

KING'S CHAPEL CAPACITY

Providing Superior Wastewater Service to Tennessee

October 15, 2019

Via Hand Delivery

Chairman, Tennessee Public Utility Commission
c/o Sharla Dillon, Dockets and Records Manager
502 Deaderick Street, 4th Floor
Nashville, TN 37243

**Re: Docket # 19-00043 - Petition of King's Chapel Capacity, LLC for a
Certificate of Convenience and Necessity Amendment**

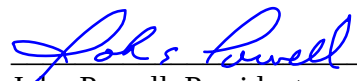
Ms. Dillon:

Attached is the supplemental supporting documentation requested for King's Chapel Capacity, LLC's petition for a Certificate of Convenience and Necessity amendment to provide wastewater service to the Hill and Roberts Parcels in Williamson County, Tennessee.

Please note that Exhibit 2.3 contains the contract between the parties for wastewater service at the Hill and Roberts parcels and contains confidential information that is being provided under seal.

Please let me know if you have any questions.

Respectfully submitted,


John Powell, President

Enclosures

Cc: Michael Murphy, TDEC

EXHIBIT 1
APPLICANT AND SYSTEM INFORMATION

Exhibit 1.1	Name and Address Information of KCC
Exhibit 1.2	Organization Chart of KCC
Exhibit 1.3	Owners, Officers and Members of KCC
Exhibit 1.4	Affiliates of KCC
Exhibit 1.5	Corporate Information of KCC
Exhibit 1.6	Business License of KCC
Exhibit 1.7	Geographic Territory of Hill Parcel and Roberts Parcel
Exhibit 1.8	Proposed Wastewater System Type
Exhibit 1.9	Estimated Wastewater Construction Dates
Exhibit 1.10	Proposed Building Phases at Hill Parcel and Roberts Parcel
Exhibit 1.11	Hill Parcel and Roberts Parcel Developer Identification

Provide the legal corporate name, physical address and mailing address of the applicant.

RESPONSE:

The Identification Information for King's Chapel Capacity is as follows:

King's Chapel Capacity, L.L.C.
9539 Mullens Road
Arrington, TN 37014

Note: Mailing address is identical to the physical address.

Provide an organizational chart showing each officer and any other key personnel by name and title.

RESPONSE:

The Organization Chart for King's Chapel Capacity is as follows:

John Powell President & General Manager
--

Mr. Powell is the owner of King's Chapel Capacity, as well as the President and General Manager. There are no other officers or key personnel of the utility.

Provide a list of owners, members and officers of the wastewater utility. Provide the address, telephone number and percentage ownership of each individual. If different, list the names of owners, members and officers located in Tennessee.

RESPONSE:

Mr. Powell is the sole owner of King's Chapel Capacity, as well as the President and General Manager. There are no other owners, officers or members of the utility. Mr. Powell's contact information is as follows:

Mr. John Powell
9539 Mullens Road
Arrington, TN 37014

Telephone: 615-496-8681

If the applicant has affiliated companies, provide a corporate organization chart showing all affiliate relationships. Describe in detail any transactions, direct or indirect, that occur or that are expected to occur between affiliated entities.

RESPONSE:

No transactions, direct or indirect, are anticipated to occur with any affiliates of King's Chapel Capacity that are related to the provision of wastewater service for the Hill Parcel and Roberts Parcel.

Provide a copy of the applicant's articles of incorporation, partnership agreement, and/or by-laws.

RESPONSE:

Attached is a copy of the Articles of Incorporation and Bylaws of King's Chapel Capacity.

OPERATING AGREEMENT OF KINGS CHAPEL CAPACITY, LLC

RECITAL

Kings Chapel Capacity, LLC (KCC) is a limited liability company (LLC) organized pursuant to the laws of the State of Tennessee. This Operating Agreement (Agreement) is between and among KCC and its initial member and any joining members and is effective when adopted by the member whose signature appears below. The Agreement is intended to delineate the basic relationships between and among KCC and its member(s) without intending to contemplate all matters that may arise during the life of the LLC. The Agreement may not be the entire agreement and, as contemplated in TCA 48-206-101(b), may from time to time be modified or supplemented by other written unanimous agreements of the member(s). It is anticipated that other members will be joining the LLC at which time this Agreement will be amended or supplanted.

ARTICLE ONE FORMATION, OPERATION, TERMINATION

1.1 Formation. The Articles of Organization for KCC were registered with the Secretary of State of Tennessee on May 13, 2004 establishing KCC as a legal entity separate and distinct from its member(s).

1.2 Activity. The activity of KCC will be to provide wastewater utility service to the Tennessee public, as regulated by the Tennessee Regulatory Authority.

1.3 Purpose of the LLC. The purpose of forming a limited liability company for KCC is to protect its member(s) from the legal and financial risk associated with acquiring, developing, and selling real property. Accordingly, any business activity associated with the LLC shall be conducted by and in the name of the LLC, and not by its member(s).

1.4 Termination. KCC may be terminated only by unanimous consent of its member(s).

ARTICLE TWO MEMBERS, CONTRIBUTIONS, AND INTERESTS

2.1 Initial and Subsequent Members. The initial member of KCC as John E. Powell.

2.2 Member Contributions. John E. Powell's initial contribution to the LLC was \$300.00. As additional members join the LLC, the existing members and the joining member contributions to the LLC will be in the nature and amount as the members elect among themselves.

2.3 Member Interests. While John E. Powell is the sole member of the LLC he will own 100% of the LLC. When other members join the LLC, the respective member interests will be determined as the members elect among themselves.

ARTICLE THREE MEMBER RIGHTS, POWERS, AND OBLIGATIONS

3.1 Member Share of Profits, Losses, Distributions, and Income Tax Attributes. While John E. Powell is the sole member of KCC he will be entitled to 100% of KCC profits, losses, distributions, and income tax attributes. As additional members join KCC the LLC profits, losses, distributions, and income tax attributes will be determined as the members elect among themselves.

3.2 Member Voting. Each member will be entitled to one vote for each percentage of member interest that each member owns.

3.3 Member Meetings. While the LLC has only one member, member meetings will not be required. As additional members join the LLC, the timing, nature, and extent of member meetings shall be as the members determine among themselves.

3.4 Sale of Land and Assets. The sale of the KCC land or other assets valued at more than \$1,000.00 will occur only upon the unanimous consent of its members.

3.5 Member Powers. John E. Powell, while the sole member of the LLC, will have the power to open and operate bank accounts of the LLC, to borrow funds on behalf of the LLC, and to mortgage, pledge, or otherwise encumber assets of the LLC. As additional members join the LLC, these powers will also be granted to the joining members as the members determine among themselves.

3.6 Member Duties. No limitations are placed upon the members respecting duties to KCC other than to endeavor to maximize the eventual profit of the LLC and to act lawfully and in good faith with respect to KCC and each other.

ARTICLE FOUR INCOME TAX AND ADMINISTRATIVE MATTERS

4.1 Entity Choice For Income Tax Purposes. While the LLC has only one member the LLC will be treated as a disregarded entity having the nature of a sole proprietorship for federal income tax reporting purposes, unless and until "check-the-box" and other elections are made for tax reporting purposes characterizing KCC as an "S" corporation.

4.2 Financial and Administrative Record Keeping. The bookkeeping and administrative record keeping system of KCC will be satisfied by any reasonable system of recording

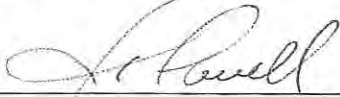
transactions. The system will include but not limited to recording member identity and capital account activity, property acquisitions and encumbrances, and financial activity necessary to facilitate balance sheet and income statement preparation.

4.3 Member Certificates. KCC member ownership interest certificates will not be issued. Member ownership shall be represented by membership interest percentages attributed to each member.

4.4 Management. As stated in the KCC Articles of Organization, KCC will be member managed.

4.5 Principal Office. The principal office of the LLC shall be located at 1413 Plymouth Drive, Brentwood, Tennessee 37027.

IN WITNESS WHEREOF, the initial member of KCC signs and adopts this Agreement as the operating agreement of Kings Chapel Capacity, LLC:



John E. Powell, Managing Member

5-13-2004

Date



Department of State

Corporate Filings
312 Eighth Avenue North
6th Floor, William R. Snodgrass Tower
Nashville, TN 37243

ARTICLES OF
ORGANIZATION
(LIMITED LIABILITY COMPANY)

For Office Use Only
FILED
RECEIVED
STATE OF TENNESSEE
23rd MAY 13 PM 3:02
RILEY D. HALL
SECRETARY OF STATE

The undersigned acting as organizer(s) of a Limited Liability Company under the provisions of the Tennessee Limited Liability Company Act, § 48-205-101, adopts the following Articles of Organization.

1. The name of the Limited Liability Company is:
King's Chapel Capacity, LLC

(NOTE: Pursuant to the provisions of § 48-207-101, each limited Liability Company name must contain the words "Limited Liability Company" or the abbreviation "LLC" or "L.L.C.")

2. The name and complete address of the Limited Liability Company's initial registered agent and office located in the state of Tennessee is:
Kings Chapel Capacity, LLC

(Name)

1413 Plymouth Drive, Brentwood, TN 37027

(Street Address)

(City)

TN

(State/Zip Code)

Williamson

(County)

3. List the name and complete address of each organizer of this Limited Liability Company.

John Powell, 1413 Plymouth Drive, Brentwood, TN 37027

(Name)

(Include: Street Address, City, State and Zip Code)

(Name)

(Street Address, City, State and Zip Code)

(Name)

(Street Address, City, State and Zip Code)

4. The Limited Liability Company will be: (NOTE: PLEASE MARK APPLICABLE BOX)

☐ Board Managed ☒ Member Managed

5. Number of members at the date of filing 1

6. If the document is not to be effective upon filing by the Secretary of State, the delayed effective date and time is:

Date _____, Time _____ (Not to exceed 90 days.)

7. The complete address of the Limited Liability Company's principal executive office is:

1413 Plymouth Drive, Brentwood, TN 37027

(Street Address)

(City)

(State/Country/Zip Code)

8. Period of Duration:

9. Other Provisions:

10. THIS COMPANY IS A NON-PROFIT LIMITED LIABILITY COMPANY (Check if applicable) ☐

MAY 13 2014

Signature Date

Sole Member

Signer's Capacity

John E Powell

Signature (manager or member authorized to sign by the Limited Liability Company)

John E Powell

Name (typed or printed)

Secretary of State
Division of Business Services
312 Eighth Avenue North
6th Floor, William R. Snodgrass Tower
Nashville, Tennessee 37243

ISSUANCE DATE: 09/29/2004
REQUEST NUMBER: 04273119
TELEPHONE CONTACT: (615) 741-6488

CHARTER/QUALIFICATION DATE: 04/13/2004
STATUS: ACTIVE
CORPORATE EXPIRATION DATE: PERPETUAL
CONTROL NUMBER: 0469590
JURISDICTION: TENNESSEE

TO:
FARRIS MATHEWS BRANAN BOBANGO & HELLEN
618 CHURCH STREET
STE 300
NASHVILLE, TN 37219

REQUESTED BY:
FARRIS MATHEWS BRANAN BOBANGO & HELLEN
618 CHURCH STREET
STE 300
NASHVILLE, TN 37219

CERTIFICATE OF EXISTENCE

I, RILEY C DARNELL, SECRETARY OF STATE OF THE STATE OF TENNESSEE DO HEREBY CERTIFY THAT
"KING'S CHAPEL CAPACITY, LLC"

A LIMITED LIABILITY COMPANY DULY FORMED UNDER THE LAW OF THIS STATE WITH DATE OF
FORMATION AND DURATION AS GIVEN ABOVE;
THAT ALL FEES, TAXES, AND PENALTIES OWED TO THIS STATE WHICH AFFECT THE
EXISTENCE OF THE LIMITED LIABILITY COMPANY HAVE BEEN PAID;
THAT ARTICLES OF DISSOLUTION HAVE NOT BEEN FILED; AND
THAT ARTICLES OF TERMINATION OF THE EXISTENCE HAVE NOT BEEN FILED.

FOR: REQUEST FOR CERTIFICATE

ON DATE: 09/29/04

FROM:
FARRIS MATHEWS BRANAN BOBANGO&HEL(618 CH
618 CHURCH ST
SUITE 300
NASHVILLE, TN 37219-0000

RECEIVED: FEES \$20.00 \$0.00
TOTAL PAYMENT RECEIVED: \$20.00

RECEIPT NUMBER: 00003590523
ACCOUNT NUMBER: 00000448



Riley C Darnell

RILEY C DARNELL
SECRETARY OF STATE

2368320

Provide a copy of the applicant's license to engage in business within the State of Tennessee registered with the Secretary of State, inclusive of any assumed names of the Company.

RESPONSE:

Attached is a copy of the business license of King's Chapel Capacity.



Tre Hargett
Secretary of State

Division of Business Services
Department of State
State of Tennessee
312 Rosa L. Parks AVE, 6th FL
Nashville, TN 37243-1102

Filing Information

Name: **KING'S CHAPEL CAPACITY, LLC**

General Information

SOS Control #	000469590	Formation Locale: TENNESSEE
Filing Type:	Limited Liability Company - Domestic	Date Formed: 04/13/2004
	04/13/2004 3:02 PM	Fiscal Year Close 12
Status:	Active	Member Count: 1
Duration Term:	Perpetual	
Managed By:	Member Managed	

Registered Agent Address
KING'S CHAPEL CAPACITY, LLC
9539 MULLINS RD
ARRINGTON, TN 37014-9732

Principal Address
9539 MULLINS RD
ARRINGTON, TN 37014-9732

The following document(s) was/were filed in this office on the date(s) indicated below:

Date Filed	Filing Description	Image #
01/20/2018	2017 Annual Report	B0480-2739
02/03/2017	2016 Annual Report	B0343-4507
Registered Agent Physical Address 1 Changed From: 1165 MEADOW BRIDGE LN To: 9539 MULLINS RD		
Registered Agent Physical Postal Code Changed From: 37014-9109 To: 37014-9732		
02/02/2016	2015 Annual Report	B0195-0310
07/20/2015	2014 Annual Report	B0128-5335
Principal Address 1 Changed From: 1165 MEADOW BRIDGE LN To: 9539 MULLINS RD		
Principal Postal Code Changed From: 37014-9109 To: 37014-9732		
06/02/2015	Notice of Determination	B0107-4861
03/21/2014	2013 Annual Report	7307-1010
03/06/2013	2012 Annual Report	7159-1291
03/05/2012	2011 Annual Report	7007-1329
Principal Address 1 Changed From: 1165 MEADOW BRIDGE LANE To: 1165 MEADOW BRIDGE LN		
Principal Postal Code Changed From: 37014 To: 37014-9109		
Registered Agent Physical Address 1 Changed From: 1413 PLYMOUTH DR To: 1165 MEADOW BRIDGE LN		
Registered Agent Physical City Changed From: BRENTWOOD To: ARRINGTON		
Registered Agent Physical Postal Code Changed From: 37027-6915 To: 37014-9109		

9/28/2018 9:59:34 AM

Page 1 of 2

Filing Information

Name: **KING'S CHAPEL CAPACITY, LLC**

05/16/2011	2010 Annual Report	A0072-1141
Principal Address 1 Changed From: 1413 PLYMOUTH DRIVE To: 1165 Meadow Bridge Lane		
Principal City Changed From: BRENTWOOD To: Arrington		
Principal Postal Code Changed From: 37027 To: 37014		
05/14/2011	Mailing Address Update	
07/14/2010	2009 Annual Report	A0037-1184
06/03/2010	Notice of Determination	A0024-2321
02/24/2009	2008 Annual Report	6455-2229
04/18/2008	2007 Annual Report	6301-0799
Member Count Changed		
04/18/2007	2006 Annual Report	6033-1265
12/12/2006	2005 Annual Report	5899-1091
12/12/2006	Application for Reinstatement	5899-1092
08/21/2006	Dissolution/Revocation - Administrative	ROLL 5835-B
06/14/2006	Notice of Determination	ROLL 5809
04/18/2005	2004 Annual Report	5435-2138
Member Count Changed		
04/13/2004	Initial Filing	5127-2005

Active Assumed Names (if any)	Date	Expires
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Provide a complete description of the geographic territory to be served by the applicant, including the name and location of development (subdivision) and the number of acres. Include the name of the subdivision or development and the name of the wastewater system as stated in the TDEC permit. In addition, provide a legible map of the area with the proposed service territory clearly and accurately plotted. The map should include:

- i. The location of the wastewater system, i.e. treatment plant, pre-application treatment facilities, collection infrastructure, building(s) for equipment, drip fields, disposal fields and/or wetland cells. Include the physical address of the wastewater system and the associated latitude and longitude coordinates.
- ii. Names of surrounding streets and roads.
- iii. Map to show access roads and names of access roads (if available) and other utilities necessary to provide wastewater service.
- iv. All residences and habitable structures served by the wastewater system.
- v. Show any portion of the area that will not be served when the wastewater system becomes operational. If the wastewater system will be operational in phases, show the phases on the map.

RESPONSE:

The Hill and Roberts parcels are located in Williamson County at the following coordinates:
35 degrees 52' 5" N - 86 degrees 42' 6" W

Roberts Parcel description:

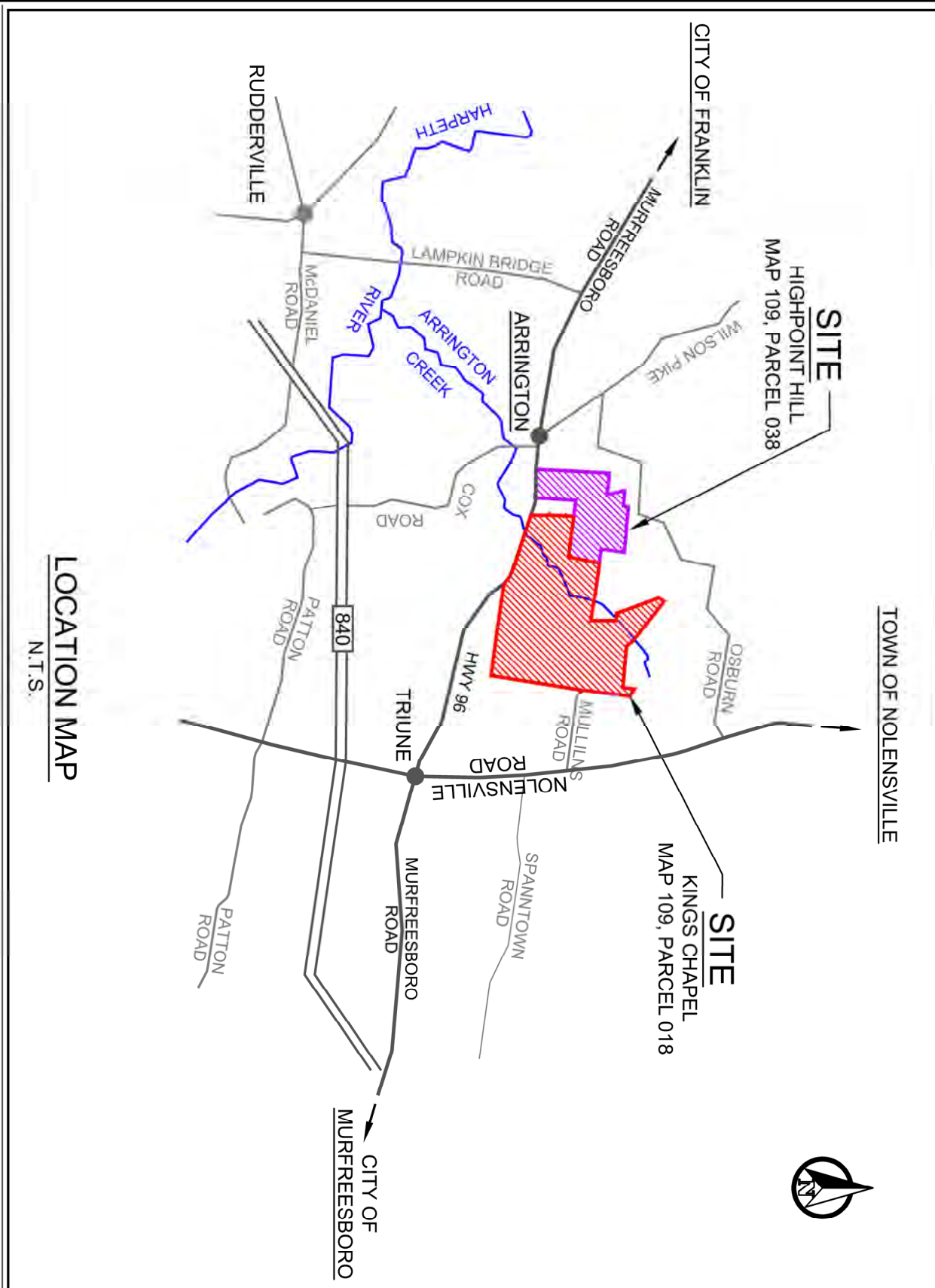
Tax Map 109, Parcel 23.00
George M. Roberts, Jr.
4860 Murfreesboro Road
Arrington, TN 37014
Deed Book 1536, Page 388 ROWC
99+/- Acres

Hill Parcel description:

Parcel #2:
Tax Map 109, Parcel 38.00
Mary L. & Beth A. Hill
4852 Murfreesboro Road
Arrington, TN 37014
Deed Book 5888, Page 276 ROWC
99.25+/- Acres

The proposed subdivision name of the above land parcels is High Point Hill. The subdivision will be served by King's Chapel Capacity wastewater system.

A map of the entire subdivision is attached showing the site for the wastewater treatment facility.



KING'S CHAPEL COMMUNITY
&
HIGH POINT HILL COMMUNITY
ARRINGTON, TENNESSEE



307 HICKERSON DRIVE
MURFREESBORO, TENNESSEE 37129
PHONE: 615-663-7678

APPENDIX 1 LOCATION MAP

SCALE: N.T.S.

ORIGINAL
ISSUE DATE: 27 MAR 2019

CIA PROJECT No: DRAWN BY: CHECKED BY:

STEG System Design - Wastewater Site Plan

for

KINGS' CHAPEL & HIGH PARK HILL

Community
(PHASES 9-12)
Community

Utility District: Superior Wastewater System
PO Box 190 Arrington, TN 37014
Williamson County.

DRAWING INDEX

C0.00 COVER SHEET

C0.01 GENERAL NOTES

C1.00 MASTER OVERALL SITE PLAN

C1.01 SITE PLAN

C1.02 SITE PLAN

C1.03 SITE PLAN

C1.04 SITE PLAN

C1.05 SITE PLAN

C1.06 SITE PLAN

C4.01 DETAILS

C4.02 DETAILS

C4.03 DETAILS

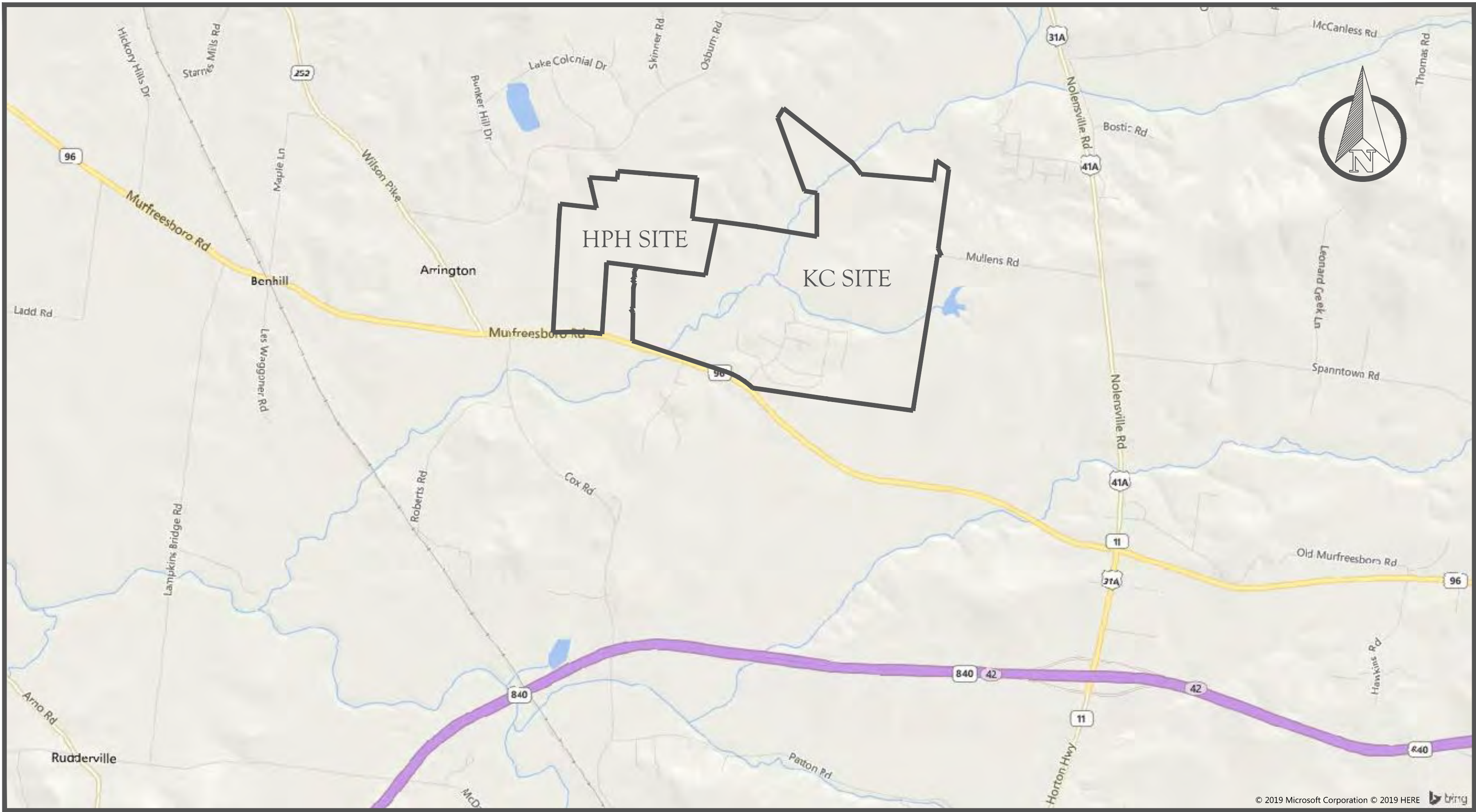
C4.04 DETAILS

C4.05 DETAILS

C4.06 DETAILS

C4.07 DETAILS

L1.00 LANDSCAPE PLAN



SITE LOCATION MAP

NOT TO SCALE

NOTES:

1. THIS PROPERTY HAS BEEN REVIEWED FOR THE EXISTENCE OF INTERMITTENT AND PERENNIAL STREAMS. STREAMS THAT WOULD REQUIRE WATERWAY NATURAL AREAS AS DESCRIBED IN SECTION 4 OF THE WILLIAMSON COUNTY STORM WATER MANAGEMENT REGULATIONS HAVE BEEN LOCATED AS SHOW.
2. THE SITE HAS BEEN REVIEWED FOR THE PRESENCE OF STEEP SLOPES, HILLTOPS AND RIDGETOPS, SLIPPAGE SOILS, AND KARST FEATURES. NONE OF THE MENTIONED FEATURES ARE PRESENT ON THIS SITE.
3. THIS SITE HAS BEEN REVIEWED FOR THE PRESENCE OF STEEP SLOPES, HILLTOPS AND RIDGETOPS, SLIPPAGE SOILS, AND KARST FEATURES. AREAS FALLING WITHIN THIS CATEGORIES ARE NOTED ON THIS PLAN.
4. ALL COMPONENTS OF THE WASTEWATER TREATMENT SYSTEM ARE ON SLOPES LESS THAN 15%.

County Engineering:
Williamson County Engineering Dept.
Suite 400
1320 West Main Street
Franklin, TN 37064
(615) 790-5809

Middle Tennessee Electric
Membership Corp.
2156 Edward Curd Lane
Franklin, TN 37067
1 (877) 777-9020

Milcrofton Utility District
(WATER)
6333 Arno Road
Franklin, TN 37064
(615) 794-5947

Developer (Properties 1)	Developer (Properties 2 & 3)
JP Properties LLC PO Box 190 Arrington, TN 37014	Waits Dev Group PO Box 111285 Nashville, TN 37222

Property #1:	Deed #1: Acreage of Parcel 214.04
JP Properties LLC PO Box 190 Arrington, TN. 37014	Deed Book 6590, Deed Page 649, Map 018, Parcel 109

Property #2:	Deed #2: Acreage of Parcel 99.25
Mary L. Hill & Beth A Hill 4852 Murfreesboro Road Arrington, TN. 37014	Deed Book 5888, Deed Page 276, Map 038, Parcel 109

Property #3:	Deed #3: Acreage of Parcel 99.00
George M Roberts, Jr. 4860 Murfreesboro Road Arrington, TN. 37014	Deed Book 1536, Deed Page 388, Map 023, Parcel 109

Floodplain Note:
A portion of this site is within the 100 year floodplain.
CP 47187C0240F & CP 47187C0380F Dated 09.26.2006

Land Data: Zoning: RD-1

STEG System Data:
Design Flow = 302 Lots x 300 gpd/lot = 90,600 gpd average daily design flow.
Land Application Area + Reserve Area Required = 862,858 sq. ft. or 19.81 Acres
Land Application Area Provided = 19.81 Acres

Approved by the Williamson County Planning Commission, with such conditions as are indicated in the minutes of the Commission on _____.

1. EPSCS SHALL BE INSTALLED BEFORE THE COMMENCEMENT OF EARTHWORK.
2. INSPECTIONS OF OUTFALLS/EPSC MEASURES SHALL BE CONDUCTED AT LEAST TWICE WEEKLY AND AT LEAST 72 HOURS APART. SEDIMENT SHALL BE REMOVED FROM SILT FENCING WHEN REACHING $\frac{3}{4}$ THE HEIGHT OF THE FENCE. CONTRACTOR TO REMOVE SEDIMENT AS RECOMMENDED IN THE TNEPSC HANDBOOK.
3. ALL NECESSARY BEST MANAGEMENT PRACTICES SHALL BE INSTALLED AND MAINTAINED REGULARLY TO PREVENT ALL POSSIBLE SEDIMENT FROM EXITING THE SITE.
4. THE PROPOSED CONTOURS AND ELEVATIONS INDICATE FINISHED SURFACE GRADE.
5. THE GENERAL CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO ADJACENT PROPERTIES DURING CONSTRUCTION. THE CONTRACTOR WILL BE HELD SOLELY RESPONSIBLE FOR ANY DAMAGES TO ADJACENT PROPERTIES OCCURRING DURING CONSTRUCTION OF THIS PROJECT. NO WORK SHALL BE PERFORMED OUTSIDE THE PROJECT BOUNDARY WITHOUT PROPER AGREEMENTS WITH THE AFFECTED PROPERTY OWNERS.
6. THE GENERAL CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR JOB SITE CONDITIONS, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND IS NOT LIMITED TO NORMAL WORKING HOURS.
7. THE LOCATION AND/OR ELEVATION OF THE EXISTING UTILITIES SHOWN HEREON ARE BASED ON UTILITY COMPANY RECORDS, AND WHERE POSSIBLE, FIELD MEASUREMENTS. THE CONTRACTOR SHALL NOT RELY UPON THIS INFORMATION AS BEING EXACT OR COMPLETE. THE CONTRACTOR SHALL CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 3 DAYS BUT NOT MORE THAN 10 DAYS PRIOR TO ANY EXCAVATION AND REQUEST FIELD VERIFICATION OF UTILITY LOCATIONS. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL UTILITIES TO REMAIN. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY DAMAGED UTILITIES ACCORDING TO LOCAL CODES AT THE CONTRACTORS EXPENSE.
8. THE CONTRACTOR SHALL CHECK ALL EXISTING AND FINISHED GRADES, DIMENSIONS, ETC. PRIOR TO BEGINNING WORK. NOTIFY THE OWNERS REPRESENTATIVE OF ANY DISCREPANCIES AND/OR ERRORS IN THE PLANS PRIOR TO COMMENCING WORK.
9. TOPSOIL AND OTHER MATERIALS NOT SUITABLE FOR FILL OR REUSE SHALL BE DISPOSED OF OFFSITE IN ACCORDANCE WITH THE REQUIREMENTS OF **WILLIAMSON COUNTY** AND AS DIRECTED BY THE OWNER OR THEIR REPRESENTATIVE.
8. THE CONTRACTOR SHALL COMPLY WITH ALL PERTINENT O.S.H.A. PROVISIONS AND THE MANUAL OF ACCIDENT PREVENTION AND CONSTRUCTION, ISSUED BY THE AGC OF AMERICA, INCORPORATED, AND THE SAFETY AND HEALTH REGULATIONS OF CONSTRUCTION ISSUED BY THE U.S. DEPARTMENT OF LABOR.
9. THE CONTRACTOR SHALL CONFORM TO ALL APPLICABLE LOCAL, STATE, AND FEDERAL CODES.
10. THE CONTRACTOR SHALL PROVIDE POSITIVE DRAINAGE THROUGH THE SITE DURING ALL PHASES OF CONSTRUCTION.
11. EXCAVATED SUBGRADES AND EACH LAYER OF FILL SHALL BE OF A QUALITY ACCEPTABLE TO THE OWNERS REPRESENTATIVE AND SHALL NOT INCLUDE ORGANIC MATERIAL, BOULDERS, DEBRIS, WET MATERIAL, ETC. CUT OR STRIPPED AREAS SHALL BE PROOF ROLLED PRIOR TO ANY FILLING. ALL GRADING ACTIVITY AND PLACEMENT OF MATERIAL SHALL BE MONITORED BY A QUALIFIED GEOTECHNICAL ENGINEER (OR THEIR REPRESENTATIVE), OR AS DIRECTED BY THE OWNERS REPRESENTATIVE. MATERIAL SHALL MEET OR EXCEED COMPACTION REQUIREMENTS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
12. ALL CONSTRUCTION MATERIALS, PAVEMENT MATERIALS, ROADWAY AND SIDEWALK CONSTRUCTION SHALL CONFORM TO LOCAL CODES AND/OR DOT STANDARDS AND SPECIFICATIONS.

1. BASE INFORMATION WAS TAKEN FROM A SURVEY. CONTRACTOR TO NOTIFY ENGINEER OF ANY DISCREPANCIES BEFORE COMMENCEMENT OF WORK.
2. ALL SITE CONSTRUCTION MATERIALS AND WORKMANSHIP, INCLUDING BUT NOT LIMITED TO PAVING, STRIPING, AND CONCRETE SHALL CONFORM TO THE CURRENT STANDARD SPECIFICATIONS, DETAILS AND REQUIREMENTS OF **WILLIAMSON COUNTY** AND/OR T.D.O.T.
3. THE CONTRACTOR SHALL CHECK AND VERIFY ALL EXISTING CONDITIONS, UTILITIES, AND DIMENSIONS IN THE FIELD PRIOR TO BEGINNING CONSTRUCTION. IF ANY DISCREPANCIES AND/OR ERRORS ARE FOUND ON THE DRAWINGS OR IF PROBLEMS ARE ENCOUNTERED DURING CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
4. THE CONTRACTOR SHALL PROTECT ANY EXISTING UTILITIES, TREES, BUILDINGS, ETC. THAT ARE TO REMAIN. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGES.
5. THE CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL NECESSARY PERMITS, AND PAY ALL APPLICABLE FEES. CONTRACTOR TO ABIDE BY ALL LOCAL CODES.
6. SHOULD ANY DAMAGES OCCUR DURING EITHER ON-SITE OR OFF-SITE CONSTRUCTION TO ANY IMPROVEMENTS TO REMAIN (SUCH AS UTILITIES, PAVEMENTS, FENCES, ETC.) OR TO ANY SURVEY POINTS TO REMAIN (SUCH AS REFERENCE POINTS, PROPERTY CORNERS, ETC.) AND IF SAID DAMAGES ARE CAUSED BY OR ARE THE RESULT OF ACTIVITIES OF THE CONTRACTOR, HIS SUBCONTRACTORS, OR THE CARELESSNESS OR NEGLIGENCE OF HIS EMPLOYEES, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING THE DAMAGED IMPROVEMENTS AND/OR POINTS.
7. CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL UTILITIES PRIOR TO BEGINNING CONSTRUCTION. UTILITY LINE LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY.

- ALL GAS, ELECTRIC, AND TELEPHONE SERVICE LINES AND EXTENSIONS ARE TO BE CONSTRUCTED TO THE RESPECTIVE UTILITY COMPANY SPECIFICATIONS. UTILITY DISCONNECTIONS TO BE COORDINATED WITH THE APPROPRIATE UTILITY COMPANY.
2. THE GENERAL CONTRACTOR IS PARTICULARLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF THE EXISTING UTILITIES SHOWN HEREON IS BASED ON UTILITY COMPANY RECORDS, AND WHERE POSSIBLE, FIELD MEASUREMENTS. THE CONTRACTOR SHALL NOT RELY UPON THIS INFORMATION AS BEING EXACT OR COMPLETE. THE CONTRACTOR SHALL CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION AND REQUEST FIELD VERIFICATION OF UTILITY LOCATIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO RELOCATE EXISTING UTILITIES CONFLICTING WITH IMPROVEMENTS SHOWN HEREON IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS GOVERNING SUCH OPERATIONS.
3. BEFORE INSTALLATION OF WATER LINE, THE CONTRACTOR SHALL EXCAVATE AND VERIFY ALL CROSSINGS AND INFORM THE OWNER AND THE ENGINEER OF ANY CONFLICTS. THE ENGINEER WILL BE HELD HARMLESS IN THE EVENT HE IS NOT NOTIFIED OF DESIGN CONFLICTS PRIOR TO CONSTRUCTION.
4. ALL WATER AND SEWER CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH WILLIAMSON COUNTY STANDARD SPECIFICATIONS.
5. THE CONTRACTOR SHALL PAY ANY APPLICABLE WATER AND SEWERAGE SERVICES INSPECTION FEES.
6. MAINTAIN 10 FEET HORIZONTAL SEPARATION AND 18 INCHES OF VERTICAL SEPARATION (WATER OVER SEWER) BETWEEN SANITARY SEWERS AND WATER LINES WHERE POSSIBLE.
7. THE CONTRACTOR IS TO VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES AND TAKE CARE TO PROTECT UTILITIES THAT ARE TO REMAIN. REPAIR ANY DAMAGE ACCORDING TO UTILITY STANDARDS AND AT THE CONTRACTOR'S EXPENSE. COORDINATE ALL CONSTRUCTION WITH THE APPROPRIATE UTILITY COMPANY.
8. ALL AND ANY FEES, LICENSES AND PERMITS NECESSARY FOR THIS CONSTRUCTION ARE TO BE OBTAINED PRIOR TO INITIATION OF CONSTRUCTION AND THE COST OF SAME TO BE BORNE BY THE CONTRACTOR.
9. CONTRACTOR SHALL EXERCISE EXTREME CAUTION IN THE USE OF EQUIPMENT IN AND AROUND OVERHEAD AND UNDERGROUND ELECTRICAL WIRES AND SERVICES. IF AT ANY TIME IN THE PURSUIT OF THIS WORK, THE CONTRACTOR MUST WORK IN THE CLOSE PROXIMITY OF THE ABOVE-NOTED WIRES, THE ELECTRIC COMPANY SHALL BE CONTACTED PRIOR TO SUCH WORK AND THE PROPER SAFETY MEASURES TAKEN. A THOROUGH EXAMINATION OF THE OVERHEAD AND UNDERGROUND WIRES IN THE PROJECT AREA SHOULD BE MADE BY THE CONTRACTOR PRIOR TO THE INITIATION OF CONSTRUCTION.
10. ALL PUBLIC WATER SYSTEMS SHALL BE CONSTRUCTED UTILIZING MATERIALS THAT AREA A.S.T.M. AND/OR A.W.W.A APPROVED.
11. PROVIDE A MINIMUM 36" OF COVER OVER ALL WATER LINES, 48" UNDER PAVEMENT.
12. THE OWNER/CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL MATERIALS AND INSTALLING ALL WATER INFRASTRUCTURE. THIS INCLUDES VALVES, HYDRANTS, METER BOXES, SERVICE LINES, WATER MAINS, TAPPING SLEEVES, TAPPING VALVES, SERVICE YOKES, ETC. THE ONLY COMPONENT THAT IS THE EXCEPTION IS THE WATER METER. THE OWNER/CONTRACTOR IS RESPONSIBLE FOR PURCHASING AND SHIPPING THE WATER METERS TO WADC FOR STORAGE, AND WADC WILL INSTALL METERS. WITH REGARD TO THE MAINLINE TAPS, THERE IS A \$1,000 FEE FOR EACH MAINLINE TAP. THE CONTRACTOR WILL PROVIDE THE MATERIALS (T&SV) AND PERFORM ALL SITE WORK, AND WADC WILL MAKE THE TAPS. WADC PREFERS MUELLER STAINLESS STEEL TAPPING SLEEVES AND TAPPING VALVES.
13. ALL WATER LINE BENDS AND FITTINGS MUST HAVE KICKERS AS PER WADC STANDARD SPECIFICATIONS AND DETAILS.

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4. ALL COMPONENTS OF THE WASTEWATER TREATMENT SYSTEM ARE ON SLOPES LESS THAN 15%.

WATER METER		
WATER VALVE		
FIRE HYDRANT		
IRON PIN (SET)		
MANHOLE		
PROPERTY LINE		
PROPOSED WATER LINE		
PROPOSED 1.5" SEWER LINE		
PROPOSED 2" SEWER LINE		
PROPOSED 2.5" SEWER LINE		
PROPOSED 4" SEWER LINE		
FORCE MAIN		
PUBLIC UTILITY & DRAINAGE EASEMENT		
MILCROFTON UTILITY DISTRICT EASEMENT		
MINIMUM BUILDING SETBACK LINE		
EXISTING CONTOUR		
EXISTING TREE LINE		
PHASE LINE		
PROPOSED CONTOUR		
PROPOSED WATER LINE AIR RELEASE VALVE WITH BOX		
PROPOSED LIMITS OF DISTURBANCE		
PROPOSED FORCEMAIN SEWER		
PROPOSED FORCEMAIN SEWER PVC CASING PIPE		
PROPOSED SEPTIC TANK		
PROPOSED SIDEWALK		
PROPOSED CRUSHED STONE PAVING		



Know what's **below**.
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KING'S CHAPEL & HIGH PARK HILL

STEG SYSTEM DESIGN - WASTEWATER SITE PLAN

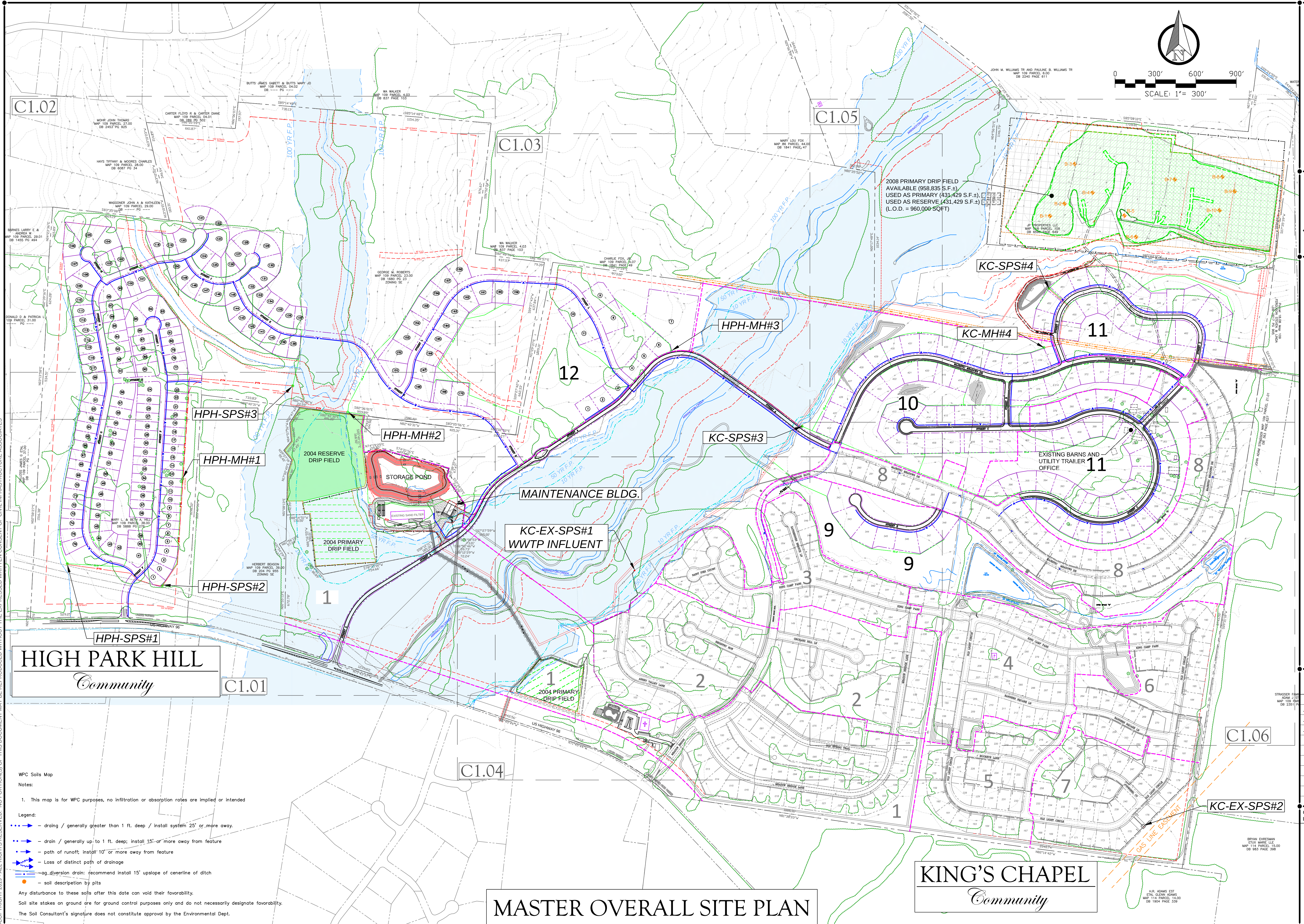
ARRINGTON, TENNESSEE 37014

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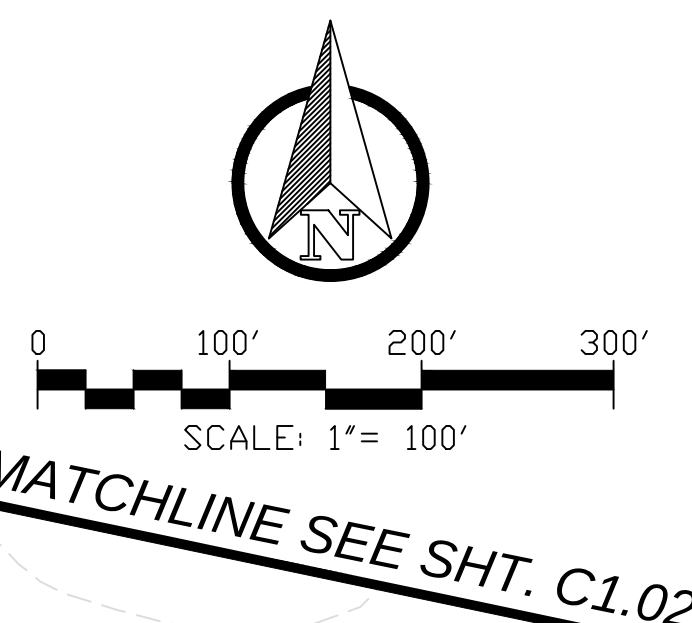
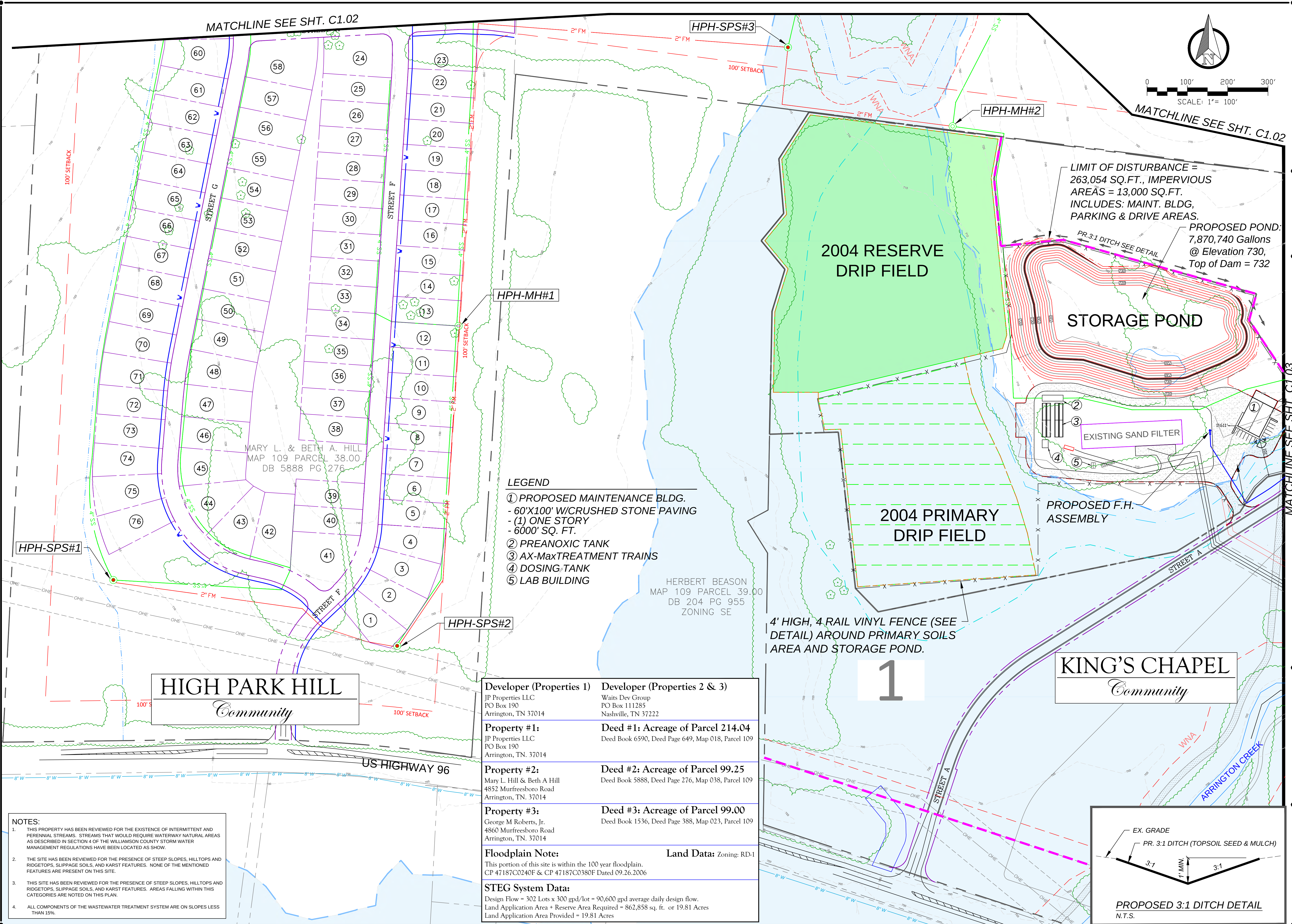
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ORIGINAL
ISSUE DATE: MAY 2019

C0.01



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KING'S CHAPEL & HIGH PARK HILL
STEG SYSTEM DESIGN - WASTEWATER SITE PLAN
ARRINGTON, TENNESSEE 37014

REVISIONS
DATE DESCRIPTION
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ORIGINAL
ISSUE DATE: MAY 2019

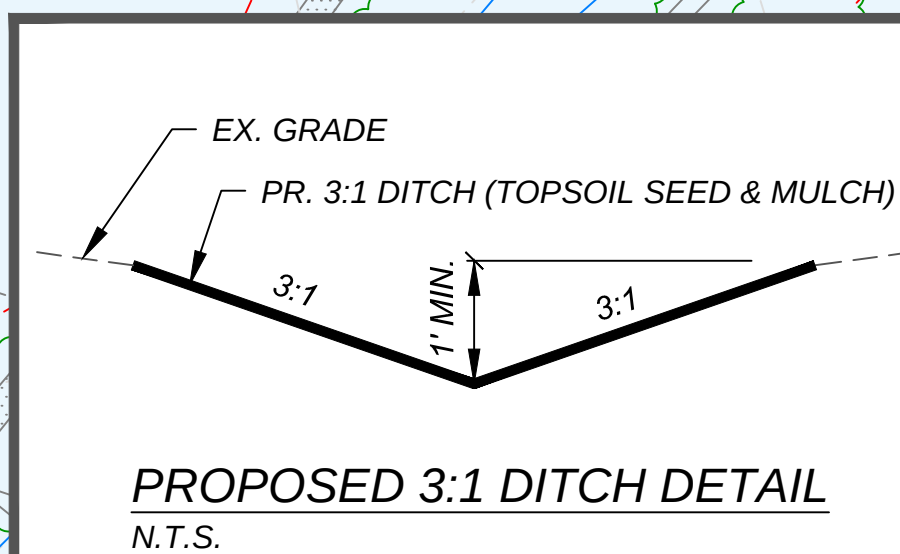
HIGH POINT HILL
SITE PLAN

C1.01

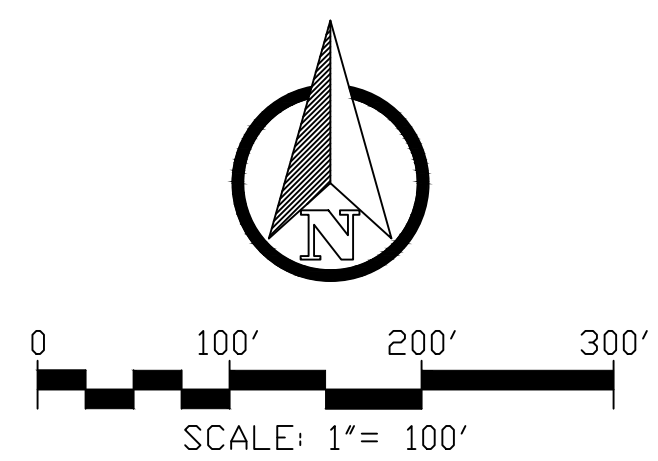
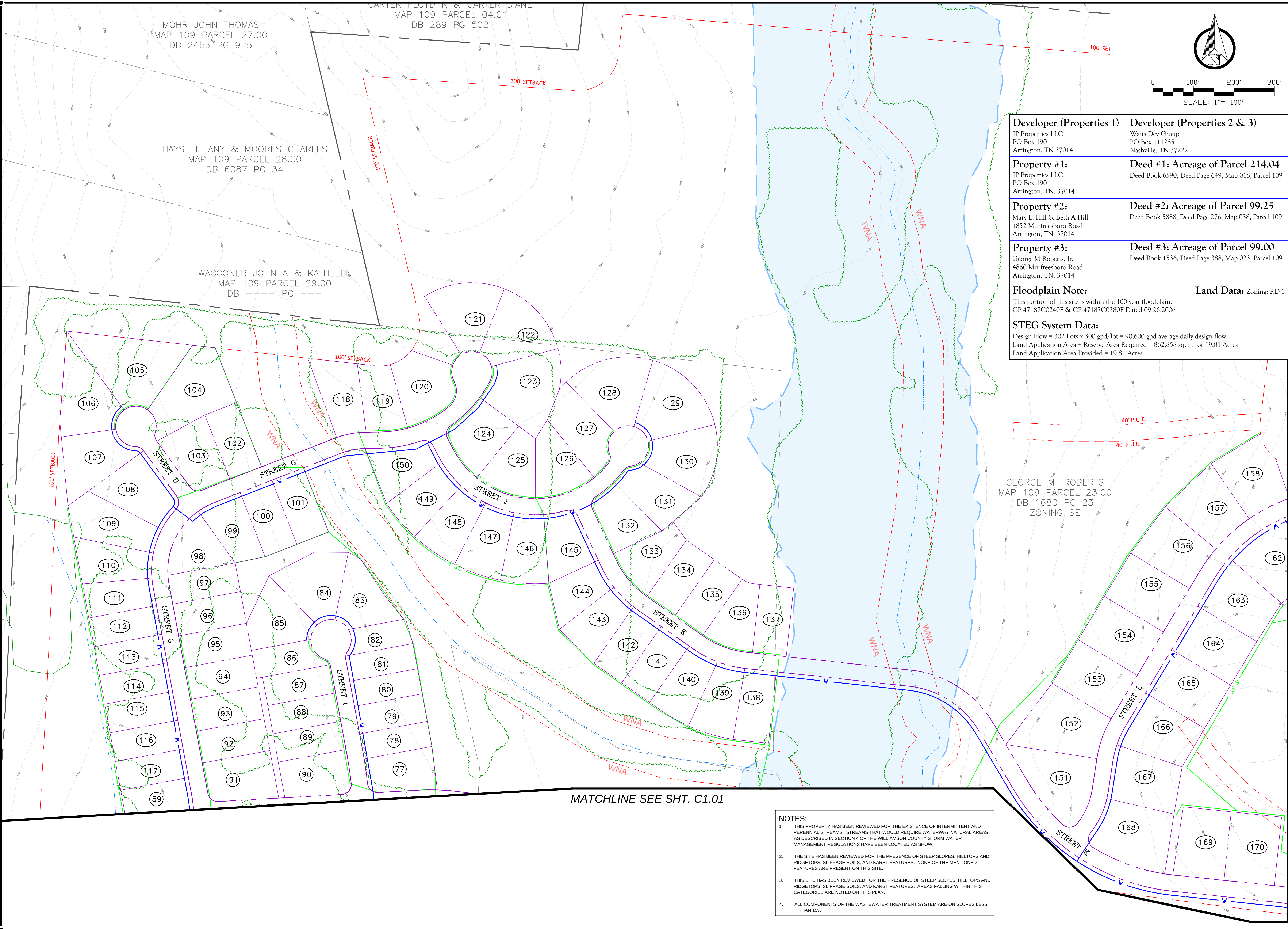
NOTES:

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Developer (Properties 1) JP Properties LLC PO Box 190 Arrington, TN 37014	Developer (Properties 2 & 3) Waits Dev Group PO Box 111285 Nashville, TN 37222
Property #1: JP Properties LLC PO Box 190 Arrington, TN. 37014	Deed #1: Acreage of Parcel 214.04 Deed Book 6590, Deed Page 649, Map 018, Parcel 109
Property #2: Mary L. Hill & Beth A Hill 4852 Murfreesboro Road Arrington, TN. 37014	Deed #2: Acreage of Parcel 99.25 Deed Book 5888, Deed Page 276, Map 038, Parcel 109
Property #3: George M Roberts, Jr. 4860 Murfreesboro Road Arrington, TN. 37014	Deed #3: Acreage of Parcel 99.00 Deed Book 1536, Deed Page 388, Map 023, Parcel 109
Floodplain Note: This portion of this site is within the 100 year floodplain. CP 47187C0240F & CP 47187C0380F Dated 09.26.2006	Land Data: Zoning: RD-1
STEG System Data: Design Flow = 302 Lots x 300 gpd/lot = 90,600 gpd average daily design flow. Land Application Area + Reserve Area Required = 862,858 sq. ft. or 19.81 Acres Land Application Area Provided = 19.81 Acres	



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MATCHLINE SEE SHT. C1.01

MATCHLINE SEE SHT. C1.03

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STEG SYSTEM DESIGN - WASTEWATER SITE PLAN
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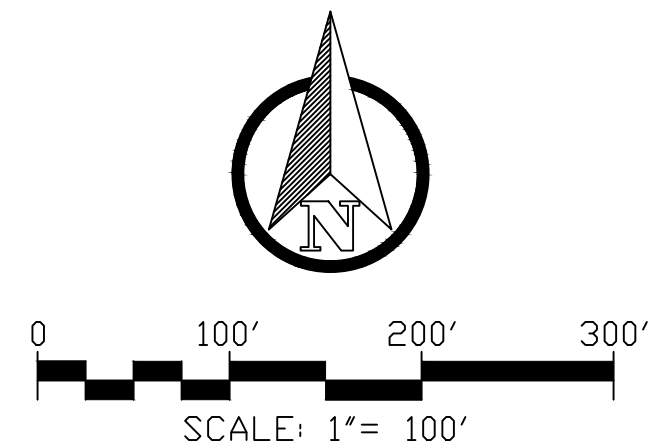
HIGH POINT HILL
SITE PLAN

C1.02



MATCHLINE SEE SHT. C1.02

CHARLIE FOX, JR.
MAP 109 PARCEL 4.07
DB 1841 PAGE 49



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STEG SYSTEM DESIGN - WASTEWATER SITE PLAN

ARRINGTON, TENNESSEE 37014

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KING'S CHAPEL
PHASE 9 & 12
HIGH POINT HILL
SITE PLAN

C1.03

MATCHLINE SEE SHT. C1.04

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PO Box 190
Arrington, TN 37014

Developer (Properties 2 & 3)
Waits Dev Group
PO Box 111285
Nashville, TN 37222

Property #1:
JP Properties LLC
PO Box 190
Arrington, TN. 37014

Deed #1: Acreage of Parcel 214.04
Deed Book 6590, Deed Page 649, Map 018, Parcel 109

Property #2:
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4852 Murfreesboro Road
Arrington, TN. 37014

Deed #2: Acreage of Parcel 99.25
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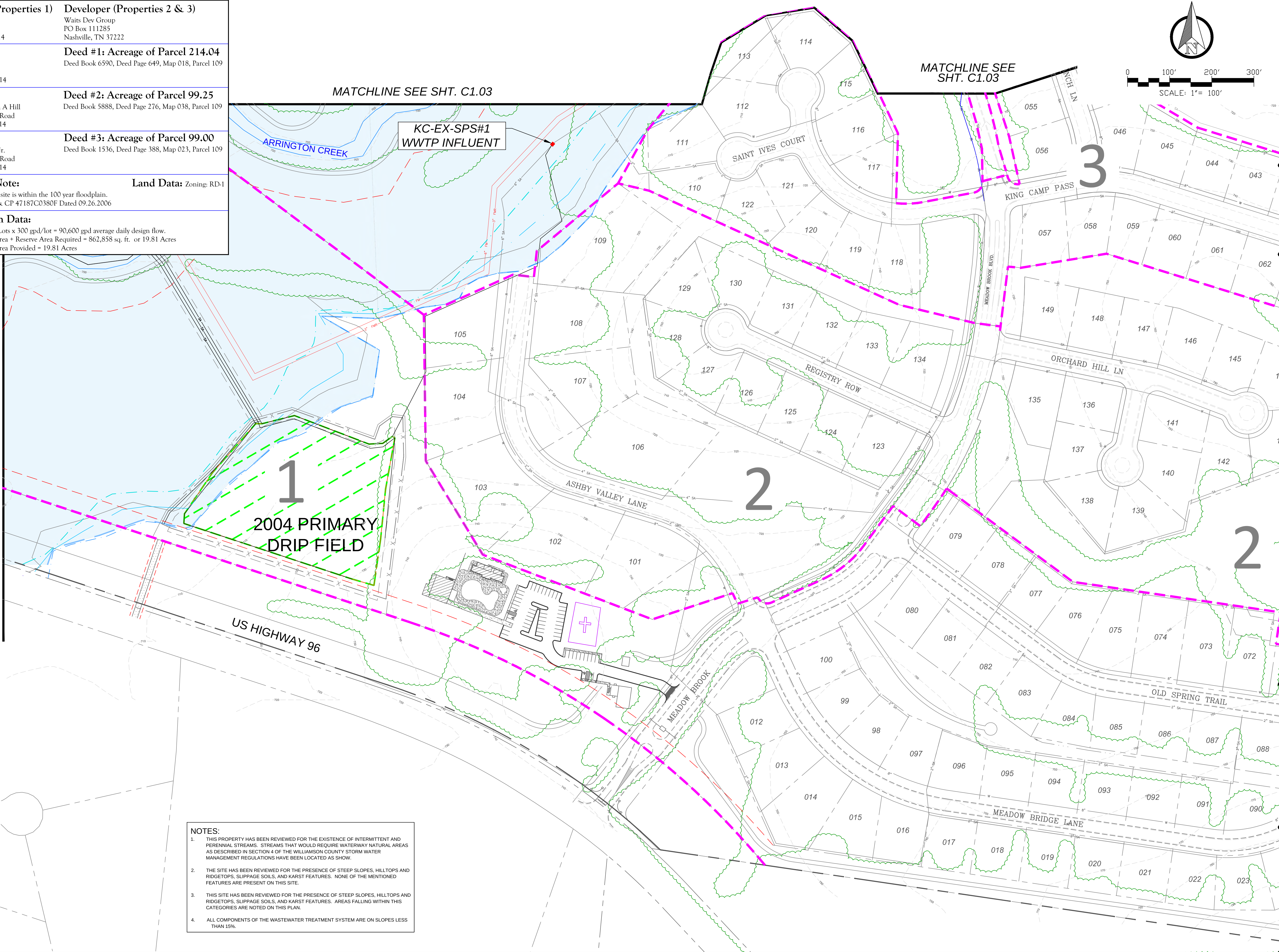
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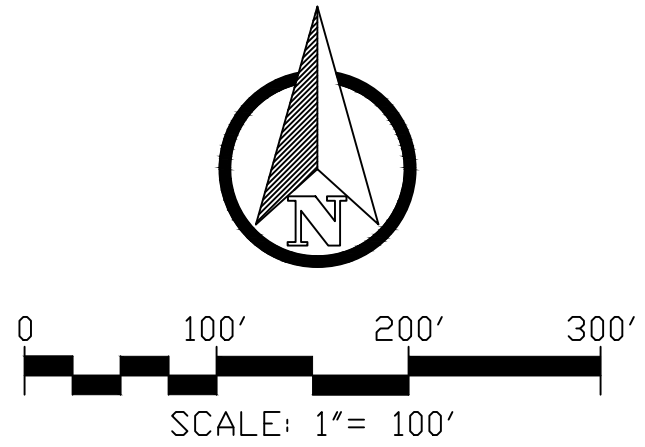
Floodplain Note:
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KING'S CHAPEL & HIGH PARK HILL
STEG SYSTEM DESIGN - WASTEWATER SITE PLAN
ARRINGTON, TENNESSEE 37014

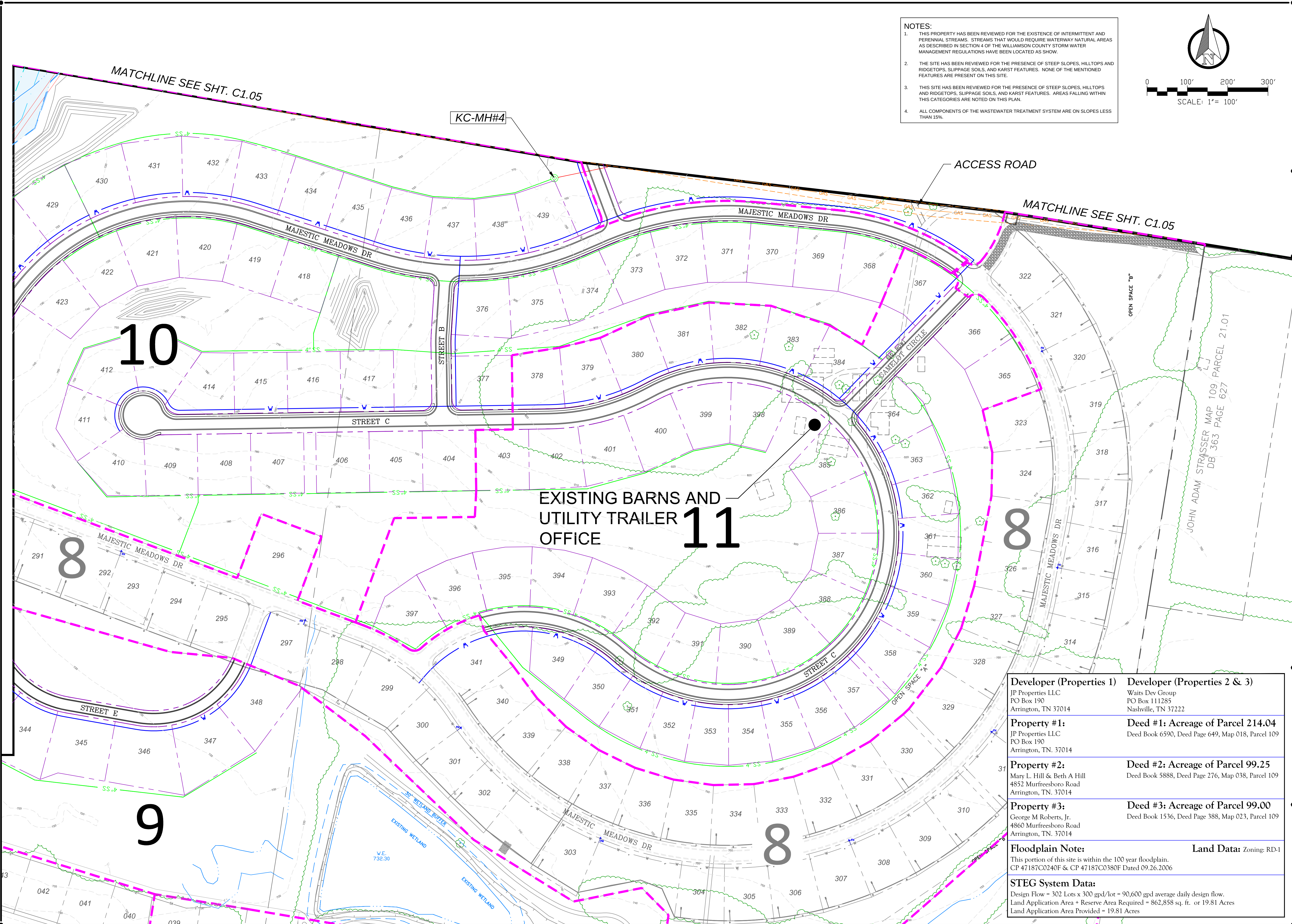
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DATE	DESCRIPTION

**ORIGINAL
ISSUE DATE:** MAY 2019

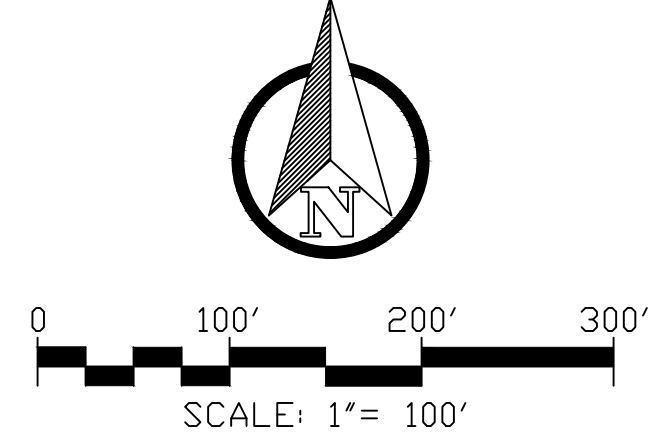
**KING'S CHAPEL
EXISTING
PHASE 1 - 3
SITE PLAN**

C1.04

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KING'S CHAPEL & HIGH PARK HILL
STEG SYSTEM DESIGN - WASTEWATER SITE PLAN
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◇ PRE-SET ISSUE DATE	△ POST-SET ISSUE DATE
DATE	DESCRIPTION

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ISSUE DATE: MAY 2019

**KING'S CHAPEL
PHASES 9 - 11
PRELIMINARY
SITE PLAN**

C1.06



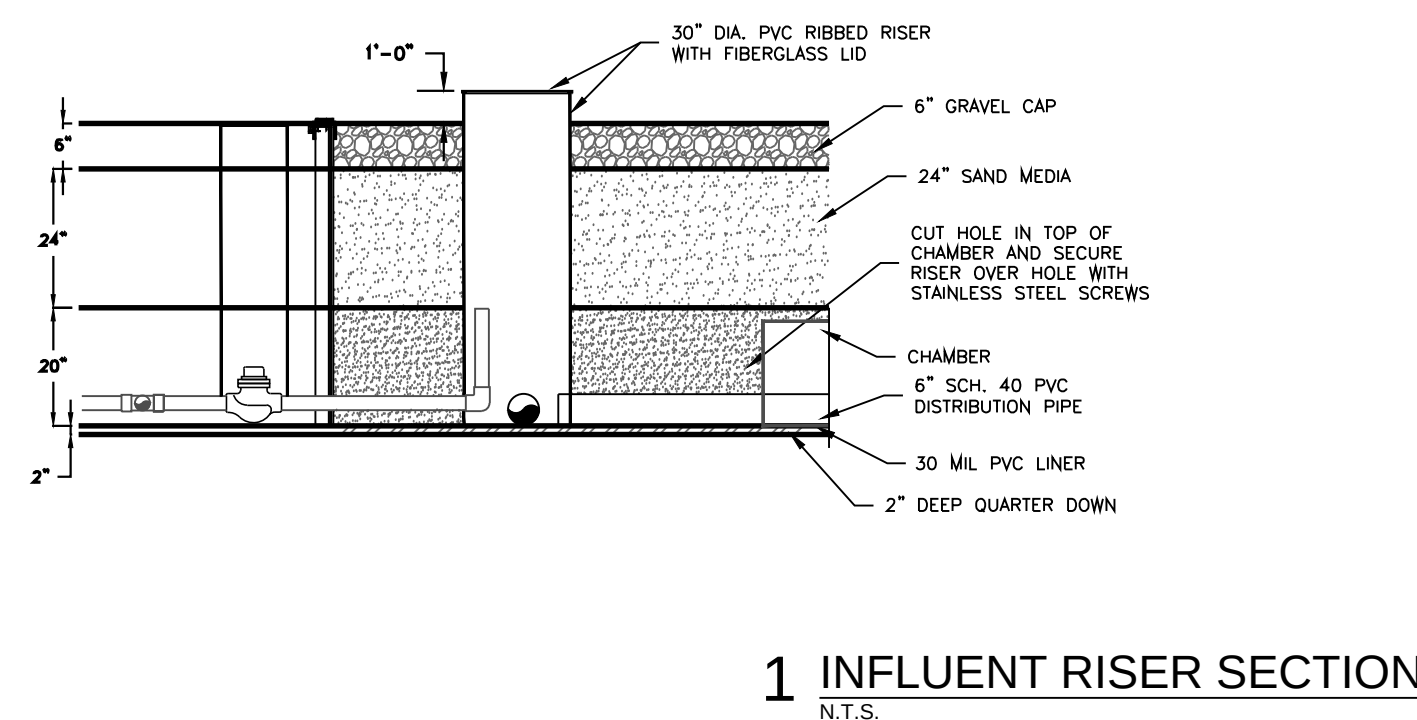
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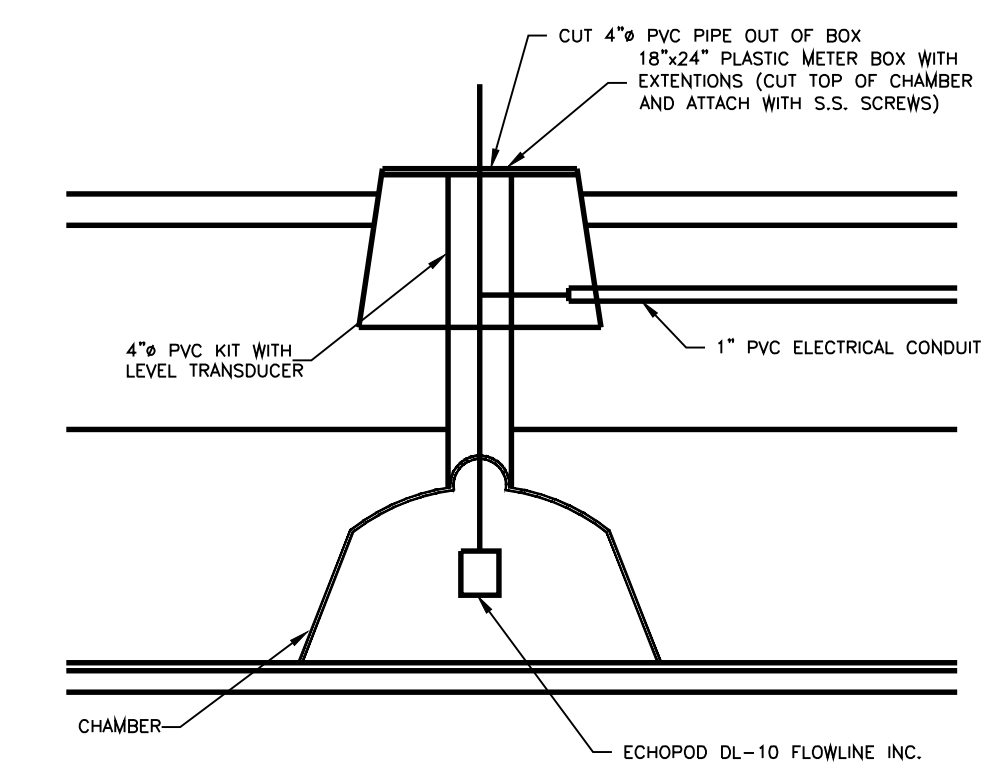
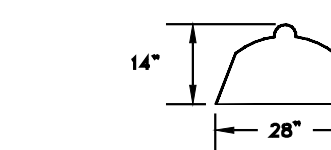
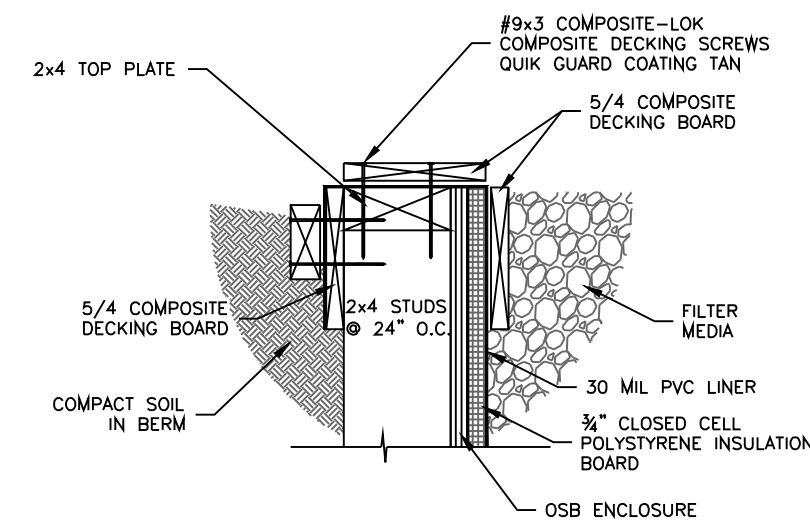
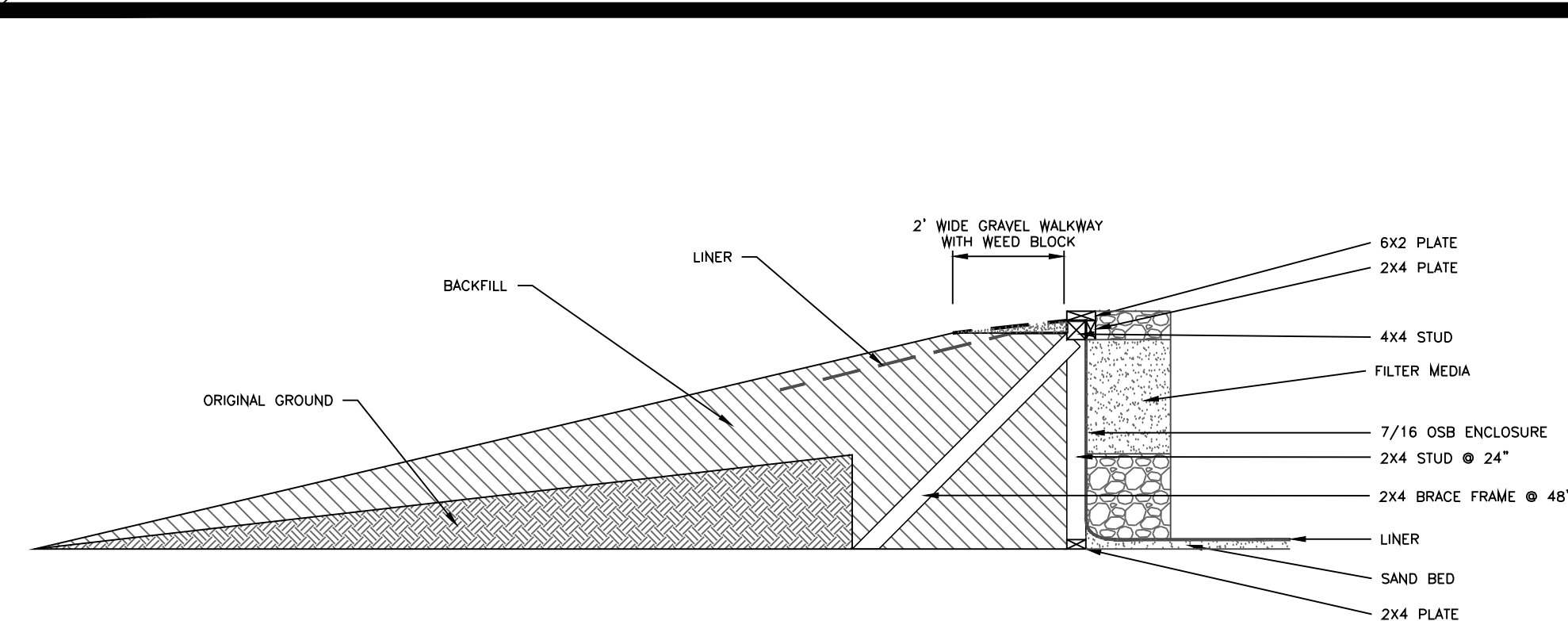
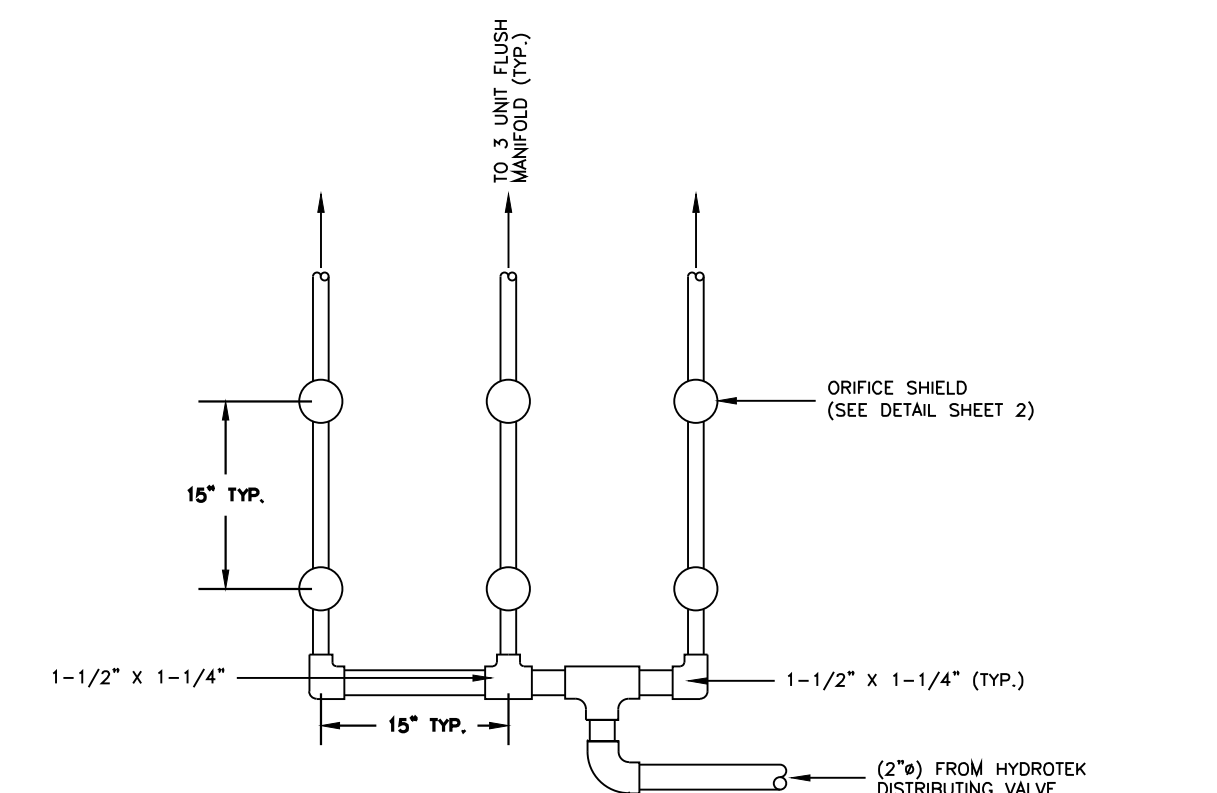
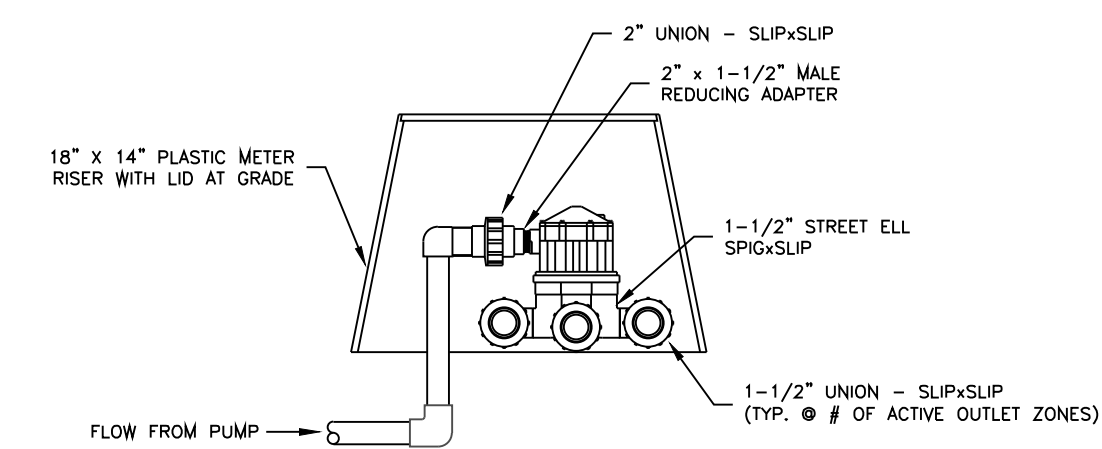
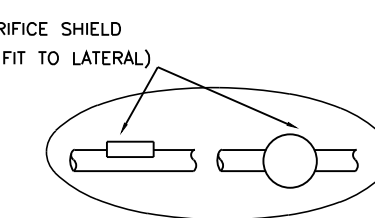
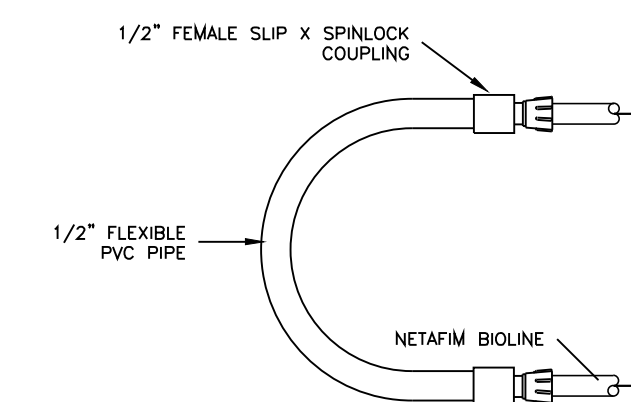
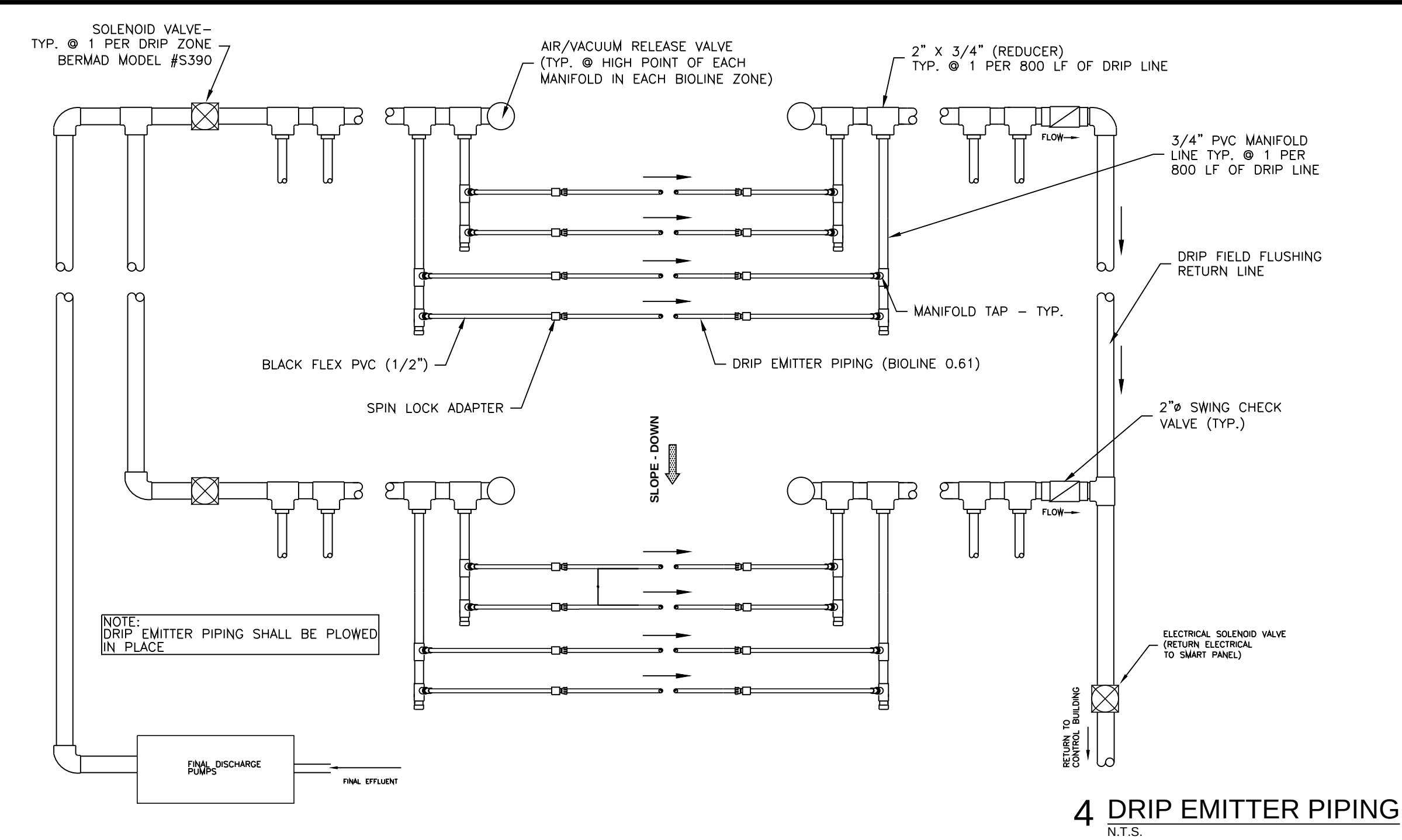
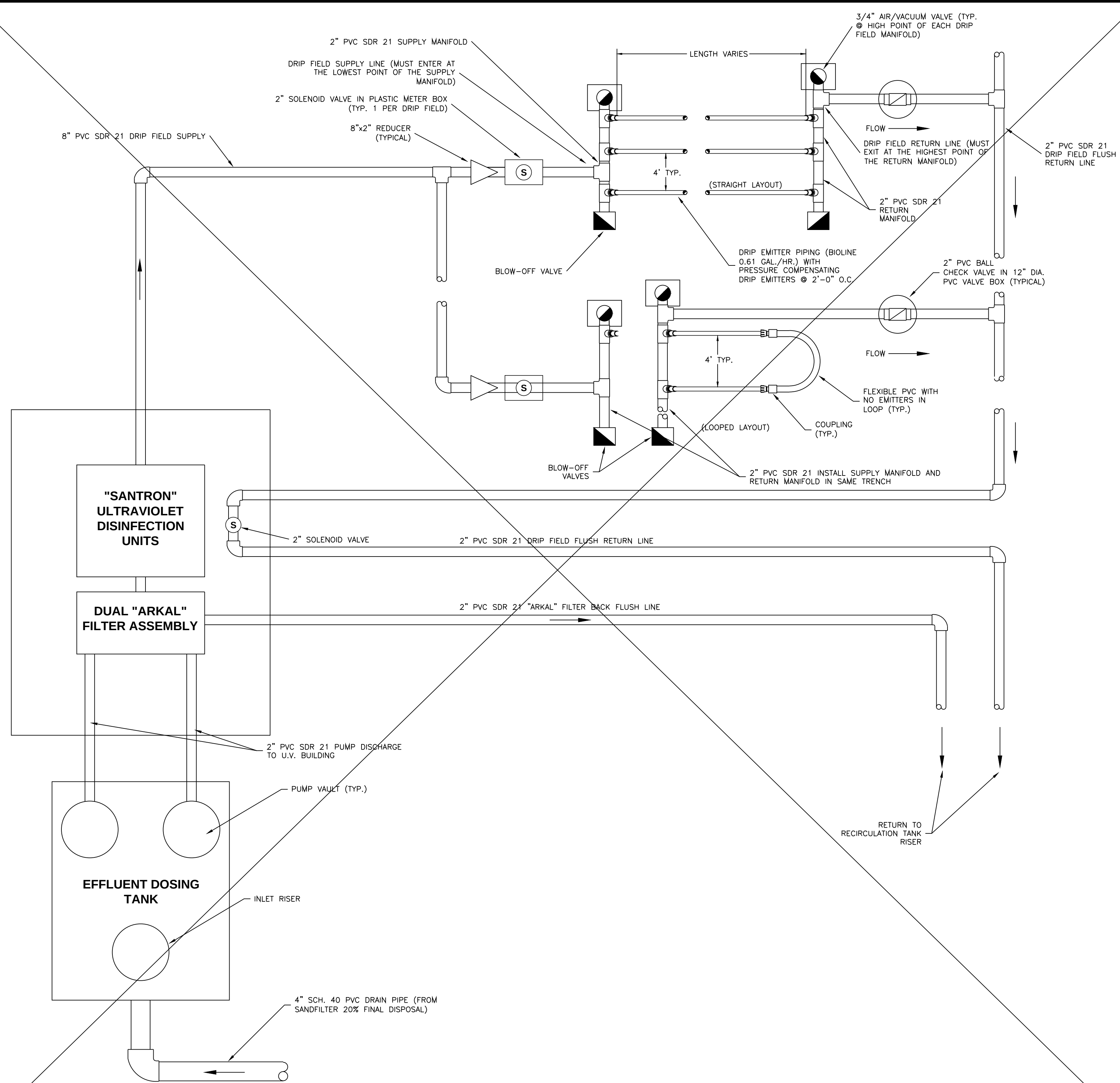


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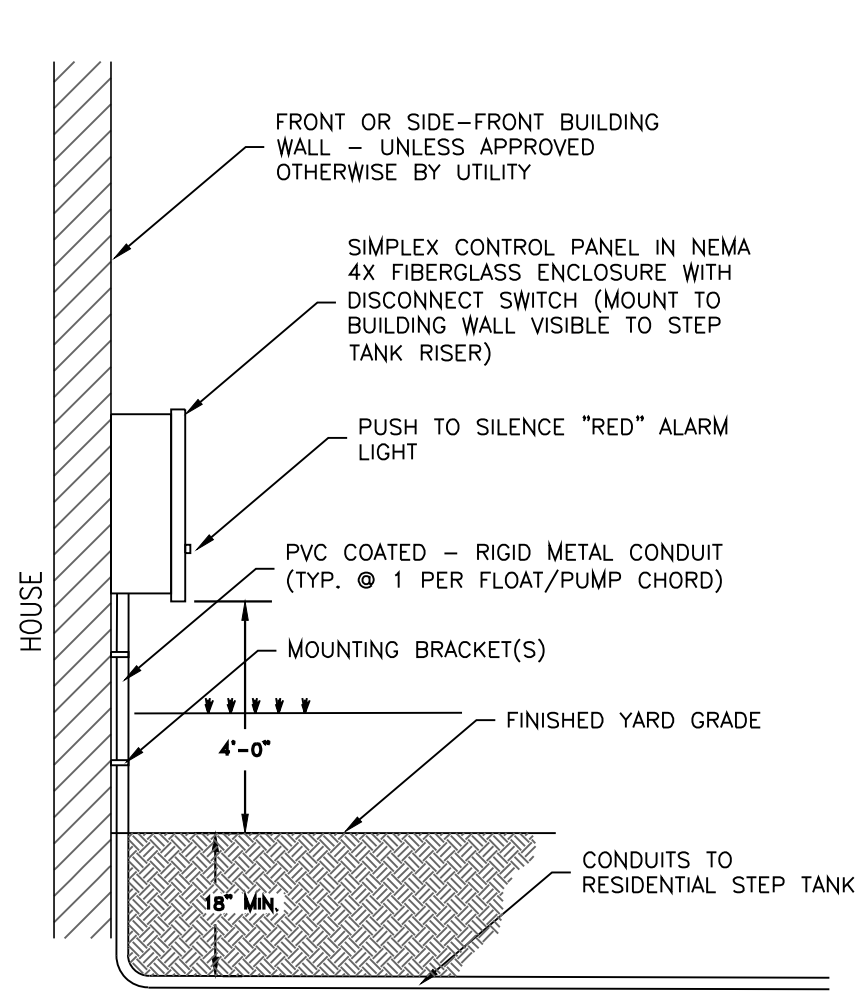
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EFFECTIVE SIZE: D₁₀ = 1.5 TO 2.5 mm
SAND MUST BE WASHED WELL



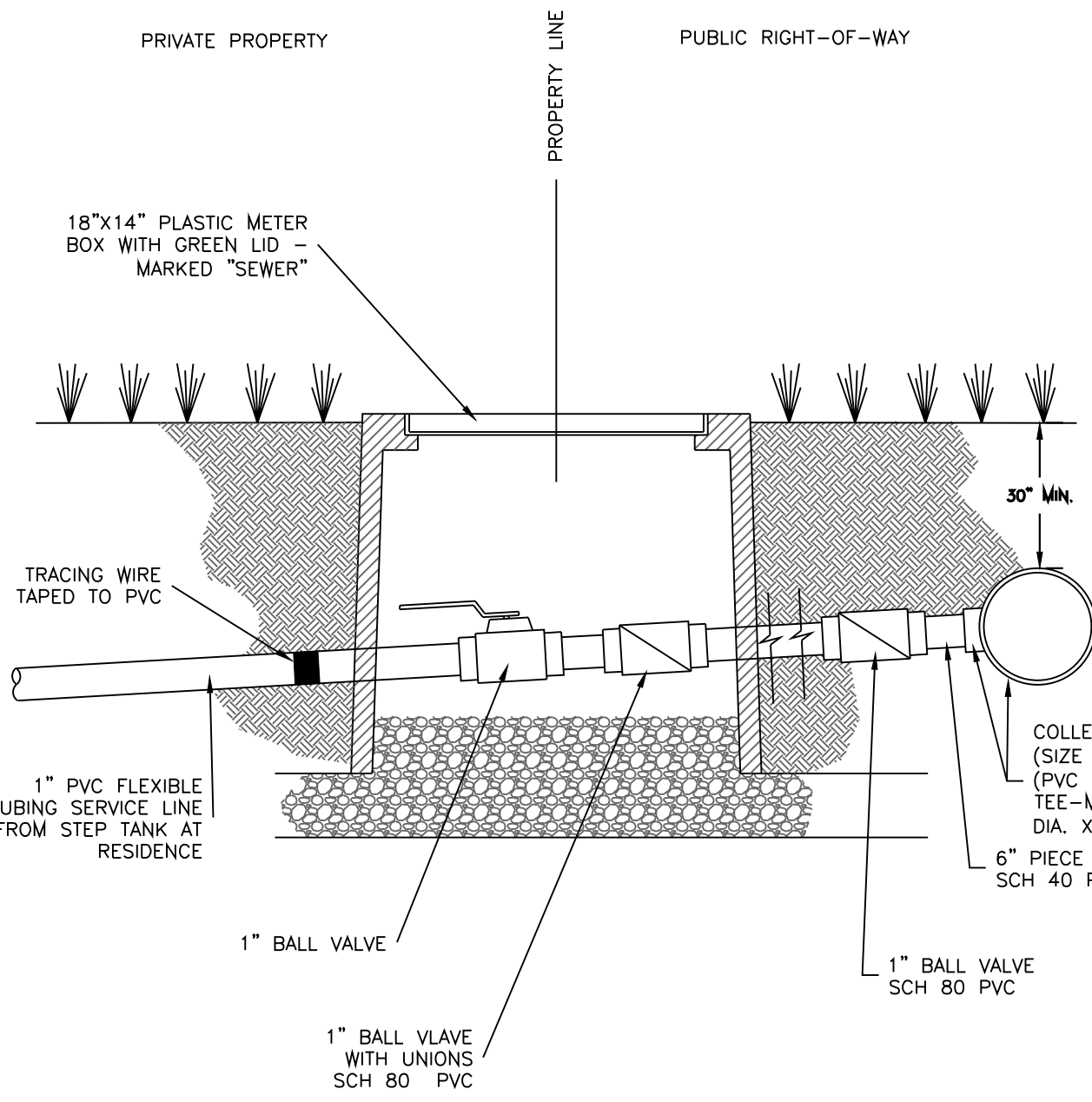
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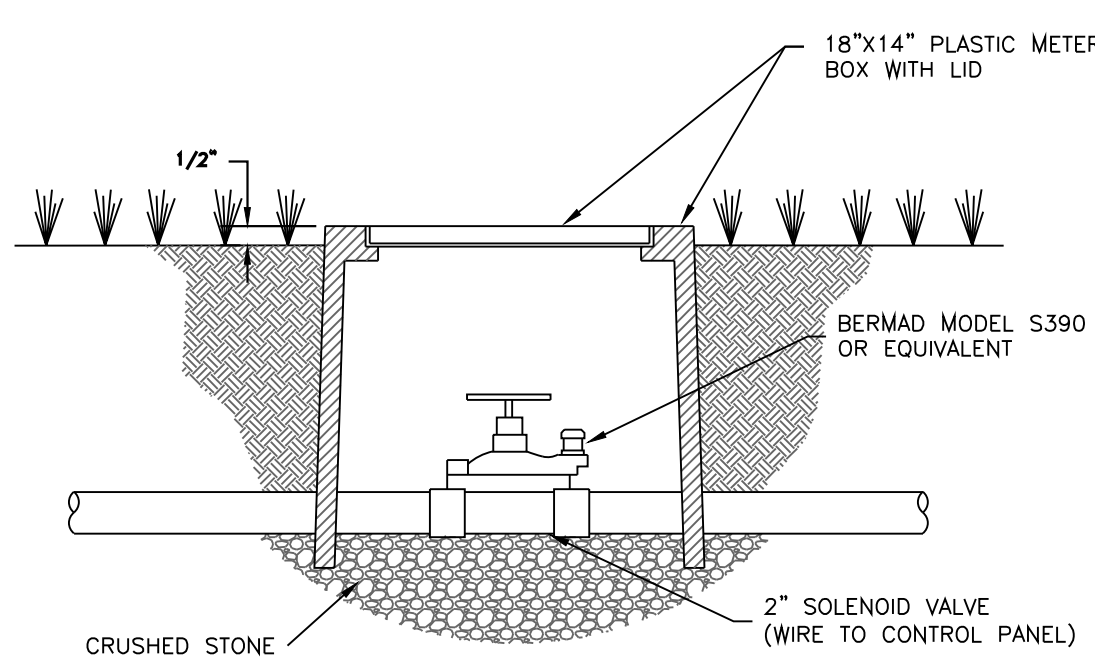
12 RESIDENTIAL CONTROL PANEL
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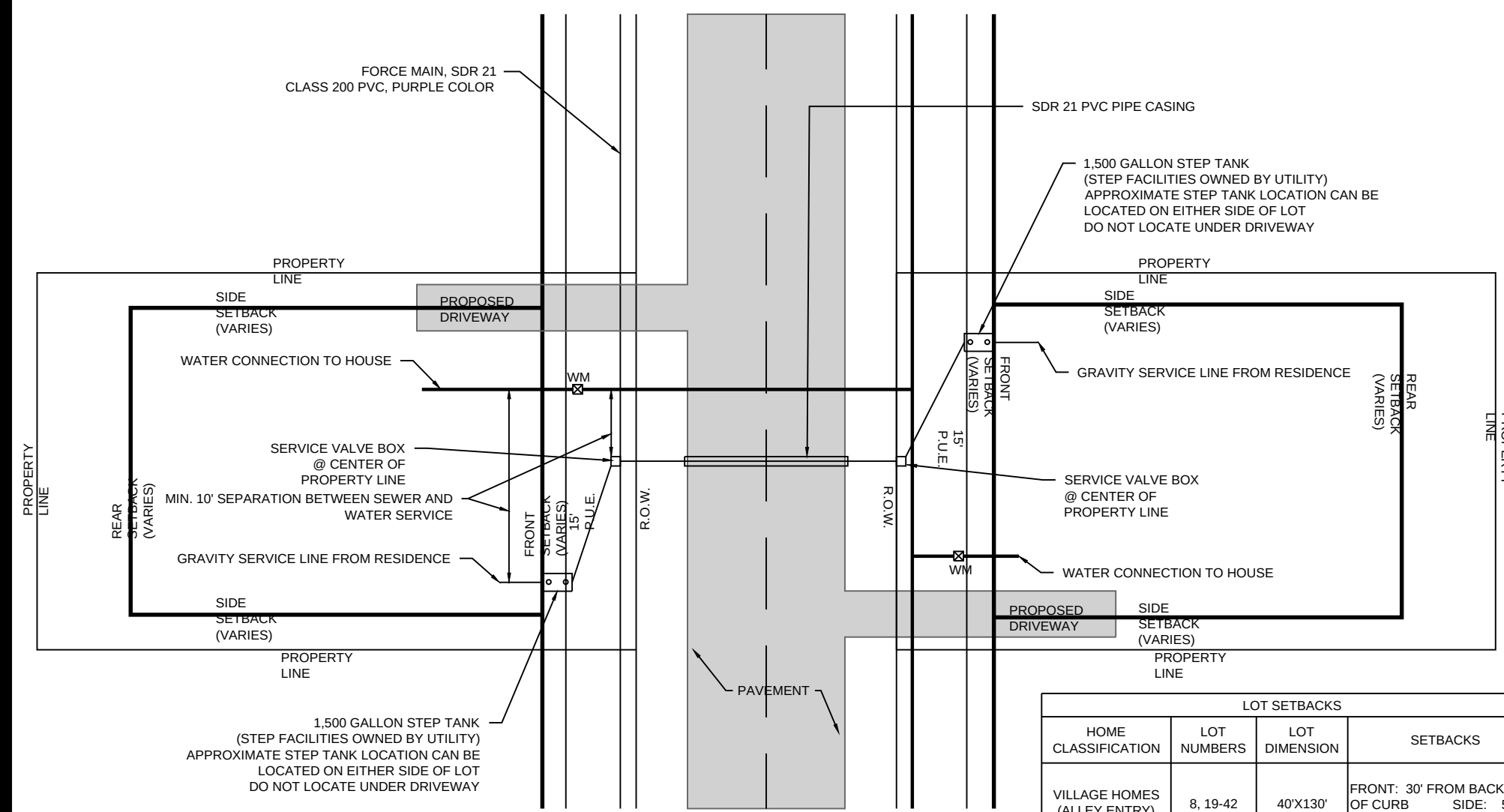
10 TYP. SERVICE CONNECTION (PRESSURE)
N.T.S.



8 ELECTRIC SOLENOID VALVE
N.T.S.



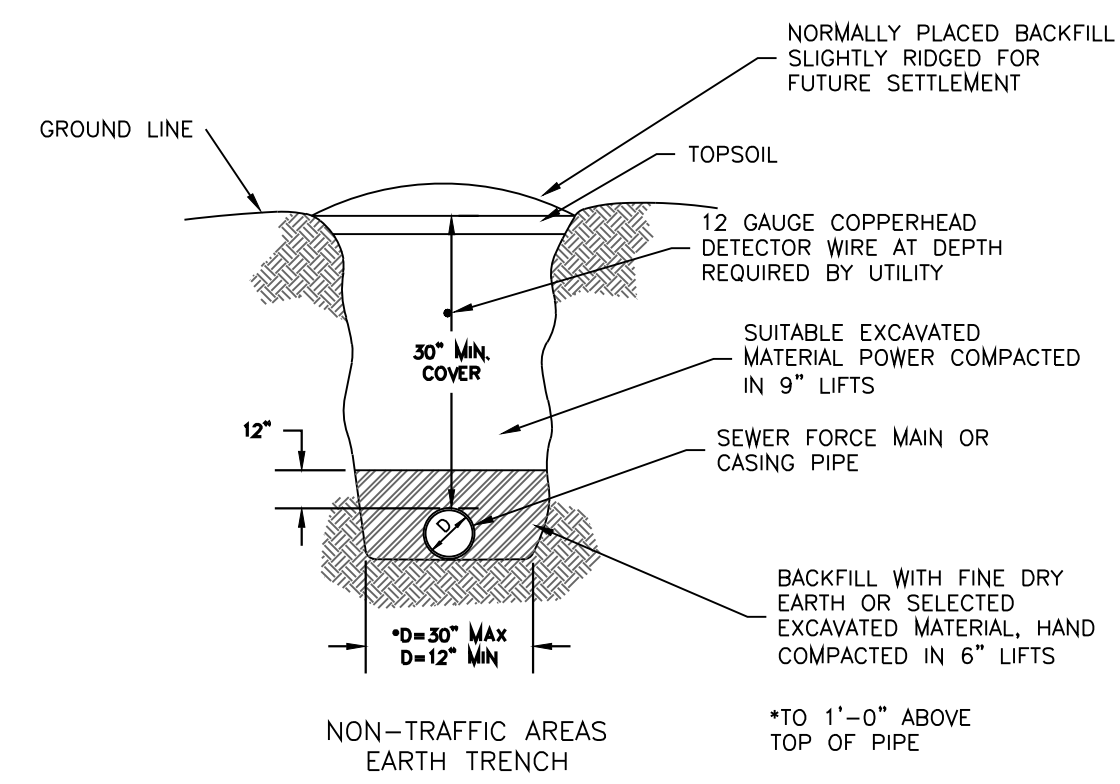
4 UTILITY SERVICE LINES LAYOUT
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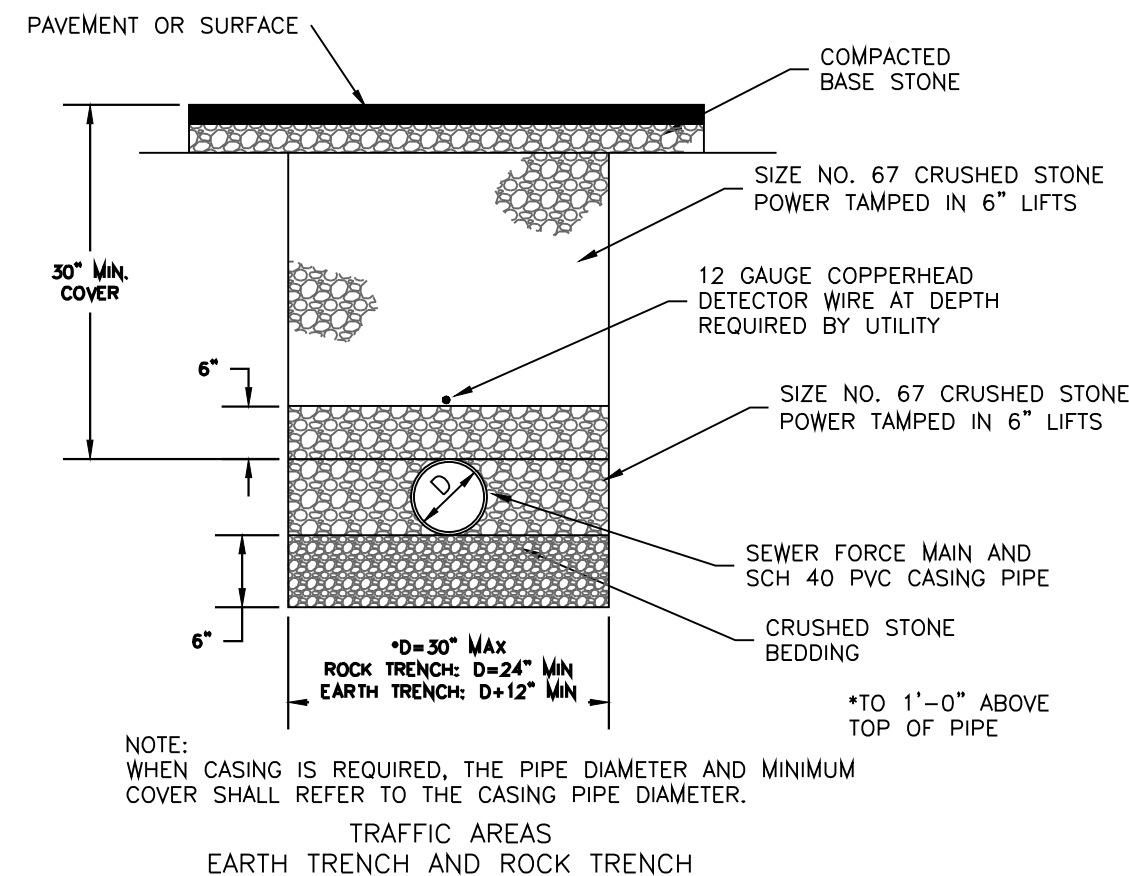
LOT SETBACKS			
HOME CLASSIFICATION	LOT NUMBERS	LOT DIMENSION	SETBACKS
VILLAGE HOMES (ALLEY ENTRY)	8, 19-42	40'X130'	FRONT: 30' FROM BACK OF CURB REAR: 25'
CLASSIC HOMES (FRONT ENTRY)	7, 9-18, 43-84	65'X150'	FRONT: 35' FROM BACK OF CURB REAR: 25'
ESTATE HOMES (FRONT/SIDE ENTRY)	1-6	100'X200'	FRONT: 35' FROM BACK OF CURB REAR: 25'

NOTE:
1. STEP TANK OR SERVICE CONNECTION SHALL NOT BE PLACED UNDER DRIVEWAY LOCATION.
2. STEP TANK TO BE PLACED WITHIN 50 FEET OF HOUSE LOCATION.
3. UTILITY TO HAVE RIGHT OF ACCESS AND MAINTENANCE FOR ALL STEP SYSTEM FACILITIES.

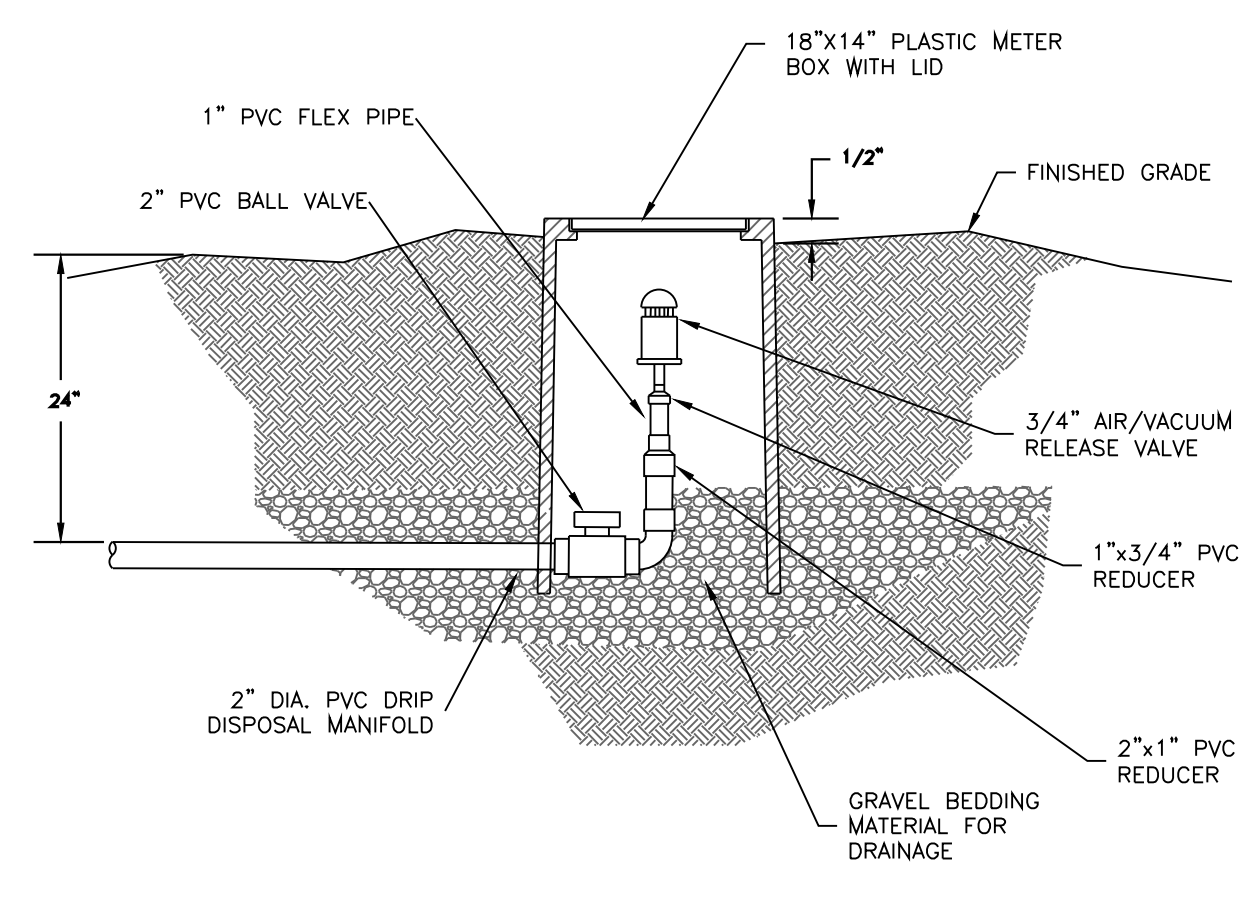
11 DRIP ZONE SUPPLY AND RETURN LINES PIPE TRENCH DETAIL
N.T.S.



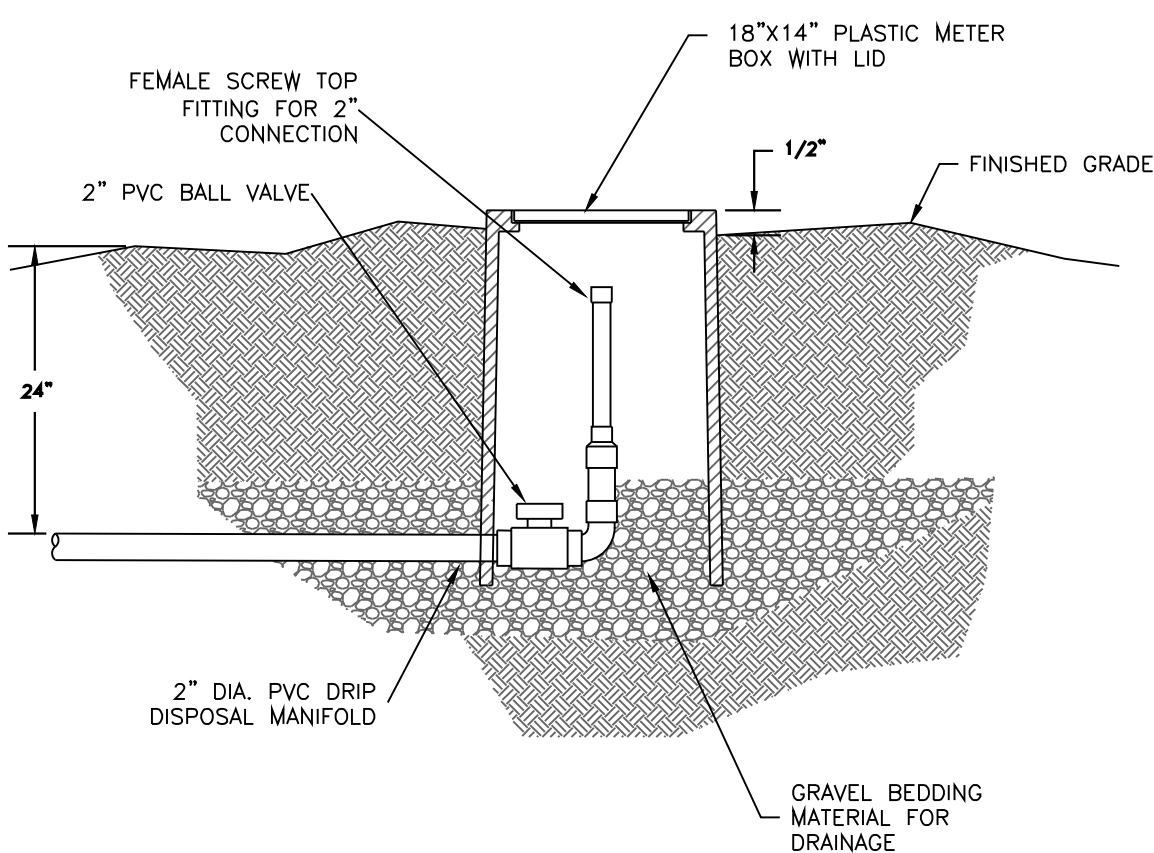
7 PIPE TRENCH DETAILS COLLECTION PIPE
N.T.S.



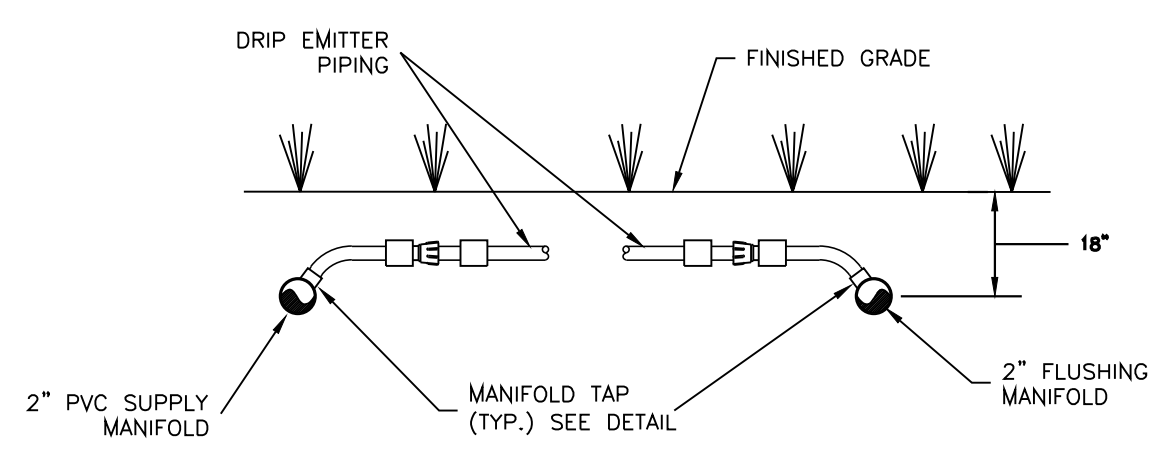
3 DRIP DISPOSAL AUTOMATIC AIR RELEASE VALVE ASSEMBLY
N.T.S.



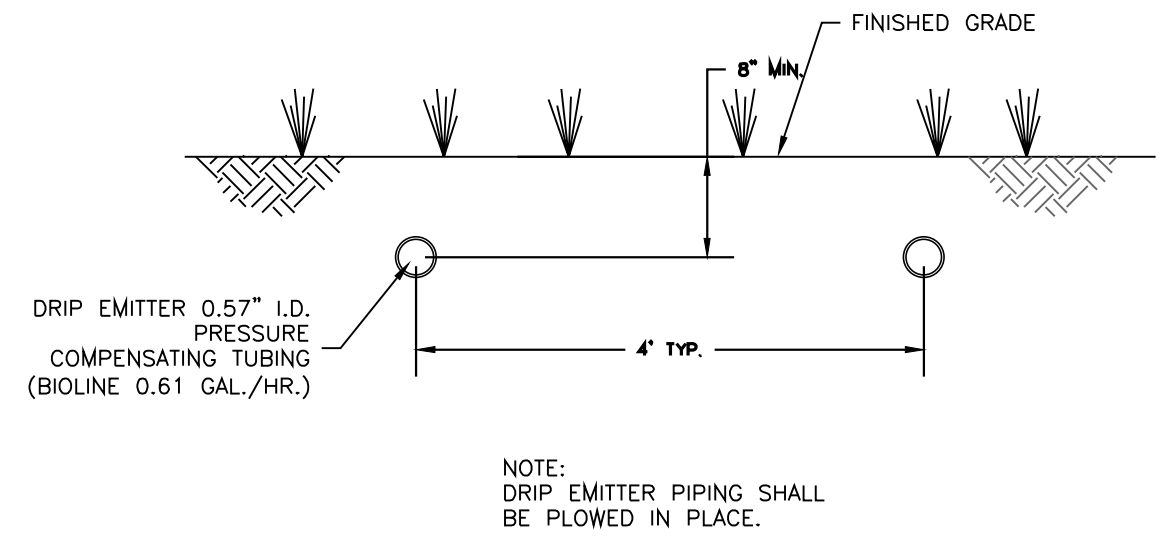
11 END-OF-LINE BLOW-OFF ASSEMBLY
N.T.S.



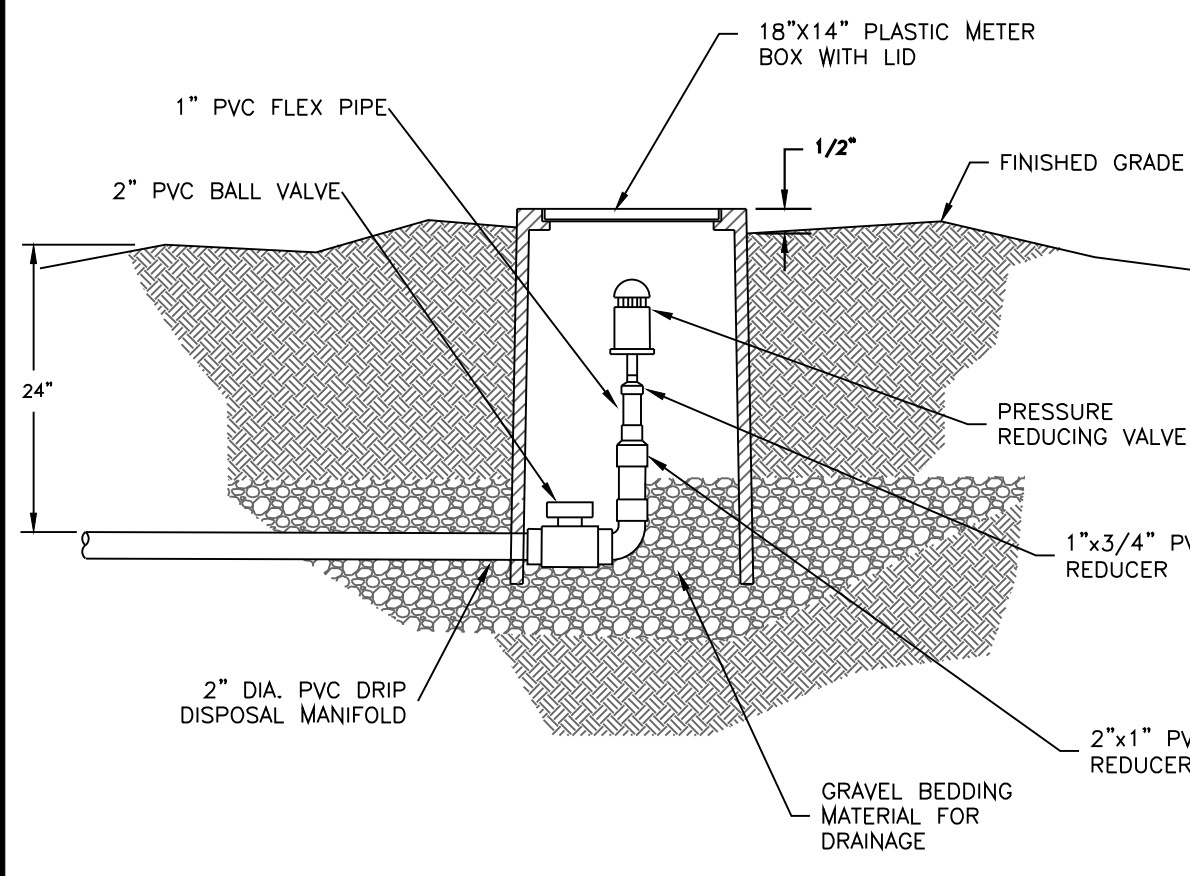
9 DRIP DISPOSAL PIPING END MANIFOLD ELEV.
N.T.S.



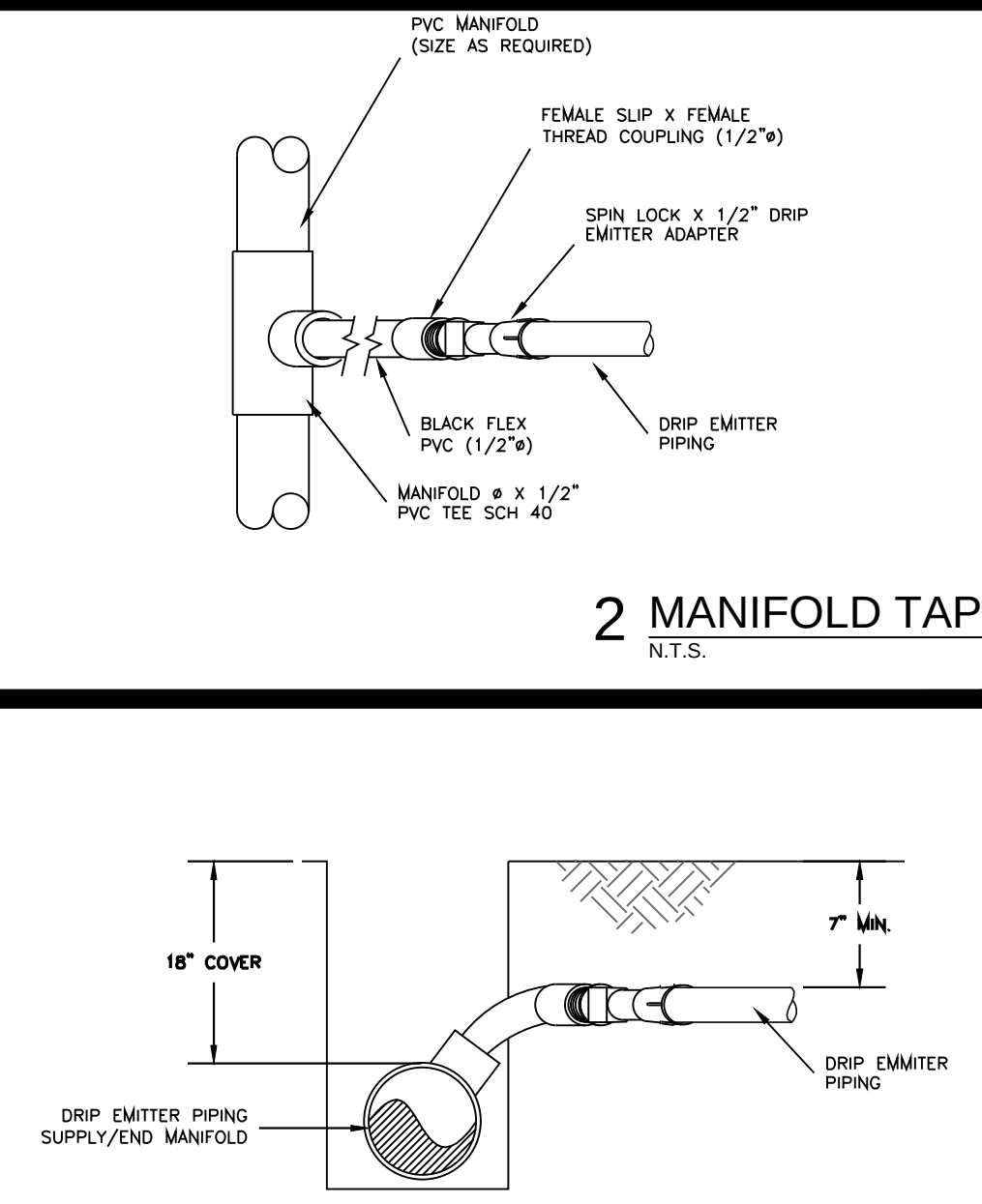
6 DRIP EMITTER PIPING
N.T.S.



5 PRESSURE REDUCING VALVE ASSEMBLY
N.T.S.



1 DRIP EMITTER MANIFOLD - SECTION
N.T.S.



CIVIL INFRASTRUCTURE ASSOCIATES

307 HICKERSON DRIVE
MURFREESBORO, TENNESSEE 37129
PHONE: 615-663-7678

REVIEW SET
NOT FOR
CONSTRUCTION

KING'S CHAPEL & HIGH PARK HILL
STEG SYSTEM DESIGN - WASTEWATER SITE PLAN
ARRINGTON, TENNESSEE 37014

CIA PROJECT NO: []
DRAWN BY: []
CHECKED BY: []

REVISIONS
PRE-80 SET
DATE
DESCRIPTION
- - -
- - -
- - -
- - -
ORIGINAL
ISSUE DATE: MAY 2019
DIP FIELD
DETAILS
C4.04

11 ACCESS ROAD SECTION

9 EROSION CONTROL AROUND STOCKPILE

8 CREEK CROSSING DETAIL

PLAN

SECTION

SECTION

ELEVATION

3 STONE CHECK DAM

PLAN VIEW FOR DITCH APPLICATION

PLAN VIEW FOR SLOPE APPLICATION

SECTION A-A

10 WATTLE/TUBES CHANNEL APPLICATION

SECTION C-C

7 WATTLE/TUBES SLOPE APPLICATION

TOP VIEW

ER

ALTERNATE DETAIL
OF TRENCH AND
FILTER CLOTH

PLAN VIEW

SECTION C - C

SECTION A - A

NOTES

1. REFER TO TDOT STANDARD DRAWING NO. EC-STR-6 FOR DETAILS AND NOTES NOT SHOWN.

4 ROCK CHECK DAMS DETAIL

N

1 CONSTRUCTION ENTRANCE

NOTES

1. COORDINATE WITH C.O.C. BMP MANUAL FOR ADDITIONAL DETAILS AND NOTES.



- 1 2" DRIP FIELD FLUSH SOLENOID CONTROL VALVE
- 2 HYDRO METER WITH SOLENOID CONTROL VALVE
- 3 2" PVC INLET FROM DOSE TANK.
- 4 2" DIA HIGH PRESSURE FLEXIBLE HOSE (2) REQUIRED.
- 5 SANITRON U.V. DISINFECTION UNIT (TYP. FOR 2).
- 6 3/4 HOSE BIBB.
- 7 2" SOLENOID CONTROL VALVE.
- 8 2"x3" DISK FILTER (ARKAL "SUPER FILTER" OR EQUAL).
- 9 FILTER FLUSHING SOLENOID VALVES.
- 10 2" UNION.
- 11 AIR RELEASE VALVE.
- 12 FILTER WIRING JUNCTION BOX.
- 13 30" HEIGHT ALUMINUM TABLE
- 14 EXPANSION TANK
- 15 FLOW METER

1. PIPING SHOWN IS FOR TWO PIPE INLET AND TWO U.V. UNITS. LAYOUT AND COMPONENTS FOR ADDITIONAL UNITS SHALL BE SIMILAR.
2. ALL BUILDING PIPING AND VALVES SHALL BE 2" SCHEDULE 80 PVC.
3. CONTRACTOR SHALL LEAVE PIPE STUB-OUTS IN BUILDING IF FUTURE ADDITIONAL U.V. DISINFECTION UNITS ARE PLANNED.
4. ALL SUFFICIENT SPACE BETWEEN WALL AND END OF U.V. UNIT FOR REMOVAL OF BULB. U.V. UNITS MAY BE ROTATED FOR ADDITIONAL SPACE.
5. FILTER UNITS AND U.V. UNITS TO BE SUPPORTED BY CUSTOM-MADE WELDED ANGLE IRON FRAME. FRAME TO BE PAINTED WITH TWO COATES BLACK ENAMEL. FRAME TO BE STURDY AND LEVEL.
6. CONTRACTOR TO SUPPLY ALL PIPING AND FITTINGS NOT LISTED IN EQUIPMENT LIST, NEEDED FOR ASSEMBLY OF EQUIPMENT.

**REVIEW SET
NOT FOR
CONSTRUCTION**

KING'S CHAPEL & HIGH PARK HILL

STEG SYSTEM DESIGN - WASTEWATER SITE PLAN
ARRINGTON, TENNESSEE 37014

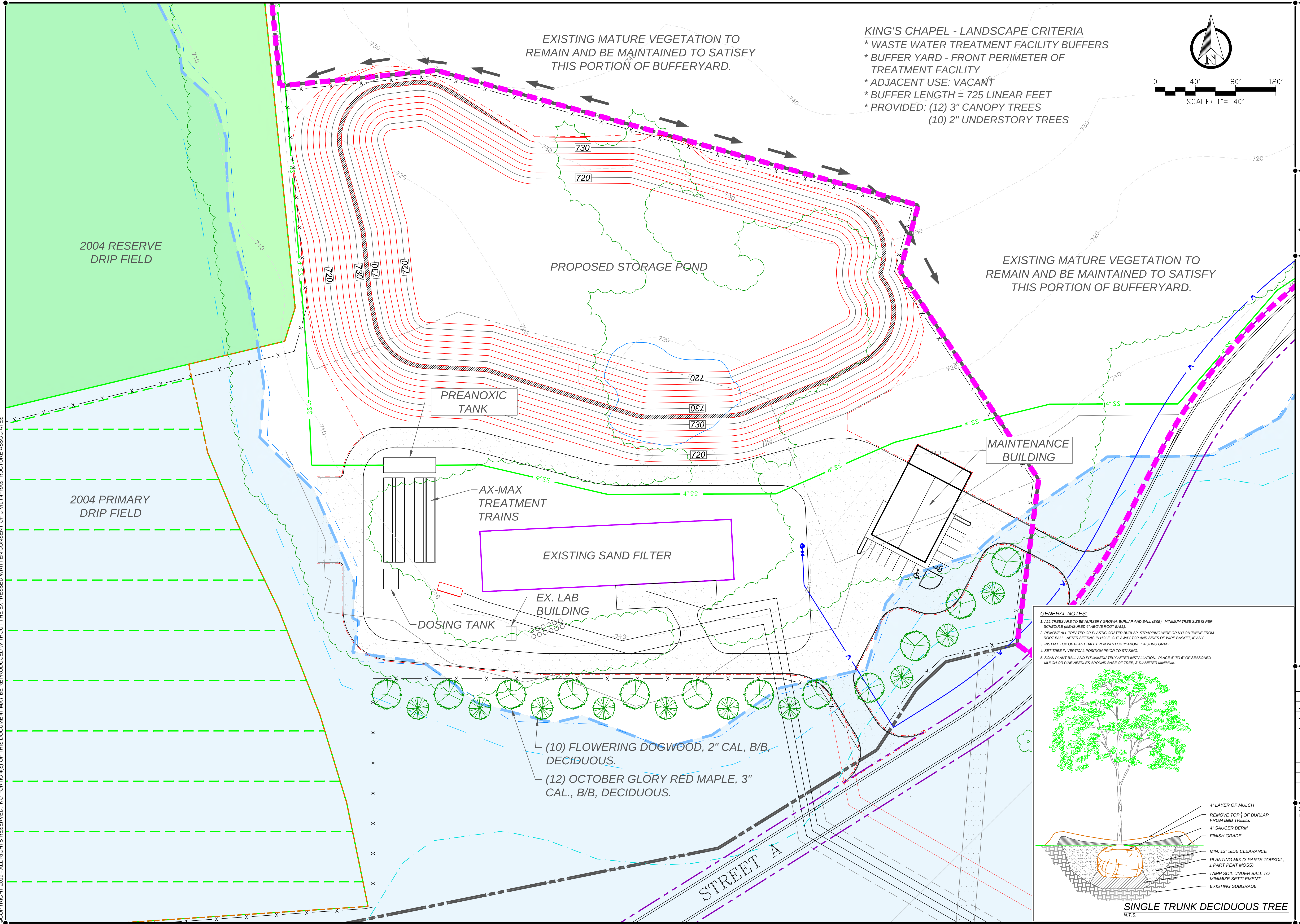
CIA PROJECT No:	DRAWN BY:	CHECKED BY:
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[illegible]

ORIGINAL
ISSUE DATE: MAY 2019

LAB BUILDING

C4.07



KING'S CHAPEL & HIGH PARK HILL

STEG SYSTEM DESIGN - WASTEWATER SITE PLAN

ARRINGTON, TENNESSEE 37014

[illegible]

LANDSCAPE PLAN
BUFFERING
TREATMENT
FACILITY

Provide a description of the type of proposed wastewater system to be constructed including the design capacity and the maximum potential number of customers the Utility will service in the proposed service area. Indicate the technology used for the wastewater system (e.g. membrane, sand filter, wetland cell and/or lagoon). The type of system and design capacity should match the type and design capacity of the associated TDEC permit and permit application.

RESPONSE:

Wastewater service to the Hill and Roberts parcels will be provided by collection tanks at each home. Wastewater from the collection tanks will be gravity fed to force mains sending wastewater to the existing wastewater treatment system. An Orenco Ax Max system will be used as outlined in the permit application. After being treated the effluent will be sent to drip fields. The developer will bear all expenses of the engineering, treatment expansion, construction of a collection system and additional soils for drip fields. Maximum potential number of customers in the proposed service area is anticipated to be 170.

Provide the estimated dates for the commencement and completion of the construction of the system and the estimated date the wastewater system will be placed into service. If the wastewater system will be constructed or placed into service in phases, provide the anticipated dates for each phase.

RESPONSE:

After approval by the Tennessee Public Utility Commission, construction of the proposed collection system and additional drip fields for the Hill Parcel and Roberts Parcels will take approximately 60 days to complete and be immediately placed into service. All construction is being completed in a single phase.

If portions of the wastewater system will be built in phases, provide how many phases and the number of houses or units to be connected in each phase.

RESPONSE:

Construction of the wastewater system for the Hill Parcel and Roberts Parcel will be completed in a single phase and ultimately provide service to 170 single family homes.

Identify the builder or developer that has requested the utility to provide wastewater service.

RESPONSE:

See attached letter from the developer of the Hill and Roberts Parcels requesting King's Chapel Capacity to provide wastewater service for the specific identifying information requested.

NASHVILLE LAND AND HOUSING GROUP, LP

% Waits Development Group, LLC

P.O. Box 111285

Nashville, Tn 37222

March 27, 2019

Mr. John Powell
Kings Chapel Capacity, LLC
P.O. Box 40
Arrington, TN 37014

Dear Mr. Powell

Please accept this letter as a formal request to provide waste water service to the Hill and Roberts parcels contiguous to your wastewater plant and the subdivision known as Kings Chapel.

We would like to initiate proceedings to include this project into the Kings Chapel Capacity Wastewater systems service area. We anticipate 170 residential homes to be built over a multiyear plan.

Respectfully Requested



John Waits,

Manager

EXHIBIT 2
PROPERTY RIGHTS & PUBLIC NEED INFORMATION

Exhibit 2.1	Letter from Existing Utilities Declining to Provide Service
Exhibit 2.2	City and County Franchise Agreement
Exhibit 2.3	Developer/Construction Contractor/Utility Contracts

Petition to Amend CCN to provide service to Hill Parcel and Roberts Parcel

Exhibit 2.1 – Decline of Service by Existing Utilities

Provide a letter(s) from local government(s) and public wastewater utilities in or near the proposed service area stating that they do not provide wastewater service to the proposed service area and that they are unable or unwilling to provide wastewater service to the proposed service area within the ensuing twelve (12) months.

RESPONSE:

See attached letters from Williamson County and Milcrofton Utility District declining to provide wastewater service to the Hill Parcel and Roberts Parcel. There are no other existing wastewater utilities in the surrounding territory.

Rogers C. Anderson
Williamson County Mayor



WILLIAMSON COUNTY GOVERNMENT

May 31, 2019

VIA UNITED STATES MAIL

Mr. John Waits
Nashville Land and Housing Group, LP
P.O. Box 111285
Nashville, TN 37222

RE: Sewer Request for Properties at:
4860 Murfreesboro Road, Arrington, TN 37014
Tax Map 109, Parcel 023.00

4852 Murfreesboro Road, Arrington, TN 37014
Tax Map 109, Parcel 038.00

Mr. Waits:

On May 29, 2019, Williamson County received your request that sewer service be provided to the above-named property. In response to your inquiry, this correspondence confirms that Williamson County Government does not currently provide public sanitary sewer service to this property and has no plans in the foreseeable future to provide said service.

I hope this information is helpful. Should you need anything further, please do not hesitate to contact me.

Sincerely,

Rogers Anderson, Mayor
Williamson County

KR/RCA/dg

xc: Joe Horne, Community Development Director
Kristi Ranson, Attorney-Community Development





May 30, 2019

Mr. John Waits
Waits Development Group, LLC
P.O. Box 111285
Nashville, TN 37222

Sent via email: john.waits1@icloud.com

**RE: High Park Hill Subdivision
4852 & 4860 Murfreesboro Road (SR 96)
Tax Map 109, Parcels 23.00 & 38.00
Arrington, Williamson County, TN**

Dear Mr. Waits:

Milcrofton Utility District does not have a sanitary sewer system and will not provide sewer service to the proposed development known as High Park Hill Subdivision on Murfreesboro Road. The parcels are known as Tax Map 109, Parcels 23.00 (Book 1536, Page 388 ROWC) and Parcel 38.00 (Book 5888, Page 276 ROWC). For further reference, if necessary, a copy of the Milcrofton Utility District Board of Commissioners 1997 resolution can be provided upon request. Milcrofton Utility District will provide water service to this development.

If you have any questions please feel free to contact Mr. Mike Jones, General Manager, or myself at 615.406.3415 or matt@m2groupllc.com. This letter is valid for sixty (60) days.

Sincerely,
Milcrofton Utility District

A handwritten signature in black ink, appearing to read "Matt W. Bryant".

Matt W. Bryant, P.E.

cc: Mike Jones, Michael Wall

As applicable, provide a copy of any application for a franchise and the franchise agreement issued by a city or county.

RESPONSE:

There are no applicable franchise agreements with the county related to the provision of wastewater service to the Hill Parcel and Roberts Parcel. In addition, the Hill Parcel and Roberts Parcel are not located within any municipal boundaries.

Provide all contracts or agreements between the builder(s) of the treatment and/or collection system, the utility, and the property and/or subdivision developer that show entitlement or ownership to the land, system specifications, cost for the wastewater system and timeline for the system to be built, and rights to the system once it is completed. Documents presented should be signed by all parties and bear marks or stamps, such as those provided by notaries or public officials, as necessary.

RESPONSE:

The contract between the parties for wastewater service at Hill Parcel and Roberts Parcel contains confidential information and is being provided under seal.

EXHIBIT 3
MANAGERIAL CAPABILITIES OF KCC

Exhibit 3.1	Biographies of Officers & Key Staff
Exhibit 3.2	State Wastewater Provider Status
Exhibit 3.3	Pending Mergers or Acquisitions
Exhibit 3.4	Construction Company Contractor's License

Provide a biography of all officers and/or key wastewater utility staff that demonstrate managerial ability. Include a list of certifications or professional licenses earned by officers or wastewater utility staff with documentation.

RESPONSE:

Mr. John Powell is the only officer of King's Chapel Capacity. There are no other employees that would be considered as "key wastewater utility staff". Attached is a biography of Mr. Powell demonstrating his managerial experience.

John Powell

Education

Hendersonville High School 1978
Tennessee Tech University
Cookeville TN 1978 – 1981
Tennessee State University
Nashville 1981 – 1982

1983 President – BJ McAdams Truck line, Little Rock Arkansas.

Structure financing of \$26,000,000.00 purchase of this corporation using several banks and financial institutions across the country. Took control completed refinancing of company, then resold back to original owners.

1985 Vice Chairman Finance, President Regan's 2nd Inaugural Taste of America

Responsible for all financial accounts and tracking of expenses related to this inaugural event. Managed a volunteer accounting staff of approximately 12, several of which were CPA's.

1986 to Present - Trailer Lease, Inc.

1986 Purchased A&R Semi Trailer Rental Nashville, TN.
1991 Purchased Guinns Semi Trailer Rental
1997 Purchased C&G Semi Trailer Rental
1998 Purchased B&H Semi Trailer Rental
1999 Purchased Ashland City Semi Trailer Rental

Negotiated the purchase and financing to acquire all of the above companies for my wife and me.

In 1991, the trailer rental company was renamed from A&R to Trailer Lease, Inc. Today Trailer Lease has the largest market share of business in the Middle Tennessee area. We have that market share because of 18 years of on going service to our customers.

During the past several years we have made commercial real estate investments in Davidson County and Williamson County.

Identify all states where the applicant is certified as a wastewater provider and/or the status of certification in states where an application is pending.

RESPONSE:

King's Chapel Capacity and Mr. John Powell have only provided wastewater service in Tennessee to the King's Chapel Subdivision and have no applications pending in any other states.

Provide copies of all contracts related to any pending merger or acquisition of the applicant, corporate parent or affiliate.

RESPONSE:

Neither King's Chapel Capacity nor any of its affiliates have any pending or anticipated mergers or acquisitions that are being considered.

Provide proof that the party contracted to install the proposed system has a valid and current contractor's license by the applicable licensing board of the State of Tennessee.

RESPONSE:

See attached contractor's license. All construction costs will be funded by the developer.



STATE OF TENNESSEE
DEPARTMENT OF
COMMERCE AND INSURANCE



338345

JOHN POWELL CONSTRUCTION LLC

ID NUMBER: 71603
LIC STATUS: ACTIVE
EXPIRATION DATE: October 31, 2019

**BOARD FOR LICENSING CONTRACTORS
CONTRACTOR**

THIS IS TO CERTIFY THAT ALL REQUIREMENTS
OF THE STATE OF TENNESSEE HAVE BEEN MET

Attn:JOHH POWELL
JOHN POWELL CONSTRUCTION LLC
9539 MULLIENS ROAD
ARRINGTON, TN 37014

State of Tennessee

338345 **10761986**

BOARD FOR LICENSING CONTRACTORS

CONTRACTOR

JOHN POWELL CONSTRUCTION LLC

This is to certify that all requirements of the State of Tennessee have been met.

ID NUMBER: 71603
LIC STATUS: ACTIVE
EXPIRATION DATE: October 31, 2019
AGLM \$500,000.00; HC ; HRA ; MU-A ; MU-C ; MU-D



IN-1313
DEPARTMENT OF
COMMERCE AND INSURANCE

EXHIBIT 4
TECHNICAL CAPABILITIES OF KCC

Exhibit 4.1	TDEC State Operating Permit Application
Exhibit 4.2	State Operator Certificate
Exhibit 4.3	Contact Information
Exhibit 4.4	Complaints, Notices or Administrative Actions
Exhibit 4.5	Design Engineer Certification

Provide a copy of the application for State Operating Permit (“SOP”) filed with TDEC. Include the letter from TDEC indicating the receipt of a complete application. Include any engineering and/or design reports submitted to TDEC, such as the Design Development Report and the Detailed Soils Investigation Report. If an operating permit has been issued, provide a copy of the permit. The utility shall file a copy of the TDEC permit in the docket file prior to providing service.

RESPONSE:

Attached are the following documents related to the TDEC State Operating Permit application.

1. KCC’s SOP application that was filed with TDEC
2. Letter from TDEC indicating receipt of the completed application
3. Design Development Report
4. Detailed Soils Investigation Report
5. Wastewater Site Plan

Permit Number: SOP- 03032
(previous)Type of application: ☐ New Permit ☐ Permit Reissuance ☒ Permit Modification**Permittee Identification:** (Name of city, town, utility, industry, corporation, individual, etc., applying, according to the provisions of Tennessee Code Annotated Section 69-3-108 and Regulations of the Tennessee Water Quality Control Board.)Permittee Name
(applicant)/Facility NameMr. John Powell / Superior Wastewater Systems (formerly Kings Chapel Capacity, LLC)

Permittee Address:

P.O. Box 40
Arrington TN 37014

Official Contact:

Mr. John Powell

Title or Position:

Managing Member

Mailing Address:

P.O. Box 34

City:

ARRINGTON

State:

TN

Zip:

37014

Phone number(s):

615-496-8681

E-mail:

john-powell@comcast.net

Optional Contact:

LINDA SULLIVAN

Title or Position:

Engineer

Address:

307 HICKERSON DRIVE

City:

Murfreesboro

State:

TN

Zip:

37129

Phone number(s):

615-516-2852

E-mail:

lsullivan@cia-engineers.com**Application Certification** (must be signed in accordance with the requirements of Rule 1200-4-5-.05)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name and title, print or type

John W Powell

Signature

J. Powell

Date

3/27/19**OFFICIAL STATE USE ONLY**

Received Date	Permit Number SOP	Field Office	Reviewer
---------------	-----------------------------	--------------	----------

Permit Number: SOP-_____

Facility Identification:		Existing Permit No.	
Facility Name: <i>Superior Wastewater Systems - Kings Chapel WWTP</i>		County: <i>Williamson</i>	
Facility Address or Location: <i>4900 Meadowbrook Drive Arrington TN 37014</i>		Latitude: <i>35.866944</i>	
Name of Engineer for the project: <i>Linda Sullivan</i>		Longitude: <i>-86.691944</i>	
Engineer address and phone number: <i>307 Hickerson Dr, Murfreesboro TN 37129, 615-516-2852</i>			
Name and distance to nearest receiving waters: <i>ARRINGTON CREEK - Beside it.</i>			
If any other State or Federal Water/Wastewater Permits have been obtained for this site, list their permit numbers: <i>N/A</i>			
Name of company, utility, or governmental entity that will operate the permitted system: <i>Superior Wastewater Systems (formerly Kings Chapel Community LLC)</i>			
Operator address: <i>P.O. Box 40 Arrington TN 37014</i>			
Has the owner/operator filed for a Certificate of Convenience & Necessity (CCN), or an amended CCN, with the Tennessee Regulatory Authority (TRA) (may be required for collection systems and land application treatment systems)? ☒ Yes ☐ No ☐ N/A			
If the applicant listed above does not yet own the facility/site or if the applicant will not be the operator, explain how and when the ownership will be transferred or describe the contractual arrangement and renewal terms of the contract for operations. <i>N/A</i>			
Name of Public Water Provider: <i>Milerofton Utility District</i>			
List Standard Industrial Codes (SIC)/ North American Industrial Code (s) (NAIC) for proposed activity (these are located at http://www.census.gov/epcd/www/naicstab.htm) <i>n/a</i>			
Complete the following information explaining the entity type, number of design units, and daily design wastewater flow:			
Entity Type	Number of Design Units		Flow (gpd)
☐ City, town or county	No. of connections:		
☒ Subdivision	No. of homes: <i>631</i>	Avg. No. bedrooms per home: <i>4</i>	<i>189,300</i>
☐ School	No. of students:	Size of cafeteria(s):	
		No. of showers:	
☐ Apartment	No. of units:	No. units with Washer/Dryer hookups:	
		No. units without W/D hookups:	
☐ Commercial Business	No. of employees:	Type of business:	
☐ Industry	No. of employees:	Product(s) manufactured:	
☐ Resort	No. of units:		
☐ Camp	No. of hookups:		
☐ RV Park	No. of hookups:	No. of dump stations:	
☐ Car Wash	No. of bays:		
☒ Other	<i>Clubhouse</i>		<i>1500</i>
Describe the type and frequency of activities that result in wastewater generation. <i>Residential Subdivision</i>			

Permit Number: SOP-_____

Engineering Report (required for collection systems and/or land application treatment systems):	☐ N/A
☒ Prepared in accordance with Rule 1200-4-2-.03 and Section 1.2 of the Tennessee Design Criteria (see <u>website</u> for more information)	
☒ Attached, or	
☐ Previously submitted and entitled: <u>2019 DDR Modification for Kings Chapel and Highpoint Hill Subdivisions</u>	Approved? ☐ Yes. Date: ☐ No

Wastewater Collection System:	☐ N/A
System type (i.e., gravity, low pressure, vacuum, combination, etc.): <u>Gravity</u>	
System Description: <u>STEG to RSF & AXMax, UV Disinfection, Drip Irrigation</u>	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.): <u>Emergency generator connections and 24 hours storage in tankage and a site pond.</u>	
In the event of a system failure describe means of operator notification: <u>telephone telemetry</u>	
List the emergency contact(s) (name/phone): <u>615-496-8681</u>	
For low-pressure systems, who is responsible for maintenance of STEP/STEG tanks and pumps or grinder pumps (list all contact information)? <u>N/A</u>	
Approximate length of sewer (excluding private service lateral): <u>78,000 LF</u>	
Number/hp of lift stations: <u>7 / 3 hp and below</u>	Number/hp of lift pumps: <u>14 / 3 hp and below</u>
Number/volume of low pressure and or grinder pump tanks septic tanks <u>→ 632 / 1500 Gallon Septic Tanks</u>	Number/volume
Attach a schematic of the collection system. ☒ Attached	
If this is a satellite sewer and you are tying in to another sewer system complete the following section, listing tie-in points to the sewer system and their location (attach additional sheets as necessary):	
Tie-in Point	Latitude (xx.xxxx°)
Longitude (xx.xxxx°)	
<u>n/a</u>	

Land Application Treatment System:	☐ N/A
Type of Land Application Treatment System: ☒ Drip ☐ Spray ☐ Other, explain:	
Type of treatment facility preceding land application (recirculating media filters, lagoons, other, etc.):	
Attach a treatment schematic. ☒ Attached	
Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.): <u>Storage in septic tanks</u> <u>24 hrs in treatment tankage and storage pond</u>	
For New or Modified Projects:	
Name of Developer for the project: <u>Same owner, just adding lots to Kings Chapel and</u>	
Developer address and phone number: <u>serving dot/development beside this parcel.</u>	
For land application, list: ☒ Proposed acreage involved:	☒ Inches/week gpd/sq.ft loading rate to be applied:
<u>18 acres of new primary & reserve</u>	<u>0.21 gpd/ft²</u>
Is wastewater disinfection proposed?	
☒ Yes Describe land application area access: <u>Will be fenced and gated off.</u>	
☐ No Describe how access to the land application area will be restricted	

Permit Number: SOP-_____

Attach required additional Engineering Report Information (see website for more information)

- ☒ Topographic map (1:24,000 scale presented at a six inch by six inch minimum size) showing the location of the project including quadrangle(s) name(s) GPS coordinates, and latitude and longitude in decimal degrees should also be included.
- ☐ Scaled layout of facility showing the following: lots, buildings, etc. being served, the wastewater collection system routes, the pretreatment system location, the proposed land application area(s), roads, property boundaries, and sensitive areas such as streams, lakes, springs, wells, wellhead protection areas, sinkholes and wetlands.
- ☐ Soils information for the proposed land disposal area in the form of a Water Pollution Control (WPC) Soils Map per Chapter 16 and 17 State of Tennessee Design Criteria for Sewage Work. The soils information should include soil depth (borings to a minimum of 4 feet or refusal) and soil profile description for each soil mapped.
- ☐ Topographic map of the area where the wastewater is to be land applied with no greater than ten foot contours presented at a minimum size of 24 inches by 24 inches.
- ☐ Describe alternative application methods based on the following priority rating: (1) connection to a municipal/public sewer system, (2) connection to a conventional subsurface disposal system as regulated by the Division of Groundwater Protection, and/or (3) land application.

For Drip Dispersal Systems Only: Unless otherwise determined by the Department, sewage treatment effluent wells, i.e., large capacity treatment/drip dispersal systems after approval of the SOP Application, will be issued an UIC tracking number and will be authorized as Permit by Rule per UIC Rule 1200-4-6-.14(2) and upon issue of a State Operating Permit and Sewage System Construction Approval by the Department. Describe the following:

The area of review (AOR) for each Drip Dispersal System shall, unless otherwise specified by the Department, consist of the area lying within a one mile radius or an area defined by using calculations under 1200-4-6-.09 of the Drip Dispersal System site or facility, and shall include, but not be limited to general surface geographic features, general subsurface geology, and general demographic and cultural features within the area. Attach to this part of the application a general characterization of the AOR, including the following: (This can be in narrative form)

- ☐ A general description of all past and present groundwater uses as well as the general groundwater flow direction and general water quality.
- ☐ A general description of the population and cultural development within the AOR; i.e. ☐ agricultural, ☐ commercial, ☐ residential or ☐ mixed.
- ☐ Nature of injected fluid to include physical, chemical, biological or radiological characteristics.
- ☐ If groundwater is used for drinking water within the area of review, then identify and locate on a topographic map all groundwater withdrawal points within the AOR, which supply public or private drinking water systems. Or supply map showing general location of publicly supplied water for the area (this can be obtained from the water provider)
- ☐ If the proposed system is located within a wellhead protection area or source water protection area designated by Rule 1200-5-1-.34, show the boundary of the protection area on the facility site plan.

☐ Description of system, Volume of injected fluid in gallons per day based upon design flow, including any monitoring wells

☐ Nature and type of system, including installed dimensions of wells and construction materials

Pump and Haul:☒ N/A

Reason system cannot be served by public sewer:

Distance to the nearest manhole where public sewer service is available:

When sewer service will be available:

Volume of holding tank: _____ gal.

Tennessee licensed septage hauler (attach copy of agreement):

Facility accepting the septage (attach copy of acceptance letter):

Latitude and Longitude (in decimal degrees) of approved manhole for discharge of septage:

Describe methods to prevent and respond to any bypass of treatment or discharges (i.e., power failures, equipment failures, heavy rains, etc.):

Permit Number: SOP-_____

Holding Ponds (for non-domestic wastewater only):	☒ N/A
Pond use: ☐ Recirculation ☐ Sedimentation ☐ Cooling ☐ Other (describe):	
Describe pond use and operation:	
If the pond(s) are existing pond(s), what was the previous use?	
Have you prepared a plan to dispose of rainfall in excess of evaporation? ☐ Yes ☐ No	
If so, describe disposal plan:	
Is the pond ever dewatered? ☐ Yes ☐ No	
If so, describe the purpose for dewatering and procedures for disposal of wastewater and/or sludge:	
Is(are) the pond(s) aerated? ☐ Yes ☐ No	
Volume of pond(s): _____ gal.	Dimensions: _____
Is the pond lined (Note if this is a new pond system it must be lined for SOP coverage. Otherwise, you must apply for an Underground Injection Control permit.)? ☐ Yes ☐ No	
Describe the liner material (if soil liner is used give the compaction specifications):	
Is there an emergency overflow structure? ☐ Yes ☐ No	
<i>If so, provide a design drawing of structure.</i>	
Are monitoring wells or lysimeters installed near or around the pond(s)? ☐ Yes ☐ No	
<i>If so, provide location information and describe monitoring protocols (attach additional sheets as necessary):</i>	
Attach required additional Information	
☐ Topographic map (1:24,000 scale presented at a six inch by six inch minimum size) showing the location of the project including GPS coordinates, latitude and longitude in decimal degrees quadrangle name should also be included.	
☐ Scaled layout of facility showing the following: lots, buildings, etc. being served, the wastewater collection system routes, the pretreatment system location, roads, property boundaries, and sensitive areas such as streams, lakes, springs, wells, wellhead protection areas, sinkholes and wetlands.	
The area of review (AOR) for each holding pond shall, unless otherwise specified by the Department, consist of the area lying within and below a one mile radius of the holding pond site or facility, and shall include, but not be limited to surface geographic features, subsurface geology, and demographic and cultural features within the area. Attach to this part of the application a complete characterization of the AOR, including the following: (This can be in narrative form)	
☐ Description of all past and present uses of groundwater within the AOR, as documented by public record.	
☐ Description of the groundwater hydrology within the AOR, including characteristics of all subsurface aquifers, presence or absence of solution development features, general direction of groundwater movement, and chemical characteristics of the ground waters in the AOR..	
☐ Description of the population and cultural development within the AOR, including the number of persons living within one mile of the well or facility, land uses within the AOR, and the existence of any community, state, regional or national parks, wildlife refuges, natural or wilderness areas, recreational or other public-use areas, or any other environmentally sensitive features within the area of review.	
☐ If groundwater is used for drinking water within the area of review, then identify and locate on a topographic map all groundwater withdrawal points within the AOR, which supply public or private drinking water systems..	
☐ Identify any surface water intake, which supplies a public water distribution system and is located within the AOR or within three miles topographically down gradient from the well or facility. If any such intake(s) wells or springs exist, then locate on map	

Permit Number: SOP-_____

Mobile Wash Operations:☒ N/A☐ Individual Operator☐ Fleet Operation Operator**Indicate the type of equipment, vehicle, or structure to be washed during normal operations (check all that apply):**☐ Cars☐ Parking Lot(s): sq. ft.☐ Trucks☐ Windows: sq. ft.☐ Trailers (Interior washing of dump-trailers, or tanks, is prohibited.)☐ Structures (describe):☐ Other (describe):**Wash operations take place at (check all that apply):**☐ Car sales lot(s)☐ Public parking lot(s)☐ Private industry lot(s)☐ Private property(ies)☐ County(ies), list:☐ Statewide**Wash equipment description:**☐ Truck mounted☐ Trailer mounted☐ Rinse tank size(s) (gal.):☐ Mixed tanks size(s) (gal.):☐ Collection tank size(s) (gal.):

Number of tanks per vehicle:

Pressure washer: psi (rated) gpm (rated)

Pressure washer: ☐ gas powered ☐ electric

Vacuum system manufacturer/model:

Vacuum system capacity: inches Hg

Describe any other method or system used to contain and collect wastewater:

List the public sewer system where you are permitted or have written permission to discharge waste wash water (include a copy of the permit or permission letter):

Are chemicals pre-mixed, prior to arriving at wash location? ☐ Yes ☐ No**Describe all soaps, detergents, or other chemicals used in the wash operation (attach additional sheets as necessary):**

Chemical name:

Manufacturer:

Primary CAS No. or Product No.



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES

William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102

May 14, 2019

Mr. John Powell
Managing Member
Superior Wastewater Systems
e-copy: john-powell@comcast.net
PO Box 40
Arrington, TN 37014

Subject: **Draft of Modification to State Operating Permit No. SOP-03032**
Superior Wastewater Systems, LLC
College Grove, Williamson County, Tennessee

Dear Mr. Powell:

Enclosed please find a draft copy of the modified State Operating Permit No. SOP-03032 which the Division of Water Resources (the division) proposes to issue. This draft copy is furnished to you solely for your review of its provisions. No wastewater discharges are authorized by this proposed modification. The issuance of an official modified permit is contingent upon your meeting all of the requirements of the Tennessee Water Quality Control Act and the Rules and Regulations of the Tennessee Water Quality, Oil and Gas Board.

If you disagree with the provisions and requirements contained in the draft permit, you have thirty (30) days from the date of this correspondence to notify the division of your objections. If your objections cannot be resolved, you may appeal this permit upon issuance. This appeal should be filed in accordance with Section 69-3-110 of the Tennessee Code Annotated.

If you have questions, please contact the Nashville Environmental Field Office at 1-888-891-TDEC; or, at this office, please contact Ms. Anastasia Sharp at (615) 532-1508 or by E-mail at Anastasia.Sharp@tn.gov.

Sincerely,

Brad C. Harris, P.E.
Manager, Land-Based Systems

Enclosure

cc: Permit File
Nashville Environmental Field Office
Ms. Patsy Fulton, Utility Rate Specialist, Tennessee Regulatory Authority, Patsy.Fulton@tn.gov
Ms. Linda Sullivan, Engineer, Civil Infrastructure Associates, LLC, lsullivan@cia-engineers.com

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102

Permit No. SOP-03032

PERMIT

For the operation of Wastewater Treatment Facilities

In accordance with the provision of Tennessee Code Annotated section 69-3-108 and Regulations promulgated pursuant thereto:

PERMISSION IS HEREBY GRANTED TO

Superior Wastewater Systems, LLC
College Grove, Williamson County, Tennessee

FOR THE OPERATION OF

Septic tanks, effluent collection system, recirculating sand filter, Orenco Advantex media filters UV disinfection and drip irrigation system located at latitude 35.87006 and longitude -86.69482 in Williamson County, Tennessee to serve approximately 631 homes in the Kings Chapel and High Point Hill subdivisions. The design capacity of the system is .1908 MGD.

This permit is issued as a result of the application filed on April 15, 2019, in the office of the Tennessee Division of Water Resources. This permit is contingent on the submission and department approval of construction plans, specifications and other data in accordance with rules of the department. Updated plans and specifications must be approved before any further construction activity.

This permit shall become effective on:

This permit shall expire on:

Issuance date:

for Jennifer Dodd
Director

A. GENERAL REQUIREMENTS

The treatment system shall be monitored by the permittee as specified below:

<u>Parameter</u>	<u>Sample Type</u>	<u>Daily Maximum</u>	<u>Monthly Average</u>	<u>Measurement Frequency</u>
Flow *	Totalizer			Daily
BOD ₅	Grab	45 mg/l	N/A	Once/Year
Ammonia as N	Grab	Report	N/A	Once /Quarter

* Report average daily flow for each calendar month.

Sampling requirements in the table above apply to effluent being discharged to the drip irrigation plots.

This permit allows the operation of a wastewater collection, treatment, and storage system with disposal of treated wastewater through approved land application areas. There shall be no discharge of wastewater to any surface waters or to any location where it is likely to enter surface waters. There shall be no discharge of wastewater to any open throat sinkhole. In addition, the drip irrigation system shall be operated in a manner preventing the creation of a health hazard or a nuisance.

The land application component shall be operated and maintained to ensure complete hydraulic infiltration within the soil profile, transmission of the effluent away from the point of application, and full utilization of the soil profile as a portion of the treatment system.

Instances of surface saturation, ponding or pooling within the land application area as a result of system operation are prohibited. Instances of surface saturation, ponding or pooling shall be promptly investigated and noted on the Monthly Operations Report. The report shall include details regarding location(s), determined cause(s), the actions taken to eliminate the issue, and the date the corrective actions were made. Any instances of surface saturation, ponding or pooling not associated with a major precipitation event not corrected within three days of discovery shall be reported to the local Environmental Field Office at that time for investigation. Surface saturation, ponding or pooling resulting in the discharge of treated wastewater into Waters of the State or to locations where it is likely to move to Waters of the State shall be immediately reported to the local Environmental Field Office, unless the discharge is separately authorized by a NPDES permit.”

All drip fields shall be fenced sufficiently to prevent or impede unauthorized entry as well as to protect the facility from vandalism. Fencing shall be a minimum of four feet in height. Fencing shall be constructed of durable materials. Gates shall be designed and constructed in a manner to prevent or impede unauthorized entry. All designs are subject to division approval. Fence shall be installed prior to beginning of operation.

All drip lines shall be buried and maintained 6 to 10 inches below the ground surface.

The site shall be inspected by the certified operator or his/her designee, at a minimum, once per fourteen days (default) OR in accordance with an operating and maintenance inspection schedule in the permit administrative file record. The default inspection frequency will apply if an operating and maintenance inspection schedule is not submitted to be a part of the permit administrative file record. The operating and maintenance inspection schedule shall at a minimum evaluate the following via onsite visits or telemetry monitoring or a combination of the two:

- the condition of the treatment facility security controls (doors, fencing, gates, etc.),
- the condition of the drip area security controls (doors, fencing, gates, etc.),
- the condition of the site signage,
- the operational status of the mechanical parts of the treatment system (pumps, filters, telemetry equipment, etc.)
- the condition of the UV bulbs (if applicable)
- the condition of the land application area including the location of any ponding
- the name of the inspector
- the description of any corrective actions

Submission of the schedule, or revisions to the schedule, may be submitted to the division electronically. The schedule shall be submitted on or before the effective date of the permit. The permittee is responsible for maintaining evidence that the schedule, or revisions, have been submitted to the division.

B. MONITORING PROCEDURES

1. Representative Sampling

Samples and measurements taken in compliance with the monitoring requirements specified above shall be representative of the volume and nature of the monitored discharge, and shall be taken at the following location(s):

Effluent to drip irrigation plots.

2. Test Procedures

Unless otherwise noted in the permit, all pollutant parameters shall be determined according to methods prescribed in Title 40, CFR, Part 136.

C. DEFINITIONS

The "daily maximum concentration" is a limitation on the average concentration, in milligrams per liter, of the discharge during any calendar day.

The "*monthly average concentration*", other than for *E. coli* bacteria, is the arithmetic mean of all the composite or grab samples collected in a one-calendar month period.

A "grab sample" is a single influent or effluent sample collected at a particular time.

For the purpose of this permit, "*continuous monitoring*" means collection of samples using a probe and a recorder with at least one data point per dosing cycle.

A "quarter" is defined as any one of the following three-month periods: January 1 through March 31, April 1 through June 30, July 1 through September 30, and/or October 1 through December 31.

"Wastewater" for the purpose of this permit means "sewage" as defined in TCA 69-3-103

D. REPORTING

1. Monitoring Results

Monitoring results shall be recorded consistent with the general requirements imposed in Part A above OR in accordance with the operating and maintenance inspection schedule in the permit administrative file record and submitted quarterly.

Submittals shall be postmarked no later than 15 days after the completion of the reporting period. A copy should be retained for the permittee's files. Monitoring results shall be reported in a format approved by the division. Operation reports and any communication regarding compliance with the conditions of this permit must be sent to:

Division of Water Resources
Nashville Environmental Field Office
711 R.S. Gass Boulevard
Nashville, TN 37216

Sampling results may be submitted electronically to: DWRWW.Report@tn.gov.

The first operation report is due on the 15th of the month following the quarter containing the permit effective date.

2. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified in Rule 0400-40-05-.07(2)(h)2, the results of such monitoring shall be included in the calculation and reporting of the values required in the Quarterly Operation Report. Such increased frequency shall also be indicated.

3. Falsifying Reports

Knowingly making any false statement on any report required by this permit may result in the imposition of criminal penalties as provided for in Section 69-3-115 of the Tennessee Water Quality Control Act.

4. Signatory Requirement

All reports or information submitted to the commissioner shall be signed and certified by the persons identified in Rules 0400-40-05-.05(6)(a-c).

PART II

A. GENERAL PROVISIONS

1. Duty to Reapply

The permittee is not authorized to discharge after the expiration date of this permit. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit such information and forms as are required to the Director of Water Resources (the "Director") no later than 180 days prior to the expiration date.

2. Right of Entry

The permittee shall allow the Director, or authorized representatives, upon the notification of permittee and presentation of credentials:

a. To enter upon the permittee's premises where an effluent source is located or where records are required to be kept under the terms and conditions of this permit, and at reasonable times to copy these records;

b. To inspect at reasonable times any monitoring equipment or method or any collection, treatment, pollution management, or discharge facilities required under this permit; and

c. To sample at reasonable times any discharge of pollutants.

3. Availability of Reports

All reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Division of Water Resources.

4. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems (and related appurtenances) for collection and treatment which are installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory and process controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. Backup continuous pH and flow monitoring equipment are not required.

The monitoring frequency stated in this permit shall not be construed as specifying a minimum level of operator attention to the facility. It is anticipated that visits to the treatment facility by the operator will occur at intervals frequent enough to assure proper operation and maintenance, but in no case less than one visit every fourteen days OR in accordance with an operating and maintenance inspection schedule in the permit administrative file record. If monitoring reports, division's inspection reports, or other information indicates a problem with the facility, the permittee may be subject to enforcement action and/or the permit may be modified to include increased parameter monitoring, increased monitoring frequency or other requirements as deemed necessary by the division to correct the problem. The permittee shall ensure that the certified operator is in charge of the facility and observes the operation of the system frequently enough to ensure its proper operation and maintenance regardless of the monitoring frequency stated in the permit

Dilution water shall not be added to comply with effluent requirements.

5. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

6. Severability

The provisions of this permit are severable. If any provision of this permit due to any circumstance, is held invalid, then the application of such provision to other circumstances and to the remainder of this permit shall not be affected thereby.

7. Other Information

If the permittee becomes aware that he failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, then he shall promptly submit such facts or information.

B. CHANGES AFFECTING THE PERMIT

1. Planned Changes

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility.

2. Permit Modification, Revocation, or Termination

a. This permit may be modified, revoked and reissued, or terminated for cause as described in Section 69-3-108 (h) of the Tennessee Water Quality Control Act as amended.

b. The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

3. Change of Ownership

This permit may be transferred to another person by the permittee if:

a. The permittee notifies the Director of the proposed transfer at least 30 days in advance of the proposed transfer date;

b. The notice includes a written agreement between the existing and new permittees containing a specified date for transfer of permit responsibility, coverage, and liability between them; and

c. The Director, within 30 days, does not notify the current permittee and the new permittee of his intent to modify, revoke or reissue, or terminate the permit and to require that a new application be filed rather than agreeing to the transfer of the permit.

4. Change of Mailing Address

The permittee shall promptly provide to the Director written notice of any change of mailing address. In the absence of such notice the original address of the permittee will be assumed to be correct.

C. NONCOMPLIANCE

1. Effect of Noncompliance

Any permit noncompliance constitutes a violation of applicable State laws and is grounds for enforcement action, permit termination, permit modification, or denial of permit reissuance.

2. Reporting of Noncompliance

a. 24-Hour Reporting

In the case of any noncompliance which could cause a threat to public drinking supplies, or any other discharge which could constitute a threat to human health or the environment, the required notice of non-compliance shall be provided to the appropriate Division environmental field office within 24 hours from the time the permittee becomes aware of the circumstances. (The environmental field office should be contacted for names and phone numbers of emergency response personnel.)

A written submission must be provided within five days of the time the permittee becomes aware of the circumstances unless this requirement is waived by the Director on a case-by-case basis. The permittee shall provide the Director with the following information:

- i. A description of the discharge and cause of noncompliance;
- ii. The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue; and

iii. The steps being taken to reduce, eliminate, and prevent recurrence of the non complying discharge.

b. Scheduled Reporting

For instances of noncompliance which are not reported under subparagraph 2.a. above, the permittee shall report the noncompliance on the Quarterly Operation Report. The report shall contain all information concerning the steps taken, or planned, to reduce, eliminate, and prevent recurrence of the violation and the anticipated time the violation is expected to continue.

3. Overflow

a. "**Overflow**" means the discharge of wastewater from any portion of the collection, transmission, or treatment system other than through permitted outfalls.

b. Overflows are prohibited.

c. The permittee shall operate the collection system so as to avoid overflows.

d. No new or additional flows shall be added upstream of any point in the collection system, which experiences chronic overflows (greater than 5 events per year) or would otherwise overload any portion of the system. Unless there is specific enforcement action to the contrary, the permittee is relieved of this requirement after: 1) an authorized representative of the Commissioner of the Department of Environment and Conservation has approved an engineering report and construction plans and specifications prepared in accordance with accepted engineering practices for correction of the problem; 2) the correction work is underway; and 3) the cumulative, peak-design, flows potentially added from new connections and line extensions upstream of any chronic overflow point are less than or proportional to the amount of inflow and infiltration removal documented upstream of that point. The inflow and infiltration reduction must be measured by the permittee using practices that are customary in the environmental engineering field and reported in an attachment to a Monthly Operating Report submitted to the local TDEC Environmental Field Office on a quarterly basis. The data measurement period shall be sufficient to account for seasonal rainfall patterns and seasonal groundwater table elevations.

e. In the event that more than 5 overflows have occurred from a single point in the collection system for reasons that may not warrant the self-imposed moratorium or completion of the actions identified in this paragraph, the permittee may request a meeting with the Division of Water Resources EFO staff to petition for a waiver based on mitigating evidence.

4. Upset

a. "**Upset**" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond

the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. An upset shall constitute an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee demonstrates, through properly signed, contemporaneous operating logs, or other relevant evidence that:

- i. An upset occurred and that the permittee can identify the cause(s) of the upset;
- ii. The permitted facility was at the time being operated in a prudent and workman-like manner and in compliance with proper operation and maintenance procedures;
- iii. The permittee submitted information required under "Reporting of Noncompliance" within 24-hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within five days); and
- iv. The permittee complied with any remedial measures required under "Adverse Impact."

5. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to the waters of Tennessee resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

6. Bypass

- a. "**Bypass**" is the intentional diversion of wastewater away from any portion of a treatment facility.
- b. Bypasses are prohibited, unless:
 - i. The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
 - ii. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have

been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

iii. For anticipated bypass, the permittee submits prior notice, if possible at least ten days before the date of the bypass; or

iv. For unanticipated bypass, the permittee submits notice of an unanticipated bypass within 24 hours from the time that the permittee becomes aware of the bypass.

c. A bypass that does not cause effluent limitations to be exceeded may be allowed only if the bypass is necessary for essential maintenance to assure efficient operation.

d. "Severe property damage" when used to consider the allowance of a bypass means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

D. LIABILITIES

1. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Notwithstanding this permit, the permittee shall remain liable for any damages sustained by the State of Tennessee, including but not limited to fish kills and losses of aquatic life and/or wildlife, as a result of the discharge of wastewater to any surface or subsurface waters. Additionally, notwithstanding this Permit, it shall be the responsibility of the permittee to conduct its wastewater treatment and/or discharge activities in a manner such that public or private nuisances or health hazards will not be created.

2. Liability Under State Law

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law.

PART III OTHER REQUIREMENTS

A. CERTIFIED OPERATOR

The waste treatment facilities shall be operated under the supervision of a Biological Natural System certified wastewater treatment operator and collection system shall be operated under the supervision of a the grade I certified collection system operator in accordance with the Water Environmental Health Act of 1984.

B. PLACEMENT OF SIGNS

The permittee shall place a sign at the entrance to the land application area if fenced or all reasonable approaches to the land application area. The sign should be clearly visible to the public. The minimum sign size should be two feet by two feet (2' x 2') with one inch (1") letters. The sign should be made of durable material

**RECLAIMED WASTEWATER
DRIP IRRIGATION
(PERMITTEE'S NAME)
(PERMITTEE'S PHONE NUMBER)
TENNESSEE DIVISION OF WATER
RESOURCES
Nashville Environmental Field Office
PHONE NUMBER: 1-888-891-8332**

C. ADDITION OF WASTE LOADS

The permittee may not add wasteloads to the existing treatment system without the knowledge and approval of the division.

D. SEPTIC (STEP) TANK OPERATION

The proper operation of this treatment system depends, largely, on the efficient use of the septic tank. The solids that accumulate in the tank shall be removed at a frequency that is sufficient to insure that the treatment plant will comply with the discharge requirements of this permit.

E. SEPTAGE MANAGEMENT PRACTICES

The permittee must comply with the provisions of Rule 0400-48-01-.22. If the septage is transported to another POTW for disposal, the permittee shall note the amount of septage wasted

in gallons and name of the facility the hauler intends to use for disposal of the septage on the monthly operation report. Sludge or any other material removed by any treatment works must be disposed of in a manner which prevents its entrance into or pollution of any surface or subsurface waters. Additionally, the disposal of such sludge or other material must be in compliance with the Tennessee Solid Waste Disposal Act, TCA 68-31-101 et seq. and Tennessee Hazardous Waste Management Act, TCA 68-46-101 et seq.

F. OWNERSHIP OF THE TREATMENT FACILITIES

a. The permittee shall own the treatment facilities (and the land upon which they are constructed) including the land to be utilized for drip or spray irrigation. A perpetual easement (properly recorded) may be accepted in lieu of ownership. Evidence of ownership of the treatment facility land application site(s) and/or a copy of the perpetual easement(s) must be furnished to the division for approval prior to construction of the wastewater collection and treatment system. Signed agreements stating the intent of the existing landowner to transfer ownership may be provided to support permit issuance. Final SOP's will not be issued without establishing ownership/access rights.

b. Where the treatment facility serves private homes, condominiums, apartments, retirement homes, nursing homes, trailer parks, or any other place where the individuals being served have property ownership, rental agreements, or other agreements that would prevent their being displaced in the event of abandonment or noncompliance of the sewerage system, ownership of the treatment facilities must be by a municipality, a public utility, a wastewater authority, or a privately owned public utility (having a Certificate of Convenience and Necessity from the Tennessee Public Utility Commission or another public agency).

Attachment 1
STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES-WATER SUPPLY BRANCH
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue
Nashville, Tennessee 37243

MEMORANDUM

TO: Hari Akunuri, WPC-CO

FROM: Allen Rather, DWS- Ground Water Management Section

DATE: 9/16/2013

SUBJECT: LCSS/SFDS (Class V Injection) Approval
King's Chapel Capacity, LLC
Arrington, Williamson County, Tennessee
UIC File WIL 0000057 SOP-03032

The Division of Water Resources has reviewed the submittal of an Application for Authorization to Operate a Class V Underground Injection Well (Large Capacity Septic System/Subsurface Fluid Disposal System) utilizing conventional disposal for the waste water at the King's Chapel Capacity located at Arrington, Williamson County, Tennessee. This Division approves the application dated 6/08/2013.

If at any time the Division learns that a ground water discharge system may be in violation of The Tennessee Water Quality Control Act, the Division shall:

- a. require the injector to apply for an individual permit;
- b. order the injector to take such actions including, where required, closure of the injection well as may be necessary to prevent the violation; or
- c. take enforcement action.

All groundwater discharge activities must operate in such a manner that they do not present a hazard to groundwater.

King's Chapel Capacity, LLC shall also conduct a monthly visual inspection of the complete drip field looking for any signs of failure.

In accordance with Underground Injection Control (UIC) Rule 1200-4-6-.14 (3) "The owner of a Class V well shall be responsible for notifying the Department of change in ownership." This notification must be made to this Division within thirty (30) days of the change in ownership.

Also note that according to Underground Injection Control (UIC) Rule 1200-4-6-.14 (8)(d) "Upon completion of the well, the owner or operator must certify to the Department that the well has been completed in accordance with the approved construction plan, and must submit any other additional information required". The certification must be submitted to the UIC Program within thirty (30) days upon the completion/closure of the Class V well.

This Division will require a minimum of seven (7) working days advance notice before the construction on the drip system is to begin to allow for a witness from this Division to be present.

No drip emitters are to discharge directly into an open throat or crevice in the subsurface. All drip lines are to be installed on contour.

Our concurrence with your approach does not imply that this procedure is exempt from future changes or restrictions in the Underground Injection Control (UIC) Regulations, or any additional requirements set forth by the Division in order to protect the groundwater of Tennessee.

A copy of this authorization must be kept on site until the development has been completed and must be made available to inspection personnel.

Should you have any questions or comments please feel free to contact me at (615) 532-5819 or allen.rather@tn.gov.

c: file

**DESIGN DEVELOPMENT REPORT
ON-SITE WASTEWATER SYSTEM
FOR
ADDITION TO KINGS CHAPEL
WILLIAMSON COUNTY, TENNESSEE**

March 2008

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DESIGN DEVELOPMENT REPORT

- 1.0 Site Description:
 - 1.1 Location map
 - 1.2 Climate
 - 1.3 Geology (including subsurface hydrology)
 - 1.4 Topography
 - 1.5 Access
 - 1.6 Water supply wells within 1,500 L.F. of facility
 - 1.7 Centralized Wastewater Treatment/Disposal (CWTD) Evaluation
 - a. Identify potential CWTD service area (topographic maps of area adjacent to proposed project).
 - b. Evaluation of the Facility for providing a CWTD system in the service area. (Nature and extent of the area to be served, including immediate and probable future development).
 - c. Summary, conclusion and plan of service regarding the potential CWTD systems within the identified service area.
- 2.0 Scaled drawing with 2 foot elevation contours showing the preliminary site layout including:
 - 2.1 Pre-application treatment facilities
 - 2.2 Storage facilities
 - 2.3 Disposal fields
 - 2.4 Buffer zones
 - 2.5 Hand auger, test pit and soil boring locations
 - 2.6 Access roads and utilities
 - 2.7 Watercourses
 - 2.8 Drainage structures
 - 2.9 Flood elevations with 10 year, 50 year, and 100 year flood plain elevation noted
 - 2.10 Residences and habitable structures within or adjacent to site
 - 2.11 Wells within 500 ft. of the site
- 3.0 Design wastewater characteristics (influent to pre-application treatment and treated effluent to disposal fields). If the project involves an existing facility, then actual, recent data should be used:
 - 3.1 Average and peak daily flows
 - 3.2 Biochemical Oxygen Demand

- 3.3 Total Suspended Solids
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- 4.0 Water Balance/determination of design wastewater loading rates for each disposal field

- 5.0 Nitrogen Balance/selection of cover crop and management scheme

- 6.0 Background groundwater samples

- 7.0 Phosphorus and other constituent loading rates

- 8.0 Determination of wetted field area(s) and required storage volume

- 9.0 Process design for pre-application treatment facility
 - 9.1 Schematic of pump stations and unit processes.
 - 9.2 Basin volumes, loading rates, hydraulic detention times, etc. (aerobic or anaerobic).
 - 9.3 Capacity of all pumps, blowers and other mechanical equipment. Pump curves and hydraulic calculations for the distribution system must accompany the DDR.
 - 9.4 Design life of treatment and disposal system

- 10.0 Detailed Soil Investigation Report (reference Table 1.9.1)

- 11.0 The back-up wastewater disposal site(s) shall be identified and shown in the DDR. All proposed uses for the back-up site(s) shall be described in the DDR.

- 12.0 Detailed construction cost estimate for the wastewater treatment and disposal system. Cost estimate shall include all components required for proper operation of system, i.e., septic tanks, collection lines, treatment systems, land cost, disposal site costs, etc.

- 13.0 Description of the "back-up" system proposed in accordance with regulations. Cost estimate for back-up system shall include all required components and modifications to existing system, sewer connection fees to public sewer system, additional land and/or system costs.

- 14.0 If auxiliary disposal sites are anticipated beyond the primary dedicated disposal site, these sites or disposal options must be presented for review. Beneficial reuse opportunities with treated wastewater will be considered on a case-by-case basis.

TABLE 1.9

DESIGN DEVELOPMENT REPORT

1.0 Site Description

- 1.1 The site is located in Williamson County, Tennessee on Highway 96 in the Arrington community. A location map is included as Exhibit 1.1.

1.2 The Climate Data:

Located in the North Temperature Zone, Middle Tennessee has generally mild climate year round but still has four distinct seasons. The average high temperature in winter is 49 degrees F, and the average low temperature is 30 degrees F. In the summer, the average high temperature is 89 degrees F, and the average low temperature is 67 degrees F. The average annual precipitation is 47.3 inches, and the average annual snowfall is 11.1 inches.

Plotted Climatology Data is provided in Exhibit 1.2.

1.3 GEOLOGY:

The site lies in the Central Basin in Tennessee. The area is underlain by the Hermitage Formation and Carters Limestone.

Geology map and descriptions are included as Exhibit 1.3.

1.4 Topography:

The site ranges from hilly to gently sloping to nearly level. Arrington Creek runs through the property from approximately the middle of the Northern most property line and runs Southwest, leaving the property at the west side of the Southern property line. An unnamed tributary to Arrington Creek enters the property at the Northwest corner and runs along the Western most property line, turning southeast and leaving the property at the west side of the southern property line and joining the Arrington Creek after crossing Highway 96. Slopes on the site range from about 2% to 25%. The site has cultivated pastures to mature woodlands. The site layout plan provided herewith as Exhibit 2.0 has 2-foot contours.

1.5 Access:

Access to the property facilities is off of Highway 96, also known as Murfreesboro Road, in the Arrington community of Williamson County. A locked gate at the access drive and fence provide some security.

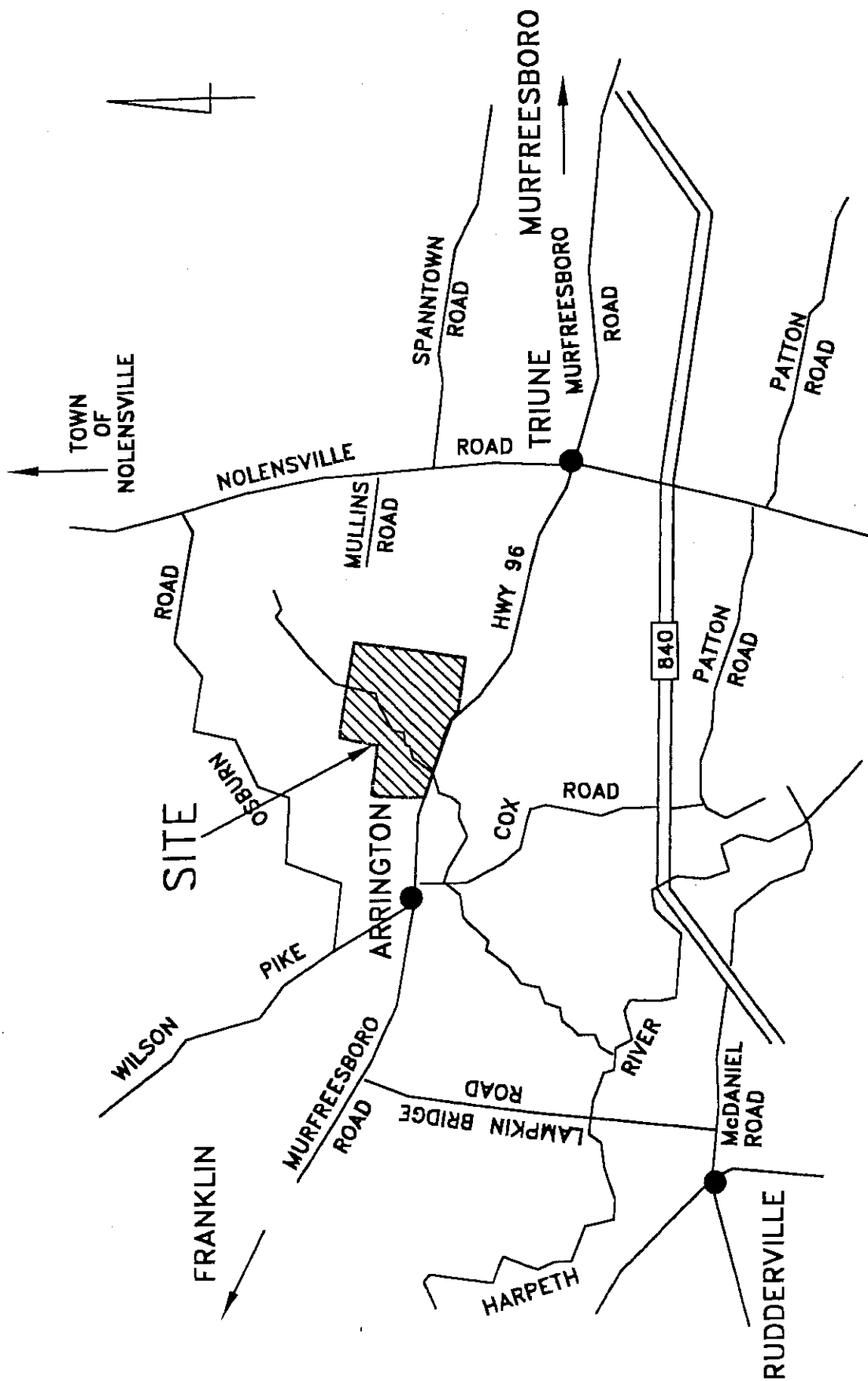
1.6 **Water Supply Wells Within 1,500 L.F. of Facility**

Included are "Records of Water Wells on the Franklin Quadrangle", "records of Water Wells on the Nolensville Quadrangle", "Records of Water Wells on the College Grove quadrangle", and "Records of Water Wells on the Bethesda quadrangle" from the Tennessee Department of Environment and Conservation – Division of Water Supply. The well data is included as Exhibit 1.6. There are no wells within 1,500 linear feet of the proposed facility.

Table 1.9
1.0 Site Description

Exhibit 1.1 – Location Map

LOCATION MAP
OF THE
PROPOSED ADDITION TO KING'S CHAPEL



VICINITY MAP
N.T.S.

Table 1.9
1.0 Site Description

Exhibit 1.2 – Climate Data

PLOTTED CLIMATOLOGICAL DATA
FOR THE AREA OF THE
PROPOSED ADDITION TO KINGS CHAPEL



US Climatology Plots

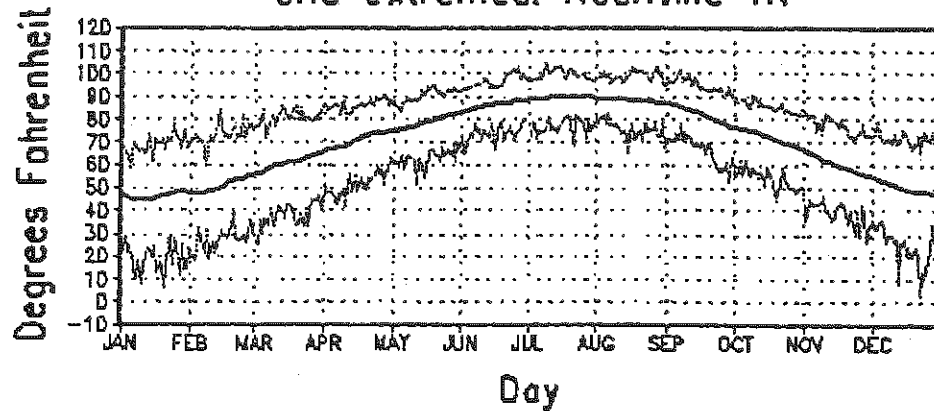
Lat=36.1N Lon=86.4W Elevation=600 feet

Number of years available from 1961 to 1990: 30

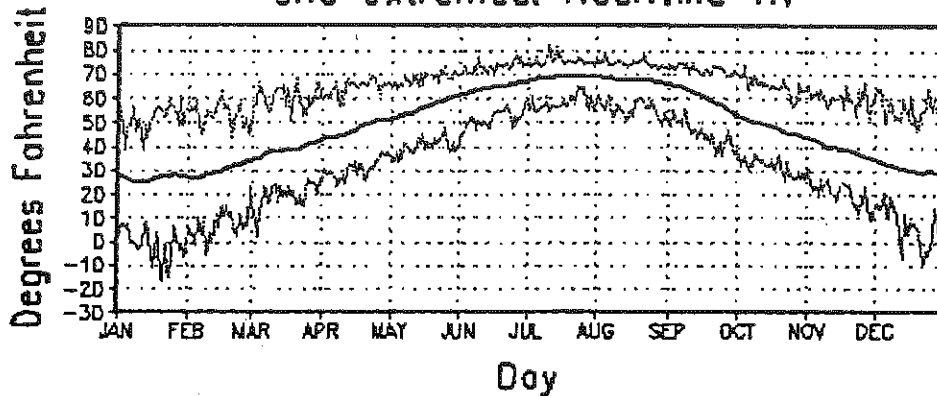
Maximum temperature 1961 to 1990: 105 F Minimum temperature 1961 to 1990: -17 F

Mean Annual Precipitation: 47.3 inches Mean Annual Snowfall: 11.1 inches

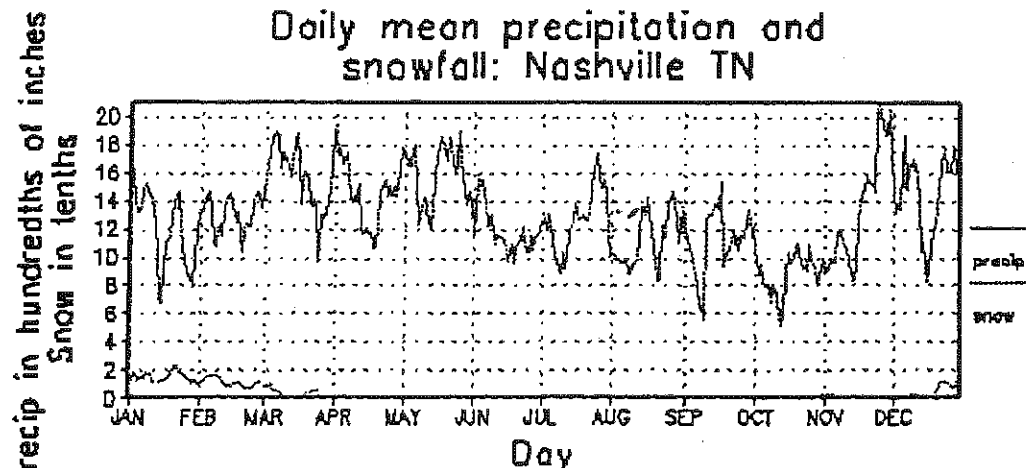
Daily mean maximum temperature
and extremes: Nashville TN



Daily mean minimum temperature
and extremes: Nashville TN

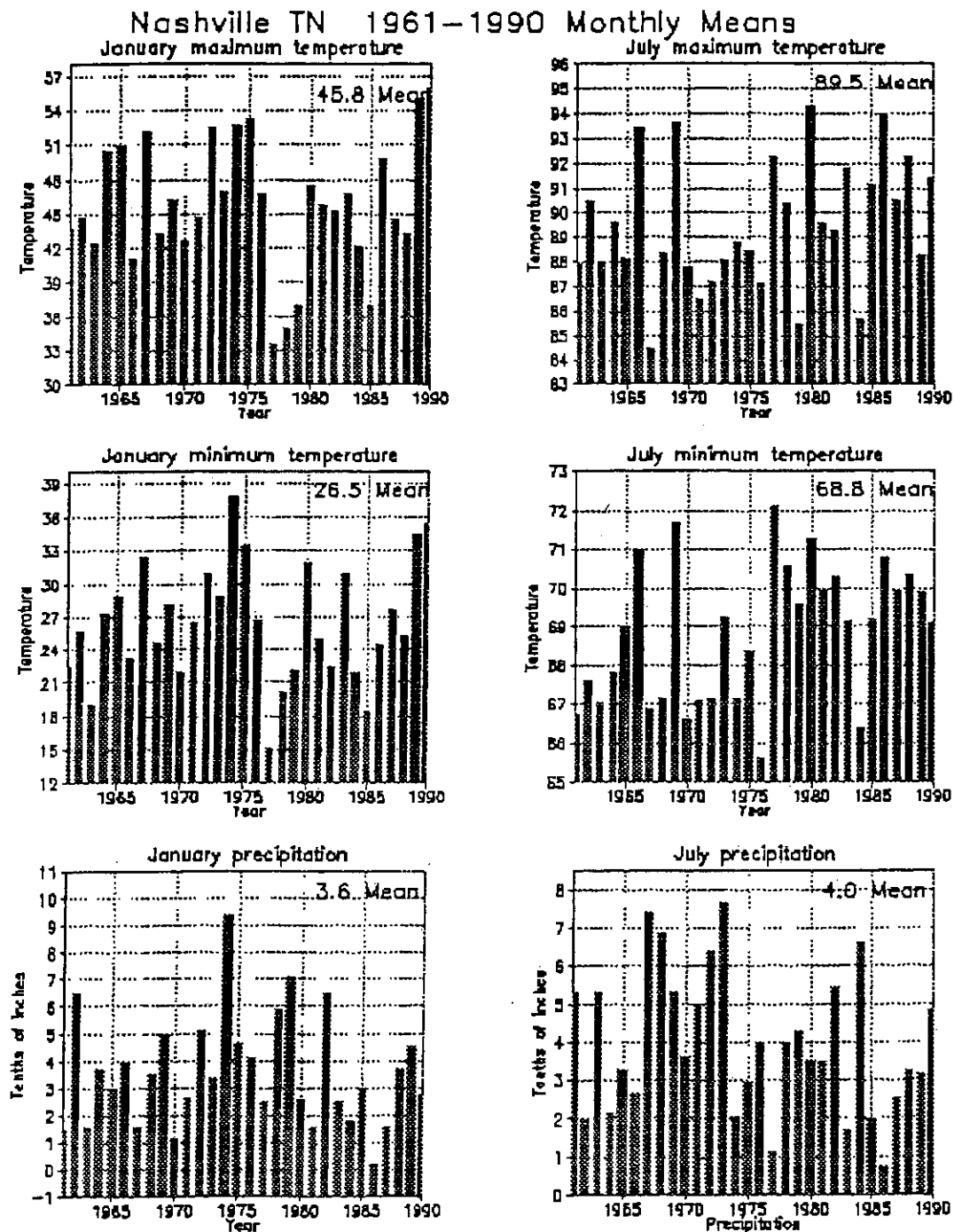


Daily mean precipitation and
snowfall: Nashville TN



NOAA-CIRES/Climate Diagnostics Center

Lat=36.1N Lon=86.4W Elevation=600 feet
 Number of years available from 1961 to 1990: 30



Lat=36.1N Lon=86.4W Elevation=600 feet

Annual average chance of precipitation: 32.4%

Annual average wind speed: 8.1 mph

Annual average percent of available sun: 55.0%

Daily Chance of Precipitation Nashville TN

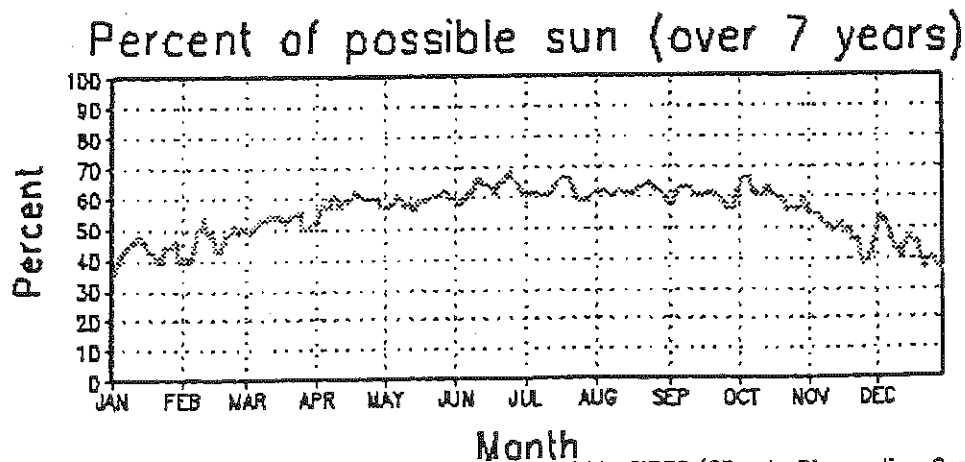
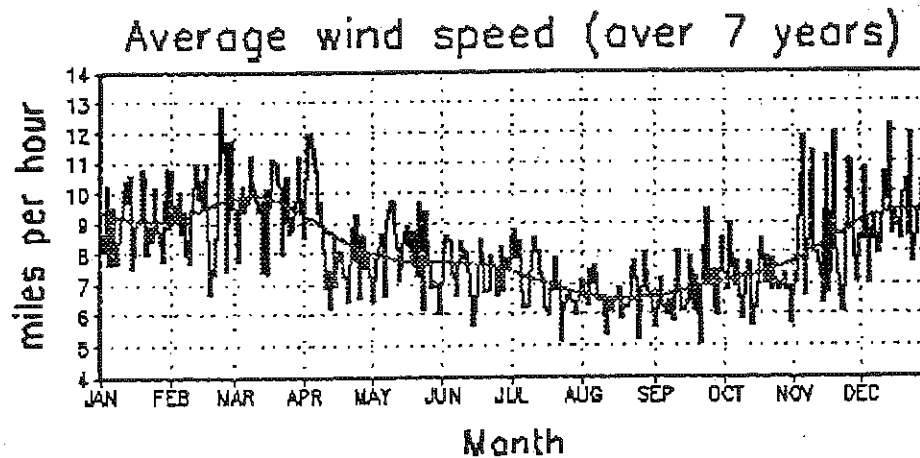
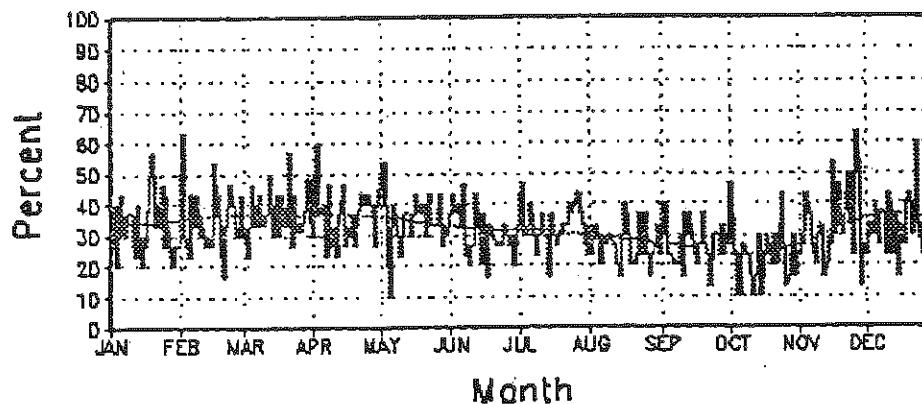


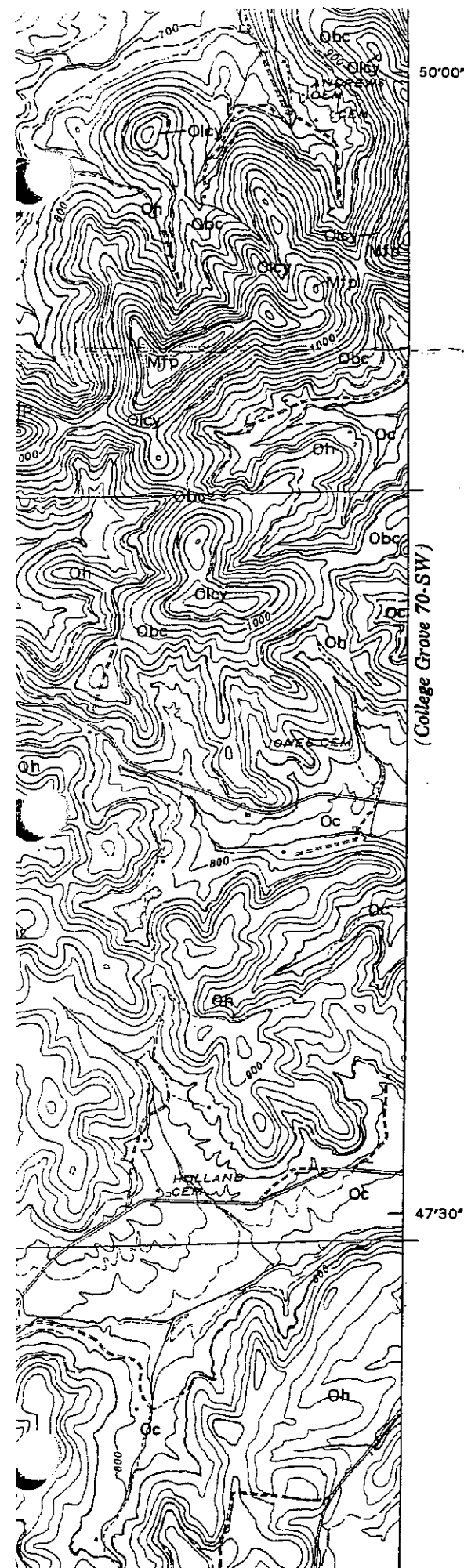
Table 1.9
Site Description

Exhibit 1.3 – Geologic Map

GEOLOGIC MAP
OF THE
PROPOSED ADDITION TO KINGS CHAPEL

STATE OF TENNESSEE
DEPARTMENT OF CONSERVATION
DIVISION OF GEOLOGY





Obc

Bigby-Cannon Limestone

The Bigby-Cannon Limestone in the Bethesda quadrangle consists of three facies—the Cannon limestone, Dove-colored limestone, and Bigby limestone—which replace each other laterally and vertically. The Bigby comprises the upper and lower parts of the formation, thinning to the southeast; the middle part is composed largely of the other two facies. The formation ranges in thickness from 80 to 110 feet.

Cannon limestone facies is medium dark-gray to brownish-black, microcrystalline to medium-grained, thin- to medium-bedded, evenly bedded. Composite thickness 0 to 35 feet.

Dove-colored limestone facies is medium light-gray to medium-gray (weathers to light-gray surface), cryptocrystalline, medium and evenly bedded, brittle, breaks with pronounced conchoidal fracture, contains specks and stringers of clear calcite. Composite thickness 0 to 60 feet.

Bigby limestone facies is calcarenite, medium light-gray to brownish-gray, coarse-grained, medium-bedded, crossbedded, contains brown phosphate pellets, intercalations of sandy beds at the base in the southeast, weathers to brown phosphatic residuum. Composite thickness 50 to 70 feet.

Oh

Hermitage Formation

Coquina facies at top is limestone with disseminated silt and shale partings, medium-gray to brownish-gray, medium-bedded, characterized by numerous shells of the brachiopod *Resserella fertilis* (formerly *Dalmanella fertilis*). Present only in the northwestern half of the quadrangle. Thickness 0 to 10 feet.

Laminated argillaceous limestone facies is sandy, medium-gray to dark-gray (weathers to pale to dark yellowish-brown), very fine- to medium-grained, thin-bedded to laminated with shale partings. Thickness 50 to 85 feet.

Curdsville Limestone Member at base is medium- to dark-gray, fine- to medium-grained, thin-bedded with thin shale partings, fossiliferous. Locally present, in the north only. Thickness 0 to 5 feet.

Thickness of entire formation 60 to 100 feet.

Oc

Carters Limestone

Upper member is limestone, medium light-gray to brownish-gray and yellowish-brown, very fine-grained to cryptocrystalline, thin-bedded with thin shale partings. Thickness about 5 feet.

Bentonite (T-3 bed), green when fresh but weathers to white and yellow sticky clay, 6 to 12 inches thick; occurs between upper and lower members, but rarely seen in natural exposures. (This is the "Pencil Cave" of drillers' terminology in Central Tennessee.)

Lower member is limestone, medium light-gray to brownish-gray and yellowish-brown, cryptocrystalline to very fine-grained with some beds ranging up to coarse-grained, medium- to thick-bedded, with minor amounts of magnesian limestone as small irregular mottlings and thin bands, and thin lenses of chert locally. Thickness 45 to 70 feet.

ORDOVICIAN

Subsurface Hydrology

Hermitage Formation

Most of the soils used for drip irrigation are underlain and formed from the Hermitage Formation as shown on the Nolensville Quadrangle Geologic Map, Exhibit 1.3. In Williamson County, the Hermitage formation consists of flaggy beds of blue-grey sandy and earthy limestone separated by calcareous seams of shale, and calcareous sandstone associated with thin-bedded limestone. These beds are usually devoid of fossils, are locally phosphatic, and at many places, simulate thin-bedded earth yellowish sandstone on weathered surfaces.

The Hermitage formation ranges in thickness between 60 and 100 feet in the Nashville Basin and crops out at proper horizons throughout the basin. Water movement into the rock formations will be through weathered upper layers into cracks and fissures in the underlying limestone formations. These cracks and fissures are ground water conduits with vast transmission capacity. These cracks occur usually by solution along preexisting bedding planes or joints. The network of joints and solution openings, both large and small, are filled with water up to a certain level, which is the water table. These underground passages are by no means fortuitous but tend to develop a definite drainage system which is tributary to the surface streams and is an integral part of the regional drainage mechanism.

Table 1.9
Site Description

Exhibit 1.6 – Water Supply Wells

**WATER SUPPLY WELLS
WITHIN 1,500 L.F.

OF THE

PROPOSED ADDITION TO KINGS CHAPEL**

Wells Within 1,500 L.F. of Treatment and Storage Facility

The "Records of Water Wells on the Franklin, Nolensville, College Grove, and Bethesda Quadrangles" do not show any water wells within 1,500 L.F. of the property. Therefore, the water wells from the Quadrangle's pertinent to this project have no bearing on the requirements of the DDR.

RECORDS OF WATER WELLS IN SELECTED AREAS OF TEXAS

EXPLANATION OF COLUMN HEADINGS

EXPLANATION	
Quadrangle/Ninth: Quadrangle indicates the 7.5 minute U.S.G.S. topographic map number (i.e., 305) followed by the quadrant (NE,NW,SE,SW). Ninth represents the smaller 2.5 minute section of the map in which the well is located. This system divides the map into (9) sections numbered from left to right, top to bottom, similar to the numbers (1-9) on a telephone key pad.	
County in which the well is located.	COUNTY
Well Number: Office identification number assigned to each well report by the Division of Water Supply.	WELL NUMBER
Registration Number: While registration tag number attached to each well by the driller.	REGISTRATION NUMBER
Name of person or organization for whom the well was drilled.	DRILLER'S NAME
Name of street or road from which to access well. (Blank if unknown)	ACCESS ROAD
Completion Date: Month, day and year the well was completed.	COMPLETION DATE
Inspection Date: Month, day and year the well was inspected by the Division of Water Supply. (Blank if not inspected)	INSPECTION DATE
Total Depth: Total depth of the well in feet.	TOTAL DEPTH
Aquifer Depth: Depth, in feet, below land surface to the top of the shallowest aquifer or water-bearing zone tapped in well.	AQUIFER DEPTH
Total Yield: Total yield of the well in gallons per minute (gpm). Yields less than one-half gpm are reported as zero.	TOTAL YIELD
Static Water Level: Depth, in feet, from the land surface to the level of the water standing in a non-pumping well.	STATIC WATER LEVEL
Casing Depth: Depth, in feet, from the land surface to the bottom of the water-tight casing installed in the well.	CASING DEPTH
Casing Type: PLAST = plastic, STEEL = black or galvanized; OTHER = other material such as concrete, fiberglass, tile, etc..	CASING TYPE
Well Finish: Construction of the well at the interval supplying water to the well. OPEN = open or uncased borehole, SLOT = slotted or perforated pipe, SCREEN = manufactured screening device designed to filter out sediment and maintain the borehole wall, while allowing ground water to enter the well through small openings.	WELL FINISH
Open Interval: The depth, in feet, below land surface where the open hole, screen/perforated pipe interval begins and ends.	OPEN INTERVAL
Water Quality: A description of the apparent water quality of the water from the well at the completion of construction.	WATER QUALITY
Inspection Number: Orange inspection tag number attached to the well by the state inspector.	INSPECTION NUMBER
Latitude: Latitude of the well reported in degrees, minutes, and seconds.	LATITUDE
Longitude: Longitude of the well reported in degrees, minutes, and seconds.	LONGITUDE
Accuracy Code: Accuracy of latitude and longitude. S = nearest second, F = nearest 15 seconds, T = nearest 30 seconds.	ACCURACY CODE
Formation Log: Refers to the availability of a geologic formation log. Y = yes; N = No.	FORMATION LOG
Driller: The license number of the driller who supervised construction of the well. Names provided upon request.	DRILLER
Well Use: The primary purpose for which the well was constructed.	WELL USE

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE FRANKLIN QUADRANGLE 0063NE TN

WAD / NTH COUNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A/C LOG	DRILLER USE
063NE WILLIAMSON	6 18700190	WILSON H	11/16/1964	240 215	3 120	24 Steel	-	Good	355521 864623	S 7 No	Residential
063NE WILLIAMSON	6 18700195	WILSON S	12/01/1964	215 210	5 100	33	-	Good	355519 864604	S 7 No	Residential
063NE WILLIAMSON	6 18700421	W CO COONHUNTER ASSO	08/23/1966	201 75	1 75	13 Steel	-	Bad	355531 864627	S 22 No	Municipal
063NE WILLIAMSON	6 18700666	VICKERS R	04/05/1969	200 195	16 60	20 Steel	-	Bad	355707 864503	S 755 No	
063NE WILLIAMSON	6 18700694	HOOD C	01/06/1969	225 210	3 60	46 Steel	-	Good	355517 864643	S 227 No	Residential
063NE WILLIAMSON	6 18700696	COON HUNTERS ASSOC	01/09/1969	425 390	7 60	22 Steel	-	Bad	355532 864626	S 227 No	Other
063NE WILLIAMSON	6 18700697	COON HUNTERS ASSOC	12/31/1968	615		22 Steel	-		355532 864626	S 227 No	Residential
063NE WILLIAMSON	6 18700760	WMSON CO COONHUNTER	08/14/1969	927 910	2 180	400 Steel	-	Good	355533 864626	S 227 No	Residential
063NE WILLIAMSON	6 18700815	GORE L	06/04/1970	75 65	10	20 Steel	-	Good	355608 864612	S 219 No	Residential
063NE WILLIAMSON	6 18700919	MCCORD W	10/19/1970	222 205	1 30	22 Steel	-	Good	355558 865501	S 227 No	Residential
063NE WILLIAMSON	6 18701022	JOHNSON J.	12/30/1972	198 184	3 30	20 Steel	-	Good	355617 864604	S 227 No	Residential
063NE WILLIAMSON	6 18701030	UNKNOWN754					-		355550 864724	S 740 No	
063NE WILLIAMSON	6 18701388	CULLOM E.	08/17/1974	1235 1170	2 41	22 Steel	-	Good	355707 864509	S 227 No	Residential

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE FRANKLIN QUADRANGLE 0063NE TN

AD / NTH UNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A/C LOG	DRILLER USE
33NE LLIAMSON	6 18701712	WILLIAMS F	10/24/1977	300 155	95	42 Steel	-	Good	355607 865544	S No	313 Residential
33NE LLIAMSON	6 18701769	REED J	11/03/1977	240 165	30 60	33 Steel	-	Bad	355505 864608	S No	178 ✓
33NE LLIAMSON	6 18702178	BRITT D	05/01/1981	260	0		-		355514 864605	S No	227 Residential
33NE LLIAMSON	6 18702607	DENNEY, JOE WILSON PK	10/18/1984	350 277	2 30	21 Open Hole	21 - 300		355500 864500	No	227 Residential
33NE LLIAMSON	6 18702769	BOSWELL, BILL WILSON PK	08/14/1985	1050 1020	4 60	20 Open Hole	20 - 1050		355500 864500	No	227 Residential
33NE LLIAMSON	6 18702796	HALL, ROBERT WILSON PK	03/03/1986	400 80	0 25	24 Open Hole	24 - 400		355500 864500	No	227 Residential
33NE LLIAMSON	6 20005720	MARTIN, MIKE	11/25/2000	280	3	20 Open Hole		Clear	355555 864644	F Yes	227 Residential
33NE LLIAMSON	6 20010738	1899 LIBERTY PK	01/22/2001	70	50	Galvanized	20 - 280	028870			✓
33NE LLIAMSON	6 20010737	MAIN STREET HOMES COOL'S SPRINGS BLVD	02/25/2001	100							227 Yes Irrigation
33NE LLIAMSON	6 20010739	MAIN STREET HOMES COOL SPRINGS BLVD	03/02/2001	300 5	8						227 Yes Irrigation
33NE LLIAMSON	6 93004528	WALKER, JIM LIBERTY PIKE	10/13/1993	985 970		20 Steel	21 - 985	Good		No	15 Residential
33NE LLIAMSON	6 98000675	SMITH, STEVE	02/24/1998	220	40	20 Open Hole			355719	S	227 ✓
33NE LLIAMSON	6 20028674	WILSON PK	02/23/1999	90	30	20 Open Hole	20 - 220	026984	864612	No	Farm

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE FRANKLIN QUADRANGLE 0063NE TN

QUAD / NTH COUNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A/C LOG USE
063NE WILLIAMSON	7 18700066	COOK R	01/11/1964	209 203	30 92	32 Steel	-	Bad	355357 865002	S 17 No ✓
063NE WILLIAMSON	7 18700090	COOK R		209 200	8 80	28 Steel	-	Good	355357 865002	S 17 No ✓
063NE WILLIAMSON	7 18700600	LEGION R		900	3 47		-		355401 865025	S 252 No Municipal ✓
063NE WILLIAMSON	7 18700801	LASKO METAL PRODUCTS	12/13/1969	450 255	5 70	21 Steel	-	Good	355418 865210	S 227 No Industrial ✓
063NE WILLIAMSON	7 18701493	CITY OF FRANKLIN	12/10/1975	253	0		-		355356 865058	S 227 No Test ✓
063NE WILLIAMSON	7 18701494	CITY OF FRANKLIN	12/12/1975	252	0		-			227 No Other
063NE WILLIAMSON	7 18701495	CITY OF FRANKLIN	12/17/1975	278 74	3 20	21 Steel	-	Bad	355401 865124	S 227 No Residential ✓
063NE WILLIAMSON	7 18702532	UNITED TECH. ESSEX G	07/06/1984 01/07/1985	330	0	20 Steel	Open Hole 20 - 330		355258 865216	F 15 No Industrial ✓
063NE WILLIAMSON	7 18702686	METRO READY MIX	09/28/1985	1030 1010	8	20 Steel	Open Hole 20 - 1030	Good	355230 865000	15 No Industrial ✓
063NE WILLIAMSON	7 18702935	RFA INVESTMENTS BY PASS	07/29/1986				-		355230 865000	227 No Other ✓
063NE WILLIAMSON	7 18702936	RFA INVESTMENTS BY PASS	07/29/1986	225	2		-		355230 865000	227 No Other ✓
063NE WILLIAMSON	7 18702937	RFA INVESTMENTS BY PASS	07/29/1986	225 30	5	24 Steel	Open Hole 24 - 225		355230 865000	227 No Irrigation ✓
063NE WILLIAMSON	7 18702998	RFA INVESTMENTS BY PASS	07/28/1986	225 30	5 20	26 Steel	Open Hole 26 - 225		355230 865000	227 No Irrigation ✓

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE FRANKLIN QUADRANGLE 0063NE TN

AD /NTH	WELL NUM	OWNER'S NAME	COMP DATE	TOT DEPTH	TOT YIELD	CSE DEPTH	WELL FINISH	WAT QUAL	LATITUDE	A/C	DRILLER
UNTY	REG NUM	LOCATION ROAD	INSP DATE	AQ DEPTH	STAT LEVEL	CSE TYPE	INTERVAL	INSP NUMBER	LONGITUDE	LOG	USE
63NE ILLIAMSON	7 18703136	NOLAND CO 431	10/13/1987	300	0	20	Open Hole 20 - 300		355230 865000	No	227 Irrigation
63NE ILLIAMSON	7 18703155	COLLIER, MARTIN MORRISWOOD LANE	06/06/1988	290 95	0	20	Open Hole 20 - 290	Good	355230 865000	No	227 Irrigation
63NE ILLIAMSON	7 18703209	WEAVER, SAMUEL BEACHLAWN DR	08/06/1988	280 135	4	20	Open Hole 20 - 280	Good	355230 865000	No	227 Irrigation
63NE ILLIAMSON	7 18703251	TUCKER, BILL STURBRIDGE DR	06/17/1988	250 41	16	34	Open Hole 34 - 250	Good	355230 865000	No	227 Irrigation
63NE ILLIAMSON	7 18703252	KROGER, JOHN STARBRIDGE DR	06/22/1988	250 71	8	33	Open Hole 33 - 250	Good	355230 865000	No	227 Irrigation
63NE ILLIAMSON	7 18703253	JACKSON, J E STURBRIDGE DR	07/05/1988	235	0				355230 865000	No	227 Irrigation
63NE ILLIAMSON	7 18703254	PINKERTON, ESTEL ASHEBORO PLACE	07/07/1988	200 65	4	20	Open Hole 20 - 200	Good	355230 865000	No	227 Irrigation
63NE ILLIAMSON	7 18703256	ANDERSON, BILL STURBRIDGE DR	07/05/1988	200 45	2	20	Open Hole 20 - 200	Good	355230 865000	No	227 Irrigation
63NE ILLIAMSON	7 18703273	MCMILLAN, ROSS KRISTON CT	01/19/1989	260 238	12	20	Open Hole 20 - 260		355230 865000	No	227 Residential
63NE ILLIAMSON	7 18703286	LEGATES, WILLIAM J	09/29/1988	330	0	62	Open Hole Steel 62 - 330		355230 875000	No	15 Residential
63NE ILLIAMSON	7 18703287	LEGATES, WILLIAM J WARREN RD	09/30/1988	100	0	62	Open Hole Steel 62 - 100		355230 875000	No	15 Residential
63NE ILLIAMSON	7 20000185	CITY OF FRANKLIN 96 WEST	01/02/2000	262 58	1	24	Galvanized 24 - 262			Yes	227 Irrigation
63NE ILLIAMSON	7 20004284	EVERETTE, WALTR	07/29/2000	207	1	20	Open Hole	Clear			15
63NE ILLIAMSON	7 20004516	POLK PLACE #1 (RIGHT OF		140	40	Steel	20 - 207			Yes	Irrigation

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE FRANKLIN QUADRANGLE 0063NE TN

QUAD / NTH COUNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A/C LOG	DRILLER USE
0063NE WILLIAMSON	7 20004286 D0045517	EVERETTE, WALTER POLK PLACE #2	07/30/2000	210		20 Steel	Open Hole 20 - 210			Yes	15 Irrigation
0063NE WILLIAMSON	7 20004397	SOUTHERN CREATIONS ROYAL OAKS	10/06/2000	260 120			-			Yes	227
0063NE WILLIAMSON	7 20005424	BAILEY, MICHAEL 1070 LEWISBURG AVE	11/08/2000	240			-			Yes	227 Residential
0063NE WILLIAMSON	7 20005711	SHORT, JIM 1100 HOLLY HILL DR	11/10/2000	260 150	23 75	20 Galvanized	Open Hole 20 - 260	Clear		Yes	227 Irrigation
0063NE WILLIAMSON	7 20005721	FUNDERBURG, MARK 2107 OAK BRANCH CIRCLE	11/30/2000	120			-			Yes	227 Irrigation
0063NE WILLIAMSON	7 20005722	FUNDERBURG, MARK 2107 OAK BRANCH CIRCLE	11/30/2000	160			-			Yes	227 Irrigation
0063NE WILLIAMSON	7 93001491	PERKINSON, KERRY STURBRIDGE DR	05/29/1992	160	0		-			No	227 Residential
0063NE WILLIAMSON	7 94004814 D0010906	CARNTON PLANTATION CARNTON LN	10/19/1994 06/27/1996	100	2		-	016415	355411 865129	S No	227 Heat Pump
0063NE WILLIAMSON	7 94004815 D0010907	CARNTON PLANTATION CARNTON LANE	10/18/1994 06/27/1996	200	0		-	016414	355413 865126	S No	227 Heat Pump
0063NE WILLIAMSON	7 94004824 D0010907	CARNTON PLANTATION CARNTON LN	10/24/1994 06/27/1996	200 75	3	20	Open Hole 20 - 200	016417	355409 865128	S No	227 Heat Pump
0063NE WILLIAMSON	7 94004825 D0010906	CARNTON PLANTATION CARNTON LN	10/20/1994 06/27/1996	175 70	20	20	Open Hole 20 - 175	016416	355409 865127	S No	227 Heat Pump
0063NE WILLIAMSON	7 95001009 D0010909	KREADY, SAM	03/02/1995	195 30	10 65	20	Open Hole 20 - 195			No	227 Residential
0063NE WILLIAMSON	7 95001089 D0010938	ANDERSON, BILL WATERCRESS DR	02/28/1995 10/23/1998	240 40	1	20	Open Hole 20 - 240	022365	355453 865116	S No	227 Irrigation

RECORDS OF WATER WELLS ON THE FRANKLIN QUADRANGLE 0063NE TN

AD / NTH	WELL NUM	OWNER'S NAME	COMP DATE	TOT DEPTH	TOT YIELD	CSE DEPTH	WELL FINISH	WAT QUAL	LATITUDE	A/G	DRILLER
UNTY	REG NUM	LOCATION ROAD	INSP DATE	AQ DEPTH	STAT LEVEL	CSE TYPE	INTERVAL	INSP NUMBER	LONGITUDE	LOG	USE
63NE	7 95001824	POLK PLACE	04/27/1995	165	0	20	Open Hole		355358	S 15	✓
LLIAMSON		POLK PLACE	06/12/1997			Steel	20 -	165 018592	865125	No Irrigation	
63NE	7 95001825	POLK PLACE	04/27/1995	227	0	20	Open Hole		355400	S 15	✓
LLIAMSON		POLK PLACE DRIV	06/12/1997			Steel	20 -	227 018591	865125	No Irrigation	
63NE	7 95001832	POLK PLACE	04/28/1995	70	50	20	Open Hole	Good	355356	S 15	✓
LLIAMSON	D0010324	POLK PLACE	06/12/1997	22		20 -	70	018593	865123	No Irrigation	✓
63NE	7 96005052	CROSS, AMY	10/23/1996	160						227	No Irrigation
LLIAMSON		LEWISBURG PIKE				-				No Irrigation	
63NE	7 96005053	CROSS, AMY	10/22/1996	320						227	No Irrigation
LLIAMSON		LEWISBURG PIKE				-				No Irrigation	
63NE	7 97000929	NASHVILLE READY MIX	03/21/1997	120					355339	S 227	✓
LLIAMSON		SOUTHEASTPKWY115	06/12/1997			-		018594	865219	No Industrial	
63NE	7 97000930	NASHVILLE READY MIX	03/13/1997	200					355339	S 227	✓
LLIAMSON		SOUTHEASTPKWY115	06/12/1997			-		018595	865220	No Industrial	
63NE	7 97001009	NASHVILLE READY MIX	03/14/1997	200	20	20	Open Hole		355342	S 227	✓
LLIAMSON	D0021499	SOUTHEASTPKWY115	06/12/1997	21		20 -	200	018596	865223	No Industrial	
63NE	7 97001010	NASHVILLE READY MIX	03/24/1997	140	30	7	Open Hole		355343	S 227	✓
LLIAMSON	D0021502	SOUTHEASTPKWY115	06/12/1997	14		7 -	140	018597	865225	No Industrial	
63NE	7 97003982	SULLIVAN FARMS COMP	08/26/1997	270	5	20		Sulphur		647	
LLIAMSON	D0016112	LEWISBURG PK		30		20 -	270			No Irrigation	
63NE	7 97003983	SULLIVAN FARMS COMP	08/26/1997	250	1	20	Open Hole	Fair		647	
LLIAMSON	D0016111	LEWISBURG PK		90		20 -	250			No Irrigation	
63NE	7 99000164	ADAMS, KEVIN M	12/14/1998	82	30	20	Open Hole			227	
LLIAMSON	D0037348	CARNTON LN		50	20	20 -	82			No Residential	
63NE	7 98004280	WATSON, DALE	08/28/1999	162						227	No Irrigation
LLIAMSON		ECHO LN 1162				-				No Irrigation	

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE FRANKLIN QUADRANGLE 0063NE TN

QUAD / NTH COUNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A/C LOG	DRILLER USE
0063NE WILLIAMSON	7 TN011895	ESSEX	01/07/1985						355259 865216	F No	740 ✓

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

D / NTH NTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG	DRILLER USE
NW IDSON	03709101	G.T.WHEELER	09/14/1964	851 850	2 80			Good		No	219
NW IDSON	03709139	BRIGHAM, A DON		300						No	755
NW IDSON	03709444	JAMES ROBINSON #-1		150						No	740
NW IDSON	03709445	JAMES ROBINSON #-2		240						No	740
NW NE	18109129	WILLIAM EDMONDSON	06/14/1972	829 800	3 800					No	227
NW IAMSON	18709062	WILLIAM EDMONDS		829 800	2 20			Good		No	740
NW IAMSON	18709063	H.L.CYREE	02/01/1972	1009 1000	1 482			Bad		No	15
NW IAMSON	18709064	A.J.BURKE	07/24/1969	755 740	8 65					No	219
NW IAMSON	18709111	ROBERT ADCOCK	08/05/1970	729 708	1 50			Bad		No	755
NW IAMSON	18709120	A.J.BURKE	07/24/1969	755 740	8 65					No	313
NW IAMSON	18709126	H.L.CYREE	02/01/1972	1009 1000	1 482			Bad		No	15
NW IAMSON	18709157	LES POLK	03/13/1970	1028 975	1 305			Good		No	313
NW IAMSON	18709165	RANDOLPH SHERLING	10/20/1971	1096 1020	1					No	313

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

AD / NTH UNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG USE	DRILLER
70NW LIAMSON	18709178	LARRY GIBBS	06/20/1972	953 925	5 133			Good		227 NO	
70NW LIAMSON	18709180	LES POLK	03/13/1970	1028 975	1 305			Good		313 NO	
70NW LIAMSON	18709313	B.O. JONES	05/14/1963	85 50	15 23			Good		740 NO	
70NW LIAMSON	18709341	ALLAN CLAXTON		100 100				Bad		740 NO	
70NW LIAMSON	18700144	BEELER H	08/03/1964	65 65	3 38	18 Steel		Bad	355918 864430 ✓	S 94 No Residential	
70NW LIAMSON	18700181	KOEN J	11/25/1964	305	0				355758 2 864257 ✓	S 219 No Other	
70NW LIAMSON	18700496	FERRIS, CLARENCE EDMONSON PIKE	08/11/1967	927 923	1 170	31 Steel	31 - 927	Good		219 No Residential	
70NW ILLIAMSON	18700743	MOONEYHAM A	06/18/1969	172 150	20 102	21 Steel		Good	355940 3 864241 ✓	S 55 No Residential	
70NW ILLIAMSON	18700838	LITTLE, VANCE LIBERTY CHURCH	03/31/1970	928 905	5 80	32 Steel	32 - 928	Good		227 No Residential	
70NW ILLIAMSON	18701054	BENNETT, SCOTT CROCKETT	10/09/1972	928 891	6 107	20 Steel	20 - 928	Good		227 No Residential	
70NW ILLIAMSON	18701070	GIBBS, LARRY CROCKETT	06/20/1972	953 900	5 133	22 Steel	22 - 953	Good		227 No Residential	
70NW ILLIAMSON	18701193	KOEN, JOHN SUNSET	08/04/1973	949 921	1 190	28 Steel	28 - 949	Good		219 No Residential	
70NW ILLIAMSON	18701279	JOHNSON W. JOHNSON W.	04/28/1971	365	1	21 Steel		Good		227 No Farm	

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

D / NTH	WELL NUM	OWNER'S NAME	COMP DATE	TOT DEPTH	TOT YIELD	CSE DEPTH	WELL FINISH	WAT QUAL	LATITUDE	A / C	DRILLER
NTY	REG NUM	LOCATION ROAD	INSP DATE	AQ DEPTH	STAT LEVEL	CSE TYPE	INTERVAL	INSP NUMBER	LONGITUDE	LOG	USE
NW 1	18701724	ROLAND B	03/25/1977	248	25	35	-	Bad	355800	S	1S
JAMSON				240		Steel			864248	No	Residential
NW 1	18702108	SOUTH D.C.	05/28/1980	150	12	21		Good	355854	S	227
JAMSON				140	100	Steel			864246	No	Residential
NW 1	18702542	BRIDGES, CURT	06/28/1984	120	55	21	Open Hole		355730		227
JAMSON		OLD SMYRNA		22	22		21 - 120		864230	No	Residential
NW 1	18702543	BRIDGES, CURT	06/29/1984	280	0				355730		227
JAMSON		OLD SMYRNA							864230	No	Residential
NW 1	18702561	EGGERT, ARTHUR	07/16/1984	200	0				355730		227
JAMSON		CLOVERMEADE DR		110					864230	No	Residential
NW 1	18702779	GATLIN, W.W.	08/06/1985	200					355730		227
JAMSON		OLD SMYRNA							864230	No	Residential
NW 1	18702811	CLINTON, JOHNNY	04/18/1986	152	8	20	Open Hole		355730		227
JAMSON		MAXWELL LANE		120	60		20 - 152		864230	No	Residential
NW 1	18702813	MAXWELL, ALTON	04/23/1986	352	0	20	Open Hole		355730		227
JAMSON		MAXWELL			50		- 20		864230	No	Heat Pump
NW 1	18702814	MAXWELL, ALTON	04/24/1986	100	4	33	Open Hole		355730		227
JAMSON		MAXWELL		45			33 - 100		864230	No	Residential
NW 1	18702820	LAMB, JOHN	05/02/1986	88	8	20	Open Hole		355730		227
JAMSON		CONCORD		77	20		- 20		864230	No	Residential
NW 1	18702822	HALL, RUSSEL	05/28/1986	650	25	20	Open Hole		355730		227
JAMSON		BUTT5		200			20 - 650		864230	No	Residential
NW 1	18702823	POWELL, JAMES	05/22/1986	325	1	54	Open Hole		355730		227
JAMSON		EDMONSON		90	70		55 - 325		864230	No	Irrigation
NW 1	18702993	RAINTREE	07/08/1987	300					355730		227
JAMSON		SPLIT LOG		18					864230	No	Irrigation

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RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

JAD / NTH COUNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG USE	DRILLER LOG USE
70NW ILLIAMSON	1 18703029	HOLMAN, DOT BUTTS RD		500 495	40 60	20	Open Hole 20 - 500		355730 864230		227 No Residential
70NW ILLIAMSON	1 18703098	BALDWIN, HAROLD BUTTS	09/10/1987	270	0		Open Hole 175 - 270	Good	355730 864230		227 No Residential
70NW ILLIAMSON	1 18703250	HARRIS, BOBBY HOLT RD	06/21/1988	225 181	24	53	Open Hole 54 - 225	Good	355730 864230		227 No Irrigation
70NW ILLIAMSON	1 18703271	COUSER, T W TALLY HOLLOW RD	04/17/1989	150 90	2 50	69	Open Hole -	Good	355730 864230		635 No Residential
70NW ILLIAMSON	1 18703291	COUSER, T W TALLY HOLLOW RD	04/17/1989	150 90	2 50	69	Open Hole 69 - 150	Good	355730 864230		635 No Residential
70NW ILLIAMSON	1 18703311	PAYNE, KENNETH	09/21/1988	250	15		Open Hole - 250		355730 864230		227 No Residential
70NW ILLIAMSON	1 18703357	CUNNINGHAM, B D 31-A	09/04/1989	145 87	50	20	Open Hole Steel 20 - 145	Good	355730 864230		15 No Residential
70NW ILLIAMSON	1 20004245 D0045524	SHERRY, DAN 9620 STANFIELD DR	08/20/2000	861 815	30 60	20	Open Hole Steel 20 - 861	Clear			15 Yes Irrigation
70NW ILLIAMSON	1 20005571 D0044586	SPLIT LOG TRUST 9814 SPLIT LOG RD	10/15/2000 01/22/2001	305 90	2	20 Galvanized	Open Hole 20 - 305 028871		355731 7 - 864253	F Yes	647 Irrigation
70NW ILLIAMSON	1 20011109 D0052396	WOODS, MIKE 1084 HAMER CT	03/27/2001	345 300	0.5	20	Open Hole Galvanized 20 - 345				647 Yes Irrigation
70NW ILLIAMSON	1 20013941	WAUGH, TROY CROOKED STICK LN	09/29/2001	340 70	0.5 40			Clear			227 Yes Irrigation
70NW ILLIAMSON	1 20023770 D0057187	ARMSTRONG, FRED BON BROOKE LOT 78	11/24/2002	350	0	62	Open Hole Galvanized 62 - 350		355923 864318		227 Yes Irrigation
70NW ILLIAMSON	1 20023891 D0055052	MAJESTIC HOMES - STEVE LI SUNSET	10/12/2002	410 275	15 30	41	Open Hole Steel 41 - 410	Clear			15 Yes Irrigation

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

D / NTH NTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG USE	DRILLER
JNW LIAMSON	1 91003813	MERCER, JOE SPLIT LOG	10/07/1991	200 85	2	20	Open Hole 20 - 200			No	227 Farm
JNW LIAMSON	1 93001983	FOSTER, CHET 1512 PINKERTON	07/22/1991	495		21 Steel	Open Hole 21 - 495			No	55 Residential
JNW LIAMSON	1 94002501 D0002015	ROGERS, OWEN LIBERTY CHURCH	07/20/1994	200 135	15	20	Open Hole 20 - 200			No	227 Residential
JNW LIAMSON	1 94004874 D0005594	NORTHCUTT, ANN 233 ENDOVER WAY	11/12/1994	445 160	7 80	25 Steel	Open Hole 25 - 445	Sulphur		No	647 Irrigation
JNW LIAMSON	1 96003368	BRANNON, TODD WESTON DR	06/24/1996	300						No	227 Irrigation
JNW LIAMSON	1 96004130	FRITCH, HERB EDMONDSON PIKE	08/08/1996	280 28	2					No	227 Irrigation
JNW LIAMSON	1 96004131	FRITCH, HERB EDMONDSON PIKE	08/08/1996	300						No	227 Irrigation
JNW LIAMSON	1 97003272	THE GOVERNORS CLUB CONCORD RD	08/05/1997 06/26/1998	260 180	3		Open Hole -	021640	355826 9 864410	S No	227 Irrigation
JNW LIAMSON	1 97003273	THE GOVERNORS CLUB CONCORD RD	08/06/1997 06/26/1998	240				021639	355832 10 864339	S No	227 Irrigation
JNW LIAMSON	1 97003279 D0021560	THE GOVERNORS CLUB CONCORD RD	07/28/1997 06/26/1998	300 210	25	52	Open Hole 52 - 300	021636	355847 11 864354	S No	227 Irrigation
JNW LIAMSON	1 97003280 D0021561	THE GOVERNORS CLUB CONCORD RD	08/04/1997 06/26/1998	300 220	20	66	Open Hole 66 - 300	021637	355851 12 864402	S No	227 Irrigation
JNW LIAMSON	1 97003281 D0021562	THE GOVERNORS CLUB CONCORD RD	08/07/1997 06/26/1998	300 270	40	20	Open Hole 20 - 300	021638	355824 13 864401	S No	227 Irrigation
JNW LIAMSON	1 97003836	WILSON, PACKER CONCORD RD	09/05/1997	260						No	227 Irrigation

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

AD / NTH UNITY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG USE	DRILLER LOG USE
70NW LLIAMSON	1 97004709	JAMES, CAROLYN WILSHIRE WAY	10/20/1997 01/02/1998	170	0		-	011916	355951 864612	F No	227 Irrigation
70NW LLIAMSON	1 98003702	THE GOVERNORS CLUB CONCORD RD	09/04/1998 10/13/1998	260 60	2		-	024302	355837 864420	S No	227 Irrigation
70NW LLIAMSON	1 98003705	THE GOVERNORS CLUB CONCORD RD	08/27/1998 10/13/1998	300			-	024301	355829 864423	S No	227 Irrigation
70NW LLIAMSON	1 98003720	THE GOVERNORS CLUB CONCORD RD	08/28/1998 10/13/1998	300 70	5	20	Open Hole		355838 864420	S No	227 Irrigation
70NW LLIAMSON	1 98003721	THE GOVERNORS CLUB CONCORD RD	08/31/1998 10/13/1998	300 230	30	59	Open Hole		355853 864349	S No	227 Irrigation
70NW LLIAMSON	1 98003722	THE GOVERNORS CLUB CONCORD RD	09/01/1998 10/13/1998	220 160	30	20	Open Hole		355909 864354	S No	227 Irrigation
70NW LLIAMSON	1 98003723	THE GOVERNORS CLUB CONCORD RD	09/02/1998 10/13/1998	300 190	30	20	Open Hole		355855 864404	S No	227 Irrigation
70NW LLIAMSON	1 98003724	THE GOVERNORS CLUB CONCORD RD	09/03/1998 10/13/1998	300 100	8 0	20	Open Hole		355858 864402	S No	227 Irrigation
70NW ILLIAMSON	1 98003728	LEE, KEVIN HERITAGE DR	09/11/1998	220 110	10	20	Open Hole				227 Residential
70NW ILLIAMSON	1 99000160	THE GOVERNORS CLUB CONCORD RD	11/23/1998	260 137	15 80	20	Open Hole				227 Irrigation
70NW ILLIAMSON	1 99002245	SANDERS, DAVID RAGSDALE 1626	06/23/1999	242 140	28 80	20	Open Hole				227 Irrigation
70NW ILLIAMSON	1 99002700	MADDUX, JERRY HAMMER CT	07/18/1999	360			-				227 Irrigation
70NW ILLIAMSON	1 99002702	CUTLER, CATHERINE CONCORD RD	07/08/1999	220 135	40 25	37	Open Hole				227 Irrigation

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

/ NTH TY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG	DRILLER USE
W 1	99003893	THE GOVERNORS CLUB	08/03/1999	300	75	20	Open Hole	Good	355906	S	647
AMSON	D0039299	9681 CONCORD RD	04/10/2001	130	30		20 -	300 028610	22 864414	No	Irrigation
W 1	99003894	THE GOVERNORS CLUB	08/04/1999	240	125	20	Open Hole	Good	355901	S	647
AMSON	D0039300	9681 CONCORD RD	04/10/2001	75	20		20 -	240 028609	23 864339	No	Irrigation
W 1	99003895	THE GOVERNORS CLUB	08/05/1999	240	150	20	Open Hole	Good	355901	S	647
AMSON	D0042301	9681 CONCORD RD	04/10/2001	30	20		-	20 025136	24 864337	No	Irrigation
W 1	99004084	THE GOVERNORS CLUB	07/29/1999	300	50	20	Open Hole	Good	355905	S	647
AMSON	D0039296	9681 CONCORD RD	04/10/2001	125	30		20 -	300 028612	25 864410	No	Irrigation
W 1	99004085	THE GOVERNORS CLUB	07/29/1999	300	50	20	Open Hole	Good	355904	S	647
AMSON	D0039297	9681 CONCORD RD	04/10/2001	135	30		20 -	300 028613	26 864406	No	Irrigation
W 1	99004086	THE GOVERNORS CLUB	07/30/1999	300	50	20	Open Hole	Good	355906	S	647
AMSON	D0039298	9681 CONCORD RD	04/10/2001	125	30		20 -	300 028611	27 864411	No	Irrigation
W 1	99004087	THE GOVERNORS CLUB	08/05/1999	240	125	20	Open Hole	Good	355901	S	647
AMSON	D0042302	9681 CONCORD RD	04/10/2001	70	20		20 -	240 028608	28 864334	No	Irrigation
W 1	99004088	THE GOVERNORS CLUB	08/06/1999	220	125	20	Open Hole	Good	355900	S	647
AMSON	D0042303	9681 CONCORD RD	04/10/2001	70	25		20 -	220 025150	29 864331	No	Irrigation
W 1	99004089	GOVERNORS CLUB	08/09/1999	260	40	20	Open Hole	Good	355820	S	647
AMSON	D0042304	9681 CONCORD RD	04/10/2001	80			20 -	260 025151	30 864338	No	Irrigation
W 1	99004091	THE GOVERNORS CLUB	08/11/1999	240	5	20	Open Hole	Good	355817	S	647
AMSON	D0042306	9681 CONCORD RD	04/10/2001	75			20 -	240 025135	31 864336	No	Irrigation
W 1	99005932	LOONEY, JOHN	12/02/1999	262	6	20	Open Hole				227
AMSON	D0041067	RAGSDALE 1620		50	35		20 -	262		No	Irrigation
W 2	03701301	RUCKER B.F #2	11/16/1982	120		21		Bad	355730		227
AMSON		BATTLE				Steel	-		864000	No	
W 2	03701320	B F RUCKER	01/12/1983	120	1	21		Good	355730		227
AMSON		BATTLE		50	30	Steel	-		864000	No	Residential

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RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

AD / NTH UNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG	DRILLER USE
70NW VIDSON	2 03709059	DODSON BATSON PETTUS RD	10/01/1962	916 885	1 240	425	-	-	355730 864000	No	740
70NW ITHERFORD	2 14903262	TOLLISON, HAROLD LASSITER	10/31/1987	105 90	10 80	20 Steel	Open Hole 20 - 105	Good	355730 864000	No	559 Residential
70NW LLIAMSON	2 18700041	PURDONA K	12/10/1963	125 65	25 55	14 Steel	-	Good	355842 864020	S No	219 Residential
70NW ILLIAMSON	2 18700120	MOONEYHAM B	05/04/1964	64 60	15 30	19 Steel	-	Good	355902 864152	S No	755 Residential
70NW ILLIAMSON	2 18700127	HYDE J	07/09/1964	105 105	25 105	25 Steel	-	-	355837 864008	S No	219 Residential
70NW ILLIAMSON	2 18700129	NICHOLS H	07/16/1964	120 17	0 103	12 Steel	-	Good	355841 864010	S No	219 Residential
70NW ILLIAMSON	2 18701846	HAMLETT J P	11/26/1978	300 295	70 295	22 Steel	-	Good	355853 864227	S No	15 Residential
70NW ILLIAMSON	2 18701961	HALL J	08/15/1978	348	0	21 Steel	-	-	355854 864219	S No	227 Other
70NW ILLIAMSON	2 18701962	HALL J	09/21/1979	600 514	1 180	21 Steel	-	Bad	355855 864220	S No	227 Residential
70NW ILLIAMSON	2 18702090	FIRST LADY BEAUTY S	09/11/1980	310 80	1 10	21 Steel	-	-	355824 864008	S No	15 Commercial
70NW ILLIAMSON	2 18702109	HOBBS J	05/28/1980	140 110	30 73	21 Steel	-	Good	355856 864136	S No	227 Residential
70NW ILLIAMSON	2 18702216	RANDOLPH B	05/05/1981	180 160	20 72	21 Steel	-	Good	355850 864140	S No	227 Residential
70NW ILLIAMSON	2 18702551	HUGHES, MAE NOLENSVILLE	06/21/1984	340	340	21 Open Hole 21 - 340	-	-	355730 864000	No	227 Heat Pump

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

WELL / NTH CITY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG USE	DRILLER
NW 2 AMSON	18702574	POTEETE, DANNY LEE BURKE HOLLOW	08/22/1984	140 35	1	21	Open Hole 21 - 140		355730 44 864000	X	227 No Residential
NW 2 AMSON	18702583	ZULAUF, GARY MAXWELL	08/19/1984 05/07/1985	145 130	15 805	20 Steel	Open Hole 20 - 145	Good	355824 45 864135	S No	15 Residential
NW 2 AMSON	18702653	CHASTAIN, WILBUR SUTTON	05/07/1985	182 95	40	20	Open Hole 20 - 182		355730 46 864000	X	227 No Residential
NW 2 AMSON	18702688	BRUCE, BILL BLACK WELL	08/05/1985	145 130	25	20 Steel	Open Hole 20 - 145	Good	355730 864000	X	15 No Residential
NW 2 AMSON	18702955	TACKITT, HOLLIS MAXWELL LANE	02/13/1987	140 110	30 25	20	Open Hole 20 - 140		355730 864000	X	227 No Residential
NW 2 AMSON	18703278	PACHAN, TOM NOLENSVILLE	03/16/1989	400 85	1	20	Open Hole 20 - 400	Good	355730 864000	X	227 No Residential
NW 2 AMSON	18703284	FREEMAN, PORTER NOLENSVILLE RD	10/15/1988	300 285	10	20 Steel	Open Hole 20 - 300	Fair	355730 864000	X	15 No Residential
NW 2 AMSON	18709015	GAIL CLARK			1				355824 47 864006	X	S No
NW 2 AMSON	20002660	MITCHELL, JR, CHARLIE SUNSET CREEK	06/14/2000	240 210	75 80	41 Galvanized	Open Hole 41 - 240				227 Yes Irrigation
NW 2 AMSON	20003535	WALKER, LARRY 72-16 NOLENSVILLE RD	07/19/2000	260 25	2 20	20 Galvanized	Open Hole 20 - 260	Clear			227 Yes Irrigation
NW 2 AMSON	20004801	MURRAY, CONNIE 9412 ASHFORD PL	09/08/2000	300	0	20 Galvanized	Open Hole 20 - 300	Unknown			647 Yes Residential
NW 2 AMSON	20022239	BUSH, BYRON 1652 SUNSET RD	07/20/2002	320 120	4 80	20 Galvanized	Open Hole 20 - 320				227 Yes Residential
NW 2 AMSON	20023402	PACHAN, TOM 7115 NOLENSVILLE RD	10/19/2002	142 90	60	20 Galvanized	Open Hole 20 - 142	Clear	355833 48 864053	X	227 Yes Irrigation

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RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

WELL / NTH COUNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG USE	DRILLER
170NW ILLIAMSON	2 20023403 D0057177	JONES, JERRY 9775 CONCORD RD	10/23/2002	300 170	20 50	20 Galvanized	Open Hole 20 - 300	Clear	355927 864159	227 Yes Irrigation	227
170NW ILLIAMSON	2 20023404	JONES, JERRY 9775 CONCORD RD	10/20/2002	300					355923 864200	227 Yes Irrigation	227
170NW ILLIAMSON	2 90000625	ALLEN, TOMMY BUTTS RD	06/07/1989	220 90	7 4	25 -	Open Hole 25 - 220	Good			647 No Residential
170NW ILLIAMSON	2 90000871	SHAVER, DALE NOLENSVILLE RD	03/07/1990	140 105	8	20	Open Hole 20 - 140				227 No Residential
170NW ILLIAMSON	2 91003655	FOWLER, GERALD NOLENSVILLE	10/22/1991	80 50	10	20	Open Hole 20 - 80				227 No Residential
170NW ILLIAMSON	2 97004832 D0026315	TAYLOR, JAMES MAUDIN RD	10/02/1997	330 305	2	20 Steel	Open Hole 20 - 330	Good			15 No Residential
170NW AVIDSON	2 98004857 D0030047	HENSON, AL GLORYLAND LN	10/06/1998	1004 940	5 100	41 Steel	Open Hole 41 - 1004	Good			15 No Irrigation
170NW ILLIAMSON	2 99000162 D0037346	ARLEDGE, BUZZ QUIET LN	12/07/1998	200 62	1 40	20 -	Open Hole 20 - 200				227 No Other
170NW AVIDSON	2 99000722 D0030809	DELOUCH, DAVID GLORY LAND LN	01/29/1999	1004 890	10 90	41 Steel	Open Hole 41 - 1004	Good			15 No Irrigation
170NW ILLIAMSON	2 TN009081	DOWELL, RAYMOND MAXWELL	05/07/1985		50				355826 864139	S 740 No	
170NW ILLIAMSON	2 TN009086	ESTES, TOM MAXWELL	05/07/1985		100				355829 864128	S 740 No	
170NW AVIDSON	3 03701173	BOMBS C	08/30/1977	985 975	3 75	21 Steel		Good	355837 863722	S 15 No Residential	15
170NW AVIDSON	3 03701275	RUCKER III, B. F. BATTLE	06/23/1982	210	30			Bad	355953 863734	S 227 No Other	227

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RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG USE	DRILLER
NW 3 03701306 AMSON	PHILLIPS JOHN KIDD	10/25/1982	400 280	160	32 Steel	-	Good	355840 863756	S No	227 Residential
NW 3 03701307 AMSON	OVERBACK WILMA KIDD	10/12/1982	400 83	70	77 Steel	-	Good	355850 863818	S No	227 Residential
NW 3 03701470 AMSON	HENSON, ERNEST DAL TWIN OAKS DR	05/16/1985	125 80	4	20 Steel	Open Hole 20 - 125	Good	355730 863730	No	15 Residential
NW 3 18700187 AMSON	ALLEN W		135 10	20 125	12 Steel	-	Good	355837 863956	S No	219 Residential
NW 3 18701599 AMSON	YATES R	07/19/1976	145 130	10	21 Steel	-	Good	355825 863916	S No	15 Residential
NW 3 18701707 AMSON	HENRY J	05/27/1977	310 290	1	21 Steel	-	Bad	355828 863900	S No	15 Residential
NW 3 18702159 AMSON	PIERCEY J H	03/26/1981	350 220	1	42 Steel	-	Good	355840 863740	S No	15 Residential
NW 3 18702587 AMSON	WILLIAMS, C H YORK	06/20/1984	227 115	20 30	20 Steel	Open Hole 20 - 227	Good	355730 863730	No	15 Irrigation
NW 3 18702743 AMSON	TURNER-MCFARLIN KIDD	09/12/1985	75 35	20 25	20 Steel	Open Hole 20 - 75		355730 863730	No	227 Farm
NW 3 20011108 AMSON	GRAY, ALLEN MCFARLIN RD	03/19/2001 09/21/2001	245 170	3 40	21 Galvanized	Open Hole 21 - 0	Clear 029381	355809 863745	F Yes	647 Residential
NW 3 91001407 AMSON	COLEWELL, DALE G KIDD RD	03/26/1991	300 140	2	20 Steel	Open Hole 20 - 300	Sulphur		No	15 Residential
NW 3 98002848 AMSON	GUESS, KELLY KIDD RD	06/24/1998 02/23/1999	175 125	7	20 Steel	Open Hole 20 - 175	Unknown 026979	355849 863930	S No	191 Residential
NW 3 98004403 AMSON	GRIFFIN, ALICIA ACORN CT	09/18/1998 01/28/1999	200 15	1	20 15	Slotted 15 - 16		355754 863940	F No	227 Other

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RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

AD / NTH UNITY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG USE	DRILLER LOG USE
70NW LLIAMSON	4 18700004	TIPPENS J	08/21/1963	808 804	3	17 Steel	-	Good	355615 66 864350	S No	755
70NW LLIAMSON	4 18700514	WARPOOL, HENRY OWL CREEK	11/08/1967	845 1	0 129	25 Steel	- 845	Good		No	219
70NW LLIAMSON	4 18701809	ALLBRIGHT J	04/14/1978	175 52	26	20 Steel	-	Good	355716 67 864308	S No	227
70NW LLIAMSON	4 18701810	ALLBRIGHT	04/13/1978	285	0	20 Steel	-		355718 68 864309	S No	227
70NW LLIAMSON	4 18701966	MABRY V L	10/11/1979	240 173	1 65	21 Steel	-	Good	355501 69 864440	S No	227
70NW LLIAMSON	4 18702526	TURNER, JOHN SPLIT LOG RD	06/21/1984	345 112	1	21 Open Hole	21 - 345		355230 70 870236	No	577
70NW LLIAMSON	4 18702554	FOSTER, ROBERT SPLIT LOG	05/22/1984	260 230	1 160	21 Open Hole	21 - 260		355500 71 864230	No	227
70NW LLIAMSON	4 18702575	JEFFRIES, FRED M OWL CREEK ROAD	08/23/1984	102 60	30	26 Open Hole	26 - 102		355500 864230	No	227
70NW LLIAMSON	4 18702599	M C I CLOVERCROFT	09/28/1984	1243 1218	6	73 Open Hole	73 - 1243		355500 864230	No	227
70NW LLIAMSON	4 18702770	FOSTER, ROBERT SPLIT LOG	08/08/1985	450 146	1 52	20 Open Hole	20 - 450		355500 864230	No	227
70NW LLIAMSON	4 18703006	CAWTHON, JAMES SPLIT LOG	04/16/1987	1100 940	6	20 Open Hole	20 - 1100		355500 864230	No	227
70NW LLIAMSON	4 18703008	WOODRING, TUCK SPLIT LOG	04/22/1987	950 950	3	20 Open Hole	20 - 950		355500 864230	No	227
70NW LLIAMSON	4 18703045	WARPOOL, HUGH BURK HOLLOW	04/30/1987	290		20 Steel	20 - 290	Iron	355500 864230	No	15

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RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

WELL TYPE	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG	DRILLER USE
W 4 MSON	20000520 D0041089	BIENVENU, GARY 1605 RAGSDALE RD.	01/07/2000	260 130	4 80	20 Galvanized	Open Hole 20 - 260				227 Yes Irrigation
W 4 MSON	20004067	GILMER, RON 9439 CLOVERCROFT RD	09/01/2000	260	0						227 Yes Irrigation
W 4 MSON	20004069	GILMER, RON 9439 CLOVERCROFT RD	09/06/2000	140							227 Yes Irrigation
W 4 MSON	20014971 D0053961	DERR, RON 9478 WINSTON DR	11/05/2001	162 25	20 15	20 20	Open Hole 20 - 162	Clear			227 Yes Irrigation
W 4 MSON	20014985	BROWN, MICHAEL 9475 WINSTON DR	11/04/2001	200							227 Yes Irrigation
W 4 MSON	91003450	TALLEY, J M TULLOSS RD	08/09/1991	225							647 No Residential
W 4 MSON	92000375	LEE, ROBERT H SPLIT LOG	01/06/1992	160 145	30	20 20	Open Hole 20 - 160				227 No Residential
W 4 MSON	93002088	AVERWATER, JIM CLOVERCROFT RD	11/09/1992	263 215	15	41 41	Open Hole 41 - 263				227 No Residential
W 4 MSON	94003475	WARREN, GARY BUTTER HOLLOW	08/16/1994	350	0	20 Steel 21	Open Hole 21 - 350				15 No Residential
W 4 MSON	94003780 D0010276	WARREN, GARY BUTLER HOLLOW	08/16/1994	85 70	15	20 Steel 21	Open Hole 21 - 85	Good			15 No Residential
W 4 MSON	96003520 D0017305	HEENY, MICHAEL SAM DONALD 9813	07/23/1996 01/28/1999	840 700	2	20 20	Open Hole 20 - 840	024404	355705 72 864230	F No	227 No Residential
W 4 MSON	99004424 D0041018	WEST, ROGER SPLIT LOG 9014	09/02/1999	300 145	4	20 20	Open Hole 20 - 300				227 No Irrigation
W 4 MSON	99004425 D0041019	WEST, ROGER SPLIT LOG 9014	09/03/1999	240 60	2 40	20 20	Open Hole 20 - 240				227 No Irrigation

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RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

JAD / NTH COUNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG USE	DRILLER
70NW ILLIAMSON	5 18700068	SEALES P	01/27/1964	170 165	20	10 Steel	-	Good	355620 73 864115	S 15 No	
70NW ILLIAMSON	5 18700744	NOLENSVILLE UTILITYD 41A @ 31A			0	0 Steel	-	Bad		No	740 Municipal
70NW ILLIAMSON	5 18700745	NOLENSVILLE UTILITYD	07/10/1969	187 160	132	100 Steel	-	Bad	000000 000000	No	212 Municipal
70NW ILLIAMSON	5 18701304	HOSSE, GENE SAM DONALD	11/18/1971	913 862	1 140	21 Steel	21 - 913	Good		No	227 Residential
70NW ILLIAMSON	5 18701305	HOSSE G.	10/06/1971	298		21 Steel	-			No	227 Residential
70NW ILLIAMSON	5 18701448	SMITH	05/02/1975	185 145	8	22 Steel	-	Good	355548 74 864057	S 15 No	15 Farm
70NW ILLIAMSON	5 18701737	SANFORD K.	07/14/1977	125 115	10	21 Steel	-	Good	355524 75 864015	S 15 No	15 Residential
70NW ILLIAMSON	5 18702260	VERNON R.	06/17/1981	220 125	2 80	21 Steel	-	Good	355610 76 864056	S 227 No	227 Residential
70NW ILLIAMSON	5 18703089	WARREN, MIKE BURKE HOLLOW RD	09/21/1987	200 26	0	20 Open Hole	20 - 200	Good	355500 77 864000	No	227 Residential
70NW ILLIAMSON	5 18703091	TANT'S PLANTS NOLENSVILLE RD	09/17/1987	350	6	Open Hole	Open Hole	Good	355500 78 864000	No	15 Irrigation
70NW ILLIAMSON	5 20011500	KLIEN, JEFF	05/26/2001	1200	2.5	20 Open Hole	Open Hole	Clear	355711	F	227
70NW ILLIAMSON	5 20023765	FRIZSELL, DAN	11/07/2002	200	12	25 Open Hole	Open Hole	Cloudy	355456 79 864753	Yes	227 Residential
70NW ILLIAMSON	5 2002853	MCCARTNEY, JOHN SAM DONALD R	07/20/1992	330 60	3	20 Steel	20 - 330	Good		No	15 Residential

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RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

WELL ID	WELL NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG	DRILLER USE
NW 5 AMSON	94000209 D0000390	MCGEACHY, PAT 31A	01/26/1994	1250 1230	5	20 Steel	Open Hole 21 - 1250	Good	355532 864109	S No	227 Residential
NW 5 AMSON	96002770	WARREN, AMY BURKE HOLLOW RD	06/11/1996 02/23/1999	100				026869	355532 864109	S No	227 Residential
NW 5 AMSON	96002771 D0017283	WARREN, AMY BURKE HOLLOW RD	06/11/1996 06/18/1996	300 13	1	2	Open Hole 12 - 300	011305	355524 864115	S No	227 Residential
NW 5 AMSON	96002772 D0017284	NEAL, DOUG CLOVERCROFT RD	06/13/1996 01/28/1999	240 217	17	33	Open Hole 33 - 240	024399	355629 864117	F No	227 Residential
NW 5 AMSON	99002640 D0036956	TENNESSEASONS 7216 NOLENSVILL	05/30/1999	298 150	1 76	20	Open Hole 20 - 298	Good		No	727 Irrigation
NW 5 AMSON	99004301 D0041035	KLIEN, JEFF 9816 SAM DONALD RD	09/15/1999 09/21/2001	562 150	1 15	20	Open Hole 20 - 562	029294	355711 864218	F No	227 Irrigation
NW 6 IERFORD	14903077	JUSTICE, PAT JUSTICE	05/30/1986	165 60	20	41 Steel	Open Hole 41 - 165	Fair	355500 863730	X No	15 Residential
NW 6 IERFORD	14903229	DEAN, STEVE INDEPENDENT	07/26/1987	207 100	5	82 Steel	Open Hole 82 - 207	Iron	355730 863500	X No	15 Residential
NW 6 IERFORD	14903230	DEAN, STEVE INDEPENDENT HIL	07/21/1987	350	1	20 Steel	Open Hole 20 - 350	Fair	355730 863500	X No	15 Residential
NW 6 IAMSON	18700102	SHELTON J	05/16/1964	146 146	30 76	24 Steel	Good -	Good	355706 863910	S No	219 Residential
NW 6 IAMSON	18700179	BATTLE L	10/20/1964	125	0				355509 863926	S No	219 Other
NW 6 IAMSON	18700180	MCCLAIN	11/09/1964	170 155	20 50	10 Steel	Good -	Good	355613 863839	S No	219 Residential
NW 6 IAMSON	18700196	RIDLEY C	12/16/1964	186 168	7 70	16 Steel	Good -	Good	355613 863831	S No	147 Residential

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RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

JAD / NTH COUNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG USE	DRILLER
70NW LLIAMSON	6 18701184	RAY E	07/30/1973	180	0	21	-		355504 863832	S 227 No Other	
70NW LLIAMSON	6 18701185	RAY E	06/23/1973	425	0	21	-		355505 863832	S 227 No Other	
70NW LLIAMSON	6 18701232	RAYAET J	11/09/1973	1151 1132	3 240	21	-	Good	355505 863832	S 227 No Residential	
70NW LLIAMSON	6 18701511	CREECH H.A.	04/12/1976	145 127	25	21	-	Good	355620 864004	S 15 No Residential	
70NW LLIAMSON	6 18701512	CREECH H.A.	04/12/1976	145 135	25	22	-	Good	355621 864003	S 15 No Residential	
70NW LLIAMSON	6 18701514	PETTUS, TOM. HWY 31A	01/28/1976	145 120	15	22	-	Good	355625 863930	S 15 No	
70NW LLIAMSON	6 18701600	LEROD R	06/11/1976	125 115	20	22	-	Good	355616 863838	S 15 No Residential	
70NW LLIAMSON	6 18701703	WILBURN A.	03/08/1977	85 60	5	21	-	Good	355650 864001	S 15 No Residential	
70NW LLIAMSON	6 18701706	MCLEMORE R.W.	05/18/1977	105 90	15	21	-	Good	355639 863948	S 15 No Residential	
70NW LLIAMSON	6 18701735	ROBERTSON GREENHOUSE	06/10/1977	280 270	50	21	-	Good	355515 863919	S 15 No Residential	
70NW LLIAMSON	6 18702839	DEAN JR, ROBERT YORK	06/28/1986	207 70	15	20	Open Hole	Good	355500 863730	15 No Residential	
70NW LLIAMSON	6 18703070	LAMPLEY, HOMER NOLENSVILLE PK	07/13/1987	310	0 310	41	Open Hole	Good	355500 863730	15 No Residential	
70NW LLIAMSON	6 20003677	JOHNSON, KEVIN	07/20/2000	265 100	250 30	41	Open Hole	Clear		15 Yes Residential	

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WELL COUNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG USE	DRILLER
NW 6 AMSON	20004070	BELL, WILLIAM 7524 NOLENSVILLE RD	08/25/2000	240						227 Yes	
NW 6 IAMSON	20005086 D0048466	BELL, L D 2600 YORK RD	10/26/2000	280 80	1 60	22 Galvanized	Open Hole 22 - 280	Clear		227 Yes	Irrigation
NW 6 IAMSON	20013545 D0054979	BERR, WILLIAM 7524 NOLENSVILLE RD	08/18/2001	270 255	65 30	20 Steel	Open Hole 20 - 270	Clear		15 Yes	Farm
NW 6 IAMSON	92000387	ARNOLD, LYNN NOLENSVILLE	03/15/1991	400 60	1	20	Open Hole 20 - 400			227 No	Heat Pump
NW 6 IAMSON	96005344 D0015738	COBB, JIM YORK RD	11/14/1996	85		54	Open Hole 54 - 85			647 No	Residential
NW 6 IAMSON	96005345 D0015739	COBB, JIM YORK RD	11/15/1996	145 115	15 45	41	Open Hole 41 - 145	Fair		647 No	Residential
NW 6 IAMSON	99004179 D0039739	WILLIAMS, GRADY YORK	08/31/1999	248 140	16 40	20 Steel	Screen 0 - 248	Sulphur		15 No	Irrigation
NW 7 IAMSON	18700082	SKINNER W	02/13/1964	140 136	9 35	21 Steel		Bad	355252 100 864328	S 147 No	Residential
NW 7 IAMSON	18700132	WHITSEY E	07/16/1964	150 58	0 55	5 Steel			355237 101 864437	S 147 No	Residential
NW 7 IAMSON	18700161	STEPHENS R	08/12/1964	45 32	12 10	20 Steel		Good	355435 102 864238	S 17 No	
NW 7 IAMSON	18700165	STEPHENS R	08/10/1964	100	0				355434 103 864236	S 17 No	Other
NW 7 IAMSON	18700167	STREET M	08/12/1964	190	0	12			355425 104 864334	S 15 No	
NW 7 IAMSON	18700168	LAMB T	08/10/1964	100 55	2	34			355359 105 864353	S 15 No	

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

JAD / NTH COUNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG USE	DRILLER
70NW ILLIAMSON	7 18700176	HUGHES D	10/21/1964	85	0				355403 106 864303	S 15 No Other	
70NW ILLIAMSON	7 18700793	ENGLISH A	09/14/1969	247 94	0 60	30 Steel		Good	355256 107 864328	S 227 No Residential	
70NW ILLIAMSON	7 18700858	JENNETTE J	05/19/1970	225 212	6 40	20 Steel		Bad	355251 108 864330	S 227 No Residential	
70NW ILLIAMSON	7 18700865	DUNN W	04/21/1970	250 205	15 28	21 Steel		Bad	355247 109 864416	S 227 No Residential	
70NW ILLIAMSON	7 18700924	SWEENEY, KENNETH MOLLY HOLLOW	09/30/1970	925 905	5 220	21 Steel	21 - 925	Good		227 No Residential	
70NW ILLIAMSON	7 18701124	ANDERSONRW.	09/29/1973	330 325	40 56	23 Steel		Good	355252 110 864329	S 15 No Residential	
70NW ILLIAMSON	7 18701172	CHRISTMAN, GARY, WARREN HOLLOW	03/27/1973	1129 1105	2 240	21 Steel	21 - 1129	Bad		227 No Residential	
70NW ILLIAMSON	7 18701310	BAILEY, HOWARD BURKE HOLLOW	10/14/1971	1255 1100	1 486	21 Steel		Good	355415 111 864314	F 227 No Residential	
70NW ILLIAMSON	7 18701965	MABRY V L	10/09/1979		0				355458 112 864442	S 227 No Other	
70NW ILLIAMSON	7 18701970	SIMMS J	05/30/1979	200 160	4 130	21 Steel		Bad	355452 113 864447	S 227 No Residential	
70NW ILLIAMSON	7 18702125	SMITH S.	09/22/1980	160	0				355427 114 864455	S 227 No Residential	
70NW ILLIAMSON	7 18702180	MONTGOMERY C	11/04/1980	100 15	7 10	21 Steel		Good	354241 115 355433	S 227 No Residential	
70NW ILLIAMSON	7 18702517	DUFF, DARYL WARREN HOLLOW	05/01/1984	40 26	14 11	24 Open Hole	24 - 40	Good	355230 116 864230	227 No Residential	

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RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

WELL NUM REG NUM	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG USE
NW 7 18702562 JAMSON	NW 7 18702562 JAMSON	WAGGONER, L J WAGGONER	07/18/1984	220 190	10 100	21 38	Open Hole 220		355230 864230	227 No Residential
NW 7 18702994 JAMSON	NW 7 18702994 JAMSON	JENKINS, RANDY BURKE HOLLOW	03/23/1987	160	0	20	Open Hole 20		355230 864230	227 No Residential
NW 7 18703115 JAMSON	NW 7 18703115 JAMSON	POWELL, DAVID BURKE HOLLOW	02/26/1988	500 128	0	46	Open Hole 46		355230 864230	227 No Residential
NW 7 20030887 JAMSON	NW 7 20030887 JAMSON	HERZBERG, DAVID 3086 WILSON PK	03/20/2003	135 32	10 10	37 Galvanized	Slotted 32	Clear 33		227 Yes Farm
NW 7 93000735 JAMSON	NW 7 93000735 JAMSON	LOSEE, TERRELL HICKORY HILLS D	02/08/1993	520	0	41	Open Hole			647 No Residential
NW 7 93000736 JAMSON	NW 7 93000736 JAMSON	LOSEE, TERRELL HICKORY HILLS R	02/10/1993	155	0	20	Open Hole			647 No Residential
NW 7 95003878 JAMSON	NW 7 95003878 JAMSON	RYANS, GLENN SHAKE RAG RD	06/21/1995	180 140	12	20	Open Hole 20			227 No Residential
NW 7 98002767 JAMSON	NW 7 98002767 JAMSON	TURNER, RICK TULLOSS RD	07/13/1998 02/23/1999	160 30	50 5	20	Open Hole 20		355437 864450	S 227 No Other
NW 7 98003530 JAMSON	NW 7 98003530 JAMSON	SWANSON, REGG BURKE HOLLOW	08/14/1998 01/28/1999	202 160	30 80	20	Open Hole 20		355354 864331	S 227 No Irrigation
NW 7 98005116 JAMSON	NW 7 98005116 JAMSON	SWANSON, REGG BURKE HOLLOW	10/26/1998 01/28/1999	180 165					355354 864327	S 227 No Other
NW 7 98005117 JAMSON	NW 7 98005117 JAMSON	SWANSON, REGG BURKE HOLLOW	10/26/1998 01/28/1999	162 162					355354 864330	S 227 No Other
NW 7 98005118 JAMSON	NW 7 98005118 JAMSON	SWANSON, REGG BURKE HOLLOW	10/27/1998 01/28/1999	40 30					355358 864328	S 227 No Other
NW 7 98005128 JAMSON	NW 7 98005128 JAMSON	SWANSON, REGG BURKE HOLLOW	10/27/1998 01/28/1999	80 20	10	23	Open Hole 23		355357 864330	F 227 No Other

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

AD / NTH JNTY	WELL NUM	OWNER'S NAME	COMP DATE	TOT DEPTH	TOT YIELD	CSE DEPTH	WELL FINISH	WAT QUAL	LATITUDE	A / C	DRILLER
REG NUM	LOCATION ROAD	INSP DATE	AQ DEPTH	STAT LEVEL	CSE TYPE	INTERVAL	INSP NUMBER	LONGITUDE	LOG	USE	
ONW 8 LIAMSON	18700221	PASCHALLS INC	05/14/1965	125 80	4 85	10 Steel	Good	355232 864219	X	S 22 No	Residential
ONW 8 LIAMSON	18700224	PASCHALLS INC	06/02/1965	190 175	1 120	22 Steel	Good	355243 864206	X	S 22 No	Residential
ONW 8 LIAMSON	18700231	WILLIAMS M	06/15/1965	173	20	12 Steel	Good	355312 864137	X	S 324 No	
ONW 8 LIAMSON	18700706	WITT, FRANK BURKE HOLLOW	09/10/1968	1153 1140	1 381	22 Steel	Good			No	Residential
ONW 8 LIAMSON	18701932	HUSKY G	04/17/1979	220	0	32 Steel		355425 864328	X	S 227 No	Residential
ONW 8 LIAMSON	18701944	HUSKEY G	03/29/1979	365	0	39 Steel		355425 864327	X	S 227 No	Other
ONW 8 LIAMSON	18702266	WOODSIDE D.	11/23/1981	350 80	1	29 Steel	Bad	355433 864153	X	S 15 No	Residential
ONW 8 LIAMSON	18702663	PARKER JR, SAM BURK HOLLOW	06/28/1985	350 280	3	20 Steel	Open Hole 20 - 350	355230 864000		No	Residential
ONW 8 LIAMSON	18702735	LITTLE, GLENN SKINNER	11/07/1985	200 30	6 20	20 20	Open Hole 20 - 200	355230 864000		No	Residential
ONW 8 LIAMSON	18703202	BENDER, CRIS BURKE HOLLOW	06/07/1988	360 280	7	28 28	Open Hole 28 - 360	355230 864000		No	Residential
ONW 8 LIAMSON	18703358	WILLIAMS, JOHN OSBORN	06/28/1989	300 295	5	20 Steel	Open Hole 20 - 300	355230 864000		No	Residential
ONW 8 LIAMSON	20005693	GREENLINKS CONST	11/23/2000	280 165	30 60	20 Galvanized	Open Hole 20 - 280			Yes	Irrigation
ONW 8 LIAMSON	20005694	GREENLINKS CONST	11/24/2000	260 170	40 70	20 Galvanized	Open Hole 20 - 260			Yes	Irrigation

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

WELL / NTH ID / ID	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG	DRILLER USE
NW 8 AMSON	20005695	GREENLINKS CONST HWY 96 EAST	11/25/2000	180						Yes	227 Irrigation
NW 8 AMSON	20005696	GREENLINKS CONST HWY 96 EAST	11/25/2000	160						Yes	227 Irrigation
NW 8 AMSON	20005697	GREENLINKS CONS HWY 96 EAST	11/26/2000	240	0					Yes	227 Irrigation
NW 8 AMSON	20005698	GREENLINKS CONST HWY 96 EAST	11/26/2000	180	100	20	Open Hole	Clear		Yes	227 Irrigation
NW 8 AMSON	20005699	GREENLINKS CONST HWY 96 EAST	11/30/2000	120	10	40	Galvanized	20 - 180		Yes	227 Irrigation
NW 8 AMSON	20005700	GREENLINKS CONST HWY 96 EAST	12/01/2000	180	50	24	Open Hole	Clear		Yes	227 Irrigation
NW 8 AMSON	20005731	GREENLINKS CONST HWY 96 EAST	11/22/2000	300	0.5	40	Galvanized	24 - 180		Yes	227 Irrigation
NW 8 AMSON	20021595	HAILEY, JAMES 2275 OSBORNE RD	06/06/2002	140	6	20	Open Hole	Clear		Yes	227 Irrigation
NW 8 AMSON	90001268	SCRUGGS III JAMES WARREN HOLLOW	04/17/1990	160	1	20	Open Hole	Sulphur		No	227 Residential
NW 8 AMSON	91003656	MASON, BRENT&KIRS SKINNER	09/18/1991	30		20	- 160			No	227 Residential
NW 8 AMSON	94003341	MCGEE, PARKER BUNKER HILL DR	08/08/1994 03/14/1995	207 160	5	20	Open Hole	Good	355243 130 864231	F 15 No	Residential
NW 8 AMSON	95004443	SHADY CK EMU FARM NOLENSVILLE RD	09/19/1995 08/16/1995	105 30	9 10	20	Open Hole	Good	355346 131 864003	F 647 No	Farm
NW 8 AMSON	97005301	CAMPBELL, KEVIN SKINNER	10/27/1997	1127 1086	12	20	Open Hole	Good		No	15 Residential

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RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

AD / NTH UNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG	DRILLER USE
70NW LIAMSON	8 99000372 D0030802	WILLIAMS, DON ROBERTS RD	01/11/1999	207 180	35 40	20 Steel	Open Hole 20 - 207	Fair		No	15 Residential
70NW LIAMSON	8 99003470 D0041006	OWENS, THOMAS OSBORN RD	08/11/1999	120 60	10	20	Open Hole 20 - 120			No	227 Other
70NW LIAMSON	8 99005927 D0041061	BLANKENSHIP, FRANK VALLEY FORGE	11/18/1999	282 50	5 20	20	Open Hole 20 - 282			No	227 Other
70NW THERFORD	9 14903447	HILL, CHARLES MT	03/17/1989	330 125	1 80	41 Steel	Open Hole 41 - 330		355230 863700	No	437 Residential
70NW LIAMSON	9 18700350	PARKER, JAMES, MCCANLESS	05/11/1965	978 50	1 258	50	- 978			No	755 Residential
70NW LIAMSON	9 18701233	MARTIN, ED MCCANLESS	11/20/1973	1151 1080	2 190	20 Steel	- 1151	Good		No	227 Residential
70NW LIAMSON	9 18701605	BROWN R	11/30/1977	370		Steel	-	Good	355457 863835	S	15 Residential
70NW LIAMSON	9 18701726	TARPLEY T	04/26/1977	80	4	21 Steel	-	Good	355452 863941	S	15 Residential
70NW LIAMSON	9 18701837	PERRY	09/25/1978	1210 1190	2	-	-	Good	355424 863738	S	15 Residential
70NW LIAMSON	9 18702831	TATE, JOE MCCLANLIES RD	03/11/1986	400	1	20 Steel	Open Hole 20 - 400	Fair	355230 863730	No	15 Residential
70NW LIAMSON	9 18702853	HORNER, JOHN SPANIN TOWN	06/04/1986	400 50	2 30	20	Open Hole -		355230 863730	No	227 Residential
70NW LIAMSON	9 18702888	MAYFIELD, BUD 31A-41A	03/10/1986	460 177	15 80	96	Open Hole 96 - 460		355230 863730	No	227 Heat Pump
70NW LIAMSON	9 20002134 D0045477	CLAWSON, STEVE 2935 BOSTICK RD	04/27/2000	410 200	12 30	41 Steel	Open Hole 41 - 410	Cloudy		Yes	15 Residential

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE NOLENSVILLE QUADRANGLE 0070NW TN

/ NTH ITY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG	DRILLER USE
NW 9 AMSON	95001535 D0010972	COULSON, CARL PUCKETT	04/04/1995 02/23/1999	1140 1060	2	20	Open Hole 20	1140 026957	355349 863829	S No	227 Residential
NW 9 AMSON	96003897	ALLEN, DAVID HENRY ALLEN LN	08/22/1996 02/23/1999	370				026988	355302 863746	F No	15 Residential
NW 9 AMSON	97003145 D0026268	ROBBINS, JOHN OLD HORTON HWY	07/10/1997 02/23/1999	207 160	25 30	20 Steel	Open Hole 20	Good 026982	355250 863936	S No	15 Residential
NW 9 AMSON	99004857 D0039750	GRAHAM, SCOTT NOLENSVILLE RD	09/17/1999 02/14/2000	1209 1189	5	20 Steel	Open Hole 20	Good 026437	355436 863904	F No	15 Residential

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE COLLEGE-GROVE QUADRANGLE 0070SW TN

JAD /NTH	WELL NUM	OWNER'S NAME	COMP DATE	TOT DEPTH	TOT YIELD	CSE DEPTH	WELL FINISH	WAT QUAL	LATITUDE	A/C	DRILLER
COUNTY	REG NUM	LOCATION ROAD	INSP DATE	AQ DEPTH	STAT LEVEL	CSE TYPE	INTERVAL	INSP NUMBER	LONGITUDE	LOG	USE
70SW 4	18700749	GRAHAM D	07/10/1969	196	0	21		Good	359812	S	227
ILLIAMSON				130	40	Steel	-		33 864415	No	Residential
70SW 4	18701457	WALLACE B.	07/24/1975	248	2	21		Good	354925	S	428
ILLIAMSON				210	50	Steel	-		34 864416	No	Residential
70SW 4	18701485	TOOMBS R.W.	10/01/1975	120	4	22		Bad	354938	S	15
ILLIAMSON				70		Steel	-		35 864346	No	Residential
70SW 4	18701609	BART W H	07/01/1976	145	10	31		Bad	354812	S	15
ILLIAMSON				115		Steel	-		36 864338	No	Farm
70SW 4	18701705	BAPTIST CHURCH	03/17/1977	248	15	30		Bad	354740	S	15
ILLIAMSON				225		Steel	-		37 864329	No	Residential
70SW 4	18701825	HARPER R	07/10/1978	85	7	33		Good	354817	S	15
ILLIAMSON				51		Steel	-		38 864448	No	Farm
70SW 4	18702141	CROWELL P B III	06/24/1980	293	21	26		Good	354934	S	227
ILLIAMSON				290	110	Steel	-		39 864441	No	Residential
70SW 4	18702588	EWING JR, TOM	06/20/1984	350	3	20	Open Hole	Good	354920	S	15
ILLIAMSON		MCDANIEL	06/27/1985	215	121	Steel	20 - 350		40 864206	No	Residential
70SW 4	18702665	PEDELLA, CONNIE	06/28/1985	550		29	Open Hole		354730	15	
ILLIAMSON						Steel	29 - 550		41 864230	No	Residential
70SW 4	18702687	MCMURRAY, SAM K	07/11/1985	350	3	20	Open Hole	Good	354730	15	
ILLIAMSON		ARNO RD		160		Steel	20 - 350		41 864230	No	Residential
70SW 4	18702716	MCMURRAY, SAM	10/25/1985	125	15	20	Open Hole		354730	227	
ILLIAMSON		ARNO		86	40	20	- 125		41 864230	No	Residential
70SW 4	18702717	MCMURRAY, SAM	10/24/1985	225					354730	227	
ILLIAMSON		ARNO		190					41 864230	No	Residential
70SW 4	18702741	ABEL, RICHARD		40	0				354730	227	
ILLIAMSON		ARNO							41 864230	No	Other

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE COLLEGE-GROVE QUADRANGLE 0070SW TN

D / NTH INTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A / C LOG	DRILLER USE
00SW 4 LIAMSON	18702790	ABEL, RICHARD H ARNO	08/15/1985	300 170	2 70	55	Open Hole 55 - 300		354730 864230	41	227 No Residential
00SW 4 LIAMSON	18702830	WILSON, JIM MEEKS	03/28/1986	207 170	7	41 Steel	Open Hole 41 - 207	Good	354730 864230	41	15 No Residential
00SW 4 LIAMSON	18702838	MAYFIELD, KENNY PINKSTON	06/25/1986	248 175	4			Good	354730 864230	41	15 No Residential
00SW 4 LIAMSON	18702866	LYNCH, CLYDE ARNO	07/24/1986	185 170	60	20 Steel	Open Hole 20 - 185	Fair	354730 864230	41	15 No Residential
00SW 4 LIAMSON	18702924	LAFRANIER, ANTHONY A EDMOND'S GROVE	01/09/1987	145 95	15	20 Steel	Open Hole 20 - 145	Fair	354730 864230	41	15 No Residential
00SW 4 LIAMSON	18703009	TREADWAY, MIKE ARNO	04/23/1987	100 92	30 5	20	Open Hole 20 - 100		354730 864230	41	227 No Residential
00SW 4 LIAMSON	18703072	GEVENS, BOBBY ARNO	11/07/1987	886 840	10	20	Open Hole 20 - 886	Fair	354730 864230	41	15 No Other
00SW 4 LIAMSON	18703221	LYNCH, PAUL ARNO	08/25/1988	240 150	2	20	Open Hole 20 - 240	Good	354730 864230	41	227 No Residential
00SW 4 LIAMSON	18703268	HEARO III, GEORGE L ARNO	03/18/1989	125 105	15	20 Steel	Open Hole 20 - 125	Fair	354730 864230	41	15 No Residential
00SW 4 LIAMSON	18703301	LUSTER, TONY ARNO	07/06/1989	160 120		20	Open Hole -		354730 864230	41	227 No Residential
00SW 4 LIAMSON	18703370	LUSTER, TONY ARNO	06/27/1989	160 120	12 90	62	Open Hole 62 - 160		354730 864230	41	227 No Residential
00SW 4 LIAMSON	20000860	HATCHER, GEORGE NATHAN SMITH	01/31/2000	410 40	3 10	20 Steel	Open Hole 20 - 410	Clear			15 Yes Residential
00SW 4 LIAMSON	90000233	MORTON, JOHN COX	11/13/1989	207 197	15	41 Steel	Open Hole 41 - 207	Sulphur			15 No Residential

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RECORDS OF WATER WELLS ON THE COLLEGE-GROVE QUADRANGLE 0070SW TN

ADJUDICATING COUNTY	WELL NUMBER	OWNER'S NAME	LOCATION ROAD	COMP DATE	TOT DEPTH	TOT YIELD	CSE DEPTH	WELL FINISH	WAT QUAL	LATITUDE	LONGITUDE	A/C	DRILLER
	REG NUM			INSP DATE	AQ DEPTH	STAT LEVEL	CSE TYPE	INTERVAL	INSP NUMBER			LOG	USE
070SW	4 91000398	HOLLY, W E		09/12/1990	207	6	20	Open Hole	Good				15
WILLIAMSON		COLLEGE GROVE			85		Steel	20	207			No	Residential
070SW	4 91002644	RICCI, LARRY		06/19/1991	300		41	Open Hole					647
WILLIAMSON		PEYTONSVILLE-AR			30			41	300			No	Residential
070SW	4 91003920	HIGHTOWER, DAVID		06/26/1991	165	40	20	Open Hole	Good				15
WILLIAMSON		PEYTONSVILLE-AR			160		Steel	20	165			No	Residential
070SW	4 92001192	GARE, FRED		11/02/1991	227	7	20	Open Hole	Good				15
UTHERFORD		GREENWOOD			200		Steel	20	207			No	Residential
070SW	4 98000291	JONES BRO CONST		12/16/1997	297					354917		S	191
WILLIAMSON		NATHAN SMITH RD		06/22/1998		100	Steel		021603	42	864422	No	Other
070SW	4 98000292	JONES BRO CONST		12/16/1997	297					354918		S	191
WILLIAMSON		ARNO RD 151		06/22/1998		110	Steel		021606	43	864423	No	Other
070SW	4 98000295	JONES BRO CONST		12/16/1997	250					354920		S	191
WILLIAMSON		ARNO RD		06/22/1998		90	Steel		021601	44	864401	No	Other
070SW	4 98000296	JONES BRO CONST		12/16/1997	110					354920		S	191
WILLIAMSON		ARNO RD		06/22/1998		60	Steel		021602		864403	No	Other

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE BETHESDA QUADRANGLE 00639E TN

D / NTH NTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A/C LOG USE	DRILLER
33SE 1 LIAMSON	18700577	STONE L	08/31/1967	200	0				355224 865142	S 227 No Other	✓
33SE 1 LIAMSON	18700578	STONE L	08/19/1967	298	0				355224 865142	S 227 No Other	✓
33SE 1 LIAMSON	18700579	LEE C	08/02/1967	334 278	15 85	56 Steel		Bad	355130 865006	S 227 No Residential	✓
33SE 1 LIAMSON	18700820	PHILLIPS 66 STATION	08/16/1969	830 825	10	21 Steel		Good	355100 865548	S 120 No Commercial	✓
33SE 1 LIAMSON	18701691	MILCROFTON UTILITY D	07/18/1977	250 153	55	21 Steel		Bad	355003 864505	S 120 No Industrial	✓
33SE 1 LIAMSON	18702104	JONES J. # 2		250 50	1 32	21 Steel		Bad	354957 865126	S 227 No Residential	✓
33SE 1 LIAMSON	18702128	JONES J	10/16/1980	300	0				355000 865128	S 227 No Other	✓
33SE 1 LIAMSON	18703197	WILLIAMS, CHARLIE 431 SOUTH	07/23/1988	360	0	35 35	Open Hole 35 - 360	Good	355000 865000	227 No Irrigation	✓
33SE 1 LIAMSON	18703262	MARTOCCI, FILBERT LEWISBURG PK	06/28/1988	200	0				355000 865000	227 No Irrigation	✓
33SE 1 LIAMSON	18703263	MARTOCCI, FILBERT LEWISBURG PK	06/29/1988	200 195	0				355000 865000	227 No Irrigation	✓
33SE 1 LIAMSON	18703264	MARTOCCI, FILBERT LEWISBURG PIKE	06/30/1988	150	0				355000 865000	227 No Irrigation	✓
33SE 1 LIAMSON	18703265	MARTOCCI, FILBERT LEWISBURG PIKE	06/30/1988	200	0				355000 865000	227 No Irrigation	✓
33SE 1 LIAMSON	18706024	DRAUGHNS		400	30	Steel		Good	355000 865130	S 227 No Residential	✓

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE BETHESDA QUADRANGLE 0063SE TN

QUAD /NTH COUNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A/C LOG USE	DRILLER
063SE WILLIAMSON	1 20004008	DAILEY, GREG MANLEY LN	08/20/2000	280 115	1		-			Yes	227 Irrigation
063SE WILLIAMSON	1 20012176	NEAL, FRANK 4690 GAINSVILLE RD	06/08/2001	95 42	25 10	20 Steel	Open Hole -			Yes	551 Residential
063SE WILLIAMSON	1 20013919	HARPER CONSTRUCTION 165 / 1840	06/01/2001	260 17	12 8	20 Galvanized	Slotted 17 - 19	Clear		Yes	227 Commercial
063SE WILLIAMSON	1 90003864	HARVEY, JEFF BUCKNER	06/12/1990	300 295	10	21 -	Open Hole 21 - 300	Good		No	227 Residential
063SE WILLIAMSON	1 95003915	BOYLAN, JOE KITRELL RD	08/18/1995	435	1	20	Open Hole 20 - 435			No	647 Residential
063SE WILLIAMSON	1 95004237	TAYLOR, JIM GOOSE CREEK BYP	09/06/1995 06/27/1996	160			-	016410	355128 865104	S No	227 Residential
063SE WILLIAMSON	1 95004238	TAYLOR, JIM GOOSE CREEK BYP	09/07/1995 06/27/1996	100			-	016409	355132 865101	S No	227 Residential
063SE WILLIAMSON	1 96003374	KELLY, JIM MCLEMORE RD	07/01/1996 06/09/1997	200 70	2	20	Open Hole 20 - 200	019512	354347 865150	S No	227 Residential
063SE WILLIAMSON	1 97003891	STICKNEY, BOB 2712 REAMS PL	08/15/1997	102 445	7 80	20 Steel	Open Hole 20 - 1023	Good		No	15 Irrigation
063SE WILLIAMSON	1 98004081	SHEPARD, WANDA GOOSE CREEK	09/17/1998	300 210	2	29	Open Hole 29 - 300			No	227 Other
063SE WILLIAMSON	1 98004948	GEARHEART, BRENDA LEE CIRCLE	10/23/1998	300	1	20	Open Hole 20 - 300			No	227 Residential

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE BETHESDA QUADRANGLE 0063SE TN

JAD / NTH COUNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A/C LOG	DRILLER USE
063SE 4 WILLIAMSON	18700086	BENNETT J	03/30/1964	100 15	1 15	15 Steel	-	Good	354910 865022	S No	94 Residential
063SE 4 WILLIAMSON	18700803	NOBLE G	09/06/1969	950	128	22 Steel	-	Good	354805 865055	S No	227 Residential
063SE 4 WILLIAMSON	18700836	SMITHSON B	04/18/1970	350 275	1 40	20 Steel	-	Good	354757 865033	S No	227 Residential
063SE 4 WILLIAMSON	18700839	OGILVIE P	04/15/1970	950 912	5 174	21 Steel	-	Good	354758 865053	S No	227 Residential
063SE 4 WILLIAMSON	18701194	KELSEY D	08/19/1973	928 892	5 60	22 Steel	-	Good	354903 865100	S No	227 Residential
063SE 4 WILLIAMSON	18701848	FROST C	12/10/1978	905 850	3	21 Steel	-	Good	354907 865017	S No	15
063SE 4 WILLIAMSON	18702523	GILES, RONALD E	05/16/1984	125 105	12 20	20 Steel	Open Hole 20 - 125	Fair	354730 852000	No	15 Residential
063SE 4 WILLIAMSON	18702722	RAINTREE FARMS THOMPSON STA	10/16/1985	287 222	300 30	25 Steel	Open Hole 25 - 287		354730 865000	No	227 Irrigation
063SE 4 WILLIAMSON	18709144	HURT, STERLING HWY 431 AT I65		884 875	2 106			Good	354730 865035	S No	252 Other
063SE 4 WILLIAMSON	20004065	HENKEL, GARY 4145 JENSOME LN	09/08/2000	260 70	17	20 Galvanized	Open Hole 20 - 260	Clear			227 Yes Irrigation
063SE 4 WILLIAMSON	20011423	ALDRIDGE, GENE 1651 840 RAMP	05/18/2001	362 217	10	20 Galvanized	Open Hole 20 - 362	Clear			227 Yes Commercial
063SE 4 WILLIAMSON	92003848	HOFFMAN, RICHARD BETHESDA	10/07/1992	150 125	18 10	20 20	Open Hole 20 - 150	Sulphur		No	120 Residential
063SE 4 WILLIAMSON	96004614	PAGLAIAIRA, TIM MCCLEMORE2698	08/26/1996 06/09/1997	360					354910 865126	S No	227 Farm

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION - DIVISION OF WATER SUPPLY

RECORDS OF WATER WELLS ON THE BETHESDA QUADRANGLE 0063SE TN

QUAD / NTH COUNTY	WELL NUM REG NUM	OWNER'S NAME LOCATION ROAD	COMP DATE INSP DATE	TOT DEPTH AQ DEPTH	TOT YIELD STAT LEVEL	CSE DEPTH CSE TYPE	WELL FINISH INTERVAL	WAT QUAL INSP NUMBER	LATITUDE LONGITUDE	A/C LOG	DRILLER USE
X063SE WILLIAMSON	4 960004615	PAGLARIRIA, TIM MCCLEMORE2698	08/26/1996 06/09/1997	200				019514	354924 865126	S No	227 Farm
X063SE WILLIAMSON	4 97001397	COKE, TOMMY BAUGH LN 7604	04/07/1997	515		20	Open Hole 20 - 515				647 Residential
X063SE WILLIAMSON	4 97002589	PAGLARIRIA, TIM ANDERSON	06/09/1997 06/09/1997	350				019515	354925 865124	S No	15 Irrigation
X063SE WILLIAMSON	4 98000293	JONES BRO CONST WATKINS RD 5	12/16/1997 06/22/1998	130	40	Steel	-	021609	354919 865047	S No	191 Other
X063SE WILLIAMSON	4 98000294	JONES BRO CONST WATKINS RD #6	12/16/1997 06/22/1998	130	40	Steel	-	021610	354916 865024	S No	191 Other

2.0 **Scaled drawing with 2-foot elevation contours showing the preliminary site layout including: (Site plan elevations = 2-foot contour intervals).**

Pre-application treatment facilities
Storage facilities
Disposal fields
Buffer Zones
Hand auger, test pit and soil boring locations (See DSIR –Table 1.9.1 Site Description 1.4 Test Locations)
Access roads and utilities
Watercourses
Drainage structures
Flood elevations with 10-year, 50-year *, and 100-year flood plain elevation noted
Residences and habitable structures within or adjacent to site
Wells within 500 feet of the site (See Exhibit 1.6) (Not applicable)

This information is provided in the site plan included as Exhibit 2.0 with the exceptions noted.

*The 50-year flood plain elevation averages approximately 6 inches deviation below the 100-year flood plain and is not shown on the site plan due to scale.

3.0 **Design Wastewater Characteristics (influent to treatment and effluent to drip system)**

Sand filter and drip field design flow will be 300 GPD per EDU (household) for residential property. There are proposed 234 residential lots in the development.

Design Flow (sand filter and drip field):
234 Edu's (max) @ 300 gpd/EDU

70,200
= 16,000 GPD

Design Flow (collection system):
(234 Edu's * 0.5 gpm/EDU)

= 117 gpm

Biochemical Oxygen Demand:

Incoming: To Septic Tank -	200 to 300 mg/l
To Recirculating Filter -	120 to 150 mg/l
Effluent to Drip Disposal -	<5 mg/l

Total Suspended Solids:

Influent to Recirculating Filter -	80 to 120
Effluent to Drip Disposal -	<10 mg/l

Ammonia Nitrogen, TKN, Nitrate plus Nitrite

Influent to Recirculating Filter – Ammonia Nitrogen as N – 30 to 40
- Total Nitrogen as N – 40 to 50

Effluent to Drip Disposal – Ammonia <2 mg/l, Nitrate <15 mg/l, Nitrite <1 mg/l
TKN <20 mg/l

Total Phosphorus		
Influent to Recirculating Filter -		7 mg/l
Effluent to Drip Disposal -		<2 mg/l
Chloride		
Influent to Recirculating Filter -		30 mg/l
Effluent to Drip Disposal -		<10 mg/l
Sodium Adsorption Ratio		
Influent to Recirculating Filter -		N/A
Effluent to Drip Disposal -		10
Electrical Conductivity -		
Influent to Recirculating Filter -		N/A
Effluent to Drip Disposal -		2 ds/m
Metals/Priority Pollutants -		
Influent to Recirculating Filter -		<10 mg/l
Effluent to Drip Disposal -		<10 mg/l

4.0 Water Balance Determination of Design Wastewater Loading Rates For Each Disposal Field

SITE EVALUATION

The irrigation fields will be sited predominantly in the Maury and Maury-Stiversville Series. The Maury and Stiversville series are very deep, well-drained to moderately well drained, moderately slow permeable soils on terraces, hillsides and floodplains. A small portion of the drip field will be constructed in the other similar series. These series are also highly suitable for drip irrigation.

All of these soils are classified as silt loam or silty clay loam. After conducting a preliminary soil investigation over the entire development, the drip irrigation plan was to use the Maury-Stiversville Series in the eastern part of the site as the preferred drip site. The Maury Series in the western part of the site was selected as the 100% reserve area. Extra high intensity maps of these soil units were then conducted.

SOILS EVALUATION

Using the procedure described in US EPA 625/1-77-008, "Process Design Manual for Land Treatment of Municipal Wastewater" the percolation (Perc) rate was calculated using 10% of the soil permeability. The proposed series of soils all fall into the category of moderate with an accepted long-term acceptance rate (LTAR) design range of soil permeability rate of 0.2 to 0.6 in/hr.

The average "perc" for all constant head percolation tests was 0.178 inches per hour. From past experience, a more conservative design percolation rate of 0.0134 in/hr. (2.25 inches/week) works well for drip irrigation sections. Average depth to rock was estimated to be greater than 12 feet based on test pits dug. Given the soil series proposed for drip irrigation soils are deep moderately well-drained soils, a design percolation/drainage rate of 0.0134 in/hr should provide for a very conservative design. According to the calculations using the Thornthwaite Equation and the Nitrogen Balance equation, the lowest allowable applied loading is in August with 2.29 inches per week. Therefore, the design applied loading will be 2.25 inches per week.

5.0 Nitrogen Balance/Selection of Cover Crop and Management Scheme

Addition to Kings Chapel
Williamson County, Tennessee

DRIP IRRIGATION FIELD NITROGEN LOADING

Using Mass Balance Equation:

Lwn	=	Calculated	Allowable Loading rate based on nitrogen limits, in/month
C _p	=	10	maximum nitrogen concentration; mg/l
Pr	=	Table A-3 (Ch. 16)	5-year return monthly precipitation, in./mon.
PET	=	Table A-2 (Ch. 16)	potential evapotranspiration, in./mon. (From Chap. 16)
U	=	50	nitrogen uptake by vegetation (lbs. N/acre/year)
C _n	=	20	nitrogen concentration in applied wastewater, mg/l
f	=	Varies	fraction of applied nitrogen removed by denitrification and volatilization, %
Constant	=	4.424	combined conversion factor

$$\text{Nutrient Loading Rate} = \text{Lwn} = [C_p((Pr - PET + 4.424U)) / ((1-f) * C_n - C_p)]$$

(1-f)*C_n-C_p) must be greater than zero

~~(2.25 in/week) 79,000 gal/day~~



Smith
Geckman
Reid, Inc.

Engineering &
Information Management

$$(2.25 \text{ in}^3/\text{hr}) \left(\frac{7.48 \text{ gal}}{\text{ft}^3} \right) \left(\frac{1.57 \text{ ft}^3}{12 \text{ in}^3} \right) \left(\frac{144 \text{ in}^2}{1 \text{ ft}^2} \right) \left(\frac{1 \text{ hr}}{60 \text{ min}} \right) \left(\frac{1 \text{ day}}{24 \text{ hr}} \right) = \underline{\underline{0.20 \text{ cfs-day}}}$$

$$(0.20 \text{ cfs}) \left(\frac{43,500 \text{ ft}^3}{1 \text{ ac}} \right) \left(\frac{1 \text{ day}}{70,100 \text{ gal}} \right) = \underline{\underline{1 \text{ ac}}}$$

$$(70,100 \text{ gal}/\text{day}) \left(\frac{1 \text{ ac}}{43,500 \text{ ft}^3} \right) \left(\frac{1 \text{ ft}^3}{0.20 \text{ cfs}} \right) = \underline{\underline{8.06 \text{ ac}}}$$

	Pr	PET	Uuptake	Uuptake		Lwn	Lwn	Lwn
	(in/mo)	(in/mo)	(%/mo)	(lb/ac/mo)	f(€/mo)	(in/mo)	(in/wk)	(gpd/sf)
Jan	7.62	0.10	1	2.2	30	15.48	3.5	0.311
Feb	6.72	0.27	2	4.4	25	13.78	3.45	0.307
Mar	8.85	0.97	4	8.8	30	19.05	4.30	0.383
Apr	6.59	2.30	8	17.6	35	14.43	3.37	0.300
May	6.13	3.59	12	26.4	40	13.67	3.09	0.275
Jun	5.52	4.9	15	33.0	50	11.58	2.70	0.241
July	6.85	5.44	17	37.4	75	17.23	3.89	0.347
Aug	4.73	5.00	15	33.0	80	10.16	2.29	0.204
Sept	5.54	3.76	12	26.4	75	13.76	3.21	0.286
Oct	4.47	1.98	8	17.6	70	11.83	2.67	0.238
Nov	6.11	0.82	4	8.8	50	14.70	3.43	0.306
Dec	7.55	0.27	2	4.4	40	16.09	3.63	0.324

This design uses 0.2 gal/sf/day as a loading rate which is conservative for this site. Cover crop will be fescue and existing grasses. Grass will be mowed at maximum 24" height.

6.0 Background Water Samples

No wells are located on the project site but, based on past sampling, the expected values would be:

Fecal Coliform – 0/100 ml

Nitrate as N – 0.06 mg/l

7.0 Phosphorus and Other Constituent Loading Rates

Constituent loading rates will be typical for residential domestic waste @ 7 mg/l.

8.0 Determination of Wetted Field Areas

The total area required for drip irrigation of the design flow of 70,200 gallons per day will be as follows:

Loading rate: 2.25 inches/week (0.20 gal/sf/day)

Area required: approx. – 9.0248 acres

8.06 A c

According to State Regulations, no storage volume is required. Using Williamson County regulations, the assumption is that wastewater can only be applied 20 days in December and February and for 10 days in January. The total storage calculations are simply the ability to store the water that would have been applied during these days. No seepage is assumed. The total wastewater effluent storage required is 2,808,000 gallons. The additional rainfall for these three months is 21.89 inches. The storage pond will be sized to store 8.70 acre-feet of effluent plus an additional 21.89 inches of rain in the pond during this period.

9.0 **Process Design for Pre-Application Treatment Facility**

- 9.1 Schematic of unit processes. See Exhibit 9.1.
- 9.2 Collection system will be septic tank effluent with a gravity filter at each individual residence to gravity collection mains. There will be two (2) pump stations to deliver effluent through force mains to a recirculating gravel filter system. A final dose pump system will pressurize the drip system and/or deliver water to the storage pond if needed.

9.3 Drip Irrigation Field Sizing:

- 9.3.1 $9.0248 \text{ acres} = 393,120 \text{ sf (approx.)}$

Laterals will be placed on 5' centers.

$393,120 / 5 = 78,624 \text{ L.F. of drip line.}$

Divide drip system into 14 zones of 5600 lf each.

Typical zone will have a maximum of 14 distal ends.

Design dose flow (See Exhibit 9.2)

$= 5600' / 2' \text{ c. to c. emitters} * 0.61 \text{ (GPH/emitter)} = 28.5 \text{ gpm}$

$\text{Design flush flow} = 14 * 1.6 + 28.4 \text{ gal/min} = 22.4 \text{ gpm} + 28.5 \text{ gal/min} = 50.9 \text{ gpm}$

The system will use two pumps to dose and flush the drip fields.

Two 5600 L.f. zone will be dosed at a time (7 cycles). Both pumps will run at the same time to dose and flush the drip fields.

Design calculations for sand filter and drip irrigation are subject to final layout and design.

Sand filter pumps are based on typical sand filters of similar size.

Design life of treatment and disposal system is expected to be 50 years.

According to State Regulations, no storage volume is required. Using Williamson County regulations, the assumption is that wastewater can only be applied 20 days in December and February and for 10 days in January. The total storage calculations are simply the ability to store the water that would have been applied during these days. No seepage is assumed. The total wastewater effluent storage required is 2,808,000 gallons. The additional rainfall for these three months is 21.89 inches. The storage pond will be sized to store 8.62 acre-feet of effluent plus an additional 21.89 inches of rain in the pond during this period. The existing storage pond will be enlarged to provide the required volume.

9.0 **Process Design for Pre-Application Treatment Facility**

9.1 Schematic of unit processes. See Exhibit 9.1.

9.2 Collection system will be septic tank effluent with a gravity filter at each individual residence to gravity collection mains. There will be two (2) pump stations to deliver effluent through force mains to a recirculating gravel filter system. A final dose pump system will pressurize the drip system and/or deliver water to the storage pond if needed.

9.3 Drip Irrigation Field Sizing:

9.3.1 8.0579 acres = 351,000 sf (approx.) required.

Laterals will be placed on 5' centers.

$351,000 / 5 = 70,200 \text{ L.F. of drip line required.}$

Divide drip system into 14 zones of 5,018 L.F. of drip line each or 70,252 L.F.

Typical zone will have a maximum of 13 distal ends.

Design dose flow (See Exhibit 9.2)

$= 5018 / 2' \text{ c. to c. emitters} * (0.61 \text{ GPH/emitter}/60 \text{ min/hr.}) = 25.5 \text{ gpm per zone}$

Design flush flow = $14 * 1.6 + 28.4 \text{ gal/min} = 22.4 \text{ gpm} + 28.5 \text{ gal/min} = 50.9 \text{ gpm}$

The system will use two pumps to dose and flush the drip fields.

Two 5018 L.f. zones will be dosed at a time (7 cycles). Both pumps will run at the same time to dose and flush the drip fields.

Design calculations for sand filter and drip irrigation are subject to final layout and design.

Sand filter pumps are based on typical sand filters of similar size.

Design life of treatment and disposal system is expected to be 50 years.

Table 1.9

10.0 Determination of Wetted Field Areas and Required Storage Volume

11.0 EXHIBIT 8.0 – REQUIRED STORAGE VOLUME

REQUIRED STORAGE VOLUME

OF THE

PROPOSED ADDITION TO KINGS CHAPEL

REQUIRED STORAGE VOLUME

	Pr (in/mo)	PET (in/mo)	Pr-PET	Perc.	Design Load (in/mo)	Days- Applied	applied (in/mo)	Required Storage (in/mo)		Cumulative Storage
Jan	7.62	0.10	7.52	18.60	8.86	10	2.86	6.00	*	6.00
Feb	6.72	0.27	6.45	16.80	8.00	20	5.71	2.76	*	2.29
Mar	8.85	0.97	7.88	18.60	8.86	31	8.86	-1.86		
Apr	6.59	2.30	4.29	18.00	8.57	30	8.57	-5.14		
May	6.13	3.59	2.54	18.60	8.86	31	8.86	-7.20		
Jun	5.52	4.9	0.062	18.00	8.57	30	8.57	-8.81		
July	6.85	5.44	1.41	18.60	8.86	31	8.86	-8.33		
Aug	4.73	5.00	-0.27	18.60	8.86	31	8.86	-10.01		
Sept	5.54	3.76	1.75	18.00	8.57	30	8.57	-7.68		
Oct	4.47	1.98	2.49	18.60	8.86	31	8.86	-7.25		
Nov	6.11	0.82	5.29	18.00	8.57	30	8.57	-4.41		
Dec	7.55	0.27	7.28	18.60	8.86	20	5.71	3.59	*	3.17

Required storage: 11.43 inches

Total Required Storage Volume: 2,640,000 gallons

or: 8.10 acre/ft

2,808,000 GAL → 8.6 AC-FT

*Required Storage is determined by adding all non-application days in the month times the design load per day. Actual pond design will also include additional rainfall on the surface area of the pond.

Table 1.9

9.0 Process Design for Pre-Application Treatment Facility

EXHIBIT 9.0 – Wastewater Process Schematic

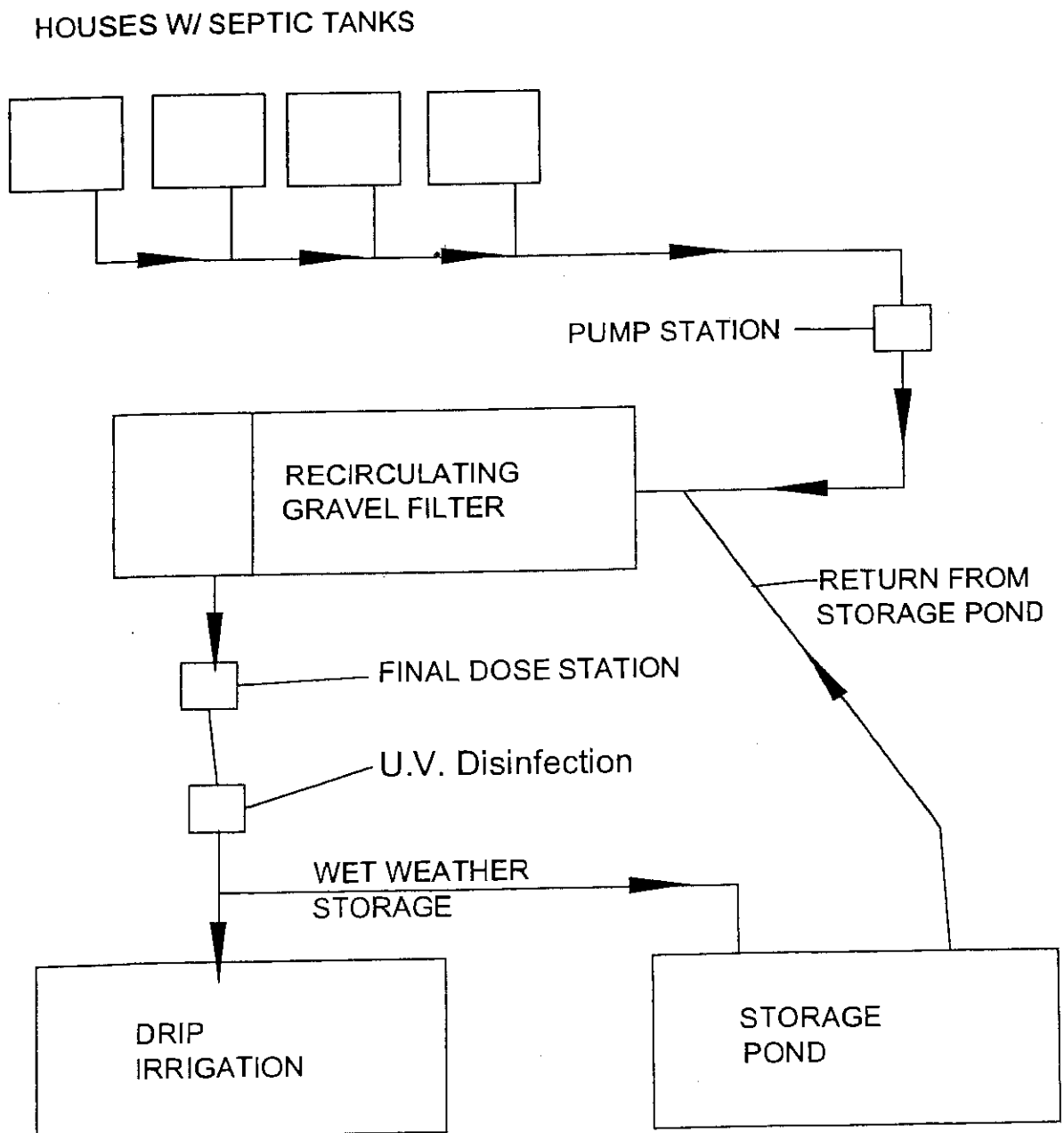
EXHIBITS 9.31, 9.32, 9.33 PUMP CURVES AND CALCULATIONS

**WASTEWATER PROCESS SCHEMATIC
AND
PUMP CURVES AND CALCULATIONS**

FOR THE

PROPOSED ADDITION TO KINGS CHAPEL

WASTEWATER PROCESS SCHEMATIC



ADDITION TO KINGS CHAPEL
WILLIAMSON COUNTY, TENNESSEE
DESIGN CRITERIA FOR STEP SYSTEM
WITH RECIRCULATING SAND FILTER TREATMENT
AND DRIP DISPOSAL

Number of Bedrooms	3	4	5	6
Daily Flow (gallons per day)	300	300	350	400
Septic Tank Size (gallons)	1,500	1,500	1,500	1,500
Recirculating Tank Size (gallons)	350	350	400	460
Sand Filter Area (square feet)	60	60	70	80
*Land Application Area (square feet)	1,500	1,500	1,750	2,000
Land Reserve Area (square feet)	1,500	1,500	1,750	2,000

* Land application rate = 2.25 in./week

Number of 3 Bedrooms = 0
 Number of 4 Bedrooms = 234
 Number of 5 Bedrooms = 0

Design Flow (gallons per day) = 70,200 Gallons

Recirculating Tank Size = 81,900 Gallons

Sand Filter Area (square feet) = 14,040 Square Feet

Land Application Area (Acres) = 8.0579 Acres

Land Reserve Area (Acres) = 8.0579 Acres

RECIRCULATING SAND FILTER DESIGN

LOCATION: Addition to Kings Chapel
Williamson County, Tennessee

PROJECT NO.: 07346
DATE: 01/12/08

1. DESIGN FLOW :

Number of lots =	234	
Use	300	gpd/lot
DESIGN FLOW (Qa) =	70,200	gpd

2. RECIRCULATING TANK:

MINIMUM VOLUME: 234 lots x 350 gal/lot = 81,900 gallons

RECIRC. PUMP TANK STORAGE: 7,750 gallons

CHAMBER STORAGE:
786 chambers x 105 gal/chamber = 82,530 gallons

Total Recirc. Storage Provided = 90,280 gallons

3. RECIRCULATING SAND FILTER:

FILTER AREA REQUIRED:

Use 4 to 5 gpd/sq. ft. loading rate			
Loading rate (Qr)	5	gpd/sq.ft.	
Filter area req'd.(Arsf)=Qa/Qr			14,040 sq. ft.

NUMBER OF ORIFICES:

Assume lateral spacing (Ls)	1.25	ft.		
Assume orifice spacing (Os)	1.25	ft.		
Area per orifice (Ao)	1.56	sq. ft.		
Total No. of Orifices (Otot) = Arsf/Ao			8.986	orifices

RATE OF DISCHARGE PER ORIFICE:

Assume residual pressure at last orifice (h)	5	ft.	
Assume orifice diameter (d)	0.125	inch	
Orifice flow rate (Qo) = 12.38*(d^2)*(h^0.5)		0.4325	gpm

NUMBER OF FILTER ZONES:

Assume pump rate (Qp)	54.2	gpm
Orifices per zone	123	orifices

Approx. No. of zones (Otot/Ozone)	73.1	zones			
	(Use	72	zones)		

FILTER AREA PROVIDED:

Min. filter area req'd. (Arsf)	14,040	sq. ft.			
Assume filter length (Lf)	55	ft.			
Min. Filter dimensions	55	feet	x	255.27	feet
	(Use	55	feet	x	270.00 feet)
Filter area provided (Asf)	14,850	sq. ft.			

NUMBER OF LATERALS:

max. lateral length (d) = 58' for 1" CL 200 PVC and 76' for 1-1/4" Sch 40 PVC

Lateral length= Lf - 2.5'	52.5	ft.			
Orifice spacing (Os)	1.25	ft.			
Assume lateral diameter	1 1/4	inches			
Approx. no. laterals = Asf / (2*(d + Os))	216	laterals			

LATERALS PER ZONE:

Zones required	72.0				
Laterals per zone	3.0	(Use	3	laterals/zone)	
Orifices per lateral	41				

DISCHARGE PER LATERAL:

Ql ~ 0.4325 gpm/orif. x	41	orif./lateral =	17.7	gpm
Ql = Sum of orifice flows from table =			18.08	gpm

PUMPING RATE FOR EACH ZONE:

Qp = 18.08 gpm/lat. x	3	lateral/zone=	54.2	gpm/zone
		(Use	54.2	gpm/zone)

TDH = Hs + Hhv + Hf + Hdv + Hr (Assume head loss across manifold is negligible)

Manifold elevation 712.0 ft.

Low liq. level in recirc. tank 704.3 ft.

Hs = Lift to Manifold, ft.

Hs = 7.7

***Hr = residual pressure at closest orifice, ft.

Hr = 5.7

*Hhv = minor losses through discharge assembly, ft.

Hhv = 5.9

**Hf = friction head loss through transport line, ft.

Hf = 9.3

*Hdv = head loss through distribution valve, ft.

Hdv = 19.9

Hdh = head loss through distribution header (manifold), ft.

Hdh = 0.1

"Add-on friction losses", ft.

Ha = 5.0

TDH = 53.55

* From manufacturer Hdv = (0.002) * (Q^2)

** Hf = (0.000995*L)*(Q^1.85)/(D^4.87)

*** Based on generated table

L = Length of transport line, ft.	190
D = Inside diameter of transport line, in.	2.049
Q = Flow thru each discharge assembly & transport line, gpm.	54.2

4. NUMBER OF PUMPS REQUIRED TO DOSE RECIRCULATING SAND FILTER

RR =	Recirculating Rate =	4	: 1 ratio
Qa =	Design flow =	70,200	gpd
Qpo =	operating pump discharge rate per zone =	54.2	gpm
1440 =	minutes per day		
Qrsf =	Dailey flow through RSF, Qa*RR + Qa =	351,000	gpd
Minimum number of pumps required = (Qrsf) / (1440 * Qpo) =		4.5	pumps / dose
		(Use 12	pumps / dose)

3. PUMP DAILEY RUN TIME:

Dailey Run Time % = $[Qrsf / (\# \text{ pumps} * Qpo) * (100\% / 1440 \text{ min. per day})]$

Qrsf =	351,000	gpd	
# pumps/dose =	12	pumps	(USE 12 PUMPS)
Qpo =	54.2	gpm	

Dailey Run Time = 37.5%

3. PUMP DOSING SEQUENCE:

Dosing frequency/zone:	6	times/hr. x	24	hours/day =	144	doses/day
				Use	144	doses/day

Orifice dose volume:

Note: The dosing volume shall not exceed 2.0 gallons per orifice per dose

351,000	gpd /	72	zones =	4,875	gal/zone/day
4875	gal/zone/day/	144	doses/day =	33.9	gal/zone/dose (min.)
			=	0.28	gal/orifice/dose (min.)

Pump Run Time:

Min. dose "run time" =	0.28	gallons /	0.4325	gpm =	0.64	minute(s)
				Use	2.73	minute(s)
Cycle length = dose run time / daily run time =					7.28	minute(s)
				Use	10.00	minute(s)
Rest time =					7.27	minute(s)
Cycles per day = (1440 min/day) /cycle length =					144.0	cycles/day

Input Parameters

Orifice Size	1/8	inches
Residual Head at Last Orifice	5.00	feet
Orifice Spacing	1.25	feet
Number of Laterals per Cell	18	
Lateral Length	51.0	feet
Lateral Pipe Class/Schedule	40	
Lateral Line Size	1.25	inches
Distributing Valve Model	6606	
Manifold Length	3.0	feet
Manifold Pipe Class/Schedule	40	
Manifold Line Size	1.50	inches
Lift to Manifold	8.0	feet
Transport Length	190.0	feet
Transport Pipe Class/Schedule	40	
Transport Line Size	2.00	inches
Discharge Assembly Size	2.00	inches
Flow Meter	None	inches
'Add-on' Friction Losses	5.0	feet

Calculation

Minimum Flow Rate per	0.43	gpm
Number of Orifices per Zone	123	
Total Flow Rate per Zone	54.2	gpm
Number of Laterals per Zone	3	
% Flow Differential 1st and Last	7.2	%

Static Heads

Lift to Manifold	8.0	feet
Residual Head at Last Orifice	5.00	feet

Frictional Head Losses

Head Loss in Laterals	0.8	feet
Head Loss through Distributing	19.9	feet
Head Loss in Manifold	0.1	feet
Head Loss in Transport Pipe	8.9	feet
Head Loss through Discharge	5.9	feet
Head Loss through Flow	0.0	feet
'Add-on' Friction Losses	5.0	feet

Size Pump For

Design Flow Rate	54.2	gpm
Total Dynamic Head	53.6	feet

Length of each distribution lateral from first to last orifice. Check that the correct number of orifices is displayed in the output.

[Calculate](#)[Generate Chart](#)

Pump Selection for a Pressurized System

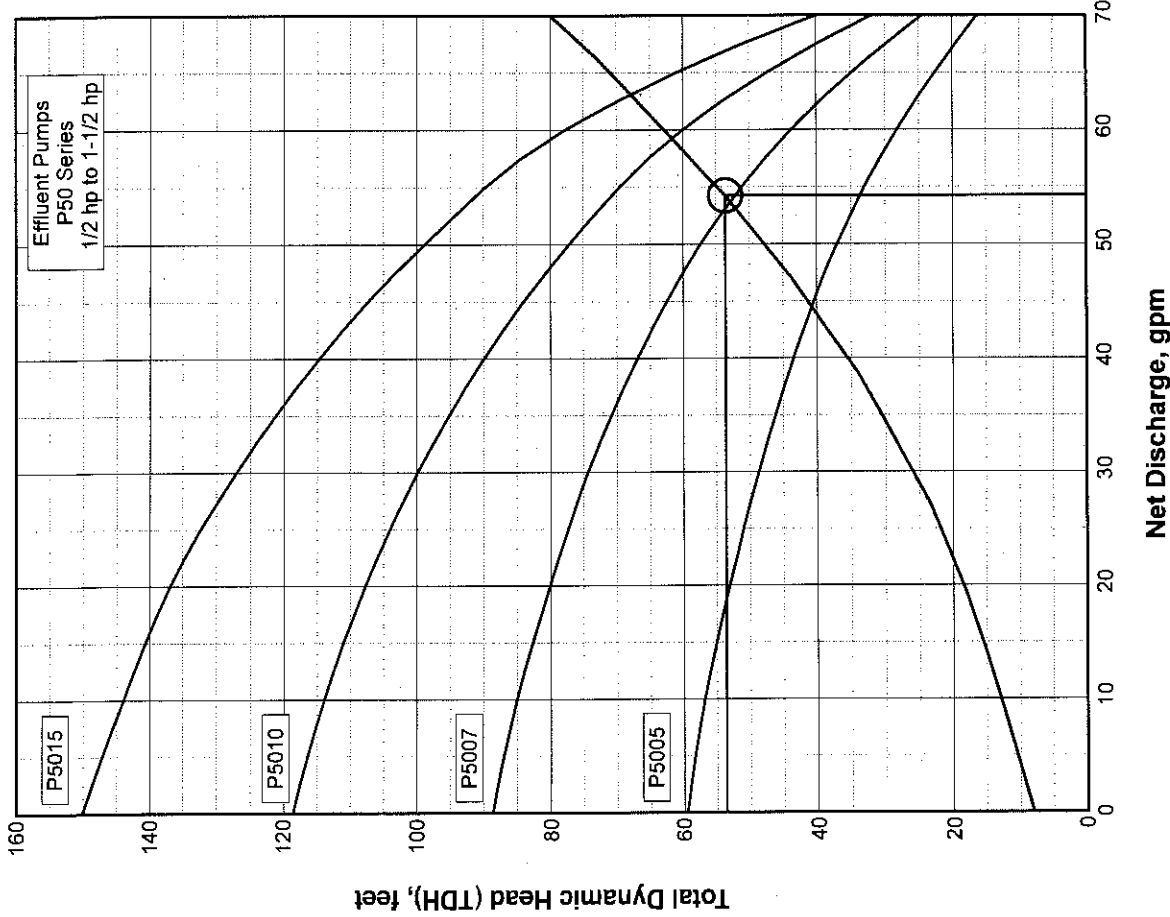
Input Parameters

Orifice Size	1/8 inches
Residual Head at Last Orifice	5.00 feet
Orifice Spacing	1.25 feet
Number of Laterals per Cell	18
Lateral Length	51.0 feet
Lateral Line Size	1.25 inches
Lateral Pipe Class/Schedule	40
Distributing Valve Model	6606
Manifold Length	3.0 feet
Manifold Line Size	1.50 inches
Manifold Pipe Class/Schedule	40
Lift to Manifold	8.0 feet
Transport Length	190.0 feet
Transport Line Size	2.00 inches
Transport Pipe Class/Schedule	40
Discharge Assembly Size	2.00 inches
Flow Meter	None
'Add-on' Friction Losses	5.0 feet

Calculations

Minimum Flow Rate per Orifice	0.43 gpm
Number of Orifices per Zone	123
Total Actual Flow Rate	54.2 gpm
Number of Lines per Zone	3
% Flow Differential 1st and Last Orifice	7.2 %
Lift to Manifold	8.0 feet
Residual Head at Last Orifice	5.00 feet
Head Loss in Laterals	0.8 feet
Head Loss Through Distributing Valve	19.9 feet
Head Loss in Manifold	0.1 feet
Head Loss in Transport Pipe	8.9 feet
Head Loss Through Discharge	5.9 feet
Head Loss Through Flow Meter	0.0 feet
'Add-on' Friction Losses	5.0 feet

Total Flow Rate	54.2 gpm
TDH	53.6 feet



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*Recirc. Pump for Addition to Kings Chapel
Use Pre, M bel 1750' "*

PRELIMINARY DRIP FIELD DOSING PUMP CALCULATIONS

Project: Addition to Kings Chapel - Drip Zone No. 1
Williamson County, TN
Design flow = 70,200 gpd

Drip Field Pipe

input - blue
output - red

(Netafim "Bioline" drip pipe)

Drip pipe run length: 386 ft.
Emitter spacing: 2 ft.
Number of emitters per run: 193
Number of runs per field: 13 @ 5 ft. spacing
Drip field area: 25,090 sq. ft.
Flow per emitter: 0.61 gal/hr
Flow per drip Zone: **25.51 gpm**
Max. distal ends per zone: 13
Flushing flow required per distal end: 1.6 gpm
Total flushing flow required per zone: **20.8 gpm**
Pressure loss across drip field: 7 psi = 16.2 ft. (from "Bioline" chart)
High elevation in drip field: 800 ft.

Pipe to drip field with flushing (for 2 zones)

Pipe diameter: 6 in.
Length: 7400 ft.
"c" coeff. 130
Min. discharge elev. (ft): 708
Flow: **92.62 gpm**
Pipe HLf: 6.8 ft.
UV house minor loss HL : 29.2 ft.
Pump Discharge Assembly HL : 1.2 ft.

Minor Losses - UV House

Filter	4.6 ft.
Meter	11.6 ft.
UV unit 1/2 flow	0.5 ft.
2 each Solenoid Valves 1/2 flow	1.4 ft.
48 ft. 2" equiv. pipe	9.2 ft.
36 ft. 2" equiv. pipe 1/2 flow	1.9 ft.
Total	29.2 ft.

Pipe to drip field without flushing (for 2 zones)

Flow: **51.02 gpm**
Pipe HLf: 2.2
UV house minor loss HL : 10.2
Pump Discharge Assembly HL : 1.6

Minor Losses - UV House

Filter	2.3 ft.
Meter	3.8 ft.
UV unit 1/2 flow	0.3 ft.
2 each Solenoid Valves 1/2 flow	0.2 ft.
48 ft. 2" equiv. pipe	3 ft.
36 ft. 2" equiv. pipe 1/2 flow	0.6 ft.
Total	10.2 ft.

Drip field flushing return line (for two zones)

Pipe diameter: 3 in.
Length: 7400 ft.
"c" coeff.: 130
Return elev. (ft): 710
Flow (gpm): **41.6 gpm**
Pipe HLf: 44.8 ft.
Pipe Hs(static): -90.0 ft.

Dosing Pump Sizing with flushing (for two zones)

Dosing pump design flow: **92.62 gpm** = (25.5 + 20.8) * 2
Minor, static, and friction losses (ft) **129.2 ft.** = (800 - 708) + 6.8 + 29.2 + 1.2
Desired pressure at drip field inlet **30.0 psi** = 69.3 ft
Final Design TDH: **198.5 ft.** = 129.2 + 69.3
(TDH required to achieve min. drip field inlet pressure)

Dosing Pump Sizing without flushing (for two zones)

Dosing pump design flow: **51.0 gpm**
Minor, static, and friction losses (ft) **106.0 ft.** = (800 - 708) + 2.2 + 10.2 + 1.6
Desired pressure at drip field inlet **30.0 psi** = 69.3 ft
Final Design TDH: **175.3 ft.** = 106.0 + 69.3
(TDH required to achieve min. drip field inlet pressure)

Drip Field Return Losses: **-25.2 ft.** = (710 - 780) + 0.0 + 44.8
-10.9 psi at drip field outlet inlet will overcome drip field return losses

Drip Field Pressure Check

(Max. allowable = 60 psi)
Hydraulic grade at drip field: **869.3**
Elev. lowest drip field (ft): **780**
Pressure at lowest point drip field: **38.7 psi** okay

Elev. highest drip field (ft): **800**
Pressure at highest point drip field: **30.0 psi** okay

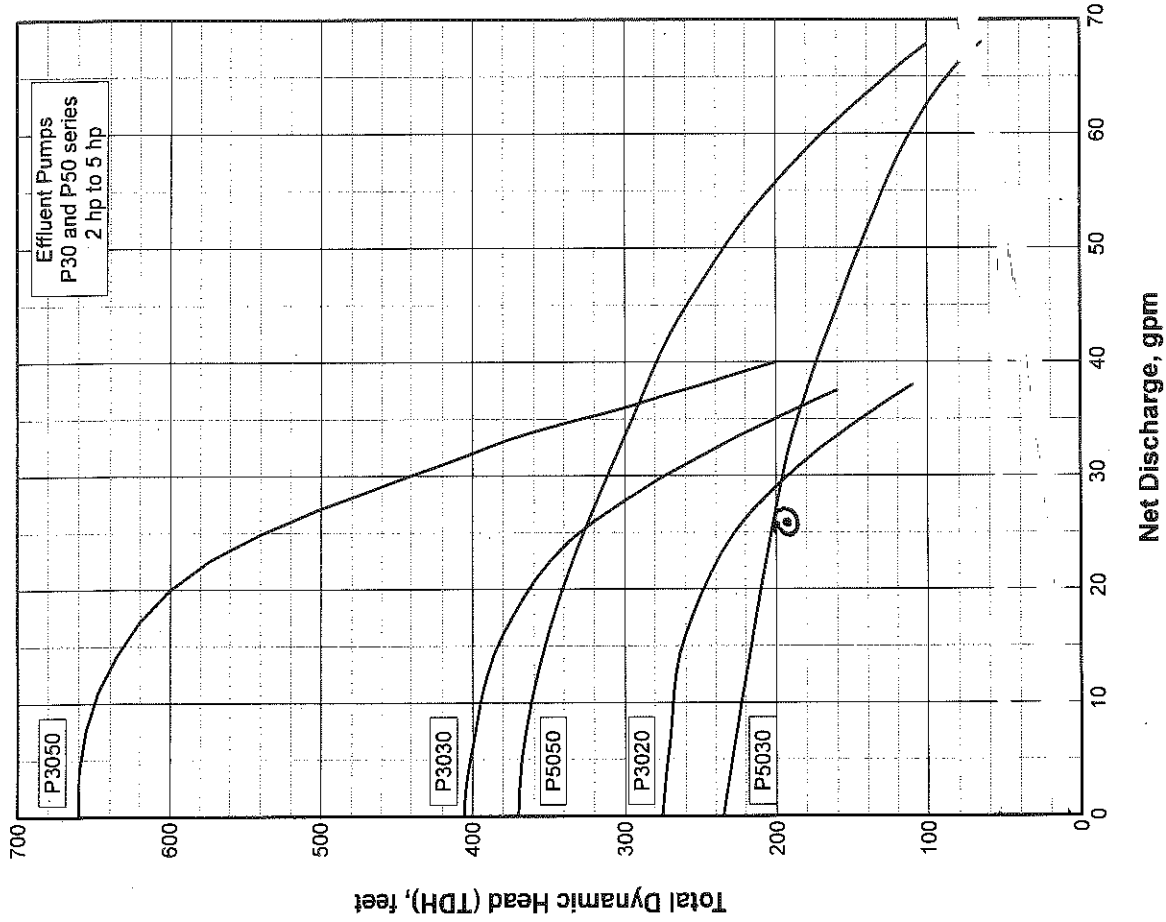
Design Pump: 51.0 gpm @ 198.5 TDH (for dosing two drip zones at a time)
Provide 4 - 2 HP Orenco pump No. P 3020, single phase, 230V. Run two pumps during dosing and four during flushing. See attached pump curve.
Fields to rotate dosing at intervals set at control panel. Required dosing pump run-time is 22.93 hours per day at design flow.

Note: Preliminary calculations based on drip field with longest drip line and at equally highest elevation and dosing and flushing two fields at a time.

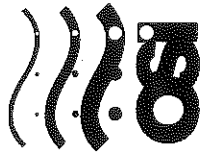
Pump Selection for a Pressurized System

Input Parameters	
Orifice Size	1/8 inches
Residual Head at Last Orifice	5.00 feet
Orifice Spacing	1.3 feet
Number of Laterals per Cell	18
Lateral Length	51.0 feet
Lateral Line Size	1.25 inches
Lateral Pipe Class/Schedule	40
Distributing Valve Model	6906
Manifold Length	3.0 feet
Manifold Line Size	1.50 inches
Manifold Pipe Class/Schedule	40
Lift to Manifold	8.0 feet
Transport Length	190.0 feet
Transport Line Size	2.00 inches
Transport Pipe Class/Schedule	40
Discharge Assembly Size	2.00 inches
Flow Meter	None
'Add-on' Friction Losses	5.0 feet

Calculations	
Minimum Flow Rate per Orifice	0.43 gpm
Number of Orifices per Zone	123
Total Actual Flow Rate	54.2 gpm
Number of Lines per Zone	3
% Flow Differential 1st and Last Orifice	7.2 %
Lift to Manifold	8.0 feet
Residual Head at Last Orifice	5.00 feet
Head Loss in Laterals	0.8 feet
Head Loss Through Distributing Valve	19.9 feet
Head Loss in Manifold	0.1 feet
Head Loss in Transport Pipe	8.9 feet
Head Loss Through Discharge	5.9 feet
Head Loss Through Flow Meter	0.0 feet
'Add-on' Friction Losses	5.0 feet
Total Flow Rate	54.2 gpm
TDH	53.6 feet



Dosing pump-Addition to Kings Chapel
 Use Orendo Model P3020 (25.5 gpm @ 198.5 TDH)



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 Incorporated

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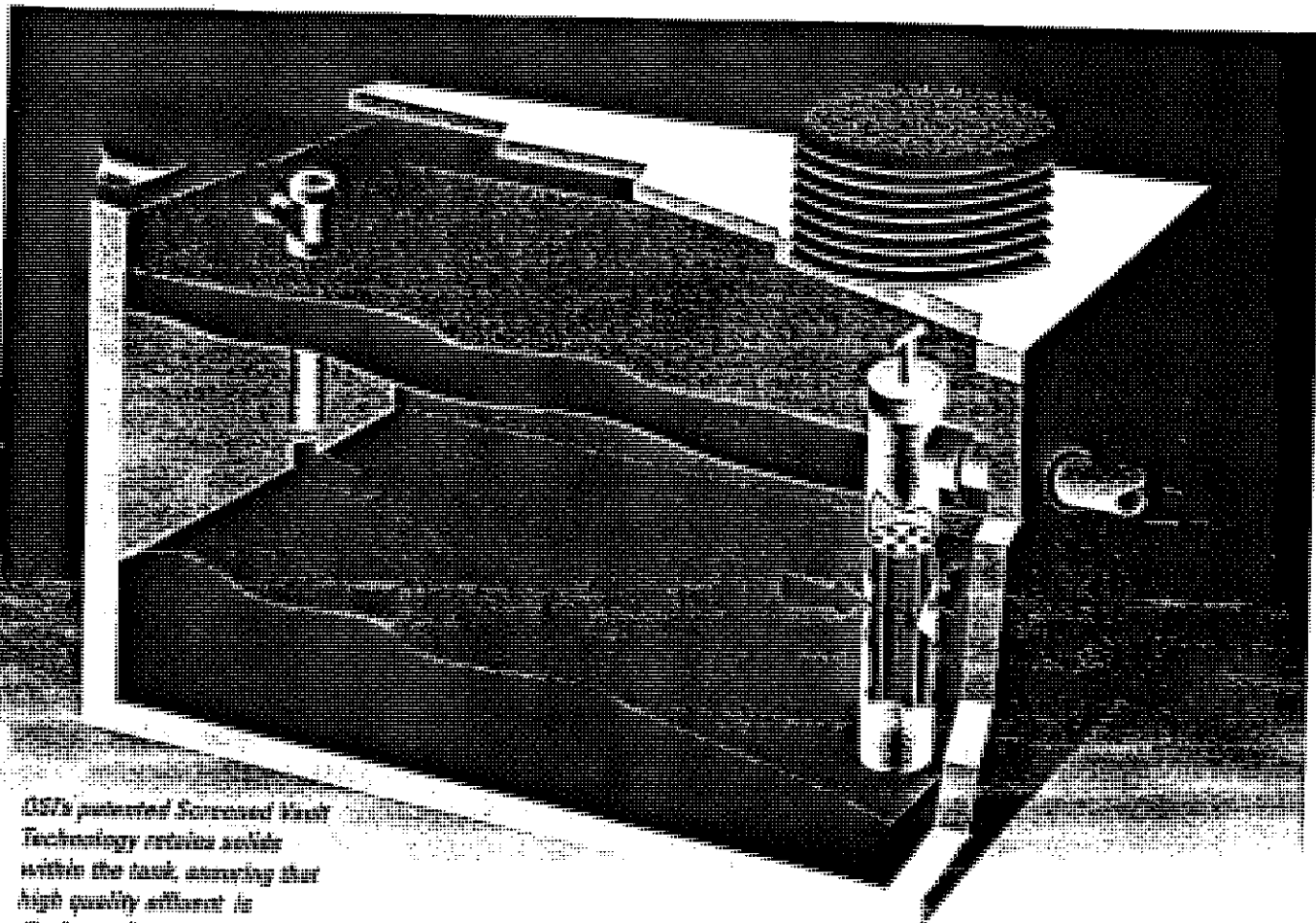
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FACSIMILE:

(541) 459-2884

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First-Line Defense for Your Septic System



OSI's patented Screened Vent Technology retains solids within the tank, ensuring that high quality effluent is discharged.

How It Works

Effluent from the relatively clear zone of the septic tank, between the scum and the sludge layers, enters the Biotube™ Effluent Filter through its inlet holes.

Effluent then enters the space between the housing and Biotubes, utilizing the entire screen surface for filtering.

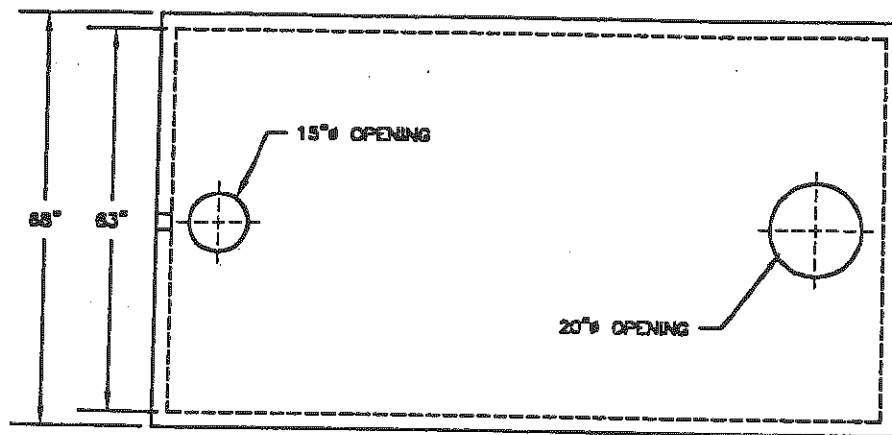
Particles larger than 1/8" are detained in the interior space, where continued decomposition of organic material occurs.

Once the effluent has been filtered through the Biotubes, it flows through the modulating orifices at the outlet of the filter.

If inflow becomes temporarily excessive, the fluid level in the tank will rise as the modulating orifices slow the flow through the tank, allowing maximum settling of solids.

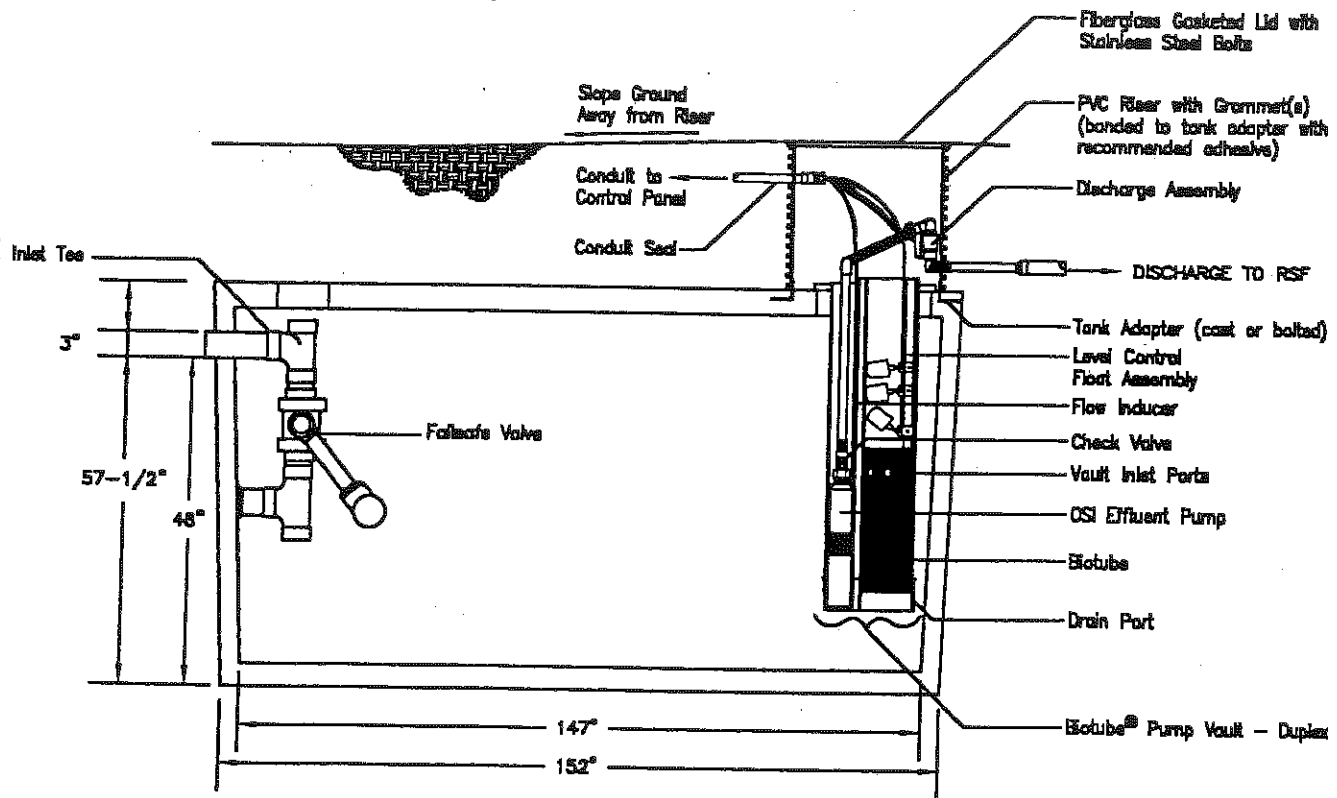
You've put your money (or your reputation) into a quality septic system. Protect your investment with OSI's advanced filtration technology.

The OSI Biotube™ Effluent Filter dramatically improves the quality of effluent discharged from a septic tank by preventing large solids from leaving the tank.



PLAN VIEW

N.T.S.



1500 GALLON PUMP STATION

N.T.S.

SANITRON™

ULTRAVIOLET WATER PURIFIERS

SPECIFICATIONS FOR STANDARD MODELS

MODEL	G.P.M.	G.P.H.	INLET and OUTLET SIZE ^⑥	REPLACEMENT LAMP(S)	POWER ^⑦ CONSUMPTION	UNIT DIMENSIONS (INCHES)			SHIPPING DATA	
						Length	Width	Height	Gross Wt. (Lbs.)	Net Wt. (Lbs.)
S14	2	120	1/2" NPT	051400	14 Watts	16 1/4	5 1/4	8 3/4	11	7
S17	3	180	3/4" NPT	051098	18 Watts	19 1/4	5 1/4	8 3/4	11	8
S23	6	360	3/4" NPT	051097	24 Watts	25 1/4	5 1/4	8 3/4	14	11
S37B	12	720	1" NPT	051343	44 Watts	39 1/4	5 1/4	9 1/4	30	20
S50B	20	1,200	1 1/2" NPT	051334	54 Watts	52 1/4	5 1/4	9 1/4	36	29
S2400B	40	2,400	2" NPT	051311	140 Watts	52 1/4	6 1/4	11 1/4	49	36
S5,000B ^①	83	5,000	2" NPT	051311 (2 Lamps)	280 Watts	52 1/4	7 1/4	15	116	85
S10,000B ^②	166	10,000	2" NPT	051311 (4 Lamps)	560 Watts	52 1/4	21	34 1/4	267	188
S15,000B ^③	250	15,000	2" NPT	051311 (6 Lamps)	840 Watts	52 1/4	21	53 3/4	400	263
S20,000B ^④	333	20,000	2" NPT	051311 (8 Lamps)	1120 Watts	52 1/4	21	71 3/4	534	396
S25,000B ^⑤	416	25,000	2" NPT	051311 (10 Lamps)	1400 Watts	52 1/4	21	90 3/4	670	520

① Two S2400B's connected in series, 1 inlet and 1 outlet.

② Two S5,000B's connected in parallel, 2 inlets and 2 outlets.

③ Three S5,000B's connected in parallel, 3 inlets and 3 outlets.

④ Four S5,000B's connected in parallel, 4 inlets and 4 outlets.

⑤ Five S5,000B's connected in parallel, 5 inlets and 5 outlets.

⑥ All inlets and outlets are male pipe threads.

⑦ Total power consumption including ballast loss.

• Maximum recommended operating pressure for all purifiers is 100 p.s.i.

• Pressure drop at maximum recommended flow rate is less than 5 p.s.i.

• 120 Volt 60 Hz and 220 Volt 50 Hz units are standard.

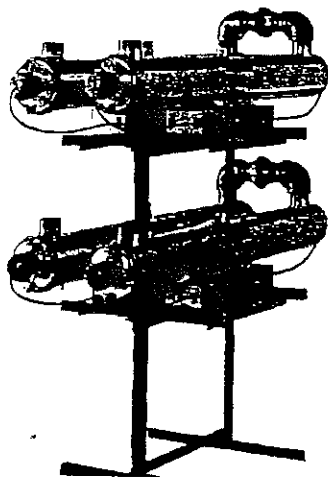
• 12 and 24 Volt DC units also available.

• Sanitron™ is available for operation on public power supplied through out the world.

• Consult factory with specific power requirements.

COMMERCIAL & INDUSTRIAL SYSTEMS

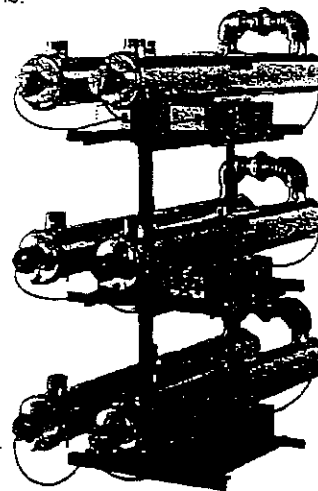
SANITRON™ systems of 5,000 g.p.h. and higher utilize interchangeable single lamp chambers. This modular configuration offers advantages found only in SANITRON™ high-capacity systems.



Model S10,000B
(10,000 g.p.h.)

- **Flexibility**
System components are readily reconfigured to meet changing flow and process requirements.
- **Independent Monitoring**
Single lamp chamber design enables separate output monitoring of each ultraviolet lamp.
- **Standby Capacity**
Reserve chambers permit shutdown or replacement of individual components without interruption of service.
- **Special Options**
Protective Coating - for seawater & corrosive environments.
Sanitary & Custom Fittings - for system compatibility.
Special Configurations - for TOC and ozone reduction.

Consult factory for more information or with custom requirements.



Model S15,000B
(15,000 g.p.h.)

Dec 28 00 01:53p

12/28/2000 12:17

61 99683

MUSIC CITY SEW

PAGE 02



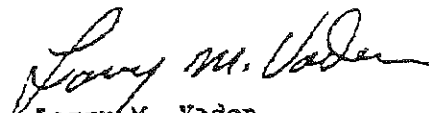
EXPERT SEWER & DRAIN CLEANING

December 28, 2000

TO WHOM IT MAY CONCERN:

Music City Septic Service is the pumper and processor of septic waste for all of Onaite Systems in Middle Tennessee.

Sincerely,


Larry M. Vaden
Owner

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28-Dec-00 12:57P

Table 1.9.1
10.0 Detailed Soils Report

DETAILED SOILS INVESTIGATION REPORT

DETAILED SOILS INVESTIGATION

Lists of Soils Professionals

Extra High Intensity Soils Maps

Mr. Jay Andrews
427 Park Avenue
Lebanon, TN 37087
(615) 444-6898

Soil Profile Descriptions

Mr. Jay Andrews
427 Park Avenue
Lebanon, TN 37087
(615) 444-6898

Soil Chemical Analysis

Waters Agricultural Laboratories Inc.
257 Newton Highway
Camilla, GA 31730
(229) 336-7216

Saturated Hydraulic Conductivity Testing

Adam Lawson
1027 Glenwood Ave.
Nashville, TN 37204
(865) 803-8020

Table 1.9.1
DETAILED SOIL INVESTIGATION REPORT

- 1.0 Site Description:
 - 1.1 Location map
 - 1.2 Topographic map
 - 1.3 Soil Survey map (see Note 1)
 - 1.4 Hand auger, test pit and soil boring locations
- 2.0 Soil series descriptions (each soil series present)
 - 2.1 Texture
 - 2.2 Permeability
 - 2.3 Slope
 - 2.4 Drainage
 - 2.5 Depth to seasonal high water table
 - 2.6 Depth to bedrock
 - 2.7 Erodibility
- 3.0 Soil characteristics (each soil series present)
 - 3.1 Hand auger, test pit and soil boring logs:
 - 3.1.1 Soil horizons
 - 3.1.2 Depth to groundwater
 - 3.1.3 Depth to rock
 - 3.2 Unified Soil Classification
 - 3.3 Results from saturated hydraulic conductivity testing
 - 3.4 Results from soil chemistry testing:
 - 3.4.1 pH
 - 3.4.2 Cation Exchange Capacity
 - 3.4.3 Percent Base Saturation
 - 3.4.4 Sodium Exchange Potential
 - 3.4.5 Phosphorus Absorption
 - 3.4.6 Nutrients (N, P, K)
 - 3.4.7 Agronomic trace elements (for cover crop proposed)

3.4.8 Mineralogy (clay)

3.5 Engineering properties of soils proposed for any potential pond construction.

3.5.1 Clay content

3.5.2 Permeability

3.5.3 Plasticity

3.5.4 Consistency

4.0 Identification of subsurface conditions adversely affecting vertical or lateral drainage of the land treatment site.

5.0 Delineation of soils and areas suitable and not suitable for wastewater drip or spray irrigation.

6.0 Determination of design percolation for each soil type.

NOTE 1: Soil Survey Maps shall be in accordance with the following requirements for an Extra High Intensity Soil Map

Extra High-Intensity Soil Maps

These are special use maps that show a high degree of soil map unit and landscape configuration detail. Each highly detailed soil map unit will be accompanied by site specific interpretations and recommendations (i.e. specific soil improvement practices). This type of map is to provide the information needed, relative to soil characteristics and landscape features, so that Williamson County is able to thoroughly evaluate a site and ascertain its suitability to support effluent disposal systems.

The base map shall be at a scale of 1:1200 or 1 inch equals 100 feet. The soil mapping grid stakes are to be set at intervals of 50 feet. Areas of 1000 square feet or more with a significant difference from the adjoining soil mapping units shall be delineated.

Soil line placement shall have a tolerance limit of 10 feet. With the available ground control, there should be no less than 41 soil observations per acre. Soil Observations should be made at each grid stake and the grid-box center. Any mappable landscape feature shall be located with absolute accuracy (i.e. drainways, embankments, field roads, wells, etc.).

These maps shall be clearly marked and labeled, in a conspicuous manner, as an *EXTRA HIGH-INTENSITY SOIL MAP*.

Table 1.9.1
DETAILED SOIL INVESTIGATION REPORT
REQUIRED INFORMATION

1.0 Site Description

- 1.1 Location Map- refer to 1.1 of the DDR
- 1.2 Topographic Map- refer to 2.0 of the DDR

Table 1.9.1
1.0 Site Description
1.3- Soil Survey Map

SOIL SURVEY REPORT
WILLIAMSON COUNTY
TENNESSEE

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
IN COOPERATION WITH
TENNESSEE AGRICULTURE EXPERIMENT STATION

Soil Survey Map



Legend

- Parcels
- Centerlines
- Railroads
- Communities
- ARRINGTON
- BETHESDA
- BURWOOD
- COLLEGE GROVE
- GRASSLAND
- GREENBRIAR
- KIRKLAND
- LEIPERS FORK
- PEYTONSVILLE
- TRIUNE
- Corporate Limits
- BRENTWOOD
- FAIRVIEW
- FRANKLIN
- NOLENSVILLE
- SPRING HILL
- THOMPSON STATION
- Rivers
- Soil Types
- County Boundary
- Williamson.sld



Scale: 1:14,212

Map center: 1767675, 560923

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Table 1.9.1
1.0 Site Description
1.4 Test Locations

SOIL TEST LOCATIONS:

TEST PIT LOCATIONS

CHEMICAL SAMPLE LOCATIONS

SATURATED HYDRAULIC CONDUCTIVITY LOCATIONS

Locations of all test holes are approximate as recorded in the field.

Soil Profile Descriptions were performed by the Soil Scientist, Jay Andrews. Each boring was observed for physical properties and a brief profile description was recorded. Profile descriptions can be observed in this booklet.

Chemical Test Samples were taken on the week of April 21, 2008. Samples were collected and sent to Waters Agricultural Laboratories, Inc for analysis.

Saturated Hydraulic Conductivity Tests were performed on the week of April 14, 2008. Tests were performed using the Compact Constant Head Permeameter (CCHP).

1.4 **TEST LOCATIONS**

See map of test locations in pocket in the rear of this report.

TABLE 1.9.1

- 4.0 Identification of subsurface conditions adversely affecting vertical or lateral drainage of the land treatment site.

Auger holes and test pits revealed no subsurface conditions that would adversely affect vertical or lateral drainage within the drip field.

- 5.0 Delineation of soils and areas not suitable for wastewater drip or spray irrigation.

No soils were considered that are not suitable for drip irrigation. Solid pipe will be used to cross any drainage gulleys that may be encountered.

- 6.0 Determination of design percolation for each type of soil.

The design percolation rate for the soils to be used for drip irrigation and reserve area is given in Section 4.0 of the Design Development Report and are based on hydraulic conductivity tests conducted on each soil series. Test results are contained in Section 3.3 of this Detailed Soil Investigation Report.

APPENDIX A

V93

Ap 0-8" Brown, silt loam, granular structure

A8-15" Brown, silt loam, moderate granular structure

Bt1 15-40" Brown, silt loam-silty clay loam, weak sub-angular blocky structure

R >40"

W92

Ap 0-6" Brown, silt loam, granular structure

A 6-16" Brown, silt loam, moderate granular structure

Bt1 16-40" Brown silt loam-silty clay loam, weak-moderate sub-angular blocky structure

R >40"

HH96

Ap 0-2" Brown, silt loam, granular structure

Bt1 2-16" Brown, silt loam, sub-angular blocky structure

Bt2 16-35" Reddish Brown, silty clay loam, moderate sub-angular blocky structure, many distinct mottles, patchy brittleness

Bt3 35-40" Reddish brown, clay, moderate sub-angular blocky structure

R >40"

JJ94

Ap 0-4" Brown, silt loam, granular structure

Bt1 4-14" Brown/reddish brown, silt loam, sub-angular blocky structure

Bt2 14-32" reddish brown silty clay loam, moderate sub-angular blocky structure, few black stains

Bt3 32-40" Reddish Brown, silty clay loam-clay loam, moderate sub-angular blocky structure, few faint gray mottles, patchy brittleness

R >40"

GG102

Ap 0-4" Brown, silt loam, granular structure

Bt1 4-16" Brown, silt loam, weak sub-angular blocky structure

Bt2 16-24" Reddish brown, silty clay loam, moderate sub-angular blocky structure

Bt3 24-32" Reddish Brown, silty clay loam-clay loam, moderate sub-angular blocky structure

Bt4 32-40" Reddish Brown, clay loam-clay, moderate sub-angular blocky structure, few faint gray mottles

R >40"

FF104

Ap 0-4" Brown, silt loam, granular structure

Bt1 4-12" Brown, silt loam, weak sub-angular blocky structure

Bt2 12-20" Reddish Brown, silty clay loam, moderate sub-angular blocky structure

Bt3 20-28" Reddish Brown, silty clay loam-clay loam, moderate sub-angular blocky structure

Bt4 28-40" Yellowish Red, clay loam-clay, moderate sub-angular blocky structure, few black stains

R >40"

Y 107

Ap 0-6" Dark brown, silt loam, granular structure
BA 6-16" Brown, silt loam moderate granular structure
Bt1 6-30" Reddish brown, silt loam- silty clay loam, weak sub-angular blocky structure
Bt2 30-40" Reddish brown, silty clay loam, moderate sub-angular blocky structure
R >40"

V98

Ap 0-6" Dark brown, silt loam, granular structure
BA 6-17" Brown, silt loam, moderate granular structure
Bt1 17-22" Reddish brown, silt loam-silty clay loam, weak sub-angular blocky structure
Bt2 22-40" Reddish brown, silty clay loam, moderate sub-angular blocky structure
R >40"

Y95

Ap 0-2" Brown, silt loam, granular structure
Bt1 2-8" Brown, silty clay loam, moderate sub-angular blocky structure
Bt2 8-20" yellowish brown, clay, moderate sub-angular blocky structure, few faint gray mottles
Bt3 20-40" yellowish brown, clay, strong sub-angular blocky/angular blocky structure, firm, many distinct gray mottles
R >40"

Y94

Ap 0-2" Brown, silt loam, granular structure
Bt1 2-10" Brown, silty clay loam, moderate sub-angular blocky structure
Bt2 10-40" yellowish brown, clay, strong sub-angular blocky/angular blocky structure, firm, many distinct gray mottles
R >40"

Table 1.9.1
2.0 Soil Series Descriptions

SOIL SERIES DESCRIPTIONS

Enclosed are the Official Series Descriptions (OSD) and Soil Interpretations Record (SIR) for each soil series that was mapped on the Kings Chapel Development.

2.0- Soil Series Descriptions

- 2.1- Texture (OSD), (SIR)**
- 2.2- Permeability (SIR)**
- 2.3- Slope (soil maps)**
- 2.4- Drainage (OSD), (SIR)**
- 2.5- Depth to seasonal high water table (SIR)**
- 2.6- Depth to bedrock (OSD), (SIR) (pit profiles)**
- 2.7- Erodibility (SIR)**

LOCATION MAURY

KY+TN

Established Series

Rev. JMR

07/2007

MAURY SERIES

The Maury series consists of deep, well drained, moderately permeable soils formed in silty material and weathered limestone, or old alluvium. These soils are on uplands. Slopes range from 0 to 20 percent. The mean annual precipitation is about 45 inches and the mean annual temperature is about 54 degrees F.

TAXONOMIC CLASS: Fine, mixed, semiactive, mesic Typic Paleudalfs

TYPICAL PEDON: Maury silt loam--cultivated. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 8 inches; brown (10YR 4/3) silt loam, crushed, dark brown (10YR 3/3) uncrushed, pale brown (10YR 6/3) dry; moderate fine and medium granular structure; very friable; many fine roots; slightly acid; gradual smooth boundary. (5 to 10 inches thick)

AB--8 to 16 inches; brown (7.5YR 4/4) silt loam, crushed, dark brown (7.5YR 3/2) uncrushed; moderate fine and medium granular structure; very friable; many fine roots; few fine pores; slightly acid; clear smooth boundary. (0 to 10 inches thick)

BA--16 to 21 inches; brown (7.5YR 4/4) light silty clay loam; weak fine granular and subangular blocky structure; very friable; common fine roots; few fine pores; moderately acid; clear smooth boundary. (0 to 9 inches thick)

Bt1--21 to 29 inches; reddish brown (5YR 4/4) silty clay loam; moderate medium subangular blocky structure that parts to strong very fine angular blocky structure; friable, sticky and slightly plastic; few fine roots; few small pores; many clay films; few small black concretions; moderately acid; gradual smooth boundary. (6 to 25 inches thick)

Bt2--29 to 42 inches; yellowish red (5YR 4/6) silty clay; moderate medium angular blocky structure that parts to strong very fine angular blocky; friable, sticky and slightly plastic; few fine roots; few fine pores; many clay films; common small black concretions; few very small yellowish sand sized chert; moderately acid; gradual smooth boundary. (8 to 30 inches thick)

Bt3--42 to 61 inches; yellowish red (5YR 4/6) clay; moderate medium angular blocky structure that parts to strong very fine angular blocky; firm, sticky and slightly plastic; very few fine roots; many clay films; common small black concretions and stainings; common small yellowish sand sized chert and a few coarse chert fragments less than 1 inch in diameter; strongly acid; abrupt wavy boundary. (0 to 30 inches thick)

Bt4--61 to 75 inches; brown (7.5YR 4/4) interlayered with pale brown (10YR 6/3) clay; weak medium angular blocky structure; very firm, sticky and slightly plastic; many clay films; common small black concretions and a few thin horizontal layers of soft black material; common small yellowish sand sized

chert; strongly acid. (10 to 35 inches thick)

TYPE LOCATION: Scott County, Kentucky; 750 feet east of farm house, 0.4 mile north of U.S. 227 & 460 alongside private road; entrance to private road is 1.2 miles east of intersection with Interstate 75 and about 3 miles east of Georgetown.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 60 to about 120 inches. Thickness of the argillic horizon ranges from about 50 to 100 inches. Depth to bedrock ranges from 60 to 200 inches or more. Chert fragments less than 3 inches in diameter range from 0 to 5 percent in the Bt and C horizons. The reaction of the A and B horizons range from neutral to strongly acid, the upper part of the Bt horizon ranges from slightly acid to strongly acid and the lower part of the B horizon ranges from medium acid to very strongly acid. The phosphate content in the solum is variable but is typically medium or high.

The Ap horizons, crushed, have hue of 10YR or 7.5YR, value of 4, and chroma from 2 to 4. Some pedons have Ap horizons less than 7 inches thick with a value of 3. E horizons underlying the Ap have the same color range as the Ap with 7.5YR hues in most pedons. Texture of the AB horizon is silt loam or light silty clay loam; structure is weak or moderate, very fine through medium granular.

The BA horizon is brown (7.5YR 4/4) or reddish brown (5YR 4/4) silty clay loam or heavy silt loam with weak or moderate, fine or medium subangular blocky or granular structure and friable or very friable consistence. The upper part of Bt horizons is reddish brown (5YR 4/4) but also includes hue of 7.5YR, value of 3, and chroma of 5 and 6; texture is silty clay loam, silty clay, or clay. The middle part of Bt horizon has hue of 5YR or 2.5YR, value of 3 through 5, and chroma of 4 through 8. Structure of the Bt consists of weak or moderate, fine and medium subangular or angular blocky parting to moderate or strong, very fine angular or subangular blocky; consistence is friable or firm but is very firm in the lower Bt in some pedons.

The lower Bt or C horizons, when present, have hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 through 8. The texture is clay, silty clay, or heavy silty clay loam; consistence is firm or very firm. Some pedons are layered or mottled with shades of brown or gray in the lower Bt horizons.

COMPETING SERIES: These are the Shenval and Vertrees series. Shenval soils lack the loess-like mantle of the Maury soils and has a few cobblestones in the upper horizons. It also has a finer textured upper Bt horizon. Vertrees soils have many distinct yellowish brown mottles in the lower Bt horizon.

GEOGRAPHIC SETTING: Broad ridgetops and gentle side slopes of a karst plain. Slopes range from 0 to 20 percent. These soils formed in 1 to 2 feet of silty loess-like material overlying limestone residuum or old alluvium, typically high in content of phosphate. The underlying limestone is cavernous and some areas have karst topography. Near the type location the average annual air temperature is 54 degrees F. and the average annual precipitation is 45 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Ashton, Caleast, Donerail, Fairmount, Loradale, Lowell, McAfee, and Nicholson series. All of these associated soils have a solum less than 60 inches thick. Ashton soils have an Ap horizon 7 to 10 inches thick with a value of 3 and are in a fine-silty family particle-size class. Caleast soils have a solum between 40 and 60 inches thick. Donerail soils have a mollic epipedon, have hues of 7.5YR or 10YR in the Bt horizon and are moderately well drained. Fairmount soils have a solum between 10 and 20 inches thick. Loradale soils have a mollic epipedon and yellower hues in the lower part of the Bt horizon. Lowell soils have hues of 7.5YR or 10YR in the Bt horizon. McAfee soils have a lithic contact at

less than 40 inches. Nicholson soils have a fragipan.

DRAINAGE AND PERMEABILITY: Well drained. Runoff is medium to slow and permeability is moderate to moderately rapid.

USE AND VEGETATION: Most areas are used for crops, such as burley tobacco, corn, small grains, and alfalfa and for pasture. Bluegrass and white clover are the most common pasture plants. Native vegetation was dominated by oaks, elm, ash, black walnut, black and honey locust, hackberry, black cherry, and Kentucky coffee tree. Glades of native grasses and canes were reported by early settlers.

DISTRIBUTION AND EXTENT: The Inner Bluegrass Region of Kentucky.

MLRA OFFICE RESPONSIBLE: Lexington, Kentucky

SERIES ESTABLISHED: Garrard County, Kentucky; 1921.

REMARKS: The Maury series is currently used in the Central Basin of Tennessee as a thermic taxajunct. The extent is large.

National Cooperative Soil Survey
U.S.A.

TABLE 5.—

Soil name and location	Parent material	Tennessee report No.	Depth	Horizon	Moisture density
Culleoka loam: ½ mile south of Bethesda (shallow over sandy limestone).	Colluvium over Hermitage formation.	24 25 26	Inches 0 to 2 7 to 20 45 to 73+	A1----- B2----- D-----	Lb. cu. 5
Dunning silt loam: 2 miles northeast of Franklin and 300 yards east of Louisville and Nashville-Railroad along Spencer Creek (central concept).	Alluvium.	1 2 3	0 to 10 19 to 39 39 to 62	Ap----- Cg1----- Cg2-----	1
4 miles south of Brentwood and 200 yards west of Wilson Pike along Little Harpeth River (poorly drained overwash).	Alluvium.	44 45 46	0 to 8 15 to 44 44 to 72+	Ap----- Cg2----- Cg3-----	1 1
Dunning silty clay loam: 6 miles east of Franklin and ¼ mile north of State Route 96 (heavy-textured surface).	Alluvium over limestone.	4 5 6 7	0 to 7 15 to 26 33 to 51 51 to 80	Ap----- Cg1----- Cg2----- Cg3----- Cg4-----	10 10 10 10
Lindside silt loam: ¼ mile southwest of Bethesda along Rutherford Creek (central concept).	Alluvium over limestone.	20 21 22 23	0 to 10 10 to 20 26 to 46 46 to 74	Ap----- C1----- Cg2----- Cg3-----	9 10 10 10
Lindside silty clay loam: 4 miles north of Franklin near Berry's Chapel (shallow alluvium).	Alluvium over limestone.	33 34	0 to 11 11 to 29	Ap----- C-----	9 10
Lindside loam: 6 miles south of Franklin and ½ mile east of U.S. Highway No. 31 (coarse textured).	Alluvium over Hermitage formation.	17 18 19	0 to 11 11 to 23 23 to 36	Ap----- C1----- Cg-----	108 107 107
Maury silt loam: ½ mile south of West Harpeth (Ortho)-----	Probably loess over limestone (Bigby formation).	62 63 64	0 to 7 25 to 40 69 to 85	Ap----- B22----- B32-----	102 98 84
1 mile east of Spring Hill on Duplex Road (red, heavy-textured subsoil).	Probably loess over limestone (Bigby formation).	53 54 55	0 to 7 18 to 36 59 to 75+	Ap----- B21----- C-----	97 88 83
5 miles northeast of Franklin along road by Monsanto farm (sandy limestone in subsoil).	Sandy limestone.	47 48 49	0 to 5 27 to 40 60 to 72+	Ap----- B22----- C-----	95 84 76
Mimosa cherty silt loam: 5 miles south of Franklin between U.S. Highways 431 and 31 (central concept).	Thin colluvium over argillaceous, phosphatic limestone.	27 28 29	0 to 8 29 to 38 43 to 72+	Ap----- B22----- C-----	94 84 93
Halfway between Bethesda and Arno (thin cherty surface layer over deep clay).	Thin colluvium over argillaceous, phosphatic limestone.	14 15 16	0 to 7 11 to 26 31 to 103+	Ap----- B2----- C2-----	96 98 95
Mimosa cherty silty clay loam: 1½ miles east of U.S. Highway No. 431 and 1,000 yards north of Beech Creek (shallow clay to bedrock).	Colluvium over argillaceous, phosphatic limestone.	30 31 32	0 to 4 7 to 12 12 to 19	A1----- B2----- C-----	81 83 80

¹ Tests performed by the Tennessee Department of Highways and Public Works in accordance with standard procedures of the American Association of State Highway Officials (AASHO). (1)

² Moisture-density according to AASHO Designation T 99-57, Method A (1). In this method, a 5.5-pound rammer and a 12-inch drop are used.

³ Mechanical analyses according to the AASHO Designation Results by this procedure may differ from results that were obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method, and the various fractions are calculated on the basis of all the material, i

TABLE 8.—*Soil series classified by order and great soil group and some factors that have contributed to their formation—Co*

Order, great soil group, and series	Distinguishing characteristics of the profile ¹	Drainage class	Parent material	Slope range	Degree of development
Zonal order—Con. Red-Yellow Podzolic soils—Continued Central concept —Continued Humphreys-----	Dark-brown to pale-brown silt loam over yellowish-brown, friable silty clay loam; cherty types are dominant; old local alluvium or colluvium 2 to more than 6 feet thick.	Well drained and moderately well drained.	Old local alluvium or colluvium from soils derived from loess and cherty limestone.	Percent 2 to 20---	Medium
Mountview-----	Grayish-brown silt loam over yellowish-brown, friable silty clay loam; 12 to 40 inches to cherty limestone residuum.	Well drained-----	Loess mantle overlying residuum from cherty limestone.	2 to 20---	Medium strong.
Talbott-----	Brown to dark-brown silty clay loam or silt loam over yellowish-red to reddish-yellow, firm and plastic clay; 2 to more than 6 feet to limestone bedrock.	Well drained-----	Residuum from argillaceous limestone.	2 to 15---	Strong.
Grading toward Reddish-Brown Lateritic soils— Etowah-----	Dark-brown silt loam over reddish-brown to yellowish-red, friable silty clay loam; old alluvium 2 to more than 10 feet thick.	Well drained-----	Old general alluvium, with thin loess mantle in places.	2 to 12---	Medium strong
Hagerstown-----	Dark-brown silt loam over strong-brown to reddish-brown, friable to firm silty clay loam or clay; 2 to more than 6 feet to limestone bedrock.	Well drained-----	Residuum from limestone	2 to 12---	Strong.
Hermitage-----	Dark-brown silt loam over reddish-brown to yellowish-red, friable silty clay loam; old local alluvium or colluvium 18 inches to more than 6 feet thick.	Well drained-----	Old local alluvium or colluvium from soils derived from limestone.	2 to 5----	Medium.
Maury-----	Dark-brown silt loam over reddish-brown, friable to firm silty clay loam or clay; 3 to more than 10 feet to phosphatic limestone bedrock.	Well drained-----	Old alluvium or residuum from phosphatic limestone; thin loess mantle in many places.	0 to 12---	Strong.
Stiversville-----	Dark-brown silt loam over yellowish-brown to reddish-brown, friable silty clay loam or clay loam; 3 to more than 6 feet to sandy limestone interbedded with shale bedrock.	Well drained-----	Residuum from sandy limestone interbedded with shale.	2 to 20---	Medium strong.
Grading toward Planosols— Captina-----	Dark-brown to dark yellowish-brown silt loam over yellowish-brown silty clay loam; fragipan at depth of 18 to 36 inches.	Moderately well drained.	Old general stream alluvium from soils derived from phosphatic limestone.	0 to 12---	Strong.
Dickson-----	Grayish-brown silt loam over yellowish-brown silt loam or silty clay loam; fragipan at depth of 18 to 36 inches.	Moderately well drained.	Loess mantle 18 to 36 inches thick over cherty limestone residuum.	2 to 5----	Strong.
Donerail-----	Dark-brown silt loam over brown to reddish-brown silty clay loam; fragipan or compact, cemented layer at depth of 18 to 36 inches.	Moderately well drained.	Residuum from phosphatic limestone.	2 to 12---	Strong.
Mercer-----	Brown to dark grayish-brown silt loam over yellowish-brown to reddish-yellow silty clay loam; fragipan or heavy, firm clay at depth of 15 to 30 inches.	Moderately well drained.	Residuum from limestone with probable thin alluvium on surface.	2 to 5----	Strong.

See footnotes at end of table.

WILLIAMSON COUNTY, TENNESSEE

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Mechanical analysis ³								Liquid limit	Plas- ticity index	Classification	
Percentage passing sieve — ⁴				Percentage smaller than — ⁴						AASHTO ⁵	Unified ⁶
No. 4 (4.75 mm.)	No. 10 (2.0 mm.)	No. 40 (0.425 mm.)	No. 200 (0.075 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.005 mm.				
94	93	90	51	48	32	14	10	34	7 NP	A-4(3)-----	ML.
	100	99	80	65	47	31	24	29	7	A-4(8)-----	ML-CL.
	100	96	75	60	43	32	27	37	10	A-4(8)-----	ML.
98	96	92	81	73	56	28	22	34	10	A-4(8)-----	ML-CL.
69	61	59	49	40	29	21	18	40	18	A-6(6)-----	GC.
99	98	85	75	68	50	35	18	40	14	A-6(10)-----	ML-CL.
100	98	93	83	76	63	27	18	44	10	A-5(9)-----	ML.
99	98	78	66	60	49	28	23	39	13	A-6(7)-----	ML-CL.
91	87	76	56	52	41	28	22	37	13	A-6(5)-----	ML-CL.
99	98	94	84	80	70	43	34	51	23	A-7-6(15)---	MH-CH.
98	86	77	68	66	57	37	34	55	32	A-7-6(17)---	CH.
98	97	94	84	83	76	56	48	51	24	A-7-6(16)---	MH-CH.
99	48	40	32	31	27	22	18	52	23	A-2-7(2)---	GM-GC.
	100	99	85	74	52	27	20	37	11	A-6(8)-----	ML-CL.
	100	98	81	76	53	33	24	33	11	A-6(8)-----	ML-CL.
90	86	80	58	51	38	25	19	30	8	A-4(5)-----	ML-CL.
60	55	50	38	34	29	23	19	44	20	A-7-6(3)---	GC.
96	94	82	59	51	39	24	17	37	9	A-4(5)-----	ML.
30	46	24	17	15	12	8	6	35	9	A-2-4(0)---	SM-SC.
92	79	55	42	35	24	18	15	34	11	A-6(2)-----	SM-SC.
100	98	90	63	53	38	19	14	26	4	A-4(6)-----	ML-CL.
97	86	49	32	27	18	12	8	30	5	A-2-4(0)---	SM.
93	99	95	76	70	53	22	14	28	4	A-4(8)-----	ML-CL.
100	99	97	77	74	65	44	38	44	16	A-7-6(11)---	ML-CL.
	100	95	54	51	48	43	40	51	15	A-7-5(7)---	MH.
100	99	92	76	70	48	18	13	31	4	A-4(8)-----	ML.
	100	97	88	86	80	64	60	53	10	A-5(11)-----	MH.
	100	98	79	77	75	68	64	64	18	A-7-5(15)---	MH.
	100	96	78	72	56	20	12	34	6	A-4(8)-----	ML.
	100	94	72	69	65	54	48	54	18	A-7-5(13)---	MH.
100	98	93	74	72	68	62	58	66	24	A-7-5(17)---	MH.
72	66	58	55	51	40	20	14	43	12	A-7-5(5)---	ML.
100	99	97	93	92	87	76	69	65	19	A-7-5(16)---	MH.
100	99	94	84	82	73	60	53	53	15	A-7-5(13)---	MH.
90	84	58	54	51	41	20	13	36	9	A-4(4)-----	ML.
90	88	54	91	90	84	57	45	47	20	A-7-6(13)---	ML-CL.
90	94	91	88	87	83	64	51	54	22	A-7-5(16)---	MH.
90	78	69	63	56	41	27	20	59	14	A-7-5(10)---	MH.
100	96	93	87	83	73	61	55	66	24	A-7-5(18)---	MH.
100	96	92	85	82	76	64	57	65	23	A-7-5(17)---	MH.

³ Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (Pt. 1, Ed. 8): The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, AASHTO Designation M. 145-49 (1).

⁴ Based on the Unified Soil Classification System, Technical Memorandum No. 1-45, Volume 1, Highway Experiment Station Corps of Engineers, March 1942 (1).

⁵ NP—Nonplastic.

⁶ Based on the Unified Soil Classification System, Technical Memorandum No. 1-45, Volume 1, Highway Experiment Station Corps of Engineers, March 1942 (1).

⁷ NP—Nonplastic.

TABLE 6.—Brief description of

Map symbol	Soil	Depth to seasonally high water table	Depth to bedrock	Brief description of site and soil	Depth from surface (typical profile)	Class USDA
Lc	Lindside cherty silt loam.	<i>Feet</i> 0 to 3-----	<i>Feet</i> 2 to 10---	Moderately deep to deep, moderately well drained soil in depressions along small drains and on first bottoms of the Highland Rim; underlain by cherty limestone or shale.	<i>Inches</i> 0-20 20-48	Cherty loam Cherty loam chert clay
Ld	Lindside cherty silt loam, phosphatic.	0 to 3-----	2 to 10---	Moderately deep to deep, moderately well drained soil in depressions along small drains and on first bottoms; underlain by phosphatic limestone.	0-30 30-48	Cherty Cherty or s
Ln	Lindside silt loam.	0 to 3-----	2 to 10---	Moderately deep to deep, moderately well drained soil in depressions along small drains and on first bottoms of the Highland Rim and inner Central Basin; underlain by cherty limestone or limestone.	0-24 24-60	Silt loam Silt loam clay chert loam
Lp	Lindside silt loam, phosphatic.	0 to 3-----	2 to 10---	Moderately deep to deep, moderately well drained soil in depressions along small drains and on first bottoms; underlain by limestone.	0-40 40-60	Silt loam Silt loam silt
Ma	Made land.	Variable----	Variable---	Areas filled with earth, trash, or both, and smoothed; mostly earth fills made in leveling or landscaping building sites near towns.	-----	-----
MbA MbB MbB2 MbC2	Maury silt loam, 0 to 2 percent slopes. Maury silt loam, 2 to 5 percent slopes. Maury silt loam, 2 to 5 percent slopes, eroded. Maury silt loam, 5 to 12 percent slopes, eroded.	10 or more---	3 to 8----	Deep, well-drained soils on uplands of the outer Central Basin; formed from phosphatic limestone; underlain by phosphatic limestone.	0-10 10-30 30-60	Silt loam Silt loam Silt loam Silt loam
McC3	Maury silty clay loam, 5 to 12 percent slopes, severely eroded.	10 or more---	2 to 6----	Deep, well-drained soil on the uplands of the outer Central Basin; formed from phosphatic limestone; underlain by phosphatic limestone.	0-20 20-48	Silt loam Silt loam
Me	Melvin silt loam, phosphatic.	0 to 1½----	3 to 10---	Poorly drained soil in depressions and along small drains on first bottoms; underlain, in most places, by limestone.	0-24 24-60	Silt loam Silt loam

¹ Perched water table.

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WILLIAMSON COUNTY, TENNESSEE

f soils and

their estimated physical properties—Continued

Classification	Classification—Continued		Percentage passing—			Selected characteristics significant to engineering					
	Unified	AASHTO	No. 4 sieve	No. 10 sieve	No. 200 sieve	Permeability	Structure	Available water	Reaction (pH)	Dispersion	S
DA textural class rty silt am. rty silt m or rty silty ay loam.	GM or ML	A-4	55-90	50-85	40-75	<i>Inches per hour</i> 0.8-5.0	Granular	<i>Inches per inch of depth</i> 0.10-0.15	5.6-6.0	Moderate	L
	GM, ML, or CL	A-4 or A-6	50-75	45-70	35-60	0.8-5.0	Blocky or massive.	0.10-0.15	5.6-6.0	Moderate	L
	GM or ML	A-4	60-80	55-75	45-65	0.8-5.0	Granular	0.10-0.15	5.6-7.3	Moderate	L
rty silt loam rty silt loam rty silty clay.	GM, ML, or CL	A-4 or A-6	55-100	50-95	40-85	0.2-2.5	Blocky or massive.	0.10-0.15	5.6-7.3	Moderate	N
	ML or CL	A-4 or A-6	90-100	85-100	75-90	0.8-2.5	Granular	0.15-0.20	5.6-6.5	Moderate	L
	GC, ML, or CL	A-4, A-6, or A-7	55-70	50-65	40-60	0.8-2.5	Blocky or massive.	0.10-0.20	5.6-6.5	Moderate to low.	L
am am, silty y loam, or rty silt n.	ML or CL	A-4 or A-6	95-100	90-100	80-95	0.8-2.5	Granular	0.15-0.20	5.6-7.3	Moderate	L
	ML or CL	A-6 or A-7	90-100	85-100	75-95	0.2-2.5	Blocky or massive.	0.10-0.20	5.6-7.3	Moderate to low.	N
am ay loam lay or	ML or CL	A-4 or A-6	95-100	90-100	80-95	0.8-2.5	Granular	0.15-0.20	5.6-6.5	Moderate	L
	CL or MH	A-6 or A-7	95-100	95-100	70-90	0.8-2.5	Blocky	0.10-0.15	5.1-5.5	Moderate	N
	CL, MH, or CH	A-7	85-100	80-100	70-95	0.2-0.8	Blocky or massive.	0.10-0.15	5.1-5.5	Moderate to low.	H
lay loam ay or	CL	A-6 or A-7	90-100	85-100	75-95	0.8-2.5	Blocky	0.10-0.15	5.1-6.0	Moderate	N
	CL, MH, or CH	A-7	85-100	80-100	70-95	0.2-0.8	Blocky or massive.	0.10-0.15	5.1-5.5	Moderate to low.	H
m ay loam y clay.	ML	A-4	95-100	90-100	80-95	0.8-5.0	Granular	0.15-0.20	5.6-7.3	Moderate	L
	CL	A-6 or A-7	80-100	75-100	65-95	0.2-2.5	Blocky or massive.	0.10-0.15	5.6-7.3	Moderate to low.	N

TABLE 7.—Engineering interpretation

Soil series and map symbols	Suitability for—			Suitability as source of—		Soil features affecting
	Winter grading	Road subgrade	Road fill	Topsoil	Sand and gravel	Vertical alignment for highways
						Materials
Hicks (HnB2, HnC2, HnC3)	Poor to fair	Fair	Fair	Fair	Not suitable	Shallow to sandy limestone interbedded with shale.
Humphreys (HpB, HpC2, HpD2, HrB, HrC2)	Poor to fair	Poor to fair	Fair to good	Fair to good	Not suitable	Stratified layers or bands of chert in places, shale; durated layer or fragipan at 2 to 3 feet in places.
Huntington (Hs, Ht, Hu)	Not suitable to poor.	Fair	Fair to good	Good	Not suitable	Limestone at 2 to 3 feet.
Inman (ImC, ImD, ImE, InC3, InD3, InE3)	Fair	Poor to fair	Fair	Poor	Not suitable	Shallow to interbedded sandy limestone and shale bedrock.
Lanton (La)	Not suitable	Poor	Poor	Poor	Not suitable	Limestone at 2 to 6 feet.
Lindside (Lc, Ld, Ln, Lp)	Not suitable	Poor	Fair to good	Fair to good	Not suitable	Limestone at 2 to 10 feet.
Made land (Ma)	Not suitable	Variable	Variable	Variable	Not suitable	Bedrock and, in some places, buried debris.
Maury (MbA, MbB, MbB2, MbC2, McC3)	Poor to fair	Poor to fair	Fair	Fair	Not suitable	Limestone bedrock at 3 to 8 feet.
Melvin (Me)	Not suitable	Poor	Poor	Poor to fair	Not suitable	Underlain by limestone.
Mercer (MfB2)	Poor	Poor	Poor	Poor to fair	Not suitable	Limestone bedrock; fragipan or heavy plastic clay at 15 to 30 inches.
Mimosa (MhC2, MhD2, MhE2, MkD3, MhE3, MIB2, MIC2, MID2, MmD3)	Poor to fair	Poor	Poor to fair	Poor to not suitable.	Not suitable	Limestone bedrock; outcrops in places.

See footnotes at end of table.

soils—Continued

Soil features affecting—Continued

Vertical alignment for highways—Con.	Farm ponds		Agricultural drainage	Irrigation	Terraces and diversions ¹
	Reservoir area	Embankment			
Good drainage-----	Shallow and excess seepage because of rapidly permeable substratum.	Fair to good stability.	(²)-----	Moderately low available water-holding capacity and rapidly permeable subsoil.	(⁴).
Possible seepage at 2 to 3 feet; permeable substratum.	Permeable substratum; excess seepage.	Fair to good stability.	(²)-----	(³)-----	(⁴).
Subject to occasional flooding and short periods of ponding.	Possible excess seepage because of stratified layers of gravel and sand, or because of caverns in underlying limestone.	Fair to good stability.	(²)-----	(³)-----	Level to nearly level.
Possible seepage over bedrock near base of steep slopes; slowly permeable clayey subsoil.	Shallow to interbedded sandy limestone and shale; possible excess seepage over and through bedrock.	Fair to good stability.	(²)-----	Low available water-holding capacity; slowly permeable subsoil.	Shallow to bedrock; clayey subsoil; predominantly steep slopes.
Seasonally high water table, slowly permeable clayey subsoil; subject to occasional flooding.	Underlying limestone is cavernous in places.	Poor stability and difficult to compact.	Seasonally high water table and slowly permeable subsoil; subject to flooding.	(³)-----	Level to nearly level.
Seasonally high water table, seepage at 2 to 3 feet; subject to occasional flooding or ponding.	Underlying limestone is cavernous in places; seepage through permeable subsoil.	Fair to good stability.	Seasonally high water table; subject to occasional flooding or ponding.	(³)-----	Level to nearly level.
Variable	Variable	Variable	Variable	Variable; generally not suitable.	Variable; generally not suitable.
Good drainage-----	Limestone bedrock; is cavernous in places; excess seepage in places because of rapidly permeable substratum.	Fair stability-----	(²)-----	(³)-----	(⁴).
Seasonally high water table saturates soil for long periods; subject to overflow; slowly permeable subsoil in most places.	Saturated for long periods; possible seepage over underlying limestone.	Mostly silt and clay; fair to poor stability.	Seasonally high water table saturates soil for long periods; subject to overflow and ponding.	Soil saturated for long periods; subject to flooding and ponding.	Level to nearly level.
Perched water table above fragipan or heavy plastic clay during long wet periods.	Limestone bedrock is cavernous in places; possible seepage along fragipan or clay layer.	Poor to fair stability.	Perched water table during long wet periods.	Fragipan restricts root growth to upper 2 feet.	(⁴).
Possible seepage over limestone bedrock; slowly permeable clayey subsoil.	Limestone bedrock is cavernous in places; and outcrops in places.	Fair to poor stability; clayey soil material.	(²)-----	Slowly permeable subsoil; moderately low to low available water-holding capacity.	Clayey subsoil; outcrops of limestone bedrock in places.

TABLE 9.—Chemical and physical

Soil type	Horizon	Depth	Exchangeable cations (milliequivalents per 100 grams of soil)					
			Ca	Mg	K	Na	H	Total cation-exchange capacity
Armour silt loam.....	Ap	Inches 0-9	9.1	0.5	0.3	<0.1	5.9	15.8
	A3	9-17	6.5	.8	.3	.1	5.1	12.8
	B1	17-21	6.3	1.0	.3	.1	5.3	13.0
	B2	21-29	5.4	1.7	.3	<.1	6.1	13.5
	B31	29-42	4.0	1.7	.4	<.1	9.6	15.7
	B32	42-53	3.4	1.6	.5	<.1	13.3	18.8
	B33	53-65	2.2	1.3	.4	<.1	13.8	17.7
	C	65-80	1.6	1.2	.4	<.1	15.8	19.0
	Ap	0-7	4.6	.5	.3	<.1	6.5	11.9
	A3	7-13	4.4	.7	.3	<.1	5.9	11.3
Armour silt loam.....	B1	13-20	4.9	.8	.3	<.1	6.1	12.1
	B21	20-24	5.4	.8	.3	<.1	6.3	12.8
	B22	24-37	5.7	1.7	.4	<.1	7.9	15.7
	B23	37-48	4.6	1.4	.4	<.1	12.1	18.5
	B31	48-66	5.9	1.7	.6	.1	12.8	21.1
	B32	66-78	6.9	1.6	.5	.1	12.8	21.9
	C	78-86	5.9	1.2	.4	<.1	14.0	21.2
	Ap	0-6	4.7	.8	.4	.1	7.4	13.4
	A2	6-12	5.8	.9	.2	<.1	5.3	12.2
	A3	12-18	6.7	1.3	.2	<.1	5.9	14.1
Maury silt loam.....	B1	18-25	6.5	2.0	.2	.1	6.9	15.7
	B21	25-37	4.1	2.1	.3	.1	10.3	16.8
	B22	37-51	4.1	2.3	.3	<.1	18.2	24.9
	B2b1	51-57	3.8	2.1	.3	<.1	21.0	27.2
	B2b2	57-76	5.1	2.8	.4	.1	27.1	35.5
	Ch1	76-101	3.4	1.7	.3	<.1	25.3	30.7
	Ap	0-7	9.6	.5	.3	<.1	4.9	15.3
	A2	7-11	7.5	.5	.3	<.1	4.7	13.0
	A3	11-19	8.2	.8	.3	<.1	5.5	14.8
	B21	19-27	8.2	.8	.3	<.1	7.3	16.6
Maury silt loam.....	B22	27-37	8.7	1.2	.4	<.1	8.4	18.7
	B31	37-51	8.9	1.9	.5	<.1	8.9	20.2
	B32	51-72	8.9	2.4	.6	<.1	10.1	22.0
	B33	72-88	6.2	1.4	.6	<.1	16.2	24.4
	C	88-101	6.3	1.7	.5	<.1	17.3	25.8
	Ap	0-7	8.4	.9	.3	<.1	4.7	14.3
	A3	7-11	7.8	.4	.2	<.1	4.7	13.1
	B1	11-16	8.3	.5	.3	.1	5.7	14.9
	B21	16-25	7.3	1.1	.3	.1	8.9	17.7
	B22	25-40	4.5	1.4	.3	.1	13.9	20.2
Maury silt loam.....	B23	40-56	4.0	1.6	.3	<.1	16.2	22.1
	B31	56-69	3.6	1.2	.3	.1	18.4	23.6
	B32	69-85	4.5	1.0	.3	<.1	17.6	23.4
	C1	85-112	8.2	1.1	.2	.1	13.4	23.0
	C3	114-129	10.9	1.0	.2	<.1	13.5	25.6
	C4	129-139	11.6	1.9	.3	.1	13.0	26.9
	Ap	0-8	6.3	.5	.4	<.1	4.7	11.9
	A3	8-11	5.9	1.1	.3	<.1	4.9	12.3
	B1	11-20	4.4	1.5	.3	<.1	7.3	13.5
	B21	20-28	3.0	1.4	.3	<.1	8.9	13.6
Maury silt loam.....	B22	28-29	2.4	1.4	.4	<.1	10.7	14.9
	B23	29-54	2.3	1.4	.4	<.1	13.7	17.8
	B24	54-64	1.8	1.4	.3	<.1	13.1	16.6
	B31	64-80	1.6	1.0	.3	<.1	12.9	15.8
	B32	80-96	4.3	2.3	.3	<.1	24.1	31.0
	B33	96-114	5.2	2.6	.3	<.1	28.1	36.4

Properties of some representative soils

pH H ₂ O (1:1)	Organic carbon	Free iron oxide	Soil class and diameter of particles in millimeters							Textural class
			Very coarse sand (2.0-1.0)	Coarse sand (1.0-0.5)	Medium sand (0.5-0.25)	Fine sand (0.25-0.1)	Very fine sand (0.1-0.05)	Silt (0.05-0.002)	Clay (<0.002)	
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	
6.0	1.41	1.5	0.3	0.4	0.4	4.5	4.4	69.8	20.2	Silt loam.
6.0	.27	1.7	.1	.3	.3	4.4	5.1	64.0	25.8	Silt loam.
5.7	.18	1.9	.4	.4	.3	4.7	5.8	62.0	26.4	Silt loam to silty clay loam.
5.4	.17	2.1	.5	.5	.4	6.3	7.7	58.3	26.3	Silt loam to silty clay loam.
4.8	.10	2.6	.4	.5	.5	8.2	10.4	47.0	33.0	Silty clay loam to clay loam.
4.5	.07	2.7	.3	.5	.4	7.9	10.7	43.1	37.1	Silty clay loam to clay loam.
4.3	.07	2.6	.4	.6	.6	11.8	17.1	36.6	32.9	Clay loam.
4.5	.09	2.2	.3	.5	.5	13.6	21.3	29.8	34.0	Clay loam.
5.6	.96	1.4	.4	.4	.3	4.0	10.9	68.7	15.3	Silt loam.
5.3	.23	1.7	.3	.4	.2	3.4	10.0	63.5	22.2	Silt loam.
5.3	.13	1.9	.2	.3	.2	3.8	11.7	61.0	22.8	Silt loam.
5.5	.12	2.0	.2	.3	.2	4.4	14.3	56.8	23.8	Silt loam.
5.4	.09	2.6	.2	.3	.2	4.1	16.5	48.6	30.1	Clay loam.
4.9	.06	2.8	.1	.2	.1	4.0	19.3	42.3	34.0	Clay loam.
5.0	.08	2.9	.1	<.1	<.1	4.4	22.7	39.4	33.4	Clay loam.
5.0	.06	2.8	.1	.1	.1	7.4	26.1	36.7	29.5	Clay loam.
5.0	.08	2.2	.3	.7	.5	11.9	27.2	33.7	25.7	Loam.
5.2	.87	1.7	.5	1.0	.5	8.4	6.9	65.9	16.8	Silt loam.
5.8	.18	2.2	.4	.8	.4	5.3	5.0	64.0	24.1	Silt loam.
6.0	.15	2.6	1.5	1.1	.4	6.1	5.2	58.4	27.3	Silty clay loam.
5.8	.12	3.1	1.4	1.0	.5	7.4	6.6	51.6	31.5	Silty clay loam.
5.2	.10	4.5	1.0	1.1	.5	7.7	6.6	38.3	44.8	Clay.
4.8	.11	6.0	1.8	1.4	.6	7.2	6.2	27.8	55.0	Clay.
4.7	.09	7.8	2.5	2.6	1.1	7.2	7.2	24.8	54.6	Clay.
5.1	.07	9.4	2.4	2.2	1.4	5.4	5.6	19.7	63.3	Clay.
4.4	.11	7.1	.2	.5	.6	23.1	4.6	7.4	63.6	Clay.
6.4	1.13	1.8	.5	1.0	.6	2.7	3.9	70.3	21.0	Silt loam.
6.2	.28	2.4	.6	1.0	.4	1.9	3.0	64.8	28.3	Silty clay loam.
6.1	.20	2.9	1.3	1.6	.5	2.1	3.1	62.1	29.7	Silty clay loam.
5.8	.14	3.5	1.5	1.5	.5	2.5	3.8	54.4	35.8	Silty clay loam.
5.5	.16	4.3	1.2	1.7	.6	2.7	4.0	45.9	43.9	Silty clay.
5.7	.11	5.0	1.8	2.0	.6	2.6	4.0	39.4	49.6	Clay.
5.6	.09	5.4	1.6	2.4	.6	2.7	4.3	35.2	53.2	Clay.
4.7	.09	6.3	1.2	2.0	.6	2.4	4.2	29.2	60.4	Clay.
4.8	.07	6.6	1.1	2.1	.7	2.3	4.0	27.7	62.1	Clay.
6.6	1.12	1.6	1.5	1.5	.7	13.2	8.1	58.1	16.9	Silt loam.
6.7	.47	2.2	1.2	1.6	.7	11.2	7.4	56.6	21.3	Silt loam.
6.6	.35	2.6	1.8	1.7	.9	13.1	8.3	42.9	31.3	Clay loam.
6.0	.25	3.3	1.0	1.1	.6	12.6	6.9	42.9	34.9	Clay loam.
5.0	.15	3.9	1.3	1.3	.6	14.8	6.9	33.7	41.4	Clay.
5.1	.09	4.4	1.0	1.5	.7	19.7	7.1	26.7	43.3	Clay.
4.8	.13	5.3	1.0	2.0	1.1	22.8	12.4	14.2	46.5	Clay.
4.8	.09	5.7	3.7	3.9	2.0	18.0	19.9	10.7	41.8	Silty clay.
5.1	.06	4.7	1.6	2.4	1.7	29.5	12.0	10.4	42.4	Silty clay.
5.2	.07	5.1	3.9	2.5	1.0	13.6	16.1	14.0	48.9	Clay.
4.9	.05	5.8	.3	.8	.8	3.1	3.5	28.9	62.6	Clay.
6.5	.58	2.2	1.3	2.1	1.0	5.2	6.0	62.8	21.6	Silt loam.
6.2	.30	2.8	1.9	2.0	.7	3.7	4.9	60.2	26.6	Silt loam.
5.4	.09	3.4	3.0	2.4	.8	4.1	5.5	55.3	28.9	Silty clay loam.
5.0	.09	3.8	2.8	2.4	.8	4.8	6.5	47.1	35.6	Silty clay loam.
4.8	.11	4.3	2.6	2.4	.7	5.4	6.8	41.7	40.4	Silty clay.
4.9	.11	4.9	2.4	2.4	.8	5.9	6.6	35.3	46.6	Clay.
4.9	.07	4.9	2.1	2.4	.8	7.1	7.7	37.4	42.5	Clay.
4.9	.04	5.3	4.6	2.4	1.0	8.1	7.9	39.6	35.4	Clay loam.
4.8	.08	9.4	2.1	1.9	.8	7.7	5.1	20.0	62.4	Clay.
4.8	.08	9.1	1.6	1.5	1.0	13.0	5.8	15.5	61.6	Clay.

LOCATION ARMOUR

TN+AL KY

Established Series

Rev. RPS,DLN

10/98

ARMOUR SERIES

The Armour series consists of very deep, well drained soils on stream terraces, foot slopes, and valley floors. These soils formed in old alluvium, valley fill, or in alluvium and the underlying residuum of limestone. Slopes range 0 to 20 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, thermic Ultic Hapludalfs

TYPICAL PEDON: Armour silt loam - cultivated. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 8 inches, dark brown (7.5YR 3/2) silt loam; weak fine granular structure; very friable; many fine roots; medium acid; clear smooth boundary. (5 to 10 inches thick)

A--8 to 17 inches, dark brown (10YR 4/3) silt loam; weak medium granular structure; friable; many fine roots; few angular fragments of chert; few fine black concretions; medium acid; gradual smooth boundary. (0 to 8 inches thick)

Bt1--17 to 23 inches, brown (7.5YR 4/4) silty clay loam; weak fine and medium subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; few angular fragments of chert; few fine black concretions; medium acid; gradual smooth boundary.

Bt2--23 to 48 inches, brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; few to common fine roots; common distinct clay films on faces of peds; few angular fragments of chert; common fine black concretions; strongly acid; clear smooth boundary.

Bt3--48 to 58 inches, reddish brown (5YR 4/4) silty clay loam; weak medium subangular blocky structure; friable; few fine distinct black stains on faces of peds and in pores; common distinct clay films on faces of peds; few angular fragments of chert; common fine black concretions; strongly acid; gradual smooth boundary. (combined thickness of the Bt horizon is 30 to 55 inches)

BC--58 to 75 inches, mottled reddish brown (5YR 4/4), strong brown (7.5YR 5/6), and light yellowish brown (10YR 6/4) silty clay loam; weak medium angular blocky structure; friable; few angular fragments of chert; strongly acid.

TYPE LOCATION: Williamson County, Tennessee; about 1 mile north of Franklin, Tennessee, on U.S. Highway 31; 1/4 mile south of Harpeth River Bridge on U.S. Highway 31; 300 feet east of U.S. Highway 31.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 40 to more than 80 inches. Depth

to limestone bedrock is greater than 5 feet. Reaction is medium acid or strongly acid except the surface layer is less acid where limed. Fragments of gravel or chert range from 0 to 10 percent in the upper 40 inches. The fragments range up to about 3 inches in diameter. Below 40 inches the fragment content is dominantly 0 to 35 percent, but ranges to 60 percent.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam except a few severely eroded areas are silty clay loam.

Some pedons have a transitional horizon between the A and Bt horizons.

The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 4 or 6. Some pedons have few to common mottles in shades of brown, yellow or red. Texture of the fine earth is dominantly silt loam or silty clay loam but includes loam below 40 inches.

The BC and C horizons, where present, have the same colors and textures as the Bt horizon. Some pedons developed in limestone residuum below 48 inches and have 2Bt, 2BC or 2C horizons. These horizons have a hue of 5YR to 2.5Y, value of 4 or 5 and chroma of 4 to 8. Mottles are in shades of brown, yellow, red, or gray. Texture of the fine earth is silty clay loam, clay loam, silty clay, or clay.

COMPETING SERIES: These are the Barnsdale, Dexter, Dossman, Goodwill and Hicks series in the same family and the closely related Ashton, Elk, Sandhill and Stiversville series. Barnsdall and Dexter soils are free of fragments and have less clay and more sand in the lower part of the solum and C horizon. Dossman soils formed in thick deposits of loess on dissected uplands and have a lower sand content in the control section. Goodwill soils have more sand in the lower B horizon. Hicks soils developed in a loess mantle and residuum of interbedded sandstone, siltstone and shale on upland ridgetops. Rippable bedrock is at 40 to 60 inches from the surface. Ashton soils are medium acid to neutral and are mesic. Elk soils have a lighter colored surface layer and are mesic. Sandhill and Stiversville soils are fine-loamy and have bedrock at 40 to 60 inches from the surface.

GEOGRAPHIC SETTING: Armour soils are on stream terraces, foot slopes, and valley floors. Slopes range from 0 to 20 percent. These soils formed in old alluvium, valley fill, or in alluvium and the underlying clayey residuum of limestone. Near the type location, mean annual temperature is 59 degrees F. and average annual precipitation is 47 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Hicks and Stiversville series, and the Braxton, Hampshire, Inman, Maury, Sengtown, Byler, Tarklin, Humphreys, Hawthorne, and Mimosa series. The Braxton, Hampshire, Inman, Maury, and Sengtown soils are on uplands and are clayey. The Byler and Tarklin soils are on stream terraces and have a fragipan. Humphreys soils are on foot slopes and stream terraces and are fine-loamy. Hawthorne soils are on uplands and are loamy-skeletal.

DRAINAGE AND PERMEABILITY: Well drained; medium runoff; moderate permeability.

USE AND VEGETATION: Most of the areas are cleared and used for pasture, hay, small grain, tobacco, and corn. The native vegetation was mixed hardwoods including oaks, hickory, elm, hackberry, maple, beech, black walnut, ash, locust, yellow-poplar, and redcedar.

DISTRIBUTION AND EXTENT: The Nashville Basin and Highland Rim in Tennessee and the inner bluegrass region of Kentucky. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Morgantown, West Virginia

SERIES ESTABLISHED: Maury County, Tennessee; 1955.

REMARKS: Diagnostic horizons recognized in this pedon are:

Ochric epipedon - 0 to 17 inches (Ap, A horizons)

Argillic horizon - 17 to 58 inches (Bt horizon)

National Cooperative Soil Survey
U.S.A.

TH0002

SOIL INTERPRETATIONS RECORD

MLRA(S): 123, 121
REV. RPS, JUL, 4-67
ULTIC HAPLUDALPS, FINE-SILTY, MIXED, THERMIC

ARMOUR SERIES

THE ARMOUR SERIES CONSISTS OF DEEP WELL-DRAINED SOILS. THEY FORMED IN A LAYER OF ALLUVIUM OR LOESS 2 TO 6 FEET THICK AND IN THE UNDERLYING OLD ALLUVIUM OR RESIDUUM OF PHOSPHATIC LIMESTONE. THE SOIL IS DARK BROWN SILTY LOAM TO A DEPTH OF 17 INCHES. BENEATH THIS TO A DEPTH OF 75 INCHES IT IS SILTY CLAY LOAM WHICH IS BROWN IN THE UPPER PART, REDDISH BROWN IN THE MIDDLE PART AND MOTTLED REDDISH-BROWN, STRONG BROWN AND LIGHT YELLOWISH-BROWN IN THE LOWER PART. SLOPES RANGE FROM 0 TO 20 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

DEPTH [IN.]	USDA TEXTURE	UNIFIED	ASHTO	FRAC. PERCENT OF MATERIAL LESS 3/8 IN. THAN 2" PASSING SIEVE NO. [PCT.]	PERCENT OF MATERIAL LESS 3/8 IN. THAN 2" PASSING SIEVE NO. [PCT.]	LIQUID LIMIT	PLAS- TICITY INDEX
0-17 SIL		CL-ML, CL, ML	A-6	0	50-100 50-100 75-95 75-95	25-35	5-10
0-17 SIEL		CL	A-6	0	50-100 50-100 75-100 75-95	32-40	11-18
17-48 SIEL, SIL		CL	A-6, A-6	0	50-100 50-100 75-95 75-95	35-40	8-16
48-75 SIEL, SIC, C		ML, MW, SM, SC	A-6, A-6, A-7	0-2	50-100 50-95 45-60 45-55	35-45	5-23

DEPTH [IN.]	CLAY [PCT.]	MOIST SUELL DENSITY [G/CM3]	PERMEA- BILITY [IN/HR]	AVAILABLE WATER CAPACITY [IN/IN]	SOIL REACTION [PH]	SALINITY [MMHES/CM]	SHRINK- SWELL POTENTIAL	EROSION FACTOR K	WIND EROS. GROUP	ORGANIC MATTER [PCT.]	CORROSIVITY
0-17	15-27	1.30-1.48	0.5-2.0	0.18-0.25	5.1-6.0	-	LOW	42	5	1-3	MODERATE
0-17	27-35	1.30-1.48	0.5-2.0	0.18-0.21	5.1-6.0	-	LOW	27	5	0-1	MODERATE
17-48	22-32	1.30-1.50	0.5-2.0	0.17-0.20	5.1-6.0	-	LOW	27	-	-	MODERATE
48-75	30-50	1.35-1.55	0.5-2.0	0.10-0.16	5.1-6.0	-	MODERATE	27	-	-	MODERATE

FLOODING			HIGH WATER TABLE		CHURNED PAN		SEDPCK		SUBSIDENCE		HYD	POTENTIAL
FREQUENCY	DURATION	MONTHS	DEPTH [FT]	KIND	MONTHS	DEPTH [IN]	DEPTH [IN]	DEPTH [IN]	DEPTH [IN]	INIT	TOTAL	PROST
NONE			18.0				110					

SANITARY FACILITIES (B)

SEPTIC TANK ABSORPTION FIELDS	0-5%: MODERATE-PERCS SLOWLY 5-15%: MODERATE-PERCS SLOWLY, SLOPE 15-4%: SEVERE-SLOPE
SEWAGE LAGOON AREAS	0-1%: MODERATE-SEEPAGE 3-7%: MODERATE-SEEPAGE, SLOPE 7-4%: SEVERE-SLOPE
SANITARY LANDFILL (TRENCH)	0-5%: MODERATE-TOO CLAYEY 5-15%: MODERATE-SLOPE, TOO CLAYEY 15-4%: SEVERE-SLOPE
SANITARY LANDFILL (AREA)	0-5%: SLIGHT 5-15%: MODERATE-SLOPE 15-4%: SEVERE-SLOPE
DAILY COVER FOR LANDFILL	0-5%: FAIR-TOO CLAYEY, THIN LAYER 5-15%: FAIR-TOO CLAYEY, SLOPE, THIN LAYER 15-4%: POOR-SLOPE

CONSTRUCTION MATERIAL (C)

ROADFILL	POOR-LOW STRENGTH
SAND	IMPROBABLE-EXCESS FINES
GRAVEL	IMPROBABLE-EXCESS FINES
TOPSOIL	0-5%: FAIR-TOO CLAYEY, SMALL STONES 5-15%: FAIR-TOO CLAYEY, SMALL STONES, SLOPE 15-4%: POOR-SLOPE

BUILDING SITE DEVELOPMENT (D)

SHALLOW EXCAVATIONS	0-5%: SLIGHT 5-15%: MODERATE-SLOPE 15-4%: SEVERE-SLOPE
DWELLINGS WITHOUT BASEMENTS	0-5%: SLIGHT 5-15%: MODERATE-SLOPE 15-4%: SEVERE-SLOPE
DWELLINGS WITH BASEMENTS	0-5%: SLIGHT 5-15%: MODERATE-SLOPE 15-4%: SEVERE-SLOPE
SMALL COMMERCIAL BUILDINGS	0-5%: SLIGHT 5-15%: MODERATE-SLOPE 15-4%: SEVERE-SLOPE
LOCAL ROADS AND STREETS	0-15% SEVERE-LOW STRENGTH 15-4%: SEVERE-LOW STRENGTH, SLOPE
LAWNES, LANDSCAPING AND GOLF FAIRWAYS	0-5%: SLIGHT 5-15%: MODERATE-SLOPE 15-4%: SEVERE-SLOPE

POOR RESERVE AREA	0-5%: MODERATE-SEEPAGE 3-5%: MODERATE-SEEPAGE, SLOPE 5-4%: SEVERE-SLOPE
EMBANKMENTS Dikes AND LEVEES	MODERATE-PIPE
EXCAVATED POND ACQUIFER FOR	SEVERE-NO WATER
DRAINAGE	DEEP TO WATER
IRRIGATION	0-5%: ERODES EASILY 5-15%: SLOPE, ERODES EASILY
TERRACES AND DIVERSIONS	0-5%: ERODES EASILY 5-15%: SLOPE, ERODES EASILY
GRASSES WATERWAYS	0-5%: ERODES EASILY 5-15%: SLOPE, ERODES EASILY

REGIONAL INTERPRETATIONS

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LOCATION STIVERSVILLE TN

Established Series
Rev. JFC-RPS
04/2001

STIVERSVILLE SERIES

The Stiversville series consists of deep, well drained permeable soils on uplands. They formed mostly in residuum of siltstone and fine grained sandstone that is interbedded with shale and limestone. On steep slopes, some pedons formed partly in colluvium from the same material. Slopes range from 2 to 30 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, active, thermic Ultic Hapludalfs

TYPICAL PEDON: Stiversville loam--pasture.
(Colors are for moist soil unless otherwise stated.)

Ap--0 to 8 inches; dark brown (10YR 3/3) loam; weak fine granular structure; very friable; few thin flat weathered fragments of siltstone; many fine roots; medium acid; clear smooth boundary. (5 to 10 inches thick)

BA--8 to 14 inches; brown (7.5YR 4/4) loam; weak fine and medium subangular blocky structure; friable; many fine roots; few thin flat weathered fragments of siltstone; few fine black concretions; medium acid; clear smooth boundary. (0 to 8 inches thick)

Bt1--14 to 23 inches; brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; common fine roots; few faint clay films; few fine black concretions; 5 percent thin fragments of siltstone; medium acid; gradual smooth boundary. (7 to 18 inches thick)

Bt2--23 to 34 inches; brown (7.5YR 4/4) clay loam, common medium distinct yellowish brown (10YR 5/4) mottles; moderate fine and medium subangular and angular blocky structure; friable; few fine roots; many distinct clay films; common fine black concretions; 8 percent thin fragments of siltstone and sandstone; strongly acid; clear smooth boundary. (7 to 18 inches thick)

Bt3--34 to 45 inches; brown (7.5YR 4/4) clay loam, common fine and medium prominent pale brown (10YR 6/3) and yellowish red (5YR 4/8) mottles; weak medium angular blocky structure; firm; few faint clay films; common fine black concretions; 15 percent soft and hard, flat fragments of sandstone and siltstone; strongly acid; clear smooth boundary. (0 to 18 inches thick)

Cr--45 to 60 inches; brown and yellowish brown interbedded sandstone and siltstone. The bedrock is rippable and can mostly be dug with a spade, but has some hard strata.

TYPE LOCATION: Williamson County, Tennessee; 1/2 mile south of Bethesda and 500 feet southwest of junction of paved roads.

RANGE IN CHARACTERISTICS: Thickness of the solum and depth to weathered rippable bedrock ranges from 40 to 60 inches. This soil is medium acid or strongly acid and medium or high in phosphate. Each horizon of the solum contains from 0 to about 15 percent soft and hard rock fragments except the lower part of the horizon contain 5 to 25 percent. Some pedons have a thin CB or C horizon with up to 50 percent fragments.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4 and chroma of 2 to 4. It is loam or silt loam, except severely eroded areas range to clay loam or silty clay loam.

The BA horizon, where present, has hue of 10YR or 7.5YR, value of 4 and chroma of 4 to 6. It is loam or silt loam.

The Bt horizon mostly has hue of 7.5YR, value of 4 or 5 and chroma of 4 to 6. Some pedons have subhorizons with hue of 10YR or 5YR with the same value and chroma. Mottles in shades of brown and red are none to common. It is loam or clay loam, except some pedons have thin subhorizons of silt loam, silty clay loam or clay. Fine and coarse sand exceeds 15 percent in most pedons and sand plus coarse fragments exceeds 15 percent in all pedons.

The Cr horizon is dominantly weathered siltstone and fine grained sandstone that is interbedded with shale and limestone. It is rippable and in most places can be dug with a spade. Most of the rock is relatively soft, but includes some thin strata that is hard. Some of the strata was calcareous prior to weathering and some strata contains phosphate nodules.

COMPETING SERIES: These are the Bolivar, Liddieville, Pamunkey, Sandhill and Toine series in the same family and the Armour, Culleoka and Hicks series in similar families. Bolivar soils have a paralithic contact between 20 and 40 inches. Liddieville, Pamunkey and Toine soils formed in alluvium on stream terraces and are greater than 60 inches to bedrock. Sandhill soils have 15 to 35 percent rock fragments in the solum. Armour soils formed in silty alluvium in the upper 2 to 4 feet, are fine-silty and are greater than 60 inches to bedrock. Hicks soils formed in loess in the upper 1.5 to 3 feet and are fine-silty.

GEOGRAPHIC SETTING: Stiversville soils are on upland ridgetops and side slopes. Slopes range from about 2 to 30 percent. They formed mostly in residuum of siltstone and fine grained sandstone that is interbedded with limestone and shale. On steep slopes, some pedons formed partly in colluvium from the same material. Near the type location, mean annual temperature is 59 degrees F., and mean annual precipitation is 48 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Hicks and Sandhill series and the Hampshire and Inman series. Hampshire and Inman soils have a fine control section and Inman soils are less than 40 inches to a paralithic contact.

DRAINAGE AND PERMEABILITY: Well drained; medium runoff; moderately rapid permeability.

USE AND VEGETATION: Most areas are used for growing pasture, hay, small grains, tobacco, and corn. The native vegetation was oak, hickory, elm, hackberry, maple, beech, black walnut, ash, locust, and yellow poplar.

DISTRIBUTION AND EXTENT: The Central Basin of Tennessee. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Lexington, Kentucky

SERIES ESTABLISHED: Williamson County, Tennessee; 1961.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - the zone from 0 to 8 inches (Ap horizons)

Argillic horizon - the zone from 14 to 42 inches (Bt1, Bt2, Bt3 horizons)

Paralithic contact - at 42 inches (top of Cr horizon.)

National Cooperative Soil Survey
U.S.A.

TH0112

SOIL INTERPRETATIONS RECORD

STIVERSVILLE SERIES

MLRA(S): 8-86

REV. RPS, JLP, 4-91

ULTIC HAFLUDALFS, FINE-LOAMY, MIXED, THERMIC

THE STIVERSVILLE SERIES CONSISTS OF WELL DRAINED SOILS ON UPLANDS. THESE SOILS FORMED IN RESIDUUM OR COLLUVIUM WEATHERED FROM SANDSTONE, SILTSTONE, LIMESTONE AND SHALE. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS DARK BROWN LOAM 6 INCHES THICK. BETWEEN DEPTHS OF 6 AND 23 INCHES THE SOIL IS BROWN LOAM. THE SOIL IS BROWN CLAY LOAM BETWEEN DEPTHS OF 23 AND 45 IN. WEATHERED BEDROCK IS BETWEEN DEPTHS OF 45 AND 60 INCHES. SLOPES RANGE FROM 2 TO 30 PERCENT.

LANDSCAPE AND CLIMATE PROPERTIES													
ANNUAL AIR TEMPERATURE		FROST FREE DAYS		ANNUAL PRECIPITATION		ELEVATION (FT)		DRAINAGE CLASS		SLOPE (PCT)		2-30	
ESTIMATED SOIL PROPERTIES													
DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT. > 10 IN (PCT)	FRACT. > 3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO.				CLAY (PCT)			
						4	10	40	200				
0-8	L, SIL	ML, CL, CL-ML	A-4		0-2	80-100	75-100	65-80	55-80	15-27			
0-8	CL, SIL	CL, CL-ML, ML	A-4, A-6		0-2	80-100	75-100	70-85	51-85	28-35			
8-34	CL, L, SIL	CL, CL-ML, ML	A-4, A-6		0-5	80-100	75-100	70-85	51-85	20-35			
34-45	CN-CL, CN-L, CN-SIL	SC, SM, GC, CL	A-4, A-6		0-10	70-85	60-80	50-75	36-65	18-32			
45-60	WB												
DEPTH (IN.)	LIQUID LIMIT	PLAS- TICITY INDEX	MOIST BULK DENSITY (G/CM3)	PERMEA- BILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SAR	CEC (ME/100G)	CACO3 (PCT)	GYPSUM (PCT)		
0-8	<30	2-10	1.40-1.55	2.0-6.0	0.15-0.20	5.1-6.0	-						
0-8	25-40	4-15	1.40-1.55	2.0-6.0	0.14-0.18	5.1-6.0	-						
8-34	20-40	3-15	1.40-1.55	2.0-6.0	0.14-0.18	5.1-6.0	-						
34-45	20-40	3-15	1.35-1.50	2.0-6.0	0.12-0.18	5.1-6.0	-						
45-60				0.0-0.2									
DEPTH (IN.)	ORGANIC MATTER (PCT)	SHRINK- SWELL POTENTIAL	EROSION FACTORS K ₁ K ₂ T	WIND EROD. GROUP	WIND EROD. INDEX	CORROSIVITY							
						STEEL	CONCRETE						
0-8	1-3	LOW	22	3	-	MODERATE	MODERATE						
0-8	5-1	LOW	28	3	-								
8-34		LOW	28										
34-45		LOW	28										
45-60													
FLOODING			HIGH WATER TABLE			CEMENTED PAN		BEDROCK		SUBSIDENCE		HYD. GRP	POTENT'L FROST ACTION
FREQUENCY NDNE		DURATION MONTHS	DEPTH (FT)	KIND	MONTHS	DEPTH (IN)	HARDNESS (IN)	DEPTH (IN)	HARDNESS (IN)	INIT. (IN)	TOTAL (IN)		
			> 6.0			-		40-60	SDFT	-		8	-
SANITARY FACILITIES (A)						CONSTRUCTION MATERIAL (A)							
SEPTIC TANK ABSORPTION FIELDS	2-8%: MODERATE-DEPTH TO ROCK					ROADFILL	2-15%: FAIR-DEPTH TO ROCK, THIN LAYER						
	8-15%: MODERATE-DEPTH TO ROCK, SLOPE						15-25%: FAIR-DEPTH TO ROCK, THIN LAYER, SLOPE						
15%: SEVERE-SLOPE						25%: POOR-SLOPE							
SEWAGE LAGOON AREAS	2-7%: SEVERE-SEEPAGE					SAND	IMPROBABLE-EXCESS FINES						
	7%: SEVERE-SEEPAGE, SLOPE												
SANITARY LANDFILL (TRENCH)	2-15%: SEVERE-DEPTH TO ROCK, SEEPAGE					GRAVEL	IMPROBABLE-EXCESS FINES						
	15%: SEVERE-DEPTH TO ROCK, SEEPAGE, SLOPE												
SANITARY LANDFILL (AREA)	2-15%: SEVERE-SEEPAGE					TOPSOIL	2-15%: POOR-SMALL STONES						
	15%: SEVERE-SEEPAGE, SLOPE						15%: POOR-SMALL STONES, SLOPE						
DAILY COVER FOR LANDFILL	2-8%: FAIR-DEPTH TO ROCK, TOO CLAYEY					POND RESERVOIR AREA	2-8%: SEVERE-SEEPAGE						
	8-15%: FAIR-DEPTH TO ROCK, TOO CLAYEY, SLOPE						8%: SEVERE-SEEPAGE, SLOPE						
15%: POOR-SLOPE													
BUILDING SITE DEVELOPMENT (A)													
SHALLOW EXCAVATIONS	2-8%: SLIGHT					EMBANKMENTS DIKES AND LEVEES	SEVERE-PIPING						
	8-15%: MODERATE-SLOPE												
15%: SEVERE-SLOPE													
DWELLINGS WITHOUT BASEMENTS	2-8%: SLIGHT					EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER						
	8-15%: MODERATE-SLOPE												
15%: SEVERE-SLOPE													
DWELLINGS WITH BASEMENTS	2-8%: SLIGHT					DRAINAGE	DEEP TO WATER						
	8-15%: MODERATE-SLOPE												
15%: SEVERE-SLOPE													
SMALL COMMERCIAL BUILDINGS	2-4%: SLIGHT					IRRIGATION	2-3%: FAVORABLE						
	4-6%: MODERATE-SLOPE						3%: SLOPE						
8%: SEVERE-SLOPE													
LOCAL ROADS AND STREETS	2-8%: SLIGHT					TERRACES AND DIVERSIONS	2-8%: FAVORABLE						
	8-15%: MODERATE-SLOPE						8%: SLOPE						
15%: SEVERE-SLOPE													
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	2-8%: SLIGHT					GRASSED WATERWAYS	2-8%: FAVORABLE						
	8-15%: MODERATE-SLOPE						8%: SLOPE						
15%: SEVERE-SLOPE													

LOCATION HAMPSHIRE

TN+KY

Established Series

Rev. RPS

04/2001

HAMPSHIRE SERIES

The Hampshire series consists of deep, well drained, soils on uplands. These soils formed in clayey residuum of interbedded limestone and shale and the underlying residuum of interbedded siltstone, fine grained sandstone, shale and limestone. Slopes range from 2 to 30 percent.

TAXONOMIC CLASS: Fine, mixed, active, thermic Ultic Hapludalfs

TYPICAL PEDON: Hampshire silt loam--pasture. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 7 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many grass roots; strongly acid; clear wavy boundary. (5 to 9 inches thick)

Bt1--7 to 12 inches; brown (7.5YR 4/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; common faint clay films on faces of peds; many fine roots; few soft fragments of shale; strongly acid; clear wavy boundary. (3 to 7 inches thick)

Bt2--12 to 24 inches; strong brown (7.5YR 5/6) clay; moderate medium and fine subangular blocky structure; firm; many distinct clay films on faces of peds; few small soft and hard fragments of shale and limestone most of which are coated with clay films; few roots; strongly acid; gradual wavy boundary. (8 to 15 inches thick)

Bt3--24 to 30 inches; strong brown (7.5YR 5/6) clay; moderate medium and fine subangular blocky structure; firm; many distinct clay films on faces of peds; few soft and hard fragments of shale and limestone; few fine roots; strongly acid; clear wavy boundary. (Combined thickness of the Bt horizon ranges from 25 to 45 inches)

2Bt4--30 to 40 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; firm; few faint clay films on faces of peds; 15 percent by volume of soft fragments of sandstone and siltstone and a few hard fragments of limestone; few roots; strongly acid; clear wavy boundary. (0 to 10 inches thick)

2C--40 to 47 inches; strong brown (7.5YR 5/6) very channery loam; massive; friable; 60 percent soft and hard, flat fragments of sandstone, siltstone and limestone up to 10 inches across strongly acid; clear smooth boundary. (0 to 12 inches thick)

2Cr--47 to 60 inches; interbedded sandstone, siltstone and limestone. Weathered bedrock that is rippable and can be dug with a spade except for some hard strata.

TYPE LOCATION: Dekalb County, Tennessee; 1 mile southeast of Alexandria, in northwest corner of Lawrence farm.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 30 to 50 inches and depth to bedrock ranges from 40 to 60 inches. Fragments of rock range from 0 to 15 percent in the A and Bt horizons, 10 to 50 percent in the BC and C horizons where present, 5 to 20 percent in the 2Bt horizon, and 25 to 75 percent in the 2C horizon. Reaction ranges from medium acid to very strongly acid. Phosphate content is medium or high.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. The chroma of 6 is in severely eroded areas. It is dominantly silt loam, but ranges to silty clay loam in severely eroded areas.

Some pedons have a transitional horizon between the A and Bt horizons.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. Some pedons are mottled with shades of brown and yellow in the middle and lower parts. It is clay, silty clay, silty clay loam or clay loam. Clay content of the control section is dominantly 40 to 45 percent, but ranges from 35 to 55 percent.

A lithologic discontinuity is not a requirement of the series. Where present, the BC and C horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. The fine earth texture ranges from loam to clay.

The 2Bt horizon has the same colors as the Bt horizon. The fine texture is clay loam, silty clay loam or clay.

The 2C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. Mottles are in shades of brown, yellow, and gray. The fine earth fraction is loam, silt loam, clay loam, or silty clay loam.

The 2Cr horizon is interbedded siltstone sandstone, shale and limestone. The weathered bedrock is rippable and in most places can be dug with a spade, but it includes some thin strata that is hard. Most of the rock was calcareous prior to weathering and some strata contains phosphate nodules.

COMPETING SERIES: These are the Brantley, Canton Bend, Capshaw, Cowton, Enon, Gundy, Maben, Magnet, Mecklenburg, Meth, Spray, and Zion series in the same family and Mimosa, Needmore and Talbott series in similar families. Brantley and Enon soils are deeper than 60 inches to bedrock. Canton Bend, Gundy, Maben, Magnet and Mecklenburg soils have hues of 5YR or redder in the B horizon. Capshaw soils have gray mottles in the B horizon. Cowton and Needmore soils have rippable bedrock at a depth of 40 to 60 inches. Meth soils have a solum greater than 60 inches thick. Mimosa soils have a solum less than 20 inches thick. Talbott soils have hue of 5YR or redder in the major part of the B horizon. Zion soils have hard bedrock at a depth of 20 to 40 inches.

GEOGRAPHIC SETTING: Gently sloping to steep uplands. Slopes range from 2 to 30 percent. These soils formed in clayey residuum of interbedded limestone and shale the underlying residuum of interbedded siltstone, fine grained sandstone and limestone. Near the type location, the average annual air temperature is 60 degrees F. and the average annual precipitation is about 52 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Mimosa soils and the Hicks, Inman, Dowellton and Sandhill and Stiversville series. Hicks soils formed partly in a loess mantle and are fine-silty. Inman soils are 20 to 40 inches to bedrock and are flaggy. Dowellton soils have gentle slopes and are poorly drained. Sandhill soils are fine-loamy and are flaggy. Stiversville soils are fine-loamy.

DRAINAGE AND PERMEABILITY: Well drained; moderately slow permeability; medium to rapid runoff.

USE AND VEGETATION: Most areas are cleared. Much of the soil is in pasture and hay, but some is used for growing corn, small grains, and tobacco. The native vegetation is forests of oaks, walnut, locust, ash, hickory, beech, elm, and maple.

DISTRIBUTION AND EXTENT: The Central Basin in Tennessee. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Lexington, Kentucky

SERIES ESTABLISHED: Maury County, Tennessee; 1954.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - The zone from 0 to 7 inches (Ap horizon)

Argillic horizon - The zone from 7 to 40 inches (Bt horizon)

Paralithic contact - at 47 inches (top of Cr horizon)

National Cooperative Soil Survey
U.S.A.

MLR(S): 12
REV. CHP, RPS, 10-92

ULTIC HAPLUDALFS, FINE, MIXED, THERMIC

THE HAMPSHIRE SERIES CONSISTS OF WELL-DRAINED SOILS ON UPLANDS. THESE SOILS FORMED IN RESIDUUM FROM INTERBEDDED SANDY LIMESTONE AND SHALE. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS BROWN SILT LOAM 7 INCHES THICK. THE NEXT 5 INCHES IS BROWN SILTY CLAY LOAM. BETWEEN DEPTHS OF 12 AND 40 INCHES THE SOIL IS STRONG BROWN CLAY IN THE UPPER PART AND MIDDLE PART AND CLAY LOAM IN THE LOWER PART. BETWEEN DEPTHS OF 40 AND 50 INCHES THERE IS WEATHERED BEDROCK WITH SEAMS OF STRONG BROWN LOAM. SLOPES RANGE FROM 2 TO 30 PERCENT.

LANDSCAPE AND CLIMATE PROPERTIES			
ANNUAL AIR TEMPERATURE	FROST FREE DAYS	ANNUAL PRECIPITATION (IN)	ELEVATION (FT)
57-60	190-205	48-54	500-850
		CLASS	SLOPE (PCT)
		M	2-30

ESTIMATED SOIL PROPERTIES

DEPTH: (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT. FRAC. >10 IN.:> 3 IN. (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 40 (PCT)	CEC (ME/100G)	SAR	CAOD3 (PCT)	GYP SUM (PCT)		
0-7	SIL	CL-ML, CL, ML	A-4, A-6	0	95-100	95-100	90-100	80-90	15-27		
0-7	SICL	CL, ML, CH, CH	A-7, A-6	0	95-100	95-100	90-100	85-95	27-40		
7-40	SIC, SICL	CL, CH, MH	A-7	0	0-3	80-100	75-100	65-95	55-85		
40-47	ENV-L, ENV-CL, ENV-SICL	CL, GC, SC, GM	A-6, A-7, A-2	0-5	10-50	50-75	40-70	30-60	22-40		
47-60	MS										
DEPTH:LIQUID (IN.)	LIMIT INDEX	PLAS- TICITY INDEX	MOIST BULK DENSITY (G/CM3)	PERMEA- BILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SAR	CEC (ME/100G)	CAOD3 (PCT)	GYP SUM (PCT)
0-7	20-40	3-20	1.35-1.50	0.6-2.0	0.18-0.22	4.5-6.0	-	-	-	-	
0-7	30-50	15-25	1.30-1.45	0.6-2.0	0.14-0.18	4.5-6.0	-	-	-	-	
7-40	45-70	21-38	1.25-1.45	0.2-0.6	0.12-0.16	4.5-6.0	-	-	-	-	
40-47	30-48	11-25	1.30-1.50	0.00-0.20	0.07-0.12	4.5-6.0	-	-	-	-	
47-60			0.00-0.2								

HIGH WATER TABLE				CEMENTED PAN				BEDROCK				SUBSIDENCE				HYD. POTENTIAL			
FREQUENCY	DURATION	MONTHS	DEPTH (FT)	KIND	MONTHS	DEPTH (IN)	HARDNESS	DEPTH (IN)	HARDNESS	INIT. (IN)	TOTAL (IN)	GRF	FROST ACTION						
NONE			26.0					10-60	SOFT										

(Range estimated. Properties indicated and computer note interspersed. Eliminates overrides).

Table 1.9.1
3.0 Soil Characteristics
3.1 Hand Auger, Test Pit and Soil Boring Logs

3.1.1 Soil Horizons
(See Appendix A)

3.1.2 Depth to Groundwater

There was no groundwater found at any depths ranging from 18 inches to 12 feet.

3.1.3 Depth to Bedrock

Several test pits were dug at depths of 12 feet on the perimeter edges of the soil fields and our studies show that no rocks were discovered up to this depth.

3.2 Unified Soil Classification
(See SID)

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SAMPLE DATA SHEET

Measurement No. 2
 Location V-98
 Weather Condition overcast
 Horizon _____
 Conducted by AL
 Date 4-10-08
 Temperature 72°
 Source of Water Tap
 Hole depth 48.25 cm
 Distance between reference level and soil surface + 2.62 cm
 Distance from the hole bottom to the reference level (D) = 55.48 cm
 Desired water depth in hole (H) = 10 cm
 Constant-head tube setting (d) = 45.88 cm
 Measured (Actual) water level in hole
 Initial 10 cm
 Final 10 cm
 Radius of the hole (r) 3 cm
 Clock time
 Start saturation 1:47
 Steady-state reading 1:57

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____ Conversion Factor (C.F.) = 20 cm²
 Both Flow Measuring and Main Reservoirs _____ Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
<u>1:57</u>	<u>28.4</u>						
<u>2:27</u>	<u>22.05</u>	<u>30</u>	<u>6.35</u>	<u>127.00</u>	<u>4.23</u>	<u>253.80</u>	<u>6.33</u>
<u>3:57</u>	<u>17.16</u>	<u>30</u>	<u>4.89</u>	<u>97.80</u>	<u>3.26</u>	<u>195.60</u>	<u>5.80</u>
<u>3:27</u>	<u>15.16</u>	<u>30</u>	<u>2.00</u>	<u>40.00</u>	<u>1.33</u>	<u>79.80</u>	<u>4.31</u>
<u>3:57</u>	<u>12.16</u>	<u>30</u>	<u>3.00</u>	<u>60.00</u>	<u>2.00</u>	<u>120.00</u>	<u>4.93</u>
<u>4:27</u>	<u>11.16</u>	<u>30</u>	<u>1.0</u>	<u>20.00</u>	<u>0.67</u>	<u>40.20</u>	<u>3.43</u>
<u>4:57</u>	<u>9.56</u>	<u>30</u>	<u>1.6</u>	<u>32.00</u>	<u>1.07</u>	<u>64.20</u>	<u>4.00</u>
<u>5:27</u>	<u>8.10</u>		<u>1.4</u>	<u>28.00</u>	<u>0.93</u>	<u>55.80</u>	<u>3.82</u>

Average of last three measurements: K_{sat} = 3.75 cm/h 35.4 in/day (other units)

COMMENTS:

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p.1

SAMPLE DATA SHEET

Measurement No. 1
 Location V-107
 Weather Condition overcast
 Horizon _____
 Source of Water Tap
 Date 4-10-08
 Temperature 20°
 Hole depth 48.20 cm
 Distance between reference level and soil surface + 2.54 cm
 Distance from the hole bottom to the reference level (D) = 50.8 cm
 Desired water depth in hole (H) = 10 cm
 Constant-head tube setting (d) = 40.8 cm
 Measured (Actual) water level in hole
 Initial 10 cm
 Final 10 cm
 Radius of the hole (r) _____ cm
 Clock time
 Start saturation 12:51
 Steady-state reading 12:52

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____

Conversion Factor (C.F.) = 20 cm²

Both Flow Measuring and Main Reservoirs _____

Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
<u>12:51</u>	<u>36.56</u>						
<u>1:21</u>	<u>33.02</u>	<u>30 min</u>	<u>2.54</u>	<u>50.80</u>	<u>1.69</u>	<u>101.40</u>	<u>4.66</u>
<u>1:51</u>	<u>30.42</u>	<u>30</u>	<u>2.60</u>	<u>52.00</u>	<u>1.73</u>	<u>103.80</u>	<u>4.70</u>
<u>2:21</u>	<u>29.79</u>	<u>30</u>	<u>0.63</u>	<u>12.60</u>	<u>0.42</u>	<u>25.20</u>	<u>2.93</u>
<u>2:51</u>	<u>28.88</u>	<u>30</u>	<u>0.91</u>	<u>18.20</u>	<u>0.61</u>	<u>36.60</u>	<u>3.32</u>
<u>3:21</u>	<u>28.11</u>	<u>30</u>	<u>0.77</u>	<u>15.40</u>	<u>0.51</u>	<u>30.60</u>	<u>3.13</u>

Average of last three measurements: K_{sat} = 3.13 cm/h 29.6 in/day (other units)

COMMENTS: _____

SAMPLE DATA SHEET

Measurement No. 3
 Location 3-96
 Weather Condition cloudy
 Horizon _____

Conducted by AL
 Date 4-14-08
 Temperature 47°F
 Source of Water tap

Hole depth 48.26 cm
 Distance between reference level and soil surface + 7.62 cm
 Distance from the hole bottom to the reference level (D) 55.88 cm
 Desired water depth in hole (H) - 10 cm
 Constant-head tube setting (d) = 45.88 cm

Measured (Actual) water level in hole
 Initial 48.18 cm
 Final 10 cm
 Radius of the hole (r) 3 cm
 Clock time _____
 Start saturation 1.01
 Steady-state reading 1.00

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____ Conversion Factor (C.F.) = 20 cm²
 Both Flow Measuring and Main Reservoirs _____ Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
<u>1:06</u>	<u>35.8</u>						
<u>1:36</u>	<u>30.00</u>	<u>30</u>	<u>5.8</u>	<u>116.0</u>	<u>3.9</u>	<u>234.0</u>	<u>6.2</u>
<u>2:06</u>	<u>28.2</u>	<u>30</u>	<u>1.8</u>	<u>36.0</u>	<u>1.2</u>	<u>72.0</u>	<u>4.2</u>
<u>2:36</u>	<u>26.2</u>	<u>30</u>	<u>2.0</u>	<u>40.0</u>	<u>1.3</u>	<u>39.0</u>	<u>3.4</u>
<u>3:06</u>	<u>25.2</u>	<u>30</u>	<u>1.0</u>	<u>20.0</u>	<u>0.7</u>	<u>21.0</u>	<u>2.8</u>
<u>3:36</u>	<u>24.2</u>	<u>30</u>	<u>1.0</u>	<u>20.0</u>	<u>0.7</u>	<u>21.0</u>	<u>2.8</u>
<u>4:06</u>	<u>23.2</u>	<u>30</u>	<u>1.0</u>	<u>20.0</u>	<u>0.7</u>	<u>21.0</u>	<u>2.8</u>

Average of last three measurements: K_{sat} = 2.8 cm/h 26.5 in/day (other units)

COMMENTS: _____

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SAMPLE DATA SHEET

Measurement No. 4
 Location R-101
 Weather Condition cloudy
 Horizon _____
 Source of Water tap
 Date 4-11-08
 Temperature 86°
 Hole depth 48.26 cm
 Distance between reference level and soil surface +5.08 cm
 Distance from the hole bottom to the reference level (D) 53.34 cm
 Desired water depth in hole (H) -10.00 cm
 Constant-head tube setting (d) =43.34 cm
 Measured (Actual) water level in hole
 Initial 9.8 cm
 Final 10.0 cm
 Radius of the hole (r) _____ cm
 Clock time
 Start saturation 4:16
 Steady-state reading 4:20

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____ Conversion Factor (C.F.) = 20 cm²
 Both Flow Measuring and Main Reservoirs _____ Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
<u>4:20</u>	<u>38.5</u>						
<u>4:50</u>	<u>35.9</u>	<u>30</u>	<u>2.6</u>	<u>52.0</u>	<u>1.7</u>	<u>102.00</u>	<u>4.7</u>
<u>5:20</u>	<u>34.4</u>	<u>30</u>	<u>1.5</u>	<u>30.0</u>	<u>1.0</u>	<u>60.0</u>	<u>3.9</u>
<u>5:50</u>	<u>33.7</u>	<u>30</u>	<u>0.7</u>	<u>14.0</u>	<u>0.5</u>	<u>30.0</u>	<u>3.1</u>
<u>6:20</u>	<u>31.5</u>	<u>30</u>	<u>2.2</u>	<u>44.0</u>	<u>1.5</u>	<u>90.0</u>	<u>4.5</u>
<u>6:50</u>	<u>29.6</u>	<u>30</u>	<u>0.9</u>	<u>18.0</u>	<u>0.6</u>	<u>36.0</u>	<u>3.3</u>
<u>7:20</u>	<u>28.9</u>	<u>30</u>	<u>0.7</u>	<u>14.0</u>	<u>0.5</u>	<u>30.0</u>	<u>3.1</u>
<u>7:50</u>	<u>28.4</u>	<u>30</u>	<u>0.5</u>	<u>10.0</u>	<u>0.3</u>	<u>18.0</u>	<u>2.6</u>

Average of last three measurements: K_{sat} = 3.0 cm/h 28.3 in/day (other units)

COMMENTS:

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SAMPLE DATA SHEET

Measurement No. 5Location E-99Conducted by ALWeather Condition SunnyDate 4-15-08

Horizon _____

Temperature 48°Source of Water tap

Hole depth

48.26 cm

Measured (Actual) water level in hole

Distance between reference level
and soil surface+ 5.08 cmInitial 10 cmDistance from the hole bottom to
the reference level (D)= 53.34 cmFinal 10 cm

Desired water depth in hole (H)

- 10.00 cmRadius of the hole (r) 3 cm

Constant-head tube setting (d)

= 43.34 cm

Clock time

Start saturation 9:40Steady-state reading 9:45

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____

Conversion Factor (C.F.) = 20 cm²

Both Flow Measuring and Main Reservoirs _____

Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sa} cm/h
<u>9:45</u>	<u>41.5</u>						
<u>10:15</u>	<u>39.0</u>	<u>30</u>	<u>2.5</u>	<u>50.0</u>	<u>1.7</u>	<u>102.0</u>	<u>4.7</u>
<u>10:45</u>	<u>37.7</u>	<u>30</u>	<u>1.3</u>	<u>26.0</u>	<u>0.9</u>	<u>54.0</u>	<u>3.8</u>
<u>11:15</u>	<u>36.7</u>	<u>30</u>	<u>1.0</u>	<u>20.0</u>	<u>0.7</u>	<u>42.0</u>	<u>3.5</u>
<u>11:45</u>	<u>35.5</u>	<u>30</u>	<u>1.2</u>	<u>24.0</u>	<u>0.8</u>	<u>48.0</u>	<u>3.6</u>
<u>12:15</u>	<u>34.0</u>	<u>30</u>	<u>1.5</u>	<u>30.0</u>	<u>1.0</u>	<u>60.0</u>	<u>3.9</u>
<u>12:45</u>	<u>33.8</u>	<u>30</u>	<u>1.2</u>	<u>24.0</u>	<u>0.8</u>	<u>48.0</u>	<u>3.6</u>

Average of last three measurements: K_{sa} = 3.7 cm/h 35.0 in/day (other units)

COMMENTS: _____

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p.6

SAMPLE DATA SHEET

Measurement No. 6 Conducted by AL
 Location E-101 Date 4-15-04
 Weather Condition sunny Temperature 60°
 Horizon _____ Source of Water tap

Hole depth 48.26 cm Measured (Actual) water level in hole
 Distance between reference level Initial 10 cm
 and soil surface + 5.08 cm Final 10 cm
 Distance from the hole bottom to the reference level (D) = 53.34 cm Radius of the hole (r) 3 cm
 Desired water depth in hole (H) - 10.00 cm Clock time
 Constant-head tube setting (d) = 43.34 cm Start saturation 12:55
 Steady-state reading 1:00

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____ Conversion Factor (C.F.) = 20 cm²
 Both Flow Measuring and Main Reservoirs _____ Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
<u>1:00</u>	<u>42.0</u>						
<u>1:30</u>	<u>40.1</u>	<u>30</u>	<u>1.9</u>	<u>38.0</u>	<u>1.3</u>	<u>78.0</u>	<u>4.3</u>
<u>2:00</u>	<u>39.6</u>	<u>30</u>	<u>0.7</u>	<u>14.0</u>	<u>0.5</u>	<u>30.0</u>	<u>3.1</u>
<u>2:30</u>	<u>39.1</u>	<u>30</u>	<u>0.5</u>	<u>10.0</u>	<u>0.3</u>	<u>18.0</u>	<u>2.6</u>
<u>3:00</u>	<u>38.5</u>	<u>30</u>	<u>0.6</u>	<u>12.0</u>	<u>0.4</u>	<u>24.0</u>	<u>2.9</u>
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____

Average of last three measurements: K_{sat} = 2.9 cm/h 27.4 in/day (other units)

COMMENTS: _____

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SAMPLE DATA SHEET

Measurement No. 7 Conducted by AL Date 4-15-08
 Location T-100 Weather Condition Sunny Temperature 64°
 Horizon _____ Source of Water Tap

Hole depth 48.3 cm Measured (Actual) water level in hole
 Distance between reference level Initial 10 cm
 and soil surface Final 10 cm
 Distance from the hole bottom to Radius of the hole (r) 3 cm
 the reference level (D) = 50.8 cm Clock time
 Desired water depth in hole (H) = 10 cm Start saturation 3:10
 Constant-head tube setting (d) = 40.8 cm Steady-state reading 3:15

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____ Conversion Factor (C.F.) = 20 cm²
 Both Flow Measuring and Main Reservoirs _____ Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
<u>3:45</u>	<u>30.43</u>						
<u>4:10</u>	<u>34.5</u>	<u>30</u>	<u>8.5</u>	<u>170.0</u>	<u>5.7</u>	<u>342.0</u>	<u>7.0</u>
<u>4:40</u>	<u>28.3</u>	<u>30</u>	<u>6.2</u>	<u>124.0</u>	<u>4.1</u>	<u>246.0</u>	<u>6.3</u>
<u>5:10</u>	<u>21.5</u>	<u>30</u>	<u>6.8</u>	<u>136.0</u>	<u>4.5</u>	<u>270.0</u>	<u>6.5</u>
<u>5:40</u>	<u>13.5</u>	<u>30</u>	<u>8.0</u>	<u>160.0</u>	<u>5.3</u>	<u>318.0</u>	<u>6.8</u>
<u>6:10</u>	<u>7.2</u>	<u>30</u>	<u>6.3</u>	<u>126.0</u>	<u>4.2</u>	<u>252.0</u>	<u>6.3</u>
<u>6:40</u>	<u>3.1</u>	<u>30</u>	<u>4.1</u>	<u>82.0</u>	<u>2.7</u>	<u>162.0</u>	<u>5.5</u>

Average of last three measurements: K_{sat} = 6.2 cm/h 58.5 in/day (other units)

COMMENTS: _____

SAMPLE DATA SHEET

Measurement No. 8 Conducted by AL
 Location K-102 Date 4-16-08
 Weather Condition Sunny Temperature 58°
 Horizon _____ Source of Water tap

Hole depth 48.20 cm Measured (Actual) water level in hole
 Distance between reference level Initial 10 cm
 and soil surface + 5.08 cm Final 10 cm
 Distance from the hole bottom to Radius of the hole (r) 3 cm
 the reference level (D) = 53.34 cm
 Desired water depth in hole (H) - 10.00 cm
 Constant-head tube setting (d) = 43.34 cm
 Clock time
 Start saturation 10:48
 Steady-state reading 10:50

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____

Conversion Factor (C.F.) = 20 cm²

Both Flow Measuring and Main Reservoirs _____

Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
<u>10:50</u>	<u>42.3</u>						
<u>11:20</u>	<u>35.4</u>	<u>30</u>	<u>6.9</u>	<u>138.0</u>	<u>4.6</u>	<u>276.0</u>	<u>6.5</u>
<u>11:50</u>	<u>30.8</u>	<u>30</u>	<u>5.3</u>	<u>106.0</u>	<u>3.5</u>	<u>210.0</u>	<u>5.9</u>
<u>12:20</u>	<u>26.3</u>	<u>30</u>	<u>3.8</u>	<u>76.0</u>	<u>2.5</u>	<u>150.0</u>	<u>5.3</u>
<u>12:50</u>	<u>22.6</u>	<u>30</u>	<u>3.7</u>	<u>74.0</u>	<u>2.5</u>	<u>150.0</u>	<u>5.3</u>
<u>1:20</u>	<u>18.8</u>	<u>30</u>	<u>3.8</u>	<u>76.0</u>	<u>2.5</u>	<u>150.0</u>	<u>5.3</u>
<u>1:50</u>	<u>15.0</u>	<u>30</u>	<u>3.8</u>	<u>76.0</u>	<u>2.5</u>	<u>150.0</u>	<u>5.3</u>

Average of last three measurements: K_{sat} = 5.3 cm/h 50.0 in/day (other units)

COMMENTS: _____

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SAMPLE DATA SHEET

Measurement No. 9

Conducted by AL

Location K-97

Date 4-16-08

Weather Condition Sunny

Temperature 71°

Horizon _____

Source of Water fac

Hole depth

48.26 cm

Measured (Actual) water level in hole

Distance between reference level and soil surface

+ 6 cm

Initial 9.8 cm

Final 9.8 cm

Distance from the hole bottom to the reference level (D)

= 54.26 cm

Radius of the hole (r) 3 cm

Desired water depth in hole (H)

= 10 cm

Clock time

Start saturation 2:08

Constant-head tube setting (d)

= 44.26 cm

Steady-state reading 2:10

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____

Conversion Factor (C.F.) = 20 cm²

Both Flow Measuring and Main Reservoirs _____

Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
<u>2:10</u>	<u>41.8</u>						
<u>2:40</u>	<u>35.1</u>	<u>30</u>	<u>6.7</u>	<u>134.0</u>	<u>4.5</u>	<u>268.0</u>	<u>6.4</u>
<u>3:10</u>	<u>29.5</u>	<u>30</u>	<u>5.6</u>	<u>112.0</u>	<u>3.7</u>	<u>224.0</u>	<u>6.1</u>
<u>3:40</u>	<u>23</u>	<u>30</u>	<u>6.5</u>	<u>130.0</u>	<u>4.3</u>	<u>260.0</u>	<u>6.4</u>
<u>4:10</u>	<u>15.1</u>	<u>30</u>	<u>7.9</u>	<u>158.0</u>	<u>5.3</u>	<u>316.0</u>	<u>6.8</u>
<u>4:40</u>	<u>5.1</u>	<u>30</u>	<u>10.0</u>	<u>200.0</u>	<u>6.7</u>	<u>400.0</u>	<u>7.4</u>
<u>5:10</u>	<u>0</u>	<u>30</u>	<u>5.1</u>	<u>102.0</u>	<u>3.4</u>	<u>204.0</u>	<u>5.9</u>

Average of last three measurements: K_{sat} = 6.7 cm/h 63.3 in/day (other units)

COMMENTS: _____

SAMPLE DATA SHEET

Measurement No. 10
 Location V-95
 Weather Condition sunny
 Horizon _____

Conducted by AL
 Date 4-17-08
 Temperature 46.0
 Source of Water tap

Hole depth 48.3 cm
 Distance between reference level and soil surface + 2.5 cm
 Distance from the hole bottom to the reference level (D) = 50.8 cm
 Desired water depth in hole (H) - 10 cm
 Constant-head tube setting (d) = 40.8 cm

Measured (Actual) water level in hole
 Initial 10 cm
 Final 10 cm
 Radius of the hole (r) 3 cm
 Clock time _____
 Start saturation 8:25
 Steady-state reading 8:30

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____

Conversion Factor (C.F.) = 20 cm²

Both Flow Measuring and Main Reservoirs _____

Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
<u>8:30</u>	<u>43.2</u>	_____	_____	_____	_____	_____	_____
<u>9:00</u>	<u>42.7</u>	<u>30</u>	<u>0.5</u>	<u>10.0</u>	<u>0.3</u>	<u>20.0</u>	<u>2.7</u>
<u>9:30</u>	<u>42.4</u>	<u>30</u>	<u>0.3</u>	<u>6.0</u>	<u>0.2</u>	<u>12.0</u>	<u>2.3</u>
<u>10:00</u>	<u>42.0</u>	<u>30</u>	<u>0.4</u>	<u>8.0</u>	<u>0.3</u>	<u>16.0</u>	<u>2.5</u>
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____

Average of last three measurements: K_{sat} = 2.5 cm/h 23.6 in/day (other units)

COMMENTS: _____

Apr 29 08 08:13a

Elaine Powell

615-370-3095

p.11

SAMPLE DATA SHEET

Measurement No. 11 Conducted by AL
 Location W-92 Date 4-17-08
 Weather Condition Sunny Temperature 63°
 Horizon _____ Source of Water tap

Hole depth 48.5 cm Measured (Actual) water level in hole
 Distance between reference level Initial 10 cm
 and soil surface + 58 cm Final 10 cm
 Distance from the hole bottom to Radius of the hole (r) 3 cm
 the reference level (D) = 53.5 cm
 Desired water depth in hole (H) = 10.0 cm
 Constant-head tube setting (d) = 43.5 cm
 Clock time
 Start saturation 10:21
 Steady-state reading 10:30

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____ Conversion Factor (C.F.) = 20 cm²
 Both Flow Measuring and Main Reservoirs _____ Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
10:36	42.8						
11:00	37.5	30	4.7	94.0	3.1	188.0	5.7
11:30	34.1	30	3.4	68.0	2.3	136.0	5.1
12:00	30.4	30	3.7	74.0	2.5	148.0	5.3
12:30	27.2	30	3.2	64.0	2.1	128.0	5.0
1:00	21.1	30	6.1	122.0	4.1	244.0	6.2
1:30	17.0	30	4.1	82.0	2.7	164.0	5.5
2:00	11.9	30	6.1				

Average of last three measurements: K_{sat} = 5.6 cm/h 50.6 in/day (other units)

COMMENTS:

Apr 29 08 08:13a

Elaine Powell

615-370-3095

p.12

SAMPLE DATA SHEET

Measurement No. 12
 Location DD-97
 Weather Condition Sunny
 Horizon _____

Conducted by AL

Date 4-17-08
 Temperature 75.0

Source of Water tap

Hole depth 48.3 cm
 Distance between reference level and soil surface + 5.3 cm
 Distance from the hole bottom to the reference level (D) = 53.6 cm
 Desired water depth in hole (H) - 10 cm
 Constant-head tube setting (d) = 43.6 cm

Measured (Actual) water level in hole
 Initial 10 cm
 Final 10 cm
 Radius of the hole (r) 3 cm
 Clock time
 Start saturation 2:15
 Steady-state reading 2:20

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____

Conversion Factor (C.F.) = 20 cm³

Both Flow Measuring and Main Reservoirs _____

Conversion Factor (C.R.) = 105 cm³

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
<u>2:20</u>	<u>41.9</u>	<u>30</u>	<u>6.5</u>				
<u>2:50</u>	<u>35.4</u>	<u>30</u>	<u>6.1</u>	<u>130.0</u>	<u>4.3</u>	<u>260.0</u>	<u>6.4</u>
<u>3:20</u>	<u>29.3</u>	<u>30</u>	<u>7.3</u>	<u>122.0</u>	<u>4.1</u>	<u>244.0</u>	<u>6.2</u>
<u>3:50</u>	<u>22.0</u>	<u>30</u>	<u>8.9</u>	<u>146.0</u>	<u>4.9</u>	<u>292.0</u>	<u>6.6</u>
<u>4:20</u>	<u>13.1</u>	<u>30</u>	<u>6.3</u>	<u>178.0</u>	<u>5.9</u>	<u>356.0</u>	<u>7.1</u>
<u>4:50</u>	<u>6.8</u>	<u>30</u>	<u>5.1</u>	<u>126.0</u>	<u>4.2</u>	<u>252.0</u>	<u>6.3</u>
<u>5:20</u>	<u>1.7</u>	<u>30</u>	<u>5.1</u>	<u>102.0</u>	<u>3.4</u>	<u>204.0</u>	<u>5.9</u>

Average of last three measurements: K_{sat} = 6.4 cm/h 60.8 in/day (other units)

COMMENTS: _____

Apr 29 08 08:13a

Elaine Powell

615-370-3095

p.13

SAMPLE DATA SHEET

Measurement No. 13

Conducted by AL

Location JT-94

Date 4-21-08

Weather Condition sunny

Temperature 74°

Horizon _____

Source of Water tap

Hole depth

48.3 cm

Measured (Actual) water level in hole

Distance between reference level and soil surface

+ 5.2 cm

Initial 10 cm

Final 10 cm

Distance from the hole bottom to the reference level (D)

- 53.5 cm

Radius of the hole (r) 3 cm

Desired water depth in hole (H)

- 10 cm

Clock time

Constant-head tube setting (d)

= 43.5 cm

Start saturation

2:00

Steady-state reading

2:05

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____

Conversion Factor (C.F.) = 20 cm²

Both Flow Measuring and Main Reservoirs _____

Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
<u>2:05</u>	<u>41.6</u>	_____	_____	_____	_____	_____	_____
<u>2:35</u>	<u>29.1</u>	<u>30</u>	<u>12.5</u>	<u>250.0</u>	<u>8.3</u>	<u>500.0</u>	<u>7.9</u>
<u>3:05</u>	<u>19.3</u>	<u>30</u>	<u>9.8</u>	<u>196.0</u>	<u>6.5</u>	<u>392.0</u>	<u>7.3</u>
<u>3:35</u>	<u>9.4</u>	<u>30</u>	<u>9.9</u>	<u>198.0</u>	<u>6.6</u>	<u>396.0</u>	<u>7.3</u>
<u>4:05</u>	<u>0</u>	<u>30</u>	<u>9.4</u>	<u>188.0</u>	<u>6.3</u>	<u>376.0</u>	<u>7.2</u>
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____

Average of last three measurements: K_{sat} = 7.3 cm/h 68.7 in/day (other units)

COMMENTS: _____

Apr 29 08 08:14a

Elaine Powell

615-370-3095

p.14

SAMPLE DATA SHEET

Measurement No. 14

Conducted by AL

Location _____

Date _____

Weather Condition Sunny

Temperature 83°

Horizon _____

Source of Water tap

Hole depth

48.3 cm

Measured (Actual) water level in hole

Distance between reference level and soil surface

+ 2.5 cm

Initial 10 cm

Final 10 cm

Distance from the hole bottom to the reference level (D)

= 50.8 cm

Radius of the hole (r) _____ cm

Desired water depth in hole (H)

= 10 cm

Clock time

Constant-head tube setting (d)

= 40.8 cm

Start saturation 4:18

Steady-state reading 4:20

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____

Conversion Factor (C.F.) = 20 cm²

Both Flow Measuring and Main Reservoirs _____

Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
<u>4:20</u>	<u>42.8</u>						
<u>4:50</u>	<u>39.0</u>	<u>30</u>	<u>3.8</u>	<u>76.0</u>	<u>2.5</u>	<u>152.0</u>	<u>5.3</u>
<u>5:20</u>	<u>36.3</u>	<u>30</u>	<u>3.7</u>	<u>74.0</u>	<u>2.5</u>	<u>148.0</u>	<u>5.3</u>
<u>5:50</u>	<u>32.5</u>	<u>30</u>	<u>3.8</u>	<u>76.0</u>	<u>2.5</u>	<u>152.0</u>	<u>5.3</u>
<u>6:20</u>	<u>29.1</u>	<u>30</u>	<u>3.4</u>	<u>68.0</u>	<u>2.3</u>	<u>136.0</u>	<u>5.1</u>
<u>6:50</u>	<u>25.5</u>	<u>30</u>	<u>3.6</u>	<u>72.0</u>	<u>2.4</u>	<u>144.0</u>	<u>5.2</u>
<u>7:20</u>	<u>22.4</u>	<u>30</u>	<u>3.1</u>	<u>62.0</u>	<u>2.1</u>	<u>124.0</u>	<u>5.0</u>
<u>7:50</u>	<u>19.8</u>	<u>30</u>	<u>2.6</u>				

Average of last three measurements: K_{sat} = 5.1 cm/h 48.2 in/day (other units)

COMMENTS: _____

Apr 29 08 08:14a

Elaine Powell

615-370-3095

p.15

SAMPLE DATA SHEET

Measurement No. 15
 Location 66-102
 Weather Condition Sunny
 Horizon _____

Conducted by AL

Date 4-22-08
 Temperature 72°

Source of Water tap

Hole depth 48.3 cm
 Distance between reference level and soil surface + 5.2 cm
 Distance from the hole bottom to the reference level (D) = 53.5 cm
 Desired water depth in hole (H) - 10 cm
 Constant-head tube setting (d) = 43.5 cm

Measured (Actual) water level in hole
 Initial 10 cm
 Final 10 cm
 Radius of the hole (r) 3 cm
 Clock time
 Start saturation 10137
 Steady-state reading 10140

Reservoirs Used for Measurement of the Steady-State Flow Rate

Flow Measuring Reservoir Only _____

Conversion Factor (C.F.) = 20 cm²

Both Flow Measuring and Main Reservoirs _____

Conversion Factor (C.F.) = 105 cm²

(To obtain flow volume multiply change in water level by the appropriate C.F. from above)

Clock Time h:min	Reservoir Reading cm	Δt min	Change in Water Level cm	Flow Volume cm ³	Q cm ³ /min	Q cm ³ /h	K _{sat} cm/h
<u>10:40</u>	<u>41.2</u>						
<u>11:10</u>	<u>36.4</u>	<u>30</u>	<u>4.8</u>	<u>96.0</u>	<u>3.2</u>	<u>192</u>	<u>5.8</u>
<u>11:40</u>	<u>33.0</u>	<u>30</u>	<u>3.4</u>	<u>68.0</u>	<u>2.3</u>	<u>136.0</u>	<u>5.1</u>
<u>12:10</u>	<u>30.4</u>	<u>30</u>	<u>2.6</u>	<u>52.0</u>	<u>1.7</u>	<u>104.0</u>	<u>4.7</u>
<u>12:40</u>	<u>28.0</u>	<u>30</u>	<u>2.4</u>	<u>48.0</u>	<u>1.6</u>	<u>96.0</u>	<u>4.6</u>
<u>1:10</u>	<u>25.7</u>	<u>30</u>	<u>2.3</u>	<u>46.0</u>	<u>1.5</u>	<u>92.0</u>	<u>4.5</u>
<u>1:40</u>	<u>23.6</u>	<u>30</u>	<u>2.1</u>	<u>42.0</u>	<u>1.4</u>	<u>84.0</u>	<u>4.4</u>
<u>2:10</u>	<u>21.8</u>	<u>30</u>	<u>1.8</u>				

Average of last three measurements: K_{sat} = 4.5 cm/h 42.5 in/day (other units)

COMMENTS:

Table 1.9.1
3.4 Results from Soil Chemistry Testing

- 3.4.1 pH
- 3.4.2 Cation Exchange Capacity
- 3.4.3 Percent Base Saturation
- 3.4.4 Sodium Exchange Potential
- 3.4.5 Phosphorus Absorption
- 3.4.6 Nutrients (N, P, K)
- 3.4.7 Agronomic trace elements
- 3.4.8 Mineralogy (clay)

RESULTS IN APPENDIX B

Table 1.9.1
3.5 Engineering Properties of Pond

- 3.5.1- Clay Content
- 3.5.2- Permeability
- 3.5.3- Plasticity
- 3.5.4- Consistency

Engineering Criteria of Soils
For Pond Construction

The Williamson County Soil Survey indicates that large areas of heavy clay are somewhat prevalent on site. However, this map was prepared for agricultural use and is not very detailed. Potential areas of significant clay will be determined and benchmarked during construction of the roads and other structures. These areas will be unearthed and used for the stabilization pond liner. If substantial clay is not found on site, clay will be trucked in for the pond liner. A clay liner will be the preferred method of lining the stabilization pond and is typically used as such.

The engineering data of the Clay liner **must** meet the following criteria:

1. Clay Content: 40 to 70 percent
2. Permeability: 1×10^{-7} to 1×10^{-6} cm/sec
3. Plasticity: 21 Plasticity Index
4. Consistency: medium stiff to stiff

Should the clay not meet the design criteria for the stabilization pond, a PVC liner will be purchased for the lining of the pond.

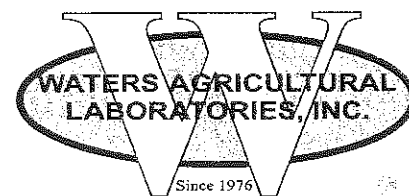
APPENDIX B

WATERS AGRICULTURAL LABORATORIES, INC.

P.O. Box 382 • 257 Newton Highway

Camilla, Georgia 31730

(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

Ship To:	For:	Received:
MID CUMBERLAND SOILS, INC.		04/25/08
1012 SANTA FE PIKE		Processed: 04/29/08
LEONUN, TN 37087		Acct #: 11501

Grower: MID CUMBERLAND SOILS

Phone: (615)-443-1159 FAX:

Lab Number: 223014CC

Sample ID: W92

Test Method: DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	138 lbs./A					
Potassium	154 lbs./A					
Magnesium	190 lbs./A					
Calcium	2,093 lbs./A					
Soil pH	5.7					
Buffer pH	7.45					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	2.98 %	EMR = 60 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	10. meq/100g	Base Saturation	K 1.9 %	Mg 7. %	Ca 49 %	H 41. %

Soil Fertility Recommendations

Crop: NO CROP

lbs. per Acre

Yield:

Lime Tons/Acre	Gypsum Tons/Acre	N Nitrogen	P ₂ O ₅ Phosphate	K ₂ O Potash	Mg Magnesium	S Sulfur	B Boron	Zn Zinc	Mn Manganese	Fe Iron	Cu Copper
1.5			*	*							

*=Maintenance Recommendation

**=See Back

Comments:

Buffer pH

Buffer pH is an indication of the soil's ability to resist a pH change. Without establishing the buffer pH it would be impossible to make an accurate lime recommendation.

The higher the buffer pH reading, the smaller the amount of lime required to raise the pH. In this case you are working with a soil that is low buffered. To simplify this - the higher the buffer pH reading - the lower the soil buffer. Conversely, the lower the buffer pH reading - the higher the soil buffer.

(NOTE: As buffer pH increases - lime recommendations decrease. High buffer pH reading indicates low resistance to pH change - low buffer pH reading indicates high resistance to pH change.)

Cation Exchange Capacity

Cation Exchange Capacity (CEC) is an indication of the soil's ability to hold or adsorb the cations or fertilizer that is applied. The higher the CEC - the more nutrients the soil will hold. The lower the CEC - the less nutrients the soil will hold. CEC is basically dependent on the amount and kinds of clay and the amount of organic matter in the soil. This explains why the soils in the Southeastern States have a low CEC. Our soils basically have a low clay and low organic matter content.

The CEC of Southeastern soils normally fall in the range between 1 to 10, with most ranging from 3 to 6.

Percent Base Saturation

Percent Base Saturation is defined as the total CEC occupied by such cations as potassium, magnesium and calcium. In our Southeastern soils, where we have a low CEC, a low organic matter and a medium pH, we should attempt to maintain the basic cations as follows: POTASSIUM: 3 to 5% of the Percent Base Saturation.

MAGNESIUM: 12 to 15% of the Percent Base Saturation.

CALCIUM: 55 to 65% of the Percent Base Saturation.

An ideal percent base saturation in Southeastern soils would be a soil that has an 85% base saturation (Potassium 5%, Magnesium 15%, Calcium 65%). As would be expected, the pH and fertility levels increase with an increase in the base solution.

Nitrogen Applications:

Small grain: Grain - Apply 25# at planting, remainder in mid to late February.

: Grazing - Apply 1/2 at planting, balance in late December or early January.

Pasture : If heavy grazing is desired apply 1/3 of Nitrogen as crop breaks dormancy, 1/3 in 60-90 days, balance as needed.

Corn : Dryland - 15-20# at planting, balance when crop is 12" to 15" tall.

: Irrigated - 15-20# at planting, 2/3 when crop is 12" to 15" tall, balance to be applied as recommended by plant analysis

Cotton : Reduce Nitrogen by 25-30# if petiole analysis or Nitrate monitoring program is employed.

Citrus : Nitrogen should be applied in split applications due to high leaching characteristics of most soil in the citrus belt. Oranges usually require approximately .4 lbs per box. Grapefruit usually requires approximately .3 lbs per box. Nitrogen should be monitored with leaf analysis.

Note : When high rates of Nitrogen are recommended, split applications are suggested to maximize nitrogen utilization.

Fertilizer Recommendations: All fertilizer recommendations are made on a broadcast basis. If banding is employed, recommendations can be reduced slightly. (Call laboratory for specific recommendations).

** Manganese Application Comment

Even though more than 7 pounds is recommended, it would be too costly to apply all of the manganese in the preplant application. Suggest applying 4 to 7 pounds as a preplant, a portion in the starter (if used) and some as a foliar spray. Alternatively, though not as effective due to cost constraints, it may be advisable to apply 3 to 5 pounds of manganese as a preplant, monitor the plant during the growing season with leaf sampling and feed the plant with foliar manganese materials.

WATERS AGRICULTURAL LABORATORIES, INC.

P.O. Box 382 • 257 Newton Highway

Camilla, Georgia 31730

(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

Ship To:	For:	Received:
HERBBERLAND SOILS, INC.		04/25/08
1111 S. GARDNER BLVD.		Processed:
LEBANON, TN 37087		04/29/08
		Acct #:
		11501

Grower: HERBBERLAND SOILS

Phone: (615)-443-1159 FAX:

Lab Number: 223010CC

Sample ID: AA102

Test Method: DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	68 lbs./A					
Potassium	131 lbs./A					
Magnesium	351 lbs./A					
Calcium	2,376 lbs./A					
Soil pH	6.2					
Buffer pH	7.55					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	3.33 %	ENR = 47 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	11 meq/100g	Base Saturation	K 1.5 %	Mg 13.5 %	Ca 53.2 %	H 32.2 %

Soil Fertility Recommendations

Crop: NO CROP

lbs. per Acre

Yield:

Lime Tons/Acre	Gypsum Tons/Acre	N Nitrogen	P ₂ O ₅ Phosphate	K ₂ O Potash	Mg Magnesium	S Sulfur	B Boron	Zn Zinc	Mn Manganese	Fe Iron	Cu Copper
1.0			*	*							

*=Maintenance Recommendation

**=See Back

Comments:

Buffer pH

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The higher the buffer pH reading, the smaller the amount of lime required to raise the pH. In this case you are working with a soil that is low buffered. To simplify this - the higher the buffer pH reading - the lower the soil buffer. Conversely, the lower the buffer pH reading - the higher the soil buffer.

(NOTE: As buffer pH increases - lime recommendations decrease. High buffer pH reading indicates low resistance to pH change - low buffer pH reading indicates high resistance to pH change.)

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Corn: Dryland - 15-20# at planting, balance when crop is 12" to 15" tall.

: Irrigated - 15-20# at planting, 2/3 when crop is 12" to 15" tall, balance to be applied as recommended by plant analysis.

Cotton: Reduce Nitrogen by 25-30# if petiole analysis or Nitrate monitoring program is employed.

Citrus: Nitrogen should be applied in split applications due to high leaching characteristics of most soil in the citrus belt. Oranges usually require approximately .4 lbs per box. Grapefruit usually requires approximately .3 lbs per box. Nitrogen should be monitored with leaf analysis.

Note: When high rates of Nitrogen are recommended, split applications are suggested to maximize nitrogen utilization.

Fertilizer Recommendations: All fertilizer recommendations are made on a broadcast basis. If banding is employed, recommendations can be reduced slightly. (Call laboratory for specific recommendations).

** Manganese Application Comment

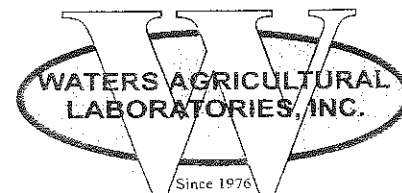
Even though more than 7 pounds is recommended, it would be too costly to apply all of the manganese in the preplant application. Suggest applying 4 to 7 pounds as a preplant, a portion in the starter (if used) and some as a foliar spray. Alternatively, though not as effective due to cost constraints, it may be advisable to apply 3 to 5 pounds of manganese as a preplant, monitor the plant during the growing season with leaf sampling and feed the plant with foliar manganese materials.

WATERS AGRICULTURAL LABORATORIES, INC.

P.O. Box 382 • 257 Newton Highway

Camilla, Georgia 31730

(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

Ship To:	For:	Received:
MID CUMBERLAND SOILS, INC.		04/25/00
1015 MARION BLVD		Processed:
LEBANON, TN 37087		04/27/00
		Acct #:
		11501

Grower : MID CUMBERLAND SOILS

Phone : (615) 443-1159 FAX :

Lab Number : 22300100

Sample ID : E99

Test Method : DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	160 lbs./A					
Potassium	197 lbs./A					
Magnesium	436 lbs./A					
Calcium	3,087 lbs./A					
Soil pH	7.3					
Buffer pH	7.70					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	2.15 %	ENR = 4.5 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	15.1 meq/100g	Base Saturation	K 2.1 %	Mg 14.1 %	Ca 63.7 %	H 19.1 %

Soil Fertility Recommendations

Crop : NO CROP

lbs. per Acre

Yield :

Lime	Gypsum	N	P ₂ O ₅	K ₂ O	Mg	S	B	Zn	Mn	Fe	Cu
Tons/Acre	Tons/Acre	Nitrogen	Phosphate	Potash	Magnesium	Sulfur	Boron	Zinc	Manganese	Iron	Copper
			*	*							

*=Maintenance Recommendation

**=See Back

Comments :

Buffer pH

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Percent Base Saturation

Percent Base Saturation is defined as the total CEC occupied by such cations as potassium, magnesium and calcium. In our Southeastern soils, where we have a low CEC, a low organic matter and a medium pH, we should attempt to maintain the basic cations as follows: POTASSIUM: 3 to 5% of the Percent Base Saturation.

MAGNESIUM: 12 to 15% of the Percent Base Saturation.

CALCIUM: 55 to 65% of the Percent Base Saturation.

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Nitrogen Applications:

Small grain: Grain - Apply 25# at planting, remainder in mid to late February.

: Grazing - Apply 1/2 at planting, balance in late December or early January.

Pasture: If heavy grazing is desired apply 1/3 of Nitrogen as crop breaks dormancy, 1/3 in 60-90 days, balance as needed.

Corn: Dryland - 15-20# at planting, balance when crop is 12" to 15" tall.

: Irrigated - 15-20# at planting, 2/3 when crop is 12" to 15" tall, balance to be applied as recommended by plant analysis.

Cotton: Reduce Nitrogen by 25-30# if petiole analysis or Nitrate monitoring program is employed.

Citrus: Nitrogen should be applied in split applications due to high leaching characteristics of most soil in the citrus belt. Oranges usually require approximately .4 lbs per box. Grapefruit usually requires approximately .3 lbs per box. Nitrogen should be monitored with leaf analysis.

Note: When high rates of Nitrogen are recommended, split applications are suggested to maximize nitrogen utilization.

Fertilizer Recommendations: All fertilizer recommendations are made on a broadcast basis. If banding is employed, recommendations can be reduced slightly. (Call laboratory for specific recommendations).

** Manganese Application Comment

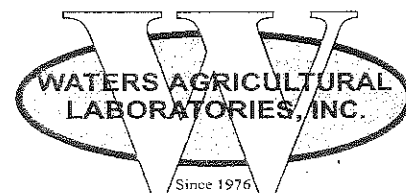
Even though more than 7 pounds is recommended, it would be too costly to apply all of the manganese in the preplant application. Suggest applying 4 to 7 pounds as a preplant, a portion in the starter (if used) and some as a foliar spray. Alternatively, though not as effective due to cost constraints, it may be advisable to apply 3 to 5 pounds of manganese as a preplant, monitor the plant during the growing season with leaf sampling and feed the plant with foliar manganese materials.

WATERS AGRICULTURAL LABORATORIES, INC.

P.O. Box 382 • 257 Newton Highway

Camilla, Georgia 31730

(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

Ship To:	For:	Received:
MID CUMBERLAND SOILS, INC.		04/25/08
1112 SPARK PIKE		Processed:
LEWISBURG, TN 37087		04/29/08
		Acct #:
		11501

Grower: MID CUMBERLAND SOILS

Phone: (615)-443-1159 FAX:

Lab Number: 223013CC

Sample ID: DD97

Test Method: DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	106 lbs./A					
Potassium	111 lbs./A					
Magnesium	342 lbs./A					
Calcium	2,794 lbs./A					
Soil pH	6.7					
Buffer pH	7.60					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	2.71 %	ENR = 54 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	11.1 meq/100g	Base Saturation	K 1.2 %	Mg 12.4 %	Ca 59.9 %	H 27.2 %

Soil Fertility Recommendations

Crop: NO CROP

lbs. per Acre

Yield:

Lime Tons/Acre	Gypsum Tons/Acre	N Nitrogen	P ₂ O ₅ Phosphate	K ₂ O Potash	Mg Magnesium	S Sulfur	B Boron	Zn Zinc	Mn Manganese	Fe Iron	Cu Copper

*=Maintenance Recommendation

**=See Back

Comments:

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Nitrogen Applications:

Small grain: Grain - Apply 25# at planting, remainder in mid to late February.

: Grazing - Apply 1/2 at planting, balance in late December or early January.

Pasture: If heavy grazing is desired apply 1/3 of Nitrogen as crop breaks dormancy. 1/3 in 60-90 days, balance as needed.

Corn: Dryland - 15-20# at planting, balance when crop is 12" to 15" tall.

: Irrigated - 15-20# at planting, 2/3 when crop is 12" to 15" tall, balance to be applied as recommended by plant analysis.

Cotton: Reduce Nitrogen by 25-30# if petiole analysis or Nitrate monitoring program is employed.

Citrus: Nitrogen should be applied in split applications due to high leaching characteristics of most soil in the citrus belt. Oranges usually require approximately .4 lbs per box. Grapefruit usually requires approximately .3 lbs per box. Nitrogen should be monitored with leaf analysis.

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Fertilizer Recommendations: All fertilizer recommendations are made on a broadcast basis. If banding is employed, recommendations can be reduced slightly. (Call laboratory for specific recommendations).

** Manganese Application Comment

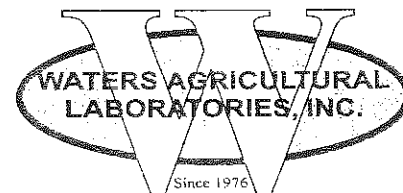
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WATERS AGRICULTURAL LABORATORIES, INC.

P.O. Box 382 • 257 Newton Highway

Camilla, Georgia 31730

(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

Ship To:	For:	Received:
MTD CUMBERLAND SOILS, INC.		04/25/08
2012 SPARKS BLVD		Processed:
DEARBORN, TN 37087		04/29/08
		Acct #:
		11501

Grower: MTD CUMBERLAND SOILS Phone: (615)-443-1159 FAX:
 Lab Number: 223009CC Sample ID: Y107 Test Method: DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	77 lbs./A					
Potassium	64 lbs./A					
Magnesium	102 lbs./A					
Calcium	1,952 lbs./A					
Soil pH	6.4					
Buffer pH	7.55					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	1.87 %	ENR = 37 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	9 meq/100g	Base Saturation	K 0.9 %	Mg 4.0 %	Ca 54.9 %	H 40.1 %

Soil Fertility Recommendations

Crop: NO CROP lbs. per Acre Yield:

Lime Tons/Acre	Gypsum Tons/Acre	N Nitrogen	P ₂ O ₅ Phosphate	K ₂ O Potash	Mg Magnesium	S Sulfur	B Boron	Zn Zinc	Mn Manganese	Fe Iron	Cu Copper
0.5			*	*							

*=Maintenance Recommendation

**=Sec Back

Comments :

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Pasture: If heavy grazing is desired apply 1/3 of Nitrogen as crop breaks dormancy, 1/3 in 60-90 days, balance as needed.

Corn: Dryland - 15-20# at planting, balance when crop is 12" to 15" tall.

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Cotton: Reduce Nitrogen by 25-30# if petiole analysis or Nitrate monitoring program is employed.

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** Manganese Application Comment

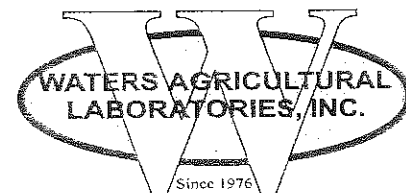
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P.O. Box 382 • 257 Newton Highway

Camilla, Georgia 31730

(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

Ship To: MRS. J. L. LEE, JR. 10722 2ND AVE. CUMBERLAND, TN 37087	For:	Received: 04/25/00 Processed: 04/29/00 Acct #: 11501
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Grower: J. L. LEE, JR. CUMBERLAND SOILS Phone: (615)-443-1159 FAX: (615)-443-1159
 Lab Number: 22300600 Sample ID: R101 Test Method: DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	97 lbs./A					
Potassium	90 lbs./A					
Magnesium	115 lbs./A					
Calcium	1,669 lbs./A					
Soil pH	5.8					
Buffer pH	7.50					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	2.25 %	ENR = 0.5 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	6.1 meq/100g	Base Saturation	K 1.3 %	Mg 5.2 %	Ca 47 %	H 45.8 %

Soil Fertility Recommendations

Crop: NO CROP lbs. per Acre Yield:

Lime Tons/Acre	Gypsum Tons/Acre	N Nitrogen	P ₂ O ₅ Phosphate	K ₂ O Potash	Mg Magnesium	S Sulfur	B Boron	Zn Zinc	Mn Manganese	Fe Iron	Cu Copper
1.5			*	*							

*=Maintenance Recommendation

**=See Back

Comments:

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Camilla, Georgia 31730

(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

To: MID CUMBERLAND SOILS, INC. 1012 SCARLETT PIKE LEBANON, TN 37087	For:	Received: 04/25/08 Processed: 04/29/08 Acct #: 11501
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Order: MID CUMBERLAND SOILS

Phone: (615) 443-1159 FAX:

Order Number: 22301500

Sample ID: Y95

Test Method: DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	116 lbs./A					
Potassium	125 lbs./A					
Magnesium	346 lbs./A					
Calcium	2,714 lbs./A					
Soil pH	5.7					
Buffer pH	7.35					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	3.40 %	ENR = 68 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	13 meq/100g	Base Saturation	K 1.2 %	Mg 10.8 %	Ca 47 %	H 30.3 %

Soil Fertility Recommendations

Crop: NO CROP

Lbs. per Acre

Yield:

Lime Tons/Acre	Gypsum Tons/Acre	N Nitrogen	P.O. Phosphate	K.O. Potash	Mg Magnesium	S Sulfur	B Boron	Zn Zinc	Mn Manganese	Fe Iron	Cu Copper
2.0			*	*							

*=Maintenance Recommendation

**=See Back

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Camilla, Georgia 31730

(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

Ship To: MID CUMBERLAND SOILS, INC. 1012 S. 38th St. PIKE LEBAMON, TN 37087	For:	Received: 04/25/08 Processed: 04/29/08 Acct #: 11501
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Grower: MID CUMBERLAND SOILS

Phone: (615)-443-1159 FAX:

Lab Number: 223002CC

Sample ID: F101

Test Method: DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	118 lbs./A					
Potassium	171 lbs./A					
Magnesium	405 lbs./A					
Calcium	2,382 lbs./A					
soil pH	7.0					
Buffer pH	7.60					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	2.32 %	ENR = 46 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	11.1 meq/100g	Base Saturation	K 2.0 %	Mg 15.3 %	Ca 53.3 %	H 28.9 %

Soil Fertility Recommendations

Crop: NO CROP

lbs. per Acre

Yield:

Lime Tons/Acre	Gypsum Tons/Acre	N Nitrogen	P ₂ O ₅ Phosphate	K ₂ O Potash	Mg Magnesium	S Sulfur	B Boron	Zn Zinc	Mn Manganese	Fe Iron	Cu Copper
			*	*							

*=Maintenance Recommendation

**=See Back

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: Irrigated - 15-20# at planting, 2/3 when crop is 12" to 15" tall, balance to be applied as recommended by plant analysis.

Cotton : Reduce Nitrogen by 25-30# if petiole analysis or Nitrate monitoring program is employed.

Citrus : Nitrogen should be applied in split applications due to high leaching characteristics of most soil in the citrus belt. Oranges usually require approximately .4 lbs per box. Grapefruit usually requires approximately .3 lbs per box. Nitrogen should be monitored with leaf analysis.

Note : When high rates of Nitrogen are recommended, split applications are suggested to maximize nitrogen utilization.

Fertilizer Recommendations: All fertilizer recommendations are made on a broadcast basis. If banding is employed, recommendations can be reduced slightly. (Call laboratory for specific recommendations).

** Manganese Application Comment

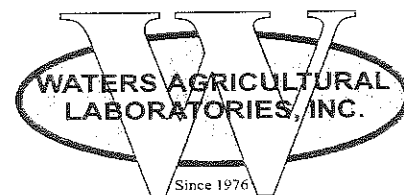
Even though more than 7 pounds is recommended, it would be too costly to apply all of the manganese in the preplant application. Suggest applying 4 to 7 pounds as a preplant, a portion in the starter (if used) and some as a foliar spray. Alternatively, though not as effective due to cost constraints, it may be advisable to apply 3 to 5 pounds of manganese as a preplant, monitor the plant during the growing season with leaf sampling and feed the plant with foliar manganese materials.

WATERS AGRICULTURAL LABORATORIES, INC.

P.O. Box 382 • 257 Newton Highway

Camilla, Georgia 31730

(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

Ship To: MID CUMBERLAND SOILS, INC. 2012 STATE ST. #114 DEERFIELD, TN 37087	For:	Received: 04/25/08 Processed: 04/29/08 Acct #: 11501
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Grower: MID CUMBERLAND SOILS

Phone: (415)-443-1159 FAX:

Lab Number: 22300500

Sample ID: K97

Test Method: DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	112 lbs./A					
Potassium	108 lbs./A					
Magnesium	295 lbs./A					
Calcium	2,057 lbs./A					
Soil pH	6.3					
Buffer pH	7.60					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	2.28 %	ENR = 46 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	9 meq/100g	Base Saturation	K 1.4 %	Mg 1.2 %	Ca 53 %	H 33 %

Soil Fertility Recommendations

Crop: NO CROP

lbs. per Acre

Yield:

Lime Tons/Acre	Gypsum Tons/Acre	N Nitrogen	P ₂ O ₅ Phosphate	K ₂ O Potash	Mg Magnesium	S Sulfur	B Boron	Zn Zinc	Mn Manganese	Fe Iron	Cu Copper
0.5			*	*							

*=Maintenance Recommendation

**=See Back

Comments:

Buffer pH

Buffer pH is an indication of the soil's ability to resist a pH change. Without establishing the buffer pH it would be impossible to make an accurate lime recommendation.

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(NOTE: As buffer pH increases - lime recommendations decrease. High buffer pH reading indicates low resistance to pH change - low buffer pH reading indicates high resistance to pH change.)

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The CEC of Southeastern soils normally fall in the range between 1 to 10, with most ranging from 3 to 6.

Percent Base Saturation

Percent Base Saturation is defined as the total CEC occupied by such cations as potassium, magnesium and calcium. In our Southeastern soils, where we have a low CEC, a low organic matter and a medium pH, we should attempt to maintain the basic cations as follows: POTASSIUM: 3 to 5% of the Percent Base Saturation.

MAGNESIUM: 12 to 15% of the Percent Base Saturation.

CALCIUM: 55 to 65% of the Percent Base Saturation.

An ideal percent base saturation in Southeastern soils would be a soil that has an 85% base saturation (Potassium 5%, Magnesium 15%, Calcium 65%). As would be expected, the pH and fertility levels increase with an increase in the base solution.

Nitrogen Applications:

Small grain: Grain - Apply 25# at planting, remainder in mid to late February.

: Grazing - Apply 1/2 at planting, balance in late December or early January.

Pasture : If heavy grazing is desired apply 1/3 of Nitrogen as crop breaks dormancy, 1/3 in 60-90 days, balance as needed.

Corn : Dryland - 15-20# at planting, balance when crop is 12" to 15" tall.

: Irrigated - 15-20# at planting, 2/3 when crop is 12" to 15" tall, balance to be applied as recommended by plant analysis.

Cotton : Reduce Nitrogen by 25-30# if petiole analysis or Nitrate monitoring program is employed.

Citrus : Nitrogen should be applied in split applications due to high leaching characteristics of most soil in the citrus belt. Oranges usually require approximately .4 lbs per box. Grapefruit usually requires approximately .3 lbs per box. Nitrogen should be monitored with leaf analysis.

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Fertilizer Recommendations: All fertilizer recommendations are made on a broadcast basis. If banding is employed, recommendations can be reduced slightly. (Call laboratory for specific recommendations).

** Manganese Application Comment

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WATERS AGRICULTURAL LABORATORIES, INC.

P.O. Box 382 • 257 Newton Highway

Camilla, Georgia 31730

(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

Ship To:	For:	Received:
MID CUMBERLAND SOILS, INC.		04/25/09
1012 SPARKS FIVE		Processed: 04/29/09
LEBANON, TN 37087		Acct #: 11501

Grower: MID CUMBERLAND SOILS

Phone: (615)-443-1159 FAX:

Lab Number: 223004CC

Sample ID: K102

Test Method: DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	99 lbs./A					
Potassium	195 lbs./A					
Magnesium	375 lbs./A					
Calcium	2,633 lbs./A					
Soil pH	6.5					
Buffer pH	7.55					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	2.59 %	ENR = 52 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	12.0 meq/100g	Base Saturation	K 2.1 %	Mg 13.0 %	Cu 54.0 %	H 36.0 %

Soil Fertility Recommendations

Crop: NO CROP

lbs. per Acre

Yield:

Lime	Gypsum	N	P ₂ O ₅	K ₂ O	Mg	S	B	Zn	Mn	Fe	Cu
Tons/Acre	Tons/Acre	Nitrogen	Phosphate	Potash	Magnesium	Sulfur	Boron	Zinc	Manganese	Iron	Copper
			*	*							

*=Maintenance Recommendation

**=See Back

Comments:

Buffer pH

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Pasture: If heavy grazing is desired apply 1/3 of Nitrogen as crop breaks dormancy, 1/3 in 60-90 days, balance as needed.

Corn: Dryland - 15-20# at planting, balance when crop is 12" to 15" tall.

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Citrus: Nitrogen should be applied in split applications due to high leaching characteristics of most soil in the citrus belt. Oranges usually require approximately .4 lbs per box. Grapefruit usually requires approximately .3 lbs per box. Nitrogen should be monitored with leaf analysis.

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** Manganese Application Comment

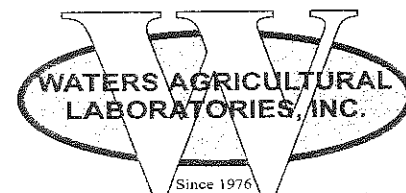
Even though more than 7 pounds is recommended, it would be too costly to apply all of the manganese in the preplant application. Suggest applying 4 to 7 pounds as a preplant, a portion in the starter (if used) and some as a foliar spray. Alternatively, though not as effective due to cost constraints, it may be advisable to apply 3 to 5 pounds of manganese as a preplant, monitor the plant during the growing season with leaf sampling and feed the plant with foliar manganese materials.

WATERS AGRICULTURAL LABORATORIES, INC.

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Camilla, Georgia 31730

(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

Ship To: MID CUMBERLAND SOILS, INC. 1012 SPARTAN PIKE DECATUR, GA 30030 TN 37087	For:	Received: 04/25/08 Processed: 04/29/08 Acct #: 11501
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Grower : MID CUMBERLAND SOILS

Phone : (615)-443-1159 FAX :

Lab Number : 223012CC

Sample ID : JJ94

Test Method : DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	31 lbs./A					
Potassium	157 lbs./A					
Magnesium	263 lbs./A					
Calcium	1,739 lbs./A					
Soil pH	6.2					
Buffer pH	7.50					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	2.26 %	ENR = 45 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	9 meq/100g	Base Saturation	K 0.1 %	Mg 11.1 %	Ca 45.9 %	H 41.5 %

Soil Fertility Recommendations

Crop : NO CROP

lbs. per Acre

Yield :

Lime Tons/Acre	Gypsum Tons/Acre	N Nitrogen	P ₂ O ₅ Phosphate	K ₂ O Potash	Mg Magnesium	S Sulfur	B Boron	Zn Zinc	Mn Manganese	Fe Iron	Cu Copper
1.0			*	*							

*=Maintenance Recommendation

**=See Back

Comments :

Buffer pH

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Nitrogen Applications:

Small grain: Grain - Apply 25# at planting, remainder in mid to late February.

: Grazing - Apply 1/2 at planting, balance in late December or early January.

Pasture: If heavy grazing is desired apply 1/3 of Nitrogen as crop breaks dormancy, 1/3 in 60-90 days, balance as needed.

Corn: Dryland - 15-20# at planting, balance when crop is 12" to 15" tall.

: Irrigated - 15-20# at planting, 2/3 when crop is 12" to 15" tall, balance to be applied as recommended by plant analysis.

Cotton: Reduce Nitrogen by 25-30# if petiole analysis or Nitrate monitoring program is employed.

Citrus: Nitrogen should be applied in split applications due to high leaching characteristics of most soil in the citrus belt. Oranges usually require approximately .4 lbs per box. Grapefruit usually requires approximately .3 lbs per box. Nitrogen should be monitored with leaf analysis.

Note: When high rates of Nitrogen are recommended, split applications are suggested to maximize nitrogen utilization.

Fertilizer Recommendations: All fertilizer recommendations are made on a broadcast basis. If banding is employed, recommendations can be reduced slightly. (Call laboratory for specific recommendations).

** Manganese Application Comment

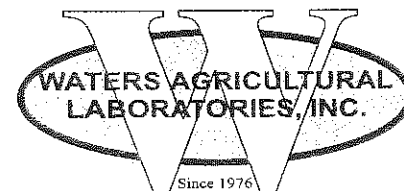
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P.O. Box 382 • 257 Newton Highway

Camilla, Georgia 31730

(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

Ship To: MTI CUMBERLAND SOILS, INC. 1015 BRYANT BLVD CLACKAMIN, TN 37087	For:	Received: 04/23/08 Processed: 04/29/08 Acct #: 11501
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Grower: MTI CUMBERLAND SOILS

Phone: (615)-443-1159 FAX:

Lab Number: 223011CC

Sample ID: H496

Test Method: DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	57 lbs./A					
Potassium	132 lbs./A					
Magnesium	368 lbs./A					
Calcium	2,460 lbs./A					
Soil pH	6.1					
Buffer pH	7.55					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	3.28 %	ENR = 66 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	11 meq/100g	Base Saturation	K 1.5 %	Mg 15 %	Ca 53 %	H 19.5 %

Soil Fertility Recommendations

Crop: NO CROP

lbs. per Acre

Yield:

Lime Tons/Acre	Gypsum Tons/Acre	N Nitrogen	P ₂ O ₅ Phosphate	K ₂ O Potash	Mg Magnesium	S Sulfur	B Boron	Zn Zinc	Mn Manganese	Fe Iron	Cu Copper
1.0											

*=Maintenance Recommendation

**=See Back

Comments:

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Nitrogen Applications:

Small grain: Grain - Apply 25# at planting, remainder in mid to late February.

: Grazing - Apply 1/2 at planting, balance in late December or early January.

Pasture : If heavy grazing is desired apply 1/3 of Nitrogen as crop breaks dormancy, 1/3 in 60-90 days, balance as needed.

Corn : Dryland - 15-20# at planting, balance when crop is 12" to 15" tall.

: Irrigated - 15-20# at planting, 2/3 when crop is 12" to 15" tall, balance to be applied as recommended by plant analysis.

Cotton : Reduce Nitrogen by 25-30# if petiole analysis or Nitrate monitoring program is employed.

Citrus : Nitrogen should be applied in split applications due to high leaching characteristics of most soil in the citrus belt. Oranges usually require approximately .4 lbs per box. Grapefruit usually requires approximately .3 lbs per box. Nitrogen should be monitored with leaf analysis.

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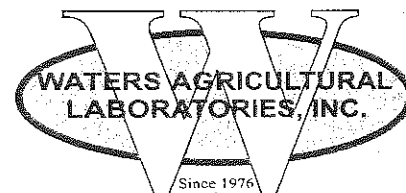
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(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

Ship To: MID CUMBERLAND SOILS, INC. 1012 SPARKLE BLVD MEMPHIS, TN 37087	For:	Received: 04/25/08 Processed: 04/29/08 Acct #: 11501
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Grower: MID CUMBERLAND SOILS

Phone: (615)-443-1159 FAX:

Lab Number: 22300700

Sample ID: S96

Test Method: DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	94 lbs./A					
Potassium	71 lbs./A					
Magnesium	217 lbs./A					
Calcium	1,569 lbs./A					
Soil pH	5.5					
Buffer pH	7.35					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	2.49 %	ENR = 50 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	10.0 meq/100g	Base Saturation	K 0.9 %	Mg 0.4 %	Ca 38.9 %	H 51.4 %

Soil Fertility Recommendations

Crop: NO CROP

lbs. per Acre

Yield:

Lime Tons/Acre	Gypsum Tons/Acre	N Nitrogen	P ₂ O ₅ Phosphate	K ₂ O Potash	Mg Magnesium	S Sulfur	B Boron	Zn Zinc	Mn Manganese	Fe Iron	Cu Copper
2.0			*	*							

*=Maintenance Recommendation

**=See Back

Comments:

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Nitrogen Applications:

- Small grain:** Grain - Apply 25# at planting, remainder in mid to late February.
: Grazing - Apply 1/2 at planting, balance in late December or early January.
- Pasture:** If heavy grazing is desired apply 1/3 of Nitrogen as crop breaks dormancy, 1/3 in 60-90 days, balance as needed.
- Corn:** Dryland - 15-20# at planting, balance when crop is 12" to 15" tall.
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Soil Analysis Report

Ship To: MID CUMBERLAND SOILS, INC. 1012 SPARTA BLVD LEBANON, TN 37087	For:	Received: 04/25/08 Processed: 04/29/08 Acct #: 11501
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Grower: MID CUMBERLAND SOILS Phone: (615)-443-1159 FAX:
 Lab Number: 12300300 Sample ID: 1100 Test Method: DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	158 lbs./A					
Potassium	370 lbs./A					
Magnesium	407 lbs./A					
Calcium	3,030 lbs./A					
Soil pH	6.8					
Buffer pH	7.65					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	2.50 %	ENR = 50 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	12 meq/100g	Base Saturation	K 3.8 %	Mg 13. %	Ca 60. %	H 22.3 %

Soil Fertility Recommendations

Crop: NO CROP lbs. per Acre Yield:

Lime Tons/Acre	Gypsum Tons/Acre	N Nitrogen	P ₂ O ₅ Phosphate	K ₂ O Potash	Mg Magnesium	S Sulfur	B Boron	Zn Zinc	Mn Manganese	Fe Iron	Cu Copper
			*	*							

*=Maintenance Recommendation

**=See Back

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(NOTE: As buffer pH increases - lime recommendations decrease. High buffer pH reading indicates low resistance to pH change - low buffer pH reading indicates high resistance to pH change.)

Cation Exchange Capacity

Cation Exchange Capacity (CEC) is an indication of the soil's ability to hold or adsorb the cations or fertilizer that is applied. The higher the CEC - the more nutrients the soil will hold. The lower the CEC - the less nutrients the soil will hold. CEC is basically dependent on the amount and kinds of clay and the amount of organic matter in the soil. This explains why the soils in the Southeastern States have a low CEC. Our soils basically have a low clay and low organic matter content.

The CEC of Southeastern soils normally fall in the range between 1 to 10, with most ranging from 3 to 6.

Percent Base Saturation

Percent Base Saturation is defined as the total CEC occupied by such cations as potassium, magnesium and calcium. In our Southeastern soils, where we have a low CEC, a low organic matter and a medium pH, we should attempt to maintain the basic cations as follows: POTASSIUM: 3 to 5% of the Percent Base Saturation.

MAGNESIUM: 12 to 15% of the Percent Base Saturation.

CALCIUM: 55 to 65% of the Percent Base Saturation.

An ideal percent base saturation in Southeastern soils would be a soil that has an 85% base saturation (Potassium 5%, Magnesium 15%, Calcium 65%). As would be expected, the pH and fertility levels increase with an increase in the base solution.

Nitrogen Applications:

Small grain: Grain - Apply 25# at planting, remainder in mid to late February.

: Grazing - Apply 1/2 at planting, balance in late December or early January.

Pasture: If heavy grazing is desired apply 1/3 of Nitrogen as crop breaks dormancy, 1/3 in 60-90 days, balance as needed.

Corn: Dryland - 15-20# at planting, balance when crop is 12" to 15" tall.

: Irrigated - 15-20# at planting, 2/3 when crop is 12" to 15" tall, balance to be applied as recommended by plant analysis.

Cotton: Reduce Nitrogen by 25-30# is petiole analysis or Nitrate monitoring program is employed.

Citrus: Nitrogen should be applied in split applications due to high leaching characteristics of most soil in the citrus belt. Oranges usually require approximately .4 lbs per box. Grapefruit usually requires approximately .3 lbs per box. Nitrogen should be monitored with leaf analysis.

Note: When high rates of Nitrogen are recommended, split applications are suggested to maximize nitrogen utilization.

Fertilizer Recommendations: All fertilizer recommendations are made on a broadcast basis. If banding is employed, recommendations can be reduced slightly. (Call laboratory for specific recommendations).

** Manganese Application Comment

Even though more than 7 pounds is recommended, it would be too costly to apply all of the manganese in the preplant application. Suggest applying 4 to 7 pounds as a preplant, a portion in the starter (if used) and some as a foliar spray. Alternatively, though not as effective due to cost constraints, it may be advisable to apply 3 to 5 pounds of manganese as a preplant, monitor the plant during the growing season with leaf sampling and feed the plant with foliar manganese materials.

WATERS AGRICULTURAL LABORATORIES, INC.

P.O. Box 382 • 257 Newton Highway

Camilla, Georgia 31730

(229) 336-7216 (229) 336-7967 FAX



Soil Analysis Report

Ship To:	For:	Received:
MID CUMBERLAND SOILS, INC.		04/25/08
1015 GORDON PIKE		Processed:
LEBANON, TN 37087		04/27/08
		Acct #:
		11501

Grower : MID CUMBERLAND SOILS

Phone : (615)-443-1159 FAX :

Lab Number : 22300800

Sample ID : V98

Test Method :

DOUBLE ACID

Element	Lab Results	Graphic Evaluation				
		Low	Medium	Adequate	High	Very High
Phosphorous	104 lbs./A					
Potassium	62 lbs./A					
Magnesium	160 lbs./A					
Calcium	1,968 lbs./A					
Soil pH	6.2					
Buffer pH	7.50					
Sulfur						
Boron						
Zinc						
Manganese						
Iron						
Copper						
Aluminum						
Sodium						
Soluble Salts						
Organic Matter	2.40 %	ENR = 48 lbs./A				
Nitrate Nitrogen						
Cation Exchange Capacity	9 meq/100g	Base Saturation	K 0.9 %	Mg 6.4 %	Ca 50 %	H 41.4 %

Soil Fertility Recommendations

Crop : NO CROP

lbs. per Acre

Yield :

Lime	Gypsum	N	P ₂ O ₅	K ₂ O	Mg	S	B	Zn	Mn	Fe	Cu
Tons/Acre	Tons/Acre	Nitrogen	Phosphate	Potash	Magnesium	Sulfur	Boron	Zinc	Manganese	Iron	Copper
1.0											

*=Maintenance Recommendation

**=See Back

Comments :

Buffer pH

Buffer pH is an indication of the soil's ability to resist a pH change. Without establishing the buffer pH it would be impossible to make an accurate lime recommendation.

The higher the buffer pH reading, the smaller the amount of lime required to raise the pH. In this case you are working with a soil that is low buffered. To simplify this - the higher the buffer pH reading - the lower the soil buffer. Conversely, the lower the buffer pH reading - the higher the soil buffer.

(NOTE: As buffer pH increases - lime recommendations decrease. High buffer pH reading indicates low resistance to pH change - low buffer pH reading indicates high resistance to pH change.)

Cation Exchange Capacity

Cation Exchange Capacity (CEC) is an indication of the soil's ability to hold or adsorb the cations or fertilizer that is applied. The higher the CEC - the more nutrients the soil will hold. The lower the CEC - the less nutrients the soil will hold. CEC is basically dependent on the amount and kinds of clay and the amount of organic matter in the soil. This explains why the soils in the Southeastern States have a low CEC. Our soils basically have a low clay and low organic matter content.

The CEC of Southeastern soils normally fall in the range between 1 to 10, with most ranging from 3 to 6.

Percent Base Saturation

Percent Base Saturation is defined as the total CEC occupied by such cations as potassium, magnesium and calcium. In our Southeastern soils, where we have a low CEC, a low organic matter and a medium pH, we should attempt to maintain the basic cations as follows: POTASSIUM: 3 to 5% of the Percent Base Saturation.

MAGNESIUM: 12 to 15% of the Percent Base Saturation.

CALCIUM: 55 to 65% of the Percent Base Saturation.

An ideal percent base saturation in Southeastern soils would be a soil that has an 85% base saturation (Potassium 5%, Magnesium 15%, Calcium 65%). As would be expected, the pH and fertility levels increase with an increase in the base solution.

Nitrogen Applications:

Small grain: Grain - Apply 25# at planting, remainder in mid to late February.

: Grazing - Apply 1/2 at planting, balance in late December or early January.

Pasture: If heavy grazing is desired apply 1/3 of Nitrogen as crop breaks dormancy, 1/3 in 60-90 days, balance as needed.

Corn: Dryland - 15-20# at planting, balance when crop is 12" to 15" tall.

: Irrigated - 15-20# at planting, 2/3 when crop is 12" to 15" tall, balance to be applied as recommended by plant analysis.

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Citrus: Nitrogen should be applied in split applications due to high leaching characteristics of most soil in the citrus belt. Oranges usually require approximately .4 lbs per box. Grapefruit usually requires approximately .3 lbs per box. Nitrogen should be monitored with leaf analysis.

Note: When high rates of Nitrogen are recommended, split applications are suggested to maximize nitrogen utilization.

Fertilizer Recommendations: All fertilizer recommendations are made on a broadcast basis. If banding is employed, recommendations can be reduced slightly. (Call laboratory for specific recommendations).

** Manganese Application Comment

Even though more than 7 pounds is recommended, it would be too costly to apply all of the manganese in the preplant application. Suggest applying 4 to 7 pounds as a preplant, a portion in the starter (if used) and some as a foliar spray. Alternatively, though not as effective due to cost constraints, it may be advisable to apply 3 to 5 pounds of manganese as a preplant, monitor the plant during the growing season with leaf sampling and feed the plant with foliar manganese materials.

DETAILED SOILS INVESTIGATION REPORT

Listing of Soils Professionals

Extra High Intensity Soils Maps

Mr. Jay Andrews
427 Park Avenue
Lebanon, TN 37087
Phone: 615-444-6898

Soil Profile Descriptions

Mr. Jay Andrews
427 Park Avenue
Lebanon, TN 37087
Phone: 615-444-6898

Soil Chemical Analysis

Mr. Nathan Fay
Pickney Bros. Inc.
7638 River Rd. Pike
Nashville, TN 37209
Phone: 615-356-7294

MicroBac Labs
Knoxville Division
505 E. Broadway Ave.
Maryville, TN 37804
Phone: 865-977-1200

Saturated Hydraulic Conductivity Testing

Mr. Glenn Marcum
Pickney Bros. Inc.
7638 River Rd. Pike
Nashville, TN 37209
Phone: 615-356-7294

Mr. Nathan Fay
Pickney Bros. Inc.
7638 River Road Pike
Nashville, TN 37209
Phone: 615-356-7294

Table 1.9.1
DETAILED SOIL INVESTIGATION REPORT
REQUIRED INFORMATION

1.0 Site Description

1.1 Location Map – refer to 1.1 of the DDR

Topographic Map – refer to 2.0 of the DDR

Table 1.9.1
1.0 Site Description
1.3 – Soil Survey Map

SOIL SURVEY REPORT

**WILLIAMSON COUNTY
TENNESSEE**

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
IN COOPERATION WITH
TENNESSEE AGRICULTURE EXPERIMENT STATION

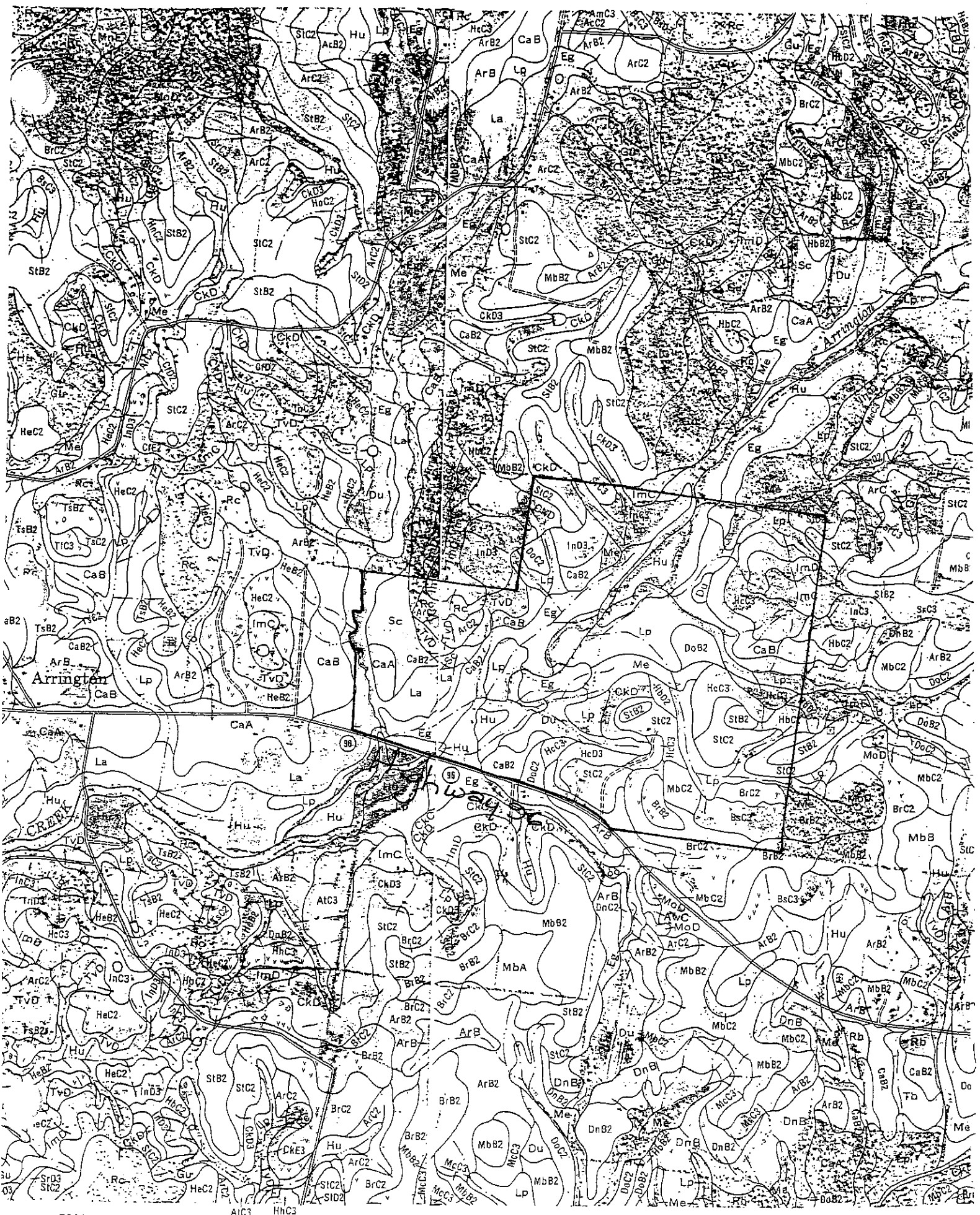


Table 1.9.1
1.0 Site Description
1.4 Test Locations

SOIL TEST LOCATIONS:

TEST PIT LOCATIONS

CHEMICAL SAMPLE LOCATIONS

SATURATED HYDRAULIC CONDUCTIVITY LOCATIONS

Locations of all test holes are approximate as recorded in the field.

Soil Profile Descriptions were performed by the Soil Scientist, Mr. Jay Andrews. Each boring was observed for physical properties and a brief profile description was recorded. Profile descriptions can be observed in this booklet.

Chemical Test Samples were taken on the week of June 15, 2003. Samples were collected and sent to MicroBac Labs for analysis.

Saturated Hydraulic Conductivity Test were performed on June 16-17th and July 11-12th, 2003. Test were performed using the Compact Constant Head Permeameter (CCHP).

LOCATION LANTON

TN+KS KY MO

Established Series
Rev. JAE:RPS
3/94

LANTON SERIES

The Lanton series consists of very deep, poorly and somewhat poorly drained soils that are dark in the surface layer and to a depth of 24 inches or more. These soils formed in alluvium on flood plains and in depressions. They have moderately slow permeability in the solum and slow permeability in the clayey substratum. Slopes range from 0 to 3 percent.

TAXONOMIC CLASS: Fine-silty, mixed, thermic Cumulic Epiaquolls

TYPICAL PEDON: Lanton silt loam, cultivated. (Colors are for moist soil)

Ap--0 to 7 inches, very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; friable; many roots; common fine pores; slightly acid; clear smooth boundary)

A1--7 to 23 inches, black (10YR 2/1) silty clay loam; moderate medium granular structure; friable; common fine roots; common fine pores; few black concretions; neutral; gradual smooth boundary.

A2--23 to 37 inches, black (10YR 2/1) silty clay loam; common medium distinct dark gray (10YR 4/1) and common prominent yellowish brown (10YR 5/4) mottles ; moderate medium granular structure; firm, few fine roots; few fine pores; few fine fragments of chert ; common fine black concretions; neutral; clear wavy boundary. (Combined thickness of the A horizon ranges from 24 to 45 inches)

Cg--37 to 62 inches, dark gray (10YR 4/1) clay, many medium prominent dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) mottles ; massive; firm; few fine fragments of chert; common black concretions; neutral.

TYPE LOCATION: Williamson County, Tennessee; one mile west of Thompson Station on R. R. Huff farm.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 24 to 45 inches and depth to bedrock is more than 60 inches. This soil is slightly acid or neutral throughout. The mollic epipedon is more than 24 inches in thickness.

The A horizon has hue of 10YR or 2.5YR, value of 0 to 3 and chroma of 0 to 2, except the Ap horizon also has chroma of 3 in some pedons. The lower part has mottles in shades of gray or brown in most pedons. The A horizon is silt loam or silty clay loam with the clay content commonly higher in the lower part.

The Cg horizon has hue of 10YR or 2.5YR, value of 4 or 5, and chroma of 0 to 2. Mottles are in shades of brown, yellow, and gray. The texture is clay, silty clay, or silty clay loam. Some pedons have a Bg horizon with colors and textures like the Cg horizon.

Table 1.9.1
2.0 Soil Series Descriptions
3.2 Unified Classification

SOIL SERIES DESCRIPTIONS

Enclosed are the Official Series Descriptions (OSD) and Soil Interpretations Record (SIR) for each soil series that was mapped on the Arrington Meadows Development.

Table 1.9.1

2.0—Soil Series Descriptions

- 2.1- Texture (OSD), (SIR)
- 2.2- Permeability (SIR)
- 2.3- Slope (soil maps)
- 2.4- Drainage (OSD), (SIR)
- 2.5- Depth to seasonal high water table (SIR)
- 2.6- Depth to bedrock (OSD), (SIR), (pit profiles)
- 2.7- Erodibility (SIR)

3.0—Soil Characteristics

- 3.2- Unified Soil Classification (SIR)

COMPETING SERIES: These are the Hopco and Wynona series in the same family and the Dekoven, Dunning, Egam, Godwin, Lynnville, and Roellen series in associated families. Hopco soils have less than 35 percent clay throughout the profile. Wynona soils are slightly acid to strongly acid. Dekoven, Dunning, Lynnville and Roellen soils have mollic epipedons less than 24 inches in thickness. Dekoven, Dunning, Godwin and Roellen soils, are all in clayey families. Egam and Lynnville soils are moderately well drained.

GEOGRAPHIC SETTING: Lanton soils are on nearly level flood plains, and in depressions. Slopes range from 0 to 3 percent. The soil is formed in alluvium. Near the type location, mean annual temperature is 59.3 degrees F., and mean annual precipitation is 47.3 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Arrington, Staser, and Woolper series, in addition to the competing Egam, Godwin, Lynnville, and Roellen series. Arrington and Staser soils are well drained. Woolper soils have argillic horizons.

DRAINAGE AND PERMEABILITY: Poorly drained and somewhat poorly drained; slow runoff; moderately slow permeability except the lower, clayey part is slow.

USE AND VEGETATION: Nearly all of the acreage is cleared and used for growing corn, soybeans, hay, and pasture. The original vegetation was hardwood forest.

DISTRIBUTION AND EXTENT: The Nashville Basin and Highland Rim of Tennessee, the Bluegrass region of Kentucky, and in Missouri and Kansas. The series is of small extent.

MLRA OFFICE RESPONSIBLE: Salina, Kansas

SERIES ESTABLISHED: Williamson County, Tennessee; 1961.

REMARKS: Diagnostic horizons in the pedon are:
Molic epipedon - 0 to 37 inches (A horizon)

National Cooperative Soil Survey
U.S.A.

LOCATION LYNNVILLE

TN+KY

Established Series

Rev. DEL

04/2001

LYNNVILLE SERIES

The Lynnville series consists of very deep, moderately well drained soils. They formed in alluvium on flood plains and in depressions. Slopes range from 0 to 3 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, thermic Fluvaquent Hapludolls

TYPICAL PEDON: Lynnville silt loam--cultivated. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 8 inches; dark brown (10YR 3/3) silt loam; weak fine granular structure; very friable; many fine roots; few fine dark brown and black concretions; slightly acid; gradual smooth boundary.

A1--8 to 14 inches; dark brown (10YR 3/3) silt loam; common fine faint mottles of brown; weak fine granular structure; very friable; many fine roots; few fine dark brown and black concretions; slightly acid; gradual wavy boundary. (combined thickness of A horizons is 10 to 24 inches)

Bw1--14 to 34 inches; brown (10YR 4/3) silt loam; common fine and medium distinct grayish brown (10YR 5/2) mottles; weak fine granular structure; very friable; common fine roots; few fine and medium dark brown and black concretions; slightly acid; gradual wavy boundary.

Bw2--34 to 45 inches; mottled brown (10YR 5/3), grayish brown (10YR 5/2), dark yellowish brown (10YR 4/4), and brown (10YR 4/3) silt loam; weak fine granular structure; friable; few fine roots in upper part; few fine and medium dark brown and black concretions; slightly acid; gradual wavy boundary. (combined thickness of Bw horizons is 0 to 36 inches)

C--45 to 65 inches; mottled grayish brown (2.5Y 5/2), yellowish brown (10YR 5/4), and light brownish gray (10YR 6/2) silt loam; weak fine granular structure; friable; many fine and medium weakly cemented dark brown and black concretions; slightly acid.

TYPE LOCATION: Giles County, Tennessee; 5 miles west of Pulaski; 1/4 mile north of U.S. Highway 64; 500 yards west of Richland Creek.

RANGE IN CHARACTERISTICS: Depth to bedrock is more than 60 inches. Fragments of chert are less than 5 percent in most pedons, but ranges from 0 to 15 percent by volume. Reaction is dominantly slightly acid to mildly alkaline throughout, but ranges to medium acid. Some pedons have transitional horizons with color and texture similar to adjacent horizons.

The A or Ap horizon has hue of 10YR, 7.5YR or 5YR, value of 3, and chroma of 2 or 3. It is silt loam, loam, or fine sandy loam.

The Bw horizon, where present, has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 or 4 with mottles in shades of brown and gray. In some pedons the Bw horizon has no matrix color but is mottled

in shades of brown and gray. Texture is silt loam, silty clay loam, or rarely loam.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4 with mottles in shades of brown and gray or has no matrix color but is mottled in shades of yellow, brown and gray. Texture is silt loam, silty clay loam, or rarely loam.

COMPETING SERIES: Lynnville is the only soil in this family. Soils in similar families are the Egam, Godwin, Lanton, Cannon, and Staser series. All of these soils have mollic epipedons more than 24 inches thick. In addition, Egam and Godwin soils are clayey, Lanton soils are poorly drained, Cannon soils are gravelly, and Staser soils are fine-loamy.

GEOGRAPHIC SETTING: These soils are on stream flood plains, along upland drainageways and in depressions. Slopes range from 0 to 3 percent. Lynnville soils formed in alluvium transported mainly from soils developed in phosphatic limestone residuum. In a few places there is some mixture of materials from loess and shale. Near the type location the mean annual air temperature is 59 degrees F.

GEOGRAPHICALLY ASSOCIATED SOILS: These include the competing series and the Agee and Roellen series. Agee and Roellen soils are poorly drained and have vertic properties.

DRAINAGE AND PERMEABILITY: Moderately well drained; medium runoff; moderate permeability.

USE AND VEGETATION: Used principally for growing corn, hay, and pasture.

DISTRIBUTION AND EXTENT: The Central Basin of Tennessee and the Bluegrass Region of Kentucky. The series is of large extent with an area of about 150,000 acres.

MLRA OFFICE RESPONSIBLE: Lexington, Kentucky

SERIES ESTABLISHED: Giles County, Tennessee; 1970.

REMARKS: Lynnville soils were formerly classified as phosphatic phases of the Lindsides series. Diagnostic horizons and features recognized in this pedon are;

Mollic epipedon - from the surface of the soil to about 14 inches (Ap and A horizons).

Aquic conditions - colors of chroma 2 from about 14 inches to 65 inches (Bw1, Bw2 and C horizons).

National Cooperative Soil Survey
U.S.A.

LOCATION ARRINGTON

TN+AR

Established Series

Rev. DEL:RPS

04/2001

ARRINGTON SERIES

The Arrington series consists of very deep, well drained soils with thick dark surface layers. They formed in silty alluvium on flood plains and along drainageways. Slopes are dominantly 0 to 3 percent but range up to 8 percent on escarpments and along drainageways near major streams.

TAXONOMIC CLASS: Fine-silty, mixed, superactive, thermic Cumulic Hapludolls

TYPICAL PEDON: Arrington silt loam - cultivated. (Colors are for moist soils unless otherwise stated.)

Ap--0 to 10 inches, dark brown (10YR 3/3) silt loam; moderate fine granular structure; very friable; many fine roots; slightly acid; gradual smooth boundary. (6 to 10 inches thick)

A--10 to 26 inches, dark brown (10YR 3/3) silt loam; few fine faint brown mottles; weak fine granular structure; very friable; common fine roots; slightly acid; gradual wavy boundary. (18 to 25 inches thick)

Bw1--26 to 44 inches, dark yellowish brown (10YR 3/4) silt loam; few fine faint brown and yellowish brown mottles; weak medium subangular blocky structure that parts to weak fine and medium granular structure; friable; common fine roots; few fine black concentrations; slightly acid; gradual smooth boundary.

Bw2--44 to 50 inches, dark brown (10YR 3/3) silt loam; few fine faint yellowish brown mottles; weak fine and medium granular structure; friable; few fine roots; few fine black concentrations; slightly acid; gradual smooth boundary. (Combined thickness of the Bw horizon ranges from 10 to 40 inches)

C--50 to 75 inches, dark grayish brown (10YR 4/2) silt loam; few fine and medium distinct dark yellowish brown (10YR 4/4) and few fine faint grayish brown and brown mottles; massive; friable; common fine black concretions; neutral.

TYPE LOCATION: Giles County, Tennessee; five miles west of Pulaski, one-fourth mile north of U.S. Highway 64, and 200 feet west of Richland Creek.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 40 to greater than 60 inches. The mollic epipedon ranges from 24 to greater than 50 inches in thickness. Reaction ranges from slightly acid to mildly alkaline. Coarse fragments range from 0 to 5 percent in the solum and from 0 to 15 percent in the C horizon.

The A horizon has hue of 10YR or 7.5YR, value of 3, and chroma of 2 or 3. Some pedons have a few faint mottles in shades of brown. The texture is commonly silt loam and less commonly silty clay loam or loam.

The Bw horizon has hue of 10YR, value of 3 or 4, and chroma of 3 or 4, or hue of 7.5YR, value of 3 or 4 and chroma of 2 or 4. Some pedons have mottles in shades of brown. Texture is silt loam or silty clay loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5 and chroma of 2 to 4. Mottles range from none to common in shades of brown or gray. Texture is dominantly silt loam or silty clay loam, but the range includes loam, clay loam, and clay.

COMPETING SERIES: These are the Redport and Verdigris series in the same family and the closely related Cannon, Egam, Huntington, Lynnville, and Staser series. Redport soils have hue of 5YR or redder and are commonly calcareous. Verdigris soils are in a region with a mean annual precipitation range of 35 to 47 inches and are probably dry for longer periods during most years. Cannon soils have more than 15 percent coarse fragments in each horizon. Egam soils average more than 35 percent clay in the control section. Huntington soils have a mollic epipedon less than 24 inches thick and are mesic. Lynnville soils have a mollic epipedon less than 24 inches thick and have mottles of chroma 2 or less immediately below the mollic epipedon. Staser soils are fine-loamy.

GEOGRAPHIC SETTING: These soils are on nearly level flood plains and along drainageways. Slopes are dominantly 0 to 3 percent but range up to 8 percent percent on escarpments and along drainageways near major streams. Arrington soils formed in recent alluvium. Mean annual rainfall is 55 inches and mean annual temperature is 59 degrees F. near the type location.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Egam, Godwin, Lanton, Lynnville, and Staser series. The Armour, Bradyville, Etowah, Pickwick, and Talbott series are on terraces and uplands and argillic horizons.

DRAINAGE AND PERMEABILITY: Well drained; medium or slow surface runoff; moderate permeability. These soils are flooded for brief periods mostly during the winter and early spring.

USE AND VEGETATION: Most areas are cleared and used for cultivated crops, pasture, and hay. The native vegetation was bottom land oaks, hickory, elm, hackberry, maple, beech, black walnut, ash, yellow-poplar, and sycamore.

DISTRIBUTION AND EXTENT: The Nashville Basin, the Highland Rim, in Tennessee and possibly Sand Mountain in northern Alabama and northwest Georgia The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Lexington, Kentucky

SERIES ESTABLISHED: DeKalb County, Tennessee; 1970.

REMARKS: Diagnostic horizons recognized in this pedon are:

Mollic epipedon - 0 to 26 inches (Ap, A horizons)

Cambic horizon -26 to 50 inches (Bw1, Bw2 horizons)

LOCATION HAMPSHIRE

TN+KY

Established Series

Rev. RPS

04/2001

HAMPSHIRE SERIES

The Hampshire series consists of deep, well drained, soils on uplands. These soils formed in clayey residuum of interbedded limestone and shale and the underlying residuum of interbedded siltstone, fine grained sandstone, shale and limestone. Slopes range from 2 to 30 percent.

TAXONOMIC CLASS: Fine, mixed, active, thermic Ultic Hapludalfs

TYPICAL PEDON: Hampshire silt loam--pasture. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 7 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many grass roots; strongly acid; clear wavy boundary. (5 to 9 inches thick)

Bt1--7 to 12 inches; brown (7.5YR 4/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; common faint clay films on faces of peds; many fine roots; few soft fragments of shale; strongly acid; clear wavy boundary. (3 to 7 inches thick)

Bt2--12 to 24 inches; strong brown (7.5YR 5/6) clay; moderate medium and fine subangular blocky structure; firm; many distinct clay films on faces of peds; few small soft and hard fragments of shale and limestone most of which are coated with clay films; few roots; strongly acid; gradual wavy boundary. (8 to 15 inches thick)

Bt3--24 to 30 inches; strong brown (7.5YR 5/6) clay; moderate medium and fine subangular blocky structure; firm; many distinct clay films on faces of peds; few soft and hard fragments of shale and limestone; few fine roots; strongly acid; clear wavy boundary. (Combined thickness of the Bt horizon ranges from 25 to 45 inches)

2Bt4--30 to 40 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; firm; few faint clay films on faces of peds; 15 percent by volume of soft fragments of sandstone and siltstone and a few hard fragments of limestone; few roots; strongly acid; clear wavy boundary. (0 to 10 inches thick)

2C--40 to 47 inches; strong brown (7.5YR 5/6) very channery loam; massive; friable; 60 percent soft and hard, flat fragments of sandstone, siltstone and limestone up to 10 inches across strongly acid; clear smooth boundary. (0 to 12 inches thick)

2Cr--47 to 60 inches; interbedded sandstone, siltstone and limestone. Weathered bedrock that is rippable and can be dug with a spade except for some hard strata.

TYPE LOCATION: Dekalb County, Tennessee; 1 mile southeast of Alexandria, in northwest corner of Lawrence farm.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 30 to 50 inches and depth to bedrock ranges from 40 to 60 inches. Fragments of rock range from 0 to 15 percent in the A and Bt horizons, 10 to 50 percent in the BC and C horizons where present, 5 to 20 percent in the 2Bt horizon, and 25 to 75 percent in the 2C horizon. Reaction ranges from medium acid to very strongly acid. Phosphate content is medium or high.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. The chroma of 6 is in severely eroded areas. It is dominantly silt loam, but ranges to silty clay loam in severely eroded areas.

Some pedons have a transitional horizon between the A and Bt horizons.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. Some pedons are mottled with shades of brown and yellow in the middle and lower parts. It is clay, silty clay, silty clay loam or clay loam. Clay content of the control section is dominantly 40 to 45 percent, but ranges from 35 to 55 percent.

A lithologic discontinuity is not a requirement of the series. Where present, the BC and C horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. The fine earth texture ranges from loam to clay.

The 2Bt horizon has the same colors as the Bt horizon. The fine texture is clay loam, silty clay loam or clay.

The 2C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. Mottles are in shades of brown, yellow, and gray. The fine earth fraction is loam, silt loam, clay loam, or silty clay loam.

The 2Cr horizon is interbedded siltstone sandstone, shale and limestone. The weathered bedrock is rippable and in most places can be dug with a spade, but it includes some thin strata that is hard. Most of the rock was calcareous prior to weathering and some strata contains phosphate nodules.

COMPETING SERIES: These are the Brantley, Canton Bend, Capshaw, Cowton, Enon, Gundy, Maben, Magnet, Mecklenburg, Meth, Spray, and Zion series in the same family and Mimosa, Needmore and Talbott series in similar families. Brantley and Enon soils are deeper than 60 inches to bedrock. Canton Bend, Gundy, Maben, Magnet and Mecklenburg soils have hues of 5YR or redder in the B horizon. Capshaw soils have gray mottles in the B horizon. Cowton and Needmore soils have rippable bedrock at a depth of 40 to 60 inches. Meth soils have a solum greater than 60 inches thick. Mimosa soils have a solum less than 20 inches thick. Talbott soils have hue of 5YR or redder in the major part of the B horizon. Zion soils have hard bedrock at a depth of 20 to 40 inches.

GEOGRAPHIC SETTING: Gently sloping to steep uplands. Slopes range from 2 to 30 percent. These soils formed in clayey residuum of interbedded limestone and shale the underlying residuum of interbedded siltstone, fine grained sandstone and limestone. Near the type location, the average annual air temperature is 60 degrees F. and the average annual precipitation is about 52 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Mimosa soils and the Hicks, Inman, Dowellton and Sandhill and Stiversville series. Hicks soils formed partly in a loess mantle and are fine-silty. Inman soils are 20 to 40 inches to bedrock and are flaggy. Dowellton soils have gentle slopes and are poorly drained. Sandhill soils are fine-loamy and are flaggy. Stiversville soils are fine-loamy.

DRAINAGE AND PERMEABILITY: Well drained; moderately slow permeability; medium to rapid runoff.

USE AND VEGETATION: Most areas are cleared. Much of the soil is in pasture and hay, but some is used for growing corn, small grains, and tobacco. The native vegetation is forests of oaks, walnut, locust, ash, hickory, beech, elm, and maple.

DISTRIBUTION AND EXTENT: The Central Basin in Tennessee. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Lexington, Kentucky

SERIES ESTABLISHED: Maury County, Tennessee; 1954.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - The zone from 0 to 7 inches (Ap horizon)

Argillic horizon - The zone from 7 to 40 inches (Bt horizon)

Paralithic contact - at 47 inches (top of Cr horizon)

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GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Mimosa soils and the Hicks, Inman, Dowellton and Sandhill and Stiversville series. Hicks soils formed partly in a loess mantle and are fine-silty. Inman soils are 20 to 40 inches to bedrock and are flaggy. Dowellton soils have gentle slopes and are poorly drained. Sandhill soils are fine-loamy and are flaggy. Stiversville soils are fine-loamy.

DRAINAGE AND PERMEABILITY: Well drained; moderately slow permeability; medium to rapid runoff.

USE AND VEGETATION: Most areas are cleared. Much of the soil is in pasture and hay, but some is used for growing corn, small grains, and tobacco. The native vegetation is forests of oaks, walnut, locust, ash, hickory, beech, elm, and maple.

DISTRIBUTION AND EXTENT: The Central Basin in Tennessee. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Lexington, Kentucky

SERIES ESTABLISHED: Maury County, Tennessee; 1954.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - The zone from 0 to 7 inches (Ap horizon)

Argillic horizon - The zone from 7 to 40 inches (Bt horizon)

Paralithic contact - at 47 inches (top of Cr horizon)

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ULTIC HAFLUDALFS, FINE, MIXED, THERMIC

THE HAMPSHIRE SERIES CONSISTS OF WELL-DRAINED SOILS ON UPLANDS. THESE SOILS FORMED IN RESIDUUM FROM INTERBEDDED SANDY LIMESTONE AND SHALE. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS BROWN SILT LOAM 7 INCHES THICK. THE NEXT 5 INCHES IS BROWN SILTY CLAY LOAM. BETWEEN DEPTHS OF 12 AND 40 INCHES THE SOIL IS STRONG BROWN CLAY IN THE UPPER PART AND MIDDLE PART AND CLAY LOAM IN THE LOWER PART. BETWEEN DEPTHS OF 40 AND 50 INCHES THERE IS WEATHERED BEDROCK WITH SEAMS OF STRONG BROWN LOAM. SLOPES RANGE FROM 2 TO 30 PERCENT.

LANDSCAPE AND CLIMATE PROPERTIES					
ANNUAL AIR TEMPERATURE	FROST FREE DAYS	ANNUAL PRECIPITATION	ELEVATION (FT)	DRAINAGE CLASS	SLOPE (PCT)
57-60	190-205	48-54	500-850	W	2-30

ESTIMATED SOIL PROPERTIES

UNIFIED SOIL CLASSIFICATION												
DEPTH: (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT.: >10 IN	FRACT.: > 3 IN	PERCENT OF MATERIAL LESS	CLAY					
				(FCI)	(FCI)	4 10 40 1 200 (FCI)						
0-7	SIL	CL-ML, CL, ML	A-4, A-6	0	0	95-100 95-100 90-100 80-90	15-27					
0-7	SICL	CL, ML, CH, CH	A-7, A-6	0	0	95-100 95-100 90-100 85-95	17-40					
7-40	C, SICL, SIC	CL, CH, MH	A-7	0	0-3	80-100 75-100 65-95 55-85	35-55					
40-47	CNV-L, CNV-CL, CNV-SICL	CL, GC, SC, GM	A-5, A-7, A-2	0-5	10-50	50-75 40-70 30-60	12-40					
47-60	WE											
DEPTH: (IN.)	LIQUID LIMIT	PLASTICITY INDEX	MOIST DENSITY (G/CM3)	BULK DENSITY	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHOS/CM)	SAR	CEC (ME/100G)	CAC03 (FCI)	GYPSUM (FCI)
0-7	20-40	3-20	1.35-1.50		0.6-2.0	0.18-0.22	4.5-6.0	-	-	-	-	-
0-7	30-40	10-25	1.30-1.45		0.6-2.0	0.14-0.18	4.5-6.0	-	-	-	-	-
7-40	45-70	21-38	1.25-1.45		0.2-0.6	0.12-0.16	4.5-6.0	-	-	-	-	-
40-47	30-48	11-25	1.30-1.50		0.00-0.2	0.07-0.12	4.5-6.0	-	-	-	-	-
47-60					0.00-0.2			-	-	-	-	-

DEPTH:	ORGANIC:	SHRINK-	EROSION	WIND	CORROSION
(IN.)	MATTER	Swell	FACORS.	EROD.	
	(PCI)	POTENTIAL:	K f I	GROUP INDEX	STEEL CONCRETE:
					HIGH MODERATE
0-7	1-3	LOW	.43 .43	3 -	-
0-7	5-1	MODERATE	.32 .32	3 -	-
7-40	4.5	MODERATE	.28 .28	-	-
40-47	4.5	LOW	.24 .32	-	-
47-60					

FLOODING			
FREQUENCY	DURATION	MONTHS	
NONE			
		>6.0	

HIGH WATER TABLE		CEMENTED PAN		BEDROCK	SUBSIDENCE	HYDROTENTIAL
DEPTH	KIND	MONTHS	DEPTH	HARDNESS	INIT. TOTAL	GRP.
(FT)			(IN)	(IN)	(IN)	ACTION
					40-60	SOFT
						C

Disjunctive properties indicated and compared rate interps. Eliminates overrides.

LOCATION STIVERSVILLE TN

Established Series
Rev. JFC-RPS
04/2001

STIVERSVILLE SERIES

The Stiversville series consists of deep, well drained permeable soils on uplands. They formed mostly in residuum of siltstone and fine grained sandstone that is interbedded with shale and limestone. On steep slopes, some pedons formed partly in colluvium from the same material. Slopes range from 2 to 30 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, active, thermic Ultic Hapludalfs

TYPICAL PEDON: Stiversville loam--pasture.
(Colors are for moist soil unless otherwise stated.)

Ap--0 to 8 inches; dark brown (10YR 3/3) loam; weak fine granular structure; very friable; few thin flat weathered fragments of siltstone; many fine roots; medium acid; clear smooth boundary. (5 to 10 inches thick)

BA--8 to 14 inches; brown (7.5YR 4/4) loam; weak fine and medium subangular blocky structure; friable; many fine roots; few thin flat weathered fragments of siltstone; few fine black concretions; medium acid; clear smooth boundary. (0 to 8 inches thick)

Bt1--14 to 23 inches; brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; common fine roots; few faint clay films; few fine black concretions; 5 percent thin fragments of siltstone; medium acid; gradual smooth boundary. (7 to 18 inches thick)

Bt2--23 to 34 inches; brown (7.5YR 4/4) clay loam, common medium distinct yellowish brown (10YR 5/4) mottles; moderate fine and medium subangular and angular blocky structure; friable; few fine roots; many distinct clay films; common fine black concretions; 8 percent thin fragments of siltstone and sandstone; strongly acid; clear smooth boundary. (7 to 18 inches thick)

Bt3--34 to 45 inches; brown (7.5YR 4/4) clay loam, common fine and medium prominent pale brown (10YR 6/3) and yellowish red (5YR 4/8) mottles; weak medium angular blocky structure; firm; few faint clay films; common fine black concretions; 15 percent soft and hard, flat fragments of sandstone and siltstone; strongly acid; clear smooth boundary. (0 to 18 inches thick)

Cr--45 to 60 inches; brown and yellowish brown interbedded sandstone and siltstone. The bedrock is rippable and can mostly be dug with a spade, but has some hard strata.

TYPE LOCATION: Williamson County, Tennessee; 1/2 mile south of Bethesda and 500 feet southwest of junction of paved roads.

RANGE IN CHARACTERISTICS: Thickness of the solum and depth to weathered rippable bedrock ranges from 40 to 60 inches. This soil is medium acid or strongly acid and medium or high in phosphate. Each horizon of the solum contains from 0 to about 15 percent soft and hard rock fragments except the lower part of the horizon contain 5 to 25 percent. Some pedons have a thin CB or C horizon with up to 50 percent fragments.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4 and chroma of 2 to 4. It is loam or silt loam, except severely eroded areas range to clay loam or silty clay loam.

The BA horizon, where present, has hue of 10YR or 7.5YR, value of 4 and chroma of 4 to 6. It is loam or silt loam.

The Bt horizon mostly has hue of 7.5YR, value of 4 or 5 and chroma of 4 to 6. Some pedons have subhorizons with hue of 10YR or 5YR with the same value and chroma. Mottles in shades of brown and red are none to common. It is loam or clay loam, except some pedons have thin subhorizons of silt loam, silty clay loam or clay. Fine and coarse sand exceeds 15 percent in most pedons and sand plus coarse fragments exceeds 15 percent in all pedons.

The Cr horizon is dominantly weathered siltstone and fine grained sandstone that is interbedded with shale and limestone. It is rippable and in most places can be dug with a spade. Most of the rock is relatively soft, but includes some thin strata that is hard. Some of the strata was calcareous prior to weathering and some strata contains phosphate nodules.

COMPETING SERIES: These are the Bolivar, Liddieville, Pamunkey, Sandhill and Toine series in the same family and the Armour, Culleoka and Hicks series in similar families. Bolivar soils have a paralithic contact between 20 and 40 inches. Liddieville, Pamunkey and Toine soils formed in alluvium on stream terraces and are greater than 60 inches to bedrock. Sandhill soils have 15 to 35 percent rock fragments in the solum. Armour soils formed in silty alluvium in the upper 2 to 4 feet, are fine-silty and are greater than 60 inches to bedrock. Hicks soils formed in loess in the upper 1.5 to 3 feet and are fine-silty.

GEOGRAPHIC SETTING: Stiversville soils are on upland ridgetops and side slopes. Slopes range from about 2 to 30 percent. They formed mostly in residuum of siltstone and fine grained sandstone that is interbedded with limestone and shale. On steep slopes, some pedons formed partly in colluvium from the same material. Near the type location, mean annual temperature is 59 degrees F., and mean annual precipitation is 48 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Hicks and Sandhill series and the Hampshire and Inman series. Hampshire and Inman soils have a fine control section and Inman soils are less than 40 inches to a paralithic contact.

DRAINAGE AND PERMEABILITY: Well drained; medium runoff, moderately rapid permeability.

USE AND VEGETATION: Most areas are used for growing pasture, hay, small grains, tobacco, and corn. The native vegetation was oak, hickory, elm, hackberry, maple, beech, black walnut, ash, locust, and yellow poplar.

DISTRIBUTION AND EXTENT: The Central Basin of Tennessee. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Lexington, Kentucky

SERIES ESTABLISHED: Williamson County, Tennessee; 1961.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - the zone from 0 to 8 inches (Ap horizons)

Argillic horizon - the zone from 14 to 42 inches (Bt1, Bt2, Bt3 horizons)

Paralithic contact - at 42 inches (top of Cr horizon.)

National Cooperative Soil Survey
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THE STIVERSVILLE SERIES CONSISTS OF WELL DRAINED SOILS ON UPLANDS. THESE SOILS FORMED IN RESIDUUM OR COLLUVIUM WEATHERED FROM SANDSTONE, SILTSTONE, LIMESTONE AND SHALE. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS DARK BROWN LOAM 8 INCHES THICK. BETWEEN DEPTHS OF 8 AND 23 INCHES THE SOIL IS BROWN LOAM. THE SOIL IS BROWN CLAY LOAM BETWEEN DEPTHS OF 23 AND 45 IN. WEATHERED BEDROCK IS BETWEEN DEPTHS OF 45 AND 60 INCHES. SLOPES RANGE FROM 2 TO 30 PERCENT.

LANDSCAPE AND CLIMATE PROPERTIES													
ANNUAL AIR TEMPERATURE		FROST FREE DAYS		ANNUAL PRECIPITATION		ELEVATION (FT)		DRAINAGE CLASS		SLOPE (PCT)			
								W		2-30			
ESTIMATED SOIL PROPERTIES													
DEPTH (IN.)	USDA TEXTURE		UNIFIED		AASHTO		FRACT. > 10 IN (PCT)	FRACT. > 3 IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO.				CLAY (PCT)
									4	10	40	200	
0-8	L, SIL		ML, CL, CL-ML		A-4			0-2	80-100	75-100	65-80	55-80	15-27
0-8	CL, SIL		CL, CL-ML, ML		A-4, A-6			0-2	80-100	75-100	70-85	51-85	28-35
8-34	CL, L, SIL		CL, CL-ML, ML		A-4, A-6			0-5	80-100	75-100	70-85	51-85	20-35
34-45	CM-CL, CN-L, CN-SIL		SE, SM, GC, CL		A-4, A-6			0-10	70-85	60-80	50-75	36-65	18-32
45-60	WB												
DEPTH (IN.)	LIQUID LIMIT	PLASTICITY INDEX	MOIST DENSITY (G/CM3)	BULK DENSITY (G/CM3)	PERMEABILITY (IN/HR)	AVAILABLE WATER CAPACITY (IN/IN)	SOIL REACTION (PH)	SALINITY (MMHDS/CM)	SAR	CEC (ME/100G)	CAC03 (PCT)	GYP SUM (PCT)	
0-8	<30	2-10	1.40-1.55		2.0-6.0	0.15-0.20	5.1-6.0	-					
0-8	25-40	4-15	1.40-1.55		2.0-6.0	0.14-0.18	5.1-6.0	-					
8-34	30-40	3-15	1.40-1.55		2.0-6.0	0.14-0.18	5.1-6.0	-					
34-45	20-40	3-15	1.35-1.50		0.0-0.2	0.12-0.14	5.1-6.0	-					
45-60													
DEPTH (IN.)	ORGANIC MATTER (PCT)	SHRINK-SWELL POTENTIAL	EROSION FACTORS	WIND EROD. GROUP	WIND EROD. INDEX	CORROSION							
			K, K ₁ , T			STEEL	CONCRETE						
0-8	1-3	LOW	32	3	-	MODERATE	MODERATE						
0-8	5-1	LOW	38	3	-								
8-34		LOW	28										
34-45		LOW	28										
45-60													
FLOODING			HIGH WATER TABLE			CEMENTED PAN		BEDROCK		SUBSIDENCE		HYD. CAP.	POTENTIAL FROST ACTION
FREQUENCY	DURATION	MONTHS	DEPTH (FT)	KIND	MONTHS	DEPTH (IN)	HARDNESS (IN)	DEPTH (IN)	HARDNESS (IN)	INIT. (IN)	TOTAL (IN)	6	
NONE			>6.0			-							
SANITARY FACILITIES (A)						CONSTRUCTION MATERIAL (A)							
SEPTIC TANK ABSORPTION FIELDS	2-8%: MODERATE-DEPTH TO ROCK 8-15%: MODERATE-DEPTH TO ROCK, SLOPE 15+%: SEVERE-SLOPE					ROADFILL	2-15%: FAIR-DEPTH TO ROCK, THIN LAYER 15-25%: FAIR-DEPTH TO ROCK, THIN LAYER, SLOPE 25+%: POOR-SLOPE						
SEWAGE LAGOON AREAS	2-7%: SEVERE-SEEPAGE 7+%: SEVERE-SEEPAGE, SLOPE					SAND	IMPROBABLE-EXCESS FINES						
SANITARY LANDFILL (TRENCH)	2-15%: SEVERE-DEPTH TO ROCK, SEEPAGE 15+%: SEVERE-DEPTH TO ROCK, SEEPAGE, SLOPE					GRAVEL	IMPROBABLE-EXCESS FINES						
SANITARY LANDFILL (AREA)	2-15%: SEVERE-SEEPAGE 15+%: SEVERE-SEEPAGE, SLOPE					TOPSOIL	2-15%: POOR-SMALL STONES 15+%: POOR-SMALL STONES, SLOPE						
DAILY COVER FOR LANDFILL	2-8%: FAIR-DEPTH TO ROCK, TOO CLAYEY 8-15%: FAIR-DEPTH TO ROCK, TOO CLAYEY, SLOPE 15+%: POOR-SLOPE					WATER MANAGEMENT (A)							
						POND RESERVOIR AREA	2-8%: SEVERE-SEEPAGE 8+%: SEVERE-SEEPAGE, SLOPE						
BUILDING SITE DEVELOPMENT (A)													
SHALLOW EXCAVATIONS	2-8%: SLIGHT 8-15%: MODERATE-SLOPE 15+%: SEVERE-SLOPE					EMBANKMENTS DIKES AND LEVEES	SEVERE-PIPING						
DWELLINGS WITHOUT BASEMENTS	2-8%: SLIGHT 8-15%: MODERATE-SLOPE 15+%: SEVERE-SLOPE					EXCAVATED PONDS AQUIFER FED	SEVERE-NO WATER						
DWELLINGS WITH BASEMENTS	2-8%: SLIGHT 8-15%: MODERATE-SLOPE 15+%: SEVERE-SLOPE					DRAINAGE	DEEP TO WATER						
SMALL COMMERCIAL BUILDINGS	2-4%: SLIGHT 4-8%: MODERATE-SLOPE 8+%: SEVERE-SLOPE					IRRIGATION	2-3%: FAVORABLE 3+%: SLOPE						
LOCAL ROADS AND STREETS	2-8%: SLIGHT 8-15%: MODERATE-SLOPE 15+%: SEVERE-SLOPE					TERRACES AND DIVERSIONS	2-8%: FAVORABLE 8+%: SLOPE						
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	2-8%: SLIGHT 8-15%: MODERATE-SLOPE 15+%: SEVERE-SLOPE					GRASSED WATERWAYS	2-8%: FAVORABLE 8+%: SLOPE						

LOCATION EGAM

TN+AL AR KY VA

Established Series
Rev. RPS
10/98

EGAM SERIES

The Egam series consists of very deep, well drained or moderately well drained soils that formed in clayey alluvium on flood plains and in depressions. Slopes are dominantly less than 2 percent but range from 0 to 5 percent.

TAXONOMIC CLASS: Fine, mixed, active, thermic Cumulic Hapludolls

TYPICAL PEDON: Egam silty clay loam--pasture. (Colors are for moist soil.)

Ap--0 to 7 inches; dark brown (10YR 3/3) silty clay loam; moderate medium granular structure; friable; many fine roots; moderately acid; clear smooth boundary. (6 to 10 inches thick)

A--7 to 22 inches; very dark grayish brown (10YR 3/2) silty clay loam; strong medium angular blocky structure, some medium prismatic structure that parts to angular blocky; firm; many fine roots; moderately acid; gradual smooth boundary. (6 to 30 inches thick)

Bw1--22 to 39 inches; very dark grayish brown (10YR 3/2) silty clay, few fine faint grayish brown mottles; weak medium prismatic structure parting to strong medium angular blocky; very firm; common fine roots largely between peds, few fine roots within peds; pressure faces on some peds; slightly acid; gradual smooth boundary. (0 to 30 inches thick)

Bw2--39 to 56 inches; dark brown (10YR 4/3) silty clay, common fine and medium faint dark grayish brown (10YR 4/2) redox depletions; strong medium angular blocky structure; firm; common fine roots; pressure faces on some peds; slightly acid; gradual smooth boundary.

Bw3--56 to 75 inches; brown (10YR 4/3) silty clay loam, common medium and fine faint dark grayish brown (10YR 4/2) redox depletions; moderate medium angular blocky structure; firm; few fine roots; slightly acid. (Combined thickness of the Bw horizon below the mollic epipedon ranges from 20 to 55 inches)

TYPE LOCATION: Davidson County, Tennessee; Tennessee State University farm; northwest corner of farm, 200 feet south of Cumberland River and 150 feet west of rock fence.

RANGE IN CHARACTERISTICS: Thickness of solum is 40 inches or more and depth to bedrock is greater than 60 inches. Thickness of the mollic epipedon ranges from 24 to 55 inches. Reaction is neutral to moderately acid in the A and B horizon except below about 50 inches it ranges from moderately alkaline to moderately acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 2 or 3. Some pedons have a few faint

gray and brown mottles in the lower part. It is dominantly silty clay loam or silt loam but a few pedons are loam or silty clay.

The upper part of the Bw horizon is part of the mollic epipedon in some pedons and has colors like the A horizon. Below this, the Bw horizon has hue of 7.5YR to 2.5Y, value of 4 or 5 and chroma of 3 to 6. Redox features in shades of brown are few to common and those with chroma 1 or 2 range from none to common.

Below about 50 inches, the Bw horizon or C horizon where present has hue of 7.5YR to 2.5Y, value of 4 to 6 and chroma of 1 to 6. Redox features are in shades of brown and gray and some pedons are mottled without a dominant matrix color. Texture is dominantly silty clay loam, silty clay or clay, but some pedons range to clay loam or coarser.

COMPETING SERIES: These are the Frioton series in the same family. Similar soils are the Agee, Arrington, Bowdre, Cannon, Catalpa, Godwin, Lanton, and Staser series in closely related families. Frioton soils have free carbonates in the solum. Arrington soils are fine-silty and Cannon and Staser soils are fine-loamy. Bowdre and Catalpa soils have mollic epipedons less than 20 inches thick. Agee, Godwin, and Lanton soils are wetter. They have distinct or prominent gray mottles in the mollic epipedon or dominantly gray colors just below the mollic epipedon.

GEOGRAPHIC SETTING: Egam soils are on flood plains and in depressions. Slopes are most commonly 0 to 2 percent and range from 0 to about 5 percent. The soil formed in fine-textured alluvium. Near the type location average annual air temperature is about 59 degrees F., and average annual precipitation is about 50 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the similar Arrington, Agee, Godwin, Lanton, and Staser series and the Lynnville series which is fine-silty.

DRAINAGE AND PERMEABILITY: Well drained or moderately well drained; slow runoff, moderately slow permeability. Most areas are flooded for very brief periods. The flooding is rare to frequent.

USE AND VEGETATION: Nearly all areas are cleared and used chiefly for growing corn, soybeans, cotton, hay, and pasture. The original vegetation was hardwood forest, chiefly of oaks, maple, elm, gums, ash, sycamore, beech, and hickory.

DISTRIBUTION AND EXTENT: Nashville Basin and Great Valley regions of Tennessee, northwestern Georgia, northern Alabama, Arkansas, and Kentucky. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Morgantown, West Virginia

SERIES ESTABLISHED: Lincoln County, Tennessee; 1938.

REMARKS: Diagnostic horizons recognized in this pedon are: Mollic epipedon - 0 to 39 inches (Ap, A, Bw1 horizons) Cambic horizon - 39 to 75 inches (Bw1, Bw2, Bw3 horizons)

National Cooperative Soil Survey
U.S.A.

TH0025

SOIL INTERPRETATION RECORD

HLRAIS: 123, 124, 125
REV. CMP. 4-84

CUMULIC HAPLUDOLLS, FINE, MIXED, THERMIC

EGAN SERIES

THE EGAN SERIES CONSISTS OF MODERATELY WELL-DRAINED SOILS ON FLOODPLAINS AND IN DEPRESSIONS. THESE SOILS FORMED IN ALLUVIUM. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS DARK BROWN AND VERY DARK GRAYISH-BROWN SILTY CLAY LOAM 22 INCHES THICK. BETWEEN DEPTHS OF 22 AND 56 INCHES THE SOIL IS VERY DARK GRAYISH-BROWN AND DARK BROWN SILTY CLAY. BENEATH 56 INCHES TO A DEPTH OF 75 INCHES THE SOIL IS BROWN SILTY CLAY LOAM. SLOPES RANGE FROM 0 TO 5 PERCENT.

ESTIMATED SOIL PROPERTIES (A)

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. (PCT)	LIQUID LIMIT (PLAS-)	PLASTICITY INDEX
0-22	STCL, SIL, L	CL, ML, CL-ML	A-6, A-7, A-4	100	21-45	4-20
22-56	STCL, SIL, C	CL, ML, CH	A-7, A-6	100	38-60	15-30
56-75	STCL, C, CL	CL, ML, MH, CH	A-4, A-6, A-7	100	25-60	8-30

DEPTH (IN.)	MOISTURE (PCT)	DENSITY (G/CM ³)	WATER CAPACITY (PCT)	SOIL REACTION (PH)	SALTINITY (MMHGS/CM)	SHRINKAGE (PCT)	EROSION (PCT)	WIND EROSION (PCT)	ORGANIC MATTER (PCT)	CORROSION
0-22	1.30-1.45	0.2-0.6	0.10-0.22	5.6-7.3	-	MODERATE 1.32	4	-	2-4	STEEL CONCRETE
22-56	1.30-1.45	0.2-0.6	0.14-0.28	5.6-7.3	-	MODERATE 1.32	-	-	-	HIGH LOW
56-75	1.30-1.45	0.2-0.6	0.12-0.18	5.6-8.4	-	MODERATE 1.37	-	-	-	-

FLOODING

HIGH WATER TABLE

FREQUENCY	DURATION	DEPTH (FT)	KIND	MONTHS	CEMENTED PAV.	RED ROCK	SURSIDENCE	IMPROVEMENT
RARE-FREQUENT	V. BRIEF	0.0-4.0	APPROXIMATE	0-1	-	0.50	-	-

SANITARY FACILITIES (B)

CONSTRUCTION MATERIAL (B)

SEPTIC TANK	OCCAS. FREQ: SEVERE-FLOODING, WETNESS.	ROADFILL	POOR-LOW STRENGTH
ABSORPTION FIELDS	PERCS SLOWLY RARE: SEVERE-WETNESS, PERCS SLOWLY		
SEWER LAGOON AREAS	SEVERE-FLOODING, WETNESS	SAND	IMPROBABLE-EXCESS FINES
SANITARY LANDFILL (TRENCH)	OCCAS. FREQ: SEVERE-FLOODING, WETNESS, TOO CLAYEY RARE: SEVERE-WETNESS, TOO CLAYEY	GRAVEL	IMPROBABLE-EXCESS FINES
SANITARY LANDFILL (AREA)	OCCAS. FREQ: SEVERE-FLOODING, WETNESS RARE: SEVERE-WETNESS	TOPSOIL	SILT: FAIR-THIN LAYER SCL: FAIR-TOO CLAYEY, THIN LAYER
DAILY COVER FOR LANDFILL	POOR-TOO CLAYEY, HARD TO PACK		

BUILDING SITE DEVELOPMENT (B)

WATER MANAGEMENT (B)

SHALLOW EXCAVATIONS	OCCAS. FREQ: MODERATE-TOO CLAYEY, WETNESS, FLOODING RARE: MODERATE-TOO CLAYEY, WETNESS	EMBANKMENTS, Dikes and LEYES	SEVERE-HARD TO PACK
DWELLINGS WITHOUT BASEMENTS	SEVERE-FLOODING	EXCAVATED PERCS, AQUIFER FED	SEVERE-SLOW REFILL
DWELLINGS WITH BASEMENTS	SEVERE-FLOODING	DRAINAGE	DEEP TO WATER
SMALL COMMERCIAL BUILDINGS	SEVERE-FLOODING	IRRIGATION	0-3% OCCAS. FREQ: FLOODING 3-5% OCCAS. FREQ: SLOPE, FLOODING 0-3% RARE: FAVORABLE 3-5% RARE: SLOPE
LOCAL ROADS AND STREETS	OCCAS. FREQ: SEVERE-LOW STRENGTH, FLOODING RARE: SEVERE-LOW STRENGTH	TERRACES AND DIVERSIONS	FAVORABLE
LANDSCAPING AND GOLF FAIRWAYS	FREQ: SEVERE-FLOODING OCCAS: MODERATE-FLOODING RARE: SLIGHT	GRASED WATERWAYS	FAVORABLE

REGIONAL INTERPRETATIONS

LOCATION LINDELL

TN+KY

Established Series

Rev. JCJ

05/2000

LINDELL SERIES

The Lindell series consists of very deep, moderately well drained soils on floodplains. The soil formed in loamy alluvium. Slopes range from 0 to 3 percent.

TAXONOMIC CLASS: Fine-loamy, mixed, active, thermic Fluvaquentic Eutrudepts

TYPICAL PEDON: Lindell silt loam, on level first bottom, in hay. (Colors are for moist soil).

Ap--0 to 7 inches; brown (10YR 4/3) silt loam; weak medium granular structure; friable; common fine roots; few fine black (10YR 2/1) manganese concretions; slightly acid; clear smooth boundary. (5 to 10 inches thick)

Bw1--7 to 11 inches; brown (10YR 4/3) silt loam; moderate medium granular and subangular blocky structure; friable; common fine roots; few fine black (10YR 2/1) manganese concretions; slightly acid; clear smooth boundary.

Bw2--11 to 15 inches; brown (10YR 4/3) silt loam; moderate medium subangular blocky structure; friable; few fine roots; few fine black (10YR 2/1) manganese concretions; few medium faint yellowish brown (10YR 5/4) masses as iron accumulation; few medium faint brown (10YR 5/3) iron depletions; slightly acid; clear smooth boundary.

Bw3--15 to 26 inches; brown (10YR 5/3) silt loam; moderate medium subangular blocky structure; friable; few fine roots; few fine black (10YR 2/1) manganese concretions; common fine and medium faint dark yellowish brown (10YR 4/4) masses as iron accumulations; common fine and medium dark grayish brown (10YR 4/1) iron depletions; slightly acid; clear smooth boundary.

Bg1--26 to 34 inches; dark grayish brown (10YR 4/2) silt loam; weak medium subangular blocky structure; friable; few fine roots; few fine black (10YR 2/1) manganese concretions; common medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) masses as iron accumulations; slightly acid; clear smooth boundary. (Combined thickness of the Bw horizon ranges from 15 to 45 inches)

Bg2--34 to 52 inches; grayish brown (10YR 5/2) silty clay loam; weak medium and coarse subangular blocky structure; friable; common fine black (10YR 2/1) black manganese concretions; common fine and medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) masses as iron accumulations; common medium faint gray (10YR 6/1) iron depletions; moderately acid; gradual smooth boundary. (0 to 22 inches thick)

Cg--52 to 62 inches; grayish brown (10YR 5/2) silty clay loam; massive; friable; common fine black

(10YR 2/1) manganese concretions; common fine and medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) masses as iron accumulations; common fine and medium faint gray (10YR 6/1) iron depletions; moderately acid.

TYPE LOCATION: Davidson County, Tennessee; 0.1 mile north of Cleeces Ferry; 50 feet east of Old Hickory Boulevard.

RANGE IN CHARACTERISTICS: Depth to bedrock is greater than 5 feet. Reaction ranges from moderately acid through neutral in each horizon. Fragments range from 0 to 20 percent by volume in the A horizon, 0 to 15 percent in the B horizon, and 0 to 30 percent in the C horizon. Fragments are dominantly chert. The soil ranges from medium to high in phosphorous in each horizon.

The A and Ap horizon have hue of 10YR or 7.5YR, value of 4 or 5 and chroma of 2 to 4. Some pedons have an A horizon with hue of 10YR, value of 3 and chroma of 2 or 3 that is less than 7 inches thick. Texture of the fine earth fraction is commonly silt loam, but includes loam and silty clay loam.

The Bw horizon has hue of 10YR, value of 4 or 5 and chroma of 3 or 4. Few to common redoximorphic features with chroma 2 or less are within 24 inches of the soil surface. Texture is silt loam, silty clay loam, loam, or clay loam.

The Bg horizon has hue of 10YR, value of 4 to 6 and chroma of 1 or 2. Common to many redoximorphic features are in shades of gray and brown. Some pedons are an evenly mottled pattern in these colors without a dominant color. Texture is silt loam, silty clay loam, loam or clay loam. Some pedons have buried A and B horizons.

The Cg horizon has hue of 10YR or 2.5Y, value of 4 to 6 and chroma of 1 or 2. Common to many redoximorphic features are in shades of gray, black, and brown. Texture of the fine earth fraction is loam, silt loam, silty clay loam or clay loam.

COMPETING SERIES: Monacan is the only series in the same family. Monacan soils have less than 5 percent coarse fragments in the control section and typically have a higher sand content. Soils in closely related families are the Egam, Hamblen, Lindside, and Lynnville series. Egam soils have mollic epipedons and fine-textured control sections. Hamblen soils have siliceous mineralogy. Lindside soils have a mesic soil temperature and fine-silty control sections. Lynnville soils have mollic epipedons.

GEOGRAPHIC SETTING: Lindell soils are on the flood plains of rivers, creeks, and smaller streams. Slopes are mainly less than 1 percent but range up to about 3 percent along narrow drainageways. Near the type location, mean annual temperature is 59.0 degrees F., and mean annual precipitation is 47.3 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Egam, Arrington, Sullivan, and Nolin soils on flood plains. Arrington soils are well drained and have a thick mollic epipedon. Egam soils have a mollic epipedon and have fine texture. Sullivan soils are in similar positions on floodplains and are well drained. Nolin soils are fine-silty. The Armour soils, on adjacent or nearby terraces and footslopes, and the Mimosa, Stiversville, Hampshire, and Inman series are all on the uplands. Armour, Mimosa, Stiversville, Hampshire and Inman soils have argillic horizons.

DRAINAGE AND PERMEABILITY: Moderately well drained. Slow runoff. Moderate permeability.

USE AND VEGETATION: These soils are used for growing corn, soybeans, hay, and pasture. The native vegetation was mixed hardwoods.

DISTRIBUTION AND EXTENT: The Nashville Basin of Tennessee and adjacent areas of the Highland Rim in Tennessee and Kentucky. It is of moderate extent.

MLRA OFFICE RESPONSIBLE: Morgantown, West Virginia

SERIES ESTABLISHED: Davidson County, Tennessee; 1977.

REMARKS: Diagnostic horizons recognized in this pedon are:

Ochric epipedon - from 0 to 7 inches (Ap horizon)

Cambic horizon - from 7 to about 34 inches (Bw and Bg horizons)

National Cooperative Soil Survey.
U.S.A.

TMO129

SOIL INTERPRETATIONS RECORD

MLRA(S): 123

REV. JAF.RPC. 9-85

LUVAGUENTIC EUTROCHAFETS, FINE-LOAMY, MIXED, THERMIC

LINDALL SERIES

THE LINDALL SERIES CONSISTS OF DEEP, MODERATELY WELL-DRAINED SOILS OF FLOODPLAINS. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS BROWN SILT LOAM, 7 INCHES THICK. THE SUBSOIL, TO A DEPTH OF 26 INCHES, IS BROWN FRIABLE SILT LOAM MOTTLED IN THE LOWER PART, WITH SHADES OF GRAY. BELOW THIS, TO A DEPTH OF 52 INCHES, IT IS MOTTLED DARK GRAYISH-BROWN AND GRAYISH-BROWN FRIABLE SILT LOAM AND SILTY CLAY LOAM. SLOPES RANGE FROM 0 TO 3 PERCENT.

ESTIMATED SOIL PROPERTIES (A)													
DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO.				ILLIQUID LIMIT	PLAS- TICITY INDEX				
0-11	SIL, SIL, L	ML, CL, CL-ML	A-4	0-2	100-100	75-100	45-90	55-80	18-30	3-10			
0-11	CR-SIL, CR-L, CR-L	ML, CL, CL-ML	A-4	0-2	75-90	65-75	60-70	55-65	18-30	3-10			
11-62	SIL, SIL, CL	CL, CL-ML	A-A, A-5	0-2	100-100	75-95	45-90	55-80	23-39	6-12			
DEPTH (IN.)	CLAY (PCT)	MOIST BULK DENSITY (G/CM ³)	PERME- ABILITY (CM/HR)	AVAILABLE WATER CAPACITY (CM/IN)	SOIL REACTION (PH)	SALINITY (CMOS/CM)	SHRINK- SWELL POTENTIAL (%)	EROSION FACTORS	WIND GROUP (PCT)	ORGANIC MATTER	CORROSION		
0-11	20-32	1.35-1.50	0.6-2.0	0.10-0.20	15.6-7.3	-	LOW	1.32	5	-	1-3	STEEL	CONCRETE
0-11	20-32	1.35-1.50	0.6-2.0	0.10-0.17	15.6-7.3	-	LOW	1.28	5	-	1-3	MODERATE	LOW
11-62	20-35	1.35-1.50	0.6-2.0	0.10-0.17	15.6-7.3	-	LOW	1.28	5	-	1-3		
FLOODING				HIGH WATER TABLE		CEMENTED PAV.		BEDROCK		SUBSIDENCE		HYDROLYTIC	
FREQUENCY		DURATION		DEPTH		KIND		INCHES		DEPTH		HARDNESS	
OCCASIONAL		Y. 6 PCT		(FT)		(IN)		(IN)		(IN)		(IN)	
				DEC-MAR		2-6-1-2		APPARENT		DEC-MAR		-	
												1	

SANITARY FACILITIES (C)

SEVERE-FLOODING, WETNESS

SEPTIC TANK
ABSORPTION
FIELDS

ROADFILL

CONSTRUCTION MATERIAL (B)

FAIR-LOW STRENGTH, WETNESS

SEVERE-FLOODING, WETNESS

SEWAGE
LAGOON
AREAS

SAND

IMPROVABLE-EXCESS FINES

SEVERE-FLOODING, WETNESS

SANITARY
LANDFILL
(TRENCH)

GRAVEL

IMPROVABLE-EXCESS FINES

SEVERE-FLOODING, WETNESS

SANITARY
LANDFILL
(AREA)

TOPSOIL

GOOD
CR. 6% PODZ-SMALL STONES

FAIR-TOO CLAYEY, SMALL STONES, WETNESS

DAILY
COVER FOR
LANDFILL

WATER MANAGEMENT (D)

MODERATE-SEEPAGE

BOMB
RESERVOIR
AREA

BUILDING SITE DEVELOPMENT (E)

SEVERE-WETNESS

SHALLOW
EXCAVATIONSTERRACED
DICES AND
LOVEES

SEVERE-PIPING

SEVERE-FLOODING

DWELLINGS
WITHOUT
BASEMENTSEXCAVATED
PIERS
ACQUED FOR

MODERATE-DEEP TO WATER, SLOW REFILL

SEVERE-FLOODING, WETNESS

DWELLINGS
WITH
BASEMENTS

DRAINAGE

FLOODING

SEVERE-FLOODING

SMALL
COMMERCIAL
BUILDINGS

TERRACED

WETNESS, FLOODING

SEVERE-FLOODING

LOCAL
ROADS AND
PLOTSTERRACES
AND
DIVERSIONS

WETNESS

SIL, SIL, L, MODERATE-FLOODING

LAWNS,
LANDSCAPING
AND GOLF
FAIRWAYSGRASSED
WATERWAYS

FAVORABLE

LOCATION ARMOUR

TN+AL KY

Established Series

Rev. RPS,DLN

10/98

ARMOUR SERIES

The Armour series consists of very deep, well drained soils on stream terraces, foot slopes, and valley floors. These soils formed in old alluvium, valley fill, or in alluvium and the underlying residuum of limestone. Slopes range 0 to 20 percent.

TAXONOMIC CLASS: Fine-silty, mixed, active, thermic Ultic Hapludalfs

TYPICAL PEDON: Armour silt loam - cultivated. (Colors are for moist soil unless otherwise stated.)

Ap--0 to 8 inches, dark brown (7.5YR 3/2) silt loam; weak fine granular structure; very friable; many fine roots; medium acid; clear smooth boundary. (5 to 10 inches thick)

A--8 to 17 inches, dark brown (10YR 4/3) silt loam; weak medium granular structure; friable; many fine roots; few angular fragments of chert; few fine black concretions; medium acid; gradual smooth boundary. (0 to 8 inches thick)

Bt1--17 to 23 inches, brown (7.5YR 4/4) silty clay loam; weak fine and medium subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; few angular fragments of chert; few fine black concretions; medium acid; gradual smooth boundary.

Bt2--23 to 48 inches, brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; few to common fine roots; common distinct clay films on faces of peds; few angular fragments of chert; common fine black concretions; strongly acid; clear smooth boundary.

Bt3--48 to 58 inches, reddish brown (5YR 4/4) silty clay loam; weak medium subangular blocky structure; friable; few fine distinct black stains on faces of peds and in pores; common distinct clay films on faces of peds; few angular fragments of chert; common fine black concretions; strongly acid; gradual smooth boundary. (combined thickness of the Bt horizon is 30 to 55 inches)

BC--58 to 75 inches, mottled reddish brown (5YR 4/4), strong brown (7.5YR 5/6), and light yellowish brown (10YR 6/4) silty clay loam; weak medium angular blocky structure; friable; few angular fragments of chert; strongly acid.

TYPE LOCATION: Williamson County, Tennessee; about 1 mile north of Franklin, Tennessee, on U.S. Highway 31; 1/4 mile south of Harpeth River Bridge on U.S. Highway 31; 300 feet east of U.S. Highway 31.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 40 to more than 80 inches. Depth

to limestone bedrock is greater than 5 feet. Reaction is medium acid or strongly acid except the surface layer is less acid where limed. Fragments of gravel or chert range from 0 to 10 percent in the upper 40 inches. The fragments range up to about 3 inches in diameter. Below 40 inches the fragment content is dominantly 0 to 35 percent, but ranges to 60 percent.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. Texture is silt loam except a few severely eroded areas are silty clay loam.

Some pedons have a transitional horizon between the A and Bt horizons.

The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 4 or 6. Some pedons have few to common mottles in shades of brown, yellow or red. Texture of the fine earth is dominantly silt loam or silty clay loam but includes loam below 40 inches.

The BC and C horizons, where present, have the same colors and textures as the Bt horizon. Some pedons developed in limestone residuum below 48 inches and have 2Bt, 2BC or 2C horizons. These horizons have a hue of 5YR to 2.5Y, value of 4 or 5 and chroma of 4 to 8. Mottles are in shades of brown, yellow, red, or gray. Texture of the fine earth is silty clay loam, clay loam, silty clay, or clay.

COMPETING SERIES: These are the Barnsdale, Dexter, Dossman, Goodwill and Hicks series in the same family and the closely related Ashton, Elk, Sandhill and Stiversville series. Barnsdall and Dexter soils are free of fragments and have less clay and more sand in the lower part of the solum and C horizon. Dossman soils formed in thick deposits of loess on dissected uplands and have a lower sand content in the control section. Goodwill soils have more sand in the lower B horizon. Hicks soils developed in a loess mantle and residuum of interbedded sandstone, siltstone and shale on upland ridgetops. Rippable bedrock is at 40 to 60 inches from the surface. Ashton soils are medium acid to neutral and are mesic. Elk soils have a lighter colored surface layer and are mesic. Sandhill and Stiversville soils are fine-loamy and have bedrock at 40 to 60 inches from the surface.

GEOGRAPHIC SETTING: Armour soils are on stream terraces, foot slopes, and valley floors. Slopes range from 0 to 20 percent. These soils formed in old alluvium, valley fill, or in alluvium and the underlying clayey residuum of limestone. Near the type location, mean annual temperature is 59 degrees F. and average annual precipitation is 47 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the competing Hicks and Stiversville series, and the Braxton, Hampshire, Inman, Maury, Sengtown, Byler, Tarklin, Humphreys, Hawthorne, and Mimosa series. The Braxton, Hampshire, Inman, Maury, and Sengtown soils are on uplands and are clayey. The Byler and Tarklin soils are on stream terraces and have a fragipan. Humphreys soils are on foot slopes and stream terraces and are fine-loamy. Hawthorne soils are on uplands and are loamy-skeletal.

DRAINAGE AND PERMEABILITY: Well drained; medium runoff; moderate permeability.

USE AND VEGETATION: Most of the areas are cleared and used for pasture, hay, small grain, tobacco, and corn. The native vegetation was mixed hardwoods including oaks, hickory, elm, hackberry, maple, beech, black walnut, ash, locust, yellow-poplar, and redcedar.

DISTRIBUTION AND EXTENT: The Nashville Basin and Highland Rim in Tennessee and the inner bluegrass region of Kentucky. The series is of moderate extent.

MLRA OFFICE RESPONSIBLE: Morgantown, West Virginia

SERIES ESTABLISHED: Maury County, Tennessee; 1955.

REMARKS: Diagnostic horizons recognized in this pedon are:

Ochric epipedon - 0 to 17 inches (Ap, A horizons)

Argillic horizon - 17 to 58 inches (Bt horizon)

National Cooperative Soil Survey
U.S.A.

TH0055

SOIL INTERPRETATIONS RECORD

MLRA(S): 123, 121

REV. RPS, JUL. 4-67

ARMOUR SERIES

ULTIC HAPLUDALPS, FINE-SILTY, MIXED, THERMIC

THE ARMOUR SERIES CONSISTS OF DEEP WELL-DRAINED SOILS. THEY FORMED IN A LAYER OF ALLUVIUM OR LOESS 2 TO 4 FEET THICK AND IN THE UNDERLYING OLD ALLUVIUM OR RESIDUUM OF PHOSPHATIC LIMESTONE. THE SOIL IS DARK BROWN SILT LOAM TO A DEPTH OF 17 INCHES. BENEATH THIS TO A DEPTH OF 75 INCHES IT IS SILTY CLAY LOAM WHICH IS BROWN IN THE UPPER PART, REDDISH BROWN IN THE MIDDLE PART AND MOTTLED REDDISH-BROWN, STRONG BROWN AND LIGHT YELLOWISH-BROWN IN THE LOWER PART. SLOPES RANGE FROM 0 TO 75 PERCENT.

ESTIMATED SOIL PROPERTIES (A)										
DEPTH [IN.]	USDA TEXTURE	UNIFIED	ASNTS	FRAC. % IN [PCT]	PERCENT OF MATERIAL LESS THAN 2° PASSING SIEVE NO.				LIQUID LIMIT	PLAS- TICITY
					4	10	40	200		INDEX
0-17	SIL	CL-ML, CL, ML	A-4	0	20-100	20-100	75-95	70-90	25-35	5-10
0-17	SICL	CL	A-5	0	20-100	20-100	75-100	70-95	35-45	11-15
17-48	SICL, SIL	CL	A-4, A-5	0	20-100	20-100	75-95	70-95	35-45	8-15
48-75	SICL, SIC, C	ML, MH, EH, SC	A-4, A-5, A-7	0-3	20-100	20-95	45-90	40-65	35-45	5-25

DEPTH [IN.]	CLAY [PCT]	MOIST BULK DENSITY [G/CM ³]	PERMEA- BILITY [IN/HR]	AVAILABLE WATER CAPACITY [IN/IN]	SOIL REACTION [PH]	SALINITY [MMHQS/CM]	SHRINK- SWELL POTENTIAL	EROSION FACTORS S T CRUP	WIND EROS. GROUP	ORGANIC MATTER [PCT]	CORROSION	
0-17	15-27	20-1.45	0.5-2.0	0.15-0.25	5.1-6.0	-	LOW	42	5	1-3	STEEL	CONCRETE
0-17	27-35	20-1.45	0.5-2.0	0.15-0.21	5.1-6.0	-	LOW	27	5	1-3	MODERATE	MODERATE
17-48	22-35	20-1.50	0.5-2.0	0.17-0.20	5.1-6.0	-	LOW	37	-	-	-	-
48-75	30-50	25-1.55	0.5-2.4	0.10-0.15	5.1-6.0	-	MODERATE	37	-	-	-	-

FLOODING			HIGH WATER TABLE			COMPACTED FAN			SEDS			SUBSIDENCE			HYD POTENT L	
FREQUENCY	DURATION	MONTHS	DEPTH [FT]	KIND	MONTHS	DEPTH [IN]	HARDNESS	[IN]	DEPTH [IN]	HARDNESS	[IN]	INIT	TOTAL	GRP	PROST	ACTION
NONE	-	-	15.0	-	-	-	-	-	-	-	-	-	-	-	-	-

SANITARY FACILITIES (B)		CONSTRUCTION MATERIAL (C)	
SEPTIC TANK ABSORPTION FIELDS	0-25: MODERATE-PERCS SLOWLY 5-15%: MODERATE-PERCS SLOWLY, SLOPE 15-5%: SEVERE-SLOPE	ROADFILL	POOR-LOW STRENGTH
SEWAGE LAGOON AREAS	0-25: MODERATE-SEEPAGE 2-7%: MODERATE-SEEPAGE, SLOPE 7-5%: SEVERE-SLOPE	SAND	IMPROBABLE-EXCESS FINES
SANITARY LANDFILL (TRENCH)	0-25: MODERATE-TOO CLAYEY 5-15%: MODERATE-SLOPE, TOO CLAYEY 15-5%: SEVERE-SLOPE	GRAVEL	IMPROBABLE-EXCESS FINES
SANITARY LANDFILL (AREA)	0-25: SLIGHT 5-15%: MODERATE-SLOPE 15-5%: SEVERE-SLOPE	TOPSOIL	0-25: FAIR-TOO CLAYEY, SMALL STONES 5-15%: FAIR-TOO CLAYEY, SMALL STONES, SLOPE 15-5%: POOR-SLOPE
DAILY COVER FOR LANDFILL	0-25: FAIR-TOO CLAYEY, THIN LAYER 5-15%: FAIR-TOO CLAYEY, SLOPE, THIN LAYER 15-5%: POOR-SLOPE		

BUILDING SITE DEVELOPMENT (B)		WATER MANAGEMENT (D)	
SHALLOW EXCAVATIONS	0-25: SLIGHT 5-15%: MODERATE-SLOPE 15-5%: SEVERE-SLOPE	POND RESERVOIR AREA	0-25: MODERATE-SEEPAGE 3-5%: MODERATE-SEEPAGE, SLOPE 5-5%: SEVERE-SLOPE
DWELLINGS WITHOUT BASEMENTS	0-25: SLIGHT 5-15%: MODERATE-SLOPE 15-5%: SEVERE-SLOPE	EMBANKMENTS DICES AND LEVERS	MODERATE-PIPING
DWELLINGS WITH BASEMENTS	0-25: SLIGHT 5-15%: MODERATE-SLOPE 15-5%: SEVERE-SLOPE	EXCAVATED PODS AQUIFER PFD	SEVERE-NO WATER
SMALL COMMERCIAL BUILDINGS	0-25: SLIGHT 5-15%: MODERATE-SLOPE 5-5%: SEVERE-SLOPE	DRAINAGE	DEEP TO WATER
LOCAL ROADS AND STREETS	0-15% SEVERE-LOW STRENGTH 15-5%: SEVERE-LOW STRENGTH, SLOPE	IRRIGATION	0-25: ERODES EASILY 3-5%: SLOPE, ERODES EASILY
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	0-25: SLIGHT 5-15%: MODERATE-SLOPE 15-5%: SEVERE-SLOPE	TERRACES AND DIVERSIONS	0-25: ERODES EASILY 5-5%: SLOPE, ERODES EASILY
		GRASSED WATERWAYS	0-25: ERODES EASILY 5-5%: SLOPE, ERODES EASILY

REGIONAL INTERPRETATIONS

LOCATION NESBITT

TN

Established Series

Rev. JCJ

07/2000

NESBITT SERIES

The Nesbitt series consists of very deep, moderately well drained soils on nearly level to sloping uplands and old terraces. These soils formed in a silty mantle of loess or alluvium and the underlying residuum from limestone. Slopes range from 0 to 10 percent.

TAXONOMIC CLASS: Fine-silty, siliceous, semiactive, thermic Aquic Paleudalfs

TYPICAL PEDON: Nesbitt silt loam - in a cultivated area of 4 percent slope. (Colors are for moist soil).

Ap--0 to 8 inches; dark reddish brown (5YR 3/3) silt loam; weak medium granular structure; friable; common fine roots; few fine black (5YR 2.5/1) and brown (7.5YR 4/3) manganese and iron concretions; strongly acid; clear smooth boundary. (5 to 9 inches thick)

Bt1--8 to 14 inches; reddish brown (5YR 4/4) silty clay loam; weak medium subangular blocky structure; friable; common fine roots; few faint reddish brown (5YR 4/3) clay films on faces of peds; few fine black (5YR 2.5/1) concretions; strongly acid; gradual wavy boundary.

Bt2--14 to 25 inches; reddish brown (5YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; common fine roots; few faint reddish brown (5YR 4/3) clay films on faces of peds; few fine black (5YR 2.5/1) and dark brown (7.5YR 3/3) manganese and iron concretions; strongly acid; clear wavy boundary.

Bt3--25 to 33 inches; yellowish red (5YR 4/6) silty clay loam; moderate medium angular and subangular blocky structure; friable; few fine roots; few distinct reddish brown (5YR 4/4) clay films on faces of peds; common medium prominent light brown (7.5YR 6/4) and dark red (2.5YR 3/6) redox concentrations, and light brownish gray (10YR 6/2) redox depletions; common fine black (5YR 2.5/1) and dark brown (7.5YR 3/3) manganese and iron concretions; brittle in approximately 50 percent of the mass; strongly acid; gradual smooth boundary.

Bt4--33 to 41 inches; yellowish red (5YR 4/6) silty clay loam; moderate medium angular blocky structure; firm; few distinct reddish brown (5YR 4/4) clay films on faces of peds; common medium prominent pale brown (10YR 6/3) and light brownish gray (10YR 6/2) redox depletions, and strong brown (7.5YR 5/6) redox concentrations; common dark brown (7.5YR 3/3) and black (5YR 2.5/1) manganese and iron concretions; brittle in approximately 50 percent of the mass; strongly acid; gradual smooth boundary.

Bt5--41 to 55 inches; strong brown (7.5YR 5/6) silty clay loam; weak medium and coarse angular blocky structure; firm; many distinct brown (7.5YR 5/4) clay films on faces of peds; common medium

and fine distinct yellowish red (5YR 5/6) and yellowish brown (10YR 5/6) redox concentrations, and light yellowish brown (10YR 6/4) and pinkish gray (7.5YR 7/2) redox depletions; common dark brown (7.5 3/3) and black (5YR 2.5/1) concretions; strongly acid; gradual smooth boundary. (Combined thickness of the Bt horizon ranges from 30 to 60 inches)

2Bt6—55 to 65 inches; yellowish brown (10YR 5/6) clay, weak medium and coarse angular blocky structure; very firm, sticky and plastic; few distinct brown (7.5YR 5/4) clay films on faces of peds; common fine and medium distinct very pale brown (10YR 7/4) and light gray (10YR 6/1) redox depletions, and strong brown (7.5YR 5/6) redox concentrations; common dark brown (7.5YR 3/3) and black (5YR 2.5/1) manganese and iron concretions; strongly acid;

TYPE LOCATION: Rutherford County, Tennessee; 1.5 miles east of Salem; 200 feet north of State Highway 99; 150 feet southwest of barn.

RANGE IN CHARACTERISTICS: Depth to rock is greater than 60 inches. Reaction is moderately acid or strongly acid except where the surface layer has been limed. Content of coarse fragments range from 0 to 5 percent in the A and Bt horizons and 0 to 10 percent in the 2Bt horizon.

The A horizon has hue of 5YR to 10YR, value of 3 or 4, and chroma of 3 or 4. Texture is silt loam, except severely eroded areas are silty clay loam.

Most pedons have transition horizons with color and texture similar to adjacent horizons.

The Bt horizon has hue of 5YR to 10YR, value of 4 or 5 and chroma of 4 to 8. Redox features with chroma 2 or less are present within 30 inches of the soil surface and redox features in shades of brown, gray, or red range from none to common throughout this horizon. The texture is silt loam or silty clay loam. Commonly the middle and lower parts of the Bt horizon are brittle in about 25 to 50 percent of the mass.

Some pedons have up to 5 percent of silty eluvial material in seams, streaks and pockets in the lower part of the Bt horizon or upper part of the 2Bt horizon.

The 2Bt horizon has hue of 10YR to 5YR, value of 4 or 5 and chroma of 4 to 8. Redox features are in shades of brown, red and gray. Texture is silty clay loam, silty clay or clay.

COMPETING SERIES: These are the Falkner and Vian series, in the same family. Similar soils are the Bewleyville and Capshaw series. Falkner soils have clayey 2Bt horizons that formed in marine sediments. Vian soils do not have a lithological discontinuity. Bewleyville soils do not have mottles of chroma 2 or less within 30 inches of the soil surface. Capshaw soils are clayey.

GEOGRAPHIC SETTING: Nesbitt soils are on nearly level to gently rolling uplands and terraces in the Nashville Basin and smooth stream terraces of the Highland Rim. Slopes range from 0 to 10 percent. These soils formed in a silty mantle of loess or old alluvium and the underlying residuum from limestone. Near the type location the mean annual temperature is 58.1 degrees F. and the mean annual precipitation is 53.1 inches.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Bradyville, Cumberland, and Talbott series on adjacent uplands and the Arrington and Egam soils on flood plains in the Nashville Basin. Bradyville, Cumberland, and Talbott soils are clayey. Arrington and Egam soils have mollic epipedons.

DRAINAGE AND PERMEABILITY: Moderately well drained; low to high runoff, moderate and moderately slow permeability.

USE AND VEGETATION: Hay, pasture, corn, small grain, and tobacco. Native vegetation was mixed hardwoods.

DISTRIBUTION AND EXTENT: Nashville Basin and Highland Rim of Tennessee. The series is of small extent.

MLRA OFFICE RESPONSIBLE: Morgantown, West Virginia

SERIES ESTABLISHED: Rutherford County, Tennessee; 1974.

REMARKS: Diagnostic horizons and features recognized in the pedon are:

Ochric epipedon - from 0 to 8 inches (Ap horizon).

Argillic horizon - from 8 to 65 inches (Bt1-Bt5, 2Bt6 horizons)

Brittleness- from 25 to 55 inches (Bt3, Bt4 and Bt5 horizons)

National Cooperative Soil Survey
U.S.A.

TNR100

SOIL INTERPRETATIONS RECORD

NEBBITT SERIES

PLRAC10: 100

REV. RPS. 3-84

AGRIC. PALUDAL, FINE-SILTY, SILICEOUS, THERMIC

THE NEBBITT SERIES CONSISTS OF MODERATELY WELL-DRAINED SOILS ON UPLANDS. THEY FORMED IN A THIN LAYER OF LOESS, A LAYER OF ALLUVIUM AND IN THE UNDERLYING LIMESTONE RESIDUUM. IN A REPRESENTATIVE PROFILE, THE SURFACE LAYER IS DARK REDDISH BROWN SILTY LOAM 8 INCHES THICK. BETWEEN DEPTHS OF 8 AND 35 INCHES THE SOIL IS SILTY CLAY LOAM WHICH IS REDDISH BROWN IN THE MIDDLE PART AND STRONG BROWN WITH MOTTLES IN THE LOWER PART. BELOW THIS THE SOIL IS YELLOWISH BROWN CLAY WITH MOTTLES. SLOPES ARE 0 TO 10 PERCENT.

ESTIMATED SOIL PROPERTIES

ESTIMATED SOIL PROPERTIES											
DEPTH (IN.)	UNDA TEXTURE	UNIFIED	AASHTO	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO.				ILLIQUID LIMIT	PLAS- TICITY INDEX		
				(PCT)	4	10	40	200			
0-8" SIL. SIL		ML, CL, CL-ML	A-4	0	100	95-100	80-95	75-90	15-30	3-10	
8-25" SIL. SIL		CL, ML	A-6, A-7	0	100	95-100	85-100	85-95	30-45	10-20	
25-45" SIL. SIL		CL, ML	A-6, A-7	0	100	95-100	80-95	75-95	30-45	10-20	
45-60" CL. SIC		ML, CH, CL	A-7	0	95-100	80-100	75-95	70-90	45-65	120-34	
DEPTH CLAY MOISTURE RATIO											

DEPTH (IN.)	CLAY (PCT)	WATER CAPACITY (IN/IN)	SHRINK- SWELL POTENTIAL (K I T GROUP)	PERCENT OF ORGANIC MATTER (PCT)	CORROSIVITY STEEL CONCRETE
0-8" 15-20	1.05	0.6-2.0	0.18-0.22	15.1-5.5	LOW 1.43 5
8-25" 20-35	1.40-1.55	0.6-2.0	0.17-0.20	14.1-4.5	LOW 1.37 1
25-45" 20-35	1.50-1.65	0.2-2.0	0.10-0.15	14.1-5.5	LOW 1.37 1
45-60" 10-15	1.45-1.60	0.2-0.6	0.10-0.15	14.1-6.5	MODERATE 1.24 1

FLOODING	HIGH WATER TABLE	CEMENTED PAV.	RED ROCK	SUBSIDENCE	HYDRO- POTENTIAL
FREQUENCY	DURATION	DEPTH	DEPTH	DEPTH	DEPTH
NONE	MONTHS	(IN)	(IN)	(IN)	(IN)
		0-2-4	0-2-4	0-2-4	0-2-4

SANITARY FACILITIES (A)

CONSTRUCTION MATERIAL (A)

SEPTIC TANK ABSORPTION FIELD	SEVERE-WETNESS, PFCES FLOW	ROADFILL	POOR-LOW STRENGTH
SEWAGE LAGOON AREAS	0-7%: SEVERE-WETNESS 7-10%: SEVERE-SLOPE, WETNESS	SAND	IMPROBABLE-EXCESS FINES
SANITARY LANDFILL (TRENCH)	0-8%: MODERATE-WETNESS, TOO CLAYEY 8-10%: MODERATE-WETNESS, SLOPE, TOO CLAYEY	GRAVEL	IMPROBABLE-EXCESS FINES
SANITARY LANDFILL (AREA)	0-8%: MODERATE-WETNESS 8-10%: MODERATE-WETNESS, SLOPE	TOPSOIL	0-8%: FAIR-TOO CLAYEY 8-10%: FAIR-TOO CLAYEY, SLOPE
DAILY COVER FOR LANDFILL	0-8%: FAIR-TOO CLAYEY, WETNESS 8-10%: FAIR-TOO CLAYEY, SLOPE, WETNESS		

BUILDING SITE DEVELOPMENT (A)

WATER MANAGEMENT (A)

SHALLOW EXCAVATIONS	MODERATE-WETNESS	EMBANKMENTS DICES AND LAYERS	MODERATE-THIN LAYER, PIPING, WETNESS
DWELLINGS WITHOUT BASEMENTS	0-8%: MODERATE-WETNESS 8-10%: MODERATE-WETNESS, SLOPE	EXCAVATED POINTS AQUIFER FED	SEVERE-NO WATER
DWELLINGS WITH BASEMENTS	0-8%: MODERATE-WETNESS 8-10%: MODERATE-WETNESS, SLOPE	DRIPAGE	0-3%: FAVORABLE 3-8%: SLOPE
SMALL COMMERCIAL BUILDINGS	0-8%: MODERATE-WETNESS 8-10%: MODERATE-WETNESS, SLOPE 8-10%: SEVERE-SLOPE	IRRIGATION	0-3%: WETNESS, ERODES EASILY 3-8%: WETNESS, SLOPE, ERODES EASILY
LOCAL ROADS AND STREETS	SEVERE-LOW STRENGTH	TERPACTS AND DIVERSIONS	0-8%: ERODES EASILY, WETNESS 8-10%: SLOPE, ERODES EASILY, WETNESS
LAWNS, LANDSCAPING AND GOLF FAIRWAYS	0-8%: FLIGHT 8-10%: MODERATE-SLOPE	CRASED WATERWAYS	0-8%: ERODES EASILY 8-10%: SLOPE, ERODES EASILY

REGIONAL INTERPRETATIONS

Table 1.9.1
3.0 Soil Characteristics
3.1- Test Pits

SOIL PROFILE DESCRIPTIONS

PROFILE DESCRIPTIONS PROVIDED ON
SOILS MAP AS EVALUATED BY
JAY ANDREWS

Table 1.9.1

– Determination of design percolation

DESIGN PERCOLATION DATA

$$\left(\frac{42.59 \text{ in}}{\text{day}} \times \frac{1 \text{ day}}{24 \text{ hr}} \right) \div 1.77646 \text{ in/hr} = 1.0 \text{ in/hr}$$

Even
Pierced

**DRIP FIELD PERMEABILITY TESTING
ADDITION TO KINGS CHAPEL
WILLIAMSON COUNTY, TN**

Grid Location	cm/hr	cm/sec	in./day	Average Values in./day
V-98	3.8	1.0416667E-03	35.4	35.4
Y-107	3.1	8.6944444E-04	29.6	29.6
S-96	2.8	7.7777778E-04	26.5	*
R-101	3.0	8.3333333E-04	28.3	28.3
E-99	3.7	1.0277778E-03	35.0	35.0
F-101	2.9	8.0555556E-04	27.4	27.4
I-100	6.2	1.7222222E-03	58.6	58.6
K-102	5.3	1.4722222E-03	50.1	50.1
K-97	6.7	1.8611111E-03	63.3	*
Y-95	2.5	6.9444444E-04	23.6	*
W-92	5.6	1.5555556E-03	52.9	52.9
OO-97	6.4	1.7777778E-03	60.5	60.5
JJ-94	7.3	2.0277778E-03	69.0	*
unknown	5.1	1.4166667E-03	48.2	48.2
GG-102	4.5	1.2500000E-03	42.5	42.5
Avg.				42.59 in./day 298.12 in./wk.
Use				2.25 in./wk.

*The two lowest and highest values were deleted

Table 1.9.1
3.4- Soil Chemistry Testing

SOIL CHEMICAL TESTS

Samples were collected by Nathan Fay in accordance with 16.2.3. Each proposed useable soil series was sampled and numbered according to soil series.

T1= Stiversville Series
T2= Armour, Arrington Series
T3= Lindell, Lynnville Series
T4= Egam, Lanton Series
T5= Nesbitt Series
T6= Hampshire Series

Small areas of other series may exist but are too small to justify the chemical testing expense.

Approximate locations of Soil Samples are plotted on attached plat.

Samples were provided to the below laboratory for analysis.

MicroBac Labs
Knoxville Division
505 E. Broadway Ave.
Maryville, TN 37804

Table 1.9.1
3.5 – Engineering properties of pond

**ENGINEERING PROPERTIES OF SOILS FOR POND
CONSTRUCTION**

- 3.5.1 – Clay Content
- 3.5.2 – Permeability
- 3.5.3 – Plasticity
- 3.5.4 – Consistency

Engineering Criteria of Soils For Pond Construction

The Williamson County Soil Survey indicates that large areas of heavy clay are somewhat prevalent on site. However, this map was prepared for agricultural use and is not very detailed. Potential areas of significant clay will be determined and benchmarked during construction of the roads and other structures. These areas will be unearthed and used for the stabilization pond liner. If substantial clay is not found on site, clay will be trucked in for the pond liner. A clay liner will be the preferred method of lining the stabilization pond and is typically used as such.

The engineering data of the Clay Liner **must** meet the following criteria:

1. Clay Content: 40 to 70 percent
2. Permeability: 1×10^{-7} to 1×10^{-6} cm/sec
3. Plasticity: 21 Plasticity Index
4. Consistency: medium stiff to stiff

Should the clay not meet the design criteria for the stabilization pond, a PVC liner will be purchased for the lining of the pond.

11.0 FACILITIES CONSTRUCTION AND LAND COST ESTIMATE

Quantity	Unit		Unit Cost	Total
<u>Collection System</u>				
234 Each	1,500 Gal. STEG Tank w/Service Line	@	\$ 2,100.00	\$ 491,400.00
16000 L.F.	4" PVC Collection Line	@	\$ 6.00	\$ 96,000.00
18 Each	Cleanouts	@	\$ 150.00	\$ 2,700.00
Sub-total				\$ 590,100.00
<u>Wastewater Treatment and Drip System</u>				
1 LS	70,200 GPD Recirculating Sand Filter & Drip Irrigation Syst	@	\$ 615,000.00	\$ 615,000.00
14,000 C.Y.	Pond Excavation	@	\$ 5.00	\$ 70,000.00
800 L.F.	Fence	@	\$ 15.00	\$ 12,000.00
7,200 L.F.	6" and 3" PVC Force Main (same trench)	@	\$ 7.00	\$ 50,400.00
Sub-total				\$ 747,400.00
11 Acre	Land	@	\$ 7,000.00	\$ 77,000.00
Total				\$ 1,414,500.00

Collection System = \$590,100
OR \$2,520 EA FOR 234 LOTS

WWTP = \$747,400.00

12.0 Description of the "back-up" system proposed in accordance with regulations. Back-up system will consist of a new recirculating gravel filter, recirculation chambers and final dose tank, and provisions for a duplication of the drip irrigation system.

12.0 BACK-UP SYSTEM ESTIMATE

Quantity	Unit		Unit Cost	Total
<u>Wastewater Treatment and Drip System</u>				
1 LS	70,200 GPD Recirculating Sand Filter & Drip Irrigation Syste	@	\$ 615,000.00	\$ 615,000.00
11 Acre	Land	@	\$ 7,000.00	<u>\$ 77,000.00</u>
Total				\$ 692,000.00

**2.0 PRELIMINARY
DRIP LAYOUT**



Supersedes
 June 2008
 Drawings 1202
 6/12/08

**2.0 SAND FILTER &
STORAGE POND
LAYOUT**

SOIL EVALUATIONS

Notes:

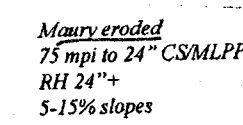
- Legend:**

Plow furrow/rut

Jay Andrews
Soil Consultant
12-31-07

1. Maurv

- Maurv
75 mpi WMS
RH 20" +
0-5% slopes



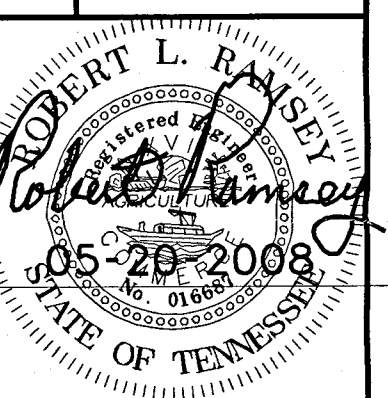
1. TEST PIT AND AUGER SAMPLES WERE TAKEN AT LOCATIONS SHOWN BY THE SYMBOL ☆
2. THE SYMBOL ● REPRESENTS THE LOCATIONS OF THE SATURATED HYDRAULIC CONDUCTIVITY TEST AND SOIL CHEMICAL SAMPLES.



JAMES C. HAILEY & COMPANY
Consulting Engineers
Nashville, Tennessee 37214
PH: 615-883-4933 FAX: 615-883-4937
<http://www.jchengr.com>

SOIL EVALUATIONS

MEADOW BROOK SUBDIVISION
Williamson County, Tennessee



SIGN
RLR
LAWN
BKQ
CHECKED
RLR
DATE
MAY 2008
SCALE
1"=100'-0"
PROJECT NO.
07436
EFT

1

**DRIP FIELD
SOILS SURVEY**

June 26, 2007

Ms. Ann Haines
Williamson County Planning Department
1320 West Main Street
Franklin, TN 37067

Dallas

Denver

RE: **Watkins Creek Section 5** - SSR No. 00-41-021.0

Fort Lauderdale

Dear Ms. Haines:

Hernando

As you requested, we have reviewed the submittal from the Watkins Creek subdivision in regards to the bond amount for the Section 5 wastewater collection system.

Houston

Based on the initial cost estimate submitted in 2000, the additional bond required for Section 5 would be as follows:

Knoxville

1. Collection System:

Memphis

$$(\$456,000)/(175 \text{ Lots}) = \$2,600 \text{ per lot}$$

$$\text{Section 5 (32 Lots)}(\$2,600)(1.5) = \mathbf{\$124,800.00}$$

Nashville

2. Treatment and Disposal System:

Phoenix

It is our understanding that the bonding has been in place for the entire treatment and disposal system, and that no additional bonding is required to accommodate Section 5.

Sarasota

If you have any questions concerning our comments, please do not hesitate to contact me.

Sincerely,

SMITH SECKMAN REID, INC.



Bo Butler, P.E.

Cc: file (1)

From Andrews

*BRENDA
P. M. B.*

March 29, 2007

Mr. Mike Matteson
Director, Williamson County Planning Department
Administrative Complex
1320 West Main Street
Franklin, TN 37067

RE: Laurel Cove Subdivision - SSR No. 00-41-021.0

Dear Mr. Matteson:

As you requested, we have reviewed the DDR & DSIR for the Laurel Cove subdivision treatment plant and disposal system prepared by Tennessee Wastewater Systems, Inc. We have enforced the wastewater treatment and disposal system regulations adopted by Williamson County and find that the applicant has met the required conditions. I have attached a few comments for the consideration of the planning commission relating to the submittal.

Per your request, the recommended performance and backup bond amounts are as follows:

1. Performance Bonds

a. Collection System:

Construction Cost of (\$2,337,300) $\times 150\% = \$3,506,000.00$

b. Treatment and Disposal System:

Construction Cost of \$1,650,900 $\times 150\% = \$2,476,500.00$

2. Backup Bond for Treatment and Disposal System:

Construction Cost of \$1,650,900 $\times 150\% = \$2,476,500.00$

If you have any questions, please feel free to call me at 383-1113.

Sincerely,

SMITH SECKMAN REID, INC.

Bo Butler, P.E.

00-41-021.0 File (1)

x 0.30 = \$700,000

*1000 BODS
OF CONCENTRATION
2/14/07
BODS
10/20/07
GIVEN D&P
4/12/08*

March 29, 2007

REVIEW COMMENTS

Design Development Report

Laurel Cove Subdivision; McCrory Creek Wastewater Treatment Facility

1. The Williamson County Wastewater Regulations require a 300-foot buffer between any part of the treatment and storage facility and the property line of the development. However, the regulations also allow that this buffer may extend into public right-of-way for roads and rail systems.

The buffer zone for the McCrory Creek treatment and storage facility does extend beyond the property line of the Laurel Cove development. The buffer extends into the adjacent Eudailey treatment facility that serves the Guffee Farms development. The affected property that lies outside the Laurel Cove development is either owned in total by the same treatment provider, Tennessee Wastewater Systems, Inc., or is part of the State Route 840 right-of-way. In essence, once all properties have been turned over to TN Wastewater Systems, the property line between the two facilities could disappear.

It is our intention merely to bring this condition to the attention of the Planning Commission. While the location of the buffer zone may not strictly comply with the Williamson County regulations at the time this DDR/DSIR is being reviewed, it is assumed that, before homes are constructed in this development, all required properties will be turned over to TN Wastewater Systems, and the intent of the regulations would then be satisfied.

2. The DDR identifies areas within the Laurel Cove development that are to be utilized as a golf course. While beneficial reuse of treated effluent from this treatment facility is not being proposed at this time, we understand that a golf course might be able to use a large portion of the effluent from this facility, and would encourage such use. In case of future beneficial reuse of treated wastewater from this facility, we would point out that the requirements for auxiliary disposal would apply.
3. This treatment facility will be one of the larger capacity facilities within Williamson County and is the first to use the Membrane system as a treatment process. The applicant has previously submitted a paper outlining opportunities for operating the Eudailey treatment facility as a regional system. The outcome of this paper was that the Guffee Farms development was not located in the best area to serve the basin as a centralized facility, nor was there sufficient land available at Guffee Farms. It was suggested at that time that future development in the area might be encouraged to locate their treatment systems nearby, and, in doing so, essentially provide a centralized treatment system for this area. The Laurel Creek

Review Comments

March 29, 2007

Page 2 of 2

development offers the opportunity to combine facilities in just that way. The treatment provider might be encouraged to find ways to combine the two facilities to operate as an area-wide wastewater plant.



Williamson County, Tennessee
Planning Commission
1320 West Main Street - Suite 400
Franklin, Tennessee 37064
Voice: 615.790-5725 Fax: 615.591-8531

Facsimile Transmittal Sheet

To: Bo Butler From: J. Horne
Company: SSR Date: 5/23/07
Fax number: 386.8469 Total No. of Pages Including Cover: 2
Phone Number: Laurel Cove / Gutter Farm Sender's Reference Number:
Re: Your Reference Number:

☐ URGENT ☐ FOR REVIEW ☒ PLEASE COMMENT ☐ PLEASE REPLY

Notes/Comments:

Bo ... please read the attached. This isn't necessary by my understanding of the Laurel Cove revised plan. But it is an expansion of the Gutter Farm plan.

May not make any difference, but I wanted your thoughts on the matter.

JH



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE ENVIRONMENTAL FIELD OFFICE

711 R. S. GASS BOULEVARD
NASHVILLE, TENNESSEE 37243

PHONE (615) 687-7000 STATEWIDE 1-888-891-8332 FAX (615) 687-7078

May 14, 2007

Mr. Keith Townsend
Adenus Solutions Group
849 Aviation Parkway
Smyrna, Tennessee 37167

Re: Site Inspection
Eudailey Treatment Facility (SOP-05036)
Williamson County

Dear Mr. Townsend:

On April 25, 2007, I met with you to investigate this site for a proposed expansion of this system to serve a proposed residential development. The treatment system expansion would include a membrane plant in addition to the existing recirculating sand filter (RSF). Effluent disposal from both treatment systems will continue to be by drip irrigation. The design capacity for this system, after the proposed expansion, will be 0.42 MGD. This letter does not authorize the construction of or use of the referenced system until all state requirements have been met.

An information submittal was received in this office on April 9, 2007. It contained an original and two (2) copies of the permit application, engineering report containing hydraulic and nitrogen loading information, treatment process schematic for both the RSF and the membrane plant, extra-high intensity soil's map, 1:24,000 scale topographic location map, 24" x 36", Site Layout and drip disposal site plan for this facility. The original and one copy have been forwarded to the WPC - Permit Section for processing.

If you have any questions or if I can be of further assistance, please contact me by phone at 615/687-7127 or by e-mail at Mike.Thornton@state.tn.us.

Sincerely,

Michael R. Thornton
Division of Water Pollution Control

cc: WPC - Municipal Facility Section
Williamson County Community Development

STEG System Design - Wastewater Site Plan

for

KINGS' CHAPEL & HIGH PARK HILL

Community
(PHASES 9-12)

Community

Utility District: Superior Wastewater System
PO Box 190 Arrington, TN 37014
Williamson County.

DRAWING INDEX

C0.00 COVER SHEET

C0.01 GENERAL NOTES

C1.00 MASTER OVERALL SITE PLAN

C1.01 SITE PLAN

C1.02 SITE PLAN

C1.03 SITE PLAN

C1.04 SITE PLAN

C1.05 SITE PLAN

C1.06 SITE PLAN

C4.01 DETAILS

C4.02 DETAILS

C4.03 DETAILS

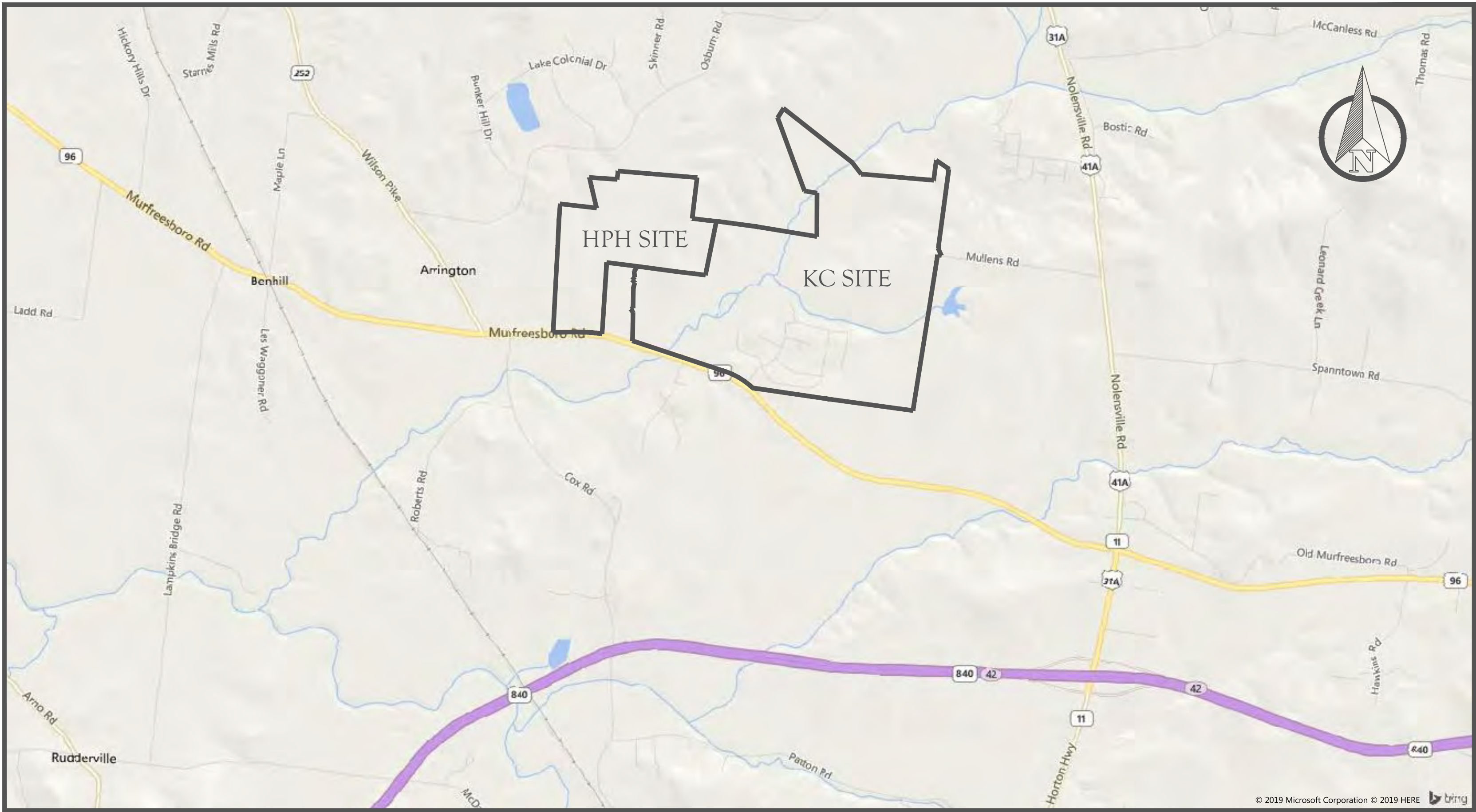
C4.04 DETAILS

C4.05 DETAILS

C4.06 DETAILS

C4.07 DETAILS

L1.00 LANDSCAPE PLAN



SITE LOCATION MAP

NOT TO SCALE

NOTES:

1. THIS PROPERTY HAS BEEN REVIEWED FOR THE EXISTENCE OF INTERMITTENT AND PERENNIAL STREAMS. STREAMS THAT WOULD REQUIRE WATERWAY NATURAL AREAS AS DESCRIBED IN SECTION 4 OF THE WILLIAMSON COUNTY STORM WATER MANAGEMENT REGULATIONS HAVE BEEN LOCATED AS SHOW.
2. THE SITE HAS BEEN REVIEWED FOR THE PRESENCE OF STEEP SLOPES, HILLTOPS AND RIDGETOPS, SLIPPAGE SOILS, AND KARST FEATURES. NONE OF THE MENTIONED FEATURES ARE PRESENT ON THIS SITE.
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4. ALL COMPONENTS OF THE WASTEWATER TREATMENT SYSTEM ARE ON SLOPES LESS THAN 15%.

County Engineering:
Williamson County Engineering Dept.
Suite 400
1320 West Main Street
Franklin, TN 37064
(615) 790-5809

Middle Tennessee Electric
Membership Corp.
2156 Edward Curd Lane
Franklin, TN 37067
1 (877) 777-9020

Milcrofton Utility District
(WATER)
6333 Arno Road
Franklin, TN 37064
(615) 794-5947

Developer (Properties 1)	Developer (Properties 2 & 3)
JP Properties LLC PO Box 190 Arrington, TN 37014	Waits Dev Group PO Box 111285 Nashville, TN 37222

Property #1:	Deed #1: Acreage of Parcel 214.04
JP Properties LLC PO Box 190 Arrington, TN. 37014	Deed Book 6590, Deed Page 649, Map 018, Parcel 109

Property #2:	Deed #2: Acreage of Parcel 99.25
Mary L. Hill & Beth A Hill 4852 Murfreesboro Road Arrington, TN. 37014	Deed Book 5888, Deed Page 276, Map 038, Parcel 109

Property #3:	Deed #3: Acreage of Parcel 99.00
George M Roberts, Jr. 4860 Murfreesboro Road Arrington, TN. 37014	Deed Book 1536, Deed Page 388, Map 023, Parcel 109

Floodplain Note:
A portion of this site is within the 100 year floodplain.
CP 47187C0240F & CP 47187C0380F Dated 09.26.2006

Land Data: Zoning: RD-1

STEG System Data:
Design Flow = 302 Lots x 300 gpd/lot = 90,600 gpd average daily design flow.
Land Application Area + Reserve Area Required = 862,858 sq. ft. or 19.81 Acres
Land Application Area Provided = 19.81 Acres

Approved by the Williamson County Planning Commission, with such conditions as are indicated in the minutes of the Commission on _____.

- EPSCS BE INSTALLED BEFORE THE COMMENCEMENT OF EARTHWORK.
2. INSPECTIONS OF OUTFALLS/EPSC MEASURES SHALL BE CONDUCTED AT LEAST TWICE WEEKLY AND AT LEAST 72 HOURS APART. SEDIMENT SHALL BE REMOVED FROM SILT FENCING WHEN REACHING $\frac{3}{4}$ THE HEIGHT OF THE FENCE. CONTRACTOR TO REMOVE SEDIMENT AS RECOMMENDED IN THE TNEPSC HANDBOOK.
3. ALL NECESSARY BEST MANAGEMENT PRACTICES SHALL BE INSTALLED AND MAINTAINED REGULARLY TO PREVENT ALL POSSIBLE SEDIMENT FROM EXITING THE SITE.
4. THE PROPOSED CONTOURS AND ELEVATIONS INDICATE FINISHED SURFACE GRADE.
5. THE GENERAL CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DAMAGE TO ADJACENT PROPERTIES DURING CONSTRUCTION. THE CONTRACTOR WILL BE HELD SOLELY RESPONSIBLE FOR ANY DAMAGES TO ADJACENT PROPERTIES OCCURRING DURING CONSTRUCTION OF THIS PROJECT. NO WORK SHALL BE PERFORMED OUTSIDE THE PROJECT BOUNDARY WITHOUT PROPER AGREEMENTS WITH THE AFFECTED PROPERTY OWNERS.
6. THE GENERAL CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR JOB SITE CONDITIONS, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTY DURING CONSTRUCTION. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND IS NOT LIMITED TO NORMAL WORKING HOURS.
7. THE LOCATION AND/OR ELEVATION OF THE EXISTING UTILITIES SHOWN HEREON ARE BASED ON UTILITY COMPANY RECORDS, AND WHERE POSSIBLE, FIELD MEASUREMENTS. THE CONTRACTOR SHALL NOT RELY UPON THIS INFORMATION AS BEING EXACT OR COMPLETE. THE CONTRACTOR SHALL CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 3 DAYS BUT NOT MORE THAN 10 DAYS PRIOR TO ANY EXCAVATION AND REQUEST FIELD VERIFICATION OF UTILITY LOCATIONS. THE CONTRACTOR SHALL VERIFY THE LOCATION AND DEPTH OF ALL UTILITIES TO REMAIN. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY DAMAGED UTILITIES ACCORDING TO LOCAL CODES AT THE CONTRACTORS EXPENSE.
8. THE CONTRACTOR SHALL CHECK ALL EXISTING AND FINISHED GRADES, DIMENSIONS, ETC. PRIOR TO BEGINNING WORK. NOTIFY THE OWNERS REPRESENTATIVE OF ANY DISCREPANCIES AND/OR ERRORS IN THE PLANS PRIOR TO COMMENCING WORK.
9. TOPSOIL AND OTHER MATERIALS NOT SUITABLE FOR FILL OR REUSE SHALL BE DISPOSED OF OFFSITE IN ACCORDANCE WITH THE REQUIREMENTS OF **WILLIAMSON COUNTY** AND AS DIRECTED BY THE OWNER OR THEIR REPRESENTATIVE.
8. THE CONTRACTOR SHALL COMPLY WITH ALL PERTINENT O.S.H.A. PROVISIONS AND THE MANUAL OF ACCIDENT PREVENTION AND CONSTRUCTION, ISSUED BY THE AGC OF AMERICA, INCORPORATED, AND THE SAFETY AND HEALTH REGULATIONS OF CONSTRUCTION ISSUED BY THE U.S. DEPARTMENT OF LABOR.
9. THE CONTRACTOR SHALL CONFORM TO ALL APPLICABLE LOCAL, STATE, AND FEDERAL CODES.
10. THE CONTRACTOR SHALL PROVIDE POSITIVE DRAINAGE THROUGH THE SITE DURING ALL PHASES OF CONSTRUCTION.
11. EXCAVATED SUBGRADES AND EACH LAYER OF FILL SHALL BE OF A QUALITY ACCEPTABLE TO THE OWNERS REPRESENTATIVE AND SHALL NOT INCLUDE ORGANIC MATERIAL, BOULDERS, DEBRIS, WET MATERIAL, ETC. CUT OR STRIPPED AREAS SHALL BE PROOF ROLLED PRIOR TO ANY FILLING. ALL GRADING ACTIVITY AND PLACEMENT OF MATERIAL SHALL BE MONITORED BY A QUALIFIED GEOTECHNICAL ENGINEER (OR THEIR REPRESENTATIVE), OR AS DIRECTED BY THE OWNERS REPRESENTATIVE. MATERIAL SHALL MEET OR EXCEED COMPACTION REQUIREMENTS AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.
12. ALL CONSTRUCTION MATERIALS, PAVEMENT MATERIALS, ROADWAY AND SIDEWALK CONSTRUCTION SHALL CONFORM TO LOCAL CODES AND/OR DOT STANDARDS AND SPECIFICATIONS.

3. BASE INFORMATION WAS TAKEN FROM A SURVEY. CONTRACTOR TO NOTIFY ENGINEER OF ANY DISCREPANCIES BEFORE COMMENCEMENT OF WORK.
2. ALL SITE CONSTRUCTION MATERIALS AND WORKMANSHIP, INCLUDING BUT NOT LIMITED TO PAVING, STRIPING, AND CONCRETE SHALL CONFORM TO THE CURRENT STANDARD SPECIFICATIONS, DETAILS AND REQUIREMENTS OF WILLIAMSON COUNTY AND/OR T.D.O.T.
3. THE CONTRACTOR SHALL CHECK AND VERIFY ALL EXISTING CONDITIONS, UTILITIES, AND DIMENSIONS IN THE FIELD PRIOR TO BEGINNING CONSTRUCTION. IF ANY DISCREPANCIES AND/OR ERRORS ARE FOUND ON THE DRAWINGS OR IF PROBLEMS ARE ENCOUNTERED DURING CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
4. THE CONTRACTOR SHALL PROTECT ANY EXISTING UTILITIES, TREES, BUILDINGS, ETC. THAT ARE TO REMAIN. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGES.
5. THE CONTRACTOR SHALL GIVE ALL NECESSARY NOTICES, OBTAIN ALL NECESSARY PERMITS, AND PAY ALL APPLICABLE FEES. CONTRACTOR TO ABIDE BY ALL LOCAL CODES.
6. SHOULD ANY DAMAGES OCCUR DURING EITHER ON-SITE OR OFF-SITE CONSTRUCTION TO ANY IMPROVEMENTS TO REMAIN (SUCH AS UTILITIES, PAVEMENTS, FENCES, ETC.) OR TO ANY SURVEY POINTS TO REMAIN (SUCH AS REFERENCE POINTS, PROPERTY CORNERS, ETC.) AND IF SAID DAMAGES ARE CAUSED BY OR ARE THE RESULT OF ACTIVITIES OF THE CONTRACTOR, HIS SUBCONTRACTORS, OR THE CARELESSNESS OR NEGLIGENCE OF HIS EMPLOYEES, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING THE DAMAGED IMPROVEMENTS AND/OR POINTS.
7. CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF ALL UTILITIES PRIOR TO BEGINNING CONSTRUCTION. UTILITY LINE LOCATIONS SHOWN HEREON ARE APPROXIMATE ONLY.

- ALL GAS, ELECTRIC, AND TELEPHONE SERVICE LINES AND EXTENSIONS ARE TO BE CONSTRUCTED TO THE RESPECTIVE UTILITY COMPANY SPECIFICATIONS. UTILITY DISCONNECTIONS TO BE COORDINATED WITH THE APPROPRIATE UTILITY COMPANY.
- THE GENERAL CONTRACTOR IS PARTICULARLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF THE EXISTING UTILITIES SHOWN HEREON IS BASED ON UTILITY COMPANY RECORDS, AND WHERE POSSIBLE, FIELD MEASUREMENTS. THE CONTRACTOR SHALL NOT RELY UPON THIS INFORMATION AS BEING EXACT OR COMPLETE. THE CONTRACTOR SHALL CALL THE APPROPRIATE UTILITY COMPANY AT LEAST 48 HOURS PRIOR TO ANY EXCAVATION AND REQUEST FIELD VERIFICATION OF UTILITY LOCATIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO RELOCATE EXISTING UTILITIES CONFLICTING WITH IMPROVEMENTS SHOWN HEREON IN ACCORDANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS GOVERNING SUCH OPERATIONS.
- BEFORE INSTALLATION OF WATER LINE, THE CONTRACTOR SHALL EXCAVATE AND VERIFY ALL CROSSINGS AND INFORM THE OWNER AND THE ENGINEER OF ANY CONFLICTS. THE ENGINEER WILL BE HELD HARMLESS IN THE EVENT HE IS NOT NOTIFIED OF DESIGN CONFLICTS PRIOR TO CONSTRUCTION.
- ALL WATER AND SEWER CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH WILLIAMSON COUNTY STANDARD SPECIFICATIONS.
- THE CONTRACTOR SHALL PAY ANY APPLICABLE WATER AND SEWERAGE SERVICES INSPECTION FEES.
- MAINTAIN 10 FEET HORIZONTAL SEPARATION AND 18 INCHES OF VERTICAL SEPARATION (WATER OVER SEWER) BETWEEN SANITARY SEWERS AND WATER LINES WHERE POSSIBLE.
- THE CONTRACTOR IS TO VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES AND TAKE CARE TO PROTECT UTILITIES THAT ARE TO REMAIN. REPAIR ANY DAMAGE ACCORDING TO UTILITY STANDARDS AND AT THE CONTRACTOR'S EXPENSE. COORDINATE ALL CONSTRUCTION WITH THE APPROPRIATE UTILITY COMPANY.
- ALL AND ANY FEES, LICENSES AND PERMITS NECESSARY FOR THIS CONSTRUCTION ARE TO BE OBTAINED PRIOR TO INITIATION OF CONSTRUCTION AND THE COST OF SAME TO BE BORNE BY THE CONTRACTOR.
- CONTRACTOR SHALL EXERCISE EXTREME CAUTION IN THE USE OF EQUIPMENT IN AND AROUND OVERHEAD AND UNDERGROUND ELECTRICAL WIRES AND SERVICES. IF AT ANY TIME IN THE PURSUIT OF THIS WORK, THE CONTRACTOR MUST WORK IN THE CLOSE PROXIMITY OF THE ABOVE-NOTED WIRES, THE ELECTRIC COMPANY SHALL BE CONTACTED PRIOR TO SUCH WORK AND THE PROPER SAFETY MEASURES TAKEN. A THOROUGH EXAMINATION OF THE OVERHEAD AND UNDERGROUND WIRES IN THE PROJECT AREA SHOULD BE MADE BY THE CONTRACTOR PRIOR TO THE INITIATION OF CONSTRUCTION.
- ALL PUBLIC WATER SYSTEMS SHALL BE CONSTRUCTED UTILIZING MATERIALS THAT AREA A.S.T.M. AND/OR A.W.W.A APPROVED.
- PROVIDE A MINIMUM 36" OF COVER OVER ALL WATER LINES, 48" UNDER PAVEMENT.
- THE OWNER/CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL MATERIALS AND INSTALLING ALL WATER INFRASTRUCTURE. THIS INCLUDES VALVES, HYDRANTS, METER BOXES, SERVICE LINES, WATER MAINS, TAPPING SLEEVES, TAPPING VALVES, SERVICE YOKES, ETC. THE ONLY COMPONENT THAT IS THE EXCEPTION IS THE WATER METER. THE OWNER/CONTRACTOR IS RESPONSIBLE FOR PURCHASING AND SHIPPING THE WATER METERS TO WADC FOR STORAGE, AND WADC WILL INSTALL METERS. WITH REGARD TO THE MAINLINE TAPS, THERE IS A \$1,000 FEE FOR EACH MAINLINE TAP. THE CONTRACTOR WILL PROVIDE THE MATERIALS (T&S&V) AND PERFORM ALL SITE WORK, AND WADC WILL MAKE THE TAPS. WADC PREFERS MUELLER STAINLESS STEEL TAPPING SLEEVES AND TAPPING VALVES.
- ALL WATER LINE BENDS AND FITTINGS MUST HAVE KICKERS AS PER WADC STANDARD SPECIFICATIONS AND DETAILS.

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WATER METER : [Symbol: Circle with crosshairs]

WATER VALVE : [Symbol: Square with crosshairs]

FIRE HYDRANT : [Symbol: Circle with crosshairs]

IRON PIN (SET) : [Symbol: Circle with dot]

MANHOLE : [Symbol: Circle with crosshairs]

PROPERTY LINE : [Symbol: Dashed line]

PROPOSED WATER LINE : [Symbol: Solid line with 'W' label]

PROPOSED 1.5" SEWER LINE : [Symbol: Solid line with '1.5S' label]

PROPOSED 2" SEWER LINE : [Symbol: Solid line with '2S' label]

PROPOSED 2.5" SEWER LINE : [Symbol: Solid line with '2.5S' label]

PROPOSED 4" SEWER LINE : [Symbol: Solid line with '4S' label]

FORCE MAIN : [Symbol: Solid line with 'FM' label]

PUBLIC UTILITY & DRAINAGE EASEMENT : [Symbol: Dashed line with '20' PUDE label]

MILCROFTON UTILITY DISTRICT EASEMENT : [Symbol: Dashed line with '20' MUDEE label]

MINIMUM BUILDING SETBACK LINE : [Symbol: Dashed line with '30' MBSL label]

EXISTING CONTOUR : [Symbol: Wavy line]

EXISTING TREE LINE : [Symbol: Cloud-like shape]

PHASE LINE : [Symbol: Dashed line]

PROPOSED CONTOUR : [Symbol: Wavy line with '830' label]

PROPOSED WATER LINE AIR RELEASE VALVE WITH BOX : [Symbol: Circle with 'ARV' label]

PROPOSED LIMITS OF DISTURBANCE : [Symbol: Dashed line]

PROPOSED FORCEMAIN SEWER : [Symbol: Solid line with '2S' label]

PROPOSED FORCEMAIN SEWER PVC CASING PIPE : [Symbol: Solid line with '2S' label]

PROPOSED SEPTIC TANK : [Symbol: Rectangle with '2S' label]

PROPOSED SIDEWALK : [Symbol: Stippled pattern]

PROPOSED CRUSHED STONE PAVING : [Symbol: Stippled pattern]

The logo for 811, featuring the numbers "811" in a bold, white, sans-serif font. The numbers are set against a black, stylized background that resembles a hand or a shield. A small registered trademark symbol (®) is located to the right of the numbers.

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Call before you dig.



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307 HICKERSON DRIVE
MURFREESBORO, TENNESSEE 37129
PHONE: 615-663-7678

REVIEW SET
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CONSTRUCTION

KING'S CHAPEL & HIGH PARK HILL

STEG SYSTEM DESIGN - WASTEWATER SITE PLAN

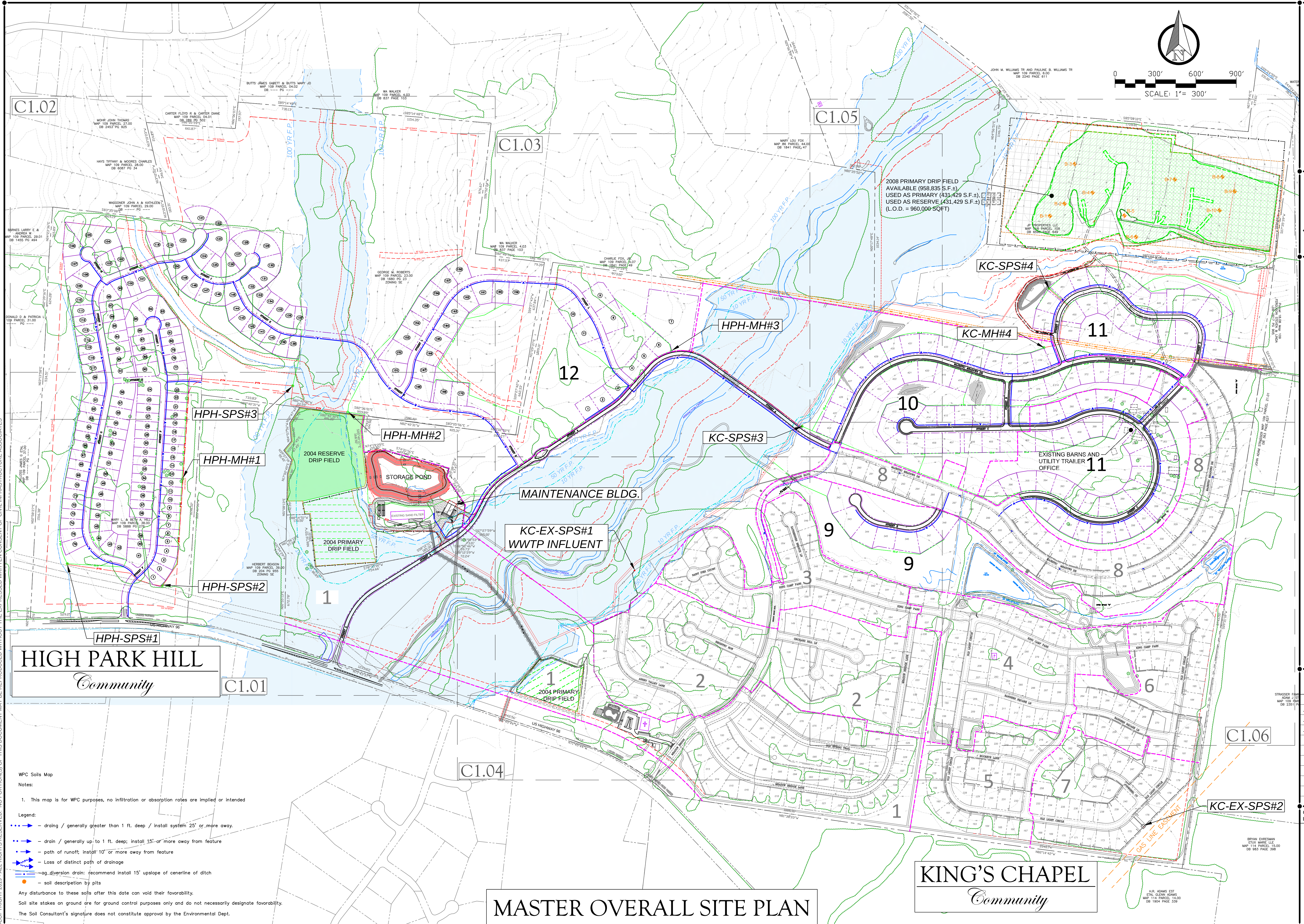
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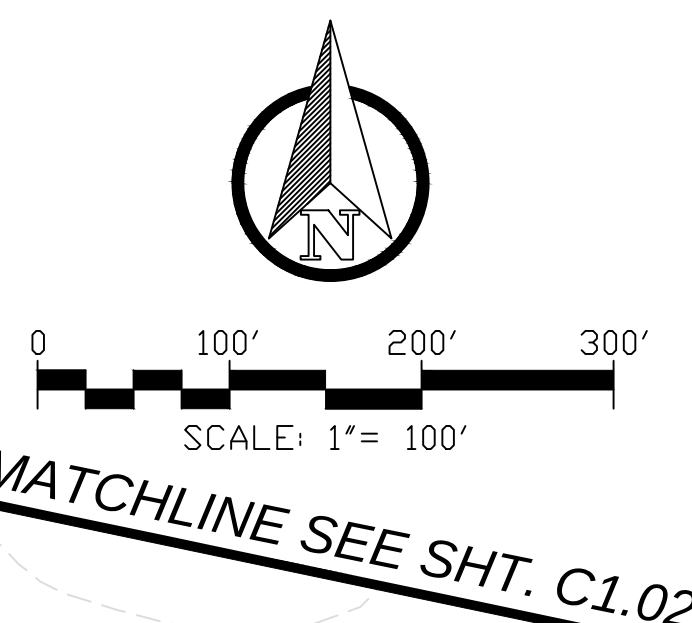
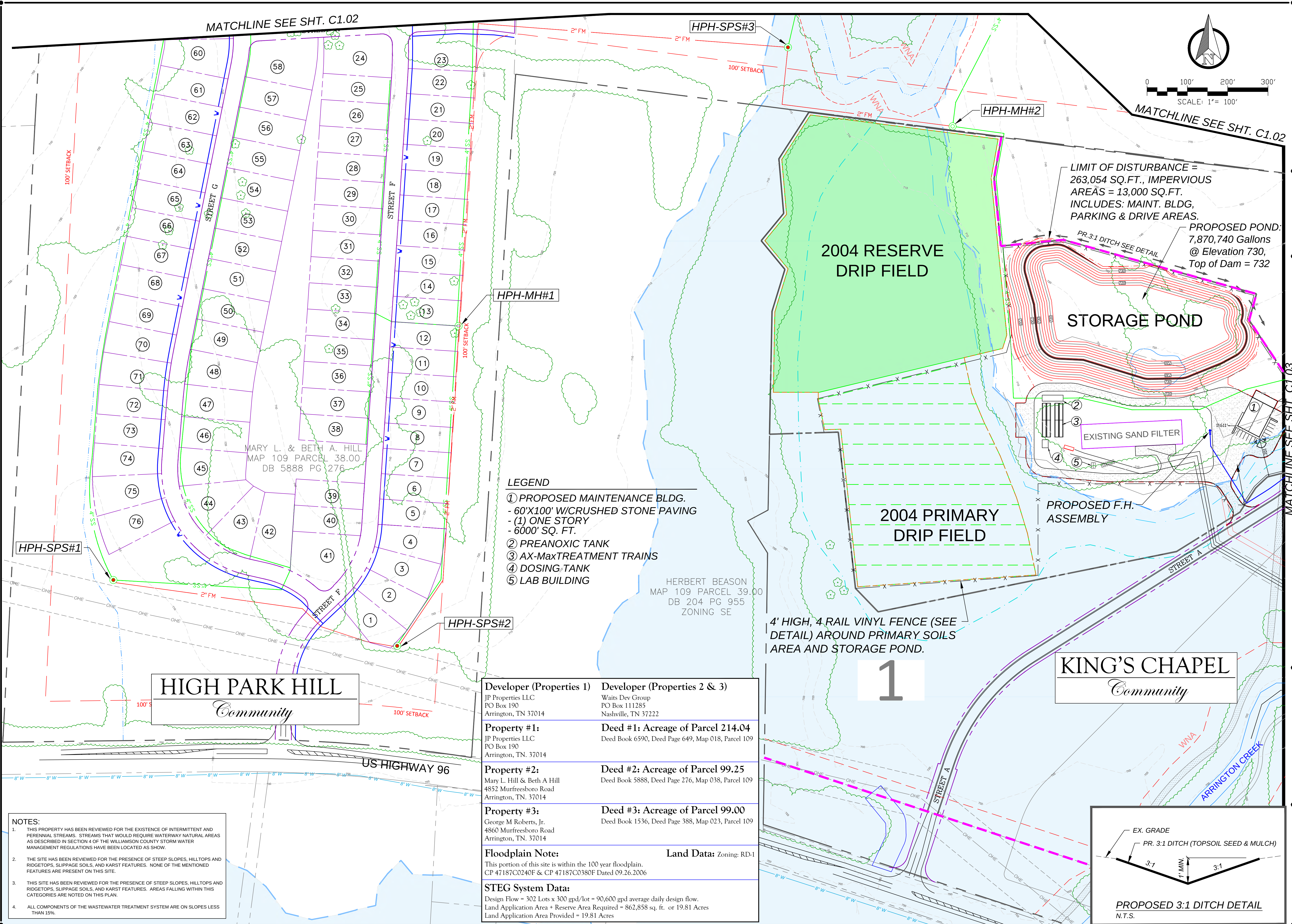
ORIGINAL
ISSUE DATE: MAY 2019

GENERAL NOTES

C0.01



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PHONE: 615-663-7678

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KING'S CHAPEL & HIGH PARK HILL
STEG SYSTEM DESIGN - WASTEWATER SITE PLAN
ARRINGTON, TENNESSEE 37014

REVISIONS
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ORIGINAL
ISSUE DATE: MAY 2019

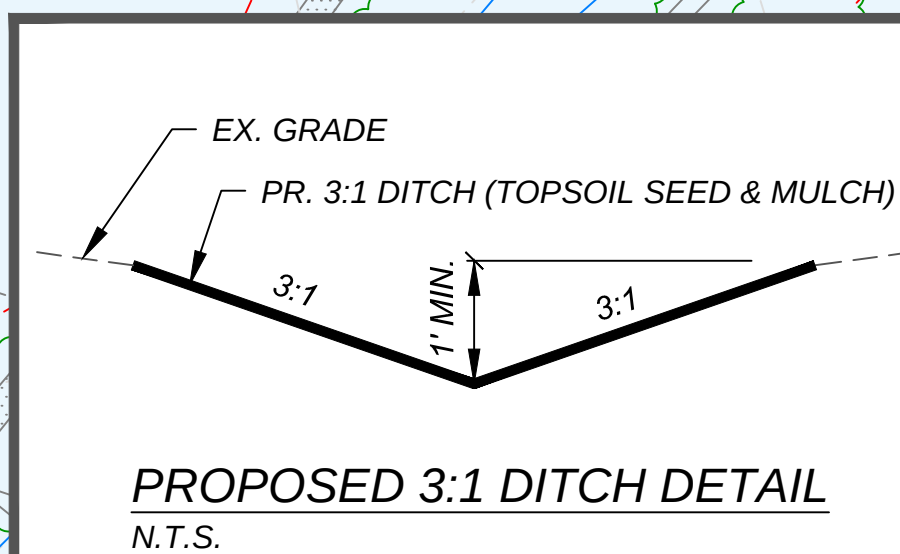
HIGH POINT HILL
SITE PLAN

C1.01

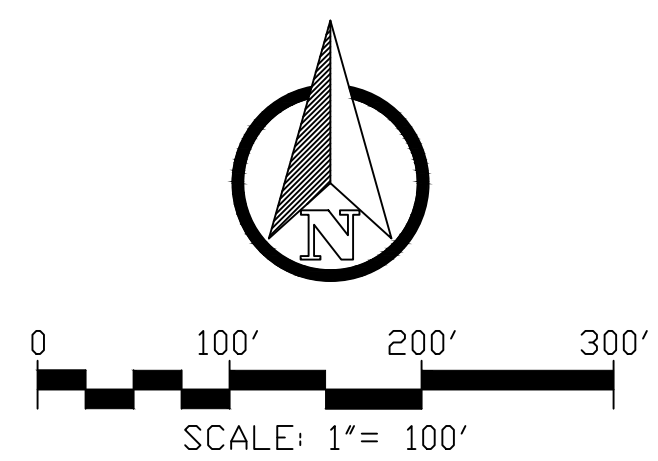
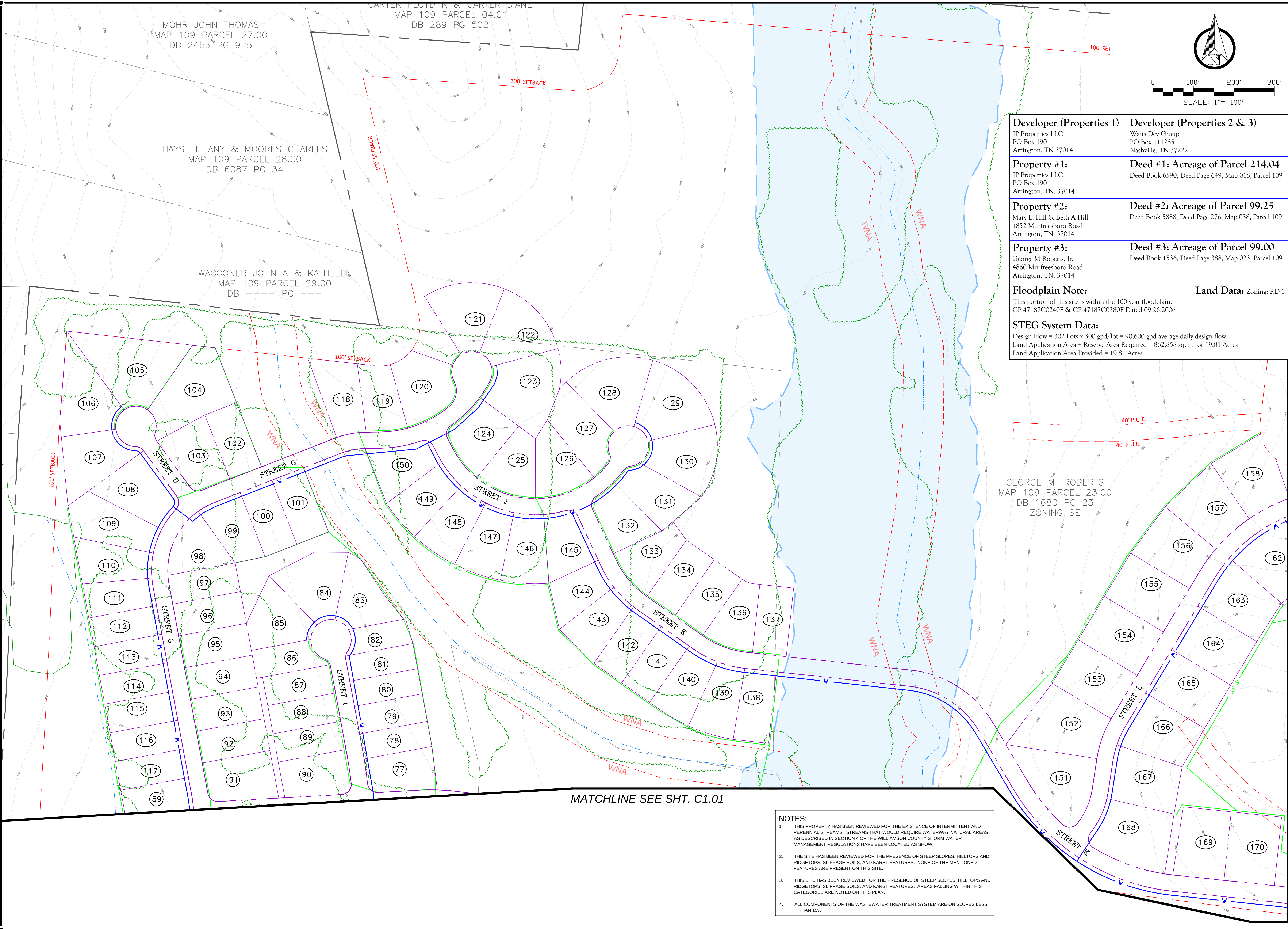
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Developer (Properties 1) JP Properties LLC PO Box 190 Arrington, TN 37014	Developer (Properties 2 & 3) Waits Dev Group PO Box 111285 Nashville, TN 37222
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Property #2: Mary L. Hill & Beth A Hill 4852 Murfreesboro Road Arrington, TN. 37014	Deed #2: Acreage of Parcel 99.25 Deed Book 5888, Deed Page 276, Map 038, Parcel 109
Property #3: George M Roberts, Jr. 4860 Murfreesboro Road Arrington, TN. 37014	Deed #3: Acreage of Parcel 99.00 Deed Book 1536, Deed Page 388, Map 023, Parcel 109
Floodplain Note: This portion of this site is within the 100 year floodplain. CP 47187C0240F & CP 47187C0380F Dated 09.26.2006	Land Data: Zoning: RD-1
STEG System Data: Design Flow = 302 Lots x 300 gpd/lot = 90,600 gpd average daily design flow. Land Application Area + Reserve Area Required = 862,858 sq. ft. or 19.81 Acres Land Application Area Provided = 19.81 Acres	



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307 HICKERSON DRIVE
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KING'S CHAPEL & HIGH PARK HILL
STEG SYSTEM DESIGN - WASTEWATER SITE PLAN
ARRINGTON, TENNESSEE 37014

REVISIONS
PRE-3RD SET ISSUE DATE
POST 3RD SET ISSUE DATE
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ORIGINAL
ISSUE DATE: MAY 2019

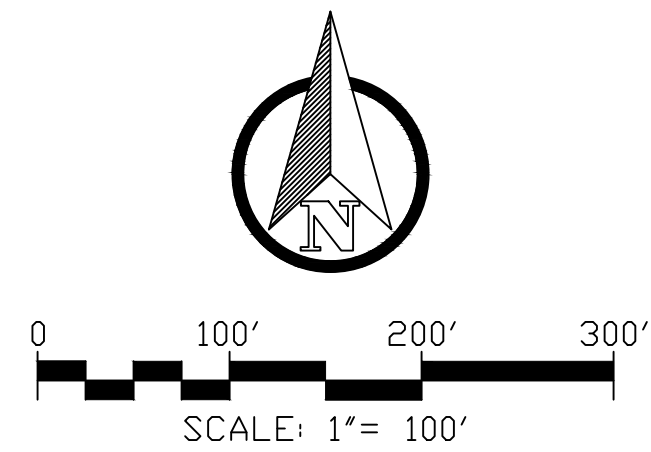
HIGH POINT HILL
SITE PLAN
C1.02

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MATCHLINE SEE SHT. C1.02

CHARLIE FOX, JR.
MAP 109 PARCEL 4.07
DB 1841 PAGE 49



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ARRINGTON, TENNESSEE 37014

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ORIGINAL
ISSUE DATE: MAY 2019

KING'S CHAPEL
PHASE 9 & 12
HIGH POINT HILL
SITE PLAN

C1.03

MATCHLINE SEE SHT. C1.04

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Arrington, TN 37014

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PO Box 111285
Nashville, TN 37222

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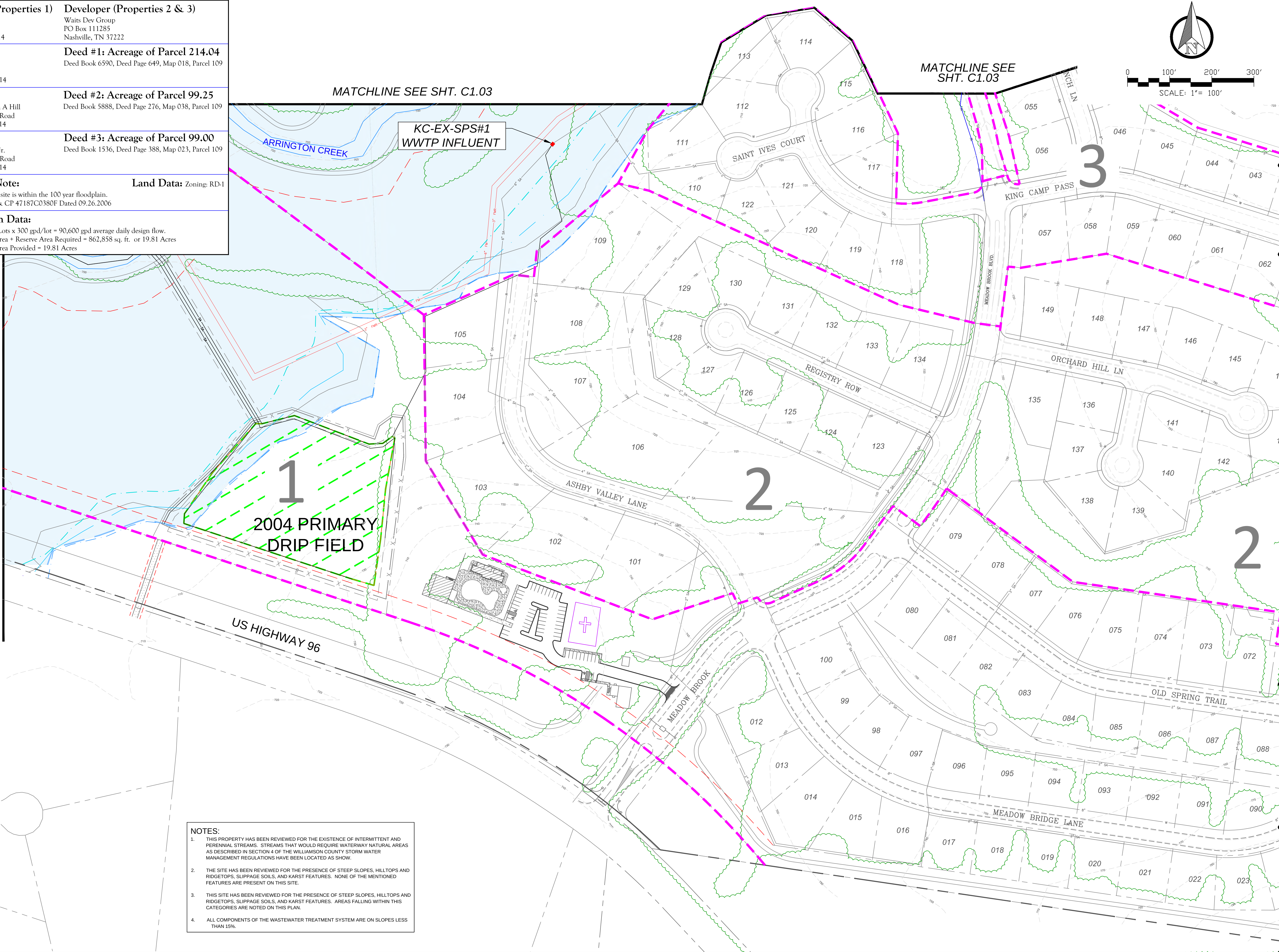
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KING'S CHAPEL & HIGH PARK HILL
STEG SYSTEM DESIGN - WASTEWATER SITE PLAN
ARRINGTON, TENNESSEE 37014

REVISIONS	
DATE	DESCRIPTION

**ORIGINAL
ISSUE DATE:** MAY 2019

**KING'S CHAPEL
EXISTING
PHASE 1 - 3
SITE PLAN**

C1.04

PLOT DATE: 5/12/2019 2:47:46 PM (MWARNER)
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JP Properties LLC
PO Box 190
Arrington, TN. 37014

Deed #1: Acreage of Parcel 214.04
Deed Book 6590, Deed Page 649, Map 018, Parcel 109

Property #2:
Mary L. Hill & Beth A Hill
4852 Murfreesboro Road
Arrington, TN. 37014

Deed #2: Acreage of Parcel 99.25
Deed Book 5888, Deed Page 276, Map 038, Parcel 109

Property #3:
George M Roberts, Jr.
4860 Murfreesboro Road
Arrington, TN. 37014

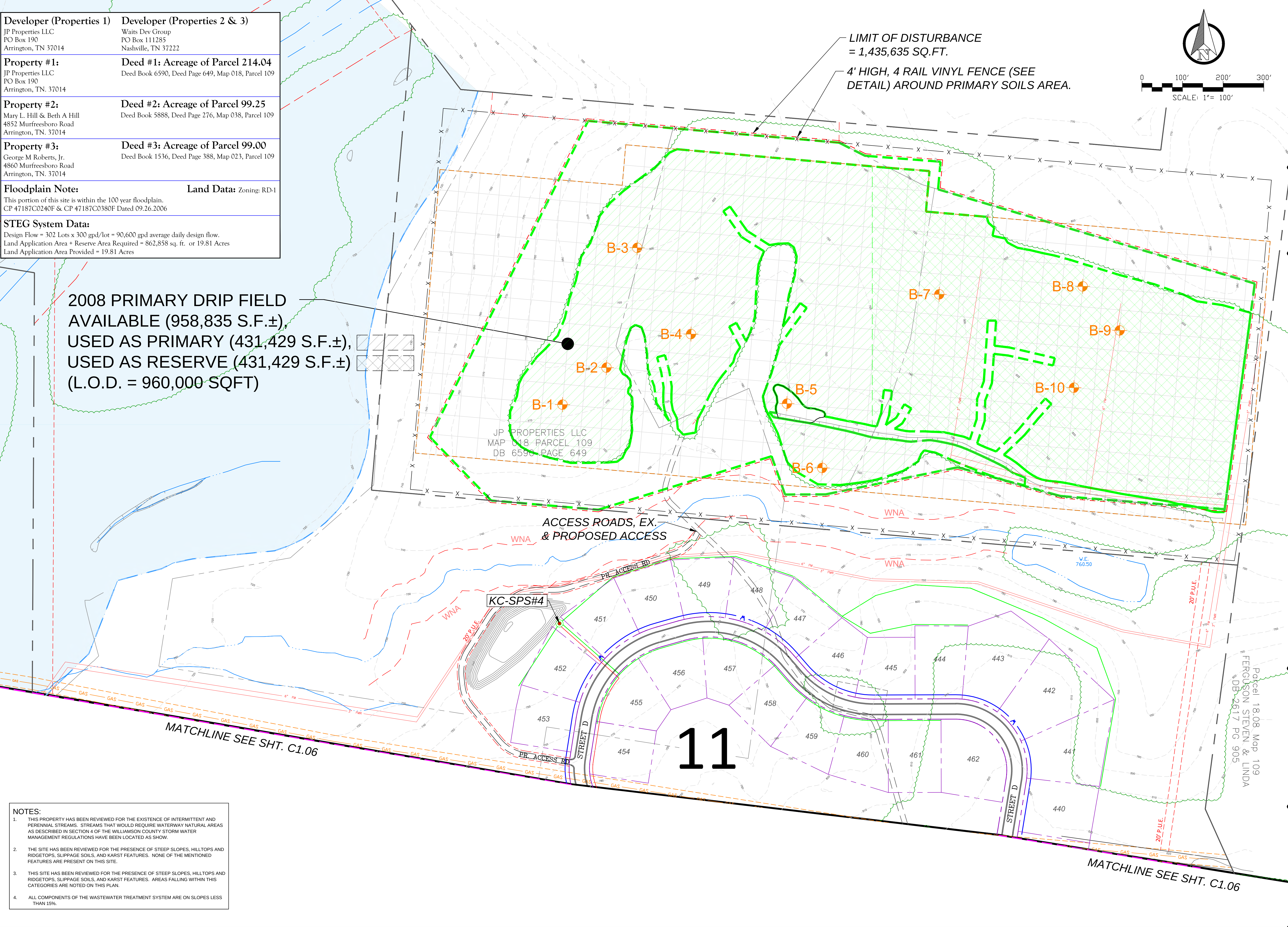
Deed #3: Acreage of Parcel 99.00
Deed Book 1536, Deed Page 388, Map 023, Parcel 109

Floodplain Note:
This portion of this site is within the 100 year floodplain.
CP 47187C0240F & CP 47187C0380F Dated 09.26.2006

Land Data: Zoning: RD-1

STEG System Data:
Design Flow = 302 Lots x 300 gpd/lot = 90,600 gpd average daily design flow.
Land Application Area + Reserve Area Required = 862,858 sq. ft. or 19.81 Acres
Land Application Area Provided = 19.81 Acres

2008 PRIMARY DRIP FIELD
AVAILABLE (958,835 S.F.±),
USED AS PRIMARY (431,429 S.F.±),
USED AS RESERVE (431,429 S.F.±)
(L.O.D. = 960,000 SQFT)



- NOTES:**
1. THIS PROPERTY HAS BEEN REVIEWED FOR THE EXISTENCE OF INTERMITTENT AND PERENNIAL STREAMS. STREAMS THAT WOULD REQUIRE WATERWAY NATURAL AREAS AS DESCRIBED IN SECTION 4 OF THE WILLIAMSON COUNTY STORM WATER MANAGEMENT REGULATIONS HAVE BEEN LOCATED AS SHOWN.
 2. THE SITE HAS BEEN REVIEWED FOR THE PRESENCE OF STEEP SLOPES, HILLTOPS AND RIDGETOPS, SLIPPAGE SOILS, AND KARST FEATURES. NONE OF THE MENTIONED FEATURES ARE PRESENT ON THIS SITE.
 3. THIS SITE HAS BEEN REVIEWED FOR THE PRESENCE OF STEEP SLOPES, HILLTOPS AND RIDGETOPS, SLIPPAGE SOILS, AND KARST FEATURES. AREAS FALLING WITHIN THIS CATEGORIES ARE NOTED ON THIS PLAN.
 4. ALL COMPONENTS OF THE WASTEWATER TREATMENT SYSTEM ARE ON SLOPES LESS THAN 15%.

CIVIL INFRASTRUCTURE ASSOCIATES

307 HICKERSON DRIVE
MURFREESBORO, TENNESSEE 37129
PHONE: 615-663-7678

**REVIEW SET
NOT FOR
CONSTRUCTION**

KING'S CHAPEL & HIGH PARK HILL
STEG SYSTEM DESIGN - WASTEWATER SITE PLAN
ARRINGTON, TENNESSEE 37014

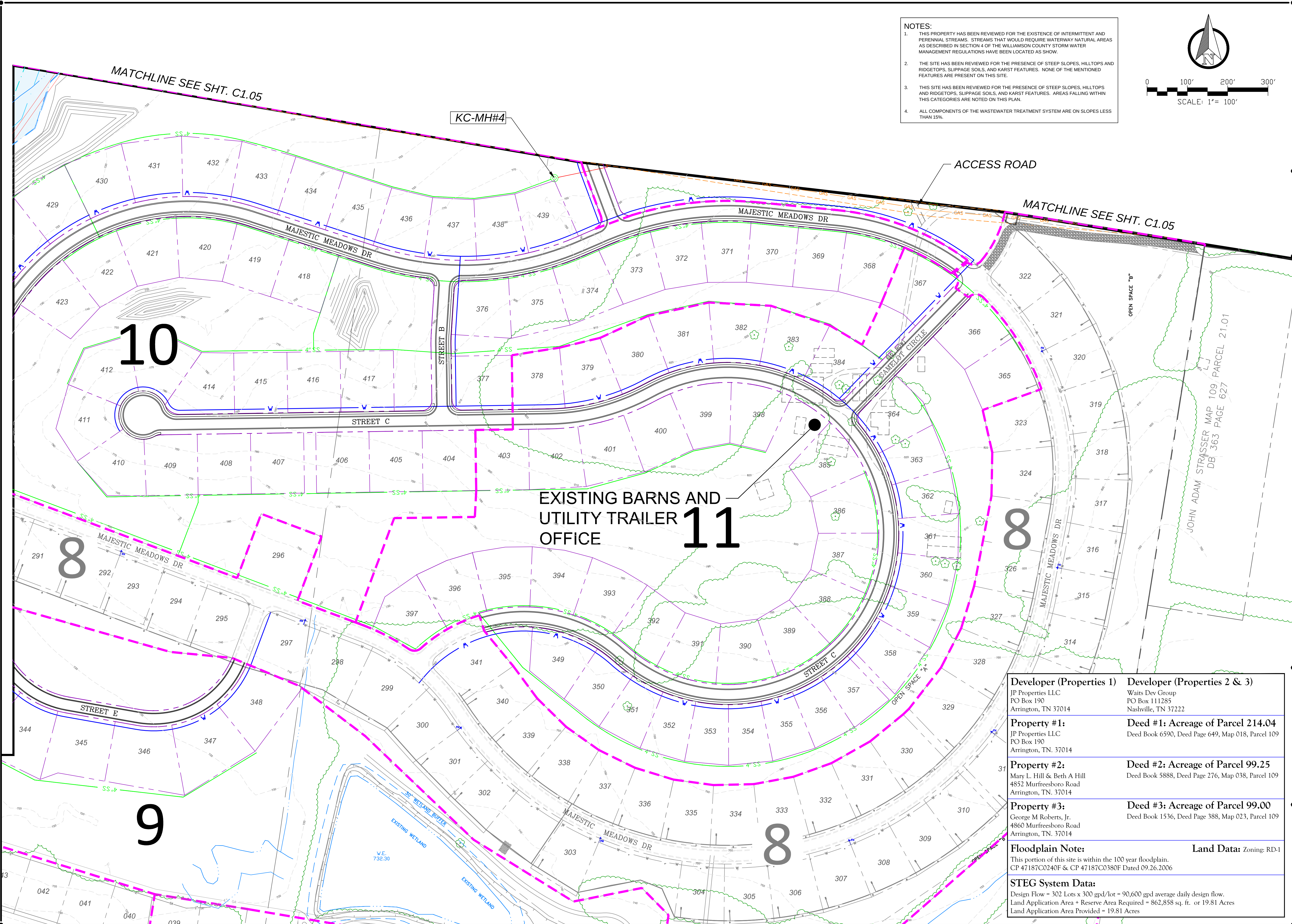
REVISIONS	
DATE	DESCRIPTION

**ORIGINAL
ISSUE DATE:** MAY 2019

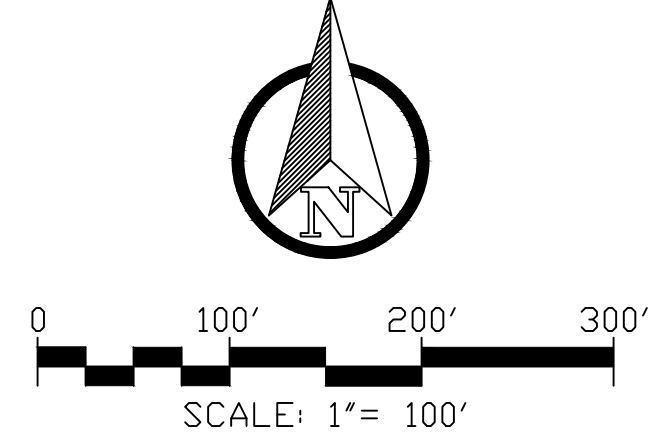
**KING'S CHAPEL
PHASE 11
PRELIMINARY
SITE PLAN**

C1.05

PLOT DATE: 5/12/2019 2:48:59 PM (MWARNER)
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 4. ALL COMPONENTS OF THE WASTEWATER TREATMENT SYSTEM ARE ON SLOPES LESS THAN 15%.





CIVIL
INFRASTRUCTURE
ASSOCIATES

307 HICKERSON DRIVE
MURFREESBORO, TENNESSEE 37129
PHONE: 615-663-7678

REVIEW SET
NOT FOR
CONSTRUCTION

KING'S CHAPEL & HIGH PARK HILL

STEG SYSTEM DESIGN - WASTEWATER SITE PLAN

ARRINGTON, TENNESSEE 37014

REVISIONS

DATE	DESCRIPTION

ORIGINAL
ISSUE DATE: MAY 2019

KING'S CHAPEL
PHASES 9 - 11
PRELIMINARY
SITE PLAN

C1.06

Developer (Properties 1) JP Properties LLC PO Box 190 Arrington, TN 37014	Developer (Properties 2 & 3) Waits Dev Group PO Box 111285 Nashville, TN 37222
Property #1: JP Properties LLC PO Box 190 Arrington, TN. 37014	Deed #1: Acreage of Parcel 214.04 Deed Book 6590, Deed Page 649, Map 018, Parcel 109
Property #2: Mary L. Hill & Beth A Hill 4852 Murfreesboro Road Arrington, TN. 37014	Deed #2: Acreage of Parcel 99.25 Deed Book 5888, Deed Page 276, Map 038, Parcel 109
Property #3: George M Roberts, Jr. 4860 Murfreesboro Road Arrington, TN. 37014	Deed #3: Acreage of Parcel 99.00 Deed Book 1536, Deed Page 388, Map 023, Parcel 109
Floodplain Note: This portion of this site is within the 100 year floodplain. CP 47187C0240F & CP 47187C0380F Dated 09.26.2006	Land Data: Zoning: RD-1
STEG System Data: Design Flow = 302 Lots x 300 gpd/lot = 90,600 gpd average daily design flow. Land Application Area + Reserve Area Required = 862,858 sq. ft. or 19.81 Acres Land Application Area Provided = 19.81 Acres	

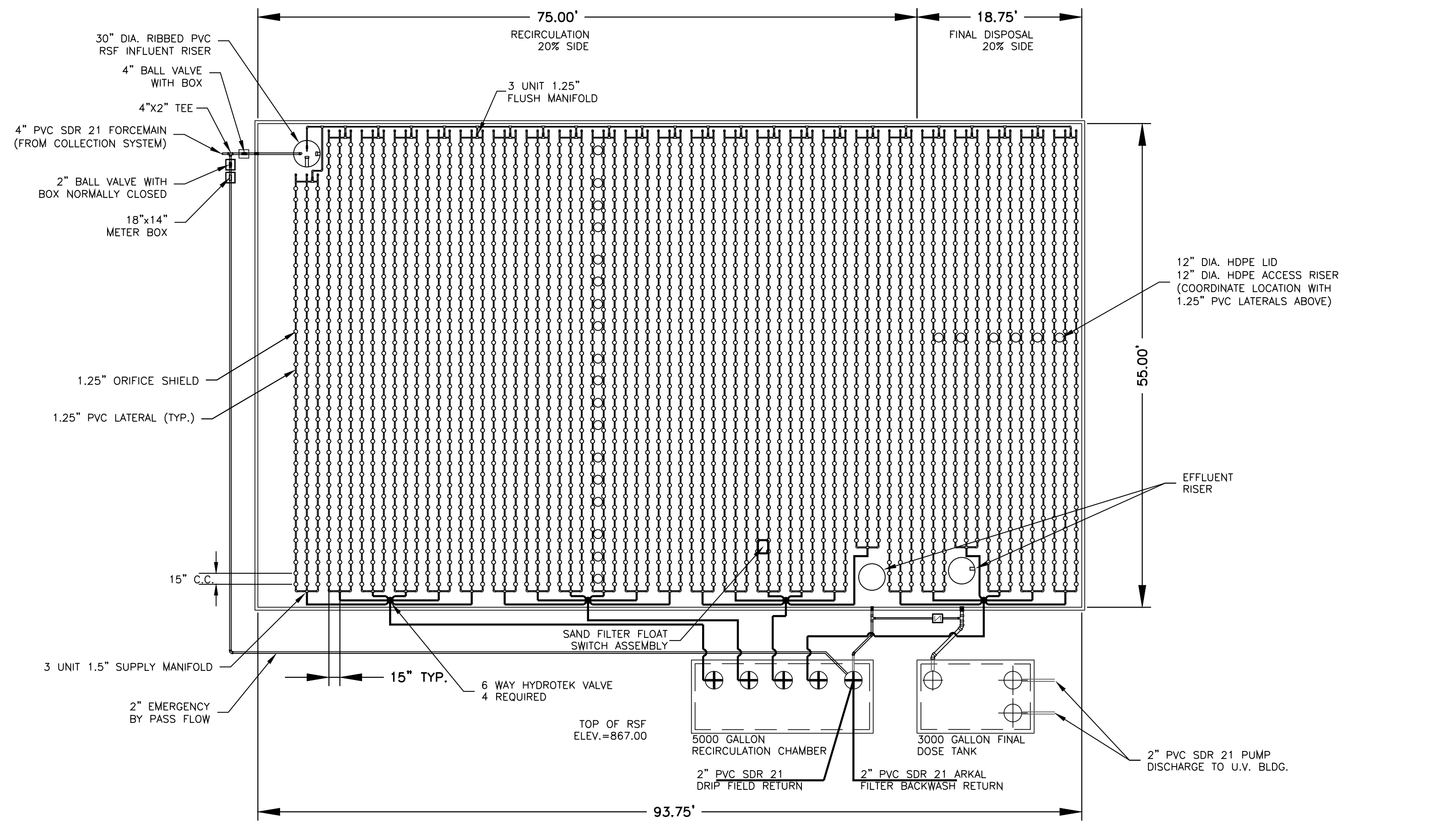


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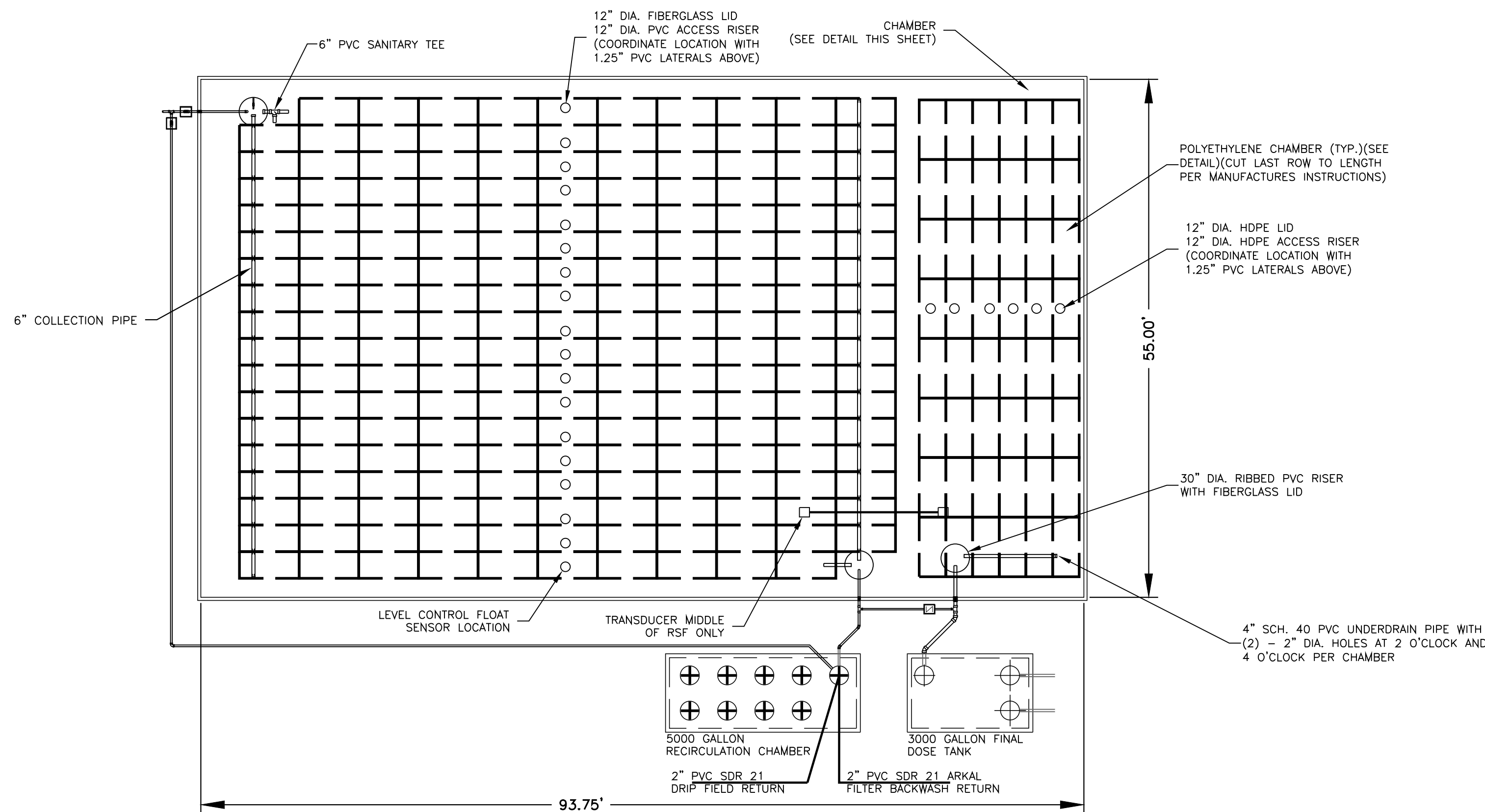
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ORIGINAL
ISSUE DATE: MAY 2015

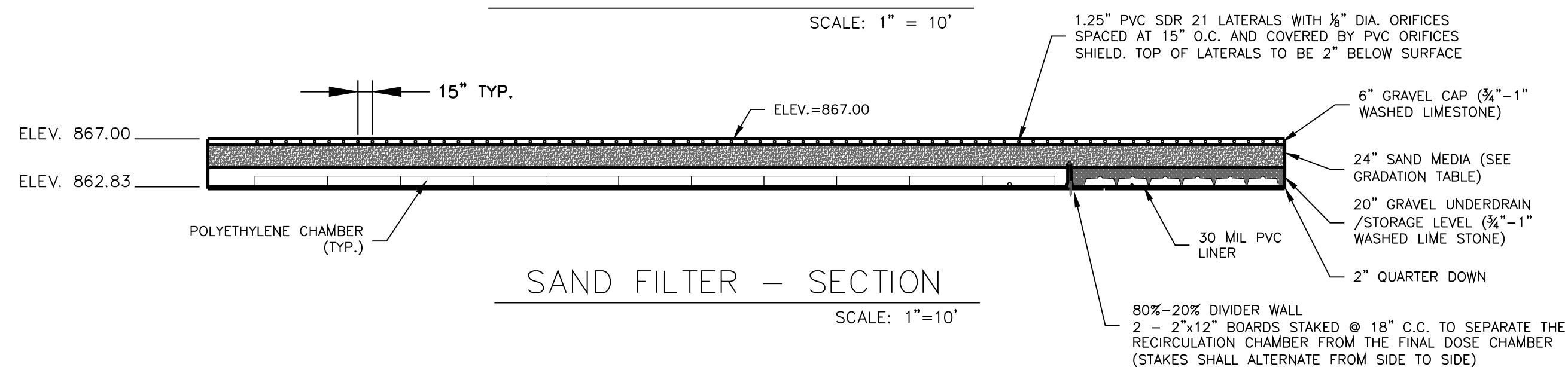
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RECIRCULATING SAND FILTER – PLAN
SCALE: 1" = 10'



RECIRCULATING SAND FILTER CHAMBER LEVEL – PLAN
SCALE: 1" = 10'

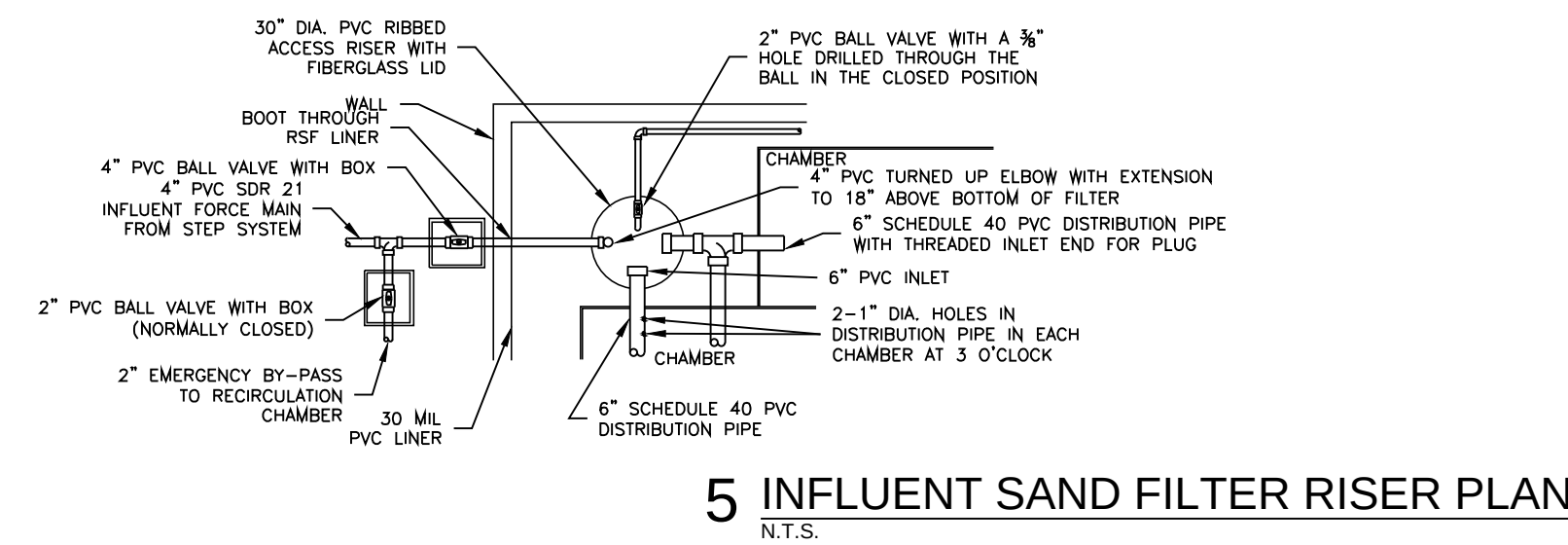


SAND FILTER – SECTION
SCALE: 1"=10'

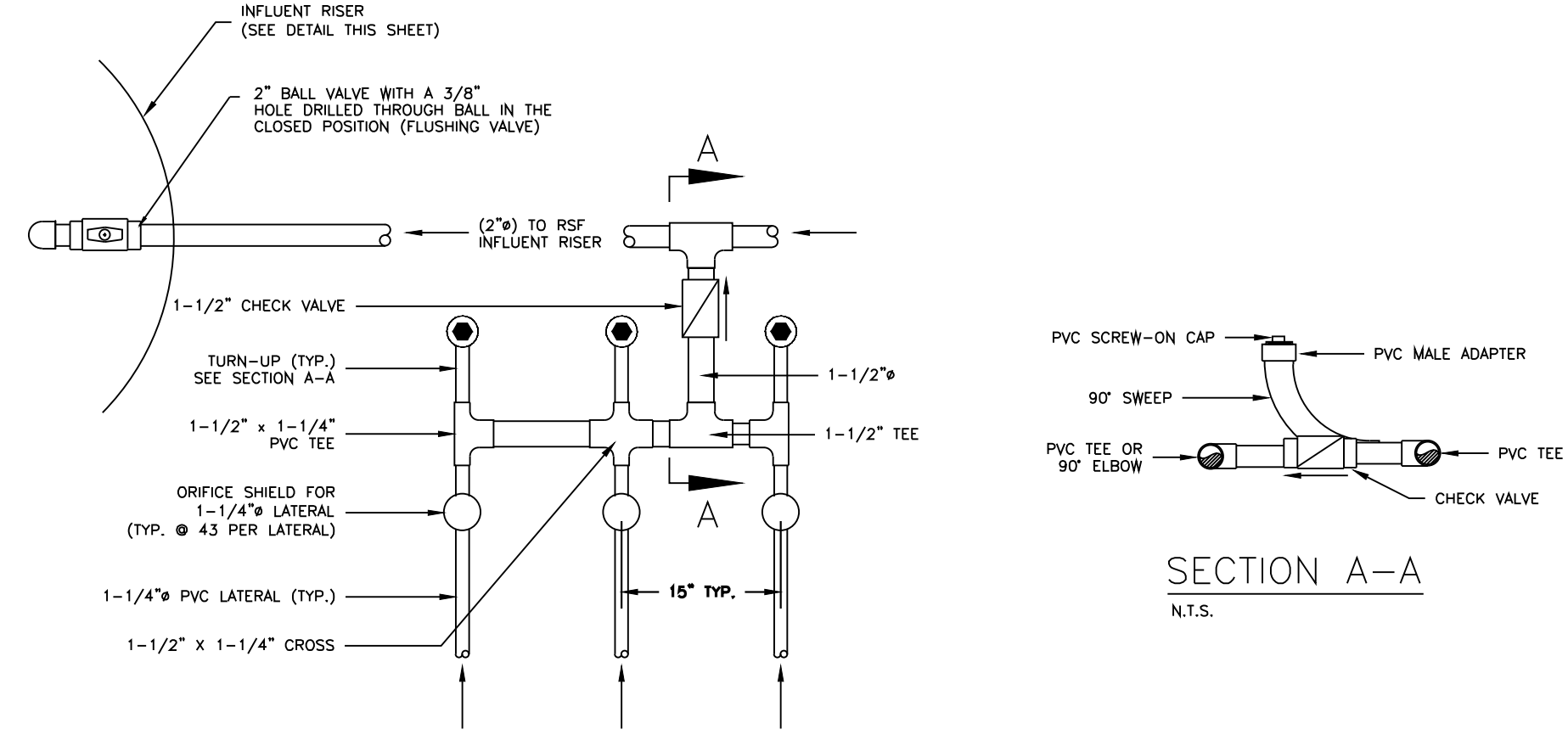
SAND GRADATION FOR FILTER SAND

SIEVE SIZE	PERCENT PASSING
3/8	100
4	60-100
8	7-75
16	0-5
30	0-3
50	0-2

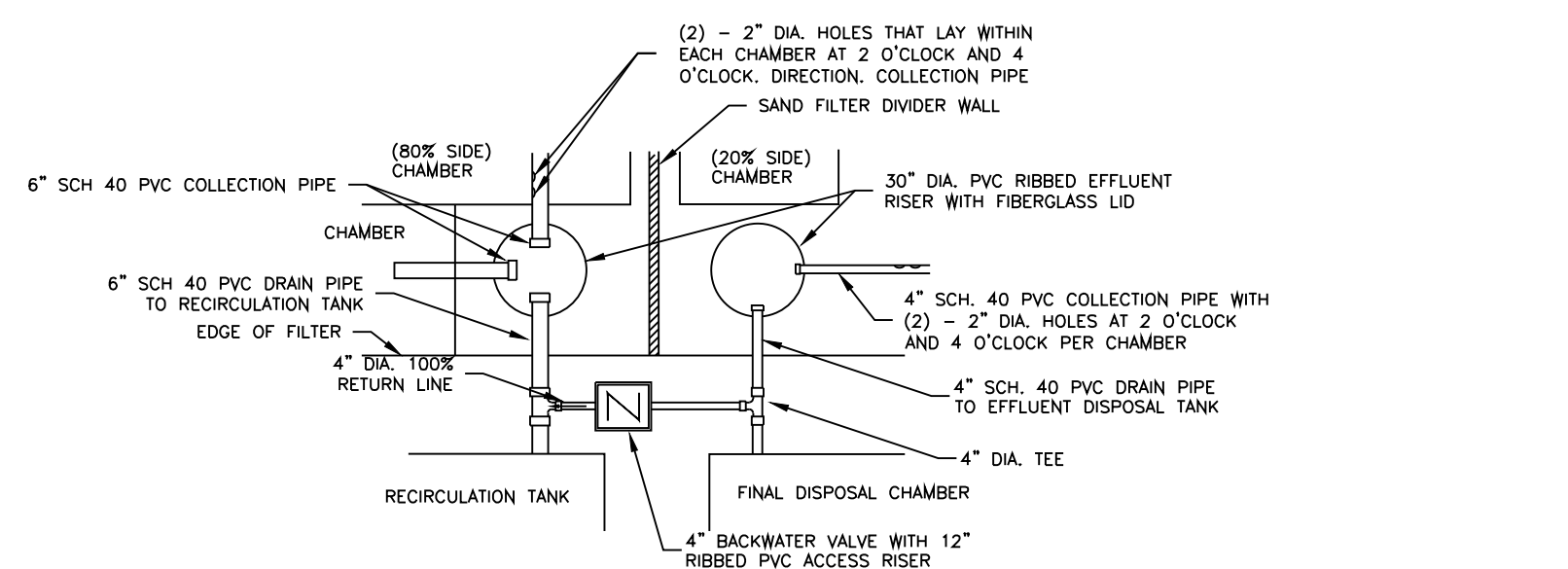
Cu = 1.5 TO 2.5
EFFECTIVE SIZE: D₁₀ = 1.5 TO 2.5 mm
SAND MUST BE WASHED WELL



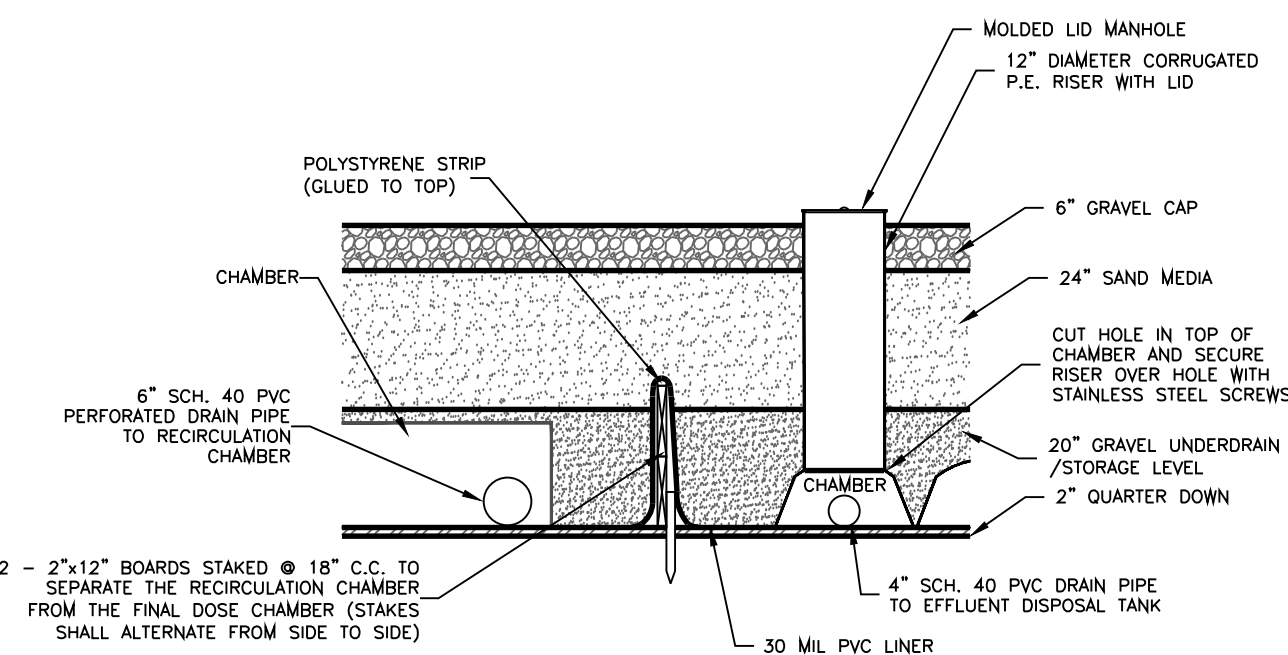
5 INFLUENT SAND FILTER RISER PLAN
N.T.S.



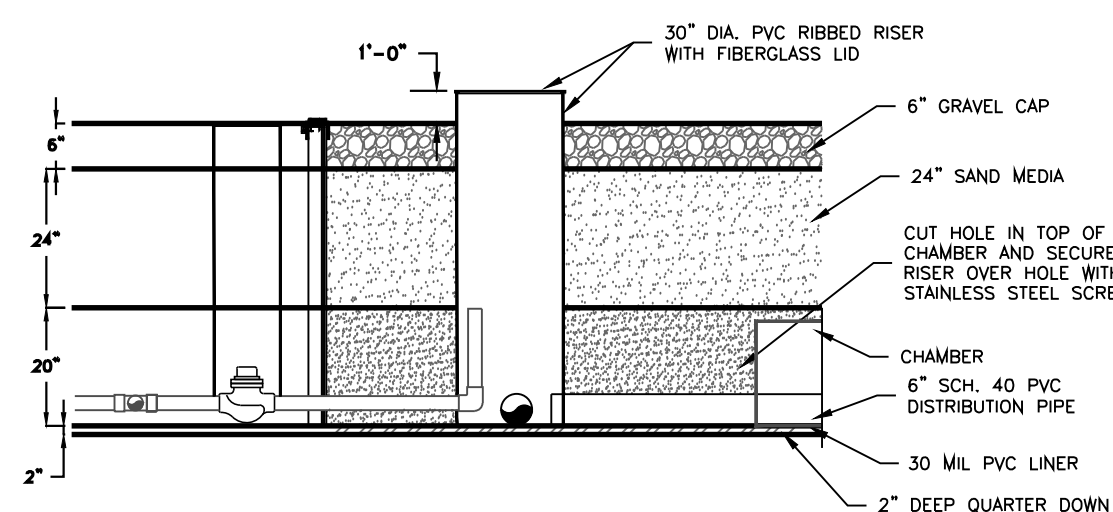
4 3 UNITY FLUSH MANIFOLD
N.T.S.



3 EFFLUENT RISER-PLAN-SECTION
N.T.S.



2 FILTER DIVIDER WALL SECTION
N.T.S.



1 INFLUENT RISER SECTION
N.T.S.

REVIEW SET
NOT FOR
CONSTRUCTION

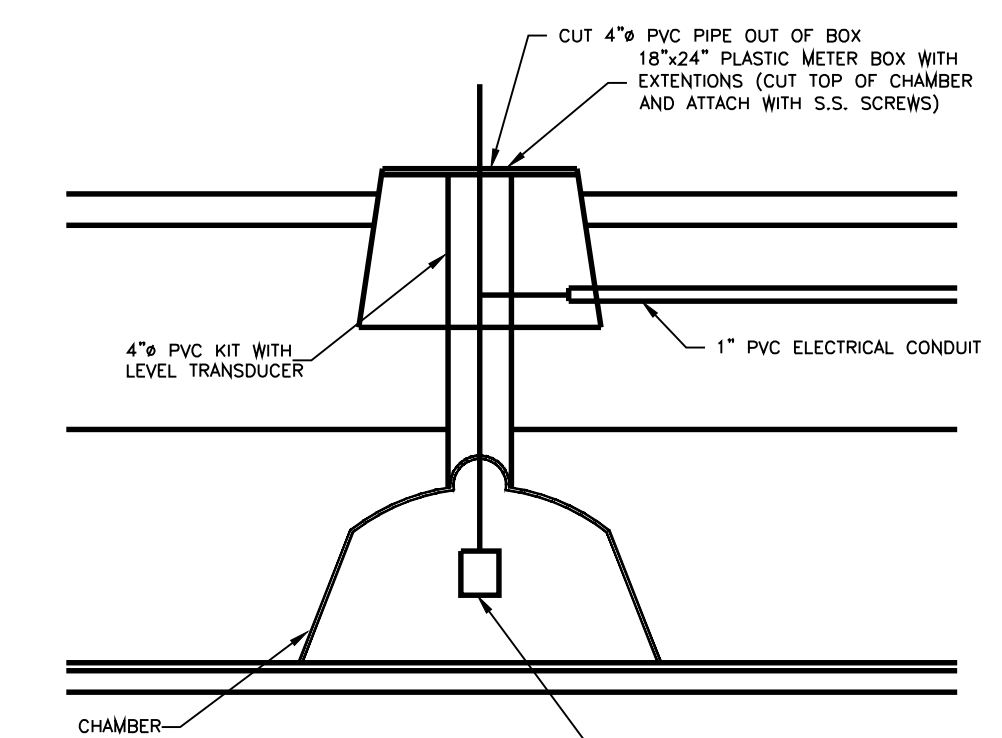
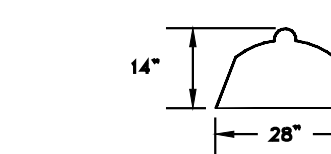
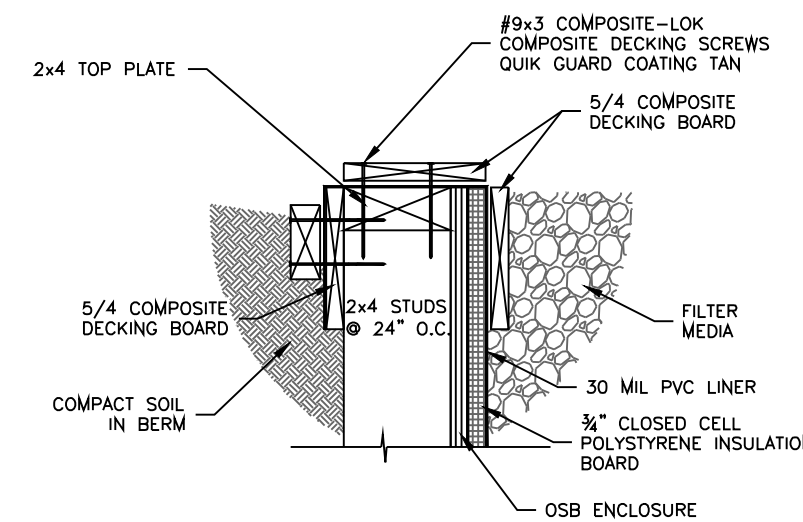
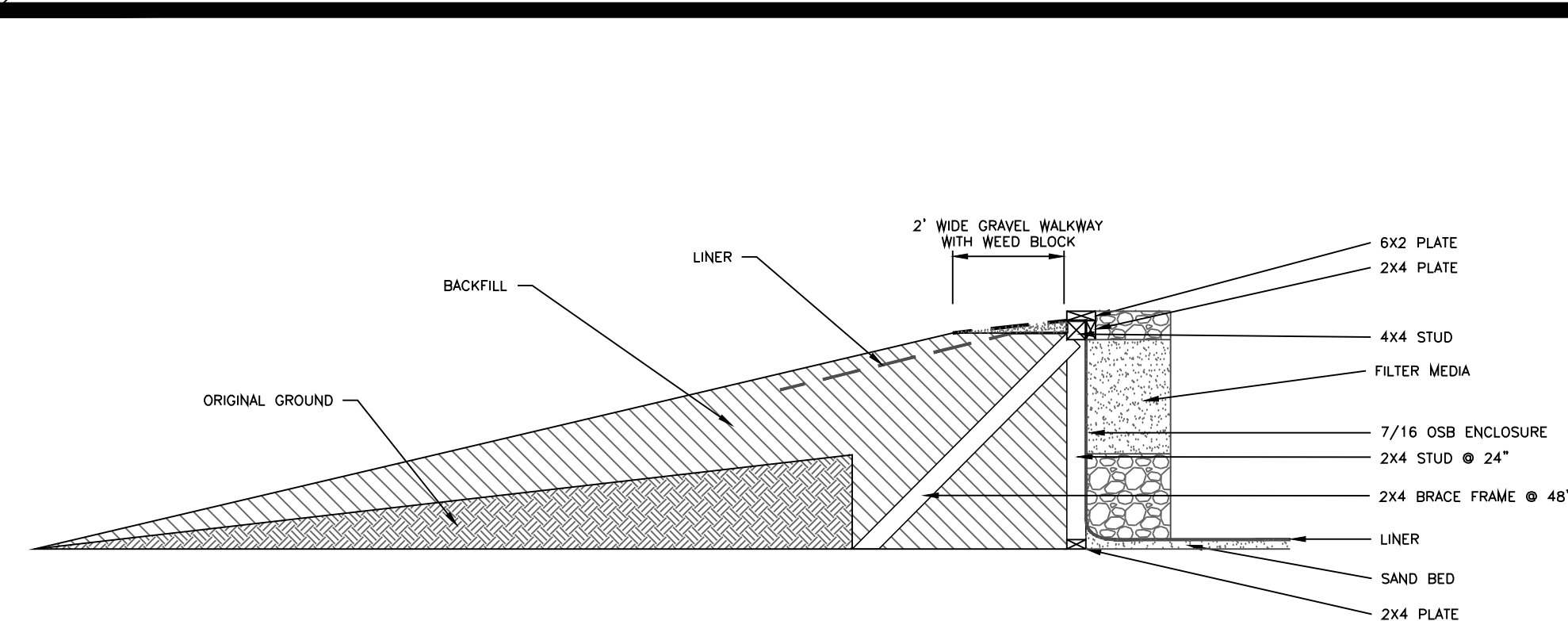
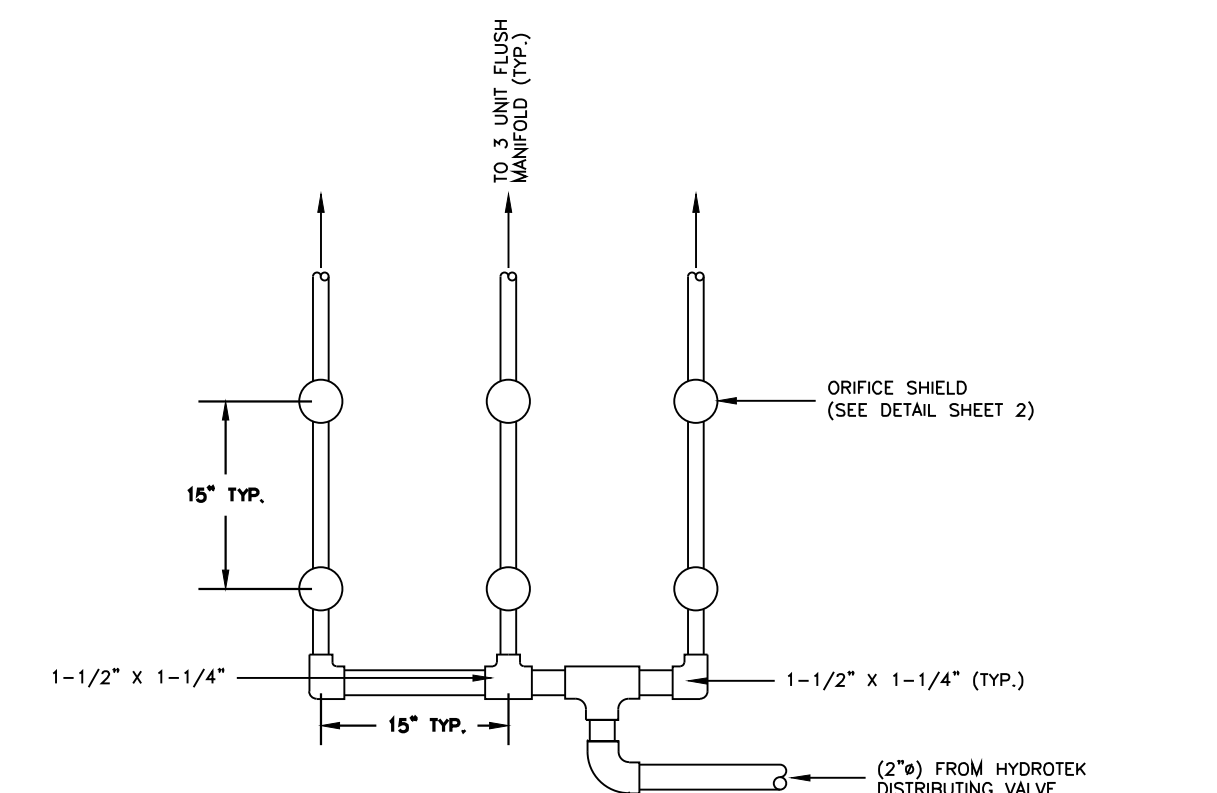
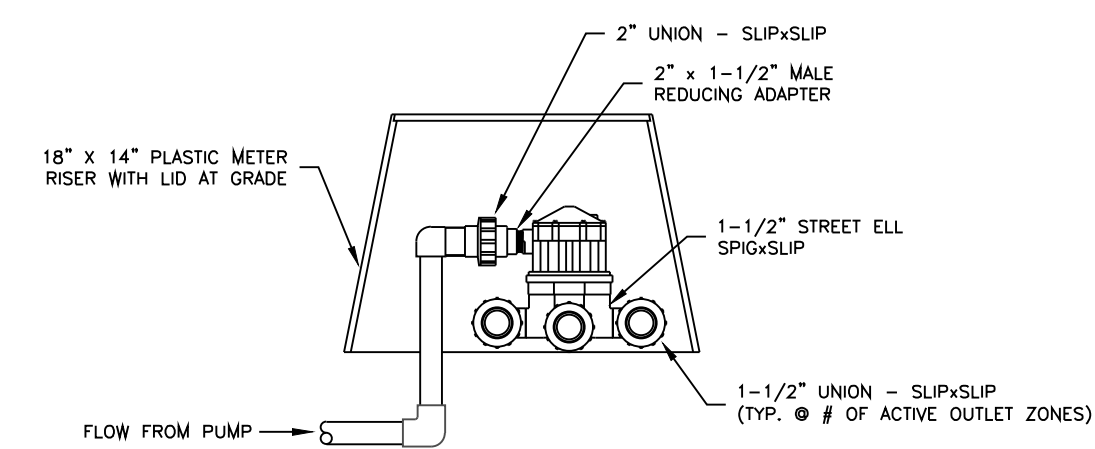
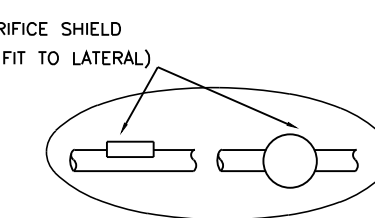
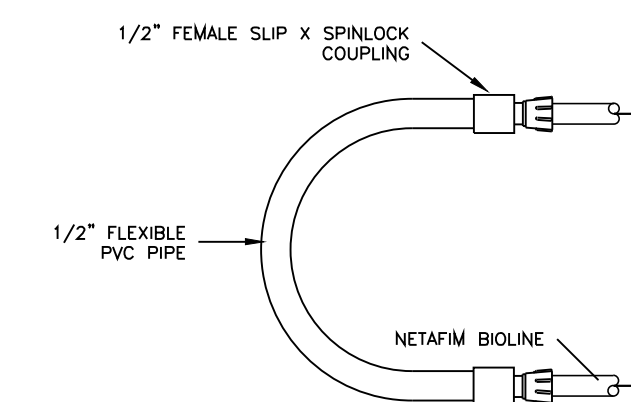
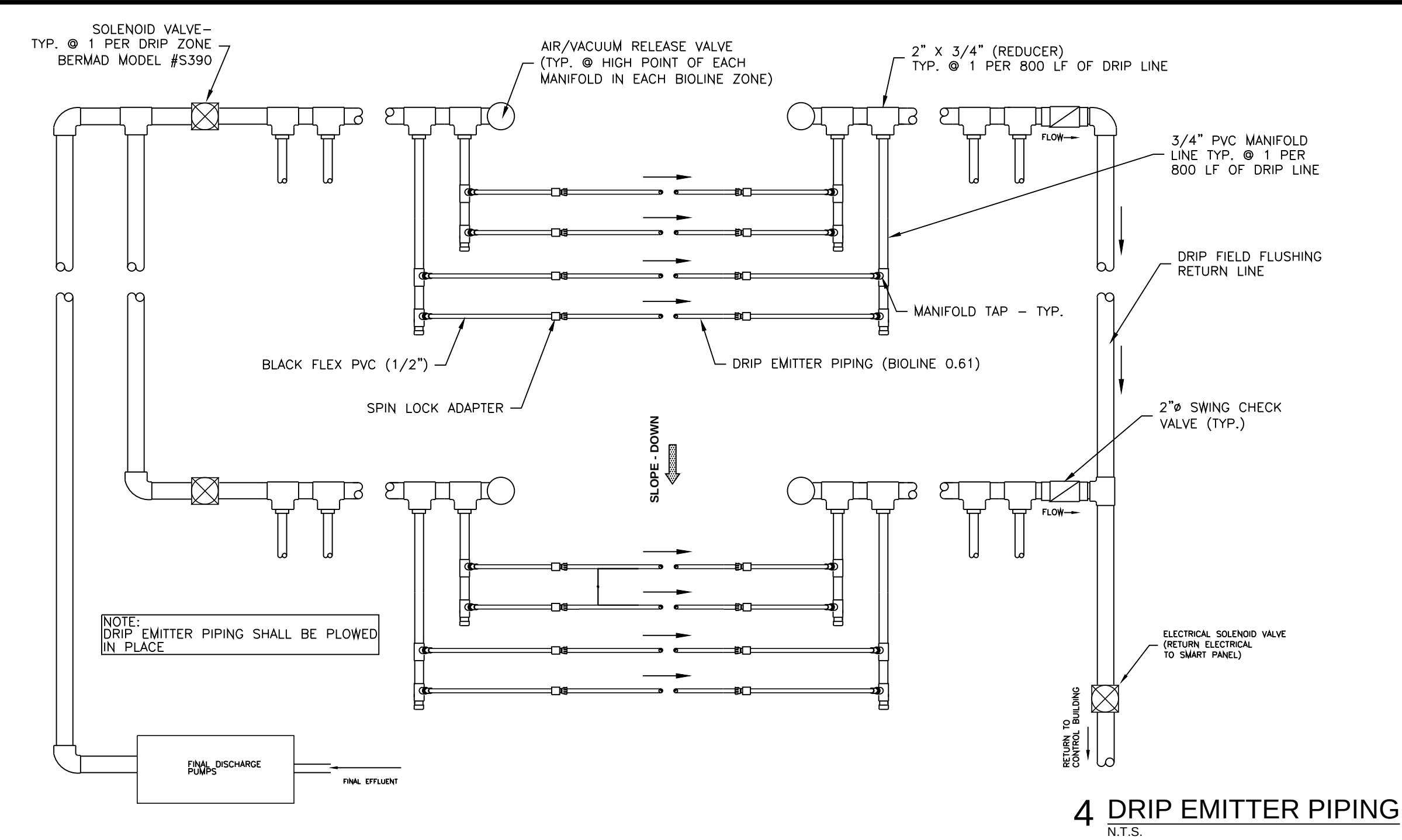
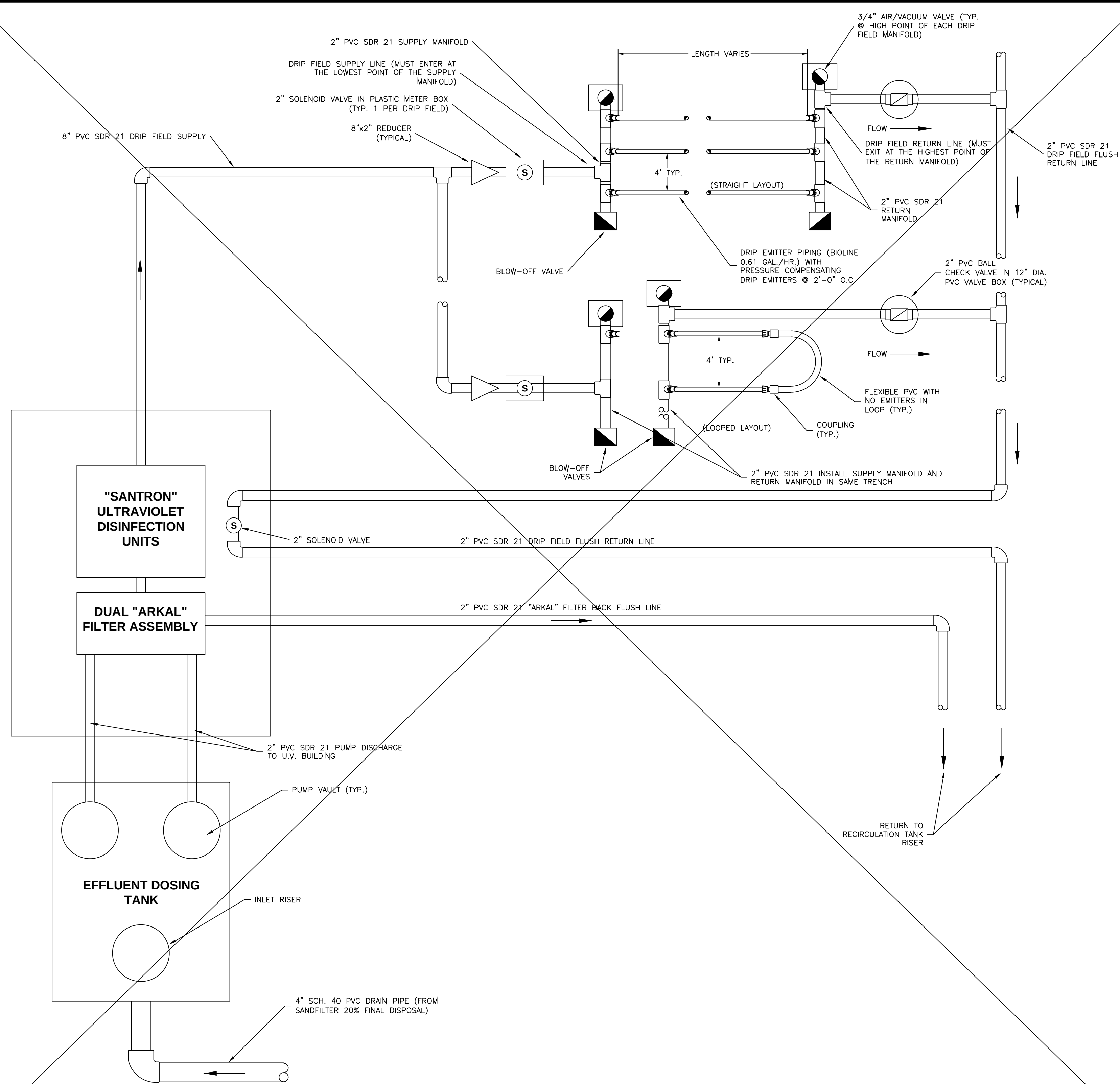
KING'S CHAPEL & HIGH PARK HILL STEG SYSTEM DESIGN - WASTEWATER SITE PLAN ARRINGTON, TENNESSEE 37014

REVISIONS	
◇ PRE-BID SET ISSUE DATE	△ POST-BID SET ISSUE DATE
DATE	DESCRIPTION
-	-
-	-
-	-
-	-

ORIGINAL
ISSUE DATE: MAY 2019

SAND FILTER BED
DETAILS

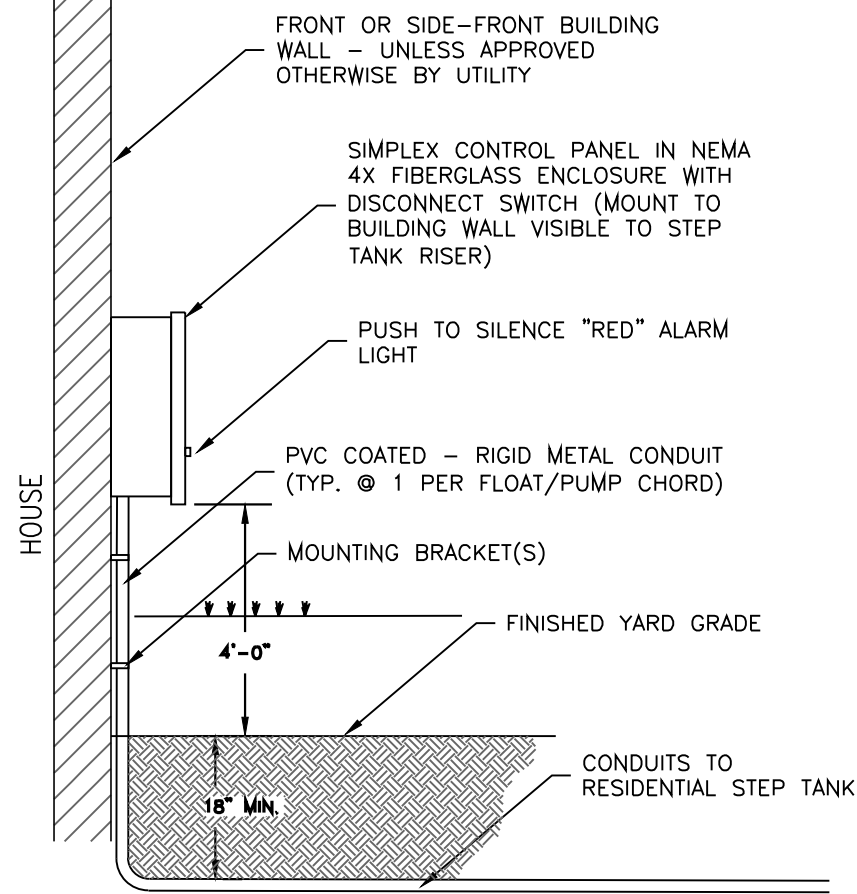
C4.02

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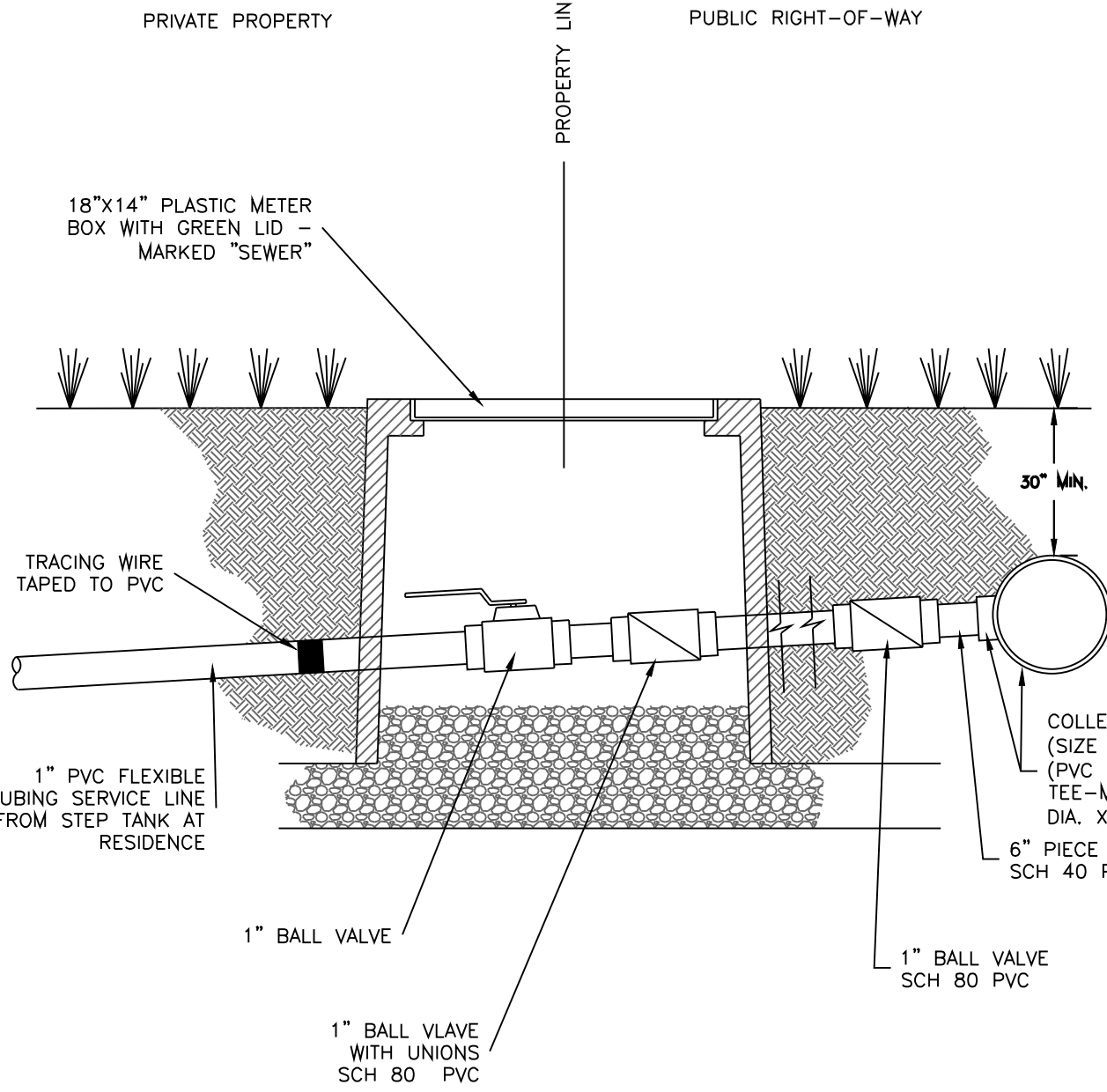
ORIGINAL
ISSUE DATE: MAY 2019

PLOT DATE: 5/2/2019 9:01:58 AM (MWARNER)
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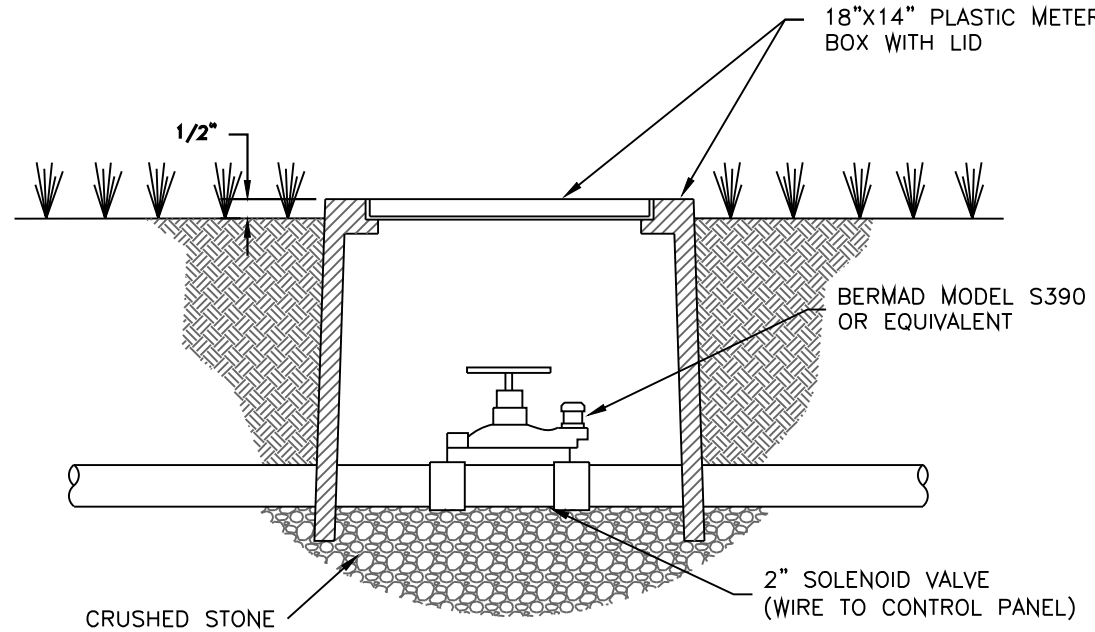
12 RESIDENTIAL CONTROL PANEL
N.T.S.



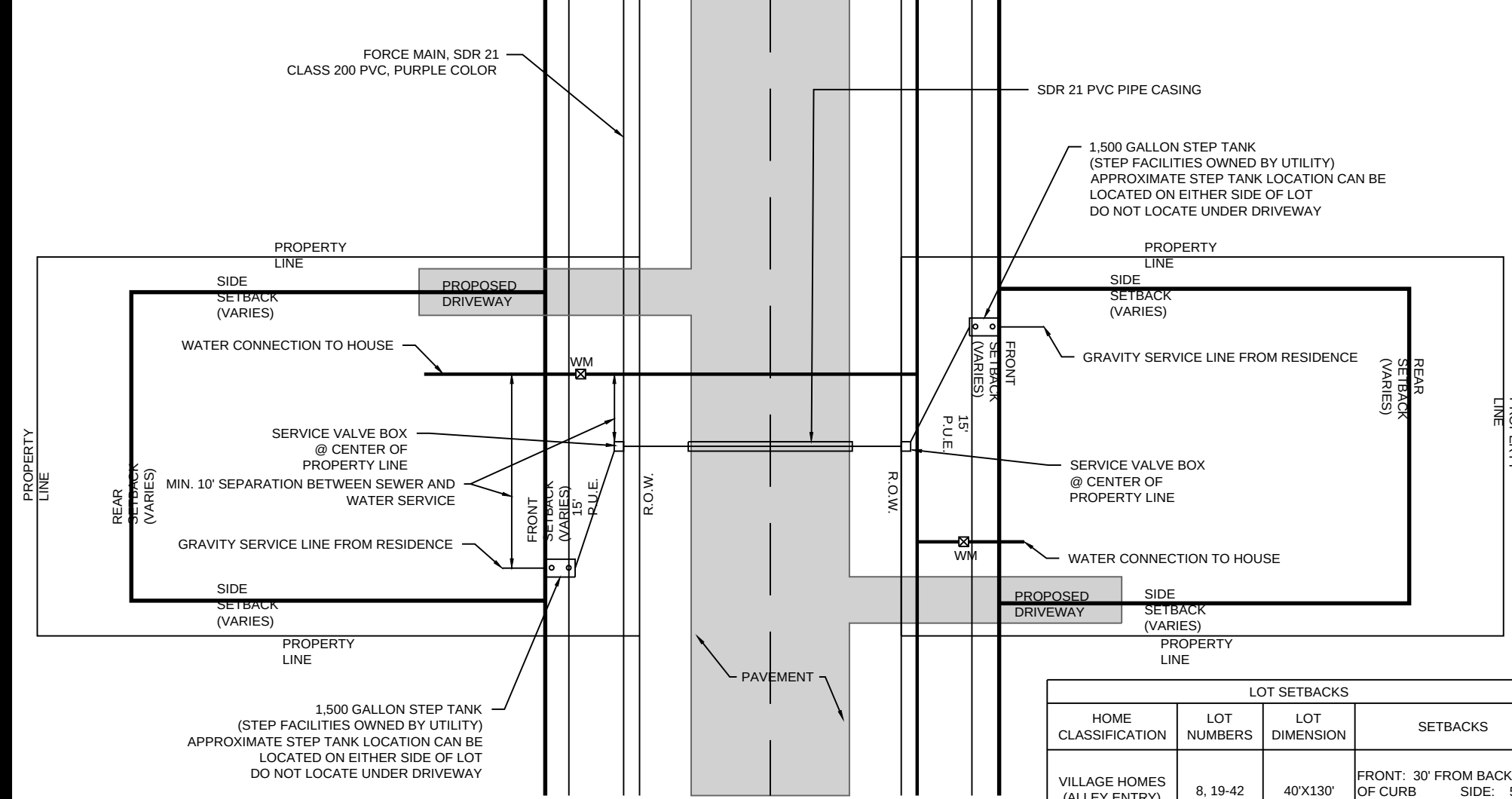
10 TYP. SERVICE CONNECTION (PRESSURE)
N.T.S.



8 ELECTRIC SOLENOID VALVE
N.T.S.



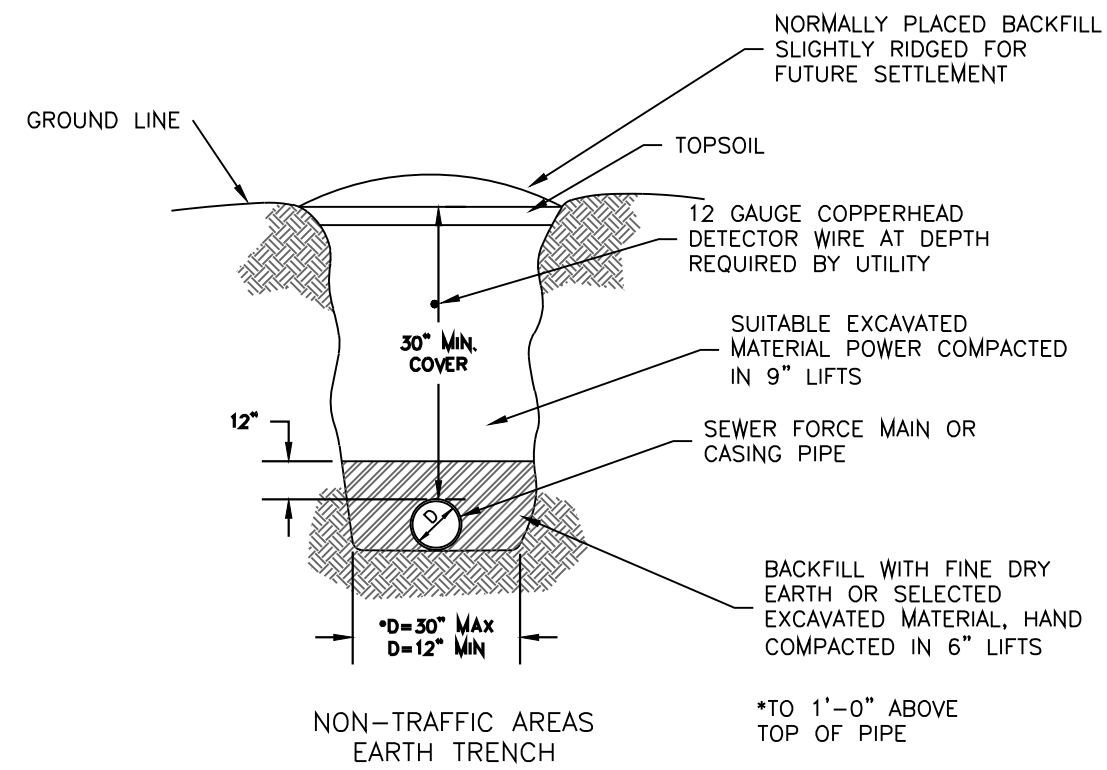
4 UTILITY SERVICE LINES LAYOUT
N.T.S.



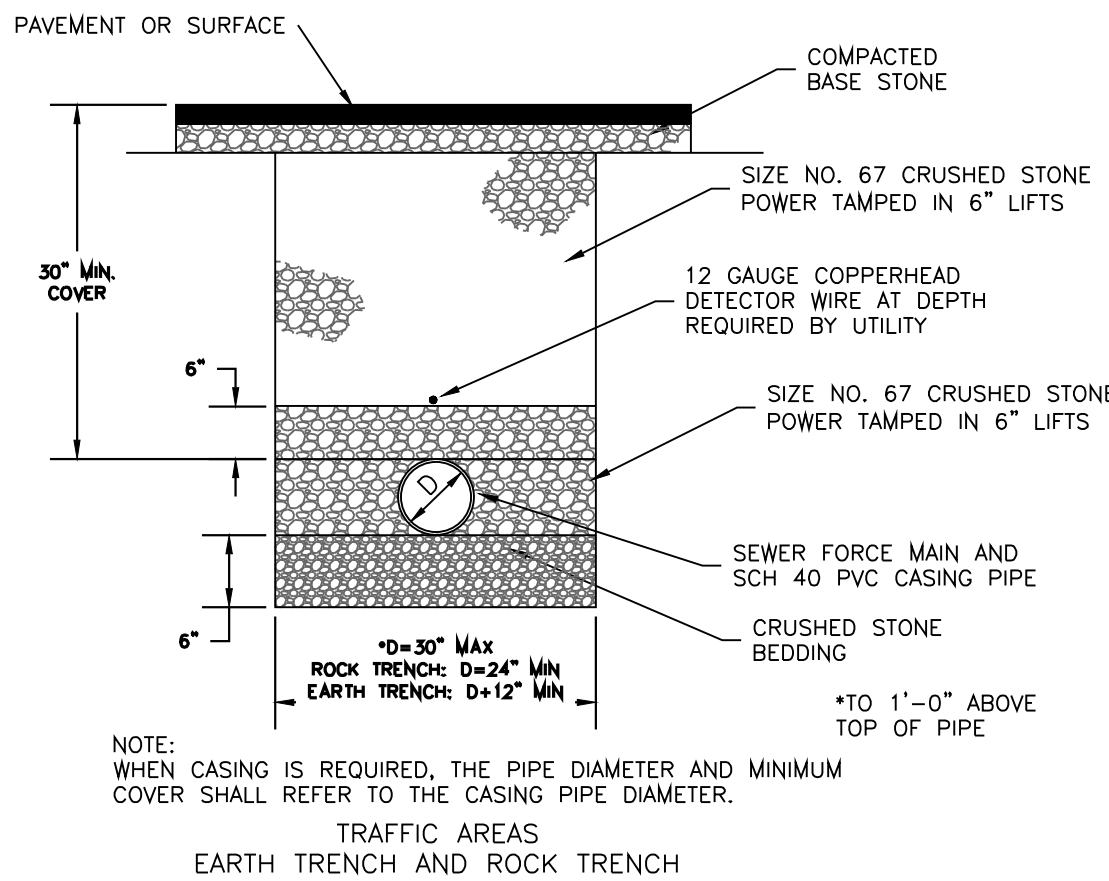
LOT SETBACKS			
HOME CLASSIFICATION	LOT NUMBERS	LOT DIMENSION	SETBACKS
VILLAGE HOMES (ALLEY ENTRY)	8, 19-42	40'X130'	FRONT: 30' FROM BACK OF CURB REAR: 25'
CLASSIC HOMES (FRONT ENTRY)	7, 9-18, 43-84	65'X150'	FRONT: 35' FROM BACK OF CURB REAR: 25'
ESTATE HOMES (FRONT/SIDE ENTRY)	1-6	100'X200'	FRONT: 35' FROM BACK OF CURB REAR: 25'

NOTE:
1. STEP TANK OR SERVICE CONNECTION SHALL NOT BE PLACED UNDER DRIVEWAY LOCATION.
2. STEP TANK TO BE PLACED WITHIN 50 FEET OF HOUSE LOCATION.
3. UTILITY TO HAVE RIGHT OF ACCESS AND MAINTENANCE FOR ALL STEP SYSTEM FACILITIES.

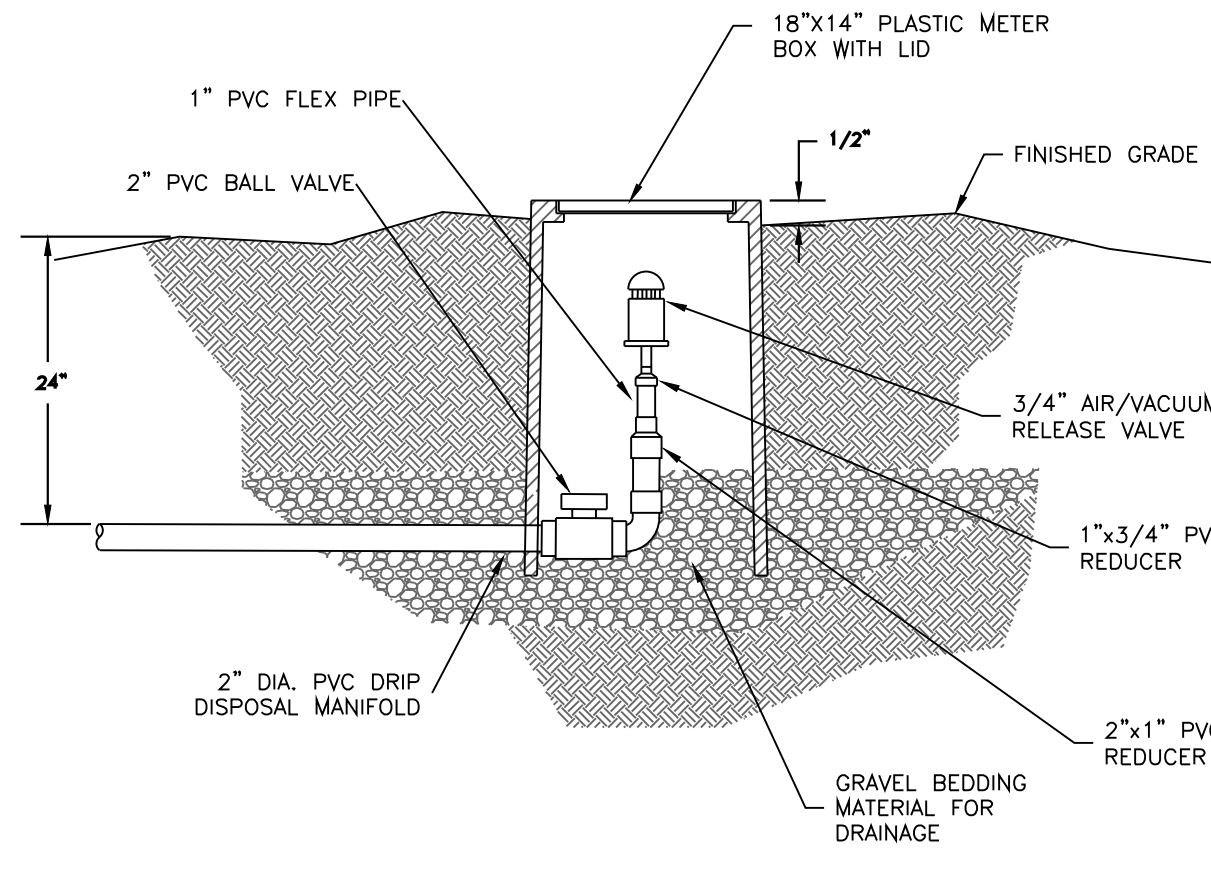
11 DRIP ZONE SUPPLY AND RETURN LINES PIPE TRENCH DETAIL
N.T.S.



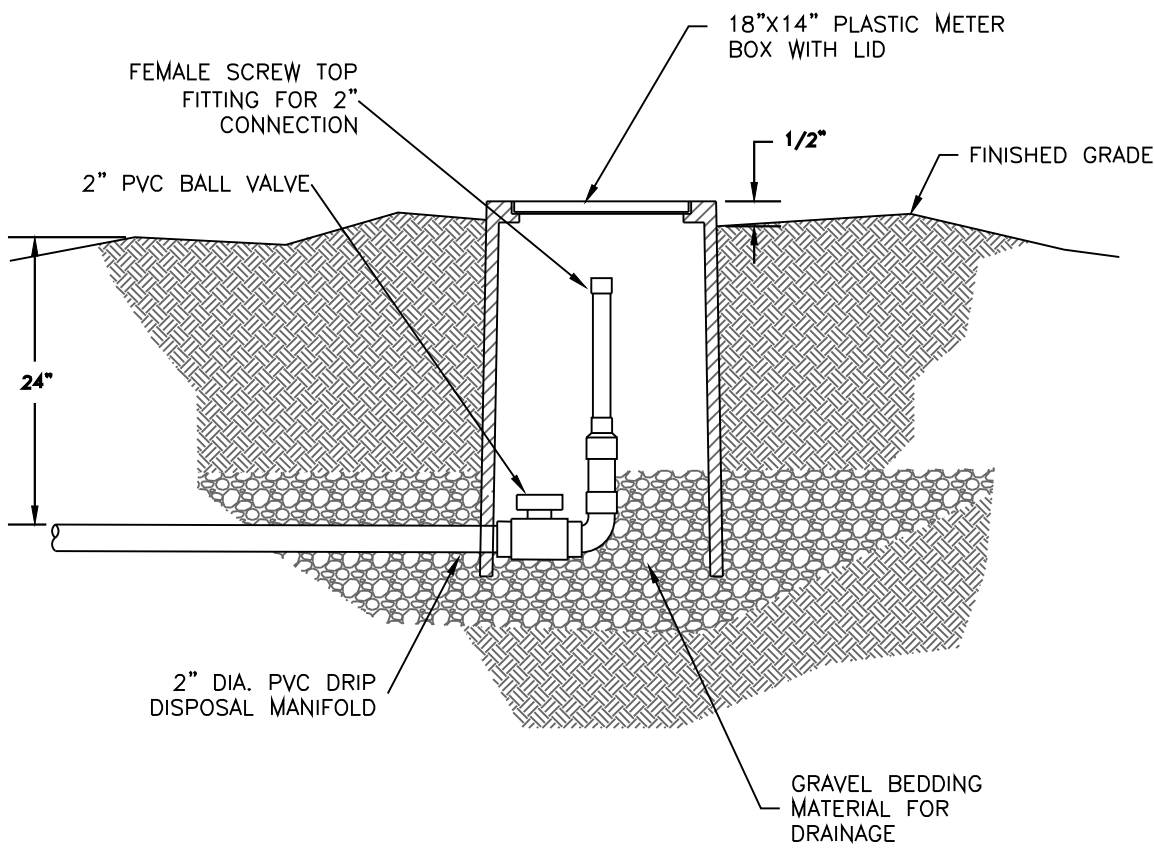
7 PIPE TRENCH DETAILS COLLECTION PIPE
N.T.S.



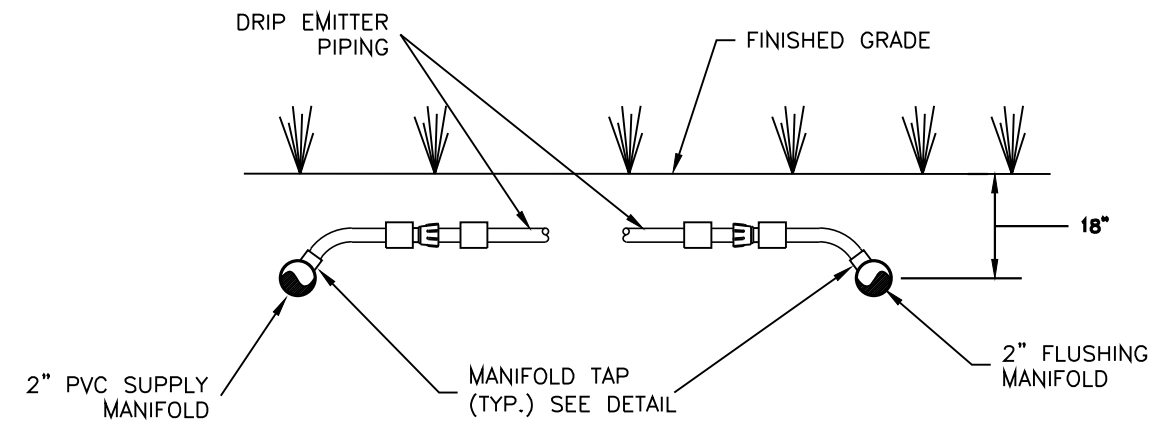
3 DRIP DISPOSAL AUTOMATIC AIR RELEASE VALVE ASSEMBLY
N.T.S.



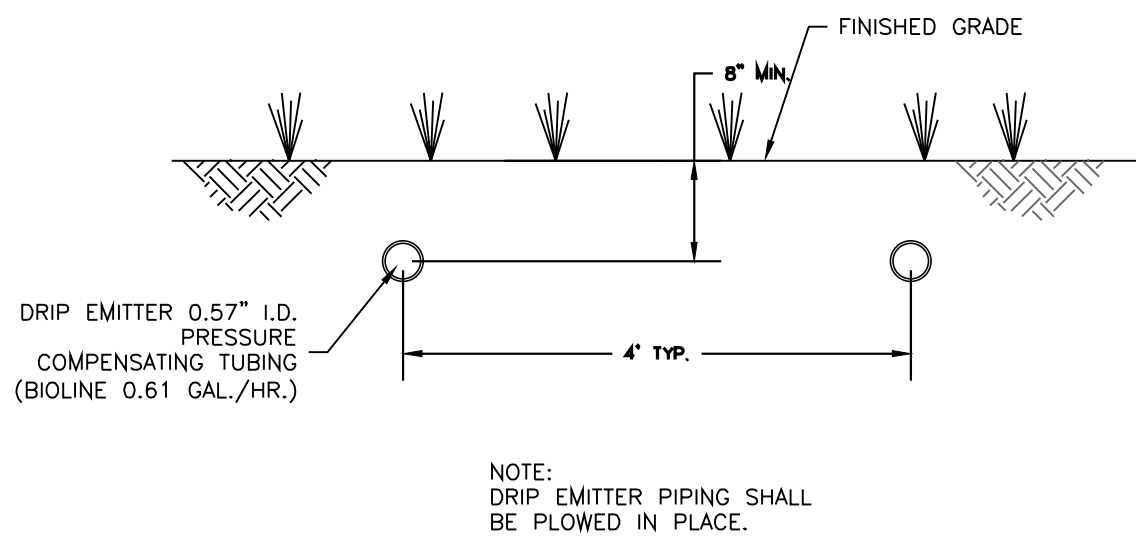
11 END-OF-LINE BLOW-OFF ASSEMBLY
N.T.S.



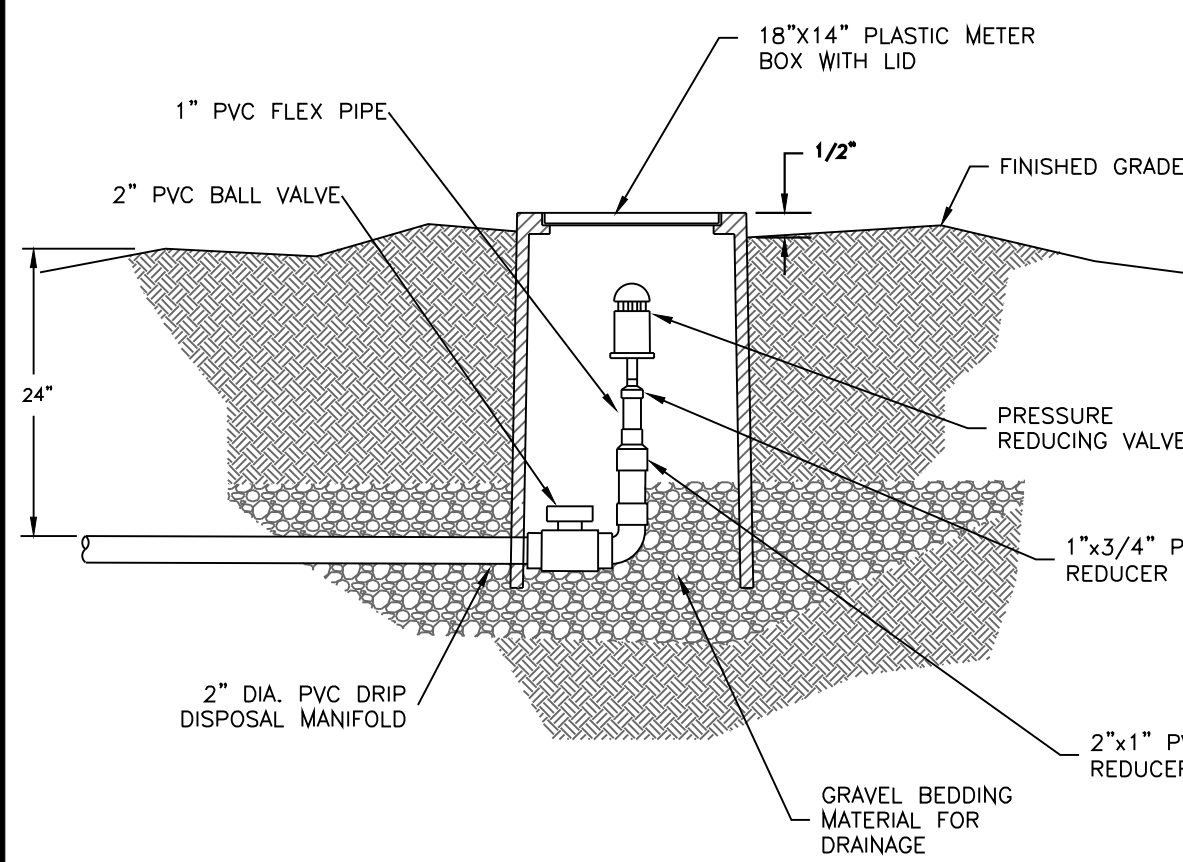
9 DRIP DISPOSAL PIPING END MANIFOLD ELEV.
N.T.S.



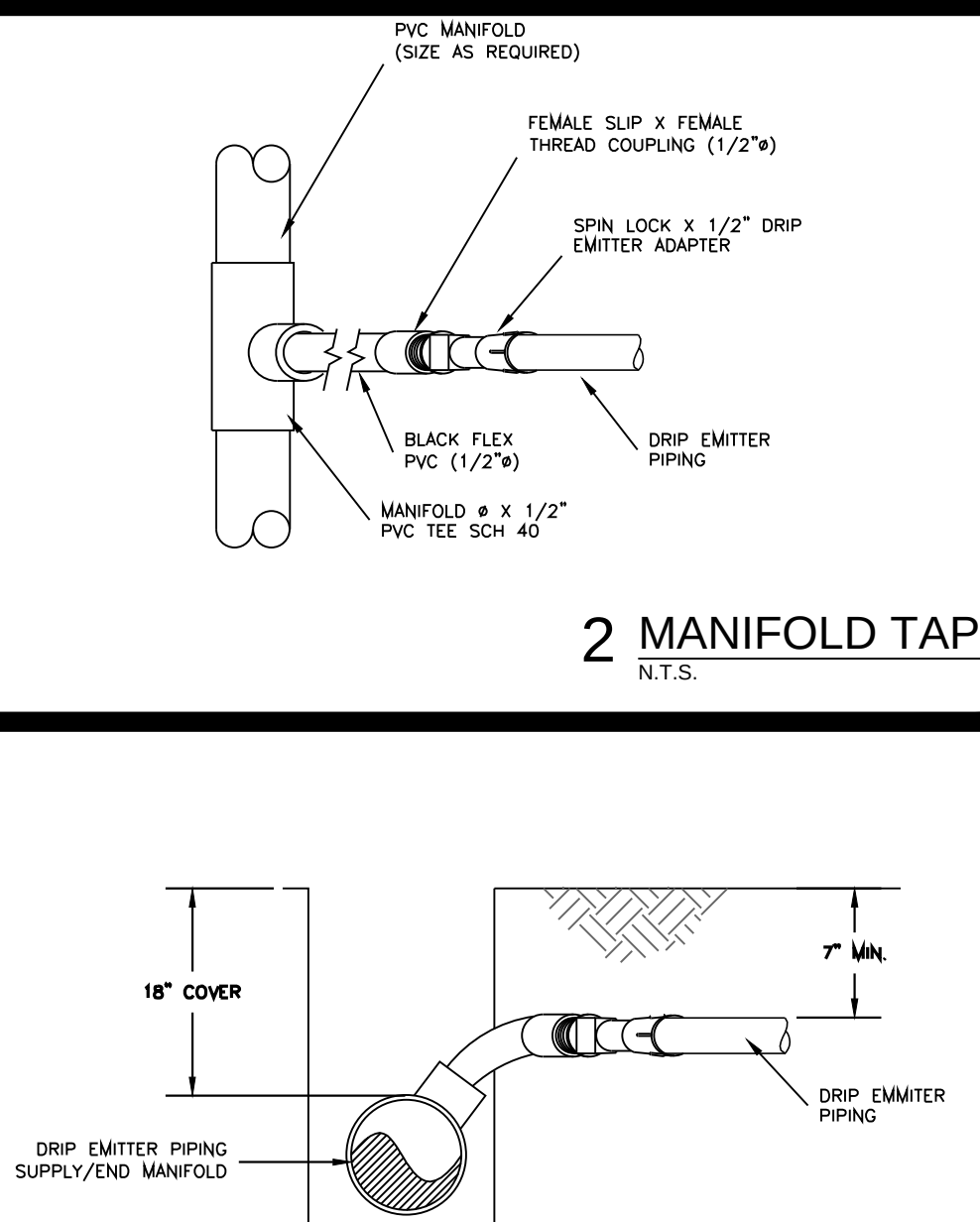
6 DRIP EMITTER PIPING
N.T.S.



5 PRESSURE REDUCING VALVE ASSEMBLY
N.T.S.



1 DRIP EMITTER MANIFOLD - SECTION
N.T.S.



KING'S CHAPEL & HIGH PARK HILL
STEG SYSTEM DESIGN - WASTEWATER SITE PLAN
ARRINGTON, TENNESSEE 37014

REVIEW SET
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CIVIL INFRASTRUCTURE ASSOCIATES
307 HICKERSON DRIVE
MURFREESBORO, TENNESSEE 37129
PHONE: 615-663-7678

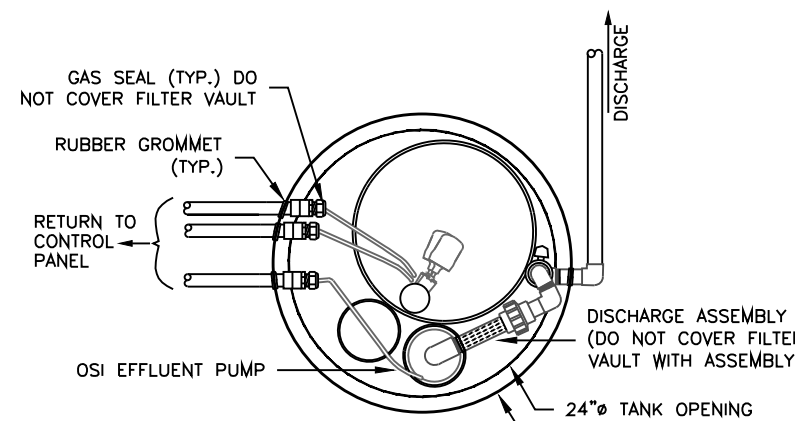
REVISIONS	
DATE	DESCRIPTION
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ORIGINAL
ISSUE DATE: MAY 2019

DRIP FIELD
DETAILS

C4.04

PLOT DATE: 5/12/2019 8:57:58 AM (MWARNER)
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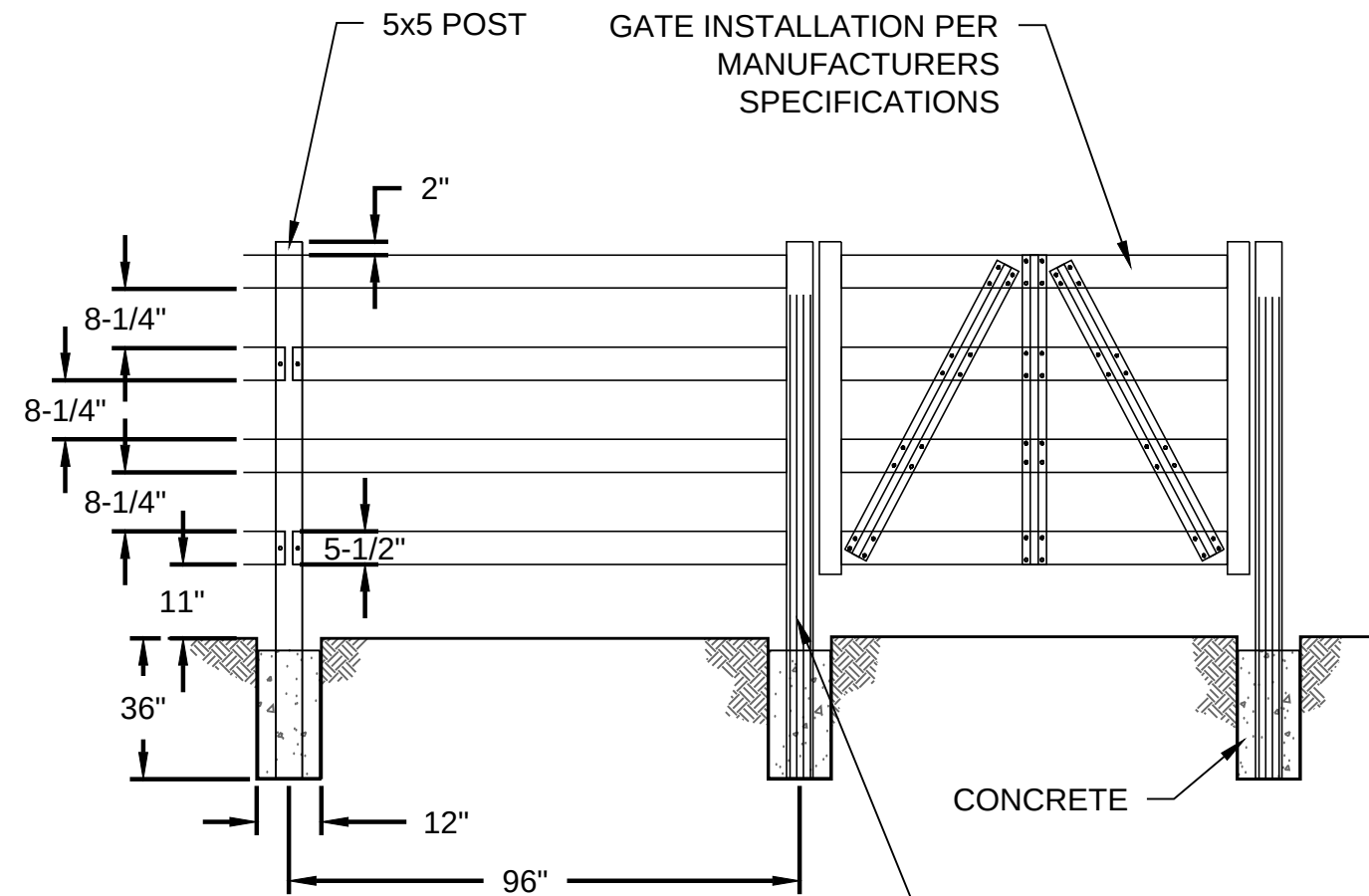


CONTROL PUMP VAULT - PLAN

N.T.S.
SPECIAL NOTE:
ONLY ONE PUMP VAULT SHALL CONTAIN FLOAT SWITCHES. THIS VAULT SHALL CONTAIN THE LOW LEVEL OFF FLOAT. ALL DUPLEX PUMP UNITS SHALL BE CONTROLLED BY THE TELEMETRY (SMART) PANEL LEVEL CONTROL PRESSURE SENSOR

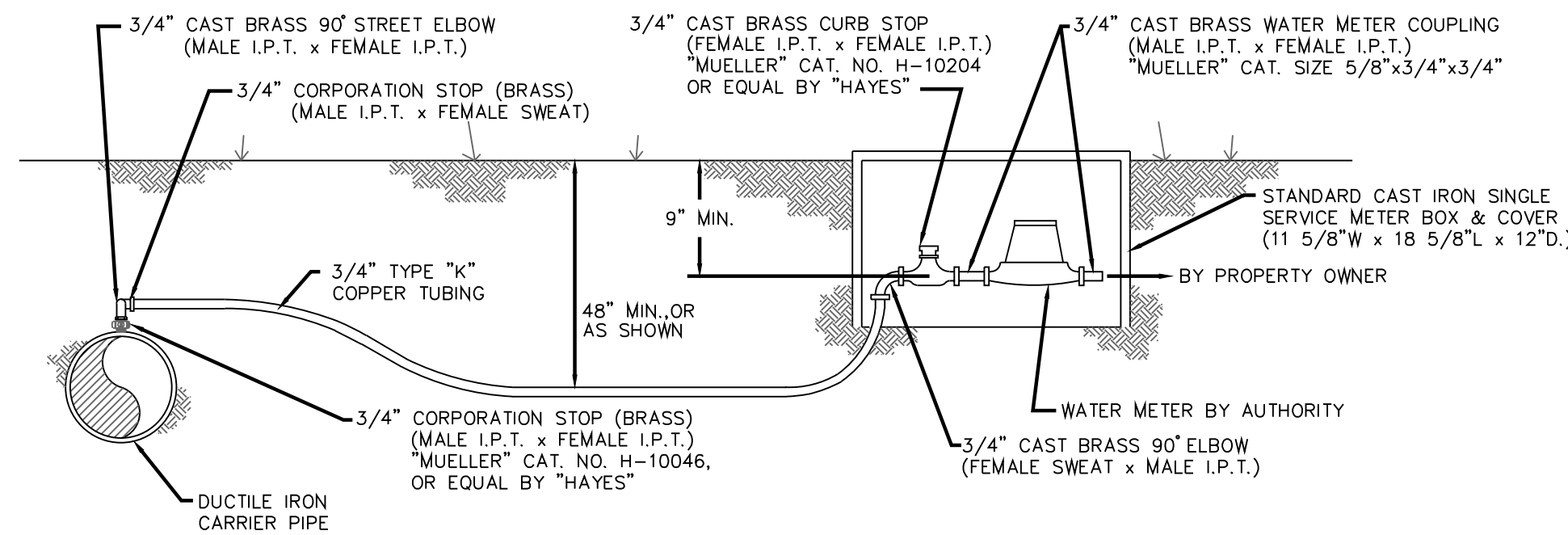
ALL TANKS SHALL BE ONE-PIECE, STRUCTURALLY SOUND, WATERTIGHT TANKS AS MANUFACTURED BY JARRETT CONCRETE PRODUCTS, OR APPROVED EQUAL

7 RECIRCULATION CONTROL PUMP VAULT
N.T.S.

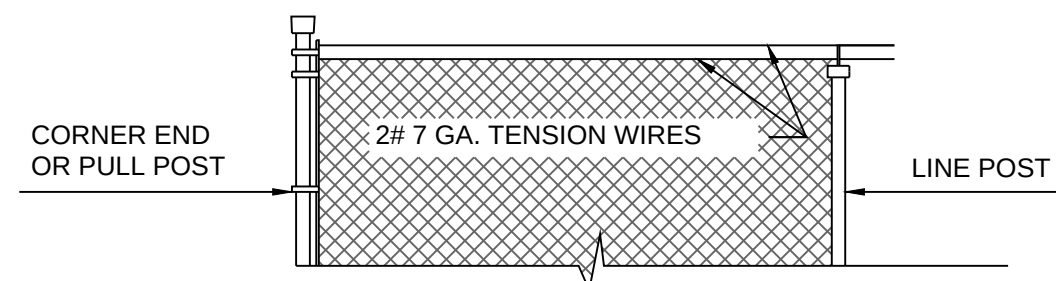
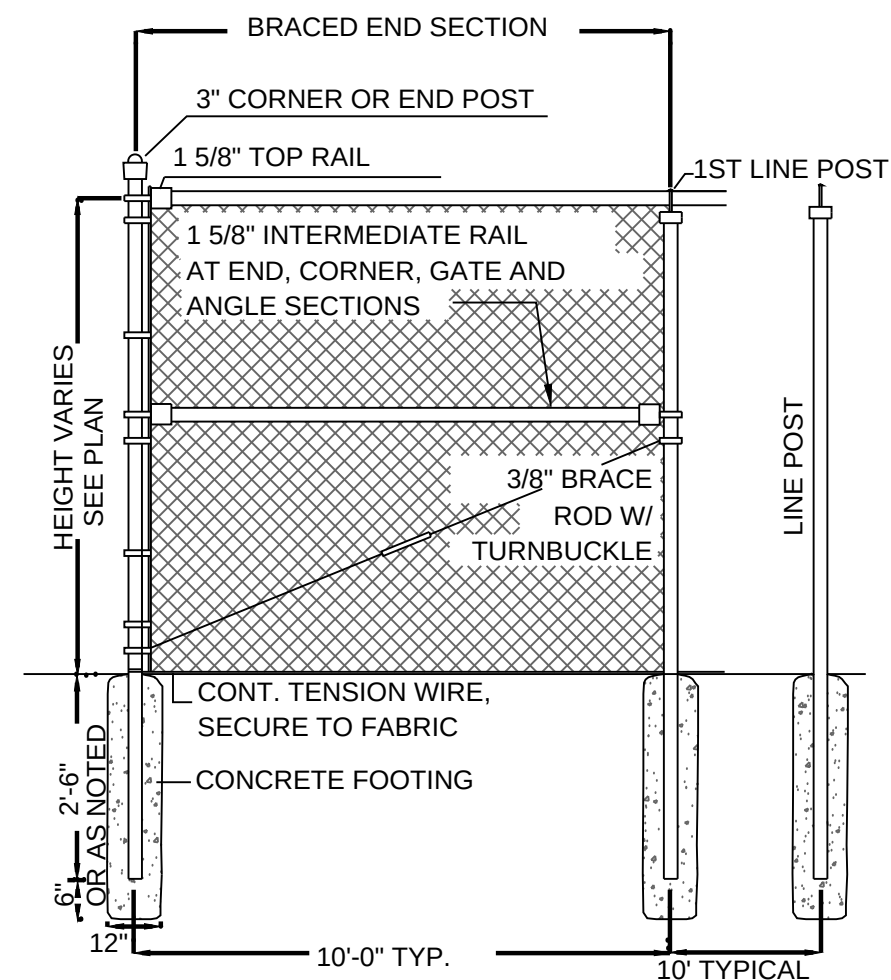


CONTRACTOR TO INSTALL FENCING COMPONENTS AND APPURTENANCES PER MANUFACTURERS SPECIFICATIONS

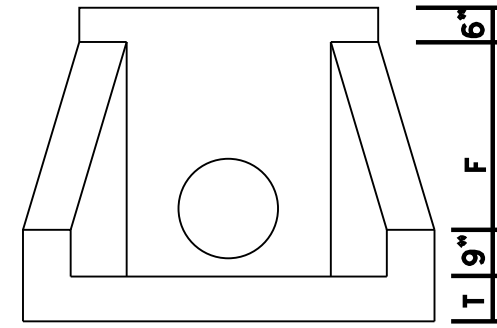
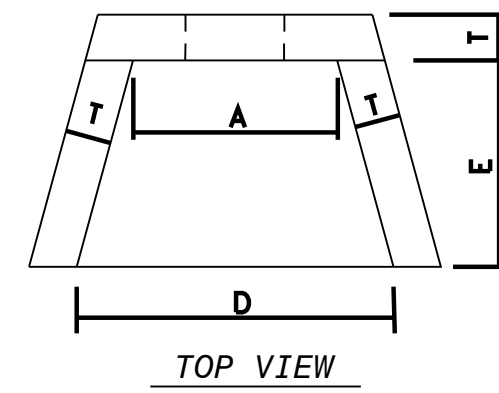
6 4-RAIL VINYL FENCE
N.T.S.



5 WATER METER
N.T.S.



4 6' FENCE DETAIL
N.T.S.



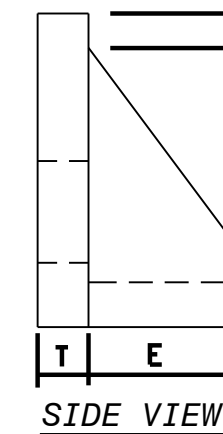
FRONT VIEW

CONCRETE: 4000 PSI AT 28 DAYS REINFORCED W/NO. 4 BARS 10" C/C EACH WAY W/WINGS & TOE SLAB DOWELLED TO HEADWALL W/NO. 5 BARS.

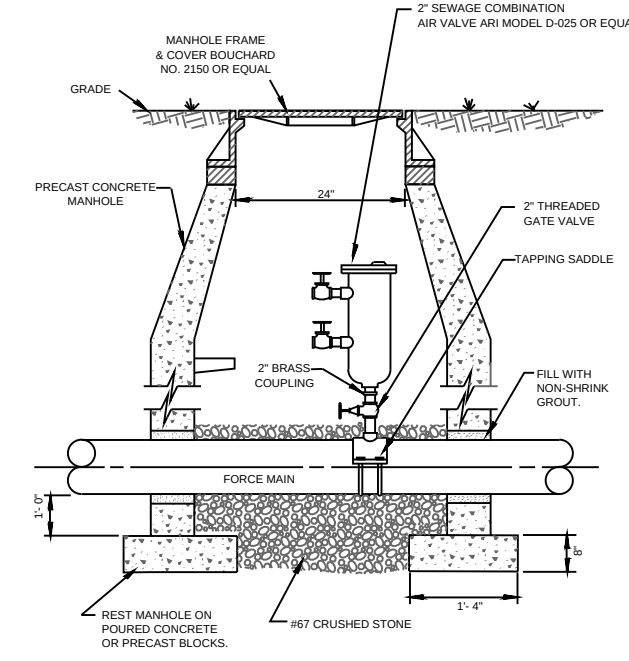
3/4" CHAMFER ON ALL EXPOSED EDGES.

3 ENDWALL DETAIL
N.T.S.

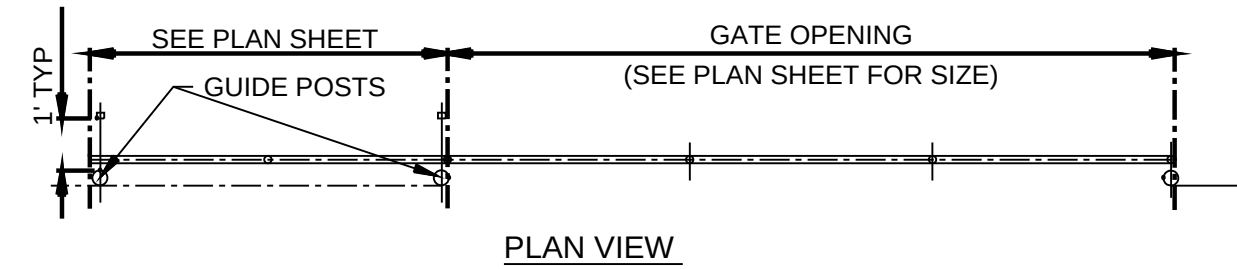
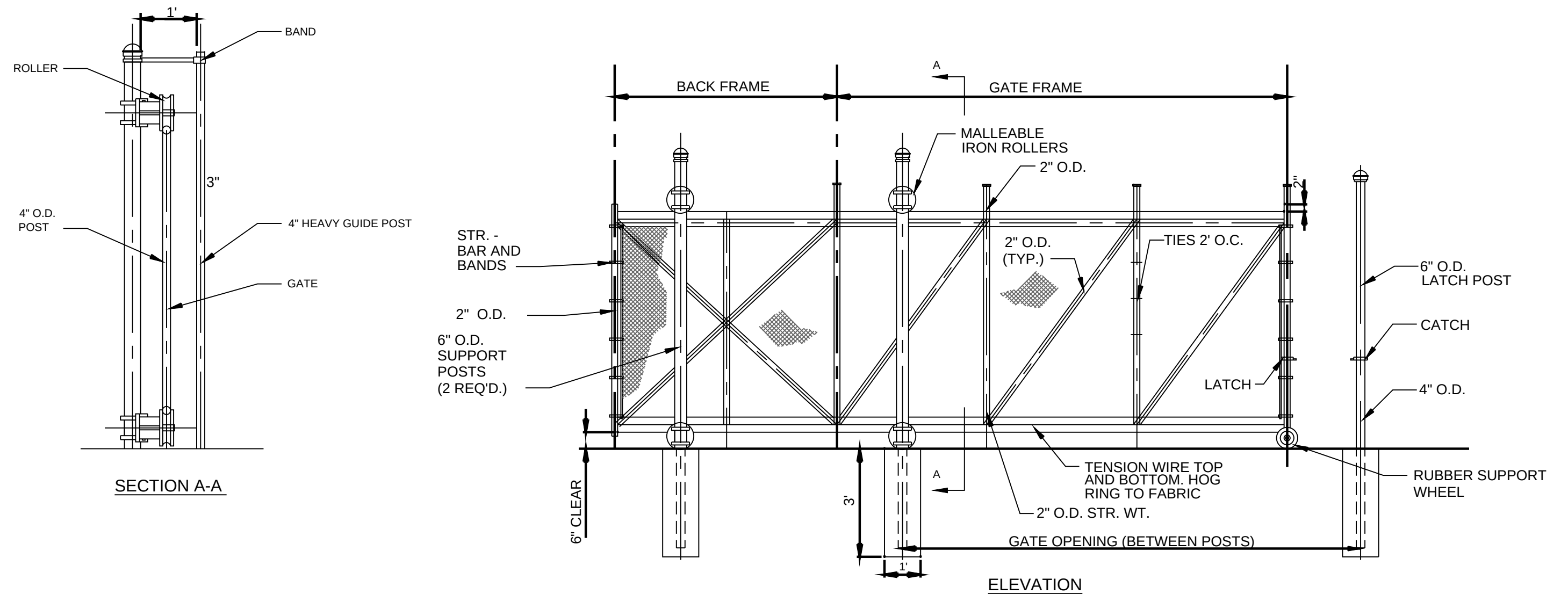
TABLE OF DIMENSIONS					
PIPE SIZES	A	D	E	F	T (MIN.)
15"	2'-6"	5'-0"	2'-6"	1'-9"	6"
18"	2'-6"	5'-0"	2'-6"	1'-9"	6"
21"	2'-6"	5'-0"	2'-6"	1'-9"	6"
24"	4'-0"	6'-6"	4'-0"	3'-3"	6"
30"	4'-0"	6'-6"	4'-0"	3'-3"	6"
36"	5'-6"	8'-0"	3'-6"	4'-5"	6"
42"	5'-6"	8'-0"	3'-6"	4'-5"	6"
48"	5'-6"	8'-0"	3'-6"	4'-5"	6"
54"	7'-0"	9'-5"	4'-6"	5'-9"	6"
60"	7'-0"	9'-5"	4'-6"	5'-9"	6"
66"	8'-6"	11'-0"	5'-6"	6'-11"	6"
72"	8'-6"	11'-0"	5'-6"	6'-11"	6"



SIDE VIEW

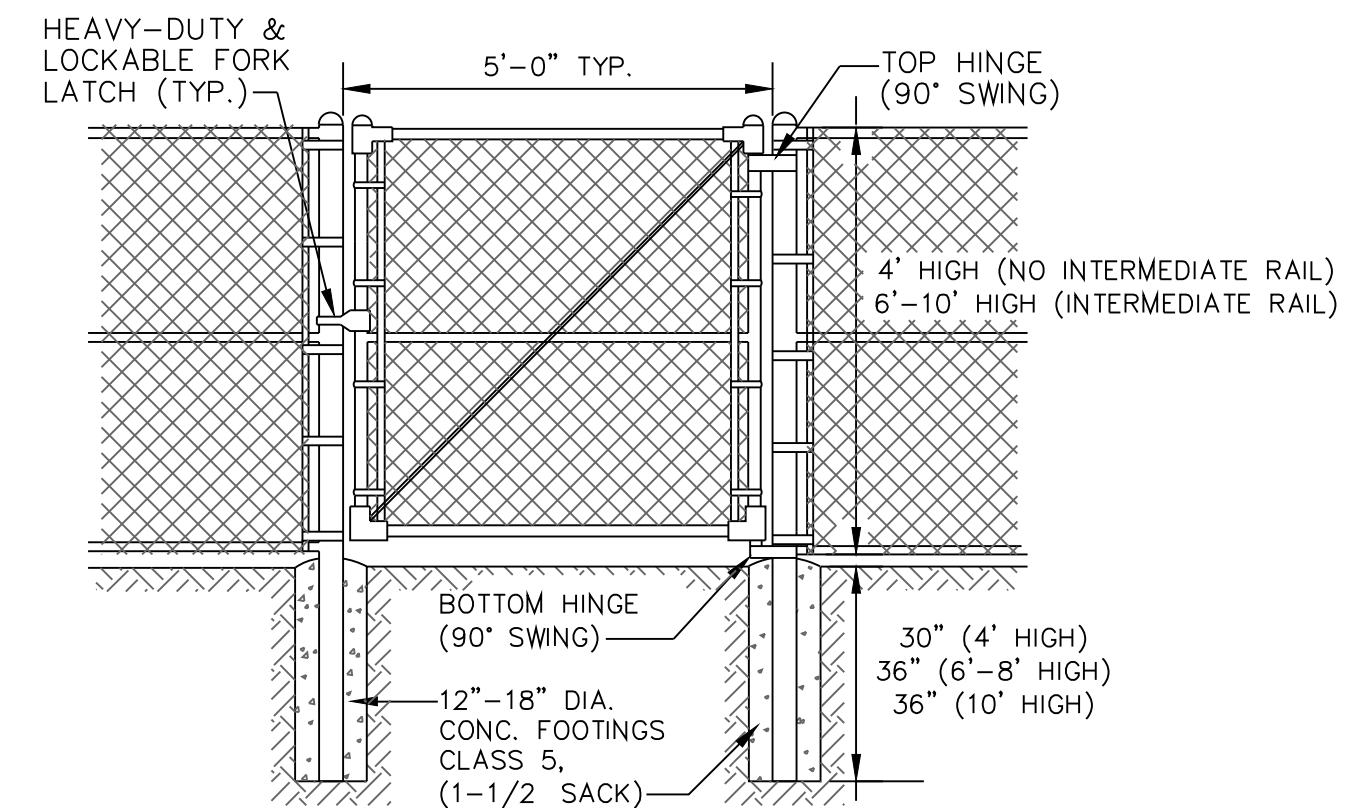


2 SEWER AIR RELEASE VALVE
N.T.S.



20' CANTILEVERED GATE

- NOTES:
- REFER TO CONSOLIDATED UTILITY DISTRICT TECHNICAL SPECIFICATIONS FOR FURTHER DETAIL, DIMENSIONS AND NOTES.
 - FENCE FABRIC SHALL BE SECURED TO GATE FRAMES WITH KNUCKLED SELVAGE ALONG ALL EDGES FOR ALL TYPES CHAIN LINK FENCE INSTALLATIONS.
 - FENCING SHALL HAVE A COLOR COATING, CONTRACTOR TO COORDINATE COLOR WITH WADC.
 - ALL CONCRETE FOOTINGS AROUND POSTS AT GROUND LINE SHALL BE MOUNDED & SLOPED FOR POSITIVE DRAINAGE.



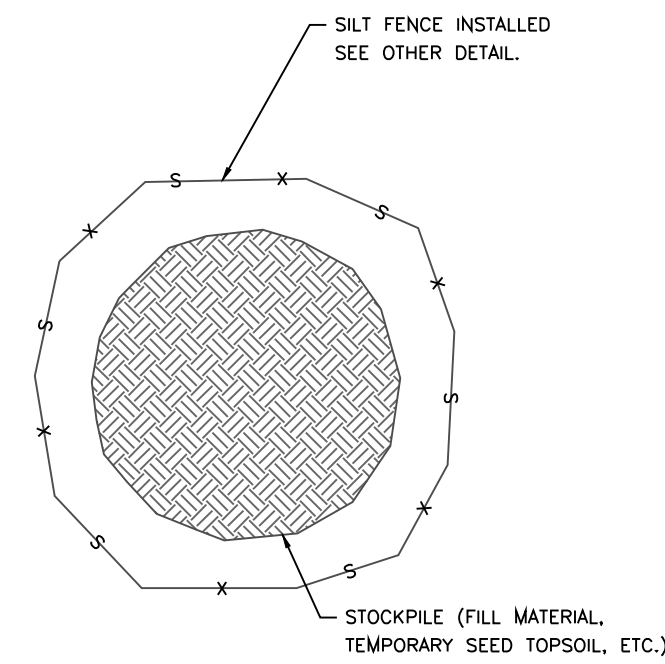
TYPICAL PEDESTRIAN GATE

1 GATE DETAILS
N.T.S.

REVISIONS	
◇ PRE-SET ISSUE DATE	△ POST-SET ISSUE DATE
DATE	DESCRIPTION
-	-
-	-
-	-
-	-

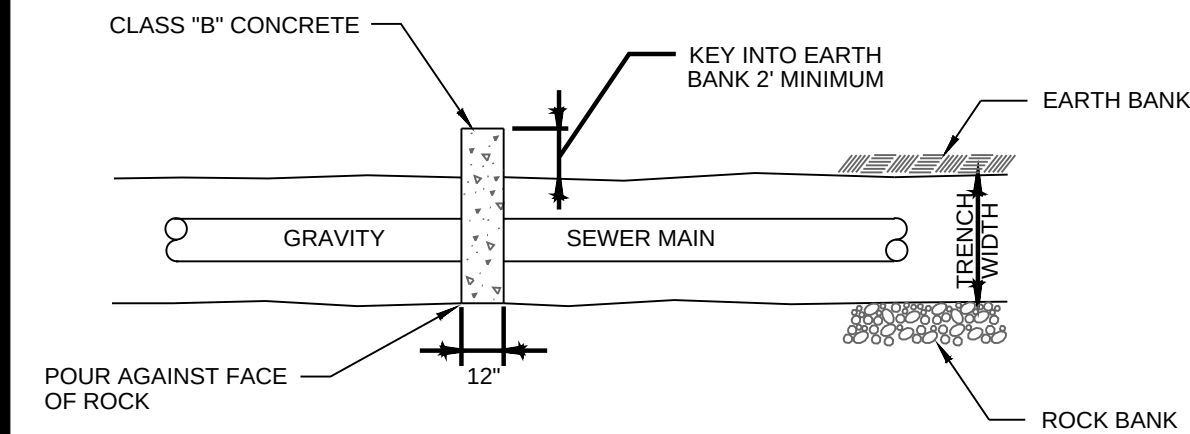
ORIGINAL
ISSUE DATE: MAY 2019

STANDARD
DETAILS



NOTE:
ACCESS DRIVE TO DRIP FIELDS SHALL BE SURFACED WITH 8" INCHES
OF COMPACTED CRUSHED LIMESTONE GRAVEL.

11 ACCESS ROAD SECTION



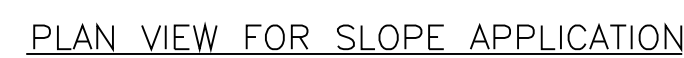
PLAN



6 CHECK DAM



3 STONE CHECK DAM

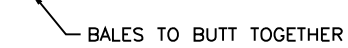


SECTION B-B

10 WATTLE/TUBES CHANNEL APPLICATION



7 WATTLE/TUBES SLOPE APPLICATION



NOTES

1. TO BE INSTALLED AS NOTED ON PLAN BEFORE COMMENCING GRADING OPERATION AND LEFT IN PLACE UNTIL A GOOD STAND OF GRASS IS ESTABLISHED OVER ALL DISTURBED AREAS.
2. STRAW BALED SEDIMENT CONTROL BARRIERS SHALL BE DESIGNED AND PLACED PER THE TDEC EROSION AND SEDIMENT CONTROL HANDBOOK, LATEST EDITION.

5 STRAW BALE SILT BARRIER



NOTES

- 1 FILTER CLOTH SHALL HAVE APPROVED BACKING OR A BUILT-IN REINFORCED STRUCTURE, AS RECOMMENDED BY THE MANUFACTURER TO SUPPORT THE FILTER CLOTH.
- 2 FILTER CLOTH SHALL MEET THE REQUIREMENTS OF SECTION 209 OF T.D.O.T. STANDARD SPECIFICATIONS
- 3 A PREASSEMBLED SILT FENCE MEETING THE REQUIREMENTS OF THIS DRAWING IS ACCEPTABLE IN LIEU OF A FIELD CONSTRUCTED SILT FENCE

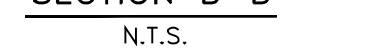
2 SILT FENCE DETAIL



NOTES

1. REFER TO TDOT STANDARD DRAWING NO. EC-STR-6 FOR DETAILS AND NOTES NOT SHOWN.

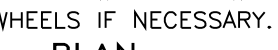
4 ROCK CHECK DAMS DETAIL



NC

NOTES:

Construct sediment barrier and channelize runoff to sediment trapping device.



NOTES

1. COORDINATE WITH C.O.C. BMP MANUAL FOR ADDITIONAL DETAILS AND NOTES.

1 CONSTRUCTION ENTRANCE



**CIVIL
INFRASTRUCTURE
ASSOCIATES**

307 HICKERSON DRIVE
MURFREESBORO, TENNESSEE 37129
PHONE: 615-663-7678

**REVIEW SET
NOT FOR
CONSTRUCTION**

ING'S CHAPEL & HIGH PARK HILL

WASTEG SYSTEM DESIGN - WASTEWATER SITE PLAN

ARRINGTON, TENNESSEE 37014

T.N. No.:	DRAWN BY:	CHECKED BY:
-----------	-----------	-------------

CIA PROJECT No:	DRAWN BY:	CHECKED BY:
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REVISIONS

[illegible]

ORIGINAL
ISSUE DATE: MAY 2019

STANDARD DETAILS

C4.06

PLOT DATE: 5/1/2019 8:59:03 AM (MWARNER)
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SECTION B-B

EQUIPMENT LIST:

- 1 2" DRIP FIELD FLUSH SOLENOID CONTROL VALVE
- 2 HYDRO METER WITH SOLENOID CONTROL VALVE
- 3 2" PVC INLET FROM DOSE TANK.
- 4 2" DIA HIGH PRESSURE FLEXIBLE HOSE (2) REQUIRED.
- 5 SANITRON U.V. DISINFECTION UNIT (TYP. FOR 2).
- 6 3/4 HOSE BIBB.
- 7 2" SOLENOID CONTROL VALVE.
- 8 2"x3" DISK FILTER (ARKAL "SUPER FILTER" OR EQUAL).
- 9 FILTER FLUSHING SOLENOID VALVES.
- 10 2" UNION.
- 11 AIR RELEASE VALVE.
- 12 FILTER WIRING JUNCTION BOX.
- 13 30" HEIGHT ALUMINUM TABLE
- 14 EXPANSION TANK
- 15 FLOW METER

GENERAL NOTES:

1. PIPING SHOWN IS FOR TWO PIPE INLET AND TWO U.V. UNITS. LAYOUT AND COMPONENTS FOR ADDITIONAL UNITS SHALL BE SIMILAR.
2. ALL BUILDING PIPING AND VALVES SHALL BE 2" SCHULDER 80 PVC.
3. CONTRACTOR SHALL LEAVE PIPE STUB-OUTS IN BUILDING IF FUTURE ADDITIONAL U.V. DISINFECTION UNITS ARE PLANNED.
4. ALL SUFFICIENT SPACE BETWEEN WALL AND END OF U.V. UNIT FOR REMOVAL OF BULB. U.V. UNITS MAY BE ROTATED FOR ADDITIONAL SPACE.
5. FILTER UNITS AND U.V. UNITS TO BE SUPPORTED BY CUSTOM-MADE WELDED ANGLE IRON FRAME. FRAME TO BE PAINTED WITH TWO COATES BLACK ENAMEL. FRAME TO BE STURDY AND LEVEL.
6. CONTRACTOR TO SUPPLY ALL PIPING AND FITTINGS NOT LISTED IN EQUIPMENT LIST, NEEDED FOR ASSEMBLY OF EQUIPMENT.

SECTION A-A



PLAN VIEW

307 HICKERSON DRIVE
MURFREESBORO, TENNESSEE 37129
PHONE: 615-663-7678

**REVIEW SET
NOT FOR
CONSTRUCTION**

KING'S CHAPEL & HIGH PARK HILL

STEG SYSTEM DESIGN - WASTEWATER SITE PLAN
ARRINGTON, TENNESSEE 37014

CIA PROJECT No:	DRAWN BY:	CHECKED BY:
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REVISIONS

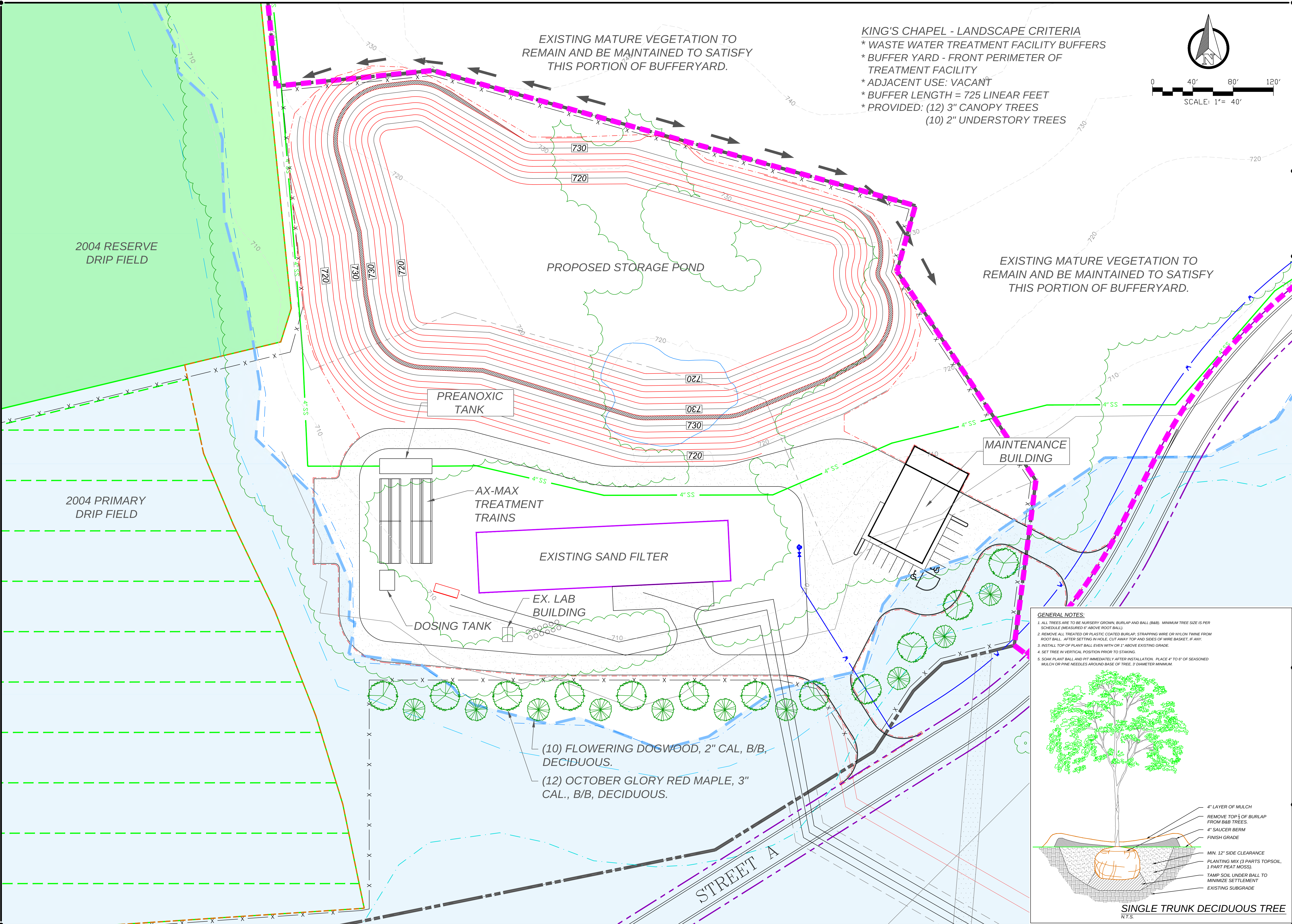
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ISSUE DATE: MAY 2019

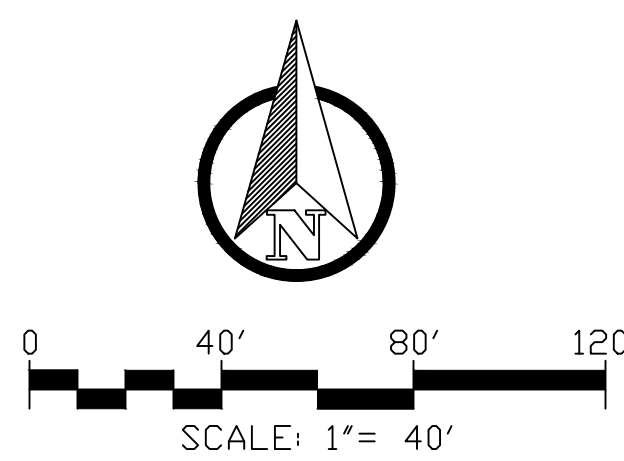
LAB BUILDING

C4.07

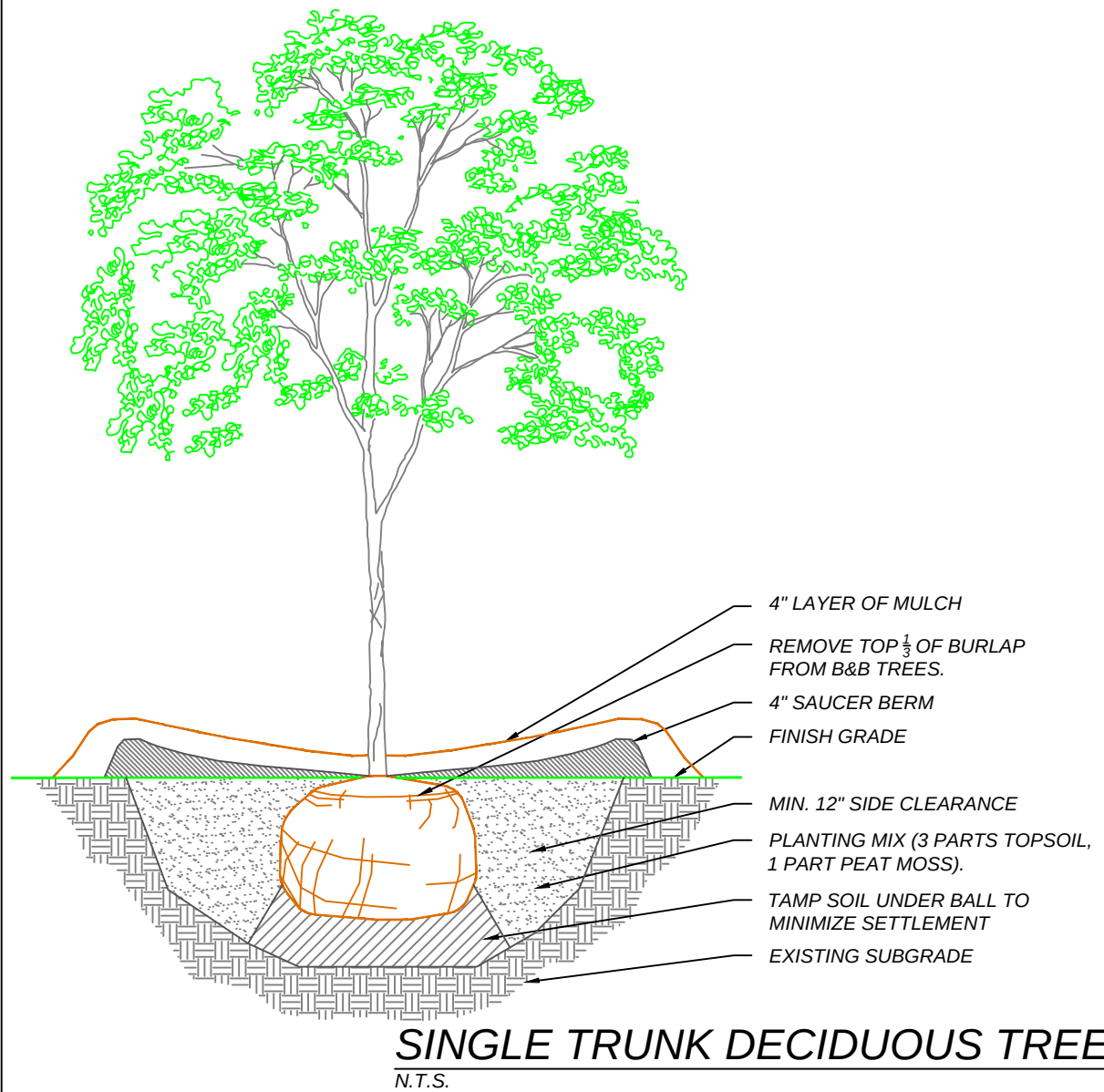
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- KING'S CHAPEL - LANDSCAPE CRITERIA**
- * WASTE WATER TREATMENT FACILITY BUFFERS
 - * BUFFER YARD - FRONT PERIMETER OF TREATMENT FACILITY
 - * ADJACENT USE: VACANT
 - * BUFFER LENGTH = 725 LINEAR FEET
 - * PROVIDED: (12) 3" CANOPY TREES
(10) 2" UNDERSTORY TREES



- GENERAL NOTES:**
1. ALL TREES ARE TO BE NURSERY GROWN, BURLAP AND BALL (B&B). MINIMUM TREE SIZE IS PER SCHEDULE (MEASURED 6" ABOVE ROOT BALL).
 2. REMOVE ALL TREATED OR PLASTIC COATED BURLAP, STRAPPING WIRE OR NYLON TWINE FROM ROOT BALL. AFTER SETTING IN HOLE, CUT AWAY TOP AND SIDES OF WIRE BASKET, IF ANY.
 3. INSTALL TOP OF PLANT BALL EVEN WITH OR 1" ABOVE EXISTING GRADE.
 4. SET TREE IN VERTICAL POSITION PRIOR TO STAKING.
 5. SOAK PLANT BALL AND PIT IMMEDIATELY AFTER INSTALLATION. PLACE 4" TO 6" OF SEASONED MULCH OR PINE NEEDLES AROUND BASE OF TREE, 3' DIAMETER MINIMUM.



CIVIL INFRASTRUCTURE ASSOCIATES

307 HICKERSON DRIVE
MURFREESBORO, TENNESSEE 37129
PHONE: 615-663-7678

**REVIEW SET
NOT FOR
CONSTRUCTION**

KING'S CHAPEL & HIGH PARK HILL

STEG SYSTEM DESIGN - WASTEWATER SITE PLAN

ARRINGTON, TENNESSEE 37014

CIA PROJECT NO. _____

DRAWN BY: _____

CHECKED BY: _____

REVISIONS

DATE	DESCRIPTION

ORIGINAL
ISSUE DATE: MAY 2019

**LANDSCAPE PLAN
BUFFERING
TREATMENT
FACILITY**

L1.00

Provide a copy of the State Operator Certificate for the wastewater system operator of record. If the operator is a contract employee of the utility, provide a copy of the employment contract.

RESPONSE:

The operator of record for King's Chapel Capacity is Mr. James Johnson. A copy of Mr. Johnson's State Operator Certificate is attached. Mr. Johnson is an independent contractor and his contract with King's Chapel Capacity is also attached.



WATER AND WASTEWATER OPERATOR CERTIFICATION BOARD

NAME AND MAILING ADDRESS

James B Johnson
307 Stafford Ct.
Smyrna, TN 37167

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
WATER AND WASTEWATER OPERATOR CERTIFICATION BOARD

I.D. NO. EXPIRATION DATE

1186 12/31/2019

RENEWAL NO.
97752

THIS IS TO CERTIFY THAT:

James B Johnson

IS IN GOOD STANDING WITH THE BOARD FOR THE CLASSIFICATIONS LISTED:

WW/4

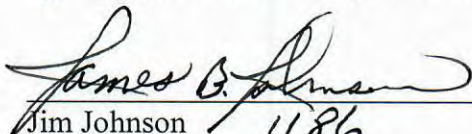
WHEN CORRESPONDING ALWAYS REFER TO YOUR I.D. NUMBER
AND SEND NOTIFICATION OF ADDRESS CHANGE

Engagement Agreement

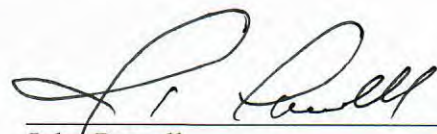
I, Jim Johnson, a certified holder of a class 4 wastewater operators license in Tennessee offer contract employment services to King's Chapel Capacity, LLC ("KCC") for the purpose of operating any of their facilities. The proposed engagement period is for an unspecified period of time and shall exist as long as services are being rendered or until terminated by either party. As payment for these services, KCC agrees to pay me a mutually agreed amount of \$250.00 per month. I Understand I may be required to appear at State Administrative Conferences, State Board Hearings, and any Williamson County Proceedings.

Pursuant to this agreement, I agree to be the full-time operator of the aforesaid sewer wastewater system. This would entail, but not be limited to, inspecting and maintaining the system in accordance with all applicable Local, State and Federal laws and rules.

Either party can terminate with or without cause this agreement. If terminated by me, I agree to give KCC a 30-day written notice prior to the final day of my services. I also agree to perform the required and necessary services needed to operate and maintain the sewer system up until the final agreed upon date of work. If terminated by KCC, KCC agrees to compensate me for any work performed up to the time of termination and agrees to provide a 30-day severance.


Jim Johnson
Operator

09-26-2018
Date


John Powell
Managing Member of KCC

9/26/18
Date

Provide the name, address, and telephone number of the technical contact person responsible for and knowledgeable about the applicant's proposed operations in Tennessee.

RESPONSE:

The operator of record for King's Chapel Capacity is Mr. James Johnson. Mr. Johnson's contact information is as follows:

Jim Johnson
307 Stafford Court
Smyrna, TN 37167

615-419-7404

Provide a list of any complaint(s), notices of violations or administrative action filed with or issued by a regulatory agency. Identify the nature of the complaint, notices of violation or administrative action, which agency is involved, and how the issue was or is being resolved.

RESPONSE:

To our knowledge, King's Chapel Capacity has never received a complaint from any end-use customer in the King's Chapel Subdivision that was filed with either the Tennessee Public Utility Commission (TPUC) or the Tennessee Department of Environment & Conservation (TDEC).

On its own motion, TPUC initiated a show cause proceeding against King's Chapel Capacity for alleged violations of wastewater utility laws and rules relating to posting of financial security in Docket No. 14-00007. This docket was conditionally dismissed by TPUC in its April 22, 2016 Order based on the submission of a fully executed bond. To our knowledge, this incident represents the only complaint, notice of violation or administrative action taken by either TPUC or TDEC against King's Chapel Capacity.

Provide a certification from a design engineer that the wastewater system was constructed in accordance with the TDEC approved construction plans and specifications. The certification shall be filed in the docket prior to providing service.

RESPONSE:

King's Chapel Capacity will provide a certification from a design engineer that the wastewater system at Hill Parcel and Roberts Parcel was constructed in accordance with the TDEC approved construction plans and specifications when construction is complete and before providing service to any end-use customers.

EXHIBIT 5
FINANCIAL CAPABILITIES OF KCC

Exhibit 5.1	2017 Financial Statements of KCC
Exhibit 5.2	10-Year Pro Forma Income Statement
Exhibit 5.3	KCC Chart of Accounts
Exhibit 5.4	Hill Parcel and Roberts Parcel Plant in Service
Exhibit 5.5	KCC Depreciation Rates
Exhibit 5.6	Estimated Wastewater Construction Cost
Exhibit 5.7	Wastewater Ownership Statement
Exhibit 5.8	KCC Wastewater Tariff for Hill Parcel and Roberts Parcel
Exhibit 5.9	Estimated Annual Customer Additions
Exhibit 5.10	Local Bonding Requirements
Exhibit 5.11	Wastewater System Performance Bond for Construction
Exhibit 5.12	Funding Sources
Exhibit 5.13	Compliance with TPUC Financial Security Requirement

Provide the financial statements for the applicant covering the most recent year ended. Include a balance sheet, income statement and statement of cash flows.

RESPONSE:

Attached is the 2018 Annual Report of King's Chapel Capacity to the Tennessee Public Utility Commission.

STATE OF TENNESSEE

COUNTY OF Williamson

We the undersigned John Powell
and
of King's Chapel Capacity, LLC

on our oath do severally say that the foregoing return has been prepared,
under our direction, from the original books, papers and records of said
utility; that we have carefully examined the same, and declare the same to be
a correct statement of the business and affairs of said utility for the period
covered by the return in respect to each and every matter and thing therein
set forth, to the best of our knowledge, information and belief.

John Powell
(Chief Officer)

(Officer in charge of accounts)

Subscribed and sworn to before me this.....
day of....., 20.....
.....
Notary Public,County,
My commission will expire.....
.....
(Seal)

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[illegible]

Name of Respondent Kings Chapel Capacity	This Report is: (1) <u>X</u> An Original (2) <u> </u> A Resubmission	Date of Report (Mo, Da, Yr) 3-31-19	Year of Report 2018		
INCOME STATEMENT					
Account Name (a)	Ref Page (b)	Water (c)	Sewer (d)	Other (e)	Total (f)
Gross Revenue:					
Residential			\$109,465		\$109,465
Commercial			0		0
Industrial			0		0
Multi-Family			0		0
Other (Please Specify)			0		0
Other (Please Specify)			0		0
Other (Please Specify)			0		0
Other (Please Specify)			0		0
Total Gross Revenue			\$109,465		\$109,465
Operation & Maint. Expense	W3/S3		\$72,667		\$72,667
Depreciation Expense	F-5		0		0
Amortization Expense			0		0
Other Expense (Please Specify)			0		0
Other Expense (Please Specify)			0		0
Taxes Other Than Income	F-7		4,635		4,635
Income Taxes	F-7		0		0
Total Operating Expenses			\$77,302		\$77,302
Net Operating Income			\$32,163		\$32,163
Other Income:					
Nonutility Income			\$0		\$0
Other (Please Specify)			0		0
Other (Please Specify)			0		0
Other (Please Specify)			0		0
Other (Please Specify)			0		0
Total Other Income			\$0		\$0
Other Deductions:					
Misc. Nonutility Expenses			\$0		\$0
Other - Interest Expense			0		0
Other (Please Specify)			0		0
Other (Please Specify)			0		0
Other (Please Specify)			0		0
Total Other Deductions			\$0		\$0
Net Income			\$32,163		\$32,163

Name of Respondent Kings Chapel Capacity	This Report is: (1) <u>X</u> An Original (2) <u> </u> A Resubmission	Date of Report (Mo, Da, Yr) 3-31-19	Year of Report 2018
COMPARATIVE BALANCE SHEET			
Account Name (a)	Ref Page (b)	Current Year (c)	Previous Year (d)
ASSETS			
Utility Plant in Service (101-105)	F5/W1/S1	\$689,063	\$689,063
Accum. Depreciation and Amortization (108)	F5/W2/S2	164,588	151,226
Net Utility Plant		\$524,475	\$537,837
Cash		\$4,177	\$8,564
Customer Accounts Receivable (141)		0	0
Escrow Deposits (132)		43	1,831
Other Assets (Please Specify)		0	0
Other Assets (Please Specify)		0	0
Other Assets (Please Specify)		0	0
Total Assets		\$528,695	\$548,232
LIABILITIES AND CAPITAL			
Common Stock Issued (201)	F-6	\$0	\$0
Preferred Stock Issued (204)	F-6	0	0
Other Paid-In Capital (211)		0	0
Retained Earnings (215)	F-6	-12,838	-45,002
Capital (Proprietary & Partnership-218)	F-6	177,812	225,436
Total Capital		\$164,974	\$180,434
Long-Term Debt (224)	F-6	\$0	\$0
Accounts Payable (231)		0	0
Notes Payable (232)		0	0
Customer Deposits (235)		2,760	2,760
Accrued Taxes (236)		0	0
Advances Payable		0	0
Escrowed Deposits (235.1)		88,685	79,400
Other Liabilities (Please Specify)		0	0
Other Liabilities (Please Specify)		0	0
Other Liabilities (Please Specify)		0	0
Advances for Construction		0	0
Contributions In Aid Of Const.-Net (271-2)	F-8	272,276	285,638
Total Liabilities		\$363,721	\$367,798
Total Liabilities & Capital		\$528,695	\$548,232

Name of Respondent Kings Chapel Capacity	This Report is: (1) <u>X</u> An Original (2) <u> </u> A Resubmission	Date of Report (Mo, Da, Yr) 3-31-19	Year of Report 2018	
NET UTILITY PLANT				
Plant Accounts (101-107) Inclusive (a)	Water (c)	Sewer (d)	Other (e)	Total (f)
Utility Plant in Service (101)		\$689,063		\$689,063
Construction Work in Progress (105)		0		0
Other (Please Specify)		0		0
Other (Please Specify)		0		0
Other (Please Specify)		0		0
Other (Please Specify)		0		0
Other (Please Specify)		0		0
Other (Please Specify)		0		0
Other (Please Specify)		0		0
Total Utility Plant		\$689,063		\$689,063
ACCUMULATED DEPRECIATION AND AMORTIZATION OF UTILITY PLANT				
Account 108 (a)	Water (c)	Sewer (d)	Other (e)	Total (f)
Balance First of Year		\$151,227		\$151,227
Credits During Year:				
Accruals charged to Depr. Account		\$13,361		\$13,361
Salvage		0		0
Other Credits (Please Specify):		0		0
Other Credits (Please Specify):		0		0
Other Credits (Please Specify):		0		0
Other Credits (Please Specify):		0		0
Total Credits		\$13,361		\$13,361
Debits During Year:				
Book/Historical Cost of Plant Retired		\$0		\$0
Cost of Removal		0		0
Other Debits (Please Specify):		0		0
Other Debits (Please Specify):		0		0
Other Debits (Please Specify):		0		0
Other Debits (Please Specify):		0		0
Total Debits		\$0		\$0
Balance End of Year		\$164,588		\$164,588

Name of Respondent Kings Chapel Capacity	This Report is: (1) ☒ An Original (2) ☐ A Resubmission	Date of Report (Mo, Da, Yr) 3-31-19	Year of Report 2018
CAPITAL STOCK (201 - 204)			
(a)	Common Stock (b)	Preferred Stock (c)	
Par or stated value per share	N/A	N/A	
Shares Authorized	N/A	N/A	
Shares issued and outstanding	N/A	N/A	
Total par value of stock issued	0	0	
Dividends declared per share for year	0	0	
RETAINED EARNINGS (215)			
(a)	Appropriated (b)	Unappropriated (c)	
Balance first of year	0	-45,002	
Changes during year NET INCOME/(NET LOSS)	0	32,163	
Changes during year (Please Specify)			
Changes during year (Please Specify)			
Changes during year (Please Specify)			
Changes during year (Please Specify)			
Changes during year (Please Specify)			
Balance end of year	0	-12,838	
PROPRIETARY CAPITAL (218)			
(a)	Proprietor (b)	Partner (c)	
Balance first of year	\$225,436		
Deposits from Owners	-47,624		
Net Income	0		
Changes during year (Please Specify)	0		
Changes during year (Please Specify)	0		
Changes during year (Please Specify)	0		
Changes during year (Please Specify)	0		
Balance end of year	\$177,812		
LONG-TERM DEBT (224)			
Description of Obligation including Issue & Maturity Dates (a)	Interest Rate (b)	Year End Balance (c)	
N/A	0.00%	\$0	
N/A	0.00%	0	
N/A	0.00%	0	
N/A	0.00%	0	
N/A	0.00%	0	
N/A	0.00%	0	
N/A	0.00%	0	
N/A	0.00%	0	
N/A	0.00%	0	
N/A	0.00%	0	
N/A	0.00%	0	
N/A	0.00%	0	
Total Long-Term Debt		\$0	

Name of Respondent Kings Chapel Capacity	This Report is: (1) <u>X</u> An Original (2) <u> </u> A Resubmission	Date of Report (Mo, Da, Yr) 3-31-19	Year of Report 2018	
TAXES ACCRUED (236)				
Description (a)	Water (b)	Sewer (c)	Other (d)	Total (e)
Balance First of year		\$0		\$0
Accruals Charged:				
Federal Income Tax		\$0		\$0
Local Property tax		0		0
State ad valorem tax		0		0
TN State Sales Tax		0		0
Regulatory Assessment Fee		0		0
Payroll Tax		0		0
Other Taxes (Please Specify)		0		0
Other Taxes (Please Specify)		0		0
Total Taxes Accrued		\$0		\$0
Taxes Paid				
Federal Income Tax		\$0		\$0
Local Property tax		0		0
State ad valorem tax		0		0
TN State Sales Tax		0		0
Regulatory assessment fee		0		0
Payroll Tax		0		0
TN Treasurer (Permit Fee)		0		0
TN Fran & Excise		0		0
Total Taxes Paid		\$0		\$0
Balance End of Year		\$0		\$0
PAYMENTS FOR SERVICES RENDERED BY OTHER THAN EMPLOYEES				
Report all info concerning rate, management, construction, advertising, labor relations, or other professional services rendered to the Utility for which total payments during the year to any Corp, Ptnshp, indiv, or organization of any kind, amounted to \$500 or more.				
Name of Recipient	Amount	Description of Service		
WHN Consulting	18,300	Regulatory & Accounting Services		
Elaine Powell	14,400	Billing Services		
Middle Tennessee Electric	9,665	Electric Supplier		
Non-Potable Well Water	7,600	Water Supplier		
Farris, Bobango, Branan, PLC	6,714	Legal Services		
Premier Property Management	8,390	Property Management Services		
Williamson County Trustee	3,108	Property Taxes		
James Johnson	3,100	Testing Services		
Shell	1,947	Materials & Supplies		
Smith Manus	1,800	Property Management Services		
USPS	1,624	Postage		
Rapid Pak	1,295	Materials & Supplies		
		See Attached Schedule F-7a for Additional Payments		

Supplement to Page F-7

Name of Recipient	Amount	Description of Service
Circle K	1,285	Materials & Supplies
John Powell (repairs)	1,200	Maintenance & Repair Services
Al & Ralph's Septic Tank	1,050	Maintenance & Repair Services
TDEC	700	Taxes
Verizon	602	Telephone Services
Mapco	576	Materials & Supplies
Sam's Club	528	Materials & Supplies
TPUC	520	Taxes

Name of Respondent Kings Chapel Capacity	This Report is: (1) <u>X</u> An Original (2) <u> </u> A Resubmission	Date of Report (Mo, Da, Yr) 3-31-19	Year of Report 2018
CONTRIBUTIONS IN AID OF CONSTRUCTION (271)			
Description (a)	Water (b)	Sewer (c)	Total (d)
Balance First of Year		\$285,638	\$285,638
Add Credits During Year		0	0
Less Charges During Year		0	0
Balance End of Year		\$285,638	\$285,638
Less Accumulated Amortization		13,362	13,362
Net Contributions in Aid of Construction		\$272,276	\$272,276
ADDITIONS TO CONTRIBUTIONS IN AID OF CONSTRUCTION DURING YEAR (CREDITS)			
Report below all developers or contractors agreements from which cash or property was received during the year (a)	Indicate "Cash" or "Property" (b)	Water (c)	Sewer (d)
Contractor or Developer #1			\$0
Contractor or Developer #2			0
Contractor or Developer #3			0
Contractor or Developer #4			0
Contractor or Developer #5			0
Contractor or Developer #6			0
Contractor or Developer #7			0
Contractor or Developer #8			0
Contractor or Developer #9			0
Contractor or Developer #10			0
Contractor or Developer #11			0
Contractor or Developer #12			0
Contractor or Developer #13			0
Contractor or Developer #14			0
Contractor or Developer #15			0
Contractor or Developer #16			0
Contractor or Developer #17			0
Contractor or Developer #18			0
Contractor or Developer #19			0
Contractor or Developer #20			0
Contractor or Developer #21			0
Contractor or Developer #22			0
Contractor or Developer #23			0
Contractor or Developer #24			0
Contractor or Developer #25			0
Contractor or Developer #26			0
Contractor or Developer #27			0
Contractor or Developer #28			0
Contractor or Developer #29			0
Contractor or Developer #30			0
Total Credits During Year			\$0

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Name of Respondent		This Report is:		Date of Report	Year of Report
Kings Chapel Capacity		(1) <u> X </u> An Original (2) <u> </u> A Resubmission		(Mo, Da, Yr) 3-31-19	2018
SEWER UTILITY PLANT ACCOUNTS					
Acct No. (a)	Account Name (b)	Previous Year (c)	Additions (d)	Retirements (e)	Current Year (f)
351	Organization	\$248,414	\$0	\$0	\$248,414
352	Franchises	0	0	0	0
353	Land & Land Rights	10	0	0	10
354	Structures & Improvements	0	0	0	0
360	Collection Sewers - Force	171,854	0	0	171,854
361	Collection Sewers - Gravity	0	0	0	0
362	Special Collecting Structures	0	0	0	0
363	Services to Customers	0	0	0	0
364	Flow Measuring Devices	3,385	0	0	3,385
365	Flow Measuring Installations	400	0	0	400
370	Receiving Wells	15,000	0	0	15,000
371	Pumping Equipment	0	0	0	0
380	Treatment & Disposal Equipment	250,000	0	0	250,000
381	Plant Sewers	0	0	0	0
382	Outfall Sewer Lines	0	0	0	0
389	Other Plant & Miscellaneous Equipment	0	0	0	0
390	Office Furniture & Equipment	0	0	0	0
391	Transportation Equipment	0	0	0	0
392	Stores Equipment	0	0	0	0
393	Tools, Shop & Garage Equipment	0	0	0	0
394	Laboratory Equipment	0	0	0	0
395	Power Operated Equipment	0	0	0	0
396	Communication Equipment	0	0	0	0
397	Miscellaneous Equipment	0	0	0	0
398	Other Tangible Plant	0	0	0	0
	Total Sewer Plant	\$689,063	\$0	\$0	\$689,063

*State basis used for percentages used in schedule.

Name of Respondent Kings Chapel Capacity		This Report is: (1) <u>X</u> An Original (2) <u> </u> A Resubmission	Date of Report (Mo, Da, Yr) 3-31-19	Year of Report 2018
SEWER OPERATION & MAINTENANCE EXPENSE				
Acct No.	Description (a)	Amount (b)		
701	Salaries & Wages - Employees	\$0		
703	Salaries & Wages - Officers, Directors & Stockholders	0		
704	Employee Pensions & Benefits	0		
710	Purchased Sewage Treatment	0		
711	Sludge Removal Expense	0		
715	Purchased Power	9,665		
716	Fuel for Power Production	0		
718	Chemicals	0		
720	Materials & Supplies	5,776		
730	Contractual Services	42,665		
740	Rents	0		
750	Transportation Expense	6,122		
755	Insurance Expense	0		
765	Regulatory Commission Expense	0		
770	Bad Debt Expense	0		
775	Miscellaneous Expenses	8,440		
	Total Sewer Operation & Maintenance Expense	\$72,667		

SEWER CUSTOMERS				
Description (a)	Customers First of Year (b)	Additions (c)	Disconnections (d)	Customers End of Year (e)
Metered Customers:				
5/8 Inch	249	19	0	268
3/4 Inch	0	0	0	0
1.0 Inch	0	0	0	0
1.5 Inch	0	0	0	0
2.0 Inch	0	0	0	0
2.5 Inch	0	0	0	0
3.0 Inch	0	0	0	0
4.0 Inch	0	0	0	0
6.0 Inch	0	0	0	0
8.0 Inch	0	0	0	0
Other (Please Specify)	0	0	0	0
Other (Please Specify)	0	0	0	0
Other (Please Specify)	0	0	0	0
Unmetered Customers	0	0	0	0
Total Customers	249	19	0	268

Name of Respondent Kings Chapel Capacity	This Report is: (1) <u>X</u> An Original (2) <u> </u> A Resubmission		Date of Report (Mo, Da, Yr) 3-31-19	Year of Report 2018
PUMPING EQUIPMENT				
Description*** (a)	Lift Station #1 (b)	Lift Station #2 (c)	Lift Station #3 (d)	Lift Station #4 (e)
Make, Model, or Type of Pump				
Year Installed	2006			
Rated Capacity (GPM)	75 GPM			
Size (HP)	1.5 HP			
Power (Electric/Mechanical)	Electric			
Make, Model or Type of Motor	Orenco PJ51512 Turbine			

SERVICE CONNECTIONS				
Description*** (a)	Service Connection #1 (b)	Service Connection #2 (c)	Service Connection #3 (d)	Service Connection #4 (e)
Size (Inches)	1.0"			
Type (PVC, VCP, etc)	PVC			
Average Length (Feet)	50'			
Connections-Beginning of Year	249	0	0	0
Connections-Added during Year	19	0	0	0
Connection-Retired during Year	0	0	0	0
Connections-End of Year	268	0	0	0
Number of Inactive Connections	0	0	0	0

COLLECTING MAINS, FORCE MAINS, & MANHOLES			
Description (a)	Collecting Mains (b)	Force Mains (c)	Manholes (d)
Size (Inches)	2.0"	6.0"	N/A
Type	PVC	PVC	N/A
Length/Number-Beginning of Year	0	0	0
Length/Number-Added During Year	12,000 LF	2,000 LF	0
Length/Number-Retired During Year	0	0	0
Length/Number-End of Year	12,000LF	2,000 LF	0

***If more space is needed to list equipment please attach additional sheets as necessary.

Name of Respondent Kings Chapel Capacity	This Report is: (1) <u>X</u> An Original (2) <u> </u> A Resubmission	Date of Report (Mo, Da, Yr) 3-31-19	Year of Report 2018	
TREATMENT PLANT				
Description*** (a)	Treatment Facility #1 (b)	Treatment Facility #2 (c)	Treatment Facility #3 (d)	Treatment Facility #4 (e)
Manufacturer	Orenco			
Type	P501512			
Steel or Concrete	Steel			
Total Capacity	560 GPM			
Average Daily Flow	36,500 Gal			
Effluent Disposal	Land			
Total Gallons of Sewage Treated	13,035,500			
MASTER LIFT STATION PUMPS				
Description*** (a)	Master Pump #1 (b)	Master Pump #2 (c)	Master Pump #3 (d)	Master Pump #4 (e)
Manufacturer	Orenco			
Capacity (GPM)	75 GPM			
Size (HP)	1.5 HP			
Power (Electric/Mechanical)	Electric			
Make, Model, or Type of Motor	Turbine			
OTHER SEWER SYSTEM INFORMATION				
Present Number of Equivalent Residential Customer's * being served			268	
Maximum Number of Equivalent Residential Customer's * that the system can efficiently serve			561	
Estimated Annual Increase in Equivalent Residential Customers *			50/Year	
* Equivalent Residential Customers = (Total Gallons Treated / 365 Days) / 275 Gallons Per Day. Total Gallons Treated includes both sewage treated and purchased sewage treatment.				
State any plans and estimated completion dates for any enlargements of this system: <u>N/A</u>				
If the present systems do not meet environmental requirements, please submit the following: A. An evaluation of the present plant or plants in regard to meeting the requirements. B. Plans for funding and construction of the required upgrading. C. The date construction will begin. N/A				
What is the percent of the certificated area that have service connections installed? <u>All (100%) of the certificated area of KCC have service connections in place.</u>				

***If more space is needed to list equipment please attach additional sheets as necessary.

Name of Respondent Kings Chapel Capacity	This Report is: (1) <u>X</u> An Original (2) <u> </u> A Resubmission	Date of Report (Mo, Da, Yr) 3-31-19	Year of Report 2018
SUPPLEMENTAL FINANCIAL DATA TO THE ANNUAL REPORT			
Rate Base			
Additions:			
Plant In Service		\$689,063	
Construction Work in Progress		0	
Property Held For Future Use		0	
Materials & Supplies		0	
Working Capital Allowance		0	
Escrow Deposits		43	
Other Additions (Please Specify)		0	
Total Additions to Rate Base		\$689,106	
Deductions:			
Accumulated Depreciation		\$164,588	
Accumulated Deferred Income Taxes		0	
Pre 1971 Unamortized Investment Tax Credit		0	
Customer Deposits		2,760	
Contributions in Aid of Construction		272,276	
Escrow Liability		88,685	
Other Deductions (Please Specify)		0	
Total Deductions to Rate Base		\$528,309	
Rate Base		\$160,797	
Adjusted Net Operating Income			
Operating Revenues:			
Residential		\$109,465	
Commercial		0	
Industrial		0	
Public Authorities		0	
Multiple Family		0	
Fire Protection		0	
All Other		0	
Total Operating Revenues		\$109,465	
Operating Expenses:			
Operation		\$72,667	
Depreciation		0	
Amortization		0	
Taxes Other Than Income Taxes		4,635	
Income Taxes		0	
Total Operating Expense		\$77,302	
Net Operating Income		\$32,163	
Other (Please Specify)		0	
Other (Please Specify)		0	
Adjusted Net Operating Income		\$32,163	
Rate of Return (Line 49 / Line 25)		20.00%	
All amounts should be calculated in a manner consistent with the last Rate Order issued by the Commission for this Company.			

Kings Chapel Capacity
Activity Report for Escrow Account
For the Twelve Months Ended December 31, 2018

SU-2

Month	Escrow Liability Required Per Books (Account 235.1)				Escrow Assets Provided Per Bank (Account 132.2)			
	Beginning Balance	Accrued Into Escrow	Removed From Escrow	Ending Balance	Beginning Balance	Deposited Into Escrow	Removed From Escrow	Ending Balance
January	\$79,399.85	\$1,988.21	0.00	\$81,388.06	\$1,830.89	\$0.00	\$0.00	\$1,830.89
February	81,388.06	2,164.77	6,599.90	76,952.93	1,830.89	0.00	0.00	1,830.89
March	76,952.93	1,916.70	0.00	78,869.63	1,830.89	0.00	0.00	1,830.89
April	78,869.63	1,807.30	1,688.04	78,988.89	1,830.89	0.00	0.00	1,830.89
May	78,988.89	2,219.77	1,946.06	79,262.60	1,830.89	0.00	0.00	1,830.89
June	79,262.60	1,839.22	0.00	81,101.81	1,830.89	0.00	0.00	1,830.89
July	81,101.81	1,982.38	692.63	82,391.56	1,830.89	20,000.00	21,000.00	830.89
August	82,391.56	2,100.62	0.00	84,492.18	830.89	0.00	0.00	830.89
September	84,492.18	1,925.65	0.00	86,417.84	830.89	0.00	0.00	830.89
October	86,417.84	3,558.76	0.00	89,976.59	830.89	21,000.00	21,363.92	466.97
November	89,976.59	1,745.68	5,232.72	86,489.56	466.97	4,500.00	5,298.72	-331.75
December	86,489.56	2,195.75	0.00	88,685.31	-331.75	7,433.00	7,058.00	43.25
Total		<u>\$25,444.81</u>	<u>\$16,159.35</u>			<u>\$52,933.00</u>	<u>\$54,720.64</u>	

Total Balance at End of Fiscal Year:

Escrow Assets	43.25
Escrow Liability	<u>88,685.31</u>
Net Escrow Assets (Shortfall)	<u>-88,642.06</u>

NOTE: This supplemental schedule to the Company's Annual Report is provided in conformance with the requirements of the TRA's Order in Docket 07-00062.

Provide a pro forma income statement for the wastewater utility for the first three (3) years of operations or for an expanded amended CCN, the first three years after the latest year-end financials. In the calculations of utility revenues show the number of consumers and the rates used in the calculations. Show operation and maintenance expenses by account number and provide the basis and/or assumptions used to arrive at these amounts.

RESPONSE:

Attached is a ten-year pro forma income statement for King's Chapel Capacity's operations at the Hill and Roberts Parcels along with an outline of assumptions considered.

King's Chapel Capacity
Pro Forma Rate Calculation for Hill and Roberts Parcels
10 Year income Projection

Exhibit 5.2
Schedule 1

Item	KCC 2018 O&M Expense	KCC 2018 Customers	Unit Rate	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Projected Customers:													
Hill and Roberts Parcels				0	30	40	40	40	20	0	0	0	0
Cumulative Customer Count				0	30	70	110	150	170	170	170	170	170
Revenues:													
Service Charges - Current Tariff Rate			\$35.11	\$0.00	\$12,639.60	\$29,492.40	\$46,345.20	\$63,198.00	\$71,624.40	\$71,624.40	\$71,624.40	\$71,624.40	\$71,624.40
Access Fees - Current Tariff Rate			7.00	14,280.00	11,760.00	8,400.00	5,040.00	1,680.00	0.00	0.00	0.00	0.00	0.00
Total Revenue				\$14,280.00	\$24,399.60	\$37,892.40	\$51,385.20	\$64,878.00	\$71,624.40	\$71,624.40	\$71,624.40	\$71,624.40	\$71,624.40
Expenses:													
710 - Purchased Sewage Treatment	\$0.00	268	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
715 - Purchased Power	9,665.00	268	36.06	0.00	1,081.90	2,524.44	3,966.98	5,409.51	6,130.78	6,130.78	6,130.78	6,130.78	6,130.78
720 - Materials & Supplies	5,776.00	268	21.55	0.00	646.57	1,508.66	2,370.75	3,232.84	3,663.88	3,663.88	3,663.88	3,663.88	3,663.88
730 - Contractual Services	42,664.00	268	159.19	0.00	4,775.82	11,143.58	17,511.34	23,879.10	27,062.99	27,062.99	27,062.99	27,062.99	27,062.99
750 - Transportation Expense	6,122.00	268	22.84	0.00	685.30	1,599.03	2,512.76	3,426.49	3,883.36	3,883.36	3,883.36	3,883.36	3,883.36
775 - Miscellaneous Expense	8,440.00	268	31.49	0.00	944.78	2,204.48	3,464.18	4,723.88	5,353.73	5,353.73	5,353.73	5,353.73	5,353.73
408 - Taxes Other Than Income Taxes	4,635.00	268	17.29	0.00	518.84	1,210.63	1,902.43	2,594.22	2,940.11	2,940.11	2,940.11	2,940.11	2,940.11
Total Expenses	\$77,302.00			\$0.00	\$8,653.21	\$20,190.82	\$31,728.43	\$43,266.04	\$49,034.85	\$49,034.85	\$49,034.85	\$49,034.85	\$49,034.85
Net Operating Income				\$14,280.00	\$15,746.39	\$17,701.58	\$19,656.77	\$21,611.96	\$22,589.55	\$22,589.55	\$22,589.55	\$22,589.55	\$22,589.55

NOTE: Monthly Service Charge excludes local and state bonding surcharges which will be billed specifically to Hill and Roberts Parcel customers.

Provide a chart of accounts for the wastewater utility, following the NARUC Uniform System of Accounts (USOA) for wastewater utilities.

RESPONSE:

Attached is a copy of the chart of accounts for King's Chapel Capacity.

Kings Chapel Capacity

ACCOUNT LIST

ACCOUNT #	ACCOUNT	TYPE	DETAIL TYPE	DESCRIPTION	BALANCE
131.00	Cash	Bank	Checking		8,564.11
131.10	Cash:Cash - First Tennessee	Bank	Checking		0.00
131.20	Cash:Cash - Reliant	Bank	Checking		0.00
131.30	Cash:Cash - SunTrust	Bank	Checking		0.00
131.40	Cash:Cash - Bank of Nashville	Bank	Checking		8,564.11
132.00	Special Deposits	Bank	Checking		1,830.89
132.10	Special Deposits:Special Deposits-Cust. Deps.	Bank	Checking		0.00
132.20	Special Deposits:Special Deposits-Escrows	Bank	Checking		1,830.89
141.00	Customer Accounts Receivable	Accounts receivable (A/R)	Accounts Receivable (A/R)		0.00
124.00	Other Investments	Other Current Assets	Other Current Assets		0.00
151.00	Plant Materials & Supplies	Other Current Assets	Other Current Assets		0.00
174.00	Misc. Current & Accrued Assets	Other Current Assets	Other Current Assets		0.00
	Inventory Asset	Other Current Assets	Inventory		0.00
	Uncategorized Asset	Other Current Assets	Other Current Assets		0.00
101.00	Utility Plant in Service	Fixed Assets	Other fixed assets		689,063.00
103.00	Property Held for Future Use	Fixed Assets	Other fixed assets		0.00
104.00	Utility Plant Purchased or Sold	Fixed Assets	Other fixed assets		0.00
105.00	Construction Work in Process	Fixed Assets	Other fixed assets		0.00
108.00	Accumulated Depreciation	Fixed Assets	Other fixed assets		-151,226.00
114.00	Acquisition Adjustment	Fixed Assets	Other fixed assets		0.00
115.00	Accumulated Amort of Acq. Adj.	Fixed Assets	Other fixed assets		0.00
122.00	Accu. Depr. of Non-Utility Prop	Fixed Assets	Other fixed assets		0.00
351.00	Utility Plant in Service:Organization	Fixed Assets	Other fixed assets		248,414.00
352.00	Utility Plant in Service:Franchises	Fixed Assets	Other fixed assets		0.00
353.00	Utility Plant in Service:Land & Land Rights	Fixed Assets	Other fixed assets		10.00
354.00	Utility Plant in Service:Structures & Improvements	Fixed Assets	Other fixed assets		0.00
355.00	Utility Plant in Service:Power Generation Equipment	Fixed Assets	Other fixed assets		0.00
360.00	Utility Plant in Service:Collection Sewers - Force	Fixed Assets	Other fixed assets		171,854.00
361.00	Utility Plant in Service:Collection Sewers - Gravity	Fixed Assets	Other fixed assets		0.00
362.00	Utility Plant in Service:Special Collecting Structures	Fixed Assets	Other fixed assets		0.00
363.00	Utility Plant in Service:Services to Customers	Fixed Assets	Other fixed assets		0.00
364.00	Utility Plant in Service:Flow Measuring Devices	Fixed Assets	Other fixed assets		3,385.00
365.00	Utility Plant in Service:Flow	Fixed Assets	Other fixed assets		400.00

ACCOUNT #	ACCOUNT	TYPE	DETAIL TYPE	DESCRIPTION	BALANCE
	Measuring Installations				
370.00	Utility Plant in Service:Receiving Wells	Fixed Assets	Other fixed assets		15,000.00
380.00	Utility Plant in Service:Treatment & Disposal Equipment	Fixed Assets	Other fixed assets		250,000.00
381.00	Utility Plant in Service:Plant Sewers	Fixed Assets	Other fixed assets		0.00
382.00	Utility Plant in Service:Outfall Sewer Lines	Fixed Assets	Other fixed assets		0.00
389.00	Utility Plant in Service:Other Plant & Misc. Equipment	Fixed Assets	Other fixed assets		0.00
390.00	Utility Plant in Service:Office Furniture & Equipment	Fixed Assets	Other fixed assets		0.00
391.00	Utility Plant in Service:Transportation Equipment	Fixed Assets	Other fixed assets		0.00
393.00	Utility Plant in Service:Tools, Shop & Garage Equipment	Fixed Assets	Other fixed assets		0.00
395.00	Utility Plant in Service:Power Operated Equipment	Fixed Assets	Other fixed assets		0.00
398.00	Utility Plant in Service:Other Tangible Plant	Fixed Assets	Other fixed assets		0.00
121.00	Non-Utility Property	Other Assets	Other Long-term Assets		0.00
186.00	Miscellaneous Deferred Debits	Other Assets	Other Long-term Assets		0.00
190.00	Accu. Deferred Income Tax	Other Assets	Other Long-term Assets		0.00
231.00	Accounts Payable	Accounts payable (A/P)	Accounts Payable (A/P)		0.00
232.00	Notes Payable	Accounts payable (A/P)	Accounts Payable (A/P)		0.00
235.00	Customer Deposits	Other Current Liabilities	Other Current Liabilities		-2,760.00
235.10	Escrowed Deposits	Other Current Liabilities	Other Current Liabilities		-79,399.85
236.00	Accrued Taxes	Other Current Liabilities	Other Current Liabilities		0.00
237.00	Accrued Interest	Other Current Liabilities	Other Current Liabilities		0.00
241.00	Misc. Current Liabilities	Other Current Liabilities	Other Current Liabilities		0.00
242.00	Long Term Debt	Long Term Liabilities	Other Long Term Liabilities		0.00
252.00	Advances for Construction	Long Term Liabilities	Other Long Term Liabilities		0.00
253.00	Other Deferred Credits	Long Term Liabilities	Other Long Term Liabilities		0.00
255.00	Accumulated Deferred FIT	Long Term Liabilities	Other Long Term Liabilities		0.00
201.00	Common Stock Issued	Equity	Owner's Equity		0.00
204.00	Preferred Stock Issued	Equity	Owner's Equity		0.00
211.00	Other Paid-In Capital	Equity	Owner's Equity		0.00
218.00	Proprietary Capital	Equity	Owner's Equity		-225,435.81
265.00	Miscellaneous Operating Reserve	Equity	Owner's Equity		0.00
271.00	Cont in Aid of Construction	Equity	Owner's Equity		-285,638.00
272.00	Accu. Amort. of CIAOC	Equity	Owner's Equity		0.00
281.00	ADFIT - Accu. Amort.	Equity	Owner's Equity		0.00
282.00	ADFIT - Liberalized Depr.	Equity	Owner's Equity		0.00
283.00	ADFIT - Other	Equity	Owner's Equity		0.00
30000	Opening Balance Equity {3}	Equity	Opening Balance Equity	Opening balances during setup post to this account. The balance of this account should be zero after	0.00
32000	Members Equity	Equity	Retained Earnings	Undistributed earnings of the corporation	0.00
400.00	Operating Revenues	Income	Service/Fee Income		
421.00	Nonutility Income	Income	Service/Fee Income		
521.10	Operating	Income	Service/Fee Income		

ACCOUNT #	ACCOUNT	TYPE	DETAIL TYPE	DESCRIPTION	BALANCE
	Revenues:Residential				
	Revenues-Flat Rate				
521.20	Operating Revenues:Commercial	Income	Service/Fee Income		
	Revenues-Flat Rate				
521.30	Operating Revenues:Industrial	Income	Service/Fee Income		
	Revenues-Flat Rate				
521.40	Operating Revenues:P/A	Income	Service/Fee Income		
	Revenues-Flat Rate				
521.50	Operating Revenues:M/F	Income	Service/Fee Income		
	Revenues-Flat Rate				
521.60	Operating Revenues:Other	Income	Service/Fee Income		
	Revenues-Flat Rate				
522.10	Operating Revenues:Residential	Income	Service/Fee Income		
	Revenues-Measured				
522.20	Operating Revenues:Commercial	Income	Service/Fee Income		
	Revenues-Measured				
522.30	Operating Revenues:Industrial	Income	Service/Fee Income		
	Revenues-Measured				
522.40	Operating Revenues:P/A	Income	Service/Fee Income		
	Revenues-Measured				
522.50	Operating Revenues:M/F	Income	Service/Fee Income		
	Revenues-Measured				
524.00	Operating Revenues:Revenues from	Income	Service/Fee Income		
	Other Systems				
530.00	Operating Revenues:Guaranteed	Income	Service/Fee Income		
	Revenues				
536.00	Operating Revenues:Other	Income	Service/Fee Income		
	Wastewater Revenues				
	Billable Expense Income	Income	Service/Fee Income		
	Markup	Income	Service/Fee Income		
	Sales of Product Income	Income	Sales of Product Income		
	Services	Income	Service/Fee Income		
	Uncategorized Income	Income	Service/Fee Income		
	Cost of Goods Sold	Cost of Goods Sold	Supplies & Materials - COGS		
401.00	Operating Expenses	Expenses	Other Miscellaneous Service		
			Cost		
403.00	Depreciation Expense	Expenses	Other Miscellaneous Service		
			Cost		
406.00	Amort. of Acq Adjustments	Expenses	Other Miscellaneous Service		
			Cost		
407.00	Amortization Expense - Other	Expenses	Other Miscellaneous Service		
			Cost		
408.00	Taxes Other Than Income	Expenses	Other Miscellaneous Service		
			Cost		
409.10	Income Taxes-Utility Oper Inc.	Expenses	Other Miscellaneous Service		
			Cost		
409.20	Income Taxes-Other Inc.	Expenses	Other Miscellaneous Service		
			Cost		
410.10	Deferred Income Taxes	Expenses	Other Miscellaneous Service		
			Cost		
410.20	Deferred Taxes - Other Inc	Expenses	Other Miscellaneous Service		
			Cost		
411.10	Deferred Income Taxes -	Expenses	Other Miscellaneous Service		
	Credit		Cost		

ACCOUNT #	ACCOUNT	TYPE	DETAIL TYPE	DESCRIPTION	BALANCE
411.20	Deferred FIT Credit-Other Inc.	Expenses	Other Miscellaneous Service Cost		
412.10	ITC Deferred to Future Periods	Expenses	Other Miscellaneous Service Cost		
412.11	ITC Restored to Oper. Income	Expenses	Other Miscellaneous Service Cost		
412.20	ITC Net - Non Utility	Expenses	Other Miscellaneous Service Cost		
412.30	ITC Nonutility-Restored to Inc.	Expenses	Other Miscellaneous Service Cost		
419.00	Interest and Dividend Income	Expenses	Other Miscellaneous Service Cost		
420.00	AFUDC	Expenses	Other Miscellaneous Service Cost		
426.00	Miscellaneous Nonutility Exp.	Expenses	Other Miscellaneous Service Cost		
427.00	Interest Expense	Expenses	Other Miscellaneous Service Cost		
701.00	Operating Expenses:S&W-Employees	Expenses	Other Miscellaneous Service Cost		
703.00	Operating Expenses:S&W-Officers & Stockholders	Expenses	Other Miscellaneous Service Cost		
704.00	Operating Expenses:Employee Pensions & Benefits	Expenses	Other Miscellaneous Service Cost		
705.00	Operating Expenses:Office Expense	Expenses	Other Miscellaneous Service Cost		
710.00	Operating Expenses:Purchased Wastewater Treatment	Expenses	Other Miscellaneous Service Cost		
711.00	Operating Expenses:Sludge Removal Expense	Expenses	Other Miscellaneous Service Cost		
715.00	Operating Expenses:Purchased Power	Expenses	Other Miscellaneous Service Cost		
716.00	Operating Expenses:Fuel for Purchased Power	Expenses	Other Miscellaneous Service Cost		
718.00	Operating Expenses:Chemicals	Expenses	Other Miscellaneous Service Cost		
719.00	Operating Expenses:Bank Charges	Expenses	Office/General Administrative Expenses		
720.00	Operating Expenses:Materials & Supplies	Expenses	Other Miscellaneous Service Cost		
721.00	Operating Expenses:Postage	Expenses	Office/General Administrative Expenses		
722.00	Operating Expenses:Office supplies	Expenses	Office/General Administrative Expenses		
724.00	Operating Expenses:Charitable Contributions	Expenses	Office/General Administrative Expenses		
730.00	Operating Expenses:Contractual Services-Billing	Expenses	Other Miscellaneous Service Cost		
731.00	Operating Expenses:Contractual Services-Prof.	Expenses	Other Miscellaneous Service Cost		
735.00	Operating Expenses:Contractual Services-Testing	Expenses	Other Miscellaneous Service Cost		
736.00	Operating	Expenses	Other Miscellaneous Service		

ACCOUNT #	ACCOUNT	TYPE	DETAIL TYPE	DESCRIPTION	BALANCE
	Expenses:Contractual Services-Other		Cost		
740.00	Operating Expenses:Rents	Expenses	Other Miscellaneous Service Cost		
750.00	Operating Expenses:Transportation Expense	Expenses	Other Miscellaneous Service Cost		
751.00	Operating Expenses:Repair & Maintenance	Expenses	Repair & Maintenance		
755.00	Operating Expenses:Insurance Expense	Expenses	Other Miscellaneous Service Cost		
756.00	Operating Expenses:Meals & Entertainment	Expenses	Office/General Administrative Expenses		
765.00	Operating Expenses:Regulatory Commission Expense	Expenses	Other Miscellaneous Service Cost		
770.00	Operating Expenses:Bad Debt Expense	Expenses	Other Miscellaneous Service Cost		
775.00	Operating Expenses:Miscellaneous Expense	Expenses	Other Miscellaneous Service Cost		
99999	Ask My Accountant	Expenses	Office/General Administrative Expenses		
	Purchases	Expenses	Supplies & Materials		
	Uncategorized Expense	Expenses	Other Miscellaneous Service Cost		

Provide a list of all plant-in-service account numbers with account names and estimated account balances as of the start of operations.

RESPONSE:

King's Chapel Capacity's estimate of the journal entry to appropriately record the wastewater plant-in-service for the Hill Parcel and Roberts Parcel is as follows:

Account	Debit	Credit
353 – Land & Land Rights	\$10	
360 – Collection Sewers-Force	292,062	
380 – Treatment & Disposal Equipment	1,271,900	
271 – Contributions in Aid of Construction		1,563,972

Provide the depreciation rates the applicant intends to use for each plant account that will be on the wastewater utility's books. Include the estimated useful life of each account. If no depreciation study has been performed, explain the basis for these rates.

RESPONSE:

King's Chapel Capacity's current depreciation rates are shown in the Table below. King's Chapel Capacity is proposing to use these same depreciation rates for new wastewater plant associated with the Hill Parcel and Roberts Parcel. However, all of the new wastewater plant will be funded through contributions in aid of construction (CIAOC), meaning that CIAOC will be amortized at the same rate as the depreciation expense resulting in a net zero expense.

King's Chapel Capacity's current depreciation rates were originally proposed in Docket 04-00335 through the supplemental testimony of John Powell. However, the Commission Order in that Docket does not specifically mention any particular depreciation rates.

Plant Classification	Service Life (Yrs)	Depreciation Rate
360 – Collection Sewers-Force	50	2.00%
364 – Flow Measuring Devices	10	10.00%
365 – Flow Measuring Installations	10	10.00%
370 – Receiving Wells	50	2.00%
380 – Treatment & Disposal Equipment	26	3.85%

Provide the total estimated detailed cost of construction of the wastewater system to be constructed for the proposed service area. If the wastewater system will be constructed in phases, provide detailed construction cost estimates for each phase. Indicate whether the developer or the applicant will pay for the construction of the system.

RESPONSE:

The estimated cost of construction for the collection system for the Hill Parcel and Roberts Parcel is \$1,563,962. See attached back up for detailed costs. All these costs will be funded by the developer of the Hill and Roberts Parcels.

Collection System:

Indicate the identity of the owner of the wastewater system once construction is complete. If a party other than the utility pays the cost of construction and transfers ownership of the wastewater system to the applicant, provide a detailed breakdown of the estimated amount of contributed capital that will be recorded on the applicant's financial books.

RESPONSE:

Once the construction of the wastewater collection system at the Hill Parcel and Roberts Parcel has been completed, title for the system including all drip fields will be transferred to King's Chapel Capacity.

King's Chapel Capacity's estimate of the journal entry to appropriately record the contributions in aid of construction for the transfer of the wastewater plant from the developer is as follows:

Account	Debit	Credit
353 – Land & Land Rights	\$10	
360 – Collection Sewers-Force	292,062	
380 – Treatment & Disposal Equipment	1,271,900	
271 – Contributions in Aid of Construction		1,563,972

Provide a tariff showing products, services, terms, conditions and proposed rates to be charged for wastewater service. The tariff should include all pass-through fees, including but not limited to, customer deposits, disconnect or reconnect fees, late fees, tap fees, escrow fees, bond fees, franchise fees and taxes.

RESPONSE:

Attached is a copy of the pro forma tariff sheets for King's Chapel Capacity's service to the Hill and Roberts Parcels. All other existing tariff sheets of King's Chapel Capacity, including the rules and regulations, will remain unchanged.

**King’s Chapel Capacity
Wastewater Service Billing Summary**

System	Monthly Charge
Ashby Communities – Sheet 2	\$30.87
Hill and Roberts Parcels – Sheet 3	35.11

**King's Chapel Capacity
Hill and Roberts Parcel Billing Rates**

	Monthly Charge	Escrowed Amount
Collection System Operation and Maintenance (Tariff Items 1 – 4)	\$8.95	\$6.35
Treatment System Cost (Tariff Items 5 – 7)	6.23	2.90
Utility Cost (Tariff Items 11 and 13)	1.30	0.00
Disposal System Cost (Tariff Items 15 – 17)	1.53	0.88
Sampling and Testing Cost (Tariff Item 18)	7.00	0.00
Billing and Collection Cost (Tariff Item 20)	1.50	0.00
Miscellaneous Cost (Tariff Items 21 – 30 excluding Bonding)	8.60	0.00
Bonding Cost (Pass Through) **	0.00	0.00
Total	\$35.11	\$10.13

Incidental Rates:

Late Payment	5% of Bill.
Disconnection	\$10.00
Reconnection	\$15.00
Returned Check	\$20.00
Access	\$84.00

**** Bonding Cost incurred is passed through to the customer with no markup by the Company.**

Provide estimated costs and customers added by month for the first five (5) years based upon the construction build-out schedule for developments in the service area of the proposed wastewater system. For each year, by month, provide an estimated number of customers by customer class anticipated to be served by the wastewater system. Include the utility's basis and assumptions used for this projection. Provide this information in a spreadsheet in Microsoft Excel format with all assumptions clearly documented.

RESPONSE:

Attached is the estimated number of monthly customers to be added at the Hill and Roberts Parcels. This estimate, which was provided by the developer, is based on the anticipated home sales in the area. These monthly customer additions are also used in King's Chapel Capacity's 10-year pro forma income statement provided as Exhibit 5.2.

King's Chapel Capacity
Anticipated Customer Build-out for Hill and Roberts Parcels

	Monthly Totals					
	2019	2020	2021	2022	2023	2024
January	0	0	0	0	2	0
February	0	0	3	3	3	2
March	0	0	6	6	4	2
April	0	0	5	5	5	3
May	0	0	4	4	4	2
June	0	5	4	4	4	2
July	0	7	0	0	0	0
August	0	5	0	0	0	0
September	0	6	5	5	5	3
October	0	4	6	6	6	3
November	0	2	5	5	5	2
December	0	1	2	2	2	1
Total	0	30	40	40	40	20

	Cumulative Totals					
	2019	2020	2021	2022	2023	2024
January	0	0	30	70	112	150
February	0	0	33	73	115	152
March	0	0	39	79	119	154
April	0	0	44	84	124	157
May	0	0	48	88	128	159
June	0	5	52	92	132	161
July	0	12	52	92	132	161
August	0	17	52	92	132	161
September	0	23	57	97	137	164
October	0	27	63	103	143	167
November	0	29	68	108	148	169
December	0	30	70	110	150	170

NOTES:

Total number of lots in the Hill and Roberts Parcels is 170.

Developer estimates construction to begin in 2019 with first home sales occurring in summer of 2020.

Provide documentation describing bonding requirements imposed by municipal governments for the proposed wastewater system.

RESPONSE:

All bonding requirements related to the construction of the wastewater system at Hill Parcel and Roberts Parcel will be paid by the developer of the parcels. At this time, King's Chapel Capacity does not anticipate any local bonding surcharge to be assessed and passed through to the customers of the Hill and Roberts parcels.

Demonstrate that the applicant has acquired a performance bond from the developer or builder of the wastewater system made payable to the Utility to ensure construction of the wastewater system. The performance bond should be for an amount equal to or greater than the cost of the system as provided in contracts between the builder, developer and/or utility.

RESPONSE:

All costs of construction of the wastewater system at Hill Parcel and Roberts Parcel will be paid by the developer, therefore King's Chapel Capacity does not anticipate a performance bond will be necessary.

List all funding sources available to the applicant for the wastewater system proposed by the applicant.

RESPONSE:

Funding for the wastewater collection system at the Hill Parcel and Roberts Parcel will be supplied by the developer. After the wastewater system is completed, the developer intends to transfer title to the wastewater system, including drip fields over to King's Chapel Capacity to operate. King's Chapel Capacity will not be supplying any funding for construction of the wastewater system at the Hill Parcel and Roberts Parcel.

Provide information demonstrating compliance with the financial security requirement of Rule 1220-4-13-.07.

RESPONSE:

Refer to the Commission Order of June 18, 2018 in Docket 18-00050 approving financial security for King's Chapel Capacity.