


9325 STONEBRIDGE WY

13903349

1/9/2008

duponbj

Groundwater and Wastewater Services File Imaging Project
May 2007
*Barcode Font = IDAutomationHC39M*

# 768

GWS – RES. APP 07/05

SEPTIC FEE: $200.00
DATE: 9/28/05
CRT.: CK # 25694

**PERMIT APPLICATION FOR A RESIDENTIAL SITE**
**IMPROVEMENT PERMIT / CONSTRUCTION AUTHORIZATION**
**FOR ON-SITE WASTEWATER SYSTEM**
**NEW WELL INSTALLATION OR REPAIR OF EXISTING WELL**
**MECKLENBURG COUNTY GROUNDWATER & WASTEWATER SERVICES**

V.W.

WELL FEE:
DATE:
CRT.:

**FILE #** 60167B

**SEPTIC / TYPE APPLICATION:** ☐ NONE ☑ NEW SYSTEM ☐ ALTERATION ☐ REPAIR ☐ MODIFY PLOT PLAN

**WELL / TYPE APPLICATION:** ☑ NONE ☐ NEW WELL ☐ MAJOR REPAIR ☐ ABANDONMENT

**JOB LOCATION INFORMATION:**

TAX/PARCEL #: 139-03-225 PO
STREET ADDRESS: CARLY LANE WEST
CITY: 139-033-49
STATE: NC ZIP:
SUBDIVISION OR MOBILE HOME PARK NAME: STONEBRIDGE SUB
LOT #: 39
TOWNSHIP:

☐ 0-MECKLENBURG ☐ 4-PINEVILLE
☐ 1-CHARLOTTE ☐ 5-MATTHEWS
☐ 2-DAVIDSON ☐ 6-HUNTERSVILLE
☐ 3-CORNELIUS ☑ 7-MINT HILL

**BUILDING INFORMATION:**

**TYPE OF BUILDING:**

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

**HEATED SQUARE FOOTAGE:**
**NUMBER OF BEDROOMS:** 4-5
**NUMBER OF OCCUPANTS:** 6

**FOUNDATION FOR RESIDENCE:**

☑ CONCRETE SLAB ☐ BASEMENT WITH PLUMBING
☐ CRAWLSPACE ☐ BASEMENT WITH NO PLUMBING

**IF PLANNING TO EXPAND/ALTER THE EXISTING SYSTEM INDICATE THE FOLLOWING CHANGES:**

NUMBER OF BEDROOMS TO BE ADDED: NUMBER OF ADDITIONAL OCCUPANTS IN THE RESIDENCE:
**WILL THERE BE A HOME BUSINESS IN THE RESIDENCE?** ☐ YES ☑ NO TYPE:

**WATER SUPPLY:**

☑ MUNICIPAL (M) ☐ PUBLIC (C) ☐ PRIVATE WELL (P) ☐ SHARED WELL (S) ☐ OTHER 'SPRINGS' (O)

**PROPOSED USE OF WELL:** ☐ N/A ☐ IRRIGATION ☐ POTABLE ☐ GEOTHERMAL ☐ OTHER

**ARE ANY OF THE FOLLOWING LOCATED ON THE PROPERTY? IF SO, PLEASE SHOW LOCATION ON SITE PLAN/PLAT.**

| | | | | | |
|---|---|---|---|---|---|
| BURIED CABLES, LANDFILLS, STUMPHOLES | ☐ YES | ☑ NO | WELLS, SPRINGS, OR WATER LINES | ☐ YES | ☑ NO |
| EXISTING WASTEWATER SYSTEMS | ☐ YES | ☑ NO | DESIGNATED WETLANDS | ☐ YES | ☑ NO |
| EASEMENTS OR RIGHT-OF-WAYS | ☐ YES | ☑ NO | GRADING/SOIL REMOVAL PERFORMED | ☐ YES | ☑ NO |

**PROPERTY OWNER:**

NAME: RYAN HOMES
ADDRESS: 10815 DAVID TAYLOR DR, SUITE 100
CITY: CHARLOTTE
STATE: NC ZIP: 28227
HOME PHONE: —— WORK PHONE: 704-548-3534
MOBILE PHONE: —— FAX: 704-503-4516

**LEGAL AGENT FOR PROPERTY OWNER, IF APPLICABLE:**

NAME: Kenny OWENS
ADDRESS: 6206 BIRKDALE VALLEY DR, APT 515
CITY: CHARLOTTE
STATE: NC ZIP: 28277
HOME PHONE: —— WORK PHONE: 704-540-0771
MOBILE PHONE: 704-502-5578 FAX: 704-541-8094

**WHAT DATE WAS THE PROPERTY ORIGINALLY DEEDED AND RECORDED?**
**WHAT IS THE ANTICIPATED CLOSING DATE FOR THIS PROPERTY?**

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

Kenneth L. Owens 9-21-05
Owner's/Agent's Signature Date

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

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

Owner's/Agent's Signature Date

MECKLENBURG COUNTY HEALTH DEPARTMENT
GROUNDWATER & WASTEWATER SERVICES
700 N. TRYON ST., SUITE 211
CHARLOTTE, NC 28202 704-336-5103 / FAX: 704-336-6894

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

Sheet: 1 of 2
Property ID: 139-032-25
Lot #: 39
File #: 6167B
Code: 2

ACS

# SOIL/SITE EVALUATION for ON-SITE WASTEWATER SYSTEM

Owner: Ryan Homes
Address: 10815 David Taylor Drive, Suite 100, Charlotte, N. C. 28227
Proposed Facility: Residence  Design Flow (.1949): 600gpd
Location of Site: Carly lane West
Water Supply: [ x ] Public  [ ] Individual  [ ] Well  [ ] Spring  [ ] Other
Evaluation Method: [ x ] Auger Boring  [ ] Pit  [ ] Cut
Type of Wastewater: [ x ] Sewage  [ ] Industrial Process  [ ] Mixed

Applicant: Kenny Owens
Date Evaluated: 10/13/05
Property Size: .73a
Property Recorded:

| PROFILE # | .1940 Landscape Position/ Slope% | Horizon Depth (IN.) | SOIL MORPHOLOGY .1941 .1941 Structure/ Texture | SOIL MORPHOLOGY .1941 .1941 Consistence Mineralogy | OTHER PROFILE FACTORS .1942 Soil Wetness/ Color | .1943 Soil Depth (IN.) | .1956 Sapro Class | .1944 Restr Horiz | Profile Class & LTAR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | LS, 10 | 0-6 | DISTURBED | | >32" TO SOIL WETNESS | 32 | N/A | NONE | US, IV .25GPD/FT |
| | | 6-32 | SBK/C | FI/SEXP/S/P | | | | | |
| 2 | " | 0-6 | GR/CL | FR/SEXP/SS/SP | >24" TO SOIL WETNESS | 24 | " | " | US, IV .125GPD/FT$^2$ |
| | | 6-24 | SBK/ABK/C | FI/SEXP/S/P | | | | | |
| 3 | LS, 15 | 0-5 | GR/CL | FR/SEXP/SS/SP | >18" TO SOIL WETNESS | 18 | " | " | " |
| | | 5-18 | SBK/C | FI/SEXP/S/P | | | | | |
| 4 | " | 0-6 | GR/CL | FR/SEXP/SS/SP | >15" TO SOIL WETNESS | 15 | " | " | " |
| | | 6-15 | SBK/ABK/C | FI/SEXP/S/P | | | | | |
| 5 | " | 0-5 | GR/CL | FR/SEXP/SS/SP | >21" TO SOIL WETNESS | 21 | " | " | " |
| | | 5-21 | SBK/ABK/C | FI/SEXP/S/P | | | | | |
| 6 | LS, 10 | 0-6 | GR/CL | FR/SEXP/SS/SP | >42" TO SOIL WETNESS | 42 | " | " | PS, IV .25GPD/FT$^2$ |
| | | 6-28 | SBK/C | FI/SEXP/S/P | | | | | |
| | | 28-42 | SBK/CL | FR/SEXP/SS/SP | | | | | |
| | | | | | | | | | |

| Description | Initial System | Repair System |
|---|---|---|
| Available Space (.1945) | US | US |
| System Type(s) | | |
| Site LTAR | .125GPD/FT$^2$ | .125GPD/FT$^2$ |

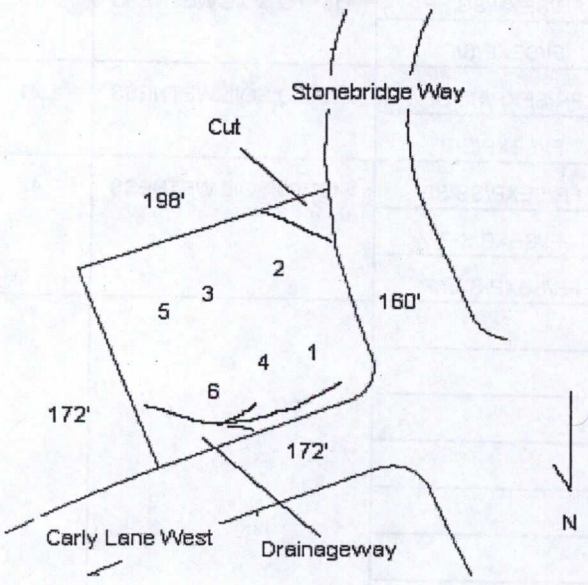
Other Factors (.1946):
Site Classification (.1948): UNSUITABLE
Evaluated By: W. R. Marlin, LSS, 10/18/05, W. R. Marlin
Others Present: K. Owens

**COMMENTS:**
100% repair

| Landscape Position | Group | Texture | .1955 LTAR | Structure |
|---|---|---|---|---|
| R-Ridge | I | S-Sand | 1.2 - 0.8 | SG-Single Grain |
| SS-Shoulder Slope | | LS-Loamy Sand | | M-Massive |
| LS-Linear Slope | | | | CR-Crumb |
| FS-Food Slope | II | SL-Sandy Loam | 0.8 - 0.6 | GR-Granular |
| NS-Nose Slope | | L-Loam | | SBK-Subangular Blocky |
| HS-Head Slope | | | | ABK-Angular Blocky |
| CC-Concave Slope | III | SI-Silt | 0.6 - 0.3 | PL-Platy |
| CV-Convex Slope | | SICL-Silty Clay Loam | | PR-Prismatic |
| T-Terrace | | CL-Clay Loam | | |
| FP-Flood Plain | | SCL-Sandy Clay Loam | | |
| | IV | SC-Sandy Clay | 0.4 - 0.1 | |
| | | SIC-Silty Clay | | |
| | | C-Clay | | |

| Consistence Moist | Consistence Wet | Mineralogy |
|---|---|---|
| VFR-Very Friable | NS-Non-Sticky | SEXP-Slightly Expansive |
| FR-Friable | SS-Slightly Sticky | EXP-Expansive |
| FI-Firm | S-Sticky | |
| VFI-Very Firm | VS-Very Sticky | |
| EFI-Extremely Firm | NP-Non-Plastic | |
| | SP-Slightly Plastic | |
| | P-Plastic | |
| | VP-Very Plastic | |

**Sketch of Soil Evaluation Locations**



## CONDITIONS OF IMPROVEMENT PERMIT / CONSTRUCTION AUTHORIZATON

139-033-49

Permit Number: **6167B**

Tax Number: ~~139-03-225PO~~

- The IMPROVEMENT PERMIT is subject to revocation if site plans or the intended use change. There is to be **NO** grading, filling, or disturbance of the soil in the area of the septic tank system or repair area.
- CONSTRUCTION AUTHORIZATION must be obtained prior to receiving a Building Permit. The Construction Authorization is **NOT** transferable. Do not clear, grade, fill or disturb soil prior to obtaining a Construction Authorization.
- Domestic-type wastewater only. No industrial process wastewater may be discharged into the system.

Basement: ☒ Yes ☐ No ☐ Partial Basement

**Primary Wastewater System**

Type: ☐ I ☐ II ☐ III ☐ IV ☒ V ☐ VI

☐ Conventional
☐ Prefabricated, permeable block panel system
☐ Shallow Placed Conventional
☒ Low Pressure Pipe
☐ Large Diameter Pipe
☐ Fill
☐ Other
☐ Innovative or Experimental:

| | | | |
|---|---|---|---|
| **0.18** Long-term acceptance rate (GPD/ft^2) | **480** Max gallons/day wastewater flow | **2667** Absorption Area (ft^2) | **5** Trench spacing (min. on centers) (ft) |
| Serviced by private well: ☐ Yes ☒ No | **1500** Gallon septic tank | **550** Total trench length (ft) | **16** Maximum trench depth (in) (At least 12" of provisionally suitable soil must remain between trench bottom and unsuitable soil conditions.) |
| **4** Bedrooms in residence | **1500** Gallon pump tank | **10** Depth of stone (in) | |

Any surface water present: **No** Type: Minimum separation distance (ft):

Additional conditions: **LTAR determined by KSat test perfromed by The Cantena Group. Test data was reviewed by Regional Soil Scientist. Maintenance agreement required prior to issuance of Operation Permit. Drip irrigation system specified for system repair. Install system according to plan submitted by the Catena Group dated 11/14/05 with 12/1/05 revision date.**

**Repair Area System**

Type: ☐ I ☐ II ☐ III ☐ IV ☒ V ☐ VI

☐ Conventional
☐ Prefabricated, permeable block panel system
☐ Shallow Placed Conventional
☐ Low Pressure Pipe
☐ Large Diameter Pipe
☐ Fill
☒ Other Drip Irrigation
☐ Innovative or Experimental:

| | | | |
|---|---|---|---|
| ____ Absorption Area (ft^2) ____ Total trench length (ft) | **NA** Depth of stone (in) | **2** Trench spacing (min. on centers) (ft) | __ Maximum trench depth (in) |

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

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

*** This Improvement permit is transferable.

12/1/05
DENR Authorized Agent Date

Patrice Garner 12/1/05
Owner/Agent Signature Date

MECKLENBURG COUNTY HEALTH DEPARTMENT
ENVIRONMENTAL HEALTH DIVISION
700 N. TRYON ST., SUITE 211
CHARLOTTE, NC 28202
PHONE: (704) 336-5103
FAX: (704) 336-6894

NC DENR
DIVISION OF ENVIRONMENTAL HEALTH
ON-SITE WASTEWATER SECTION

The Catena Group

410-B Millstone Drive
Hillsborough, NC 27278
(919) 732-1300

On-Site Septic System Evaluation

Stonebridge Subdivision
Lot 39
Tax ID # 139-032-25
Mecklenburg File # 6167B
Mecklenburg County, NC

Prepared For:

NVR Incorporated
10815 David Taylor Dr., Suite 100
Charlotte, NC 28262

Prepared By:

The Catena Group
Hillsborough, North Carolina

November 14, 2005

LICENSED SOIL SCIENTIST
STEVEN J. MELIN
1254
STATE OF NORTH CAROLINA

Steven J. Melin #1254
Steven J. Melin

## INTRODUCTION

Previously the Mecklenburg County Health Department investigated Parcel #139-032-25 (Mecklenburg file # 6167B) in Stonebridge Subdivision to determine the potential for an on-site subsurface septic system. As a follow-up to this investigation, The Catena Group's services were retained to conduct saturated hydraulic conductivity tests (Ksat's) and to make recommendations as the reconfiguration of the lot in order to determine if the lot can be used to facilitate subsurface effluent disposal and to determine appropriate loading rates. Accordingly, this report is submitted to report the findings of the additional tests and to provide hydraulic loading recommendations for system layout.

## PRIMARY INVESTIGATOR'S CREDENTIALS

Steven J. Melin: N.C. Licensed Soil Scientist (Certification # 1254)

Education: M.S. Natural Resource Administration - Soil Science Emphasis, North Carolina State University; Raleigh, NC

B.S. Watershed Management, Soil Science Minor, University of Wisconsin-Stevens Point, Stevens Point, WI

## INVESTIGATION

Parcel #139-032-25 was investigated on November 12, 2005. This lot is located in the Stonebridge Subdivision, which is off of Bartlett Road, just east of I-485 in Mecklenburg County, North Carolina. Mecklenburg County is located in the located in the center of the Piedmont physiographic region of North Carolina and the soils derived from felsic and mafic igneous rocks. The upland soils on the site can be classified as well drained and shallow to saprolite that formed in material weathered from mafic or intermediate crystalline rocks. These soils are representative of Cecil or Pacolet sandy loam. The site is cleared of vegetation, and a basement has been cut into the side of a gently sloping hill.

The Catena Group personnel made its determinations of the site through observations of the landscape (slope, drainage patterns, past use, etc.) as well as soil properties (depth, texture, structure, seasonal wetness, restrictive horizons, etc.) with hand auger borings within the parent material (BC / C horizons). Soil series found on-site in forested areas were similar to soils mapped as Cecil or Pacolet sandy loam on the NRCS Soil Survey map for Mecklenburg County (1995). According to the Mecklenburg County Soil Survey, these soils are moderately deep, well drained, and moderately permeability. Soils located on the site are shallow to saprolite (parent material) and therefore warranted additional study.

In order to utilize the lot, further investigations such as hydraulic conductivity were necessary to determine the permeability of the most restrictive horizon. Saturated hydraulic conductivity is a

quantitative measure of a saturated soil's ability to transmit water. It can be thought of as the ease with which pores of a saturated soil permit water movement. These $K_{SAT}$ tests take into account soil morphologic factors other than texture, because soil structure and clay mineralogy have been found to have a significant impact on the rate of water movement through soils (Bouma et al., 1983; Schoeneberger et al, 1995, Vepraskas et al, 1996). Based upon this information, representative loading rates were determined.

Tests were strategically done within entire soil layers that are at the bottom of the LPP trench and 12-18" below the bottom of the trench, in the most restrictive horizon. As part of the field investigation on November 30, 2004, nine (9) hydraulic conductivity (Ksat) tests were performed at five separate locations (3 in the initial system, and one in each area designated for repair area). These tests indicate that water movement is moderate, yielding an average Ksat of 4.5 gallons per day / square foot ($gpd/ft^2$) at the bottom of the trenches and 1.5 $gpd/ft^2$ in the most restrictive horizon in the initial system area. The repair area had similar results (see attached Ksat data summary sheet).

Since pre-treatment will be used, a drainage coefficient up to 25% of the actual Ksat values can be used. However, the use of a LPP system will cut these rates in half. According to the results of the saturated hydraulic conductivity test, a conservative **LTAR of 0.18 gallons per day / square foot ($gpd/ft^2$)** is recommended for this area. The results of these tests are attached to this report.

## CONCLUSION

The findings presented herein represent The Catena Group's professional opinion based on our site and soils evaluation and knowledge of the current laws and regulations governing on-site wastewater systems in North Carolina (Section .1900 of the North Carolina Administrative Code). This report details the work completed for determining that **an LTAR of 0.18 for an LPP system is recommended for the site**. The final determination and subsequent issuance of an Improvement Permit must be made by the Mecklenburg County Health Department. Any concurrence with the findings of this report would be made at that time.

# PROPOSED MODEL FIT

PREPARED BY:

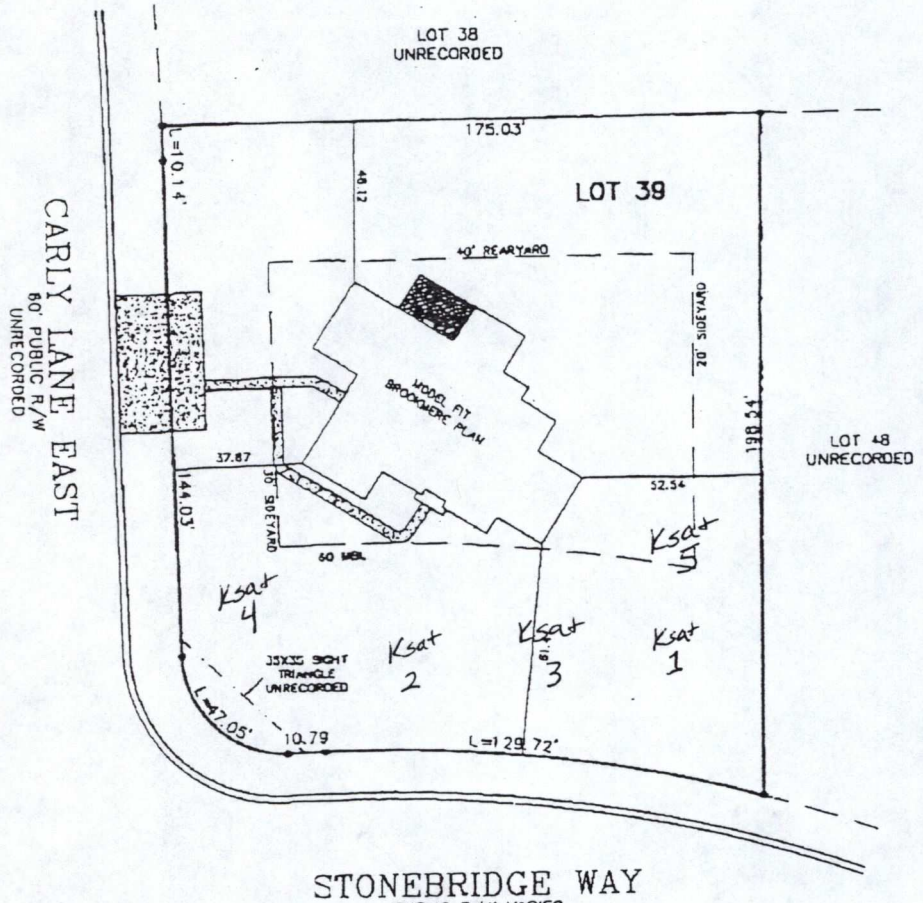
**MODEL FIT ONLY NOT TO BE USED FOR CONSTRUCTION OR STAKING**

DELTA LAND SERVICES, INC.
6033 FLORENCE AVENUE, SUITE 100
CHARLOTTE, NORTH CAROLINA 28212
(704) 536-6190

SITE PLAN

SCALE: 1"=40'

NOTE: ALL LOT INFORMATION TAKEN FROM UNAPPROVED SITE PLAN, DELTA LAND SERVICES IS NOT RESPONSIBLE FOR ANY CHANGES DUE TO RECORDED PLAT AND RECORDED COVENANTS AND RESTRICTIONS




STONEBRIDGE WAY
PUBLIC R/W VARIES
UNRECORDED

ESTIMATED DRIVEWAY AREA = 1890.0 SQ.FT.±

Ksat = Areas of hydraulic conductivity testing and soil borings.

STAKEOUT ☐

**NOT FOR RECORDATION, CONVEYANCES OR SALES**

Subdivision STONEBRIDGE SUBDIVISION, PHASE 1 (UNRECORDED) County MECKLENBURG
Address STONEBRIDGE WAY Owner RYAN HOMES
Lot 39 Block ___ Plan BROOKMERE Elevation C Drive (Left) SIDE (Right) ___ (Courtyard) ___ Deck X
Patio X Fireplace X Garage (1 Car) ___ (2 Car) ___ (3 Car) X Brick FULL Basement X Curtain Wall ___
Crawl ___ Slab ___ Other MORNING ROOM, SIDE CONSERVATORY, 1ST FLOOR SUITE

REVISED: ROTATED HOUSE; REMOVE DRIVE; ADD PARKING PAD DWN: EHD CKD: DATE: 07/07/05

G:\STONEBRIDGE\SB-0038.DWG - G1

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #1

Date: 11/12/2005
Hole Depth 18"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 45.7 | 18.0 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 40.6 | |

Valve Setting: x

1-ON 2-ON

| | cm | inches |
|---|---|---|
| Target Water Level: | 30.5 | 12.0 |
| Beginning Water Level: | 32.4 | 12.8 |
| Ending Water Level: | 31.8 | 12.5 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.0012657

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 20.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 43.4 | 0.0 | 20.0 | 0.0 | | | | | | |
| 41.7 | 1.7 | 20.0 | 5.0 | 5.00 | 0.083 | 408.0 | 0.5164 | 0.2033 | 3.042 |
| 40.5 | 1.2 | 20.0 | 10.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 39.3 | 1.2 | 20.0 | 15.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 38.1 | 1.2 | 20.0 | 20.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 36.9 | 1.2 | 20.0 | 25.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 35.7 | 1.2 | 20.0 | 30.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 34.5 | 1.2 | 20.0 | 35.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 33.3 | 1.2 | 20.0 | 40.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 32.1 | 1.2 | 20.0 | 45.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| | | | | | | **Final Ksat** | **0.365** | **0.144** | **2.147** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #1

Date: 11/12/2005
Hole Depth 30"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 76.2 | 30.0 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 71.1 | |

Valve Setting: x

1-ON 2-ON

| | cm | inches |
|---|---|---|
| Target Water Level: | 61.0 | 24.0 |
| Beginning Water Level: | 57.2 | 22.5 |
| Ending Water Level: | 57.8 | 22.8 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.0008387

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 105.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 39.3 | 0.0 | 105.0 | 20.0 | | | | | | |
| 38.9 | 0.4 | 105.0 | 25.0 | 5.00 | 0.083 | 504.0 | 0.4227 | 0.1664 | 2.490 |
| 38.6 | 0.3 | 105.0 | 30.0 | 5.00 | 0.083 | 378.0 | 0.3170 | 0.1248 | 1.867 |
| 38.3 | 0.3 | 105.0 | 35.0 | 5.00 | 0.083 | 378.0 | 0.3170 | 0.1248 | 1.867 |
| 38.1 | 0.2 | 105.0 | 40.0 | 5.00 | 0.083 | 252.0 | 0.2114 | 0.0832 | 1.245 |
| 37.9 | 0.2 | 105.0 | 45.0 | 5.00 | 0.083 | 252.0 | 0.2114 | 0.0832 | 1.245 |
| 37.5 | 0.4 | 105.0 | 55.0 | 10.00 | 0.167 | 252.0 | 0.2114 | 0.0832 | 1.245 |
| 37 | 0.5 | 105.0 | 65.0 | 10.00 | 0.167 | 315.0 | 0.2642 | 0.1040 | 1.556 |
| 36.6 | 0.4 | 105.0 | 75.0 | 10.00 | 0.167 | 252.0 | 0.2114 | 0.0832 | 1.245 |
| 36.2 | 0.4 | 105.0 | 85.0 | 10.00 | 0.167 | 252.0 | 0.2114 | 0.0832 | 1.245 |
| | | | | | | **Final Ksat** | **0.220** | **0.087** | **1.297** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #2

Date: 11/12/2005
Hole Depth 20"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 50.8 | 20.0 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 45.7 | |

| | cm | inches |
|---|---|---|
| Target Water Level: | 35.6 | 14.0 |
| Beginning Water Level: | 33.0 | 13.0 |
| Ending Water Level: | 33.0 | 13.0 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.00088437

Valve Setting: x (1-ON / 2-ON)

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 20.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 28 | 0.0 | 20.0 | 54.0 | | | | | | |
| 17 | 11.0 | 20.0 | 60.0 | 6.00 | 0.100 | 2200.0 | 1.9456 | 0.7660 | 11.460 |
| 12.8 | 4.2 | 20.0 | 62.0 | 2.00 | 0.033 | 2520.0 | 2.2286 | 0.8774 | 13.127 |
| 10.4 | 2.4 | 20.0 | 64.0 | 2.00 | 0.033 | 1440.0 | 1.2735 | 0.5014 | 7.501 |
| 8.4 | 2.0 | 20.0 | 66.0 | 2.00 | 0.033 | 1200.0 | 1.0612 | 0.4178 | 6.251 |
| 6.2 | 2.2 | 20.0 | 68.0 | 2.00 | 0.033 | 1320.0 | 1.1674 | 0.4596 | 6.876 |
| 3.9 | 2.3 | 20.0 | 70.0 | 2.00 | 0.033 | 1380.0 | 1.2204 | 0.4805 | 7.189 |
| 1.7 | 2.2 | 20.0 | 72.0 | 2.00 | 0.033 | 1320.0 | 1.1674 | 0.4596 | 6.876 |
| | | | | | | **Final Ksat** | **1.154** | **0.454** | **6.798** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #2

Date: 11/12/2005
Hole Depth 33"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 83.8 | 33.0 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 78.7 | |

| | cm | inches |
|---|---|---|
| Target Water Level: | 68.6 | 27.0 |
| Beginning Water Level: | 69.9 | 27.5 |
| Ending Water Level: | 71.1 | 28.0 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.00145403

Valve Setting: x (1-ON / 2-ON)

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 20.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 44.4 | 0.0 | 20.0 | 50.0 | | | | | | |
| 42.1 | 2.3 | 20.0 | 54.0 | 4.00 | 0.067 | 690.0 | 1.0033 | 0.3950 | 5.910 |
| 40.9 | 1.2 | 20.0 | 60.0 | 6.00 | 0.100 | 240.0 | 0.3490 | 0.1374 | 2.056 |
| 40.2 | 0.7 | 20.0 | 64.0 | 4.00 | 0.067 | 210.0 | 0.3053 | 0.1202 | 1.799 |
| 39.4 | 0.8 | 20.0 | 69.0 | 5.00 | 0.083 | 192.0 | 0.2792 | 0.1099 | 1.644 |
| 38.6 | 0.8 | 20.0 | 74.0 | 5.00 | 0.083 | 192.0 | 0.2792 | 0.1099 | 1.644 |
| 37.8 | 0.8 | 20.0 | 79.0 | 5.00 | 0.083 | 192.0 | 0.2792 | 0.1099 | 1.644 |
| 37 | 0.8 | 20.0 | 84.0 | 5.00 | 0.083 | 192.0 | 0.2792 | 0.1099 | 1.644 |
| 36.2 | 0.8 | 20.0 | 89.0 | 5.00 | 0.083 | 192.0 | 0.2792 | 0.1099 | 1.644 |
| | | | | | | **Final Ksat** | **0.279** | **0.110** | **1.644** |

# HYDRAULIC CONDUCTIVITY STUDY

## Mecklenburg County - Stonebridge Subdivision - Location #3

Date: 11/12/2005

Hole Depth 31.5"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 80.0 | 31.5 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 74.9 | |

Valve Setting: x

1-ON 2-ON

| | cm | inches |
|---|---|---|
| Target Water Level: | 64.8 | 25.5 |
| Beginning Water Level: | 64.8 | 25.5 |
| Ending Water Level: | 66.0 | 26.0 |

Hole diameter (cm): 5.2

Hole radius (r): 2.6

coefficient A: 0.0012657

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 20.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 40.4 | 0.0 | 20.0 | 0.0 | | | | | | |
| 36.8 | 3.6 | 20.0 | 2.0 | 2.00 | 0.033 | 2160.0 | 2.7339 | 1.0763 | 16.104 |
| 35.7 | 1.1 | 20.0 | 7.0 | 5.00 | 0.083 | 264.0 | 0.3341 | 0.1316 | 1.968 |
| 33.8 | 1.9 | 20.0 | 17.0 | 10.00 | 0.167 | 228.0 | 0.2886 | 0.1136 | 1.700 |
| 31.9 | 1.9 | 20.0 | 27.0 | 10.00 | 0.167 | 228.0 | 0.2886 | 0.1136 | 1.700 |
| 30.3 | 1.6 | 20.0 | 37.0 | 10.00 | 0.167 | 192.0 | 0.2430 | 0.0957 | 1.431 |
| 28.4 | 1.9 | 20.0 | 47.0 | 10.00 | 0.167 | 228.0 | 0.2886 | 0.1136 | 1.700 |
| 27 | 1.4 | 20.0 | 57.0 | 10.00 | 0.167 | 168.0 | 0.2126 | 0.0837 | 1.253 |
| 25.4 | 1.6 | 20.0 | 67.0 | 10.00 | 0.167 | 192.0 | 0.2430 | 0.0957 | 1.431 |
| 23.8 | 1.6 | 20.0 | 77.0 | 10.00 | 0.167 | 192.0 | 0.2430 | 0.0957 | 1.431 |
| 22.2 | 1.6 | 20.0 | 87.0 | 10.00 | 0.167 | 192.0 | 0.2430 | 0.0957 | 1.431 |
| | | | | | | **Final Ksat** | **0.243** | **0.096** | **1.431** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #4

Date: 11/12/2005
Hole Depth 17.5"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 44.5 | 17.5 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 39.4 | |

| | cm | inches |
|---|---|---|
| Target Water Level: | 29.2 | 11.5 |
| Beginning Water Level: | 25.4 | 10.0 |
| Ending Water Level: | 22.9 | 9.0 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.00065784

Valve Setting: 1-ON x 2-ON

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 105.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 42.5 | 0.0 | 105.0 | 52.0 | | | | | | |
| 42 | 0.5 | 105.0 | 56.0 | 4.00 | 0.067 | 787.5 | 0.5181 | 0.2040 | 3.052 |
| 41.6 | 0.4 | 105.0 | 61.0 | 5.00 | 0.083 | 504.0 | 0.3316 | 0.1305 | 1.953 |
| 41.3 | 0.3 | 105.0 | 66.0 | 5.00 | 0.083 | 378.0 | 0.2487 | 0.0979 | 1.465 |
| 41 | 0.3 | 105.0 | 71.0 | 5.00 | 0.083 | 378.0 | 0.2487 | 0.0979 | 1.465 |
| 40.7 | 0.3 | 105.0 | 76.0 | 5.00 | 0.083 | 378.0 | 0.2487 | 0.0979 | 1.465 |
| 40.4 | 0.3 | 105.0 | 81.0 | 5.00 | 0.083 | 378.0 | 0.2487 | 0.0979 | 1.465 |
| 39.8 | 0.6 | 105.0 | 91.0 | 10.00 | 0.167 | 378.0 | 0.2487 | 0.0979 | 1.465 |
| 39.2 | 0.6 | 105.0 | 101.0 | 10.00 | 0.167 | 378.0 | 0.2487 | 0.0979 | 1.465 |
| | | | | | | **Final Ksat** | **0.249** | **0.098** | **1.465** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #4

Date: 11/12/2005
Hole Depth 33.5"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 85.1 | 33.5 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 80.0 | |

| | cm | inches |
|---|---|---|
| Target Water Level: | 69.9 | 27.5 |
| Beginning Water Level: | 67.3 | 26.5 |
| Ending Water Level: | 68.6 | 27.0 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.00098846

Valve Setting: x 1-ON 2-ON

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 20.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 42.3 | 0.0 | 20.0 | 33.0 | | | | | | |
| 40.7 | 1.6 | 20.0 | 36.0 | 3.00 | 0.050 | 640.0 | 0.6326 | 0.2491 | 3.726 |
| 37 | 3.7 | 20.0 | 46.0 | 10.00 | 0.167 | 444.0 | 0.4389 | 0.1728 | 2.585 |
| 35.5 | 1.5 | 20.0 | 51.0 | 5.00 | 0.083 | 360.0 | 0.3558 | 0.1401 | 2.096 |
| 34.4 | 1.1 | 20.0 | 56.0 | 5.00 | 0.083 | 264.0 | 0.2610 | 0.1027 | 1.537 |
| 33.3 | 1.1 | 20.0 | 61.0 | 5.00 | 0.083 | 264.0 | 0.2610 | 0.1027 | 1.537 |
| 32.3 | 1.0 | 20.0 | 66.0 | 5.00 | 0.083 | 240.0 | 0.2372 | 0.0934 | 1.397 |
| 31.4 | 0.9 | 20.0 | 71.0 | 5.00 | 0.083 | 216.0 | 0.2135 | 0.0841 | 1.258 |
| 30.6 | 0.8 | 20.0 | 76.0 | 5.00 | 0.083 | 192.0 | 0.1898 | 0.0747 | 1.118 |
| 29.7 | 0.9 | 20.0 | 81.0 | 5.00 | 0.083 | 216.0 | 0.2135 | 0.0841 | 1.258 |
| 28.7 | 1.0 | 20.0 | 86.0 | 5.00 | 0.083 | 240.0 | 0.2372 | 0.0934 | 1.397 |
| | | | | | | **Final Ksat** | **0.214** | **0.084** | **1.258** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #5

Date: 11/12/2005
Hole Depth 13.75"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 34.9 | 13.8 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 29.8 | |

| | cm | inches |
|---|---|---|
| Target Water Level: | 19.7 | 7.8 |
| Beginning Water Level: | 17.8 | 7.0 |
| Ending Water Level: | 19.1 | 7.5 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.00104801

Valve Setting: x (1-ON / 2-ON)

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 20.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 44.8 | 0.0 | 20.0 | 0.0 | | | | | | |
| 42.5 | 2.3 | 20.0 | 4.0 | 4.00 | 0.067 | 690.0 | 0.7231 | 0.2847 | 4.259 |
| 38.4 | 4.1 | 20.0 | 10.0 | 6.00 | 0.100 | 820.0 | 0.8594 | 0.3383 | 5.062 |
| 34.8 | 3.6 | 20.0 | 15.0 | 5.00 | 0.083 | 864.0 | 0.9055 | 0.3565 | 5.334 |
| 32 | 2.8 | 20.0 | 19.0 | 4.00 | 0.067 | 840.0 | 0.8803 | 0.3466 | 5.185 |
| 0.1 | 31.9 | 20.0 | 65.0 | 46.00 | 0.767 | 832.2 | 0.8721 | 0.3434 | 5.137 |
| | 0.1 | | | | | | | | |
| 37 | -37.0 | 105.0 | 71.0 | | | | | | |
| 37 | 0.0 | 105.0 | 74.0 | 3.00 | 0.050 | 0.0 | 0.0000 | 0.0000 | 0.000 |
| 36.4 | 0.6 | 105.0 | 79.0 | 5.00 | 0.083 | 756.0 | 0.7923 | 0.3119 | 4.667 |
| 35.1 | 1.3 | 105.0 | 89.0 | 10.00 | 0.167 | 819.0 | 0.8583 | 0.3379 | 5.056 |
| 33.8 | 1.3 | 105.0 | 99.0 | 10.00 | 0.167 | 819.0 | 0.8583 | 0.3379 | 5.056 |
| 32.5 | 1.3 | 105.0 | 109.0 | 10.00 | 0.167 | 819.0 | 0.8583 | 0.3379 | 5.056 |
| | | | | | | **Final Ksat** | **0.858** | **0.338** | **5.056** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #5

Date: 11/12/2005
Hole Depth 31"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 78.7 | 31.0 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 73.7 | |

| | cm | inches |
|---|---|---|
| Target Water Level: | 63.5 | 25.0 |
| Beginning Water Level: | 64.8 | 25.5 |
| Ending Water Level: | 66.0 | 26.0 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.00145403

Valve Setting: x (1-ON / 2-ON)

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 20.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 43.5 | 0.0 | 20.0 | 0.0 | | | | | | |
| 42.5 | 1.0 | 20.0 | 4.0 | 4.00 | 0.067 | 300.0 | 0.4362 | 0.1717 | 2.569 |
| 41.4 | 1.1 | 20.0 | 10.0 | 6.00 | 0.100 | 220.0 | 0.3199 | 0.1259 | 1.884 |
| 40.6 | 0.8 | 20.0 | 15.0 | 5.00 | 0.083 | 192.0 | 0.2792 | 0.1099 | 1.644 |
| 39.9 | 0.7 | 20.0 | 19.0 | 4.00 | 0.067 | 210.0 | 0.3053 | 0.1202 | 1.799 |
| 33.4 | 6.5 | 20.0 | 69.0 | 50.00 | 0.833 | 156.0 | 0.2268 | 0.0893 | 1.336 |
| 32.2 | 1.2 | 20.0 | 79.0 | 10.00 | 0.167 | 144.0 | 0.2094 | 0.0824 | 1.233 |
| 31 | 1.2 | 20.0 | 89.0 | 10.00 | 0.167 | 144.0 | 0.2094 | 0.0824 | 1.233 |
| 29.8 | 1.2 | 20.0 | 99.0 | 10.00 | 0.167 | 144.0 | 0.2094 | 0.0824 | 1.233 |
| 28.6 | 1.2 | 20.0 | 109.0 | 10.00 | 0.167 | 144.0 | 0.2094 | 0.0824 | 1.233 |
| | | | | | | **Final Ksat** | **0.209** | **0.082** | **1.233** |

Table 1. Summary of Hydraulic Conductivity (Ksat) Measurments

| Location | Depth | Results | | | |
|---|---|---|---|---|---|
| | | in/hr | gal/sq ft/day | 25% Ksat g/ft^2/d | 12.5% Ksat g/ft^2/d |
| 1 | 12.5 - 18.0" | 0.144 | 2.2 | 0.54 | 0.27 |
| | 22.75 - 30.0" | 0.087 | 1.3 | 0.33 | 0.16 |
| | | | | | |
| 2 | 13.0 - 20.0" | 0.454 | 6.8 | 1.70 | 0.85 |
| | 28.0 - 33.0" | 0.110 | 1.6 | 0.41 | 0.21 |
| | | | | | |
| 3 | 26.0 - 31.5" | 0.096 | 1.4 | 0.36 | 0.18 |
| | | | | | |
| 4 | 9.0 - 17.5" | 0.098 | 1.5 | 0.37 | 0.18 |
| | 27.0 - 33.5" | 0.084 | 1.3 | 0.31 | 0.16 |
| | | | | | |
| 5 | 7.5 - 13.75" | 0.338 | 5.1 | 1.26 | 0.63 |
| | 26.0 - 31.0" | 0.082 | 1.2 | 0.31 | 0.15 |
| | | | | | |
| | Avg | 0.098 | 1.5 | 0.37 | 0.18 |

PROJECT Stonebridge Sub 7 DATE 11/2/05 COUNTY Mecklenburg

PROPOSAL/LOT# Lot #39

Parent material (res)/coll/all) clay mineralogy: (sl.exp./exp.?)

| | Boring # Kent Loc. #1 | Boring # Kent Loc. #2 | Boring # Kent Loc. #3 | Boring # Kent Loc. #4 |
|---|---|---|---|---|
| DEPTH HORIZON I | 0-8 | 0-8 | 0-10 | 0-6 |
| COLOR | 5YR 4/8 | 5YR 5/8 | 5YR 5/6 | 5YR 4/6 |
| TEXTURE | SL/SL | SL | SL | SL |
| STRUCTURE | 1 m sbk | 1 f gran sbk | 1 m. sbk | GR |
| CONSISTENCE | FR | FR | FR | FR |
| | | | | |
| | | | | |
| DEPTH HORIZON II | 8-21 | 8-20 BT1 | 10-21 | 6-36 BT |
| COLOR | 5YR 4/8 | 2.5YR 4/8 | 2.5YR 5/6 | 2.5YR |
| TEXTURE | SCL | C/CL | C | C |
| STRUCTURE | 1 m sbk | 2 m sbk | 2 m sbk | 2 m sbk |
| CONSISTENCE | FI | FI | FI | FI |
| %CLAY | 33%/10.3 | 40%/10? | 40%/10.3 | 42%/10.25 |
| | | | | |
| DEPTH HORIZON III | 21-34+ | 20-36+ BT2 | 21-36+ BT2 | |
| COLOR | 2.5YR 4/8 | 2.5YR 5/8 w/ | 2.5YR 4/6 w/ yellow mottles | |
| TEXTURE | CL | CL Yellow-ish | CL | |
| STRUCTURE | 2 m sbk | 2 m sbk | 2 m sbk | |
| CONSISTENCE | FI | FI | FI | |
| %CLAY | 40%/0.3 | 40%/0.3 | 40%/10? | |
| | | | | |
| | | | | |
| DEPTH HORIZON IV | 34-40+ | | | |
| COLOR | 2.5YR 5/8 | | | |
| TEXTURE | 1 m sbk | | | |
| STRUCTURE | FR | | | |
| CONSISTENCE | SCL | | | |
| | | | | |
| Soil Depth ? Restrict. Hor? | >40" >40" | >36 >36 | >36 >36 | >36 >36 |
| Ld. pos.? Wet? % slope | LS 10% | LS 10% | LS 10% | LS 25% |
| LTAR/soil group/ CLASSIFICATION (PS/U) | III / 0.3 | 0.3 / III | 0.3 / III | 0.25 / III |
| Notes: | PS | PS | | |

Described by: SJM RCKS

PROJECT Stone Site DATE 4/12/05 COUNTY Meck.

PROPOSAL/LOT# Lot #39

Parent material (res/coll/all) _____ clay mineralogy: (sl.exp./exp.?) _____

| | ~~Boring #~~ Kent Loc. #5 | Boring # 1 | Boring # 2 | Boring # |
|---|---|---|---|---|
| DEPTH HORIZON I | 0-6 | 0-6 Bt | 0-12 Bt | |
| COLOR | 5 YR 4/6 | 2.5 YR 4/8 | ~~2.5 YR 4/6~~ 2.5 YR 4/6 | |
| TEXTURE | SiL | C | CL | |
| STRUCTURE | 1 f sbk | 2 m sbk | 2 m sbk | |
| CONSISTENCE | FR | Fi | Fi | |
| | | | | |
| | | | | |
| DEPTH HORIZON II | 6-24 Bt | 6-24 Bc | 12-20 Bt1 | |
| COLOR | 2.5 YR 4/8 | 2.5 YR 5/6 ~~2.5 YR 5/6~~ 2.5 YR 5/6 | 5 YR 5/6 | |
| TEXTURE | SCL | SiCL | CL | |
| STRUCTURE | 2 m sbk | 2 m sbk | 2 m sbk | |
| CONSISTENCE | Fi | Fi | Fi | |
| %CLAY | 40% / 0.3 | 38% / 0.3 | 41% / 0.3 | |
| | | | | |
| DEPTH HORIZON III | 24-36+" C | 24-28 CB | 20-42 Bt2 | |
| COLOR | light yellow | light yellow | 2.5 YR 4/6 | |
| TEXTURE | SiL / L | SiL / L | CL | |
| STRUCTURE | GR | GR | 2 m sbk | |
| CONSISTENCE | FR | FR | Fi | |
| %CLAY | <20% | <20% | 38% / 0.3 | |
| | | | | |
| | | | | |
| DEPTH HORIZON IV | | 28" AR | 42-55" Bc | |
| COLOR | | | MCL | |
| TEXTURE | | | SCL | |
| STRUCTURE | | | 1+2 m sbk | |
| CONSISTENCE | | | Fi | |
| | | | | |
| Soil Depth ? Restrict. Hor? | >36" 24" | 28" 24" | >55" >55" | |
| Ld. pos.? Wet? % slope | LS 10% | LS 10% | LS 12% | |
| LTAR/soil group/ CLASSIFICATION (PS/U) | 0.3 / III | 0.3 / III | 0.3 / III | |
| Notes: | | 2-3" fill material | | |

Described by: SJM #1254

# Residential Subsurface Wastewater Treatment and Disposal System Design

**for**

**Lot 39 – Stonebridge Subdivision**
**Carly Lane East**
**Mint Hill, North Carolina**

Tax Parcel # 139-03-225 PO
Mecklenburg County File # 6167B
November 14, 2005

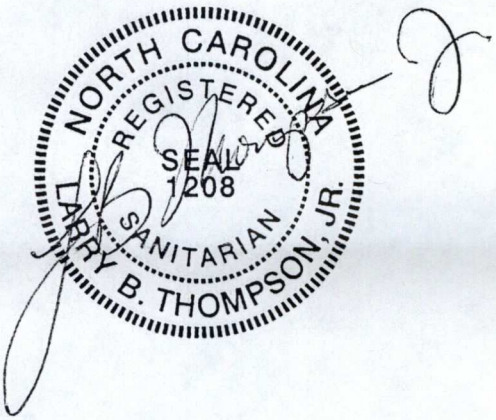
REVISED 12/1/05

**Prepared for:**

NVR, Inc.
10815 David Taylor Drive, Ste. 100
Charlotte, NC 28262

**Prepared by:**

Larry Thompson, RS, PWS
Steven Melin, LSS
The Catena Group, Inc.
410-B Millstone Drive
Hillsborough, NC 27278
Phone: 704-301-4881
Fax: 704-888-1496




CC: Mr. Drew Walker, RS
Mecklenburg County Environmental Health

## Details

In an application for an Improvement Permit filed with the Mecklenburg County Health Department (MCHD) by NVR, Inc., September 21, 2005, the subject property was proposed to be developed with a single family 4-5 bedroom residence served by a municipal water supply. Based upon this information, a soil and site evaluation was conducted by the MCHD on October 13, 2005 where the 0.73 acre lot was determined to be "Unsuitable" for the installation of a subsurface wastewater treatment and disposal system in accordance with the *Laws and Rules for Sewage Treatment, and Disposal Systems* 15A NCAC 18A .1900 (North Carolina Department of Environment and Natural Resources, Division of Environmental Health, On-Site Wastewater Section).

Upon further investigation by The Catena Group, Inc., it was determined that a sufficient amount of "Suitable" Group IV soils are located on the property which would allow for the installation of an initial Type V pre-treated low-pressure pipe system (LPP), as well as a drip irrigation repair, for a 4-bedroom residence. It is the desire of the owner that the MCHD consider reclassifying this lot as "Suitable", allowing for the issuance of a Construction Authorization, based upon the following proposal.

### Location

The subject property is located in Stonebridge Subdivision (Lot 39 – Carly Lane East) in the town of Mint Hill, North Carolina. From NC 51, travel south on NC 218 approximately 0.9 mile, turn left onto SR 3109 (Bartlett Road). Stonebridge is the first subdivision on the right after crossing the I-485 overpass. Lot 39 is located in the southeast corner of the intersection of Stonebridge Way and Carly Lane East.

### References

*Laws and Rules for Sewage Treatment and Disposal Systems, 15A NCAC 18A, Section .1900, Department of Environment and Natural Resources, Division of Environmental Health, On-Site Wastewater Section,* February 1, 2005.

*Onsite Wastewater Treatment and Disposal Systems;* EPA 625/R-00/008 Design Manual, February 2002.

*Innovative Wastewater System Approval No: IWWS-2004-3;* AdvanTex® Treatment Systems, April 6, 2005.

*Design and Installation of Low Pressure Pipe Wastewater Treatment Systems;* by Craig Cogger, Bobby Carlisle; Dennis Osborne and Ed Holland. Published by UNC Sea Grant College Pub. UNC-SC-82-03, May 1982.

Amoozegar, A., and A. W. Warrick. 1986. Hydraulic Conductivity of Saturated Soils: Field Methods, Chapter 29, *Methods of Soil Analysis, Part 1, 2nd Edition.* ASA-CSSA-SSSA, Madison, Wisconsin.

## Plans and Specifications

Septic Tank

- The septic tank shall be approved by both the state and Orenco Systems, Inc in accordance with the IWWS-2004-3 AdvanTex® approval. The septic tank will have an inlet sanitary tee and a state approved, appropriately sized Orenco effluent filter on the outlet end.
- The septic tank must be watertight, structurally sound, and 1500 gallons in capacity.
- It is the responsibility of the septic contractor to thoroughly inspect the septic tank prior to accepting delivery to assure that the tank has had time to properly cure and is free of cracks or other structural deficiencies.

AdvanTex® Dosing/Recirculating Tank

- The dosing/recirculating tank shall be approved by the state and Orenco Systems, Inc. specifically for the use with AdvanTex® systems.
- The dosing/recirculation tank will contain the recirculating splitter valve and the Biotube screened pump vault. The recirculation tanks shall be approved by the state and Orenco Systems, Inc.
- The dosing/recirculation tank shall have an inlet sanitary tee.
- A drainback configuration without a pump check valve is required for the forcemain.
- A single AX20 P3005 Orenco High Head Pump is required to dose the AdvanTex® treatment unit.
- The dosing/recirculation tank will utilize the TCOM or VeriComm® telemetry control panel. The control panel is in a NEMA 4X enclosure, and shall be located within 30 feet of the recirculation tank.
- Separate control and alarm circuits will be provided.

Drain Field Dosing Tank

- The drain field dosing tank shall be both state and Orenco approved, of one-piece construction, watertight, structurally sound and, at a minimum, 1500 gallons in capacity. Again, it is the responsibility of the septic tank contractor to thoroughly inspect each pump tank prior to accepting delivery.
- The pump tanks shall have access risers that extend, at a minimum, 6 inches above finished grade and must have less than 36 inches of fill over its top once finished grade has been established (please note that a reinforced concrete tank will be required if the finished soil cover is 36 inches or greater in depth).
- The pump and alarm controls shall be provided with manual circuit disconnects within a watertight, corrosion resistant, Nema 4X rated control panel.
- The control panel shall have pump cycle and run timer recording capability.
- The control panel must be securely mounted outside, adjacent to the pump tank riser and at a minimum of 12 inches above finished grade. Pump and float control wiring should be long enough to reach from the tank to the control panel without splicing, routed through wire conduit, and sealed at the openings within the pump tank as well

as the control panel enclosure. It is important that all conduit be properly sealed to prevent the escape of flammable gases from the pump tanks. Furthermore, there must be two electrical circuits for the pump tank controls: one for the pump and one for the alarm controls.

- The pump tank shall have a properly functioning high water alarms incorporated into its control panel. The alarm circuit shall be supplied separate from any pump overload and short circuit devices. The alarm shall be both audible and visible by the system users.
- The float switches for the high water alarms should be mounted at a location slightly above the "pump on" elevation for the pump float control switch. The high water alarm float switch shall not be set more than 3 inches above this elevation.
- Pump float(s) shall be mounted so that the effluent at the end of a pump cycle is above the top of the effluent pump.
- Float switch tie downs must be made of a corrosion resistant material (do not use electrical tape or metal hose clamps to secure these switches). Floats should be mounted on a separate "float tree" rather than the pump supply line (see pump tank detail).
- The pumps must be placed on two 4-inch concrete blocks to allow for some settling of solid particulates within the pump tanks.

Drainfield Dosing Tank Effluent

- The pump discharge piping shall be fitted with a pressure effluent filter. The filter must be equivalent to the GAG Sim Tech Filter (available through Confederate Sales and Associates, Inc., 704-542-7096).

Pipe and Fittings

- All discharge piping, supply lines, valves and disconnects should be made of PVC.
- All joints must be properly "welded" utilizing the appropriate PVC cement for each application.
- The supply line from the pump tank to the pressure manifold shall be 2 inch Schedule 40 PVC.
- The manifold piping shall be 2 inch Schedule 40 PVC and shall contain a cleanout at the opposite end of the supply line connection. After the manifold has been placed in its trench, and lateral lines connected, it should be backfilled with tightly tamped soil. Do not use gravel as a backfill material for the manifold, this could make the trench a conduit for effluent from the laterals.
- Connections from manifold to lateral lines shall be made directly off the manifold, in one valve box, using reducing tees (2" x 2" x 1 ¼"). There are three subfields in this system and all three controlling gate valves will be located within this box.
- The lateral distribution lines shall be 1 ¼ inch Schedule 40 PVC and each shall have a gate valve to restrict flow in the event of future overloading. Holes in the laterals should be drilled on site and at the 10 and the 2 o'clock position, as per design specifications. Lateral hole size is 5/32 of an inch.

AdvanTex® AX20 Treatment System

- The AdvanTex® AX20 treatment system is a pre-engineered proprietary treatment system manufactured by Orenco Systems Incorporated. The containment module is made of pre-assembled fiberglass unit containing engineered textile material as a filter media. The approximate dimensions of the unit are 91 inches long by 40 inches wide by 31 inches deep. The AdvanTex® AX20 treatment system is available through AQWA – Steve Barry (919) 427-1114.
- Discharge from the unit shall be split by a flow divider (gravity fall from unit), sending ¾ of the wastewater back to the AdvanTex® dosing tank and ¼ to the pump tank that supplies the LPP fields.
- Treatment Performance Standards (TS-II): Tertiary treatment with nitrogen reduction.
- The AdvanTex® treatment system shall be designed, installed and operated to meet the following standards:
    1. Biochemical Oxygen Demand, 5-day ($BOD_5$) = 15 mg/l
    2. Total Suspended Solids (TSS) = 15 mg/l
    3. Ammonia-Nitrogen ($NH_4$-N) = 10 mg/l
    4. Total nitrogen (Total Kjeldahl Nitrogen +NOx-N) standard shall be met through one of the following methods:
        (1) Total nitrogen concentration in the AdvanTex effluent = 15 mg/l, or
        (2) Total nitrogen reduction of 50%. Measured as the difference between the septic tank effluent (TKN) and AdvanTex effluent (TKN+NOx-N), or
        (3) Calculated as a maximum daily load (this criteria shall only be applicable when the average daily flow for the past 30 days is below 25 percent of the design flow and when the effluent $CBOD_5$ is less than 5 mg/l): Nitrogen reduction may be measured in terms of pounds of total nitrogen actually delivered to the field per day. Up to .004 lbs per day for every 60 gallons of daily design flow is allowed. See Attachment C for guidance on calculating this for compliance determination.
    5. Fecal Coliform Bacteria Densities = 10,000 colonies/100 ml (MPN)

Drainfield Installation

- The drainfield has been previously laid out on-site utilizing metal stemmed flags. Once this area has been approved by the MCHD, the property owner/builder should mark this area and isolate it as much as possible from construction traffic. Prior to the system installation, the septic contractor shall contact the MCHD and the system designer for a preconstruction conference at which time the drainfield area will be re-verified.
- Under no circumstances shall any construction take place within the drainfield area while the soil is in a wet condition. If the installer has doubts as to whether or not the

drainfield area is dry enough to begin construction, the Mecklenburg County Health Department should be contacted for permission to proceed with the installation.

- The specified system is a Type V LPP.
- The drainfield consists of (2) lateral trenches to be constructed 2 feet wide by 70 feet in length, (5) lateral trenches to be constructed 2 feet wide by 50 feet in length, and (4) lateral trenches to be constructed 2 feet wide by 40 feet in length.
- The maximum trench depth for this system shall be 16 inches.
- The laterals are to be installed on contour with the land, keeping the individual trench bottoms level from beginning to end.
- The trenches should be left open for the final inspection by the MCHD.

Lateral Lines

*The lateral lines have been laid out in the field and sketched in this plan. Field layout should supercede what is in this plan, they having been checked by an engineer's level.*

- Once trenches are dug, a 6 inch gravel base (# 5 or # 57 stone – washed and clean) is to be installed.
- After the gravel based has been spread level, the 1 ¼ inch PVC pipes should be laid out and cut to the proper lengths for the lateral lines. Holes are drilled according to the plan specifications at 10 and 2 o'clock and are only drilled through one side of the pipe.
- Sleeve laterals in 4 inch diameter perforated corrugated pipe. The corrugated pipe shall have three rows of holes, each between ½ inch and ¾ inch in diameter, spaced longitudinally approximately 4 inches on center. The holes in the outer 4 inch sleeve should be placed facing down into the trench bottom while the holes in the 1 ¼ inch laterals should be placed facing up.
- The end of each lateral should be fitted with a short turn up consisting of elbows topped by a threaded female coupling with cap. Each turn up must be fitted with a turf/gate valve box with lid fitted flush to finished grade.
- The laterals having been installed, an additional 4 inches of stone (for a total of 10 inches of stone) shall be added to complete the trench installation.
- At this point, the trenches should be left open for the final inspection by the MCHD.

Proper Operation Check

- After all components of the waste water disposal system have been installed and connected, the system shall be checked for proper operation.
- With the electrical power turned off, fill the pump tank with water until the liquid rises to a level high enough to activate the high water alarm float. Turn on the electrical power. The alarm, alarm light and pump should activate at this time. Turn off the electrical power once these checks have been performed and prepare to set the head pressure.

Pressure Head Adjustment

- The pressure head must be adjusted to match the design specifications. The pressure head is measured by the height of the liquid coming from the turn ups at the end of each lateral when the pump is running (utilizing stand pipes).
- Prepare a length of pipe (stand pipe), cut to the desired head pressure height and fitted with a threaded adapter that will screw into the turn up couplings at the end of each lateral. Thread the stand pipes into each lateral and then turn the power on to the pump, allowing the water to rise within the stand pipes. Adjust the gate valves within the supply manifold box to achieve the specified head pressure (liquid height in the stand pipes should equal the design head pressure).
- Once the pressure head has been adjusted, allow the pump to run through the remainder of the cycle. The pump float switch will automatically turn the pump off if it is operating properly. Make sure that the effluent pump is completely submerged in the remaining water, making adjustments to the float switch(es) as needed. This completes the checks for proper operation of the pump, alarm and float switches.
- At this point, the standpipes may be removed and replaced with the threaded turn up caps.

Final Landscaping

- The drainfield shall be shaped to shed rainwater and be free from low spots.
- The entire area of the drainfield should be planted with grass as soon as possible to prevent erosion. The soil should be properly tilled, limed (if necessary) and fertilized prior to planting. After applying grass seed, the area should be heavily mulched with straw or other suitable material.

Utility Conflicts

- The builder and property owner must take special care in planning for water, power, gas, telephone and cable lines. These utilities shall be kept clear of all parts of the septic system and its proposed repair area. Improper planning for underground utilities can negatively impact the installation and, in some cases, cause irreparable damage. If there are any questions regarding preferred routes, contact the MCHD as soon as possible.

## Maintenance

Operation and Maintenance

The designed system is classified as a Type V wastewater treatment and disposal system and will require ongoing maintenance. State regulations require that a system of this type be managed by a person certified by the North Carolina Department of Environment and Natural Resources to operate subsurface wastewater systems (Section .1961 Maintenance of Sewage Systems). A "Maintenance Contract" between the system owner and a Certified Operator will be required by the MCHD prior to the issuance of a final system approval or Operation Permit.

- The minimum inspection/maintenance and reporting frequency for a Type V system is once every 6 months by the Certified Operator. The local health department is required to inspect the system once (1) a year.
- At each AdvanTex Treatment System inspection the ORC shall, at a minimum, observe, monitor, and record:
  a. wastewater level in the tanks,
  b. the processing tank Biotube® (effluent filter) Pump Vault for clogging,
  c. watertightness of tanks, risers and pipe connections at tanks,
  d. operation of pumps, floats, valves, electrical controls and alarms,
  e. pumping frequency from pump impulse counters and elapsed run time meters,
  f. the AdvanTex® Treatment System for any structural damage, accessibility, adequate ventilation, excess odors, ponding of effluent, insect infestations, vegetative growth over the drain field, the drain field area for surfacing the effluent, and a sample of AdvanTex® Treatment System effluent collected from the sampling point to check for effluent clarity and odor, and,
  g. the pump cycle and run time meters and any water meter readings.
- At least once per year the ORC shall, at a minimum, measure and report to the health department:
  a. sludge and scum levels in the septic tank,
  b. sludge level and grease presence in the pump tank,
  c. drain field pump delivery rate (drawdown test), and
  d. drain field dosing volume and measure or calculate average pump run time.
- At least once a year the ORC shall collect and submit a sample to be tested for TKN in the septic tank effluent and $CBOD_5$, TSS, Fecal Coliform, TKN, NH3 and Nitrate-Nitrogen and Nitrite-Nitrogen in the AdvanTex Effluent.
  a. All samples shall be obtained, preserved, and analyzed in accordance with 40 CFR 136.
  b. A state certified wastewater laboratory shall analyze samples for the treatment performance standards specified in Section B and complete chain of custodies shall be maintained.
- The ORC shall also conduct other additional observations, measurements, monitoring, and maintenance activities as specified in the Operation Permit and as recommended by the manufacturer.
- It should be noted that the septic and dosing tanks may need to be pumped every 4 years (in some situations, the tank may need to be pumped more frequently). At a minimum the tanks should be pumped when the solids within the septic tank reach an elevation that is equivalent to 1/3 of the volume of the tank.
- Effluent filters should be inspected semi-annually. When it becomes necessary to clean the effluent filters, the filters should be removed and the accumulated debris washed back into the septic or pump tank – not onto the lawn.
- All piping and valves should be inspected semi-annually for damage and corrections/repairs made immediately.
- The pump and float controls/switches should be inspected semi-annually to assure proper operation

- The drain field area should be maintained to prevent over growth of vegetation. Any damp areas, leakages or malfunctions should be addressed immediately.

Suggestions to the Homeowner

- As previously mentioned, if you plan to use a garbage disposal in your home you should plan to have your septic and pump tanks cleaned out annually. The ground up garbage adds large amounts of solids into a septic tank that tend to degrade at a very slow rate.
- Grease, cooking oils, coffee grounds and non-degradable solids (disposable diapers, cigarettes and solid paper wastes) should never be put into a septic tank.
- Used motor oil or any oily liquids should not be disposed of in a septic tank.
- Be aware of the amount of water that you are using in your home. Water saving fixtures and devices can be installed on sinks, toilets and showers to reduce the volume of wastewater that you are sending to your drain field.
- Run dishwashers and washing machines only when you have a full load.
- Use liquid detergents. Powdered detergents have binding agents in them that can precipitate in the wastewater disposal system.
- Repair leaky faucets and toilets. Small drips equal large volumes of water over time and can over burden your drain field.
- Divert gutter downspouts and surface water runoff away from the septic and pump tanks.
- Do not use chemical additives in your system. Several studies that we have reviewed indicate that they do not increase the biological activity that naturally occurs in the septic system and, in some cases, they have been found to be detrimental to the biological activity of a system.
- Finally, taking good care of your septic system will help to assure that you experience years of trouble free service at a relatively low cost. On-site wastewater treatment and disposal is still the most environmentally friendly method of treating residential/commercial waste and you should keep your system in use for as long as it is properly functioning! If you have additional questions, please feel free to contact your system designer or the MCHD.

## Design Specifics

| | |
|---|---|
| Daily Design Flow: | 480 GPD – 4 bedroom house |
| Septic Tank Size: | 1500 gallons (2 compartments) |
| AdvanTex Recirculating Tank: | (1) required w/AX20 P3005 Orenco High Head Pump |
| Pump Tank Size: | 1500 gallons (one piece) |
| Effluent Loading Rate: | Design = 0.175 GPD per sq. ft. |
| Supply Length and Diameter: | Approx. 155 feet of 2 inch Sch. 40 PVC (please see note at the bottom of this page.) |
| Laterals: | (2) @ 70 feet, (5) @ 50 feet, and (4) @ 40 feet – variable hole size and spacing, see LPP DESIGN |
| Dosing Volume: | 201.11 gallons per dose |
| Flow Rate Through System: | 33.07 gallons per minute |
| Elevation Head: | 16.5 feet (may vary, please see note at the bottom of this page) |
| Total Dynamic Head: | 26 feet |
| Drain Field Pump Requirements: | 33.07 GPM at 26.0 feet of head |
| Depth of Water Pumped: | 9.6 inches average (pump tank volumes vary - 1 cubic foot of water equals 7.5 gallons) |
| Pump Run: | 6 minutes |
| Check Valve: | Yes |
| Vapor Lock Hole: | Yes (A vapor lock hole can reduce vibrations in the discharge pipe upon start up and shut down) |

* Please note that supply line and elevation head measurements are approximate. It is the contractor's responsibility to confirm these values based upon the actual house and plumbing location. If there is a discrepancy, contact the system designer prior to beginning construction.

# Residential Subsurface Wastewater Treatment and Disposal System Design

**for**

**Lot 39 – Stonebridge Subdivision**
**Carly Lane East**
**Mint Hill, North Carolina**

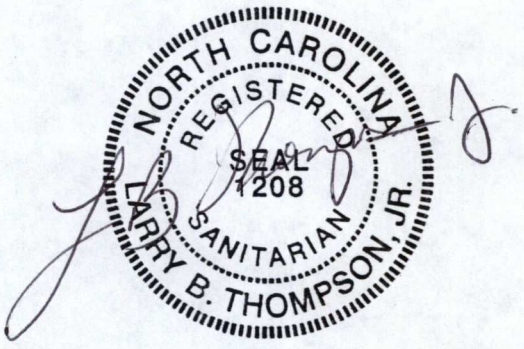
Tax Parcel # 139-03-225 PO
Mecklenburg County File # 6167B
November 14, 2005

**Prepared for:**

NVR, Inc.
10815 David Taylor Drive, Ste. 100
Charlotte, NC 28262

**Prepared by:**

Larry Thompson, RS, PWS
Steven Melin, LSS
The Catena Group, Inc.
410-B Millstone Drive
Hillsborough, NC 27278
Phone: 704-301-4881
Fax: 704-888-1496




CC: Mr. Drew Walker, RS
Mecklenburg County Environmental Health

## Details

In an application for an Improvement Permit filed with the Mecklenburg County Health Department (MCHD) by NVR, Inc., September 21, 2005, the subject property was proposed to be developed with a single family 4-5 bedroom residence served by a municipal water supply. Based upon this information, a soil and site evaluation was conducted by the MCHD on October 13, 2005 where the 0.73 acre lot was determined to be "Unsuitable" for the installation of a subsurface wastewater treatment and disposal system in accordance with the *Laws and Rules for Sewage Treatment, and Disposal Systems* 15A NCAC 18A .1900 (North Carolina Department of Environment and Natural Resources, Division of Environmental Health, On-Site Wastewater Section).

Upon further investigation by The Catena Group, Inc., it was determined that a sufficient amount of "Suitable" Group IV soils are located on the property which would allow for the installation of an initial Type V pre-treated low-pressure pipe system (LPP), as well as a drip irrigation repair, for a 4-bedroom residence. It is the desire of the owner that the MCHD consider reclassifying this lot as "Suitable", allowing for the issuance of a Construction Authorization, based upon the following proposal.

Location

The subject property is located in Stonebridge Subdivision (Lot 39 – Carly Lane East) in the town of Mint Hill, North Carolina. From NC 51, travel south on NC 218 approximately 0.9 mile, turn left onto SR 3109 (Bartlett Road). Stonebridge is the first subdivision on the right after crossing the I-485 overpass. Lot 39 is located in the southeast corner of the intersection of Stonebridge Way and Carly Lane East.

References

*Laws and Rules for Sewage Treatment and Disposal Systems, 15A NCAC 18A, Section .1900, Department of Environment and Natural Resources, Division of Environmental Health, On-Site Wastewater Section,* February 1, 2005.

*Onsite Wastewater Treatment and Disposal Systems;* EPA 625/R-00/008 Design Manual, February 2002.

*Innovative Wastewater System Approval No: IWWS-2004-3;* AdvanTex® Treatment Systems, April 6, 2005.

*Design and Installation of Low Pressure Pipe Wastewater Treatment Systems;* by Craig Cogger, Bobby Carlisle; Dennis Osborne and Ed Holland. Published by UNC Sea Grant College Pub. UNC-SC-82-03, May 1982.

Amoozegar, A., and A. W. Warrick. 1986. Hydraulic Conductivity of Saturated Soils: Field Methods, Chapter 29, *Methods of Soil Analysis, Part 1, 2nd Edition.* ASA-CSSA-SSSA, Madison, Wisconsin.

## Plans and Specifications

Septic Tank

- The septic tank shall be approved by both the state and Orenco Systems, Inc in accordance with the IWWS-2004-3 AdvanTex® approval. The septic tank will have an inlet sanitary tee and a state approved, appropriately sized Orenco effluent filter on the outlet end.
- The septic tank must be watertight, structurally sound, and 1500 gallons in capacity.
- It is the responsibility of the septic contractor to thoroughly inspect the septic tank prior to accepting delivery to assure that the tank has had time to properly cure and is free of cracks or other structural deficiencies.

AdvanTex® Dosing/Recirculating Tank

- The dosing/recirculating tank shall be approved by the state and Orenco Systems, Inc. specifically for the use with AdvanTex® systems.
- The dosing/recirculation tank will contain the recirculating splitter valve and the Biotube screened pump vault. The recirculation tanks shall be approved by the state and Orenco Systems, Inc.
- The dosing/recirculation tank shall have an inlet sanitary tee.
- A drainback configuration without a pump check valve is required for the forcemain.
- A single AX20 P3005 Orenco High Head Pump is required to dose the AdvanTex® treatment unit.
- The dosing/recirculation tank will utilize the TCOM or VeriComm® telemetry control panel. The control panel is in a NEMA 4X enclosure, and shall be located within 30 feet of the recirculation tank.
- Separate control and alarm circuits will be provided.

Drain Field Dosing Tank

- The drain field dosing tank shall be both state and Orenco approved, of one-piece construction, watertight, structurally sound and, at a minimum, 1500 gallons in capacity. Again, it is the responsibility of the septic tank contractor to thoroughly inspect each pump tank prior to accepting delivery.
- The pump tanks shall have access risers that extend, at a minimum, 6 inches above finished grade and must have less than 36 inches of fill over its top once finished grade has been established (please note that a reinforced concrete tank will be required if the finished soil cover is 36 inches or greater in depth).
- The pump and alarm controls shall be provided with manual circuit disconnects within a watertight, corrosion resistant, Nema 4X rated control panel.
- The control panel shall have pump cycle and run timer recording capability.
- The control panel must be securely mounted outside, adjacent to the pump tank riser and at a minimum of 12 inches above finished grade. Pump and float control wiring should be long enough to reach from the tank to the control panel without splicing, routed through wire conduit, and sealed at the openings within the pump tank as well

as the control panel enclosure. It is important that all conduit be properly sealed to prevent the escape of flammable gases from the pump tanks. Furthermore, there must be two electrical circuits for the pump tank controls: one for the pump and one for the alarm controls.

- The pump tank shall have a properly functioning high water alarms incorporated into its control panel. The alarm circuit shall be supplied separate from any pump overload and short circuit devices. The alarm shall be both audible and visible by the system users.
- The float switches for the high water alarms should be mounted at a location slightly above the "pump on" elevation for the pump float control switch. The high water alarm float switch shall not be set more than 3 inches above this elevation.
- Pump float(s) shall be mounted so that the effluent at the end of a pump cycle is above the top of the effluent pump.
- Float switch tie downs must be made of a corrosion resistant material (do not use electrical tape or metal hose clamps to secure these switches). Floats should be mounted on a separate "float tree" rather than the pump supply line (see pump tank detail).
- The pumps must be placed on two 4-inch concrete blocks to allow for some settling of solid particulates within the pump tanks.

Drainfield Dosing Tank Effluent

- The pump discharge piping shall be fitted with a pressure effluent filter. The filter must be equivalent to the GAG Sim Tech Filter (available through Confederate Sales and Associates, Inc., 704-542-7096).

Pipe and Fittings

- All discharge piping, supply lines, valves and disconnects should be made of PVC.
- All joints must be properly "welded" utilizing the appropriate PVC cement for each application.
- The supply line from the pump tank to the pressure manifold shall be 2 inch Schedule 40 PVC.
- The manifold piping shall be 2 inch Schedule 40 PVC and shall contain a cleanout at the opposite end of the supply line connection. After the manifold has been placed in its trench, and lateral lines connected, it should be backfilled with tightly tamped soil. Do not use gravel as a backfill material for the manifold, this could make the trench a conduit for effluent from the laterals.
- Connections from manifold to lateral lines shall be made directly off the manifold, in one valve box, using reducing tees (2" x 2" x 1 ¼"). There are three subfields in this system and all three controlling gate valves will be located within this box.
- The lateral distribution lines shall be 1 ¼ inch Schedule 40 PVC and each shall have a gate valve to restrict flow in the event of future overloading. Holes in the laterals should be drilled on site and at the 10 and the 2 o'clock position, as per design specifications. Lateral hole size is 5/32 of an inch.

AdvanTex® AX20 Treatment System

- The AdvanTex® AX20 treatment system is a pre-engineered proprietary treatment system manufactured by Orenco Systems Incorporated. The containment module is made of pre-assembled fiberglass unit containing engineered textile material as a filter media. The approximate dimensions of the unit are 91 inches long by 40 inches wide by 31 inches deep. The AdvanTex® AX20 treatment system is available through AQWA – Steve Barry (919) 427-1114.
- Discharge from the unit shall be split by a flow divider (gravity fall from unit), sending ¾ of the wastewater back to the AdvanTex® dosing tank and ¼ to the pump tank that supplies the LPP fields.
- Treatment Performance Standards (TS-II): Tertiary treatment with nitrogen reduction.
- The AdvanTex® treatment system shall be designed, installed and operated to meet the following standards:
    1. Biochemical Oxygen Demand, 5-day ($BOD_5$) = 15 mg/l
    2. Total Suspended Solids (TSS) = 15 mg/l
    3. Ammonia-Nitrogen ($NH_4$-N) = 10 mg/l
    4. Total nitrogen (Total Kjeldahl Nitrogen +NOx-N) standard shall be met through one of the following methods:
        (1) Total nitrogen concentration in the AdvanTex effluent = 15 mg/l, or
        (2) Total nitrogen reduction of 50%. Measured as the difference between the septic tank effluent (TKN) and AdvanTex effluent (TKN+NOx-N), or
        (3) Calculated as a maximum daily load (this criteria shall only be applicable when the average daily flow for the past 30 days is below 25 percent of the design flow and when the effluent $CBOD_5$ is less than 5 mg/l): Nitrogen reduction may be measured in terms of pounds of total nitrogen actually delivered to the field per day. Up to .004 lbs per day for every 60 gallons of daily design flow is allowed. See Attachment C for guidance on calculating this for compliance determination.
    5. Fecal Coliform Bacteria Densities = 10,000 colonies/100 ml (MPN)

Drainfield Installation

- The drainfield has been previously laid out on-site utilizing metal stemmed flags. Once this area has been approved by the MCHD, the property owner/builder should mark this area and isolate it as much as possible from construction traffic. Prior to the system installation, the septic contractor shall contact the MCHD and the system designer for a preconstruction conference at which time the drainfield area will be re-verified.
- Under no circumstances shall any construction take place within the drainfield area while the soil is in a wet condition. If the installer has doubts as to whether or not the

drainfield area is dry enough to begin construction, the Mecklenburg County Health Department should be contacted for permission to proceed with the installation.

- The specified system is a Type V LPP.
- The drainfield consists of (2) lateral trenches to be constructed 2 feet wide by 70 feet in length, (5) lateral trenches to be constructed 2 feet wide by 50 feet in length, and (4) lateral trenches to be constructed 2 feet wide by 40 feet in length.
- The maximum trench depth for this system shall be 16 inches.
- The laterals are to be installed on contour with the land, keeping the individual trench bottoms level from beginning to end.
- The trenches should be left open for the final inspection by the MCHD.

Lateral Lines

*The lateral lines have been laid out in the field and sketched in this plan. Field layout should supercede what is in this plan, they having been checked by an engineer's level.*

- Once trenches are dug, a 6 inch gravel base (# 5 or # 57 stone – washed and clean) is to be installed.
- After the gravel based has been spread level, the 1 ¼ inch PVC pipes should be laid out and cut to the proper lengths for the lateral lines. Holes are drilled according to the plan specifications at 10 and 2 o'clock and are only drilled through one side of the pipe.
- Sleeve laterals in 4 inch diameter perforated corrugated pipe. The corrugated pipe shall have three rows of holes, each between ½ inch and ¾ inch in diameter, spaced longitudinally approximately 4 inches on center. The holes in the outer 4 inch sleeve should be placed facing down into the trench bottom while the holes in the 1 ¼ inch laterals should be placed facing up.
- The end of each lateral should be fitted with a short turn up consisting of elbows topped by a threaded female coupling with cap. Each turn up must be fitted with a turf/gate valve box with lid fitted flush to finished grade.
- The laterals having been installed, an additional 4 inches of stone (for a total of 10 inches of stone) shall be added to complete the trench installation.
- At this point, the trenches should be left open for the final inspection by the MCHD.

Proper Operation Check

- After all components of the waste water disposal system have been installed and connected, the system shall be checked for proper operation.
- With the electrical power turned off, fill the pump tank with water until the liquid rises to a level high enough to activate the high water alarm float. Turn on the electrical power. The alarm, alarm light and pump should activate at this time. Turn off the electrical power once these checks have been performed and prepare to set the head pressure.

Pressure Head Adjustment

- The pressure head must be adjusted to match the design specifications. The pressure head is measured by the height of the liquid coming from the turn ups at the end of each lateral when the pump is running (utilizing stand pipes).
- Prepare a length of pipe (stand pipe), cut to the desired head pressure height and fitted with a threaded adapter that will screw into the turn up couplings at the end of each lateral. Thread the stand pipes into each lateral and then turn the power on to the pump, allowing the water to rise within the stand pipes. Adjust the gate valves within the supply manifold box to achieve the specified head pressure (liquid height in the stand pipes should equal the design head pressure).
- Once the pressure head has been adjusted, allow the pump to run through the remainder of the cycle. The pump float switch will automatically turn the pump off if it is operating properly. Make sure that the effluent pump is completely submerged in the remaining water, making adjustments to the float switch(es) as needed. This completes the checks for proper operation of the pump, alarm and float switches.
- At this point, the standpipes may be removed and replaced with the threaded turn up caps.

Final Landscaping

- The drainfield shall be shaped to shed rainwater and be free from low spots.
- The entire area of the drainfield should be planted with grass as soon as possible to prevent erosion. The soil should be properly tilled, limed (if necessary) and fertilized prior to planting. After applying grass seed, the area should be heavily mulched with straw or other suitable material.

Utility Conflicts

- The builder and property owner must take special care in planning for water, power, gas, telephone and cable lines. These utilities shall be kept clear of all parts of the septic system and its proposed repair area. Improper planning for underground utilities can negatively impact the installation and, in some cases, cause irreparable damage. If there are any questions regarding preferred routes, contact the MCHD as soon as possible.

## Maintenance

Operation and Maintenance

The designed system is classified as a Type V wastewater treatment and disposal system and will require ongoing maintenance. State regulations require that a system of this type be managed by a person certified by the North Carolina Department of Environment and Natural Resources to operate subsurface wastewater systems (Section .1961 Maintenance of Sewage Systems). A "Maintenance Contract" between the system owner and a Certified Operator will be required by the MCHD prior to the issuance of a final system approval or Operation Permit.

- The minimum inspection/maintenance and reporting frequency for a Type V system is once every 6 months by the Certified Operator. The local health department is required to inspect the system once (1) a year.
- At each AdvanTex Treatment System inspection the ORC shall, at a minimum, observe, monitor, and record:
    a. wastewater level in the tanks,
    b. the processing tank Biotube® (effluent filter) Pump Vault for clogging,
    c. watertightness of tanks, risers and pipe connections at tanks,
    d. operation of pumps, floats, valves, electrical controls and alarms,
    e. pumping frequency from pump impulse counters and elapsed run time meters,
    f. the AdvanTex® Treatment System for any structural damage, accessibility, adequate ventilation, excess odors, ponding of effluent, insect infestations, vegetative growth over the drain field, the drain field area for surfacing the effluent, and a sample of AdvanTex® Treatment System effluent collected from the sampling point to check for effluent clarity and odor, and,
    g. the pump cycle and run time meters and any water meter readings.
- At least once per year the ORC shall, at a minimum, measure and report to the health department:
    a. sludge and scum levels in the septic tank,
    b. sludge level and grease presence in the pump tank,
    c. drain field pump delivery rate (drawdown test), and
    d. drain field dosing volume and measure or calculate average pump run time.
- At least once a year the ORC shall collect and submit a sample to be tested for TKN in the septic tank effluent and $CBOD_5$, TSS, Fecal Coliform, TKN, NH3 and Nitrate-Nitrogen and Nitrite-Nitrogen in the AdvanTex Effluent.
    a. All samples shall be obtained, preserved, and analyzed in accordance with 40 CFR 136.
    b. A state certified wastewater laboratory shall analyze samples for the treatment performance standards specified in Section B and complete chain of custodies shall be maintained.
- The ORC shall also conduct other additional observations, measurements, monitoring, and maintenance activities as specified in the Operation Permit and as recommended by the manufacturer.
- It should be noted that the septic and dosing tanks may need to be pumped every 4 years (in some situations, the tank may need to be pumped more frequently). At a minimum the tanks should be pumped when the solids within the septic tank reach an elevation that is equivalent to 1/3 of the volume of the tank.
- Effluent filters should be inspected semi-annually. When it becomes necessary to clean the effluent filters, the filters should be removed and the accumulated debris washed back into the septic or pump tank – not onto the lawn.
- All piping and valves should be inspected semi-annually for damage and corrections/repairs made immediately.
- The pump and float controls/switches should be inspected semi-annually to assure proper operation

- The drain field area should be maintained to prevent over growth of vegetation. Any damp areas, leakages or malfunctions should be addressed immediately.

Suggestions to the Homeowner

- As previously mentioned, if you plan to use a garbage disposal in your home you should plan to have your septic and pump tanks cleaned out annually. The ground up garbage adds large amounts of solids into a septic tank that tend to degrade at a very slow rate.
- Grease, cooking oils, coffee grounds and non-degradable solids (disposable diapers, cigarettes and solid paper wastes) should never be put into a septic tank.
- Used motor oil or any oily liquids should not be disposed of in a septic tank.
- Be aware of the amount of water that you are using in your home. Water saving fixtures and devices can be installed on sinks, toilets and showers to reduce the volume of wastewater that you are sending to your drain field.
- Run dishwashers and washing machines only when you have a full load.
- Use liquid detergents. Powdered detergents have binding agents in them that can precipitate in the wastewater disposal system.
- Repair leaky faucets and toilets. Small drips equal large volumes of water over time and can over burden your drain field.
- Divert gutter downspouts and surface water runoff away from the septic and pump tanks.
- Do not use chemical additives in your system. Several studies that we have reviewed indicate that they do not increase the biological activity that naturally occurs in the septic system and, in some cases, they have been found to be detrimental to the biological activity of a system.
- Finally, taking good care of your septic system will help to assure that you experience years of trouble free service at a relatively low cost. On-site wastewater treatment and disposal is still the most environmentally friendly method of treating residential/commercial waste and you should keep your system in use for as long as it is properly functioning! If you have additional questions, please feel free to contact your system designer or the MCHD.

## Design Specifics

| | |
|---|---|
| Daily Design Flow: | 480 GPD – 4 bedroom house |
| Septic Tank Size: | 1500 gallons (2 compartments) |
| AdvanTex Recirculating Tank: | (1) required w/AX20 P3005 Orenco High Head Pump |
| Pump Tank Size: | 1500 gallons (one piece) |
| Effluent Loading Rate: | Design = 0.175 GPD per sq. ft. |
| Supply Length and Diameter: | Approx. 155 feet of 2 inch Sch. 40 PVC (please see note at the bottom of this page.) |
| Laterals: | (2) @ 70 feet, (5) @ 50 feet, and (4) @ 40 feet – variable hole size and spacing, see LPP DESIGN |
| Dosing Volume: | 201.11 gallons per dose |
| Flow Rate Through System: | 33.07 gallons per minute |
| Elevation Head: | 16.5 feet (may vary, please see note at the bottom of this page) |
| Total Dynamic Head: | 26 feet |
| Drain Field Pump Requirements: | 33.07 GPM at 26.0 feet of head |
| Depth of Water Pumped: | 9.6 inches average (pump tank volumes vary - 1 cubic foot of water equals 7.5 gallons) |
| Pump Run: | 6 minutes |
| Check Valve: | Yes |
| Vapor Lock Hole: | Yes (A vapor lock hole can reduce vibrations in the discharge pipe upon start up and shut down) |

* Please note that supply line and elevation head measurements are approximate. It is the contractor's responsibility to confirm these values based upon the actual house and plumbing location. If there is a discrepancy, contact the system designer prior to beginning construction.

# LPP DESIGN Sheet1

**Permit #** 6167B

**Bench Mark** 7.06 is = 100.00 set at transformer base - right rear property corner

**subfield 1**

| line | color | rod read | elev. | elev. dif. | head | length | hole size | flow/hole | spacing | # holes | 1st/last | flow/lat | inst. flow rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L 1 | | 4.21 | 102.85 | 0.00 | 2.00 | 50 | 5/32 | 0.4071 | 6.00 | 8 | 4.00 | 3.26 | 0.0651 |
| L 2 | | 4.5 | 102.56 | -0.29 | 2.29 | 40 | 5/32 | 0.4356 | 5.00 | 7 | 5.00 | 3.05 | 0.0762 |
| L 3 | | 5.08 | 101.98 | -0.87 | 2.87 | 40 | 5/32 | 0.4876 | 6.00 | 6 | 5.00 | 2.93 | 0.0731 |
| L 4 | | 5.6 | 101.46 | -1.39 | 3.39 | 50 | 9/64 | 0.4293 | 8.00 | 6 | 5.00 | 2.58 | 0.0515 |
| L 5 | | 6.27 | 100.79 | -2.06 | 4.06 | 50 | 9/64 | 0.4698 | 8.00 | 6 | 5.00 | 2.82 | 0.0564 |

**total** **feet =** **230** **gal/min =** **14.63**

**subfield 2**

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L 6 | | 4.5 | 102.56 | 0.00 | 2.29 | 40 | 5/32 | 0.4356 | 5.00 | 7 | 5.00 | 3.05 | 0.0762 |
| L 7 | | 5.08 | 101.98 | -0.58 | 2.87 | 40 | 5/32 | 0.4876 | 6.00 | 6 | 5.00 | 2.93 | 0.0731 |
| L 8 | | 5.6 | 101.46 | -1.10 | 3.39 | 50 | 9/64 | 0.4293 | 8.00 | 6 | 5.00 | 2.58 | 0.0515 |
| L 9 | | 6.27 | 100.79 | -1.77 | 4.06 | 50 | 9/64 | 0.4698 | 8.00 | 6 | 5.00 | 2.82 | 0.0564 |

**total** **feet =** **180** **gal/min =** **11.37**

**subfield 3**

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L 10 | | 7.62 | 99.44 | 0.00 | 2.00 | 70 | 5/32 | 0.4071 | 7.00 | 9 | 7.00 | 3.66 | 0.0523 |
| L 11 | | 8.27 | 98.79 | -0.65 | 2.65 | 70 | 9/64 | 0.3795 | 7.00 | 9 | 7.00 | 3.42 | 0.0488 |

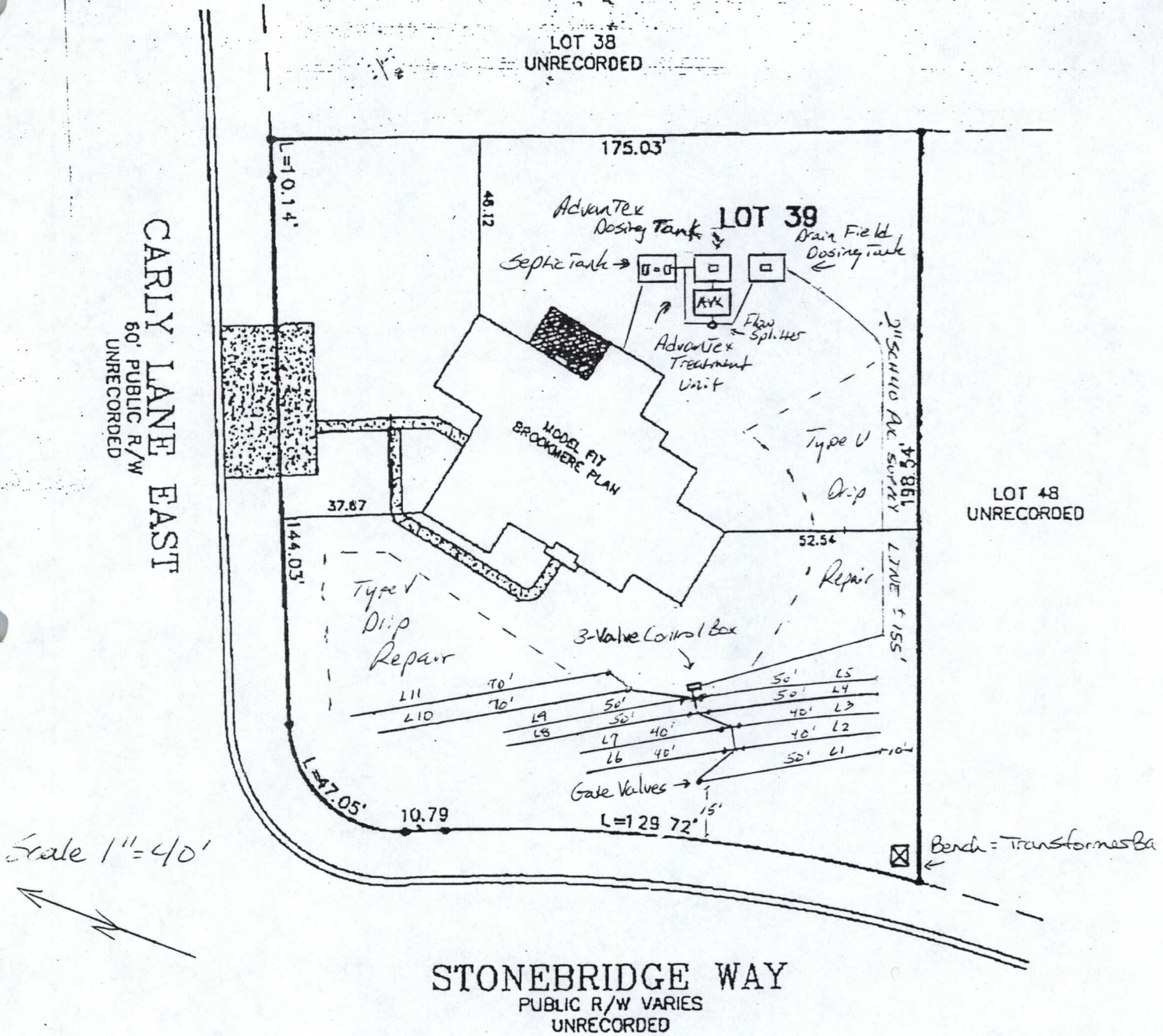
**total** **feet =** **140** **gal/min =** **7.08**

**Total Feet =** **550**

**Total gal/min =** 33.07

**Max Reduction =** 100.00

Permit No 61676
Tax Parcel ID No 139-032-25 Po
LOT 39 Stonebridge




- Keep drainlines level and on contour - max. trench depth of 16 inches
- Trenches are to be 2' wide x 16 inches deep (see design).
- 3 subfields to be controlled via a centrally located valve box. However, all laterals are to have a gate valve that will remain open.

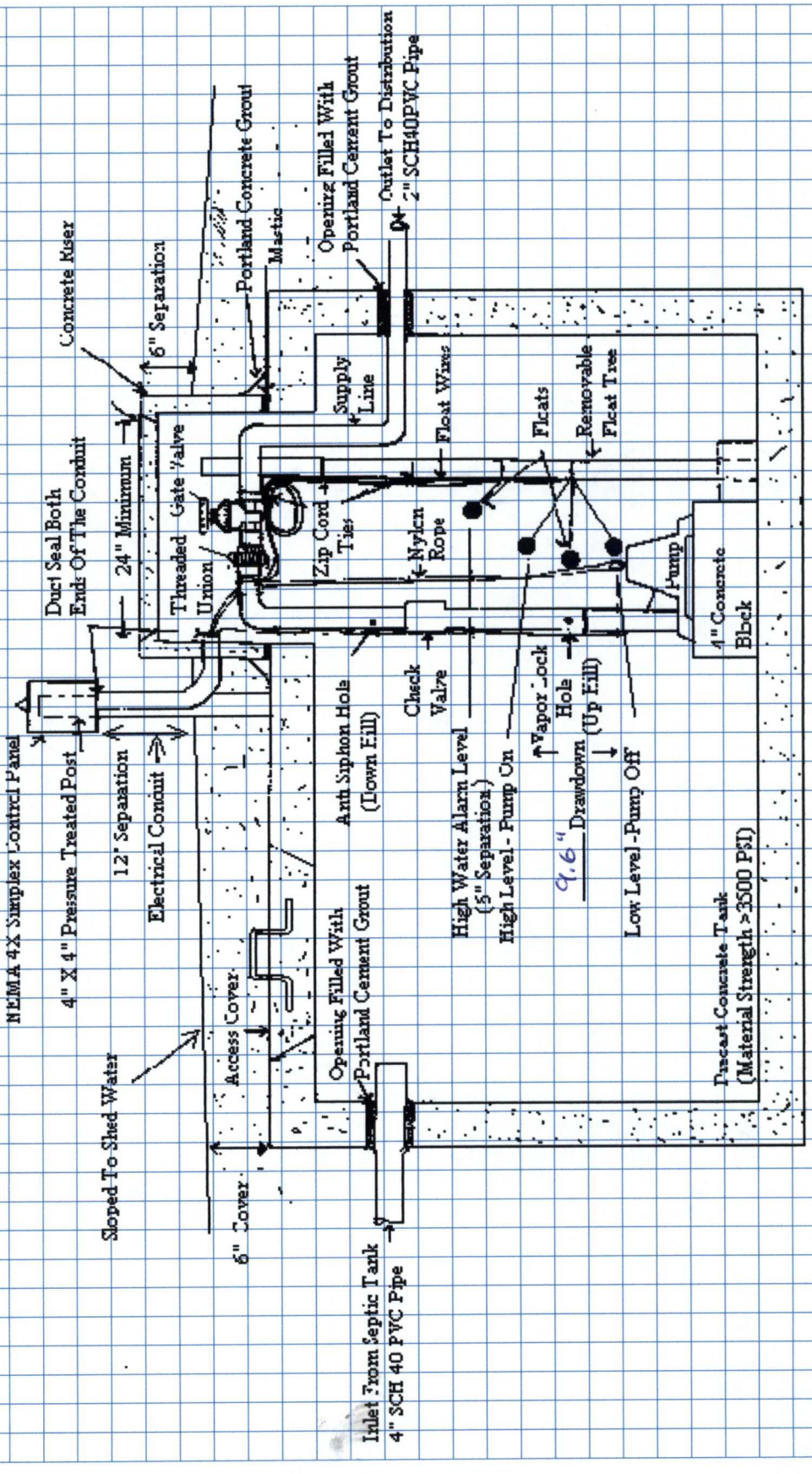
The Catena Group
410-B Millstone Drive
Hillsborough, NC 27278

Permit Number: 6167B

Location: Lot 39 - Stonebridge

Date: November 15, 2005

**Recommended Pump Tank Design**
**Lot 39 – Stonebridge**

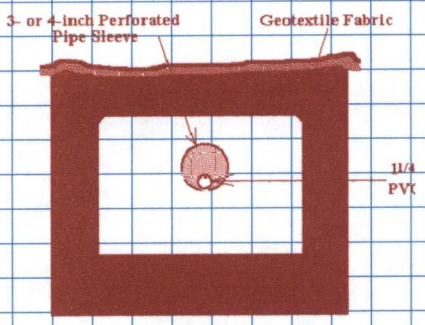


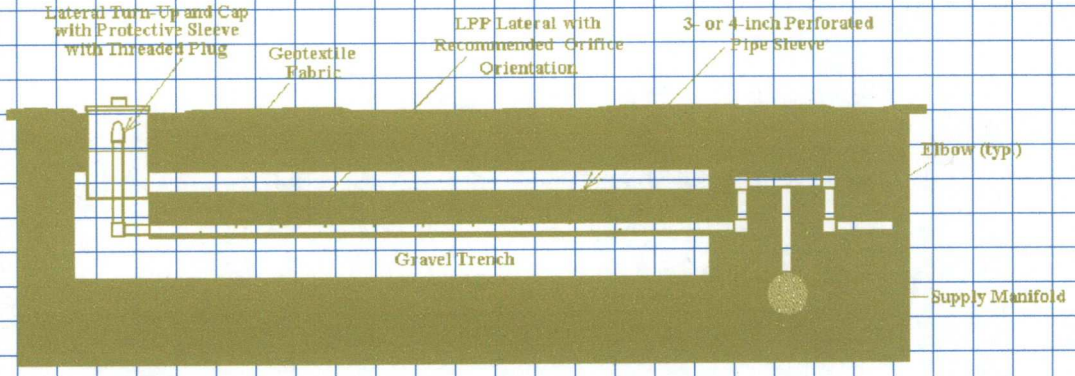
The Catena Group
410-B Millstone Drive
Hillsborough, NC 27278

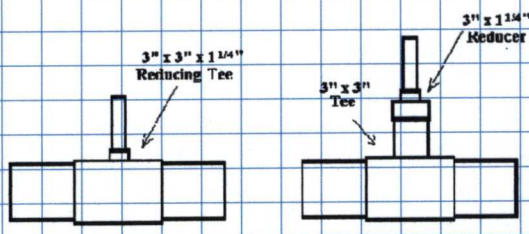
Permit Number: 6167B

Location: Lot 39 - Stonebridge

Date: November 15, 2005



# Residential Subsurface Wastewater Treatment and Disposal System Design

**for**

**Lot 39 – Stonebridge Subdivision**
**Carly Lane East**
**Mint Hill, North Carolina**

Tax Parcel # 139-03-225 PO
Mecklenburg County File # 6167B
November 14, 2005

REVISED 12/1/05

**Prepared for:**

NVR, Inc.
10815 David Taylor Drive, Ste. 100
Charlotte, NC 28262

**Prepared by:**

Larry Thompson, RS, PWS
Steven Melin, LSS
The Catena Group, Inc.
410-B Millstone Drive
Hillsborough, NC 27278
Phone: 704-301-4881
Fax: 704-888-1496




CC: Mr. Drew Walker, RS
Mecklenburg County Environmental Health

## Details

In an application for an Improvement Permit filed with the Mecklenburg County Health Department (MCHD) by NVR, Inc., September 21, 2005, the subject property was proposed to be developed with a single family 4-5 bedroom residence served by a municipal water supply. Based upon this information, a soil and site evaluation was conducted by the MCHD on October 13, 2005 where the 0.73 acre lot was determined to be "Unsuitable" for the installation of a subsurface wastewater treatment and disposal system in accordance with the *Laws and Rules for Sewage Treatment, and Disposal Systems* 15A NCAC 18A .1900 (North Carolina Department of Environment and Natural Resources, Division of Environmental Health, On-Site Wastewater Section).

Upon further investigation by The Catena Group, Inc., it was determined that a sufficient amount of "Suitable" Group IV soils are located on the property which would allow for the installation of an initial Type V pre-treated low-pressure pipe system (LPP), as well as a drip irrigation repair, for a 4-bedroom residence. It is the desire of the owner that the MCHD consider reclassifying this lot as "Suitable", allowing for the issuance of a Construction Authorization, based upon the following proposal.

Location

The subject property is located in Stonebridge Subdivision (Lot 39 – Carly Lane East) in the town of Mint Hill, North Carolina. From NC 51, travel south on NC 218 approximately 0.9 mile, turn left onto SR 3109 (Bartlett Road). Stonebridge is the first subdivision on the right after crossing the I-485 overpass. Lot 39 is located in the southeast corner of the intersection of Stonebridge Way and Carly Lane East.

References

*Laws and Rules for Sewage Treatment and Disposal Systems, 15A NCAC 18A, Section .1900, Department of Environment and Natural Resources, Division of Environmental Health, On-Site Wastewater Section,* February 1, 2005.

*Onsite Wastewater Treatment and Disposal Systems;* EPA 625/R-00/008 Design Manual, February 2002.

*Innovative Wastewater System Approval No: IWWS-2004-3;* AdvanTex® Treatment Systems, April 6, 2005.

*Design and Installation of Low Pressure Pipe Wastewater Treatment Systems;* by Craig Cogger, Bobby Carlisle; Dennis Osborne and Ed Holland. Published by UNC Sea Grant College Pub. UNC-SC-82-03, May 1982.

Amoozegar, A., and A. W. Warrick. 1986. Hydraulic Conductivity of Saturated Soils: Field Methods, Chapter 29, *Methods of Soil Analysis, Part 1, 2nd Edition.* ASA-CSSA-SSSA, Madison, Wisconsin.

## Plans and Specifications

Septic Tank

- The septic tank shall be approved by both the state and Orenco Systems, Inc in accordance with the IWWS-2004-3 AdvanTex® approval. The septic tank will have an inlet sanitary tee and a state approved, appropriately sized Orenco effluent filter on the outlet end.
- The septic tank must be watertight, structurally sound, and 1500 gallons in capacity.
- It is the responsibility of the septic contractor to thoroughly inspect the septic tank prior to accepting delivery to assure that the tank has had time to properly cure and is free of cracks or other structural deficiencies.

AdvanTex® Dosing/Recirculating Tank

- The dosing/recirculating tank shall be approved by the state and Orenco Systems, Inc. specifically for the use with AdvanTex® systems.
- The dosing/recirculation tank will contain the recirculating splitter valve and the Biotube screened pump vault. The recirculation tanks shall be approved by the state and Orenco Systems, Inc.
- The dosing/recirculation tank shall have an inlet sanitary tee.
- A drainback configuration without a pump check valve is required for the forcemain.
- A single AX20 P3005 Orenco High Head Pump is required to dose the AdvanTex® treatment unit.
- The dosing/recirculation tank will utilize the TCOM or VeriComm® telemetry control panel. The control panel is in a NEMA 4X enclosure, and shall be located within 30 feet of the recirculation tank.
- Separate control and alarm circuits will be provided.

Drain Field Dosing Tank

- The drain field dosing tank shall be both state and Orenco approved, of one-piece construction, watertight, structurally sound and, at a minimum, 1500 gallons in capacity. Again, it is the responsibility of the septic tank contractor to thoroughly inspect each pump tank prior to accepting delivery.
- The pump tanks shall have access risers that extend, at a minimum, 6 inches above finished grade and must have less than 36 inches of fill over its top once finished grade has been established (please note that a reinforced concrete tank will be required if the finished soil cover is 36 inches or greater in depth).
- The pump and alarm controls shall be provided with manual circuit disconnects within a watertight, corrosion resistant, Nema 4X rated control panel.
- The control panel shall have pump cycle and run timer recording capability.
- The control panel must be securely mounted outside, adjacent to the pump tank riser and at a minimum of 12 inches above finished grade. Pump and float control wiring should be long enough to reach from the tank to the control panel without splicing, routed through wire conduit, and sealed at the openings within the pump tank as well

as the control panel enclosure. It is important that all conduit be properly sealed to prevent the escape of flammable gases from the pump tanks. Furthermore, there must be two electrical circuits for the pump tank controls: one for the pump and one for the alarm controls.

- The pump tank shall have a properly functioning high water alarms incorporated into its control panel. The alarm circuit shall be supplied separate from any pump overload and short circuit devices. The alarm shall be both audible and visible by the system users.
- The float switches for the high water alarms should be mounted at a location slightly above the "pump on" elevation for the pump float control switch. The high water alarm float switch shall not be set more than 3 inches above this elevation.
- Pump float(s) shall be mounted so that the effluent at the end of a pump cycle is above the top of the effluent pump.
- Float switch tie downs must be made of a corrosion resistant material (do not use electrical tape or metal hose clamps to secure these switches). Floats should be mounted on a separate "float tree" rather than the pump supply line (see pump tank detail).
- The pumps must be placed on two 4-inch concrete blocks to allow for some settling of solid particulates within the pump tanks.

Drainfield Dosing Tank Effluent

- The pump discharge piping shall be fitted with a pressure effluent filter. The filter must be equivalent to the GAG Sim Tech Filter (available through Confederate Sales and Associates, Inc., 704-542-7096).

Pipe and Fittings

- All discharge piping, supply lines, valves and disconnects should be made of PVC.
- All joints must be properly "welded" utilizing the appropriate PVC cement for each application.
- The supply line from the pump tank to the pressure manifold shall be 2 inch Schedule 40 PVC.
- The manifold piping shall be 2 inch Schedule 40 PVC and shall contain a cleanout at the opposite end of the supply line connection. After the manifold has been placed in its trench, and lateral lines connected, it should be backfilled with tightly tamped soil. Do not use gravel as a backfill material for the manifold, this could make the trench a conduit for effluent from the laterals.
- Connections from manifold to lateral lines shall be made directly off the manifold, in one valve box, using reducing tees (2" x 2" x 1 ¼"). There are three subfields in this system and all three controlling gate valves will be located within this box.
- The lateral distribution lines shall be 1 ¼ inch Schedule 40 PVC and each shall have a gate valve to restrict flow in the event of future overloading. Holes in the laterals should be drilled on site and at the 10 and the 2 o'clock position, as per design specifications. Lateral hole size is 5/32 of an inch.

AdvanTex® AX20 Treatment System

- The AdvanTex® AX20 treatment system is a pre-engineered proprietary treatment system manufactured by Orenco Systems Incorporated. The containment module is made of pre-assembled fiberglass unit containing engineered textile material as a filter media. The approximate dimensions of the unit are 91 inches long by 40 inches wide by 31 inches deep. The AdvanTex® AX20 treatment system is available through AQWA – Steve Barry (919) 427-1114.
- Discharge from the unit shall be split by a flow divider (gravity fall from unit), sending ¾ of the wastewater back to the AdvanTex® dosing tank and ¼ to the pump tank that supplies the LPP fields.
- Treatment Performance Standards (TS-II): Tertiary treatment with nitrogen reduction.
- The AdvanTex® treatment system shall be designed, installed and operated to meet the following standards:
    1. Biochemical Oxygen Demand, 5-day ($BOD_5$) = 15 mg/l
    2. Total Suspended Solids (TSS) = 15 mg/l
    3. Ammonia-Nitrogen ($NH_4$-N) = 10 mg/l
    4. Total nitrogen (Total Kjeldahl Nitrogen +NOx-N) standard shall be met through one of the following methods:
        (1) Total nitrogen concentration in the AdvanTex effluent = 15 mg/l, or
        (2) Total nitrogen reduction of 50%. Measured as the difference between the septic tank effluent (TKN) and AdvanTex effluent (TKN+NOx-N), or
        (3) Calculated as a maximum daily load (this criteria shall only be applicable when the average daily flow for the past 30 days is below 25 percent of the design flow and when the effluent $CBOD_5$ is less than 5 mg/l): Nitrogen reduction may be measured in terms of pounds of total nitrogen actually delivered to the field per day. Up to .004 lbs per day for every 60 gallons of daily design flow is allowed. See Attachment C for guidance on calculating this for compliance determination.
    5. Fecal Coliform Bacteria Densities = 10,000 colonies/100 ml (MPN)

Drainfield Installation

- The drainfield has been previously laid out on-site utilizing metal stemmed flags. Once this area has been approved by the MCHD, the property owner/builder should mark this area and isolate it as much as possible from construction traffic. Prior to the system installation, the septic contractor shall contact the MCHD and the system designer for a preconstruction conference at which time the drainfield area will be re-verified.
- Under no circumstances shall any construction take place within the drainfield area while the soil is in a wet condition. If the installer has doubts as to whether or not the

drainfield area is dry enough to begin construction, the Mecklenburg County Health Department should be contacted for permission to proceed with the installation.

- The specified system is a Type V LPP.
- The drainfield consists of (2) lateral trenches to be constructed 2 feet wide by 70 feet in length, (5) lateral trenches to be constructed 2 feet wide by 50 feet in length, and (4) lateral trenches to be constructed 2 feet wide by 40 feet in length.
- The maximum trench depth for this system shall be 16 inches.
- The laterals are to be installed on contour with the land, keeping the individual trench bottoms level from beginning to end.
- The trenches should be left open for the final inspection by the MCHD.

Lateral Lines

*The lateral lines have been laid out in the field and sketched in this plan. Field layout should supercede what is in this plan, they having been checked by an engineer's level.*

- Once trenches are dug, a 6 inch gravel base (# 5 or # 57 stone – washed and clean) is to be installed.
- After the gravel based has been spread level, the 1 ¼ inch PVC pipes should be laid out and cut to the proper lengths for the lateral lines. Holes are drilled according to the plan specifications at 10 and 2 o'clock and are only drilled through one side of the pipe.
- Sleeve laterals in 4 inch diameter perforated corrugated pipe. The corrugated pipe shall have three rows of holes, each between ½ inch and ¾ inch in diameter, spaced longitudinally approximately 4 inches on center. The holes in the outer 4 inch sleeve should be placed facing down into the trench bottom while the holes in the 1 ¼ inch laterals should be placed facing up.
- The end of each lateral should be fitted with a short turn up consisting of elbows topped by a threaded female coupling with cap. Each turn up must be fitted with a turf/gate valve box with lid fitted flush to finished grade.
- The laterals having been installed, an additional 4 inches of stone (for a total of 10 inches of stone) shall be added to complete the trench installation.
- At this point, the trenches should be left open for the final inspection by the MCHD.

Proper Operation Check

- After all components of the waste water disposal system have been installed and connected, the system shall be checked for proper operation.
- With the electrical power turned off, fill the pump tank with water until the liquid rises to a level high enough to activate the high water alarm float. Turn on the electrical power. The alarm, alarm light and pump should activate at this time. Turn off the electrical power once these checks have been performed and prepare to set the head pressure.

Pressure Head Adjustment

- The pressure head must be adjusted to match the design specifications. The pressure head is measured by the height of the liquid coming from the turn ups at the end of each lateral when the pump is running (utilizing stand pipes).
- Prepare a length of pipe (stand pipe), cut to the desired head pressure height and fitted with a threaded adapter that will screw into the turn up couplings at the end of each lateral. Thread the stand pipes into each lateral and then turn the power on to the pump, allowing the water to rise within the stand pipes. Adjust the gate valves within the supply manifold box to achieve the specified head pressure (liquid height in the stand pipes should equal the design head pressure).
- Once the pressure head has been adjusted, allow the pump to run through the remainder of the cycle. The pump float switch will automatically turn the pump off if it is operating properly. Make sure that the effluent pump is completely submerged in the remaining water, making adjustments to the float switch(es) as needed. This completes the checks for proper operation of the pump, alarm and float switches.
- At this point, the standpipes may be removed and replaced with the threaded turn up caps.

Final Landscaping

- The drainfield shall be shaped to shed rainwater and be free from low spots.
- The entire area of the drainfield should be planted with grass as soon as possible to prevent erosion. The soil should be properly tilled, limed (if necessary) and fertilized prior to planting. After applying grass seed, the area should be heavily mulched with straw or other suitable material.

Utility Conflicts

- The builder and property owner must take special care in planning for water, power, gas, telephone and cable lines. These utilities shall be kept clear of all parts of the septic system and its proposed repair area. Improper planning for underground utilities can negatively impact the installation and, in some cases, cause irreparable damage. If there are any questions regarding preferred routes, contact the MCHD as soon as possible.

## Maintenance

Operation and Maintenance

The designed system is classified as a Type V wastewater treatment and disposal system and will require ongoing maintenance. State regulations require that a system of this type be managed by a person certified by the North Carolina Department of Environment and Natural Resources to operate subsurface wastewater systems (Section .1961 Maintenance of Sewage Systems). A "Maintenance Contract" between the system owner and a Certified Operator will be required by the MCHD prior to the issuance of a final system approval or Operation Permit.

- The minimum inspection/maintenance and reporting frequency for a Type V system is once every 6 months by the Certified Operator. The local health department is required to inspect the system once (1) a year.
- At each AdvanTex Treatment System inspection the ORC shall, at a minimum, observe, monitor, and record:
  a. wastewater level in the tanks,
  b. the processing tank Biotube® (effluent filter) Pump Vault for clogging,
  c. watertightness of tanks, risers and pipe connections at tanks,
  d. operation of pumps, floats, valves, electrical controls and alarms,
  e. pumping frequency from pump impulse counters and elapsed run time meters,
  f. the AdvanTex® Treatment System for any structural damage, accessibility, adequate ventilation, excess odors, ponding of effluent, insect infestations, vegetative growth over the drain field, the drain field area for surfacing the effluent, and a sample of AdvanTex® Treatment System effluent collected from the sampling point to check for effluent clarity and odor, and,
  g. the pump cycle and run time meters and any water meter readings.
- At least once per year the ORC shall, at a minimum, measure and report to the health department:
  a. sludge and scum levels in the septic tank,
  b. sludge level and grease presence in the pump tank,
  c. drain field pump delivery rate (drawdown test), and
  d. drain field dosing volume and measure or calculate average pump run time.
- At least once a year the ORC shall collect and submit a sample to be tested for TKN in the septic tank effluent and $CBOD_5$, TSS, Fecal Coliform, TKN, NH3 and Nitrate-Nitrogen and Nitrite-Nitrogen in the AdvanTex Effluent.
  a. All samples shall be obtained, preserved, and analyzed in accordance with 40 CFR 136.
  b. A state certified wastewater laboratory shall analyze samples for the treatment performance standards specified in Section B and complete chain of custodies shall be maintained.
- The ORC shall also conduct other additional observations, measurements, monitoring, and maintenance activities as specified in the Operation Permit and as recommended by the manufacturer.
- It should be noted that the septic and dosing tanks may need to be pumped every 4 years (in some situations, the tank may need to be pumped more frequently). At a minimum the tanks should be pumped when the solids within the septic tank reach an elevation that is equivalent to 1/3 of the volume of the tank.
- Effluent filters should be inspected semi-annually. When it becomes necessary to clean the effluent filters, the filters should be removed and the accumulated debris washed back into the septic or pump tank – not onto the lawn.
- All piping and valves should be inspected semi-annually for damage and corrections/repairs made immediately.
- The pump and float controls/switches should be inspected semi-annually to assure proper operation

- The drain field area should be maintained to prevent over growth of vegetation. Any damp areas, leakages or malfunctions should be addressed immediately.

Suggestions to the Homeowner

- As previously mentioned, if you plan to use a garbage disposal in your home you should plan to have your septic and pump tanks cleaned out annually. The ground up garbage adds large amounts of solids into a septic tank that tend to degrade at a very slow rate.
- Grease, cooking oils, coffee grounds and non-degradable solids (disposable diapers, cigarettes and solid paper wastes) should never be put into a septic tank.
- Used motor oil or any oily liquids should not be disposed of in a septic tank.
- Be aware of the amount of water that you are using in your home. Water saving fixtures and devices can be installed on sinks, toilets and showers to reduce the volume of wastewater that you are sending to your drain field.
- Run dishwashers and washing machines only when you have a full load.
- Use liquid detergents. Powdered detergents have binding agents in them that can precipitate in the wastewater disposal system.
- Repair leaky faucets and toilets. Small drips equal large volumes of water over time and can over burden your drain field.
- Divert gutter downspouts and surface water runoff away from the septic and pump tanks.
- Do not use chemical additives in your system. Several studies that we have reviewed indicate that they do not increase the biological activity that naturally occurs in the septic system and, in some cases, they have been found to be detrimental to the biological activity of a system.
- Finally, taking good care of your septic system will help to assure that you experience years of trouble free service at a relatively low cost. On-site wastewater treatment and disposal is still the most environmentally friendly method of treating residential/commercial waste and you should keep your system in use for as long as it is properly functioning! If you have additional questions, please feel free to contact your system designer or the MCHD.

## Design Specifics

| | |
|---|---|
| Daily Design Flow: | 480 GPD – 4 bedroom house |
| Septic Tank Size: | 1500 gallons (2 compartments) |
| AdvanTex Recirculating Tank: | (1) required w/AX20 P3005 Orenco High Head Pump |
| Pump Tank Size: | 1500 gallons (one piece) |
| Effluent Loading Rate: | Design = 0.175 GPD per sq. ft. |
| Supply Length and Diameter: | Approx. 155 feet of 2 inch Sch. 40 PVC (please see note at the bottom of this page.) |
| Laterals: | (2) @ 70 feet, (5) @ 50 feet, and (4) @ 40 feet – variable hole size and spacing, see LPP DESIGN |
| Dosing Volume: | 201.11 gallons per dose |
| Flow Rate Through System: | 33.07 gallons per minute |
| Elevation Head: | 16.5 feet (may vary, please see note at the bottom of this page) |
| Total Dynamic Head: | 26 feet |
| Drain Field Pump Requirements: | 33.07 GPM at 26.0 feet of head |
| Depth of Water Pumped: | 9.6 inches average (pump tank volumes vary - 1 cubic foot of water equals 7.5 gallons) |
| Pump Run: | 6 minutes |
| Check Valve: | Yes |
| Vapor Lock Hole: | Yes (A vapor lock hole can reduce vibrations in the discharge pipe upon start up and shut down) |

* Please note that supply line and elevation head measurements are approximate. It is the contractor's responsibility to confirm these values based upon the actual house and plumbing location. If there is a discrepancy, contact the system designer prior to beginning construction.

# LPP DESIGN Sheet1

**Permit #** 6167B

**Bench Mark** 7.06 is = 100.00 set at transformer base - right rear property corner

**subfield 1**

| line | color | rod read | elev. | elev. dif. | head | length | hole size | flow/hole | spacing | # holes | 1st/last | flow/lat | inst. flow rate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L 1 | | 4.21 | 102.85 | 0.00 | 2.00 | 50 | 5/32 | 0.4071 | 6.00 | 8 | 4.00 | 3.26 | 0.0651 |
| L 2 | | 4.5 | 102.56 | -0.29 | 2.29 | 40 | 5/32 | 0.4356 | 5.00 | 7 | 5.00 | 3.05 | 0.0762 |
| L 3 | | 5.08 | 101.98 | -0.87 | 2.87 | 40 | 5/32 | 0.4876 | 6.00 | 6 | 5.00 | 2.93 | 0.0731 |
| L 4 | | 5.6 | 101.46 | -1.39 | 3.39 | 50 | 9/64 | 0.4293 | 8.00 | 6 | 5.00 | 2.58 | 0.0515 |
| L 5 | | 6.27 | 100.79 | -2.06 | 4.06 | 50 | 9/64 | 0.4698 | 8.00 | 6 | 5.00 | 2.82 | 0.0564 |

**total feet = 230** **gal/min = 14.63**

**subfield 2**

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L 6 | | 4.5 | 102.56 | 0.00 | 2.29 | 40 | 5/32 | 0.4356 | 5.00 | 7 | 5.00 | 3.05 | 0.0762 |
| L 7 | | 5.08 | 101.98 | -0.58 | 2.87 | 40 | 5/32 | 0.4876 | 6.00 | 6 | 5.00 | 2.93 | 0.0731 |
| L 8 | | 5.6 | 101.46 | -1.10 | 3.39 | 50 | 9/64 | 0.4293 | 8.00 | 6 | 5.00 | 2.58 | 0.0515 |
| L 9 | | 6.27 | 100.79 | -1.77 | 4.06 | 50 | 9/64 | 0.4698 | 8.00 | 6 | 5.00 | 2.82 | 0.0564 |

**total feet = 180** **gal/min = 11.37**

**subfield 3**

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L 10 | | 7.62 | 99.44 | 0.00 | 2.00 | 70 | 5/32 | 0.4071 | 7.00 | 9 | 7.00 | 3.66 | 0.0523 |
| L 11 | | 8.27 | 98.79 | -0.65 | 2.65 | 70 | 9/64 | 0.3795 | 7.00 | 9 | 7.00 | 3.42 | 0.0488 |

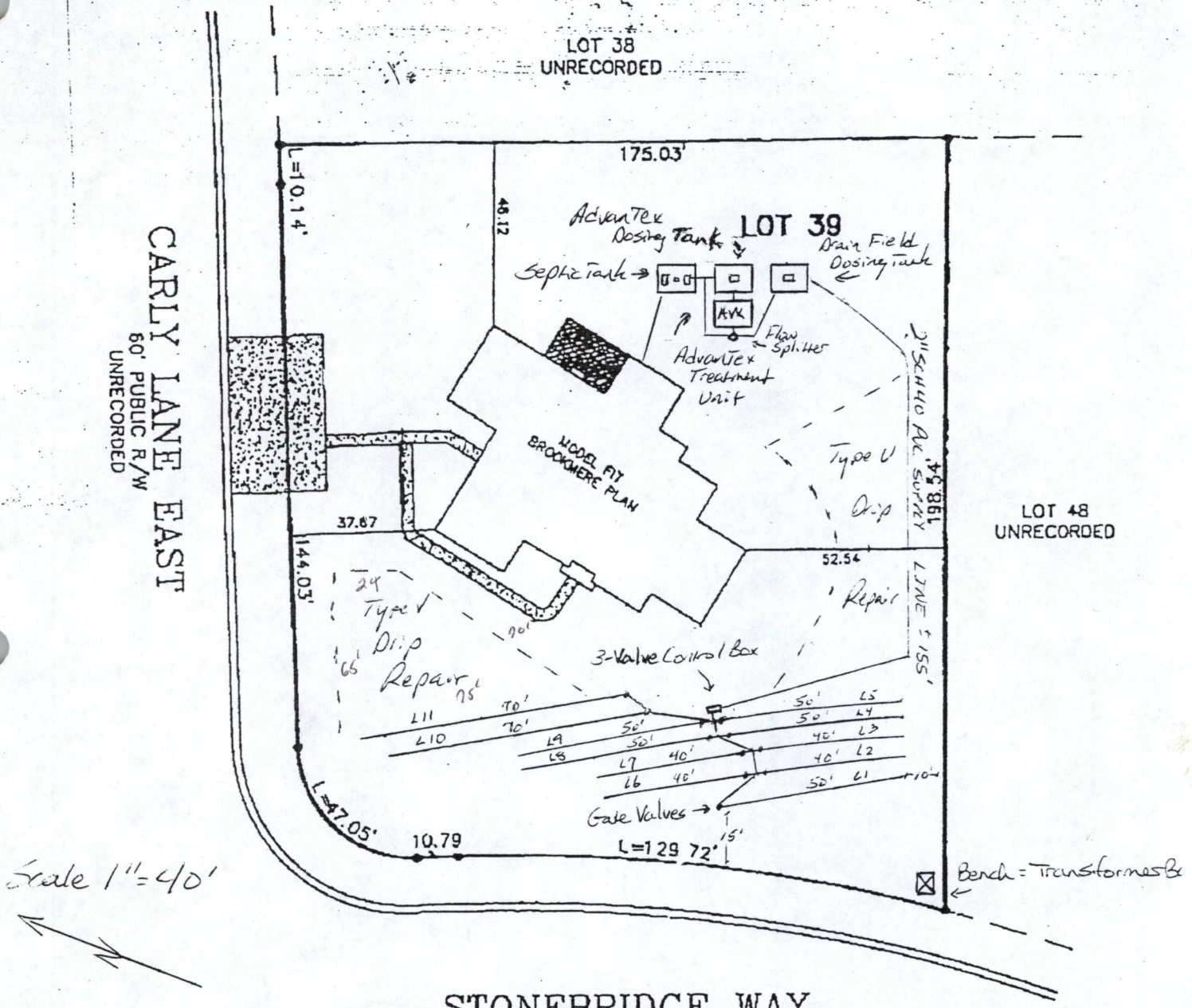
**total feet = 140** **gal/min = 7.08**

**Total Feet = 550**

**Total gal/min =** 33.07

**Max Reduction =** 100.00

Permit No 61676
Tax Parcel ID No 139-032-25 Po
LOT 39 Stonebridge




- Keep drainlines level and on contour - max. trench depth of 16 inches
- Trenches are to be 2' wide x 16 inches deep (see design).
- 3 subfields to be controlled via a centrally located valve box. However, all laterals are to have a gate valve that will remain open.

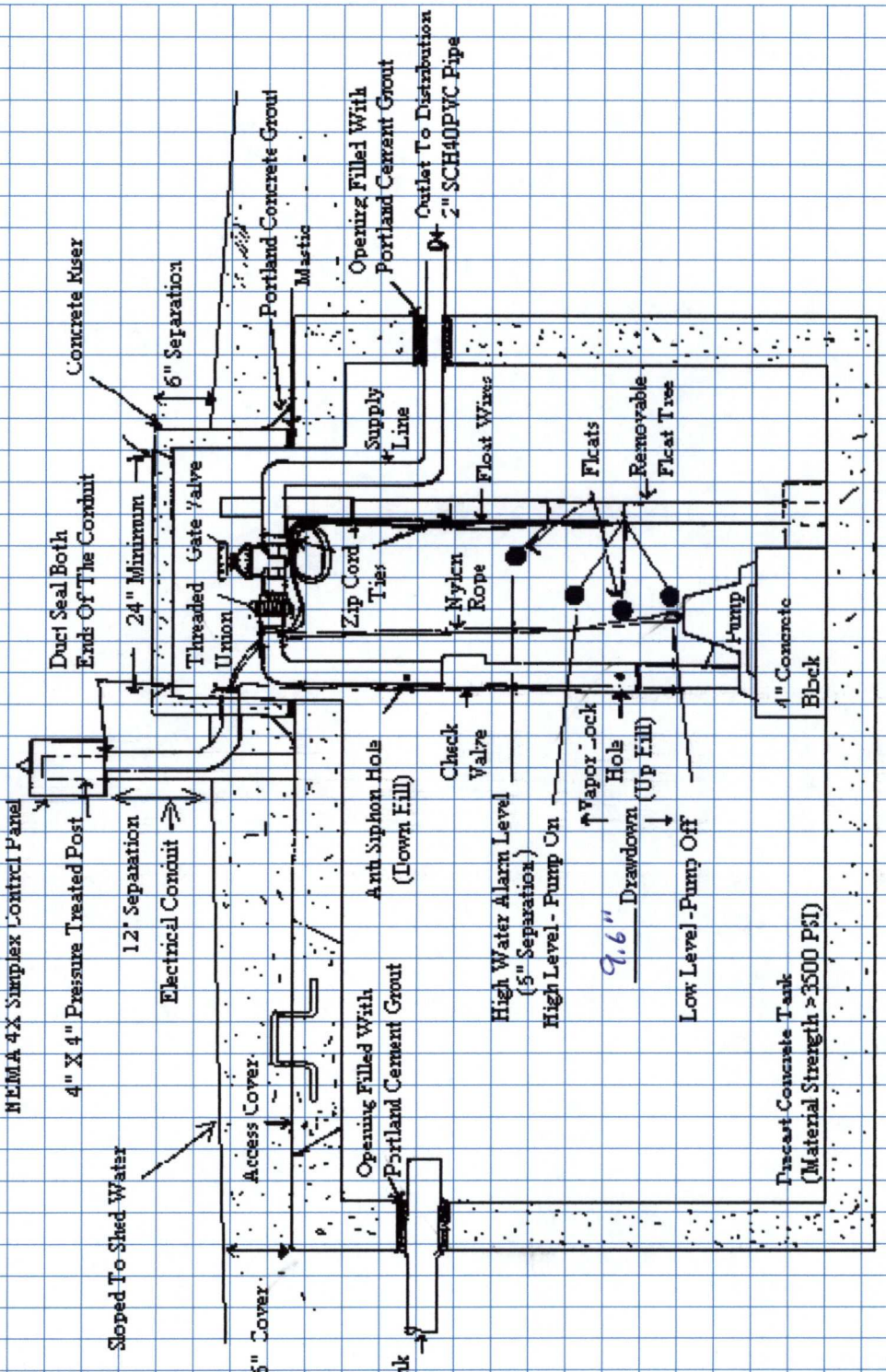
The Catena Group
410-B Millstone Drive
Hillsborough, NC 27278

Permit Number: 6167B

Location: Lot 39 - Stonebridge

Date: November 15, 2005

**Recommended Pump Tank Design**
**Lot 39 – Stonebridge**

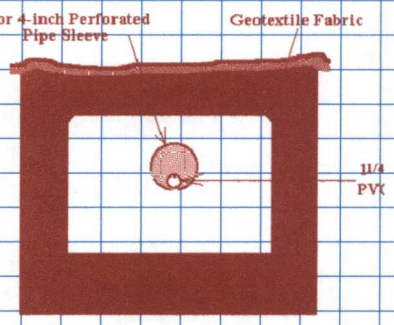


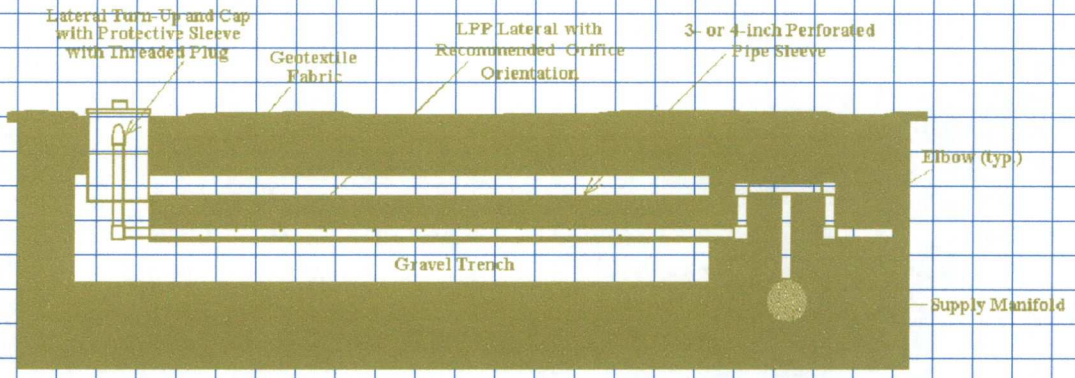
The Catena Group
410-B Millstone Drive
Hillsborough, NC 27278

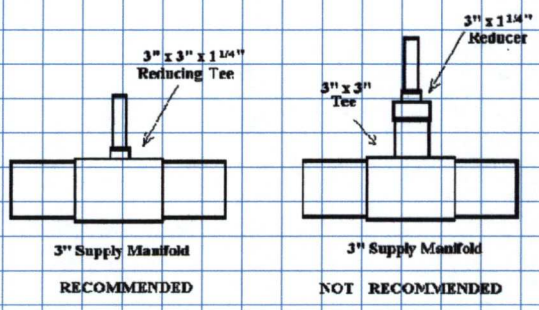
Permit Number: 6167B

Location: Lot 39 - Stonebridge

Date: November 15, 2005



## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #1

Date: 11/12/2005
Hole Depth 18"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 45.7 | 18.0 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 40.6 | |

| | cm | inches |
|---|---|---|
| Target Water Level: | 30.5 | 12.0 |
| Beginning Water Level: | 32.4 | 12.8 |
| Ending Water Level: | 31.8 | 12.5 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.0012657

Valve Setting:

| 1-ON | 2-ON |
|---|---|
| x | |

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 20.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 43.4 | 0.0 | 20.0 | 0.0 | | | | | | |
| 41.7 | 1.7 | 20.0 | 5.0 | 5.00 | 0.083 | 408.0 | 0.5164 | 0.2033 | 3.042 |
| 40.5 | 1.2 | 20.0 | 10.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 39.3 | 1.2 | 20.0 | 15.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 38.1 | 1.2 | 20.0 | 20.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 36.9 | 1.2 | 20.0 | 25.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 35.7 | 1.2 | 20.0 | 30.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 34.5 | 1.2 | 20.0 | 35.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 33.3 | 1.2 | 20.0 | 40.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| 32.1 | 1.2 | 20.0 | 45.0 | 5.00 | 0.083 | 288.0 | 0.3645 | 0.1435 | 2.147 |
| | | | | | | **Final Ksat** | **0.365** | **0.144** | **2.147** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #1

Date: 11/12/2005
Hole Depth 30"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 76.2 | 30.0 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 71.1 | |

| | cm | inches |
|---|---|---|
| Target Water Level: | 61.0 | 24.0 |
| Beginning Water Level: | 57.2 | 22.5 |
| Ending Water Level: | 57.8 | 22.8 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.0008387

Valve Setting:

| 1-ON | 2-ON |
|---|---|
| | x |

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 105.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 39.3 | 0.0 | 105.0 | 20.0 | | | | | | |
| 38.9 | 0.4 | 105.0 | 25.0 | 5.00 | 0.083 | 504.0 | 0.4227 | 0.1664 | 2.490 |
| 38.6 | 0.3 | 105.0 | 30.0 | 5.00 | 0.083 | 378.0 | 0.3170 | 0.1248 | 1.867 |
| 38.3 | 0.3 | 105.0 | 35.0 | 5.00 | 0.083 | 378.0 | 0.3170 | 0.1248 | 1.867 |
| 38.1 | 0.2 | 105.0 | 40.0 | 5.00 | 0.083 | 252.0 | 0.2114 | 0.0832 | 1.245 |
| 37.9 | 0.2 | 105.0 | 45.0 | 5.00 | 0.083 | 252.0 | 0.2114 | 0.0832 | 1.245 |
| 37.5 | 0.4 | 105.0 | 55.0 | 10.00 | 0.167 | 252.0 | 0.2114 | 0.0832 | 1.245 |
| 37 | 0.5 | 105.0 | 65.0 | 10.00 | 0.167 | 315.0 | 0.2642 | 0.1040 | 1.556 |
| 36.6 | 0.4 | 105.0 | 75.0 | 10.00 | 0.167 | 252.0 | 0.2114 | 0.0832 | 1.245 |
| 36.2 | 0.4 | 105.0 | 85.0 | 10.00 | 0.167 | 252.0 | 0.2114 | 0.0832 | 1.245 |
| | | | | | | **Final Ksat** | **0.220** | **0.087** | **1.297** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #2

Date: 11/12/2005
Hole Depth 20"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 50.8 | 20.0 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 45.7 | |

Valve Setting: x (1-ON / 2-ON)

| | cm | inches |
|---|---|---|
| Target Water Level: | 35.6 | 14.0 |
| Beginning Water Level: | 33.0 | 13.0 |
| Ending Water Level: | 33.0 | 13.0 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.00088437

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 20.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 28 | 0.0 | 20.0 | 54.0 | | | | | | |
| 17 | 11.0 | 20.0 | 60.0 | 6.00 | 0.100 | 2200.0 | 1.9456 | 0.7660 | 11.460 |
| 12.8 | 4.2 | 20.0 | 62.0 | 2.00 | 0.033 | 2520.0 | 2.2286 | 0.8774 | 13.127 |
| 10.4 | 2.4 | 20.0 | 64.0 | 2.00 | 0.033 | 1440.0 | 1.2735 | 0.5014 | 7.501 |
| 8.4 | 2.0 | 20.0 | 66.0 | 2.00 | 0.033 | 1200.0 | 1.0612 | 0.4178 | 6.251 |
| 6.2 | 2.2 | 20.0 | 68.0 | 2.00 | 0.033 | 1320.0 | 1.1674 | 0.4596 | 6.876 |
| 3.9 | 2.3 | 20.0 | 70.0 | 2.00 | 0.033 | 1380.0 | 1.2204 | 0.4805 | 7.189 |
| 1.7 | 2.2 | 20.0 | 72.0 | 2.00 | 0.033 | 1320.0 | 1.1674 | 0.4596 | 6.876 |
| | | | | | | **Final Ksat** | **1.154** | **0.454** | **6.798** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #2

Date: 11/12/2005
Hole Depth 33"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 83.8 | 33.0 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 78.7 | |

Valve Setting: x (1-ON / 2-ON)

| | cm | inches |
|---|---|---|
| Target Water Level: | 68.6 | 27.0 |
| Beginning Water Level: | 69.9 | 27.5 |
| Ending Water Level: | 71.1 | 28.0 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.00145403

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 20.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 44.4 | 0.0 | 20.0 | 50.0 | | | | | | |
| 42.1 | 2.3 | 20.0 | 54.0 | 4.00 | 0.067 | 690.0 | 1.0033 | 0.3950 | 5.910 |
| 40.9 | 1.2 | 20.0 | 60.0 | 6.00 | 0.100 | 240.0 | 0.3490 | 0.1374 | 2.056 |
| 40.2 | 0.7 | 20.0 | 64.0 | 4.00 | 0.067 | 210.0 | 0.3053 | 0.1202 | 1.799 |
| 39.4 | 0.8 | 20.0 | 69.0 | 5.00 | 0.083 | 192.0 | 0.2792 | 0.1099 | 1.644 |
| 38.6 | 0.8 | 20.0 | 74.0 | 5.00 | 0.083 | 192.0 | 0.2792 | 0.1099 | 1.644 |
| 37.8 | 0.8 | 20.0 | 79.0 | 5.00 | 0.083 | 192.0 | 0.2792 | 0.1099 | 1.644 |
| 37 | 0.8 | 20.0 | 84.0 | 5.00 | 0.083 | 192.0 | 0.2792 | 0.1099 | 1.644 |
| 36.2 | 0.8 | 20.0 | 89.0 | 5.00 | 0.083 | 192.0 | 0.2792 | 0.1099 | 1.644 |
| | | | | | | **Final Ksat** | **0.279** | **0.110** | **1.644** |

HYDRAULIC CONDUCTIVITY STUDY

Mecklenburg County - Stonebridge Subdivision - Location #3

Date: 11/12/2005

Hole Depth 31.5"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 80.0 | 31.5 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 74.9 | |

Valve Setting: x

1-ON 2-ON

Coversion Factor (C.F.): 20.0

| | cm | inches |
|---|---|---|
| Target Water Level: | 64.8 | 25.5 |
| Beginning Water Level: | 64.8 | 25.5 |
| Ending Water Level: | 66.0 | 26.0 |

Hole diameter (cm): 5.2

Hole radius (r): 2.6

coefficient A: 0.0012657

**NOTE:** Readings based on Ending Water Level

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 40.4 | 0.0 | 20.0 | 0.0 | | | | | | |
| 36.8 | 3.6 | 20.0 | 2.0 | 2.00 | 0.033 | 2160.0 | 2.7339 | 1.0763 | 16.104 |
| 35.7 | 1.1 | 20.0 | 7.0 | 5.00 | 0.083 | 264.0 | 0.3341 | 0.1316 | 1.968 |
| 33.8 | 1.9 | 20.0 | 17.0 | 10.00 | 0.167 | 228.0 | 0.2886 | 0.1136 | 1.700 |
| 31.9 | 1.9 | 20.0 | 27.0 | 10.00 | 0.167 | 228.0 | 0.2886 | 0.1136 | 1.700 |
| 30.3 | 1.6 | 20.0 | 37.0 | 10.00 | 0.167 | 192.0 | 0.2430 | 0.0957 | 1.431 |
| 28.4 | 1.9 | 20.0 | 47.0 | 10.00 | 0.167 | 228.0 | 0.2886 | 0.1136 | 1.700 |
| 27 | 1.4 | 20.0 | 57.0 | 10.00 | 0.167 | 168.0 | 0.2126 | 0.0837 | 1.253 |
| 25.4 | 1.6 | 20.0 | 67.0 | 10.00 | 0.167 | 192.0 | 0.2430 | 0.0957 | 1.431 |
| 23.8 | 1.6 | 20.0 | 77.0 | 10.00 | 0.167 | 192.0 | 0.2430 | 0.0957 | 1.431 |
| 22.2 | 1.6 | 20.0 | 87.0 | 10.00 | 0.167 | 192.0 | 0.2430 | 0.0957 | 1.431 |
| | | | | | | **Final Ksat** | **0.243** | **0.096** | **1.431** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #4

Date: 11/12/2005
Hole Depth 17.5"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 44.5 | 17.5 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 39.4 | |

Valve Setting: x

1-ON 2-ON

| | cm | inches |
|---|---|---|
| Target Water Level: | 29.2 | 11.5 |
| Beginning Water Level: | 25.4 | 10.0 |
| Ending Water Level: | 22.9 | 9.0 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.00065784

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 105.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 42.5 | 0.0 | 105.0 | 52.0 | | | | | | |
| 42 | 0.5 | 105.0 | 56.0 | 4.00 | 0.067 | 787.5 | 0.5181 | 0.2040 | 3.052 |
| 41.6 | 0.4 | 105.0 | 61.0 | 5.00 | 0.083 | 504.0 | 0.3316 | 0.1305 | 1.953 |
| 41.3 | 0.3 | 105.0 | 66.0 | 5.00 | 0.083 | 378.0 | 0.2487 | 0.0979 | 1.465 |
| 41 | 0.3 | 105.0 | 71.0 | 5.00 | 0.083 | 378.0 | 0.2487 | 0.0979 | 1.465 |
| 40.7 | 0.3 | 105.0 | 76.0 | 5.00 | 0.083 | 378.0 | 0.2487 | 0.0979 | 1.465 |
| 40.4 | 0.3 | 105.0 | 81.0 | 5.00 | 0.083 | 378.0 | 0.2487 | 0.0979 | 1.465 |
| 39.8 | 0.6 | 105.0 | 91.0 | 10.00 | 0.167 | 378.0 | 0.2487 | 0.0979 | 1.465 |
| 39.2 | 0.6 | 105.0 | 101.0 | 10.00 | 0.167 | 378.0 | 0.2487 | 0.0979 | 1.465 |
| | | | | | | **Final Ksat** | **0.249** | **0.098** | **1.465** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #4

Date: 11/12/2005
Hole Depth 33.5"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 85.1 | 33.5 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 80.0 | |

Valve Setting: x

1-ON 2-ON

| | cm | inches |
|---|---|---|
| Target Water Level: | 69.9 | 27.5 |
| Beginning Water Level: | 67.3 | 26.5 |
| Ending Water Level: | 68.6 | 27.0 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.00098846

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 20.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 42.3 | 0.0 | 20.0 | 33.0 | | | | | | |
| 40.7 | 1.6 | 20.0 | 36.0 | 3.00 | 0.050 | 640.0 | 0.6326 | 0.2491 | 3.726 |
| 37 | 3.7 | 20.0 | 46.0 | 10.00 | 0.167 | 444.0 | 0.4389 | 0.1728 | 2.585 |
| 35.5 | 1.5 | 20.0 | 51.0 | 5.00 | 0.083 | 360.0 | 0.3558 | 0.1401 | 2.096 |
| 34.4 | 1.1 | 20.0 | 56.0 | 5.00 | 0.083 | 264.0 | 0.2610 | 0.1027 | 1.537 |
| 33.3 | 1.1 | 20.0 | 61.0 | 5.00 | 0.083 | 264.0 | 0.2610 | 0.1027 | 1.537 |
| 32.3 | 1.0 | 20.0 | 66.0 | 5.00 | 0.083 | 240.0 | 0.2372 | 0.0934 | 1.397 |
| 31.4 | 0.9 | 20.0 | 71.0 | 5.00 | 0.083 | 216.0 | 0.2135 | 0.0841 | 1.258 |
| 30.6 | 0.8 | 20.0 | 76.0 | 5.00 | 0.083 | 192.0 | 0.1898 | 0.0747 | 1.118 |
| 29.7 | 0.9 | 20.0 | 81.0 | 5.00 | 0.083 | 216.0 | 0.2135 | 0.0841 | 1.258 |
| 28.7 | 1.0 | 20.0 | 86.0 | 5.00 | 0.083 | 240.0 | 0.2372 | 0.0934 | 1.397 |
| | | | | | | **Final Ksat** | **0.214** | **0.084** | **1.258** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #5

Date: 11/12/2005
Hole Depth 13.75"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 34.9 | 13.8 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 29.8 | |

Valve Setting: x (1-ON / 2-ON)

| | cm | inches |
|---|---|---|
| Target Water Level: | 19.7 | 7.8 |
| Beginning Water Level: | 17.8 | 7.0 |
| Ending Water Level: | 19.1 | 7.5 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.00104801

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 20.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 44.8 | 0.0 | 20.0 | 0.0 | | | | | | |
| 42.5 | 2.3 | 20.0 | 4.0 | 4.00 | 0.067 | 690.0 | 0.7231 | 0.2847 | 4.259 |
| 38.4 | 4.1 | 20.0 | 10.0 | 6.00 | 0.100 | 820.0 | 0.8594 | 0.3383 | 5.062 |
| 34.8 | 3.6 | 20.0 | 15.0 | 5.00 | 0.083 | 864.0 | 0.9055 | 0.3565 | 5.334 |
| 32 | 2.8 | 20.0 | 19.0 | 4.00 | 0.067 | 840.0 | 0.8803 | 0.3466 | 5.185 |
| 0.1 | 31.9 | 20.0 | 65.0 | 46.00 | 0.767 | 832.2 | 0.8721 | 0.3434 | 5.137 |
| | 0.1 | | | | | | | | |
| 37 | -37.0 | 105.0 | 71.0 | | | | | | |
| 37 | 0.0 | 105.0 | 74.0 | 3.00 | 0.050 | 0.0 | 0.0000 | 0.0000 | 0.000 |
| 36.4 | 0.6 | 105.0 | 79.0 | 5.00 | 0.083 | 756.0 | 0.7923 | 0.3119 | 4.667 |
| 35.1 | 1.3 | 105.0 | 89.0 | 10.00 | 0.167 | 819.0 | 0.8583 | 0.3379 | 5.056 |
| 33.8 | 1.3 | 105.0 | 99.0 | 10.00 | 0.167 | 819.0 | 0.8583 | 0.3379 | 5.056 |
| 32.5 | 1.3 | 105.0 | 109.0 | 10.00 | 0.167 | 819.0 | 0.8583 | 0.3379 | 5.056 |
| | | | | | | **Final Ksat** | **0.858** | **0.338** | **5.056** |

## HYDRAULIC CONDUCTIVITY STUDY
Mecklenburg County - Stonebridge Subdivision - Location #5

Date: 11/12/2005
Hole Depth 31"

**SET UP**

| | cm | inches |
|---|---|---|
| Hole Depth (cm): | 78.7 | 31.0 |
| Reference (cm): | + 10.2 | 4.0 |
| Head (cm): | - 15.2 | 6.0 |
| CHT Tube(s) setting: | = 73.7 | |

Valve Setting: x (1-ON / 2-ON)

| | cm | inches |
|---|---|---|
| Target Water Level: | 63.5 | 25.0 |
| Beginning Water Level: | 64.8 | 25.5 |
| Ending Water Level: | 66.0 | 26.0 |

Hole diameter (cm): 5.2
Hole radius (r): 2.6
coefficient A: 0.00145403

**NOTE:** Readings based on Ending Water Level

Coversion Factor (C.F.): 20.0

| Water Reading | change in water level | Chamber C.F. | clock time (min) | Elapsed Time (min) | Elapsed Time (hr) | Q (cm3/hr) | K (cm/hr) | K (in/hr) | K (gpd/sq foot) |
|---|---|---|---|---|---|---|---|---|---|
| 43.5 | 0.0 | 20.0 | 0.0 | | | | | | |
| 42.5 | 1.0 | 20.0 | 4.0 | 4.00 | 0.067 | 300.0 | 0.4362 | 0.1717 | 2.569 |
| 41.4 | 1.1 | 20.0 | 10.0 | 6.00 | 0.100 | 220.0 | 0.3199 | 0.1259 | 1.884 |
| 40.6 | 0.8 | 20.0 | 15.0 | 5.00 | 0.083 | 192.0 | 0.2792 | 0.1099 | 1.644 |
| 39.9 | 0.7 | 20.0 | 19.0 | 4.00 | 0.067 | 210.0 | 0.3053 | 0.1202 | 1.799 |
| 33.4 | 6.5 | 20.0 | 69.0 | 50.00 | 0.833 | 156.0 | 0.2268 | 0.0893 | 1.336 |
| 32.2 | 1.2 | 20.0 | 79.0 | 10.00 | 0.167 | 144.0 | 0.2094 | 0.0824 | 1.233 |
| 31 | 1.2 | 20.0 | 89.0 | 10.00 | 0.167 | 144.0 | 0.2094 | 0.0824 | 1.233 |
| 29.8 | 1.2 | 20.0 | 99.0 | 10.00 | 0.167 | 144.0 | 0.2094 | 0.0824 | 1.233 |
| 28.6 | 1.2 | 20.0 | 109.0 | 10.00 | 0.167 | 144.0 | 0.2094 | 0.0824 | 1.233 |
| | | | | | | **Final Ksat** | **0.209** | **0.082** | **1.233** |

Table 1. Summary of Hydraulic Conductivity (Ksat) Measurments

| Location | Depth | Results | | | |
|---|---|---|---|---|---|
| | | in/hr | gal/sq ft/day | 25% Ksat g/ft^2/d | 12.5% Ksat g/ft^2/d |
| 1 | 12.5 - 18.0" | 0.144 | 2.2 | 0.54 | 0.27 |
| | 22.75 - 30.0" | 0.087 | 1.3 | 0.33 | 0.16 |
| | | | | | |
| 2 | 13.0 - 20.0" | 0.454 | 6.8 | 1.70 | 0.85 |
| | 28.0 - 33.0" | 0.110 | 1.6 | 0.41 | 0.21 |
| | | | | | |
| 3 | 26.0 - 31.5" | 0.096 | 1.4 | 0.36 | 0.18 |
| | | | | | |
| 4 | 9.0 - 17.5" | 0.098 | 1.5 | 0.37 | 0.18 |
| | 27.0 - 33.5" | 0.084 | 1.3 | 0.31 | 0.16 |
| | | | | | |
| 5 | 7.5 - 13.75" | 0.338 | 5.1 | 1.26 | 0.63 |
| | 26.0 - 31.0" | 0.082 | 1.2 | 0.31 | 0.15 |
| | | | | | |
| | Avg | 0.098 | 1.5 | 0.37 | 0.18 |

AQWA
The clear leader.

May 9, 2006

Ryan Homes
ATTN: Todd Burlingame
10815 David Taylor Drive, Suite 100
Charlotte, NC 28262

Subject: Ryan Homes Model, Lot 39 Stonebridge Way, Mint Hill, NC

Mr. Burlingame:

We have certified the installation and start-up of the wastewater system at the model home with the following conditions:

- Connection of the system to the house electrical panel. Please have your electrician connect the three circuits that have been run from the wastewater control panel to rear of the house to the master electrical panel.
- The telephone line must be connected to the house phone system. The connection can either be made to an internal source or at the telephone terminal once installed.
- We received one signed original of the Inspection and Maintenance Agreement and no signed originals of the Treatment Equipment Disclosure. If you want a signed original of the Inspection and Maintenance Agreement, please mail me one of the originals you retained. Forward one signed original of Treatment Equipment Disclosure to AQWA and have one filed at the Mecklenburg County Register of Deeds.
- CONTACT AQWA IMMEDIATELY WHEN PERMANENT POWER IS CONNECTED TO THE HOUSE AND WASTEWATER CONTROL PANEL. THE WASTEWATER SYSTEM WILL NOT FUNTION UNTIL POWER IS ESTABLISHED AND AQWA IS NOTIFIED. THE EASIEST WAY TO DO THIS IS TO HAVE YOUR ELECTRICIAN CALL BY CELL PHONE (919 427 1125) FROM THE PANEL AS SOON AS HE HAS CONNECTED THE POWER.
- Payment for the Inspection and Maintenance for the first year has not been received. This is a result of adjustments to AQWA's insurance to meet your

252 | 243 | 7693 PHONE 252 | 243 | 7694 FAX
2604 | Willis Court | Wilson, NC | 27896
www.aqwa.net

requirements. As soon as the adjustment has been completed, I will provided the necessary documents to Cathy Ward of your office.

Please call if you have questions.

Sincerely,

Mike Barry
Vice President

INSPECTION AND MAINTENANCE AGREEMENT



**STATE OF NORTH CAROLINA, COUNTY OF MECKLENBURG**

This agreement is made and entered into this 20 day of APRIL, 2006 by and between Ryan Homes, (hereinafter referred to as the "Owner"), and AQWA, Inc. (hereinafter referred to as the "Contractor").

**WITNESSETH**

WHEREAS, the Owner owns or controls the property upon which a ground absorption sewage treatment system (hereinafter "system") is installed, such system being designated a Type Va system under the Rules for Sanitary Sewage Collection, Treatment and Disposal found at 15A N.C. Administrative Code 18A.1900 et seq.; and

WHEREAS, 15A N.C. Administrative Code 18A.1961 requires a contract to be executed between the system Owner and a management entity prior to the issuance of an Operation Permit for said system; and

WHEREAS, 15A N.C. Administrative Code 18A.1961 requires that a condition of the Operation Permit for said system be that a properly executed contract between the system Owner and a management entity shall be in effect for as long as the system is in use; and

WHEREAS, the Contractor is a management entity, of a type authorized by 15A N.C. Administrative Code 18A.1961 to manage a Type Va system.

NOW THEREFORE, in consideration of the promises and of the mutual covenants contained in this Agreement, it is hereby agreed by and between the Owner and the Contractor as stipulated below.

1. The Contractor's Obligations. The Contractor shall perform the following services on the Owner's system located at Lot 39 Stonebridge Way, Parcel ID # 139-032-25 FO.

a) The Contractor shall inspect the system at least at the frequency, required in Table V (b) of 15A N.C. Admin. Code 18A.1961(b) for a Type Va System and as specified in the State approval document for the equipment.

b) The Contractor shall monitor the routine operation of the system using the telemetry equipped control panel at least monthly and make such performance data available to the Owner.

c) The Contractor shall take laboratory samples of effluent from the system as prescribed by the Health Department to monitor system performance at no additional expense to the Owner.

d) The Contractor shall perform the maintenance procedures in accordance with the conditions of the Operation Permit, specifications as set forth by the designer, 15A N.C. Administrative Code 18A.1961, specifications of the applicable N. C. Department of Natural Resources system approval document, and the manufacturers Operations and Maintenance Manual. Routine maintenance procedures include: inspect the structural integrity and maintain all of the physical and mechanical components of the system, inspect the performance and condition of the pressure drainfield, clean septic tank filter if applicable and accessible, and perform any other requirements of the operations permit.

e) The Contractor shall have an operator on call 24 hours daily. All emergency service will be billed to the Owner.

f) The Contractor shall report the results of its inspections to the local health department at the frequency specified in Table V (b) of 15A N.C. Administrative Code 18A.1961(b) for a Type Va System.

g) If an inspection indicates the need for system repairs, the Contractor shall notify the local health department

within 48 hours of the inspection.

h) The Contractor shall notify the Owner of needed repairs, which are outside of the scope of routine maintenance described in subparagraph (b) above. The Contractor shall perform necessary repairs to the system at the request of the Owner and shall be entitled to payment therefore at the Contractor's normal charge for services and materials.

i) The Contractor shall employ or shall contract with a State certified operator(s) if required by Table V (b) of 15A N.C. Administrative Code 18A.1961(b) for a Type Va System.

j) The Contractor shall respond to a request for service or maintenance call within twenty-four (24) hours after receipt of such request. The first two hours of the first non-scheduled call during each contract year will be at no cost to the Owner. Additional hours will be charged at an hourly fee of $45.00 per hour.

2. The Owner's Obligations.

a) The Owner shall pay to the Contractor sum of $550.00 for the first year for periodic inspections, routine maintenance procedures, required sampling and periodic reports. The annual fee will be renewed at the end of each 12 month period. The annual fee may be amended upon sixty (60) days advance notice to the Owner but may not be increased more than ten (10) percent per year. Upon notice by from the Contractor, the Owner shall pay to the Contractor his normal and customary fees for any work performed on the system as a result of unscheduled service or maintenance calls. All unscheduled service or maintenance calls will be at $45 per hour, with one hour minimum plus materials. All fees are due and payable within thirty (30) days of billing. Payments due to the Contractor and unpaid by the Owner after thirty (30) days shall incur a late fee of $25 per month for each month payment is not received by the contractor.

b) Within thirty (30) days of receipt of notice of needed repairs pursuant to paragraph 1.h. above, the Owner shall request the Contractor to complete needed repairs.

c) The Owner shall provide the Contractor with such access to the system as is reasonably necessary for the Contractor to comply with the terms of this Agreement.

d) The Owner shall keep the area of the septic system equipment and drainfield properly mowed and protected from traffic and lawn trimmers/mowers.

e) The Owner shall provide routine telephone service with "800 number" access to the telemetry control panel to support monthly download of system data and contact with the Authorized Service Provider when required. The line shall be installed prior to system start-up, connected to service within 5 working days of the issuance of the Certificate of Occupation, and disconnection will place the system Out of Service.

3. Term. This Agreement shall remain in effect until terminated.

a) Automatic Termination. This agreement shall automatically terminate if the Operation Permit for the system is revoked and all appeals of the revocation are exhausted or the time for taking an appeal has passed.

b) Termination by Mutual Consent. The Parties may mutually agree to terminate this Agreement by giving written notice of termination by mutual consent to the local health department thirty (30) days in advance of the date of termination.

c) Termination by the Owner. The Owner may terminate this Agreement by giving notice to the Contractor and to the local health department thirty (30) days in advance of the date of termination.

d) Termination by the Contractor.

1) The Contractor may terminate this Agreement for cause by giving written notice of intent to terminate this Agreement to the Owner and to the local health department thirty (30) days in advance of the date of termination Cause shall be defined as:

a) failure of the Owner to remit payment for any bill for services performed under and in accordance with this Agreement if said bill is not paid within thirty (30) days of receipt by the Owner of the bill. If said bill is paid after notice of termination of this Agreement, the Agreement shall continue in effect; or

b) failure of the Owner to provide to the Contractor authorization to complete needed repairs within thirty (30) days of receipt of notice of needed repairs pursuant to paragraph 1.h. above. If said authorization to complete needed repairs or evidence of completion of said repairs is provided after notice of termination is given but prior to the date of termination of this Agreement, this Agreement shall continue in effect; or

c) failure of the Owner or Occupant to allow the Contractor such access to the system as is reasonably necessary in order for the Contractor to comply with the terms of this Agreement.

d) failure of the Owner or Occupant to provide telephone service with "800 number" access to the telemetry control panel for a period of (30) days or more, as documented on the equipment manufacturer's VeriComm website.

2) The Contractor may not terminate this Agreement without cause, but may assign its rights and duties under this Agreement as provided in paragraph 4, below.

4. Assignment.

a) Assignment by the Owner. The Owner shall notify the Contractor of the name and address of any purchaser of the property on which the system is located. The Owner shall also notify any purchaser of the property on which the system is located of the existence of this Agreement and shall assign all rights and duties under this Agreement to said purchaser.

b) Assignment by the Contractor. The Contractor may assign its rights and duties under this Agreement to another management entity, which is qualified pursuant to 15A N.C. Administrative Code 18A 1961 to manage a Type Va system upon thirty (30) days written notice to the Owner and to the local health department.

5. Use of Subcontractors. The Contractor may subcontract with such manufacturers, suppliers and contractors as it deems desirable to perform any of the Contractor's duties under this Agreement. The Contractor shall at all times remain responsible for the performance of and payment for all work performed by all subcontractors.

6. Representations. The Parties represent to each other that each has the power, authority and legal right to enter into and perform its obligations as set forth in this Agreement.

7. Regulatory Amendments. References in this Agreement to sections of the Administrative Code shall include such rules as they may be amended in the future.

8. No Implied Waiver. The waiver by either Party, of the default or a breach by the other Party of any provision of this Agreement shall not operate or be construed to operate as a waiver of any subsequent default or breach. The failure at any time of either Party to enforce any provision of this Agreement (a) shall not be construed

to be a waiver of such provisions, or of any other provision; and (b) shall not in any way affect the validity of this Agreement, or any part of this Agreement, or the right of either Party thereafter to enforce each provision of this Agreement.

9. Notice. Every notice required under this Agreement shall be in writing and shall be deemed sufficiently given if delivered in person or sent by certified or registered mail, return receipt requested, postage prepaid to the Party to be notified and addressed as follows:

To The Owner: Ryan Homes, ATTN: _____, 10815 David Taylor Drive, Suite 100, Charlotte, NC 28262

To The Contractor: AQWA, Inc., 2604 Willis Court, Wilson, North Carolina 27896

To: The Mecklenburg Co. Health Dept., 700 North Tryon St., Suite 208, Charlotte, NC 28202

The date of any Notice shall be the date of personal delivery or the date shown on the return receipt as the date of delivery or attempted deliver, as the case may be. Changes in the respective addresses to which notice may be directed may be made from time to time by either Party by notice to the other party.

10. Place of Agreement. This Agreement and any questions concerning its validity, the system construction or performance shall be governed by the laws of the State of North Carolina, notwithstanding the place of execution, or the order in which the signatures of the Parties are affixed.

11. Entire Agreement and Amendment. This Agreement supersedes all prior negotiations, agreements and understandings between the Parties with respect to Inspection and Maintenance of the system and constitutes the entire Inspection and Maintenance Agreement between the Parties. To be effective, any amendment or modification to this Agreement must be in writing and must be signed by the Parties.

12. Severability. In the event that any provision of this Agreement shall, for any reason, be determined to be invalid, illegal or unenforceable in any respect, the Parties shall negotiate in good faith and agree to such amendments, modifications or supplements of or to this Agreement or such other appropriate actions as shall, to the maximum practicable in light of such determination, implement and give effect to the intentions of the Parties as reflected in this Agreement, and the other provisions of this Agreement shall, as so amended, modified, supplemented or otherwise affected by such actions, remain in full force and effect.

IN TESTIMONY WHEREOF, the Parties hereto have executed this Agreement in duplicate originals, one of which is retained by each of the Parties, the day and year first above written.

Todd Brunsome
For Ryan Homes, Printed Name

Signature

Mike Barry
(Contractor)
Mike Barry, Chief Operating Officer, AQWA, Inc.

FEE: 300.00
DATE: 12/1/05
X33575 JKA

# AUTHORIZATION FOR WASTEWATER SYSTEM CONSTRUCTION

ACC
LD 15719 3

PERMIT NUMBER: 6167B
PARCEL NUMBER: ~~139-03-225PO~~ 139-033-49

JOB LOCATION ADDRESS: ~~Lot #39 - Carly Lane East~~ 9325 Stonebridge Way Lot 39
PROPERTY OWNER: Ryan Homes
BUILDING CONTRACTOR: ____
SUBDIVISION NAME: Stonebridge
AUTHORIZATION ISSUED BY: Trevor Thomason, R.S.I. DATE: 12/01/05

DENR/DEH AUTHORIZED AGENT

## AUTHORIZATION CONDITIONS

1. WASTEWATER SYSTEM CONSTRUCTION AND INSTALLATION MUST MEET ALL CONDITIONS AND SPECIFICATIONS AS SET FORTH IN IMPROVEMENT PERMIT NUMBER 6167B, AND THE ATTACHED SITE PLAN WITH SYSTEM DETAILS. CONSTRUCTION AND INSTALLATION MUST ALSO MEET ALL REQUIREMENTS SET FORTH IN THE RULES GOVERNING SANITARY SEWAGE COLLECTION, TREATMENT, AND DISPOSAL AND ANY OTHER APPLICABLE RULES AND LAWS.

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

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

4. THIS CONSTRUCTION AUTHORIZATION AS PROVIDED IN G.S. 130A-335(f) AND G.S. 130A-336(b) SHALL BE VALID FOR A PERIOD EQUAL TO THE VALIDITY OF THE IMPROVEMENT PERMIT, NOT TO EXCEED 60 MONTHS.

5. OTHER CONDITIONS:
   1. Install system according to plan submitted by The Catena Group dated 11/14/05 with revision date of 12/1/05.
   2. Maintenance contract with a Certified Operator must be on file prior to issuance of the Operation Permit.

FEE: 300.00

DATE: 5/17/2006

# CONSTRUCTION AUTHORIZATION FOR AN ON-SITE WASTEWATER TREATMENT & DISPOSAL SYSTEM

**MECKLENBURG COUNTY**

**GROUNDWATER & WASTEWATER SERVICES**

**FILE NUMBER:** 6167B

**PERMIT NUMBER:** 30000768

**PARCEL NUMBER:** 13903349

**JOB LOCATION INFORMATION**

**ADDRESS:** 9325 STONEBRIDGE

**CITY:** CHARLOTTE **STATE: NC** **ZIP:** 28227

**ISSUED TO:** RYAN HOMES

**CONSTRUCTION AUTHORIZATION ISSUANCE DATE:** 5/17/2006

## CONSTRUCTION AUTHORIZATION CONDITIONS

1. **WASTEWATER SYSTEM CONSTRUCTION AND INSTALLATION MUST MEET ALL CONDITIONS AND SPECIFICATIONS AS SET FORTH IN IMPROVEMENT PERMIT NUMBER 30000768, AND THE ATTACHED SITE PLAN WITH SYSTEM DETAILS. CONSTRUCTION AND INSTALLATION MUST ALSO MEET ALL REQUIREMENTS SET FORTH IN THE RULES GOVERNING SANITARY SEWAGE COLLECTION, TREATMENT, AND DISPOSAL AND ANY OTHER APPLICABLE RULES AND LAWS.**

2. **AN INSTALLATION APPROVAL MUST BE SECURED PRIOR TO INSTALLATION OF THE SEPTIC TANK SYSTEM. THE INSTALLER OF THE SYSTEM SHALL BE A REGISTERED SEPTIC TANK CONTRACTOR WITH THE MECKLENBURG COUNTY HEALTH DEPARTMENT.**

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

4. **THIS CONSTRUCTION AUTHORIZATION AS PROVIDED IN G.S. 130A-335(f) AND G.S. 130A-336(b) SHALL BE VALID FOR A PERIOD EQUAL TO THE VALIDITY OF THE IMPROVEMENT PERMIT, NOT TO EXCEED 60 MONTHS.**
   ***CONSTRUCTION AUTHORIZATION EXPIRATION DATE: 12/1/2010**

310 Jean Place Court
Weddington, North Carolina 28104

December 29, 2008

Mr. Bill D. Hardister, R.S.
Environmental Health Director
Mecklenburg County Health Department
249 Billingsley Road
Charlotte, North Carolina 28211

RE: 9325 Stonebridge Way, Mint Hill, NC
GWS File #6167B

Dear Mr. Hardister,

I am writing in response to information that I have discovered regarding the above referenced property. Upon review of the GWS file I obtained on December 16, 2008, it appears that the wastewater system installed on this property does not meet the minimum requirements as set forth in 15A NCAC 18A .1900 for installation based on the size of the home.

An inspection of the file shows an initial Application for Improvement Permit/Construction Authorization was submitted to Mecklenburg County Ground and Wastewater Services on September 21, 2005, by Mr. Kenneth Owens, on behalf of Ryan Homes, for the construction of a 4-5 bedroom. The information regarding heated square footage has been omitted on the application. On November 10, 2005, your office issued a denial of the application for improvement permit for the following reasons:

- Unsuitable soil topography and/or landscape position
- Unsuitable soil characteristics
- Unsuitable soil wetness
- Unsuitable soil depth
- Insufficient space for septic and repair area.

The denial also states:

> *"These severe soil or site limitations could cause premature system failure, leading to the discharge of untreated sewage on the ground surface, into surface waters, directly to ground water or inside your structure.*
>
> *The site evaluation included consideration of possible site modifications, and modified, innovative or alternative systems. However, the Health Department has determined that none of the above options will overcome the severe conditions on this site. A possible option might be a system designed to dispose of sewage to another area of suitable soil or off-site to additional property."*

On November 14, 2005, 4 days following the denied application letter, a new system design was submitted on behalf of Ryan Homes by Mr. Larry Thompson of The Catena Group. Mr. Thompson's design submittal was for a 4-bedroom residence and also is void of any data regarding the heated square footage of the home.

The building permit issued for this property by Mecklenburg County Land Use and Environmental Service on December 01, 2005, Permit #B1551777, identifies the proposed structure as a 2-story, 5-bedroom, 6298 heated square foot home with a basement. It is assumed that this data was based on the Building Permit Application submitted by, or on behalf of, Ryan Homes.

The subsequent operation permit for the wastewater system issued on May 12, 2006, shows a design capacity of 480 gallons per day, the minimum required for a 4 bedroom home in North Carolina before consideration of square footage.

This home is currently for sale and the listing agent for the home is Ms. Lori Haffner of South Charlotte Realty Group. I have contacted Ms. Haffner and my conversation with her, and a review of the listing, reveals the home to be a 6 bedroom, 8138 square foot, 3 story home. Ms. Haffner confirmed that the home has been used solely for the purposes of a model home by Ryan and that the purchasers, Mr. & Mrs. Mehta, have never resided in the home nor are they located in North Carolina. Ms. Haffner also confirmed that her clients have made no modifications to the home since its purchase.

Notification of these findings is being initiated as a courtesy to the Mecklenburg County Health Department, the owners of the property and any potential purchasers. The decision to present these findings is based on the potential violations of NC code with regard to the wastewater system and the health hazards this may pose to the public, as well as the discrepancies noted between the applications submitted by Ryan Homes and the home that was actually constructed.

Sincerely,

Mrs. Kelly. A. R. Cruz

Enclosures: 5

cc: Mr. Ted Lyon, Section Chief NCDENR/OSWW
Ms. Lori Haffner
Mr. Kirtikumar Mehta
Mr. Michael D. McCulley, P.A.

From
Mecklenburg County
Land Use and Environmental Services
P.O. Box 31097
700 N Tryon St
Charlotte, NC 28231-1097
(704) 336-3830

NVR INC (EAST)
10815 DAVID TAYLOR DR 100
CHARLOTTE, NC 28262

X33575 NVR INC (EAST)

CUT ALONG THIS LINE. CERTIFICATE SHOULD BE PROPERLY DISPLAYED.

# Mecklenburg County
# Certificate of Occupancy

## Land Use and Environmental Services Agency
## Code Enforcement Division

Property Address: 9325 STONEBRIDGE WAY Unit:
Jurisdiction: MINT HILL
Subdivision/Project: STONEBRIDGE
Job Description: NEW RESIDENCE/PLAN REVIEW/ LOT

Property Description
Parcel Number: 13903349 Zoning Code: R-30
Lot Number: 39 Block Number:

Building Permit Information
Permit Number: B1551777 Construction Type: 5B * WOOD FRAME/UNPROTECTED
Permit Issue Date: 12/01/2005 Occupancy Type: R3 * RESIDENTIAL - SINGLE FAM

Contractor: NVR INC (EAST) X33575 NVR INC (EAST)

Restrictions/Limitations:

Remarks:

IN THE OPINION OF THIS DEPARTMENT, THE PREMISES REPRESENTED ABOVE COMPLIES WITH APPLICABLE BUILDING AND ZONING REGULATIONS. THIS CERTIFICATE IS BASED ON THE STATED USE AND OCCUPANCY. A NEW CERTIFICATE WILL BE REQUIRED PRIOR TO CHANGE OF EITHER.
* DATE OF CERTIFICATION IS THE DATE ON WHICH ALL PERMITS RELATED TO THE JOB WERE FINALED AND APPLICABLE HOLDS WERE RELEASED.

BY _____
DIRECTOR

05/15/2006
DATE OF CERTIFICATION *

# Recap Report

**Contractor Name:** NVR INC (EAST) ID # X33575
**Project Address:** 9325 STONEBRIDGE WAY
**Project Description:** 157193 Residence

| Trade | # of Inspections | Chargeable Failures | Permit # | Contractor |
|---|---|---|---|---|
| Building | 12 | 5 | B1551777 | NVR INC (EAST) |
| Building | 1 | 0 | B1606422 | NVR INC (EAST) |
| Electrical | 8 | 4 | E1551821 | MCDONALD ELE SER OF ROCK HILL |
| Electrical | 1 | 0 | E1606428 | MCDONALD ELE SER OF ROCK HILL |
| Mechanical | 2 | 0 | M1551818 | HEARTH TECHNOLOGIES |
| Mechanical | 7 | 2 | M1551820 | PARKS HEATING & COOLING |
| Mechanical | 2 | 0 | M1606427 | PARKS HEATING & COOLING |
| Plumbing | 10 | 0 | P1551819 | RASH PLBG CO- GARY R |
| Plumbing | 1 | 0 | P1606426 | RASH PLBG CO- GARY R |
| **SUBTOTAL:** | **44** | **11** | | |
| Cancelled permits | 0 | 0 | | |
| **TOTAL:** | **44** | **11** | | |

| | | |
|---|---|---|
| **Failure Rate** | = | 25.00 % |
| **Adj. Rate Per Permit** | = | 10.00 % |
| **Original Permit Fees** | $ | 2,667.92 |
| **Defect Rate Charge** | $ | 266.79 |
| **SH Task Adjustment** | $ | 0.00 |
| **Final Permit Fees** | $ | 2,934.71 |

# MECKLENBURG COUNTY
## Health Department

November 10, 2005

Ryan Homes
10815 David Taylor Drive
Charlotte, NC 28227

Re: Application for improvement permit for
Property Site: Carly Lane West, Stonebridge Subdivision, Lot 39
Health Department file number: **6167B**

Dear Property Owner or Owner's Agent:

The Mecklenburg County Health Department, Environmental Health Division on **November 10, 2005** evaluated the above-referenced property at the site designated on the plat that accompanied your improvement permit application. According to your application the site is to serve a four-bedroom residence, with a design wastewater flow of 480 gallons per day. The evaluation was done in accordance with the laws and rules governing wastewater systems in North Carolina General Statute 130A-333 and related statutes and Title 15A, Subchapter 18A, of the North Carolina Administrative Code, Rule .l900 and related rules.

Based on the criteria set out in Title 15A, Subchapter 18A, of the North Carolina Administrative Code, Rules .1940 through .1948, the evaluation indicated that the site is **UNSUITABLE for** a ground absorption sewage system. Therefore, your request for an improvement permit is **DENIED.** A copy of the site evaluation is enclosed. The site is unsuitable based on the following:

- ☒ Unsuitable soil topography and/or landscape position (Rule .1940)
- ☒ Unsuitable soil characteristics (structure or clay mineralogy) (Rule .1941)
- ☒ Unsuitable soil wetness condition (Rule .1942)
- ☒ Unsuitable soil depth (Rule .1943)
- ☐ Presence of restrictive horizon (Rule .1944)
- ☒ Insufficient space for septic system and repair area (Rule .1945)
- ☐ Unsuitable for meeting required setbacks (Rule .1950)
- ☐ Other (Rule .1946)

These severe soil or site limitations could cause premature system failure, leading to the discharge of untreated sewage on the ground surface, into surface waters, directly to ground water or inside your structure.

The site evaluation included consideration of possible site modifications, and modified, innovative or alternative systems. However, the Health Department has determined that none of the above options will overcome the severe conditions on this site. A possible option might be a system designed to dispose of sewage to another area of suitable soil or off-site to additional property.

For the reasons set out above, the property is currently classified **UNSUITABLE,** and an improvement permit shall not be issued for this site in accordance with Rule .1948 (c).

However, the site classified as **UNSUITABLE** may be classified as **PROVISIONALLY SUITABLE** if written documentation is provided that meets the requirements of Rule .1948(d). A copy of this rule is enclosed. You may hire a consultant to assist you if you wish to try to develop a plan under which your site could be reclassified as **PROVISIONALLY SUITABLE.**

You have a right to an informal review of this decision. You may request an informal review by the soil scientist or environmental health supervisor at the local health department. You may also request an informal review by the
N. C. Department of Environment and Natural Resources regional soil specialist. A request for informal review must be made in writing to the local health department.

You also have a right to a formal appeal of this decision. To pursue a formal appeal, you must file a petition for a contested case hearing with the Office of Administrative Hearings, 6714 Mail Center, Raleigh, NC 27699-6714. To get a copy of a petition form, you may write the Office of Administrative Hearings or call the office at (919) 733-0926 or from the OAH web site at www.oah.state.nc.us/form.htm. The petition for a contested case hearing must be filed in accordance with the provision of North Carolina General Statutes 130A-24 and 150B-23 and all other applicable provisions of Chapter 150B. N. C. General Statue 130A-335(g) provides that your hearing would be held in the county where your property is located.

Please note: If you wish to pursue a formal appeal, you must file the petition form with the Office of Administrative Hearings **WITHIN 30 DAYS OF THE DATE OF THIS LETTER.** The date of this letter is **November 10, 2005**. Meeting the 30-day deadline is critical to your right to a formal appeal. Beginning a formal appeal within 30 days will not interfere with any informal review that you might request. Do not wait for the outcome of any informal review if you wish to file a formal appeal.

If you file a petition for a contested case hearing with the Office of Administrative Hearings, you are required by law (N.C. General Statute 150B-23) to send a copy of your petition to the North Carolina Department of Environment and Natural Resources. Send the copy to: Office of General Counsel, N. C. Department of Environment and Natural Resources, 1601 Mail Service Center, Raleigh, NC. 27699-1601. Do **NOT** send the copy of the petition to your local health department. Sending a copy of your petition to the local health department will **NOT** satisfy the legal requirement in N.C. General Statute 150B-23 that you send a copy to the Office of General Counsel, NCDENR.

You may call or write the local health department if you need any additional information or assistance.

Sincerely,

J. Andrew Walker, R.S.
Authorized Agent - DENR

Encl: (2)

Project No. 157193

| FILE COPY | |
|---|---|
| FILED FOR REGISTRATION | DOC. # 904200 |
| DATE 12/1/05 | TIME 10:15 am |
| BOOK 19700 | PAGE 430 |
| STAMPS | REC FEE 20.00 |
| JUDITH A. GIBSON, REGISTER OF DEEDS MECKLENBURG COUNTY, NC | |

STATE OF NORTH CAROLINA

COUNTY OF MECKLENBURG

**WASTEWATER TREATMENT AND DISPOSAL SYSTEM DESIGN AGREEMENT: 15A NCAC 18A .1948 AND ANY OF THE FOLLOWING RULES: .1956; .1957(a); .1957(b); or .1957(c); OR .1969**

MA1039

FILE # 6166MB

PARCEL # 139-~~03-225~~ 033-49

The undersigned, NUR, INC DBA Ryan Homes, owner of property located at ~~Slate Carley Lane~~ 9325 Stonebridge Way (the "site") and described in an instrument recorded in Book 44 at Page 521, Mecklenburg Public Registry, hereby acknowledges that the undersigned applied to the Mecklenburg County Health Department (the 'Department") for a permit to install a septic tank sewage disposal system on the site; that the Department evaluated the site for suitability for such a system in accordance with the regulations promulgated by the North Carolina Commission for Health Services as 15A NCAC 18A .1900 et seq.; that the Department originally classified the site as "unsuitable" pursuant to the standards set forth in the regulations; that the undersigned requested that the Department reclassify the site as "provisionally suitable" in light of the particular septic tank system proposed by the undersigned; that the Department considered various studies, data, and other information which indicate to the Department that the septic tank system proposed by the undersigned is allowed by the rules; and that the Department therefore reclassified the site as "provisionally suitable" and issued an appropriate permit for such proposed septic tank system.

The undersigned further acknowledges that the proper design, construction, operation and maintenance of such septic tank system is the responsibility of the designer, owner, developer, installer, or user of the system, as applicable, and that neither the Department nor its officials, employees, or agents warrant or guarantee that the said system installed pursuant to the permit issued by the Department will function in a satisfactory manner for any given period of time or that the Department, its officials, employees or agents assume any liability for any damages of any kind which are caused, or which may be caused, by a malfunction of such system.

The undersigned further acknowledges that the following conditions will apply to the site:

This instrument was prepared by: NUR, INC DBA Ryan Homes

Mail after recording to: 10815 David Taylor Dr

Charlotte, NC 28262

Mecklenburg County Groundwater & Wastewater Services
700 N. Tryon St., Suite 211 Charlotte, NC 28202
Phone: (704) 336-5103 Fax: (704) 336-6894

NC DENR
Division of Environmental Health
On-Site Wastewater Section

**INSTALLATION APPROVAL for an**
**ON-SITE WASTEWATER TREATMENT & DISPOSAL SYSTEM**

File #: 6167B Permit #: 6167B Tax Parcel #: 139-033-49

Property Owner: RYAN HOMES

Job Location Address: 9325 STONEBRIDGE WAY LOT #39

City: CHARLOTTE State: NC Zip Code: 28227

**Installation Approval Issuance Date:** 3/29/06

Permission is hereby given to ☑ install ☐ alter ☐ repair an on-site wastewater treatment & and disposal system, with subsurface soil absorption and effluent discharge, as specified herein at the described location. This approval is granted based upon the application information submitted to our office. All work shall be completed on or before 6/1/06, after which date this approval shall be null and void. The system shall meet all of the construction requirements of 15A NCAC 18A. 1900 which are in effect on the date of granting this approval. An **Operation Permit** must be obtained from the Mecklenburg County Health Department before any system can be covered up or placed into service. The issuance of this permit does not in any way guarantee that the system anticipated to be constructed will operate properly, or relieve any person now of hereafter owning, controlling or using such system from any liability resulting from the failure of the system to operate properly.

***NOTICE: This system shall not be installed while soils are in a wet condition.**

Permitted Design Flow: 480 GPD

Site LTAR: 0.175 GPD/ft² (For new installations only.)

Liquid Capacity of Septic Tank: 1500 gallons

Liquid Capacity of Dosing Tank: 1500 gallons

Drainfield Design ☐ N/A

Trench Depth: 16 inches

Trench Width: 2 feet

Line Spacing: _____ feet (O.C.)

Total line length: 550 feet

# of Lines: _____ @ _____ feet

2 @ 70'
5 @ 50'
4 @ 40'

Depth of Media: _____ inches (Type) DRIP

Distribution Device: PRESSURE MANIFOLD

Bed Design *(For Repair Installations ONLY.)* ☑ N/A

Bed Depth: _____ inches

Bed Width: _____ feet

Total line length: _____ feet

# of Lines: _____ @ _____ feet

Depth of Media: _____ inches (Type) _____

Distribution Device: _____

Water Supply Source

☑ Municipal ☐ Private Well ☐ Community Well

☐ Other _____

Minimum System Setbacks

Distance from Building Foundation: 5 feet

Distance from Property Line: 10 feet

Distance from Water Supply Source: 7100 feet

SKETCH OF SYSTEM LAYOUT
(Proposed Layout)

INSTALL SYSTEM ACCORDING TO PLANS ON FILE SUBMITTED BY HARRY THOMPSON & THE CATENA GROUP.

Comments: System Classification & Type: TYPE II LPP. INSTALL ACCORDING TO PLANS ON FILE SUBMITTED BY HARRY THOMPSON & THE CATENA GROUP. AGREEMENT FORMS & MAINTENANCE CONTRACT W/ CERTIFIED OPERATOR REQUIRED BEFORE TO RELEASE.

DENR Authorized Agent: DAVID CORNELIUS, RS Signature: David Cornelius, RS

Mecklenburg County Groundwater & Wastewater Services
700 N. Tryon St., Suite 211 Charlotte, NC 28202
Phone: (704) 336-5103 Fax: (704) 336-6894

NC DENR
Division of Environmental Health
On-Site Wastewater Section

# OPERATION PERMIT for an ON-SITE WASTEWATER TREATMENT & DISPOSAL SYSTEM

File #: 6167B Permit #: 6167B Tax Parcel #: 139-033-49

Property Owner: RYAN HOMES

Job Location Address: 9325 STONEBRIDGE WAY LOT #139

City: CHARLOTTE, NC State: NC Zip Code: 28227

**Operation Permit Issuance Date:** 5/12/06 Contractor Name: SID GASKIN

Permitted Design Flow: 480 GPD

Liquid Capacity of Septic Tank: 1500 gallons

Liquid Capacity of Dosing Tank: 1500 gallons

Effluent Pump Model: AXO P3005 ORENCO

Drainfield Installation ☐ N/A

Trench Depth: 16 inches

Trench Width: 2 feet

Line Spacing: _____ feet (O.C.)

Total line length: 550 feet

# of Lines: _____ @ _____ feet

2@70'
5@50'
4@40'

Depth of Media: _____ inches (Type) DRP

Depth of Cover: 6 inches

Distribution Device: PRESSURE MANIFOLD

Inspection Dates

Tank(s) Inspected: 4/20

Excavation Inspected: 4/20

Pump & Controls Inspected: 4/20

SKETCH OF SYSTEM INSTALLATION
(As-Built Drawing)

SYSTEM INSTALLED ACCORDING TO PLANS ON FILE, SUBMITTED BY LARRY THOMPSON & THE CATAWBA GROUP.

Bed Installation *(For Repair Installations ONLY.)* ☑ N/A

Bed Depth: _____ inches

Bed Width: _____ feet

Total line length: _____ feet

# of Lines: _____ @ _____ feet

Depth of Media: _____ inches (Type) _____

Depth of Cover: _____ inches

Distribution Device: _____

Water Supply Source

☑ Municipal ☐ Private Well ☐ Community Well

☐ Other _____

System Installation Setbacks

Distance from Building Foundation: 5 feet

Distance from Property Line: 10 feet

Distance from Water Supply Source: 7100' feet

The undersigned has inspected the Septic Tank System described above, and certifies it has been ☐ installed ☐ altered ☐ repaired ☐ as detailed in the plot above ☐ in accordance with the permit issued and meets the provisions of 15A NCAC 18A. 1900, "Laws and Rules for Sewage Treatment and Disposal Systems" in effect on the date of issuance of the permit. The issuance of this Operation Permit does not in any way guarantee that the system will operate properly or relieve any person now or hereafter owning, controlling, or using such system from any liability resulting from the failure of the system to operate properly. This document is issued subject to those restrictions and conditions shown on the permit(s) and the provisions of 15A NCAC 18A. 1900 in addition to those listed below under "Comments." This document shall be null and void if any information contained in the application is untrue or if any additions are made to the property which would increase the requirements for said system.

**Notice: Disturbance of the designated repair area may result in the Suspension or Revocation of this permit.**

Comments: System Classification & Type: TYPE II LPP. SEE ABOVE.
AGREEMENT FORMS & MAINTENANCE CONTRACT REQ.

DENR Authorized Agent: DAVID CORNELIUS, RS Signature: _____, RS



PLACE STICKER AT TOP OF ENVELOPE TO THE RIGHT OF THE RETURN ADDRESS, FOLD AT DOTTED LINE

CERTIFIED MAIL™

7008 1830 0004 9083 0485

UNITED STATES POSTAL SERVICE

0000

28211

U.S. POSTAGE
PAID
CHARLOTTE, NC
28277
DEC 30, '08
AMOUNT

$6.24

00035926-03

Cruz
310 Jean Place Court
Weddington, North Carolina 28104

Lisa Corbett

RETURN RECEIPT REQUESTED

Hal Marshburn

Mr. Bill D. Hardister. R.S.
Environmental Health Director
Mecklenburg County Health Department
~~249 Billingsley Road~~
Charlotte, North Carolina 28211