

Assessment of BiOWiSH™ Septic Tank Aid on the Sludge Depth and Effluent Constituents for Several Low Pressure Pipe (LPP) Septic Systems in Central North Carolina

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BiOWiSH™ Septic Tank Aid is a septic system additive that is specified for usage in domestic septic systems. The benefits listed for the product include odor reduction, solids degradation (to reduce the need for pumping), and degradation of fat layers. BiOWiSH™ Septic Tank Aid can also reduce solids accumulation in septic system leachfields (drainfields) according to product descriptions. The product usage specifications indicate quarterly treatment to maintain proper septic system operation. Additional information can be found on the BiOWiSH™ Septic Tank Aid Fact Sheet or at www.biowishtech.com.

A study was initiated using BiOWiSH™ Septic Tank Aid as an additive for thirteen low pressure pipe (LPP) septic systems in central North Carolina. This particular study is a follow-up to a similar pilot study completed in 2010 and detailed in a paper titled *Assessment of BiOWiSH™ Septic Tank Aid on the Sludge Depth and Effluent Constituents for a Low Pressure Pipe (LPP) Septic System in Central North Carolina*. The purpose of the current study is to expand on the pilot study by adding to the number of evaluation sites and determine the impact of the BiOWiSH™ Septic Tank Aid on the septic tank and pump tank solids levels, the septic tank and pump tank scum layers, the septic tank and drainfield effluent constituents, and the septic system flow rate.

Materials and Methods

Thirteen LPP septic systems were utilized for this study, all located in western Wake County or eastern Chatham County, North Carolina. The study had the following treatments: 100g/quarter BiOWiSH™, 200g/week BiOWiSH™, 100g/week BiOWiSH™, 50g/week BiOWiSH™, 25g/week BiOWiSH™, 25g bi-weekly BiOWiSH™, 100g/month BiOWiSH™,

50g/month BiOWiSH™, 25g/month BiOWiSH™, 3 separate sites with a competing product applied according to the package instructions, and a control (no additive).

The 100g/quarter BiOWiSH™ treatment is a septic system is located in Chatham County, North Carolina. The system is designed and permitted for a 3 bedroom home and 360 gallons per day (GPD) wastewater flow. The system has a 1000 gallon septic tank, a 1000 gallon pump tank, and 711 feet of drainfield line. The design pressure head for the system is 2 feet and the design flow rate is 38.54 gallons per minute (GPM). A graywater collection tank (collects washing machine, dishwasher, and kitchen sink wastewater) also flows into the septic tank. The design specifications are located in Attachment 1.

The 200g/week BiOWiSH™ treatment is a septic system is located in Wake County, North Carolina. The system is designed and permitted for a 3 bedroom home and 360GPD wastewater flow. The system has a 1000 gallon septic tank, a 1200 gallon pump tank, and 480 feet of drainfield line. The design pressure head for the system is 2 feet and the design flow rate is 38.4GPM. The design specifications are located in Attachment 2.

The 100g/week BiOWiSH™ treatment is a septic system is located in Chatham County, North Carolina. The system is designed and permitted for a 4 bedroom home and 480GPD wastewater flow. The system has a 1200 gallon septic tank, a 1000 gallon pump tank, and 960 feet of drainfield line. The design pressure head for the system is 2 feet and the design flow rate is 62.07GPM. The design specifications are located in Attachment 3.

The 50g/week BiOWiSH™ treatment is a septic system is located in Chatham County, North Carolina. The system is designed and permitted for a 3 bedroom home and 360GPD wastewater flow. The system has a 1200 gallon septic tank, a 1000 gallon pump tank, and 480 feet of drainfield line. The design pressure head for the system is 2 feet and the design flow rate is 49.7GPM. The design specifications are located in Attachment 4.

The 25g/week BiOWiSH™ treatment is a septic system is located in Chatham County, North Carolina. The system is designed and permitted for a 3 bedroom home and 360GPD wastewater flow. The system has a 1000 gallon septic tank, a 1000 gallon pump tank, and 720 feet of drainfield line. The design pressure head for the system is 2 feet and the design flow rate is 74.23GPM. The design specifications are located in Attachment 5.

The 25g bi-weekly BiOWiSH™ treatment is a septic system is located in Wake County, North Carolina. The system is designed and permitted for a 3 bedroom home and 360GPD wastewater flow. The system has a 1000 gallon septic tank, a 1000 gallon pump

tank, and 720 feet of drainfield line. The design pressure head for the system is 4 feet and the design flow rate is 64.2GPM. The design specifications are located in Attachment 6.

The 100g/month BiOWiSH™ treatment is a septic system is located in Chatham County, North Carolina. The system is designed and permitted for a 3 bedroom home and 360GPD wastewater flow. The system has a 1000 gallon septic tank, a 1000 gallon pump tank, and 720 feet of drainfield line. The design pressure head for the system is 2 feet and the design flow rate is 50.1GPM. The design specifications are located in Attachment 7.

The 50g/month BiOWiSH™ treatment is a septic system is located in Chatham County, North Carolina. The system is designed and permitted for a 4 bedroom home and 480GPD wastewater flow. The system has a 1200 gallon septic tank, a 1000 gallon pump tank, and 960 feet of drainfield line. The design pressure head for the system is 2 feet and the design flow rate is 53.5GPM. The design specifications are located in Attachment 8.

The 25g/month BiOWiSH™ treatment is a septic system is located in Chatham County, North Carolina. The system is designed and permitted for a 4 bedroom home and 480GPD wastewater flow. The system has a 1200 gallon septic tank, a 1200 gallon pump tank, and 960 feet of drainfield line. The design pressure head for the system is 2 feet and the design flow rate is 79.3GPM. The design specifications are located in Attachment 9.

The treatments of the competing product are three septic systems located in Chatham County and Wake County, North Carolina. The Chatham County system is designed and permitted for a 4 bedroom home and 480GPD wastewater flow. The system has a 1200 gallon septic tank, a 1200 gallon pump tank, and 800 feet of drainfield line. The design pressure head for the system is 4 feet and the design flow rate is 26.55GPM. The design specifications are located in Attachment 10. The Wake County systems are both designed and permitted for 3 bedroom homes and 360GPD wastewater flows. Both systems also have 1000 gallon septic tanks and 1000 gallon pump tanks. One system has 1005 feet of drainfield line and the other system has 795 feet of drainfield line. Both systems have design pressure heads of 2 and 4 feet with flow rates of 38.2GPM and 35.32GPM. The design specifications are located in Attachment 11.

The control treatment (no additive) is a septic system is located in Chatham County, North Carolina. The system is designed and permitted for a 4 bedroom home and 480GPD wastewater flow. The system has a 1200 gallon septic tank, a 1200 gallon pump tank, and 812 feet of drainfield line. The design pressure head for the system is 2 feet and the design flow rate is 58.5GPM. The design specifications are located in Attachment 12.

For the 100g/quarter treatment, one 100 gram (g) package of BiOWiSH™ Septic Tank Aid was added to the toilet bowls according to the package instructions each quarter. The product was added to the toilets on 2/8/11, 5/16/11, 8/15/11, and 11/14/11 (4 consecutive quarters). For the

competitor's treatments, one box package of the competitor's product was added to the septic systems according to package instructions each month. Two of the systems were initiated into the study on September 19, 2011, and concluded September 17, 2012. One of the systems was initiated into the study on January 30, 2012, and concluded January 28, 2013. All the competitor's treatments were mixed with water in a clean bucket and then immediately poured into the inlet end of the septic tanks.

For the 50g/week, 100g/week, and 200g/week weekly BiOWiSH™ treatments, one 100g package of BiOWiSH™ Septic Tank Aid was added to each of the septic systems each week beginning on February 14, 2011, and ending on May 9, 2011. One-half (50g) of a package of BiOWiSH™ Septic Tank Aid was added to the 50g/week septic system each week beginning on May 16, 2011, and continuing through February 6, 2012 (52 weeks). One 100g package of BiOWiSH™ Septic Tank Aid continued to be added to the 100g/week septic system each week beginning on May 16, 2011, and continuing through February 6, 2012 (52 weeks). Two 100g packages of BiOWiSH™ Septic Tank Aid were added to the 200g/week septic system each week beginning on May 16, 2011, and continuing through February 6, 2012 (52 weeks).

The remaining BiOWiSH™ treatments were initiated into the study either on September 19, 2011, or January 30, 2012, and concluded September 17, 2012, or January 28, 2013, respectively. The Biowish product was added to the septic systems at the treatment rates of 25g/week, 25g bi-weekly, 100g/month, 50g/month, and 25g/month.

The BiOWiSH™ product was pre-activated each week or month (as appropriate depending on the treatment) by adding the contents of the packet to a 2 gallon bucket about half to three-quarters full of freshwater and stirring vigorously for about 2 minutes. The buckets were stored inside (at approximately 70°F) and uncovered for about 15-18 hours. The contents of the bucket were then poured into the inlet end of the septic tank. The intent of this procedure was to attempt to mimic the package instructions for adding the product to the septic system.

The septic tank and pump tank solids levels and scum layers were measured before study initiation and every week during the study using a Sludge Judge™. The system flow rate (at a known pressure head) was also measured before study initiation and every week during the study. The septic tank effluent temperature was measured on the inlet end of the tank each week using a digital thermometer. Wastewater samples were collected at 0 (baseline), 7, 14, 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, and 360 days from the septic tank and from the drainfield during the study period. The septic tank wastewater samples were collected from the inlet end of the septic tank using a standard wastewater sampling cup. Samples were collected from about 1 foot below the surface of the septic tank effluent. A sample spigot was constructed to sample the drainfield wastewater (Picture 1, other selected pictures are also

located in Attachment 13). The spigot was connected to the drainfield line ends that are accessible at the soil surface, the pump activated, and then wastewater collected in a 2 gallon bucket from the end of the spigot. Subsamples were collected and composited in the 2 gallon bucket from the uppermost and lowermost drainfield line ends from each of the 2 drainfield zones (4 total sample points). All samples were placed in a cooler on ice, transported to a local commercial laboratory, and analyzed for the following parameters: biochemical oxygen demand (BOD), total suspended solids (TSS), total Kjeldahl nitrogen (TKN), fats/oils/grease (F.O.G.), dissolved oxygen (DO), and nitrate/nitrite-nitrogen ($\text{NO}_2/\text{NO}_3\text{N}$).



Picture 1. Sampling Effluent from the Drainfield

Results and Discussion

The pump tank solids levels and scum layers for all systems were <3" and 0", respectively, throughout the entire study. The overwhelming majority of wastewater samples were not detectable for DO and NO₂/NO₃-N, so analysis for these parameters was discontinued after the 6/20/11 sampling event. The flow rate measurements are presented in Table 1 below and remained consistent throughout the study for each system. The initial flow rate measurements were very near the design flow rates, so there was little room for improvement in the flow rate.

Table 1. Septic System Flow Rate Averages for the Study Period.

<u>System</u>	ate (Average)
	-----GPM-----
100g/Qtr	24.93
200g/Wk	36.90
100g/Wk	80.20
50g/Wk	41.24
25g/Wk	83.15
25g Biweekly	53.42
100g/Mo	33.80
50g/Mo	58.95
25g/Mo	64.87
Competitor's Product #1	28.48
Competitor's Product #2	33.42
Competitor's Product #3	29.07
Control	47.00

The drainfield wastewater sample results are presented in Table 2 as averages. The sample results changed very little throughout the study. The wastewater results were initially low and remained low in each sample. Drainfield wastewater sampling was discontinued after the 4/11/11 sample since the results were low and relatively unchanged.

Table 2. Drainfield Wastewater Sample Averages for Samples Collected from 2/8/11 – 4/11/11.

<u>System</u>	<u>BOD</u>	<u>TKN</u>	<u>TSS</u>	<u>FOG</u>
	-----mg/L-----			
100g/Qtr	180	70.7	97.2	26.8
200g/Wk	164	88.4	143.4	20.3
100g/Wk	78	39.1	51.7	14.2
50g/Wk	72	46.2	84.4	17.1

Treatment Effects on Septic Systems – Biochemical Oxygen Demand (BOD) There was generally a decrease in BOD during the study for all additive treatments (Figure 1). The decrease resulted in BOD levels below or very near the regulatory standard of 350 mg/L. The largest decreases occurred during the first 4 weeks after the initial addition of the treatments. All treatments showed a greater decrease and a more steady decrease in BOD level than the control. The control exhibited very irregular levels of BOD and very large swings in BOD levels between sample times. Additionally, the control BOD was never close to the regulatory standard, ranging from 2.5 to 22 times the standard. This strongly indicates the positive impact that the additives had on the BOD compared to the control.

The BOD decrease in the additive treatments ranged dramatically depending on the baseline BOD in the wastewater. This suggests that the BiOWiSH™ Septic Tank Aid may provide a higher BOD reduction benefit for those systems with a higher initial BOD concentration compared to those systems with a lower initial BOD concentration. This fact can be especially seen in Figure 2 where the data has been normalized relative to baseline BOD concentration AND those systems with baseline BOD less than the regulatory standard have been dropped from the dataset.

Treatment Effects on Septic Systems – Total Kjeldahl Nitrogen (TKN)

There were very minimal, if any, changes in the TKN concentration throughout the study for all treatments, including the control (Figure 3). The TKN level was nearly always below the regulatory standard of 100 mg/L. The TKN fluctuated slightly for all treatments, but generally hovered around 80-100 mg/L range, which is below the regulatory standard of 100 mg/L.

Six treatments, including the control, had baseline TKN levels higher than the regulatory standard of 100 mg/L. These treatments showed some reduction in TKN level over the course of the study thus far, but these reductions appeared very similar to the control (Figure 4). Therefore, the impact of the additives on TKN levels is inconclusive.

Treatment Effects on Septic Systems – Total Suspended Solids (TSS)

There was generally a decrease in TSS during the study for all additive treatments (Figure

5). The decrease resulted in TSS levels very near the regulatory standard of 200 mg/L, but seldom below the standard. The largest decreases occurred during the first 4 weeks after the initial addition of the treatments. All treatments showed a greater decrease and a more steady decrease in TSS level than the control. The control exhibited very irregular levels of TSS and very large swings in TSS levels between sample times. Additionally, the control TSS was never close to the regulatory standard, ranging from 4 to 43 times the standard. This strongly indicates the positive impact that the additives had on the TSS compared to the control.

The TSS decrease in the additive treatments ranged dramatically depending on the baseline TSS in the wastewater. This suggests that the BiOWiSH™ Septic Tank Aid may provide a higher TSS reduction benefit for those systems with a higher initial TSS concentration compared to those systems with a lower initial TSS concentration. This fact can be especially seen in Figure 6 where the data has been normalized relative to baseline TSS concentration AND those systems with baseline TSS less than the regulatory standard have been dropped from the dataset.

Treatment Effects on Septic Systems – Fats, Oil, & Grease (FOG)

There was generally a decrease in FOG during the study for all additive treatments (Figure 7). The decrease resulted in FOG levels near the regulatory standard of 30 mg/L, but very seldom below the standard. The largest decreases occurred during the first 4 weeks after the initial addition of the treatments. All treatments showed a greater decrease and a more steady decrease in FOG level than the control. The control exhibited very irregular levels of FOG and very large swings in FOG levels between sample times. Additionally, the control FOG was never close to the regulatory standard, ranging from 5 to 187 times the standard. This strongly indicates the positive impact that the additives had on the FOG compared to the control.

The FOG decrease in the additive treatments ranged dramatically depending on the baseline FOG in the wastewater. This suggests that the BiOWiSH™ Septic Tank Aid may provide a higher FOG reduction benefit for those systems with a higher initial FOG concentration compared to those systems with a lower initial FOG concentration. This fact can be especially seen in Figure 8 where the data has been normalized relative to baseline FOG concentration

AND only those systems with baseline FOG 8 times or more higher than the regulatory standard have been retained in the dataset.

Treatment Effects on Septic Systems – Solids and Scum Layer Levels

The septic tank solids levels fluctuated slightly for the 100g/quarter treatment, but remained fairly unchanged (Figure 9). The septic tank scum layer decreased slightly during the course of the test for the 100g/quarter treatment, especially about 120 days after study initiation (Figure 10).

The septic tank solids levels fluctuated slightly during the early part of the study and remained fairly unchanged until about 120 days after study initiation for the 200g/week, 100g/week, and 50g/week treatments (Figure 9). After this point, the solids levels began to decrease. The solids levels decreased about 2 inches from the beginning to end of the study for these systems.

The septic tank scum layer levels fluctuated slightly during the early part of the study and remained fairly unchanged until about 120 days after study initiation (Figure 10) for the 200g/week, 100g/week, and 50g/week treatments. At this point, the scum layer levels began to decrease for the 200g/week and 50g/week treatments. The scum layer levels have decreased about 8 inches since the study began for the 200g/week treatment. The scum layer levels have decreased about 4 inches since the study began for the 50g/week treatment. The 100g/week treatment had the smallest baseline scum layer depth and did not exhibit any scum layer depth reduction during the study. The 200g/week treatment had the largest baseline scum layer depth and exhibited the highest scum layer depth reduction during the study. The 50g/week treatment had an intermediate baseline scum layer depth (compared to the 200g/week and 100g/week treatments) and exhibited an intermediate scum layer depth reduction (compared to the 200g/week and 100g/week treatments) during the study. These results suggest that the BiOWiSH™ Septic Tank Aid may provide a higher scum layer reduction benefit for those systems with a higher initial scum layer depth compared to those systems with a lower initial scum layer depth.

The monthly BiOWiSH™ Septic Tank Aid treatments, the 25g/week and 25g biweekly BiOWiSH™ Septic Tank Aid treatments, and treatments of the competitor's product did not show consistent reductions in solids or scum levels.

BiOWiSH™ Septic Tank Aid Versus Competitor's Product Impacts on Septic Systems

The impact of BiOWiSH™ Septic Tank Aid versus the competitor's product, applied according to package instructions (100g/quarter for BiOWiSH™ Septic Tank Aid and 1 box/month for the competitor's product), are compared in Figures 11 – 16. As stated above, these treatments did not impact septic tank solids or scum layer levels. Additionally, as stated above, the wastewater TKN levels were impacted very little (if any) in these treatments.

The wastewater BOD, TSS, and FOG levels exhibited a decrease when using both products according to package instructions. These levels were also lower than the same levels in the control treatment, indicating both products cause a reduction in BOD, TSS, and FOG compared to the control. Finally, both products reduced wastewater BOD levels to below or near the regulatory standard of 350 mg/L.

The BiOWiSH™ Septic Tank Aid product caused lower wastewater BOD, TSS, and FOG levels than the competitor's product. Furthermore, the BOD, TSS, and FOG levels were more consistently below the regulatory standards when the BiOWiSH™ Septic Tank Aid product was used than when the competitor's product was used. Finally, more consistently stable reductions in BOD, TSS, and FOG levels were observed when the BiOWiSH™ Septic Tank Aid product was used than when the competitor's product was used.

Septic Tank Effluent Temperatures

The septic tank effluent temperatures steadily fluctuated during the study relative to the air temperature, peaking between 78 to 85°F during the summer months (Figure 17).

This temperature peak timeframe corresponds to septic tank solids levels and scum layer depth reductions, which may indicate an influence of temperature on these reductions.

Conclusions

- 1) BiOWiSH™ Septic Tank Aid is simple to prepare and add to an LPP septic system.
- 2) BiOWiSH™ Septic Tank Aid can substantially reduce the BOD, TSS, and FOG levels in septic tanks when added on a quarterly, monthly, or weekly basis, regardless of the application rate. This reduction occurs within 2-4 weeks from addition to the system and the reductions remain consistent as long as the product is consistently added to the system.

- 3) BiOWiSH™ Septic Tank Aid can reduce the BOD, TSS, and FOG levels in septic tanks (when added on a quarterly, monthly, or weekly basis) to near or below regulatory standards for these constituents.
- 4) BiOWiSH™ Septic Tank Aid may provide a higher BOD/TSS/FOG reduction benefit for those systems with a higher initial BOD/TSS/FOG concentrations compared to those systems with a lower initial BOD/TSS/FOG concentrations.
- 5) The BOD, TSS, and FOG in the control exhibited very irregular levels and very large swings between sample times. Additionally, the control was never close to any of the regulatory standards, ranging from 2.5 to 187 times greater than the standards. This strongly indicates the positive impact that the additives had on the systems compared to the control.
- 6) BOD, TSS, and FOG are important parameters that substantially impact the operation of a septic system. Therefore, an inexpensive and easy to apply additive like BiOWiSH™ Septic Tank Aid could potentially improve the operation of septic systems.
- 7) BiOWiSH™ Septic Tank Aid does not impact the TKN levels in septic tanks, but initial TKN levels in the systems in this study were low (below regulatory standards). Therefore, it is possible that septic tanks with higher initial TKN levels may benefit from the addition of BiOWiSH™ Septic Tank Aid.
- 8) BiOWiSH™ Septic Tank Aid does not appear to impact the solids levels or scum layer depths in septic tanks when added to the systems according to package instructions (i.e. quarterly).
- 9) BiOWiSH™ Septic Tank Aid does not impact the BOD, TSS, TKN, or FOG levels in septic system drainfield effluent, but initial levels in the systems in this study were low (below regulatory standards). Therefore, it is possible that drainfield effluent with higher initial levels may benefit from the addition of BiOWiSH™ Septic Tank Aid.
- 10) BiOWiSH™ Septic Tank Aid can reduce septic tank solids levels and scum layer depths when added to the systems on a weekly basis. However, these reductions do not occur until after about 3 months of consistent weekly additions.
- 11) BiOWiSH™ Septic Tank Aid may provide a higher scum layer reduction benefit for those systems with a higher initial scum layer depth compared to those systems with a lower initial scum layer depth.
- 12) Both BiOWiSH™ Septic Tank Aid and the competitor's product cause BOD, TSS, and FOG reductions compared to the control treatment.
- 13) The BiOWiSH™ Septic Tank Aid product caused lower wastewater BOD, TSS, and FOG levels than the competitor's product.

- 14) The BOD, TSS, and FOG levels were more consistently below the regulatory standards when the BiOWiSH™ Septic Tank Aid product was used than when the competitor's product was used.
- 15) More consistently stable reductions in BOD, TSS, and FOG levels were observed when the BiOWiSH™ Septic Tank Aid product was used than when the competitor's product was used.
- 16) Further study, to include both additional time and additional septic systems, is needed to determine the most appropriate application rate and frequency of BiOWiSH™ Septic Tank Aid addition to septic systems. A control also needs to be added to future investigations in order to determine the amount of impact that time and temperature have on the measured septic tank parameters. This additional study is currently underway.

- (1) Jeff Vaughan is the Senior Agronomist/Soil Scientist and President of Agri- Waste Technology, Inc. Jeff is a Certified Professional Soil Scientist, a North Carolina Licensed Soil Scientist, and NCOWCICB Certified Septic System Inspector, and a North Carolina Subsurface Septic System Operator.
- (2) Agri-Waste Technology, Inc. (AWT) is a full service environmental engineering consulting firm specializing in waste management, wastewater system design and permitting, wastewater system inspections and operation, and land use management. AWT serves the entire U.S. Additional information can be found at www.agriwaste.com.

Figure 1. Septic Tank Effluent Biochemical Oxygen Demand (BOD).

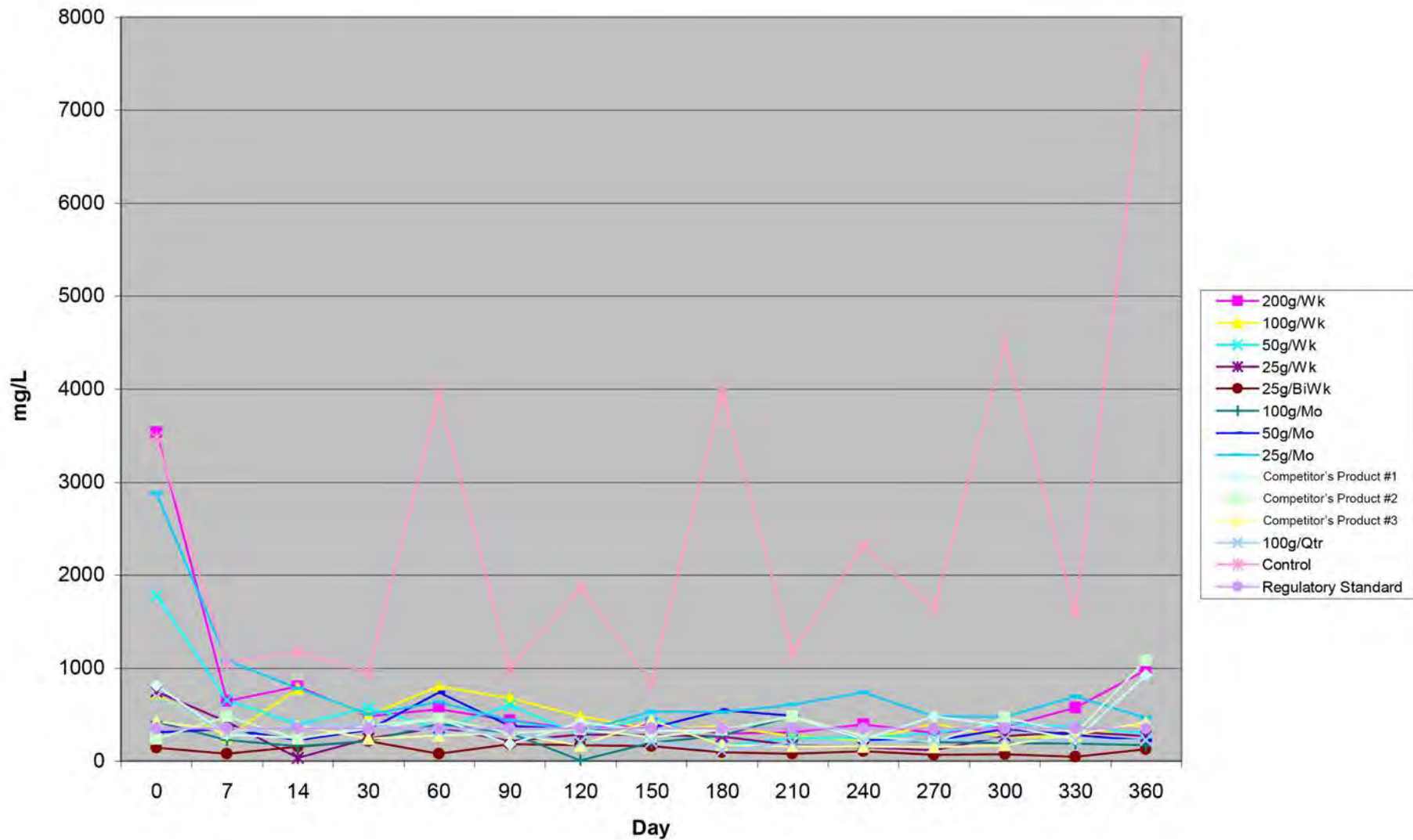


Figure 2. Septic Tank Effluent Biochemical Oxygen Demand (BOD) Relative to Baseline BOD.

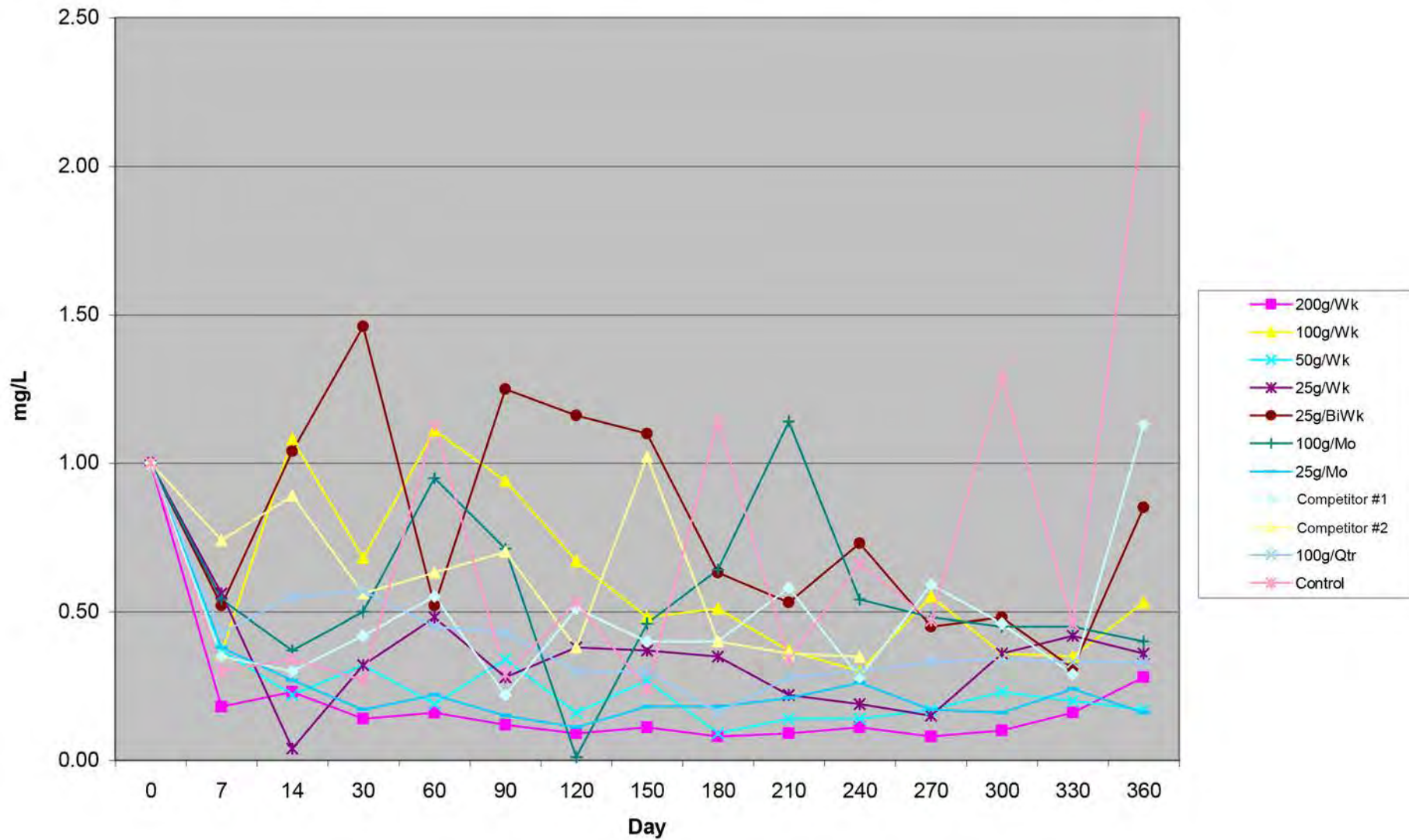


Figure 3. Septic Tank Effluent Total Kjeldahl Nitrogen (TKN).

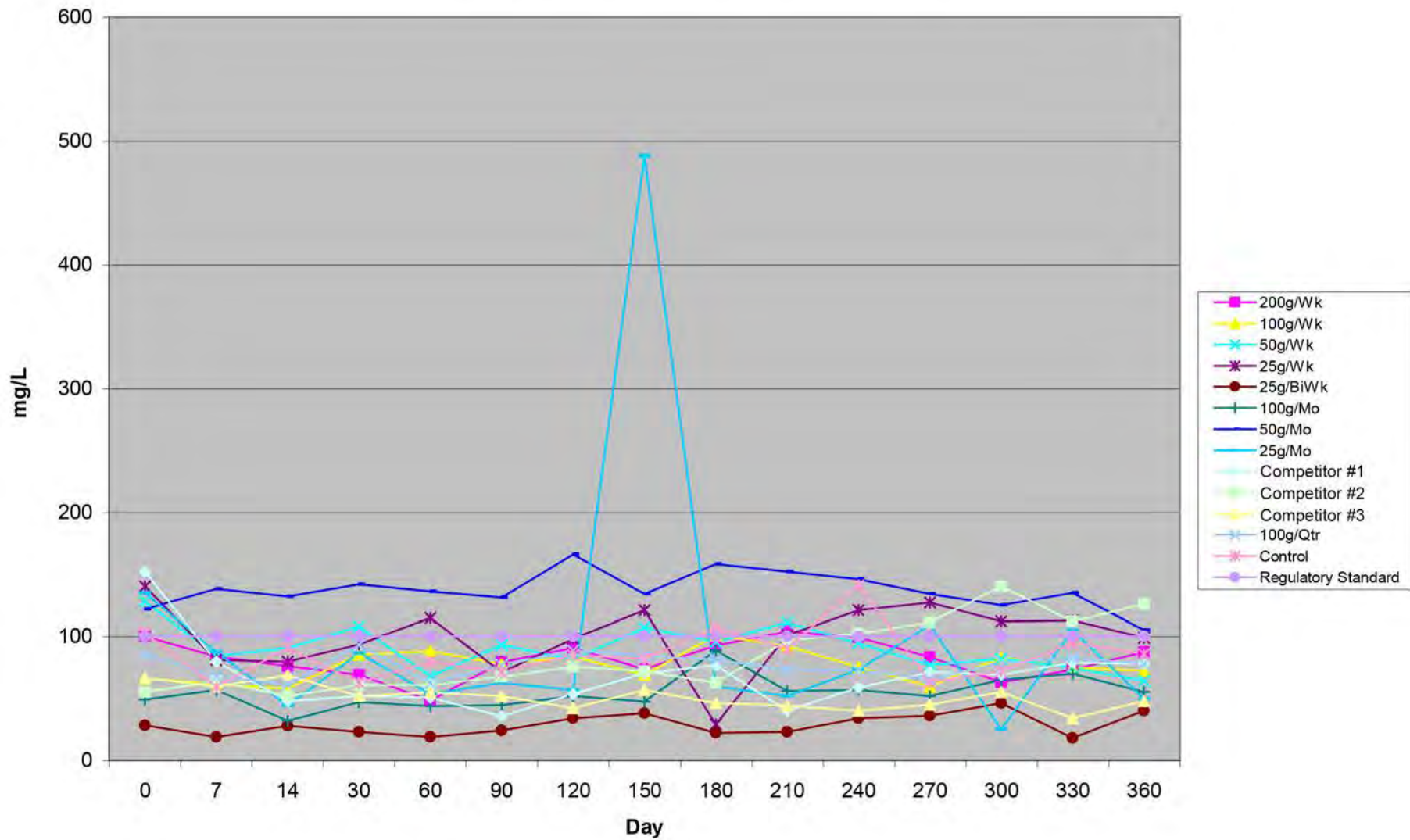


Figure 4. Septic Tank Effluent Total Kjeldahl Nitrogen (TKN) Relative to Baseline TKN.

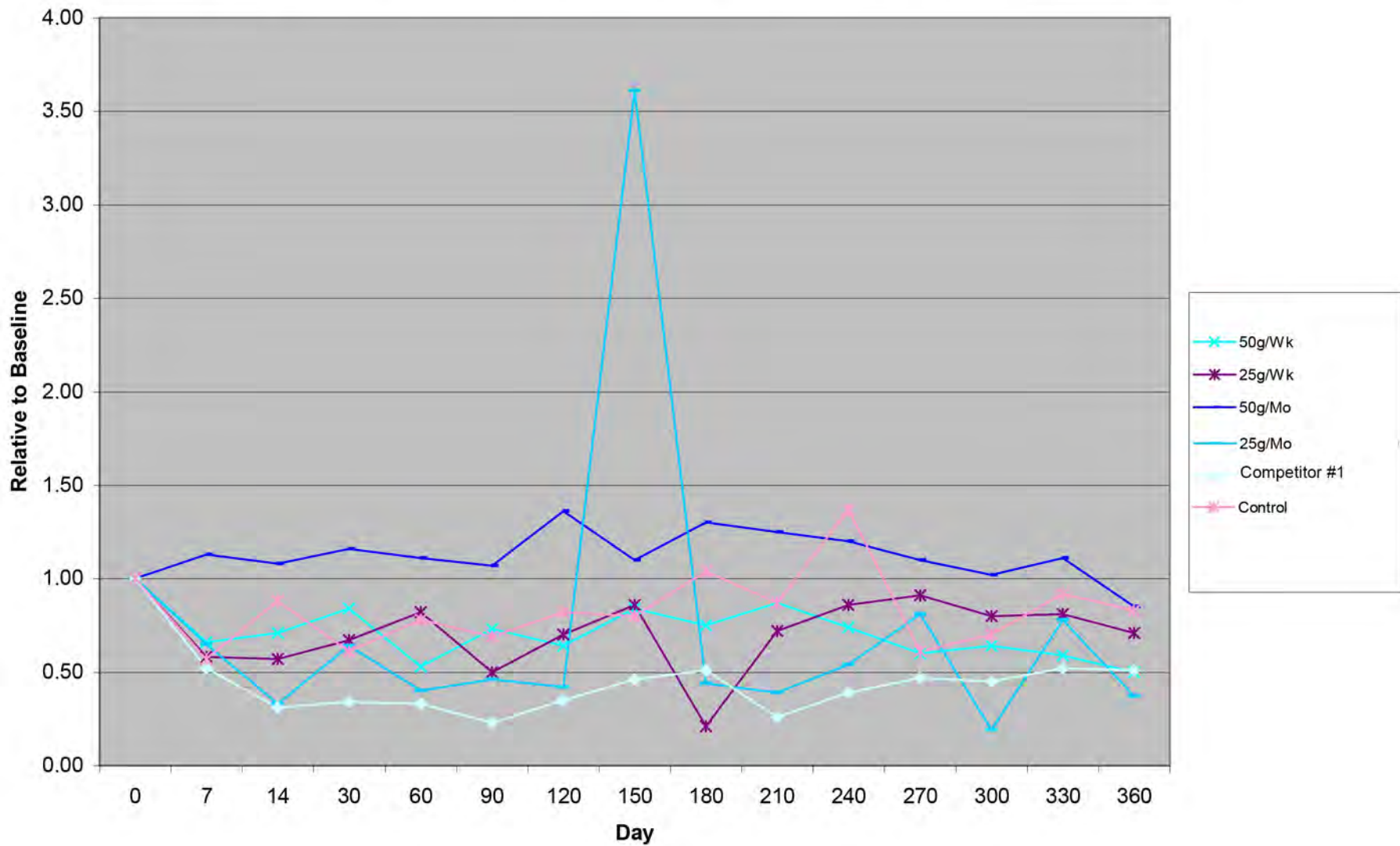


Figure 5. Septic Tank Effluent Total Suspended Solids (TSS).

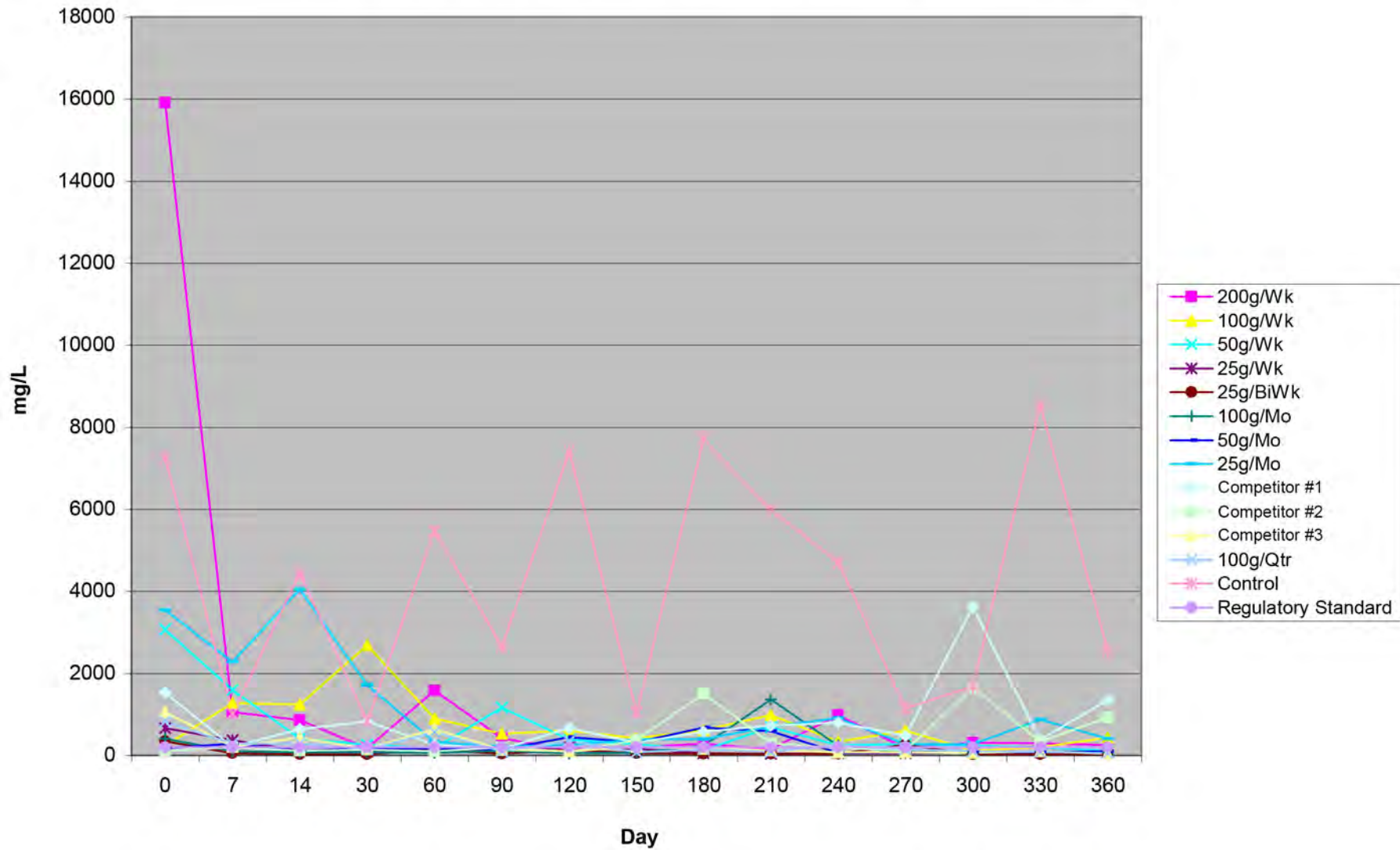


Figure 6. Septic Tank Effluent Total Suspended Solids (TSS) Relative to Baseline TSS.

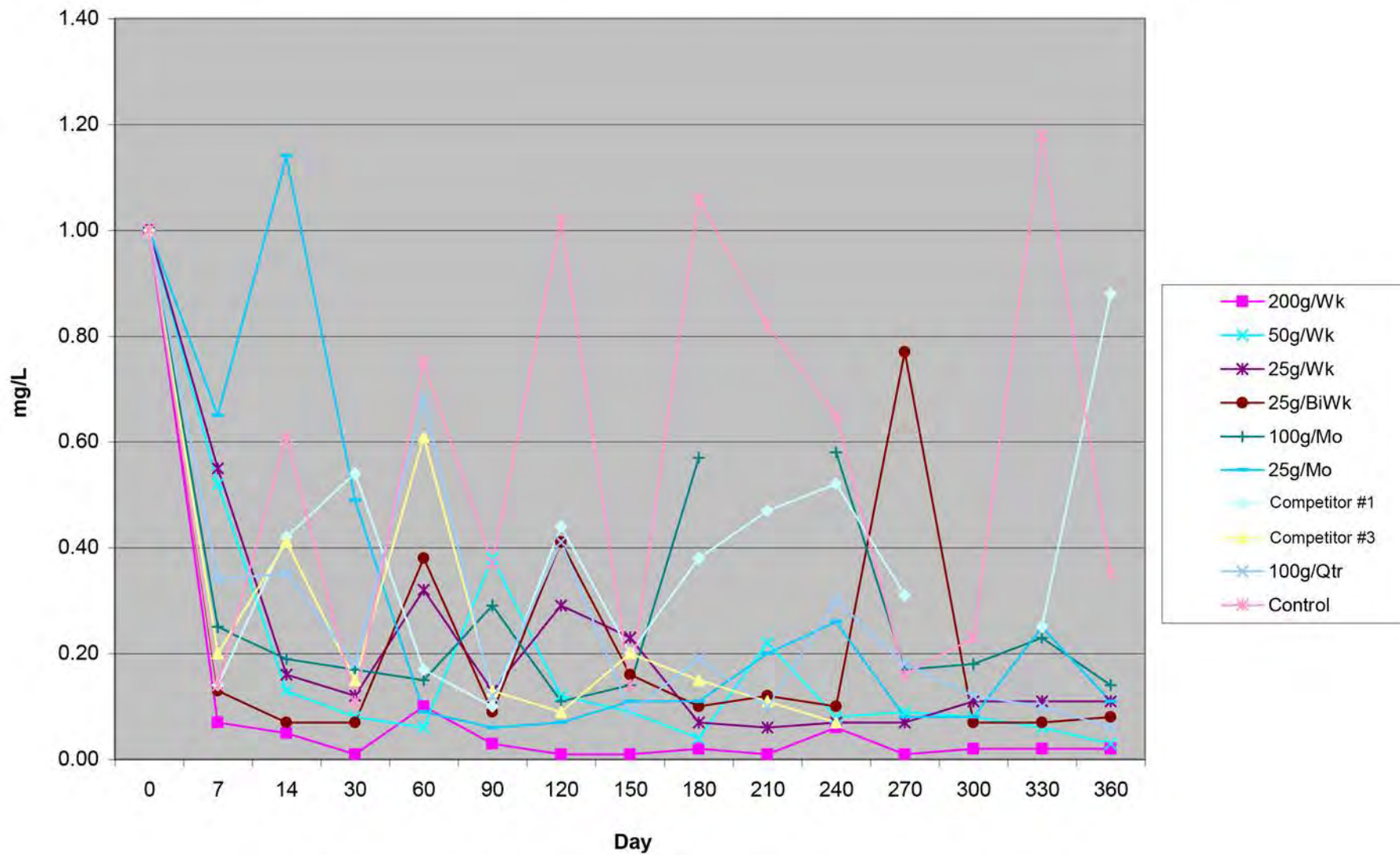


Figure 7. Septic Tank Effluent Fat, Oils, & Grease (FOG).

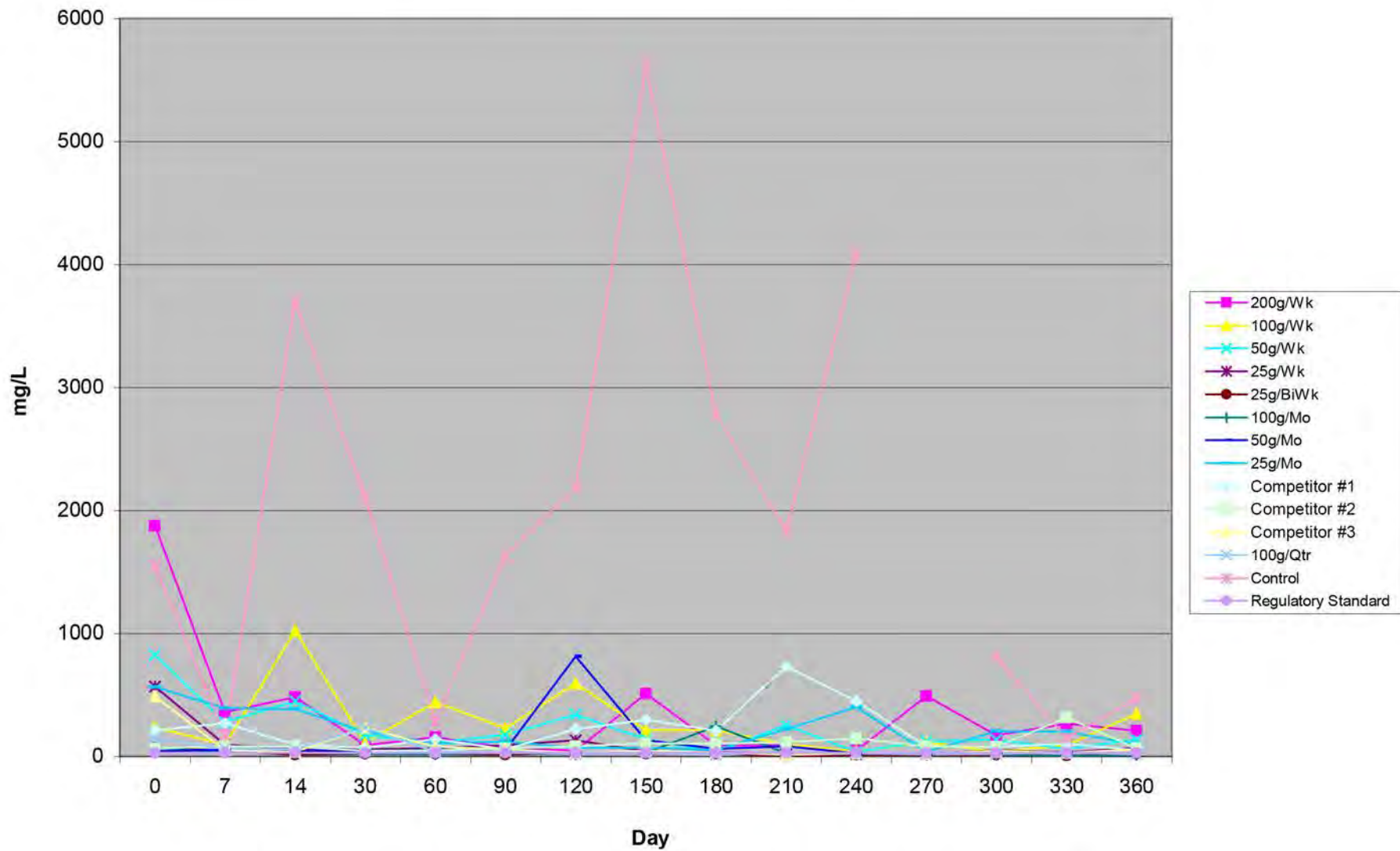


Figure 8. Septic Tank Effluent Fat, Oils, & Grease (FOG) Relative to Baseline FOG.

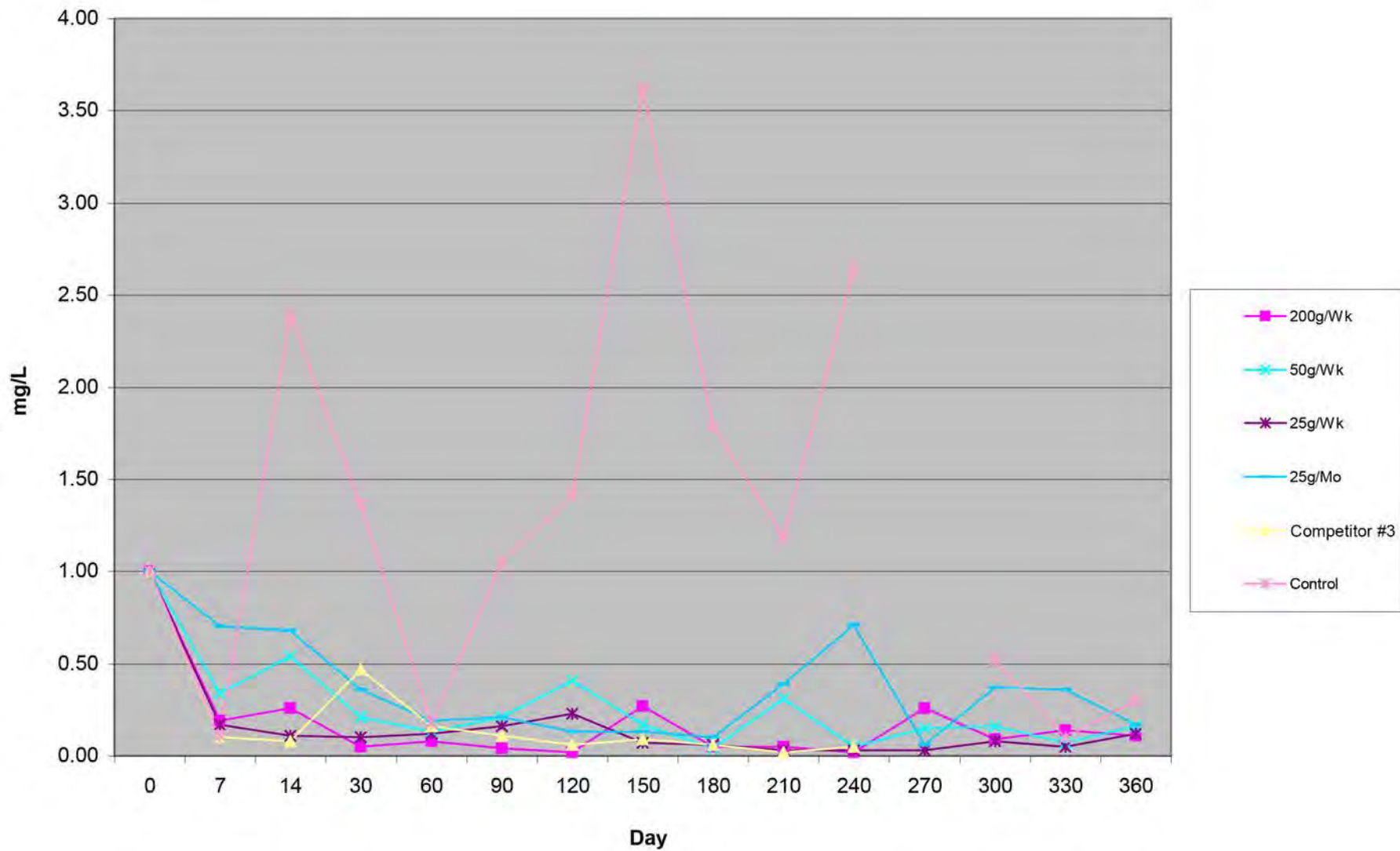


Figure 9. Septic Tank Solids Levels.

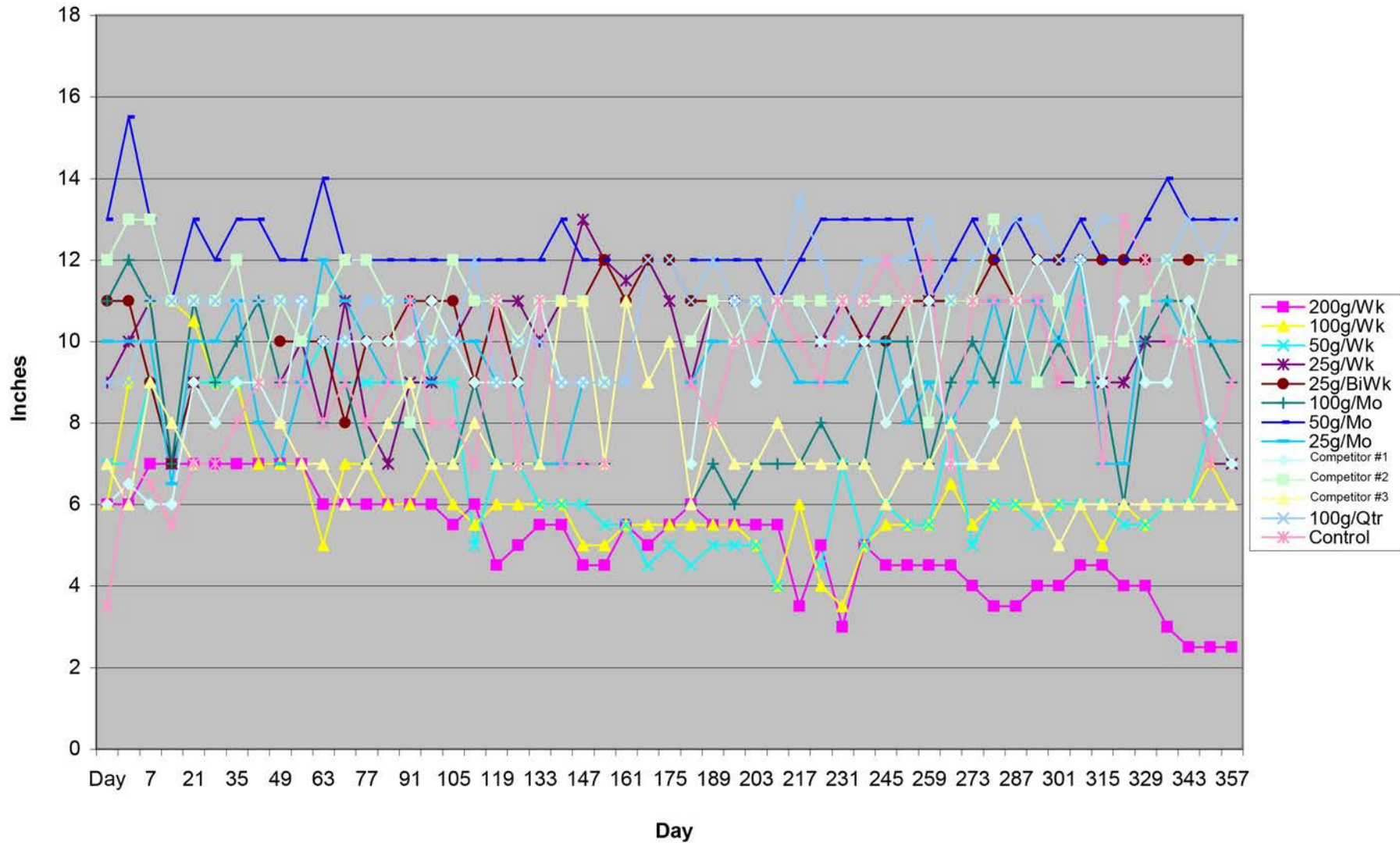


Figure 10. Septic Tank Scum Layer Levels.

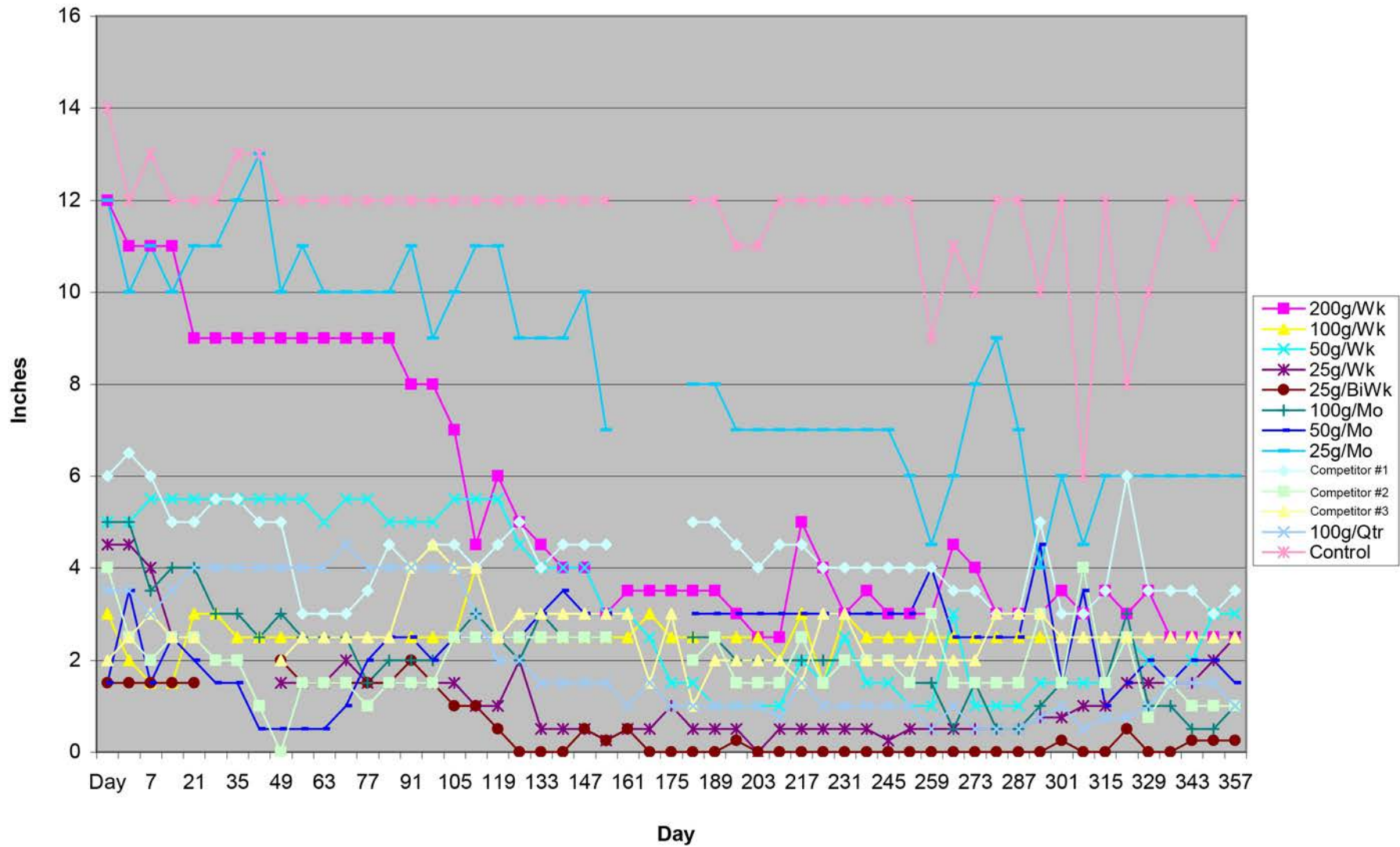


Figure 11. Septic Tank Effluent Biochemical Oxygen Demand (BOD) - Septic Tank Aid vs. Competitor

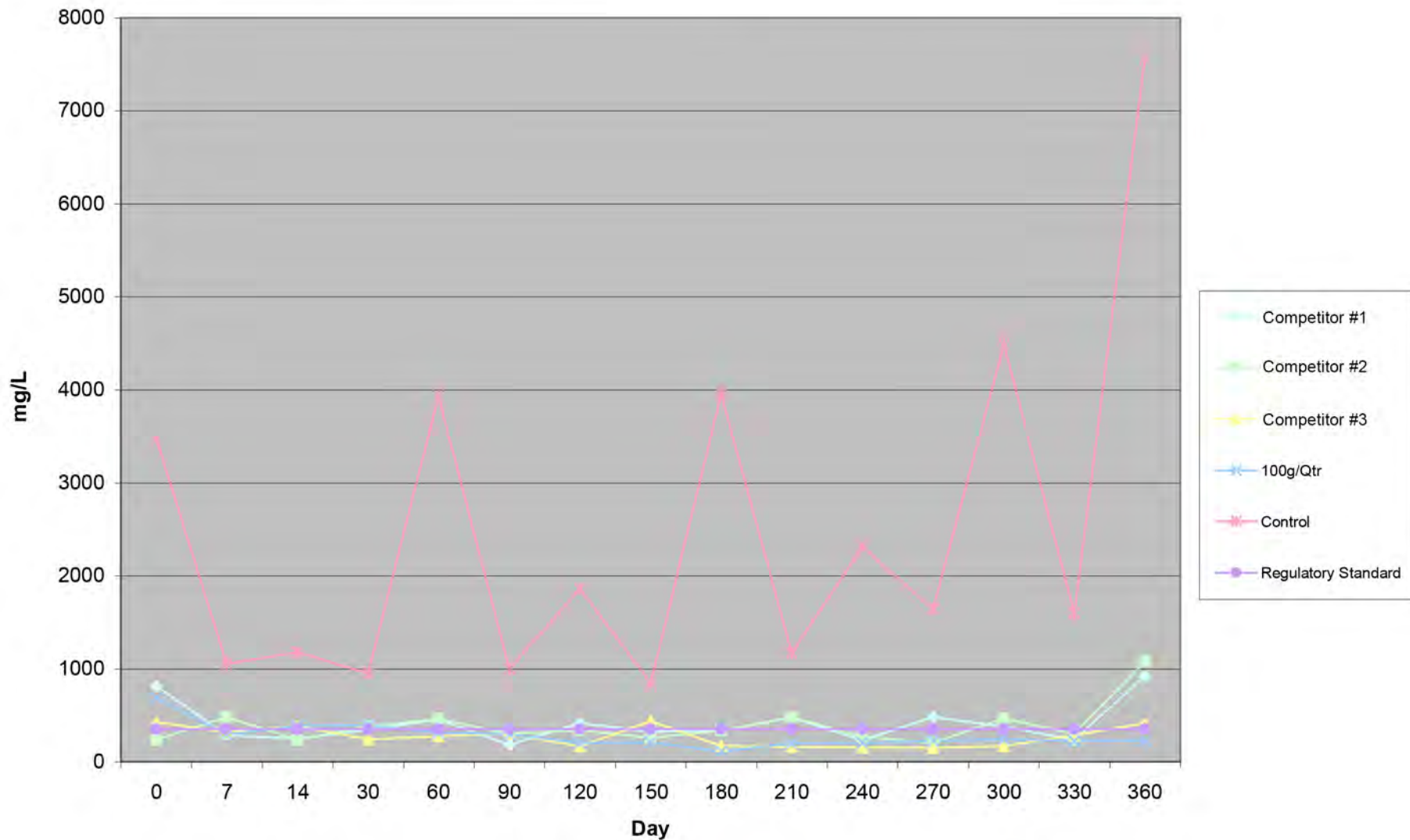


Figure 12. Septic Tank Effluent Biochemical Oxygen Demand (BOD) Relative to Baseline - Septic Tank Aid vs. Competitor

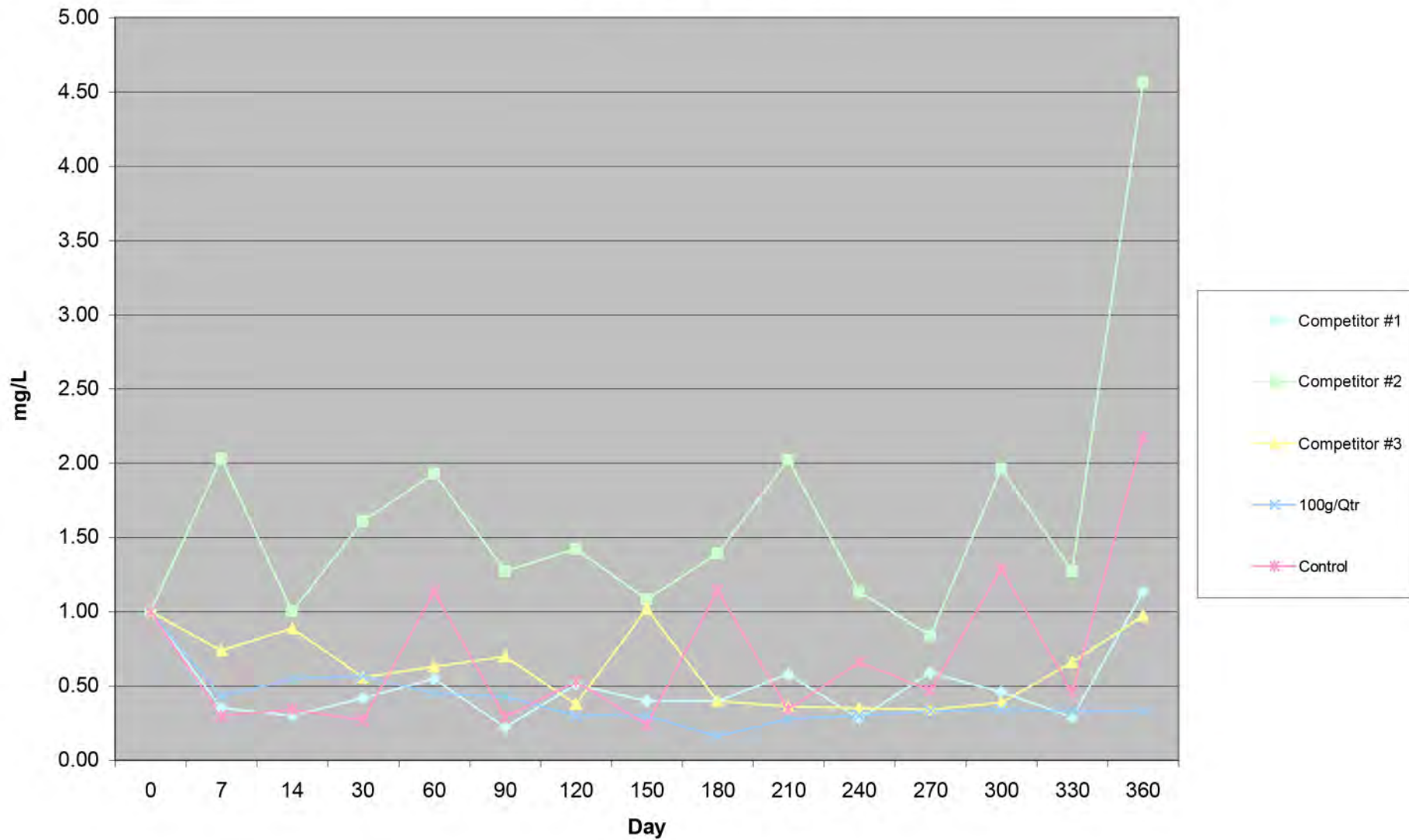


Figure 13. Septic Tank Effluent Total Suspended Solids (TSS) - Septic Tank Aid vs. Competitor

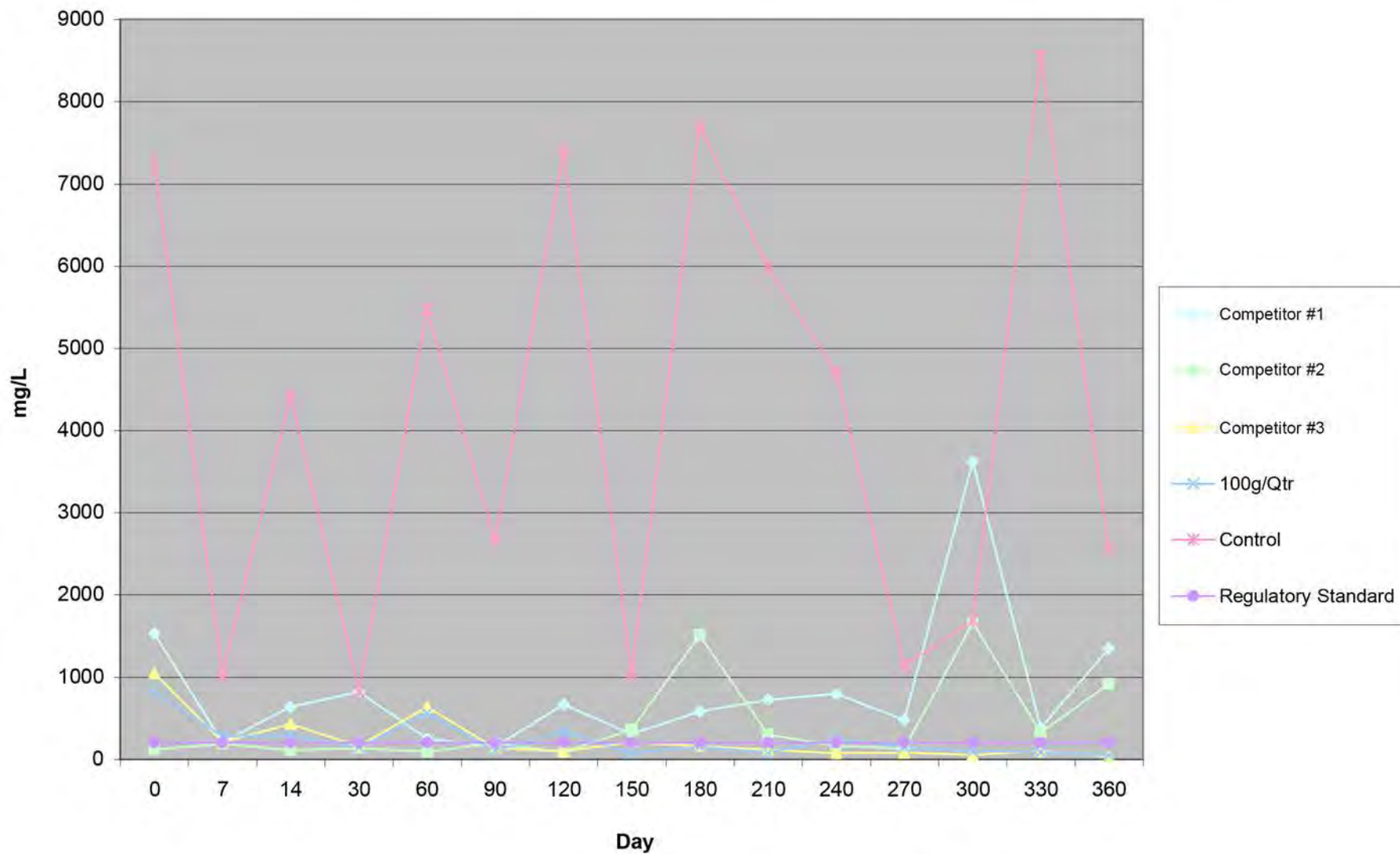


Figure 14. Septic Tank Effluent Total Suspended Solids (TSS) Relative to Baseline - Septic Tank Aid vs. Competitor

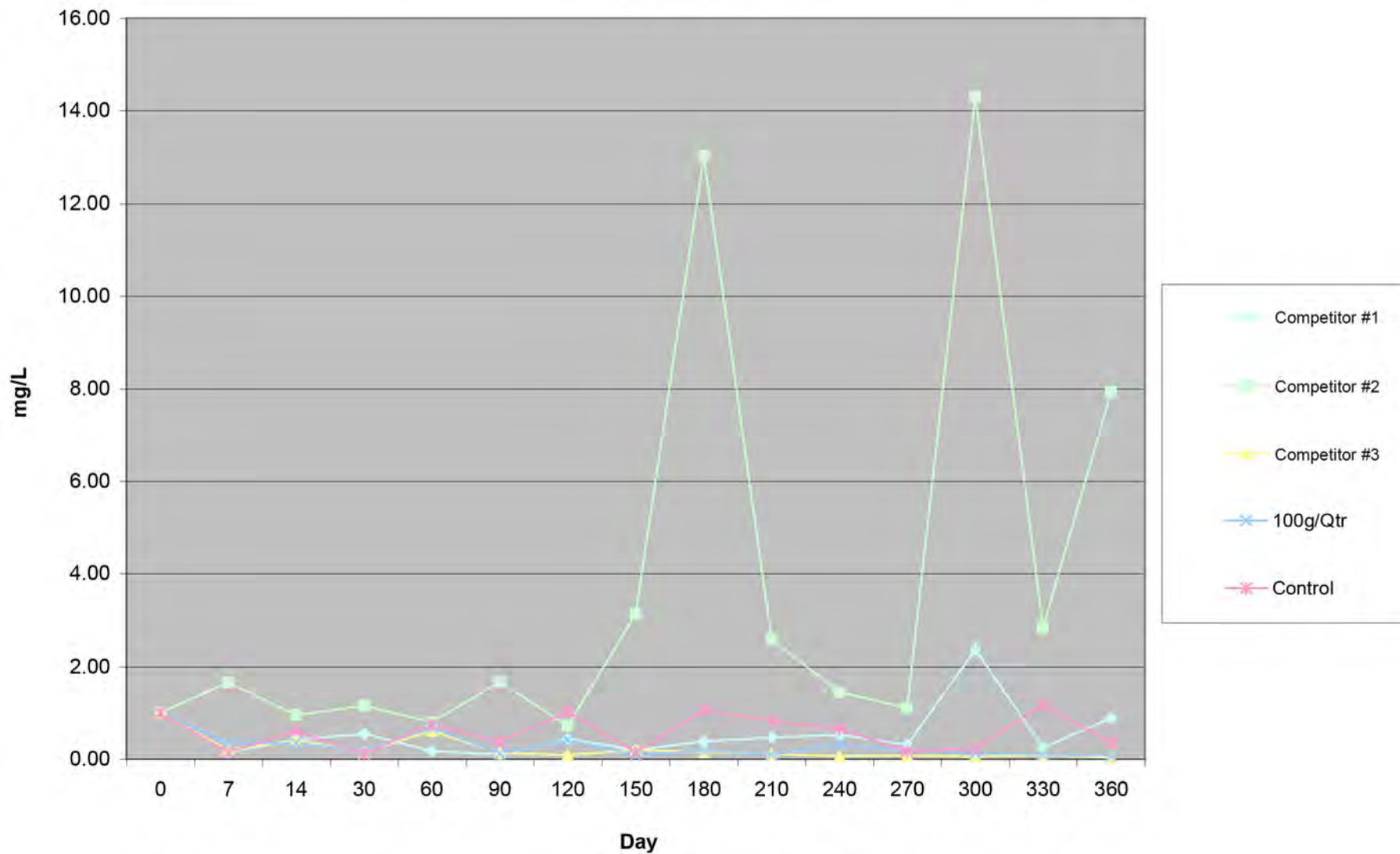


Figure 15. Septic Tank Effluent Fat, Oils, & Grease (FOG) - Septic Tank Aid vs. Competitor

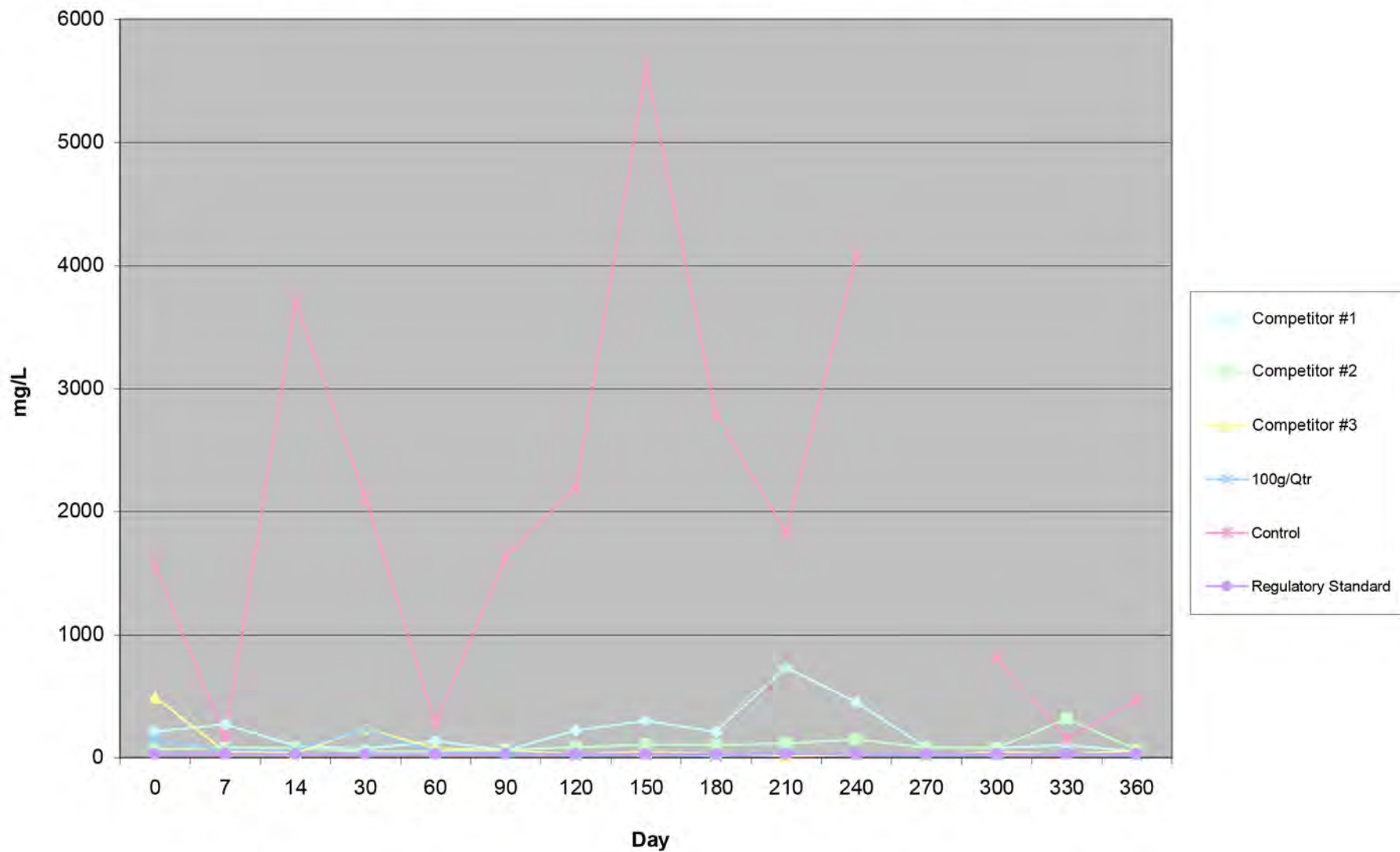


Figure 16. Septic Tank Effluent Fat, Oils, & Grease (FOG) Relative to Baseline - Septic Tank Aid vs. Competitor

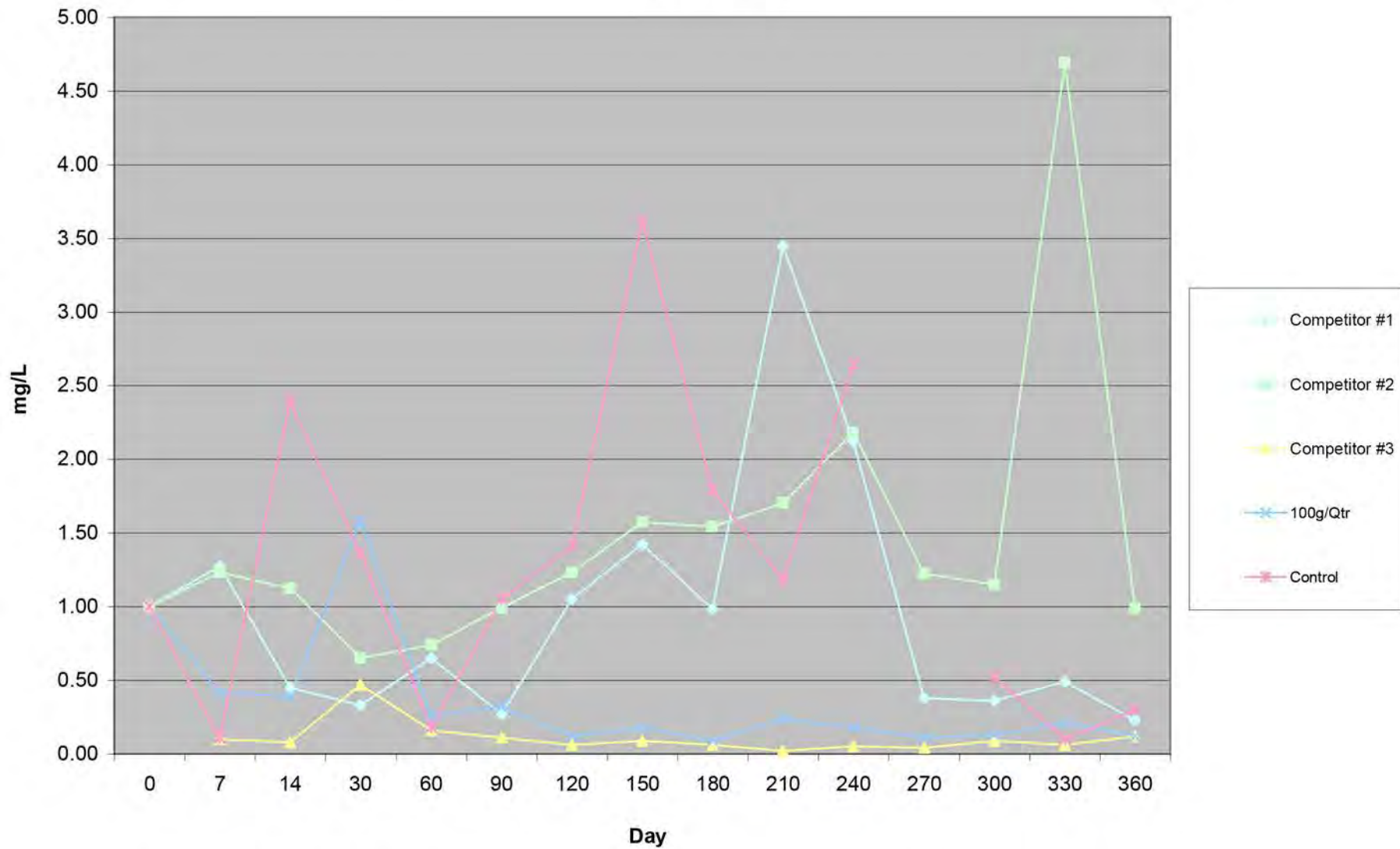
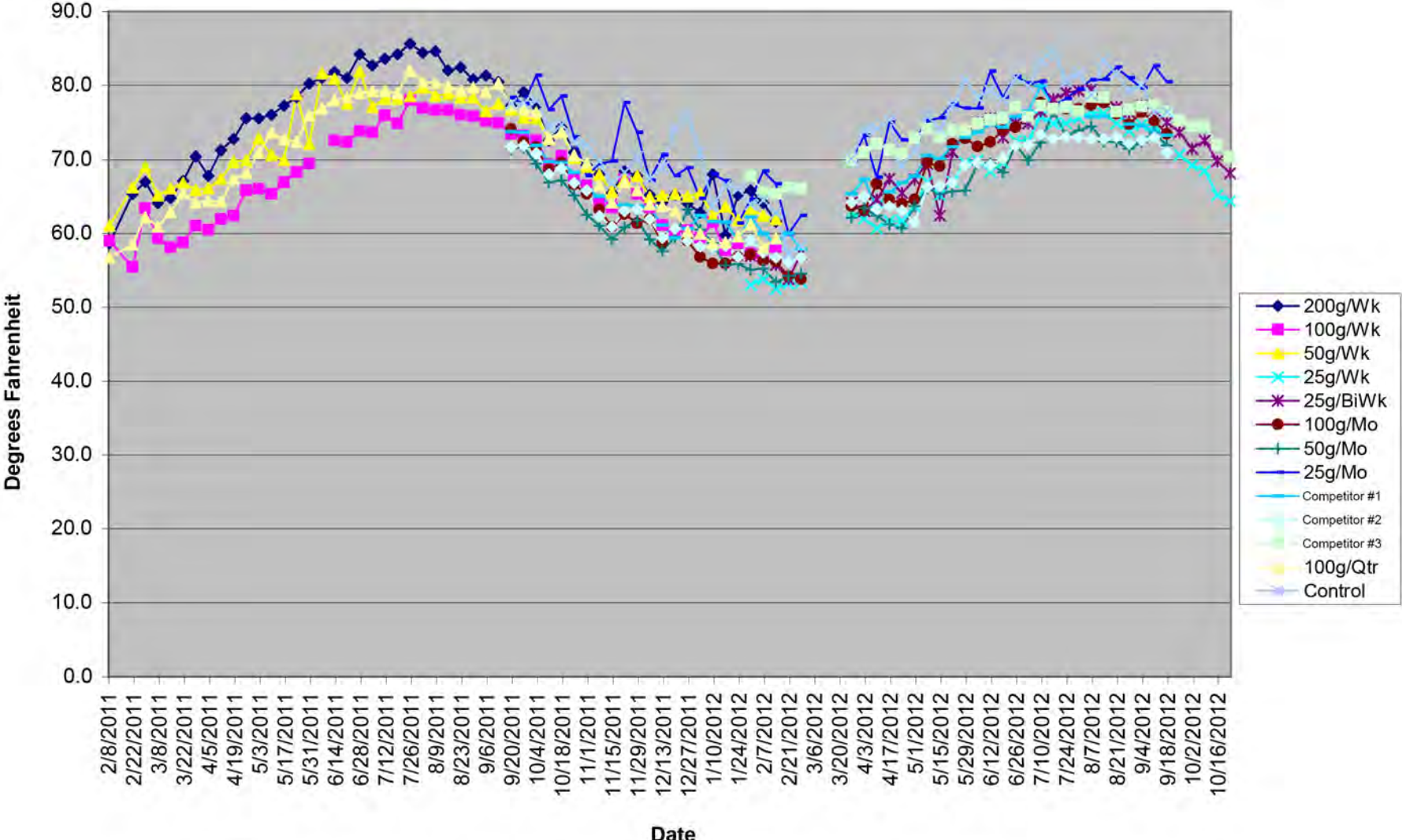


Figure 17. Septic Tank Effluent Temperature.



ATTACHMENT 1:

Design Specifications for 100g/Quarter Treatment

Map Block Lot 18

Size of tank: _____

Nitrification line: _____

Septic tank should be pumped out every 3 to 5 years and shall be maintained by owner in such a manner as not to create a public health hazard. Septic tank and nitrification line MUST BE INSPECTED AND APPROVED BY A MEMBER OF THE HEALTH DEPARTMENT STAFF BEFORE ANY PORTION OF THE INSTALLATION IS COVERED AND PUT INTO USE.

Counter-
signed _____
(Owner or his representative)

This permit is subject to revocation if site plans or the intended use change. This permit for sewage disposal is valid for 5 years.

Certificate of Completion
Date Approved: 10-17-95 By: [Signature]
Sanitarian

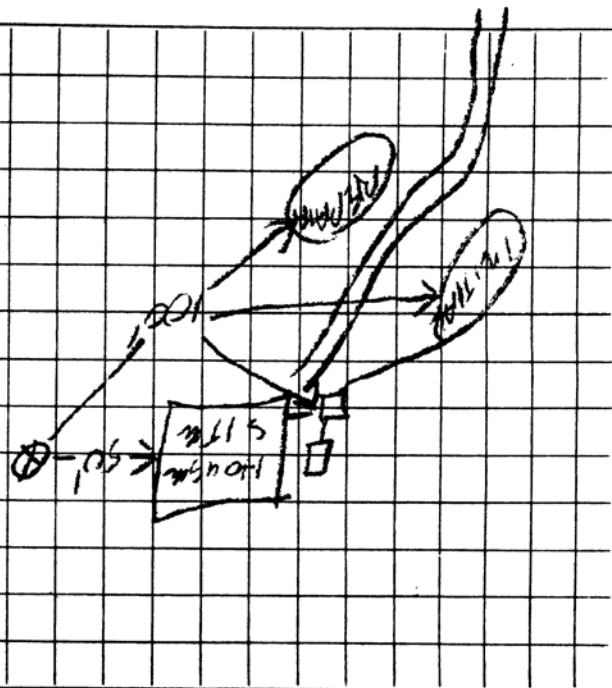
(OVER)
Location of well and sewage disposal facilities sketched on back.

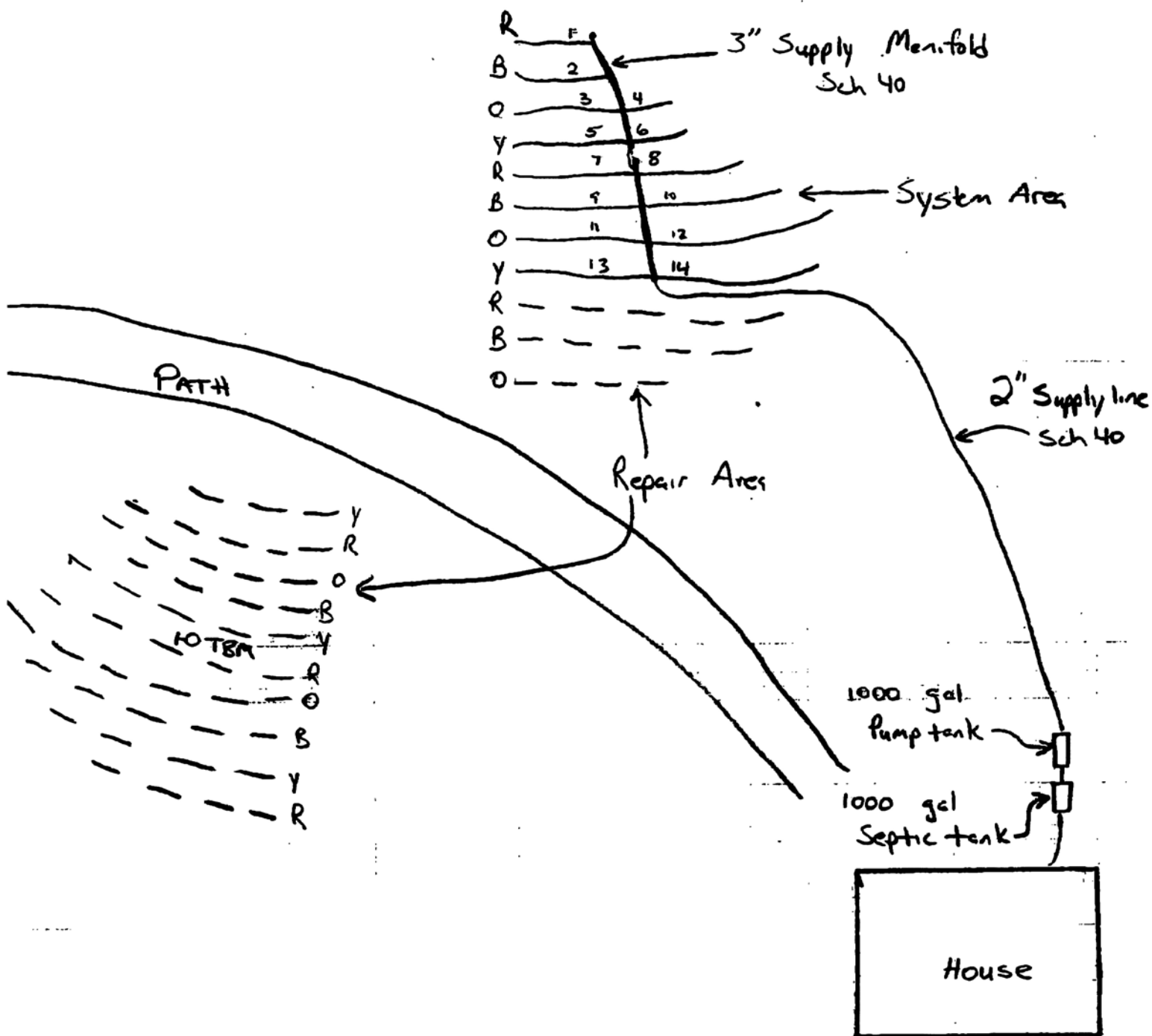
B&E 10789

NOTE: Make sketch of installation showing lot size and shape, location of house, septic tanks, privies, water supplies, etc. Note special problems existing on lot. Write in measurements in order that installations may be located at later date. Note location of water supplies on adjacent lots.

(1)

(2)





Site Plan Lot 18
Jordan Woods
N.T.S

Lot # 18

Jordan Woods Subdivision

LATERAL NUMBER	ELEVATION (FT)	HEAD (FT)	HOLE SIZE (IN)	FLOW PER HOLE (GPM)	LENGTH (FT)	SPACING (FT)	NUMBER OF HOLES	FLOW PER LAT. (GPM)	INST FLOW RATE (GPM/FT)
-------------------	-------------------	--------------	----------------------	------------------------------	----------------	-----------------	-----------------------	------------------------------	----------------------------------

FIELD #1

1	111.56	2	5/32	.41	27	5.4	4	1.64	.0607
2	110.91	2.65	5/32	.47	50	7.1	6	2.82	.0564
3	110.26	3.3	5/32	.52	45	7.5	5	2.6	.058
4	110.26	3.3	5/32	.52	25	6.3	3	1.56	.0624
5	109.66	3.9	5/32	.57	59	8.4	6	3.42	.058
6	109.66	3.9	5/32	.57	33	8.3	3	1.71	.0518

FIELD #2

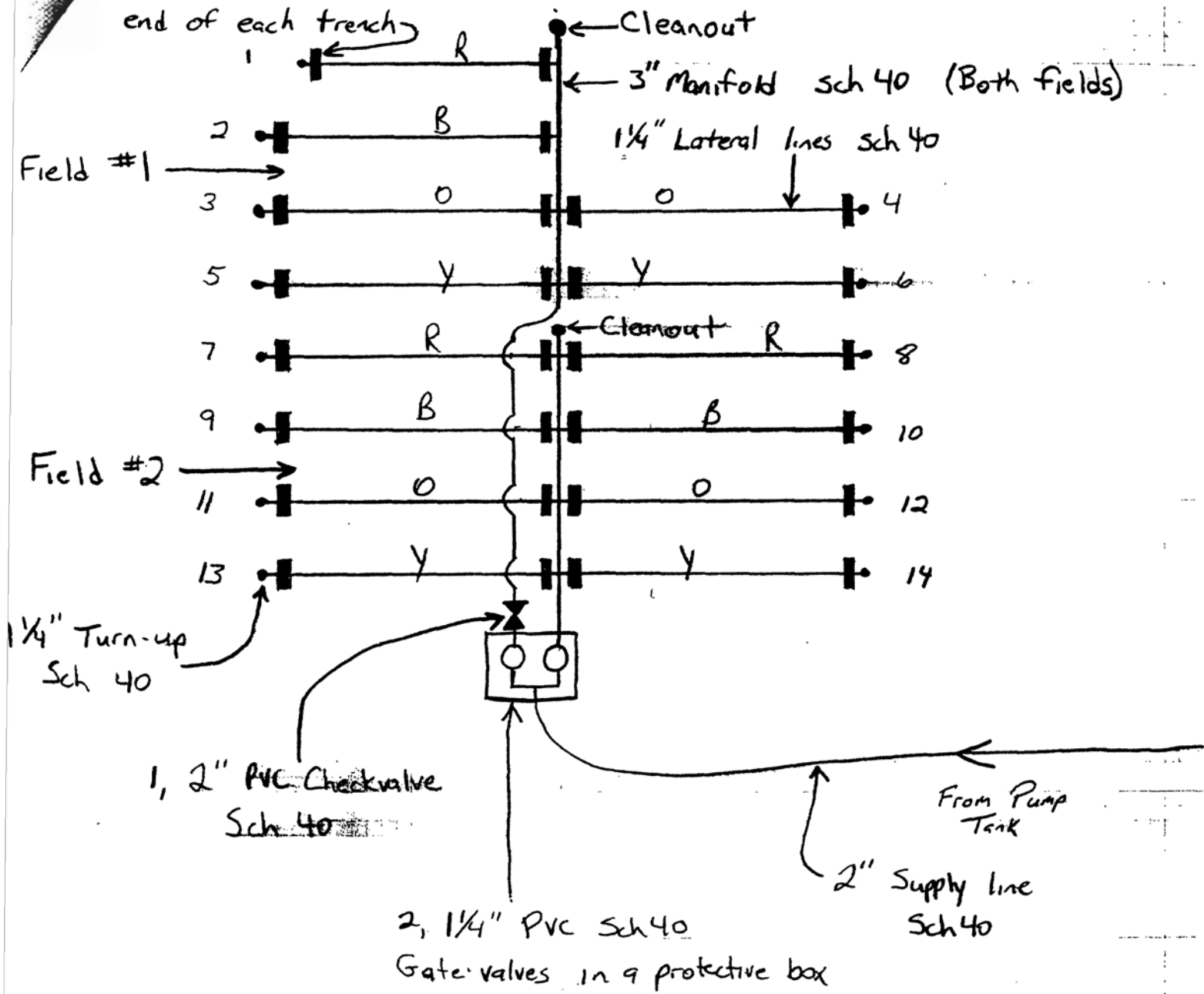
7	109.01	2	5/32	.41	60	6.7	8	3.28	.0547
8	109.01	2	5/32	.41	40	6.7	5	2.05	.0513
9	108.16	2.85	5/32	.49	65	8.1	7	3.43	.053
10	108.16	2.85	5/32	.49	61	7.6	7	3.43	.056
11	107.31	3.7	5/32	.55	67	9.6	6	3.3	.049
12	107.31	3.7	5/32	.55	66	9.4	6	3.3	.05
13	106.61	4.4	5/32	.6	65	9.3	6	3.6	.0554
14	106.61	4.4	5/32	.6	48	9.6	4	2.4	.05

TOTAL LATERAL LINE LENGTH = 711 ft.

TOTAL SYSTEM FLOW = 38.54 gpm

TOTAL SYSTEM REDUCTION FROM #1 TO #14 - 17.6%

Impervious dam at the
end of each trench



Notes

- 1) All lines are flagged in field layout, and flagged on contour.
- 2) Drawing is not indicating ground contours and should be used for generalization.
- 3) All lines are 5 ft. minimum on center. Supply manifold is flagged in field layout.

Drainfield Layout
N.T.S

LPP SYSTEM FOR WASTEWATER TREATMENT

Owner's name: Edward Rankin
Mailing Address:

Phone (H)
(W)

System Location: Jordan Woods Lot 18

Tax Map #: Parcel: Town: County:
Source of Wastewater Flow: 3 bedroom residential house
Estimated Daily Wastewater Production: 360 gallons per day (GPD)
System Flow: 38.54 gallons per minute (GPM)

Design Parameters

Drainfield size: 711 LF 3555 sq.ft. Loading Rate: 0.101 GPD/sq.ft.
Depth of gravel in trench: 8" Gravel size: 3, 4, 5, 57 or 6 ASTM
Trench depth: 12" D-448
Trench width: 12"

Septic tank size: 1000 gal	Pump tank size: 1000 gal
Supply line volume: 48 gal	Pump tank dimensions: 48" lq. depth
Supply line length: 275 ft.	Approx. pump tank drawdown: 17.3"
Supply line diameter: 2"	Combined lateral line volume: 56 gal
Supply line pressure rating: sch 40	Dosing volume: 360 gal
Supply manifold: 3" sch 40	
Supply manifold length: 60'	
Supply manifold volume: 23 gal	Elevation head: 2 ft
Recommended float controls: SJE Pumpmaster	Pressure head: 2 ft
Threaded union: 1 in tank	Friction head: 13 ft
Gate valves: 1 in tank, 2 at field	Total dynamic head: 17 ft

Check valves: 1 in tank, 1 at field
Anti-siphon hole: in tank
Recommended high water alarm: rhombus panel and floats or
the Tank Alert I
Recommended Pump: Goulds model #3885, series WEO312L, 1/3 HP, 230 volts
1 phase or approved equal

ATTACHMENT 2:
Design Specifications for 200g/Week Treatment

**Environmental
Services**TEL 919 856 7400
FAX 919 856 7407

Administration

336 Fayetteville St. • P.O. Box 550 • Raleigh, NC 27602

FAX FAX FAX FAX FAX FAX

Date: 4-12-05Total pages transmitted (including this page) 6To: Jeff VaughnFax Number: 919-233-1970From: Brett S. Martin
Soil Scientist
Wake County Environmental Services
919-856-7463Comments: _____

If you did not receive the total number of transmitted pages specified above, please contact the originating office at 919-856-7400.

★ NOT FOR WASTEWATER SYSTEM CONSTRUCTION ★

WAKE COUNTY HEALTH DEPARTMENT WELL AND SEWAGE SITE, LOCATION PERMIT

NO PERMIT(S) FOR CONSTRUCTION, LOCATION OR RELOCATION ACTIVITY SHALL BE ISSUED
UNTIL AN AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION HAS BEEN ISSUED.

Pln # 0743.03118211 Project # _____
Tax Map No. _____ Parcel No. _____
Zoning Apx Township White Oak
Owner/Contractor: Louis Spence Martin Date: 3-14-97
Location/Address: 1024 Twin Creek Rd. Hwy 64 W. (R) on SR 1011 (C)
SR 1611 (Old Tanks Rd) (B) on Twin Creek Cotton Rd S.R. # 1611
Subdivision Name: _____ Lot No. 4, 5, 6 ^{recombined} Section or Block No. _____

Preliminary Layout

Existing well to be abandoned
use cement to fill in.

SEE ATTACHED PLOT PLAN FOR WASTEWATER
DISPOSAL SITE.

SEE CONSTRUCTION AUTHORIZATION FOR
WASTEWATER SYSTEM DESIGN.

3 Bedrooms Maximum - No
Closets in Bonus Room!

Final Layout Tanks must be 15' from
Basement

Oper. Contract - David Yates 4-17-98
Maint Schedule - 4-17-98

Hold C.O.C. for well

ST-SRTL 1000
STB-891

PT SRTL-1200
PT-147
25.71 gal/hr

Sewage System Specifications

Repair [] Original Permit No. _____
Garbage Disposal Unit Yes [] No ☒
House ☒ Mobile Home [] Business []
No. of Bedrooms 3 Lot Area 1200 used
Size of Tank 1000 ST 1000 PT gal.
Wastewater: Sewage ☒ Industrial [] Comments: _____

Nitrification Line C.T.A.R. 15 2400 sq. ft.
Depth of Stone: 8" ☒ Max Depth of Trenches: 12 in.
Riser and Baffle Required ☒ Pump Required ☒
• Permit void if not in compliance with zoning regulations
• Permits may be voided if site is altered or intended use changed
Layout by: Ed D. Duff

Date: 4-17-98 Installed By: Otto Lyons Approved By: Ed D. Duff

Well System
Individual ☒ Semi-Public [] Public []
New ☒ Replacement [] Repair []
Fee Paid: Yes ☒ No []

Construction Compliance Yes [] No []
Site Approved ☒ []
Well Head Approved ☒ []
Grouting Approved ☒ []
Date Inspected 5/1/98 Sanitarian Sam Glascock

Bacteriological Results
Initial Sample: 2/2 Date: 4/24/98
• Re-Sample #1 2/2 Date: 5/1/98
• Re-Sample #2 2/2 Date: _____
• Re-chlorination as required [] Yes [] No
• Fees for all resamples

All checks payable to: Wake County Health Department

Final Inspection Yes No
Required Slab ☒ []
Chlorinated ☒ []
Required Certificate [] []
Variance (Explain) [] []
WCHD I.D. Affixed 7670 ☒ []
Sample Collected ☒ []

Comments: See C.A. Site Plan for
Location of Well

Well Installed By: Acme Well
5/4/98 Sam Glascock
Date System Finalized Sanitarian

This report is based in part on information provided by the homeowner or his/her representative in the application submitted for this permit. The sanitarian is not responsible for false or misleading information contained in the application. The sanitarian is also not responsible for concealed conditions on the property or for statements in this report that may have resulted from false or misleading statements provided to him in the application. Neither Wake County nor the sanitarian warrants that the septic tank system will continue to function satisfactorily in the future or that the water supply will remain potable.

COPY TO HEALTH DEPARTMENT

30.203-10/15/98

Tax Map No. 0743.03118211

Parcel No. _____



FEBRUARY ASSOCIATES, INC.

P.O. Box 5427

Cary, N.C. 27512

Ph: 919/467-5427

Fax: 919/467-5463

ALTERNATIVE SYSTEM DESIGN

date. 3-3-97

OWNER LOUIS "SPENCE" MARTINTYPE OF SYSTEM LPPADDRESS 503 MIDDLETON DR.COUNTY WAKECARY NC 27513SITE 1024 TWIN CREEK DR.LOT 5PHONE 919-28030143.03.71.8420Site evaluation by ED DUKE, R.S.SPECIFICATIONS: (Source, permit, site evaluation, other: _____)Daily waste load 360 gpd. for 3 BR HOUSE LTAR .15 gal/sq.ft./day

Trenches

Maximum depth 12 inchesWidth 12 inchesGravel depth 8 inchesGravel size 3/8-1 inches

Lateral

sleeves: no yes with 4 " diameter corrugated tubingFill cap no yes, _____ deep, placed on site prior to installation
yes, _____ deep, placed over completed trenches* ON UPHILL SIDE

DESIGN PARAMETERS:

Septic tank 1000 gallonsPump tank 1000 gallons, 22 gallons per inchLateral field 2400 sq ftLaterals 480 linear feet, 1 1/4 " diameter
with turnups in valve boxes or 6"-diameter capped risersConfiguration SEE SITE PLANSupply line 140 feet, 2 " diam.

All pipe and fittings: Sch. 40 PVC unless otherwise noted. See "SITE PLAN & DETAILS" sheet for size and placement of valves, etc.

Manifold(s) 25 feet, 3 " diam.Dosing rate 38.4 gpmDosing volume 330 gallonsTotal dynamic head 16.8 feetDrawdown in pump tank 15 inchesPump HYDRAMATIC SP40M1 Controls RHOMBUS TYPE 115 PANEL WITHCIRCUIT BREAKERS, ALARM OPTION, ELAPSED TIME METER, NEMA 4x BOX

Other equipment which meets or exceeds the specifications may be substituted

OTHER REQUIREMENTS: _____

newlpp.doc

ALTERNATIVE SYSTEM DESIGN

NAME MARTIN

PAGE 2

Dosing rate (from flow chart) 38.44 gpmMax. pump run time 9.1 minAnti-siphon hole flow rate — gpmActual pump run time 8.6 min
(dosing volume / dosing rate)TOTAL DOSING RATE 38.44 GPMTop lateral elevation 100.0Friction loss = $\frac{1.85}{4.87} \cdot \frac{.00113 \cdot L \cdot Q^2}{D^5}$ Pump-off elevation ~ 92.0Elevation head 8.0' feetL = length Q = dosing rate. D = actual inside diameter
(new pipe)Design head 2.0 feetsupply line 140 of 2 " = 3.9'Flush head 2.0 feetmanifolds 25 of 3 " = .1'Friction & fittings loss 4.8' feet+ 20% fittings loss .8' 4.0'TOTAL DYNAMIC HEAD 16.8' FEET

TOTAL

Draining manifold(s)
and
supply linelength 25 ' X 38.4 gal/100' = 9.6 gallonslength — ' X — gal/100' = — gallonstotal draining volume 9.6 gallons

Lateral volume

length 480 ' X 7.8 gal/100' = 37.4 gallonsvolume to pressurize 47.0 gallonsDosing volume min. (5 x lat vol + drain) = ~ 197 gallonsmax (10 x lat vol + drain) = ~ 384 gallonsDOSING VOLUME 330 GALLONSInterior dimensions
of pump tanklength 101 " X width 50 " X 1 " = 22 gallons per inch
230 cubic inches per gallon

DRAWDOWN

15 INCHES = dosing volume / gallons per inch

Note pump tank dimensions vary by manufacturer. Drawdown should be recalculated using dimensions of specific tank selected. A minor adjustment in the dosing volume to achieve a whole number of inches is acceptable.

LATERAL	ELEVATION (FT)	ELEV. DIFF. (FT)	HEAD (FT)	HOLE SIZE (IN)	FLOW PER HOLE (GPM)	LENGTH (FT)	SPAC- ING (FT)	NO. HOLES	FLOW PER LATERAL (GPM)	1ST AND LAST HOLE (FT)	INST FLOW RATIO (GPM /FT)
1	100.00	0.00	2.0	5/32	0.407	60	4.0	14	5.70	4.0	0.095
2<2	99.60	0.40	2.4	5/32	0.446	65	4.5	13	5.80	5.5	0.089
3<3	99.60	0.40	2.4	5/32	0.446	65	4.5	13	5.80	5.5	0.089
3<4	98.90	1.10	3.1	5/32	0.507	70	6.0	11	5.58	5.0	0.080
5<5	98.90	1.10	3.1	5/32	0.507	70	6.0	11	5.58	5.0	0.080
4<6	98.30	1.70	3.7	5/32	0.554	75	8.0	9	4.99	5.5	0.067
7<7	98.30	1.70	3.7	5/32	0.554	75	8.0	9	4.99	5.5	0.067

INPUT ↓, ↑ OR END

RESERVE CAP.

LAT 1 : 2.6 gal

4 : 43.2 gal

FIELD NUMBER = 1

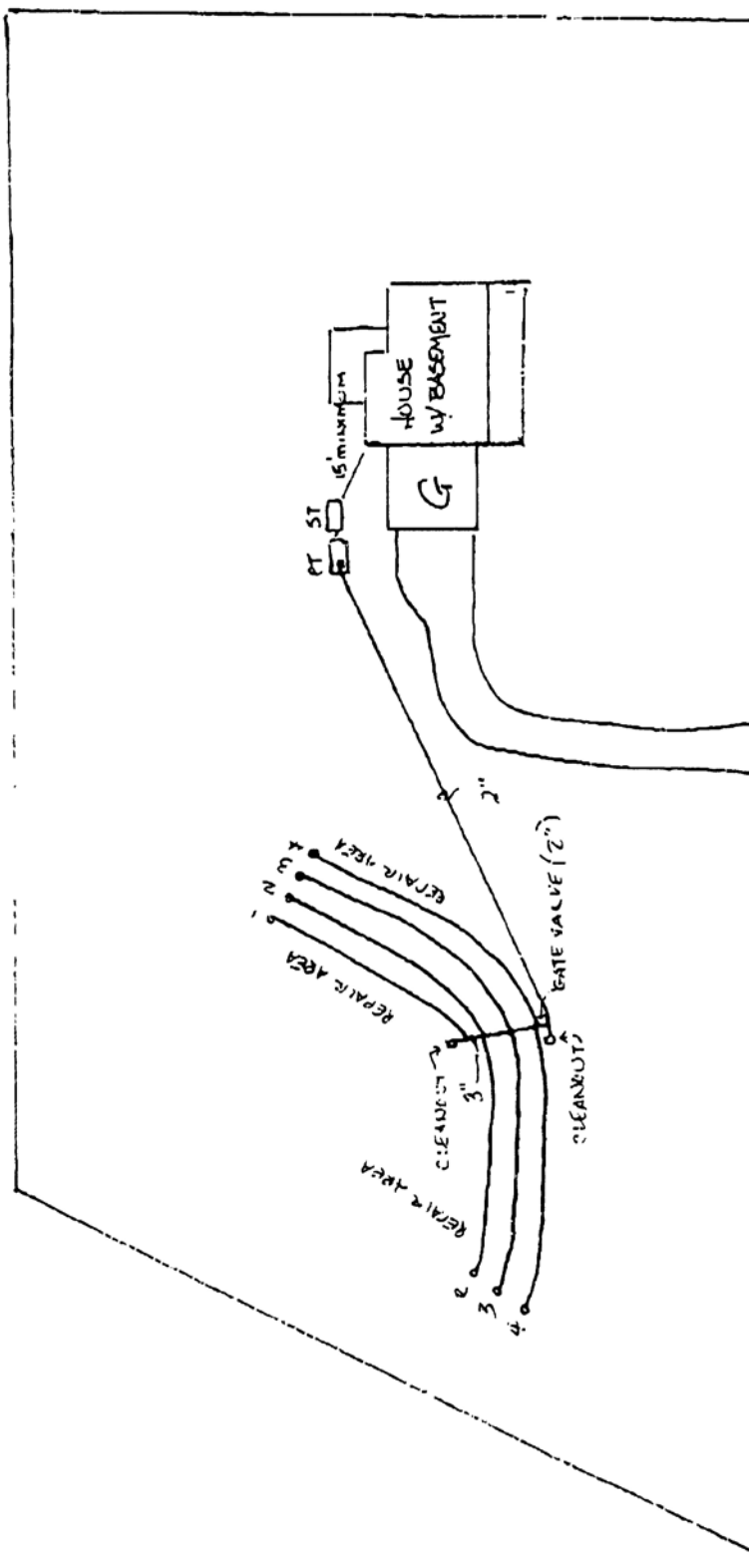
TOTAL LENGTH = 480 FT

TOTAL FLOW = 38.44 GPM

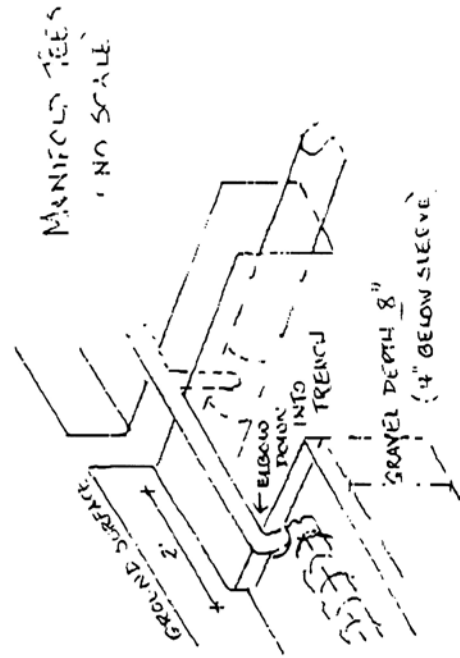
MAXIMUM REDUCTION OF FLOW BETWEEN LATERALS = 29.47%

Press any key to continue...

0 25 50
FEET
1"=50'



ERAL	LENGTH	ELEV. DIFF.	HEAD	HOLESIZE	# HOLES	SPACING	1ST, LAST	FLAG
1	60'	0	2.0'	5 1/32"	14	4'	4'	RED
2	130'	-.4'	2.4'	"	26	4'6"	5'6"	WHITE
3	140'	-1.1'	3.1'	"	22	6'	5'	BLUE
4	150'	-1.7'	3.7'	"	18	8'	5'6"	RED



ATTACHMENT 3:
Design Specifications for 100g/Week Treatment

649 THOMPSON RD.
911 ADDRESS

OLD THOMPSON CREEK
NAME / SUBDIVISION & LOT # 12

CHATHAM COUNTY HEALTH DEPARTMENT SEWAGE DISPOSAL OPERATIONS PERMIT

Date 5-7-02

Improvements Permit No. A53184

Owner ASSURED BUILDERS

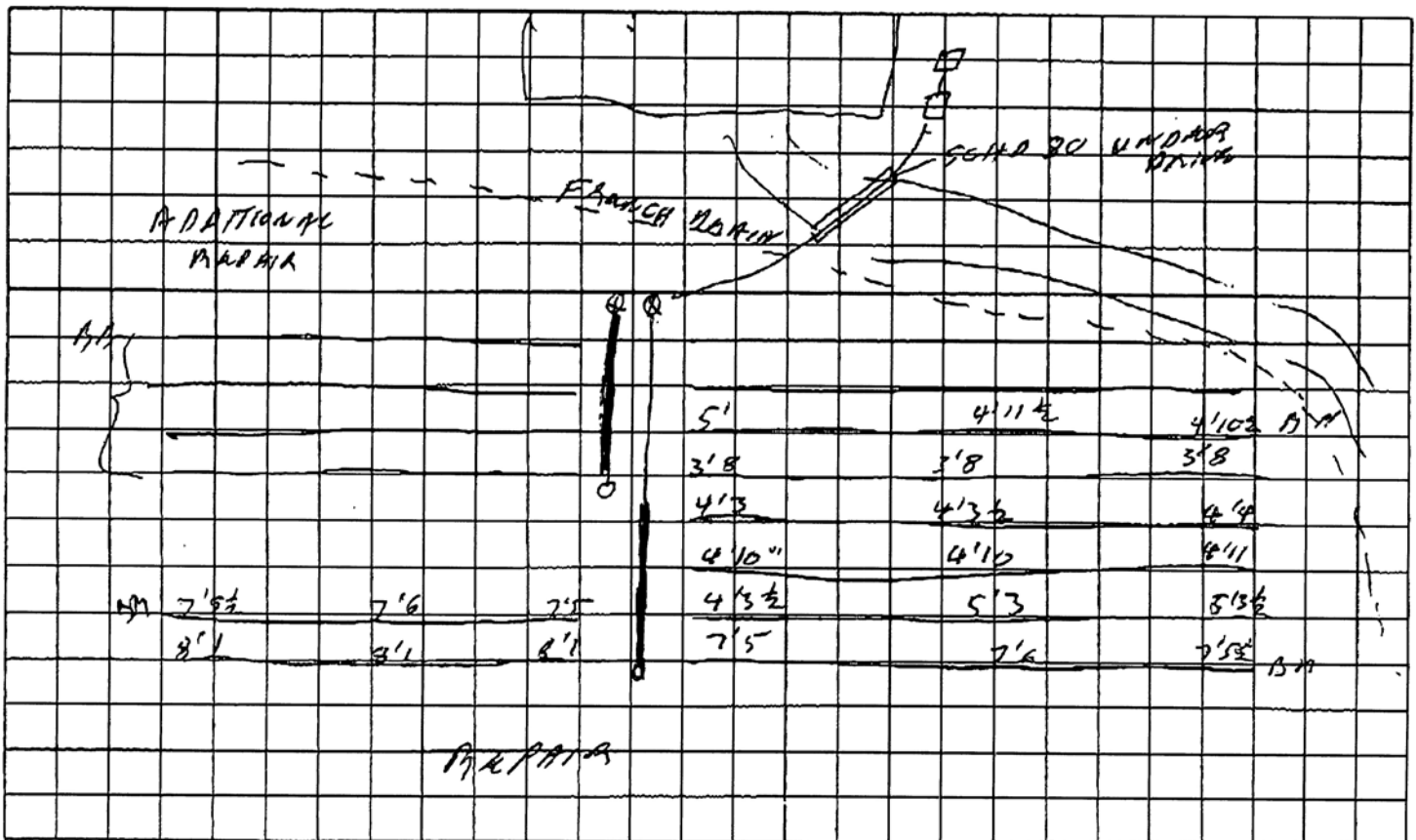
Conditions _____

This permit authorizes the owner to operate the sewage disposal system in accordance with the state and local rules. The department does recommend that septic tanks be pumped out every 3 to 5 years, and filters be cleaned every 2 to 3 years. In the event of a malfunction contact this office.

This certifies that the system has been installed in compliance with applicable NC General Statutes and Rules for Sewage Treatment and Disposal and all conditions of the Improvements Permit and Construction Authorization.


Environmental Health Specialist

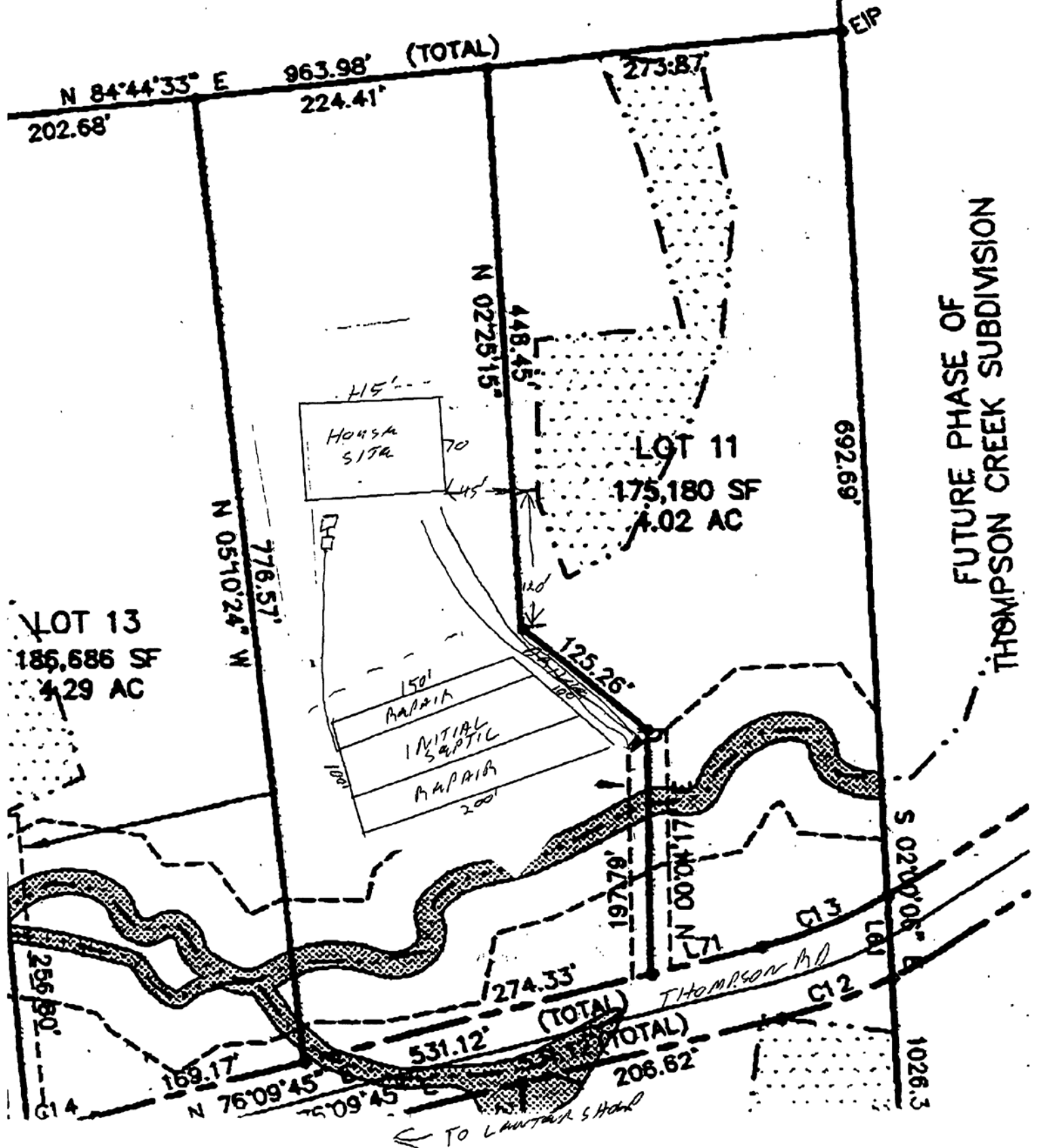
Type System: I ☐ II ☐ III ☐ IV ☒ V ☐ Other _____ Installer BOB DAVIS



CPS 10-00

MICHAEL BROOKS KANOY

DB 401 PG 62



CHATHAM COUNTY HEALTH DEPARTMENT ENVIRONMENTAL HEALTH DIVISION

80 E. Street
P. O. Box 130
Pittsboro, NC 27312-0130
(919) 542-8208 Phone
(919) 542-8288 Fax

1000 S. 10th Avenue
Siler City, NC 27344
Phone (919) 742-4911
Fax (919) 542-1442

IMPROVEMENT PERMIT FOR WASTEWATER SYSTEMS ARTICLE II-CHAPTER 130A OF THE NC GENERAL STATUTES

An Improvement Permit is issued to CHATHAM DEVELOPMENT CORP. for
a 4.10 ± acre site located THOMPSON CREEK LOT 12
in Chatham County. It is specifically issued for the following facility:

Facility: Residence (X) Business ()
No. Bedrooms 4 No. Residents/Employees 8 MAX
Type Wastewater: Residential (X) Commercial ()
Type System: Shallow Conventional () LPP (X)
Other _____
Design Flow 480 EGD Application Rate 1 GPD/ft²
Size Tank(s) w/Risers and Effluent Filter ST 1200 Gal PT 1000 Gal
Nitrification Line (Length/Width/Max Depth) 960' X 18" X 12"

(On contour in surveyed septic area; solid earth dams every 50' for shallow conventional systems using Schedule 40)"

Type Repair SAME

Special Conditions PLANS REQUIRED

A plat with site plan showing specific location of the facility, the site for the proposed wastewater system, existing buildings, property lines, water supplies, surface waters, the conditions for any site modifications; and any other information required by the department must be attached to be valid.

This permit is valid [] without expiration [X] for five years but is subject to revocation if the site is altered, soil disturbed, set-backs violated, or the plans of intended use are changed.

THIS IS NOT AUTHORIZATION TO INSTALL. An authorization for Wastewater Construction must be obtained from this department before installation.

Environmental Health Specialist Carol L. G. [Signature]

Reg. No. 1341

Date 6-11-00



FEBRUARY ASSOCIATES, INC.

AUG 20 2001

P.O. Box 5427
Cary, N.C. 27512

Ph: 919/467-5427
Fax: 919/467-5463

Low Pressure Pipe Design

Date: 8/14/01
County: Chatham

Name:	<u>Assured Construction</u>		P.I.N. #:	<u>Permit # AS03184</u>	
	<u>PO Box 159</u>		Property address:		
	<u>Apex NC 27502</u>				
Phone:	<u>303-3336</u>	<u>James Bruce</u>	Subdiv:	<u>Thompson Creek</u>	Lot#: <u>12</u>
# of BDR:	<u>4</u>	Daily Flow:	<u>480</u> gal/day	L.T.A.R.:	<u>0.10</u> gal/day/sq.ft
Sq. Ft:	<u>4800</u>	Laterals:	<u>980</u> linear ft.	Lat. diameter:	<u>1.25</u> in, sleeved in 4" diam. corrug. pipe
			<u>975' actual</u>		
Trench depth:	<u>12</u> inches	on downhill side	Depth of stone:	<u>8</u> inches	
Fill cap:	<input checked="" type="checkbox"/> no	<input type="checkbox"/> yes	See site plan, flow chart, and detail sheets		
Septic Tank:	<u>1200</u> gals	Filter:	<u>yes</u>	Pump Tank:	<u>1200</u> gals gal per inch: <u>25</u>
Supply Line:	<u>170</u> ft	Diameter:	<u>2</u> in. sch 40pvc	actual I.D. =	<u>2.067</u> in
Manifold(s):	<u>55</u> ft	Diameter:	<u>3</u> in. sch 40pvc	actual I.D. =	<u>3.068</u> in
Elev. Head:	<u>-8.00</u> ft				
Design Head:	<u>2.00</u> ft				See calculations page
Friction loss:	<u>13.73</u> ft (incl. fittings)				
Flush Head:	<u>2.00</u> ft				
Total Dynamic Head	<u>11.73</u> ft	Dose volume:	<u>450</u> gallons		
		Pump to Deliver:	<u>62.07</u> gpm @	<u>11.73</u> ft	
		Drawdown:	<u>18</u> inches		
Pump & Controls:	Pump run time: <u>7.5</u> minutes				
pump:	<u>Zoeller N 137</u>		panel: <u>Rhombus 1121W014H8AC</u> simplex control panel		
	<u>1 phase, 115 volts, 10.7 amps</u>		with event counter, elapsed time meter, NEMA 4X box, separate alarm circuit		
other equipment that meets or exceeds the specifications may be substituted. Contact designer if questions.					

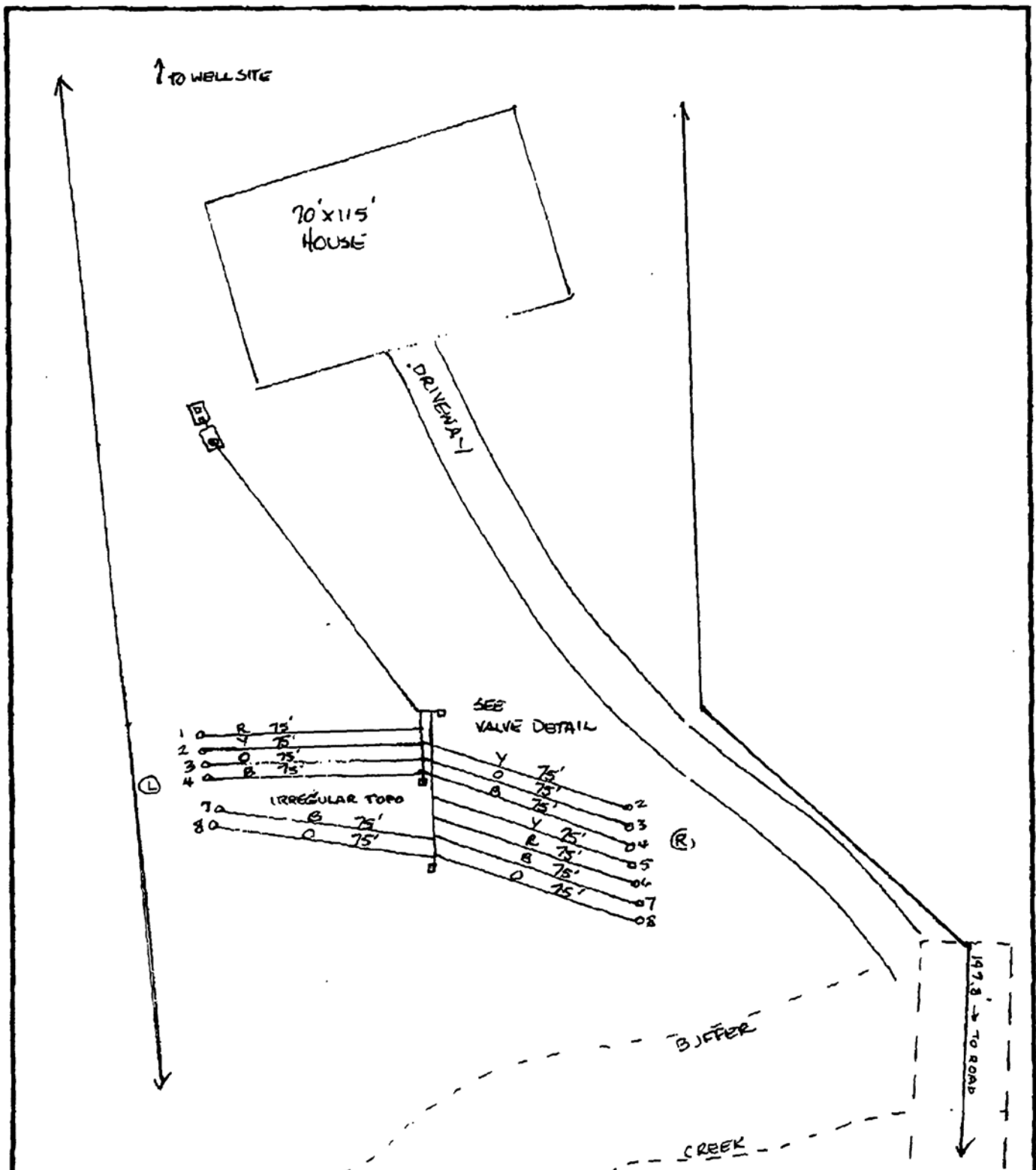
The plans and specifications for this On-site Sewage Disposal & Treatment System have been prepared according to criteria in North Carolina's rules and regulations governing On-site Systems, to additional county standards (if applicable), and to generally-accepted design principles. February Associates, Inc., makes no representation regarding soils conditions on this property. Long-term acceptance rates, trench dimensions, and waste loads are determined by the county Health Department (or other soil science professionals), and are included as conditions of the permit issued by the Health Department. February Associates, Inc., accepts no responsibility for changes in these plans & specifications, unless we specifically authorize such changes in advance. If changes in specifications or locations of components are needed, please feel free to contact us for assistance in making alterations before the component in question is installed.


Repair: LPP

1200 GAC TANK = 12.41" x 54" x 2.48" x 1" x 1"

February Associates, Inc.

8/16/01



LOT 12 THOMPSON CREEK	ASSURED CONSTR. JAMES BRUCE	 FEBRUARY ASSOCIATES, INC.
FIN:	DRAWN BY: KRM	110 Box 5427
SCALE: 1" = 50'	DATE: 8/10/01	County NC 27512
		(718) 487-5427

LPP Calculations

<u>Manifold(s)</u>			<u>Supply line</u>			<u>Laterals</u>		
length	<u>55</u>	ft	length	<u>170</u>	ft	length	<u>975</u>	ft
actual diameter	<u>3.068</u>	in	actual diameter	<u>2.087</u>	in	diameter	<u>1 1/4</u>	in
volume	<u>21.12</u>	gal	volume	<u>29.58</u>	gal	volume	<u>76.05</u>	gal

<u>Elevations</u>			<u>Friction loss</u>			★ dosing rate <u>62.07</u>		
top lateral	<u>100.00</u>		manifold(s)	<u>0.52</u>	ft	draining volume	<u>50.7</u>	gal
pump tank	<u>111.00</u>		supply line	<u>10.92</u>	ft	min. dosing vol.	<u>431.0</u>	gal
pump off	<u>106.00</u>		fittings	<u>2.29</u>	ft	max. dosing vol.	<u>811.2</u>	gal
						PT gal/inch	<u>25</u>	

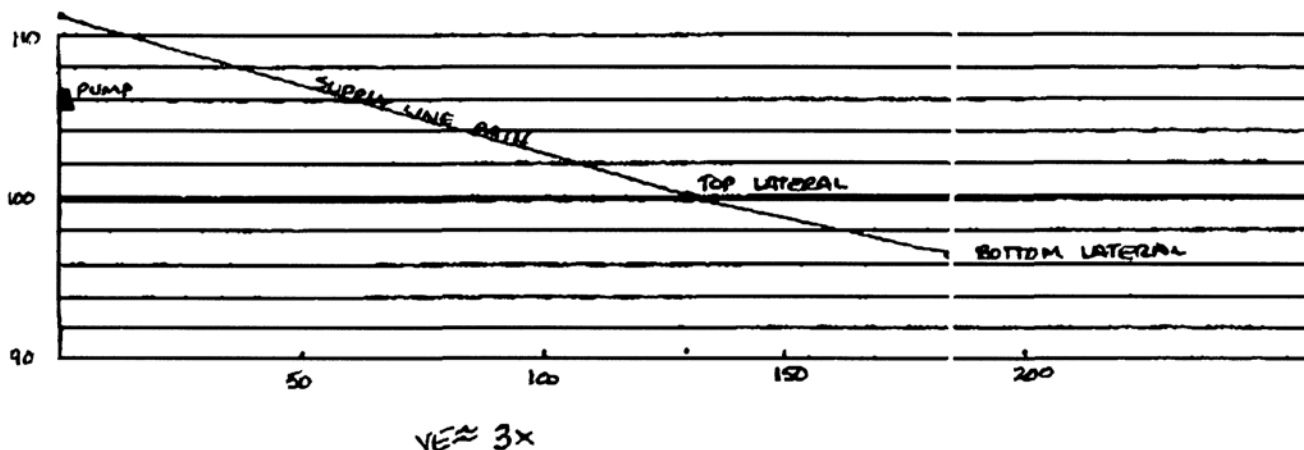
ELEVATION HEAD	<u>8.00</u>	ft
DESIGN HEAD	<u>2.00</u>	ft
FRICTION LOSS	<u>13.73</u>	ft
FLUSH HEAD	<u>2.00</u>	ft

DOSING VOLUME	<u>450</u>	gal
DRAWDOWN	<u>18</u>	in
PUMP RUN TIME	<u>7.49</u>	min

TOTAL DYNAMIC HEAD 11.73 ft

★ INCLUDES 2.0 GPM
FOR ANTI-SIPHON HOLE

HYDRAULIC PROFILE



Flow Chart

Lot 12, Thompson Creek

Permit #

Bench Mark 5.1

=100.00

set at

top lateral

subfield 1

line	color	rod read	elev.	elev. dif. head	length	hole size	flow/hole	spacing #	holes 1st/last	flow/lat	inst. flow rate		
1	red	5.1	100.00	0.00	2.00	75	5/32	0.41	15	6.00	6.11	0.081	
2L	yellow	5.8	99.30	-0.70	2.70	75	5/32	0.47	12	4.50	5.88	0.076	
2R	yellow	5.8	99.30	-0.70	2.70	75	5/32	0.47	12	4.50	5.88	0.076	
3L	orange	6.5	98.60	-1.40	3.40	75	5/32	0.53	10	6.00	5.31	0.071	
3R	orange	6.5	98.60	-1.40	3.40	75	5/32	0.53	10	6.00	5.31	0.071	
4L	blue	6.7	98.40	-1.60	4.30	75	5/32	0.60	7	9.00	4.18	0.056	
4R	blue	6.7	98.40	-1.60	4.30	75	5/32	0.60	7	9.00	4.18	0.056	
total										feet =	525	gal/min	36.43

subfield 2

5	yellow	7.2	97.90	0.00	2.00	5/32	0.41	8.00	12	4.50	4.88	0.085
6	red	7.6	97.50	-0.40	2.40	5/32	0.45	7.00	10	6.00	4.46	0.059
7L	blue	8.3	96.80	-1.10	3.10	5/32	0.51	9.00	8	6.00	4.05	0.054
7R	blue	8.3	96.80	-1.10	3.10	5/32	0.51	9.00	8	6.00	4.05	0.054
8L	orange	8.8	96.30	-1.60	3.60	9/64	0.44	9.50	7	9.00	3.10	0.041
8R	orange	8.8	96.30	-1.60	3.60	9/64	0.44	9.50	7	9.00	3.10	0.041
total										feet = 450	gal/min	23.65

Total Feet =

975

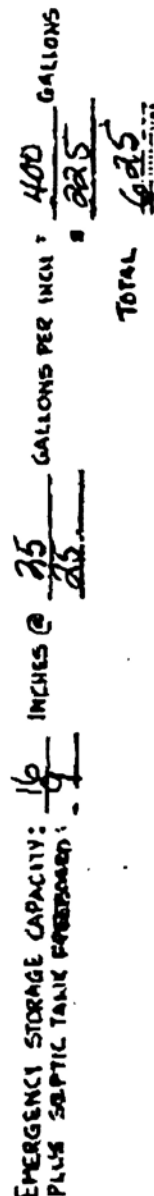
Total gal/min = 60.07

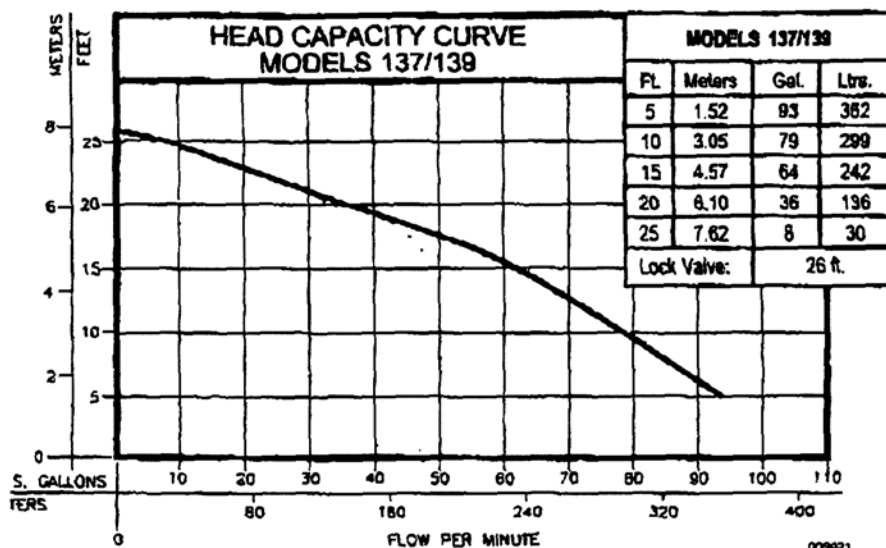
Max Reduction = 49.29

February Associates, Inc.

8/16/01

14075





CONSULT FACTORY FOR SPECIAL APPLICATIONS

- Three phase pumps are available in 200/208V, 230V or 460V.
- Electrical alternators, for duplex systems, are available and supplied with an alarm.
- Mechanical alternators, for duplex systems, are available with or without alarm switches.
- Simplex Panels are available for 3 phase pumps.
- Control alarm systems are available for 1 phase pumps.

- Variable level control switches are available for controlling single and three phase systems.
- Double piggyback variable level float switches are available for variable level long cycle controls.
- Over 130°F. (54°C.) special quotation required.
- Refer to FM0806 for 100° F. applications.

137 Series - 47 lbs. 139 Series - 51 lbs.

Single Seal	Control Selection						Listings	
Model	Volts-Ph	Mode	Amps	Simplex	Duplex		CSA	UL
M137/139	115	1	Auto	10.7	1 or 1 & 8	—	Y	Y
N137/139	115	1	Non	10.7	2 or 2 & 7	3 or 5 & 6	Y	Y
BN137	115	1	Auto	10.7	—	—	Y	Y
D137/139	230	1	Auto	5.8	1 or 1 & 8	—	Y	Y
E137/139	230	1	Non	5.8	2 or 2 & 7	3 or 5 & 6	Y	Y
H137/139	200-208	1	Auto	6.2	1 & 8	—	Y	N
I137/139	200-208	1	Non	6.2	2 & 7	3 or 5 & 6	Y	N
J137/139	200-208	3	Non	2.6	4	3&4 or 5&6	Y	Y
F137/139	230	3	Non	2.6	4	3&4 or 5&6	Y	Y
G137	460	3	Non	1.4	4	3&4 or 5&6	N	N
G139	460	3	Non	1.4	4	3&4 or 5&6	N	N

* No molded plug

**Single piggyback switch included.

Pumps must be operated in upright position.

Three phase units require a control switch to operate an external magnetic contactor.

For information on additional Zoeller products refer to catalog on Piggyback Variable Level Float Switches, FM0477; Electrical Alternator, FM0486; Mechanical Alternator, FM0495; Alarm Package, FM0732; and Sump/Sewage Basins, FM0487.

SELECTION GUIDE

1. Integral float operated 2-pole mechanical switch, no external control required.
2. Single piggyback variable level float switch or double piggyback variable level float switch. Refer to FM0477.
3. Mechanical alternator M-Pak 10-0072 or 10-0075. Refer to FM0495
4. Simplex three phase control panel. Refer to FM1228.
5. See FM0712 for correct model of Electrical Alternator.
6. Variable level control switch 10-0225 used as a control activator, specify duplex (3) or (4) float system.

CAUTION

All installation of controls, protection devices and wiring should be done by a qualified licensed electrician. All electrical and safety codes should be followed including the most recent National Electric Code (NEC) and the Occupational Safety and Health Act (OSHA).

RESERVE POWERED DESIGN

For unusual conditions a reserve safety factor is engineered into the design of every Zoeller pump.



<http://www.zoeller.com>

ZOELLER
PUMP CO.

MAIL TO: P.O. BOX 18347
Louisville, KY 40268-0347
SHIP TO: 3649 Cane Run Road
Louisville, KY 40211-1981
(502) 778-2731 • 1 (800) 928-PUMP
FAX (502) 774-3624

Manufacturers of . . .

"QUALITY PUMPS SINCE 1939"

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MODEL 112 Control Panel

Single phase, simplex motor contactor control.

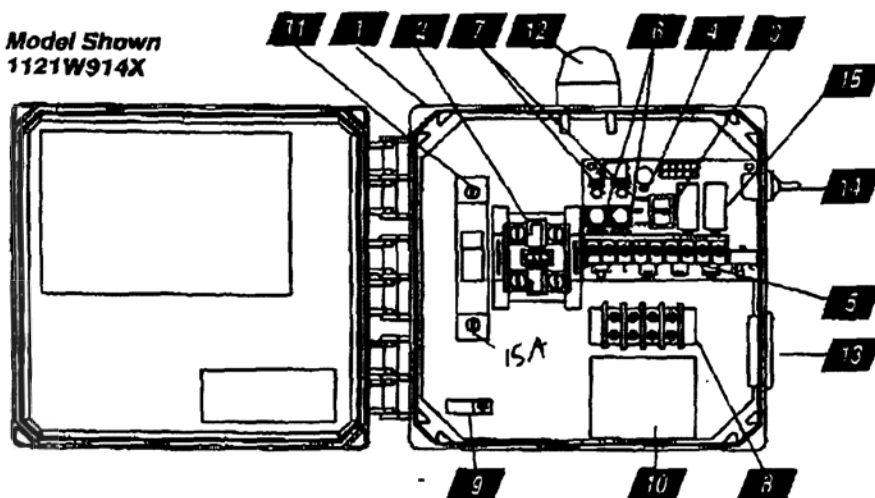
The Model 112 control panel provides a reliable means of controlling one 120, 208, or 240 VAC single-phase pump in pump chambers, sump pump basins, irrigation systems and lift stations. Two control switches activate a magnetic motor contactor to turn the pump on and off. If an alarm condition occurs, an additional alarm switch activates the audio/visual alarm system.



indoor

indoor/outdoor

Model Shown
1121W914X



FEATURES

- Entire control system (panel and switches) is UL Listed to meet and/or exceed industry safety standards
- Dual safety certification for the United States and Canada
- Standard package includes three 20' Sensor Float® control switches
- Complete with step-by-step installation instructions
- Three-year limited warranty



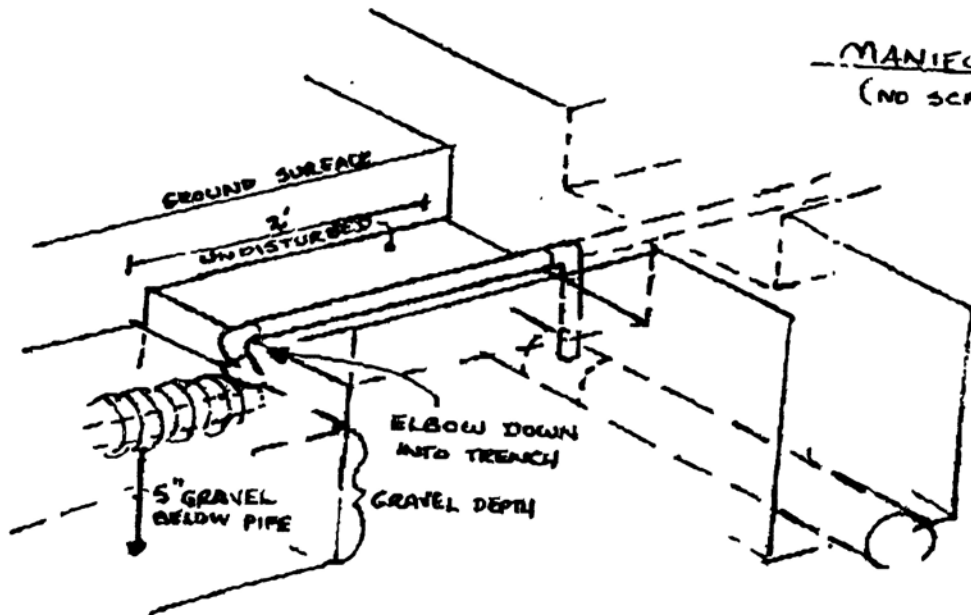
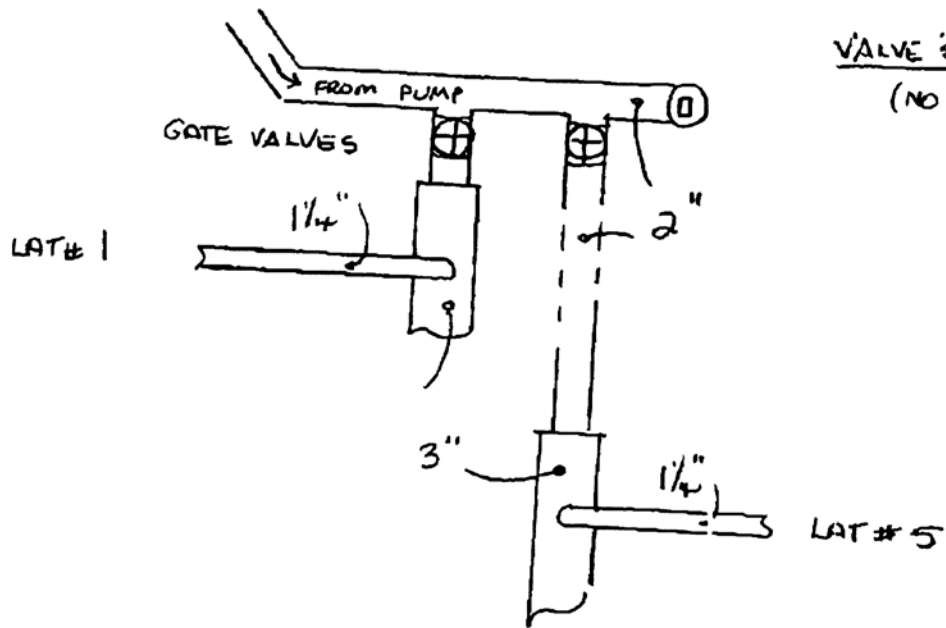
1. Enclosure measures 8 x 8 x 4 Inches (20.32 X 20.32 X 10.16 cm). Choice of NEMA 1 (steel for indoor use), or NEMA 4X (ultraviolet stabilized thermoplastic with removable flanges for outdoor or indoor use).
* Options selected may increase enclosure size and change component layout.
2. Magnetic Motor Contactor controls pump by switching hot electrical lines.
3. HOA Switch for manual pump control (mounted on circuit board).
4. Green Pump Run Indicator Light (mounted on circuit board).
5. Float Switch Terminal Block (mounted on circuit board).
6. Alarm and Control Fuses (mounted on circuit board).
7. Alarm and Control Power Indicators (mounted on circuit board).
8. Pump Input Power and Pump Connection Terminal Block
9. Ground Lug
10. Terminal Block Installation Label
11. Circuit Breaker (optional) provides pump disconnect and branch circuit protection.

STANDARD ALARM PACKAGE (other options available)

12. Red Alarm Beacon provides 360° visual check of alarm condition.
Note: NEMA 1 style utilizes a door mounted Indicator in lieu of a beacon.
13. Alarm Horn provides audio warning of alarm condition (83 to 85 decibel rating).
Note: NEMA 1 style utilizes an internally mounted buzzer (83 to 85 decibel) in lieu of horn.
14. Exterior Horn Test/Normal/Silence Switch allows alarm horn to be silenced and testing of horn and light to ensure proper operation of alarm system.
15. Horn Silence Relay automatically resets alarm after alarm condition has been resolved (mounted on circuit board).

SJE rhombus
SJE ELECTRO SYSTEMS, INC.

PO Box 1708, Detroit Lakes, MN 56502
1-888-DIAL-SJE • 1-218-847-1317
1-218-847-4617 Fax
email: sje@sjerhombus.com
www.sjerhombus.com



Installation Instructions - Sleeved Laterals

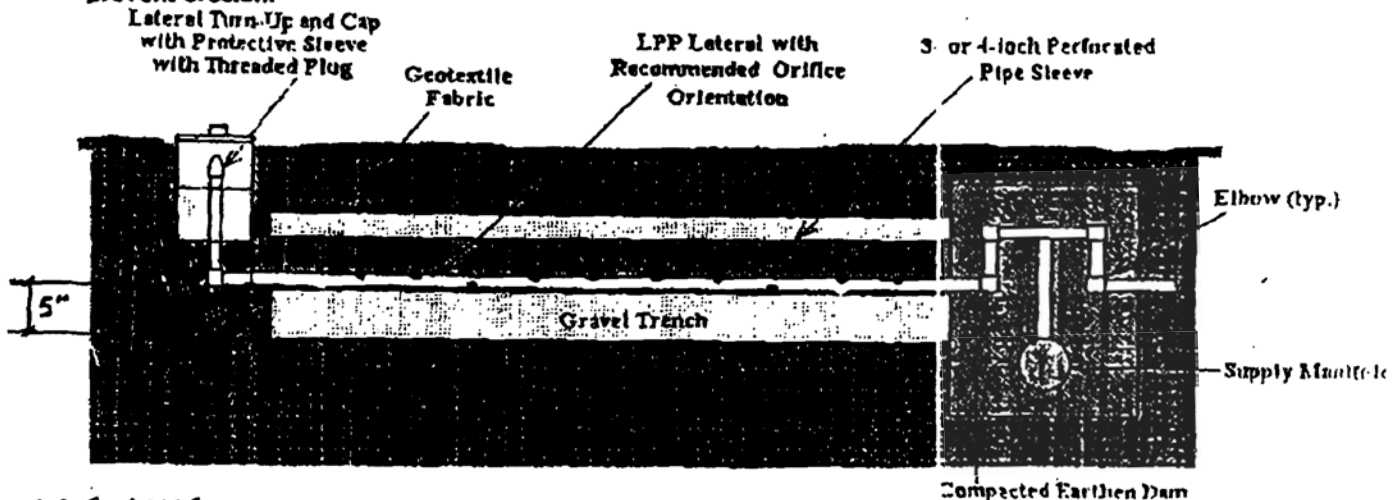
TANKS: The contractor shall install precast septic tank and pump tank in the configuration shown on the plans. All tank components, risers, and connections to tanks shall be waterproofed with mastic joint sealer or concrete mortar on both sides of all joints. Prior to backfilling pump tank should be filled with water and allowed to stand for at least 24 hours to determine that there is no leakage.

SITE PREPARATION: The designated field area and repair area MUST be left in an undisturbed state prior to installation. NO traffic, parking, heavy equipment, material stockpiles, or grading is permitted on field areas. On wooded sites, clear only those trees, shrubs, or brush necessary to provide clearance for a small trenching tractor to install lateral lines. All trees to be removed shall be cut off flush with the ground and treated with stump killer. No stumps or roots are to be removed unless otherwise specified.

TRENCHES: Trenches of the specified width and depth shall be dug ONLY when the soil is dry or slightly moist. Trench bottoms shall be levelled by hand so that the difference in bottom elevation from trench to trench is as shown on the plans. If required by the Health Department, compacted earth dams shall be placed in the trenches at the specified intervals. There must also be a solid earth barrier at least two feet wide between the manifold trench and the gravel in the lateral trenches. Place clean washed quarry gravel (# 5 or larger - do not use # 57) in the trench to a depth of 5". Then, place sleeved lateral (with holes already drilled and turnups in place - see below) on top of the gravel. Add another 3-4" of gravel. The gravel should stop at least 2' short of the turnup at the end of each lateral. Install the manifold pipe in the manifold trench, and install the manifold tees as specified in the plans. Connect the laterals to the manifold. The laterals should then be tamped down into the trenches. Install gate valves and check valves as specified, with valve boxes so that valves are protected but accessible from the surface. DO NOT put gravel in the manifold trench. Dig the supply line trench from the pump tank to the field. Install the supply line in the trench, taking care to maintain a constant gradient.

LATERAL PIPES: PVC laterals shall be of the specified diameter and material strength, and all joints and fittings shall be primed and glued according to manufacturer's recommendations. Lay out and glue each lateral. Label the TOP of the lateral. Measure and mark the holes as specified in the plans. "Spacing" is the distance between the holes; "1st & last" is the distance from the manifold to the first hole. Holes are drilled in the top of the lateral, EXCEPT: select two of the marked hole sites, approximately 1/3 and 2/3 of the distance from the manifold. THESE holes are drilled in the BOTTOM of the lateral to allow drainage when the pump shuts off. DO NOT drill holes all the way through the pipe. Wrongly-drilled holes can be sealed with duct tape. After the holes are drilled, glue the turnup pipe into the open end of the elbow (be sure the turnup points up), and sleeve the lateral in 4" diameter corrugated tubing ("holey" pipe). Tubing holes should point down. Glue the male adapter on the turnup, and screw the cap on (don't glue the cap). The turnup on the top lateral of each subfield should measure exactly 2.0 feet (or whatever is specified as the design head) from the bottom of the lateral to the lip of the opening. Turnups must be sleeved in capped 6" diameter pipe OR valve boxes.

BACKFILL AND LANDSCAPING: Install any curtain drains, swales, or other water diversion devices specified in the plans. Fill the trenches with topsoil packed and mounded over the trenches to a height of at least 4 inches to allow for settling. The drainfield area should be seeded as soon as possible to prevent erosion.



NOT TO SCALE

ATTACHMENT 4:
Design Specifications for 50g/Week Treatment

Water Supply and Sewage Disposal IMPROVEMENTS PERMIT

Owner: David O'Brien Date: 7/25/94 No. 16.21
 Location: Horton Pond Road Turn off
off road - 1 mile or at a 27 R.R. 20
 Contractor: _____
 Water Supply: Private _____ Public _____
 No. Bedrooms: _____ Other _____
 Daily Flow Rate: 360 Application Rates _____

Size of tank: 1200 gal Nitrification line: 0.15
Contact Health Dept for layout

Water supply and sewage disposal facilities location, installation and protection must meet state and local regulations.
 Septic tank should be pumped out every 3 to 5 years and shall be maintained by owner in such a manner as not to create a public health hazard. Septic tank and nitrification line MUST BE INSPECTED AND APPROVED BY A MEMBER OF THE HEALTH DEPARTMENT STAFF BEFORE ANY PORTION OF THE INSTALLATION IS COVERED AND PUT INTO USE.

Signed: Jimmy Decker Sanitarian
 Counter-signed: _____
 (Owner or his representative)

This permit is subject to revocation if site plans or the intended use change. This permit for sewage disposal is valid for 5 years.

Certificate of Completion
 Date Approved: 7/29/94 By: Carol High Sanitarian
 (OVER)

Location of well and sewage disposal facilities sketched on back.

8AE 10789

O'Brien, David

Post-it Fax Note	7671	Date	3/31/06	# of pages	3
To	Jeff Vaughn	From	Medissa		
Co./Dept.		Co.			
Phone #		Phone #	542-8294		
Fax #	233-1970	Fax #	542-8288		

Brian Turner
 215 Bell's Chapel Rd
 Apex NC 27523

Water Supply and Sewage Disposal IMPROVEMENTS PERMIT

 No. AS1126
 Date 1-31-97

Owner: _____

Location: _____

644 D 1008 @HORTON POND @ GASTON1ST PR ONL

Contractor: _____

Water Supply: Private ☒ Public _____

No. Bedrooms _____ Other _____

Daily Flow Rate _____

Application Rate _____

RELAYS PEXION TO PPDDETACHED GARAGE

Size of tank: _____

Nitrification line: SYSTEMAPPEARED TO BE FUNCTIONING
PROPERLY AT TIME OF INSPECTION

Water supply and sewage disposal facilities location, installation and protection must meet state and local regulations.

Septic tank should be pumped out every 3 to 5 years and shall be maintained by owner in such a manner as not to create a public health hazard. Septic tank and nitrification line MUST BE INSPECTED AND APPROVED BY A MEMBER OF THE HEALTH DEPARTMENT STAFF BEFORE ANY PORTION OF THE INSTALLATION IS COVERED AND PUT INTO USE.

Signed _____

Sanitarian

Counter-
signed _____

(Owner or his representative)

This permit is subject to revocation if site plans or the intended use change. This permit for sewage disposal is valid for 5 years.

Certificate of Completion

Date Approved: 1-31-97

By: _____

Sanitarian

(OVER)

Location of well and sewage disposal facilities sketched on back.

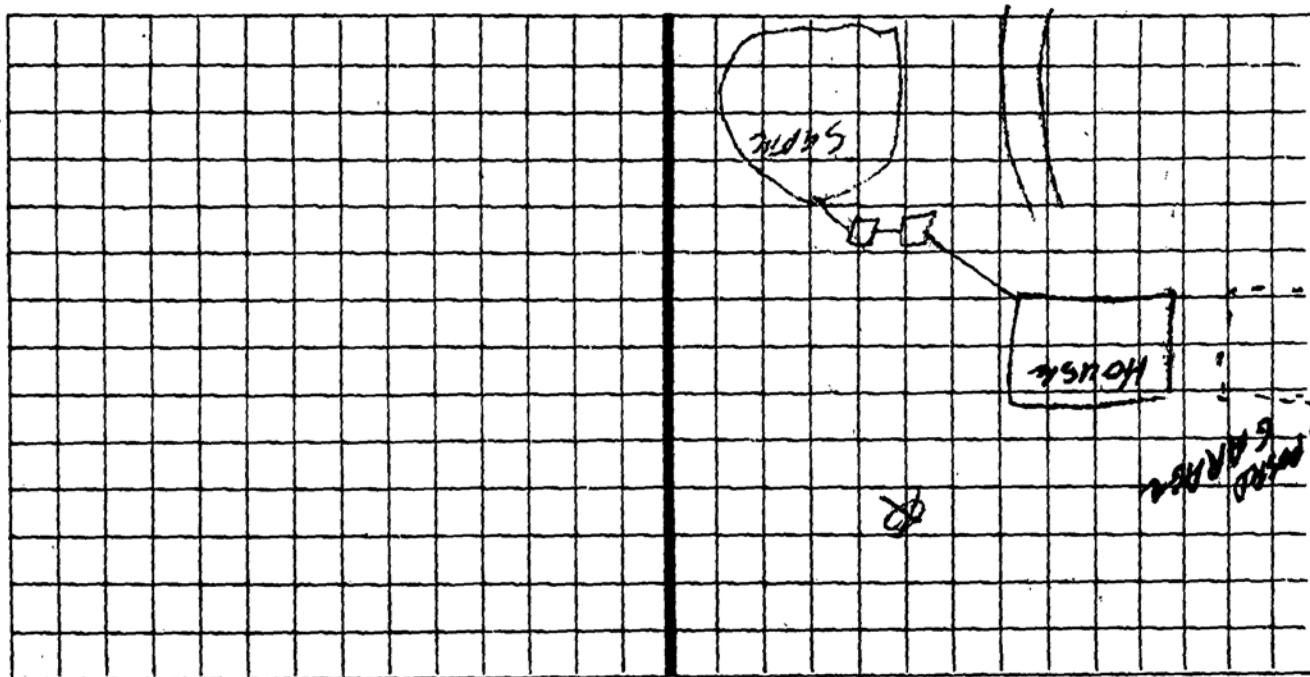



8&E 10/89

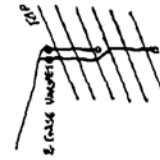
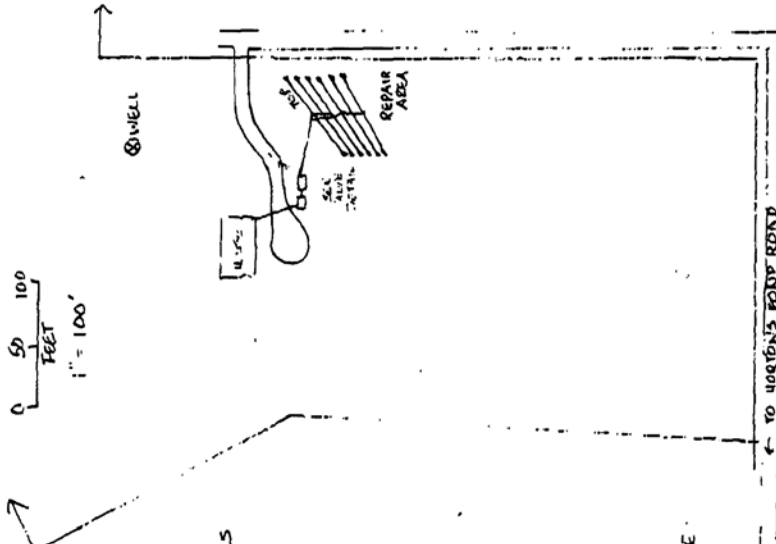
NOTE: Make sketch of installation showing lot size and shape, location of house, septic tanks, privies, water supplies, etc. Note special problems existing on lot. Write in measurements in order that installations may be located at later date. Note location of water supplies on adjacent lots.

(1)

(2)



	FEBRUARY ASSOCIATES, INC. P.O. Box 5427 C/O, N.C. 27517 919/467-5427
LPP DESIGN HORTONS POND ROAD CLATHAM COUNTY	OWNER: DAVID C. BRIEN
DATE: 4.13.94	



Brian Turner
215 Bells Chapel Rd
Apex NC 27523

Post-It Fax Note	7671	Date	3/5/06	# of pages	3
To	Jeff Vaughn	From	Melissa		
Co./Dept.		Co.			
Phone #		Phone #	542-8294		
Fax #	233-1970	Fax #	542-8288		

DESIGN SUMMARY

1200-GALLON 50 PSI TANK, 1000-GALLON PUMP TANK.
PUMP 49.7 GPM @ 7.1' TDH

DESIGN HEAD: 2.0'

TRENCHES: 12" IN DEPTH, 10" WIDTH, 8" GRAVEL DEPTH

AT FIELD: 2 CUEPOINTS, 2 GATE VALVES

IN PUMP TANK: GATE VALVE, ANTI-SIPHON VALVE, 20" DRAWDOWN

DOSE CHECK: 9" IN 4 MINUTES

SUPPLY LINE: 2" DIAM SCL 40 PVC

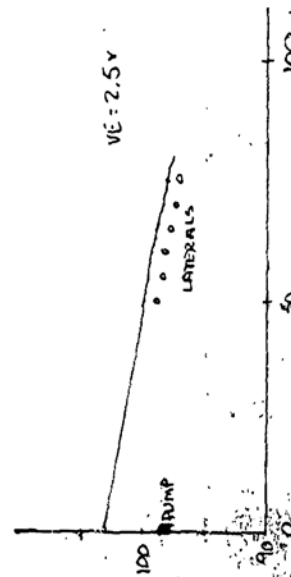
MANIFOLDS: 3" DIAM SCL 40 PVC

VALVES: 2" PVC

LATERALS: 1/2" DIAM, ≥ 160 PSI PVC, w/ SCL 40 TURNUPS IN 6" CUEPOINTS OR VALVE BOXES

LATERAL	TOTAL DEPTH	DIAM	5/32"	# HOLES	SPACING	LAST	FLAG
1	0	2"	"	24	3'	3 1/2"	BLUE
2	2'	2"	"	22	3'	5'	ORANGE
3	6'	2"	"	18	3 1/2"	6'	PINK
4	10'	2"	"	20	3 1/2"	4 1/2"	WHITE
5	15'	2"	"	16	4'	6'	BLUE
6	18'	2"	"	14	5'	5'	ORANGE

* TRENCH BOTTOM ELEVATION COMPARED TO TOP LATERAL.
DEVIATION OF ± 0.1' BETWEEN ADJACENT LINES IS ACCEPTABLE.
TOTAL DEVIATION BETWEEN TOP & BOTTOM LINE OF ± 10% IS ACCEPTABLE.



FEBRUARY ASSOCIATES, INC.

Box 5427 Cary, N.C. 27511 919/467-5427

L.P.P.

L.P.P. system design & specifications
date: 4-13-94county CHATHAM
site location HORTONS POND Rd
PERMIT # JC25Owner DAVID O'BRIEN
Address c/o OUTFITTERS UNLTD.
Rt. 6 BOX 269-B
PITTSBORO NC 27312
Phone (919) 542-6442Tax Map _____ Parcel _____ Twp _____
Soils eval. by JIMMY COLLINS, R.S.
CC HD
Application rate .15 gal/ft²/day
Design flow 360 gal/day

Type of structure (check one)

☒ Single family dwelling with 3 bedrooms. Garbage disposal? NO
Business (describe) _____ No. of employees _____
Other (describe) _____

DESIGN SUMMARY

Drainfield: 2400 sq. ft.
Laterals: 480 linear ft., 1 1/4" diameter 160 psi PVC or better
Configuration: 6 @ 80, IN 2 SUBFIELDS
Supply line: 50 feet, 2" diameter Sch. 40 PVC
Manifold: (SPLIT) 50 feet, 3" diameter Sch. 40 PVC
Manifold placement: CENTER tee: UP
Septic tank: 1200 gallons
Pump tank: 1000 gallons, 22 gallons per inchwith Sch. 40
turnups, in
valve boxes
sleeved in 6"
diam. pipe 1/2"Total dosing rate 49.7 gpm
Dosing volume 440 gallons
Drawdown in pump tank 20 inches
Total dynamic head 7.1 feetTrench depth 12"-14"
Trench width 10" MINIMUM
Depth of gravel in laterals 8"
Size of gravel 3/8"-1"Pump HYDROMATIC SP40 M1
Controls RHOMBUS TYPE 115
W/ NEMA 4-X ENCLOSURE AND
ALARM PACKAGECheck valve DUE IN P.T.
Gate valve(s) 2 @ FIELD
Anti-siphon hole YES
Curtain drain RECOMMENDED(Other equipment which meets or exceeds
specifications may be substituted)

Comments _____

O'BRIEN

CALCULATIONS

Total dosing rate: 49.7 gallons per minuteReduction of flow: 31.2Slope: 6Manifold cross-sectional area: 7.4 in²lateral cross-sectional area: 1.8 in² each3 laterals/manifold, area: 5.4 in²Ratio: 7.4 / 5.4 = 1.37Top lateral elevation: 100.0Pump-off elevation: 98.0Elevation head: 2.0'Design head: 2.0'Friction loss: 2.6'Fittings loss:
(20% friction loss) .5'TOTAL DYNAMIC HEAD: 7.1'supply line: 50 ' of 2 " = 2.3
manifolds: 50 ' of 3 " = .3'

$$= \frac{.00113 L Q^{1.85}}{D^{4.87}}$$

L = length
Q = dosing rate
D = actual inside diameter
(assumes new pipe)Draining manifold & supply line: length 50 ' x 38.4 gal/100' = 19.2 gallons
length 50 ' x 17.4 gal/100' = 8.7 gallons = 27.9lateral volume: length 480 ' x 9 gal/100' = 43.2 gallonsDosing volume: min: (5 lat vol + drain) 244 gallons
max: (10 lat vol + drain) 470 gallons USE: 440 gallonsPump run time: 8.9 minutes Volume to pressurize: 71.1 gallons
16.2 dosing volume delivered under gravity

Drawdown:

Interior dimensions of prep tank: length 101 inches x width 50 inches x "

230 cubic inches per gallon

= 22 gallons per inchDrawdown = dosing volume ÷ gallons per inch = 20 inches

NOTE: Pump tank dimensions vary by manufacturer. Drawdown should be recalculated using dimensions of specific tank selected. A minor adjustment in the dosing volume to achieve a whole number of inches is acceptable.

DOSE CHECK: 9" IN 4 MINUTES

ATTACHMENT 5:
Design Specifications for 25g/Week Treatment

SUMMER CHILL

Lot 7
Block
Map

CHATHAM COUNTY HEALTH DEPARTMENT

Water Supply and Sewage Disposal
IMPROVEMENTS PERMITNo. A113Date 10/16/93Owner: STACE WATSONLocation: 644 (2) 751 (2) LUTHERA
SHOP (2) 644 AN LAVAL (2) 751
LOT 7 ON (2)

Contractor: _____

Water Supply: Private _____ Public _____

No. Bedrooms _____ Other _____

Daily Flow Rate _____ Application Rate _____

INSTALL EPS SYSTEM ACCORDING
TO FEBRUARY ASSOC. DESIGNSize of tank: _____ Nitrification line: MANAGEMENT
UNITY CONTRACT REQUIRED

Water supply and sewage disposal facilities location, installation and protection must meet state and local regulations.

Septic tank should be pumped out every 3 to 5 years and shall be maintained by owner in such a manner as not to create a public health hazard. Septic tank and nitrification line MUST BE INSPECTED AND APPROVED BY A MEMBER OF THE HEALTH DEPARTMENT STAFF BEFORE ANY PORTION OF THE INSTALLATION IS COVERED AND PUT INTO USE.

Signed J. D. Collins
SanitarianCounter-
signed _____
(Owner or his representative)

This permit is subject to revocation if site plans or the intended use change. This permit for sewage disposal is valid for 5 years.

Certificate of Completion

Date Approved: 3/18/94 By: Ann King
Sanitarian

(OVER)

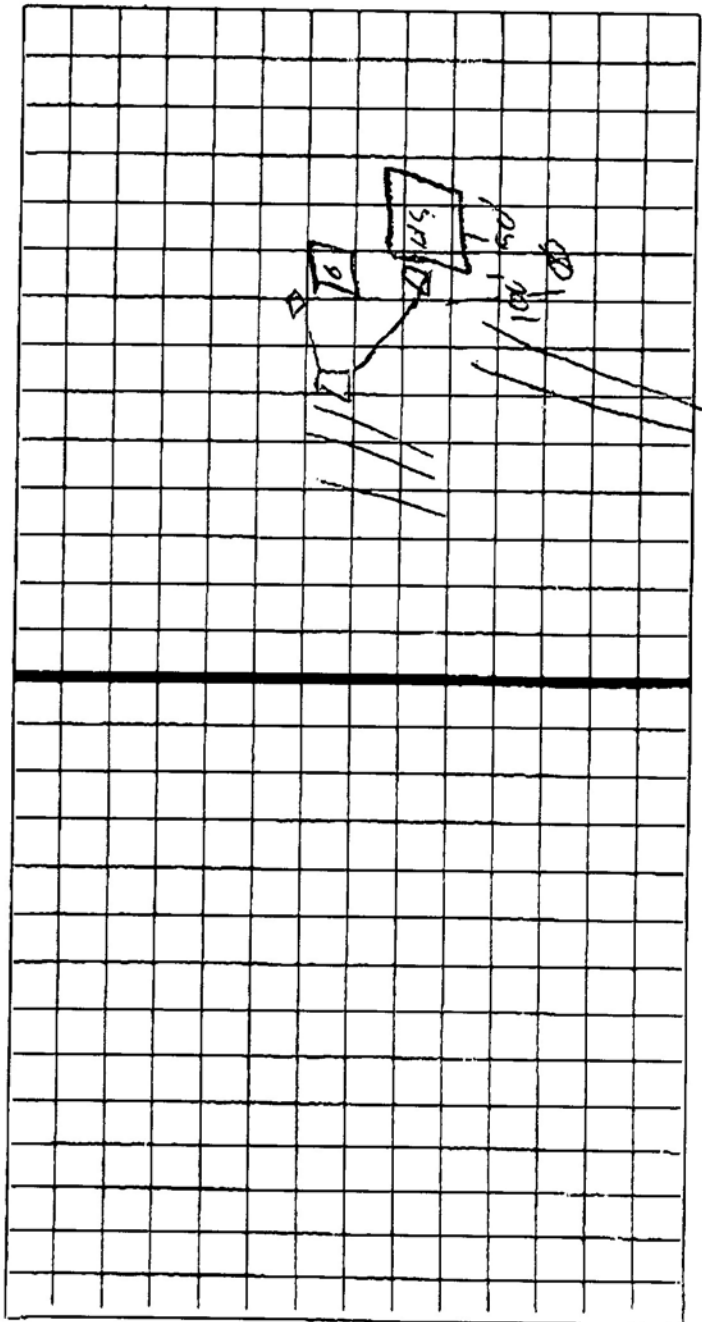
Location of well and sewage disposal facilities sketched on back.



B&E 1089

NOTE: Make sketch of installation showing lot size and shape, location of house, septic tanks, privies, water supplies, etc. Note special problems existing on lot. Write in measurements in order that installations may be located at later date. Note location of water supplies on adjacent lots.

(1)



(2)

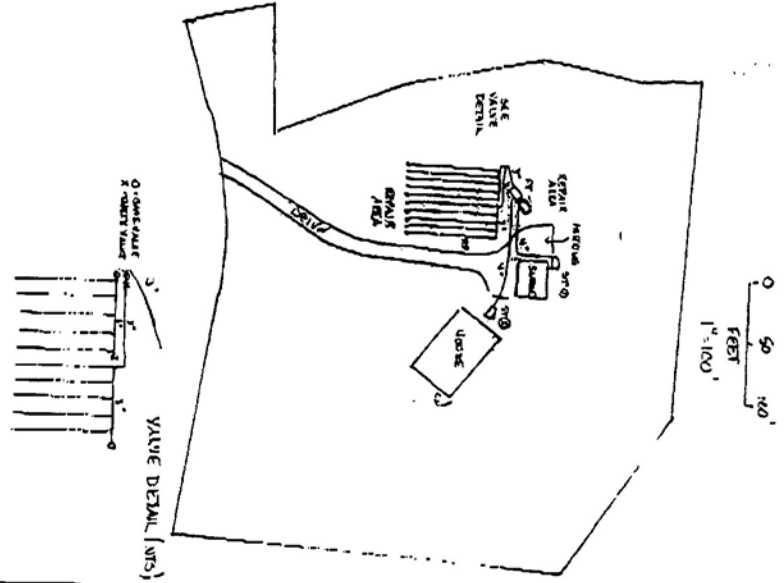
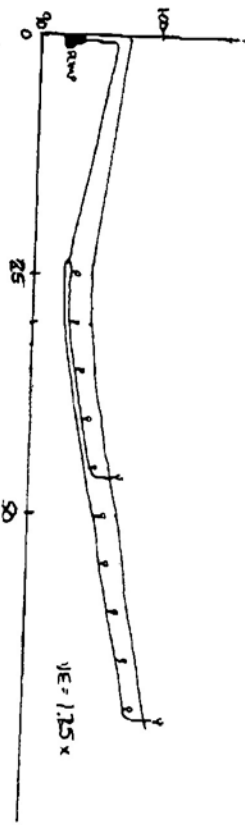
CLAUSER INSTRUMENT 819-072-2288

DESIGN SUMMARY

2-1000 GALLON OSEPTIC TANKS; 1000 GALLON PUMP TANK
 PUMP 74.2 GPM @ 11.7' TDH
 DESIGN HEAD: 2.0'
 TRENCHES: 12"-14" AVG. DEPTH; 10" WIDE, 8" GRAVEL DEPTH.
 IN PUMP TANK: CHECK VALVE, 24" DEPTH. DOG CHECK: 8" x 10" IN 3 MIN.
 AT FIELD: 2 GATE VALVES, 1 CHECK VALVE.
 SUPPLY LINE & MANIFOLDS: 3" DIAM. SCH. 40 PIPE
 LATERALS: 1 1/2" DIAM. 2160 PSI PVC 1/2" SCH. 40 FITTINGS IN 6" SLEEVES OR
 VALVES & FITTINGS: 3"

LINEAL	TOTAL DIST	WOLE SIZE	# HOLES	SPACING	1ST & LAST	ELAGE
TOP	0	5/32"	23	3'	3'	CRANE
2	.6'	"	19	3 3/4"	4 1/2"	BLUE
3	1.4'	"	16	4'	6'	O
4	1.9'	"	14	5'	3 3/4"	B
5	2.2'	"	13	5'	4'	O
6	2.7'	"	18	3 3/4"	6' 3"	PLUX
7	3.4'	"	15	4 1/2"	4 1/2"	B
8	4.0'	"	12	6'	3'	P
9	4.7'	"	10	7'	4 1/2"	B
10	5.1'	"	9	7'	8'	P

* TRENCH BOTTOM ELEVATIONS COMPARED TO TOP LINE. DEVIATION OF
 ± 0.1' BETWEEN ADJACENT LINES IS ACCEPTABLE. TOTAL DEVIATION
 BETWEEN TOP & BOTTOM LINE OF ± 10% IS ACCEPTABLE.
 * THESE REPRESENT AVERAGE ELEVATIONS. SURFACE TOPO IS
 IRREGULAR AND TRENCH DEPTH WILL VARY. SOME GENERAL
 CHALLENGE END MAY BE NECESSARY.



FEEDBACK ASSOCIATES, INC.
 P.O. Box 5192
 Cary, NC 27512
 919/487-5422

LPP DESIGN

LOT 1 SUMMER GULL

CUNYAN County

**OWNER: STEVE & DIANE
 WATSON**

NOTES

1. 4" PIPE FROM EACH SEPTIC
 TANK TO PUMP TANK MUST
 BE SLEEVED IN SCH. 80
 WHERE IT CROSSES DRIVEWAY
 AND PARKING AREA. PLACE
 CEMENTS EVERY 50' OR
 AS REQUIRED BY PUMPTANK
 CODE.

10-1-195

**FEBRUARY ASSOCIATES, INC.**

P.O. Box 5427
Cary, N.C. 27512

Ph: 919/467-5427
Fax: 919/467-5463

Date: Oct. 4, 1993

Jimmy Collins, R.S.
Andy Signor
Chatham Co. Health Dept
PO Box 126
Pittsboro NC 27312

Attached please find our proposal for a low-pressure-pipe on-site
sewage disposal system for:

Loc 7 Summer Creek

The proposal includes:

Plans & specs, including flow chart & calculations

Plot plan

Septic tank & pump tank specs

Pump, controls, & accessory specs

Other installation info

Please note that specific manufacturers mentioned in the proposal
are for example: other products that meet or exceed the specific-
ations may be substituted.

When review of plans has been completed, please forward one copy of
the plans (and permit, if applicable) to:

Steve Watson

Phone: 387-1037

11 Neolake Rd

919 460-1917

Apex NC 27502

If you have questions or require additional information, please call.

Katherine H. Tew, R.S., P.G.
President

plans transmitted via client



FEBRUARY ASSOCIATES, INC.

P.O. Box 6427 Cary, N.C. 27511 919/467-5427

I.P.P.

I.P.P. system design & specifications

date: 10-1-94

county CHATHAMsite location LOT 7 SUMMER HILLOwner STEVE & DIANE WATSONAddress # 11 NEEDARAPEX PITTSBORO NC 27312Phone 387-1037

Tax Map _____ Parcel _____ Twp _____

Soils eval. by CCNDApplication rate .1 gal/ft²/dayDesign flow 360 gal/day

Type of structure (check one)

☒ Single family dwelling with 3 bedrooms. Garbage disposal? NO☐ Business (describe) _____ No. of employees _____☐ Other (describe) _____

DESIGN SUMMARY

Drainfield: 3600 sq. ft.// laterals: 720 linear ft., 1 1/4" diameter 160 psi PVC or betterConfiguration: 10 @ 72' IN 2 SUBMERSIONSSupply line: ~ 30 feet, 3" diameter Sch. 40 PVCManifold: ~ 75 feet, 3" diameter Sch. 40 PVCManifold placement: SIDE Levee UPSeptic tank: 1000-GAL. @ GARAGE
1000-GAL. @ HOUSE gallonsPump tank: 1000 gallons, 22 gallons per inchTotal dosing rate 74.2 gpmDosing volume 572 gallonsDrawdown in pump tank 26 inchesTotal dynamic head 11.7 feetTrench depth 12"-14"Trench width 10"Depth of gravel in laterals 8"Size of gravel 3/8"-1"Pump HYDROMATIC SP50MIControls WATER GUARD TACII-AW/ SEPARATE ALARM CIRCUITCheck valve ONE IN P.T., ONE @ FIELDGate valve(s) 2 @ FIELDAnti-siphon hole NOCurtain drain NO

(Other equipment which meets or exceeds specifications may be substituted)

Comments _____

with Sch. 40
turnups, in
valve boxes
sleeved in 6"
diam. pipe

LATERAL	ELEVATION (FT)	ELEV. DIFF. (FT)	HEAD (FT)	HOLE SIZE (IN)	FLOW PER HOLE (GPM)	LENGTH (FT)	SPAC- ING (FT)	NO. HOLES	FLOW PER LATERAL (GPM)	1ST AND LAST HOLE (FT)	INST FLOW RATE (GPM /FT)
1	100.00	0.00	2.0	5/32	0.407	72	3.0	23	9.36	3.0	0.130
2	99.40	0.60	2.6	5/32	0.464	72	3.5	19	8.82	4.5	0.123
3	98.60	1.40	3.4	5/32	0.531	72	4.0	16	8.50	6.0	0.118
4	98.10	1.90	3.9	5/32	0.569	72	5.0	14	7.97	3.5	0.111
5	97.80	2.20	4.2	5/32	0.590	72	5.0	13	7.67	6.0	0.107
1	97.30	0.00	2.0	5/32	0.407	72	3.5	18	7.33	6.3	0.102
2	96.60	0.70	2.7	5/32	0.473	72	4.5	15	7.10	4.5	0.099
3	96.00	1.30	3.3	5/32	0.523	72	6.0	12	6.28	3.0	0.087
4	95.30	2.00	4.0	5/32	0.576	72	7.0	10	5.76	4.5	0.080
5	94.90	2.40	4.4	5/32	0.604	72	7.0	9	5.44	8.0	0.076

OR, END

FIELD NUMBER = 2

TOTAL LENGTH = 720 FT

TOTAL FLOW = 74.23 GPM

MAXIMUM REDUCTION OF FLOW BETWEEN LATERALS = 41.54%

Press any key to continue...

✱

Name: WATSON

CALCULATIONS

Total dosing rate: 74.2 gallons per minuteReduction of flow: 41.5Slope: 11.3Manifold cross-sectional area: 7.4 in²Lateral cross-sectional area: 1.8 in² each5 laterals/manifold, area: 9.0 in²Ratio: 7.4 / 9.0 = .82Top lateral elevation: 100Pump-off elevation: 92.5Elevation head: 7.5'Design head: 2.0'Friction loss: 1.8'Fittings loss: .4'
(20% friction loss)TOTAL DYNAMIC HEAD: 11.7'supply line: 105' of 3" = 1.8'
manifolds: 5 of 3" = 1.8'

$$= \frac{.00113 L Q^{1.85}}{D^{4.87}}$$

L = length
Q = dosing rate
D = actual inside diameter
(assumes NEW pipe)

Draining manifold & : length 75' x 38.4 gal/100' = _____ gallons
supply line: length 5' x _____ gal/100' = _____ gallons = 28.8

Lateral volume : length 720' x 9 gal/100' = 64.8 gallons

Dosing volume : min: (5 lat vol + drain) ~353 gallons
max: (10 lat vol + drain) ~677 gallons USE: 572 gallons

Pump run time: 7.7 minutes Volume to pressurize: 93.6 gallons
16.4 % dosing volume delivered under gravity

Drawdown:

Interior dimensions of pump tank: length 101 inches X width 50 inches X 1"

$$= \frac{230 \text{ cubic inches per gallon}}{22} \text{ gallons per inch}$$

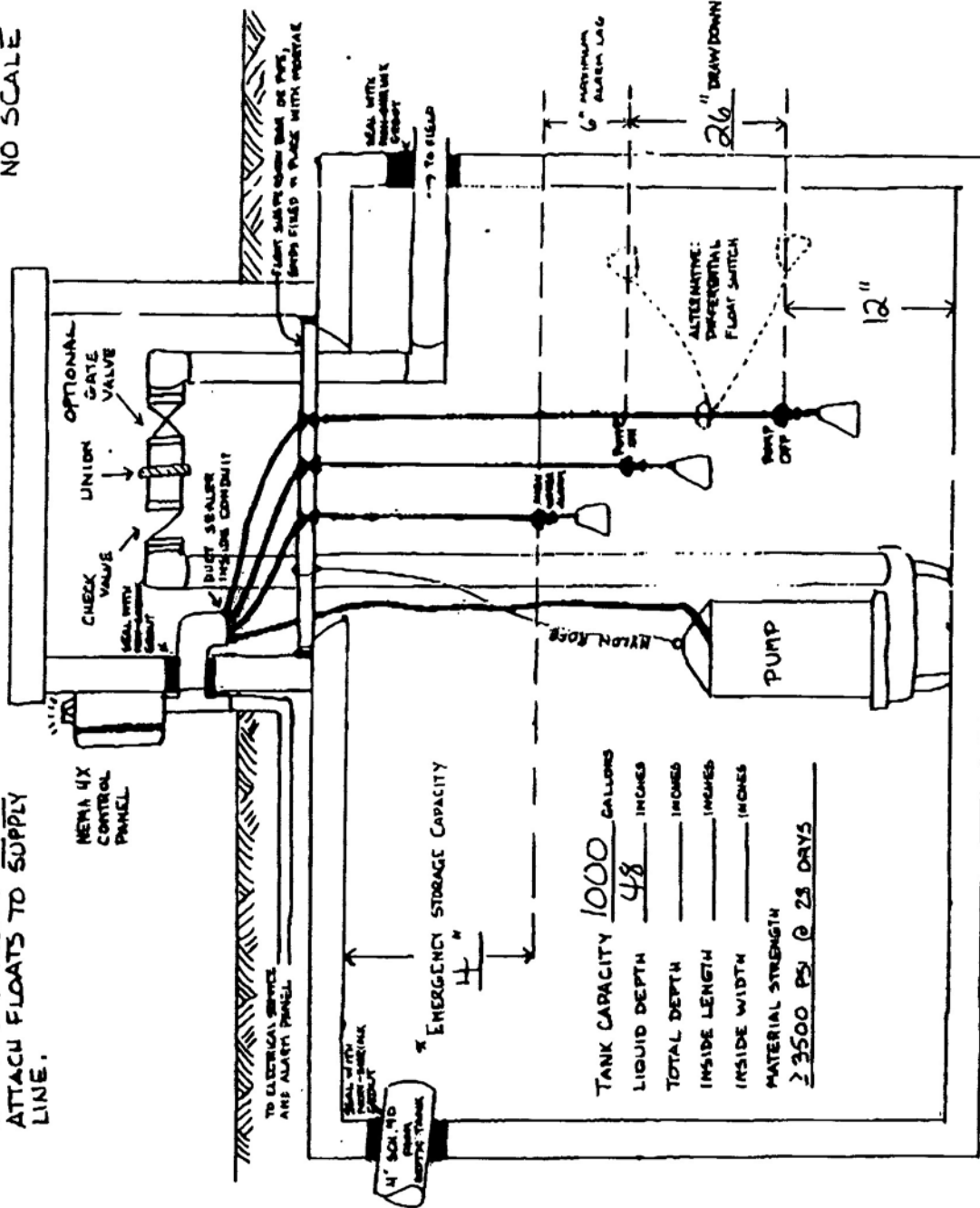
Drawdown = dosing volume ÷ gallons per inch = 26 inches

NOTE: Pump tank dimensions vary by manufacturer. Drawdown should be recalculated using dimensions of specific tank selected. A minor adjustment in the dosing volume to achieve a whole number of inches is acceptable.

DOSE CHECK : ~10 INCHES IN 3 MINUTES

OPTIONAL: MOUNT FLOATS ON "FLOAT TREE". DO NOT ATTACH FLOATS TO SUPPLY LINE.

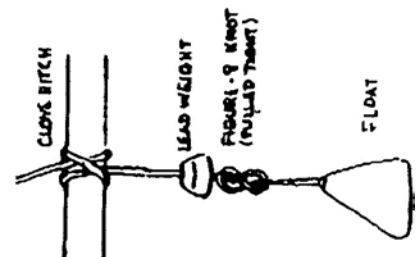
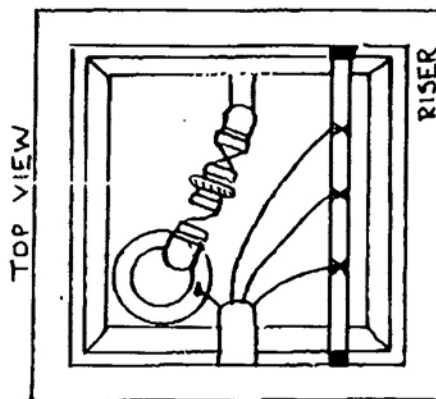
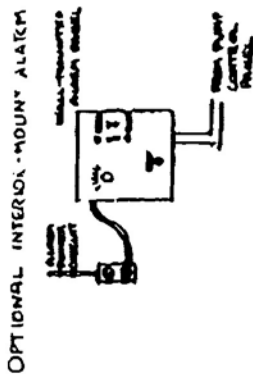
NO SCALE

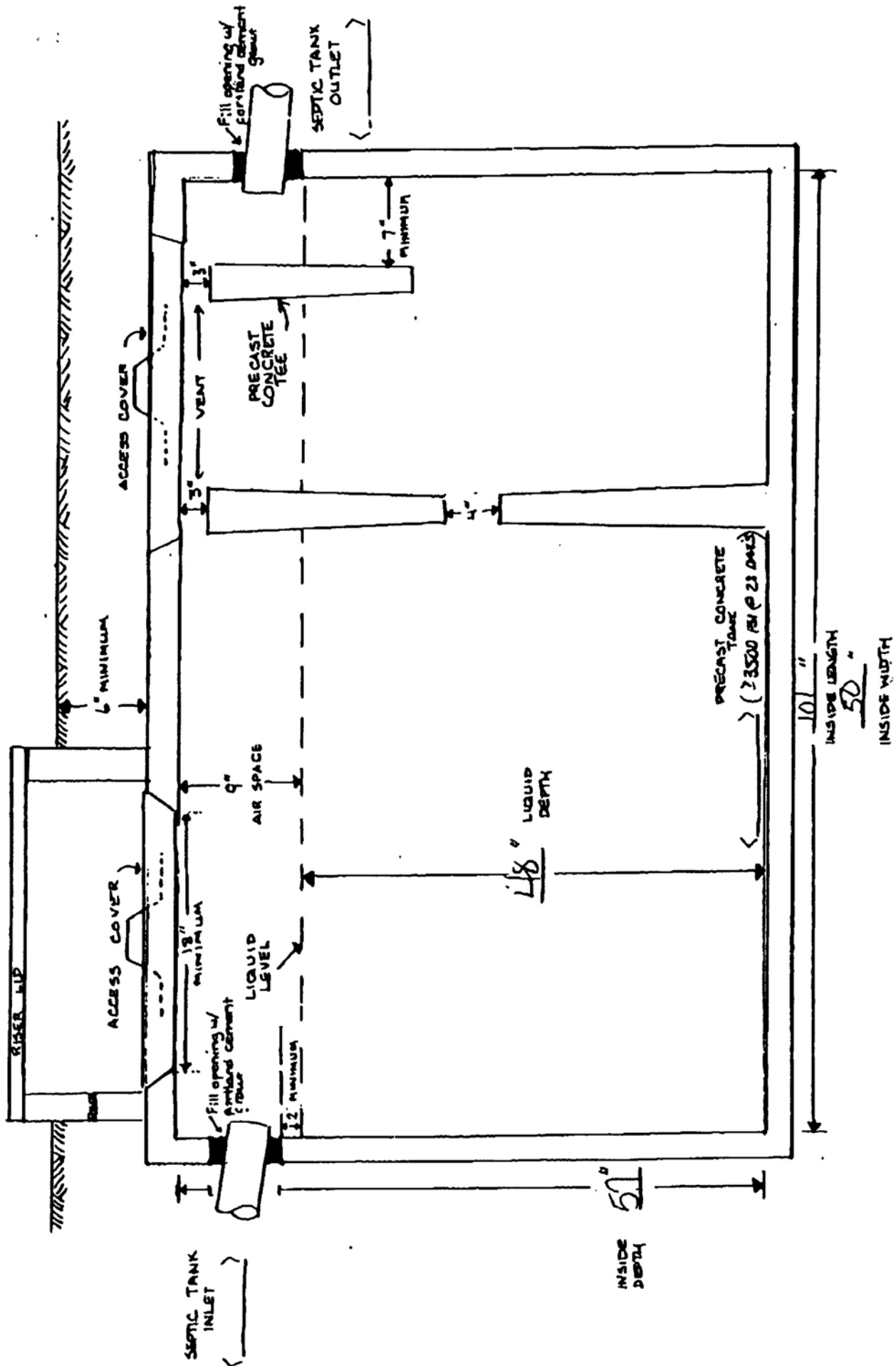


TANK CAPACITY	1000	GALLONS
LIQUID DEPTH	48	INCHES
TOTAL DEPTH		INCHES
INSIDE LENGTH		INCHES
INSIDE WIDTH		INCHES
MATERIAL STRENGTH	≥ 3500 PSI @ 25 DAYS	

ALL PIPE: VALVES: 3" D.I.M.

EMERGENCY STORAGE CAPACITY:	4	INCHES @	22	GALLONS PER INCH:	88	GALLONS
PLUS SEPTIC TANK FREBOARD:	18		23		396	
2 SEPTIC TANKS				TOTAL	484	





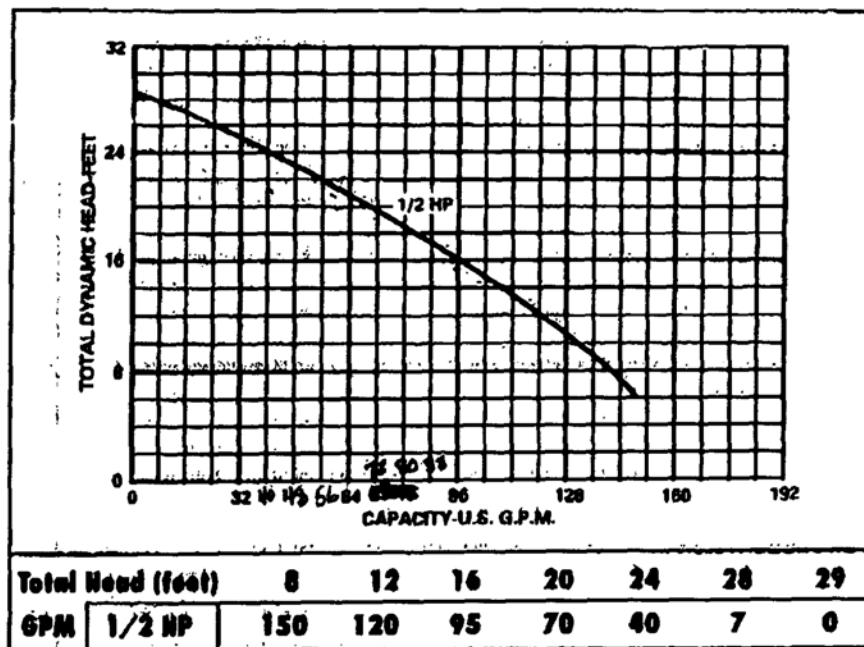
1000 GALLON SEPTIC TANK

SCALE: NONE



ENGINEERING DETAILS - SP50

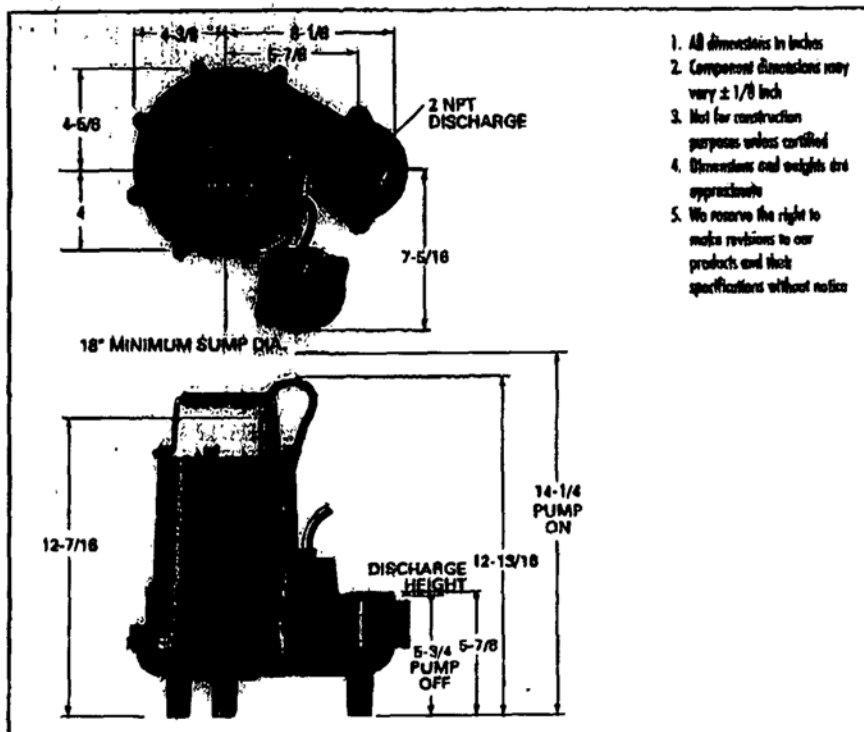
Performance Data



Pump Characteristics

Pump/Motor Unit	Submersible						
Manual Models	M1	M7	M2	M6	M3	M4	M5
Automatic Models	A1	-	A2	-	-	-	-
Automatic All Brz.	A81	-	-	-	-	-	-
Horsepower	1/2						
Full Load Amps	12.0	5.7	6.0	4.1	3.5	1.9	1.4
Motor Type	Split-Phase			Three-Phase			
R.P.M.	1750						
Phase Ø	1			3			
Voltage	115	200	230	200	230	460	575
Hertz	60						
Operation	Intermittent						
Temperature	140°F Ambient						
NEMA Design	A						
Insulation	Class A						
Discharge Size	2" NPT std. (3" opt.)						
Solids Handling	1-1/2"						
Unit Weight	70 lbs. (SP50AB) 77 lbs.)						
Power Cord	16/3, 57W, to 115V, 200V, 230V - 10' std. (20' optional) 16/4, 57W, to 200V, 230V, 460V, or 575V - 20' std.						

Dimensional Data



Materials of Construction

Handle	Steel
Lubricating Oil	Dielectric Oil
Motor Housing	Cast Iron*
Pump Casing	Cast Iron*
Shaft	Stainless Steel
Mechanical Shaft Seal	Seal Faces: Carbon/Ceramic Seal Body: Brass Spring: Stainless Steel Bellows: Buna-N
Impeller	Cast Iron*
Upper Bearing	Brass Sleeve
Lower Bearing	Single Row Ball Bearing
Fasteners	Stainless Steel

*SP50AB) = Bronze

AURORA/HYDROMATIC Pumps, Inc.
1840 Baney Road, Ashland, Ohio 44805
(419) 289-3042



TAC III A

SINGLE PHASE SERIES **SIMPLEX AND ALARM SUMP CONTROLS**

U.L. APPROVED & LABELED

TAC III A SSC12WX SIMPLEX SUMP CONTROL

The Putnam Water Guard TAC III a Simplex Sump Control with alarm is designed specifically as an economical, high quality pump control and alarm combination for the private residence or small commercial building installation. The control is designed for two separate power feeds, one for the pump and one for the alarm.

Note: The installer must provide the separate power feeds. Control features as follows:

- Nema 4X weatherproof fiberglass enclosure (10x8x5 1/8)
- 20 AMP rated contractor (LRA 100)
- Hand-Off-Auto switch for pump (internal-tamper proof)
- Run light for pump (long life neon)
- Auto-reset high water alarm circuit
- On-Off switch for alarm circuit (internal for maintenance)
- Test-Normal-Silence switch for alarm circuit
- Weatherproof alarm device (horn and/or light-see model no's below)
- Terminals for power, pump and float switch connections

The SSC12WX is also available with the following options:

OPTIONS
Elapsed Time Meter
Circuit Breakers
Locking Hasp



Water Guard

by Putnam Water Guard, Inc.

MANUFACTURERS OF WATER & SEWERAGE SYSTEM CONTROL PANELS

LPP Installation Instructions

TANKS: The contractor shall install precast septic tank and pump tank in the configuration shown on the plans. All tank components, risers, and connections to tanks shall be waterproofed with mastic joint sealer or concrete mortar on both sides of all joints. Prior to backfilling, pump tank should be filled with water and allowed to stand for at least 24 hours to determine that there is no leakage.

SITE PREPARATION: The designated field area and repair area **MUST** be left in an undisturbed state prior to installation. NO traffic, parking, heavy equipment, material stockpiles, or grading is permitted on field areas. On wooded sites, clear only those trees, shrubs, or brush necessary to provide clearance for a small trenching tractor to install lateral lines. All trees to be removed shall be cut off flush with the ground and treated with stump killer. No stumps or roots are to be removed unless otherwise specified.

TRENCHES: Trenches of the specified width and depth shall be dug **ONLY** when the soil is dry or slightly moist. Trench bottoms shall be levelled by hand so that the difference in bottom elevation from trench to trench is as shown on the plans. If required by the Health Department, compacted earth dams shall be placed in the trenches at the specified intervals. There must also be a solid earth barrier at least two feet wide between the manifold trench and the gravel in the lateral trenches. Place quarry gravel (3/8" to 1" in diameter) in the trench to a depth of 6". Then, install the PVC lateral (with holes already drilled and turnups in place - see below) on top of the gravel so that the holes are **DOWN** and the turnups are **UP**. Add another 2" of gravel on top of the pipe. The gravel should stop at least 2' short of the turnup at the end of each lateral. Install the manifold pipe in the manifold trench, and install the manifold tees as specified in the plans. Tee **UP** from the manifold, and connect the laterals to the manifold. Install gate valves and check valves as specified, with valve boxes so that valves are protected but accessible from the surface. **DO NOT** put gravel in the manifold trench. Dig the supply line trench from the pump tank to the field. Install the supply line in the trench, taking care to maintain a constant gradient.

LATERAL PIPES: PVC laterals shall be of the specified diameter and material strength, and all joints and fittings shall be primed and glued according to manufacturer's recommendations. Lay out and glue each lateral, including the elbow but not the turnup at the end. Then, placing the open end of the elbow over a peg in the ground so that the bottom of the lateral is up, measure and drill the holes as specified in the plans. "Spacing" is the distance between the holes; "1st & last" is the distance from the manifold to the first hole. Wrongly-drilled holes can be sealed with duct tape. After the holes are drilled, glue the turnup pipe into the open end of the elbow. **REMEMBER:** The holes are drilled only in the bottom of the pipe, not all the way through it!! Glue the male adapter on the turnup, and screw the cap on (don't glue the cap). The turnup on the top lateral of each subfield should measure exactly 2.0 feet (or whatever is specified as the design head) from the bottom of the lateral to the lip of the opening.

BACKFILL AND LANDSCAPING: Install any curtain drains, swales, or other water diversion devices specified in the plans. Fill the trenches with topsoil packed and mounded over the trenches to a height of at least 4 inches to allow for settling. The drainfield area should be seeded as soon as possible to prevent erosion.



ATTACHMENT 6:
Design Specifications for 25g Bi-Weekly Treatment

#28 weavers

2760
Weaver Hill**WAKE COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES WELL AND SEWAGE SITE LOCATION PERMIT**

NO PERMIT(S) FOR CONSTRUCTION, LOCATION OR RELOCATION ACTIVITY SHALL BE ISSUED

UNTIL AN AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION HAS BEEN ISSUED

PERMIT VOID IF NOT IN COMPLIANCE WITH ZONING REGULATIONS AND/OR IF SITE IS ALTERED OR INTENDED USE CHANGED

PERMIT#: D005419 STATUS: A APP DATE: 02/26/1997 BLDG PERMIT#: 0004190

APPLICANT: ASSURED CONSTRUCTION INC. DAY PHONE: (919) 303 - 3336

ADDRESS: P O BOX 159 FAX#: (919) 303 - 3363

CITY: APEX STATE: NC ZIP: 27502

OWNER: ASSURED CONSTRUCTION INC DAY PHONE: (919) 999 - 9999

ADDRESS: SAME FAX#: (000) 000 - 0000

CITY: APEX STATE: NC ZIP: 27502

HD USE CD: 101 ONE-FAMILY HOUSE ORIG PERMIT#: REC?: Y

EXIST USE: TAX MAP#: 0667 0006

BEDROOMS: 3 BSMT: Y #EMPLOYEES: 0 WATER: I WASTEWATER: I GARB DISPOSAL: N

TOWNSHIP: 03 BUCKHORN JURIS: WC ZON: R30 PIN: 0711.03 21 7715 000

SUBD#: S 000 018 96 SUBD NAME: WEAVER CROSSING LOT-SEC: 28 ACRE: 3.00

MPRV PRMT: ISSUED?: Y DATE: 04/09/1997 BY: SES TYPE SYSTEM: IV A PUMP: Y

NSTR AUTH: ISSUED?: Y DATE: 07/12/2000 BY: SBX MAINT: Y OPER: Y

RECEIPT#: 0012759 FEE: 290.00 OP DATE: BY:

ATR SAMPL: REQ?: APPROVED?: DATE: PROPRIETARY SYS:

ST#: 2760 MI: DIR: NAME: WEAVER HILL DIR: TYP: DR

IRECTIONS: 64 WEST TO COUNTY LINE TO L ON SR 1141 GO 2.5 M

ILES TO R INTO SUB.

IMPROVEMENT PERMITSIZE OF TANK 1000 ST 1000 PT GALS. TOTAL SQ. FT. 3600 DEPTH OF STONE 8 IN. MAX. DEPTH LINE 12 IN.WASTEWATER: DOMESTIC ☒ INDUSTRIAL ☐

I.P. ISSUED BY

*[Signature]***AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION**

VOID SIXTY (60) MONTHS FROM DATE OF ISSUANCE

AUTHORIZATION CONDITIONS

Contractor To Follow Contours, See Attached Site Plan For Wastewater System Design And Well Location. The wastewater system shall not be covered or placed into use until inspected by the Wake County Department of Environmental Services and an Operation Permit issued.

OTHER CONDITIONS: Follow LPP plans- see approval letter.SIZE OF TANK 1000 ST 1000 PT GALS. TOTAL SQ. FT. 3600 DEPTH OF STONE 8 IN. MAX. DEPTH LINE 12 IN.ST FILTER REQUIRED ☒ NUMBER OF TRENCHES 11 LENGTH OF TRENCHES 720 FT. WIDTH OF TRENCHES 18 IN.C.A. ISSUED BY *[Signature]* INSTALLED BY _____ CTR. I.D. # _____

SEPTIC TANK FILTER USED _____

INNOV. APPL. #: IWWS- _____ DATE _____ INSTALLATION APPROVED BY _____

WELL SYSTEM = PRIVATE ☒ SEMI-PUBLIC ☐ NEW ☐ REPLACEMENT ☐ EXISTING ☐

WELL LOG INFORMATION = DEPTH _____ CASING DEPTH _____ YIELD _____ STATIC LEVEL _____

WELL CONTRACTOR _____ REG.# _____ PUMP CONTRACTOR _____ REG.# _____

CONSTRUCTION COMPLIANCE = GROUT APPROVED ☐ DATE _____ EHS _____WCHD ID # _____ WELLHEAD APPROVED ☐ DATE _____ EHS _____NEGATIVE BACTERIOLOGICAL RESULTS ☐ DATE _____ EHS _____SYSTEM FINALIZED ☐ DATE _____ EHS _____COMMENTS: See CA site plan for well location

This permit is based in part on information provided by the homeowner or his/her representative in the application submitted for this permit. The Environmental Health Specialist is not responsible for false or misleading information contained in the application. The Environmental Health Specialist is also not responsible for concealed conditions on the property or for statements in this report that may have resulted from false or misleading statements provided to him in the application. Neither Wake County nor the Environmental Health Specialist warrants that the septic tank system will continue to function satisfactorily in the future or that the water supply will remain potable.

FEBRUARY ASSOCIATES, INC.

#28 WC

2/10

P.O. Box 5427
Cary, N.C. 27512

Ph: 919/467-5427
Fax: 919/467-5463

ALTERNATIVE SYSTEM DESIGN date: 6-23-00

OWNER JAMES BRUCE TYPE OF SYSTEM LPP
ADDRESS ASSURED CONSTRUCTION COUNTY WAKE
PO Box 4694 SITE LOT 28 WEAVER CROSSING
CARY NC 27519 0711.03-21-771?
PHONE 422-0652 D-5419

Site evaluation by SPEC; LAYOUT DEMO BY FEB. ASSOC (1-15-97); STEVE SMITH, R.S.

SPECIFICATIONS: (Source: permit, site evaluation, other: _____)

Daily waste load 360 gpd, for 3 BR HOUSE LTAR .1 gal/sq.ft./day

Trenches
Maximum depth 12-14 inches* Lateral sleeves: no (yes) with 4" diameter corrugated tubing
Width 18 inches
Gravel depth 8-9 inches Fill cap: (no) yes, _____ deep, placed on site prior to installation
Gravel size #5 or 1/4" max inches yes, _____ deep, placed over completed trenches
* SURFACE TOP IS VERY IRREGULAR - FINAL LANDSCAPING MUST BE UNIFORM

DESIGN PARAMETERS:

Septic tank 1000 gallons Pump tank 1000 gallons, 20 gallons per inch
With effluent filter

Lateral field 3600 sq. ft. Laterals 720 linear feet, 1 1/4" diameter
SEE SITE PLAN FOR CONFIGURATION OF SYSTEM with turnups in valve boxes or 6"-diameter capped risers

Supply line 205 feet, 3" diam. All pipe and fittings: Sch. 40 PVC unless otherwise noted. See "SITE PLAN & DETAILS" sheet for size and placement of valves, etc.
Manifold(s) 160 feet, 3" diam.

Dosing rate 64.2 gpm Dosing volume 360 gallons

Total dynamic head 28.5 feet Drawdown in pump tank 18 inches

Pump HYDROMATIC SPD: 100 H controls RHOMBUS TYPE 112 PANEL

W/ ALARM ELAPSED TIME EVENT COUNTER.
Other equipment which meets or exceeds the specifications may be substituted

OTHER REQUIREMENTS: _____
newlpp.doc

JAMES BRUCE
LOT 28 WENDY HILL

#28 WC

5/10

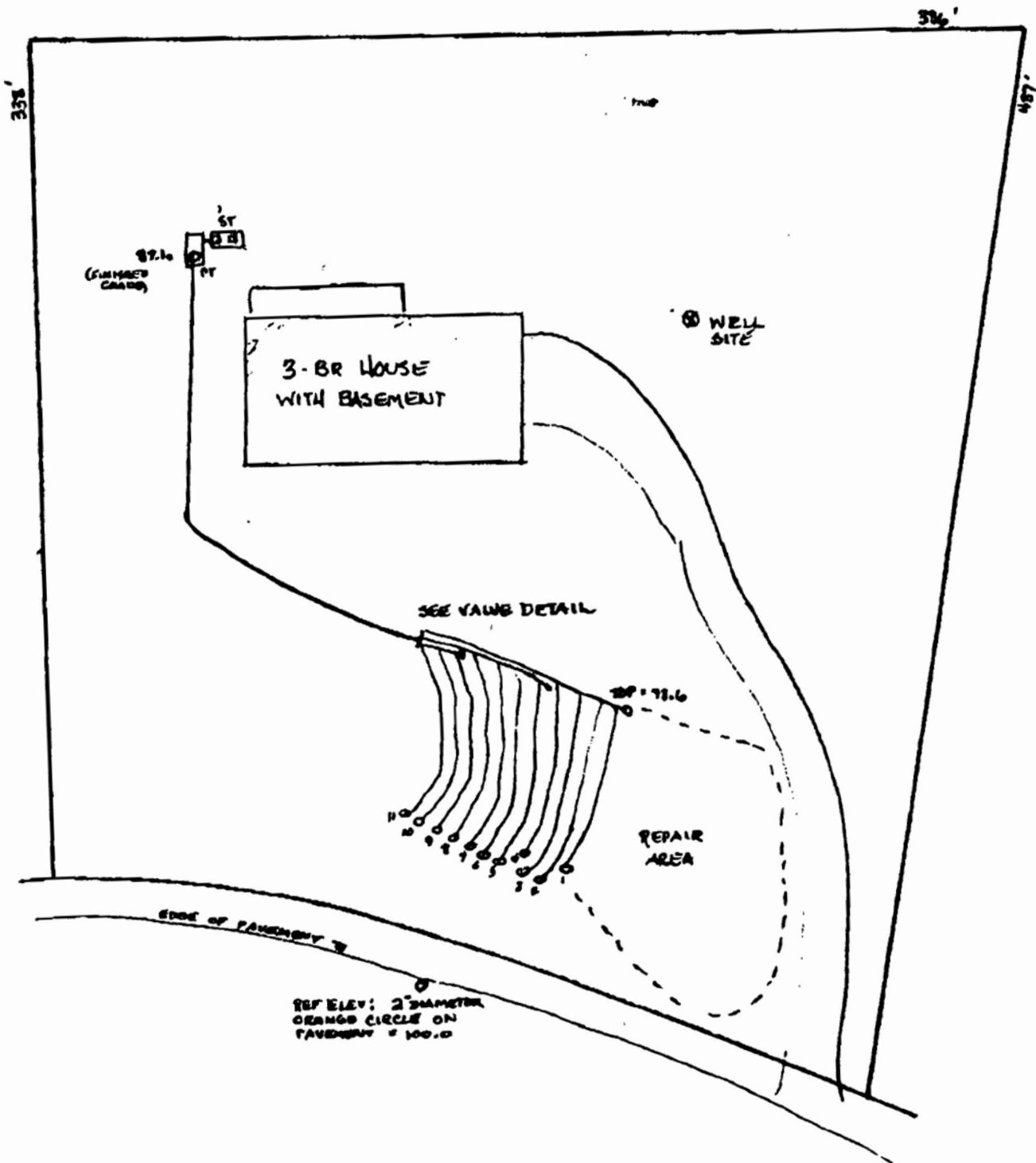
FLAG

line	length	elevation	elev. diff	head	hole size	flow/hole	# holes	spacing	1st/last	flow/lat	inst
1	60	98.6	0	4.0	5/32	.58	12	5'	2.5'	6.96	.116
2	70	98.4	-.2'	4.2	"	.59	13	5'	5'	7.67	.110
3	65	98.1	-.5'	4.5	"	.61	11	5.5'	5'	6.71	.103
4	60	97.5	-1.1	5.1	"	.65	8	7'	5.5'	5.20	.087
5	70	97.3	-1.3	4.0	"	.58	12	5'	7.5'	6.96	.099
6	70	97.1	-1.5	4.2	"	.59	11	6'	5'	6.49	.093
7	70	96.7	-1.9	4.6	"	.62	10	7'	3.5'	6.20	.089
8	65	96.5	-2.1	4.8	"	.63	8	8'	4.5'	5.04	.078
9	65	96.3	-2.3	4.0	"	.58	9	7'	4.5'	5.22	.080
10	65	96.1	-2.5	4.2	"	.59	8	8'	4.5	4.72	.073
11	60	95.8	-2.8	4.5	"	.61	5	10'	10'	3.05	.051
	720'									64.22 GPM	

56% REDUCTION

#28 WC
4/10

D-5419



LOT 28
WEAVER CROSSING

JAMES BRUCE
ASSURED CONSTR.



FEBRUARY ASSOCIATES, INC.

PIN: 0711-03-21-771?

DRAWN BY: KHM

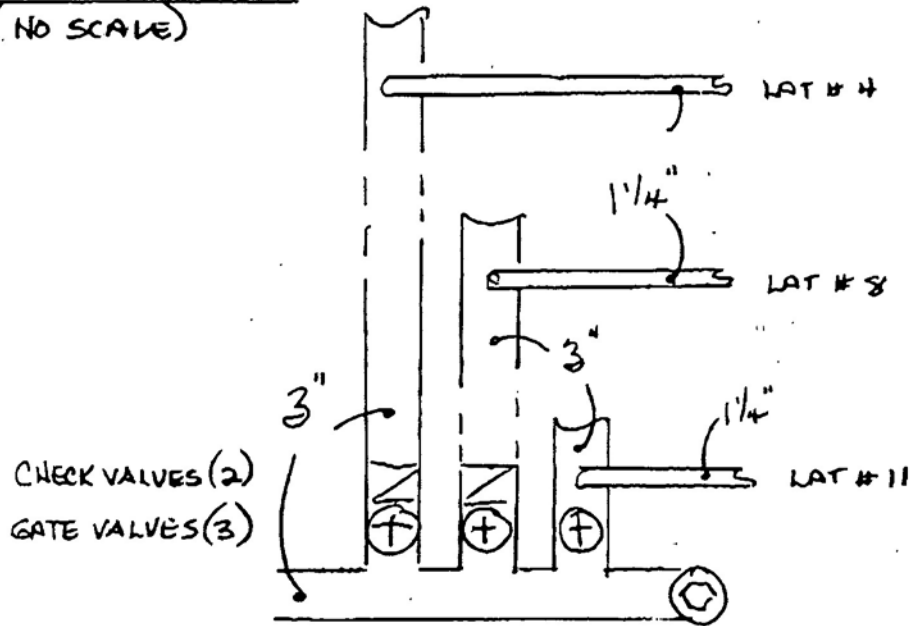
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DATE: 6-23-00

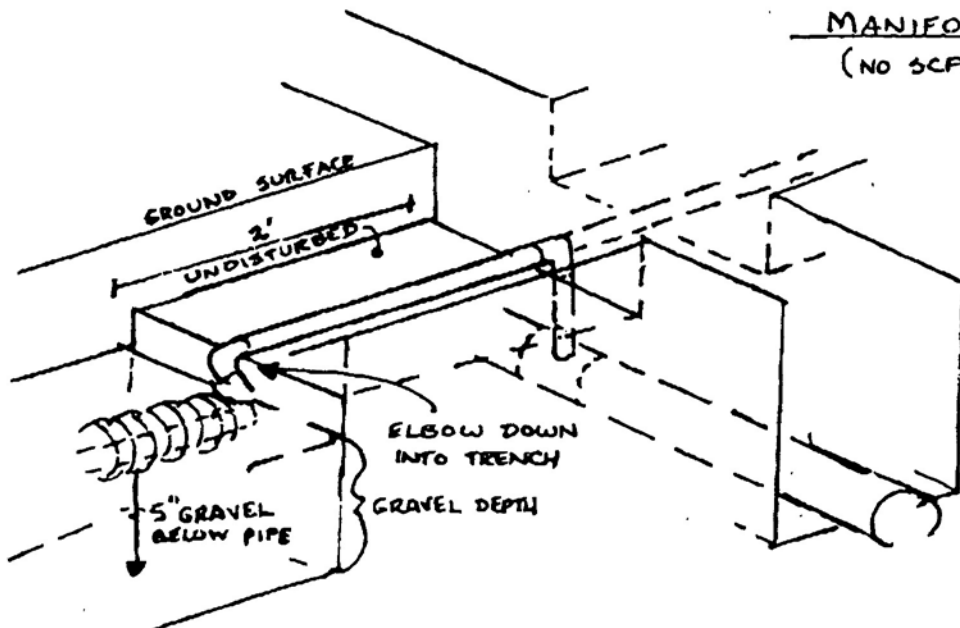
P.O. Box 5427
Cary, N.C. 27812
919/487-5427

6/10

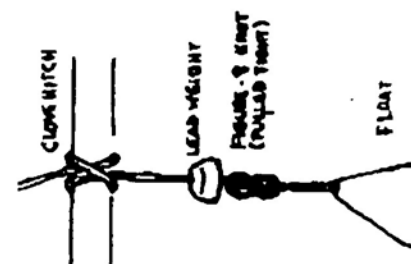
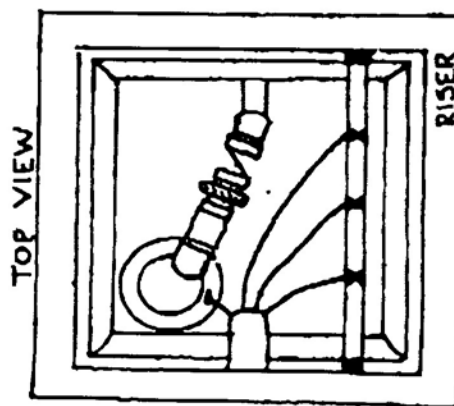
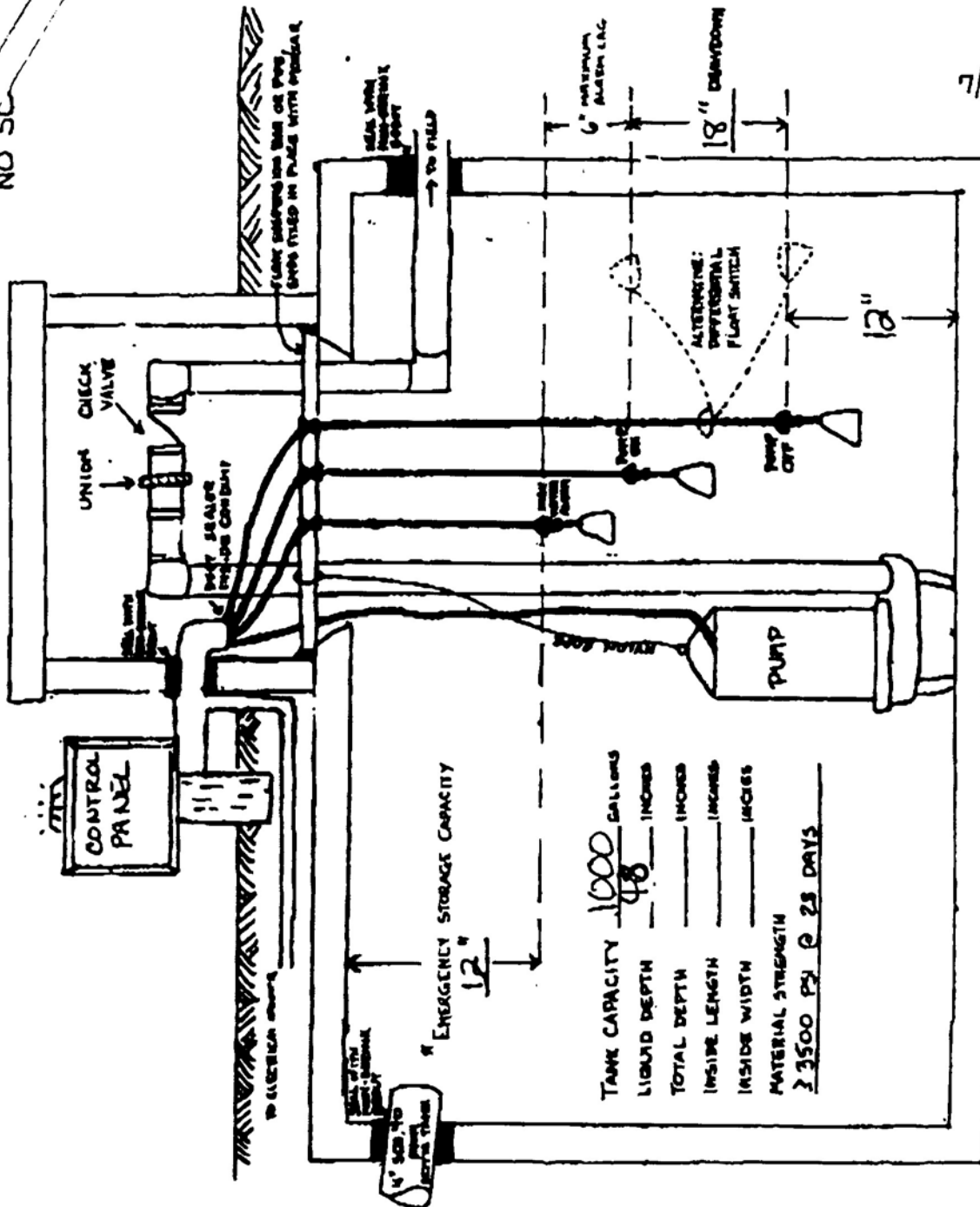
VALVE & PIPE DETAIL (NO SCALE)



MANIFOLD TEES (NO SCALE)



NO SC



EMERGENCY STORAGE CAPACITY: 12 INCHES @ 20 GALLONS PER INCH 240 GALLONS
PLUS SEPTIC TANK FREEDOM: 9 20 180

TOTAL 420

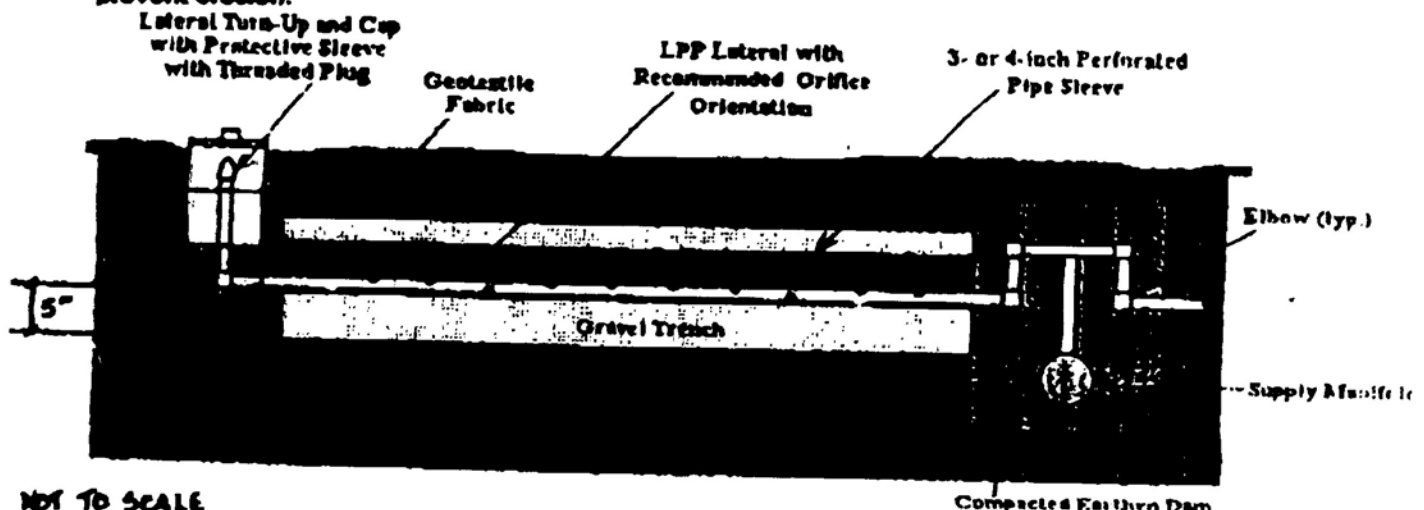
TANKS: The contractor shall install precast septic tank and pump tank in the configuration shown on the plans. All tank components, risers, and connections to tanks shall be waterproofed with mastic joint sealer or concrete mortar on both sides of all joints. Prior to backfilling, pump tank should be filled with water and allowed to stand for at least 24 hours to determine that there is no leakage.

SITE PREPARATION: The designated field area and repair area **MUST** be left in an undisturbed state prior to installation. NO traffic, parking, heavy equipment, material stockpiles, or grading is permitted on field areas. On wooded sites, clear only those trees, shrubs, or brush necessary to provide clearance for a small trenching tractor to install lateral lines. All trees to be removed shall be cut off flush with the ground and treated with stump killer. No stumps or roots are to be removed unless otherwise specified.

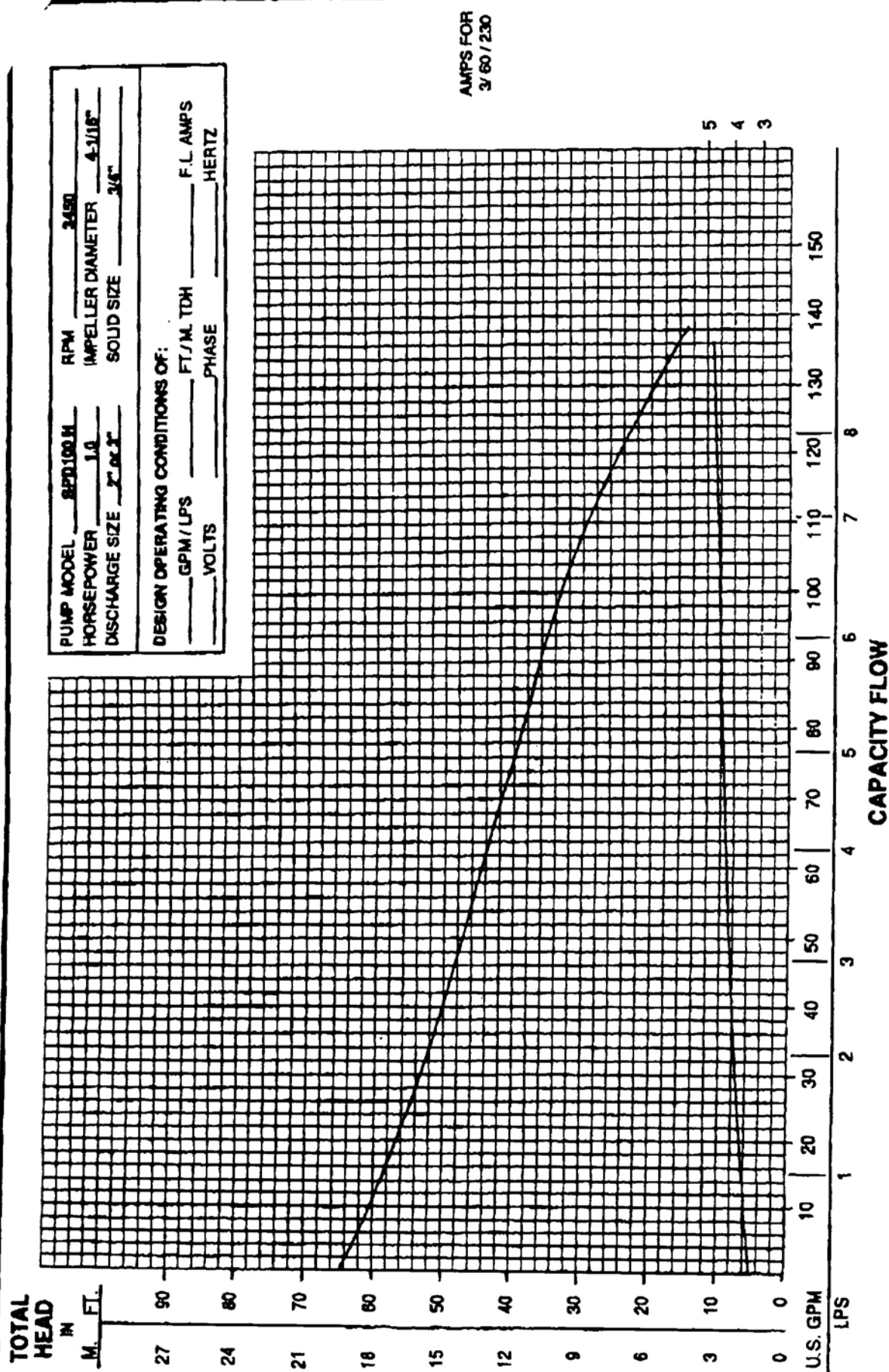
TRENCHES: Trenches of the specified width and depth shall be dug **ONLY** when the soil is dry or slightly moist. Trench bottoms shall be levelled by hand so that the difference in bottom elevation from trench to trench is as shown on the plans. If required by the Health Department, compacted earth dams shall be placed in the trenches at the specified intervals. There must also be a solid earth barrier at least two feet wide between the manifold trench and the gravel in the lateral trenches. Place clean washed quarry gravel (# 5 or larger - do not use # 57) in the trench to a depth of 5". Then, place sleeved lateral (with holes already drilled and turnups in place - see below) on top of the gravel. Add another 3-4" of gravel. The gravel should stop at least 2' short of the turnup at the end of each lateral. Install the manifold pipe in the manifold trench, and install the manifold tees as specified in the plans. Connect the laterals to the manifold. The laterals should then be lead down into the trenches. Install gate valves and check valves as specified, with valve boxes so that valves are protected but accessible from the surface. **DO NOT** put gravel in the manifold trench. Dig the supply line trench from the pump tank to the field. Install the supply line in the trench, taking care to maintain a constant gradient.

LATERAL PIPES: PVC laterals shall be of the specified diameter and material strength, and all joints and fittings shall be primed and glued according to manufacturer's recommendations. Lay out and glue each lateral. Label the TOP of the lateral. Measure and mark the holes as specified in the plans. "Spacing" is the distance between the holes; "1st & last" is the distance from the manifold to the first hole. Holes are drilled in the top of the lateral, **EXCEPT:** select two of the marked hole sites, approximately 1/3 and 2/3 of the distance from the manifold. **THESE** holes are drilled in the **BOTTOM** of the lateral to allow drainage when the pump shuts off. **DO NOT** drill holes all the way through the pipe. Wrongly-drilled holes can be sealed with duct tape. After the holes are drilled, glue the turnup pipe into the open end of the elbow (be sure the turnup points up), and sleeve the lateral in 4" diameter corrugated tubing ("holey" pipe). Tubing holes should point down. Glue the male adapter on the turnup, and screw the cap on (don't glue the cap). The turnup on the top lateral of each subfield should measure exactly 2.0 feet (or whatever is specified as the design head) from the bottom of the lateral to the lip of the opening. Turnups must be sleeved in capped 6" diameter pipe OR valve boxes.

BACKFILL AND LANDSCAPING: Install any curtain drains, swales, or other water diversion devices specified in the plans. Fill the trenches with topsoil packed and mounded over the trenches to a height of at least 4 inches to allow for settling. The drainfield area should be seeded as soon as possible to prevent erosion.



NOT TO SCALE



PERFORMANCE TABLE

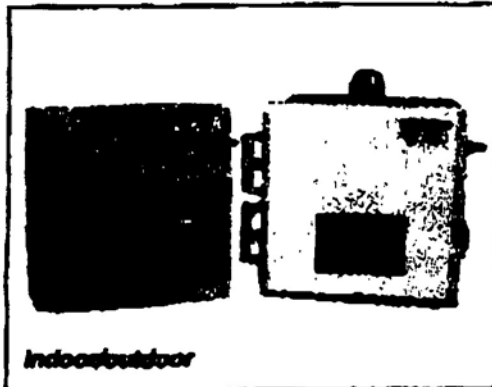
TOTAL DISCHARGE HEAD	CAPACITY FLOW													
	FEET	15	20	25	30	35	40	45	50	55	60	65		
FLOW	METERS	4.6	6.1	7.6	9.1	10.7	12.2	13.7	15.2	16.8	18.3	19.8		
	: U.S. GALLONS / MINUTE	140	131	120	108	94	76	58	40	24	11	0		
	: LITERS/SECOND	8.8	8.3	7.6	6.8	5.9	4.8	3.7	2.5	1.5	.69	0		

HYDROMATE™
ALUMINUM PUMP
A UNIT OF GENERAL SIGNAL

PERFORMANCE CURVE
SPD 100 H

MODEL 112 control panels

Single-phase, simplex motor contactor control.



APPLICATIONS

The Model 112 control panel provides residential and commercial customers with a reliable means of controlling one 120, 208, or 240 VAC single-phase pump in water and sewage installations. Two control switches activate a magnetic motor contactor to turn the pump on and off. If an alarm condition occurs, an additional alarm switch activates the audio/visual alarm system. Common applications include pump chambers, sump pump basins, irrigation systems, and lift stations.

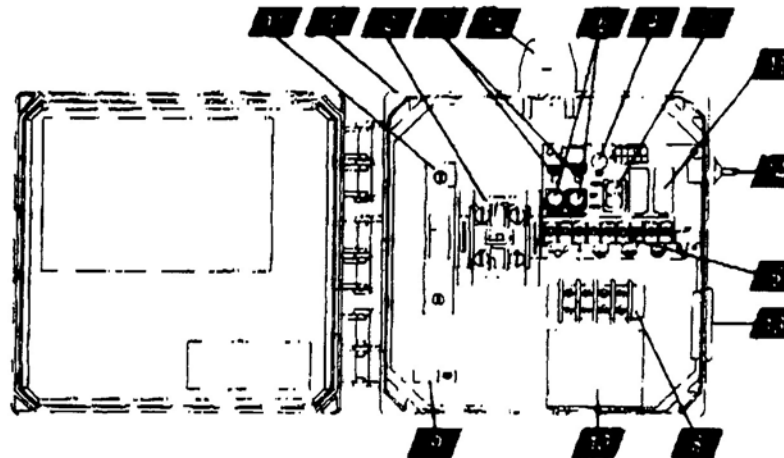
FEATURES

- Entire control system (panel and switches) is UL Labeled to meet and/or exceed industry safety standards
- Dual safety certification for the United States and Canada
- Package includes float switches
- Complete, step-by-step installation instructions included
- Two-year limited warranty



Model Shown 1121W914X

- 1 Enclosure measures 8 x 8 x 4 inches (20.32 X 20.32 X 10.16 cm). Choice of NEMA 1 (steel for indoor use), or NEMA 4X (ultraviolet stabilized thermoplastic with removable flanges for outdoor use).
- 2 Magnetic Motor Contactor controls pump by switching hot electrical lines
- 3 HOA Switch for manual pump control (on circuit board)
- 4 Green Pump Run Indicator Light (on circuit board)
- 5 Float Switch Terminal Block (on circuit board)
- 6 Alarm and Control Fuses (on circuit board)
- 7 Alarm and Control Power Indicators (on circuit board)
- 8 Pump Input Power and Pump Connection Terminal Block
- 9 Ground Lug
- 10 Terminal Block Installation Label
- 11 Circuit Breaker (optional) provides pump disconnect and branch circuit protection



STANDARD ALARM PACKAGE

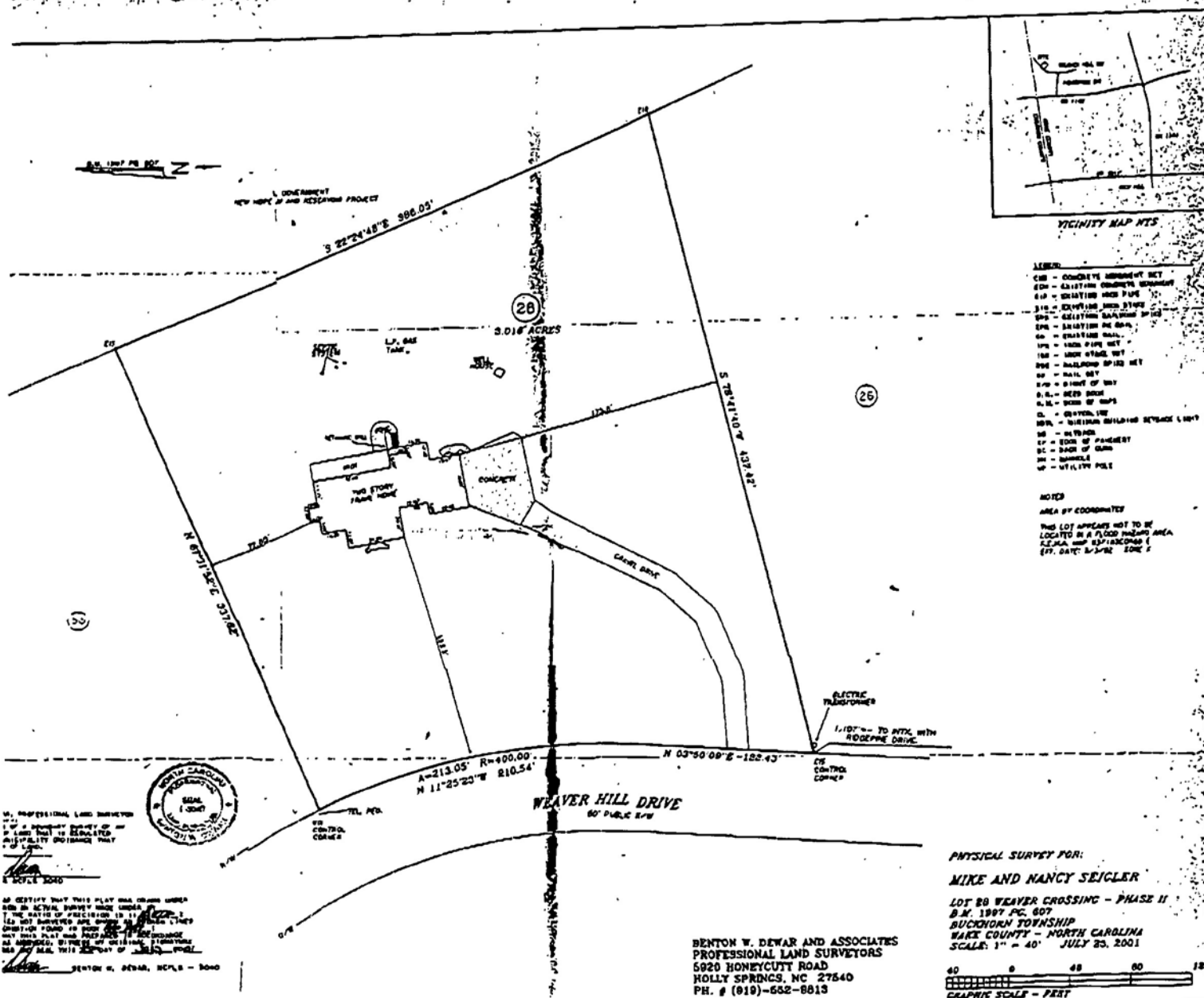
(see back page for list of options)

- 12 Red Alarm Beacon provides 360° visual check of alarm condition
Note: NEMA 1 style utilizes a door mounted indicator in lieu of a beacon.
- 13 Alarm Horn provides audio warning of alarm condition (83 to 85 decibel rating) Note: NEMA 1 style utilizes an internally mounted buzzer (83 to 85 decibel) in lieu of horn.
- 14 Exterior Horn Test/Normal/Silence Switch allows alarm horn to be silenced and testing of horn and light to ensure proper operation of alarm system.
- 15 Horn Silence Relay automatically resets alarm after alarm condition has been resolved (on circuit board)

SID
Rhombus
CONTROLS

Plat Map

Borrower/Client	Seigler, Charles/Nancy				
Property Address	2780 Weaver Hill Drive				
City	Apex	County	Wake	State	NC
Zip Code	27502				
Lender	Equity Services, Inc. and/or Assigns				



ATTACHMENT 7:
Design Specifications for 100g/Month Treatment

Revised Design from
7/20/95 & 10/23/96

WPP system design & specifications
date: 11/4/96

Owner Larry E. SEARS
Address 1913 SNOWY OWL LANE
Cary, N.C. 27511

Phone (419) 659-4067
(419) 662-3495

Type of structure (check one)

☒ Single family dwelling with 3 bedrooms. Garbage disposal? Not Recommended
☒ Business (describe) _____ No. of employees NA
☐ Other (describe) _____

county Chatham
site location SR1561 Buckner-
Clark Rd

Tax Map _____ Parcel _____ Twp _____
Soils eval. by Kim Warren, R.S.

Application rate 1 gal/ft²/day
Design flow 360 gal/day

DESIGN SUMMARY

Drainfield: 3600 sq. ft. Schedule 40
Laterals: 720 linear ft., 1 1/4" diameter 160 psi PVC or better

Configuration: 9 Laterals, 2 Fields

Supply line: 65 feet, 2" diameter Sch. 40 PVC

Manifold: 45 feet, 2" diameter Sch. 40 PVC

Manifold placement: Center, end toe UP

Septic tank: 1000 gallons

Pump tank: 1000 gallons, 48" liquid depth

Total dosing rate 50.10 gpm

Dosing volume 300 gallons

Drawdown in pump tank 14 inches

Total dynamic head 11 feet

Trench width 12"

Depth of gravel in laterals 8"

Size of gravel 3/8" - 1"

Pump _____

Check valve NO

Controls: ZOELLER 10-0050 SIMPLEX CONTROL

Gate valve(s) ONE AT FIELD

2 WEIGHTED MECHANICAL SENSORS FLOATS

Anti-siphon hole NO

Alarm: ZOELLER "A-PAL" 10-0053

Curtain drain NO

Other equipment which meets or exceeds
Specifications may be substituted)

Comments: PUMP IS ONLY AN EXAMPLE. ANY OTHER PUMP MAY BE
SUBSTITUTED THAT PRODUCES A MINIMUM 50.10 gpm @ 11 FT. TDH

* Sleeve laterals in 3" or 4" conventional nitrification line
perforated tubing.

line	elev.	diff.	head	hole size	flow/ hole	# holes	flow/ lat	spacing
SUBFIELD #1								
9	100.00	0	2.0	5/32	.41	7	2.87	5.0' 5'0"
8	100.00	0	2.0		.41	20	8.20	5.5' 5'6"
7	99.80	0.2	2.2		.43	20	8.60	6.0' 6'0"
6	99.70	0.3	2.3		.44	20	8.80	6.0' 6'0"

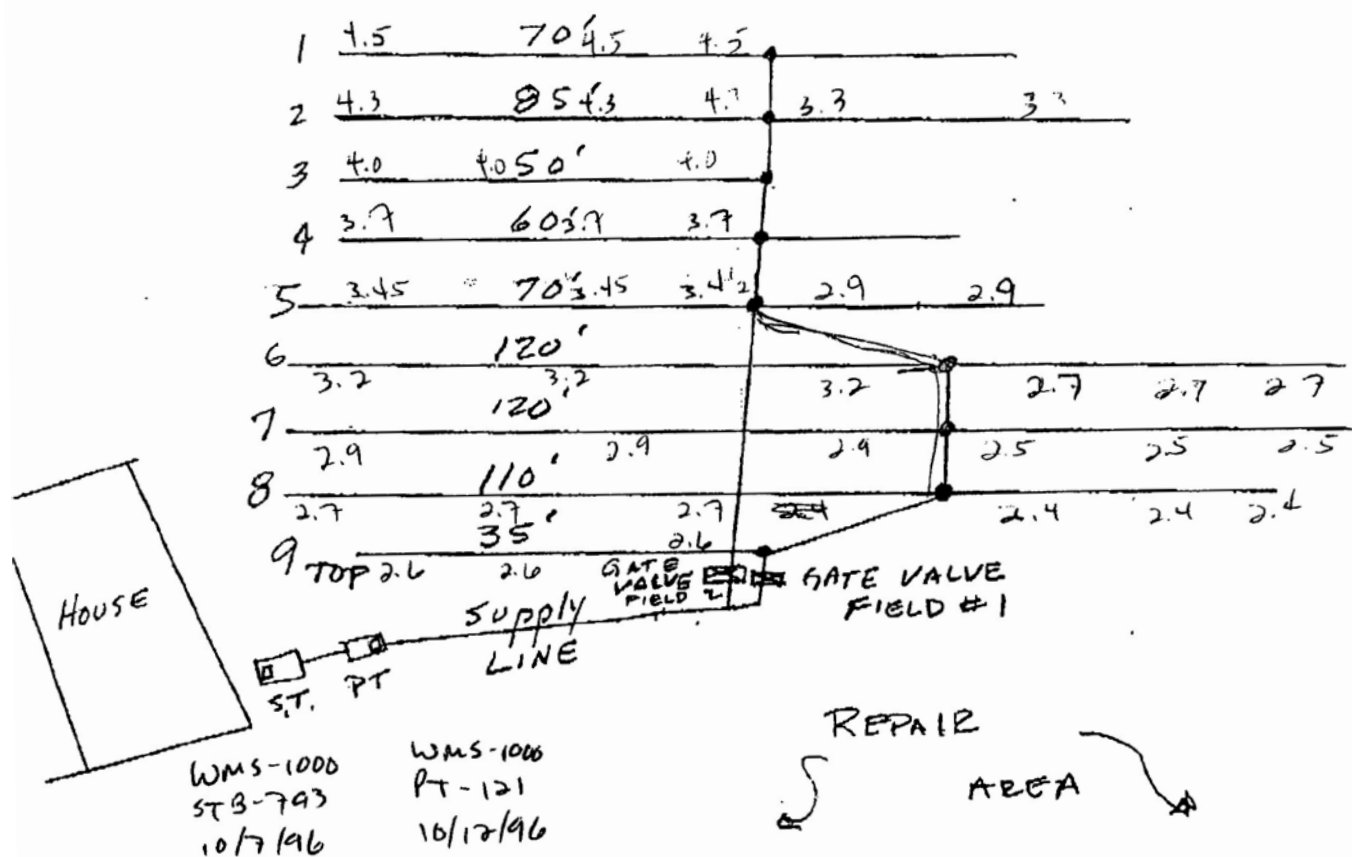
SUBFIELD #2								
5	99.5	0	2.0	5/32	.41	12	4.92	5.83' 5'10"
4	99.5	0	2.0		.41	10	4.10	6.0' 6'0"
3	99.0	0.5	2.5		.46	7	3.22	7.14' 7'2"
2	98.7	0.8	2.8		.49	11	5.39	7.73' 7'9"
1	98.5	1.0	3.0		.50	8	4.00	8.75' 8'9"

LINE	FLOW/FT.	LINE	FLOW/FT.	TOTAL DOSING RATE.
9	0.082	5	0.070	50.10 GPM
8	0.075	4	0.068	
7	0.072	3	0.064	
6	0.073	2	0.063	
	11% REDUCTION	1	0.057	19% REDUCTION
				30% REDUCTION TOP TO LOWER

Pump elevation 95.65

CALCULATIONS

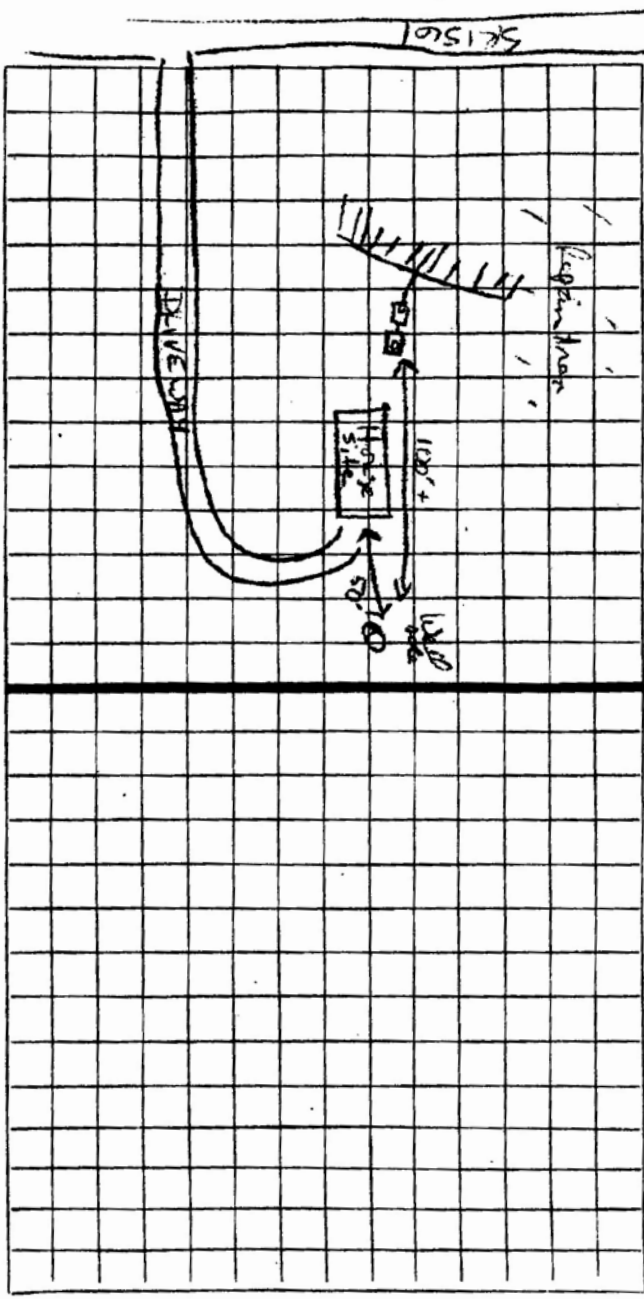
Design head: 2.00 feetElevation head: 4.35 feetFriction loss: 3.98 feet = supply line length $\frac{100}{100} \times 3.98$ Fittings loss: .80 feet = 20% of friction lossTOTAL DYNAMIC HEAD 11 feetSupply line volume: length $\frac{100}{100}$ x 16.2 gallons = 16.2 gallonsLateral volume: length $\frac{720}{100}$ x 6.4 gallons = 46.08 gallonsDosing volume: 5 x lat. vol. 46.08 gal = 230 galDrawdown: dosing vol. 230 gal x liquid depth $\frac{1}{4}$ " = 14"
pump tank vol. 1000 gal



	<u>Lateral</u>	<u>Diff</u>	<u>HOLE SIZE</u>	<u># HOLES</u>	<u>SPACING</u>	<u>FLAGGED</u>
Field #1	9	0	5/32"	7	5'0"	ORANGE
	8	0	5/32"	20	5'6"	YELLOW
	7	0.2'	5/32"	20	6'0"	ORANGE
	6	0.3'	5/32"	20	6'0"	YELLOW
	5	0.0	5/32"	12	5'10"	ORANGE
Field #2	4	0.0'	5/32"	10	6'0"	YELLOW
	3	0.5'	5/32"	7	7'2"	ORANGE
	2	0.8'	5/32"	11	7'9"	YELLOW
	1	1.0'	5/32"	8	8'9"	ORANGE

NOTE: Make sketch of installation showing lot size and shape, location of house, septic tanks, privies, water supplies, etc. Note special problems existing on lot. Write in measurements in order that installations may be located at later date. Note location of water supplies on adjacent lots.

(1)



(2)

ATTACHMENT 8:
Design Specifications for 50g/Month Treatment

#3
OLDE THOMPSON
47 Songbird Ct.

Permit

No. A03181

CHATHAM COUNTY HEALTH DEPARTMENT ENVIRONMENTAL HEALTH DIVISION

80 E. Street
P. O. Box 130
Pittsboro, NC 27312-0130
(919) 542-8208 Phone
(919) 542-8288 Fax

1000 S. 10th Avenue
Siler City, NC 27344
Phone (919) 742-4911
Fax (919) 542-1442

IMPROVEMENT PERMIT FOR WASTEWATER SYSTEMS

ARTICLE II-CHAPTER 130A OF THE NC GENERAL STATUTES

An Improvement Permit is issued to CHATHAM DEVELOPMENT CORP. for
a 3.37 ± acre site located THOMPSON CREEK LOT 3

in Chatham County. It is specifically issued for the following facility:

Facility: Residence (X) Business ()
No. Bedrooms 4 No. Residents/Employees 8 MAX
Type Wastewater: Residential (X) Commercial ()
Type System: Shallow Conventional () LPP (X)
Other _____

Design Flow 480 EPGD Application Rate 1 GPD/ft²
Size Tank(s) w/Risers and Effluent Filter ST 1200 Gal PT 1000 Gal
Nitrification Line (Length/Width/Max Depth) 960' X 18" X 12" PER
APPROVED PLANS

(On contour in surveyed septic area; solid earth dams every 50' for shallow conventional systems using Schedule 40)

Type Repair SAME

Special Conditions HARD CLEAR AREA.

A plat with site plan showing specific location of the facility, the site for the proposed wastewater system, existing buildings, property lines, water supplies, surface waters, the conditions for any site modifications; and any other information required by the department must be attached to be valid.

This permit is valid [] without expiration [X] for five years but is subject to revocation if the site is altered, soil disturbed, set-backs violated, or the plans of intended use are changed.

THIS IS NOT AUTHORIZATION TO INSTALL. An authorization for Wastewater Construction must be obtained from this department before installation.

Environmental Health Specialist [Signature]

Reg. No. 1341

Date 6-9-00

911 Address

Name THOMPSON CREEK 3

Permit

No. A03181

CHATHAM COUNTY HEALTH DEPARTMENT ENVIRONMENTAL HEALTH DIVISION

80 E. Street
P. O. Box 130
Pittsboro, NC 27312-0130
(919) 542-8200 Phone
(919) 542-8200 Fax

1000 S. 10th Avenue
Siler City, NC 27344
Phone (919) 742-4911
Fax (919) 542-1442

IMPROVEMENT PERMIT FOR WASTEWATER SYSTEMS ARTICLE II-CHAPTER 130A OF THE NC GENERAL STATUTES

An Improvement Permit is issued to CHATHAM OVERSEASMENT CORP. for
3.37 acre site located THOMPSON CREEK LOT 3

in Chatham County. It is specifically issued for the following facility:

Facility: Residence ☒ Business ☐
No. Bedrooms 4 No. Residents/Employees 5 MAX
Type Wastewater: Residential ☒ Commercial ☐
Type System: Shallow Conventional ☐ LPP ☒
Other _____

Design Flow 480 EGPD Application Rate 1 GPD/ft²
Size Tank(s) w/Risers and Effluent Filter ST 1200 Gal PT 1000 Gal
Nitrification Line (Length/Width/Max Depth) 960' X 18" X 12" PER
APPROVED PLANS

(On contour in surveyed septic area; solid earth dams every 50' for shallow conventional systems using Schedule 40)

Type Repair SAME

Special Conditions HAND CLEAR AREA

A plat with site plan showing specific location of the facility, the site for the proposed wastewater system, existing buildings, property lines, water supplies, surface waters, the conditions for any site modifications; and any other information required by the department must be attached to be valid.

This permit is valid ☐ without expiration ☒ for five years but is subject to revocation if the site is altered, soil disturbed, set-backs violated, or the plans of intended use are changed.

THIS IS NOT AUTHORIZATION TO INSTALL. An authorization for Wastewater Construction must be obtained from this department before installation.

Environmental Health Specialist [Signature]

Reg. No. 1341

Date 6-9-00

911 Address

THOMPSON CREEK 3

MICHAEL BROOKS KANOPY

020-2 MC

ASSURED CONST.

DB 401 PG 82

1" = 100'

EXHIBIT "A"

203-7836

Site Plan #3

N 89°32'50" W - 455.84'

S 89°38'00" E - 379.52'

LOT 2
180,127 SF
4.14 AC

LOT 1
137,076 SF
3.15 AC

333.18'
N 89°31'57" W

FALLING CREEK ROAD
60' PUBLIC R/W

LOT 3
147,571 SF
3.38 AC

LOT 4
135,730 SF
3.12 AC

497.25'
N 07°05'28" E

424.08'
S 45°55'19" W

ROB
R02

#307C



FEBRUARY ASSOCIATES, INC.

OCT 2 4 2000

1 of 9

P.O. Box 5427
Cary, N.C. 27512

Ph: 919/467-5427
Fax: 919/467-5463

LOW PRESSURE PIPE SYSTEM DESIGN

OWNER JAMES BRUCE DATE 10-20-00
ADDRESS ASSURED CONSTRUCTION COUNTY CLATHAM
1011 PEMBERTON HILL RD #201 SITE LOT 3 OLDE THOMPSON CRK.
APEX NC 27502 PIN _____
PHONE 303-3336 PERMIT AS 03181

Daily waste load 1480 gal/day, for 4 BR. HOUSE LTAR .1 gal/sq.ft./day
Nitrification line 4800 square feet Laterals: 960 linear feet 1 1/4 " diameter.
With turnups in valve boxes or 6" diameter capped risers
See site plan and flow chart for lateral configuration.

Trenches
Maximum depth 12 inches Lateral sleeves: no ☒ yes 4 " diameter corrugated tubing
Width 18 inches
Gravel size #5 or larger inches Fill cap: ☒ no yes, _____ " placed prior to installation
Gravel depth 8-9 inches yes, _____ " over completed trenches

Tankage
Septic tank 1200 gallons Pump tank 1200 gallons, 25 gallons per inch
(with filter)

Pump & Controls
Supply line: 240 ' 2 " Sch. 40 PVC Manifolds: 65 ' 3 " Sch. 40 PVC
All pipe and fittings Sch. 40 PVC unless noted. See detail for type, number, and arrangement of valves, etc.

Dosing rate: 53.5 gpm @ 20.5 ' TDH Dose volume 500 gallons, drawdown 20 inches
Pump ZOELLER N140 Controls RHOMBUS 112 1W 914 H 8AC

Electrical requirements PUMP: 115V 20A CONTROL: 115V 20A
Other equipment which meets or exceeds the specifications may be substituted

OTHER REQUIREMENTS: _____

NOTICE TO THE PROPERTY OWNER, THE INSTALLER, AND THE OPERATOR:

The plans and specifications for this On-site Sewage Disposal System have been prepared according to criteria included in North Carolina's rules and regulations governing On-Site Sewage Disposal Systems, to additional county standards (if applicable), and to generally accepted design principles.

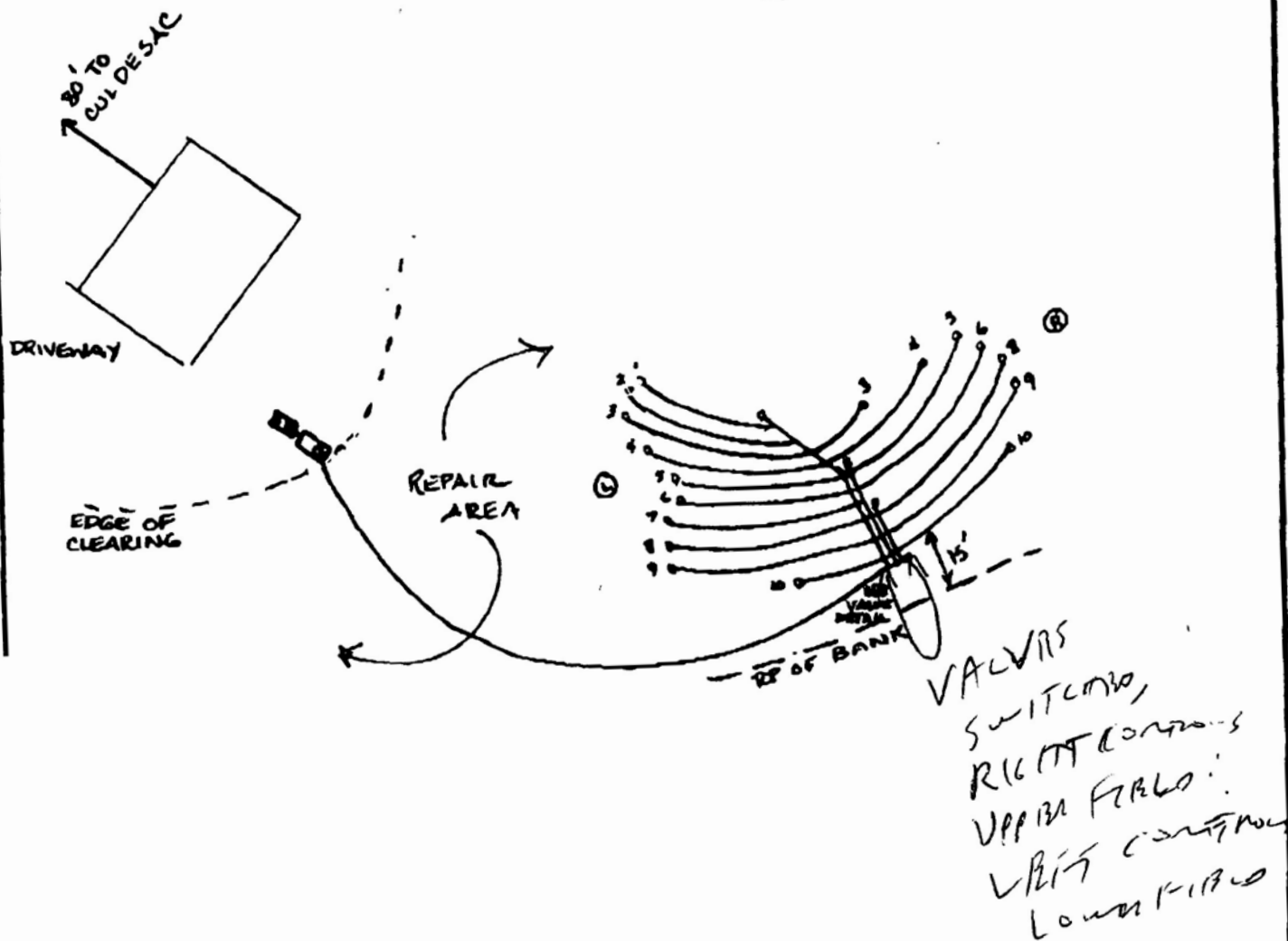
February Associates, Inc. makes no representation regarding soil conditions on this property. Long-term acceptance rates, trench dimensions, and waste loads are determined by the county Health Department (or other soils science professionals) and are included as conditions of the permit issued by the Health Department.

February Associates, Inc. accepts no responsibility for changes in these plans and specifications, unless we specifically authorize such changes in advance. If there is a question regarding tank placement, pump specifications, accessory requirements, or any other feature of these plans, please feel free to contact us for assistance in making alterations before the component in question is installed.

Note: If you are being asked to bid on the installation of this system, please make sure that you have been given ALL the pages!!
Newapp.doc rev. 9/00

3
OTC

2 of 9



LOT 3
THOMPSON CREEK

ASSURED CONSTR.



FEBRUARY ASSOCIATES, INC.

PIN:

DRAWN BY: KUM

SCALE: 1"=50'

DATE: 10-15-00

P.O. Box 5427
Cary, N.C. 27512
919/467-5427

#3
OTC

ALTERNATIVE SYSTEM DESIGN
CALCULATIONS

NAME JAMES BRUCE

Dosing rate (from flow chart) 51.5 gpm
Anti-siphon hole flow rate 2.0 gpm
TOTAL DOSING RATE 53.5 GPM

Max. pump run time 18.0 min
Actual pump run time 9.4 min
(dosing volume / dosing rate)

Top lateral elevation 100.0
Pump-off elevation 99.0
Elevation head 1.0 feet
Design head 2.0 feet
Flush head 2.0 feet
Friction & fittings loss 15.5 feet
TOTAL DYNAMIC HEAD 20.5 FEET

Friction loss = $\frac{1.85}{4.87} \frac{L Q^2}{D^5}$
L = length, Q = dosing rate, D = actual inside diameter
(C=140) (new pipe)

supply line 240 of 2 = 12.4
manifolds 65 of 3 = .5
+ 20% fittings loss 2.6
TOTAL 15.5

Draining manifold(s) and supply line
length 65 x 38.4 gal/100' = 25.0 gallons
length 90 x 17.4 gal/100' = 5.7 gallons
total draining volume 40.7 gallons
Lateral volume
length 960 x 7.8 gal/100' = 74.9 gallons
volume to pressurize 115.6 gallons

Dosing volume: min: (5 x lat vol + drain) = 490 gallons
max: (10 x lat vol + drain) = _____ gallons

DOSING VOLUME 500 GALLONS

Interior dimensions of pump tank
length _____ x width _____ x 1' = 25 gallons per inch
230 cubic inches per gallon

DRAWDOWN 20 INCHES = dosing volume / gallons per inch

Note: pump tank dimensions vary by manufacturer. Drawdown should be recalculated using dimensions of specific tank selected. A minor adjustment in the dosing volume to achieve a whole number of inches is acceptable.

4 of 9

ATTN

VAGGIAN

FLAS

line	length	elevation	elev.diff.	head	hole size	flow/hole	# holes	spacing	1st/last	flow/lat	inst. flow
P 1L	50	100.0	0	2.0'	5/32"	.41	9	5'	5'	3.69	.074
Y 2L	60	99.4	-.6'	2.6'		.46	9	6'	6'	4.14	.069
R 3L	60	98.9	-1.1'	3.1'		.51	7	9'	3'	3.57	.060
W 3R	25	98.7	-1.1'	3.1'		.51	3	9'	3.5'	1.53	.061
W 4L	60	98.8	-1.2'	3.2'		.51	6	10'	5'	3.06	.051
W 4R	50	98.8	-1.2'	3.2'		.51	5	10'	5'	2.55	.051
Y 5L	60	98.4	-1.6'	2.0'		.41	7	6'	6'	3.69	.062
Y 5R	60	98.4	-1.6'	2.0'		.41	7	6'	6'	3.69	.063
P 6L	60	98.1	-1.7'	2.3'		.44	8	7'	5.5'	3.32	.057
P 6R	60	98.1	-1.7'	2.3'		.44	8	7'	5.5'	3.32	.059
Y 7L	65	97.8	-2.2'	2.6'		.46	7	9'	5.5'	3.22	.049
R 8L	65	97.6	-2.4'	2.0'		.41	8	8'	4.5'	3.28	.050
R 8R	65	97.6	-2.4'	2.0'		.41	8	8'	4.5'	3.28	.050
W 9L	70	97.4	-2.6'	2.2'		.43	7	10'	5'	3.01	.043
W 9R	70	97.4	-2.6'	2.2'		.43	7	10'	5'	3.01	.043
P 10L	30	97.2	-2.8'	2.4'		.45	2	10'	10'	0.70	.030
P 10R	50	97.2	-2.8'	2.4'		.45	4	10'	10'	1.80	.036
	960									51.46 GPM	

51.4%
REDUCTION
ACROSS
10 INTERVALS

ATTACHMENT 9:
Design Specifications for 25g/Month Treatment



FEBRUARY ASSOCIATES, INC.

P.O. Box 6427 Cary, N.C. 27511 919/487-6427

LPP system design & specifications
date: 8-23-95Owner: MARK & RACHEL MATTHEWS
Address: 112 FISHERS CREEK COURT
CARY NC 27513Phone: 380-7229 H

Type of structure (check one)

☒ Single family dwelling with 4 bedrooms. Garbage disposal? NO
☐ Business (describe) _____ No. of employees _____
☐ Other (describe) _____county CHATHAM
site location LOT 11 SUMMER CREEKTax Map _____ Parcel _____ Twp _____
Soils eval. by A. SEIGNER, R.S.Application rate .1 gal/ft²/day
Design flow 480 gal/day

DESIGN SUMMARY

Drainfield: 4800 sq. ft.
Laterals: 960 linear ft., 1 1/4" diameter Bch. 40 PVC
Configuration: VARYING LENGTHS - SEE SITE PLAN
Supply line: 260 feet, 3" diameter Sch. 40 PVC
Manifolds: (SPUR) 105 feet, 3" diameter Sch. 40 PVC
Manifold placement: _____ tee: UP
Septic tank: MINIMUM 1200 gallons
Pump tank: 1200 gallons, 28 gallons per inchwith Sch. 40
turnups, in
valve boxes or
6" diameter
capped pipeTotal dosing rate 79.3 gpm
Dosing volume 700 gallons
Drawdown in pump tank 25 inches
Total dynamic head 4.9 feetTrench depth 12"-14" AVERAGE
Trench width VARIES - SEE SITE PLANDepth of gravel in laterals 8"
Size of gravel 3/8" - 1"Pump HYDROMATIC SP40M1
Controls RHOMBUS TYPE 115 PANEL
W/ NARM OPTION & NEMA 4X RAYCheck valve ONE IN P.T.
Gate valve(s) 3 AT FIELD, 1 (OPTIONAL) IN P.T.
Anti-siphon hole YES
Curtain drain SWALE - SEE SITE PLAN

(Other equipment which meets or exceeds specifications may be substituted)

Comments _____

MATTHEWS

CALCULATIONS

Total dosing rate: 79.3 gallons per minuteReduction of flow: 20.5Slope: 8~~Manifold cross-sectional area: _____ in²~~~~Lateral cross-sectional area: _____ in² each~~~~_____ laterals/manifold area: _____ in²~~~~Ratio: _____~~Top lateral elevation: 98.0'Pump-off elevation: 102.0'Elevation head: - 4.0'Design head: 2.0'Friction loss: 5.7'Fittings loss:
(20% Friction loss) 1.2'TOTAL DYNAMIC HEAD: MIN 4.9'supply line } 365' of 3" = 5.7
manifolds } of _____

$$= \frac{.00113 L Q^{1.85}}{D^{4.97}}$$

L = length
Q = dosing rate
D = actual inside diameter
(assumes new pipe)Draining manifold & supply line: } length 105' x 38.4 gal/100' } 127 gallons
length 220' x 38.4 gal/100' } 127 gallons = 127Lateral volume : length 960' x 7.8 gal/100' = 75 gallonsDosing volume : min: (5 lat vol + drain) 502 gallons
max: (10 lat vol + drain) 877 gallons USE: 700 gallonsPump run time: 8.8 minutes Volume to pressurize: 202 gallons
29 % dosing volume delivered under gravity

Drawdown:

Interior dimensions of pump tank: length 108 inches x width 60 inches x 1"

230 cubic inches per gallon

= 28 gallons per inchDrawdown = dosing volume ÷ gallons per inch = 25 inches

NOTE: Pump tank dimensions vary by manufacturer. Drawdown should be recalculated using dimensions of specific tank selected. A minor adjustment in the dosing volume to achieve a whole number of inches is acceptable.

8 1/2" IN 3 MINUTES DOSE CHECK

	ELEVATION (FT)	FLEV. DIFF. (FT)	HEAD (FT)	HOLE SIZE (IN)	FLOW PER HOLE (GPM)	LENGTH (FT)	SPAC- ING (FT)	NO. HOLES	FLOW PER LATERAL (GPM)	1ST AND LAST HOLE (FT)	12" SPAC- ING (FT)
	98.00	0.00	2.0	5/32	0.407	45	4.0	10	4.07	4.5	0.00
	97.30	0.70	2.7	5/32	0.473	45	5.0	8	3.78	5.0	0.00
	96.70	1.30	3.3	5/32	0.523	55	6.0	9	4.71	3.5	0.00
	96.30	1.70	3.7	5/32	0.554	60	6.0	9	4.99	6.0	0.00
	95.70	2.30	4.3	5/32	0.597	70	18" 7.0	9	5.37	7.0	0.00
6	95.70	0.00	2.0	5/32	0.407	60	4.0	14	5.70	4.0	0.00
7	95.40	0.30	2.3	5/32	0.437	50	18" 4.5	10	4.37	4.5	0.00
8	95.40	0.30	2.3	5/32	0.437	45	18" 4.5	9	3.93	4.5	0.00
9 <	95.20	0.00	2.0	5/32	0.407	65	4.0	14	5.70	6.5	0.00
	95.20	0.00	2.0	5/32	0.407	65	4.0	14	5.70	6.5	0.00
10 <	94.70	0.50	2.5	5/32	0.455	60	5.0	11	5.01	5.0	0.00
	94.70	0.50	2.5	5/32	0.455	60	5.0	11	5.01	5.0	0.00
11 <	94.30	0.90	2.9	5/32	0.490	55	5.5	9	4.41	5.5	0.00
	94.30	0.90	2.9	5/32	0.490	55	5.5	9	4.41	5.5	0.00
2 <	93.70	1.50	3.5	5/32	0.539	50	7.0	7	3.77	4.0	0.00
	93.70	1.50	3.5	5/32	0.539	50	7.0	7	3.77	4.0	0.00
3 <	93.20	2.00	4.0	5/32	0.576	35	18" 7.0	4	2.30	7.0	0.00
	93.20	2.00	4.0	5/32	0.576	35	18" 7.0	4	2.30	7.0	0.00

ALL OTHERS 12"

FIELD NUMBER = 3

TOTAL LENGTH = 960 FT

TOTAL FLOW = 79.30 GPM

REDUCTION OF FLOW BETWEEN LATERALS = 30.53%

- press key to continue...

MAY 2007

0 25 50
FEET
1"=50'

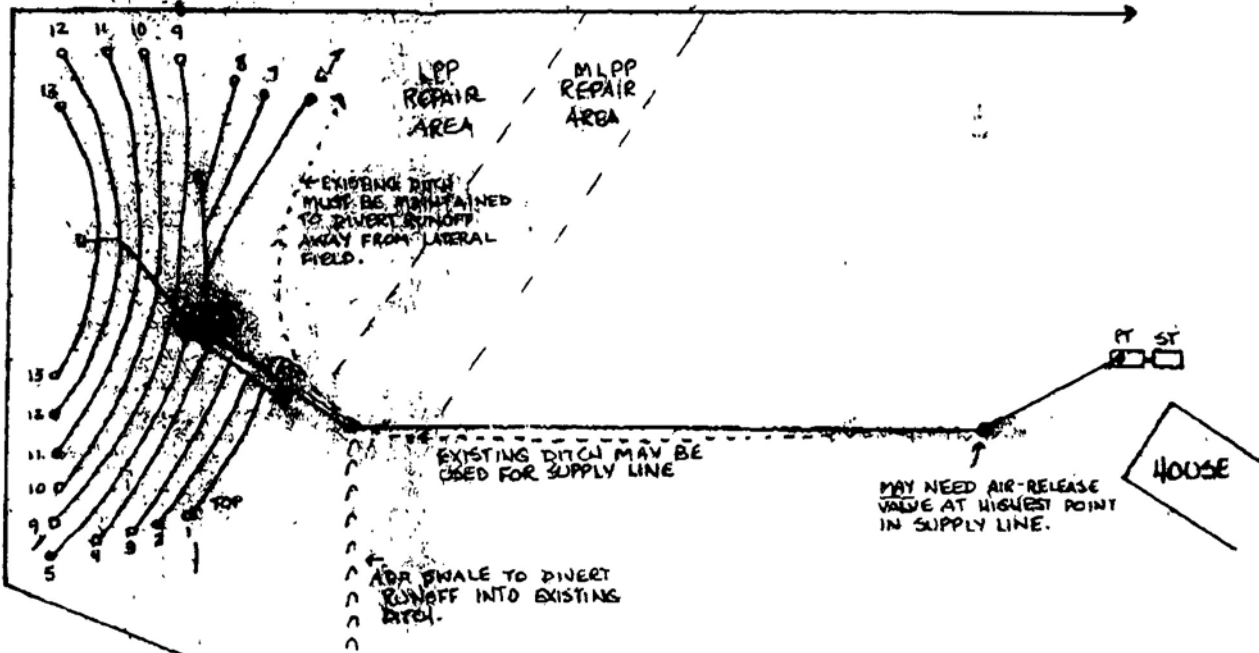


LP

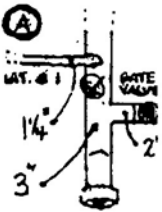
LOT 11

CHA

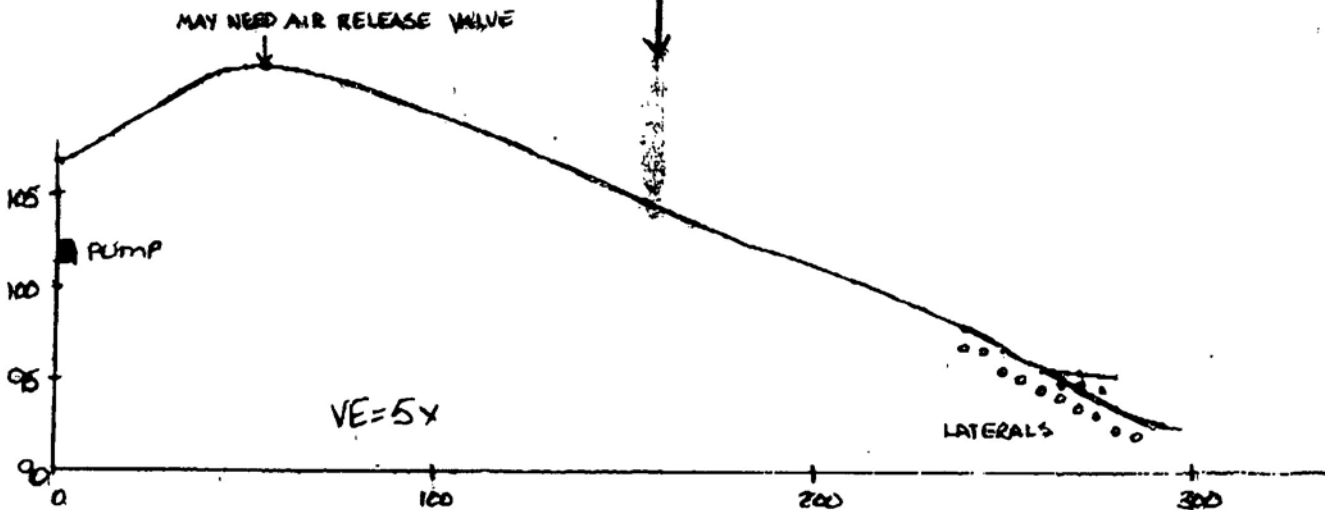
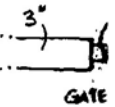
FOR MAP
M



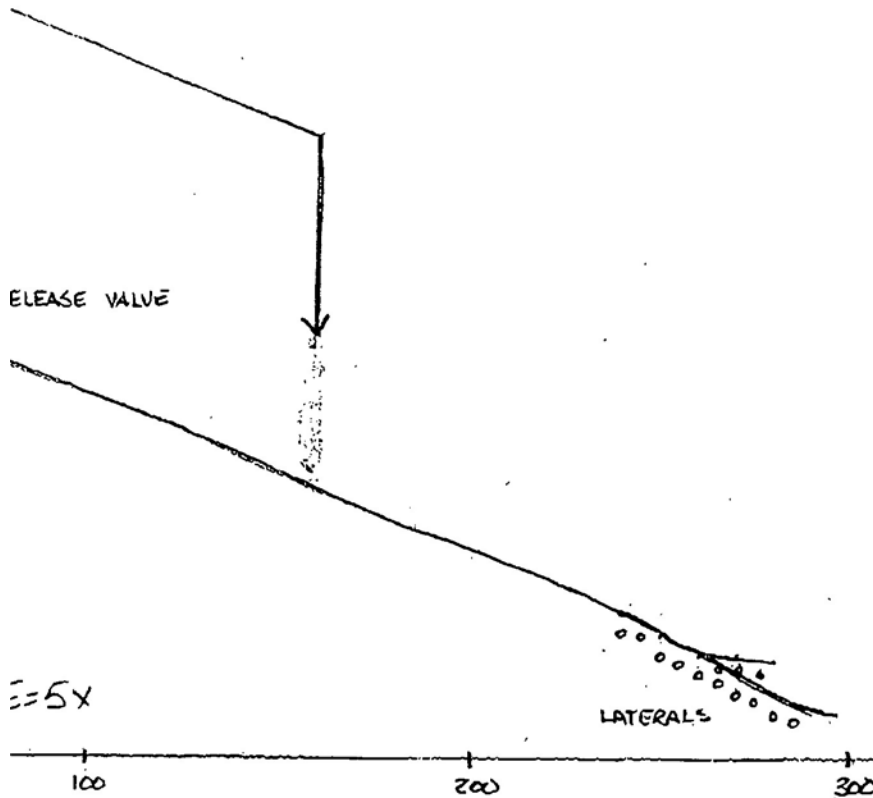
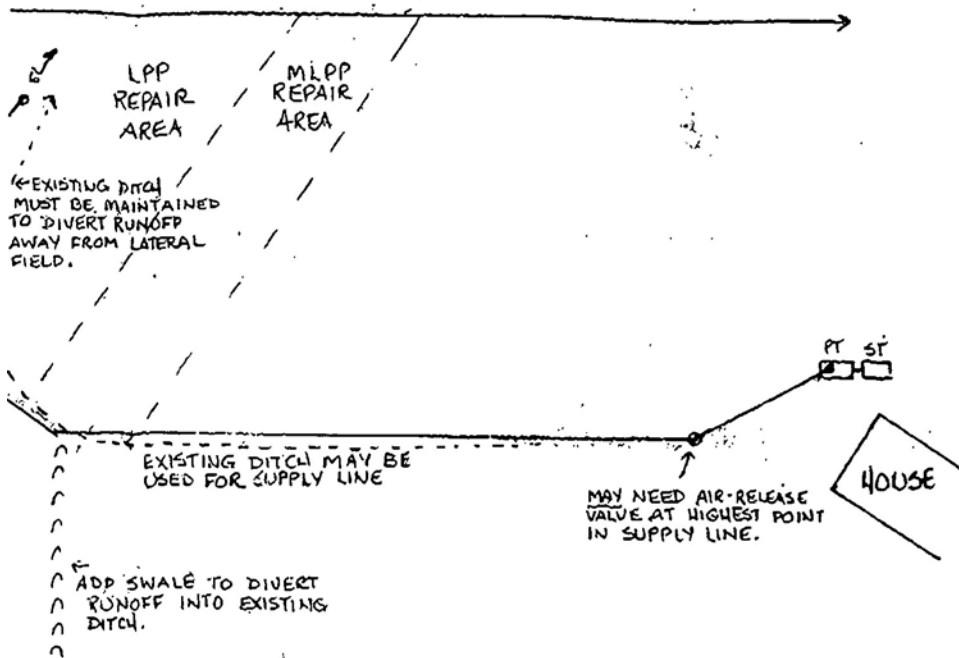
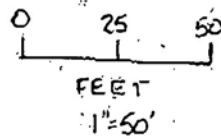
PIPE AN



(B)



KWT 8-1



FEBRUARY ASSOCIATES, INC.

P.O. Box 5427
Cary, N.C. 27512
919/467-5427

LPP DESIGN

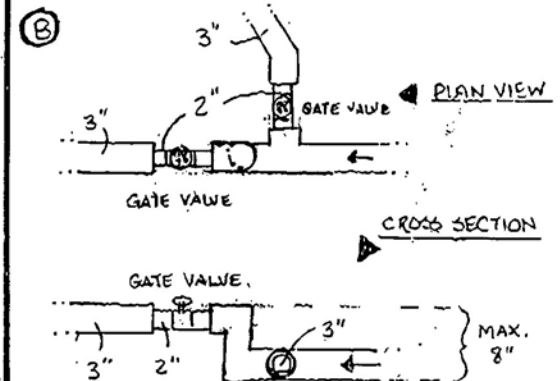
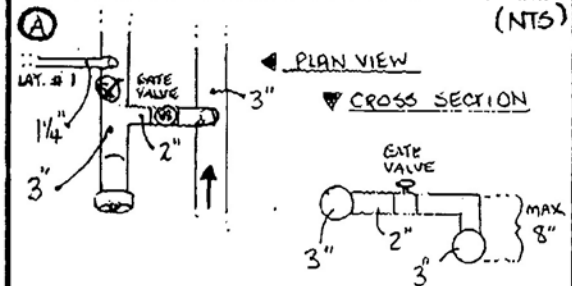
LOT 11 SUMMER GULL

CHATHAM COUNTY

FOR MARK & RACHEL
MATTHEWS

PIPE AND VALVE DETAIL

(NTS)



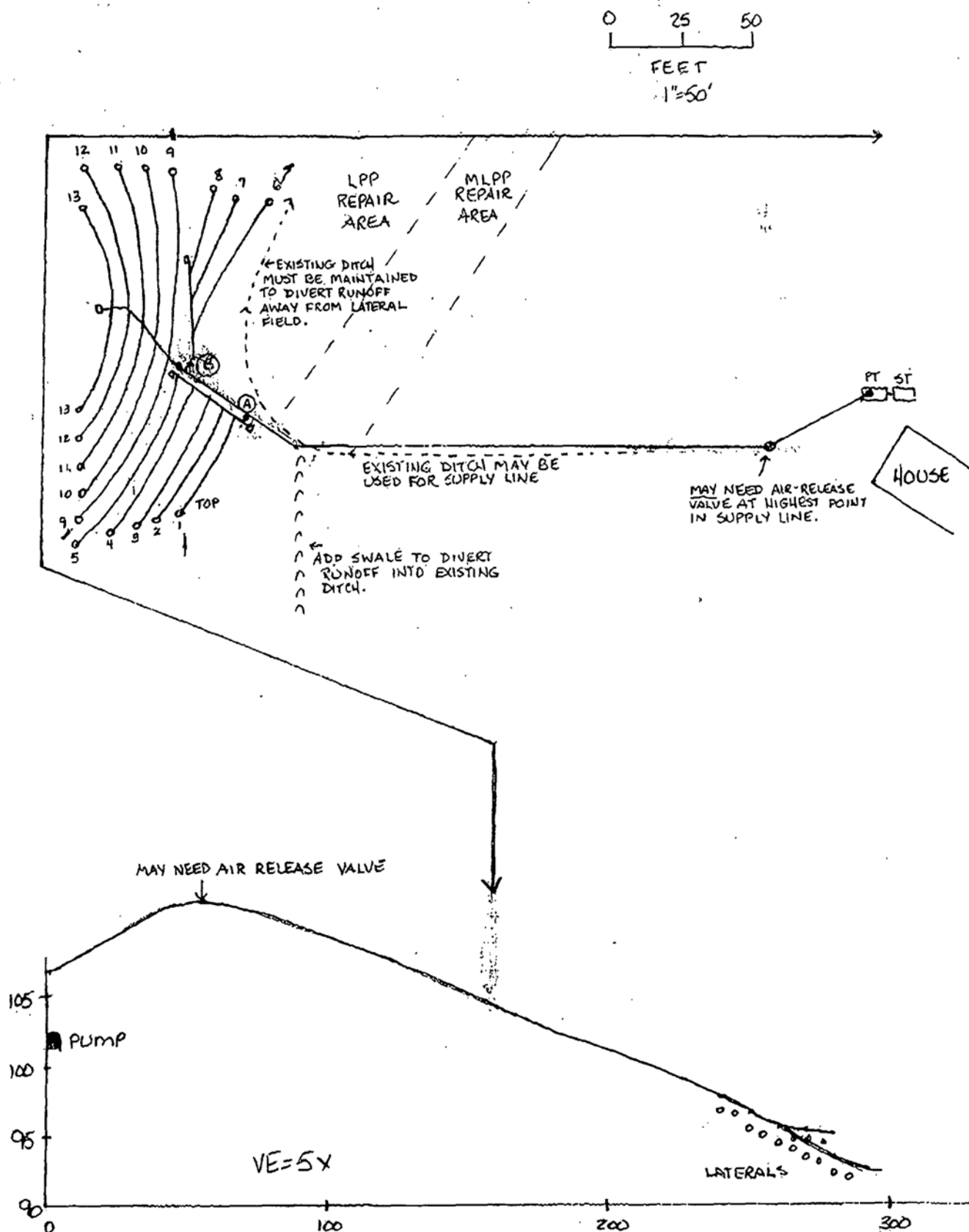
KUT 8-19-95

To: Jeff Vaughan
233-1970

From: Kim Warren
2 pages

DESIGN SUMMARY

1200 GALLON SEPTIC TANK, 1200 GALLON PUMP TANK. PUMP 79.3 GPM @ 4.9' TDH (DOWNHILL). DESIGN HEAD: 2.0'
 ALL PIPE & FITTINGS SCH 40 PVC UNLESS OTHERWISE NOTED.
 AT FIELD: 3 GATE VALVES & 1 AIR RELEASE VALVE



F
 (A)
 LAT. 3
 1/4
 3"
 (B)

KL

ATTACHMENT 10:

**Design Specifications for Competitor Treatment from Chatham
County**

Permit

No. 1503229

CHATHAM COUNTY HEALTH DEPARTMENT ENVIRONMENTAL HEALTH DIVISION

80 E. Street
P. O. Box 130
Pittsboro, NC 27312-0130
(919) 542-8208 Phone
(919) 542-8288 Fax

1000 S. 10th Avenue
Siler City, NC 27344
Phone (919) 742-4911
Fax (919) 542-1442

IMPROVEMENT PERMIT FOR WASTEWATER SYSTEMS

ARTICLE II-CHAPTER 130A OF THE NC GENERAL STATUTES

An Improvement Permit is issued to CHATHAM DEVELOPMENT CO-OP for
a 8.121 ± acre site located OLDE THOMPSON CREEK LOT 27
in Chatham County. It is specifically issued for the following facility:

Facility: Residence (X) Business ()
No. Bedrooms 4 No. Residents/Employees 8 MAX
Type Wastewater: Residential (X) Commercial ()
Type System: Shallow Conventional () LPP (X)
Other _____

Design Flow 480 EGPD Application Rate .12 GPD/ft²

Size Tank(s) w/Risers and Effluent Filter ST 1200 Gal PT 1200 Gal

Nitrification Line (Length/Width/Max Depth) 800' X 4" X 18" X 12"

(On contour in surveyed septic area; solid earth dams every 50' for shallow conventional systems using Schedule 40)

Type Repair SAME

Special Conditions PLANS MUST BE APPROVED PRIOR TO C/A

A plat with site plan showing specific location of the facility, the site for the proposed wastewater system, existing buildings, property lines, water supplies, surface waters, the conditions for any site modifications; and any other information required by the department must be attached to be valid.

This permit is valid [] without expiration [X] for five years but is subject to revocation if the site is altered, soil disturbed, set-backs violated, or the plans of intended use are changed.

THIS IS NOT AUTHORIZATION TO INSTALL. An authorization for Wastewater Construction must be obtained from this department before installation.

Environmental Health Specialist [Signature]

Reg. No. 1341

Date 8-18-00

Name OLDE THOMPSON CREEK 27 911 Address

CHATHAM COUNTY PUBLIC HEALTH DEPARTMENT

80 EAST STREET, P.O. BOX 130 • PITTSBORO, NC 27312-0130

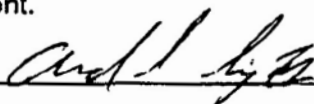
Phone 919-542-8208 • Fax 919-542-8288

SEWAGE DISPOSAL CONSTRUCTION AUTHORIZATION (Required for Building Permit)

Date 9-16-03Improvements Permit No. AS 3229New ☒Repair ☐Expansion ☐Owner RICHARD JONESLocation 642 (W) 751 (B) LANTANA SHED RT THOMPSON RD. TO AND
ON (A) RAYMOND CULDESSAC 862

This permit authorizes the owner to install the sewage disposal system within five years of the issue date on the Improvement Permit. **THE CONSTRUCTION AUTHORIZATION IS NON-TRANSFERABLE.** The installer must be registered in Chatham County. Before an Operations Permit can be issued, all required inspections and conditions of the permit must be completed and verified by this department.

Plans (if required) approved by



The installer must flag the system prior to installation to ensure proper grade.


SITE PLAN ATTACHMENT

This Construction Authorization is subject to revocation if the site plan, plat, or the intended use changes. This Construction Authorization is subject to compliance with the provisions of the Laws and Rules for Sewage Treatment and Disposal conditions of this permit.

System

Type TK

No. Bedrooms/

GPD 4

Environmental Health Specialist

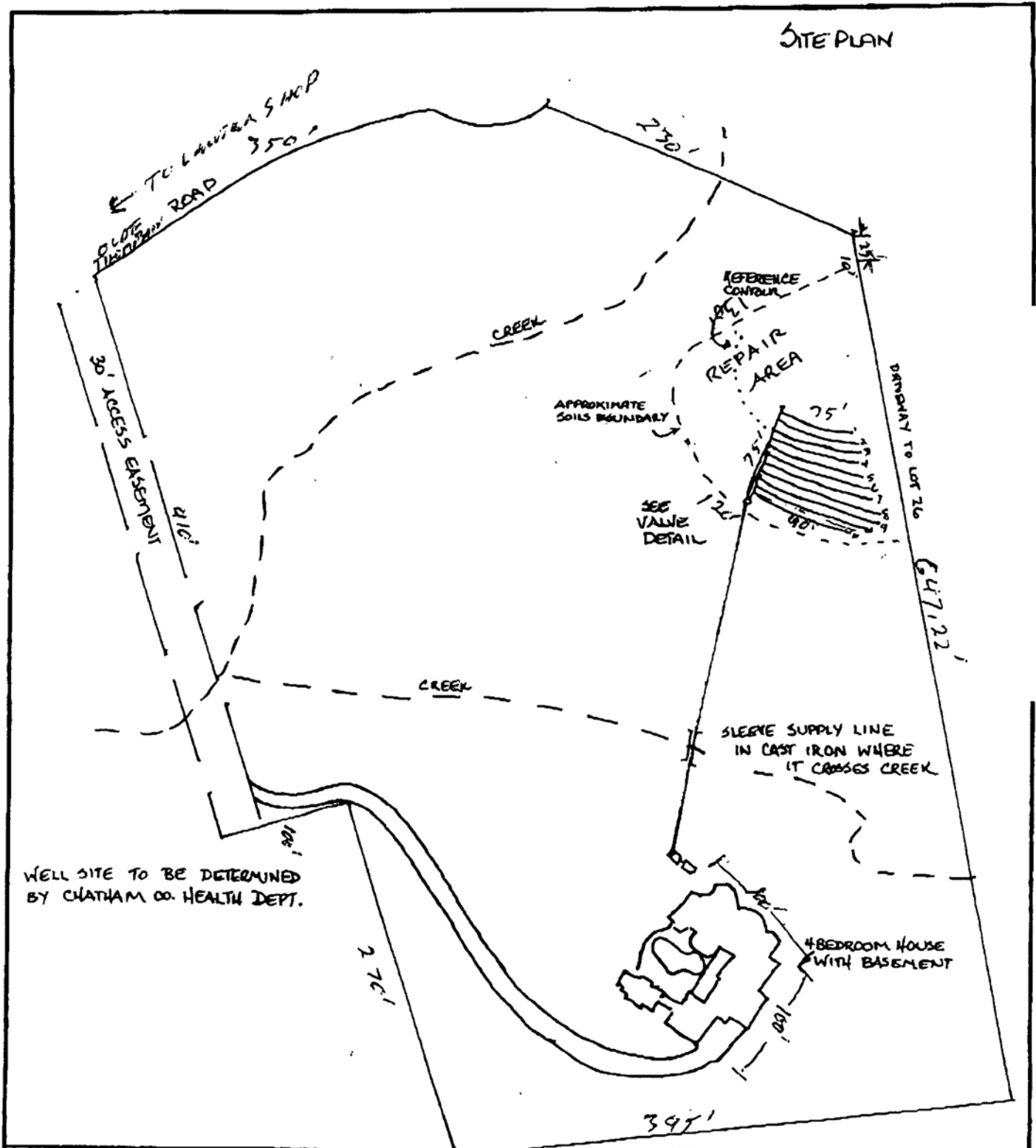
**If applicable

I understand the system type specified is different from the type specified on the application.
I accept the specifications of this permit.

Owner/Legal Representative Signature

Date:

Name OLIVE THOMPSON GREAT 27 911 Address 862 OLIVE THOMPSON RD



LOT 27
OLD THOMPSON CREEK

ASSURED CONSTRUCTION
JAMES BRUCE



FEBRUARY ASSOCIATES, INC.

PIN:

DRAWN BY: R.H. MORRIS

SCALE: 1"=100'

DATE: 7-31-03

700 Old Oaks Lane

Pittsboro NC 27312

(919)467-5427



FEBRUARY ASSOCIATES, INC.

700 Old Oaks Lane
Pittsboro, NC 27312

Ph: 919/545-0785
Fax: 919/542-3482

Low Pressure Pipe Design

prepared by Kathy Morris

Date: 7/30/2003
County: Chatham

Name:	<u>Assured Construction</u> <u>1011 Pemberton Hill Road, # 201</u> <u>Apex NC 27502</u>	P.I.N. #:		Permit #	<u>AS 0322?</u>
Phone:	<u>303-3363</u> <u>James Bruce (cell: 422-0652)</u>	Property address:	<u>Thompson Road</u>		
		Subdiv:	<u>Old Thompson Crk</u>	Lot#:	<u>27</u>

DESIGN PARAMETERS		TANKAGE		LOCKABLE RISERS RECOMMENDED	
LTAR	<u>0.12</u> gal/sq.ft/day	SEPTIC TANK	<u>1200</u>	gallons	
# BEDROOMS	<u>4</u>	with filter			
		PUMP TANK	<u>1200</u>	gallons	
			<u>25</u>	gallons/inch	
DIMENSIONS		TRENCHES			
SQ. FT	<u>4000</u>	WIDTH	<u>18</u>	inches	
LINEAR FT	<u>800</u> min	DEPTH	<u>12</u>	inches on downhill side	
	<u>805</u> actual	STONE DEPTH	<u>8 to 9</u>	inches	
ZONES	<u>3</u>	STONE SIZE	<u>#5</u>	or larger	
FOR 3 ZONES:		average	maximum		
PUMP RUN TIME	<u>9.54</u>	min	<u>9.7</u>		
DOSING RATE	<u>26.20</u>	gpm	<u>26.55</u>	PUMP SIZE CRITERIA	
DOSE VOLUME	<u>250</u>	gal	<u>250</u>		
DRAWDOWN	<u>10.00</u>	inches	<u>10.00</u>		
TOTAL DYNAMIC HEAD	<u>31.98</u>	feet	<u>32.86</u>		

PUMP AND CONTROLS

PUMP	<u>Zoeller N 153</u>	PANEL:	<u>Rhombus 1121W914H8AC</u>	<u>simplex</u>
	<u>1 phase, 115 volts, 10.5 amps</u>		<u>with event counter, elapsed time meter, NEMA 4X box,</u>	
ZONE VALVE	<u>Zoeller 4403</u>		<u>separate alarm circuit</u>	
<u>other equipment that meets or exceeds the specifications may be substituted. Contact designer if questions.</u>				

The plans and specifications for this On-site Sewage Disposal & Treatment System have been prepared according to criteria in North Carolina's rules and regulations governing On-site Systems, to additional county standards (if applicable), and to generally-accepted design principles. February Associates, Inc., makes no representation regarding soils conditions on this property. Long-term acceptance rates, trench dimensions, and waste loads are determined by the county Health Department (or other soil science professionals), and are included as conditions of the permit issued by the Health Department. February Associates, Inc., accepts no responsibility for changes in these plans & specifications, unless we specifically authorize such changes in advance. If changes in specifications or locations of components are needed, please feel free to contact us for assistance in making alterations before the component in question is installed.

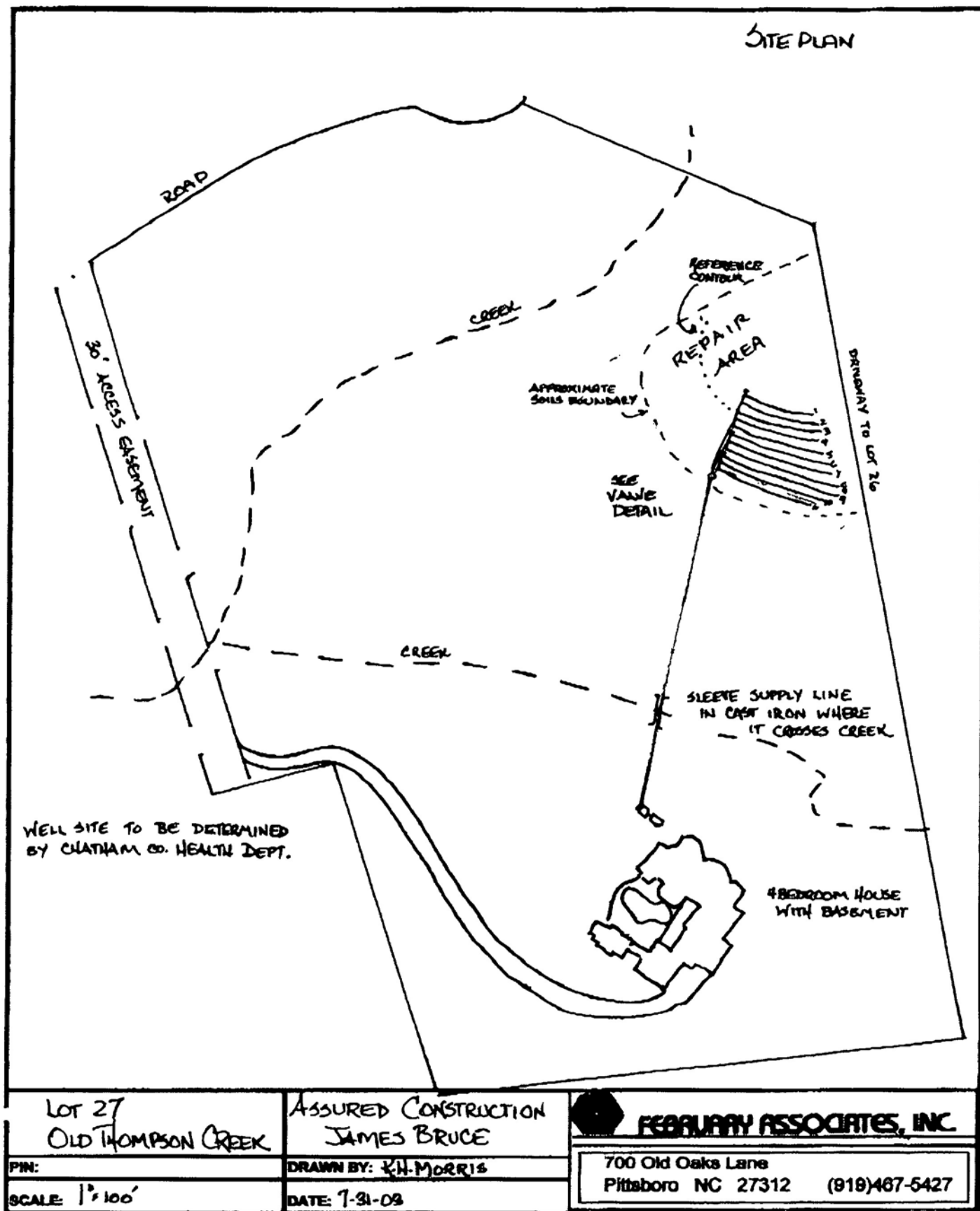
Repair: LPP

If you're being asked to bid on this job, please make sure that you have been given ALL the pages.

February Associates, Inc.

number of pages: 11

7/30/2003



Materials

Lot 27 Old Thompson Crk

This summary of materials includes major components of the system, and is meant to assist the installer in preparing an estimate. It does not include consumable supplies (glue, etc.) or exact number of fittings. It does not include any specified drainage (swales, curtain drains, etc.)

<u>septic tank</u>	1200	gallon		
<u>effluent filter</u>	yes			
<u>pump tank</u>	1200	gallon		
<u>grease trap</u>	none			
<u>pretreatment</u>	none			
<u>pump</u>	one	Zoeller N 153		
<u>panel</u>	simplex	Rhombus 1121W914H8AC		
<u>floats</u>	three	with panel	mounted on float tree	
<u>zone valve</u>	one	Zoeller 4403	cammed for 2 zone operation	
<u>view tubes</u>	1.5'	1 1/4" diameter	CLEAR schedule 40	(6" view tube for each zone)
<u>supply line</u>	370	ft 2" Sch. 40"	includes segments between zone valve and subfields	
<u>manifolds</u>	40	ft 3" Sch. 40"		
<u>check valves</u>	four	2" diameter	1 in PT	3 at zone valve
<u>gate valves</u>	four	2" diameter	1 in PT	3 at zone valve
<u>threaded unions</u>	one	2" diameter	1 in PT	
	three	1 1/4" diameter	at zone valve	
<u>trenches, linear ft</u>	805	12" wide, 8-9" gravel	WASHED STONE	
<u>laterals</u>	805	1 1/4" Sch. 40	sleeved in 4" corrugated "holey" pipe	
		11 end-fed laterals, with turnups in valve boxes.		
<u>fittings</u>	couplings, tees, elbows, etc. as needed to connect components			
	cleanouts, valve boxes, etc. as needed to provide access and protection to components			

SPECIAL: SUPPLY LINE MUST BE SLEEVED IN CAST IRON WHERE IT CROSSES CREEK.
CONTACT CHATHAM COUNTY HEALTH DEPARTMENT FOR SPECIFICS.

* equivalent product may be substituted without designer permission

** length is approximate

All valve boxes are to have a layer of gravel in the bottom. Boxes should be large enough to allow all valves to be turned by hand, and to allow installation of standpipes on all lateral turnups. Make sure that all lateral turnups are VERTICAL, not leaning.

Lot 27 Old Thompson C

Start-up Inspection Checklist

installed by _____
 inspected by _____

date _____
 OP date _____

specified
 pump Zoeller N 153
 panel Rhombus 1121W914H8AC
 septic tank 1200 gallon
 filters _____
 pump tank 1200 gallon
 gallons per inch 25

installed

 ID# _____

 ID# _____

designed

	Zone 1	Zone 2	Zone 3	Zone 4
dosing rate	25.88	26.55	26.55	n/a
dosing volume	250 gal			
drawdown	10.00 inches			

measured

Zone 1	Zone 2	Zone 3	Zone 4

Lateral heads

1	4.0
2	4.5
3	4.9
4	5.4
5	5.9
6	4.0
7	4.4
8	4.9
9	4.0
10	4.3
11	4.7

Please list or sketch any deviations from plans. Include changes in location of tanks, valves, supply lines, or other components. Note utility line crossings, locations of sleeves & cleanouts, and any other features of interest.

PLEASE RETURN A COMPLETED COPY OF THIS TO:
 FEBRUARY ASSOCIATES, INC. FAX: (919)542-3482

printed 7/30/2003

Initial System Flow Chart

Lot 27 Old Thompson Crk

Permit # AS 0322?

Bench Mark 5.4 = 100.00 set at top lateral

line	color	rod read	elev.	elev. dif.	head	length	hole size	flow/hole	spacing	# holes	1st/last	flow/lat	inst. flow rate
zone 1													
1	blue	5.4	100.00	0.00	4.00	50	5/32	0.58	4.00	10	7.00	5.76	0.115
2	red	5.9	99.50	-0.50	4.50	55	5/32	0.61	5.00	9	7.50	5.50	0.100
3	blue	6.3	99.10	-0.90	4.90	60	5/32	0.64	6.00	9	6.00	5.73	0.096
4	orange	6.8	98.60	-1.40	5.40	60	5/32	0.67	7.00	7	9.00	4.68	0.078
5	blue	7.3	98.10	-1.90	5.90	70	5/32	0.70	10.00	6	10.00	4.19	0.060
												gal/min	25.86
												TOTAL Zone 1 =	25.86

feet = 295

TOTAL Zone 1 = 295

zone 2													
6	red	7.7	97.70	0.00	4.00	80	5/32	0.58	4.50	16	8.25	9.21	0.115
7	blue	8.1	97.30	-0.40	4.40	85	5/32	0.60	5.00	15	7.50	9.06	0.107
8	orange	8.6	96.80	-0.90	4.90	90	5/32	0.64	7.00	13	3.00	8.28	0.092
												gal/min	26.55
												TOTAL Zone 2 =	26.55

feet = 255

TOTAL Zone 2 = 255

zone 3													
9	blue	9.7	95.70	0.00	4.00	90	5/32	0.58	4.50	18	6.75	10.36	0.115
10	red	10.0	95.40	-0.30	4.30	85	5/32	0.60	5.00	15	7.50	8.95	0.105
11	blue	10.4	95.00	-0.70	4.70	80	5/32	0.62	7.00	11	5.00	6.73	0.086
												gal/min	26.18
												TOTAL Zone 3 =	26.18

feet = 255

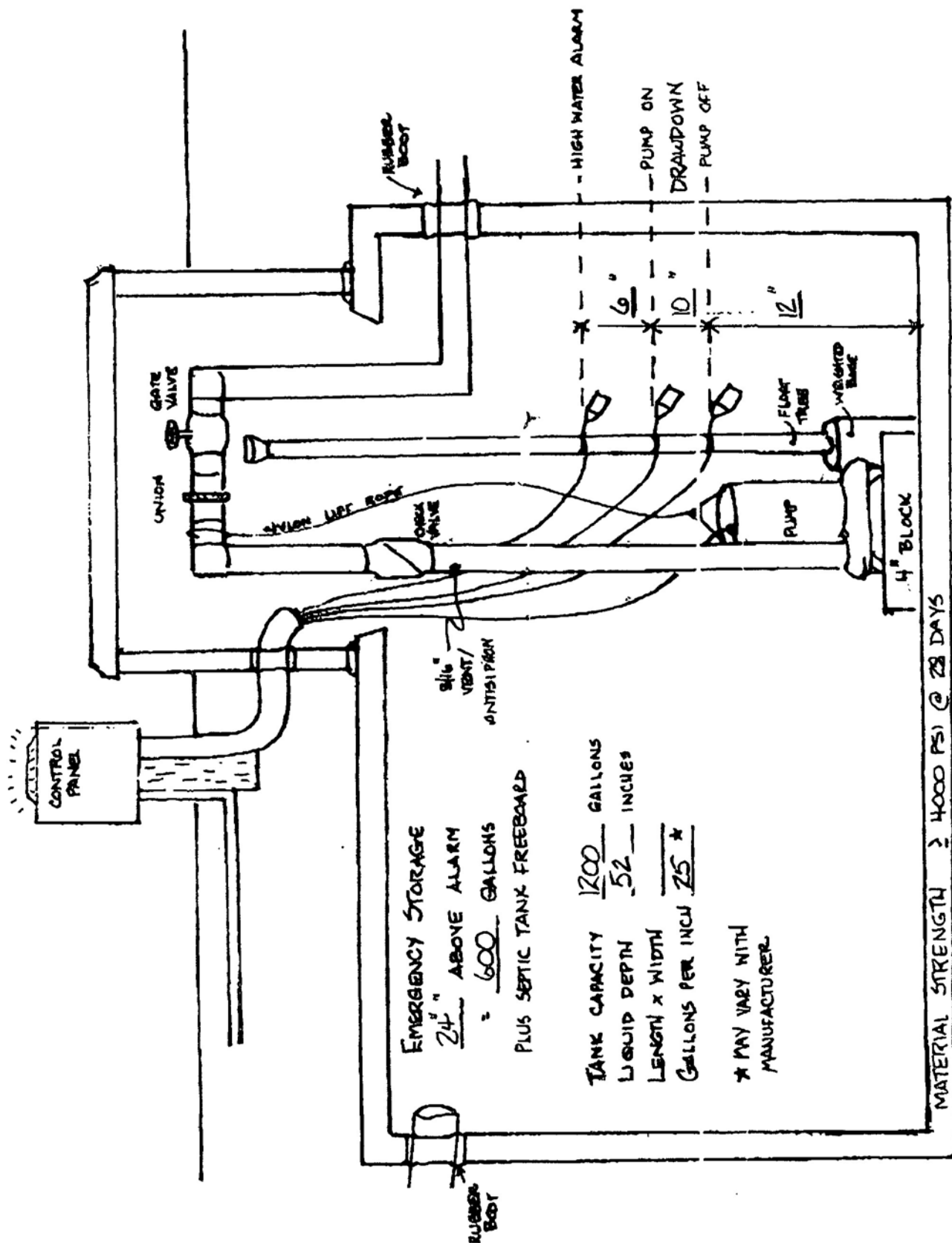
TOTAL Zone 3 = 255

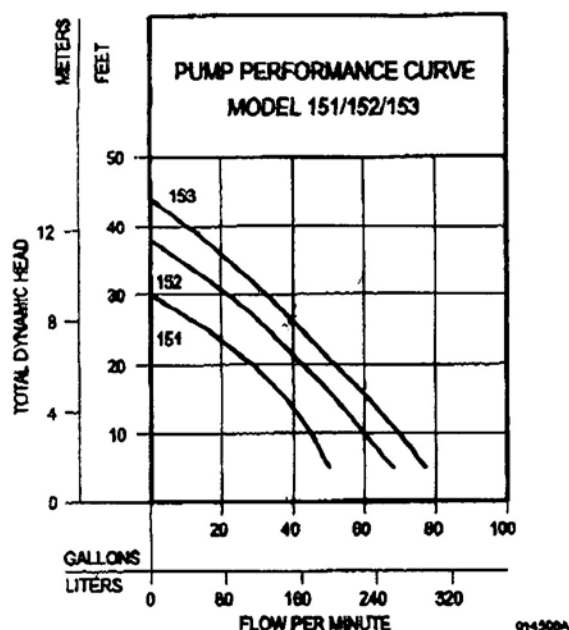
TOTAL 805 feet

Zone Charts

Lot 27 Old Thompson Crk

Zone 1			Zone 2			Zone 2		
Manifold(s)	3" Sch. 40		Manifold(s)	3" Sch. 40		Manifold(s)	3" Sch. 40	
length	25	ft	length	15	ft	length	15	ft
actual diameter	3.068	in	actual diameter	3.068	in	actual diameter	3.068	in
volume	9.60	gal	volume	5.76	gal	volume	5.76	gal
draining length	25	ft	draining length	15	ft	draining length	15	ft
draining volume	9.60	gal	draining volume	5.76	gal	draining volume	5.76	gal
Elevations			Elevations			Elevations		
top lateral	100.00		top lateral	97.70		top lateral	95.70	
pump tank	93.00		pump tank	93.00		pump tank	88.00	
pump off	88.00		pump off	88.00		pump off	83.00	
ELEVATION HEAD	12.00	ft	ELEVATION HEAD	9.70	ft	ELEVATION HEAD	12.70	ft
DESIGN HEAD	4.00	ft	DESIGN HEAD	4.00	ft	DESIGN HEAD	4.00	ft
FRICTION LOSS	5.65	ft	FRICTION LOSS	5.57	ft	FRICTION LOSS	5.10	ft
FLUSH HEAD	2.00	ft	FLUSH HEAD	2.00	ft	FLUSH HEAD	2.00	ft
VALVE LOSS	8.96	ft	VALVE LOSS	9.19	ft	VALVE LOSS	9.06	ft
TOTAL DYNAMIC HEAD	32.61	ft	TOTAL DYNAMIC HEAD	30.46	ft	TOTAL DYNAMIC HEAD	32.86	ft
Supply line	2" Sch. 40		Supply line	2" Sch. 40		Supply line	2" Sch. 40	
length	345	ft	length	325	ft	length	305	ft
actual diameter	2.067	in	actual diameter	2.067	in	actual diameter	2.067	in
volume	60.03	gal	volume	58.55	gal	volume	53.07	gal
draining length	0	ft	draining length	0	ft	draining length	0	ft
draining volume	0	gal	draining volume	0	gal	draining volume	0	gal
Friction loss			Friction loss			Friction loss		
manifold(s)	0.05	ft	manifold(s)	0.03	ft	manifold(s)	0.03	ft
supply line	4.66	ft	supply line	4.61	ft	supply line	4.22	ft
fittings	0.94	ft	fittings	0.93	ft	fittings	0.85	ft
Lateral	1 1/4" Sch. 40		Lateral	1 1/4" Sch. 40		Lateral	1 1/4" Sch. 40	
length	295	ft	length	255	ft	length	255	ft
diameter	1 1/4	in	diameter	1 1/4	in	diameter	1 1/4	in
volume	23.01	gal	volume	19.89	gal	volume	19.89	gal
dosing rate	25.86	gpm	dosing rate	26.56	gpm	dosing rate	26.16	gpm
draining volume	9.6	gal	draining volume	5.8	gal	draining volume	5.8	gal
min. dosing vol.	124.7	gal	min. dosing vol.	105.2	gal	min. dosing vol.	105.2	gal
max. dosing vol.	239.7	gal	max. dosing vol.	204.7	gal	max. dosing vol.	204.7	gal
PT gal/inch	25		PT gal/inch	25		PT gal/inch	25	
DOSING VOLUME	250	gal	DOSING VOLUME	250	gal	DOSING VOLUME	250	gal
DRAWDOWN	10.00	in	DRAWDOWN	10.00	in	DRAWDOWN	10.00	in
PUMP RUN TIME	9.67	min	PUMP RUN TIME	9.42	min	PUMP RUN TIME	9.66	min





TOTAL DYNAMIC HEAD/FLOW PER MINUTE EFFLUENT AND DEWATERING

MODEL		151		152		153	
Feet	Meters	Gal.	Liters	Gal.	Liters	Gal.	Liters
5	1.5	50	189	88	281	77	291
10	3.1	45	170	81	231	70	265
16	4.8	38	144	65	201	61	231
20	6.1	29	110	44	167	52	197
25	7.6	18	61	34	129	42	158
30	9.1	-	-	23	87	33	125
35	10.7	-	-	-	-	22	85
40	12.2	-	-	-	-	11	42
Shut-off Head:		30 ft. (9.1m)		38 ft. (11.6m)		44 ft. (13.4m)	

0143085

CONSULT FACTORY FOR SPECIAL APPLICATIONS

- Timed dosing panels available.
- Electrical alternators, for duplex systems, are available and supplied with an alarm.
- Variable level control switches are available for controlling single phase systems.
- Double piggyback variable level float switches are available for variable level long and short cycle controls.
- Sealed Qwik-Box available for outdoor installations. See FM1420.
- Over 130°F. (54°C.) special quotation required.

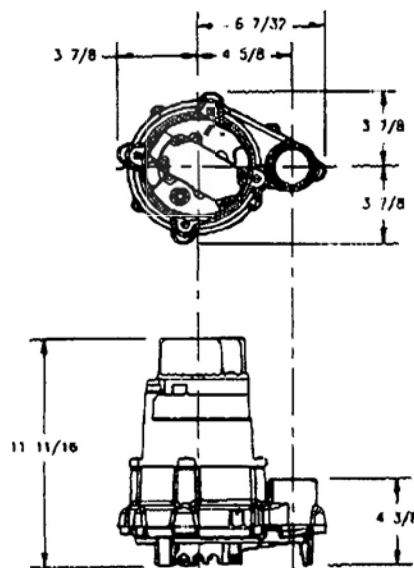
151/152/153 Series

151/152/153 MODELS				Control Selection	
Model	Volts-Ph	Mode	Amps	Simplex	Duplex
N151	115 1	Non	6.0	1	2 or 3
BN151	115 1	Auto	6.0	Included	2 or 3
E151	230 1	Non	3.2	1	2 or 3
BE151	230 1	Auto	3.2	Included	2 or 3
N152	115 1	Non	8.5	1	2 or 3
BN152	115 1	Auto	8.5	Included	2 or 3
E152	230 1	Non	4.3	1	2 or 3
BE152	230 1	Auto	4.3	Included	2 or 3
N153	115 1	Non	10.5	1	2 or 3
BN153	115 1	Auto	10.5	Included	2 or 3
E153	230 1	Non	5.3	1	2 or 3
BE153	230 1	Auto	5.3	Included	2 or 3

CAUTION

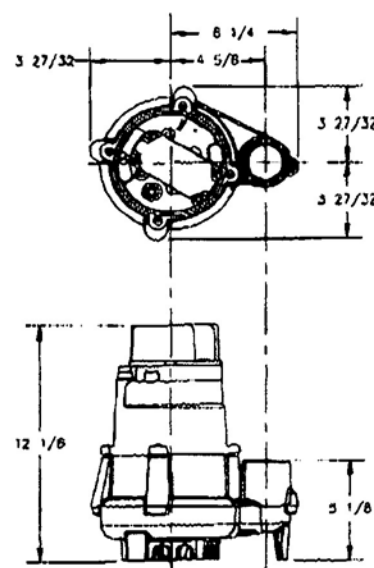
All installation of controls, protection devices and wiring should be done by a qualified licensed electrician. All electrical and safety codes should be followed including the most recent National Electric Code (NEC) and the Occupational Safety and Health Act (OSHA).

Model 151



151TEMP

Models 152 / 153



8K2084

SELECTION GUIDE

1. Single piggyback variable level float switch or double piggyback variable level float switch. Refer to FM0477.
2. See FM0712 for correct model of Electrical Alternator E-Pak.
3. Variable level control switch 10-0225 used as a control activator, specify duplex (3) or (4) float system.

RESERVE POWERED DESIGN

For unusual conditions a reserve safety factor is engineered into the design of every Zoeller pump.



<http://www.zoeller.com>

ZOELLER
PUMP CO.

MAIL TO: P.O. BOX 16347
Louisville, KY 40266-0347
SHIP TO: 3849 Cane Run Road
Louisville, KY 40211-1961
(502) 778-2731 • 1 (800) 928-PUMP
FAX (502) 774-3524

Manufacturers of...

"QUALITY PUMPS SINCE 1939"

MODEL 112 Control Panel

Single phase, simplex motor contactor control.

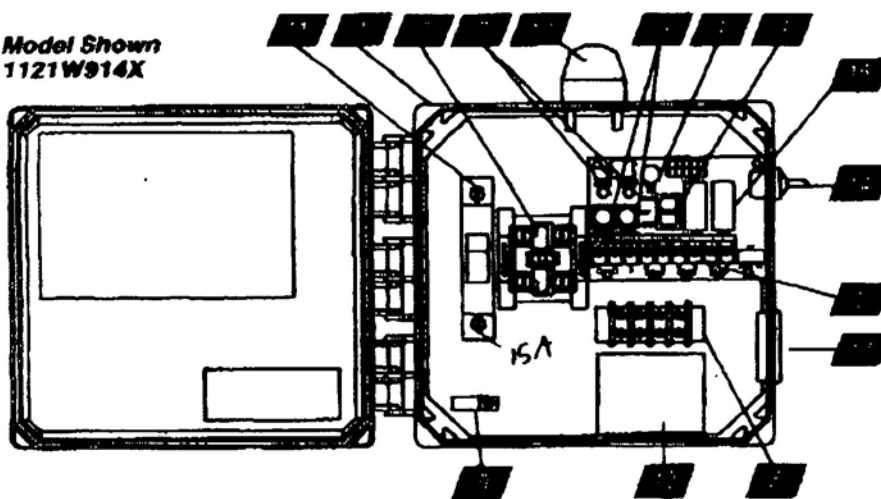
The Model 112 control panel provides a reliable means of controlling one 120, 208, or 240 VAC single-phase pump in pump chambers, sump pump basins, irrigation systems and lift stations. Two control switches activate a magnetic motor contactor to turn the pump on and off. If an alarm condition occurs, an additional alarm switch activates the audio/visual alarm system.



Indoor

Indoor/outdoor

Model Shown
1121W914X



1. Enclosure measures 8 x 8 x 4 inches (20.32 X 20.32 X 10.16 cm). Choice of NEMA 1 (steel for indoor use), or NEMA 4X (ultraviolet stabilized thermoplastic with removable flanges for outdoor or indoor use).
- * Options selected may increase enclosure size and change component layout.
2. Magnetic Motor Contactor controls pump by switching hot electrical lines.
3. HOA Switch for manual pump control (mounted on circuit board).
4. Green Pump Run Indicator Light (mounted on circuit board).
5. Float Switch Terminal Block (mounted on circuit board).
6. Alarm and Control Fuses (mounted on circuit board).
7. Alarm and Control Power Indicators (mounted on circuit board).
8. Pump Input Power and Pump Connection Terminal Block
9. Ground Lug
10. Terminal Block Installation Label
11. Circuit Breaker (optional) provides pump disconnect and branch circuit protection.

STANDARD ALARM PACKAGE (other options available)

12. Red Alarm Beacon provides 360° visual check of alarm condition.
Note: NEMA 1 style utilizes a door mounted indicator in lieu of a beacon.
13. Alarm Horn provides audio warning of alarm condition (83 to 85 decibel rating).
Note: NEMA 1 style utilizes an internally mounted buzzer (83 to 85 decibel) in lieu of horn.
14. Exterior Horn Test/Normal/Silence Switch allows alarm horn to be silenced and testing of horn and light to ensure proper operation of alarm system.
15. Horn Silence Relay automatically resets alarm after alarm condition has been received (mounted on circuit board).

FEATURES

- Entire control system (panel and switches) is UL Listed to meet and/or exceed industry safety standards
- Dual safety certification for the United States and Canada
- Standard package includes three 20' Sensor Float® control switches
- Complete with step-by-step installation instructions
- Three-year limited warranty



1121W914XAC

SJERHOMBUS
SJ ELECTRO SYSTEMS, INC.

PO Box 1708, Detroit Lakes, MN 56502

1-888-DIAL-SJE • 1-218-847-1317

1-218-847-4617 Fax

email: sje@sjerhombus.com

www.sjerhombus.com

4000 & 6000 Automatic Multizoned Valves

Flow Range:	4 Outlet Valve: 10 - 40 GPM 6 Outlet Valve: 10 - 25 GPM	4 Outlet Valve: 15 - 150 GPM 6 Outlet Valve: 15 - 150 GPM
Pressure Rating:	25 - 75 PSI	25 - 150 PSI
Pressure Loss - 4 Outlet Valve:	Flow (GPM): 10 20 30 40 PSI Loss: 2.0 3.0 4.5 6.4	Flow (GPM): 20 40 60 80 100 PSI Loss: 2.5 3.5 5.0 7.5 10.0
Pressure Loss - 6 Outlet Valve:	Flow (GPM): 10 20 30 PSI Loss: 2.5 4.5 7.5	Flow (GPM): 20 40 60 80 100 PSI Loss: 3.0 4.0 6.0 9.0 11.0

Inlet:	Slip and glue connections to 1½" PVC pipe.	Threaded 1½" NPT Connection.
Outlets:	Slip and glue connections. 4 Outlet Valve: To 1½" PVC Pipe 6 Outlet Valve: To 1" PVC Pipe	Slip and glue connections to 1½" PVC Pipe.
Construction:	High strength noncorrosive ABS polymer.	Valve Top/Housing: Die Cast Metal Valve Outlets: High strength non-corrosive ABS Polymer
Dimensions:	Height: 5¼" Width: 5¾"	Height: 7" Width: 8"

4000 SERIES:

4 Outlet Models have interchangeable cams for 2, 3, or 4 zone operation.

- P/N 170-0064 Model 4402 - Cammed for 2 Zone operation, with four outlet bottom.
P/N 170-0065 Model 4403 - Cammed for 3 Zone operation, with four outlet bottom.
P/N 170-0066 Model 4404 - Cammed for 4 Zone operation, with four outlet bottom.

6 Outlet Models have interchangeable cams for 5 or 6 zone operation.

- P/N 170-0067 Model 4605 - Cammed for 5 Zone operation, with six outlet bottom.
P/N 170-0068 Model 4606 - Cammed for 6 Zone operation, with six outlet bottom.

6000 SERIES:

4 Outlet Models have interchangeable cams for 2, 3, or 4 zone operation.

- P/N 170-0069 Model 6402 - Cammed for 2 Zone operation, with four outlet bottom.
P/N 170-0070 Model 6403 - Cammed for 3 Zone operation, with four outlet bottom.
P/N 170-0071 Model 6404 - Cammed for 4 Zone operation, with four outlet bottom.

6 Outlet Models have interchangeable cams for 5 or 6 zone operation.

- P/N 170-0072 Model 6605 - Cammed for 5 Zone operation, with six outlet bottom.
P/N 170-0073 Model 6606 - Cammed for 6 Zone operation, with six outlet bottom.

6" Clear PVC Pipe

- P/N 170-0074 6" Clear PVC pipe for 4400 2-4 Zone - (4) 1¼" dia. pieces.
P/N 170-0075 6" Clear PVC pipe for 4600 5-6 Zone - (6) 1¼" dia. pieces.
P/N 170-0076 6" Clear PVC pipe for 6400 2-4 Zone - (4) 1½" dia. pieces.
P/N 170-0077 6" Clear PVC pipe for 6600 5-6 Zone - (6) 1½" dia. pieces.

ATTACHMENT 11:
Design Specifications for Competitor Treatments from Wake
County

WAKE COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES WELL AND SEWAGE SITE LOCATION PERMIT
NO PERMIT(S) FOR CONSTRUCTION, LOCATION OR RELOCATION ACTIVITY SHALL BE ISSUED
UNTIL AN AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION HAS BEEN ISSUED
PERMIT VOID IF NOT IN COMPLIANCE WITH ZONING REGULATIONS AND/ OR IF SITE IS ALTERED OR INTENDED USE CHANGED

PERMIT#: D013405 STATUS: C APP. DATE: 02/11/1999 BLDG. PERMIT#:
PIN: 0720.02 57 1268 000 TAX MAP: 0692 0067 RECORDED: Y ORIG. PERMIT#: C 18020
TOWNSHIP: 03 BUCKHORN JURISDICTION: WC ZONING:
APPLICANT: TAYLOR, RUTH W
4705 FAIRFIELD RD.
NEW HILL, NC 27562
(919) 362 - 1290
USE: HD USE: 0001 REPAIR/EXISTING SYSTEM
EXIST USE: 101 ONE-FAMILY HOUSE
DISPOSAL: N BEDROOMS: 3 BASEMENT: N #EMPLOYEES: 0
SITE: ADDRESS: 4705 FAIRFIELD RD
SUBDIVISION: FAIRFIELD LOT: 26 ACRES: 2.01
DIRECTION: OLD US1S R INTO S/D LOT ON LEFT AT FORK IN RD.

IMPROVEMENT PERMIT

TANK SIZE: 1000 gal. PUMP Tank: 1000 gal. SQ FT: 795 STONE DEPTH: 08 in. MAX DEPTH LINE: 16 in.
WASTEWATER: INDIVIDUAL SEWAGE: DOMESTIC TYPE SYSTEM: IV A PUMP: Y P/M: N
DAILY FLOW: 00369 gal/day WATER: INDIVIDUAL

COMMENTS: PUMP SEPTIC AND PUMP TANKS AT TIME OF REPAIR. BRING IN 1000 GALS. OF FRESH H2O TO THOROUGHLY
FLUSH OLD LINES AFTER THEY ARE SPLIT INTO 2 SUBFIELDS. ADD SEPTIC TANK FILTER WITH RISER FOR ACCESS. CUT
EXISTING MANIFOLD INTO 2 EQUAL SECTIONS, INSTALL GATE VALVES AND CHECK VALVES FOR EACH EXISTING SUBFIELD
AND THE NEW SUBFIELD. RESET PUMP HEAD TO 2' IN UPPER LATERAL IN EACH SUBFIELD (LOWER SUBFIELD WILL NOT BE
USED). PLACE GATE VALVES IN VALVE BOXES FOR ACCESS. RECOMMEND LATERAL TURNUPS TO BE CUTOFF BELOW
GROUND LEVEL AND COVERED BY VALVE BOXES.

IP ISSUED? Y DATE: 03/24/1994 BY: (SWB) by EDD PHONE#: 856-7432

AUTHORIZATION FOR WASTEWATER/WATER SYSTEM CONSTRUCTION
VOID SIXTY (60) MONTHS FROM DATE OF ISSUANCE
AUTHORIZATION CONDITIONS:

Contractors shall install system on contours, see attached site plan for wastewater system design and well location. No
underground utilities, water lines or sprinkler systems may be located in the original system or repair areas. A septic tank filter
with a riser for access is required. The wastewater system shall not be covered or placed into use until inspected by the Wake
County Department of Environmental Services and an Operation Permit issued. OTHER CONDITIONS:
REMOVE PLASTIC SHEETING, MULCH AND ALL SMALL TREES FROM EXISTING DRAINFIELD. INSTALL ACCORDING TO THE
ATTACHED DESIGN. INSTALL NEW SUBFIELD ABOVE EXISTING FIELDS. DRAINLINES ARE TO HAVE 4" OF FILTER SAND
PLACED IN BOTTOM OF TRENCHES BEFORE ADDING THE 8" OF STONE. SLEEVE THE LATERALS IN 4" CORR. PIPE. EXISTING
PUMP IS TO BE USED, UNLESS IT WILL NOT PRESSURIZE THE SYSTEM, THEN IT MUST BE REPLACED WITH ONE OF THE
RECOMMENDED PUMPS. EXISTING ELECTRICAL CONNECTIONS MUST AT LEAST BE LOCATED IN AN APPROVED NEMA 4X BOX.
DESIGN FLOW IS 41.15GPM.

TANK SIZE: 1000 gal. PUMP TANK: 1000 gal. SQ FT: 795 STONE DEPTH: 08 in. MAX DEPTH LINE: 16 in.
MAINT: R OPER: R L/O: Y TRENCH#: 6 LENGTH: 6070 ft. WIDTH: 18 in.
SUBFIELDS: 3 DESIGN HEAD PRESSURE: 2 DESIGN FLOW: 38.20 gal/min DOSE VOLUME: 310 gal.

CA ISSUED? Y DATE: 12/20/1999 BY: (ETD) EDD PHONE#: 856-7436

WAKE COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES WELL AND SEWAGE SITE LOCATION PERMIT
NO PERMIT(S) FOR CONSTRUCTION, LOCATION OR RELOCATION ACTIVITY SHALL BE ISSUED
UNTIL AN AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION HAS BEEN ISSUED

PERMIT VOID IF NOT IN COMPLIANCE WITH ZONING REGULATIONS AND/ OR IF SITE IS ALTERED OR INTENDED USE CHANGED

PERMIT#: D013405 STATUS: C APP. DATE: 02/11/1999 BLDG. PERMIT#:
PIN: 0720.02 57 1268 000 TAX MAP: 0692 RECORDED: Y ORIG. PERMIT#: C 18020
TOWNSHIP: 03 BUCKHORN JURISDICTION: WC ZONING:
APPLICANT: TAYLOR, RUTH W
4705 FAIRFIELD RD.
NEW HILL, NC 27562
(919) 362 - 1290
USE: HD USE: 0001 REPAIR/EXISTING SYSTEM
EXIST USE: 101 ONE-FAMILY HOUSE
DISPOSAL: N BEDROOMS: 3 BASEMENT: N #EMPLOYEES: 0
SITE: ADDRESS: 4705 FAIRFIELD RD
SUBDIVISION: FAIRFIELD LOT: 26 ACRES. 2.01
DIRECTION: OLD US1S R INTO S/D LOT ON LEFT AT FORK IN RD.

Well System: WATER: INDIVIDUAL - TYPE:

WELL LOG INFORMATION: DEPTH: _____ CASING DEPTH: _____ YIELD: _____ STATIC LEVEL: _____
WELL CONTRACTOR: _____ REG.# _____ PUMP CONTRACTOR: _____ REG.# _____
Construction Compliance GROUT APPROVED ☐ DATE _____ EHS _____
WELLHEAD APPROVED ☐ DATE _____ EHS _____
SYSTEM FINALIZED ☐ DATE _____ EHS _____

COMMENTS:

Operation Permit

DESIGN FLOW: 38.20 gal./min. ACTUAL FLOW: 30.0 INNOVATIVE LETTER:

INSTALLED BY: R. Eberhart

INSTALLATION APPROVED BY: Ed DwyfRS

PROPRIETARY SYSTEM:

FILTER NO: Polylock

COMMENTS: SYSTEM REPAIRED BY R. EBERHART. POLYLOCK SEPTIC TANK FILTER USED. TOP RIGHT LATERAL OF 2ND SUBFIELD PLUGGED & IS NOT IN USE. HEAD PRESSURE RESET IN NEXT LATERAL TO 2' & CHANGES EST. DESIGN FLOW TO 38.2GPM. ACTUAL FLOW IN NEW SUBFIELD ALONE IS 19.95GPM(DESIGN WAS FOR 21.72GPM). ACTUAL FLOW IN BOTH THE NEW SUBFIELD & MIDDLE SUBFIELD(AS CHECKED BY D. YATES, THE CERTIFIED OPERATOR) WAS 30GPM. THIS WAS ~78.5% OF THE ESTIMATED DESIGN FLOW OF 38.2GPM.

OPERATIONS PERMIT ISSUED? Y

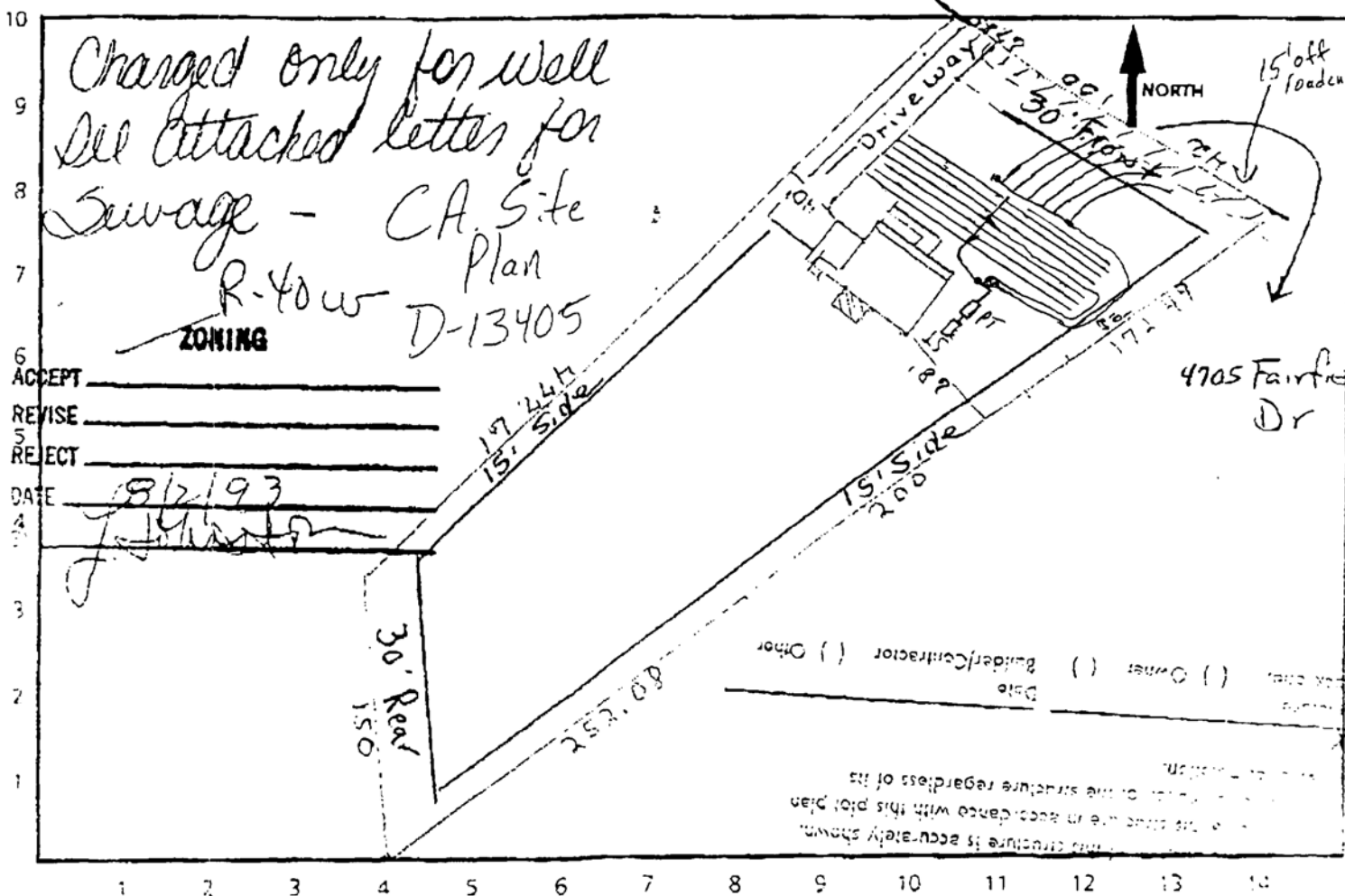
OP DATE: 1-26-01

BY: Ed DwyfRS

This permit is based in part on information provided by the homeowner or his/her representative in the application submitted for this permit. The Environmental Health Specialist is not responsible for false or misleading information contained in the application. The Environmental Health Specialist is also not responsible for concealed conditions on the property or for statements in this report that may have resulted from false or misleading statements provided to him in the application. Neither Wake County nor the Environmental Health Specialist warrants that the septic tank system will continue to function satisfactorily in the future or that the water supply will remain potable.

SITE PLAN

Tax Map # 692 Parcel # 67 Lot # 26 Sub'd Fairfield Project # 0940346



CONSTRUCTION CANNOT OCCUR WITHIN ANY REQUIRED YARD AS SHOWN

I certify that all of the statements made in this application and any attached documents are true, complete and correct to the best of my knowledge and belief and are made in good faith. I also understand that false information may be grounds for rejection of this application. Authorized Health Department and Municipal/County Representatives are granted the right of entry to make evaluations or inspections and to release information upon public request. I certify the location of structures are accurately shown.

Eldred M. McEwen
Signature of Owner or Authorized Agent

August 2, 1993
Date

ZONING REQUIREMENTS

Lot Area 40,000 Sq. Ft.
Side Yard Setback 15 Ft.
Rear Yard Setback 30 Ft.

Lot Width 209.55 Ft. ≤ 110
Rear Yard Setback 30 Ft.

Corner Yard Setback 30 Ft.
Front Yard Setback 122 Ft.

COMMENTS:

Approved By:

[Signature]

Date:

8/2/93

1505.004

NAME OF PROJECT : Ruth Taylor
COUNTY : Wake
REFERENCE NO. : D-13405
SUMMARY

DESIGN FLOW : 360 GPD
APPLICATION RATE : 0.09 GPD/SQFT
TOTAL AREA REQUIRED : 3975 SQFT
TOTAL LATERAL LENGTH REQUIRED : 795 LFT
TOTAL LATERAL LENGTH SPECIFIED : 375 LFT NEW
NUMBER OF FIELDS : 3 (1 New & 2 Existing)

CHECKVALVE : 3
GATEVALVES : 3

SPECIFY ELEVATION OF SUPPLY LINE HIGH POINT : 100.24
SPECIFY ELEVATION OF PUMP OFF LEVEL : 90.24

DEPTH OF TRENCHES : 16 INCHES
DEPTH OF FILTER SAND : 4 INCHES
DEPTH OF STONE : 8 INCHES
LATERAL PIPE SIZE : 1 1/4 INCHES (SCHEDULE 40)
MANIFOLD PIPE SIZE : 3 INCHES (SCHEDULE 40) (NEW)
SUPPLY LINE PIPE SIZE : 2 INCHES (SCHEDULE 40)
SUPPLY LINE LENGTH : 175 FEET
TOTAL DYNAMIC HEAD : 20.11 FEET
DOSING VOLUME : 310 GALLONS
PUMP TANK DRAWDOWN : 15.5 INCHES
TOTAL FLOW : 41.15 GAL/MIN

FRICTION HEAD : 8.11
ELEVATION HEAD : 10.00
PRESSURE HEAD : 2.00
TOTAL DYNAMIC HEAD : 20.11

USE EXISTING PUMP, BUT IF IT FAILS TO PRESSURIZE THE SYSTEM REPLACE WITH ONE OF THE FOLLOWING PUMPS: GOULDS 3885 WE05H; HYDROMATIC SP50; MYERS ME50; ZOELLER 140.

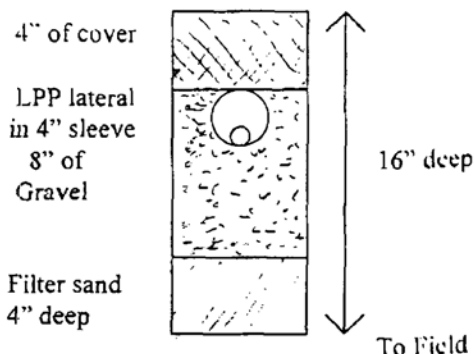
APPROVED
APPROVED AS NOTED
DISAPPROVED

Review of this document has been made only for conformance with the design concept of the project and approval or approval as noted shall not relieve the contractor from responsibility for any errors herein or for furnishing the materials, and equipment of proper dimension, size, quantity, quality and performance characteristics to meet the requirements and intent of the contract documents.

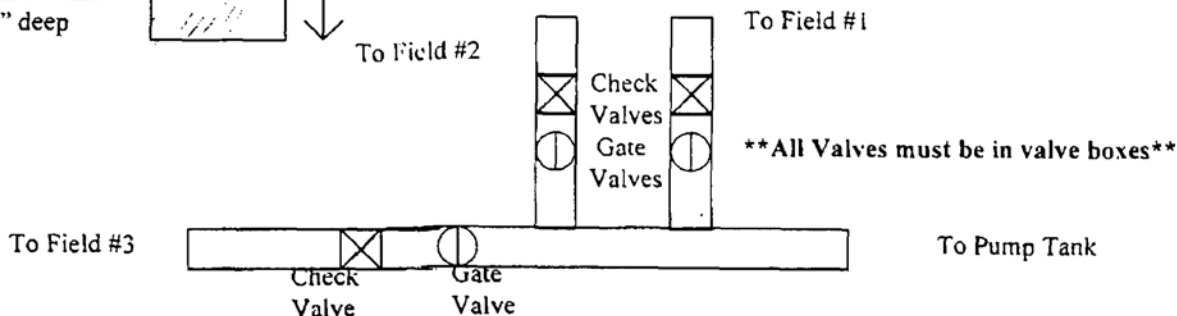
WAKE COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION

Date 12-20-99 By ELQ [Signature]

TRENCH DETAIL



VALVE DETAIL



FIELD NO. 1 (NEW)

LAT. NO.	LENGTH	ELEV-ATION	PRESS. HEAD	HOLE SIZE	HOLE SPAC.	NO.OF HOLES	FLOW PER HOLE	FLOW PER LATERAL	FLOW PER LIN. FT.	1 ST /LAST SPACING
1	60	100.24	2.00	0.156	6.00	10 <i>271</i>	0.41	4.06	0.068	3.0
2	60	100.08	2.16	0.156	6.67	9 <i>278</i>	0.42	3.80	0.063	3.32
3	60	99.74	2.50	0.156	7.50	8 <i>278</i>	0.45	3.63	0.060	3.75
4	60	99.58	2.66	0.156	8.57	7 <i>278</i>	0.47	3.28	0.055	4.29
5	65	99.28	2.96	0.156	9.29	7 <i>276</i>	0.49	3.46	0.053	4.63
6	70	99.19	3.05	0.156	10.00	7 <i>276</i>	0.50	3.51	0.050	5.0

FLOW TO FIELD : 21.72 GPM

FLOW VARIATION : 25.9 %

FIELD NUMBER 2 (ORIGINAL UPPER FIELD)

LATERAL NO.	LATERAL LENGTH
1	60 ✓ <i>Not working</i>
2	60
3	60
4	60
5	60
6	60
7	60

TOTAL LENGTH 420

FLOW TO FIELD : 19.43 GPM (ESTIMATED)

FIELD NUMBER 3 (ORIGINAL LOWER FIELD - NOT TO BE USED AT THIS TIME)

LATERAL NO.	LATERAL LENGTH
8	60
9	60
10	60
11	60
12	60
13	60
14	60

TOTAL LENGTH 420

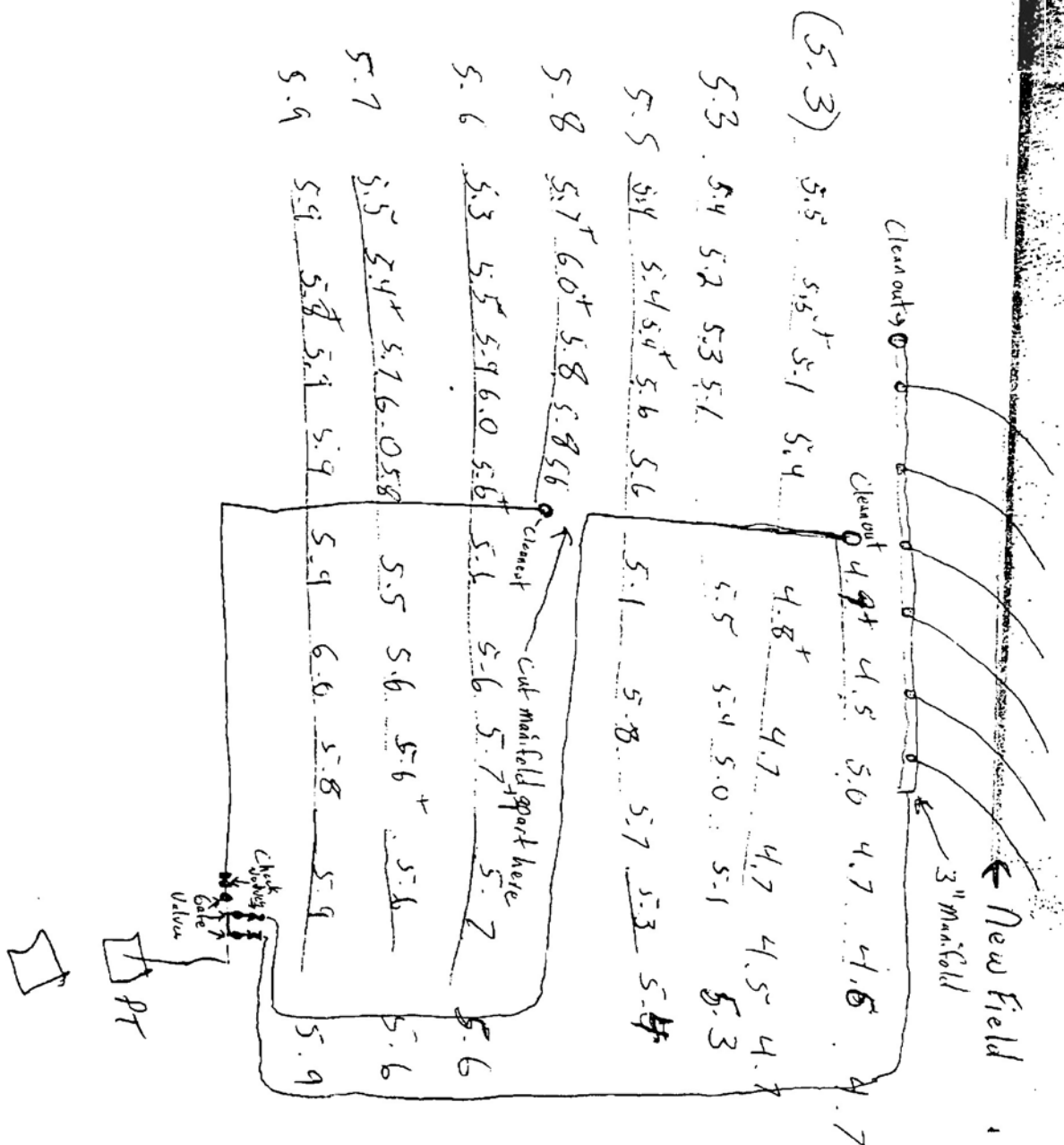
FLOW TO FIELD : 16.37 GPM (ESTIMATED)

16.45

36.7 est.

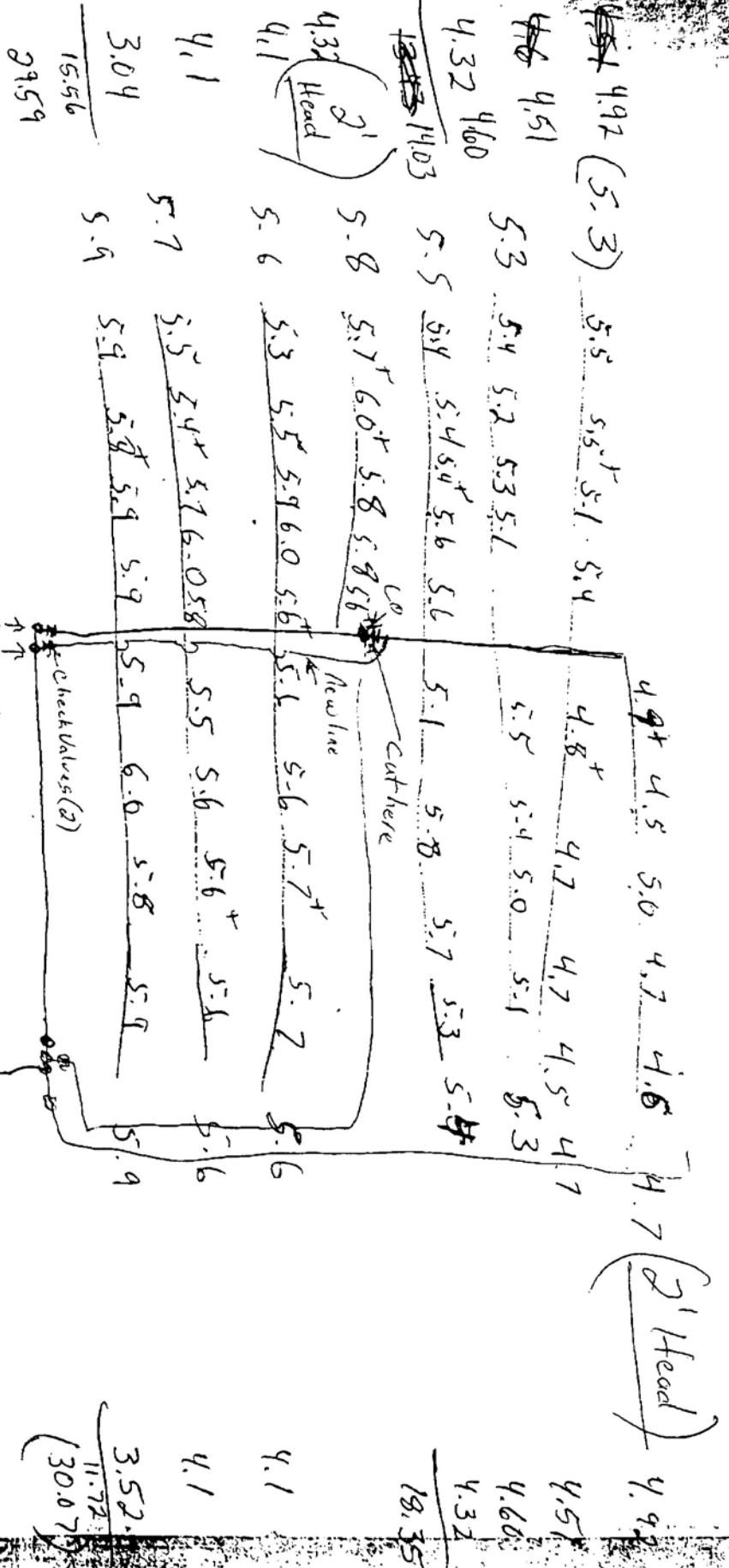
78.5% of Design

Existing Field Valve Detail



CA Site Plan

D-13405



MF 32.38 - Field 2
BF 27.26 - Field 3
59.66

16.37 est

Field 1 = 19.43
60.70%

2267



16'

16" 11
4" Sand
8" Stone

32.38
- 4.92
27.46
x .6
16.48

38.2

daily waste flow
 septic tank size
 Pumping tank size
 Effluent loading rate
 Absorption area
 Total length of laterals
 Lateral diameter
 Lateral configuration
 Supply line length
 Supply line diameter
 Manifold placement
 Pressure head
 Total flow
 Total head
 Pump requirements
 Dosing volume

360 GPD
 1000 gal.
 1000 gal.
 0.075 gal./day/sq.ft. 1192
 4800 sq. ft. 1875
 960 ft. 375
 1.25 in.
 35x120(ft.)
 150 ft.
 2 in.
 center end
 2.0 ft.
 64.02 GPM
 17 ft.
 SP-50M Hydromatic at 60gpm, 21.57
 85gal.

Notes:

- 1) maximum trench depth- 16 inches
- 2) trench bottom to be lined with four inches(depth) of filter grade sand. 0.35 to 0.5 mm effective size, 3.0 uniformity coef., 0.5% dust content
- 3) minimum of six inches of gravel(3/4 to 1 inches in size)
- 4) septic tank and pump tank to meet the minimum requirements of the Wake County Health Department
- 5) all piping to be schedule 40 pvc

	Elevation (feet)	Pressure (feet)	Hole size (inches)	Hole no.	Flow/hole (GPM)	Total flow
Line 1	4.5	2.0	5/32	22	.41	9.02
Line 2	4.6	2.1	5/32	22	.41	9.24
Line 3	4.7	2.2	5/32	20	.43	8.60
Cut Line 4	5.0	2.5	9/64	22	.37	8.28
Line 5	5.2	2.7 2.0	9/64	22	.39	8.59
Line 6	5.4	2.9 2.2	1/8	22	.31	8.30
Line 7	5.6	3.1 2.4	1/8	22	.33	7.92
Line 8	5.8	3.3 2.6	1/8	24	.34	8.18
						68.60

Sheet 2 of 3

WAKE COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES WELL AND SEWAGE SITE LOCATION PERMIT
NO PERMIT(S) FOR CONSTRUCTION, LOCATION OR RELOCATION ACTIVITY SHALL BE ISSUED
UNTIL AN AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION HAS BEEN ISSUED

PERMIT VOID IF NOT IN COMPLIANCE WITH ZONING REGULATIONS AND/ OR IF SITE IS ALTERED OR INTENDED USE CHANGED

PERMIT#: D020730 STATUS: A APP. DATE: 02/07/2001 BLDG. PERMIT#:
PIN: 0720.02 57 0498 000 TAX MAP: 0692 0066 RECORDED: Y ORIG. PERMIT#: B 36219
TOWNSHIP: 03 BUCKHORN JURISDICTION: WC ZONING:
APPLICANT: WUORI, L.H. & S.M.
4711 FAIRFIELD ROAD
NEW HILL, NC 27562
(919) 472 - 6778
USE: HD USE: 0001 REPAIR/EXISTING SYSTEM
EXIST USE: 101 ONE-FAMILY HOUSE
DISPOSAL: N BEDROOMS: 3 BASEMENT: N #EMPLOYEES: 0
SITE: ADDRESS: 4711 FAIRFIELD RD
SUBDIVISION: FAIRFIELD LOT: 25 ACRES: 2.09
DIRECTION: US1S R ON HWY55W L ON OLD US1S(SR1011) R INTO
S/D 2ND DRIVE ON LEFT.

IMPROVEMENT PERMIT

TANK SIZE: EXIST gal. PUMP Tank: EXIST gal. SQ FT: 2625 STONE DEPTH: 08 in. MAX DEPTH LINE: 16 in.
WASTEWATER: INDIVIDUAL SEWAGE: DOMESTIC TYPE SYSTEM: IV A PUMP: Y P/M: N
DAILY FLOW: 00360 gal/day WATER: INDIVIDUAL

COMMENTS: EXISTING LPP SYSTEM DESIGNED & INSTALLED BY J. BROWN. IT WAS DESIGNED AS 8 LINES 60' LONG. IT WAS DESIGNED @ 38.14GPM WITH 11' OF TOTAL HEAD. THE PRESSURE HEAD FOR THE SYSTEM IS 2'. THE SUPPLY LINE FEEDING THIS SYSTEM IS TO BE CUT, A CHECKVALVE & 2 ON/OFF BALLVALVES, IN VALVE BOXES, ARE TO BE INSTALLED TO ALLOW FOR THE SWITCHING BETWEEN THE 2 SYSTEMS. A GATE VALVE MUST ALSO BE INSTALLED ON THE ORIGINAL SYSTEM SIDE OF THE CHECKVALVE TO ALLOW FOR THE ADJUSTMENT OF HEAD PRESSURE FOR THAT SYSTEM SHOULD IT BE NEEDED IN THE FUTURE.

IP ISSUED? Y DATE: 11/18/1986 BY: (JR) PHONE#:

AUTHORIZATION FOR WASTEWATER/WATER SYSTEM CONSTRUCTION

VOID SIXTY (60) MONTHS FROM DATE OF ISSUANCE

AUTHORIZATION CONDITIONS:

Contractors shall install system on contours, see attached site plan for wastewater system design and well location. No underground utilities, water lines or sprinkler systems may be located in the original system or repair areas. A septic tank filter with a riser for access is required. The wastewater system shall not be covered or placed into use until inspected by the Wake County Department of Environmental Services and an Operation Permit issued. **OTHER CONDITIONS:**
PUMP SEPTIC TANK & PUMP TANK. REMOVE "T" FROM ST & INSTALL PVC "T"/FILTER. SEE DESIGN FOR SPECIFICATIONS.
UPGRADE ELECTRICAL CONNECTIONS TO A SIMPLEX CONTROL PANEL WITH ELAPSED TIME METER, CYCLE COUNTER, ALARM & PUMP ON SEPARATE CIRCUITS. REWORK SUPPLY LINE AS DIRECTED IN PLAN DESIGN. INSTALL NEW DRAINFIELD ACCORDING TO THE DESIGN. TRENCHES ARE TO BE DUG 16" DEEP & 4" OF SAND FILTER QUALITY SAND ADDED & LEVELED IN TRENCH BEFORE THE 8" OF STONE IS ADDED. LATERALS ARE TO BE SLEEVED IN 4" CORRUGATED PIPE. SEE THE CA SITE PLAN AND THE DESIGN FOR FURTHER DETAILS.

TANK SIZE: EXIST gal. PUMP TANK: EXIST gal. SQ FT: 2625 STONE DEPTH: 08 in. MAX DEPTH LINE: 16 in.
MAINT: R OPER: Y L/O: Y TRENCH#: 7 LENGTH: 75 ft. WIDTH: 18 in.
SUBFIELDS: 2 DESIGN HEAD PRESSURE: 4 DESIGN FLOW: 35.32 gal/min DOSE VOLUME: 300 gal.

CA ISSUED? Y DATE: 02/07/2001 BY: (ETD) *Ed Dulep* PHONE#: 856-7436

WAKE COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES WELL AND SEWAGE SITE LOCATION PERMIT
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PERMIT VOID IF NOT IN COMPLIANCE WITH ZONING REGULATIONS AND/ OR IF SITE IS ALTERED OR INTENDED USE CHANGED

PERMIT#: D020730 STATUS: C APP. DATE: 02/07/2001 BLDG. PERMIT#: _____
 PIN: 0720.02 57 0498 000 TAX MAP: 0692 RECORDED: Y ORIG. PERMIT#: B 36219
 TOWNSHIP: 03 BUCKHORN JURISDICTION: WC ZONING: _____
 APPLICANT: WUORI, L.H. & S.M.
 4711 FAIRFIELD ROAD
 NEW HILL, NC 27562
 (919) 472 - 6778
 USE: HD USE: 0001 REPAIR/EXISTING SYSTEM
 EXIST USE: 101 ONE-FAMILY HOUSE
 DISPOSAL: N BEDROOMS: 3 BASEMENT: N #EMPLOYEES: 0
 SITE ADDRESS: 4711 FAIRFIELD RD
 SUBDIVISION: FAIRFIELD LOT: 25 ACRES: 2.09
 DIRECTION: US1S R ON HWY66W L ON OLD US1S(SR1011) R INTO
 S/D 2ND DRIVE ON LEFT.

Well System: WATER INDIVIDUAL - TYPE: EXISTING

WELL LOG INFORMATION: DEPTH: _____ CASING DEPTH: _____ YIELD: _____ STATIC LEVEL: _____
 WELL CONTRACTOR: _____ REG.# _____ PUMP CONTRACTOR: _____ REG.# _____
 Construction Compliance GROUT APPROVED ☐ DATE _____ EHS _____
 WELLHEAD APPROVED ☐ DATE _____ EHS _____
 SYSTEM FINALIZED ☐ DATE _____ EHS _____

COMMENTS: EXISTING WELL.

DESIGN FLOW: 35.32 gal./min. ACTUAL FLOW: 36.36 ^{Operation Permit} INNOVATIVE LETTER: _____

INSTALLED BY: Russell Miles INSTALLATION APPROVED BY: Ed Duda
 PROPRIETARY SYSTEM: FILTER NO: Polylock
 COMMENTS: SYSTEM INSTALLED BY RUSSELL MILES. POLYLOCK SEPTIC TANK FILTER USED. RHOMBUS PANEL USED; ETM: 0.37HR, CC: 999832. VALVE BOXES BEING INSTALLED OVER ALL THE VALVES. SUPPLY LINE WAS INSTALLED BETWEEN DECK AND ORIGINAL SYSTEM. DRAWDOWN SET FOR 12" X 25GAL/IN = 300GAL/DOSE. DESIGN FLOW 35.32, ACTUAL FLOW 36.36GPM. ORIGINAL PUMP WAS USED. CERTIFIED OPERATOR IS DAVID YATES.

OPERATIONS PERMIT ISSUED? Y OP DATE: 5-14-01 BY: Ed Duda

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WAKE COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES WELL AND SEWAGE SITE LOCATION PERMIT
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PERMIT VOID IF NOT IN COMPLIANCE WITH ZONING REGULATIONS AND/ OR IF SITE IS ALTERED OR INTENDED USE CHANGED

PERMIT#: D020730 STATUS: A APP. DATE: 02/07/2001 BLDG. PERMIT#: _____
PIN: 0720.02 57 0498 000 TAX MAP: 0692 RECORDED: Y ORIG. PERMIT#: B 36219
TOWNSHIP: 03 BUCKHORN JURISDICTION: WC ZONING: _____
APPLICANT: WUORI, L.H. & S.M.
4711 FAIRFIELD ROAD
NEW HILL, NC 27562
(919) 472 - 6778
USE: HD USE: 0001 REPAIR/EXISTING SYSTEM
EXIST USE: 101 ONE-FAMILY HOUSE
DISPOSAL: N BEDROOMS: 3 BASEMENT: N #EMPLOYEES: 0
SITE: ADDRESS: 4711 FAIRFIELD RD
SUBDIVISION: FAIRFIELD LOT: 25 ACRES: 2.09
DIRECTION: US1S R ON HWY55W L ON OLD US1S(SR1011) R INTO
S/D 2ND DRIVE ON LEFT.

Well System: WATER: INDIVIDUAL - TYPE: EXISTING

WELL LOG INFORMATION: DEPTH: _____ CASING DEPTH: _____ YIELD: _____ STATIC LEVEL: _____
WELL CONTRACTOR: _____ REG.# _____ PUMP CONTRACTOR: _____ REG.# _____
Construction Compliance GROUT APPROVED ☐ DATE _____ EHS _____
WELLHEAD APPROVED ☐ DATE _____ EHS _____
SYSTEM FINALIZED ☐ DATE _____ EHS _____

COMMENTS: EXISTING WELL.

Operation Permit

DESIGN FLOW: 35.32 gal./min. ACTUAL FLOW: _____ INNOVATIVE LETTER: _____

INSTALLED BY: _____ INSTALLATION APPROVED BY: _____
PROPRIETARY SYSTEM: _____ FILTER NO: _____
COMMENTS: _____

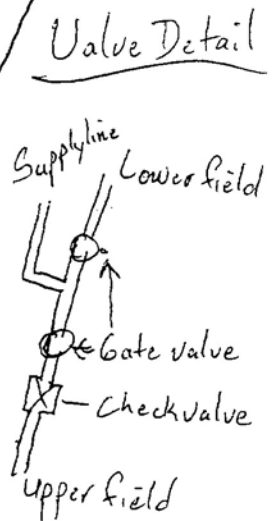
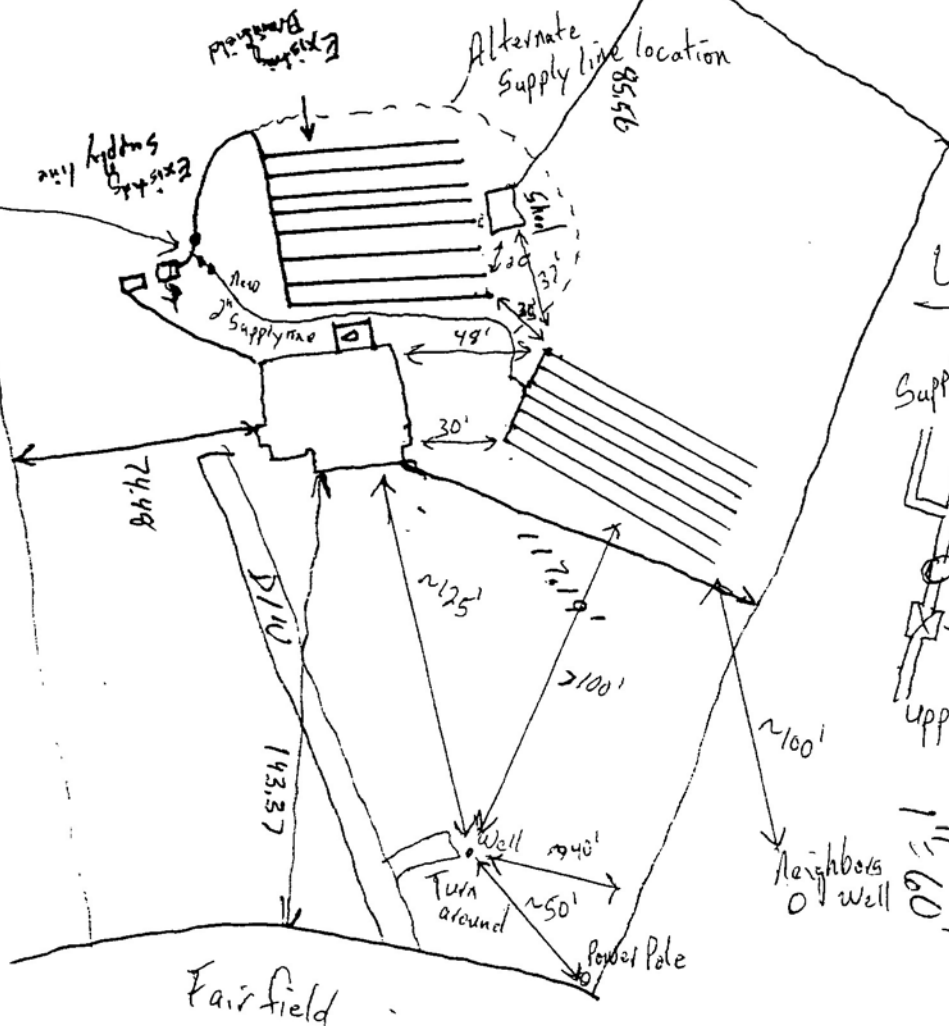
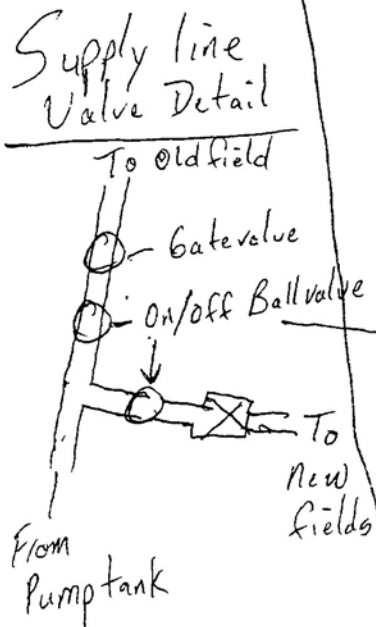
OPERATIONS PERMIT ISSUED? _____ OP DATE: _____ BY: _____

.....
This permit is based in part on information provided by the homeowner or his/her representative in the application submitted for this permit. The Environmental Health Specialist is not responsible for false or misleading information contained in the application. The Environmental Health Specialist is also not responsible for concealed conditions on the property or for statements in this report that may have resulted from false or misleading statements provided to him in the application. Neither Wake County nor the Environmental Health Specialist warrants that the septic tank system will continue to function satisfactorily in the future or that the water supply will remain potable.

CA Site Plan

D-20730

6720.02570498



WAKE COUNTY DEPARTMENT OF ENVIRONMENTAL SERVICES

LOW PRESSURE PIPE DESIGN

Name : Wuori, L.H. & S.M. P.I.N. # : 0720.02570498 D # : 20730

Address : 4711 Fairfield Road, New Hill, NC 27562 Subdivision : Fairfield Lot # : 25

Number of Bedrooms : 3 Daily Flow : 360gal/day L.T.A.R. : .14gal/day/sq.ft.

Septic Tank : 1000gals Pump Tank : 1000gals

Square Footage : 2625ft² Total Lateral Length: 525ft (See LPP Design For Details)

Width of Trenches : 18in Depth of Trenches : 16in Depth of Stone: 4" filter sand + 8in

Lateral Pipe Size: 1 1/4in Number of Subfields: 2

Number of Gatevalves: 3 + 2 ballvalves Number of Checkvalves: 3

Manifold Diameter : 3 in sch40pvc Manifold Length : 35ft

Supply Line : Diameter : 2in Sch40pvc, Length : ~140 or ~250(if line must be installed around existing field)ft

Design Head : 4ft, Friction Head : 7.96ft(supply line length + 70' for fittings in pump tank)

Elevation Head : 6.63ft (difference between pump elevation & first lateral)

Total Head : 18.59ft (design head + elevation head + friction head)

Pump to Deliver : 35.32gals/min at ~19ft head

Draining Volume : 35ft manifold X 38.4 gal/100ft = 13.44 gals

Dosing Volume : 525 total lateral-length X 7.8 gal/100ft = 40.95 gals X 7(5-10) = 286.7 gals

286.7 gals + Draining Volume : 13.44 gals = 300 gals Dosing Volume

Drawdown : 300gals divided by 21 gals/in = 14.3inches

Simplex Control Panel with elapsed time meter, cycle counter, alarm and pump on separate circuits is required ☒; Floats to be determined by type of pump tank used. A septic tank filter, Zabel A1800(a Zabel A300 is preferred) or equal is required.

Possible pumps: Goulds WE05H, Hydromatic SP40(existing)/SP50(new), Myers ME50, Zoeller 140.

Other: Pump septic tank remove "T" add PVC "T" with filter & add riser to tank. Rewire controls into new Simplex Control panel. Try to install supply line between upper line and deck, otherwise it must be installed around the existing system. Install On/Off ballvalves and a check valve in supply line to divert flow between the original & repair systems. A gate valve for the original system must also be installed. These valves are to be located in valve boxes. The system is designed to try and use the existing pump, but if it will not work then use one of the other listed pumps.

LPP DESIGN Sheet1

Permit # D20730

Bench Mark 5.9 is = 100.00 set at base of AC unit closest to back of the house.

ump tank elev. 6.97 98.93 Pump elev. 95 Elevation Head 6

subfield 1

line	color	rod read	elev.	elev. dif.	head	length	hole size	flow/hole	spacing	# holes	1st/last	flow/lat	inst. flow rate
1		5.34	100.56	0.00	4.00	75	5/32	0.5757	7.00	10	6.00	5.76	0.0768
2		5.44	100.46	-0.10	4.10	75	9/64	0.4721	6.00	12	4.50	5.67	0.0755
3		5.8	100.10	-0.46	4.46	75	5/32	0.6079	7.50	9	7.50	5.47	0.0729
4		6.11	99.79	-0.77	4.77	75	9/64	0.5092	7.00	10	6.00	5.09	0.0679

total feet = 300 gal/min = 21.99

subfield 2

1		6.53	99.37	0.00	4.00	75	9/64	0.4663	7.00	10	6.00	4.66	0.0622
2		6.89	99.01	-0.36	4.36	75	9/64	0.4868	7.50	9	7.50	4.38	0.0584
3		7.07	98.83	-0.54	4.54	75	5/32	0.6133	9.50	7	9.00	4.29	0.0572
		total		feet =		225		0.6133	9.50	7	9.00	4.29	0.0572

gal/min = 13.34

Total Feet = 525

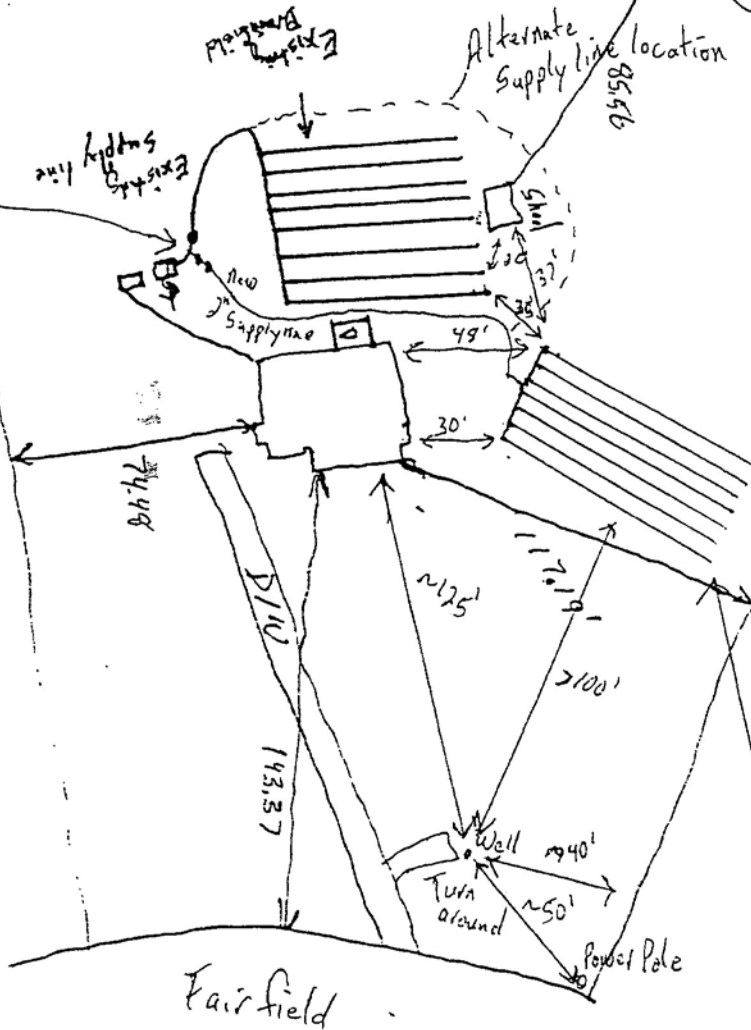
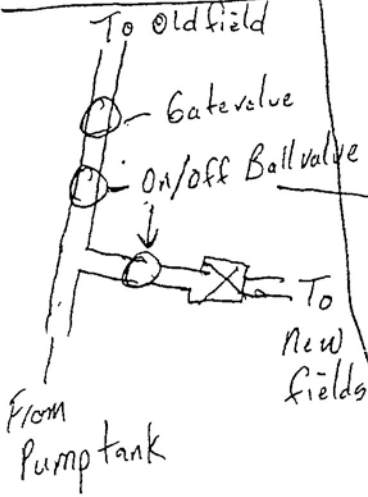
Total gal/min = 35.32

Max Reduction = 25.42

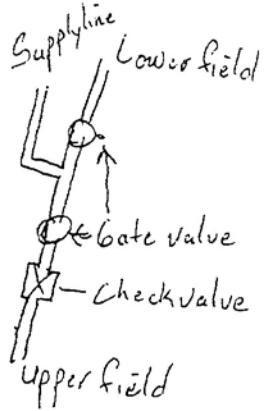
C.A. Site Plan

D-20730
0720.02570498

Supply line Valve Detail

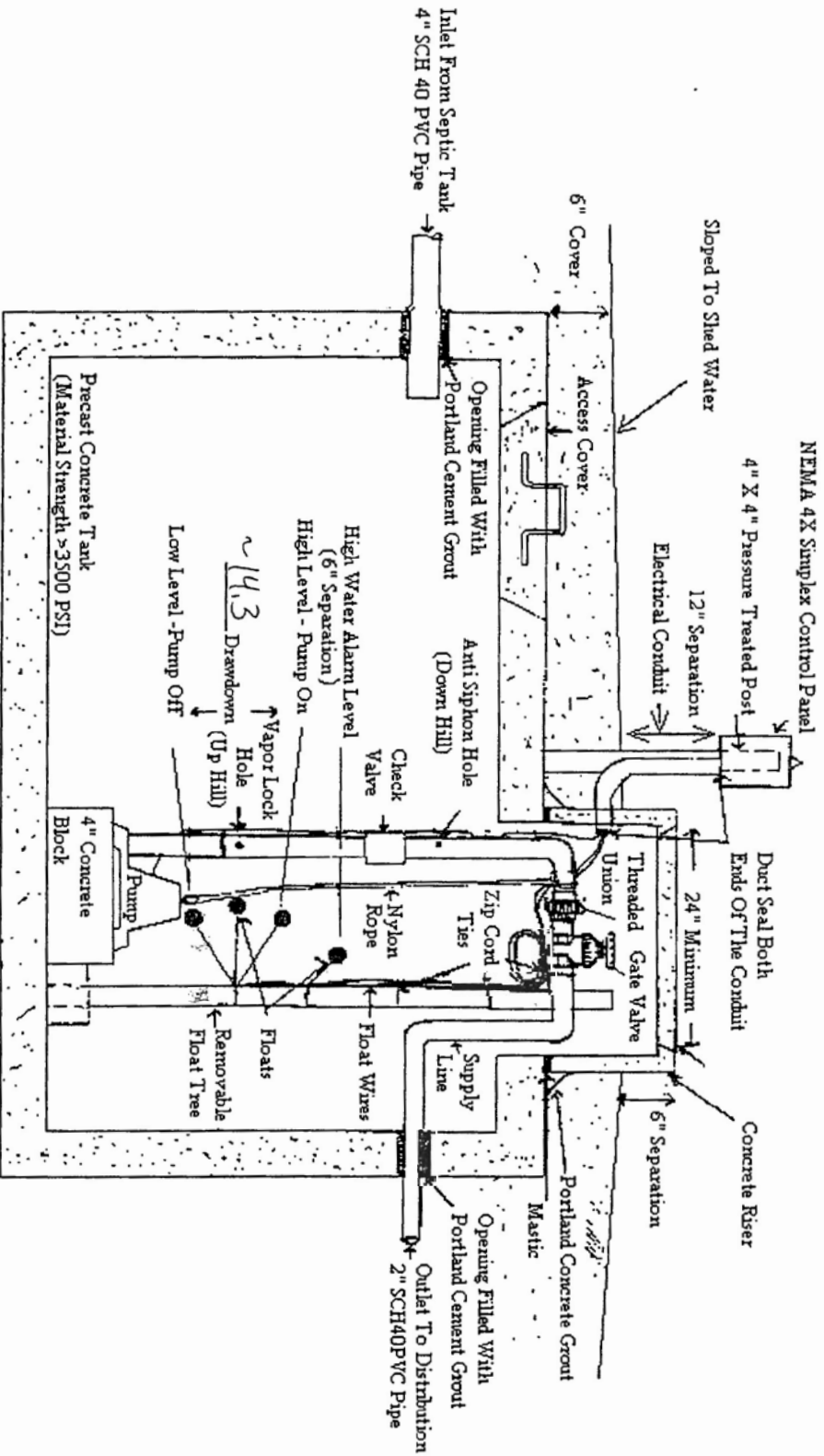


Valve Detail



Neighbors well

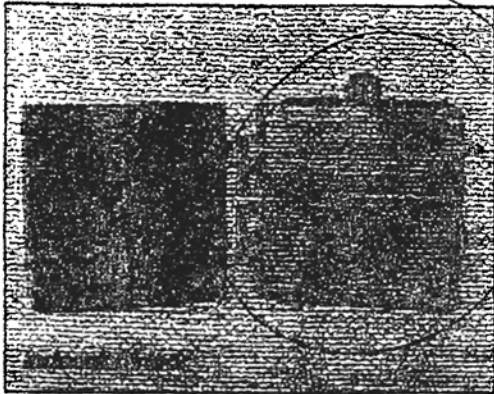
Wake County Department Of Environmental Services



1000 GALLON PUMP TANK

MODEL 112 control panels

Single-phase, simplex motor contactor control.



APPLICATIONS

The Model 112 control panel provides residential and commercial customers with a reliable means of controlling one 120, 208, or 240 VAC single-phase pump in water and sewage installations. Two control switches activate a magnetic motor contactor to turn the pump on and off. If an alarm condition occurs, an additional alarm switch activates the audio/visual alarm system. Common applications include pump chambers, sump pump basins, irrigation systems, and lift stations.

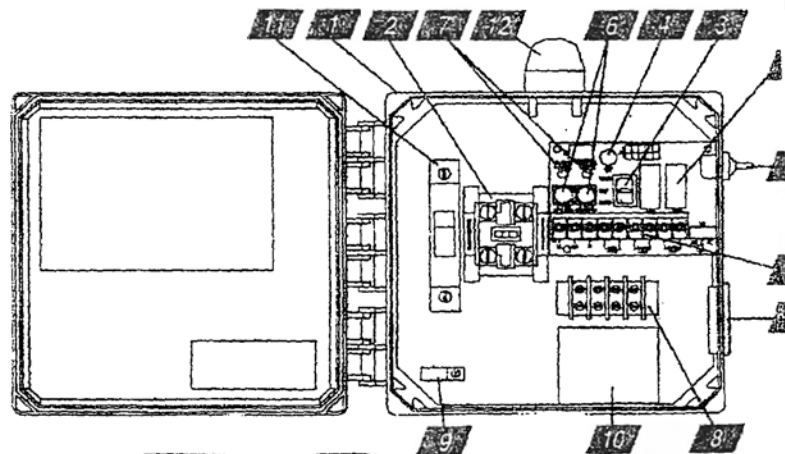
FEATURES



Model Shown 1121W914X

- Entire control system (panel and switches) is UL Labeled to meet and/or exceed industry safety standards
- Dual safety certification for the United States and Canada
- Package includes float switches
- Complete, step-by-step installation instructions included
- Two-year limited warranty

- 1 Enclosure measures 8 x 8 x 4 inches (20.32 X 20.32 X 10.16 cm). Choice of NEMA 1 (steel for indoor use), or NEMA 4X (ultraviolet stabilized thermoplastic with removable flanges for outdoor use).
- 2 Magnetic Motor Contactor controls pump by switching hot electrical lines
- 3 HOA Switch for manual pump control (on circuit board)
- 4 Green Pump Run Indicator Light (on circuit board)
- 5 Float Switch Terminal Block (on circuit board)
- 6 Alarm and Control Fuses (on circuit board)
- 7 Alarm and Control Power Indicators (on circuit board)
- 8 Pump Input Power and Pump Connection Terminal Block
- 9 Ground Lug
- 10 Terminal Block Installation Label
- 11 Circuit Breaker (optional) provides pump disconnect and branch circuit protection



STANDARD ALARM PACKAGE

(see back page for list of options)

- 12 Red Alarm Beacon provides 360° visual check of alarm condition
Note: NEMA 1 style utilizes a door mounted indicator in lieu of a beacon.
- 13 Alarm Horn provides audio warning of alarm condition (83 to 85 decibel rating) **Note:** NEMA 1 style utilizes an internally mounted buzzer (83 to 85 decibel) in lieu of horn.
- 14 Exterior Horn Test/Normal/Silence Switch allows alarm horn to be silenced and testing of horn and light to ensure proper operation of alarm system.
- 15 Horn Silence Relay automatically resets alarm after alarm condition has been resolved (on circuit board)

SI
Rhombic

MODEL NUMBER ORDERING INFORMATION

See sample at bottom of page to help complete your model number. Please call the factory for assistance. 1-888-DIAL-SJE
(1-888-342-5753)

112

MODEL 112

ALARM PACKAGE

- 0 - selected options or no alarm package
- 1 - alarm package (includes test/normal/silence switch, fuse, red light, horn, and alarm float)

ENCLOSURE RATING

- I - Indoor (NEMA 1)
- W - Weatherproof (NEMA 4X)

STARTING DEVICE

- 1 - magnetic motor contactor 208/240V
- 9 - magnetic motor contactor 120V

PUMP FULL LOAD AMPS

If pumps do not have integral overload protection, you must specify overloads as an option.

- 0 - 0-7 FLA
- 1 - 8-15 FLA
- 2 - 16-20 FLA
- 3 - 21-30 FLA
- 4 - 31-40 FLA
- 5 - 41-50 FLA

PUMP DISCONNECT

- 0 - no pump disconnect
- 1 - pull-out with safety deadfront in a 10 X 8 inch (25.4 X 20.32 cm) enclosure
- 2 - through door fused (fuses not included)
- 3 - through door non-fused
- 4 - circuit breaker

FLOAT SWITCH APPLICATION

Three 20 foot (6.09 meter) pipe clamp floats are standard. For alternate float switches see the option pages. Designate H or L for all floats ordered.

- H - high level pump down/normally open
- L - low level pump up/normally closed
- X - no alarm/control floats

OPTIONS

OPTION

NUMBERS

OPTIONS

- 1A Alarm Beacon (no audio)
- 1C Alarm Horn (no visual)
- 3A Flasher
- 6A Alarm Auxiliary Contacts (normally open)
- 11C Remote Status Device (indoor)
- 11D Remote Status Device (outdoor)
- 10E Lockable Latch
- Alternate Float Switches (see Build-A-Panel Option Selection Chart - options 16 and 17)

Additional options are available and may require a larger size enclosure. Refer to the Build-A-Panel Option Selection Chart in the price schedule. Options are subject to change without notice.

ELAPSED TIME METER
EVENT COUNTER

SJ Rhombus
CONTROLS
SJ ELECTRO SYSTEMS, INC.

P.O. Box 1708 ■ 22850 County Hwy 6 ■ Detroit Lakes, MN 56502 USA
1-888-DIAL-SJE (342-5753) ■ Phone: 218-847-1317
■ Fax: 218-847-4617

Cat. Page PN 1007998A

CSJE-Rhombus
Printed in USA 0299

SAMPLE-MODEL #112IW914H 3A 10E

112

1

W

9

1

4

H

3A

10E

MODEL

ALARM PACKAGE

ENCLOSURE RATING

STARTING DEVICE

PUMP FULL LOAD AMPS

PUMP DISCONNECT

LOCKABLE LATCH

FLASHER

ATTACHMENT 12:
Design Specifications for Control Treatment

NOV 16 1994

Alternatives By Choice

Environmental Design/Consultation/Construction

5413 Pine Top Circle

Raleigh, NC. 27612

919-571-7682

Low Pressure Design & SpecificationsOwner GEORGE FARRELL JR.County CHATHAMAddress 354 MCGHEE RD.Site Location SR 1717, 3 mileCHAPEL HILL, N.C. 27514
933-1064EAST OF SR 1008 on Rt.

Type of Structure

Tax Map _____ Parcel _____

Business _____

Application rate .12 gal/ft 2/dResidential YES (4 br.)Design flow 480 gal/dGarbage disposal NONE**DESIGN SUMMARY**Drainfield: 4060 sq ftLaterals: 812 linear ft. 1 1/4" diameter 160 psi PVC or betterConfiguration: CENTER FEED 2 SUB FIELDS (4 LATERALS = 3 LATERALS) 58'00"Supply Line: 832 ft, 2 1/2" diameter Sch 40 PVCManifold: 35 ft, 3" diameter Sch 40 PVCSeptic tank: 1200 gallons, Pump tank 1200 gallonsDrawdown in pump tank 28.7 inchesDesign head 2 ftTotal dynamic head 17 ftTrench width 10 inchesPump HYDROMATIC SP-50M1Size/# gravel 57Controls S.J.E. SUPER SINGLECheck valve 2 (2" SCH 40)FLAT: 101 ALARM or equa.Gate valve(s) 2 (2" SCH 40)Comments CONSIDER DECREASED DOSE VOLUME OR
SLIGHTLY GREATER REDUCTION / CHECK ALL ELEVATION PRIOR TO
CONSTRUCTION

	Lateral	Elev	Head	Hole Size	F/hole	# holes	F/lat	F/ft	1st hole	Spacing	Flag Color
(Top)	1	99.2'	2.0'	5/32"	.41 gpm	24	9.84 g	.085	3'	4.72'	Blue
A	2	98.8'	2.4'	5/32"	.45	20	9.0	.078	4'	5.56'	Yellow
	3	98.4'	2.8'	5/32"	.48	18	8.64	.074	3'	6.5'	O
+	4	97.9'	3.3'	5/32"	.52	16	8.32	.072	4'	7.14'	B
⊗	5	97.6'	2.0'	5/32"	.41	20	8.2	.071	3'	5.77'	Y
⊗	6	97.3'	2.3'	5/32"	.44	18	7.92	.068	4'	6.25'	B
B	7	96.9'	2.7'	5/32"	.47	16	7.52	.065	5'	6.86'	Y
	8										
	9										
	10										

Reduction: 24 %System flow 59.44 gpm.Pump elevation 107.7 ftDose Volume 585 gals
min 5x laterals & SupplyDesign head 2.0 ftElevation head -8.5 ftFriction loss 23.5 ft = 20% / frictionTOTAL DYNAMIC HEAD 17 ft

$$852' (2\frac{1}{2}" \text{ SCH-40}) = 212.1 \text{ gals}$$

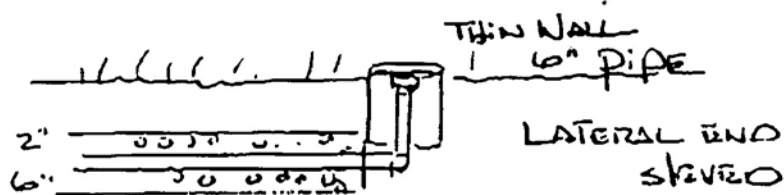
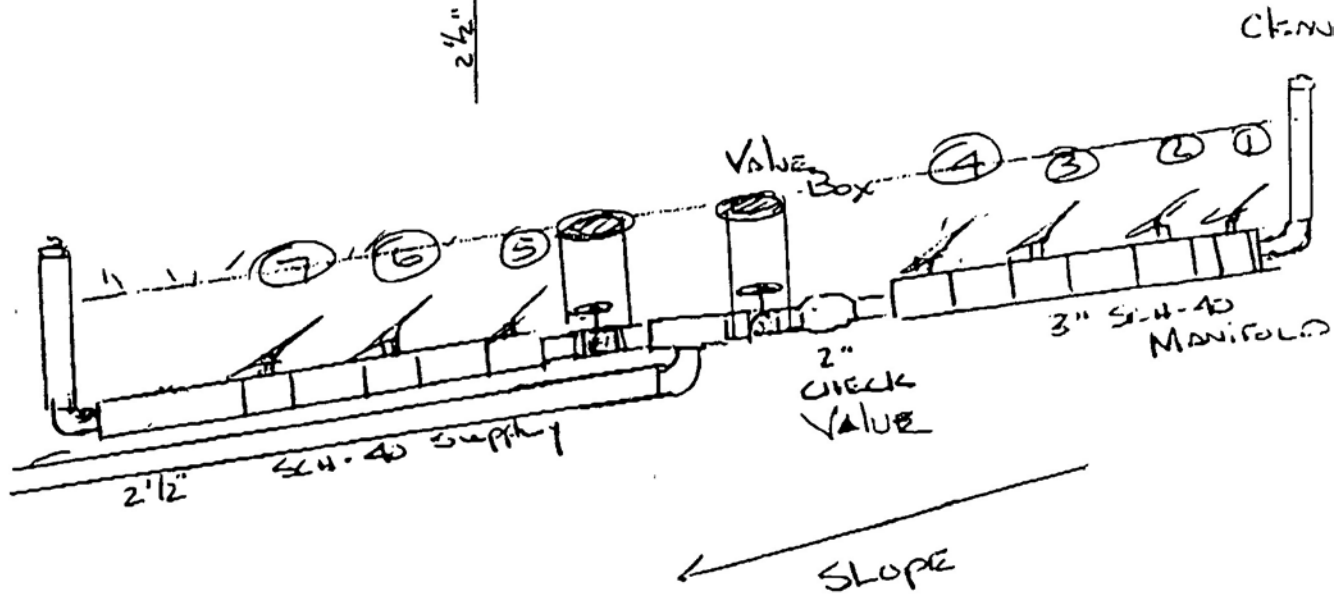
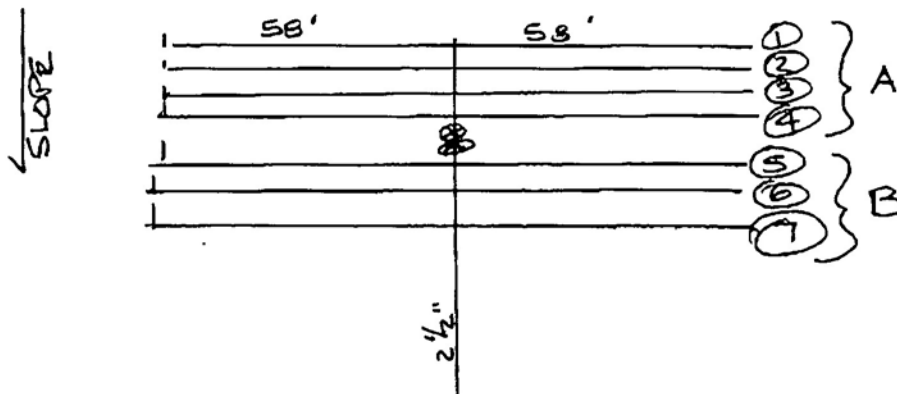
$$812' (1\frac{1}{4}" \text{ PR-200}) = 74.7 \text{ gals}$$

$$74.7 \text{ gals} (x) 5 + 212.1 = 585.5 \text{ gals}$$

* Line 2 (yellow) Double Flags Center

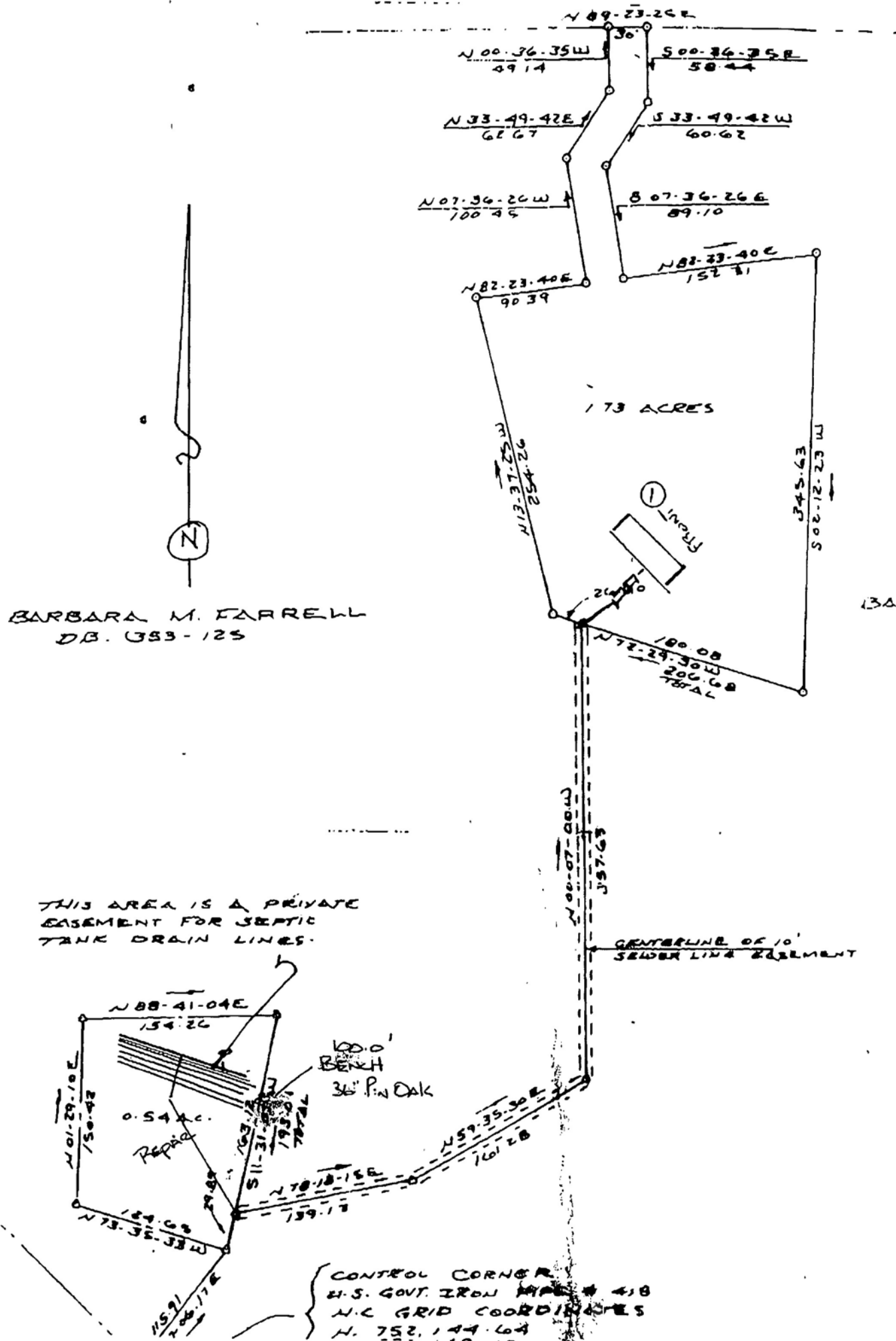
Alternatives By Choice

Environmental Design/Consultation/Construction



~ 3" # 57 STONE (10" WIDTH)

TEST RISERS 24" @ LINES 1 & 5



ATTACHMENT 13: Pictures



Measuring Pump Flow Rate



Measuring Solids Levels and Scum Layer Levels



Activating BiOWiSH Technologies, Inc. Septic Tank Aid™ in Bucket



Activating BiOWiSH Technologies, Inc. Septic Tank Aid™ in Bucket



Activating BiOWiSH Technologies, Inc. Septic Tank Aid™ For 15 – 18 Hours



*Adding BiOWiSH Technologies, Inc. Septic Tank Aid™
to Toilet According to Package Instructions*



Adding Activated BiOWiSH Technologies, Inc. Septic Tank Aid™ to Septic Tank



Measuring Septic Tank Effluent Temperature



Sampling Septic Tank Effluent



Sampling Septic Tank Effluent