**Land Development Division**
5400 Etta Burke Court
Raleigh, North Carolina 27606
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www.awtlanddevelopment.com

7/26/07

Re: Edward P. Lineberger

**Soil Suitability for Domestic Sewage Treatment and Disposal Systems**
**816 NC Highway 751, Apex NC 27523**
**PIN (0712-48-0512)**
**Chatham County, NC**

PREPARED FOR: Mr. Larry Henson, Buyer

PREPARED BY: Christopher McGee
Jeff Vaughan

DATE: July 26, 2007

The following report is a summary of saturated hydraulic conductivity tests ($K_{sat}$) conducted at 816 NC Highway 751 in Apex, NC, on July 17, 2007. The tests were performed by Chris McGee of Agri-Waste Technology using a Guelph Permeameter. It is our understanding that the lot is currently owned by Mr. Edward Lineberger and will be subdivided for the purpose of constructing a single-family residence. It is also our understanding that a preliminary soils evaluation was performed by Mr. Thomas Boyce of the Chatham County Health Department. A map of the property showing the location of the $K_{sat}$ tests is available as Attachment 1. A preliminary survey of the lot provided by Mr. Larry Henson is included as Attachment 2.

Six in-field $K_{sat}$ tests were conducted within the proposed lot area. Tests were performed at 6" and 12" depths at each location. A summary of the field data is provided as Attachment 3. The purpose of the tests is to provide an estimated loading rate for a subsurface drip with pre-treatment septic system, with the understanding that the final loading rate will be set by the Chatham County Health Department. Results from the $K_{sat}$ tests are detailed in Table 1 below.

Table 1. $K_{sat}$ Results for the Proposed Lot at 816 NC Highway 751 in Apex, NC.

| $K_{sat}$ Test | Soil Depth of $K_{sat}$ Test | $K_{sat}$ Results | |
|---|---|---|---|
| | ----inches----- | -----GPD/ft$^2$----- | -----in/hr----- |
| 1 | 6 | 1.253 | 0.084 |
| | 12 | 1.657 | 0.111 |
| 2 | 6 | 0.102 | 0.007 |
| | 12 | 1.154 | 0.077 |
| 3 | 6 | 1.078 | 0.072 |
| | 12 | 0.632 | 0.042 |
| 4 | 6 | 1.296 | 0.087 |
| | 12 | 1.369 | 0.091 |
| 5 | 6 | 2.766 | 0.185 |
| | 12 | 2.211 | 0.148 |
| 6 | 6 | 2.860 | 0.191 |
| | 12 | 3.232 | 0.216 |
| Arithmetic Mean 6" | | 1.559 | 0.104 |
| Geometric Mean 6" | | 1.059 | 0.071 |
| Arithmetic Mean 12" | | 1.709 | 0.114 |
| Geometric Mean 12" | | 1.509 | 0.101 |

Results of the $K_{sat}$ tests within the proposed lot showed that the soil would support a loading rate of up to 1.06 GPD/ft$^2$ based on most restrictive of the two depths. However, due to the nature of the soils in the area and give the type of system expected for installation, we do not recommend a loading rate exceeding 0.15 GPD/ft$^2$.

We appreciate the opportunity to assist you in this matter. Please contact us with any questions, concerns, or comments.

hensen

## ATTACHMENT 1: Map of $K_{sat}$ Test Locations

AWT
Land Development Division
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Henson Property
816 NC HWY 751
Apex, NC

**Soil Types:**
**CrB,C- Creedmoor sandy loam**

Legend

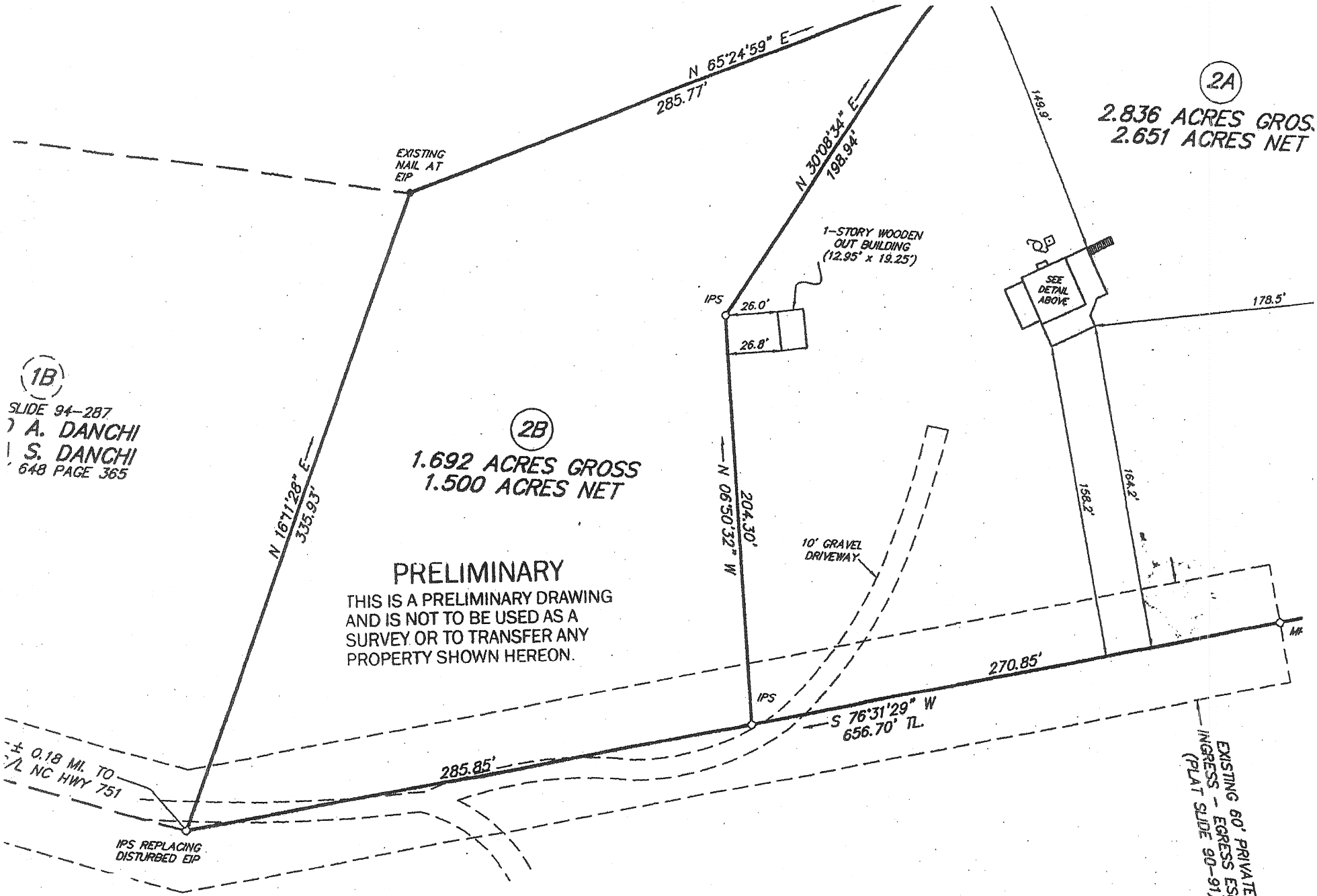
- Approx Lots
- KSAT Locations
- Soil Types
- Parcels_withtax.shp
- 5' Contours

**Drawn By:**
**Enrique Cachafeiro**
**Reviewed By:**
**Chris McGee**
**Date:**
**07/20/2007**

300 0 300 Feet

Scale: 1:1200

**ATTACHMENT 2: Preliminary survey provided by Mr. Larry Henson**


(1B)
SLIDE 94-287
A. DANCHI
S. DANCHI
648 PAGE 365
(2B)
1.692 ACRES GROSS
1.500 ACRES NET
(2A)
2.836 ACRES GROS.
2.651 ACRES NET
PRELIMINARY
THIS IS A PRELIMINARY DRAWING AND IS NOT TO BE USED AS A SURVEY OR TO TRANSFER ANY PROPERTY SHOWN HEREON.
N 65°24'59" E
285.77'
EXISTING NAIL AT EIP
N 30°08'34" E
198.94'
149.9'
1-STORY WOODEN OUT BUILDING (12.95' x 19.25')
IPS
26.0'
26.8'
SEE DETAIL ABOVE
178.5'
N 16°11'28" E
335.93'
N 06°50'32" W
204.30'
158.2'
164.2'
10' GRAVEL DRIVEWAY
270.85'
IPS
S 76°31'29" W
656.70' TL
285.85'
± 0.18 MI. TO
NC HWY 751
IPS REPLACING DISTURBED EIP
EXISTING 60' PRIVATE INGRESS - EGRESS ESMT. (PLAT SLIDE 90-91)

# ATTACHMENT 3: $K_{sat}$ Data Summary & Calculations

## Subsurface Drip with Pre-Treatment

### Test 1

| 6" | | | 12" | | |
|---|---|---|---|---|---|
| H = | 2.7 | cm (measured) | H = | 3 | cm (measured) |
| a = | 2.25 | cm | a = | 2.25 | cm |
| $C_2$ = | 0.68208039 | | $C_2$ = | 0.73009607 | |
| Y = | 2.1 | $cm^2$ | Y = | 2.1 | $cm^2$ |
| $R_1$ = | 1.19 | cm/min (measured) | $R_1$ = | 1.65 | cm/min (measured) |
| $R_1$ = | 0.01983333 | cm/sec | $R_1$ = | 0.0275 | cm/sec |
| alpha = | 0.04 | $cm^{-1}$ | alpha = | 0.04 | $cm^{-1}$ |
| Q = | 0.04165 | $cm^3$/sec | Q = | 0.05775 | $cm^3$/sec |
| $K_{fs}$ = | 5.909E-05 | cm/sec | $K_{fs}$ = | 7.8167E-05 | cm/sec |
| $K_{fs}$ = | 0.0837499 | in/hr | $K_{fs}$ = | 0.11078742 | in/hr |
| | 1.25298552 | gal/day/$ft^2$ | | 1.65749492 | gal/day/$ft^2$ |

### Test 2

| 6" | | | 12" | | |
|---|---|---|---|---|---|
| H = | 2.9 | cm (measured) | H = | 3.3 | cm (measured) |
| a = | 2.25 | cm | a = | 2.25 | cm |
| $C_2$ = | 0.71431906 | | $C_2$ = | 0.77616325 | |
| Y = | 2.1 | $cm^2$ | Y = | 2.1 | $cm^2$ |
| $R_1$ = | 0.1 | cm/min (measured) | $R_1$ = | 1.2 | cm/min (measured) |
| $R_1$ = | 0.00166667 | cm/sec | $R_1$ = | 0.02 | cm/sec |
| alpha = | 0.04 | $cm^{-1}$ | alpha = | 0.04 | $cm^{-1}$ |
| Q = | 0.0035 | $cm^3$/sec | Q = | 0.042 | $cm^3$/sec |
| $K_{fs}$ = | 4.8104E-06 | cm/sec | $K_{fs}$ = | 5.441E-05 | cm/sec |
| $K_{fs}$ = | 0.00681787 | in/hr | $K_{fs}$ = | 0.07711686 | in/hr |
| | 0.10200238 | gal/day/$ft^2$ | | 1.15374837 | gal/day/$ft^2$ |

### Test 3

| 6" | | | 12" | | |
|---|---|---|---|---|---|
| H = | 2.8 | cm (measured) | H = | 2.9 | cm (measured) |
| a = | 2.25 | cm | a = | 2.25 | cm |
| $C_2$ = | 0.69831705 | | $C_2$ = | 0.71431906 | |
| Y = | 2.1 | $cm^2$ | Y = | 2.1 | $cm^2$ |
| $R_1$ = | 1.04 | cm/min (measured) | $R_1$ = | 0.62 | cm/min (measured) |
| $R_1$ = | 0.01733333 | cm/sec | $R_1$ = | 0.01033333 | cm/sec |
| alpha = | 0.04 | $cm^{-1}$ | alpha = | 0.04 | $cm^{-1}$ |
| Q = | 0.0364 | $cm^3$/sec | Q = | 0.0217 | $cm^3$/sec |
| $K_{fs}$ = | 5.0818E-05 | cm/sec | $K_{fs}$ = | 2.9824E-05 | cm/sec |
| $K_{fs}$ = | 0.07202584 | in/hr | $K_{fs}$ = | 0.04227078 | in/hr |
| | 1.0775814 | gal/day/$ft^2$ | | 0.63241475 | gal/day/$ft^2$ |

## Test 4

| 6" | | |
|---|---|---|
| H = | 2.5 | cm (measured) |
| a = | 2.25 | cm |
| $C_2$ = | 0.64886035 | |
| Y = | 2.1 | $cm^2$ |
| $R_1$ = | 1.19 | cm/min (measured) |
| $R_1$ = | 0.01983333 | cm/sec |
| alpha = | 0.04 | $cm^{-1}$ |
| Q = | 0.04165 | $cm^3$/sec |
| $K_{fs}$ = | 6.1103E-05 | cm/sec |
| $K_{fs}$ = | 0.08660226 | in/hr |
| | 1.29565975 | gal/day/$ft^2$ |

| 12" | | |
|---|---|---|
| H = | 2.7 | cm (measured) |
| a = | 2.25 | cm |
| $C_2$ = | 0.68208039 | |
| Y = | 2.1 | $cm^2$ |
| $R_1$ = | 1.3 | cm/min (measured) |
| $R_1$ = | 0.02166667 | cm/sec |
| alpha = | 0.04 | $cm^{-1}$ |
| Q = | 0.0455 | $cm^3$/sec |
| $K_{fs}$ = | 6.4552E-05 | cm/sec |
| $K_{fs}$ = | 0.09149149 | in/hr |
| | 1.36880771 | gal/day/$ft^2$ |

## Test 5

| 6" | | |
|---|---|---|
| H = | 2.8 | cm (measured) |
| a = | 2.25 | cm |
| $C_2$ = | 0.69831705 | |
| Y = | 2.1 | $cm^2$ |
| $R_1$ = | 2.67 | cm/min (measured) |
| $R_1$ = | 0.0445 | cm/sec |
| alpha = | 0.04 | $cm^{-1}$ |
| Q = | 0.09345 | $cm^3$/sec |
| $K_{fs}$ = | 0.00013047 | cm/sec |
| $K_{fs}$ = | 0.18491249 | in/hr |
| | 2.76648303 | gal/day/$ft^2$ |

| 12" | | |
|---|---|---|
| H = | 3.3 | cm (measured) |
| a = | 2.25 | cm |
| $C_2$ = | 0.77616325 | |
| Y = | 2.1 | $cm^2$ |
| $R_1$ = | 2.3 | cm/min (measured) |
| $R_1$ = | 0.03833333 | cm/sec |
| alpha = | 0.04 | $cm^{-1}$ |
| Q = | 0.0805 | $cm^3$/sec |
| $K_{fs}$ = | 0.00010429 | cm/sec |
| $K_{fs}$ = | 0.14780732 | in/hr |
| | 2.21135103 | gal/day/$ft^2$ |

## Test 6

| 6" | | |
|---|---|---|
| H = | 2.8 | cm (measured) |
| a = | 2.25 | cm |
| $C_2$ = | 0.69831705 | |
| Y = | 2.1 | $cm^2$ |
| $R_1$ = | 2.76 | cm/min (measured) |
| $R_1$ = | 0.046 | cm/sec |
| alpha = | 0.04 | $cm^{-1}$ |
| Q = | 0.0966 | $cm^3$/sec |
| $K_{fs}$ = | 0.00013486 | cm/sec |
| $K_{fs}$ = | 0.1911455 | in/hr |
| | 2.85973526 | gal/day/$ft^2$ |

| 12" | | |
|---|---|---|
| H = | 2.6 | cm (measured) |
| a = | 2.25 | cm |
| $C_2$ = | 0.66559861 | |
| Y = | 2.1 | $cm^2$ |
| $R_1$ = | 3.02 | cm/min (measured) |
| $R_1$ = | 0.05033333 | cm/sec |
| alpha = | 0.04 | $cm^{-1}$ |
| Q = | 0.1057 | $cm^3$/sec |
| $K_{fs}$ = | 0.00015246 | cm/sec |
| $K_{fs}$ = | 0.21608035 | in/hr |
| | 3.23278656 | gal/day/$ft^2$ |