

9106 WINDYGAP RD

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Groundwater and Wastewater Services File Imaging Project
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RESIDENTIAL LOW PRESSURE T & J PANEL SEPTIC SYSTEM FOR SUBSURFACE WASTEWATER DISPOSAL 4.24 ACRE WINDY GAP ROAD TRACT LAKE WYLIE

MCHD FILE 53738

Prepared for:
Mr. Ed Easter
Crescent Resources, Inc.
P.O. Box 1003
Charlotte, North Carolina 28201

Prepared by:
Toney C. Jacobs & Associates, Inc.
168 Broadbill Drive
Mooresville, North Carolina 28117
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September 22, 2003

Copy: Mr. David Cornelius, R.S.
MCHD-IWWS
700 N. Tyron Street
Charlotte, NC 28202

Paul G. Penninger, LSS

BACKGROUND

The 4.24 acre tract is located on the north side of Windy Gap Road on Lake Wylie, in Mecklenburg County. CMUD is currently building a sewer pumping station directly across the road from this tract. CMUD is also working with the current owner, Crescent Resources, Inc., to secure an easement for an 8-inch gravity sewer line to run across the tract (see attached map). As of 9-19-03 the easements had not been recorded, but we assume they will be in the future. The attached septic plan places both the house and septic system drainfield out of the proposed sewer easement. Crescent has restricted that the property can only be subdivided into two lots. If another lot is created, we assume the proposed septic system will be abandoned and both lots will hook onto the proposed 8 inch gravity sewer line.

Crescent currently has the tract under contract and a condition of that contract is that the tract is suitable for a 4-bedroom septic system. The buyer wishes to build a house on the tract and wants to begin construction before the sewer line will be installed. Toney C. Jacobs and Associates has been working with Crescent to obtain a 4-bedroom septic Improvement Permit for this tract. The soils on the lot were evaluated by Mr. Bill Marlin of the Mecklenburg County Health Department (MCHD) and Toney C. Jacobs and Associates on September 19, 2003. Mr. Marlin classified the three auger borings described as provisionally suitable at a 0.3 gpd/ft^2 LTAR. The auger borings were adjacent Windy Gap Road, and upslope of the proposed sewer easement.

Toney C. Jacobs and Associates, Inc. flagged the proposed system on September 22, 2003. Due to the limited available space on the lot after the proposed sewer easement is drawn on the site plan, a T & J panel block septic system was considered the best system option for the lot. We are recommending a pressure T & J panel block system with 268 ft. of line for the primary system and the required 100% repair. The proposed system will be a Type IV and require a maintenance contract with a certified operator. As stated previously, each line of the proposed system is flagged in the field, as shown on the attached site plan.

APPLICATION INFORMATION

1. Owner: Crescent Resources, Inc.
   P.O. Box 1003
   Charlotte, NC 28201

   Soil Scientists
   and Designers: Mr. Paul Penninger, LSS
   Toney C. Jacobs & Associates, Inc.
   168 Broadbill Drive
   Mooresville, NC 28117
   (704) 663-6905 (Office)
   (704) 662-9845 (fax)
   E-mail jacobs@i-america.net

2. Water supply is to be provided by a proposed private well.
3. Facility to be served by the proposed system is a 4-bedroom single family residence.

LOCATION

The property is located north of Windy Gap Road, across from the CMUD pump station currently under construction.

REFERENCES

Design and Installation of Low Pressure Pipe Waste Treatment Systems by: Craig Cogger, Bobby L. Carlile, Dennis Osborne, Ed Holland; published by UNC Sea Grant College Pub. UNC-SC-82-03, May 1982.

Law and Rules for Sewage Treatment and Disposal Systems, 15A NCAC 18A, Section .1900, Department of Environment Health and Natural Resources, August 1, 1998.

T & J Design Manual.

PLANS AND SPECIFICATIONS FOR SPECIFIC SYSTEM COMPONENTS

Septic Tank

1. The septic tank receives wastewater directly from the house.
2. A septic tank shall be watertight, structurally sound, and not subject to excessive corrosion or decay.
3. The septic tank must be of two-compartment design for maximum solids retention. The inlet compartment of two-compartment tank shall hold between two-thirds and three-fourths of the total tank capacity.
4. Effluent from the two-compartment septic tank flows by gravity through a State approved effluent filter and a four-inch solid PVC pipe to the pumping tank.
5. Both the septic tank and pumping tank must be provided with above ground approved manhole risers to provide easy access for clean-out and pump service.

6. When prefabricated concrete tanks or tanks of other material are used, they shall be constructed in accordance with the plans which have been approved by the State and shall comply with all requirements of Section .1953 of 15A NCAC 18A.
7. On the outlet tee of the septic tank an effluent filter must be installed. This filter should be equivalent to a Zabel Model A1800 or other State approved unit supplied by the tank manufacturer.

Pumping Tank

1. The pumping tank shall have an access manhole extending at least 6 inches above finished grade.
2. A septic tank effluent pump that will not be corroded by sewage shall be used in the pumping tank.
3. The pump must be placed on two concrete blocks set next to each other on the bottom of the tank. This prevents the pumping of any solid particles that can clog the system.
4. 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.
5. The lower level control or "pump-off" must be positioned above the pump, so that the pump remains submerged at all time.
6. The pump outlet pipe should be connected to the supply manifold with a threaded PVC union to allow quick removal.
7. Pump and Simplex control circuits shall be provided with manual circuit disconnects within a watertight, corrosion-resistant, outside enclosure (NEMA 4X or equivalent) adjacent to the pump tank, securely mounted at least 12 inches above finished grade. Pump control (Simplex) may be mounted on side of house if long cord pump is used. The pump shall be manually operable without requiring the use of special tools or entrance into the tank for testing purposes. Conductors shall be conveyed to the disconnect enclosure through water proof, gas proof, and corrosion-resistant conduits, with no splices or junction boxes provided inside the tank. Wire grips, duct seal or other suitable material shall be used to seal around wire and wire conduit openings inside the pump tank and disconnect enclosure. There shall be two electric circuits for controls: one for pump power, one for the alarm. These will require 2 circuit breakers.
8. The pump tank shall have a properly functioning high-water alarm. The alarm circuit shall be supplied ahead of any pump overload and short circuit protective devices. It should be on a separate electrical circuit from the pump power line. The alarm shall be audible and visible by system users and included in the pump and control enclosure (Simplex Panel). The alarm is activated if the water level in the pump tank rises above the "pump-on" float control. The tank provides at least one day or more of excess storage capacity (depending on water use in the home) during which time the system must be repaired.
9. Float switch for the high water alarm shall be set no more than 3 inches above the high water level of pump cycle.
10. Float switch tie downs to be made of corrosion resistant material, no tape or metal hose clamps. For maintenance flexibility, tree must be used to set floats.
11. Watertight testing per .1900 rules shall be required on two piece pump tanks.
12. Wiring between the pumping tank and the house should meet State and local code

requirements.

Pipe and Fittings

1. All pipes and fitting should be made of SCH 40 PVC.
2. All joints must be sealed with appropriate PVC-solvent cement.
3. There should be a threaded PVC union above the pump to allow easy removal or replacement.
4. A gate valve for final pressure adjustment is installed in the supply line inside the pumping tank.
5. Manifold and valve as shown in specifications.
6. Lateral lines are made of 1 1/4 inch SCH 40 PVC placed in T & J panels. Holes in laterals are drilled on-site.
7. The end of each lateral is equipped with a capped "turn-up" that provides above ground access for clean-out or back flushing of the laterals. Using (2) 45-degree elbows rather than a 90-degree elbow for the turn-ups will make clean-out easier.

CONSTRUCTION INSTALLATION

Site Preparation

1. One of the most important concerns for an on-site system is to protect the site from soil disturbance by heavy equipment.
2. Now that the absorption area has been designed and flagged, it should be roped off and protected from construction traffic. No site preparation or construction work should occur if the soil is wet.
3. The site is relatively clear of brush and small trees. Minimum site disturbance should be necessary. **Do Not Grade!**
4. Provisions must be made for intercepting or diverting surface water away from the absorption area.

Tank Installation

1. The two-compartment septic tank is installed.
2. The pumping tank is installed next to the septic tank.
3. The tanks are connected with an appropriate length of solid, four-inch PVC pipe.

Supply Manifold

1. The supply manifold conveys effluent from the pump to the distribution laterals.
2. Design of the manifold is shown on attached diagrams.
3. After the supply manifold has been placed in its trench and lateral lines connected, it should be backfilled with tightly tamped soil. The supply manifold trench must not be backfilled with gravel, or the trench may become a conduit for downslope flow effluent from the laterals.

T & J Lateral Lines

1. Install T & J Panels per cited reference material and this plan.
2. Trenches shall be 24" wide, and 8' minimum on center. Trenches shall be "level" from end to end.
3. There should be one 5/32 inch hole near the center of each panel, pointed up. (Note this system uses four valves; one on each lateral.)
4. A short turn-up with a capped end is at the end of each lateral. The capped end must be brought up above or flush with the final grade. Using two 45-degree elbows for constructing cleanouts is recommended. A larger diameter sleeve with cap or approved box with lid shall be placed over the turn-up.

PROPER OPERATION CHECK AND PRESSURE HEAD ADJUSTMENT

1. After all connections have been installed and connected, the system should be checked for proper operation. With electrical power turned off, fill the pump tank with a garden hose until the liquid rises to the level of the high-water alarm float.
2. Turn on the electrical power. The alarm light should go off when the liquid level falls below the high-water float. The pump should turn off when the liquid reaches the lowest float control. Be sure the pump is still completely submerged.
3. The pressure head is measured as the height liquid will rise above the turned-up elbow when the pump is running. To set or check the pressure head:

    - Glue a three-foot length of pipe (preferable clear) to a threaded adapter that will screw onto the turn-ups at the end of each lateral.
    - Replace each turn-up cap with the pipe and adapter.
    - Turn the power on to allow liquid to rise in the pipe.
    - Adjust the gate valves until the effluent reaches the desired height in the pipe. Remember to include the distance below the ground surface to the lateral line when measuring the height.

FINAL LANDSCAPING

1. After the system is installed, the following should be checked to ensure that the system will not be overloaded with excess rainwater and runoff:
    - The distribution field is shaped to shed rainwater and is free of low areas.
    - Grassy swales or ditches for diverting surface water are properly installed.
    - Gutter and downspout drains are directed away from the system.

2. Finally, the entire area should be planted with grass in order to prevent erosion. The soil should be properly tilled, limed (if necessary) and fertilized before planting. After applying an appropriate grass seed, the area should be heavily mulched with straw or other suitable material.

QUALITY ASSURANCE REQUIREMENTS

The system must be installed by a qualified, contractor that is on the Mecklenburg County list of competent contractors. Critical stages of the installation, which should be checked, are:

1. System layout
2. Septic and pump tank installation prior to backfilling.
3. Manifold and lateral installation prior to backfilling.
4. Final landscaping, operation and pressure head check.

The system design is based on a maximum waste flow of 480 gallons per day. Homeowners should pay particular attention to the section titled Homeowner Suggestions for ways to minimize the burden on the system.

OPERATION AND MAINTENANCE PROCEDURE

The system is classified as **Type IV and DOES require a maintenance contract** with a certified operator. The contract shall be executed between the system owner and a management entity prior to the issuance of an Operation Permit. The contract shall include the specific requirements for maintenance and operation, responsibilities of the owner and system operator, and provisions that the contract shall be in effect for as long as the system in in use.

Operating, Maintenance and Inspection procedures shall include, but not be limited to the following:

Minimum inspection/maintenance frequency shall be 2 times per year, with reporting frequency every 6 months to the local health department.

Septic system shall be pumped every 4 years or when solids accumulate to 1/3 the volume of the tank.

At 6 month intervals, inspect the effluent filter. When washing the filter, debris must be sprayed directly back into the septic tank and not onto the lawn.

All laterals shall be checked and if necessary, flushed annually with clean water.

Pressure head for laterals should be checked and adjusted one month after installation and semi-annually thereafter.

All piping and fittings shall be checked annually for damage and/or proper operation and corrections made immediately.

The property should be inspected to insure all surface water is diverted away from the fields and tank. Any ponding of surface water should be corrected.

Grasses shall be mowed and maintained and any erosion shall be corrected promptly.

The nitrification field area shall be checked for leakages, blowouts or malfunction, indications of damp or mushy areas compared to surrounding area or evidence of noticeable odor of sewage. Repairs shall be made immediately.
The pump electrical should be checked to insure tight, clean connections with no corrosion and proper operation.
Pump switches shall be checked for free operation and proper level set.
Pump draw down depth and delivery rate shall be checked each year.
Check septic tank and pump tank for evidence of damage or leakage. Check the quality of effluent including grease and sludge accumulation.

The system operator, in conjunction with the local Health Department shall establish an operation and maintenance program and procedure based on experience obtained from similar installations.

HOMEOWNER SUGGESTION

Most systems do not require much effort to operate and maintain. Even though the effort is small, the system must be maintained properly so that it operates reliably and at a minimum cost. Following are suggestions for the homeowner to minimize the burden on the septic system.

1. Garbage disposals should not be used in on-site systems. The ground garbage adds large amounts of solids to a septic tank, causing sludge to build up at a quicker rate than without. If disposal is installed, use should be limited.
2. Grease, cooking oils and coffee grounds should never be put into a septic tank.
3. Items such as disposable diapers, cigarettes, facial tissues and other solid or paper wastes should not be flushed into the on-site system.
4. Used motor oil and other such oily liquids should not be put into a septic tank.
5. Using less water can reduce the amount of water flowing to the treatment and disposal field.
6. Water-saving fixtures and devices can be installed on sinks, toilets and showers to reduce the rate at which the water flows from the fixture.
7. Dishwashers and washing machines should only be run with full loads.
8. Leaky faucets and toilets can add large volumes of water to the daily flow of water into the on-site system. Repair the leaks to save water and give the treatment and disposal field a rest.
9. Roof drains, basement sump pumps, foundation drains, and other such drains should not empty into or onto the surface above the on-site system. These drains should be directed to another part of the lot away from the treatment and disposal field.

DESIGN SPECIFICATIONS (4.24 Acre Crescent-Windy Gap Road Tract)

Daily design flow:	480 gpd.
Septic tank size:	1500 gal. (2 compartments)
Pumping tank size:	1000 gal.
Effluent loading rate:	0.3 gpd/ft^2
Total length and diameter of supply pipe:	approx. 330 ft. 2" SCH 40 PVC)
Number and length of laterals:	4@ 67 ft., end fed (1¼ SCH 40 PVC in T & J Panels)
Hole size:	5/32"
Hole spacing:	1 per panel
Total number of holes:	60 (one in each T & J Panel near the center with the hole turned up) (15 panels per 67' line)
Flow rate through the system:	30 gpm
Elevation head:	*Approx. 24'
Pressure head:	3.0'
Friction head:	6.4'
20% contingency	6.7'
Total head:	40.1'
Pump requirements:	30 gpm at 41' of head; use Goulds WE 07H pump or equivalent with compatible electrical
Dosing volume:	216 gal. – 2.2 doses/day at design flow**
Depth of water pumped per dose:	calculated to specific tank by measure or dealer engineering specifications (1 cubic ft. of water equals 7.48 gal.)
Pump run per dose:	approx. 7.2 min
Check valve:	Yes
Siphon break hole:	No

*must be verified by installer before installing pump

** Before placement of cap block, one panel on each line near the center of the field should be observed filling to make certain that it does not overflow top chamber into air chambers of panel. If overflow occurs, reduce floats by 25 gallons and reset until no overflow is observed.

List of Attachments

1. Site plan
2. Record map
3. Preliminary proposed CMUD 8" gravity sewer easement
4. Tank Detail
5. Panel trench detail
6. Central Valve box detail
7. Pump Curve
8. T & J Panel Manufacturers Booklets

S38°25'58"E	12.87'
S03°00'30"E	36.87'
S28°45'20"E	21.52'
S50°48'14"E	28.68'
N88°42'55"E	84.62'
	111.76'

1" = 50'

LAKE WYLIE

#5 REBAR (F)

L20

IPS

L30

IPS

L35

SEPTIC AND PUMP tank

L15

#5 REBAR (F)

2" SCH 40 PVC

AREA

4.24 ACRES

Potential well site

40'x60'

DRIVE

L10

IPS

Proposed CMUD-TCE EASEMENT BOUNDARY (SEE ATTACHED MAP)

4 lines @ 67' : T&S Tanks & 1½" SCH 40 PVC Laterals

Central valve box (see detail)

50' Streams

67W

67C

AC

14½ Bermuda

100% Bermuda

IPS

IPS

C2

IPS

S74°55'00"W

156.75'

C1

IPS — IPS

Additional Return

S58°17'00"W

36.27'

Turn-ups

IPS

(60' PUBLIC R/

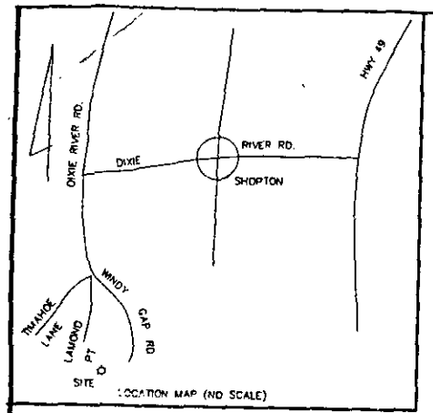
WINDYGAP ROAD

1. SITE PLAN

NOTES:

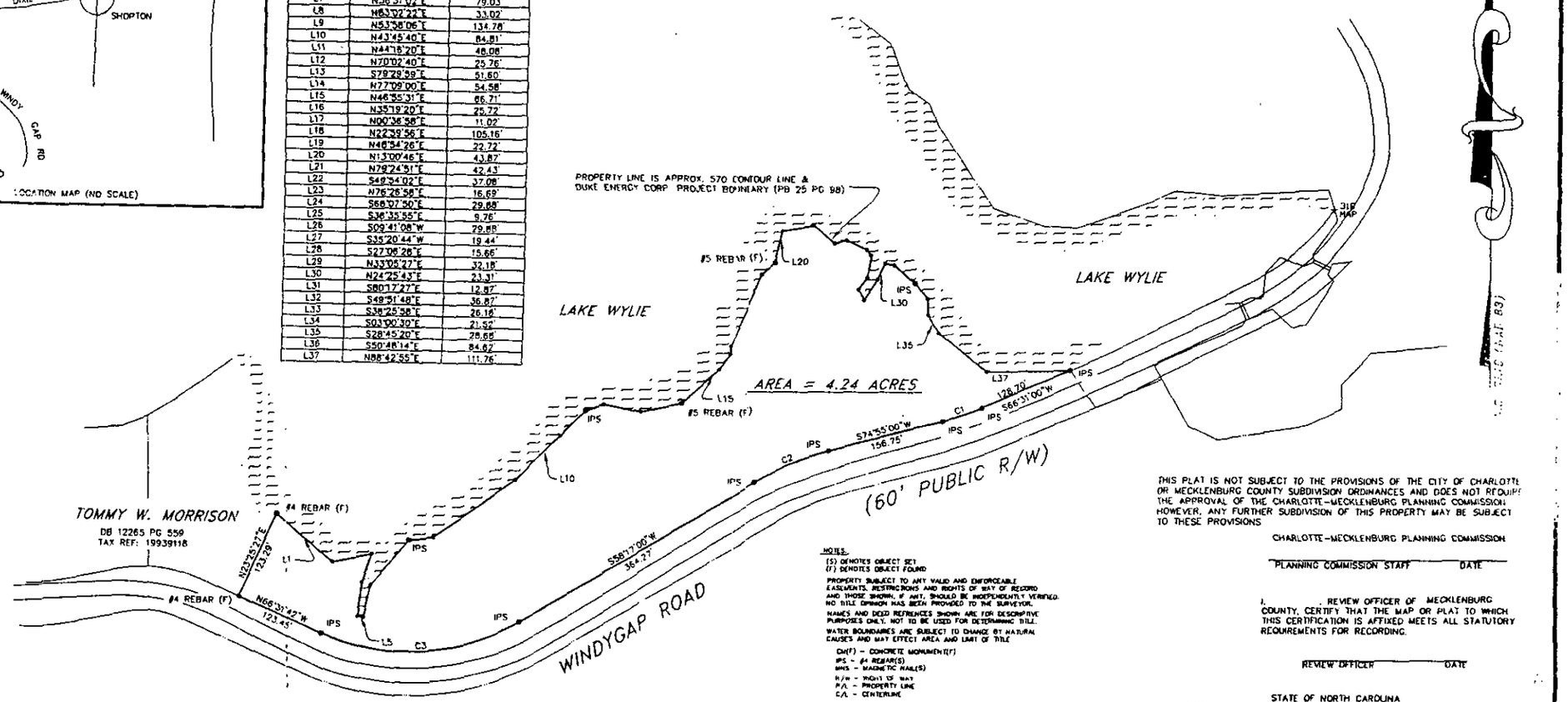
(S) DENOTES OBJECT SET
(F) DENOTES OBJECT FOUND

PROPERTY SUBJECT TO ANY VALID AND E
EASEMENTS, RESTRICTIONS AND
AND THOSE SHOWN IF
NO TITLE OP



LOCATION MAP (NO SCALE)

LINE TABLE		
LINE	BEARING	DISTANCE
L1	S50°39'01"E	101.09'
L2	N77°49'27"E	53.83'
L3	S17°43'50"W	41.13'
L4	S06°24'01"W	46.57'
L5	S76°32'49"E	8.00'
L6	N11°22'23"E	45.44'
L7	N38°31'02"E	79.03'
L8	N63°02'22"E	33.02'
L9	N53°58'06"E	134.78'
L10	N43°45'40"E	84.81'
L11	N44°18'20"E	48.08'
L12	N70°02'40"E	25.76'
L13	S79°28'59"E	51.60'
L14	N77°09'00"E	54.58'
L15	N46°55'31"E	66.71'
L16	N35°19'20"E	25.72'
L17	N00°36'58"E	11.02'
L18	N22°39'56"E	105.16'
L19	N46°54'26"E	22.72'
L20	N13°00'46"E	43.87'
L21	N79°24'51"E	42.43'
L22	S48°34'02"E	37.08'
L23	N76°26'58"E	16.69'
L24	S68°07'30"E	29.68'
L25	S36°35'55"E	9.76'
L26	S09°41'08"W	29.88'
L27	S35°20'44"W	19.44'
L28	S27°06'26"E	15.66'
L29	N33°05'27"E	32.18'
L30	N24°25'43"E	23.31'
L31	S80°17'27"E	12.97'
L32	S49°31'48"E	36.87'
L33	S38°25'58"E	26.16'
L34	S03°00'30"E	21.52'
L35	S28°45'20"E	28.66'
L36	S50°48'14"E	84.62'
L37	N88°42'55"E	111.76'



CURVE TABLE				
CURVE	RADIUS	ARC LENGTH	CHORD LENGTH	CHORD BEARING
C1	376.20'	55.47'	55.42'	S70°43'00"W
C2	372.36'	108.10'	107.72'	S66°36'00"W
C3	287.29'	276.49'	265.95'	S85°30'51"W

NOTES:
(S) DENOTES OBJECT SET
(F) DENOTES OBJECT FOUND

PROPERTY SUBJECT TO ANY VALID AND ENFORCEABLE EASEMENTS, RESTRICTIONS AND RIGHTS OF WAY OF RECORD AND THOSE SHOWN, IF ANY, SHOULD BE INDEPENDENTLY VERIFIED. NO TITLE OPINION HAS BEEN PROVIDED TO THE SURVEYOR.

NAMES AND DEED REFRENCES SHOWN ARE FOR DESCRIPTIVE PURPOSES ONLY, NOT TO BE USED FOR DETERMINING TITLE.

WATER BOUNDARIES ARE SUBJECT TO CHANGE BY NATURAL CAUSES AND MAY EFFECT AREA AND LIMIT OF TITLE

DM(F) - CONCRETE MONUMENT(F)
IPS - #4 REBAR(S)
MNS - MAGNETIC NAIL(S)
R/W - RIGHT OF WAY
P/L - PROPERTY LINE
C/L - CENTERLINE

NCGS MONUMENT "BEAGLE" NOT FOUND.
SURPLUS TRACT 453-13
LINEAR FEET OF SHORELINE = 1661'±

THIS IS A SURVEY OF AN EXISTING PARCEL OF LAND.

TED M. BEVERLY, PLS L-2605

THIS PLAT IS NOT SUBJECT TO THE PROVISIONS OF THE CITY OF CHARLOTTE OR MECKLENBURG COUNTY SUBDIVISION ORDINANCES AND DOES NOT REQUIRE THE APPROVAL OF THE CHARLOTTE-MECKLENBURG PLANNING COMMISSION. HOWEVER, ANY FURTHER SUBDIVISION OF THIS PROPERTY MAY BE SUBJECT TO THESE PROVISIONS

CHARLOTTE-MECKLENBURG PLANNING COMMISSION

PLANNING COMMISSION STAFF DATE

I, , REVIEW OFFICER OF MECKLENBURG COUNTY, CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.

REVIEW OFFICER DATE

STATE OF NORTH CAROLINA

I certify that this map was drawn from an actual survey made under my supervision and was prepared in accordance with G.S. 47-30 as amended. The undetermined ratio of precision is 1': 10,000. Boundaries not surveyed, if any, are noted. Deed descriptions are recorded in Book 2808, Page 475.

Witness my hand and seal this 5th day of MARCH, 2003

Professional Land Surveyor

L-2605
License No.

NORTH CAROLINA PROFESSIONAL SEAL L-2605 LAND SURVEYOR TED M. BEVERLY

PLAT PREPARED FOR:

CRESCENT RESOURCES LLC
P.O. BOX 1003
CHARLOTTE, N.C. 28201-1003

(Corr 1" = 200')

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

TITLE: CAROLINA CENTERS, LLC/WINDYGAP ROAD PLAT 2
OWNER: CAROLINA CENTERS, LLC
P O BOX 1003
CHARLOTTE, NC 28201

TOWNSHIP: STEELE CREEK TAX I.D : 19939122
COUNTY: MECKLENBURG STATE: NORTH CAROLINA
DATE: MARCH 3, 2003 JOB NO.: 0303101

REVISIONS

DATE	DESCRIPTION

CBS Surveying & Mapping, Inc

114 E. ROBINSON STREET - P. O. BOX 190
GAFFNEY, SC 29342-0190 (864) 489-5068

Ed Galetc

LEGEND

○ EIP	EXISTING IRON PIN
● MH	MANHOLE (PLAN)
R/W	RIGHT-OF-WAY
CGF	COMBINED GRID FACTOR

NOTE: Property corners shown circled were located by actual survey. All distances are horizontal distances unless otherwise noted. Bearings are based on NAD 83.

This map was prepared from an actual field survey performed by LandDesign Surveying, Inc. for the purpose of easement acquistion only, and is not to be construed to be a boundary survey of the property shown.

N.C. Professional Land Surveyor L-3135

The surveyor's signature and seal must be in green to be original. If the signature and seal are not in green, this map is a copy that may be presumed to contain unauthorized alterations.

Preliminary

C.M.U.D.

LINE TABLE		
LINE	LENGTH	BEARING
L1	60.08	N00°42'34"W
L2	307.46	N53°09'22"E
L3	128.34	N77°26'32"E
L4	211.53	N45°07'35"E
L5	199.69	S74°36'02"E
L6	41.68	S24°57'43"E
L7	68.89	S31°43'27"E
L8	139.84	S66°17'00"W

Detail "A"

8" Proposed Gravity Line

5' TCE

20' Permanent Sewer Easement

20' TCE

20'

20'

N/A

TCE

15' Permanent Sewer Easement

Line Table (Map Calls)

L234	N23°20'40"E-123.04'
L235	S50°38'08"E-101.08'
L236	N77°49'23"E-53.83'
L237	S17°43'46"W-41.13'
L238	S6°23'57"W-46.57'
L239	S76°32'52"E-8.00'
L240	N11°22'19"E-45.44'
L241	N38°30'57"E-79.03'
L242	N83°02'18"E-33.02'
L243	N53°38'02"E-134.78'
L244	N45°45'36"E-84.81'
L245	N44°16'16"E-48.08'
L246	N70°02'35"E-25.76'
L247	S79°30'03"E-51.60'
L248	N77°39'34"E-54.58'
L249	N46°55'05"E-66.72'
L250	N35°19'16"E-25.72'
L251	N00°36'54"E-11.02'
L252	N22°59'52"E-105.16'
L253	N18°54'22"E-22.72'
L254	N13°00'42"E-43.67'
L255	N79°24'47"E-42.43'
L256	S49°54'06"E-37.08'
L257	N76°26'54"E-16.69'
L258	S66°07'54"E-29.88'
L259	S36°35'59"E-9.76'
L260	S09°41'04"W-29.88'
L261	S35°20'40"W-19.44'
L262	S27°06'32"E-15.66'
L263	N33°05'22"E-32.18'
L264	N24°25'39"E-23.31'
L265	S30°17'31"E-12.87'
L266	S49°51'52"E-36.87'
L267	S38°26'02"E-26.18'
L268	S03°00'35"E-21.52'
L269	S28°45'24"E-28.68'
L270	S50°48'18"E-84.62'
L271	N88°40'56"E-112.23'
L272	N66°35'27"W-124.02'
L273	S58°19'32"W-364.26'
L274	S74°54'32"W-156.74'
L275	S66°30'32"W-113.64'

N/F
Carolina Centers, LLC
DB 7606-745 (Remainder)
Tax Id#199-391-22

Lake Wylie

(L255)

EIP

Lake Wylie

TCE

L5

(L271) EIP

L4

TCE

L6 L8

(L245)

L3

S88°47'31"E-7709.40' (Grid)

Lake Wylie

L7

R/W

(C3)

(L275)

See Detail "A"

L2

Grid Coords.
N: 522048.46
E: 1405269.36

NCGS Monument
"Boxer"
N: 521885.90
E: 1412977.05
CGF: 0.99983903

Hwy 160

I-485

Windy Gap Road

Site X

(L234)

TCE

TCE

R/W

(L274)

R/W

(C2)

Dixie River Road

(Tie Line)
N74°11'22"W-263.76'

Windy Gap Road

Vicinity Map
(Not to scale)

(L272)

R/W

(L273) (60' Public Road)

(C1)

N/F
City of Charlotte
DB 14349-146
Tax Id#199-251-10

C1
R=347.29'
L=334.23'
CH.=321.48'
S85°50'25"W

C2
R=446.73'
L=90.52'
CH.=90.13'
S66°35'08"W

C3
R=438.20'
L=64.27'
CH.=64.21'
S70°42'32"W

N/F
Dixie River Land Company, LLC
DB 13089-911
Tax Id#199-251-04

Notes:
1. This map was prepared for the purpose of Right-of-way and/or easement acquistion only, and not intended to be a boundary survey of the property shown.
2. This plat does not comply with G.S. 47-30.
3. This property may be subject to to additional restrictions, easements, right-of-ways, utilities, convenants and restrictions that may be of record.
4. This plat has not been reviewed by a local government agency for compliance with any applicable land development regulations.

Area
Permanent Easement: 24486 Sq. Ft. (0.562 Ac.)
Temporary Easement: 23737 Sq. Ft. (0.544 Ac.)

Note.
All calls in parenthesis are based on Deed Book 7606 Page 475 & Deed Book 13089 Page 911. (MB 25-98)

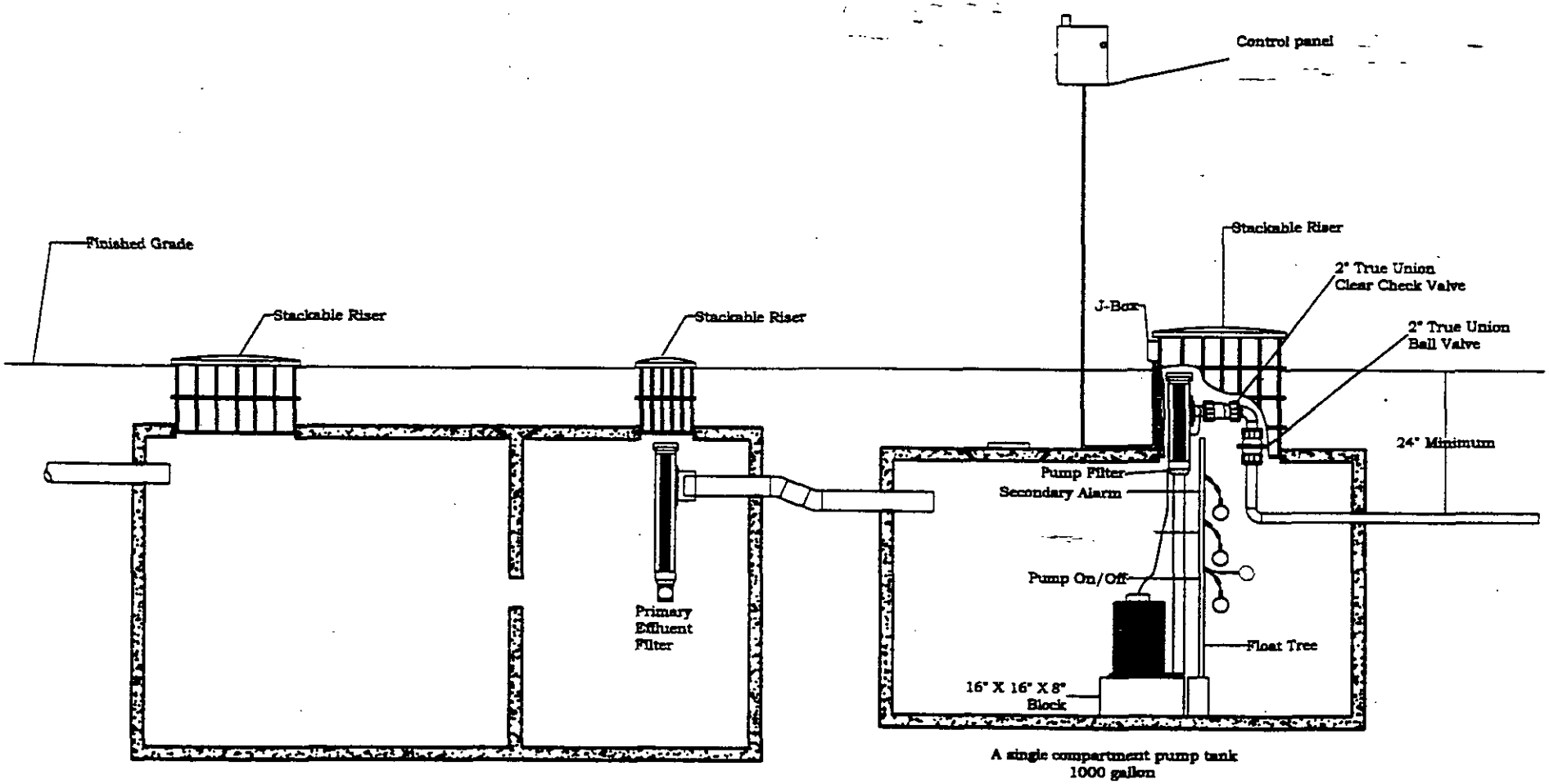
LandDesign Surveying
223 North Graham Street
Charlotte, North Carolina 28202
(704)-376-7777 (Voice)
(704)-376-2448 (FAX)

C:\4102009\Dwg\Brown Cove\easement.dwg

3. CHARLOTTE-MECKLENBURG
UTILITY DEPARTMENT ENGINEERING DIVISION

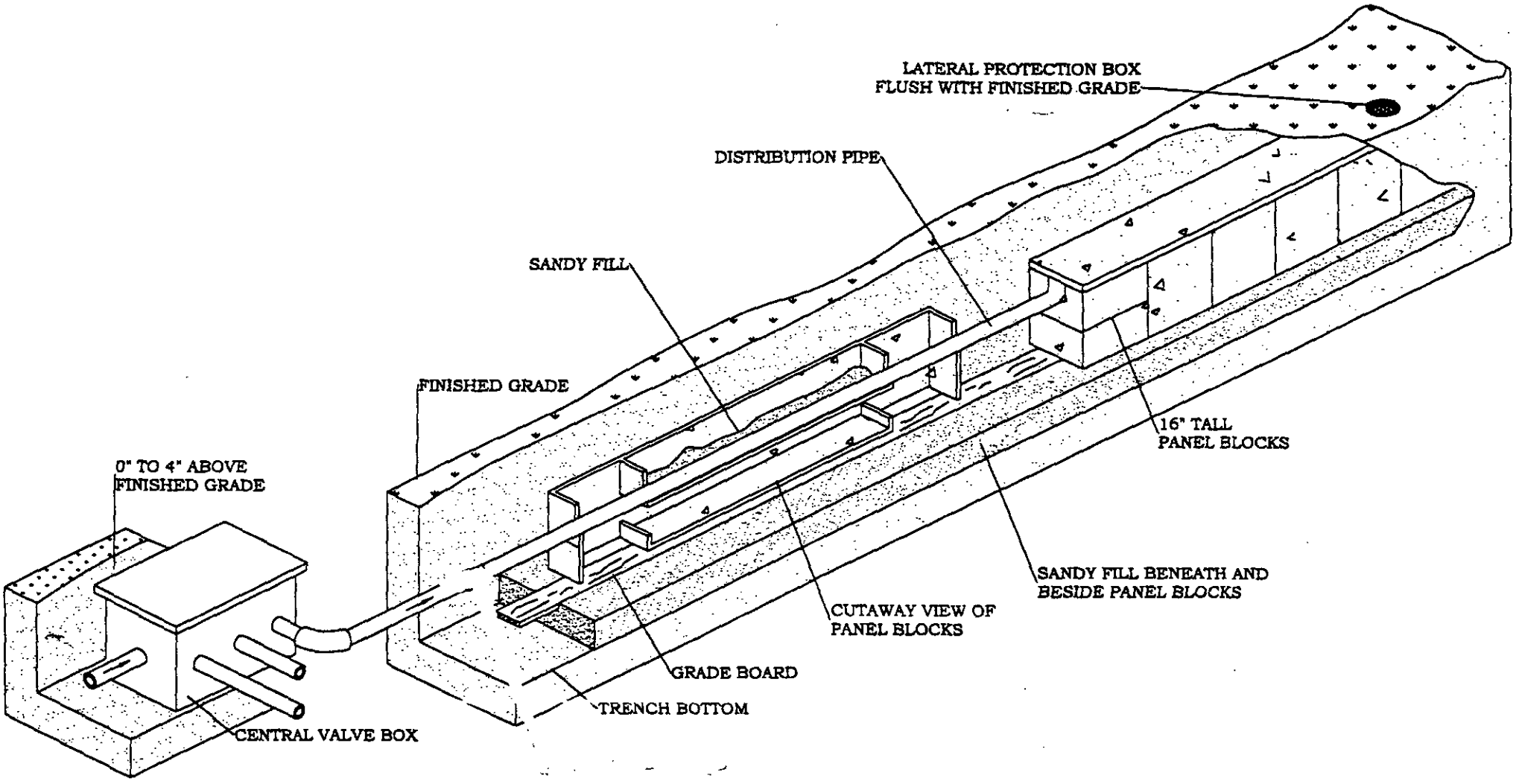
REVISIONS	JOB NO. 400-028-SRS
BEAVER DAM 8" GRAVITY SEWER EASEMENT	FILE NO.
SCALE 0 150	SHEET 1
EASEMENT PROPERTY OF: CAROLINA CENTERS, LLC	OF 1
DRAWN BY: djb	
DATE 09/16/03	CHECKED BY dbb SURVEY SUPVR. dbb

4 PPBPS-PRESSURE DOSED TANK DETAIL 1.3B



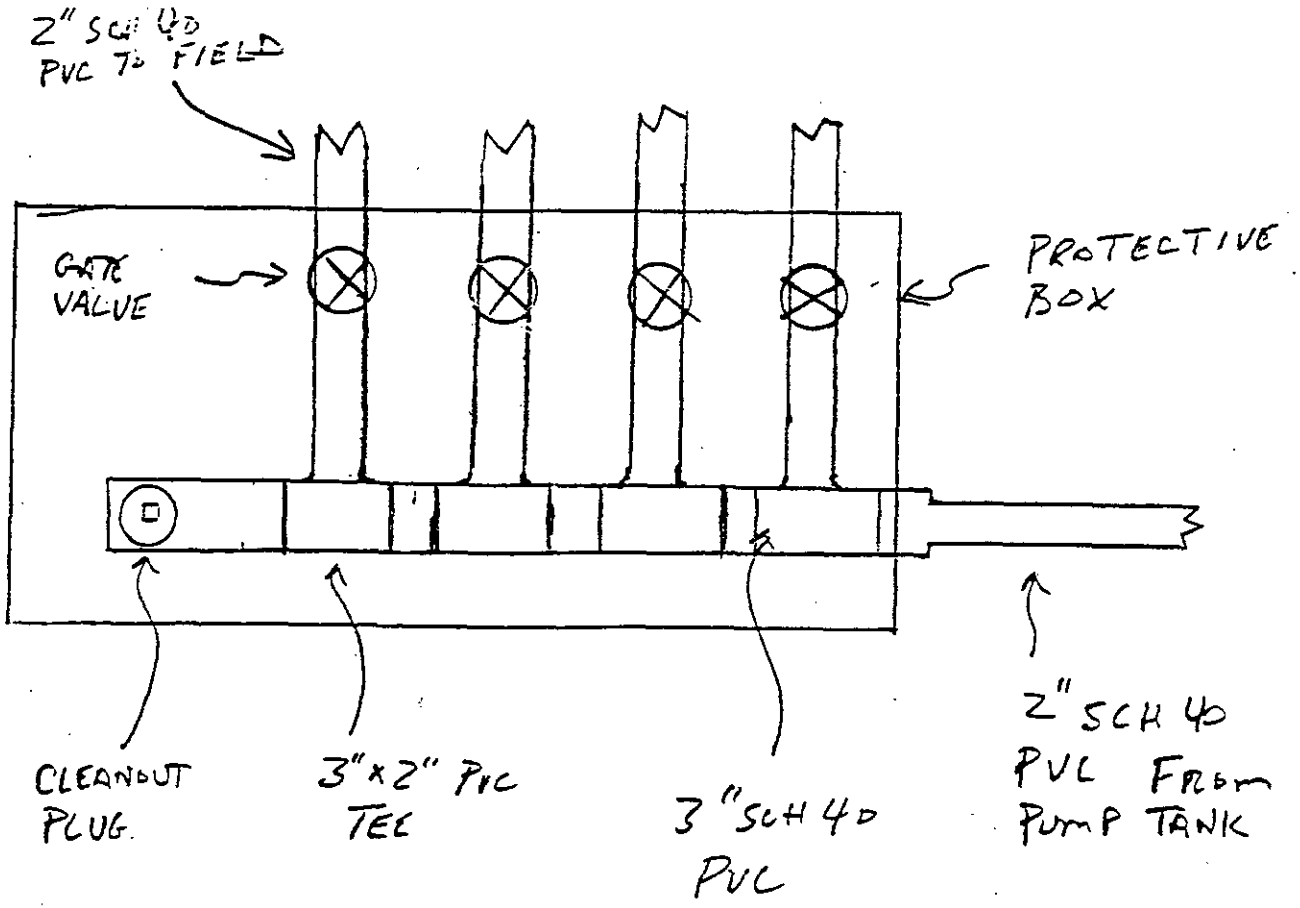
(modified from TCWW Point)

5 PREFABRICATED PERMEABLE BLOCK PANEL
DETAIL 1.3A



(modified from TCHW Point manual)

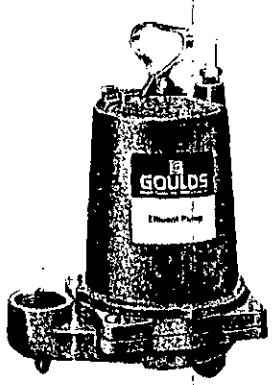
6. CENTRAL VALVE BOX DETAIL



GOULDS PUMPS

7.

Submersible Effluent Pump



MODEL

3885

PROSURANCE AVAILABLE FOR RESIDENTIAL APPLICATIONS.

APPLICATIONS

Specifically designed for the following uses:

- Homes
- Farms
- Trailer courts
- Motels
- Schools
- Hospitals
- Industry
- Effluent systems

SPECIFICATIONS

Pump

- Solids handling capabilities: ¾" maximum.
- Discharge size: 2" NPT.
- Capacities: up to 140 GPM.
- Total heads: up to 128 feet TDH.
- Temperature: 104°F (40°C) continuous 140°F (60°C) intermittent.
- See order numbers on reverse side for specific HP, voltage, phase and RPM's available.

FEATURES

■ **Impeller:** Cast iron, semi-open, non-clog with pump-out vanes for mechanical seal protection. Balanced for smooth operation. Silicon bronze impeller available as an option.

■ **Casing:** Cast iron volute type for maximum efficiency. 2" NPT discharge.

■ **Mechanical Seal: SILICON CARBIDE VS. SILICON CARBIDE** sealing faces. Stainless steel metal parts, BUNA-N elastomers.

■ **Shaft:** Corrosion-resistant, stainless steel. Threaded design. Locknut on three phase models to guard against component damage on accidental reverse rotation.

■ **Fasteners:** 300 series stainless steel.

■ Capable of running dry without damage to components.

■ Designed for continuous operation when fully submerged.

MOTORS

■ Fully submerged in high-grade turbine oil for lubrication and efficient heat transfer.

■ **Class B insulation.**

Single phase:

- Built-in overload with automatic reset.
- All single phase models feature capacitor start motors for maximum starting torque.
- ⅓ and ½ HP – 16/3 SJTOW with 115 V or 230 V three prong plug.
- ¾-2 HP – 14/3 STOW with bare leads.

Three phase:

- Overload protection must be provided in starter unit.
- ½-2 HP – 14/4 STOW with bare leads.

■ **Designed for Continuous Operation:** Pump ratings are within the motor manufacturer's recommended working limits, can be operated continuously without damage.

■ **Bearings:** Upper and lower heavy duty ball bearing construction.

■ **Power Cable:** Severe duty rated, oil and water resistant. Epoxy seal on motor end provides secondary moisture barrier in case of outer jacket damage and to prevent oil wicking. 20 foot standard with optional lengths available.

■ **O-ring:** Assures positive sealing against contaminants and oil leakage.

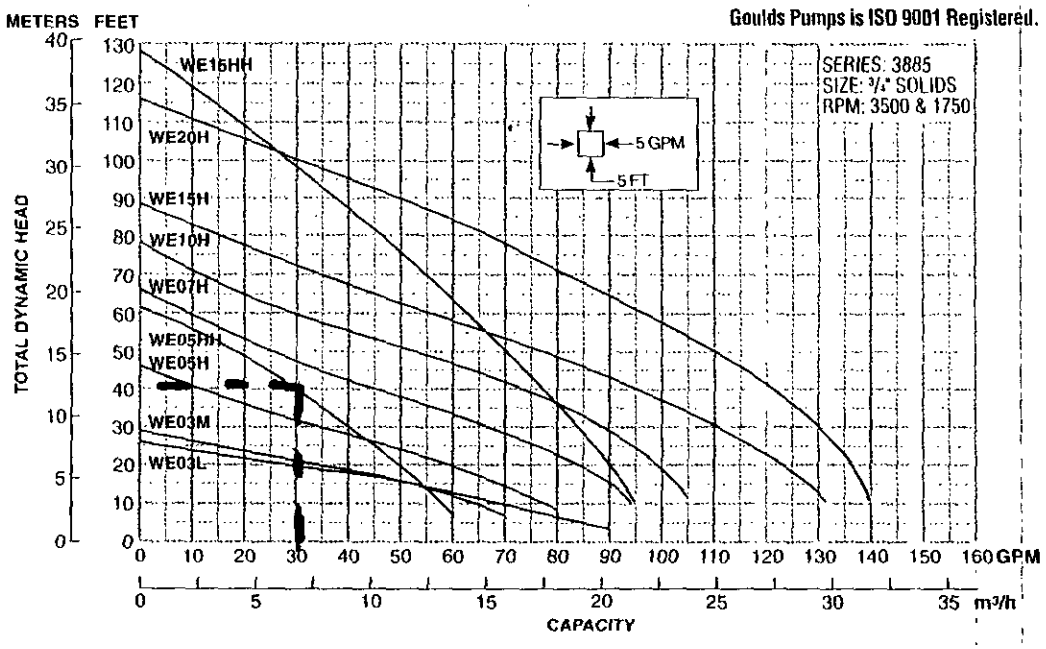
■ Consult factory for information on CSA listed models.

AGENCY LISTINGS

Canadian Standards Association File #LR38549

Underwriters Laboratories File #83318

Goulds Pumps is ISO 9001 Registered.



Goulds Pumps

ITT Industries

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Effective January, 1999
B3885

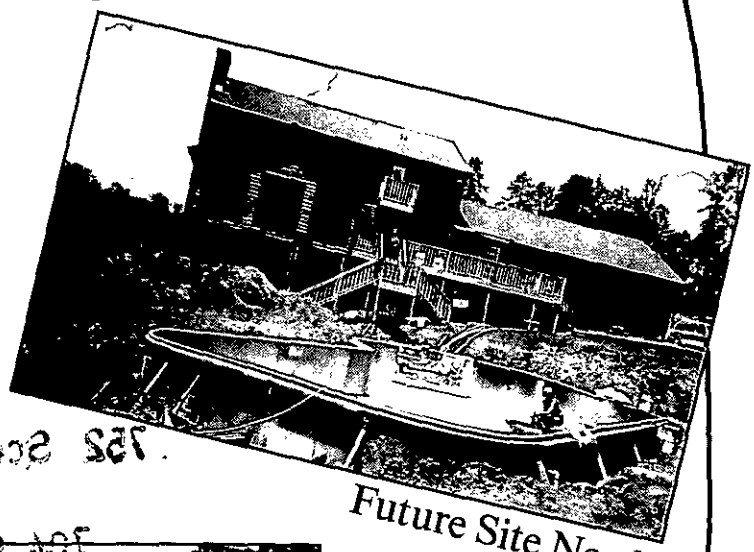
When Your Problem in On-site Waste Is:



Topography and Vegetation



Special Landscaping Needs



Future Site Needs



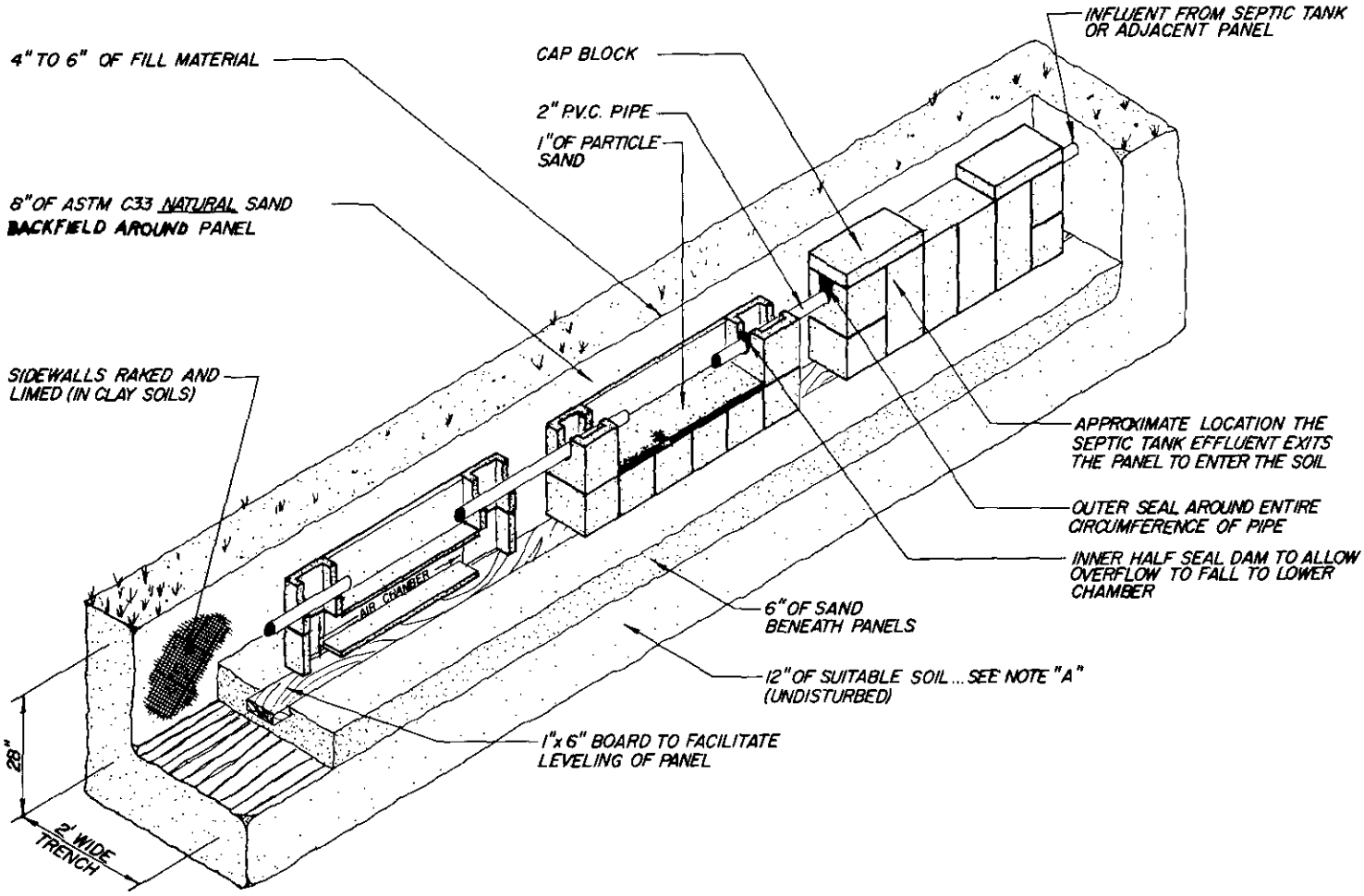
Limited Suitable Area

Then consider the

T&J Panel Wastewater Treatment System

A Better Quality Effluent Than With Conventional Systems

Isometric Drawing of A Segment of 16" T&J Panel System Drainfield

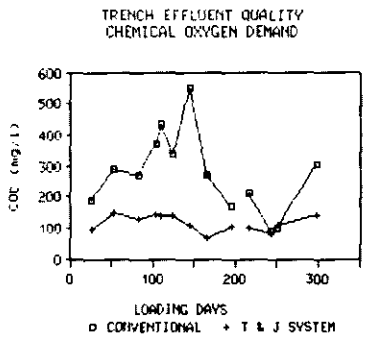


Advantages of the T&J Panel System

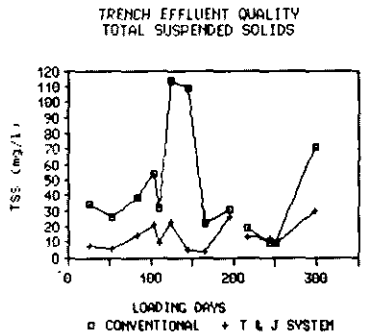
- Effluent discharged closer to the ground surface
- Each panel works as individual unit
- Panel may be grouped where best soils are found
- Less soil distributed during installation
- Less catch basin effect
- Lines only 24" wide — more landscape flexibility
- Aerobic bacterial activity
- Easily installed — similar to conventional system
- Can be installed as modified mound system
- Lines can be inspected or serviced through lids
- Prefabricated panels delivered to job site

Environmentally Superior Effluent With The T&J Panel System

In a side by side test, both total suspended solids and chemical oxygen demand was reduced with the Panel System. The panels were loaded at 3.4 times that of the conventional system.



Total Suspended Solids Concentration for Effluent from Simulated Conventional and T&J System Trenches. (Note: Hydraulic Loading Rate for Conventional = 1.53 ca/day, for T&J = 5.27 ca/day.)



Chemical Oxygen Demand Concentration for Effluent from Simulated Conventional and T&J System Trenches. (Note: Hydraulic Loading Rate for Conventional = 1.53 ca/day, for T&J = 5.27 ca/day.)

THE T.&J. PANEL
WASTEWATER TREATMENT SYSTEM

PATENT NUMBER 4013559

P.O. Box 288 • Statesville, North Carolina 28677
N.C. WATS 1-800-222-2577 • (704) 872-9566

There are many new developments in ground absorption sewage disposal system on the market today. The T&J Panel System is designed to make the most out of the least amount of space possible. This is made possible by the fuller use of the more porous top soil and the limited effect of evapotransporation and the wicking action of the block as the effluent is kept close to the surface of the ground and fused through the pores of the block to the sidewall area of the drainfield lines. This more general distribution and wicking allows for the use of the entire sidewall area and helps prevent the sealing off of the bottom and lower sidewalls that often occurs in a conventional system.

A 16 inch high panel is 46 inches long, 8 inches wide, and weighs about 155 pounds. There is a 6 inch by 6 inch air chamber at each end of the panel which extends from top to bottom to ensure aerobic action in each level of the field lines. Each panel has a storage chamber just below the top chamber for storage during peak use periods. A 24 inch panel is also available for use in repair or specially engineered systems.

* *

Limited Warranty

The structural integrity of each T&J Panel, when installed in accordance with manufacturer's instructions, is warranted against defective materials and workmanship for one year from date of manufacture. Should a defect appear within the warranty period, purchaser must inform T&J Panel System of the defect before the warranty expires. T&J Panel System will supply a replacement unit. T&J Panel System's liability specifically excludes the cost of removal and/or installation of the panels. There are no other warranties with respect to the units, including no warranties of merchantability or of fitness for a particular purpose. The warranty does not extend to incidental, consequential, special or indirect damages. The company shall not be liable for penalties or liquidated damages, including loss of production and profits, labor and materials, overhead costs, or other loss or expense incurred by buyer. Specifically excluded from warranty coverage are: Damage to the panels due to ordinary wear and tear; alteration, accident, misuse, abuse or neglect of the panels; the panels being subjected to stresses greater than those prescribed in the installation instructions; the placement by buyer of improper materials into buyer's system; or any other event not caused by the company. Furthermore, in no event shall the company be responsible for any loss or damage to the buyer, the panels or any third party resulting from its installation or shipment. Buyer shall be solely responsible for ensuring that installation of the system is completed in accordance with all applicable laws, codes, rules and regulations. Any alteration of this warranty must be noted as "Warranty" in writing by the company.

THE T&J PANEL
WASTEWATER TREATMENT SYSTEM
PATENT NUMBER 4013559

[redacted]

Distributed by

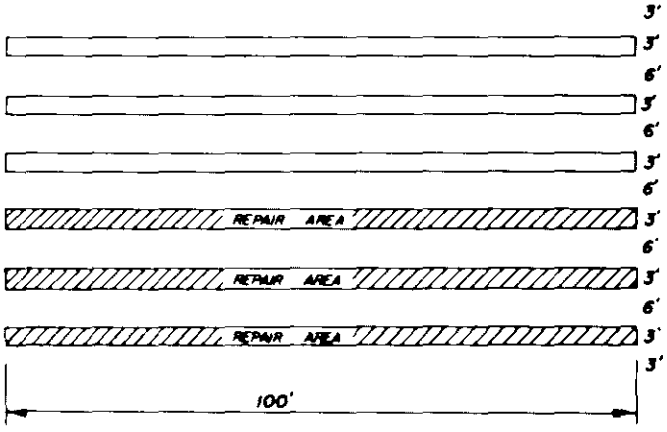
T & J Panels, Inc.
269 Marble Rd.
Statesville, NC 28625

704-924-3600

Serving people with a better quality system

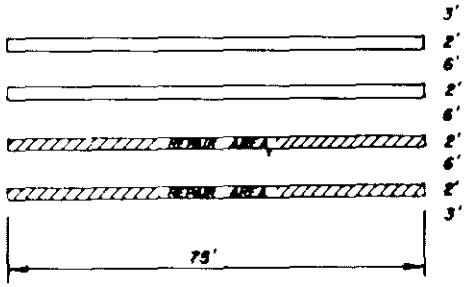
See the difference in a real space needed with the T&J Panel System Wastewater Treatment System when compared to a conventional tile/stone nitrification system.

Conventional System



A total suitable and usable area of 5400 square feet is needed for a conventional system.

T & J Panel System



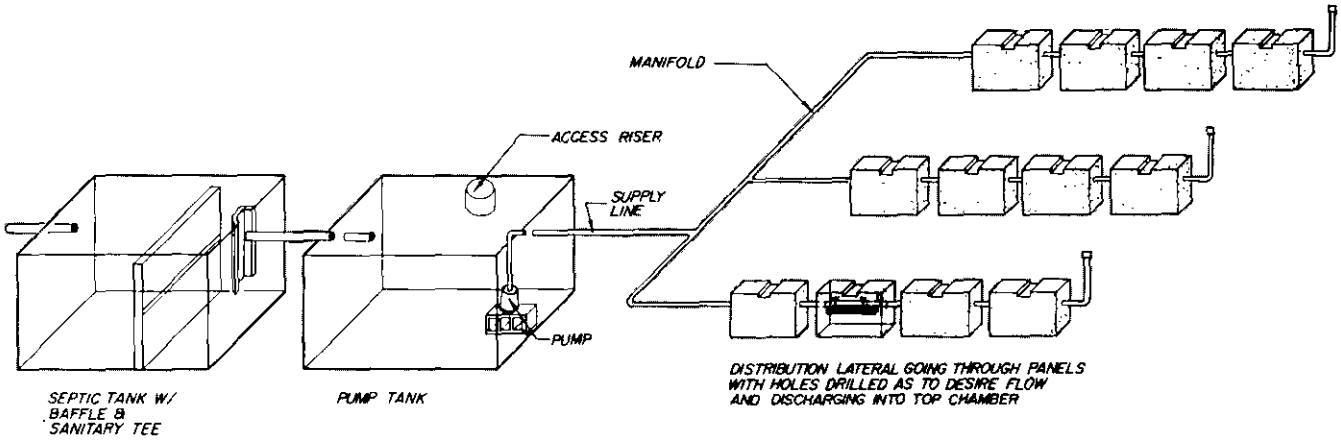
A total suitable and usable area of 2400 square feet is needed for the T & J Panel System**.

*Typical 3 bedroom house in a clay soil with 0.4 gallon per day per foot square application rate with a design flow on 120 gallons per day per bedroom.

**The T & J Panel Wastewater Treatment System is included in the North Carolina Sewage regulations as a PPBPS as of August 1, 1988. This allows for a 50% reduction in lineal footage of trench with the 16 inch panel as illustrated above. (See note "A")
Note A - This reflects North Carolina Codes. Please check local codes and practices for your area.

Low Pressure Panels (LP Panel) - Alternative installation for the T&J Panel System.

The LP offers a high quality effluent with a uniform distribution of wastewater throughout the entire system.



- Uniform distribution of the effuent.
- Elimination of localized overloading.
- Works with 2-4 feet of pressure head.
- Dosing and resting cycles.
- Placing of the effluent into the sidewall near the surface—where the more porous soils are found.
- The aerobic action of the T&J Panel's design.
- The filtration of the effluent through the T&J Panel System and its sand backfill.

Design, Installation and Maintenance

of the

T & J Panel Wastewater Treatment System

For

Environmental Health Specialist

And

Septic Tank Installers

Although this manual is sectioned for specific user groups, we at T & J Panel suggest that you familiarize yourself with the complete manual. Sixth Edition.

System Design

In the early days of the T & J Panel system when it was still Considered an experimental system the primary reason for permitting the Panel System was because of insufficient space for a conventional system. Now with inclusion in the Sewage Regulations [10NCAC 10A .1956 (3) (a) (ii)] , the Panel System should be considered when a quality effluent may be needed, space is limited, usable soil is limited, or there are indications that at some future time space may be needed for other development. When there is a trend for added development such as additions to homes, pools, or other special landscaping development the T & J Panel System may prevent insufficient space later. As the environmental health specialist who is designing a system, and you can foresee such a trend of continued development, the Panel System may be an option the home owner would like to utilize.

As noted in the regulations a PPBPS is only permitted where soils are suitable, provisionability suitable, or reclassified provisionability suitable, however only one half of the area needed for a conventional system is required. This is one reason that the Panel System can help you use the best soils available on the lot. The system can be gravity fed, pumped to pressure manifold and gravity fed into the lines, or pumped to Low Pressure Panel lines. Most of the concepts for a Panel System layout are the same as for a conventional system. The biggest difference being the areal area needed and the quality of effluent being introduced into the ground.

The T & J Panel system can be installed as either gravity, pump to gravity, pump to pressure manifold, or low pressure pipe distribution system. When designing a pressure system the principles of low pressure distribution are as described in the LPP manual. There is futher discussion on pressure systems in the installer section of this manual.

Conversion

A three bedroom house with a 0.4 gpd application rate. (The first three steps are the same as for the conventional system.)

1) 120 gallons per bedroom x 3 bedrooms = 360 gallons per day design flow rate.

2) 360 gallons flow rate / 0.4 application rate = 900 sq. ft. of conventional trench bottom.

3) 900 sq. ft. / 3 ft. wide trench = 300 lineal feet of conventional system.

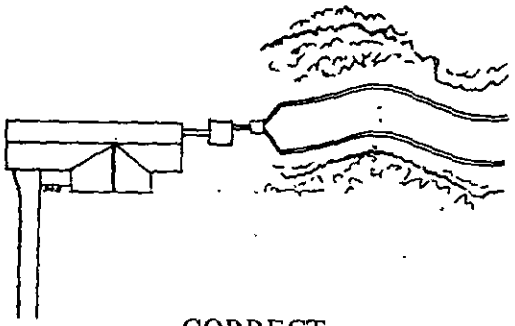
This conventional layout requires 2700 sq. ft. of area on the lot with another equal area of repair space for a total of 5400 sq. ft. of suitable usable area. To calculate the size of the T & J Panel system , the above calculations must be made with an additional fourth step as described in 10NCAC 10A .1956 (3) (a) (ii) (B) for a PPBPS, (the T & J panel system).

4) 300 lineal feet of conventional system x 0.5 for a 16 inch high Pane System = 150 lineal feet of T & J Panel System.

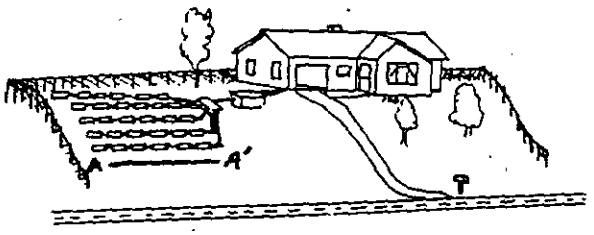
A Panel System requires only a 1200 sq. ft. area on the lot for the system with an equal area for repair, for a total of 2400 sq. ft. . With the panel system the installation and repair can go into the same area as the initial area required for a conventional gravel trench system.

Window Effect

To prevent hydraulic overload in the soil areal space should always be a consideration for any system, however, it is especially notable with the Panel System as with any system that reduces the size of the areal area drainfield. The following is a simplistic example of this concept.



CORRECT

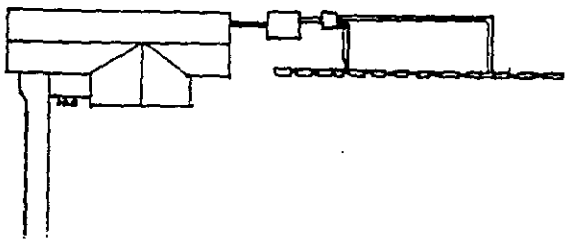


INCORRECT

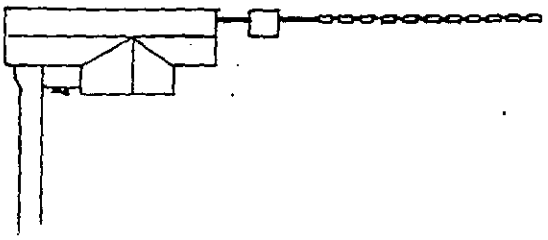
While both systems have the same lineal footage of trench the incorrect diagram is not a desirable design. The effluent must pass through the area A-A' which can cause a strain on that area and even a failure because of hydraulic overloading.

Distribution

Another extreme would be the use of a long single trench fed from only one end. In the first example, below the areal space is good and the chance of hydraulic over loading is greatly reduced. However, downline distribution in the panel line will not give optimum treatment.



CORRECT



INCORRECT

In the lower example we see that the trench has been fed from multiple points. Because the Panel lines are put in as level as possible, never exceeding 1/4 inch of rainfall in 10 feet of run, they feed both ways equally. T & J recommends that no gravity line exceed 50 feet, unless it is fed from multiple points. In both of these examples, we are specifying the Panel System, but the logic applies to the conventional system as well.

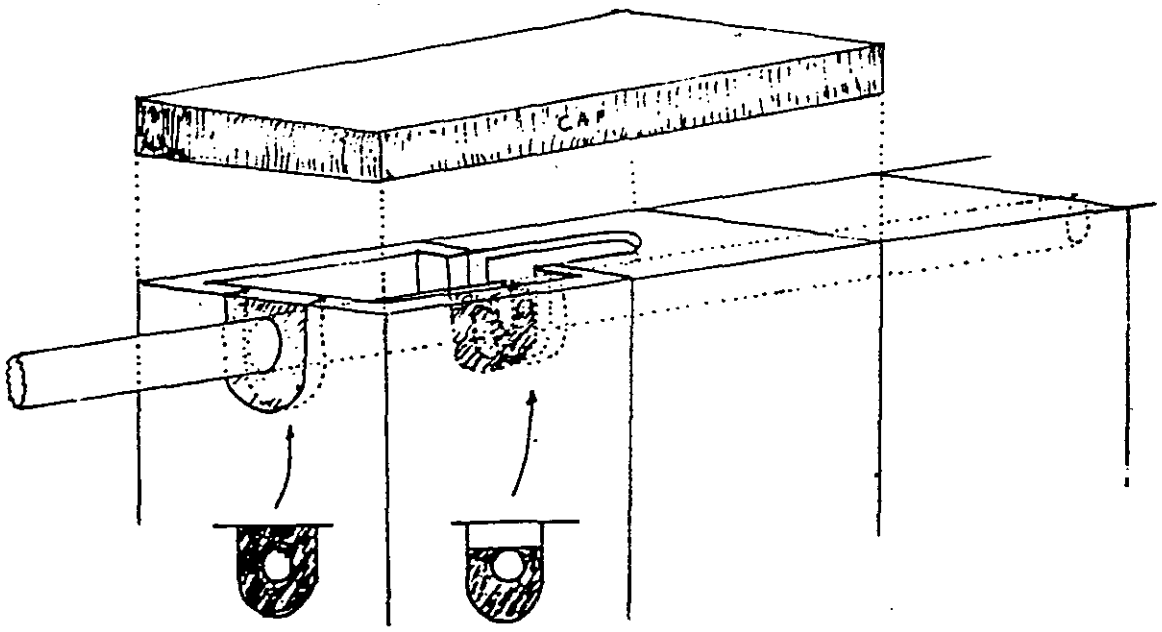
To calculate the number of 16 inch high panels needed for a 150 foot line, multiply 150' x 12" = 1800" then divide by 52" which is 46 inches for the panel and 6 inches for the space between the panels in the trench. 1800" /52" = 34.6 panels, so you would call for 34 panels. (A material order chart is included in the installer section of this manual.) If there is to be more than one trench, the sizing of the lines should be as equal as possible with as close to the same number of panels in each trench as is practical. Environmental Health Specialists should show the panel as small blocks on the line of the trench.

Backfill

Backfill sand shall be a clean, washed, medium sand that is naturally occurring and falls within the gradation of ASTM C-33 specification. This specification is one that is used in the ready mix industry and is readily available in all areas. The second type of sand that you will need is a clean particle sand to coat the bottom of each panel's top chamber with a bed of sand one inch thick. This sand is a medium grade of sand blasting sand. Each one hundred pound bag should cover eight panels. Backfill sand calculations should be taken from the material sheet.

Tar Seals

The two drawings below illustrate the inner and outer seal. Note that while the outer seal is a complete seal, the inner seal is only up to the top of the connecting pipe. This is to allow for over flow of the effluent at peak use periods into the lower air chambers. At this point the air chamber become additional storage chambers for the effluent. These seals can be inspected by lifting the caps at the ends of the panels while inspecting the system installation



INNER and OUTER SEALS

Trench Preparation

Trench grade should be established so that backfill cover will be four to six inches over the tops of the panels. (Note on several slopes system depth should be adjusted to protect against brakeout of effluent) In clay type soils the trench side walls should be raked to bring slicked over areas back as near to original structure as possible. A light dusting of lime on the side walls will help the system to continue the brake down of solids.

Final Inspection

The following list of points are things that an inspector should look for when issuing a completion permit.

1) Is depth of the panels within guidelines?

2) Are drain lines level or less than 1/4 inch fall in ten feet?

3) Have seals been properly constructed?

4) Was the proper sand used in the trench backfill?

5) If in clay type soils were the side walls raked and limed?

(For Pumped Systems)

6) Have pump size, head pressure, and dose cycle been properly sized and set?

7) Record field data on operations permit.

(Set dose cycle for 3.6 gallons per 16 inch high panel.)

Installer

The Panel Block System

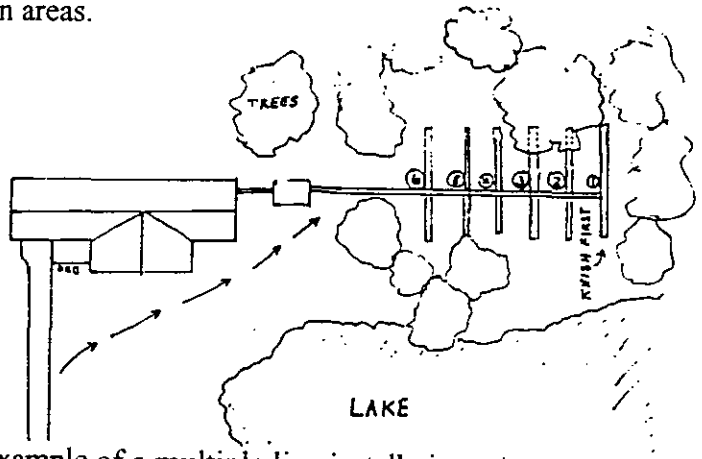
Generally, on level open land, a Panel System can be installed in about the same time as a conventional system; however traditionally, Panel Systems have been installed where space and topography have restricted use of a conventional system. For this reason Panel System installations have required more time. Many installers enjoy the change of working with panels, not handling gravel, and the satisfaction of knowing a system being installed where previously a conventional system was not possible.

Ordering Materials

Inclosed on following two pages you will find an order sheet for the T & J Panel System and a materials chart for 16 inch high Panel System. The distributor in your area will lead you through these sheets when ordering or pricing the system. For information on the distributor located closest to you call 1-800-222-2577 (inside N.C.) or 704-872-9566. After ordering, your panels will be shipped to the job site banded together on pallets.

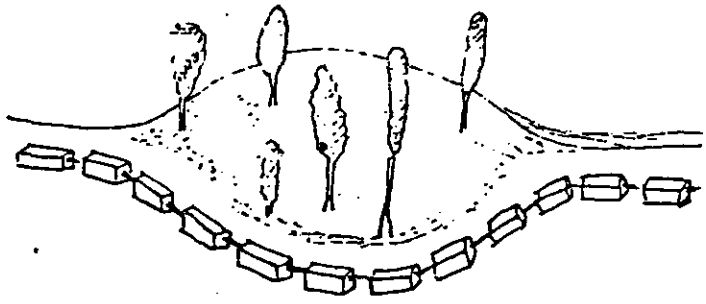
Installation Tips

Installation for multiple line systems should begin in the most confiding area and be worked to the more open areas.

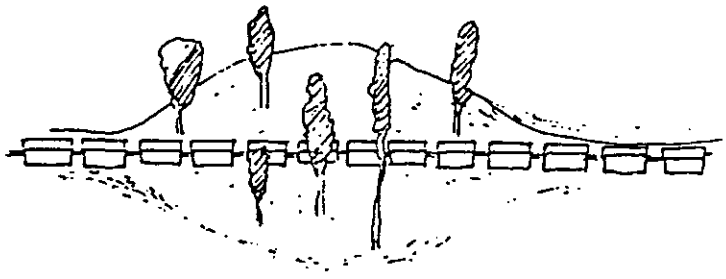


Above is an example of a multiple line installation. As you can see the installation should begin with the line marked 1 and proceed to 2, 3, then 4. This procedure will greatly ease material handling and backfilling. (Note sections of the drainlines should be left uncovered to allow for inspection of lines when area is confined and return access to lines is limited.)

On the following page are two examples of drain lines on sloping lots. The first drawing shows the drainline going through a slope making the center of the line deeper in the ground. This is not a desirable situation. The second drawing shows the drainline going around the slope keeping around the slope keeping the trench depth and cover uniform for the entire length o the line. On slopes, care should be given to avoid cutting away valuable top soil in an effort to make straight lines. The Panel line should be installed on grade with the contour of the natural slope. Panel lines can be curved to almost any degree.



CORRECT



INCORRECT

Digging The Trench

Start by shooting the grade and marking the contour. Then for a 16 inch panel add 28 inches to the shallowest or lowest grade that the trench must cross to obtain the trench bottom grade. Now dig the trench at the elevation derived, checking the grade frequently. The trench should be a minimum of two feet wide. With the trench open all side walls shall be raked to bring smeared areas back to their original structure before a light dusting of lime is applied. Now place a 6 inch layer of backfill sand in the trench and level to grade, then place a 1 x 4 or 6 inch board flat on its side on top of the 6 inch layer of sand. Once more check the grade of the trench by shooting the top of the board. Once the grade boards have been set, the panels may be set into the ditch by hand or using the backhoe. Each panel weighs about 155 pounds and placement by hand goes quickly. The panels should be place about 6 inches apart in the trench to obtain equal spacing. Now place 10 to 12 pounds of clean particle sand (medium sand blasting sand) in the top chamber of each panel to form a bed of sand about one inch thick. Tar seal rope should be placed in the U outs to form seals as shown in earlier drawings. Once the tar rope is in place, a 24 inch section of two inch PR160 pipe is cut to span from the upper middle top chamber of the first panel to the upper middle chamber of the next panel. The tar seal rope that is used should be of tar or butyl that is soft and pliable to obtain a water tight seal. Now that the connection and sealing is complete a block cap is placed on each end of the panel covering all openings. (These will be delivered with the panels.) The cap block may well serve as an inspection port at some future date. The trench is ready to be backfilled to the top so the panel with the same backfill sand used in the trench bottom. With the sand to the top of the panel, trenches should be left for the sanitarian to inspect. Soil cover should be added after the final inspection.

Most Panel Systems are currently used due to space considerations and caution should be taken to preserve suitable soil structure and site conditions.

Materials Chart For 16 Inch Panels

Materials needed per panel:

- Three feet of half inch tar seal rope per panel

- Two feet of two inch PR160 pipe per panel or same linear feet as line layout of pressure system of one and a quarter inch pipe. Add pipe for tie in of lines to tank and house.

- One hundred pounds of particle sand (sand blasting sand fine texture) per eight panels.

- Same linear feet of one by six boards as line length.

- Bag powder lime when in clay soils.

Panel and C-33 Sand fill

50 LF - 11 panels
8 1/4 tons sand

60 LF - 14 panels
10 tons sand

70 LF - 16 panels
11 1/2 tons sand

80 LF - 18 panels
13 1/4 tons sand

90 LF - 21 panels
15 tons sand

100 LF - 23 panels
16 1/2 tons sand

110 LF - 25 panels
18 1/4 tons sand

120 LF - 27 panels
20 tons sand

130 LF - 30 panels
21 1/2 tons sand

140 LF - 32 panels
23 tons sand

150 LF - 34 panels
25 tons sand

160 LF - 37 panels
26 1/2 tons sand

170 LF - 39 panels
28 tons sand

180 LF - 41 panels
30 tons sand

190 LF - 43 panels
31 1/2 tons sand

200 LF - 46 panels
33 tons sand

T & J Panel Material Worksheet

Homeowner _____ County _____

Address _____

_____

Description of System _____

_____

_____

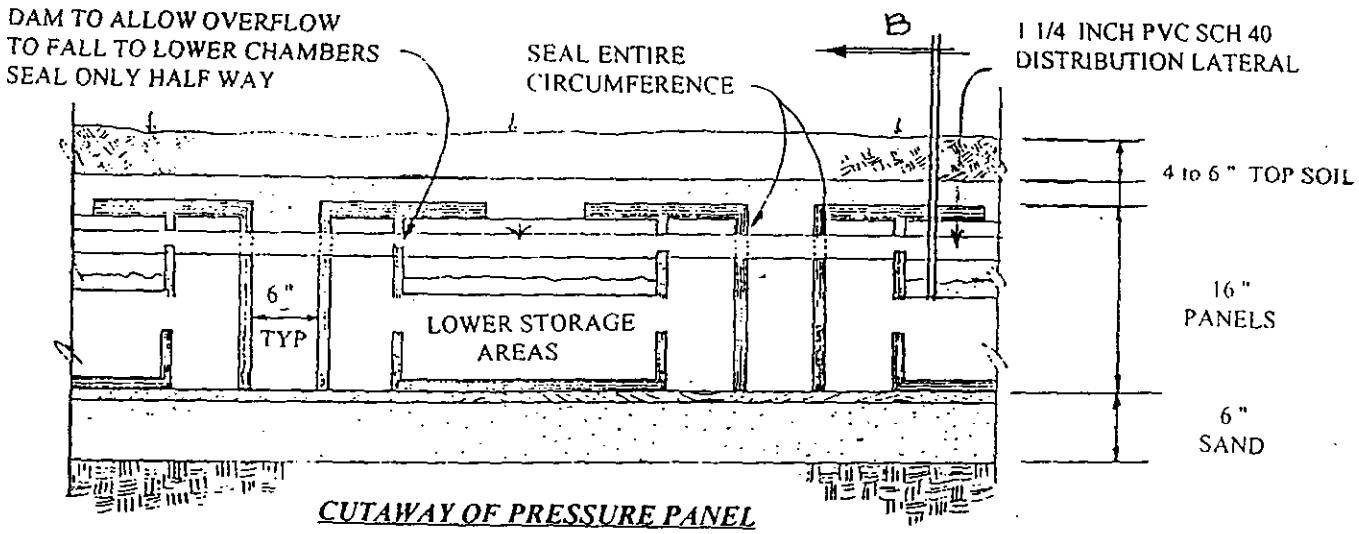
_____	T & J Panels _____ Inch (caps N/C)	_____
_____	2" Pipe	_____
_____	1 1/4" Pipe	_____
_____	Fittings for Pipe	_____
_____	Tar Seal Rope (3' per Panel)	_____
_____	Bag Partial Sand (100 lbs per 8 panels)	_____
_____	Pallets No Return	_____
_____	Screened Creek Sand (FM 2.3 to 3.0)	_____
_____	1x4 or 1x6 Boards	_____
_____	Power Lime	_____
_____	Sep. Tank _____ Gallon	_____
_____	Tar Seal for Tank	_____
_____	4" PVC Pipe Schedule 40	_____
_____	Distribution Box	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
	Sub-total	_____
	Delivery Charge	_____
	tax	_____
	Total	_____

Panels With Pressure Distribution

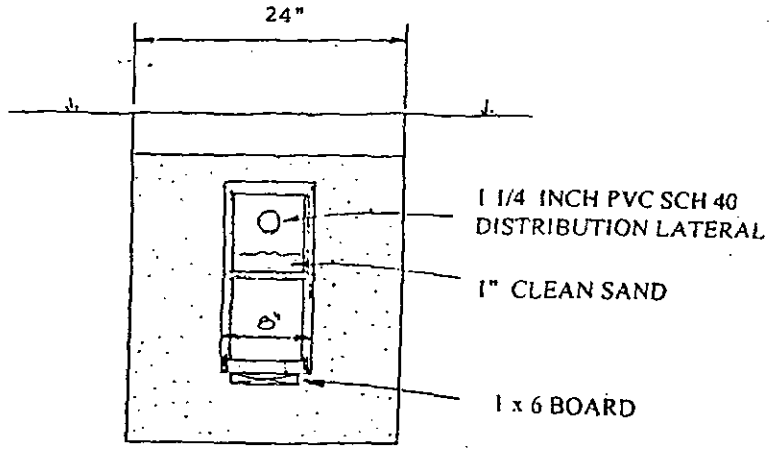
The LP Panel uses Technology similar to that of Low Pressure Pipe (LPP) System. The tables and distribution design described in the LPP manual is applicable to the pressure Panel System. The system should be used with two to four feet of head. In many respects a LP Panel is similar to a LPP with the holes discharging into the panels.

The dosing cycle for the Panel System is designed to pump enough effluent to fill the top chambers of all the panels in the system. The top chamber of a 16 inch panel hold 3.6 gallons. When the system has 34 panels and all holes are the same size, then you would multiply 34 x 3.6 to get 122 gallon per dose cycle. The holes are drilled in the distribution pipe at the 10 and the 2 o'clock position. These are then placed so that the effluent is pumped into the top chamber of the panel. If the hole sizing changes in the system the pump cycle is set by the hole that is discharging the fastest.

All valves and turnups should be neatly capped, covered and labeled for future service. Pump tanks should be constructed as shown in the drawing as to allow for service and repairs.



CUTAWAY OF PRESSURE PANEL



Pressure Panels Continued

Below you will find a pressure head table to help in flow design of your LP Panel. These numbers are a guide to help in selecting the right flow in your system. We have found that in most systems the 5/32" and 3/16" hole at 2 to 4 feet of head work the best in giving a pump cycle of more than five minutes and keep the same maximum top chamber flow load as sited on the prior page.

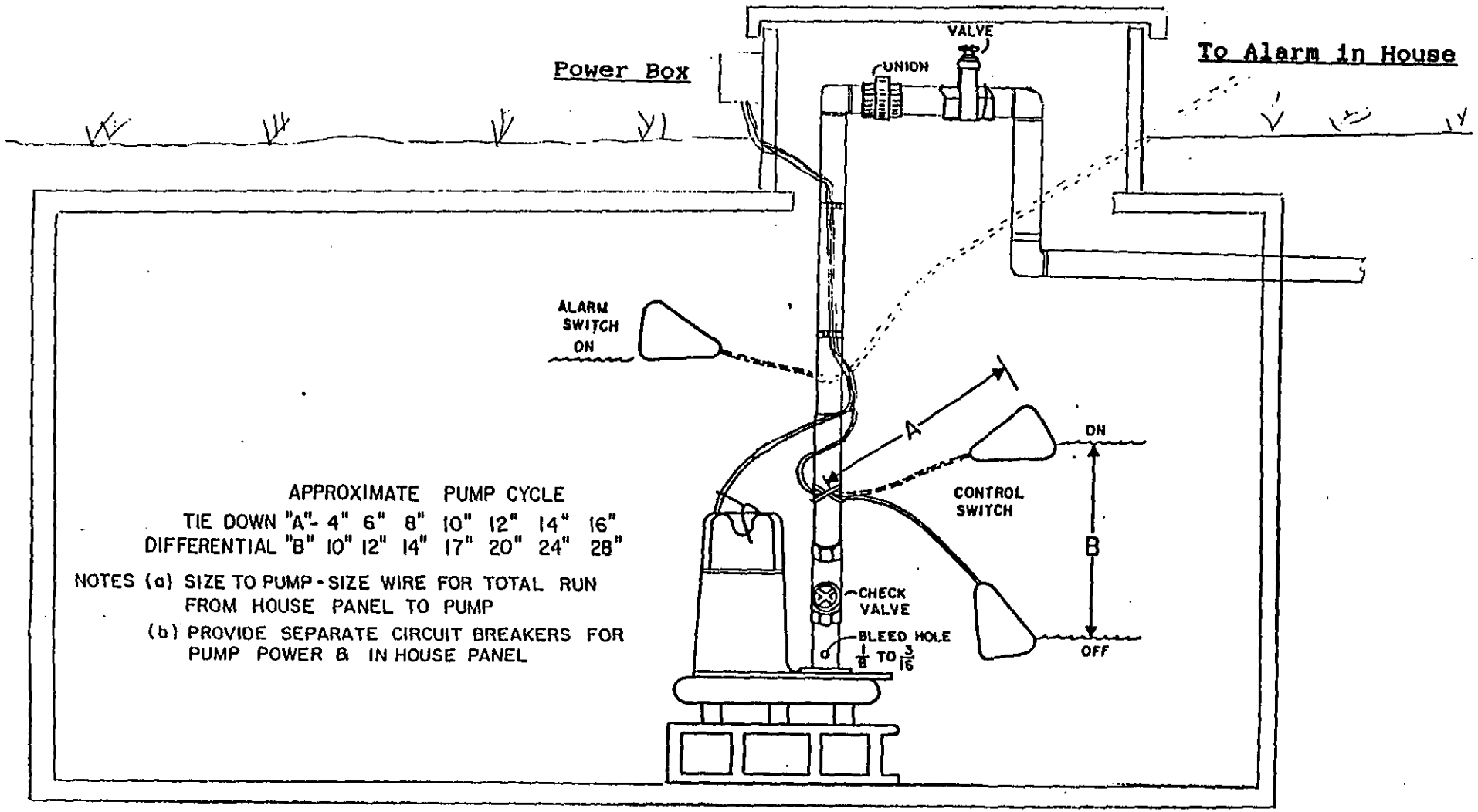
Flow Chart of Various Orifices and Pressure Heads

Orifice Size	3/32" 0.094	1/8" 0.125	5/32" 0.156	3/16" 0.188	7/32" 0.219	1/4" 0.250	9/32" 0.281	5/16" 0.313	11/32" 0.344	3/8" 0.375
Press. Head										
2.0	0.15	0.26	0.41	0.59	0.80	1.04	1.32	1.63	1.97	2.34
2.1	0.15	0.27	0.42	0.60	0.82	1.07	1.35	1.67	2.02	2.40
2.2	0.15	0.27	0.43	0.61	0.84	1.09	1.38	1.71	2.07	2.46
2.3	0.16	0.28	0.44	0.63	0.86	1.12	1.41	1.75	2.11	2.51
2.4	0.16	0.29	0.45	0.64	0.87	1.14	1.44	1.78	2.16	2.57
2.5	0.16	0.29	0.46	0.66	0.89	1.17	1.47	1.82	2.20	2.62
2.6	0.17	0.30	0.46	0.67	0.91	1.19	1.50	1.86	2.25	2.67
2.7	0.17	0.30	0.47	0.68	0.93	1.21	1.53	1.89	2.29	2.72
2.8	0.17	0.31	0.48	0.69	0.94	1.23	1.56	1.93	2.33	2.77
2.9	0.18	0.31	0.49	0.71	0.96	1.25	1.59	1.96	2.37	2.82
3.0	0.18	0.32	0.50	0.72	0.98	1.28	1.62	1.99	2.41	2.87
3.1	0.18	0.32	0.51	0.73	0.99	1.30	1.64	2.03	2.45	2.92
3.2	0.19	0.33	0.51	0.74	1.01	1.32	1.67	2.06	2.49	2.97
3.3	0.19	0.33	0.52	0.75	1.02	1.34	1.69	2.09	2.53	3.01
3.4	0.19	0.34	0.53	0.76	1.04	1.36	1.72	2.12	2.57	3.06
3.5	0.19	0.34	0.54	0.78	1.06	1.38	1.74	2.15	2.61	3.10
3.6	0.20	0.35	0.55	0.79	1.07	1.40	1.77	2.18	2.64	3.15
3.7	0.20	0.35	0.55	0.80	1.09	1.42	1.79	2.21	2.68	3.19
3.8	0.20	0.36	0.56	0.81	1.10	1.44	1.82	2.24	2.72	3.23
3.9	0.20	0.36	0.57	0.82	1.11	1.46	1.84	2.27	2.75	3.27
4.0	0.21	0.37	0.58	0.83	1.13	1.47	1.87	2.30	2.79	3.32
4.1	0.21	0.37	0.58	0.84	1.14	1.49	1.89	2.33	2.82	3.36
4.2	0.21	0.38	0.59	0.85	1.16	1.51	1.91	2.36	2.86	3.40
4.3	0.21	0.38	0.60	0.86	1.17	1.53	1.93	2.39	2.89	3.44
4.4	0.22	0.39	0.60	0.87	1.18	1.55	1.96	2.42	2.92	3.48
4.5	0.22	0.39	0.61	0.88	1.20	1.56	1.98	2.44	2.96	3.52
4.6	0.22	0.40	0.62	0.89	1.21	1.58	2.00	2.47	2.99	3.56
4.7	0.22	0.40	0.62	0.90	1.22	1.60	2.02	2.50	3.02	3.59
4.8	0.23	0.40	0.63	0.91	1.24	1.61	2.04	2.52	3.05	3.63
4.9	0.23	0.41	0.64	0.92	1.25	1.63	2.06	2.55	3.08	3.67
5.0	0.23	0.41	0.64	0.93	1.26	1.65	2.09	2.57	3.12	3.71

Pump Sizing

Below is a chart to aid in head selection due to friction loss in PVC pipe. In calculating friction be sure to add 20% for loss in fittings. In the chart below friction loss is per 100 feet of pipe. The head created by friction loss is added to the elevation head of lift form bottem of the pump tank to the top of the highest turnup.

Flow	Pipe diameter (in.)					
	1	1¼	1½	2	3	4
gpm	*Friction loss (ft)*					
1	0.07					
2	0.28	0.07				
3	0.60	0.16	0.07			
4	1.01	0.25	0.12			
5	1.52	0.39	0.18			
6	2.14	0.55	0.25	0.07		
7	2.89	0.76	0.36	0.10		
8	3.63	0.97	0.46	0.14		
9	4.57	1.21	0.58	0.17		
10	5.50	1.46	0.70	0.21		
11		1.77	0.84	0.25		
12		2.09	1.01	0.30		
13		2.42	1.17	0.35		
14		2.74	1.33	0.39		
15		3.06	1.45	0.44	0.07	
16		3.49	1.65	0.50	0.08	
17		3.93	1.86	0.56	0.09	
18		4.37	2.07	0.62	0.10	
19		4.81	2.28	0.68	0.11	
20		5.23	2.46	0.74	0.12	
25			3.75	1.10	0.16	
30			5.22	1.54	0.23	
35				2.05	0.30	0.07
40				2.62	0.39	0.09
45				3.27	0.48	0.12
50				3.98	0.58	0.16
60					0.81	0.21
70					1.08	0.28
80					1.38	0.37
90					1.73	0.46
100					2.09	0.55



APPROXIMATE PUMP CYCLE

TIE DOWN "A"	4"	6"	8"	10"	12"	14"	16"
DIFFERENTIAL "B"	10"	12"	14"	17"	20"	24"	28"

NOTES (a) SIZE TO PUMP - SIZE WIRE FOR TOTAL RUN FROM HOUSE PANEL TO PUMP

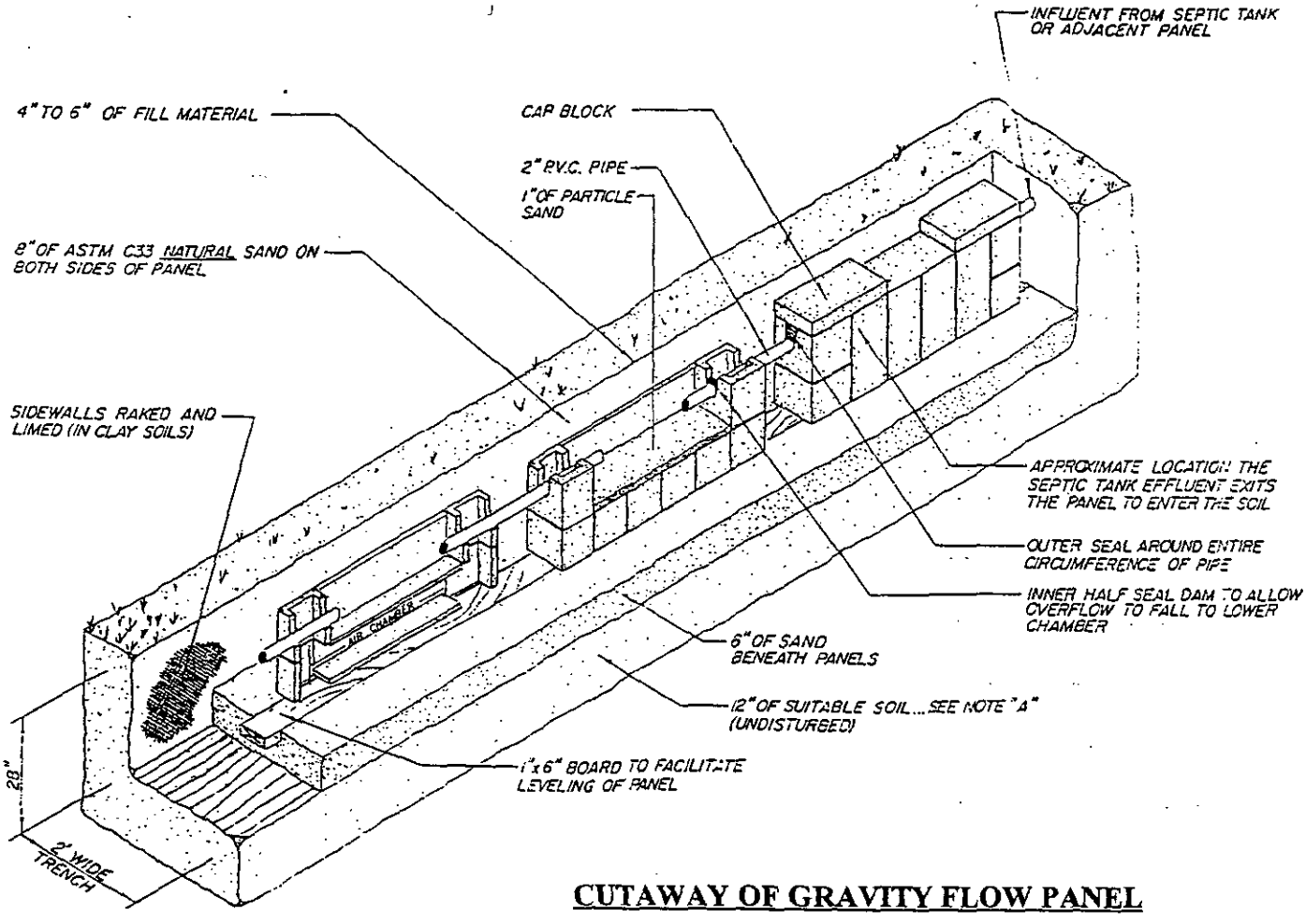
(b) PROVIDE SEPARATE CIRCUIT BREAKERS FOR PUMP POWER & IN HOUSE PANEL

The T & J Panel
Wastewater Treatment System

Patent # 4013559

269 Marble Road
Statesville, N.C. 28625
704-924-8600

ISOMETRIC DRAWING OF A SEGMENT OF 16" T & J PANEL SYSTEM DRAINFIELD



CUTAWAY OF GRAVITY FLOW PANEL

check 2235

FEE: 150.00 **AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION** ACS
DATE: 9/24/03 **VOID SIXTY (60) MONTHS FROM DATE OF ISSUANCE**

DATE: 9/23/03 **PERMIT NO:** 5373B
PARCEL NO: 199-391-22

JOB LOCATION ADDRESS: WINDY GAP RD.
PROPERTY OWNER: CRESCENT RESOURCES, INC.
BUILDING CONTRACTOR: _____
SUBDIVISION NAME: _____
AUTHORIZATION ISSUED BY: DAVID CORNELIUS, R.S. **DATE:** 9/23/03
DEHNR AUTHORIZED AGENT

AUTHORIZATION CONDITIONS

1. WASTEWATER SYSTEM CONSTRUCTION AND INSTALLATION MUST MEET ALL CONDITIONS AND SPECIFICATIONS AS SET FORTH IN IMPROVEMENT PERMIT NO. 5373B, AND THE ATTACHED SITE PLAN WITH SYSTEM DETAILS. CONSTRUCTION AND INSTALLATION MUST ALSO MEET ALL REQUIREMENTS SET FORTH IN THE RULES GOVERNING SANITARY SEWAGE COLLECTION, TREATMENT, AND DISPOSAL AND ANY OTHER APPLICABLE RULES AND LAWS.

2. AN INSTALLATION, CONSTRUCTION, ALTERATION AND/OR REPAIR APPROVAL MUST BE SECURED **PRIOR** TO INSTALLATION OF THE SEPTIC TANK SYSTEM. THE INSTALLER OF THE SYSTEM SHALL BE A REGISTERED SEPTIC TANK CONTRACTOR WITH MECKLENBURG COUNTY HEALTH DEPARTMENT.

3. ANY ALTERATION IN SITE OR SOIL CONDITIONS (INCLUDING LOCATION OF STRUCTURES AND APPURTENANCES) OR MODIFICATION IN USE, DESIGN WASTEWATER FLOW, OR WASTEWATER CHARACTERISTICS AS SPECIFIED IN THE ASSOCIATED IMPROVEMENT PERMIT AND APPLICATION, MAY SUBJECT THIS AUTHORIZATION AND ASSOCIATED PERMIT(S) TO REVOCATION.

4. OTHER CONDITIONS: MAINTENANCE CONTRACT MUST BE ON FILE PRIOR TO RELEASE OF OPERATION PERMIT.

OWNER CERTIFICATION

I CERTIFY THAT THERE HAVE BEEN NO ALTERATIONS IN SITE OR SOIL CONDITIONS OR MODIFICATIONS TO FACILITY, WASTEWATER FLOW, OR WASTEWATER CHARACTERISTICS FROM THOSE SPECIFIED IN THE ORIGINAL APPLICATION OR ASSOCIATED IMPROVEMENT PERMIT UNLESS AUTHORIZED IN WRITING BY THE MECKLENBURG COUNTY HEALTH DEPARTMENT. I ALSO UNDERSTAND THAT ANY SUCH ALTERATIONS, MODIFICATIONS, OR FALSE INFORMATION ARE GROUNDS FOR REVOCATION OF PERMITS AND/AUTHORIZATION TO CONSTRUCT.

SIGNATURE OF OWNER/OWNER'S REPRESENTATIVE — DATE 9/24/03

CONDITIONS OF IMPROVEMENT PERMIT

mit Number: 53738

Tax Number: 199-391-22

The IMPROVEMENT PERMIT is subject to revocation if site plans or the intended use change. There is to be NO grading, filling or disturbance of the soil in the area of the septic tank system or repair area.

CONSTRUCTION AUTHORIZATION must be obtained prior to receiving a Building Permit. The Construction Authorization is NOT transferable. Do not clear, grade, fill or disturb soil prior to obtaining a Construction Authorization.

Domestic-type wastewater only. No industrial process wastewater may be discharged into the system.

Basement	___ Yes	___ No	___ Partial Basement	
Type Primary Wastewater System Type (circle one): I II III (IV) V VI	X Conventional Prefabricated, permeable block panel system ___ Shallow Placed Conventional	___ Low Pressure Pipe ___ Large Diameter Pipe ___ Fill ___ Other	___ Innovative or Experimental: ___ IWWS-93-1 ___ IWWS-93-2 ___ IWWS-94-1	
.3 Long-term acceptance rate	480 Max gallons/day wastewater flow	804 Absorption Area (sq ft)	8' Trench spacing (min. on centers)	
Y Serviced by private well	1500 Gallon septic tank	268 Total trench length (ft)	30" Maximum trench depth (At least 12" of provisionally suitable soil must remain between trench bottom and unsuitable soil conditions)	
4 Bedrooms in residence	1000 Gallon pump tank	N/A Depth of stone		

Any surface waters present: Type: LAKE Minimum separation distance: 50'

Site modifications required:

Additional Conditions: ① INSTALL ACCORDING TO PLAN SUBMITTED ON FILE BY TONEY JACOBS & ASSOCIATES.

② MAINTENANCE CONTRACT MUST BE ON FILE PRIOR TO RELEASE OF OPERATION PERMIT.

Repair Area System Type Type (circle one): I II III (IV) V VI	X Conventional Prefabricated, permeable block panel system ___ Shallow Placed Conventional	___ Low Pressure Pipe ___ Large Diameter Pipe ___ Fill ___ Other	___ Innovative or Experimental: ___ IWWS-93-1 ___ IWWS-93-2 ___ IWWS-94-1	
804 Absorption Area (Sq ft) 268 Total Trench Length (Ft)	___ Depth of Stone Trench	8' Trench spacing (min. on centers)	30" Maximum Trench Depth	

For existing system, enter the year originally installed:

The undersigned, an authorized agent of the MECKLENBURG COUNTY HEALTH DEPARTMENT, certifies that the Department has approved the Request for the Job Location contained in this document. This approval is granted in accordance with the provisions of Laws and Rules For Sewage, Treatment and Disposal in effect at the time of issuance of the permit and is subject to the following provisions:

- No work shall be conducted on the septic tank system until an Installation, Construction, Alteration and/or Repair Approval is granted by this Department.
- This Improvement permit is transferable.

R.S. 9/24/03
DEHNR Authorized Agent Date

9-24-03
Owner/Agent Signature Date

MECKLENBURG COUNTY
HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
c/o HAL MARSHALL CTR.
SUITE 211
700 N. TRYON ST.
CHARLOTTE, N.C. 28202.
(704) 336-5102

NORTH CAROLINA DEPARTMENT OF
ENVIRONMENTAL, HEALTH,
AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH
ON-SITE WASTEWATER SECTION

FEE: 200.00 cash 1454

DATE: 9/8/03 JC

APPLICATION FOR IMPROVEMENT PERMIT
FOR RESIDENTIAL SITE
INDIVIDUAL WATER AND WASTEWATER
SYSTEMS PROGRAM

1 1 CRT

TYPE APPLICATION: ✓ NEW SYSTEM ___ EXPANSION/ ALTERATION OF EXISTING SYSTEM ___ REPAIR OF EXISTING SYSTEM

NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT,
HEALTH, AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH
ON-SITE WASTEWATER SECTION

FILE #: 53236

PROPERTY INFORMATION (FROM ENGINEERING FORM) FOR JOB LOCATION:

TAX/PARCEL NUMBER: 199 391 22

STREET ADDRESS: Windy Gap Rd 0.4 mile past Timberlake Lane

SUBDIVISION OR MOBILE HOME PARK NAME:

LOT NUMBER:

TYPE OF BUILDING (CHECK ONE):

___ SINGLE MOBILE HOME(S)
___ DOUBLE WIDE (D)
___ HOUSE (H)
___ MODULAR HOME (M)
___ MULTIPLE FAMILY (U)
___ OTHER (O)

TOWNSHIP (CHECK ONE):

✓ 0 MECKLENBURG
___ 1 CHARLOTTE
___ 2 DAVIDSON
___ 3 CORNELIUS
___ 4 PINEVILLE
___ 5 MATTHEWS
___ 6 HUNTERSVILLE
___ 7 MINT HILL

HEATED SQUARE FOOTAGE:

NUMBER OF BEDROOMS: NUMBER OF OCCUPANTS:

CLOSING DATE 10/4

FOUNDATION FOR RESIDENCE:

___ WITHOUT BASEMENT
___ ON SLAB
___ CRAWL SPACE
___ WITH BASEMENT /PLUMBING
___ WITH BASEMENT /NO PLUMBING

IF EXPANSION/ALTERATION OF EXISTING SYSTEM, DESCRIBE THE PROPOSED BUILDING ADDITION:

WILL THERE BE A HOME BUSINESS IN THE RESIDENCE: ___ YES ✓ NO TYPE: _____

WATER SUPPLY (CHECK ONE):

___ COMMUNITY (C)
___ SHARED WELL (S)
___ MUNICIPAL (M)
___ OTHER 'SPRINGS' (O)
✓ PRIVATE WELL (P)

IF ANY OF THE FOLLOWING ARE LOCATED ON THE PROPERTY, PLEASE SHOW LOCATION ON PLAT:

BURIED CABLES, LANDFILLS, STUMPHOLES ___ YES ✓ NO
EXISTING WASTEWATER SYSTEMS ___ YES ✓ NO
EASTMENTS OR RIGHT-OF-WAYS ✓ YES ___ NO
WELL, SPRINGS OR WATERLINES ___ YES ✓ NO
DESIGNATED WETLANDS ___ YES ✓ NO

PROPERTY OWNER:

NAME: (LAST) Crescent Resources Inc. (FIRST) (MI)

ADDRESS: PO Box 1003

CITY: Charlotte STATE: NC ZIP: 28202-1003

DAYTIME PHONE: (704) 663-6905

LEGAL AGENT FOR PROPERTY OWNER, IF APPLICABLE:

NAME: (LAST) Jacobs (FIRST) Toney (MI) C

DAYTIME PHONE: (704) 663-6905

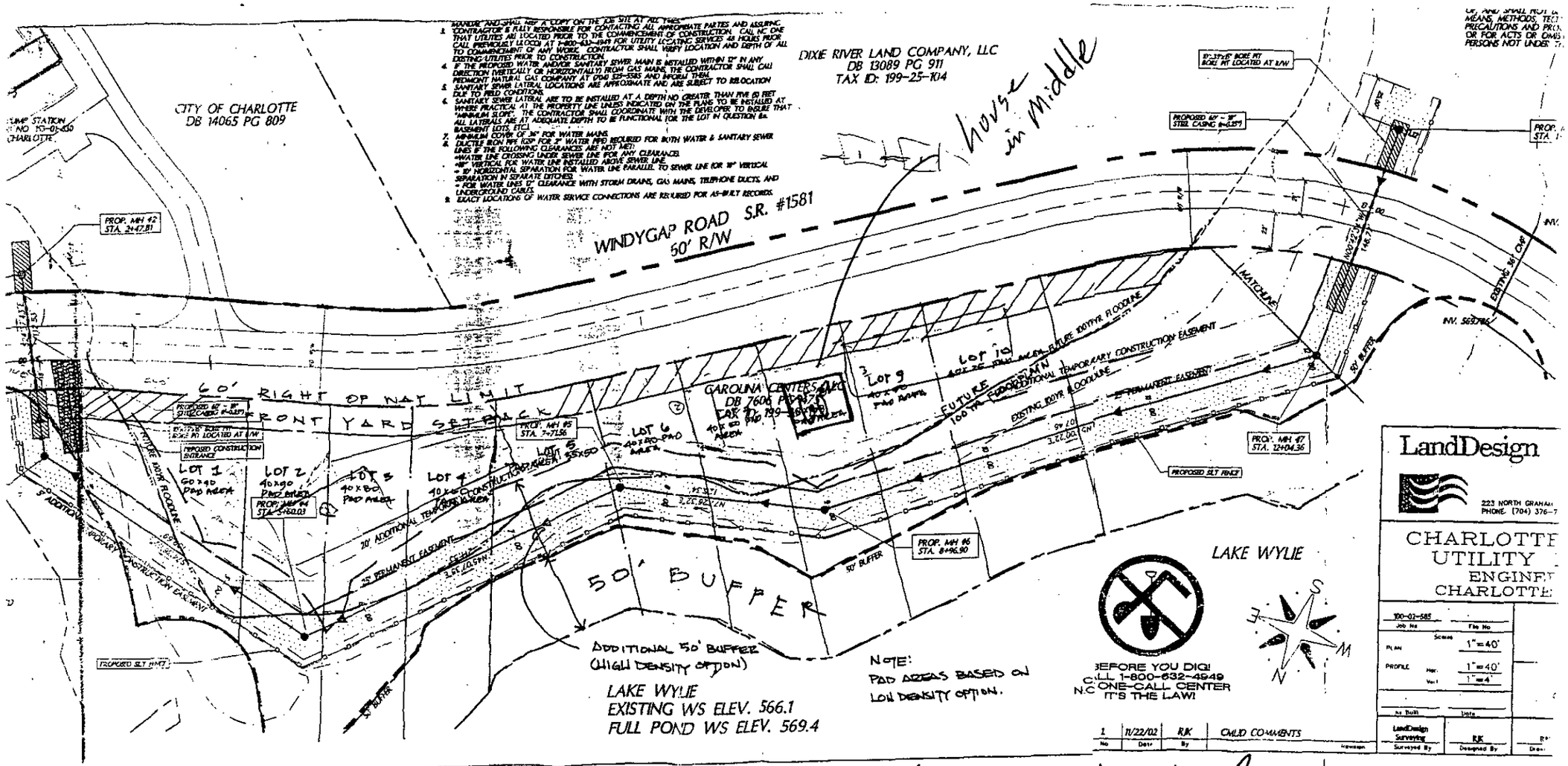
WHAT DATE WAS THE PROPERTY ORIGINALLY DEEDED AND RECORDED? _____

An Improvement Permit is subject to suspension or revocation if site plans or the intended use change or if information submitted in this application is falsified or changed. The undersigned, owner, or legal agent for the owner, of the property described above as the "Job Location" has read the foregoing application, acknowledges that the contents of same are true, and authorizes agents of the Mecklenburg County Health Department to enter onto the property for the purpose of processing this request.

SIGNED: Toney C Jacobs, CPSS DATE: 9/8/03

MECKLENBURG COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
c/o HAL MARSHALL CTR., SUITE 211, 700 N. TRYON ST., CHARLOTTE, N.C. 28202., (704) 336-5102

53735



Not subdivided

Department of Environment, Health, and Natural Resources
Division of Environmental Health
On-site Wastewater Section

Sheet: 1
Property ID: 199-391-22
Lot #:
File #: 5373B
Code: 1

SOIL/SITE EVALUATION for ON-SITE WASTEWATER SYSTEM

Owner: Crescent Resources, Inc.
Applicant: Toney Jacobs
Address: PO Box 1003, Charlotte, N. C. 28202-1003
Date Evaluated: 09/19/2003
Proposed Facility: Residence
Design Flow (.1949): 480gpd
Property Size: .3a inv
Location of Site: Windygap Road
Property Recorded:
Water Supply: [ ] Public [x] Individual [x] Well [ ] Spring [ ] Other
Evaluation Method: [x] Auger Boring [ ] Pit [ ] Cut
Type of Wastewater: [x] Sewage [ ] Industrial Process [ ] Mixed

PROFILE #	.1940 Landscape Position/ Slope%	Horizon Depth (IN.)	SOIL MORPHOLOGY .1941 Structure/ Texture	SOIL MORPHOLOGY .1941 Consistence Mineralogy	OTHER PROFILE FACTORS .1942 Soil Wetness/ Color	.1943 Soil Depth (IN.)	.1956 Sapro Class	.1944 Restr Horiz	Profile Class & LTAR
1	LS, 10	0-3	GR/CL	FR/SEXP/SS/SP	>48" TO SOIL WETNESS	48	N/A	NONE	PS, IV .3GPD/FT^2
		3-40	SBK/C	FI/SEXP/S/P					
		40-48	SBK/CL	FR/SEXP/SS/SP					
2	"	0-22	SBK/C	FI/SEXP/S/P	"	"	"	"	"
		22-48	WKSBK/CL	FR/SEXP/SS/SP					
3	"	0-28	SBK/C	FI/SEXP/S/P	"	"	"	"	"
		28-48	SBK/CL	FR/SEXP/SS/SP					

Description	Initial System	Repair System
Available Space (.1945)	PS	PS
System Type(s)		
Site LTAR	.3GPD/FT^2	.3GPD/FT^2

Other Factors (.1946): _____
Site Classification (.1948): PROVISIONALLY SUITABLE
Evaluated By: W. R. Marlin, LSS, 9/19/2003, W. R. Marlin
Others Present: P.Penninger

FILE # 5373B

COMMENTS: 100% repair

LANDSCAPE POSITIONS	GROUP	TEXTURES	.1955 LTAR	CONSISTENCE MOIST	WET
R-RIDGE	I	S-SAND	1.2 - 0.8	VFR-VERY FRIABLE	NS-NON-STICKY
S-SHOULDER SLOPE		LS-LOAMY SAND		FR-FRIABLE	SS-SLIGHTLY STICKY
L-LINEAR SLOPE				FI-FIRM	S-STICKY
FS-FOOT SLOPE	II	SL-SANDY LOAM	0.8 – 0.6	VFI-VERY FIRM	VS-VERY STICKY
N-NOSE SLOPE		L-LOAM		EFI-EXTREMELY FIRM	NP-NON-PLASTIC
H-HEAD SLOPE					SP-SLIGHTLY STICKY
CC-CONCLAVE SLOPE	III	SI-SILT-	0.6 – 0.3		P-PLASTIC
CV-CONVEX SLOPE		SIL-SILT LOAM			VP-VERY PLASTIC
T-TERRACE		CL-CLAY LOAM			
FP-FLOOD PLAN		SCL-SANDY CLAY LOAM			
		SICL-SILTY CLAY LOAM			
	IV	SIC-SILTY CLAY	0.4 – 0.1		
		C-CLAY			
		SC-SANDY CLAY			

STRUCTURE	MINERALOGY
SG-SINGLE GRAIN	SLIGHTLY EXPANSIVE
M-MASSIVE	
CR-CRUMB	EXPANSIVE
GR-GRANULAR	
SBK-SUBANGULAR BLOCKY	
ABK-ANGULAR BLOCKY	
PL-PLATY	
PR-PRISMATIC	

