ORIGINAL CK# 153

BUTTREY DEVELOPMENT THREE L.L.C.

MAY 2002
RECEIVED
D.E.P. CENTRAL
DISTRICT

MODIFICATION APPLICATION

KEENE ROAD DISPOSAL CLASS III LANDFILL EXPANSION

230 WEST KEENE ROAD
APOPKA, FLORIDA 32703

PREPARED FOR

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CENTRAL DISTRICT
3319 MAGUIRE BLVD., STE. 232
ORLANDO, FLORIDA 32803-3767

ATTENTION:
James Bradner, P.E.

PREPARED BY

ED CHESNEY, P.E.
BISHOP & BUTTREY, INC.
6239 EDGEWATER DRIVE. SUITE D-1
ORLANDO FLORIDA 32810

MAY, 2002

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File Copy

BUTTREY DEVELOPMENT THREE L.L.C.

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KEENE ROAD DISPOSAL CLASS III LANDFILL EXPANSION

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BUTTREY DEVELOPMENT THREE, L.L.C.

May 16, 2002

Mr. James Bradner, P.E.
FDEP Solid Waste
Central District
3319 Maguire Blvd., Ste. 232
Orlando, Florida 32803-3767

Subject: Buttrey Development Two, L.L.C. Buttrey Development Three, L.L.C.
Class III Landfill Expansion - Application
Orange County, Florida

Dear Mr. Bradner:

This application is for an expansion to the Buttrey Development Two L.L.C. Class III Landfill, located at 230 W. Keene Road in Apopka Florida. The expansion parcel is owned and being permitted by Buttrey Development Three, L.L.C. The following sections are intended to satisfy FDEP regulations to the best of my understanding of the required materials. If anything has been omitted, or you require additional information please do not hesitate to call me a 407- 296-0016.

Sincerely,

Ed Chesney

Ed Chesney, P.E.
Project Engineer

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6239 Edgewater Dr., Suite D-1, Orlando, Florida 32810-4747
Telephone: (407) 296-0016; FAX: (407) 294-8090

CERTIFICATION BY A PROFESSIONAL ENGINEER

The engineering components which include the civil, geotechnical and hydrogeologic elements of this application have been prepared by me or under my direct supervision as a professional engineer (P.E. No. 51888) licensed under the provisions of Chapter 471, Florida Statutes. The information presented in this application is believed to be accurate. Furthermore, the design concepts and elements are believed to be appropriate for the permitting of the Keene Road Disposal Class III landfill expansion.

Edward F. Chesney, Jr., P.E.

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Orange Co FL 2001-0462463
10/11/2001 03:23:45pm
OR Bk 6367 Pg 7829
Rec 10.50 DSC 2,800.00

Prepared by and return to:
Terrence R. Holihen, Esquire
Akerman, Senterfitt & Eidson, P.A.
255 So. Orange Avenue, 17th Floor
Orlando, Florida 32801
Telephone: (407)843-7860

Grantee's Tax ID No: ______________________
Parcel ID No(s):
28-21-28-0000-00018;
28-21-28-0000-00020; and
28-21-28-0000-00022

WARRANTY DEED

THIS WARRANTY DEED dated as of September 17, 2001, by **NANCY PARDEN ROUNSAVILLE,** a single woman, and having an address of 147 Blackland Road, N.W., Atlanta, Georgia 30342-4419, hereinafter called the Grantor, to **BUTTREY DEVELOPMENT THREE, LLC,** a Florida limited liability company, having an address of 6239 Edgewater Drive, Suite D-1, Orlando, Florida 32810, hereinafter called the Grantee.

WITNESSETH: That the Grantor, for and in consideration of the sum of Ten Dollars ($10.00) and other valuable consideration, the receipt and sufficiency whereof are hereby acknowledged, by these presents does grant, bargain, sell, alien, remise, release, convey and confirm unto the Grantee, all that certain real property situate in Orange County, Florida, more particularly described as:

> The West 1/2 of the Southwest 1/4 of the Northeast 1/4; and the Southeast 1/4 of the Southwest 1/4 of the Northeast 1/4; and the Northeast 1/4 of the Southwest 1/4 of the Northeast 1/4 of Section 28, Township 21 South, Range 28 East, Orange County, Florida, less and except road right-of-way on West for McQueen Road.

TOGETHER with all the tenements, hereditaments and appurtenances thereto belonging or in anywise appertaining.

TO HAVE AND TO HOLD, the same in fee simple forever.

AND the Grantor hereby covenants with the grantee that it is lawfully seized of the real property in fee simple; that it has good right and lawful authority to sell and convey the real property; that it hereby fully warrants the title to the real property and will defend the same against the lawful claims of all persons whomsoever; and that the real property is free of all encumbrances, except taxes accruing subsequent to December 31, 2000, and those matters recorded in the Public Records of Orange County, but reference herein shall not serve to reimpose same.

IN WITNESS WHEREOF the Grantor has caused this Deed to be executed as of the date first above set forth.

Witnesses:

Steven Marks
Print Name: Steven Marks

Print Name: Cathryne Lindo

Nancy Parden Rounsaville
Nancy Parden Rounsaville

STATE OF Georgia

COUNTY OF Fulton

The foregoing instrument was acknowledged before me this 17th day of September, 2001, by Nancy Parden Rounsaville. Said person (check one) ☐ is personally known to me or ☒ produced GA DL as identification.

ROSEMARY REYES
EXP. Mar. 10, 2003

Rosemary Reyes
Print Name: Rosemary Reyes
Notary Public, State of Georgia
Commission No.:
My Commission Expires: Notary Public, Fulton County, Georgia
My Commission Expires March 10, 2003

OR419250;2

Orange Co FL 2000-0248307
06152000 12:06:20pm
OR Bk 6024 Pg 3121
Rec 10.50 DSC 959.00

This instrument was prepared by
and should be returned to:
J. Lindsay Builder, Jr., Esq.
Graham, Clark, Jones, Builder, Pratt & Marks
369 N. New York Avenue, Winter Park, Florida 32789
P.O. Drawer 1690, Winter Park, FL 32790-1690

WARRANTY DEED

THIS WARRANTY DEED is made this 14th day of June, 2000, by **DEBORA OLIVER ALEXANDER (formerly DEBORA OLIVER) joined by her husband, DAVID ALLEN ALEXANDER**, whose address is 2826 Osprey Creek Lane, Orlando, Florida 32825 (hereinafter called the "Grantors"), to **BUTTREY DEVELOPMENT THREE, LLC**, a Florida limited liability company, whose address is 6239 Edgewater Drive, Suite D-1, Orlando, Florida 32810 (hereinafter called the "Grantee").

WITNESSETH:

The Grantors, for and in consideration of the sum of Ten and No/100 Dollars ($10.00) and other valuable considerations, receipt whereof is hereby acknowledged, by these presents grants, bargains, sells, aliens, remises, releases, conveys and confirms unto the Grantees, all that certain land situate in Orange County, Florida, to-wit:

The North 1/2 of the Southwest 1/4 of the Northwest 1/4 of the Northeast 1/4 of Section 28, Township 21 South, Range 28 East, Orange County, Florida. LESS the West 30 feet for Road Right of Way.

Tax Parcel No. 28-21-28-0000-00019

TOGETHER with all the tenements, hereditaments and appurtenances thereto belonging or in anywise appertaining.

TO HAVE AND TO HOLD, the same in fee simple forever.

AND the Grantors hereby covenant with the Grantee that the Grantors are lawfully seized of the Property in fee simple; that they have good right and lawful authority to sell and convey the Property; that they hereby fully warrant the title to the Property and will defend the same against the lawful claims of all persons whomsoever; and that the Property is free of all encumbrances except real property taxes accruing subsequent to December 31, 1999, and easements and restrictions of record, if any; however, this reference shall not serve to reimpose same.

IN WITNESS WHEREOF, the Grantors have executed this Warranty Deed the day and year first above written.

Signed, sealed and delivered
in the presence of:

Vanda D. Mitchell
Signature of witness
Print name: Vanda D. Mitchell

Signature of witness
Print name: J. LINDSAY BUILDER Jr.

Debora Oliver Alexander
DEBORA OLIVER ALEXANDER
(formerly DEBORA OLIVER)

David Allen Alexander
DAVID ALLEN ALEXANDER

OR Bk 6024 Pg 3122
Orange Co FL 2000-0248307

Recorded - Martha O. Haynie

STATE OF FLORIDA
COUNTY OF ORANGE

The foregoing instrument was acknowledged before me this 14th day of June, 2000, by **DEBORA OLIVER ALEXANDER (formerly DEBORA OLIVER) joined by her husband, DAVID ALLEN ALEXANDER**. They are personally known to me or have produced Florida Driver's Licenses as identification.

Vanda D. Mitchell
Notary Public
Print name: Vanda D. Mitchell
My Commission Expires:

Vanda D. Mitchell
MY COMMISSION # CC912143 EXPIRES
March 10, 2004
BONDED THRU TROY FAIN INSURANCE, INC.

Orange Co FL 2000-0443538
10192000 08:50:46am
OR Bk 6111 Pg 4307
Rec 10.50 DSC 238.00

This instrument was prepared by
and should be returned to:
Valerie Jahn Grandin, Esq.
Graham, Clark, Jones, Builder, Pratt & Marks
369 N. New York Avenue, Winter Park, Florida 32789
P.O. Drawer 1690, Winter Park, FL 32790-1690

WARRANTY DEED

THIS WARRANTY DEED is made this 16th day of October, 2000, by **JOHN ALLEN BROWN**, a single man, whose address is 2703 McQueen Road, Apopka, Florida 32703-8977 (hereinafter called the "Grantor"), to **BUTTREY DEVELOPMENT THREE, LLC**, a Florida limited liability company, whose address is 6239 Edgewater Drive, Suite D-1, Orlando, Florida 32810 (hereinafter called the "Grantee").

WITNESSETH:

The Grantors, for and in consideration of the sum of Ten and No/100 Dollars ($10.00) and other valuable considerations, receipt whereof is hereby acknowledged, by these presents grants, bargains, sells, aliens, remises, releases, conveys and confirms unto the Grantees, all that certain land situate in Orange County, Florida, to-wit:

> The South Half of the Southwest Quarter of the Northwest Quarter of Section 28, Township 21 South, Range 28 East, LESS the West 30 feet for McQueen Road, Orange County, Florida.
>
> Tax Parcel No. 28-21-28-0000-00023

TOGETHER with all the tenements, hereditaments and appurtenances thereto belonging or in anywise appertaining.

TO HAVE AND TO HOLD, the same in fee simple forever.

AND the Grantors hereby covenant with the Grantee that the Grantors are lawfully seized of the Property in fee simple; that they have good right and lawful authority to sell and convey the Property; that they hereby fully warrant the title to the Property and will defend the same against the lawful claims of all persons whomsoever; and that the Property is free of all encumbrances except real property taxes accruing subsequent to December 31, 1999, and easements and restrictions of record, if any; however, this reference shall not serve to reimpose same.

IN WITNESS WHEREOF, the Grantors have executed this Warranty Deed the day and year first above written.

Signed, sealed and delivered
in the presence of:

John Allen Brown
Signature of witness
Print name: J. Lindsay Builder, Jr.

JOHN ALLEN BROWN

Vanda D. Mitchell
Signature of witness
Print name: Vanda D. Mitchell

OR Bk 6111 Pg 4308
Orange Co FL 2000-0443538

Recorded - Martha O. Haynie

STATE OF FLORIDA
COUNTY OF ORANGE

The foregoing instrument was acknowledged before me this 16th day of October, 2000, by **JOHN ALLEN BROWN**. He is

☐ personally known to me or
☑ has produced Florida Driver's License as identification and
☐ did ☐ did not take an oath.

Vanda D. Mitchell
Notary Public
Print name: Vanda D. Mitchell
My Commission Expires:

Vanda D. Mitchell
MY COMMISSION # CC912143 EXPIRES
March 10, 2004
BONDED THRU TROY FAIN INSURANCE, INC.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
APPLICATION FOR A PERMIT TO CONSTRUCT, OPERATE, MODIFY OR CLOSE A SOLID WASTE MANAGEMENT FACILITY

Please Type or Print

A. GENERAL INFORMATION

1. Type of facility (check all that apply):

☒ Disposal

☐ Class I Landfill	☐ Ash Monofill
☐ Class II Landfill	☐ Asbestos Monofill
☒ Class III Landfill	☐ Industrial Solid Waste

☐ Other Describe: ______

☐ Non-Disposal
- ☐ Incinerator For Non-biomedical Waste
- ☐ Waste to Energy Without Power Plant Certification
- ☐ Other Describe: ______

NOTE: Waste Processing Facilities should apply on Form 62-701.900(4), FAC; Land Clearing Disposal Facilities should notify on Form 62-701.900(3), FAC; Compost Facilities should apply on Form 62-701.900(10), FAC; and C&D Disposal Facilities should apply on Form 62-701.900(6), FAC

2. Type of application:
- ☐ Construction
- ☐ Operation
- ☒ Construction/Operation
- ☐ Closure

3. Classification of application:

☐ New	☒ Substantial Modification
☐ Renewal	☐ Intermediate Modification
	☐ Minor Modification

4. Facility name: Keene Road Disposal

5. DEP ID number: SC48-0165969-001 ~~SC48-0165969-002~~ County: Orange

6. Facility location (main entrance): 230 W. Keene Road
Apopka, FL. 32703

7. Location coordinates:

Section: 28 Township: 21 Range: 28

Latitude: 28 ° 22 ' 58 " Longitude: 81 ° 18 ' 29 "

8. Applicant name (operating authority): Buttrey Development Three, LLC

Mailing address: 6239 Edgewater Drive Suite D-1 Orlando, FL 32810
Street or P.O. Box City State Zip

Contact person: John Buttrey Telephone: (407) 296-0016

Title: Manager

bb@purplenet.net
E-Mail address (if available)

9. Authorized agent/Consultant: Ed Chesney, P.E.

Mailing address: 6239 Edgewater Dr. Suite D-1 Orlando, FL. 32810
Street or P.O. Box City State Zip

Contact person: Ed Chesney, P.E. Telephone: (407) 296-0016

Title: Project Engineer

bb@purplenet.net
E-Mail address (if available)

10. Landowner(if different than applicant): N/A

Mailing address: N/A
Street or P.O. Box City State Zip

Contact person: ______ Telephone: (___) ______

______
E-Mail address (if available)

11. Cities, towns and areas to be served: Northwest Orange County & Metro Orlando

12. Population to be served:

Current: ± 100, 000 Five-Year Projection: + 100,000

13. Date site will be ready to be inspected for completion: 2017

14. Expected life of the facility: 15 years

15. Estimated costs:

Total Construction: $ proprietary Closing Costs: $ to follow

16. Anticipated construction starting and completion dates:

From: 2002 To: 2017

17. Expected volume or weight of waste to be received:

± 3500 yds³/day ______ tons/day ______ gallons/day

B. DISPOSAL FACILITY GENERAL INFORMATION

1. Provide brief description of disposal facility design and operations planned under this application:

This application proposes to expand the existing landfill site. The existing site is 60 acres with approximately 37 acres permitted to accept Class III waste. ~~The expansion site is 50 acres with approximately 33 acres permitted as~~ a borrow ~~pit. The expanded facility will encompase 110 acres, with approximately~~ 70 acres of Class III air space.

2. Facility site supervisor: Vic McCall

Title: Field Supervisor Telephone: (407) 296 - 0016

N/A
E-Mail address (if available)

3. Disposal area: Total ± 70 acres; Used 0 acres; Available ± 70 acres.

4. Weighing scales used: ☒ Yes ☐ No

5. Security to prevent unauthorized use: ☒ Yes ☐ No

6. Charge for waste received: * $/yds³ ______ $/ton * based on market

7. Surrounding land use, zoning:

- ☐ Residential
- ☒ Agricultural
- ☐ Commercial
- ☐ Industrial
- ☐ None
- ☐ Other Describe: ______

8. Types of waste received:

- ☐ Residential
- ☐ Commercial
- ☐ Incinerator/WTE ash
- ☐ Treated biomedical
- ☐ Water treatment sludge
- ☐ Air treatment sludge
- ☐ Agricultural
- ☐ Asbestos
- ☐ Other Describe: ______
- ☒ C & D debris
- ☐ Shredded/cut tires
- ☒ Yard trash
- ☐ Septic tank
- ☐ Industrial
- ☐ Industrial sludge
- ☐ Domestic sludge

9. Salvaging permitted: ☐ Yes ☒ No

10. Attendant: ☒ Yes ☐ No Trained operator: ☒ Yes ☐ No

11. Spotters: Yes ☒ No ☐ Number of spotters used: 2

12. Site located in: ☐ Floodplain ☐ Wetlands ☒ Other Uplands only

13. Property recorded as a Disposal Site in County Land Records: ☒ Yes ☐ No

14. Days of operation: Monday - Saturday

15. Hours of operation: 7am to 5pm Mon - Fri / 7am to 12pm Saturdays

16. Days Working Face covered: Weekly Saturdays

17. Elevation of water table: 50 - 60 Ft. (NGVD 1929) (normal to high range)

18. Number of monitoring wells: 29 total for existing + expansion.

19. Number of surface monitoring points: N/A

20. Gas controls used: ☐ Yes ☒ No Type controls: ☐ Active ☐ Passive

Gas flaring: ☐ Yes ☒ No Gas recovery: ☐ Yes ☒ No

21. Landfill unit liner type:

☒ Natural soils
☐ Single clay liner
☐ Single geomembrane
☐ Single composite
☐ Slurry wall
☐ Other Describe:

☐ Double geomembrane
☐ Geomembrane & composite
☐ Double composite
☐ None

22. Leachate collection method:

☐ Collection pipes
☐ Geonets
☐ Well points
☐ Perimeter ditch
☐ Other Describe:

☐ Sand layer
☐ Gravel layer
☐ Interceptor trench
☒ None

23. Leachate storage method:

☐ Tanks
☐ Surface impoundments
☐ Other Describe: N/A

24. Leachate treatment method:

☐ Oxidation
☐ Secondary
☐ Advanced
☐ None
☐ Other N/A

☐ Chemical treatment
☐ Settling

25. Leachate disposal method:

☐ Recirculated
☐ Transported to WWTP
☐ Injection well
☐ Evaporation
☐ Other N/A

☐ Pumped to WWTP
☐ Discharged to surface water
☐ Percolation ponds

26. For leachate discharged to surface waters:

Name and Class of receiving water: N/A

27. Storm Water:

Collected: ☒ Yes ☐ No

Type of treatment: Dry Retention

Name and Class of receiving water: N/A

28. Environmental Resources Permit (ERP) number or status:

48-0171289-001-E1 & 48-0187635-001-E1

C. NON-DISPOSAL FACILITY GENERAL INFORMATION

1. Provide brief description of the non-disposal facility design and operations planned under this application:

N/A

2. Facility site supervisor: N/A

Title: ______ Telephone: (___) ______

______
E-Mail address (if available)

3. Site area: Facility N/A acres; Property ______ acres

4. Security to prevent unauthorized use: [ ] Yes [ ] No

5. Site located in: [ ] Floodplain [ ] Wetlands [ ] Other ______

6. Days of operation: N/A

7. Hours of operation: N/A

8. Number of operating staff: N/A

9. Expected useful life: N/A Years

10. Weighing scales used: [ ] Yes [ ] No

11. Normal processing rate: ______ yd^3/day ______ tons/day ______ gal/day

12. Maximum processing rate: ______ yd^3/day ______ tons/day ______ gal/day

13. Charge for waste received: N/A

14. Storm Water Collected: [ ] Yes [ ] No

Type of treatment: N/A

Name and Class of receiving water: ______

15. Environmental Resources Permit (ERP) number or status: ______

N/A

16. Final residue produced:

______ % of normal processing rate ______ % of maximum processing rate

______ Tons/day ______ Tons/day

Disposed of at:

Facility name: N/A County: ______

17. Estimated operating costs: $ N/A

Total cost/ton: $ N/A Net cost/ton: $

18. Provide a site plan, at a scale not greater than 200 feet to the inch, which shows the facility location and identifies the proposed waste and final residue storage areas, total acreage of the site, and any other features which are relevant to the prohibitions or location restrictions in Rule 62-701.300, FAC, such as water bodies or wetlands on or within 200 feet of the site, and potable water wells on or within 500 feet of the site.

19. Provide a description of how the waste and final residue will be managed to not be expected to cause violations of the Department's ground water, surface water or air standards or criteria

20. Provide an estimate of the maximum amount of waste and final residue that will be store on-site.

21. Provide a detailed description of the technology use at the facility and the functions of all processing equipment that will be utilized. The descriptions shall explain the flow of waste and residue through all the proposed unit operations and shall include: (1) regular facility operations as they are expected to occur; (2) procedures for start up operations, and scheduled and unscheduled shut down operations; (3) potential safety hazards and control methods, including fire detection and control; (4) a description of any expected air emissions and wastewater discharges from the facility which may be potential pollution sources; (5) a description and usage rate of any chemical or biological additives that will be used in the process; and (6) process flow diagrams for the facility operations.

22. Provide a description of the loading, unloading and processing areas.

23. Provide a description of the leachate control system that will be used to prevent discharge of leachate to the environment and mixing of leachate with stormwater. *Note: Ground water monitoring may be required for the facility depending on the method of leachate control used.*

24. Provide an operation plan for the facility which includes: (1) a description of general facility operations, the number of personnel responsible for the operations including their respective job descriptions, and the types of equipment that will be used at the facility; (2) procedures to ensure any unauthorized wastes received at the site will be properly managed; (3) a contingency plan to cover operation interruptions and emergencies such as fires, explosions, or natural disasters; (4) procedures to ensure operational records needed for the facility will be adequately prepared and maintained; and (5) procedures to ensure that the wastes and final residue will be managed to not be expected to cause pollution.

25. Provide a closure plan that describes the procedures that will be implemented when the facility closes including: (1) estimated time to complete closure; (2) procedures for removing and properly managing or disposing of all wastes and final residues; (3) notification of the Department upon ceasing operations and completion of final closure.

D. PROHIBITIONS (62-701.300, FAC)

S	**LOCATION**	**N/A**	**N/C**		
✓	Section II			1.	Provide documentation that each of the siting criteria will be satisfied for the facility; (62-701.300(2), FAC)
		N/A		2.	If the facility qualifies for any of the exemptions contained in Rules 62-701.300(12) through (16), FAC, then document this qualification(s).
		N/A		3.	Provide documentation that the facility will be in compliance with the burning restrictions; (62-701.300(3), FAC)
✓	Section I			4.	Provide documentation that the facility will be in compliance with the hazardous waste restrictions; (62-701.300(4), FAC)
✓	Section I	N/A		5.	Provide documentation that the facility will be in compliance with the PCB disposal restrictions; (62-701.300(5), FAC)
		N/A		6.	Provide documentation that the facility will be in compliance with the biomedical waste restrictions; (62-701.300(6), FAC)
		N/A		7.	Provide documentation that the facility will be in compliance with the Class I surface water restrictions; (62-701.300(7), FAC)
✓	Section I			8.	Provide documentation that the facility will be in compliance with the special waste for landfills restrictions; (62-701.300(8), FAC)
		N/A		9.	Provide documentation that the facility will be in compliance with the special waste for waste-to-energy facilities restrictions; (62-701.300(9), FAC)
✓	Section I			10.	Provide documentation that the facility will be in compliance with the liquid restrictions; (62-701.300(10), FAC)
	Section I			11.	Provide documentation that the facility will be in compliance with the used oil restrictions; (62-701.300(11), FAC)

E. SOLID WASTE MANAGEMENT FACILITY PERMIT REQUIREMENTS, GENERAL (62-701.320, FAC)

S	LOCATION	N/A	N/C		
✓				1.	Four copies, at minimum, of the completed application form, all supporting data and reports; (62-701.320(5)(a),FAC)
✓	Binder			2.	Engineering and/or professional certification (signature, date and seal) provided on the applications and all engineering plans, reports and supporting information for the application; (62-701.320(6),FAC)
✓	Binder			3.	A letter of transmittal to the Department; (62-701.320(7)(a),FAC)
✓	Binder			4.	A completed application form dated and signed by the applicant; (62-701.320(7)(b),FAC)
✓				5.	Permit fee specified in Rule 62-701.315, FAC in check or money order, payable to the Department; (62-701.320(7)(c),FAC)
✓	Section II			6.	An engineering report addressing the requirements of this rule and with the following format: a cover sheet, text printed on 8 1/2 inch by 11 inch consecutively numbered pages, a table of contents or index, the body of the report and all appendices including an operation plan, contingency plan, illustrative charts and graphs, records or logs of tests and investigations, engineering calculations; (62-701.320(7)(d),FAC)
✓	Section I/II			7.	Operation Plan and Closure Plan; (62-701.320(7)(e)1,FAC)
✓	Section I			8.	Contingency Plan; (62-701.320(7)(e)2,FAC)
				9.	Plans or drawings for the solid waste management facilities in appropriate format (including sheet size restrictions, cover sheet, legends, north arrow, horizontal and vertical scales, elevations referenced to NGVD 1929) showing; (62-702.320(7)(f),FAC)
✓	Binder			a.	A regional map or plan with the project location;
✓	Section II			b.	A vicinity map or aerial photograph no more than 1 year old;
✓	Section II			c.	A site plan showing all property boundaries certified by a registered Florida land surveyor;

S	LOCATION	N/A	N/C		PART E CONTINUED
✓	Section II			d.	Other necessary details to support the engineering report.
✓	Binder			10.	Documentation that the applicant either owns the property or has legal authority from the property owner to use the site; (62-701.320(7)(g),FAC)
		N/A		11.	For facilities owned or operated by a county, provide a description of how, if any, the facilities covered in this application will contribute to the county's achievement of the waste reduction and recycling goals contained in Section 403.706,FS; (62-701.320(7)(h),FAC)
		N/A		12.	Provide a history and description of any enforcement actions taken by the Department against the applicant for violations of applicable statutes, rules, orders or permit conditions relating to the operation of any solid waste management facility in this state; (62-701.320(7)(i),FAC)
Not	At this time	N/A		13.	Proof of publication in a newspaper of general circulation of notice of application for a permit to construct or substantially modify a solid waste management facility; (62-702.320(8),FAC)
✓	Section I			14.	Provide a description of how the requirements for airport safety will be achieved including proof of required notices if applicable. If exempt, explain how the exemption applies; (62-701.320(13),FAC)
✓	Section I			15.	Explain how the operator training requirements will be satisfied for the facility; (62-701.320(15), FAC)

F. LANDFILL PERMIT REQUIREMENTS (62-701.330, FAC)

S	LOCATION	N/A	N/C			
✓	Section II			1.	Vicinity map or aerial photograph no more than 1 year old and of appropriate scale showing land use and local zoning within one mile of the landfill and of sufficient scale to show all homes or other structures, water bodies, and roads other significant features of the vicinity. All significant features shall be labeled; (62-701.330(3)(a),FAC)	
✓	Section I			2.	Vicinity map or aerial photograph no more than 1 year old showing all airports that are located within five miles of the proposed landfill; (62-701.330(3)(b),FAC)	
✓	Section II			3.	Plot plan with a scale not greater than 200 feet to the inch showing; (62-701.330(3)(c),FAC)	
✓	Section II				a.	Dimensions;
✓	Section II				b.	Locations of proposed and existing water quality monitoring wells;
✓	Section II				c.	Locations of soil borings;
✓	Section II				d.	Proposed plan of trenching or disposal areas;
✓	Section II				e.	Cross sections showing original elevations and proposed final contours which shall be included either on the plot plan or on separate sheets;
✓	Section II				f.	Any previously filled waste disposal areas;
✓	Section II				g.	Fencing or other measures to restrict access.
				4.	Topographic maps with a scale not greater than 200 feet to the inch with 5-foot contour intervals showing; (62-701.330(3)(d),FAC):	
✓	Construction Plans				a.	Proposed fill areas;
✓	Construction Plans				b.	Borrow areas;
✓	Construction Plans				c.	Access roads;
✓	Construction Plans				d.	Grades required for proper drainage;
✓	Construction Plans				e.	Cross sections of lifts;

S	LOCATION	N/A	N/C		PART F CONTINUED
✓	Construction Plans				f. Special drainage devices if necessary;
✓	Construction Plans				g. Fencing;
✓	Construction Plans				h. Equipment facilities.
				5.	A report on the landfill describing the following; (62-701.330(3)(e),FAC)
✓	Section I				a. The current and projected population and area to be served by the proposed site;
✓	Section I				b. The anticipated type, annual quantity, and source of solid waste, expressed in tons;
✓	Section II				c. The anticipated facility life;
✓	Section II				d. The source and type of cover material used for the landfill.
✓	Section II			6.	Provide evidence that an approved laboratory shall conduct water quality monitoring for the facility in accordance with Chapter 62-160,FAC; (62-701.330(3)(h),FAC)
✓	Section II			7.	Provide a statement of how the applicant will demonstrate financial responsibility for the closing and long-term care of the landfill; (62-701.330(3)(i),FAC)

G. GENERAL CRITERIA FOR LANDFILLS (62-701.340,FAC)

✓	Section II			1.	Describe (and show on a Federal Insurance Administration flood map, if available) how the landfill or solid waste disposal unit shall not be located in the 100-year floodplain where it will restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain unless compensating storage is provided, or result in a washout of solid waste; (62-701.340(4)(b),FAC)
✓	Section II			2.	Describe how the minimum horizontal separation between waste deposits in the landfill and the landfill property boundary shall be 100 feet, measured from the toe of the proposed final cover slope; (62-701.340(4)(c),FAC)
✓	Section II			3.	Describe what methods shall be taken to screen the landfill from public view where such screening can practically be provided; (62-701.340(4)(d),FAC)

H. **LANDFILL CONSTRUCTION REQUIREMENTS** (62-701.400,FAC)

S	LOCATION	N/A	N/C	
✓	Section I			1. Describe how the landfill shall be designed so that solid waste disposal units will be constructed and closed at planned intervals throughout the design period of the landfill; (62-701.400(2),FAC)
				2. Landfill liner requirements; (62-701.400(3),FAC)
				a. General construction requirements; (62-701.400(3)(a),FAC):
		N/A		(1) Provide test information and documentation to ensure the liner will be constructed of materials that have appropriate physical, chemical, and mechanical properties to prevent failure;
		N/A		(2) Document foundation is adequate to prevent liner failure;
		N/A		(3) Constructed so bottom liner will not be adversely impacted by fluctuations of the ground water;
		N/A		(4) Designed to resist hydrostatic uplift if bottom liner located below seasonal high ground water table;
		N/A		(5) Installed to cover all surrounding earth which could come into contact with the waste or leachate.
				b. Composite liners; (62-701.400(3)(b),FAC)
		N/A		(1) Upper geomembrane thickness and properties;
		N/A		(2) Design leachate head for primary LCRS including leachate recirculation if appropriate;
		N/A		(3) Design thickness in accordance with Table A and number of lifts planned for lower soil component.

PART H CONTINUED

S	LOCATION	N/A	N/C		
				c.	Double liners; (62-701.400(3)(c),FAC)
		N/A		(1)	Upper and lower geomembrane thicknesses and properties;
		N/A		(2)	Design leachate head for primary LCRS to limit the head to one foot above the liner;
		N/A		(3)	Lower geomembrane sub-base design;
		N/A		(4)	Leak detection and secondary leachate collection system minimum design criteria (k $\geq$ 10 cm/sec, head on lower liner $\leq$ 1 inch, head not to exceed thickness of drainage layer);
				d.	Standards for geosynthetic components; (62-701.400(3)(d),FAC)
		N/A		(1)	Field seam test methods to ensure all field seams are at least 90 percent of the yield strength for the lining material;
		N/A		(2)	Geomembranes to be used shall pass a continuous spark test by the manufacturer;
		N/A		(3)	Design of 24-inch-thick protective layer above upper geomembrane liner;
		N/A		(4)	Describe operational plans to protect the liner and leachate collection system when placing the first layer of waste above 24-inch-thick protective layer.
		N/A		(5)	HDPE geomembranes, if used, meet the specifications in GRI GM13;
		N/A		(6)	PVC geomembranes, if used, meet the specifications in PGI 1197;
		N/A		(7)	Interface shear strength testing results of the actual components which will be used in the liner system;
		N/A		(8)	Transmissivity testing results of geonets if they are used in the liner system;
		N/A		(9)	Hydraulic conductivity testing results of geosynthetic clay liners if they are used in the liner system;

S **LOCATION** **N/A** **N/C** **PART H CONTINUED**

e. Geosynthetic specification requirements; (62-701.400(3)(e),FAC)

___ ___________ N/A ___ (1) Definition and qualifications of the designer, manufacturer, installer, QA consultant and laboratory, and QA program;

___ ___________ N/A ___ (2) Material specifications for geomembranes, geocomposites, geotextiles, geogrids, and geonets;

___ ___________ N/A ___ (3) Manufacturing and fabrication specifications including geomembrane raw material and roll QA, fabrication personnel qualifications, seaming equipment and procedures, overlaps, trial seams, destructive and nondestructive seam testing, seam testing location, frequency, procedure, sample size and geomembrane repairs;

___ ___________ N/A ___ (4) Geomembrane installation specifications including earthwork, conformance testing, geomembrane placement, installation personnel qualifications, field seaming and testing, overlapping and repairs, materials in contact with geomembrane and procedures for lining system acceptance;

___ ___________ N/A ___ (5) Geotextile and geogrid specifications including handling and placement, conformance testing, seams and overlaps, repair, and placement of soil materials and any overlying materials;

___ ___________ N/A ___ (6) Geonet and geocomposite specifications including handling and placement, conformance testing, stacking and joining, repair, and placement of soil materials and any overlying materials;

___________ N/A ___ (7) Geosynthetic clay liner specifications including handling and placement, conformance testing, seams and overlaps, repair, and placement of soil material and any overlying materials;

f. Standards for soil components (62-710.400(3)(f),FAC):

___ ___________ N/A ___ (1) Description of construction procedures including overexcavation and backfilling to preclude structural inconsistencies and procedures for placing and compacting soil component in layers;

PART H CONTINUED

S	LOCATION	N/A	N/C	
		N/A		(2) Demonstration of compatibility of the soil component with actual or simulated leachate in accordance with EPA Test Method 9100 or an equivalent test method;
		N/A		(3) Procedures for testing in-situ soils to demonstrate they meet the specifications for soil liners;
		N/A		(4) Specifications for soil component of liner including at a minimum:
		N/A		(a) Allowable particle size distribution, Atterberg limits, shrinkage limit;
		N/A		(b) Placement moisture and dry density criteria;
		N/A		(c) Maximum laboratory-determined saturated hydraulic conductivity using simulated leachate;
		N/A		(d) Minimum thickness of soil liner;
		N/A		(e) Lift thickness;
		N/A		(f) Surface preparation (scarification);
		N/A		(g) Type and percentage of clay mineral within the soil component;
		N/A		(5) Procedures for constructing and using a field test section to document the desired saturated hydraulic conductivity and thickness can be achieved in the field.
				3. Leachate collection and removal system (LCRS); (62-701.400(4),FAC)
				a. The primary and secondary LCRS requirements; (62-701.400(4)(a),FAC)
		N/A		(1) Constructed of materials chemically resistant to the waste and leachate;
		N/A		(2) Have sufficient mechanical properties to prevent collapse under pressure;
		N/A		(3) Have granular material or synthetic geotextile to prevent clogging;
		N/A		(4) Have method for testing and cleaning clogged pipes or contingent designs for rerouting leachate around failed areas;

PART H CONTINUED

S	LOCATION	N/A	N/C	
				b. Primary LCRS requirements; (62-701.400(4)(b),FAC)
		N/A		(1) Bottom 12 inches having hydraulic conductivity $\geq 1 \times 10^{-3}$ cm/sec;
		N/A		(2) Total thickness of 24 inches of material chemically resistant to the waste and leachate;
		N/A		(3) Bottom slope design to accomodate for predicted settlement;
		N/A		(4) Demonstration that synthetic drainage material, if used, is equivalent or better than granular material in chemical compatibility, flow under load and protection of geomembrane liner.
				4. Leachate recirculation; (62-701.400(5),FAC)
		N/A		a. Describe general procedures for recirculating leachate;
		N/A		b. Describe procedures for controlling leachate runoff and minimizing mixing of leachate runoff with storm water;
		N/A		c. Describe procedures for preventing perched water conditions and gas buildup;
		N/A		d. Describe alternate methods for leachate management when it cannot be recirculated due to weather or runoff conditions, surface seeps, wind-blown spray, or elevated levels of leachate head on the liner;
		N/A		e. Describe methods of gas management in accordance with Rule 62-701.530, FAC;
		N/A		f. If leachate irrigation is proposed, describe treatment methods and standards for leachate treatment prior to irrigation over final cover and provide documentation that irrigation does not contribute significantly to leachate generation.

S	LOCATION	N/A	N/C	PART H CONTINUED
				5. Leachate storage tanks and leachate surface impoundments; (62-701.400(6),FAC)
				a. Surface impoundment requirements; (62-701.400(6)(b),FAC)
		N/A		(1) Documentation that the design of the bottom liner will not be adversely impacted by fluctuations of the ground water;
		N/A		(2) Designed in segments to allow for inspection and repair as needed without interruption of service;
		N/A		(3) General design requirements;
		N/A		(a) Double liner system consisting of an upper and lower 60-mil minimum thickness geomembrane;
		N/A		(b) Leak detection and collection system with hydraulic conductivity $\geq$ 1 cm/sec;
		N/A		(c) Lower geomembrane placed on subbase $\geq$ 6 inches thick with $k \leq 1x10^{-5}$ cm/sec or on an approved geosynthetic clay liner with $k \leq 1x10^{-7}$ cm/sec;
		N/A		(d) Design calculation to predict potential leakage through the upper liner;
		N/A		(e) Daily inspection requirements and notification and corrective action requirements if leakage rates exceed that predicted by design calculations;
		N/A		(4) Description of procedures to prevent uplift, if applicable;
		N/A		(5) Design calculations to demonstrate minimum two feet of freeboard will be maintained;
		N/A		(6) Procedures for controlling disease vectors and off-site odors.

PART H CONTINUED

S	LOCATION	N/A	N/C			
				b.	Above-ground leachate storage tanks; (62-701.400(6)(c),FAC)	
		N/A			(1)	Describe tank materials of construction and ensure foundation is sufficient to support tank;
		N/A			(2)	Describe procedures for cathodic protection if needed for the tank;
		N/A			(3)	Describe exterior painting and interior lining of the tank to protect it from the weather and the leachate stored;
		N/A			(4)	Describe secondary containment design to ensure adequate capacity will be provided and compatibility of materials of construction;
		N/A			(5)	Describe design to remove and dispose of stormwater from the secondary containment system;
		N/A			(6)	Describe an overfill prevention system such as level sensors, gauges, alarms and shutoff controls to prevent overfilling;
					(7)	Inspections, corrective action and reporting requirements;
		N/A				(a) Overfill prevention system weekly;
		N/A				(b) Exposed tank exteriors weekly;
		N/A				(c) Tank interiors when tank is drained or at least every three years;
		N/A				(d) Procedures for immediate corrective action if failures detected;
		N/A				(e) Inspection reports available for department review.
				c.	Underground leachate storage tanks; (62-701.400(6)(d),FAC)	
		N/A			(1)	Describe materials of construction;
		N/A			(2)	A double-walled tank design system to be used with the following requirements;

PART H CONTINUED

S	LOCATION	N/A	N/C	
		N/A		(a) Interstitial space monitoring at least weekly;
		N/A		(b) Corrosion protection provided for primary tank interior and external surface of outer shell;
		N/A		(c) Interior tank coatings compatible with stored leachate;
		N/A		(d) Cathodic protection inspected weekly and repaired as needed;
		N/A		(3) Describe an overfill prevention system such as level sensors, gauges, alarms and shutoff controls to prevent overfilling and provide for weekly inspections;
		N/A		(4) Inspection reports available for department review.
		N/A		d. Schedule provided for routine maintenance of LCRS; (62-701.400(6)(e),FAC)
				6. Liner systems construction quality assurance (CQA); (62-701.400(7),FAC)
		N/A		a. Provide CQA Plan including:
		N/A		(1) Specifications and construction requirements for liner system;
		N/A		(2) Detailed description of quality control testing procedures and frequencies;
		N/A		(3) Identification of supervising professional engineer;
		N/A		(4) Identify responsibility and authority of all appropriate organizations and key personnel involved in the construction project;
		N/A		(5) State qualifications of CQA professional engineer and support personnel;
		N/A		(6) Description of CQA reporting forms and documents;

S	LOCATION	N/A	N/C	PART H CONTINUED
		N/A		b. An independent laboratory experienced in the testing of geosynthetics to perform required testing;
				7. Soil Liner CQA (62-701.400(8)FAC)
		N/A		a. Documentation that an adequate borrow source has been located with test results or description of the field exploration and laboratory testing program to define a suitable borrow source;
		N/A		b. Description of field test section construction and test methods to be implemented prior to liner installation;
		N/A		c. Description of field test methods including rejection criteria and corrective measures to insure proper liner installation.
				8. Surface water management systems; (62-701.400(9),FAC)
		N/A		a. Provide a copy of a Department permit for stormwater control or documentation that no such permit is required;
		N/A		b. Design of surface water management system to isolate surface water from waste filled areas and to control stormwater run-off;
		N/A		c. Details of stormwater control design including retention ponds, detention ponds, and drainage ways;
				9. Gas control systems; (62-701.400(10),FAC)
		N/A		a. Provide documentation that if the landfill is receiving degradable wastes, it will have a gas control system complying with the requirements of Rule 62-701.530, FAC;
				10. For landfills designed in ground water, provide documentation that the landfill will provide a degree of protection equivalent to landfills designed with bottom liners not in contact with ground water; (62-701.400(11),FAC)

I. HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS (62-701.410(1), FAC)

S	LOCATION	N/A	N/C	
				1. Submit a hydrogeological investigation and site report including at least the following information:
✓	Section II			a. Regional and site specific geology and hydrogeology;
✓	Section II			b. Direction and rate of ground water and surface water flow including seasonal variations;
✓	Section II			c. Background quality of ground water and surface water;
✓	Section II			d. Any on-site hydraulic connections between aquifers;
✓	Section II			e. Site stratigraphy and aquifer characteristics for confining layers, semi-confining layers, and all aquifers below the landfill site that may be affected by the landfill;
✓	Section II			f. Description of topography, soil types and surface water drainage systems;
✓	Section II			g. Inventory of all public and private water wells within a one-mile radius of the landfill including, where available, well top of casing and bottom elevations, name of owner, age and usage of each well, stratigraphic unit screened, well construction technique and static water level;
		N/A		h. Identify and locate any existing contaminated areas on the site;
✓	Section II			i. Include a map showing the locations of all potable wells within 500 feet, and all community water suupply wells within 1000 feet, of the waste storage and disposal areas;
✓	Section II			2. Report signed, sealed and dated by PE or PG.

J. GEOTECHNICAL INVESTIGATION REQUIREMENTS (62-701.410(2),FAC)

S	LOCATION	N/A	N/C		
				1.	Submit a geotechnical site investigation report defining the engineering properties of the site including at least the following:
✓	Section II			a.	Description of subsurface conditions including soil stratigraphy and ground water table conditions;
✓	Section II			b.	Investigate for the presence of muck, previously filled areas, soft ground, lineaments and sink holes;
✓	Section II			c.	Estimates of average and maximum high water table across the site;
				d.	Foundation analysis including:
✓	Section II			(1)	Foundation bearing capacity analysis;
✓	Section II			(2)	Total and differential subgrade settlement analysis;
✓	Section II			(3)	Slope stability analysis;
✓	Section II			e.	Description of methods used in the investigation and includes soil boring logs, laboratory results, analytical calculations, cross sections, interpretations and conclusions;
		N/A		f.	An evaluation of fault areas, seismic impact zones, and unstable areas as described in 40 CFR 258.13, 40 CFR 258.14 and 40 CFR 258.15.
✓	Section II			2.	Report signed, sealed and dated by PE or PG.

K. VERTICAL EXPANSION OF LANDFILLS (62-701.430,FAC)

S	LOCATION	N/A	N/C		
		N/A		1.	Describe how the vertical expansion shall not cause or contribute to leachate leakage from the existing landfill or adversely affect the closure design of the existing landfill;
		N/A		2.	Describe how the vertical expansion over unlined landfills will meet the requirements of Rule 62-701.400, FAC with the exceptions of Rule 62-701.430(1)(c),FAC;
✓	Section II			3.	Provide foundation and settlement analysis for the vertical expansion;
✓	Section II			4.	Provide total settlement calculations demonstrating that the final elevations of the lining system, that gravity drainage, and that no other component of the design will be adversely affected;
✓	Section II			5.	Minimum stability safety factor of 1.5 for the lining system component interface stability and deep stability;
✓	Section II			6.	Provide documentation to show the surface water management system will not be adversely affected by the vertical expansion;
		N/A		7.	Provide gas control designs to prevent accumulation of gas under the new liner for the vertical expansion.

L. LANDFILL OPERATION REQUIREMENTS (62-701.500,FAC)

✓	Section I			1.	Provide documentation that landfill will have at least one trained operator during operation and at least one trained spotter at each working face; (62-701.500(1),FAC)
				2.	Provide a landfill operation plan including procedures for: (62-701.500(2), FAC)
✓	Section I			a.	Designating responsible operating and maintenance personnel;
✓	Section I			b.	Contingency operations for emergencies;
✓	Section I			c.	Controlling types of waste received at the landfill;
✓	Section I			d.	Weighing incoming waste;
✓	Section I			e.	Vehicle traffic control and unloading;
✓	Section I			f.	Method and sequence of filling waste;
✓	Section I			g.	Waste compaction and application of cover;
✓	Section I			h.	Operations of gas, leachate, and stormwater controls;
✓	Section I			i.	Water quality monitoring.
		N/A		j.	Maintaining and cleaning the leachate collection system;
✓	Section I			3.	Provide a description of the landfill operation record to be used at the landfill; details as to location of where various operational records will be kept (i.e. FDEP permit, engineering drawings, water quality records, etc.) (62-701.500(3),FAC)
✓	Section I			4.	Describe the waste records that will be compiled monthly and provided to the Department quarterly; (62-701.500(4),FAC)
✓	Section I			5.	Describe methods of access control; (62-701.500(5),FAC)
✓	Section I			6.	Describe load checking program to be implemented at the landfill to discourage disposal of unauthorized wastes at the landfill; (62-701.500(6),FAC)
				7.	Describe procedures for spreading and compacting waste at the landfill that include: (62-701.500(7),FAC)
✓	Section I			a.	Waste layer thickness and compaction frequencies;

S	LOCATION	N/A	N/C	PART L CONTINUED
		N/A		b. Special considerations for first layer of waste placed above liner and leachate collection system;
✓	Section I			c. Slopes of cell working face and side grades above land surface, planned lift depths during operation;
✓	Section I			d. Maximum width of working face;
				e. Description of type of initial cover to be used at the facility that controls:
✓	Section I			(1) Disease vector breeding/animal attraction
✓	Section I			(2) Fires
✓	Section I			(3) Odors
✓	Section I			(4) Blowing litter
✓	Section I			(5) Moisture infiltration
✓	Section I			f. Procedures for applying initial cover including minimum cover frequencies;
✓	Section I			g. Procedures for applying intermediate cover;
✓	Section I			h. Time frames for applying final cover;
✓	Section I			i. Procedures for controlling scavenging and salvaging.
✓	Section I			j. Description of litter policing methods;
✓	Section I			k. Erosion control procedures.
				8. Describe operational procedures for leachate management including; (62-701.500(8),FAC)
		N/A		a. Leachate level monitoring, sampling, analysis and data results submitted to the Department;
		N/A		b. Operation and maintenance of leachate collection and removal system, and treatment as required;
		N/A		c. Procedures for managing leachate if it becomes regulated as a hazardous waste;
		N/A		d. Agreements for off-site discharge and treatment of leachate;
		N/A		e. Contingency plan for managing leachate during emergencies or equipment problems;

S	LOCATION	N/A	N/C	PART L CONTINUED
		N/A		f. Procedures for recording quantities of leachate generated in gal/day and including this in the operating record;
		N/A		g. Procedures for comparing precipitation experienced at the landfill with leachate generation rates and including this information in the operating record;
		N/A		h. Procedures for water pressure cleaning or video inspecting leachate collection systems.
		N/A		9. Describe how the landfill receiving degradable wastes shall implement a gas management system meeting the requirements of Rule 62-701.530, FAC; (62-701.500(9),FAC)
	Section II			10. Describe procedures for operating and maintaining the landfill stormwater management system to comply with the requirements of Rule 62-701.400(9); (62-701.500(10),FAC)
				11. Equipment and operation feature requirements; (62-701.500(11),FAC)
	Section I			a. Sufficient equipment for excavating, spreading, compacting and covering waste;
	Section I			b. Reserve equipment or arrangements to obtain additional equipment within 24 hours of breakdown;
	Section I			c. Communications equipment;
	Section I			d. Dust control methods;
	Section I			e. Fire protection capabilities and procedures for notifying local fire department authorities in emergencies;
	Section I			f. Litter control devices;
	Section I			g. Signs indicating operating authority, traffic flow, hours of operation, disposal restrictions.
	Section I			12. Provide a description of all-weather access road, inside perimeter road and other roads necessary for access which shall be provided at the landfill; (62-701.500(12),FAC)
				13. Additional record keeping and reporting requirements; (62-701.500(13),FAC)

PART L CONTINUED

S	LOCATION	N/A	N/C		
✓	Section I			a.	Records used for developing permit applications and supplemental information maintained for the design period of the landfill;
✓	Section I			b.	Monitoring information, calibration and maintenance records, copies of reports required by permit maintained for at least 10 years;
✓	Section I			c.	Maintain annual estimates of the remaining life of constructed landfills and of other permitted areas not yet constructed and submit this estimate annually to the Department;
✓	Section I			d.	Procedures for archiving and retrieving records which are more than five year old.

M. WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS (62-701.510, FAC)

S	LOCATION	N/A	N/C	
✓	Section II			1. Water quality and leachate monitoring plan shall be submitted describing the proposed ground water, surface water and leachate monitoring systems and shall meet at least the following requirements;
✓	Section II			a. Based on the information obtained in the hydrogeological investigation and signed, dated and sealed by the PG or PE who prepared it; (62-701.510(2)(a),FAC)
✓	Section II			b. All sampling and analysis preformed in accordance with Chapter 62-160, FAC; (62-701.510(2)(b),FAC)
				c. Ground water monitoring requirements; (62-701.510(3),FAC)
✓	Section II			(1) Detection wells located downgradient from and within 50 feet of disposal units;
✓	Section II			(2) Downgradient compliance wells as required;
✓	Section II			(3) Background wells screened in all aquifers below the landfill that may be affected by the landfill;
✓	Section II			(4) Location information for each monitoring well;
✓	Section II			(5) Well spacing no greater than 500 feet apart for downgradient wells and no greater than 1500 feet apart for upgradient wells unless site specific conditions justify alternate well spacings;
✓	Section II			(6) Well screen locations properly selected;
		N/A		(7) Procedures for properly abandoning monitoring wells;
		N/A		(8) Detailed description of detection sensors if proposed.

PART M CONTINUED

S	LOCATION	N/A	N/C	
				d. Surface water monitoring requirements; (62-701.510(4),FAC)
		N/A		(1) Location of and justification for all proposed surface water monitoring points;
		N/A		(2) Each monitoring location to be marked and its position determined by a registered Florida land surveyor;
		N/A		e. Leachate sampling locations proposed; (62-701.510(5),FAC)
				f. Initial and routine sampling frequency and requirements; (62-701.510(6),FAC)
		N/A		(1) Initial background ground water and surface water sampling and analysis requirements;
		N/A		(2) Routine leachate sampling and analysis requirements;
		N/A		(3) Routine monitoring well sampling and analysis requirements;
		N/A		(4) Routine surface water sampling and analysis requirements.
		N/A		g. Describe procedures for implementing evaluation monitoring, prevention measures and corrective action as required; (62-701.510(7),FAC)
		N/A		h. Water quality monitoring report requirements; (62-701.510(9),FAC)
		N/A		(1) Semi-annual report requirements;
		N/A		(2) Bi-annual report requirements signed, dated and sealed by PG or PE.

N. SPECIAL WASTE HANDLING REQUIREMENTS (62-701.520, FAC)

S	LOCATION	N/A	N/C		
		N/A		1.	Describe procedures for managing motor vehicles; (62-701.520(1),FAC)
✓	Section I			2.	Describe procedures for landfilling shredded waste; (62-701.520(2),FAC)
✓	Section I			3.	Describe procedures for asbestos waste disposal; (62-701.520(3),FAC)
		N/A		4.	Describe procedures for disposal or management of contaminated soil; (62-701.520(4), FAC)
		N/A		5.	Describe procedures for disposal of biological wastes; (62-701.520(5), FAC)

O. GAS MANAGEMENT SYSTEM REQUIREMENTS (62-701.530,FAC)

				1.		Provide the design for a gas management systems that will (62-701.530(1), FAC):
					a.	Be designed to prevent concentrations of combustible gases from exceeding 25% the LEL in structures and 100% the LEL at the property boundary;
		N/A			b.	Be designed for site-specific conditions;
		N/A			c.	Be designed to reduce gas pressure in the interior of the landfill;
		N/A			d.	Be designed to not interfere with the liner, leachate control system or final cover.
		N/A		2.		Provide documentation that will describe locations, construction details and procedures for monitoring gas at ambient monitoring points and with soil monitoring probes; (62-701.530(2), FAC):
		N/A		3.		Provide documentation describing how the gas remediation plan and odor remediation plan will be implemented; (62-701.530(3), FAC):
				4.		Landfill gas recovery facilities; (62-701.530(5), FAC):
		N/A			a.	Information required in Rules 62-701.320(7) and 62-701.330(3), FAC supplied;
		N/A			b.	Information required in Rule 62-701.600(4), FAC supplied where relevant and practical;
		N/A			c.	Estimate of current and expected gas generation rates and description of condensate disposal methods provided;

PART O CONTINUED

S	LOCATION	N/A	N/C		
		N/A		d.	Description of procedures for condensate sampling, analyzing and data reporting provided;

✓ Section I ___ ___ e. Closure plan provided describing methods to control gas after recovery facility ceases operation and any other requirements contained in Rule 62-701.400(10), FAC;

✓ Section II ___ ___ f. Performance bond provided to cover closure costs if not already included in other landfill closure costs.

P. LANDFILL FINAL CLOSURE REQUIREMENTS (62-701.600,FAC)

1. Closure schedule requirements; (62-701.600(2),FAC)

✓ Section II ___ ___ a. Documentation that a written notice including a schedule for closure will be provided to the Department at least one year prior to final receipt of wastes;

✓ Section II ___ ___ b. Notice to user requirements within 120 days of final receipt of wastes;

✓ Section II ___ ___ c. Notice to public requirements within 10 days of final receipt of wastes.

2. Closure permit general requirements; (62-701.600(3),FAC)

✓ Section II ___ ___ a. Application submitted to Department at least 90 days prior to final receipt of wastes;

b. Closure plan shall include the following:

✓ Section II ___ ___ (1) Closure report;

✓ Section II ___ ___ (2) Closure design plan;

✓ Section II ___ ___ (3) Closure operation plan;

✓ Section II ___ ___ (4) Closure procedures;

✓ Section II ___ ___ (5) Plan for long term care;

✓ Section II ___ ___ (6) A demonstration that proof of financial responsibility for long term care will be provided.

3. Closure report requirements; (62-701.600(4),FAC)

a. General information requirements;

✓ Section II ___ ___ (1) Identification of landfill;

S	LOCATION	N/A	N/C	PART P CONTINUED
✓	Section II			(2) Location, description and vicinity map;
✓	Section II			(3) Total acres of disposal areas and landfill property;
✓	Section II			(4) Legal property description;
✓	Section II			(5) History of landfill;
✓	Section I			(6) Identification of types of waste disposed of at the landfill.
✓	Section II			b. Geotechnical investigation report and water quality monitoring plan required by Rule 62-701.330(3),FAC;
✓	Section II			c. Land use information report indicating: identification of adjacent landowners; zoning; present land uses; and roads, highways right-of-way, or easements.
		N/A		d. Report on actual or potential gas migration at landfills containing degradable wastes which would allow migration of gas off the landfill property;
✓	Section II			e. Report assessing the effectiveness of the landfill design and operation including results of geotechnical investigations, surface water and storm water management, gas migration and concentrations, condition of existing cover, and nature of waste disposed of at the landfill;
				4. Closure design requirements to be included in the closure design plan: (62-701.600(5),FAC)
✓	Binder			a. Plan sheet showing phases of site closing;
✓	Binder			b. Drawings showing existing topography and proposed final grades;
✓	Section II			c. Provisions to close units when they reach approved design dimensions;
✓	Section II			d. Final elevations before settlement;
✓	Section II			e. Side slope design including benches, terraces, down slope drainage ways, energy dissipators and discussion of expected precipitation effects;
				f. Final cover installation plans including:
✓	Section II			(1) CQA plan for installing and testing final cover;

S	LOCATION	N/A	N/C	PART P CONTINUED
✓	Section II			(2) Schedule for installing final cover after final receipt of waste;
✓	Section II			(3) Description of drought-resistant species to be used in the vegetative cover;
✓	Section II			(4) Top gradient design to maximize runoff and minimize erosion;
✓	Section II			(5) Provisions for cover material to be used for final cover maintenance.
				g. Final cover design requirements:
✓	Section II			(1) Protective soil layer design;
✓	Section II			(2) Barrier soil layer design;
✓	Section II			(3) Erosion control vegetation;
✓	Section II			(4) Geomembrane barrier layer design;
✓	Section II			(5) Geosynthetic clay liner design if used;
✓	Section II			(6) Stability analysis of the cover system and the disposed waste.
✓	Section II			h. Proposed method of stormwater control;
✓	Section II			i. Proposed method of access control;
✓	Section II			j. Description of proposed final use of the closed landfill, if any;
✓	Section II			k. Description of the proposed or existing gas management system which complies with Rule 62-701.530, FAC.
				5. Closure operation plan shall include: (62-701.600(6),FAC)
✓	Section II			a. Detailed description of actions which will be taken to close the landfill;
✓	Section II			b. Time schedule for completion of closing and long term care;
✓	Section II			c. Describe proposed method for demonstrating financial responsibility;
✓	Section II			d. Indicate any additional equipment and personnel needed to complete closure.

PART P CONTINUED

S	LOCATION	N/A	N/C		
✓	Section II			e.	Development and implementation of the water quality monitoring plan required in Rule 62-701.510, FAC.
		N/A		f.	Development and implementation of gas management system required in Rule 62-701.530, FAC.
✓	Section I			6.	Justification for and detailed description of procedures to be followed for temporary closure of the landfill, if desired; (62-701.600(7),FAC)

Q. CLOSURE PROCEDURES (62-701.610,FAC)

S	LOCATION	N/A	N/C		
✓	Section I			1.	Survey monuments; (62-701.610(2),FAC)
✓	Section I			2.	Final survey report; (62-701.610(3),FAC)
	Section I			3.	Certification of closure construction completion; (62-701.610(4),FAC)
✓	Section I			4.	Declaration to the public; (62-701.610(5),FAC)
✓	Section I			5.	Official date of closing; (62-701.610(6),FAC)
✓	Section I			6.	Use of closed landfill areas; (62-701.610(7),FAC)
✓	Section I			7.	Relocation of wastes; (62-701.610(8), FAC)

R. LONG TERM CARE REQUIREMENTS (62-701.620,FAC)

S	LOCATION	N/A	N/C		
✓	Section II			1.	Maintaining the gas collection and monitoring system; (62-701.620(5), FAC)
✓	Section II			2.	Right of property access requirements; (62-701.620(6),FAC)
✓	Section II			3.	Successors of interest requirements; (62-701.620(7),FAC)
✓	Section II			4.	Requirements for replacement of monitoring devices; (62-701.620(9),FAC)
✓	Section II			5.	Completion of long term care signed and sealed by professional engineer (62-701.620(10), FAC).

S. FINANCIAL RESPONSIBILITY REQUIREMENTS (62-701.630,FAC)

S	LOCATION	N/A	N/C		
✓	Binder			1.	Provide cost estimates for closing, long term care, and corrective action costs estimated by a PE for a third party performing the work, on a per unit basis, with the source of estimates indicated; (62-701.630(3)&(7), FAC).
✓	Binder			2.	Describe procedures for providing annual cost adjustments to the Department based on inflation and changes in the closing, long-term care, and corrective action plans; (62-701.630(4)&(8), FAC).
✓	Binder			3.	Describe funding mechanisms for providing proof of financial assurance and include appropriate financial assurance forms; (62-701.630(5),(6),&(9), FAC).

T. CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER

1. Applicant:

The undersigned applicant or authorized representative of Buttrey Development Three LLC ____________________ is aware that statements made in this form and attached information are an application for a landfill Permit from the Florida Department of Environmental Protection and certifies that the information in this application is true, correct and complete to the best of his/her knowledge and belief. Further, the undersigned agrees to comply with the provisions of Chapter 403, Florida Statutes, and all rules and regulations of the Department. It is understood that the Permit is not transferable, and the Department will be notified prior to the sale or legal transfer of the permitted facility.

Signature of Applicant or Agent

John Buttrey, Manager
Name and Title (please type)

BB@purplenet.net
E-Mail address (if available)

P.O. Box 1029
Mailing Address

Clarcona, FL 32710 - 1029
City, State, Zip Code

(407 814 - 1029
Telephone Number

Date: May 15, 2002

Attach letter of authorization if agent is not a governmental official, owner, or corporate officer.

2. Professional Engineer registered in Florida (or Public Officer if authorized under Sections 403.707 and 403.7075, Florida Statutes):

This is to certify that the engineering features of this solid waste management facility have been designed/examined by me and found to conform to engineering principles applicable to such facilities. In my professional judgment, this facility, when properly maintained and operated, will comply with all applicable statutes of the State of Florida and rules of the Department. It is agreed that the undersigned will provide the applicant with a set of instructions of proper maintenance and operation of the facility.

Ed Chesney

Signature

Ed Chesney, P.E.
Name and Title (please type)

51888
Florida Registration Number
(please affix seal)

6239 Edgewater Dr, Ste. D-1
Mailing Address

Orlando, FL 32810
City, State, Zip Code

BB@purplenet.net
E-Mail address (if available)

(407 296 - 0016
Telephone Number

Date: May 15, 2002

Section I: Operations Plan

Buttrey Development Keene Road Disposal Class III Site

May, 2002

1 OPERATIONS PLAN

1.1 *DESIGNATION OF RESPONSIBLE PERSONS*

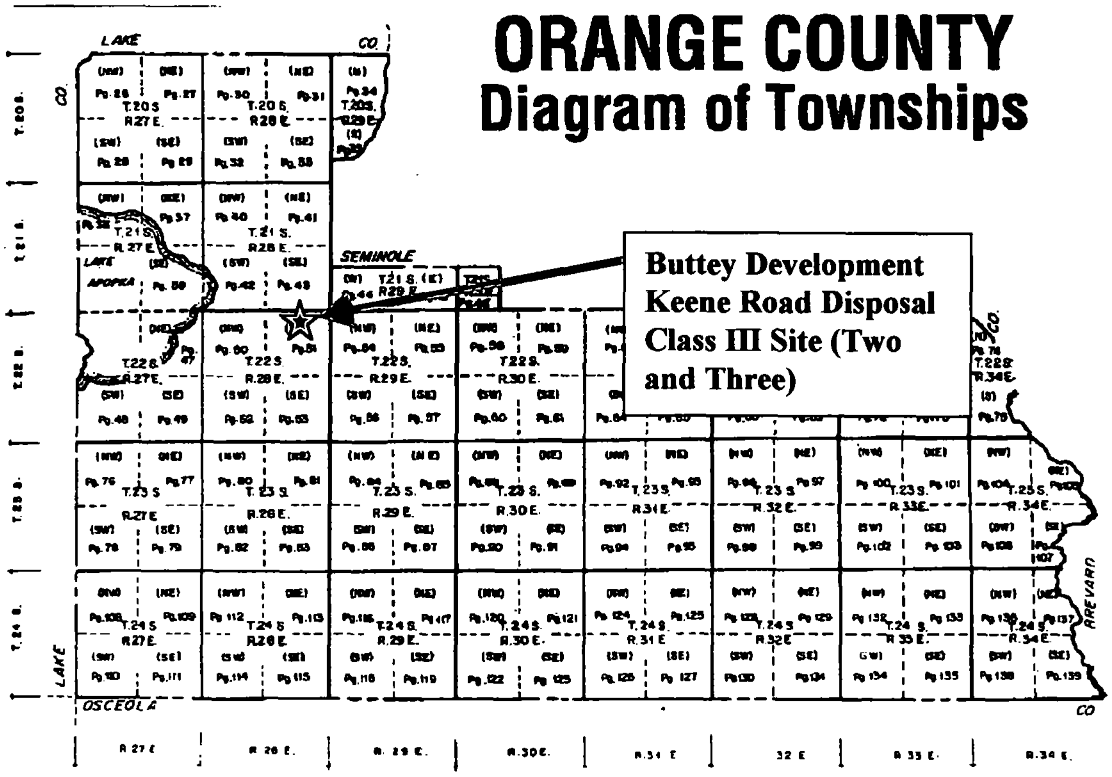
The expansion parcel is currently (as of May 2002) being excavated pursuant to Orange County Excavation Permit # 01-E2-258.

The original site is owned by Buttrey Development Two, L.L.C. The expansion parcel is owned by Buttrey Development Three, L.L.C.

The landfill permitting designee and responsible persons are Buttrey Development Two, L.L.C. and Buttrey Development Three, L.L.C., located at 6239 Edgewater Drive, Suite D-1, Orlando, Florida, 32810, with Mr. John Buttrey as principal representative.

1.2 Location

Buttrey Development Keene Road Disposal is located in Orange County, Florida, west of Apopka Vineland Road on the south side of Keene Road, at 230 & 242 west Keene Road, Apopka Florida 32703.



Site Features

The area of the originally permitted site is 60.53 acres, of which the southern 37 acres has been excavated for borrow purposes. The currently permitted disposal area occupies the 37-acre footprint created by the excavation.

This modification of the Operations Plan (May 2002) also includes an expansion on to an additional 50 acres contiguous with the original property. This expansion area is located southeast of the originally permitted property and is contiguous with the eastern portion of its southern boundary and the southern portion of its eastern boundary (see Fig. 1).

With the original parcel and the expansion site, total site acreage is approximately 110 acres, of which approximately 70 acres will be landfill footprint.

This property is zoned A-1, Citrus Rural Development. Landfilling in areas zoned A-1 is compatible with Current Orange County Planning and Zoning Code. This project has already received approval by Orange County DRC, BZA, and the BOCC. Surrounding land uses include: 1) a Medical Waste Facility located immediately to the west, 2) the Waste Management Class III Landfill located just across Keene Road to the north and the 3) Orange County RIBS facility located to the south (see Fig. 1, below).

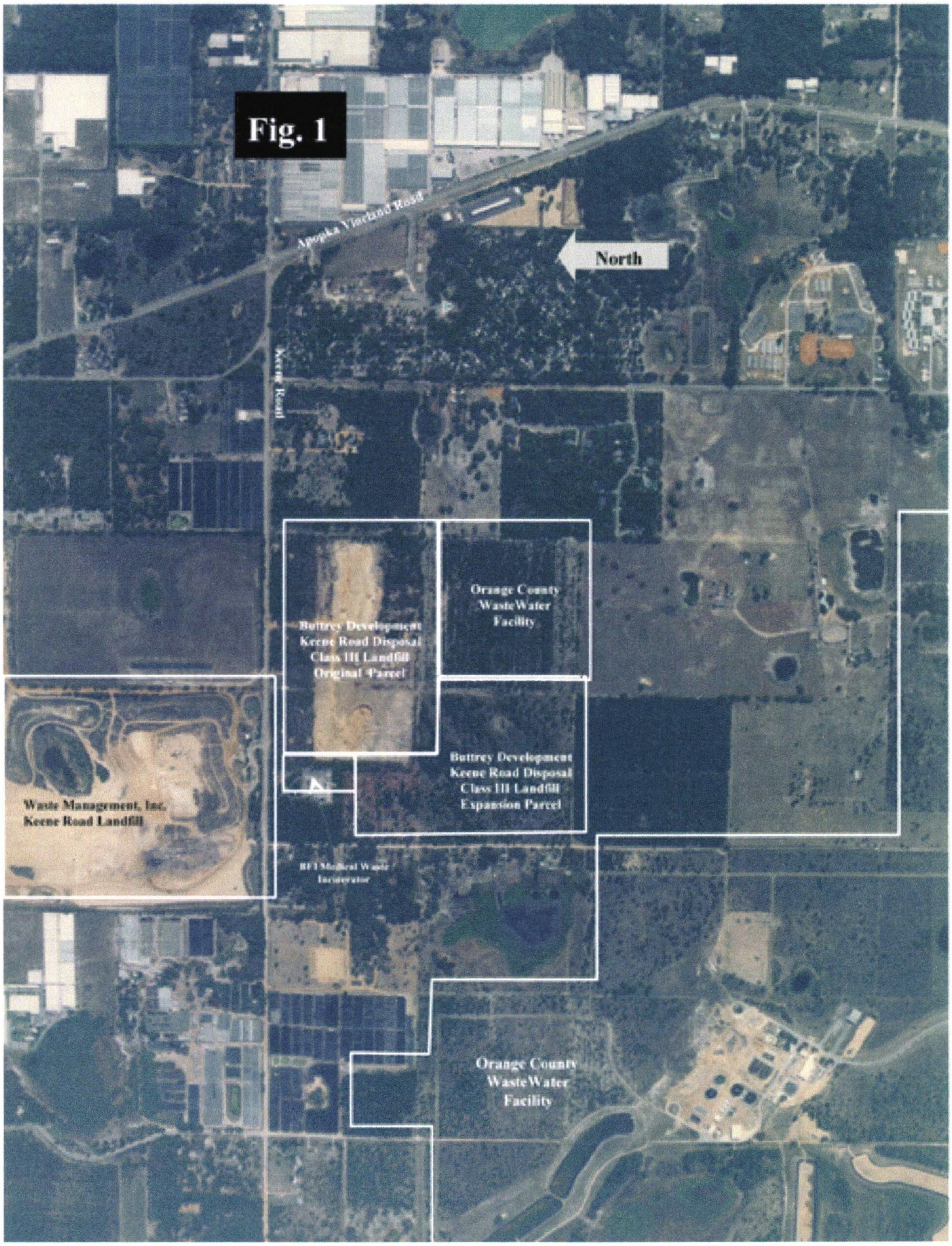
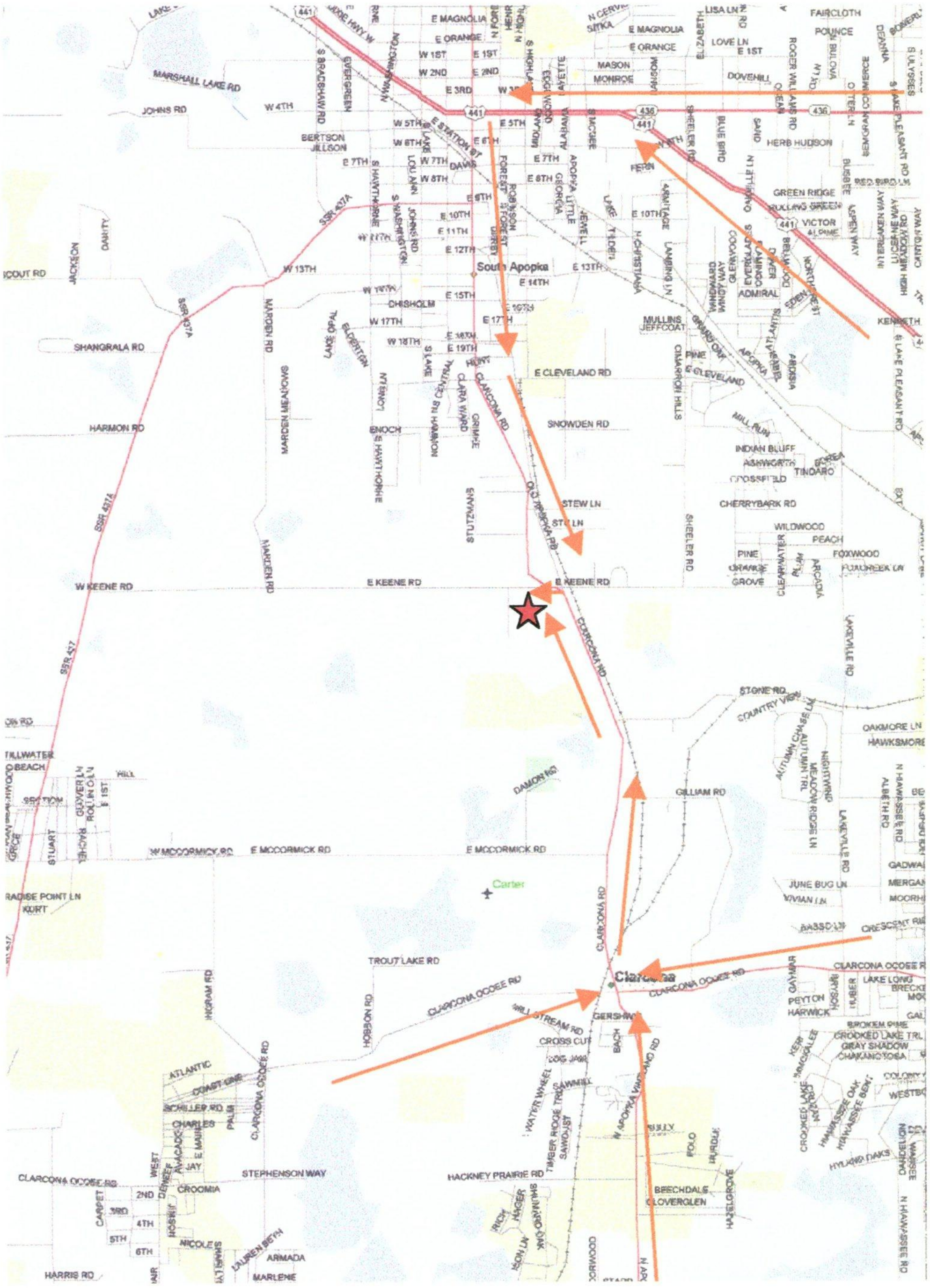

Apopka Vineland Road
North
Keene Road
Orange County
WasteWater
Facility
Buttrey Development
Keene Road Disposal
Class III Landfill
Original Parcel
Buttrey Development
Keene Road Disposal
Class III Landfill
Expansion Parcel
Waste Management, Inc.
Keene Road Landfill
BFI Medical Waste
Incinerator
Orange County
WasteWater
Facility

Fig. 1

1.2.1 Haul Route

The proposed haul route is consistent with the permitted haul routes for both the existing borrow pit, and the Waste Management Landfill. This route is identified as westbound on Keene Road for all traffic entering the site, and east bound on Keene Road for all traffic leaving the site. Major arterial roads, including Clarcona-Ocoee Road, S. Clarcona Road and W. Orange Blossom Trail provide access into Keene Road.



1.2.2 Site Access

The only access to the site will is off Keene Road via an existing driveway as shown on the site plan. Access to East Keene Road will be from Clarcona-Ocoee Road, S. Clarcona Road, W. Orange Blossom Trail, entering Keene Road east of the site.

Currently the site is fenced with "cattle type" fencing. Following the borrow operations, and in preparation for landfilling activities, a 6' galvanized chain link security fence with a locking gate will be installed around the entire site. Preventing access via fencing and locked gates when the site is not in operation will control access.

Operating Hours

The proposed hours of operation are Monday - Friday 7AM to 5 PM, and 7 AM to 12 PM on Saturdays, closed Sundays.

1.3 CONTINGENCY OPERATIONS

Emergency and contingency procedures delineated for this site involves five distinct potential scenarios: (1) detection of prohibited materials, (2) fires, (3) hurricanes/severe weather, (4) equipment failure, and (5) disruption of disposal access or service. The emergency and contingency procedures for each scenario are summarized below:

1.3.1 Detection of Hazardous or Prohibited Materials

A summary of procedures for waste screening and detection of hazardous materials improperly tipped of at this facility are described below:

- Screen waste using the three tiered system described in Chapter 1.10.1
- If hazardous materials are detected, the containers are in good shape (not leaking), and the driver is present, require the driver to remove the non-compliant waste for proper disposal, notify the designated landfill supervisor and record the event in the daily log
- If the container is in good shape and the driver has already left, or if the container is leaking, notify the designated landfill supervisor.
- For non-leaking containers, the designated landfill supervisor will determine whether the material can be traced back to the hauler who delivered it. If so, the hauler will be required to retrieve the waste. Remove the waste to a safe location, if deemed safe by the designated landfill supervisor, or cordon off the area until the waste is removed.
- For leaking containers, notify the designated landfill supervisor immediately, cordon off the area, divert traffic, and stay up wind, avoiding any vapors.
- The designated landfill supervisor will attempt to trace the source of the material and require the hauler to clean up the spill
- If the hauler cannot be located or identified, or refuses to clean up the spill, the

designated landfill supervisor will determine whether clean up can proceed on site, or if an outside hazardous waste clean up contractor is required

- Notify the fire department hazardous materials unit (hazmat) if an imminent hazard requiring fastest possible response is involved
- Record the event and outcome in the daily log
- For any spill clean ups involving significant or substantial amounts of hazardous waste materials, FDEP and OCEPD will be notified immediately upon the detection of hazardous wastes.

Any hazardous wastes detected and/or removed through the waste screening process will be disposed of at a properly licensed and permitted hazardous waste disposal facility under the direction and discretion of a properly licensed, bonded, and experienced hazardous materials cleanup and remediation contractor.

1.3.2 Fire

Fires present an extremely dangerous situation, particularly if they burn out of control. Catching the fire early is the key to successfully controlling it.

Fire prevention provisions provided at the site include:

- Posted Smoking Prohibition,
- Daily site inspections,
- Use of a landfill compactor to reduce void space,
- The express right to refuse any suspect loads,
- Availability of onsite water supply wells
  - One well for fire fighting designed to produce 50 GPM (as required in Section 2.4 of the Fire Fighting Agreement)
  - One well for non-potable water supply for office trailer
- Availability of water truck

Fires may start from something burning or smoldering in a load of refuse delivered to the site, such as charcoal briquettes or fireplace ashes. Lightning strikes, lit cigarette butts, and spontaneous combustion can also cause fires at solid waste management facilities.

Daily site inspections will detect obvious fires on site, and load screening will detect "hot loads". If a "hot load" is detected, the following procedures will be followed:

- Direct load to a soil covered area removed from the active tipping and staging areas
- If the vehicle is involved in the fire, call the fire department, remove the vehicle from the active are to an area more accessible to fire trucks (if possible) and evacuate the area immediately around the vehicle. Let the fire department extinguish the fire.
- Have the Driver drop the load away from active tipping and staging areas on an

open area safely removed from the buildings and storage areas and remove his vehicle to a safe location
- For smaller fires, use water, if available, or fire extinguishers to extinguish the fire
- Use the water truck, if necessary, to provide additional water volume
- Make sure the fire is completely out
- Pick up burned material and return it to the disposal location
- Record the incident and outcome in the daily logbook.

Fire fighting capabilities will be provided by fire extinguishers located on all pieces of equipment, the water truck used on site for dust control, and the ability to haul large quantities of dirt to fight a major landfill fire. The presence of a water supply well on site further augments the fire fighting capabilities.

In most cases, it is the ability to obtain and haul large quantities of dirt that makes the difference in a landfill fire.

In the absence of Fire Department emergency personnel, the designated landfill supervisor will determine whether a fire is sufficiently hazardous to require closing the facility or evacuation of personnel.

Fire extinguishers will be inspected monthly to ensure their usability in the event of a fire, and out of date, empty or defective extinguishers will be replaced as necessary to maintain adequate fire fighting capabilities. Records of inspections will be retained on site. All extinguishers will be removed from service for container integrity evaluations and hydrostatic testing as required OSHA, usually every five years, or when recharged.

Fires which spread through deposited waste materials present the greatest problem for landfill operators. Such fires, if left undetected, can create severe conditions of smoke, which can have significant impacts both on the site and off the site. Surface fires can burn down into the compacted waste, undercutting the visible burn areas and making access for fire fighting extremely hazardous.

Such fires are not readily extinguished with water or foam or other typical fire fighting techniques. Ordinarily, the best method for fighting fires involving significant amounts of in place refuse requires hauling and placing large quantities of dirt on and around the burning area to cut off the oxygen supply required to support burning. It is important to quickly marshal the equipment necessary to haul, spread, and compact large quantities of dirt, if the fire is to be contained and fought effectively.

If caught quickly, it is sometimes possible to push smaller quantities of burning material away from the exposed refuse and onto well covered areas of the landfill where the burning material can be extinguished without catching the whole landfill on fire.

If a large surface or subsurface fire is involved care must be taken to place large quantities of dirt around the burning area, starting well away from the visible burning. Heavy equipment should then build a thick floor of dirt that is steadily advanced inward from all access points. Care should be taken to place sufficient dirt in front of and under machinery to prevent undercut burning areas from forming voids under the working area which can give way, stranding or even engulfing the equipment. It may be necessary to place several feet of dirt on the fire to finally extinguish it. Wetting down cover materials will assist in reducing air infiltration.

Smoldering sub-surface fires can burn underground for long periods of time, with only the occasional smoke plume to indicate the presence of "hot spots". It is important to distinguish between normal water vapor emissions and smoke emissions. Typically, water vapor or steam emissions will not exhibit opacity or "smoke" plumes that extend more than a few feet from the surface, while combustion smoke will usually exhibit a visible plume extending well above the surface and will usually be accompanied by a distinctive "smoky" odor.

Once the dirt layer is in place, the covered area should be left undisturbed for as long as it takes to insure that the fire is totally out. Typically, this involves leaving the area involved in the fire undisturbed for a minimum of 48 hours, but longer periods may be necessary to insure the fire is completely extinguished, particularly for subsurface fires. Visual inspection for smoke plumes and/or inserting temperature probes into the landfill can help determine the extent of underground fires and the effectiveness of the fire fighting activities.

Orange County Fire and Rescue Division (OCFRD) command officers will be in charge of the emergency scene upon arrival, and will work closely with landfill personnel to address emergency conditions.

OCFRD will be notified of any fire at the landfill site.

All fire fighting activities will be conducted in accordance with the Emergency and Fire Fighting Guidelines negotiated and executed with OCFRD as required by 32-215(a)(23), Orange County Code.

1.3.3 Natural Disaster

Hurricanes/Severe Weather:
There is usually some form of advance notice when a hurricane or other severe weather approaches. Emergency procedures focus primarily on securing the site to prevent damage until the storm passes. When the arrival of severe weather is imminent (within 12 hours of arrival), the following general practices (primarily geared toward a hurricane) will be observed:

- Secure loose materials and equipment to prevent damage from wind blown debris
- Fuel up all vehicles an equipment
- Park equipment in accessible areas not subject to flooding

- Inspect drainage system to insure proper function.
- Notify haulers of closure due to emergency circumstances
- Notify employees of call back procedures for restarting the facility
- Dismiss employees with sufficient time for them attend to their personal business.
- Secure access to the site, seek appropriate shelter (off site) and ride out the storm
- After the storm has passed, assess site conditions, make repairs if necessary, establish access, notify haulers, and open for business

1.3.4 Equipment Failure

Key operating equipment is typically readily available from the local rental and lease market. Replacement dozers, dump trucks, backhoes, and other heavy equipment can be obtained within 24 hours to prevent disruption of operations. In the event of equipment failure which effects the facility's ability to operate in accordance with the operations plan or applicable regulations, replacement equipment will be obtained from the local rental or lease market and used until inoperative equipment is repaired.

1.3.5 Disruption of Access or Service

Disruption of disposal access or service will result in the temporary closure of the disposal facility until access can be restored. Such disruptions may result from natural disasters, severe weather, hazardous materials spills, or other emergency situations.

In the event of major service disruption, notification of the facility closure will be posted at the facility entrance to notify customers of the nature and anticipated extent of the closure. The facility entrance gate will be closed and locked to prevent entry. If the closure is anticipated to continue for an extended period of time (several hours or days), all regular customers for whom account data is available will be notified by telephone (if possible) of the nature and anticipated duration of facility closure. This will allow selection of alternate disposal sites and to prevent traffic and uncontrolled dumping problems at the facility entrance.

1.4 CONTROLLING WASTE

1.4.1 Number and Location of Spotters

At least on Spotter will be present at the disposal location at all times waste is being delivered. The Spotter will be trained to recognize prohibited materials and to safely manage the detection of prohibited materials. In the event the on site Equipment Operator also performs the Spotter duties, the Equipment Operator will inspect the load from the ground as it is discharged.

1.4.2 Prohibited Materials

If unacceptable materials are delivered to the landfill, they will be refused entry at the gate. If unloaded, materials will be reloaded on the delivery vehicle, if this can be accomplished without risk of contamination. If unacceptable materials are discovered after the delivery vehicle has left, they will be placed in an appropriate container specifically for that purpose. The locations of these containers can be found on the site plan. Arrangements will then be made to transport any unacceptable materials to an appropriate facility at our expense.

Items prohibited from arriving in loads include, but are not limited to:

- Hazardous Wastes
- White Goods (stoves, refrigerators, water heaters, etc., as defined in Chapter 62-701.200, F.A.C.)
- Household Garbage, putrescible waste (Class I, II type waste)
- Tires
- Waste Oils, oil filters
- Drums
- Septic Tanks, Grease Traps
- Liquids or Sludge
- Gasoline Cans and Tanks
- Automotive Batteries
- Mercury Containing Devices
- Automobiles and Automotive Parts
- Regulated Asbestos Containing Wastes
- Biomedical Wastes
- PCB's
- Cadmium (rechargeable) Batteries

These prohibitions dictate operational practices by defining those materials which cannot be accepted for disposal at landfills and which must be extracted from the waste at some point prior to placement for disposal.

1.4.3 Weighing Incoming Waste

Waste will arrive at the scale house located at the entrance of the site, where each load will be weighed for record keeping and assessment of tipping fees. Tipping fees will be assessed based on the weight of the delivery vehicle contents and the type of waste delivered. All incoming loads are required to be adequately secured or covered. Scale house personnel will conduct initial waste screening activities and prohibited materials will be rejected.

Scale facilities consist of a 60-foot platform scale linked to a computer operated data system allowing accurate tracking of quantity, waste type, and customer data. The scale will be calibrated at least every 12 months and calibration certificates will be displayed at the scale house.

1.4.4 Vehicle Traffic Control and Unloading

Based on the access design and location of the filling areas, there will be ample staging areas within the site. Staging excess traffic within the landfill site will greatly reduce any traffic conflicts involving Keene Road. Typically, it is expected to have one vehicle dumping, with one or two waiting to dump and another in transit to dump. The proposed on-site road system allows for smooth uninterrupted flow from the ticket master through dumping phase and to the exit.

The Gatehouse personnel will inspect all incoming vehicles as they enter the site and prohibited materials will be rejected.

After entry, vehicles will be directed to the disposal area where the spotter will direct them to the proper dumping area. The Spotter will visually screen each load for prohibited wastes before it is pushed into the disposal area. Equipment Operators will visually screen the waste as it is being placed in the disposal unit.

Vehicles containing prohibited wastes will be detained until disposition of the improper wastes can be arranged.

Signs within the site, along the access road will advise site users of speed limits, safety rules and disposal locations.

1.4.5 Removal of Recyclable Materials

Recycling activities at the site will assist the County in meeting State mandated recycling goals. Recycling at Buttrey Development Keene Road Disposal will consist primarily of manual removal of targeted materials from incoming loads and storage in roll-off containers or stockpiles. Since no mechanical processing of recyclable materials is anticipated at this time, no off site impacts from noise, dust, visual impacts or odors are expected to result from site recycling activities.

1.4.5.1 Materials to be targeted for recycling

- Old corrugated cardboard (OCC),
- Ferrous metals,
- Non-ferrous metals,
- Aggregate by products,
- glass and plastic (as markets dictate)
- Other materials as future markets or uses dictate

1.4.5.2 Removal, storage, processing and marketing recyclables

- Spotters and Equipment Operators will remove targeted materials when the occasion arises and removal can be accomplished safely.
- Targeted materials will be segregated and placed in separate roll –off boxes or storage piles
- Storage piles will be used only for clean concrete and aggregate by products
- No materials will be retained on site more than 30 days without permission form Orange County Environmental Protection Department (OCEPD)
- Except for storage piles containing clean concrete and/or aggregate by products, all containers will be covered when not in use
- Personnel will be provided with gloves, hard hats, and other appropriate safety equipment

when removing materials for recycling

- Excessively contaminated materials will not be removed
- Amounts of recycled materials will be recorded and reported quarterly to FDEP and OCEPD
- Materials removed from the waste stream may be utilized on site, where applicable, or marketed to local brokers or recycling companies
- Materials leaving the site will be properly secured, covered, or containerized to prevent spillage and litter
- No mechanical processing of recyclable materials will be conducted without approval from OCEPD

1.5 METHOD AND SEQUENCE OF FILLING THE WASTE

1.5.1 Waste Compaction and Application Cover

Primary waste compaction will be accomplished by placing the waste in relatively thin layers and compacting with a Tractor-Dozer or a Landfill Compactor. Incoming trash will be segregated based on density. Bulky, incompressible items will be separated and recycled or reduced in volume as appropriate. Additional compaction is also realized as a result of site equipment moving over the active Cell during normal operations.

After the waste is tipped and screened for prohibited materials, it is spread as thinly as possible with a Tractor-Dozer or a Landfill Compactor. After spreading, the in place material is compacted by repeatedly driving the equipment over the waste material to break up and consolidate the material as much as possible. Three or more passes of the equipment over the refuse layers are performed to maximize compaction.

The active face is maintained to be as small as possible to accommodate incoming traffic. Typically, the active face is kept to a width of 75 feet or less. The active face is normally maintained at a slope no steeper than 3:1 (one foot of vertical rise for three feet of horizontal run), to assure maximum compaction.

The active disposal area is covered weekly with six inches of soil to provide a fire control mechanism and to minimize odors and fugitive litter.

Eighteen inches of intermediate cover is applied to the top of refuse lifts and to side slopes as necessary as the active face progresses.

Cover will be hauled with dump trucks or scrapers and spread/compacted with a tractor/dozer or landfill compactor.

A final cover of compacted soil will be placed upon closed cell as specified in the closure plan.

1.5.2 Cell and Lift Dimensions

The original (i.e. currently permitted) landfill operation will progress in a series of four cells as shown on Sheet 5 of the construction plans submitted with the Permit application. Each cell is roughly 475 feet wide (from east to west) and 850 long (from north to south). Cell No. 1 will begin at the southwest corner of the excavation.

The expansion will also be divided into four cells (numbered 6-8). Cell 4 will be used for internal storm water control as shown on the construction plans.

1.5.3 Fill Sequence

Cell progression (landfilling) will work from the west to the east. Each working face will not exceed a slope of 3:1. External side slopes will note exceed 3:1.

1.6 OPERATIONS OF GAS, LEACHATE, AND STORM WATER CONTROL

1.6.1 Gas Control

The types of materials accepted at Class III Landfills are not expected to generate significant amount of methane or other gases.

Information from other landfills indicate that concentrated dumping of gypsum wallboard materials have been known to create hydrogen sulfide emissions under the right conditions.

Spotters are trained to distribute loads containing gypsum wallboard to avoid concentrating large amounts in any one area.

Gas and odor control at the site will be accomplished through the exclusion of putrescible wastes, segregation of storm water, compaction, application of cover, waste screening, and controlling the distribution of gypsum wallboard in the fill.

1.6.2 Leachate Control

The quantity of leachate generated at the site will be minimized by the application of initial and intermediate cover and the sequential closure of completed landfill areas.

The quality of any leachate generated is expected to be much less concentrated than leachate resulting from mixed municipal solid waste (MSW).

The discharge of any leachate generated will be controlled by the existing hydrogeological conditions as described in the Hydrogeological Survey Report.

1.7 WATER QUALITY MONITORING

A full-scale groundwater-monitoring plan has been developed for this facility.

1.8 OPERATING RECORDS

1.8.1 Availability of Design Documents & Operations Plan

A copy of the Orange County, and Florida Department of Environmental Protection (FDEP) approved engineering drawings and permits will be kept on site and readily available for inspection or reference. Permits will be posted as required along with the approved Operations Plan. All reports detailing operations will be submitted to both Orange County and FDEP as required.

1.9 RECORDS OF WASTE

The scale house will be equipped with a video camera which will record a daily log of vehicles and haulers that enter the landfill. Besides the obvious security reasons, this will allow a tracing mechanism for load identification.

Documentation including vehicle registration numbers, net weight, and type of waste, along with identity of location from which it came, will be kept on site.

1.9.1 Quantity and Type of Records

Records will be kept for the Annual Report to FDEP, including:

- The amount and type of waste received
- The amount and type of waste materials recycled
- The County of origin of the Recycled materials
- A statement of unknown County, when County of origin is not known

These records will be collected daily and compiled monthly.

Quarterly reports will be submitted to the Orange County Environmental Protection Department (EPD). Information submitted to the EPD will include:

- Volume of waste received in cubic yards
- Volume of soil excavated in cubic yards
- Density of in place waste
- Calculated compaction ratio
- Volume of waste stream recycled in cubic yards
- Estimated airspace consumption

The volume of recycled materials (in tons) will be submitted to Orange County Solid Waste Division on a quarterly basis.

Additional record keeping for operational purposes will includes:

- A daily count of vehicles
- A daily operational logbook providing a record of activities at the site
- Daily site inspection checklists

- Delivery of prohibited wastes/How handled
- Records of prohibited waste removed from site

1.9.2 Daily Inspection Reports

A daily operations log will be maintained by the Operations Manager and Site Attendant, describing conditions and activities each day. Information, which may be included in the daily log, includes:

- Date
- Weather conditions
- Rainfall amount since yesterday
- Unusual occurrences
- Equipment condition
- Notable activities such as regulatory inspections (who, when, what), etc.
- Truck count
- Delivery of prohibited wastes, disposition
- Shipments of recyclable materials
- Site conditions, including litter, cover condition, erosion, roadway conditions. etc.
- Maintenance, litter collection, or construction activities, etc.
- Fires or other emergencies such as accidents or injuries

1.9.3 Control Access

Currently the site is fenced with "cattle type" fencing. Following the borrow operations, and in preparation for landfilling activities, a 6' galvanized chain link security fence with a locking gate will be installed around the entire site. Preventing access via fencing and locked gates when the site is not in operation will control access.

1.10 MONITORING WASTE

1.10.1 Waste Screening/Removal of Prohibited Waste

The purpose of the waste screening program is to identify, to the greatest extent possible, any prohibited wastes which might be received in arriving waste loads, and to remove prohibited waste for appropriate disposal. It takes more than one person to accomplish this job. A three tiered process is employed at the Buttrey Development Keene Road Disposal:

- Initial evaluation of the load as it arrives in the vehicle by scale house personnel,
- Observation of the load after it is unloaded by a spotter, and, finally,
- Observation of the materials as they are placed, spread and compacted, by the equipment operator(s).

Ticket House

Ticket house personnel will provide the first chance to evaluate an arriving load. The attendant will get an indication of the waste type from the vehicle driver in order to assess acceptability for disposal, to assign the appropriate tipping fee, and to direct the load to the proper disposal location. The truck number and company name will be recorded for each transaction, along with the truck weight and material type. Although all arriving loads required to be covered or secured, the attendant will have an opportunity to determine if anything is obviously suspect about the load.

Unusual odors, liquids leaking from the truck, and mixed loads, will be considered suspect and subject to closer evaluation. Any suspicious loads will be scrutinized more closely to determine their acceptability. If necessary, on site supervisory staff will inspect suspect loads to determine acceptability. Any loads refused will be noted in the daily logbook, including pertinent information regarding the delivering customer and the type of prohibited materials detected.

Spotter
After leaving the ticket house, a spotter located at the active disposal area where material is unloaded will screen the arriving loads. Loads will be evaluated while the truck is still present, when possible, to allow prohibited materials to be removed by the hauler, where appropriate. Evaluations will consist of a close visual observation of the tipped loads for detectable signs of prohibited materials.

Equipment Operator
Equipment Operators will assist the Spotter(s) with the screening process by knocking loads down when necessary to reveal contents inside the load. They will also observe the waste materials as they are being spread and placed for disposal. They will visually evaluate the materials as they are placed, looking for hazardous or otherwise prohibited materials.

If prohibited materials are detected the hauler will be required to remove it from the site, if such action can be performed without threat of contamination or adverse worker exposure.
If the hauler has left, the prohibited waste will be removed by the site attendant, when such removal can be done without injury to the site attendant or other landfill personnel. If removal of prohibited materials a pose risk to site personnel or involves hazardous waste materials, the waste generator, waste hauler and/or a commercial hazardous waste contractor will be contacted for cleanup, at the supervisor's discretion. Supervisory personnel on site will facilitate the identification and proper disposal or recycling of prohibited and hazardous wastes.

Removed material will be placed in roll-off boxes or similar containers and hauled off site to appropriate disposal facilities, depending on the type of material involved.

Materials that may leak or contain liquids will be stored to provide protection against leaking containers.

1.10.2 Prohibited Material Guidelines:

Hazardous Wastes: Disposal of hazardous wastes will be strictly prohibited.
The term "hazardous wastes" describes a broad group of materials that share the common characteristic of having the potential of causing harm to human health or the environment. Detection of hazardous waste materials in waste loads can be improved by looking for the hazard characteristics of materials, usually printed on the label. Some hazard classes have special labels or placards, which identify the principal hazards exhibited. Any containers that have these hazard placards on them will be prohibited for receipt at the site, whether they are empty or not.

The primary hazard characteristics defined by the hazardous waste regulations are:

- Ignitable (flammable)
- Corrosive (caustic, acid)
- Reactive (unstable, spontaneous reactions)
- Toxic (contains poisonous or toxic materials)

In addition to the characteristics, a series of toxic chemicals and chemical by-products are listed specifically in the regulations. These materials are primarily pesticides, industrial chemicals, and the by-products of chemical manufacturing.

Potential sources of hazardous wastes from waste include paints, solvents, pool chemicals, cleaning chemicals, construction adhesives, vehicle fuels and fluids, petroleum products, or similar materials improperly deposited in unsecured waste receptacles. Any containers or vehicles suspected of containing these or other hazardous or prohibited wastes will be denied access to the site, as necessary.

If operations personnel detect containers suspected of being hazardous wastes, the designated landfill supervisor will be notified immediately, and the truck driver detained, if possible. The designated landfill supervisor will assess the situation and determine the appropriate response. In most cases, where the containers are sealed and not leaking, the driver will be required to remove the material for alternate disposal. In cases where the driver can not be detained, or the containers are leaking, the designated landfill supervisor may arrange to have the material properly stored for evaluation and possible disposal by licensed hazardous waste remediation contractors.

The following procedure will be followed if leaking containers are detected:

1) Any leaking container will be treated as a hazardous waste until proven otherwise.

2) Leaking containers will be reported to the designated landfill supervisor for determination of appropriate action.
3) The area around the leaking container will be blocked off from traffic access and efforts will be taken to avoid breathing any vapors or fumes.
4) The designated landfill supervisor will have the option of taking actions ranging

from notifying the generator or hauler to remove and clean up the waste, to notifying a licensed hazardous waste remediation contractor to perform the clean-up, or calling in the Hazardous Materials Response Team from the fire department.

1.10.3 Management of Prohibited Materials

White Goods:
The term "white goods" applies to household appliances such as stoves, refrigerators, freezers, hot water heaters, etc. Although White Goods are not accepted for disposal at Buttrey Development Keene Road Disposal, they may arrive as unintended contaminants in incoming loads. White goods detected by the waste screening program will be removed from incoming loads for recycling. White goods removed from incoming waste loads will be segregated from waste materials and stored in designated areas or containers for recycling. Freon containing white goods (refrigerators, freezers, and air conditioners) will be recycled to prevent venting of Freon to the atmosphere, and verification of the removal of Freon will be required from all vendors removing such devices from the site. All Freon containing devices will be stored upright for at least 48 hours before recycling or removal to prevent contamination of Freon with compressor oil. Haulers are required to remove white goods, when possible.

Household Garbage:
Household garbage (putrescible waste) will be prohibited from disposal at the Buttrey Development Keene Road Disposal, although insignificant (de minimis) amounts may be encountered in normal wastes. Household or putrescible wastes detected during the load evaluation process will be removed and placed in containers for alternate disposal at a properly permitted Class I landfill. Putrescible wastes removed from incoming loads will be placed in suitable containers for temporary storage (typically roll-off boxes) and removed for disposal within 48 hours of receipt.

Whole Tires:
Whole tires will not be knowingly accepted for disposal at this facility. Tires detected in arriving loads or at the active disposal area will be returned to the delivering hauler for removal off site to proper disposal. Any tires removed from the waste stream during the waste screening process will be placed in appropriate containers (such as roll off boxes) and removed to a permitted waste tire storage or recycling facility. No more than 999 tires will be stored on site at any time.

Properly shredded tires may be accepted for disposal on a case by case basis.

Waste Oils:
No waste oil or oil filters will be knowingly accepted at the Buttrey Development Keene Road Disposal. No vehicles will be allowed to discharge oil or fluids while on site and maintenance activities conducted on site will be limited to maintenance of facility operating equipment only. Vehicles discharging oil or fluids due to accident or mechanical failure will be required to clean up and properly dispose of the fluids and any contaminated materials associated with the incident.

Waste oil and oil filters resulting from on site equipment maintenance will be managed in accordance with the provisions of Chapter 62-710 F.A.C. No oil or other vehicle fluids will be knowingly allowed to discharge onto the ground or into the site storm water system.

Drums:
No drums of any kind will be knowingly accepted at the Buttrey Development Keene Road Disposal, regardless of contents. If drums are detected, the designated landfill supervisor will be notified immediately to arrange disposition. Drums should be treated as a hazardous waste until proven to be otherwise. Empty drums, suitable for recycling will be removed as scrap metal in the ferrous metal container. Drums detected through the screening process will be placed in appropriate storage and removed for proper disposal or recycling.

Asbestos Containing Materials:
No regulated or friable asbestos materials are allowed for disposal. Small amounts of non-regulated asbestos containing materials (floor tiles and roofing shingles) may be present in roof tear-offs or demolition materials.

Septic Tanks, Grease Traps, and Pumpings:
No materials from septic tanks, grease traps, and the liquid from pumping septic tanks and grease traps will not be knowingly accepted for disposal at the B&B Keene Road Disposal., Class III Landfill.

Liquids or Sludges:
Liquids or sludge will not be knowingly accepted for disposal at the Buttrey Development Keene Road Disposal.

Gasoline Cans and Tanks:
Gas cans, gas tanks, or gasoline contaminated materials will not be knowingly accepted for disposal at the B&B Keene Road Disposal., Class III Landfill. Any such items detected will be removed from the disposal area, placed in appropriate containers (such as roll-off boxes) and shipped off site for proper disposal.

Automotive Batteries:
Automotive batteries will not be knowingly accepted for disposal at the Buttrey Development Keene Road Disposal. Any automotive batteries detected will be removed from the tipping area and placed in a container with leak containment for temporary storage. Batteries removed from the waste stream will be directed or removed to proper recycling off site.

Fluorescent Lamps, and Thermostats:
Fluorescent lamps and thermostats contain mercury which is a toxic material, and are therefore will not be knowingly accepted for disposal at the Buttrey Development Keene Road Disposal.

Any lamps, thermostats, or other mercury containing devices detected and removed will be transported to properly permitted disposal or recycling facilities.

Biomedical Wastes:
No biomedical ("red bag") waste will be knowingly accepted for disposal at the B&B Keene Road Disposal., Class III Landfill. In the event that "red bags", "biohazard" bags, or other regulated biomedical wastes are detected, the designated landfill supervisor will be notified. The designated landfill supervisor will evaluate the situation and determine whether the origin of the waste can be identified. If the origin of the waste can be identified, the medical facility involved will be notified to retrieve the biomedical waste. If the generator of the waste cannot be identified, a licensed biomedical waste contractor will be called to remove the material. A detailed incident report will be attached to the daily site evaluation form describing the incident and disposition of the waste.

PCB's:
PCB's, or polychlorinated biphenyls, are compounds once widely used as electrical insulators in electrical equipment. The most likely source of PCB's today is fluorescent light ballasts manufactured in the 1960's and 1970's, before the use of PCB's was banned. This is why fluorescent light ballasts will not be knowingly accepted at the Buttrey Development Keene Road Disposal.

1.10.4 Random Load Inspections

Random load inspections will be performed on three randomly selected loads each week. A Spotter who has completed an FDEP approved Spotter or Random Load Inspections course will conduct all random load inspections.

- Selected loads will be directed to unload in an area near the active disposal, on a dirt pad where the contents of the load can be distinguished from materials already placed for disposal.
- The Spotter, with the assistance of the Equipment Operator, will closely inspect the contents of the loads, looking for unauthorized and prohibited materials.
- Loads will be broken apart during the inspection process to allow thorough inspection of the waste.
- The person acting as inspector will have the authority to require contaminated loads to be reloaded and removed from the site.
- Waste haulers and/or generators will be notified of detected unauthorized or prohibited materials. Notification will consist of telephone contact initially, followed by written notification for repeat violations.
- If Hazardous Waste is detected, the hauler/generator will be notified by telephone and in writing.
- The hauler/generator will be required to remove unauthorized or prohibited materials and to dispose of them properly, or to pay the have materials cleaned up and disposed of properly.
- FDEP and OCEPD will be notified immediately upon the detection of hazardous wastes during random load inspections.

- Verification of hauler/generator notification will be recorded in the daily logbook, and on the Random Load Inspection Form.
- The Random Load Inspection Form will record the following information:

Record of Random Load Inspection

Random Load Number:__________________

Date of Inspection:____________________

Time of Inspection:___________________
Hauler/Transporter:___________________

Driver's Name:_______________________

Vehicle License Tag #__________________

Inspector's Name:____________________

Source of Waste:
Commercial
Residential
Industrial
Agricultural
Specific Facility (explain):______________
____
____
Other (explain):___________________
____

Results of Inspection

Prohibited Waste	Detected ? (Y/N)	Container Size	Number of Containers	General Condition
Hazardous Waste Ignitable Corrosive Toxic Reactive				
PCB's				
Biohazardous Waste				
Lead/Acid Batteries				
Used Oil Filters				
Food Waste				
White goods				
Whole tires				
Liquids not in containers				
Mercury Containing devices				
Cadmium batteries				
Radioactive materials				
Sludge				
Other (specify)				

- Detected prohibited or hazardous materials will be managed as described in sections 1.10.1 and 1.10.3.
- Mixed loads may be reloaded on delivery vehicle and removed from the site.
- Rejected loads will be directed to alternate disposal, if possible.
- Records of random load inspections will be retained on site for entire life of the site.

1.11 TRAINING

1.11.1 Landfill Operator Training

Chapter 62-701, F.A.C. requires training for Landfill Operators and Spotters at Class III Landfill sites. Operators are required to receive 24 hours of initial training within one year of their hire date. Subsequent to initial training, Operators must receive 16 hours of continuing training every three years. Spotters are required to attend an approved 8-hour initial training class and to receive 4 hours of continuing training every three years.

The regulatory training requirements for Landfill Operators and Spotters will be accomplished using training programs offered by the Solid Waste Association of North America (SWANA), the University of Florida TREEO Center, and private training providers approved by the Solid Waste Management Training Committee, included in the FDEP's list of approved training courses, as amended in the future. Training will include on site programs and other course work as required by Chapter 62-701, F.A.C, and approved by the Department and the Solid Waste Management Training Committee.

The approved course list is expected to be expanded over the next few years to include additional training programs offered by TREEO, SWANA, Chris Kohl Training and Consulting Services, and other approved training providers. Current uncertainty as to the presentation schedules for courses under development make exact scheduling impossible at this time. Ordinarily, training providers do not advertise their course schedules more than 12 months in advance of the training dates.

Continuing education requirements will be accomplished by utilizing on site and/or off site programs, providing operators with an average of five hours training each year. Courses for Operators and Spotters will be selected from the Solid Waste Management Training Committees list of approved courses, or submitted to the committee for approval at the time of presentation. No training credit will be claimed for courses that do not receive Training Committee or FDEP approval.

Training records for all personnel will be maintained on site for review by FDEP and Orange County EPD. These will consist of attendance records for approved training courses verifying the required amount of initial and continuing training for all covered personnel.

1.11.2 New Hire Orientation Training

All newly hired personnel (Gate Attendants, Spotters, Equipment Operators) will be required to attend an in house training program based on the new hire training materials attached, entitled **New Hire Training for Buttrey Development Keene Road Disposal: Waste Acceptability and Site Operations, August 1998.** The training sessions will be conducted before newly hired Gate Attendants, Spotters and Equipment Operators are allowed to work without close supervision at the site.

All in house training will be conducted by a Landfill Operator who has successfully completed an approved 24 hour Landfill Operators Training Course with required examination.

Each employee will sign a form verifying the date and extent of training, and records of these training sessions will be maintained on site for review by the Florida Department of Environmental Protection and Orange County EPD.

1.11.3 Employee Health and Safety

Health and safety training for all employees on site will include:

- General equipment operation and maintenance
- Inspection and reporting procedures
- Housekeeping procedures
- Hazard Communication/Right to Know
- Emergency and Contingency Plans and response
- Waste screening, identification and handling prohibited materials
- Drug and alcohol policy
- Use of personal protective equipment (where required)
- Site safety rules

Additional training in specific areas of site safety will also be conducted periodically, including proper lifting techniques, safe equipment operations, CPR, use of safety equipment, and general first aid. Safety meetings will be conducted with staff at least quarterly, and will be comprised of on site safety briefings by site management or other training personnel.

When in active areas, all personnel will be required to wear reflective vests, safety hard hats, protective eye gear, safety shoes and gloves.

1.12 WASTE HANDLING REQUIREMENTS

1.12.1 Cell and Lift Construction

The existing borrow pit will be completed with perimeter side slopes of 5:1. As waste is placed in the existing pit, these slopes will be reduced to 2:1 until the existing pit is filled to the surrounding ground elevation.

At the start of each new cell, the existing 5:1 side slope of the excavation will be reduced to 2:1. This material will be stock piled for use as cover at a later date.

Material will be placed in 10-foot lifts. Each lift will be compacted as waste is placed in the cell.

Waste loads are directed to the landfill disposal area where a spotter directs the vehicles to the active tipping area. A spotter and/or an equipment operator are stationed at the active tipping area at all times the facility is accepting waste.

After the waste is tipped and screened for prohibited materials, it is spread as thinly as possible with a tractor/dozer or landfill compactor. Typically, a layer thickness of two feet is ideal, although actual thickness may vary, depending on the material being spread and compacted.

After spreading, the in place material is compacted by repeatedly driving the tractor/dozer or landfill compactor over the waste material to break up and consolidate the material as much as possible. Three or more passes of the equipment over the refuse layers are performed to maximize compaction.
Bulky items will be placed into areas excavated at the toe of the active face and covered with additional compacted refuse.

The active face is maintained to be as small as possible to accommodate incoming traffic. Typically, the active face is kept to a width of 75 feet or less. The active face is normally maintained at a slope no steeper than 3:1 (one foot of vertical rise for three feet of horizontal run), to assure maximum compaction.

Clean debris is segregated for re-use, and ferrous metal, dimensional lumber, pallets, and other recyclable or re-usable materials may be diverted from the disposal as the occasion arises.

1.12.2 Cover

The active disposal area is covered weekly with six inches of soil to provide a fire control mechanism and to minimize odors and fugitive litter.

Eighteen inches of intermediate cover is applied to the top of refuse lifts and to side slopes as necessary as the active face progresses.

Cover will be hauled with dump trucks or scrapers and spread/compacted with a tractor/dozer or landfill compactor.

A final cover of two feet compacted soil will be placed upon closed cell as specified in the grading plan.

All cover material is planned to come from on site sources. Cover will be produced as the existing

5:1 side slopes of the borrow pit are reduced to 2:1 in preparation to receive waste, and through the excavation of storm water ponds. Material generated in the site preparation and construction process will be stockpiled for future use. Additional borrow capacity has been reserved on site for future cover needs.

1.13 SCAVENGING

Unauthorized scavenging shall not be allowed at the landfill site. No personnel who are not directly involved with the landfill operation will be allowed to remove or recover any dumped materials for any purpose. All customer personnel not directly involved with unloading will be required to remain inside the vehicle while in the disposal area.

1.14 LITTER CONTROL

1.14.1 Covered Load Policy

All loads entering the site will be required to be covered by tarps or properly secured to prevent litter emissions or flying debris. Uncovered loads will be assessed a double disposal fee.

1.14.2 Litter Fencing

Four-foot plastic litter fencing will be installed around all storm water ponds. Additional litter fencing will be installed as necessary, in and around the active disposal area, to prevent litter from spreading outside the active disposal area.

1.14.3 Active Litter Collection

Litter will be collected periodically, as necessary, along the Keene Road frontage, along the on-site access road, and within the landfill site to prevent and/or correct conditions of excessive litter.

1.15 EROSION CONTROL

Erosion is not expected to be problem throughout the below grade filling of the existing borrow pit. The above ground operations also do not present any concerns, considering the surface water design proposed and the plans to stabilize finished areas quickly with seed and mulch.

Prior to landfilling in each cell, the existing 5:1 side slopes will be cut to a 2:1 side slope. A berm will be constructed along the top of the slope for the purpose of keeping rainfall runoff away from the side slopes. The re-slope of each cell will occur in sections within the cell. This will eliminate erosion problems within the working sections of each cell as well as reduce the amount of material stock piled at any one time.

1.16 LEACHATE MANAGEMENT & GAS MONITORING

As discussed above, neither gas nor leachate collection systems are proposed for this project.

1.17 STORM WATER SYSTEM MANAGEMENT

The proposed storm water management plan for the landfill consists of swales and ponds constructed to collect and contain storm water runoff from the completed site. These facilities are designed to retain the 100-year storm volume as required by County Code. Prior to completion, temporary ponds will provide this service. These temporary ponds are also designed to retain the 100-year storm volume from corresponding drainage basins.

Storm water will be diverted into temporary ponds within the excavation away from the active Cell and allowed to percolate naturally into the ground. As cell sequencing progresses and the elevation in the disposal area begins to lift above existing surface elevations, external ponds will be used to collect storm water.

1.18 EQUIPMENT AND OPERATION FEATURES

1.18.1 Equipment

The following equipment (or equivalent) will be on site to facilitate landfill activities:

- One Front End Loader
- One Track Type Tractor (Bull Dozer) and/or One 70,000 lb. (minimum) Landfill Compactor
- One 17 cubic yard Dump Truck
- One Water Tanker, Approximately 1000 gallons
- One Pick Up Truck

All site equipment is equipped with safety devices and shields designed to protect the operators. In the event that other equipment is needed due to breakdown or failure, local accounts with equipment companies assure quick response on rentals.

All resident equipment will be equipped with fire extinguishers, and operating equipment will have rollover protection. All site equipment is in compliance or exceeds OSHA standards.

All equipment will be serviced and maintained on site by landfill personnel qualified to do so. General maintenance includes fueling, lubrication and oil changes. Equipment fuel will be stored on site near the fill operations, as shown on the plans. Fuel is stored in a 1,000-gallon tank and filled and inspected periodically by an independent provider.

Waste oil and other automotive fluids will be stored and managed to prevent uncontrolled discharge.

1.18.2 Communications

Site personnel will be equipped with wireless means of communication. Landline communication will be available at the gate house and office trailer. The gatehouse and office trailers act as a base station with constant radio contact between working site personnel. Other means of site communication include a fax machine and computer network.

1.18.3 Personnel Shelters, Sanitary Facilities, First Aid Equipment

During operating hours, there will always be a gate attendant in position, as well as personnel monitoring operations of the open face. In addition, equipment operators, mechanics, clerical staff and an operations supervisor will be available. All site personnel will be equipped with wireless means of communication at all times.

1.18.4 Dust Control Methods

A sprinkler system will be installed to water the perimeter roads to be used during the landfill operations. This system is operated on a timer and pumps water from a shallow well installed for that purpose. A water truck will be on site to assist with dust control and fire fighting activities. The sprinkler system will not be hooked up the 50 GPM well designated for fire fighting use. The water truck may be filled from the 50 GPM well designated for fire fighting use, if required.

1.18.5 Litter Control Devices

The nature of materials disposed of at Class III landfills generally do not create litter problems. The primary means for litter control is the compaction efforts and cover applied to the working face. Earthen berms located around the active disposal area will aid in litter control. If necessary, site personnel will be available to correct any litter problem that may arise.

Other litter collection information is included in Section 1.14.

1.18.6 Signs

Signs will be posted at the entrance of the landfill and provide the following information:

The operating entity;
24 hour emergency contact
The hours of operation;
Charge for disposal;
List of acceptable & unacceptable waste
The non-acceptance of hazardous waste;
No scavenging allowed

Traffic control, informational and customer safety signage will be located along the on-site roadways and in the disposal area. Such signage will include speed limits, "No Smoking" (in disposal areas), "No Scavenging", and directional information, etc.

Additional signs, such as "No Trespassing" signs will be installed around the perimeter as required by Orange County Ordinance.

1.18.7 Roads

On-site roads will be stabilized to provide all weather access. On-site roads will be maintained by establishing swales and providing adequate drainage. Periodic grading and repair will be performed as necessary.

1.19 LIFE EXPECTANCY

A calculated volume for each of the Cells is found on Sheet 5 of the construction plans submitted with the Permit application.

Original Site Air Space (cubic yards)	Expansion Site Additional Air Space (cubic yards)	Total Air Space (cubic yards)	Available Air Space Less 10% for cover, etc.) (cubic yards)
3,600,000	4,029,576	7,629,576	6,866,618

Year #	Annual Disposal (YDS^3 estimated)	Compacted Volume, YDS^3 @ 2:1 ratio	Total Available Volume (Air Space less 10%)
0	0	0	6,866,618
1	700,000	350,000	6,516,618
2	800,000	400,000	6,116,618
3	900,000	450,000	5,666,618
4	1,000,000	500,000	5,166,618
5	1,000,000	500,000	4,666,618
6	1,000,000	500,000	4,166,618
7	1,000,000	500,000	3,666,618
8	1,000,000	500,000	3,166,618
9	1,000,000	500,000	2,666,618
10	1,000,000	500,000	2,166,618
11	1,000,000	500,000	1,666,618
12	1,000,000	500,000	1,166,618
13	1,000,000	500,000	666,618
14	1,000,000	500,000	166,618
15	333,236	166,618	0

Disposal rates can be estimated using known data for the nearby Keene Road Waste Management facility. Based on an estimated annual gate volume ranging from 700,000 cubic yards (at startup, year 1) to 1,000,000 cubic yards (at peak flow), This amounts to an annual tonnage rate of approximately 420,000 to 600,000 tons (approximately 1,300 to 1,900 tons per day). Assuming a

50% compaction factor, an annual volume consumption of between 350,000 and 500,000 cubic yards is estimated.

Considering the calculated volume of landfill space available (including the original site and the expansion property and subtracting about 10% for cover) a total life expectancy of approximately 15 years is projected.

1.20 Airport Safety

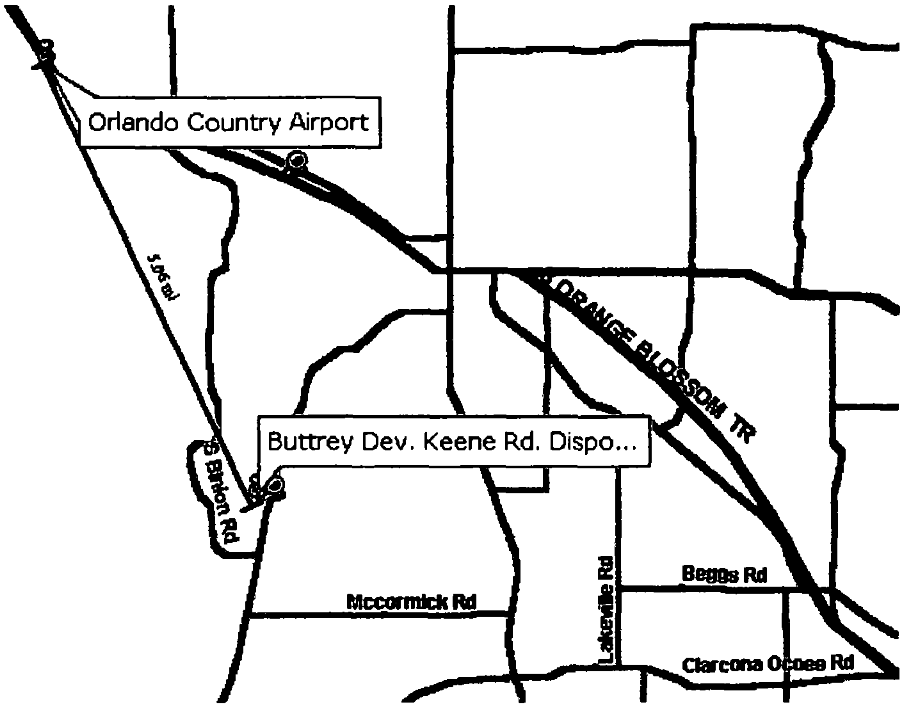
1.20.1 Waste Types Accepted

Class III landfills are prohibited from handling putrescible wastes that are likely to attract birds that present a strike hazard to private and commercial aircraft. The waste screening procedures described in Section 1.10 are intended to exclude food or other putrescible wastes that serve as bird attractants.

Therefore, birds and the hazards they pose to aircraft are not expected to be issues at properly operated Class III Landfills

1.20.2 Nearest Airport

The nearest airport to the Buttrey Development Keen Road Class III Landfill site is the Orlando Country Airport, located at 4040 W. Orange Blossom Trail, Apopka, Florida, 32712. This is a airport for piston driven aircraft and is located slightly more than 5 miles from the landfill site (see map, below)



1.20.3 FIRE PROTECTION AND FIRE FIGHTING FACILITIES

Fires that originate in landfills are primarily extinguished by soil application. The City of Apopka Fire Department, Station No.1, supplies supplemental fire protection. In addition, all equipment and site vehicles are equipped with fire extinguishers and radio/cell phone communication to notify personnel in the event of a fire. Cover dirt is always available on site and can be quickly accessed to extinguish as necessary.

Orange County Fire and Rescue Division (OCFRD) command officers will be in charge of the emergency scene upon arrival, and will work closely with landfill personnel to address emergency conditions.

OCFRD will be notified of any fire at the landfill site.

All fire fighting activities will be conducted in accordance with the Emergency and Fire Fighting Guidelines negotiated and executed with OCFRD as required by 32-215(a)(23), Orange County Code.

1.21 Final Grade Plan

The final grade plan of the facility is shown on Sheet 3 of the construction plans submitted with the Permit application. No fill will be placed below elevation 73 feet-NGVD. The maximum elevation including final cover is proposed at elevation 160 feet NGVD.

SECTION II

ENGINEERING REPORT

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1.0 INTRODUCTION

1.1 Objective

The objective of this Engineering Report is to develop an acceptable construction plan for the proposed Keene Road Disposal Class III landfill expansion. The existing Keene Road Disposal site is a 60 acre parcel with approximately 37 acres permitted for acceptance of Class III waste. The existing site is currently permitted under FDEP Permit Nos. SC48-0165969-001, SO48-0165969-002, & ERP 48-0171289-001-EI. The proposed expansion plans are to incorporate an adjacent 33 acre borrow pit site, which is located on a 50 acre parcel contiguous to the existing landfill site. The adjacent borrow it site is currently permitted under FDEP Permit No. ERP 48-0187635-001-EI. The 50 acre expansion site has already received it's Special Exception Zoning from Orange County. As a result, the Buttrey Development properties comprise 110 acres zoned for use as a Class III landfill.

This report is designed to meet the Class III requirements of the Florida Department of Environmental Protection (FDEP) as outlined in 62-701.320 (7) (a -d), Florida Administrative Code (FAC). A similar application is being prepared for submittal to the Orange County E.P.D.

1.2 Site Location and Background

The existing 60 acre landfill site is located at 230 west Keene Road, Apopka Florida, Orange County, Section 28 - Township 21- Range 28. The attached aerial (Exhibit A) shows the existing site, the expansion area and other surrounding land uses. The Buttrey Development properties are located just south of the Waste Management Keene Road Landfill, and adjacent to the B.F.I. Medical Waste Facility. Located to the southwest is the Northwest Water Reclamation Facility (NWWRF), owned and operated by Orange County. The existing landfill site is permitted as a 50 foot high rise to elevation 150 feet NGVD. The expansion site is being proposed as a 60 foot high rise. The average site elevation is approximately + 100 feet NGVD.

The Special Exception Zoning granted by the Orange County Board of County Commissioners approved a 60 foot high rise at this site to accommodate increased groundwater recharge at the NWWRF. The groundwater recharge modeling at the NWWRF predicts increases in lake and groundwater elevations of the surrounding properties. To avoid any future groundwater related issues, we have raised our bottom elevations of the landfill to accommodate the NWWRF, and will compensate for borrow and airspace losses with the proposed 60 foot high rise.

1.3 FDEP Prohibitions

This application was prepared satisfying all applicable siting criteria as required in 62-701.300, FAC. The following sections provide assurances that all applicable criteria has been met as it pertains specifically to the geology, hydrogeology, and water quality of the landfill site and surrounding areas. In addition, the handling of hazardous or special waste is discussed in the Operations Plan back in Section I.

2.0 REGIONAL GEOLOGY & HYDROGEOLOGY

2.1 Geology

The site lies within the Apopka Upland physiographic subdivision, a part of the Central Lake District (Brooks, 1981) which is characterized by sand hills and small lakes. These features are developed on a thick sequence of limestone which lie beneath 80 to 100 feet of surficial sands and clays. The area is known for typical relic karstic features (steep sided conical depressions) some of which are filled with water (lakes).

In general, the sediments which underlie Orange County consist of about 6500 feet of marine sand, limestone, anhydrite, dolomite and shale which overlie granite and other crystalline rocks. Only the upper 2,000 feet contain fresh water, therefore, discussion is limited to these sediments.

The surficial soils are mostly undifferentiated marine sediments consisting of loose poorly- sorted quartz sand with varying amounts of organic matter and occasional lenses of clay. These sediments are generally thought to have been deposited on the bottom of shallow seas during interglacial times when sea level was higher than it is at present. Thickness of the surficial deposits ranges from approximately 30 to 60 feet in the area around the site.

According to the Soil Conservation Service (1989) this site is located within the Lakeland-Blanton Soil Association. These soils are characterized as fine sands with a deep water table and rapid permeability. Permeability of these soils ranges from 6 to 20 inches per hour.

The Hawthorn Formation lies beneath the surficial deposits. The Hawthorn consists mostly of greenish, clayey sand and sandy clay with appreciable quantities of phosphorite grains. It is highly variable in character and includes interbedded sands, clayey sands, sandy clays, phosphatic sediments, dolomites and limestones. The limestones and dolomite generally occur near the base of the Hawthorn and may be hydraulically connected with the underlying Floridan aquifer. Orange County is an a transitional lithologic zone where the presence of the Hawthorn limestone and dolomite is quite variable. The Hawthorn Formation, where present, forms a confining layer between the surficial and underlying Floridan aquifer. This confining layer is estimated to be between 50 and 80 feet thick, but may be entirely absent in some areas.

The Hawthorn Formation unconformably overlies the Ocala Limestone, which consists of cream to tan, fine grained, porous limestone. After deposition, the limestone was exposed above sea level for an extended period of time. During that exposure, the limestone was weathered prior to re-submergence and the deposition of the Hawthorn Formation sediments. The Ocala Limestone beneath the proposed site is estimated to be approximately 30 feet thick (Litchtler, et al, 1968). Scott (1980) estimated the top of the Ocala to occur at elevation 0 feet NGVD in the area surrounding the site (approximately 100 feet below ground surface). Beneath the Ocala there is 1100 to 1300 feet of limestone belonging to the Avon Park Formation.

2.2 Hydrogeology

Groundwater in western Orange County occurs under both non-artesian and artesian conditions. The non-artesian surficial aquifer occurs in the undifferentiated marine deposits which extend to a depth of 30 to 60 feet. Water in the Floridan Aquifer is confined under pressure by the Hawthorne Formation confining unit. In the vicinity of the site the potentiometric typically ranges between 50 & 60 feet NGVD. In the last several years, this region has seen elevations in the 46 to 50 feet NGVD. The aquifer in the vicinity of the landfill is recharged by infiltration of rainfall and by return seepage of irrigation water. More specifically, the aquifer is also recharged to by the nearby Orange County NWWRF.

The Ocala Limestone and underlying limestones form one to the most productive aquifers in the world, the Floridan aquifer. The potentiometric surface of the Floridan aquifer was approximately 55 feet NGVD in May, 1983 (Barr, Schiner, 1983) and 58 feet NGVD in September 1983 (Barr, Schiner, 1983). These published elevations correspond to the average 1995 elevations used in the modeling of the subject area by PB Water in the NWWRF 2000 FDEP permit renewal application. 1995 was selected for the modeling because it represented a very wet year. Refer to Table 2 which provides a 48 year snap shot of rainfall in the City of Orlando. Based on this chart it can be seen that 1995 is the wettest year on record since 1960.

Gradients between the surficial and Floridan aquifers indicate the surficial aquifer at various times of the year may recharge the Floridan aquifer in the project area. Based on potentiometric surface maps, regional flow in the Floridan aquifer is generally northeastward under the project area (Figure 1). Several Floridan aquifer wells installed at various facilities in the area confirm the above mentioned potentiometric surface elevations and flow directions. The surficial aquifer across this site and in the vicinity does not appear to show a dominant regional flow direction; instead flow patterns of recharge are controlled by depressional features in the area. It is typical in western Orange County for the surficial aquifer to mimic a reflection of surface topography.

The landfill expansion site itself is relatively flat and does not exhibit any steep water table gradients or lateral movements of the surfical aquifer. While depressional and unconfined features exist on surrounding properties, the results of the geotechnical evaluation performed on the expansion site did not uncover any such features in the expansion borings. Based on the known surface & subsurface conditions that surround the expansion property, any surficial aquifer flow towards the expansion site is strongly influenced by the regional and site specific geology.

2.3 Sinkholes

It is likely that higher elevation portions of the region have experienced sinkhole activity during prehistoric time. While the region has several characteristics which are indicative to sinkholes (lakes), the subject area has a low probability of sinkhole activity for the near future. The area around this site has been and is still subject to large withdrawals from the Floridan aquifer for spray irrigation of the many nurseries which occupy the region, and for municipal public use. The proposed site area has no recorded history of subsidence events and there is no reason from observations during field work to suspect that any such events are likely to happen during the life or closure period of the landfill.

2.4 Well Inventory

Multiple well inventories within one mile of the of the project site have already been performed during the permitting of the Waster Management Landfill to the north, the B.F.I. facility to the west, the Buttrey Development Two landfill site and the NWWRF to the south. The attached Table 1 was compiled from their records obtained from the St. Johns River Water Management District, along with a ground search for other visible wells not registered. Most of the wells within this radius are used for irrigating foliage plant or citrus. Other uses include public, industrial, and private supply. Well depths range from 60 to 668 feet, with the deepest, largest capacity wells being the deepest. Little data is know about the construction of wells in this area. Typically, most wells are cased to about 100 feet, which would allow for most of the water being withdrawn from the upper part of the Floridan aquifer. Exhibit B contains an aerial photograph which covers a one mile radius and shows the location of known wells within this radius.

The closest potable wells in the area exist along McQueen Road. According to area residents along McQueen Road, most of their shallow wells are less than 100 feet deep. This would indicate that water is being drawn from the upper most zone of the Floridan aquifer. Based on the known regional flow and gradient of the Floridan aquifer with respect to these potable wells and landfill activities, the proposed landfill expansion is not hydraulically capable of affecting these shallow wells.

3.0 Site Geology & Hydrogeology

The subsurface exploration for the expansion area consists of seventeen (17) Standard Penetration Test (SPT) & eleven (11) auger borings to various depths. In addition 3 monitor wells were installed to evaluate groundwater elevations. Each of the SPT borings were advanced to identify or confirm clayey confining soils prior to the borings termination. Groundwater levels were not encountered in any of the borings at the time of drilling.

Figure 2 of this section contains a soil boring locations map, while Figures 3a & 3b illustrates cross sections of these borings. Attached as Exhibit C is the Soils Report prepared by Universal Engineering Sciences. This report contain the boring logs and associated laboratory tests performed on selected samples. For the purpose of this study laboratory tests included permeability, Atterberg limit and grain size sieve analysis. The cross sections noted above provide the elevated locations of laboratory verified permeabilities. These permeabilities verify of the natural confining soils present across the site.

The soil profile beneath this site generally consists of fine to slightly silty fine sands of various depths which overlies clayey sands and sandy clays. Based on borings performed within the foot print of the proposed expansion area, the clayey sand and sandy clay confining appear to be continuous under the expansion area (borrow pit) footprint.

The surficial aquifer beneath the site is generally found in the lower sands and upper zones of the clayey sands or clay layers, with flow patterns of any recharge being controlled by depressional features on both the east and west sides of the site, which ultimately recharges the Floridan aquifer. Recharge to the Floridan occurs at the point where the confining soils are absent or have been breached (sinkholes). Groundwater estimates for the expansion area are based on a number of factors. The first being monitor wells installed as part of this assessment along with historical data from monitor wells located on adjacent properties owned by Orange County. Based on the results of site investigation, along with known data in the area, aquifer levels in the area (both the surficial and Floridan) are known to fluctuate up to 10 feet between the seasonal low and seasonal high. This fluctuation is best seen when comparing data over longer periods which include both wet & dry years. Refer to Exhibit D for data collected from various Buttrey Development monitor wells. Also found in Exhibit D is a location map for these wells. Figures 4, 5 & 6 are groundwater contour maps generated from data collected in February, March & April 2002. The February 2002 contour map includes groundwater data collected from monitor wells installed on the Orange County property adjacent to the landfill sites.

A major consideration of the proposed expansion was to realize the fully permitted discharge capacity of the NWWRF located to the southwest of the landfill sites. Monitor wells at the County's facility similarly report groundwater levels and fluctuations as described above. The most recent modeling for the County facility was performed by PB Water (August 2000). The purpose of the August 2000 PB Water report was to evaluate the effects of an increased capacity of up to 7.5 mgd for the County's FDEP Wastewater Permit and it's impact on the surrounding properties.

As part of the Wastewater Permit Application, a groundwater model boundary was identified by PB Water. All of the Buttrey properties are within the limits of their study boundary. As a result, all groundwater issues on the Buttrey landfill sites are evaluated considering the fully permitted and proposed discharge capacity of the NWWRF. The seasonal high groundwater estimates for the existing landfill and the proposed landfill expansion plans include additional factors of safety beyond the PB Water modeling of the 7.5 mgd capacity.

In general, the surfical aquifer in depressional areas is well connected to the Floridan aquifer. For example, if the potentiometric surface rises one foot under a karst lake, the water surface elevation of the lake will likely rise approximately one foot. Based on the PB Water modeling using the average 1995 (wet year) lake elevation of Lake Mitchell (58.3 feet NGVD) and a modeled rise of the potentiometric surface at Lake Mitchell of 1.5 feet, a rise in lake elevation of 1.9 feet is expected. This is considering realizing the permitted 7.5 mgd recharge at the NWWRF and results in a simulated average wet season elevation at Lake Mitchell of 60.2 feet NGVD.

Using the average 1995 wet year data, a seasonal high water table of 61.7 feet NGVD is estimated to produce a 63.6 feet NGVD seasonal high water table elevation at Lake Mitchell. This seasonal high calculated for Lake Mitchell is a result of the 7.5 mgd discharge and will control the seasonal high estimates at the Buttrey landfill expansion. The proposed landfill bottom base grade elevation on the expansion property is 73 feet NGVD. This equates to a 9.4 feet separation between the seasonal high groundwater and any landfill trash. This 9.4 foot separation is over 4 feet greater than the required minimum 5 foot separation.

3.1 Soil Testing

In addition to visual examination of the recovered samples, the following laboratory tests were conducted on select samples; -200 Sieve Analysis, Atterburg Limits, vertical permeability (from both Shelby Tubes and remolded samples), and natural moisture content. The results of all laboratory tests are listed on the corresponding soil boring log at the depth of the material tested. Vertical permeability as determined by the constant head method testing, to date ranged from 2.10E^{-4} to 3.29E^{-7} cm/sec. These confining type soils underlie the sandy material to be excavated during the borrow pit operations. The clayey and silty sands and clays are classified as the Hawthorn Formation. These sediments, when present, form an effective confining layer above the Floridan aquifer. The presence of these soils across the site, the relative thickness and confining qualities support the request to permit this expansion without installing an additional liner system.

Attached as Exhibit E are two reports prepared by Universal Engineering Sciences Inc., these reports cover the bearing capacity and settlement analyses (foundation analysis) and the slope stability of the proposed expansion. The purpose and goal of these evaluations was to examine the structural integrity of the landfill subgrade to support the expected loads and stresses at design elevations and the associated slope stability using design criteria.

4.0 Groundwater Monitoring Plan

The purpose of this Groundwater Monitoring Plan is to monitor groundwater quality, movement and elevation at this site. The goal of the system is to identify any potential groundwater quality impacts caused by site landfilling activities that would violate State of Florida groundwater quality standards. Water quality will be monitored within the zone of discharge. The zone of discharge is defined as the volume of aquifer underlying and surrounding the site to the base of the uppermost aquifer and out 100 feet from the landfill, or to the property line, whichever is less. Monitoring within this area allows for the treatment, mixture or dispersion of waters into the receiving groundwater if necessary. This will be achieved first by establishing a baseline of the existing groundwater conditions prior to any filling, and then monitoring the site for any changes or deviations in groundwater quality.

The proposed groundwater monitoring system was based on all the geologic and hydrogeologic information collected to date, regional data, along with the neighboring Waste Management Class III site and the NWWRF. Based on investigations to date, we are able to describe the aquifer(s) potentially affected by the proposed facility, and the most likely pathways and rates of any leachate or contaminants that may discharge from the facility.

4.1 Monitor Well Locations

The proposed well locations (Figure 7) have been strategically located to establish the background quality of the surficial aquifer and upper Floridan aquifer, followed by ongoing monitoring of the water quality down gradient of the proposed landfill. Figure 7 also contains the locations of the approved monitor wells for the Buttrey Development Two site. These wells will be incorporated into one monitoring plan for both the original site and the expansion area. This site does not have distinct "surficial" or "intermediate" aquifer zones, because site confining units/layer exists at elevations within the surficial aquifer and at the top to the Floridan aquifer. This is based on the varying thickness of each soil unit, the depth to groundwater, and the absence of a dominate flow direction for the surficial aquifer.

The potentiometric surface map of the Floridan aquifer (refer back to Figure 1) indicates it's flow direction beneath the facility is northeastward. The surficial aquifer does not have a dominate flow direction, but tends to mimic surface topography. The groundwater monitoring plan for this facility is designed to address these scenarios.

Monitoring of the surficial & upper Floridan aquifer is proposed as follows:

Monitor well clusters **MW-3, MW-4, MW-5,** MW E10, MW-E12, & MW-E13 will serve as downgradient wells. Well clusters **MW-1, MW-2, MW-6** & **MW-8** will serve as upgradient wells. Three side gradient well clusters **MW-7,** MW-E9, MW-E11 and four deeper upper Floridan monitor wells **MW-FL1, MW-FL2, MW-FL3** & MW-FL4. Based on the above proposed monitoring plan, the total number of monitor wells for the entire 110 acre site will = 29. The wells shown above in **bold** represent wells that are part of the approved monitoring plan (by both FDEP & Orange County EPD)for the Buttrey Development Two site.

4.2 Groundwater Flow Direction & Velocities

As discussed above, regional flow in the Floridan aquifer is known to be generally northeastward in the project area. Multiple Floridan monitor wells located just across the street and to the south at the NWWRF agree with this flow direction. Comparing four Floridan wells (FL-05, FL-06, FL-07, & FL-08) located at the Waste Management Keene Road Landfill, an average horizontal gradient (I) of 5.8 E^{-04} ft/ft resulted. An average horizontal velocity (V_h) of the Floridan can be calculated using this horizontal gradient along with representative horizontal hydraulic conductivity (K_h) (100 ft/day (0.035cm/sec) and porosity values (n_e) (0.27).

Average horizontal groundwater velocities can be calculated based on the following equation:

$$V_h = (I)(K_h)/(n_e)$$

Thus an average groundwater velocity in the area for the Floridan aquifer system can be calculated as 7.51 E^{-05} cm/sec or 0.21 ft/day.

Similarly, average groundwater velocities, hydraulic conductivities and flow direction for the surficial/intermediate aquifer system have been calculated at the Buttrey Development site during earlier permitting. These values were calculated by Universal Engineering Sciences, using slug test data from site wells installed specifically for that purpose. The hydraulic conductivity as measured at MW-2 is representative of the typical surficial sands (101.29 ft/day). The hydraulic conductivity measured at MW-3 is representative of the typical surficial/intermediate aquifer sandy clays (1.03 ft/day). Values determined from MW-1 (0.94 ft/day) are representative of a saturated zone of silty sands/clays. Refer back to the attached Universal Engineering Sciences Report (Exhibit F) for more specific details and analysis. This report has been updated to include the most recent depth to water data available.

MW-3 is located immediately adjacent to the expansion site and exhibits similar hydrogeologic conditions. The groundwater flow velocity varies across the site due to the variable hydraulic conductivities and is estimated to be 0.23 ft/day. Also found as part of Exhibit F is a May 2000 report from Universal Engineering Sciences which describes two pump tests performed on the site during earlier permitting.

5.0 Groundwater Monitoring System Design

As discussed above, the surficial aquifer does not show a dominant regional flow direction at this site or in the surrounding area. It does however appear to have a general flow trend to the southwest, while the Floridan aquifer is known to have a general flow to the northeast. It is my opinion that with the confining soils identified beneath this site, and a tendency for the surficial aquifer to be controlled by depressional features, deep monitoring of the Floridan would not be as useful as clustered surficial/upper Floridan monitoring.

Monitoring of the surficial & upper Floridan aquifers will be achieved by the monitoring of twelve surficial & upper Floridan clustered well locations. Monitor well cluster locations MW-1, MW-2, & MW-6 will serve as upgradient wells, while cluster locations MW-3, MW-4, MW-5, MW-E10, MW-E12 & MW-E13 will serve as downgradient wells. Well cluster locations MW-7 & MW-E-9 & MW-E11 are side gradient wells. Four deeper Floridan wells are also part of the monitoring network. Refer back to the revised Figure 7 for all of the above described monitor well locations.

5.1 Monitor Well Installation

Based on the soil and groundwater information gathered during site investigations, all permanent monitor wells should be installed to the depths specified in Table 3. These depths and construction details are based on field conditions encountered through March, 2002. Actual well construction details or adjustments will depend on field conditions encountered at the time of installation. The proposed wells (as were any existing wells) will be installed by a licensed water well contractor utilizing 6-inch I.D. hollow-stem augers. At each well location, a standard penetration test (SPT) boring will be advanced, to assure proper placement and screen interval location. Following the SPT boring and visual examination, the hollow stem augers will be advanced.

5.1.1 Monitor Well Design

Design details of all existing monitor wells as well as those proposed are shown on Table 3. Well screen and filter pack selections were based on lithologic samples and grain size analysis conducted at the various soil boring and monitor well locations. Using this data and recommendations from ASTM along with Driscoll's "Groundwater and Wells", standard commercial slot sizes and filter pack gradations were selected. Each well will be finished with a 6-inch locking galvanized steel protector set in concrete. Well depths were determined based on existing site monitor wells, along with available local data and the multitude of soil borings performed to date. Screen lengths for the surficial wells were selected to accommodate for both drought and surplus groundwater conditions. The screened intervals are designed to accommodate the 10 foot fluctuation in groundwater levels known to exist across the area. Upon completion, the top of casing elevation will be surveyed and tied to existing well elevations on the site. Development of each well will follow consisting of pumping with a small submersible pump until the water is clear.

5.2 Sampling and Analysis Plan

Following the acceptance of the proposed monitor well locations, (and prior to the acceptance of waste) background evaluation at each well location will be performed. The parameters for the background evaluation and the first semi-annual monitoring event shall be the Florida Primary and Secondary Drinking Water parameters, and those listed in Appendix I and II of 40 CFR part 258.

All related field and laboratory activities will be performed by ENCO Laboratories of Orlando, who have an FDEP approved CompQAP. ENCO's approved CompQAP outlines both their field and laboratory parameters, as well as specific procedures. Monitor well sampling following the baseline will occur semi-annually. Refer to Exhibit G for a copy of their qualifications. At least ten days prior to the next sampling event, both Orange County and FDEP will be notified. At that time, the sampling team will be prepared to submit a split sample/samples if requested. In addition, keys for all monitor well will be stored on site and made available to monitoring agencies during normal business hours (even without prior notice).

5.2.1 Implementation

Upon approval of the location and sampling plans discussed above, all wells will be installed and sampled. Well completion logs as well as surveys for each well will be submitted to the county within thirty days of installation.

6.0 Stormwater Management

6.1 Introduction

The 50 acre expansion site is currently permitted by both Orange County and the FDEP as a borrow pit operation (Orange County Permit No. 01-E2-258 & FDEP Permit No.ERP48-0187635-001-EI).

The current ERP permit covers the surface water management of the 50 acre site through the active life of the borrow pit. The ERP Permit will be modified to include the conversion of the borrow pit to a high rise landfill, which will include connecting the original Buttrey Development Two landfill.

6.2 Development Basin Discussion

For the purpose of this application, the proposed expansion site (designed as a high rise) can divided into two multiple sub basins. These basins are identified are identified on Sheet 5 of 7. Five stormwater ponds (P-1 through P-5) are also shown on Sheet 5 which are designed to manage the surface water related to the construction of the landfill expansion. In addition Pond P-5 will receive runoff associated with the original Buttrey Development Two landfill that was designated earlier to two infiltration galleries. As a result of pond P-5, the two infiltration galleries are being eliminated from the stormwater system design.

Prior to landfilling above the existing grades, temporary storage areas within the open excavation will divert water away from the active working face. A perimeter berm around the open excavation will prevent surface runoff from entering the excavation. As a result, the only water able to enter the open excavation would be from normal rain fall events. Cell 4 of the original landfill site was designated as the internal storage area for runoff within the landfill footprint. Cell 4 will also serve as the internal storage area for the expansion cells 5 through 8.

The proposed expansion site does not lie within any boundaries of the 100 year floodplain as delineated by the Federal Emergency Management Agency. Exhibit H contains a copy of the relative FIRM panel. Figure 8 depicts the site location on the corresponding U.S.G.S. topographic map.

6.3 Stormwater Management

The original landfill site as well as the expansion parcel was evaluated considering the 100 year, 24 hour storm event using a 10.60 inch rainfall depth. (ADVANCED INTERCONNECTED CHANNEL & POND ROUTING (ICPR VER 2.11)). This approach uses the Soil Conservation Service (SCS) Unit Hydrograph Method to compute runoff hydrographs for small watersheds. Rainfall excess is computed using the SCS curve number and infiltration formulas outlined in Urban Hydrology for Small Watersheds, Technical Release 55. Rainfall excess is then applied based on the basin characteristics and hydrograph shape factor to obtain runoff throughout the entire storm duration.

The results of the ICPR modeling will be submitted to the FDEP under separate cover as part of the ERP Surface Water application.

6.4 Design Notes

The expansion site generally ranges in altitude from approximately 110 feet at its highest point to approximately 81 feet at its lowest point, with the landfill footprint falling within (averaging) the 100 foot elevation. Refer to Exhibit I for a copy of the most recent topographic/boundary survey taken prior to any borrow activity.

The proposed stormwater management system consists primarily of five retention basins designed to collect runoff from the covered combined landfill areas through a system of inlets, piping, chutes and swales. The project as designed provides total onsite storage and percolation of the design storm runoff. These five ponds, designed to accommodate the 100 year 24 hr storm event, eliminate the need for the two infiltration galleries permitted during the Buttrey Development Two phase.

The typical swale ditches were developed as a dry conveyance system, with 5 foot wide bottoms and 3 to 1 side slopes. The depths of these conveyance channels may vary depending on calculated flows. All five retention basins are designed as dry ponds with 5 to 1 side slopes. In each basin, the seasonal high groundwater table elevation is well below the pond bottom.

Construction Plan Detail Sheets 6, & 7 contain the various aspects of the drainage design features. In addition, flow and routing directions within each basin are also indicated.

6.5 Soil Design

SCS Type soils: For the purpose of these calculations, curve numbers (CN) of 49 and 90 were used for the pre & post development conditions of the site, considering soil types A and C/D respectively. Figure 9 presents the Orange County Soil Survey Map for the site and surrounding areas. The "virgin" site consists of Hydrologic Soil Group A (Candler Fine Sand). Once the site is land filled, the land filled areas would then be classified as Hydrologic Soil Group C/D (Arents).

Based on the findings reported of the hydrogeologic survey (discussed above), a surficial aquifer elevation of approximately 48 - 50 feet can be established. This elevation is considered to be below normal for the season. Also referenced and discussed above were other details of the hydrogeologic survey, which contains all of laboratory tests to date. These tests include horizontal and vertical permeability along with field tested hydraulic conductivities.

The system is designed for the 100 year, 24 hour storm event, using a 10.60 inch rainfall depth. Runoff will be routed to the surrounding dry bottom ponds where water will be allowed to percolate naturally into the surficial aquifer without any mounding or other effects to the site water table.

6.6 Post Development Conditions

This data is part of the Environmental Resource Permit (ERP) and will be supplied under separate cover as part of the ERP modification.

6.7 Pond Recovery

The computer program "PONDS" version 2.25 was utilized to demonstrate the ability of the ponds to recover from storage of runoff in reasonable time frames. The recovery analysis also considered the 100 year 24 hour storm event (10.60 inch). Due to the comfortable separation between the pond bottoms and the seasonal high groundwater table, groundwater mounding is not expected, or considered in the program run. This data will also be supplied under separate cover as part of the ERP submittal.

7.0 Reclamation & Closure Plan

7.1 Objective

The Keene Road Disposal Class III Landfill including the expansion will be closed in accordance with Chapter 62-701, FAC. and all Orange County Solid Waste regulations. The final cover system proposed is designed to prevent infiltration of stormwater into the waste, and to provide positive drainage of stormwater off of the landfill mound. In addition, design elements are expected to minimize erosion of the cover soil, and provide long term low maintenance performance.

7.2 Closure

In accordance with Orange county code, closure will be complete within 180 days of filling a cell to final grades. Cover material will be placed as follows: A weekly cover consisting of a 6 inch layer of clean fill material shall be applied to active filling areas. An intermediate cover consisting of 1 foot of clean fill material shall be applied within 7 days of placing waste in areas which will not receive additional waste for 180 days. The final cover shall be installed within 180 days after waste has been placed to final grades within each cell. Closure will occur in phases on a cell by cell basis. Based on available volume and expected disposal rates, the projected life of the proposed landfill expansion adds 8 additional years to the life of this site. The combined site is expected to have a life of 15 years. Refer to Sheet 4 of 7 of the construction plans for the cell layout and volume calculations.

As determined during the Orange County approval, following closure, this site may become a Orange County Park. The decision to turn this into a park site is subject to the acceptance by the B.O.C.C. at that future time. If this is the case, the Department will be notified of the future use or activity.

7.3 Closure Design

The landfill is proposed to have side slopes of 3(horizontal) : 1(vertical). The top of the landfill will be graded at approximately 2-3 % to direct runoff towards the swale design. The final design height will reach elevation 160' N.G.V.D. This is based on an average site elevation of 100'. The nearly level (gently sloping) top of the landfill will cover approximately 21.5 acres. Drainage swales will be constructed on the final cover to collect and divert surface runoff to perimeter swales and down chutes directed towards the stormwater areas. Refer back to the construction plans for complete details and routing design of the drainage system.

7.4 Final Cover Design

The final cover for this facility will consist of the following design: Beginning at the top, a 0.5 foot thick layer of topsoil material will overlay a 1.0 foot thick layer of common fill material, which over lays a 1.5 foot thick clay unit (barrier layer). Refer to the construction plans (detail sheets) for various cross sections of this design.

The 0.5 foot topsoil layer will be vegetated by seeding and mulching with Argentine Bahia grass. This type of drought tolerant grass is known to help minimize erosion. These seeded areas shall be watered to promote optimum growth using water from site water trucks. The underlying 1.0 of fill will be compacted during construction/placement to inhibit any root penetration down into the underlying clay barrier layer. The onsite sandy clays will serve as a cap, used as a final cover. The clays used will have a maximum permeability of 1.0×10^{-5} cm/sec. Soils are proposed to come from onsite sources and have been laboratory test by Universal Engineering Sciences, Inc. Refer to the Universal Soils Reports found in Exhibit C for specific details of the onsite soils including laboratory testing done to date. Figure 3 presents the soil boring locations and cross sections which locates the clays proposed for use.

7.5 Final Cover Stability

Refer back to the Universal Engineering Sciences, Inc., Slope Stability Report found in Exhibit E, for details which evaluate the slope stability of the final cover system.

7.6 Final Cover Drainage System

Drainage swales will be incorporated in the final cover system to route and intercept surface water runoff. These swales along with a system of down chutes and drop inlets will convey the surface water runoff to adjacent dry detention areas. Refer to the construction plans which provide details of the proposed surface water routing for the proposed system.

7.7 Landscape Plan

During the Orange county "Special Use Zoning" approval of this project, a landscape plan along McQueen Road was approved. A 50' minimum dense vegetative buffer will remain along McQueen Road at all times. All areas outside of the landfill facilities/features will remain undisturbed as much as practicable. As a result, the landscape plan proposed for this site will exceed the minimum standards required by Chapter 32 of Orange County Code. Landscape details are found on Plan Sheet 6 of 7.

7.8 Closure and Long Term Care Cost

As required, a cost estimate for closure and long term care is being prepared by Chris Kohl Training and Consulting Services. Mr Kohl will also prepare a similar estimate for Orange County on this project. This cost estimate will follow under separate cover, as submitted by Mr. Kohl. Once these costs are reviewed and deemed complete and acceptable to the FDEP, a surety guaranteeing performance will be forthcoming.

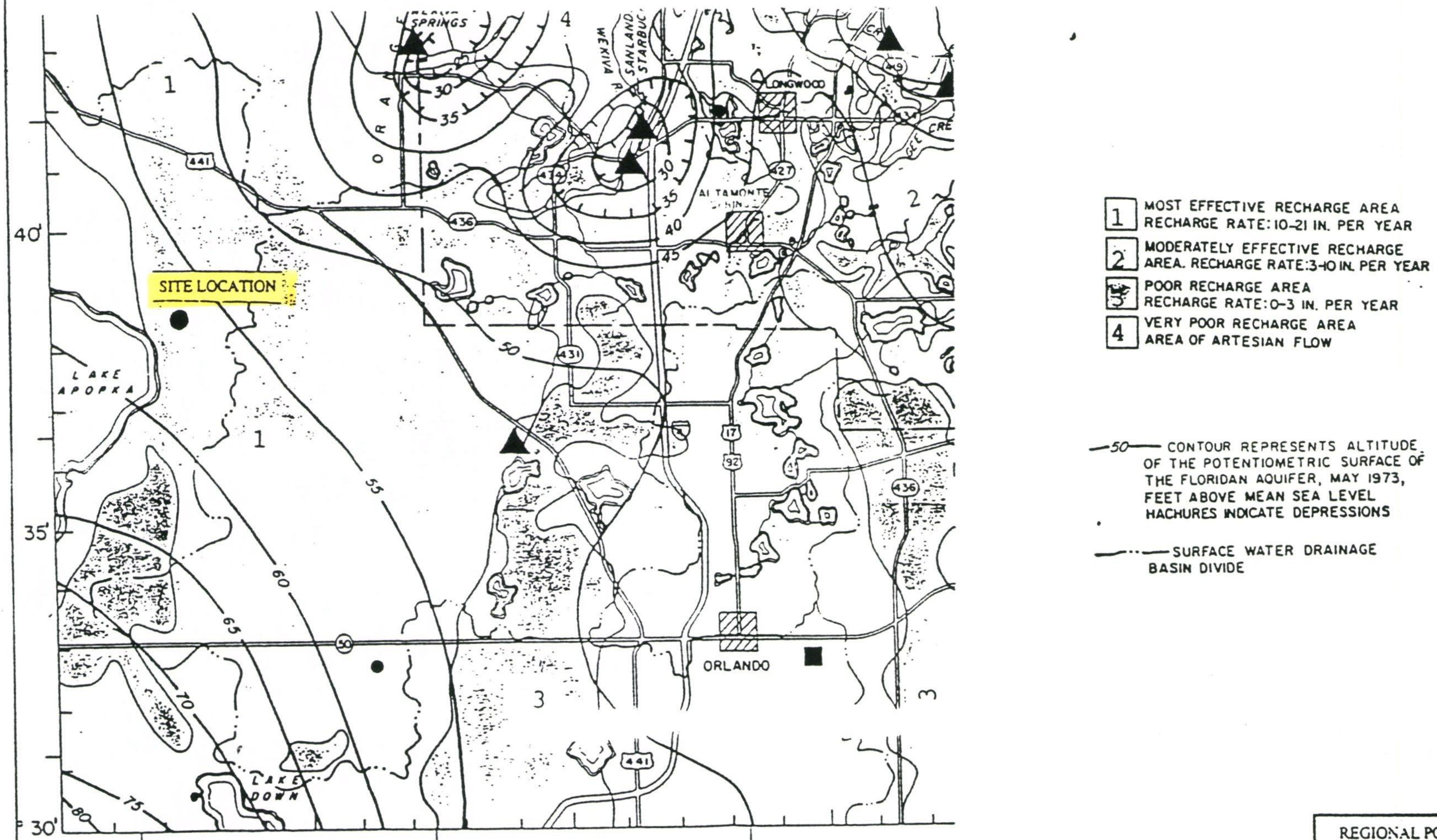
As required, at least one year prior to the projected closure date at which time wastes will no longer be accepted, written notices will be provided to Orange county as well as to the FDEP. At least 120 days prior to the projected closing date, the operator shall advise all known users of the upcoming closing of the facility. In addition, signs will be posted at this time and remain post throughout the closing period. Prior to closing and no less than 90 days prior to the scheduled closing day, a revised/updated closure plan/application will be submitted to both Orange county and FDEP. Finally, within 10 days prior to the actual closing date, a legal notice shall be published in the legal advertising section of a newspaper of general circulation in Orange county.

Long term care for this facility will include maintaining the landscaping, security features (fencing), and erosion control devises for a period conditioned and required by the county and FDEP. A approved groundwater monitoring plan and reporting schedule will also remain in force for the length of time conditioned by both entities (thirty years).

A final survey report will be prepared and submitted to verify that final contours and elevations of the facility are in accordance with the plans as approved in the permit. In addition, certification of closure construction completion, signed, dated and sealed by a professional engineer shall be provided to the Department.

7.9 Long Term Maintenance

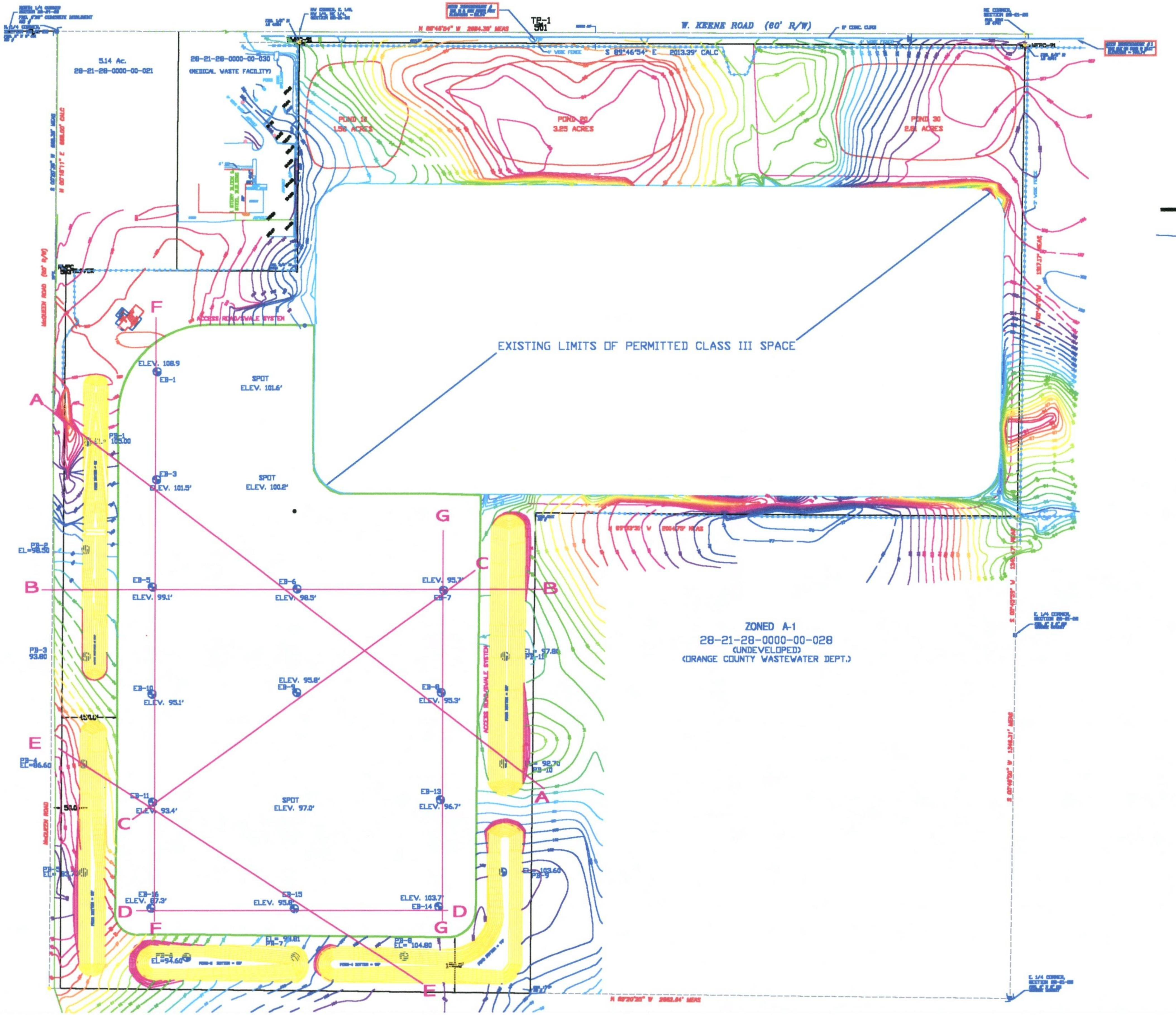
Regular maintenance of all reclaimed areas shall be performed by the operator or a designated agent in order to assure that the reclamation standards are achieved and the approved reclamation plan is accomplished. The maintenance shall include monitoring and replacement of any planted areas that fail to survive in accordance with county standards. The monitoring time period shall be no less than the current regulations required and will be conditioned to the permit as well as directly related to the surety for long term care. Non-native species may be required to be removed during this period. In addition, general maintenance of the required slopes, embankment, ponds, fences, signs or any other site feature deemed necessary will be performed.



1975. Recharge Areas of the Floridan Aquifer in Seminole County and Vicinity, Florida. Map Series No. 68

REGIONAL POTENTIOMETRIC SURFACE MAP OF THE FLORIDAN AQUIFER SYSTEM
KEENE ROAD RECYCLING AND DISPOSAL FACILITY

FIGURE 1



FLOOD ZONE C
(AREA OF MINIMAL FLOODING)
PER FEMA "FIRM" MAP
PANEL NO. 120179 0100 B
12/1/81

BISHOP &
BUTTREY,
INC.

NOT VALID WITHOUT RAISED SEAL

LEGEND

▬	PROPERTY LINE
— 90 —	EXISTING TOPO LINE
	SPOT ELEVATION
◐	SOIL BORING

BUTTREY DEVELOPMENT THREE, L.L.C.
KEENE ROAD DISPOSAL CLASS III LANDFILL EXPANSION

JOB NO.	
DATE	
SCALE	
DRAWN BY	EC
CHKD BY	EC

REVISIONS

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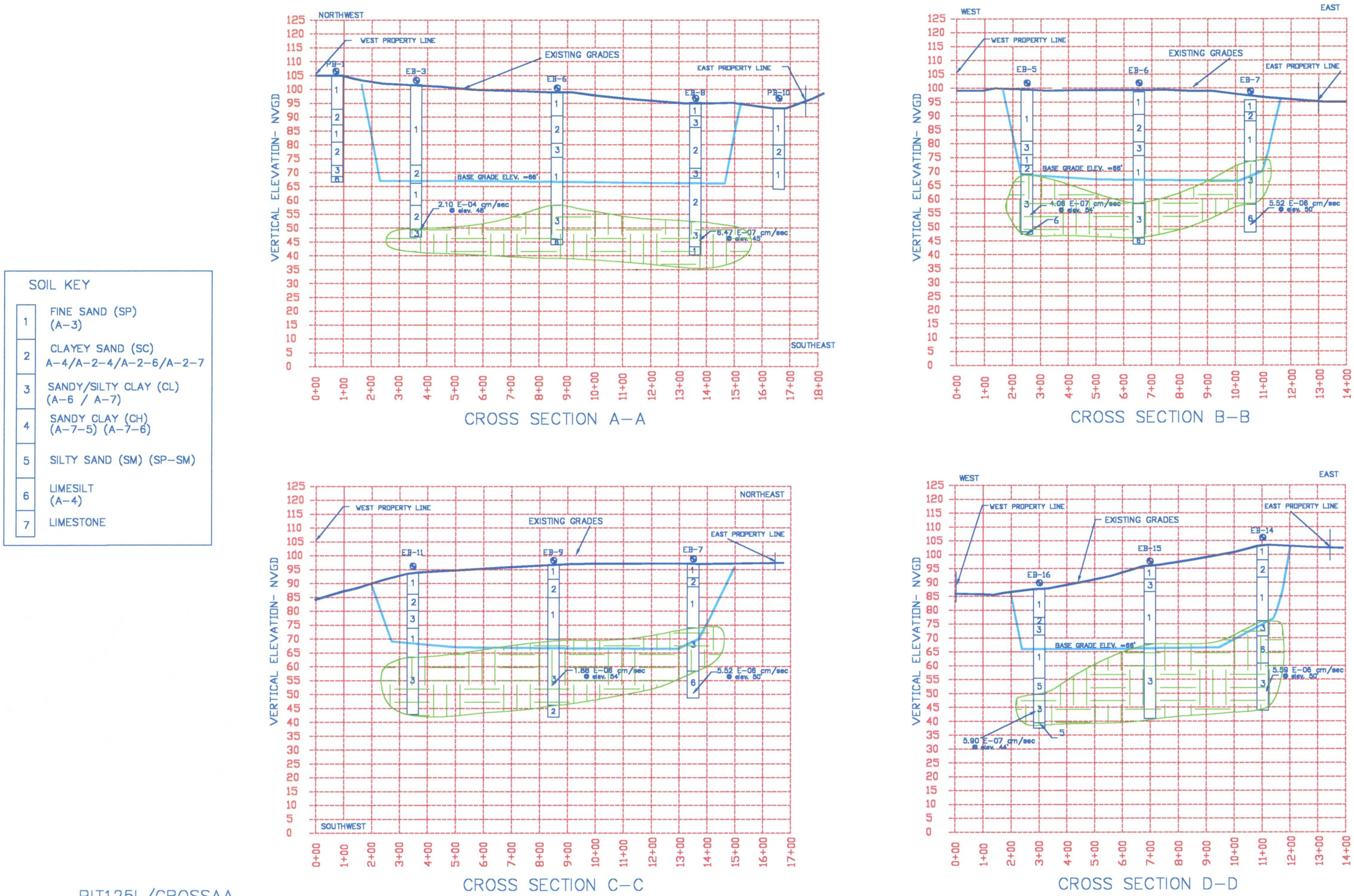
DRAWING DESCRIPTION

SOIL BORING
LOCATION MAP

DRAWING NO.
FIGURE 2

Scale 1" = 300'



	SOIL KEY
1	FINE SAND (SP) (A-3)
2	CLAYEY SAND (SC) A-4/A-2-4/A-2-6/A-2-7
3	SANDY/SILTY CLAY (CL) (A-6 / A-7)
4	SANDY CLAY (CH) (A-7-5) (A-7-6)
5	SILTY SAND (SM) (SP-SM)
6	LIMESILT (A-4)
7	LIMESTONE

CROSS SECTION A-A

CROSS SECTION B-B

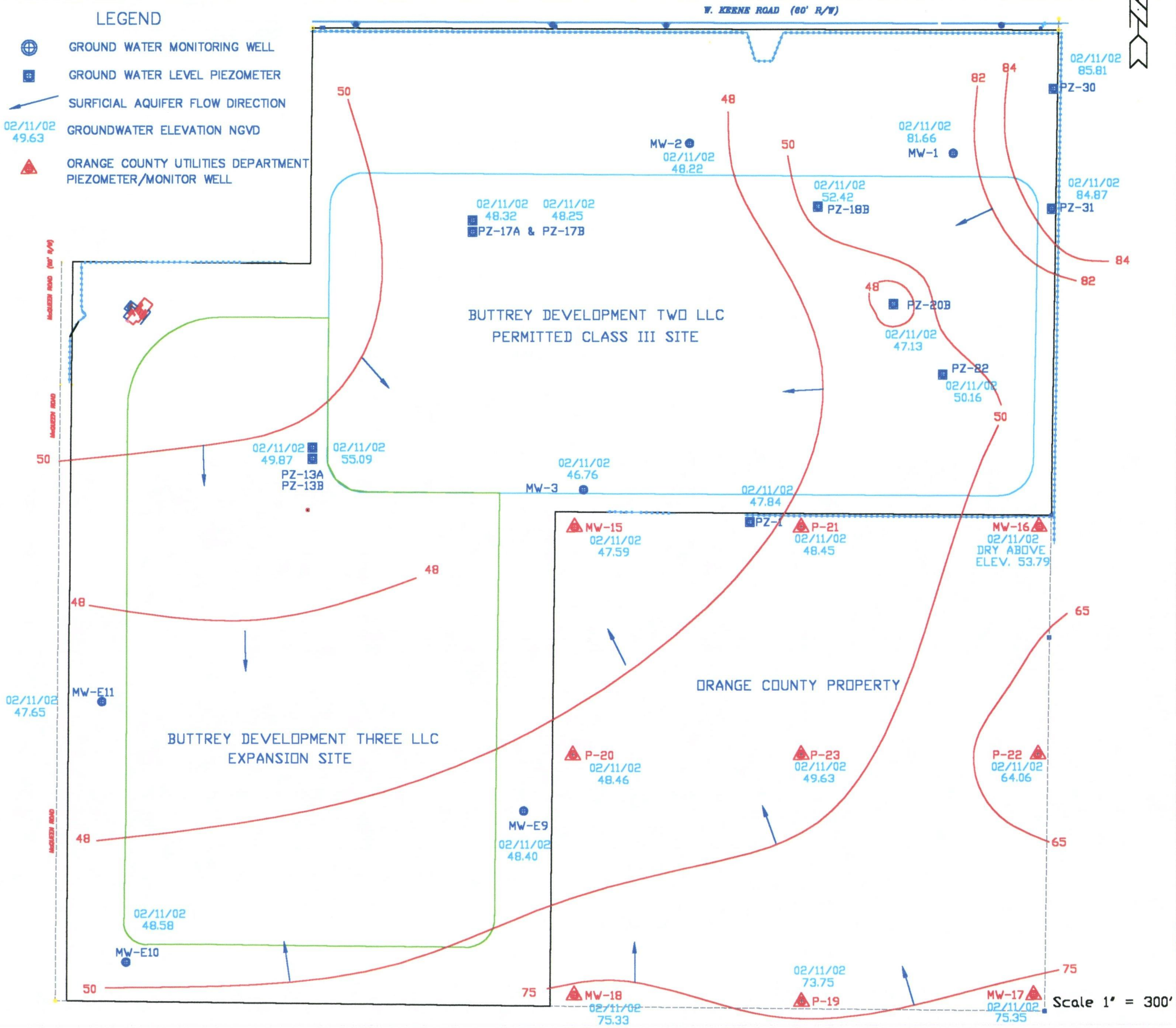
CROSS SECTION C-C

CROSS SECTION D-D

PIT125L/CROSSAA

FIGURE 3A

NOTE: DATA ON THE ORANGE COUNTY UTILITIES PROPERTY COLLECTED ON 02/11/02
BY OCUD CONSULTANT PB WATER & BISHOP & BUTTREY INC. REPRESENTATIVES



Scale 1" = 300'

BISHOP & BUTTREY, INC.

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BUTTREY DEVELOPMENT THREE, L.L.C.
KEENE ROAD DISPOSAL CLASS III LANDFILL EXPANSION

JOB NO.
DATE APRIL 2002
SCALE
DRAWN BY EC
CHKD BY EC

REVISIONS
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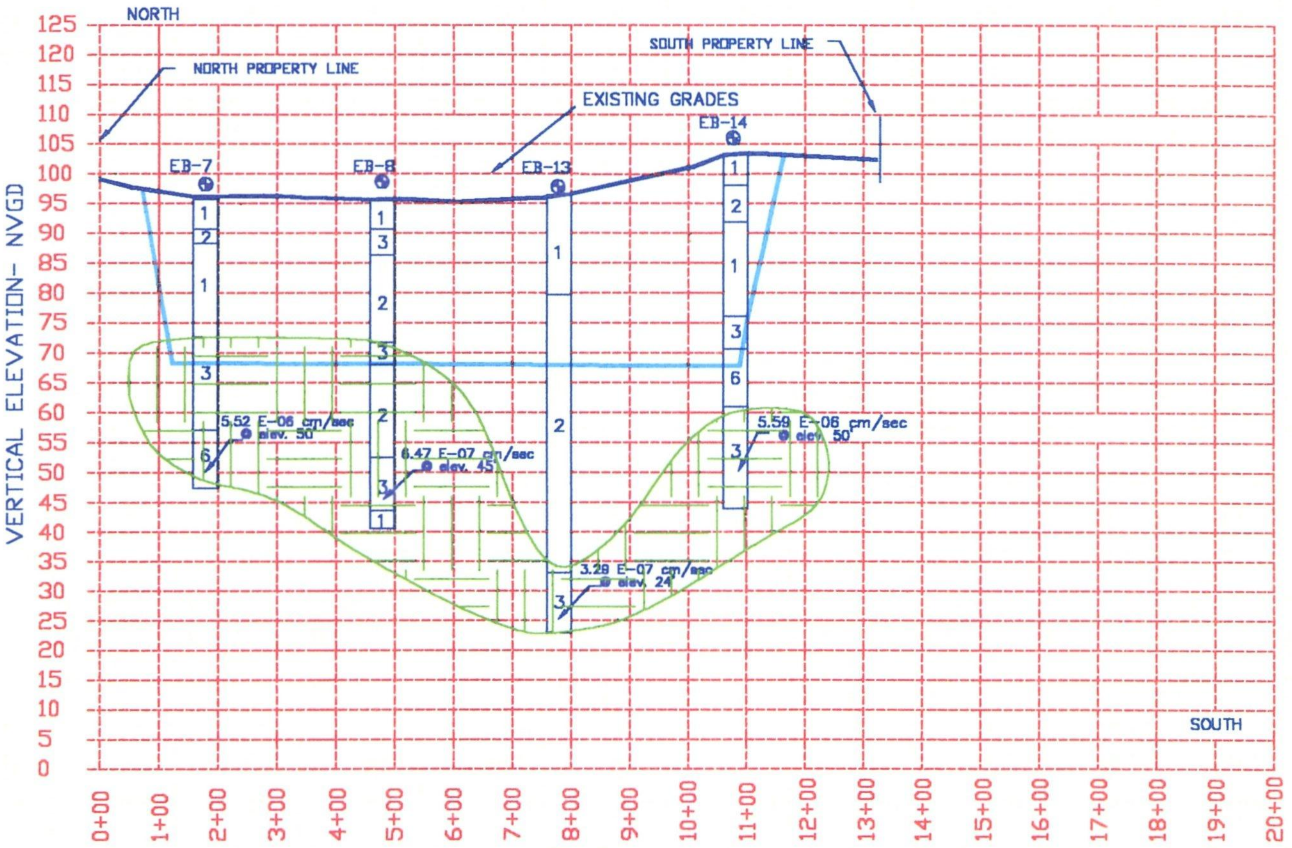
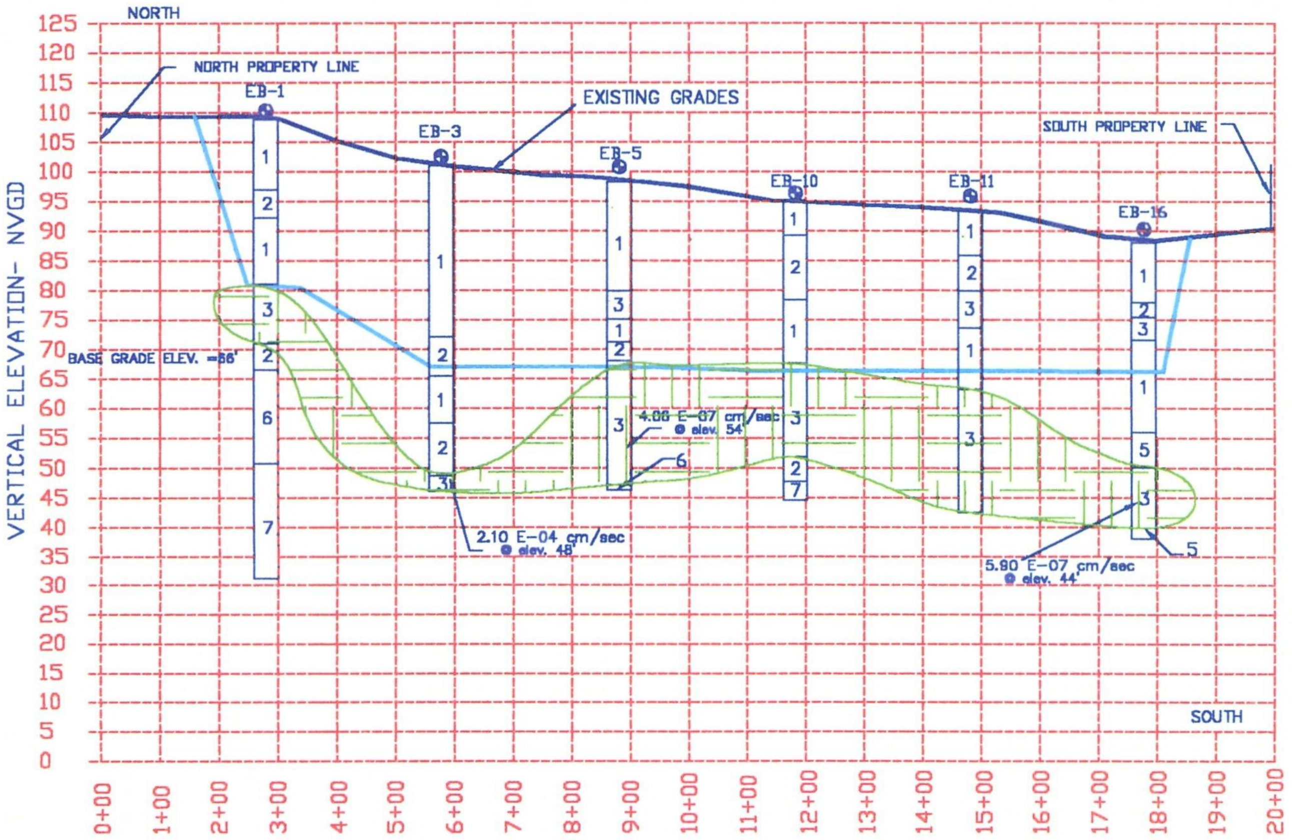
C:\DESIGN\PIT125L\GV-FLOW
DRAWING DESCRIPTION
GROUNDWATER FLOW
DIRECTION MAP
FEBRUARY 2002
DRAWING NO.
FIGURE 4



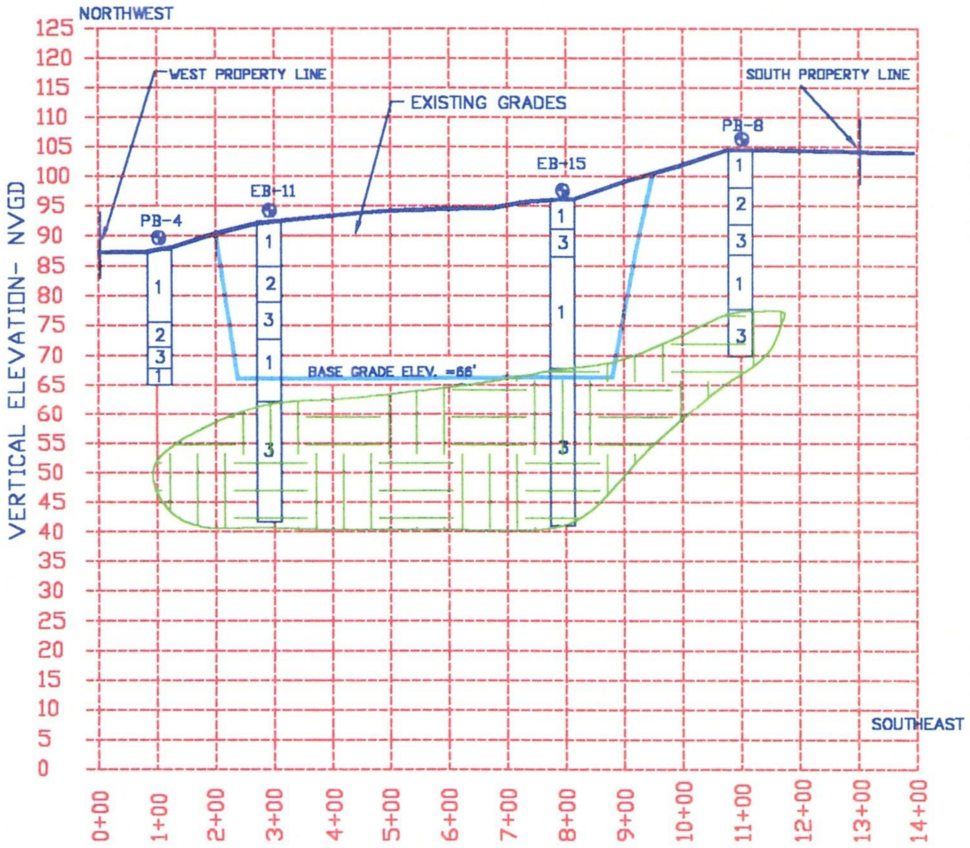
CROSS SECTION G–G



CROSS SECTION F–F

SOIL KEY

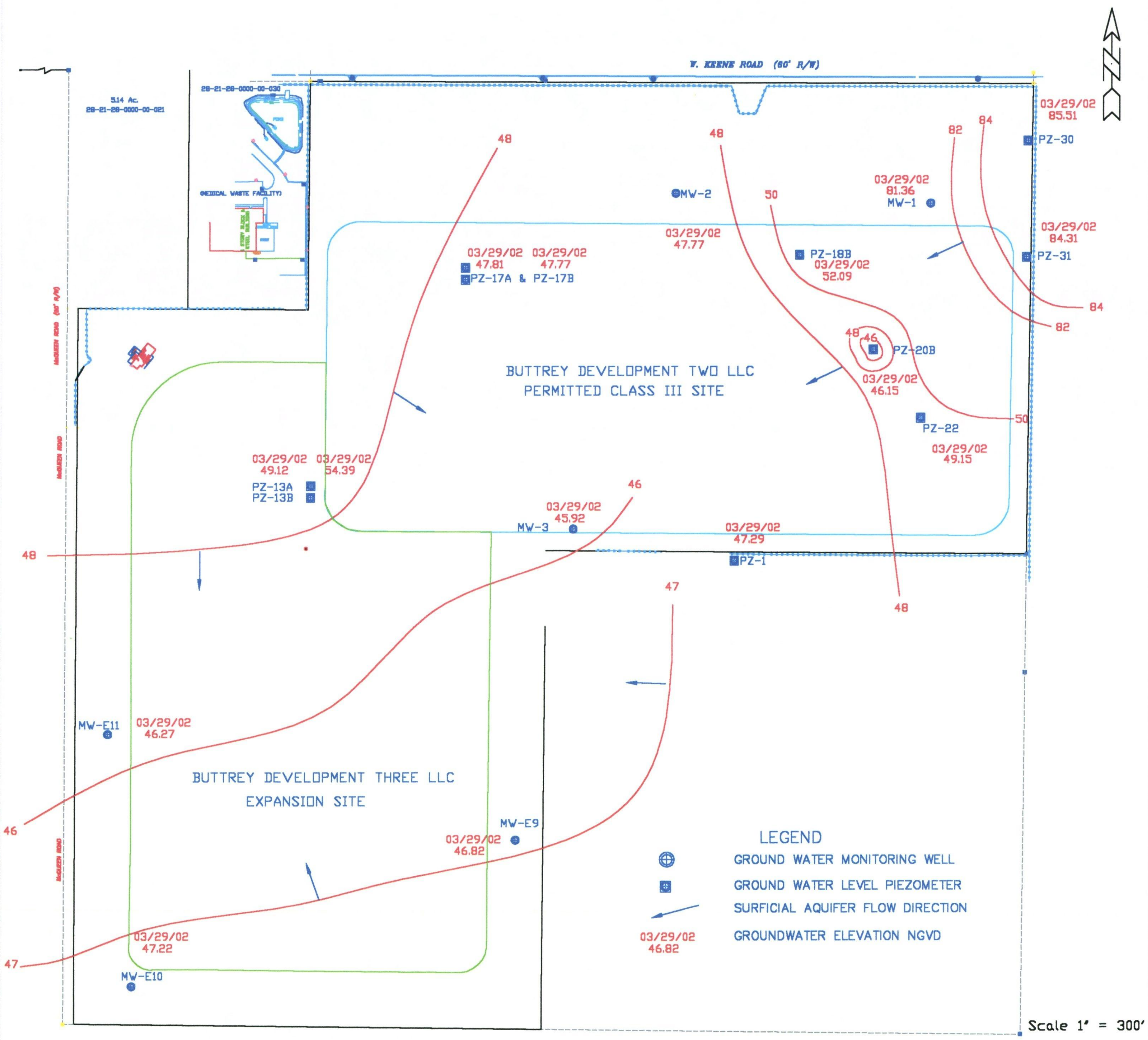
1	FINE SAND (SP) (A–3)
2	CLAYEY SAND (SC) A–4/A–2–4/A–2–6/A–2–7
3	SANDY/SILTY CLAY (CL) (A–6 / A–7)
4	SANDY CLAY (CH) (A–7–5) (A–7–6)
5	SILTY SAND (SM) (SP–SM)
6	LIMESILT (A–4)
7	LIMESTONE



CROSS SECTION E–E

PIT125L/CROSSAA

FIGURE 3B



BISHOP & BUTTREY, INC.

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BUTTREY DEVELOPMENT THREE, L.L.C.
KEENE ROAD DISPOSAL CLASS III LANDFILL EXPANSION

JOB NO.
DATE APRIL 2002
SCALE
DRAWN BY EC
CHKD BY EC

REVISIONS
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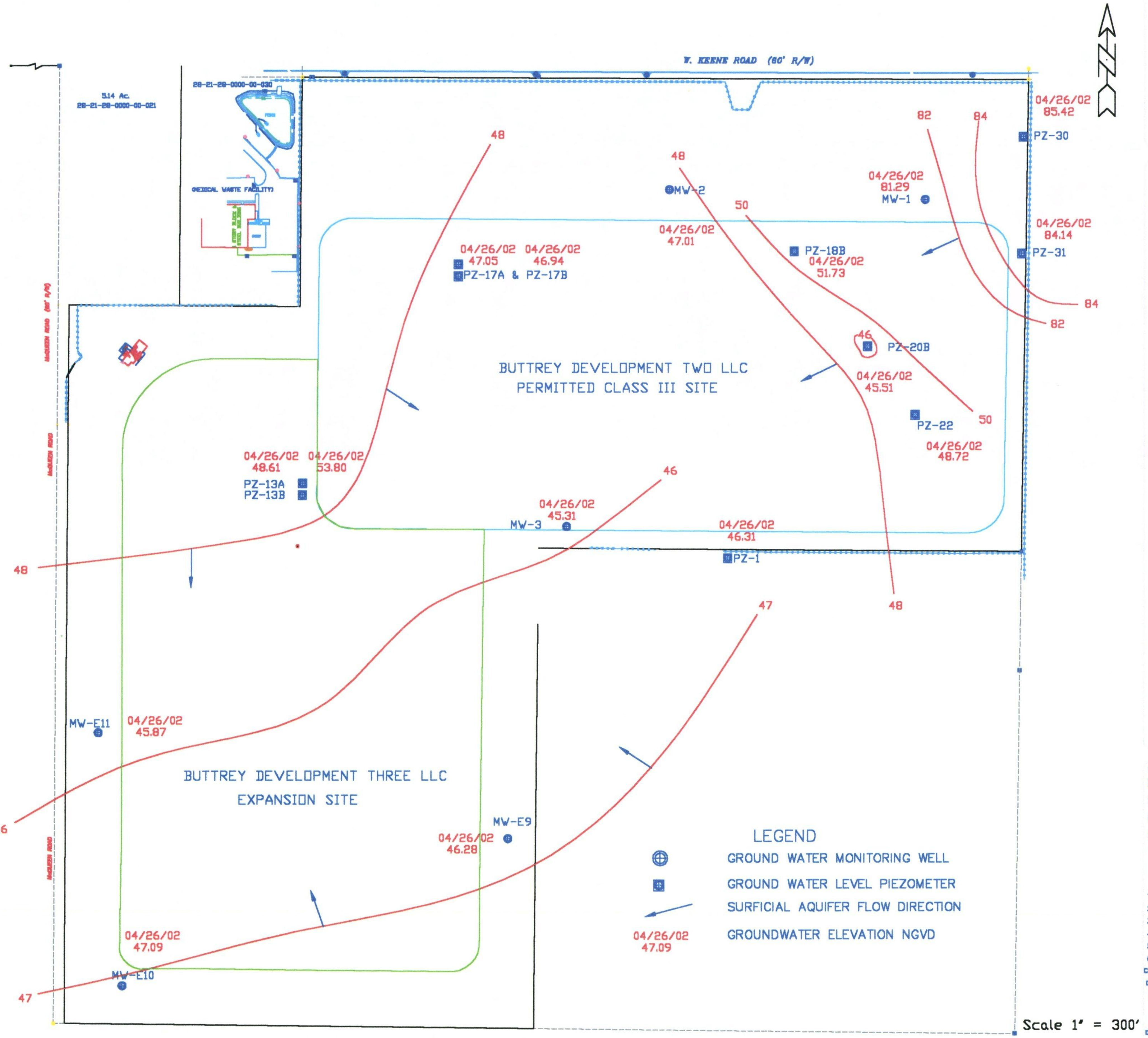
DRAWING DESCRIPTION
GROUNDWATER FLOW
DIRECTION MAP
MARCH 2002

DRAWING NO.
FIGURE 5



BISHOP &
BUTTREY,
INC.

NOT VALID WITHOUT RAISED SEAL

BUTTREY DEVELOPMENT THREE, L.L.C.
KEENE ROAD DISPOSAL CLASS III LANDFILL EXPANSION

JOB NO.
DATE APRIL 2002
SCALE
DRAWN BY EC
CHKD BY EC

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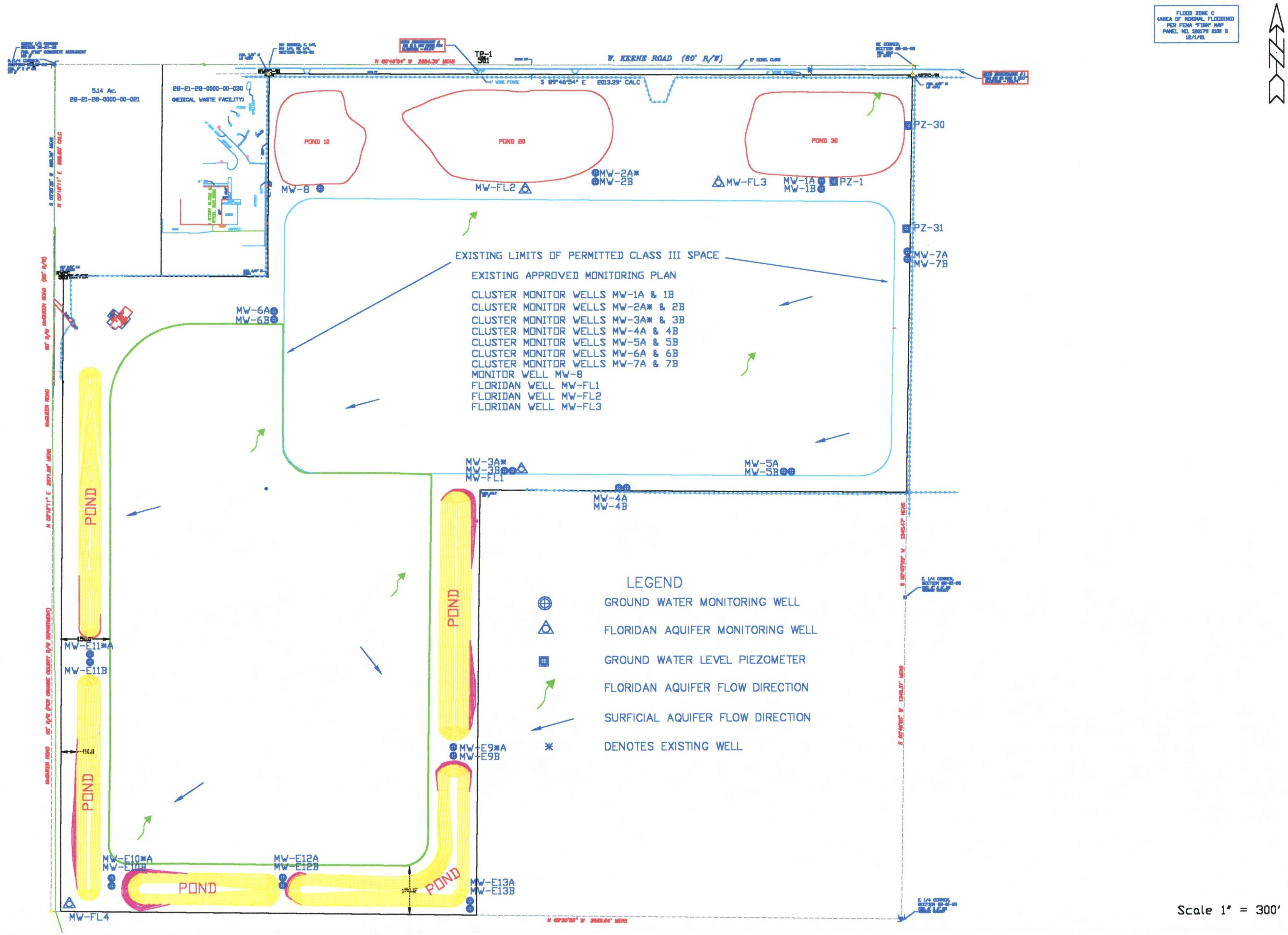
DRAWING DESCRIPTION
GROUNDWATER FLOW
DIRECTION MAP
APRIL 2002

DRAWING NO.
FIGURE 6



BISHOP &
BUTTREY,
INC.

NOT VALID WITHOUT RAISED SEAL

BUTTREY DEVELOPMENT THREE, L.L.C.
KEENE ROAD DISPOSAL CLASS III LANDFILL EXPANSION

JOB NO.
DATE
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DRAWN BY EC
CHKD BY EC

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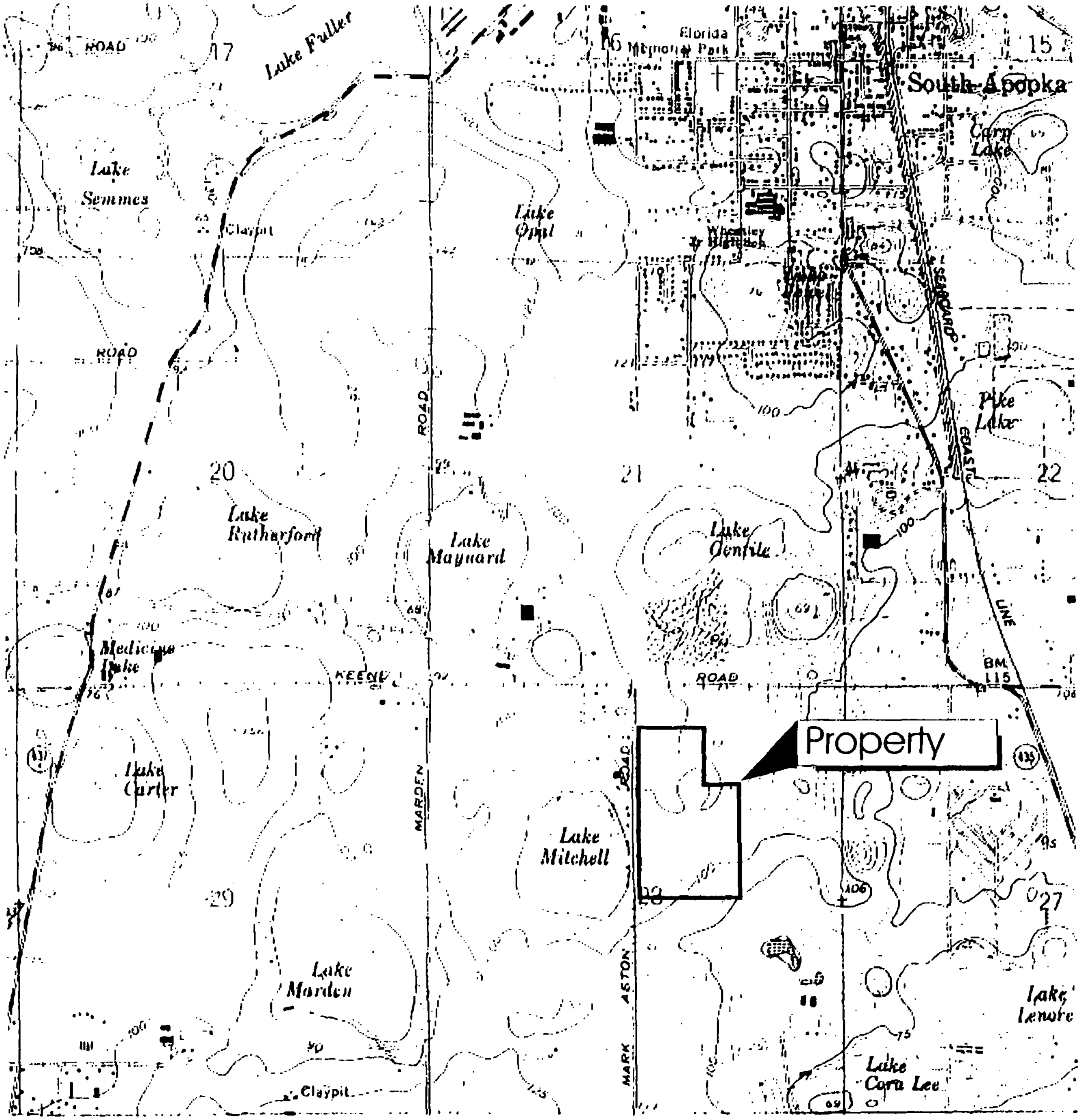
DRAWING DESCRIPTION
MONITOR WELL
LOCATION MAP

DRAWING NO.
FIGURE 7



Source: U.S.G.S. Topographical Survey, Apopka, FL., Quadrangle. (1980)
Scale: 1"=2000'
Section 28, Township 21 South, Range 28 East

Location/Topographic Map

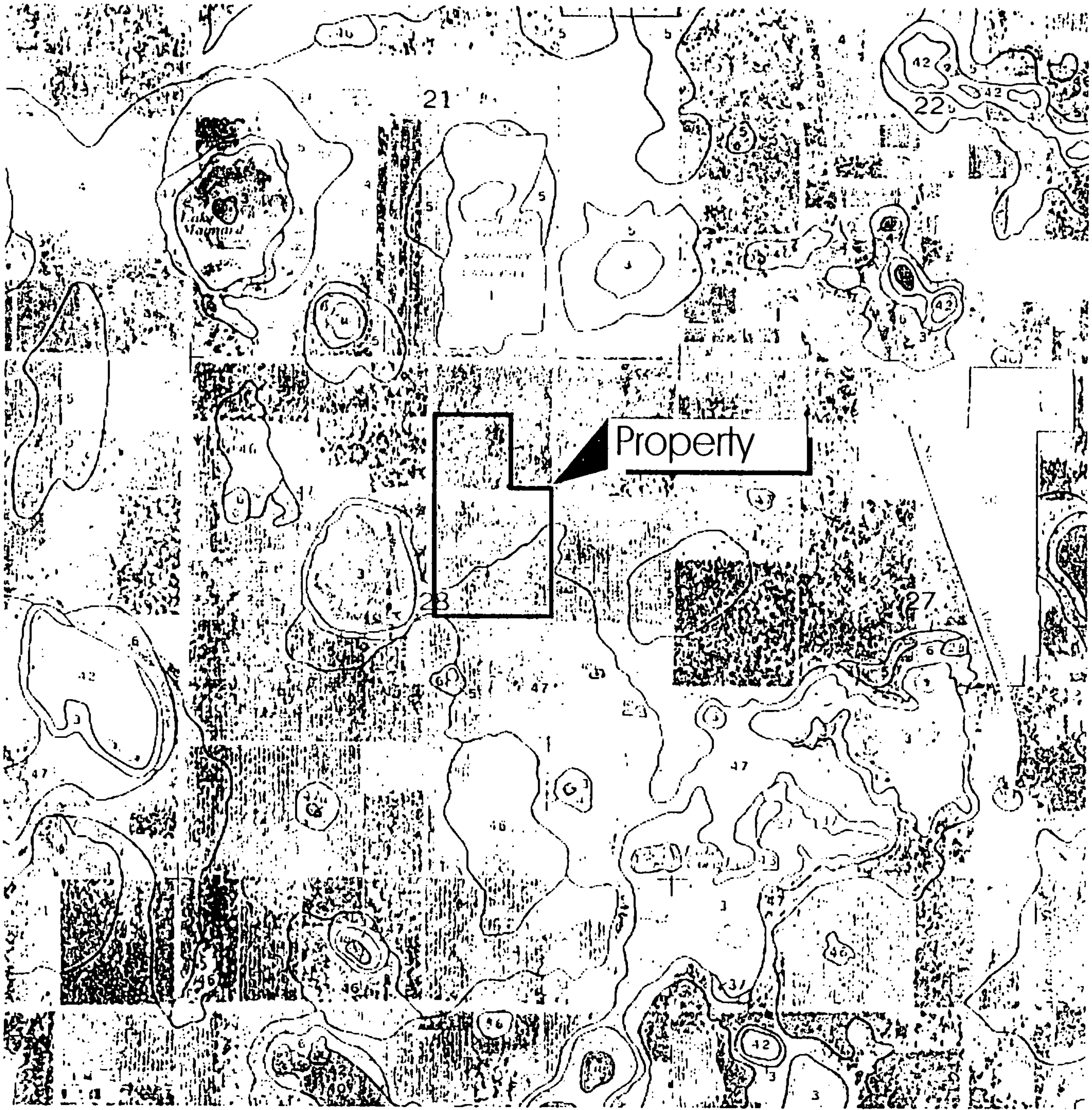
ENVIRONMENTAL SERVICES, INC.

Keene Road
#125
Orange County, Florida

Project No. EC01030

Date May 2002

Figure 8



Source: U.S.D.A. Soil Survey of Orange County, FL. (1989) Page 14.
Scale: 1"=1667'

Soil Legend:
- 4 - Candler fine sand, 0 to 5% slopes
- 47 - Tavares-Millhopper fine sands, 0 to 5% slopes

Soils Map

ENVIRONMENTAL SERVICES, INC.

Keene Road
#125
Orange County, Florida

Project No. EC01030

Date May 2002

Figure 9

TABLES

TABLE 1

WELL INVENTORY DATA**

Location No.	Owner	Dia. (in.)	Total Depth (ft.)	Use
2	Stanley Jacobson	4	NR	Irrigation
2	Stanley Jacobson	6	NR	Irrigation
3	Natural Beauty of Florida	8	100+	Irrigation
5	Yogi Bear Campground - Sun Resorts, Inc.	10	NR	Public
5	Yogi Bear Campground - Sun Resorts, Inc.	8	NR	Public
8	Nelson and Sons Nursery	8	NR	Irrigation
14	Dewar Nurseries	6	140	Irrigation
14	Dewar Nurseries	6	140	Irrigation
20	Hilltop Floral, Inc.	10	500	Irrigation
21	Hilltop Floral, Inc.	10	500	Irrigation
21	Hilltop Floral, Inc.	12	550	Irrigation
22	Orange Co. Public Utilities - Orange Village Water Treatment Plant	10	NR	Public
26	O.F. Nelson and Sons, Inc.	6	NR	Irrigation
26	O.F. Nelson and Sons, Inc.	12	420	Irrigation
26	O.F. Nelson and Sons, Inc.	12	420	Irrigation
27	O.F. Nelson and Sons, Inc.	4	150+	Potable
27	O.F. Nelson and Sons, Inc.	4	NR	Potable
30 ***	A. Duda and Sons	6	NR	Irrigation
30 ***	A. Duda and Sons	6	NR	Irrigation
42 ***	Herman Engelman Greenhouses	6	NR	Irrigation
42 ***	Herman Engelman Greenhouses	6	NR	Irrigation
42 ***	Herman Engelman Greenhouses	8	NR	Irrigation
80	Coca Cola	10	480	Irrigation
80	Coca Cola	8	512	Irrigation
80	Coca Cola	8	668	Irrigation
80	Coca Cola	8	664	Irrigation
17 21S 28E*	Emma Kazaros	4	406	Private
21 21S 28E*	Mamie Rencher Renner	8	430	Irrigation
21 21S 28E*	Alfred Barlow	NR	117	Private
22 21S 28E*	Baptist Churchsonship	4	175	Industrial
27 21S 28E*	Edgar Reffitt	4	120	Private
27 21S 28E*	Orange Primative Baptist Church	4	150	Public
27 21S 28E*	Apopka Infant/Toddler Center	4	175	Industrial
28 21S 28E*	Daisey Senior	4	130	Private
29 21S 28E*	Joe L. McNatt	4	105	Private

* Exact location unknown; section, township, range provided.

** Source: Data on file with St. Johns River Water Management District.

NR Not recorded by SJRWMD

\+ Cased depth, total depth unknown.

*** Beyond Radius

TABLE 2

Yearly Rainfall Averages for the City of Orlando

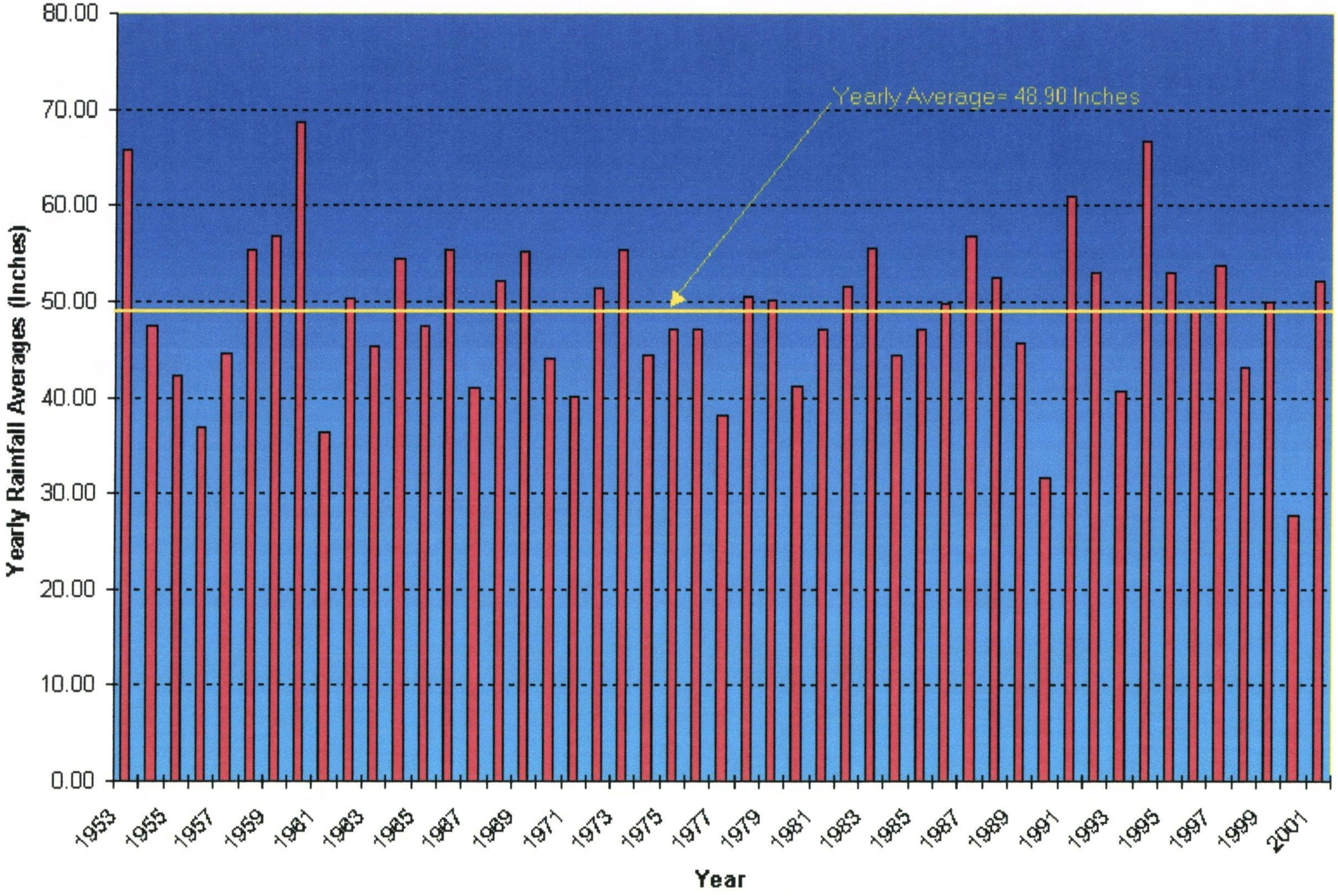


TABLE 3
MONITOR WELL DESIGN

WELL NO.	MW-1A*	MW-2A*	MW-3A*	MW-4A*
DIAMETER	2 - INCH	2 - INCH	2 - INCH	2 - INCH
GROUND ELEV.	106' NGVD	83' NGVD	93' NGVD	79' NGVD
TOTAL DEPTH bls	69 - FEET	40 - FEET	56 - FEET	42 - FEET
CASING LENGTH	49 - FEET	25 - FEET	36 - FEET	22 - FEET
SCREEN LENGTH	20 - FEET	15 - FEET	20 - FEET	20 - FEET
SLOT SIZE	** INCH	.01 INCH	** INCH	**
SCREEN INTERVAL	57' to 37' NGVD	43' to 58' NGVD	57' to 37' NGVD	57' to 37' NGVD
FILTER SAND	***	30/45 SILICA	***	***
FILTER SEAL	3' FINE SAND SEAL	BENTONITE	3' FINE SAND SEAL	3' FINE SAND SEAL

WELL NO.	MW-5A*	MW-6A*	MW-7A*	MW-1B*
DIAMETER	2 - INCH	2 - INCH	2 - INCH	2 - INCH
GROUND ELEV.	76' NGVD	98' NGVD	106' NGVD	106' NGVD
TOTAL DEPTH bls	39 - FEET	61 - FEET	69 - FEET	96 - FEET
CASING LENGTH	19 - FEET	41 - FEET	49 - FEET	86- FEET
SCREEN LENGTH	20 - FEET	20 - FEET	20- FEET	10- FEET
SLOT SIZE	** INCH	** INCH	** INCH	** INCH
SCREEN INTERVAL	57' to 37' NGVD	57' to 37' NGVD	57' to 37' NGVD	20' to 10' NGVD
FILTER SAND	***	***	***	***
FILTER SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL

WELL NO.	MW-2B*	MW-3B*	MW-4B*	MW-5B*
DIAMETER	2 - INCH	2 - INCH	2 - INCH	2 - INCH
GROUND ELEV.	83' NGVD	93' NGVD	79' NGVD	76' NGVD
TOTAL DEPTH bls	73 - FEET	83 - FEET	69 - FEET	66 - FEET
CASING LENGTH	63 - FEET	73 - FEET	59 - FEET	56 - FEET
SCREEN LENGTH	10 - FEET	10 - FEET	10 - FEET	10 - FEET
SLOT SIZE	** INCH	** INCH	** INCH	** INCH
SCREEN INTERVAL	20' to 10' NGVD	20' to 10' NGVD	20' to 10' NGVD	20' to 10' NGVD
FILTER SAND	***	***	***	***
FILTER SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL

Notes: All wells constructed of schedule 40 PVC. All wells protected above the surface with locking 4 x 4 protective metal well casings. * indicates approved monitoring plan well. ** slot size pending laboratory testing. *** filter sand pending laboratory testing. C:\MyFiles\pit125application\MW_TAB.WPD

TABLE 3 (continued)
MONITOR WELL DESIGN

WELL NO.	MW-6B*	MW-7B*	MW-8*	MW-FL1*
DIAMETER	2 - INCH	2 - INCH	2 - INCH	2 - INCH
GROUND ELEV.	98' NGVD	106' NGVD	97' NGVD	80' NGVD
TOTAL DEPTH bls	88 - FEET	96 - FEET	60 - FEET	125 - FEET
CASING LENGTH	78 - FEET	86 - FEET	50 - FEET	115 - FEET
SCREEN LENGTH	10 - FEET	10- FEET	10- FEET	10- FEET
SLOT SIZE	** INCH	** INCH	** INCH	** INCH
SCREEN INTERVAL	20' to 10' NGVD	20' to 10' NGVD	47' to 37' NGVD	-45' to -35' NGVD
FILTER SAND	***	***	***	***
FILTER SEAL	3'FINE SAND SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL

WELL NO.	MW-FL2*	MW-FL3*		
DIAMETER	2 - INCH	2 - INCH		
GROUND ELEV.	84' NGVD	94' NGVD		
TOTAL DEPTH bls	129 - FEET	139 - FEET		
CASING LENGTH	119 - FEET	129 - FEET		
SCREEN LENGTH	10- FEET	10- FEET		
SLOT SIZE	** INCH	** INCH		
SCREEN INTERVAL	-45' to -35' NGVD	-45' to -35' NGVD		
FILTER SAND	***	***		
FILTER SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL		

WELL NO.				
DIAMETER				
GROUND ELEV.				
TOTAL DEPTH bls				
CASING LENGTH				
SCREEN LENGTH				
SLOT SIZE				
SCREEN INTERVAL				
FILTER SAND				
FILTER SEAL				

Notes: All wells constructed of schedule 40 PVC. All wells protected above the surface with locking 4 x 4 protective metal well casings. * indicates approved monitoring plan well. ** slot size pending laboratory testing. *** filter sand pending laboratory testing.

TABLE 3
EXPANSION MONITOR WELL DESIGN

WELL NO.	MW-E9A	MW-E9B	MW-E10A	MW-E10B
DIAMETER	2 - INCH	2 - INCH	2 - INCH	2 - INCH
GROUND ELEV.	96.90' NGVD	96.90' NGVD	87.62' NGVD	87.60' NGVD
TOTAL DEPTH bls	52'- FEET	87 - FEET	48 - FEET	78 - FEET
CASING LENGTH	42 - FEET	77 - FEET	38 - FEET	68' - FEET
SCREEN LENGTH	10 - FEET	10 - FEET	10 - FEET	10' - FEET
SLOT SIZE	0.01 INCH	** INCH	0.01 INCH	** INCH
SCREEN INTERVAL	42' - 52'NGVD	10'-20' NGVD	38' - 48' NGVD	10'-20' NGVD
FILTER SAND	20/30	***	20/30	***
FILTER SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL

WELL NO.	MW-E11A	MW-E11B	MW-E12A	MW-E12B
DIAMETER	2 - INCH	2 - INCH	2 - INCH	2 - INCH
GROUND ELEV.	91.96' NGVD	91.96' NGVD	100' NGVD	100' NGVD
TOTAL DEPTH bls	50 - FEET	82 -FEET	55 - FEET	90 - FEET
CASING LENGTH	40 - FEET	72 - FEET	40 - FEET	80 - FEET
SCREEN LENGTH	10 - FEET	10' -FEET	15 - FEET	10 - FEET
SLOT SIZE	0.01 INCH	** INCH	** INCH	** INCH
SCREEN INTERVAL	42' - 52' NGVD	10'-20' NGVD	45'–60"NGVD	10'-20' NGVD
FILTER SAND	20/30	***	***	***
FILTER SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL

WELL NO.	MW-E13A	MW-E13B	MW-FL4	
DIAMETER	2 - INCH	2 - INCH	2 - INCH	
GROUND ELEV.	101' NGVD	101' NGVD	86' NGVD	
TOTAL DEPTH bls	56 - FEET	91 - FEET	121 - FEET	
CASING LENGTH	41 - FEET	81 - FEET	111 - FEET	
SCREEN LENGTH	15 - FEET	10 - FEET	10 - FEET	
SLOT SIZE	** INCH	** INCH	** INCH	
SCREEN INTERVAL	45'-60' NGVD	10'-20' NGVD	-35 to -45 NGVD	
FILTER SAND	***	***	***	
FILTER SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL	3' FINE SAND SEAL	

Notes: All wells constructed of schedule 40 PVC. All wells protected above the surface with locking 4 x 4 protective metal well casings. * indicates approved monitoring plan well. ** slot size pending laboratory testing. *** filter sand pending laboratory testing. C:\MyFiles\pit125application\MW_TAB.WPD

EXHIBIT A

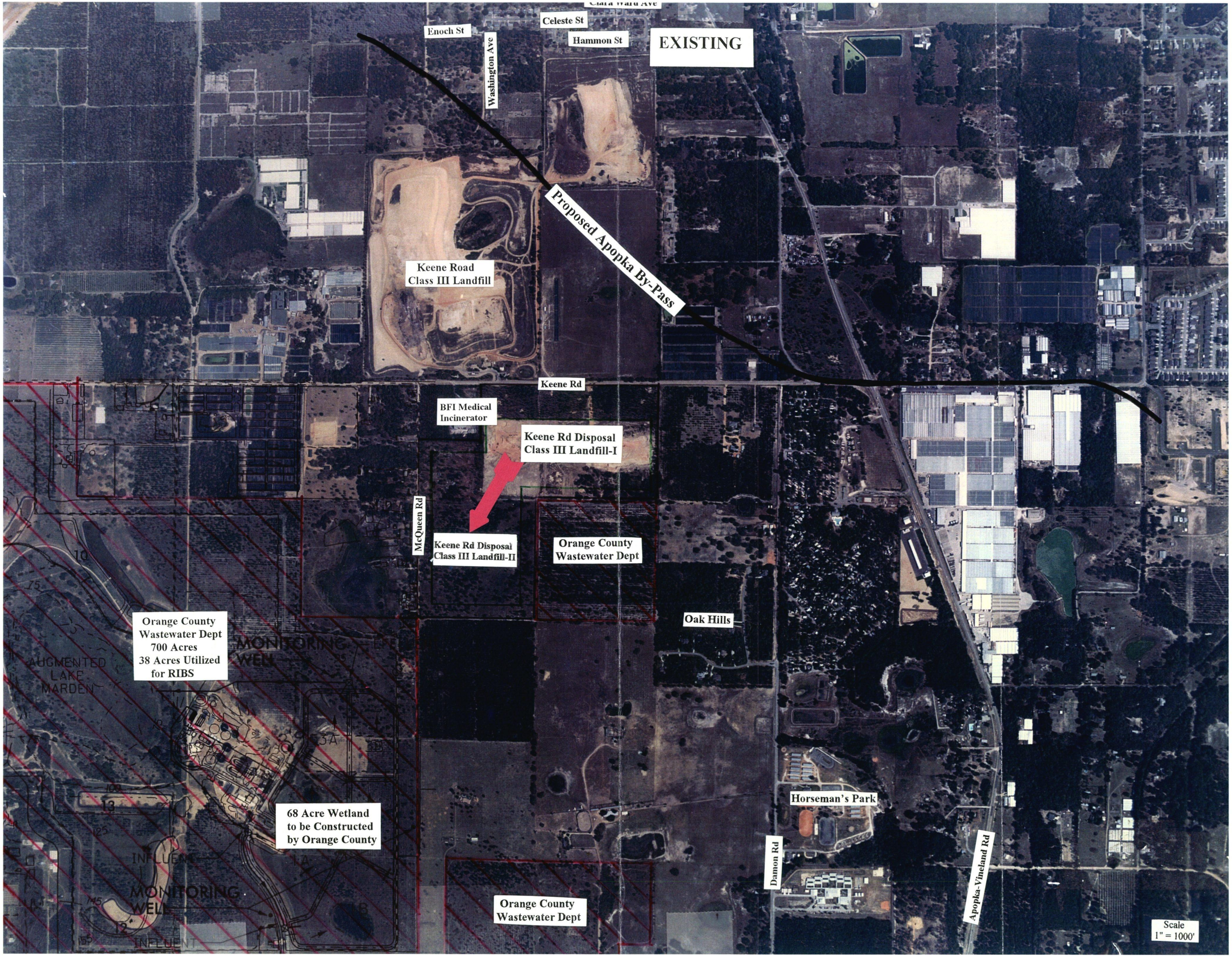

Clara Ward Ave
Enoch St
Celeste St
Hammon St
EXISTING
Washington Ave
Proposed Apopka By-Pass
Keene Road Class III Landfill
Keene Rd
BFI Medical Incinerator
Keene Rd Disposal Class III Landfill-I
McQueen Rd
Keene Rd Disposal Class III Landfill-II
Orange County Wastewater Dept
Oak Hills
Orange County Wastewater Dept 700 Acres 38 Acres Utilized for RIBS
AUGMENTED LAKE MARDEN
MONITORING WELL
68 Acre Wetland to be Constructed by Orange County
INFLUENT
MONITORING WELL
INFLUENT
Horseman's Park
Damon Rd
Apopka-Vineland Rd
Orange County Wastewater Dept
Scale 1" = 1000'

EXHIBIT B

EXHIBIT C

UNIVERSAL
ENGINEERING SCIENCES
Consultants in: Geotechnical Engineering • Threshold Inspection
Environmental Sciences • Construction Materials Testing

Offices in
- Orlando
- Gainesville
- Fort Myers
- Rockledge
- St. Augustine
- Daytona Beach
- West Palm Beach
- Jacksonville
- Ocala
- Tampa
- Debary

RECEIVED FEB 5 2002

February 4, 2002

Buttrey Development, LLC
6239 Edgewater Drive, Suite D-1
Orlando, FL 32810

Attention: Mr. Ed Chesney, P.E.

Reference: Borrow Pit 125 - Keene Road Landfill Expansion
Orange County, FL
UES Project No. 10942-002-01
UES Report No. 209519

Dear Mr. Chesney:

Universal Engineering Sciences has completed the requested soil borings and laboratory testing related to the referenced project. The boring logs (AB-8, EB-1 through EB-16, and PB-1 through PB-11) along with the laboratory test data are included with this letter.

I trust this meets your current needs. If you have any questions or need additional assistance, please do not hesitate to contact us.

Respectfully submitted,
Universal Engineering Sciences, Inc.

Mark C. Israel, P.E.
President
P.E. NO. 47070

MCI/mja

Enc: Boring Logs

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.2

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **EB-1**
SHEET: **1 of 2**
SECTION:
TOWNSHIP:
RANGE:

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

G.S. ELEVATION (ft): 108.9
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 10/23/01
DATE FINISHED: 10/23/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0						Loose light tan fine SAND [A-3]						
	☒	1-2-2	4									
	☒	2-2-3	5									
5	☒	2-2-2	4									
	☒	2-2-3	5									
	☒	2-2-3	5									
10	☒	3-3-3	6				2	3			18.2	
						Medium dense orange brown SAND with clay [A-3, A-2-4]						
15	☒	6-8-12	20									
						Very dense gray & yellow brown SAND [A-3]						
20	☒	10-21-40	61									
25	☒	12-23-24	47			-- dense						
						Stiff gray & yellow brown CLAY [A-7]						
30	☒	2-5-7	12									
35	☒	2-3-5	8			-- 2" layer of LIMESTONE -- medium stiff						
						Medium dense gray SILT [A-4, A-5]						
40	☒	4-6-6	12									
						Loose tan LIMESILT with limestone [A-4]						
45	☒	2-2-3	5									
50	☒	2-2-3	5									
55	☒	3-4-4	8									
						Tan weathered LIMESTONE with phosphates						
60	☒	50	50/5"									
65	☒	86	86/6"									

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.3

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **EB-1**
SHEET: **2 of 2**
SECTION:
TOWNSHIP:
RANGE:

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
65												
	☒	23-40-50	90/11"			-- dark gray						
70												
	☒	50	50/1"									
75												
						BORING TERMINATED AT 78.0 FEET						
80												
85												
90												
95												
100												
105												
110												
115												
120												
125												
130												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.1

PROJECT:	BORROW PIT NO. 125 - KEENE ROAD LANDFILL EXPANSION ORANGE COUNTY, FLORIDA	BORING DESIGNATION:	EB-3	SHEET:	1 of 1
		SECTION:	TOWNSHIP:	RANGE:	
CLIENT:	BUTTREY DEVELOPMENT TWO L.L.C.	G.S. ELEVATION (ft):	101.5	DATE STARTED:	6/28/01
LOCATION:		WATER TABLE (ft):	N.E.	DATE FINISHED:	6/28/01
REMARKS:		DATE OF READING:	06/28/01	DRILLED BY:	UES-ORLANDO
		EST. W.S.W.T. (ft):		TYPE OF SAMPLING:	ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0						Very loose, orange-brown fine SAND [A-3]						
	☒	3-2-2	4									
	☒	3-2-3	5			---Loose						
5	☒	1-1-1	2									
	☒	2-2-2	4			---Very loose						
	☒	2-2-3	5			---Loose						
10	☒	2-2-3	5				2	4				
15	☒	4-8-7	15			---Medium dense, little lighter						
20	☒	7-8-12	20			---Light brown						
25	☒	13-27-28	55			---Very dense, light gray	3	11				
30	☒	16-28-20	48			Dense, light gray silty fine SAND [A-2-4]	12	16				
35	☒	11-14-14	28				3	21				
						Medium dense, light gray fine SAND [A-3]						
40	☒	12-12-12	24			Medium dense, light gray fine SAND; with silt [A-3]	9	20				
						Very loose, orange clayey fine SAND [A-2-4]						
45	☒	1-2-2	4									
50	☒	5-6-9	15			---Medium dense, light brown	9	17			5.94E-01 2.10 X 10^{-4}	cm/sec
55	☒	5-7-7	14			Medium dense, orange-brown and gray sandy silty CLAY [A-6, A-7]						
						BORING TERMINATED AT 55 FEET						
60												
65												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.4

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **EB-5**
SHEET: **1 of 1**
SECTION:
TOWNSHIP:
RANGE:

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

G.S. ELEVATION (ft): 99.1
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 10/24/01
DATE FINISHED: 10/24/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0					⁘	Loose gray fine SAND [A-3] -- light brown						
	☒	2-2-3	5									
	☒	2-2-3	5									
5	☒	2-2-2	4									
	☒	2-3-2	5									
	☒	2-2-2	4									
	☒	2-3-4	7				2	2			23.0	
10												
						-- medium dense; gray brown						
	☒	5-7-8	15									
15												
					▨	Stiff orange brown CLAY [A-7]						
	☒	4-6-7	13									
20												
					⁘	Medium dense light gray fine SAND [A-3]						
	☒	8-12-13	25									
25												
					⁘	Medium dense light gray & yellow brown SAND with yellow brown sandy clay [A-2-4]						
	☒	4-6-11	17									
30					▨	Light orange brown & gray sandy CLAY [A-6]						
						-- soft						
	☒	2-1-2	3									
35												
	☒	2-2-2	4									
40												
	■					-- SHELBY TUBE TAKEN FROM 43.0 FEET TO 45.0 FEET	80	53			1.15E-03	
45	☒	2-3	5			-- medium stiff					4.06×10^{-7} cm/sec	
	☒	2-3-3	6									
50												
	☒	5-50	50/3"		✕	Very dense light gray consolidated LIMESILT [A-4]						
						BORING TERMINATED AT 52.0 FEET						
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.5

[illegible]JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **EB-6** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

G.S. ELEVATION (ft): 98.5
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 10/24/01
DATE FINISHED: 10/24/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0						Very loose gray fine SAND [A-3] -- light tan						
	☒	1-1-2	3									
	☒	2-1-2	3									
5	☒	1-2-2	4									
	☒	2-2-2	4									
	☒	2-3-4	7									
10	☒	4-5-6	11			Loose to medium dense orange brown clayey SAND [A-2-4, A-2-6]						
15	☒	12-22-31	53			-- very dense						
20	☒	10-13-20	33			Very hard orange & gray sandy CLAY [A-6]						
25	☒	18-30-30	60			Very dense light gray & yellow brown SAND [A-3						
30	☒	46-20-29	49			-- dense						
35	☒	13-12-17	29									
40	☒	6-6-5	11			Stiff light orange brown & gray sandy CLAY [A-6]						
45	☒	4-4-5	9			-- medium stiff						
50	☒	2-2-3	5									
55	☒	2-3-4	7			Loose gray & yellow brown SILT [A-4]						
						BORING TERMINATED AT 55.0 FEET						
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.6

)JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

BORING DESIGNATION: **EB-7**
SHEET: **1 of 1**
SECTION:
TOWNSHIP:
RANGE:
G.S. ELEVATION (ft): 95.7
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):
DATE STARTED: 10/25/01
DATE FINISHED: 10/25/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0					░	Very loose gray fine SAND [A-3] -- light brown						
	☒	1-1-2	3		░							
	☒	1-2-3	5		░							
5	☒	6-8-11	19		▨	Medium dense orange clayey SAND [A-2-4, A-2-6]						
	☒	8-9-10	19		▨							
	☒	8-8-9	17		░	Medium dense light tan brown SAND [A-3]						
10	☒	9-10-10	20		░							
					░	-- light gray						
15	☒	8-15-19	34		░							
20	☒	9-13-18	31		░							
					▨	Medium stiff gray & orange brown CLAY [A-7]						
25	☒	3-4-6	10		▨							
					▥	Stiff orange brown & Gray silty CLAY [A-6]						
30	☒	3-4-6	10		▥							
					▥	-- orange brown, with limestone						
35	☒	3-4-6	10		▥							
					▥	Very loose orange gray LIMESILT [A-4]						
40	☒	3-2-3	5		▥							
	■				▥	-- SHELBY TUBE TAKEN FROM 44.0 FEET TO 46.0 FEET						
45					▥		32	32			1.57E-02 5.52 x 10-6 cm/sec	
	☒	5-6-12	18		▥	-- with phosphates						
						BORING TERMINATED AT 47.5 FEET						
50												
55												
60												
65												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.1

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **EB-8** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

G.S. ELEVATION (ft): 95.3
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 9/27/01
DATE FINISHED: 9/27/01
DRILLED BY: UES-ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0					░	Loose, light brown fine SAND						
	☒	2-3-3	6		░							
	☒	2-1-1	2		░	---With roots						
5	☒	2-3-5	8		▨	Loose, orange-brown, with gray mottling sandy CLAY						
	☒	6-10-10	20		▨		78	26	56	30	4.79E-05	
	☒	8-10-12	22		▨	Medium dense, orange-brown clayey fine SAND					1.69×10^{-8} Cm/sec	
10	☒	6-7-8	15		░	Medium dense, light orange-brown fine SAND						
					░	---With clay						
15	☒	14-17-24	41		░							
20	☒	18-15-18	33		░							
25	☒	6-6-6	12		▨	Stiff, orange-brown CLAY						
30	☒	6-7-8	15		░	Medium dense, orange-brown silty fine SAND; with clay						
35	☒	2-2-3	5		░	---Loose						
40	☒	4-4-4	8		▨	Loose, gray clayey fine SAND						
45	☒	2-3-4	7		▨	Firm, orange-brown silty sandy CLAY						
50	☒	4-9-5	14		▨	---Stiff	15	31			1.83E-03 6.47×10^{-7} Cm/sec	
					░	Very dense, gray cemented SAND						
55	☒	100	100/1"			BORING TERMINATED AT 55 FEET						
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.2

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **EB-9**
SHEET: **1 of 1**
SECTION:
TOWNSHIP:
RANGE:

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

G.S. ELEVATION (ft): 98.5
WATER TABLE (ft): N.E.
DATE OF READING: 06/28/01
EST. W.S.W.T. (ft):

DATE STARTED: 6/28/01
DATE FINISHED: 6/28/01
DRILLED BY: UES-ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0						Very loose, gray-brown fine SAND [A-3]						
	☒	2-2-2	4									
	☒	2-1-2	3			Medium dense, orange fine SAND; with trace of clay [A-3]	2	4				
5	☒	5-6-11	17									
	☒	11-12-16	28			Dense, light orange-brown clayey fine SAND [A-2-4]						
	☒	20-21-23	44				19	10				
10	☒	14-16-17	33			---Gray and orange						
15	☒	14-23-27	50			Very dense, light brown fine SAND [A-3]						
20	☒	21-26-29	55			---Light gray						
25	☒	17-21-25	46			---Light orange-brown	5	17				
30	☒	4-6-8	14			Stiff, orange-brown sandy CLAY [A-6, A-7]						
35	☒	2-3-4	7			---Firm, orange-gray	82	62			5.35E-03 1.88 x10^{-6} cm/sec	
40	☒	3-4-4	8									
45	☒	4-7-7	14									
50	☒	11-13-17	30			Very stiff, green sandy silty CLAY [A-6, A-7]						
55	☒	10-11-13	24			Medium dense, dark greenish-gray silty fine SAND; with shells [A-2-4]						
						BORING TERMINATED AT 55 FEET						
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.7

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

BORING DESIGNATION: **EB-10** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft): 95.1
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 10/24/01
DATE FINISHED: 10/24/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0						Loose gray fine SAND [A-3] -- light brown						
	☒	1-2-2	4									
	☒	1-1-2	3									
5	☒	1-2-2	4									
	☒	1-2-3	5			Loose orange brown clayey SAND [A-2-4, A-2-6]						
	☒	2-3-3	6									
	☒	3-3-4	7									
10												
						-- dense						
15	☒	8-14-23	37									
						Dense light tan SAND [A-3]						
20	☒	14-16-21	37									
						Medium dense light tan SAND with silt [A-3, A-2-4]						
25	☒	8-8-7	15									
						Soft gray & orange brown sandy CLAY [A-6]						
30	☒	1-2-2	4									
						Soft orange brown silty CLAY [A-5, A-6]						
35	☒	2-1-2	3									
						-- medium stiff						
40	☒	1-2-3	5									
						Loose gray & orange SILT [A-4, A-5]						
45	☒	2-3-3	6									
						Gray weathered LIMESTONE with phosphates						
50	☒	50	50/5"			BORING TERMINATED AT 50.0 FEET						
55												
60												
65												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.8

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

BORING DESIGNATION: **EB-11** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft): 93.4
WATER TABLE (ft): N.E.
DATE OF READING: 06/28/01
EST. W.S.W.T. (ft):

DATE STARTED: 6/28/01
DATE FINISHED: 6/28/01
DRILLED BY: UES-ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0												
	☒	2-2-2	4		░	Very loose, light gray-brown fine SAND [A-3]						
	☒	2-1-2	3		░							
5	☒	1-2-2	4		░	---Shade lighter	1	2				
	☒	2-2-4	6		░							
	☒	5-6-9	15		▨	Medium dense, orange-brown clayey fine SAND [A-2-4]						
10	☒	7-9-10	19		▨							
15	☒	8-10-16	26		▨	Very stiff, orange CLAY [A-6, A7]	90	34	82	39		
20	☒	10-16-19	35		▨							
					░	Dense, orange-brown fine SAND: with silt [A-3]	5	21				
25	☒	16-14-8	22		░	---Loose, light gray	7	16				
					░	---Very dense, light gray						
30	☒	2-2-2	4		▨	Firm, orange-gray silty CLAY [A-6, A-7]						
35	☒	3-3-3	6		▨	---Light gray						
40	☒	2-3-4	7		▨							
45	☒	5-5-6	11		▨	Stiff, light brown silty CLAY: with limestone [A-6, A-7]						
50	☒	27-24-17	41		▨	*BORING TERMINATED AT 50 FEE*						
55												
60												
65												

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BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.2

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **EB-13** SHEET: **1 of 2**
SECTION: TOWNSHIP: RANGE:

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

G.S. ELEVATION (ft): 96.7
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 9/25/01
DATE FINISHED: 9/25/01
DRILLED BY: UES-ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Loose, light brown fine SAND						
	☒	2-3-2	5									
	☒	1-2-1	3			---Very loose						
5	☒	1-1-1	2			---Shade lighter						
	☒	1-1-1	2									
	☒	1-2-1	3			---Loose, orange-brown						
10	☒	3-4-4	8			---Loose						
15	☒	9-11-15	26			---Medium dense						
						Medium dense, brown silty fine SAND, slightly clay						
20	☒	10-12-18	30									
25	☒	10-12-12	24									
30	☒	12-13-13	26			---Shade lighter						
35	☒	11-14-17	31									
40	☒	14--14-20	34			---Dense, orange-brown						
45	☒	14-17-18	35									
50	☒	6-6-12	18			---Medium dense						
55	☒	10-10-12	22									
60	☒	5-4-4	8			---Loose, light orange-brown						
65	☒	4-6-8	14									

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.3

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **EB-13** SHEET: **2 of 2**
SECTION: TOWNSHIP: RANGE:

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
65					▨	Stiff, gray silty CLAY						
	☒	1-1-2	3		▨	---Soft						
70					▨							
	☒	2-3-4	7		▨	---Firm	57	56			9.34E-04	
75						BORING TERMINATED AT 75 FEET					3.29×10^{-7} cm/sec	
80												
85												
90												
95												
100												
105												
110												
115												
120												
125												
130												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.8

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

BORING DESIGNATION: **EB-14** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft): 103.7
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 10/24/01
DATE FINISHED: 10/24/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	PI	K (FT./ DAY)	ORG. CONT. (%)
0					⁘	Gray fine SAND [A-3] -- light brown						
	☒	1-2-2	4									
	☒	1-2-2	4									
5	☒	1-2-1	5									
	☒	14-18-22	40		▨	Dense orange brown clayey SAND [A-2-4, A-2-6] -- very dense						
	☒	25-31-37	68									
10	☒	34-40-41	81									
					⁘	Medium dense light gray SAND [A-3]						
15	☒	8-13-20	33									
20	☒	12-22-31	53			-- dense						
25	☒	11-17-21	38			-- medium dense						
					▨	Soft gray & orange brown silty CLAY [A-6]						
30	☒	2-2-2	4									
35	☒	3-4-5	9		✕	Loose gray LIMESILT with limestone pieces [A-4]						
40	☒	4-6-7	13									
					▨	Hard dark green silty CLAY [A-6]						
45	☒	5-9-18	27									
50	☒	8-8-14	22			-- stiff						
55	■					-- SHELBY TUBE ATTEMPTED FROM 53.0 FEET TO 55.0 FEET (8" RECOVERY)	26	38			1.58E-02 5.59×10^{-6} cm/sec	
60	☒	12-18-21	39		▨	Very hard dark green silty sandy CLAY with shell [A-6]						
						BORING TERMINATED AT 60.0 FEET						
65												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

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REPORT NO.:
PAGE: B-2.4

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **EB-15**
SHEET: **1 of 1**
SECTION:
TOWNSHIP:
RANGE:

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

G.S. ELEVATION (ft): 95.8
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 9/27/01
DATE FINISHED: 9/27/01
DRILLED BY: UES-ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0					░	Loose, brown fine SAND						
	☒	3-3-3	6		░							
	☒	3-2-3	5		░							
5	☒	3-4-6	10		▨	Stiff, orange-brown and gray mottling sandy CLAY						
	☒	10-8-10	18		▨							
	☒	12-12-13	25		▨	---Medium dense	77	25	64	33		
	☒	7-8-10	18		░	Medium dense, orange-brown fine SAND						
10					░							
					░	---Light brown						
15	☒	6-7-9	16		░							
20	☒	9-12-13	25		░							
25	☒	8-8-12	20		░							
					▨	Stiff, gray silty CLAY						
30	☒	6-6-8	14		▨							
35	☒	4-4-4	8		▨	---Firm						
					▨	---Stiff						
40	☒	4-5-6	11		▨							
45	☒	6-6-6	12		▨							
					▨	---Gray						
50	☒	6-6-9	15		▨							
					▨	---Very stiff, gray						
55	☒	6-8-12	20			BORING TERMINATED AT 55 FEET						
60												
65												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
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PAGE: B-2.6

ɔJECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

BORING DESIGNATION: **EB-16**
SHEET: **1 of 1**
SECTION:
TOWNSHIP:
RANGE:

G.S. ELEVATION (ft): 87.3
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 9/25/01
DATE FINISHED: 9/25/01
DRILLED BY: UES-ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0						Loose, light brown fine SAND						
	☒	2-3-3	6									
	☒	2-2-2	4			---Very loose						
5	☒	1-1-1	2									
	☒	1-1-1	2									
	☒	2-1-2	3			---Orange-brown						
	☒	3-2-3	5									
10						Loose, orange-brown clayey fine SAND						
						Very stiff, light gray sandy CLAY						
	☒	8-10-10	20									
15						Medium dense, light tan SAND						
	☒	12-16-18	34									
20												
	☒	36-56-44	100									
25												
						Medium dense, orange-brown fine SAND; with silt						
	☒	10-10-10	20									
30												
						Loose, orange-brown silty fine SAND						
	☒	2-3-5	8									
35												
						Stiff, light orange-brown silty CLAY						
	☒	3-4-6	10									
40												
	☒	3-3-4	7				30	45			1.67E-03	
45											5.90×10^{-7} cm/sec	
	☒	3-4-4	8			Loose, brown silty fine SAND [SM]						
50						BORING TERMINATED AT 50 FEET						
55												
60												
65												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
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JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

BORING DESIGNATION: **PB-1**
SHEET: **1 of 1**
SECTION:
TOWNSHIP:
RANGE:
G.S. ELEVATION (ft): 105.0
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):
DATE STARTED: 10/26/01
DATE FINISHED: 10/26/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0						Loose gray fine SAND [A-3]						
	☒	2-2-3	5			-- light brown						
	☒	2-3-3	6									
5	☒	2-2-2	4			-- very loose						
	☒	2-2-2	4									
	☒	2-1-2	3									
	☒	2-2-3	5			-- loose						
10												
						Medium dense orange brown clayey SAND [A-2-4, A-2-6]						
	☒	5-8-9	17									
15												
						Dense orange brown SAND with silt [A-3, A-2-4]						
	☒	7-14-20	34									
20												
						Medium dense light gray & orange clayey SAND [A-2-4, A-2-6]						
25	☒	5-9-14	23									
						-- dense; light gray						
	☒	14-17-16	33									
30												
						Soft gray & orange silty CLAY [A-6]						
35	☒	2-2-1	3									
	☒	2-3-4	7			Loose to medium dense gray LIMESILT [A-4]						
	☒	5-6-6	12									
						BORING TERMINATED AT 38.0 FEET						
40												
45												
50												
55												
60												
65												

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BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.10

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

BORING DESIGNATION: **PB-2**
SHEET: **1 of 1**
SECTION:
TOWNSHIP:
RANGE:
G.S. ELEVATION (ft): 98.5
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):
DATE STARTED: 10/29/01
DATE FINISHED: 10/29/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0						Very loose gray fine SAND [A-3] -- light brown						
	☒	1-2-1	3									
	☒	1-1-1	2									
5	☒	1-2-1	3									
	☒	2-2-2	4									
	☒	2-2-3	5									
	☒	3-3-4	7			-- loose						
10												
						Loose orange brown fine SAND with silt [A-3, A-2-4]						
	☒	3-4-5	9									
15												
						Very dense light gray fine SAND [A-3]						
	☒	13-21-33	54									
20												
	☒	11-18-24	42									
25												
						Orange silty sandy CLAY [A-6]						
	☒	3-4-5	9									
30	☒	5-6-7	13			Loose to medium dense orange silty SAND [A-2-4]						
	☒	7-8-9	17			Medium dense orange & gray silty CLAY [A-6]						
						BORING TERMINATED AT 32.0 FEET						
35												
40												
45												
50												
55												
60												
65												

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BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.11

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **PB-3**
SHEET: **1 of 1**
SECTION:
TOWNSHIP:
RANGE:

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

G.S. ELEVATION (ft): 93.8
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 10/29/01
DATE FINISHED: 10/29/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0						Very loose gray fine SAND [A-3] -- light brown						
	☒	1-1-1	2									
	☒	1-2-2	4									
5	☒	3-3-4	7			Loose orange & brown clayey SAND [A-2-4, A-2-6] -- medium dense						
	☒	4-4-5	9									
	☒	5-6-7	13									
10	☒	7-8-8	16									
						Very dense light tan silty SAND [A-2-4]						
15	☒	18-29-35	64									
20	☒	31-17-13	30			Hard gray & orange brown silty CLAY [A-6]						
25	☒	4-5-6	11			Stiff & orange brown sandy CLAY [A-6]						
	☒	4-5-5	10									
	☒	6-7-9	16			Medium dense gray & orange brown SAND [A-3]						
30						BORING TERMINATED AT 28.0 FEET						
35												
40												
45												
50												
55												
60												
65												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.12

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

BORING DESIGNATION: **PB-4**
SHEET: **1 of 1**
SECTION:
TOWNSHIP:
RANGE:

G.S. ELEVATION (ft): 86.6
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 10/29/01
DATE FINISHED: 10/29/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0					⁘	Very loose gray fine SAND [A-3]						
	☒	1-2-1	3		⁘	-- light brown						
	☒	1-1-2	3		⁘							
5	☒	1-2-2	4		⁘							
	☒	2-2-3	5		⁘	-- loose						
	☒	2-3-3	6		⁘	-- light tan						
	☒	3-3-4	7		⁘							
10					⁘							
					▨	Gray & yellow brown clayey SAND [A-2-4, A-2-6]						
	☒	7-14-16	30									
15					▨	Hard gray, yellow & red brown silty sandy CLAY [A-6]						
					⁘	Medium dense light gray SAND [A-3]						
20	☒	7-8-10	18		⁘							
	☒	11-12-14	26		⁘							
						BORING TERMINATED AT 22.0 FEET						
25												
30												
35												
40												
45												
50												
55												
60												
65												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.13

)JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

BORING DESIGNATION: **PB-5** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft): 83.7
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 10/29/01
DATE FINISHED: 10/29/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0					░	Very loose gray fine SAND [A-3]						
	☒	1-1-2	3		░	-- light brown						
	☒	2-2-2	4		░							
5	☒	2-1-2	3		░							
	☒	2-3-4	7		░	-- loose						
	☒	5-7-12	19		░	-- medium dense						
	☒	9-11-12	23		▧	Medium dense orange brown clayey SAND [A-2-6]						
10					▧							
	☒	7-9-11	20		▨	Very stiff orange and brown sandy CLAY [A-6]						
15	☒	9-11-10	21		▨							
	☒	12-14-18	32		░	Dense orange brown SAND [A-3]						
	☒	18-18-21	39		░							
20						BORING TERMINATED AT 19.0 FEET						
25												
30												
35												
40												
45												
50												
55												
60												
65												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.14

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

BORING DESIGNATION: **PB-6**
SHEET: **1 of 1**
SECTION:
TOWNSHIP:
RANGE:
G.S. ELEVATION (ft): 94.6
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):
DATE STARTED: 10/29/01
DATE FINISHED: 10/29/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0						Very loose gray fine SAND [A-3] -- light brown						
	☒	1-1-2	3									
	☒	1-2-2	4									
5	☒	2-2-2	4									
	☒	2-2-2	4			Very loose orange brown SAND with clay [A-3, A-2-4]						
	☒	3-3-4	7			Loose light brown clayey SAND [A-2-4, A-2-6]						
	☒	4-4-5	9									
10						Medium dense light orange brown SAND with clay [A-3, A-2-4]						
15	☒	9-11-16	27									
						Very stiff gray & orange brown CLAY [A-7]						
20	☒	9-9-9	18									
						Medium dense gray & orange brown SAND with clay [A-3, A-2-4]						
25	☒	6-7-9	16									
30	☒	8-9-9	18									
						BORING TERMINATED AT 30.0 FEET						
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-C02-01
REPORT NO.:
PAGE: B-2.15

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA
CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

BORING DESIGNATION: **PB-7**
SHEET: **1 of 1**
SECTION:
TOWNSHIP:
RANGE:
G.S. ELEVATION (ft): 98.81
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):
DATE STARTED: 10/30/01
DATE FINISHED: 10/30/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0						Very loose gray fine SAND [A-3]						
	☒	1-1-2	3									
	☒	1-2-2	4									
5	☒	3-4-6	9			Stiff red brown & yellow brown sandy CLAY [A-6]						
	☒	6-6-9	15									
	☒	9-14-17	31			-- very hard						
	☒	21-18-18	36			Dense red brown & yellow brown SAND with layers of clayey sand [A-2-4]						
10												
						Dense yellow brown to light brown fine SAND [A-3]						
	☒	10-14-18	32									
15												
	☒	10-13-12	25			-- medium dense						
20												
	☒	7-9-15	24			Medium dense light gray fine SAND [A-3], with thin layers of gray & yellow brown sandy clay [A-6]						
25												
	☒	6-7-6	13			Medium dense gray & yellow brown fine SAND [A-3]						
30	☒	6-8-8	16			-- tan & orange brown						
	☒	6-7-8	15									
						BORING TERMINATED AT 33.0 FEET						
35												
40												
45												
50												
55												
60												
65												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.16

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **PB-8**
SHEET: **1 of 1**
SECTION:
TOWNSHIP:
RANGE:

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

G.S. ELEVATION (ft): 104.8
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 10/25/01
DATE FINISHED: 10/25/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0					░	Very loose gray fine SAND [A-3]						
	☒	1-1-2	3		░	-- light brown						
	☒	1-2-2	4		░							
5	☒	2-2-3	5		░	-- loose						
	☒	3-3-3	6		░							
	☒	7-11-20	31		▨	Dense to very dense orange & red brown clayey SAND [A-2-6]						
10	☒	20-24-28	52		▨							
					▨	Stiff gray & orange brown silty CLAY [A-6]						
15	☒	4-6-10	16		▨							
					░	Very dense light gray brown SAND [A-3]						
20	☒	12-22-30	52		░							
25	☒	7-10-14	24		░	-- medium dense						
					▨	Stiff gray & orange brown silty CLAY [A-6]						
30	☒	3-4-5	9		▨							
35	☒	1-0-1	1		▨	-- very soft						
						BORING TERMINATED AT 35.0 FEET						
40												
45												
50												
55												
60												
65												

03412

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.17

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.

LOCATION:

REMARKS:

BORING DESIGNATION: **PB-9**

SHEET: **1 of 1**

SECTION:

TOWNSHIP:

RANGE:

G.S. ELEVATION (ft): 103.6

DATE STARTED: 10/26/01

WATER TABLE (ft):

DATE FINISHED: 10/26/01

DATE OF READING:

DRILLED BY: UES - ORLANDO

EST. W.S.W.T. (ft):

TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0						Very loose gray fine SAND [A-3]						
	☒	1-2-1	3			-- light brown						
	☒	1-2-2	4									
5	☒	2-3-4	7			-- loose						
	☒	4-4-8	12			Dense orange brown & red brown clayey SAND [A-2-6]						
	☒	13-17-21	38									
	☒	21-24-31	55			-- very dense						
10												
						Dense light gray & orange brown SAND [A-3]						
	☒	14-15-18	33									
15												
	☒	14-16-26	42									
20												
	☒	11-11-14	25			-- medium dense						
25												
						Stiff gray & orange brown silty CLAY [A-6]						
	☒	5-7-7	14									
30												
						-- with limestone						
	☒	4-7-7	14									
35						BORING TERMINATED AT 35.0 FEET						
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.18

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

BORING DESIGNATION: **PB-10** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:
G.S. ELEVATION (ft): 92.7
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):
DATE STARTED: 10/26/01
DATE FINISHED: 10/26/01
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
0					∴	Very loose gray fine SAND [A-3]						
	☒	1-1-2	3		∴	-- light brown						
	☒	1-2-2	4		∴							
5	☒	2-2-2	4		∴							
	☒	2-1-2	3		∴							
	☒	1-1-2	3		∴							
	☒	1-2-3	5		∴	-- loose; brown						
10					∴							
					▨	Medium dense gray & orange brown clayey SAND [A-2-6]						
15	☒	8-9-10	19		▨							
					∴	Medium dense light gray SAND [A-3]						
20	☒	7-12-16	28		∴							
					∴	-- dense						
25	☒	10-14-23	37		∴							
	☒	13-14-19	33		∴							
	☒	12-18-23	41		∴							
						BORING TERMINATED AT 28.0 FEET						
30												
35												
40												
45												
50												
55												
60												
65												

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: B-2.19

JECT: BORROW PIT NO. 125 - KEENE ROAD
LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT TWO L.L.C.
LOCATION:
REMARKS:

BORING DESIGNATION: **PB-11**
SHEET: **1 of 1**
SECTION:
TOWNSHIP:
RANGE:
G.S. ELEVATION (ft): 97.8
DATE STARTED: 10/26/01
WATER TABLE (ft):
DATE FINISHED: 10/26/01
DATE OF READING:
DRILLED BY: UES - ORLANDO
EST. W.S.W.T. (ft):
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0						Very loose gray fine SAND [A-3] -- light brown, with roots						
	☒	1-2-2	4									
	☒	2-2-2	4									
5	☒	2-2-1	3									
	☒	1-2-1	3									
	☒	1-1-1	2									
	☒	1-2-2	4									
10												
						Medium dense gray & orange brown clayey SAND [A-2-6]						
15	☒	11-14-16	30									
						Dense light gray SAND [A-3], with layers of orange clayey SAND [A-2-4, A-2-6]						
20	☒	14-16-25	41									
25	☒	15-22-31	53									
	☒	12-14-14	28			-- medium dense						
30	☒	14-20-16	36			-- dense						
						BORING TERMINATED AT 31.0 FEET						
35												
40												
45												
50												
55												
60												
65												

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RECEIVED [illegible] 28 2002

February 27, 2002

Bishop Development, LLC
6239 Edgewater Drive, Suite D1
Orlando, FL 32810

Attention: Mr. Ed Chesney, P.E.

Reference: Monitor Well Installation
B & B Borrow Pit 125 - Keene Road Landfill Expansion
Orange County, FL
UES Project No. 10942-002-01
UES Report No. 212723

Dear Mr. Chesney:

Universal Engineering Sciences has completed the requested soil borings and monitor well installation at the referenced project. The scope of our work was planned in conjunction with, and authorized by, you.

Detailed descriptions of the soils encountered, along with well completion logs are included as Appendix A: Boring Logs.

We appreciate the opportunity to have worked with you on this project and look forward to a continued association. If you should have any questions, or if you need further assistance, or discussion of your development options for this project, please do not hesitate to call.

Respectfully submitted,
Universal Engineering Sciences

Mark C. Israel, P.E.
P.E. No. 47070
President

MCI/mja

Enclosure: Appendix A -
Well Completion Logs
Boring Logs

cc: client (3)

3532 Maggie Blvd. • Orlando, Fl 32811 • (407) 423-0504 • Fax (407) 423-3106

COPY

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: 1

JECT: BISHOP & BUTTREY PIT 125
KEENE ROAD LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **MW-E9** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: BUTTREY DEVELOPMENT L.L.C.
LOCATION: AS SPECIFIED BY CLIENT
REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 2/4/02
DATE FINISHED: 2/4/02
DRILLED BY: U.E.S. - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0					░	Gray fine SAND [A-3] -- very loose, light brown						
	☒	1-1-2	3		░							
	☒	1-1-1	2		░							
5	☒	1-2-3	5		░	-- loose						
	☒	2-3-6	9		░							
	☒	17-18-21	39		▨	Dense, gray and dark brown clayey fine SAND [A-2-4]						
	☒	18-21-24	45		▨							
10					▨							
					░	Dense, gray and yellow brown fine SAND [A-3]						
15	☒	10-19-27	46		░							
					░	-- very dense						
20	☒	13-29-36	65		░							
					░	-- dense						
25	☒	11-16-26	42		░							
					▨	Firm, gray and yellow brown silty CLAY [A-6]						
30	☒	3-3-3	6		▨							
					░	Loose, gray and yellow brown silty fine SAND [A-2-4]						
35	☒	2-4-6	10		▨	Loose, gray and yellow brown silty clayey fine SAND [A-2-4]						
					▨	Firm, gray and yellow brown silty sandy CLAY [A-5]						
40	☒	2-3-5	8		▨							
					▨	-- stiff						
45	☒	4-5-7	12		▨							
					▨	Stiff, brown sandy CLAY [A-6]						
0	☒	3-4-8	12		▨							
55	☒	3-4-8	12		▨	BORING TERMINATED AT 55.0 FT.						

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: 2

OJECT: BISHOP & BUTTREY PIT 125
KEENE ROAD LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA
CLIENT: BUTTREY DEVELOPMENT L.L.C.
LOCATION: AS SPECIFIED BY CLIENT
REMARKS:

BORING DESIGNATION: **MW-E10** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:
G.S. ELEVATION (ft):
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):
DATE STARTED: 2/4/02
DATE FINISHED: 2/4/02
DRILLED BY: U.E.S. - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0					░	Very loose, light brown fine SAND [A-3]						
	☒	1-1-2	3									
	☒	2-2-2	4									
5	☒	1-1-1	2									
	☒	2-1-2	3									
	☒	2-2-3	5			-- loose						
10	☒	2-3-4	7									
					▨	Dense, gray and yellow brown clayey fine SAND [A-2-4]						
15	☒	16-24-22	46									
					░	Medium dense, gray and yellow brown fine to medium SAND; with silt [A-3]						
20	☒	6-11-12	23									
						-- dense						
25	☒	11-18-21	39									
					▨	Stiff, yellow brown silty sandy CLAY [A-5]						
30	☒	3-4-7	11									
						-- firm						
35	☒	2-3-2	5									
						-- soft						
40	☒	1-2-2	4									
					▨	Soft, light gray and yellow brown sandy silty CLAY; with phosphates [A-6]						
45	☒	1-2-2	4									
					▨	Hard, gray CLAY [A-6]						
.0	☒	7-15-26	41									
					▦	Medium dense, LIMESTONE; with phosphates BORING TERMINATED AT 55.0 FT.						
55	☒	5-7-12	19									

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE: 3

JECT: BISHOP & BUTTREY PIT 125
KEENE ROAD LANDFILL EXPANSION
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **MW-E11** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: BUTTREY DEVELOPMENT L.L.C.
LOCATION: AS SPECIFIED BY CLIENT
REMARKS:

G.S. ELEVATION (ft):
WATER TABLE (ft):
DATE OF READING:
EST. W.S.W.T. (ft):

DATE STARTED: 2/4/02
DATE FINISHED: 2/4/02
DRILLED BY: U.E.S. - ORLANDO
TYPE OF SAMPLING: ASTM D-1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0					░	Gray fine SAND [A-3] – very loose, light brown						
	☒	1-1-2	3		░							
	☒	1-2-2	4		░							
					▨	Medium dense, gray and yellow brown clayey fine SAND [A-2-4] – very dense						
5	☒	2-7-12	19		▨							
	☒	18-27-33	60		▨							
	☒	50	50/3"		▨							
	☒	50	50/4"		▨							
10					▨							
					▨	Very stiff, gray and yellow brown sandy CLAY [A-5]						
	☒	9-9-11	20		▨							
15					▨							
					░	Dense, gray and yellow brown fine to medium SAND [A-3]						
	☒	11-21-23	44		░							
20					░							
					▨	Stiff, gray and yellow brown silty sandy CLAY [A-5]						
	☒	3-4-5	9		▨							
25					▨							
					▨	– firm						
	☒	2-3-4	7		▨							
30					▨							
	☒	2-3-3	6		▨							
35					▨							
	☒	1-3-4	7		▨							
40					▨							
					▨	Soft, gray and yellow brown CLAY; with phosphates and sand [A-6]						
	☒	1-2-2	4		▨							
45					▨							
					▦	LOSS OF CIRCULATION AT 47.0 FT. Weathered LIMESTONE						
	☒	60	60/3"		▦							
50						BORING TERMINATED AT 50.0 FT.						
55												

03412

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 10942-007-01
REPORT NO.:
PAGE NO.:

PROJECT: BISHOP & BUTTREY PIT 125, KEENE ROAD LANDFILL EXPANSION, ORANGE COUNTY, FLORIDA

CLIENT: BISHOP & BUTTREY

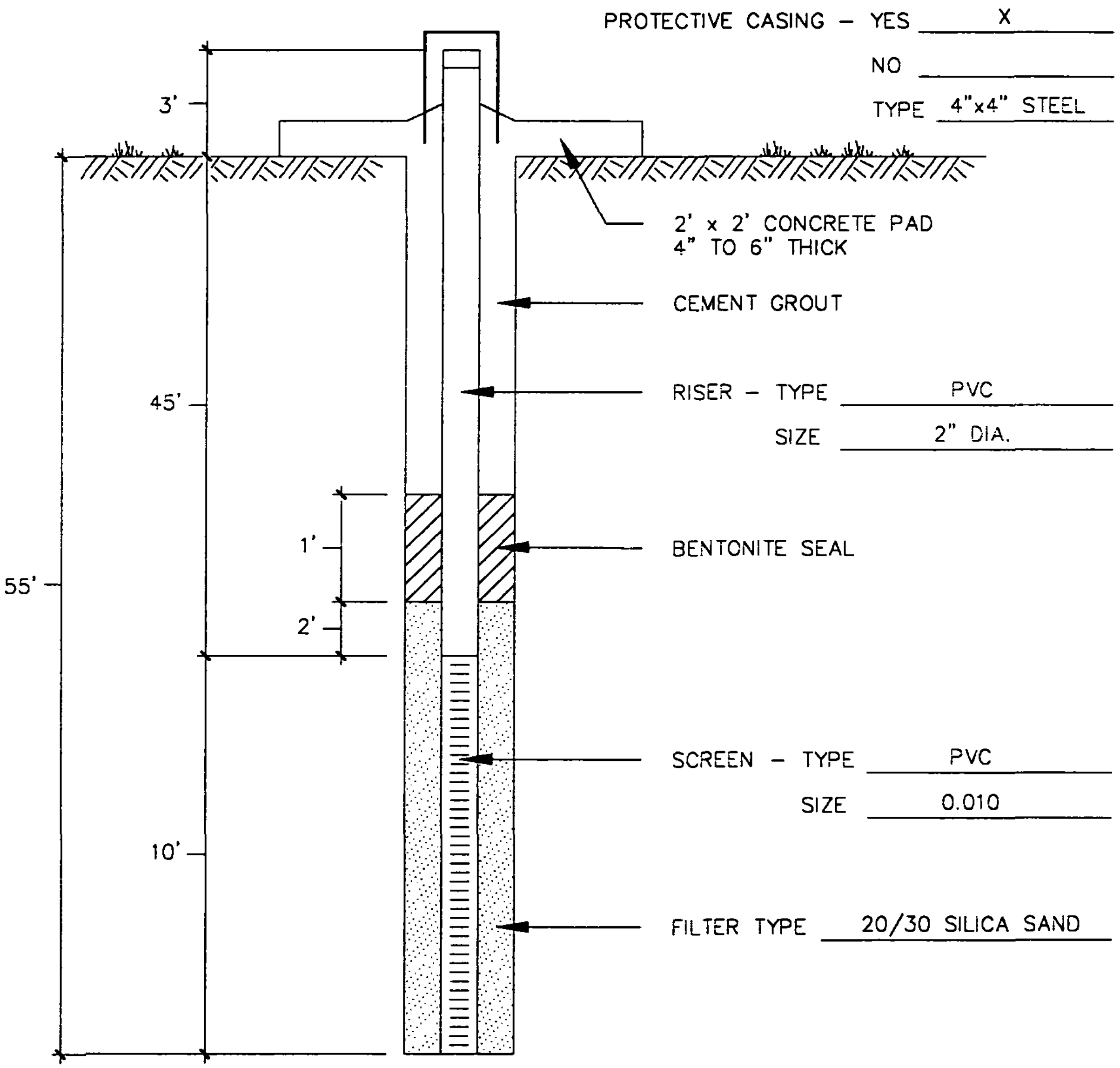
DATE: 2/6/02

WELL NUMBER: MW-E9

LOCATION: AS SPECIFIED BY CLIENT

INSTALLED BY: U.E.S. DRILLING DEPT. - ORLANDO

WELL DIAGRAM - NOT TO SCALE



PROTECTIVE CASING - YES X
NO
TYPE 4"x4" STEEL

RISER - TYPE PVC
SIZE 2" DIA.

SCREEN - TYPE PVC
SIZE 0.010

FILTER TYPE 20/30 SILICA SAND

02-0112-0

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE NO.:

PROJECT: BISHOP & BUTTREY PIT 125, KEENE ROAD LANDFILL EXPANSION, ORANGE COUNTY, FLORIDA

CLIENT: BISHOP & BUTTREY

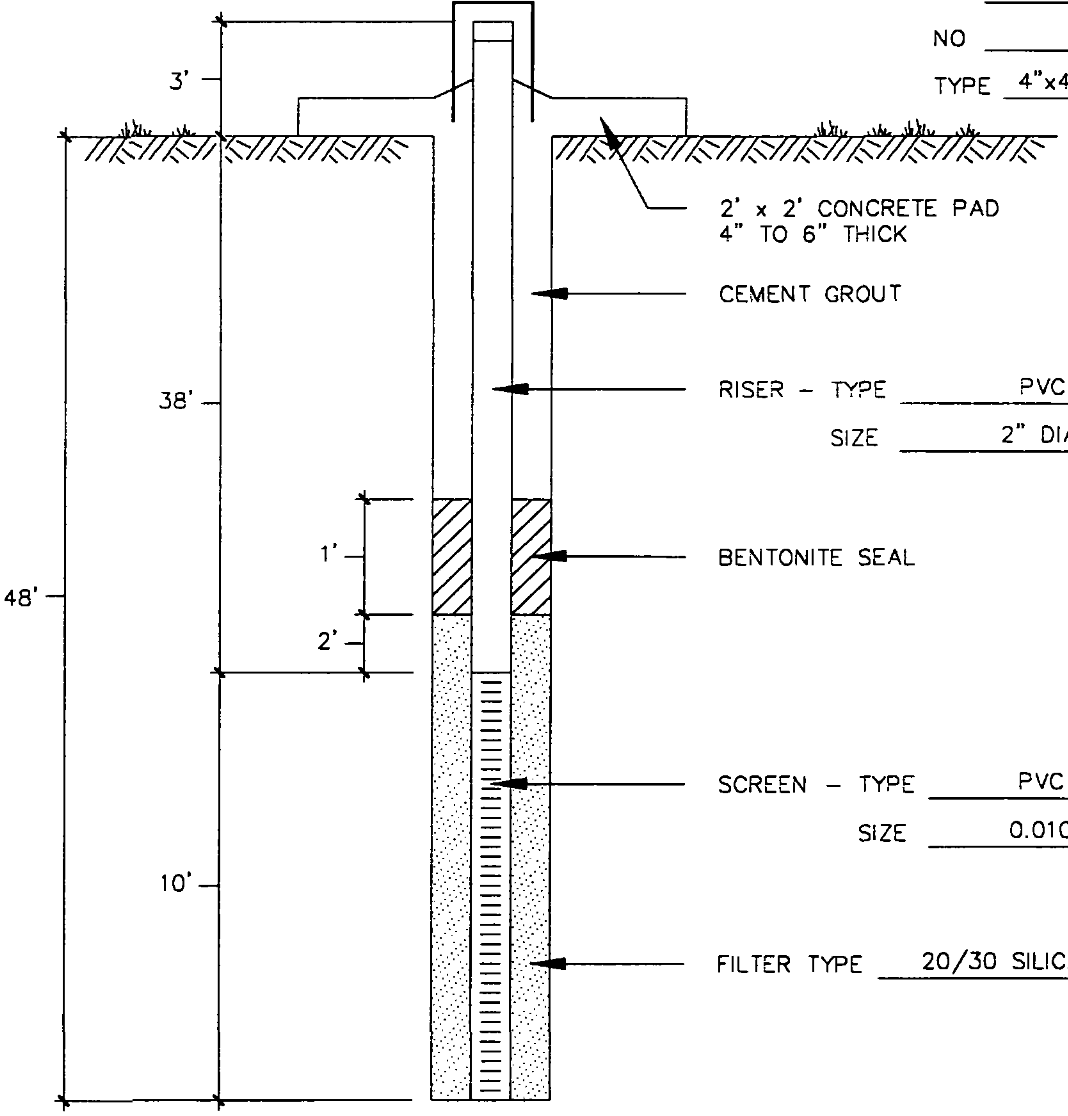
DATE: 2/6/02

WELL NUMBER: MW-E10

LOCATION: AS SPECIFIED BY CLIENT

INSTALLED BY: U.E.S. DRILLING DEPT. - ORLANDO

WELL DIAGRAM - NOT TO SCALE



PROTECTIVE CASING - YES X

NO

TYPE 4"x4" STEEL

2' x 2' CONCRETE PAD
4" TO 6" THICK

CEMENT GROUT

RISER - TYPE PVC

SIZE 2" DIA.

BENTONITE SEAL

SCREEN - TYPE PVC

SIZE 0.010

FILTER TYPE 20/30 SILICA SAND

02-0112-02

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 10942-002-01
REPORT NO.:
PAGE NO.:

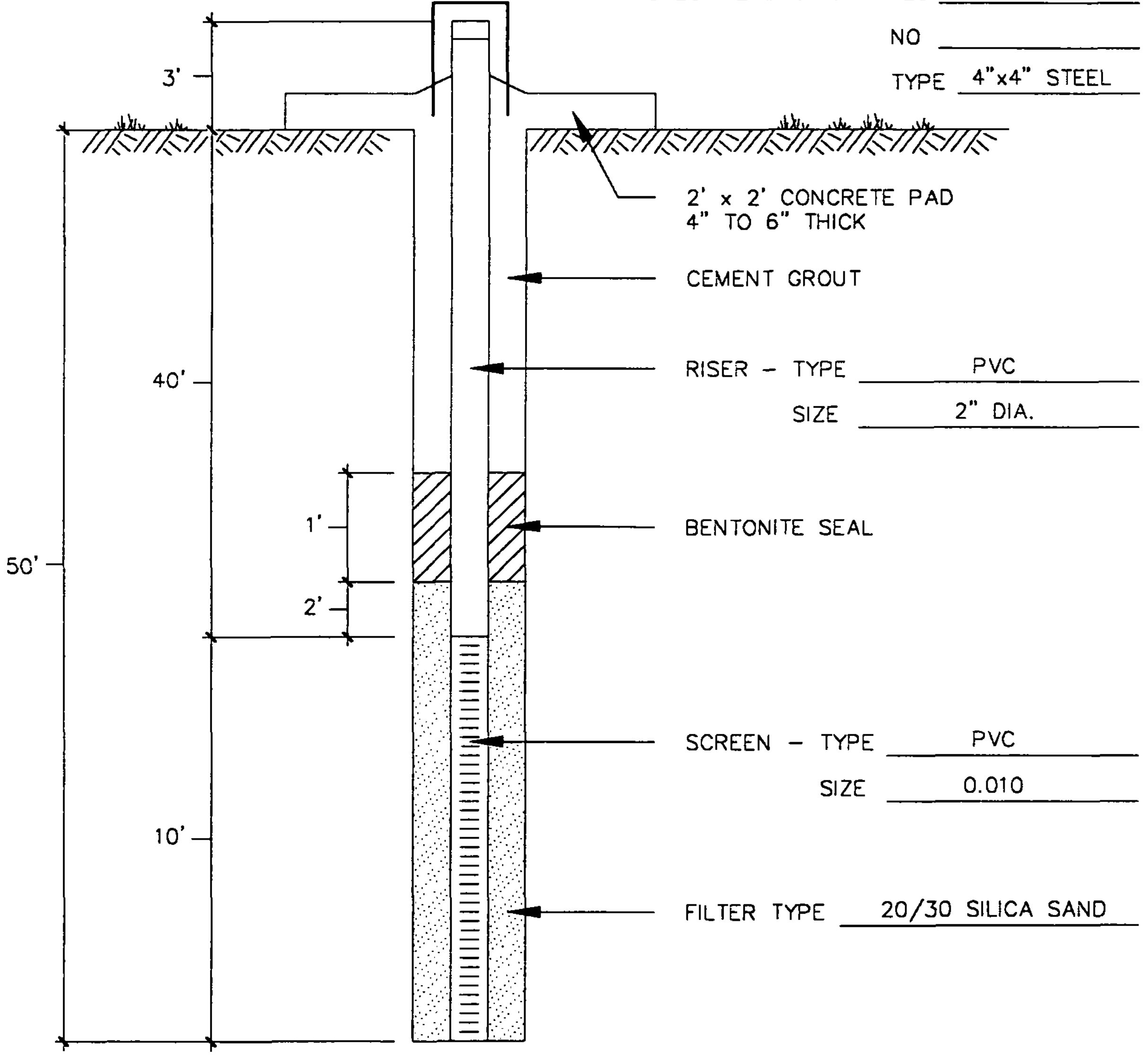
PROJECT: BISHOP & BUTTREY PIT 125, KEENE ROAD LANDFILL EXPANSION, ORANGE COUNTY, FLORIDA

CLIENT: BISHOP & BUTTREY DATE: 2/6/02

WELL NUMBER: MW-E11 LOCATION: AS SPECIFIED BY CLIENT

INSTALLED BY: U.E.S. DRILLING DEPT. - ORLANDO

WELL DIAGRAM - NOT TO SCALE



PROTECTIVE CASING - YES X
NO
TYPE 4"x4" STEEL

2' x 2' CONCRETE PAD
4" TO 6" THICK

CEMENT GROUT

RISER - TYPE PVC
SIZE 2" DIA.

BENTONITE SEAL

SCREEN - TYPE PVC
SIZE 0.010

FILTER TYPE 20/30 SILICA SAND

02-0112-

EXHIBIT D

BUTTREY DEVELOPMENT THREE L.L.C.
Monitor Well/Piezometer Readings (NGVD)

WELL NO.	MW-E9	MW-E10	MW-E11	
DIAMETER	2 - INCH	2 - INCH	2 - INCH	
TOTAL DEPTH	52 - FEET	48 - FEET	50 - FEET	
SCREEN INTERVAL	42' - 52' NGVD	38' TO 48' NGVD	42' TO 52' NGVD	
GROUND ELEV.	96.90' NGVD	87.62' NGVD	91.96' NGVD	
TOC - NGVD	99.58'	90.59'	94.50'	

DATE	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)
02/11/02	51.18/48.40	42.01/48.58	46.85/47.65	
03/29/02	52.76/46.82	43.37/47.22	48.23/46.27	
04/26/02	53.30/46.28	43.50/47.09	48.63/45.87	

C:\MyFiles\pit125application\DTW.WPD

Monitor Well/Piezometer Readings (NGVD)

WELL NO.	PZ-1	MW-1	MW-2	MW-3
DIAMETER	2 - INCH	2 - INCH	2 - INCH	2 - INCH
TOTAL DEPTH	~50 - FEET	46 - FEET	42 - FEET	52 - FEET
SCREEN LENGTH	unknown	20- FEET	15 - FEET	15 - FEET
RISER	~ 3 - FEET	2.89 - FEET	2.48 - FEET	2.64 - FEET
TOC - NGVD	79.68'	109.26'	85.67'	95.92'

DATE	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)
05/10/99	31.76/47.92	27.45/81.81	36.91/48.76	48.62/47.30
05/19/99	-	27.36/81.90	37.01/48.66	48.48/47.44
12/14/99	25.55/54.13	23.40/85.86	30.37/55.30	42.32/53.60
03/09/00	28.40/51.28	25.98/83.28	33.44/52.23	46.85/49.07
04/24/00	31.08/48.60	26.90/82.36	35.99/49.68	48.68/47.24
04/28/00	31.20/48.48	26.81/82.45	36.20/49.47	48.88/47.04
05/15/00	32.38/47.30	27.05/82.21	37.29/48.38	50.26/45.66
06/23/00	34.89/44.79	27.42/81.84	39.94/45.73	51.05/44.87
07/17/00	34.28/45.40	27.56/81.70	39.69/45.98	50.99/44.93
08/25/00	33.81/45.87	27.64/81.62	39.46/46.21	50.62/45.03
09/01/00	-	27.66/81.60	-	-
10/17/00	32.86/46.82	26.91/82.35	38.45/47.22	52.50/43.42
11/21/00	34.05/45.63	27.28/81.98	39.48/46.19	51.00/44.92
02/28/01	34.79/44.89	28.07/81.19	40.45/45.22	51.05/44.87
04/11/01	34.68/45.00	28.20/81.06	40.06/45.61	51.08/44.84
05/16/01	35.74/43.94	28.25/81.01	41.10/44.57	51.06/44.86
08/07/01	33.10/46.58	27.74/81.52	39.30/46.37	50.12/45.80
09/19/01	31.46/48.22	27.38/81.88	37.05/48.62	47.73/48.19
11/14/01	30.08/49.60	26.29/82.97	35.77/49.90	47.00/48.92
01/24/02	31.37/48.31	31.38/77.88	37.05/48.62	48.38/47.54

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Notes: - Well not available for reading

Monitor Well/Piezometer Readings (NGVD)

WELL NO.	**PZ-1**	**MW-1**	**MW-2**	**MW-3**
DIAMETER	2 - INCH	2 - INCH	2 - INCH	2 - INCH
TOTAL DEPTH	~50 - FEET	46 - FEET	42 - FEET	52 - FEET
SCREEN LENGTH	unknown	20- FEET	15 - FEET	15 - FEET
RISER	~ 3 - FEET	2.89 - FEET	2.48 - FEET	2.64 - FEET
TOC - NGVD	79.68'	109.26'	85.67'	95.92'

DATE	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)
02/11/02	31.84/47.84	27.60/81.66	37.45/48.22	49.16/46.76
03/29/02	32.39/47.29	27.90/81.36	37.90/47.77	50.00/45.92
04/26/02	33.37/46.31	27.97/81.29	38.66/47.01	50.61/45.31

Notes: - Well not available for reading

Monitor Well/Piezometer Readings (NGVD)

WELL NO.	**PZ-8a**	**PZ-8b**	**PZ-13a**	**PZ-13b**
DIAMETER	2 - INCH	2 - INCH	2 - INCH	2 - INCH
TOTAL DEPTH	75 - FEET	33 - FEET	73 - FEET	55 - FEET
SCREEN LENGTH	5 - FEET	10- FEET	5 - FEET	10 - FEET
RISER ABOVE GROUND	3.01 - FEET	2.98 - FEET	2.88 - FEET	3.04 - FEET
TOC - NGVD	78.11'	77.99'	103.08'	103.14'

DATE	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)
04/24/00	29.47/48.64	29.29/48.70	48.31/54.77	43.15/59.99
04/28/00	29.63/48.48	29.44/48.55	50.10/52.98	43.54/59.60
05/02/00	-	-	50.16/52.92	43.78/59.36
05/15/00	30.85/47.26	30.75/47.24	51.23/51.85	44.39/58.75
06/23/00	33.32/44.79	33.18/44.81	53.23/49.85	46.02/57.12
07/17/00	32.71/45.40	32.57/45.42	52.89/50.19	46.35/56.79
08/25/00	32.23/45.88	32.12/45.87	52.99/50.09	46.50/56.64
09/01/00	-	-	-	-
10/17/00	31.30/46.81	31.17/46.82	53.22/49.86	47.66/55.48
11/21/00	32.46/45.65	32.45/45.54	54.52/48.56	48.50/54.64
02/28/01	33.20/44.91	33.05/44.94	55.50/47.58	50.28/52.86
04/11/01	33.11/45.00	33.00/44.99	55.91/47.17	51.08/52.06
05/16/01	34.20/43.91	34.10/43.89	57.12/45.96	51.89/51.25
08/07/01	31.50/46.61	31.40/46.59	55.60/47.48	52.55/50.59
09/19/01	29.80/48.31	29.57/48.42	53.50/49.58	51.43/51.71
11/14/01	28.55/49.56	28.39/49.60	52.12/50.96	49.05/54.09
01/24/02	-	-	52.58/50.50	47.85/55.29
02/11/02	-	-	53.21/49.87	48.05/55.09
03/29/02	-	-	53.96/49.87	48.75/54.39

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Notes: - Well not available for reading

Monitor Well/Piezometer Readings (NGVD)

WELL NO.	**PZ-8a**	**PZ-8b**	**PZ-13a**	**PZ-13b**
DIAMETER	2 - INCH	2 - INCH	2 - INCH	2 - INCH
TOTAL DEPTH	75 - FEET	33 - FEET	73 - FEET	55 - FEET
SCREEN LENGTH	5 - FEET	10- FEET	5 - FEET	10 - FEET
RISER ABOVE GROUND	3.01 - FEET	2.98 - FEET	2.88 - FEET	3.04 - FEET
TOC - NGVD	78.11'	77.99'	103.08'	103.14'

DATE	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)
04/26/02	-	-	54.47/48.61	49.34/53.80

C:\MyFiles\pit125application\DTW91.WPD

Notes: - Well not available for reading

Monitor Well/Piezometer Reading (NGVD)

WELL NO.	**PZ-17a**	**PZ-17b**	**PZ-18**	**PZ-18b**
DIAMETER	2 - INCH	2 - INCH	2 - INCH	1 - INCH
TOTAL DEPTH	50 - FEET	20 - FEET	30 - FEET	44 - FEET
SCREEN LENGTH	5 - FEET	10- FEET	10 - FEET	10 - FEET
RISER ABOVE GROUND	3.13 - FEET	3.08 - FEET	3.06 - FEET	2.45 - FEET
TOC - NGVD	61.93'	61.58'	97.96'	85.11'

DATE	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)
04/24/00	12.30/49.63	12.01/49.57	Dry/<65	-
04/28/00	12.41/49.52	12.11/49.47	Dry/<65	-
05/02/00	-	-	-	-
05/15/00	13.48/48.45	13.18/48.40	Dry/<65	-
06/23/00	15.88/46.05	15.60/45.98	-	-
07/17/00	15.90/46.03	15.63/45.95	-	32.57/52.54
08/25/00	15.66/46.27	15.40/46.18	-	32.01/53.10
09/01/00	-	-	Dry	-
10/17/00	14.66/47.27	14.39/47.19	-	30.64/54.47
11/21/00	15.73/46.20	15.44/46.14	-	32.00/53.11
02/28/01	16.62/45.31	16.32/45.26	-	33.32/51.59
04/11/01	16.33/45.60	16.00/45.58	-	33.01/52.10
05/16/01	17.30/44.63	17.05/44.53	-	33.59/51.52
08/07/01	15.66/46.27	15.24/46.34	-	31.95/53.16
09/19/01	12.39/49.04	12.55/49.03	-	29.45/55.66
11/14/01	12.00/49.93	11.74/49.84	-	30.36/54.75
01/24/02	13.18/48.75	12.95/48.63	-	31.85/53.23
02/11/02	13.61/48.32	13.33/48.25	-	32.69/52.42
03/29/02	14.12/47.81	13.81/47.77	-	33.02/52.09
04/26/02	14.88/47.05	14.64/46.94	-	33.38/51.73

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Notes: - Well not available for reading

Monitor Well/Piezometer Readings (NGVD)

WELL NO.	**PZ-19**	**PZ-19b**	**PZ-20**	**PZ-20b**
DIAMETER	2 - INCH	1 - INCH	2 - INCH	2 - INCH
TOTAL DEPTH	40 - FEET	65 - FEET	15 - FEET	35 - FEET
SCREEN LENGTH	10 - FEET	10- FEET	10 - FEET	10 - FEET
RISER ABOVE GROUND	2.99 - FEET	0.1 - FEET	3.06 - FEET	3.10 - FEET
TOC - NGVD	109.09'/96.89'	105.07'	78.56'	78.25/73.33

DATE	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)
04/24/00	26.23/82.86	-	17.77/<60.79	-
04/28/00	26.28/82.81	-	17.81/<60.75	-
05/02/00	26.28/82.81	-	-	-
05/15/00	26.44/82.65	-	17.80/<60.76	-
06/23/00	26.73/82.36	-	-	-
07/17/00	26.70/82.39	49.12/55.95	-	32.79/45.46
08/25/00	26.74/82.35	48.76/56.31	-	32.19/46.06
09/01/00	26.76/82.33	-	Dry	-
10/17/00	13.84/83.05	-	-	26.56/46.77
11/20/00	-	-	-	28.32/45.01
02/28/01	-	-	-	28.50/44.83
04/11/01	-	-	-	29.00/44.33
05/16/01	-	-	-	30.03/43.30
08/07/01	-	-	-	26.57/46.76
09/19/01	-	-	-	24.11/49.22
11/14/01	-	-	-	24.00/49.33
01/24/02	-	-	-	25.45/47.88
02/11/02	-	-	-	26.20/47.13
03/29/02	-	-	-	27.18/46.15
04/26/02	-	-	-	27.82/45.51

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Notes: - Well not available for reading

Monitor Well/Piezometer Readings (NGVD)

WELL NO.	PZ-21	PZ-21b	PZ-22	PZ-
DIAMETER	2 - INCH	1 - INCH	1 - INCH	
TOTAL DEPTH	43 - FEET	50 - FEET	50 - FEET	
SCREEN LENGTH	10 - FEET	10 - FEET	10 - FEET	
RISER ABOVE GROUND	2.36 - FEET	2.94 - FEET	3.42 - FEET	
TOC - NGVD	91.46'	91.96'	91.05'	

DATE	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)
04/24/00	44.69*/<46.77	-	-	
04/28/00	44.67*/<46.79	-	-	
05/15/00	44.68*/<46.78	-	-	
06/23/00	44.76*/<46.70	-	-	
07/17/00	-	47.59/44.70	45.20/45.85	
08/25/00	-	46.96/45.00	45.02/46.03	
09/01/00	-	-	-	
10/17/00	-	44.76/45.36	45.56/45.50	
11/21/00	-	47.90/44.06	47.04/44.01	
02/28/01	-	48.13/43.83	47.18/43.87	
04/11/01	-	48.20/43.76	47.30/43.75	
05/16/01	-	49.25/42.71	48.58/42.47	
08/07/01	-	-	40.60/50.45	
09/19/01	-	-	38.80/52.55	
11/14/01	-	-	38.46/52.59	
01/24/02	-	-	40.05/51.00	
02/11/02	-	-	40.89/50.16	
03/29/02	-	-	41.90/49.15	
04/26/02	-	-	42.33/48.72	

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Notes: - Well not available for reading

Monitor Well/Piezometer Readings (NGVD)

WELL NO.	PZ-30	PZ-31	PZ-	PZ-
DIAMETER	1 - INCH	1 - INCH		
TOTAL DEPTH	40 - FEET	40 - FEET		
SCREEN LENGTH	10 - FEET	10 - FEET		
RISER ABOVE GROUND	3.29 - FEET	2.49 - FEET		
TOC - NGVD	109.19'	108.89'		

DATE	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)	DTW/ELEVATION (Feet/NGVD)
09/01/00	22.99/86.20	24.24/84.65		
10/17/00	22.52/86.67	23.86/85.03		
11/21/00	22.63/86.56	24.12/84.77		
02/28/01	23.80/85.39	24.98/83.91		
04/11/01	23.84/85.35	24.81/84.08		
05/16/01	23.74/85.45	24.97/83.92		
08/07/01	23.50/85.69	24.38/84.51		
09/19/01	22.88/86.31	23.75/85.14		
11/14/01	22.07/87.12	23.60/85.29		
01/24/02	23.13/86.06	24.27/84.62		
02/11/02	23.38/85.81	24.42/84.87		
03/29/02	23.68/85.51	24.58/84.31		
04/26/02	23.77/85.42	24.75/84.14		

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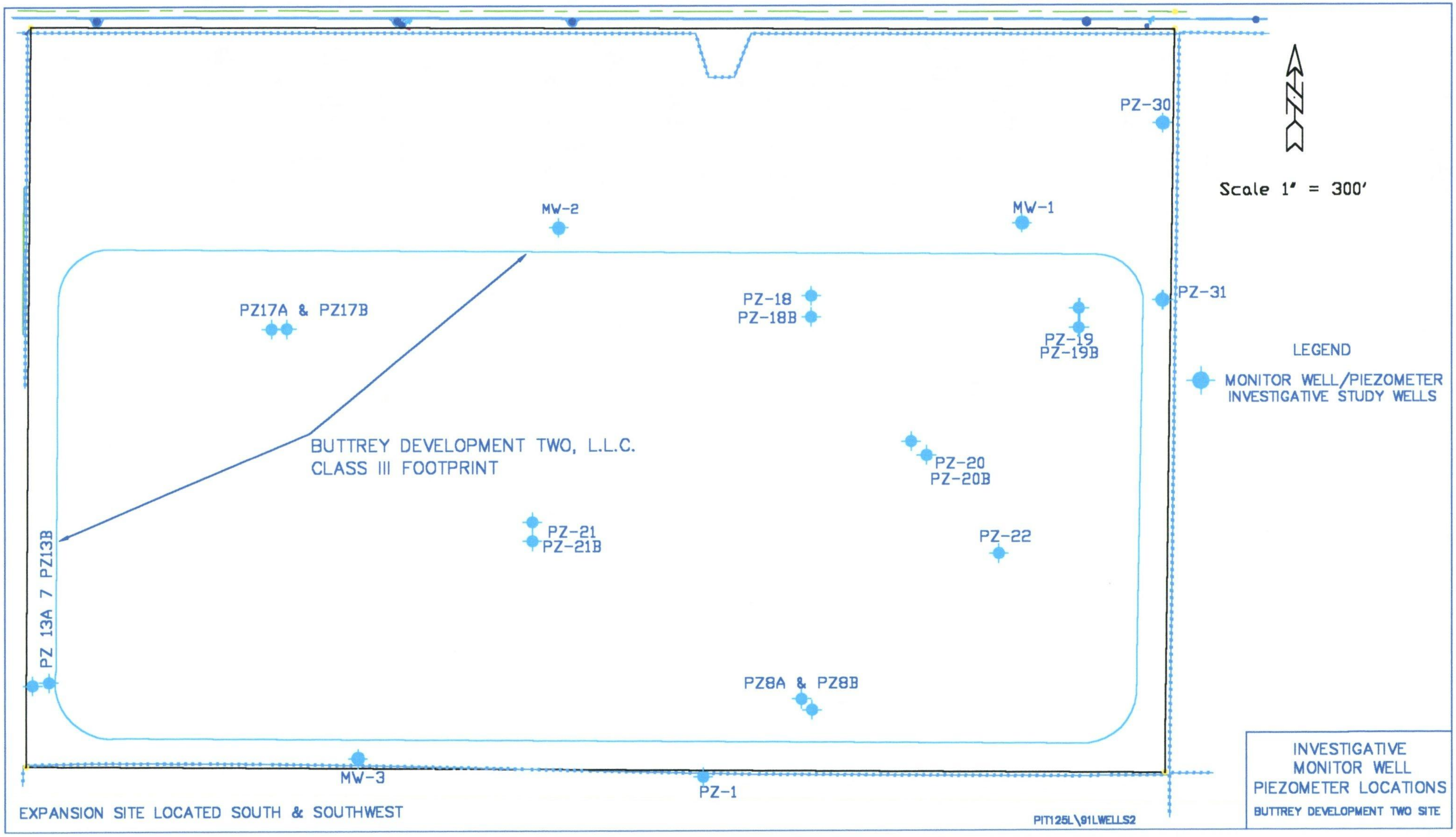
Notes: - Well not available for reading



INVESTIGATIVE
MONITOR WELL
PIEZOMETER LOCATIONS
BUTTREY DEVELOPMENT TWO SITE

EXHIBIT E

UNIVERSAL
ENGINEERING SCIENCES

GEOTECHNICAL EVALUATION

SLOPE STABILITY, BEARING CAPACITY & SETTLEMENT ANALYSIS
DISPOSAL CLASS III LANDFILL EXPANSION
B & B PIT NO. 125 - KEENE ROAD
ORANGE COUNTY, FLORIDA

PROJECT NO. 10942-002-02
REPORT NO. 223051

Prepared For:

Buttrey Development LLC
P.O. Box 1029
Clarcona, Florida 32710

Prepared By:

Universal Engineering Sciences
3532 Maggie Boulevard
Orlando, Florida 32811
(407) 423-0504

April 30, 2002

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- Tampa
- Debary

April 30, 2002

Buttrey Development, LLC.
P.O. Box 1029
Clarcona, Florida 32710

Attention: Mr. Ed Chesney, P.E.

Reference: Geotechnical Evaluation
Slope Stability, Bearing Capacity and Settlement Analyses
Proposed Disposal Class III Landfill Expansion
B&B Pit No. 125 - Keene Road
Orange County, Florida
UES Project No. 10942-002-02
UES Report No. 223051

Dear Mr. Chesney:

At your request, Universal Engineering Sciences Inc. (UES) has performed additional engineering evaluation consisting of slope stability evaluation, bearing capacity and settlement analyses for the proposed Bishop & Buttrey Development, Disposal Class III Landfill expansion (B&B Pit No. 125) located on Keene Road in Orange County, Florida. The results of our evaluation together with our conclusions, are presented in the following paragraphs.

PROJECT DESCRIPTION

As part of the geotechnical investigation for this site, Universal Engineering Sciences had performed a total of 27 soil borings for this project in between July 2001and October, 2001. The proposed Disposal Class III Landfill expansion is planned to be excavated down to about elevation 66.0 MSL. The current natural grade elevations at the expansion area vary from 90 to about 105 MSL.

We have been requested to perform a slope stability evaluation as well as provide an estimate of the settlement and factor of safety against bearing capacity failure of the landfill under loading to elevation 150 MSL. To assist us in our evaluation, we have been provided with electronic drawing files showing the proposed landfill expansion area, boring locations and cross-sectional details indicating side slope geometry along seven critical cross-sections. Additionally, we have also relied on the subsurface information collected from the soil borings and monitoring wells installed at the subject site.

SOIL DESCRIPTION

Generally the site soils consist of a surficial layer of very loose light brown to light gray sand to slightly silty in the upper 5 to 12 feet, followed by an intermediate layer of medium dense to dense, sands with silt and clayey sands and silty sands to a depth of 12 to 18 feet below existing grade. Below the clayey sands, we typically encounter medium dense to very dense, orange brown fine sands with varying amounts of silt, which was then followed by firm to stiff, orange gray sandy to silty clay or clayey sands extending to 45 to 50 feet depth. Below the clay was loose sand, limesilt, and/or solid limestone at the termination depths ranging from 55 to 78 feet below existing grade. We recommend that you refer to the soil boring logs provided in the UES report No. 209519 for detailed subsurface conditions at each boring locations.

SLOPE STABILITY EVALUATION

We have performed a slope stability evaluation of the berm slope for the landfill using the commercial software program "PCSTABL." We developed the parameters used in our slope stability evaluation from the information obtained during our field and laboratory investigations, and from information provided by you. The grading information and the cross-sectional detail provided indicates that the interior side slopes of the proposed landfill will be constructed with at least a 2:1 ratio for the lower portion of the existing grade extending to the landfill bottom elevation.

The results of our evaluation presented in Appendix A, indicates that the proposed landfill side slopes and berms do not pose a stability concern. Our evaluation indicates the proposed slope geometry results in a minimum factor of safety of 1.5 to 3.38 for all the critical cross-sections AA through G, with the fill materials and native site soils prepared with adequate level of care. Since a minimum factor of safety of 1.3 is generally acceptable for this type of construction, we believe that the landfill side slopes will remain stable. Please note that as the landfill is filled sequentially, the stability of side slopes in the filled portion will be further augmented.

BEARING CAPACITY & SETTLEMENT EVALUATION

Based on the review of the subsurface conditions encountered within the landfill footprint, we believe the weakest soil condition was encountered in boring EB-10. The landfill is proposed to be excavated to a depth of about 29 feet at this location. The bearing soils at this depth are likely to vary from sands with silts to plastic clays. The average Disposal Class III Landfill debris weight is estimated at about 75 pounds per cubic foot (pcf), and the average unit weight of soil is 115 (pcf). The average natural grade elevation at boring EB-10 is at elevation 95 feet.

Using this data, we can estimate the net loading on the base of the landfill as 2965 pounds per square foot (psf). Using an effective angle of internal friction of 20 degrees and a conservatively low cohesion value of 100 psf for the stiff clays and clayey sands, the ultimate bearing capacity of the underlying soils can be calculated as approximately 36,145 psf.

Therefore, a factor of safety of at least 12 exists against bearing capacity failure of the underlying soils. Further, we believe that majority of the settlement of the underlying clayey soils will occur during filling of the landfill. We estimate that the settlement of the underlying soils will be on the order of 1 to 2 inches during the loading phase of the land filling (see Appendix B for results). Post construction movements are estimated to be on the order 3 to 4 inches due to the presence of underlying clayey soils and internal settlement of the landfilled mass. The estimate of the internal settlement is contingent on the material landfilled.

CONSULTATION

There may be questions that arise after reviewing the report. Please feel free to contact the writer if you should have any questions concerning this information. It has been a pleasure working with you on this project.

Sincerely,
UNIVERSAL ENGINEERING SCIENCES INC.

S. Shridhar
Shridhar S. Rao, P.E.
Senior Project Engineer

R. Kenneth Derick, P.E.
P. E. No. 37711
Senior Vice President

SSR/RKD:si

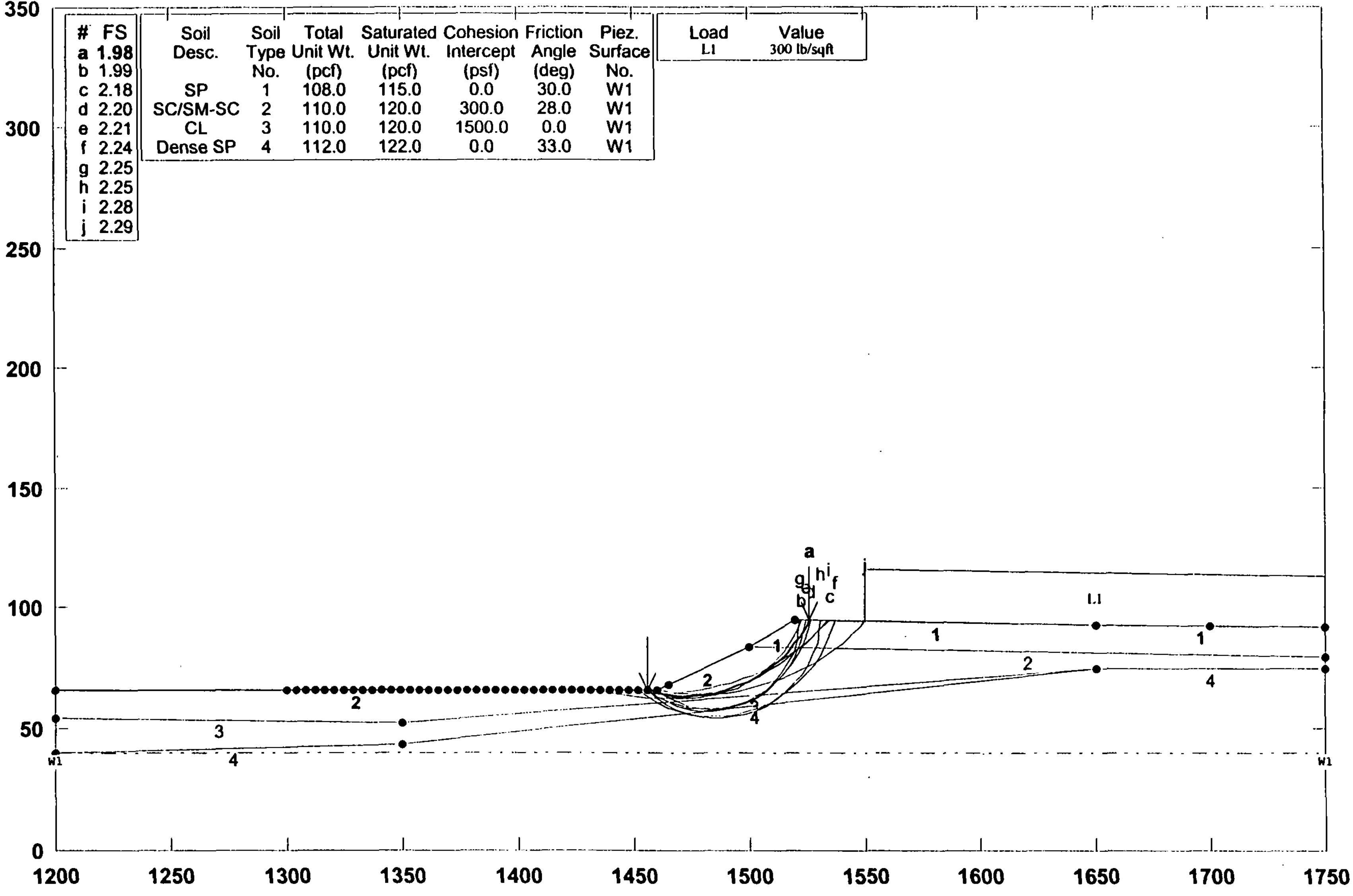
Attachments:
- Appendix A - Slope Stability Analyses
- Appendix B - Soil Bearing Capacity and Settlement Analyses

APPENDIX A

SECTION A-A

Bishop & Buttrey Pit No. 125 Keene Road Side Slope Stability - Section A-A

C:\ENGGSO~1\STEDWIN\BB125AA.PL2 Run By: Shri Rao, UES, Inc. 4/29/02 9:48AM



#	FS
a	**1.98**
b	1.99
c	2.18
d	2.20
e	2.21
f	2.24
g	2.25
h	2.25
i	2.28
j	2.29

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
SP	1	108.0	115.0	0.0	30.0	W1
SC/SM-SC	2	110.0	120.0	300.0	28.0	W1
CL	3	110.0	120.0	1500.0	0.0	W1
Dense SP	4	112.0	122.0	0.0	33.0	W1

Load	Value
L1	300 lb/sqft

STABL6H FSmin=1.98

Safety Factors Are Calculated By The Modified Janbu Method

STED

```
                      ** STABL6H  **
                            by
                     Purdue University
                 --Slope Stability Analysis--
              Simplified Janbu, Simplified Bishop
                 or Spencer`s Method of Slices
 Run Date:                   4/29/02
 Time of Run:                9:48AM
 Run By:                     Shri Rao, UES, Inc.
 Input Data Filename:        C:bb125aa.
 Output Filename:            C:bb125aa.OUT
 Plotted Output Filename:    C:bb125aa.PLT
 PROBLEM DESCRIPTION    Bishop & Buttrey Pit No. 125 Keene Road
                        Side Slope Stability - Section A-A
 BOUNDARY COORDINATES
      Note: User origin value specified.
      Add 1200.00 to X-values and 0.00 to Y-values listed.

     5 Top   Boundaries
    11 Total Boundaries
 Boundary     X-Left      Y-Left     X-Right     Y-Right     Soil Type
    No.        (ft)        (ft)        (ft)        (ft)      Below Bnd
     1           .00       66.00      260.00       66.00         2
     2        260.00       66.00      300.00       84.00         2
     3        300.00       84.00      320.00       95.00         1
     4        320.00       95.00      450.00       93.00         1
     5        450.00       93.00      550.00       92.00         1
     6        300.00       84.00      550.00       80.00         2
     7           .00       54.00      150.00       52.00         3
     8        150.00       52.00      450.00       75.00         3
     9           .00       40.00      150.00       43.00         4
    10        150.00       43.00      450.00       75.00         4
    11        450.00       75.00      550.00       75.00         4
ISOTROPIC SOIL PARAMETERS
  4 Type(s) of Soil
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
  No.   (pcf)    (pcf)     (psf)    (deg)   Param.    (psf)    No.
   1   108.0    115.0        .0     30.0     .00        .0      1
   2   110.0    120.0     300.0     28.0     .00        .0      1
   3   110.0    120.0    1500.0       .0     .00        .0      1
   4   112.0    122.0        .0     33.0     .00        .0      1
 1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
 Unit Weight of Water =  62.40
 Piezometric Surface No.  1 Specified by  2 Coordinate Points
   Point      X-Water     Y-Water
    No.         (ft)        (ft)
     1           .00       40.00
     2        550.00       40.00
BOUNDARY LOAD(S)
     1 Load(s) Specified
 Load         X-Left       X-Right      Intensity     Deflection
  No.          (ft)         (ft)        (lb/sqft)        (deg)
   1         350.00       550.00         300.0            .0
 NOTE - Intensity Is Specified As A Uniformly Distributed
        Force Acting On A Horizontally Projected Surface.
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
1600 Trial Surfaces Have Been Generated.
  40 Surfaces Initiate From Each Of 40 Points Equally Spaced
 Along The Ground Surface Between  X = 100.00 ft.
                             and  X = 260.00 ft.
 Each Surface Terminates Between   X = 265.00 ft.
                             and  X = 500.00 ft.
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =    .00 ft.
  5.00 ft. Line Segments Define Each Trial Failure Surface.
```

```
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Examined.  They Are Ordered - Most Critical
      First.
      * * Safety Factors Are Calculated By The Modified Janbu Method * *
      Failure Surface Specified By 18 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1        255.90        66.00
          2        260.75        64.79
          3        265.68        63.99
          4        270.67        63.59
          5        275.67        63.60
          6        280.65        64.03
          7        285.58        64.86
          8        290.43        66.09
          9        295.15        67.72
         10        299.73        69.73
         11        304.13        72.11
         12        308.31        74.85
         13        312.26        77.91
         14        315.94        81.30
         15        319.34        84.97
         16        322.42        88.91
         17        325.16        93.09
         18        326.15        94.91
              ***    1.975    ***
      Failure Surface Specified By 18 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1        255.90        66.00
          2        260.66        64.47
          3        265.54        63.40
          4        270.51        62.81
          5        275.51        62.70
          6        280.49        63.07
          7        285.42        63.92
          8        290.24        65.24
          9        294.92        67.01
         10        299.40        69.23
         11        303.65        71.87
         12        307.62        74.90
         13        311.29        78.30
         14        314.61        82.04
         15        317.55        86.08
         16        320.09        90.38
         17        322.21        94.91
         18        322.23        94.97
              ***    1.992    ***
      Failure Surface Specified By 21 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1        247.69        66.00
          2        252.65        65.34
          3        257.63        64.93
          4        262.63        64.78
          5        267.63        64.87
          6        272.62        65.21
          7        277.58        65.81
          8        282.51        66.65
          9        287.39        67.74
         10        292.21        69.07
         11        296.96        70.64
         12        301.62        72.45
         13        306.18        74.49
         14        310.64        76.76
         15        314.98        79.25
         16        319.18        81.95
```

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    17        323.25       84.86
    18        327.16       87.97
    19        330.92       91.27
    20        334.50       94.76
    21        334.52       94.78
       ***     2.185     ***
Failure Surface Specified By 20 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
     1        255.90       66.00
     2        260.18       63.41
     3        264.71       61.31
     4        269.45       59.72
     5        274.34       58.65
     6        279.31       58.13
     7        284.31       58.16
     8        289.28       58.73
     9        294.15       59.84
    10        298.88       61.48
    11        303.39       63.63
    12        307.64       66.26
    13        311.58       69.34
    14        315.16       72.84
    15        318.33       76.70
    16        321.06       80.89
    17        323.32       85.35
    18        325.07       90.03
    19        326.30       94.88
    20        326.31       94.90
       ***     2.200     ***
Failure Surface Specified By 19 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
     1        255.90       66.00
     2        260.04       63.20
     3        264.48       60.90
     4        269.16       59.13
     5        274.01       57.93
     6        278.97       57.30
     7        283.97       57.25
     8        288.94       57.79
     9        293.81       58.91
    10        298.52       60.59
    11        303.00       62.81
    12        307.19       65.54
    13        311.03       68.74
    14        314.47       72.37
    15        317.47       76.38
    16        319.97       80.70
    17        321.95       85.30
    18        323.38       90.09
    19        324.22       94.94
       ***     2.209     ***
Failure Surface Specified By 23 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
     1        251.80       66.00
     2        255.93       63.19
     3        260.30       60.76
     4        264.88       58.75
     5        269.62       57.17
     6        274.49       56.03
     7        279.44       55.34
     8        284.44       55.11
     9        289.43       55.34
    10        294.39       56.03
    11        299.26       57.16
```

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  12         304.00        58.74
  13         308.58        60.75
  14         312.95        63.17
  15         317.09        65.98
  16         320.95        69.16
  17         324.50        72.68
  18         327.71        76.52
  19         330.56        80.63
  20         333.01        84.98
  21         335.06        89.54
  22         336.68        94.27
  23         336.80        94.74
      ***      2.238    ***
Failure Surface Specified By 18 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
   1         260.00        66.00
   2         264.13        63.19
   3         268.60        60.94
   4         273.32        59.29
   5         278.22        58.28
   6         283.20        57.91
   7         288.19        58.20
   8         293.11        59.13
   9         297.85        60.70
  10         302.35        62.88
  11         306.53        65.63
  12         310.31        68.90
  13         313.64        72.64
  14         316.44        76.77
  15         318.68        81.24
  16         320.32        85.97
  17         321.33        90.87
  18         321.62        94.98
      ***      2.247    ***
Failure Surface Specified By 21 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
   1         255.90        66.00
   2         259.76        62.83
   3         263.96        60.11
   4         268.43        57.87
   5         273.13        56.15
   6         277.98        54.96
   7         282.94        54.32
   8         287.94        54.23
   9         292.92        54.70
  10         297.81        55.72
  11         302.56        57.29
  12         307.11        59.37
  13         311.40        61.94
  14         315.37        64.97
  15         318.98        68.43
  16         322.18        72.27
  17         324.94        76.44
  18         327.21        80.90
  19         328.98        85.57
  20         330.21        90.42
  21         330.82        94.83
      ***      2.249    ***
Failure Surface Specified By 23 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
   1         235.39        66.00
   2         240.22        64.74
   3         245.12        63.73
   4         250.06        62.98
```

```
       5        255.04        62.49
       6        260.03        62.26
       7        265.03        62.29
       8        270.03        62.58
       9        275.00        63.13
      10        279.93        63.94
      11        284.81        65.01
      12        289.64        66.33
      13        294.38        67.90
      14        299.04        69.72
      15        303.60        71.78
      16        308.04        74.07
      17        312.36        76.59
      18        316.54        79.33
      19        320.57        82.29
      20        324.44        85.46
      21        328.14        88.82
      22        331.66        92.37
      23        333.82        94.79
          ***     2.278     ***
   Failure Surface Specified By 21 Coordinate Points
     Point      X-Surf       Y-Surf
      No.        (ft)         (ft)
       1        260.00        66.00
       2        264.94        65.20
       3        269.91        64.64
       4        274.90        64.34
       5        279.90        64.29
       6        284.89        64.48
       7        289.87        64.93
       8        294.82        65.62
       9        299.73        66.57
      10        304.59        67.75
      11        309.38        69.18
      12        314.10        70.85
      13        318.72        72.75
      14        323.24        74.88
      15        327.66        77.23
      16        331.94        79.80
      17        336.10        82.59
      18        340.11        85.57
      19        343.96        88.76
      20        347.65        92.13
      21        350.03        94.54
          ***     2.293     ***
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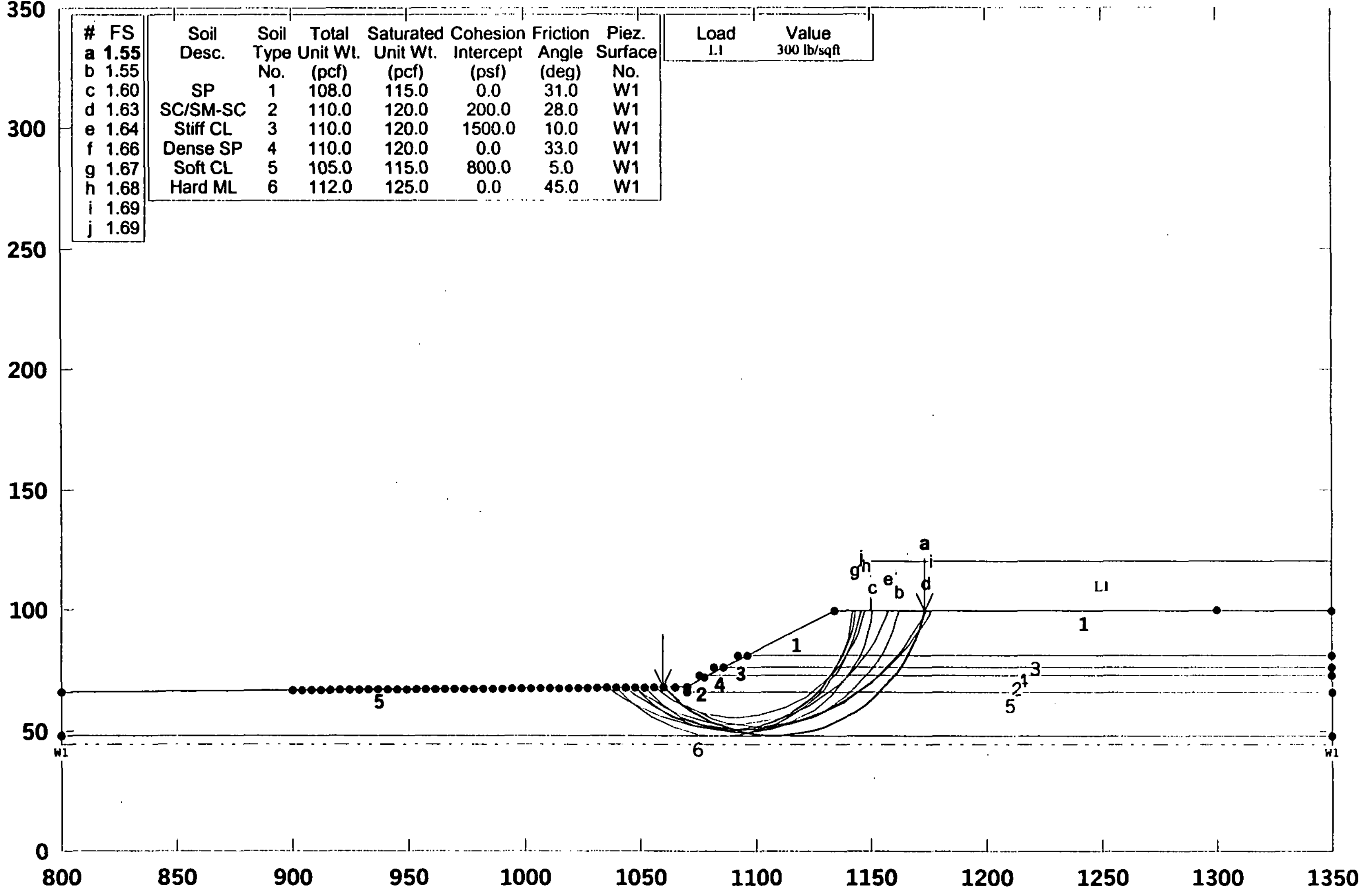
SECTION B-B

Bishop & Buttrey Pit No. 125 Keene Road Side Slope Stability - Section B-B (EB5)

C:\ENGGSO~1\STEDWIN\BB125BB.PL2 Run By: Shri Rao, UES, Inc. 4/29/02 9:51AM



#	FS
a	**1.55**
b	1.55
c	1.60
d	1.63
e	1.64
f	1.66
g	1.67
h	1.68
i	1.69
j	1.69

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
SP	1	108.0	115.0	0.0	31.0	W1
SC/SM-SC	2	110.0	120.0	200.0	28.0	W1
Stiff CL	3	110.0	120.0	1500.0	10.0	W1
Dense SP	4	110.0	120.0	0.0	33.0	W1
Soft CL	5	105.0	115.0	800.0	5.0	W1
Hard ML	6	112.0	125.0	0.0	45.0	W1

Load	Value
L1	300 lb/sqft

STABL6H FSmin=1.55

Safety Factors Are Calculated By The Modified Janbu Method

STED

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                      ** STABL6H  **
                            by
                    Purdue University
                --Slope Stability Analysis--
           Simplified Janbu, Simplified Bishop
              or Spencer`s Method of Slices
 Run Date:                  4/29/02
 Time of Run:               9:51AM
 Run By:                    Shri Rao, UES, Inc.
 Input Data Filename:       C:bb125bb.
 Output Filename:           C:bb125bb.OUT
 Plotted Output Filename:   C:bb125bb.PLT
 PROBLEM DESCRIPTION   Bishop & Buttrey Pit No. 125 Keene Road
                       Side Slope Stability - Section B-B (EB5)
 BOUNDARY COORDINATES
      Note: User origin value specified.
      Add 800.00 to X-values and 0.00 to Y-values listed.

     6 Top   Boundaries
    11 Total Boundaries
 Boundary      X-Left      Y-Left    X-Right     Y-Right     Soil Type
    No.         (ft)        (ft)       (ft)        (ft)      Below Bnd
     1           .00       66.00     270.00       68.00          5
     2        270.00       68.00     278.00       72.00          2
     3        278.00       72.00     286.00       76.00          4
     4        286.00       76.00     296.00       81.00          3
     5        296.00       81.00     334.00      100.00          1
     6        334.00      100.00     550.00      100.00          1
     7        292.00       81.00     550.00       81.00          3
     8        282.00       76.00     550.00       76.00          4
     9        276.00       73.00     550.00       73.00          2
    10        270.00       66.00     550.00       66.00          5
    11           .00       48.00     550.00       48.00          6
ISOTROPIC SOIL PARAMETERS
  6 Type(s) of Soil
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
  No.   (pcf)    (pcf)     (psf)    (deg)   Param.    (psf)    No.
   1   108.0    115.0        .0     31.0     .00        .0      1
   2   110.0    120.0     200.0     28.0     .00        .0      1
   3   110.0    120.0    1500.0     10.0     .00        .0      1
   4   110.0    120.0        .0     33.0     .00        .0      1
   5   105.0    115.0     800.0      5.0     .00        .0      1
   6   112.0    125.0        .0     45.0     .00        .0      1
 1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
 Unit Weight of Water =  62.40
 Piezometric Surface No.  1 Specified by  2 Coordinate Points
   Point      X-Water    Y-Water
    No.        (ft)       (ft)
     1          .00       45.00
     2       550.00       45.00
BOUNDARY LOAD(S)
     1 Load(s) Specified
 Load        X-Left       X-Right     Intensity     Deflection
  No.         (ft)          (ft)      (lb/sqft)        (deg)
   1        350.00        550.00        300.0            .0
 NOTE - Intensity Is Specified As A Uniformly Distributed
        Force Acting On A Horizontally Projected Surface.
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
1600 Trial Surfaces Have Been Generated.
  40 Surfaces Initiate From Each Of 40 Points Equally Spaced
 Along The Ground Surface Between  X = 100.00 ft.
                               and  X = 260.00 ft.
 Each Surface Terminates Between   X = 265.00 ft.
                              and   X = 500.00 ft.
 Unless Further Limitations Were Imposed, The Minimum Elevation
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At Which A Surface Extends Is  Y =    .00 ft.
 5.00 ft. Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Examined.  They Are Ordered - Most Critical
      First.
      * * Safety Factors Are Calculated By The Modified Janbu Method * *
      Failure Surface Specified By 30 Coordinate Points
        Point        X-Surf       Y-Surf
         No.          (ft)         (ft)
          1          260.00        67.93
          2          263.66        64.52
          3          267.57        61.40
          4          271.70        58.58
          5          276.02        56.06
          6          280.52        53.88
          7          285.16        52.03
          8          289.93        50.53
          9          294.80        49.39
         10          299.74        48.61
         11          304.72        48.20
         12          309.72        48.16
         13          314.71        48.48
         14          319.66        49.18
         15          324.55        50.24
         16          329.34        51.65
         17          334.02        53.42
         18          338.55        55.53
         19          342.92        57.97
         20          347.09        60.72
         21          351.05        63.78
         22          354.77        67.11
         23          358.24        70.72
         24          361.43        74.57
         25          364.32        78.65
         26          366.91        82.93
         27          369.17        87.38
         28          371.10        92.00
         29          372.68        96.74
         30          373.51       100.00
            ***       1.554      ***
      Failure Surface Specified By 27 Coordinate Points
        Point        X-Surf       Y-Surf
         No.          (ft)         (ft)
          1          260.00        67.93
          2          263.84        64.73
          3          267.93        61.84
          4          272.23        59.30
          5          276.73        57.11
          6          281.39        55.29
          7          286.17        53.85
          8          291.06        52.80
          9          296.02        52.15
         10          301.01        51.90
         11          306.01        52.04
         12          310.98        52.60
         13          315.89        53.54
         14          320.71        54.88
         15          325.40        56.61
         16          329.94        58.70
         17          334.30        61.15
         18          338.44        63.95
         19          342.35        67.07
         20          345.99        70.49
         21          349.35        74.20
         22          352.40        78.16
         23          355.12        82.36
         24          357.49        86.76
```

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   25        359.50      91.34
   26        361.14      96.06
   27        362.16     100.00
       ***    1.554   ***
Failure Surface Specified By 28 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        251.80      67.87
    2        255.36      64.35
    3        259.21      61.17
    4        263.32      58.33
    5        267.67      55.86
    6        272.22      53.78
    7        276.93      52.10
    8        281.76      50.83
    9        286.69      50.00
   10        291.68      49.60
   11        296.68      49.63
   12        301.66      50.10
   13        306.57      51.00
   14        311.40      52.32
   15        316.08      54.06
   16        320.60      56.20
   17        324.92      58.73
   18        328.99      61.62
   19        332.81      64.86
   20        336.32      68.41
   21        339.51      72.26
   22        342.36      76.38
   23        344.83      80.72
   24        346.92      85.26
   25        348.60      89.97
   26        349.87      94.81
   27        350.71      99.74
   28        350.73     100.00
       ***    1.597   ***
Failure Surface Specified By 32 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        243.59      67.80
    2        247.70      64.95
    3        251.96      62.33
    4        256.36      59.97
    5        260.89      57.86
    6        265.54      56.01
    7        270.28      54.43
    8        275.11      53.12
    9        280.00      52.10
   10        284.95      51.35
   11        289.93      50.89
   12        294.92      50.72
   13        299.92      50.83
   14        304.91      51.22
   15        309.86      51.91
   16        314.77      52.87
   17        319.61      54.11
   18        324.37      55.63
   19        329.04      57.42
   20        333.60      59.47
   21        338.03      61.79
   22        342.33      64.35
   23        346.47      67.15
   24        350.44      70.18
   25        354.24      73.44
   26        357.84      76.91
   27        361.24      80.58
   28        364.42      84.44
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    29         367.37        88.47
    30         370.09        92.66
    31         372.57        97.01
    32         374.05       100.00
        ***     1.629    ***
Failure Surface Specified By 28 Coordinate Points
  Point        X-Surf       Y-Surf
   No.          (ft)         (ft)
    1          247.69        67.83
    2          251.73        64.89
    3          255.97        62.23
    4          260.39        59.89
    5          264.96        57.87
    6          269.66        56.17
    7          274.47        54.81
    8          279.37        53.80
    9          284.33        53.14
   10          289.32        52.84
   11          294.32        52.89
   12          299.30        53.29
   13          304.24        54.05
   14          309.12        55.16
   15          313.90        56.61
   16          318.57        58.40
   17          323.10        60.52
   18          327.47        62.95
   19          331.66        65.69
   20          335.64        68.71
   21          339.39        72.02
   22          342.90        75.58
   23          346.15        79.38
   24          349.11        83.40
   25          351.79        87.63
   26          354.16        92.03
   27          356.21        96.59
   28          357.46       100.00
        ***     1.636    ***
Failure Surface Specified By 26 Coordinate Points
  Point        X-Surf       Y-Surf
   No.          (ft)         (ft)
    1          251.80        67.87
    2          255.34        64.34
    3          259.21        61.17
    4          263.36        58.38
    5          267.76        56.01
    6          272.37        54.07
    7          277.14        52.59
    8          282.04        51.56
    9          287.01        51.02
   10          292.01        50.95
   11          296.99        51.36
   12          301.91        52.25
   13          306.72        53.61
   14          311.38        55.42
   15          315.85        57.67
   16          320.07        60.34
   17          324.03        63.41
   18          327.66        66.83
   19          330.96        70.60
   20          333.87        74.66
   21          336.39        78.98
   22          338.47        83.53
   23          340.11        88.25
   24          341.29        93.11
   25          342.00        98.06
   26          342.09       100.00
        ***     1.656    ***
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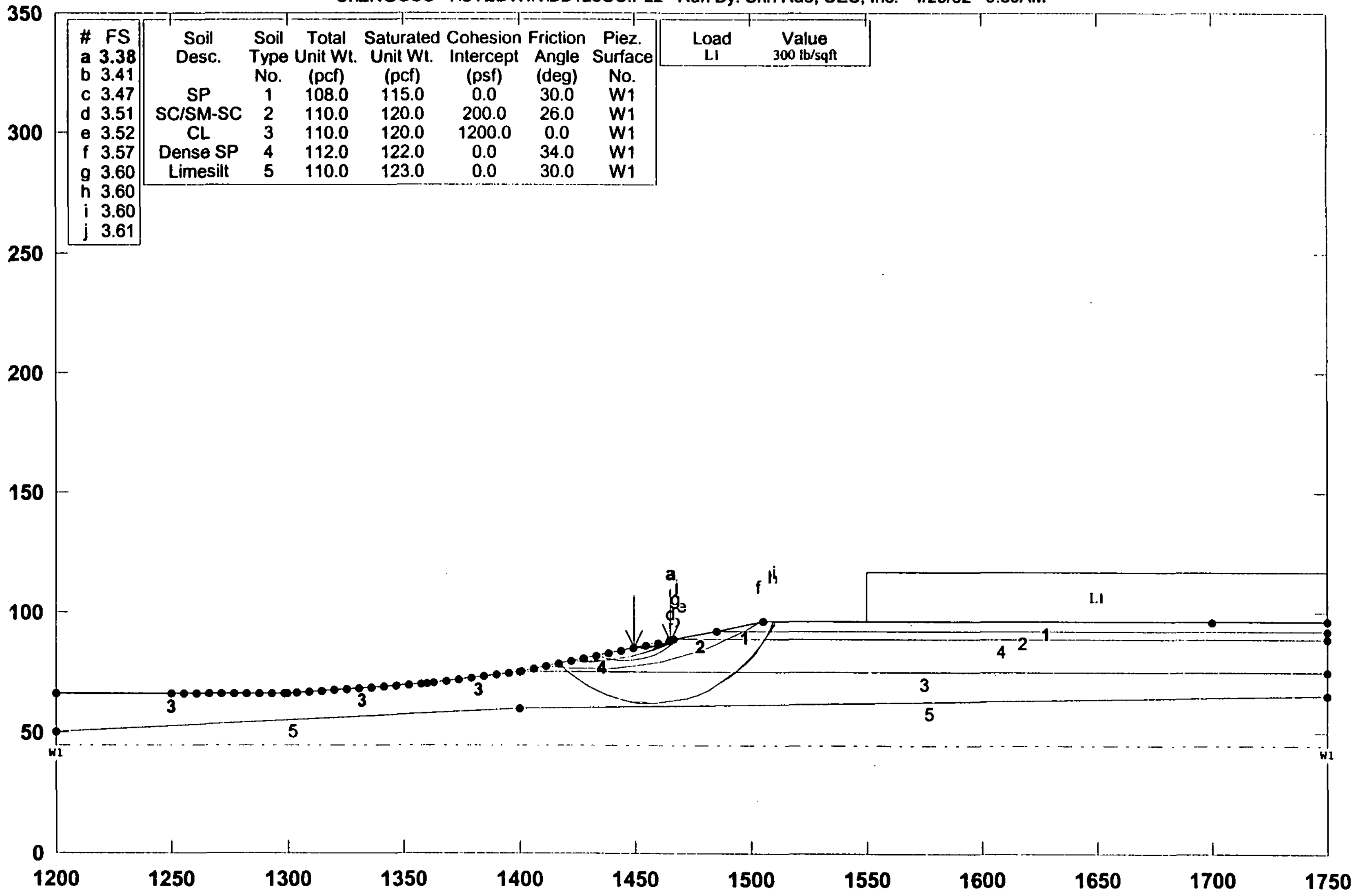
Failure Surface Specified By 27 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1        247.69        67.83
    2        251.27        64.34
    3        255.15        61.19
    4        259.30        58.40
    5        263.69        56.00
    6        268.27        54.00
    7        273.01        52.42
    8        277.88        51.28
    9        282.83        50.58
   10        287.83        50.33
   11        292.82        50.53
   12        297.78        51.19
   13        302.66        52.29
   14        307.42        53.82
   15        312.02        55.78
   16        316.42        58.14
   17        320.60        60.90
   18        324.50        64.02
   19        328.11        67.48
   20        331.40        71.25
   21        334.33        75.30
   22        336.88        79.60
   23        339.03        84.11
   24        340.77        88.80
   25        342.08        93.62
   26        342.94        98.55
   27        343.06       100.00
       ***     1.667    ***
Failure Surface Specified By 25 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1        255.90        67.90
    2        259.98        65.00
    3        264.29        62.47
    4        268.80        60.32
    5        273.49        58.57
    6        278.30        57.23
    7        283.22        56.32
    8        288.20        55.83
    9        293.19        55.77
   10        298.18        56.14
   11        303.12        56.94
   12        307.96        58.17
   13        312.69        59.81
   14        317.25        61.85
   15        321.62        64.28
   16        325.77        67.07
   17        329.65        70.22
   18        333.26        73.69
   19        336.55        77.45
   20        339.50        81.49
   21        342.09        85.76
   22        344.30        90.25
   23        346.12        94.91
   24        347.53        99.70
   25        347.59       100.00
       ***     1.676    ***
Failure Surface Specified By 34 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1        235.39        67.74
    2        239.57        65.01
    3        243.89        62.50
    4        248.34        60.20
```

```
       5        252.89        58.14
       6        257.55        56.31
       7        262.29        54.72
       8        267.10        53.38
       9        271.98        52.28
      10        276.91        51.43
      11        281.87        50.83
      12        286.86        50.49
      13        291.86        50.40
      14        296.86        50.56
      15        301.84        50.98
      16        306.79        51.66
      17        311.71        52.58
      18        316.57        53.76
      19        321.36        55.18
      20        326.08        56.84
      21        330.70        58.74
      22        335.22        60.87
      23        339.63        63.23
      24        343.91        65.81
      25        348.06        68.61
      26        352.05        71.61
      27        355.89        74.82
      28        359.56        78.21
      29        363.06        81.79
      30        366.36        85.54
      31        369.47        89.45
      32        372.38        93.52
      33        375.08        97.73
      34        376.37       100.00
         ***     1.688    ***
 Failure Surface Specified By 29 Coordinate Points
   Point      X-Surf       Y-Surf
    No.        (ft)         (ft)
       1        239.49        67.77
       2        243.05        64.27
       3        246.89        61.06
       4        250.97        58.17
       5        255.27        55.62
       6        259.76        53.43
       7        264.42        51.60
       8        269.21        50.16
       9        274.09        49.11
      10        279.05        48.46
      11        284.05        48.21
      12        289.04        48.36
      13        294.01        48.92
      14        298.92        49.87
      15        303.73        51.22
      16        308.43        52.95
      17        312.96        55.06
      18        317.31        57.52
      19        321.45        60.33
      20        325.35        63.46
      21        328.98        66.90
      22        332.32        70.61
      23        335.35        74.59
      24        338.05        78.80
      25        340.41        83.21
      26        342.40        87.80
      27        344.01        92.53
      28        345.23        97.38
      29        345.68       100.00
         ***     1.688    ***
```

SECTION C-C

Bishop & Buttrey Pit No. 125 Keene Road Side Slope Stability - Section C-C

C:\ENGGSO~1\STEDWIN\BB125CC.PL2 Run By: Shri Rao, UES, Inc. 4/29/02 9:59AM



#	FS
a	3.38
b	3.41
c	3.47
d	3.51
e	3.52
f	3.57
g	3.60
h	3.60
i	3.60
j	3.61

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
SP	1	108.0	115.0	0.0	30.0	W1
SC/SM-SC	2	110.0	120.0	200.0	26.0	W1
CL	3	110.0	120.0	1200.0	0.0	W1
Dense SP	4	112.0	122.0	0.0	34.0	W1
Limesilt	5	110.0	123.0	0.0	30.0	W1

Load	Value
L1	300 lb/sqft

STABL6H FSmin=3.38

Safety Factors Are Calculated By The Modified Janbu Method

STED

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                       ** STABL6H  **
                             by
                      Purdue University
                  --Slope Stability Analysis--
               Simplified Janbu, Simplified Bishop
                  or Spencer`s Method of Slices
 Run Date:                  4/29/02
 Time of Run:               9:59AM
 Run By:                    Shri Rao, UES, Inc.
 Input Data Filename:       C:bb125cc.
 Output Filename:           C:bb125cc.OUT
 Plotted Output Filename:   C:bb125cc.PLT
 PROBLEM DESCRIPTION    Bishop & Buttrey Pit No. 125 Keene Road
                        Side Slope Stability - Section C-C
 BOUNDARY COORDINATES
      Note: User origin value specified.
      Add 1200.00 to X-values and 0.00 to Y-values listed.

     7 Top   Boundaries
    12 Total Boundaries
 Boundary     X-Left      Y-Left     X-Right     Y-Right     Soil Type
    No.        (ft)        (ft)        (ft)        (ft)      Below Bnd
     1           .00       66.00      100.00       66.00         3
     2        100.00       66.00      160.00       70.00         3
     3        160.00       70.00      200.00       75.00         3
     4        200.00       75.00      267.00       88.50         4
     5        267.00       88.50      285.00       92.00         2
     6        285.00       92.00      305.00       96.00         1
     7        305.00       96.00      550.00       96.00         1
     8        285.00       92.00      550.00       92.00         2
     9        267.00       88.50      550.00       88.50         4
    10        200.00       75.00      550.00       75.00         3
    11           .00       50.00      200.00       60.00         5
    12        200.00       60.00      550.00       65.00         5
ISOTROPIC SOIL PARAMETERS
  5 Type(s) of Soil
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt. Intercept  Angle  Pressure Constant  Surface
  No.  (pcf)    (pcf)     (psf)    (deg)   Param.    (psf)     No.
   1   108.0    115.0        .0    30.0     .00        .0       1
   2   110.0    120.0     200.0    26.0     .00        .0       1
   3   110.0    120.0    1200.0      .0     .00        .0       1
   4   112.0    122.0        .0    34.0     .00        .0       1
   5   110.0    123.0        .0    30.0     .00        .0       1
 1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
 Unit Weight of Water =  62.40
 Piezometric Surface No.  1 Specified by  2 Coordinate Points
   Point      X-Water     Y-Water
    No.        (ft)        (ft)
     1          .00       45.00
     2       550.00       45.00
BOUNDARY LOAD(S)
     1 Load(s) Specified
 Load        X-Left      X-Right     Intensity     Deflection
  No.         (ft)        (ft)       (lb/sqft)        (deg)
   1        350.00      550.00        300.0             .0
 NOTE - Intensity Is Specified As A Uniformly Distributed
        Force Acting On A Horizontally Projected Surface.
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
1600 Trial Surfaces Have Been Generated.
  40 Surfaces Initiate From Each Of 40 Points Equally Spaced
 Along The Ground Surface Between  X =  50.00 ft.
                                 and  X = 260.00 ft.
 Each Surface Terminates Between   X = 265.00 ft.
                                 and  X = 500.00 ft.
 Unless Further Limitations Were Imposed, The Minimum Elevation
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At Which A Surface Extends Is  Y =   .00 ft.
 5.00 ft. Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Examined.  They Are Ordered - Most Critical
      First.
      * * Safety Factors Are Calculated By The Modified Janbu Method * *
      Failure Surface Specified By  5 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1         249.23        84.92
          2         254.22        85.21
          3         259.14        86.09
          4         263.93        87.55
          5         265.31        88.16
             ***     3.378    ***
      Failure Surface Specified By 11 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1         222.31        79.49
          2         227.30        79.28
          3         232.30        79.35
          4         237.29        79.72
          5         242.25        80.37
          6         247.16        81.31
          7         252.00        82.54
          8         256.77        84.05
          9         261.44        85.84
         10         266.00        87.89
         11         267.26        88.55
             ***     3.411    ***
      Failure Surface Specified By  5 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1         249.23        84.92
          2         254.21        84.49
          3         259.16        85.19
          4         263.82        87.00
          5         265.61        88.22
             ***     3.472    ***
      Failure Surface Specified By  4 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1         254.62        86.00
          2         259.61        85.76
          3         264.35        87.34
          4         265.34        88.16
             ***     3.508    ***
      Failure Surface Specified By 11 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1         222.31        79.49
          2         227.31        79.38
          3         232.30        79.53
          4         237.29        79.91
          5         242.25        80.55
          6         247.17        81.44
          7         252.04        82.57
          8         256.85        83.94
          9         261.58        85.55
         10         266.23        87.40
         11         269.85        89.05
             ***     3.522    ***
      Failure Surface Specified By 21 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1         211.54        77.33
          2         216.50        76.73
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     3        221.49       76.31
     4        226.48       76.07
     5        231.48       76.00
     6        236.48       76.10
     7        241.47       76.38
     8        246.45       76.83
     9        251.41       77.46
    10        256.35       78.26
    11        261.25       79.23
    12        266.12       80.38
    13        270.94       81.69
    14        275.72       83.17
    15        280.44       84.82
    16        285.10       86.63
    17        289.70       88.60
    18        294.22       90.73
    19        298.66       93.02
    20        303.03       95.46
    21        303.38       95.68
        ***      3.574    ***
Failure Surface Specified By  4 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
     1        254.62       86.00
     2        259.60       85.65
     3        264.46       86.83
     4        267.28       88.55
        ***      3.595    ***
Failure Surface Specified By 24 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
     1        216.92       78.41
     2        220.64       75.07
     3        224.64       72.06
     4        228.88       69.41
     5        233.34       67.15
     6        237.97       65.27
     7        242.75       63.81
     8        247.64       62.77
     9        252.61       62.16
    10        257.60       61.98
    11        262.60       62.23
    12        267.55       62.92
    13        272.42       64.04
    14        277.18       65.58
    15        281.79       67.52
    16        286.21       69.86
    17        290.41       72.57
    18        294.35       75.64
    19        298.02       79.04
    20        301.38       82.75
    21        304.40       86.73
    22        307.06       90.96
    23        309.35       95.41
    24        309.59       96.00
        ***      3.602    ***
Failure Surface Specified By 24 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
     1        216.92       78.41
     2        220.67       75.10
     3        224.68       72.12
     4        228.94       69.49
     5        233.40       67.24
     6        238.05       65.39
     7        242.83       63.93
     8        247.72       62.90
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     9        252.69       62.29
    10        257.68       62.11
    11        262.68       62.36
    12        267.63       63.03
    13        272.51       64.13
    14        277.27       65.65
    15        281.89       67.56
    16        286.33       69.87
    17        290.55       72.55
    18        294.52       75.58
    19        298.22       78.95
    20        301.62       82.62
    21        304.69       86.56
    22        307.41       90.76
    23        309.76       95.17
    24        310.11       96.00
        ***     3.604    ***
Failure Surface Specified By  9 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
     1        233.08       81.66
     2        237.89       80.30
     3        242.84       79.64
     4        247.84       79.70
     5        252.78       80.47
     6        257.56       81.95
     7        262.07       84.10
     8        266.24       86.87
     9        268.34       88.76
        ***     3.607    ***
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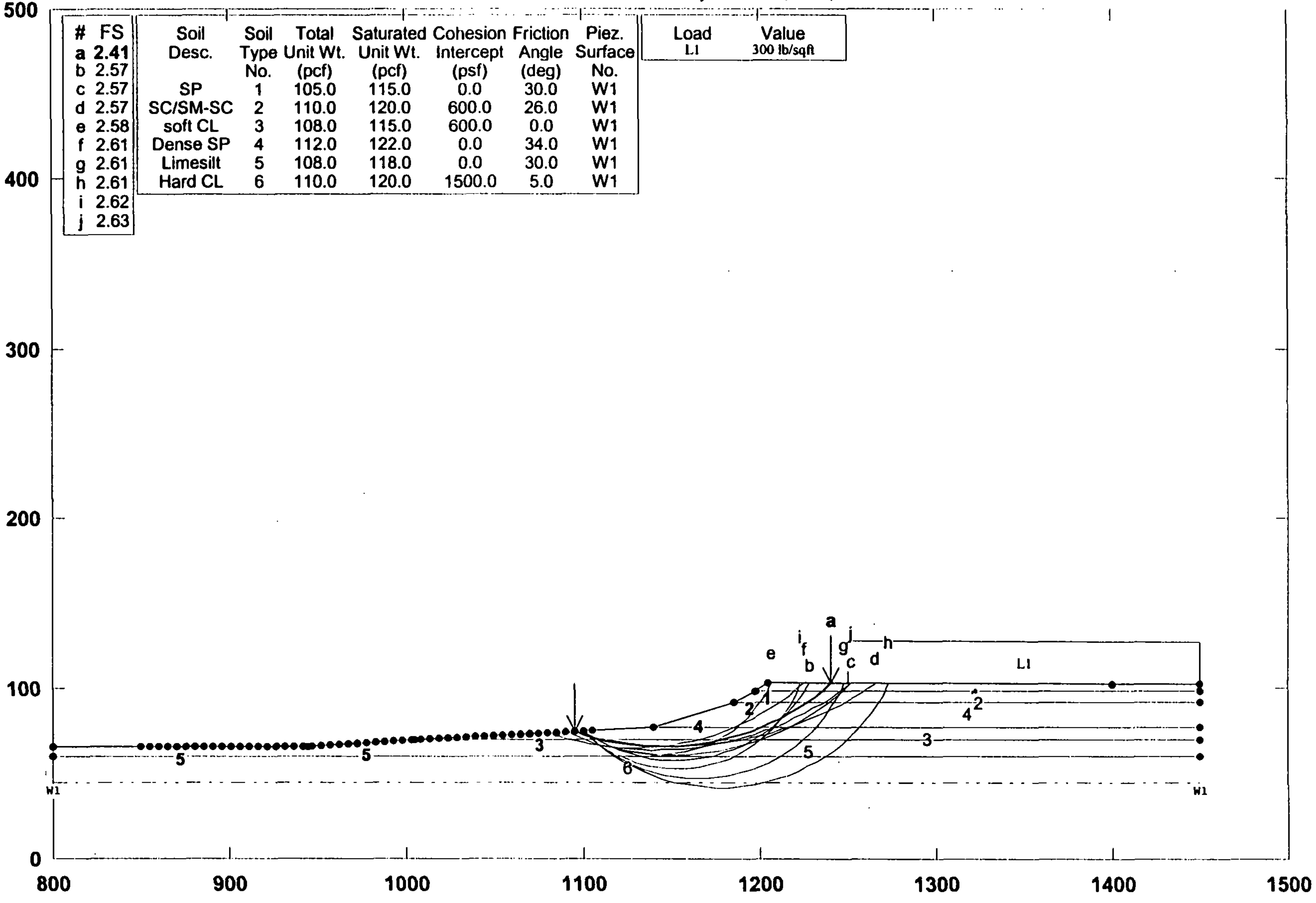
SECTION DD

Bishop & Buttrey Pit No. 125 Keene Road Side Slope Stability - Section DD (EB14)

C:\ENGGSO~1\STEDWIN\BB125DD.PL2 Run By: Shri Rao, UES, Inc. 4/29/02 10:00AM



#	FS
a	**2.41**
b	2.57
c	2.57
d	2.57
e	2.58
f	2.61
g	2.61
h	2.61
i	2.62
j	2.63

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
SP	1	105.0	115.0	0.0	30.0	W1
SC/SM-SC	2	110.0	120.0	600.0	26.0	W1
soft CL	3	108.0	115.0	600.0	0.0	W1
Dense SP	4	112.0	122.0	0.0	34.0	W1
Limesilt	5	108.0	118.0	0.0	30.0	W1
Hard CL	6	110.0	120.0	1500.0	5.0	W1

Load	Value
L1	300 lb/sqft

STABL6H FSmin=2.41

Safety Factors Are Calculated By The Modified Janbu Method

STED

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                         ** STABL6H  **
                               by
                        Purdue University
                   --Slope Stability Analysis--
               Simplified Janbu, Simplified Bishop
                  or Spencer`s Method of Slices
 Run Date:                  4/29/02
 Time of Run:               10:00AM
 Run By:                    Shri Rao, UES, Inc.
 Input Data Filename:       C:bb125dd.
 Output Filename:           C:bb125dd.OUT
 Plotted Output Filename:   C:bb125dd.PLT
 PROBLEM DESCRIPTION   Bishop & Buttrey Pit No. 125 Keene Road
                       Side Slope Stability - Section DD (EB14)
 BOUNDARY COORDINATES
      Note: User origin value specified.
      Add 800.00 to X-values and 0.00 to Y-values listed.

     7 Top    Boundaries
    12 Total Boundaries
 Boundary     X-Left      Y-Left     X-Right     Y-Right     Soil Type
    No.        (ft)        (ft)        (ft)        (ft)      Below Bnd
     1           .00       66.00      145.00       66.00         5
     2        145.00       66.00      205.00       70.00         5
     3        205.00       70.00      340.00       77.00         3
     4        340.00       77.00      385.00       92.00         4
     5        385.00       92.00      397.00       98.00         2
     6        397.00       98.00      405.00      103.00         1
     7        405.00      103.00      650.00      102.00         1
     8        397.00       98.00      650.00       98.00         2
     9        385.00       92.00      650.00       92.00         4
    10        340.00       77.00      650.00       77.00         3
    11        205.00       70.00      650.00       70.00         5
    12           .00       60.00      650.00       60.00         6
ISOTROPIC SOIL PARAMETERS
  6 Type(s) of Soil
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt.  Intercept  Angle  Pressure Constant  Surface
  No.  (pcf)     (pcf)     (psf)    (deg)   Param.    (psf)     No.
   1   105.0     115.0        .0     30.0     .00        .0      1
   2   110.0     120.0     600.0     26.0     .00        .0      1
   3   108.0     115.0     600.0       .0     .00        .0      1
   4   112.0     122.0        .0     34.0     .00        .0      1
   5   108.0     118.0        .0     30.0     .00        .0      1
   6   110.0     120.0    1500.0      5.0     .00        .0      1
 1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
 Unit Weight of Water =  62.40
 Piezometric Surface No.  1 Specified by  2 Coordinate Points
   Point      X-Water     Y-Water
    No.        (ft)        (ft)
     1           .00       45.00
     2        650.00       45.00
BOUNDARY LOAD(S)
     1 Load(s) Specified
 Load         X-Left       X-Right     Intensity     Deflection
  No.          (ft)         (ft)      (lb/sqft)        (deg)
   1         450.00       650.00        300.0            .0
 NOTE - Intensity Is Specified As A Uniformly Distributed
        Force Acting On A Horizontally Projected Surface.
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
2500 Trial Surfaces Have Been Generated.
  50 Surfaces Initiate From Each Of 50 Points Equally Spaced
 Along The Ground Surface Between  X =   50.00 ft.
                             and   X = 300.00 ft.
 Each Surface Terminates Between   X = 305.00 ft.
                             and   X = 600.00 ft.
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Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =   .00 ft.
 6.00 ft. Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Examined.  They Are Ordered - Most Critical
      First.
      * * Safety Factors Are Calculated By The Modified Janbu Method * *
      Failure Surface Specified By 27 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1         294.90        74.66
          2         300.56        72.68
          3         306.30        70.94
          4         312.12        69.45
          5         317.99        68.20
          6         323.90        67.21
          7         329.86        66.46
          8         335.83        65.97
          9         341.83        65.73
         10         347.83        65.74
         11         353.82        66.01
         12         359.80        66.53
         13         365.75        67.30
         14         371.66        68.33
         15         377.53        69.60
         16         383.33        71.12
         17         389.06        72.89
         18         394.72        74.89
         19         400.28        77.13
         20         405.75        79.61
         21         411.10        82.32
         22         416.34        85.25
         23         421.45        88.40
         24         426.42        91.76
         25         431.24        95.33
         26         435.91        99.10
         27         440.18       102.86
            ***      2.415      ***
      Failure Surface Specified By 26 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1         300.00        74.93
          2         304.92        71.49
          3         310.07        68.41
          4         315.41        65.69
          5         320.94        63.34
          6         326.61        61.39
          7         332.41        59.83
          8         338.29        58.68
          9         344.25        57.94
         10         350.24        57.62
         11         356.24        57.71
         12         362.22        58.22
         13         368.15        59.14
         14         374.00        60.47
         15         379.74        62.20
         16         385.35        64.33
         17         390.80        66.84
         18         396.06        69.73
         19         401.11        72.97
         20         405.92        76.55
         21         410.48        80.46
         22         414.75        84.67
         23         418.71        89.18
         24         422.36        93.94
         25         425.66        98.95
         26         427.90       102.91
```

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      ***     2.565     ***
Failure Surface Specified By 31 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         289.80        74.40
    2         295.28        71.97
    3         300.87        69.77
    4         306.54        67.81
    5         312.28        66.09
    6         318.10        64.61
    7         323.97        63.37
    8         329.89        62.39
    9         335.84        61.65
   10         341.82        61.17
   11         347.82        60.93
   12         353.82        60.95
   13         359.81        61.22
   14         365.79        61.74
   15         371.74        62.51
   16         377.65        63.53
   17         383.52        64.80
   18         389.32        66.32
   19         395.06        68.07
   20         400.72        70.07
   21         406.29        72.30
   22         411.76        74.76
   23         417.12        77.45
   24         422.37        80.37
   25         427.49        83.50
   26         432.47        86.84
   27         437.31        90.39
   28         441.99        94.14
   29         446.51        98.08
   30         450.87       102.21
   31         451.45       102.81
      ***     2.574     ***
Failure Surface Specified By 31 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         294.90        74.66
    2         300.66        73.00
    3         306.48        71.51
    4         312.33        70.21
    5         318.23        69.09
    6         324.15        68.14
    7         330.10        67.39
    8         336.08        66.81
    9         342.06        66.42
   10         348.06        66.22
   11         354.06        66.20
   12         360.06        66.36
   13         366.05        66.71
   14         372.02        67.24
   15         377.98        67.96
   16         383.91        68.86
   17         389.82        69.94
   18         395.68        71.21
   19         401.50        72.65
   20         407.28        74.28
   21         413.00        76.08
   22         418.67        78.05
   23         424.27        80.20
   24         429.80        82.53
   25         435.26        85.02
   26         440.64        87.68
   27         445.93        90.50
   28         451.14        93.48
```

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   29         456.25       96.63
   30         461.26       99.93
   31         465.28      102.75
      ***      2.574    ***
Failure Surface Specified By 23 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
    1         300.00       74.93
    2         304.96       71.54
    3         310.18       68.60
    4         315.64       66.11
    5         321.29       64.09
    6         327.10       62.57
    7         333.01       61.55
    8         338.99       61.04
    9         344.99       61.04
   10         350.97       61.55
   11         356.88       62.58
   12         362.68       64.10
   13         368.33       66.12
   14         373.79       68.61
   15         379.02       71.56
   16         383.97       74.94
   17         388.62       78.74
   18         392.92       82.92
   19         396.85       87.45
   20         400.38       92.30
   21         403.49       97.44
   22         406.14      102.82
   23         406.21      103.00
      ***      2.581    ***
Failure Surface Specified By 27 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
    1         279.59       73.87
    2         285.27       71.91
    3         291.02       70.20
    4         296.83       68.74
    5         302.71       67.52
    6         308.63       66.55
    7         314.59       65.84
    8         320.57       65.38
    9         326.57       65.17
   10         332.57       65.22
   11         338.56       65.52
   12         344.53       66.08
   13         350.48       66.89
   14         356.38       67.95
   15         362.24       69.27
   16         368.03       70.83
   17         373.75       72.63
   18         379.39       74.68
   19         384.94       76.96
   20         390.39       79.48
   21         395.72       82.23
   22         400.94       85.20
   23         406.02       88.38
   24         410.96       91.79
   25         415.75       95.40
   26         420.39       99.20
   27         424.54      102.92
      ***      2.613    ***
Failure Surface Specified By 31 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
    1         300.00       74.93
    2         304.26       70.70
```

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       3        308.79       66.77
       4        313.58       63.15
       5        318.60       59.87
       6        323.83       56.93
       7        329.25       54.34
       8        334.82       52.13
       9        340.54       50.30
      10        346.36       48.86
      11        352.27       47.82
      12        358.24       47.17
      13        364.23       46.93
      14        370.23       47.09
      15        376.20       47.65
      16        382.12       48.62
      17        387.97       49.98
      18        393.70       51.74
      19        399.31       53.87
      20        404.76       56.38
      21        410.03       59.25
      22        415.10       62.47
      23        419.93       66.02
      24        424.52       69.89
      25        428.83       74.06
      26        432.86       78.51
      27        436.57       83.22
      28        439.96       88.17
      29        443.01       93.34
      30        445.70       98.70
      31        447.44      102.83
        ***      2.613    ***
Failure Surface Specified By 36 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
       1        300.00       74.93
       2        304.24       70.68
       3        308.72       66.69
       4        313.42       62.95
       5        318.32       59.49
       6        323.40       56.31
       7        328.66       53.42
       8        334.07       50.83
       9        339.63       48.55
      10        345.30       46.59
      11        351.07       44.96
      12        356.92       43.65
      13        362.85       42.68
      14        368.81       42.04
      15        374.80       41.74
      16        380.80       41.77
      17        386.79       42.15
      18        392.75       42.87
      19        398.66       43.92
      20        404.49       45.30
      21        410.25       47.01
      22        415.89       49.04
      23        421.41       51.39
      24        426.79       54.05
      25        432.01       57.01
      26        437.06       60.25
      27        441.91       63.78
      28        446.56       67.57
      29        450.99       71.63
      30        455.17       75.92
      31        459.11       80.45
      32        462.79       85.19
      33        466.20       90.13
      34        469.32       95.25
```

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     35         472.14       100.55
     36         473.15       102.72
        ***      2.614   ***
Failure Surface Specified By 27 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
      1         300.00        74.93
      2         304.35        70.79
      3         309.02        67.02
      4         313.98        63.65
      5         319.19        60.68
      6         324.64        58.16
      7         330.27        56.08
      8         336.04        54.47
      9         341.94        53.33
     10         347.90        52.67
     11         353.90        52.51
     12         359.89        52.82
     13         365.83        53.63
     14         371.69        54.92
     15         377.43        56.68
     16         383.01        58.89
     17         388.38        61.56
     18         393.52        64.65
     19         398.40        68.15
     20         402.97        72.04
     21         407.21        76.28
     22         411.09        80.86
     23         414.59        85.73
     24         417.68        90.87
     25         420.34        96.25
     26         422.56       101.83
     27         422.89       102.93
        ***      2.616   ***
Failure Surface Specified By 32 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
      1         279.59        73.87
      2         285.29        71.98
      3         291.04        70.28
      4         296.85        68.77
      5         302.70        67.46
      6         308.60        66.34
      7         314.53        65.42
      8         320.48        64.70
      9         326.46        64.17
     10         332.45        63.85
     11         338.45        63.72
     12         344.45        63.79
     13         350.44        64.07
     14         356.43        64.54
     15         362.39        65.21
     16         368.33        66.07
     17         374.23        67.14
     18         380.10        68.40
     19         385.92        69.85
     20         391.69        71.50
     21         397.40        73.34
     22         403.05        75.36
     23         408.62        77.58
     24         414.12        79.97
     25         419.54        82.55
     26         424.87        85.31
     27         430.11        88.24
     28         435.24        91.35
     29         440.27        94.62
     30         445.18        98.06
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            31          449.98        101.66
            32          451.42        102.81
                ***      2.625    ***
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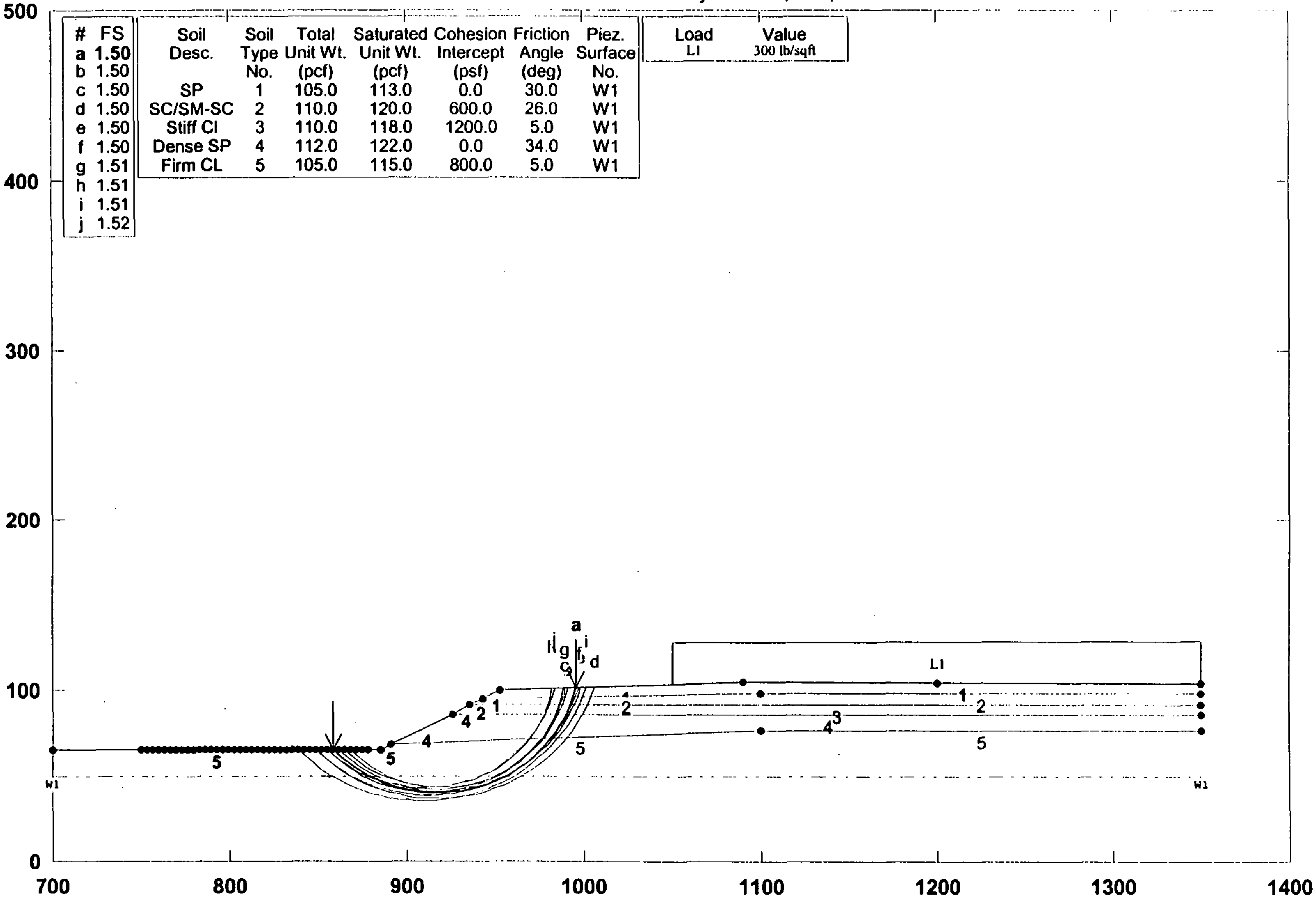
SECTION EE

Bishop & Buttrey Pit No. 125 Keene Road Side Slope Stability- EE (EB15/PB8)

C:\ENGGSO~1\STEDWIN\BB125EE.PL2 Run By: Shri Rao, UES, Inc. 4/29/02 10:02AM



#	FS
a	**1.50**
b	1.50
c	1.50
d	1.50
e	1.50
f	1.50
g	1.51
h	1.51
i	1.51
j	1.52

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
SP	1	105.0	113.0	0.0	30.0	W1
SC/SM-SC	2	110.0	120.0	600.0	26.0	W1
Stiff Cl	3	110.0	118.0	1200.0	5.0	W1
Dense SP	4	112.0	122.0	0.0	34.0	W1
Firm CL	5	105.0	115.0	800.0	5.0	W1

Load	Value
L1	300 lb/sqft

STABL6H FSmin=1.50

Safety Factors Are Calculated By The Modified Janbu Method

STED

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                      ** STABL6H  **
                             by
                      Purdue University
                 --Slope Stability Analysis--
              Simplified Janbu, Simplified Bishop
                 or Spencer`s Method of Slices
 Run Date:                  4/29/02
 Time of Run:               10:02AM
 Run By:                    Shri Rao, UES, Inc.
 Input Data Filename:       C:bb125ee.
 Output Filename:           C:bb125ee.OUT
 Plotted Output Filename:  C:bb125ee.PLT
 PROBLEM DESCRIPTION   Bishop & Buttrey Pit No. 125 Keene Road
                       Side Slope Stability- EE (EB15/PB8)
 BOUNDARY COORDINATES
      Note: User origin value specified.
      Add 700.00 to X-values and 0.00 to Y-values listed.

    8 Top   Boundaries
   14 Total Boundaries
 Boundary     X-Left     Y-Left     X-Right     Y-Right     Soil Type
    No.        (ft)       (ft)       (ft)        (ft)       Below Bnd
     1          .00       66.00     185.00       66.00          5
     2       185.00       66.00     191.00       69.00          5
     3       191.00       69.00     226.00       86.50          4
     4       226.00       86.50     236.00       91.50          4
     5       236.00       91.50     243.00       95.00          2
     6       243.00       95.00     253.00      100.00          1
     7       253.00      100.00     390.00      104.50          1
     8       390.00      104.50     650.00      104.00          1
     9       243.00       95.00     400.00       98.00          2
    10       400.00       98.00     650.00       98.00          2
    11       236.00       91.50     650.00       91.50          3
    12       226.00       86.50     650.00       86.50          4
    13       191.00       69.00     400.00       77.50          5
    14       400.00       77.50     650.00       77.50          5
ISOTROPIC SOIL PARAMETERS
  5 Type(s) of Soil
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant  Surface
  No.  (pcf)    (pcf)     (psf)    (deg)   Param.    (psf)     No.
   1   105.0    113.0        .0     30.0     .00        .0       1
   2   110.0    120.0     600.0     26.0     .00        .0       1
   3   110.0    118.0    1200.0      5.0     .00        .0       1
   4   112.0    122.0        .0     34.0     .00        .0       1
   5   105.0    115.0     800.0      5.0     .00        .0       1
 1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
 Unit Weight of Water =  62.40
 Piezometric Surface No.  1 Specified by  2 Coordinate Points
   Point     X-Water     Y-Water
    No.        (ft)        (ft)
     1          .00       50.00
     2       650.00       50.00
BOUNDARY LOAD(S)
     1 Load(s) Specified
 Load        X-Left       X-Right      Intensity     Deflection
  No.         (ft)         (ft)       (lb/sqft)        (deg)
   1        350.00       650.00        300.0             .0
 NOTE - Intensity Is Specified As A Uniformly Distributed
        Force Acting On A Horizontally Projected Surface.
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
1600 Trial Surfaces Have Been Generated.
  40 Surfaces Initiate From Each Of 40 Points Equally Spaced
 Along The Ground Surface Between  X =  50.00 ft.
                               and  X = 178.00 ft.
 Each Surface Terminates Between   X = 185.00 ft.
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                          and   X = 500.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =    .00 ft.
 5.00 ft. Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Examined.  They Are Ordered - Most Critical
      First.
      * * Safety Factors Are Calculated By The Modified Janbu Method * *
      Failure Surface Specified By 36 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1         158.31        66.00
          2         161.85        62.47
          3         165.60        59.16
          4         169.54        56.09
          5         173.67        53.27
          6         177.97        50.71
          7         182.41        48.42
          8         186.99        46.41
          9         191.68        44.69
         10         196.48        43.26
         11         201.35        42.13
         12         206.28        41.30
         13         211.25        40.77
         14         216.24        40.56
         15         221.24        40.65
         16         226.23        41.06
         17         231.18        41.77
         18         236.07        42.78
         19         240.90        44.10
         20         245.63        45.71
         21         250.26        47.61
         22         254.75        49.79
         23         259.11        52.25
         24         263.30        54.97
         25         267.32        57.94
         26         271.15        61.16
         27         274.77        64.60
         28         278.18        68.27
         29         281.35        72.13
         30         284.27        76.19
         31         286.94        80.42
         32         289.34        84.80
         33         291.47        89.33
         34         293.31        93.98
         35         294.86        98.73
         36         295.55       101.40
            ***      1.495    ***
      Failure Surface Specified By 36 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1         155.03        66.00
          2         158.56        62.47
          3         162.31        59.16
          4         166.26        56.09
          5         170.40        53.28
          6         174.70        50.73
          7         179.15        48.45
          8         183.73        46.46
          9         188.43        44.75
         10         193.23        43.35
         11         198.11        42.24
         12         203.04        41.44
         13         208.02        40.95
         14         213.02        40.78
         15         218.01        40.91
         16         222.99        41.36
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     17         227.94        42.11
     18         232.82        43.18
     19         237.63        44.54
     20         242.35        46.21
     21         246.95        48.16
     22         251.42        50.40
     23         255.74        52.92
     24         259.90        55.69
     25         263.87        58.73
     26         267.65        62.00
     27         271.22        65.51
     28         274.56        69.23
     29         277.66        73.15
     30         280.51        77.26
     31         283.10        81.53
     32         285.42        85.96
     33         287.45        90.53
     34         289.20        95.22
     35         290.65       100.00
     36         290.95       101.25
        ***      1.498    ***
 Failure Surface Specified By 34 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
      1         161.59        66.00
      2         165.14        62.48
      3         168.92        59.21
      4         172.91        56.19
      5         177.09        53.45
      6         181.44        50.99
      7         185.95        48.82
      8         190.59        46.96
      9         195.34        45.41
     10         200.19        44.18
     11         205.11        43.27
     12         210.07        42.69
     13         215.07        42.45
     14         220.06        42.53
     15         225.05        42.95
     16         229.99        43.70
     17         234.87        44.78
     18         239.67        46.17
     19         244.37        47.89
     20         248.95        49.91
     21         253.37        52.23
     22         257.64        54.84
     23         261.72        57.73
     24         265.60        60.88
     25         269.26        64.28
     26         272.69        67.92
     27         275.87        71.78
     28         278.79        75.84
     29         281.43        80.09
     30         283.78        84.50
     31         285.83        89.06
     32         287.58        93.75
     33         289.01        98.54
     34         289.62       101.20
        ***      1.498    ***
 Failure Surface Specified By 40 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
      1         148.46        66.00
      2         152.03        62.50
      3         155.78        59.19
      4         159.69        56.08
      5         163.77        53.18
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      6         167.99        50.50
      7         172.35        48.05
      8         176.83        45.84
      9         181.42        43.86
     10         186.12        42.13
     11         190.89        40.65
     12         195.74        39.42
     13         200.64        38.45
     14         205.59        37.74
     15         210.57        37.30
     16         215.57        37.11
     17         220.57        37.20
     18         225.56        37.54
     19         230.52        38.15
     20         235.44        39.02
     21         240.31        40.15
     22         245.12        41.53
     23         249.84        43.17
     24         254.48        45.05
     25         259.00        47.18
     26         263.41        49.54
     27         267.68        52.13
     28         271.82        54.94
     29         275.80        57.97
     30         279.61        61.20
     31         283.25        64.64
     32         286.70        68.25
     33         289.95        72.05
     34         293.00        76.01
     35         295.84        80.13
     36         298.46        84.39
     37         300.84        88.78
     38         302.99        93.30
     39         304.90        97.92
     40         306.25       101.75
         ***      1.502      ***
 Failure Surface Specified By 36 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
      1         158.31        66.00
      2         161.96        62.59
      3         165.81        59.39
      4         169.84        56.44
      5         174.04        53.72
      6         178.40        51.27
      7         182.89        49.07
      8         187.50        47.14
      9         192.22        45.50
     10         197.03        44.13
     11         201.92        43.05
     12         206.85        42.27
     13         211.83        41.78
     14         216.83        41.59
     15         221.82        41.69
     16         226.81        42.09
     17         231.76        42.78
     18         236.66        43.77
     19         241.50        45.05
     20         246.25        46.61
     21         250.89        48.45
     22         255.43        50.56
     23         259.82        52.94
     24         264.07        55.58
     25         268.16        58.46
     26         272.06        61.58
     27         275.78        64.93
     28         279.29        68.49
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       29        282.58        72.25
       30        285.64        76.21
       31        288.46        80.33
       32        291.03        84.62
       33        293.35        89.06
       34        295.39        93.62
       35        297.16        98.29
       36        298.16       101.48
          ***      1.502    ***
 Failure Surface Specified By 38 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
     1         148.46        66.00
     2         152.05        62.52
     3         155.83        59.25
     4         159.79        56.19
     5         163.91        53.36
     6         168.19        50.77
     7         172.60        48.42
     8         177.14        46.32
     9         181.79        44.48
    10         186.54        42.91
    11         191.36        41.60
    12         196.25        40.57
    13         201.20        39.81
    14         206.17        39.33
    15         211.17        39.13
    16         216.17        39.21
    17         221.15        39.57
    18         226.11        40.21
    19         231.03        41.12
    20         235.88        42.31
    21         240.67        43.77
    22         245.36        45.50
    23         249.95        47.49
    24         254.42        49.73
    25         258.75        52.22
    26         262.94        54.95
    27         266.97        57.91
    28         270.83        61.09
    29         274.50        64.48
    30         277.98        68.07
    31         281.25        71.85
    32         284.31        75.81
    33         287.13        79.94
    34         289.72        84.21
    35         292.07        88.63
    36         294.16        93.17
    37         296.00        97.82
    38         297.21       101.45
          ***      1.504    ***
 Failure Surface Specified By 33 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
     1         168.15        66.00
     2         171.70        62.47
     3         175.48        59.21
     4         179.49        56.22
     5         183.70        53.52
     6         188.09        51.13
     7         192.64        49.05
     8         197.32        47.30
     9         202.12        45.89
    10         207.01        44.82
    11         211.95        44.10
    12         216.94        43.73
    13         221.94        43.72
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      14         226.93        44.06
      15         231.88        44.76
      16         236.77        45.80
      17         241.57        47.19
      18         246.27        48.92
      19         250.82        50.97
      20         255.23        53.34
      21         259.45        56.02
      22         263.47        58.99
      23         267.27        62.24
      24         270.84        65.74
      25         274.14        69.50
      26         277.17        73.47
      27         279.91        77.66
      28         282.35        82.02
      29         284.47        86.55
      30         286.26        91.22
      31         287.72        96.00
      32         288.84       100.87
      33         288.89       101.18
         ***      1.506     ***
   Failure Surface Specified By 32 Coordinate Points
     Point       X-Surf       Y-Surf
      No.         (ft)         (ft)
       1         164.87        66.00
       2         168.45        62.51
       3         172.27        59.29
       4         176.32        56.35
       5         180.57        53.72
       6         185.00        51.40
       7         189.59        49.41
       8         194.31        47.76
       9         199.14        46.45
      10         204.04        45.50
      11         209.01        44.91
      12         214.00        44.68
      13         219.00        44.82
      14         223.98        45.31
      15         228.90        46.17
      16         233.75        47.39
      17         238.50        48.95
      18         243.13        50.85
      19         247.60        53.09
      20         251.90        55.64
      21         256.00        58.50
      22         259.88        61.65
      23         263.53        65.07
      24         266.91        68.75
      25         270.02        72.67
      26         272.84        76.80
      27         275.35        81.12
      28         277.54        85.62
      29         279.39        90.26
      30         280.90        95.03
      31         282.07        99.89
      32         282.24       100.96
         ***      1.509     ***
   Failure Surface Specified By 41 Coordinate Points
     Point       X-Surf       Y-Surf
      No.         (ft)         (ft)
       1         138.62        66.00
       2         142.16        62.47
       3         145.88        59.13
       4         149.77        55.99
       5         153.81        53.05
       6         158.00        50.31
       7         162.32        47.80
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       8         166.77        45.51
       9         171.32        43.46
      10         175.98        41.63
      11         180.72        40.05
      12         185.54        38.72
      13         190.42        37.63
      14         195.35        36.80
      15         200.32        36.22
      16         205.31        35.89
      17         210.31        35.82
      18         215.30        36.00
      19         220.28        36.45
      20         225.24        37.14
      21         230.15        38.09
      22         235.00        39.29
      23         239.79        40.74
      24         244.49        42.42
      25         249.10        44.35
      26         253.61        46.52
      27         258.01        48.91
      28         262.27        51.52
      29         266.39        54.34
      30         270.37        57.38
      31         274.18        60.61
      32         277.82        64.04
      33         281.28        67.65
      34         284.56        71.43
      35         287.63        75.37
      36         290.50        79.46
      37         293.16        83.70
      38         295.59        88.07
      39         297.80        92.55
      40         299.78        97.15
      41         301.42       101.59
           ***     1.513    ***
  Failure Surface Specified By 34 Coordinate Points
    Point      X-Surf       Y-Surf
     No.        (ft)         (ft)
       1        155.03        66.00
       2        158.69        62.59
       3        162.56        59.43
       4        166.63        56.53
       5        170.88        53.89
       6        175.29        51.54
       7        179.85        49.48
       8        184.53        47.72
       9        189.31        46.27
      10        194.18        45.13
      11        199.11        44.31
      12        204.09        43.81
      13        209.08        43.63
      14        214.08        43.78
      15        219.06        44.26
      16        224.00        45.05
      17        228.87        46.17
      18        233.66        47.60
      19        238.35        49.33
      20        242.92        51.37
      21        247.34        53.70
      22        251.60        56.31
      23        255.69        59.19
      24        259.58        62.34
      25        263.26        65.72
      26        266.71        69.34
      27        269.91        73.18
      28        272.86        77.22
      29        275.55        81.44
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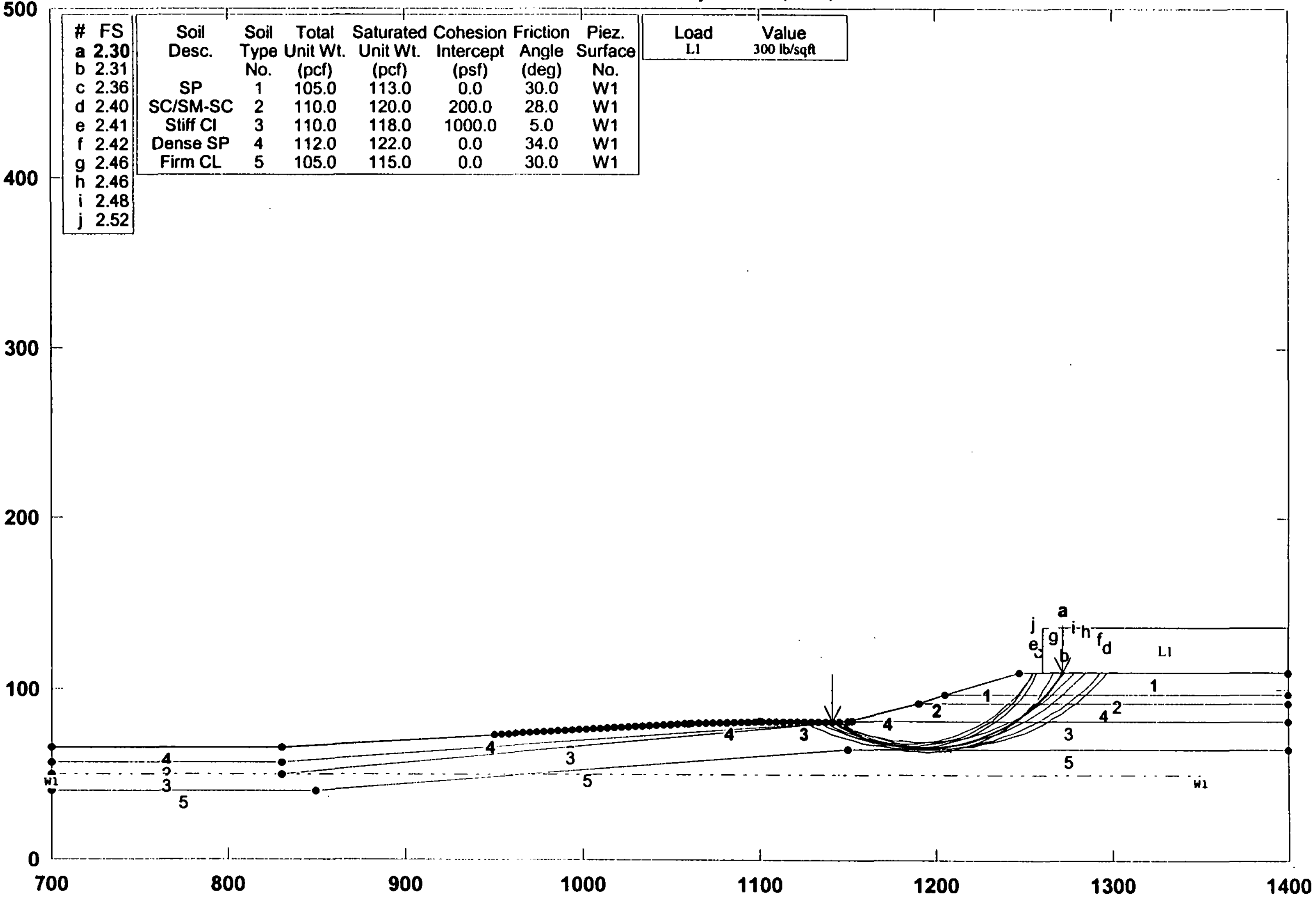
30          277.95        85.82
31          280.06        90.35
32          281.88        95.01
33          283.39        99.78
34          283.69       101.01
    ***      1.520    ***
```

Bishop & Buttrey Pit No. 125 Keene Road Side Slope Stability- FF (EB1/EB3)

C:\ENGGSO~1\STEDWIN\BB125FF.PL2 Run By: Shri Rao, UES, Inc. 4/29/02 10:03AM



#	FS
a	2.30
b	2.31
c	2.36
d	2.40
e	2.41
f	2.42
g	2.46
h	2.46
i	2.48
j	2.52

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
SP	1	105.0	113.0	0.0	30.0	W1
SC/SM-SC	2	110.0	120.0	200.0	28.0	W1
Stiff Cl	3	110.0	118.0	1000.0	5.0	W1
Dense SP	4	112.0	122.0	0.0	34.0	W1
Firm CL	5	105.0	115.0	0.0	30.0	W1

Load	Value
L1	300 lb/sqft

STABL6H FSmin=2.30

Safety Factors Are Calculated By The Modified Janbu Method

STED

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                         ** STABL6H  **
                               by
                        Purdue University
                   --Slope Stability Analysis--
                Simplified Janbu, Simplified Bishop
                   or Spencer`s Method of Slices
 Run Date:                  4/29/02
 Time of Run:               10:03AM
 Run By:                    Shri Rao, UES, Inc.
 Input Data Filename:       C:bb125ff.
 Output Filename:           C:bb125ff.OUT
 Plotted Output Filename:   C:bb125ff.PLT
 PROBLEM DESCRIPTION    Bishop & Buttrey Pit No. 125 Keene Road
                        Side Slope Stability- FF (EB1/EB3)
 BOUNDARY COORDINATES
      Note: User origin value specified.
      Add 700.00 to X-values and 0.00 to Y-values listed.

     8 Top   Boundaries
    18 Total Boundaries
 Boundary      X-Left      Y-Left     X-Right     Y-Right     Soil Type
   No.          (ft)        (ft)        (ft)        (ft)      Below Bnd
    1            .00       66.00      130.00       66.00          4
    2         130.00       66.00      360.00       80.00          4
    3         360.00       80.00      400.00       81.00          4
    4         400.00       81.00      450.00       81.00          3
    5         450.00       81.00      490.00       92.00          4
    6         490.00       92.00      505.00       97.00          2
    7         505.00       97.00      547.00      110.00          1
    8         547.00      110.00      700.00      110.00          1
    9         505.00       97.00      700.00       97.00          2
   10         490.00       92.00      700.00       92.00          4
   11         450.00       81.00      700.00       81.00          3
   12            .00       57.00      130.00       57.00          2
   13         130.00       57.00      450.00       81.00          2
   14            .00       50.00      130.00       50.00          3
   15         130.00       50.00      450.00       81.00          3
   16            .00       40.00      150.00       40.00          5
   17         150.00       40.00      450.00       65.00          5
   18         450.00       65.00      700.00       65.00          5
ISOTROPIC SOIL PARAMETERS
  5 Type(s) of Soil
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant  Surface
  No.  (pcf)    (pcf)     (psf)     (deg)   Param.    (psf)     No.
   1   105.0    113.0        .0     30.0     .00        .0       1
   2   110.0    120.0     200.0     28.0     .00        .0       1
   3   110.0    118.0    1000.0      5.0     .00        .0       1
   4   112.0    122.0        .0     34.0     .00        .0       1
   5   105.0    115.0        .0     30.0     .00        .0       1
 1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
 Unit Weight of Water =  62.40
 Piezometric Surface No.  1 Specified by  2 Coordinate Points
   Point       X-Water      Y-Water
    No.          (ft)         (ft)
     1            .00        50.00
     2         650.00        50.00
BOUNDARY LOAD(S)
     1 Load(s) Specified
 Load         X-Left       X-Right      Intensity     Deflection
  No.          (ft)          (ft)       (lb/sqft)        (deg)
   1         560.00        700.00         300.0            .0
 NOTE - Intensity Is Specified As A Uniformly Distributed
        Force Acting On A Horizontally Projected Surface.
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
2500 Trial Surfaces Have Been Generated.
```

```
 50 Surfaces Initiate From Each Of 50 Points Equally Spaced
Along The Ground Surface Between  X = 250.00 ft.
                             and  X = 445.00 ft.
Each Surface Terminates Between   X = 452.00 ft.
                             and  X = 700.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =   .00 ft.
 6.00 ft. Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Examined.  They Are Ordered - Most Critical
      First.
      * * Safety Factors Are Calculated By The Modified Janbu Method * *
      Failure Surface Specified By 26 Coordinate Points
        Point      X-Surf       Y-Surf
         No.        (ft)         (ft)
          1        441.02        81.00
          2        446.12        77.84
          3        451.41        75.02
          4        456.88        72.54
          5        462.50        70.43
          6        468.24        68.69
          7        474.08        67.33
          8        480.00        66.34
          9        485.97        65.75
         10        491.97        65.54
         11        497.97        65.73
         12        503.94        66.30
         13        509.86        67.27
         14        515.71        68.61
         15        521.46        70.33
         16        527.08        72.43
         17        532.55        74.88
         18        537.86        77.69
         19        542.97        80.83
         20        547.86        84.30
         21        552.52        88.08
         22        556.93        92.16
         23        561.05        96.51
         24        564.89       101.12
         25        568.42       105.97
         26        570.97       110.00
            ***     2.297    ***
      Failure Surface Specified By 26 Coordinate Points
        Point      X-Surf       Y-Surf
         No.        (ft)         (ft)
          1        441.02        81.00
          2        446.16        77.91
          3        451.49        75.15
          4        456.98        72.74
          5        462.62        70.68
          6        468.37        68.98
          7        474.23        67.65
          8        480.15        66.70
          9        486.12        66.12
         10        492.12        65.93
         11        498.12        66.12
         12        504.09        66.69
         13        510.01        67.64
         14        515.87        68.96
         15        521.62        70.66
         16        527.26        72.71
         17        532.75        75.12
         18        538.08        77.88
         19        543.23        80.96
         20        548.16        84.37
         21        552.88        88.09
         22        557.34        92.10
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    23        561.54       96.38
    24        565.46      100.93
    25        569.08      105.71
    26        571.92      110.00
       ***     2.312    ***
Failure Surface Specified By 24 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         445.00       81.00
    2         449.98       77.66
    3         455.22       74.73
    4         460.67       72.23
    5         466.31       70.17
    6         472.09       68.57
    7         477.99       67.45
    8         483.95       66.79
    9         489.95       66.62
   10         495.94       66.93
   11         501.89       67.72
   12         507.75       68.98
   13         513.50       70.71
   14         519.09       72.90
   15         524.48       75.52
   16         529.65       78.57
   17         534.55       82.03
   18         539.17       85.86
   19         543.46       90.06
   20         547.40       94.58
   21         550.96       99.41
   22         554.13      104.51
   23         556.88      109.84
   24         556.94      110.00
       ***     2.359    ***
Failure Surface Specified By 29 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         445.00       81.00
    2         450.30       78.19
    3         455.74       75.66
    4         461.30       73.40
    5         466.96       71.42
    6         472.72       69.73
    7         478.55       68.32
    8         484.45       67.21
    9         490.40       66.40
   10         496.37       65.89
   11         502.37       65.68
   12         508.37       65.77
   13         514.36       66.16
   14         520.32       66.85
   15         526.23       67.83
   16         532.10       69.12
   17         537.89       70.69
   18         543.59       72.55
   19         549.19       74.70
   20         554.68       77.12
   21         560.04       79.82
   22         565.26       82.78
   23         570.32       86.00
   24         575.22       89.47
   25         579.93       93.18
   26         584.46       97.12
   27         588.78      101.28
   28         592.89      105.66
   29         596.57      110.00
       ***     2.404    ***
Failure Surface Specified By 24 Coordinate Points
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```
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         441.02        81.00
    2         446.05        77.72
    3         451.31        74.85
    4         456.79        72.39
    5         462.44        70.37
    6         468.23        68.80
    7         474.12        67.68
    8         480.09        67.03
    9         486.08        66.85
   10         492.08        67.13
   11         498.03        67.89
   12         503.90        69.10
   13         509.67        70.78
   14         515.28        72.89
   15         520.71        75.44
   16         525.93        78.41
   17         530.89        81.77
   18         535.58        85.52
   19         539.97        89.61
   20         544.02        94.04
   21         547.71        98.77
   22         551.02       103.78
   23         553.92       109.03
   24         554.37       110.00
      ***      2.411    ***
Failure Surface Specified By 31 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         433.06        81.00
    2         438.38        78.23
    3         443.83        75.71
    4         449.38        73.44
    5         455.04        71.44
    6         460.78        69.70
    7         466.60        68.24
    8         472.48        67.04
    9         478.41        66.12
   10         484.38        65.48
   11         490.36        65.12
   12         496.36        65.04
   13         502.36        65.24
   14         508.34        65.71
   15         514.29        66.47
   16         520.20        67.50
   17         526.06        68.81
   18         531.85        70.39
   19         537.56        72.24
   20         543.17        74.35
   21         548.68        76.72
   22         554.08        79.35
   23         559.35        82.22
   24         564.47        85.34
   25         569.45        88.69
   26         574.26        92.27
   27         578.90        96.07
   28         583.36       100.09
   29         587.63       104.30
   30         591.70       108.72
   31         592.77       110.00
      ***      2.424    ***
Failure Surface Specified By 26 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         445.00        81.00
    2         449.78        77.37
```

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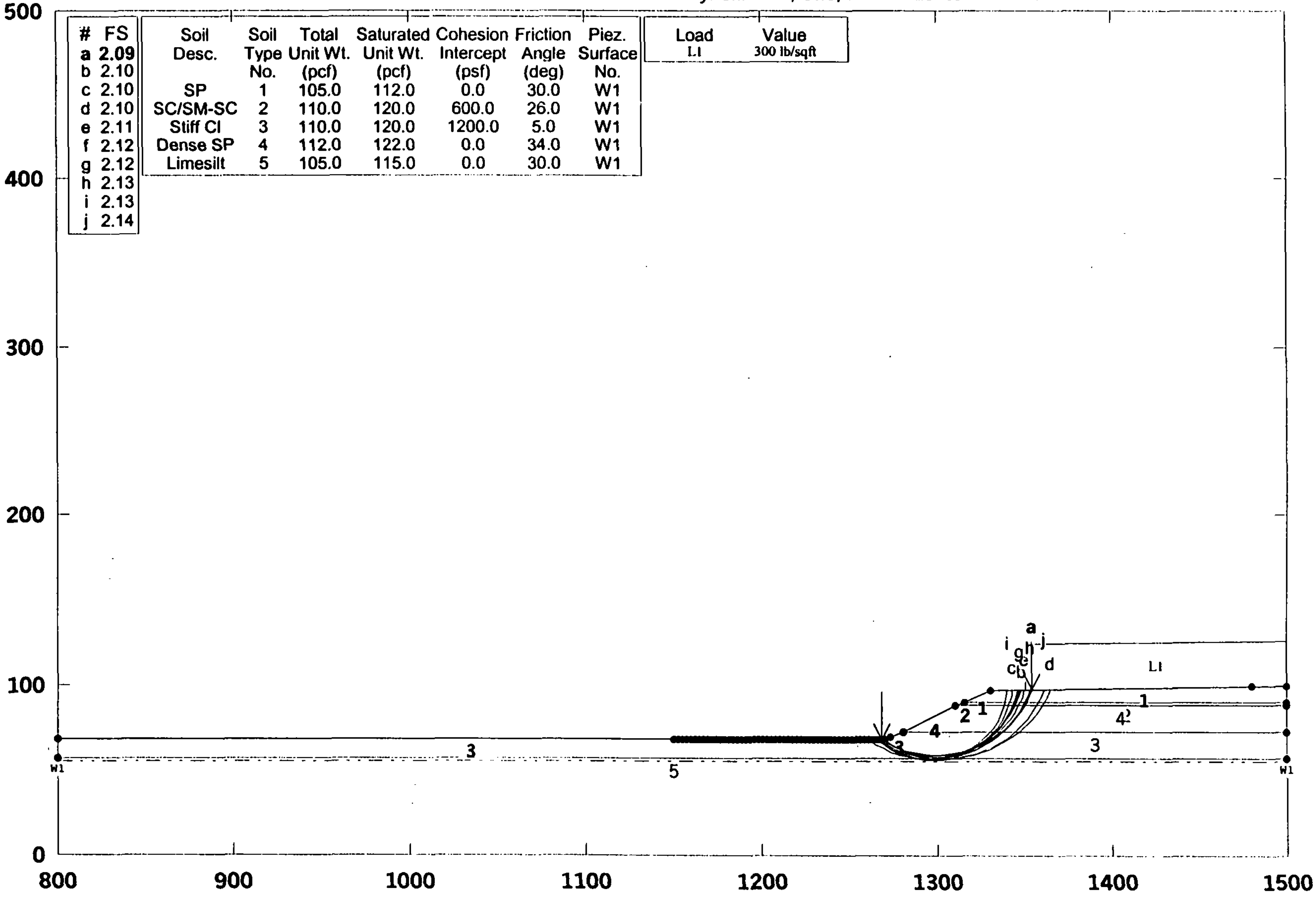
     3         454.82        74.12
     4         460.10        71.27
     5         465.58        68.83
     6         471.24        66.82
     7         477.03        65.25
     8         482.92        64.13
     9         488.89        63.47
    10         494.88        63.26
    11         500.88        63.52
    12         506.83        64.24
    13         512.72        65.41
    14         518.50        67.03
    15         524.13        69.09
    16         529.59        71.57
    17         534.85        74.47
    18         539.86        77.76
    19         544.61        81.43
    20         549.06        85.45
    21         553.19        89.80
    22         556.98        94.46
    23         560.39        99.39
    24         563.42       104.57
    25         566.04       109.97
    26         566.05       110.00
       ***      2.457   ***
Failure Surface Specified By 31 Coordinate Points
  Point        X-Surf        Y-Surf
   No.          (ft)          (ft)
     1         425.10        81.00
     2         430.42        78.23
     3         435.87        75.71
     4         441.43        73.45
     5         447.09        71.45
     6         452.83        69.72
     7         458.65        68.27
     8         464.53        67.08
     9         470.46        66.18
    10         476.43        65.55
    11         482.42        65.20
    12         488.42        65.14
    13         494.42        65.35
    14         500.40        65.85
    15         506.35        66.63
    16         512.25        67.68
    17         518.10        69.01
    18         523.88        70.62
    19         529.58        72.49
    20         535.19        74.63
    21         540.69        77.03
    22         546.07        79.68
    23         551.32        82.59
    24         556.43        85.73
    25         561.39        89.12
    26         566.18        92.73
    27         570.79        96.56
    28         575.22       100.61
    29         579.46       104.85
    30         583.49       109.30
    31         584.08       110.00
       ***      2.465   ***
Failure Surface Specified By 27 Coordinate Points
  Point        X-Surf        Y-Surf
   No.          (ft)          (ft)
     1         441.02        81.00
     2         446.46        78.47
     3         452.03        76.23
     4         457.70        74.29
```

```
      5          463.48        72.65
      6          469.33        71.33
      7          475.24        70.32
      8          481.20        69.63
      9          487.19        69.25
     10          493.19        69.20
     11          499.19        69.47
     12          505.16        70.05
     13          511.09        70.96
     14          516.96        72.18
     15          522.76        73.71
     16          528.48        75.55
     17          534.08        77.69
     18          539.56        80.12
     19          544.91        82.85
     20          550.10        85.86
     21          555.12        89.14
     22          559.97        92.68
     23          564.61        96.48
     24          569.05       100.52
     25          573.26       104.79
     26          577.25       109.28
     27          577.82       110.00
        ***      2.481    ***
 Failure Surface Specified By 24 Coordinate Points
   Point         X-Surf        Y-Surf
    No.           (ft)          (ft)
      1          437.04        81.00
      2          442.24        78.01
      3          447.64        75.40
      4          453.22        73.17
      5          458.93        71.34
      6          464.76        69.92
      7          470.68        68.92
      8          476.65        68.34
      9          482.65        68.18
     10          488.64        68.45
     11          494.60        69.13
     12          500.50        70.24
     13          506.30        71.76
     14          511.98        73.69
     15          517.51        76.02
     16          522.87        78.73
     17          528.01        81.81
     18          532.93        85.25
     19          537.59        89.02
     20          541.98        93.12
     21          546.06        97.52
     22          549.82       102.19
     23          553.25       107.12
     24          554.96       110.00
        ***      2.523    ***
```

SECTION GG

Bishop & Buttrey Pit No. 125 Keene Road Side Slope Stability- GG (EB7)

C:\ENGGSO~1\STEDWIN\BB125GG.PL2 Run By: Shri Rao, UES, Inc. 4/29/02 9:47AM



#	FS
a	**2.09**
b	2.10
c	2.10
d	2.10
e	2.11
f	2.12
g	2.12
h	2.13
i	2.13
j	2.14

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
SP	1	105.0	112.0	0.0	30.0	W1
SC/SM-SC	2	110.0	120.0	600.0	26.0	W1
Stiff Cl	3	110.0	120.0	1200.0	5.0	W1
Dense SP	4	112.0	122.0	0.0	34.0	W1
Limesilt	5	105.0	115.0	0.0	30.0	W1

Load	Value
L1	300 lb/sqft

STABL6H FSmin=2.09

Safety Factors Are Calculated By The Modified Janbu Method

STED

```
                     ** STABL6H  **
                          by
                  Purdue University
              --Slope Stability Analysis--
           Simplified Janbu, Simplified Bishop
              or Spencer`s Method of Slices
 Run Date:                  4/29/02
 Time of Run:               9:47AM
 Run By:                    Shri Rao, UES, Inc.
 Input Data Filename:       C:bb125gg.
 Output Filename:           C:bb125gg.OUT
 Plotted Output Filename:   C:bb125gg.PLT
 PROBLEM DESCRIPTION    Bishop & Buttrey Pit No. 125 Keene Road
                        Side Slope Stability- GG (EB7)
 BOUNDARY COORDINATES
      Note: User origin value specified.
      Add 800.00 to X-values and 0.00 to Y-values listed.

     6 Top   Boundaries
    10 Total Boundaries
 Boundary      X-Left      Y-Left     X-Right     Y-Right     Soil Type
    No.         (ft)        (ft)        (ft)        (ft)      Below Bnd
     1           .00       68.00      470.00       68.00          3
     2        470.00       68.00      480.00       73.00          3
     3        480.00       73.00      510.00       88.00          4
     4        510.00       88.00      515.00       90.50          2
     5        515.00       90.50      530.00       97.50          1
     6        530.00       97.50      700.00      100.00          1
     7        515.00       90.50      700.00       90.50          2
     8        510.00       88.00      700.00       88.00          4
     9        480.00       73.00      700.00       73.00          3
    10           .00       57.00      700.00       57.00          5
ISOTROPIC SOIL PARAMETERS
  5 Type(s) of Soil
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant  Surface
  No.  (pcf)    (pcf)     (psf)     (deg)   Param.    (psf)     No.
   1   105.0    112.0        .0      30.0     .00        .0       1
   2   110.0    120.0     600.0      26.0     .00        .0       1
   3   110.0    120.0    1200.0       5.0     .00        .0       1
   4   112.0    122.0        .0      34.0     .00        .0       1
   5   105.0    115.0        .0      30.0     .00        .0       1
 1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
 Unit Weight of Water =  62.40
 Piezometric Surface No.  1 Specified by  2 Coordinate Points
   Point      X-Water     Y-Water
    No.         (ft)        (ft)
     1           .00       55.00
     2        700.00       55.00
BOUNDARY LOAD(S)
     1 Load(s) Specified
 Load         X-Left       X-Right     Intensity     Deflection
  No.          (ft)         (ft)      (lb/sqft)        (deg)
   1          550.00       700.00       300.0             .0
 NOTE - Intensity Is Specified As A Uniformly Distributed
        Force Acting On A Horizontally Projected Surface.
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
2500 Trial Surfaces Have Been Generated.
  50 Surfaces Initiate From Each Of 50 Points Equally Spaced
 Along The Ground Surface Between   X = 350.00 ft.
                             and    X = 468.00 ft.
 Each Surface Terminates Between    X = 473.00 ft.
                             and    X = 680.00 ft.
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =   .00 ft.
  5.00 ft. Line Segments Define Each Trial Failure Surface.
```

```
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Examined.  They Are Ordered - Most Critical
      First.
      * * Safety Factors Are Calculated By The Modified Janbu Method * *
      Failure Surface Specified By 22 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1        468.00        68.00
          2        472.33        65.49
          3        476.85        63.36
          4        481.54        61.63
          5        486.36        60.31
          6        491.28        59.41
          7        496.26        58.94
          8        501.26        58.89
          9        506.24        59.28
         10        511.18        60.09
         11        516.02        61.32
         12        520.75        62.97
         13        525.31        65.01
         14        529.68        67.44
         15        533.82        70.24
         16        537.71        73.38
         17        541.32        76.85
         18        544.61        80.61
         19        547.56        84.64
         20        550.16        88.91
         21        552.39        93.39
         22        554.14        97.86
            ***      2.094    ***
      Failure Surface Specified By 22 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1        468.00        68.00
          2        472.18        65.26
          3        476.61        62.94
          4        481.25        61.07
          5        486.05        59.66
          6        490.96        58.73
          7        495.94        58.29
          8        500.94        58.34
          9        505.91        58.89
         10        510.80        59.92
         11        515.57        61.42
         12        520.17        63.39
         13        524.55        65.79
         14        528.67        68.62
         15        532.50        71.84
         16        535.99        75.42
         17        539.11        79.33
         18        541.84        83.52
         19        544.13        87.96
         20        545.98        92.61
         21        547.37        97.41
         22        547.43        97.76
            ***      2.101    ***
      Failure Surface Specified By 21 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1        468.00        68.00
          2        471.95        64.94
          3        476.22        62.33
          4        480.75        60.21
          5        485.48        58.60
          6        490.36        57.52
          7        495.33        56.98
          8        500.33        57.00
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      9        505.30       57.57
     10        510.18       58.68
     11        514.90       60.32
     12        519.41       62.47
     13        523.66       65.10
     14        527.60       68.19
     15        531.17       71.69
     16        534.33       75.56
     17        537.05       79.76
     18        539.29       84.23
     19        541.02       88.92
     20        542.22       93.77
     21        542.75       97.69
        ***     2.103     ***
 Failure Surface Specified By 25 Coordinate Points
   Point      X-Surf       Y-Surf
    No.        (ft)         (ft)
      1        468.00       68.00
      2        472.26       65.38
      3        476.70       63.09
      4        481.31       61.15
      5        486.05       59.57
      6        490.91       58.35
      7        495.83       57.52
      8        500.81       57.06
      9        505.81       56.99
     10        510.80       57.30
     11        515.76       57.99
     12        520.64       59.06
     13        525.43       60.50
     14        530.09       62.30
     15        534.60       64.46
     16        538.94       66.95
     17        543.06       69.77
     18        546.96       72.90
     19        550.61       76.32
     20        553.99       80.01
     21        557.07       83.94
     22        559.84       88.10
     23        562.29       92.47
     24        564.39       97.00
     25        564.77       98.01
        ***     2.103     ***
 Failure Surface Specified By 23 Coordinate Points
   Point      X-Surf       Y-Surf
    No.        (ft)         (ft)
      1        465.59       68.00
      2        469.75       65.23
      3        474.15       62.85
      4        478.75       60.89
      5        483.51       59.36
      6        488.40       58.28
      7        493.36       57.66
      8        498.35       57.50
      9        503.34       57.80
     10        508.29       58.57
     11        513.14       59.78
     12        517.85       61.44
     13        522.40       63.53
     14        526.73       66.03
     15        530.81       68.92
     16        534.60       72.18
     17        538.08       75.77
     18        541.21       79.67
     19        543.96       83.84
     20        546.32       88.25
     21        548.26       92.86
```

```
          22          549.77         97.63
          23          549.81         97.79
             ***       2.105     ***
       Failure Surface Specified By 22 Coordinate Points
          Point       X-Surf        Y-Surf
           No.         (ft)          (ft)
            1         465.59         68.00
            2         469.57         64.97
            3         473.83         62.35
            4         478.34         60.19
            5         483.04         58.49
            6         487.89         57.28
            7         492.84         56.58
            8         497.84         56.38
            9         502.83         56.69
           10         507.76         57.50
           11         512.58         58.82
           12         517.25         60.62
           13         521.71         62.89
           14         525.91         65.59
           15         529.81         68.72
           16         533.38         72.22
           17         536.57         76.07
           18         539.36         80.22
           19         541.70         84.64
           20         543.59         89.27
           21         544.99         94.07
           22         545.66         97.73
             ***       2.118     ***
       Failure Surface Specified By 23 Coordinate Points
          Point       X-Surf        Y-Surf
           No.         (ft)          (ft)
            1         460.78         68.00
            2         464.87         65.13
            3         469.21         62.64
            4         473.75         60.56
            5         478.47         58.91
            6         483.32         57.69
            7         488.26         56.93
            8         493.25         56.61
            9         498.25         56.76
           10         503.22         57.36
           11         508.10         58.41
           12         512.87         59.91
           13         517.49         61.83
           14         521.91         64.17
           15         526.09         66.91
           16         530.01         70.01
           17         533.63         73.46
           18         536.92         77.23
           19         539.85         81.28
           20         542.40         85.58
           21         544.54         90.10
           22         546.26         94.79
           23         547.05         97.75
             ***       2.122     ***
       Failure Surface Specified By 24 Coordinate Points
          Point       X-Surf        Y-Surf
           No.         (ft)          (ft)
            1         460.78         68.00
            2         464.88         65.15
            3         469.22         62.65
            4         473.74         60.53
            5         478.44         58.81
            6         483.26         57.48
            7         488.17         56.57
            8         493.15         56.08
```

```
    9         498.15        56.02
   10         503.14        56.38
   11         508.08        57.16
   12         512.93        58.35
   13         517.67        59.95
   14         522.25        61.95
   15         526.65        64.33
   16         530.83        67.08
   17         534.76        70.16
   18         538.42        73.57
   19         541.77        77.28
   20         544.80        81.26
   21         547.48        85.48
   22         549.79        89.92
   23         551.72        94.53
   24         552.78        97.83
       ***      2.125     ***
Failure Surface Specified By 21 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         465.59        68.00
    2         469.46        64.83
    3         473.66        62.12
    4         478.14        59.90
    5         482.84        58.19
    6         487.70        57.02
    7         492.66        56.41
    8         497.66        56.36
    9         502.64        56.87
   10         507.52        57.94
   11         512.26        59.55
   12         516.78        61.68
   13         521.03        64.30
   14         524.97        67.39
   15         528.53        70.90
   16         531.67        74.79
   17         534.36        79.01
   18         536.55        83.50
   19         538.23        88.21
   20         539.37        93.08
   21         539.90        97.65
       ***      2.129     ***
Failure Surface Specified By 25 Coordinate Points
  Point       X-Surf       Y-Surf
   No.         (ft)         (ft)
    1         465.59        68.00
    2         469.78        65.27
    3         474.17        62.88
    4         478.74        60.84
    5         483.45        59.17
    6         488.28        57.89
    7         493.20        56.99
    8         498.18        56.48
    9         503.18        56.37
   10         508.17        56.66
   11         513.12        57.34
   12         518.00        58.42
   13         522.79        59.87
   14         527.44        61.71
   15         531.93        63.90
   16         536.23        66.45
   17         540.32        69.33
   18         544.17        72.52
   19         547.75        76.01
   20         551.04        79.77
   21         554.02        83.79
   22         556.68        88.02
```

```
         23          558.99          92.46
         24          560.94          97.06
         25          561.24          97.96
            ***        2.136    ***
```

APPENDIX B

BISHOP & BUTTREY LANDFILL EXPANSION (PIT NO. 125 - KEENE ROAD)

SOIL BEARING CAPACITY/ALLOWABLE VERTICAL LOAD

Meyerhof
GENERAL BEARING CAPACITY EQUATION

Vertical Load :
qult = c Nc Sc dc + q Nq Sq dq + 0.5 gama B Ng Sg dg

Inclined Load :
qult = c Nc dc ic + q Nq dq iq + 0.5 gama B Ng dg ig

Where:

c =	cohesion
q =	effective stress at the level of the bottom of foundation
gama =	unit weight of soil
B =	width of foundation (= dia. for a circular foundation)
Sc Sq Sg =	shape factors
dc dq dg =	depth factors
ic iq ig =	load inclination factors
Nq Nc Ng =	bearing capacity factors

Assumed Information

c =	100	pcf
phi =	20	Degrees
Inc ang. =	0	Degrees
B =	1000	(feet)
L =	1650	(feet)
Emd D =	29	(feet)
WSHWT =	55	(feet)
gama =	115	pcf

Calculated Answer

Ultimate bearing capacity
Vertical = 36144.93 psf
Inclined = 0 psf

BEARING CAPACITY FACTORS

angle phi =	20	Degrees	*Nq =*	6.40
			Nc =	14.83
			Ng =	2.87

SHAPE FACTORS

Kp =	2.039607		*Sc =*	1.25
Base =	12000	(inches)	*Sq =*	1.12
Length =	19800	(inches)	*Sg =*	1.12

Note where L = length of the foundation (L > B)

DEPTH FACTOR

Embedment Depth =	29	(feet)	*dc =*	1.17
			dq =	1.09
			dg =	1.09

INCLINATION

ic =	1
iq =	1
ig =	1

Angle of resultant measured from vertical
without a sign = 0 degrees

EFFECT OF GROUND WATER TABLE

Utilized Criterion

Υ =	115 pcf	Case III	3335.00	psf
Υ sub =	52.6 pcf	Υ	54.22	pcf

Wet Seasonal High Water Table
(Below Natural Grade) = 55 (feet)

Bearing Capacity Analysis

Ultimate bearing capacity of the soil based on subsurface encountered=	**36,144.93**	**psf**	
Estimated Vertical Load applied from Landfill (assuming 75pcf unit weight) =	**2,965.00**	**psf**	**O.K**
Estimated Factor of Safety	**12.190532**		

```
ETTLEMENT ANALYSIS

ROJECT:BB Pit No. 125
CLIENT:BB II
ENGINEER:SHRI
ATE:April 28 02

IDTH= 10       LENGTH= 1000      DEPTH= 29      LOAD= 2965
RY WEIGHT= 110      SATURATED WEIGHT= 120      DEPTH H2O= 55

TOP     BOTTOM     N     RATIO     RHO

0.00     7.00      4     6.0       0.00
7.00    18.00     22     2.5       0.00
8.00    28.00     26     4.0       0.00
8.00    43.00      4     2.0       2.58
43.00   47.00      6     3.5       0.28
7.00    %100.00    %100     6.0       0.02

SETTLEMENT= 2.88 INCH
```

```
ETTLEMENT ANALYSIS


ROJECT:BB Pit No. 125 Landfill Expansion
CLIENT:BB III LLC
NGINEER:SHRI
ATE:Apr 28 02


IDTH= 1000      LENGTH= 1650     DEPTH= 29     LOAD= 2965
RY WEIGHT= 110      SATURATED WEIGHT= 120     DEPTH H2O= 55

TOP     BOTTOM     N     RATIO     RHO

 0.00     7.00     4     6.0       0.00
 7.00    18.00    22     2.5       0.00
8.00    28.00    26     4.0       0.00
8.00    43.00     4     2.0       0.88
43.00    47.00     6     3.5       0.10
7.00    %100.00    %100     6.0       0.05
100.00    %200.00    %100     6.0       0.14
%200.00    %400.00    %100     6.0       0.42

ETTLEMENT= 1.60 INCH
```

EXHIBIT F

UNIVERSAL
ENGINEERING SCIENCES

SLUG TEST RESULTS AND GROUNDWATER FLOW MEASUREMENT
B&B #91 - KEENE ROAD BURROW PIT/LANDFILL

Project No. 17862-085-01
Report No. 63003
Date: May 1999

UPDATED MARCH 2002
ED CHESNEY P.E.

Prepared For:

Bishop & Buttery, Inc.
6239 Edgewater Drive, Suite D-1
Orlando, Florida 32810

Prepared By:

Universal Engineering Sciences, Inc.
3532 Maggie Boulevard
Orlando, Florida 32811
(407) 423-0504

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• Jacksonville
• Ocala
• Tampa
• Debary

May 26, 1999

Bishop & Buttrey, Inc.
6239 Edgewater Drive, Suite D-1
Orlando, Florida 32810

Attention: Mr. Ed Chesney, P.E.

Reference: Slug Test Results And Groundwater Flow Measurement
B&B #91 - Keene Rd. Burrow Pit / Landfill
UES Project No. 17862-085-01 (63003)

Dear Mr Chesney:

Universal Engineering Sciences, Inc. (UES) has prepared this report to provide results of aquifer slug test data and groundwater flow measurement performed at the referenced site.

Monitor Well Installation

UES installed water table monitor wells MW-1, MW-2, and MW-3 on May 11, 1999. Figure 1 shows the monitor well locations on the site plan. The wells were installed to depths of 40 to 50 feet below land surface using hollow stem augers (10.25-inch outer diameter, 6.25-inch inner diameter). Soil boring logs for monitor wells MW-1, MW-2, and MW-3, soils within the surficial aquifer include discontinuous layer of sands, sands with fines, and clays. Well construction diagrams and soil boring logs are provided in Appendix A. Table 1 contains a summary of monitor well construction.

Piezometer PZ-1, shown on the site plan, was installed by others.

Slug Tests

UES performed slug-out tests on May 19, 1999 at water table monitor wells MW-1, MW-2, and MW-3 to hydraulic conductivity of the surficial aquifer at the site. The water in each well was pumped out and the recovery of the water level in each well was measured over time. Table 2 contains a summary of water level measurements. The water level recovery at each well was recorded using a 15 pounds per square inch (psi) transducer probe and an electronic data logger. The data collected from the slug out tests were analyzed using the Bouwer and Rice Method updated by Bouwer in 1989. Monitor well MW-1 was analyzed as fully penetrating a perched aquifer zone. Monitor wells MW-2 and MW-3 were evaluated as partially penetrating the surficial aquifer above the Hawthorn. Based on regional geology, the top of the Hawthorn is at an elevation of approximately 0 feet NGVD in the site vicinity.

The calculated hydraulic conductivities (K) are 0.94 ft/day at MW-1, 101.29 ft/day at MW-2, and 1.03 ft/day at MW-3. The field data, graphs, and hydraulic conductivity calculations are presented in Appendix B. Comparison of the slug test results to the soil lithologic logs and well construction logs in Table 1 and Appendix A, and water level data in Table 2, indicates the hydraulic conductivity measured at MW-1 is representative of a saturated zone of silty sand perched above a clay layer. The hydraulic conductivity measured at MW-2 is representative of surficial aquifer sands. The hydraulic conductivity measured at MW-3 is representative of surficial aquifer sandy clay.

The transmissivity (T) of the surficial aquifer can be estimated by the product of the hydraulic conductivity (K) and the aquifer thickness (B). Transmissivity varies across the site with changes in soil lithology. A transmissivity of 2.82 ft^2/day was measured at MW-1, using perched aquifer thickness of 3 feet. A transmissivity of 4,356 ft^2/day was measured at MW-2, using an estimated aquifer thickness of 43 feet. A transmissivity of 48 ft^2/day was measured at MW-2, using an estimated aquifer thickness of 47 feet.

Groundwater Flow

Groundwater elevation information obtained at the site are provided on Table 2. Groundwater elevations from May 10, 1999 were plotted and contoured on Figure 2. Shallow groundwater flow was measured toward the southwest at a hydraulic gradient of 0.0018, based a distance ot 560 feet between the 47.50 and 48.50 groundwater elevation contours.

The groundwater flow velocity at the site was measured using an average effective porosity (ne) at the shallow surficial aquifer of 0.4, an observed average hydraulic gradient of 0.0018 (I), and average hydraulic conductivity (K) at the water table of 51 ft/day. The average horizontal groundwater flow velocity (Vh) at the site is then estimated by the Darcian Equation Vh = k*I/ne to be 0.23 ft/day or 84 feet per year. The groundwater flow velocity varies across the site due to variable hydraulic conductivity.

If you have any questions concerning the work performed or results, please call

Respectfully Submitted;

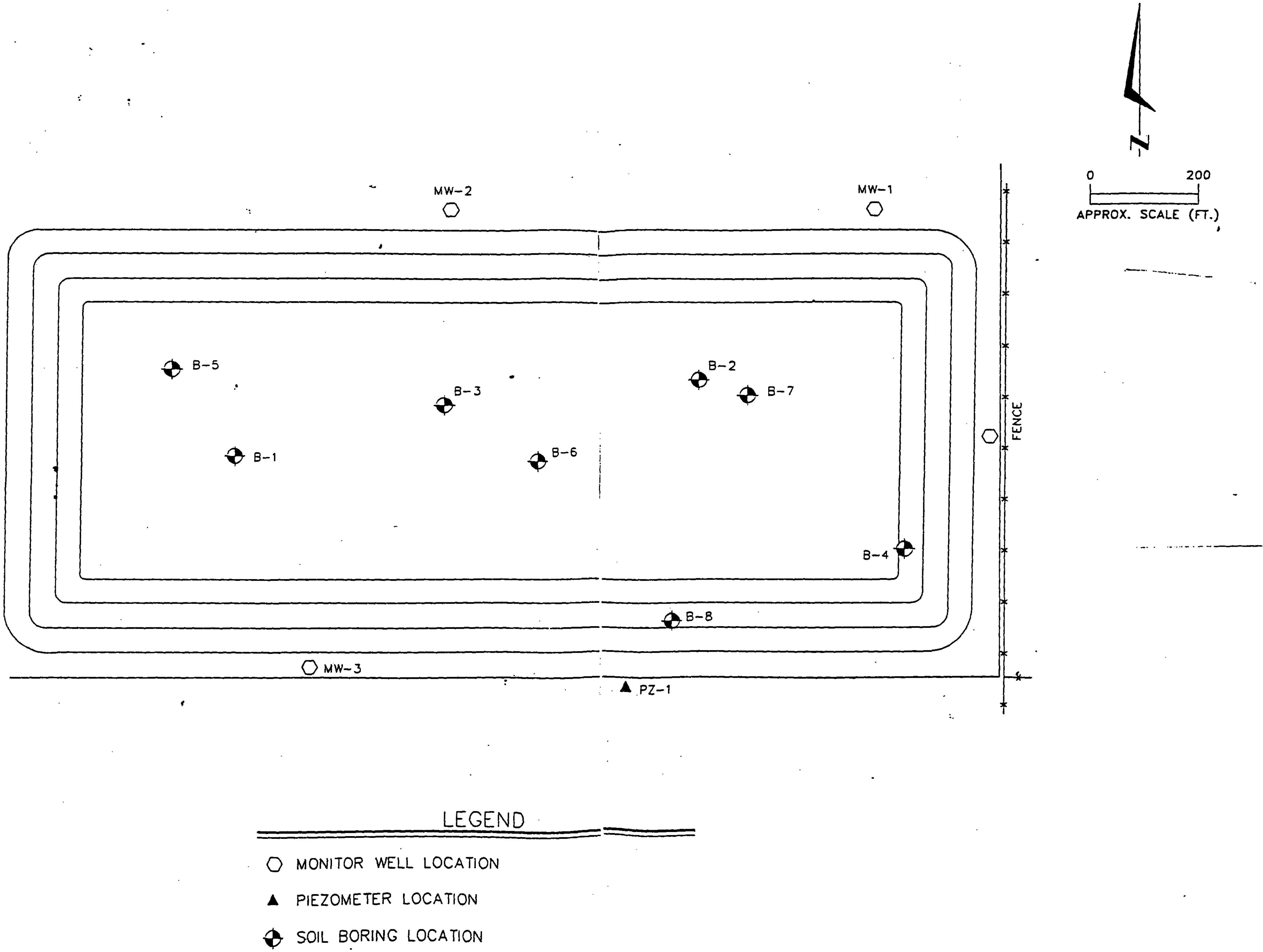
Universal Engineering Sciences, Inc.

5/26/99

Eric Krebill, P.G.
Project Manager
Florida License No. 0001162

Enc: Figure 1 - Site Plan
Figure 2 - Groundwater Elevation 5/10/99
Table 1 - Monitor Well Construction Summary
Table 2 - Groundwater Elevation Data
Appendix A - Soil Boring Logs and Monitor Well Construction Details
Appendix B - Slug Test Data

FIGURES



THIS DRAWING REPRODUCED FROM PLAN PROVIDED BY CLIENT.

L0207-01

FOR: BISHOP & BUTTREY

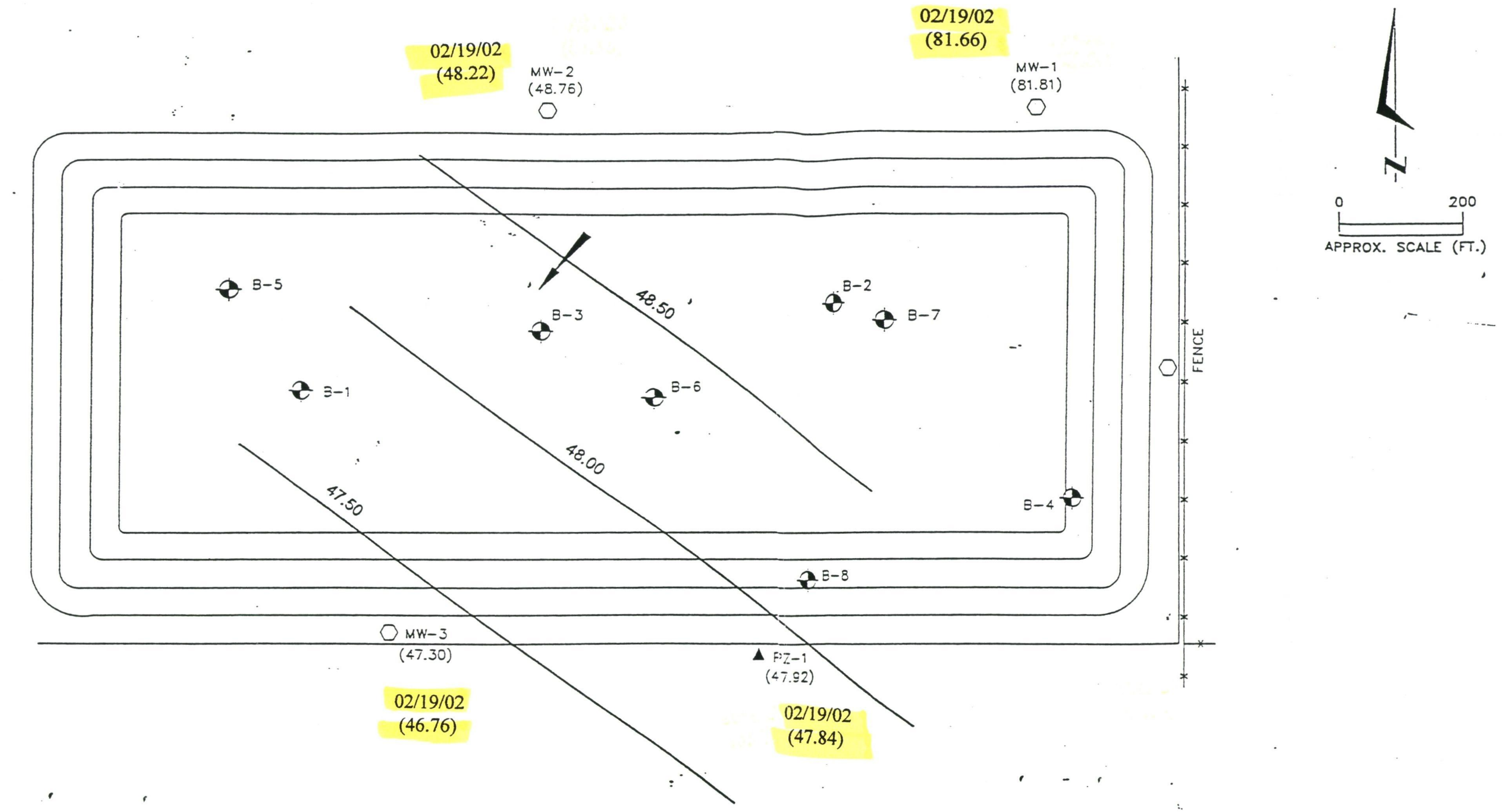
DRAWN BY: R.K.S. DATE: 5/24/99
CHECKED BY: DATE: 5/27/99
REPORT NO: 63003 SCALE: AS SHOWN
PROJECT NO: 17862-085-01

BISHOP & BUTTREY NO. 91
KEENE ROAD BORROW PIT/LANDFILL
ORANGE COUNTY, FLORIDA

SITE PLAN

UNIVERSAL
ENGINEERING SCIENCES

PAGE NO: FIGURE 1



LEGEND

○ MONITOR WELL LOCATION

▲ PIEZOMETER LOCATION

SOIL BORING LOCATION

47.50 GROUNDWATER ELEVATION CONTOUR (FT.)
CONTOUR INTERVAL 0.5 FT.

GROUNDWATER FLOW DIRECTION

THIS DRAWING REPRODUCED FROM PLAN PROVIDED BY CLIENT.

FOR: BISHOP & BUTTREY

DRAWN BY: R.K.S. DATE: 5/25/99
CHECKED BY: DATE:
SCALE: AS SHOWN
REPORT NO: 63003
PROJECT NO: 17862-085-01

BISHOP & BUTTREY NO. 91
KEENE ROAD BORROW PIT/LANDFILL
ORANGE COUNTY, FLORIDA

GROUNDWATER ELEVATION CONTOUR MAP (5/10/99)

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PAGE NO: FIGURE 2

TABLES

TABLE 1
MONITOR WELL CONSTRUCTION SUMMARY
B&B #91 - KEENE ROAD BORROW PIT / LANDFILL
ORANGE COUNTY, FLORIDA

WELL #	INSTALL DATE	DIAMETER (IN)	SCREEN DEPTH (FT) AND SLOT SIZE (IN)
MW-1	5/11/99	2	26-46, 0.01
MW-2	5/11/99	2	27 -42, 0.001
MW-3	5/11/99	2	37 -52, 0.01
PZ-1	Unknown	2	Total Depth 50'

TABLE 2
GROUNDWATER ELEVATION DATA
B&B #91 - KEENE ROAD BORROW PIT / LANDFILL
ORANGE COUNTY, FLORIDA

WELL	DATE	CASING ELEVATION (FT NGVD)*	WATER LEVEL (FT)	GROUNDWATER ELEVATION (FT)
MW-1	5/10/99 5/19/99	109.26	27.45 27.36	81.81 81.90
MW-2	5/10/99 5/19/99	85.67	36.91 37.01	48.76 48.66
MW-3	5/10/99 5/19/99	95.92	48.62 48.48	47.30 47.44
PZ-1	5/10/99	79.68	31.76	47.92

*Well Casing Elevations and 5/10/99 data provided by B&B

Well	date	DTW	GW elevation
MW-1	12/14/99	23.40'	85.86'
MW-2	12/14/99	30.37'	55.30'
MW-3	12/14/99	42.32'	53.60'
PZ-1	12/14/99	25.55'	54.13'

UPDATED 02/19/02

MW-1	27.60	81.66
MW-2	37.45	48.22
MW-3	49.16	46.76
PZ-1	31.84	47.84

APPENDIX A

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 17862-085-01

REPORT NO.:

PAGE NO.:

PROJECT: BISHOP & BUTTREY, KEENE ROAD LANDFILL PIT NO. 91

CLIENT: BISHOP & BUTTREY, INC.

WELL NUMBER: MW-1

LOCATION: SEE PRINT

INSTALLED BY: UES - ORLANDO

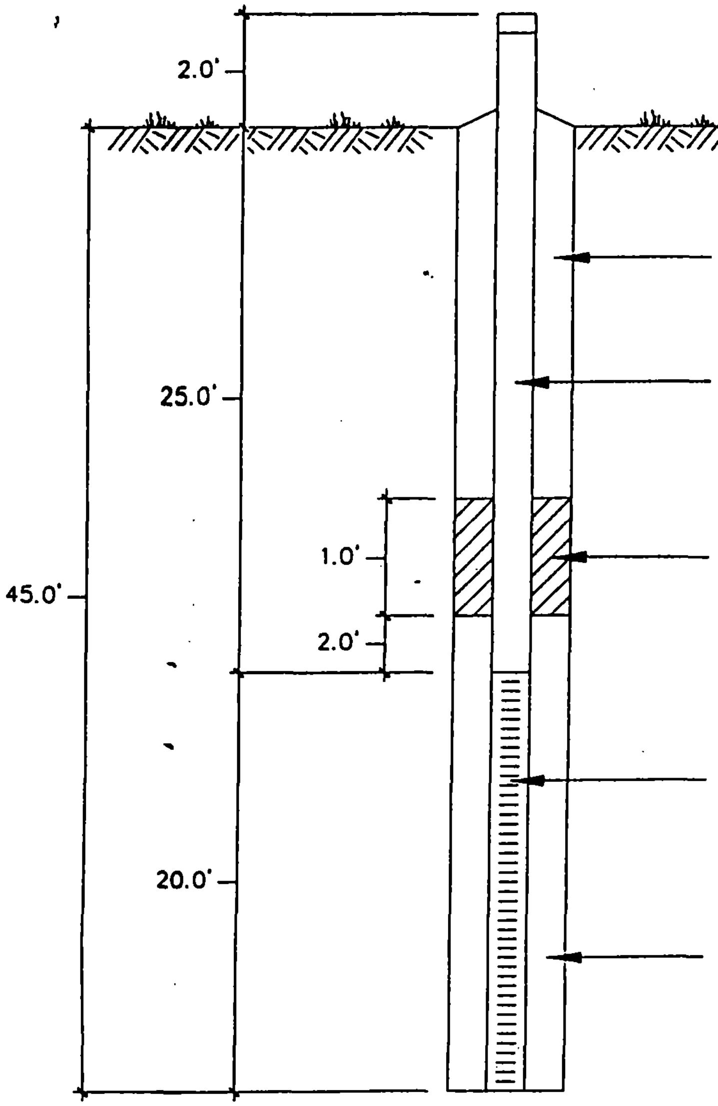
DATE: 05/11/99

WELL DIAGRAM - NOT TO SCALE

PROTECTIVE CASING - YES X

NO

TYPE 4x4 PROTECTOR



CUTTINGS

RISER - TYPE PVC

SIZE 2-INCH

BENTONITE SEAL

SCREEN - TYPE PVC

SIZE 2-INCH, 0.010

FILTER TYPE 30/45 SILICA

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 17862-085-01
REPORT NO.:
PAGE NO.:

PROJECT: BISHOP & BUTTREY, KEENE ROAD LANDFILL PIT NO. 91

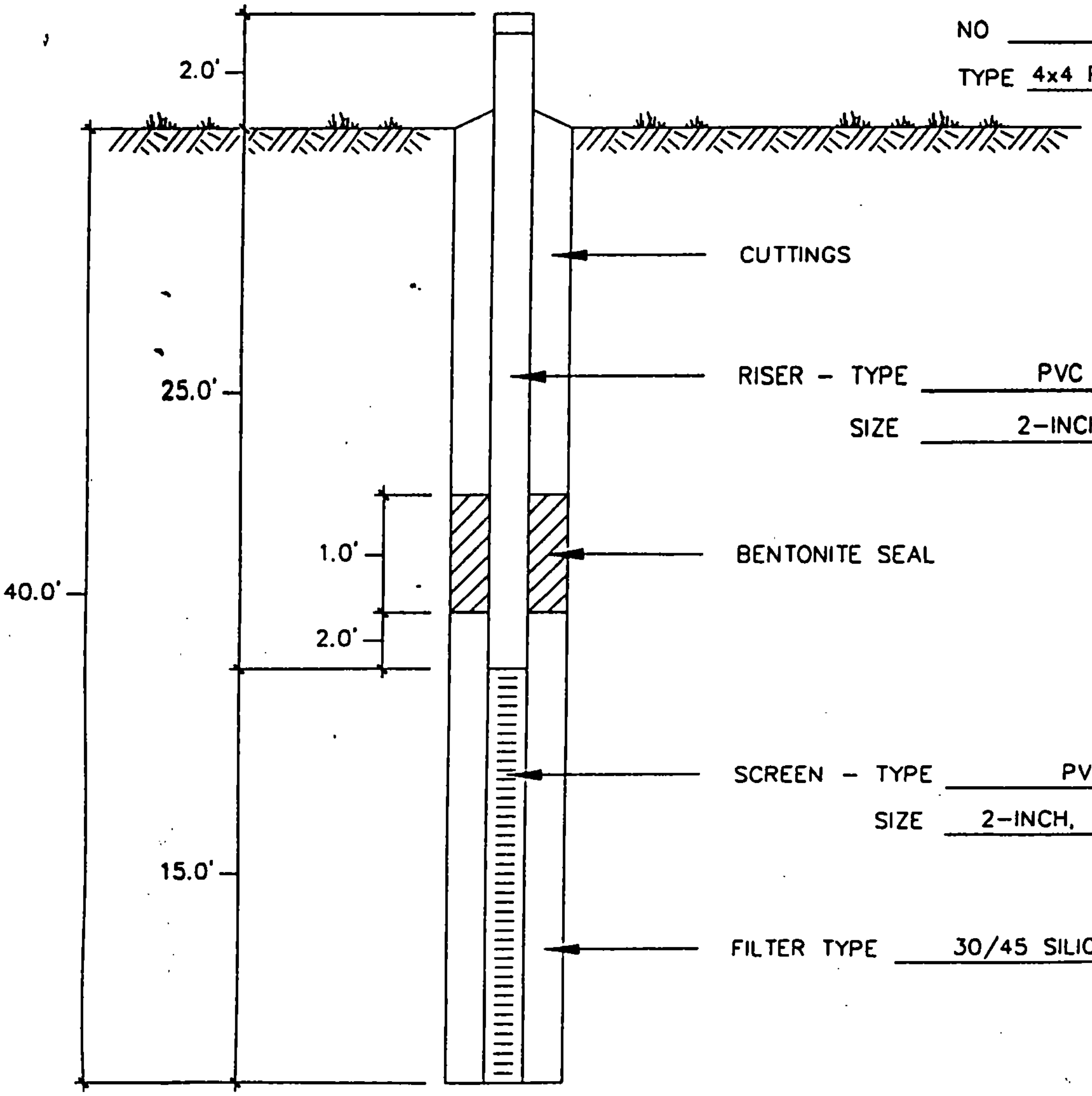
CLIENT: BISHOP & BUTTREY, INC.

WELL NUMBER: MW-2 LOCATION: SEE PRINT

INSTALLED BY: UES - ORLANDO DATE: 05/11/99

WELL DIAGRAM - NOT TO SCALE

PROTECTIVE CASING - YES X
NO
TYPE 4x4 PROTECTOR



RISER - TYPE PVC
SIZE 2-INCH

SCREEN - TYPE PVC
SIZE 2-INCH, 0.010

FILTER TYPE 30/45 SILICA

6613

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 17862-085-01

REPORT NO.:

PAGE NO.:

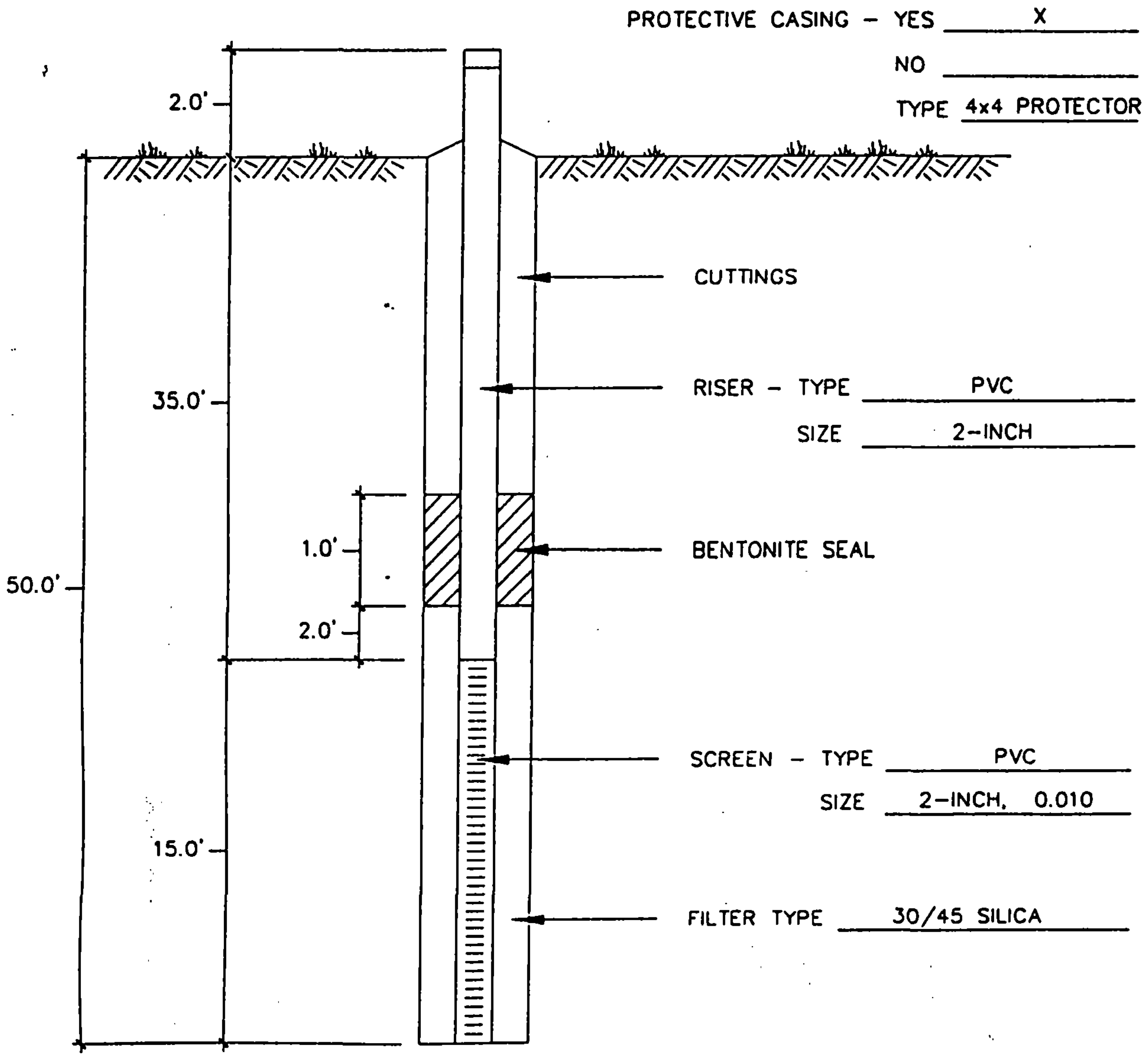
PROJECT: BISHOP & BUTTREY, KEENE ROAD LANDFILL PIT NO. 91

CLIENT: BISHOP & BUTTREY, INC.

WELL NUMBER: MW-3 LOCATION: SEE PRINT

INSTALLED BY: UES - ORLANDO DATE: 05/11/99

WELL DIAGRAM - NOT TO SCALE



PROTECTIVE CASING - YES X

NO

TYPE 4x4 PROTECTOR

CUTTINGS

RISER - TYPE PVC

SIZE 2-INCH

BENTONITE SEAL

SCREEN - TYPE PVC

SIZE 2-INCH, 0.010

FILTER TYPE 30/45 SILICA

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 17862-085-01
REPORT NO.:
PAGE: MW-1.1

PROJECT: BISHIP & BUTTREY
KEENE ROAD LANDFILL PIT 91
ORANGE COUNTY, FLORIDA

CLIENT: BISHOP AND BUTTREY
LOCATION:
REMARKS:

BORING DESIGNATION: MW-1 **SHEET:** 1 of 1
SECTION: **TOWNSHIP:** **RANGE:**

G.S. ELEVATION (ft): 45.0 **DATE STARTED:** 5/11/99
WATER TABLE (ft): 37.0 **DATE FINISHED:** 5/11/99
DATE OF READING: 05/11/99 **DRILLED BY:** UES - ORLANDO
EST. W.S.W.T. (ft): **TYPE OF SAMPLING:** ASTM D-1452

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0					⁘	Brown fine SAND [SP]						
					⁘	— light brown						
5					⁘							
10					⁘							
15					⁘							
					▨	Orange brown very clayey fine SAND [SC]						
20					▨							
25					▨							
			5-19-99	▽	⁘	Orange brown fine SAND; with silt [SP-SM]						
30					⁘							
35					⁘							
				▼	⁘							
40					▨	Gray green CLAY [CH]						
45						BORING TERMINATED AT 45 FEET						
50												
55												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 17862-085-01
REPORT NO.:
PAGE: MW-1.2

PROJECT: BISHIP & BUTTREY
KEENE ROAD LANDFILL PIT 91
ORANGE COUNTY, FLORIDA

BORING DESIGNATION: **MW-2** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: BISHOP AND BUTTREY
LOCATION:
REMARKS:

G.S. ELEVATION (ft): 45.0
WATER TABLE (ft): 33.0
DATE OF READING: 05/11/99
EST. W.S.W.T. (ft):

DATE STARTED: 5/11/99
DATE FINISHED: 5/11/99
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1452

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0					∴	Brown fine SAND [SP]						
					∴	— light brown						
5					∴							
10					∴							
15					∴							
20					∴							
25					∴							
30					∴							
				▼	∴							
35					∴							
			5-19-99	▽	∴	— light gray						
40						BORING TERMINATED AT 40 FEET						
45												
50												
55												

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 17862-085-01
REPORT NO.:
PAGE: MW-1.3

ROJECT: BISHIP & BUTTREY
KEENE ROAD LANDFILL PIT 91
ORANGE COUNTY, FLORIDA

CLIENT: BISHOP AND BUTTREY
LOCATION:
REMARKS:

BORING DESIGNATION: **MW-3** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

G.S. ELEVATION (ft): 45.0
WATER TABLE (ft): 44.0
DATE OF READING: 05/11/99
EST. W.S.W.T. (ft):

DATE STARTED: 5/11/99
DATE FINISHED: 5/11/99
DRILLED BY: UES - ORLANDO
TYPE OF SAMPLING: ASTM D-1452

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N (BLOWS/ FT.)	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT./ DAY)	ORG. CONT. (%)
									LL	PI		
0						Medium brown fine SAND [SP]						
						— brown						
5												
						— orange brown						
10												
15												
20												
						— very light brown						
25												
						Brown fine SAND; with clay [SP-SM]						
30												
					▨	Orange brown very sandy CLAY [CH]						
35												
40												
				▼								
45												
			5/19/99	▽								
50						BORING TERMINATED AT 50 FEET						
55												

APPENDIX B

HORIZONTAL HYDRAULIC CONDUCTIVITY (k)
CALCULATION SPREADSHEET

FULLY PENETRATING SYSTEM
BASED ON THE BOUWER AND RICE EQUATION:

$$\text{Ln Re/Rw} = \frac{1}{[(1.1/(\text{Ln}(Lw/Rw))) + (C/(Le/Rw)]}$$

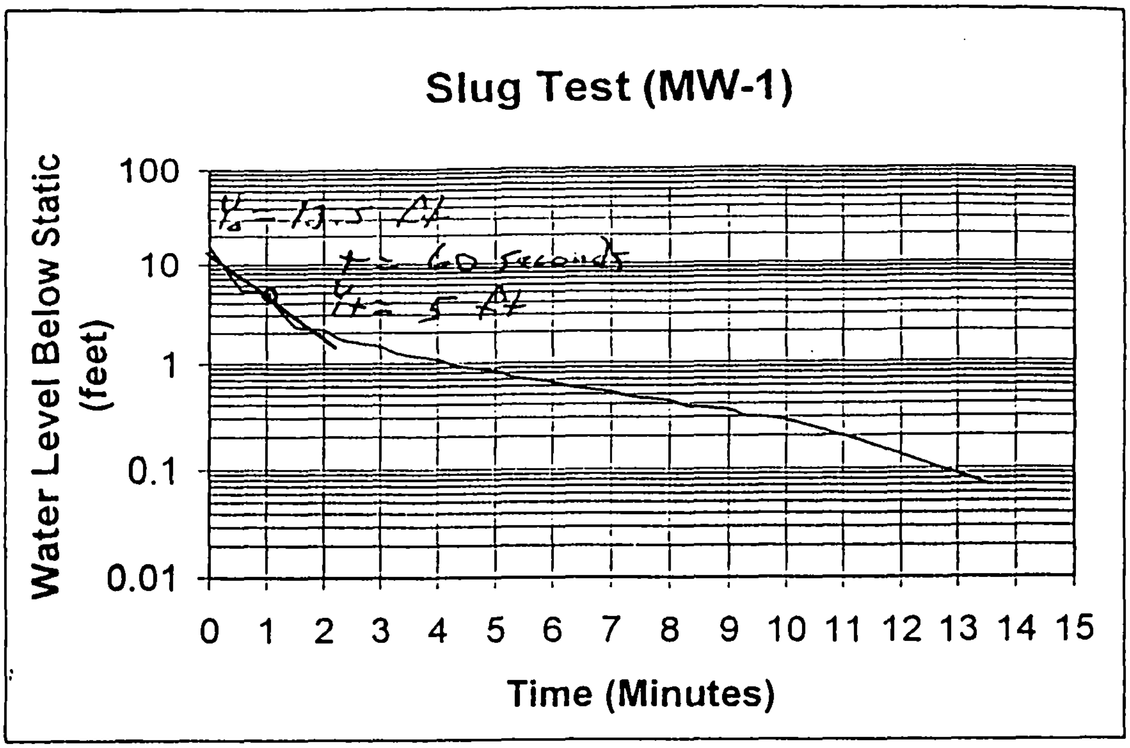
WHERE: $$k = Rc^{2}(\text{Ln Re/Rw})/2Le * (1/t) * (\text{Ln Yo/Yt}) * 86{,}400$$

PROJEC *Keene Road Landfill*

STATION *MW-1* *DEPTH(ft* *46.15* *SCREEN I* *2", 26.1' to 46.1'*
dtw:27.36

Clay at 42' below top of well screen

EQUATIO VARIABL	*VARIABL VALUE*	*HYDRAULIC CONDUCTIV CALCULATIONS*	
Lw =	*18.7900*		
Rw =	*0.2500*		
		Ln =	*3.5554*
H =	*18.7900*	*(Re/Rw)*	*3.5554E+00*
Le =	*18.7900*		
Rc =	*0.0833*		
t =	*60.0000*	*k =*	
		(ft/sec)	*1.087E-05*
Yo =	*13.5000*	*(ft/day)*	*0.9390*
Yt =	*5.0000*		
C =	*2.0000*		
Le/Rw =	*15.00*		


Slug Test (MW-1)
Water Level Below Static (feet)
100
10
1
0.1
0.01
Y_0 = 13.5 ft
t = 60 seconds
Y_t = 5 ft
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
Time (Minutes)

Keen Road Landfill Site MW-1

Field Data		Graph Data	
Time	Recovery	Time	Recovery
0.024	0.058	0.024	15.092
0.026	0.146	0.026	15.005
0.029	0.24	0.029	14.91
0.031	0.323	0.031	14.827
0.034	0.418	0.034	14.732
0.036	0.492	0.036	14.658
0.039	0.572	0.039	14.578
0.041	0.644	0.041	14.506
0.044	0.713	0.044	14.437
0.046	0.78	0.046	14.37
0.049	0.856	0.049	14.294
0.051	0.93	0.051	14.22
0.054	0.997	0.054	14.153
0.056	1.063	0.056	14.087
0.059	1.137	0.059	14.013
0.061	1.202	0.061	13.948
0.064	1.273	0.064	13.877
0.066	1.336	0.066	13.814
0.069	1.407	0.069	13.743
0.071	1.474	0.071	13.676
0.074	1.543	0.074	13.607
0.076	1.612	0.076	13.538
0.079	1.677	0.079	13.473
0.081	1.746	0.081	13.404
0.084	1.808	0.084	13.342
0.086	1.877	0.086	13.273
0.089	1.94	0.089	13.21
0.091	2	0.091	13.15
0.094	2.064	0.094	13.086
0.096	2.133	0.096	13.017
0.099	2.186	0.099	12.964
0.101	2.258	0.101	12.892
0.104	2.323	0.104	12.827
0.106	2.383	0.106	12.767
0.109	2.445	0.109	12.705
0.111	2.5	0.111	12.65
0.114	2.576	0.114	12.574
0.116	2.636	0.116	12.514
0.119	2.694	0.119	12.456
0.121	2.754	0.121	12.396
0.124	2.811	0.124	12.338
0.126	2.876	0.126	12.274
0.129	2.938	0.129	12.212
0.131	3.003	0.131	12.147
0.134	3.065	0.134	12.085
0.136	3.122	0.136	12.028
0.139	3.178	0.139	11.972
0.141	3.238	0.141	11.912
0.144	3.298	0.144	11.852
0.146	3.365	0.146	11.785
0.149	3.418	0.149	11.732
0.151	3.475	0.151	11.675
0.154	3.535	0.154	11.615
0.156	3.583	0.156	11.567
0.159	3.655	0.159	11.495
0.161	3.705	0.161	11.445
0.164	3.763	0.164	11.387
0.166	3.826	0.166	11.324
0.169	3.883	0.169	11.267
0.171	3.943	0.171	11.207
0.174	3.994	0.174	11.156
0.176	4.049	0.176	11.101
0.179	4.112	0.179	11.038
0.181	4.162	0.181	10.988
0.184	4.22	0.184	10.93
0.186	4.277	0.186	10.873
0.189	4.328	0.189	10.822
0.191	4.39	0.191	10.76
0.194	4.441	0.194	10.709
0.196	4.494	0.196	10.656
0.199	4.552	0.199	10.598
0.251	5.605	0.251	9.545
0.301	6.469	0.301	8.681
0.351	7.23	0.351	7.92
0.401	7.9	0.401	7.25
0.451	8.52	0.451	6.63
0.501	9.11	0.501	6.04
0.551	9.64	0.551	5.51
1.001	10.14	1.001	5.01
1.051	10.58	1.051	4.57
1.101	10.96	1.101	4.19
1.151	11.3	1.151	3.85
1.201	11.61	1.201	3.54
1.251	11.87	1.251	3.28
1.301	12.09	1.301	3.06
1.351	12.3	1.351	2.85
1.401	12.48	1.401	2.67
1.451	12.64	1.451	2.51
1.501	12.78	1.501	2.37
1.551	12.9	1.551	2.25
2.001	13	2.001	2.15
2.301	13.41	2.301	1.74
3.001	13.66	3.001	1.49
3.301	13.88	3.301	1.27
4.001	14.06	4.001	1.09
4.301	14.2	4.301	0.95
5.001	14.31	5.001	0.84
5.301	14.41	5.301	0.74
6.001	14.49	6.001	0.66
6.301	14.56	6.301	0.59
7	14.62	7	0.53
7.3	14.67	7.3	0.48
8	14.72	8	0.43
8.3	14.77	8.3	0.38
9	14.8	9	0.35
9.3	14.84	9.3	0.31
10	14.87	10	0.28
11.54	14.99	11.54	0.16
13.54	15.08	13.54	0.07
1251	15.15		

HORIZONTAL HYDRAULIC CONDUCTIVITY (k)
CALCULATION SPREADSHEET

PARTIALLY PENETRATING SYSTEM
BASED ON THE BOUWER AND RICE EQUATION:

$$\text{Ln Re/Rw} = \frac{1}{[(1.1/(\text{Ln}(Lw/Rw))) + ((A + B(\text{Ln}\{H-Lw/Rw\})/(Le/Rw)]}$$

WHERE:

$$k = Rc(\text{Ln Re/Rw})^{2}/2Le * (1/t) * (\text{Ln Yo/Yt}) * 86{,}400$$

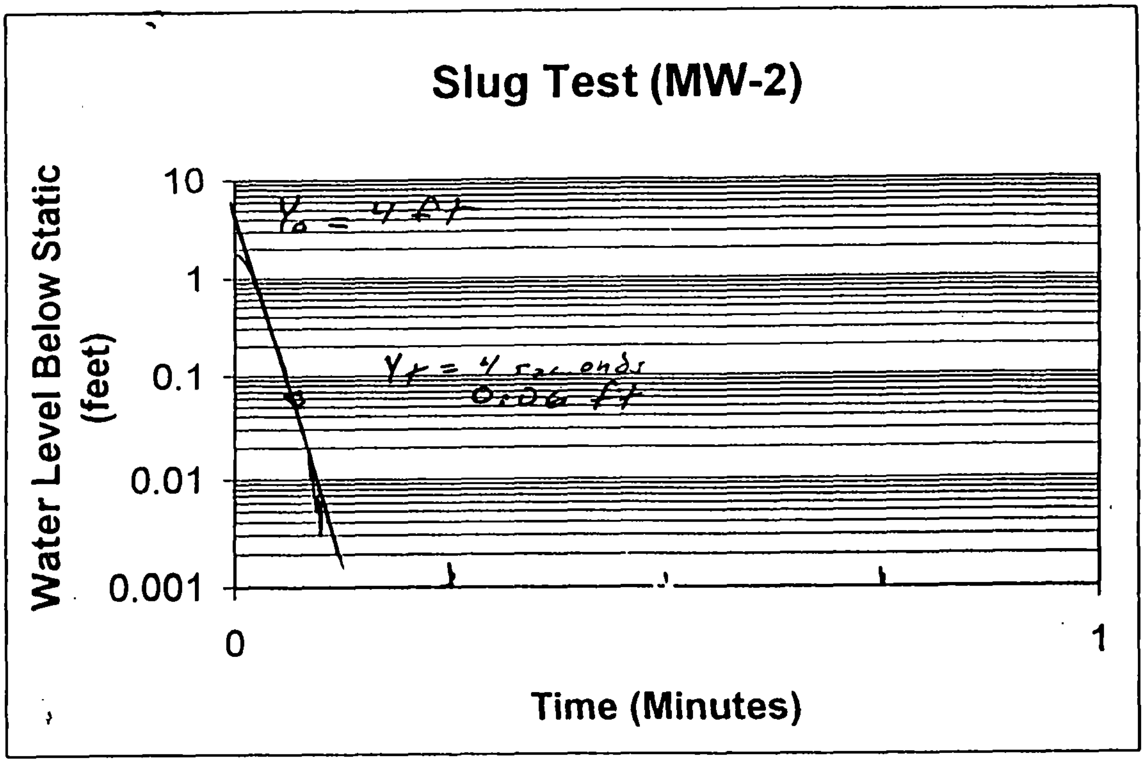
PROJEC Keene Road Landfill

STATION MW-2 DEPTH(ft 42.48 SCREEN I 2", 27.4 to 42.4

Casing Elevation = 85.67 *dtw:37.01*

Aquifer thickness is 43 feet, using top of the Hawthorn lying at 0 feet NGVD.

EQUATIO VARIABL	*VARIABL VALUE*	*HYDRAULIC CONDUCTIV CALCULATIONS*	
Lw =	*5.4700*		
Rw =	*0.3000*		
H =	*43.0000*	*Ln =* *(Re/Rw)*	*1.7605* *1.760E+00*
Le =	*5.4700*		
Rc =	*0.0833*		
t =	*4.0000*	*k =*	
Yo =	*4.0000*	*(ft/sec)* *(ft/day)*	*1.172E-03* *101.2917*
Yt =	*0.0600*		
A =	*2.0000*		
B =	*0.3000*		
Le/Rw =	*18.23*		


Slug Test (MW-2)
Water Level Below Static (feet)
10
1
0.1
0.01
0.001
0
1
Time (Minutes)
Y_o = 4 ft
Y_t = 4 seconds
0.06 ft

Keen Road Landfill Site MW-2

Field Data

Time	Recovery
0.002	2.265
0.005	2.276
0.007	2.355
0.01	2.466
0.012	2.565
0.015	2.687
0.017	2.812
0.02	2.957
0.022	3.1
0.025	3.231
0.027	3.339
0.03	3.439
0.032	3.527
0.035	3.6
0.037	3.662
0.04	3.711
0.042	3.754
0.045	3.798
0.047	3.828
0.05	3.862
0.053	3.885
0.055	3.911
0.058	3.929
0.06	3.952
0.063	3.971
0.065	3.978
0.068	3.992
0.07	3.996
0.073	4.01
0.075	4.017
0.078	4.019
0.08	4.024
0.083	4.029
0.085	4.033
0.088	4.042
0.09	4.038
0.093	4.045
0.095	4.047
0.097	4.045
0.1	4.049
0.102	4.045
0.105	4.045
0.107	4.052

Graph Data

Time	Recovery
0.002	1.787
0.005	1.776
0.007	1.697
0.01	1.586
0.012	1.487
0.015	1.365
0.017	1.24
0.02	1.095
0.022	0.952
0.025	0.821
0.027	0.713
0.03	0.613
0.032	0.525
0.035	0.452
0.037	0.39
0.04	0.341
0.042	0.298
0.045	0.254
0.047	0.224
0.05	0.19
0.053	0.167
0.055	0.141
0.058	0.123
0.06	0.1
0.063	0.081
0.065	0.074
0.068	0.06
0.07	0.056
0.073	0.042
0.075	0.035
0.078	0.033
0.08	0.028
0.083	0.023
0.085	0.019
0.088	0.01
0.09	0.014
0.093	0.007
0.095	0.005
0.097	0.007
0.1	0.003
0.102	0.007
0.105	0.007

HORIZONTAL HYDRAULIC CONDUCTIVITY (k)
CALCULATION SPREADSHEET

PARTIALLY PENETRATING SYSTEM
BASED ON THE BOUWER AND RICE EQUATION:

$$\text{Ln Re/Rw} = \frac{1}{[(1.1/(\text{Ln}(\text{Lw/Rw}))) + ((A + B(\text{Ln}\{\text{H-Lw/Rw}\})/(\text{Le/Rw})]}$$

2

WHERE: $k = \text{Rc}(\text{Ln Re/Rw})/2\text{Le} * (1/t) * (\text{Ln Yo/Yt}) * 86{,}400$

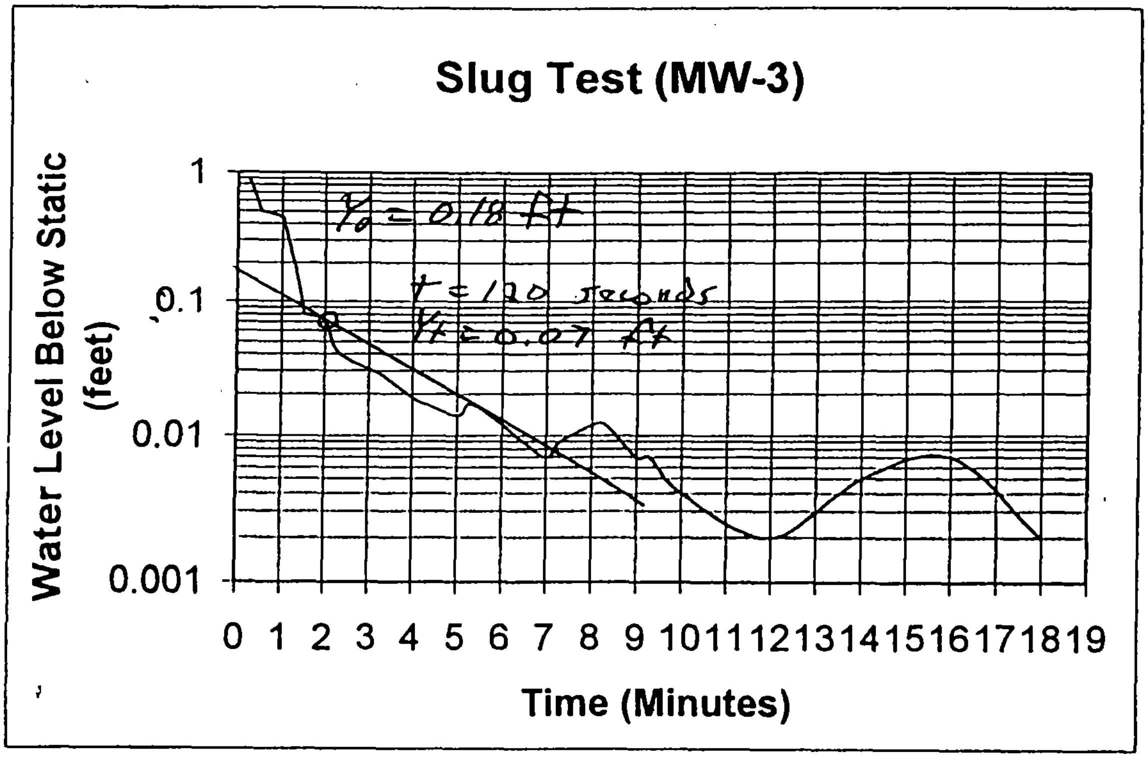
PROJEC Keene Road Landfill

STATION MW-3 DEPTH(ft 51.88 SCREEN I 2", 36.8 to 51.8

Casing Elevation 95.92 NGVD dtw:48.98

Aquifer thickness is 47 feet, asuming top of Hawthorn lies at elevation 0 feet NGVD.

EQUATIO VARIABL	*VARIABL VALUE*	*HYDRAULIC CONDUCTIV CALCULATIONS*	
Lw =	*2.8200*		
Rw =	*0.3000*		
		Ln =	*1.2267*
H =	*47.0000*	*(Re/Rw)*	*1.227E+00*
Le =	*2.8200*		
Rc =	*0.0833*		
t =	*120.0000*	*k =*	
		(ft/sec)	*1.188E-05*
Yo =	*0.1800*	*(ft/day)*	*1.0263*
Yt =	*0.0700*		
A =	*1.8000*		
B =	*0.2500*		
Le/Rw =	*9.40*		


Slug Test (MW-3)
Water Level Below Static (feet)
1
0.1
0.01
0.001
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Time (Minutes)
Yo = 0.18 ft
t = 120 seconds
Yt = 0.07 ft

Keen Road Landfill Site MW-3

Field Data		Graph Data	
Time	Recovery	Time	Recovery
0.199	-0.26	0.199	0.915
0.251	-0.241	0.251	0.896
0.301	-0.158	0.301	0.813
0.351	-0.095	0.351	0.75
0.401	-0.025	0.401	0.68
0.451	0.037	0.451	0.618
0.501	0.102	0.501	0.553
0.551	0.153	0.551	0.502
1.001	0.206	1.001	0.449
1.051	0.262	1.051	0.393
1.101	0.303	1.101	0.352
1.151	0.357	1.151	0.298
1.201	0.398	1.201	0.257
1.251	0.43	1.251	0.225
1.301	0.463	1.301	0.192
1.351	0.497	1.351	0.158
1.401	0.516	1.401	0.139
1.451	0.546	1.451	0.109
1.501	0.56	1.501	0.095
1.551	0.574	1.551	0.081
2.001	0.583	2.001	0.072
2.301	0.613	2.301	0.042
3.001	0.624	3.001	0.031
3.301	0.627	3.301	0.028
4.001	0.636	4.001	0.019
4.301	0.638	4.301	0.017
5.001	0.641	5.001	0.014
5.301	0.638	5.301	0.017
6.001	0.643	6.001	0.012
6.301	0.645	6.301	0.01
7	0.648	7	0.007
7.3	0.646	7.3	0.009
8	0.643	8	0.012
8.3	0.643	8.3	0.012
9	0.648	9	0.007
9.3	0.648	9.3	0.007
10	0.651	10	0.004
12	0.653	12	0.002
14	0.65	14	0.005
16	0.648	16	0.007
18	0.653	18	0.002
20	0.655		

UNIVERSAL
ENGINEERING SCIENCES

SLUG TEST AND PUMPING TEST RESULTS
B & B #91 - KEENE ROAD BORROW PIT / LANDFILL

UES Project No. 17862-085-07
Report No. 114026
Date: MAY 2000

Prepared For:

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5/23/04

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1.0 Introduction

Universal Engineering Sciences, Inc. (UES) has prepared this report to provide results of aquifer slug test and pumping test data measured at the Bishop & Buttrey, Inc. (B&B) borrow pit #91/ proposed landfill site. The site is located along the south side of Keene Road in Orange County, Florida. The site plan is provided as Figure 1.

2.0 Groundwater Flow

Groundwater elevation data obtained at the site are provided on Table 2. Groundwater elevations from April 28, 2000 were plotted and contoured on Figure 2. Shallow groundwater flow was measured toward the southwest at a hydraulic gradient of 0.002, based a distance of 480 feet between the 48.00 and 49.00 groundwater elevation contours. The groundwater flow measurement is based on comparison of water levels measured in monitor wells with screen intervals bracketing the water table, monitor wells MW-1, MW-2, MW-3, and PZ-8b.

3.0 Slug Tests

UES performed slug-out tests to measure hydraulic conductivities of the surficial aquifer at the site. Slug tests were performed on May 19, 1999 at water table monitor wells MW-1, MW-2, and MW-3 as documented in UES Report No. 63003, dated May 1999. Slug tests were performed at piezometers PZ-8a, PZ-8b, PZ-17a, and PZ17b on April 28, 2000. Slug tests were performed at piezometers PZ-13a, and PZ-13b on May 2, 2000. We intended to perform slug tests at piezometers PZ-19, PZ-20, and PZ-21; however, there was not enough water within these piezometers to perform valid slug tests.

The water in each well was pumped out and the recovery of the water level in each well was measured over time. The water level recovery at each well was recorded using a 15 pounds per square inch (psi) transducer probe and an electronic data logger. The data collected from the slug out tests were analyzed for hydraulic conductivity using the Bouwer and Rice Method updated by Bouwer in 1989. Based on regional geology, the top of the Hawthorn is at an elevation of approximately zero feet in the site vicinity, relative to the national geodetic vertical datum. Transmissivity (T) is estimated by the product of the hydraulic conductivity (K) and the aquifer thickness (b).

The field data, graphs, and hydraulic conductivity calculations are presented in Appendix A. Soil lithologic logs and well construction details are provided in Appendix B. Table 1 contains a summary of monitor well construction information. Water level data is contained in Table 2. The calculated hydraulic conductivities and transmissivities are summarized on Table 3. Aquifer characteristics vary across the site with changes in lithology.

4.0 Pumping Tests

Pumping tests were performed by UES to evaluate connectivity between the upper and lower portions of the surficial aquifer. Independent tests were performed at piezometer clusters PZ-8a/8b and PZ-17a/17b. Soil boring logs B-8 and B-17 indicate sand is present from the surface to the bottom of the borings. Boring B-8 was performed to a depth of 75 feet below land surface (bls). Boring B-17 was performed to a depth of 90 feet bls. Copies of the boring log are contained in Appendix B.

4.0 Pumping Tests

Pumping tests were performed by UES to further evaluate aquifer characteristics in the upper and lower portions of the surficial aquifer. Independent tests were performed at piezometer clusters PZ-8a/8b and PZ-17a/17b. Soil boring logs B-8 and B-17 indicate sand is present from the surface to the bottom of the borings. Boring B-8 was performed to a depth of 75 feet below land surface (bls). Boring B-17 was performed to a depth of 90 feet bls. Copies of the boring logs are contained in Appendix B.

On May 1, 2000 a submersible pump was placed in piezometer PZ-8a, screened at a depth of 72 to 77 feet bls. A pressure transducer connected to an electronic data logger was placed in adjoining piezometer PZ-8b, screened at a depth of 26.5 to 36.5 feet bls. The submersible pump was operated at the maximum achievable constant discharge rate of five gallons per minute (gpm) for approximately 19 hours. Groundwater pumped from piezometer PZ-8a was discharged on the ground approximately 30 feet away from both piezometers, rapid infiltration was observed. Water level data collected from both piezometers are provided and plotted in Appendix C. Pumping groundwater from piezometer PZ-8a at a constant rate of 5 gpm caused approximately 1.5 feet of drawdown within piezometer PZ-8a, and approximately 0.05 feet of drawdown was measured in piezometer PZ-8b. Aquifer recharge at the water table caused by infiltration of the pumped discharge water was measured in piezometer PZ-8b beginning approximately six hours after the start of pumping.

On May 2, 2000 a submersible pump was placed in piezometer PZ-17a, screened at a depth of 47.5 to 52.5 feet bls. A pressure transducer connected to an electronic data logger was placed in adjoining piezometer PZ-17b, screened at a depth of 12.8 to 22.8 feet bls. The submersible pump was operated at the maximum achievable constant discharge rate of 5 gpm for approximately 15 hours. Groundwater pumped from piezometer PZ-17a was discharged on the ground approximately 70 feet away from both piezometers, rapid infiltration was observed. Water level data collected from both piezometers are provided and plotted in Appendix C. Pumping groundwater from piezometer PZ-17a at a constant rate of 5 gpm caused approximately 1.6 feet of drawdown within piezometer PZ-17a, and approximately 0.04 feet of drawdown was measured in piezometer PZ-17b.

The pumping test data from Piezometers PZ-8a and PZ-17a were used to estimate the aquifer transmissivity using Jacob's equation presented on Page 1021 of Driscoll F.G. Time drawdown data obtained during the constant rate pumping tests from piezometers PZ-8b and PZ-17b were evaluated for transmissivity by the Cooper-Jacob Method. Table 3 includes a summary of the pumping test transmissivity measurements. The transmissivity measurements based on pumping test data collected in the shallow piezometers are higher than the transmissivity measurements based on slug test data. The transmissivity measurements based on pumping test data collected in the deep piezometers are lower than the transmissivity measurements based on slug test data.

TABLES

TABLE 1
MONITOR WELL CONSTRUCTION SUMMARY
B&B #91 - KEENE ROAD BORROW PIT / LANDFILL
ORANGE COUNTY, FLORIDA

WELL #	INSTALL DATE	DIAMETER (IN)	CASING STICK-UP ABOVE LAND SURFACE (FT)	TOTAL DEPTH BELOW TOP OF CASING (FT)	SCREEN DEPTH (FT) BELOW TOP OF CASING AND SLOT SIZE (IN)
MW-1	5/11/99	2	3	46.15	26-46, 0.01
MW-2	5/11/99	2	3	42.48	27-42, 0.01
MW-3	5/11/99	2	3	51.88	37-52, 0.01
PZ-1	Unknown	2	3	50	unknown
PZ-8a		2	2.80	77.34	72-77, 0.01
PZ-8b		2	2.83	36.84	26.5-36.5, 0.01
PZ-13a		2	2.83	73.95	68.6-73.6, 0.01
PZ-13b		2	2.95	58.03	47.7-57.7, 0.01
PZ-17a		2	2.89	52.88	47.5-52.5, 0.01
PZ-17b		2	2.93	23.12	12.8-22.8, 0.01
PZ-18		2	3.00	30	20-30, 0.01
PZ-19		2	4.24	42.70	32.4-42.4, 0.01
PZ-20		2	2.90	17.88	7.5 to 17.5, 0.01
PZ-21		2	2.08	45.24	34.9-44.9, 0.01

TABLE 2
GROUNDWATER ELEVATION DATA
B&B #91 - KEENE ROAD BORROW PIT / LANDFILL
ORANGE COUNTY, FLORIDA

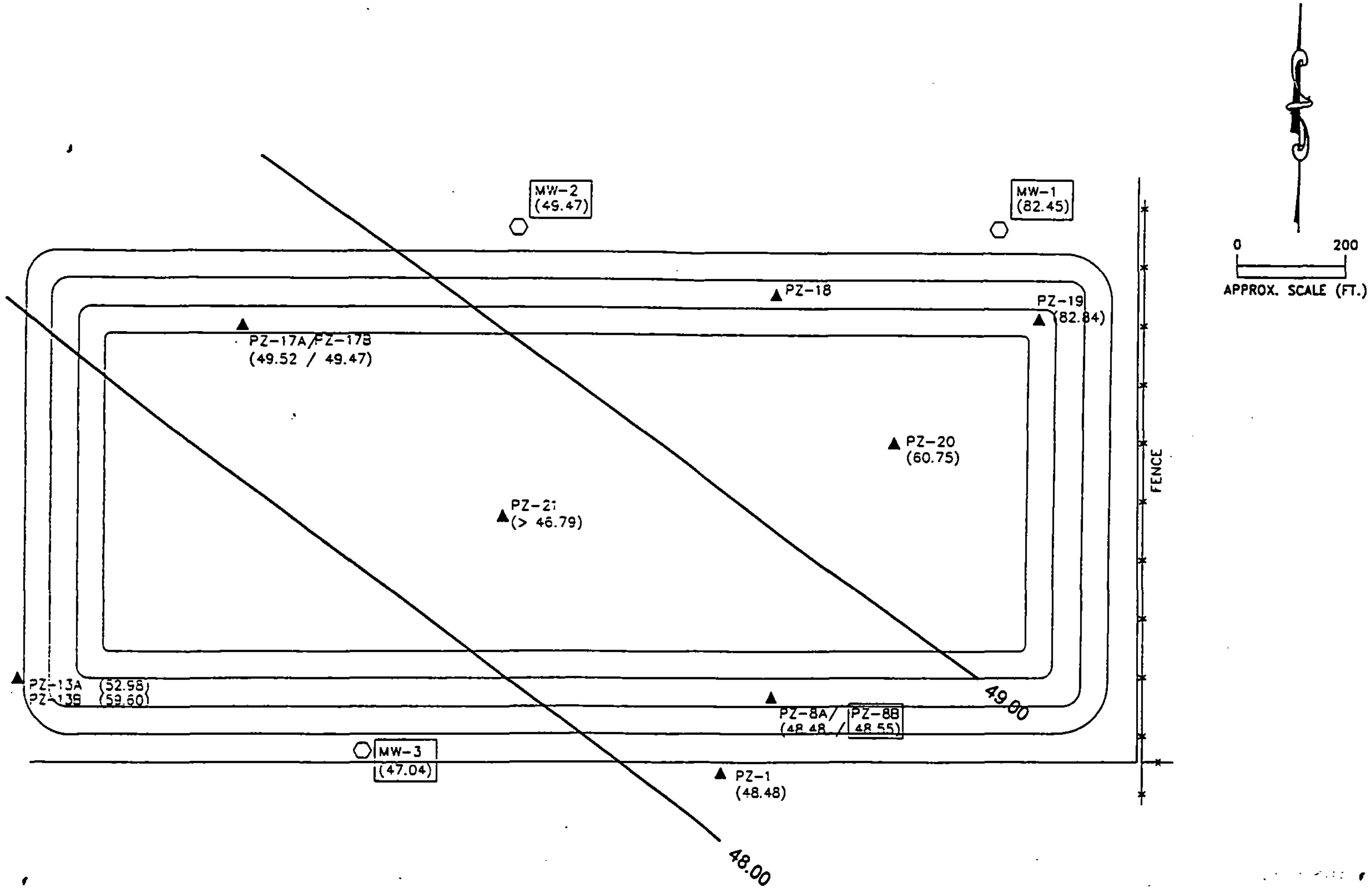
WELL	DATE	CASING ELEVATION (FT NGVD)*	WATER LEVEL (FT)	GROUNDWATER ELEVATION (FT)
MW-1	5/10/99	109.26	27.45	81.81
	5/19/99		27.36	81.90
	4/28/00		26.81	82.45
MW-2	5/10/99	85.67	36.91	48.76
	5/19/99		37.01	48.66
	4/28/00		36.20	49.47
MW-3	5/10/99	95.92	48.62	47.30
	5/19/99		48.48	47.44
	4/28/00		48.88	47.04
PZ-1	5/10/99	79.68	31.76	47.92
	4/28/00		31.20	48.48
PZ-8a	4/28/00	78.11	29.63	48.48
PZ-8b	4/28/00	77.99	29.44	48.55
PZ-13a	4/28/00	103.08	50.10	52.98
	5/2/00		50.16	52.92
PZ-13b	4/28/00	103.14	43.54	59.60
	5/2/00		43.78	59.36
PZ-17a	4/28/00	61.93	12.41	49.52
PZ-17b	4/28/00	61.58	12.11	49.47
PZ-18	4/28/00	97.96	Dry	
PZ-19	4/28/00	109.09	26.25	82.84
	5/2/00		26.28	82.81
PZ-20	4/28/00	78.56	17.81-Dry	>60.75
PZ-21	4/28/00	91.46	44.67-Dry	>46.79

*Well Casing Elevations and 5/10/99 data provided by B&B

TABLE 3
AQUIFER TEST RESULTS
B&B #91 - KEENE ROAD BORROW PIT / LANDFILL
ORANGE COUNTY, FLORIDA

LOCATION	TEST	HYDRAULIC CONDUCTIVITY (ft/day)	TRANSMISSIVITY (ft2/day)	SOIL
MW-1	slug	0.9	0.94	Sand, clayey sand, clay
MW-2	slug	101	4,356	sand
MW-3	slug	1	48	sandy clay
PZ-8a	slug Jacob	77	3,722 903	sand
PZ-8b	slug Cooper-Jacob	29	1,422 6,127	sand
PZ-13a	slug	0.2	10	clayey sand
PZ-13b	slug	0.3	21	silty sand
PZ-17a	slug Jacob	57	2,800 825	sand
PZ-17b	slug Cooper-Jacob	46	2,292 6,085	sand

FIGURES



LEGEND

- ▲ PIEZOMETER LOCATION
- ⬡ MONITOR WELL LOCATION
- (47.04) GROUNDWATER ELEVATION AT WELL/PIEZOMETER LOCATION, FEET
- 48.00 —— GROUNDWATER ELEVATION CONTOUR, FEET

NOTE: WELL SCREEN INTERVALS BRACKET THE WATER TABLE ONLY IN MONITOR WELLS MW-1, MW-2, MW-3 & PZ-8B

THE DATA FROM THESE WELLS (SHOWN ABOVE IN BOXES) WAS USED TO DEVELOP THE APPROXIMATE GROUNDWATER ELEVATION CONTOURS

THIS DRAWING REPRODUCED FROM PLAN PROVIDED BY CLIENT.

M0255-03

FOR: BISHOP & BUTTREY

DRAWN BY: G.D.

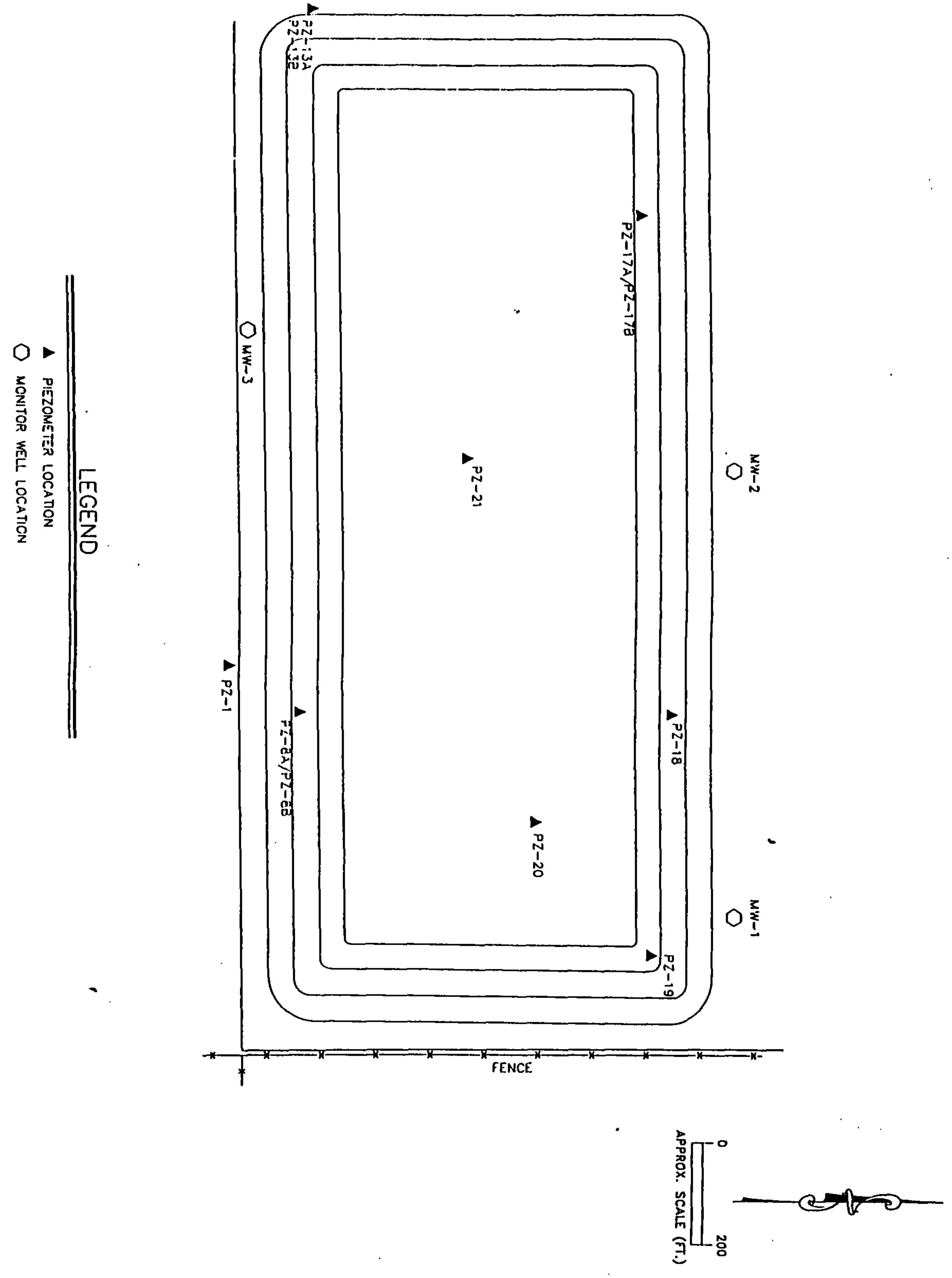
DATE: 5/19/00

BISHOP & BUTTREY NO. 91
KEENE ROAD BORROW PIT/LANDFILL
ORANGE COUNTY, FLORIDA

UNIVER
ENGINEERING S

FIGURE: 2

M0255.01



THIS DRAWING REPRODUCED FROM PLAN PROVIDED BY CLIENT.

FIGURE: 1

UNIVERSAL ENGINEERING SCIENCES

BISHOP & BUTTREY NO. 91
KEENE ROAD BORROW PIT/LANDFILL
ORANGE COUNTY, FLORIDA

SITE PLAN

FOR: BISHOP & BUTTREY

DRAWN BY: M.E.T.	DATE: 05/05/00
CHECKED BY:	DATE: 5/14/00
REPORT NO: 114026	SCALE: AS SHOWN

APPENDIX A

HORIZONTAL HYDRAULIC CONDUCTIVITY (k)
CALCULATION SPREADSHEET

PARTIALLY PENETRATING SYSTEM
BASED ON THE BOUWER AND RICE EQUATION:

$$\text{Ln Re/Rw} = \frac{1}{[(1.1/(\text{Ln}(Lw/Rw))) + ((A + B(\text{Ln}\{H\text{-}Lw/Rw\})/(Le/Rw)]}$$

2

WHERE: $k = Rc(\text{Ln Re/Rw})/2Le \ * \ (1/t) \ * \ (\text{Ln Yo/Yt}) \ * \ 86{,}400$

PROJECT Keene Road Landfill

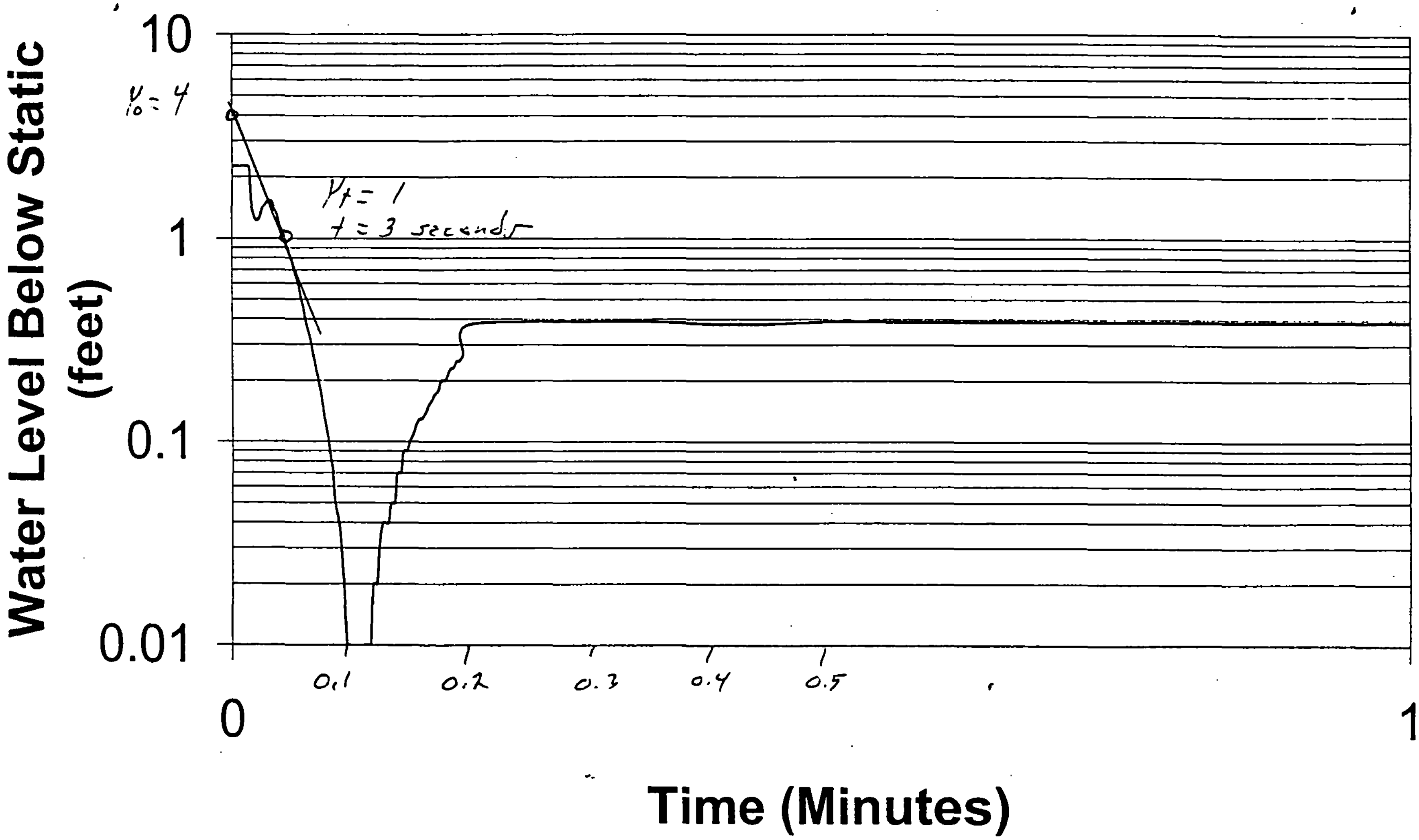
STATION: PZ-8A DEPTH(ft) 77.34 SCREEN IN 2", 72 to 77

Casing Elevation = 78.11 dtw:29.63

Aquifer thickness is 48.48 feet, using top of the Hawthorn lying at 0 feet NGVD.

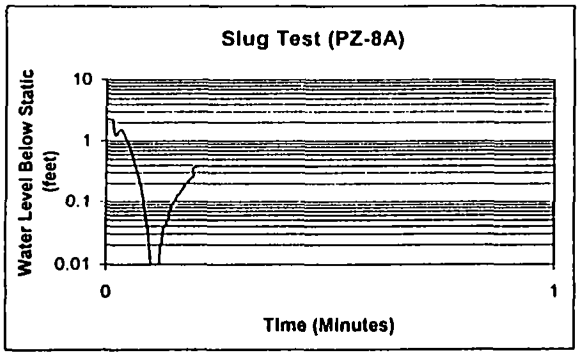
EQUATIOI VARIABLI	*VARIABLI VALUE*	*HYDRAULIC CONDUCTIVI CALCULATIONS*	
Lw =	*47.3700*		
Rw =	*0.3000*		
		Ln =	*2.7712*
H =	*48.4800*	*(Re/Rw)*	*2.771E+00*
Le =	*5.0000*		
Rc =	*0.0833*		
t =	*3.0000*	*k =*	
		(ft/sec)	*8.886E-04*
Yo =	*4.0000*	*(ft/day)*	*76.7720*
Yt =	*1.0000*		
A =	*2.0000*		
B =	*0.3000*		
Le/Rw =	*16.67*		

Slug Test (PZ-8A)



Keen Road Landfill Site PZ-8A

Field Data		Graph Data	
Time	Recovery	Time	Recovery
0	40.61	0.001	2.27
0.002	40.62	0.002	2.26
0.005	40.62	0.005	2.26
0.007	40.62	0.007	2.26
0.01	40.63	0.01	2.26
0.012	40.61	0.012	2.27
0.015	40.62	0.015	2.26
0.017	40.65	0.017	2.23
0.02	41.26	0.02	1.62
0.022	41.61	0.022	1.27
0.025	41.65	0.025	1.23
0.027	41.59	0.027	1.29
0.03	41.47	0.03	1.41
0.032	41.27	0.032	1.61
0.035	41.24	0.035	1.64
0.037	41.26	0.037	1.62
0.04	41.46	0.04	1.42
0.042	41.58	0.042	1.3
0.045	41.71	0.045	1.17
0.047	41.81	0.047	1.07
0.05	41.91	0.05	0.97
0.053	42.01	0.053	0.87
0.055	42.11	0.055	0.77
0.058	42.19	0.058	0.69
0.06	42.28	0.06	0.6
0.063	42.35	0.063	0.53
0.065	42.43	0.065	0.45
0.068	42.49	0.068	0.39
0.07	42.55	0.07	0.33
0.073	42.59	0.073	0.29
0.075	42.64	0.075	0.24
0.078	42.67	0.078	0.21
0.08	42.71	0.08	0.17
0.083	42.74	0.083	0.14
0.085	42.77	0.085	0.11
0.088	42.79	0.088	0.09
0.09	42.81	0.09	0.07
0.093	42.83	0.093	0.05
0.095	42.84	0.095	0.04
0.097	42.85	0.097	0.03
0.1	42.86	0.1	0.02
0.102	42.87	0.102	0.01
0.105	42.87	0.105	0.01
0.107	42.88	0.107	0
0.11	42.88	0.11	0
0.112	42.88	0.112	0
0.115	42.88	0.115	0
0.117	42.87	0.117	0.01
0.12	42.87	0.12	0.01
0.122	42.87	0.122	0.01
0.125	42.86	0.125	0.02
0.127	42.86	0.127	0.02
0.13	42.85	0.13	0.03
0.132	42.84	0.132	0.04
0.135	42.84	0.135	0.04
0.137	42.84	0.137	0.04
0.14	42.83	0.14	0.05
0.142	42.83	0.142	0.05
0.145	42.81	0.145	0.07
0.147	42.81	0.147	0.07
0.15	42.79	0.15	0.09
0.152	42.79	0.152	0.09
0.155	42.78	0.155	0.1
0.157	42.77	0.157	0.11
0.16	42.76	0.16	0.12
0.162	42.75	0.162	0.13
0.165	42.75	0.165	0.13
0.167	42.74	0.167	0.14
0.17	42.73	0.17	0.15
0.172	42.72	0.172	0.16
0.175	42.71	0.175	0.17
0.177	42.7	0.177	0.18
0.18	42.68	0.18	0.2
0.182	42.68	0.182	0.2
0.185	42.67	0.185	0.21
0.187	42.65	0.187	0.23
0.19	42.65	0.19	0.23
0.192	42.63	0.192	0.25
0.195	42.63	0.195	0.25
0.197	42.61	0.197	0.27
0.25	42.51	0.25	0.37
0.3	42.49	0.3	0.39
0.35	42.49	0.35	0.39
0.4	42.49	0.4	0.39
0.45	42.5	0.45	0.38
0.5	42.5	0.5	0.38
0.55	42.49	0.55	0.39
0.6	42.49	0.6	0.39
1.05	42.49	1.05	0.39
1.1	42.49	1.1	0.39
1.15	42.49	1.15	0.39
1.2	42.48	1.2	0.4
1.25	42.48	1.25	0.4
1.3	42.48	1.3	0.4
1.35	42.48	1.35	0.4
1.4	42.47	1.4	0.41
1.45	42.48	1.45	0.4
1.5	42.48	1.5	0.4
1.55	42.48	1.55	0.4
1.6	42.48	1.6	0.4
2.3	42.47	2.3	0.41
2.6	42.47	2.6	0.41
3.3	42.47	3.3	0.41
3.6	42.47	3.6	0.41
4.3	42.46	4.3	0.42
4.6	42.48	4.6	0.4
5.3	42.48	5.3	0.4
5.6	42.47	5.6	0.41
6.3	42.48	6.3	0.4
6.6	42.48	6.6	0.4
7.3	42.48	7.3	0.4
7.6	42.48	7.6	0.4
8.3	42.48	8.3	0.4
8.6	42.47	8.6	0.41
9.3	42.48	9.3	0.4
9.6	42.48	9.6	0.4
11.6	42.48	11.6	0.4
13.6	42.48	13.6	0.4
1250	42.49	1250	0.39



HORIZONTAL HYDRAULIC CONDUCTIVITY (k)
CALCULATION SPREADSHEET

PARTIALLY PENETRATING SYSTEM
BASED ON THE BOUWER AND RICE EQUATION:

Ln Re/Rw= $$\frac{1}{[(1.1/(\mathrm{Ln}(Lw/Rw))) + ((A + B(\mathrm{Ln}\{H\text{-}Lw/Rw\})/(Le/Rw)]}$$

2

WHERE: k = Rc(Ln Re/Rw)/2Le * (1/t) * (Ln Yo/Yt) * 86,400

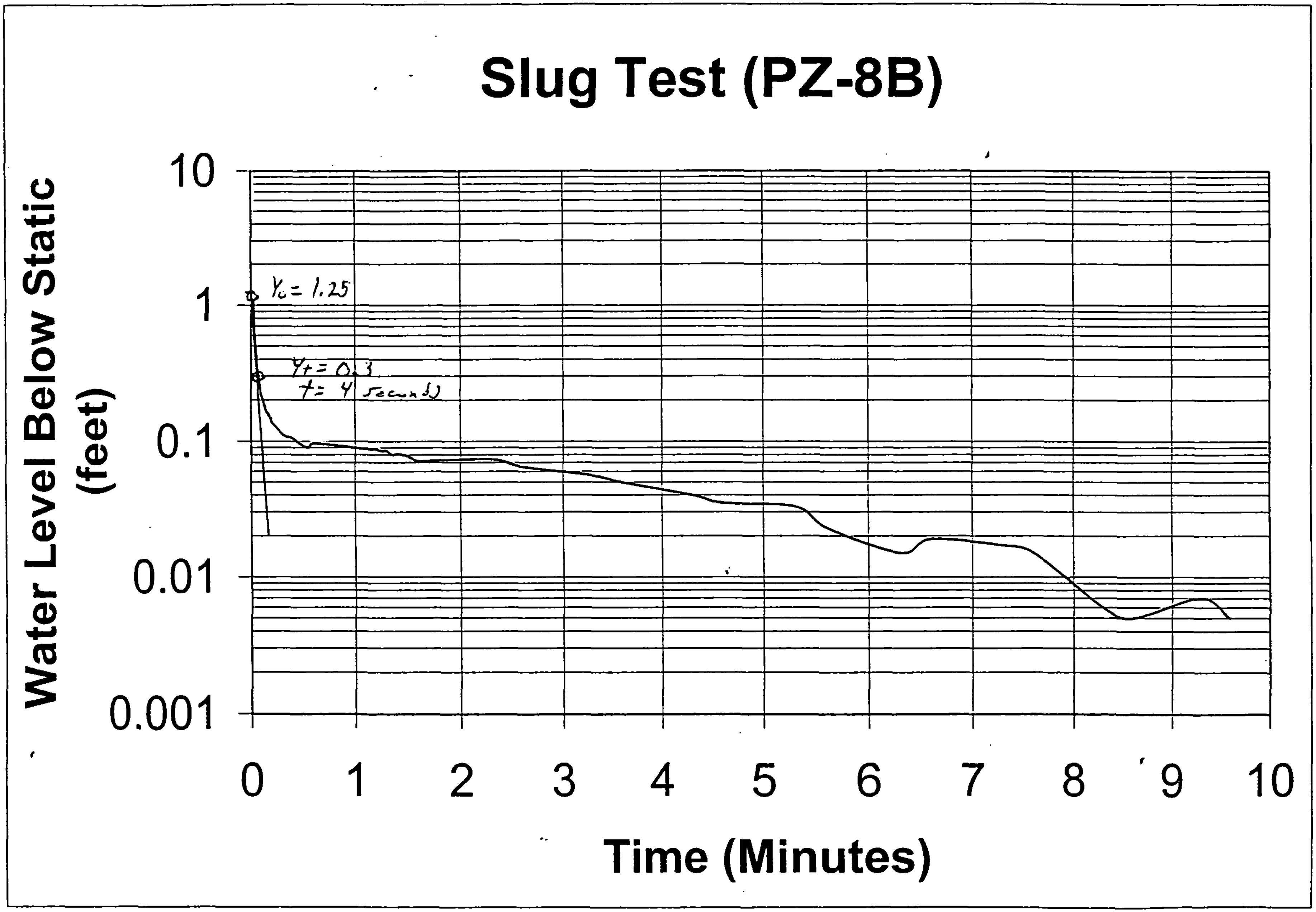
PROJECT Keene Road Landfill

STATION: PZ-8B DEPTH(ft) 36.84 SCREEN II 2", 26.5 to 36.5

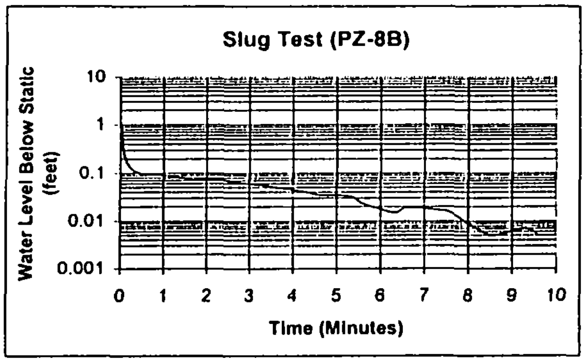
Casing Elevation = 77.99 ft *Depth to Water = 29.44 ft*

Aquifer thickness is 48.55 feet, using top of the Hawthorn lying at 0 feet NGVD.

EQUATIOI VARIABLI	*VARIABLI VALUE*	*HYDRAULIC CONDUCTIVI CALCULATIONS*	
Lw =	*7.0600*		
Rw =	*0.3000*	*Ln =*	*1.9335*
H =	*48.5500*	*(Re/Rw)*	*1.933E+00*
Le =	*7.0600*		
Rc =	*0.0833*		
t =	*4.0000*	*k =*	
		(ft/sec)	*3.390E-04*
Yo =	*1.2500*	*(ft/day)*	*29.2895*
Yt =	*0.3000*		
A =	*2.2500*		
B =	*0.3500*		
Le/Rw =	*23.53*		


Slug Test (PZ-8B)
Water Level Below Static (feet)
10
1
0.1
0.01
0.001
0
1
2
3
4
5
6
7
8
9
10
Time (Minutes)
Y0 = 1.25
Yt = 0.3
t = 4 seconds

Keen Road Landfill Site		PZ-8B	
Field Data		Graph Data	
Time	Recovery	Time	Recovery
0	3.773	0.001	1.079
0.002	3.768	0.002	1.084
0.005	3.773	0.005	1.079
0.007	3.773	0.007	1.079
0.01	3.761	0.01	1.081
0.012	3.768	0.012	1.084
0.015	3.771	0.015	1.081
0.017	3.771	0.017	1.081
0.02	3.782	0.02	1.07
0.022	3.768	0.022	1.084
0.025	3.934	0.025	0.918
0.027	3.969	0.027	0.883
0.03	3.981	0.03	0.871
0.032	4.049	0.032	0.803
0.035	4.149	0.035	0.703
0.037	4.216	0.037	0.636
0.04	4.277	0.04	0.575
0.042	4.321	0.042	0.531
0.045	4.365	0.045	0.487
0.047	4.4	0.047	0.452
0.05	4.428	0.05	0.424
0.053	4.45	0.053	0.402
0.055	4.476	0.055	0.376
0.058	4.496	0.058	0.356
0.06	4.515	0.06	0.337
0.063	4.522	0.063	0.33
0.065	4.54	0.065	0.312
0.068	4.548	0.068	0.304
0.07	4.559	0.07	0.293
0.073	4.566	0.073	0.286
0.075	4.573	0.075	0.279
0.078	4.584	0.078	0.268
0.08	4.589	0.08	0.263
0.083	4.593	0.083	0.259
0.085	4.603	0.085	0.249
0.088	4.609	0.088	0.243
0.09	4.609	0.09	0.243
0.093	4.616	0.093	0.236
0.095	4.621	0.095	0.231
0.097	4.633	0.097	0.219
0.1	4.635	0.1	0.217
0.102	4.635	0.102	0.217
0.105	4.64	0.105	0.212
0.107	4.639	0.107	0.213
0.11	4.642	0.11	0.21
0.112	4.645	0.112	0.207
0.115	4.651	0.115	0.201
0.117	4.649	0.117	0.203
0.12	4.654	0.12	0.198
0.122	4.656	0.122	0.196
0.125	4.663	0.125	0.189
0.127	4.668	0.127	0.184
0.13	4.668	0.13	0.184
0.132	4.668	0.132	0.184
0.135	4.679	0.135	0.173
0.137	4.681	0.137	0.171
0.14	4.672	0.14	0.18
0.142	4.684	0.142	0.168
0.145	4.682	0.145	0.17
0.147	4.684	0.147	0.168
0.15	4.689	0.15	0.163
0.152	4.689	0.152	0.163
0.155	4.691	0.155	0.161
0.157	4.691	0.157	0.161
0.16	4.691	0.16	0.161
0.162	4.693	0.162	0.159
0.165	4.693	0.165	0.159
0.167	4.698	0.167	0.154
0.17	4.698	0.17	0.154
0.172	4.698	0.172	0.154
0.175	4.7	0.175	0.152
0.177	4.696	0.177	0.156
0.18	4.701	0.18	0.151
0.182	4.703	0.182	0.149
0.185	4.705	0.185	0.147
0.187	4.705	0.187	0.147
0.19	4.705	0.19	0.147
0.192	4.708	0.192	0.144
0.195	4.704	0.195	0.148
0.197	4.713	0.197	0.139
0.25	4.727	0.25	0.125
0.3	4.739	0.3	0.113
0.35	4.744	0.35	0.108
0.4	4.746	0.4	0.106
0.45	4.753	0.45	0.099
0.5	4.759	0.5	0.093
0.55	4.762	0.55	0.09
0.6	4.755	0.6	0.097
1.05	4.763	1.05	0.089
1.1	4.764	1.1	0.088
1.15	4.764	1.15	0.088
1.2	4.764	1.2	0.088
1.25	4.767	1.25	0.085
1.3	4.767	1.3	0.085
1.35	4.772	1.35	0.08
1.4	4.771	1.4	0.081
1.45	4.772	1.45	0.08
1.5	4.774	1.5	0.078
1.55	4.778	1.55	0.074
1.6	4.78	1.6	0.072
2.3	4.778	2.3	0.074
2.6	4.787	2.6	0.065
3.3	4.796	3.3	0.056
3.6	4.802	3.6	0.05
4.3	4.812	4.3	0.04
4.6	4.817	4.6	0.035
5.3	4.819	5.3	0.033
5.6	4.829	5.6	0.023
6.3	4.837	6.3	0.015
6.6	4.833	6.6	0.019
7.3	4.835	7.3	0.017
7.6	4.837	7.6	0.015
8.3	4.846	8.3	0.006
8.6	4.847	8.6	0.005
9.3	4.845	9.3	0.007
9.6	4.847	9.6	0.005
11.6	4.852		



HORIZONTAL HYDRAULIC CONDUCTIVITY (k) CALCULATION SPREADSHEET

PARTIALLY PENETRATING SYSTEM BASED ON THE BOUWER AND RICE EQUATION:

$$\text{Ln Re/Rw} = \frac{1}{[(1.1/(\text{Ln}(Lw/Rw))) + ((A + B(\text{Ln}\{H\text{-}Lw/Rw\})/(Le/Rw)]}$$

2

WHERE: $k = Rc(\text{Ln Re/Rw})/2Le \ * \ (1/t) \ * \ (\text{Ln Yo/Yt}) \ * \ 86{,}400$

PROJECT Keene Road Landfill

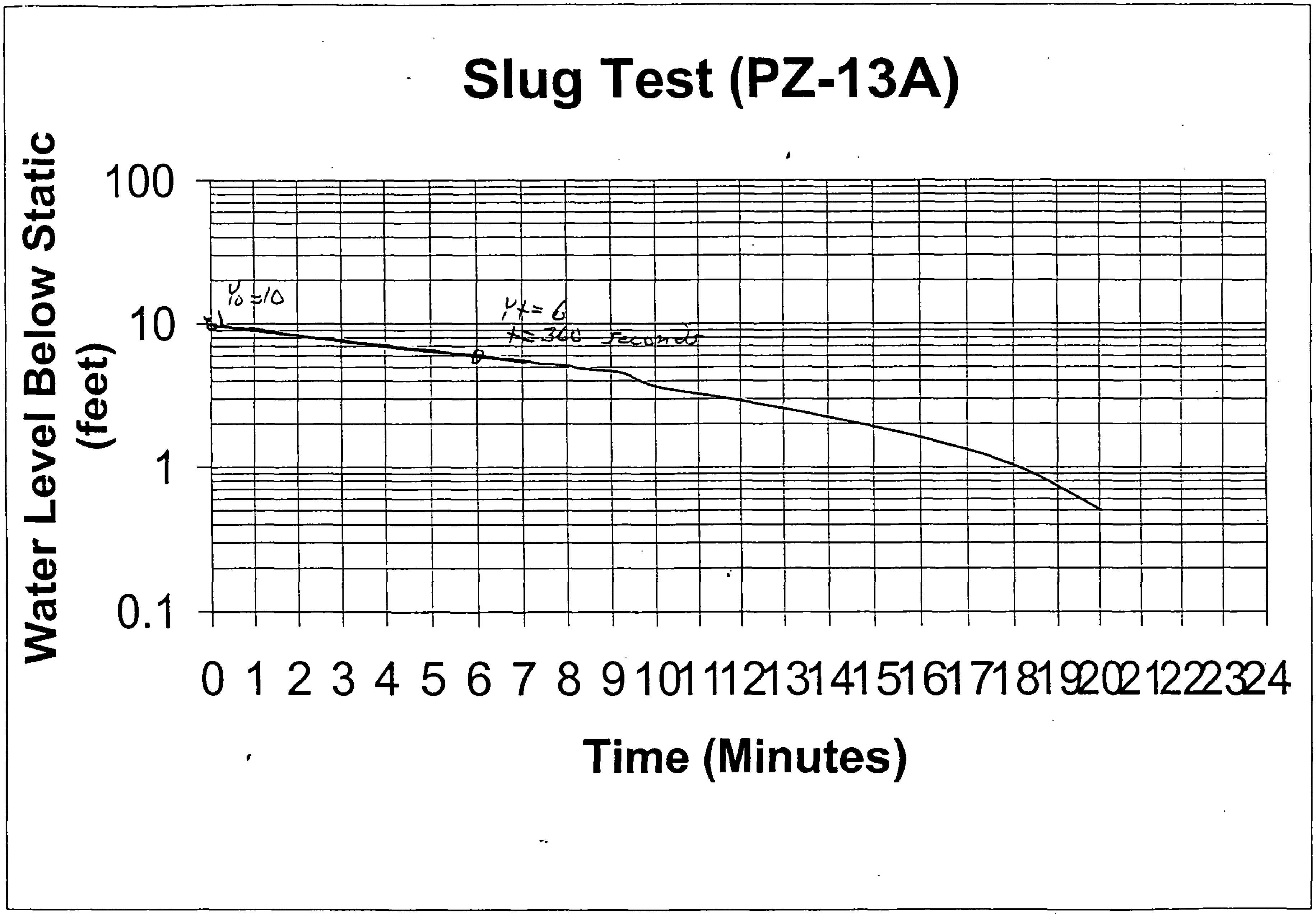
PZ

STATION: MW-13a DEPTH(ft) 73.95 SCREEN IN 2", 68.6 to 73.6

Casing Elevation = 103.08 ft *Depth to Water = 50.16 ft*

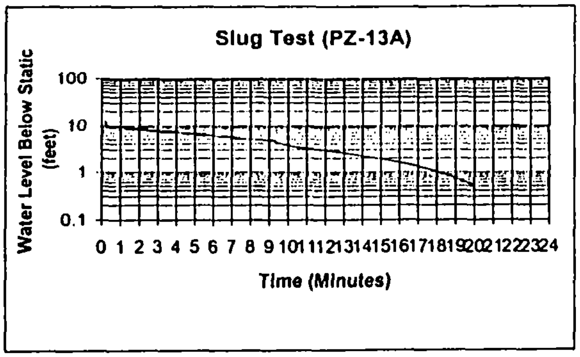
Aquifer thickness is 52.92 feet, using top of the Hawthorn lying at 0 feet NGVD.

EQUATIOI VARIABL	VARIABLI VALUE	HYDRAULIC CONDUCTIVI CALCULATIONS	
Lw =	23.4400		
Rw =	0.3000	Ln =	2.1980
H =	52.9200	(Re/Rw)	2.198E+00
Le =	5.0000		
Rc =	0.0833		
t =	360.0000	k =	
		(ft/sec)	2.164E-06
Yo =	10.0000	(ft/day)	0.1870
Yt =	6.0000		
A =	2.0000		
B =	0.3000		
Le/Rw =	16.67		


Slug Test (PZ-13A)
Water Level Below Static (feet)
100
10
1
0.1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time (Minutes)
$Y_0=10$
$Y_t=6$
t=360 seconds

Keen Road Landfill Site PZ-13A

Field Data		Graph Data	
Time	Recovery	Time	Recovery
0.175	-0.178	0.175	12.398
0.178	-0.099	0.178	12.319
0.18	-0.009	0.18	12.229
0.183	0.079	0.183	12.141
0.185	0.148	0.185	12.072
0.188	0.234	0.188	11.986
0.19	0.312	0.19	11.908
0.192	0.396	0.192	11.824
0.195	0.467	0.195	11.753
0.197	0.532	0.197	11.688
0.2	0.597	0.2	11.623
0.202	0.661	0.202	11.559
0.205	0.724	0.205	11.496
0.207	0.777	0.207	11.443
0.21	0.84	0.21	11.38
0.212	0.89	0.212	11.33
0.215	0.955	0.215	11.265
0.217	1.008	0.217	11.212
0.22	1.059	0.22	11.161
0.222	1.119	0.222	11.101
0.225	1.173	0.225	11.047
0.227	1.226	0.227	10.994
0.23	1.272	0.23	10.948
0.232	1.321	0.232	10.899
0.235	1.374	0.235	10.846
0.237	1.42	0.237	10.8
0.24	1.471	0.24	10.749
0.242	1.512	0.242	10.708
0.245	1.559	0.245	10.661
0.297	2.236	0.297	9.984
0.347	2.468	0.347	9.752
0.397	2.528	0.397	9.692
0.447	2.609	0.447	9.611
0.497	2.69	0.497	9.53
0.547	2.757	0.547	9.463
0.597	2.817	0.597	9.403
1.047	2.88	1.047	9.34
1.097	2.944	1.097	9.276
1.147	3.005	1.147	9.215
1.197	3.067	1.197	9.153
1.247	3.121	1.247	9.099
1.297	3.176	1.297	9.044
1.347	3.241	1.347	8.979
1.397	3.297	1.397	8.923
1.447	3.357	1.447	8.863
1.497	3.41	1.497	8.81
1.547	3.468	1.547	8.752
1.597	3.524	1.597	8.696
2.047	3.577	2.047	8.643
2.347	3.909	2.347	8.311
3.047	4.226	3.047	7.994
3.347	4.523	3.347	7.697
4.047	4.817	4.047	7.403
4.347	5.107	4.347	7.113
5.047	5.376	5.047	6.844
5.347	5.646	5.347	6.574
6.047	5.909	6.047	6.311
6.347	6.161	6.347	6.059
7.05	6.41	7.05	5.81
7.35	6.654	7.35	5.566
8.05	6.889	8.05	5.331
8.35	7.11	8.35	5.11
9.05	7.34	9.05	4.88
9.35	7.56	9.35	4.66
10.05	7.77	10.05	4.45
12.05	8.58	12.05	3.64
14.05	9.32	14.05	2.9
16.05	10	16.05	2.22
18.05	10.62	18.05	1.6
20.05	11.2	20.05	1.02
22.05	11.72	22.05	0.5
24.05	12.22	24.05	0



HORIZONTAL HYDRAULIC CONDUCTIVITY (k)
CALCULATION SPREADSHEET

PARTIALLY PENETRATING SYSTEM
BASED ON THE BOUWER AND RICE EQUATION:

$$\text{Ln Re/Rw} = \frac{1}{[(1.1/(\text{Ln}(\text{Lw/Rw}))) + ((A + B(\text{Ln}\{\text{H-Lw/Rw}\})/(\text{Le/Rw})]}$$

WHERE:

$$k = \text{Rc}^{2}(\text{Ln Re/Rw})/2\text{Le} * (1/t) * (\text{Ln Yo/Yt}) * 86{,}400$$

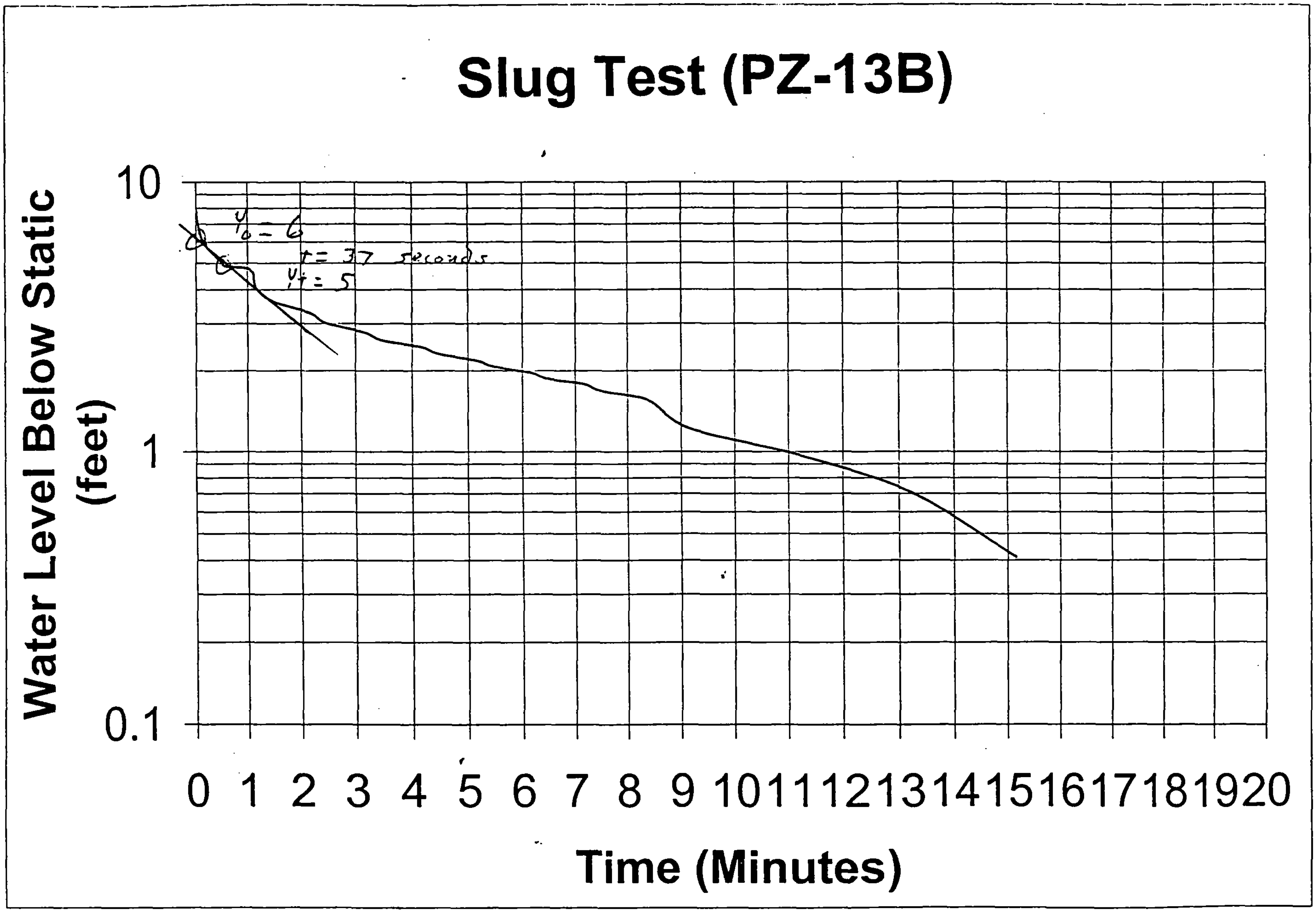
PROJECT Keene Road Landfill

STATION: PZ-13b DEPTH(ft) 58.03 SCREEN I\ 2", 47.7 to 57.7

Casing Elevation = 103.14 ft *Depth to Water = 43.54 ft*

Aquifer thickness is 59.60 feet, using top of the Hawthorn lying at 0 feet NGVD.

EQUATIOI VARIABLE	*VARIABLI VALUE*	*HYDRAULIC CONDUCTIVI CALCULATIONS*	
Lw =	*14.1600*		
Rw =	*0.3000*		
		Ln =	*2.3605*
H =	*59.6000*	*(Re/Rw)*	*2.361E+00*
Le =	*10.0000*		
Rc =	*0.0833*		
t =	*37.0000*	*k =*	
		(ft/sec)	*4.036E-06*
Yo =	*6.0000*	*(ft/day)*	*0.3487*
Yt =	*5.0000*		
A =	*2.6000*		
B =	*0.4000*		
Le/Rw =	*33.33*		

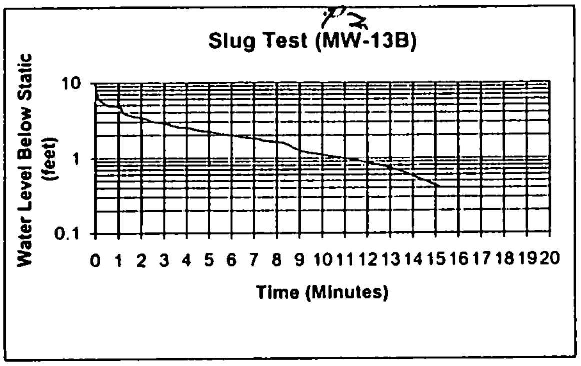

Slug Test (PZ-13B)
Water Level Below Static (feet)
10
1
0.1
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Time (Minutes)
y₀ = 6
t = 37 seconds
yₜ = 5

13B

P2

Keen Road Landfill Site MW-13B

Field Data		Graph Data	
Time	Recovery	Time	Recovery
0	-0.243	0.001	7.813
0.002	-0.229	0.002	7.799
0.005	-0.217	0.005	7.787
0.007	-0.215	0.007	7.785
0.01	-0.185	0.01	7.755
0.012	-0.153	0.012	7.723
0.015	-0.097	0.015	7.667
0.017	-0.023	0.017	7.593
0.02	0.051	0.02	7.519
0.022	0.118	0.022	7.452
0.025	0.176	0.025	7.394
0.027	0.236	0.027	7.334
0.03	0.296	0.03	7.274
0.032	0.358	0.032	7.212
0.035	0.414	0.035	7.156
0.037	0.464	0.037	7.106
0.04	0.511	0.04	7.059
0.042	0.557	0.042	7.013
0.045	0.601	0.045	6.969
0.047	0.647	0.047	6.923
0.05	0.682	0.05	6.888
0.053	0.728	0.053	6.842
0.055	0.76	0.055	6.81
0.058	0.802	0.058	6.768
0.06	0.843	0.06	6.727
0.063	0.88	0.063	6.69
0.065	0.912	0.065	6.658
0.068	0.952	0.068	6.618
0.07	0.979	0.07	6.591
0.073	1.012	0.073	6.558
0.075	1.042	0.075	6.528
0.078	1.074	0.078	6.496
0.08	1.102	0.08	6.468
0.083	1.134	0.083	6.436
0.085	1.16	0.085	6.41
0.088	1.185	0.088	6.385
0.09	1.21	0.09	6.36
0.093	1.238	0.093	6.332
0.095	1.259	0.095	6.311
0.097	1.28	0.097	6.29
0.1	1.305	0.1	6.265
0.102	1.319	0.102	6.251
0.105	1.338	0.105	6.232
0.107	1.363	0.107	6.207
0.11	1.379	0.11	6.191
0.112	1.395	0.112	6.175
0.115	1.411	0.115	6.159
0.117	1.428	0.117	6.142
0.12	1.444	0.12	6.126
0.122	1.46	0.122	6.11
0.125	1.467	0.125	6.103
0.127	1.478	0.127	6.092
0.13	1.49	0.13	6.08
0.132	1.504	0.132	6.066
0.135	1.516	0.135	6.054
0.137	1.523	0.137	6.047
0.14	1.532	0.14	6.038
0.142	1.541	0.142	6.029
0.145	1.548	0.145	6.022
0.147	1.557	0.147	6.013
0.15	1.559	0.15	6.011
0.152	1.569	0.152	6.001
0.155	1.571	0.155	5.999
0.157	1.58	0.157	5.99
0.16	1.58	0.16	5.99
0.162	1.59	0.162	5.98
0.165	1.592	0.165	5.978
0.167	1.603	0.167	5.967
0.17	1.608	0.17	5.962
0.172	1.613	0.172	5.957
0.175	1.617	0.175	5.953
0.177	1.617	0.177	5.953
0.18	1.624	0.18	5.946
0.182	1.631	0.182	5.939
0.185	1.638	0.185	5.932
0.187	1.647	0.187	5.923
0.19	1.654	0.19	5.916
0.192	1.661	0.192	5.909
0.195	1.67	0.195	5.9
0.197	1.68	0.197	5.89
0.215	1.726	0.215	5.844
0.265	1.853	0.265	5.717
0.315	1.982	0.315	5.588
0.365	2.107	0.365	5.463
0.415	2.223	0.415	5.347
0.465	2.35	0.465	5.22
0.515	2.463	0.515	5.107
0.565	2.574	0.565	4.996
1.015	2.683	1.015	4.887
1.065	2.787	1.065	4.783
1.115	2.887	1.115	4.683
1.165	2.991	1.165	4.579
1.465	3.514	1.465	4.056
2.165	3.935	2.165	3.635
2.465	4.286	2.465	3.284
3.165	4.553	3.165	3.017
3.465	4.78	3.465	2.79
4.165	4.959	4.165	2.611
4.465	5.109	4.465	2.461
5.165	5.25	5.165	2.32
5.465	5.383	5.465	2.187
6.165	5.492	6.165	2.078
6.465	5.603	6.465	1.967
7.16	5.699	7.16	1.871
7.46	5.786	7.46	1.784
8.16	5.884	8.16	1.686
8.46	5.967	8.46	1.603
9.16	6.051	9.16	1.519
11.16	6.353	11.16	1.217
13.16	6.595	13.16	0.975
15.16	6.853	15.16	0.717
17.16	7.16	17.16	0.41
19.16	7.67		



HORIZONTAL HYDRAULIC CONDUCTIVITY (k)
CALCULATION SPREADSHEET

PARTIALLY PENETRATING SYSTEM
BASED ON THE BOUWER AND RICE EQUATION:

$$\text{Ln Re/Rw} = \frac{1}{[(1.1/(\text{Ln}(\text{Lw/Rw}))) + ((A + B(\text{Ln}\{\text{H-Lw/Rw}\})/(\text{Le/Rw})]}$$

WHERE:

$$k = \text{Rc}^{2}(\text{Ln Re/Rw})/2\text{Le} \;*\; (1/t) \;*\; (\text{Ln Yo/Yt}) \;*\; 86{,}400$$

PROJECT Keene Road Landfill

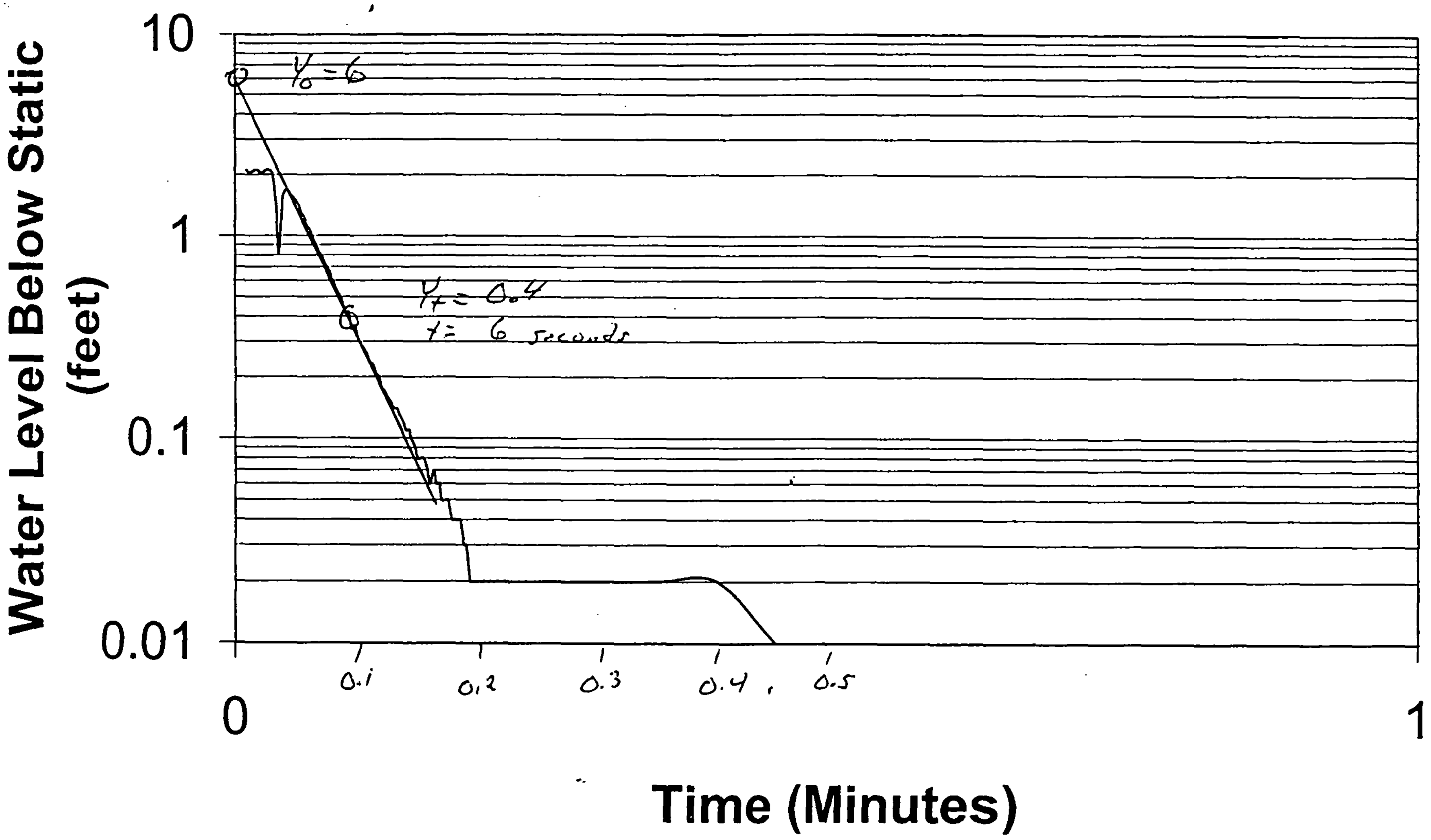
STATION: PZ-17A DEPTH(ft) 52.88 SCREEN IN 2", 47.5 to 52.5

Casing Elevation = 61.93 dtw:12.41

Aquifer thickness is 49.52 feet, using top of the Hawthorn lying at 0 feet NGVD.

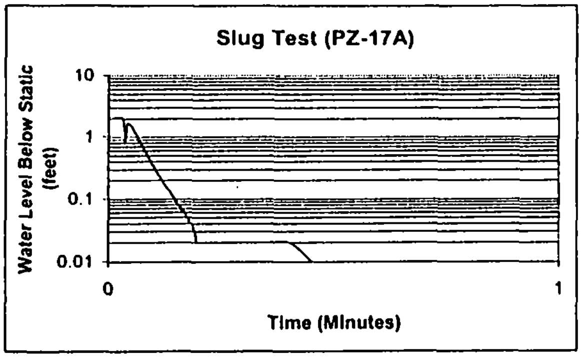
EQUATIOI VARIABLI	*VARIABLI VALUE*	*HYDRAULIC CONDUCTIVI CALCULATIONS*	
Lw =	*40.0900*		
Rw =	*0.3000*		
		Ln =	*2.4584*
H =	*49.5200*	*(Re/Rw)*	*2.458E+00*
Le =	*5.0000*		
Rc =	*0.0833*		
t =	*6.0000*	*k =*	
		(ft/sec)	*6.546E-04*
Yo =	*6.0000*	*(ft/day)*	*56.5604*
Yt =	*0.6000*		
A =	*2.0000*		
B =	*0.3000*		
Le/Rw =	*16.67*		

Slug Test (PZ-17A)



Keen Road Landfill Site PZ-17A

Field Data		Graph Data	
Time	Recovery	Time	Recovery
0	33.78	0.001	2.12
0.002	33.85	0.002	2.05
0.005	33.83	0.005	2.07
0.007	33.78	0.007	2.12
0.01	33.79	0.01	2.11
0.012	33.86	0.012	2.04
0.015	33.82	0.015	2.08
0.017	33.77	0.017	2.13
0.02	33.8	0.02	2.1
0.022	33.9	0.022	2
0.025	34.59	0.025	1.31
0.027	35.08	0.027	0.82
0.03	34.36	0.03	1.54
0.032	34.23	0.032	1.67
0.035	34.24	0.035	1.66
0.037	34.3	0.037	1.6
0.04	34.38	0.04	1.52
0.042	34.47	0.042	1.43
0.045	34.58	0.045	1.32
0.047	34.67	0.047	1.23
0.05	34.76	0.05	1.14
0.053	34.84	0.053	1.06
0.055	34.92	0.055	0.98
0.058	35	0.058	0.9
0.06	35.06	0.06	0.84
0.063	35.12	0.063	0.78
0.065	35.17	0.065	0.73
0.068	35.22	0.068	0.68
0.07	35.27	0.07	0.63
0.073	35.32	0.073	0.58
0.075	35.36	0.075	0.54
0.078	35.4	0.078	0.5
0.08	35.44	0.08	0.46
0.083	35.49	0.083	0.41
0.085	35.48	0.085	0.42
0.088	35.55	0.088	0.35
0.09	35.54	0.09	0.36
0.093	35.58	0.093	0.32
0.095	35.61	0.095	0.29
0.097	35.62	0.097	0.28
0.1	35.64	0.1	0.26
0.102	35.66	0.102	0.24
0.105	35.67	0.105	0.23
0.107	35.69	0.107	0.21
0.11	35.7	0.11	0.2
0.112	35.72	0.112	0.18
0.115	35.73	0.115	0.17
0.117	35.74	0.117	0.16
0.12	35.75	0.12	0.15
0.122	35.76	0.122	0.14
0.125	35.76	0.125	0.14
0.127	35.77	0.127	0.13
0.13	35.78	0.13	0.12
0.132	35.79	0.132	0.11
0.135	35.79	0.135	0.11
0.137	35.8	0.137	0.1
0.14	35.81	0.14	0.09
0.142	35.82	0.142	0.08
0.145	35.82	0.145	0.08
0.147	35.82	0.147	0.08
0.15	35.83	0.15	0.07
0.152	35.84	0.152	0.06
0.155	35.83	0.155	0.07
0.157	35.84	0.157	0.06
0.16	35.84	0.16	0.06
0.162	35.85	0.162	0.05
0.165	35.85	0.165	0.05
0.167	35.85	0.167	0.05
0.17	35.86	0.17	0.04
0.172	35.86	0.172	0.04
0.175	35.86	0.175	0.04
0.177	35.86	0.177	0.04
0.18	35.87	0.18	0.03
0.182	35.87	0.182	0.03
0.185	35.88	0.185	0.02
0.187	35.88	0.187	0.02
0.19	35.88	0.19	0.02
0.192	35.88	0.192	0.02
0.195	35.88	0.195	0.02
0.197	35.88	0.197	0.02
0.25	35.89	0.25	0.01
0.3	35.9	0.3	0
0.35	35.9	0.35	0
0.4	35.9	0.4	0
0.45	35.9	0.45	0
0.5	35.9	0.5	0
0.55	35.9	0.55	0
0.6	35.9	0.6	0
1.05	35.9	1.05	0
1.1	35.9	1.1	0
1.15	35.9	1.15	0
1.2	35.89	1.2	0.01
1.25	35.9	1.25	0
1.3	35.9	1.3	0
1.35	35.9	1.35	0
1.4	35.89	1.4	0.01
1.45	35.89	1.45	0.01
1.5	35.89	1.5	0.01
1.55	35.89	1.55	0.01
1.6	35.88	1.6	0.02
2.3	35.89	2.3	0.01
2.6	35.89	2.6	0.01
3.3	35.89	3.3	0.01
3.6	35.89	3.6	0.01
4.3	35.89	4.3	0.01
4.6	35.89	4.6	0.01
5.3	35.89	5.3	0.01
5.6	35.89	5.6	0.01
6.3	35.9	6.3	0
6.6	35.9	6.6	0
7.3	35.9	7.3	0
7.6	35.9	7.6	0
8.3	35.9	8.3	0
8.6	35.9	8.6	0
9.3	35.9	9.3	0
9.6	35.9	9.6	0
11.6	35.9	11.6	0
13.6	35.9	13.6	0



HORIZONTAL HYDRAULIC CONDUCTIVITY (k) CALCULATION SPREADSHEET

PARTIALLY PENETRATING SYSTEM BASED ON THE BOUWER AND RICE EQUATION:

$$\text{Ln Re/Rw} = \frac{1}{[(1.1/(\text{Ln}(\text{Lw/Rw}))) + ((A + B(\text{Ln}\{\text{H-Lw/Rw}\})/(\text{Le/Rw})]}$$

WHERE:

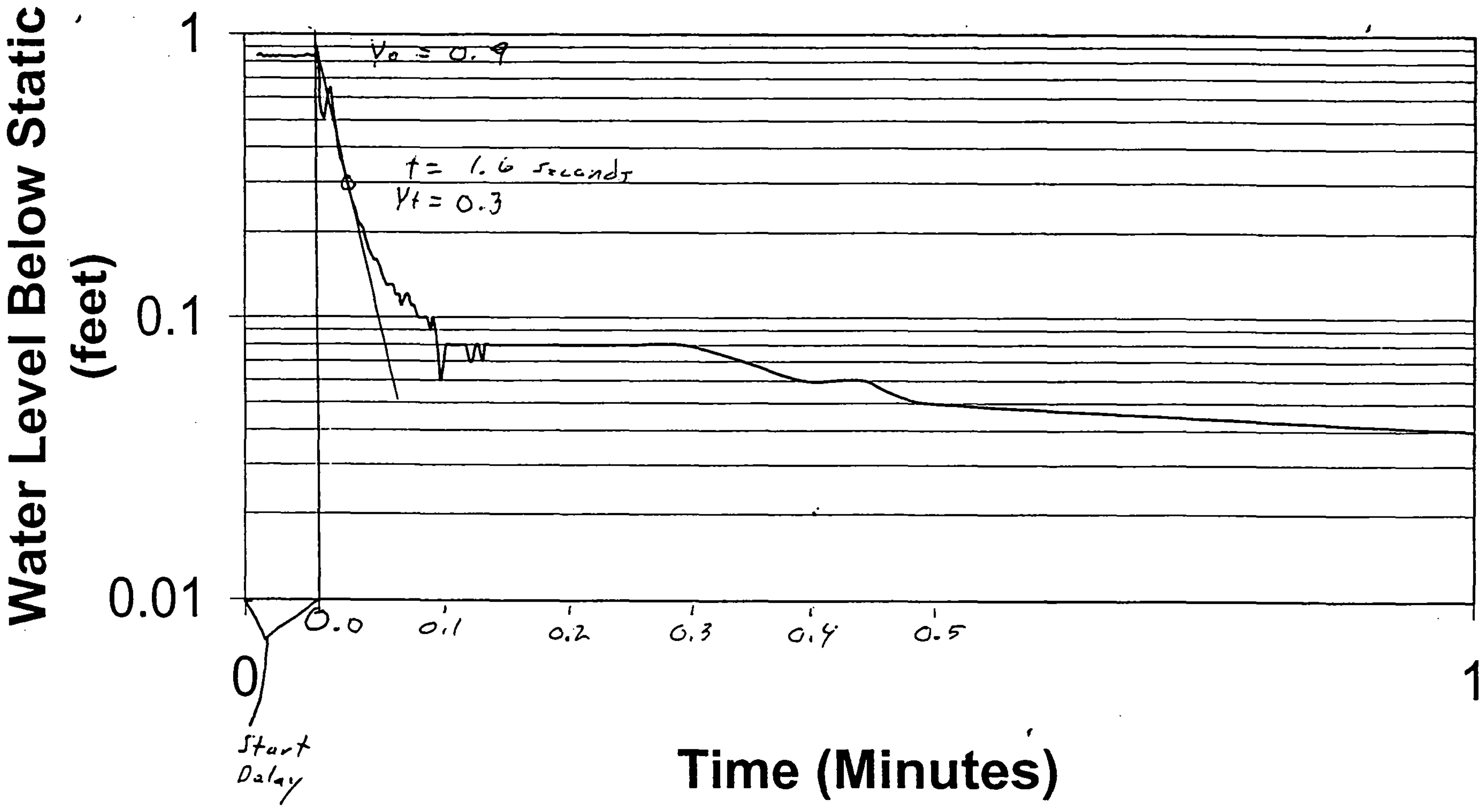
$$\overset{2}{k} = \text{Rc}(\text{Ln Re/Rw})/2\text{Le} \; * \; (1/t) \; * \; (\text{Ln Yo/Yt}) \; * \; 86{,}400$$

PROJECT Keene Road Landfill

STATION: PZ-17B DEPTH(ft) 23.12 SCREEN I 2", 12.8 to 22.8
Casing Elevation = 61.58 dtw:12.11
Aquifer thickness is 49.47 feet, using top of the Hawthorn lying at 0 feet NGVD.

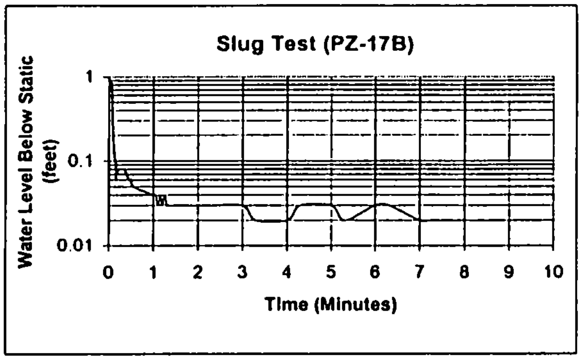
EQUATIO VARIABL	*VARIABL VALUE*	*HYDRAULIC CONDUCTIVI CALCULATIONS*	
Lw =	*10.6900*		
Rw =	*0.3000*		
		Ln =	*2.2513*
H =	*49.4700*	*(Re/Rw)*	*2.251E+00*
Le =	*10.0000*		
Rc =	*0.0833*		
t =	*1.6000*	*k =*	
		(ft/sec)	*5.363E-04*
Yo =	*0.9000*	*(ft/day)*	*46.3379*
Yt =	*0.3000*		
A =	*2.6000*		
B =	*0.4000*		
Le/Rw =	*33.33*		

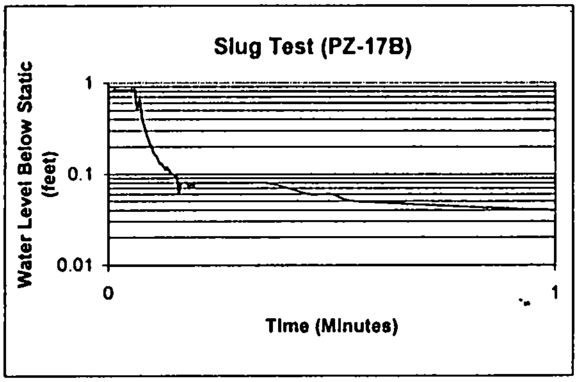
Slug Test (PZ-17B)



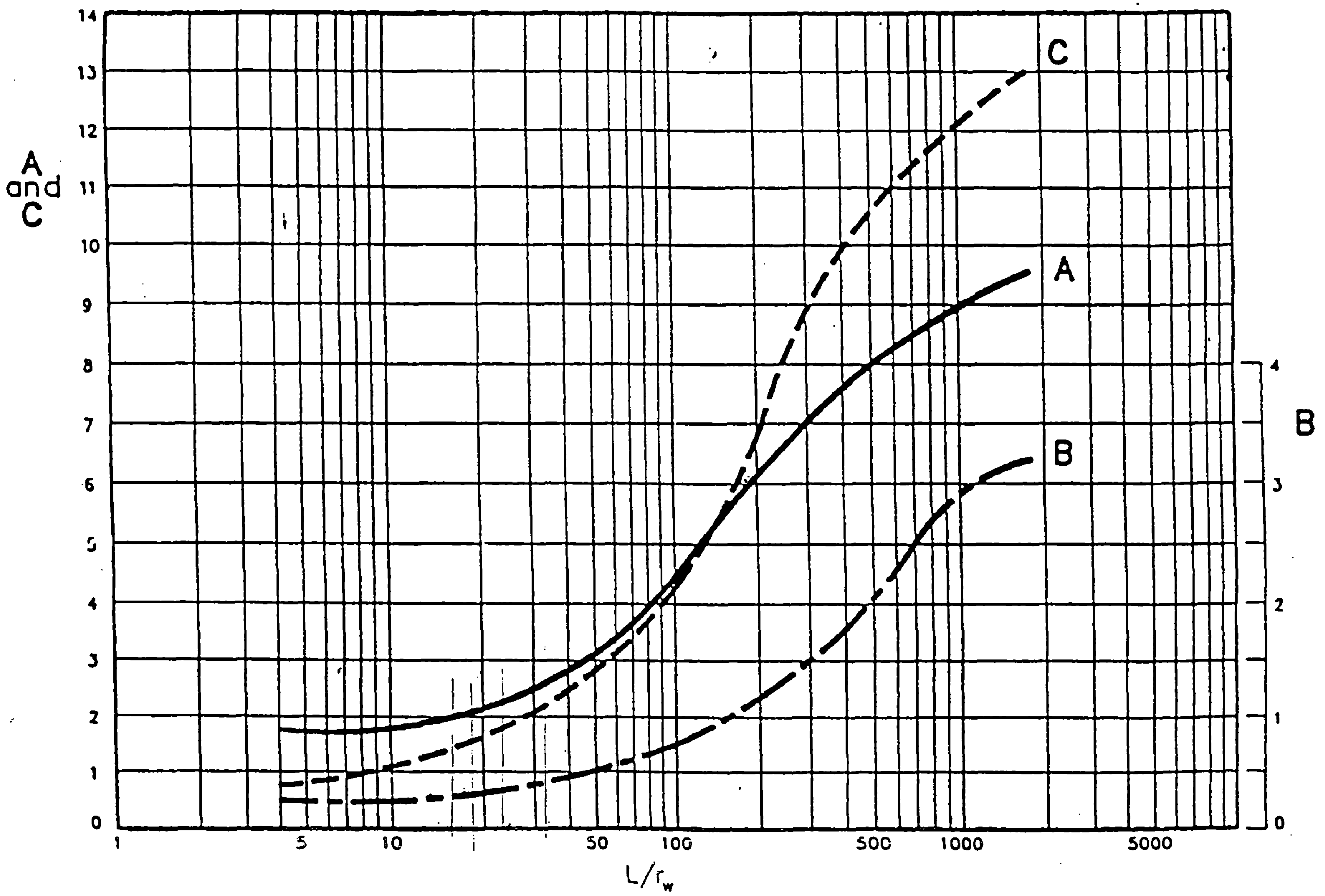
Keen Road Landfill Site PZ-17B

Field Data		Graph Data	
Time	Recovery	Time	Recovery
0	7.73	0.001	0.84
0.004	7.72	0.004	0.85
0.006	7.74	0.006	0.83
0.009	7.73	0.009	0.84
0.011	7.74	0.011	0.83
0.014	7.73	0.014	0.84
0.016	7.74	0.016	0.83
0.019	7.73	0.019	0.84
0.021	7.73	0.021	0.84
0.024	7.73	0.024	0.84
0.026	7.73	0.026	0.84
0.029	7.73	0.029	0.84
0.031	7.74	0.031	0.83
0.034	7.73	0.034	0.84
0.036	7.73	0.036	0.84
0.039	7.73	0.039	0.84
0.041	7.72	0.041	0.85
0.044	7.73	0.044	0.84
0.046	7.73	0.046	0.84
0.049	7.73	0.049	0.84
0.051	8.01	0.051	0.56
0.054	8.06	0.054	0.51
0.056	8	0.056	0.57
0.059	7.92	0.059	0.65
0.061	8.01	0.061	0.56
0.064	8.12	0.064	0.45
0.066	8.19	0.066	0.38
0.069	8.22	0.069	0.35
0.071	8.25	0.071	0.32
0.074	8.29	0.074	0.28
0.076	8.31	0.076	0.26
0.079	8.33	0.079	0.24
0.081	8.35	0.081	0.22
0.084	8.36	0.084	0.21
0.086	8.37	0.086	0.2
0.089	8.39	0.089	0.18
0.091	8.4	0.091	0.17
0.094	8.41	0.094	0.16
0.096	8.41	0.096	0.16
0.099	8.42	0.099	0.15
0.101	8.43	0.101	0.14
0.104	8.44	0.104	0.13
0.106	8.44	0.106	0.13
0.109	8.44	0.109	0.13
0.111	8.45	0.111	0.12
0.114	8.45	0.114	0.12
0.116	8.46	0.116	0.11
0.119	8.45	0.119	0.12
0.121	8.45	0.121	0.12
0.124	8.46	0.124	0.11
0.126	8.46	0.126	0.11
0.129	8.47	0.129	0.1
0.131	8.47	0.131	0.1
0.134	8.47	0.134	0.1
0.136	8.47	0.136	0.1
0.139	8.48	0.139	0.09
0.141	8.47	0.141	0.1
0.144	8.49	0.144	0.08
0.146	8.51	0.146	0.06
0.149	8.5	0.149	0.07
0.151	8.49	0.151	0.08
0.154	8.49	0.154	0.08
0.156	8.49	0.156	0.08
0.159	8.49	0.159	0.08
0.161	8.49	0.161	0.08
0.164	8.49	0.164	0.08
0.166	8.49	0.166	0.08
0.169	8.5	0.169	0.07
0.171	8.5	0.171	0.07
0.174	8.49	0.174	0.08
0.176	8.49	0.176	0.08
0.179	8.5	0.179	0.07
0.181	8.49	0.181	0.08
0.184	8.49	0.184	0.08
0.186	8.49	0.186	0.08
0.189	8.49	0.189	0.08
0.191	8.49	0.191	0.08
0.194	8.49	0.194	0.08
0.196	8.49	0.196	0.08
0.199	8.5	0.199	0.07
0.251	8.51	0.251	0.06
0.301	8.51	0.301	0.06
0.351	8.52	0.351	0.05
0.401	8.53	0.401	0.04
0.451	8.53	0.451	0.04
0.501	8.54	0.501	0.03
0.551	8.53	0.551	0.04
1.001	8.54	1.001	0.03
1.051	8.53	1.051	0.04
1.101	8.54	1.101	0.03
1.151	8.54	1.151	0.03
1.201	8.54	1.201	0.03
1.251	8.54	1.251	0.03
1.301	8.54	1.301	0.03
1.351	8.54	1.351	0.03
1.401	8.54	1.401	0.03
1.451	8.54	1.451	0.03
1.501	8.54	1.501	0.03
1.551	8.55	1.551	0.02
2.001	8.65	2.001	0.02
2.301	8.54	2.301	0.03
3.001	8.64	3.001	0.03
3.301	8.55	3.301	0.02
4.001	8.54	4.001	0.03
4.301	8.54	4.301	0.03
5.001	8.55	5.001	0.02
5.301	8.55	5.301	0.02
6.001	8.55	6.001	0.02
6.301	8.54	6.301	0.03
7	8.55	7	0.02
7.3	8.56	7.3	0.01
8	8.56	8	0.01
8.3	8.56	8.3	0.01
9	8.55	9	0.02
9.3	8.55	9.3	0.02
10	8.55	10	0.02
10.58	8.56	10.58	0.01
12.58	8.57	12.58	0
14.58	8.56	14.58	0.01
1442	8.57	1442	0





BOUWER AND RICE SLUG TEST CURVES



Curves relating coefficients A,B and C to L/r_w

APPENDIX B

Notes: (top of casing elevations pending)

PZ-8a : total depth = 75' with 5 ' of screen. 2" well, 10 slot screen 20/30 sand pack/with a fine sand seal.

PZ-8 b: total depth = 33' with 10' of screen. Constructed with materials as noted above.

PZ-17a: total depth = 50' with 5' of screen. Constructed with materials as noted above.

PZ-17b: total depth = 20' with 10' of screen. Same as above

PZ-13a: total depth = 73' with 5' of screen. 2"/10 slot 30/40 sandpack with fine sand seal.

PZ-13b: total depth = 55' with 10' of screen same materials as 13a

PZ-18 (dry, but verify by checking water level) total depth 30' with 10' of 10 slot screen. 30/40 sand with fine sand seal.

PZ-19 total depth 40' with 10' of 10 slot screen. 30/40 sand paçk with a fine sand seal.

PZ-20 total depth 15' with 10' of 10 slot screen. 30/40 sand pack with a fine sand seal.

PZ-21 total depth 43' with 10' of 10 slot screen. 30/40 sand pack with a fine sand seal.

C:\OFFICE\WPWIN\WPDOCS\PIT911.\ERIC_UN2.WPD

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 10942-001-02
REPORT NO.:
PAGE NO.:

PROJECT: BORROW PIT 91 – KEENE ROAD LANDFILL, ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT L.L.C.

DATE: 4/12/00

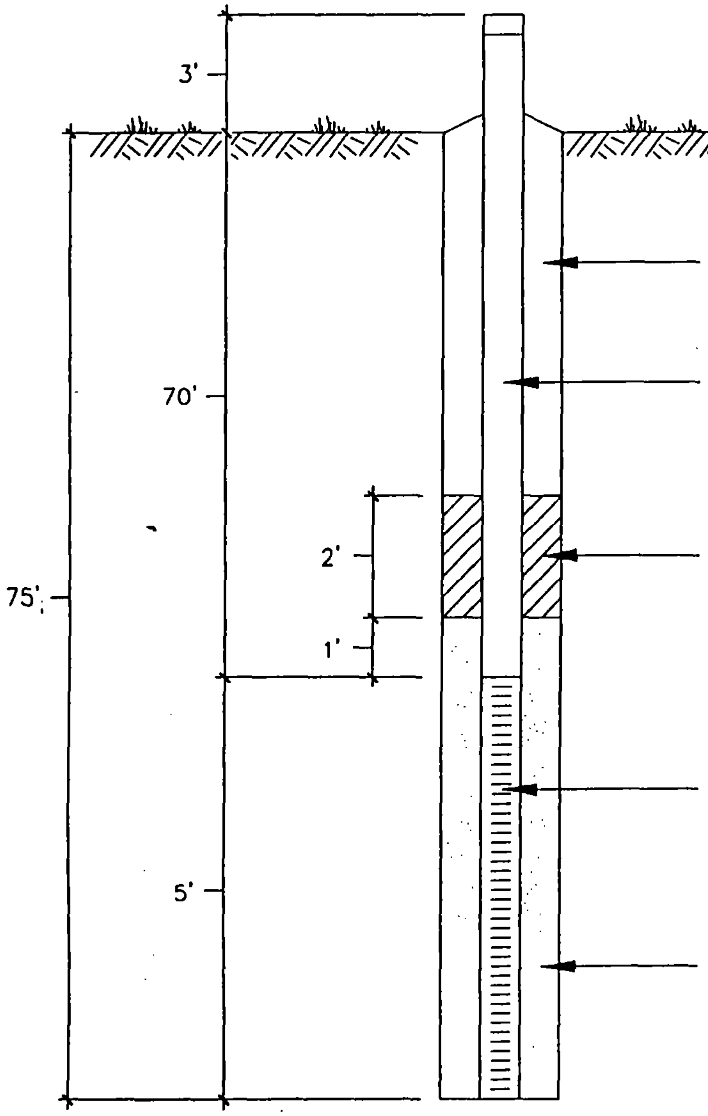
WELL NUMBER: PZ-8A

LOCATION: SELECTED IN FIELD BY CLIENT

INSTALLED BY: U.E.S. – ORLANDO

WELL DIAGRAM - NOT TO SCALE

PROTECTIVE CASING – YES
NO X
TYPE



CEMENT GROUT

RISER – TYPE PVC
SIZE 2" I.D.

30/65 SILICA SAND SEAL

SCREEN – TYPE PVC
SIZE 2" I.D., 0.010" SLOT

FILTER TYPE 20/30 SILICA SAND

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 10942-001-02

REPORT NO.:

PAGE NO.:

PROJECT: BORROW PIT 91 – KEENE ROAD LANDFILL, ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT L.L.C.

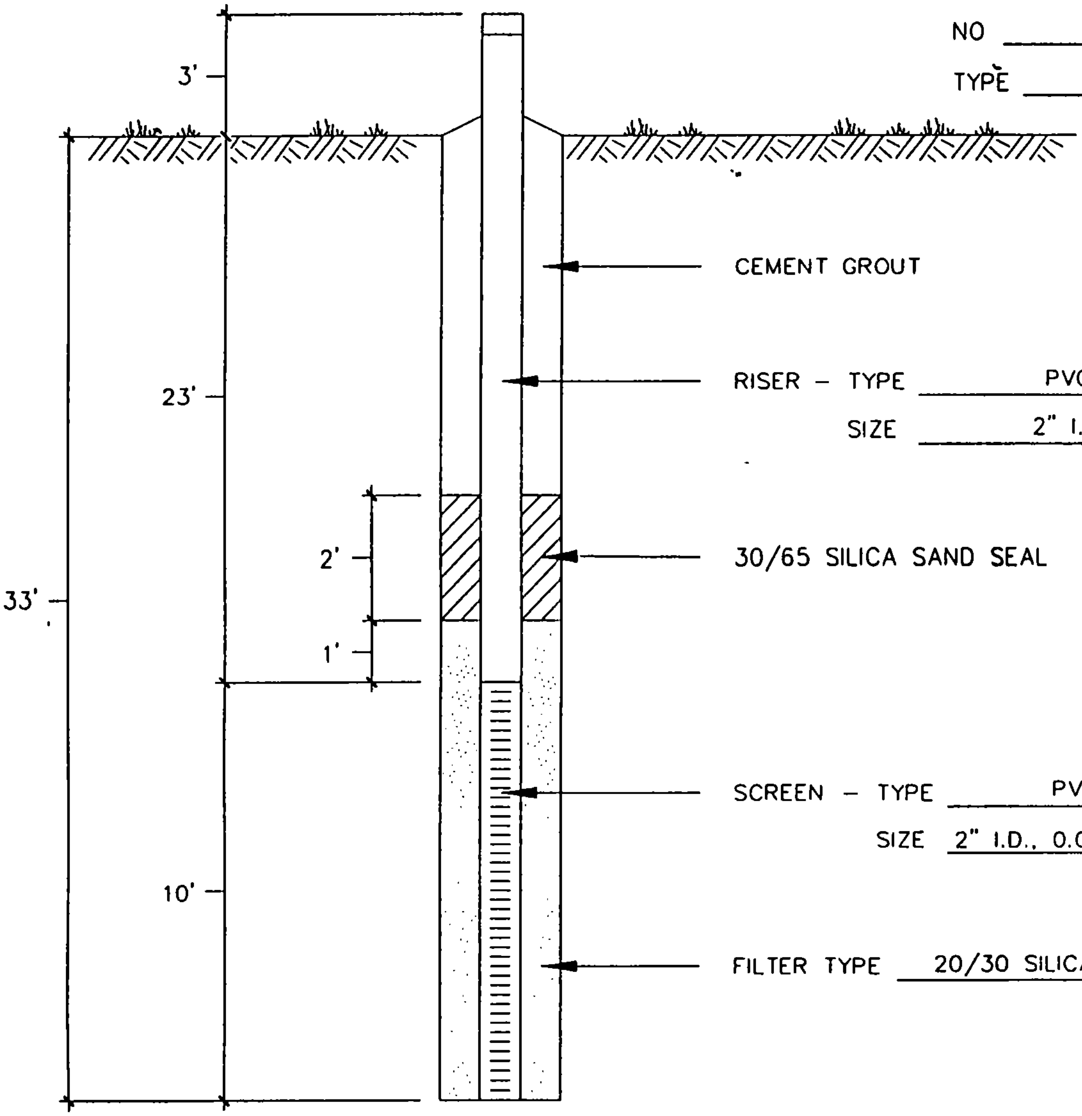
DATE: 4/12/00

WELL NUMBER: PZ-8B

LOCATION: SELECTED IN FIELD BY CLIENT

INSTALLED BY: U.E.S. – ORLANDO

WELL DIAGRAM – NOT TO SCALE



PROTECTIVE CASING – YES

NO X

TYPE

CEMENT GROUT

RISER – TYPE PVC

SIZE 2" I.D.

30/65 SILICA SAND SEAL

SCREEN – TYPE PVC

SIZE 2" I.D., 0.010" SLOT

FILTER TYPE 20/30 SILICA SAND

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 10942-001-02

REPORT NO.:

PAGE NO.:

PROJECT: BORROW PIT 91 – KEENE ROAD LANDFILL, ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT L.L.C.

DATE: 3/31/00

WELL NUMBER: PZ-13A

LOCATION: SELECTED IN FIELD BY CLIENT

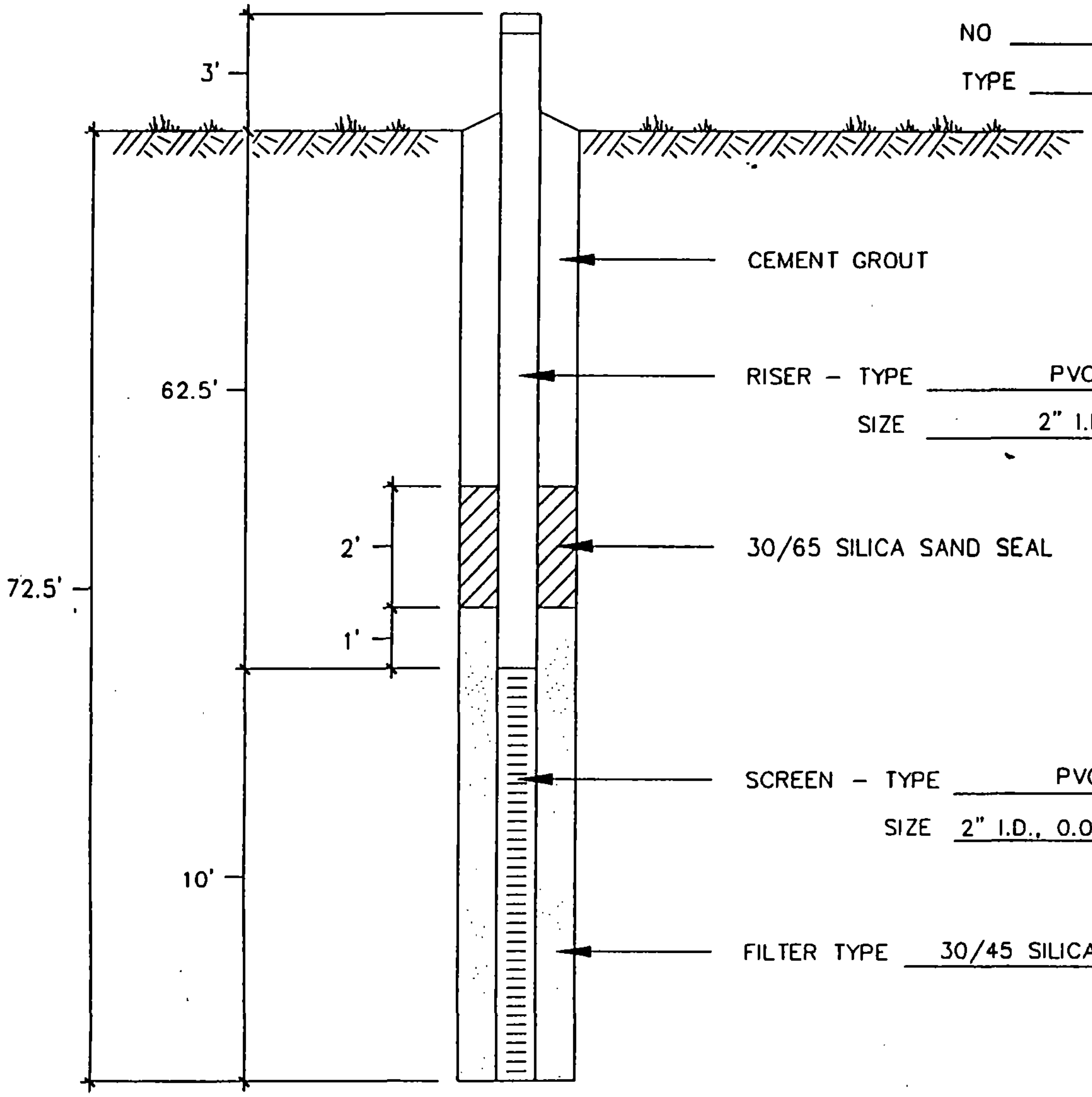
INSTALLED BY: U.E.S. – ORLANDO

WELL DIAGRAM - NOT TO SCALE

PROTECTIVE CASING – YES

NO X

TYPE



CEMENT GROUT

RISER – TYPE PVC

SIZE 2" I.D.

30/65 SILICA SAND SEAL

SCREEN – TYPE PVC

SIZE 2" I.D., 0.010" SLOT

FILTER TYPE 30/45 SILICA SAND

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 10942-001-02
REPORT NO.:
PAGE NO.:

PROJECT: BORROW PIT 91 – KEENE ROAD LANDFILL, ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT L.L.C.

DATE: 4/11/00

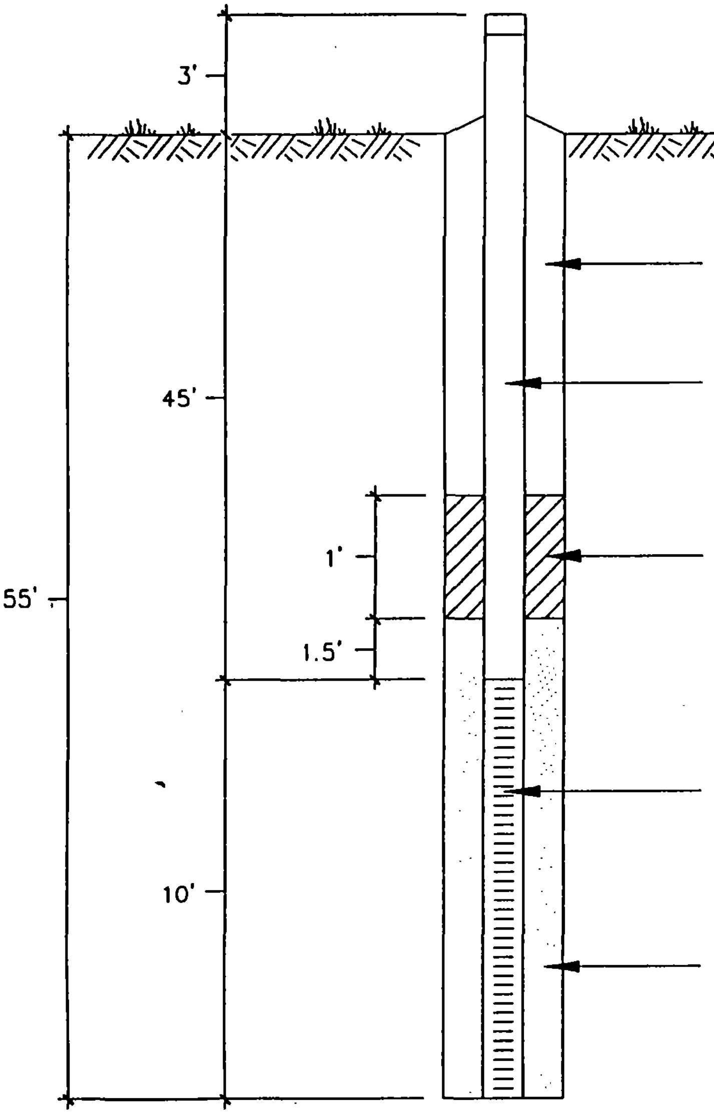
WELL NUMBER: PZ-13B

LOCATION: SELECTED IN FIELD BY CLIENT

INSTALLED BY: U.E.S. – ORLANDO

WELL DIAGRAM - NOT TO SCALE

PROTECTIVE CASING – YES
NO X
TYPE



CEMENT GROUT

RISER – TYPE PVC
SIZE 2" I.D.

30/65 SILICA SAND SEAL

SCREEN – TYPE PVC
SIZE 2" I.D., 0.010" SLOT

FILTER TYPE 30/45 SILICA SAND

M0223-01

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 10942-001-02
REPORT NO.:
PAGE NO.:

PROJECT: BORROW PIT 91 – KEENE ROAD LANDFILL, ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT L.L.C.

DATE: 4/13/00

WELL NUMBER: PZ-17A

LOCATION: SELECTED IN FIELD BY CLIENT

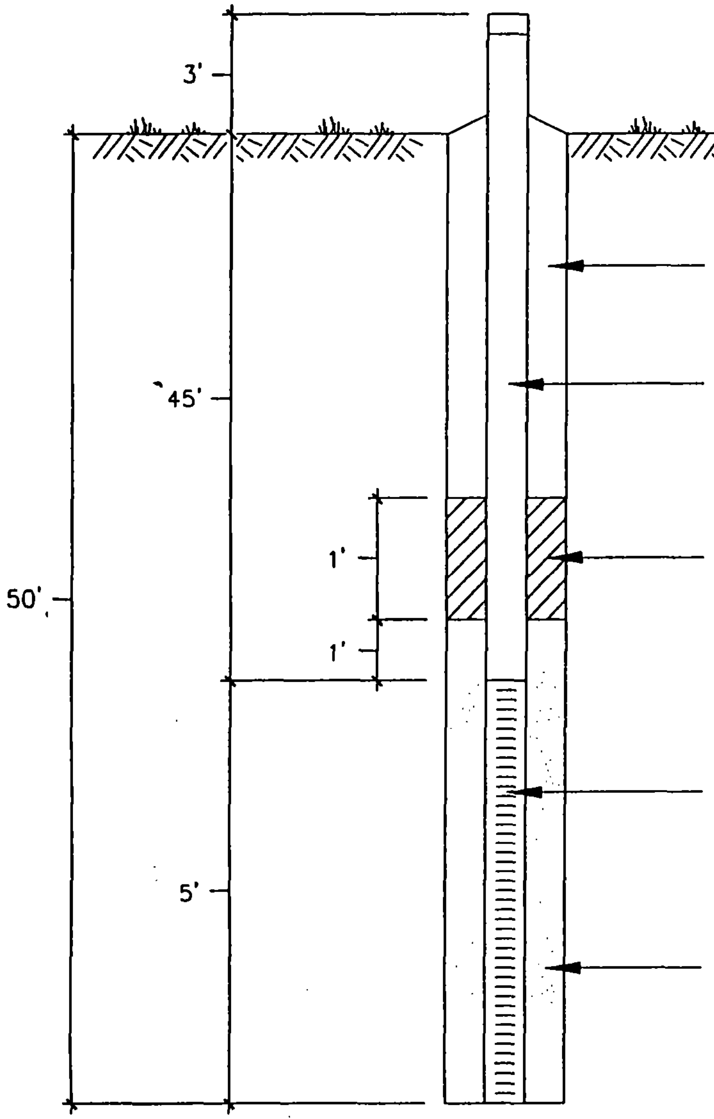
INSTALLED BY: U.E.S. – ORLANDO

WELL DIAGRAM – NOT TO SCALE

PROTECTIVE CASING – YES

NO X

TYPE



CEMENT GROUT

RISER – TYPE PVC

SIZE 2" I.D.

30/65 SILICA SAND SEAL

SCREEN – TYPE PVC

SIZE 2" I.D., 0.010" SLOT

FILTER TYPE 20/30 SILICA SAND

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 10942-001-02

REPORT NO.:

PAGE NO.:

PROJECT: BORROW PIT 91 – KEENE ROAD LANDFILL, ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT L.L.C.

DATE: 4/13/00

WELL NUMBER: PZ-17B

LOCATION: SELECTED IN FIELD BY CLIENT

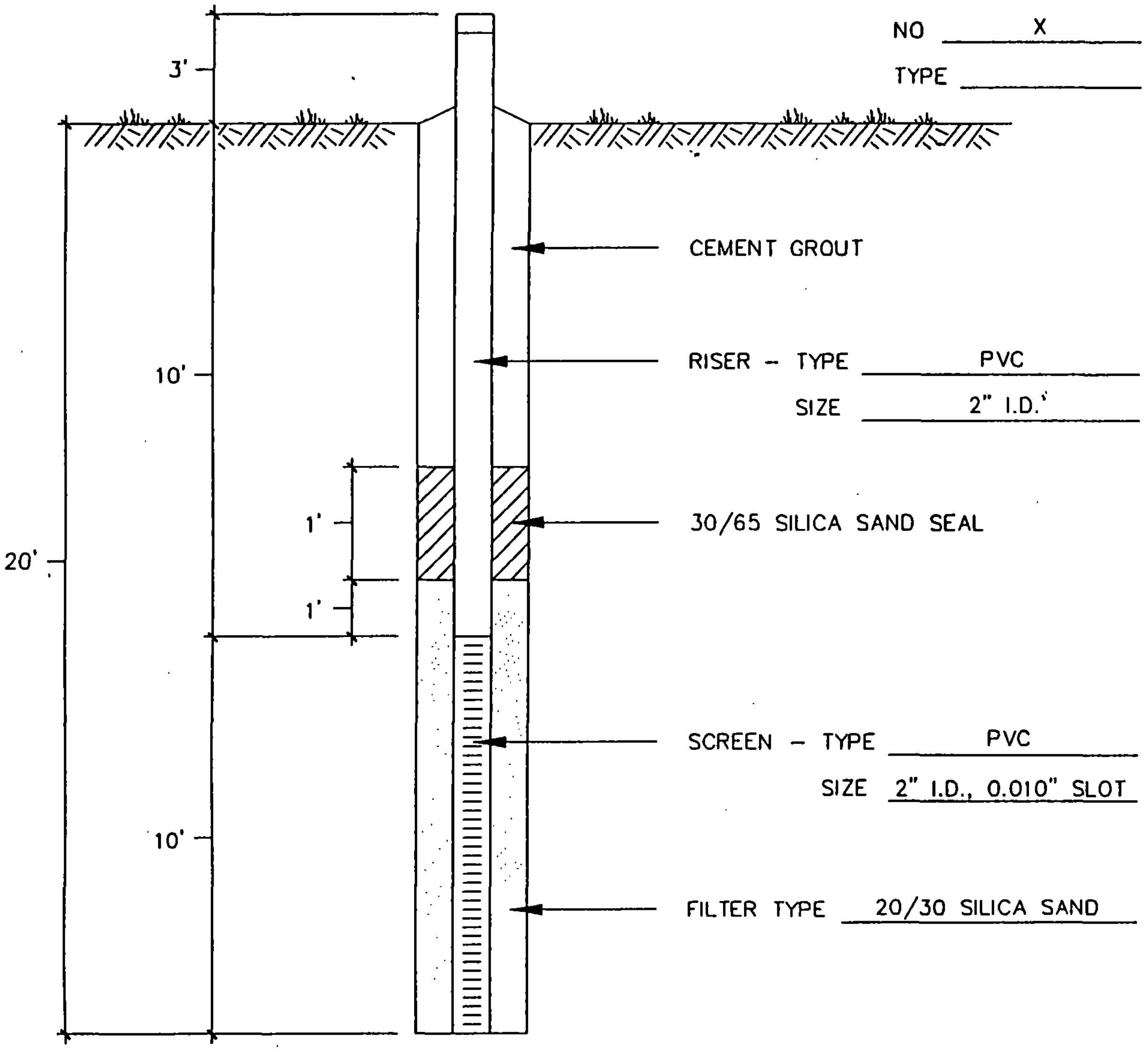
INSTALLED BY: U.E.S. – ORLANDO

WELL DIAGRAM - NOT TO SCALE

PROTECTIVE CASING – YES

NO X

TYPE



CEMENT GROUT

RISER – TYPE PVC

SIZE 2" I.D.

30/65 SILICA SAND SEAL

SCREEN – TYPE PVC

SIZE 2" I.D., 0.010" SLOT

FILTER TYPE 20/30 SILICA SAND

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 10942-001-02
REPORT NO.:
PAGE NO.:

PROJECT: BORROW PIT 91 – KEENE ROAD LANDFILL, ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT L.L.C.

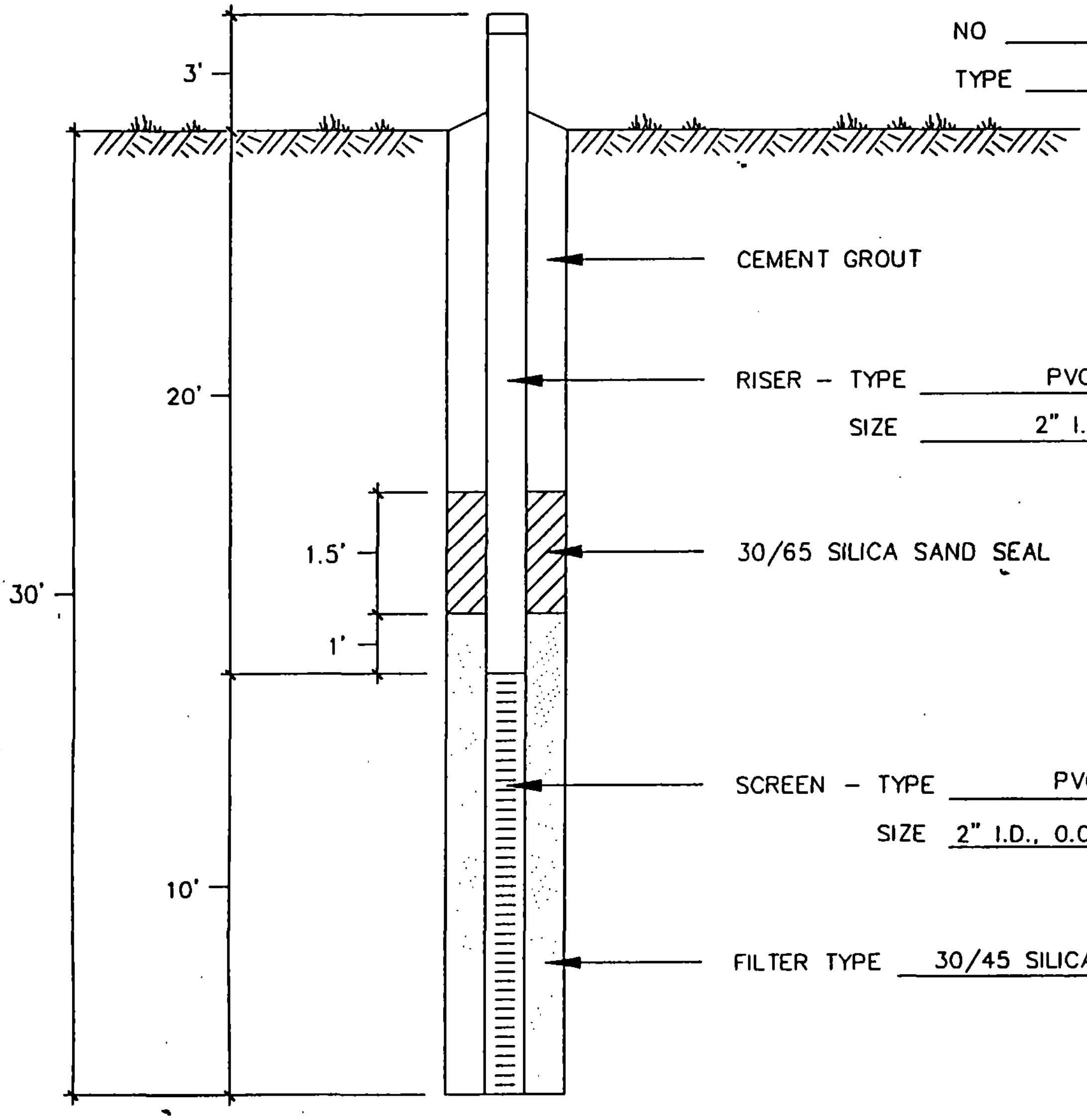
DATE: 4/10/00

WELL NUMBER: PZ-18

LOCATION: SELECTED IN FIELD BY CLIENT

INSTALLED BY: U.E.S. – ORLANDO

WELL DIAGRAM - NOT TO SCALE



PROTECTIVE CASING – YES
NO X
TYPE

CEMENT GROUT

RISER – TYPE PVC
SIZE 2" I.D.

30/65 SILICA SAND SEAL

SCREEN – TYPE PVC
SIZE 2" I.D., 0.010" SLOT

FILTER TYPE 30/45 SILICA SAND

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 10942-001-02

REPORT NO.:

PAGE NO.:

PROJECT: BORROW PIT 91 – KEENE ROAD LANDFILL, ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT L.L.C.

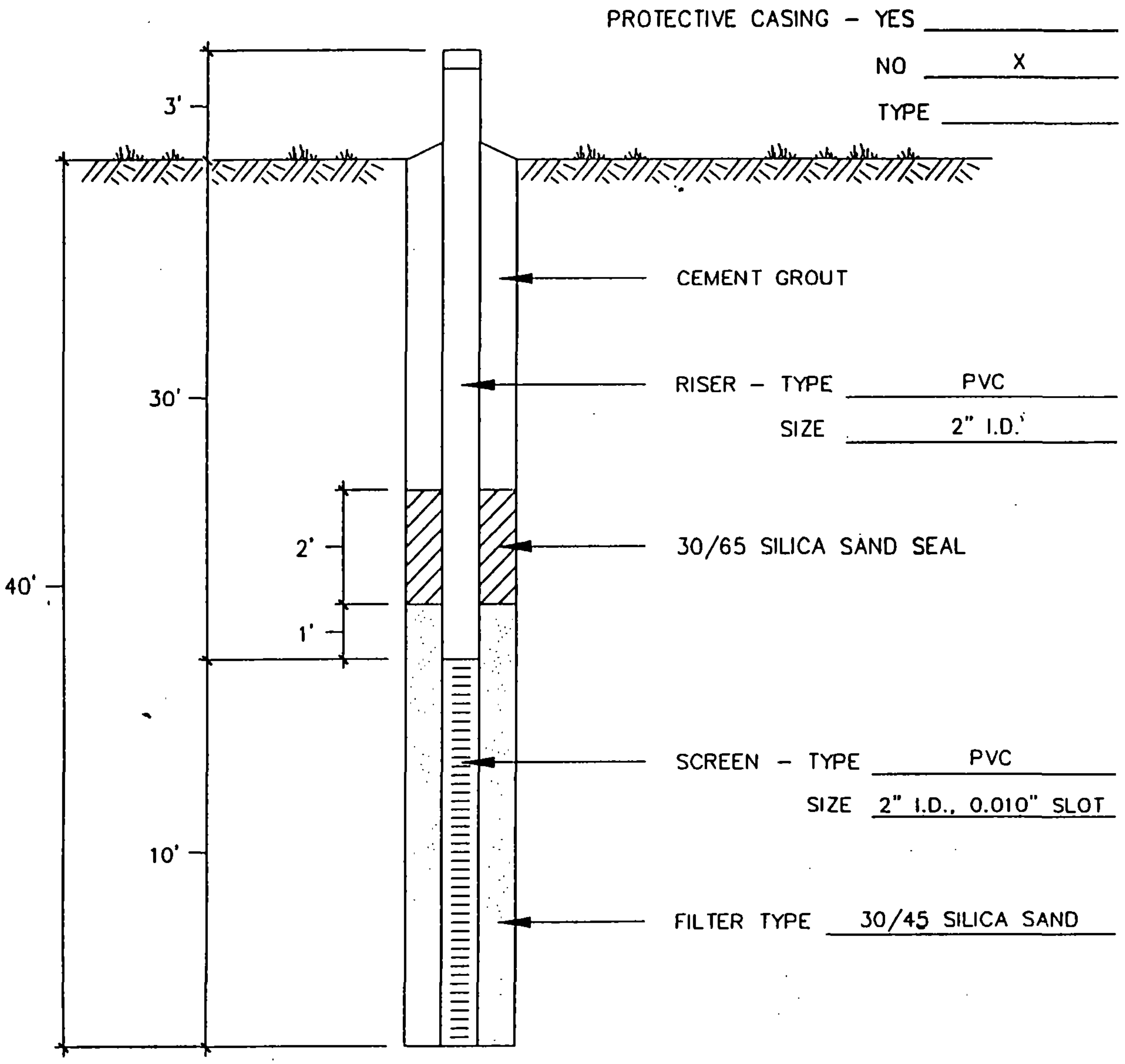
DATE: 4/10/00

WELL NUMBER: PZ-19

LOCATION: SELECTED IN FIELD BY CLIENT

INSTALLED BY: U.E.S. – ORLANDO

WELL DIAGRAM – NOT TO SCALE



PROTECTIVE CASING – YES

NO X

TYPE

RISER – TYPE PVC

SIZE 2" I.D.

SCREEN – TYPE PVC

SIZE 2" I.D., 0.010" SLOT

FILTER TYPE 30/45 SILICA SAND

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 10942-001-02
REPORT NO.:
PAGE NO.:

PROJECT: BORROW PIT 91 – KEENE ROAD LANDFILL, ORANGE COUNTY, FLORIDA

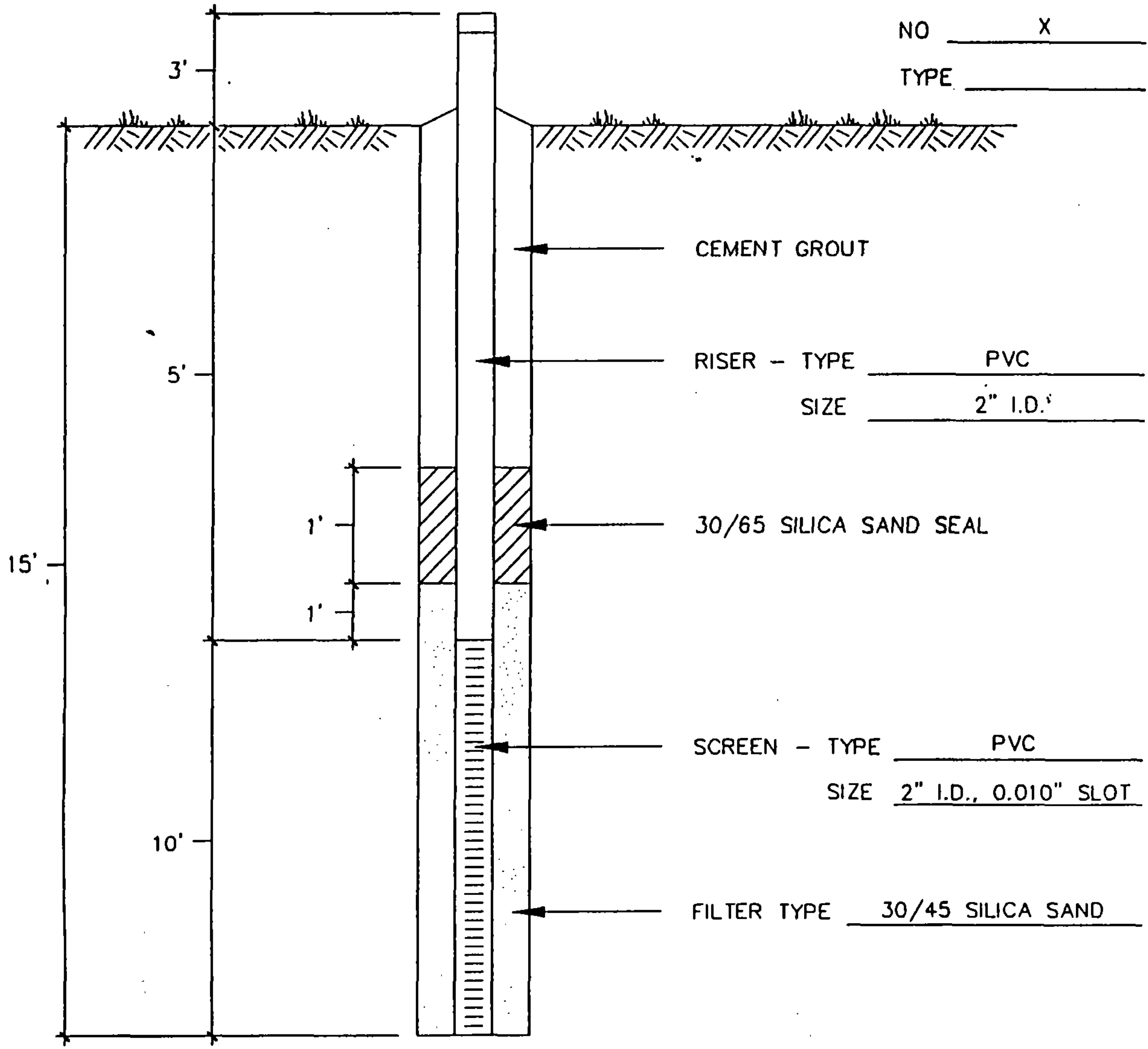
CLIENT: BUTTREY DEVELOPMENT L.L.C.
DATE: 4/10/00

WELL NUMBER: PZ-20
LOCATION: SELECTED IN FIELD BY CLIENT

INSTALLED BY: U.E.S. – ORLANDO

WELL DIAGRAM – NOT TO SCALE

PROTECTIVE CASING – YES
NO X
TYPE



RISER – TYPE PVC
SIZE 2" I.D.

SCREEN – TYPE PVC
SIZE 2" I.D., 0.010" SLOT

FILTER TYPE 30/45 SILICA SAND

UNIVERSAL ENGINEERING SCIENCES
WELL COMPLETION LOG

PROJECT NO.: 10942-001-02

REPORT NO.:

PAGE NO.:

PROJECT: BORROW PIT 91 - KEENE ROAD LANDFILL, ORANGE COUNTY, FLORIDA

CLIENT: BUTTREY DEVELOPMENT L.L.C.

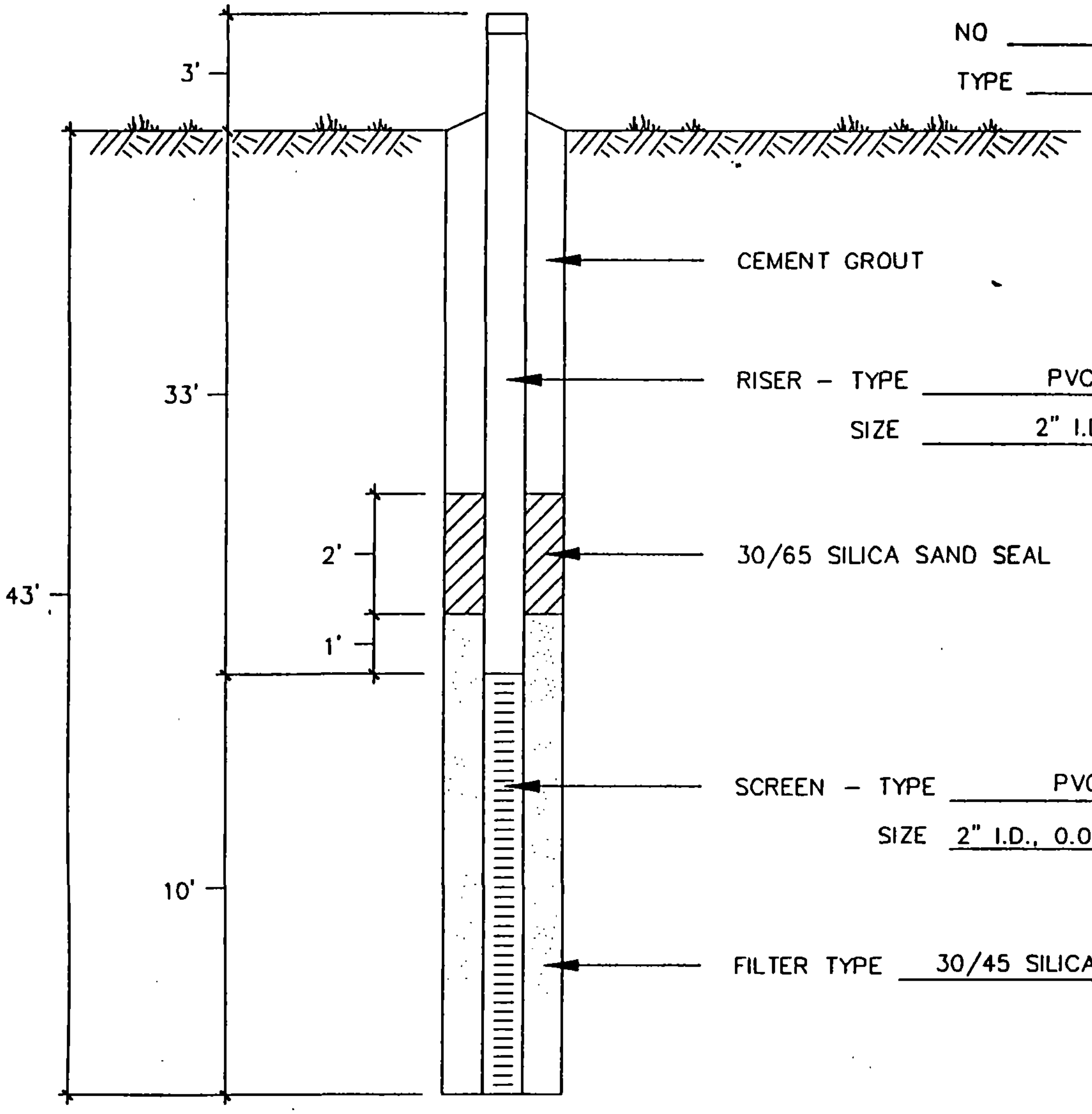
DATE: 4/11/00

WELL NUMBER: PZ-21

LOCATION: SELECTED IN FIELD BY CLIENT

INSTALLED BY: U.E.S. - ORLANDO

WELL DIAGRAM - NOT TO SCALE



PROTECTIVE CASING - YES

NO X

TYPE

CEMENT GROUT

RISER - TYPE PVC

SIZE 2" I.D.

30/65 SILICA SAND SEAL

SCREEN - TYPE PVC

SIZE 2" I.D., 0.010" SLOT

FILTER TYPE 30/45 SILICA SAND

APPENDIX C

Keen Road Landfill Site

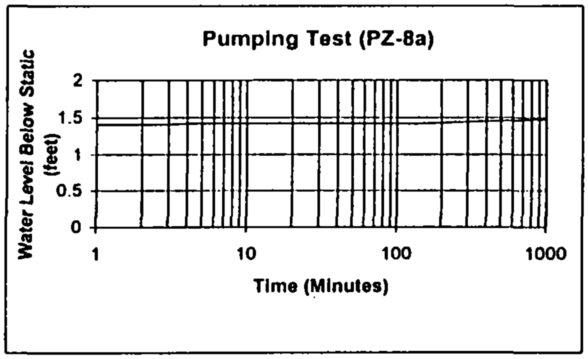
Field Data

Time	Water Level
0	29.83
1	31.24
2	31.24
3	31.24
4	31.25
5	31.25
6	31.25
7	31.25
8	31.25
9	31.25
10	31.25
11	31.25
21	31.25
31	31.25
41	31.25
51	31.25
61	31.25
71	31.25
81	31.25
91	31.25
101	31.25
111	31.25
151	31.25
191	31.26
1143	31.31

PZ-8a

Graph Data

Time	Drawdown
0.01	0
1	1.41
2	1.41
3	1.41
4	1.42
5	1.42
6	1.42
7	1.42
8	1.42
9	1.42
10	1.42
11	1.42
21	1.42
31	1.42
41	1.42
51	1.42
61	1.42
71	1.42
81	1.42
91	1.42
101	1.42
111	1.42
151	1.42
191	1.43
1143	1.48

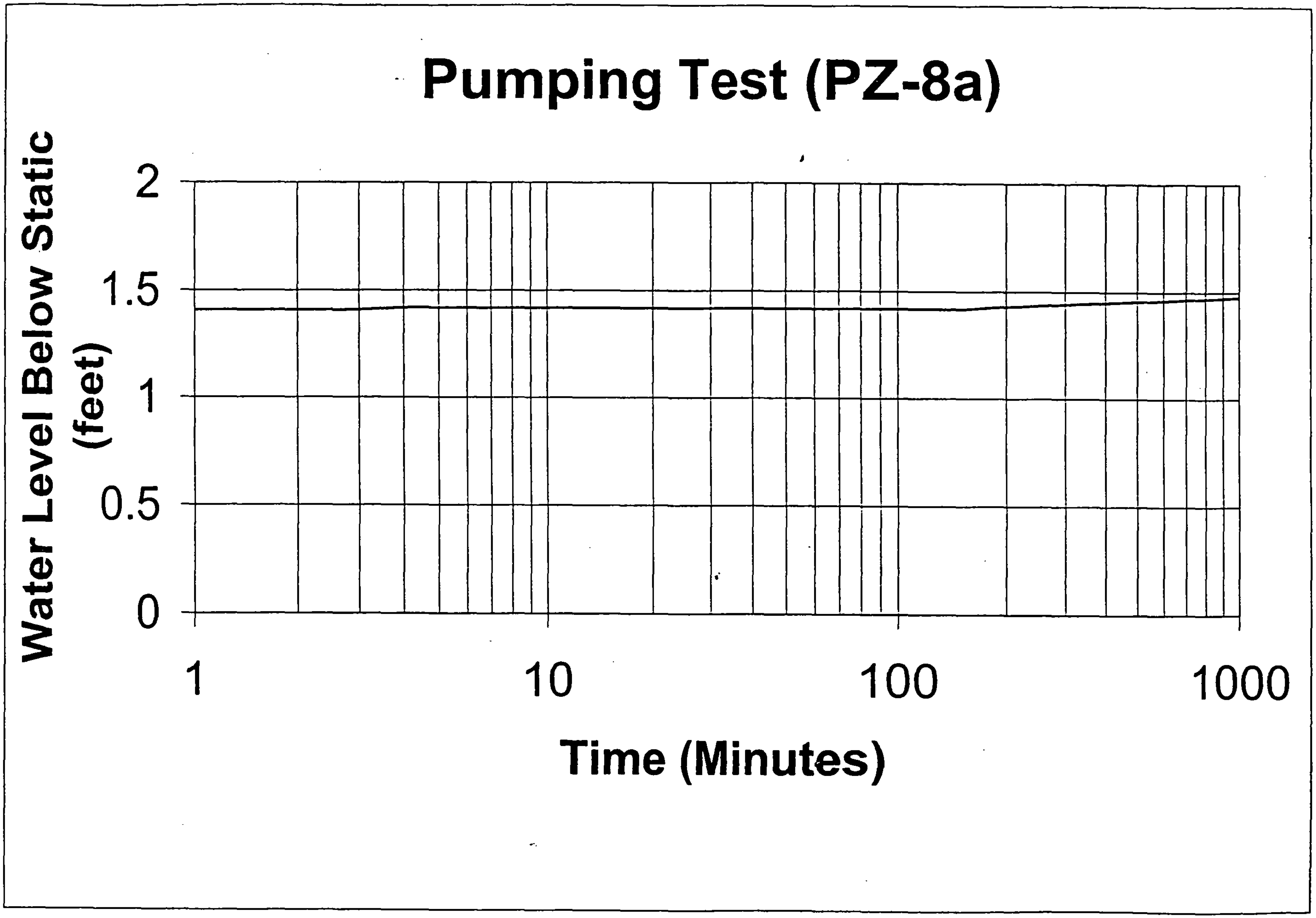


Jacob $\frac{Q}{s} = \frac{T}{2000}$ gpd/ft

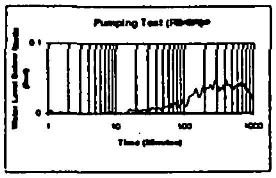
$$\frac{5 \text{ gpm}}{1.48 \text{ ft}} = \frac{T}{2000}$$

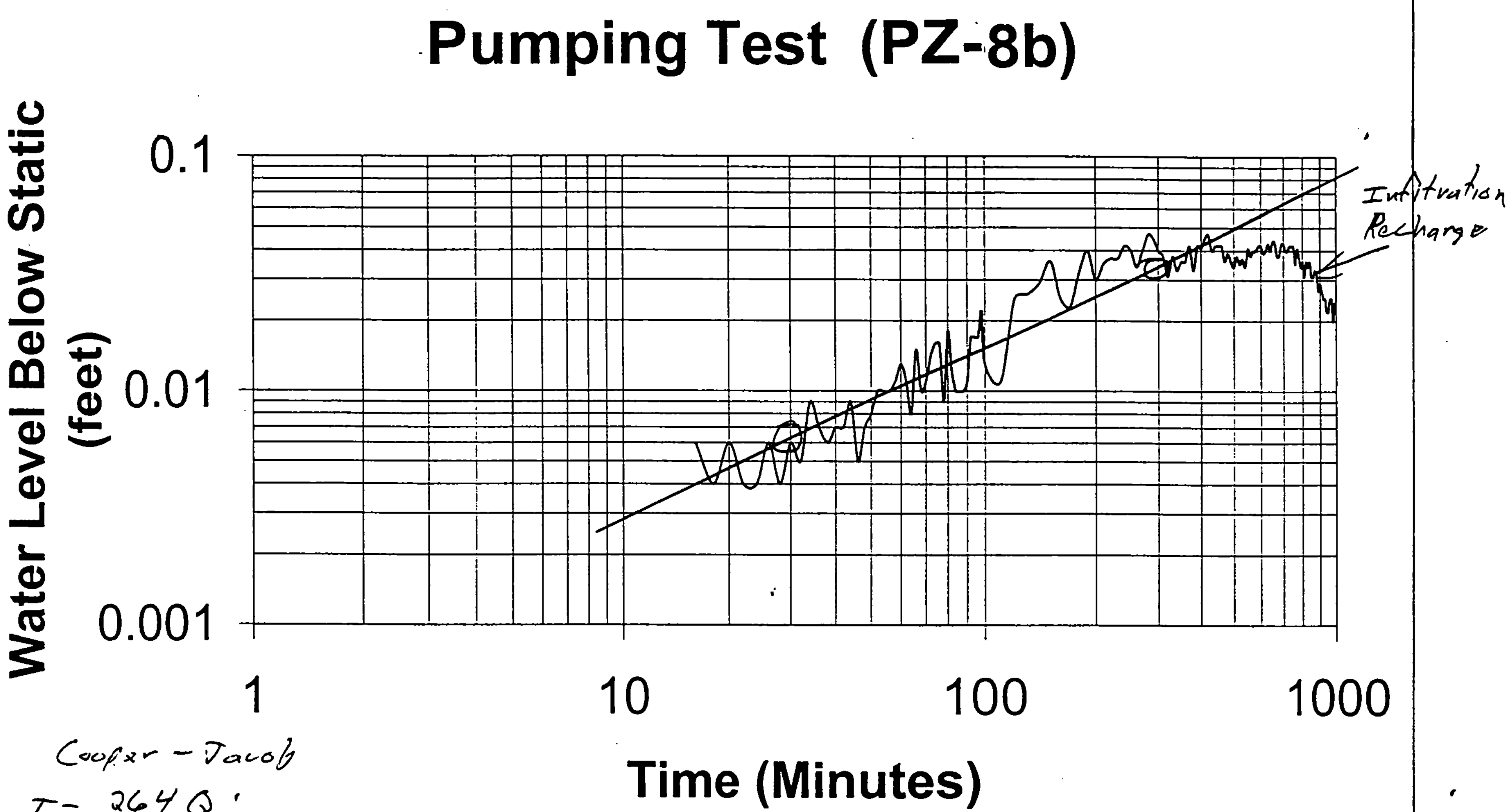
$T = 6{,}757$ gpd/ft

$= 903$ ft/day


Pumping Test (PZ-8a)
Water Level Below Static (feet)
2
1.5
1
0.5
0
1
10
100
1000
Time (Minutes)

P2-86





Cooper - Jacob

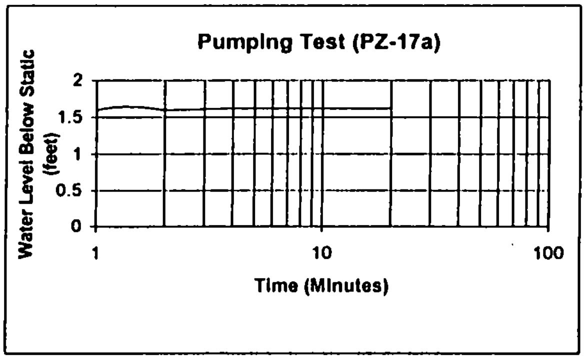
$$T = \frac{264\,Q}{\Delta s}$$

$$= \frac{264(5\text{ gpm})}{(0.035-0.0062)\text{ ft}}$$

= 45,833 gpd/ft

= 6,127 ft/day

Keen Road Landfill Site		PZ-17a	
Field Data		Graph Data	
Time	Water Level	Time	Drawdown
0	12.66	0.01	0
1	14.26	1	1.6
2	14.26	2	1.6
3	14.27	3	1.61
4	14.28	4	1.62
5	14.28	5	1.62
6	14.28	6	1.62
7	14.28	7	1.62
8	14.28	8	1.62
9	14.28	9	1.62
10	14.28	10	1.62
20	14.28	20	1.62

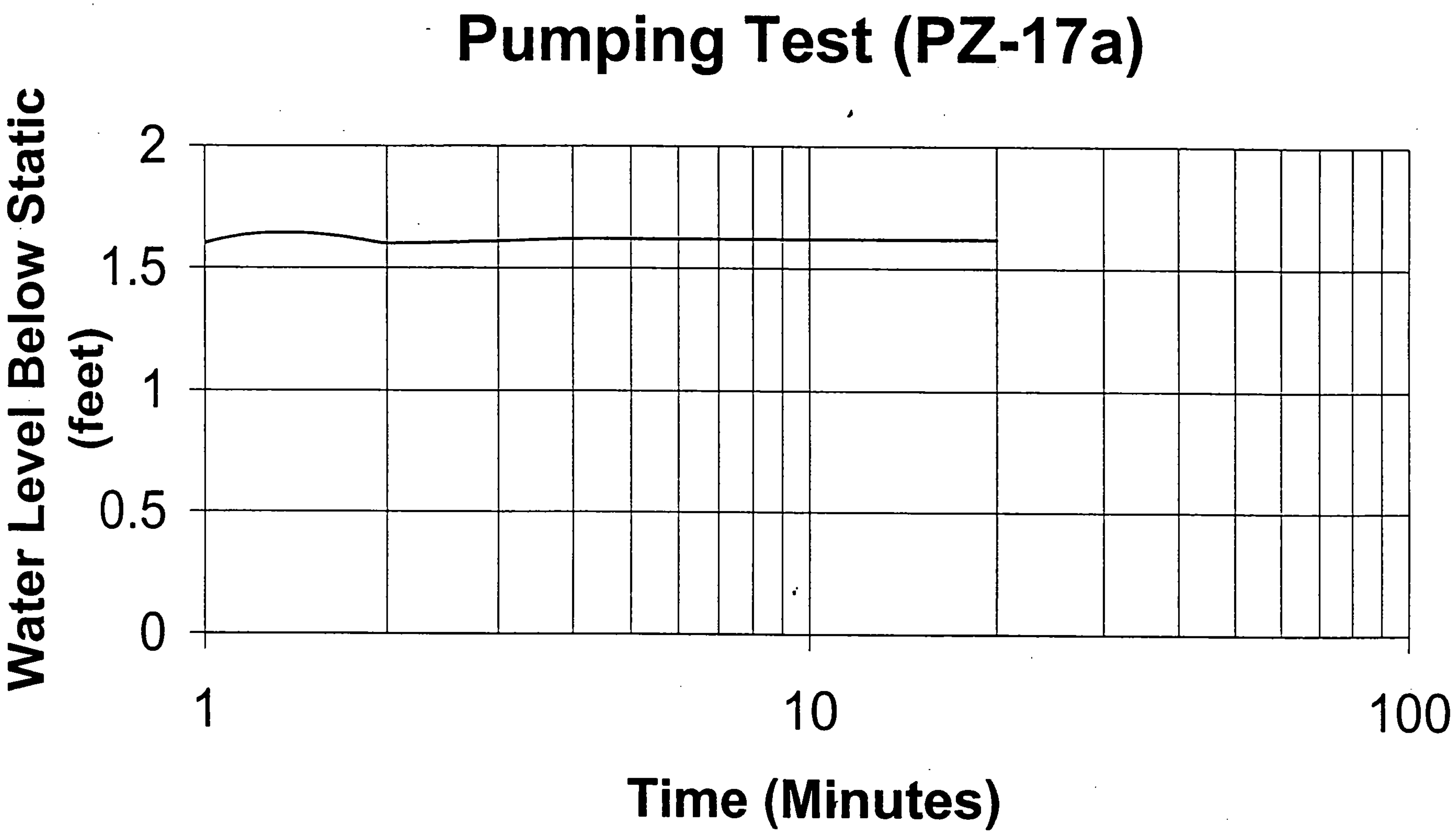


Jacob $\frac{Q}{s} = \frac{T}{2000}$. gpd/ft

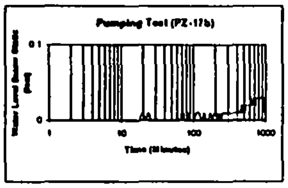
$\frac{5\text{ gpm}}{1.62\text{ ft}} = \frac{T}{2000}$

T = 6173 gpd/ft

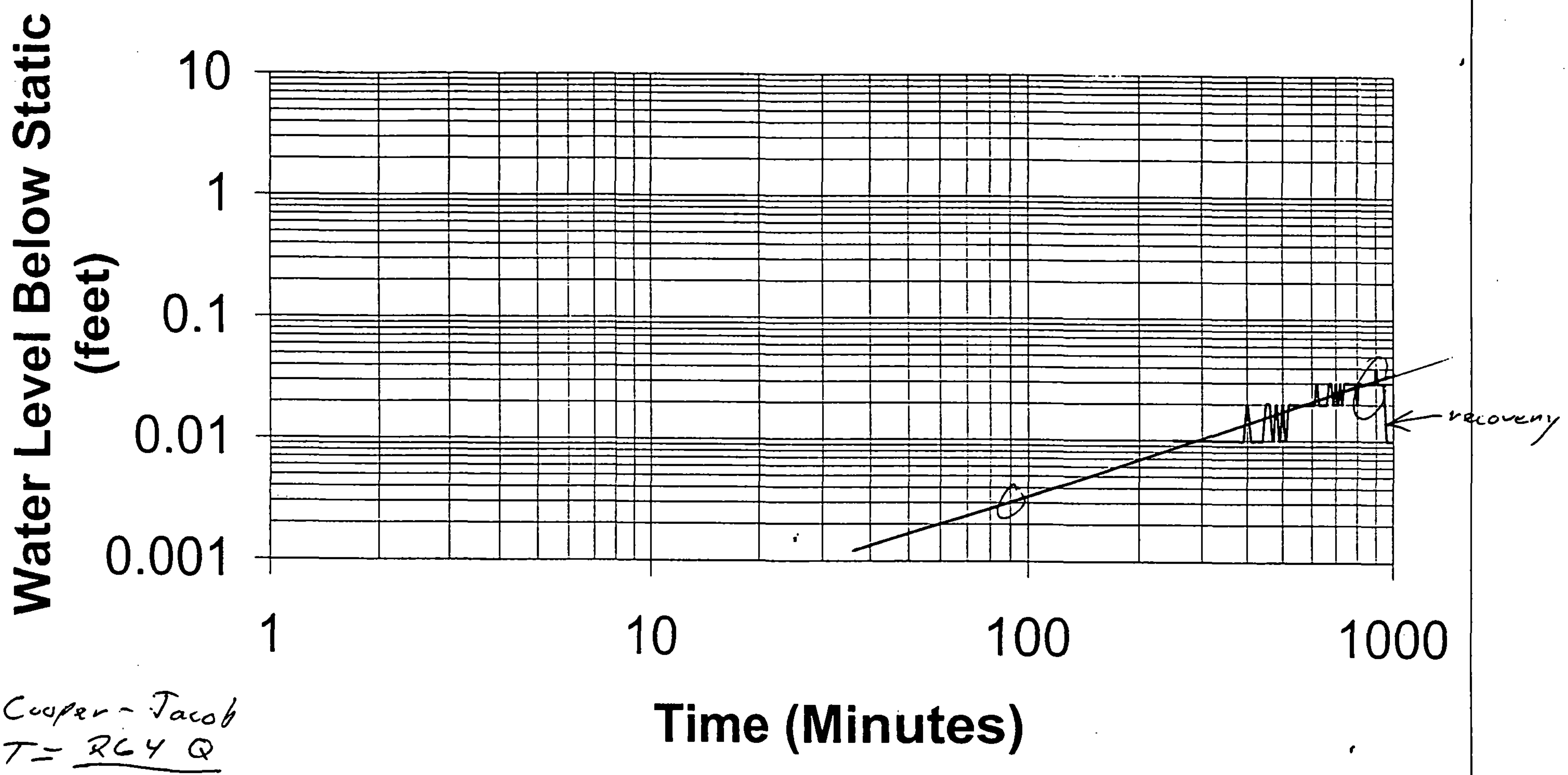
= 825 ft/day


Pumping Test (PZ-17a)
Water Level Below Static (feet)
2
1.5
1
0.5
0
1
10
100
Time (Minutes)

[illegible]


Pumping Test (PZ-17b)
0.1
0
1
10
100
1000
Time (Minutes)

Pumping Test (PZ-17b)



Cooper - Jacob

$$T = \frac{264\ Q}{\Delta s}$$

$$= \frac{264\ (5\ gpm)}{(0.032 - 0.003)\ ft}$$

= 45,517 gpd/ft

= 6,085 ft/day

EXHIBIT G

Environmental Conservation Laboratories, Inc
10207 General Drive
Orlando, Florida 32824-8529
407 / 826-5314
Fax 407 / 850-6945
www.encolabs.com

ENCO
Laboratories
DHRS Certification No. E83182

September 20, 1999

Bishop & Buttrey, Inc.
6239 Edgewater Drive
Suite D-1
Orlando, Florida 32810

Attention: Mr. Ed Chesney, P.E.,

Thank you for the opportunity to present our laboratory and qualifications to you. Environmental Conservation Laboratories, Inc., (ENCO), is a full service, environmental testing company with laboratory facilities located in Orlando, Florida and Jacksonville, Florida. It has always been the object of our firm to provide service and quality data to the highest standard to all of our clients located throughout the southeastern United States. ENCO operates under FDEP QAP # 960038 and is certified for environmental analyses by the Florida Department of Health (FDOH). We also carry certifications from the states of Tennessee, North Carolina and South Carolina, and have serviced clients in Georgia, Alabama, Louisiana and Virginia, as well as providing analytical services for projects in Central America and the Caribbean basin.

ENCO Laboratories takes great pride in the work they perform and we strive diligently to establish a team-like relationship with our clients. We recognize that in todays environmental market there are many things which can be done to attain a competitive edge. These might include the provision of custom reports, electronic deliverable data, sample kits that make sense - provided when the client needs them, turn around times which meet the needs of the client and, of course, fair pricing. All of these items can be consolidated into the concept of providing exceptional service.

We at ENCO would be pleased to assist you with your analytical requirements. Should you have any questions regarding technical issues, please feel free to contact me or one of our chemists.

Regarding fee schedules; the laboratory has found that in establishing a working relationship with new clients, it is often important to discuss the particular needs of the client and their specific job site requirements in an attempt to assure that the client get what they expect in terms of both data reporting and invoicing for the work provided.

Please contact us at your convenience should there be any issue we might be of help with.

Respectfully,
ENCO Laboratories, Inc.

David J. Vesey
Mgr., Client Services

FLORIDA

Department of
Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

March 16, 1999

Mark E. Inman, Ph.D.
Environmental Conservation Laboratories (Orlando)
4810 Executive Park Court Suite 211
Jacksonville, Florida 32216-6069

SUBJECT: Quality Assurance Review; Environmental conservation Laboratories (Orlando);
Comprehensive QA Plan #960038, Annual Amendment

Dear Dr. Inman:

The Statement of Intent and Florida Planner/Certifier (FPC) file were received on January 4, 1999. The DEP QA Section has completed the electronic evaluation of your plan

Your QA Plan has been approved as explained in this correspondence and the attached evaluation report, with an effective date of **March 16, 1999**. Your FPC file must be revised and resubmitted if you desire approval of activities that were not approved with this evaluation.

Multiple Laboratories

The last revision of your QA Plan, CompQAP #960038, was approved for both your Jacksonville and Orlando laboratories. A new policy has been established for electronic QA Plan submittals which allows only one laboratory per quality assurance plan. The DEP QA Section has assigned the FPC file received with this submittal to your Orlando facility which will retain CompQAP #960038. A copy of your file was made, and a QA Plan was created for your Jacksonville laboratory, the CompQAP number for this facility will be 910190, which was the number for the Jacksonville facility before the combined document was submitted. A copy of the Orlando FPC file is enclosed with this correspondence.

Method Validations

Method validation packages will have to be submitted and approved before the following analyte method combinations will be approved:

1) Captan by method 8081 is not approved. Captan is not a target analyte of 8081A.

2) Ethanol and methanol by method 8015 P/T. The method identifies this prep as an inappropriate technique for these analytes

Company Methods

The methods listed under this category are not approved as explained:

1) DRO and GRO. specific method citations must be provided and validation packages submitted if the methods are not those already listed in the FPC (please note that we are now approving the Massachusetts Method for Petroleum Hydrocarbons which will have to be added as a Company Method until the FPC can be updated)

2) The RSK175 method cannot be approved until you submit a copy of the analytical method for evaluation. A determination will be made based on the method information as to whether or not a validation package is required

"Protect, Conserve and Manage Florida's Environment and Natural Resources"

Annual Amendment Approval
Chapter 62-160, F.A.C., requires that your organization renew approval of this document on an annual basis. Your annual amendment must consist of a diskette containing your QA Plan file and a signed Statement of Intent even if changes have not been made to your plan. Your renewal request must be received by the DOH Laboratory Certification Office on or before **May 28, 2000**.

If you have any questions concerning this matter, please call Andy Tintle at (850) 921-9733.

Sincerely,

for Sylvia S. Labie, QA Officer
Quality Assurance Section

SSL/ART/art

Attachments (2): Copy of Evaluation Report
Copy of FPC File

cc. Nancy Cohen; DOH Lab Certification Program (with copy of Evaluation Report))

1999 - 2000

FLORIDA DEPARTMENT OF HEALTH

State of Florida, Department of Health,
Bureau of Laboratories, Environmental Water

This is to certify that

E83182

Environmental Conservation Laboratories, Inc. (ENCO) - Orlando
10207 General Drive
Orlando, FL 32824

has complied with Florida Administrative Code 64E-1, Part II, for the examination of environmental water in the following categories:

Metals, Nutrients, Demands, General Category I, General Category II, Extractable Organics (GC, GC/MS, HPLC), Purgeable Organics (GC, GC/MS), Pesticides/Herbicides/PCB's (GC), Hazardous Waste Characterization**************

Specific methods, parameters, and analytes certified are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231

EFFECTIVE JULY 1, 1999 **THROUGH JUNE 30, 2000**

Ming S. Chan, Ph D
Acting Bureau Chief, Bureau of Laboratories
Florida Department of Health
DH Form 1697, 3/98
NON-TRANSFERABLE ENV99124

EXHIBIT H

NA...NAL FLOOD INSURANCE PROGRAM

#91

maps, Aerials etc

FIRM

FLOOD INSURANCE RATE MAP

ORANGE COUNTY, FLORIDA

(UNINCORPORATED AREAS)

PANEL 100 OF 625

COMMUNITY-PANEL NUMBER
120179 0100 B

EFFECTIVE DATE:
DECEMBER 1, 1981

federal emergency management agency

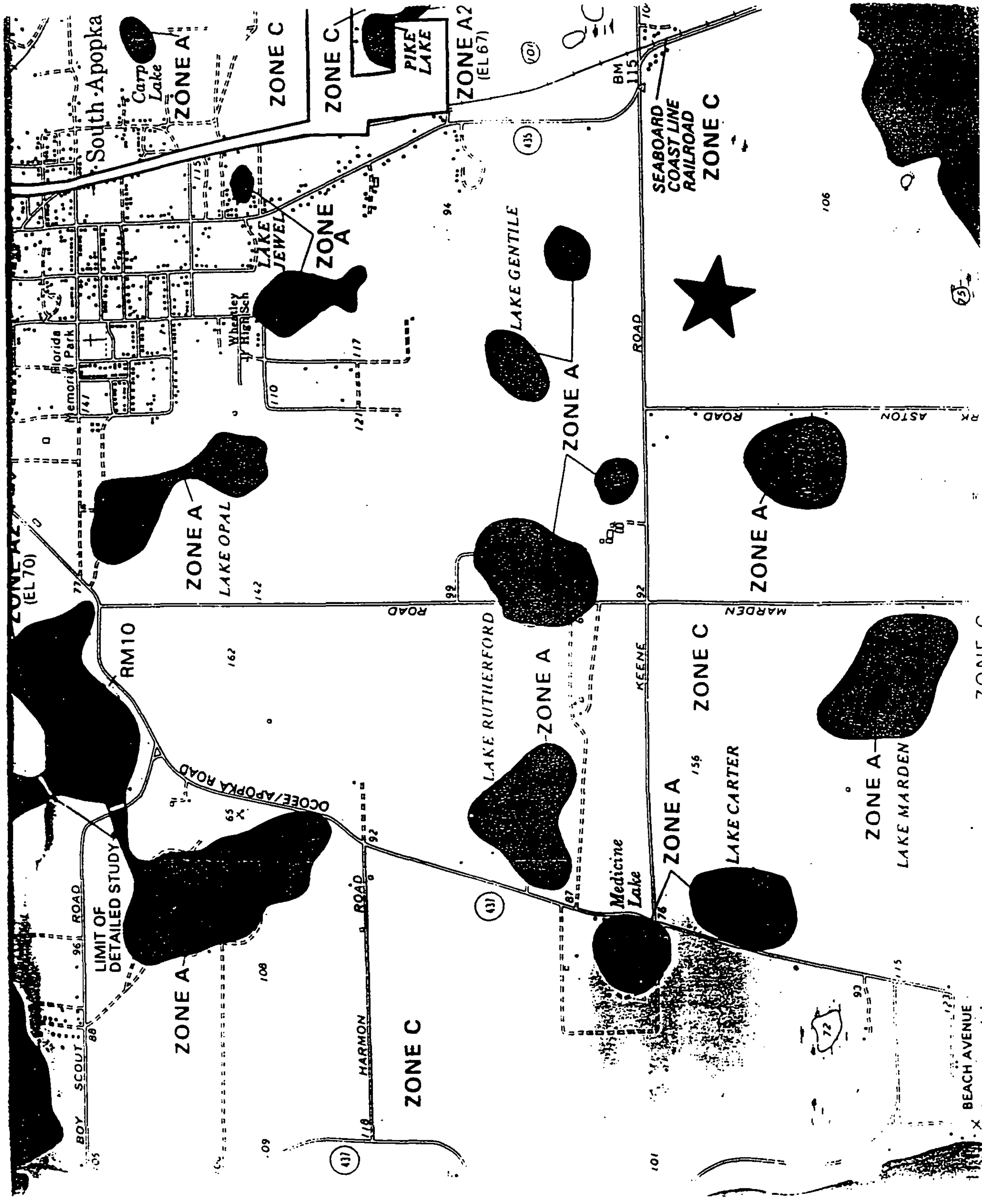


EXHIBIT I