

033-012-27

6/20/2007

duponbj

Groundwater and Wastewater Services File Imaging Project
May 2007

Barcode Font = IDAutomationHC39M

Mecklenburg County
Health Department

Basil G. Delta, M.D., M.P.H.
Health Director

NOVEMBER 29, 1990

TO: Susan P. Latimer
Accountant I

FROM: Lorraine C. Whitaker
Accounting Technician I

SUBJECT: Request for Refund/ Environmental Health Services

The following refund is requested:

AMOUNT: $255.00

ORG/ACCOUNT # 462-3511

PAYABLE: MCGUIRE GROUP SERVICES, INC. FILE #6699A
ATTENT: ALLEN COLLINS
212 SOUTH TRYON STREET SUITE #800
CHARLOTTE, N. C. 28281

DATE OF ORIGINAL DEPOSIT: 06/07/90

REASON: HOLDING CREDIT FOR FURTHER SERVICES AT REQUEST OF CLIENT
SOIL TEST UNSUITABLE ON PRE-PRELIMINARY, THEREFORE CLIENT
HAS REQUESTED REFUND.

/Enclosures

249 Billingsley Road • Charlotte, North Carolina 28211 • (704) 375-1885

Mecklenburg County
Health Department

November 15, 1990

MEMORANDUM

TO: Lorraine Whittaker

FROM: Sylvia D. Daniel, R.S.
Program Chief

Please issue a refund in the amount $255.00 for a soil test application at 3432 Mt. Holly-Huntersville Road, Charlotte, File No. 6699A. The property owner requested a credit refund since the soil is unsuitable for any type of septic system. Please make refund payable to the following address:

McGuire Group Services, Inc.
Attn: Allen Collins
212 South Tryon Street
Suite 800
Charlotte, NC 28281

Thank you for your prompt attention to this matter.

Fix #6699A

STATEMENT

Mecklenburg County Health Department
249 BILLINGSLY ROAD
CHARLOTTE, NORTH CAROLINA 28211

TELEPHONE:
(704) 375-1885

MCGUIRE GROUP SERVICES, INC
212 SOUTH TRYON STREET SUITE 800
CHARLOTTE, N. C. 28281
CENTERMARK /MT HOLLY HUNTERSVILLE
PROPERTY

CHARGES OR PAYMENTS MADE AFTER LAST DATE SHOWN WILL APPEAR ON YOUR NEXT STATEMENT

#3432 Mt Holly-Huntersville Rd

DATE / FAMILY MEMBER	DESCRIPTION	TOTAL FEE		CREDITS PAYMENTS		CREDITS ADJ.	BALANCE FORWARD / BALANCE	
							BALANCE FORWARD	
06/07/90	SOIL TEST PRE-PREL 11 ACRES	160	00	440	00		(280	
6/18/90	Demo-1000 SF	25	00	-0-		-285	0	

©SAFEGUARD BUSINESS SYSTEMS, INC. 1977

PLEASE PAY LAST AMOUNT IN BALANCE COLUMN

STATEMENT

Mecklenburg County Health Department
249 BILLINGSLY ROAD
CHARLOTTE, NORTH CAROLINA 28211

TELEPHONE:
(704) 375-1885

MCGUIRE GROUP SERVICES, INC
212 SOUTH TRYON STREET SUITE 800
CHARLOTTE, N. C. 28281
CENTERMARK /MT HOLLY HUNTERSVILLE
PROPERTY

CHARGES OR PAYMENTS MADE AFTER LAST DATE SHOWN WILL APPEAR ON YOUR NEXT STATEMENT

BALANCE FORWARD

DATE / FAMILY MEMBER	DESCRIPTION	TOTAL FEE		CREDITS PAYMENTS		CREDITS ADJ.	BALANCE	
6/07/90	SOIL TEST PRE-PREL 11 ACRES	160	00	440	00		(280	00)

SAFEGUARD BUSINESS SYSTEMS, INC. 1977

PLEASE PAY LAST AMOUNT IN BALANCE COLUMN

APPLICATION FOR SOIL INVESTIGATION

HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
1200 BLYTHE BOULEVARD
CHARLOTTE, NC 28203
PHONE (704) 376-4603

(OFFICE USE ONLY)

FILE: 6699A

TC: _____

☐ PC ☐ REPT

JOB LOCATION

① ADDRESS: N/A

② SUBDIVISION: N/A ③ LOT: N/A ④ BLOCK: N/A

⑤ PARCEL REFERENCE: BOOK NO.: 33 PAGE NO.: 012 PARCEL NO.: [redacted]27/122

⑥ DEED REFERENCE: BOOK NO.: 6116 PAGE NO.: 515

OWNER

⑦ NAME: CENTERMARK / MOUNT HOLLY - HUNTERSVILLE LTD. PARTNERSHIP
(FIRST) (MIDDLE) (LAST)

⑧ MAILING ADDRESS: 212 S. TRYON SUITE 500

⑨ CITY: CHARLOTTE ⑩ STATE: NC ⑪ ZIP: 28281

⑫ PHONE: (WORK) 704/373-0204 (HOME) N/A

⑬ Accurately diagram and dimension lot. 11 acres

- SEE ATTACHED MAP

Pre-preliminary

⑭ The undersigned, 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: [signature]

Date: 5/15/90

Mecklenburg County services are available without regard to ethnic origin, sex, or disability.

WHITE - HEALTH DEPARTMENT'S COPY • CANARY - ENVIRONMENTALIST'S COPY • PINK - OWNER'S COPY

pd 100.00

APPLICATION FOR SOIL INVESTIGATION

HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
1200 BLYTHE BOULEVARD
CHARLOTTE, NC 28203
PHONE (704) 376-4603

(OFFICE USE ONLY)

FILE: 6699A

TC: 033-012-27

☒ PC ☐ REPT

JOB LOCATION

① ADDRESS: N/A

② SUBDIVISION: N/A ③ LOT: N/A ④ BLOCK: N/A

⑤ PARCEL REFERENCE: BOOK NO.: 33 PAGE NO.: 01 PARCEL NO.: 1227

⑥ DEED REFERENCE: BOOK NO.: 6163 PAGE NO.: 515

OWNER

⑦ NAME: CENTERMARK / MOUNT HOLLY-HUNTERSVILLE LTD. PARTNERSHIP
(FIRST) (MIDDLE) (LAST)

⑧ MAILING ADDRESS: 212 S. TRYON SUITE 500

⑨ CITY: CHARLOTTE ⑩ STATE: NC ⑪ ZIP: 28281

⑫ PHONE: (WORK) 704/373-0204 (HOME) N/A

⑬ Accurately diagram and dimension lot.

- SITE LOCATED ON MOUNT HOLLY-HUNTERSVILLE ROAD, APPROX. 1000 FT. WEST OF INTERSECTION WITH NEW HWY. 16. TEST AREA IS 2.5 ACRES. (SEE MAP ATTACHED)

- SOIL TEST SIGNS HAVE BEEN PLACED ON MT. HOLLY-HUNTERSVILLE RD., AND ON GRAVEL ROAD INSIDE PROPERTY. TEST AREA BOUNDARY HAS BEEN MARKED WITH PINK FLAGGING, AS OF THIS DATE.

⑭ The undersigned, 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: Don Garrett

Date: 4/24/90

Mecklenburg County services are available without regard to ethnic origin, sex, or disability.

WHITE - HEALTH DEPARTMENT'S COPY • CANARY - ENVIRONMENTALIST'S COPY • PINK - OWNER'S COPY

Mecklenburg County
Health Department

May 31, 1990

Mr. Don Garrett
Centermark/Mount Holly-Huntersville Ltd. Partnership
212 S. Tryon Suite 500
Charlotte, NC 28281

Ref: File ~~6669A~~ 6699A

Dear Mr. Garrett:

A pre-preliminary investigation of soils and topography was made on a portion of the property (parcel 033-012-26) located on Mt. Holly-Huntersville Rd. A soils map was prepared and a copy is enclosed.

The area investigated appears to be dominantly unacceptable for the installation of septic tank systems. Soils found in the area included the presence of expanding clay, seasonal perched water, shallow depth to saprolite and drainageway depression areas.

The expanding clay present in the soils swells when wet. This action reduces soil pore space and inhibits internal soil water movement.

Evidence of seasonal perched water was found at depths as shallow as 20-24 inches below the soil surface. Gray drainage mottles are present in many places over the area.

Soils with saprolite as shallow as 24 inches are also present in spots. These soils lack strongly developed subsoil horizons in most instances.

The drainageway-depression areas collect and channel surface runoff from surrounding land areas. Some surface flooding would be expected during periods of precipitation. Soils in these areas exhibit the same general characteristics that are present in the other portions of the site investigated.

Based on this investigation, the soils investigated appear to be dominantly unacceptable for the installation of septic tank systems. It should be noted that no specific lots or sites for septic tank systems were identified on the tract. Inclusions of small areas of soils other than those described could possibly be present. However, additional investigation with established reference points would be necessary. Please contact me if there are any questions regarding this report.

Sincerely,

William R. Marlin

William R. Marlin
Soil Scientist

Environmental Health Division
1200 Blythe Boulevard • Charlotte, North Carolina 28203 • (704) 376-4603

APPLICATION FOR SOIL INVESTIGATION

HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
1200 BLYTHE BOULEVARD
CHARLOTTE, NC 28203
PHONE (704) 376-4603

(OFFICE USE ONLY)

FILE: 6699A

TC: 033-012-20-27

☐ PC ☐ REPT

JOB LOCATION

① ADDRESS: N/A

② SUBDIVISION: N/A ③ LOT: N/A ④ BLOCK: N/A

⑤ PARCEL REFERENCE: BOOK NO.: 33 PAGE NO.: 012 PARCEL NO.: 033-012-20-27

⑥ DEED REFERENCE: BOOK NO.: 10163 PAGE NO.: 95

OWNER

⑦ NAME: CENTERMARK/ MOUNT HOLLY - HUNTERSVILLE LTD. PARTNERSHIP
(FIRST) (MIDDLE) (LAST)

⑧ MAILING ADDRESS: 212 S. TRYON SUITE 500

⑨ CITY: CHARLOTTE ⑩ STATE: NC ⑪ ZIP: 28281

⑫ PHONE: (WORK) 704/ 372-0204 (HOME) N/A

⑬ Accurately diagram and dimension lot. 11 acres

- SEE ATTACHED MAP

⑭ The undersigned, 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: [signature]

Date: 5/15/97

Mecklenburg County services are available without regard to ethnic origin, sex, or disability.

WHITE - HEALTH DEPARTMENT'S COPY • CANARY - ENVIRONMENTALIST'S COPY • PINK - OWNER'S COPY

GIFFORD NIELSON ASSOCIATES Incorporated

LETTER OF TRANSMITTAL

Meck. County Environ. Health Dept.
1200 Blythe Blvd.
Charlotte, NC 28203

DATE: 5/15/90	JOB NO: 28365
ATTENTION: Bill Martin	
RE: CenterMark - Mt-Holly - Huntersville Site	

WE ARE SENDING YOU ✓ ATTACHED __ UNDER SEPARATE COVER VIA JDO THE FOLLOWING ITEMS:

O SHOP DRAWINGS O PRINTS O CHANGE ORDER O SPECIFICATIONS
O COPY OF LETTER O PLANS O REPORT X OTHER Application

COPIES	DATE	DESCRIPTION
1	5/15/90	Application for Soil Investigation - 11.0 Ac Site
1	5/14/90	Check # 259068 - Applic Fee $440.00
1	-	Map of Test Site location

THESE ARE TRANSMITTED AS CHECKED BELOW:

X FOR APPROVAL
O FOR YOUR USE
O AS REQUESTED
O FOR REVIEW AND COMMENT
O CONFIRM
O REJECTED
O NOTE MARKINGS
O NO REVISIONS
O RESUBMIT ____ COPIES
O SUBMIT ____ COPIES FOR DISTRIBUTION
O RETURN ____ CORRECTED PRINTS
O OTHER ____

REMARKS

Bill - please call me as soon as possible to discuss this second evaluation. Thank you!

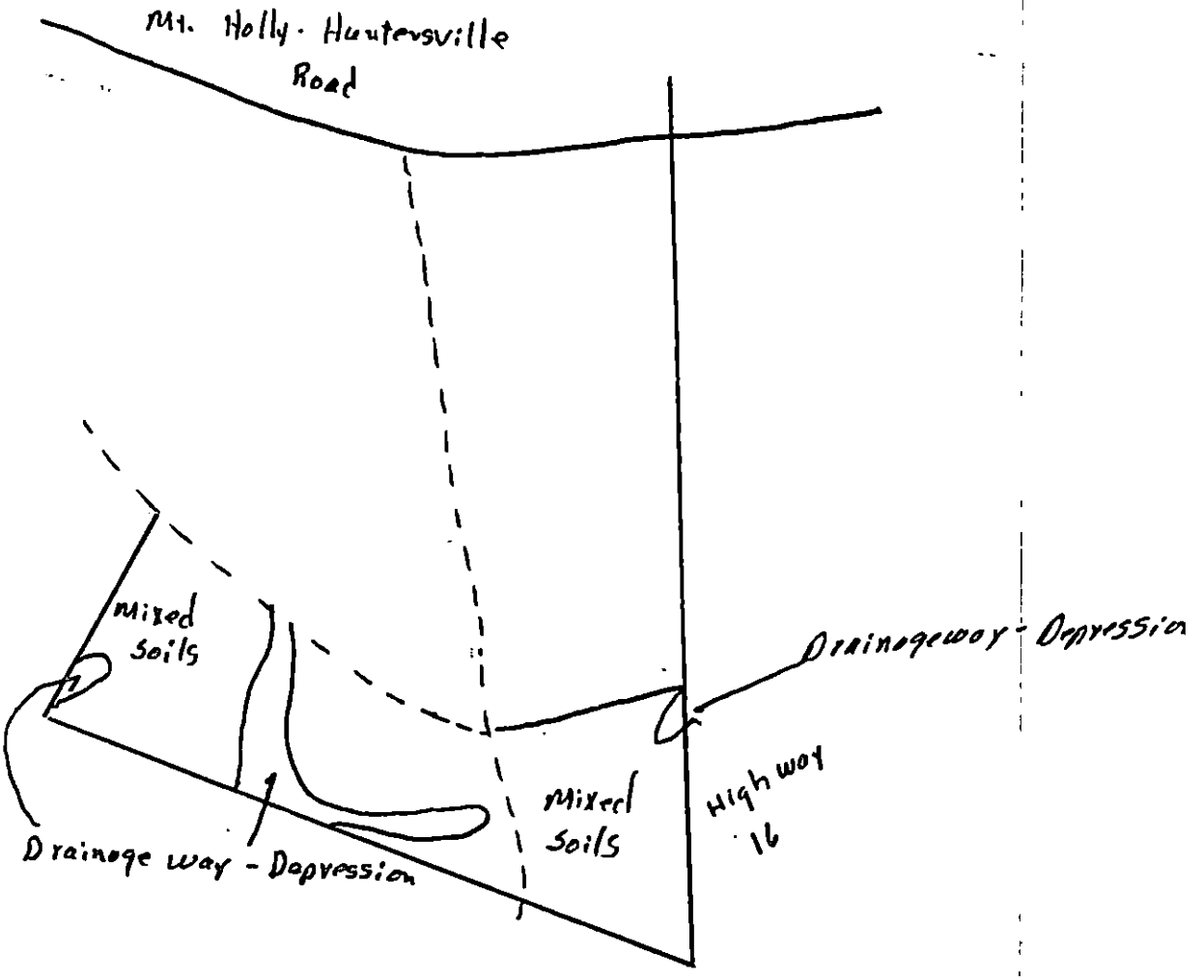
COPY TO: File / Don Garrett
COURIER: ____
RECEIVED BY: ____
DATE: ____ TIME: ____

SIGNED: Jeff Edens
DEPARTMENT: ____

IF ENCLOSURES ARE NOT AS NOTED, PLEASE NOTIFY US AT ONCE.

428 EAST FOURTH STREET CHARLOTTE, NC 28202 704/373-1907

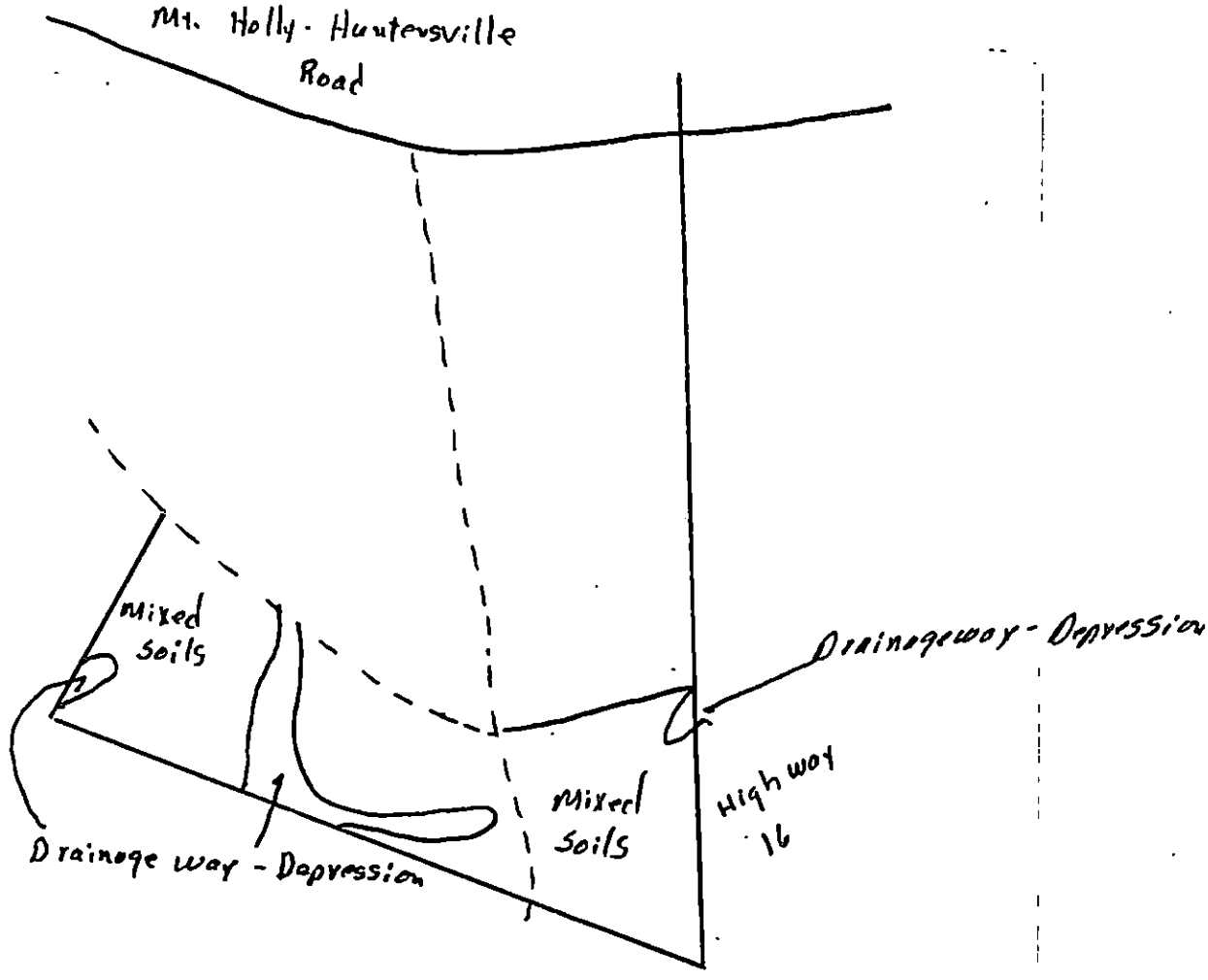
Pre-Preliminary PO 033-012-2627



☐ Soils Appearing To Be Dominantly Unacceptable For Septic Tank System Installation

W. A. Marlin 5-30-90

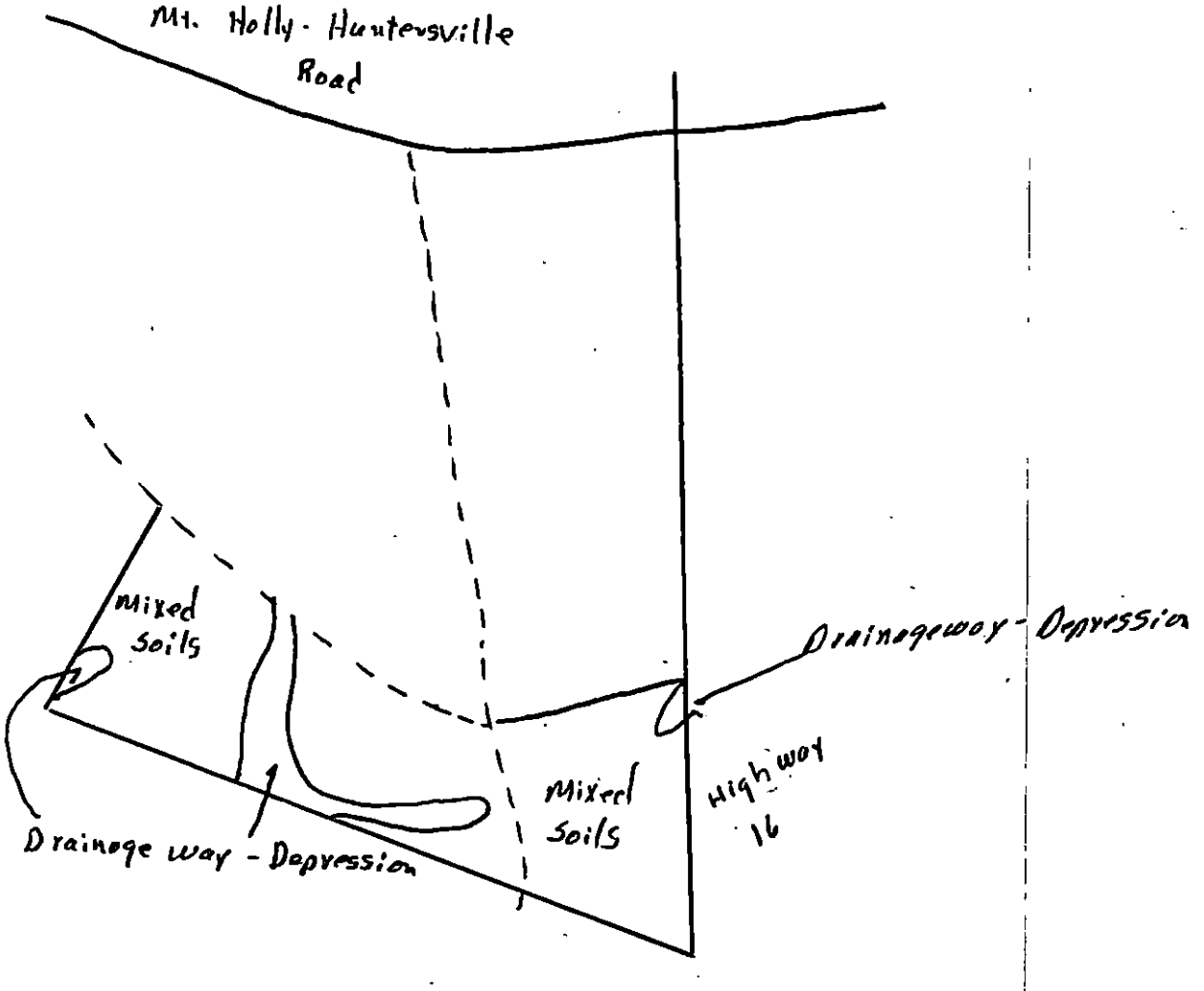
Pre-Preliminary PO 033-012-2627



☐ Soils Appearing To Be Dominantly Unacceptable For Septic Tank System Installation

W. R. Morlin 5-30-90

Pre-Preliminary PD 033-012-2627



☐ Soils Appearing To Be Dominantly Unacceptable For Septic Tank System Installation

W. R. Morlin- 5-30-90

Mecklenburg County
Health Department

May 8th, 1990

Centermark/Mt.Holly-Hunters. Ltd.
212 S. Tryon Suite 500
Charlotte, NC 28281

RE: Property located at Mt. Holly Huntersville RD.
FILE: 6699A
PARCEL: 03301227

Dear Sir:

At your request a soils investigation was conducted on the property designated above. Results of this investigation showed the site to be classified as UNSUITABLE under criteria as set forth in Section .1900 of the North Carolina Administrative Code, Title 10, Department of Human Resources, Chapter 10, Division of Health Services; Sanitary Engineering Section, Subchapter 10A, Sanitation. A copy of the Site Evaluation Report (Serial Number 17807) is enclosed.

The soil on this property is not suitable for use with any conventional, modified or alternative system of which I am aware. If you wish to exercise your right of appeal concerning the interpretation and enforcement of these rules you may do so in accordance with G.S. 150B and 10 NCAC 1B.

If I can be of assistance, please do not hesitate to call.

Very truly yours,

Gene Vaughan, R.S., Supervisor
On Premises Waste Disposal & Water Supply

Enclosure

Environmental Health Division
1200 Blythe Boulevard • Charlotte, North Carolina 28203 • (704) 376-4603

MECKLENBURG COUNTY HEALTH DEPARTMENT
SITE EVALUATION REPORT
SERIAL NUMBER 17807

File: 6699A Action 5

Parcel: 20 033-012-27 ☐ PC

Location:

Subdivision:

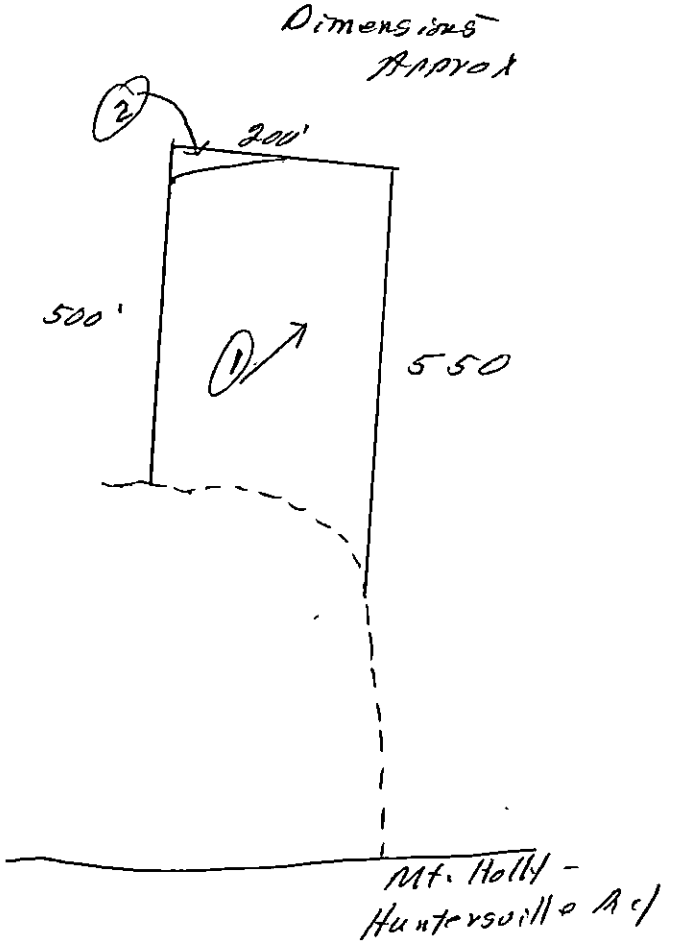
Lot: Block: Acres: Approx 2.5

Owner:
Address:

Comments: _____

Described by: William A. Marlin

Date: 5-3-90



***** EVALUATION KEY *****

S = Suitable U = Unsuitable
PS = Provisionally Suitable
The "Area Classification" below indicates the suitability of areas in the diagram.

FACTORS	AREA 1	AREA 2	AREA 3	AREA 4	AREA 5	AREA 6
Topography	(S) PS U 6-15%	S PS (U) Depression	S PS U	S PS U	S PS U	S PS U
Texture	S PS (U) 2-1 clay	S PS U —	S PS U	S PS U	S PS U	S PS U
Structure	S (PS) U Blocky	S PS U —	S PS U	S PS U	S PS U	S PS U
Drainage	S PS (U) Perched water 20-30"	S PS U	S PS U	S PS U	S PS U	S PS U
Depth	S PS (U) 24-36"	S PS U —	S PS U	S PS U	S PS U	S PS U
Restrictive Horizons	S (PS) U 736"	S PS U —	S PS U	S PS U	S PS U	S PS U
Available Space	S (PS) U	S PS U	S PS U	S PS U	S PS U	S PS U
Other (specify)	S PS U	S PS U	S PS U	S PS U	S PS U	S PS U
Soil Group/Series	Enon-Helena Expansive clay	Depression				
Area Classification	S PS (U)	S PS (U)	S PS U	S PS U	S PS U	S PS U

MECKLENBURG COUNTY HEALTH DEPARTMENT
SITE EVALUATION REPORT
SERIAL NUMBER 17807

File: Action

Parcel: ☐ PC

Location:

Subdivision:

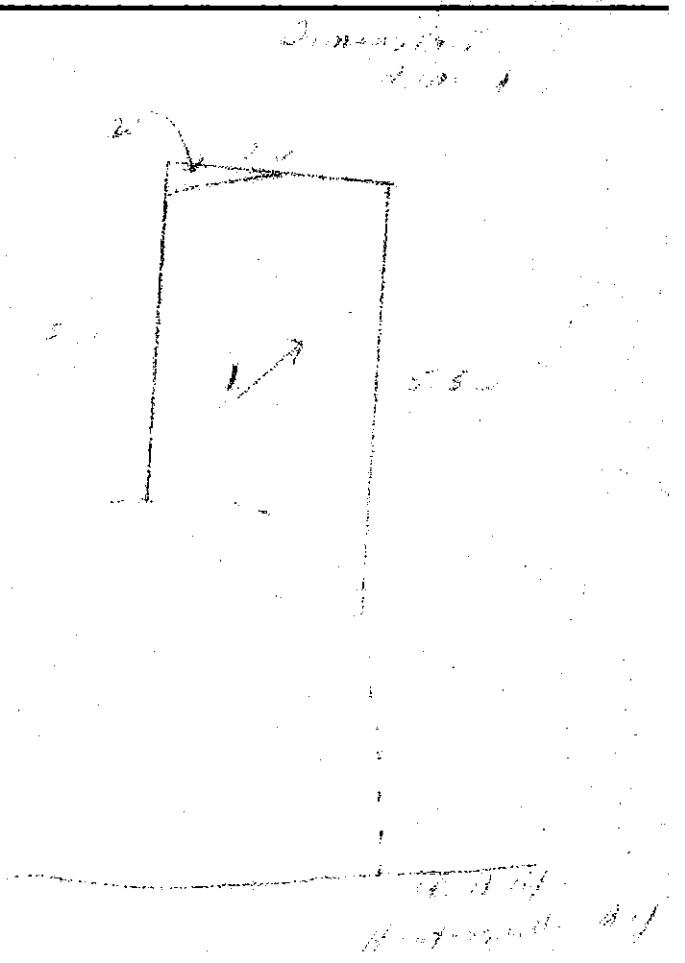
Lot: Block: Acres:

Owner:
Address:

Comments: _____

Described by: _____

Date: _____



***** EVALUATION KEY *****

S = Suitable U = Unsuitable
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The "Area Classification" below indicates the suitability of areas in the diagram.

FACTORS	AREA 1	AREA 2	AREA 3	AREA 4	AREA 5	AREA 6
Topography	S PS U	S PS U	S PS U	S PS U	S PS U	S PS U
Texture	S PS U	S PS U	S PS U	S PS U	S PS U	S PS U
Structure	S PS U	S PS U	S PS U	S PS U	S PS U	S PS U
Drainage	S PS U	S PS U	S PS U	S PS U	S PS U	S PS U
Depth	S PS U	S PS U	S PS U	S PS U	S PS U	S PS U
Restrictive Horizons	S PS U	S PS U	S PS U	S PS U	S PS U	S PS U
Available Space	S PS U	S PS U	S PS U	S PS U	S PS U	S PS U
Other (specify)	S PS U	S PS U	S PS U	S PS U	S PS U	S PS U
Soil Group/Series						
Area Classification	S PS U	S PS U	S PS U	S PS U	S PS U	S PS U

GIFFORD NIELSON ASSOCIATES Incorporated

LETTER OF TRANSMITTAL

Mech. County Environ. Health Dept.
1200 Blythe Blvd.
Charlotte, NC

DATE: 4/24/90 | JOB NO.: 28365
ATTENTION: Gene Vaughn
RE: CenterMark - Mt. Holly - Huntersville Site

WE ARE SENDING YOU ✓ ATTACHED __ UNDER SEPARATE COVER VIA Hand Del. THE FOLLOWING ITEMS:

O SHOP DRAWINGS O PRINTS O CHANGE ORDER O SPECIFICATIONS
O COPY OF LETTER O PLANS O REPORT X OTHER Application

COPIES	DATE	DESCRIPTION
1	4/24/90	Applic. for Soil Investigation - 2.5 Ac site
1	4/23/90	Check # 255242 - Applic. Fee $100.00
1	—	Map of Site location

THESE ARE TRANSMITTED AS CHECKED BELOW:

X FOR APPROVAL
O FOR YOUR USE
O AS REQUESTED
O FOR REVIEW AND COMMENT
O CONFIRM
O REJECTED
O NOTE MARKINGS
O NO REVISIONS
O RESUBMIT ____ COPIES
O SUBMIT ____ COPIES FOR DISTRIBUTION
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REMARKS:

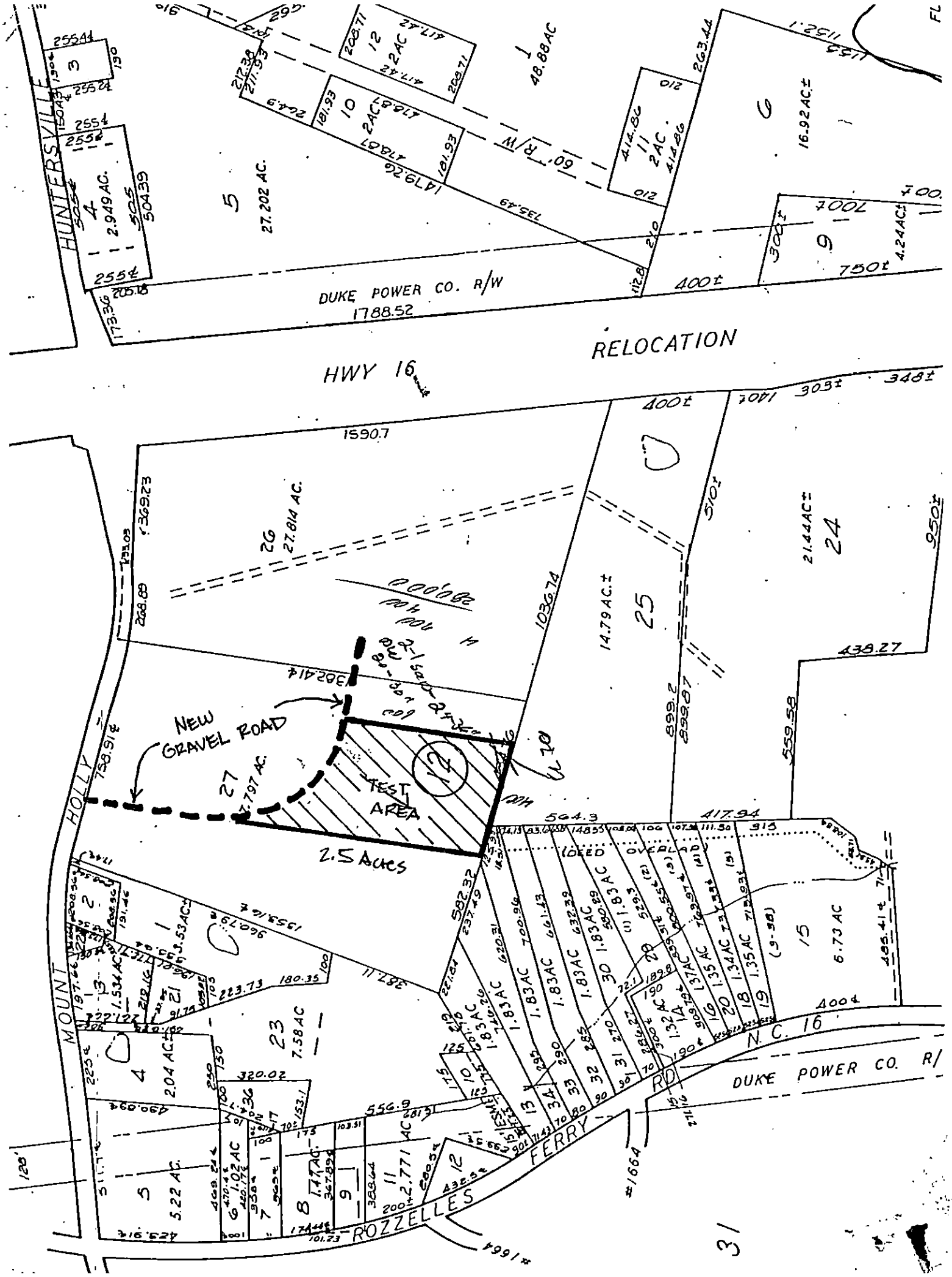
Gene - On behalf of CenterMark, I am submitting this prelim. Soil investigation application. Please complete the investigation as quickly as possible, Your prompt attention will be appreciated. Please call if you have any questions Contact me @ 373-1907 when work is ready for reviewing - Thank You

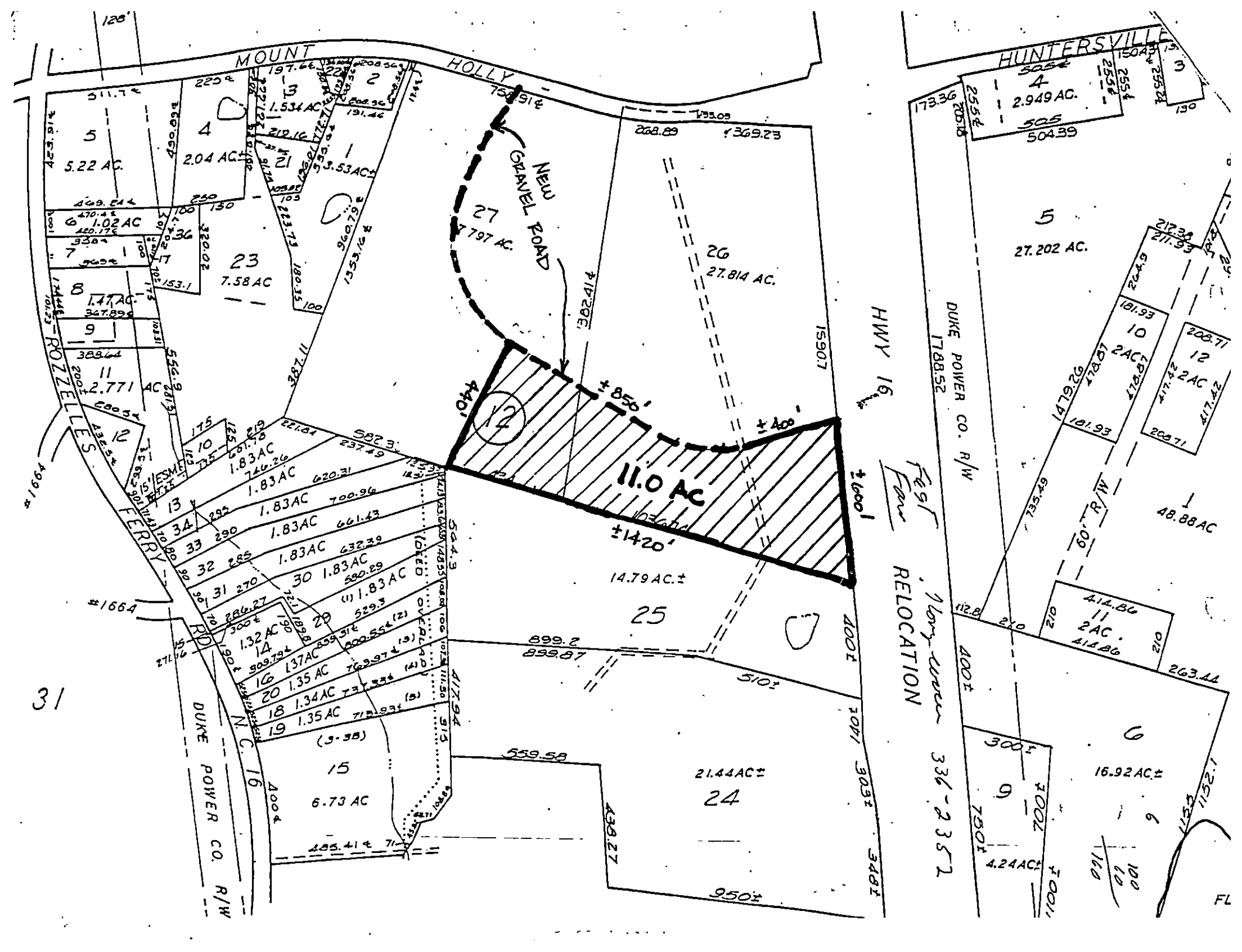
COPY TO: File / Don Garrett
COURIER: ____
RECEIVED BY: ____
DATE: ____ TIME: ____

SIGNED: Jeff D Eden
DEPARTMENT: Civil

IF ENCLOSURES ARE NOT AS NOTED, PLEASE NOTIFY US AT ONCE.

428 EAST FOURTH STREET CHARLOTTE, NC 28202 704/373-1907


HUNTERSVILLE
HWY 16
RELOCATION
DUKE POWER CO. R/W
1788.52
NEW GRAVEL ROAD
TEST AREA
2.5 Acres
HOLLY
MOUNT
ROZZELLES FERRY RD
N.C. 16
DUKE POWER CO. R/
1590.7
1036.74
14.79 AC.±
27.814 AC.
27.202 AC.
16.92 AC.±
48.88 AC
21.44 AC±
6.73 AC
7.58 AC
5.22 AC.
2.04 AC±
1.83 AC
1.34 AC
1.35 AC
1.37 AC
1.32 AC
2.771 AC
1.02 AC
1.47 AC
2.949 AC.
4.24 AC±
7.797 AC.
564.3
417.94
582.32
559.58
439.27
400±
700±
750±
950±
1664


MOUNT HOLLY
HUNTERSVILLE
NEW GRAVEL ROAD
HWY 16
DUKE POWER CO. R/W
ROZZELLES FERRY RD
N.C. 16
DUKE POWER CO. R/W
60' R/W
OVERFLOW
Fest Fam Mary Turner RELOCATION 336-2352
11.0 AC
14.79 AC.±
21.44 AC±
6.73 AC
7.58 AC
5.22 AC.
2.04 AC±
1.534 AC
3.53 AC±
1.02 AC
1.47 AC.
2.771 AC
1.83 AC
1.32 AC
1.37 AC
1.35 AC
1.34 AC
1.35 AC
27.797 AC.
27.814 AC.
27.202 AC.
2.949 AC.
48.88 AC
1.79 AC
2 AC.
16.92 AC.±
4.24 AC±
±850'
±400'
±1420'
±1600'
400'±
1382.41'
1590.7'
1353.16'
960.79'
387.11'
882.3'
544.3'
417.94'
559.58'
438.27'
950'±
1041'
303'±
348'±
510'±
899.2
899.87
735.49
1479.26
1788.52
1152.1'
1664
1664

MECKLENBURG COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION

CHARGE SLIP

Date: 4-25-90

Name/Company: Centermark Mt. Holly-Huntersville
c/o Mr. Jim Bruno TSP Investments

Sanitation _____ 2,12 South Tryon St
Suite 800

Vector Control _____ Charlotte, NC
28281

O.P.W.D. ✓

Service: Soil Test
Centermark / Mt. Holly -
Huntersville Rd.

MECKLENBURG COUNTY
HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
PAID
APR 25 1990

File # 6699A

Fee: $ 100.00

Ck # 255242
$100.00

NOTICE:

A processing fee of $15.00 will be charged for all returned checks in accordance with N.C. General Statute 25-3-512.

Completed by

Collected by

MECKLENBURG COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION

CHARGE SLIP

Date: 6-7-90

Name/Company: McGinn Group
Lennox Inc.

Sanitation _____

Vector Control _____

O.P.W.D. X

Service: Pre-Preliminary
11 acres

COUNTY Soil Investigations
TMENT
ENVIRO... ALTH DIVISION 12 S. Tryon

PAID

JUN 7 1990 160.00 25906 #440.00

Fee: $ 440.00

NOTICE:

A processing fee of $15.00 will be charged for all returned checks in accordance with N.C. General Statute 25-3-512.

Elizabeth Hanstine
Completed by

Collected by

SOIL AND SITE CHARACTERIZATION
FOR ON-SITE WASTE SYSTEM
AT
MOUNTAIN ISLAND MARKETPLACE,
MECKLENBURG COUNTY, NORTH CAROLINA

by

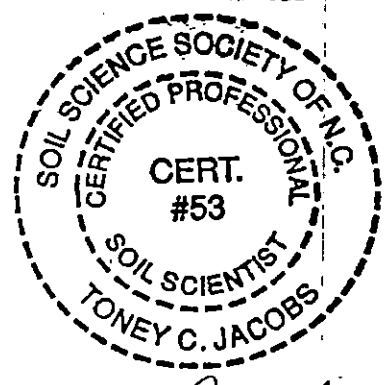
Toney C. Jacobs
Consulting Soil Scientist
Rt. 2 Box 280
Troutman, N. C. 28166

October 12, 1990

Submitted to: Mr. Jeff Oden, P.E.
DesiGNAssociates, Inc.
428 E. Fourth Street
Charlotte, N. C. 28202

Copy to: Mr. Bill Marlin, CPSS
Environmental Health Division
1200 Blythe Blvd.
Charlotte, N. C. 28203





Toney C. Jacobs, CPSS

Introduction

This report summarizes the activities, observations, data collection, recommendations and conclusions for the proposed shopping center, Mountain Island Marketplace. This report is a supplement to the engineering plan, and some details which will be included in the engineer's design are omitted. This is a new shopping center and waste system located northwest of Charlotte at the Highway 16, Mt. Holly-Huntersville Road intersection (Fig. 1). The proposed design is 7,200 expandable to 10,000 gal/day from a variety of general business establishments, including grocery store and restaurants. This investigation was made to determine a recommendation for waste disposal possibilities; either, spray irrigation permitted through HENR-DEM (15NCAC 2H .0200) or subsurface ground absorption permitted through Mecklenburg County Environmental Health and the HENR-DHS (10NCAC 10A .1900). Soils criteria for both systems follow. For ground absorption this report addresses both initial and repair areas. Because of the large size of this system, the site was evaluated to comply with criteria of 10NCAC 10A .1946(4) with a ground absorption system. Some elements of the evaluation required assumptions or extrapolations and these are noted.

This proposed disposal site is a polygon approximately rectangular, 620 by 420 feet, or approximately 6 acres. The disposal site is primarily a large interfluve landscape position (Fig. 2). The drainfield area was recently logged timberland and before this, indications are that it was old cropland. The field slopes to the south/southwest at approximately 3-6 percent. In the area proposed for disposal there are no erosional features, such as rills or gullies.

Soils

The Soil Survey of Mecklenburg County, North Carolina (McCachren, 1980) has the area mapped mostly as Cecil sandy clay loam, 2 to 8 percent slopes and eroded (Fig. 3) This is consistent with my finding and the descriptions which follow. There was one inclusion of mixed mineralogy material south of the proposed drainfield area (Fig. 4). Backhoe pits were placed on the property August 31, 1990. After a preliminary investigation, William R. Marlin, CPSS of the Mecklenburg County Health Department was contacted and he assisted in evaluating 12 of 15 pits placed. These pits are roughly spotted on Figure 5. These pits were excavated by backhoe to varying depths with 4-6 feet of face exposed on the bottom. Pit depths were:

Pit	1	7.2ft.	Pit	9	6.2
	2	15.6		10	5.4
	3	6.2		11	6.0
	4	6.6		12	6.0
	5	4.2		13	4.5
	6	16.3		14	4.4
	7	6.4		15	5.3
	8	6.2			

All pits were formally described and descriptions are available in field notes. The following two descriptions are typical of the entire area:

Pit 2

feet	
+-0	common cutover timber, succession weed litter.
0-0.7	yellowish-brown (10YR 5/8) sandy loam; weak, granular structure; loose friable; common fine roots; clear smooth boundary.
0.7-2.2	red (2.5YR 5/8) clay; strong subangular blocky structure (SAB); v. firm; common roots; clear smooth boundary.
2.2-4.8	red (2.5YR 5/8) clay loam/clay; massive to v. weak; SAB; common fine pores; firm; s. sticky; thin continuous clay films; few roots; gradual wavy boundary.
4.8-6.2	red (2.5YR 4/8) clay loam; massive in place; firm; v. friable removed; v. thin discontinuous clay films; few inclusions of reddish-yellow (5YR 6/8) mottles; gradual smooth boundary.
6.2-8.2	red (2.5YR 4/8) loam soil/saprolite; easily crushes to coarse loamy texture; few fine mica flakes; firm in place; friable when disturbed; gradual smooth boundary.
auger hole continuation	
8.2-13.1	brownish-yellow (10YR 6/8) loam to silt loam; saprolite; friable few black inclusions; abrupt smooth boundary.
13.1-15.6	weak red (10R 5/4) loam saprolite; v. friable; many mica flakes to cause a metallic shine in some areas; base of hole(BOH).

Pit 6

+-.0	woods litter
0-0.7	dark yellowish-brown (10YR 4/4) sandy loam; weak granular; friable; common fine roots; abrupt smooth boundary.
0.7-2.2	yellowish-red (5YR 5/6) clay; firm SAB; continuous clay films; clear smooth boundary.

2.2-6.2 red (2.5YR 5/8) clay loam; weak fine SAB; medium firm; thick discontinuous clay films in some areas and crotovina; few pockets saprolite in horizontal planes; few mica flakes; common reddish-yellow (5YR 6/8) h. clay loam mottles; clear wavy boundary.

6.2-16.3 (6.2-8.3 pit) (8.3-16.6 auger hole continuation) mostly yellowish-brown (10YR 5/8) loam saprolite; common felsic residual material and mica matrix and flakes; BOH.

At the time of the field investigation there was no water or saturated soils encountered in any pit or hole. On the two deep explorations, there was careful attention given to identify any drainage mottles or indication of watertables or other wetness condition. Pit 6, which was located in the center of a drainage way (Fig. 2) and at the lowest elevation of any of the pits. There was no indication of poor aeration or impeded drainage in this location.

A geotechnical evaluation was conducted July 29 and August 1, 1988. This work was in the proposed disposal area (Appendix 1). There was no free water or watertable in any of these observations. Also notable was that to a 15 feet depth there was no auger refusal. Because of the 24" width of the bucket on the backhoe, and the expansive 4-6 lineal feet of pit face at the pit bottom, a thorough examination of saprolite was possible. There were no indications of cracks or fissures in any of the holes which would cause channeling or "pipe lining" of effluent waters.

In the approximately 16 acres evaluated (shown in white - Fig. 4) the majority, or approximately 9 acres, is Cecil series soil. This has few limitations for use as either a spray or ground absorption system. The Wilkes/Enon-like soil (approximately 2 acres) has a mixed mineralogy clay, poor internal drainage, and is unsuitable for ground absorption. There are very limited possibilities for a low rate, <.2" per week of spray irrigation. The approximately 5 acres of Appling soil, because of severe erosion, has a clay layer at or near the surface. It is usable for either type system, but at a lower application than the Cecil. This soil would be more suitable for the spray irrigation than ground absorption because of the low application rate for its use.

A total of 14 soil samples were collected on the site and analyzed by the NCDA laboratory, Raleigh, N. C. (Appendix 2). These were A,B, BC, and C horizon samples. The CEC for these samples from the proposed drainfield ranged 1.3-3.8, except at pit 9 which was 5.9-9.4 millequivalents per 100 cubic centimeters. This is indicative of kaolinitic mineralogy in the drainfield area.

Hydraulic Conductivity

The most hydraulically limiting subsurface layer, based on soil texture and apparent structure, was selected for a soil permeability test. The horizon or saprolite at the depth indicated below was also evaluated by Air-Entry Permeameter (AEP). This was done at two locations in the profile at deep pit 2. A description of the AEP test procedure and equipment is attached (Appendix 2).

The results were as follows:

Pit 2	1.92 in/hr at 0.9-1.2
	1.45 in/hr at 8.3-8.5

From experience in similar soils of the same soil series in the Piedmont physiographic providence, these readings are normal within the expected variation of each repetition. These measured values fall within the USDA range of 0.6-2.0 in/hr for the Cecil profile in both horizons (Fig. 6) These measurements were made while low plant available moisture existed in the surface horizon, but at the test depth soils were moist on August 31, 1990 when the tests were run. The value of the B soil horizon is higher than expected, but with the strong SAB structure, water could, and probably did, move interped. Also, the drought conditions may have influenced values.

Groundwater Mounding

There have been many groundwater mounding models developed since the advent of large soil absorption systems. Of those reviewed, including the one developed by DHS, the Hoopes (1981) appeared to fill the parameters of this site. Figures 7 and 8 give results of two iterations and indicated that groundwater mounding beneath this drainfield should not cause a violation of the regulations and greatly exceed the 2 feet minimum separation to the watertable. Two of the main assumptions on depth to watertable and depth to impermeable layer were provided in a personal communication with Mr. George McCall (1990) of McCall Brothers Well Company. From his vast experience in this area, he estimated rock at 60' and watertable at 28'. This equation does have assumptions; however, these are made with conservative estimates. There is also slope on this site and the equation does not address this. These calculations therefore give a more conservative estimate of suitability.

There is always concern about upslope loading to lower lines (up to 15 initial lines and 15 repair lines in large systems. This would be approximately 270 lateral feet and 10 feet change in elevation. With the measured Ksat and physical properties of the soil, there should be no influence from upslope lines as long as there is not a sealing of the existing profile to cause a rise in the watertable. With 9' minimum spacing of trenches, capillary flow from one trench to the next would be unlikely. There is no reason to expect such sealing from this system in the top 15 feet of the profile.

Two factors of concern in field design are the rainwater addition which does not run off and subsurface lateral flow. A series of surface drainage swells should be included to divert water from the field to the side areas for accelerated runoff. These should be shown on the engineering plan. Consideration should be given to a backfill pattern to exclude as much rainwater from the downgrade lines as possible. This would require using the clay loam subsurface material, rather than the sandy loam A surface horizon for capfill. In some Piedmont soils, lateral subsurface flows are common during winter/early spring. Should required monitoring for large systems indicate increased ponding in trenches, a space

upslope and near the center should be designated for interceptor drains should they be needed in the future.

Area

The USGS topo and in the soils maps Fig. 2 and 3, respectively, do not indicate perennial or ephemeral streams on or near the proposed drainfield area. There is the area where Pit 6 is located that concentrates water for overload flow during spate rainfalls. There is no cut in the surface to represent a channel. This area is excluded from the drainfield or considered spray irrigation possibility.

There is one house on the proposed property with a well. This is at least 300 feet from the field and possibly further. Across Mt. Holly-Huntersville Road is also a farmstead which would be served by the well. The topo indicates a house in what is now US 16. This would have been the closest potential well to the site and its origin or fate was not determinable.

Summary of Site

The gentle sideslope with a deep soil profile offers sufficient area for an on-site soil absorption system. There are no indications of a seasonal watertable or confinement to prevent a satisfactory design. A 0.35-0.4 gal/ft sq/d application rate should be consistent with the regulations and sound design. Over the suggested area is at least 15 feet of suitable soil/saprolite. Also there is indication of approximately twice that distance to the watertable. This recommendation is enhanced because of the dosing and equal distribution required for such a system. This report also addresses additional area which is available to repair or upgrade should hydraulic overload occur.

Any of the area evaluated can be used for a spray system. The application rate, based on an informal hydrologic budget, would be approximately 0.9-1.0 inches per week for the Cecil soil and less for the others. On this site with the ground absorption option, I see these advantages over spray irrigation:

1. less monitoring of waste, if any
2. no soil monitoring
3 minimal buffers required
4. less physical plant to operate
5. no storage required
6. less total area to waste system
7. low input system monitoring

Before final approval, the county may require the lines be staked on contour, along with a field survey showing each line length. The site can either be mowed (bush hogged) before this work or grubbed to remove tree stumps and vegetation. This does not mean grading with any cutting or filling of the surface. Until construction, the site should be maintained undisturbed. This should include placement of signs, ribbons, and special instructions to site personnel to avoid traffic, storage, or parking in the area. There should also be special

conditions imposed on the contractor installing the drainfield. This includes prohibiting any work while the site is wet. Attention should be given to avoid the smearing of sidewalls in trenches and should any occur, there should be raking or pulling off of the smeared area.

After the pressure distribution conventional system is installed, the following should be checked to insure that the system will not pond or be overloaded with excess rainwater or runon:

1. The distribution field is shaped to shed water and is free of low areas.
2. Curtain drains, grassy swales or ditches for diverting ground and surface water are properly installed.

Finally, the entire area should be planted with grass according to the following specifications:

1. Apply agricultural lime at the rate of 1 ton/acre.
2. Apply 10-10-10 commercial fertilizer at the rate of 900 lbs.A.
3. Seed in accordance with the following schedule and application rate:

Date	Type	Planting Rate
8/15 - 11/1	Tall Fescue	200 lb/ac
11/1 - 3/1*	Tall Fescue and Abruzzi Rye	200 lb/ac 25 lb/ac
3/1 - 4/15	Tall Fescue	200 lb/ac
4/15 - 7/30	Mulled Common or Bermuda Grass	30 lb/ac
7/15 - 8/15	Tall Fescue and Browntop Millet or Sorghum-Sudan Hybrids	200 lb/ac 35 lb/ac 30 lb/ac

4. Mulch with straw applied at the rate of 75-100 lb/1000 square feet.

* Heavily mulched during January - March period.

REFERENCES

1. Hoopes, J. A. et al. 1981. Modeling pollutant movement in groundwater. In. High Rate Soil Absorption System HRSA Task Force Final Report, 1984, Minnesota Pollution Control Agency, Roseville, Minnesota.

2. McCachren, Clifford M. 1980. Soil Survey of Mecklenburg County, North Carolina, USDA.

3. McCall, George. 1990. Personal Communication: McCall Brothers, Inc., 6700 Belhaven Blvd., Charlotte, N. C. (704)399-1506.

4. USDA - SCS, Cecil series "bluesheet".

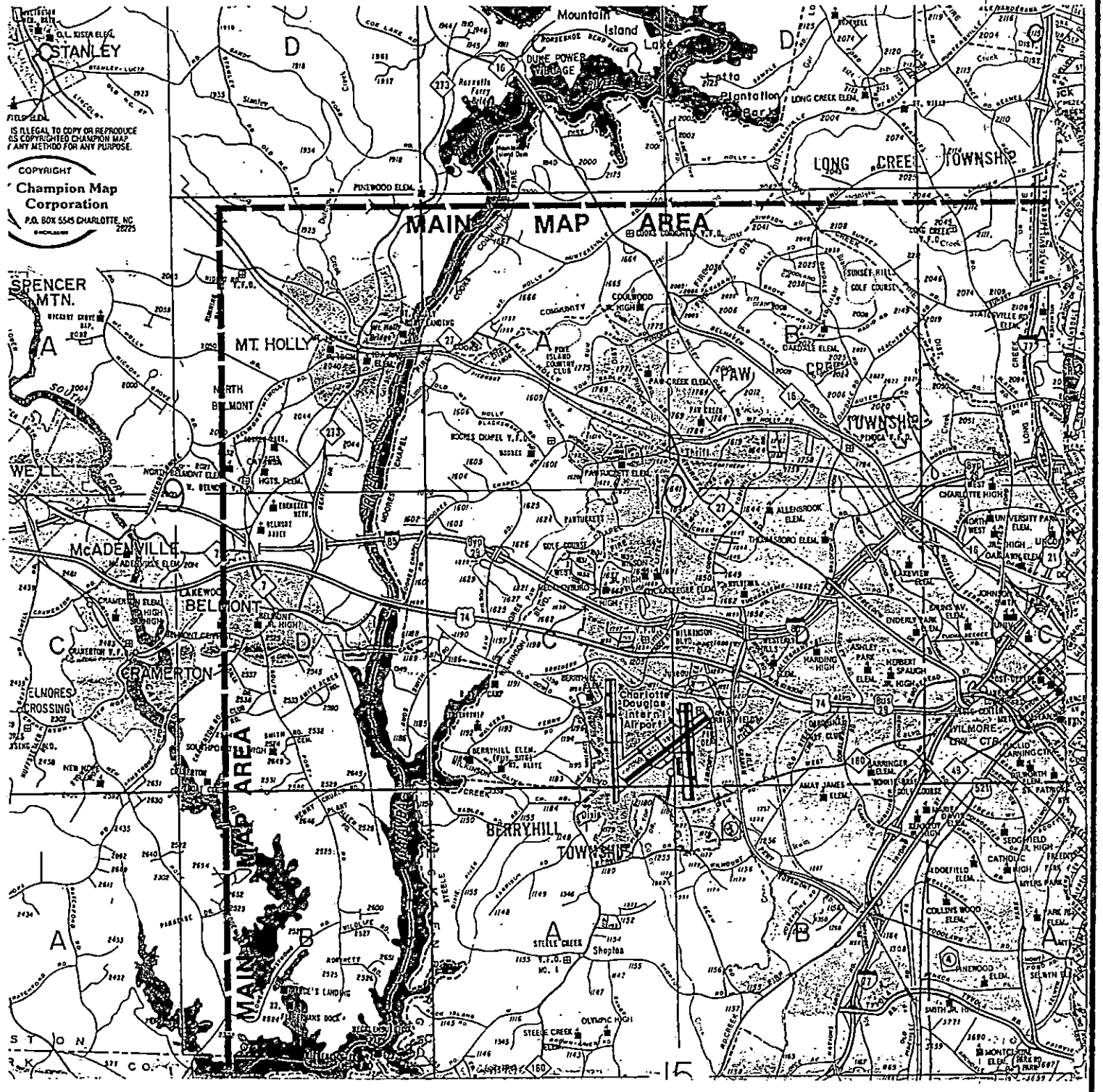

MAIN MAP AREA
MAIN MAP AREA
STANLEY
SPENCER MTN.
MT. HOLLY
NORTH BELMONT
McADENVILLE
LAKEWOOD
BELMONT
CRAMERTON
ELMORES CROSSING
Mountain Island Lake
DUKE POWER VILLAGE
Plantation
LONG CREEK TOWNSHIP
PAW CREEK TOWNSHIP
BERRYHILL TOWNSHIP
COULWOOD
SUNSET HILLS
PINEWOOD ELEM.
PAW CREEK ELEM.
CHARLOTTE HIGHS
ALLENSBROOK ELEM.
PARKWOOD ELEM.
Charlotte Douglas International Airport
STEELE CREEK
Shopton
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Fig. 1

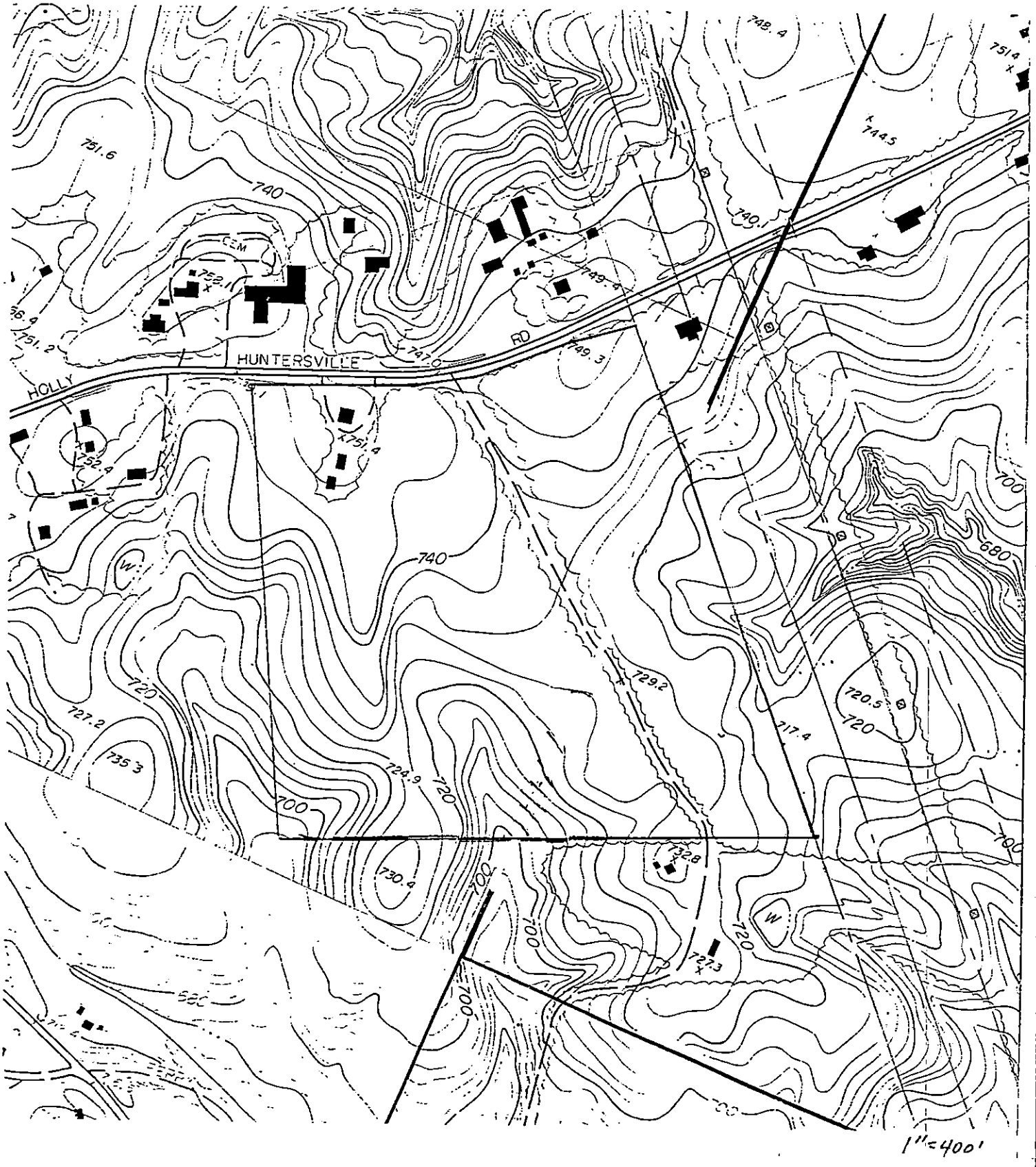

HUNTERSVILLE
HOLLY
RD
CEM
751.6
740
752.1
749.4
749.3
747.0
751.2
752.4
751.4
740
720
727.2
735.3
724.9
700
730.4
729.2
720.5
717.4
720
680
700
732.8
727.3
720
700
700
700
1"=400'

Fig. 2



Fig. 3

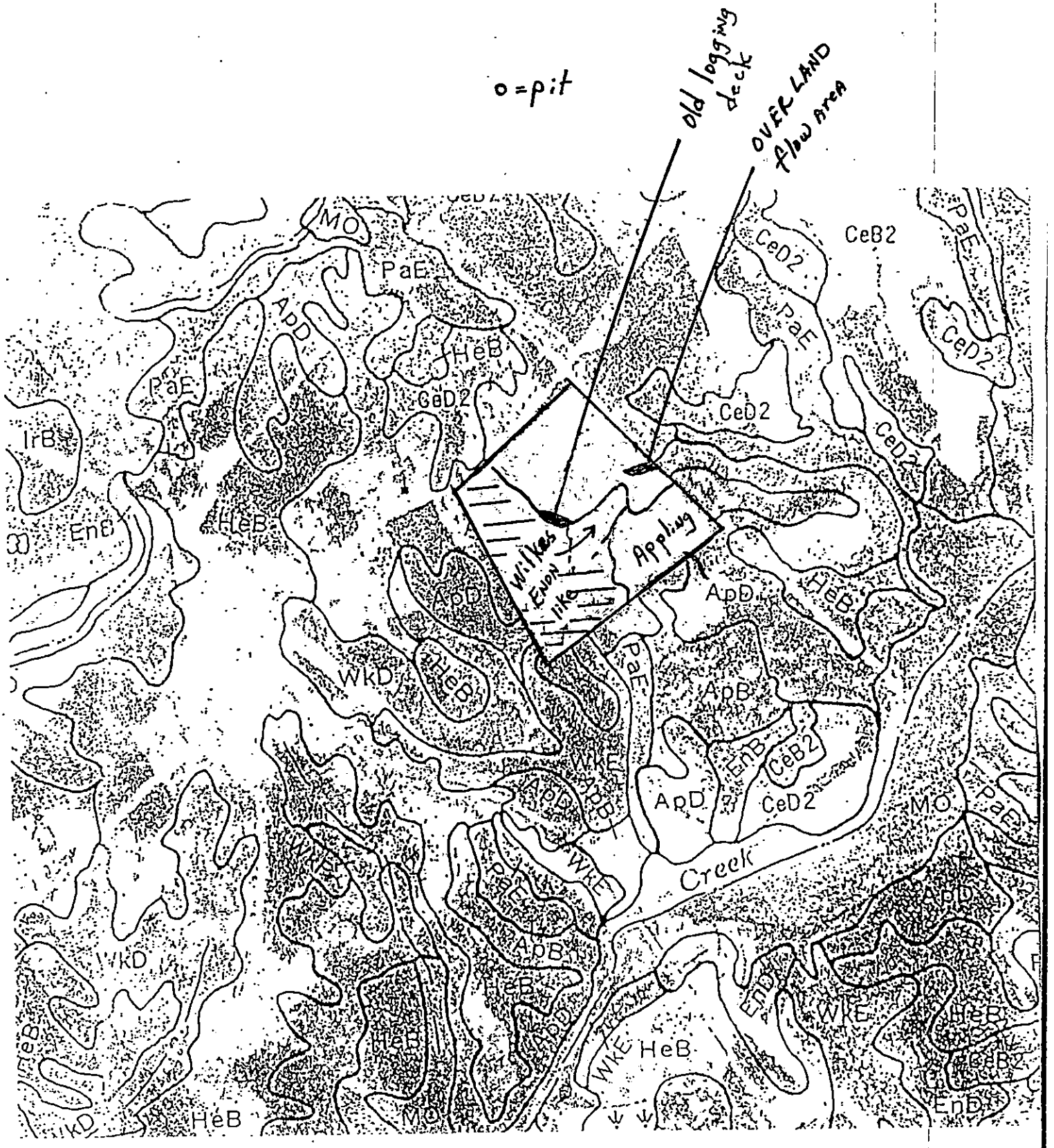

o = pit
old logging deck
OVER LAND flow area
Wilkes
Ender
Like
Applin
Creek
MO
PaE
ApD
HeB
CeD2
CeB2
IrB
EnB
WkD
WkE
ApB

Fig. 4

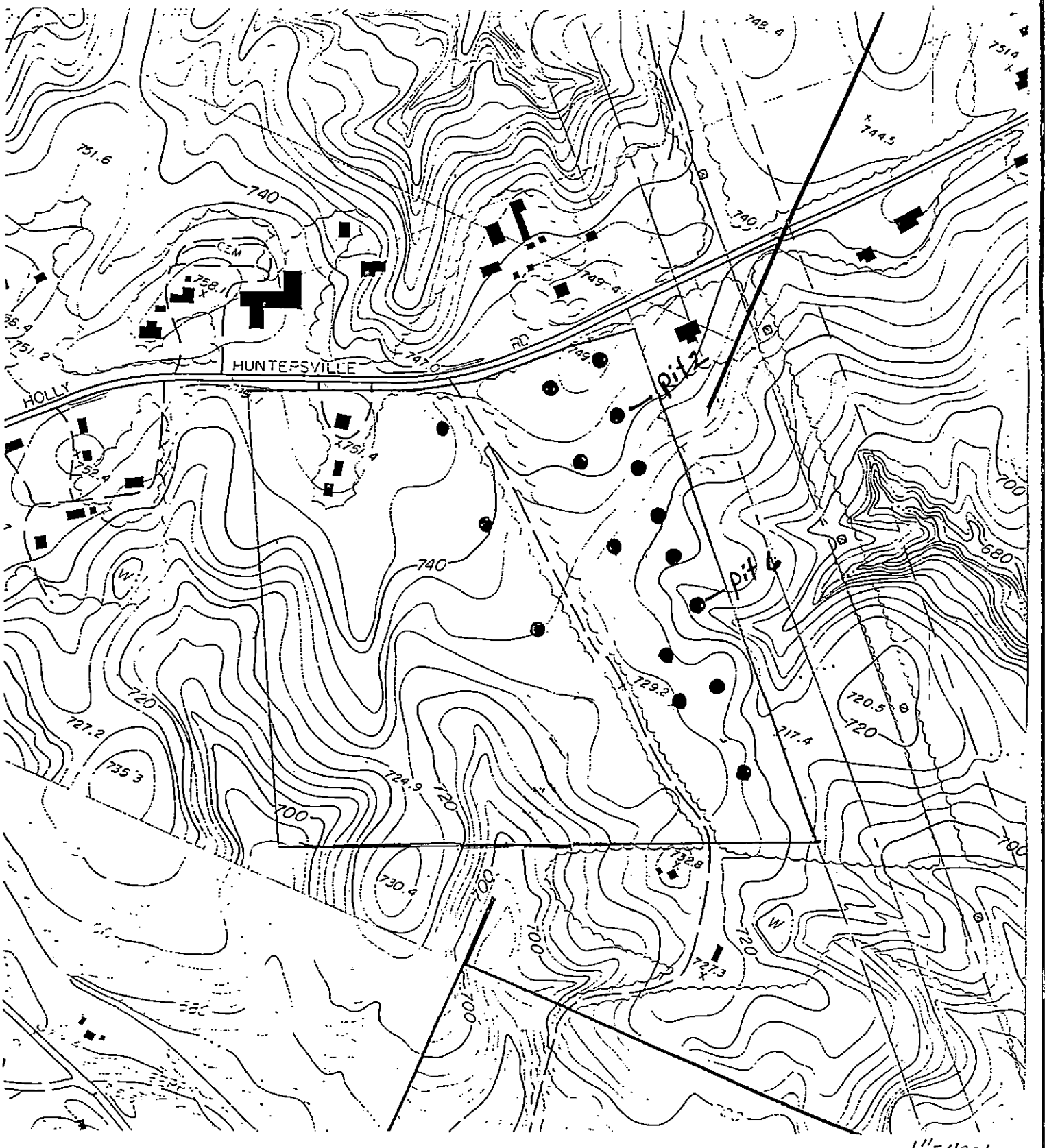

HUNTERSVILLE
HOLLY
Pit 2
Pit 1
740
720
700
680
1"=400'
● = soil pit (App.)

Fig. 5

NC0018 SOIL INTERPRETATIONS RECORD

MLRA(S): 136, 148
REV. RAG,DLN, 5-84
TYPIC HAPLUDULTS, CLAYEY, KAOLINITIC, THERMIC

CECIL SERIES

THE CECIL SERIES CONSISTS OF WELL DRAINED NEARLY LEVEL TO STEEP SOILS ON PIEDMONT UPLANDS. TYPICALLY THESE SOILS HAVE A SANDY LOAM SURFACE LAYER ABOUT 7 INCHES THICK. THE SUBSOIL IS DOMINANTLY RED CLAY AND CLAY LOAM 43 INCHES THICK. THE UNDERLYING MATERIAL IS MULTICOLORED, LOAMY SAPROLITE OF ACID CRYSTALLINE ROCK. SLOPES RANGE FROM 0 TO 25 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT >3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	LIQUID LIMIT	PLASTICITY INDEX
0-7	SL, FSL, L	SM, SM-SC	A-2, A-4	0-5	84-100	80-100	67-90	26-42	< 30	NP-6
0-7	GR-SL	SM	A-2	5-15	70-95	55-85	40-75	13-30	< 22	NP-4
0-7	SCL, CL	SM, SC, CL, ML	A-4, A-6	0-5	74-100	72-100	68-95	38-81	21-35	3-15
7-11	SCL, CL	SM, SC, ML, CL	A-4, A-6	0-5	74-100	72-100	68-95	38-81	21-35	3-15
11-50	C, CL	MH, ML, CL	A-7, A-5	0-5	97-100	92-100	72-99	55-95	41-80	9-37
50-75	VAR									

DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SHRINK-SWELL POTENTIAL	EROSION FACTORS KI	EROSION FACTORS T	WIND EROD. GROUP	ORGANIC MATTER (PCT)	CORROSIVITY STEEL	CORROSIVITY CONCRETE
0-7	5-20	1.30-1.50	2.0-6.0	0.12-0.14	4.5-6.0	-	LOW	.28	4	-	.5-2	MODERATE	MODERATE
0-7	5-20	1.40-1.60	2.0-6.0	0.07-0.09	4.5-6.0	-	LOW	.15	4	-	.5-2		
0-7	20-35	1.30-1.50	0.6-2.0	0.13-0.15	4.5-6.0	-	LOW	.28	4	-	.5-1		
7-11	20-35	1.30-1.50	0.6-2.0	0.13-0.15	4.5-6.0	-	LOW	.28					
11-50	35-70	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	-	LOW	.28					
50-75													

FLOODING FREQUENCY	FLOODING DURATION	FLOODING MONTHS	HIGH WATER TABLE DEPTH (FT)	HIGH WATER TABLE KIND	HIGH WATER TABLE MONTHS	CEMENTED PAN DEPTH (IN)	CEMENTED PAN HARDNESS	BEDROCK DEPTH (IN)	BEDROCK HARDNESS	SUBSIDENCE INIT. (IN)	SUBSIDENCE TOTAL (IN)	HYDROLOGIC GRP	POTENTIAL FROST ACTION
NONE			>6.0			-		>60		-		B	-

SANITARY FACILITIES (B)

SEPTIC TANK ABSORPTION FIELDS	0-8%: MODERATE-PERCS SLOWLY 8-15%: MODERATE-PERCS SLOWLY,SLOPE 15+%: SEVERE-SLOPE
SEWAGE LAGOON AREAS	0-2%: MODERATE-SEEPAGE 2-7%: MODERATE-SEEPAGE,SLOPE 7+%: SEVERE-SLOPE
SANITARY LANDFILL (TRENCH)	0-8%: MODERATE-TOO CLAYEY 8-15%: MODERATE-SLOPE,TOO CLAYEY 15+%: SEVERE-SLOPE
SANITARY LANDFILL (AREA)	0-8%: SLIGHT 8-15%: MODERATE-SLOPE 15+%: SEVERE-SLOPE
DAILY COVER FOR LANDFILL	0-8%: FAIR-TOO CLAYEY,HARD TO PACK 8-15%: FAIR-TOO CLAYEY,HARD TO PACK,SLOPE 15+%: POOR-SLOPE

BUILDING SITE DEVELOPMENT (B)

SHALLOW EXCAVATIONS	0-8%: MODERATE-TOO CLAYEY 8-15%: MODERATE-TOO CLAYEY,SLOPE 15+%: SEVERE-SLOPE
DWELLINGS WITHOUT BASEMENTS	0-8%: SLIGHT 8-15%: MODERATE-SLOPE 15+%: SEVERE-SLOPE
DWELLINGS WITH BASEMENTS	0-8%: SLIGHT 8-15%: MODERATE-SLOPE 15+%: SEVERE-SLOPE
SMALL COMMERCIAL BUILDINGS	0-4%: SLIGHT 4-8%: MODERATE-SLOPE 8+%: SEVERE-SLOPE
LOCAL ROADS AND STREETS	0-8%: MODERATE-LOW STRENGTH 8-15%: MODERATE-SLOPE,LOW STRENGTH 15+%: SEVERE-SLOPE

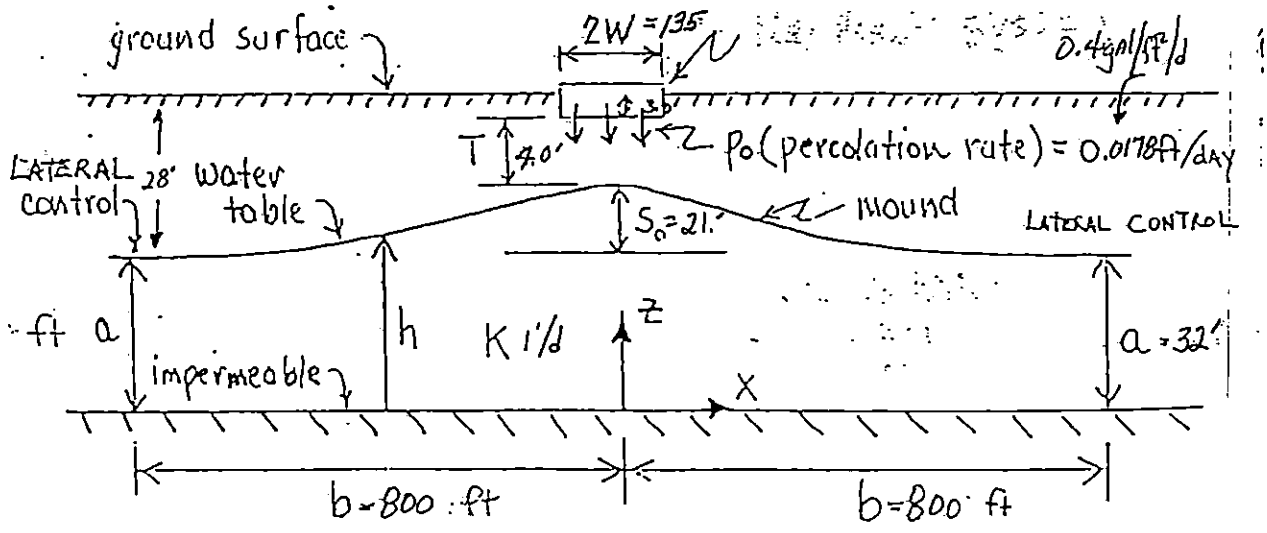
CONSTRUCTION MATERIAL (B)

ROADFILL	FAIR-LOW STRENGTH
SAND	IMPROBABLE-EXCESS FINES
GRAVEL	IMPROBABLE-EXCESS FINES
TOPSOIL	0-15%: POOR-THIN LAYER 15+%: POOR-THIN LAYER,SLOPE

WATER MANAGEMENT (B)

POND RESERVOIR AREA	0-20%: MODERATE-SEEPAGE 20+%: SEVERE-SLOPE
EMBANKMENTS DIKES AND LEVEES	SEVERE-HARD TO PACK
EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER
DRAINAGE	DEEP TO WATER
IRRIGATION	0-3%: FAVORABLE 3+%: SLOPE
TERRACES AND DIVERSIONS	0-8%: FAVORABLE 8+%: SLOPE

Fig. 6



Maximum at the center of the recharge area:

$$\frac{So}{W} = \left\{\frac{Po}{K}\left(\frac{2b-W}{W}\right) + \left(\frac{a}{W}\right)^2\right\}^{\frac{1}{2}} - \left(\frac{a}{W}\right)$$

Recharge at center to be worse case

$$\frac{S_o}{67.5} = \left\{\frac{0.0178}{1}\left(\frac{2(800-67.5}{67.5}\right) + \left(\frac{32}{67.5}\right)^2\right\}^{\frac{1}{2}} - \frac{32}{67.5}$$

$S_o = 21'$

where:

Q_o = existing groundwater flow rate. (ft/day)

S_o = maximum mound height (ft)

W = radius of the recharge area or one half of the width of a rectangular area (ft)

h = height of the mound at distance x (ft)

P_o = loading rate (ft/day)

b = distance to lateral control (ft)

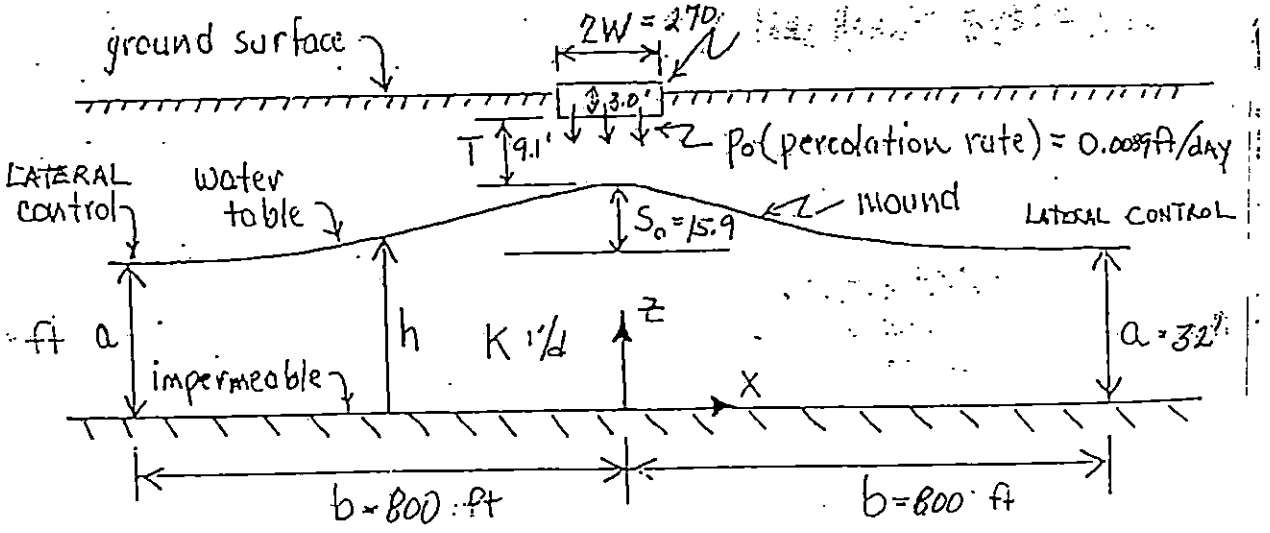
a = saturated thickness (ft)

K = saturated hydraulic conductivity (ft/day)

r or x = selected horizontal distance from the center of the recharge area (ft)

from Hoopes (1981)

Fig. 7



$$\frac{So}{W} = \left\{\frac{Po}{K}\left(\frac{2b-W}{W}\right) + \left(\frac{a}{W}\right)^2\right\}^{\frac{1}{2}} - \left(\frac{a}{W}\right)$$

Recharge at center to be worse case

$$\frac{So}{135} = \left\{\frac{.0089}{1}\left(\frac{2(665-135)}{135}\right) + \left(\frac{32}{135}\right)^2\right\}^{\frac{1}{2}} - \frac{32}{135}$$

$$So = 15.9$$

where:

Q_o = existing groundwater flow rate. (ft/day)

S_o = maximum mound height (ft)

W = radius of the recharge area or one half of the width of a rectangular area (ft)

h = height of the mound at distance x (ft)

P_o = loading rate (ft/day)

b = distance to lateral control (ft)

a = saturated thickness (ft)

K = saturated hydraulic conductivity (ft/day)

r or x = selected horizontal distance from the center of the recharge area (ft)

from Hoopes (1981)

Fig. 8

SUMMARY REPORT OF PRELIMINARY GEOTECHNICAL FOUNDATION INVESTIGATION AND ENGINEERING EVALUATION SHOPPING CENTER MT. HOLLY-HUNTERSVILLE ROAD AND HIGHWAY 16 MECKLENBURG COUNTY, NORTH CAROLINA

OUR PROJECT NUMBER 2687

SUBSURFACE INVESTIGATIONS, INC.

P.O. BOX 241204

CHARLOTTE, N.C. 28224-1204

(704) 334-0619

AUG 05 1988

SUBSURFACE INVESTIGATIONS, INC.
P.O. BOX 241204
CHARLOTTE, NC 28224-1204
(704) 334-0819

August 4, 1988

Mr. Don Garrett
Center Mark Properties
Suite 500
212 South Tryon Street
Charlotte, North Carolina 28281

SUBJECT: SUMMARY REPORT OF PRELIMINARY GEOTECHNICAL FOUNDATION INVESTIGATION AND ENGINEERING EVALUATION
SHOPPING CENTER
MT. HOLLY-HUNTERSVILLE ROAD AND HIGHWAY 16
MECKLENBURG COUNTY, NORTH CAROLINA

OUR PROJECT NUMBER 2687

Dear Mr. Garrett:

Subsurface Investigations, Inc. has completed the preliminary foundation investigation and analysis for the proposed Shopping Center. This report summarizes our Findings and Recommendations.

FINDINGS

Six test borings (ASTM D-1586) were drilled at the site within the vicinity of the Shopping Center as shown on the attached plan.

The following general soil strata are present at the test locations.

(1) A 0.5 to 0.7 foot thick surface veneer of leaves, straw and topsoil is generally present at the ground surface.

(2) The U.S. Soil Conservation Service Soil Survey for Mecklenburg County maps this site predominantly with the Helena soil series. This soil is characterized by the presence of a highly plastic clay, locally termed "Bull Tallow" which exhibits high shrink-swell characteristics when subjected to seasonal moisture variations. This soil is not suitable for foundation or direct floor slab or pavement support.

No Bull Tallow was encountered in the test borings but may be present in isolated pockets across the site.

(3) Existing fill may be present along the existing dirt road that crosses this site. Potential fill areas will exist in areas where the road crosses drainage features or gullies.

Subsurface Investigations, Inc. is not responsible for undetected existing fill soils between the test borings.

(4) Weathered in-place, or residual, soil is present below the topsoil at the test locations. Generally, this residual soil is a clayey silt or silty clay in the upper 3 to 5 feet and transitions to a sandy silt with depth. Isolated lenses of silty sand are also present. Consistencies of this residual strata range from stiff to hard.

No partially weathered rock or auger refusal strata was encountered within the depths sampled.

No ground water was encountered within the depths sampled at the time of boring. This testing program was performed during a drought period in which extremely low ground water tables exist. Ground water is projected to rise 4 to 6 feet with the return of normal seasonal moisture. Ground water will be shallow in low areas and at the base of gullies during wet periods. Springs or seeps may also be present at the base of gullies during wet periods such as late winter and early spring.

PRELIMINARY RECOMMENDATIONS

The Shopping Center, as we understand it, will be a tall one story structure with masonry walls and an interior steel frame. Loads are estimated at 2 to 4 Kips per linear foot of wall. Interior column loads are projected at 40 to 60 Kips. Floor slabs will be on grade without a basement.

Cuts and fills, as we understand it, may be 6 to 8 feet over the site to obtain the desired subgrade elevation.

Any Bull Tallow should be completely removed and replaced with a new non-clay structural fill. Bull Tallow may be left in parking areas with a minimum structural fill cover of 4 feet.

Structural fill should be compacted to at least 95% of the standard Proctor (ASTM D-698) maximum dry density and to 100% for 12 inches directly beneath floor slabs and 24 inches directly beneath paved areas. This fill should extend 5 feet horizontally beyond the footing foundations and paved areas and then extend downward on a maximum 2 horizontal to 1 vertical slope. Visual inspection of the soil samples indicate that the on-site residual soils are suitable for reuse as structural fill. Bull tallow should not be used as structural fill but may be wasted in the form of berms around the perimeter of the site or in bury pits where future expansion will not occur.

The Shopping Center may be supported on a system of shallow spread footing foundations. A preliminary 3000 psf design soil bearing pressure can be used to size the footing foundations. This applies to foundations supported at least 1.5 foot into stiff to very stiff residual soils or new structural fill compacted to at least 95% of the standard Proctor (ASTM D-698) maximum dry density.

Lightly loaded interior partitions may be supported on thickened floor slabs.

Minimum building code footing widths and 18 inch frost depths should be followed.

Floor slabs may be supported on proof rolled subgrade or new structural fill soils.

No excavation or ground water problems are projected for this site. Higher ground water will be present during wet seasons.

If you have any questions on this summary report or if you need additional information, please contact us.

Sincerely,

SUBSURFACE INVESTIGATIONS, INC.

Richard L. Greene
Engineer In Training

William G. Smith, P.E.
President

NOMENCLATURE AND SYMBOLS

SYMBOLS

▮	UNDISTURBED SAMPLE (UD) RECOVERED
▯	UNDISTURBED SAMPLE (UD) NOT RECOVERED
●	STANDARD PENETRATION RESISTANCE (ASTM-D 1586-67)
■	PENETRATION RESISTANCE OBTAINED USING THE HORIZONTAL PENETROMETER. THIS VALUE IS APPROXIMATELY THE SAME AS THE STANDARD PENETRATION RESISTANCE.
100/2"	NUMBER OF BLOWS (100) TO DRIVE THE SPOON A NUMBER OF INCHES (2)
AX,BX,NX	CORE BARREL SIZES WHICH OBTAIN CORES 1-1/8, 1-5/8, AND 2-1/8 INCHES IN DIAMETER, RESPECTIVELY.
65%	PERCENTAGE OF ROCK CORE RECOVERED
RQD	ROCK QUALITY DESIGNATION OF CORE SEGMENTS 4 OR MORE INCHES LONG
▽	WATER TABLE AT LEAST 24 HOURS AFTER DRILLING
▽	WATER TABLE ONE HOUR OR LESS AFTER DRILLING
▲	LOSS OF DRILLING WATER

PENETRATION RESISTANCE RESULTS

	NO. OF BLOWS, N.	APPROXIMATE RELATIVE DENSITY
SANDS	0 - 4	VERY LOOSE
	5 - 10	LOOSE
	11 - 20	FIRM
	21 - 30	VERY FIRM
	31 - 50	DENSE
	OVER 50	VERY DENSE

	NO. OF BLOWS, N.	APPROXIMATE CONSISTENCY
SILTS AND CLAYS	0 - 1	VERY SOFT
	2 - 4	SOFT
	5 - 8	FIRM
	9 - 15	STIFF
	16 - 30	VERY STIFF
	31 - 50	HARD
	OVER 50	VERY HARD

DRILLING PROCEDURES

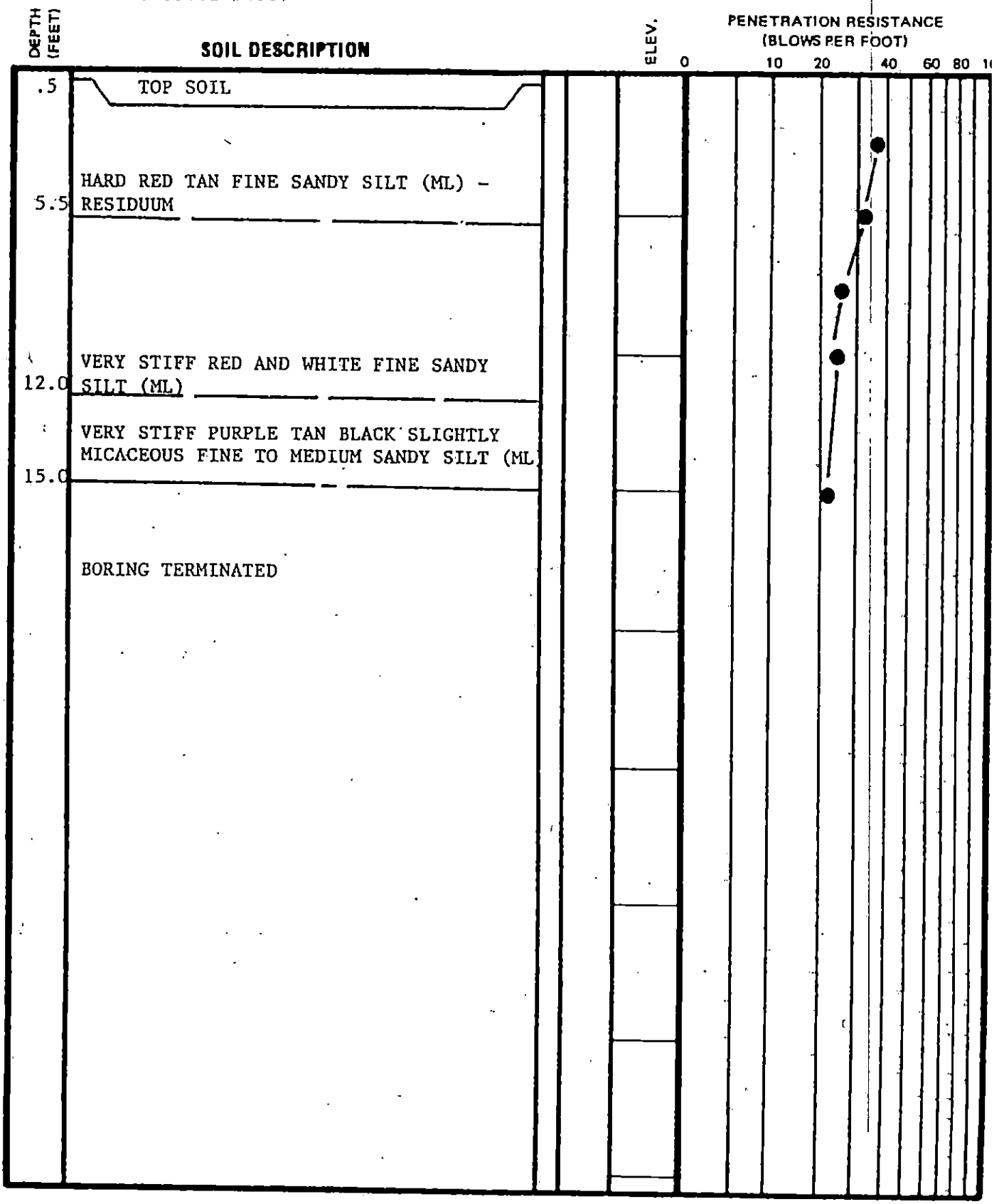
Soil sampling and standard penetration testing performed in accordance with ASTM-D 1586-87. The standard penetration resistance is the number of blows of a 140 pound hammer falling 30 inches to drive a 2 inch O. D., 1.4 inch L. D. Split Spoon Sampler one foot. Core drilling in accordance with ASTM designation D 2113-62T. The undisturbed sampling procedure is described by ASTM Specification D 1587-67.

REMARKS: NO GROUND WATER AT TIME OF BORING

BORING NO. B-1

BORING TERMINATED 7-29-88

PROJECT #2687



TEST BORING RECORD

SUBSURFACE INVESTIGATIONS, INC.
GEOTECHNICAL ENGINEERS
CONSTRUCTION QUALITY CONTROL

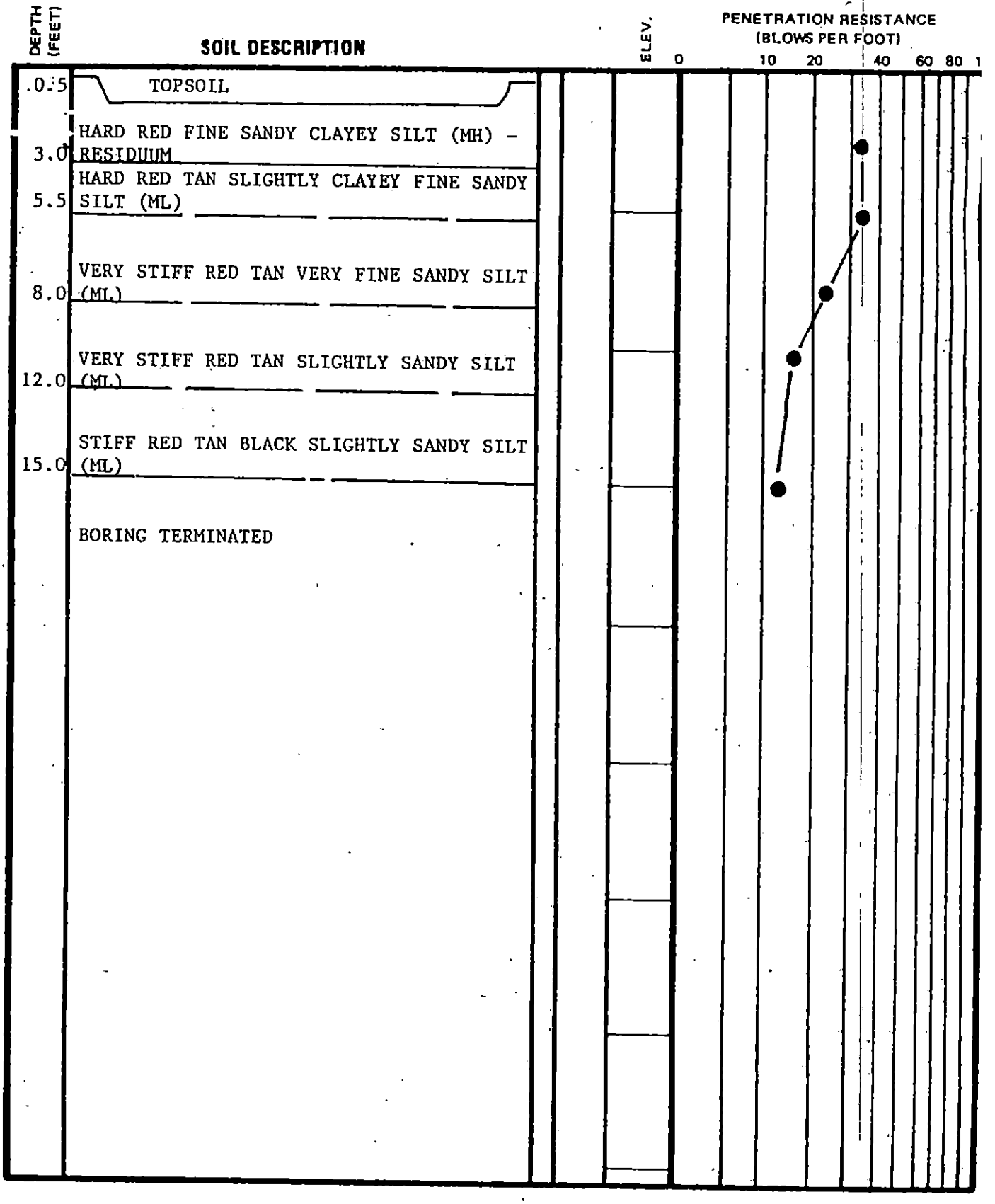
SHEET OF

REMARKS: NO GROUND WATER AT TIME OF BORING

BORING NO. B-2

BORING TERMINATED 8-01-88

PROJECT #2687



TEST BORING RECORD

SUBSURFACE INVESTIGATIONS, INC.

GEOTECHNICAL ENGINEERS
CONSTRUCTION QUALITY CONTROL

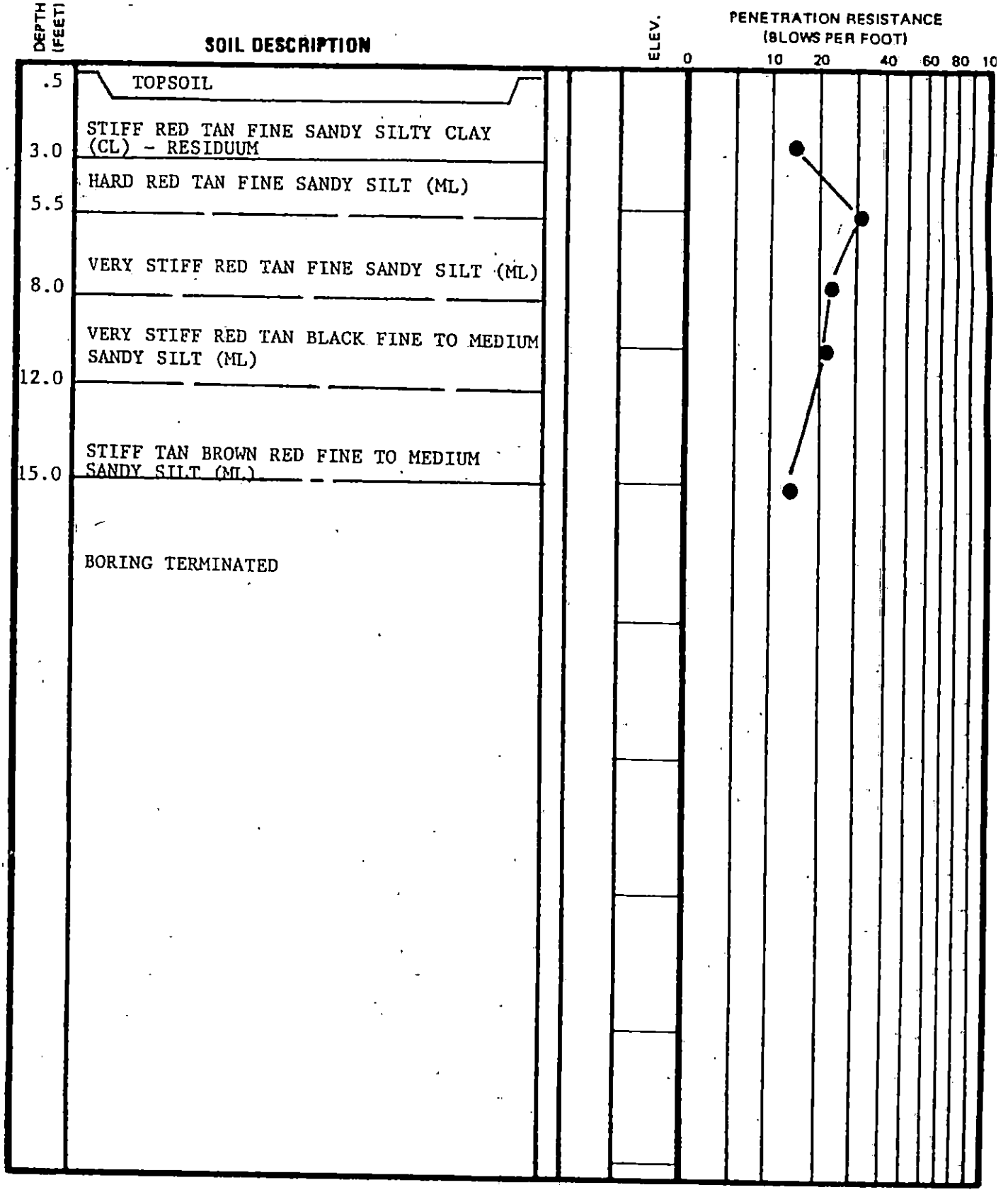
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REMARKS: NO GROUND WATER AT TIME OF BORING

BORING NO. B-3

BORING TERMINATED 8-1-88

PROJECT #2687



TEST BORING RECORD

SUBSURFACE INVESTIGATIONS, INC.

GEOTECHNICAL ENGINEERS
CONSTRUCTION QUALITY CONTROL

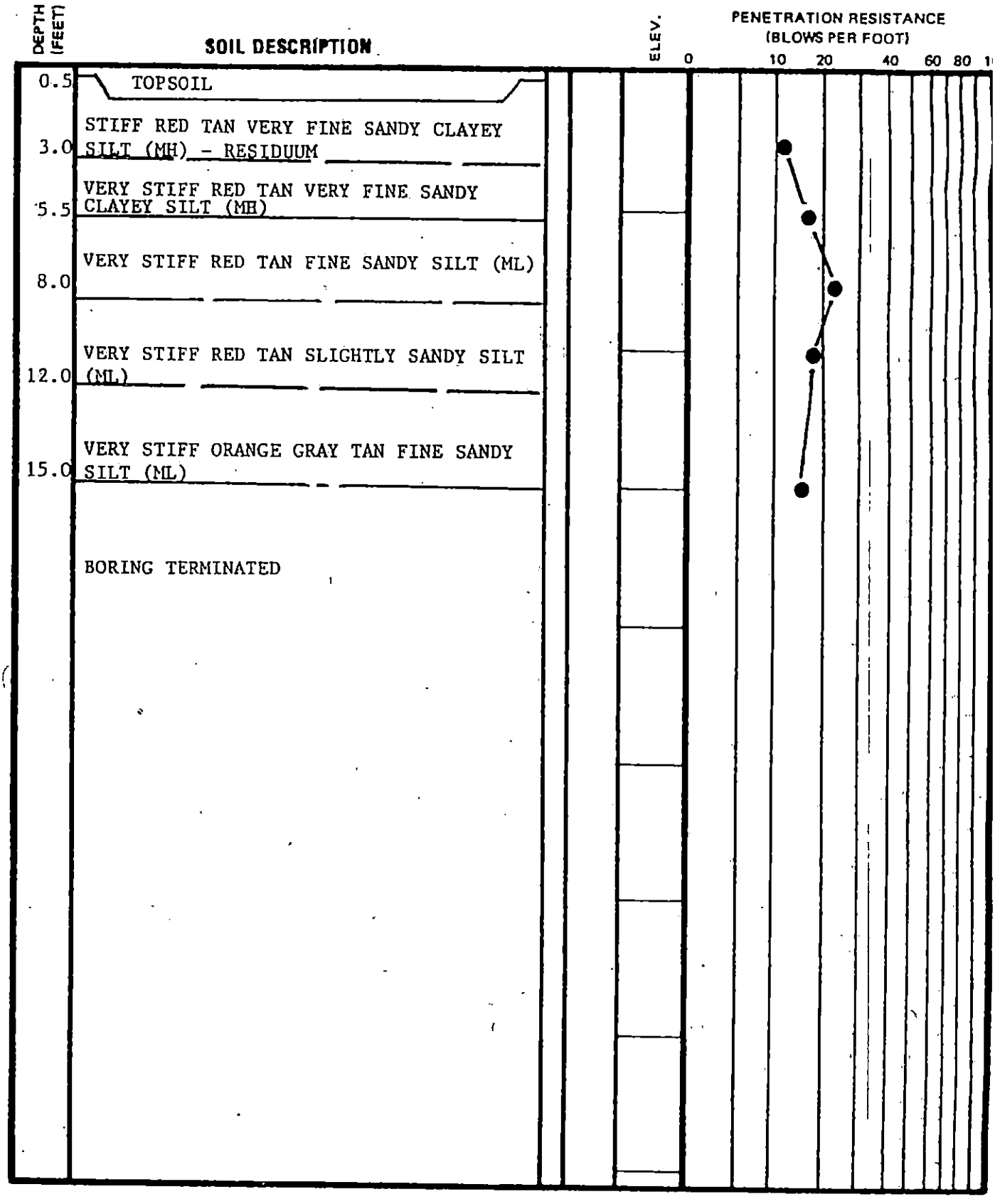
SHEET OF

REMARKS: NO GROUND WATER AT TIME OF BORING

BORING NO. B-4

BORING TERMINATED 7-29-88

PROJECT #2687



TEST BORING RECORD

SUBSURFACE INVESTIGATIONS, INC.
GEOTECHNICAL ENGINEERS
CONSTRUCTION QUALITY CONTROL

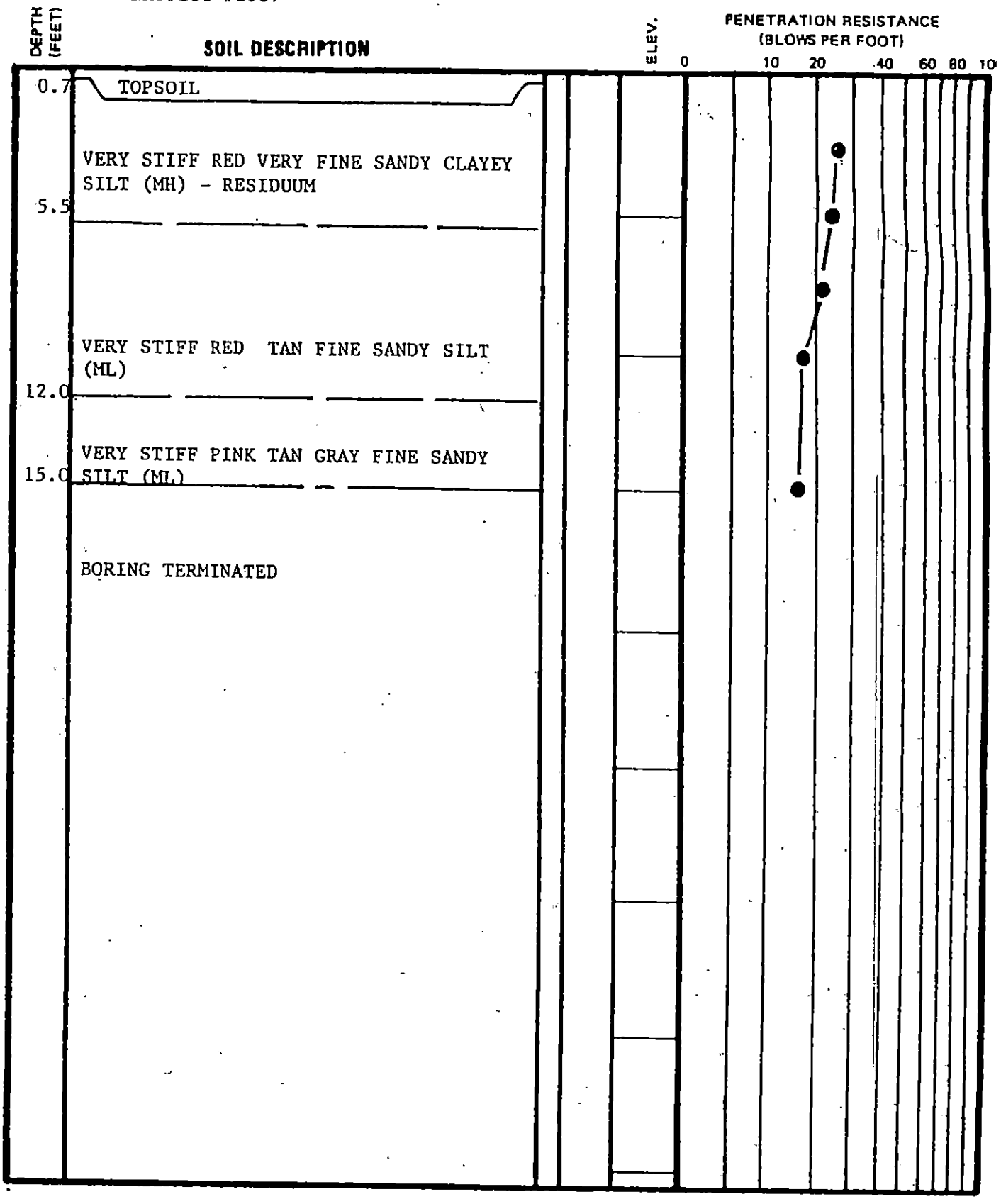
SHEET OF

REMARKS: NO GROUND WATER AT TIME OF BORING

BORING NO. B-5

BORING TERMINATED 8-1-88

PROJECT #2687



TEST BORING RECORD

SUBSURFACE INVESTIGATIONS, INC.
GEOTECHNICAL ENGINEERS
CONSTRUCTION QUALITY CONTROL

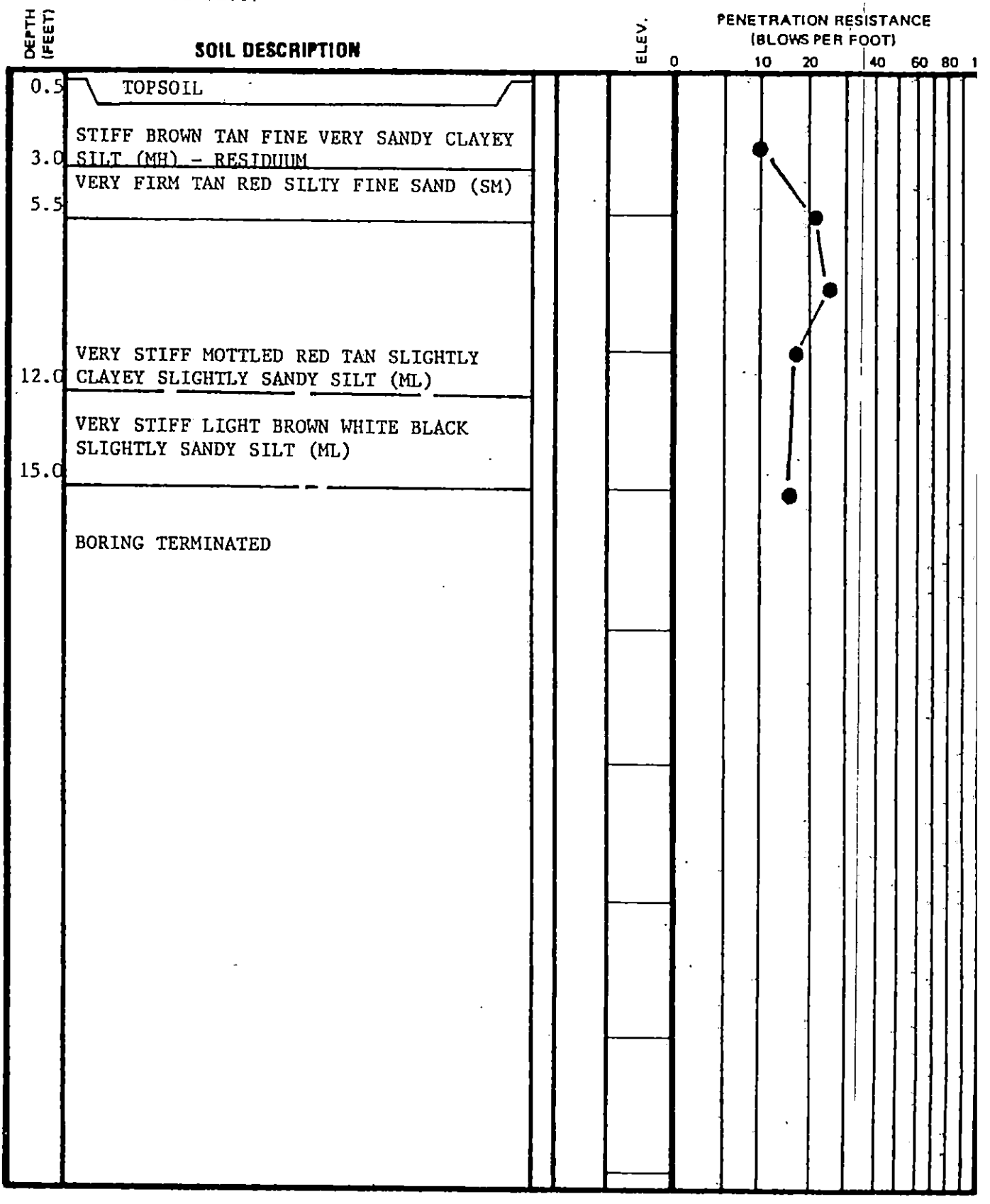
SHEET OF

REMARKS: NO GROUND WATER AT TIME OF BORING

BORING NO. B-6

BORING TERMINATED 7-29-88

PROJECT #2687

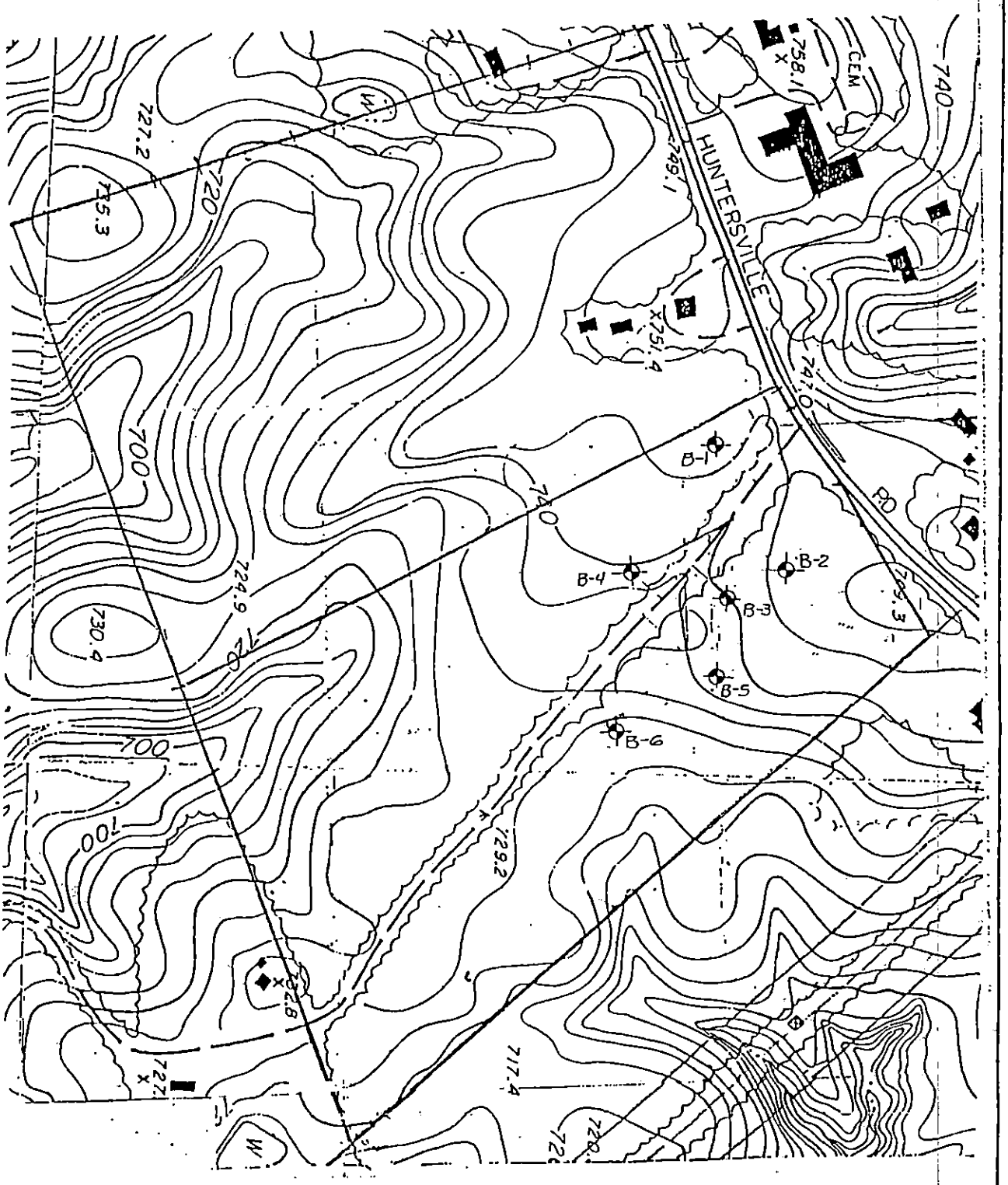


TEST BORING RECORD

SUBSURFACE INVESTIGATIONS, INC.

GEOTECHNICAL ENGINEERS
CONSTRUCTION QUALITY CONTROL

SHEET OF



Legend

TEST BORINGS (TYPICAL)

THIS

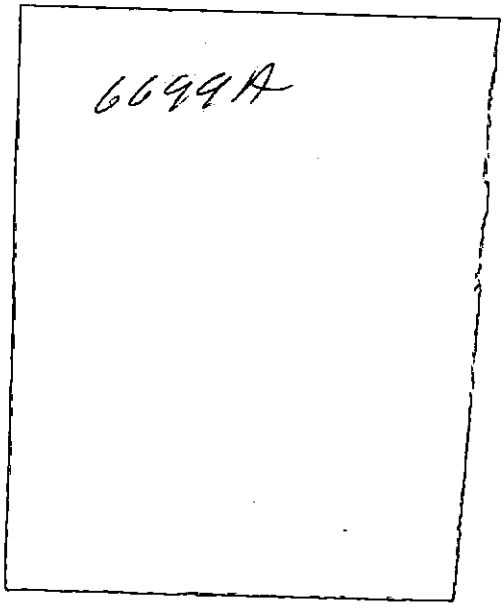
Scale: 1"=200'

SUBSURFACE INVESTIGATIONS, INC.
GEOTECHNICAL ENGINEERS
CONSTRUCTION QUALITY CONTROL

Project

MOUNT HOLLY-HUNTERSVILLE ROAD SHOPPING CENTER

PROJECT No 2687


6699A

SOIL TEST REPORT

GRONOMIC DIVISION, N.C. DEPARTMENT OF AGRICULTURE
LUE RIDGE ROAD CENTER, RALEIGH, N.C.
IONE: (919) 733-2655

COPIES SENT TO:
X COUNTY EXTENSION CHAIRMAN

04, 12,

NC 28166-

IREDELL

FORMATION (076)

APPLIED LIME Mo.	Yr.	T/A	FERT. LAST CROP P_2O_5	K_2O	SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	S-I	SS-I	NO_3N	NH_4N
					MIN	0.0	0.94	3.8	90	0.4	5.3	002	10	65.6	22.6	(058) 81	(030) 030	20				

TESTED TREATMENT FOR FIRST CROP (OR YEAR)**

N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
50-70	130-150	080-100	0	$	0		0	12

SUGGESTED TREATMENT FOR SECOND CROP (OR YEAR)**

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	S NO
FES/OG/TIM. M	0.0	100-200	130-150	110-130	0	$	0		0	1

FORMATION (048)

APPLIED LIME Mo.	Yr.	T/A	FERT. LAST CROP P_2O_5	K_2O	SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	S-I	SS-I	NO_3N	NH_4N
					MIN	0.0	1.02	2.7	55	1.2	4.4	001	6	37.5	16.5	(016) 11	(012) 012	10				

TESTED TREATMENT FOR FIRST CROP (OR YEAR)**

N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
50-70	140-160	090-110	0	$	$		0	12

SUGGESTED TREATMENT FOR SECOND CROP (OR YEAR)**

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	S NO
FES/OG/TIM M	0.0	100-200	140-160	120-140	0	$	$		$	1

FORMATION (040)

APPLIED LIME Mo.	Yr.	T/A	FERT. LAST CROP P_2O_5	K_2O	SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	S-I	SS-I	NO_3N	NH_4N
					MIN	0.0	0.92	1.5	22	1.2	4.6	001	4	13.0	7.8	(011) 3	(078) 078	20				

TESTED TREATMENT FOR FIRST CROP (OR YEAR)**

N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
50-70	140-160	100-120	$	$	0		0	12

SUGGESTED TREATMENT FOR SECOND CROP (OR YEAR)**

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	S NO
FES/OG/TIM M	0.0	100-200	140-160	130-150	$	$	0		$	1

FORMATION (056)

APPLIED LIME Mo.	Yr.	T/A	FERT. LAST CROP P_2O_5	K_2O	SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	S-I	SS-I	NO_3N	NH_4N
					MIN	0.0	1.00	1.3	39	0.8	4.3	001	4	22.7	15.2	(023) 23	(013) 013	18				

GESTED TREATMENT FOR FIRST CROP (OR YEAR)**

N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
50-70	140-160	100-120	$	$	$		0	12

SUGGESTED TREATMENT FOR SECOND CROP (OR YEAR)**

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	S NO
FES/OG/TIM M	0.0	100-200	140-160	130-150	$	$	$		$	1

FORMATION (251)

APPLIED LIME Mo.	Yr.	T/A	FERT. LAST CROP P_2O_5	K_2O	SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	S-I	SS-I	NO_3N	NH_4N
					MIN	0.4	1.14	3.2	38	2.0	4.4	004	12	27.8	8.6	(219) 349	(053) 053	30				

GESTED TREATMENT FOR FIRST CROP (OR YEAR)**

N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
50-70	130-150	080-100	$	0	0		0	12

SUGGESTED TREATMENT FOR SECOND CROP (OR YEAR)**

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	S NO
FES/OG/TIM M	0.0	100-200	130-150	110-130	$	0	0		0	1

ill not compare directly to numbers obtained by other methods.)

BS-% = Base Saturation, % of CEC
Ac = Acidity, meq/100 cm³
pH = Hydrogen-ion Activity
P-I = Phosphorus Index
K-I = Potassium Index
Ca-% = Calcium, % of CEC
Mg-% = Magnesium, % of CEC
Mn-I = Manganese Index
Zn-I = Zinc Index
Cu-I = Copper Index
S-I = Sulfate Sulfur Index
SS-I = Soluble Salt Index
NO_3N = Nitrate N, mg/dm³
NH_4N = Ammonium N, mg/dm³
Na = Sodium, meq/100 cm³

**TREATMENT, lbs/a unless specified
LIME: T = tons/a, M = lbs./1000 sq. ft.
N = Nitrogen, M = lbs./1000 sq. ft.
P_2O_5 = Phosphate, M = lbs./1000 sq. ft.
K_2O = Potash, M = lbs./1000 sq. ft.
Mg = Magnesium
Cu = Copper
Zn = Zinc
B = Boron
Mn = Manganese

$ Test Level is questionable. See supplemental material.

READ SUPPLEMENTAL MATERIAL AND BACK OF REPORT FOR FURTHER DETAIL

SOIL TEST REPORT

AGRONOMIC DIVISION, N.C. DEPARTMENT OF AGRICULTURE
BLUE RIDGE ROAD CENTER, RALEIGH, N.C.
PHONE: (919) 733-2655

REPORT NO. 04607

09/11/90

COPIES SENT TO:
X COUNTY EXTENSION CHAIRMAN

TO: JACOBS, TONEY
RT 2 BOX 280
TROUTMAN NC 28166-

FARM LOCATION (COUNTY): IREDELL

SAMPLE -11 (047)

FIELD INFORMATION

SAMPLE NO.	PREVIOUS CROP	APPLIED LIME Mo.	APPLIED LIME Yr.	APPLIED LIME T/A	FERT. LAST CROP P_2O_5	FERT. LAST CROP K_2O
-11						

TEST RESULTS *

SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	S
MIN	0.0	0.95	5.4	78	1.2	5.0	001	8	44.4	32.6	(024) 25	(005) 005	12	

SUGGESTED TREATMENT FOR FIRST CROP (OR YEAR)**

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
FES/OG/TIM E	1.1T	50-70	140-160	090-110	0	$	$		0	12

SUGGESTED TREATMENT FOR SECOND CROP (OR

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg
FES/OG/TIM M	0.0	100-200	140-160	120-140	0

SAMPLE -12 (107)

FIELD INFORMATION

SAMPLE NO.	PREVIOUS CROP	APPLIED LIME Mo.	APPLIED LIME Yr.	APPLIED LIME T/A	FERT. LAST CROP P_2O_5	FERT. LAST CROP K_2O
-12						

TEST RESULTS *

SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	
MIN	0.5	1.12	2.5	37	1.6	4.4	005	012	27.6	7.1	(075) 110	(042) 042	16	

SUGGESTED TREATMENT FOR FIRST CROP (OR YEAR)**

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
FES/OG/TIM E	1.5T	50-70	130-150	080-100	$	$	0		0	12

SUGGESTED TREATMENT FOR SECOND CROP (OR

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg
FES/OG/TIM M	0.0	100-200	120-140	110-130	$

SAMPLE -13 (064)

FIELD INFORMATION

SAMPLE NO.	PREVIOUS CROP	APPLIED LIME Mo.	APPLIED LIME Yr.	APPLIED LIME T/A	FERT. LAST CROP P_2O_5	FERT. LAST CROP K_2O
-13						

TEST RESULTS *

SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	
MIN	0.1	1.03	2.8	72	0.8	4.8	001	6	53.0	17.7	(038) 48	(010) 010	14	

SUGGESTED TREATMENT FOR FIRST CROP (OR YEAR)**

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
FES/OG/TIM E	0.8T	50-70	140-160	090-110	0	$	$		0	12

SUGGESTED TREATMENT FOR SECOND CROP (OR

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg
FES/OG/TIM M	0.0	100-200	140-160	120-140	0

SAMPLE -14 (046)

FIELD INFORMATION

SAMPLE NO.	PREVIOUS CROP	APPLIED LIME Mo.	APPLIED LIME Yr.	APPLIED LIME T/A	FERT. LAST CROP P_2O_5	FERT. LAST CROP K_2O
-14						

TEST RESULTS *

SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	
MIN	0.0	1.05	2.1	42	1.2	4.6	005	14	24.2	14.5	13	(017) (010) 010	16	

SUGGESTED TREATMENT FOR FIRST CROP (OR YEAR)**

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
FES/OG/TIM E	1.1T	50-70	130-150	070-090	0	$	$		0	12

SUGGESTED TREATMENT FOR SECOND CROP (O

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg
FES/OG/TIM M	0.0	100-200	120-140	100-120	0

SAMPLE 101

FIELD INFORMATION

SAMPLE NO.	PREVIOUS CROP	APPLIED LIME Mo.	APPLIED LIME Yr.	APPLIED LIME T/A	FERT. LAST CROP P_2O_5	FERT. LAST CROP K_2O
101						

TEST RESULTS *

SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	
MIN	0.2	1.25	6.2	87	0.8	5.3	001	020	56.1	29.5	625+	051	188	

SUGGESTED TREATMENT FOR FIRST CROP (OR YEAR)**

CROP TO BE GROWN	LIME		SEE NOTE
LAWN	20M (20 LBS 5-10-10 OR EQUIV PER 1000 SQ FT)		4

SUGGESTED TREATMENT FOR SECOND CROP (O

CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg

* TEST RESULTS (N.C. tests will not compare directly to numbers obtained by other methods.)

Soil Class: MIN = Mineral; M-O = Mineral-Organic; ORG = Organic
HM-% = Humic Matter, Percent by vol.
W/V = Weight per Volume, g/cm³
CEC = Cation Exch. Cap., meq/100 cm³
BS-% = Base Saturation, % of CEC
Ac = Acidity, meq/100 cm³
pH = Hydrogen-ion Activity
P-I = Phosphorus Index
K-I = Potassium Index
Ca-% = Calcium, % of CEC
Mg-% = Magnesium, % of CEC
Mn-I = Manganese Index
Zn-I = Zinc Index
Cu-I = Copper Index
S-I = Sulfate Sulfur Index
SS-I = Soluble Salt Index
NO_3N = Nitrate N, mg/dm³
NH_4N = Ammonium N, mg/dm³
Na = Sodium, meq/100 cm³

**TREATMENT, lbs/a unless specified
LIME: T = tons/a, M = lbs./1000 sq. ft.
N = Nitrogen, M = lbs./1000 sq. ft.
P_2O_5 = Phosphate, M = lbs./1000 sq. ft.
K_2O = Potash, M = lbs./1000 sq. ft.
Mg = Magnesium
Cu = Copper

S Test Level is questionable. See supplemental material.

READ SUPPLEMENTAL MATERIAL AND BACK OF REPORT FOR FURTHER DETAIL

SOIL TEST REPORT

GRONOMIC DIVISION, N.C. DEPARTMENT OF AGRICULTURE
.UE RIDGE ROAD CENTER, RALEIGH, N.C.
IONE: (919) 733-2655

04-12-

COPIES SENT TO:
X COUNTY EXTENSION CHAIRMAN

NC 28166-

IREDELL

ORMATION — **TEST RESULTS * (076)**

APPLIED LIME Mo.	Yr.	T/A	FERT. LAST CROP P_2O_5	K_2O	SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	S-I	SS-I	NO_3N	NH_4N
					MIN	0.0	0.94	3.8	90	0.4	5.3	002	10	65.6	22.6	(058) 81	(030) 030	20				

ESTED TREATMENT FOR FIRST CROP (OR YEAR)** — **SUGGESTED TREATMENT FOR SECOND CROP (OR YEAR)****

N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE	CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
50-70	130-150	080-100	0	$	0		0	12	FES/OG/TIM. M	0.0	100-200	130-150	110-130	0	$	0		0	1

ORMATION — **TEST RESULTS * (048)**

APPLIED LIME Mo.	Yr.	T/A	FERT. LAST CROP P_2O_5	K_2O	SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	S-I	SS-I	NO_3N	NH_4N
					MIN	0.0	1.02	2.7	55	1.2	4.4	001	6	37.5	16.5	(016) 11	(012) 012	10				

ESTED TREATMENT FOR FIRST CROP (OR YEAR)** — **SUGGESTED TREATMENT FOR SECOND CROP (OR YEAR)****

N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE	CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
50-70	140-160	090-110	0	$	$		0	12	FES/OG/TIM M	0.0	100-200	140-160	120-140	0	$	$		$	1

ORMATION — **TEST RESULTS * (040)**

APPLIED LIME Mo.	Yr.	T/A	FERT. LAST CROP P_2O_5	K_2O	SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	S-I	SS-I	NO_3N	NH_4N
					MIN	0.0	0.92	1.5	22	1.2	4.6	001	4	13.0	7.8	(011) 3	(078) 078	20				

ESTED TREATMENT FOR FIRST CROP (OR YEAR)** — **SUGGESTED TREATMENT FOR SECOND CROP (OR YEAR)****

N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE	CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
50-70	140-160	100-120	$	$	0		0	12	FES/OG/TIM M	0.0	100-200	140-160	130-150	$	$	0		$	1

FORMATION — **TEST RESULTS * (056)**

APPLIED LIME Mo.	Yr.	T/A	FERT. LAST CROP P_2O_5	K_2O	SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	S-I	SS-I	NO_3N	NH_4N
					MIN	0.0	1.00	1.3	39	0.8	4.3	001	4	22.7	15.2	(023) 23	(013) 013	18				

GESTED TREATMENT FOR FIRST CROP (OR YEAR)** — **SUGGESTED TREATMENT FOR SECOND CROP (OR YEAR)****

N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE	CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
50-70	140-160	100-120	$	$	$		0	12	FES/OG/TIM M	0.0	100-200	140-160	130-150	$	$	$		$	1

FORMATION — **TEST RESULTS * (251)**

APPLIED LIME Mo.	Yr.	T/A	FERT. LAST CROP P_2O_5	K_2O	SOIL CLASS	HM-%	W/V	CEC	BS-%	Ac	pH	P-I	K-I	Ca-%	Mg-%	Mn-I	Zn-I	Cu-I	S-I	SS-I	NO_3N	NH_4N
					MIN	0.4	1.14	3.2	38	2.0	4.4	004	12	27.8	8.6	(219) 349	(053) 053	30				

GESTED TREATMENT FOR FIRST CROP (OR YEAR)** — **SUGGESTED TREATMENT FOR SECOND CROP (OR YEAR)****

N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE	CROP TO BE GROWN	LIME	N	P_2O_5	K_2O	Mg	Cu	Zn	B	Mn	SEE NOTE
50-70	130-150	080-100	$	0	0		0	12	FES/OG/TIM M	0.0	100-200	130-150	110-130	$	0	0		0	1

ill not compare directly to numbers obtained by other methods.)

BS-% = Base Saturation, % of CEC
Ac = Acidity, meq/100 cm³
pH = Hydrogen-ion Activity
P-I = Phosphorus Index
K-I = Potassium Index
Ca-% = Calcium, % of CEC
Mg-% = Magnesium, % of CEC
Mn-I = Manganese Index
Zn-I = Zinc Index
Cu-I = Copper Index
S-I = Sulfate Sulfur Index
SS-I = Soluble Salt Index
NO_3N = Nitrate N, mg/dm³
NH_4N = Ammonium N, mg/dm³
Na = Sodium, meq/100 cm³

**TREATMENT, lbs/a unless specified
LIME: T = tons/a, M = lbs./1000 sq. ft.
N = Nitrogen, M = lbs./1000 sq. ft.
P_2O_5 = Phosphate, M = lbs./1000 sq. ft.
K_2O = Potash, M = lbs./1000 sq. ft.
Mg = Magnesium
Cu = Copper
Zn = Zinc
B = Boron
Mn = Manganese

$ Test Level is questionable. See supplemental material.

READ SUPPLEMENTAL MATERIAL AND BACK OF REPORT FOR FURTHER DETAIL