FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE____________, FIELD EVALUATION DATE______________
PROPERTY OWNER:_______________________________ PHONE______________
ADDRESS:____________________ CITY,STATE,ZIP:______________________
LEGAL DESCRIPTION:____
PIN#____________________ SEC____ T_____ R____ TWP NAME____________
FIRE#________ LAKE/RIVER________________ LAKE CLASS________ OHWL______FT.

DESCRIPTION OF SOIL TREATMENT AREAS

	AREA #1	**AREA #2**
DISTURBED AREAS	YES___NO___	YES___NO___
COMPACTED AREAS	YES___NO___	YES___NO___
FLOODING	YES___NO___	YES___NO___
RUN ON POTENTIAL	YES___NO___	YES___NO___
SLOPE %	______	______
DIRECTION OF SLOPE	______	______
LANDSCAPE POSITION	______________	______________
VEGETATION TYPES	______________	______________

REFERENCE BM ELEV.________FT.
REFERENCE BM DESCRIPTION___
____
____
____
____

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1_____, 1A_____, 2_____,2A______

BOTTOM ELEVATION--FIRST TRENCH OR BOTTOM OF ROCK BED: #1______FT., #2_____FT.

SOIL SIZING FACTOR: SITE # 1______________, SITE #2________________

CONSTRUCTION RELATED ISSUES:____

LIC#________________ SITE EVALUATOR SIGNATURE:______________________

SITE EVALUATOR NAME:___________________________ TELEPHONE#______________

LUG REVIEW_____________________________________ DATE______________

Comments:____
____
____
____
____

SOIL BORING LOGS ON REVERSE SIDE

Form des 2/20/98

SOILS CHARTS FOR BOTH PROPOSED AND ALTERNATE SITES

1 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

2 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

1 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

2 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

ADDITIONAL SOIL BORINGS MAY BE REQUIRED

TRENCH AND BED WORKSHEET

1. AVERAGE DESIGN FLOW

A. Estimated ________________ gpd *(see figure A-1)*
or measured ___x 1.5 *(safety factor)* =___ gpd
B. Septic tank capacity _________ gal *(see figure C-1)*

2. SOILS *(Site evaluation data)*

C. Depth to restricting layer =_________ ft
D. Max depth of system Item 2C - 3 ft = ______ ft - 3 ft = _______ ft
E. Texture ___________Percolation rate _________ MPI
F. Soil Sizing Factor (SSF)_______sqft/gpd *(see figure D-15)*
G. % Land Slope ___________%

3. TRENCH or BED BOTTOM AREA

H. For trenches with 6 inches of rock below the pipe:
A x F = _______gpd x _______sqft/gpd = ______ sqft
I. For trenches with 12 inches of rock below the pipe:
A x F x 0.8 = ______gpd x _______sqft/gpd x 0.8 = _______ sqft
J. For trenches with 18 inches of rock below the pipe:
A x F x 0.66 = _______gpd x _______sqft/gpd x 0.66 =_______ sqft
K. For trenches with 24 inches of rock below the pipe:
A x F x 0.6 = _______gpd x _______sqft/gpd x 0.6 = _______ sqft
L. For gravity beds with 6 or 12 inches of rock below the pipe;
1.5 x A x F = 1.5 x ____gpd x ___sqft/gpd = ____ sqft
For pressure beds with 6 or 12 inches of rock below the pipe;
A x F =____gpd x___sqft/gpd = _______sqft

4. DISTRIBUTION *(Check all that apply)*

____ Bed (< 6% slope) ____ Drop boxes (any slope) ______ Rock
____ Trenches ____ Distribution box (< 3%) ______ Chamber
____ Pressure ____ Gravity ______ Gravelless

5. SYSTEM WIDTH, LENGTH and VOLUME

M. Select trench width = _________ ft
N. If using rock, divide bottom area by width: (H, I, J,K or L) ÷ M =
________sqft ÷______ft= ______ lineal feet
Rock depth below distribution pipe plus 0.5 foot times bottom area:
Rock depth in feet + 0.5 feet x Area (H,I,J,K, or L)
(____ft + 0.5 ft) x _____sqft =_______cuft
Volume in cubic yards = cuft ÷27
__________cuft ÷ 27 = ________cuyds
Weight of rock in tons = cubic yds x 1.4
__________cuyds x 1.4 = _______tons
O. If using 10" Gravelless Pipe, Flow (A) x Gravelless SSF*(see figure D-9)*
_______gpd x ____lineal feet/gpd = ______ lineal feet
P. If using Chambers, H,I,J, or K(based on hieght of chamber slats) ÷ width of chamber in feet(M)
________sqft ÷ ________ft= _______ lineal ft

6. LAWN AREA

Q. Select trench spacing, center to center = ____ feet
R. Multiply trench spacing by lineal feet R x Q = sqft of lawn area
_______ft x ______ft = _______ sqft

7. Include a drawing with scale (one inch = _________ft). Show pertinent boundaries, right of way, easements, location of house, garage, driveway, all other imporvements, existing or proposed soil treatment system, well and dimensions of all elevations, setbacks and separation distances.

I hereby certify that I have completed this work in accordance with applicable ordinances, rules and laws.

______________________________(signature) ______________(license #) ______________(date)

A-1: Estimated Sewage Flows in Gallons per Day

number of bedrooms	Class I	Class II	Class III	Class IV
2	300	225	180	60%
3	450	300	218	of the
4	600	375	256	values
5	750	450	294	in the
6	900	525	332	Class I,
7	1050	600	370	II, or III
8	1200	675	408	columns.

C-1: Septic Tank Capacities (in gallons)

Number of Bedrooms	Minimum Liquid Capacity	Liquid capacity with garbage disposal	Liquid capacity with disposal& lift inside
2 or less	750	1125	1500
3 or 4	1000	1500	2000
5 or 6	1500	2250	3000
7, 8 or 9	2000	3000	4000

D-15: Soil Characteristics and Soil Sizing Factor (SSF) (> 3' separation)

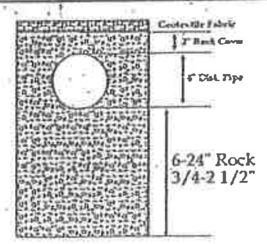
Percolation Rate minutes per inch (mpi)	Soil Texture	Soil Sizing Factor square feet/gallon per day(sqft/gpd)
faster than 0.1*	Coarse sand	0.83
0.1 to 5*	Medium sand	0.83
	Loamy sand	
0.1 to 5**	Fine sand	1.67
6 to 15	Sandy loam	1.27
16 to 30	Loam	1.67
31 to 45	Silt loam	2.00
	Silt	
46 to 60	Clay loam	2.20
	Sandy clay	
	Silty clay	
over 61 to 120***	Clay	4.20
	Sandy clay	
	Silty clay	
slower than 120****		

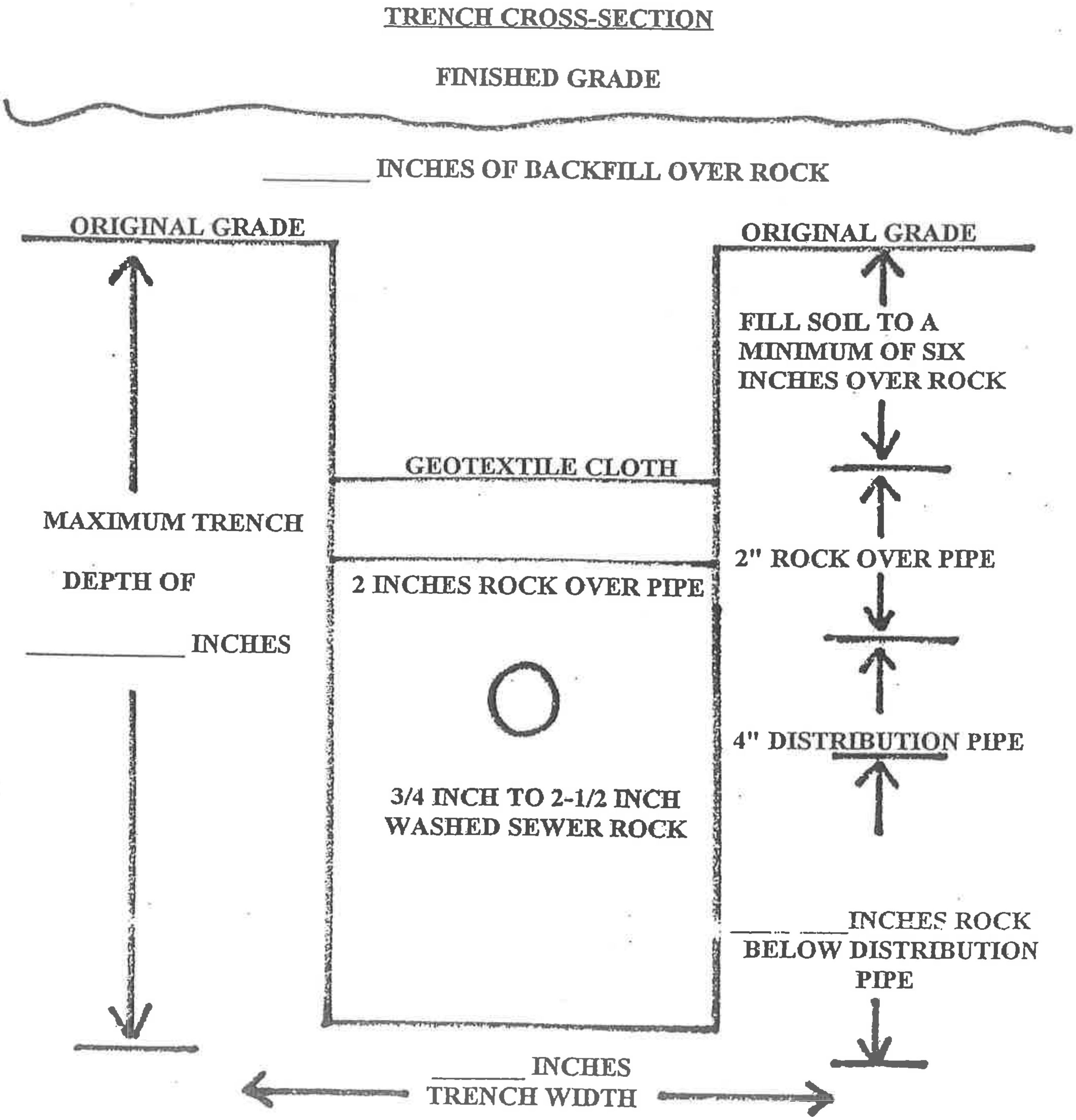
*Use systems for rapidly permeable soils: pressure distribution or serial distribution with no trench >25% of the total system.
**Soil having 50% or more fine sand plus very fine sand.
***A mound must be used.
****An other or performance system must be used

D-9: Soil Characteristics and Soil sizing factors (SSF) for Gravelless Pipe

percolation rate (minutes/inch)	soil texture	lineal feet/ gallon/day
Faster than 0.1 *	Coarse Sand	—
0.1 to 5	Medium Sand	0.28
	Loamy Sand	
0.1 to 5	Fine Sand **	0.6
6 to 15	Sandy Loam	0.42
16 to 30	Loam	0.56
31 to 45	Silt Loam	0.67
	Silt	
46 to 60	Clay Loam (CL)	0.74
	Sandy CL	
	Silty CL	
slower than 60***	Clay	—
	Sandy Clay	
	Silty Clay	

*Soil too coarse for sewage treatment. Use systems for rapidly permeable soils.
**Soil having 50% or more fine sand + very fine sand.
***Soil with too high a percentage of clay for installation of a standard inground system.




TRENCH CROSS-SECTION
FINISHED GRADE
_______ INCHES OF BACKFILL OVER ROCK
ORIGINAL GRADE
ORIGINAL GRADE
FILL SOIL TO A MINIMUM OF SIX INCHES OVER ROCK
GEOTEXTILE CLOTH
MAXIMUM TRENCH
DEPTH OF
__________ INCHES
2 INCHES ROCK OVER PIPE
2" ROCK OVER PIPE
4" DISTRIBUTION PIPE
3/4 INCH TO 2-1/2 INCH WASHED SEWER ROCK
_______INCHES ROCK BELOW DISTRIBUTION PIPE
_______ INCHES
TRENCH WIDTH

MOUND DESIGN WORK SHEET (For Flows up to 1200 gpd)

A. Average Design FLOW

Estimated ________ gpd *(see figure A-1)*
or measured _______ x 1.5 (safety *factor)* =______ gpd

A-1: Estimated Sewage Flows in Gallons per Day				
number of bedrooms	Class I	Class II	Class III	Class IV
2	300	225	180	60%
3	450	300	218	of the
4	600	375	256	values
5	750	450	294	in the
6	900	525	332	Class I,
7	1050	600	370	II, or III
8	1200	675	408	columns.

B. SEPTIC TANK Capacity

_______________ gallons *(see figure C-1)*

C. SOILS *(refer to site evaluation)*

C-1: Septic Tank Capacities (in gallons)			
Number of Bedrooms	Minimum Liquid Capacity	Liquid capacity with garbage disposal	Liquid capacity with disposal& lift inside
2 or less	750	1125	1500
3 or 4	1000	1500	2000
5 or 6	1500	2250	3000
7, 8 or 9	2000	3000	4000

1. Depth to restricting layer = ____________ feet
2. Depth of percolation tests = ____________ feet
3. Texture_______________
   Percolation rate ________ mpi
4. Soil loading rate ____________gpd/sqft *(see figure D-33)*
5. Percent land slope ___________%

D. ROCK LAYER DIMENSIONS

1. Multiply average design flow (A) by 0.83 to obtain required rock layer area.
   __________ gpd x 0.83 sqft/gpd = _________ sqft
2. Determine rock layer width = 0.83 sqft/gpd x linear Loading Rate (LLR)
   0.83 sqft/gpd x ____________gpd/sqft = _____________ft
3. Length of rock layer = area ÷ width =
   _______ sqft (D1) ÷ ______ ft (D2) = ______ ft

Mound LLR	
< 120 MPI	≤12
≥ 120 MPI	≤ 6

E. ROCK VOLUME

1. Multiply rock area (D1) by rock depth of 1 ft to get cubic feet of rock
   ________ sqft x 1 ft = ______ cuft
2. Divide cuft by 27 cuft/cuyd to get cubic yards
   ________ cuft ÷ 27 cuyd/cuft = ________ cuyd
3. Multiply cubic yards by 1.4 to get weight of rock in tons
   ________ cuyd x 1.4 ton/cuyd = _________ tons

F. SEWAGE ABSORPTION WIDTH

Absorption width equals absorption ratio (See Figure D-33) times rock layer width (D2)

_______ x _______ ft = _______ ft

D-33: Absorption Width Sizing Table			
Percolation Rate in Minutes per Inch (MPI)	Soil Texture	Loading Rate Gallons per day per square foot	Absorption Ratio
Faster than 5	Coarse Sand Medium Sand Loamy Sand Fine Sand	1.20	1.00
6 to 15	Sandy Loam	0.79	1.50
16 to 30	Loam	0.60	2.00
31 to 45	Silt Loam Silt	0.50	2.40
46 to 60	Sandy Clay Loam Silty Clay Loam Clay Loam	0.45	2.67
61 to 120	Silty Clay Sandy Clay Clay	0.24	5.00
Slower than 120*			

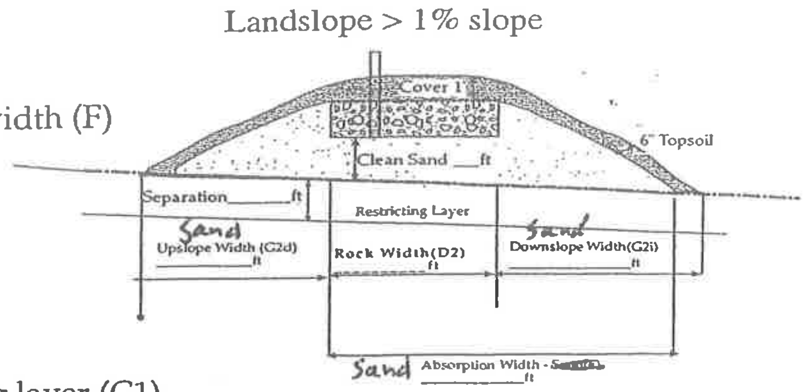
*System designed for these soils must be other or performance

G. MOUND SLOPE WIDTH & LENGTH

(landslope greater than 1%)

1. Downslope absorption width = absorption width (F) minus rock layer width (D2)

__________ ft - __________ft = __________ ft



2. Calculate mound size

UPSLOPE

a. Depth of clean sand fill at upslope edge of rock layer = 3 ft minus the distance to restricting layer (C1)

3 ft -_______ ft = _______ ft

b. Mound height at the upslope edge of rock layer = depth of clean sand for separation (G2a) at upslope edge plus depth of rock layer (1 ft) plus depth of cover (1 ft)

_______ ft + 1ft + 1ft = _______ ft

c. Upslope berm multiplier based on land slope

_______________ *(see figure D-34)*

d. Upslope width = berm multiplier (G2c) x upslope mound height (G2b):

_______ x _______ft = _______ ft

DOWNSLOPE

e. Drop in elevation = rock layer width (D2) x percent landslope (C5) ÷ 100

______ft x _____% ÷ 100 = _____ft

f. Downslope mound height = depth of clean sand for slope difference (G2e) at downslope rock edge plus the mound height at the upslope edge of rock layer (G2b)

_______ ft + _______ ft = _______ft

g. Downslope berm multiplier based on percent land slc

_______________ *(see figure D-34)*

h. Downslope width = downslope multiplier (G2g) times downslope mound height (G2f)

_______ x _______ft = _______ft

i. Select the greater of G1 and G2h as the downslope width: ___________ft

j. Total mound width is the sum of upslope width (G2d) width plus rock layer width (D2) plus downslope width (G2i)

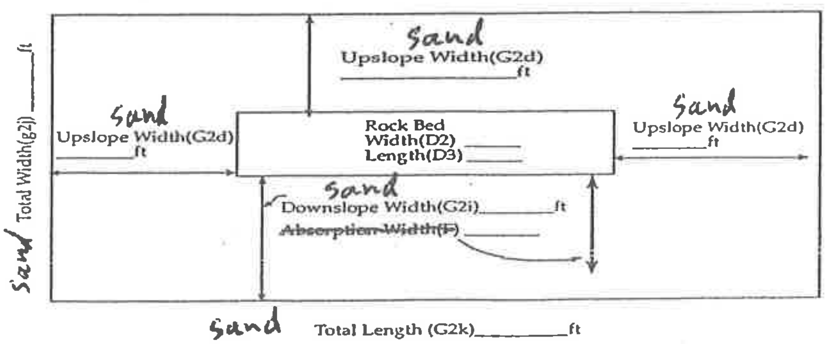
_______ ft + _______ ft + _______ ft = _______ ft

k. Total mound length is the sum of upslope width (G2d) plus rock layer length (D3) plus upslope width (G2d)

_____ ft + _____ ft + _____ ft = _____ feet

D-34: SLOPE MULTIPLIER TABLE

Land Slope, in %	UPSLOPE multipliers for various slope ratios						DOWNSLOPE multipliers for various slope ratios				
	3:1	4:1	5:1	6:1	7:1	8:1	3:1	4:1	5:1	6:1	7:1
0	3.0	4.0	5.0	6.0	7.0	8.0	3.0	4.0	5.0	6.0	7.0
1	2.91	3.85	4.76	5.66	6.54	7.41	3.09	4.17	5.26	6.38	7.53
2	2.83	3.70	4.54	5.36	6.14	6.90	3.19	4.35	5.56	6.82	8.14
3	2.75	3.57	4.35	5.08	5.79	6.45	3.30	4.54	5.88	7.32	8.86
4	2.68	3.45	4.17	4.84	5.46	6.06	3.41	4.76	6.25	7.89	9.72
5	2.61	3.33	4.00	4.62	5.19	5.71	3.53	5.00	6.67	8.57	10.77
6	2.54	3.23	3.85	4.41	4.93	5.41	3.66	5.26	7.14	9.38	12.07
7	2.48	3.12	3.70	4.23	4.70	5.13	3.80	5.56	7.69	10.34	13.73
8	2.42	3.03	3.57	4.05	4.49	4.88	3.95	5.88	8.33	11.54	15.91
9	2.36	2.94	3.45	3.90	4.30	4.65	4.11	6.25	9.09	13.04	18.92
10	2.31	2.86	3.33	3.75	4.12	4.44	4.29	6.67	10.00	15.00	23.33
11	2.26	2.78	3.23	3.61	3.95	4.26	4.48	7.14	11.11	17.65	30.43
12	2.21	2.70	3.12	3.49	3.80	4.08	4.69	7.69	12.50	21.43	43.75



Final Dimensions:

___________ X ___________

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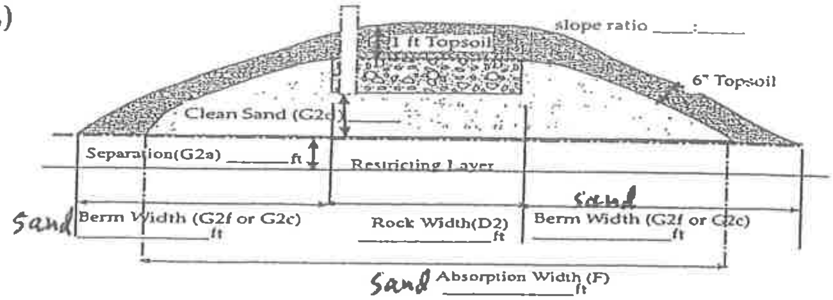
G. Mound Slope Width and Length (landslope less than or equal to 1%)

<=1% land slope



1. Absorption width (F) ________ ft
2. Calculate mound size

a. Determine depth of clean sand fill at upslope edge of rock layer = 3 ft minus the distance to restricting layer (C1)

3 ft -_______ ft = _______ ft

b. Mound height at the upslope edge of rock layer = depth of clean sand for separation (G2a) at upslope edge plus depth of rock layer (1 ft) plus depth of cover (1 ft)

_______ ft + 1ft + 1ft = _______ ft

c. Berm width = upslope mound height (G2b) times 4 *(4 is recommended, but could be 3-12)*

_______ x 4 = _______ft

d. The total landscape width is the sum of berm (G2c) width plus rock layer width (D2) plus berm widt (G2c): _______ft + _______ft + _______ft = _______ft

e. Additional width necessary for absorption = absorption width (F) minus the landscape width (G2d)

_______ft - _______ft = _______ft, *if number is negative (<0) skip to g*

f. Final berm width = additional width (G2e) plus the berm width (G2c)

_______ft + _______ft = _______ft

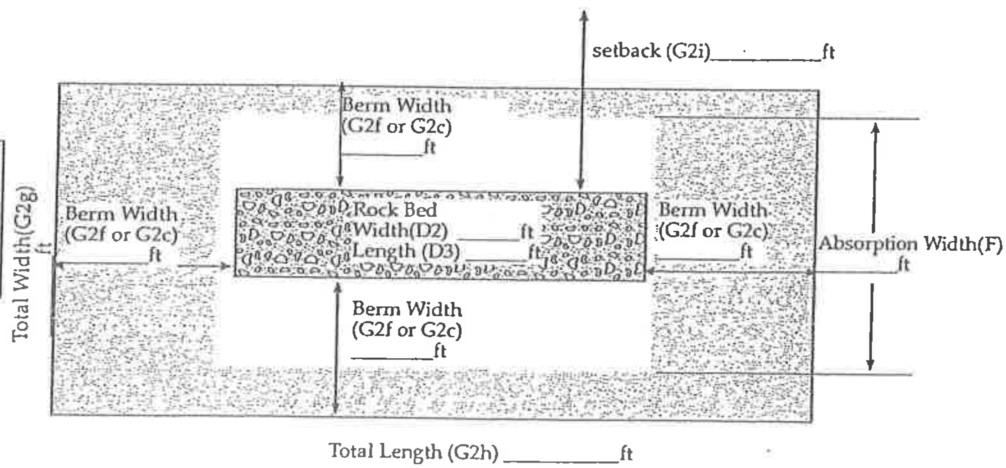
g. Total mound width is the sum of berm width (G2f or G2c) plus rock layer width (D2) plus berm width (G2f or G2c): _______ft + _______ft + _______ft = _______ft

h. Total mound length is the sum of berm (G2f or G2c) plus rock layer length (D3) plus berm (G2f or G2c): _______ft + _______ft + _______ft = _______ft

i. Setbacks from the rockbed are calculated as follows: the absorption width (F) minus the rock bed widt (D2) divided by 2: (_______ft - _______ft) ÷ 2 = _______ft

Final Dimensions:

__________ x __________



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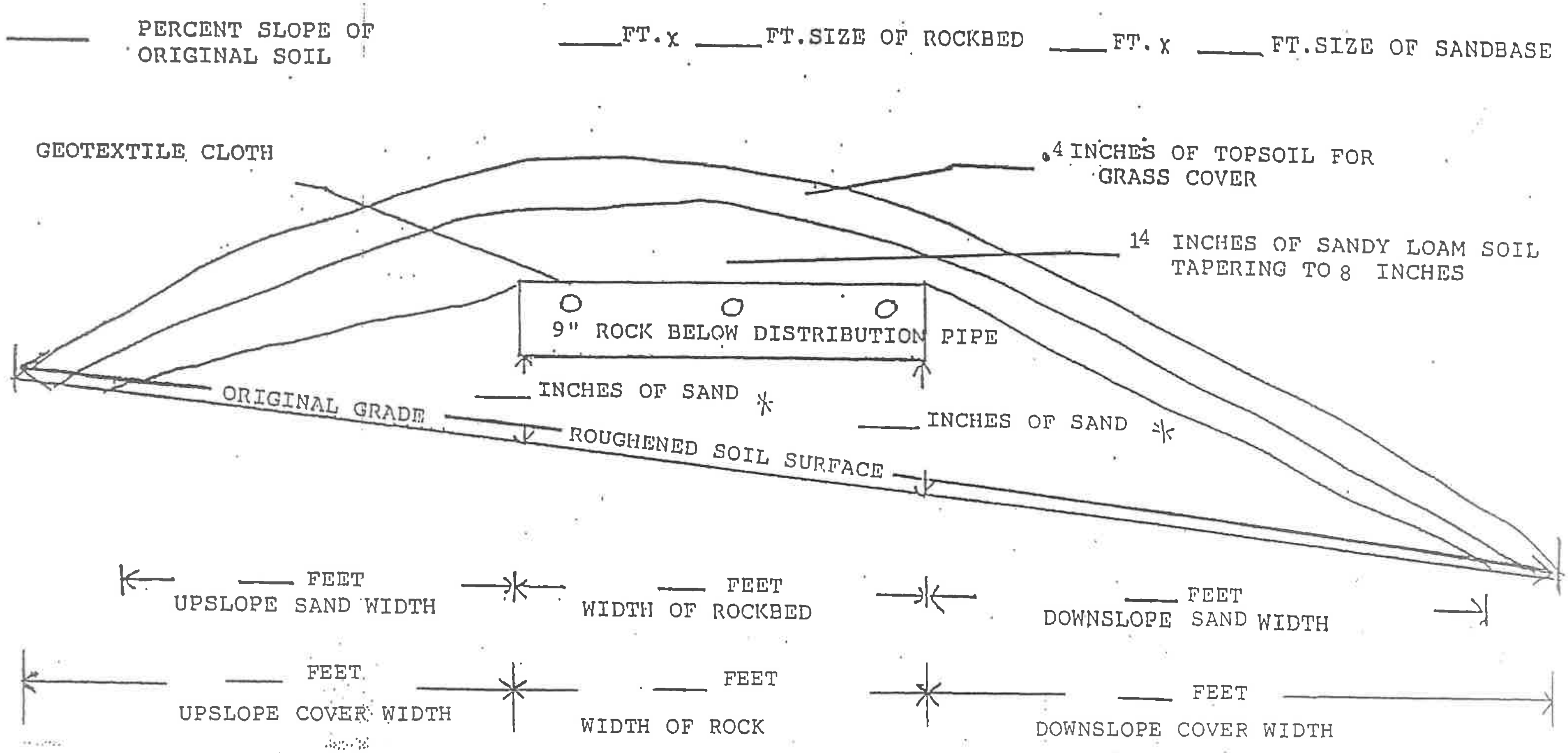
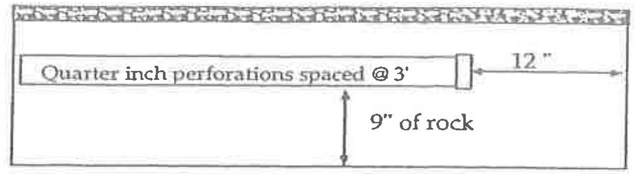
MOUND CROSS-SECTION



PRESSURE DISTRIBUTION SYSTEM



Perf Sizing 3/16" - 1/4"
Perf Spacing 1.5'- 5'

1. Select number of perforated laterals ___________

2. Select perforation spacing = _________ ft

3. Since perforations should not be placed closer than 1 foot to the edge of the rock layer (see diagram), subtract 2 feet from the rock layer length.

   ___________ - 2 ft = ________ ft
   Rock layer length

4. Determine the number of spaces between perforations. Divide the length (3) by perforation spacing (2) and <u>round down</u> to nearest whole number.

   Perforation spacing = ______ ft ÷ ____ ft = _____ spaces

5. Number of perforations is equal to one plus the number of perforation spaces(4). *Check figure E-4 to assure the number of perforations per lateral guarantees <10% discharge variation.*

   ________ spaces + 1 = ______ perforations/lateral

6. A. Total number of perforations = perforations per lateral (5) times number of laterals (1)

   _______perfs/lat x _______lat= _______ perforations

   B. Calculate the square footage per perforation.
   Should be 6-10 sqft/perf. *Does not apply to at-grades.*
   Rock bed area = rock width (ft) x rock length (ft)
   ________ft x ________ft =_________sqft
   Square foot per perforation = Rock bed area ÷ number of perfs (6)
   _________sqft ÷ ________perfs = _______sqft/perf

7. Determine required flow rate by multiplying the total number of perforations (6A) by flow per perforation *(see figure E-6)*

   ______ perfs x _______gpm/perfs =________ gpm

8. If laterals are connected to header pipe as shown on upper example, to select minimum required lateral diameter; enter figure E-4 with perforation spacing (2) and number of perforations per lateral (5) Select minimum diameter for perforated lateral = ______ inches.

9. If perforated lateral system is attached to manifold pipe near the center, lower diagram, perforated lateral length (3) and number of perforations per lateral (5) will be approximately one half of that in step 8. Using these values, select minimum diameter for perforated lateral = ________ inches.

E-4: Maximum allowable number of 1/4-inch perforations per lateral to guarantee <10% discharge variation

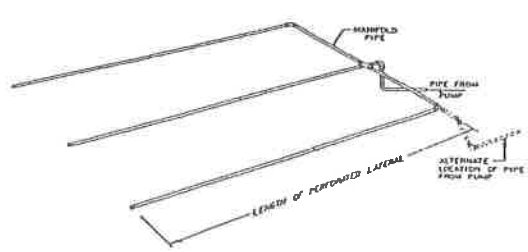
perforation spacing (feet)	1 inch	1.25 inch	1.5 inch	2.0 inch
2.5	8	14	18	28
3.0	8	13	17	26
3.3	7	12	16	25
4.0	7	11	15	23
5.0	6	10	14	22

E-6: Perforation Discharge in gpm

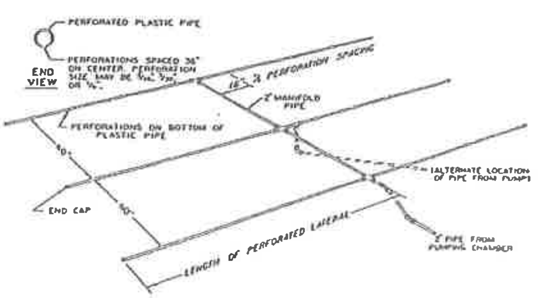
head (feet)	perforation diameter (inches)			
	1/8	3/16	7/32	1/4
1.0[a]	0.18	0.42	0.56	0.74
2.0[b]	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

[a] Use 1.0 foot for single-family homes.
[b] Use 2.0 feet for anything else.

MANIFOLD LOCATED AT END OF PRESSURE DISTRIBUTION SYSTEM



LAYOUT OF PERFORATED PIPE LATERALS FOR PRESSURE DISTRIBUTION IN MOUND



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______________________________(signature) ______________(license #) ______________(date)

PUMP SELECTION PROCEDURE

1. Determine pump capacity:

A. Gravity distribution

1. Minimum required discharge is 10 gpm
2. Maximum suggested discharge is 45 gpm. For other establishments at least 10% greater than the water supply rate, but no faster than the rate at which effluent will flow out of the distribution device.

B. Pressure distribution

See pressure distribution work sheet

From A or B Selected pump capacity: ________ gpm

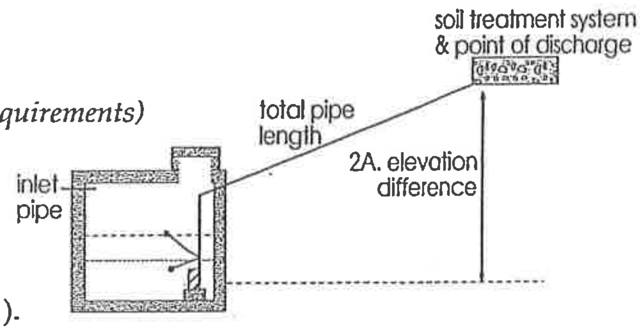
2. Determine pump head requirements:

A. Elevation difference between pump and point of discharge?

__________feet

B. Special head requirement? *(See Figure at right - Special Head Requirements)*

__________feet



Special Head Requirements	
Gravity Distribution	0 ft
Pressure Distribution	5 ft

C. Calculate Friction loss

1. Select pipe diameter __________in
2. Enter *Figure E-9* with gpm (1A or B) and pipe diameter (C1).
   Read friction loss in feet per 100 feet from Figure E-9
   Friction Loss = ________ ft/100ft of pipe
3. Determine total pipe length from pump discharge to soil treatment discharge point. Estimate by adding 25 percent to pipe length for fitting loss. Total pipe length times 1.25 = equivalent pipe length
   _________feet x 1.25 = _________feet
4. Calculate total friction loss by multiplying friction loss (C2) in ft/100 ft by the equivalent pipe length (C3) and divide by 100.
   = _________ ft/100ft x __________ ÷100 = __________ft

E-9: Friction Loss in Plastic Pipe Per 100 feet	nominal pipe diameter		
flow rate gpm	1.5"	2"	3"
20	2.47	0.73	0.11
25	3.73	1.11	0.16
30	5.23	1.55	0.23
35	6.96	2.06	0.30
40	8.91	2.64	0.39
45	11.07	3.28	0.48
50	13.46	3.99	0.58
55		4.76	0.70
60		5.60	0.82
65		6.48	0.95
70		7.44	1.09

D. Total head required is the sum of elevation difference (A), special head requirements (B), and total friction loss (C4)

__________ft + __________ft+ __________ft =

Total head: __________feet

3. Pump selection

A pump must be selected to deliver at least ________gpm (1A or B) with at least ________ feet of total head (2D)

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______________________(signature) ______________(license #) ______________(date)

SKETCH SHEET

CLIENT: ______________________ DATE: ________________

MAP DRAWN TO SCALE [redacted] WITH A NORTH ARROW

CHECK OFF LIST--HAVE ALL OF THE FOLLOWING BEEN DRAWN ON THE MAP??

SHOW EXISTING OR PROPOSED

- ☐ WATER WELLS WITHIN 100 FT OF TREATMENT AREAS
- ☐ PRESSURE WATER LINES WITHIN 10 FT OF TREATMENT AREAS
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- ☐ LOT IMPROVEMENTS
- ☐ ALL SOIL TREATMENT AREAS
- ☐ ALL ISTS COMPONENTS
- ☐ HORIZONTAL AND VERTICALREFERENCE
- ☐ POINT OF SOIL BORINGS
- ☐ DIRECTION OF SLOPE
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- ☐ DISTURBED/ COMPACTED AREAS
- ☐ SITE PROTECTION--LATHE AND RIBBON EVERY 15 FT
- ☐ ACCESS ROUTE FOR TANK MAINTENANCE

REQUIRED SETBACKS

- ☐ STRUCTURES
- ☐ PROPERTY LINES
- ☐ OHWL

COMMENTS:

INDICATE ELEVATIONS

BENCHMARK ____

ELEVATION OF SEWER LINE @ HOUSE ____

ELEVATION @ TANK INLET ____

ELEVATION @ BOTTOM OF ROCK LAYER ____

ELEVATION @ BOTTOM OF BORING OR RESTRICTIVE LAYER ____

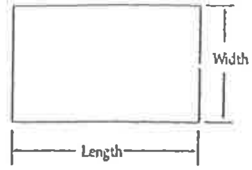
ELEVATION OF PUMP ____

ELEVATION OF DISTRIBUTION DEVICE ____

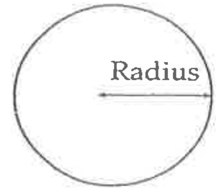
DESIGNER SIGNATURE ______________________

LICENSE# ______________________ DATE ________________

DOSING CHAMBER SIZING



1. Determine area
   A. Rectangle area = L x W
   ________ x ________ = ________square feet
   B. Circle area = π (3.14) x radius in feet x radius in feet
   3.14 x _______ft x _______ft = ________sqft
   C. Get area from manufacturer ________sqft



2. Calculate gallons per inch
   There are 7.5 gallons per cubic foot of volume, therefore multiply the area (1A, B or C) times the conversion factor and divide by 12 inches per foot to calculate gallon per inch.
   Area x 7.5 ÷ 12 = ________sqft x 7.5 ÷ 12 in/ft = ________ gallon per inch

Legal Tank:
500 gallons or
100% the Daily flow
or
Alternating Pumps

3. Calculate total tank volume
   A. Depth from bottom of inlet pipe to tank bottom ____________in
   B. Total tank volume = depth from bottom of inlet pipe to tank bottom (3A) x gal/in (2)
   = ________in x ________gal/in = ________ gal

4. Calculate gallons to cover pump (with 2-3 inches of water covering pump)
   (Pump and block height (inch) + 2 inch) x gallon/inch
   (________in +2 in) x ________gal/in =________gallon

5. Calculate total pumpout volume
   A. Select pump size for 4-5 does per day. Gallon per dose = gpd (see *figure A-1*) / doses per day =________ gpd ÷ ________doses/day = ________ gallons
   B. Calculate drainback
      1. Determine total pipe length, _____feet
      2. Determine liquid volume of pipe, _____ gal per ft (*see figure E-20*)
      3. Drainback quantity = ______ft (5B1) x ______ gal per ft (5B2) = ________gal
   C. Total pump out volume = dose volume (5A) + drainback (5B3)
   ________gal + ________gal = ___________Total gallon

A-1: Estimated Sewage Flows in Gallons per Day

number of bedrooms	Class I	Class II	Class III	Class IV
2	300	225	180	60%
3	450	300	218	of the
4	600	375	256	values
5	750	450	294	in the
6	900	525	332	Class I,
7	1050	600	370	II, or III
8	1200	675	408	columns.

6. Float separation distance (using total pumpout volume)
   Total pumpout volume (5C) ÷ gal/inch (2)
   ________gal ÷________gal/in= ________ inch

E-20: Volume of Liquid in Pipe

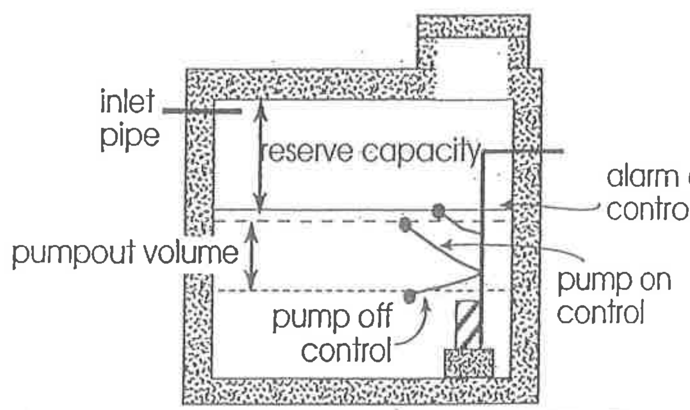
Pipe Diameter *inches*	Gallons per foot
1	0.045
1.25	0.078
1.5	0.11
2	0.17
2.5	0.25
3	0.38
4	0.66

7. Calculate volume for alarm (typically 2 to 3 inches)
   Alarm depth (inch) x gallon/inch (2) = ______in x ______gal/in) = ______ gal

8. Calculate total gallon = gallons over pump (4) + gallons pumpout (5C) + gallons alarm (7)
   __________gal + __________gal + __________gal =__________ gallons

9. Total Tank Depth = total gallon (8) ÷ gallon/inch (2)
   __________gal ÷ __________gal/in = __________ in

Recommended:
Calculate reserve capacity (75% the daily flow)
Daily flow x .75 =_______ x .75 = ______gallons



I hereby certify that I have completed this work in accordance with applicable ordinances, rules and laws.

________________________(signature) ____________(license #) ____________(date)

ATGRADE DESIGN WORK SHEET

A. AVERAGE DESIGN FLOW

Estimated ________ gpd *(see figure A-1)*
or measured _____ x 1.5 *(safety factor)* =_____ gpd

B. SEPTIC TANK CAPACITY

______________ gallons *(see figure C-1)*

C. SOILS *(refer to site evaluation)*

1. Depth to restricting layer =____________ feet
2. Depth of percolation tests = ____________ feet
3. Texture______________________ Percolation rate ___________ mpi
4. SSF _____________ ft^2/gpd *(see figure D-15)*
5. Linear Loading Rate ___________ gpd/ft *(see figure D-42)*
6. Land slope ___________%

D. ROCK WIDTH

1. Rock absorption width equals LLR (C5) times SSF (C4) =
   _________gpd/ft x ________ ft^2/gpd = _________ft

E. SYSTEM SIZE

1. The height of the system is _2_ feet
2. Determine upslope width
   a. Upslope multiplier based on % land slope *(see figure D-46):* ________
   b. Upslope width = upslope multiplier (E2a) times height (E1)
   ________ x 2 ft = ________ ft
3. Determine downslope width
   a. Downslope multiplier based on % land slope *(see figure D-46)* ________
   b. Downslope width = downslope multiplier (E2a) by height (E1)
   ___________ x 2 ft = ___________ ft
   c. Rock absorption width (D1) + 5'= ___________+5' =___________ft
   d. Downslope width equals larger of 3a and 3b ____________ft
4. System width is the sum of upslope width (E2b) plus downslope width (E3d):
   __________ ft + ___________ ft = __________ feet
5. The rock layer length is the flow (A) divided by LLR (C5)
   _________gpd ÷ ________gpd/ft =_________ feet
6. Total length is the sum of upslope width (E2b) plus rock layer length (E5) plus upslope width (E2b)
   _________ ft + _________ ft + _________ ft = _________ feet

F. ROCK VOLUME

1. Rock Area = Length(E5) x Width(D1+1ft)
   ___________ft x (____________ft + 1ft) =_________ sqft
2. Multiply rock area(F1) by depth of rock(1 ft) and divide by two because the shape is triangular
   __________ sqft x 1 ft ÷ 2 = _______ cuft
3. Divide cubic feet by 27 cuft/cuyd to get cubic yards
   __________ cuft ÷ 27 = _______ cuyd
4. Multiply cubic yards by 1.4 to get weight of rock in tons
   __________ cuyd x 1.4 = ________ tons

A-1: Estimated Sewage Flows in Gallons per Day

number of bedrooms	Class I	Class II	Class III	Class IV
2	300	225	180	60%
3	450	300	218	of the
4	600	375	256	values
5	750	450	294	in the
6	900	525	332	Class I,
7	1050	600	370	II, or III
8	1200	675	408	columns.

C-1: Septic Tank Capacities (in gallons)

Number of Bedrooms	Minimum Liquid Capacity	Liquid capacity with garbage disposal	Liquid capacity with disposal& lift inside
2 or less	750	1125	1500
3 or 4	1000	1500	2000
5 or 6	1500	2250	3000
7, 8 or 9	2000	3000	4000

D-42: At-Grade Linear Loading Rate (LLR)

Precolation Rate at 12" (MPI)	Soil Texture (0-12")	Other Chacteristics in Upper 48"	Linear Loading Rate - LLR (gpd/ft)
Faster than 0.1	Coarse Sand	No textural change Layers of other textures	6
		Saturated soil (<3') Bedrock	5
0.1 to 5	Sand Loamy Sand Fine Sand*	No textural change	8
		Layers of other textures	7
		Layers or Banding	4
		Saturated soil (<3') Bedrock	5
6 to 15	Sandy Loam	Strong to moderate structure No textural change	7
		Condition II	6
		Condition III	5
16 to 60	Loam Silt Loam Silt Sandy Clay Loam Silty Clay Loam Clay Loam	Strong to moderate structure No textural change	6
		Condition II	5
		Condition III	4
60 to 120 Slower than 120	Clay Sandy Clay Silty Clay	Strong or modeate sturcture No textural change	3
		Condition II	2
		Condition III	2

Condition II
weak structure
layers of other textures

Condition III
platy or massive structure
saturated soil (<3') or bedrock (<4')

Total system LLR < 8

D-15: Soil Characteristics and Soil Sizing Factor (SSF) (> 3' separation)

Percolation Rate minutes per inch (mpi)	Soil Texture	Soil Sizing Factor square feet/gallon per day(sqft/gpd)
faster than 0.1*	Coarse sand	0.83
0.1 to 5	Medium sand Loamy sand	0.83
0.1 to 5**	Fine sand	1.67
6 to 15	Sandy loam	1.27
16 to 30	Loam	1.67
31 to 45	Silt loam Silt	2.00
46 to 60	Clay loam Sandy clay Silty clay	2.20
over 61 to 120***	Clay Sandy clay Silty clay	4.20
slower than 120****		

*Use systems for rapidly permeable soils: pressure distribution or serial distribution with no trench >25% of the total system.
**Soil having 50% or more fine sand plus very fine sand
***A mound must be used.
****An other or performance system must be used

D-46: BERM SLOPE MULTIPLIERS

Land Slope, in %	UPSLOPE berm multipliers for berm slope ratio of 4:1	DOWNSLOPE berm multipliers for berm slope ratio of 4:1
0	4.0	4.0
1	3.85	4.17
2	3.70	4.35
3	3.57	4.54
4	3.45	4.76
5	3.33	5.00
6	3.23	5.26
7	3.12	5.56
8	3.03	5.88
9	2.94	6.25
10	2.86	6.67
11	2.78	7.14
12	2.70	7.69

* 4:1 is the steepest slope allowed, less steeper slopes may be used, see Fig D-34 in manual

I hereby certify that I have completed this work in accordance with applicable ordinances, rules and laws.

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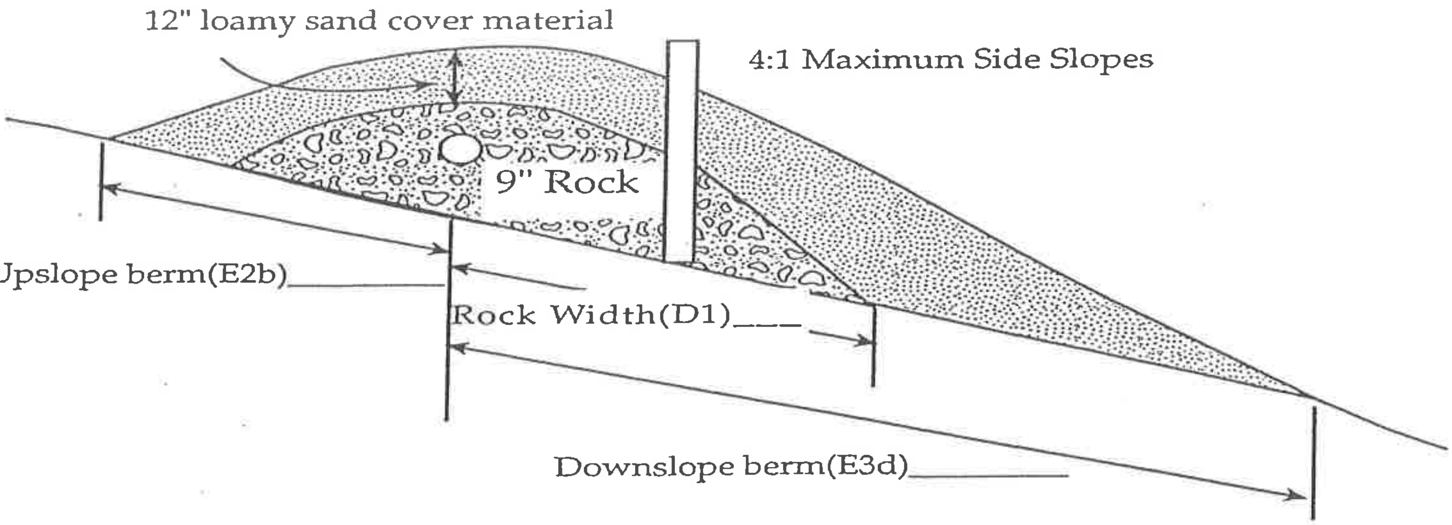
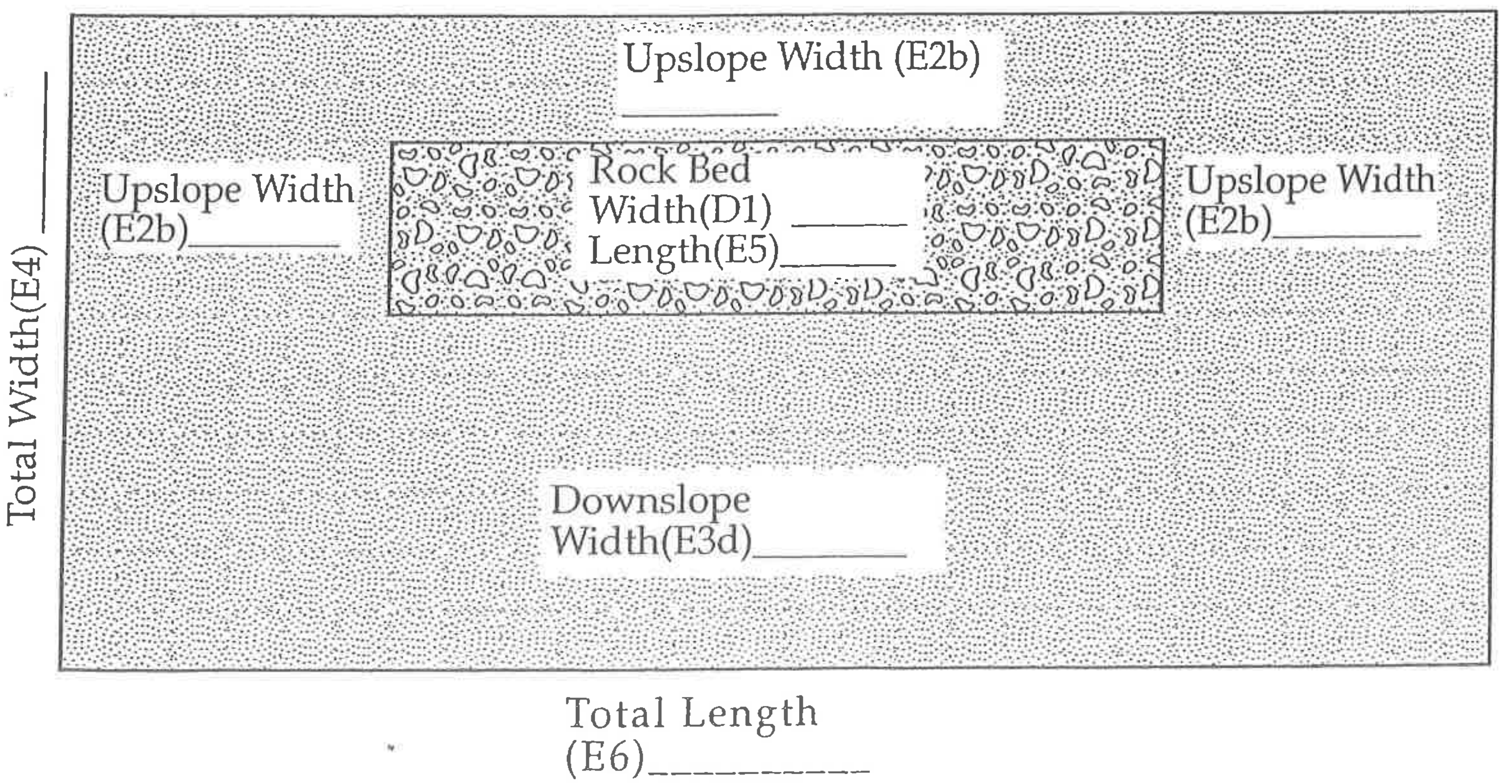

12" loamy sand cover material
4:1 Maximum Side Slopes
9" Rock
Upslope berm(E2b)___
Rock Width(D1)___
Downslope berm(E3d)___


Upslope Width (E2b)
___
Upslope Width
(E2b)___
Rock Bed
Width(D1) ___
Length(E5)___
Upslope Width
(E2b)___
Downslope
Width(E3d)___
Total Width(E4)___
Total Length
(E6)___

SKETCH SHEET

CLIENT:____________________ DATE:________________

MAP DRAWN TO SCALE [redacted] WITH A NORTH ARROW

CHECK OFF LIST--HAVE ALL OF THE FOLLOWING BEEN DRAWN ON THE MAP??

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