LOW PRESSURE PIPE SEPTIC SYSTEM PLAN

FOR

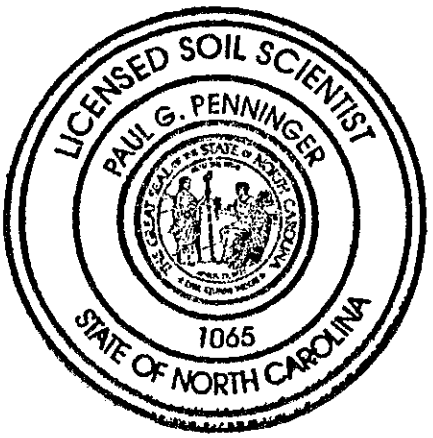
LOT 271 BLUEWING ROAD

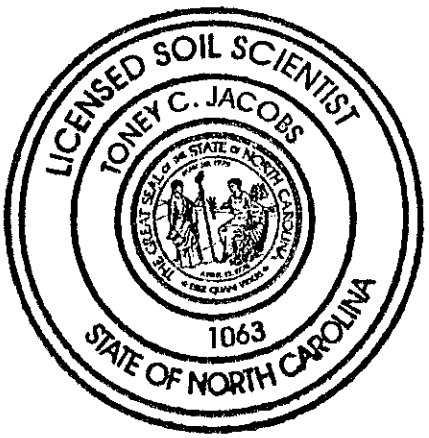
IREDELL COUNTY, NORTH CAROLINA

by

Toney C. Jacobs & Associates, Inc.
Consulting Soil Scientists
168 Broadbill Drive
Mooresville, N. C. 28115

July 20, 1997
Slightly revised: August 12, 1997





To: Mr. Wesley Sparks, R. S.
Iredell County Health Dept.
Mooresville, N. C. 28115

Mr. John Bishop
2201-G Crown Pointe Executive Dr.
Charlotte, N. C. 28227

Paul G. Penninger

Toney C. Jacobs, CPSS

Lot 271 - Bluewing Road

LOW-PRESSURE PIPE SYSTEM (LPP)

Design Considerations

This system is proposed for a small 0.26 Ac single family residential lot in an existing subdivision on Lake Norman. The system is designed for a 2-bedroom home. This tract was recorded prior to 1983 and 100% repair area is not required or available. The soil on most of the tract is unsuitable for ground absorption by a conventional septic system, but there is one area which has been evaluated and was judged to be provisionally suitable for a low pressure pipe system by the Iredell County Health Department and Toney C. Jacobs & Associates, Inc. The soil is very marginal and available space is very limited. Any site alterations or soil disturbance during construction could render the lot unsuitable for a septic system. The flagged lines should be fenced off during construction to keep traffic off the system are.

A very conservative LTAR of 0.1 gpd/ft^2 was recommended for the soil. Though the soil/site does meet the minimum requirements for permitting, the designer has some reservations about future system performance and these should be acknowledged by the owner. Without repair area on-site, any future needed modifications will be expensive to complete.

Location

The approximately 0.26 acre building lot is left off Bluewing Lane, right off Stutts Rd, left off Brawley School Rd. in southern Iredell County, N. C.

Reference Material

(1) *Design and Installation of Low Pressure Pipe Wastewater Treatment Systems,* by Craig Cogger, Bobby L. Carlisle, Dennis Osborne, and Ed Holland. UNC Sea Grant UNC-SC-82-03, May 1982.

(2) *Laws and Rules for Ground Absorption Sewage Disposal Systems 15A NCAC 18A. 1900,* NCDEHNR-DEH.

Recommendation

Four hundred and eighty (480) lineal feet of LPP lines in 18" wide trenches 13" deep. LPP lines must be sleeved with 4" corrugated drain pipe.

Ownership Responsibility for an LPP System

Conservation measures should be undertaken in plumbing fixture specifications to minimize the volume of wastewater entering the disposal system, including, but not limited to the following precautions:

(a) Provide water conserving plumbing fixtures within the facility. Waterclosets should be 1.6 gal. flush, per code. Shower heads should also have restrictions or be of low volume design. This is a voluntary action, but very important to the health department and the system designer. With previously described limits, this is very important.

(b) Develop conservative water use habits.

(c) Monitor and maintain the system as necessary for proper operation. An Operation Permit will require a maintenance contract to be filed with the Iredell County Health Department. It is recommended that the owner aggressively utilize this service and requirement because of its importance to system longevity. If possible, management entity should be a part of the installation process.

System must be properly installed by a qualified and competent contractor following the requirements of the Iredell County Department of Environmental Health, DEH, the N. C. Building Code, Plumbing Code, and Electrical Code. This plan, as any, is a guide to a minimum standard, but cannot take the place of experience and common sense.

Components of System

1. Two compartment septic tank - 1000 gal.
2. Pumping tank - 1000 gal.
3. Submersible effluent pump and level controls - SSOMA certified
4. High water alarm signals which are UL approved
5. Supply pipe
6. Gate valves
7. Laterals with LPP distribution in ground absorption trenches, 18" wide, level end to end, and placed to the exact level specifications in plan. Lines must be sleeved with 4" corrugated pipe.

Construction Sequence

1. Lines have been flagged as noted on drawing.
2. The area has been cleared of most organic material. Backfill any low areas with clean imported loam from off-site and tamp to surrounding compaction and look.
3. Install trench per cited reference material and this plan. Top grade on pipes to be "level" from end to end and vertically from manifold, and checked by sanitarian. Gravel stone to be #57 washed stone. (Note: This is a three valve designed system.)
4. All joints in lateral manifold piping shall be watertight connections to insure that the only source of the water seepage from the system is through the orifices as designed. Carefully install manifold and lateral network according to the attached designed layout. Protect valves with valve box. A

larger diameter protective sleeve with cap or approved box with lid shall be placed over the turned up lateral and positioned level with the ground surface (so as not be damaged by mowing machine). Turn-up with two 45 degree elbows, not one 90. This turn-up to be sleeved and sleeve backfilled with washed stone.

5. Carefully backfill manifold trenches to grade with clean fill material.

6. The installation contractor shall stabilize the area of construction by planting and mulching with Fescue grass. Area to be limed and fertilized with 0.5 tons lime, 75 units of N, 150 units P, and 100 units of K per acre.

7. The septic tank shall consist of a 1000 gallon capacity reinforced, precast concrete tank with full baffle and shall have easy access to each chamber from ground level for inspection. The first chamber of the septic tank shall consist of 2/3 to 3/4 of the volume of the total tank and the baffle shall contain a horizontal opening across the tank at about midway its height. Locate the septic tank at such height as to provide approximately 8" of cover soil over top of the tank.

8. The dosing tank shall consist of a 1000 gallon capacity, reinforced, precast concrete tank without baffle and shall have a concrete mounting pad (concrete blocks) for accommodating the pump. Provide access for entry into the tank directly over the pump location, and extending 6' above final grade. Use a 30" diameter concrete well casing and concrete well cap or other approved type cover. There must be a seal between well tile and top of tank.

9. All piping and fitting shall be SCH 40 PVC. Glue for all PVC pipe joints shall be as recommended by the pipe manufacturer. (Note: On the distal end of each lateral turn-up should be 2 each 45 degree elbows, rather than one 90 to facilitate maintenance.)

10. Pump: The submerged pump shall be Model ME 50 manufactured by Myers, or equal, ½hp 115v/1ph; capable of pumping 33.2 gallons per minute at a 25.7' head.

11. Pump controls and alarm to meet specifications of .1952, all being compatible.

12. A "Warning Sign" shall be located within the house to inform the occupants of action to take in case the "High Water Alarm" is activated. This sign shall contain the name, address, telephone number, and emergency telephone number of the person to contact upon malfunction of the system.

13. Pump and Controls: Details of pump installation are shown in the plan. The pump must be placed on concrete blocks on the bottom of the tank. This prevents the pumping of any solid particles which can clog the pipe system. A piece of nylon rope or other non-corrodible material should be attached to the pump and to the outlet pipe for lifting the pump in and out of the chamber. Care must be taken to insure that floats do not become fouled by other components in the tank, such as the electric power cord or the lifting rope. A telescoping "tree" shall be used for floats and

adjustments. The lower level control or "pump-off" must be positioned above the pump, so that the pump remains submerged at all times. The level control "pump-on" is positioned to pump a specified volume of effluent. The high water control float is then mounted about 3" above the upper pump-on control. The pump outlet pipe should be connected to the supply manifold with a threaded PVC union (or dresser coupling) to allow quick removal.

14. Electrical Connections: The pump and high water alarm must be placed on separate electrical circuits. (If the pump circuit fails, the alarm must still be able to operate.) Follow the manufacturers recommendations for the proper fuses or circuit breakers. All electrical connections must be made outside the pumping chamber. Power cords from the pumps and controls should be plugged into a NEMA 4X approved outdoor receptacle mounted outside of the pumping chamber, a minimum of 1 foot above finished grade. The receptacle must not be located inside the pumping chamber due to the corrosive and explosive gasses that may form from the sewage. Electrical connections may be made inside the pumping tank only if wired inside a sealed, watertight box. Some level control switches have a box built into the housing, but are more expensive than the plug-in devices. Wiring between the pumping chamber and the station should meet State and local code requirements. A lightning arrester is recommended to protect the pump and controls from electrical surges.

15. Proper Operation Check: After all components have been installed and connected, the system should be checked for proper operation. With electrical power turned off, fill the pumping chamber with water from a garden hose until the liquid rises to the level of the high-water alarm float. Turn off the electrical power. The alarm light should go on in the house, and the pump should start operating. The alarm light should go off when the liquid reaches the lowest float control. Be sure the pump is still completely submerged.

16. Pressure Head Adjustment: The pressure head must be adjusted to match that specified in the design. The pressure head is measured as the height liquid will rise above the turn-up elbow when the pump is running. To adjust the head:

(a) Glue a 4' length of pipe (preferably clear) to a threaded adapter that will screw onto the turn-up adapters. (Call this the "test tube".)

(b) Replace the turn-up cap with the "test tube". There must be one for each line with all lines adjusted at the same time.

(c) Adjust the gate valves until the effluent reaches the desired height in the "test tube". Remember to include the distance below the ground surface to the lateral line when measuring the height. The pressure head should be as specified for each line. This is the height above the lateral where the liquid should be in the temporary "test tube".

17. Final Landscaping: After the system is installed, the area should be checked to insure that the system will not be overloaded with excess rainwater and runoff. The distribution field must be shaped to shed rainwater and be free of low areas.

Concluding Note:

This plan was done to facilitate permitting by the Iredell County Health Department as a service to the county by the property owner. Any additions, additional requirement(s), or deletions to enhance design or workability which will facilitate a permit are welcomed and may be made by note on this plan without returning entire design. The designer realizes a plan with as many details as this can be changed and/or improved upon. The installer must realize that this is an exact plan and must be installed with exacting measurements. Final inspection will also require more time and detail than a conventional system.

Design Specifications

Lot 271 - Bluewing Road

Daily design flow:	240 gpd - 2 bedroom house
Septic tank size:	1000 gal (2 compartments)
Pumping tank size	1000 gal
Effluent loading rate:	0.1 gpd/ ft^2
T otal length and diameter of supply manifold:	app. 200 lf of 2" sch 40 PVC
Number and length of laterals:	See Table
Hole size:	5/32", 3/16"
Hole spacing:	See table
Total number of holes	See table
Flow rate through the system	33.2 gpm
Elevation head:	13'
Pressure head:	2.0' - 3.1'
Friction head:	5.3'
20% over design:	4.3'
Total head:	25.7'
Pump requirements:	33.2 gpm at 25.7' of head; use Myers ME50 ½ hp pump or equivalent with compatible electrical
Dosing volume:	186 gal. - 1.3 doses/day at design flow
Depth of water pumped per dose:	calculated to specific tank by measure or dealer engineered specifications (1 cubic ft. of water equals 7.5 gal) - 3.5 Tether
Pump run dose:	approx. 5.5 min.
Check valve:	No
Siphon break hole:	No

Lot ~~121~~ 271 BLUEWING DESIGN SPECIFICATIONS

LINE	COLOR	LENGTH (ft)	ASSUMED G.S. ELEV. (ft)	DESIGN HEAD (ft)	HOLE SIZE (in)	HOLE SPACING (ft)	# HOLES	FLOW per HOLE (gpm)	FLOW per Line (gpm)	gpm per linear ft. of trench
1	RED	10	97.4	2.0	3/16	—	1	0.589	0.59	0.0589
2	WHITE	40	97.1	2.3	5/32	5.7	7	0.439	3.07	0.077
3	YELLOW	56	96.6	2.8	5/32	6.2	9	0.484	4.35	0.078
4	RED	69	95.8	3.6	5/32	7.6	9	0.549	4.94	0.072
5	WHITE	70	95.3	2.0	5/32	5.3	13	0.401	5.21	0.074
6	BLUE	73	95.0	2.3	5/32	6.0	12	0.439	5.27	0.072
7	YELLOW	63	94.7	2.6	5/32	7.0	9	0.466	4.19	0.067
8	RED	45	94.5	2.0	5/32	6.4	7	0.401	2.81	0.062
9	WHITE	26	94.0	2.5	5/32	8.6	3	0.457	1.37	0.053
10	BLUE	18	93.8	2.7	5/32	9	2	0.475	0.95	0.052
11	ORANGE	10		2.9	5/32	—	1	0.493	0.49	0.049
								TOTAL =	33.24	gpm

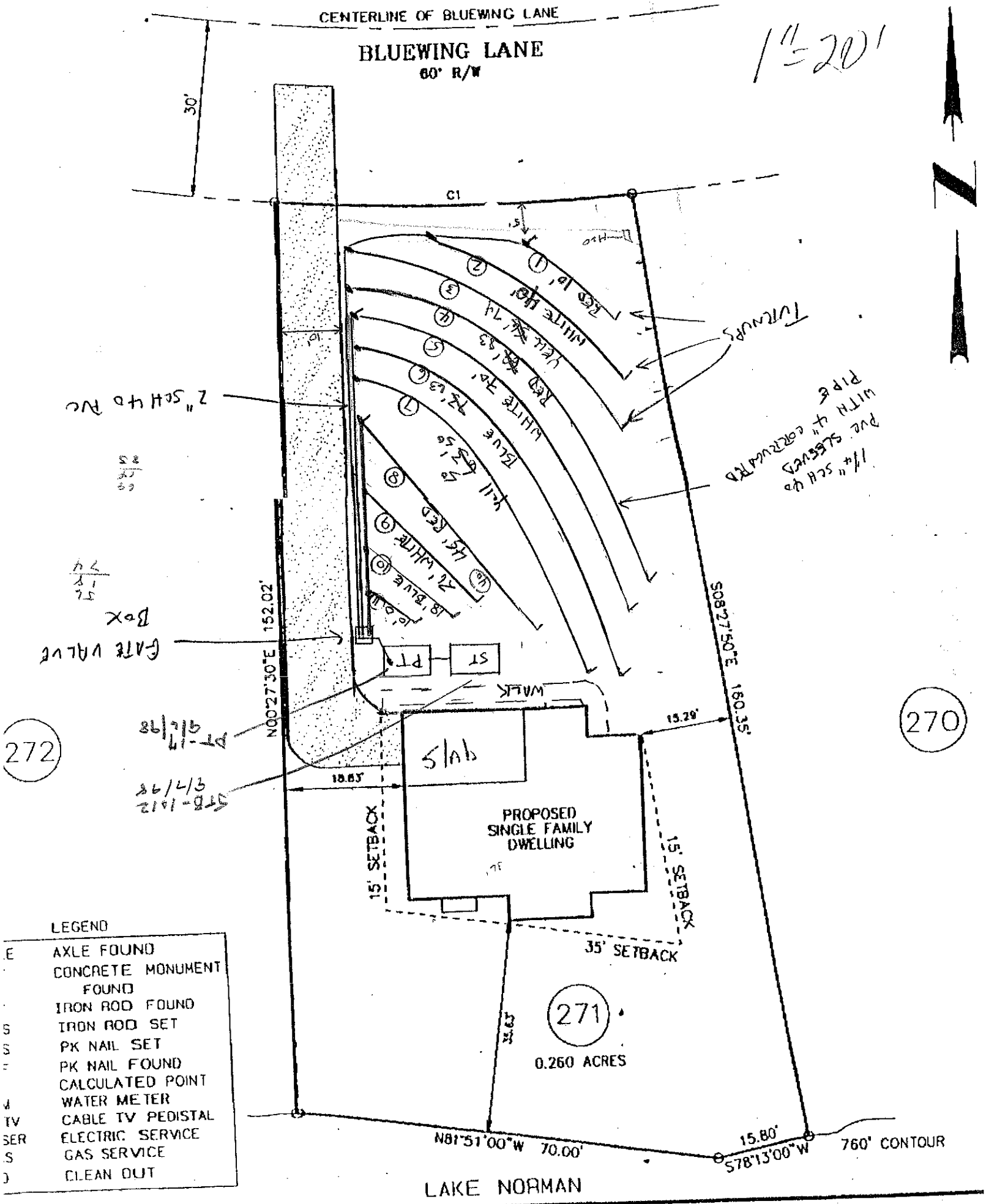
TOTAL = 480 ft

DOSE VOLUME CALCULATION

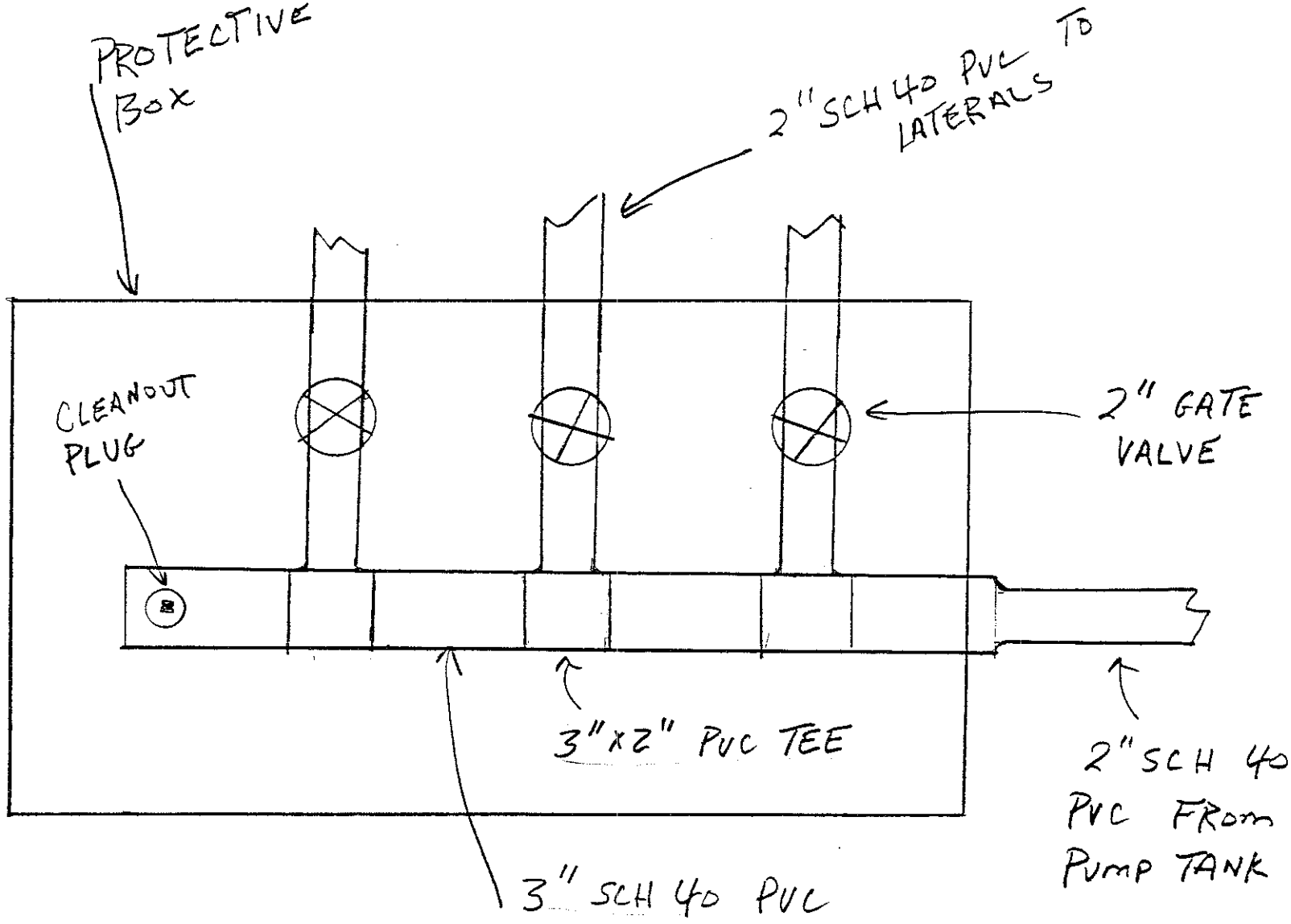
(200' 2" PVC)(16.2 gal/100') = 32.4 gal

(480' 1¼" PVC)(6.4 gal/100') = (30.7 × 5) 2 ZONE Tether

DOSE VOLUME = 185.9 gal

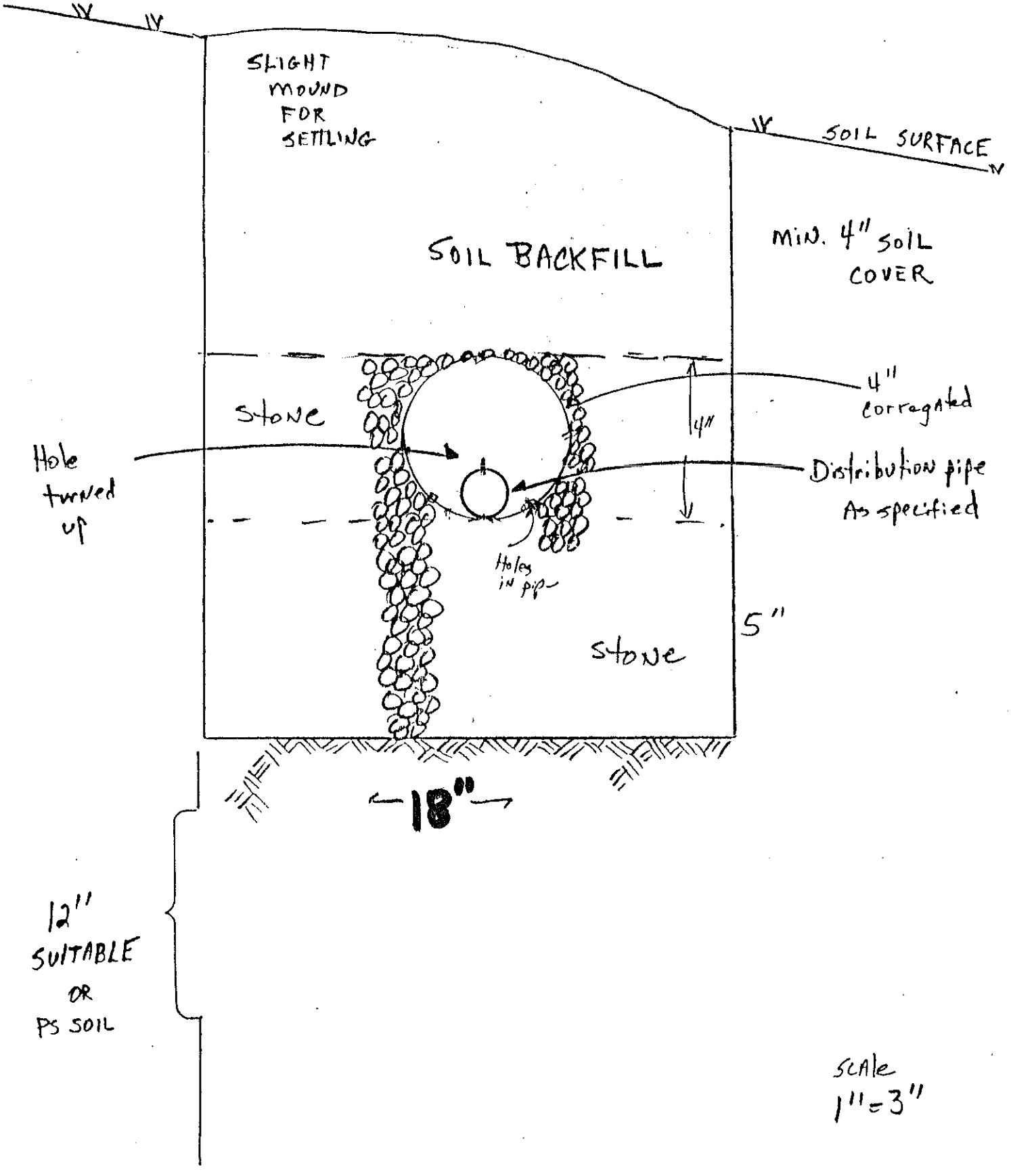

CENTERLINE OF BLUEWING LANE
BLUEWING LANE
60' R/W
30'
1"=20'
C1
TURNUPS
2" SCH 40 PVC
GATE VALVE
BOX
PVC SLEEVES
1½" SCH 40
WITH 4" CORRUGATED
PIPE
152.02'
N00°27'30"E
S08°27'50"E 160.35'
15.29'
15.83'
15' SETBACK
15' SETBACK
35' SETBACK
PROPOSED
SINGLE FAMILY
DWELLING
SLAB
WALK
PT
ST
272
270
271
0.260 ACRES
N81°51'00"W 70.00'
S78°13'00"W 15.80'
760' CONTOUR
LAKE NORMAN
LEGEND
AXLE FOUND
CONCRETE MONUMENT FOUND
IRON ROD FOUND
IRON ROD SET
PK NAIL SET
PK NAIL FOUND
CALCULATED POINT
WATER METER
CABLE TV PEDISTAL
ELECTRIC SERVICE
GAS SERVICE
CLEAN OUT
PRELIMINARY PLAT
SITE DEVELOPM
OF
REVISED HOUSE LOCATION.

CENTRAL VALVE BOX DETAIL

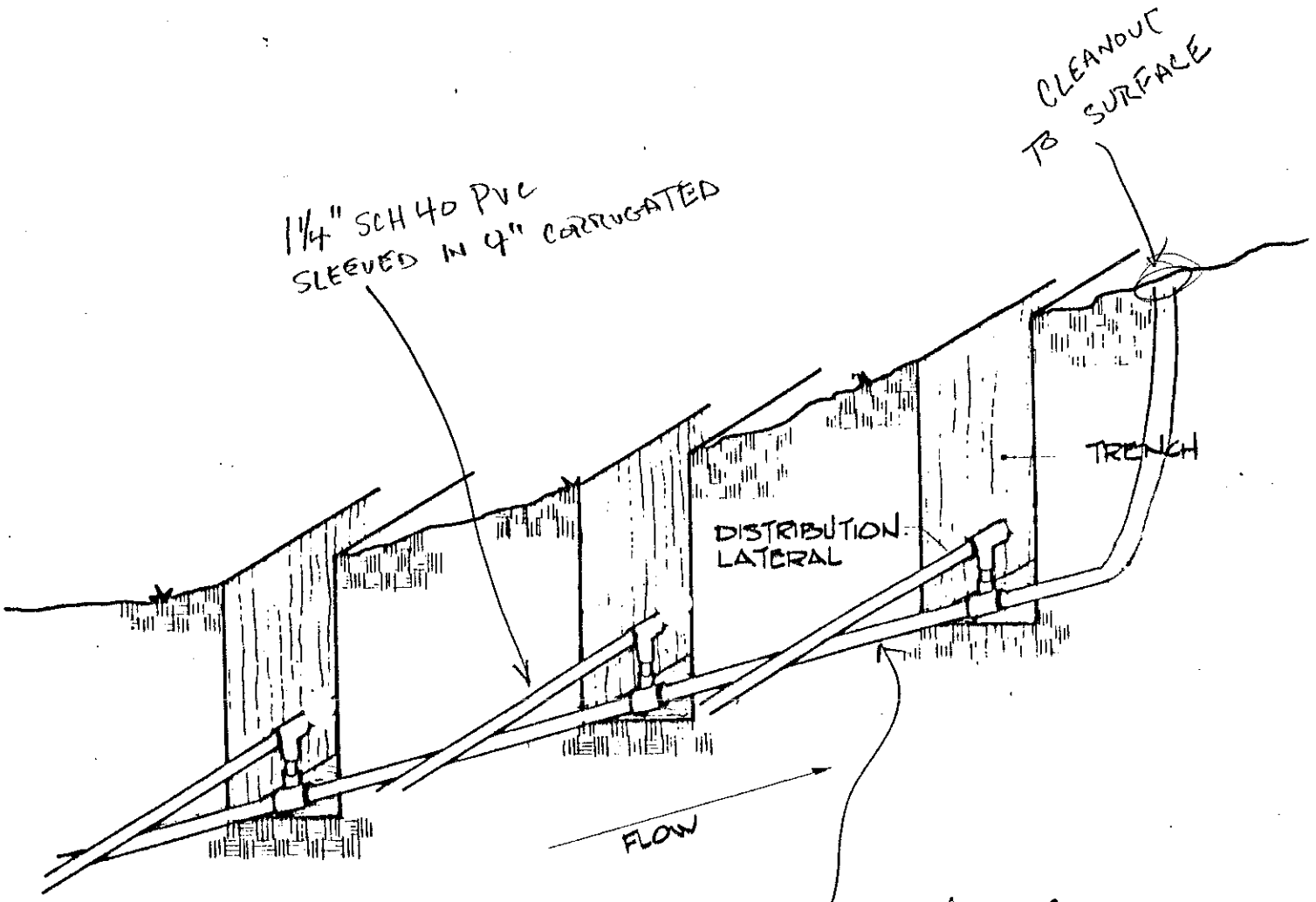


LPP Trench Design

typical



SCALE
1" = 3"

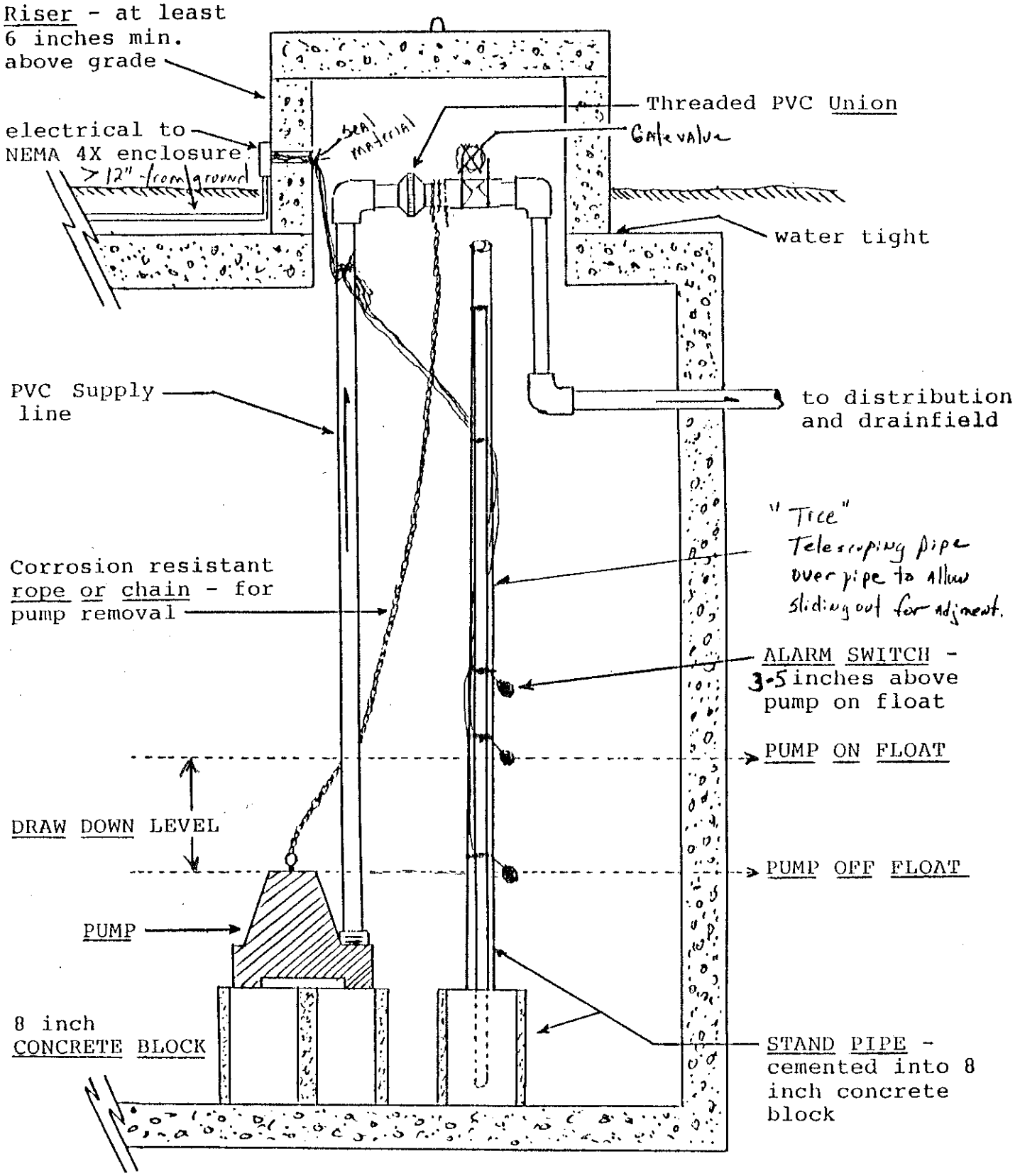


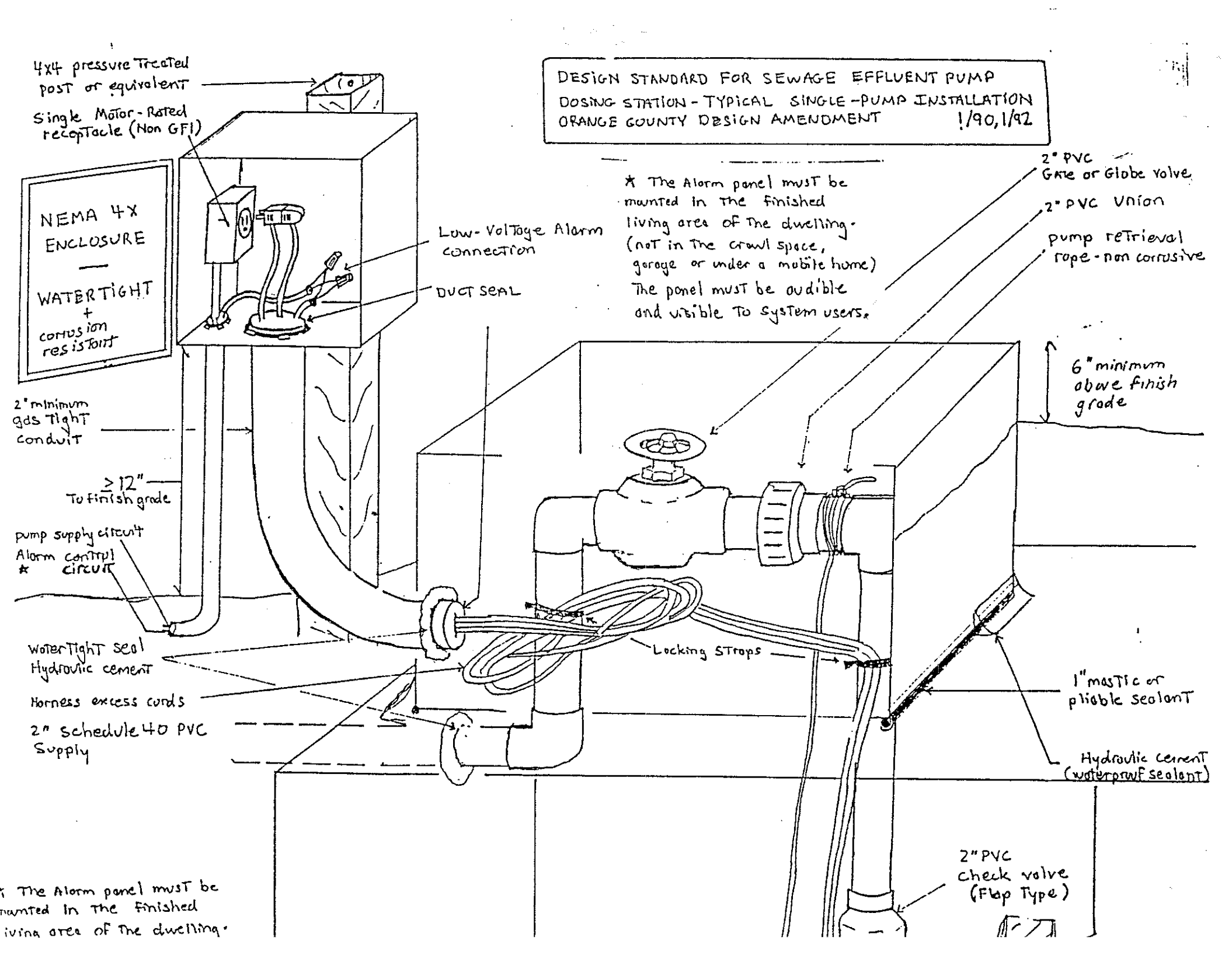
A. PUMPING UPHILL

(from Cogger et al, 1982)

2" SCH 40 PVC FROM VALVE BOX

PUMP DIAGRAM




DESIGN STANDARD FOR SEWAGE EFFLUENT PUMP
DOSING STATION - TYPICAL SINGLE-PUMP INSTALLATION
ORANGE COUNTY DESIGN AMENDMENT 1/90, 1/92
4x4 pressure Treated post or equivalent
Single Motor-Rated receptacle (Non GFI)
NEMA 4X ENCLOSURE
WATERTIGHT + corrosion resistant
Low-Voltage Alarm connection
DUCT SEAL
* The Alarm panel must be mounted in the finished living area of the dwelling. (not in the crawl space, garage or under a mobile home) The panel must be audible and visible To System users.
2" PVC Gate or Globe Valve
2" PVC Union
pump retrieval rope - non corrosive
6" minimum above finish grade
2" minimum gds Tight conduit
≥ 12" To finish grade
pump supply circuit
Alarm control * circuit
WaterTight seal Hydraulic cement
Harness excess cords
2" schedule 40 PVC Supply
Locking STraps
1" mastic or pliable sealant
Hydraulic cement (waterproof sealant)
2" PVC check valve (Flap Type)
* The Alarm panel must be mounted in the finished living area of the dwelling.

Design Specifications

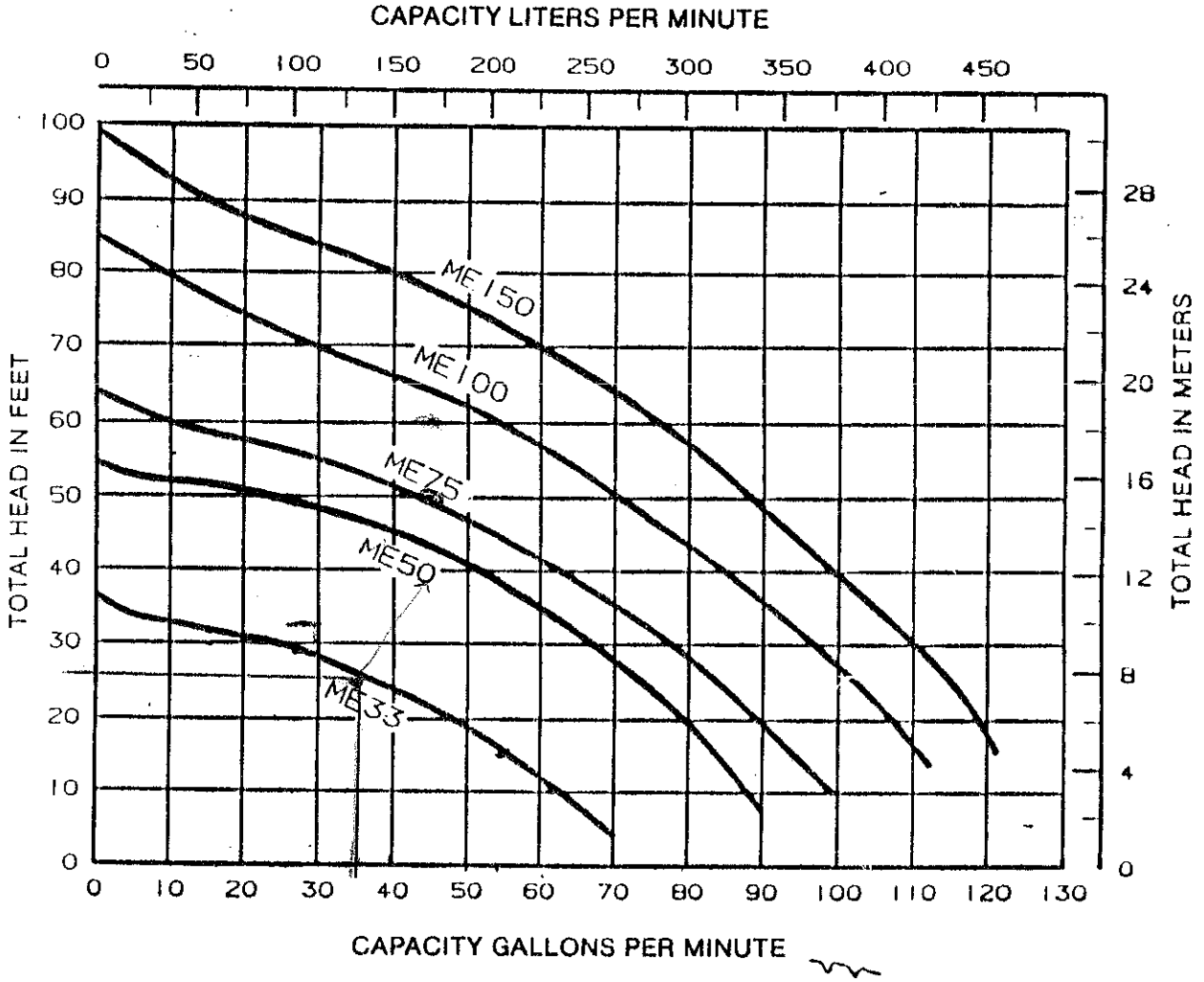
Lot 271 - Bluewing Road

Daily design flow:	240 gpd - 2 bedroom house
Septic tank size:	1000 gal (2 compartments)
Pumping tank size	1000 gal
Effluent loading rate:	0.1 gpd/ ft^2
Total length and diameter of supply manifold:	app. 200 lf of 2" sch 40 PVC
Number and length of laterals:	See Table
Hole size:	5/32", 3/16"
Hole spacing:	See table
Total number of holes	See table
Flow rate through the system	33.2 gpm
Elevation head:	13'
Pressure head:	2.0' - 3.1'
Friction head:	5.3'
20% over design:	4.3'
Total head:	25.7'
Pump requirements:	33.2 gpm at 25.7' of head; use Myers ME50 ½ hp pump or equivalent with compatible electrical
Dosing volume:	186 gal. - 1.3 doses/day at design flow
Depth of water pumped per dose:	calculated to specific tank by measure or dealer engineered specifications (1 cubic ft. of water equals 7.5 gal)
Pump run dose:	approx. 5.5 min.
Check valve:	No
Siphon break hole:	No

~ 5" Tether = 7.5"

ME Series
1/3 through 1-1/2 HP
Effluent Pumps
Performance Curve

Myers



F.E. Myers, A Pentair Company • 1101 Myers Parkway, Ashland, Ohio 44805-1923
419/289-1144 FAX 419/289-6658 Telex 98-7443

K3327 7/91

Printed in U.S.A.