

Tri-County Health Department

Serving Adams, Arapahoe and Douglas Counties

Chris J. Wiant, M.P.H., Ph.D.
Executive Director

CERTIFICATION OF INDIVIDUAL SEWAGE DISPOSAL SYSTEM

This certifies that Individual Sewage Disposal System (ISDS) at
5521 S Lake Gulch Road Castle Rock CO 80104

County: Douglas

has been permitted and installed in compliance with Tri-County Health Department Regulation Number I-96. A file for the ISDS will be kept in our Castle Rock office.

SUMMARY OF INFORMATION

The permit number for the system was: 1999-07-003770

The soils and percolation test was performed by: Geo Technica

The design engineer for the system was: Geo Technica

The system consists of:

A 1,000 gallon septic tank and 1,000 gallon dosing tank and 4,000 square foot absorption area.

The system is sized for 4 bedrooms. If additional bedrooms are added, an expansion may be necessary.

Maintenance Requirements:

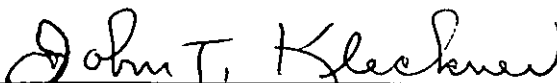
The septic tank must be pumped and inspected every 4 years

If the septic or dosing tank is equipped with an effluent filter, the filter must be cleaned annually

If the system has alternating beds or is a drip irrigation system, beds or zones must be rotated annually

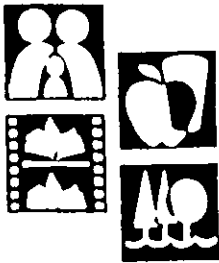
Additional maintenance requirements may apply. Refer to the operations manual or engineer's report for specific requirements.

Signature:


KLECKNER, JOHN T.

Date:

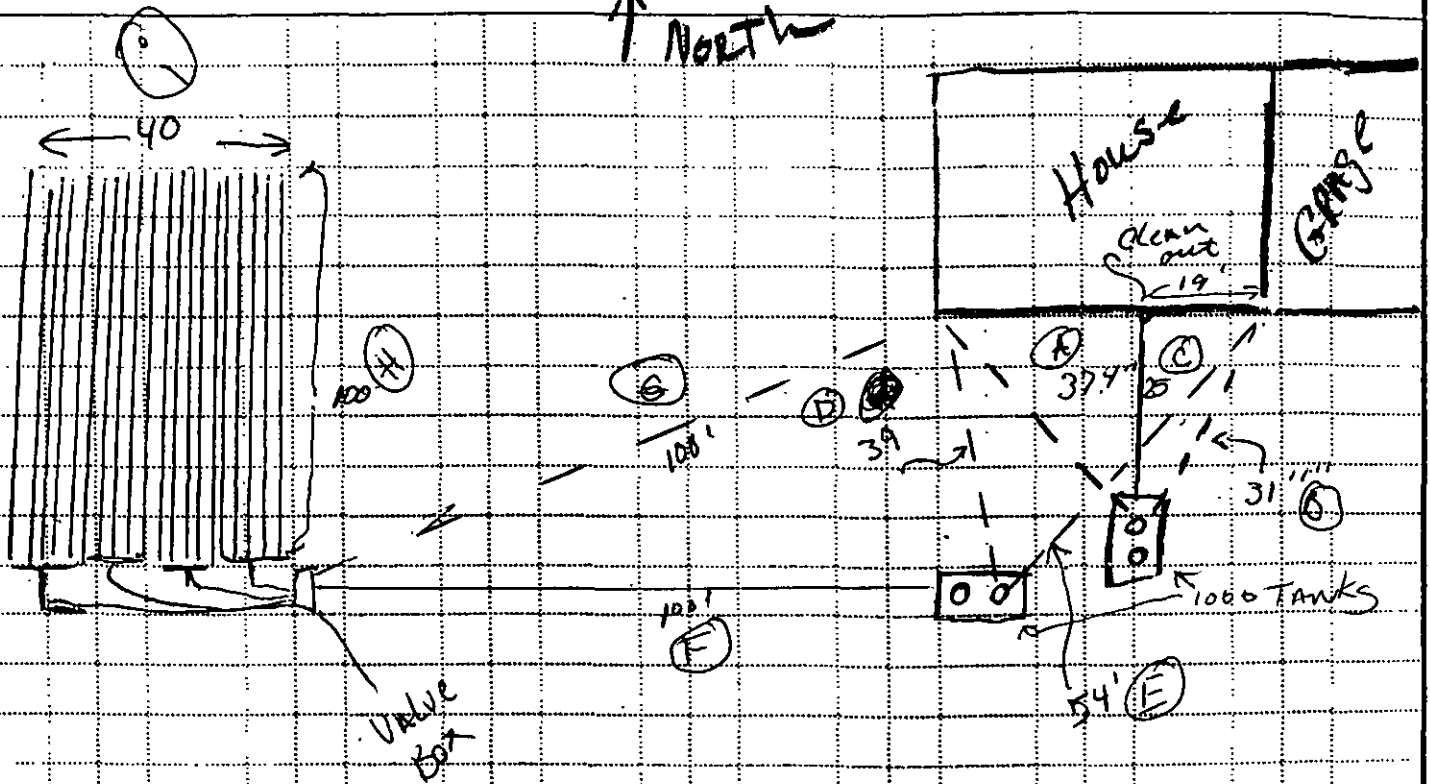
11/22/99



Onsite System
As-Built
Drawing

Property Address 5521 S. LAKE Gulch Rd.
 Permit # 99-2081
 Date System Completed 10-18-99
 Installer's Name BACKYARD BACKHOES INC
 Installer's License # 99-002553
 Installer's Address and Phone 303-621-2884

↑ NORTH



Sec 1 5 Lines 100'
 Sec 2 5 Lines 100'
 Sec 3 5 Lines 100'
 Sec 4 5 Lines 100'

(A)	37' 9"
(B)	31'
(C)	25'
(D)	39'
(E)	54'
(F)	100'
(G)	100'
(H)	100'
(I)	40'

GEO-teknica Engineering, Inc.

SOIL TESTS • PERCOLATION TESTS • FOUNDATION DESIGNS

P.O. BOX 266
FRANKTOWN, CO 80116
(303) 660-0300
(303) 660-3615 (FAX)

Job No: 98-137

Rick & Rita Meyers

Inspection Dates: 1. 9/29/99

420 Cantril

2. 10/18/99

Castle Rock, CO 80104

3. NA

Certification of the On-site Wastewater Disposal System Inspection for a Residence at:

5521 S. Lake Gulch Road,

Douglas County, Colorado

The following inspections have been performed by GEO-teknica Engineering for the above system:

- Site Evaluation
- Equipment and Facilities Installation
- Completed System

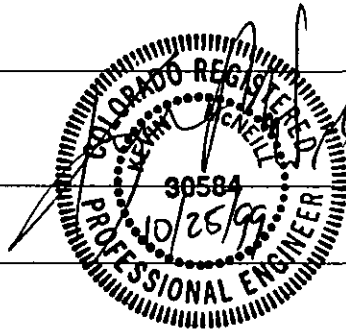
This report is to certify that the system is in compliance with the design and specifications with the following exceptions, if any:

1. _____

2. _____

3. _____

Remarks: _____





FINAL VISIT WORKSHEET

Permit Number: **1999-07-003770**

Date Printed: **October 18, 1999**

Property Location: **5521 S Lake Gulch Road**
 County: **Douglas**
 Owner: **Frederick/rita Meyers**
 System Installer: **,**

SITE INFORMATION:

Keys for completing information on installed tanks:
 Usage (D)osing (T)reatment (V)ault

Tank Manufacturer

100	Aguilars Corp	102	Colorado Precast	103	Copeland
104	Dekta Env. Products	105	Erie Precast	106	Firebaugh Pre-Cast
107	Front Range Precast	108	Schmitt Reddi Mix	109	Sterling Pre Cast
110	Vaughn Concrete				

Tank Type: Concrete (PT) Polyethelene (FG) Fiber Glass

TANK INFORMATION

Number of Tanks Installed: 2
 Tank Size in gallons and Usage:

Tank 1:
 Size 1000 Use (D) (T) (V)
 Type (PT) (FG) T's or Baffles (T) (B) Mfg Vaughn
 Effluent Screen Y N

Tank 2:
 Size 1000 Use (D) (T) (V)
 Type (PT) (FG) T's or Baffles (T) (B) Mfg Vaughn
 Effluent Screen Y N

Tank 3:
 Size _____ Use (D) (T) (V)
 Type (C) (PT) (FG) T's or Baffles (T) (B) Mfg _____
 Effluent Screen Y N

Secondary Treatment System Y N If yes, type: (circle one)
 Sand Filter (SF) Constructed Wetlands (CW) Trickling Filter (TF)
 Aerobic System (AS) Recirculating Sand Filter (RSP) Other (OT)

Final Treatment Type:

Bed (BD)	Mound (MD)	Trench (T)
ET (ET)	Pond (PD)	Sand Filter (SF)
Bed (Chambers) (BD-CH)	Trench SB-2 (TR-SB)	Drip Irrigation <input checked="" type="radio"/> (DR)
Trench (Chambers) (TR-CH)	Other (OT)	
Area Size (s.f.) <u>4,000</u>	If Chambers Used, # _____	ET Lined Y N

Method of Waste Water Application:

Dosed w/Pump (DP)	Dosed w/Siphon (DS)	Gravity (GR)
Uniformly Dosed w/ Pump (UDP)	Uniformly Dosed w/ Siphon <input checked="" type="radio"/> (UDS)	

Continued on Next Page

FINAL VISIT WORKSHEET

Permit Number: 1999-07-003770
ted:

Date Prin

RECORD OF SITE VISITS:

(It is important to record any extra visits for billing purposes)

Visit 1 Date 10/18/99 By (EHS #) 408

Visit 2 Date _____ By (EHS #) _____

Visit 3 Date _____ By (EHS #) _____

Visit 4 Date _____ By (EHS #) _____

TCHD Engineer Review Y N Time _____ EHS# _____

FINAL SITE VISIT COMMENTS:

Need AS-Built
~~Need Eng letter Geo~~

Final Approval Given Y N By (EHS #) 408

Geo-design, per
Backyard Backhoe - Installer
2-1000 - 4000 sq ft

SITE VISIT WORKSHEET

Permit Number: 1999-07-003770

Date Printed: March 2, 1999

Property Location: 5521 S Lake Gulch Road

Owner: Frederick/Rita Meyers

System Installer: ,

SITE INFORMATION AS REPORTED BY ENGINEER:

PERC RATE:

Holes:

One 48 Two 30 Three 34 Four 40 Five _____ Six _____ Avg Rate 38 Sizing Rate 38

CIRCLE ONE:

Bedrock Encountered? Yes No If Yes, Type Sandstone Depth to Bedrock (ft) 6

Ground Water Encountered? Yes No If Yes, Depth to Groundwater (ft) _____

Ground Slope at Absorption Area (%) 2

Max depth of disposal area (ft) 2 1/2' (not to exceed depth of percolation test holes)

Min depth of disposal area (ft) 1'

SOIL CLASSIFICATION:

- CL Clay (low-med plasticity) CH Clay (high plasticity) MH Silt
ML Silt ML-CL Silt & Clay SC Clayey Sand
SM-SC Silty Clayey Sand SM Silty Sand SW Sand, Well Graded
SP Sand, Poorly Graded GC Clayey Gravel GM-GC Silty Clayey Gravel
GM Silty Gravel GW Gravel, Well Graded

FIELD OBSERVATIONS:

Field Observations Consistent with Engineer's Data: Yes No

CIRCLE ONE:

Bedrock Encountered? Yes No If Yes, Type Sandstone

Depth to Bedrock (ft) 4'

Ground Water Encountered? Yes No If Yes, Depth to Groundwater (ft) _____

SOIL CLASSIFICATION:

- CL Clay (low-med plasticity) CH Clay (high plasticity) MH Silt
ML Silt ML-CL Silt & Clay SC Clayey Sand
SM-SC Silty Clayey Sand SM Silty Sand SW Sand, Well Graded
SP Sand, Poorly Graded GC Clayey Gravel GM-GC Silty Clayey Gravel
GM Silty Gravel GW Gravel, Well Graded

CONTINUED ON THE NEXT PAGE

SITE VISIT WORKSHEET

Permit Number: **1999-07-003770**

Date Printed: March 2, 1999

RECORD OF SITE VISITS:

(It is important to record any extra visits for billing purposes)

Visit 1 Date	<u>3/9/99</u>	By (EHS #)	<u>408</u>	Time Spent	<u>2.00</u>
Visit 2 Date	_____	By (EHS #)	_____	Time Spent	_____
Visit 3 Date	_____	By (EHS #)	_____	Time Spent	_____
Visit 4 Date	_____	By (EHS #)	_____	Time Spent	_____

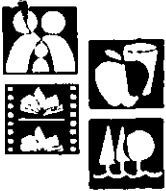
SPECIAL CONDITIONS

Install system as per Geo Technical
Design # 99-3015
Report # 98-137

COMMENTS

Obhole max

Signature TCHD Inspector: John Keckner Date 3/8/99



PERMIT # 3770

TRI-COUNTY HEALTH DEPARTMENT
Serving Adams, Arapahoe and Douglas Counties

APPLICATION TO
 INSTALL(255) REPAIR(256) EXPAND(256)
\$300 \$250 \$250
AN INDIVIDUAL SEWAGE DISPOSAL SYSTEM

ADDRESS OF PROPERTY SERVED BY PROPOSED SYSTEM:

5521 S. Lake Gulch Rd Castle Rock, Co.
Street Address City
80104 Douglas
Zip Code County

1/4 Sec ___ 1/4 Sec ___ Parcel ___ Section ___ Township ___ Range ___ Lot ___ Block ___
Legal Description (if no street address)

If GPS Information Available/Obtained: Longitude ___ Latitude ___ Elevation ___

Subdivision Name	Filing (if applicable)
Property Owner: Name <u>FREDERICK W. + RITA K. MEYERS</u> Address <u>420 COUNTRY ST.</u> City, State <u>CASTLEROCK CO.</u> Zip <u>80104</u> Phone <u>303-688-1580</u>	Applicant: Name <u>FREDERICK W. + RITA K. MEYERS</u> Address <u>420 COUNTRY ST.</u> City, State <u>CASTLEROCK</u> Zip <u>80104</u> Phone <u>303-688-1580</u>

TCHD Use Only: License #

Systems Contractor: _____

Soils/Percolation Test Engineer <u>Geo-Teknica</u>	Report No. _____
TCHD Use Only: FSE # _____	Job # <u>98-137</u>
Design Engineer (if applicable) <u>Geo-Teknica</u>	Design No. _____
TCHD Use Only: FSE # _____	Job # <u>99-3015</u>

Is this to be an Engineered System? Yes No
Is Lot Marked and are Perc Holes Staked? Yes No ___

PROPOSED FACILITY:
 Single Family (SF) Multi-Family (MF) Commercial (CM) Other (OT) _____
Lot Size: 4.3 ACRES

WATER SUPPLY:
On Site: Yes No Community Water Yes No If Yes, Supplier Well

Continued on back

SINGLE FAMILY RESIDENTIAL GENERAL INFORMATION:

Number of Bedrooms 4 Basement: Full (F) Walkout (W) Partial (P) None (N)

Basement Plumbed: Yes No

Are Additional Bedrooms Planned? Yes No Are the premises within 400 ft. of a sewer line? Yes No

Is property within boundaries of a sewer district? Yes No

If Yes, name of sewer district _____

COMMERCIAL GENERAL INFORMATION:

Type of Business: _____

TCHD Use Only: SIC Code _____

Number of Employees _____

Design Flow > 1,000 Gallons/Day Yes No

If Yes, has Site Approval been given from CDPHE? Yes No

(Note: Permit cannot be issued until site approval is given from CDPHE)

Floor Drains Yes No

EPA Shallow Injection Well Inventory Request Form Completed Yes No

Date Paid: 3-2-99 Received By: C.F. Blair

Payment Type: Cash


Check (# 1096)

Charge . . .

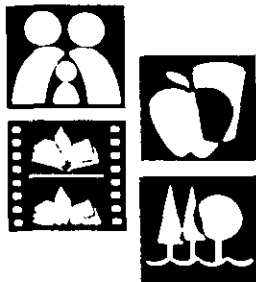
Other _____

Amount Paid \$ 300⁰⁰

Applicant's Name Friedrick W. Meyers
Please Print

Applicant's Signature 

Date _____



Tri-County Health Department

Serving Adams, Arapahoe and Douglas Counties

Permit # 1999-07-003770

Chris J. Wiant, M.P.H., Ph.D.
Executive Director

**PERMIT TO CONSTRUCT
AN INDIVIDUAL SEWAGE DISPOSAL SYSTEM**
Tri-County Health Department
7000 East Belleview Avenue Suite 301
Englewood, Colorado 80111

Owner **FREDERICK/RITA MEYERS**
Location: **5521 S Lake Gulch Road Castle Rock CO 80104**
County: **Douglas**

Design Requirements:

Install system per specifications of the Design Engineer

*****Special Conditions*****

INSTALL SYSTEM AS PER GEO-TEKNICA, DESIGN #99-3015, REPORT #98-137.

2-1000 / 4000

A Permit to CONSTRUCT shall expire ONE YEAR from the date of issuance unless extended to a fixed date upon request by the Applicant and approved by the Tri-County Health Department.

This Permit Expires: 03/10/2000

Issued by: Kleckner, John T.,

EHS

Tri-County Health Department on March 10, 1999

OWNER MUST MAKE SURE THAT HIS/HER ENTIRE WASTE DISPOSAL SYSTEM REMAINS OPEN FOR INSPECTION UNTIL IT HAS RECEIVED APPROVAL BY TRI-COUNTY HEALTH DEPARTMENT. TRI-COUNTY HEALTH DEPARTMENT CANNOT ASSUME RESPONSIBILITY IN CASE OF FAILURE OR INADEQUACY OF A WASTE DISPOSAL SYSTEM BEYOND CONSULTING IN GOOD FAITH WITH THE PROPERTY OWNER.

Permit Fee: 300.00 Payment Method Check #1096

Received By: Blair, Carol on 03/02/1999

() Owner Copy () Bldg. Dept. Copy () Installer Copy () H.D.

For Accounting Use Only:
680-500000

300.00

Fifty years of working to

50

improve the public's health

Tri-County Health Department

Percolation Test and Soils Data Form

Property address 5521 S. Lake Gulch Road

Legal description _____

Property Owner:

Name Rick & Rita Meyers

Address 420 Cantril, Castle Rock, CO 80104

Phone (303) 688-1580

Note:

- Percolation Test Form, Site Plan and Grain Size Distribution Curve of the Sample must be submitted with this form.
- For all <5 acres the site plan must include the entire lot. Test locations must be accurately tied to lost corners or other permanent markers.

Saturation and Swelling

- Smear surfaces removed: Yes No
- Sand or gravel added: Yes No
- Date and time presoak water added:
10-8-98 2:45 pm
- Amount of presoak water added (gallons):
± 6½
- Date and time percolation test is started:
10-9-98 11:00 am
- Did water remain in the hole after the overnight swelling period:
Hole 1 Yes No
Hole 2 Yes No
Hole 3 Yes No
Hole 4 Yes No

Percolation Rate Measurement

Percolation Rate (min./in.)	Hole 1	<u>48</u>
	Hole 2	<u>30</u>
	Hole 3	<u>34</u>
	Hole 4	<u>40</u>
Average		<u>38</u>

Groundwater:

- Encountered @ NE feet.
- Estimated depth to maximum seasonal water table if not encountered in profile: UNKNOWN.
- Is area believed to be subject to seasonal fluctuations which could result in a seasonal water table within 8' of surface?
 Yes No

Slope determination in absorption area: 2 % to the NW (direction)

Bedrock:

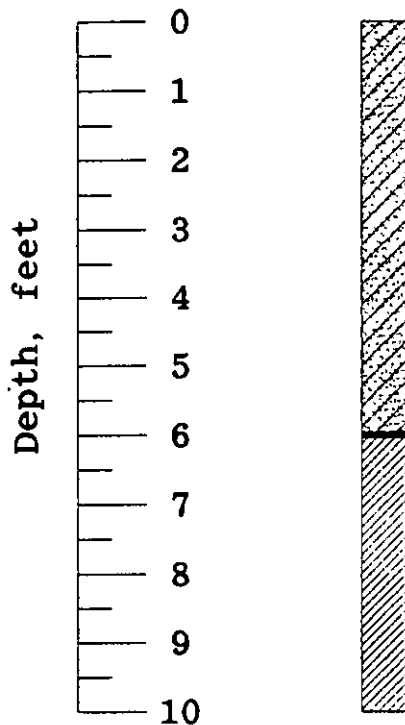
- Encountered @ 6 feet.
- Estimated depth if not encountered in profile: _____
- Type of bedrock: Sandstone
 Claystone Siltstone
_____ Other
- Is bedrock fractured or weathered?
 Yes No
- Is bedrock believed to be permeable?
(Perc rate <60 min./in.)
 Yes No

Profile Hole Information

(Soils must be classified using Unified System ASTM D2487)

GEO-teknica Engineering Job No. 98-137

Profile Hole Log



SAND, clayey, loose

Drive Sample Taken at 36"

9/12 Blow Count

15% Moisture Content

38% Passed the #200 Sieve

SANDSTONE, clayey



Certification

I certify that the above information is correct and complete to the best of my knowledge and that all tests were performed in accordance with the provisions of Tri-County Health Department Regulation I-96 by myself or under my supervision.

Michael J. Ballou

Original Signature

10/22/98

Date

GEO-teknica Engineering

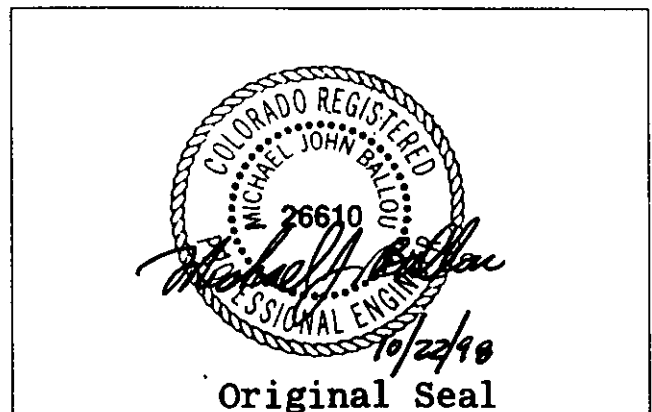
Company Name

P.O. Box 266, Franktown, CO 80116

Address

(303) 660-0300

Phone



TRI-COUNTY HEALTH DEPARTMENT
PERCOLATION TEST RESULT FORM
JOB NO. 98-137

HOLE NO.	HOLE DEPTH (IN.)	LENGTH OF INTERVAL (MIN.)	WATER ADDED	WATER DEPTH @ START OF INTERVAL (IN.)	WATER DEPTH @ END OF INTERVAL (IN.)	DROP IN WATER LEVEL (IN.)	PERCOLATION RATE @ FINAL INTERVAL (MIN./IN.)
1	60	30		8.0000	5.7500	2.2500	48
		30		5.7500	4.2500	1.5000	
		30		4.2500	3.1250	1.1250	
		30		3.1250	2.1875	0.9375	
		30	**	8.0000	6.9375	1.0625	
		30		6.9375	6.1875	0.7500	
		30		6.1875	5.5000	0.6875	
		30		5.5000	4.8750	0.6250	
		2	48	30		8.0000	
30				5.0000	2.5000	2.5000	
30	**			8.0000	5.3750	2.6250	
30				5.3750	3.3125	2.0625	
30				3.3125	1.6250	1.6875	
30	**			8.0000	6.0000	2.0000	
30				6.0000	4.6250	1.3750	
30				4.6250	3.6250	1.0000	
3	36	30		8.0000	4.6250	3.3750	34
		30		4.6250	2.0000	2.6250	
		30	**	8.0000	5.0625	2.9375	
		30		5.0625	3.3125	1.7500	
		30		3.3125	1.9375	1.3750	
		30	**	8.0000	6.3125	1.6875	
		30		6.3125	5.3750	0.9375	
		30		5.3750	4.5000	0.8750	
4	60	30		8.0000	5.2500	2.7500	40
		30		5.2500	3.1875	2.0625	
		30	**	8.0000	5.8125	2.1875	
		30		5.8125	4.2500	1.5625	
		30		4.2500	3.1875	1.0625	
		30	**	8.0000	6.6250	1.3750	
		30		6.6250	5.7500	0.8750	
		30		5.75	5	0.75	

** WATER ADDED

* FIELD NOTES SHALL BE RECORDED ON THIS FORM OR IN THIS FORMAT; TYPED COPIES OF FIELD RECORDS MAY BE SUBMITTED ON THIS FORM.

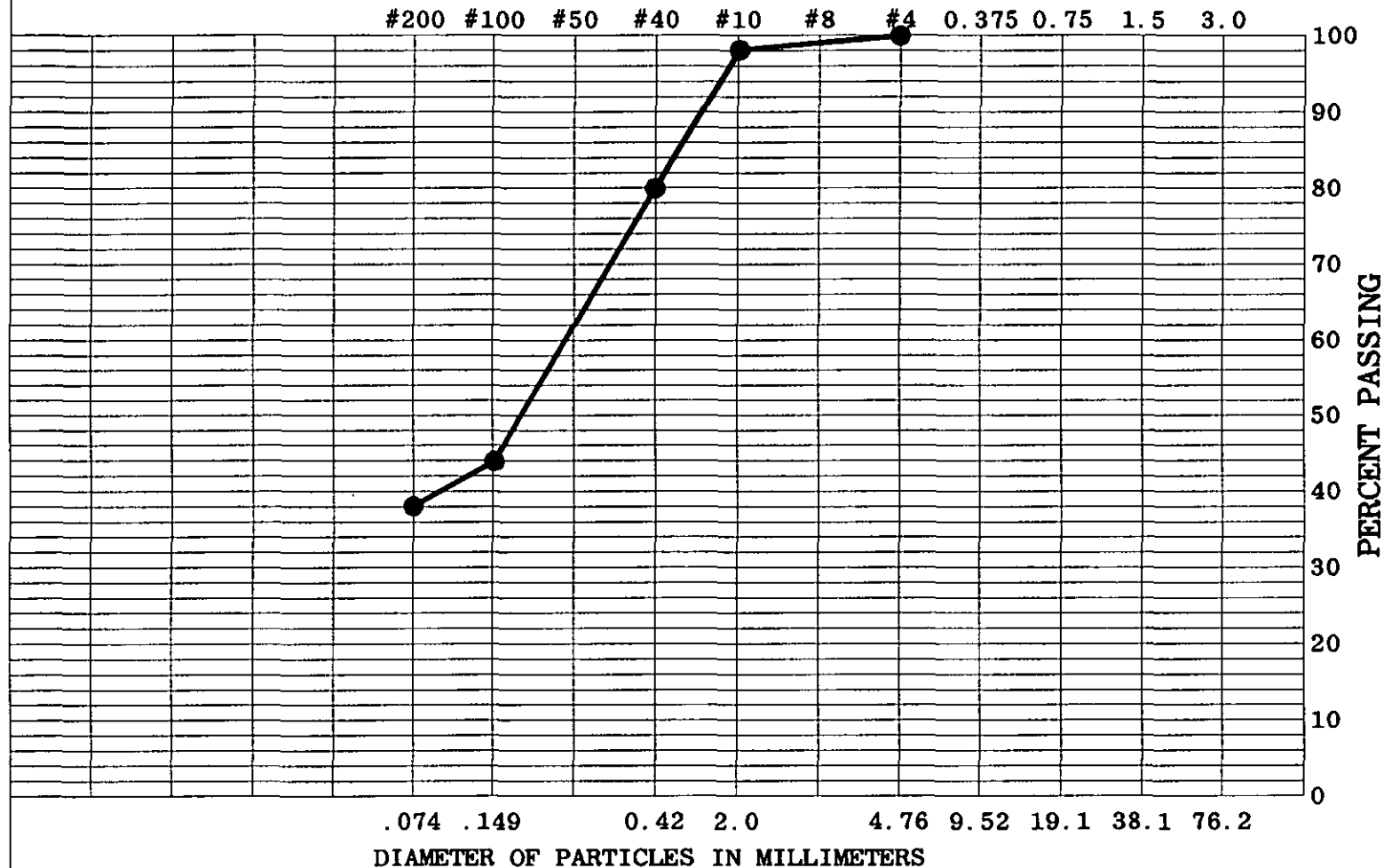
* A FOUR HOUR TEST MUST BE CONDUCTED UNLESS: A) WATER REMAINS IN THE HOLE AFTER THE PRESOAK IN WHICH CASE ONE 30 MIN. INTERVAL IS SUFFICIENT, B) THE FIRST 6" OF WATER SEEPS AWAY IN < 30 MINUTES IN WHICH CASE A ONE-HOUR TEST OF 6 -10 MINUTE TIME INTERVALS MAY BE USED, C) THE TEST IS BEING CONDUCTED IN SAND IN WHICH CASE A ONE-HOUR TEST OF 6 - 10 MINUTE TIME INTERVALS MAY BE USED, D) THREE SUCCESSIVE WATER LEVELS DROPS DO NOT VARY MORE THAN 1/16 INCH IN WHICH CASE A TWO HOUR TEST MAY BE CONDUCTED.

PARTICLE SIZE DISTRIBUTION ANALYSIS

Date Sampled 4-10-98 Hole No. Profile Sample Depth 36 inches Report No. 98-137

Sample Location 5521 S. Lake Gulch Road, Douglas County, Colorado

SIEVE ANALYSIS

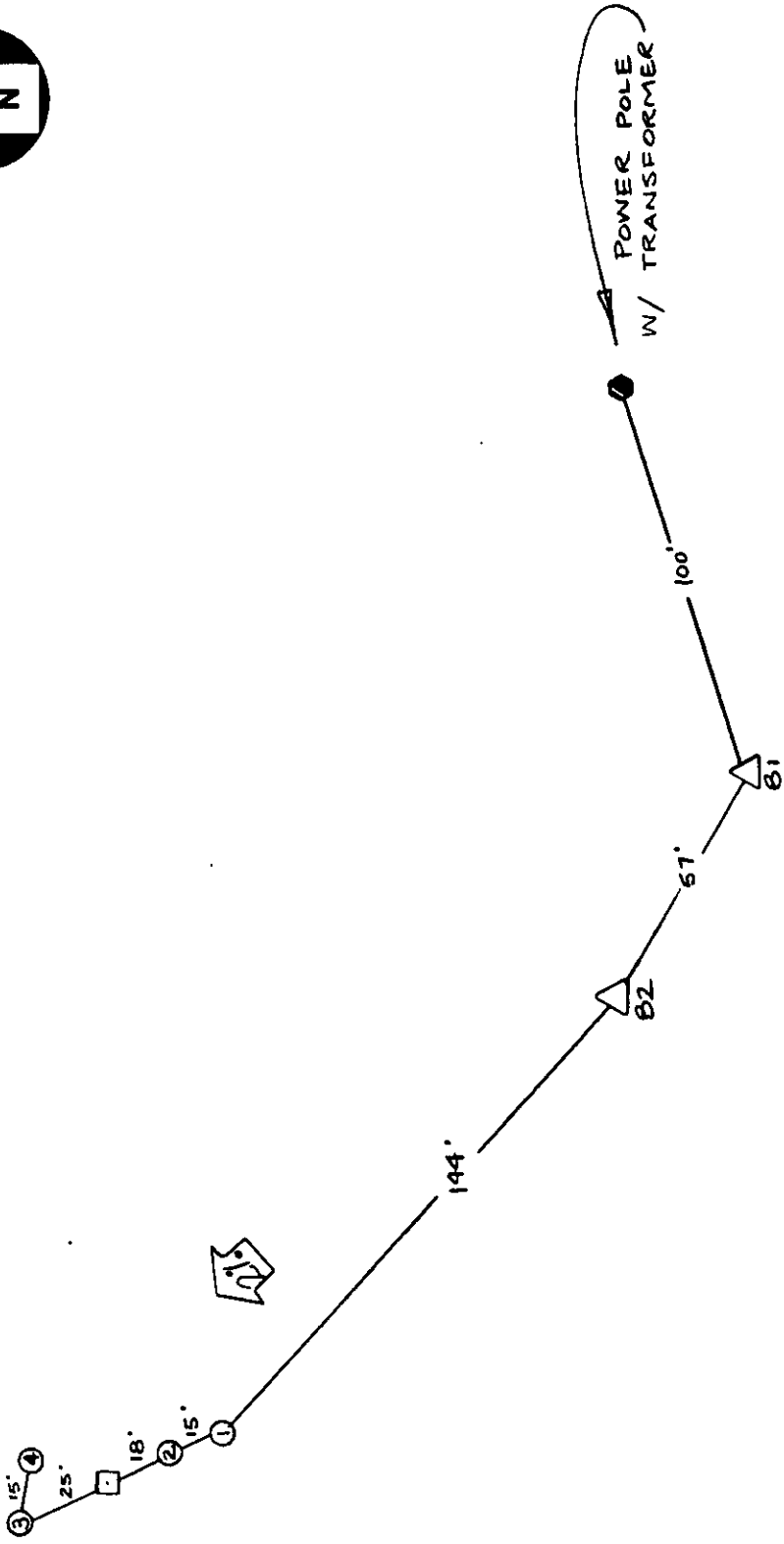


Sieve Number	Percent Passing
3.0	
1.5	
0.75	
0.375	
# 4	100
# 8	
# 10	98
# 40	80
# 50	
# 100	44
# 200	38

Soil Classification
SC

CLAY (plastic) to SILT (non-plastic)	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE

Location Map

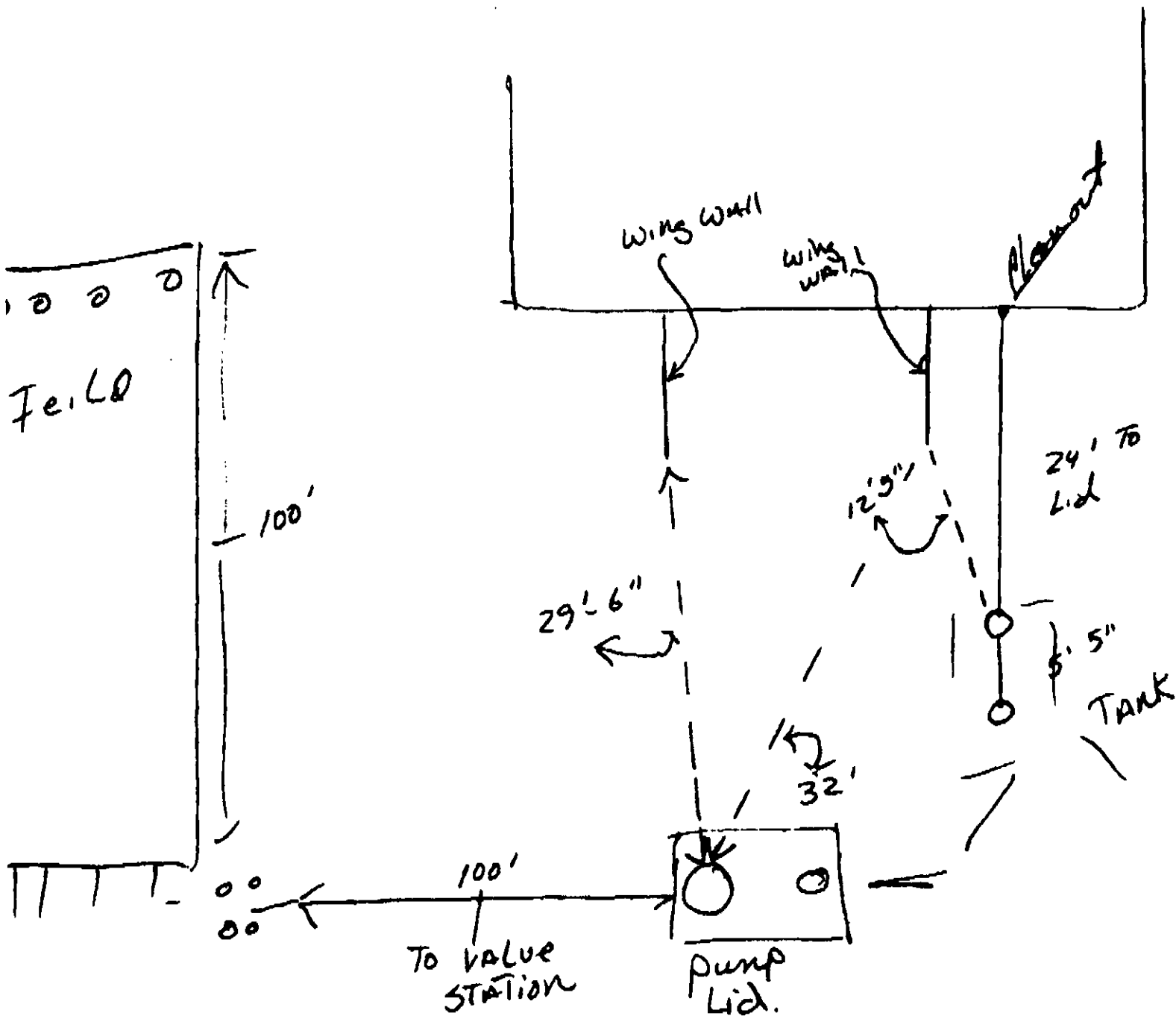


- △ Foundation Soil Test Borings
- Percolation Test Holes
- Soil Profile Hole
- ⊗ Unsuitable Soil Profile Hole

GEO-teknic
SOIL TESTS PERCOLATION TESTS FOUNDATION DESIGNS

98-137

Figure 1



For : Rick & Rita Meyers
 5521 S. Lake Gulch Rd.
 Douglas, County

Septic
 As-Built Drawing

By: BBS Excavating
 P.O. Box 62

Kingman, AZ 86401 L/N 97-002553

Attn: Millie
Tri-County.

To follow: Rick's drawing for the
Meyers residence.

Geo-Technika has an inspection
scheduled for Monday A.M.
(First thing)

I don't have a time written in
for your inspection - probably should
be later in the day.

Let me know of any problems.

Ann Wicker

303-621-2884



GEO-teknica Engineering

SOIL TESTS · PERCOLATION TESTS · FOUNDATION DESIGNS

P.O. Box 266
Franktown, Colorado 80116
Web: www.geo-teknica.com
Fax: 303-660-3615
Tel: 303-660-0300

7
J

**Rick & Rita Meyers
420 Cantril
Castle Rock, CO 80104
688-1580**

**DESIGN SPECIFICATIONS FOR
ONSITE WASTEWATER TREATMENT SYSTEM**

AT

**5521 S. LAKE GULCH ROAD
DOUGLAS COUNTY, COLORADO**

DESIGN NO. 99-3015
REPORT NO. 98-137
February 18, 1999



2-18-99

GENERAL

As requested, we have investigated subsurface conditions at the subject site. The purpose of our investigation was to evaluate subsurface conditions and to design an onsite wastewater treatment system (OWTS).

SITE CONDITIONS

The site is a vacant lot located in **5521 S. Lake Gulch Road, Douglas County, Colorado**. The location of the site, percolation tests and proposed OWTS are presented in Figure 1. The slope at the proposed field is approximately 2% to the northwest.

PROPOSED CONSTRUCTION

A 4-bedroom residence is proposed as indicated on Figure 1. The base sewage loading for a 4-bedroom dwelling is 600 gallons per day (GPD), (1440 GPD with a 1.5 safety factor and design loading factors for garbage grinder and washing machine).

SUBSURFACE CONDITIONS

Subsurface conditions were investigated by one profile test hole and four percolation holes, as indicated on Figure 1. Subsurface conditions encountered consist of clayey sand to 6' overlying clayey sandstone to 10'. No free water was encountered in the profile pit. Percolation rates ranged from 30 to 48 minutes per inch (MPI). The average percolation rate is 38 MPI.

RECOMMENDATIONS

Due to Tri-County Health requirements, we recommend a low pressure shallow trench OWTS be installed in the natural soils. We recommend the OWTS be designed based on a percolation rate of 60 MPI, which is an application rate of 0.32 gallons/square foot/day (GAL/SF/DAY). This application rate utilizes slow rate soil absorption. The OWTS should be designed for a base sewage load of 600 GPD with appropriate design factors. A low pressure shallow trench disposal system design based on an application rate of 0.32 GAL/SF/DAY and a base sewage load of 600 GPD is presented on Figures 2 through 5. As indicated on Fig. 2, the disposal field has an area of 4000 square feet (SF) in 4 sections. We recommend a minimum of 2-1000 gallon, 2-compartment septic tanks. From the second chamber of the second septic tank effluent will be pumped to the drip irrigation disposal field through 4 distribution valves. Dosing will be done by pumping of effluent from the final chamber of the septic tank. A minimum of 150 gallons per dose will be pumped to distribute effluent through a minimum of 33% of the disposal field. **The OWTS installer must be approved by this office before work begins on this system.**

If more bedrooms are added the system will have to be increased to accommodate the new sewage load which will mean an increase in tank size and field size. The installation of a properly sized OWTS to serve future buildout can be cost effective. The proposed septic tank configuration will serve up to a 5-bedroom residence.

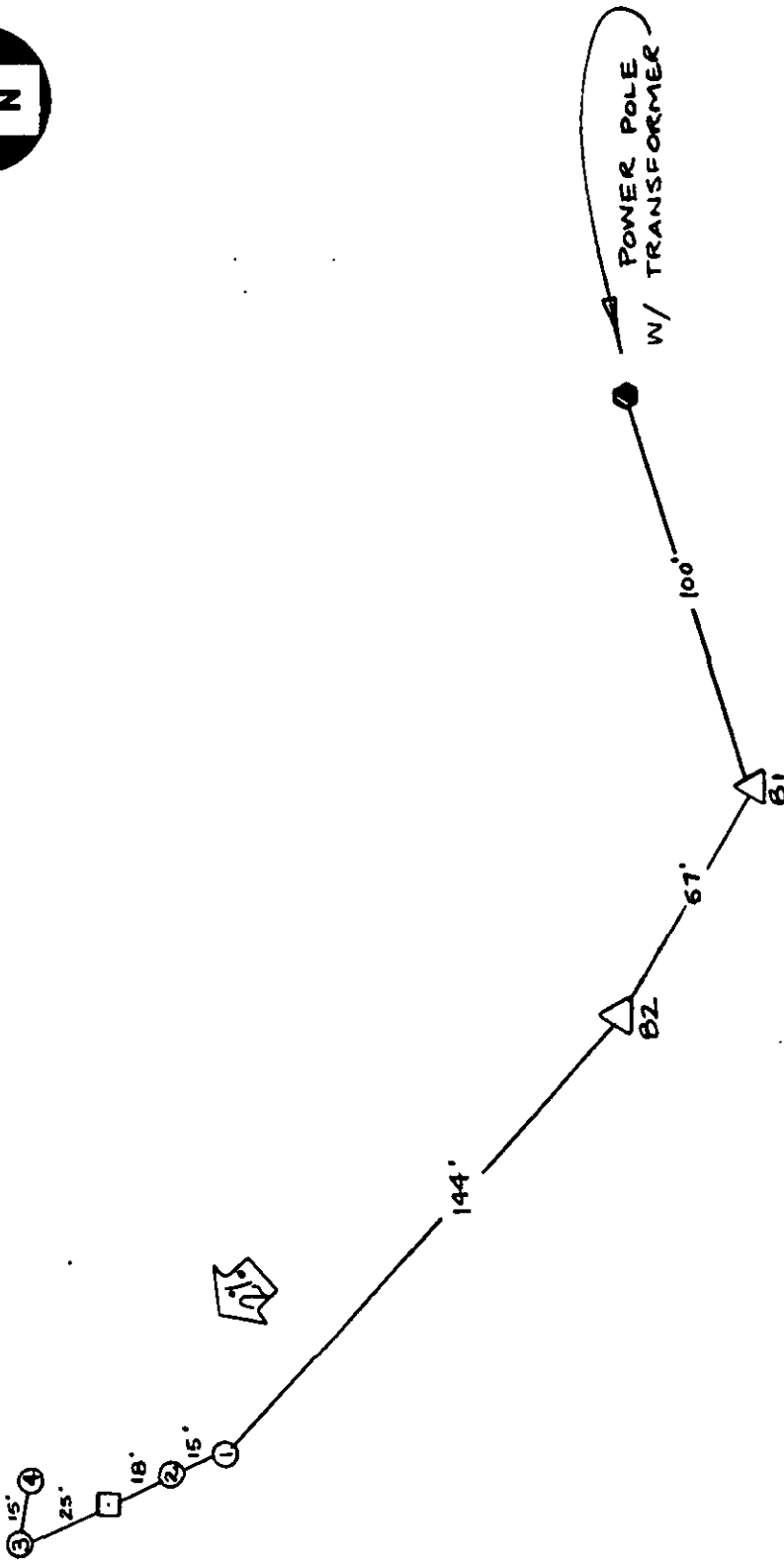
We recommend the surface of the field be seeded after installation of the drip irrigation system. A good native grass cover will prevent erosion. We recommend a seed mix such as a "Foothills, Pasture, or Prairie" mixes available at local seed stores. These mixes do not require irrigation and develop a growth 10 to 15 inches high. No automatic sprinkler system should be installed over the field.

The owner must realize an OWTS is different from public sewer service. The owner must be aware of and assume responsibility for maintenance of the system. The system is relatively maintenance free, but the owner must have the septic tanks pumped. We recommend the tanks be pumped every two years. There are daily considerations, such as not putting plastic or other nonbiodegradable material into the septic system. Water use must be monitored so toilets are not allowed to run when seals malfunction. To illustrate the point, it should be noted a running toilet will consume in excess of 1000 gallons per day, if allowed to run. As the system is designed for 600 GPD, an excess 1000 GPD loading could irreparably harm the system. No discharge from water softeners, spas, or pools should be directed to the OWTS.

LIMITATIONS

Our investigation, layout, and recommendations are based on data submitted. If conditions different from those described in this report are encountered, we should be notified to evaluate the effect of the changes on the proposed OWTS. If modifications to our recommendations are made by local health departments, we should be contacted to evaluate the impact to our OWTS recommendations.

Location Map



GEO-tekhnica
SOIL TESTS PERCOLATION TESTS FOUNDATION DESIGN

98-137





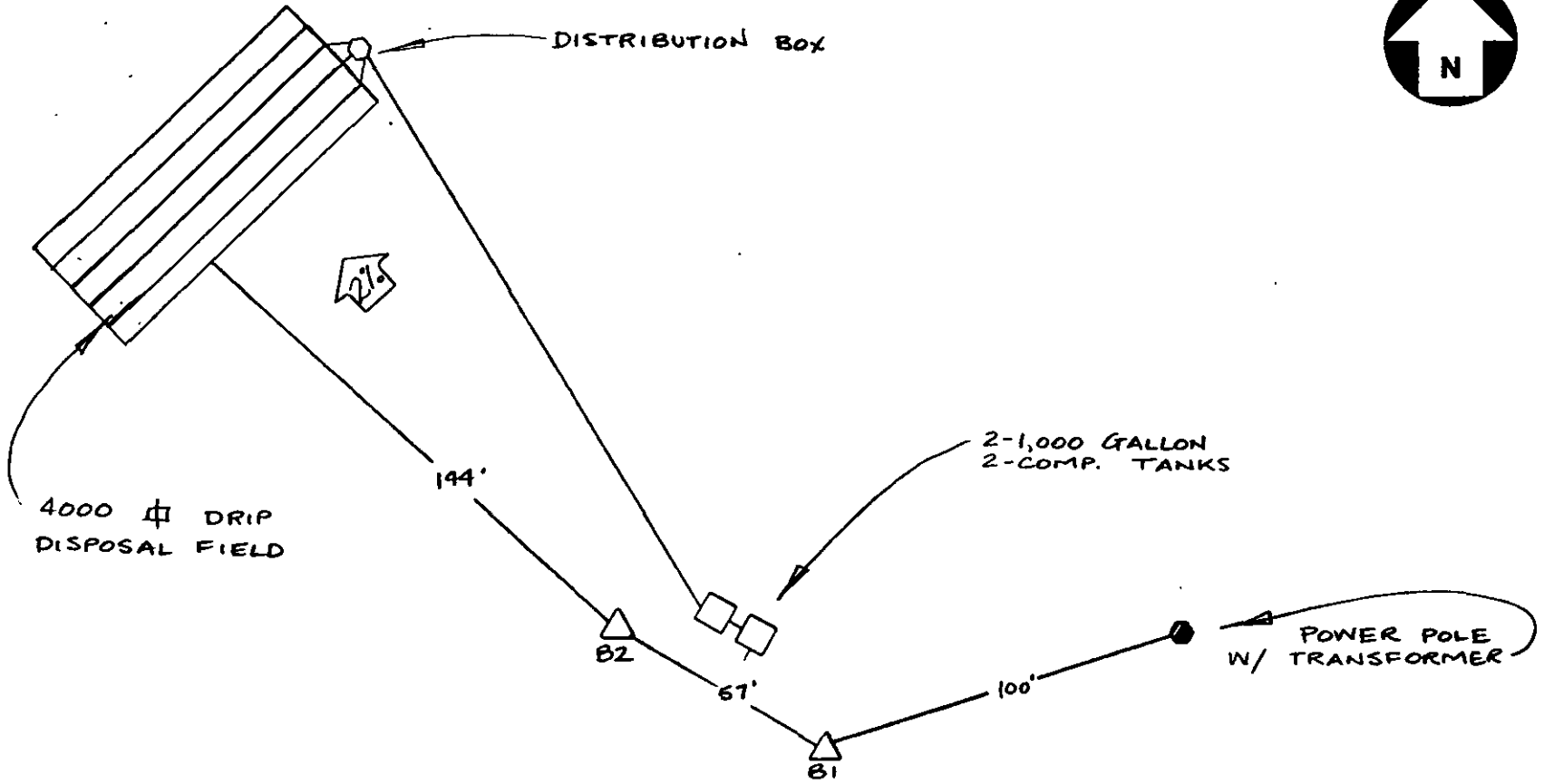
-  Foundation Soil Test Borings
-  Percolation Test Holes
-  Soil Profile Hole
-  Unsuitable Soil Profile Hole

Figure 1

Location Map







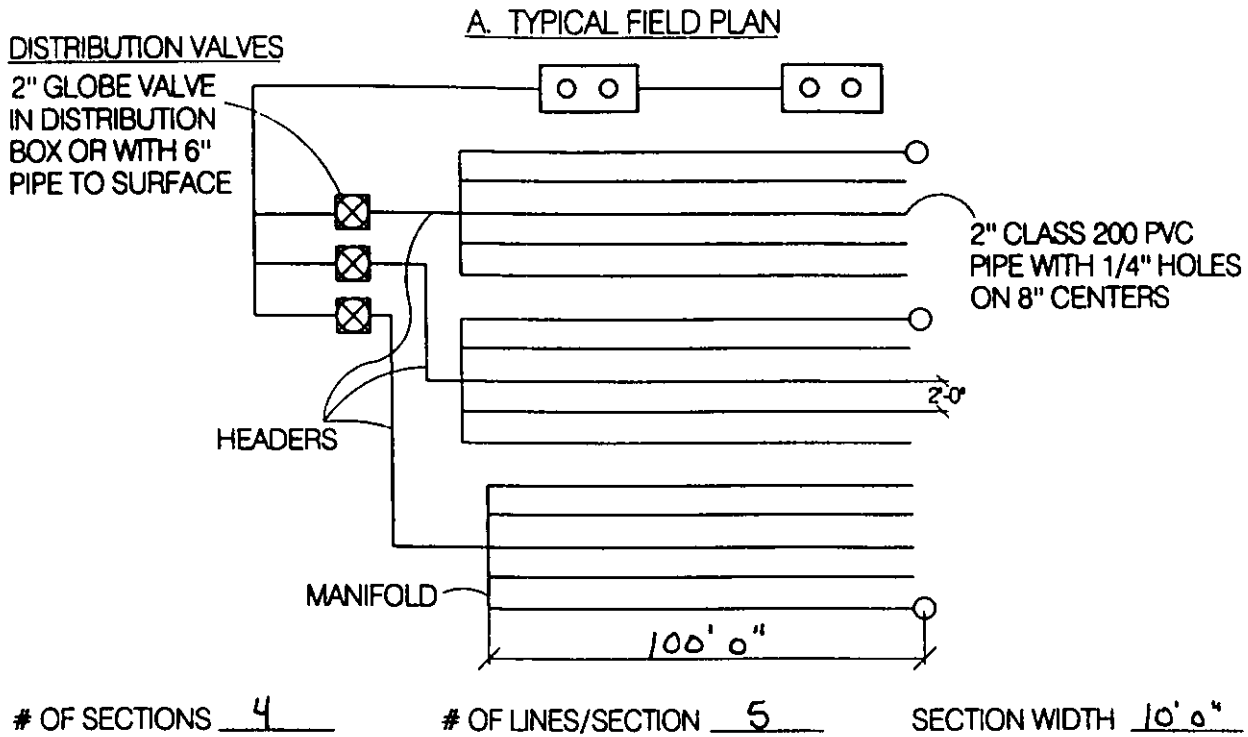
-  Foundation Soil Test Borings
-  Percolation Test Holes
-  Soil Profile Hole
-  Unsuitable Soil Profile Hole

Figure 1

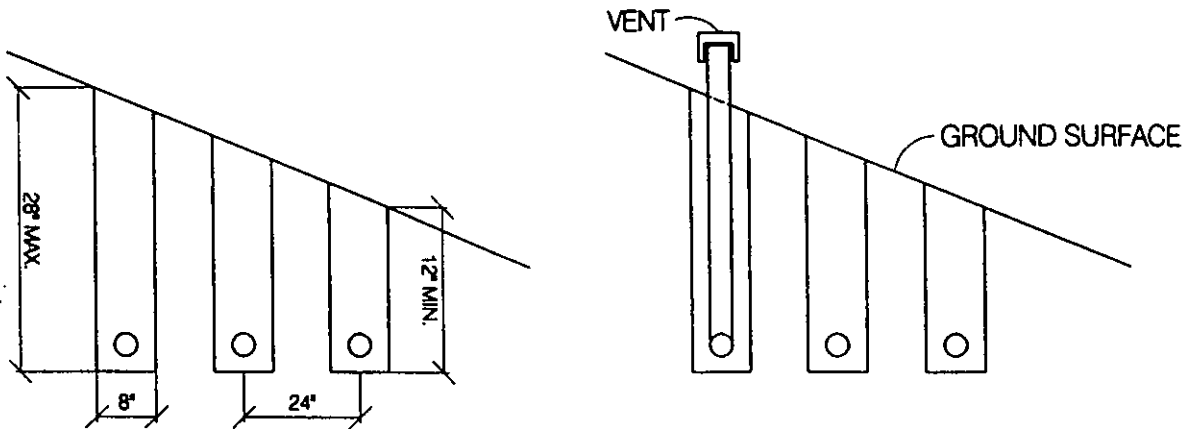
GEO-tekhnica
SOIL TESTS PERCOLATION TESTS FOUNDATION DESIGN

98-137

DETAIL OF DISTRIBUTION LATERALS



B. TYPICAL FIELD CROSS-SECTION



C. SPECIFICATIONS

TREATMENT UNIT

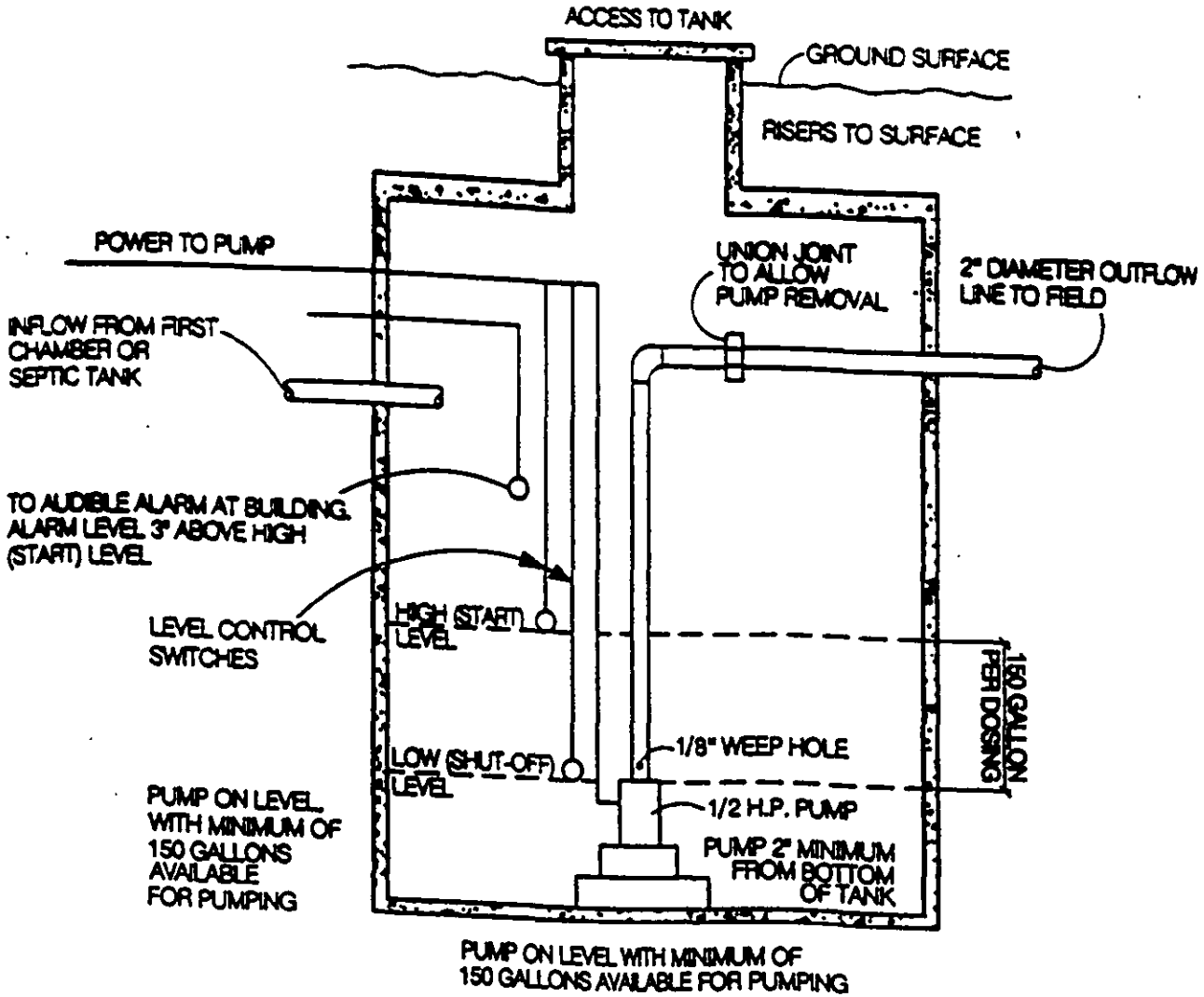
1. TWO 1000 GALLON 2 COMPARTMENT SEPTIC TANKS WITH PUMP IN SECOND CHAMBER OF SECOND TANK.
2. PUMP 1/2 HP Gould or Equal
3. ALARM/CONTROL LOCATED BY OWNER
4. # OF RISERS TO SURFACE 4
5. DRAIN BACK TO PUMP; FIELD
6. OTHER _____

DISTRIBUTION FIELD

1. BEDROOMS 4 (Q GAL.) 400
2. DESIGN PERCOLATION RATE (MPI) 60
3. DISPOSAL RATE (R GAL/SF/DAY) .32
4. REQUIRED AREA OF FIELD 3949
5. DESIGN FIELD AREA (SQ. FT.) 4000
6. LINEAR FT. (PIPE) 2000
7. OTHER _____

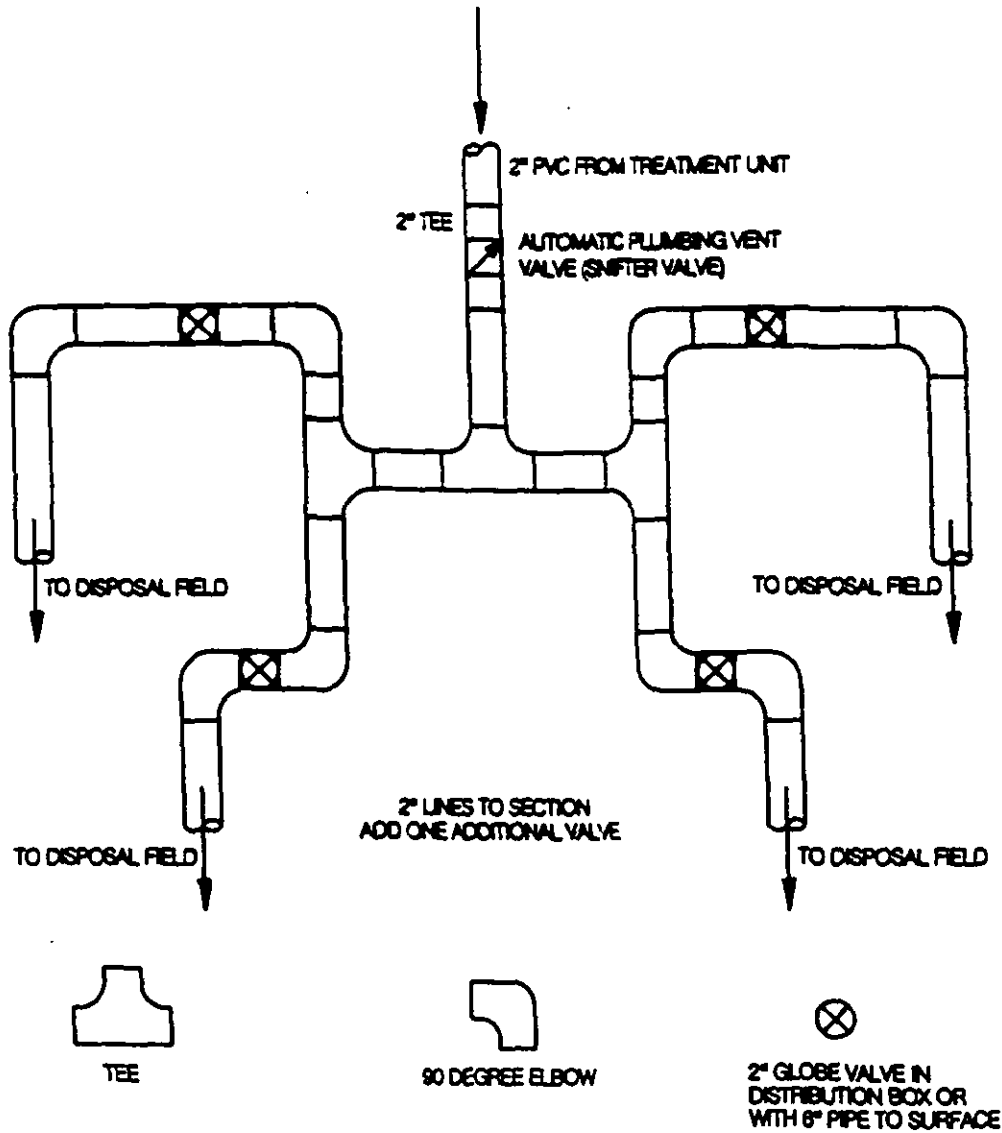
FIGURE 3

PUMP CHAMBER DETAIL



SECOND COMPARTMENT OF SECOND 1,000 GALLON
TANK OR SEPARATE 500 GALLON CHAMBER

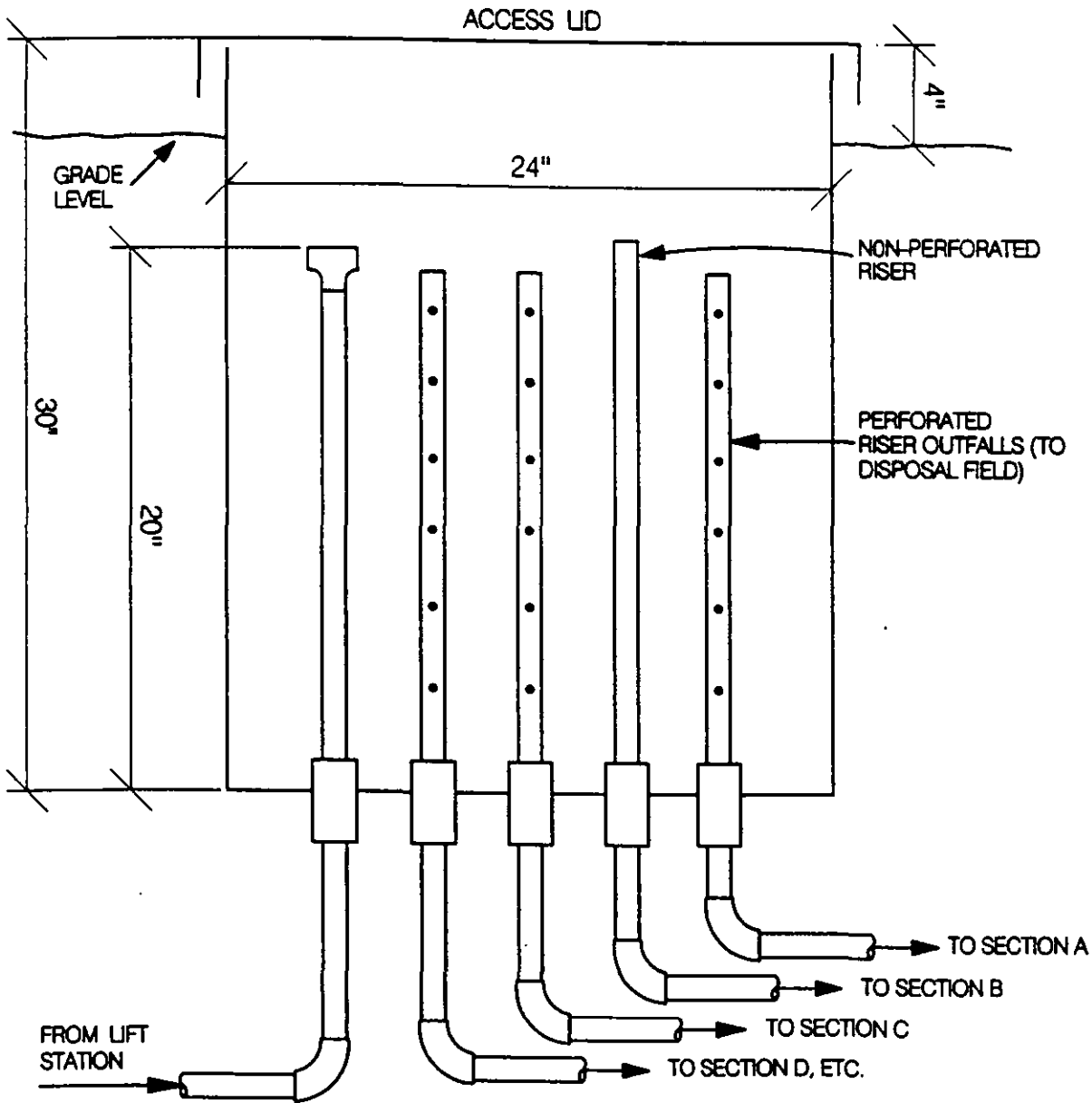
DETAIL OF DISTRIBUTION VALVES



IN ORDER TO EXTEND THE LIFE OF THE FIELD, WE RECOMMEND THAT ONE SECTION OF THE FIELD BE CLOSED AT ALL TIMES TO ALLOW DRYING OF THAT FIELD. THIS CAN BE ACCOMPLISHED BY SEQUENTIALLY CLOSING THE VALVE TO ONE SECTION OF THE FIELD EVERY SIX MONTHS.

FIGURE 5

ALTERNATE SURGE TANK DETAIL



DISTRIBUTION PIPE SHOULD SLOPE DOWNGRADE
TO LATERALS FOR FROST PROTECTION.

TO EXTEND THE LIFE OF THE FIELD, WE RECOMMEND ONE
SECTION OF THE FIELD BE CLOSED AT ALL TIMES TO ALLOW
DRYING OF THAT FIELD. THIS CAN BE ACCOMPLISHED BY
SEQUENTIALLY ROTATING THE NON-PERFORATED TALL
RISER TO ONE SECTION OF THE FIELD EVERY SIX MONTHS.

FIGURE 5A

Tri-County Health Department

Percolation Test and Soils Data Form

Property address 5521 S. Lake Gulch Road

Legal description _____

Property Owner:

Name Rick & Rita Meyers

Address 420 Cantril, Castle Rock, CO 80104

Phone (303) 688-1580

Note:

- Percolation Test Form, Site Plan and Grain Size Distribution Curve of the Sample must be submitted with this form.
- For all <5 acres the site plan must include the entire lot. Test locations must be accurately tied to lost corners or other permanent markers.

Saturation and Swelling

- Smear surfaces removed: Yes No
- Sand or gravel added: Yes No
- Date and time presoak water added:
10-8-98 2:45 pm
- Amount of presoak water added (gallons):
± 6½
- Date and time percolation test is started:
10-9-98 11:00 am
- Did water remain in the hole after the overnight swelling period:
Hole 1 Yes No
Hole 2 Yes No
Hole 3 Yes No
Hole 4 Yes No

Percolation Rate Measurement

Percolation Rate (min./in.)	Hole 1	<u>48</u>
	Hole 2	<u>30</u>
	Hole 3	<u>34</u>
	Hole 4	<u>40</u>
Average		<u>38</u>

Groundwater:

- Encountered @ NE feet.
- Estimated depth to maximum seasonal water table if not encountered in profile: UNKNOWN.
- Is area believed to be subject to seasonal fluctuations which could result in a seasonal water table within 8' of surface?
 Yes No

Slope determination in absorption area: 2 % to the NW (direction)

Bedrock:

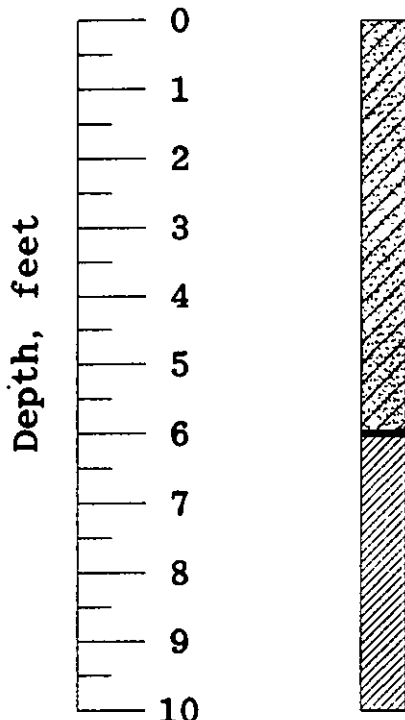
- Encountered @ 6 feet.
- Estimated depth if not encountered in profile:
—
- Type of bedrock: Sandstone
 Claystone Siltstone
 Other
- Is bedrock fractured or weathered?
 Yes No
- Is bedrock believed to be permeable?
(Perc rate <60 min./in.)
 Yes No

Profile Hole Information

(Soils must be classified using Unified System ASTM D2487)

GEO-teknica Engineering Job No. 98-137

Profile Hole Log



SAND, clayey, loose

Drive Sample Taken at 36"

9/12 Blow Count

15% Moisture Content

38% Passed the #200 Sieve

SANDSTONE, clayey

Certification

I certify that the above information is correct and complete to the best of my knowledge and that all tests were performed in accordance with the provisions of Tri-County Health Department Regulation I-96 by myself or under my supervision.

Michael Ballou

Original Signature

10/22/98

Date

GEO-teknica Engineering

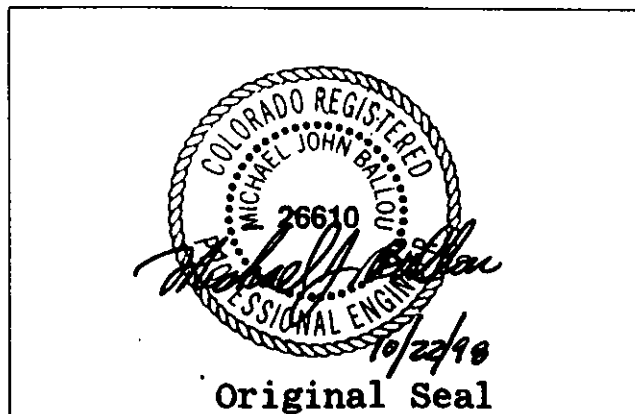
Company Name

P.O. Box 266, Franktown, CO 80116

Address

(303) 660-0300

Phone



Original Seal

TRI-COUNTY HEALTH DEPARTMENT
PERCOLATION TEST RESULT FORM
JOB NO. 98-137

HOLE NO.	HOLE DEPTH (IN.)	LENGTH OF INTERVAL (MIN.)	WATER ADDED	WATER DEPTH @ START OF INTERVAL (IN.)	WATER DEPTH @ END OF INTERVAL (IN.)	DROP IN WATER LEVEL (IN.)	PERCOLATION RATE @ FINAL INTERVAL (MIN./IN.)
1	60	30		8.0000	5.7500	2.2500	48
		30		5.7500	4.2500	1.5000	
		30		4.2500	3.1250	1.1250	
		30		3.1250	2.1875	0.9375	
		30	**	8.0000	6.9375	1.0625	
		30		6.9375	6.1875	0.7500	
		30		6.1875	5.5000	0.6875	
		30		5.5000	4.8750	0.6250	
2	48	30		8.0000	5.0000	3.0000	30
		30		5.0000	2.5000	2.5000	
		30	**	8.0000	5.3750	2.6250	
		30		5.3750	3.3125	2.0625	
		30		3.3125	1.6250	1.6875	
		30	**	8.0000	6.0000	2.0000	
		30		6.0000	4.6250	1.3750	
		30		4.6250	3.6250	1.0000	
3	36	30		8.0000	4.6250	3.3750	34
		30		4.6250	2.0000	2.6250	
		30	**	8.0000	5.0625	2.9375	
		30		5.0625	3.3125	1.7500	
		30		3.3125	1.9375	1.3750	
		30	**	8.0000	6.3125	1.6875	
		30		6.3125	5.3750	0.9375	
		30		5.3750	4.5000	0.8750	
4	60	30		8.0000	5.2500	2.7500	40
		30		5.2500	3.1875	2.0625	
		30	**	8.0000	5.8125	2.1875	
		30		5.8125	4.2500	1.5625	
		30		4.2500	3.1875	1.0625	
		30	**	8.0000	6.6250	1.3750	
		30		6.6250	5.7500	0.8750	
		30		5.75	5	0.75	

** WATER ADDED

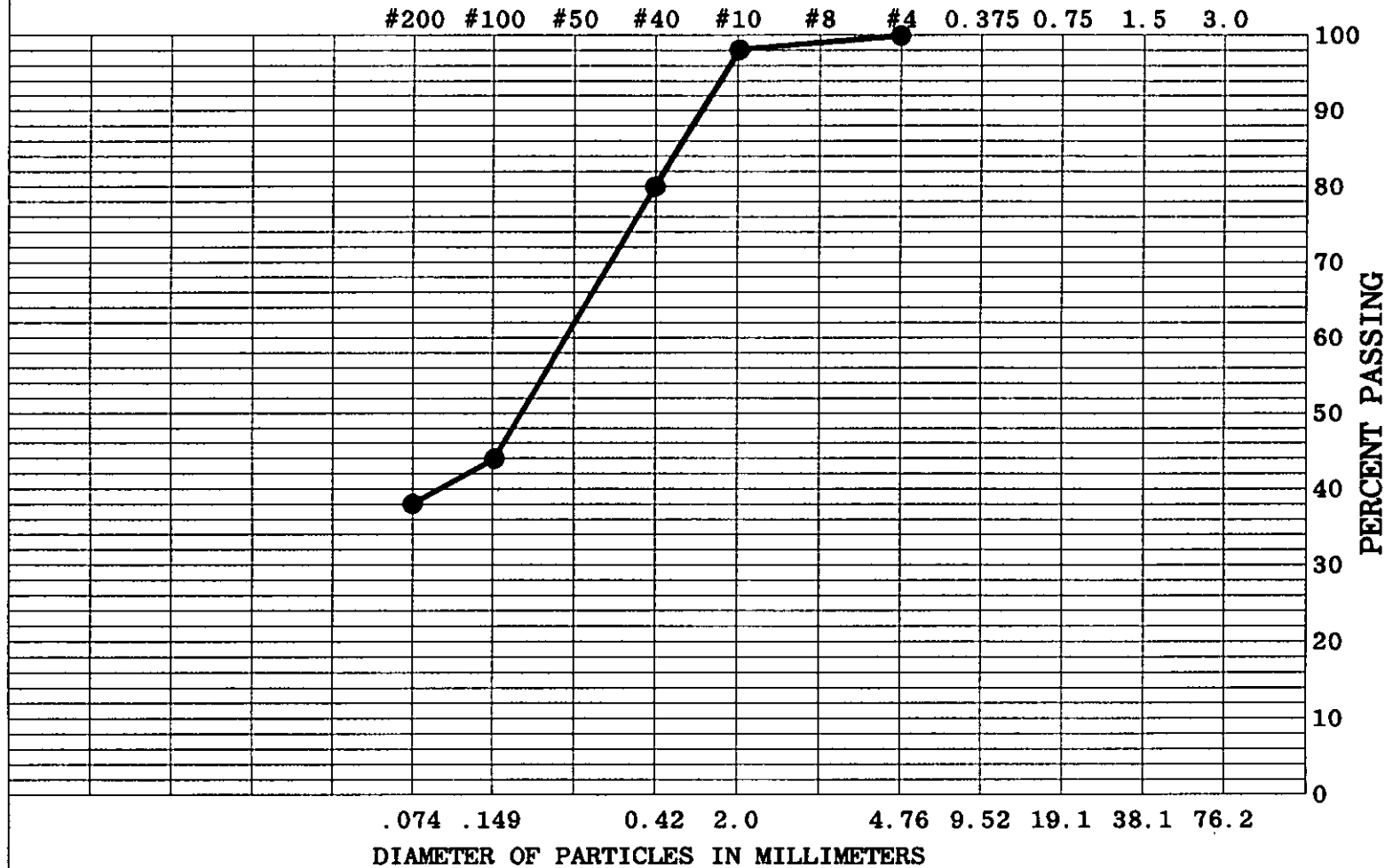
* FIELD NOTES SHALL BE RECORDED ON THIS FORM OR IN THIS FORMAT; TYPED COPIES OF FIELD RECORDS MAY BE SUBMITTED ON THIS FORM.

* A FOUR HOUR TEST MUST BE CONDUCTED UNLESS: A) WATER REMAINS IN THE HOLE AFTER THE PRESOAK IN WHICH CASE ONE 30 MIN. INTERVAL IS SUFFICIENT, B) THE FIRST 6" OF WATER SEEPS AWAY IN < 30 MINUTES IN WHICH CASE A ONE-HOUR TEST OF 6 -10 MINUTE TIME INTERVALS MAY BE USED, C) THE TEST IS BEING CONDUCTED IN SAND IN WHICH CASE A ONE-HOUR TEST OF 6 - 10 MINUTE TIME INTERVALS MAY BE USED, D) THREE SUCCESSIVE WATER LEVELS DROPS DO NOT VARY MORE THAN 1/16 INCH IN WHICH CASE A TWO HOUR TEST MAY BE CONDUCTED.

PARTICLE SIZE DISTRIBUTION ANALYSIS

Date Sampled 4-10-98 Hole No. Profile Sample Depth 36 inches Report No. 98-137
 Sample Location 5521 S. Lake Gulch Road, Douglas County, Colorado

SIEVE ANALYSIS



Sieve Number	Percent Passing
3.0	
1.5	
0.75	
0.375	
# 4	100
# 8	
# 10	98
# 40	80
# 50	
# 100	44
# 200	38

Soil Classification
SC

CLAY (plastic) to SILT (non-plastic)	SAND			GRAVEL	
	FINE	MEDIUM	COARSE	FINE	COARSE



GEO-teknica Engineering

SOIL TESTS · PERCOLATION TESTS · FOUNDATION DESIGNS

P.O. Box 266
Franktown, Colorado 80116
Web: www.geo-teknica.com
Fax: 303-660-3615
Tel: 303-660-0300

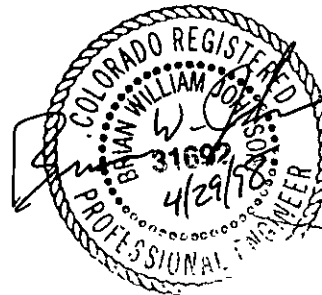
**Rick & Rita Meyers
420 Cantril
Castle Rock, CO 80104**

SUBSURFACE INVESTIGATION

OF

**5521 S. LAKE GULCH ROAD,
DOUGLAS COUNTY, COLORADO**

REPORT NO. 98-137
April 28, 1998



GENERAL

This report presents the results of data obtained during the subsoil investigation of **5521 S. LAKE GULCH ROAD, DOUGLAS COUNTY, COLORADO**. This investigation was made to determine the type of foundation required, allowable bearing capacity, ground water conditions and any problems that may be encountered during and after construction.

SITE CONDITIONS

At the present time this site is vacant. It is our understanding that a single-family residence is planned for this site.

FOUNDATION REQUIREMENTS

Based on our evaluation of the subsoils, we believe the proposed residence should be founded with continuous concrete footings bearing on the undisturbed soil. These footings shall be designed for a maximum soil bearing pressure of 1,000 pounds per square foot, dead load plus one-half live load. All continuous footings supporting perimeter concrete foundation walls should be at least 16 inches wide. All loose and disturbed soil shall be removed before pouring the concrete for the footings. The bottom of the footings shall be a minimum of three feet (3') below final grade for frost protection. Some settlement may occur with this type of foundation system.

SUBSURFACE DRAINAGE

The installation of a foundation drainage system is required for any habitable space below grade level. See **Perimeter Drain Detail 1**, for a suggested method of installing this system. Ground water should not affect or be a deterrent to the construction of this house.

FIELD AND LABORATORY INVESTIGATION

Two (2) exploratory test holes were drilled on April 10, 1998 at the site shown on the **Location Map, Figure 1**. These test holes were drilled with a four-inch (4") diameter auger.

At specific intervals, the drilling tools were removed from the test holes and soil samples were obtained with a two-inch (2") diameter spoon sampling tube. The depths at which soil samples were taken and a description of the soil encountered are shown on the **Logs of Test Holes, Figure 2**, and the **Summary of Laboratory Testing, Table 1**.

All soil samples were carefully inspected in the field during the drilling operation. These samples were classified in the laboratory through visual inspection and testing to determine the pertinent properties. The natural moisture content was obtained from relatively undisturbed drive samples of typical soils. Swell-consolidation tests were performed on typical soil samples, see **Figure 3**. These tests indicate the behavior of the soil upon various loadings in a wetted condition.

DESIGN AND DETAILS FOR SLAB ON GRADE CONSTRUCTION

The natural soils appear suitable for the support of exterior concrete slabs, garage slabs, and basement slabs. It is very important for the moisture to stay constant during the construction process. When sandy soils have an increase in moisture content, they may consolidate and settle, potentially lowering and cracking the concrete slab. When clayey soils are exposed to an increase in moisture content, they can increase in volume resulting in movement and possible cracking of the concrete slab. Experience with similar soil conditions has shown that the following details help prevent damage to a concrete slab:

1. The slab must be placed directly on undisturbed natural soils, or on recompacted soil. Do not place a gravel layer beneath the concrete slab.
2. The floating slab must be separated from the foundation or utility lines to allow for independent movement of the slab. A positive control joint must be provided at the junction between the slab and foundation walls.
3. Control joints must be provided in the slab to confine cracks to the joints and not in the visible area of the slab. Control joints must be one-third the thickness of the slab. The maximum slab area shall be 175 square feet. A maximum dimension of 16'0" in any direction is permitted.
4. A minimum void of one and one-half inches (1½") shall be provided at the bottom of all non-bearing partitions. Drywall or paneling shall not be placed within two inches (2") of the top surface of the slab, allowing space for upward movement of the slab.
5. If a hot water heating system is used, the piping should not be placed beneath the concrete floor slab. If a forced air furnace is used, a two-inch (2") flexible connection should be installed between the furnace and the duct.
6. The soils that will support the concrete slabs should be kept moist, but not wet, during construction.
7. If the builder or future owner provides decorative gravel or bark around the house, see **Foundation Grading Detail 2**, for an acceptable method of installation. This method will prevent ponding of water near the foundation and provide for proper drainage away from the house.

SURFACE DRAINAGE

The backfill soil around the house should be kept moist and well-compacted to prevent future settling. Controlled puddling of the backfill soils is not allowed. For proper drainage, a slope of 10% (6" in 5'-0") away from the foundation in all directions is required. This slope must be maintained for a minimum distance of 5'-0". The future owners are advised to immediately fill in any settled area near the house to eliminate containment of water. Down spouts must discharge onto four-foot long concrete splash blocks or into metal gutter extensions to direct water away from the house.

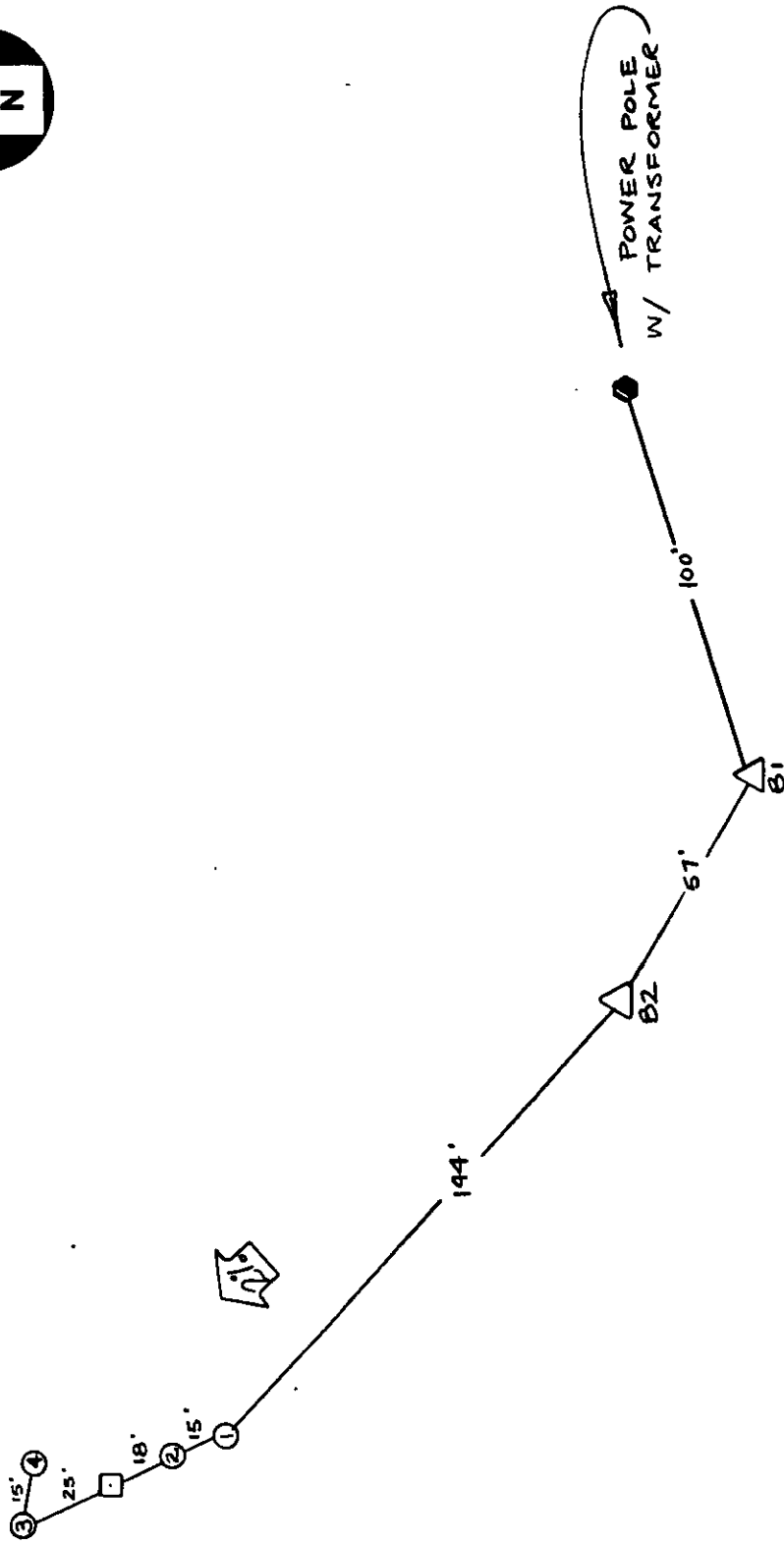
The future owners should be cautioned regarding the installation of a lawn adjacent to the foundation walls. Lawn irrigation must be more than five feet (5') from the foundation walls to prevent wetting of the subsurface soils. Lawn and/or plants within five feet (5') of the foundation walls should be hand watered and this watering kept to a minimum.

CONSTRUCTION DETAILS

In any soil investigation it is necessary to assume that the subsurface soil conditions do not vary greatly from the conditions encountered in our field and laboratory testing. Our experience has been that at times soil conditions do change and variations do occur and may become apparent at the time of excavation for the foundation system. If soil conditions are encountered which appear different from the test borings as presented in this report, it is requested that an engineer from this office be called to inspect the open excavation. This inspection service is not a part of this report.

The parties specifically agree that GEO-teknica Engineering Inc. has not been retained nor will they render an opinion concerning any environmental issues, hazardous waste or any other known or unknown conditions that may be present on this site.

Location Map



Foundation Soil Test Borings



Percolation Test Holes



Soil Profile Hole



Unsuitable Soil Profile Hole



GEO-teknic
SOIL TESTS PERCOLATION TESTS FOUNDATION DESIGN

98-137

Figure 1

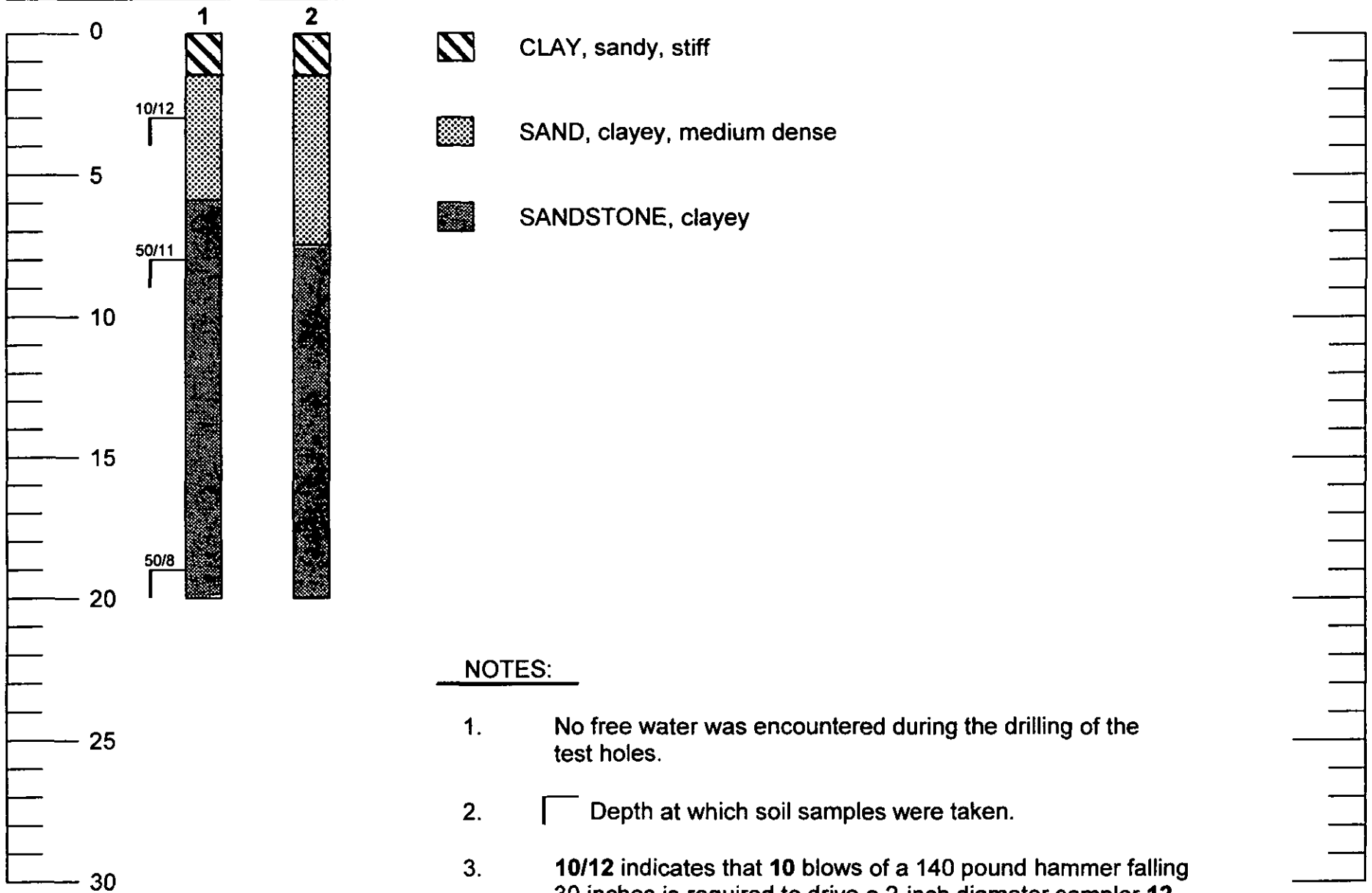
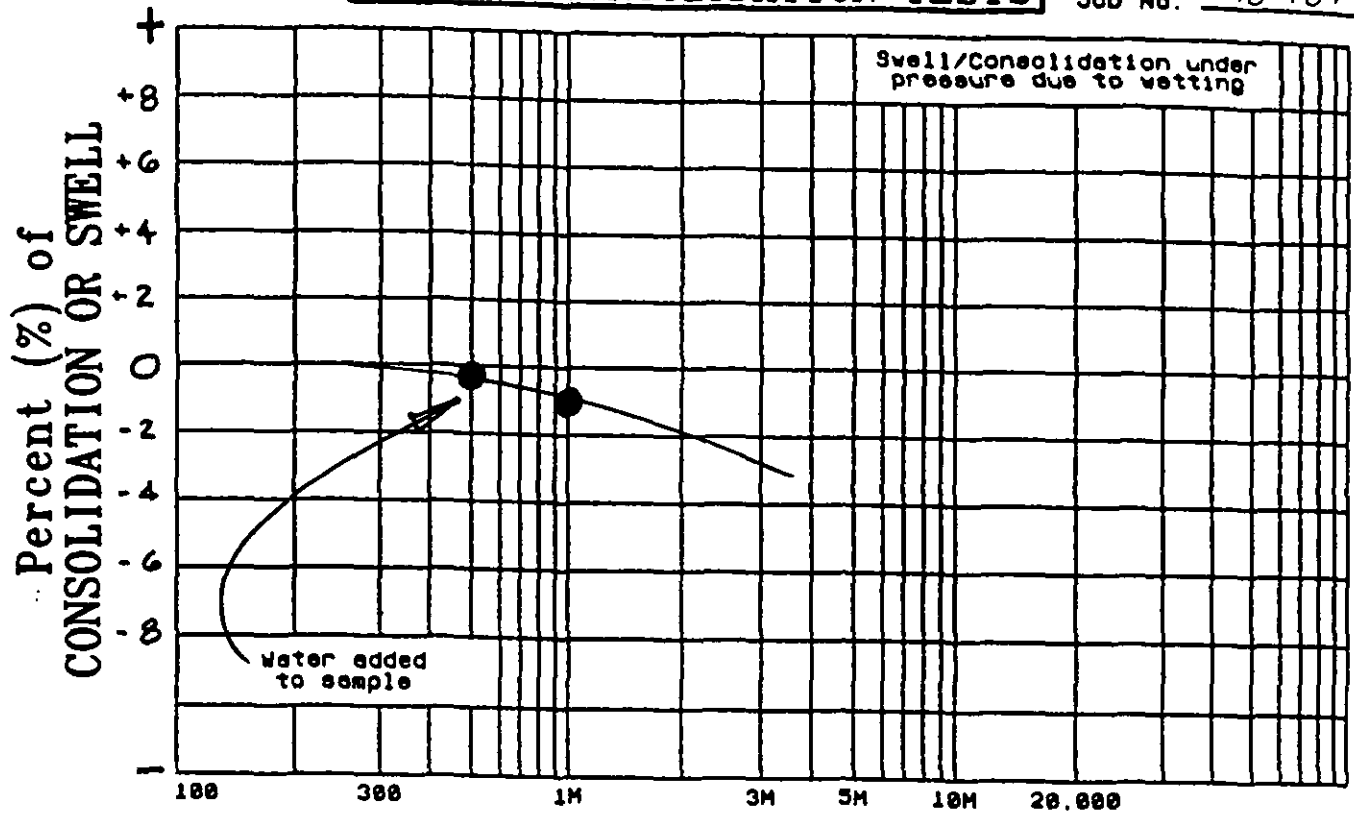


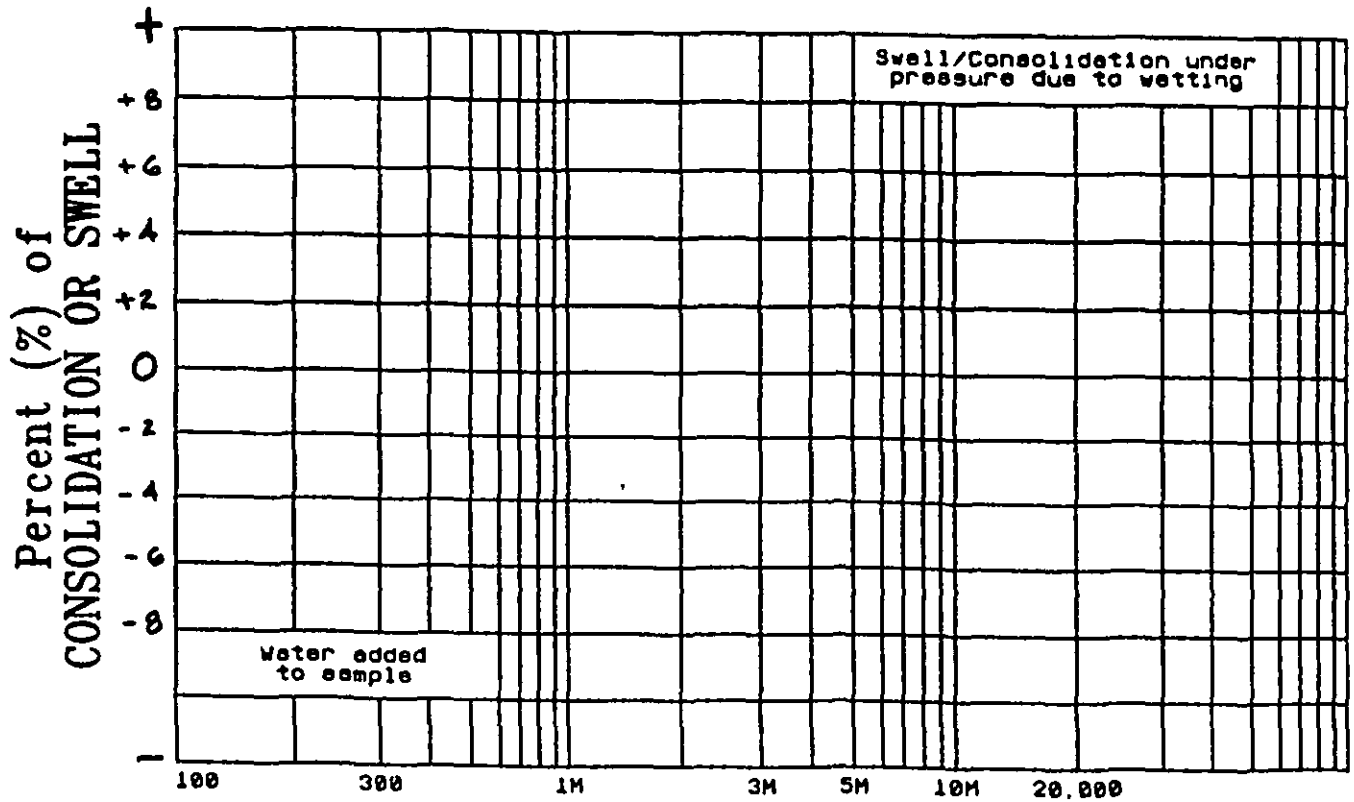
Figure 2

SWELL - CONSOLIDATION TESTS

Job No. 98-137

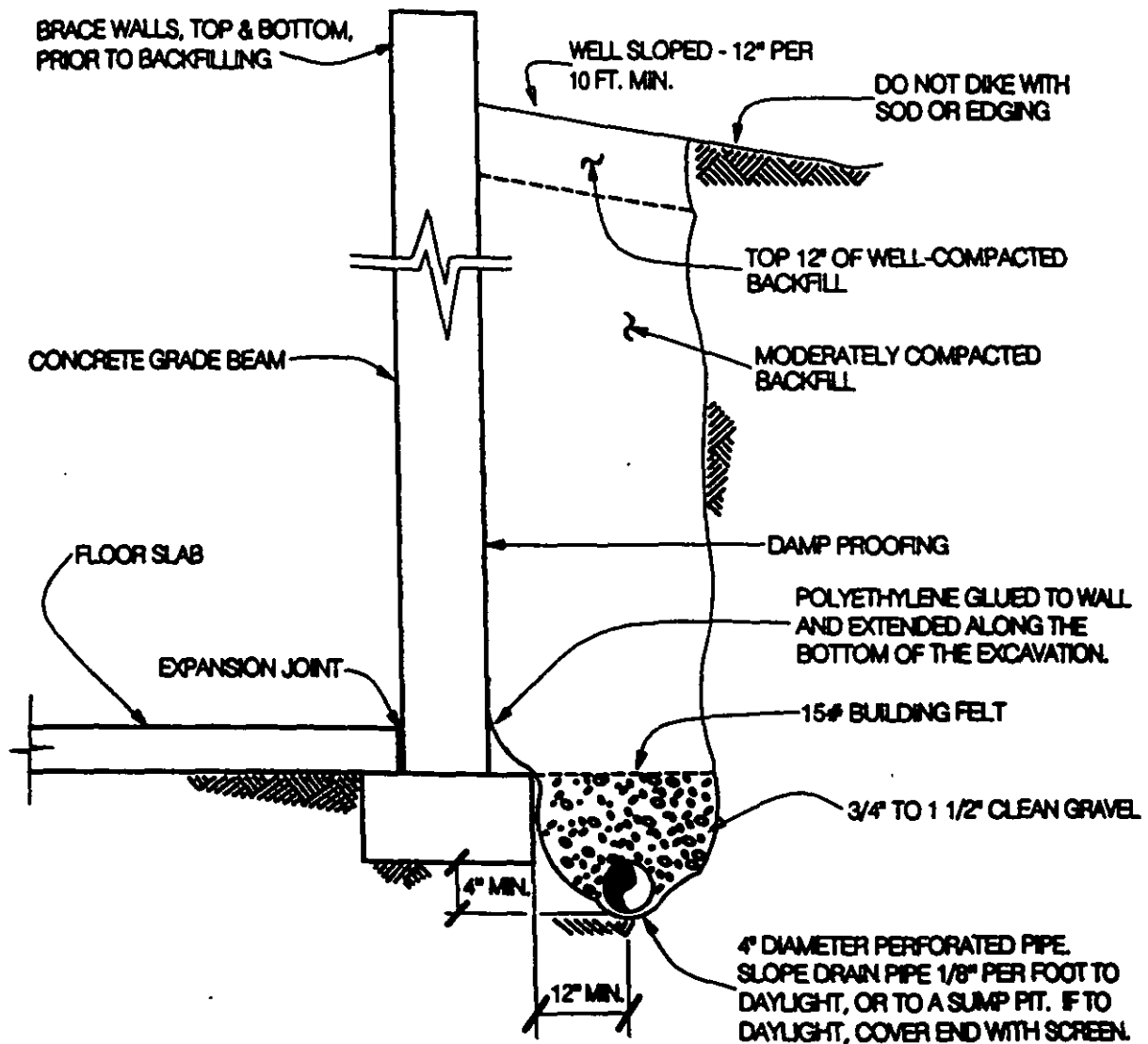


Test Hole No. 1 Depth. 3 Soil Description. SAND, CLAYEY MED. DENSE



Test Hole No. _____ Depth. _____ Soil Description. _____

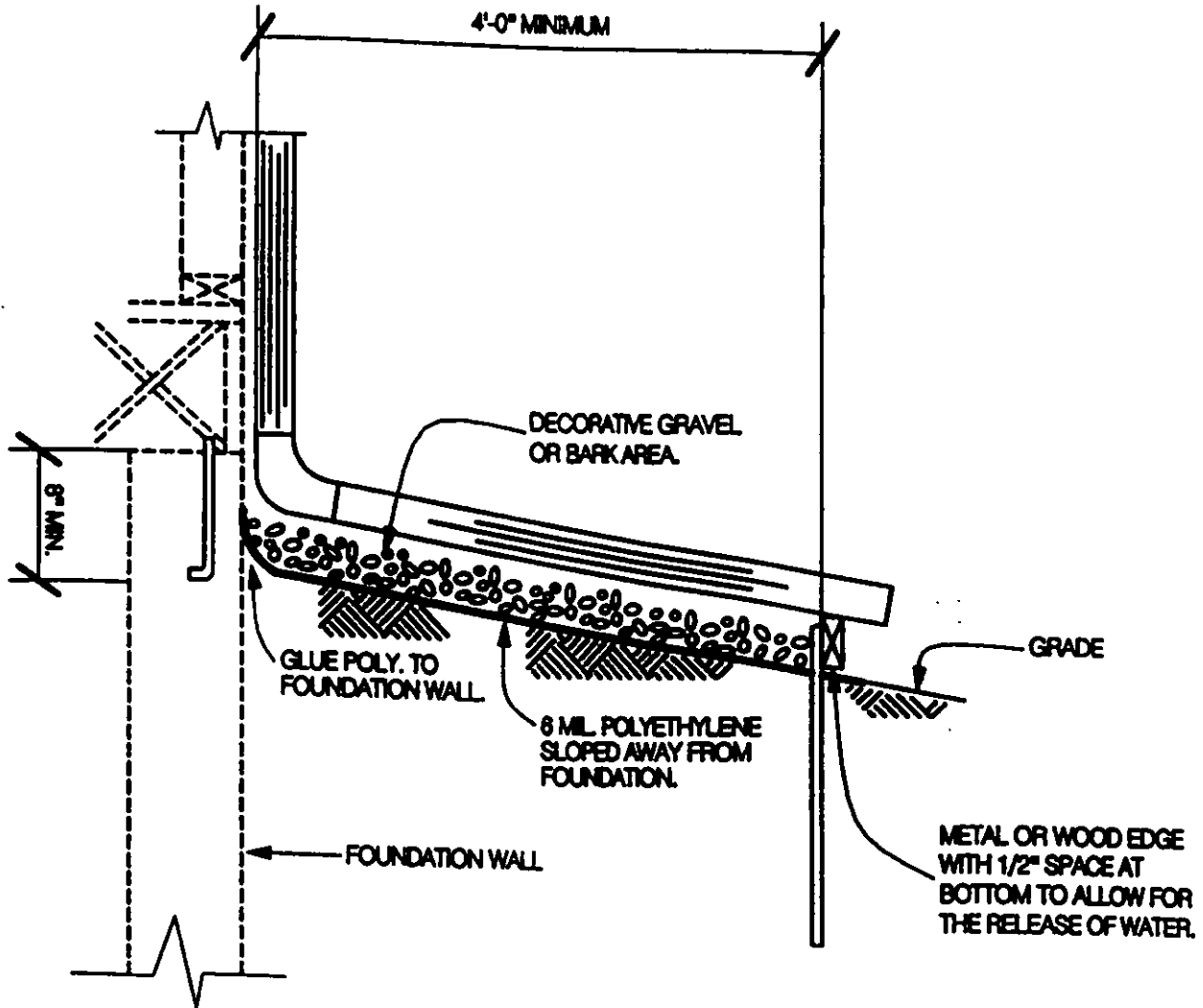
Figure 3



BACKFILL AROUND THE FOUNDATION SHOULD BE MOISTENED AND COMPACTED AND THE FINAL GRADE SHOULD BE WELL SLOPED TO PRECLUDE PONDING OF RAINFALL, IRRIGATION WATER, AND SNOW MELT ADJACENT TO FOUNDATION WALLS. CAUTION: DO NOT DIKE OR IMPEDE THE FLOW OF WATER AWAY FROM FOUNDATION WALLS WITH SOD, EDGING OR DECORATIVE GRAVEL AND POLYETHYLENE. DOWNSPOUTS AND SILL COCKS SHOULD DISCHARGE INTO SPLASH BLOCKS OR LONG EXTENSIONS.

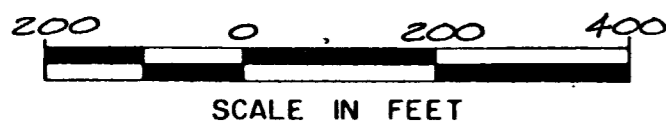
DRAIN SYSTEM BELOW GRADE
AND BACKFILL DETAILS
 (FOR FOOTING FOUNDATION)

FOUNDATION GRADING DETAIL



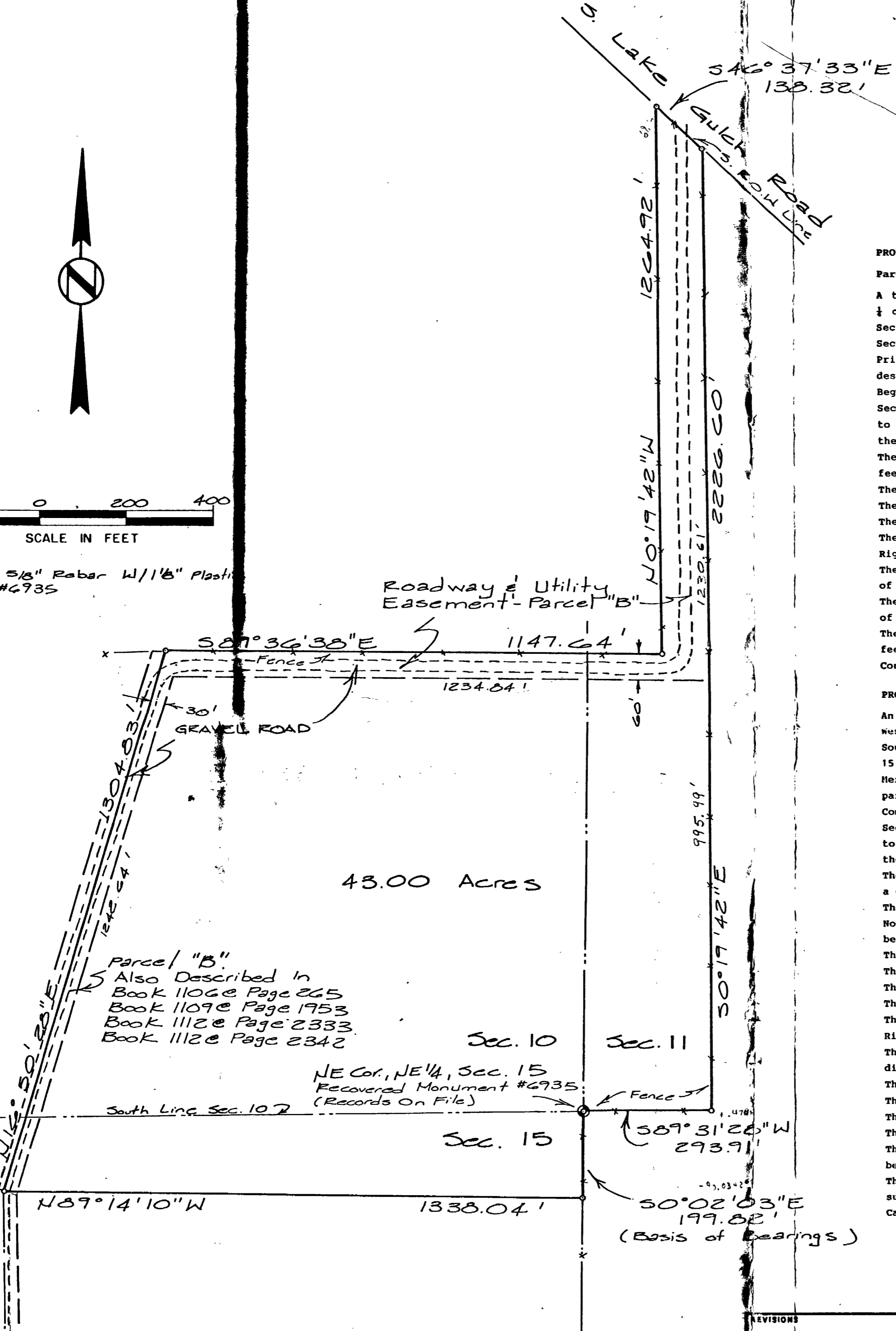
NOTE:

1. PROVIDE A MINIMUM SLOPE OF 6" IN THE FIRST 5'-0" FROM HOUSE (10%).
2. DOWNSPOUTS AND EXTENSIONS SHOULD EXTENDED BEYOND THE GRAVEL OR BARK AREA.



o = Found 5/8" Rebar w/1 1/8" Plastic Cap #6935

Roadway & Utility Easement - Parcel "B"



43.00 Acres

Parcel "B"
Also Described In
Book 1106 @ Page 265
Book 1109 @ Page 1953
Book 1112 @ Page 2333
Book 1112 @ Page 2342

NE Cor., NE 1/4, Sec. 15
Recovered Monument #6935
(Records On File)

Sec. 10

Sec. 11

N 89° 14' 10" W

1338.04'

S 0° 02' 03" E

199.82'

(Basis of Bearings)

PROPERTY DESCRIPTION: Tract 1

Parcel A:

A tract of land situated partly in the West 1/2 of the Southwest 1/4 of Section 11, partly in the South 1/2 of the Southeast 1/4 of Section 10 and partly in the North 1/2 of the Northeast 1/4 of Section 15, all in Township 9 South, Range 66 West of the 6th Principal Meridian, Douglas County, Colorado, more particularly described as follows:

Beginning at the Northeast corner of the Northeast 1/4 of said Section 15 and considering the East line of said Northeast 1/4 to bear S 0° 02' 03" E with all bearings contained herein relative thereto;
Thence S 0° 02' 03" E along said East line a distance of 199.82 feet;
Thence N 89° 14' 10" W a distance of 1338.04 feet;
Thence N 16° 50' 28" E a distance of 1304.83 feet;
Thence S 89° 36' 38" E a distance of 1147.64 feet;
Thence N 0° 19' 42" W a distance of 1264.92 feet to the Southerly Right of Way line of South Lake Gulch Road;
Thence S 46° 37' 33" E along said South Right of Way line a distance of 138.32 feet;
Thence S 0° 19' 42" E a distance of 2226.60 feet to the South line of the West 1/2 of the Southwest 1/4 of said Section 11;
Thence S 89° 31' 28" W along said South line a distance of 293.91 feet to the point of beginning;
Containing 43.00 acres, more or less.

PROPERTY DESCRIPTION: Parcel B

An easement for roadway and utility purposes situated in the West 1/2 of the Southwest 1/4 of Section 11, in the South 1/2 of the Southeast 1/4 of Section 10 and in the Northeast 1/4 of Section 15 all in Township 9 South, Range 66 West of the 6th Principal Meridian, Douglas County, Colorado, subject easement being more particularly described as follows:

Commencing at the Southeast corner of the Northeast 1/4 of said Section 15 and considering the East line of said Northeast 1/4 to bear N 00° 02' 03" W with all bearings contained herein relative thereto;
Thence N 89° 14' 10" W along the South line of said Northeast 1/4 a distance of 1335.48 feet;
Thence N 00° 02' 03" W, parallel with the East line of said Northeast 1/4 a distance of 1304.83 feet to the true point of beginning of subject easement;
Thence N 89° 14' 10" W a distance of 30.00 feet;
Thence N 00° 09' 46" W a distance of 1144.68 feet;
Thence N 16° 50' 28" E a distance of 1300.45 feet;
Thence S 89° 36' 38" E a distance of 1178.92 feet;
Thence N 00° 19' 42" W a distance of 1264.92 feet to the Southerly Right of Way line of South Lake Gulch Road;
Thence S 46° 37' 33" E along said Southerly Right of Way line a distance of 138.32 feet;
Thence S 00° 19' 42" E a distance of 1230.61 feet;
Thence N 89° 36' 38" W a distance of 1234.84 feet;
Thence S 16° 50' 28" W a distance of 1246.66 feet;
Thence S 00° 09' 46" E a distance of 1136.65 feet;
Thence N 89° 14' 10" W a distance of 30.00 feet to the point of beginning.

This property description was prepared under the direct supervision of David E. Archer (P.L.S. 6935), 105 Wilcox Street, Castle Rock, CO 80104.

CERTIFICATE OF SURVEY:

This is to certify to Kenneth N. and Victoria J. Haley; Gerald Dale and Shirley Dianne Ehmann; and Land Title Guarantee Company, that on September 23, 1993 a survey was made under my direct supervision of the her on described property situated in Douglas County, Colorado. The survey was made on the ground using the normal standard of care of Professional Land Surveyors practicing in Douglas County, Colorado, and that this plat accurately represents said survey. The location and dimensions of all buildings, improvements, easements and rights of way in evidence or known to me and encroachments by or on th premises are accurately shown. This survey does not constitute a titl search by David E. Archer & Associates, Inc. of the property shown and described hereon to determine:
1. Ownership of the tract of land.
2. Compatibility of this description with those of adjacent tracts of land.
3. Rights of way, eas ments and encumbrances of r cord affecting this tract of land.
Land Title Guarantee Company Commitment No. P-1031516 dated September 7 1993 was entirely relied upon for recorded information regarding rights of way, eas ments and encumbrances in the preparation of this survey.
Corner monuments w re set, r found and acc pted as indicated hereon.

This is to certify that this map or plat and th survey on which it is based were made in substantial compliance with the "Minimum Standard Detail requirements for ALTA/ACSM Land Title Surveys" jointly established and adopted by ALTA and ACSM and meets the accuracy requirements of a Class A Survey, as defined therein.

Signed [Signature]
Professional Land Surveyor

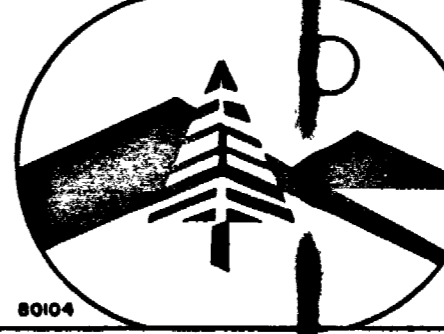
This property does not li within any designated 100 year flood plain according to panel No. 080049 0320 C Dated Sept 30, 1987

[Signature]
3/2/99
Dale K. Meyer
3-2-99

"NOTICE: According to Colorado law you must commence any legal action based upon any defect in this survey within three years after you first discover such defect. In no event, may any action based upon any defect in this survey be commenced more than ten years from the date of the certification shown hereon."

REVISIONS
Parcel "B" 9-27-93

DAVID E. ARCHER & ASSOCIATES, INC.
LAND DEVELOPMENT CONSULTING
SURVEYING & ENGINEERING
PHONE (303) 688-4642
105 WILCOX ST. CASTLE ROCK, COLORADO 80104



SCALE 1" = 200'
DATE 9-23-93
DR. W. CRD. AP. VD.

TITLE A.L.T.A. SURVEY In Section 10, 11, & 15, T9S R66W, 6th P.M., Douglas Co.	
CLIENT HIER & COMPANY	
Sheet 1 of 1	JOB NUMBER 92-514