FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE 4/18/2016, FIELD EVALUATION DATE 4/18/2016
PROPERTY OWNER: Mike Withers PHONE 507-251-7459
ADDRESS: 13680 188 pl. CITY,STATE,ZIP: McGrath MN 56350
LEGAL DESCRIPTION: Snake River Valley LOT 6 Block 3
PIN# 38-1-060400 SEC 15 T 43 R 23 TWP NAME Williams
FIRE# LAKE/RIVER Snake River 1,000+07 LAKE CLASS OHWL 300- FT.

DESCRIPTION OF SOIL TREATMENT AREAS

	AREA #1	AREA #2
DISTURBED AREAS	YES NO l	YES NO
COMPACTED AREAS	YES NO k	YES NO
FLOODING	YES NO X	YES NO
RUN ON POTENTIAL	YES NO X	YES NO
SLOPE %	6%	
DIRECTION OF SLOPE	West	
LANDSCAPE POSITION	Side Slope	
VEGETATION TYPES	Birch-Popple	

REFERENCE BM ELEV. 100 FT
REFERENCE BM DESCRIPTION
Reddish for elec. transformer.

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 15", 1A 15", 2 ____, 2A ____

BOTTOM ELEVATION--FIRST TRENCH OR BOTTOM OF ROCK BED: #1 +1.7 FT., #2 ____ FT.

SOIL SIZING FACTOR: SITE # 1 1.67, SITE #2 ____

CONSTRUCTION RELATED ISSUES: None

LIC# <2006 SITE EVALUATOR SIGNATURE: Dave Englehl

SITE EVALUATOR NAME: Dave Englehl TELEPHONE# 507-732-3606

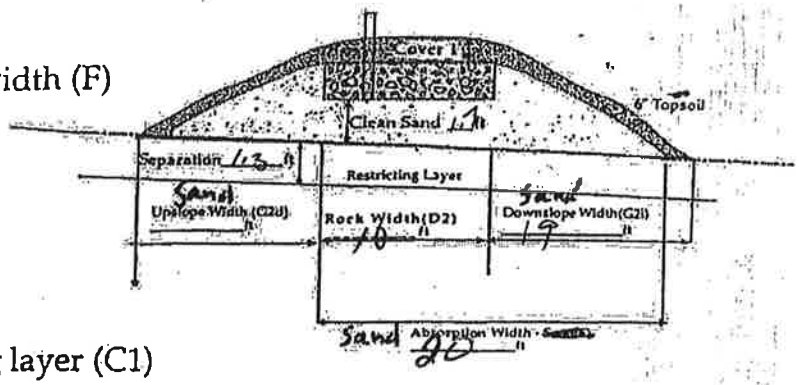
LUG REVIEW [signature] 4/22/16 DATE ____

Comments:

SOIL BORING LOGS ON REVERSE SIDE

G. MOUND SLOPE WIDTH & LENGTH

(landslope greater than 1%)



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

20 ft - 10 ft = 10 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 - 1.3 ft = 1.7 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)

1.7 ft + 1ft + 1ft = 3.7 ft

c. Upslope berm multiplier based on land slope

3.23 *(see figure D-34)*

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

3.7 x 3.23 ft = 12 ft

DOWNSLOPE

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

10 ft x 6 % ÷ 100 = .6 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)

3.7 ft + .6 ft = 4.3 ft

g. Downslope berm multiplier based on percent land slc

5.26 *(see figure D-34)*

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

4.3 x 5.26 ft = 22.6 ft

i. Select the greater of G1 and G2h as the downslope width: 22.6 ft

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

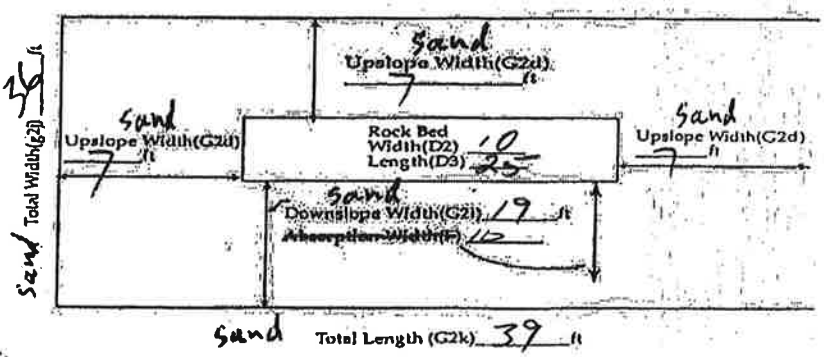
12 ft + 10 ft + 22.6 ft = 44.6 ft

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

12 ft + 25 ft + 12 ft = 49 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



(MIKE WITHERS)

Final Dimensions:

44.6 x 49

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

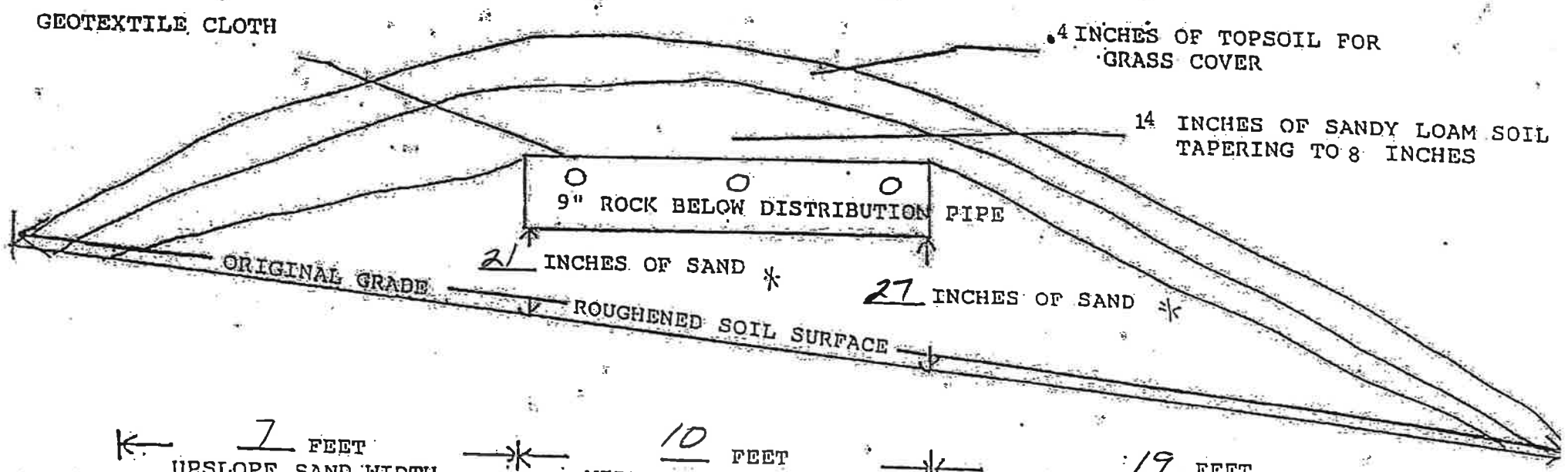
Dave Lyell (signature) C2906 (license #) 4/19/2016 (date)

Mike Withers

MOUND CROSS-SECTION

6% PERCENT SLOPE OF ORIGINAL SOIL

10 FT. x 25 FT. SIZE OF ROCKBED 36 FT. x 37 FT. SIZE OF SANDBASE



7 FEET
UPSLOPE SAND WIDTH

10 FEET
WIDTH OF ROCKBED

19 FEET
DOWNSLOPE SAND WIDTH

12 FEET
UPSLOPE COVER WIDTH

10 FEET
WIDTH OF ROCK

28.6 FEET
DOWNSLOPE COVER WIDTH

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: 22.2 gpm

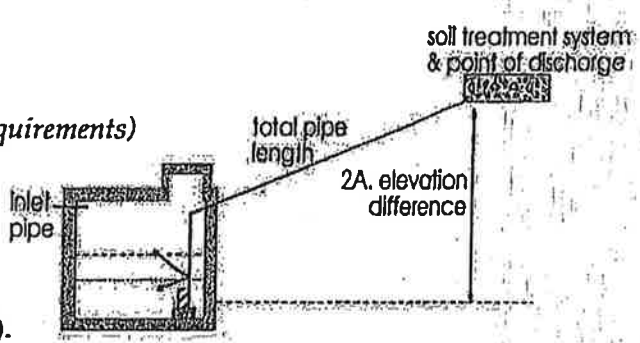
2. Determine pump head requirements:

A. Elevation difference between pump and point of discharge?

8.6 feet

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

5 feet



Special Head Requirements	
Gravity Distribution	0 ft
Pressure Distribution	5 ft

C. Calculate Friction loss

1. Select pipe diameter 2 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 = 1.11 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
   25 feet x 1.25 = 31 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.
   = 1.11 ft/100ft x 31 ÷100 = .35 ft

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

8.6 ft + 5.0 ft + .35 ft =

Total head: _____ feet

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

3. Pump selection

A pump must be selected to deliver at least 22.2 gpm (1A or B) with at least 13.96 feet of total head (2D)

Mike Withers

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

Bruce Gabbard (signature) C2066 (license #) 4/19/2016 (date)

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

A. Average Design FLOW

Estimated 300 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

1,000 gallons *(see figure C-1)*

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

C. SOILS *(refer to site evaluation)*

1. Depth to restricting layer = 1.3 feet
2. Depth of percolation tests = — feet
3. Texture Sandy Loam
   Percolation rate 16-30 mpi
4. Soil loading rate .66 gpd/sqft *(see figure D-33)*
5. Percent land slope 6% %

D. ROCK LAYER DIMENSIONS

1. Multiply average design flow (A) by 0.83 to obtain required rock layer area.
   300 gpd x 0.83 sqft/gpd = 250 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 =
   250 sqft (D1) ÷ 10 ft (D2) = 25 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
   250 sqft x 1 ft = 250 cuft
2. Divide cuft by 27 cuft/cuyd to get cubic yards
   250 cuft ÷ 27 cuyd/cuft = 9.3 cuyd
3. Multiply cubic yards by 1.4 to get weight of rock in tons
   9.3 cuyd x 1.4 ton/cuyd = 13 tons

F. SEWAGE ABSORPTION WIDTH

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

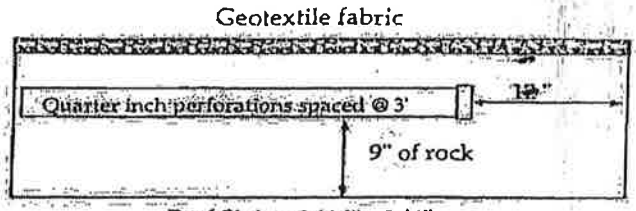
10 x 2.0 ft = 20.0 ft

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	0.80	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*			

*Systems designed for these soils must be either or performance

PRESSURE DISTRIBUTION SYSTEM



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

1. Select number of perforated laterals 3

2. Select perforation spacing = 2.5 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.

25 (Rock layer length) - 2 ft = 23 ft

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

Perforation spacing = 23 ft ÷ 2.5 ft = 9 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.*

9 spaces + 1 = 10 perforations/lateral

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

10 perfs/lat x 3 lat = 30 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)
10 ft x 25 ft = 250 sqft
Square foot per perforation = Rock bed area ÷ number of perfs (6)
250 sqft ÷ 30 perfs = 8.3 sqft/perf

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

30 perfs x .74 gpm/perfs = 22.2 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 = 1½ 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.

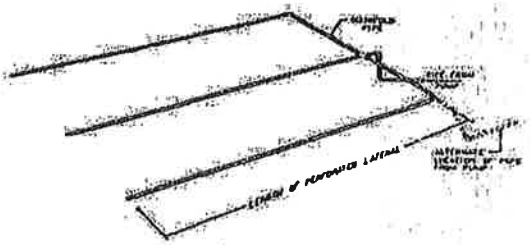
E-4: Maximum allowable number of 1/4-inch perforations per lateral to guarantee <10% discharge variation

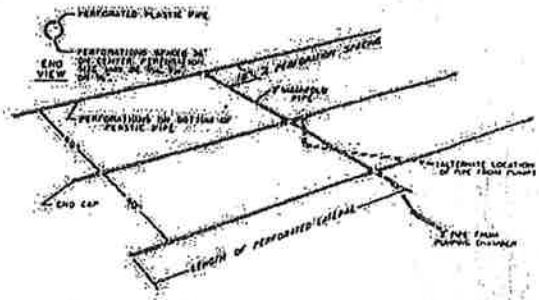
perforation spacing (feet)	1 inch	1.25 inch	1.5 inch	2.0 inch
2.5	8	14	18	28
3.0	8	13	17	26
3.3	7	12	16	25
4.0	7	11	15	23
5.0	6	10	14	22

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.





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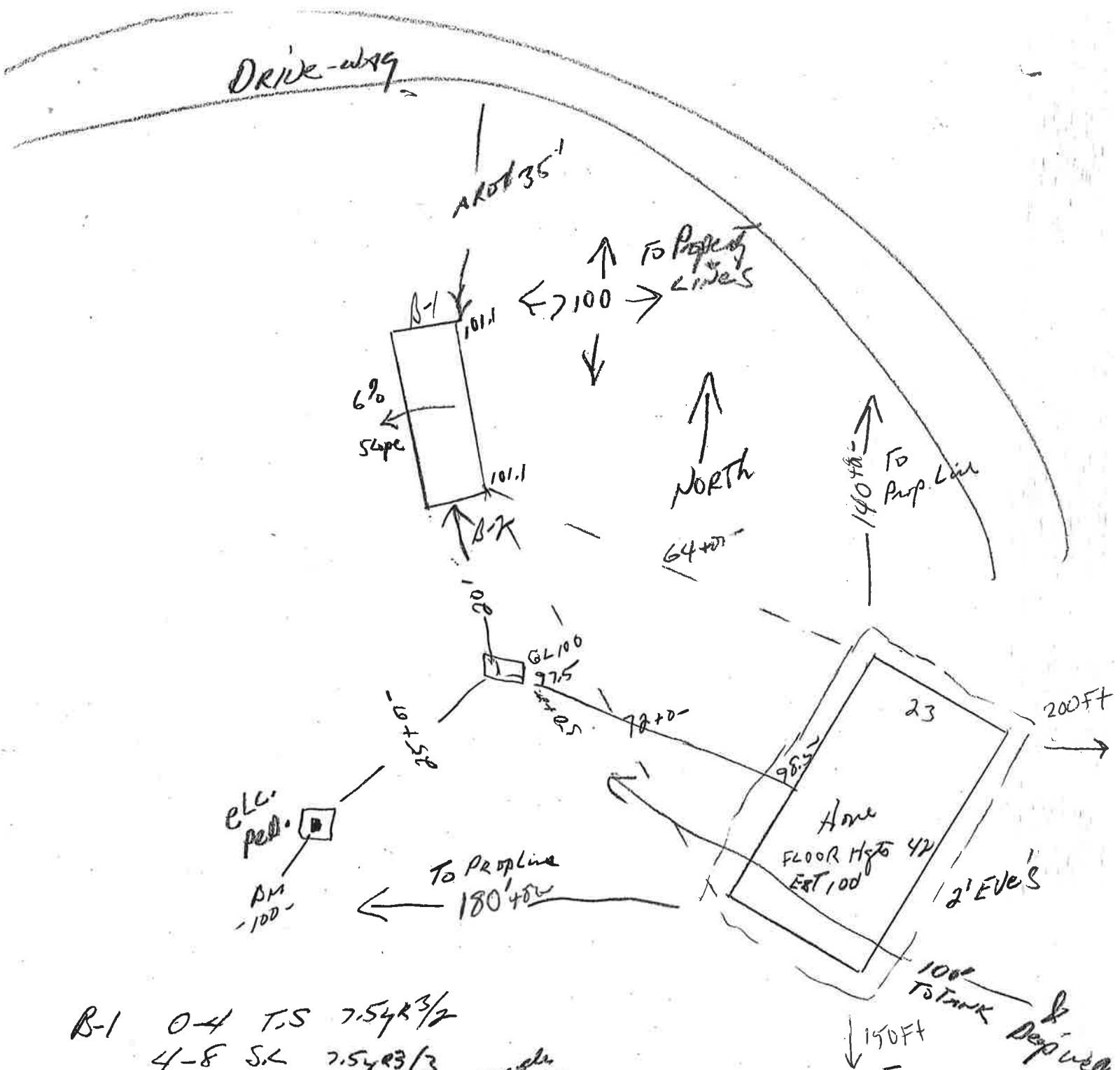
Dave Eyckhoff (signature) L2006 (license #) 4/19/2016 (date)



B-1 0-4 T.S 7.5yr 3/2
4-8 S.L 7.5yr 3/3
8-15 S.L. 7.5yr 4/4 FRIABLE NO ROCKS NO ROOTS
15+ Redox, 5/2 4/6

B-2 0-8 T.S 7.5yr 3/3
8-15 S.L. 7.5yr 4/4 FRIABLE NO ROCKS-ROOTS
15+ S.L. Redox 7.5yr 5/2/4/6

BM 100 Pedestal Electric Transformer.
98.5 Pipe at Home
97.5 Pipe at Tank
101.1 Ground Hgt RB.
99.8 Restricted Layer
102.8 Bottom of Rock bed
95.0 Pump elev.
103.6 Dist elev.
8.6 Pump Hgt.

4/22/12