

HARNETT COUNTY HEALTH DEPARTMENT  
ENVIRONMENTAL HEALTH SECTION  
APPLICATION FOR IMPROVEMENT PERMIT

\* Mail permit  
to Leray Ennis

DATE 4-14-92

NAME Hodges Chapel Church TELEPHONE NO. 892-3924 LERAY ENNIS

ADDRESS (current) Rt 7 Box 510 DUNN, N.C. 28334

PROPERTY OWNER Hodges Chapel Church

SUBDIVISION NAME \_\_\_\_\_ LOT NO. \_\_\_\_\_

PROPERTY ADDRESS RT 1 Benson, N.C. 27504 STATE ROAD NO. N.S. 1769 + 1707

DO YOU HAVE A LEGAL DEED TO THIS PROPERTY? YES yes NO \_\_\_\_\_

IF NO EXPLAIN \_\_\_\_\_

DIRECTIONS High way 27 From Coats To Benson, RT Stewarts Nursery,  
Turn Right on Hodges Chapel Rd. Approx 1 1/2 Miles on Right,  
in front of Bethesda Primitive Baptist Church S.R. 1709 + S.R. 1707

SIZE OF LOT OR TRACT 5 Acres

1. Type of dwelling Church Basement with plumbing \_\_\_\_\_
2. Number of Bedrooms \_\_\_\_\_ Garage \_\_\_\_\_
3. Dishwasher \_\_\_\_\_
4. Garbage Disposal \_\_\_\_\_ 300 seat capacity

WATER SUPPLY - PRIVATE WELL X COMMUNITY SYSTEM \_\_\_\_\_ COUNTY \_\_\_\_\_

Kitchen + Fellowship  
Hall  
Facility

A plot plan must be attached to this application showing: 1) Setting of dwelling, 2) Desired placement of septic tank system and 3) well placement.

#6309

Place stakes at the exact location of dwelling and at each corner of lot.

04/20/92

An on site inspection must be made, which consists of a soil evaluation.

Void.

A zoning permit must be obtained from the Planning Department before an improvement permit can be issued by this department.

New

Permit

#6500

08/10/92

This certifies that all the above information is correct to the best of my knowledge and any false information will result in the denial of permit. Once the permit is issued, the permit is good for a period of 5 years. The permit is subject to revocation if site plans or the intended use change.

Signature

Leray T. Ennis

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# SITE EVALUATION FORM

SPECIFY: S (suitable) P (provisionally) U (unsuitable)

FACTORS	AREA 1	AREA 2	AREA 3	AREA 4
TOPOGRAPHY				
SOIL TEXTURE				
SOIL STRUCTURE				
SOIL DEPTH				
RESTRICT HORIZON				
SOIL WETNESS				
OTHER				
SOIL GROUP				
SITE CLASSIFICATION				

LOT SIZE [                      ]                      LOADING RATE [                      ]

LIST RECOMMENDATIONS, REMARKS, AND ALTERNATIVES: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

DATE OF EVALUATION:     /     /                      BY: \_\_\_\_\_

1/90

\*\*\*\*\*

DRAW AREAS BELOW;



PRESSURE MANIFOLD DESIGN  
FOR GROUND ABSORPTION SEWAGE SYSTEMS

Steven J. Berkowitz  
February, 1986

RECEIVED  
MAY 10 1989  
PERMITS & ENGINEERING

RECEIVED  
MAR 15 1989

ENV. MANAGEMENT  
FAYETTEVILLE REG. OFFICE

Large subsurface wastewater systems are being used more frequently as alternatives to discharging systems for many public and private facilities.

Dosing effluent periodically and uniformly throughout the drain field improves absorption field performance and increases field longevity (Otis et al. 1977, Harget et al. 1982). Low-pressure distribution of effluent in small diameter, perforated laterals has become a popular design alternative for achieving uniform distribution. Over 2,000 low-pressure pipe systems are now in use at single-family homes in North Carolina. A comprehensive design and installation manual for residential low-pressure pipe systems is available (Cogger et al. 1982). Design criteria and a simplified design procedure have also been published (Otis 1982). Available information, however, does not adequately address some key design parameters for the more extensive low-pressure pipe networks being planned and installed in North Carolina.

Pressure distribution manifolds feeding conventional gravity drain lines is another alternative being used in North Carolina to improve the distribution of effluent in large subsurface fields. This method is applied where soil conditions are favorable for conventional trenches and where the length of drain pipe required and degree of field slope would make it difficult to achieve uniform distribution between laterals in a low-pressure pipe network. Design criteria for such systems have not been previously available.

This paper sets forth some critical design parameters for pressure manifolds and laterals in large conventional and low-pressure pipe ground absorption sewage systems. The justification for these design parameters is presented elsewhere (Berkowitz, 1985).

PRESSURE MANIFOLDS  
FOR CONVENTIONAL DRAIN FIELDS

The traditional approach to dividing effluent between conventional trenches is with a gravity distribution box. While relatively simple in concept and design, distribution boxes have proven to be generally ineffective in uniformly distributing effluent, especially when the number of trenches to be dosed is large (Mitchell, 1983).

Pressure manifolds can be designed to more effectively split flow between separate conventional trenches while still under pressure from the dosing tank. Schematics are presented below of pressure manifolds designed for level (Fig. 1) and sloping (Fig. 2) sites.

Pressure manifolds must be installed level, although some deviations may not seriously impair flow uniformity. Protective accessible boxes are recommended to be constructed around pressure manifolds installed above the drain field on sloping sites. Note that

The author is: Steven J. Berkowitz, Environmental Engineer, Sanitation Branch, N. C. Division of Health Services, Raleigh, NC 27602-2091.

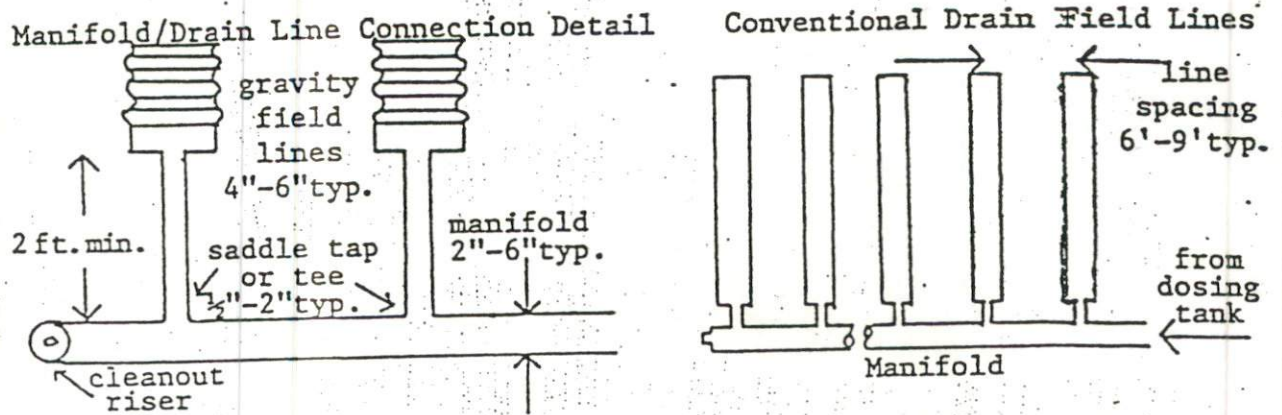


Fig. 1 Pressure Manifold For Level Site (1 ft. = .305 m)

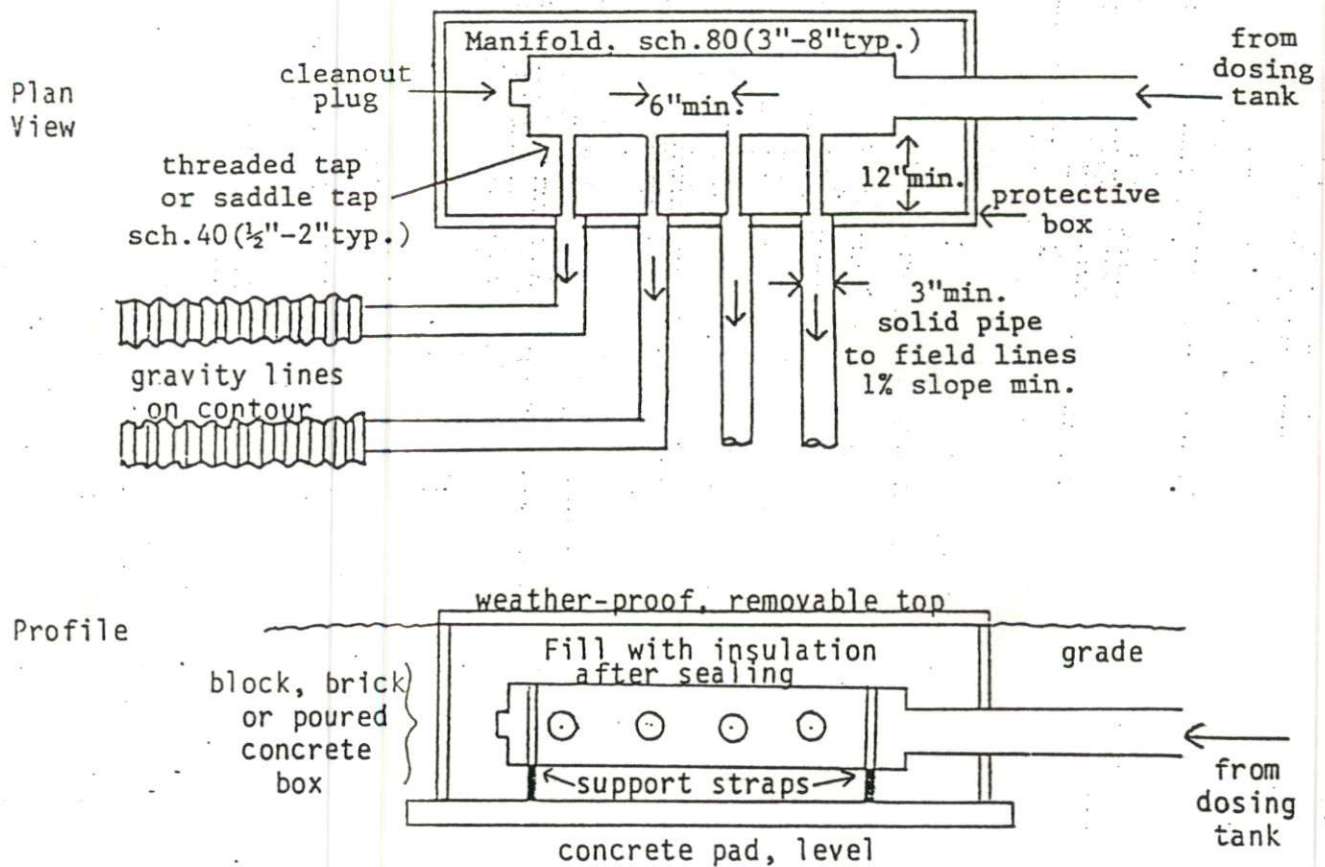


Fig. 2 Pressure Manifold For Sloping Sites



Precautions against freezing may be necessary in cold regions if the system is subject to extended periods of disuse unless provisions are made to drain out the manifolds, since they will normally remain about half-full between dosing cycles.

Design criteria for pressure distribution manifolds and laterals are presented in Table 1. Shown are the maximum number of taps by differently sized laterals which can be made out of manifolds of varying sizes, while maintaining no more than a five-percent difference between flow rates into each lateral. An important further assumption is that 1 to 4 feet of pressure head are available at the lateral outlets. Design criteria are presented both for manifolds with lateral taps in one side and for manifolds with lateral taps in adjacent sides.

Recommended design steps utilizing these criteria are as follows:

1. Select Drain Field Configuration: Determine the required field size, number of laterals to be dosed from each pressure manifold, and desired lateral and tap spacing.
2. Choose Lateral Tap Size: For pump dosed systems, pick the largest pressure tap that can be adequately pressurized by a reasonably sized pump. Use the orifice equation<sup>1</sup> to compute required flow per tap, assuming at least 2 feet of pressure head at each lateral opening. Taps less than one-half-inch nominal size are not recommended. For siphon-dosed systems, select a tap size large enough to handle the maximum siphon discharge rate with the head available between the siphon outlet and the pressure manifold, while still maintaining a sufficient pressure head at the minimum siphon discharge rate.
3. Select Manifold Size: Given the desired lateral tap size and spacing, select from Table 1 the minimum size of manifold from which at least the desired number of taps can be made while staying within the five-percent flow variation limit. Selecting the next larger sized manifold will yield an even greater degree of flow distribution uniformity.

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<sup>1</sup>Orifice equation:  $Q = 13 (d^2) (h^{\frac{1}{2}})$   
where Q = flow from orifice, gallons per minute  
d = diameter of orifice, inches  
h = pressure head, feet

Example: Required flow per orifice assuming 2 feet of head and Schedule 40 PVC tap: ½-inch tap-- 7.1 GPM; ¾-inch tap-- 12 GPM; 1-inch tap-- 20 GPM

Table 1: Pressure Distribution Manifolds for Conventional Septic Systems; Manifold and Lateral Tap Size Criteria<sup>a</sup>

p Separation Distance (Feet)	Manifold Size (Inches)	Lateral Taps out of One Side of Manifold						Lateral Taps out of Both Sides of Manifold					
		Lateral Tap Size (inches)						Lateral Tap Size (inches)					
		1/2	3/4	1	1 1/4	1 1/2	2	1/2	3/4	1	1 1/4	1 1/2	2
		Maximum Number of Taps						Maximum Number of Tap Pairs					
0.5 <sup>b</sup>	2	4	2					2					
	3	9	5	3	2			4	2				
	→ 4	16	9 ←	5	3	2		7	4	2			
	6	40+	21	12	7	5	3	18	10	6	3	1	
	8		38	22	12	9	5		17	10	6	4	
3.0 <sup>c</sup>	2	8	2					2					
	3	14	12	3	2			6	2				
	4	21	18	6	3	2		16	5	3			
	6	38	30	26	8	5	3	20+	19	7	3	2	
6.0 <sup>c</sup>	2	5	4					4					
	3	9	7	6	2			7	3	2			
	4	14	11	9	4	2		10	9	3			
	6	27	20	17	14	7	3	19	15	13	4	3	
9.0 <sup>c</sup>	2	4	3	3				3					
	3	7	6	5	2			6	5	2			
	4	12	9	7	6	3		8	7	6	2		
	6	22	16	13	11	10	4	15	12	10	5	3	

<sup>a</sup> Assumptions: 1 to 4 feet (.3 to 1.2 meters) head at lateral outlets; 5% maximum flow differential maintained between laterals; Hazen-Williams "C" factor of 140; taps are of Schedule 40 PVC and manifolds are of Schedule 40 PVC, with the following actual inside diameters:

	1/2	3/4	1	1 1/4	1 1/2	2	3	4	6
Taps	.622(19)	.824(25)	1.049(32)	1.38(42)	1.61(49)	2.067(63)	2.393(59)	2.90(88)	3.826(117)
Manifolds									5.761(176)
									7.62

<sup>b</sup> Use for pressure manifold distribution box designed for sloping lots, located above highest field line.

<sup>c</sup> Use for pressure manifold on flat lots, located adjacent to end of each field line.



PRESSURE MANIFOLDS  
FOR LOW-PRESSURE PIPE DRAIN FIELDS

Low-pressure systems involve distributing effluent throughout the nitrification field within a pressurized manifold and small diameter lateral network. Effluent enters the nitrification trenches from orifices drilled into the distribution laterals (Fig. 3).

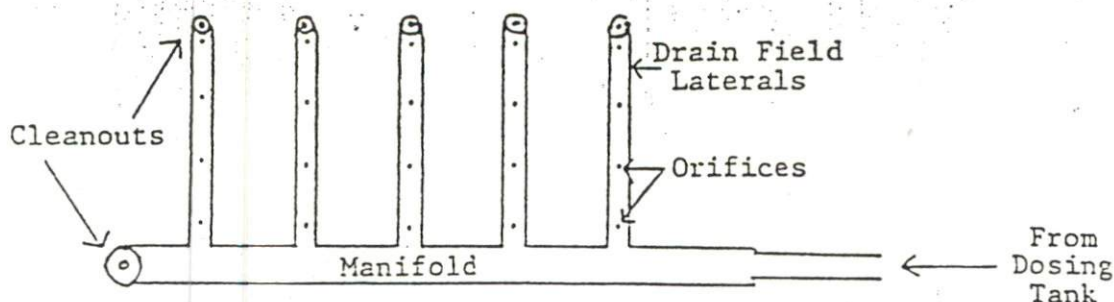


Fig. 3 Low-Pressure Pipe Drain Field

Pressure is generally maintained between 2 and 5 feet in the laterals to facilitate uniform distribution while minimizing scour outside of the orifices.

Critical design parameters for laterals are pipe diameter, lateral length, orifice size, and orifice spacing. In most low-pressure pipe applications in North Carolina, orifices range from 1/8-inch to 1/4-inch, with 5/32-inch orifices now recommended as the minimum size to use. Curves were developed which relate maximum lateral length to pipe diameter, orifice size, and spacing, based on yielding no more than a ten-percent difference between flow rates from each orifice (Fig. 4).

Critical design decisions for low-pressure system manifolds involve selecting the manifold diameter needed relative to the diameter of the laterals served and determining the maximum number of laterals which can be fed off a common supply manifold. Manifold design criteria are presented for the condition that the nitrification field is level and the manifold and laterals are on the same level (e.g.; laterals tee directly off from the manifold). Lateral spacing is assumed to be 5 feet, the most frequently used spacing for low-pressure pipe systems in North Carolina. Results are presented in Fig. 5 showing the maximum number of laterals of different sizes which can be supplied by a common manifold at varying mean lateral flow rates, while maintaining no more than 15-percent difference between flow rates into each lateral.

Results shown in Fig. 5 indicate that relatively few laterals can be served by small manifolds. It is uncertain, however, whether these criteria can be considered directly transferable to the more popular design whereby laterals are above the manifold, connected by short risers which tee off of the manifold and are elbowed or teed into each lateral. Under these conditions, more laterals than shown in Fig. 5 may in fact be fed by a common manifold while still maintaining relatively uniform flow distribution. Further research in this area is needed.

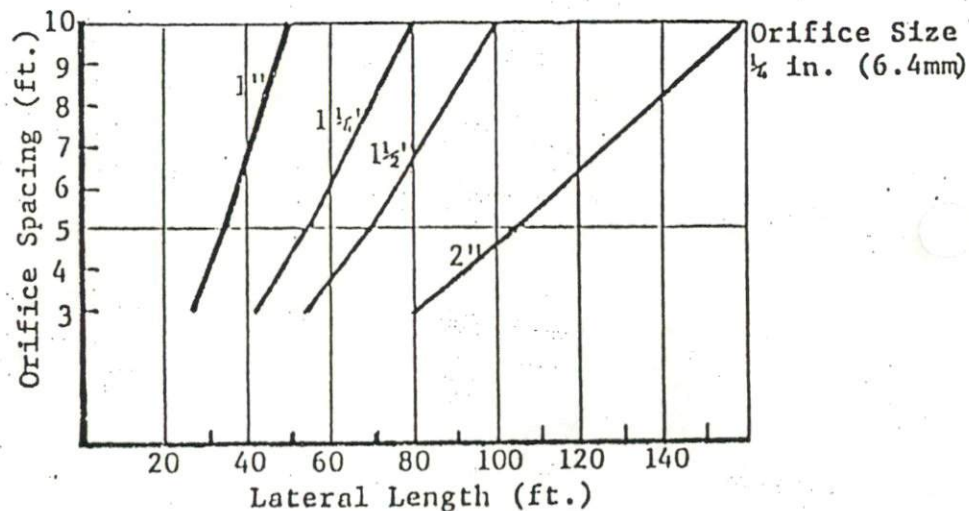
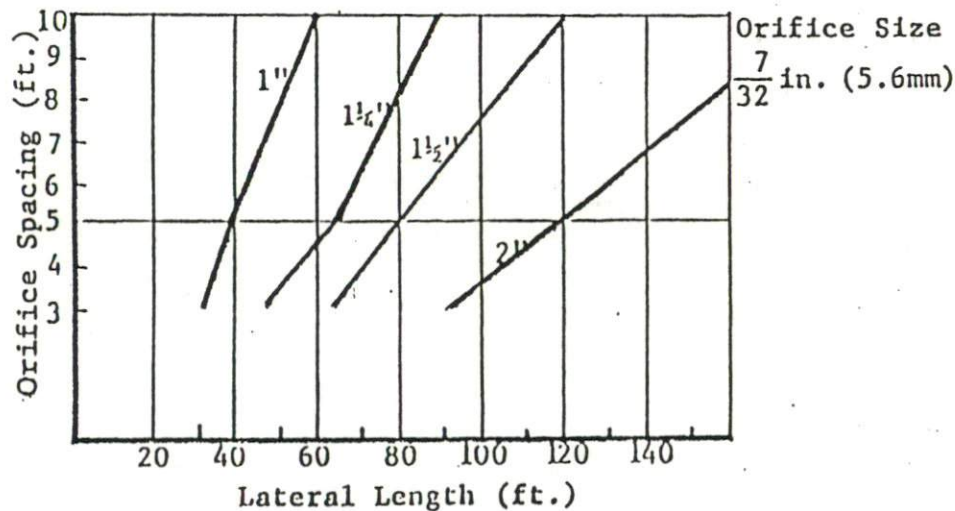
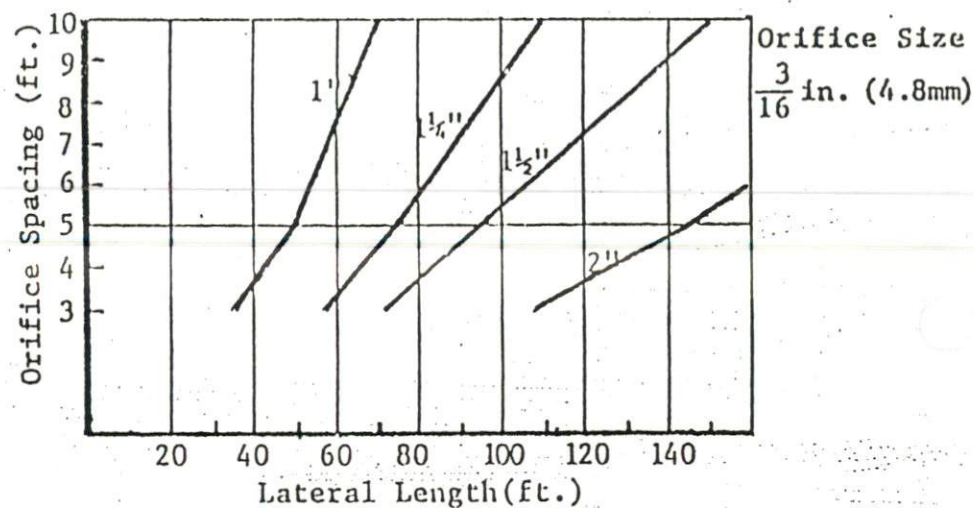
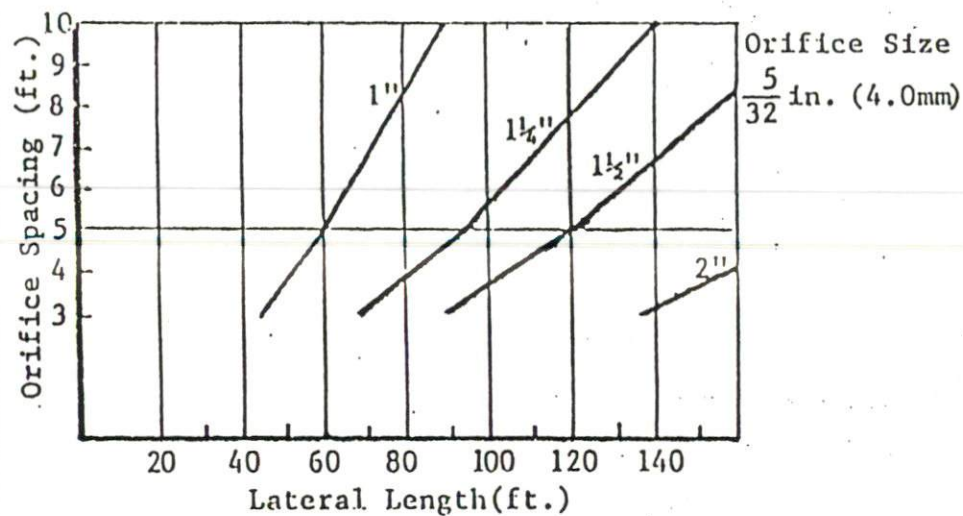


Fig. 4 Maximum Length of Different Sized Laterals For Low-Pressure Pipe Systems With Varying Orifice Sizes and Spacings (1 ft. = .305 m)



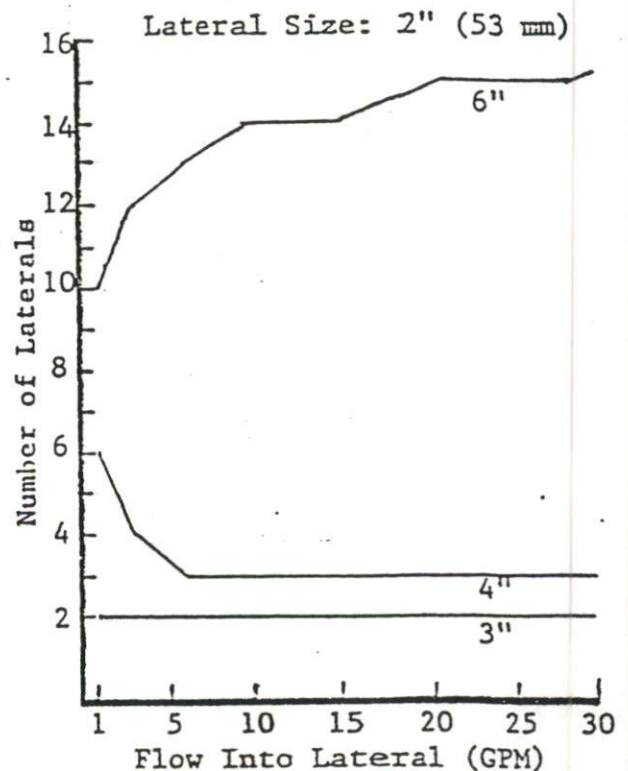
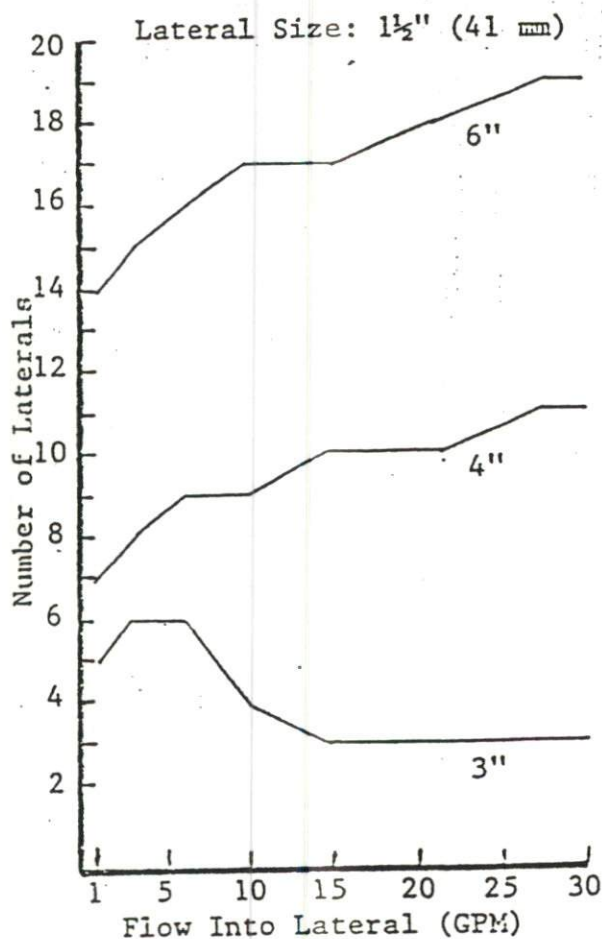
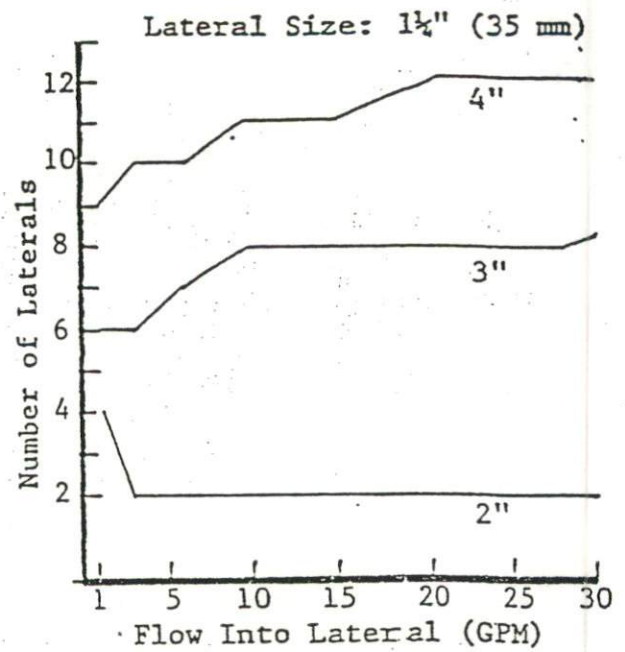
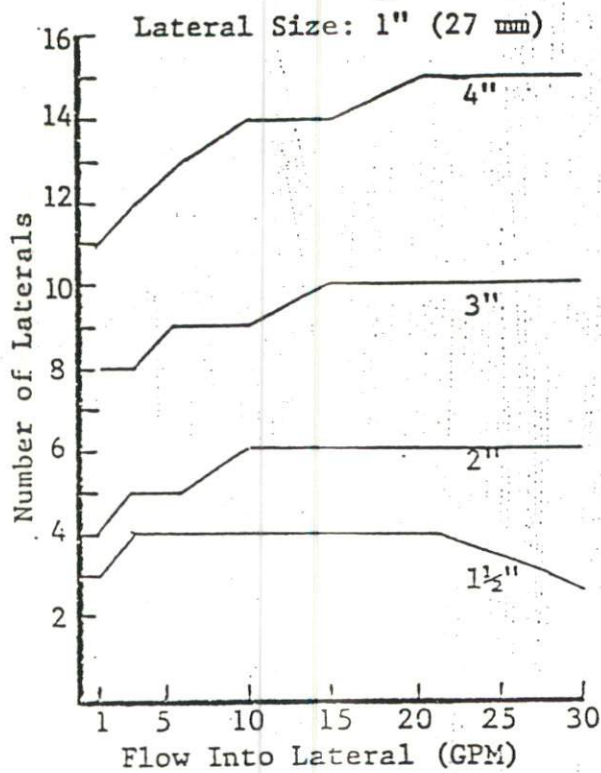


Fig. 5 Maximum Number of Different Sized Laterals For Low-Pressure Pipe Systems With Varying Sizes of Manifolds and Varying Rates of Flow Into Lateral (1 GPM = .0631 l/sec)

Recommended design steps using these criteria are as follows:

1. Select Drain Field Configuration: Determine the desired field size configuration, lengths of laterals, and location of supply manifolds.
2. Choose Orifice Size and Spacing: For pump dosed systems, select the largest orifice size and shortest orifice spacing resulting in a total number of orifices which can be adequately pressurized by a reasonably sized pump. Use the orifice equation to compute required flow per orifice, assuming at least 2 feet of pressure head at each orifice. Taps less than 5/32-inch and spacings greater than 10 feet are not recommended. For siphon-dosed systems, select an orifice size and spacing so that there are enough orifices of sufficient size to handle the maximum siphon discharge rate with the head available between the siphon outlet and the drain field, while still maintaining a sufficient pressure head at the minimum siphon discharge rate.
3. Choose Lateral Diameter: Given the desired lateral length and orifice size and spacing, select from Fig. 4 the minimum size of lateral from which at least the desired size and spacing of orifices can be used while staying within the 10-percent flow variation limit.
4. Select Manifold Size: Given the desired lateral size and lateral design flow rate, select from Fig. 5 the minimum size of manifold from which at least the desired number of laterals can be dosed while staying within the 15-percent flow variation limit.
5. Optimize Design: Repeat steps 1 through 4 above until a practical, workable manifold and lateral network design is obtained.

#### REFERENCES

1. Berkowitz, S. J. 1985. Pressure manifold design for large subsurface ground absorption sewage systems. In: On-Site Wastewater Treatment: Proceedings of the fourth national symposium on individual and small community sewage systems. Dec. 10 - 11, 1984. New Orleans. American Society of Agricultural Engineers.
2. Cogger, C., B. L. Carlile, D. Osborne and E. Holland. 1982. Design and installation of low-pressure pipe waste treatment systems. UNC Sea Grant College Pub. UNC-SG-82-03. 31p.
3. Mitchell, D. 1983. Nonuniform distribution by septic tank systems. 1982 southeastern on-site sewage treatment conference. N. C. Div. of Health Services, Raleigh, NC 37-45.
4. Otis, R. J. 1982. Pressure distribution design for septic tank systems. Jour. of the Env. Eng. Div., ASCE 108(1): 123-140.
5. Otis, R. J., J. C. Converse, B. L. Carlile and J. E. Witty. 1977. Effluent distribution. Home Sewage Treatment. ASAE Pub. 5-77. St. Joseph, Mich. 61-85.





# PRESSURE MANIFOLD DESIGN SUMMARY

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PROJECT : Hodges Chapel Church  
COUNTY : Harnett  
REFERENCE NO. : 6500

DESIGN FLOW : 1500 GPD  
APPLICATION RATE : 0.40 GPD/SQFT  
TOTAL AREA TRENCH BOTTOM REQUIRED : 3750 SQFT  
TOTAL LATERAL LENGTH REQUIRED : 1250 LFT  
TOTAL LATERAL LENGTH SPECIFIED : 1280 LFT  
NUMBER OF FIELDS : 1  
LATERAL LENGTH REQUIRED PER FIELD : 1250 LFT

FIELD NO.	NO. OF LATERALS	LATERAL LENGTH	TOTAL PER FIELD
1	8	160	1280

FIELD NO.	NOMINAL TAP SIZE	ACTUAL TAP SIZE	TAP MATERIAL	PRESSURE HEAD	TAP FLOW	TAP NO.	FIELD FLOW
1	3/4	0.742	SCHED. 80	2	10.12	8	80.98

FIELD NO.	SUPPLY LINE LENGTH	TOTAL DYNAMIC HEAD	MANIFOLD SIZE
1	100	10.7	4 INCHES

DOSING VOLUME : 502 GALLONS  
PUMP TANK INSIDE LENGTH : 8.00 FEET  
PUMP TANK INSIDE WIDTH : 5.00 FEET  
PUMP TANK DRAWDOWN : 1.68 FEET



Scale 1" = 60'

# County of Harnett

## DEPARTMENT OF PLANNING ZONING PERMIT

Date 14 April 92

Owner HODGES CHAPEL P. F. W. B. CHURCH. (LEROY T. ENNIS)  
Address: RT 7 Box 510 Dunn NC 28334  
Zoning District: RA-30  
Use Classification: CHURCH.  
Permit Number: No 1958

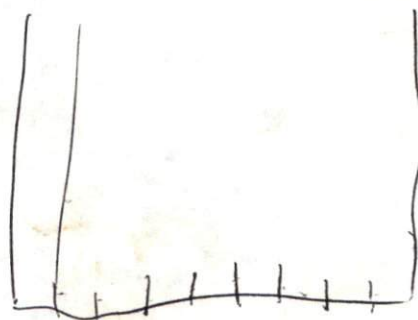
Provided the person accepting this permit shall in every respect conform to the terms of the application on file in the Zoning Administrator's office and to the provisions of the Statutes and Ordinances regulating development in Harnett County. Any VIOLATION of the terms above stated immediately REVOKES this PERMIT.

NOTICE: This structure is not to be occupied until a CERTIFICATE OF OCCUPANCY is issued by the Building Official.

PERMIT EXPIRES SIX MONTHS FROM DATE OF ISSUANCE.

**PLANNING DEPARTMENT**  
**893-7525**





ob

Hodges Chapel New Church Site  
550'

1 Road N.C.S.R. 1709 60' R/W

285'

11 SPACES

Loz  
Bushes

Neighbors Road N.C.S.R. 1707° 69' R/w

400.

5 CAR  
4 PORT  
25'

56 Septic Tank  
+ Sewer lines  
36+

10' wide  
Buffer Strip

Trees - 40' Apart

335'

Scale  $1'' = 60'$

1-APRIL-1992