAILING ADDRESS 8171 (STREET) MAPLE LAWN Blvd (CITY/TOWN) FULTON (STATE) MD (ZIP) 20759

APPLICANT TREVOR POQUETTE

DAYTIME PHONE _____ CELL 443 336 7690 FAX 4104890813

MAILING ADDRESS 1300 (STREET) St. Michaels Rd. (CITY/TOWN) Mt. Airy (STATE) MD (ZIP) 21771

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

PROPERTY LOCATION
SUBDIVISION/PROPERTY NAME ~~Lot 33 GOLDEN GRAIN Dr.~~ ALLNUTT FARMS ESTATES LOT NO. 33

PROPERTY ADDRESS GOLDEN CORN DRIVE (STREET), HIGHLAND (TOWN/POST OFFICE) MD 20777

TAX MAP PAGE(S) 34 GRID 15 PARCEL(S) 375 PROPOSED LOT SIZE 1.689

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
7178 COLUMBIA GATEWAY DRIVE COLUMBIA, MARYLAND 21046 (410) 313-1771 FAX (410) 313-2648
TDD (410) 313-2323 TOLL FREE 1-877-4MD-DHMH

PLEASE SUBMIT ORIGINALS ONLY (BY MAIL OR IN PERSON)

MOUND TEST DATA SHEETS

Property I.D. Golden Corn Dr. Lot # 33 Date 5-6-09

Sanitarian HS Landscape Position

% Slope Soil Type GmB & GbC Contractor

HOLE # 653 DEPTH OF TEST 21" START TIME 10:20

dk brn
l dense
lmsbk

12"

brn gr cl
moist 2csbk

20"

org red l
scl
1fsbk
sticky

28"

seepage
@ 4' 10% quartz
vchsl / boulders @ 7'

Hook Gauge Reading	Elapsed Time (min)	Measured Drop	Estimated Rate	% Change
10 16/16	—	—		
10 2/16	10	14/16		
9 5/16	10	13/16	restart	
8 4/16	10	15/16		
7 15/16	10	12/16		
7 3/16	10	12/16		
6 7/16	10	12/16		
5 14/16	10	12/16		
5 3/16	10	11/16		

HOLE # 652 DEPTH OF TEST 22" START TIME 11:05

dk brn
l 2fsbk

13"

red brn
dense
cl

25"

vchsl
org brn
1csbk

H2O @ 7.5'

Hook Gauge Reading	Elapsed Time (min)	Measured Drop	Estimated Rate	% Change
10 16/16	—	—		
10 7/16	10	9/16		
9 16/16	10	7/16		
9 10/16	10	6/16		
9 4/16	10	6/16		
8 15/16	10	5/16		
8 9/16	10	6/16		
8 3/16	10	6/16		

MOUND TEST DATA SHEETS

Property I.D. Golden Corn Dr. Lot # 33 Date 5-6-09

Sanitarian HS Landscape Position

% Slope GmB & Soil Type GbC Contractor

HOLE # 650 DEPTH OF TEST 18" START TIME 9:30

7"	dk brn l 2fsbk
1'	org/red brn cl 1msbk
24"	brn cl gr 1fsbk
	yellow brn scl

Hook Gauge Reading	Elapsed Time (min)	Measured Drop	Estimated Rate	% Change
10 16/16	—	—		
10 15/16	10	1/16		
10 12/16	10	3/16		
10 10/16	10	2/16		
10 7/16	10	3/16		
10 4/16	10	3/16		
9 16/16	10	4/16		
9 12/16	10	4/16		
9 8/16	10	4/16		

HOLE # 651 DEPTH OF TEST 19" START TIME 9:55

8"	brn l 2fsbk
14"	red brn cl 1msbk dense
20"	org/red brn cl many mica
	yellow org brn scl H_2O @ 5-6'

Hook Gauge Reading	Elapsed Time (min)	Measured Drop	Estimated Rate	% Change
10 16/16	—	—		
10 10/16	10	6/16		
10 6/16	10	4/16		
10 1/16	10	5/16		
9 12/16	10	5/16		
9 8/16	10	4/16		
9 4/16	10	4/16		
8 15/16	10	5/16		

MOUND TEST DATA SHEETS

Property I.D. Golden Corn Dr. Lot # 33 Date 5-6-09

Sanitarian HS Landscape Position

% Slope Soil Type GmB & GbC Contractor

HOLE # 654 DEPTH OF TEST 23" START TIME 11:35

brn l dense cl 1msbk
11"
red brn cl lfrbk sticky
24"
org brn cl 2csbk
→ cave-in 4' → H2O @ ~5'
heavy @ mottles/grays @ 7.5'

Hook Gauge Reading	Elapsed Time (min)	Measured Drop	Estimated Rate	% Change
10 16/16	—	—		
10 12/16	10	4/16		
10 8/16	10	4/16		
10 4/16	10	4/16		
10 1/16	10	3/16		
9 14/16	10	3/16		
9 11/16	10	3/16		

HOLE # 655 DEPTH OF TEST 22" START TIME 12:15

brn grvl 2csbk
12"
org brn cl dense heavy
25"
org brn clcl 20% blocky quartz

Hook Gauge Reading	Elapsed Time (min)	Measured Drop	Estimated Rate	% Change
10 16/16	—	—		
10 1/16	10	15/16		
9 5/16	10	12/16		
8 12/16	10	9/16		
8 2/16	10	10/16		
7 9/16	10	9/16		
6 15/16	10	10/16		
6 5/16	10	10/16		

A/P _____

C S O

1' brn e 2cs bK

red brn scl 1fsbK

3-4' ↓ → seepage 3-5'

yellow brn cl

7' yellow brn sl — seepage @ 8'
many mica

chs @ gr

10' ~~very moist~~ H_2O @ bottom

DATE	TEST #	DEPTH	START	BREAK 1" DROP	STOP 2" DROP	TIME OF 2ND INCH	P/F/H
5-6-09	650						

REMARKS _____

SANITARIAN _____ BACKHOE _____ OTHERS _____

TEST HOLES USED IN SDA _____ AVG. PERC TIME _____ SQ. FT/BR _____

TRENCH WIDTH _____ INLET DEPTH _____ MAX. BOT DEPTH _____ EFFECTIVE S/W _____

Howard County
Health Department

Bureau of Environmental Health
7178 Gateway Drive Columbia, MD 21046
(410) 313-2640 Fax (410) 313-2648
TDD (410) 313-2323 Toll Free 1-866-313-6300
website: www.hchealth.org

Peter L. Beilenson, M.D., M.P.H., Health Officer

Date: May 14th, 2009

To: Trevor Poquette

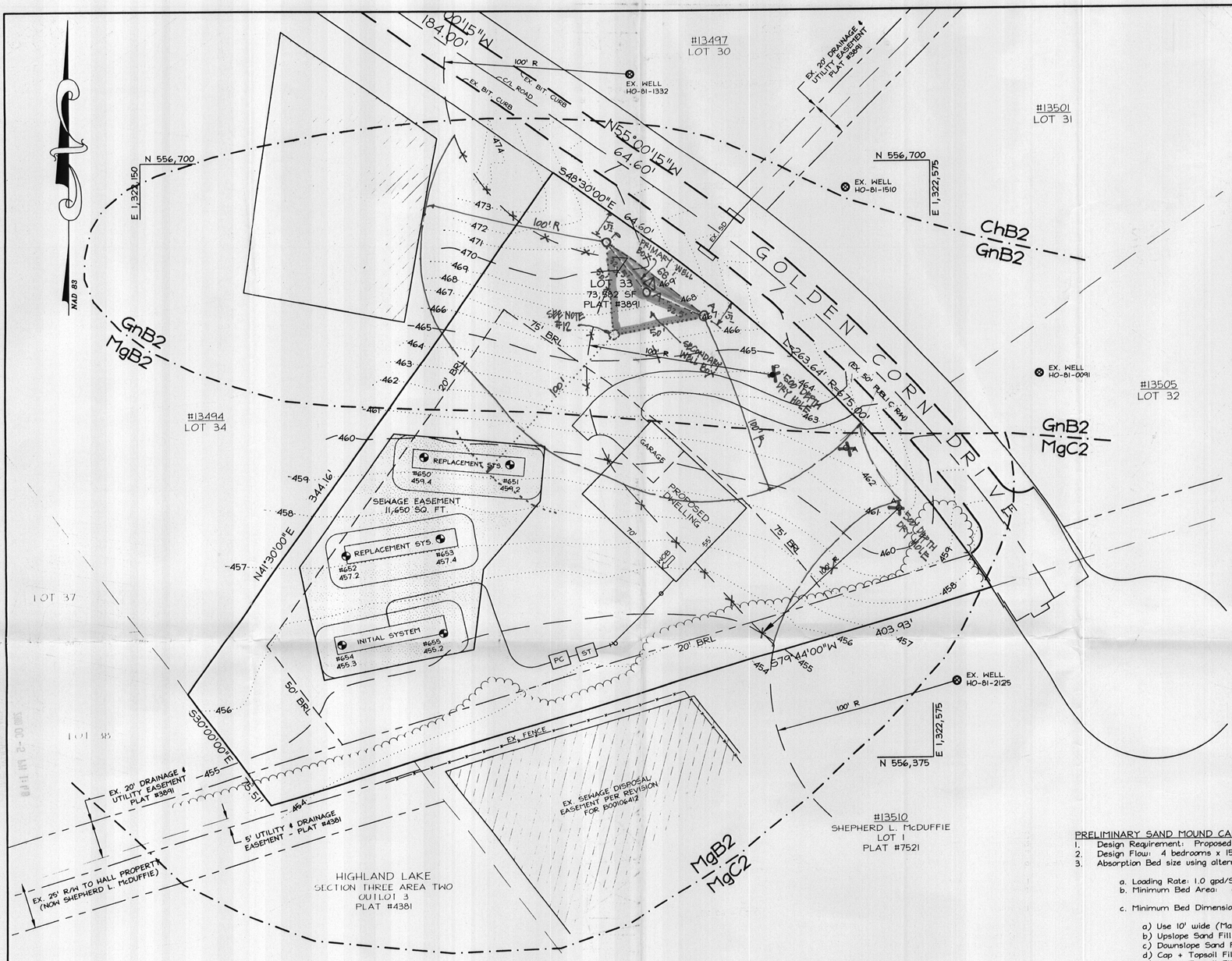
From: Heidi Scott
Development Coordination Section
Well & Septic Program

RE: PERCOLATION TEST RESULTS A#530961 – **WET SEASON TESTING**
Golden Corn Dr. Tax Map: 34 Parcel: 375

Percolation testing was conducted at the above referenced property on May 6th, 2009. Due to a shallow water table observed in the upper 4' of soil material infiltrometer tests for sand mounds were conducted. A total of three areas were identified for potential sand mound sites. Results indicate satisfactory soil conditions and perc rates for onsite wastewater disposal and adequate septic reserve area for this lot. Field data collected is shown on the Mound Test Data Worksheets enclosed with this letter.

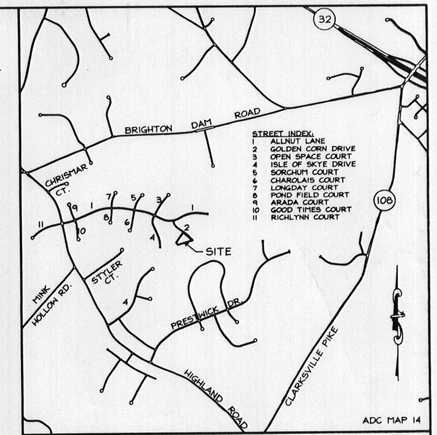
Further review of this project is contingent upon submission of a Percolation Certification Plan. If you have any questions regarding this evaluation or requirements for the Percolation Certification Plan, please contact me at (410) 313-6287.

Cc:
File



LEGEND

- PROPOSED SEWAGE DISPOSAL EASEMENT
- EXISTING SEWAGE DISPOSAL EASEMENT
- GnB2 / MgB2 — SOILS DIVIDE
- EXISTING 5' CONTOUR
- EXISTING 1' CONTOUR
- EXISTING TREELINE
- PASSED SAND MOUND TEST LOCATION 5/6/09
- EXISTING WELL
- P — PRIMARY WELL LOCATION
- A — ALTERNATE WELL LOCATION
- PRIMARY WELL BOX
- SECONDARY WELL BOX



VICINITY MAP

SCALE: 1"=2000'

NOTES:

1. Existing Zoning: RR-DEO per 2/2/04 Comprehensive Zoning Plan
2. Plat Reference: Plat #3891
3. Total Area of Lot: 73,582 SF or 1.689 Ac.±
4. The lot shown hereon complies with the minimum lot area and ownership width as required by the Maryland Department of the Environment.
5. All existing wells and septic systems within 100 feet of the lot which may affect this proposal have been shown.
6. The topography shown is taken from field run topography done by C. B. Miller Associates in July, 2004. The location of the sand mound tests is from field run data performed by LDE, Inc. on October 29, 2009.
7. Any changes to the Private Sewage Easement shall require a Revised Percolation Certification Plan.
8. The well for this lot shall be drilled prior to approval of the Building Permit.
9. The septic system for this lot shall be equipped with an Advanced Pretreatment System.
10. The sand mound areas delineated and identified on Lot 33, must be protected by a fixed barrier at all times during grading and construction activities. Thereafter protective measures should be implemented to protect those areas from erosion, particularly due to concentrated flow or encroachment by wheeled vehicles while soil is saturated. Subsequent building permit applications may be denied should a sand mound area be evaluated and found to be unsatisfactory for the intended use. A supplemental plan with all of the necessary details for installation of the system will be required prior to release of the building permit.
11. Prior to building permit approval for Lot 33, the primary sand mound and gravel bed corners must be staked for field review.
12. ⚠ ANY WELL DRILLED WITHIN THE SECONDARY WELL BOX (OUTSIDE OF THE PRIMARY WELL BOX) WILL REQUIRE REALIGNMENT OF BOTH OF THE REPLACEMENT SAND MOUND LOCATIONS SHOWN ON THIS PLAN.

SOILS LEGEND:

SYMBOL	NAME/DESCRIPTION	SOIL GROUP
GnB2	Glenville silt loam, 3 to 8 percent slopes, mderately eroded	C
MgB2	Manor gravely loam, 3 to 8 percent slopes, moderately eroded	B
MgC2	Manor gravely loam, 8 to 15 percent slopes, moderately eroded	B

PRELIMINARY SAND MOUND CALCULATIONS

1. Design Requirement: Proposed duelling with 4 bedrooms
2. Design Flow: 4 bedrooms x 150 gpd = 600 gpd
3. Absorption Bed size using alternate sand media: Design Flow / Loading Rate = Area of Bed
   a. Loading Rate: 1.0 gpd/SF (Alternate sand media)
   b. Minimum Bed Area: 600 gpd / 1.0 gpd/SF = 600 SF (Total Area)
   c. Minimum Bed Dimensions: Total Area / Max. Width = Min. Length or 10 FT = 60 FT
      a) Use 10' wide (Max. Width) x 60' long Sand Bed
      b) Upslope Sand Fill Depth: 12" min., or 1'
      c) Downslope Sand Fill Depth (6% slope): 19.2" or 1.6'
      d) Cap + Topsoil Fill @ Bed center: 18" or 1.5'
      e) Cap + Topsoil Fill @ Bed edge: 12" or 1'
      f) Total Bed Depth: 10" or 0.83'
      g) Sideslope setback: 130.8" or 10.9'
      h) Upslope setback (0.86 Corr. factor for 6% slope): 87.7" or 7.3'
      i) Downslope setback (1.22 Corr. factor for 6% slope): 150.8" or 12.6'
      j) Total Mound width: 358.5" or 29.9' use 30'
      k) Total Mound length: 981.6" or 81.8' use 82'
      l) Use Mound size of 30' x 82'
      m) Check Basal area: 1200 SF required
         1) Area provided: Bed width + Downslope setback x Bed length = Basal area
            10' + 12.6' x 60' = 1356 SF > 1200 required

This area designates a private sewage easement of at least 10,000 square feet as required by the Maryland Department of the Environment for individual sewage disposal. Improvements of any nature in this area are restricted until public sewage is available. These easements shall become null and void upon connection to a public system. The county health officer shall have the authority to grant adjustments to the private sewage easement. Recordation of a modified sewage easement shall not be necessary.

Approved for Private Water and Private Sewerage
Howard County Health Department

BWeyman for Peter Beilenson — 12/23/2009
Howard County Health Officer — Date

PERC CERTIFICATION

I certify that the information shown hereon is based on field work performed by me or under my direct supervision and is correct, to the best of my knowledge and belief.

Bruce D. Burton — 12/10/09
Bruce D. Burton, Professional Engineer — Date
MD Reg. NO. 19184

STATE OF MARYLAND — BRUCE DAVID BURTON — NO. 19184 — REGISTERED PROFESSIONAL ENGINEER

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND, LICENSE NO: 19184, EXPIRATION DATE: 6/30/11.

SIGNED Bruce D. Burton — DATE 12/10/09
BRUCE D. BURTON

NO.	DATE	REVISIONS
⚠	10/5/10	REVISE WELL SITES/PRIMARY & SECONDARY WELL BOX; NOTE 12.

LDE Inc.
Engineers, Surveyors, Planners
9250 Rumsey Road, Suite 106 Columbia, Maryland - 21045
(410)715-1070 - (301)596-3424 - FAX(410)715-9540

PERCOLATION CERTIFICATION PLAN

ALLNUTT FARMS ESTATES

SECTION FOUR
LOT 33

A#530961
TAX MAP 34 GRID 15 P/O PARCEL 375
5th ELECTION DISTRICT HOWARD COUNTY, MD

Previous Submittals:

DESIGNED	DRAWN	CHECKED	DATE	SCALE	DRAWING	JOB NO.	FILE NO.
BDB	GDW	BDB	12/2009	1" = 30'	1 OF 1	09-008	

DEVELOPER: Trevor Paquette, 1300 Saint Michaels Road, Mt. Airy, MD 21771, 443-336-7690
OWNER: Steve Allnutt, 8171 Maple Lawn Blvd. Suite 101, Fulton, MD 20759, 410-336-7787

SAND MOUND DESIGN REPORT
for
LOT 33 - ALLNUTT FARMS ESTATES
SECTION FOUR

5th Election District
Howard County, Maryland

JUNE, 2011

1' 8" off end
28' 4"

Prepared for:

HAMILTON REED, LLC
c/o
3368 Brantly Court
Glenwood, MD 21738

3 laterals @ 1 1/4"
28 1/4' long
9 holes
(5/16") holes
spacing - 3.2'

Prepared by:

LDE, Inc.
Historic Carriage House
7520 Main Street
Suite 203
Sykesville, MD 21784
(410) 795-6391

1' 8"

PROFESSIONAL CERTIFICATION

I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 19184, expiration date: June 30, 2013.

STATE OF MARYLAND
BRUCE DAVID BURTON
No. 19184
REGISTERED
PROFESSIONAL ENGINEER

BRUCE D. BURTON

6/14/11
DATE

TABLE OF CONTENTS

REPORT

Sand Mound Design Summary

SAND MOUND CALCULATIONS - LOT 33

1. Design Requirement: Proposed dwelling with 4 bedrooms
2. Design Flow: 4 bedrooms x 150 gpd = 600 gpd
3. Absorption Bed size using alternate sand media:

$$\text{Loading Rate} = \frac{\text{Design Flow}}{\text{Area of Bed}}$$

a. Loading rate: 1.0 gpd/SF (Alternate sand media)

b. Minimum Bed area: $\frac{600 \text{ gpd}}{1.0 \text{ gpd/SF}} = 600 \text{ SF (Total Area)}$

c. Minimum Bed dimensions: $\frac{\text{Total Area}}{\text{Max Width}} = \text{Min. Length}$

or $\frac{600 \text{ SF}}{10 \text{ FT}} = 60 \text{ FT}$

a) Use 10.0' wide (Max. Width) x 60' long Sand Bed
b) Upslope Sand Fill Depth: 12" min, or 1'
c) Downslope Sand Fill Depth (10% slope): 18.24" or 1.52'
d) Cap + Topsoil Fill @ Bed center: 18" or 1.5'
e) Cap + Topsoil Fill @ Bed edge: 12" or 1'
f) Total Bed Depth: 10" or 0.83'
g) Sideslope setback: 129.36" or 10.78'
h) Upslope setback (0.89 Corr. factor for 4% slope) : 90.78" or 7.57'
i) Downslope setback (1.14 Corr. factor for 2.5% slope) : 137.62" or 11.47'
j) Total Mound width: 348.40" or 29.03' use 29'
k) Total Mound length: 978.72" or 81.56' use 82'
l) Use Mound size of 29' x 82'
m) Check Basal area: 600 SF required
   1) Area provided:
      Bed width + Downslope setback x Bed length =
      Basal area 10.0' + 11.47' x 60' = 1288.2 SF
      = 1288.2 SF > 600 required

SEPTIC SYSTEM / DISTRIBUTION CALCULATIONS

1. 4" PVC @ Foundation Wall, Inv. Elev. = 452.5
2. 1500 Gal. Septic Tank
   Inv. In Elev. = 451.8, Ground Over Tank @ 456.8
   Inv. Out Elev. = 451.5, Ground Over Tank @ 456.8
3. 1500 Gal. Pump Tank
   Inv. In Elev. = 451.0, Ground Over Tank @ 456.3
   Inv. Out Elev. = 451.5, Ground Over Tank @ 456.3
4. Effluent Pump = Gould - Model 3885 WE Series
   WE Submersible Effluent Pump - Item # WE 0718 H
   3/4 Horsepower, 208 Volt, 1 Phase or Equal *
5. 3" Force Main (Maintain 4 ft cover)
6. 3" Central Distribution Manifold; Inv 457.5
7. (6) 28.25 LF - 1-¼" Distribution Laterals w/ 9 Perforations each spaced @ 3'-4" (Perforation Size = 5/16"), Perforations located @ Invert of Lateral Pipe
8. First perforation = 1.75' from CL 3" Manifold Pipe
9. Last perforation at crown of lateral pipe in a turn-up, see detail
10. Spacing between laterals = 3.33'
11. Spacing between Lateral ℄ edge Absorption Bed = 1.67'

* For Substitute Effluent Pump; The septic installer shall provide Pump Specifications ℄ Performance Curves at Time of Septic Permit Application

Sand Mound Dimension Calculations

a. Plan View

b. Cross Section

c. Grading Plan 1: = 20'

EQUATIONS FOR CALCULATING SAND MOUND DIMENSIONS

Initial System - LOT 33

USE ALTERNATE SAND MEDIA = 1.0 gpd/ft2

4 Bedrooms
150 gpd/BR
600 gpd

1. Absorption Bed (sq.ft.) — a x b = Design Flow / 1.0 gpd/ft2 = 600 sqft max = 750 sqft max

Max 1.2
Min 0.8

600 sq.ft.

---

2. Bed Length (B) — 60 ft ---------- 42 to 104 depends on site conditions

---

3. Bed width (A) = Bed Area / Bed Length = 600 sqft / 60 ft

= 10.0 12 ft or less

---

4. Upslope sand fill depth (D) = 48 in - Zin.

= 12 12 in min.

---

5. Downslope sand fill depth (E) = (12 A x % slope) + D in

A= 10.0
% Slope = 0.052

= 18.24 inches

---

6. Cap + topsoil at bed center (H) = 18 inches

---

7. Cap + topsoil at bed edge (G) = 12 inches

---

8. Total bed depth (F) = 10 inches

---

9. Sideslope setback (K) = (((D+E)/2)+28 inches) x 3

D = 12
E = 18.24

= 129.36 inches
= 10.78 ft

---

10. Upslope setback (J) = (22 in + D) x 3 x Upslope Corr Factor

D = 12

= 90.78 inches
= 7.57 ft

%	Factor
0	1
2	0.94
4	0.89
6	0.86
8	0.8
10	0.77
12	0.73

---

11. Downslope setback (I) = (22 in + E) x 3 x Downslope Corr Factor

E = 18.24

= 137.6208 inches
= 11.47 ft

%	Factor
0	1
2	1.06
4	1.14
6	1.22
8	1.32
10	1.44
12	1.57

---

12. Total Width of Mound (W) = (12 A + J + I)

A = 10.00
J = 90.78
I = 137.62

= 348.40 inches
= 29.03 ft

---

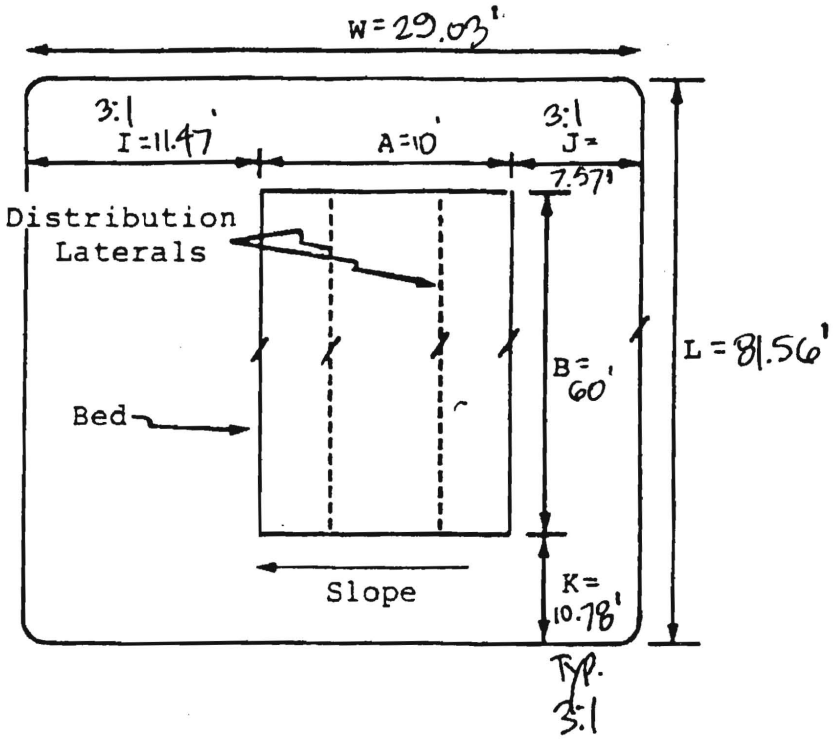
12. Total Length of Mound (L) = (12 B + K + K)

B = 60.00
K = 129.36

= 978.72 inches
= 81.56 ft

SAND MOUND

Plan View



A = Bed Width (ft.) 10' MAX

B = Bed Length (ft.) 60' MAX

K = Sideslope Setback (ft.) 3:1

J = Upslope Setback (ft.) 3:1

I = Downslope Setback (ft.) 3:1

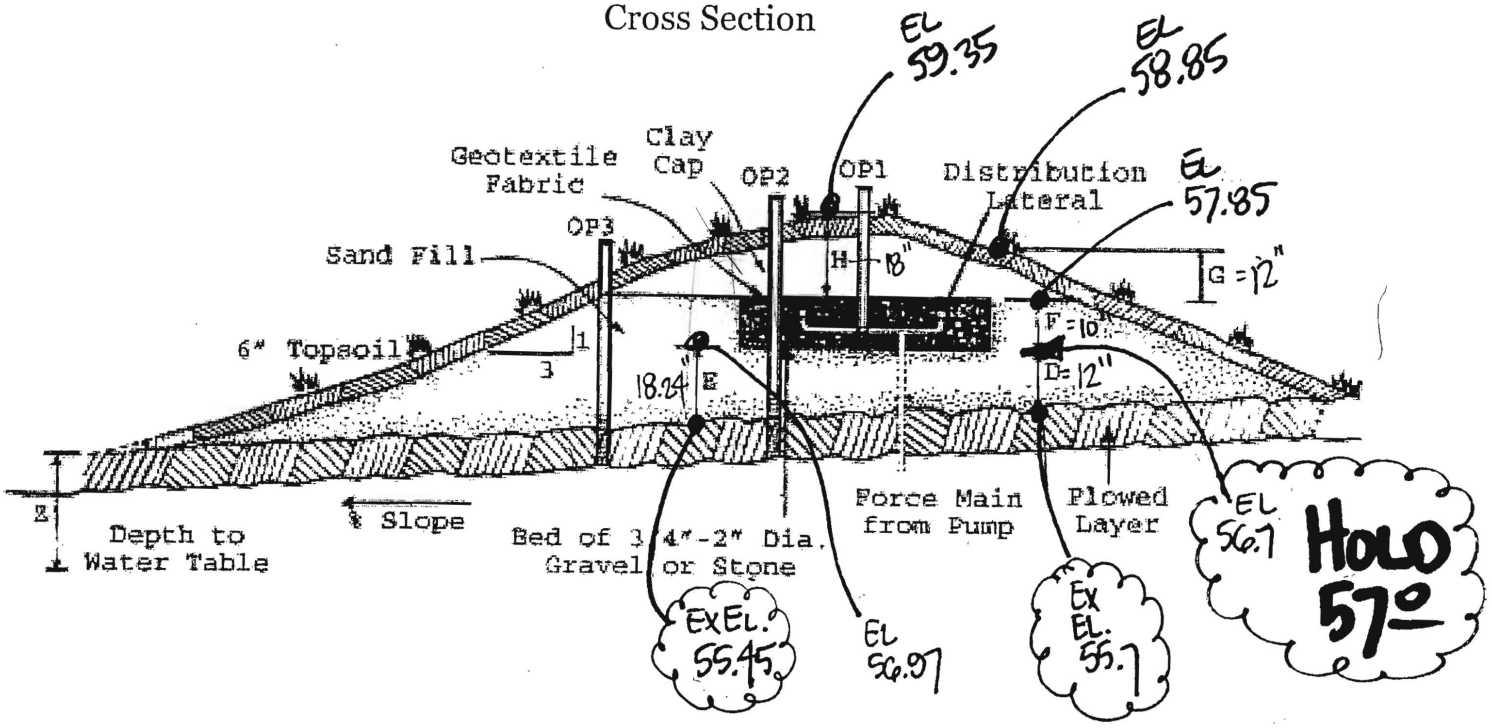
W = Total Width of Mound (ft.) 29.03'

L = Total Length of Mound (ft.) 81.56'

FIGURE 3.2 – DESIGN WORKSHEET, PLAN VIEW

SAND MOUND

Cross Section



D = Upslope Sand Fill Depth (in.) = 12"

E = Downslope Sand Fill Depth (in.) = 18.24"

F = Bed Depth (in.) = 10"; INVERT @ ELEV 57°

G = Cap and Topsoil Height at Bed Edges (in.) = 12"

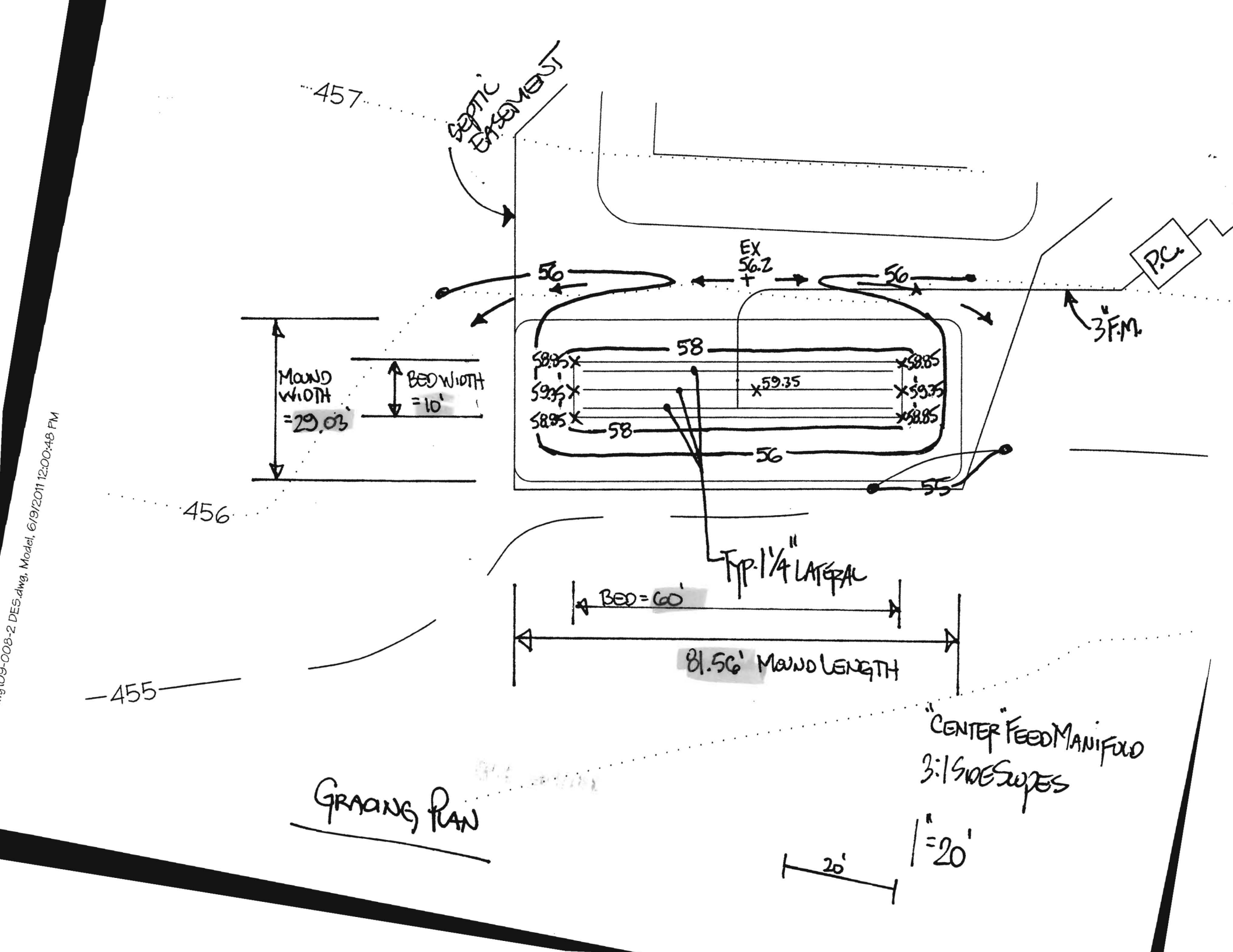
H = Cap and Topsoil Height at Bed Center (in.) = 18"

Z = Depth to Water Table (in.)

OP = Observation Ports (recommended) PER HEALTH DEPT.

FIGURE 3.1 – DESIGN WORKSHEET CROSS SECTION

INVERT DISTRIBUTION LATERAL = 57.50


457
SEPTIC EASEMENT
EX 56.2 +
56
56
P.C.
3" F.M.
58
58.85
59.35
58.85
59.35
58.85
58
56
55
59.35
MOUND WIDTH = 29.03'
BED WIDTH = 10'
456
TYP. 1 1/4" LATERAL
BED = 60'
81.56' MOUND LENGTH
455
"CENTER" FEED MANIFOLD
3:1 SIDE SLOPES
GRADING PLAN
1" = 20'
20'
109-008-2 DES.dwg, Model, 6/9/2011 12:00:48 PM

Distribution Network -Manifold Calculations

a. Central Manifold Typical Detail

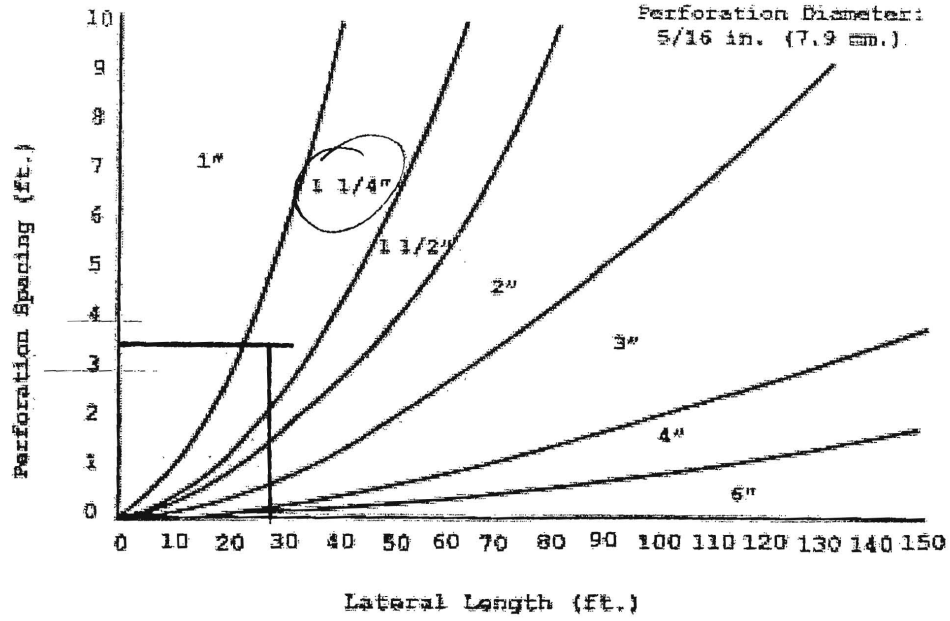
b. Central Manifold Distribution Detail

c. Lateral Size Determination

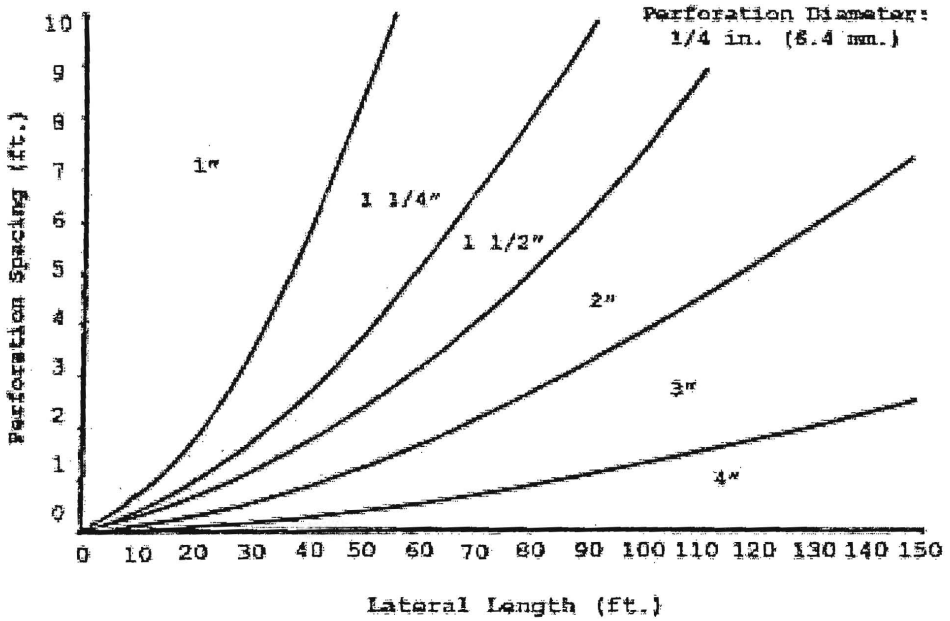
d. Perforation Spacing Typical Detail (Central Manifold)

e. Distal End Perforation & Turn Up Detail

f. Observation Port Detail (Typical)

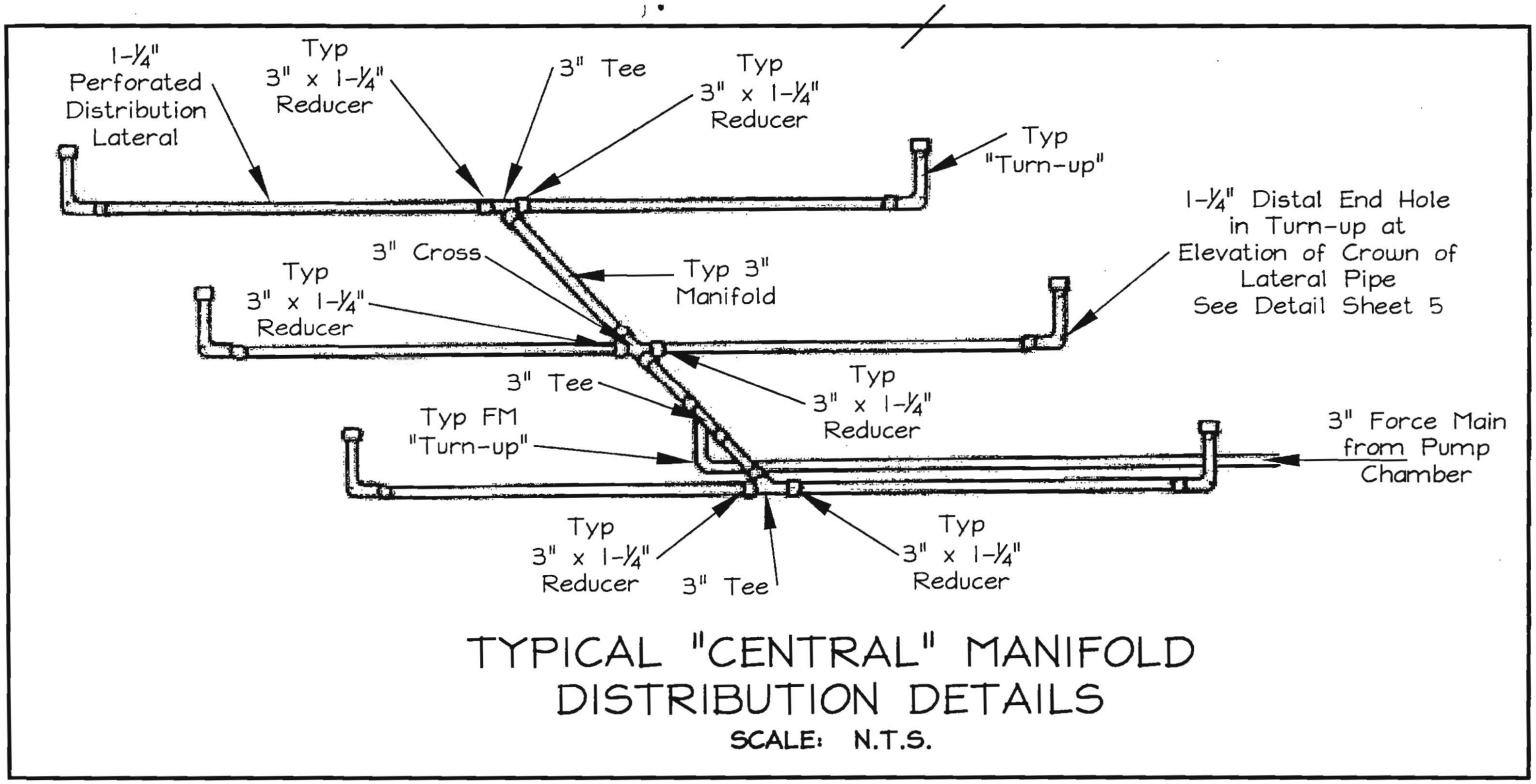


Minimum Lateral Diameter for Plastic Pipe (C_1 = 150) Versus Perforation Spacing and Lateral Length for 5/16 in. Diameter Perforations (Otis, 1981)



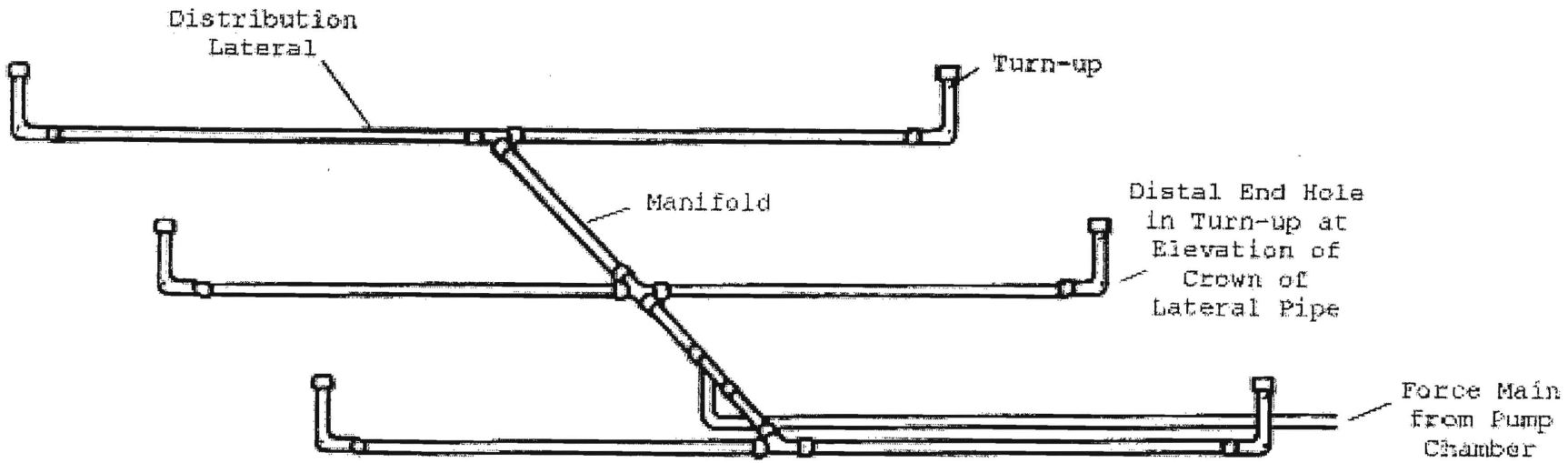
Minimum Lateral Diameter for Plastic Pipe (C_1 = 150) Versus Perforation Spacing and Lateral Length for 1/4 in. Diameter Perforations (Otis, 1981)

FIGURE 4.4 – PERFORATION SPACING AS A FUNCTION OF PERFORATION DIAMETER, LATERAL DIAMETER AND LATERAL LENGTH



TYPICAL "CENTRAL" MANIFOLD DISTRIBUTION DETAILS

SCALE: N.T.S.



Modified from EPA Design Manual

FIGURE 4.2 – CENTRAL MANIFOLD DISTRIBUTION NETWORK

EQUATIONS FOR CALCULATING SAND MOUND DISTRIBUTION NETWORK

Absorbtion Bed Length = 60 ft. Central Feed

End Feed = <51 ft
Central Feed = >41 ft

Use Central Feed

Lateral Length = 1/2 Bed Length - 1/2 Perforation Spacing

Perforation Spacing = 3.5 ft.

Lateral Length = [(0.5 x 63 ft) - (0.5 x 3.5 ft)]
= 28.25
= 28.25 ft

Number of Perforations = [(0.5 x Bed Length) / Perforation Spacing]
= 8.6 Perforations
Use 9 Perforations

Actual Perforation Spacing = [(0.5 x Bed Length) / Number of Perforations]
= 3.33 ft.
= 3.00 ft. 4.00 inches

Diameter of Perforations = 5/16 "

Diameter of Laterals = 1-1/4 " Table 4.1 & Figure 4.4

L = 28.25 ft

Lateral Length	Diameter
L less than 23 feet	1
L between 23 and 36	1-1/4
L between 36 and 47	1-1/2
L between 47 and 50	2

Spacing & Number of Laterals =

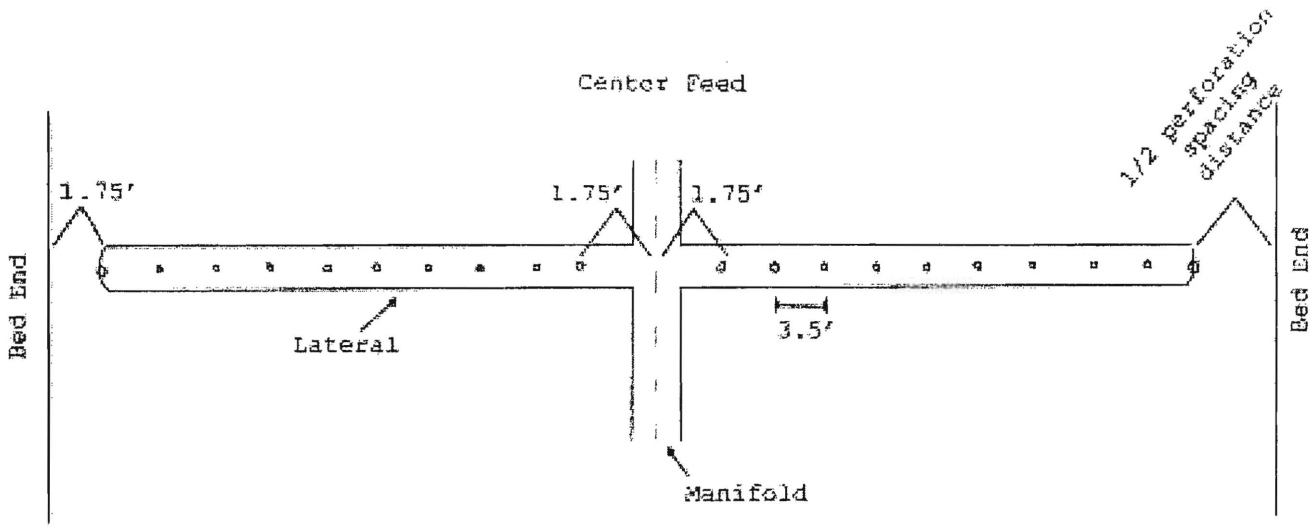
Bed Width = 10.0 ft

Note: The number of laterals should be between two & four feet

Use 3 laterals = 3 2 sides = 6 @ 28.25
Spacing between laterals = Bed width / # of laterals
= 3.33 ft

Spacing between laterals = 0.5 x Space between Lateral
= 1.66667

Bed Width Check = 10.000 ft



*Bed length is 70' from example problem.
*Laterals are 33.25' from center manifold.

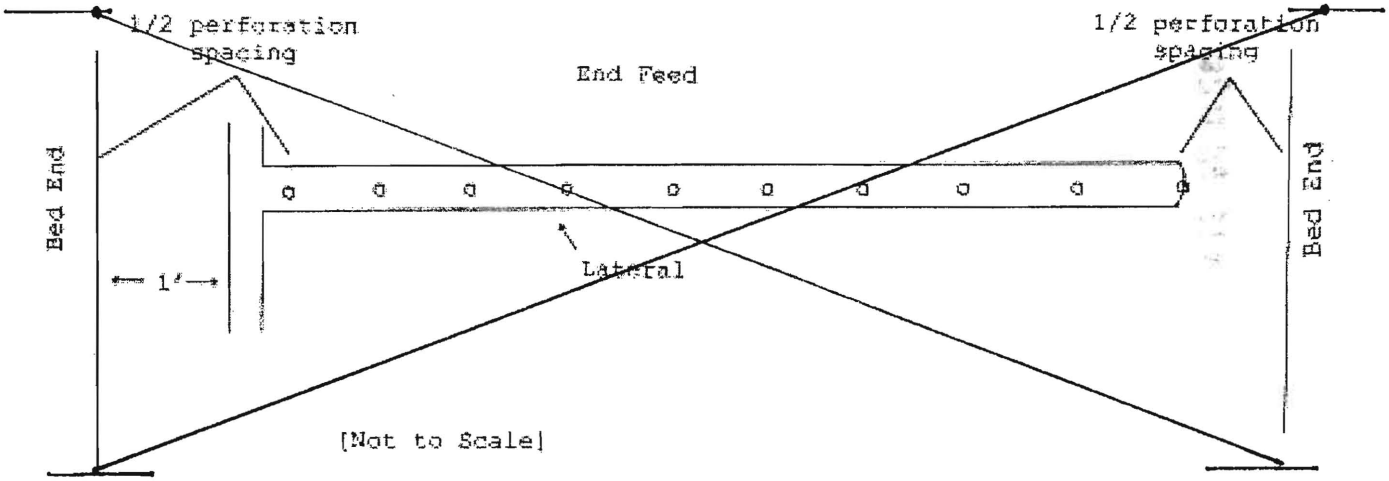
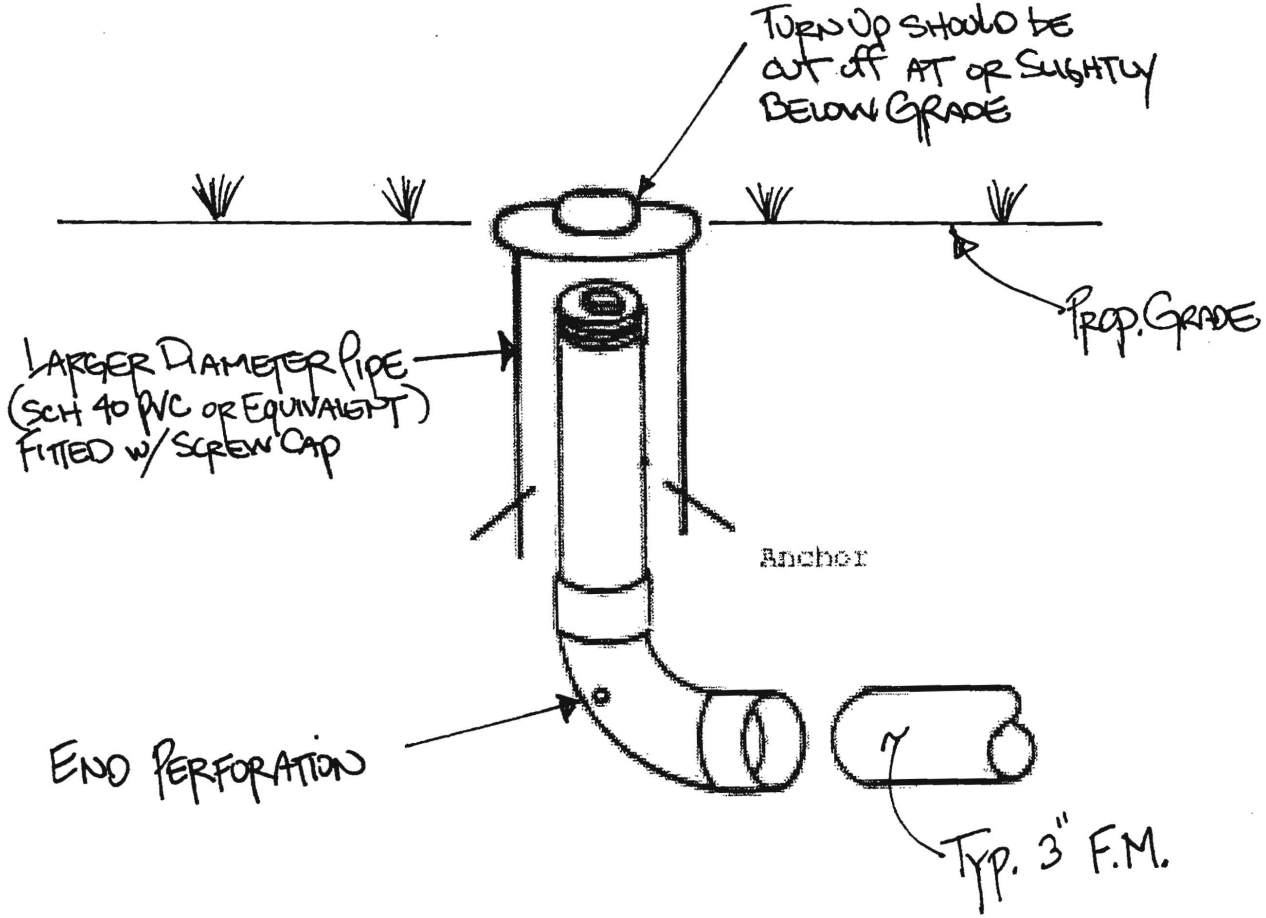


FIGURE 4.3 – PERFORATION SPACING AND LATERAL LENGTH DIAGRAMS

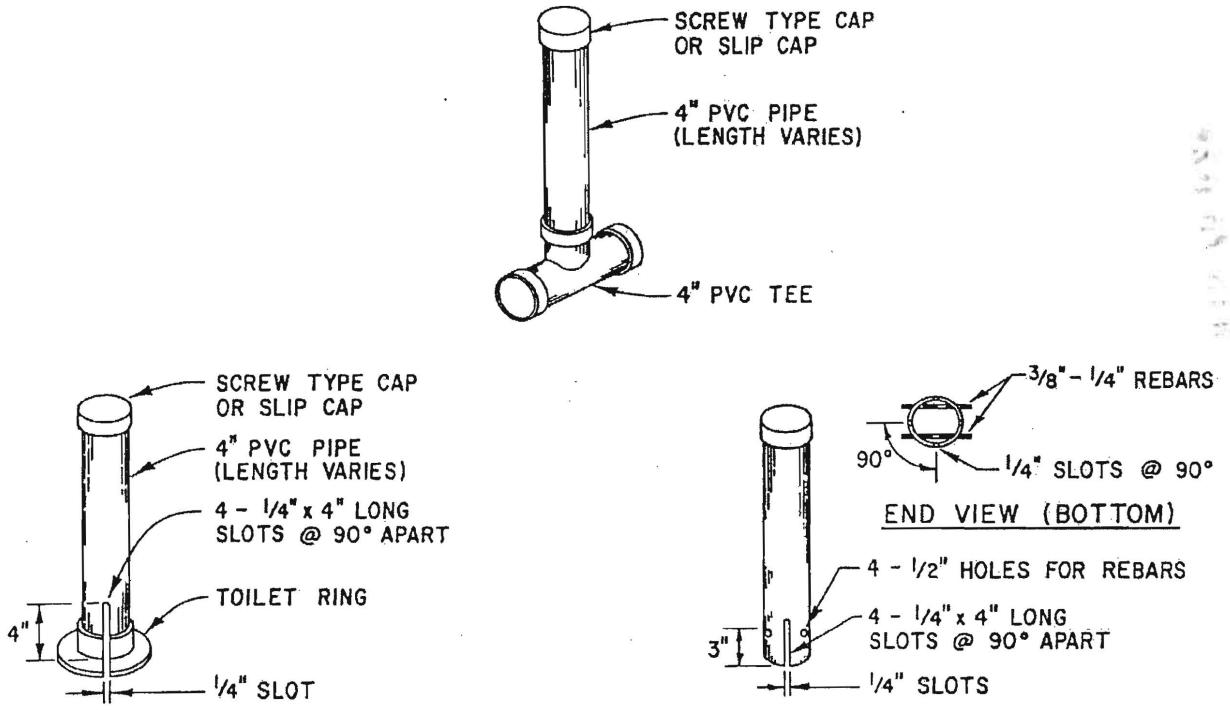
DETAIL of LATERAL TURN UP : PLACEMENT of END PERFORATION (TYP.)



REFER to MOE MEMO DATED 5/2010, PAGE 3

restricts oxygen diffusion. Thicker soil covers also reduce oxygen transfer. The recommended mound cover consists of the sandy loam, loamy sands and silt loams. These coarser soils will not shed the precipitation as well as heavier soils and will not hold as much moisture during the summer dry periods but the benefits of breathing is probably superior to the negatives. If the soil cover does not support good vegetative cover, other means, such as decorative stone, must be implemented to avoid surface erosion.

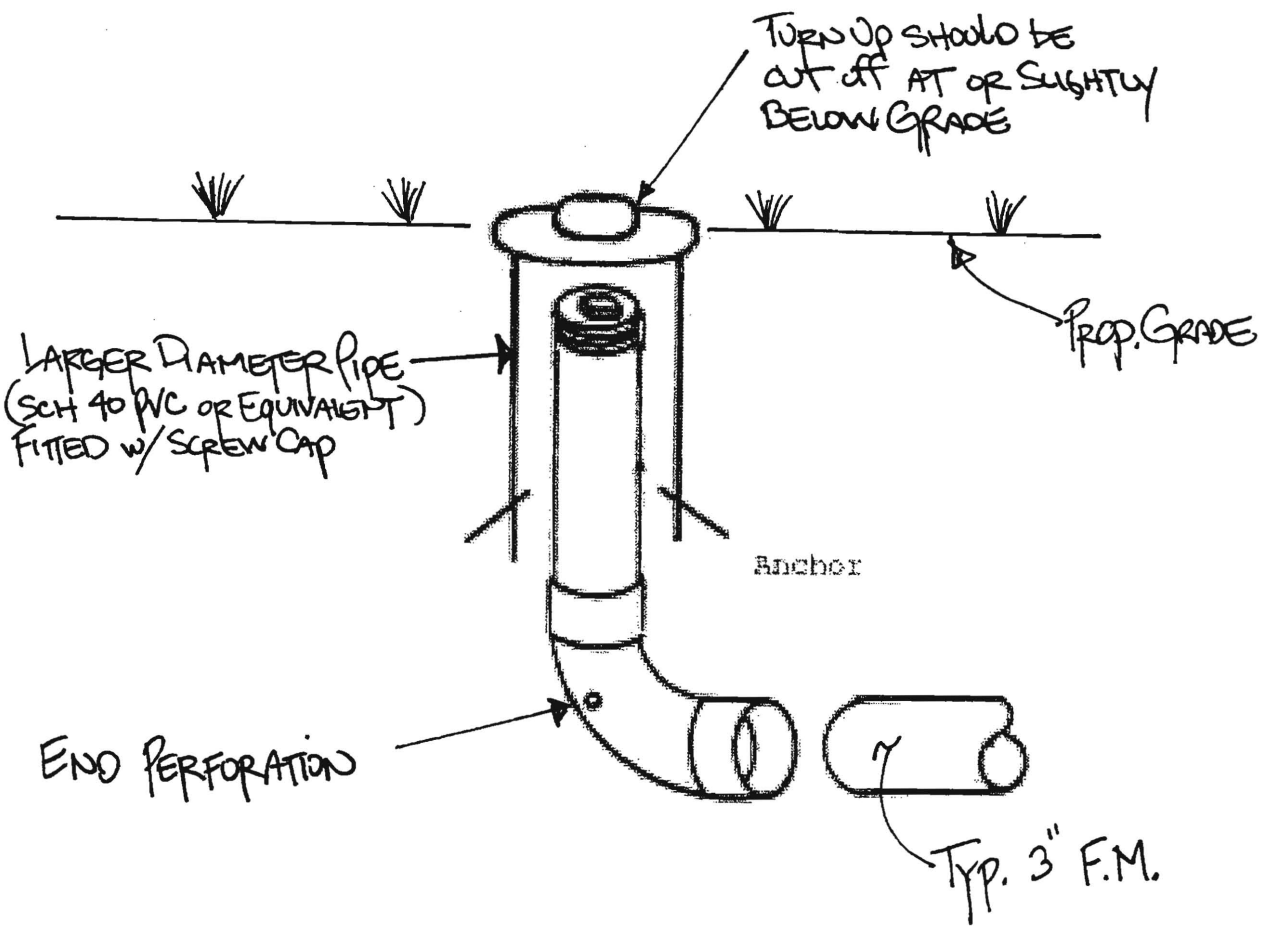
Observation Tubes: It is essential that all soil absorption systems, including mounds, have observation tubes extending from the infiltrative surface (aggregate/sand interface for mounds) to or above the ground surface to observe ponding at the infiltrative surface. Tubes should be placed at approximately 1/4 and 3/4 points along the length of the absorption area. Fig. 7 illustrates three methods of anchoring the observation tubes. **The bottom 4" must have perforations in the sides to allow ponded effluent to enter and exit the pipes. Ponded**



OBSERVATION WELLS

effluent will not enter from the bottom of the pipe.

DETAIL of LATERAL TURN UP : PLACEMENT of END PERFORATION (TYP.)



REFER to MOE MEMO DATED 5/2010, PAGE 3

Sewage Disposal System Design Data (Per Plot Plan)

Pumping System Calculations

a. Friction Loss Table 4.3

b. Friction Loss Table 4.4

c. Typical 1,500 Gallon Pump Chamber Detail w/ Design Elevations

d. Typical Tank Size Justification (Mayer Brothers) & Details

e. Gould Submersible Pump Data - Model 3885

SEWAGE DISPOSAL SYSTEM DESIGN DATA

1. Invert @ Wall: 452.5

2. 1500 Gallon Septic Tank:
   Ex. Grade Over Tank 456.8
   Proposed Grade Over Tank 456.8
   Invert In 451.8
   Invert Out 451.5

3. 1500 Gallon Pump Chamber:
   Ex. Grade Over Tank 456.3
   Proposed Grade Over Tank 456.3
   Invert In 451.0
   Invert Out 451.5

Note: Pump Design and Sand Mound Design to be Provided by Contractor Prior to Issuance of Septic Installation Permit

EQUATIONS FOR CALCULATING SAND MOUND PUMPING SYSTEM

4.3.1 MINIMUM DOSE COMPUTATIONS

Min. Dose = > 1/6 Design Flow = 100 gallons
or
(Volume of Force Main & Manifold) + (5 x Volume of the Laterals) =

Inv In Pump Chamber = 451.00
Inv Manifold = 457.85
+ 6.85 feet difference

Pipe Volume per Table 4.2

Length of Force Main & Manifold = 90 ft of 3" Pipe
Length of Laterals = 169.5 ft of 1-1/4" Pipe

90	x	38.4	gal per 100 feet =	34.56
169.5	x	7.8	gal per 100 feet =	13.221
				47.781

= 34.56 + 13.221 x 5
= 100.665 gallons

Min. Dose =	100.7 gallons

4.3.2 PUMPING CHAMBER DESIGN

A. Watertight

B. Sizing:

One Day Capacity =	600	gallons
Dose =	100.7	gallons
Total =	700.7	gallons

4.3.3 PUMPING CHAMBER SIZING

A. Sizing: (Flow)

# Laterals =	6	
Perforation Size =	5/16	
Perforation Discharge Rate =	1.63	gpm @ 2 feet head
# Perforations =	9	

Perforations = 54 5/16" Perforations

Flow = 54 x 1.63gpm

Flow =	88.02	gpm @ 2 feet head

B. Design Head =

Static Head
+ Friction Head
+ 2 feet Head @ Distal end of Laterals

Design Head

Elevation of Higest Component of Distribution System
- Relative Elevation of pump off float switch

Static Head = Answer

457.85 Elevation of Higest Component of Distribution System
449.30 Relative Elevation of pump off float switch

Static Head =	8.55	feet

Friction Head = (Approx)

EQUATIONS FOR CALCULATING SAND MOUND PUMPING SYSTEM

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Flow = 54 x 1.63gpm

Flow =	88.02	gpm @ 2 feet head

B. Design Head =

Static Head
+ Friction Head
+ 2 feet Head @ Distal end of Laterals

Design Head

Elevation of Higest Component of Distribution System
- Relative Elevation of pump off float switch

Static Head = Answer

457.85 Elevation of Higest Component of Distribution System
449.30 Relative Elevation of pump off float switch

Static Head =	8.55	feet

Friction Head = (Approx)

	3	#	Equivalent Length of Pipe
90 Degree	10	1	10.0
45 Degree	6	3	18.0
90 Tee	15	1	15.0
Lateral Coupling	3	0	0.0
Run Coupling	3	9	27.0
			70 linear feet

Length of Force Main = 90 ft of 3" Pipe
Fricton Loss Length of Pipe Equiv. = 70 ft of 3" Pipe
160 ft of 3" Pipe @ 88.02 gpm
Use 88.02 gpm

100 foot length of 3" Pipe = 1.66 foot friction loss(interpolated)
= 160 / 100
= 1.6 correction
1.66 x 1.60 = 2.66 foot friction loss

Design Head =

Static Head	=	8.55	feet
+ Friction Head	=	2.66	feet
+ 2 feet Head @ Distal end of Laterals	=	2	feet
		13.21	feet

REQUIRED PUMP HORSEPOWER CALCULATION

$$= \frac{\text{Flow x Total Dynamic Head x Specific Gravity (Water @ 68degrees = 1)}}{\text{3960 x efficiency}}$$

$$= \frac{88.02 \times 13.21 \times 1}{3960 \times 0.4}$$

$$= \frac{1162.39}{1584}$$

= 0.7338 Min Horsepower Pump Required — USE 3/4 Horsepower Min

Pump Selected or Equal

Gould - Model 3885 WE Series - WE Submersible Effluent Pump
Item # WE 0718 H - 3/4 Horsepower, 208 Volt, 1 Phase
OR EQUAL

Dosing Schedule

$$= \frac{600 \text{ gpd}}{100.7 \text{ Dose}}$$

= 5.96
= 6 Events in 24 hours

Pump Run Time

Comp: $\frac{100.7 \text{ Gallon Dose}}{88.02 \text{ gpm}} \times 6 \text{ Events} = 600 \text{ gallons}$

= 6.8 minutes / day
= 1.1 minutes / dose event

Actual: $\frac{108.0 \text{ Gallon Dose}}{88.02 \text{ gpm}} \times 6 \text{ Events} = 644 \text{ gallons}$

= 7.3 minutes / day
= 1.2 minutes / dose event

inch pipe in the system. Once the total equivalent length of pipe is determined, friction head can be determined. Friction loss (feet) per 100 feet of pipe for a given flow can be found in **Table 4.4**.

TABLE 4.3
ALLOWANCE IN EQUIVALENT LENGTH OF PIPE FOR FRICTION LOSS IN VALVES AND THREADED FITTINGS (ASA A40.8-1955)

Diameter of Fitting	90 Deg. Standard Ell	45 Deg. Standard Ell	90 Deg. Side Tee	Coupling or Str. Run of Tee	Gate Valve	Glove Valve	Angle Valve
Inches	Feet	Feet	Feet	Feet	Feet	Feet	Feet
3/8	1	0.6	1.5	0.3	0.2	8	4
1/2	2	1.2	3	0.6	0.4	15	8
3/4	2.5	1.5	4	0.8	0.5	20	12
1	3	1.8	5	0.9	0.6	25	15
1 1/4	4	2.4	6	1.2	0.8	35	18
1 1/2	5	3	7	1.5	1.0	45	22
2	7	4	10	2	1.3	55	28
2 1/2	8	5	12	2.5	1.6	65	34
3	10	6	15	3	2	80	40
3 1/2	12	7	18	3.6	2.4	100	50
4	14	8	21	4	2.7	125	55
5	17	10	25	5	3.3	140	70
6	20	12	30	6	4	165	80

TABLE 4.4
FRICTION LOSS IN SCHEDULE 40 PLASTIC PIPE, C = 150 (ft / 100 ft)

Flow gpm	Pipe Diameter (In.) 1	1-¼	1-½	2	3	4	6	8	10
1	0.07								
2	0.28	0.07							
3	0.60	0.16	0.07						
4	1.01	0.25	0.12						
5	1.52	0.39	0.18						
6	2.14	0.55	0.25	0.07					
7	2.89	0.76	0.36	0.10					
8	3.63	0.97	0.46	0.14					
9	4.57	1.21	0.58	0.17					
10	5.50	1.46	0.70	0.21					
11		1.77	0.84	0.25					
12		2.09	1.01	0.30					
13		2.42	1.17	0.35					
14		2.74	1.33	0.39					
15		3.06	1.45	0.44	0.07				
16		3.49	1.65	0.50	0.08				
17		3.93	1.86	0.56	0.09				
18		4.37	2.07	0.62	0.10				
19		4.81	2.28	0.68	0.11				
20		5.23	2.46	0.74	0.12				
25			3.75	1.10	0.16				
30			5.22	1.54	0.23				
35				2.05	0.30	0.07			
40				2.62	0.39	0.09			
45				3.27	0.48	0.12			
50				3.98	0.58	0.16			
60					0.81	0.21			
70					1.08	0.28			
80					1.38	0.37			
90					1.73	0.46			
100					2.09	0.55	0.07		
150						1.17	0.16		
200							0.28	0.07	
250							0.41	0.11	
300							0.58	0.16	
350							0.78	0.20	0.07
400							0.99	0.26	0.09
450							1.22	0.32	0.11
500								0.38	0.14
600								0.54	0.18
700								0.72	0.24
800									0.32
900									0.38
1000									0.46

Source: EPA Design Manual

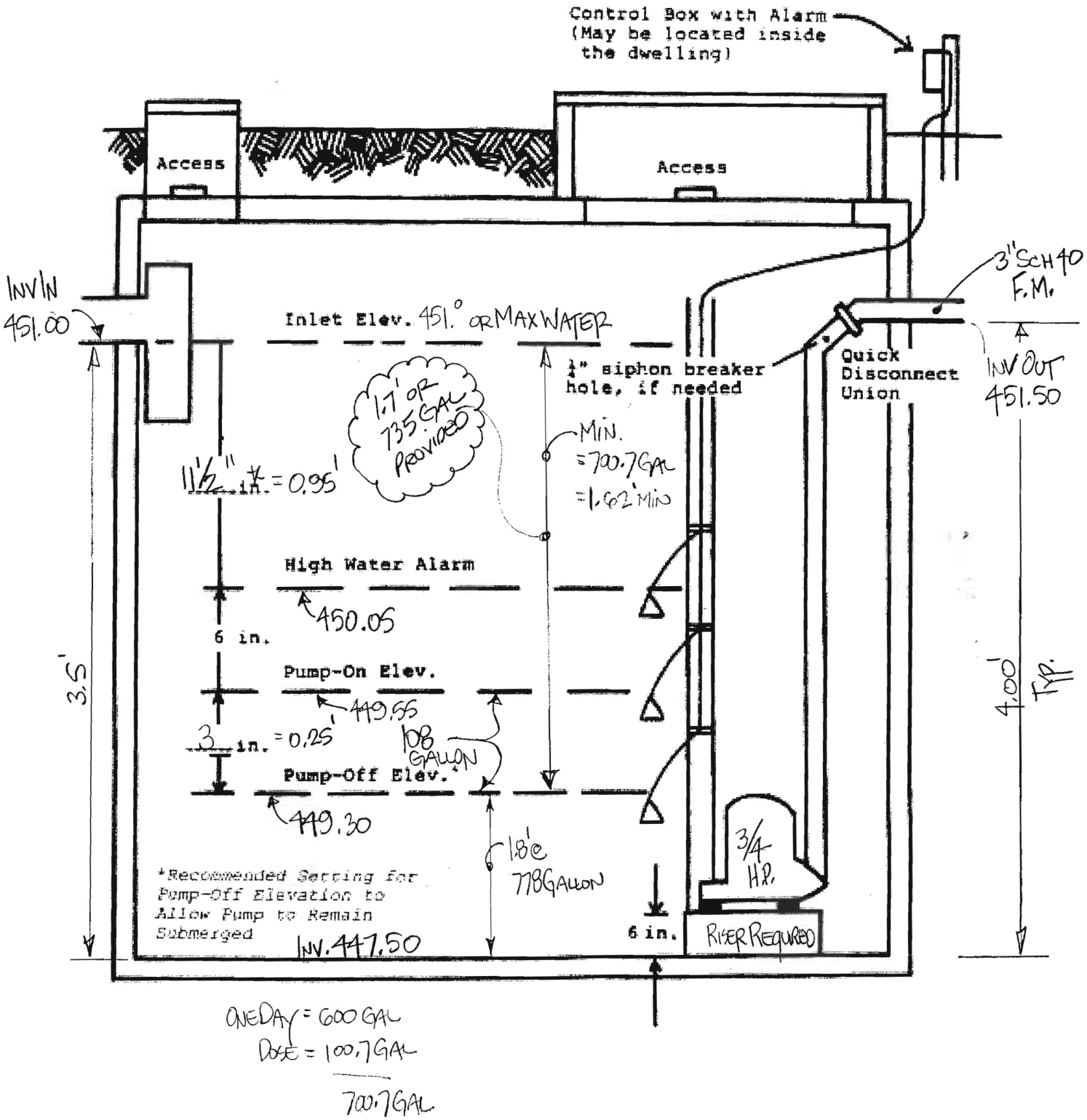
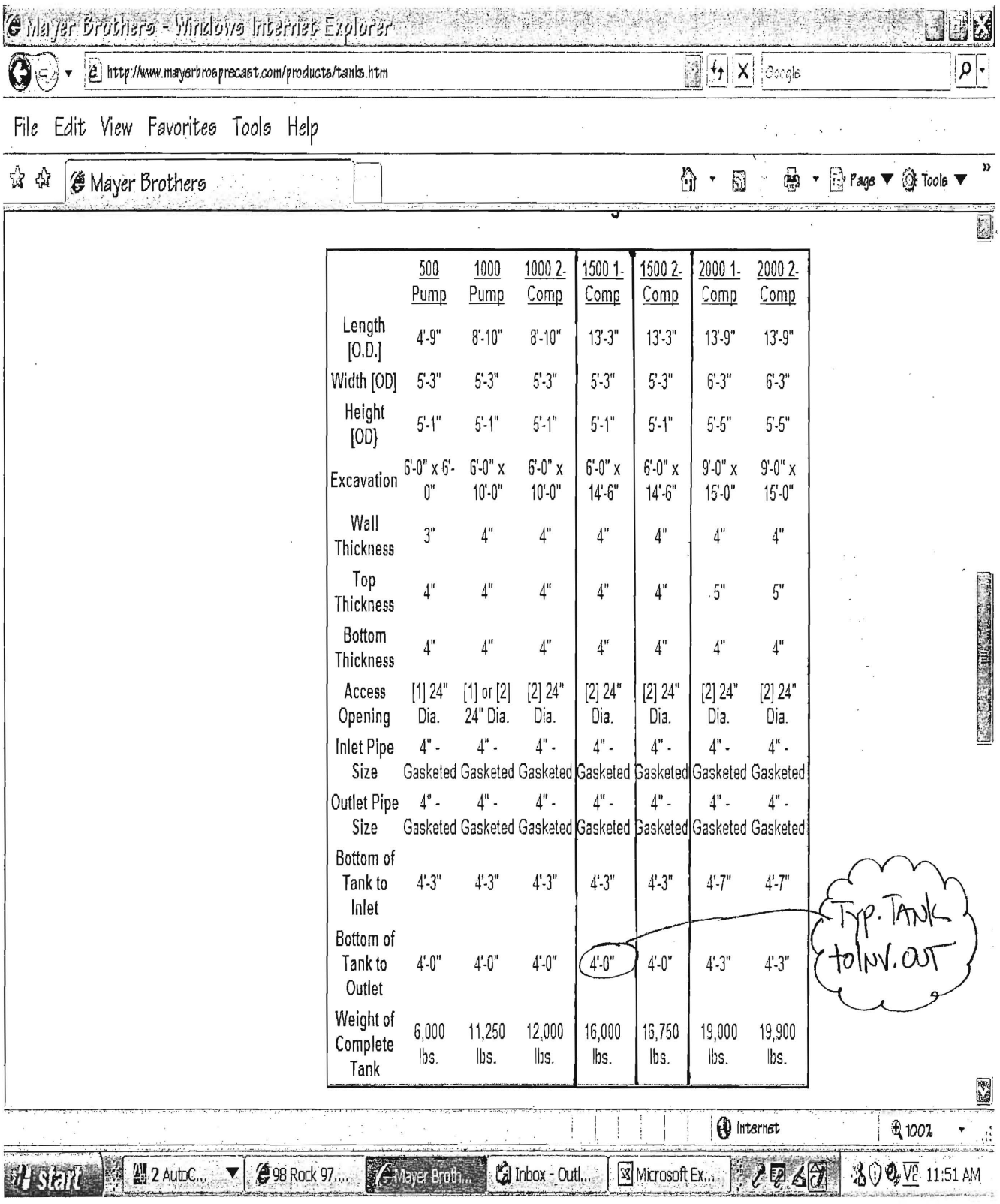


FIGURE 4.6 – TYPICAL PUMP CHAMBER DETAIL

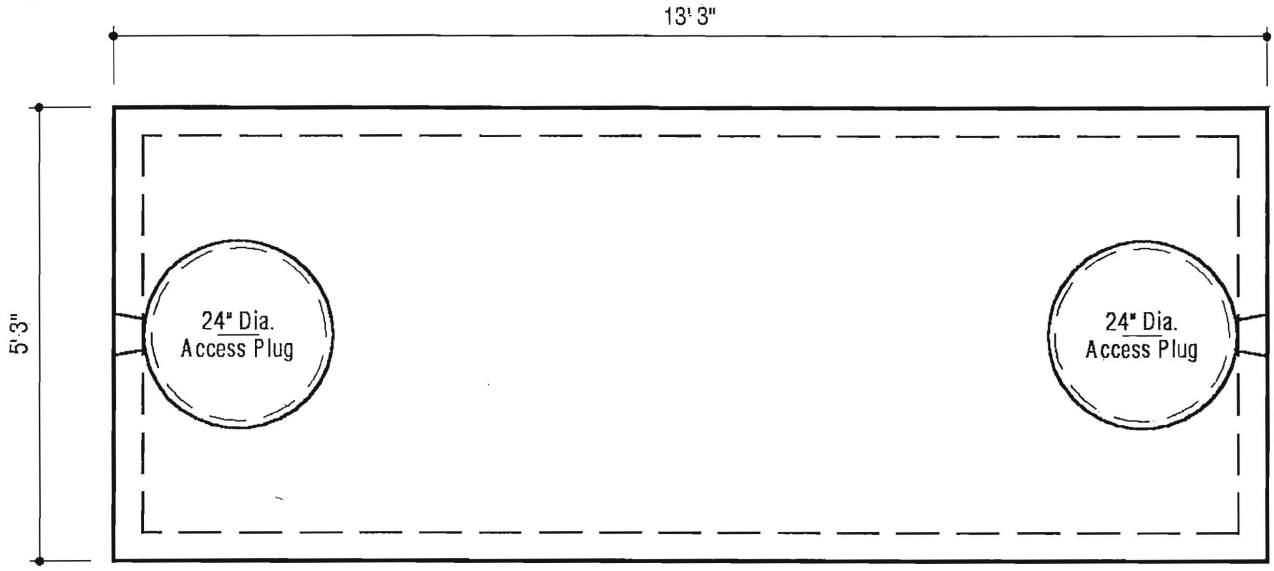
@1,500 GALLON

TYP TANK = 12.59' x 4.59' x 3.50' TYP.
= 202.26 CUFE
= 202.26 X 7.48
= 1512.9 GALLON
@ 432.2 GAL./FT

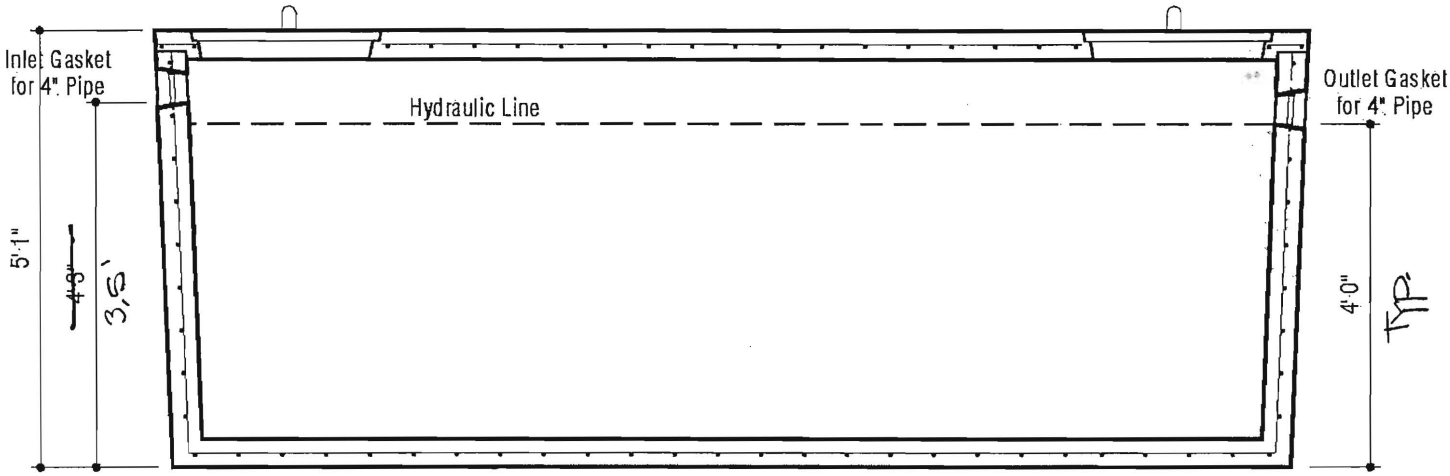


	500 Pump	1000 Pump	1000 2-Comp	1500 1-Comp	1500 2-Comp	2000 1-Comp	2000 2-Comp
Length [O.D.]	4'-9"	8'-10"	8'-10"	13'-3"	13'-3"	13'-9"	13'-9"
Width [OD]	5'-3"	5'-3"	5'-3"	5'-3"	5'-3"	6'-3"	6'-3"
Height [OD}	5'-1"	5'-1"	5'-1"	5'-1"	5'-1"	5'-5"	5'-5"
Excavation	6'-0" x 6'-0"	6'-0" x 10'-0"	6'-0" x 10'-0"	6'-0" x 14'-6"	6'-0" x 14'-6"	9'-0" x 15'-0"	9'-0" x 15'-0"
Wall Thickness	3"	4"	4"	4"	4"	4"	4"
Top Thickness	4"	4"	4"	4"	4"	.5"	5"
Bottom Thickness	4"	4"	4"	4"	4"	4"	4"
Access Opening	[1] 24" Dia.	[1] or [2] 24" Dia.	[2] 24" Dia.	[2] 24" Dia.	[2] 24" Dia.	[2] 24" Dia.	[2] 24" Dia.
Inlet Pipe Size	4" - Gasketed	4" - Gasketed	4" - Gasketed	4" - Gasketed	4" - Gasketed	4" - Gasketed	4" - Gasketed
Outlet Pipe Size	4" - Gasketed	4" - Gasketed	4" - Gasketed	4" - Gasketed	4" - Gasketed	4" - Gasketed	4" - Gasketed
Bottom of Tank to Inlet	4'-3"	4'-3"	4'-3"	4'-3"	4'-3"	4'-7"	4'-7"
Bottom of Tank to Outlet	4'-0"	4'-0"	4'-0"	4'-0"	4'-0"	4'-3"	4'-3"
Weight of Complete Tank	6,000 lbs.	11,250 lbs.	12,000 lbs.	16,000 lbs.	16,750 lbs.	19,000 lbs.	19,900 lbs.

Typ. Tank to Inv. out



PLAN VIEW



SECTION A-A

DESIGN DATA & GENERAL NOTES

[1] Concrete strength f'c=4,000 p.s.i. @ 28 days. Density = 150 pcf.
[2] Cement - Portland Type I/II per ASTM C 150-92.
[3] Admixtures & plasticizers per ASTM C 260-86 & C 494-92.
[4] Reinforcing per ASTM A185. Min. 1-1/2" cover.
[5] Top slab sealed with butyl rope mastic.
[6] 4" wall, base, & top thickness.

MBI
Mayer Bros., Inc.
6264 Race Road
Elkridge, Maryland 21075
Tel. 410.796.1434
Fax. 410.796.1438
www.mayerbrosprecast.com

1,500 GALLON ~~SEPTIC~~/PUMP TANK
1-Compartment

NON-TRAFFIC MAX 3 ft. OF COVER

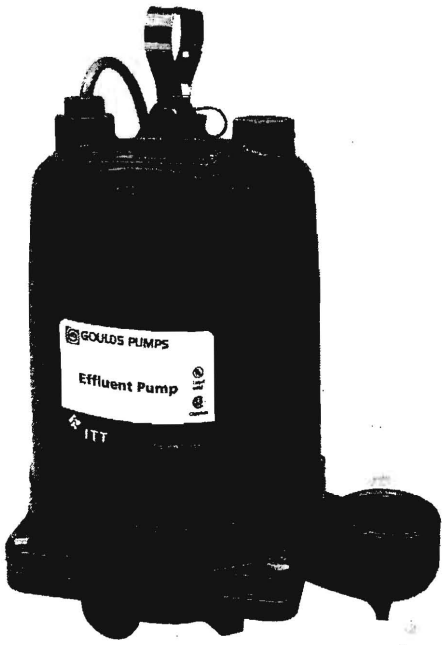
Dwg. No..1500-1C	No Scale	Jan 1, 2000

B3885

GOULDS PUMPS

WE Series Model 3885

Submersible Effluent Pumps



FEATURES

Impeller: Cast iron, semi-open, non-clog with pump-out vanes for mechanical seal protection. Balanced for smooth operation. Silicon bronze impeller available as an option.

Casing: Cast iron volute type for maximum efficiency. 2" NPT discharge.

Mechanical Seal: Silicon Carbide vs. Silicon Carbide sealing faces. Stainless steel metal parts, BUNA-N elastomers.

Shaft: Corrosion-resistant, stainless steel. Threaded design. Locknut on all models to guard against component damage on accidental reverse rotation.

Fasteners: 300 series stainless steel.

Capable of running dry without damage to components.

Designed for continuous operation when fully submerged.

EXTENDED WARRANTY AVAILABLE FOR RESIDENTIAL APPLICATIONS.

APPLICATIONS

Specifically designed for the following uses:

- Homes, Farms, Trailer Courts, Motels, Schools, Hospitals, Industry, Effluent Systems

SPECIFICATIONS

Pump

- Solids handling capabilities: ¾" maximum.
- Discharge size: 2" NPT.
- Capacities: up to 140 GPM.
- Total heads: up to 128 feet TDH.
- Temperature:
  104°F (40°C) continuous, 140°F (60°C) intermittent.
- See order numbers on reverse side for specific HP, voltage, phase and RPM's available.

MOTORS

- Fully submerged in high-grade turbine oil for lubrication and efficient heat transfer.
- Class B insulation on ⅓ – 1½ HP models.
- Class F insulation on 2 HP models.

Single phase (60 Hz):

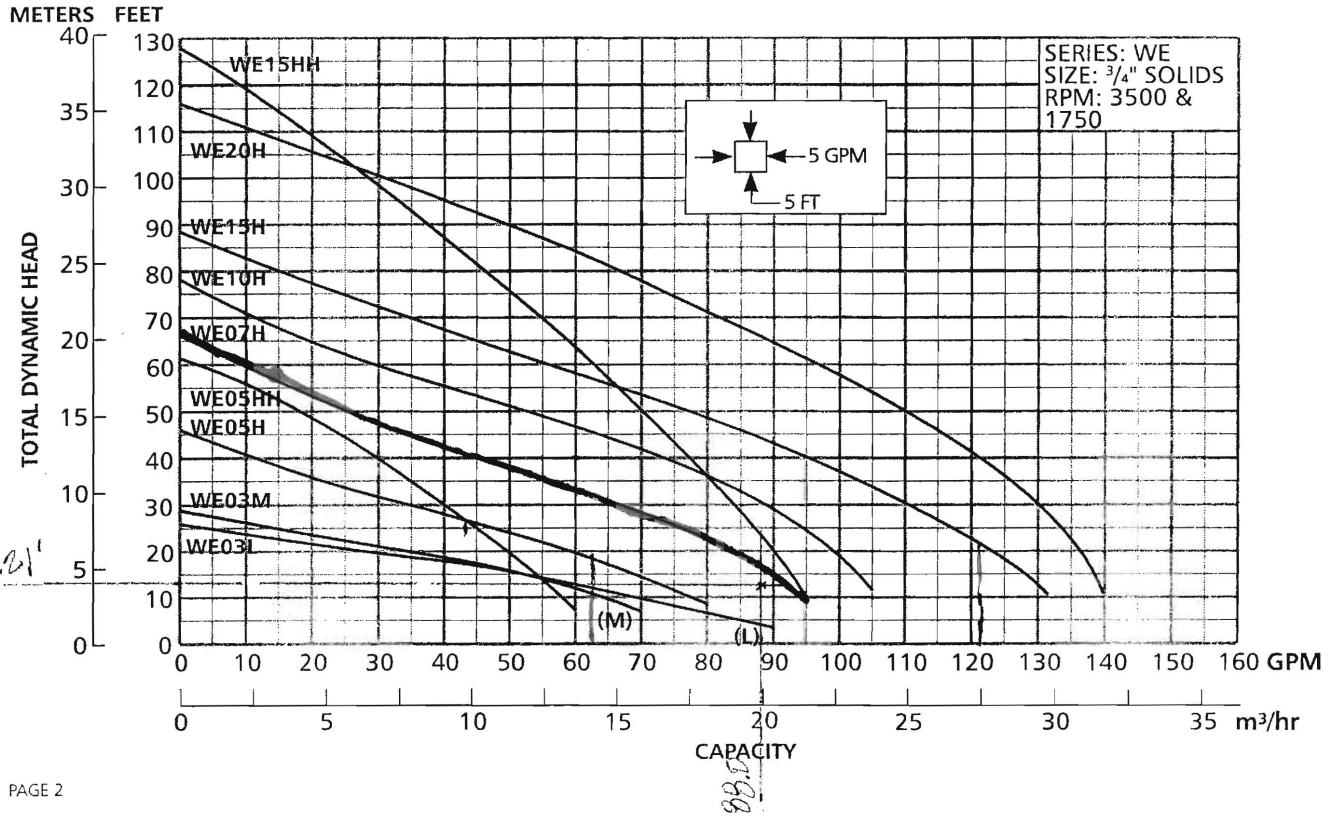
- Capacitor start motors for maximum starting torque.
- Built-in overload with automatic reset.
- SJTOW or STOW severe duty oil and water resistant power cords.
- ⅓ – 1 HP models have NEMA three prong grounding plugs.
- 1½ HP and larger units have bare lead cord ends.

Three phase (60 Hz):

- Class 10 overload protection must be provided in separately ordered starter unit.
- STOW power cords all have bare lead cord ends.
- **Designed for Continuous Operation:** Pump ratings are within the motor manufacturer's recommended working limits, can be operated continuously without damage when fully submerged.
- **Bearings:** Upper and lower heavy duty ball bearing construction.
- **Power Cable:** Severe duty rated, oil and water resistant. Epoxy seal on motor end provides secondary moisture barrier in case of outer jacket damage and to prevent oil wicking. Standard cord is 20'. Optional lengths are available.
- **O-ring:** Assures positive sealing against contaminants and oil leakage.

AGENCY LISTINGS

Tested to UL 778 and CSA 22.2 108 Standards
By Canadian Standards Association File #LR38549



MODELS

Order Number	HP	Phase	Volts	RPM	Impeller Diameter (in.)	Maximum Amps	Locked Rotor Amps	KVA Code	Full Load Efficiency %	Resistance		Power Cable Size	Weight (lbs.)
										Start	Line-Line		
WE0311L	0.33	1	115	1750	5.38	10.7	30.0	M	54	11.9	1.7	16/3	56
WE0318L			208			6.8	19.5	K	51	9.1	4.2		
WE0312L			230			4.9	14.1	L	53	14.5	8.0		
WE0311M			115			10.7	30.0	M	54	11.9	1.7		
WE0318M			208			6.8	19.5	K	51	9.1	4.2		
WE0312M			230			4.9	14.1	L	53	14.5	8.0		
WE0511H	0.5	1	115	3450	3.56	14.5	46.0	M	54	7.5	1.0	14/3	60
WE0518H			208			8.1	31.0	K	68	9.7	2.4	16/3	60
WE0512H			230			7.3	34.5	M	53	9.6	4.0		
WE0538H		3	200			4.9	22.6	R	68	NA	3.8	14/4	60
WE0532H			230			3.3	18.8	R	70	NA	5.8		
WE0534H			460			1.7	9.4	R	70	NA	23.2		
WE0537H			575			1.4	7.5	R	62	NA	35.3		
WE0511HH		1	115		3.88	14.5	46.0	M	54	7.5	1.0	14/3	60
WE0518HH			208			8.1	31.0	K	68	9.7	2.4	16/3	60
WE0512HH			230			7.3	34.5	M	53	9.6	4.0		
WE0538HH		3	200			4.9	22.6	R	68	NA	3.8	14/4	60
WE0532HH			230			3.6	18.8	R	70	NA	5.8		
WE0534HH			460			1.8	9.4	R	70	NA	23.2		
WE0537HH			575			1.5	7.5	R	62	NA	35.3		
WE0718H	0.75	1	208		4.06	11.0	31.0	K	68	9.7	2.4	14/3	70
WE0712H			230			10.0	27.5	J	65	12.2	2.7		
WE0738H		3	200			6.2	20.6	L	64	NA	5.7	14/4	70
WE0732H			230			5.4	15.7	K	68	NA	8.6		
WE0734H			460			2.7	7.9	K	68	NA	34.2		
WE0737H			575			2.2	9.9	L	78	NA	26.5		
WE1018H	1	1	208		4.44	14.0	59.0	K	68	9.3	1.1	14/3	70
WE1012H			230			12.5	36.2	J	69	10.3	2.1		
WE1038H		3	200			8.1	37.6	M	77	NA	2.7	14/4	70
WE1032H			230			7.0	24.1	L	79	NA	4.1		
WE1034H			460			3.5	12.1	L	79	NA	16.2		
WE1037H			575			2.8	9.9	L	78	NA	26.5		
WE1518H	1.5	1	208		4.56	17.5	59.0	K	68	9.3	1.1	14/3	80
WE1512H			230			15.7	50.0	H	68	11.3	1.6		
WE1538H		3	200			10.6	40.6	K	79	NA	1.9	14/4	80
WE1532H			230			9.2	31.7	K	78	NA	2.9		
WE1534H			460			4.6	15.9	K	78	NA	11.4		
WE1537H			575			3.7	13.1	K	75	NA	16.9		
WE1518HH		1	208		5.50	17.5	59.0	K	68	9.3	1.1	14/3	80
WE1512HH			230			15.7	50.0	H	68	11.3	1.6		
WE1538HH		3	200			10.6	40.6	K	79	NA	1.9	14/4	80
WE1532HH			230			9.2	31.7	K	78	NA	2.9		
WE1534HH			460			4.6	15.9	K	78	NA	11.4		
WE1537HH			575			3.7	13.1	K	75	NA	16.9		
WE2012H	2	1	230		5.38	18.0	49.6	F	78	3.2	1.2	14/3	83
WE2038H		3	200			12.0	42.4	K	78	NA	1.7	14/4	83
WE2032H			230			11.6	42.4	K	78	NA	1.7		
WE2034H			460			5.8	21.2	K	78	NA	6.6		
WE2037H			575			4.7	16.3	L	78	NA	10.5		

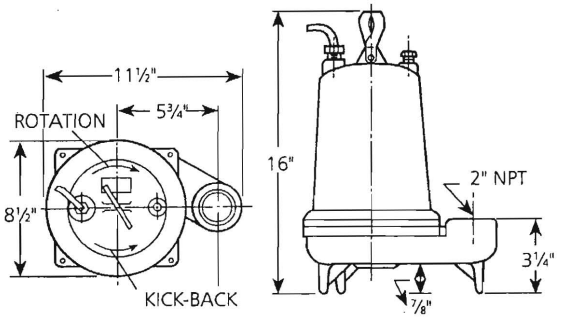
GOULDS PUMPS

PERFORMANCE RATINGS (gallons per minute)

Order No.		WE03L	WE03M	WE05H	WE07H	WE10H	WE15H	WE05HH	WE15HH	WE20H
	HP	⅓	⅓	½	¾	1	1½	½	1½	2
	RPM	1750	1750	3500	3500	3500	3500	3500	3500	3500
Total Head Feet of Water	5	86	–	–	–	–	–	–	–	–
	10	70	63	78	94	–	–	58	95	–
	15	52	52	70	90	103	128	53	93	138
	20	27	35	60	83	98	123	49	90	136
	25	5	15	48	76	94	117	45	87	133
	30	–	–	35	67	88	110	40	83	130
	35	–	–	22	57	82	103	35	80	126
	40	–	–	–	45	74	95	30	77	121
	45	–	–	–	35	64	86	25	74	116
	50	–	–	–	25	53	77	–	70	110
	55	–	–	–	–	40	67	–	66	103
	60	–	–	–	–	30	56	–	63	96
	65	–	–	–	–	20	45	–	58	89
	70	–	–	–	–	–	35	–	55	81
	75	–	–	–	–	–	25	–	51	74
	80	–	–	–	–	–	–	–	47	66
	90	–	–	–	–	–	–	–	37	49
	100	–	–	–	–	–	–	–	28	30

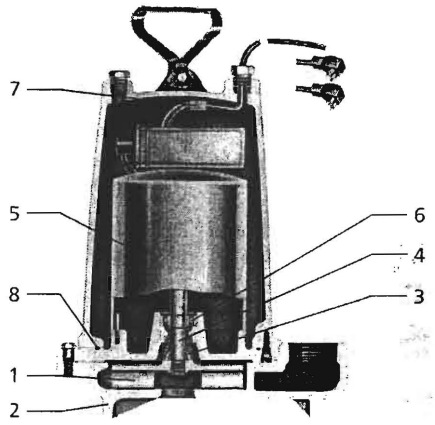
DIMENSIONS

(All dimensions are in inches. Do not use for construction purposes.)



COMPONENTS

Item No.	Description
1	Impeller
2	Casing
3	Mechanical Seal
4	Motor Shaft
5	Motor
6	Ball Bearings
7	Power Cable
8	Casing O-Ring



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Construction Procedures

Amended per May 4, 2010 Memo from MDE

SECTION FIVE
CONSTRUCTION PROCEDURES

And amended per 5/2010 MDE Memo - Sand Mound Guidance

5.1 GENERAL

Proper construction is extremely important if the sand mound is to function as designed. Installation of a sand mound system is prohibited when soils are frozen. Construction of the mound should not occur if the soil is wet. Compaction and puddling of the soil in the location of the mound and downslope should be avoided. Soil is too wet for construction of the mound if a sample, taken anywhere within the uppermost eight inches, when rolled between the hands forms a wire. If the sample crumbles, the soil is dry enough for construction to proceed.

5.2 EQUIPMENT

The following special equipment is recommended:

1. A small track-type tractor with blade for placing and spreading the sand fill.
2. A cordless drill for drilling holes in the pipe on-site.
3. A moldboard or chisel plow for plowing the soil within the perimeter of the mound. A rototiller may only be used on structureless soils with USDA sand textures.
4. A rod and level for determining bed elevations, slope on pipes, outlet elevation of septic tank, slope of site, etc.

5.3 MATERTALS

The following specifications are required:

1. Sand Specification: per MDE - 5/2010 Memo - Sand Mound Guidance

This design utilizes the use of alternative sand media,

A material certification and recent sieve analysis must be provided with the proposed sand. The specification for alternative sand includes allowable sample percentages for fine particles less than 0.053 mm and coarse particles greater than 2 mm. A sand mound constructed in Maryland utilizing the alternative sand specification and meeting the requirements of the 2003 "Alternative Sand for Mounds" memo, is:

- Classified as an alternative (non-conventional) onsite sewage disposal system;
- Required to utilize a bed loading rate of 1.0 gpd/ft2 or less. When using this bed loading rate, the bed width will equal the linear loading rate. Beds as long and narrow as possible are preferred.
- Required to have properly constructed observation ports installed so that causes of malfunctions can be easily assessed; and,

2. Bed Aggregate: per MDE - 5/2010 Memo - Sand Mound Guidance

The bed aggregate shall between 3/4 and 2 inches in diameter and be free of fines. The Mound Manual states that crushed limestone should not be used, however dolomitic limestone with sufficient magnesium content to give the rock a hardness greater than 4 on the Moh's scale may be allowed if it is also free of fines. Prior to its use, review of professional industry certification of its hardness is required and this is the responsibility of the approving authority. Allowing poor quality bed aggregate to be used can result in premature clogging of the sand/gravel interface and limit repair options to removal and replacement of the gravel and the clogged sand interface. Advanced pretreatment units have been successfully employed to remediate systems that have been determined to have biological clogging and not clogging due to fines.

3. Geotextile fabric shall be of a type approved by the Approving Authority.

4. Cap Material shall be soil relatively free of coarse fragments and preferably a loam, silt loam or finer texture.

Cap Material: per MDE - 5/2010 Memo - Sand Mound Guidance

In Section 5.7.1 (Page 54) of the Mound Manual, we specify the use of a "finer textured soil material such as sandy clay loam, clay loam, silt loam or loam on top of the fabric over the bed" **At this time our recommendation is to not encourage the use of a clay, sandy clay loam or clay loam cap.** We prefer the use of more loamy textured soils, including non-clayey sub-soils. Experience has shown that clogging of the bed can be slowed if oxygen transfer into the bed is enhanced. The use of a silt loam or loamy cap seems to optimize that transfer while at the same time having some moisture storing capacity to promote vegetative growth. Cap material shall be soil relatively free of coarse fragments.

5.4 TANK INSTALLATION AND SITE PREPARATION

5.4.1 Locate and rope-off the entire sewage disposal area to prevent damage to the area during other construction activity on the site. Vehicular traffic over the disposal area should be prohibited to avoid soil compaction.

5.4.2 Install septic tank(s) and pumping chamber(s) and pump as shown on the drawings. Access risers should terminate 6 inches above finished grade. **Call for inspection.**

5.4.3 Stake out the initial and recovery mound perimeters in their proper orientation as shown in the drawings. Reference stakes offset from the mound corner stakes are recommended. Locate the upslope edge of the absorption bed within the mound and determine the ground elevation at the highest location. Reference this elevation to a benchmark for future use. This is necessary to determine the bottom elevation of the absorption bed.

5.4.4 Excess vegetation should be cut and removed. Trees should be cut at ground level and stumps left in place.

5.4.5 Determine the location where the force main from the pumping chamber will connect to the distribution network manifold within the mound.

5.4.6 Install the force main from the pumping chamber to the proper location within the mound. Pipe should be laid with uniform slope back to the chamber so that it drains after dosing. Cut and stub off pipe one foot below existing grade within the proposed perimeter of the initial mound. Backfill trench and compact to prevent seepage along the trench.

5.4.7 Plow the soil within the perimeter of the mound to a depth of about eight inches, if the soil is not too wet. Moldboard or chisel plows may be used. Plowing should be done along the contour, throwing soil upslope when using a two bottom or larger Moldboard plow. In wooded areas with stumps, roughening the surface to a depth of four to six inches with backhoe teeth with extensions may be satisfactory. However, all work should be done from the upslope or sides of the mound if at all possible. Rototilling may be used only on soils with USDA textures of sand. After plowing, all foot and vehicular traffic shall be kept off the plowed area.

5.5 FILL PLACEMENT

5.5.1 Relocate and extend the force main several feet above the ground surface.

5.5.2 Place the approved sand fill material on the upslope edge(s) of the plowed area. Keep delivery trucks off the plowed area. Minimize traffic on the downslope side. Fill should be placed and spread immediately after plowing. Move the fill material into place using a small track-type tractor with a blade. Work from the end and upslope side. Always keep a minimum of six inches of material beneath the tracks of the tractor to minimize compaction of the natural soil. The fill material should be worked in this manner until the height of the fill reaches the elevation of the top of the absorption bed.

5.5.3 With the blade of the tractor, form the absorption bed. Hand level the bottom of the bed and check it for proper elevation. The bed should be level for proper functioning of the mound. **Call for inspection.**

5.5.4 Shape the sides of the sand fill to design slope (i.e., 3:1 or flatter).

Also required:

Observation Ports: per MDE - 5/2010 Memo - Sand Mound Guidance (See Details herein)

The location of the observation ports within the sand mound can be found on page 14 of the Sand Mound Design and Construction Manual (Figure 3.1). Options for properly anchoring the observation ports in the bed (OP1) can be found in the document called *"Wisconsin Mound Soil Absorption System: SITING, DESIGN AND CONSTR UCTION MANUAL" by Jerry Tyler and James Converse* at: http://www.soils.wisc.edu/sswmp/SSWMP 15.24.pdf on Page 18.

5.6 BED AND DISTRIBUTION NETWORK

5.6.1 Carefully place the coarse aggregate in the bed. Do not create ruts in the bottom of the bed. Level the aggregate to a minimum depth of six inches.

5.6.2 The distribution network is assembled in place setting the manifold to ensure draining the laterals between doses. The laterals should be laid level with the holes directed downward. **Call for inspection.** Test the pumping chamber and distribution network with clean water.

Also required:

Lateral Turn ups: per MDE - 5/2010 Memo - Sand Mound Guidance (See Details herein)

MDE recommends that all distribution system laterals be constructed with accessible, protected turn ups. This applies to distribution networks in systems such as sand mounds, subsurface LPDs, pressure dosed beds, and at-grade mounds. Each turn up should be cut off at, or slightly below grade and sleeved in a larger diameter pipe (SCH 40 PVC or equivalent) fitted with a screw cap for inspection and routine maintenance access. The installation of these serves three purposes:

- It makes the mound more aesthetically pleasing to the property owner;
- It prevents damage to the turn ups from lawnmowers and other equipment; and,
- It provides a way to properly flush the laterals while ensuring that the effluent doesn't flow across the land surface and has a way to travel back into the aggregate.

Lateral head pressure should be monitored on a regular basis by the homeowner, and laterals should be flushed whenever a significant increase in distal head pressure is observed.

5.6.3 Place additional aggregate to a depth of at least two inches over the crown of the pipe.

5.6.4 Place the approved geotextile fabric over the aggregate bed. The fabric may extend beyond the bed over the sand fill.

5.7 COVER MATERIAL

5.7.1 Place a finer textured soil material such as silt loam or loam on top of the fabric over the bed. The minimum depth of this cap shall be six inches at the outer edges of the bed and 12 inches along the center.

Cap Material: per MDE - 5/2010 Memo - Sand Mound Guidance

In Section 5.7.1 (Page 54) of the Mound Manual, we specify the use of a "finer textured soil material such as sandy clay loam, clay loam, silt loam or loam on top of the fabric over the bed" **At this time our recommendation is to not encourage the use of a clay, sandy clay loam or clay loam cap.** We prefer the use of more loamy textured soils, including non-clayey sub-soils. Experience has shown that clogging of the bed can be slowed if oxygen transfer into the bed is enhanced. The use of a silt loam or loamy cap seems to optimize that transfer while at the same time having some moisture storing capacity to promote vegetative growth. Cap material shall be soil relatively free of coarse fragments.

5.7.2 Place a minimum of six inches of good quality topsoil over the entire mound surface including sideslopes. **Call for final inspection.**

5.8 VEGETATION

5.8.1 Fertilize, lime, seed and mulch the entire surface of the mound. Grass mixtures adapted to the area should be used.

5.8.2 Consult the county extension agent or Soil Conservation Service for recommendations.

General Recommendations: per MDE - 5/2010 Memo - Sand Mound Guidance

We offer the following in addition to the above guidance:

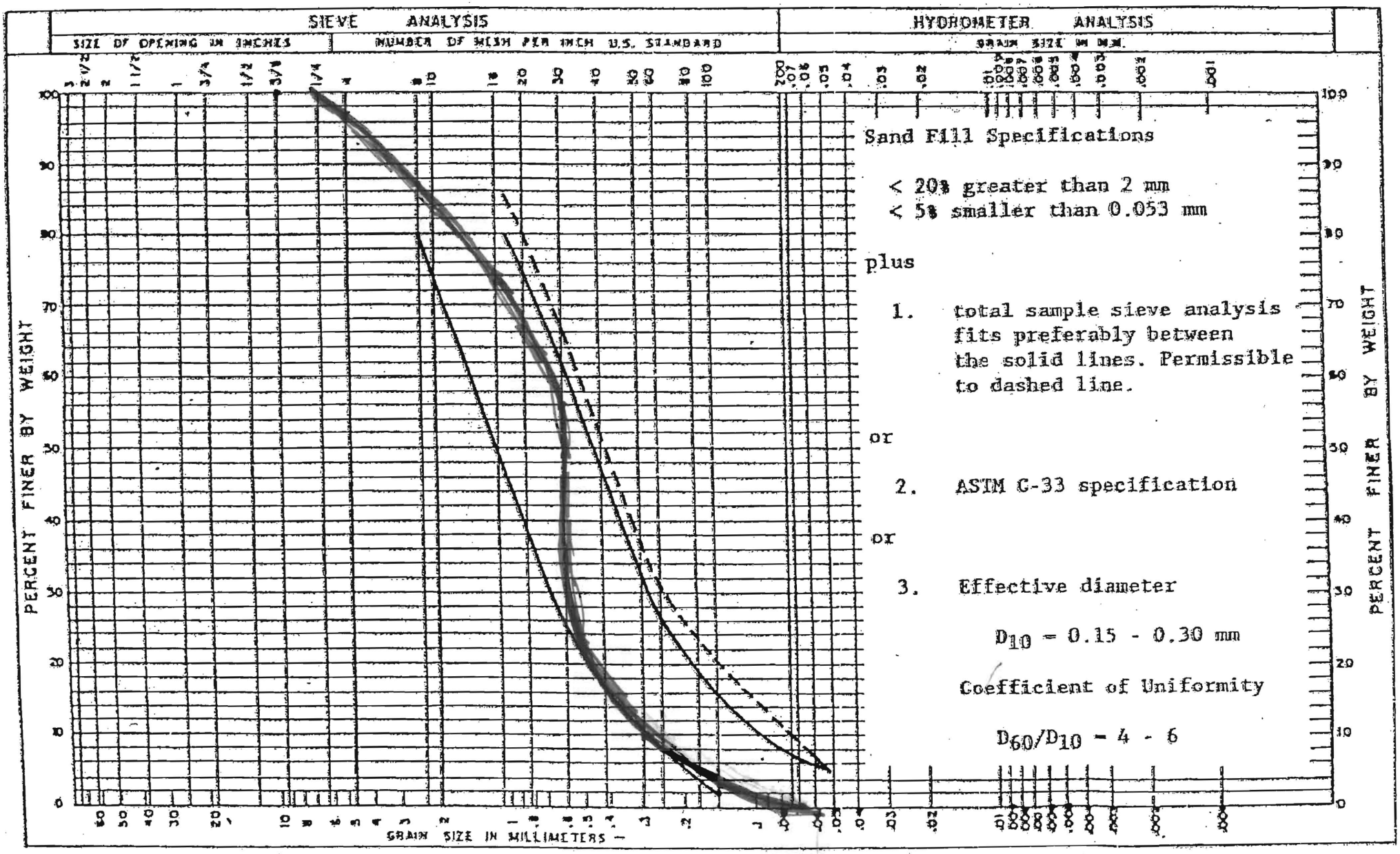
- Require the installation and proper maintenance of an effluent filter in the final chamber of the multi—compartment septic tank, unless the mound is served by an advanced pretreatment unit; and
- Use the inspection checklist provided on page 57 of the Mound Manual to determine that all aspects of the mound construction are done correctly.

MDE continues to encourage the use of sand mound systems. They have proven to be an effective means of treatment and dispersal to overcome certain site limitations that prohibit the use of conventional trench sewage disposal systems. Please contact your Regional Consultant with any questions.

Reference

Design and Construction Manual for Sand Mound Systems; June 2003 (4th Edition); State of Maryland - Department of the Environment - Water Management Administration, On-site Systems Division.

Sand Mound Guidance Memo; May 2010; State of Maryland - Department of the Environment - Water Management Administration, To: All Local Approving Authorities and Environmental Health Directors.


SIEVE ANALYSIS
SIZE OF OPENING IN INCHES
NUMBER OF MESH PER INCH U.S. STANDARD
HYDROMETER ANALYSIS
GRAIN SIZE IN MM.
PERCENT FINER BY WEIGHT
GRAIN SIZE IN MILLIMETERS
Sand Fill Specifications
< 20% greater than 2 mm
< 5% smaller than 0.053 mm
plus
1. total sample sieve analysis fits preferably between the solid lines. Permissible to dashed line.
or
2. ASTM C-33 specification
or
3. Effective diameter
D_{10} = 0.15 - 0.30 mm
Coefficient of Uniformity
D_{60}/D_{10} = 4 - 6

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August 5, 2011

Howard County Health Department
Bureau of Environmental Health
7178 Columbia Gateway Drive
Columbia, MD 21046

Attn: Mr. Brian Baker

Re: Material Certification
COMAR - Sand Mound Sand

Gentlemen:

This letter certifies that the COMAR - Sand Mound Sand (processed and washed Concrete Sand), shipped by S.W. Barrick & Sons through our Woodsboro facility, meets the material specifications for ASTM C-33, the Maryland Department of Transportation - State Highway Administration - Standard Specifications For Construction And Materials - Section 901, and the requirements for the Sand in Sand Mounds in Maryland in accordance with Sand Specifications from COMAR 26.04.02.05 Q (1).

The following sieve analysis is an average gradation of our COMAR Sand Mound Sand.

Sieve Size	Percent Passing	ASTM C-33 Specifications
3/8"	100.0	100
No. 4	97.4	95-100
No. 8	87.2	80-100
No. 16	73.3	50-85
No. 30	56.4	25-60
No. 50	10.0	5-30
No. 100	3.4	0-10
No. 200	0.6	

Uniformity Coefficient (CU) = 2.26
Effective Size = 0.31mm

Note: Specifications for CU (less than or equal to 3.50) and Effective Size (0.25 – 0.50 mm) are presented in COMAR 26.04.02.05 Q (4) (L).

Thank you for your interest in our products. If you have any questions or require additional information, please contact the lab at 301-845-6302, or Jerry Blank at 301-845-6341.

Sincerely,

David Olson

David Olson
Quality Control Manager