SCS ENGINEERS

CITRUS COUNTY
CLASS I CENTRAL LANDFILL
PHASE 3 EXPANSION
CONSTRUCTION PERMIT APPLICATION

[redacted]

COLLATED FILE COPY

Volume 1 – Section A-G and I-S

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DEC 10 2008
SOUTHWEST DISTRICT TAMPA

Prepared for:

Citrus County

Board of County Commissioners

P.O. Box 340
Lecanto, Florida 34460

Presented by:

SCS ENGINEERS
4041 Park Oaks Blvd.
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Tampa, Florida 33610
(813) 621-0080
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~~August 14,~~December 10, 2008
File No. 09207049.02

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SCS ENGINEERS

August 31, 2009
File No. 09207049.02

Steven G. Morgan
Solid Waste Section Southwest District
Florida Department of Environmental Protection
13051 North Telecom Parkway
Temple Terrace, Florida 33637-0926

Dept Of Environmental Protection
SEP 01 2009
Southwest District

Subject: Response to verbal comments
Citrus County Central Class I Landfill Phase 3 Expansion Construction
Pending Permit No.: 21375-013-SC/01,
Citrus County WACS No.: SWD/09/39859

Dear Mr. Morgan:

SCS Engineers (SCS) contacted FDEP on August 7th and received verbal comments for the above referenced pending permit. During our phone conversation you indicated that the slope stability and relevant specification sections would need to be revised to include the biaxial geogrid layer. SCS has revised the slope stability to include this layer as well as the CQA Plan, geogrid and GCL specifications have been revised to include the biaxial geogrid layer.

Please advise if this pending permit requires further action by Citrus County. If you should have any questions please do not hesitate to contact either of the undersigned.

Sincerely,

D. Bramlett

Ed Hilton

Dominique H. Bramlett, P.E.
Senior Project Engineer
SCS ENGINEERS

C. Ed Hilton, P.E.
Project Director
SCS ENGINEERS

DHB/CEH:dhb

cc: Susan Pelz, P.E., FDEP Tampa
Susan Metcalfe, P.G., Citrus County, P.O. Box 340, Lecanto, FL 34460-0340

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August 14, 2008
File No. 09207049.02

Susan J. Pelz, P.E.
Solid Waste Program Manager
Florida Department of Environmental Protection
Southwest District
13051 N. Telecom Parkway
Temple Terrace, FL 33637

Subject: Application for Construction of the Phase 3 Expansion Area
Class I Central Landfill
Citrus County, Florida

Dear Ms. Pelz:

On behalf of the Citrus County Board of County Commissioners, SCS Engineers (SCS) hereby provides four original permit applications for the construction of the Phase 3 Expansion Area of the Class I Central Landfill located in Citrus County Florida. The application is for an approximately 6.2 acre lateral expansion from Phase 2.

The proposed Phase 3 cell will be comprised of a double liner as follows and as detailed in the Lining System Detail of the Construction Permit Application Drawings located in Attachment F-1 (from bottom up):

- Prepared sub-base comprised of compacted soils free of sharp materials.
- Geosynthetic Clay Liner (GCL) (bottom of cell only).
- 60-mil HDPE textured geomembrane liner (secondary liner).
- 250-mil biplanar geocomposite drainage layer (secondary geocomposite).
- 60-mil HDPE textured geomembrane liner (primary liner).
- 300-mil triplanar geocomposite drainage layer (primary geocomposite).
- 24-inch thick layer of protective sand (bottom of cell only).
- Geogrid (sideslopes only)
- Scrim reinforced raincoat (sideslopes and 2/3 of cell bottom).

It should be noted that the liner profile is similar to that of Phase 2, GCL (as opposed to clay) and a double sided bi-planar geocomposite (as opposed to a triplanar geocomposite) for the secondary leachate collection system are the only differences from Phase 2. Geo-grid will be added to the bottom liner sequence on the side slopes. A scrim reinforced cell cover will be included over approximately two-thirds of the Phase 3 cell liner system as the top layer of the system.

The proposed liner design for the interior sideslopes of Phase 3 is identical to that used for Phase 2, except for use of a biplanar geocomposite in the secondary detection layer. This design does not include the prescriptive subbase component. This exception to the prescriptive liner design was previously approved by the Department as an Alternate Procedure (AP) for Phase 2 (SWAP 01-6). The change in the secondary detection layer from a triplanar to a biplanar geocomposite does not affect the stability of the design because a geogrid is provided for stability purposes. Therefore, because conditions for which the previous AP request was granted are unchanged we are requesting that the previous AP approval be applied to the Phase 3 Expansion project.

The processing fee of $10,000 is submitted under a separate cover.

Please do not hesitate to call should you have any questions or require additional information.

Sincerely,

Dominique H. Bramlett, P.E.
Project Manager
SCS ENGINEERS

John A. Banks, P.E.
Project Director
SCS ENGINEERS

DHB/JAB:dhb

cc: Susan J. Metcalfe, P.G., Citrus County, with enclosures

Enclosures

Dept. of Environmental Protection

AUG 14 2008

Southwest District

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
AUG 14 2008
SOUTHWEST DISTRICT TAMPA

CITRUS COUNTY CLASS I CENTRAL LANDFILL
PHASE 3 EXPANSION
CONSTRUCTION PERMIT APPLICATION

Prepared for:

Citrus County
Board of County Commissioners
P.O. Box 340
Lecanto, Florida 34460

Prepared by:

SCS Engineers
4041 Park Oaks Blvd.
Suite 100
Tampa, Florida 33610
Certification No. 00004892

Dominique H. Bramlett, P.E.
P.E. No. 61829
8/14/08

File No. 09207049.02
August 14, 2008

DEP Form #	62-701.900(1)
Form Title	Solid Waste Management Facility Permit
Effective Date	05-27-01
DEP Application No.	(Filled by DEP)

Florida Department of Environmental Protection
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, FL 32399-2400

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

APPLICATION FOR A PERMIT TO CONSTRUCT, OPERATE, MODIFY OR CLOSE A SOLID WASTE MANAGEMENT FACILITY

APPLICATION INSTRUCTIONS AND FORMS

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DEC 10 2003
SOUTHWEST DISTRICT
TAMPA

INSTRUCTIONS TO APPLY FOR A SOLID WASTE MANAGEMENT FACILITY PERMIT

I. General

Solid Waste Management Facilities shall be permitted pursuant to Section 403.707, Florida Statutes,(FS) and in accordance with Florida Administrative Code (FAC) Chapter 62-701. A minimum of four copies of the application shall be submitted to the Department's District Office having jurisdiction over the facility. The appropriate fee in accordance with Rule 62-701.315, FAC, shall be submitted with the application by check made payable to the Department of Environmental Protection (DEP).

Complete appropriate sections for the type of facility for which application is made. Entries shall be typed or printed in ink. All blanks shall be filled in or marked "not applicable" or "no substantial change". Information provided in support of the application shall be marked "submitted" and the location of this information in the application package indicated. The application shall include all information, drawings, and reports necessary to evaluate the facility. Information required to complete the application is listed on the attached pages of this form.

II. Application Parts Required for Construction and Operation Permits

A. Landfills and Ash Monofills - Submit parts A,B, D through T
B. Asbestos Monofills - Submit parts A,B,D,E,F,G,J,L,N, P through S, and T
C. Industrial Solid Waste Facilities - Submit parts A,B, D through T
D. Non-Disposal Facilities - Submit parts A,C,D,E,J,N,S and T

NOTE: Portions of some parts may not be applicable.

NOTE: For facilities that have been satisfactorily constructed in accordance with their construction permit, the information required for A,B,C and D type facilities does not have to be resubmitted for an operation permit if the information has not substantially changed during the construction period. The appropriate portion of the form should be marked "no substantial change".

III. Application Parts Required for Closure Permits

A. Landfills and Ash Monofills - Submit parts A,B,M, O through T
B. Asbestos Monofills - Submit parts A,B,N, P through T
C. Industrial Solid Waste Facilities - Submit parts A,B, M through T
D. Non-Disposal Facilities - Submit parts A,C,N,S and T

NOTE: Portions of some parts may not be applicable.

IV. Permit Renewals

The above information shall be submitted at time of permit renewal in support of the new permit. However, facility information that was submitted to the Department to support the expiring permit, and which is still valid, does not need to be re-submitted for permit renewal. Portions of the application not re-submitted shall be marked "no substantial change" on the application form.

V. Application Codes

S	-	Submitted
LOCATION	-	Physical location of information in application
N/A	-	Not Applicable
N/C	-	No Substantial Change

VI. LISTING OF APPLICATION PARTS

PART A: GENERAL INFORMATION

PART B: DISPOSAL FACILITY GENERAL INFORMATION

PART C: NON-DISPOSAL FACILITY GENERAL INFORMATION

PART D: PROHIBITIONS

PART E: SOLID WASTE MANAGEMENT FACILITY PERMIT REQUIREMENTS, GENERAL

PART F: LANDFILL PERMIT REQUIREMENTS

PART G: GENERAL CRITERIA FOR LANDFILLS

PART H: LANDFILL CONSTRUCTION REQUIREMENTS

PART I: HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS

PART J: GEOTECHNICAL INVESTIGATION REQUIREMENTS

PART K: VERTICAL EXPANSION OF LANDFILLS

PART L: LANDFILL OPERATION REQUIREMENTS

PART M: WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS

PART N: SPECIAL WASTE HANDLING REQUIREMENTS

PART O: GAS MANAGEMENT SYSTEM REQUIREMENTS

PART P: LANDFILL CLOSURE REQUIREMENTS

PART Q: CLOSURE PROCEDURES

PART R: LONG TERM CARE REQUIREMENTS

PART S: FINANCIAL RESPONSIBILITY REQUIREMENTS

PART T: CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER

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
- [ ] Class II Landfill
- [ ] Class III Landfill
- [✓] Other Describe: Yard Waste mulching and consumer goods recycling.
- [ ] Ash Monofill
- [ ] Asbestos Monofill
- [ ] Industrial Solid Waste

[ ] 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
- [ ] Renewal
- [ ] Substantial Modification
- [ ] Intermediate Modification
- [ ] Minor Modification

4. Facility name: Citrus County Central Landfill

5. DEP ID number: 4009C00086, SWD-09-39859 County: Citrus

6. Facility location (main entrance): State Road 44 between Lecanto and Inverness, Florida

7. Location coordinates:

Section: 1 Township: 19S Range: 18E

Latitude: 28 ° 51 ' 08 " Longitude: 82 ° 26 ' 38 "

DEP FORM 62-701.900(1)
Effective 05-27-01

8. Applicant name (operating authority): Citrus County Board of County Commissioners

Mailing address: P.O. Box 340 (Street or P.O. Box) Lecanto (City) FL (State) 34460 (Zip)

Contact person: Ms. Susan Metcalfe, P.G. Telephone: (352) 527-7671

Title: Solid Waste Management Division Director

susan.metcalfe@bocc.citrus.fl.us
E-Mail address (if available)

9. Authorized agent/Consultant: SCS Engineers

Mailing address: 4041 Park Oaks Blvd., Suite 100 (Street or P.O. Box) Tampa (City) FL (State) 33610 (Zip)

Contact person: Dominique H. Bramlett, P.E. Telephone: (813) 621-0080

Title: Senior Project Engineer

dbramlett@scsengineers.com
E-Mail address (if available)

10. Landowner(if different than applicant): Citrus County BOCC

Mailing address: 110 N. Apopka Avenue (Street or P.O. Box) Inverness (City) FL (State) 34450 (Zip)

Contact person: Joyce Valentino Telephone: (352) 341-6560

E-Mail address (if available)

11. Cities, towns and areas to be served: Citrus County, including, but not limited to towns of Inverness, Lecanto & Crystal River.

12. Population to be served:

Current: 138,280 (2008 Census) Five-Year Projection: 150,340 (CY 2013)

13. Date site will be ready to be inspected for completion: August 31, 2009

14. Expected life of the facility: 11 years

15. Estimated costs:

Total Construction: $ 2,500,000 Closing Costs: $ 5,100,000

16. Anticipated construction starting and completion dates:

From: February 1, 2009 To: August 31, 2009

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

______ yds^3/day ~350 tons/day ______ gallons/day

B. DISPOSAL FACILITY GENERAL INFORMATION

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

   Expand Citrus County Landfill Class I waste disposal area with the addition of a new 6.2-acre cell (Phase 3).

2. Facility site supervisor: Carmen Bruno

   Title: Crew Leader Telephone: (352) 527-7670

   carmen.bruno@bocc.citrus.fl.us
   E-Mail address (if available)

3. Disposal area: Total 32 acres; Used 25.8* acres; Available 6.2** acres.

4. Weighing scales used: [✓] Yes [ ] No

5. Security to prevent unauthorized use: [✓] Yes [ ] No

6. Charge for waste received: ________ $/yds^3 30 $/ton

7. Surrounding land use, zoning:

   [ ] Residential
   [ ] Agricultural
   [✓] Commercial
   [✓] Industrial
   [ ] None
   [ ] Other Describe: Conservation

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: minimum of one

12. Site located in: [ ] Floodplain [ ] Wetlands [✓] Other Upland

*Existing Phase 1/1A, and 2 disposal areas.

**Phase 3 disposal area

13. Property recorded as a Disposal Site in County Land Records: [✓] Yes [ ] No

14. Days of operation: Monday - Saturday

15. Hours of operation: Monday-Friday: 6:30 am - 5:00 pm Holidays and Saturdays: 6:30 am - 3:00 pm

16. Days Working Face covered: Monday-Saturday

17. Elevation of water table: 7 Ft. (NGVD 1929)

18. Number of monitoring wells: 15

19. Number of surface monitoring points: 0

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: ______

24. Leachate treatment method:

[ ] Oxidation
[ ] Secondary
[✓] Advanced
[ ] None
[ ] Other ______
[✓] Chemical treatment
[ ] Settling

25. Leachate disposal method:

[ ] Recirculated
[ ] Transported to WWTP
[ ] Injection well
[ ] Evaporation
[✓] Other Dry Percolation Basin
[ ] Pumped to WWTP
[ ] Discharged to surface water
[ ] Percolation ponds

26. For leachate discharged to surface waters:

Name and Class of receiving water: ______

27. Storm Water:

Collected: [✓] Yes [ ] No

Type of treatment: Dry Retention/percolation

Name and Class of receiving water: None

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

Water Management District #402023.02. An Environmental Resource Permit will be submitted.

C. NON-DISPOSAL FACILITY GENERAL INFORMATION

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

   Part C is not applicable to this permit application.

2. Facility site supervisor: ____________________

   Title: ____________________ Telephone: (___) ____________________

   ____
   E-Mail address (if available)

3. Site area: Facility 32 acres; Property ________ acres

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

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

6. Days of operation: ____________________

7. Hours of operation: ____________________

8. Number of operating staff: ____________________

9. Expected useful life: ________ 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: ____________________

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

    Type of treatment: ____________________

    Name and Class of receiving water: ____________________

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

16. Final residue produced:

    ________ % of normal processing rate ________ % of maximum processing rate

    ________ Tons/day ________ Tons/day

    Disposed of at:

    Facility name: ____________________ County: ____________________

17. Estimated operating costs: $ ________________

Total cost/ton: $ ____________________ 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 D.1			1.	Provide documentation that each of the siting criteria will be satisfied for the facility; (62-701.300(2), FAC)
✓	Section D.2			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).
✓	Section D.3			3.	Provide documentation that the facility will be in compliance with the burning restrictions; (62-701.300(3), FAC)
✓	Section D.4			4.	Provide documentation that the facility will be in compliance with the hazardous waste restrictions; (62-701.300(4), FAC)
✓	Section D.5			5.	Provide documentation that the facility will be in compliance with the PCB disposal restrictions; (62-701.300(5), FAC)
✓	Section D.6			6.	Provide documentation that the facility will be in compliance with the biomedical waste restrictions; (62-701.300(6), FAC)
✓	Section D.7			7.	Provide documentation that the facility will be in compliance with the Class I surface water restrictions; (62-701.300(7), FAC)
✓	Section D.8			8.	Provide documentation that the facility will be in compliance with the special waste for landfills restrictions; (62-701.300(8), FAC)
	Section D.9	✓		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 D.10			10.	Provide documentation that the facility will be in compliance with the liquid restrictions; (62-701.300(10), FAC)
✓	Section D.11			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		
✓	Section E.1			1.	Four copies, at minimum, of the completed application form, all supporting data and reports; (62-701.320(5)(a),FAC)
✓	Section E.2			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)
✓	Section E.3			3.	A letter of transmittal to the Department; (62-701.320(7)(a),FAC)
✓	Section E.4			4.	A completed application form dated and signed by the applicant; (62-701.320(7)(b),FAC)
✓	Section E.5			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 E.6			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 E.7			7.	Operation Plan and Closure Plan; (62-701.320(7)(e)1,FAC)
✓	Section E.8			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)
✓	Section E.9.a			a.	A regional map or plan with the project location;
✓	Section E.9.b			b.	A vicinity map or aerial photograph no more than 1 year old;
	Section E.9.c		✓	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 E.9.d				d. Other necessary details to support the engineering report.
	Section E.10		✓	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)
	Section E.11		✓	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)
✓	Section E.12			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)
✓	Section E.13			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 E.14			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 E.15			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 F.1			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 F.2			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 F.3			3.	Plot plan with a scale not greater than 200 feet to the inch showing; (62-701.330(3)(c),FAC)
✓	Section F.3			a.	Dimensions;
✓	Section F.3			b.	Locations of proposed and existing water quality monitoring wells;
✓	Section F.3			c.	Locations of soil borings;
✓	Section F.3			d.	Proposed plan of trenching or disposal areas;
✓	Section F.3			e.	Cross sections showing original elevations and proposed final contours which shall be included either on the plot plan or on separate sheets;
✓	Section F.3			f.	Any previously filled waste disposal areas;
✓	Section F.3			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):
✓	Section F.4			a.	Proposed fill areas;
✓	Section F.4			b.	Borrow areas;
✓	Section F.4			c.	Access roads;
✓	Section F.4			d.	Grades required for proper drainage;
✓	Section F.4			e.	Cross sections of lifts;

S	LOCATION	N/A	N/C		PART F CONTINUED
✓	Section F.4				f. Special drainage devices if necessary;
✓	Section F.4				g. Fencing;
✓	Section F.4				h. Equipment facilities.
				5.	A report on the landfill describing the following; (62-701.330(3)(e),FAC)
✓	Section F.5.a				a. The current and projected population and area to be served by the proposed site;
✓	Section F.5.b				b. The anticipated type, annual quantity, and source of solid waste, expressed in tons;
✓	Section F.5.c				c. The anticipated facility life;
✓	Section F.5.d				d. The source and type of cover material used for the landfill.
✓	Section F.6			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 F.7			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)

S	LOCATION	N/A	N/C		
	Section G.1		✓	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 G.2			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 G.3			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 H.1			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):
✓	Section H.2.a.1			(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;
✓	Section H.2.a.2			(2)	Document foundation is adequate to prevent liner failure;
✓	Section H.2.a.3			(3)	Constructed so bottom liner will not be adversely impacted by fluctuations of the ground water;
	Section H.2.a4	✓		(4)	Designed to resist hydrostatic uplift if bottom liner located below seasonal high ground water table;
✓	Section H.2.a.5			(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)
	Section H.2.b1	✓		(1)	Upper geomembrane thickness and properties;
	Section H.2.b2	✓		(2)	Design leachate head for primary LCRS including leachate recirculation if appropriate;
	Section H.2.b3	✓		(3)	Design thickness in accordance with Table A and number of lifts planned for lower soil component.

S	LOCATION	N/A	N/C	PART H CONTINUED
				c. Double liners; (62-701.400(3)(c),FAC)
✓	Section H.2.c.1			(1) Upper and lower geomembrane thicknesses and properties;
✓	Section H.2.c.2			(2) Design leachate head for primary LCRS to limit the head to one foot above the liner;
✓	Section H.2.c.3			(3) Lower geomembrane sub-base design;
✓	Section H.2.c.4			(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)
✓	Section H.2.d.1			(1) Field seam test methods to ensure all field seams are at least 90 percent of the yield strength for the lining material;
✓	Section H.2.d.2			(2) Geomembranes to be used shall pass a continuous spark test by the manufacturer;
✓	Section H.2.d.3			(3) Design of 24-inch-thick protective layer above upper geomembrane liner;
✓	Section H.2.d.4			(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.
✓	Section H.2.d.5			(5) HDPE geomembranes, if used, meet the specifications in GRI GM13;
	Section H.2.d.6	✓		(6) PVC geomembranes, if used, meet the specifications in PGI 1197;
✓	Section H.2.d.7			(7) Interface shear strength testing results of the actual components which will be used in the liner system;
✓	Section H.2.d.8			(8) Transmissivity testing results of geonets if they are used in the liner system;
✓	Section H.2.d.9			(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)
✓	Section H.2.e			(1) Definition and qualifications of the designer, manufacturer, installer, QA consultant and laboratory, and QA program;
✓	Section H.2.e			(2) Material specifications for geomembranes, geocomposites, geotextiles, geogrids, and geonets;
✓	Section H.2.e			(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;
✓	Section H.2.e			(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;
✓	Section H.2.e			(5) Geotextile and geogrid specifications including handling and placement, conformance testing, seams and overlaps, repair, and placement of soil materials and any overlying materials;
✓	Section H.2.e			(6) Geonet and geocomposite specifications including handling and placement, conformance testing, stacking and joining, repair, and placement of soil materials and any overlying materials;
✓	Section H.2.e			(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):
✓	Section H.2.f			(1) Description of construction procedures including overexcavation and backfilling to preclude structural inconsistencies and procedures for placing and compacting soil component in layers;

S	LOCATION	N/A	N/C	PART H CONTINUED
✓	Section H.2.f			(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;
✓	Section H.2.f			(3) Procedures for testing in-situ soils to demonstrate they meet the specifications for soil liners;
				(4) Specifications for soil component of liner including at a minimum:
✓	Section H.2.f			(a) Allowable particle size distribution, Atterberg limits, shrinkage limit;
✓	Section H.2.f			(b) Placement moisture and dry density criteria;
✓	Section H.2.f			(c) Maximum laboratory-determined saturated hydraulic conductivity using simulated leachate;
✓	Section H.2.f			(d) Minimum thickness of soil liner;
✓	Section H.2.f			(e) Lift thickness;
✓	Section H.2.f			(f) Surface preparation (scarification);
✓	Section H.2.f			(g) Type and percentage of clay mineral within the soil component;
	Section H.2.f	✓		(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)
✓	Section H.3.a.1			(1) Constructed of materials chemically resistant to the waste and leachate;
✓	Section H.3.a.2			(2) Have sufficient mechanical properties to prevent collapse under pressure;
✓	Section H.3.a.3			(3) Have granular material or synthetic geotextile to prevent clogging;
✓	Section H.3.a.4			(4) Have method for testing and cleaning clogged pipes or contingent designs for rerouting leachate around failed areas;

S	LOCATION	N/A	N/C	PART H CONTINUED
				b. Primary LCRS requirements; (62-701.400(4)(b),FAC)
✓	Section H.3.b			(1) Bottom 12 inches having hydraulic conductivity $\geq$ 1 x 10^{-3} cm/sec;
✓	Section H.3.b			(2) Total thickness of 24 inches of material chemically resistant to the waste and leachate;
✓	Section H.3.b			(3) Bottom slope design to accomodate for predicted settlement;
✓	Section H.3.b			(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)
✓	Section H.4			a. Describe general procedures for recirculating leachate;
✓	Section H.4			b. Describe procedures for controlling leachate runoff and minimizing mixing of leachate runoff with storm water;
✓	Section H.4			c. Describe procedures for preventing perched water conditions and gas buildup;
✓	Section H.4			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;
✓	Section H.4			e. Describe methods of gas management in accordance with Rule 62-701.530, FAC;
✓	Section H.4			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)
	Section H.5.a	✓		(1) Documentation that the design of the bottom liner will not be adversely impacted by fluctuations of the ground water;
	Section H.5.a	✓		(2) Designed in segments to allow for inspection and repair as needed without interruption of service;
				(3) General design requirements;
	Section H.5.a	✓		(a) Double liner system consisting of an upper and lower 60-mil minimum thickness geomembrane;
	Section H.5.a	✓		(b) Leak detection and collection system with hydraulic conductivity $\geq$ 1 cm/sec;
	Section H.5.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;
	Section H.5.a	✓		(d) Design calculation to predict potential leakage through the upper liner;
	Section H.5.a	✓		(e) Daily inspection requirements and notification and corrective action requirements if leakage rates exceed that predicted by design calculations;
	Section H.5.a	✓		(4) Description of procedures to prevent uplift, if applicable;
	Section H.5.a	✓		(5) Design calculations to demonstrate minimum two feet of freeboard will be maintained;
	Section H.5.a	✓		(6) Procedures for controlling disease vectors and off-site odors.

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

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

S	LOCATION	N/A	N/C
✓	Section H.6		
✓	Section H.7		
✓	Section H.7		
✓	Section H.7		
✓	Section H.8.a		
✓	Section H.8.b		
✓	Section H.8.c.		
✓	Section H.9		
	Section H.10	✓	

PART H CONTINUED

b. An independent laboratory experienced in the testing of geosynthetics to perform required testing;

7. Soil Liner CQA (62-701.400(8)FAC)

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;

b. Description of field test section construction and test methods to be implemented prior to liner installation;

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)

a. Provide a copy of a Department permit for stormwater control or documentation that no such permit is required;

b. Design of surface water management system to isolate surface water from waste filled areas and to control stormwater run-off;

c. Details of stormwater control design including retention ponds, detention ponds, and drainage ways;

9. Gas control systems; (62-701.400(10),FAC)

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 I.1.a		✓	a.	Regional and site specific geology and hydrogeology;
	Section I.1.b		✓	b.	Direction and rate of ground water and surface water flow including seasonal variations;
	Section I.1.c		✓	c.	Background quality of ground water and surface water;
	Section I.1.d		✓	d.	Any on-site hydraulic connections between aquifers;
	Section I.1.e		✓	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 I.1.f		✓	f.	Description of topography, soil types and surface water drainage systems;
✓	Section I.1.g			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;
	Section I.1.h		✓	h.	Identify and locate any existing contaminated areas on the site;
	Section I.1.i		✓	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 I.2		✓	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 J.1.a		✓	a.	Description of subsurface conditions including soil stratigraphy and ground water table conditions;
	Section J.1.b		✓	b.	Investigate for the presence of muck, previously filled areas, soft ground, lineaments and sink holes;
	Section J.1.c		✓	c.	Estimates of average and maximum high water table across the site;
				d.	Foundation analysis including:
	Section J.1.d.1		✓	(1)	Foundation bearing capacity analysis;
	Section J.1.d.2		✓	(2)	Total and differential subgrade settlement analysis;
	Section J.1.d.3		✓	(3)	Slope stability analysis;
	Section J.1.e		✓	e.	Description of methods used in the investigation and includes soil boring logs, laboratory results, analytical calculations, cross sections, interpretations and conclusions;
	Section I.1.f		✓	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 J.2		✓	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		
	Section K	✓		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;
	Section K	✓		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 K	✓		3.	Provide foundation and settlement analysis for the vertical expansion;
	Section K	✓		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 K	✓		5.	Minimum stability safety factor of 1.5 for the lining system component interface stability and deep stability;
	Section K	✓		6.	Provide documentation to show the surface water management system will not be adversely affected by the vertical expansion;
	Section K	✓		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 L.1			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 L.2.a		✓	a.	Designating responsible operating and maintenance personnel;
✓	Section L.2.b			b.	Contingency operations for emergencies;
	Section L.2.c		✓	c.	Controlling types of waste received at the landfill;
	Section L.2.d		✓	d.	Weighing incoming waste;
	Section L.2.e		✓	e.	Vehicle traffic control and unloading;
✓	Section L.2.f			f.	Method and sequence of filling waste;
✓	Section L.2.g			g.	Waste compaction and application of cover;
	Section L.2.h		✓	h.	Operations of gas, leachate, and stormwater controls;
	Section L.2.i		✓	i.	Water quality monitoring.
	Section L.2.j		✓	j.	Maintaining and cleaning the leachate collection system;
	Section L.3		✓	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 L.4		✓	4.	Describe the waste records that will be compiled monthly and provided to the Department quarterly; (62-701.500(4),FAC)
	Section L.5		✓	5.	Describe methods of access control; (62-701.500(5),FAC)
	Section L.6		✓	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 L.7.a		✓	a.	Waste layer thickness and compaction frequencies;

S	LOCATION	N/A	N/C		PART L CONTINUED
	Section L.7.b		✓	b.	Special considerations for first layer of waste placed above liner and leachate collection system;
	Section L.7.c		✓	c.	Slopes of cell working face and side grades above land surface, planned lift depths during operation;
	Section L.7.d		✓	d.	Maximum width of working face;
				e.	Description of type of initial cover to be used at the facility that controls:
✓	Section L.7.e			(1)	Disease vector breeding/animal attraction
✓	Section L.7.e			(2)	Fires
✓	Section L.7.e			(3)	Odors
✓	Section L.7.e			(4)	Blowing litter
✓	Section L.7.e			(5)	Moisture infiltration
	Section L.7.f		✓	f.	Procedures for applying initial cover including minimum cover frequencies;
	Section L.7.g		✓	g.	Procedures for applying intermediate cover;
	Section L.7.h		✓	h.	Time frames for applying final cover;
	Section L.7.i		✓	i.	Procedures for controlling scavenging and salvaging.
	Section L.7.j		✓	j.	Description of litter policing methods;
	Section L.7.k		✓	k.	Erosion control procedures.
				8.	Describe operational procedures for leachate management including; (62-701.500(8),FAC)
✓	Section L.8.a			a.	Leachate level monitoring, sampling, analysis and data results submitted to the Department;
	Section L.8.b		✓	b.	Operation and maintenance of leachate collection and removal system, and treatment as required;
	Section L.8.c		✓	c.	Procedures for managing leachate if it becomes regulated as a hazardous waste;
	Section L.8.d		✓	d.	Agreements for off-site discharge and treatment of leachate;
✓	Section L.8.e			e.	Contingency plan for managing leachate during emergencies or equipment problems;

S	LOCATION	N/A	N/C		PART L CONTINUED
	Section L.8.f		✓	f.	Procedures for recording quantities of leachate generated in gal/day and including this in the operating record;
	Section L.8.g		✓	g.	Procedures for comparing precipitation experienced at the landfill with leachate generation rates and including this information in the operating record;
	Section L.8.h		✓	h.	Procedures for water pressure cleaning or video inspecting leachate collection systems.
	Section L.9		✓	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 L.10			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 L.11.a		✓	a.	Sufficient equipment for excavating, spreading, compacting and covering waste;
	Section L.11.b		✓	b.	Reserve equipment or arrangements to obtain additional equipment within 24 hours of breakdown;
	Section L.11.c		✓	c.	Communications equipment;
	Section L.11.d		✓	d.	Dust control methods;
	Section L.11.e		✓	e.	Fire protection capabilities and procedures for notifying local fire department authorities in emergencies;
	Section L.11.f		✓	f.	Litter control devices;
	Section L.11.g		✓	g.	Signs indicating operating authority, traffic flow, hours of operation, disposal restrictions.
	Section L.12		✓	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)
	Section L.13		✓	13.	Additional record keeping and reporting requirements; (62-701.500(13),FAC)

S	LOCATION	N/A	N/C	PART L CONTINUED
	Section L.13.a		✓	a. Records used for developing permit applications and supplemental information maintained for the design period of the landfill;
	Section L.13.b		✓	b. Monitoring information, calibration and maintenance records, copies of reports required by permit maintained for at least 10 years;
✓	Section L.13.c			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 L.13.d		✓	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 M.1			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 M.1.a			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 M.1.b			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 M.1.c.1		✓	(1)	Detection wells located downgradient from and within 50 feet of disposal units;
	Section M.1.c.2		✓	(2)	Downgradient compliance wells as required;
	Section M.1.c.3		✓	(3)	Background wells screened in all aquifers below the landfill that may be affected by the landfill;
	Section M.1.c4		✓	(4)	Location information for each monitoring well;
	Section M.1.c.5		✓	(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 M.1.c.6		✓	(6)	Well screen locations properly selected;
	Section M.1.c7		✓	(7)	Procedures for properly abandoning monitoring wells;
	Section M.1.c8	✓		(8)	Detailed description of detection sensors if proposed.

S	LOCATION	N/A	N/C		PART M CONTINUED
				d.	Surface water monitoring requirements; (62-701.510(4),FAC)
	Section M.1.d		✓		(1) Location of and justification for all proposed surface water monitoring points;
	Section M.1.d		✓		(2) Each monitoring location to be marked and its position determined by a registered Florida land surveyor;
✓	Section M.1.e			e.	Leachate sampling locations proposed; (62-701.510(5),FAC)
				f.	Initial and routine sampling frequency and requirements; (62-701.510(6),FAC)
	Section M.1.f.1		✓		(1) Initial background ground water and surface water sampling and analysis requirements;
	Section M.1.f.2		✓		(2) Routine leachate sampling and analysis requirements;
	Section M.1.f.3		✓		(3) Routine monitoring well sampling and analysis requirements;
	Section M.1.f.4		✓		(4) Routine surface water sampling and analysis requirements.
	Section M.1.g		✓	g.	Describe procedures for implementing evaluation monitoring, prevention measures and corrective action as required; (62-701.510(7),FAC)
	Section M.1.h		✓	h.	Water quality monitoring report requirements; (62-701.510(9),FAC)
	Section M.1.h1		✓		(1) Semi-annual report requirements;
	Section M.1.h2		✓		(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		
	Section N.1	✓		1.	Describe procedures for managing motor vehicles; (62-701.520(1),FAC)
	Section N.2	✓		2.	Describe procedures for landfilling shredded waste; (62-701.520(2),FAC)
	Section N.3 .		✓	3.	Describe procedures for asbestos waste disposal; (62-701.520(3),FAC)
	Section N.4		✓	4.	Describe procedures for disposal or management of contaminated soil; (62-701.520(4), FAC)
	Section N.5		✓	5.	Describe procedures for disposal of biological wastes; (62-701.520(5), FAC)

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

S	LOCATION	N/A	N/C		
				1.	Provide the design for a gas management systems that will (62-701.530(1), FAC):
	Section O.1.a	✓		a.	Be designed to prevent concentrations of combustible gases from exceeding 25% the LEL in structures and 100% the LEL at the property boundary;
	Section O.1.b	✓		b.	Be designed for site-specific conditions;
	Section O.1.c	✓		c.	Be designed to reduce gas pressure in the interior of the landfill;
	Section O.1.d	✓		d.	Be designed to not interfere with the liner, leachate control system or final cover.
	Section O.2		✓	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):
	Section O.3		✓	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):
	Section O.4	✓		a.	Information required in Rules 62-701.320(7) and 62-701.330(3), FAC supplied;
	Section O.4	✓		b.	Information required in Rule 62-701.600(4), FAC supplied where relevant and practical;
	Section O.4	✓		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		
	Section O.4	✓		d.	Description of procedures for condensate sampling, analyzing and data reporting provided;

	Section O.4	✓		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 O.4	✓		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 P.1.a			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 P.1.b			b.	Notice to user requirements within 120 days of final receipt of wastes;
✓	Section P.1.c			c.	Notice to public requirements within 10 days of final receipt of wastes.

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

✓	Section P.2.a			a.	Application submitted to Department at least 90 days prior to final receipt of wastes;
				b.	Closure plan shall include the following:
✓	Section P.2.b			(1)	Closure report;
✓	Section P.2.b			(2)	Closure design plan;
✓	Section P.2.b			(3)	Closure operation plan;
✓	Section P.2.b			(4)	Closure procedures;
✓	Section P.2.b			(5)	Plan for long term care;
✓	Section P.2.b			(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 P.3.a			(1)	Identification of landfill;

S	LOCATION	N/A	N/C	PART P CONTINUED
✓	Section P.3.a			(2) Location, description and vicinity map;
✓	Section P.3.a			(3) Total acres of disposal areas and landfill property;
✓	Section P.3.a			(4) Legal property description;
✓	Section P.3.a			(5) History of landfill;
✓	Section P.3.a			(6) Identification of types of waste disposed of at the landfill.
✓	Section P.3.b			b. Geotechnical investigation report and water quality monitoring plan required by Rule 62-701.330(3),FAC;
✓	Section P.3.c			c. Land use information report indicating: identification of adjacent landowners; zoning; present land uses; and roads, highways right-of-way, or easements.
✓	Section P.3.d			d. Report on actual or potential gas migration at landfills containing degradable wastes which would allow migration of gas off the landfill property;
✓	Section P.3.e			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)
✓	Section P.4			a. Plan sheet showing phases of site closing;
✓	Section P.4			b. Drawings showing existing topography and proposed final grades;
✓	Section P.4			c. Provisions to close units when they reach approved design dimensions;
✓	Section P.4			d. Final elevations before settlement;
✓	Section P.4			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 P.4			(1) CQA plan for installing and testing final cover;

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

S	LOCATION	N/A	N/C		PART P CONTINUED
✓	Section P.5				e. Development and implementation of the water quality monitoring plan required in Rule 62-701.510, FAC.
✓	Section P.5				f. Development and implementation of gas management system required in Rule 62-701.530, FAC.
✓	Section P.6			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 Q.1	✓		1.	Survey monuments; (62-701.610(2),FAC)
✓	Section Q.2			2.	Final survey report; (62-701.610(3),FAC)
✓	Section Q.3			3.	Certification of closure construction completion; (62-701.610(4),FAC)
✓	Section Q.4			4.	Declaration to the public; (62-701.610(5),FAC)
✓	Section Q.5			5.	Official date of closing; (62-701.610(6),FAC)
✓	Section Q.6			6.	Use of closed landfill areas; (62-701.610(7),FAC)
✓	Section Q.7			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 R.1		✓	1.	Maintaining the gas collection and monitoring system; (62-701.620(5), FAC)
	Section R.2		✓	2.	Right of property access requirements; (62-701.620(6),FAC)
	Section R.3		✓	3.	Successors of interest requirements; (62-701.620(7),FAC)
	Section R.4		✓	4.	Requirements for replacement of monitoring devices; (62-701.620(9),FAC)
	Section R.5	✓		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		
✓	Section S.1			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).
✓	Section S.2			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).
✓	Section S.3			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 Citrus County Board of County Commissioners is aware that statements made in this form and attached information are an application for a Construction 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.

Susan J Metcalfe
Signature of Applicant or Agent

Susan J. Metcalfe, Director, Division of S.W. Mgmt.
Name and Title (please type)

susan.metcalfe@bocc.citrus.fl.us
E-Mail address (if available)

P.O. Box 340
Mailing Address

Lecanto, Florida 34460
City, State, Zip Code

(352) 527-7671
Telephone Number

Date: 10/15/08

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.

[signature] 12/9/08
Signature

Dominique Bramlett, PE (Senior Project Engr)
Name and Title (please type)

61829
Florida Registration Number
(please affix seal)

SCS Engineers
4041 Park Oaks Blvd, Suite 100
Mailing Address

Tampa, FL 33610
City, State, Zip Code

dbramlett@scsengineers.com
E-Mail address (if available)

(813) 621-0080
Telephone Number

Date: 12/9/08

DEP FORM 62-701.900(1)
Effective 05-27-01

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Tables & Figures

SECTION A

GENERAL INFORMATION

This report presents information supporting the application to construct a new Class I landfill cell (i.e., Phase 3) at the Citrus County Central Landfill in Citrus County, Florida. The Citrus County Central landfill is owned and operated by the Citrus County Board of County Commissioners (BOCC) under Florida Department of Environmental Protection (FDEP) Permit Number 21375-008-SO/01.

SCS Engineers (SCS) prepared this Construction Permit Application in accordance with applicable sections of Rule 62-701 Florida Administrative Code (F.A.C.) on behalf of Citrus County Board of County Commissioners (County). This Construction Permit Application is divided into sections following the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1).

The information required for Section A - General Information and Section B - Disposal Facility General Information of the State of Florida Department of Environmental Protection Application for a Permit to Construction, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1) has been included on the Form which is attached at the beginning of this permit application report. Section C - Non-Disposal Facility General Information of the State of Florida Department of Environmental Protection Application for a Permit to Construction, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1) is not applicable to the Construction Permit Application to construct a new cell (i.e., Phase 3) and has been indicated on the Form.

A.1 SITE LOCATION

The Citrus County Central Landfill is located on S.R. 44, 3 miles east of Lecanto, Citrus County, Florida. The site property lies within Section 1, Township 19 South, and Range 18 East in Citrus County, Florida. The main entrance of the Citrus County Central Landfill facility is located at latitude 28°51'08", longitude 82°26'38".

SECTION B

DISPOSAL FACILITY GENERAL INFORMATION

The County's permitted Class I landfill (Phase 1 and 1A, and Phase 2), currently occupies approximately 26 acres. The proposed Phase 3 cell is a lateral expansion from Phase 2. When the Phase 3 cell is operational, the total landfill area will be increased by approximately 6.2 acres, for a total of 32 acres.

The County currently collects leachate from a lined area of approximately 7 acres of the old, 60-acre landfill site, and the active lined 26-acre new landfill described above. The County does not anticipate any changes in this management plan once the new Phase 3 cell is operational.

The Phase 3 cell will be comprised of a double liner as follows and as detailed in the lining System Detail of the Construction Permit Application Drawings located in Attachment F-1 (from bottom up):

- Prepared sub-base comprised of compacted soils free of sharp materials.
- Geosynthetic Clay Liner (GCL) (bottom of cell only).
- 60-mil HDPE textured on both sides geomembrane liner (secondary liner).
- 250-mil bi-planar geocomposite drainage layer (secondary geocomposite).
- 60-mil HDPE textured on both sides geomembrane liner (primary liner).
- 300-mil tri-planar geocomposite drainage layer (primary geocomposite).
- 24-inch thick layer of protective sand (bottom of cell only).
- Geogrid (sideslopes only)
- Scrim reinforced raincoat (sideslopes and 2/3 of cell bottom).

It should be noted that the liner profile is similar to that of Phase 2, GCL (as opposed to clay) and a double sided bi-planar geocomposite (as opposed to a tri-planar geocomposite) for the secondary leachate collection system, and a tri-planar layer will overlay the bi-planar layer in the trench are the only differences from Phase 2. Geo-grid will be added to the bottom liner sequence on the side slopes. A scrim reinforced cell cover will be included over approximately two-thirds of the Phase 3 cell liner system as the top layer of the system.

The tri-planar geocomposite will be used to convey leachate generated above the primary liner to a perforated collection pipe that covers the length of the cell and discharges into a double-lined holding sump. A bi-planar geocomposite will also convey leakage through the secondary liner in the detection zone to the sump. Leachate will be pumped from the Phase 3 sump to the storage tank then to the treatment plant.

The existing leachate treatment plant is operated as an advanced two-stage process, with aerobic organic reduction and nitrification in the first stage, and anoxic denitrification in the second stage. Treated effluent is discharged to two on-site percolation basins. The treatment plant has available capacity and will not need modifications to handle the increased leachate flow contributed by Phase 3. No off-site discharge of leachate is anticipated.

Stormwater runoff from the active landfill is collected in ditches and discharged to an on-site percolation/retention basin. Future clean stormwater runoff generated from the Phase 3 expansion will be handled in the same manner. No off-site discharges of stormwater are anticipated.

SECTION C

NON-DISPOSAL FACILITY GENERAL INFORMATION

Section C does not apply to the Citrus County Central Landfill Construction Permit Application and is designated as "Not Applicable" on the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the beginning of this permit application report.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DEC 10 2003
SOUTHWEST DISTRICT TAMPA

SECTION D

PROHIBITIONS

D.1 SITING CRITERIA

There are eight siting restrictions listed in Rule 62-701.300(2).

- Per Rule 62-701.300(2)(a), F.A.C. several geotechnical investigations have been performed at the area of the Citrus County Landfill. The purposes of the geotechnical investigations were to characterize the subsurface soils and to evaluate the material properties of the soils. The geotechnical investigations included field and laboratory testing. Based on the results of the geotechnical investigations, it has been determined that there are no geologic formations or other subsurface features that would prevent development of the site for landfill purposes. The geotechnical investigations that were performed were included in Section J of the Construction Permit Application for Phase 2.

- Per Rule 62-701.300(2)(b), F.A.C. solid waste is not disposed within 500 feet of an existing water well nor is it proposed as a component of the Phase 3 disposal area. Potable water well is defined under Rule 62-701.200(93), F.A.C. as any excavation that is drilled or bored, or converted from a non-potable water use, when the intended use of such excavation is for the location and acquisition of groundwater which supplies water for human consumption.

- Per Rule 62-701.300(2)(c), F.A.C. solid waste is not disposed within a dewatered pit nor is it proposed as a component of the development of the Phase 3 disposal area.

- Per Rule 62-701.300(2)(d), F.A.C. solid waste is not disposed within, or is proposed to be disposed within, areas of the Citrus County Central Landfill that is subject to periodic flooding. The proposed Phase 3 disposal area is outside of the area designated as a 100-year flood plain.

- Per Rule 62-701.300(2)(e), F.A.C. the storage or disposal of solid waste in any body of water either natural, artificial, or groundwater, is not proposed as a component of the development of the Phase 3 disposal area.

- Per Rule 62-701.300(2)(f), F.A.C. solid waste is not stored or disposed, nor is it proposed to be, within 200 feet of a body of water which is not completely contained within the property boundaries of the Citrus County Central Landfill. For the purposes of this paragraph this includes wetlands within the jurisdiction of the Department, but does not include impoundments or conveyances which are part of an onsite permitted surface water management system.

- Per Rule 62-701.300(2)(g), F.A.C., Citrus County Central Landfill is located entirely on property leased by the Board of County Commissioners (BOCC). The landfill is not on any public highways, roads, or alleys.

- Per Rule 62-701.300(2)(h), F.A.C. there are no potable water wells serving a community water supply located within 1,000 feet of the Citrus County Central Landfill. A community water supply is defined under Rule 62-550.200(12), F.A.C. as a public water system which serves at least 15 service connections used by year round residents or regularly serves at least 25 year round residents.

D.2 EXEMPTIONS

There are five general exemptions contained in Rules 62-701.300(12) through (16), FAC. Paragraph (12) applies to yard trash. Yard trash is not accepted for disposal in the Class I cell and this exemption does not apply to the landfill expansion project described in this permit application. Paragraph (13) applies to waste stored in tanks. This exemption does not apply to the landfill expansion project described in this permit application. Paragraph (14) applies to waste stored indoors. This exemption does not apply to the landfill expansion project described in this permit application. Paragraph (15) applies to storage in vehicles, which does not apply to the landfill. Paragraph (16) relates to existing facilities. Phase 1 was permitted prior to May 27, 2001, and remains subject to the prohibitions that were in effect at the time the construction permit was issued.

D.3 BURNING

The County does not burn waste at the landfill. The burning of solid waste is not proposed as a component of the development of the Citrus County Central Landfill in accordance with Rule 62-701.300(3), F.A.C.

D.4 HAZARDOUS WASTE

Hazardous waste is not knowingly disposed of at the Citrus County Central Landfill in accordance with Rule 62-701.300(4), F.A.C. Hazardous material will be defined as indicated in the policies, procedures, and guidelines as outlined in the Operations Plan for the Citrus County Central Landfill included as Attachment L-1 to this Construction Permit Application.

D.5 PCB DISPOSAL

Polychlorinated biphenyls (PCB's) or liquids containing a PCB concentration of 50 parts per million or greater, or non-liquid PCB's at concentrations of 50 parts per million or greater in the form of contaminated soil, rags, or other debris are not accepted for disposal at the Citrus County Central Landfill in accordance with Rule 62-701.300(5), F.A.C.

D.6 BIOMEDICAL WASTE

In accordance with Rule 62-701.300(6), F.A.C., biomedical waste is not accepted for disposal in the proposed Phase 3 disposal area except for waste that has been properly incinerated. Biomedical waste generated by individuals performing self-care at home is included in the household waste placed in the proposed Phase 3 disposal area.

D.7 CLASS I SURFACE WATERS

The Citrus County Central Landfill is not located within 3,000 feet of Class I surface waters.

D.8 SPECIAL WASTE

Per Rule 62-701.300(8), F.A.C. the Citrus County Central Landfill shall not accept the following special wastes for disposal:

i. Lead-acid batteries,
ii. Used oil,
iii. Yard trash,
iv. White goods, and
v. Whole waste tires.

The procedures to be followed by the Citrus County Central Landfill personnel in preventing the unloading of these materials in the waste disposal unit at the Citrus County Central Landfill are described in the facility Operations Plan included as Attachment L-1 to this Construction Permit Application.

D.9 WASTE-TO-ENERGY FACILITIES RESTRICTIONS

Per Rule 62-701.300(9), F.A.C. this prohibition is not applicable since the Citrus County Central Landfill does not include a waste-to-energy facility. It has been designated as "Not Applicable" on the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the beginning of this permit application report.

D.10 LIQUIDS

Per Rule 62-701.300(10)(a), F.A.C. noncontainerized liquid waste will not be accepted for disposal at the Citrus County Central Landfill. The procedures to be followed personnel in preventing the unloading of these materials in the waste disposal unit at the Citrus County Central Landfill are described in the facility Operations Plan included as Attachment L-1 to this Construction/Operation Permit renewal application.

Per Rule 62-701.300(10)(b), F.A.C. containers holding liquid waste will not be accepted for disposal at the Citrus County Central Landfill. The procedures to be followed by personnel in preventing the unloading of these materials in the waste disposal unit at the Citrus County Central Landfill are described in the facility Operations Plan included as Attachment L-1 to this Construction/Operation Permit renewal application.

Only those containers and tanks meeting the requirements of Rule 62-701.300(10)(c), F.A.C. will be accepted for disposal at the Citrus County Central Landfill.

D.11 USED OIL

Per Rule 62-701.300(11)(a), F.A.C. used oil, either commingled or mixed with solid waste, will not be accepted for disposal at the Citrus County Central Landfill.

Only oily wastes, sorbents, or other materials used for maintenance or to clean up or contain leaks, spills, or accidental releases of oil may be disposed of in the Citrus County Central Landfill per Rule 62-701.300(11)(b), F.A.C.

SECTION E

GENERAL REQUIREMENTS

E.1 APPLICATION FORM AND SUPPORTING DOCUMENTS

In accordance with Rule 62-701.320(5)(a), F.A.C. four copies of the completed State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the beginning of this permit application report, including all supporting data are included as part of this Construction Permit Application.

E.2 ENGINEERING CERTIFICATION

Part T of the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1) has been signed and sealed by Dominique H. Bramlett, P.E., a registered Professional Engineer in the State of Florida (License No. 61829) together will all other applicable engineering plans, reports and supporting information for the application herein as required by Rule 62-701.320(6), F.A.C.

E.3 TRANSMITTAL LETTER

A transmittal letter is included at the front of this application as required by Rule 62-701.320(7)(a), F.A.C.

E.4 APPLICATION FORMS

The State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1) DEP Form No. 62-701.900(1) is included in this submittal as required by Rule 62-701.320(7)(b), F.A.C.

E.5 PERMIT FEE

In accordance with Rule 62-701.320(7)(c), F.A.C., a check in the amount of $10,000.00 for the permit application fee for the construction permit, payable to FDEP, is submitted with this application.

E.6 ENGINEERING REPORT

This document with supporting Figures, Tables, and Attachments meets the requirements of an Engineering Report as required by Rule 62-701.320(7)(d), FAC.

E.7 OPERATION PLAN AND CLOSURE PLAN

Per Rule 62-701.320(7)(e)1, F.A.C the Operation Plan is outlined in Section L. A new Operations Plan was submitted with the RAI#1 dated July 24, 2008, Operations Permit Modification for the closed 7-acre Landfill Pending Permit No.: 21375-012-SO/MM~~, will also apply to the Phase 3 Expansion Area~~. The Operations Plan will be updated with the Operation Permit Renewal to include Operations of Phase 3.The Closure Plan is discussed in Section P of this Construction Permit Application for the Citrus County Central Landfill.

E.8 CONTINGENCY PLAN

A new Contingency Plan is provided as Appendix A of the Operations Plan located in Attachment L-1.

E.9 DRAWINGS

Design Drawings for the construction of the Phase 3 expansion are included in Attachment F-1.

a. A regional map with the project location is included in the Construction Permit Application drawings (Attachment F-1).

b. An aerial photograph no more than one year old is included in the Construction Permit Application drawings (Attachment F-1).

c. There are no changes to the previously submitted Site Plan certified by a registered Florida Land Surveyor showing all property boundaries for the Citrus County Central Landfill.

d. Engineering details necessary for this Construction Permit Application are shown on the Construction Permit Application drawings (Attachment F-1).

E.10 PROOF OF OWNERSHIP

The Citrus County Landfill is owned and operated by the Citrus County Board of County Commissioners. A copy of the lease extending the property area is also included in Attachment E-3.

E.11 RECYCLING GOALS

This landfill expansion does not influence the achievement of the County's recycling goals. Therefore, there is no change to the recycling program previously provided to FDEP.

E.12 ENFORCEMENT HISTORY

Based on a letter received from FDEP dated July 22, 2005, all of the terms and conditions of the Consent Agreement Order OGC Case No.05-1078 between Citrus County Board of County Commissioners and the Department, for exceedances of groundwater standards and landfill gas criteria at the Citrus County Central Class I and Closed Class I Landfills, were complied with and FDEP closed its case on the matter. At this time, there are no FDEP enforcement actions against the County for violation of statutes, rules, orders, or permit conditions for the Citrus County Class I and Closed Class I Landfills pertaining to solid waste activities.

The County cooperates fully with respect to FDEP requests or notations regarding construction, operation, and maintenance of the facility. Any errors or omissions are not to be construed as a misrepresentation of the facts.

E.13 PROOF OF PUBLICATION

To comply with Rule 62-701.320(8)(a), FAC, the County published a Notice of Application within 14 days after filing the application. Proof of publication is included in Attachment E-4.

E.14 AIRPORT SAFETY

The Citrus County Central Landfill is not located within five miles of any licensed airports. Therefore, the requirements of Rule 62-701.320(13)(c), notification of the Federal Aviation Administration, does not apply.

E.15 OPERATOR TRAINING

In accordance with Rule 62-701.320(15), F.A.C. key supervisory staff at the Citrus County Central Landfill has received Landfill Operator Certification Training. Operator training certificates and hours completed for the individuals are provided in Attachment E-2 within this application.

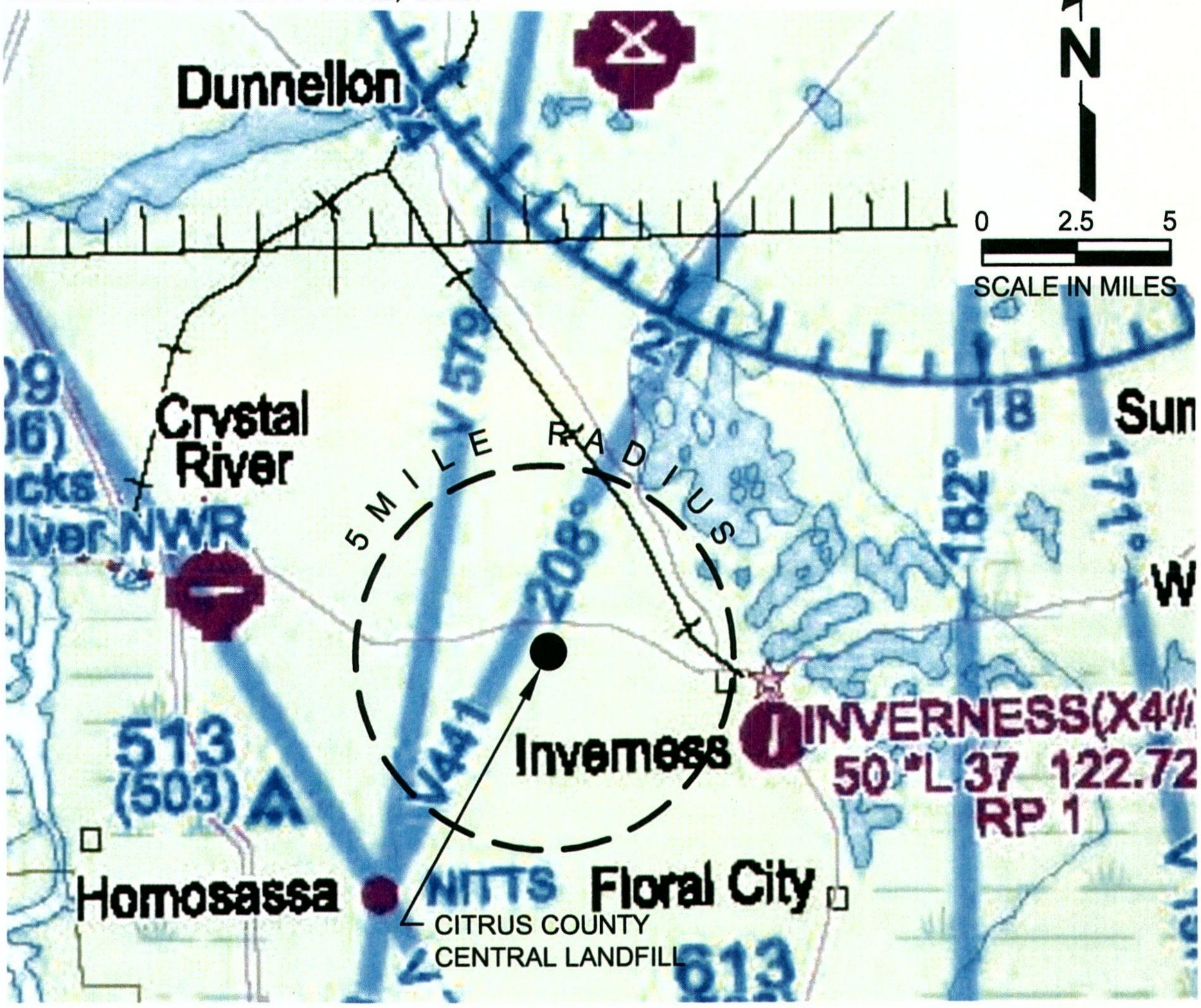
As required by Rule 62-701.320(15), F.A.C. a State-certified Landfill Operator will be onsite when waste is received for disposal at the Citrus County Central Landfill and a trained spotter will be onsite during all times when waste is deposited at the landfill working face to detect unauthorized wastes. In addition, the equipment operators have sufficient training and knowledge to move waste and soil, and to develop the site in accordance with the design and operational standards described in this application.

Operator training includes a 24-hour course and 16 hours of continuing education every three years. Spotter training includes an 8-hour course and 4 hours of continuing education every three years. Operator and spotter training courses will be attended as offered by the University of Florida Center for Training, Research and Education for Environmental Occupations (TREEO) and through other FDEP approved sources. A listing of TREEO training courses and schedules is available at www.treeo.ufl.edu.

ATTACHMENT E-1

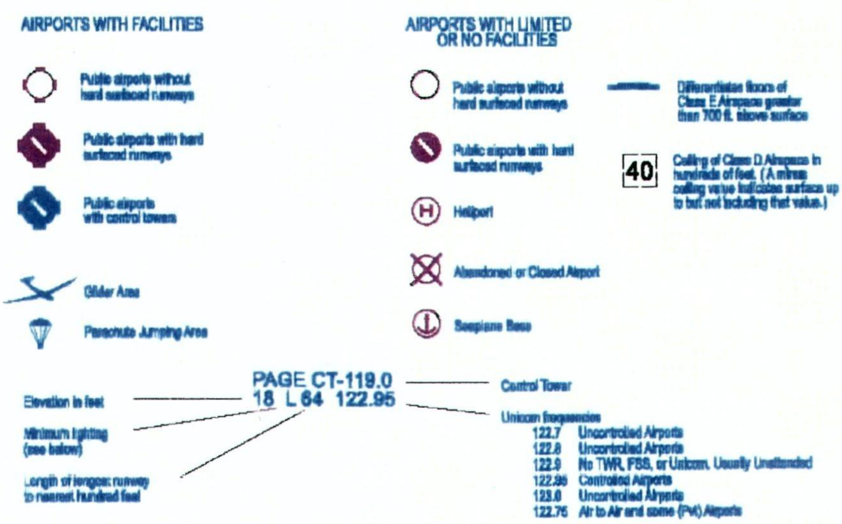
FIGURE E-1. AIRPORTS WITHIN FIVE MILES OF CITRUS COUNTY CENTRAL LANDFILL

SOURCE:
JACKSONVILLE SECTIONAL AERONAUTICAL CHART, 74TH EDITION, BY THE U.S. DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION NATIONAL AERONAUTICAL CHARTING OFFICE, 2008.



LEGEND

Airports having CONTROL TOWERS (Airport Traffic Areas) are shown in blue, all others are magenta.



SCS ENGINEERS

Figure E–1. Airports Within Five Miles of Citrus County Central Landfill

ATTACHMENT E-2

TRAINING CERTIFICATES

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:15 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Bowen, Norman
Solid Waste Technician
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 08/24/2004 - 08/23/2010**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **08/24/2004 - 08/23/2007 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	08/24/2004	Initial
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
263	Spotter Refresher 4-hour Training for Solid Waste Facilities		07/25/2007	4
			Total:	6

Period: **08/24/2007 - 08/23/2010**
No courses taken

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:16 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Bruno, Carmen C.
Customer Service Crew Leader
Citrus County Solid Waste
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670 ext: 4693
Fax: (352) 527-7672

Track: "**Class I, II, III Landfill Operator 09/13/2002 - 09/12/2011**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
256	Waste Screening & Identification for Landfill Operations and Spotters Refresher	Citrus County - Hazardous Material Section	08/29/2002	4
			Total:	Prior

Period: **09/13/2002 - 09/12/2005 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
160	SWANA-Manager of Landfill Operations (MOLO) Course and Exam	University of Florida - TREEO	09/13/2002	Initial
267	FDEP DOT 4-Hour Awareness Training [5/5/03, 12/04]	Florida Department of Environmental Protection (SQG)	05/05/2003	2
226	FDEP Annual SQG Assessment, Notification & Verification Program Workshop [5/20-21/02]	Florida Department of Environmental Protection (SQG)	05/06/2003	5
265	FDEP HHW & Conditionally Exempt SQG [5/7-8/03]	Florida Department of Environmental Protection (SQG)	05/08/2003	5
268	FDEP HHW Facility Design [5/9/03]	Florida Department of Environmental Protection (SQG)	05/09/2003	4
125	Management of Leachate, Gas, Stormwater and Odor at Class I, II, and III Landfills	Kohl Consulting, Inc.	10/07/2003	8
13	Train-the-Trainer For Environmental Occupations	University of Florida - TREEO	12/19/2003	7
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	01/22/2004	8
348	Wood Waste Recycling Conference 2004	Recycle Florida Today, Inc	04/30/2004	6
286	Hazardous Materials Chemistry for the Non-Chemist	University of Florida - TREEO	10/25/2004	8
285	Chemical Compatibility and Storage	University of Florida - TREEO	10/26/2004	8
385	SWANA-FL 2005 Summer Conference	Solid Waste Association of North America (SWANA - Florida Chapter)	06/29/2005	8

4	Instructor for a SWANA MOLO Course	University of Florida - TREEO	07/29/2005	7
			Total:	76

Period: **09/13/2005 - 09/12/2008**

Course #	Course Name	Provider	Completion Date	Hours
425	SWANA-FL 2006 Spring Tri-State Conference [4/2-5/06]	Solid Waste Association of North America (SWANA - Florida Chapter)	04/05/2006	7
434	FDEP Household Hazardous Waste Workshop [5/1-3/06]	Florida Department of Environmental Protection	05/03/2006	5
457	Disaster Debris Management	American Society of Civil Engineers	02/15/2007	6
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
			Total:	20

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:16 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Bruno, Carmen C.
Customer Service Crew Leader
Citrus County Solid Waste
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670 ext: 4693
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 01/22/2004 - 01/21/2013**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
256	Waste Screening & Identification for Landfill Operations and Spotters Refresher	Citrus County - Hazardous Material Section	08/29/2002	4
160	SWANA-Manager of Landfill Operations (MOLO) Course and Exam	University of Florida - TREEO	09/13/2002	4
267	FDEP DOT 4-Hour Awareness Training [5/5/03, 12/04]	Florida Department of Environmental Protection (SQG)	05/05/2003	2
265	FDEP HHW & Conditionally Exempt SQG [5/7-8/03]	Florida Department of Environmental Protection (SQG)	05/08/2003	5
268	FDEP HHW Facility Design [5/9/03]	Florida Department of Environmental Protection (SQG)	05/09/2003	4
			Total:	Prior

Period: **01/22/2004 - 01/21/2007 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	01/22/2004	Initial
286	Hazardous Materials Chemistry for the Non-Chemist	University of Florida - TREEO	10/25/2004	8
285	Chemical Compatibility and Storage	University of Florida - TREEO	10/26/2004	4
385	SWANA-FL 2005 Summer Conference	Solid Waste Association of North America (SWANA - Florida Chapter)	06/29/2005	1
			Total:	13

Period: **01/22/2007 - 01/21/2010**

Course #	Course Name	Provider	Completion Date	Hours
457	Disaster Debris Management	American Society of Civil Engineers	02/15/2007	2
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2

Total: 4

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:49 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Carney, Owen D.
Recycling Coordinator
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670 ext: 4692
Fax: (352) 527-7672

Track: "**Class I, II, III Landfill Operator 05/11/2007 - 05/10/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		10/19/2006	8
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
286	Hazardous Materials Chemistry for the Non-Chemist		04/23/2007	8
			Total:	Prior

Period: **05/11/2007 - 05/10/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
442	Initial Training Course for Landfill Operators and C&D Sites - 24 Hour	University of Florida - TREEO	05/11/2007	Initial
443	Initial Training Course for Transfer Station Operators and Material Recovery Facilities - 16 Hour	University of Florida - TREEO	09/19/2007	12
			Total:	12

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:49 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Carney, Owen D.
Recycling Coordinator
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670 ext: 4692
Fax: (352) 527-7672

Track: "**Construction and Demolition Debris Landfill Operator 05/11/2007 - 05/10/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		10/19/2006	8
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
286	Hazardous Materials Chemistry for the Non-Chemist		04/23/2007	8
			Total:	Prior

Period: **05/11/2007 - 05/10/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
442	Initial Training Course for Landfill Operators and C&D Sites - 24 Hour	University of Florida - TREEO	05/11/2007	Initial
443	Initial Training Course for Transfer Station Operators and Material Recovery Facilities - 16 Hour	University of Florida - TREEO	09/19/2007	12
			Total:	12

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:49 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Carney, Owen D.
Recycling Coordinator
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670 ext: 4692
Fax: (352) 527-7672

Track: "**Material Recovery Facility Operator 09/19/2007 - 09/18/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		10/19/2006	8
286	Hazardous Materials Chemistry for the Non-Chemist		04/23/2007	8
442	Initial Training Course for Landfill Operators and C&D Sites - 24 Hour	University of Florida - TREEO	05/11/2007	8
			Total:	Prior

Period: **09/19/2007 - 09/18/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
443	Initial Training Course for Transfer Station Operators and Material Recovery Facilities - 16 Hour	University of Florida - TREEO	09/19/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:51 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Carney, Owen D.
Recycling Coordinator
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670 ext: 4692
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 10/19/2006 - 10/18/2012**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **10/19/2006 - 10/18/2009 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		10/19/2006	Initial
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
286	Hazardous Materials Chemistry for the Non-Chemist		04/23/2007	8
442	Initial Training Course for Landfill Operators and C&D Sites - 24 Hour	University of Florida - TREEO	05/11/2007	4
443	Initial Training Course for Transfer Station Operators and Material Recovery Facilities - 16 Hour	University of Florida - TREEO	09/19/2007	4
			Total:	18

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:52 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Carney, Owen D.
Recycling Coordinator
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670 ext: 4692
Fax: (352) 527-7672

Track: "**Transfer Station Operator 09/19/2007 - 09/18/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		10/19/2006	8
286	Hazardous Materials Chemistry for the Non-Chemist		04/23/2007	8
442	Initial Training Course for Landfill Operators and C&D Sites - 24 Hour	University of Florida - TREEO	05/11/2007	8
			Total:	Prior

Period: **09/19/2007 - 09/18/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
443	Initial Training Course for Transfer Station Operators and Material Recovery Facilities - 16 Hour	University of Florida - TREEO	09/19/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:35 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Davis, Paul
Citrus County Central Landfill
PO Box 340
Brooksville, FL 34614

Track: "**Spotter / Waste Screener 03/15/2007 - 03/14/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
			Total:	Prior

Period: **03/15/2007 - 03/14/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		03/15/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:36 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

DeVaughn, Prime
Landfill Crew Leader
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Class I, II, III Landfill Operator 11/19/1993 - 11/18/2011**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
21	Solid Waste Landfill Operator's Short School	Solid Waste Association of North America (SWANA - Florida Chapter)	11/16/1990	20
			Total:	Prior

Period: **11/19/1993 - 11/18/1996 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
21	Solid Waste Landfill Operator's Short School		11/19/1993	Initial
50	Hazardous Materials Awareness Training [1/25/94]	Citrus County - Hazardous Material Section	01/25/1994	8
52	17-701 & 17-703 Update [6/17/94]	Solid Waste Association of North America	06/17/1994	4
39	Stormwater Management for Landfills		05/16/1995	8
			Total:	20

Period: **11/19/1996 - 11/18/1999**

Course #	Course Name	Provider	Completion Date	Hours
124	Landfill Compaction Training School	Caterpilla & Ringhaver Equipment	10/06/1998	5
128	Method of Erosion and Sedimentation Control for Construction Sites	University of Florida - TREEO	10/27/1998	6
49	Landfill Gas and Leachate Systems	University of Florida - TREEO	10/20/1999	8
			Total:	19

Period: **11/19/1999 - 11/18/2002**

Course #	Course Name	Provider	Completion Date	Hours
124	Landfill Compaction Training School	Caterpilla & Ringhaver Equipment	10/12/2000	5
104	Permit Required Confined Space Entry	University of Florida - TREEO	06/27/2002	8

256	Waste Screening & Identification for Landfill Operations and Spotters Refresher	Citrus County - Hazardous Material Section	08/29/2002	4
223	Health and Safety Training for Landfill Operations OnLine	University of Florida - TREEO	10/02/2002	5
			Total:	22

Period: **11/19/2002 - 11/18/2005**

Course #	Course Name	Provider	Completion Date	Hours
125	Management of Leachate, Gas, Stormwater and Odor at Class I, II, and III Landfills	University of Florida - TREEO	10/07/2003	8
49	Landfill Gas and Leachate Systems	University of Florida - TREEO	11/20/2003	8
353	SWANA-FL 2004 Summer Conference [7/21-23/04]	Solid Waste Association of North America (SWANA - Florida Chapter)	07/23/2004	4
73	Wet Weather Operations	Kohl Consulting, Inc.	10/20/2004	4
49	Landfill Gas and Leachate Systems	SCS Engineers	11/20/2004	8
281	Health and Safety for Solid Waste Workers	University of Florida - TREEO	09/16/2005	8
			Total:	40

Period: **11/19/2005 - 11/18/2008**

Course #	Course Name	Provider	Completion Date	Hours
426	SWANA-FL 2006 Summer Conference [7/23-26/06]	Solid Waste Association of North America (SWANA - Florida Chapter)	07/26/2006	7
225	19-Hour Initial Training Course for Transfer Station Operators and MRF Operators	University of Florida - TREEO	07/28/2006	10
457	Disaster Debris Management	American Society of Civil Engineers	02/15/2007	6
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
			Total:	25

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

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If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:36 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

DeVaughn, Prime
Landfill Crew Leader
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Material Recovery Facility Operator 07/28/2006 - 07/27/2009**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
104	Permit Required Confined Space Entry	University of Florida - TREEO	06/27/2002	8
256	Waste Screening & Identification for Landfill Operations and Spotters Refresher	Citrus County - Hazardous Material Section	08/29/2002	4
223	Health and Safety Training for Landfill Operations OnLine	University of Florida - TREEO	10/02/2002	5
353	SWANA-FL 2004 Summer Conference [7/21-23/04]	Solid Waste Association of North America (SWANA - Florida Chapter)	07/23/2004	2
281	Health and Safety for Solid Waste Workers	University of Florida - TREEO	09/16/2005	8
426	SWANA-FL 2006 Summer Conference [7/23-26/06]	Solid Waste Association of North America (SWANA - Florida Chapter)	07/26/2006	4
			Total:	Prior

Period: **07/28/2006 - 07/27/2009 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
225	19-Hour Initial Training Course for Transfer Station Operators and MRF Operators	University of Florida - TREEO	07/28/2006	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

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Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:37 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

DeVaughn, Prime
Landfill Crew Leader
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Transfer Station Operator 07/28/2006 - 07/27/2009**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
104	Permit Required Confined Space Entry	University of Florida - TREEO	06/27/2002	8
256	Waste Screening & Identification for Landfill Operations and Spotters Refresher	Citrus County - Hazardous Material Section	08/29/2002	4
223	Health and Safety Training for Landfill Operations OnLine	University of Florida - TREEO	10/02/2002	5
353	SWANA-FL 2004 Summer Conference [7/21-23/04]	Solid Waste Association of North America (SWANA - Florida Chapter)	07/23/2004	2
281	Health and Safety for Solid Waste Workers	University of Florida - TREEO	09/16/2005	8
426	SWANA-FL 2006 Summer Conference [7/23-26/06]	Solid Waste Association of North America (SWANA - Florida Chapter)	07/26/2006	4
			Total:	Prior

Period: **07/28/2006 - 07/27/2009 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
225	19-Hour Initial Training Course for Transfer Station Operators and MRF Operators	University of Florida - TREEO	07/28/2006	Initial
457	Disaster Debris Management	American Society of Civil Engineers	02/15/2007	6
			Total:	6

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

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Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:37 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Dozier, Chris
Citrus County Solid Waste Management
P.O. Box 340
Lecanto, FL 34460-0340

Phone: 352 527-7670
Fax: 352 527-7672

Track: "**Spotter / Waste Screener 07/25/2007 - 07/24/2010**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **07/25/2007 - 07/24/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		07/25/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

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Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:38 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Gilmore, William M.
Lead Solid Waste Technician
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Class I, II, III Landfill Operator 11/15/2007 - 11/14/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		07/25/2007	8
			Total:	Prior

Period: **11/15/2007 - 11/14/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
195	24-Hour Initial Training Course for Landfill Operators (Class I, II, III and C&D Sites)	University of Florida - TREEO	11/15/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

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Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:38 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Gilmore, William M.
Lead Solid Waste Technician
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Construction and Demolition Debris Landfill Operator 11/15/2007 - 11/14/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		07/25/2007	8
			Total:	Prior

Period: **11/15/2007 - 11/14/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
195	24-Hour Initial Training Course for Landfill Operators (Class I, II, III and C&D Sites)	University of Florida - TREEO	11/15/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

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Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:39 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Gilmore, William M.
Lead Solid Waste Technician
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 07/25/2007 - 07/24/2010**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **07/25/2007 - 07/24/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		07/25/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

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Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:39 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Gravely, Harold
Heavy Equipment Operator
Citrus County Solid Waste Management
P.O. Box 340
Lecanto, FL 34460-0340

Phone: 352 527-7670
Fax: 352 527-7672

Track: "**Spotter / Waste Screener 09/25/2000 - 09/24/2012**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **09/25/2000 - 09/24/2003 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
111	Landfill Operations and Waste Screening for Class I, II, III Sites	Kohl Consulting, Inc.	09/25/2000	Initial
256	Waste Screening & Identification for Landfill Operations and Spotters Refresher	Citrus County - Hazardous Material Section	08/29/2002	4
			Total:	4

Period: **09/25/2003 - 09/24/2006**

Course #	Course Name	Provider	Completion Date	Hours
295	Heavy Equipment Operator Training - 4 Hours	Fleet Solutions	04/16/2004	4
			Total:	4

Period: **09/25/2006 - 09/24/2009**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		07/25/2007	8
			Total:	8

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

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An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

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Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:40 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Heath, Eric M.
Heavy Equipment Operator
Citrus County Solid Waste Mgt.
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670 ext: 4690
Fax: (352) 527-7672

Track: "**Class I, II, III Landfill Operator 07/15/2005 - 07/14/2008**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	01/22/2004	8
295	Heavy Equipment Operator Training - 4 Hours	University of Florida - TREEO	04/16/2004	4
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	05/08/2005	2
			Total:	Prior

Period: **07/15/2005 - 07/14/2008 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
195	24-Hour Initial Training Course for Landfill Operators (Class I, II, III and C&D Sites)	Kohl Consulting, Inc.	07/15/2005	Initial
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	03/24/2006	2
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	05/12/2007	2
49	Landfill Gas and Leachate Systems	University of Florida - TREEO	11/14/2007	8
			Total:	14

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

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Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:40 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Heath, Eric M.
Heavy Equipment Operator
Citrus County Solid Waste Mgt.
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670 ext: 4690
Fax: (352) 527-7672

Track: "**Construction and Demolition Debris Landfill Operator 07/15/2005 - 07/14/2008**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	01/22/2004	8
295	Heavy Equipment Operator Training - 4 Hours	University of Florida - TREEO	04/16/2004	4
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	05/08/2005	2
			Total:	Prior

Period: **07/15/2005 - 07/14/2008 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
195	24-Hour Initial Training Course for Landfill Operators (Class I, II, III and C&D Sites)	Kohl Consulting, Inc.	07/15/2005	Initial
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	03/24/2006	2
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	05/12/2007	2
49	Landfill Gas and Leachate Systems	University of Florida - TREEO	11/14/2007	8
			Total:	14

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

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Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:40 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Heath, Eric M.
Heavy Equipment Operator
Citrus County Solid Waste Mgt.
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670 ext: 4690
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 01/22/2004 - 01/21/2013**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **01/22/2004 - 01/21/2007 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	01/22/2004	Initial
295	Heavy Equipment Operator Training - 4 Hours	University of Florida - TREEO	04/16/2004	4
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	05/08/2005	2
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	03/24/2006	2
			Total:	8

Period: **01/22/2007 - 01/21/2010**

Course #	Course Name	Provider	Completion Date	Hours
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	05/12/2007	2
			Total:	4

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

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Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:41 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Heglund, Susan
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670 Ext. _____
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 11/29/2005 - 11/28/2008**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **11/29/2005 - 11/28/2008 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	11/29/2005	Initial
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
			Total:	2

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

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Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:41 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Holst, Michael R.
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 11/29/2005 - 11/28/2011**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **11/29/2005 - 11/28/2008 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	11/29/2005	Initial
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	03/24/2006	2
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	05/12/2007	2
			Total:	6

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:52 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Keim, Michael J.
Hazardous Waste Technician
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460-0340

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 03/15/2007 - 03/14/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
36	Waste Screening and Identification for Landfill Operators and Spotters	SCS Engineers	01/20/1995	8
62	Health and Safety Training for Hazardous Materials Activities: 8-hour OSHA Refresher	University of Florida - TREEO	11/29/2006	2
			Total:	Prior

Period: **03/15/2007 - 03/14/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		03/15/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

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352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:42 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Lake, Aaron W.
Maintenance Coordinator
Citrus County Solid Waste Mgt.
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Class I, II, III Landfill Operator 05/11/2007 - 05/10/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	08/24/2004	8
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	05/08/2005	2
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
			Total:	Prior

Period: **05/11/2007 - 05/10/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
442	Initial Training Course for Landfill Operators and C&D Sites - 24 Hour	University of Florida - TREEO	05/11/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

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If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:42 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Lake, Aaron W.
Maintenance Coordinator
Citrus County Solid Waste Mgt.
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Construction and Demolition Debris Landfill Operator 05/11/2007 - 05/10/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	08/24/2004	8
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	05/08/2005	2
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
			Total:	Prior

Period: **05/11/2007 - 05/10/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
442	Initial Training Course for Landfill Operators and C&D Sites - 24 Hour	University of Florida - TREEO	05/11/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:43 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Lake, Aaron W.
Maintenance Coordinator
Citrus County Solid Waste Mgt.
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 08/24/2004 - 08/23/2010**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **08/24/2004 - 08/23/2007 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	08/24/2004	Initial
396	SWANA-FL Chapter Annual Road-e-o Safety Training	Solid Waste Association of North America (SWANA - Florida Chapter)	05/08/2005	2
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
442	Initial Training Course for Landfill Operators and C&D Sites - 24 Hour	University of Florida - TREEO	05/11/2007	4
			Total:	8

Period: **08/24/2007 - 08/23/2010**
No courses taken

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:43 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Laubert, Judith
Citrus County Solid Waste
Citrus County Central Landfill
Lecanto, FL 34461

Phone: (352) 527-7670 ext: 4693
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 10/19/2006 - 10/18/2009**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **10/19/2006 - 10/18/2009 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		10/19/2006	Initial
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
			Total:	2

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:43 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Martone, Rich
Citrus County Division of Solid Waste Management
PO Box 340
Lecanto, FL 34461

Track: "**Spotter / Waste Screener 02/02/2005 - 02/01/2008**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **02/02/2005 - 02/01/2008 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	02/02/2005	Initial
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
			Total:	2

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:44 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Metcalfe, Susan J.
Director
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7671
Fax: (352) 527-7672

Track: "**Class I, II, III Landfill Operator 05/20/1994 - 05/19/2012**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **05/20/1994 - 05/19/1997 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
21	Solid Waste Landfill Operator's Short School		05/20/1994	Initial
56	Successfully Contracting for Solid Waste Services [7/14/95]		07/14/1995	4
75	Landfill Compliance Inspections		02/01/1997	2
76	Groundwater Monitoring, Requirements and Techniques for Landfills		02/01/1997	2
36	Waste Screening and Identification for Landfill Operators and Spotters	SCS Engineers	04/29/1997	8
			Total:	16

Period: **05/20/1997 - 05/19/2000**

Course #	Course Name	Provider	Completion Date	Hours
72	Bird and Wildlife Management at Solid Waste Management Facilities		10/20/1997	8
39	Stormwater Management for Landfills		04/19/1999	8
42	SWANA-Transfer Station Design & Operations	Solid Waste Association of North America	08/03/1999	16
141	SWANA-FL 1999 Summer Conference [8/3-5/99]	Solid Waste Association of North America (SWANA - Florida Chapter)	08/05/1999	4
			Total:	36

Period: **05/20/2000 - 05/19/2003**

Course #	Course Name	Provider	Completion Date	Hours
173	SWANA-FL 2000 Summer Conference [8/10-	Solid Waste Association of North	08/11/2000	6

	11/00]	America (SWANA - Florida Chapter)		
198	FDEP HHW & Conditionally Exempt SQG Waste Mgmt Mtg [4/30-5/1/01]	Florida Department of Environmental Protection	05/02/2001	5
199	FDEP 8 Hour HazWoper OSHA Refresher [5/1/01]	Florida Department of Environmental Protection	05/03/2001	4
256	Waste Screening & Identification for Landfill Operations and Spotters Refresher	Citrus County - Hazardous Material Section	08/29/2002	4
244	SWANA-Landfill Gas Basics	Solid Waste Association of North America	03/24/2003	8
262	SWANA-Landfill Gas Symposium 26th Annual [3/25-27/03]	Solid Waste Association of North America	03/27/2003	15
255	SWANA-FL 2003 Spring Conference [4/11-12/03]	Solid Waste Association of North America (SWANA - Florida Chapter)	04/11/2003	6
			Total:	48

Period: **05/20/2003 - 05/19/2006**

Course #	Course Name	Provider	Completion Date	Hours
148	Two-hour Spotter Refresher Training Online	University of Florida - TREEO	12/12/2003	2
326	SWANA-FL 2004 Spring Tri-State Conference [4/4-7/04]	Solid Waste Association of North America (SWANA - Florida Chapter)	04/07/2004	12
339	Bioreactor Landfill Workshop 2004	Florida Center for Solid & Hazardous Waste Management	04/20/2004	8
374	SWANA - Florida 2005 Spring Conference [4/10-13/05]	Solid Waste Association of North America (SWANA - Florida Chapter)	04/13/2005	6
225	19-Hour Initial Training Course for Transfer Station Operators and MRF Operators	University of Florida - TREEO	04/14/2006	10
			Total:	38

Period: **05/20/2006 - 05/19/2009**

Course #	Course Name	Provider	Completion Date	Hours
457	Disaster Debris Management	American Society of Civil Engineers	02/15/2007	6
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
447	SWANA-FL 2007 Summer Conference [7/15-18/07]		07/18/2007	11
			Total:	19

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:44 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Metcalfe, Susan J.
Director
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7671
Fax: (352) 527-7672

Track: "**Material Recovery Facility Operator 04/14/2006 - 04/13/2009**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
36	Waste Screening and Identification for Landfill Operators and Spotters	SCS Engineers	04/29/1997	8
198	FDEP HHW & Conditionally Exempt SQG Waste Mgmt Mtg [4/30-5/1/01]	Florida Department of Environmental Protection	05/02/2001	5
199	FDEP 8 Hour HazWoper OSHA Refresher [5/1/01]	Florida Department of Environmental Protection	05/03/2001	4
256	Waste Screening & Identification for Landfill Operations and Spotters Refresher	Citrus County - Hazardous Material Section	08/29/2002	4
255	SWANA-FL 2003 Spring Conference [4/11-12/03]	Solid Waste Association of North America (SWANA - Florida Chapter)	04/11/2003	5
148	Two-hour Spotter Refresher Training Online	University of Florida - TREEO	12/12/2003	2
326	SWANA-FL 2004 Spring Tri-State Conference [4/4-7/04]	Solid Waste Association of North America (SWANA - Florida Chapter)	04/07/2004	12
374	SWANA - Florida 2005 Spring Conference [4/10-13/05]	Solid Waste Association of North America (SWANA - Florida Chapter)	04/13/2005	5
			Total:	Prior

Period: **04/14/2006 - 04/13/2009 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
225	19-Hour Initial Training Course for Transfer Station Operators and MRF Operators	University of Florida - TREEO	04/14/2006	Initial
447	SWANA-FL 2007 Summer Conference [7/15-18/07]		07/18/2007	4
			Total:	4

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

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If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:45 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Metcalfe, Susan J.
Director
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7671
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 04/07/2004 - 04/06/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
75	Landfill Compliance Inspections		02/01/1997	2
36	Waste Screening and Identification for Landfill Operators and Spotters	SCS Engineers	04/29/1997	8
256	Waste Screening & Identification for Landfill Operations and Spotters Refresher	Citrus County - Hazardous Material Section	08/29/2002	4
255	SWANA-FL 2003 Spring Conference [4/11-12/03]	Solid Waste Association of North America (SWANA - Florida Chapter)	04/11/2003	3
148	Two-hour Spotter Refresher Training Online	University of Florida - TREEO	12/12/2003	2
			Total:	Prior

Period: **04/07/2004 - 04/06/2007 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
326	SWANA-FL 2004 Spring Tri-State Conference [4/4-7/04]	Solid Waste Association of North America (SWANA - Florida Chapter)	04/07/2004	Initial
374	SWANA - Florida 2005 Spring Conference [4/10-13/05]	Solid Waste Association of North America (SWANA - Florida Chapter)	04/13/2005	2
225	19-Hour Initial Training Course for Transfer Station Operators and MRF Operators	University of Florida - TREEO	04/14/2006	4
457	Disaster Debris Management	American Society of Civil Engineers	02/15/2007	2
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
			Total:	10

Period: **04/07/2007 - 04/06/2010**
No courses taken

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

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Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:45 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Metcalfe, Susan J.
Director
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7671
Fax: (352) 527-7672

Track: "**Transfer Station Operator 04/14/2006 - 04/13/2012**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
36	Waste Screening and Identification for Landfill Operators and Spotters	SCS Engineers	04/29/1997	8
72	Bird and Wildlife Management at Solid Waste Management Facilities		10/20/1997	8
42	SWANA-Transfer Station Design & Operations	Solid Waste Association of North America	08/03/1999	16
198	FDEP HHW & Conditionally Exempt SQG Waste Mgmt Mtg [4/30-5/1/01]	Florida Department of Environmental Protection	05/02/2001	5
199	FDEP 8 Hour HazWoper OSHA Refresher [5/1/01]	Florida Department of Environmental Protection	05/03/2001	4
256	Waste Screening & Identification for Landfill Operations and Spotters Refresher	Citrus County - Hazardous Material Section	08/29/2002	4
255	SWANA-FL 2003 Spring Conference [4/11-12/03]	Solid Waste Association of North America (SWANA - Florida Chapter)	04/11/2003	5
148	Two-hour Spotter Refresher Training Online	University of Florida - TREEO	12/12/2003	2
326	SWANA-FL 2004 Spring Tri-State Conference [4/4-7/04]	Solid Waste Association of North America (SWANA - Florida Chapter)	04/07/2004	12
374	SWANA - Florida 2005 Spring Conference [4/10-13/05]	Solid Waste Association of North America (SWANA - Florida Chapter)	04/13/2005	4
			Total:	Prior

Period: **04/14/2006 - 04/13/2009 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
225	19-Hour Initial Training Course for Transfer Station Operators and MRF Operators	University of Florida - TREEO	04/14/2006	Initial
457	Disaster Debris Management	American Society of Civil Engineers	02/15/2007	6
447	SWANA-FL 2007 Summer Conference [7/15-		07/18/2007	4

18/07]

Total: 10

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:45 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Palmer, James S.
Lead Heavy Equipment Operator
Citrus County Solid Waste Mgt.
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Class I, II, III Landfill Operator 11/15/2007 - 11/14/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	11/29/2005	8
396	SWANA-FL Chapter Annual Road-e-o Safety Training	University of Florida - TREEO	03/24/2006	2
			Total:	Prior

Period: **11/15/2007 - 11/14/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
195	24-Hour Initial Training Course for Landfill Operators (Class I, II, III and C&D Sites)	University of Florida - TREEO	11/15/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call

352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:46 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Palmer, James S.
Lead Heavy Equipment Operator
Citrus County Solid Waste Mgt.
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Construction and Demolition Debris Landfill Operator 11/15/2007 - 11/14/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	11/29/2005	8
396	SWANA-FL Chapter Annual Road-e-o Safety Training	University of Florida - TREEO	03/24/2006	2
			Total:	Prior

Period: **11/15/2007 - 11/14/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
195	24-Hour Initial Training Course for Landfill Operators (Class I, II, III and C&D Sites)	University of Florida - TREEO	11/15/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call

352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:46 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Palmer, James S.
Lead Heavy Equipment Operator
Citrus County Solid Waste Mgt.
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 11/29/2005 - 11/28/2008**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **11/29/2005 - 11/28/2008 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	11/29/2005	Initial
396	SWANA-FL Chapter Annual Road-e-o Safety Training	University of Florida - TREEO	03/24/2006	2
			Total:	2

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:53 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Poore, Jean
Citrus County Solid Waste
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670 ext: 4693
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 07/25/2007 - 07/24/2010**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **07/25/2007 - 07/24/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		07/25/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7
Sent: Thursday, December 27, 2007 1:46 PM
Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Vance, David W.
Solid Waste Technician
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460-0340

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 09/25/2000 - 09/24/2006**
Status: **Expired**

Period: **Prior Courses**
No courses taken

Period: **09/25/2000 - 09/24/2003 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
111	Landfill Operations and Waste Screening for Class I, II, III Sites	Kohl Consulting, Inc.	09/25/2000	Initial
256	Waste Screening & Identification for Landfill Operations and Spotters Refresher	Citrus County - Hazardous Material Section	08/29/2002	4
			Total:	4

Period: **09/25/2003 - 09/24/2006**
No courses taken

Period: **09/25/2006 - 09/24/2009**

Course #	Course Name	Provider	Completion Date	Hours
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
			Total:	2

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:47 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Vaughn, Michelle
Solid Waste Technician I
Citrus County Solid Waste Management
PO Box 340
Lecanto, FL 34460

Phone: (352) 527-7670 Ext. _____
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 06/26/2002 - 06/25/2011**
Status: **Current**

Period: **Prior Courses**
No courses taken

Period: **06/26/2002 - 06/25/2005 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
147	Training for Spotters at Construction and Demolition Sites, Landfills and Transfer Stations	University of Florida - TREEO	06/26/2002	Initial
256	Waste Screening & Identification for Landfill Operations and Spotters Refresher	Citrus County - Hazardous Material Section	08/29/2002	4
256	Waste Screening & Identification for Landfill Operations and Spotters Refresher	Citrus County - Hazardous Material Section	08/29/2002	4
			Total:	4

Period: **06/26/2005 - 06/25/2008**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	11/29/2005	8
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	11/29/2005	8
			Total:	8

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

Warner, Drew

From: Saved by Windows Internet Explorer 7

Sent: Thursday, December 27, 2007 1:48 PM

Subject: Transcripts Report

Florida DEP Solid Waste Management Facility Operator Courses

Weiss, Jana
Solid Waste Technician I
Citrus County Division of Solid Waste Management
PO Box 340
Lecanto, FL 34460-0340

Phone: (352) 527-7670
Fax: (352) 527-7672

Track: "**Spotter / Waste Screener 03/15/2007 - 03/14/2010**
Status: **Current**

Period: **Prior Courses**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities	University of Florida - TREEO	10/08/2003	8
186	Pedestrian, Vehicles, and Equipment Safety in Landfills	University of Florida - TREEO	03/13/2007	2
			Total:	Prior

Period: **03/15/2007 - 03/14/2010 - (Initial Period)**

Course #	Course Name	Provider	Completion Date	Hours
248	Spotter Training for Solid Waste Facilities		03/15/2007	Initial
			Total:	0

Continuing Education (CE) Minimum 3 Year Requirement: I,II,III/C&D-16 hours TS/MRF-8 hours Spotter-4 hours.

Expired: If you have exceeded the 3 year training period without completing the minimum number of CE, you must start over by taking an approved initial course and pass exam.

Initial hours are not counted toward continuing education.

An Initial course can be taken as a CE course only if it was not taken as the operator's or spotter's initial training. No CE credit will be given for the same course taken within the same 3-year period.

If you have any questions, please contact djenkins@treeo.ufl.edu or jtouchton@treeo.ufl.edu or call 352.392.9570 extensions 227 or 212.

ATTACHMENT E-3

SUBLEASE AGREEMENT

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FDA 3289 E

OAS6101

FLORIDA DEPARTMENT OF AGRICULTURE
AND
CONSUMER SERVICES
DIVISION OF FORESTRY

SUBLEASE AGREEMENT

CERTIFIED TO BE A TRUE COPY
BETTY STRIFLER
CLERK OF CIRCUIT COURT
BY: Janey B. Mishou D.C.
This 2nd day of May, A.D. 19 96

Sublease No. 3316-5

THIS SUBLEASE AGREEMENT is entered into this 22nd day of April 1996, by and between the STATE OF FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES, DIVISION OF FORESTRY hereinafter referred to as "SUBLESSOR", and BOARD OF COUNTY COMMISSIONERS OF CITRUS COUNTY, FLORIDA hereinafter referred to as "SUBLESSEE".

WITNESSETH

In consideration of the covenants and conditions set forth herein SUBLESSOR subleases the below described premises to SUBLESSEE on the following terms and conditions:

1. ACKNOWLEDGEMENTS: The parties acknowledge that title to the subleased premises is held by the Board of Trustees of the Internal Improvement Trust Fund ("TRUSTEES") and is currently managed by SUBLESSOR as a portion of the Withlacoochee State Forest pursuant to TRUSTEES' Lease Number 3316.

2. DESCRIPTION OF PREMISES: The property subject to this sublease agreement, is situated in the County of Citrus, State of Florida and is more particularly described in Exhibit A attached hereto and hereinafter referred to as the "subleased premises".

3. SUBLEASE TERM: The term of this sublease shall be for a period of twenty five (25) years commencing on April 15, 1996 and ending on April 14, 2021, or for the active life of the adjacent landfill, owned and operated by SUBLESSEE, whichever is less, unless sooner terminated pursuant to the provisions of this sublease!

4. PURPOSE: SUBLESSEE shall manage the subleased premises only for the uses outlined in the Site Master Plan identified as Exhibit B.

5. CONFORMITY: This sublease shall conform to all terms and conditions of TRUSTEES' Lease Number 3316 between the

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TRUSTEES, as Lessor and SUBLESSOR, as Lessee, dated January 10, 1984, a copy of which is attached hereto as Exhibit C, and SUBLESSEE shall through its agents and employees prevent the unauthorized use of the subleased premises or any use thereof not in conformance with this sublease.

6. QUIET ENJOYMENT AND RIGHT OF USE: SUBLESSEE shall have the right of ingress and egress to, from and upon the subleased premises for all purposes necessary to full quiet enjoyment by said SUBLESSEE of the rights conveyed herein.

7. MANAGEMENT PLAN: SUBLESSEE shall prepare and submit a Management Plan for the subleased premises in accordance with Chapters 18-2 and 18-4, Florida Administrative Code, within 12 months of the effective date of this sublease. The Management Plan shall be submitted to the TRUSTEES for approval through SUBLESSOR and the Division of State Lands, Department of Environmental Protection. The subleased premises shall not be developed or physically altered in any way other than what is necessary for security and maintenance of the subleased premises without the prior written approval of the TRUSTEES and SUBLESSOR until the Management Plan is approved. SUBLESSEE shall provide SUBLESSOR with an opportunity to participate in all phases of preparing the development and Management Plan for the subleased premises. The Management Plan shall be submitted to SUBLESSOR in draft form for review and comments within ten months of the effective date of this sublease. SUBLESSEE shall give SUBLESSOR reasonable notice of the application for and receipt of any state, federal or local permits as well as any public hearings or meetings relating to the development or use of the subleased premises. SUBLESSEE shall not proceed with development of said subleased premises including, but not limited to, funding, permit application, design or building contracts, until the Management Plan required herein has been submitted and approved. Any financial commitments made by SUBLESSEE which are not in compliance with the terms of this sublease shall be done at SUBLESSEE'S own risk. The Management Plan shall emphasize the original management concept as approved by the TRUSTEES at the

time of acquisition which established the primary purpose for which the subleased premises were acquired. The approved Management Plan shall provide the basic guidance for all management activities and shall be reviewed jointly by SUBLESSEE, SUBLESSOR and the TRUSTEES at least every five (5) years. SUBLESSEE shall not use or alter the subleased premises except as provided for in the approved Management Plan without the advance written approval of the TRUSTEES and SUBLESSOR. The Management Plan prepared under this sublease shall identify management strategies for exotic species, if present. The introduction of exotic species is prohibited, except when specifically authorized by the approved Management Plan.

8. ASSIGNMENT: This sublease shall not be assigned in whole or in part without the prior written consent of the TRUSTEES and SUBLESSOR. Any assignment made either in whole or in part without the prior written consent of the TRUSTEES and SUBLESSOR shall be void and without legal effect.

9. RIGHT OF INSPECTION: The TRUSTEES and SUBLESSOR or their duly authorized agents, representatives or employees shall have the right at any and all times to inspect the subleased premises and the works and operations thereon of SUBLESSEE in any matter pertaining to this sublease.

10. PLACEMENT AND REMOVAL OF EQUIPMENT: All buildings, structures, improvements and signs shall be constructed at the expense of SUBLESSEE in accordance with plans prepared by professional designers and shall require the prior written approval of SUBLESSOR as to purpose, location and design. Further, no trees, other than non-native species, shall be removed or major land alterations done without the prior written approval of SUBLESSOR. Removable equipment and removable improvements placed on the subleased premises by SUBLESSEE which do not become a permanent part of the subleased premises will remain the property of SUBLESSEE and may be removed by SUBLESSEE upon termination of this sublease.

11. INSURANCE REQUIREMENTS: During the term of this sublease SUBLESSEE shall procure and maintain policies of fire,

extended risk, and liability insurance coverage. The extended risk and fire insurance coverage shall be in an amount equal to the full insurable replacement value of any improvements or fixtures located on the subleased premises. The liability insurance coverage shall be in amounts not less than ($100,000.00) per occurrence and ($200,000.00) per accident for personal injury, death, and property damage on the subleased premises. Such policies of insurance shall name SUBLESSEE, the TRUSTEES, SUBLESSOR and the State of Florida as co-insureds. SUBLESSEE shall submit written evidence of having procured all insurance policies required herein prior to the effective date of this sublease and shall submit annually thereafter, written evidence of maintaining such insurance policies to SUBLESSOR and the Bureau of Land Management Services, Division of State Lands, Department of Environmental Protection, 3900 Commonwealth Boulevard, Mail Station 130, Tallahassee, Florida 32399. SUBLESSEE shall purchase all policies of insurance from a financially-responsible insurer duly authorized to do business in the State of Florida. Any certificate of self-insurance shall be issued or approved by the Insurance Commissioner, State of Florida. The certificate of self-insurance shall provide for casualty and liability coverage. SUBLESSEE further agrees to immediately notify SUBLESSOR, the TRUSTEES and the insurer of any erection or removal of any structure or other fixed improvement on the subleased premises and any changes affecting the value of any improvements and to request said insurer to make adequate changes in the coverage to reflect the changes in value. SUBLESSEE shall be financially responsible for any loss due to failure to obtain adequate insurance coverage, and the failure to maintain such policies or certificate in the amounts set forth shall constitute a breach of this sublease.

12. LIABILITY: Each party is responsible for all personal injury and property damage attributable to the negligent acts or omissions of that party and the officers, employees and agents thereof. Nothing herein shall be construed as an indemnity or a waiver of sovereign immunity enjoyed by any party hereto, as

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provided in Section 768.28, Florida Statutes, as amended from time to time, or any other law providing limitations on claims.

13. PAYMENT OF TAXES AND ASSESSMENTS: SUBLESSEE shall assume full responsibility for and shall pay all liabilities that accrue to the subleased premises or to the improvements thereon, including any and all drainage and special assessments or taxes of every kind and all mechanic's or materialman's liens which may be hereafter lawfully assessed and levied against the subleased premises.

14. NO WAIVER OF BREACH: The failure of SUBLESSOR to insist in any one or more instances upon strict performance of any one or more of the covenants, terms and conditions of this sublease shall not be construed as a waiver of such covenants, terms and conditions, but the same shall continue in full force and effect, and no waiver of SUBLESSOR of any of the provisions hereof shall in any event be deemed to have been made unless the waiver is set forth in writing, signed by SUBLESSOR.

15. TIME: Time is expressly declared to be of the essence of this sublease.

16. NON-DISCRIMINATION: As a condition of obtaining this sublease, SUBLESSEE hereby agrees not to discriminate against any individual because of that individual's race, color, religion, sex, national origin, age, handicap, or marital status with respect to any activity occurring within the subleased premises or upon lands adjacent to and used as an adjunct of the subleased premises.

17. UTILITY FEES: SUBLESSEE shall be responsible for the payment of all charges for the furnishing of gas, electricity, water and other public utilities to the subleased premises and for having all utilities turned off when the subleased premises are surrendered.

18. MINERAL RIGHTS: This sublease does not cover petroleum or petroleum products or minerals and does not give the right to SUBLESSEE to drill for or develop the same. However, SUBLESSEE shall be fully compensated for any and all damages that might result to the subleasehold interest of SUBLESSEE by reason of

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such exploration and recovery operations.

19. RIGHT OF AUDIT: SUBLESSEE shall make available to the TRUSTEES and SUBLESSOR all financial and other records relating to this sublease, and SUBLESSOR and/or the TRUSTEES shall have the right to audit such records at any reasonable time. This right shall be continuous until this sublease expires or is terminated. This sublease may be terminated by SUBLESSOR should SUBLESSEE fail to allow public access to all documents, papers, letters or other materials made or received in conjunction with this sublease, pursuant to the provisions of Chapter 119, Florida Statutes.

20. CONDITION OF PROPERTY: SUBLESSOR assumes no liability or obligation to SUBLESSEE with reference to the condition of the subleased premises or the suitability of the subleased premises for any improvements. The subleased premises herein are subleased by SUBLESSOR to SUBLESSEE in an "as is" condition, with SUBLESSOR assuming no responsibility for bidding, contracting, permitting, construction, and the care, repair, maintenance or improvement of the subleased premises for the benefit of SUBLESSEE. It is acknowledged that the site was a previously State-permitted sanitary landfill, which now has a closure/long-term care permit, the requirements of which are being administered by SUBLESSEE.

21. NOTICES: All notices given under this sublease shall be in writing and shall be served by certified mail including, but not limited to, notice of any violation served pursuant to Section 253.04, Florida Statutes, to the last address of the party to whom notice is to be given, as designated by such party in writing. SUBLESSOR and SUBLESSEE hereby designate their address as follows:

SUBLESSOR: Mr. Charles Maynard, Chief
Forest Management Bureau
Division of Forestry
3125 Conner Boulevard
Tallahassee, Florida 32399-3650

SUBLESSEE: Ms. Susan Metcalfe, Director
Division of Solid Waste Management
Citrus County
Lecanto, Florida 34460-0340

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22. BREACH OF COVENANTS TERMS, OR CONDITIONS: Should SUBLESSEE breach any of the covenants, terms, or conditions of this sublease, SUBLESSOR shall give written notice to SUBLESSEE to remedy such breach within sixty (60) days of such notice. In the event SUBLESSEE fails to remedy the breach to the satisfaction of SUBLESSOR within sixty (60) days of receipt of written notice, SUBLESSOR may either terminate this sublease and recover from SUBLESSEE all damages SUBLESSOR may incur by reason of the breach including, but not limited to, the cost of recovering the subleased premises and attorneys' fees or maintain this sublease in full force and effect and exercise all rights and remedies herein conferred upon SUBLESSOR.

23. DAMAGE TO THE PREMISES: (A) SUBLESSEE shall not do, or suffer to be done, in, on or upon the subleased premises or as affecting said subleased premises or adjacent properties, any act which may result in damage or depreciation of value to the subleased premises or adjacent properties, or any part thereof. (B) SUBLESSEE shall not generate, store, produce, place, treat, release or discharge any contaminants, pollutants or pollution, including, but not limited to, hazardous or toxic substances, chemicals or other agents on, into, or from the subleased premises or any adjacent lands or waters in any manner not permitted by law. For the purposes of this sublease, "hazardous substances" shall mean and include those elements or compounds defined in 42 USC Section 9601 or which are contained in the list of hazardous substances adopted by the United States Environmental Protection Agency (EPA) and the list of toxic pollutants designated by the United States Congress or the EPA or defined by any other federal, state or local statute, law, ordinance, code, rule, regulation, order or decree regulating, relating to, or imposing liability or standards of conduct concerning any hazardous, toxic or dangerous waste, substance, material, pollutant or contaminant. "Pollutants" and "pollution" shall mean those products or substances defined in Chapters 376 and 403, Florida Statutes, and the rules promulgated thereunder,

all as amended or updated from time to time. In the event of SUBLESSEE's failure to comply with this paragraph, SUBLESSEE shall, at its sole cost and expense, promptly commence and diligently pursue any legally required closure, investigation, assessment, cleanup, decontamination, remediation, restoration and monitoring of (1) the leased premises, and (2) all off-site ground and surface waters and lands affected by SUBLESSEE's such failure to comply, as may be necessary to bring the subleased premises and affected off-site waters and lands into full compliance with all applicable federal, state or local statutes, laws, ordinances, codes, rules, regulations, orders and decrees, and to restore the damaged property to the condition existing immediately prior to the occurrence which caused the damage. SUBLESSEE's obligations set forth in this paragraph shall survive the termination or expiration of this sublease. This paragraph shall not be construed as a limitation upon SUBLESSEE's obligations regarding indemnification and payment of costs and fees as set forth in Paragraph 12 of this sublease, nor upon any other obligations or responsibilities of SUBLESSEE as set forth herein. Nothing herein shall relieve SUBLESSEE of any responsibility or liability prescribed by law for fines, penalties and damages levied by governmental agencies, and the cost of cleaning up any contamination caused directly or indirectly by SUBLESSEE's activities or facilities. Upon discovery of a release of a hazardous substance or pollutant, or any other violation of local, state or federal law, ordinance, code, rule, regulation, order or decree relating to the generation, storage, production, placement, treatment, release or discharge of any contaminant, SUBLESSEE shall report such violation to all applicable governmental agencies having jurisdiction, and to SUBLESSOR, all within the reporting periods of the applicable governmental agencies.

24. SURRENDER OF PREMISES: Upon termination or expiration of this sublease, SUBLESSEE shall surrender the subleased premises to SUBLESSOR. In the event no further use of the subleased premises or any part thereof is needed, SUBLESSEE shall

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give written notification to SUBLESSOR and the Bureau of Land Management Services, Division of State Lands, Department of Environmental Protection, 3900 Commonwealth Boulevard, Mail Station 130, Tallahassee, Florida 32399 at least six (6) months prior to the release of any or all of the subleased premises. Notification shall include a legal description, this sublease number and an explanation of the release. The release shall only be valid if approved by SUBLESSOR and the TRUSTEES through execution of a release of sublease instrument with the same formality as this sublease. Upon release of all or any part of the subleased premises or upon termination or expiration of this sublease, all improvements, including both physical structures and modifications of the subleased premises, shall become the property of the TRUSTEES and SUBLESSOR, unless SUBLESSOR gives written notice to SUBLESSEE to remove any or all such improvements at the expense of SUBLESSEE. The decision to retain any improvements upon termination of this sublease shall be at SUBLESSOR'S sole discretion. Prior to surrender of all or any part of the subleased premises a representative of SUBLESSOR shall perform an on-site inspection and the keys to any building on the subleased premises shall be turned over to SUBLESSOR. If the subleased premises do not meet all conditions as set forth in paragraphs 17 and 34 herein, SUBLESSEE shall, at its expense, pay all costs necessary to meet the prescribed conditions.

25. <u>BEST MANAGEMENT PRACTICES</u>: SUBLESSEE shall comply with applicable state and local ordinances and Best Management Practices for all activities conducted under this sublease.

26. <u>QUADRUPLICATE ORIGINALS</u>: This sublease is executed in quadruplicate originals each of which shall be considered an original for all purposes.

27. <u>SOVEREIGNTY SUBMERGED LANDS</u>: This sublease does not authorize any use of lands located waterward of the mean or ordinary high water line of any lake, river, stream, creek, bay, estuary, or other water body or the waters or the air space thereabove.

28. <u>PROHIBITIONS AGAINST LIENS OR OTHER ENCUMBRANCES</u>: Fee

title to the subleased premises is held by the TRUSTEES. SUBLESSEE shall not do or permit anything to be done which purports to create a lien or encumbrance of any nature against the real property contained in the subleased premises including, but not limited to, mortgages or construction liens against the subleased premises or against any interest of the TRUSTEES and SUBLESSOR therein.

29. CONDITIONS AND COVENANTS: All of the provisions of this sublease shall be deemed covenants running with the land included in the subleased premises, and construed to be "conditions" as well as "covenants" as though the words specifically expressing or imparting covenants and conditions were used in each separate provision.

30. PARTIAL INVALIDITY: If any term, covenant, condition or provision of this sublease shall be ruled by a court of competent jurisdiction to be invalid, void, or unenforceable, the remainder shall remain in full force and effect and shall in no way be affected, impaired or invalidated.

31. ENTIRE UNDERSTANDING: This sublease sets forth the entire understanding between the parties and shall only be amended with the prior written approval of the TRUSTEES and SUBLESSOR.

32. EASEMENTS: All easements including, but not limited to, utility easements are expressly prohibited without the prior written approval of the TRUSTEES and SUBLESSOR. Any easement not approved in writing by the TRUSTEES and SUBLESSOR shall be void and without legal effect.

33. SUBSUBLEASES: This sublease is for the purposes specified herein and any subsubleases of any nature are prohibited, without the prior written approval of the TRUSTEES and SUBLESSOR. Any subsublease not approved in writing by the TRUSTEES and SUBLESSOR shall be void and without legal effect.

34. MAINTENANCE OF IMPROVEMENTS: SUBLESSEE shall maintain the real property contained within the subleased premises and any improvements located thereon, in a state of good condition, working order and repair including, but not limited to,

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maintaining the planned improvements as set forth in the approved Management Plan, keeping the subleased premises free of trash or litter, meeting all building and safety codes in the location situated and maintaining any and all existing roads, canals, ditches, culverts, risers and the like in as good condition as the same may be on the effective date of this sublease.

35. COMPLIANCE WITH LAWS: SUBLESSEE agrees that this sublease is contingent upon and subject to SUBLESSEE obtaining all applicable permits and complying with all applicable permits, regulations, ordinances, rules, and laws of the State of Florida or the United States or of any political subdivision or agency of either.

36. ARCHAEOLOGICAL AND HISTORIC SITES: Execution of this sublease in no way affects any of the parties' obligations pursuant to Chapter 267, Florida Statutes. The collection of artifacts or the disturbance of archaeological and historic sites on state-owned lands is prohibited unless prior authorization has been obtained from the Department of State, Division of Historical Resources. The Management Plan prepared pursuant to Chapters 18-2 and 18-4, Florida Administrative Code, shall be reviewed by the Division of Historical Resources to insure that adequate measures have been planned to locate, identify, protect and preserve the archaeological and historic sites and properties on the subleased premises.

37. GOVERNING LAW: This sublease shall be governed by and interpreted according to the laws of the State of Florida.

38. SECTION CAPTIONS: Articles, subsections and other captions contained in this sublease are for reference purposes only and are in no way intended to describe, interpret, define or limit the scope, extent or intent of this sublease or any provisions thereof.

39. ADMINISTRATIVE FEE: SUBLESSEE shall pay the Division of State Lands, Department of Environmental Protection, as agent for the TRUSTEES an annual administrative fee of $300.00. The initial annual administrative fee shall be payable within 30 days from the receipt of an invoice from the Division of State Lands

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and shall be prorated based on the number of months or fraction thereof remaining in the fiscal year of execution. For purposes of this sublease agreement, the fiscal year shall be the period extending from July 1 to June 30. Each annual payment thereafter shall be due and payable on July 1 of each subsequent year.

40. SPECIAL CONDITIONS: The following special conditions shall apply to this sublease.

a. SUBLESSEE will improve roads within the Withlacoochee State Forest (WSF) according to the map and specifications set forth in Exhibit D.

b. SUBLESSEE will locate, identify and map Cogongrass (*Imperata cylindrica*) infestations occurring on the Citrus Unit of WSF according to specifications set forth in Exhibit E.

c. SUBLESSEE will plant a visual screen or barrier between State Road 44 and the two landfill sites. Said barrier shall utilize native species as approved by WSF personnel.

d. The subleased premises were previously a State-permitted sanitary landfill, which now has a closure/long-term care permit. SUBLESSEE will continue to comply with the requirements of the above mentioned closure/long-term care permit. Uses of the subleased premises under this sublease agreement will be as identified in Exhibit B and the management plan required under paragraph 7. One potential use for the subleased premises will be for handling and temporary (up to 3 months) storage of waste materials. These activities, such as collection of household waste, including hazardous materials or yard waste, must be performed according to all applicable state and federal laws and regulations.

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IN WITNESS WHEREOF, the parties have cause this sublease to be executed on the day and year first above written.

STATE OF FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES, DIVISION OF FORESTRY

Ben C. Brown
Witness
Ben C. Brown
Print/Type Witness Name

By: Mike Gresham (SEAL)

Mike Gresham
Print/Type Name

Its: Director of Administration

Susie P. Burch
Witness
Susie P. Burch
Print/Type Witness Name

"SUBLESSOR"

STATE OF FLORIDA
COUNTY OF LEON

The foregoing instrument was acknowledged before me this 28th day of MARCH 1996, by MIKE GRESHAM, as DIRECTOR OF ADMINISTRATION, State of Florida Department of AGRICULTURE who is/~~are~~ personally known to me or who produced ______________ as identification.

Karen A. Meyer
Notary Public, State of Florida
KAREN A. MEYER
Print/Type Notary Name

(SEAL)

KAREN A. MEYER
MY COMMISSION # CC237028 EXPIRES
October 20, 1996
BONDED THRU TROY FAIN INSURANCE, INC.

Commission Number:

Commission Expires:

BOARD OF COUNTY COMMISSIONERS
CITRUS COUNTY, FLORIDA

Cheryl A. Clamer
Witness
Cheryl A. Clamer
Print/Type Witness Name

By: Brad Thorpe (SEAL)

Brad Thorpe
Print/Type Name

Its: Chairman

Joan E. Lambertson
Witness
JOAN E. LAMBERTSON
Print/Type Witness Name

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STATE OF Florida
COUNTY OF Citrus

Attest: Betty Strifler
Betty Strifler
Print/Type Name
Its: Clerk

(OFFICIAL SEAL)

The foregoing instrument was acknowledged before me this 27th day of February 1996, by Brad Thorpe, as Chairman, Board of County Commissioners of Citrus County, who is/~~are~~ personally known to me ~~or who produced~~ ______ ~~as identification.~~

Cheryl A. Clamer
Notary Public, State of Florida

(SEAL)

STATE OF FLORIDA NOTARY PUBLIC
CHERYL A. CLAMER
My Comm Exp. 4/02/99
Bonded By Service Ins
No. CC450028
[✓] Personally Known [ ] Other I. D.

Print/Type Notary Name

Commission Number:

Commission Expires:

Consented to by the TRUSTEES ~~on~~ 18th day of April, 1996.

Daniel T. Crabb
Chief, Bureau of Land Management Services, Division of State Lands, Department of Environmental Protection

Approved as to Form and Legality

By: [signature]
DEP Attorney

1130PG0122

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EXHIBIT A

A portion of Section 1, Township 19 South, Range 18 East being more particularly described as follows: Commence at the Southwest Corner of Lot 9, Block A, New Mayfield Acres as recorded in Plat Book 2, Page 42, Public Records of Citrus County, Florida, thence N 89°13'46" E on an Easterly projection of the South line of said Lot 9, Block A, a distance of 640.22 feet, thence S 0°46'14" E a distance of 76.67 feet to a point that is 150 feet from, measured at a right angle to, the Centerline of State Road No. 44, said point also being the Point of Beginning, thence continue S 0°46'14" E a distance of 2151.70 feet, thence S 89°13'46" W a distance of 1320 feet, thence N 0°46'14" W a distance of 1808.78 feet to a point that is 150 feet from, measured at a right angle to, the Centerline of said State Road No. 44, thence N 74°40'03" E, parallel to and 150 feet from the Centerline of State Road No. 44 a distance of 1363.81 feet to the Point of Beginning:

LESS AND EXCEPT: A portion of Section 1, Township 19 South, Range 18 East, Citrus County, Florida described as follows: Commence at the SW corner of Lot 9, Block A, New Mayfield Acres as recorded in Plat Book 2, Page 42, Public Records of Citrus County, Florida, thence S 89°43'25" E along the South line of said Lot 9 and an Easterly projection thereof a distance of 640.22 feet, thence S 0°16'35" W 76.49 feet to a point that is 150 feet Southeasterly from, measured at a right angle to, the Centerline of State Road No. 44, thence continue S 0°16'35" W 2151.70 feet, thence N 89°43'25" W 808.77 feet to the Point of Beginning, thence continue N 89°43'25" W 511.23 feet, thence N 0°16'35" E 511.23 feet, thence S 89°43'25" E 511.23 feet, thence S 0°16'35" W 511.23 feet to the Point of Beginning. Said exception containing 6 acres more or less.

TOGETHER WITH an Easement for ingress and egress over the following described lands: Commence at the Southwest Corner of Lot 9, Block A, New Mayfield Acres, as recorded in Plat Book 2, Page 42, Public Records of Citrus County, Florida, thence N 89°13'46" E on an Easterly projection of the South line of said Lot 9, Block A, a distance of 640.22 feet, thence S 0°46'14" E a distance of 76.67 feet to a point that is 150 feet from, measured at a right angle to, the Centerline of State Road No. 44, said point also being the Point of Beginning, thence S 74°40'03" W, parallel to and 150 feet from the Centerline of State Road No. 44, a distance of 1363.81 feet, thence N 0°46'14" W a distance of 101.33 feet to the Southerly right-of-way line of State Road No. 44, thence N 74°40'03" E along said right-of-way line a distance of 1265.77 feet, thence N 89°13'46" E a distance of 94.90 feet, thence S 0°46'14" E a distance of 76.67 feet to the Point of Beginning.

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EXHIBIT B

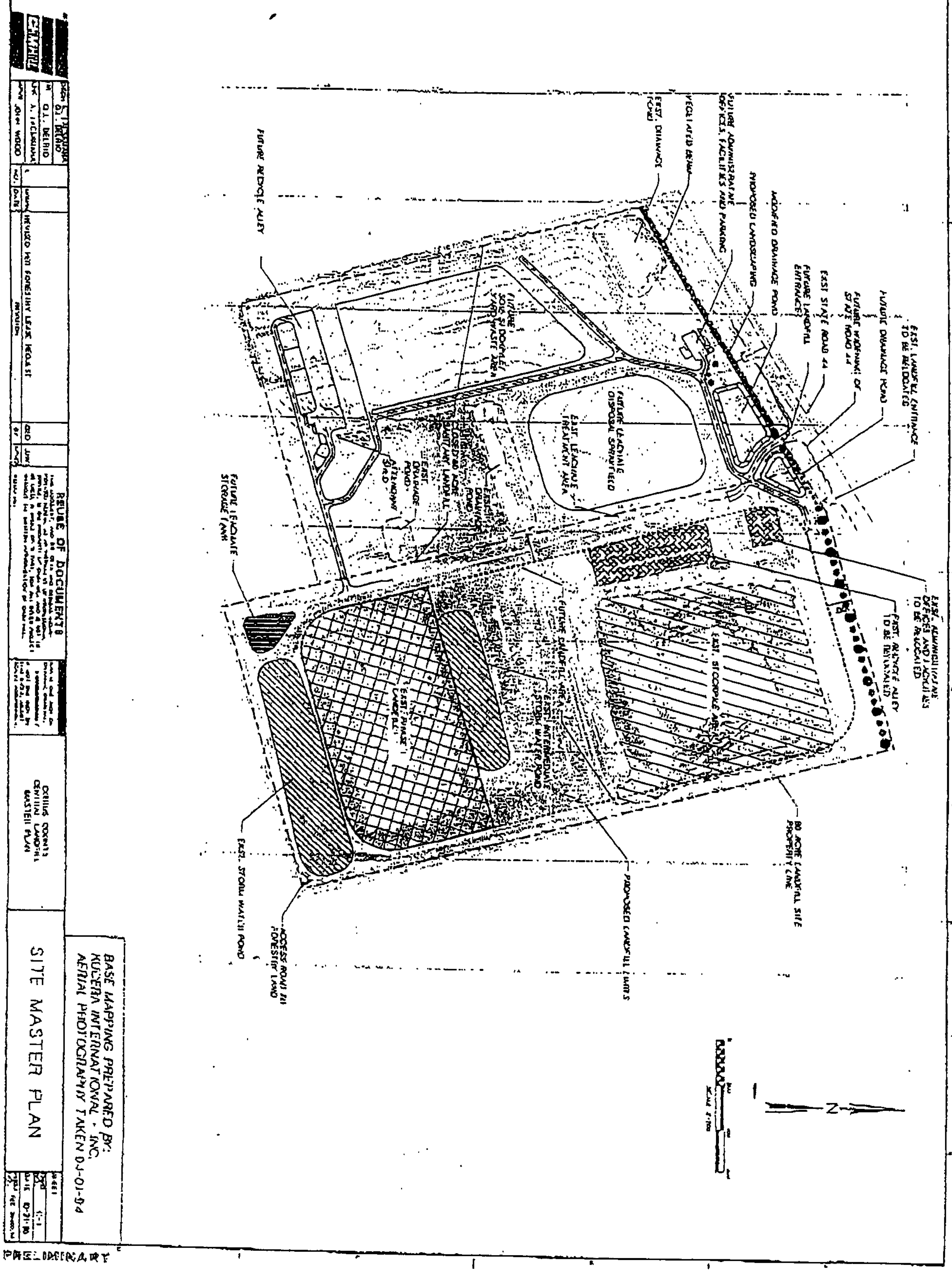

EXHIBIT C

TRUSTEES THE INTERNAL IMPROVEMENT TRUST FUND

BK 1130 PG 0124

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LEASE AGREEMENT

No. 3316

WHEREAS, the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida holds title to certain lands and property being utilized by the State of Florida for public purposes, and

WHEREAS, the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida is authorized in Section 253.03, Florida Statutes, to enter into leases for the use, benefit and possession of public lands by State agencies which may properly use and possess them for the benefit of the State;

NOW, THEREFORE, this agreement made between the BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND of the State of Florida, as LESSOR, and the DIVISION OF FORESTRY, DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES, as LESSEE,

WITNESSETH:

The parties, for and in consideration of mutual covenants and agreements hereinafter contained, hereby covenant and agree as follows:

1. The lessor does hereby lease to the lessee the following described premises in the County of Citrus, Hernando, Pasco & Sumter, State of Florida, together with the improvements thereon (if applicable), viz:

(Exhibit A - attached)

TO HAVE AND TO HOLD the above described land for a period of Fifty (50) years for management as a state forest (Withlacoochee State Forest).

2. The lessee shall have the right to enter upon said land for all purposes necessary to the full enjoyment by said lessee of the rights herein conveyed to it.

3. The lessee shall through its agents and employees prevent the unauthorized use of said land or any use thereof not in conformity with this lease.

1867 28

4. This lease shall terminate at the sole option of the lessor, and the lessee shall surrender up the premises to the lessor, when and if said premises, including lands and improvements, shall cease to be used for state forestry purposes (Withlacoochee State Forest).

Any costs arising out of the enforcement of the terms of this lease agreement shall be the exclusive obligation of the lessee, payable upon demand of the lessor.

5. The lessee hereby covenants and agrees to investigate all claims of every nature at its own expense and to indemnify, protect, defend, hold and save harmless the lessor from any and all claims, actions, lawsuits and demands of any kind or nature arising out of this agreement to the extent allowable by law.

6. The lessor does not warrant or guarantee title, right or interest in the hereinabove described property.

7. The lessor or its duly authorized agents shall have the right at any time to inspect the said land and the works and operations thereon of the lessee in any matter pertaining to this agreement.

8. The lessee agrees to assume all responsibility for liabilities that accrue to the subject property or to the improvements thereon, including any and all drainage or special assessments or taxes of every kind and description which are now or may be hereafter lawfully assessed and levied against the subject property during the effective period of this lease.

9. The lessee is hereby authorized to grant utility easements which will be necessary to service authorized facilities located within the leased premises. Copies of any such easements granted shall be filed timely with the lessor.

10. This agreement is for the purposes specified herein, and subleases of any nature, excepting utility easements incident to authorized facilities, (Provision 9), are prohibited, unless previously authorized by the lessor.

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No. 3316

11. Upon cessation of occupation of said property, the lessee agrees to leave all fixed improvements for the use of the lessor and to put no claim upon said fixed improvements; or, at the option of the lessor, the lessee agrees to remove any or all improvements on the property at the lessee's expense.

12. Execution of this agreement in no way affects the lessee's obligations pursuant to Chapter 267, Florida Statutes.

IN TESTIMONY WHEREOF, the lawfully designated agent of the Board of Trustees of the Internal Improvement Trust Fund, has hereunto subscribed his name and has caused the official seal of said Board to be hereunto affixed, in the City of Tallahassee, Florida, on the 10th day of January, A.D. 1984.

(SEAL)
BOARD OF TRUSTEES
OF THE INTERNAL
IMPROVEMENT TRUST
FUND OF THE STATE
OF FLORIDA

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA

By: [signature]
DIRECTOR, DIVISION OF STATE LANDS
AGENT FOR THE BOARD OF TRUSTEES
OF THE INTERNAL IMPROVEMENT TRUST
FUND OF THE STATE OF FLORIDA

APPROVED AS TO
FORM & LEGALITY
[signature]
DEPARTMENT ATTORNEY

DEPARTMENT OF AGRICULTURE AND
CONSUMER SERVICES
Division of Forestry

By: Doyle Conner
Commissioner of Agriculture

Approved as to form and legality

By: Leslie McLeod, Jr.
Resident Attorney

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LEASE NO. 3316

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All those certain tracts or parcels of land embraced within the Withlacoochee Land Utilization Project, FL-LU-3, lying and being in the counties of Citrus, Hernando, Pasco and Sumter, State of Florida, Tallahassee Meridian, to wit:

CITRUS COUNTY

T. 19 S., R. 18 E.,
- Sec. 1, S½;
- Sec. 2, S½S½, that part of NE¼SE¼ described in final judgment of 7/25/38, Civil Action No. 64, United States District Court, Southern District of Florida;
- Sec. 3, SE¼SE¼, SW¼SE¼ LESS AND EXCEPT a right-of-way described in final judgment of 7/25/38, Civil Action No. 44, USDC, Southern District of Florida;
- Sec. 10, E½;
- Secs. 11 to 14, inclusive;
- Sec. 15, E½;
- Sec. 21, SE¼NE¼, NE¼SE¼ LESS AND EXCEPT a tract of land described in deed dated 7/28/37, Book 73, page 195, Citrus County;
- Sec. 22, E½, S½NW¼, SW¼;
- Secs. 23 to 27, inclusive;
- Sec. 36, W½SW¼, SE¼SW¼, SE¼, N½ LESS AND EXCEPT a tract of land described in deed dated 3/19/37, Book 72, page 465, Citrus County.

T. 19 S., R. 19 E.,
- Sec. 6, S½, that part of S½NE¼ described in deed dated 2/18/38, Book 74, page 94, Citrus County, that part of S½NW¼ described in deed dated 12/17/37, Book 74, page 280, Citrus County;
- Sec. 7;
- Sec. 9, entire LESS AND EXCEPT a tract of land described in the deed dated 10/29/68 from the Director, Division of Lands, Forest Service, Department of Agriculture, acting on behalf of the United States of America, to Robert M. Howard, Sr., et ux;
- Sec. 10, W½NW¼, SE¼NW¼, SW¼, W½SE¼, that part of SE¼NE¼, of NW¼NE¼ and of NE¼NW¼ described in deed dated 4/15/38, Book 74, page 140, Citrus County, that part of SW¼NE¼ described in deed dated 8/16/38, Book 74, page 360, Citrus County;
- Sec. 11, SW¼SE¼, that part of S½NW¼ described in deed dated 4/15/38, Book 74, page 140, Citrus County;
- Sec. 13, SW¼SE¼, SE¼SE¼ LESS AND EXCEPT a right-of-way described in deed dated 3/17/37, Book 73, page 10, Citrus County;
- Sec. 14, SW¼;
- Sec. 15, W½NE¼, W½, SE¼;
- Secs. 16, 18, 19, 21 and 22;
- Sec. 23, NE¼NW¼, S½NW¼, SW¼, SE¼ LESS AND EXCEPT a right-of-way described in deeds dated 12/15/36 and 6/22/37, filed in Book 73, page 143 and Book 73, page 140, respectively, Citrus County, NE¼ LESS AND EXCEPT a right-of-way described in deed dated 2/17/38, Book 74, page 33, Citrus County;
- Sec. 24, SW¼, N½SE¼, SW¼SE¼, N½SE¼SE¼ LESS AND EXCEPT a tract of land described in deed dated 2/10/41, Book 76, page 451, Citrus County, N½ LESS AND EXCEPT a right-of-way described in deed dated 11/13/37, Book 73, page 477, Citrus County;
- Sec. 25, NW¼, N½SW¼, SW¼SW¼, W½SE¼;

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Sec. 26, entire LESS AND EXCEPT a tract of land described in deed dated 2/10/41, Book 76, page 449, Citrus County and a right-of-way described in deed dated 3/7/38, Book 74, page 90, Citrus County;
Secs. 27 and 28;
Sec. 30, S½NE¼NE¼, W½NE¼, SE¼NE¼, N½NW¼, SW¼NW¼, S½;
Sec. 31, fractional;
Secs. 33 and 34;
Sec. 35, entire LESS AND EXCEPT a tract of land described in final judgment of 2/1/39, Civil Action No. 74, USDC, Southern District of Florida and a right-of-way described in deed dated 3/7/38, Book 74, page 88, Citrus County;
Sec. 36.

T. 19 S., R. 20 E.,
Sec. 7, SW¼ LESS AND EXCEPT the SE¼NE¼SW¼ and two tracts of land and two rights-of-way, all described in deed dated 4/7/38, Book 74, page 129, Citrus County;
Sec. 18, NW¼ LESS AND EXCEPT THE E½SE¼SE¼NW¼ and a tract of land and a right-of-way, all described in deed dated 4/7/38, Book 74, page 129, Citrus County.

T. 20 S., R. 19 E.,
Sec. 1;
Sec. 2, entire LESS AND EXCEPT a right-of-way described in deed dated 12/29/37, Book 73, page 597, Citrus County;
Sec. 3, entire LESS AND EXCEPT a right-of-way described in deed dated 12/29/37, Book 73, page 597, Citrus County;
Secs. 4 and 5;
Sec. 6, fractional;
Sec. 7, entire LESS AND EXCEPT a right-of-way described in final judgment of 1/19/38, Civil Action No. 45, USDC, Southern District of Florida;
Secs. 8 and 9;
Sec. 10, entire LESS AND EXCEPT a right-of-way described in judgment of 6/9/42, Civil Action No. 50, USDC, Southern District of Florida and a right-of-way described in deed dated 9/13/37, Book 73, page 313, Citrus County and a right-of-way described in deed dated 7/31/37, Book 73, page 227, Citrus County;
Sec. 11, entire LESS AND EXCEPT a right-of-way described in deed dated 7/31/37, Book 73, page 227, Citrus County;
Sec. 12;
Sec. 14, W½ LESS AND EXCEPT a right-of-way described in deed dated 4/15/38, Book 74, page 140, Citrus County and a right-of-way described in deed dated 5/13/37, Book 73, page 99, Citrus County;
Secs. 15 to 17, inclusive;
Sec. 18, N½, E½SW¼, SE¼;
Sec. 19, E½, N½NW¼, S½SW¼NW¼, SE¼NW¼, SW¼;
Secs. 20 to 22, inclusive;
Sec. 23, NE¼NW¼, W½W½, NW¼NE¼ LESS AND EXCEPT a right-of-way described in deed dated 9/13/37, Book 73, page 313, Citrus County;

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Sec. 26, N½NW¼ LESS AND EXCEPT a right-of-way described in deed dated 6/17/37, Book 73, page 234, Citrus County;
Secs. 27 to 30, inclusive;
Sec. 31, N½NW¼, SE¼NW¼, N½NE¼SW¼, W½SW¼, SE¼SW¼, NW¼NW¼SE¼, S½SE¼, NE¼ LESS AND EXCEPT a tract of land described in deed dated 3/11/37, Book 72, page 467, Citrus County;
Sec. 32, N½NE¼, E½SE¼NE¼, W½, SE¼;
Sec. 33, entire LESS AND EXCEPT two tracts of land described in final judgment of 7/25/38, Civil Action No. 52, USDC, Southern District of Florida;
Sec. 34, N½, N½SW¼, SW¼SW¼, N½N½SE¼, SE¼NE¼SE¼, E½SE¼SE¼;
Sec. 35, SE¼NW¼ LESS AND EXCEPT a tract of land described in final judgment of 7/24/39, Civil Action No. 84, USDC, Southern District of Florida.

T. 21 S., R. 19 E.,
Sec. 3, NW¼, W½SW¼, NE¼SW¼;
Sec. 4;
Sec. 9, N½, NW¼SE¼;
Sec. 10, NE¼NE¼, SW¼NE¼, E½SW¼, SW¼SW¼, W½SE¼, NW¼ LESS AND EXCEPT a tract of land described in deed dated 9/13/37, Book 73, page 313, Citrus County.

HERNANDO COUNTY
(asterisk (*) indicates part of land described may lie in Sumter County)

T. 21 S., R. 19 E.,
Sec. 5, E½, NW¼, N½SW¼, SE¼SW¼;
Sec. 6, NE¼, N½NW¼;
Sec. 8, NE¼.

T. 21 S., R. 20 E.,
Sec. 17, entire LESS AND EXCEPT a right-of-way described in final judgment of 12/6/38, Civil Action No. 402, USDC, Southern District of Florida;
Sec. 18, E½SE¼, NW¼SE¼;
Sec. 19, E½NE¼, SW¼NE¼, SE¼ LESS AND EXCEPT a right-of-way described in deed dated 12/16/36, Book 72, page 77, Hernando County;
Sec. 20, NW¼, that part of W½SW¼ described in deed dated 7/9/36, Book 74, page 208, Hernando County;
*Sec. 25, N½NE¼NE¼, W½NE¼, W½, W½NE¼SE¼, NW¼SE¼, S½SE¼;
Sec. 33, E½SE¼;
Secs. 34 to 36, inclusive.

T. 22 S., R. 20 E.,
Secs. 1 to 3, inclusive;
Sec. 4, E½, E½NW¼, N½SW¼, SW¼SW¼, N½N½SE¼SW¼, S½SE¼SW¼;
Sec. 9, NE¼NE¼, W½E½NW¼NE¼, W½NW¼NE¼, N½NW¼;
Sec. 10, E½, E½SW¼, NW¼SW¼, NW¼ LESS AND EXCEPT a tract of land described in final judgment of 12/6/38, Civil Action No. 390, USDC, Southern

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2328

District of Florida and a tract of land described in deed dated 9/28/36, Book 68, page 580, Hernando County and a right-of-way described collectively in two deeds dated 3/31/38, Book 74, page 76, and Book 74, page 77, Hernando County and deed dated 8/31/37, Book 72, page 391, Hernando County;

Sec. 11;
Sec. 12, E½, E½NE¼NW¼, NW¼NW¼, S½NW¼, SW¼;
Secs. 13 and 14;
Sec. 15, E½, E½NW¼, N½NW¼NW¼, N½S½NW¼NW¼;
Sec. 23, E½, N½NW¼, SE¼NW¼, E½SW¼;
Sec. 24, N½NE¼, SW¼NE¼, W½SE¼NE¼, W½, SE¼;
Sec. 25;
Sec. 26, E½.

T. 21 S., R. 21 E.,
*Sec. 30, N½NW¼SW¼, S½SW¼, SW¼SE¼;
*Sec. 31, entire LESS AND EXCEPT a right-of-way described in deed dated 5/4/37, Book 72, page 252, Hernando County.

T. 22 S., R. 21 E.,
*Sec. 5;
Secs. 6 and 7;
*Sec. 8, N½NE¼, E½SE¼, W½ LESS AND EXCEPT two rights-of-way and a tract of land described in final judgment of 12/6/38, Civil Action No. 347, USDC, Southern District of Florida and two tracts of land described in deed dated 9/23/49, Book 111, page 281, Hernando County, SW¼SE¼ LESS AND EXCEPT a right-of-way described in deed dated 7/2/37, Book 72, page 317, Hernando County, that part of NW¼SE¼ described in deed dated 12/31/48, Book 107, page 192, Hernando County, SE¼NE¼ LESS AND EXCEPT a right-of-way described in final judgment of 2/1/39, Civil Action No. 62, USDC, Southern District of Florida;
*Sec. 9, entire LESS AND EXCEPT a right-of-way described in final judgment of 1/19/38, Civil Action No. 38, USDC, Southern District of Florida;
Sec. 14, that part of S½SW¼ described in deed dated 5/4/37, Book 72, page 252, Hernando County;
*Sec. 15, E½, NW¼NE¼, N½SW¼NE¼, W½, SE¼ LESS AND EXCEPT a tract of land described in deed dated 3/14/73, Book 311, page 772, Hernando County;
*Sec. 16, entire LESS AND EXCEPT a tract of land described in the deed dated 6/4/64, from the Deputy Chief of the Forest Service, Department of Agriculture, acting on behalf of the United States of America, to H. W. Lindsay;
Sec. 17;
Sec. 18, E½, NW¼, E½SW¼, NW¼SW¼, that part of SW¼SW¼ described in deed dated 5/4/37, Book 72, page 252, Hernando County;
Sec. 19;
Sec. 20, SW¼NE¼, N½NW¼, that part of SE¼NE¼ described in deed dated 5/4/37, Book 72, page 252, Hernando County, N½NE¼ LESS AND EXCEPT a tract of land described in deed dated 5/4/37, Book 72, page 252, Hernando County, and a tract of land described in deed dated 5/4/37, Book 72, page 346, Hernando County;

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24/28

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Secs. 15 to 17, inclusive;
Sec. 18, entire LESS AND EXCEPT a right-of-way described in deed dated 8/4/37, Book 72, page 369, Hernando County.

PASCO COUNTY

T. 23 S., R. 22 E.,
Sec. 19, NE¼SW¼, SW¼SW¼, SE¼, N½ LESS AND EXCEPT a right-of-way described in deed dated 9/22/36, Book 99, page 343, Pasco County;
Secs. 20 to 22, inclusive;
Sec. 23, S½NE¼NE¼, NW¼NE¼, S½NE¼, W½, NW¼SE¼, SW¼SE¼ LESS AND EXCEPT a tract of land described in deed dated 9/28/36, Book 99, page 340, Pasco County;
Sec. 24, E½, NE¼SW¼, S½SW¼, that part of NW¼NW¼ described in deed dated 3/7/39, Book 106, page 16, Pasco County;
Sec. 25;
Sec. 26, S½NE¼, N½NW¼, SW¼NW¼, S½;
Secs. 27 to 29, inclusive;
Sec. 30, E½, NE¼NW¼, S½SW¼;
Sec. 31, NW¼NW¼.

SUMTER COUNTY
(asterisk (*) indicates part of land described may lie in Hernando County)

T. 21 S., R. 20 E.,
*Sec. 25, N½NE¼NE¼, W½NE¼, W½, W½NE¼SE¼, NW¼SE¼, S½SE¼.

T. 21 S., R. 21 E.,
*Sec. 30, N½NW¼SW¼, S½SW¼, SW¼SE¼;
*Sec. 31, entire LESS AND EXCEPT a right-of-way described in deed dated 5/4/37, Book 72, page 252, Hernando County;
Sec. 32;
Sec. 33, entire LESS AND EXCEPT a tract of land described in deed dated 7/6/60, Book 21, page 429, Sumter County.

T. 22 S., R. 21 E.,
Sec. 4, W½NE¼, NW¼, S½ LESS AND EXCEPT a right-of-way described in deed dated 5/30/41, Book 112, page 497, Sumter County;
*Sec. 5;
*Sec. 8, N½NE¼, E½SE¼, W½ LESS AND EXCEPT two rights-of-way and a tract of land described in final judgment of 12/6/38, Civil Action No. 347, USDC, Southern District of Florida and two tracts of land described in deed dated 9/23/49, Book 111, page 281, Hernando County, SW¼SE¼ LESS AND EXCEPT a right-of-way described in deed dated 7/2/37, Book 72, page 317, Hernando County, that part of NW¼SE¼ described in deed dated 12/31/48, Book 107, page 192, Hernando County, SE¼NE¼ LESS AND EXCEPT a right-of-way described in final judgment of 2/1/39, Civil Action No. 62, USDC, Southern District of Florida;

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O.R. 1240 PG 01073

OFF REC 517 PG 0499

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*Sec. 9, entire LESS AND EXCEPT a right-of-way described in final judgment of 1/19/36, Civil Action No. 38, USDC, Southern District of Florida;
Sec. 10, $N\frac{1}{2}SW\frac{1}{4}$, $E\frac{1}{2}SE\frac{1}{4}SW\frac{1}{4}$, $W\frac{1}{2}NW\frac{1}{4}SE\frac{1}{4}$;
*Sec. 15, $E\frac{1}{2}$, $NW\frac{1}{4}NE\frac{1}{4}$, $N\frac{1}{2}SW\frac{1}{4}NE\frac{1}{4}$, $W\frac{1}{2}$, $SE\frac{1}{4}$ LESS AND EXCEPT a tract of land described in deed dated 3/14/73, Book 311, page 772, Hernando County;
*Sec. 16, entire LESS AND EXCEPT a tract of land described in the deed dated 6/1/64 from the Deputy Chief of the Forest Service, Department of Agriculture, acting on behalf of the United States of America, to H. W. Lindsay.

T. 22 S., R. 22 E.,
*Sec. 20, $S\frac{1}{2}SW\frac{1}{4}$;
Sec. 27, $W\frac{1}{2}$;
*Secs. 28, 29, 33 and 34.

T. 23 S., R. 23 E.,
Secs. 1 to 36, inclusive.

T. 24 S., R. 23 E.,
Secs. 1 to 6, inclusive.

Containing 113,431 acres, more or less.

(7) BOOK 610 PAGE 1237

O R 1240 PG 01074

24978

EXHIBIT D

The following narrative and map identify specifications for road improvement work to be performed by Citrus County on portions of Withlacoochee State Forest under provisions of Sublease Number 3316-S.

1.) Approximately twelve (12) miles of road, as identified on the enclosed map, shall be improved. Most of the improvement will take place on Forest Road 13 between State Road 44 and County Road 480, with Forest Road 2 improved as a connector between the landfill and Forest Road 13.

2.) All roads are to be filled and compacted to a level above the level of the surrounding forest grade and built with a crown such that water runs off of the road.

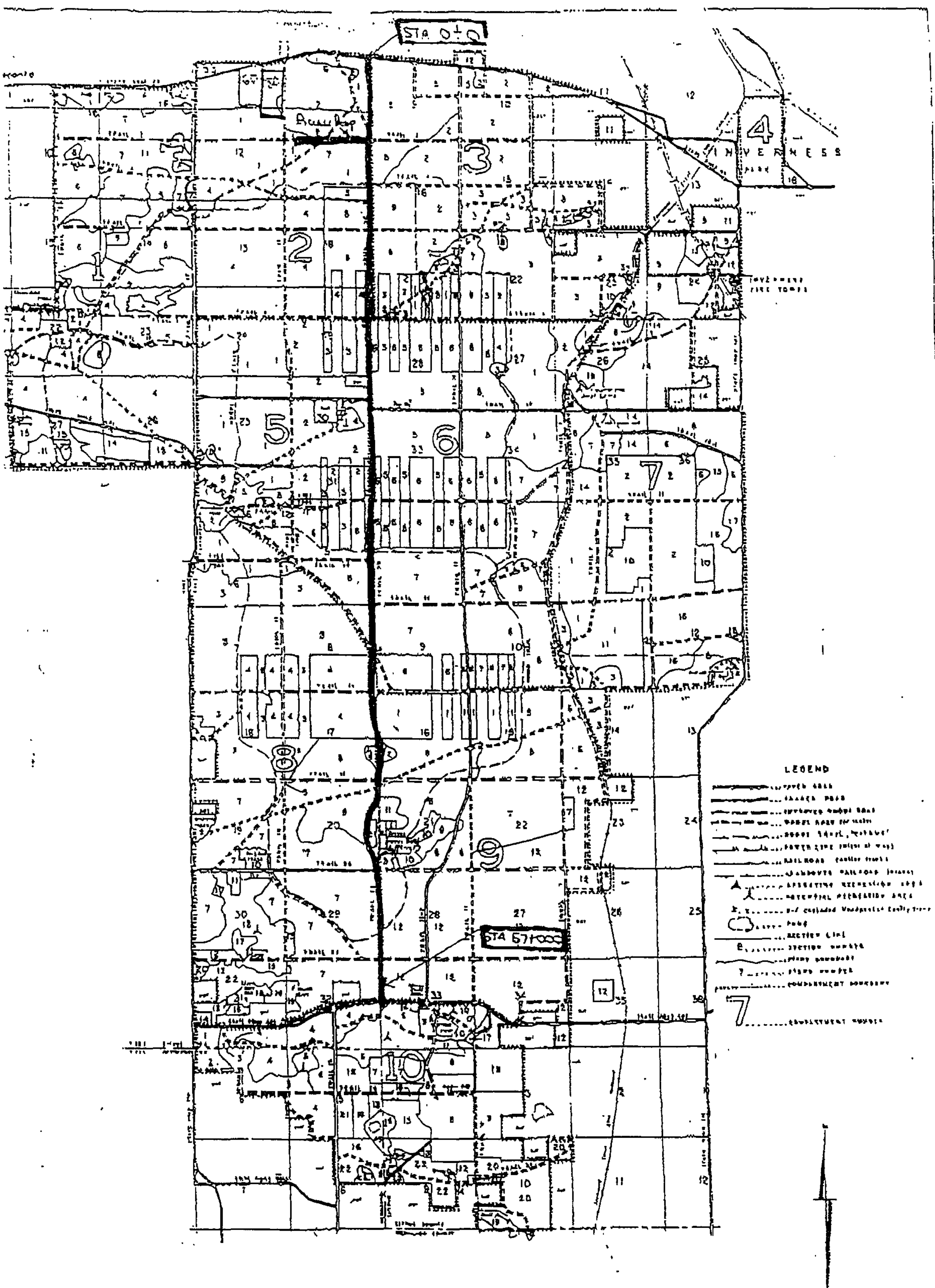
3.) At least thirty-three thousand, five hundred (33,500) feet of road improvements will include a cap of at least four (4) inches of railroad ballast rock in areas where large volumes of fill are needed.

4.) Properly engineered water washouts will be installed at necessary locations to prevent water build up on the roads.

5.) All work shall be carried out with little damage to existing road shoulder vegetation.

6.) Upon completion, access will be retained to all forest roads where the improved road crosses unimproved roads.

27 & 28



CITRUS TRACT
WITHLACOOCHEE STATE FOREST
TOWNSHIPS 19, 20 & 21 SOUTH – RANGES 18 & 19 EAST

28028

EXHIBIT E

Following are specifications for the cogongrass (*Imperata cylindrica*) survey to be conducted by Citrus County on portions of Withlacoochee State Forest (WSF) under provisions of Sublease Number 3316-5.

1.) Citrus County will arrange to have cogongrass infestations within the Citrus Unit of Withlacoochee State Forest located and drawn onto USGS topographic maps at a scale of 1:24,000 (1 inch = 2000 feet), or drawn onto aerial photographs. Citrus County will also arrange to have this data digitized in a GIS program compatible with ARC View II and referenced by latitude and longitude. These products will be delivered to the Division of Forestry upon completion of the project.

2.) A minimum of ninety per cent of all cogongrass patches over the size of 110 square feet shall be identified.

3.) The accuracy range for each occurrence shall be within plus or minus 20% for acreage and plus or minus 10% for distance measurements. For example, a patch of cogongrass that was 66 feet by 66 feet (0.1 acre) would have to be mapped as 59.4 feet to 72.6 feet on a side and between 0.08 to 0.12 acres.

4.) The area in acres of each occurrence shall be indexed to a location on the maps or aerial photographs.

5.) The Division of Forestry will designate a person to monitor the progress of the project and to serve as a contact for the County's contractor.

FDACS CONTRACT #
003289

ATL2

STATE OF FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES,

DIVISION OF FORESTRY

AMENDMENT NUMBER ONE TO SUBLEASE NUMBER 3316-05

THIS SUBLEASE AMENDMENT is entered into this 30th day of August, 2006, by and between the STATE OF FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES, DIVISION OF FORESTRY, hereinafter referred to as "SUBLESSOR" and CITRUS COUNTY, FLORIDA, hereinafter referred to as "SUBLESSEE";

W I T N E S S E T H

WHEREAS, the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida, by virtue of Section 253.03, Florida Statutes, holds title to certain lands and property for the use and benefit of the State of Florida; and

WHEREAS, on April 22, 1996, SUBLESSOR and SUBLESSEE entered into Sublease Number 3316-05; and

WHEREAS, SUBLESSOR and SUBLESSEE desire to amend the Sublease to include additional lands listed in Exhibit "A" for use by SUBLESSEE to construct and maintain monitoring wells.

NOW THEREFORE, in consideration of the mutual covenants and agreements contained herein, the parties hereto agree as follows:

1. The sublease agreement is hereby amended to add land described in Exhibit "A" to expand an existing well monitoring area within which SUBLESSEE may construct and maintain monitoring wells. As consideration for this land being added to this sublease, SUBLESSEE agrees to perform those obligations contained in Exhibit "B". The lands described in Exhibit "B" are for well monitoring purposes only and are not for any landfill expansion.

2. It is understood and agreed by SUBLESSOR and SUBLESSEE that in each and every respect the terms of the Sublease Number 3316-05 except as amended shall remain unchanged and in full force and effect and the same are hereby ratified, approved and confirmed by SUBLESSOR and SUBLESSEE.

CERTIFIED TO BE A TRUE COPY
BETTY STRIFLER
CLERK OF THE CIRCUIT COURT
BY Theresa Ste[illegible] D.C.
THIS 18 DAY OF Sept A.D. 2006

IN WITNESS WHEREOF, the parties have caused this sublease agreement to be executed on the day and year first above written.

Charles D. Baker
Witness
Chander D. Baker
Print/Type Witness Name

Susie P. Burch
Witness
Susie P. Burch
Print/Type Witness Name

STATE OF FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES, DIVISION OF FORESTRY

By: Mike Gresham (SEAL)

Mike Gresham
Print/Type Name

Title: Director of Administration

"SUBLESSOR"

STATE OF FLORIDA
COUNTY OF LEON

The foregoing instrument was acknowledged before me this 28th day of August 2004, by Mike Gresham, as Director of Administration, on behalf of the STATE OF FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES, DIVISION OF FORESTRY. He/She is personally known to me or has produced ______________ as identification.

Karen A. Meyer
Notary Public, State of Florida

Karen A. Meyer
Commission # DD346679
Expires October 20, 2008
Bonded Troy Fain - Insurance, Inc. 800-385-7019

Karen A. Meyer
Print/Type Notary Name

Commission Number: #DD 346679

Commission Expires: 10/20/2008

CITUS COUNTY, FLORIDA
BY ITS BOARD OF COUNTY COMMISSIONERS

By: Gary Bartell (SEAL)

Gary Bartell
Print/Type Name

Title: Chairman

(OFFICIAL SEAL)

Theresa SteelFox
Witness
Theresa SteelFox
Print/Type Witness Name

Glenda Brown
Witness
Glenda Brown
Print/Type Witness Name

ATTEST: Betty Strifler
~~County Administrator and~~ Ex-Officio
Clerk of the Board of County
Commissioners of Citrus County

"SUBLESSEE"

STATE OF FLORIDA
COUNTY OF CITRUS

The foregoing instrument was acknowledged before me this 8 day of August 2006 by Gary Bartell, ~~and~~ ________ as Chairman, and ________, respectively, on behalf of the Board of County Commissioners or Citrus County, Florida. They are personally known to me ~~or produced~~ ________ ~~as identification~~.

THERESA STEELFOX
Notary Public - State of Florida
My Commission Expires Nov 28, 2009
Commission # DD 481370
Bonded By National Notary Assn.

Theresa SteelFox
Notary Public, State of Florida

Print/Type Notary Name

Commission Number:

Commission Expires:

Consented to by the TRUSTEES on 30th day of August 2006

Gloria C. Nelson
GLORIA C. NELSON, OPERATIONS AND MANAGEMENT CONSULTANT MANAGER, BUREAU OF PUBLIC LAND ADMINISTRATION, DIVISION OF STATE LANDS, DEPARTMENT OF ENVIRONMENTAL PROTECTION

Approved as to Form and Legality
By: [signature]
DEP Attorney

EXHIBIT "A"

PARCEL 1:

Lots 1,2,3,4,5,6, 7, 8, 9, 10, 11 and 12, Block 153; Lots 1,2,3,4,5,6, 7, 8,9, 10, 11 and 12, Block 154; Lots 7, 8, 9, 10, 11 and 12, Block 155; Lots 1,2,3,4,5 and 6, Block 156; Lots 1,6,8,9, 10, 11 and 12, Block 157, TOWN PLAT OF HOMOSASSA, according to the plat thereof, recorded in Plat Book 1, Page 6, Public Records of Citrus County, Florida.

PARCEL 2:

The West 1/2 of Block 21, HOMOSASSA COMPANY'S SUBDIVISION OF SECTION 33, TOWNSHIP 19 SOUTH, RANGE 17 EAST, according to the plat thereof, recorded in Plat Book 1, Page 4, Public Records of Citrus County, Florida.

PARCEL 3:

A portion of the NE 1/4 of Section 14, Township 20 South, Range 19 East, Citrus County, Florida, more particularly described as follows:

Begin at the Northeast corner of Section 14, Township 20 South, Range 19 East, Citrus County, Florida; thence S 89°42'37" W, along the North line of the NE 1/4 of said Section 14, a distance of 389.96 feet; thence, departing said North line, S 00°03'44" W, a distance of 1,060.00 feet; thence S 89°42'37" W, a distance of 917.00 feet to a point of intersection with the West line of the East 1/2 of the NE 1/4 of said Section 14; thence S 00°03'44" W, along said West line, a distance of 182.59 feet; thence, departing said West line, N 89°42'37" E, a distance of 1,309.26 feet to a point of intersection with the East line of the NE 1/4 of said Section 14; thence N 00°02'37" W, along said East line, a distance of 1,242.60 feet, to the Point of Beginning.

All lying and being in Citrus County, Florida.

Homosassa Springs Mitigation
Citrus County (Donor)
Citrus County

BA 11/7/06

ATTACHMENT E-4

PROOF OF PUBLICATION

Board of Country Commissioners
DEPARTMENT OF PUBLIC WORKS
SOLID WASTE MANAGEMENT DIVISION
P.O. Box 340, Lecanto, Florida 34460
Telephone: (352) 527-7670 FAX: (352) 527-7672
email: landfillinfo@bocc.citrus.fl.us
TDD Telephone: (352) 527-5303
Citrus Springs/Dunnellon/Inglis/Yankeetown area Toll Free (352) 489-2120

Document Transmittal

SCS ENGINEERS
NOV 6 2008

TO: SCS Engineers

Att: Dominique Bramlett

FROM: Cathy Winter, Contract Services Specialist
Citrus County, Division of
Solid Waste Management
Fax #352/527-7672
Phone 352/527-7670

Re: Phase 3 Landfill Expansion

Transmittal Date: November 3, 2008

Please find the following documents for your records:

- Original Proof of Publication for Notice of Application

CC: 30 day file

Cjw-k:F:\SHARED\Bids\Solid Waste Mgt Consultant Bids\RFQ 109-07 SCS Eng (T1.Master Files T2.SM Files)\TransmittalSCS.DB.11.3.08.doc

494-1006 MCRN

State of Florida
Department of Environmental Protection
Notice of Application

The Department announces receipt of an application for a construction permit from Citrus County Solid Waste Division for a permit to construct a lateral expansion of an existing Class I Landfill (Phase 3), subject to Department rules, at the Citrus County Central Class I Landfill located on S.R. 44, 3 miles east of Lecanto, Citrus County, Florida.

This application is being processed and is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at the Department of Environmental Protection, Southwest District Office, 13051 North Telecom Parkway, Temple Terrace, Florida 33637-0926.

730514

Proof of Publication

from the

CITRUS COUNTY CHRONICLE

Crystal River, Citrus County, Florida

PUBLISHED DAILY

STATE OF FLORIDA
COUNTY OF CITRUS
Before the undersigned authority personally appeared

Mary Ann Naczi

Of the Citrus County Chronicle, a newspaper published daily at Crystal River, in Citrus County, Florida, that the attached copy of advertisement being a public notice in the matter of the

Insertion Order: 730514
Legal number: 494-1006 MCRN
Description: State of Florida Department of Environmental Protection Notice of Application for Solid Waste Management Division
Display Advertisement: to run 1 time

Court, was published in said newspaper in the issue of
Date of publication: October 6, 2008.

Affiant further says that the Citrus County Chronicle is a Newspaper published at Crystal River in said Citrus County, Florida, and that the said newspaper has heretofore been continuously published in Citrus County, Florida, each week and has been entered as second class mail matter at the post office in Inverness in said Citrus County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he/she has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in the said newspaper.

Mary Ann Naczi

The forgoing instrument was acknowledged before me

This 30th day of October 2008

By: Mary Ann Naczi

who is personally known to me and who did take an oath.

Nancy A Parke

Notary Public NANCY A PARKE

NANCY A. PARKE
Commission # DD[illegible]
Expires [illegible]
Bonded Through
Florida Notary Assn

SECTION F

LANDFILL PERMIT REQUIREMENTS

F.1 VICINITY MAP

The aerial photograph provided in Attachment F-2 indicates land use, significant structures, water bodies, roads, and zoning within one mile of the landfill as required per Rule 62-701.330(3)(a), F.A.C.

F.2 AIRPORT MAP

Figure E-1 - Airports within five miles of the Citrus County Central Landfill is included in Attachment E-1. As depicted on Figure E-1 the Citrus County Central Landfill is not located within five miles of any licensed airports.

F.3 PLOT PLAN

The plot plans and drawings required by Rule 62-701.330(3)(c), FAC are included in Attachment F-1. This includes plot plans that show the proposed dimensions, water quality monitoring wells, plans of the proposed trenching and disposal area, plans showing the existing topography and the proposed final contours, and the proximity of the existing landfill to the proposed expansion area.

The locations of soil borings taken were included in Appendix B of Universal Engineering's Geotechnical Report located in Appendix F of the Phase 2 Construction Permit Application report. No additional soil borings were taken as part of this Construction Permit Application.

No additional fencing is required, since the proposed expansion area lies adjacent to the existing landfill and within the existing fence surrounding the facility.

F.4 TOPOGRAPHIC MAP

A current aerial photograph is provided in the Construction Permit Application drawings located in Attachment F-1. The photograph indicates proposed fill area, borrow area, access roads, grades, drainage features, cross section of lifts, fencing and equipment facilities as required by Rule 62-701.330(3)(d), F.A.C.

F.5 LANDFILL REPORT

F.5.a Current and Projected Population

The estimated population of the landfill service area, as determined by the University of Florida Bureau of Business and Economic Research Bulletin 138 projections of Florida Population by County 2003-2030, is shown in the following table:

TABLE F-1. PROJECTED ~~WASTE DISPOSAL~~POPULATION CITRUS COUNTY CENTRAL LANDFILL

Year	Population*
2008	138,280
2009	140,740
2010**	143,200
2011	145,580
2012	147,960
2013	150,340
2014	152,720
2015**	155,100
2016	157,480
2017	159,860
2018	162,240
2019	164,620
2020**	167,000

Source:
* University of Florida Bureau if Business and Economic Research bulletin 138, Projections of Florida Population by County 2003-2030.

** University of Florida Bureau if Business and Economic Research estimates population in five-year intervals that are highlighted in bold. A linear interpolation for increase in population was performed between two highlighted years.

F.5.b Waste Type, Quantity, and Source

Solid waste currently entering the Citrus County Central Landfill is mainly Class I municipal solid waste with sources that include residential, commercial, and industrial, non-hazardous waste customers. Other waste, such as C&D debris and non-combustible materials, are also accepted in mixed loads.

Waste projections were developed using recent waste generation and population projections. In developing the waste projections, several assumptions were made. It was assumed that the current per capita waste generation requiring disposal will remain constant and that total waste quantity will grow in proportion to population growth. The future increase in solid waste quantity is estimated to be 4% per year.

Furthermore, of the projected total annual waste estimated to be received at the landfill facility, approximately 15 percent will be recycled and 85 percent will require disposal in the landfill. Waste to be recycled includes yard waste, white goods and other scrap metal, tires, electronics, plus household commodities (paper, cardboard, cans and bottles). Changes in projected population growth, recycling, and economic growth within the county may influence waste projections. Table F-2 presents the waste projection data.

TABLE F-2. PROJECTED WASTE RECEIVED CITRUS COUNTY CENTRAL LANDFILL

Year	Solid Waste Received (tons)
2007-08	118,111
2008-09	122,835
2009-10	127,749
2010-11	132,858
2011-12	132,858
2012-13	143,700
2013-14	149,448
2014-15	155,426
2015-16	161,643

F.5.c Anticipated Facility Life

The estimated life of a landfill is influenced by various factors, which include the actual solid waste disposal quantity and operational factors including waste density achieved, type of daily cover materials, final achievable side slopes, and top elevation, and the overall rate of settlement of the waste mass. Key design and operation assumptions in estimating the life of site include:

- The final contours shown on the Construction Permit Application drawings (Attachment F-1).
- The assumed in place density of the waste is approximately 1,715 pounds per cubic yards (lbs/yd^3), based on the tonnage information supplied by the County.
- The estimated remaining air space volume through Phase 2 as of April 12, 2008 was 1,035,846 cubic yards (yd^3). The total remaining air space volume was calculated by comparing the final design contours of Phases 1, 1A and 2 to an aerial topographic map of the same area provided by Kucera dated April 12, 2008.

The remaining life through Phase 2 was calculated by applying the airspace utilization factor to the projected quantities of future waste. The projected future waste generation rates are based on a four percent annual increase applied to the historic waste generation rate. The projected tonnage for each year is multiplied by the utilization rate to calculate the volume of airspace consumed. The airspace projected to be consumed each year is subtracted from the remaining airspace for each year until the available airspace is exhausted. The calculations located in Attachment F-5 indicate the Phase 2 area has an estimated life to April 2015.

- Phase 3 will provide an additional 786,692 yd^3 of air space available based upon the topographic map provided by Kucera dated April 12, 2008.

Phase 3 will provide an additional 4.3 years of site life thus, the remaining life through Phase 3 has an estimated life to August 2019 as shown in the calculations located in Attachment F-5.

F.5.d Cover Material

Cover material will be utilized to minimize vector breeding, animal attraction, and fire potential, as well as to prevent blowing litter and control odors. Daily cover will be composed of soil from the on-site stockpile, a 50/50 mixture of yard waste mulch and soil, synthetic materials such as tarps and geomembranes, or approved Alternate Daily Cover (ADC) material consisting of a spray on slurry of polymer and recycled paper fibers. Daily soil cover will be placed and compacted to a minimum thickness of 6 inches; spray on daily cover will be applied per manufacturer specifications and shall not be used in the rain. The intermediate cover will be comprised of soil from the on-site stockpile or a 50/50 mixture of yard waste mulch and soil. The intermediate soil cover will be placed and compacted to a minimum thickness of 12 inches. Mulch is from on-site recycled yard waste.

F.6 APPROVED LABORATORY

Currently one of the engineering consultants under contract with the County selects a qualified laboratory as a subcontractor for analytical work for groundwater and leachate monitoring. The credentials of the selected laboratory are presented along with the first report prepared for the County. No change is contemplated for the proposed Phase 3 disposal area described in this Construction Permit Application.

F.7 FINANCIAL RESPONSIBILITY

Financial responsibility requirements are discussed in Section S of this Construction Permit Application.

ATTACHMENT F-1

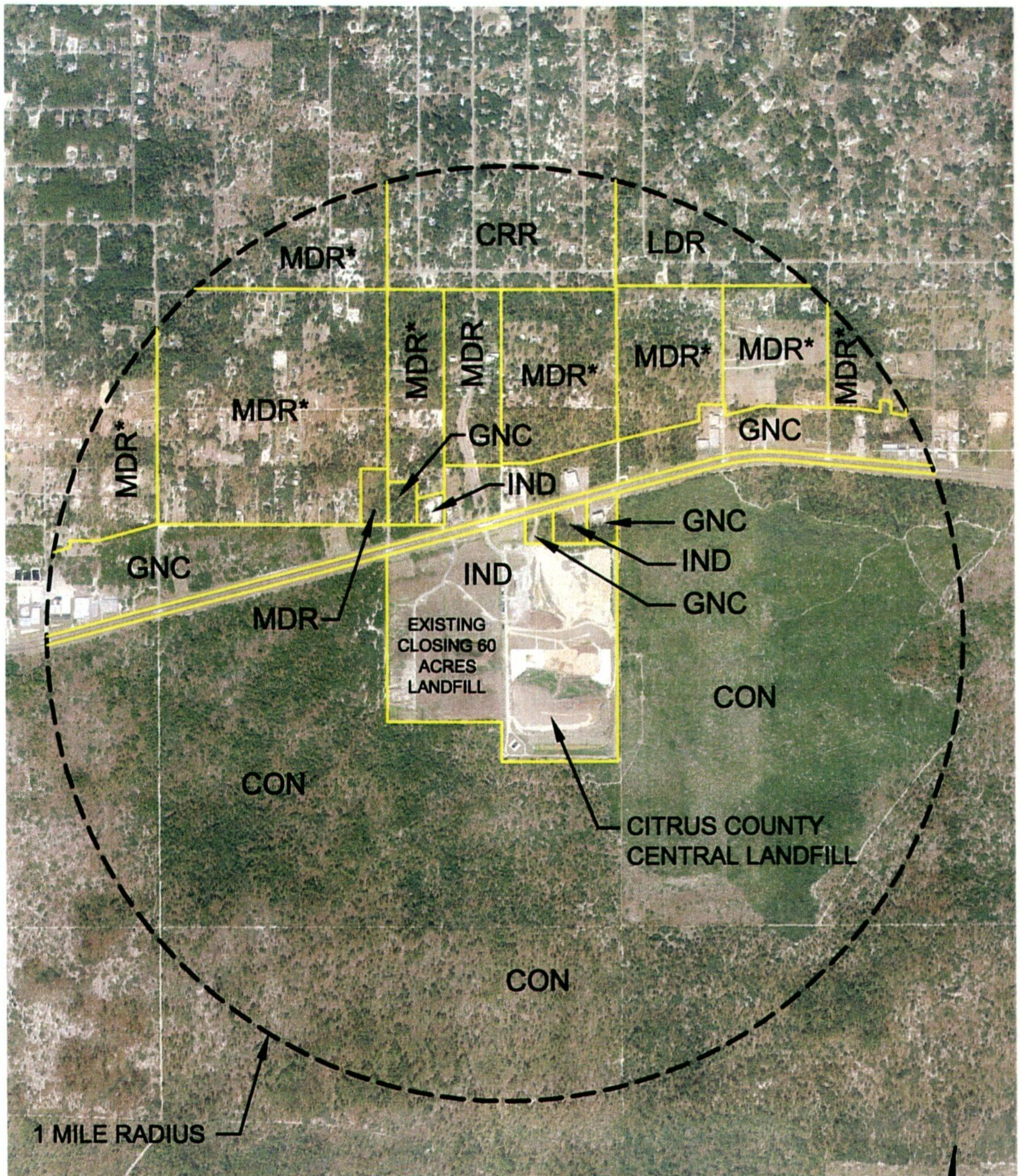
CONSTRUCTION PERMIT APPLICATION DRAWINGS

(24"x36" DRAWINGS BOUND UNDER SEPARATE COVER)

ATTACHMENT F-2

FIGURE F-1. LAND USE AND ZONING MAP

AERIAL PHOTOGRAPHY DATE: OCTOBER 12, 2006.



Zoning Code legend

GNC	General Commercial
IND	Industrial
CON	Conservation
MDR	Medium Density Residential
MDR*	Medium Density Residential (Including Modular)
LDR	Low Density Residential
CRR	Central Ridge Residential

N

0 1000 2000

SCALE IN FEET

SCS ENGINEERS

G:\PROJECT\Citrus\09207049.02\Figures\074902Zoning-Map.dwg Apr 07, 2008 - 9:33am Layout Name: Figure 1-1 By: cnguyen

Figure F-1. Land Use And Zoning Map

ATTACHMENT F-3

PHASE 3 FILL SEQUENCE DRAWINGS

ATTACHMENT F-4

FINAL BUILDOUT OF PHASES 1/1A, 2 AND 3

ATTACHMENT F-5

SITE LIFE CALCULATIONS FOR PHASE 3

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
AUG 14 2008
SOUTHWEST DISTRICT TAMPA

SITE LIFE CALCULATIONS CALCULATIONS

Citrus County
Phase 3 Expansion

Prepared for:

Citrus County
Board of County Commissioners
P.O. Box 340
Lecanto, Florida 34460

Presented by:

SCS ENGINEERS
4041 Park Oaks Blvd., Suite 100
Tampa, Florida 33610
(813) 621-0080

DOMINIQUE H. BRAMLETT LICENSED NO. 61829 FLORIDA PROFESSIONAL ENGINEER
Dominique H. Bramlett, P.E.
P.E. No. 61829

August 14, 2008
File No. 09207049.02

SCS ENGINEERS

Sheet 1 of 1

Client	Project	Job No.
Citrus County	Central Landfill, Florida	9207049.02

Subject	By	Date
Site life calculations for Phase 3	DHB	9-Jul-08
	Checked [illegible]	Date 7/18/08

Objective: Calculate remaining site life for Phase 3 using waste tonnage records from Citrus County and calculated waste generation projections.

Approach: 1. Calculate the available airspace as of the most recent survey.
2. Calculate "Effective Density" using volume consumed between October 2007 and April 2008
3. Use the effecive density to calculate the remaining life of the available airspace.

Airspace available from April 2008 to Final Grade = 1,822,538 CY (As per Final Buildout vs. 4/12/08 Survey)

Air volume consumed 10/11/07 to 4/12/08 = 62,202 CY (Based upon Phase 2 site life calculations)

Effective Density calcs:

Waste disposed between 10/10/07 and 4/12/08 = 53,334 tons (per scalehouse records).

Effective density = $\frac{53{,}334 \text{ tons}}{62{,}202}$ = 1,715 lbs/CY

Effective airspace consumption rate = 1.17 CY/ton

Assuming the waste will be filled up to the final capacity and allowed to settle before placing the cover soil

Cap volume = 0 CY

Subtract Cap Volume from air volume to determine useable waste volume for site life calculation

Waste Volume = 1,822,538 CY

SITE LIFE CALCULATION (based on County waste tonnage records and population projections from University of Florida)

Year	Tonnage *	Volume Consumed (CY)	Net Remaining Airspace (CY)	
			1,822,538	(approx. air volume remaining as of April 2008)
2007-08	58,000	67,644	1,754,894	(Second half of year)
2008-09	113,360	132,209	1,622,685	
2009-10	117,894	137,497	1,485,188	
2010-11	122,610	142,997	1,342,191	
2011-12	127,515	148,717	1,193,475	
2012-13	132,615	154,665	1,038,809	
2013-14	137,920	160,852	877,957	
2014-15	143,437	167,286	710,671	
2015-16	149,174	173,978	536,693	
2016-17	155,141	180,937	355,757	
2017-18	161,347	188,174	167,582	
2018-19	167,800	195,701	-28,119	

* Annual tonnage based on a 4% increase from tonnaged used during the 2008-09 year.

CONCLUSION:

2018-19 average monthly disposal rate = 16,308 CY/month

Number of months used in 2018-19 = 10.28 months

Approximate Fill Completion Date = August, 2019

ATTENTION

OVERSIZED MAPS HAVE BEEN SCANNED SEPARATELY PLEASE SEE:

- 21375-012-SC/01-Attachment F-5 Final Closure Plan ✓
- 21375-012-SC/01-Attachment F-5 Sheet 1 of 2 Survey ✓
- 21375-012-SC/01-Attachment F-5 Sheet 2 of 2 Survey ✓

ATTACHMENTS

Material Summary R

From: 10/10/2007 To:

Product	Name	# Transaction	% Transactioi	Weight
851M	SLUDGE	106	32.52%	475.40
861C	BOATS	4	1.23%	2.40
871B	VERIFIED BURIAL	3	0.92%	1.36
871C	VERIFIED BURIAL	1	0.31%	0.68
891B	SPECIAL WASTE	7	2.15%	13.81
891C	SPECIAL WASTE	5	1.53%	3.04
DRY	UTILITIES DRIED SLUDGE	8	2.45%	39.15
SHW	SPECIAL HANDLE WASTE	2	0.61%	2.76
51	30 GAL BAGS OR EQUIVALENT	179	0.31%	3.58
52	30 GAL BAGS OR EQUIVALENT	419	0.72%	16.76
53	30 GAL BAGS OR EQUIVALENT	241	0.42%	14.46
54	30 GAL BAGS OR EQUIVALENT	1511	2.60%	120.88
55	30 GAL BAGS OR EQUIVALENT	179	0.31%	17.90
56	30 GAL BAGS OR EQUIVALENT	499	0.86%	59.88
57	30 GAL BAGS OR EQUIVALENT	73	0.13%	10.22
58	30 GAL BAGS OR EQUIVALENT	210	0.36%	33.60
59	30 GAL BAGS OR EQUIVALENT	74	0.13%	13.32
600	Bulk Trash Citizens	1293	2.23%	425.00
600NP	NON PROFIT R/A SCALE TRASH FREE	2	0.00%	0.32
600U	UNCOVERED RECYCLE ALLEY SCALE TRASH	155	0.27%	36.76
60F	FREE TRASH TO ROLLOFFS	423	0.73%	63.45
60H	TRASH @ 50% TO ROLLOFFS	2	0.00%	0.82
900	trash to cell	643	1.11%	4,613.33
90F	FREE GARBAGE CLASS I CELL	24	0.04%	19.51
90R	RECYCLING TRASH TO CELL	10	0.02%	16.64
911C	1 30 GAL BAGS OR EQUIVALENT	1520	2.62%	30.40
911F	1 FREE 30 GAL BAGS OR EQUIVALENT	6	0.01%	0.12
912C	2 30 GAL BAGS OR EQUIVALENT	3111	5.36%	124.44
913C	3 30 GAL BAGS OR EQUIVALENT	1690	2.91%	101.40
914C	4 30 GAL BAGS OR EQUIVALENT	14351	24.73%	1,148.08
915C	5 30 GAL BAGS OR EQUIVALENT	1676	2.89%	167.60
916C	6 30 GAL BAGS OR EQUIVALENT	4299	7.41%	515.88
917C	7 30 GAL BAGS OR EQUIVALENT	535	0.92%	74.90
918C	8 30 GAL BAGS OR EQUIVALENT	1655	2.85%	297.90
919C	9 30 GAL BAGS OR EQUIVALENT	709	1.22%	127.62
920	ROLL-OFF FROM UNINCORPORATED	144	0.25%	534.21
921B	BUSINESS CSA WEIGHED	632	1.09%	325.60
921C	CSA WEIGHED	9989	17.21%	3,368.57
921F	CSA WEIGHED FREE	3631	6.26%	544.65
921M	MUNICIPAL CSA WEIGHED	3	0.01%	0.68
922B	BUSINESS CSA WEIGHED UNCOVERED	21	0.04%	10.58
922C	CSA WEIGHED UNCOVERED	1302	2.24%	285.44
925	ROLL-OFF FROM CITIES	27	0.05%	104.05
931B	NON-ASSESSED GARBAGE TO THE CELL	19	0.03%	58.48
931C	Garbage to Cell	4709	8.11%	35,158.15
931F	Free Trash to the Cell	274	0.47%	326.77

931M	MUNICIPAL GARBAGE TO CELL	1	0.00%	0.99
932C	UNCOVERED GARBAGE TO CELL	1	0.00%	0.16
941B	ROLL-OFF FROM UNINCORPORATED	940	1.62%	3,235.72
941M	ROLL-OFF FROM CITIES	170	0.29%	731.31
942B	ROLL-OFF FROM UNICORPORATED UNCOVERE	1	0.00%	0.95
945	MUNICIPAL RATE@ 45.00 a Ton	4	0.01%	5.78
9NC	NOT CERTIFIED OR ASSESSED	98	0.17%	47.50
9NCU	UNCOVERED NOT CERTIFIED OR ASSESSED	3	0.01%	0.67
		57,594		**53,333.61**

KUCERA INTERNATIONAL INC.

PHOTOGRAMMETRISTS • GEOGRAPHIC PROFESSIONALS • ENGINEERS

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18921G East Valley View Parkway
PMB 296
Independence, MO 64055
(816) 516-0493
(866) 336-2908
[illegible]elly@kucerainternational.com

REPORT OF TOPOGRAPHIC MAP
SURVEY OF LANDS IN THE
SE 1/4 OF SECTION 1-TWP19 SOUTH-RNG18 EAST,
Tallahassee Meridian
IN CITURS COUNTY FLORIDA
Known as Citrus County Central Landfill
Our Project No. 36039-Date of Photography April 12, 2008

<u>Ground Surveys and Custodianship</u>
Ground surveys for mapping were performed by Citrus County, Division of Engineering, Survey Section Lecanto, Florida, under the direct supervision of Mr. Patrick L. Henson, PLS No. 4547. Elevations shown hereon are based on N.G.V.D. of 1929, D.O.T. B.M. No. 54, EL = 115.05.

This topographic map and report is not valid without the signature and original seal of a Florida licensed surveyor and mapper which can be found at the end of this report. The map and report are not full and complete without the other.

<u>ACCURACY</u>
Horizontal and vertical ground surveys meet minimum relative accuracy for photogrammetric topographic mapping at 1" = 100' with 1' contours.

Photogrammetric topographic mapping meets accuracy standards as classified in the Florida Minimum Technical Standards – Chapter 61G17-6.

<u>LIMITATIONS</u>
No ground surveys were obtained to check photogrammetric horizontal and vertical accuracy's. However, if future ground surveys reveal an accuracy error greater than Minimum Technical Standards the photogrammetrist will remap the area of concern and resubmit approved mapping with appropriate report and notes.

Planimetric features and vertical data that is obscured from the stereo operators view due to heavy brush, long grass, tree cover or other physical features are to be considered horizontally and vertically indefinite and further ground surveys must be taken to bring these features to an accuracy that meets Minimum Technical Standards.

Report of Topographic Map
Our Project No. 36039
April 12, 2008

DIGITAL IMAGE
The geo-referenced ortho image is based on the topographic mapping and points file data.

Prepared for:
SCS Engineers
4041 Park Oaks Blvd.
Suite 100
Tampa, Florida 33610

Survey and Mapper in Responsible Charge:
Larry E. Towles
KUCERA SOUTH
Professional Surveyor and Mapper
License Number LS5413

Certified Photogrammetrist
702R

Larry E. Towles

Date Signed: 4-23-2008

Seal

SECTION G

GENERAL CRITERIA FOR LANDFILLS

G.1 100-YEAR FLOODPLAIN

There has been no change in the 100-year flood plain since Phase 1A was constructed as verified by review of FEMA map panel #250 dated August 15, 1984. The proposed Phase 3 disposal area is outside of the 100-year flood plain. A copy of the flood hazard map for the Citrus County Central Landfill is shown in Figure G-1 located in Attachment G-1.

G.2 MINIMUM HORIZONTAL SEPARATION

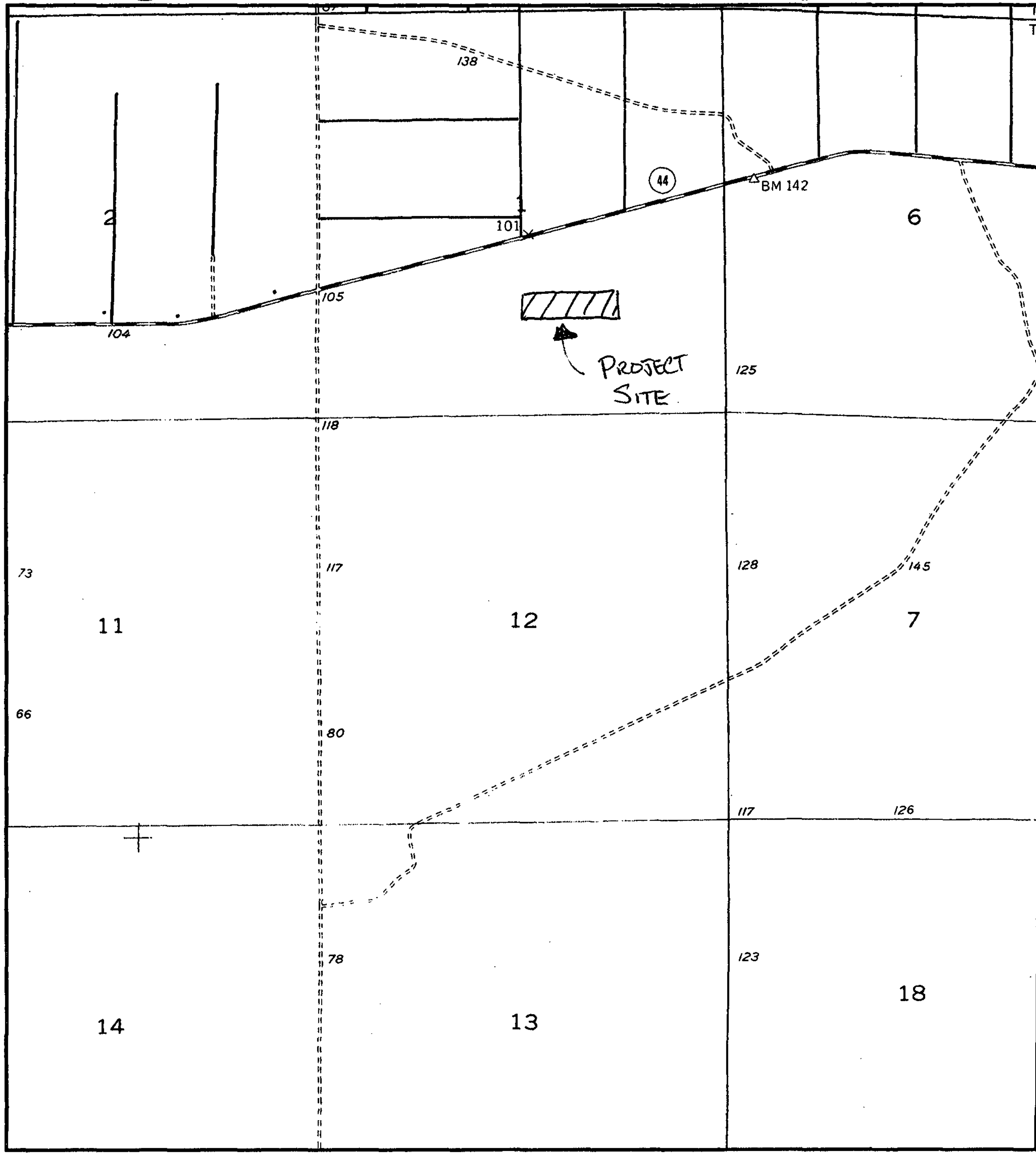
Rule 62-701.340(4)(c), FAC, requires a minimum 100-feet horizontal separation between waste deposits and the landfill property boundary as measured from the toe of the proposed final cover slope. As shown on the Construction Permit Application drawings (Attachment F-1), more than 100 feet measured horizontally separates the toe of the final cover slope of the Citrus County Central Class I Landfill and the landfill property boundary.

G.3 LANDFILL SCREENING

Citrus County has implemented a comprehensive plan to screen the landfill from public view. Visual screening of the landfill is provided by the existing pine flatwoods/turkey oak forest, which surrounds most of the site. The County has also planted over 350 native trees and shrubs along the north side of the landfill property. The entrance road from SR 44 is the only area not screened from public view.

ATTACHMENT G-1

FIGURE G-1. FLOOD HAZARD MAP



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITRUS COUNTY, FLORIDA
(UNINCORPORATED AREAS)

PANEL 250 OF 400
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
120063 0250 B

EFFECTIVE DATE:
AUGUST 15, 1984

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

FIGURE C-1 FLOOD HAZARD MAP

SECTION H

LANDFILL CONSTRUCTION REQUIREMENTS

See Volume 2
For
Section H and Section H Attachments

SECTION I

HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS

I.1 HYDROGEOLOGICAL INVESTIGATION AND SITE REPORT

The Citrus County Landfill has had numerous geological, hydrogeological and geotechnical investigations conducted over the last 20 years as part of the design, permitting, and on-going monitoring of lined waste disposal cells at the facility. Copies of these reports were provided in the Phase 2 Expansion Construction Permit Application or under a separate cover to FDEP and include the following:

- *Citrus County Central Landfill – Expansion Site Ground Water Monitoring Plan*, August 1988, prepared by Post, Buckley, Schuh & Jernigan, Inc.(PBS&J): The PBS&J investigation was performed for the new (at the time) proposed 80-acre landfill site and results provided within the report also include the area of the proposed Phase 3 expansion. The PBS&J report was provided in Appendix G of the Phase 2 Expansion Construction Permit Application.

- *Ground Water and Leachate Monitoring Plan Review, Class I Central Landfill, Citrus County, FL*, July 2001, prepared by Jones Edmunds and Associates, Inc.(JE&A): The JE&A Report provides information on the overall ground water resources and monitoring effort on-going for the entire 80-acre site. The JE&A report was provided in Appendix M of the Phase 2 Expansion Construction Permit Application.

- *Geotechnical Investigation for Citrus County Central Landfill – New Disposal Cell*, November 2001, prepared by Universal Engineering Sciences (Universal): The Universal report provides specific geologic, hydrogeologic and geotechnical information related to the proposed Phase 2 expansion area. A copy of the Universal report is provided in Appendix F.

- *Citrus County Central Class I Landfill, Biennial Report 2004-2007*, July 2007, prepared by Jones Edmunds and Associates, Inc. (JE&A): The JE&A Report provides information on the overall ground water resources and monitoring effort on-going for the entire 80-acre site for the period extending from October 2004 through April 2007. This document was provided under a separate cover to FDEP.

The following documents provide new or revised information regarding aspects of the site hydrogeology:

- ~~2004 JE&A GWMPE~~Ground Water Monitoring Plan Evaluation, 2004 prepared by JE&A ~~document~~. The ~~JE&A~~Ground Water Monitoring Plan Evaluation document provides site hydrogeology description, calculation of hydraulic gradient and ground water velocity.

- ~~GWIR~~ Ground Water Investigation Report, November 2006, prepared by JE&A~~document~~. This document provides slug test results at compliance wells, revised calculation of ground water velocity.

- ~~*SAR*~~*Citrus County Central Landfill Site Assessment Report*, October 2007, prepared by JE&A~~document~~. This document provides slug test results at assessment wells/new piezometers.

- *Citrus County Central Landfill Water Quality and Leachate Monitoring Plan*, November 2008, prepared by JE&A. This document was prepared to update the monitoring program from the Citrus County Central Landfill in response to the construction of the Phase 3 Expansion Area.

I.1.a Regional and Site-Specific Geology and Hydrology

Sections 3 and 4 of the PBS&J Hydrogeological Investigation Report present regional and site-specific geology and hydrogeology for the overall Landfill site. In addition, the geotechnical investigation performed by Universal Engineering Sciences on November 15, 2001 provides more information on the site-specific geology of the proposed Phase 3 Expansion area.

I.1.b Groundwater and Surface Water Flow Direction and Rate

~~According to the two report sources referenced in I.1. above, (Sections 3.2 and 4.4 of the PBS&J report and Section 2.1.2 of the JE&A report) the historic regional trend in ground water flow direction at the Landfill is to the west.~~

~~However, the JE&A Report mentions that there also have been ground water monitoring events conducted at the Landfill where there was a radial pattern of localized ground water flow movement that appeared to be focused near the percolation basin for the leachate treatment plant effluent. The localized groundwater mound may be due to effluent and/or the stormwater retention pond that is immediately to the west on the closed site.~~The Water Quality and Leachate Monitoring Plan (WQLMP), November 2008, prepared by JE&A document mentions that the overall gradient across the site is towards the west however, the percolation basin for the leachate treatment plant effluent has created a localized northwesterly flow direction near the northern boundary of the proposed Phase 3 Expansion area. A conceptual diagram that displays the effects of the groundwater mounding caused by the percolation basin on flow across the site was provided as Figure 1 of the WQLMP, November 2008, prepared by JE&A document. The groundwater mounding creates a localized zone of influence where flow patterns are different than the regional gradient. When groundwater flow leaves the zone of influence of the percolation basin it flows westerly parallel to the regional gradient.

The construction and operation of the proposed Phase 3 waste disposal cell is not anticipated to affect the regional ground water flow direction.

There are no permanent surface waters on or near the Landfill site.

I.1.c Background Quality

The most current background ground water quality information for the Landfill site is presented in the JE&A report referenced in Section I.1 above. No adverse changes are expected to the background ground water quality as a result of the proposed Phase 3 expansion.

I.1.d Hydraulic Connections

There are no changes to the description of the hydrogeology at the site for the proposed Phase 3 disposal area. There is a hydraulic connection between two aquifers at the site as described in Section I.1.e.

I.1.e Site Stratigraphy and Aquifer Characteristics

There are no changes to the site stratigraphy and aquifer characteristics below the landfill site that may be affected by the proposed Phase 3 disposal area.

The Floridan aquifer is located approximately 35 to 40 feet below the base of the proposed Phase 3 disposal area in the sandy deposits of the Alachua formation. Water levels in the Floridan aquifer often rise above the contact between the overlying sands/clayey sands and the underlying limestone formations.

These features are described in Sections 3.2, 4.1, and 4.6 of the PBS&J Report.

I.1.f Site Topography and Soil Characteristics

Sections 2.1 and 4.2 of the PBS&J Hydrogeological Investigation Report present site topography, soil characteristics and surface water drainage systems. In addition, the geotechnical investigation performed by Universal Engineering Sciences on November 15, 2001 provides more information on the site-specific geology of the Phase 3 Expansion.

I.1.g Well Inventory

SCS has obtained from the Southwest Florida Water Management District (SWFWMD) an updated printout of the inventory of all public and private water wells within a one-mile radius of the Citrus County Central Landfill. The list is included in Attachment I-1.

I.1.h Existing Contaminated Areas

There are no known contaminated areas at the proposed Phase 3 landfill expansion site.

I.1.i Map of Potable Wells and Community Water Supply Wells

~~There are no changes to this subsection.~~A revised well inventory map is included in Attachment I-1. The edge of Phase 3 was measured out to the closest domestic and public supply well and it was determined that the domestic and public supply wells identified by the SWFWMD Well Construction Permitting database query for Section 6, Twp 19, Rge 19 were not located within the 500-foot and 1,000-foot setbacks for potable supply wells and public supply wells, respectively for the Phase 3 Expansion Area only. Thus, the proposed Phase 3 Expansion Area meets the prohibitions of Rules 62-701.300(2)(b) and 62-701.300(2)(h), F.A.C.

1.2 PROFESSIONAL ENGINEER OR GEOLOGIST SIGNATURE

The PBS&J Hydrogeological Investigation Report was previously submitted to FDEP in support of permitting for the Citrus County Central Landfill. This previous submission was signed, sealed, and dated by a professional engineer or professional geologist, as were the JE&A reports and the Universal report referenced in this section.

ATTACHMENT I-1

SWFWMD PUBLIC AND PRIVATE WELL INVENTORY

Table I-2. SWFWMD Wells, Central Landfill, Hillsborough County, Florida.

Map ID	Site ID	Site Name	Longitude			Latitude			Diameter	Casing Depth	Surface Elevation	Total Depth	Aquifer ID
134	799	KURTH FLDN	82	26	17.34	28	51	36.94	4	185	110	220	FLADN
135	11820	ROBERTS N FLDN	82	26	14.34	28	52	7.93	4	180	999.99	350	FLADN

Notes:

1. Information obtained from the SWFWMD GIS Layer "wmdbwell". This information can be downloaded at: http://www.swfwmd.state.fl.us/data/gis/layer_library/category/data_collection

Table I-3. Department of Health Super Act Listed Wells, Central Landfill, Citrus County, Florida.

Map ID	Well ID	LONGITUDE	LATITUDE	Casing Length	Casing Depth	Permit Number	Owner	Phone	ADDRESS	ZIPCODE
137	AAC1443	-82.4298	28.8589	0	NA	6092693	AMERICAN\ITALIAN SOCIAL CLUB	NA	NA	NA
138	AAL7684	-82.45372	28.86563	0	4	NA	Robert Bryner	352-527-7970	1157 Union ST	34442

Notes:

1. Well information obtained from the Florida Department of Health Super Act Well listing. This information can be downloaded at http://www.doh.state.fl.us/environment/water/petroleum/saindex.html
2. NA = Information was not available.

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SCS ENGINEERS

June 11, 2009
File No. 09207049.02

Mr. Steven G. Morgan
Florida Department of Environmental Protection
Southwest District, Solid Waste Section
13051 North Telecom Parkway
Temple Terrace, Florida 33637

Dept. Of Environmental Protection
JUN 26 2009
Southwest District

Subject: Response to Request for Additional Information (RAI) No. 3
Citrus County Central Class I Landfill Phase 3 Expansion
Pending Permit No.: 21375-013-SC/01, Citrus County
WACS No.: SWD/09/39859

Dear Mr. Morgan:

On behalf of Citrus County (Citrus), SCS Engineers (SCS) submits the following responses to your request for additional information in a letter dated April 3, 2009, to Ms. Susan Metcalfe, P.G. For ease of review, Florida Department of Environmental Protection (FDEP) comments are reiterated in bold type, followed by our response in normal type.

We have provided revised submittals, or replacement pages to the submittals, using the requested ~~strikethrough~~ and underline format, to facilitate review. The following documents are enclosed:

1. Engineering Report Table of Contents (revised)
2. Engineering Report Section J (revised)
3. Attachment H-1: Construction Quality Assurance Plan and Technical Specifications (revised):
   a. CQA Plan (revised Section 5)
   b. Section 31 20 00 – Excavation, Backfill, Fill and Grading (revised Part 2.03.A. & Table 31 20 00-1)
   c. Section 31 32 19 – Geogrid (revised)
4. Attachment H-6: Pipe Crushing Calculations (revised memorandum)
5. Attachment H-9: Liner Stress Analysis (revised)
6. Attachment H-12: Alternate Procedure Request (revised)
7. Attachment H-15: Notice of Intent to Issue Environmental Resource Permit

8. Revised Drawing Sheets 7, 8, 9, and 10.

9. Attachment J-5: Sinkhole Potential Assessment

10. Attachment M-1: Water Quality and Leachate Monitoring Plan, JE&A, November 2008

1. **Rule 62-701.310, F.A.C.: Please provide a copy of the approved alternate procedure, upon issuance.**

   Response: A copy of the approved alternate procedure will be provided upon issuance.

2. **Rule 62-701.320(5)(b), F.A.C.: Please address the comments in John Morris' April 2, 2009, memorandum (attached) regarding this application. You may call Mr. Morris at (813) 632-6100, extension 336, to discuss the items in his memorandum.**

   Response: John Morris' April 2, 2009 comments are addressed at the end of this letter.

SECTION H - LANDILL CONSTRUCTION REQUIREMENTS (Rule 62-701.400(9), F.A.C.):

3. **Section H.8.b: Please provide a copy of the ERP permit upon issuance.**

   Response: A copy of the Notice of Intent to Issue Environmental Resource Permit is provided in Attachment H-15. Please note that the Table of Contents (TOC) for the permit application has been revised to include this attachment. The revised TOC is included following this letter.

ATTACHMENT H-1 -CONSTRUCTION QUALITY ASSURANCE PLAN AND TECHNICAL SPECIFICATIONS (Rules 62-701.400(3), (7) and (8), F.A.C.)

4. **Section 5.3.1: Based on the HELP Model analyses provided in Attachment H-12, the Department does not object to the elimination of a hydraulic conductivity specification for the liner protective layer on the constructed side slopes. However, a hydraulic conductivity specification must be provided for the cell bottom protective soil layer, consistent with the assumed hydraulic conductivity utilized for the protective soil layer in the HELP Models analyses utilized to predict leachate generation. Please revise the narrative in this section and Technical Specification Section 31 20 00 accordingly.**

   Response: The CQA Plan and Technical Specifications have been revised to include a hydraulic conductivity requirement of not less than 5.2 x10-4 cm/sec for the cell bottom protective soil layer consistent with the assumed hydraulic conductivity utilized for the protective soil layer in the HELP Models analyses.

ATTACHMENT H.1, APPENDIX L - TECHNICAL SPECIFICATIONS (Rules 62-701.400(3), (7) and (8)

5. **Section 31 20 00 - Excavation, Backfilling, Fill and Grading:**

   a. **<u>Part 2.03.A. & Table 31 20 00-1</u>: Please revise Part 2.03.A. & Table 31 20 00-1 to reinsert the hydraulic conductivity specification for the protective soil layer on the cell bottom liner system (see Comment #4).**

   <u>Response:</u> Specification Section 31 20 00, Part 2.03A & Table 31 20 00-1 has been modified to include a hydraulic conductivity specification of a minimum of 5.2×10^{-4} cm/sec for the protective soil layer on the cell bottom liner system.

ATTACHMENT H-6 - PIPE CRUSHING CALCULATIONS

6. **Please revise the introductory narrative section of Attachment H-6 from the December 10, 2008, submittal to reflect changes in information and calculated values provided with the March 5, 2009, submittal.**

   <u>Response:</u> The introductory narrative section of Attachment H-6 has been modified to reflect changes in information and calculated values provided with the March 5, 2009 submittal.

ATTACHMENT H-9 - LINER STRESS ANALYSIS

7. **These calculations appear to be based on a waste unit weight of 45 psf. The March 5, 2009, response indicates that Koerner suggests using the maximum stress based on application of 10 ft. of fresh waste. The assumed waste unit weight for the initial 10 feet of waste utilized in the Help Model analyses is 63.5 psf. Please verify and provide additional justification for the use of an assumed waste unit weight of 45 psf or provide revised calculations based on the assumed waste unit weight of 63.5 psf.**

   <u>Response:</u> Please see revised calculations based on the assumed waste unit weight of 63.5 psf. Please note that the specification for Geogrid (Section 31 32 19) has been revised to reflect the selection of Tensar UX1800HS in place of the previously specified UX1700HS.

ATTACHMENT H-12 - ALTERNATE PROCEDURES REQUEST

8. **Rule 62-701.310(2)(e), F.A.C.: Please revise the liner stress analysis in Attachment B based on the comments provided for Attachment H-9.**

   <u>Response:</u> Attachment B of Attachment H-12 has been revised based on the assumed waste unit weight of 63.5 psf.

SECTION J – GEOTECHNICAL INVESTIGATION REQUIREMENTS (Rule 62-701.410(2), F.A.C.)

9. **Section J.1.b: Since the assessment in Attachment J-4 was not able to specifically determine whether the landfill site was a karst sensitive area, the information provided in Section J.1.b and Attachment J-4 does not appear to address the requirements of Rule 62-701.410(2) (b), F.A.C., in support of this application. Please provide a current, updated, independent evaluation, in accordance with Rule 62-701.410(2) (b), F.A.C., of soft ground, lineaments, and sinkholes for sinkhole potential within and in the immediate vicinity of the Phase 2 and Phase 3 footprint that at a minimum includes the following:**

   a) **An evaluation that identifies areas of loose sands and other anomalies, if any, that could indicate potentially unstable areas beneath or within the immediate vicinity the proposed landfill footprint and adequately explains or addresses this potential, and/or identifies sufficient geotechnical measures necessary to modify the foundation to provide adequate structural support for the landfill.**

   Response: The County investigated an area in the vicinity of the leachate risers on May 1, 2009 where observations indicated the possibility for the presence of loose sands or other anomalies indicating potentially unstable areas. Results of the investigation are included in Attachment J-5.

   b) **An evaluation of the data generated as part of the Universal Engineering November 15, 2001, geotechnical investigation report and any subsequent sinkhole evaluation information provided as part of the Phase 3 expansion permit.**

   Response: Findings of the Universal Engineering Sciences (Universal) November 15, 2001, geotechnical investigation report were evaluated relative to potential occurrence of sinkholes and briefly summarized in the previously submitted "Karst Sensitive Area Assessment Summary" dated December 18, 2008. The report was further reviewed and additional comments are provided in Attachment J-5.

   During November 2008, Universal performed a limited geotechnical exploration of the proposed drainage retention areas (DRAs) of the landfill by installing nine STP borings to depths of 20 to 40 feet below grade at various locations in the DRAs. Results of this investigation relative to potential sinkhole development at the landfill are included in Attachment J-5.

   c) **An evaluation of the sinkhole occurrences both on-site and in the vicinity of the site (within a 5 mile radius).**

   Response: An evaluation of sinkhole occurrence and statistical assessment of sinkhole dimensions were performed for the area extending out to a distance of five miles from the landfill. This evaluation is included in Attachment J-5.

d) An evaluation of the additional subsurface investigation conducted as part of this application or since the Universal Engineering 2001 report, if any.

<u>**Response:**</u> See b) above.

e) An evaluation of any additional site investigation conducted, as deemed necessary.

<u>**Response:**</u> Based on the Karst Sensitive Area Assessment Summary, additional findings presented in Attachment J-5, and the engineering design modifications (see below), no additional site investigation regarding subsidence potential was deemed necessary.

f) An evaluation of the proposed construction details for Phase 3 that address the findings in Comments (a) through (e) above.

<u>**Response:**</u> Please see Attachment J-5 which provides the results of the above requested analysis. Also, please see the additional text included in Section J of the Engineering Report.

SECTION S - FINANCIAL RESPONSIBILITY REQUIREMENTS (Rule 62-701.630, F.A.C.)

10. Attachment S-l: The Cell 3 financial assurance cost estimates provided in Attachment S-1 (total for closing $5,503,120.00 and long-term care $164,723.00/year x 30 years = $4,941,676.00), are <u>approved</u> (see attached letter). In the event that changes in the facility's design, operation, closure, and/or groundwater monitoring plan are required, revised closure cost estimates, as specified in Rule 62-701.630(4) (b)1., F.A.C,. will be required. A copy of these estimates will be forwarded to Mr. Fred Wick, Solid Waste Section, FDEP, 2600 Blair Stone Road, Tallahassee, Florida 32399-2407. Please work with him directly to assess the facility's compliance with the funding mechanism requirements of Rule 62-701.630, F.A.C. Please note that approval of the proof of financial assurance funding shall be required prior to issuance of an operation permit for Phase 3. This comment is for information purposes only and does not necessarily require a response.

<u>**Response:**</u> Acknowledged.

John Morris' Memorandum Dated April 2, 2009

PART M - WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS (Rule 62-701.510, F.A.C)

Section M.1 of the Engineering Report was revised to reference the WQLMP document provided in Attachment M-1. It is noted that the text of the WQLMP document [dated November 21, 2008] included in the responses received March 5, 2009 [provided as Attachment M-1 to the Engineering Report] appears to be consistent with the text of the WQLMP document [dated December 9, 2008] included in the responses received December 10, 2008, with the exception that page 6 was omitted. Please note that page 6 in the WQLMP dated December 9, 2008 included the following sections:

- M.1.f.(3)b - compliance well monitoring parameters and sampling frequency
- M.1.f.(3)c - intermediate well monitoring parameters and sampling frequency
- M.1.f.(3)d - assessment well monitoring parameters and sampling frequency [as continued on page 7]

Please submit additional revisions to Section M.1 of the Engineering Report that refer to a complete WQLMP document as Attachment M-1 to the Engineering Report, including the information previously provided on page 6. Please also ensure that Attachment 1 [site map showing monitoring locations] and Attachment 2 [table of existing/proposed monitor well construction details] are included in the complete WQLMP document.

Response: Attachment M-1 has been revised to include a complete WQLMP document. Attachment 1 and 2 are also included in the complete WQLMP document.

As requested enclosed are four copies of this submittal. If you should have any questions please do not hesitate to contact either of the undersigned.

Sincerely,

6/18/09

Dominique H. Bramlett, P.E.
Senior Project Engineer
SCS ENGINEERS

John A. Banks, P.E.
Project Director
SCS ENGINEERS

DHB/JAB:klr

cc: Susan Pelz, P.E., FDEP Tampa
Susan Metcalfe, P.G., Citrus County, P.O. Box 340, Lecanto, FL 34460-0340

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March 5, 2009
File No. 09207049.02

INSERTED INTO OCULUS
MAR 12 2009
INITIAL

Dept. of Environmental Protection
MAR 05 2009
Southwest District

Steven G. Morgan
Solid Waste Section Southwest District
Florida Department of Environmental Protection
13051 North Telecom Parkway
Temple Terrace, Florida 33637-0926

Subject: Response to Request for Additional Information (RAI) No. 2
Citrus County Central Class I Landfill Phase 3 Expansion Construction
Pending Permit No.: 21375-013-SC/01,
Citrus County WACS No.: SWD/09/39859

Dear Mr. Morgan:

On behalf of the Citrus County Solid Waste Division, SCS Engineers (SCS) submits the following responses to your request for additional information in a letter dated January 9, 2009. For ease of review, Florida Department of Environmental Protection (FDEP) comments are reiterated in bold type, followed by our response.

We have provided revised submittals, or replacement pages to the submittals, using ~~strikethrough~~ and underline format, to facilitate review. The following documents are enclosed:

1. FDEP Application Form page 4 and 7 of 40 (revised)
2. Revised Sections of the Engineering Report
3. Attachment F-1: Construction Permit Application Drawings (revised) Drawing Sheet No. 7, 9 and 10
4. Attachment H-1: Construction Quality Assurance Plan and Technical Specifications (revised):
    a. CQA Plan (revised)
    b. Section 31 05 20 – Tri-Planar Geocomposite
    c. Section 31 05 21 – Bi-Planar Geocomposite
    d. Section 31 20 00 – Excavation, Backfill, Fill and Grading
    e. Section 31 32 19 – Geogrid
5. Attachment H-2: Anchor Trench Calculations (revised)
6. Attachment H-3: HELP Model Calculations – Phase 3 Expansion (revised)

7. Attachment H-4: HELP Model Calculations – Phase 2 (revised)

8. Attachment H-5: Pump Calculations (cycle time calculations revised)

9. Attachment H-6: Pipe Crushing Calculations (revised)

10. Attachment H-10: Leachate Collection and Removal System Trench Capacity Calculations

11. Attachment H-11: LCRS Geotextile Calculations

12. Attachment H-12: Alternate Procedure Request (revised)

13. Attachment H-13: Leachate Collection and Detection System Flow Calculations (revised)

14. Attachment J-4: KARST Sensitive Assessment Summary Dated December 18, 2008

15. Attachment M-1: Water Quality Leachate Monitoring Plan, JE&A, November 2008 (updated)

16. Attachment S-1: Financial Assurance Cost Estimate – Long Term Care Cost (revised)

17. Attachment J-1: Settlement of Foundation Soils (revised)

18. Attachment J-2: Slope Stability Calculations (revised)

19. Letter from JE&A dated January 21, 2009

1. **Rule 62-701.310, F.A.C.: Please provide a copy of the approved alternate procedure, upon issuance.**

   Response: A copy of the approved alternate procedure will be provided upon issuance.

2. **Rule 62-701.320(5) (b), F.A.C.: Please address the comments in John Morris' January 8, 2009 memorandum (attached) regarding this application. You may call Mr. Morris at (813) 632-6100, extension 336, to discuss the items in his memorandum.**

   Response: John Morris' January 8, 2009 comments are addressed at the end of this letter.

SECTION E (Rule 62-701.320, F.A.C.):

3. **Sections E.7: The narrative information and figures in the revised operation plan submitted with Permit Application No. 21375-012-S0/MM refer to operation of Phases 1, 1A, and 2 only, and therefore does not apply to Phase 3 operation. An application for operation of Phase 3. will be required, which shall include a revised Operations Plan that addresses the operation of Phase 3 and the proposed vertical expansion over Phases 1, 1A, and 2. Please revise this section accordingly.**

Response: The Operations Plan will be updated to include the Phase 3 Expansion Area and submitted to the FDEP when the County applies for an Operation Permit for the Phase 3 Expansion Area. This Section of the Engineering Report has been revised to reflect this approach.

SECTION F - LANDFILL PERMIT REQUIREMENTS (Rule 62-701.330, F.A.C.)

Attachment F-1 - Construction Permit Application Drawings

Please provide the following additional information and revisions to the Construction Drawings that include all necessary details for the construction of the facility. The drawings will be reviewed in their entirety after the responses to this request for information.

4. Sheet 7 of 19:

a. **Section B: Please verify whether there is overlap of the 16 oz geotextile above the secondary sump and below the primary sump HDPE liner at the points of intersection with the primary geocomposite or if the layers are tied together.**

Response: Please see revised detail. The detail was revised to represent the geotextile being extended on both sides by 4 ft.

5. Sheet 10 of 19:

a. Section A:

1) **Please verify the reference to the Connection to Existing Liner Section as Section "C" and revise as applicable.**

Response: The detail callout has been changed to Section "A". A new detail has been added to this sheet to include the existing Phase 2 liner anchor trench detail.

2) **Sections A and B on Sheet 5 appear to depict the Phase 2 side slope as a 2H:1V slope. Please verify and revise this section or Sections A and B on Sheet 5, as applicable.**

Response: Please see revised detail. The detail was revised to represent a 2H:1V side slope.

b. Detail 1: Detail 1 appears to be deleted from this sheet and not relocated in the plan set. Please verify and explain.

Response: This detail was deleted from this sheet because it was redundant to Section "C" on this sheet.

SECTION H - LANDFILL CONSTRUCTION REQUIREMENTS (Rule 62-701.400 (9), F.A.C.):

6. **Section H.1: Initial cover must be reasonably stabilized with no exposed waste to allow runoff from initial cover to be treated as stormwater. Therefore operation of the facility will require that area outside the bermed working face have a minimum of six inches of initial cover with no visible waste (i.e., flagging). Traffic areas that temporarily may have flagged waste will be required to be bermed to prevent runoff from these areas to stormwater. The revised operation plan submitted with the operation permit for Phase 3 must include these provisions for initial cover as will the operation permit for the facility. This comment is for informational purposes only and does not necessarily require a response.**

   Response: Acknowledged.

7. **Section H.2.a.5: The anchor trench calculations in Attachment H-2 for the liner system (except for the geogrid anchor trench) appear to include cover over the anchor trench. Therefore it appears that liner markers would be necessary. Please verify and revise this section as applicable.**

   Response: Please see revised calculations. The calculations were revised with no cover soil over the anchor trench. Please see Attachment H-2.

8. **Section H.2.c.1: Please revise the narrative in this section, as appropriate, based on your responses to comments regarding Attachments H-1 through H-14 below, as applicable.**

   Response: Please see the revised narrative in Section H, Subsection H.2.c.2.

9. **Section H.2.c.1:**

   a. **Leachate Recirculation: The reintroduction of leachate as subsurface inflow in the HELP Model is on a per acre basis, however the recirculation of leachate proposed at the facility will be limited to the working face area that is assumed to be 0.5 acres. Therefore it appears that only one-half of the predicted subsurface flow can actually be recirculated in the working face area. Please verify and revise this section and/or the HELP Model runs, as appropriate.**

   Response: The working face area is assumed to be 1 acre. This Section has been revised to reflect this. The total daily recirculation amount has been revised to 4,663 gallons based on revised HELP Model simulations included in Attachment H-3.

   b. **Design of the Leachate Collection Later:**

      1) **It does not appear that the impacts of the revised unit weight of waste**

due to recirculation were considered in the HELP Model runs for recirculation, as indicated. The additional HELP Model runs for 15,000 psf appear to only consider the 135 ft of waste conditions with no subsurface inflow (i.e., no recirculation). Please verify and provide revised HELP Model recirculation runs for the predicted recirculation waste unit weight, for both Phases 2 and 3, as appropriate and revise this section accordingly.

Response: The HELP Model recirculation runs have been revised with the estimated waste unit weights reflecting bioreactor Operations for both Phases 2 and 3.

2) **It does not appear that the impacts of the revised unit weight of waste were considered in the other calculations utilized in the design of the leachate collection system (e.g., pipe strength calculations, settlement calculation and analysis, liner stress analysis, etc.). Please revise the applicable calculations and analyses in Attachments H-2 through H-14 and Section J, for both Phases 2 and 3, based on the assumed recirculation waste unit weight.**

Response: Please see the pump calculations (Attachment H-5), pipe strength calculations (Attachment H-6), settlement calculation and analysis (Attachment J-1) and slope stability calculations (Attachment J-2). They have been revised with the estimated waste unit weights reflecting bioreactor Operations.

10. **Section H.2.c.4: The minimum required hydraulic conductivity for the leak detection system provided in Rule 62-701.400(3) (c)2., F.A.C. (10 cm/sec) is a performance standard that must be met throughout the life of the facility and not only at installation. Please revise the design specifications for the leak detection system and all appropriate calculations for this project accordingly.**

Response: SCS contacted Richard Tedder Director of the Division of Waste Management FDEP, Tallahassee, and confirmed that the 10 cm/sec refers to the hydraulic conductivity at time of installation. Mr. Tedder agreed with this interpretation of the rule. At time of installation the hydraulic conductivity for the leak detection system is greater than 10 cm/sec, 15.8 cm/sec, which meets the requirements of the Rule. For modeling purposes we used a factor of safety of 2, to reduce the hydraulic conductivity value.

11. **Section H.2.d.3: Please verify the continued reference to the protective layer sand having less than 10% fines content and revise this section, as appropriate.**

Response: The reference to the protective layer sand having less than 10% fines has been removed from the Engineering Report.

12. **Section H.2.f.: Please verify the reference to the GCL having maximum hydraulic**

conductivity of 1x10-^{7} cm/sec and revise this section, as appropriate.

<u>Response:</u> Section H.2.f has been modified to specify a hydraulic conductivity for the GCL of $5x10^{-9}$ cm/sec.

13. **Section H.3.a.2: Please revise the information in this section based on the use of the recirculation waste unit weight in stress analyses, as appropriate.**

<u>Response:</u> Section H.3.a.2 has been modified based on the assumed recirculation waste unit weight.

14. **Section H.3.b.2: Specification Section 31 20 00-Part 2.03 does not appear to have been revised to specify less than 1% organic content, as indicated. Please verify and revise Specification Section 31 20 00-Part 2.03, as appropriate.**

<u>Response:</u> Section H.3.b.2 and Specification Section 31 20 00-Part 2.03.A. were revised to specify less than one percent organic matter.

15. **Section H.4:**

a. **Please revise this section, as appropriate, based on your response to Comment # 9.a. above and the results of the revised HELP Model analyses.**

<u>Response:</u> Section H.4 was revised based on comment 9 above.

b. **The revised operation plan will need to specify if leachate recirculatin will not occur after <u>any</u> rainfall event or after a rainfall event of a specified intensity. <u>This comment is for informational purposes only and does not necessarily require a response</u>.**

<u>Response:</u> Comment noted.

16. **Section H.8.b: Please provide a copy of the ERP permit upon issuance.**

ATTACHMENT H-1 – CONSTRUCTION QUALITY ASSURANCE PLAN AND TECHNICAL SPECIFICATIONS (Rules 62-701.400 (3), (7) and (8), F.A.C.)

Please revise the CQA Plan and/or other referenced application documents, as appropriate, to address the following comments and/or inconsistencies. The CQA Plan will be reviewed in its entirety after receipt of this following information

17. **Section 5.3.1: The liner protective layer is part of the liner system and adequate CQA testing shall be provided to ensure the soils of the specified hydraulic conductivity at the specified depth are installed, whether it occurs during initial cell construction or on the side slopes during phased operation of the facility. Please revise this section to describe the CQA testing to be conducted as part of phased**

installation of the liner protective cover on the constructed side slopes of Phase 2 and 3 as part of future operation of the facility.

Response: As discussed in our meeting of February 9, 2009 the hydraulic conductivity will not be specified in the Specifications or CQA Plan as the protective soil cover is not being used as the drainage layer and our analysis shows that the hydraulic conductivity of the protective soil layer has a negligible effect on the HELP Model results. The County will select sand from the cover soil stockpile that is of average consistency; not overly clayey or overly sandy.

The leachate collection system (LCS) drainage layer consists of 24 inches of soil cover placed over a 300-mil (0.300-inch) triplanar geocomposite. In accordance with Rule 62-701.400(3)(c)1, F.A.C. the hydraulic head on the upper liner must not exceed one foot or the thickness of the drainage layer during normal landfill operations. Three scenarios were developed, based on the different hydraulic conductivity of the drainage material ranging from $1x10^{-3}$ cm/sec to $1x10^{-5}$ cm/sec with and without a GCL. The summary of these model runs and model outputs are included in Attachment H-12.

Based upon the results from the HELP Model and the assumptions made in the modeling, the leachate collection system will maintain the leachate head to be within the thickness of the geocomposite layer. In addition, the expected flow through natural soils and through the GCL subbase is the same. Thus, we can conclude that the hydraulic conductivity of the protective material on top of the primary leachate collection and removal system is insignificant.

18. **Section 5.4: The specified protective layer soil for Phase 3 cannot be utilized for Phase 2 unless revised design calculations are provided that demonstrate their adequacy for use in the Phase 2 design. Please revise this section to describe the CQA construction quality evaluation that will be conducted as part of phased installation of the liner protective cover on the constructed side slopes of Phase 2 and 3 as part of future operation of the facility, including how protective soils of different specification will be installed adjacent to each other.**

    Response: As indicated above the hydraulic conductivity of the protective material is insignificant. It is our professional opinion that the protective layer soil for Phase 3 could be used for Phase 2 without any adverse effects on the performance of the Phase 2 system.

19. **Section 7: Please revise this section to include documentation of CQA testing and/or construction oversight associated with the phased removal of rain tarps and installation of the liner protective layer on the side slopes of Phases 2 and 3 during operation of the facility.**

    Response: As discussed in our meeting of February 9, 2009 the CQA testing and/or construction oversight associated with the phased removal of rain tarps and installation of the liner protective layer on the side slopes of Phases 2 and 3 during operation of the facility will be addressed in the revised Operations Plan for Phase 3 Expansion. Section H.6 of the Engineering Report was modified to include a description of these activities.

20. Please revise the CQA plan to include CQA activities related to the installation of the rain tarp and phased removal of the rain tarp from Phase 2 and 3 during operation of the facility. Please note that the specifications for the rain tarp for Phases 1A and 2 are not the same as for Phase 3.

Response: As mentioned above, the CQA activities related to the phased removal of the rain tarp from Phase 2 and 3 during operation of the facility will be addressed in the revised Operations Plan for the Phase 3 Expansion. However, Section H.6 of the Engineering Report was modified to include these activities. The CQA activities for the initial installation of the rain tarp has been added to the CQA Plan.

ATTACHMENT H.1, APPENDIX L - TECHNICAL SPECIFICATIONS (Rules 62-701.400(3), (7) and (8)

Please revise the Technical Specifications and/or other referenced application documents, as appropriate, to address the following comments and/or inconsistencies. The Technical Specifications will be reviewed in their entirety after receipt of this information.

21. Geotextile Specification Section 31 05 19 was not resubmitted with the technical specification section submitted on December 10, 2008. Please verify that Section 31 05 19 submitted on August 14, 2008 is still valid.

Response: The geotextile specification Section 31 05 19 submitted on August 14, 2008 is still valid. No changes have been made therefore it was not resubmitted with RAI No. 1 on December 10, 2008.

22. Section 02 90 41 - Geosynthetic Rain Tarp:

In addition to leachate minimization, the rain tarp on this project functions as a substitute for the liner protective layer until the protective soil layer is installed and therefore, is an integral part of the liner system.

a. Part 3.01: Please revise this part to include procedures for the phased removal of the rain tarp from Phase 2 and 3 during operation of the facility.

Response: As discussed in our meeting on February 9, 2009, the procedures for the phased removal of the rain tarp from Phases 2 and 3 during operation of the facility will be added to the Operations Plan instead of Specification Section 02 90 41. A new Operations Plan will be submitted with the Operations Permit Renewal Application. In addition, Section H.6 of the Engineering Report was modified to include the procedures for the phased removal of the rain tarp from Phases 2 and 3.

b. **<u>Part 3.02</u>: Please revise this part to include procedures for the repair of rain tarp damaged during the phased removal of the rain tarp from Phase 1a, 2, and 3 during operation of the facility.**

<u>Response:</u> As stated above, the information pertaining to the removal and repair of the rain tarp will be included in the new Operations Plan. However, Section H.6 of the Engineering Report was modified to include the procedures for the repair of the rain tarp.

23. **Section 31 05 20 - Tri-Planar Geocomposite:**

a. **<u>Part 3.01.C</u>: Please explain why tensile strength and carbon black properties listed in Table 31 05 20-1 would not be tested during manufacturing for compliance with Table 31 05 20-1 and revise this part, as appropriate.**

<u>Response:</u> These were inadvertently omitted from the specification. Please find the revised specification including these parameters. In addition, the CQA Plan Section 6.3.2.2 was revised to include theses parameters for testing.

b. **<u>Part 3.01.D</u>: Please explain why the grab elongation property listed in this table is not included in Table 31 05 20-2 "[S.I.C.]" and revise this part and/or Table 31 05 20-2, as appropriate.**

<u>Response:</u> Part 3.01D was revised to include the grab elongation testing parameters. In addition, the CQA Plan Section 6.3.2.3 was revised to include the grab elongation testing parameter.

c. **<u>Table 31 05 20-2</u>: Please explain why the water flow rate property specified for the bi-planar geocomposite geotextile in Section 31 05 21 - Table 31 05 21-2 is not included in Table 31 05 20-2 and revise this table, as appropriate.**

<u>Response:</u> Water flow rate and permittivity have the same test method (ASTM D 4491) and represent the same property of the material with different units. The water flow rate was removed from the biplanar specification.

24. **Section 31 05 20 "[S.I.C.]" - Bi-Planar Geocomposite:**

a. **<u>Part 3.01.C</u>: Please explain why tensile strength and carbon black properties listed in Table 31 05 21-1 would not be tested during manufacturing for compliance with Table 31 05 21-1 and revise this part, as appropriate.**

<u>Response:</u> These were inadvertently omitted from the specification. Please find the revised specification including these parameters. In addition, the CQA Plan Section 6.3.2.2 was revised to include theses parameters for testing.

b. **<u>Table 31 05 20-3 "[S.I.C.]"</u>:**

1) **Please explain why the transmissivity test is conducted at 10,000 psf for the biplanar geocomposite and 15,000 psf for the triplanar geocomposite and revise these specification sections, as applicable.**

<u>**Response:**</u> The specifications were written per the manufacturer's published transmissivity and gradient data for conformance testing requirements. The calculations were based upon the actual gradient and transmissivity to confirm that the correct product will meet the design requirements.

2) **Please revise this table to provide a transmissivity specification that will result in the minimum required hydraulic conductivity for the leak detection system provided in Rule 62-701.400(3) (c)2., F.A.C. (10 cm/sec) throughout the life of the facility and not just at installation.**

<u>**Response:**</u> As indicated above, SCS contacted Richard Tedder Director of the Division of Waste Management FDEP, Tallahassee, and confirmed that the 10 cm/sec refers to the hydraulic conductivity at time of installation. Mr. Tedder agreed with this interpretation of the Rule. At time of installation the hydraulic conductivity for the leak detection system is greater than 10 cm/sec, 15.8 cm/sec, which meets the requirements of the Rule. For modeling purposes we used a factor of safety of 2, to reduce the hydraulic conductivity value.

3) **Note 1 does not appear to have been modified to include a minimum hydraulic conductivity of 10 cm/sec, as indicated. Please verify and revise this note, as applicable.**

<u>**Response:**</u> As indicated above, this note would not be applicable.

25. Section 31 20 00 - Excavation, Backfilling, Fill and Grading:

a. **<u>Table 31 32 19-1"[S.I.C.]"</u>: The HELP Model utilized a 5.2 x 10^{-4} cm/sec permeability for the protective soil layer. Please explain the inconsistency between the HELP Model input and Table 31 20 00-1 and revise Table 31 20 00-1 as appropriate.**

<u>**Response:**</u> SCS utilized the HELP Model default value for the protective soil layer. References to the permeability of the protective soil layer was removed from the specifications as discussed in our meeting February 9, 2009.

26. Section 31 32 19 - Geogrid:

a. **<u>Part 3.04.A.</u>: The placement of backfill material on the geogrid does not appear to be shown on the drawings as indicated. Please verify and revise**

this part, as appropriate.

Response: This reference was intended to address backfill in the anchor trench. The reference has been revised accordingly.

ATTACHMENT H-2 - ANCHOR TRENCH CALCULATIONS:

27. **For the σ_n value in the anchor trench calculation, it appears that a cover soil is assumed, although Section H.2.a.5 indicates that there will be no soil cover over the anchor trench at construction completion. Please verify and revise this calculation, as appropriate.**

    Response: Please see revised calculations included in Attachment H-3.

28. **Please provide the applicable sections of the Tensar reference and any other references utilized in the geogrid anchor trench calculations. These calculations will be re -evaluated in their entirety upon receipt of this information.**

    Response: The reference material is included in Attachment 1 of Attachment H-2.

ATTACHMENT H-3 - HELP MODEL/LEACHATE GENERATION RATES CALCULATIONS (Rules 62-701.320 (7) (e), 62-701.400(4), F.A.C.)

Please revise the HELP model evaluation and/or other referenced application documents, as appropriate, to address the following comments and/or inconsistencies. The HELP Model evaluation will be reviewed in its entirety after receipt of this following information.

29. **Step 2: The revised stormwater runoff percentages appear to be based on the assumption that there will be 100% runoff (i.e., 0% infiltration) on initial cover outside the bermed working face, at a 4% slope. This assumption does not appear reasonable. Please provide supporting information and/or calculations for this assumption.**

    Response: The runoff percentage represents the percentage of the calculated amount of runoff that will actually be allowed to runoff.

30. **Attachment 1:**

    a. <u>HELP Model Load Calculations</u>**: Please revise these calculations to include applicable calculations for loading based on the assumed recirculation waste unit weight.**

       Response: The calculations were revised based on the assumed recirculation waste unit weight, see Attachment H-3

b. **Please revise this attachment to provide revised design transmissivity for the leak detection layer utilizing geocomposite that will result in the minimum required hydraulic conductivity for the leak detection system provided in Rule 62-701.400(3) (c)2., F.A.C. (10 cm/sec) throughout the life of the facility.**

Response: SCS contacted Richard Tedder Director of the Division of Waste Management FDEP, Tallahassee, and confirmed that the 10 cm/sec refers to the hydraulic conductivity at time of installation. Mr. Tedder agreed with this interpretation of the Rule. At time of installation the hydraulic conductivity for the leak detection system is greater than 10 cm/sec, 15.8 cm/sec, which meets the requirements of the Rule. For modeling purposes we used a factor of safety of 2, to reduce the hydraulic conductivity value.

31. **There does not appear to be an Attachment 7 included in Attachment H-3. Please verify and provide Attachment 7, as applicable.**

Response: Attachment 7 included in Attachment H-3, References, was submitted with the original application. No changes were made to this Attachment thus it was not included with RAI No. 1.

ATTACHMENT H-6 - PIPE CRUSHING CALCULATIONS

32. **Please verify that the page titled "HeliCAP-v2.0 Summary Report" was included in Attachment 6 in error.**

Response: This page was inadvertently included in the submittal. Please disregard this page.

33. **Load on Pipe (Overburden):**

a. **Please verify and explain why a unit weight of 123 psf was assumed for the drainage sand only in the John Deere 700H calculations, and revise these calculations, as applicable to be consistent with the remaining pipe strength calculations.**

Response: The pipe crushing calculations for the John Deere 700H was revised using a unit weight for the drainage sand of 110 psf which is consistent with the remaining pipe strength calculations.

b. **Please explain why the internal soil friction angle value in these calculations is a waste friction angle value.**

Response: A soil friction angle value of 28 is representative of soil. This friction angle was also used for waste in the slope stability analysis as a conservative value. The term "for waste" was removed from the calculation sheet.

ATTACHMENT H-9 - LINER STRESS ANALYSIS PIPE CRUSHING CALCULATIONS

34. These calculations appear to be based on a waste unit weight of 45 psf. Please verify and provided revised calculations based on the assumed waste unit weight for recirculation.

Response: The calculation guidance from Koerner for this scenario suggest the maximum stress on the liner materials occurs with the application of a fresh 10 ft of waste. Thus an increase in waste density is not warranted for this analysis.

35. Please verify that the specified tensile strength @5% for this project is 5100 lb/ft and revise these calculations, as appropriate.

Response: If the calculation on page 5 of 6 is revised using 5,100 lb/ft, the factor of safety is reduced from 1.52 to 1.50. Therefore, no revisions to these calculations are warranted.

ATTACHMENT H-12 - ALTERNATE PROCEDURES REQUEST

36. Please revise the information, calculations and analyses, and conclusions presented in the alternate procedure request based on your responses and revised calculations and analyses provided in response to this letter.

Response: The information, calculations and analyses, and conclusions presented in the alternate procedure request were revised and are included in Attachment H-12.

37. Rule 62-701.310(2) (d), F.A.C.: It does not appear that the HELP Model analysis provided in Attachment A considered the proposed recirculation of leachate and the worst case geocomposite transmissivity based on increased waste unit weight. Please verify and revise the HELP Model analyses, as applicable.

Response: The calculations were revised using the assumed recirculation waste unit weight. Please note that an average of 35 ft of waste is being applied to the sideslope. Thus, 35 ft of waste would create the worst case geocomposite transmissivity.

38. Rule 62-701.310(2) (e), F.A.C.:

a. Please revise the liner stress analysis in Attachment B based on the comments provided for Attachment H-9.

Response: The responses to the comments on Attachment H-9 do not effectively alter these calculations.

b. Please revise the anchor trench calculations in Attachment C based on the comments provided for Attachment H-2. The geogrid anchor trench

calculations should also be included in Attachment C.

Response: The anchor trench calculations were inadvertently submitted with the letter request for approval of an alternate procedure for landfill sideslope subbase design dated October 30, 2008 and are replaced with the geogrid anchor trench calculations.

SECTION J – GEOTECHNICAL INVESTIGATION REQUIREMENTS (Rule 62-701.410 (2), F.A.C.)

39. **Section J.1.b: Please provide a copy of the sinkhole assessment being conducted in conjunction with the ERP application.**

Response: Attachment J-4 contains a copy of the sinkhole assessment that was conducted in conjunction with the ERP application. Also included are photographs of the suspect sinkhole feature which occurred approximately 2 years ago near the entrance of the facility.

40. **Sections J.1.d.: Please revise the foundation bearing capacity, settlement, and slope stability analyses for Phase 3 and provide a revised settlement analysis for Phase 2, including an evaluation of the pre-settlement and post-settlement of the leachate collection system piping, utilizing the assumed recirculation waste unit weight and revise the narrative in these sections, as applicable.**

Response: The above calculations and narrative in these sections were revised using the assumed recirculation waste unit weight.

SECTION O – LANDFILL GAS MANAGEMENT SYSTEM REQUIREMENTS (Rule 62-701.530, F.A.C.)

41. **Section O.1: The December 10, 2008 response indicates that the overall design capacity of the site currently does exceed 2.5 million megagrams and therefore the site is already subject to 40 CFR Section 60.752(b). Please revise this section accordingly.**

Response: Section O.1. was modified to reflect that the site currently exceeds 2.5 million megagrams; the site has a Title V permit and is complying with NSPS standards.

SECTION S – FINANCIAL RESPONSIBILITY REQUIREMENTS (Rule 62-701.630, F.A.C.)

42. **Attachment S-l: Please address the comments in Department's January 8, 2009 letter (attached) regarding the financial assurance cost estimates provided in Attachment S-1.**

Response: Please see the responses below.

The following comments/responses are from the Department's January 8, 2009 letter regarding the financial assurance cost estimates.

<u>"Long-term Care Costs"</u>

4. <u>Gas Monitoring</u> - **The number of gas monitoring locations does not appear to correspond to the number of sampling locations that will be in the facility's approved gas monitoring plan. Please verify and revise this section accordingly, as appropriate.**

   <u>**Response:**</u> This section has been adjusted to include the long-term care cost for 19 gas monitoring wells.

5. <u>Leachate Monitoring</u> - **The number of leachate monitoring locations (influent and effluent) does not appear to correspond to the number of sampling locations that will be in the facility's approved water quality monitoring plan. Please verify and revise this section accordingly, as appropriate.**

   <u>**Response:**</u> This section has been adjusted to include the long-term care cost for 3 leachate monitoring locations to be consistent with the WQLMP.

6. <u>Leachate Collection/Treatment Systems Maintenance - Disposal</u> - **Please revise the one year disposal costs provided in this section to be consistent with the one year disposal costs provided in the closure costs.**

   <u>**Response:**</u> This section has been revised to be consistent with the one year disposal costs provided in the closure costs.

The following comments/responses are from John Morris' memorandum dated January 8, 2009 regarding the hydrogeologic and environmental monitoring review.

SECTION A – PERMIT APPLICATION FORM

2. **A.7.: The SCS response letter reiterated that the coordinates provided on the application form (latitude 28° 51'08", longitude 82° 26'38") represented the center of Phase 3. As previous indicated, it appears that these coordinates represent a location west of the facility, approximately 2,350 feet west of the center of Phase 3 (see attached aerial photograph). Please submit a revised application form for this item that reflects the approximate center of the Phase 3 expansion area.**

   <u>**Response:**</u> The location coordinates have been revised to represent the center of Phase 3.

SECTION B – DISPOSAL FACILITY GENERAL INFORMATION

3. **B.18.: The SCS response letter indicated that this item of the application form was revised to identify that 15 monitor wells are located at the facility. It appears that the WQLMP document designates 14 well locations (3 background wells, 1 intermediate well, 8 compliance wells, and 2 assessment wells). Please submit a revised application form for this item to address the apparent inconsistency.**

   Response: This section has been revised to be consistent with the WQLMP.

SECTION I – HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS (Rule 62-701.410(1), F.A.C.)

5. **I.1.b.: Direction and rate of ground water flow and surface water flow including seasonal variations.**

   b. **The SCS response letter referred to the JEA response letter. The JEA response letter indicated that a localized northwesterly flow direction near the northern boundary of the proposed Phase 3 boundary was caused by the percolation basin for the leachate treatment plan. Please submit revisions to ¶2 in this section of the Engineering Report to be consistent with the JEA response letter.**

      Response: This Section of the Engineering Report has been modified to be consistent with the JE&A response letter.

8. **I.1.i: Map of Potable Wells and Community Water Supply Wells. The SCS response letter referred to the map included in revised Attachment I-1 of the Engineering Report. Please submit revisions to this section of the Engineering Report to reference this well inventory map (Figure I-1) included in revised Attachment I-1. Please submit additional revisions to this section of the Engineering Report to describe how it was determined that the domestic and public supply wells identified by the SWFWMD Well Construction Permitting database query for Section 6, Twp 19, Rge 19 were not located within the 500-foot and 1,000-foot setbacks for potable supply wells and public supply wells, respectively, to demonstrate that the proposed Phase 3 expansion area meets the prohibitions of Rules 62-701.300(2)(b) and 62-701.300(2)(h), F.A.C.**

   Response: The edge of Phase 3 was measured out to the closest domestic and public supply well and it was determined that the domestic and public supply wells identified by the SWFWMD Well Construction Permitting database query for Section 6, Twp 19, Rge 19 were not located within the 500-foot and 1,000-foot setbacks for potable supply wells and public supply wells, respectively for the Phase 3 Expansion Area only. Thus, the proposed Phase 3 Expansion Area meets the prohibitions of Rules 62-701.300(2)(b) and 62-701.300(2)(h), F.A.C. These findings have been incorporated into Section I.1.i of the Engineering Report.

PART M – WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS

(RULE 62-701.510, F.A.C.)

10. M.1.c(3): Background Wells.

a. **The SCS response letter referred to the JEA response letter. The JEA response letter indicated that the only laterally continuous aquifer at the facility is the unconfined Floridan aquifer and that this section of the Engineering Report would be changed accordingly, however it does not appear that this revision was made. Please submit revisions to this section of the Engineering Report to delete the reference to the surficial aquifer.**

Response: Reference to MW-1R as a piezometer and clarification on background well designations has been added to this Section of the Engineering Report, consistent with the WQLMP. Please see the attached JE&A response dated January 21, 2009 for further clarification.

b. **The SCS response letter referred to the JEA response letter and to the revisions to Section M.1.c(4), ¶2 of the Engineering Report regarding existing background well MW-1R. The JEA response letter indicated that existing background well MW-1R would be re-designated as a piezometer. The JEA response letter also included the sentence fragment: "A new background well is proposed…" however, it does not appear that a new background well location was included in the WQLMP document. Please clarify this apparent inconsistency between the JEA response letter and the WQLMP document.**

Response: Reference to MW-1R as a piezometer and clarification on background well designations has been added to this Section of the Engineering Report, consistent with the WQLMP. Please see the attached JE&A response dated January 21, 2009 for further clarification.

11. M.1.c.(4): Location information for Each Monitoring Well. The SCS response letter referred to the JEA response letter. The JEA response letter referred to the approximate location of the proposed well MW-20 shown on Figure 2 (attached to the JEA response letter). Please submit revision to ¶1 in this section of the Engineering Report to replace the reference to the monitor well locations on the site drawings (Attachment F-1) with a reference to Attachment 1 of the WQLMP document.

Response: The Engineering Report has been modified to reference Attachment 1 of the WQLMP and reference to Figure 2 of the Construction Permit Application Drawings has been removed from the Engineering Report.

13. M.1.e(6): Leachate Sampling Locations Proposed.

b. **The SCS report letter indicated that the site map has been revised to include**

the leachate collection locations for Phase 1/1A, Phase 2 and Phase 3 (assumed to refer to Figure 2 attached to the JEA response letter). Please include these leachate collection locations and identification numbers on Attachment 1 of the WQLMP document.

<u>Response:</u> Please see the attached JE&A response and revisions to this Section of the Engineering Report.

As requested, we are providing you with four copies of all requested information.

Sincerely,

D. Bramlett
3/5/09

Dominique H. Bramlett, P.E.
Senior Project Engineer
SCS ENGINEERS

John A. Banks, P.E.
Project Director
SCS ENGINEERS

DHB/JAB:klr

cc: Fred Wick, FDEP, Tallahassee
Susan Pelz, P.E., FDEP Tampa
Susan Metcalfe, P.G., Citrus County, P.O. Box 340, Lecanto, FL 34460-0340

JONES EDMUNDS

February 27, 2009

Susan Metcalfe, P.G.
Director of Solid Waste
Citrus County
P.O. Box 340
Lecanto, FL 34460-0340

RE: Citrus County Central Class I Landfill
Phase III Request for Additional Information
Jones Edmunds Project No: 03860-037-01

Dear Susie:

This letter addresses comments 10.M.1.c.(3)b and 13.M.1.e(b) of Section M, Water Quality and Leachate Monitoring Requirements from FDEP, dated January 9, 2009 concerning the Citrus Central Class I Landfill. The Department comment is presented below in *italics*, followed by the Jones Edmunds response in **bold** type.

Comment 10.M.1.c.(3)b: The SCS response letter referred to the JEA response letter and to the revisions to Section M.1.c.(4), ¶2 of the Engineering Report regarding existing background well MW-1R. The JEA response letter indicated that existing background well MW-1R would be re-designated as a piezometer. The JEA response letter also included the sentence fragment: "A new background well is proposed..." however it does not appear that a new background well location was included in the WQLMP document. Please clarify this apparent inconsistency between the JEA response letter and the WQLMP document.

Response 10.M.1.c.(3)b: No additional background wells are proposed. The sentence fragment "A new background well is proposed..." was included in the draft RAI as a reminder to facilitate internal discussion of a possible additional background well location. No location was identified. The sentence fragment should have been removed from the final document.

730 NE Waldo Rd
Gainesville, FL 32641

352.377.5821 Phone
352.377.3166 Fax
www.jonesedmunds.com

Comment 13.M.1.e(b): Leachate Sampling Locations Proposed.
The SCS report letter indicated that the site map has been revised to include the leachate collection locations for Phase 1/1A, Phase 2 and Phase 3 (assumed to refer to Figure 2 attached to the JEA response letter). Please include these leachate collection locations and identification numbers on Attachment 1 of the WQLMP document.

Response 13.M.1.e(b): Attachment 1 to the WQLMP document has been updated to include the leachate collection locations and identification numbers. The updated figure is attached to this letter.

If you have any questions or need clarification, please contact me at (352) 377-5821.

Sincerely,

Troy Hays
Project Manager

John Catches, P.G. 2/27/09
Professional Geologist

\\Gnv-projects\projects\03860-CitrusCounty\037-01-LFG sampling_Phase III RAI\Phase III RAI\2009-02-27-LTR-SMetcalfe-RAI-2.doc

Attachment

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
- [ ] Class II Landfill
- [ ] Class III Landfill
- [ ] Ash Monofill
- [ ] Asbestos Monofill
- [ ] Industrial Solid Waste
- [✓] Other Describe: Yard Waste mulching and consumer goods recycling.

[ ] 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
- [ ] Renewal
- [ ] Substantial Modification
- [ ] Intermediate Modification
- [ ] Minor Modification

4. Facility name: Citrus County Central Landfill

5. DEP ID number: 4009C00086, SWD-09-39859 County: Citrus

6. Facility location (main entrance): State Road 44 between Lecanto and Inverness, Florida

7. Location coordinates:

Section: 1 Township: 19S Range: 18E

Latitude: 28 ° 51 ' 8.5 " Longitude: 82 ° 26 ' 11.5 "

13. Property recorded as a Disposal Site in County Land Records: [✓] Yes [ ] No

14. Days of operation: Monday - Saturday

15. Hours of operation: Monday-Friday: 6:30 am - 5:00 pm Holidays and Saturdays: 6:30 am - 3:00 pm

16. Days Working Face covered: Monday-Saturday

17. Elevation of water table: 7 Ft. (NGVD 1929)

18. Number of monitoring wells: 14

19. Number of surface monitoring points: 0

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: ______

24. Leachate treatment method:

[ ] Oxidation
[ ] Secondary
[✓] Advanced
[ ] None
[ ] Other ______
[✓] Chemical treatment
[ ] Settling

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December 10, 2008
File No. 09207049.02

Steven G. Morgan
Solid Waste Section Southwest District
Florida Department of Environmental Protection
13051 North Telecom Parkway
Temple Terrace, Florida 33637-0926

Subject: Citrus County Central Class I Landfill Phase 3 Expansion Construction
Pending Permit No.: 21375-013-SC/01,
Citrus County WACS No.: SWD/09/39859

Dear Mr. Morgan:

On behalf of the Citrus County Solid Waste Division, SCS Engineers (SCS) submits the following responses to your request for additional information in a letter dated September 22, 2008. For ease of review, each Florida Department of Environmental Protection (FDEP) comments are reiterated in bold type, followed by our response.

We have provided revised submittals, or replacement pages to the submittals, using ~~strikethrough~~ and underline format, to facilitate review. The following documents are enclosed:

1. FDEP Form

2. Attachment E-4: Proof of Publication.

3. Attachment H-1: Construction Quality Assurance Plan (Revised) and Specification Sections:

   a. Section 01 50 01 – Field Engineering and Surveying
   b. Section 02 53 16 – Leachate Collection and Detection Pumps
   c. Section 02 56 15 – Geosynthetic Clay Liner
   d. Section 02 90 41 – Geosynthetic Rain Tarp
   e. Section 31 05 20 – Tri-planar Geocomposite
   f. Section 31 05 21 – Bi-planar Geocomposite
   g. Section 31 20 00 – Excavation, Backfill, Fill and Grading
   h. Section 31 32 19 – Geogrid
   i. Section 32 90 00 – Seeding and Sodding
   j. Section 33 05 20 – HDPE Geomembrane Liner
   k. Section 33 51 10 – Piping System

4. Attachment H-2: Anchor Trench Calculations (Revised)

5. Attachment H-3: HELP Model Calculations – Phase 3 Expansion (Revised)

6. Attachment H-4: HELP Model Calculations – Phase 2 (Revised)

7. Attachment H-5: Pump Calculations (Revised)

8. Attachment H-6: Pipe Crushing Calculations (Revised)

9. Attachment H-7: Stormwater Calculations (Revised)

10. Attachment H-8: Leak Detection System Action Leakage Rate Calculations

11. Attachment H-9: Liner Stress Analysis

12. Attachment H-10: Leachate Collection and Removal System Trench Capacity Calculations

13. Attachment H-11: LCRS Geotextile Calculations

14. Attachment H-12: Alternate Procedure Request

15. Attachment H-13: Leachate Collection and Detection System Flow Calculations

16. Attachment H-14: Drainage Gravel Calculations

17. Attachment I-1: SWFWMD Public and Private Well Inventory (Revised)

18. Attachment J-1: Settlement of Foundation Soils (Revised)

19. Attachment J-2: Slope Stability Analysis (Revised)

20. Attachment P-1: Closure Plan

21. Attachment S-1: Financial Assurance Cost Estimate (Revised)

22. Drawings including revised drawing sheet nos.: Cover Sheet, 2, 4, 5, 6, 7, 8, 9, 10, 14, and 17

The following information is needed in support of the solid waste application [Chapter 62-701, Florida Administrative Code (F.A.C.)].

1. **Rule 62-701.320(7)(b), F.A.C. Application Form #62-701.900(1), Part T: Please provide a revised Page 40 of 40 of the application form that has the original**

signature of the applicant.

Response: Please find attached a revised page 40 of 40 that has the original signature of the applicant.

2. **Rule 62-701.310, F.A.C. The cover letter and Section H.2.c.3 of this application refer to Approval of Alternate Procedure No. SWAP 01-6 as being applicable to this application. However the alternate procedures approval states, "This Order applies only to the Phase 2 liner side slopes and the 75-foot setback distance on the east side of the Phase 2 expansion." Therefore an alternate procedure will need to be applied for and issued to be granted relief from the same liner design requirements for the proposed Phase 3 expansion. Please provide a copy of the approved alternate procedure approval for Phase 3 or revise this application to meet all liner design requirements.**

Response: An alternate procedure request was submitted on October 30, 2008 to FDEP in Tallahassee. A copy of this request is included in Attachment H-12.

3. **Rule 62-701.320(5)(b), F.A.C. Please address the comments in John Morris' September 19, 2008 memorandum (attached) regarding this application. You may call Mr. Morris at (813) 632-6100, extension 336, to discuss the items in his memorandum.**

Response: The John Morris' September 19, 2008 comments are addressed at the end of this letter.

SECTION B (Rule 62-701.320(7), F.A.C.):

4. **Please verify whether the textured geomembrane is textured on both sides and revise this section accordingly.**

Response: The textured geomembrane is textured on both sides. This section has been revised accordingly.

5. **Please explain why a different rain tarp (12 mil) is being specified for Phase 3 than for Phase 2 (16 mil) and how that was considered in the design of the facility.**

Response: The actual rain tarp provided in Phase 2 construction was a temporary UV-resistant 10-mil polypropylene rain cover. A thicker rain tarp (12-mil) is being specified for Phase 3. The purpose of the rain tarp system is to cover the exposed cell bottom and sideslopes where operations are not occurring to minimize leachate generation. The stormwater collected on top of the rain tarp is diverted from the leachate system to the existing channels using portable pumps. The rain tarp is temporary and is removed prior to placement of 24-inches of protective sand cover and refuse.

SECTION E (Rule 62-701.320, F.A.C.):

6. **Sections E.7 and P.2.b:**

   a. **The referenced Attachment L-1 was not provided as indicated. Please verify and provide Attachment L-1, as applicable.**

   __Response:__ A new Operations Plan was submitted with the Operations Permit Modification for the closed 10-Acre Landfill Proposed New Class III Disposal Operation Pending Permit No.: 21375-012-SO/MM. This new Operations Plan will also apply to the Phase 3 Expansion Area. Therefore, the Operations Plan is not being resubmitted with this application and the above Section has been modified to state this.

   b. **In accordance with Rule 62-701.320(7)(e)1., F.A.C. a closure plan is required as part of this application and therefore is applicable at this time. Please provide a closure plan for the facility that includes a description of the proposed closure design and activities to be included in closing of the facility through Phase III build-out and a long-term plan. This closure plan should be as detailed as, and be consistent with, the details for closure and long-term care provided in support of the facility's closing cost estimates.**

   __Response:__ Please see Attachment P-1 for the Closure Plan.

7. **Section E.13: Please publish the attached Notice of Application and provide proof of publication to the Department.**

   __Response:__ The proof of publication is included in Attachment E-4.

8. **Section E.14: Please provide documentation from the FAA that the expansion does not violate FAA 150/5200-33B CA.**

   __Response:__ The Citrus County Central Landfill is not located within five miles of any licensed airports as shown in Figure E.1 which was included in the original submittal. Therefore, the Phase 3 expansion does not violate FAA 150/5200-33B thus notification to FAA is not required. The FAA does not provide documentation that facilities are not in violation.

SECTION F – LANDFILL PERMIT REQUIREMENTS (Rule 62-701.330, F.A.C.)

__Attachment F-1 - Construction Permit Application Drawings__

Please provide the following additional information and revisions to the Construction Drawings that include all necessary details for the construction of the facility. Due to the

difficulty in describing comments related to these drawings, these drawings will be discussed in detail at the meeting requested at the end of this letter. The drawings will be reviewed in their entirety after the responses to this request for information.

9. Sheet 4 of 19:

a. Note 4: Please revise this note to indicate that the sod pinning shall not damage the underlying liner system, where applicable.

<u>Response:</u> The note 4 was revised to indicate that all finished slopes greater than 10% outside the anchor trench limit shall be sodded (see attached plan sheet 4 of 19).

10. Sheet 5 of 19:

a. <u>Sections A & B:</u> Please explain the 1H:1V liner slope at the Phase 2 interface shown on these sections.

<u>Response:</u> The side slope at the Phase 2 interface have been revised from 1H:1V to 2H:1V (see attached plan set sheet 5 of 19).

b. <u>Section C:</u> The top of subgrade elevation at the east end of the bottom liner subgrade appears to be inconsistent with the elevation shown on Sheet 4 of 19. Please verify and revise this sheet, as appropriate.

<u>Response:</u> The section is taken at the bottom of the collection trench. The elevation is correct as shown.

11. Sheet 6 of 19:

a. <u>Collection Header, Sump, and Riser Plan:</u>

1) The indicated location of Section A on this plan view appears to be inconsistent with Section A on Sheet 8 of 19. Please verify and revise this plan view, as appropriate.

<u>Response:</u> The location of Section A has been modified to be consistent with Section A on Sheet 8 of 19 (see attached plan sheet 6).

2) The reference to Detail 4 on Sheet 14 of 19 for the pipe trench detail appears to be a typographic error. Please verify and revise this plan view accordingly.

<u>Response:</u> The reference to Detail 4 was revised to reference the correct detail, Detail 2 on Sheet 14 of 19 (see attached plan sheet 6 of 19).

b. **<u>Collection Leachate Manifold/Header Piping Detail</u>: Please revise this detail to identify the meters on the leachate collection header lines.**

<u>Response:</u> Please see revised detail. The meters are identified with a symbol which is shown in the legend.

12. **Sheet 7 of 19:**

a. **<u>Section A:</u> Please verify whether the leachate collection and detection riser pipes lay directly on top of the secondary geocomposite and if so how frictional damage to the secondary geocomposite does not result.**

<u>Response:</u> The pipes do lay directly on the geocomposite and are bedded in gravel backfill. Thermal expansion and contraction will be minimized due to gravel bedding, resulting in minimal movement of the pipes. No frictional damage is anticipated.

b. **<u>Section B:</u> Please verify whether there is overlap of the 18 oz geotextile that is over the secondary sump area at the points of intersection with the primary geocomposite or if the layer are tied together.**

<u>Response:</u> There is 4-feet overlap with sand being placed over the overlap as shown on Section B Sheet 7. Please note this is a 16-oz geotextile not an 18-oz geotextile.

13. **Sheet 8 of 19:**

a. **<u>Section A:</u> Please revise this section to identify the 18" carrier pipe specification (e.g. HDPE, corrugated metal, etc.).**

<u>Response:</u> The section was revised to identify the 16-inch carrier pipe. The 16-inch carrier pipe is carbon steel.

b. **<u>Section C:</u> Please revise this section to show the proposed geogrid between the secondary geocomposite and the rain tarp.**

<u>Response:</u> This section was revised to show the proposed geogrid between the secondary geocomposite and the rain tarp.

c. **<u>Detail 1:</u> The 3x4" reducer identified on Sheet 6 of 19, Detail 1 does not appear to be shown on this detail. Please verify and revise this detail, as**

appropriate.

__Response:__ Detail 1 was modified to more clearly show the 3x4-inch reducer identified on Sheet 6 of 19 (see attached plan sheet 8 of 19).

14. Sheet 9 of 19:

a. __Detail 2:__

1) **Please explain the function of the geogrid between the secondary geocomposite and the rain tarp.**

__Response:__ The function of the geogrid between the secondary geocomposite and the rain tarp is for additional strength for the liner system to support forces pulling down on the liner system. See calculations in Attachment H-9. Please note that these calculations were approved for Phase 2 and are applicable for the Phase 3 Expansion Area.

2) **Please revise this detail to identify the prepare sub-base below the secondary geomembrane, as applicable.**

__Response:__ This detail has been revised to identify the prepared sub-base below the secondary geomembrane.

b. __Detail 5:__ Based on the configuration shown on Sheet 10 of 19, Detail B, the location of the leachate cleanout support shown on Section C appears to coincide with the location of the anchor trench and/or access road. Please verify and show the location of the anchor trench and assess road on this detail, as applicable.

__Response:__ This detail has been removed from Sheet 10 of 19. The cleanout pipe will terminate before the stormwater swale thus the cleanout supports are no longer needed.

15. Sheet 10 of 19:

a. Section A:

1) **The configuration on the side slope of Phase 2 on this section is confusing. Please explain.**

__Response:__ Please see revised detail. The detail was revised to better represent the 3H:1V side slope and the geogrid tie-in to the existing geogrid.

2) **Discussion of the geogrid layer appears to be omitted from the notes on this section please verify and revise, as appropriate.**

<u>**Response:**</u> Please see the revised notes to include discussions on the geogrid layer.

3) <u>**Note 6:**</u> **The protective soil layer over the joined section discussed in this note does not appear to be shown on the detail. Please verify and explain.**

<u>**Response:**</u> The protective soil layer is not shown for clarity.

b. **Section D:**

1) **There appear to be typographic errors in the sheet references of this section. Reference to this section does not appear to be provided on Sheet 5 of 19. Please verify and revise this section and Sheet 5 of 19, as appropriate.**

<u>**Response:**</u> This section and Sheet 5 of 19 has been revised.

2) **Since this is a section of the Phase 2 liner system and anchor trench, Detail 2 on Sheet 9 of 19 does not appear applicable. Please verify and revise this section, as applicable.**

<u>**Response:**</u> It is now being shown as existing Phase 2 Lining Side Slope Anchor Trench Section and has been screened back to show that it is existing.

3) **Please explain why the rain tarp would still be on Phase 2 and verify whether the Phase 2 rain tarp extended into the anchor trench as shown and revise this section, as applicable.**

<u>**Response:**</u> The rain tarp is existing because the area has not yet been filled and it does extend into the anchor trench as shown.

c. <u>**Detail 1:**</u> **Please revise this detail to show the geogrid, as applicable.**

<u>**Response:**</u> This detail has been revised to include details of the geogrid.

16. **Sheet 14 of 19:**

a. **<u>Detail 2:</u> Please explain where on the project the reference 16" stormwater discharge pipe is located and verify that this detail of the pipe trench is referenced at that location.**

<u>Response:</u> The reference to a 12-inch discharge pipe has been removed as it is not applicable to the Phase 3 Expansion Area.

SECTION H - LANDFILL CONSTRUCTION REQUIREMENTS (Rule 62-701.400(9), F.A.C.):

17. **Section H.1:**

a. **<u>General:</u> This and several other sections of this application (e.g. Help Model) refer to sloping Phase 3 to promote stormwater runoff. Please verify whether it is the intention for stormwater runoff from initial cover to be discharge to the stormwater management system. Please note that initial cover must be reasonably stabilized with no exposed waste to allow runoff from initial cover to be treated as stormwater.**

<u>Response:</u> The intent is for stormwater runoff from initial cover to be discharged to the stormwater management system. The initial cover will be placed in accordance with the Rule and generally accepted landfilling procedures. The working face area is contained with berms, thus no runoff from this area will be allowed and any runoff within the bermed area will be managed as leachate.

18. **Section H.2:**

a. **<u>Liner Strength Assessment:</u> Please provide a copy of the referenced Liner Stress Analysis conducted for Phase 2.**

<u>Response:</u> A copy of the referenced Liner Stress Analysis is included in Attachment H-9 Liner Stress Analysis. Please note that the attached liner system stress calculations include the use of a geogrid on the 2:1 side slopes to add an additional factor of safety. The resulting calculations show that no stress is applied to any of the Geosynthetic liner system materials. The geogrid specified can withstand the downward force calculated using methods prescribed by Koerner plus the addition of the landfill compactor and maintain at least a 1.5 F.S. with only 5 percent strain on the material.

19. **Section H.2.a.1: Please revise this section to also reference CQA direct shear testing for the geosynthetic liner layers.**

Response: Section H.2.a.1 already references CQA direct shear testing for the Geosynthetic liner layers. Refer to Geosynthetic Clay Liner (GCL) bullet which refers to MQC certificates, CQA direct shear test results (interface and internal), GCL installation plan, repair log, and record drawings for the GCL.

20. **Section H.2.a.5: This section indicates that liner marker will not be placed until the waste reaches the level of the anchor trench. If the anchor trench will not be initially covered as part of construction, please provide additional anchor trench calculations in Attachment H-2 to evaluate this condition.**

    Response: Please see the anchor trench calculations that include this scenario, provided in Attachment H-2.

21. **Section H.2.c.1: Please verify whether the textured geomembrane is textured on both sides and revise this section accordingly.**

    Response: The textured geomembrane is textured on both sides. This section has been revised accordingly.

22. **Section H.2.c.2:**

    a. **Please revise the narrative in this section, as appropriate, based on your responses to comments regarding Attachments H-3 & H-4 below.**

       Response: Section H.2.c.2. has been revised based on comments regarding Attachments H-3 and H-4.

    b. **Design of the Leachate Collection Later:**

       1) **Please explain how increased waste density due to leachate recirculation was considered in the design calculations for the leachate collection layer.**

          Response: An additional HELP Model run was made using a loading of 15,000 psf which represents a waste density of 108 pcf which is well above densities expected in a bioreactor landfill (normal waste density specified in previous calculations is 63.5 pcf). Refer to Attachment H-3 for the HELP Model input and output. The increased waste is reflected in the transmissivity and thickness of the geocomposite drainage layer used in the model simulation. The results indicate that the head over the liner is less than the thickness of the primary drainage layer for minimum length and equal to the thickness of the primary drainage layer for the maximum length thus less than the one foot required by Rule 62-701.400(3)(c), F.A.C.

Scenario 5 - 135 ft Waste + 18-inch Soil Cover

Material	Material Density (pcf)	Depth of material (ft)	Load (psf)
Sand	110	2	220
Solid Waste	108	135	14,580
Soil Cover	110	1.5	165
		Total	14,965

2) **The referenced calculations using average peak flow between minimum and maximum drainage length do not appear to be provided. Please verify.**

Response: The peak design flow references the worst case scenario between the minimum and the maximum drainage length. Based upon the calculations the highest generation of leachate occurred with the maximum drainage length. A summary of the peak design flows for the Phase 3 is included in Attachment H-3 Leachate Balance Summary Report.

3) **Please provide leachate collection, detection, and transmission system pipe flow calculations.**

Response: Please refer to Attachment H-13 for the leachate collection and detection system flow calculations. Please refer to Attachment H-5 for the transmission system pipe flow calculations.

4) **Please provide leachate detection system flow calculations that demonstrate that the system will not flood.**

Response: Please refer to Attachment H-13 for the leachate detection system flow calculations. A 300-mil tri-planar geocomposite will overlay the bi-planar layer in the trench. Detail B on Drawing No. 9 has been modified to reflect a triplanar overlaying the biplanar in the trench. Based upon the calculations, the leachate detection system will not flood.

5) **Please provide leakage action rate calculations to establish a leakage action rate that triggers corrective actions.**

Response: Attachment H-8 includes the leak detection system action leakage rate.

23. **Section H.2.c.3: The GCL hydraulic conductivity provided in this section appears inconsistent with that specified for this project in specification Section 02 56 16. Please verify and revise this section accordingly.**

<u>**Response:**</u> The GCL hydraulic conductivity in Section H.2.c.3 has been changed to 5×10^{-9} cm/sec to be consistent with that specified in the project specifications.

24. **Section H.2.c.4: The leak detection system minimum hydraulic conductivity provided in this section for this project (2.8 cm/sec) does not meet the minimum required hydraulic conductivity for the leak detection system provided in Rule 62-701.400(3) (c)2., F.A.C. (10 cm/sec). Please verify and revise this section and the design of the leak detection system and all appropriate design calculations for this project accordingly.**

<u>**Response:**</u> At time of installation the hydraulic conductivity for the leak detection system is greater than 10 cm/sec (250-mil biplanar geocomposite). Therefore, the specified product meets the requirement of the Rule. For modeling purposes, a factor of safety of 2 was applied to the value for new material.

25. **Section H.2.d.3: Specification Section 31 20 00 - Part 2.03.A. does not appear to specify less than 10% fines in the protective layer sand. Please verify and revise specification Section 31 20 00 - Part 2.03.A. accordingly.**

<u>**Response:**</u> We do not believe that 10 percent fines is a critical criterion whereas the hydraulic conductivity is the key parameter to judge the cover material.

26. **Section H.3.a.3:**

a. **Please provide geotextile retainage/drainage calculations that demonstrate that the drainage sand will not clog the geotextile.**

<u>**Response:**</u> Please find in Attachment H-11 the LCRS geotextile calculations. Based upon these calculations, the drainage sand will not clog the geotextile.

b. **Please provide calculations that demonstrate that the drainage gravel will not clog pipe perforations.**

<u>**Response:**</u> Please find in Attachment H-14 the drainage gravel calculations. Based upon these calculations, the drainage gravel will not clog the pipe perforations.

27. Section H.3.a.4:

a. **<u>Contingent Design</u>: Please provide leachate collection/detection system trench calculations, which demonstrate that the trench will carry leachate flow if the pipes become clogged or damaged. Please note that open channel flow calculations are not appropriate for this calculation.**

<u>Response:</u> Please find in Attachment H-10, the leachate collection/detection system trench calculations.

28. Section H.3.b.2: Specification Section 31 20 00 - Part 2.03.A. does not appear to specify that there will be no carbonates or organics in the protective layer sand. Please verify and revise Specification Section 31 20 00 - Part 2.03.A. accordingly.

<u>Response:</u> This Specification Section 31 20 00 – Part 2.03 has been revised to specify that the sand will have minimal calcium content and contain less than 1 percent organic matter.

29. Section H.3.b.3: Sheet 4 of the construction drawings indicates that the header pipe and trench drains will be at a minimum 1% slope. Please revise this section accordingly.

<u>Response:</u> Section H.3.b.3 has been revised to indicate a minimum 1 percent slope.

30. Section H.4:

a. **The HELP Models inputs for leachate recirculation reintroduced leachate on a per acre basis, resulting in much greater than 5000 gallon per day of leachate recirculation into Phases 1A, 2, and 3. Please verify that the HELP inputs were for design purposes only and that only 5000 gallons of leachate per day is intended to be recirculated. The actual leachate recirculation procedures should be addressed in the permit application for operation of Phase 3 and vertical expansion over Phases 1, 1A, and 2.**

<u>Response:</u> The revised HELP Model analyses indicate that 100 percent of the average leachate generation can be recirculated and still maintain the required head over liner requirement. Thus a maximum of 9,152 gal/day will be recirculated in Phase 3 and 8,166 gal/day will be recirculated in Phase 2. Please note that recirculation is no longer proposed within Phase 1A. The following is a summary of the quantity being recirculated within Phase 3 and Phase 2:

Phase 3:

Case 3 - 30 ft Waste + 6-inch Daily Cover

Waste Thickness ft	Leachate Collected in/yr/ac	Drainage Recirculated 100% gal/day/acre	Phase 3 Area acres	Drainage Recirculated gal/day	
30	18.50	1376	6.65	9,152	<---- used Max. L.

Case 4 - 70 ft Waste + 6-inch Daily Cover

Waste Thickness ft	Leachate Collected in/yr/ac	Drainage Recirculated 100% gal/day/acre	Phase 3 Area acres	Drainage Recirculated gal/day	
70	18.45	1373	6.65	9,128	<---- used Max. L.

Case 5 - 135 ft Waste + 18-inch Intermediate Cover

Waste Thickness ft	Leachate Collected in/yr/ac	Drainage Recirculated 100% gal/day/acre	Phase 3 Area acres	Drainage Recirculated gal/day	
135	15.85	1179	6.65	7,842	<---- used Max. L.

Phase 2:

Phase 2 Current Condition 70 ft waste + 6-inch daily cover with Recirculation

Waste Thickness ft	Leachate Collected in/yr/ac	Drainage Recirculated 100% in/yr/acre	Drainage Recirculated 100% gal/day/acre	Phase 2 Area acres	Drainage Recirculated gal/day
70	18.32	18.32	1361	6	8,166

b. **If it is the intention for runoff from initial cover to be treated as stormwater, then leachate recirculation cannot occur on initial cover. Please verify and revise this section, as appropriate.**

Response: The working face is bermed thus any stormwater coming into contact with the working face will be treated as leachate and the stormwater outside the bermed area will be considered stormwater. Thus leachate recirculation will only occur on initial cover within the bermed area.

c. **Please clarify if leachate recirculation will not occur after any rainfall event or after a rainfall event of a specified intensity and revise this section, as appropriate.**

Response: Leachate recirculation will only be applied within the bermed working face. If this area is already saturated due to rainfall, leachate recirculation will not be applied. Leachate recirculation will not occur during active rainfall or when any standing water is observed within the bermed working face area.

31. **Section H.8.b: Please provide a copy of the ERP permit upon issuance.**

    Response: Acknowledged.

32. **Section H.8.c & Attachment H-7: The information provided in Attachment H-7 appears to be presented to demonstrate that the stormwater ponds are capable of handling and treating the stormwater predicted to flow from the landfill stormwater conveyance system. However it is unclear how the information in Attachment H-7 demonstrates the adequacy of the side slope stormwater conveyance swale and downpipe system. Please explain.**

    Response: See Figure 1. included in Attachment H-7 (please note that this figure has been revised to incorporate the responses to the ERP RAI#1). This figure includes the side slope conveyance swale and down pipe system. The stormwater management system is sized for the 100 year, 24 hour storm event and indicates that no overtopping of the system will occur including side slope conveyances. The stormwater runoff will be fully contained on-site.

ATTACHMENT H-1 – CONSTRUCTION QUALITY ASSURANCE PLAN AND TECHNICAL SPECIFICATIONS (Rules 62-701.400(3), (7) and (8), F.A.C.)

Please revise the CQA Plan and/or other referenced application documents, as appropriate, to address the following comments and/or inconsistencies. The CQA Plan will be reviewed in its entirety after receipt of this following information.

33. **Please revise the CQA plan to include CQA activities related to the LCS/LDS collection and transmission system construction.**

    Response: Please find attached the revised CQA plan to include the activities related to the leachate piping system.

34. **Please revise the CQA plan to include CQA activities related to the installation of the rain tarp and phased removal of the rain tarp from Phases 1A, 2, and 3 during operation of the facility. Please note that the specifications for the rain tarp for Phases 1A and 2 are not the same as for Phase 3.**

    Response: This is a temporary component to minimize leachate quantity. This is not part of the final liner system, therefore CQA activities are to include verification that the product provided meets or exceeds the specification requirements based on manufacturer's submittal information. The removal of the rain tarp will occur after the disposal area has been constructed and certified, thus it is not appropriate to include this discussion in the CQA Plan or the Specifications. The County will be responsible for the installation and removal of the rain tarp from Phases 1A, 2, and 3 during the operational phase and will do so in accordance with the manufacturer's recommendations.

35. **Section 3.1: Please revise this section to indicate that the permitting agency also reviews and approves the construction certification report.**

<u>**Response:**</u> Once completed the construction certification report will be submitted to the agency for review and approval.

36. **Section 5.3.1: Please revise this section to describe the CQA testing to be conducted as part of phased installation of the liner protective cover on the constructed side slopes of Phase 1A, 2, and 3 as part of future operation of the facility. <u>Please note that the specifications for the liner protective layer for Phases 1A and 2 are not the same as for Phase 3</u>.**

<u>**Response:**</u> These activities will occur after the disposal area has been constructed and certified, thus it is not appropriate to include this discussion in the CQA Plan or the Specifications. No additional CQA activities are proposed other than visual inspection of the application of protective layer by the Director of Solid Waste.

37. **Section 5.4: Please revise this section to describe the CQA construction quality evaluation that will be conducted as part of phased installation of the liner protective cover on the constructed side slopes of Phase 1A, 2, and 3 as part of future operation of the facility, including how protective soils of different specification will be installed adjacent to each other.**

<u>**Response:**</u> These activities will occur after the disposal area has been constructed and certified, thus it is not appropriate to include this discussion in the CQA Plan or the Specifications. No additional CQA activities are proposed other than visual inspection of the application of protective layer by the Director of Solid Waste. With regards to differing specifications for the protective cover layer, we proposed to allow the Phase 3 specified protective cover to be used on the side slopes of the Phase 2 areas where protective cover has not yet been applied. The difference in specification will not affect performance of the LCRS on the side slope.

38. **Section 6.1.2.1: Specification Section 33 05 20-3.02 appears to allow for CQA testing at the plant as an option. Please verify and revise this section or the specification, as appropriate.**

<u>**Response:**</u> Section 6.1.2.2, Conformance Sampling and Testing has been revised to include CQA testing at the plant as an option.

39. **Section 6.1.5: This section refers to anchor trench backfilling and compaction as outlined in the specification. However, there do not appear to be specifications for anchor trench installation, including backfilling and compaction provided. Please verify and provides specifications for anchor trench installation, as applicable.**

Response: The anchor trench specification is included in Specification Section 33 05 20-3.08.

40. **Section 6.1.7: Please revise this or an appropriate section of the CQA plan to include verification that ballasts are removed before installation of the next liner layer.**

Response: Section 6.1.7 has been revised to include that CQA Consultant shall verify all ballast and other objects be removed prior to deployment of next layer.

41. **Section 6.1.9.3: Specification Section 33 05 20-3.05 appears to specify a different size sample strip for laboratory testing. Please verify and revise this section or Specification Section 33 05 20-3.05, as appropriate.**

Response: The CQA Plan Section 6.1.9.3 has been revised to specify a sample strip size of 12-inch by 48-inch consistent with Specification Section 33 05 20-3.05.

42. **Sections 6.3.2.2 & 6.3.3.1: Please verify the appropriateness of testing geonet for mass per unit area and revise these sections and/or the appropriate specifications, as appropriate.**

Response: The minimum testing frequency has been added to Sections 6.3.2.2 and 6.3.3.1.

43. **Sections 6.4.3: This section describes CQA testing for geogrid but does not describe the parameters to be tested, the test methods, or the acceptable values. Specifications for Geogrid CQA testing also do not appear to be provided in Specification Section 31 32 19. Please verify and revise this section and/or specification Section 31 32 19 accordingly.**

Response: The current specification states that the Construction Quality Assurance (CQA) will be performed by a designated CQA Consultant retained by the OWNER. The CQA Consultant, or his Inspector, shall observe and inspect the geogrid installation activities and conduct CQA testing at a random frequency and location. The CQA Consultant shall submit a final report, signed and sealed by a professional engineer licensed in the State of Florida, certifying the test results (refer to Part 1.03). The CQA Plan refers to the Specifications for test methods, frequency and acceptable values. Please note that this section is identical to the approved Phase 2 Expansion CQA Plan.

44. Section 6.5.2: Specification Section 02 56 16-2.02 appears to allow for CQA testing prior to delivery as an option. Please verify and revise this section or Specification Section 02 56 16-2.02, as appropriate.

<u>**Response:**</u> This Section has been modified to allow CQA testing prior to delivery as an option.

45. Section 7: Please revise this section to include documentation of CQA testing and construction oversight associated with the phased removal of rain tarps and installation of the liner protective layer on the side slopes of Phases 1A, 2, and 3 during operation of the facility.

<u>**Response:**</u> The County will remove the rain tarp to expose additional disposal area as needed. The tarp will be cut at the desired location and a new anchor berm will be constructed to separate the tarped stormwater area from the active landfill area. On side slopes, the County will place the 2-foot thick protective sand layer over the liner system. The County will use plastic traffic cones, attached to the geogrid, as depth indicators. The traffic cones will be trimmed to be 2 feet in height. Thus covering the top of the cones with the protective layer will ensure proper depth of fill. These activities will occur after the disposal area has been constructed and certified, thus it is not appropriate to include this discussion in the CQA Plan or the Specifications. No additional CQA activities are proposed other than visual inspection of the application of protective layer by the Director of Solid Waste.

46. Please revise the CQA plan to include CQA activities related to the installation of the rain tarp and phased removal of the rain tarp from Phase 1a, 2, and 3 during operation of the facility. <u>Please note that the specifications for the rain tarp for Phases 1A and 2 are not the same as for Phase 3</u>.

<u>**Response:**</u> The County will remove the rain tarp to expose additional disposal area as needed. The tarp will be cut at the desired location and a new anchor berm will be constructed to separate the tarped stormwater area from the active landfill area. On side slopes, the County will place the 2-foot thick protective sand layer over the liner system. The County will use plastic traffic cones, attached to the geogrid, as depth indicators. The traffic cones will be trimmed to be 2 feet in height. Thus covering the top of the cones with the protective layer will ensure proper depth of fill. These activities will occur after the disposal area has been constructed and certified, thus it is not appropriate to include this discussion in the CQA Plan or the Specifications. No additional CQA activities are proposed other than visual inspection of the application of protective layer by the Director of Solid Waste.

ATTACHMENT H.1, APPENDIX L- TECHNICAL SPECIFICATION (Rules 62-701.400(3), (7) and (8)

Please revise the Technical Specifications and/or other referenced application documents, as appropriate, to address the following comments and/or inconsistencies. The Technical Specifications will be reviewed in their entirety after receipt of this information.

47. Please provide a Table of Contents for the Appendix L.

<u>Response:</u> A Table of Contents for the Specifications has been added as page i.

48. Section 02 53 16 - Leachate collection and Detection Pumps:

a. **<u>Part 2.04.B.</u>: Sheet 4 of the construction drawings appears to show three meters (two collection, one detection). Please verify and revise this part, as appropriate.**

<u>Response:</u> Please note that this should be Part 2.05.B. instead of Part 2.04.B which indicates two flow meters. The meters are shown on sheet 6 of the construction drawings. Detail 1 has been modified to show two flow meters on the discharge lines. One flow meter will be for the primary collection pump and one for the secondary detection pump.

b. **<u>Part 2.04.E.</u>: This part indicates that the flow meters must be capable of handling solids up to 2" in diameter, however the leak detection line is only 2" in diameter. Please verify and explain this apparent discrepancy.**

<u>Response:</u> Please see the revised Specification Section 02 53 16 Part 2.05.

49. Section 02 56 16 - Geosynthetic Clay Liner:

a. **<u>Part 3.07.B</u>: Please provide supporting information on the epoxy adhesive that demonstrates that it will damage or diminish the effectiveness of the GCL.**

<u>Response:</u> While we don't believe that the adhesive will impact the GCL in any way, there hasn't been any test data to verify this. This Part has been revised to remove the epoxy requirement.

50. Section 02 90 41 - Geosynthetic Rain Tarp:

a. **<u>Part 1.04.C</u>: Please revise this or an appropriate part of this specification section to identify the properties to be tested for and the testing frequency for CQA testing of the rain tarp.**

Response: This is a temporary component to minimize leachate quantity. This is not part of the final liner system, therefore CQA activities are to include verification that the product provided meets or exceeds the specification requirements based on manufacturer's submittal information.

b. **Part 3.01: Please revise this part to include procedures for the phased removal of the rain tarp from Phase 1a, 2, and 3 during operation of the facility.**

Response: The County will remove the rain tarp to expose additional disposal area as needed. The tarp will be cut at the desired location and a new anchor berm will be constructed to separate the tarped stormwater area from the active landfill area. On side slopes, the County will place the 2-foot thick protective sand layer over the liner system. The County will use plastic traffic cones, attached to the geogrid, as depth indicators. The traffic cones will be trimmed to be 2 feet in height. Thus covering the top of the cones with the protective layer will ensure proper depth of fill. These activities will occur after the disposal area has been constructed and certified, thus it is not appropriate to include this discussion in the CQA Plan or the Specifications. No additional CQA activities are proposed other than visual inspection of the application of protective layer by the Director of Solid Waste.

c. **Part 3.02: Please revise this part to include procedures for the repair of rain tarp damaged during the phased removal of the rain tarp from Phase 1a, 2, and 3 during operation of the facility.**

Response: These activities will occur after the disposal area has been constructed and certified, thus it is not appropriate to include this discussion in the CQA Plan or the Specifications. The County will be responsible for repair of the rain tarp during the operational phase and will do so in accordance with the manufacturer's recommendations.

55. **Section 31 05 20 - Tri-Planar Geocomposite:**

a. **Part 3.01.C: The properties listed in this part appear inconsistent with Table 31 05 20-1. Please verify and revise this part and/or the table as appropriate.**

Response: Please see revised Tables.

b. **Part 3.01.D: The properties listed in this part appear inconsistent with Table 31 05 20-2. Please verify and revise this part and/or the table as appropriate.**

Response: Please see revised Tables.

c. **Table 31 05 20-1: Please revise the table to include a geonet minimum transmissivity specification, consistent with the bi-planar geocomposite specifications.**

Response: The geonet minimum transmissivity is not representative of product performance and is not necessary to confirm the correct product.

d. **Table 31 05 20-3: Please explain why the transmissivity test is conducted at 5000 psf and not at the maximum assumed stress on the geocomposite.**

Response: The transmissivity testing has been modified to be conducted at 15,000 psf which exceeds the maximum stress on the geocomposite. Please note that the gradient was modified from 0.02 to 0.1. The gradient of 0.1 is a conformance test to confirm the correct product that will meet the design requirement. The manufacturer's published transmissivity data for this product is set at 15,000 psf and a gradient of 0.1. Laboratory testing at a small gradient such as 0.02 is subject to inconsistent results therefore it is not recommended.

56. Section 31 05 20 - Bi-Planar Geocomposite:

a. **Part 1.04.C: Please revise this part to include the submittal of the direct shear testing results.**

Response: The direct shear testing results are not typically included in the manufacturing conformance sampling.

b. **Part 3.01.C: The properties listed in this part appear inconsistent with Table 31 05 21-1. Please verify and revise this part and/or the table as appropriate.**

Response: Please see revised Tables.

c. **Part 3.01.D: The properties listed in this part appear inconsistent with Table 31 05 21-2. Please verify and revise this part and/or the table as appropriate.**

Response: Please see revised Tables.

d. **Table 31 05 21-2: Please explain why the bi-planar geotextile specifications include the property of water flow rate, while the tri-planar geotextile specifications include the property of permittivity.**

Response: The bi-planar specification has been modified to include the property of the permittivity.

e. <u>**Table 31 05 20-3**</u>**:**

1) **Please explain why the transmissivity test is conducted at 5000 psf and not at the maximum assumed stress on the geocomposite.**

<u>**Response:**</u> The transmissivity test was modified to be conducted at 10,000 psf which exceeds the maximum assumed stress on the geocomposite. Please note that the gradient was changed from 0.02 to 0.1. The gradient of 0.1 is a conformance test to confirm the correct product that will meet the design requirement. The manufacturer's published transmissivity data for this product is set at 10,000 psf and a gradient of 0.1. Laboratory testing at a small gradient such as 0.02 is subject to inconsistent results therefore it is not recommended.

2) **Please revise note 1 to include the minimum hydraulic conductivity of the geocomposite.**

<u>**Response:**</u> Note 1 has been modified to include a minimum hydraulic conductivity of 10 cm/sec.

57. **Section 31 20 00 - Excavation, Backfilling, Fill and Grading:**

a. <u>**Part 1.03.A**</u>**: This part refers to Part 1.06, however there is no Part 1.06 in this specification section. Please verify and revise this section to provided Part 1.06, as appropriate.**

<u>**Response:**</u> Part 1.03.A should refer to Part 1.04 Submittals. This Part has been modified accordingly.

b. <u>**Part 2.02.**</u>**: Please revise this part to include specifications for the sub-base under the secondary geomembrane on the Phase 3 construction side slopes.**

<u>**Response:**</u> Part 2.02 has been modified to include the sub-base under the secondary geomembrane on the Phase 3 construction side slopes.

c. <u>**Part 2.02.A.**</u>**: The sub-base soil specifications in this part appear inconsistent with Specification Sections 32 11 16-2.01.C. and 02 56 16-3.04A. Please verify and revise this part, as appropriate.**

<u>**Response:**</u> Specification Section 32 11 16 was deleted and all information pertaining to the sub-base soil is included in Specification Section 31 20 00.

d. **<u>Part 2.04.A.</u>: Section H.3.a.1. of the application and Sheet 7 of 19 of the construction drawings indicate that No. 57 aggregate will be used in the leachate collection system. Please verify and as appropriate, revise this part to delete the reference to No. 4 aggregate.**

<u>Response:</u> The reference to No. 4 aggregate has been removed from this Specification.

e. **<u>Part 2.06.C.</u>: It is unlikely that mulch could meet the <1/4 inch diameter stick requirement in Part 2.06.A of this specification section. Please verify and revise this part, as appropriate.**

<u>Response:</u> Part 2.06 has been modified to indicate that the topsoil shall be free from MSW, large stones, toots, sticks, clay, peat, weeds and sod. Screening has been added to the requirement for the mulched yard waste.

f. **<u>Part 3.03.D.</u>: There do not appear to be compaction requirements in Part 3.09 as indicated. Please verify and revise this part or an appropriate part of this specification section to specify compaction requirements.**

<u>Response:</u> Part 3.09 has been added to include the compaction requirements.

58. Section 31 32 19 - Geogrid:

a. **<u>Part 1.04</u>: Please revise this part to require the submittal of interface friction angle testing for the proposed geogrid/geocomposite and geogrid/protective soil layer interfaces and to specify at minimum interface friction angle for these interfaces.**

<u>Response:</u> Part 2.02, CQA Conformance Testing, has been added to include the interface friction angle testing for the proposed geogrid/geocomposite and geogrid/protective soil layer interfaces and the minimum interface friction angle is specified for these interfaces.

b. **<u>Table 31 32 19-1</u>: Please revise Specification Section 31 32 19 to require the submittal of information and/or testing that demonstrates that the geogrid used on the project meets the specifications in this table.**

<u>Response:</u> Please see revised Specification.

c. **<u>Part 3.02.B.</u>: The repair information appears to be provided in CQA Plan Section 6.4.5. Please verify and revise this part or the CQA Plan, as appropriate.**

Response: Part 3.03 was added to include the repair information provided in the CQA Plan Section 6.4.5.

d. **Part 3.03.A.: The placement of backfill material on the geogrid does not appear to be shown on the drawings as indicated. Please verify and revise this part, as appropriate.**

Response: There will be no placement of backfill material on the geogrid. Thus this reference was removed from the specification.

59. **Section 32 11 16 - Sub-Sase:**

a. **Part 1.03.C.: This part appears inconsistent with Specification Section 31 20 00-1.04.C. Please verify and revise this part or Specification Section 31 20 00-1.04.C, as appropriate.**

Response: Specification Section 32 11 16 was deleted. The sub-base soil requirements are included in Specification Section 31 20 00.

b. **Part 1.03.G.: Please provide Specification Section 01 50 01.**

Response: Specification Section 01 50 01 is included for your review.

c. Table 32 11 16-1:

1) **The specified value for grain size does not appear to be provided in Part 2.01.A. Please verify and provide.**

Response: Specification Section 32 11 16 was deleted. The sub-base soil requirements are included in Specification Section 31 20 00.

2) **The specified value for Atterberg Limits Plasticity Index appear to be inconsistent with Specification Section 31 20 00-Part 2.02.A. Please verify and revise this part or Specification Section 31 20 00-Part 2.02.A., as appropriate.**

Response: Specification Section 32 11 16 was deleted. The sub-base soil requirements are included in Specification Section 31 20 00.

3) **Please explain the Compaction Characteristic property in this table and the rational for the test frequency.**

Response: Specification Section 32 11 16 was deleted. The sub-base soil requirements are included in Specification Section 31 20 00.

d. **<u>Part 3.01.A.</u>: Please revise this part to specifically identify the part of Specification Section 31 20 00 referred to for backfilling preparation.**

<u>Response:</u> Specification Section 32 11 16 was deleted. The sub-base soil requirements are included in Specification Section 31 20 00.

e. **<u>Part 3.02.</u>: Please revise this part to provide the specifications for the sub-base (under the geomembrane) preparation/installation on the constructed side slopes of Phase 3.**

<u>Response:</u> The specification has been modified to include specifications for the sub-base under the geomembrane preparation/installation on the constructed side slopes of Phase 3. Specification Section 32 11 16 was deleted. Please refer to Specification Section 31 20 00 for the sub-base under the geomembrane preparation/installation on the constructed side slopes of Phase 3.

60. Section 33 05 20 - HDPE Geomembrane Liner:

a. **<u>Part 1.01.B.</u>: Please verify that the geomembrane will be textured on both sides.**

<u>Response:</u> The textured geomembrane is textured on both sides.

b. **<u>Parts 1.04 and 2.02</u>: Please revise these parts to require the submittal of interface friction angle testing for the proposed sub-base/geomembrane interface on the constructed side slopes of Phase 3 and to specify the minimum interface friction angle for this interface.**

<u>Response:</u> Part 3.03 has been revised to include the submittal of interface friction angle testing for the proposed sub-base/geomembrane interface on the constructed side slopes of Phase 3. A minimum interface friction angle of 20.5 degrees has been specified for this interface.

c. **<u>Part 3.03</u>: Subbase testing does not appear to be shown on the Drawings, as indicated. Please verify and revise this part, as accordingly.**

<u>Response:</u> This section has been revised to be consistent with the sub-base Specification No. 32 11 16.

d. **<u>Part 3.04.B.</u>: Please explain why the indicated 45 degree cut will minimize seam stress.**

Response: Liner stress is parallel to the slope. A seam that is greater than 45 degrees will result in stress that is tangent to the seam as opposed to perpendicular to the seam, if the seam were horizontal. Stress tangent to the seam will resolve to a lesser force acting perpendicular to the seam.

e. **Part 3.08.A.: Backfilling and compaction criteria do not appear to be indicated on the Drawings, as stated in this part. Please verify and revise this part, as appropriate.**

Response: This Part was changed to refer to Specification Section 31 20 00 Table 1, for General Fill.

61. Section 33 51 10 - Piping System:

a. **Please revise this specification section to provide specified procedures for hydrostatic testing of pressure lines and jet cleaning and video inspection of gravity lines upon construction completion.**

Response: Please find attached a revised piping system specification which addresses the jet cleaning and video inspection and hydrostatic testing of pressure lines.

ATTACHMENT H-2 – ANCHOR TRENCH CALCULATIONS:

62. Please provide revised anchor trench calculations that utilize the weakest interface angle of the liner system and the specified yield stress for the geomembrane (126 lb/inch width).

Response Please find attached revised anchor trench calculations (Attachment H-2) considering the weakest interface angle of the liner system and the specified yield stress for the geomembrane.

63. The anchor trench configuration utilized appears inconsistent with that shown on Detail B of Sheet 10 of 19 of the construction drawings. Please verify and revise the anchor trench calculations accordingly.

Response: The revised anchor trench calculations require a horizontal anchor or runout length of 3 feet, assuming a tensile at break of 126 lbs/in with a depth of the anchor trench of 2 feet. Our design provides a horizontal anchor runout of length of 3 feet with a depth of the anchor trench of 4 feet and a width of anchor trench at the bottom of 2 feet. This is a conservative design.

ATTACHMENT H-3 – HELP MODEL/LEACHATE GENERATION RATES CALCULATIONS (rules 62-701.210(7)(e), 62-701.400(4), F.A.C.)

Please revise the HELP model evaluation and/or other referenced application documents, as appropriate, to address the following comments and/or inconsistencies. The HELP Model evaluation will be reviewed in their entirety after receipt of this following information.

64. **Design Intent: The side slope geogrid does not appear to be considered in the HELP Model Analyses. Please verify and explain.**

    Response: The geogrid has no effect in the HELP Model Analyses. The purpose of the geogrid is for slope stability along the side slope. The geogrid has an open area of 90 percent.

65. **Step 2: Please explain the basis for assumed percent stormwater runoff in Cases 2-5 and provide fill sequence plan sheets that illustrate the area that are considered for stormwater runoff in each case.**

    Response: The Phase 3 area will be divided into three sections of roughly 2.2 acres each. The working face area will be similar in all three sections, approximately 150' x 150' or about 0.5 acres. Thus at any given time 23 percent (0.5 acres / 2.2 acres) will not be runoff and 77 percent will be considered runoff. The HELP Model has been revised to assume 23 percent will not be considered stormwater runoff and 77 percent will be considered runoff.

66. **Step 3: Please explain how the methods presented in the Giroud et al reference were incorporated into the HELP Models analyses and leachate generation rates calculations in Attachment H-3.**

    Response: As stated in Step 3 of the HELP Model Memorandum, the geometry of the cell floor is irregular. In order to account for the two different slopes, upstream slope of 2H:1V and downstream slope of 2 percent, the method presented in Giroud et el was used to account for two slopes for a given slope length. Thus the horizontal length equals the upstream length plus the downstream length and the lesser of the two slopes is used. Refer to Figure 5 in the Giroud et al reference.

67. **Attachment 1:**

    a. **The k-value for the drainage sand in the liner system schematic is inconsistent with that specified and utilized in the HELP model analyses. Please verify and revise as accordingly.**

       Response: The K-value in the schematic was incorrect and has been revised. The k-value in the schematic should be as specified in the HELP Model analyses,

$k = 5.4 \times 10^{-4}$ cm/sec (see Attachment 1 in the HELP Model calculations, Attachment H-3).

b. **Please identify the source of the t' values in the triplanar and biplanar transmissivity/hydraulic conductivity calculations.**

<u>Response:</u> The source of the t' values for the triplanar and biplanar were included in Attachment 1 of Attachment H-3.

c. **The biplanar hydraulic conductivity results do not meet the minimum required hydraulic conductivity for the leak detection system provided in Rule 62-701.400(3) (c)2., F.A.C. (10 cm/sec). Please verify and revise the design of the leak detection system and these calculations for this project accordingly.**

<u>Response:</u> At time of installation the minimum required hydraulic conductivity for the leak detection system is greater than 10, K=15.8 cm/sec, which meets the requirements of the Rule. For modeling purposes we used a factor of safety of 2, to reduce the k value.

d. **<u>HELP Model Length Calculations</u>: Please explain why horizontal projections of the side slope and not the actual slope lengths were not utilized in these calculations.**

<u>Response:</u> The actual slope lengths were used in the model. The schematics were drawn incorrectly and have been revised (see Attachment 1 in the HELP Model calculations Attachment H-3).

68. Attachment 3 and 5:

a. **Section H.2.c.2 of the application indicates that 1 pinhole/acre was utilized in the HELP Model analyses. Please verify and revise the HELP Model analyses or Section H.2.c.2, as appropriate.**

<u>Response:</u> Section H.2.c.2 was modified to be consistent with the HELP Model analyses, 0.5 pinhole/acre was specified. In addition 1 installation defect per acre is also used. Please see the revised Section H.2.c.2.

b. **Please explain why the specified GCL hydraulic conductivity for this project (5xl0E-9 cm/sec) was not utilized in the HELP Model analyses.**

<u>Response:</u> The HELP Model input has been modified to specify a hydraulic conductivity for the GCL of 5×10^{-9} cm/sec.

c. **Please provide revised HELP Model analyses that utilize at least five years of actual on-site rainfall data collected at the facility and include the worst case annual rainfall year and worst case daily rainfall event recorded.**

<u>Response:</u> Revised HELP Model analyses were provided to include five recent years of actual on-site rainfall data collected at the facility (see Attachment H-3). This data includes 2004 when 4 hurricanes affected the site.

d. **Please explain why the SCS runoff curve number changes without a change in soil texture number.**

<u>Response:</u> The curve number is computed by the HELP model based on the landfill surface slope, slope length, soil texture of the top layer, and the vegetative cover. Even though the soil texture remains the same, the slope length is different in each run thus the difference in SCS curve number. All other parameters are consistent between the model runs.

69. Attachment 4:

a. **Section H.2.c.2 of the application indicates that 90% and 80% of the average leachate generation was utilized in the HELP Model analyses for recirculation. However it appears that the peak leachate generation were utilized. Please verify and revise the HELP Model analyses or Section H.2.c.2, as appropriate.**

<u>Response:</u> The revised HELP Model analyses indicates that 100 percent of the average leachate generation can be recirculated and still maintain the required head over liner requirement. Thus a maximum of 9,152 gal/day can be recirculated in Phase 3 and 8,166 gal/day can be recirculated in Phase 2. There will be no recirculation in Phase 1A.

70. Attachment 5:

a. **The detection system hydraulic conductivity results do not meet the minimum required hydraulic conductivity for the leak detection system provided in Rule 62-701.400(3) (c)2., F.A.C. (10 cm/sec). Please verify and revise the design of the leak detection system and these calculations for this project accordingly.**

<u>Response:</u> At time of installation the minimum required hydraulic conductivity for the leak detection system is greater than 10, K=15.8 cm/sec, which meets the requirements of the Rule. For modeling purposes we used a factor of safety of 2 which reduces the k value.

ATTACHMENT H-4 – HELP MODEL CALCULATIONS – PHASE 2 AND 1A (Rules 62-701.320(7)(e), 62-701.400(4), F.A.C.)

Please revise the HELP model evaluation and/or other referenced application documents, as appropriate, to address the following comments and/or inconsistencies. The HELP Model evaluation will be reviewed in their entirety after receipt of this following information.

71. **Bottom Liner System Configuration: It does not appear that the liner configuration provided in this section and utilized in the HELP Model Analyses in Attachment H-4 are consistent with the constructed bottom liner systems for Phases 1A and 2 as indicated (e.g. Permit Modification No. 21375-007-SC, change the design of Phase 2 to replacing the 6-in. clay subbase with a GCL layer on the 2% slopes). Please provide supporting information that the liner system assumptions utilized in the HELP analyses are consistent with the liner specification for the installed liner systems for Phases 1A and 2, and/or revise this section and the HELP Model analyses provided in Attachment H-4 as appropriate.**

    Response: HELP Model analyses and supporting text is consistent with the design of Phase 2. The permit modification that was issued was not used, thus the 6-inch clay sub-base was constructed on the cell floor.

72. **Attachment 1:**

    a. **HELP Model Drainage Length:**

        1) **Please explain why horizontal projections of the side slope and not the actual slope lengths were not utilized in these calculations.**

            Response: The actual slope lengths were used in the model. The schematics were drawn incorrectly and have been revised (see Attachment 1 in the HELP Model calculations Attachment H-3).

        2) **Please verify that there is a lined 2H:1V north bottom liner slope in Phases 1A and 2 as depicted and/or revise these calculations accordingly.**

            Response: Please see the revised calculations which include the 2:1 slope in the slope length.

ATTACHMENT H-6 – PIPE CRUSHING CALCULATIONS

73. Load on Pipe (Overburden):

a. Please explain why 90 psf was assumed for the drainage sand in these calculations, but 110 psf is assumed in the geocomposite calculations and the slope stability analyses and revise these calculations and all other applicable pipe strength calculations and/or analyses, as appropriate.

Response: The pipe crushing calculations have been modified to utilize a unit weight of 110 psf for the drainage sand.

b. The leachate trench configuration assumed in these calculations appears inconsistent with that shown on Sheet 9 of 19, Detail B. Please verify and revise these calculations accordingly.

Response: The calculations now show 10-inches of No. 89 stone and 6-inches of No. 57 stone. Both stones assume a unit weight of 140 lb/ft^3.

c. Please explain why the friction angle for waste in these calculations is inconsistent with that assumed in the slope stability analyses and revise these calculations and/or analyses, as appropriate.

Response: The slope stability analysis used a friction angle of 28 degrees for the waste which is consistent with the pipe crushing calculations. No changes have been made.

74. Effective Pressure on Pipe Due to Perforations: Please provide EPA SW-870, P. 370.

Response: The EPA reference is included as Source No. 5 of Attachment H-6.

75. Constrained Pipe Wall Buckling:

a. The cover above pipe assumed in these calculations appears inconsistent with that shown on Sheet 9 of 19, Detail B. Please verify and revise these calculations accordingly.

Response: This has been modified to show 2.33 ft of cover above the pipe (i.e., 1 ft of select sand, 10-inches FDOT No. 89 stone, and 6-inches of FDOT No. 57 stone).

SECTION J - GEOTECHNICAL INVESTIGATION REQUIREMENTS (Rule 62-701.410(2), F.A.C.)

76. **Section J.1.b: As indicated in this section, the last sinkhole evaluation for this facility was conducted in 1988. Please provide an updated lineament study and sinkhole evaluation for the facility based on current information.**

<u>Response:</u> The lineament study indicated no discernible structural trends that would indicate active solution features at or near the landfill. Lineament studies are based on geologic indicators which do not change over 20 years. SCS believes that an update to the lineament study would not be useful. In conjunction with the ERP application SCS is conducting a current sinkhole assessment.

77. **J.1.d.1: Please explain why a waste density of 60 pcf was used instead of the actual waste density at the facility (63.5 pcf) determined in Attachment F-5.**

<u>Response:</u> This section has been modified to utilize the actual waste density at the facility (63.5 pcf). Please note that the HELP Model calculations were also modified to utilize the actual waste density at the facility (refer to Attachment H-3 for the revised HELP Model calculations).

78. **J.1.d.2:**

a. **Please provide a site plan of the facility or revise the site plan on Sheet 2 of the construction drawings to show the location of the borings and the evaluation points in the settlement analysis in relation to the footprints of Phases 2 and 3. The settlement analysis in Attachment J-1 will be re-evaluated upon receipt of this information.**

<u>Response:</u> Revised settlement calculations are attached to include the previous comments. In addition, a site plan of the facility showing the location of the borings and the evaluation points are also included.

b. **It is not clear which borings were considered in the Universal Phase 2 settlement analysis and how that is related to settlement in Phase 3. Please explain.**

<u>Response:</u> Please see the attached site plan and boring location map to show how it relates to the settlement for Phase 3.

79. J.1.d.2:

a. **It is unclear how the conclusion that the protective soil should not be placed more than 12 ft. up the slope from existing waste was obtained from the slope stability analyses conducted. Please explain.**

<u>Response:</u> This sentence was removed for section J.1.d.3.

80. Attachment J.1:

a. **It is unclear how the information in the Estimated Settlement, Compression Index Values, and Estimated Soil Properties tables were obtained. Please indentify the source of assumed values and identify the equations used for calculated values. The settlement analysis in Attachment J-1 will be re-evaluated upon receipt of this information.**

<u>Response:</u> Please refer to Attachment 1 of Attachment J-1.

b. **Boring Log B-1: Please explain why n>40 is assumed at 10 ft. depth when the actual blow count is 33.**

<u>Response:</u> The tables created are for blow counts n=5, n=10, n=20, n=25, n=30 and n>40. We have not created a table for each individual blow count. Using a blow count of n>40 is more conservative (dry unit weight for blow count of 40 is 141.5 pcf versus 116 pcf for a blow count of 30) than using the blow count for n=30.

81. Attachment J.2:

a. <u>Selection of Soil Parameters:</u> **Please identify and, as appropriate, provide the soil report and slope stability reports referred to in this section and specifically identify where in the reports the shear strength properties are provided.**

<u>Response:</u> The geotechnical investigation and site evaluation was presented in the geotechnical report entitled "Geotechnical Investigation for Citrus County Central Landfill new Disposal Cell" prepared by Universal Engineering Sciences, Inc dated November 15, 2001. The boring location plan, boring logs and laboratory test results conducted by Universal Engineering Sciences, Inc is included as requested.

In addition, the slope stability analysis performed for the Operations Renewal is included as requested and supports the selection of soil parameters for the final Buildout scenario (refer to page 3 of the memorandum).

Table 1. Material Soil Data has been revised to reflect the shear strength properties used in the model. Please note that the soil density for the municipal waste has been changed from 60 pcf to 63.5 pcf. In addition, the GCL layer of the liner system has been changed from 22 degrees to 10 degrees. Thus revised slope stability calculations are provided supporting these changes.

b. **Table 1:**

1) **Some of the values in this table appear to be inconsistent with the values used in the slope stability analyses. Please verify and revise as applicable.**

<u>Response:</u> The table has been revised to be consistent with the values used in the slope stability analyses.

2) **Since the GCL layer of the liner system is specified to have a minimum friction angle of 10 degrees, it would appear that should be the shear strength of the liner system used in the analyses. Please verify and revise the analyses, as appropriate.**

<u>Response:</u> The shear strength of the GCL has been modified to 10 degrees. Please refer to the revised slope stability analyses.

c. **<u>Excavated Slope-West side:</u> Please identify the soil types assumed in the analysis and the source of the assumed soil types and properties.**

<u>Response:</u> The shear strength properties of the soil types selected were based upon the November 15, 2001 Universal Geotechnical Report which was included in the Construction Permit Application for the Phase 2 Expansion Area and in the previously approved slope stability analyses. *The soil profile in the subject area consists of loose to medium dense tan to brown fine SAND from surface grade to a depth of approximately 20 to 25 feet below surface grade, where a 10 to 15 feet of medium dense orange and gray clayey SAND is present. Beneath this layer there typically lies a medium dense to very dense orange to tan or white fine SAND to the maximum boring depth of 120 feet. Lenses of gray and orange slightly clayey SAND were encountered from 50 to 60 feet below grade.* (Reference: Section 3.3 Subsurface Condition of the November 15, 2001 Universal Geotechnical Report).

SECTION K - VERTICAL EXPANSION OF LANDFILLS (Rule 62-701.430, F.A.C.)

82. **Based on the sequence of fill and final buildout drawings provided in Attachments F-3 and F-4, vertical expansion over Phases 1, 1A, and 2 is proposed as part of**

Phase 3 operation. Therefore the information required in Part K of the application and Rule 62-701.430, F.A.C. is applicable to the proposed operation of this facility. Please either provide this information as part of this application or as part of the permit application for operation of Phase 3.

Response: This section will be included in the Operation Permit Application for Phase 3.

SECTION L - LANDFILL OPERATIONS REQUIREMENTS (Rule 62-701.500, F.A.C.)

83. **Section L.2: Please note that an application for operation of Phase 3 will be required, which shall include a revised Operations Plan that addresses the operation of Phase 3 and the proposed vertical expansion over Phases 1, 1A, and 2. This comment is for informational purposes only and does not necessarily require a response.**

Response: Comment noted.

SECTION O - LANDFILL GAS MANAGEMENT SYSTEM REQUIREMENTS (Rule 62-701.530, F.A.C.)

84. **Section O.1: Please verify whether the additional capacity from the proposed construction and operation of Phase 3 and the proposed vertical expansion over Phases 1, 1A, and 2 will exceed the NSPS design capacity threshold.**

Response: The overall design capacity of the site currently exceeds 2.5 million megagrams therefore, the site is already subject to comply with 40CFR§60.752 (B).

85. **Section O.2: An additional gas monitoring well is proposed as part of this application. Please verify and revise this section, accordingly.**

Response: This section has been revised to include the additional gas monitoring probe.

SECTION S – FINANCIAL RESPONSIBILITY REQUIREMENTS (Rule 62-701.630, F.A.C.)

86. **Attachment S-1: Please address the comments in Department's September 20, 2008 letter (attached) regarding the financial assurance cost estimates provided in Attachment S-1.**

Response: Acknowledged.

The following comments/responses are from the Department's September 20, 2008 letter regarding the financial assurance cost estimates.

Closing Costs

4. **Slope and Fill & Top Soil Cover - The cost estimates provided for these activities cannot assumed the use of on-site soils. Please revise these estimates accordingly to include the cost of off-site soils.**

   Response: The closing cost for slope, fill and top soil cover has been adjusted to include the cost of off-site soils.

5. **Stormwater Control System - The estimates provided appear to include material costs but not the labor cost for construction of the system (except for hauling costs for soils). Similarly, these costs also appear to assume the use of on-site soils. Please verify and revise these costs accordingly.**

   Response: The closing cost for stormwater control system has been adjusted to include the cost of off-site soils and labor cost for construction of the system.

6. **Engineering – NSPS/Title V Air Permit - While an estimate was prepared for this activity, it does not appear that the cost was included on DEP Form 62-701.900(28). Please verify and revise the form accordingly.**

   Response: The closing cost for engineering has been adjusted to include the cost for the NSPS/Title V Air Permit.

7. **Site Specific Cost Leachate Disposal for One Year - In accordance with Rule 62-701.630(3)(a), closure and long-term care costs estimates are based on "... the time period in the landfill operations when the extent and manner of its operation making closing most expensive." In the case of leachate generation rates at the time of closure, the time of maximum generation rate is immediately upon completion of closure activities. This generation rate should be based on the actual per acre leachate generation rate for the previous year calculated for the total acreage to be closed. As the average annual leachate generation rate decreases, cost for leachate disposal can be reduced accordingly. Please revise the leachate quantities provided for closure and the corresponding costs accordingly.**

   Response: This section has been revised based on adding one year of off-site leachate disposal at the post closure annual average generation rate. The average generation rate used was approved in the financial assurance closing cost estimate in 2005 (letter dated July 12, 2005) and in 2006 (letter dated October 31, 2006). A letter dated July 8, 2005 from SCS to FDEP include backup calculations using this average generation rate.

Long-term Care Costs

8. **Groundwater Monitoring - The number of monitor wells and sampling frequencies provided in this section may not correspond to the number of wells and sampling frequencies that will be in the facility's approved groundwater monitoring plan. (See John Morris' memo dated August 19, 2008) Please revise this section accordingly, as appropriate.**

   Response: This section has been revised to include the long-term care cost for 15 monitoring wells.

9. **Groundwater Monitoring - The costs for groundwater monitoring, based on the provided third party information is confusing. Please clarify how the assumed per well costs were developed.**

   Response: This section has been revised to clarify the third party information.

10. **Leachate Collection of Treatment Systems Maintenance - Disposal In accordance with Rule 62- 701.630(3)(a), closure and long-term care costs estimates are based on "... the time period in the landfill operations when the extent and manner of its operation making closing most expensive." In the case of leachate generation rates during long-term care, the time of maximum generation rate is immediately upon completion of closure activities. This generation rate corresponds to the leachate generation rate during closure, which should be based on the actual per acre leachate generation rate for the previous year calculated for the total acreage to be closed. During the facility's long-term care period, as the average annual leachate generation rate decreases, long-term care costs for leachate disposal can be reduced accordingly. Please revise the leachate quantities provided for long-term care costs and the corresponding costs accordingly.**

    Response: This section has been revised based on adding one year of off-site leachate disposal at the post closure annual average generation rate. The average generation rate used was approved in the financial assurance closing cost estimate in 2005 (letter dated July 12, 2005) and in 2006 (letter dated October 31, 2006). A letter dated July 8, 2005 from SCS to FDEP include backup calculations using this average generation rate.

The following comments/responses are from John Morris' memo dated September 19, 2008 regarding the hydrogeologic and environmental monitoring review.

SECTION A - PERMIT APPLICATION FORM

1. **A.5.: Please submit a revised application form for this item that identifies facility #SWD-09-39859 that has been established for Citrus Central Landfill in the Department's Water Assurance Compliance System database.**

Response: Facility #SWD-09-39859 has been added to the application form.

2. **A.7.: Please submit a revised application form for this item that reflects the approximate center of the Phase 3 expansion area. It appears that the coordinates provided on the application form represent a location west of the facility, approximately 2,350 feet west of the center of Phase 3.**

Response: Latitude 28^{0}51'08" and Longitude 82^{0}26'38" represents the center of Phase 3. No changes have been made to the application.

SECTION B - DISPOSAL FACILITY GENERAL INFORMATION

3. **B.18.: This item of the application form indicated 14 monitor wells are located at the facility. Please submit a revised application form for this item to be consistent with the response to comment #9.b., below, as appropriate.**

Response: The application form was modified to indicate 15 monitoring wells.

SECTION I - HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS
(Rule 62-701.410(1), F.A.C.)

4. **I.1.: Hydrogeological Investigation and Site Report. This section of the Engineering Report indicated that numerous geological, hydrogeological and geotechnical investigations have been conducted over the last 20 years in support of the design, permitting and on-going monitoring of the lined disposal cells at the facility. This section of the Engineering Report specifically referenced the PBS&J Monitoring Plan, the 2001 JEA GWMPE document, and the 2007 JEA GWMPE document. Please submit revisions to this section to also reference the following documents as they provide new or revised information regarding aspects of the site hydrogeology:**

   - **2004 JEA GWMPE document [site hydrogeology description, calculation of hydraulic gradient and ground water velocity];**
   - **GWIR document [slug test results at compliance wells, revised calculation of ground water velocity]; and,**
   - **SAR document [slug test results at assessment wells/new piezometers].**

   Response: These documents have been added to the engineering report.

5. **I.1.b.: Direction and rate of ground water flow and surface water flow including seasonal variations.**
   a. **¶1 in this section of the Engineering Report referred to the historic regional trend in ground water flow to the west at the landfill as indicated in Sections 3.2 and 4.4 of the PBS&J Monitoring Plan. It is noted that Section 4.4 of the**

PBS&J Monitoring Plan referred to water level contours drawn on Figure 5 of that document, which indicated a northwest direction of ground water flow. Please submit revisions to the Engineering Report to address this apparent inconsistency.

Response: Please see the attached JEA response.

b. **¶2 in this section of the Engineering Report referred to the radial pattern of localized ground water flow movement that appeared to be focused near the percolation basin for the leachate treatment plan effluent as indicated in the 2001 JEA GWMPE document. The ground water surface contour maps provided in each of the nine documents referenced on page 1 of this memorandum were reviewed to characterize ground water flow in the vicinity of the proposed Phase 3 expansion area, and the inferred directions of ground water flow are presented on the attached table. Please submit revisions to the Engineering Report to discuss the potential for a northward component to the direction of ground water flow along the north boundary of the proposed Phase 3 expansion area.**

Response: Please see the attached JEA response.

6. **I. 1e.: Site Stratigraphy and Aquifer Characteristics. ¶2 in this section of the Engineering Report referred to the occurrence of a non-artesian aquifer below the base of the proposed Phase 3 expansion area in the sandy deposits of the Alachua formation that has a hydraulic connection to the underlying Floridan aquifer which begins in the lower, limestone portion of the Alachua formation. ¶3 of this section referred to Sections 3.2, 4.1 and 4.6 of the PBS&J Monitoring Plan for descriptions of these features. It is noted that Section 4.6 of the PBS&J Monitoring Plan, Section 2.0 of the 2004 JEA GWMPE document, Section 2.0 of the 2007 JEA GWMPE document, and Section 2.16 of the SAR document refer to the absence of a surficial aquifer at the facility or to the unconfined Floridan aquifer as the only laterally continuous aquifer at the facility. Please submit revisions to this section of the Engineering Report to address this apparent inconsistency.**

Response: Please see the attached JEA response. Please note that the Engineering Report has been modified to address this inconsistency.

7. **I.1.g.: Well Inventory. This section of the Engineering Report referred to an updated inventory of all public and private water wells within a 1-mile radius of the Citrus County Central Landfill provided in Attachment I-1. Tabulated well inventory information was provided for the following:**

- **Twp 19, Rge 18, Section 1 (pages 1, 2, and 3) [the section that includes the Central County Class I landfill]**

- **Twp 18, Rge 18, Section 1 (page 4) [located outside l-mile radius]**
- **Twp 18, Rge 19, Section 1 (pages 5, 6, 7, and 8) [located outside l-mile radius]**
- **Twp 19, Rge 19, Section 1 (pages 9, 10, and 11) [located outside l-mile radius]**

Based on review of the Department's GIS information, it appears that the area represented by a 1-mile radius around proposed Phase 3 would include the following:

- **Twp 19, Rge 18 - Section 1 (provided above), Section 2, Section 11, Section 12**
- **Twp 19, Rge 19 - Section 6, Section 7**
- **Twp 18, Rge 18 - Section 36**
- **Twp 18, Rge 19 - Section 31**

Please submit revisions to Attachment I-1 of the Engineering Report to provide well inventory information for the above-referenced sections that were not provided.

<u>Response:</u> Attachment I-1 has been revised to include the above referenced sections in the well survey.

8. **I.1.i.: Map of Potable Wells and Community Water Supply Wells. This section of the Engineering Report indicated there were no changes to this subsection. Please submit revisions to this section to provide a map of potable and community supply wells required by Rule 62-701.410(1)(d), F.A.C., to demonstrate that the proposed Phase 3 expansion area meets the prohibitions of Rules 62-701.300(2)(b) and 62-701.300(2)(h), F.A.C.**

   <u>Response:</u> Please see the map included in Attachment I-1.

PART M - WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS
(Rule 62-701.510, F.A.C)
The approved water quality monitoring plan for the Citrus Central Class I landfill referenced in operating permit #21375-008-SO/01 (issued September 30, 2005), as amended by permit modification #21375-011 (dated April 27, 2007), is presented in the following submittals:

- **Engineering Report, Part M, Attachment M-1 entitled "Citrus County Central Landfill, Ground Water Monitoring Plan Evaluation," prepared by JEA, dated November 2004 with revisions dated through July 2005**
- **Engineering Report, Part M, Section M.1 ("Water Quality and Leachate Monitoring Plan"), prepared by JEA, dated December 8, 2006 and revised April 11, 2007 which reflected the changes to the monitor wells associated with the sublease agreement entered into between the State of Florida Division of Forestry and Citrus County during August 2006.**

In accordance with Rules 62-701.510(1)(a) and 62-701.510(2)(a), F.A.C., applications for construction or lateral expansion of solid waste disposal units received after January 6, 1993 shall include a water quality monitoring plan that describes the proposed ground water, surface water, and leachate monitoring systems. Please submit a revised water quality monitoring plan for the entire facility including the proposed Phase 3 expansion area to address the following:

9. M.1.c.(l): Detection Wells.

a. This section of the Engineering Report referred to the locations of the detection wells shown on the site plan provided in Attachment F-1. Please note that Section M.1 of the Engineering Report prepared by JEA, dated December 8, 2006 and revised April 11, 2007, does not include detection wells, but designated downgradient locations at the facility as compliance, assessment or intermediate wells. Please submit revisions to this section of the Engineering Report to address this inconsistency.

Response: Please see the attached JEA response, following this letter. Please note that the Engineering Report has been modified to address this inconsistency.

b. This section of the Engineering Report referred to the well locations shown on the site plan in Attachment F-1 and indicated that no new wells are currently planned to be constructed. Please review the direction of ground water flow information in proximity to the proposed Phase 3 expansion area (refer to comment #5.b., above) and evaluate the need to install downgradient monitor well(s) along its north boundary to meet the requirements of Rule 62-701.510(3)(d), F.A.C. Please submit additional revisions to this section of the Engineering Report to refer to a revised monitoring plan that includes a site map (no larger than 11 x 17 inches in a black-and-white format) showing the property/easement boundaries, disposal footprints (closed areas, Phase 1, Phase 1A, Phase 2 and Phase 3), zone of discharge, existing monitor wells/piezometers and identification numbers, and proposed monitor well(s) and identification number(s).

Response: Please see the attached JEA response, following this letter. Please note that the Engineering Report has been modified to reflect this change.

c. In the event that the response to comment #9.b., above, indicates new monitor well(s) are needed, please include the justification of construction details in the revised monitoring plan to comply with the requirements of Rule 62-701.510(3)(d)4, F.A.C.

Response: Please see the attached JEA response, following this letter.

10. **M.1c.(3): Background Wells.**

a. **This section of the Engineering Report referred to the results of previous monitoring that indicated a westerly ground water flow direction in the surficial aquifer system. Please submit revisions to this section of the Engineering Report to be consistent with the response to comment #6, above, regarding the uppermost aquifer.**

<u>Response:</u> Please see the attached JEA response, following this letter.

b. **This section of the Engineering Report indicated no new background wells were planned to be constructed. It is noted that ¶1 of Section 3.0 in the 2007 JEA GWMPE document indicated that existing background well MW -1R was located downgradient of the active landfill and upgradient of the closed landfill. Please submit revisions to this section of the Engineering Report to evaluate the appropriateness of maintaining well MW -1R as a background location considering the proposed Phase 3 expansion area. In the event that it is determined that well MW-1R would not be representative of background conditions, please submit revisions to the monitoring plan, as appropriate.**

<u>Response:</u> Please see the attached JEA response, following this letter and revised section of the Engineering Report.

11. **M.1.c.(4): Location Information for Each Monitoring Well. Please submit revisions to this section of the Engineering Report and to the monitoring plan to be consistent with the response to comment #9.b., above.**

<u>Response:</u> Please see the attached JEA response, following this letter.

12. **M.1.c.(6): Well Screen Locations Properly Selected. Please submit revisions to this section of the Engineering Report and to the monitoring plan to be consistent with the response to comment #9.c., above.**

<u>Response:</u> Please see the attached JEA response, following this letter.

13. **M.1.e.: Leachate Sampling Locations Proposed.**

a. **This section of the Engineering Report indicated leachate samples can be obtained from the pipe access pad located at the west end of Phase 3 via either a removable cap on the 8-inch diameter leachate collection header pipe <u>or</u> at the valved port on each of the leachate discharge pipes. Please submit revisions to this section of the Engineering Report and to the monitoring plan to describe how leachate samples would be collected from the leachate collection header pipe.**

<u>Response:</u> Reference to the removable cap on the 8-inch diameter leachate collection header pipe was removed from the Engineering Report.

b. **Please submit revisions to the monitoring plan to describe leachate collection locations for Phase 1/1A, Phase 2 and Phase 3. Please include these leachate collection locations and identification numbers on the site map referenced in comment #9.b., above.**

<u>Response:</u> The site map has been revised to include the leachate collection locations for Phase 1/A, Phase 2, and Phase 3.

PART O - GAS MANAGEMENT SYSTEM REQUIREMENTS (Rule 62-701.530, F.A.C.)

14. **O.2.: Gas Monitoring Locations. This section of the Engineering Report indicated that the addition of the Phase 3 cell is not expected to require any changes in landfill gas monitoring, however Drawings #2 and #14 of the site plans (Attachment F-1) indicated the location and construction details, respectively, of proposed gas probe #GP-19. Please submit revisions to this section of the Engineering Report to reference this proposed gas probe. Please also submit revisions to Detail 4 on Drawing # 14 of the site plans to specify the length of slotted screen for proposed gas probe #GP-19 based on the proposed cell bottom elevation for Phase 3.**

<u>Response:</u> Detail 4 on Drawing #14 has been modified to specify the length of the slotted screen. The slotted screen for GP-19 will be 67 feet. The Engineering Report has been updated to include the proposed gas probe #19.

As requested, we are providing you with four copies of all requested information.

Sincerely,

Dominique H. Bramlett, P.E.
Senior Project Engineer
SCS ENGINEERS

John A. Banks, P.E.
Project Director
SCS ENGINEERS

DHB/JAB:jlh

cc: Fred Wick, FDEP, Tallahassee
Susan Pelz, P.E., FDEP Tampa
Susan Metcalfe, P.G., Citrus County, P.O. Box 340, Lecanto, FL 34460-0340

JONES EDMUNDS

November 13, 2008

Susan Metcalfe, P.G.
Director of Solid Waste
Citrus County
P. O. Box 340
Lecanto, FL 34460-0340

RE: Citrus County Central Class I Landfill
Phase III Request for Additional Information
Jones Edmunds Project No: 03860-037-01

Dear Susie:

This letter addresses comments from the Florida Department of Environmental Protection (FDEP), dated September 20, 2008 concerning the Citrus Central Class I Landfill. The responses address Comments 5.a, 5.b, and 6 of Section I, Hydrogeological Investigation Requirements and Comments 9.a, 9.b, 9.c, 10.b, 11, and 12 of Section M, Water Quality and Leachate Monitoring Requirements. The Department comments are presented below in *italics*, followed by the Jones Edmunds response in **bold** type.

Comment 5.a: ¶1 in this section of the Engineering Report referred to the historic regional trend in groundwater flow to the west at the landfill as indicated in Section 3.2 and 4.4 of the PBS&J Monitoring Plan. It is noted that Section 4.4 of the PBS&J Monitoring Plan referred to water level contours drawn on Figure 5 of that document, which indicated a northwest direction of groundwater flow. Please submit revisions to the Engineering Report to address this apparent inconsistency.

> **Response 5.a: Groundwater flow across the Citrus Central landfill is toward the west, parallel to the regional flow direction. Groundwater flow is impacted by the disposal of treated leachate effluent and collection of site stormwater in the center of the site near MW-4, MW-5, and MW-6, thus creating a localized groundwater mounding effect, which slightly alters the westerly flow direction. PBS&J's interpretation of the flow as northwesterly (Figure 5, PBS&J Monitoring Plan) was based on only five data points to create the map. Jones Edmunds interpretation of groundwater flow is based on 23 data points. Groundwater contour maps are prepared semiannually and all display a similar westerly flow.**

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Comment 5.b: ¶2 in this section of the Engineering Report referred to the radial pattern of localized groundwater flow movement that appeared to be focused near the percolation basin for the leachate treatment plant effluent as indicated in the 2001 JEA GWMPE document. The groundwater surface contour maps provided in each of the nine documents referenced on page 1 of this memorandum were reviewed to characterize groundwater flow in the vicinity of the proposed Phase 3 expansion area, and the inferred directions of groundwater flow are presented on the attached table. Please submit revisions to the Engineering Report to discuss the potential for a northward component to the direction of groundwater flow along the north boundary of the proposed Phase 3 expansion area.

> **Response 5.b: Although the overall gradient across the site is towards the west, the percolation basin for the leachate treatment plant effluent has created a localized northwesterly flow direction near the northern boundary of the proposed Phase 3 expansion area. A conceptual diagram that displays the effects of the groundwater mounding caused by the percolation basin on flow across the site is provided as Figure 1. The groundwater mounding creates a localized zone of influence where flow patterns are different than the regional gradient. When groundwater flow leaves the zone of influence of the percolation basin it flows westerly parallel to the regional gradient.**

Comment 6: II.e.: Site Stratigraphy and Aquifer Characteristics. ¶2 in this section of the Engineering Report referred to the occurrence of a non-artesian aquifer below the base of the proposed Phase 3 expansion area in the sandy deposits of the Alachua formation that has a hydraulic connection to the underlying Floridan aquifer which begins in the lower, limestone portion of the Alachua Formation. ¶3 of this section referred to Sections 3.2, 4.1 and 4.6 of the PBS&J Monitoring Plan for descriptions of these features. It is noted that Section 4.6 of the PBS&J Monitoring Plan, Section 2.0 of the 2004 JEA GWMPE document, Section 2.0 of the 2007 JEA GWMPE document, and Section 2.16 of the SAR document refer to the absence of a surficial aquifer at the facility or to the unconfined Floridan aquifer as the only laterally continuous aquifer at the facility. Please submit revisions to this section of the Engineering Report to address this apparent inconsistency.

> **Response 6: The only laterally continuous aquifer at the Citrus County Central Landfill is the unconfined Floridan aquifer. Water levels in the Floridan aquifer often rise above the contact between the overlying sands/clayey sands and the underlying limestone formations. The unconformable contact between the irregular surface of the limestone—normally associated with the Floridan aquifer—and the sand/clayey sand at some locations—along with water levels measured above the limestone—cause an incorrect interpretation that there is a surficial aquifer. The limestone contact is shallower near the west boundary of the site. The Engineering Report will be changed accordingly.**

Comment 9.a: This section of the Engineering Report referred to the locations of the detection wells shown on the site plan provided in Attachment F-1. Please note that Section M.1 of the Engineering Report prepared by JEA, Dated December 8, 2006 and revised April 11, 2007, does not include detection wells, but designated downgradient locations at the facility as compliance, assessment or intermediate wells. Please submit revisions to this section of the Engineering Report to address this inconsistency.

Response 9.a: It is noted that there are no detection wells in the current monitoring program. There are seven compliance wells (MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, and MW-17) positioned at the edge of the zone of discharge, which is the compliance line boundary. These are referred to as the "100-foot monitoring wells" as they are positioned 100 feet from the edge of waste. The Engineering Report will be changed accordingly.

Comment 9.b: This section of the Engineering Report referred to the well locations shown on the site plan provided in Attachment F-1 and indicate that no new wells are currently planned to be constructed. Please review the direction of groundwater flow information in proximity to the proposed Phase 3 expansion area (refer to Comment #5.b above) and evaluate the need to install downgradient monitor well(s) along its north boundary to meet the requirements of Rule 62-701.510(3)(d), FAC. Please submit additional revisions to this section of the Engineering Report to refer to a revised monitoring plan that includes a site map (no larger than 11X17 inches in black-and-white format) showing the property/easement boundaries, disposal footprints (closed areas, Phase I, Phase 1A, Phase 2 and Phase 3), zone of discharge, existing monitoring wells/piezometers and identifications numbers, and proposed monitor well(s) and identifications number(s).

Response 9.b: We propose to install one compliance well north of the Phase 3 Expansion Area. The approximate location is shown in Figure 2 attached to this letter. The well will be installed 100 feet from the edge of waste on the zone of discharge compliance line. The well will be installed after the new transfer station and site improvements are completed to avoid damage during construction. The well will be designated MW-20.

Comment 9.c: In the event that the response to comment #9.b., above, indicates new monitor well(s) are needed, please include the justification of construction details in the revised monitoring plan to comply with the requirements of Rule 62-701.510(3)(d)4, FAC.

Response 9.c: A construction diagram for the well proposed in Response 9.b is included as Figure 3. The exact well depth will be determined at the time of installation based upon the final grade where the well is installed. The construction

diagram shows the intended elevations. The well screen will be positioned between 15 ft and -5 ft NGVD.

Comment 10.a: This section of the Engineering Report referred to the results of previous monitoring that indicated a westerly groundwater flow direction in the surfical aquifer system. Please submit revisions to this section of the Engineering Report to be consistent with the response to comment #6, above, regarding the uppermost aquifer.

Response 10.a: The only laterally continuous aquifer at the Citrus County Central Landfill is the unconfined Floridan aquifer. The Engineering Report will be changed accordingly.

Comment 10.b. This section of the Engineering Report indicated no new background wells were planned to be constructed. It is noted that ¶ 1 of Section 3.0 in the 2007 JEA GWMPE document indicating that existing background well MW-1A was located downgradient of the active landfill and upgradient of the closed landfill. Please submit revisions to this section of the Engineering Report to evaluate the appropriateness of maintaining well MW-1R as a background location considering the proposed Phase 3 expansion area. In the event that it is determined that well MW-1R would not be representative of background conditions, please submit revisions to the monitoring plan, as appropriate.

Response 10.b: Well MW-1R is downgradient of the Phase 3 expansion area. The well will be re-designated as a piezometer and used to provide water levels only. Water level measurements will be collected semiannually in conjunction with the continuous-round measurements. A new background well is proposed ...

Comment 11: M.1.c.(4): location information for each monitoring well. Please submit revisions to this section of the Engineering Report and to the monitoring plan to be consistent with the response to comment #9.c., above.

Response 11: The approximate location of proposed compliance well MW-20 is shown in Figure 2. We will give the Department the exact location after the well is installed and surveyed.

Comment 12: M.1.c.(6) Well Screen Locations Properly Selected. Please submit revisions to this section of the Engineering Report and to the monitoring plan to be consistent with the response to comment #9.c., above.

Response 12: The well screen for proposed well MW-20 will be positioned to intersect the water table during normal seasonal fluctuation. A construction diagram for proposed compliance well MW-20 is provided as Figure 3. The well

screen will be positioned between 15 ft and -5 ft NGVD. The Engineering Report and the monitoring plan will be updated accordingly.

If you have any questions or need clarification regarding the enclosed information, please contact me at (352) 377-5821.

Sincerely,

Troy Hays
Project Manager

John S. Catches, P.G.
Florida License No. 2203
12/5/08

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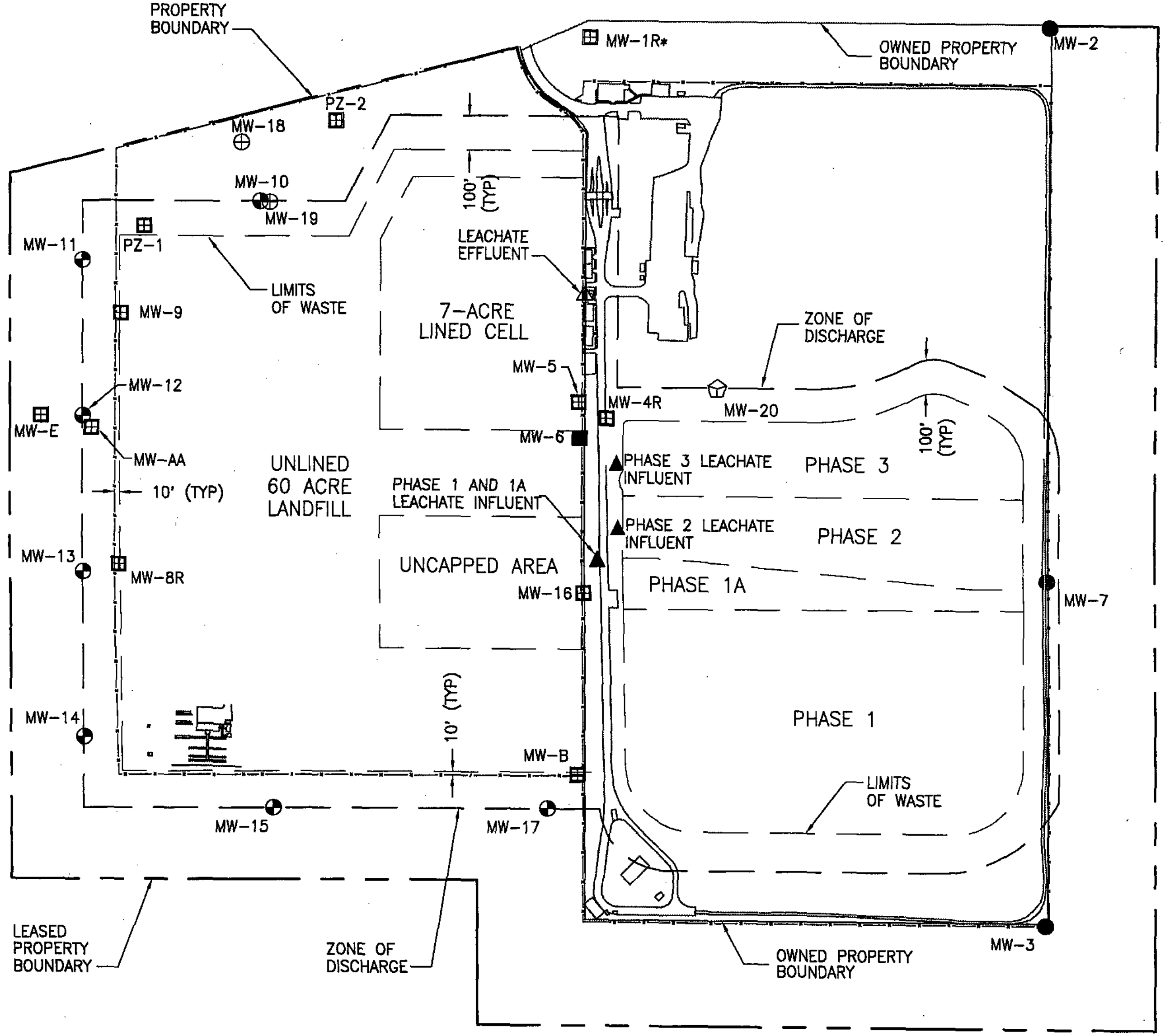
03860-018-01



-N-

GRAPHIC SCALE

0 125 250 500

SCALE IN FEET

LEGEND

- BACKGROUND WELLS
- COMPLIANCE MONITORING WELL
- ASSESSMENT MONITORING WELL
- INTERMEDIATE WELL
- PIEZOMETERS
- PROPOSED COMPLIANCE WELL
- LEACHATE INFLUENT SAMPLING LOCATION
- LEACHATE EFFLUENT SAMPLING LOCATION
- ZONE OF DISCHARGE
- PROPERTY BOUNDARY (OWNED BY COUNTY)
- LIMITS OF WASTE
- PROPERTY BOUNDARY (LEASED BY COUNTY)

NOTE: * MW-1R IS NOW DESIGNATED A PIEZOMETER

FIGURE 2 SITE PLAN
CITRUS COUNTY CENTRAL LANDFILL

JONES EDMUNDS

LAST SAVED: 11/20/2008 3:40 PM THAYS K:\Jones Edmunds\Citrus County\Central Landfill\SAR\Phase 3 RA\Fig 1_proposed wells.dwg

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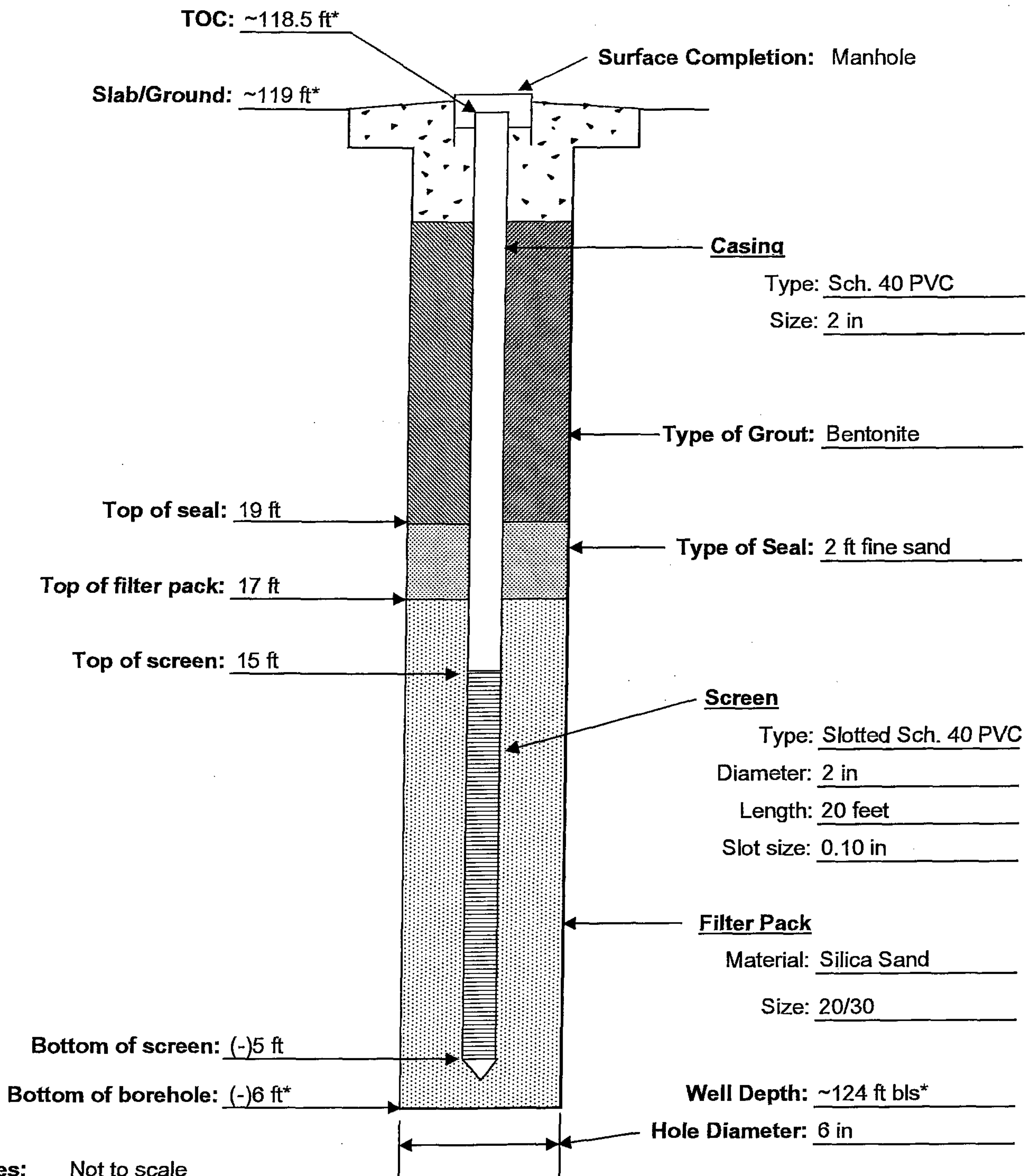
FIGURE 3: MONITORING WELL CONSTRUCTION

Client: Citrus County
Location: Central Landfill
Well Number: MW-20

Elevations: Surface elevations are approximate in ft NGVD



Notes: Not to scale

*Total well depth and surface elevations are approximate; calculate total depth based upon ground elevation at well location to position screen interval approximately -5 ft to 15 ft NGVD.

JONES EDMUNDS
ENGINEERS | ARCHITECTS | SCIENTISTS

CITRUS COUNTY CENTRAL LANDFILL

WATER QULAITY AND LEACHATE MONITORING PLAN

DEP PERMIT NO. 21375-008-SO/01

Prepared by:

JONES EDMUNDS & ASSOCIATES, INC.
730 N.E. Waldo Road
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Professional Engineering Certificate of Authorization # 1841
Professional Geology Certificate of Authorization #133

November 2008

John S. Catches, P.G.
Florida License No. 2203
12/9/08

WATER QUALITY AND LEACHATE MONITORING PLAN FOR THE CITRUS COUNTY CENTRAL LANDFILL

This Water Quality and Leachate Monitoring Plan has been prepared to update the monitoring program for the Citrus Central Landfill in response to the construction of the Phase 3 Expansion. This monitoring plan follows the format of Part M—Water Quality and Leachate Monitoring Requirements—of the State of Florida Application for a Permit to Construct, Operate, Modify, or Close a Solid Waste Management Facility. Proposed modifications to the previous monitoring plan—as outlined in Permit # 21375-008-SO/01—are:

- The background well MW-1R will be re-designated as a piezometer. Water levels will be collected semiannually in conjunction with the compliance monitoring events.
- A new compliance well—MW-20—will be installed to monitor the northern compliance line boundary of the Phase 3 Expansion.

A site map that shows the groundwater and leachate monitoring network with the proposed changes is provided as Attachment 1.

1. WATER QUALITY AND LEACHATE MONITORING PLAN

a. Sign and Seal

The water quality monitoring plan has been signed, dated, and sealed in accordance with Chapter 62-701.510(2)(a), FAC.

b. Sampling and Analysis

All sampling and analysis have been performed in accordance with Chapter 62-160, FAC; 62-701.510(2)(b), FAC; the FDEP Standard Operating Procedures for Field Activities (FDEP-SOP-001/01); the FDEP Standard Operating Procedures for Laboratory Activities (FDEP-SOP-002/01); and the current Permit No. 21375-008-SO/01.

c. Groundwater Monitoring Requirements

(1) There are no detection wells in the Groundwater Monitoring Plan.

(2) There are seven compliance wells—MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, and MW-17—in the existing monitoring network. One additional compliance well—MW-20—is proposed along the northern zone of discharge boundary for the Phase 3 Expansion as shown on Attachment 1. The proposed monitoring network will have eight compliance wells. Table 1.c compares the current monitoring network

outlined in Permit # 21375-008-SO/01 and the proposed monitoring network.

(3) Four background wells—MW-1R, MW-2, MW-3, and MW-7—are included in the existing monitoring network. MW-1R is downgradient from the Phase 3 Expansion area and is proposed to be used as a piezometer in the new monitoring network. The proposed network will have three background wells—MW-2, MW-3, and MW-7.

(4) A site map showing the locations of each groundwater monitoring well in the proposed monitoring network is presented as Attachment 1. Attachment 2 is a table that includes well construction information for all wells—existing and proposed.

(5) Well spacing is less than 500 feet across the downgradient direction of groundwater flow and approximately 1,500 feet apart across the upgradient direction of groundwater flow in the uppermost aquifer—the Floridan aquifer—within the zone of discharge.

(6) The screened intervals of the monitoring wells were positioned to encounter the water table of the unconfined Floridan aquifer throughout normal seasonal fluctuation.

(7) Unused wells and piezometers will be abandoned properly, as specified in Rule 62-532.440, FAC, and the rules of the Southwest Florida Water Management District.

(8) There are no detection sensors at the Citrus Central Landfill.

Table 1.c. Existing and Proposed Monitoring Networks.

Existing Network	Proposed Network
Background wells	
MW-1R	MW-2
MW-2	MW-3
MW-3	MW-7
MW-7	
Compliance Wells	
MW-10	MW-10
MW-11	MW-11
MW-12	MW-12
MW-13	MW-13
MW-14	MW-14
MW-15	MW-15
MW-17	MW-17

	MW-20

Assessment Wells

MW-18	MW-18
MW-19	MW-19

Intermediate Well

MW-6	MW-6

Piezometers

MW-4R	MW-4R
MW-5	MW-5
MW-8R	MW-8R
MW-9	MW-9
MW-16	MW-16
MW-AA	MW-AA
MW-B	MW-B
MW-E	MW-E
PZ-1	PZ-1
PZ-2	PZ-2
	MW-1R

d. <u>Surface Water Monitoring Requirements</u>

Surface water is only required to be sampled if there is a discharge off of the Citrus County Central Landfill Property as required by Specific Condition Part E.8 of the Current Permit. The sample will be collected from the body of water from which the discharge occurred.

e. <u>Leachate Sampling Locations</u>

Samples for leachate influent are collected from the master lift station for Phase 1/1A and from the primary pump sampling port for the Phase 2. Leachate influent samples for the Phase 3 Expansion will be collected from the sampling port at the top of the side slope riser pipes.

Samples for leachate effluent are collected from the discharge from the chlorine contact tank.

f. <u>Sampling Frequency and Requirements</u>

(1) Newly installed wells and replacement wells will be sampled for the parameters listed in Rules 62-701.510(8)(a) and (8)(b), FAC, within 1 week of well completion and development.

(2) Leachate Influent, Effluent, and Treatment Plant Sludge sampling parameters and frequency:

(a) Leachate influent samples will be collected annually for the parameters listed in Table f(2)(a). A composite sample may be collected combining each of phases, except that individual samples must be collected from each location for the analysis of volatile organic compounds.

Table f(2)(a) Leachate Influent Sampling Parameters	
Field Parameters	Laboratory Parameters
Specific Conductivity	Total Ammonia –N
pH	Bicarbonate
Dissolved Oxygen	Chlorides
Colors and Sheens (by observation)	Iron
	Mercury
	Nitrate
	Sodium
	Total Dissolved Solids (TDS)
	Those parameters listed in 40 CFR Part 258, Appendix II

(b) Leachate effluent samples are collected as outlined in Table f(2)(b) with results reported quarterly. Leachate effluent is analyzed annually for the parameters listed in 40 CFR Part 258, Appendix I, except during the annual sampling event before a permit renewal, at which time the effluent needs to be analyzed for the parameters listed in 40 CFR Part 258, Appendix II.

Table f(2)(b) Leachate Effluent Sampling Parameters and Frequency	
Parameter	Sampling Frequency
Flow	Daily
pH	Daily
$CBOD_5$	Monthly
TSS	Monthly
Nitrate –N	Monthly
Chloride	Quarterly
Sodium	Quarterly
TDS	Quarterly
Total Ammonia-N	Quarterly
Benzene	Quarterly
Toluene	Quarterly

Ethlybenzene	Quarterly
Total Xylenes	Quarterly
Vinyl Chloride	Quarterly
Ethylene dibromide (EDB)	Quarterly
Total Trihalomethanes	Semi-annually
Arsenic	Annually
Barium	Annually
Cadmium	Annually
Chromium	Annually
Iron	Annually
Mercury	Annually
Lead	Annually
Selenium	Annually
Silver	Annually

(c) Waste Sludge from the leachate treatment plant shall be sampled annually for the parameters listed below:

- Toxicity Characteristics Leaching Potential Test (TCLP) for the organics
- Metals and Pesticides listed in 40 CFR Part 261.24, Table 1
- pH (standard units)
- Solids (percent)

(3) Background, Compliance, Intermediate, and Assessment well analytical parameters and sampling frequency:

(a) All background wells—MW-2, MW-3, and MW-7—will be sampled semiannually for the parameters listed in Table f(3)(a).

Table f(3)(a) Background Well Sampling Parameters	
Field Parameters	Laboratory Parameters
Static Water Levels	Total Ammonia -N
Specific Conductivity	Chlorides
pH	Iron
Dissolved Oxygen	Mercury
Turbidity	Nitrate
Temperature	Sodium
Colors and Sheens (by observation)	Total Dissolved Solids (TDS)
	Those parameters listed in 40 CFR Part 258, Appendix I

(b) All compliance wells—MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, MW-17, and proposed well MW-20—will be sampled semiannually for the parameters listed in Table f(3)(b). Note: These are the same parameters required for the background wells.

Table f(3)(b) Compliance Well Sampling Parameters	
Field Parameters	Laboratory Parameters
Static Water Levels	Total Ammonia -N
Specific Conductivity	Chlorides
pH	Iron
Dissolved Oxygen	Mercury
Turbidity	Nitrate
Temperature	Sodium
Colors and Sheens (by observation)	Total Dissolved Solids (TDS)
	Those parameters listed in 40 CFR Part 258, Appendix I

(c) The intermediate well—MW-6—will be sampled semiannually for the parameters listed in Table f(3)(c).

Table f(3)(c) Intermediate Well Sampling Parameters	
Field Parameters	Laboratory Parameters
Static Water Levels	Total Ammonia -N
Specific Conductivity	Chlorides
pH	Iron
Dissolved Oxygen	Mercury
Turbidity	Nitrate
Temperature	Sodium
Colors and Sheens (by observation)	Total Dissolved Solids (TDS)
	Fecal Coliform
	Total Trihalomethanes
	Those parameters listed in 40 CFR Part 258, Appendix I

(d) Assessment wells—MW-18 and MW-19—will be sampled semiannually for the parameters listed in Table f(3)(d).

Table f(3)(d) Assessment Well Sampling Parameters	
Field Parameters	Laboratory Parameters
Static Water Levels	Benzene
Specific Conductivity	Methylene Chloride
pH	Vinyl Chloride
Dissolved Oxygen	

Turbidity	
Temperature	
Colors and Sheens (by observation)	

(4) Surface water is only required to be sampled if there is a discharge off of the Citrus County Central Landfill Property as required by Specific Condition Part E.8 of the Current Permit. If discharge off of the property occurs, samples will be collected for the parameters listed in Table f(4).

Table f(4). Surface Water Sampling Parameters	
Field Parameters	Laboratory Parameters
Specific Conductivity	Unionized Ammonia
pH	Total Hardness
Dissolved Oxygen	Total Phosphates
Turbidity	Chlorophyll A
Temperature	Copper
Colors and Sheens (by observation)	Iron
	Mercury
	Nitrate
	Total Organic Carbon (TOC)
	Total Nitrogen
	Chemical Oxygen Demand (COD)
	Fecal Coliform
	Biochemical Oxygen Demand (BOD5)
	Total Dissolved Solids (TDS)
	Total Suspended Solids (TSS)
	Zinc
	Those parameters listed in 40 CFR Part 258, Appendix I

g. Evaluation Monitoring, Prevention Measures, and Corrective Action

(1) Groundwater Corrective Actions

If at any time analyses from the groundwater detect parameters which are significantly above the background water quality or which are at levels above the Department's water quality standards or criteria specified in Chapter 62-520, FAC at the edge of the Zone of Discharge, the well will be resampled within 30 days after the sampling data are received to confirm the data. If the data are confirmed, the FDEP will be notified in writing within 14 days of this finding. Upon notification by the FDEP, evaluation monitoring will be initiated in accordance with Rule 62-701.510(7) FAC.

(2) Leachate Influent Corrective Actions

If the annual leachate influent sampling analysis reports a contaminant that exceeds the regulatory level listed in 40 CFR Part 261.24, monthly sampling shall be initiated. The Department will be notified within 24 hours of confirmation of the contamination and written correspondence detailing the exceedence and proposed remediation will follow within 7 days. Monthly sampling will continue until 3 consecutive months have no regulatory exceedences.

(3) Leachate Effluent Corrective Actions

If in any 2 consecutive months of leachate effluent sampling, the same listed parameter exceeds the regulatory level, discharge to the percolation ponds will cease and off-site disposal will be initiated. Off-site disposal shall continue until acceptable leachate treatment is again demonstrated and approved by the Department.

(4) Surface Water Corrective Actions

Surface Water is only sampled on a per discharge event. The Department will be notified within 24 hours of discovery of a discharge event.

h. Water Quality Monitoring Report Requirements

Groundwater monitoring is required and has been completed in accordance with Rule 62-701.510(9), FAC.

(1) Groundwater compliance monitoring reports are submitted to FDEP semi-annually in accordance with the current permit (FDEP Permit No.21375-008-SO/01). Additionally, these reports are submitted in accordance with the requirements of Chapter 62-701.510(9) (a), FAC. Compliance monitoring reporting due dates are outlined in Table h.

Table h. FDEP Reporting Deadlines	
Groundwater Sampling	
July-December Semiannual Event	January 15th
January-June Semiannual Event	July 15th
Leachate	
Annual Influent	January 15th
Annual Treated Effluent	January 15th
Annual Treatment Plant Sludge	January 15th

Surface Water	
Discharge Event	within 30 days of receipt of results

(2) Groundwater biennial reports are submitted to FDEP in accordance with the current permit (FDEP Permit No. 21375-008-SO/01). Additionally, these reports are submitted in accordance with the requirements of Chapter 62-701.510(9) (b), FAC.

A technical report signed, sealed, and dated by a P.G. or P.E. will be submitted to the FDEP every 2 years. The most recent report summarized data from the Second Semiannual 2004 through the First Semiannual 2007 sampling events. The report will summarize and interpret the water quality, water level measurements, and leachate quality collected during the past 2 years.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
JUN 26 2009
SOUTHWEST DISTRICT TAMPA

SECTION J

GEOTECHNICAL INVESTIGATION REQUIREMENTS

The geotechnical site investigations were previously conducted for Phases 1, 1A and 2. There is no change to this information which is applicable to this application.

J.1 GEOTECHNICAL SITE INVESTIGATION REPORT

Several geotechnical investigations have been performed at the area of the Citrus County Central Landfill. The purpose of these investigations was to characterize the subsurface soils and to evaluate the material properties for these soils. The investigations included field and laboratory testing. Based on the review of the investigations, it has been concluded that the subsurface soils will provide adequate support for the Phase 3 expansion area.

The geotechnical investigation was performed by Universal on November 15, 2001 and was included in Appendix F of the Phase 2 Expansion Construction Permit Application. The Universal Engineering Report is supplemented by the PBS&J Report in Appendix G of the Phase 2 Expansion Construction Permit Application and the JE&A Groundwater and Leachate Monitoring Plan in Appendix M of the Phase 2 Expansion Construction Permit Application. The JE&A Biennial Report 2004-2007 was submitted under a separate cover to FDEP.

J.1.a Subsurface Conditions Description

Section 3.0 of the Universal geotechnical investigation report presents a description of subsurface conditions including soil stratigraphy and groundwater table conditions.

J.1.b Investigation for the Presence of Muck, Previously Filled Areas, Soft Ground, Lineaments and Sinkholes

There is no muck, soft ground, or previously filled areas in the proposed Phase 3 disposal area. This is based on the geotechnical report prepared by Universal, a site inspection conducted in late 2007 by SCS Engineers, and conversations with the County's Solid Waste Director.

Section 3.4 of the PBS&J Report provides information on a lineament and sinkhole assessment that was conducted in 1985 of the Landfill site by Seaburn & Robertson, and supplemented with aerial photo-interpretations in 1988 by PBS&J. The PBS&J report (which includes the lineament assessment summary) was included in Appendix G of the Phase 2 Expansion Construction Permit Application.

As part of the Phase 3 Expansion Area Environmental Resource Permit Application, SCS performed a karst sensitive area (KSA) assessment. A copy of this assessment is included in Attachment J-4 of this Construction Permit Application. The conclusion of this assessment was that it was not possible to determine if this specific site met the criteria as a KSA based on the requirements of the Water Management District assessment protocol.

At the Department's request an additional site specific analysis was conducted to assess the potential for sinkhole formation within the immediate vicinity of Phases 2 and 3. The results of this analysis are included in Attachment J-5.

A limestone boulder or pinnacle was encountered during the construction of the base of Phase 1 cell. However, this was not identified with any sinkhole and was removed and the excavation backfilled to provide a suitable foundation for the cell liner.

J.1.c Average and Maximum High Water Table

Estimates of the average and maximum high water table are presented in Section 3.3 of the Universal Geotechnical Investigation in Appendix F and in Section 2.1.2 of the Citrus County Central Landfill Groundwater and Leachate Monitoring Plan Review in Appendix M.
The highest ground water elevation is reported to be approximately elevation 13 ft. NGVD, according to the PBS&J report prepared for the original 80-acre Landfill site (see Appendix G).

J.1.d Foundation Analysis

J.1.d.1 Foundation Bearing Capacity Analysis

The Phase 3 Expansion area will rise at the current design condition from elevation 48 feet NGVD (corresponding bottom of sump elevation) to a maximum final elevation of 184.5 feet NGVD (top of intermediate cover). The maximum overburden compressive stress on the sub-base will be approximately 3.5 feet of cover soil at 110 pounds per cubic feet (pcf) and 135.0 feet of buried waste at 76.5 pcf. The buried waste density of 76.5 pcf was interpolated from the estimated waste unit weights reflecting bioreactor Operations for a landfill depth of 135 ft. Refer to Selection of Densities Calculations, Tim Townsend dated November 8, 2004, Attachment 9 of Attachment H-3 for the estimated waste unit weights reflecting bioreactor Operations for different landfill depths. The resultant stress due to the weight of the landfill is given by:

$$\sigma = \gamma_{MSW}\, h_{MSW} + \gamma_{sc}\, h_{sc} \qquad \text{(Equation J-1)}$$

Where:

σ = maximum overburden compressive stress;
γ_{MSW} = combined unit weight of the waste and associated daily cover;
h_{MSW} = maximum height of waste;
γ_{sc} = unit weight of sand protective layer, and final cover soil; and
h_{sc} = height of lining system, sand protective layer, and final cover soil.

Therefore, the maximum overburden compressive stress exerted on the sub-base of the landfill at the highest point is estimated to be approximately 10,714 (pounds per square foot) psf or roughly 74.4 pounds per square inch (psi).

The bearing capacity of the sub-base must be adequate to support the maximum overburden stress applied by the landfill after closure without undergoing shear failure. The bearing capacity of the sub-base beneath the Phase 3 Expansion area was analyzed using classical bearing capacity methods. The base of Phase 3 was conservatively modeled as a uniformly-loaded rectangular foundation with average plan dimensions of approximately 200 feet by 1,120 feet. These dimensions are roughly the width and length of Phase 3. The underlying sub-base soils are conservatively assumed to have a uniform effective angle of internal friction of 30 degrees and a uniform unit weight of 110 pcf.

The ultimate bearing capacity of the foundation soil was calculated using Terzaghi-Meyerhof equation [Lindeburg, 2001, 8th edition, "Civil Engineering Reference Manual for P.E.", Chapter 36-Shallow Foundations, included in Attachment J-3].

$$Q_{ult} = 0.5\,\gamma B\,N_\gamma + c\,N_c + (p_q + \gamma D_f)\,N_q \qquad \text{(Equation J-2)}$$

where: Q_{ult} = ultimate bearing capacity of the foundation soil; γ = the unit weight of sub-base materials; B = width of foundation; L = length of foundation; N_γ , N_c and N_q = bearing capacity factor given by Tables 36.2, 36.4, and 36.5, which is a function of the effective angle of internal friction, ϕ, of the sub-base materials and shape factor (B/L) correction.

Using an internal friction angle of 30° for the sub-base sandy soil,

$N_\gamma = 19.7$, from Table 36.2 of the reference book

At B/L = 200 ft/1,120 ft = 0.179, the shape factor multiplier is equal to 0.97, calculated by interpolating values shown in Table 36.5.

Since $N_c = 0$ (for sandy sub-base), $p_q = 0$ (no surcharge), and $D_f = 0$ (footing at surface), the Terzaghi-Meyerhoff Equation J-2 becomes:

$$Q_{ult} = 0.5\,\gamma B\,N_\gamma\,(0.97) = 0.485\,\gamma B\,N_\gamma \qquad \text{(Equation J-3)}$$

The allowable bearing capacity of the foundation is then calculated from Equation J-3 using the relationship:

$$Q_a = Q_{ult}/FS \qquad \text{(Equation J-4)}$$

where: Q_a = allowable bearing capacity and FS = factor of safety. A factor of safety of 3 is typically used in foundation analysis. Note that the allowable bearing capacity must exceed the maximum overburden compressive stress exerted on the sub-base in order to avoid shear failure of the sub-base of the Phase 3 at the Citrus County Central Landfill.

The bearing capacity of the sub-base is analyzed using the following parameters:

- B = 200 ft;
- L = 1,120 ft

- N_γ = 19.7;
- γ = 110 pcf;
- γ_w = 62.4 pcf; and
- FS = 3.

Using the above parameters in the Terzaghi-Meyerhoff equation (Equations J-3 and J-4, respectively), the ultimate and allowable bearing capacities of the landfill foundation sub-base were calculated to be about 210,199 psf and 70,066 psf, respectively. This exceeds the maximum overburden compressive stress of approximately 10,714 psf.

J.1.d.2 Settlement Analysis

Rule 62-701.410(2)(e)2 F.A.C. requires that the foundation analysis include an analysis of "...subgrade settlements, both total and differential...". As discussed in the Universal Geotechnical Investigation, included in the Phase 2 Expansion Construction Permit Application as Appendix F, the soil in the area consists of loose to medium dense tan to brown fine sand from surface grade to a depth of approximately 20 to 25 feet below surface grade, where a 10 to 15 feet of medium dense orange and gray clayey sand is present. Beneath this layer there typically lies a medium dense to very dense orange to tan or white fine sand to the maximum boring depth of 120 feet. Lenses of gray and orange slightly clayey sand were encountered from 50 to 60 feet below grade.

As discussed in the Universal Geotechnical Report the differential settlement is estimated to be approximately 3 inches or less under the full height of the landfill (Elevation 220.0 feet NGVD). Therefore, settlement of the sub-base is expected to have no significant effect on the lining system integrity and performance.

A copy of the settlement calculations are provided in Attachment J-1.

J.1.d.3 Slope Stability Analysis

SCS conducted a slope stability analysis to assess stability of the existing soils and waste placement relative to the proposed geometry and design features of the Phase 2 disposal area. The stability analysis was based on static conditions and investigation of circular and sliding block-type failure modes using the Bishop and Janbu simplified method of slices. A seismic analysis is not required at this site based on the peak acceleration being much less than threshold limits.

SCS assessed four design cross-sections that were judged to be the most critical for slope stability analysis. These sections included the following:

- Excavated side slope of 2:1 (horizontal to vertical) maximum cut with exposed soil.
- A 3:1 final waste side slope with the full height of waste applied (i.e. top elevation 195.0.)

Findings and recommendations from the stability analysis include:

- The calculated factor of safety for all conditions was greater than 1.5.

- A 3:1 compacted waste slope above the perimeter berm is stable at a final elevation of 195.0 ft. NGVD.

A copy of the complete SCS slope stability analysis report is provided in Attachment J-2.

J.1.e Investigation Methods

A description of the methods used in the investigation, soil borings, laboratory results, cross sections, interpretations, and conclusions have been included in Sections 2.4 and 2.5 of the Universal Geotechnical Investigation included in the Phase 2 Expansion Construction Permit Application as Appendix F.

J.1.f Fault Areas, Seismic Impact Zones, and Unstable Areas Investigation

There are no known active faults in the vicinity of the Citrus County Central Landfill. The United States Geological Survey (USGS) Seismic Hazard Map for Florida indicates that the Citrus County Central Landfill is within an area of low expected seismic activity.

The Citrus County Central Landfill is not located in an area of karst terrain or known sinkhole formation.

Unstable areas are defined as areas with poor foundation conditions, areas susceptible to mass movements and the occurrence of karst terrain. The Citrus County Central Landfill is not located in an unstable area, as discussed above.

J.2 PROFESSIONAL ENGINEER OR GEOLOGIST SIGNATURE

The Geotechnical Investigation Report prepared by Universal Engineering Sciences was signed and sealed by Thomas A. Boatman, P.E. Original signed and sealed reports are available in the Phase 2 Expansion Construction Permit Application submittals on file with FDEP.

ATTACHMENT J-1

SETTLEMENT OF FOUNDATION SOILS

3/4/09

SETTLEMENT OF FOUNDATION SOILS CALCULATIONS

Citrus County
Phase 3 Expansion

Dept. of Environmental Protection

AUG 14 2008

Southwest District

Prepared for:

Citrus County
Board of County Commissioners
P.O. Box 340
Lecanto, Florida 34460

Presented by:

SCS ENGINEERS
4041 Park Oaks Blvd., Suite 100
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8/14/08
Dominique H. Bramlett, P.E.
P.E. No. 61829
STATE OF FLORIDA
PROFESSIONAL ENGINEER

August 14, 2008
File No. 09207049.02

PHASE 2 SETTLEMENT CALCULATIONS

Settlement of Foundation Soils - PHASE 2

Based on the variability of the soil properties and the range of reasonable values of settlement of sand based on correlations with SPT N-value, the estimated settlement at points A, B and C are the following:

Location	Foundation Settlement (inches)	Location Description
A	0.25	west end of collection trench
B	0.04	mid-point of collection trench
C	2.45	east end of collection trench

The original Univeral settlement calculations estimated that the additional landfill will result in approximately less than 6 inches of additional settlement. Differential settlement was estimated to be 3 inches or less. Therefore, using the waste unit weight with recirculation developed by Tim Townsend, PHD, P.E. (refer to Attachment H-3 for the waste unit weights with recirculation developed by Tim Townsend) has minimal impact on the overall settlement for Phase 2.

Settlement - PHASE 2
Lateral Slope

	Initial Conditions				Final Conditions			
Points	Initial Elevation (ft NGVD)	Difference (ft)	Distance (ft)	Slope (%)	Settlement (ft)	Elevation (ft NGVD)	Difference (ft)	Slope (%)
A	34.7				0.02	34.68		
		3.3	330.0	1.00			3.32	1.01
B	38				0.00	38.00		
		4.2	418.0	1.00			4.00	0.96
C	42.2				0.204	42.00		

Estimated Stress - PHASE 2

Point A

Initial Stress Conditions		**Buildout Stress Conditions**							
Use Boring B-6		Final Closure EL	177 ft	Cover Soil	2 ft	110 pcf	220 psf		
		Intermediate Cover EL	175 ft	Intermed Soil	1.5 ft	110 pcf	165 psf		
Ground Surface	100 ft	Bottom EL	34.7 ft	Waste/Daily	136.8 ft	76.51 pcf	10,467 psf		
Water Table	0.0 ft	Depth	142.3 ft	Drainage Sand	2 ft	110 pcf	220 psf		
Unit Weight of Water, γ_w	62.4 pcf	Water Table	0.0 ft	Depth	142.3 ft	Total Bottom Stress	11,072 psf		

		Initial Conditions				Final Conditions							Change in Stress
Soil Layers	Elevation (ft)	Thickness (ft)	Point Elevation	Unit Weight γ (pcf)	Stress σ' (psf)	Soil Layers	Unit Weight γ (pcf)	Thickness (ft)	Point Elevation (ft)	Excavation (psf)	Waste/Soil (psf)	Final Stress (psf)	Stress (psf)
											11,072		
Point 1	100.0	9.0	95.5	110.3	496	Point 1	110.3	0.0	0.0	0		0	0
(SC), N~10	91.0			131.3		(SC), N~10	131.3						
Point 2	91.0	8.0	87.0	101.0	1,397	Point 2	101.0	0.0	0.0	0.00		0	0
(SP/SM), N~10	83.0			125.2		(SP/SM), N~10	125.2						
Point 3	83.0	20.0	73.0	113.2	2,933	Point 3	113.2	0.0	0.0	0.00		0	0
(SC), N~20	63.0			133.1		(SC), N~20	133.1						
Point 4	63.0	68.0	29.0	141.5	8,876	Point 4	141.5	39.7	14.9	2,809		13,880	5,005
(SP/SM), N>40	-5.0			150.0		(SP/SM), N>40	150.0						

Estimated Stress - PHASE 2

Point B

Initial Stress Conditions	
Use Boring B-7	
Ground Surface	90.5 ft
Water Table	5.0 ft
Unit Weight of Water, γ_w	62.4 pcf

Buildout Stress Conditions					
Final Closure EL	205 ft	Cover Soil	2 ft	110 pcf	220 psf
Intermediate Cover EL	203 ft	Intermed Soil	1.5 ft	110 pcf	165 psf
Bottom EL	38.0 ft	Waste/Daily	161.5 ft	76.51 pcf	12,356 psf
Depth	167.0 ft	Drainage Sand	2 ft	110 pcf	220 psf
Water Table	5.0 ft	Depth	167.0 ft	Total Bottom Stress	12,961 psf

	Elevation (ft)	Initial Conditions				Final Conditions							Change in Stress
Soil Layers		Thickness (ft)	Point Elevation	Unit Weight γ (pcf)	Stress σ' (psf)	Soil Layers	Unit Weight γ (pcf)	Thickness (ft)	Point Elevation (ft)	Excavation (psf)	Waste/Soil (psf)	Final Stress (psf)	Stress (psf)
											12,961		
Point 1	90.5	5.0	88.0	101.0	253	Point 1	101.0	0.0	0	0		0	0
(SP/SM), N~10	85.5			125.2		(SP/SM), N~10	125.2						
Point 2	85.5	5.0	83.0	110.5	781	Point 2	110.5	0	0.0	0		0	0
(SP/SM), N~25	80.5			131.3		(SP/SM), N~25	131.3						
Point 3	80.5	5.0	78.0	108.0	1,328	Point 3	108.0	0.0	0.0	0		0	0
(SP/SM), N~20	75.5			129.7		(SP/SM), N~20	129.7						
Point 4	75.5	40.0	55.5	141.5	4,428	Point 4	141.5	2.5	36.8	177		13,138	8,711
(SP/SM), N>40	35.5			150.0		(SP/SM), N>40	150.0						

Notes:

1. Groundwater encountered at approximately 120 feet below existing ground surface per Universal Engineering Science (see Attachment).

Estimated Stress - PHASE 2

Point C

Initial Stress Conditions

Use Boring B-9	
Ground Surface	66.4 ft
Water Table	5.0 ft
Unit Weight of Water, γ_w	62.4 pcf

Buildout Stress Conditions

Final Closure EL	177 ft	Cover Soil	2 ft	110 pcf	220 psf
Intermediate Cover EL	175 ft	Intermed Soil	1.5 ft	110 pcf	165 psf
Bottom EL	42.2 ft	Waste/Daily	129.3 ft	76.51 pcf	9,893 psf
Depth	134.8 ft	Drainage Sand	2 ft	110 pcf	220 psf
Water Table	4.0 ft	Depth	134.8 ft	Total Bottom Stress	10,498 psf

	Initial Conditions					Final Conditions							Change in Stress
Soil Layers	Elevation (ft)	Thickness (ft)	Point Elevation	Unit Weight γ (pcf)	Stress σ' (psf)	Soil Layers	Unit Weight γ (pcf)	Thickness (ft)	Point Elevation (ft)	Excavation (psf)	Waste/Soil (psf)	Final Stress (psf)	Stress (psf)
											10,498		
Point 1	66.4	4.0	64.4	118.5	237	Point 1	118.5	0.0	0.0	0		0	0
(SM), N~30	62.4			136.4		(SM), N~30	136.4						
Point 2	62.4	16.0	54.4	108.0	1,338	Point 2	108.0	0	0.0	0		0	0
(SP/SM), N~20	46.4			129.7		(SP/SM), N~20	129.7						
Point 3	46.4	5.0	43.9	110.5	2,478	Point 3	110.5	0.8	41.8	44		10,542	8,064
(SP/SM), N~25	41.4			131.3		(SP/SM), N~25	131.3						
Point 4	41.4	7.0	37.9	108.0	3,133	Point 4	108.0	7.0	37.9	466		10,964	7,832
(SP/SM), N~20	34.4			129.7		(SP/SM), N~20	129.7						
Point 5	34.4	13.0	27.9	116.0	4,265	Point 5	116.0	13.0	27.9	1,598		12,096	7,832
(SP/SM), N~30	21.4			134.7		(SP/SM), N~30	134.7						

Notes:

1. Groundwater encountered at approximately 120 feet below existing ground surface per Universal Engineering Science (see Attachment).

Estimated Settlement - PHASE 2

Point A Final Buildout

	Soil Type, N	H (ft)	C_c	C_s	e_o	P_o (psf)	ΔP (psf)	Settlement (ft)	
Point 1	(SC), N~10	0.0	0.040	0.008	0.50	496	0	0.00	
Point 2	(SP/SM), N~10	0.0	0.045	0.009	0.64	1,397	0	0.00	
Point 3	(SC), N~20	0.0	0.032	0.006	0.46	2,933	0	0.00	
Point 4	(SP/SM), N>40	39.7	0.003	0.001	0.18	8,876	5,005	0.02	
								0.02	ft
								0.25	in

Point B Final Buildout

	Soil Type, N	H (ft)	C_c	C_s	e_o	P_o (psf)	ΔP (psf)	Settlement (ft)	
Point 1	(SP/SM), N~10	0.0	0.045	0.009	0.64	253	0	0.00	
Point 2	(SP/SM), N~25	0.0	0.032	0.006	0.50	781	0	0.00	
Point 3	(SP/SM), N~20	0.0	0.035	0.007	0.53	1,328	0	0.00	
Point 4	(SP/SM), N>40	2.5	0.003	0.001	0.18	4,428	8,711	0.00	
								0.00	ft
								0.04	in

Point C Final Buildout

	Soil Type, N	H (ft)	Cc	Cs	eo	Po (psf)	ΔP (psf)	Settlement (ft)	
Point 1	(SM), N~30	0.0	0.011	0.002	0.39	237	0	0.00	
Point 2	(SP/SM), N~20	0.0	0.035	0.007	0.53	1,338	0	0.00	
Point 3	(SP/SM), N~25	0.8	0.032	0.006	0.50	2,478	8,064	0.01	
Point 4	(SP/SM), N~20	7.0	0.035	0.007	0.53	3,133	7,832	0.09	
Point 5	(SP/SM), N~30	13.0	0.026	0.005	0.42	4,265	7,832	0.11	
								0.204	ft
								2.45	in

Estimated Soil Properties

SPT N values 5		
Soil Type	SP/SM	Silty Sand and Gravel
Relative Density (D_R)	0.05	Target Relative Density
Dry Unit Weight, min. ($\gamma_{min.}$)	89	pcf
Dry Unit Weight, max. ($\gamma_{max.}$)	146	pcf
Dry Unit Weight (γ_d)	90.6	pcf
Relative Density (D_R)	0.05	Computed Relative Density
Void Ratio, max. ($e_{max.}$)	0.85	
Void Ratio, min. ($e_{min.}$)	0.14	
Void Ratio, initial ($e_{o.}$)	0.81	
Relative Density (D_R)	0.05	Computed Relative Density
Degree of Saturation	1	Pore space fully saturated @ D_R
Specific Gravity of Soil	2.65	
Unit Weight of Water (γ_w)	62.4	pcf
Saturated Unit Weight (γ_{sat})	119.14	pcf

SPT N values 10		
Soil Type	SP/SM	Silty Sand and Gravel
Relative Density (D_R)	0.3	Target Relative Density
Dry Unit Weight, min. ($\gamma_{min.}$)	89	pcf
Dry Unit Weight, max. ($\gamma_{max.}$	146	pcf
Dry Unit Weight (γ_d)	101	pcf
Relative Density (D_R)	0.30	Computed Relative Density
Void Ratio, max. ($e_{max.}$)	0.85	
Void Ratio, min. ($e_{min.}$)	0.14	
Void Ratio, initial ($e_{o.}$)	0.64	
Relative Density (D_R)	0.30	Computed Relative Density
Degree of Saturation	1	Pore space fully saturated @ D_R
Specific Gravity of Soil	2.65	
Unit Weight of Water (γ_w)	62.4	pcf
Saturated Unit Weight (γ_{sat})	125.18	pcf

SPT N values 20		
Soil Type	SP/SM	Silty Sand and Gravel
Relative Density (D_R)	0.45	Target Relative Density
Dry Unit Weight, min. ($\gamma_{min.}$)	89	pcf
Dry Unit Weight, max. ($\gamma_{max.}$	146	pcf
Dry Unit Weight (γ_d)	108	pcf
Relative Density (D_R)	0.45	Computed Relative Density
Void Ratio, max. ($e_{max.}$)	0.85	
Void Ratio, min. ($e_{min.}$)	0.14	
Void Ratio, initial ($e_{o.}$)	0.53	
Relative Density (D_R)	0.45	Computed Relative Density
Degree of Saturation	1	Pore space fully saturated @ D_R
Specific Gravity of Soil	2.65	
Unit Weight of Water (γ_w)	62.4	pcf
Saturated Unit Weight (γ_{sat})	129.69	pcf

SPT N values 25		
Soil Type	SP/SM	Silty Sand and Gravel
Relative Density (D_R)	0.50	Target Relative Density
Dry Unit Weight, min. ($\gamma_{min.}$)	89	pcf
Dry Unit Weight, max. ($\gamma_{max.}$)	146	pcf
Dry Unit Weight (γ_d)	110.5	pcf
Relative Density (D_R)	0.50	Computed Relative Density
Void Ratio, max. ($e_{max.}$)	0.85	
Void Ratio, min. ($e_{min.}$)	0.14	
Void Ratio, initial ($e_{o.}$)	0.50	
Relative Density (D_R)	0.50	Computed Relative Density
Degree of Saturation	1	Pore space fully saturated @ D_R
Specific Gravity of Soil	2.65	
Unit Weight of Water (γ_w)	62.4	pcf
Saturated Unit Weight (γ_{sat})	131.27	pcf

SPT N values 30		
Soil Type	SP/SM	Silty Sand and Gravel
Relative Density (D_R)	0.6	Target Relative Density
Dry Unit Weight, min. ($\gamma_{min.}$)	89	pcf
Dry Unit Weight, max. ($\gamma_{max.}$	146	pcf
Dry Unit Weight (γ_d)	116	pcf
Relative Density (D_R)	0.60	Computed Relative Density
Void Ratio, max. ($e_{max.}$)	0.85	
Void Ratio, min. ($e_{min.}$)	0.14	
Void Ratio, initial ($e_{o.}$)	0.42	
Relative Density (D_R)	0.60	Computed Relative Density
Degree of Saturation	1	Pore space fully saturated @ D_R
Specific Gravity of Soil	2.65	
Unit Weight of Water (γ_w)	62.4	pcf
Saturated Unit Weight (γ_{sat})	134.50	pcf

SPT N values greater than 40		
Soil Type	SP/SM	Silty Sand and Gravel
Relative Density (D_R)	0.95	Target Relative Density
Dry Unit Weight, min. ($\gamma_{min.}$)	89	pcf
Dry Unit Weight, max. ($\gamma_{max.}$	146	pcf
Dry Unit Weight (γ_d)	141.5	pcf
Relative Density (D_R)	0.96	Computed Relative Density
Void Ratio, max. ($e_{max.}$)	0.85	
Void Ratio, min. ($e_{min.}$)	0.14	
Void Ratio, initial ($e_{o.}$)	0.18	
Relative Density (D_R)	0.95	Computed Relative Density
Degree of Saturation	1	Pore space fully saturated @ D_R
Specific Gravity of Soil	2.65	
Unit Weight of Water (γ_w)	62.4	pcf
Saturated Unit Weight (γ_{sat})	150.08	pcf

Estimated Soil Properties

SPT N values 5			
Soil Type	SC	Clayey Sand	
Relative Density (D_R)	0.05	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	105	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$)	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	105.8	pcf	
Relative Density (D_R)	0.05	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.57		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.56		
Relative Density (D_R)	0.05	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	128.48	pcf	

SPT N values 10			
Soil Type	SC	Clayey Sand	
Relative Density (D_R)	0.3	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	105	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$)	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	110.3	pcf	
Relative Density (D_R)	0.30	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.57		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.50		
Relative Density (D_R)	0.30	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	131.27	pcf	

SPT N values 20			
Soil Type	SC	Clayey Sand	
Relative Density (D_R)	0.45	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	105	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	113.2	pcf	
Relative Density (D_R)	0.45	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.57		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.46		
Relative Density (D_R)	0.45	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	133.07	pcf	

SPT N values 25			
Soil Type	SC	Clayey Sand	
Relative Density (D_R)	0.50	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	105	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$)	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	114.2	pcf	
Relative Density (D_R)	0.50	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.57		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.45		
Relative Density (D_R)	0.50	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	133.62	pcf	

SPT N values 30			
Soil Type	SC	Clayey Sand	
Relative Density (D_R)	0.6	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	105	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$)	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	116.2	pcf	
Relative Density (D_R)	0.60	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.57		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.42		
Relative Density (D_R)	0.60	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	134.91	pcf	

SPT N values greater than 40			
Soil Type	SC	Clayey Sand	
Relative Density (D_R)	0.95	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	105	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	123.8	pcf	
Relative Density (D_R)	0.95	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.57		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.33		
Relative Density (D_R)	0.95	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	139.64	pcf	

Compression Index Values

SM-SC

D_R	SPT N	a	e_{min}	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.21	0.3	0.87	0.120	0.024
30%	10	0.21	0.3	0.72	0.088	0.018
45%	20	0.21	0.3	0.63	0.069	0.014
50%	25	0.21	0.3	0.60	0.063	0.013
60%	30	0.21	0.3	0.54	0.050	0.010
95%	>40	0.21	0.3	0.33	0.006	0.001

SP

D_R	SPT N	a	e_{min}	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.07	0.2	0.91	0.050	0.010
30%	10	0.07	0.2	0.73	0.037	0.007
45%	20	0.07	0.2	0.61	0.029	0.006
50%	25	0.07	0.2	0.58	0.026	0.005
60%	30	0.07	0.2	0.50	0.021	0.004
95%	>40	0.07	0.2	0.24	0.003	0.001

SP-SM

D_R	SPT N	a	e_{min}	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.09	0.14	0.81	0.061	0.012
30%	10	0.09	0.14	0.64	0.045	0.009
45%	20	0.09	0.14	0.53	0.035	0.007
50%	25	0.09	0.14	0.50	0.032	0.006
60%	30	0.09	0.14	0.42	0.026	0.005
95%	>40	0.09	0.14	0.18	0.003	0.001

SC

D_R	SPT N	a	e_{min} (2)	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.23	0.32	0.56	0.055	0.011
30%	10	0.23	0.32	0.50	0.040	0.008
45%	20	0.23	0.32	0.46	0.032	0.006
50%	25	0.23	0.32	0.45	0.029	0.006
60%	30	0.23	0.32	0.42	0.023	0.005
95%	>40	0.23	0.32	0.33	0.003	0.001

Compression Index Values

SM

D_R	SPT N	a	e_{min}	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.15	0.32	0.49	0.026	0.005
30%	10	0.15	0.32	0.45	0.019	0.004
45%	20	0.15	0.32	0.42	0.015	0.003
50%	25	0.15	0.32	0.41	0.014	0.003
60%	30	0.15	0.32	0.39	0.011	0.002
95%	>40	0.15	0.32	0.33	0.001	0.000

SW

D_R	SPT N	a	e_{min}	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.09	0.4	0.97	0.051	0.010
30%	10	0.09	0.4	0.82	0.038	0.008
45%	20	0.09	0.4	0.73	0.030	0.006
50%	25	0.09	0.4	0.70	0.027	0.005
60%	30	0.09	0.4	0.64	0.022	0.004
95%	>40	0.09	0.4	0.43	0.003	0.001

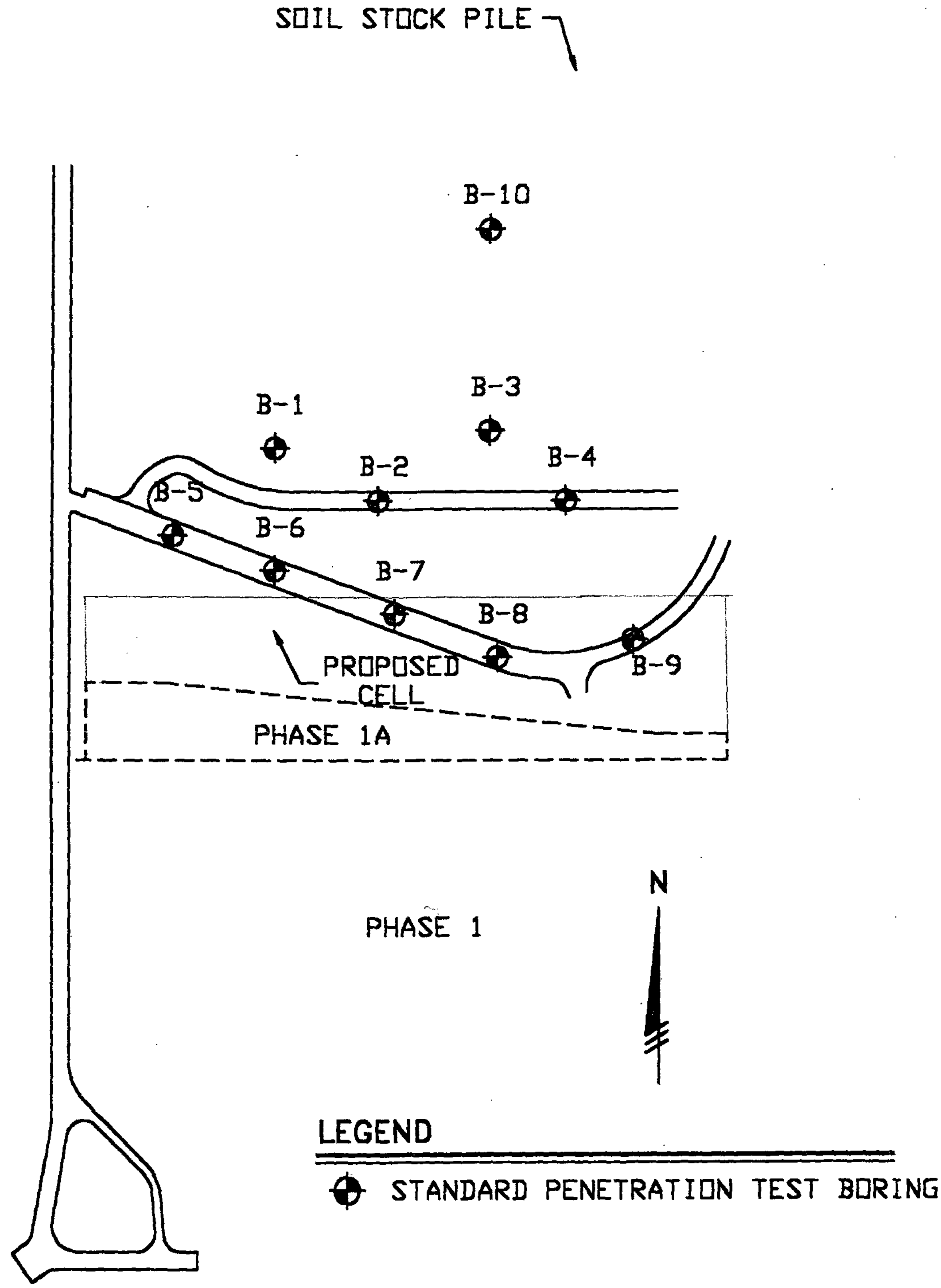
ML

D_R	SPT N	a	e_{min}	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.29	0.4	1.07	0.193	0.039
30%	10	0.29	0.4	0.89	0.142	0.028
45%	20	0.29	0.4	0.788	0.113	0.023
50%	25	0.29	0.4	0.75	0.102	0.020
60%	30	0.29	0.4	0.68	0.081	0.016
95%	>40	0.29	0.4	0.435	0.010	0.002

Notes:

1) e_o = initial void ratio use equation:

$$D_R = \frac{e_{max} - e_o}{e_{max} - e_{min}} \times 100$$



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S.R. 44
CITRUS COUNTY, FLORIDA

BORING LOCATION PLAN

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26081

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	26081-001-01
REPORT NO.:	21607
PAGE:	B-12

PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

Pt A

BORING DESIGNATION: B-6 SHEET: 1 of 2
SECTION: TOWNSHIP: RANGE:

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft): 100.00
WATER TABLE (ft): 100.0
DATE OF READING: 11/01/01
EST. WSWT (ft):
DATE STARTED: 11/1/01
DATE FINISHED: 11/1/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING: ASTMD-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 (100)						Brown SAND						
	X	2-3-4	7			Loose orange very CLAYEY SAND [SC]						
5	X	4-5-7	12			SC ~ 10						
						Medium dense orange CLAYEY SAND [SC] SC ~ 10	24					
10	X	4-5-7	12			Medium dense tan orange fine SAND [SP/SM]						
						SP/SM ~ 10						
15	X	4-6-8	14									
						Medium dense gray CLAYEY SAND [SC]						
20	X	5-7-10	17									
						SC ~ 20						
25	X	5-7-7	14				28		29	21		
30	X	5-7-7	14			Medium dense gray & orange slightly CLAYEY SAND [SC]						
						SC ~ 20						
35	X	4-8-10	18									
						Dense to very dense tan fine SAND [SP/SM]						
40	X	13-16-18	34									
						SP/SM ~ 40						
45	X	12-15-16	31									
50	X	10-16-20	36									
55	X	11-19-22	41				9					
60	X	12-17-17	34									

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PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: **B-6** 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 LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
60						Very dense tan fine SAND [SP/SM]						
65	X	15-26-30	56									
						SP/sm ~ 40						
70	X	17-27-34	61									
75	X	18-30-36	66									
80	X	50 for 4"	50+									
85	X	50 for 3"	50+									
90	X	50 for 3"	50+				12				3	
95	X	15-18-50	68									
100	X	25-35-45	80	▼			9					
105	X	50 for 3"	50+			Boring terminated at 105'						

BL2

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 26081-001-01
REPORT NO.: 21607
PAGE: B-14

PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: B-7 SHEET: 1 of 1
SECTION: TOWNSHIP: RANGE:

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN pt B
REMARKS:

GS ELEVATION(ft): 90.50
WATER TABLE (ft): NE
DATE OF READING: 11/02/01
EST. WSWT (ft):
DATE STARTED: 11/2/01
DATE FINISHED: 11/2/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING: ASTMD-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 (90.5)						Loose to medium dense tan to yellow fine SAND [SP/SM]						
	X	2-3-4	7									
5	X	4-4-5	9			SP/SM ~ 10						
10	X	5-12-12	24			SP/SM ~ 25						
15	X	7-8-12	20			SP/SM ~ 20	8					
20	X	8-15-33	48									
25	X	10-30-40	70			SP/SM ~ 40						
30	X	9-20-25	45									
35	X	50 for 3"	50+									
						Very dense orange SAND [SP/SM]						
40	X	50 for 3"	50+									
45	X	22-26-39	65			SP/SM ~ 40	8					
50	X	18-26-28	54									
55	X	15-35-45	80									
						Boring terminated at 55'						

BL2

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 26081-001-01
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PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: B-9 SHEET: 1 of 1
SECTION: TOWNSHIP: RANGE:

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

A C

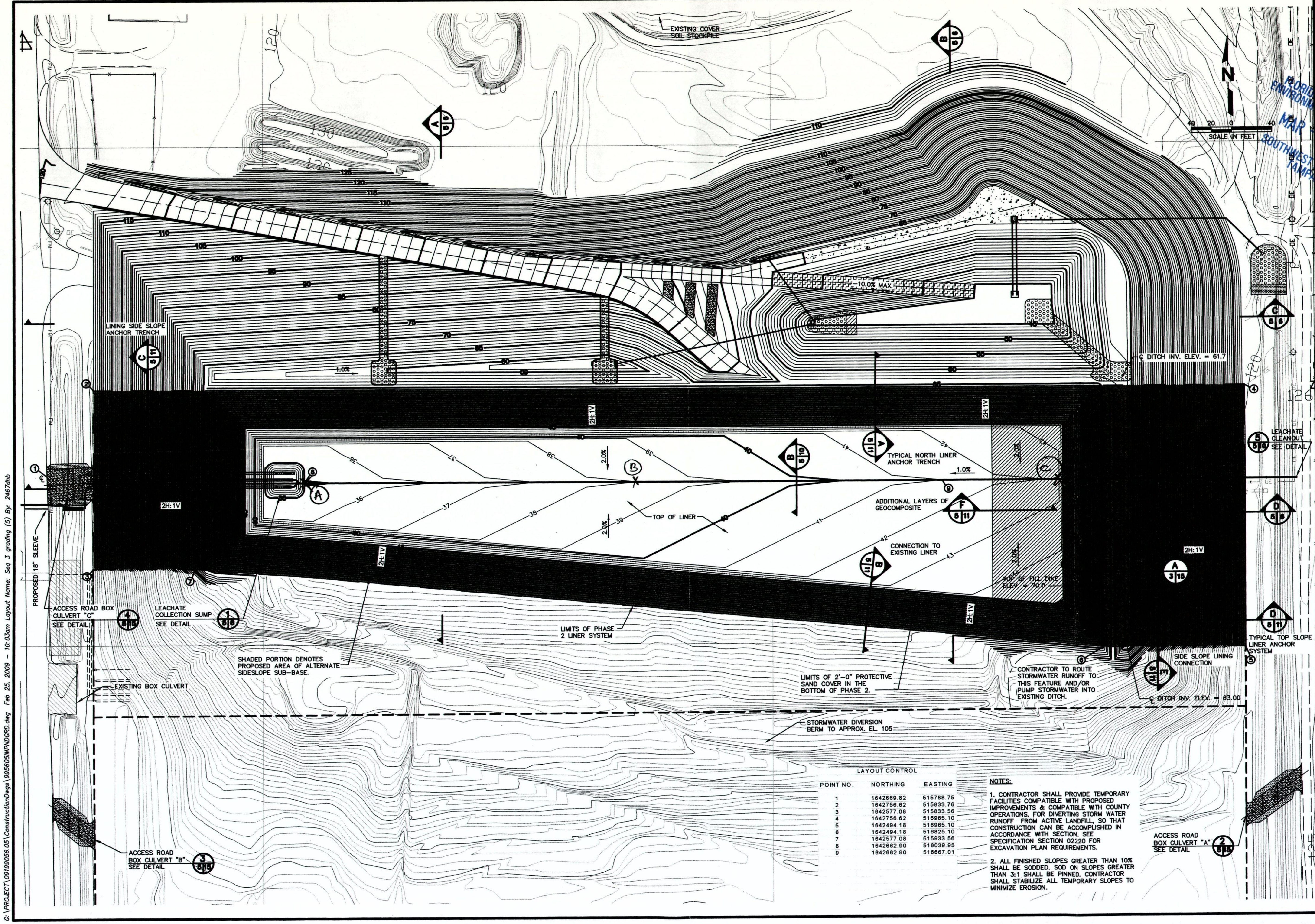
GS ELEVATION(ft): 66.40
WATER TABLE (ft): NE
DATE OF READING: 11/05/01
EST. WSWT (ft):

DATE STARTED: 11/5/01
DATE FINISHED: 11/5/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING: ASTMD-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 (66.40)						Medium dense brown fine SAND [SM]	14					
	X	10-10-20	30			SM ~ 30						
	X	5-7-10	17			Medium dense white fine SAND [SP/SM]						
5												
						SP/SM ~ 20						
10	X	4-8-8	16									
15	X	5-5-12	17				9					
						Medium dense white to tan fine SAND [SP/SM]						
						SP/SM ~ 20						
20	X	6-8-9	17									
						SP/SM ~ 25						
25	X	8-13-13	26									
						SP/SM ~ 20						
30	X	8-9-10	19									
						Medium dense tan fine SAND [SP/SM]						
35	X	6-10-20	30									
						SP/SM ~ 30						
40	X	8-10-18	28									
45	X	8-10-12	22									
						Boring terminated at 45'						

BL21

G:\PROJECT\09199056.05\ConstructionDwgs\995605IMPNDGRD.dwg Feb 25, 2009 - 10:03am Layout Name: Seq 3 grading (5) By: 2467dhb



LAYOUT CONTROL

POINT NO.	NORTHING	EASTING
1	1642669.82	515788.75
2	1642756.62	515833.76
3	1642577.08	515833.56
4	1642756.62	516965.10
5	1642494.18	516965.10
6	1642494.18	516825.10
7	1642577.08	515933.56
8	1642662.90	516039.95
9	1642662.90	516667.01

NOTES:

1. CONTRACTOR SHALL PROVIDE TEMPORARY FACILITIES COMPATIBLE WITH PROPOSED IMPROVEMENTS & COMPATIBLE WITH COUNTY OPERATIONS, FOR DIVERTING STORM WATER RUNOFF FROM ACTIVE LANDFILL, SO THAT CONSTRUCTION CAN BE ACCOMPLISHED IN ACCORDANCE WITH SECTION. SEE SPECIFICATION SECTION 02220 FOR EXCAVATION PLAN REQUIREMENTS.

2. ALL FINISHED SLOPES GREATER THAN 10% SHALL BE SODDED. SOD ON SLOPES GREATER THAN 3:1 SHALL BE PINNED. CONTRACTOR SHALL STABILIZE ALL TEMPORARY SLOPES TO MINIMIZE EROSION.

REV	DATE	DESCRIPTION	BY

DRAWING TITLE: SEQUENCE III NEW WASTE DISPOSAL CELL LINER

PROJECT TITLE: CENTRAL LANDFILL PHASE II EXPANSION CONSTRUCTION DRAWINGS

CLIENT: CITRUS COUNTY SOLID WASTE MANAGEMENT DIVISION CITRUS COUNTY, FLORIDA

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS
3012 U.S. HWY. 301 NORTH, SUITE 700, TAMPA, FL 33619
PH (813) 621-0080 FAX NO. (813) 623-6757

PROJ. NO. 09199056.05 | DWN. BY: PEI | Q/A RVW BY: BJC
DSN. BY: BJC/LEK | CHK. BY: JAB | APP. BY: RJD

CADD FILE: 995605IMPNDGRD.dwg
DATE: JUNE 2003
SCALE: 1" = 40'
DRAWING NO. 5 of 21

PHASE 3 SETTLEMENT CALCULATIONS

Settlement of Foundation Soils

Based on the variability of the soil properties and the range of reasonable values of settlement of sand based on correlations with SPT N-value, the estimated settlement at points A, B and C are the following:

Location	Foundation Settlement (inches)	Location Description
A	0.13	west end of collection trench
B	0.32	mid-point of collection trench
C	0.02	east end of collection trench

See Attachment 2 for location points.

Estimated Settlement

Point A Final Buildout

	Soil Type, N	H (ft)	C_c	C_s	e_o	P_o (psf)	ΔP (psf)	Settlement (ft)	
Point 1	(SP/SM), N~25	0.0	0.032	0.006	0.50	718.3	0	0.00	
Point 2	(SP/SM), N~5	0.0	0.061	0.012	0.81	1663.0	0	0.00	
Point 3	(SC), N~20	0.0	0.032	0.006	0.46	2229.1	0	0.00	
Point 4	(SP/SM), N~20	0.0	0.035	0.007	0.53	4404.7	0	0.00	
Point 5	(SC), N~20	6.0	0.032	0.006	0.46	7033.1	1371.2	0.01	
Point 6	(SM), N>40	18.0	0.001	0.000	0.33	8943.3	918.4	0.00	
								0.01	ft
								0.13	in

Point B Final Buildout

	Soil Type, N	H (ft)	C_c	C_s	e_o	P_o (psf)	ΔP (psf)	Settlement (ft)	
Point 1	(SP/SM), N~10	0.0	0.045	0.009	0.64	252.5	0	0.00	
Point 2	(SP/SM), N~25	0.0	0.032	0.006	0.50	781.3	0	0.00	
Point 3	(SP/SM), N~20	0.0	0.035	0.007	0.53	1327.5	0	0.00	
Point 4	(SP/SM), N>40	29.0	0.003	0.001	0.18	4427.5	5382.9	0.03	
								0.03	ft
								0.32	in

Point C Final Buildout

	Soil Type, N	H (ft)	Cc	Cs	eo	Po (psf)	ΔP (psf)	Settlement (ft)	
Point 1	(SP/SM), N~5	0.0	0.061	0.012	0.81	226.5	0	0.00	
Point 2	(SP/SM), N~20	0.0	0.035	0.007	0.53	885.0	0	0.00	
Point 3	(SP/SM), N~25	0.0	0.032	0.006	0.50	2145.8	0	0.00	
Point 4	(SP/SM), N~20	0.0	0.035	0.007	0.53	3136.5	0	0.00	
Point 5	(SP/SM), N>40	0.0	0.003	0.001	0.18	5138.0	0	0.00	
Point 6	(SP/SM), N~20	1.0	0.035	0.007	0.53	7139.5	367.1	0.00	
Point 7	(SP/SM), N>40	60.0	0.003	0.001	0.18	11546.5	259.1	0.00	
								0.002	ft
								0.02	in

Settlement
Lateral Slope

	Initial Conditions				Final Conditions			
Points	Initial Elevation (ft NGVD)	Difference (ft)	Distance (ft)	Slope (%)	Settlement (ft)	Elevation (ft NGVD)	Difference (ft)	Slope (%)
A	52				0.01	51.99		
		4	402.0	1.00			3.98	0.99
B	56				0.03	55.97		
		4	402.0	1.00			4.02	1.00
C	60				0.002	60.00		

Estimated Stress

Point A

Initial Stress Conditions

(Use Boring B-5, Ground Surface Elevation assumed from approx. location of Boring compared to 6-21-2001 survey)

Ground Surface	118 ft
Water Table	5.0 ft
Unit Weight of Water, γ_w	62.4 pcf

Buildout Stress Conditions

Final Closure EL	155 ft	Cover Soil	2 ft	110 pcf	220 psf
Intermediate Cover EL	153 ft	Intermed Soil	1.5 ft	110 pcf	165 psf
Bottom EL	52.0 ft	Waste/Daily	97.5 ft	76.51 pcf	7460 psf
Depth	103.0 ft	Drainage Sand	2 ft	110 pcf	220 psf
Water Table	5.0 ft	Depth	103.0 ft	Total Bottom Stress	8065 psf

	Initial Conditions					Final Conditions							Change in Stress
Soil Layers	Elevation (ft)	Thickness (ft)	Point Elevation	Unit Weight γ (pcf)	Stress σ' (psf)	Soil Layers	Unit Weight γ (pcf)	Thickness (ft)	Point Elevation (ft)	Excavation (psf)	Waste/Soil (psf)	Final Stress (psf)	Stress (psf)
											8064.725		
Point 1	118.0	13.0	111.5	110.5	718.3	Point 1	110.5	0.0	0.0	0		0	0
(SP/SM), N~25	105			131.3		(SP/SM), N~25	131.3						
Point 2	105.0	5.0	102.5	90.6	1663.0	Point 2	90.6	0.0	0.0	0.00		0	0
(SP/SM), N~5	100.0			119.1		(SP/SM), N~5	119.1						
Point 3	100.0	6.0	97.0	113.2	2229.1	Point 3	113.2	0.0	0.0	0.00		0	0
(SC), N~20	94.0			133.1		(SC), N~20	133.1						
Point 4	94.0	34.0	77.0	108.0	4404.7	Point 4	108.0	0.0	0.0	0.00		0	0
(SP/SM), N~20	60.0			129.7		(SP/SM), N~20	129.7						
Point 5	60.0	14.0	53.0	113.2	7033.1	Point 5	113.2	6.0	49.0	339.60		8404.3	1371.2
(SC), N~20	46.0			133.1		(SC), N~20	133.1						
Point 6	46.0	18.0	37.0	124.2	8943.3	Point 6	124.2	18.0	37.0	1797.00		9861.7	918.4
(SM), N>40	28.0			139.9		(SM), N>40	139.9						

Notes:

1. Groundwater encountered at approximately 120 feet below existing ground surface per Universal Engineering Science (see Attachment).

Estimated Stress

Point B

Initial Stress Conditions

(Use Boring B-7, Ground Surface Elevation assumed from approx. location of Boring compared to 6-21-2001 survey)

Ground Surface	82 ft
Water Table	5.0 ft
Unit Weight of Water, γ_w	62.4 pcf

Buildout Stress Conditions

Final Closure EL	155 ft	Cover Soil	2 ft	110 pcf	220 psf
Intermediate Cover EL	153 ft	Intermed Soil	1.5 ft	110 pcf	165 psf
Bottom EL	56.0 ft	Waste/Daily	93.5 ft	76.51 pcf	7154 psf
Depth	99.0 ft	Drainage Sand	2 ft	110 pcf	220 psf
Water Table	5.0 ft	Depth	99.0 ft	Total Bottom Stress	7759 psf

	Initial Conditions					Final Conditions							Change in Stress
Soil Layers	Elevation (ft)	Thickness (ft)	Point Elevation	Unit Weight γ (pcf)	Stress σ' (psf)	Soil Layers	Unit Weight γ (pcf)	Thickness (ft)	Point Elevation (ft)	Excavation (psf)	Waste/Soil (psf)	Final Stress (psf)	Stress (psf)
											7758.685		
Point 1	82.0	5.0	79.5	101.0	252.5	Point 1	101.0	0.0	0.0	0		0	0
(SP/SM), N~10	77			125.2		(SP/SM), N~10	125.2						
Point 2	77.0	5.0	74.5	110.5	781.3	Point 2	110.5	0	0.0	0.00		0	0
(SP/SM), N~25	72.0			131.3		(SP/SM), N~25	131.3						
Point 3	72.0	5.0	69.5	108.0	1327.5	Point 3	108.0	0.0	0.0	0.00		0	0
(SP/SM), N~20	67.0			129.7		(SP/SM), N~20	129.7						
Point 4	67.0	40.0	47.0	141.5	4427.5	Point 4	141.5	29.0	41.5	2051.75		9810.4	5382.9
(SP/SM), N>40	27.0			150.0		(SP/SM), N>40	150.0						

Notes:

1. Groundwater encountered at approximately 120 feet below existing ground surface per Universal Engineering Science (see Attachment).

Estimated Stress

Point C

Initial Stress Conditions		**Buildout Stress Conditions**					
(Use Boring B-4, Ground Surface Elevation assumed from approx.		Final Closure EL	155 ft	Cover Soil	2 ft	110 pcf	220 psf
location of Boring compared to 6-21-2001 survey)		Intermediate Cover EL	153 ft	Intermed Soil	1.5 ft	110 pcf	165 psf
Ground Surface	119 ft	Bottom EL	60.0 ft	Waste/Daily	89.5 ft	76.51 pcf	6848 psf
Water Table	5.0 ft	Depth	95.0 ft	Drainage Sand	2 ft	110 pcf	220 psf
Unit Weight of Water, γ_w	62.4 pcf	Water Table	4.0 ft	Depth	95.0 ft	Total Bottom Stress	7453 psf

	Initial Conditions					Final Conditions							Change in Stress
Soil Layers	**Elevation (ft)**	**Thickness (ft)**	**Point Elevation**	**Unit Weight γ (pcf)**	**Stress σ' (psf)**	**Soil Layers**	**Unit Weight γ (pcf)**	**Thickness (ft)**	**Point Elevation (ft)**	**Excavation (psf)**	**Waste/Soil (psf)**	**Final Stress (psf)**	**Stress (psf)**
											7452.645		
Point 1 (SP/SM), N~5	119.0 114	5.0	116.5	90.6 119.1	226.5	Point 1 (SP/SM), N~5	90.6 119.1	0.0	0.0	0		0	0
Point 2 (SP/SM), N~20	114.0 106.0	8.0	110.0	108.0 129.7	885.0	Point 2 (SP/SM), N~20	108.0 129.7	0	0.0	0.00		0	0
Point 3 (SP/SM), N~25	106.0 91.0	15.0	98.5	110.5 131.3	2145.8	Point 3 (SP/SM), N~25	110.5 131.3	0.0	0.0	0.00		0	0
Point 4 (SP/SM), N~20	91.0 88.0	3.0	89.5	108.0 129.7	3136.5	Point 4 (SP/SM), N~20	108.0 129.7	0.0	0.0	0.00		0	0
Point 5 (SP/SM), N>40	88.0 62.0	26.0	75.0	141.5 150.0	5138.0	Point 5 (SP/SM), N>40	141.5 150.0	0.0	0.0	0.00		0	0
Point 6 (SP/SM), N~20	62.0 59.0	3.0	60.5	108.0 129.7	7139.5	Point 6 (SP/SM), N~20	108.0 129.7	1.0	59.5	54.00		7506.6	367.1
Point 7 (SP/SM), N>40	59.0 -1.0	60.0	29.0	141.5 150.0	11546.5	Point 7 (SP/SM), N>40	141.5 150.0	60.0	29.0	4353.00		11805.6	259.1

Notes:

1. Groundwater encountered at approximately 120 feet below existing ground surface per Universal Engineering Science (see Attachment).

Compression Index Values

<u>**SM-SC**</u>

D_R	SPT N	a	e_{min}	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.21	0.3	0.87	0.120	0.024
30%	10	0.21	0.3	0.72	0.088	0.018
45%	20	0.21	0.3	0.63	0.069	0.014
50%	25	0.21	0.3	0.60	0.063	0.013
60%	30	0.21	0.3	0.54	0.050	0.010
95%	>40	0.21	0.3	0.33	0.006	0.001

<u>**SP**</u>

D_R	SPT N	a	e_{min}	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.07	0.2	0.91	0.050	0.010
30%	10	0.07	0.2	0.73	0.037	0.007
45%	20	0.07	0.2	0.61	0.029	0.006
50%	25	0.07	0.2	0.58	0.026	0.005
60%	30	0.07	0.2	0.50	0.021	0.004
95%	>40	0.07	0.2	0.24	0.003	0.001

<u>**SP-SM**</u>

D_R	SPT N	a	e_{min}	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.09	0.14	0.81	0.061	0.012
30%	10	0.09	0.14	0.64	0.045	0.009
45%	20	0.09	0.14	0.53	0.035	0.007
50%	25	0.09	0.14	0.50	0.032	0.006
60%	30	0.09	0.14	0.42	0.026	0.005
95%	>40	0.09	0.14	0.18	0.003	0.001

<u>**SC**</u>

D_R	SPT N	a	e_{min} (2)	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.23	0.32	0.56	0.055	0.011
30%	10	0.23	0.32	0.50	0.040	0.008
45%	20	0.23	0.32	0.46	0.032	0.006
50%	25	0.23	0.32	0.45	0.029	0.006
60%	30	0.23	0.32	0.42	0.023	0.005
95%	>40	0.23	0.32	0.33	0.003	0.001

Compression Index Values

SM

D_R	SPT N	a	e_{min}	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.15	0.32	0.49	0.026	0.005
30%	10	0.15	0.32	0.45	0.019	0.004
45%	20	0.15	0.32	0.42	0.015	0.003
50%	25	0.15	0.32	0.41	0.014	0.003
60%	30	0.15	0.32	0.39	0.011	0.002
95%	>40	0.15	0.32	0.33	0.001	0.000

SW

D_R	SPT N	a	e_{min}	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.09	0.4	0.97	0.051	0.010
30%	10	0.09	0.4	0.82	0.038	0.008
45%	20	0.09	0.4	0.73	0.030	0.006
50%	25	0.09	0.4	0.70	0.027	0.005
60%	30	0.09	0.4	0.64	0.022	0.004
95%	>40	0.09	0.4	0.43	0.003	0.001

ML

D_R	SPT N	a	e_{min}	e_o (1)	C_c	$C_s = 1/5\ C_c$
5%	5	0.29	0.4	1.07	0.193	0.039
30%	10	0.29	0.4	0.89	0.142	0.028
45%	20	0.29	0.4	0.788	0.113	0.023
50%	25	0.29	0.4	0.75	0.102	0.020
60%	30	0.29	0.4	0.68	0.081	0.016
95%	>40	0.29	0.4	0.435	0.010	0.002

Notes:

1) e_o = initial void ratio use equation: $$D_R = \frac{e_{max} - e_o}{e_{max} - e_{min}} \times 100$$

Estimated Soil Properties

SPT N values 5		
Soil Type	SP/SM	Silty Sand and Gravel
Relative Density (D_R)	0.05	Target Relative Density
Dry Unit Weight, min. ($\gamma_{min.}$)	89	pcf
Dry Unit Weight, max. ($\gamma_{max.}$)	146	pcf
Dry Unit Weight (γ_d)	90.6	pcf
Relative Density (D_R)	0.05	Computed Relative Density
Void Ratio, max. ($e_{max.}$)	0.85	
Void Ratio, min. ($e_{min.}$)	0.14	
Void Ratio, initial (e_o)	0.81	
Relative Density (D_R)	0.05	Computed Relative Density
Degree of Saturation	1	Pore space fully saturated @ D_R
Specific Gravity of Soil	2.65	
Unit Weight of Water (γ_w)	62.4	pcf
Saturated Unit Weight (γ_{sat})	119.14	pcf

SPT N values 10		
Soil Type	SP/SM	Silty Sand and Gravel
Relative Density (D_R)	0.3	Target Relative Density
Dry Unit Weight, min. ($\gamma_{min.}$)	89	pcf
Dry Unit Weight, max. ($\gamma_{max.}$	146	pcf
Dry Unit Weight (γ_d)	101	pcf
Relative Density (D_R)	0.30	Computed Relative Density
Void Ratio, max. ($e_{max.}$)	0.85	
Void Ratio, min. ($e_{min.}$)	0.14	
Void Ratio, initial (e_o)	0.64	
Relative Density (D_R)	0.30	Computed Relative Density
Degree of Saturation	1	Pore space fully saturated @ D_R
Specific Gravity of Soil	2.65	
Unit Weight of Water (γ_w)	62.4	pcf
Saturated Unit Weight (γ_{sat})	125.18	pcf

SPT N values 20		
Soil Type	SP/SM	Silty Sand and Gravel
Relative Density (D_R)	0.45	Target Relative Density
Dry Unit Weight, min. ($\gamma_{min.}$)	89	pcf
Dry Unit Weight, max. ($\gamma_{max.}$	146	pcf
Dry Unit Weight (γ_d)	108	pcf
Relative Density (D_R)	0.45	Computed Relative Density
Void Ratio, max. ($e_{max.}$)	0.85	
Void Ratio, min. ($e_{min.}$)	0.14	
Void Ratio, initial (e_o)	0.53	
Relative Density (D_R)	0.45	Computed Relative Density
Degree of Saturation	1	Pore space fully saturated @ D_R
Specific Gravity of Soil	2.65	
Unit Weight of Water (γ_w)	62.4	pcf
Saturated Unit Weight (γ_{sat})	129.69	pcf

SPT N values 25		
Soil Type	SP/SM	Silty Sand and Gravel
Relative Density (D_R)	0.50	Target Relative Density
Dry Unit Weight, min. ($\gamma_{min.}$)	89	pcf
Dry Unit Weight, max. ($\gamma_{max.}$)	146	pcf
Dry Unit Weight (γ_d)	110.5	pcf
Relative Density (D_R)	0.50	Computed Relative Density
Void Ratio, max. ($e_{max.}$)	0.85	
Void Ratio, min. ($e_{min.}$)	0.14	
Void Ratio, initial (e_o)	0.50	
Relative Density (D_R)	0.50	Computed Relative Density
Degree of Saturation	1	Pore space fully saturated @ D_R
Specific Gravity of Soil	2.65	
Unit Weight of Water (γ_w)	62.4	pcf
Saturated Unit Weight (γ_{sat})	131.27	pcf

SPT N values 30		
Soil Type	SP/SM	Silty Sand and Gravel
Relative Density (D_R)	0.6	Target Relative Density
Dry Unit Weight, min. ($\gamma_{min.}$)	89	pcf
Dry Unit Weight, max. ($\gamma_{max.}$	146	pcf
Dry Unit Weight (γ_d)	116	pcf
Relative Density (D_R)	0.60	Computed Relative Density
Void Ratio, max. ($e_{max.}$)	0.85	
Void Ratio, min. ($e_{min.}$)	0.14	
Void Ratio, initial (e_o)	0.42	
Relative Density (D_R)	0.60	Computed Relative Density
Degree of Saturation	1	Pore space fully saturated @ D_R
Specific Gravity of Soil	2.65	
Unit Weight of Water (γ_w)	62.4	pcf
Saturated Unit Weight (γ_{sat})	134.70	pcf

SPT N values greater than 40		
Soil Type	SP/SM	Silty Sand and Gravel
Relative Density (D_R)	0.95	Target Relative Density
Dry Unit Weight, min. ($\gamma_{min.}$)	89	pcf
Dry Unit Weight, max. ($\gamma_{max.}$	146	pcf
Dry Unit Weight (γ_d)	141.5	pcf
Relative Density (D_R)	0.95	Computed Relative Density
Void Ratio, max. ($e_{max.}$)	0.85	
Void Ratio, min. ($e_{min.}$)	0.14	
Void Ratio, initial (e_o)	0.18	
Relative Density (D_R)	0.95	Computed Relative Density
Degree of Saturation	1	Pore space fully saturated @ D_R
Specific Gravity of Soil	2.65	
Unit Weight of Water (γ_w)	62.4	pcf
Saturated Unit Weight (γ_{sat})	150.03	pcf

Estimated Soil Properties

SPT N values 5			
Soil Type	SC	Clayey Sand	
Relative Density (D_R)	0.05	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	105	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$)	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	105.8	pcf	
Relative Density (D_R)	0.05	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.57		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.56		
Relative Density (D_R)	0.05	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	128.48	pcf	

SPT N values 10			
Soil Type	SC	Clayey Sand	
Relative Density (D_R)	0.3	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	105	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$)	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	110.3	pcf	
Relative Density (D_R)	0.30	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.57		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.50		
Relative Density (D_R)	0.30	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	131.27	pcf	

SPT N values 20			
Soil Type	SC	Clayey Sand	
Relative Density (D_R)	0.45	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	105	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	113.2	pcf	
Relative Density (D_R)	0.45	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.57		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.46		
Relative Density (D_R)	0.45	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	133.07	pcf	

SPT N values 25			
Soil Type	SC	Clayey Sand	
Relative Density (D_R)	0.50	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	105	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$)	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	114.2	pcf	
Relative Density (D_R)	0.50	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.57		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.45		
Relative Density (D_R)	0.50	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	133.62	pcf	

SPT N values 30			
Soil Type	SC	Clayey Sand	
Relative Density (D_R)	0.6	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	105	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$)	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	116.2	pcf	
Relative Density (D_R)	0.60	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.57		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.42		
Relative Density (D_R)	0.60	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	134.91	pcf	

SPT N values greater than 40			
Soil Type	SC	Clayey Sand	
Relative Density (D_R)	0.95	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	105	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	123.8	pcf	
Relative Density (D_R)	0.95	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.57		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.33		
Relative Density (D_R)	0.95	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	139.64	pcf	

Estimated Soil Properties

SPT N values 5			
Soil Type	SM	Silty Sands	
Relative Density (D_R)	0.05	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	110	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$)	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	110.6	pcf	
Relative Density (D_R)	0.05	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.5		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.49		
Relative Density (D_R)	0.05	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	131.45	pcf	

SPT N values 10			
Soil Type	SM	Silty Sands	
Relative Density (D_R)	0.3	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	110	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$)	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	114.1	pcf	
Relative Density (D_R)	0.30	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.5		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.45		
Relative Density (D_R)	0.30	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	133.62	pcf	

SPT N values 20			
Soil Type	SM	Silty Sands	
Relative Density (D_R)	0.45	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	110	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	116.3	pcf	
Relative Density (D_R)	0.45	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.5		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.42		
Relative Density (D_R)	0.45	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	134.96	pcf	

SPT N values 25			
Soil Type	SM	Silty Sands	
Relative Density (D_R)	0.50	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	110	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$)	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	117	pcf	
Relative Density (D_R)	0.50	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.5		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.41		
Relative Density (D_R)	0.50	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	135.42	pcf	

SPT N values 30			
Soil Type	SM	Silty Sands	
Relative Density (D_R)	0.6	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	110	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$)	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	118.5	pcf	
Relative Density (D_R)	0.60	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.5		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.39		
Relative Density (D_R)	0.60	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	136.37	pcf	

SPT N values greater than 40			
Soil Type	SM	Silty Sands	
Relative Density (D_R)	0.95	Target Relative Density	
Dry Unit Weight, min. ($\gamma_{min.}$)	110	pcf	From Lindberg Ref. Manual
Dry Unit Weight, max. ($\gamma_{max.}$	125	pcf	From Lindberg Ref. Manual
Dry Unit Weight (γ_d)	124.2	pcf	
Relative Density (D_R)	0.95	Computed Relative Density	
Void Ratio, max. ($e_{max.}$)	0.5		From Lindberg Ref. Manual
Void Ratio, min. ($e_{min.}$)	0.32		From Lindberg Ref. Manual
Void Ratio, initial (e_o)	0.33		
Relative Density (D_R)	0.95	Computed Relative Density	
Degree of Saturation	1	Pore space fully saturated @ D_R	
Specific Gravity of Soil	2.65		
Unit Weight of Water (γ_w)	62.4	pcf	
Saturated Unit Weight (γ_{sat})	139.87	pcf	

ATTACHMENT 1

SETTLEMENT CALCULATIONS PROCEDURES

SCS ENGINEERS

SHEET 1 of 4

CLIENT	PROJECT	JOB NO.
Citrus County	Phase 3 Expansion	09207049.02

SUBJECT	BY	DATE
Settlement Calculations Procedure	DHB	10/23/2008
	CHECKED DB	DATE 12/5/08

Settlement Calcs

Reference:
Universal Geotechnical Report (Nov. 15, 2001)

1) Soil Properties

A) The subsurface conditions were investigated using ten borings advanced to depths of 30 to 120 feet, while performing the Standard Penetration Test. Ground surface was encountered at approximately 120 feet below existing ground surface. The soil profile in the subject area consists of loose to medium dense tan to brown fine SAND from surface grade to a depth of approximtaly 20 to 25 feet below surface grade, where a 1 to 15 feet of medium dense orange and gray clayey SAND is present. Beneath this layer there typically lies a medium dense to very dense orange to tan or white fine SAND to the maximum boring depth of 120 feet. Lenses of gray and orange slightly clayey SAND were encountered from 50 to 60 feet below grade.

B) SPT blow counts vary from ~1 to >80. Therefore, each layer has a different relative density and unit weight.

C) To estimate unit weights of soils use SPT blow counts to estimate D_R (Relative Density) of soils, then based on D_R estimate e (void ratio), S (degree of saturation) and compute γ (unit weights).

D) Using approximate relationship between blow counts and relative density representative values were selected to cover the range of SPT N values recorded in the field.

SPT N~Values	Relative Density
5	5%
10	30%
20	45%
25	50%
30	60%
>40	95%

Reference:
Principal of Geotechnical Engr. Das (1985)

SCS ENGINEERS			
SHEET 2 of 4			
CLIENT Citrus County	PROJECT Phase 3 Expansion	JOB NO. 09207049.02	
SUBJECT Settlement Calculations Procedure	BY DHB	DATE 10/23/2008	
	CHECKED DB	DATE 12/5/08	

Settlement Calcs Continued

Reference:
Lambe Whitman 1969 Chapter 3
B.K. Hough Table 5.1

E) Estimate Min. & Max. Soil Properties

For Silty Sands (SM/SC)

Void Ratio		Porosity (%)		Dry Unit Weight (pcf)	
e_{max}	e_{min}	n_{max}	n_{min}	$\gamma_{d\ min}$	$\gamma_{d\ max}$
0.90	0.30	47	23	87	127

For Fine Sand to Course Sand (SP)

Void Ratio		Porosity (%)		Dry Unit Weight (pcf)	
e_{max}	e_{min}	n_{max}	n_{min}	$\gamma_{d\ min}$	$\gamma_{d\ max}$
0.95	0.20	49	17	85	138

For Silty Sand and Gravel (SP/SM)

Void Ratio		Porosity (%)		Dry Unit Weight (pcf)	
e_{max}	e_{min}	n_{max}	n_{min}	$\gamma_{d\ min}$	$\gamma_{d\ max}$
0.85	0.14	46	12	89	146

F) For Relative density and soil properties in 1E) Estimate unit weights

EX.: SPT N = 10, D_R = 30% (SM/SC)

$\gamma_{d\ min}$	$\gamma_{d\ max}$
87	127

Reference:
Lambe Whitman Chapter 3

$\boxed{\gamma_d = 96 \text{ pcf}}$

$D_R = (\gamma_{d\ max} / \gamma_d) \times [(\gamma_d - \gamma_{d\ min})/(\gamma_{d\ max} - \gamma_{d\ min})]$

$D_R = (127 / \gamma_d) \times [(\gamma_d - 87)/(127 - 87)]$

$D_R = 0.30$

G) Estimate Insity Void Ratio

$D_R = (e_{max} - e) / (e_{max} - e_{min})$ Eq. 3.1 Lambe Whitman

EX.: SPT N = 10, D_R = 30% (SM/SC)

$D_R = (e_{max} - e) / (e_{max} - e_{min})$

$0.30 = (0.90 - e) / (0.90 - 0.30)$

$\boxed{e = 0.72}$

SCS ENGINEERS			
SHEET 3 of 4			
CLIENT Citrus County	PROJECT Phase 3 Expansion	JOB NO. 09207049.02	
SUBJECT Settlement Calculations Procedure		BY DHB	DATE 10/23/2008
		CHECKED DB	DATE 12/5/08

Settlement Calcs

Reference:
Lambe Whitman Chapter 3

H) Estiamte Saturated Soil Weight

$\gamma_T = [(G + Se) / (1 + e)]\ \gamma_w$

where,

G = specific gravity of solids, $G = 2.65$

S = degree of saturation = 1 or 100% saturated

e = void ratio

γ_w = unit weight of water, $\gamma_w = 62.4$ pcf

$\gamma_T = [(G + Se) / (1 + e)]\ \gamma_w$

$\gamma_T = [(2.65 + 1*0.72) / (1 + 0.72)] * 62.4$

$\gamma_T = 122.26$ pcf

2) Estimate consolidation (Settlement Properties)

Reference:
Basics of Soil Engr. B. K. Hough 1957 Ch. 5
Equation 5.7

$C_c = a\,(e_o - b)$

where,

C_c = compression index

e_o = initial void

a = coefficient table 5.1 (Bases of Soil Engineering Hough)

b = coefficient table 5.1 (Bases of Soil Engineering Hough) or e_{min} whenever e_{min} is known.

See compression index values

3) Estimate settlement in each soil layer based upon soil type and relative density and estimate properties.

Use the following equation to estimate settlement.

$\Delta H = [(C_c H) / (1 + e_o)] \log [(P_o + \Delta P) / P_o]$

where,

ΔH = change in soil strata (ft)

H = soil thickness (ft)

e_o = initial void ratio

P_o = initial effective pressure (psf) stress

ΔP = change in pressure (psf)

SCS ENGINEERS

SHEET 4 of 4

CLIENT	PROJECT	JOB NO.
Citrus County	Phase 3 Expansion	09207049.02

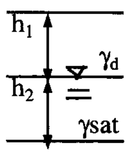
SUBJECT	BY	DATE
Settlement Calculations Procedure	DHB	10/23/2008
	CHECKED	DATE
	JB	12/5/08

Settlement Calcs

σ' = effective stress = σ - u

The effective stress, σ', is the portion of the total stress that will be supported through grain contact.
The stresses in a soil element at a depth z, include the weight above that depth and the buoyant force u, exterted by the water.
Total stress (σ at a point in a soil mass is the sume of pore water pressure u, and effective stress)

σ' = effective stress = γ_d (h_1) + (γ_{sat} - γ_w) (h_2)



Normally consolidated soils (final stress greater than initial stress).
$S = [(C_c H) / (1 + e_o)] \log [(P_o + \Delta P) / P_o]$

C_c = use estimated compression index values, see spreadsheet
H = height of soil strata ,use boring logs
e_o = estimated void ratio at relative density or lab test
P_o = initial stress estimated by computing soil properties from relative densities or lab test
ΔP = change in stress due to excavation and placement of waste over the site
(stress = density waste x height)

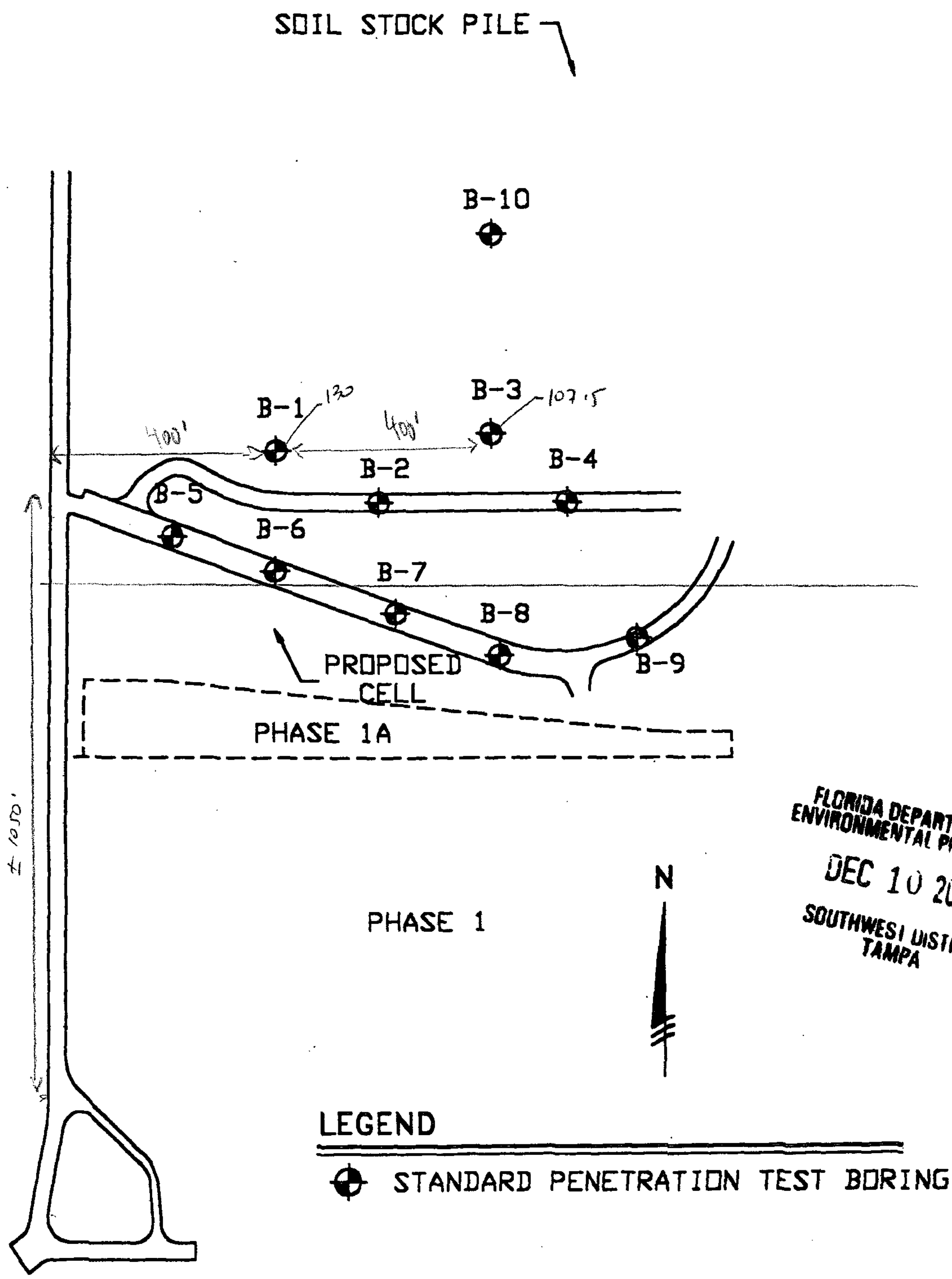
Soil swell (final stress than initial stress)
$S = [(C_s H) / (1 + e_o)] \log [(P_o + \Delta P) / P_o]$

$C_s = 1/5\ C_c$

C_s = Swell Index (if final stress is less than initial stress soils will swell to adjust to new stress conditions).

ATTACHMENT 2

REFERENCE MATERIALS



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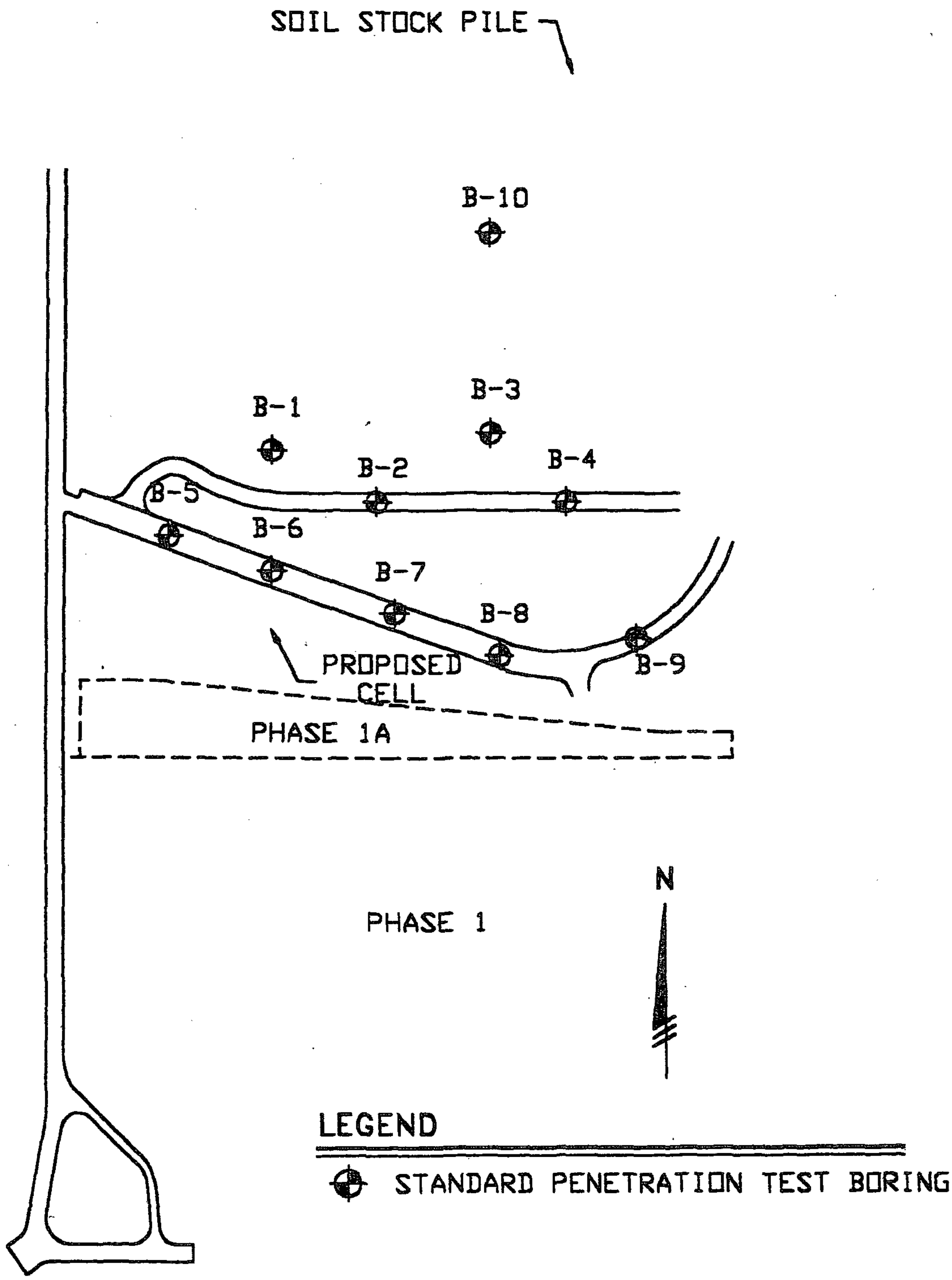
CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING LOCATION PLAN

DRAWN BY:	DATE: 11/16/01	CHECKED BY: ES	DATE: 11/19/01
SCALE: NTS	ORDER NO: 26081-001	REPORT NO: 21607	PAGE NO: B - 1

26081



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26081

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KEY TO BORING LOGS

SYMBOLS

22	Number of Blows of a 140-lb Weight Falling 30 In. Required to Drive Standard Spoon One Foot
WOR	Weight of Drill Rods
S	Thin-Wall Shelby Tube Undisturbed Sampler Used
90% Rec.	Percent Core Recovery from Rock Core-Drilling Operations
	Sample Taken at this Level
	Sample Not Taken at this Level
	Change in Soil Strata
	Free Ground Water Level
	Seasonal High Ground Water Level

UNIFIED CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than 50% retained on No. 200 sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes No. 200 sieve*	SILTS AND CLAYS Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	*Organic silts and organic silty clays of low plasticity*
	SILTS AND CLAYS Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays or high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

* Based on the material pasing the 3-in. (75-mm) sieve.

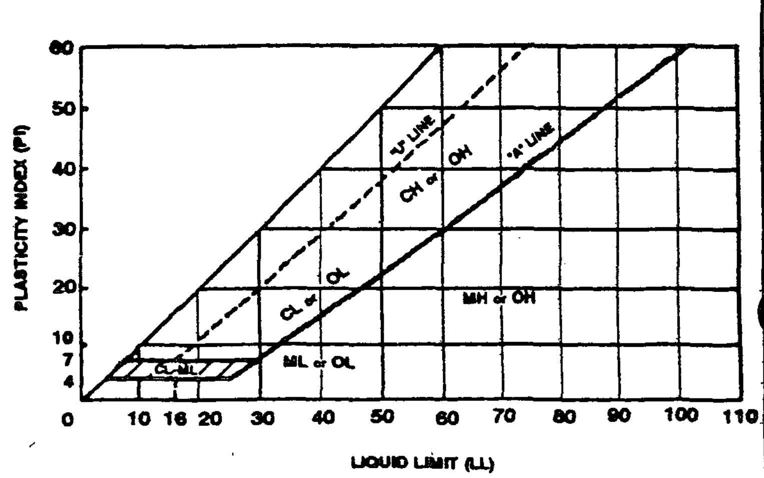
RELATIVE DENSITY
(sand-silt)

Very Loose - Less Than 4 Blows/Ft.
Loose - 4 - 10 Blows/Ft.
Medium - 10 to 30 Blows/Ft.
Dense - 30 to 50 Blows/Ft.
Very Dense - More Than 50 Blows/Ft.

CONSISTENCY
(clay)

Very Soft - Less Than 2 Blows/Ft.
Soft - 2 to 4 Blows/Ft.
Medium - 4 to 8 Blows/Ft.
Stiff - 8 to 15 Blows/Ft.
Very Stiff - 15 to 30 Blows/Ft.
Hard - More Than 30 Blows/Ft.

PLASTICITY CHART



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S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: B-1 SHEET: 1 of 2
SECTION: TOWNSHIP: RANGE:

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft):
WATER TABLE (ft): NE
DATE OF READING: 10/31/01
EST. WSWT (ft):

DATE STARTED: 10/31/01
DATE FINISHED: 10/31/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING: ASTMD-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. (%)
119 0						Loose orange to tan fine SAND [SP/SM] SP/SM N~5						
	X	5-2-2	4									
	X	1-2-2	4			Woodchips & clay						
5												
113						Asphalt, rock, trace of phosphate & brown sand SP/SM, N>40						
	X	5-13-20	33									
10												
107						Loose to medium dense brown fine SAND [SP]						
	X	7-4-4	8				4					
15						SP, N~10						
	X	4-5-6	11									
20						SP, N~20						
	X	4-5-10	15									
94 25						Medium dense brown fine SAND [SP] SP, N~20						
	X	3-6-8	14									
30												
88						Dense orange fine SAND [SP/SM] SP/SM, N>40						
	X	12-18-24	42									
35												
81						Medium dense orange CLAYEY SAND [SC]						
	X	13-11-12	23				20					
40						SC, N~25						
76						Medium dense orange fine SAND [SP/SM]						
	X	5-7-8	15									
74 45												
	X	10-15-18	33									
50												
	X	9-13-14	27									
55												
62						Very dense orange to tan fine SAND [SM]						
	X	22-29-30	59									
60												

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SECTION: TOWNSHIP: RANGE:

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. (%)
60						Very dense tan to orange fine SAND [SM] (Continued)						
65	X	17-30-40	70			SM, N>40						
70	X	15-32-34	66									
75	X	50 for 4"	50+									
0	X	50 for 3"	50+				17					
85	X	50 for 3"	50+									
90	X	50 for 4"	50+			Boring terminated at 90'						

DLCL

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SECTION: TOWNSHIP: RANGE:

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft):
WATER TABLE (ft): NE
DATE OF READING: 10/29/01
EST. WSWT (ft):

DATE STARTED: 10/29/01
DATE FINISHED: 10/29/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING: ASTMD-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. (%)
113 0						Orange SAND						
	X	2-2-2	4			Loose to medium dense gray & orange very CLAYEY SAND [SC]						
108 5	X	2-2-5	7			SC, N~10	35		34	17		
10	X	5-10-12	22			SC, N~20						
15	X	5-5-10	15			Medium dense gray CLAYEY SAND [SC] SC, N~20						
20	X	2-5-5	10									
89 25	X	4-7-10	17			Medium dense light gray SAND [SP/SM] SP/SM, N~20	10					
84 30	X	5-10-13	23			Medium dense tan SAND [SM] SM, N~25						
79 35	X	6-12-18	30			Dense light gray SAND [SP/SM] SP/SM, N~30						
40	X	5-13-16	29									
69 45	X	5-16-23	39			Dense tan SAND [SP/SM] tan SAND SP/SM, N>40						
63 50	X	10-22-26	48									
55	X	6-9-12	21			SP/SM, N~20						
53 60	X	11-15-18	33			SP/SM, N~30						

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SECTION: TOWNSHIP: RANGE:

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. (%)
60						Dense tan SAND (Continued)						
65												
70												
						Very dense tan to white fine SAND [SP/SM]						
75												
80						Boring terminated at 80'						

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SECTION: TOWNSHIP: RANGE:

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft):
WATER TABLE (ft): 115.0
DATE OF READING:
EST. WSWT (ft):

DATE STARTED: 10/30/01
DATE FINISHED: 10/30/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING: ASTMD-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. (%)
119 0						Very loose to loose orange fine SAND [SP/SM]						
	X	1-2-1	3			SP/SM, N~5						
114 5	X	1-1-2	3				9					
						SP/SM, N~20						
10	X	8-8-10	18									
106						Medium dense tan to yellow SAND [SP/SM]						
15	X	7-7-7	14			SP/SM, N~25						
20	X	5-10-12	22				8					
25	X	8-8-18	26									
91						Medium dense tan SAND [SP/SM] SP/SM, N~20						
30	X	7-7-9	16									
88						Medium dense tan fine SAND [SP/SM]						
35	X	9-12-15	27			SP/SM, N>40						
40	X	13-22-24	46									
45	X	11-17-22	39				8					
50	X	12-14-18	32									
55	X	12-13-17	30									
62						Medium dense to dense white SAND [SP/SM] SP/SM, N~20						
59 60	X	6-7-8	15			SP/SM, N>40						
65	X	12-16-20	36									

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SECTION: TOWNSHIP: RANGE:

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. (%)
65						Medium dense to dense white SAND [SP/SM] (Continued)						
70	X	11-18-22	40				10					
75	X	16-16-16	32									
80	X	20-24-31	55									
85	X	12-20-25	45									
90	X	18-18-26	44			SP/SM, N>40						
95	X	15-19-32	51									
100	X	18-22-32	54									
105	X	20-25-35	60									
110	X	22-29-35	64									
4 115	X	22-30-36	66	▼								
4 120	X	20-30-39	69									
						Boring terminated at 120'						

DLCL

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CLIENT: SCS ENGINEERS

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

BORING DESIGNATION: B-5 SHEET: 1 of 2

SECTION: TOWNSHIP: RANGE:

GS ELEVATION(ft): DATE STARTED: 10/29/01

WATER TABLE (ft): DATE FINISHED: 10/30/01

DATE OF READING: DRILLED BY: J. STILLSON

EST. WSWT (ft): TYPE OF SAMPLING:

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. (%)
118 0						Brown SAND						
		12-15-10	25			Limerock base						
						Medium dense brown to tan SAND [SP/SM]						
5		3-8-14	22			SP/SM N~25						
10		8-10-14	24			Medium dense dark brown silty SAND [SP/SM] SP/SM, N~25	7					
105												
15		2-2-3	5			Loose tan fine SAND [SP/SM] SP/SM, N~5						
100 20		3-5-7	12			Loose orange very CLAYEY SAND [SC] SC, N~20	33		31	25		
25		3-6-7	13									
						Loose orange fine CLAYEY SAND [SC] SC, N~20	17					
94 30		4-5-6	11			Medium tan fine SAND [SP/SM] SP/SM, N~20						
35		6-6-6	12									
40		4-6-10	16			Medium dense tan to white fine SAND [SP/SM]						
45		6-8-9	17			SP/SM, N~20						
50		5-6-9	15									
55		5-6-8	14									
60												
60		5-6-6	12			Medium dense gray CLAYEY SAND [SC] SC, N~20						

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BORING DESIGNATION: B-5
SECTION:
TOWNSHIP:
SHEET: 2 of 2
RANGE:

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. (%)
60						Medium dense gray CLAYEY SAND [SC] (Continued)						
						Medium dense gray & orange CLAYEY SAND [SC]						
65	X	5-6-10	16									
70	X	6-6-8	14									
46						Medium dense tan to white fine SAND [SM]						
75	X	8-11-11	22				15					
						SM, N>40						
80	X	10-12-12	24									
85	X	12-16-20	36									
28 90	X	13-23-26	49									
						Boring terminated at 90'						

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BORING DESIGNATION: **B-7** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft):
WATER TABLE (ft): NE
DATE OF READING: 11/02/01
EST. WSWT (ft):

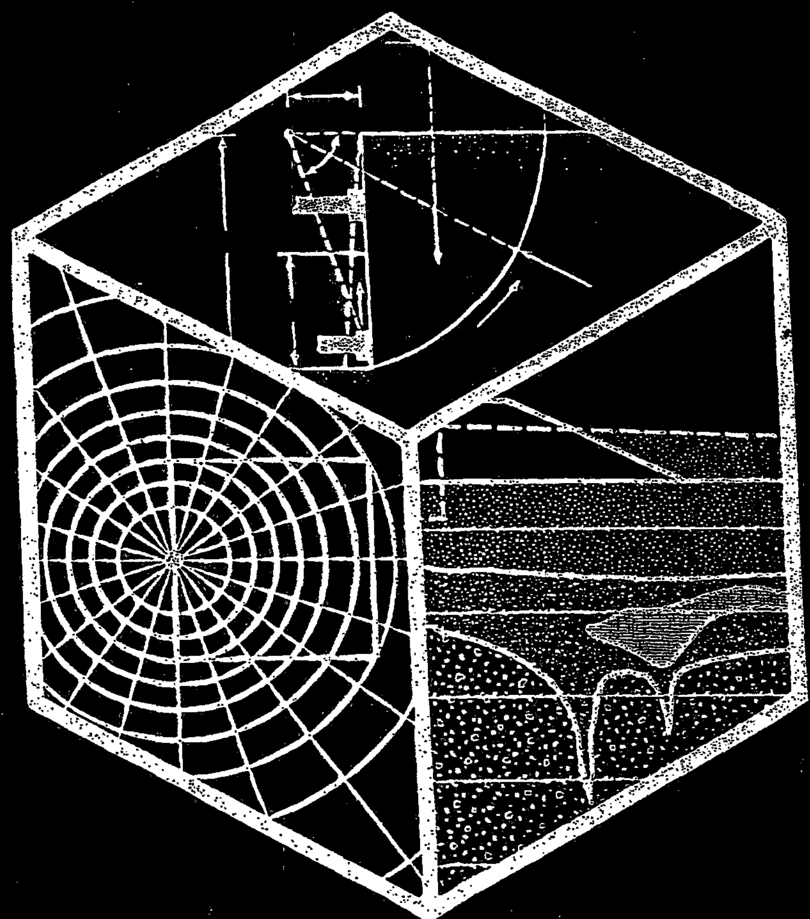
DATE STARTED: 11/2/01
DATE FINISHED: 11/2/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING: ASTMD-1586

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. (%)
82 0						Loose to medium dense tan to yellow fine SAND [SP/SM]						
	X	2-3-4	7									
77 5	X	4-4-5	9			SP/SM, N~10						
						SP/SM, N~25						
72 10	X	5-12-12	24									
						SP/SM, N~20						
67 15	X	7-8-12	20				8					
20	X	8-15-33	48			SP/SM, N>40						
25	X	10-30-40	70									
30	X	9-20-25	45									
35	X	50 for 3"	50+									
						Very dense orange SAND [SP/SM]						
40	X	50 for 3"	50+									
45	X	22-26-39	65				8					
50	X	18-26-28	54									
27 55	X	15-35-45	80									
						Boring terminated at 55'						

DLC1

Principles of Geotechnical Engineering

BRAJA M. DAS



SOURCE: B. DAS "PRINCIPLES OF GEOTECH. ENGINEERING" 1985

Table 13.2 Approximate Correlation of Standard Penetration Number and Consistency of Clay

Standard penetration number, N	Consistency	Unconfined compression strength, q_u (ton/ft^2)
0		0
	Very soft	
2		0.25
	Soft	
4		0.5
	Medium stiff	
8		1
	Stiff	
16		2
	Very stiff	
32		4
>32	Hard	>4

Note: 1 ton/ft^2 = 95.76 kN/m^2

BLOW COUNT VS STIFFNESS (CLAYS)

overburden pressure (and hence higher lateral confining pressure) at depth h_2 will contribute to a higher value of the standard penetration number. This fact has clearly been demonstrated by Gibbs and Holtz (1957). The results of their findings are shown in Figure 13.10. As an example, one can see that at D_r = 80%, the standard penetration number is about 12 with $\sigma' = 0$ lb/ft^2. It increases to about 50 with $\sigma' = 40$ lb/in.^{2} (276 kN/m^2). For that reason, it is necessary to convert the standard penetration numbers obtained at various depths to reflect a constant effective overburden pressure. Peck, Hanson, and Thornburn (1974) proposed the following empirical correlation for converting the field standard penetration number to an effective overburden pressure of $\sigma' = 1$ ton/ft^2 (95.6 kN/m^2).

$$N' = C_N N_F = 0.77 N_F \log\left(\frac{20}{\sigma'}\right) \qquad (\text{for } \sigma' > 0.25 \text{ ton/ft}^2) \tag{13.6}$$

where

N' = corrected standard penetration number
N_F = field standard penetration number
C_N = correction factor

The unit of σ' is in ton/ft^2.

In SI units, the preceding equation can be expressed as

$$N' = 0.77 N_F \log\left(\frac{20}{0.0105\,\sigma'}\right) \qquad (\text{for } \sigma' > 23.9 \text{ kN/m}^2) \tag{13.7}$$

The unit of σ' in Eq. (13.7) is in kN/m^2.

2

Source: B. Das
"Principle of Geotech. Engineering" 1985

Table 13.3 Approximate Relation Between Corrected Standard Penetration Number, Angle of Friction, and Relative Density of Sand

Corrected standard penetration number, N	Relative density, D_r (%)	Angle of friction, ϕ (degrees)
0–5	0–5	26–30
5–10	5–30	28–35
10–30	30–60	35–42
30–50	60–95	38–46

Blow counts vs Relative Density (DR) Sands

The standard penetration number is a very useful guideline in soil exploration and assessment of subsoil conditions, provided that the results are interpreted correctly. Note that all equations and correlations relating to the standard penetration numbers are approximate. Since soil is not homogeneous, a wide variation in the N-value may be obtained in the field. In soil deposits

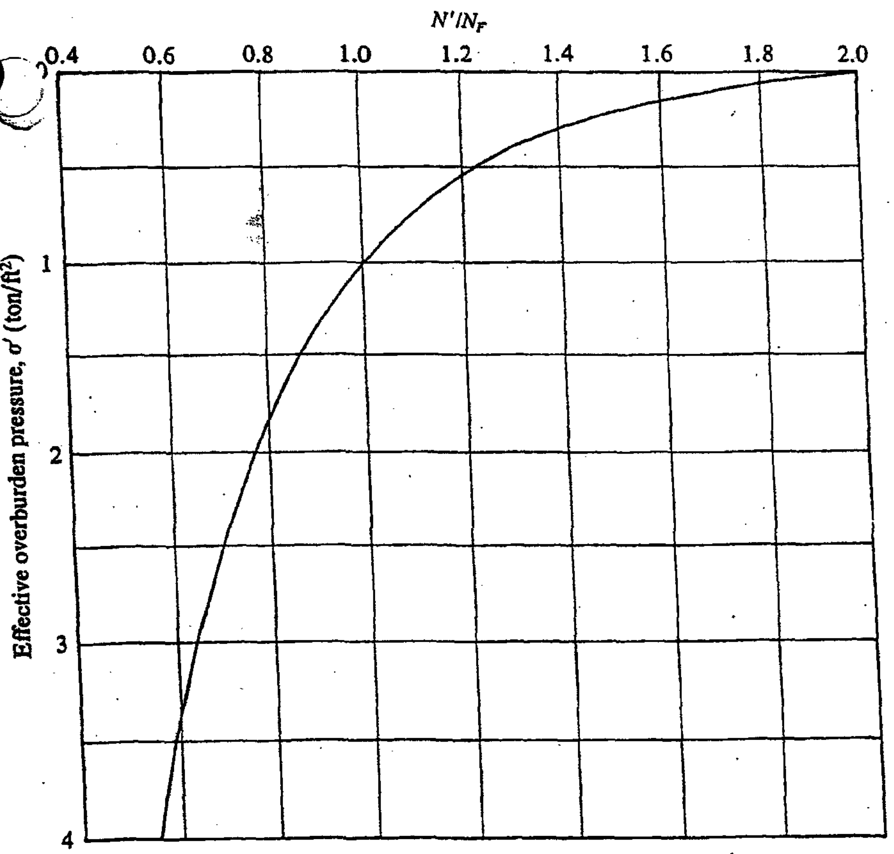


Figure 13.11 Variation of N'/N_F with vertical effective stress, σ' (after Peck, Hanson, and Thornburn, 1974)

Soil Mechanics

T. William Lambe • Robert V. Whitman

Massachusetts Institute of Technology

1969

JOHN WILEY & SONS, New York • Chichester • Brisbane • Toronto • Singapore

Source: T. Lambe R. Whitman "Soil Mechanics" 1969

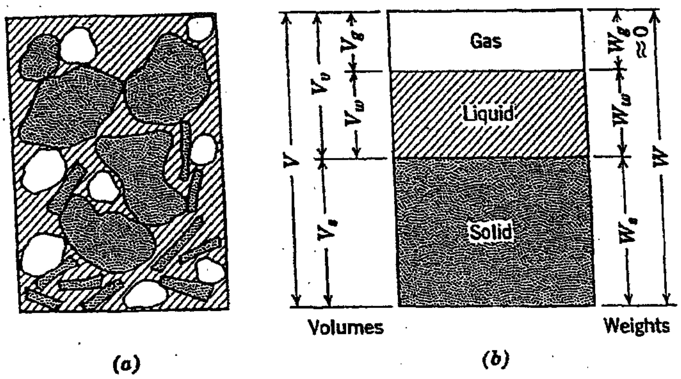


Fig. 3.1 Relationships among soil phases. (*a*) Element of natural soil. (*b*) Element separated into phases.

Volume

Porosity:

$$n = \frac{V_v}{V} \times 100 = \%$$

Void ratio:

$$e = \frac{V_v}{V_s}$$

Degree of saturation:

$$S = \frac{V_w}{V_v} \times 100 = \%$$

$$n = \frac{e}{1+e}; \quad e = \frac{n}{1-n}$$

Weight

Water content:

$$w = \frac{W_w}{W_s} \times 100 = \%$$

Specific Gravity

Mass:

$$G_m = \frac{\gamma_t}{\gamma_0}$$

Water:

$$G_w = \frac{\gamma_w}{\gamma_0}$$

Solids:

$$G = \frac{\gamma_s}{\gamma_0}$$

γ_0 = Unit weight of water at 4°C $\approx \gamma_w$

Note that $Gw = Se$ $\quad Se = \frac{V_w}{V_v} \cdot \frac{V_v}{V_s} = \frac{V_w}{V_s}$

$$G w = \frac{\gamma_s}{\gamma_0} \cdot \frac{W_w}{W_s} = \frac{W_w}{\gamma_0} \cdot \left(\frac{1}{\frac{W_s}{\gamma_s}} \right) = \frac{V_w}{V_s}$$

Unit Weight

Total:

$$\gamma_t = \frac{W}{V} = \frac{G + Se}{1+e}\gamma_w = \frac{1+w}{1+e} G\gamma_w$$

Solids:

$$\gamma_s = \frac{W_s}{V_s}$$

Water:

$$\gamma_w = \frac{W_w}{V_w}$$

Dry:

$$\gamma_d = \frac{W_s}{V} = \frac{G}{1+e}\gamma_w = \frac{G\gamma_w}{1 + wG/S} = \frac{\gamma_t}{1+w}$$

Submerged (buoyant): "effective"

$$\gamma_b = \gamma_t - \gamma_w = \frac{G - 1 - e(1-S)}{1+e}\gamma_w$$

Submerged (saturated soil):

$$\gamma_b = \gamma_t - \gamma_w = \frac{G-1}{1+e}\gamma_w$$

Specific gravity is the unit weight divided by the unit weight of water. Values of specific gravity of solids G for a selected group of minerals[3] are given in Table 3.1.

Table 3.1 Specific Gravities of Minerals

Quartz	2.65
K-Feldspars	2.54–2.57
Na–Ca-Feldspars	2.62–2.76
Calcite	2.72
Dolomite	2.85
Muscovite	2.7–3.1
Biotite	2.8–3.2
Chlorite	2.6–2.9
Pyrophyllite	2.84
Serpentine	2.2–2.7
Kaolinite	2.61[a]
	2.64 ± 0.02
Halloysite (2 H_2O)	2.55
Illite	2.84[a]
	2.60–2.86
Montmorillonite	2.74[a]
	2.75–2.78
Attapulgite	2.30

[a] Calculated from crystal structure.

The expression $Gw = Se$ is useful to check computations of the various relationships.

The student in soil mechanics must understand the meanings of the relationships in Fig. 3.1, convince himself once and for all that they are correct, and add these terms to his active vocabulary. These relationships are basic to most computations in soil mechanics and thus are an essential part of soil mechanics.

Typical Values of Phase Relationships for Granular Soils

Figure 3.2 shows two of the many possible ways tha a system of equal-sized spheres can be packed. The dens packings represent the densest possible state for such system. Looser systems than the simple cubic packir can be obtained by carefully constructing arches with the packing, but the simple cubic packing is the loosest the stable arrangements. The void ratio and porosity

[3] Chapter 4 discusses the common soil minerals.

Source: T. Lambe R. Whitman "Soil Mechanics" Fig

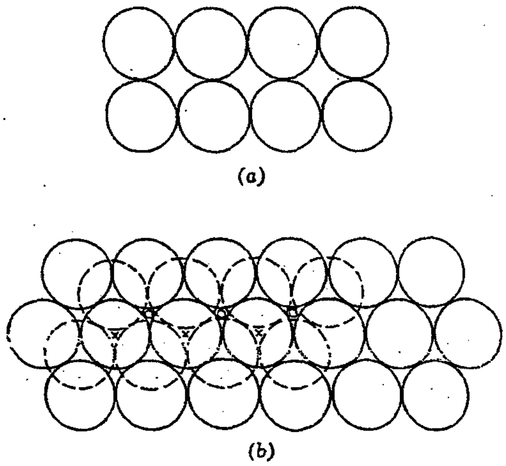


Fig. 3.2 Arrangements of uniform spheres. (*a*) Plan and elevation view: simple cubic packing. (*b*) Plan view: dense packing. Solid circles, first layer; dashed circles, second layer; ∘, location of sphere centers in third layer: face-centered cubic array; ×, location of sphere centers in third layer: close-packed hexagonal array. (From Deresiewicz, 1958.)

these simple packings can be computed from the geometry of the packings, and the results are given in Table 3.2.

This table also gives densities for some typical granular soils in both the "dense" and "loose" states. A variety of tests have been proposed to measure the maximum and minimum void ratios (Kolbuszewski, 1948). The test to determine the maximum density usually involves some form of vibration. The test to determine minimum density usually involves pouring oven-dried soil into a container. Unfortunately, the details of these tests have not been entirely standardized, and values of the maximum density and minimum density for a given granular soil depend on the procedure used to determine them. By using special measures, one can obtain densities greater than the so-called maximum density. Densities considerably less than the so-called minimum density can be obtained, especially with very fine sands and silts, by slowly sedimenting the soil into water or by fluffing the soil with just a little moisture present.

Table 3.2 Maximum and Minimum Densities for Granular Soils

Description	Void Ratio		Porosity (%)		Dry Unit Weight (pcf)	
	e_{max}	e_{min}	n_{max}	n_{min}	$\gamma_{d\,min}$	$\gamma_{d\,max}$
Uniform spheres	0.92	0.35	47.6	26.0	—	—
Standard Ottawa sand	0.80	0.50	44	33	92	110
SW Clean uniform sand	1.0	0.40	50	29	83	118
ML Uniform inorganic silt	1.1	0.40	52	29	80	118
M/SC Silty sand	0.90	0.30	47	23	87	127
SP Fine to coarse sand	0.95	0.20	49	17	85	138
Micaceous sand	1.2	0.40	55	29	76	120
?/SM Silty sand and gravel	0.85	0.14	46	12	89	146

B. K. Hough, *Basic Soils Engineering*. Copyright © 1957, The Ronald Press Company, New York.

The smaller the range of particle sizes present (i.e., the more nearly uniform the soil), the smaller the particles, and the more angular the particles, the smaller the minimum density (i.e., the greater the opportunity for building a loose arrangement of particles). The greater the range of particle sizes present, the greater the maximum density (i.e., the voids among the larger particles can be filled with smaller particles).

A useful way to characterize the density of a natural granular soil is with *relative density* D_r, defined as

$$D_r = \frac{e_{max} - e}{e_{max} - e_{min}} \times 100\%$$
$$= \frac{\gamma_{d\,max}}{\gamma_d} \times \frac{\gamma_d - \gamma_{d\,min}}{\gamma_{d\,max} - \gamma_{d\,min}} \times 100\% \qquad (3.1)$$

where

e_{min} = void ratio of soil in densest condition
e_{max} = void ratio of soil in loosest condition
e = in-place void ratio
$\gamma_{d\,max}$ = dry unit weight of soil in densest condition
$\gamma_{d\,min}$ = dry unit weight of soil in loosest condition
γ_d = in-place dry unit weight

Table 3.3 characterizes the density of granular soils on the basis of relative density.

Table 3.3 Density Description

Relative Density (%)	Descriptive Term
0–15	Very loose
15–35	Loose
35–65	Medium
65–85	Dense
85–100	Very dense

moisture

$\omega = \frac{M_s}{M_w}$

Values of water content for natural granular soils vary from less than 0.1% for air-dry sands to more than 40% for saturated, loose sand.

Typical Values of Phase Relationships for Cohesive Soils

The range of values of phase relationships for cohesive soils is much larger than for granular soils. Saturated sodium montmorillonite at low confining pressure can exist at a void ratio of more than 25; saturated clays

Table 35.10 Typical Values of Optimum Moisture Content and Suggested Relative Compactions (based on standard Proctor test)

class group symbol	description	range of maximum dry densities (lbm/ft³)	range of optimum moisture content (%)	recommended percentage of Proctor maximum (%) class[a] 1	2	3
GW	well-graded, clean gravels, gravel-sand mixtures	125–135	11–8	97	94	90
GP	poorly graded clean gravels, gravel-sand mixtures	115–125	14–11	97	94	90
GM	silty gravels, poorly graded gravel-sand silt	120–135	12–8	98	94	90
GC	clayey gravels, poorly graded gravel-sand-clay	115–130	14–9	98	94	90
SW	well-graded clean sands, gravelly sands	110–130	16–9	97	95	91
SP	poorly graded clean sands, sand-gravel mix	100–120	21–12	98	95	91
SM	silty sands, poorly graded sand-silt mix	110–125	16–11	98	95	91
SM-SC	sand-silt-clay mix with slightly plastic fines	110–130	15–11	99	96	92
SC	clayey sands, poorly graded sand-clay mix	105–125	19–11	99	96	92
ML	inorganic silts and clayey silts	95–120	24–12	100	96	92
ML-CL	mixture of organic silt and clay	100–120	22–12	100	96	92
CL	inorganic clays of low-to-medium plasticity	95–120	24–12	100	96	92
OL	organic silts and silt-clays, low plasticity	80–100	33–21	–	96	93
MH	inorganic clayey silts, elastic silts	70–95	40–24	–	97	93
CH	inorganic clays of high plasticity	75–105	36–19	–	–	93
OH	organic and silty clays	65–100	45–21	–	97	93

(Multiply lbm/ft³ by 16.02 to obtain kg/m³.)

[a]Class 1 uses include the upper 9 ft (2.7 m) of fills supporting one- and two-story buildings, the upper 3 ft (0.9 m) of subgrade under pavements, and the upper 1 ft (0.3 m) of subgrade under floors. Class 2 uses include deeper parts of fills under buildings and pavements as well as earth dams. All other fills requiring some degree of strength or incompressibility are classified as class 3.

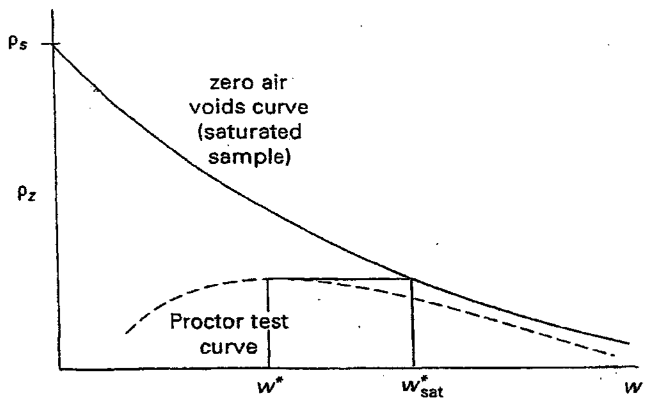


Figure 35.7 Typical Zero Air Voids Curve

The *zero air voids density* (i.e., *dry unit weight at zero air voids*) is the ratio of the mass of the solids to the total volume if the sample is fully compacted (i.e., there is no air in the voids).

$$\rho_z = \frac{m_s}{V_w + V_s} \qquad 35.20$$

The theoretical dry density of the zero air voids curve is calculated from Eq. 35.21.

$$\rho_z = \frac{\rho_w}{w + \frac{1}{\text{SG}}} \qquad 35.21$$

The maximum value of the zero air voids density occu at $w = 0$. At that point, the maximum zero air voi density is equal to the density of the solid itself (calculated from the solid specific gravity).

$$\rho_s = (\text{SG})\rho_w \qquad 35.$$

ρ_s and ρ_d^* are not the same, however, since air voi exist in the ρ_d^* case and ρ_d^* occurs at w^*.

Example 35.5

A Proctor test using a 1/30 ft³ (0.9443 L) mold is p formed on a sample of soil.

test no.	sample net mass (lbm)	(kg)	water content (%)
1	4.28	1.941	7.3
2	4.52	2.050	9.7
3	4.60	2.087	11.0
4	4.55	2.064	12.8
5	4.50	2.041	14.4

If 0.032 ft³ (0.00091 m³) of compacted soil tested construction site had a mass of 3.87 lbm (1.755 kg) and 3.74 lbm (1.696 kg) dry, what is the percentag compaction?

Reference: Lindeburg

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BASIC SOILS ENGINEERING

B. K. HOUGH

SECOND EDITION

References for Settlement

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...ions, the slope of the recompression diagram gives a more realistic ...dication of the compressibility of the formation than the slope of the ...rgin curve. One would then represent in the diagram the anticipated ...d increment Δp and establish the prospective change in void ratio ...the difference between the values of e_1 and e_2. For these conditions, ...e change in thickness of a compressible soil layer would be calculated ...substitution of these values in Eq. (5–4).

...-14. LIMITATIONS OF COMPRESSION TESTING

In order to evaluate the compression index of soil in the manner de...ribed above, suitable specimens must be obtained or prepared and ...e or more laboratory compression tests must be conducted. In most ...ses, undisturbed specimens are considered necessary. Because of the ...mitations of present-day sampling equipment, however, especially the ...uipment in the hands of most contract drillers, it is for all practical ...rposes *impossible to obtain* undisturbed samples except in stone-free ...ay and silt formations. Testing equipment is at present also similarly ...mited to use with these particular soil types. Thus there remains the ...oblem of establishing the compression index or some similar parameter ...r mixed soils containing significant amounts of gravel or stone frag...ents as well as clay or silt, and for cohesionless formations in general. ...here has been some tendency in the past to dismiss this problem with ...e assertion that the last-mentioned soil types are relatively incompres...ble. While this is true in certain cases (as with hardpan or dense ...nd and gravel formations), there are many occasions when the problem ...nnot be thus dismissed. The fact is that *all* particulate materials ...e compressible to some degree. Some fine-grained cohesionless soil ...rmations, especially those containing significant amounts of mica or ...ganic matter, for example, are considerably more compressible than ...rtain clays while many others are at least equally compressible. Fur...ermore, with unusual combinations of loading and settlement limita...ons,[12] the compressibility of even the most compact sand and gravel ...rmation or compacted fill may become a matter of practical ...portance.

Perhaps the most important consideration, however, is that what is ...own as the *allowable bearing capacity* of soil formations for support ...spread foundations is directly related to soil compressibility. Evalu...ion of bearing capacity, which is an essential preliminary step in the ...sign of spread foundations (footings in particular), cannot be accomplished except by the most empirical procedures, unless ...pressibility of the bearing materials is known at least approximately; this is true whether the soil happens to be stoney or stone-free.

An alternative to use of data from conventional compression tests for evaluating the compression index is therefore an evident necessity in many cases. Even with stone-free, cohesive materials, some alternative is often desirable since there are many occasions when preliminary settlement estimates or bearing capacity evaluations must be made before laboratory testing programs can be completed or even initiated. The following section deals with one such alternative.

Compression Index as a Function of Initial Density

5–15. SUPPORTING EVIDENCE AND DEVELOPMENT OF RELATIONSHIP

Virgin compression curves and typical C_c values for specimens of many different types of soil are presented in Fig. 5–11. Some of the specimens were undisturbed (U); some remolded (R). Examination of the converging pattern of these curves clearly indicates that, in a general way, compressibility varies with initial void ratio; the looser the specimen initially, the more compressible it is over any given loading range, and vice versa.

The nature of the relationship between the compression index, C_c, and no-load void ratio, e_0, for certain types of material can be established by conducting tests on remolded specimens prepared at densities which vary over a significant range. It is then possible to plot C_c as a function of e_0. In Fig. 5–12, curves plotted on this basis for remolded specimens of four different types of sand are presented. For each individual type and within the range of densities characteristic of the type, the relationship appears to be approximately linear. When this is true, the relationship may be expressed by the equation

$$C_c = a(e_0 - b) \tag{5–7}$$

In Eq. (5–7), the terms C_c and e_0 are the dependent variables, the terms a and b constants for a particular soil type. From presently available information it appears that the term a, which represents the slope of a given diagram, is dependent chiefly on particle shape, size, and gradation. The term b, the value of the intercept on the X-axis, is apparently a close approximation of the minimum void ratio of the material. Values of a and b for the sand specimens represented in Fig. 5–12 are given in the figure and values for other materials are given in a later section.

[12] See *Jour. Soil Mech. & Fdns. Div.*, ASCE, April 1960, discussion by Lev ...tlin of paper by K. Hough, "*Compressibility as the Basis for Soil Bearing* ...alue."

values ... and 0.270, respectively; a curve plotted on this basis is included in Fig. 5-12 for comparative purposes.

Values of the constants a and b of Eq. (5-7) obtained from tests on laboratory prepared specimens of many different soil types, including those described above, are summarized in Table 5-1. The values given

TABLE 5-1

Values of the Constants of Equation (5-7) for Typical Materials

	Type of Soil	Value of Constant a		Value of Constant b*	
	Uniform cohesionless material ($C_u \leq 2$)				
	Clean gravel	0.05		0.50	
	Coarse sand	0.06		0.50	
SP	Medium sand	0.07		0.50	
	Fine sand	0.08		0.50	
	Inorganic silt	0.10		0.50	
	Well-graded, cohesionless soil				
SI/SM	Silty sand and gravel	0.09		0.20	
	Clean, coarse to fine sand	0.12		0.35	
SM	Coarse to fine silty sand	0.15		0.25	
SC	Sandy silt (inorganic)	~~0.18~~	0.23 / 0.2	0.25	SM/SC
	Inorganic, cohesive soil				
CL	Silt, some clay; silty clay; clay	0.29		0.27	
	Organic, fine-grained soil				
	Organic silt, little clay	0.35		0.50	

* The value of the constant b should be taken as e_{min} whenever the latter is known or can conveniently be determined. Otherwise, use tabulated values as a rough approximation.

for materials such as sand and gravel, which are too coarse for testing in consolidometers of conventional size, represent assumptions based on study of available settlement records.

5-16. GENERALIZATIONS AS TO COMPRESSIBILITY

Before describing procedures for utilizing Eq. (5-7) for evaluation of the compression index in practical applications, it may be instructive to consider certain general aspects of compressibility which are evident from the discussion which has thus far been presented. These generalities may be stated in the following manner.

At a given void ratio, a (confined) *uniform* material is less compressible than one which is well graded.

C...ing (confined) uniform materials at a given void ratio, the fine... particle size, the more compressible is the material.

Soils in general with bulky, angular, or rounded particles are less compressible than those with flat particles.

Clays with needle-shaped particles, such as attapulgite (and to a lesser degree, halloysite), are less compressible than those with plate-shaped particles, montmorillonite (plate-shaped particles plus expanding lattice) in particular.

Materials of any given type which include significant amounts of mica and/or organic matter are more (sometimes considerably more) compressible than those of the same type which do not.

As an overall generalization, the greater its void ratio prior to loading, the greater is the compressibility of any given soil type; and vice versa.[15]

5-17. INITIAL DENSITY OF SOIL FORMATIONS

It is evident that information on the original, "no-load" void ratio of a formation must be available if the C_c, e_n relationship is to be used directly for estimating soil compressibility. A rather general impression apparently exists to the effect that sedimentary formations, at least, are laid down initially in a condition approximating their maximum void ratio. Skempton's work suggests that this is true in the case of fine-grained sedimentary formations, clay in particular. Coupled with this belief is the assumption that the present, in-place condition of such formations is entirely the result of loading subsequent to deposition. If these assumptions could be completely accepted, the value e_{max} could be substituted for e_n in Eq. (5-7) and application of the equation would be greatly simplified.

Unfortunately, there are many reasons for doubting the general ap...cability of such assumptions as the above. For example, in a texturally uniform deposit of fine-grained sand or silt, if these assumptions were valid, the void ratio of the material would steadily decrease with depth and at any given depth would have the same value at points which laterally are some distance apart. The finding of such a condition in a natural formation, however, is very much more the exception than the rule. In many cases, void ratio varies quite unpredictably both laterally and with depth. Most surprising to the layman, perhaps, is the finding that void ratio often *increases* with depth, loose sand layers being found beneath more compact surface layers and soft clay intervals underlying stiff clay.

The construction of compression diagrams based on use of the C_c, e_n relationship in the manner described in the next section is often helpful

[15] This, of course, is the justification for the expenditure of ...siderable sums of money to compact both ear... fills and natural soil formations ... to loading.

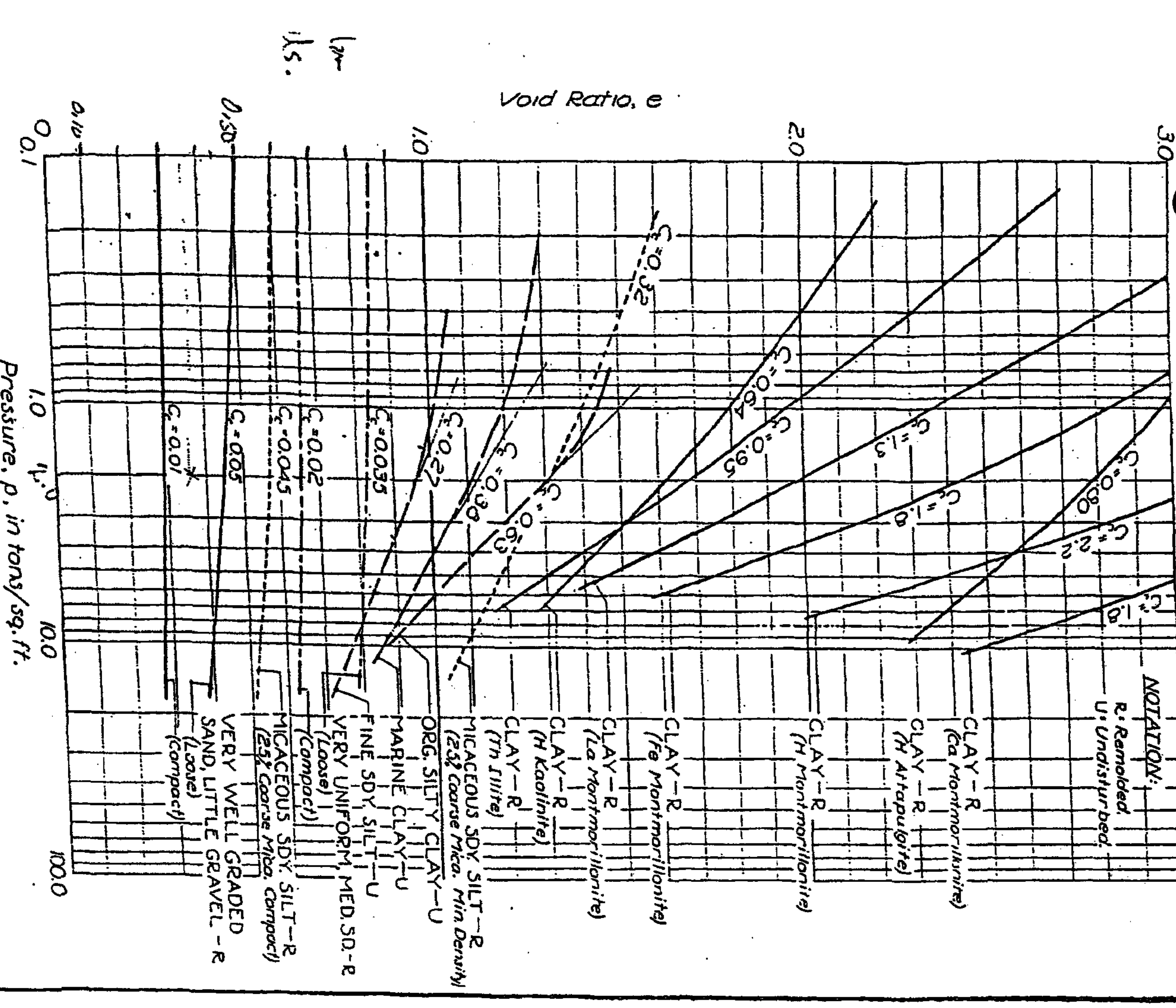

Fig. 5-11. Variation in slope of p-e curves with initial void ratio.

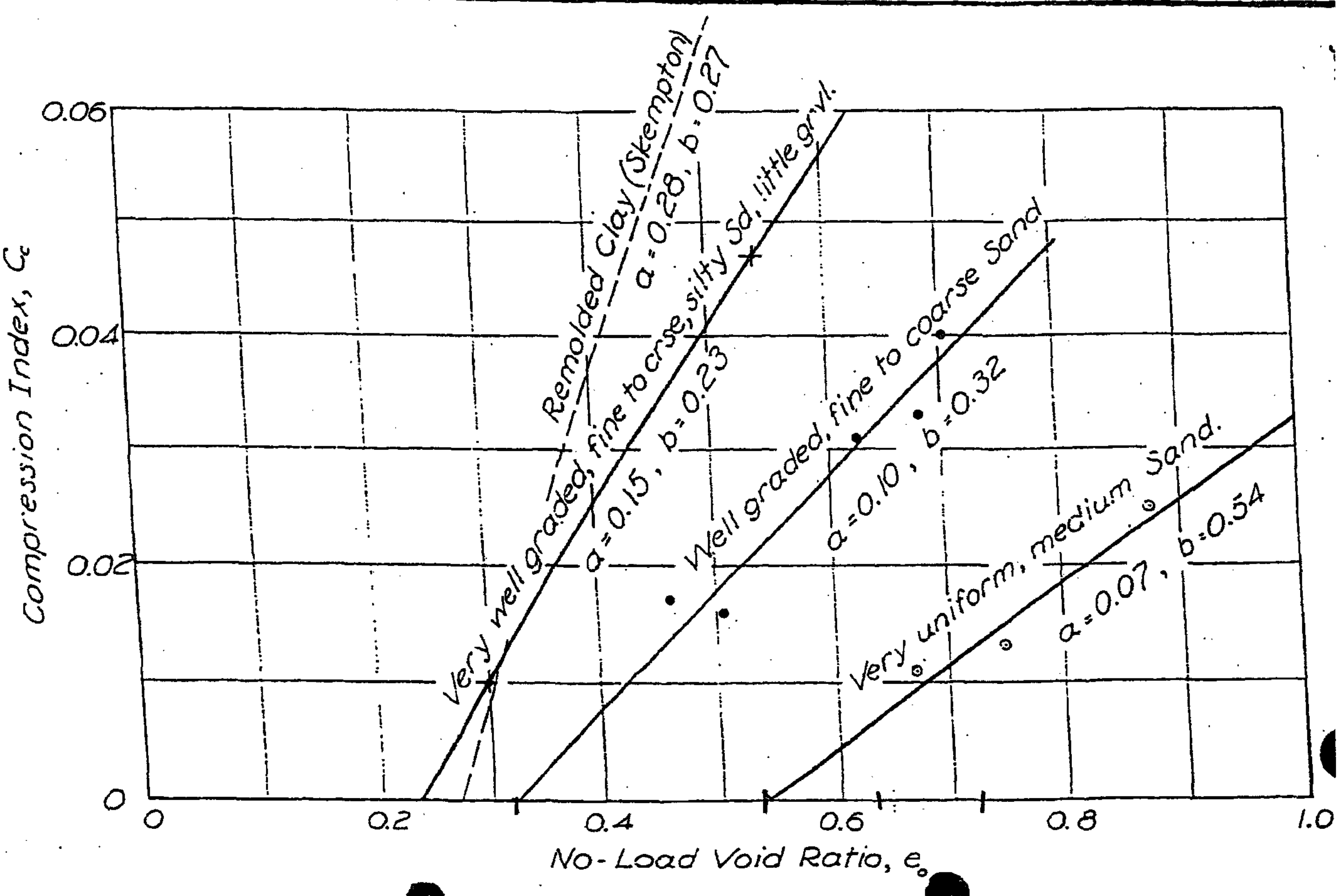

Fig. 5-12. Variation of C_c with no-load void ratio, e_o.

ield Compression Diagrams

18. DEFINITION

ls the term is used in this book, a field compression diagram is a ssure-void ratio curve originating at or passing through a point which resents the in-place density of an element in a natural soil formation earth fill and the existing overburden pressure.

19. CONSTRUCTION AND UTILIZATION

The recommended construction should be performed on semilog paper h pressure and void ratio scales appropriate to the conditions of the blem. The void ratio scale should cover the range from e_{max} to e_{min} the material in question. For the pressure scale, it is usually sufficient make provision for two logarithmic cycles ranging from 0.1 to 1.0 and n 1.0 to 10.0 tons per sq. ft., respectively.

pressure-void ratio curve originating at $e = e_{max}$ and $p = 0.1$ ton sq. ft. is then constructed as shown in Fig. 5–14, by utilization of relationship,

$$C_c = a(e_{max} - b)$$

clay soils, e_{max} can be taken as the void ratio at the liquid limit. other soil types, an indication of e_{max} can be obtained by reference Table 2–3 or by test on representative material. Although of less ctical importance, it may be of interest to draw a second diagram, ginating at e_{min}. The latter may be assumed to be a horizontal line. he two diagrams described above establish limits on the area within ch a point representing the in-place condition of the soil will fall ept in a very few cases, which are mentioned later. Points A, B, C in Fig. 5–14 represent examples of in-place condition points for nary situations.

a plotting of the in-place void ratio and overburden pressure for il element of any type results in a point such as point A, close he uppermost limiting diagram, it may reasonably be assumed that material was laid down in an approximation of its loosest condition that the subsequent reduction in void ratio was due entirely to ht of present overburden. If the soil is a cohesive type it would

oid ratio and pressure plot at point B, it should be presumed, ... a), that it is precompressed and that the field compression diagram

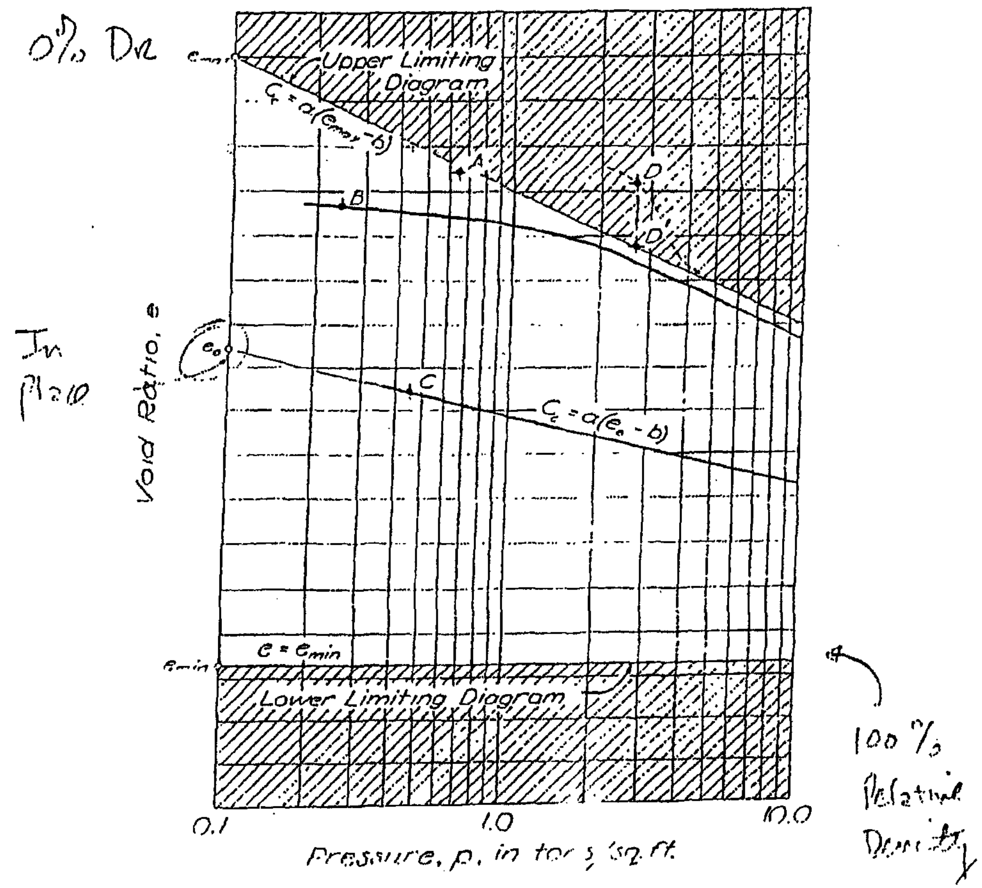

Fig. 5–14. Illustration of procedure for constructing field compression diagrams.

will resemble that shown by the full line diagram through B in Fig. 5–14. This plotting provides a reasonable basis for recommending a program of undisturbed sampling and laboratory testing even though greater than ordinary expense may be involved.

Reference: Braja M. Das
Principles of Geotechnical Engg.
3rd Edition.

The reason for such variation in the e-log p curve is that as time t is increased, the amount of secondary consolidation of the specimen is also increased. This will tend to reduce the void ratio e. Note also that the e-log p curves shown in Figure 8.15 will give slightly different values for the preconsolidation pressure (p_c). The value of p_c will increase with the decrease of t.

The load increment ratio ($\Delta p/p$) also has an influence on the e-log p curves. This was discussed in detail by Leonards and Altschaeffl (1964). Figure 8.16 shows the variation of e with log p for various values of $\Delta p/p$. When $\Delta p/p$ is gradually increased, the e-log p curve gradually moves to the left.

8.7 CALCULATION OF SETTLEMENT FROM ONE-DIMENSIONAL PRIMARY CONSOLIDATION

With the knowledge gained from the analysis of consolidation test results, we can now proceed to calculate the probable settlement caused by primary consolidation in the field, assuming one-dimensional consolidation.

Let us consider a saturated clay layer of thickness H and cross-sectional area A under an existing average effective overburden pressure p_O. Because of an increase of pressure, Δp, let the primary settlement be S. Thus, the change in volume (Figure 8.17) can be given by

$$\Delta V = V_0 - V_1 = HA - (H - S)A = SA \tag{8.14}$$

where V_0 and V_1 are the initial and final volumes, respectively. However, the change in the total volume is equal to the change in the volume of voids, ΔV_v. Thus,

$$\Delta V = SA = V_{v0} - V_{v1} = \Delta V_v \tag{8.15}$$

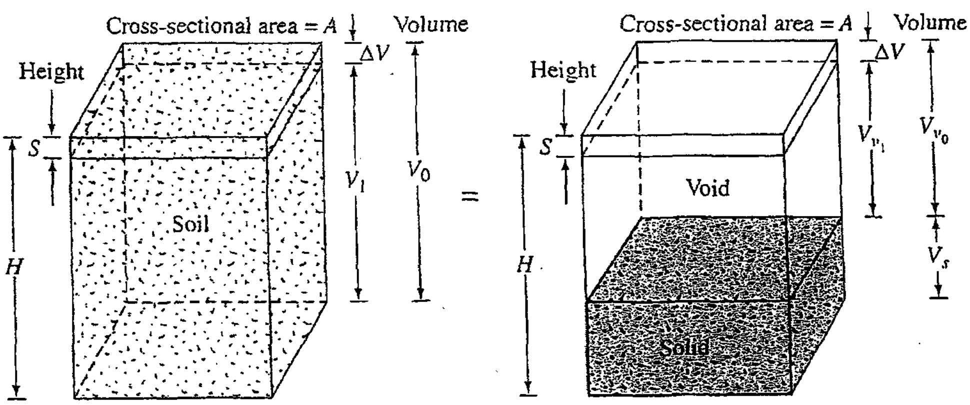

FIGURE 8.17 Settlement caused by one-dimensional consolidation

where V_{v0} and V_{v1} are the initial and final void volumes, respectively. From the definition of void ratio,

$$\Delta V_v = \Delta e V_s \tag{8.16}$$

where Δe = change of void ratio. But

$$V_s = \frac{V_0}{1 + e_O} = \frac{AH}{1 + e_O} \tag{8.17}$$

where e_O = initial void ratio at volume V_0. Thus, from Eqs. (8.14), (8.15), (8.16), and (8.17),

$$\Delta V = SA = \Delta e V_s = \frac{AH}{1 + e_O} \Delta e$$

or

$$S = H \frac{\Delta e}{1 + e_O} \tag{8.18}$$

For normally consolidated clays that exhibit a linear e-log p (Figure 8.12) relationship,

$$\Delta e = C_c[\log (p_O + \Delta p) - \log p_O] \tag{8.19}$$

where C_c = slope of the e-log p plot and is defined as the compression index. Substitution of Eq. (8.19) in Eq. (8.18) gives

$$\boxed{S = \frac{C_c H}{1 + e_O} \log \left(\frac{p_O + \Delta p}{p_O}\right)} \tag{8.20}$$

Normally consolidated soils

For a thicker clay layer, it is more accurate if the layer is divided into a number of sublayers and calculations for settlement are made separately for each sublayer. Thus, the total settlement for the entire layer can be given as

$$S = \sum \left[\frac{C_c H_i}{1 + e_O} \log \left(\frac{p_{O(i)} + \Delta p_{(i)}}{p_{O(i)}}\right)\right]$$

where H_i = thickness of sublayer i
$p_{O(i)}$ = initial average effective overburden pressure for sublayer i
$\Delta p_{(i)}$ = increase of vertical pressure for sublayer i

In overconsolidated clays (Figure 8.13), for $p_O + \Delta p \le p_c$ field e-log p variation will be along the line cb, the slope of which will be approximately equal to that for the laboratory rebound curve. The slope of the rebound curve, C_s, is referred to as the *swell index*, so

$$\Delta e = C_s[\log (p_O + \Delta p) - \log p_O] \tag{8.21}$$

ference: DAS

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From Eqs. (8.18) and (8.21),

$$\boxed{S = \frac{C_s H}{1+e_O}\log\left(\frac{p_O + \Delta p}{p_O}\right)} \tag{8.22}$$

If $p_O + \Delta p > p_c$, then

$$\boxed{S = \frac{C_s H}{1+e_O}\log\frac{p_c}{p_O} + \frac{C_c H}{1+e_O}\log\left(\frac{p_O + \Delta p}{p_c}\right)} \tag{8.23}$$

However, if the e-log p curve is given, it is possible simply to pick Δe off the plot for the appropriate range of pressures. This figure may be substituted into Eq. (8.18) for the calculation of settlement, S.

8.8 COMPRESSION INDEX (C_c)

The compression index for the calculation of field settlement caused by consolidation can be determined by graphic construction (as shown in Figure 8.12) after obtaining laboratory test results for void ratio and pressure.

Terzaghi and Peck (1967) suggested the following empirical expressions for compression index:

For undisturbed clays:

$$\boxed{C_c = 0.009(LL - 10)} \tag{8.24}$$

For remolded clays:

$$C_c = 0.007(LL - 10) \tag{8.25}$$

where LL = liquid limit, in percent.

In the absence of laboratory consolidation data, Eq. (8.24) is often used for an approximate calculation of primary consolidation in the field.

Several other correlations for the compression index are also available now. They have been developed by tests on various clays. Some of these correlations are given in Section E.2 (Appendix E).

Reference: Braja Das
Principles of Geotechnical Engg. 3rd Edition.

ATTACHMENT J-2

SLOPE STABILITY CALCULATIONS

3/4/09

~~March 5~~August 31, 2009
File No. 09207049.02

MEMORANDUM

TO: ~~John A. Banks~~C. Ed Hilton, P.E.

FROM: Dominique H. Bramlett, P.E.

SUBJECT: Slope Stability Analysis

Phase 3 Expansion Area, Citrus County, Florida

PURPOSE

This slope stability analysis was prepared to demonstrate the stability of the sideslopes during the excavation of the Phase 3 Expansion Area and at final buildout.

Excavated slopes mean the internal slopes that are excavated and/or constructed and ready to receive the proposed composite bottom liner system, drainage material, protective cover material, etc.

Final slopes mean the slopes that occur at a landfill when it has reached its final grades and includes the final cap over the waste.

BACKGROUND

The Citrus County Central Landfill site is located on State Route 44 West of Inverness in the southwest quadrant of Citrus County. The existing footprint of the landfill includes Phase 1/1A, and Phase 2. The bottom elevation of the proposed Phase 3 cell is approximately at elevation 48 ft.

The permit application proposes to expand the existing landfill by expanding the existing landfill mound in Phase 2 area to the new disposal cell in Phase 3 area. The expansion area is approximately 6.25 acres.

REVIEW OF GEOTECHNICAL SOIL DATA

Geotechnical Soil Data

The geotechnical soil data used in Phase 2 area was reviewed regarding the assumed soil properties and geotechnical characteristic of the site. The Phase 2 geotechnical investigation and site evaluation prepared by Universal Engineering Sciences, Inc. dated November 15, 2001 was included in the Phase 2 Construction Permit Application.

Groundwater Data

The groundwater data specified in the model for the excavated slope section and final buildout section was taken from the Universal Engineering Sciences' report. The groundwater table is at least 40 feet below the proposed bottom liner system and should not influence slope stability of the waste mass.

SLOPE STABILITY ANALYSIS

Methodology

The slope stability was evaluated using a computer program called PCSTABL. This program uses two-dimensional limit equilibrium methods to calculate a factor of safety (FS) against shear failure for slope sections analyzed. This program is able to use an automatic search routine to generate multiple shear failure surfaces for both circular failures and block or wedge-type failure modes until the surface with the lowest FS-value is found. The analytical methods used for the circular and sliding block failure modes in the slope stability analysis are the Bishop Simplified and Janbu Simplified methods of slices, respectively.

To calculate minimum factor of safety for the site, stability analyses were performed for the west excavated sideslope and the west final buildout sideslope assuming:

- Circular failure surface under static conditions; and
- Block-type failure surface under static conditions.

Selection of Critical Cross-Section

Two critical landfill cross-sections were chosen for the slope stability analysis. The critical sections were selected based on the locations of the slopes with respect to the slope heights and slope lengths that comprise the expansion. One section represents the excavated west side slope and the proposed final west slope section of the Phase 3 Expansion Area. The profiles of these sections are presented in the computer graphical printouts and cadd drawings included in the Attachments (Excavated Slope – West Side and Final Buildout Scenario – West Side) following this memorandum.

Selection of Soil Parameters

The shear strength properties of the materials selected for each section were based on assumed values presented in the soil report and in the previous slope stability report(s). Based on the site-specific conditions and our experience in dealing with these soil/geosynthetic materials, these values are conservative for the purpose of this analysis. A summary of the selected unit weights and shear strength parameters (friction angle and cohesion values) obtained from these previous studies is provided in Table 1.

Table 1. Material Soil Data

Material Group	Unit Weight γ_{moist} (pcf)	Unit Weight γ_{sat} (pcf)	Effective Shear Strength (Peak Values)	
			ϕ (deg.)	c' (psf)
Final Cover	110	120	30	0
Intermediate Cover	110	120	30	0
Municipal Waste	63.5(1), 76.5(2)	80	28	0
Protective Cover	110	115	28	0
Geosynthetic Layer	63	63	~~10~~12	0
Existing Soil (Subbase)	90	100	30	0
Surficial Layer	110	125	32	0
Biaxial Geogrid	63	63	12	0
GCL	63	63	12	0
Geogrid	63	63	12	0

(1) Waste unit weight without recirculation
(2) Assumed recirculation waste unit weight per Selection of Densities for Use in Landfill Design, Tim Townsend, Dated Nov. 8, 2004 (Attachment 9 of Attachment H-3).

SLOPE STABILITY ANALYSIS RESULTS

Excavated Slopes

The slope stability analysis was performed on the excavated 2:1 sideslope to determine whether any of the site-specific conditions considered yielded factors of safety less than 1.5 under static conditions for circular type failure mode.

For this model, the factor of safety for the static analysis for the circular-type failure mode yielded a factor of safety of 1.5. A graph and PCSTABL output files that depicts the most critical failure surface is presented in the Attachments (Excavated Slope – West Side) following this memorandum.

Final Slopes

The analyses were performed on the final slope (3:1) to determine whether any site conditions considered yielded factors of safety less than 1.5 under static condition for both the circular and the block-type failure modes with and without equipment.

The factors of safety for the static analysis are greater than the minimum acceptable value of 1.5. The results are summarized as follows:

Table 2. Final Slope Results

	CIRCULAR (F.S.)	BLOCK (F.S.)
No Equipment	1.9	2.5
CAT 826 G Series II	1.9	2.4
CAT D8R Series II	1.8	2.4

Graphs that depict the most critical failure surface for each scenario are presented in the Attachment (Final Buildout Scenario – West Side) following this memorandum.

CONCLUSIONS

Based on the result of the slope stability analyses, it is concluded that the factors of safety obtained were all greater than the minimum acceptable value of 1.5 under static conditions. Therefore, the existing slope configuration is stable under static conditions.

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Sheet 1 of 1

Client:	Project:	Job No.
Citrus County	Phase 3 Expansion	09207049.02

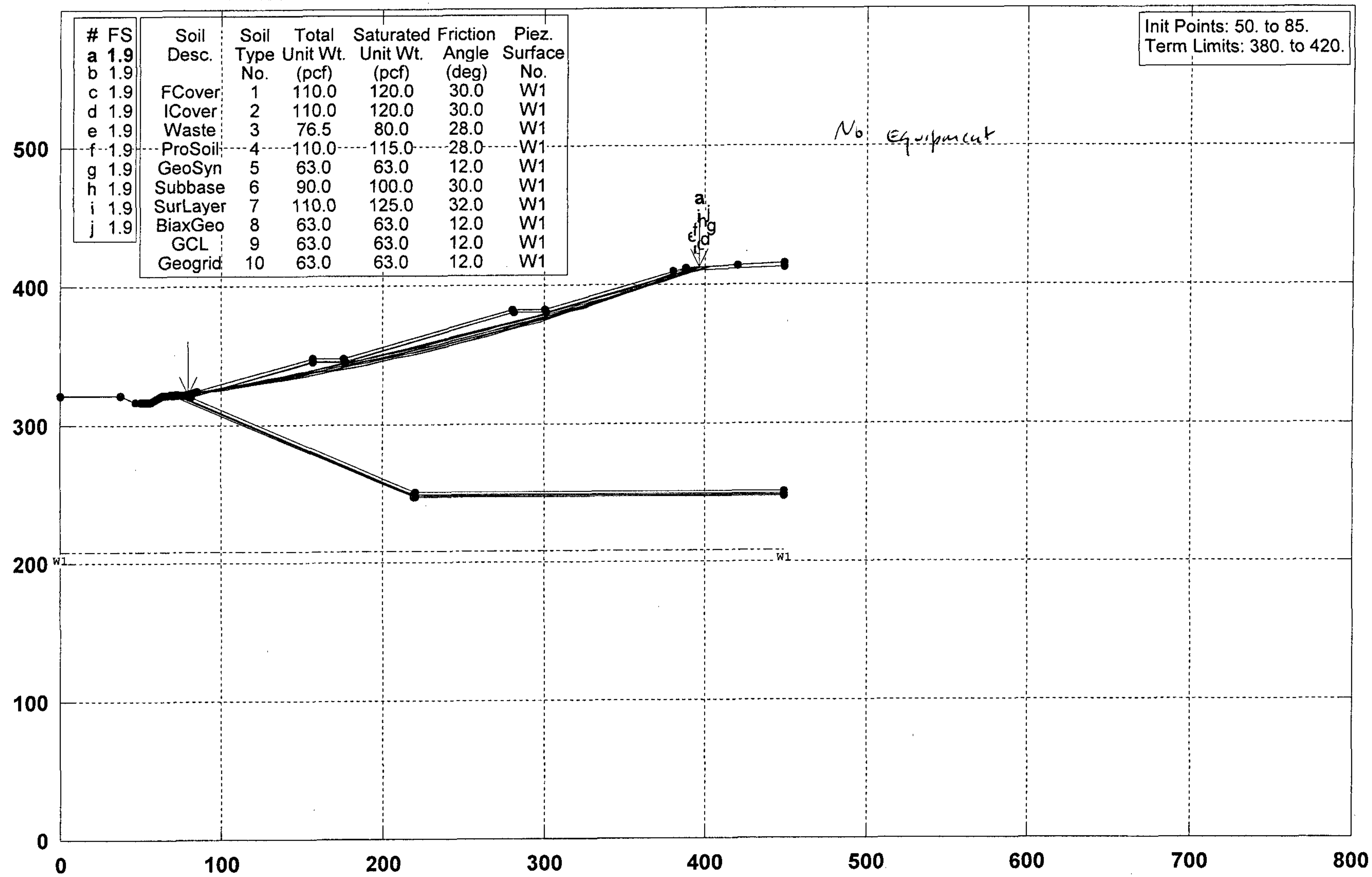
Subject:	By:	Date:
Slope Stability Factor of Safety Summary Results	DHB	8/31/09
	Checked: SAF	Date: 8/31/09

	CIRCULAR MODE FACTOR SAFETY (FS)	BLOCK MODE FACTOR SAFETY (FS)
West Excavated Side Slope		
No Equipment	1.5	
West Side Final Buildout		
No Equipment	1.9	2.5
CAT 826G Series II	1.9	2.4
CAT D8R Series II	1.8	2.4

The slope stability calculations used to derive the Factor of Safety summary results listed in the above table have been reviewed and have been completed in accordance with good engineering practice and industry-accepted values.

Citrus County Phase 3 Expansion West Final Buildout Side Slope

F:\PROJECT\CITRUS\09207049.02\CA32A6~1\WFINAL.PL2 Run By: Dominique H. Bramlett, P.E. 8/31/2009 11:20AM



#	FS
a	**1.9**
b	1.9
c	1.9
d	1.9
e	1.9
f	1.9
g	1.9
h	1.9
i	1.9
j	1.9

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
FCover	1	110.0	120.0	30.0	W1
ICover	2	110.0	120.0	30.0	W1
Waste	3	76.5	80.0	28.0	W1
ProSoil	4	110.0	115.0	28.0	W1
GeoSyn	5	63.0	63.0	12.0	W1
Subbase	6	90.0	100.0	30.0	W1
SurLayer	7	110.0	125.0	32.0	W1
BiaxGeo	8	63.0	63.0	12.0	W1
GCL	9	63.0	63.0	12.0	W1
Geogrid	10	63.0	63.0	12.0	W1

STABL6H FSmin=1.9
Safety Factors Are Calculated By The Modified Bishop Method

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**** STABL6H ****
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 8/31/2009
Time of Run: 11:20AM
Run By: Dominique H. Bramlett, P.E.
Input Data Filename: F:wfinal.
Output Filename: F:wfinal.OUT
Plotted Output Filename: F:wfinal.PLT
PROBLEM DESCRIPTION Citrus County Phase 3 Expansion
West Final Buildout Side Slope

BOUNDARY COORDINATES
15 Top Boundaries
41 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	321.70	37.60	321.70	7
2	37.60	321.70	46.60	316.70	7
3	46.60	316.70	56.20	316.70	7
4	56.20	316.70	63.70	321.70	7
5	63.70	321.70	70.20	321.80	7
6	70.20	321.80	71.30	321.90	8
7	71.30	321.90	72.40	321.90	5
8	72.40	321.90	73.40	321.90	10
9	73.40	321.90	77.70	322.00	4
10	77.70	322.00	155.70	348.00	1
11	155.70	348.00	175.70	348.00	1
12	175.70	348.00	280.00	383.00	1
13	280.00	383.00	300.70	383.00	1
14	300.70	383.00	387.70	412.00	1
15	387.70	412.00	448.80	415.00	1
16	80.30	320.70	156.10	346.00	2
17	156.10	346.00	176.10	346.00	2
18	176.10	346.00	281.10	381.00	2
19	281.10	381.00	301.10	381.00	2
20	301.10	381.00	388.10	410.00	2
21	388.10	410.00	448.80	413.00	2
22	77.70	322.00	80.30	320.70	4
23	80.90	320.40	156.10	345.50	3
24	156.10	345.50	176.10	345.50	3
25	176.10	345.50	281.10	380.50	3
26	281.10	380.50	301.10	380.50	3
27	301.10	380.50	388.20	409.50	3
28	388.20	409.50	448.80	412.50	3
29	80.30	320.70	80.90	320.40	4
30	80.90	320.40	219.70	251.00	4
31	219.70	251.00	448.80	251.00	4
32	73.40	321.90	219.30	249.00	10
33	219.30	249.00	448.80	249.00	5
34	72.40	321.90	219.10	248.50	5
35	219.10	248.50	219.30	249.00	5
36	71.30	321.90	219.00	248.00	8
37	219.00	248.00	448.80	248.00	9
38	219.00	248.00	219.30	247.50	8
39	219.30	247.50	448.80	247.50	8
40	70.20	321.80	219.90	247.00	7
41	219.90	247.00	448.80	247.00	7

ISOTROPIC SOIL PARAMETERS
10 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	1
2	110.0	120.0	.0	30.0	.00	.0	1

3	76.5	80.0	.0	28.0	.00	.0	1
4	110.0	115.0	.0	28.0	.00	.0	1
5	63.0	63.0	.0	12.0	.00	.0	1
6	90.0	100.0	.0	30.0	.00	.0	1
7	110.0	125.0	.0	32.0	.00	.0	1
8	63.0	63.0	.0	12.0	.00	.0	1
9	63.0	63.0	.0	12.0	.00	.0	1
10	63.0	63.0	.0	12.0	.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 No.	X-Water (ft)	Y-Water (ft)
1	.00	208.50
2	448.80	208.50

BOUNDARY LOAD(S)
1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	387.70	398.20	2152.8	.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.
SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
50 Surfaces Initiate From Each Of100 Points Equally Spaced
Along The Ground Surface Between X = 50.00 ft.
and X = 85.00 ft.
Each Surface Terminates Between X = 380.00 ft.
and X = 420.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 ft.
10.00 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 Bishop Method * *
Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.99	322.43
2	88.78	324.46
3	98.56	326.54
4	108.34	328.66
5	118.10	330.82
6	127.85	333.03
7	137.60	335.28
8	147.33	337.58
9	157.05	339.92
10	166.76	342.30
11	176.46	344.73
12	186.16	347.20
13	195.83	349.71
14	205.50	352.26
15	215.16	354.86
16	224.80	357.51
17	234.44	360.19
18	244.06	362.92
19	253.66	365.69
20	263.26	368.51
21	272.84	371.37
22	282.41	374.27
23	291.97	377.21
24	301.51	380.20
25	311.04	383.23
26	320.56	386.30

27	330.06	389.41
28	339.55	392.57
29	349.02	395.77
30	358.48	399.01
31	367.93	402.30
32	377.36	405.62
33	386.78	408.99
34	396.18	412.40
35	396.22	412.42

Circle Center At X = -369.7 ; Y = 2508.5 and Radius, 2231.6

*** 1.900 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	81.82	323.37
2	91.67	325.08
3	101.51	326.85
4	111.34	328.69
5	121.16	330.59
6	130.96	332.56
7	140.76	334.60
8	150.53	336.69
9	160.30	338.86
10	170.05	341.08
11	179.78	343.37
12	189.50	345.73
13	199.20	348.15
14	208.89	350.63
15	218.56	353.18
16	228.21	355.79
17	237.85	358.47
18	247.46	361.21
19	257.06	364.01
20	266.64	366.88
21	276.20	369.81
22	285.75	372.80
23	295.27	375.86
24	304.77	378.98
25	314.25	382.16
26	323.71	385.40
27	333.14	388.71
28	342.56	392.08
29	351.95	395.51
30	361.32	399.01
31	370.67	402.56
32	379.99	406.18
33	389.29	409.86
34	395.56	412.39

Circle Center At X = -171.4 ; Y = 1813.4 and Radius, 1511.4

*** 1.908 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	79.34	322.55
2	89.21	324.19
3	99.06	325.90
4	108.90	327.68
5	118.73	329.52
6	128.55	331.44
7	138.35	333.42
8	148.13	335.47
9	157.91	337.58
10	167.67	339.77
11	177.41	342.02
12	187.14	344.34
13	196.85	346.72
14	206.54	349.18

15	216.22	351.70
16	225.88	354.28
17	235.52	356.94
18	245.14	359.66
19	254.75	362.45
20	264.33	365.30
21	273.90	368.22
22	283.44	371.21
23	292.96	374.26
24	302.46	377.37
25	311.94	380.56
26	321.40	383.81
27	330.84	387.12
28	340.25	390.50
29	349.64	393.94
30	359.00	397.45
31	368.34	401.03
32	377.66	404.66
33	386.95	408.37
34	396.21	412.13
35	396.99	412.46

Circle Center At X = -153.1 ; Y = 1749.8 and Radius, 1446.0

*** 1.909 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	79.34	322.55
2	89.17	324.38
3	99.00	326.27
4	108.81	328.21
5	118.60	330.20
6	128.39	332.25
7	138.17	334.35
8	147.93	336.51
9	157.69	338.72
10	167.43	340.98
11	177.15	343.30
12	186.87	345.67
13	196.57	348.10
14	206.26	350.57
15	215.93	353.11
16	225.59	355.69
17	235.24	358.33
18	244.87	361.02
19	254.48	363.77
20	264.09	366.57
21	273.67	369.42
22	283.24	372.32
23	292.79	375.28
24	302.33	378.29
25	311.85	381.35
26	321.35	384.47
27	330.84	387.63
28	340.30	390.85
29	349.75	394.13
30	359.18	397.45
31	368.60	400.83
32	377.99	404.25
33	387.37	407.73
34	396.72	411.27
35	400.24	412.62

Circle Center At X = -247.4 ; Y = 2103.6 and Radius, 1810.8

*** 1.909 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.05	322.78

2	89.87	324.69
3	99.67	326.65
4	109.47	328.67
5	119.25	330.74
6	129.02	332.87
7	138.78	335.05
8	148.53	337.29
9	158.26	339.58
10	167.98	341.92
11	177.69	344.32
12	187.39	346.77
13	197.07	349.28
14	206.73	351.84
15	216.38	354.46
16	226.02	357.13
17	235.64	359.85
18	245.25	362.62
19	254.84	365.45
20	264.42	368.34
21	273.98	371.27
22	283.52	374.26
23	293.05	377.31
24	302.55	380.40
25	312.04	383.55
26	321.52	386.76
27	330.97	390.01
28	340.41	393.32
29	349.83	396.68
30	359.23	400.09
31	368.61	403.56
32	377.97	407.08
33	387.31	410.65
34	391.24	412.17

Circle Center At X = -256.8 ; Y = 2081.8 and Radius, 1791.0

*** 1.911 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.64	322.31
2	88.53	323.76
3	98.41	325.30
4	108.28	326.92
5	118.14	328.61
6	127.98	330.40
7	137.80	332.26
8	147.61	334.20
9	157.40	336.23
10	167.18	338.34
11	176.94	340.52
12	186.67	342.79
13	196.39	345.15
14	206.09	347.58
15	215.77	350.09
16	225.43	352.68
17	235.07	355.35
18	244.68	358.11
19	254.27	360.94
20	263.84	363.85
21	273.38	366.85
22	282.90	369.92
23	292.39	373.07
24	301.85	376.30
25	311.29	379.61
26	320.70	382.99
27	330.08	386.46
28	339.43	390.00
29	348.75	393.62

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30         358.04      397.32
31         367.30      401.09
32         376.53      404.95
33         385.73      408.87
34         393.53      412.29
Circle Center At X =  -91.0 ; Y = 1512.1  and Radius, 1201.8
     ***     1.911    ***
Failure Surface Specified By 35 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1         78.28       322.19
    2         88.08       324.22
    3         97.86       326.28
    4        107.64       328.39
    5        117.40       330.53
    6        127.16       332.72
    7        136.91       334.94
    8        146.65       337.21
    9        156.38       339.52
   10        166.10       341.86
   11        175.81       344.25
   12        185.51       346.68
   13        195.20       349.15
   14        204.89       351.65
   15        214.55       354.20
   16        224.21       356.79
   17        233.86       359.42
   18        243.50       362.09
   19        253.13       364.80
   20        262.74       367.55
   21        272.34       370.34
   22        281.94       373.16
   23        291.52       376.03
   24        301.08       378.94
   25        310.64       381.89
   26        320.18       384.88
   27        329.71       387.90
   28        339.23       390.97
   29        348.74       394.08
   30        358.23       397.22
   31        367.71       400.41
   32        377.17       403.63
   33        386.63       406.89
   34        396.07       410.20
   35        403.32       412.77
Circle Center At X = -404.0 ; Y = 2681.6  and Radius, 2408.2
     ***     1.912    ***
Failure Surface Specified By 34 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1         83.94       324.08
    2         93.82       325.65
    3        103.68       327.30
    4        113.53       329.02
    5        123.37       330.81
    6        133.19       332.68
    7        143.00       334.61
    8        152.80       336.62
    9        162.58       338.69
   10        172.35       340.84
   11        182.10       343.07
   12        191.83       345.36
   13        201.55       347.72
   14        211.25       350.15
   15        220.93       352.66
   16        230.59       355.24
   17        240.24       357.88
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18	249.86	360.60
19	259.46	363.38
20	269.05	366.24
21	278.61	369.17
22	288.15	372.17
23	297.67	375.23
24	307.16	378.37
25	316.64	381.57
26	326.08	384.85
27	335.51	388.19
28	344.91	391.60
29	354.28	395.08
30	363.63	398.63
31	372.95	402.25
32	382.25	405.94
33	391.52	409.69
34	398.37	412.52

Circle Center At X = -126.6 ; Y = 1675.8 and Radius, 1368.0

*** 1.915 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	82.53	323.61
2	92.43	325.00
3	102.32	326.47
4	112.20	328.03
5	122.06	329.67
6	131.91	331.40
7	141.74	333.22
8	151.56	335.12
9	161.36	337.11
10	171.15	339.18
11	180.91	341.34
12	190.66	343.58
13	200.38	345.91
14	210.09	348.32
15	219.77	350.82
16	229.43	353.40
17	239.07	356.06
18	248.68	358.81
19	258.27	361.65
20	267.84	364.56
21	277.38	367.56
22	286.89	370.64
23	296.38	373.81
24	305.84	377.06
25	315.26	380.39
26	324.66	383.80
27	334.03	387.29
28	343.37	390.87
29	352.68	394.52
30	361.96	398.26
31	371.20	402.08
32	380.41	405.98
33	389.58	409.95
34	395.00	412.36

Circle Center At X = -71.7 ; Y = 1461.2 and Radius, 1148.0

*** 1.916 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	84.29	324.20
2	94.14	325.96
3	103.97	327.79
4	113.79	329.67
5	123.60	331.61
6	133.40	333.60

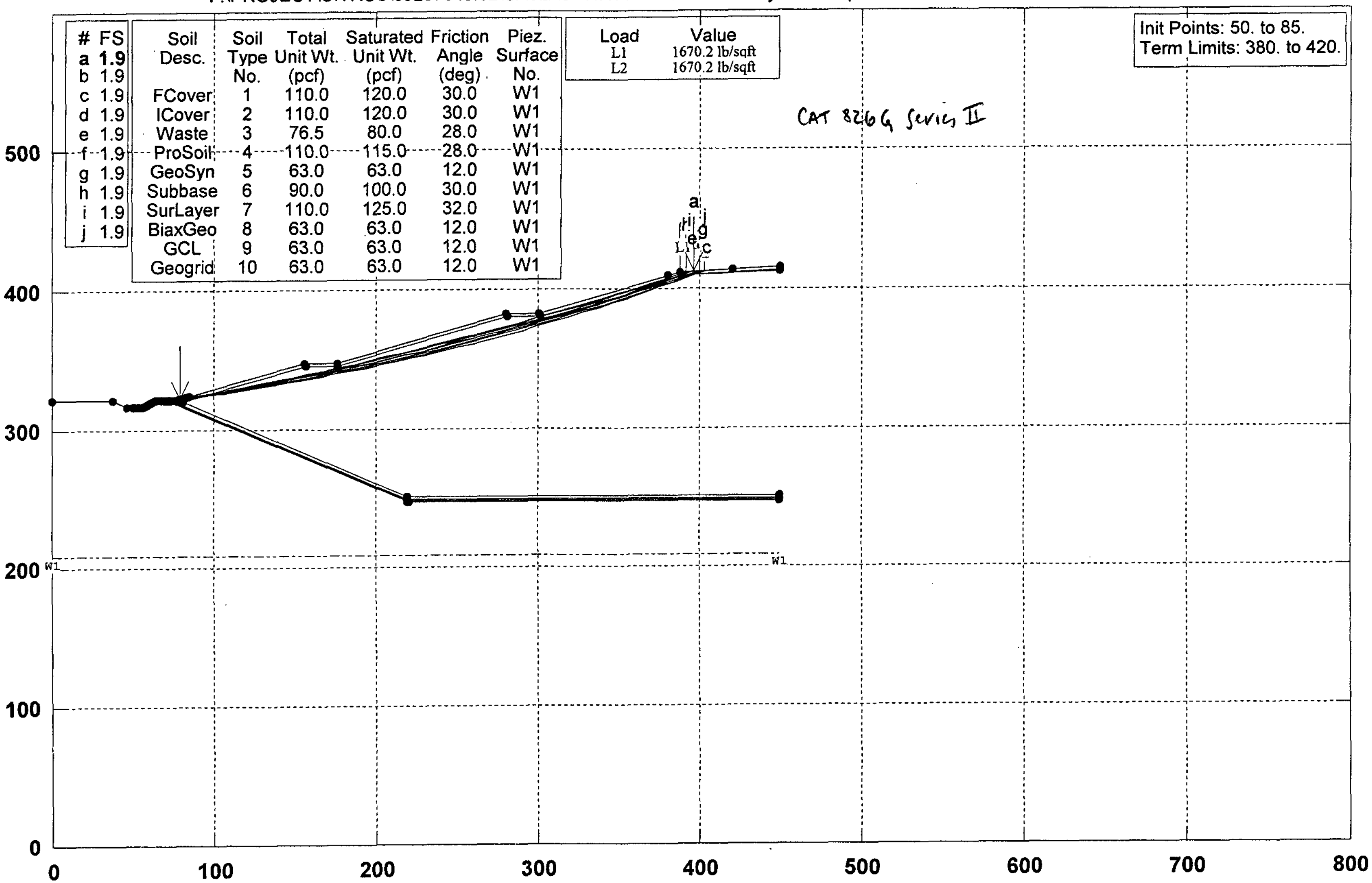
7	143.19	335.66
8	152.96	337.77
9	162.72	339.94
10	172.47	342.17
11	182.21	344.46
12	191.93	346.80
13	201.63	349.20
14	211.33	351.66
15	221.01	354.17
16	230.67	356.75
17	240.32	359.38
18	249.95	362.06
19	259.57	364.81
20	269.17	367.61
21	278.75	370.46
22	288.32	373.38
23	297.86	376.35
24	307.40	379.37
25	316.91	382.46
26	326.40	385.59
27	335.88	388.79
28	345.34	392.04
29	354.77	395.35
30	364.19	398.71
31	373.59	402.13
32	382.97	405.60
33	392.32	409.13
34	401.57	412.68

Circle Center At X = -209.4 ; Y = 1990.7 and Radius, 1692.2

*** 1.916 ***

Citrus County Phase 3 Expansion West Final Buildout Side Slope

F:\PROJECT\CITRUS\09207049.02\CA32A6~1\WFINAL.PL2 Run By: Dominique H. Bramlett, P.E. 8/31/2009 11:28AM



STABL6H FSmin=1.9

Safety Factors Are Calculated By The Modified Bishop Method

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**** STABL6H ****
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 8/31/2009
Time of Run: 11:28AM
Run By: Dominique H. Bramlett, P.E.
Input Data Filename: F:wfinal.
Output Filename: F:wfinal.OUT
Plotted Output Filename: F:wfinal.PLT
PROBLEM DESCRIPTION Citrus County Phase 3 Expansion
West Final Buildout Side Slope

BOUNDARY COORDINATES
15 Top Boundaries
41 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	321.70	37.60	321.70	7
2	37.60	321.70	46.60	316.70	7
3	46.60	316.70	56.20	316.70	7
4	56.20	316.70	63.70	321.70	7
5	63.70	321.70	70.20	321.80	7
6	70.20	321.80	71.30	321.90	8
7	71.30	321.90	72.40	321.90	5
8	72.40	321.90	73.40	321.90	10
9	73.40	321.90	77.70	322.00	4
10	77.70	322.00	155.70	348.00	1
11	155.70	348.00	175.70	348.00	1
12	175.70	348.00	280.00	383.00	1
13	280.00	383.00	300.70	383.00	1
14	300.70	383.00	387.70	412.00	1
15	387.70	412.00	448.80	415.00	1
16	80.30	320.70	156.10	346.00	2
17	156.10	346.00	176.10	346.00	2
18	176.10	346.00	281.10	381.00	2
19	281.10	381.00	301.10	381.00	2
20	301.10	381.00	388.10	410.00	2
21	388.10	410.00	448.80	413.00	2
22	77.70	322.00	80.30	320.70	4
23	80.90	320.40	156.10	345.50	3
24	156.10	345.50	176.10	345.50	3
25	176.10	345.50	281.10	380.50	3
26	281.10	380.50	301.10	380.50	3
27	301.10	380.50	388.20	409.50	3
28	388.20	409.50	448.80	412.50	3
29	80.30	320.70	80.90	320.40	4
30	80.90	320.40	219.70	251.00	4
31	219.70	251.00	448.80	251.00	4
32	73.40	321.90	219.30	249.00	10
33	219.30	249.00	448.80	249.00	5
34	72.40	321.90	219.10	248.50	5
35	219.10	248.50	219.30	249.00	5
36	71.30	321.90	219.00	248.00	8
37	219.00	248.00	448.80	248.00	9
38	219.00	248.00	219.30	247.50	8
39	219.30	247.50	448.80	247.50	8
40	70.20	321.80	219.90	247.00	7
41	219.90	247.00	448.80	247.00	7

ISOTROPIC SOIL PARAMETERS
10 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	1
2	110.0	120.0	.0	30.0	.00	.0	1

3	76.5	80.0	.0	28.0	.00	.0	1
4	110.0	115.0	.0	28.0	.00	.0	1
5	63.0	63.0	.0	12.0	.00	.0	1
6	90.0	100.0	.0	30.0	.00	.0	1
7	110.0	125.0	.0	32.0	.00	.0	1
8	63.0	63.0	.0	12.0	.00	.0	1
9	63.0	63.0	.0	12.0	.00	.0	1
10	63.0	63.0	.0	12.0	.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 No.	X-Water (ft)	Y-Water (ft)
1	.00	208.50
2	448.80	208.50

BOUNDARY LOAD(S)
2 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	387.70	390.92	1670.2	.0
2	399.84	403.06	1670.2	.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.
5000 Trial Surfaces Have Been Generated.
50 Surfaces Initiate From Each Of100 Points Equally Spaced
Along The Ground Surface Between X = 50.00 ft.
and X = 85.00 ft.
Each Surface Terminates Between X = 380.00 ft.
and X = 420.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 ft.
10.00 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 Bishop Method * *
Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.99	322.43
2	88.78	324.46
3	98.56	326.54
4	108.34	328.66
5	118.10	330.82
6	127.85	333.03
7	137.60	335.28
8	147.33	337.58
9	157.05	339.92
10	166.76	342.30
11	176.46	344.73
12	186.16	347.20
13	195.83	349.71
14	205.50	352.26
15	215.16	354.86
16	224.80	357.51
17	234.44	360.19
18	244.06	362.92
19	253.66	365.69
20	263.26	368.51
21	272.84	371.37
22	282.41	374.27
23	291.97	377.21
24	301.51	380.20
25	311.04	383.23
26	320.56	386.30

27	330.06	389.41
28	339.55	392.57
29	349.02	395.77
30	358.48	399.01
31	367.93	402.30
32	377.36	405.62
33	386.78	408.99
34	396.18	412.40
35	396.22	412.42

Circle Center At X = -369.7 ; Y = 2508.5 and Radius, 2231.6

*** 1.887 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.28	322.19
2	88.08	324.22
3	97.86	326.28
4	107.64	328.39
5	117.40	330.53
6	127.16	332.72
7	136.91	334.94
8	146.65	337.21
9	156.38	339.52
10	166.10	341.86
11	175.81	344.25
12	185.51	346.68
13	195.20	349.15
14	204.89	351.65
15	214.55	354.20
16	224.21	356.79
17	233.86	359.42
18	243.50	362.09
19	253.13	364.80
20	262.74	367.55
21	272.34	370.34
22	281.94	373.16
23	291.52	376.03
24	301.08	378.94
25	310.64	381.89
26	320.18	384.88
27	329.71	387.90
28	339.23	390.97
29	348.74	394.08
30	358.23	397.22
31	367.71	400.41
32	377.17	403.63
33	386.63	406.89
34	396.07	410.20
35	403.32	412.77

Circle Center At X = -404.0 ; Y = 2681.6 and Radius, 2408.2

*** 1.888 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.64	322.31
2	88.50	323.94
3	98.36	325.64
4	108.20	327.40
5	118.03	329.23
6	127.85	331.11
7	137.66	333.07
8	147.46	335.08
9	157.24	337.17
10	167.00	339.31
11	176.76	341.52
12	186.50	343.79
13	196.22	346.13

14	205.93	348.52
15	215.62	350.99
16	225.30	353.51
17	234.95	356.10
18	244.60	358.75
19	254.22	361.47
20	263.83	364.25
21	273.42	367.09
22	282.99	369.99
23	292.54	372.95
24	302.07	375.98
25	311.58	379.07
26	321.07	382.22
27	330.54	385.43
28	339.99	388.71
29	349.41	392.05
30	358.82	395.44
31	368.20	398.90
32	377.56	402.43
33	386.90	406.01
34	396.21	409.65
35	404.13	412.81

Circle Center At X = -166.3 ; Y = 1833.9 and Radius, 1531.3

*** 1.889 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	79.34	322.55
2	89.21	324.19
3	99.06	325.90
4	108.90	327.68
5	118.73	329.52
6	128.55	331.44
7	138.35	333.42
8	148.13	335.47
9	157.91	337.58
10	167.67	339.77
11	177.41	342.02
12	187.14	344.34
13	196.85	346.72
14	206.54	349.18
15	216.22	351.70
16	225.88	354.28
17	235.52	356.94
18	245.14	359.66
19	254.75	362.45
20	264.33	365.30
21	273.90	368.22
22	283.44	371.21
23	292.96	374.26
24	302.46	377.37
25	311.94	380.56
26	321.40	383.81
27	330.84	387.12
28	340.25	390.50
29	349.64	393.94
30	359.00	397.45
31	368.34	401.03
32	377.66	404.66
33	386.95	408.37
34	396.21	412.13
35	396.99	412.46

Circle Center At X = -153.1 ; Y = 1749.8 and Radius, 1446.0

*** 1.890 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	81.82	323.37
2	91.67	325.08
3	101.51	326.85
4	111.34	328.69
5	121.16	330.59
6	130.96	332.56
7	140.76	334.60
8	150.53	336.69
9	160.30	338.86
10	170.05	341.08
11	179.78	343.37
12	189.50	345.73
13	199.20	348.15
14	208.89	350.63
15	218.56	353.18
16	228.21	355.79
17	237.85	358.47
18	247.46	361.21
19	257.06	364.01
20	266.64	366.88
21	276.20	369.81
22	285.75	372.80
23	295.27	375.86
24	304.77	378.98
25	314.25	382.16
26	323.71	385.40
27	333.14	388.71
28	342.56	392.08
29	351.95	395.51
30	361.32	399.01
31	370.67	402.56
32	379.99	406.18
33	389.29	409.86
34	395.56	412.39

Circle Center At X = -171.4 ; Y = 1813.4 and Radius, 1511.4

*** 1.890 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	79.34	322.55
2	89.17	324.38
3	99.00	326.27
4	108.81	328.21
5	118.60	330.20
6	128.39	332.25
7	138.17	334.35
8	147.93	336.51
9	157.69	338.72
10	167.43	340.98
11	177.15	343.30
12	186.87	345.67
13	196.57	348.10
14	206.26	350.57
15	215.93	353.11
16	225.59	355.69
17	235.24	358.33
18	244.87	361.02
19	254.48	363.77
20	264.09	366.57
21	273.67	369.42
22	283.24	372.32
23	292.79	375.28
24	302.33	378.29
25	311.85	381.35
26	321.35	384.47
27	330.84	387.63
28	340.30	390.85

29	349.75	394.13
30	359.18	397.45
31	368.60	400.83
32	377.99	404.25
33	387.37	407.73
34	396.72	411.27
35	400.24	412.62

Circle Center At X = -247.4 ; Y = 2103.6 and Radius, 1810.8
*** 1.890 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	84.29	324.20
2	94.14	325.96
3	103.97	327.79
4	113.79	329.67
5	123.60	331.61
6	133.40	333.60
7	143.19	335.66
8	152.96	337.77
9	162.72	339.94
10	172.47	342.17
11	182.21	344.46
12	191.93	346.80
13	201.63	349.20
14	211.33	351.66
15	221.01	354.17
16	230.67	356.75
17	240.32	359.38
18	249.95	362.06
19	259.57	364.81
20	269.17	367.61
21	278.75	370.46
22	288.32	373.38
23	297.86	376.35
24	307.40	379.37
25	316.91	382.46
26	326.40	385.59
27	335.88	388.79
28	345.34	392.04
29	354.77	395.35
30	364.19	398.71
31	373.59	402.13
32	382.97	405.60
33	392.32	409.13
34	401.57	412.68

Circle Center At X = -209.4 ; Y = 1990.7 and Radius, 1692.2
*** 1.892 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.05	322.78
2	89.87	324.69
3	99.67	326.65
4	109.47	328.67
5	119.25	330.74
6	129.02	332.87
7	138.78	335.05
8	148.53	337.29
9	158.26	339.58
10	167.98	341.92
11	177.69	344.32
12	187.39	346.77
13	197.07	349.28
14	206.73	351.84
15	216.38	354.46
16	226.02	357.13

17	235.64	359.85
18	245.25	362.62
19	254.84	365.45
20	264.42	368.34
21	273.98	371.27
22	283.52	374.26
23	293.05	377.31
24	302.55	380.40
25	312.04	383.55
26	321.52	386.76
27	330.97	390.01
28	340.41	393.32
29	349.83	396.68
30	359.23	400.09
31	368.61	403.56
32	377.97	407.08
33	387.31	410.65
34	391.24	412.17

Circle Center At X = -256.8 ; Y = 2081.8 and Radius, 1791.0
*** 1.892 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.64	322.31
2	88.53	323.76
3	98.41	325.30
4	108.28	326.92
5	118.14	328.61
6	127.98	330.40
7	137.80	332.26
8	147.61	334.20
9	157.40	336.23
10	167.18	338.34
11	176.94	340.52
12	186.67	342.79
13	196.39	345.15
14	206.09	347.58
15	215.77	350.09
16	225.43	352.68
17	235.07	355.35
18	244.68	358.11
19	254.27	360.94
20	263.84	363.85
21	273.38	366.85
22	282.90	369.92
23	292.39	373.07
24	301.85	376.30
25	311.29	379.61
26	320.70	382.99
27	330.08	386.46
28	339.43	390.00
29	348.75	393.62
30	358.04	397.32
31	367.30	401.09
32	376.53	404.95
33	385.73	408.87
34	393.53	412.29

Circle Center At X = -91.0 ; Y = 1512.1 and Radius, 1201.8
*** 1.892 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	85.00	324.43
2	94.91	325.81
3	104.80	327.27
4	114.68	328.81
5	124.55	330.43

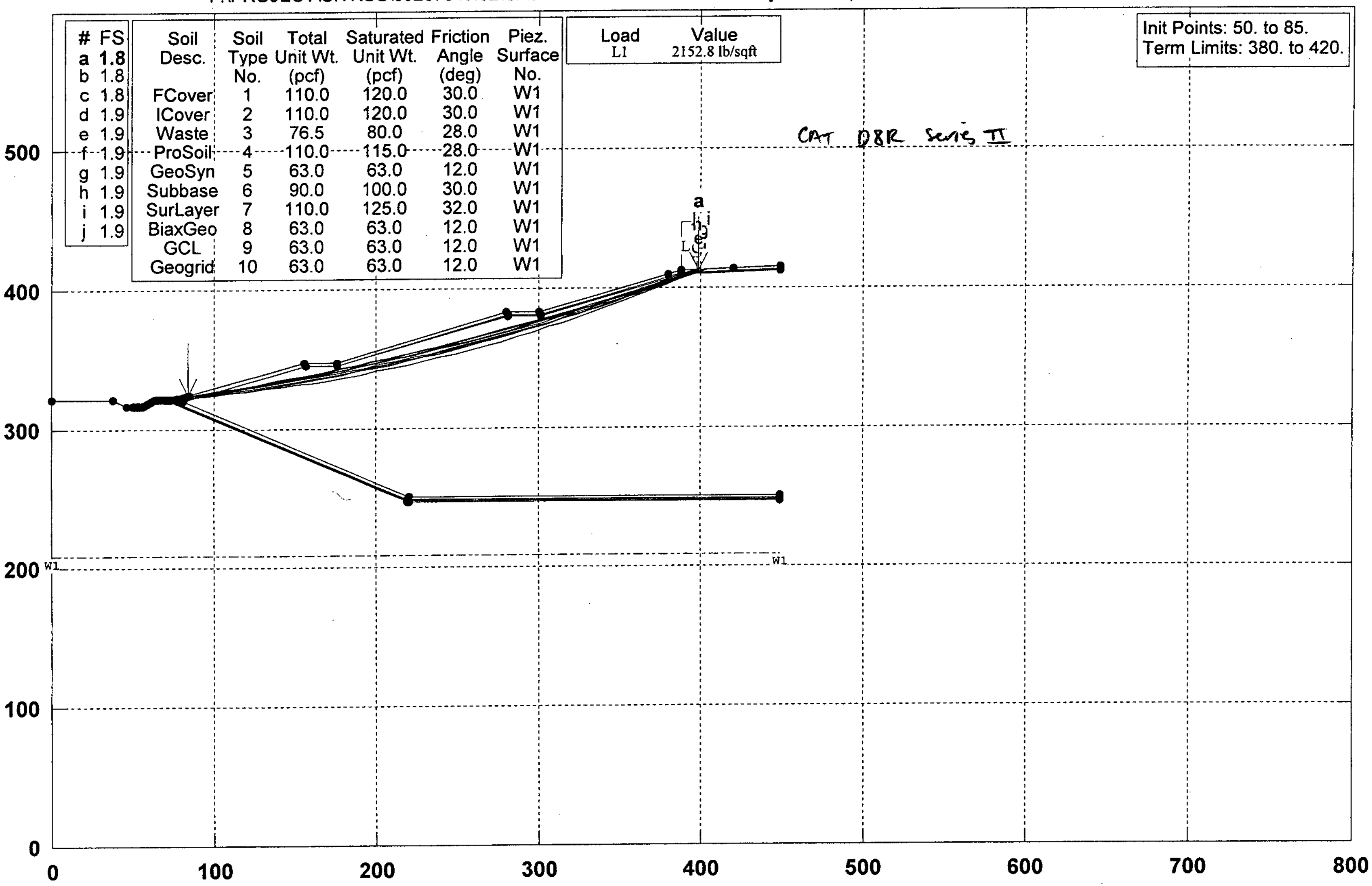
6	134.40	332.14
7	144.24	333.93
8	154.06	335.80
9	163.87	337.75
10	173.66	339.78
11	183.44	341.89
12	193.19	344.08
13	202.93	346.36
14	212.65	348.72
15	222.35	351.15
16	232.03	353.67
17	241.68	356.27
18	251.32	358.94
19	260.93	361.70
20	270.52	364.54
21	280.08	367.45
22	289.62	370.45
23	299.14	373.53
24	308.63	376.68
25	318.09	379.91
26	327.53	383.22
27	336.94	386.61
28	346.32	390.08
29	355.67	393.63
30	364.99	397.25
31	374.28	400.95
32	383.54	404.72
33	392.76	408.58
34	401.96	412.51
35	402.45	412.72

Circle Center At X = -75.9 ; Y = 1517.7 and Radius, 1204.0

*** 1.894 ***

Citrus County Phase 3 Expansion West Final Buildout Side Slope

F:\PROJECT\CITRUS\09207049.02\CA32A6~1\WFINAL.PL2 Run By: Dominique H. Bramlett, P.E. 8/31/2009 11:32AM



STABL6H FSmin=1.8

Safety Factors Are Calculated By The Modified Bishop Method

SCS ENGINEERS

** STABL6H **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 8/31/2009
Time of Run: 11:32AM
Run By: Dominique H. Bramlett, P.E.
Input Data Filename: F:wfinal.
Output Filename: F:wfinal.OUT
Plotted Output Filename: F:wfinal.PLT
PROBLEM DESCRIPTION Citrus County Phase 3 Expansion
West Final Buildout Side Slope

BOUNDARY COORDINATES
15 Top Boundaries
41 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	321.70	37.60	321.70	7
2	37.60	321.70	46.60	316.70	7
3	46.60	316.70	56.20	316.70	7
4	56.20	316.70	63.70	321.70	7
5	63.70	321.70	70.20	321.80	7
6	70.20	321.80	71.30	321.90	8
7	71.30	321.90	72.40	321.90	5
8	72.40	321.90	73.40	321.90	10
9	73.40	321.90	77.70	322.00	4
10	77.70	322.00	155.70	348.00	1
11	155.70	348.00	175.70	348.00	1
12	175.70	348.00	280.00	383.00	1
13	280.00	383.00	300.70	383.00	1
14	300.70	383.00	387.70	412.00	1
15	387.70	412.00	448.80	415.00	1
16	80.30	320.70	156.10	346.00	2
17	156.10	346.00	176.10	346.00	2
18	176.10	346.00	281.10	381.00	2
19	281.10	381.00	301.10	381.00	2
20	301.10	381.00	388.10	410.00	2
21	388.10	410.00	448.80	413.00	2
22	77.70	322.00	80.30	320.70	4
23	80.90	320.40	156.10	345.50	3
24	156.10	345.50	176.10	345.50	3
25	176.10	345.50	281.10	380.50	3
26	281.10	380.50	301.10	380.50	3
27	301.10	380.50	388.20	409.50	3
28	388.20	409.50	448.80	412.50	3
29	80.30	320.70	80.90	320.40	4
30	80.90	320.40	219.70	251.00	4
31	219.70	251.00	448.80	251.00	4
32	73.40	321.90	219.30	249.00	10
33	219.30	249.00	448.80	249.00	5
34	72.40	321.90	219.10	248.50	5
35	219.10	248.50	219.30	249.00	5
36	71.30	321.90	219.00	248.00	8
37	219.00	248.00	448.80	248.00	9
38	219.00	248.00	219.30	247.50	8
39	219.30	247.50	448.80	247.50	8
40	70.20	321.80	219.90	247.00	7
41	219.90	247.00	448.80	247.00	7

ISOTROPIC SOIL PARAMETERS
10 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	1
2	110.0	120.0	.0	30.0	.00	.0	1

3	76.5	80.0	.0	28.0	.00	.0	1
4	110.0	115.0	.0	28.0	.00	.0	1
5	63.0	63.0	.0	12.0	.00	.0	1
6	90.0	100.0	.0	30.0	.00	.0	1
7	110.0	125.0	.0	32.0	.00	.0	1
8	63.0	63.0	.0	12.0	.00	.0	1
9	63.0	63.0	.0	12.0	.00	.0	1
10	63.0	63.0	.0	12.0	.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 No.	X-Water (ft)	Y-Water (ft)
1	.00	208.50
2	448.80	208.50

BOUNDARY LOAD(S)
1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	387.70	398.20	2152.8	.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.
5000 Trial Surfaces Have Been Generated.
50 Surfaces Initiate From Each Of100 Points Equally Spaced
Along The Ground Surface Between X = 50.00 ft.
and X = 85.00 ft.
Each Surface Terminates Between X = 380.00 ft.
and X = 420.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 ft.
10.00 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 Bishop Method * *
Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.94	324.08
2	93.82	325.65
3	103.68	327.30
4	113.53	329.02
5	123.37	330.81
6	133.19	332.68
7	143.00	334.61
8	152.80	336.62
9	162.58	338.69
10	172.35	340.84
11	182.10	343.07
12	191.83	345.36
13	201.55	347.72
14	211.25	350.15
15	220.93	352.66
16	230.59	355.24
17	240.24	357.88
18	249.86	360.60
19	259.46	363.38
20	269.05	366.24
21	278.61	369.17
22	288.15	372.17
23	297.67	375.23
24	307.16	378.37
25	316.64	381.57
26	326.08	384.85
27	335.51	388.19

28	344.91	391.60
29	354.28	395.08
30	363.63	398.63
31	372.95	402.25
32	382.25	405.94
33	391.52	409.69
34	398.37	412.52

Circle Center At X = -126.6 ; Y = 1675.8 and Radius, 1368.0

*** 1.846 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	81.11	323.14
2	91.03	324.39
3	100.94	325.74
4	110.84	327.18
5	120.72	328.71
6	130.59	330.34
7	140.44	332.05
8	150.27	333.86
9	160.09	335.76
10	169.89	337.74
11	179.67	339.83
12	189.43	342.00
13	199.18	344.26
14	208.89	346.61
15	218.59	349.05
16	228.27	351.59
17	237.92	354.21
18	247.54	356.92
19	257.14	359.73
20	266.71	362.62
21	276.26	365.60
22	285.78	368.67
23	295.26	371.82
24	304.72	375.07
25	314.15	378.40
26	323.55	381.82
27	332.91	385.33
28	342.24	388.92
29	351.54	392.61
30	360.80	396.37
31	370.03	400.23
32	379.22	404.17
33	388.38	408.19
34	397.49	412.30
35	397.93	412.50

Circle Center At X = -48.9 ; Y = 1390.3 and Radius, 1075.1

*** 1.847 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	79.34	322.55
2	89.21	324.19
3	99.06	325.90
4	108.90	327.68
5	118.73	329.52
6	128.55	331.44
7	138.35	333.42
8	148.13	335.47
9	157.91	337.58
10	167.67	339.77
11	177.41	342.02
12	187.14	344.34
13	196.85	346.72
14	206.54	349.18
15	216.22	351.70

16	225.88	354.28
17	235.52	356.94
18	245.14	359.66
19	254.75	362.45
20	264.33	365.30
21	273.90	368.22
22	283.44	371.21
23	292.96	374.26
24	302.46	377.37
25	311.94	380.56
26	321.40	383.81
27	330.84	387.12
28	340.25	390.50
29	349.64	393.94
30	359.00	397.45
31	368.34	401.03
32	377.66	404.66
33	386.95	408.37
34	396.21	412.13
35	396.99	412.46

Circle Center At X = -153.1 ; Y = 1749.8 and Radius, 1446.0

*** 1.849 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	79.34	322.55
2	89.17	324.38
3	99.00	326.27
4	108.81	328.21
5	118.60	330.20
6	128.39	332.25
7	138.17	334.35
8	147.93	336.51
9	157.69	338.72
10	167.43	340.98
11	177.15	343.30
12	186.87	345.67
13	196.57	348.10
14	206.26	350.57
15	215.93	353.11
16	225.59	355.69
17	235.24	358.33
18	244.87	361.02
19	254.48	363.77
20	264.09	366.57
21	273.67	369.42
22	283.24	372.32
23	292.79	375.28
24	302.33	378.29
25	311.85	381.35
26	321.35	384.47
27	330.84	387.63
28	340.30	390.85
29	349.75	394.13
30	359.18	397.45
31	368.60	400.83
32	377.99	404.25
33	387.37	407.73
34	396.72	411.27
35	400.24	412.62

Circle Center At X = -247.4 ; Y = 2103.6 and Radius, 1810.8

*** 1.851 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	81.47	323.26
2	91.43	324.13

3	101.38	325.12
4	111.32	326.23
5	121.24	327.45
6	131.15	328.79
7	141.05	330.24
8	150.92	331.80
9	160.78	333.48
10	170.62	335.28
11	180.43	337.18
12	190.23	339.21
13	200.00	341.34
14	209.74	343.59
15	219.46	345.95
16	229.15	348.42
17	238.81	351.01
18	248.44	353.70
19	258.04	356.51
20	267.60	359.43
21	277.13	362.46
22	286.62	365.60
23	296.08	368.85
24	305.50	372.21
25	314.88	375.68
26	324.22	379.26
27	333.51	382.94
28	342.77	386.74
29	351.97	390.64
30	361.14	394.64
31	370.25	398.75
32	379.32	402.97
33	388.34	407.29
34	397.31	411.72
35	398.95	412.55

Circle Center At X = 10.9 ; Y = 1183.2 and Radius, 862.9

*** 1.854 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	85.00	324.43
2	94.91	325.81
3	104.80	327.27
4	114.68	328.81
5	124.55	330.43
6	134.40	332.14
7	144.24	333.93
8	154.06	335.80
9	163.87	337.75
10	173.66	339.78
11	183.44	341.89
12	193.19	344.08
13	202.93	346.36
14	212.65	348.72
15	222.35	351.15
16	232.03	353.67
17	241.68	356.27
18	251.32	358.94
19	260.93	361.70
20	270.52	364.54
21	280.08	367.45
22	289.62	370.45
23	299.14	373.53
24	308.63	376.68
25	318.09	379.91
26	327.53	383.22
27	336.94	386.61
28	346.32	390.08
29	355.67	393.63

30	364.99	397.25
31	374.28	400.95
32	383.54	404.72
33	392.76	408.58
34	401.96	412.51
35	402.45	412.72

Circle Center At X = -75.9 ; Y = 1517.7 and Radius, 1204.0
*** 1.854 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	84.29	324.20
2	94.14	325.96
3	103.97	327.79
4	113.79	329.67
5	123.60	331.61
6	133.40	333.60
7	143.19	335.66
8	152.96	337.77
9	162.72	339.94
10	172.47	342.17
11	182.21	344.46
12	191.93	346.80
13	201.63	349.20
14	211.33	351.66
15	221.01	354.17
16	230.67	356.75
17	240.32	359.38
18	249.95	362.06
19	259.57	364.81
20	269.17	367.61
21	278.75	370.46
22	288.32	373.38
23	297.86	376.35
24	307.40	379.37
25	316.91	382.46
26	326.40	385.59
27	335.88	388.79
28	345.34	392.04
29	354.77	395.35
30	364.19	398.71
31	373.59	402.13
32	382.97	405.60
33	392.32	409.13
34	401.57	412.68

Circle Center At X = -209.4 ; Y = 1990.7 and Radius, 1692.2
*** 1.854 ***

Failure Surface Specified By 37 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	60.61	319.64
2	70.54	320.76
3	80.47	321.98
4	90.38	323.28
5	100.29	324.68
6	110.17	326.17
7	120.05	327.74
8	129.91	329.41
9	139.75	331.17
10	149.58	333.02
11	159.39	334.96
12	169.18	336.98
13	178.96	339.10
14	188.71	341.31
15	198.44	343.60
16	208.16	345.99
17	217.85	348.46

18	227.51	351.02
19	237.15	353.67
20	246.77	356.41
21	256.36	359.23
22	265.93	362.14
23	275.47	365.15
24	284.98	368.23
25	294.46	371.41
26	303.92	374.67
27	313.34	378.02
28	322.73	381.45
29	332.09	384.97
30	341.42	388.57
31	350.72	392.26
32	359.98	396.04
33	369.20	399.90
34	378.39	403.84
35	387.54	407.87
36	396.66	411.98
37	397.78	412.49

Circle Center At X = -57.4 ; Y = 1406.8 and Radius, 1093.5

*** 1.855 ***

Failure Surface Specified By 35 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.64	322.31
2	88.50	323.94
3	98.36	325.64
4	108.20	327.40
5	118.03	329.23
6	127.85	331.11
7	137.66	333.07
8	147.46	335.08
9	157.24	337.17
10	167.00	339.31
11	176.76	341.52
12	186.50	343.79
13	196.22	346.13
14	205.93	348.52
15	215.62	350.99
16	225.30	353.51
17	234.95	356.10
18	244.60	358.75
19	254.22	361.47
20	263.83	364.25
21	273.42	367.09
22	282.99	369.99
23	292.54	372.95
24	302.07	375.98
25	311.58	379.07
26	321.07	382.22
27	330.54	385.43
28	339.99	388.71
29	349.41	392.05
30	358.82	395.44
31	368.20	398.90
32	377.56	402.43
33	386.90	406.01
34	396.21	409.65
35	404.13	412.81

Circle Center At X = -166.3 ; Y = 1833.9 and Radius, 1531.3

*** 1.856 ***

Failure Surface Specified By 34 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	81.82	323.37
2	91.67	325.08

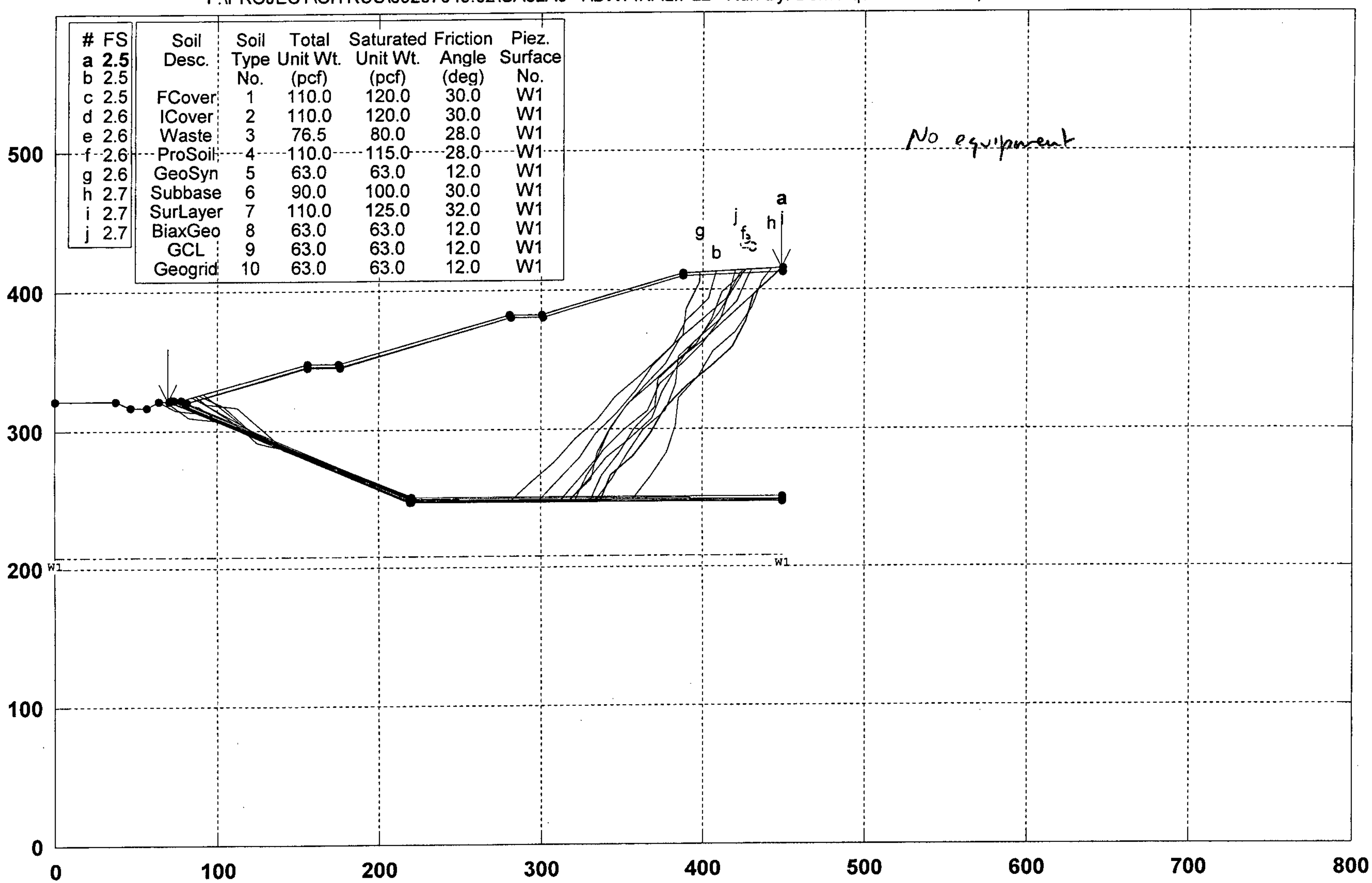
3	101.51	326.85
4	111.34	328.69
5	121.16	330.59
6	130.96	332.56
7	140.76	334.60
8	150.53	336.69
9	160.30	338.86
10	170.05	341.08
11	179.78	343.37
12	189.50	345.73
13	199.20	348.15
14	208.89	350.63
15	218.56	353.18
16	228.21	355.79
17	237.85	358.47
18	247.46	361.21
19	257.06	364.01
20	266.64	366.88
21	276.20	369.81
22	285.75	372.80
23	295.27	375.86
24	304.77	378.98
25	314.25	382.16
26	323.71	385.40
27	333.14	388.71
28	342.56	392.08
29	351.95	395.51
30	361.32	399.01
31	370.67	402.56
32	379.99	406.18
33	389.29	409.86
34	395.56	412.39

Circle Center At X = -171.4 ; Y = 1813.4 and Radius, 1511.4

*** 1.857 ***

Citrus County Phase 3 Expansion West Final Buildout Side Slope

F:\PROJECT\CITRUS\09207049.02\CA32A6~1\BWFINAL.PL2 Run By: Dominique H. Bramlett, P.E. 8/31/2009 11:34AM



#	FS
a	**2.5**
b	2.5
c	2.5
d	2.6
e	2.6
f	2.6
g	2.6
h	2.7
i	2.7
j	2.7

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
FCover	1	110.0	120.0	30.0	W1
ICover	2	110.0	120.0	30.0	W1
Waste	3	76.5	80.0	28.0	W1
ProSoil	4	110.0	115.0	28.0	W1
GeoSyn	5	63.0	63.0	12.0	W1
Subbase	6	90.0	100.0	30.0	W1
SurLayer	7	110.0	125.0	32.0	W1
BiaxGeo	8	63.0	63.0	12.0	W1
GCL	9	63.0	63.0	12.0	W1
Geogrid	10	63.0	63.0	12.0	W1

STABL6H FSmin=2.5

Safety Factors Are Calculated By The Modified Janbu Method

SCS ENGINEERS

**** STABL6H ****
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 8/31/2009
Time of Run: 11:34AM
Run By: Dominique H. Bramlett, P.E.
Input Data Filename: F:bwfinal.
Output Filename: F:bwfinal.OUT
Plotted Output Filename: F:bwfinal.PLT
PROBLEM DESCRIPTION Citrus County Phase 3 Expansion
West Final Buildout Side Slope

BOUNDARY COORDINATES
15 Top Boundaries
41 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	321.70	37.60	321.70	7
2	37.60	321.70	46.60	316.70	7
3	46.60	316.70	56.20	316.70	7
4	56.20	316.70	63.70	321.70	7
5	63.70	321.70	70.20	321.80	7
6	70.20	321.80	71.30	321.90	8
7	71.30	321.90	72.40	321.90	5
8	72.40	321.90	73.40	321.90	10
9	73.40	321.90	77.70	322.00	4
10	77.70	322.00	155.70	348.00	1
11	155.70	348.00	175.70	348.00	1
12	175.70	348.00	280.00	383.00	1
13	280.00	383.00	300.70	383.00	1
14	300.70	383.00	387.70	412.00	1
15	387.70	412.00	448.80	415.00	1
16	80.30	320.70	156.10	346.00	2
17	156.10	346.00	176.10	346.00	2
18	176.10	346.00	281.10	381.00	2
19	281.10	381.00	301.10	381.00	2
20	301.10	381.00	388.10	410.00	2
21	388.10	410.00	448.80	413.00	2
22	77.70	322.00	80.30	320.70	4
23	80.90	320.40	156.10	345.50	3
24	156.10	345.50	176.10	345.50	3
25	176.10	345.50	281.10	380.50	3
26	281.10	380.50	301.10	380.50	3
27	301.10	380.50	388.20	409.50	3
28	388.20	409.50	448.80	412.50	3
29	80.30	320.70	80.90	320.40	4
30	80.90	320.40	219.70	251.00	4
31	219.70	251.00	448.80	251.00	4
32	73.40	321.90	219.30	249.00	10
33	219.30	249.00	448.80	249.00	5
34	72.40	321.90	219.10	248.50	5
35	219.10	248.50	219.30	249.00	5
36	71.30	321.90	219.00	248.00	8
37	219.00	248.00	448.80	248.00	9
38	219.00	248.00	219.30	247.50	8
39	219.30	247.50	448.80	247.50	8
40	70.20	321.80	219.90	247.00	7
41	219.90	247.00	448.80	247.00	7

ISOTROPIC SOIL PARAMETERS
10 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	1
2	110.0	120.0	.0	30.0	.00	.0	1

3	76.5	80.0	.0	28.0	.00	.0	1
4	110.0	115.0	.0	28.0	.00	.0	1
5	63.0	63.0	.0	12.0	.00	.0	1
6	90.0	100.0	.0	30.0	.00	.0	1
7	110.0	125.0	.0	32.0	.00	.0	1
8	63.0	63.0	.0	12.0	.00	.0	1
9	63.0	63.0	.0	12.0	.00	.0	1
10	63.0	63.0	.0	12.0	.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 No.	X-Water (ft)	Y-Water (ft)
1	.00	208.50
2	448.80	208.50

BOUNDARY LOAD(S)
2 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	387.70	390.92	1670.2	.0
2	399.84	403.06	1670.2	.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.
SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Sliding Block Surfaces, Has Been
Specified.
100 Trial Surfaces Have Been Generated.
3 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 20.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	79.00	318.80	216.40	250.10	3.00
2	222.70	248.70	227.70	248.70	3.00
3	232.70	248.70	392.20	248.70	3.00

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 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	69.09	321.78
2	80.92	316.76
3	99.19	308.62
4	226.90	247.27
5	336.97	247.28
6	343.26	266.27
7	357.40	280.41
8	368.38	297.13
9	376.75	315.29
10	390.21	330.09
11	404.07	344.51
12	418.15	358.71
13	426.16	377.03
14	430.99	396.44
15	444.52	411.17
16	448.24	414.97

*** 2.513 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.13	322.14
2	84.12	316.16
3	223.88	248.08
4	298.93	247.90

5	311.33	263.59
6	324.13	278.96
7	333.79	296.46
8	347.08	311.41
9	358.66	327.72
10	368.90	344.90
11	381.83	360.16
12	390.13	378.35
13	403.42	393.31
14	408.25	412.71
15	408.55	413.02

*** 2.517 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	91.39	326.56
2	102.12	316.49
3	116.63	302.72
4	133.50	291.99
5	227.55	248.22
6	316.37	247.66
7	329.68	262.59
8	340.70	279.28
9	354.84	293.43
10	368.65	307.89
11	375.49	326.69
12	384.09	344.74
13	394.18	362.01
14	407.92	376.54
15	420.80	391.85
16	427.92	410.53
17	429.79	414.07

*** 2.548 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	67.22	321.75
2	68.93	321.14
3	88.68	317.95
4	104.05	305.15
5	223.45	248.92
6	333.27	247.34
7	344.30	264.02
8	353.21	281.93
9	363.26	299.22
10	377.34	313.42
11	383.78	332.36
12	385.32	352.30
13	399.15	366.75
14	410.31	383.34
15	419.44	401.14
16	425.16	413.84

*** 2.576 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	68.76	321.78
2	82.49	309.32
3	102.27	306.36
4	226.82	247.28
5	318.13	248.58
6	331.49	263.46
7	335.50	283.06
8	343.05	301.57
9	353.93	318.36
10	367.97	332.60
11	381.72	347.12

12	395.87	361.26
13	405.77	378.64
14	411.58	397.78
15	425.36	412.27
16	426.37	413.90

*** 2.621 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	88.38	325.56
2	104.01	317.64
3	118.18	303.53
4	133.23	290.36
5	222.78	249.78
6	311.08	247.68
7	323.62	263.25
8	334.87	279.80
9	342.28	298.37
10	352.31	315.67
11	364.16	331.79
12	376.79	347.29
13	386.02	365.04
14	400.12	379.22
15	414.11	393.52
16	422.83	411.51
17	424.32	413.80

*** 2.635 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	63.96	321.70
2	73.59	315.28
3	93.32	311.97
4	227.44	248.50
5	280.94	248.04
6	294.75	262.51
7	308.50	277.04
8	320.99	292.65
9	334.77	307.15
10	346.32	323.47
11	360.40	337.68
12	374.26	352.10
13	387.86	366.76
14	390.03	386.65
15	397.82	405.06
16	397.93	412.50

*** 2.646 ***

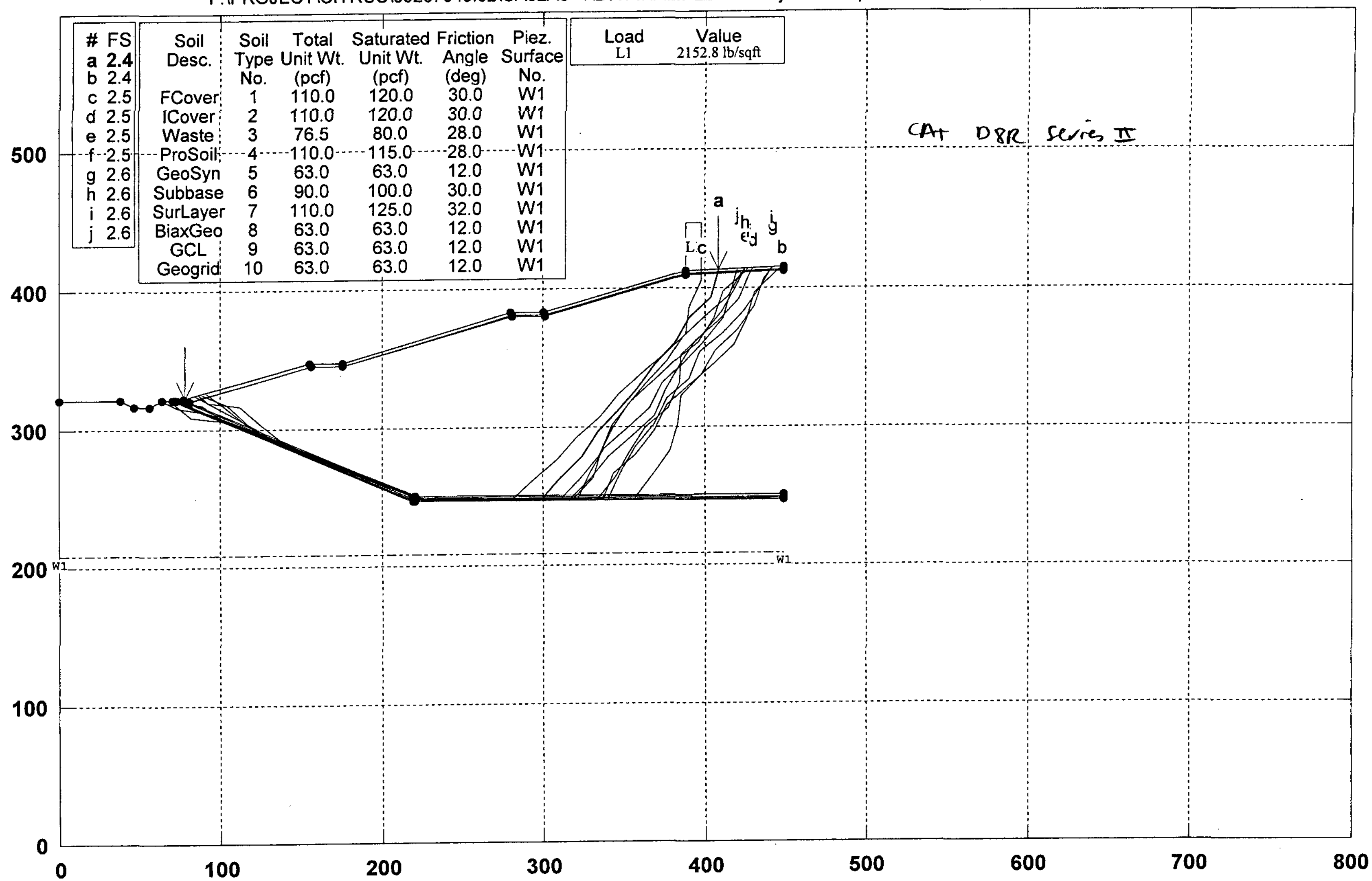
Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	86.80	325.03
2	92.29	319.98
3	108.99	308.98
4	125.76	298.08
5	141.49	285.72
6	159.80	277.68
7	225.54	247.90
8	356.87	248.94
9	367.59	265.83
10	378.00	282.90
11	383.67	302.08
12	385.38	322.01
13	397.60	337.83
14	406.71	355.64
15	420.43	370.19
16	430.39	387.54
17	436.87	406.46

```
    18         442.27       414.68
        ***      2.656     ***
Failure Surface Specified By 18 Coordinate Points
    Point      X-Surf       Y-Surf
     No.        (ft)         (ft)
      1         86.61       324.97
      2         94.95       317.47
      3        110.90       305.41
      4        125.17       291.39
      5        144.30       285.58
      6        224.76       248.25
      7        330.16       247.70
      8        337.65       266.25
      9        349.10       282.65
     10        357.90       300.61
     11        370.72       315.96
     12        372.64       335.87
     13        386.34       350.44
     14        400.45       364.61
     15        414.34       379.00
     16        428.01       393.60
     17        442.14       407.75
     18        447.92       414.96
        ***      2.678     ***
Failure Surface Specified By 17 Coordinate Points
    Point      X-Surf       Y-Surf
     No.        (ft)         (ft)
      1         84.64       324.31
      2         92.45       319.48
      3        112.23       316.55
      4        126.54       302.57
      5        140.85       288.60
      6        223.28       247.39
      7        321.79       248.31
      8        328.77       267.05
      9        338.39       284.58
     10        351.94       299.29
     11        366.08       313.44
     12        373.58       331.98
     13        387.00       346.81
     14        400.18       361.85
     15        410.83       378.78
     16        416.43       397.98
     17        420.42       413.61
        ***      2.681     ***
```

Citrus County Phase 3 Expansion West Final Buildout Side Slope

F:\PROJECT\CITRUS\09207049.02\CA32A6~1\BWFINAL.PL2 Run By: Dominique H. Bramlett, P.E. 8/31/2009 11:38AM



STABL6H FSmin=2.4

Safety Factors Are Calculated By The Modified Janbu Method for the case of BOUNDARY LOAD(S)

SCS ENGINEERS

**** STABL6H ****
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 8/31/2009
Time of Run: 11:38AM
Run By: Dominique H. Bramlett, P.E.
Input Data Filename: F:bwfinal.
Output Filename: F:bwfinal.OUT
Plotted Output Filename: F:bwfinal.PLT
PROBLEM DESCRIPTION Citrus County Phase 3 Expansion
West Final Buildout Side Slope

BOUNDARY COORDINATES
15 Top Boundaries
41 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	321.70	37.60	321.70	7
2	37.60	321.70	46.60	316.70	7
3	46.60	316.70	56.20	316.70	7
4	56.20	316.70	63.70	321.70	7
5	63.70	321.70	70.20	321.80	7
6	70.20	321.80	71.30	321.90	8
7	71.30	321.90	72.40	321.90	5
8	72.40	321.90	73.40	321.90	10
9	73.40	321.90	77.70	322.00	4
10	77.70	322.00	155.70	348.00	1
11	155.70	348.00	175.70	348.00	1
12	175.70	348.00	280.00	383.00	1
13	280.00	383.00	300.70	383.00	1
14	300.70	383.00	387.70	412.00	1
15	387.70	412.00	448.80	415.00	1
16	80.30	320.70	156.10	346.00	2
17	156.10	346.00	176.10	346.00	2
18	176.10	346.00	281.10	381.00	2
19	281.10	381.00	301.10	381.00	2
20	301.10	381.00	388.10	410.00	2
21	388.10	410.00	448.80	413.00	2
22	77.70	322.00	80.30	320.70	4
23	80.90	320.40	156.10	345.50	3
24	156.10	345.50	176.10	345.50	3
25	176.10	345.50	281.10	380.50	3
26	281.10	380.50	301.10	380.50	3
27	301.10	380.50	388.20	409.50	3
28	388.20	409.50	448.80	412.50	3
29	80.30	320.70	80.90	320.40	4
30	80.90	320.40	219.70	251.00	4
31	219.70	251.00	448.80	251.00	4
32	73.40	321.90	219.30	249.00	10
33	219.30	249.00	448.80	249.00	5
34	72.40	321.90	219.10	248.50	5
35	219.10	248.50	219.30	249.00	5
36	71.30	321.90	219.00	248.00	8
37	219.00	248.00	448.80	248.00	9
38	219.00	248.00	219.30	247.50	8
39	219.30	247.50	448.80	247.50	8
40	70.20	321.80	219.90	247.00	7
41	219.90	247.00	448.80	247.00	7

ISOTROPIC SOIL PARAMETERS
10 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	1
2	110.0	120.0	.0	30.0	.00	.0	1

3	76.5	80.0	.0	28.0	.00	.0	1
4	110.0	115.0	.0	28.0	.00	.0	1
5	63.0	63.0	.0	12.0	.00	.0	1
6	90.0	100.0	.0	30.0	.00	.0	1
7	110.0	125.0	.0	32.0	.00	.0	1
8	63.0	63.0	.0	12.0	.00	.0	1
9	63.0	63.0	.0	12.0	.00	.0	1
10	63.0	63.0	.0	12.0	.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 No.	X-Water (ft)	Y-Water (ft)
1	.00	208.50
2	448.80	208.50

BOUNDARY LOAD(S)
1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	387.70	398.20	2152.8	.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 Sliding Block Surfaces, Has Been
Specified.
100 Trial Surfaces Have Been Generated.
3 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of
Sliding Block Is 20.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	79.00	318.80	216.40	250.10	3.00
2	222.70	248.70	227.70	248.70	3.00
3	232.70	248.70	392.20	248.70	3.00

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 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.13	322.14
2	84.12	316.16
3	223.88	248.08
4	298.93	247.90
5	311.33	263.59
6	324.13	278.96
7	333.79	296.46
8	347.08	311.41
9	358.66	327.72
10	368.90	344.90
11	381.83	360.16
12	390.13	378.35
13	403.42	393.31
14	408.25	412.71
15	408.55	413.02

*** 2.425 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	69.09	321.78
2	80.92	316.76
3	99.19	308.62
4	226.90	247.27
5	336.97	247.28
6	343.26	266.27
7	357.40	280.41

8	368.38	297.13
9	376.75	315.29
10	390.21	330.09
11	404.07	344.51
12	418.15	358.71
13	426.16	377.03
14	430.99	396.44
15	444.52	411.17
16	448.24	414.97

*** 2.448 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	63.96	321.70
2	73.59	315.28
3	93.32	311.97
4	227.44	248.50
5	280.94	248.04
6	294.75	262.51
7	308.50	277.04
8	320.99	292.65
9	334.77	307.15
10	346.32	323.47
11	360.40	337.68
12	374.26	352.10
13	387.86	366.76
14	390.03	386.65
15	397.82	405.06
16	397.93	412.50

*** 2.450 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	91.39	326.56
2	102.12	316.49
3	116.63	302.72
4	133.50	291.99
5	227.55	248.22
6	316.37	247.66
7	329.68	262.59
8	340.70	279.28
9	354.84	293.43
10	368.65	307.89
11	375.49	326.69
12	384.09	344.74
13	394.18	362.01
14	407.92	376.54
15	420.80	391.85
16	427.92	410.53
17	429.79	414.07

*** 2.455 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	67.22	321.75
2	68.93	321.14
3	88.68	317.95
4	104.05	305.15
5	223.45	248.92
6	333.27	247.34
7	344.30	264.02
8	353.21	281.93
9	363.26	299.22
10	377.34	313.42
11	383.78	332.36
12	385.32	352.30
13	399.15	366.75

```
  14        410.31      383.34
  15        419.44      401.14
  16        425.16      413.84
      ***     2.502    ***
Failure Surface Specified By 16 Coordinate Points
  Point     X-Surf      Y-Surf
   No.       (ft)        (ft)
    1       68.76      321.78
    2       82.49      309.32
    3      102.27      306.36
    4      226.82      247.28
    5      318.13      248.58
    6      331.49      263.46
    7      335.50      283.06
    8      343.05      301.57
    9      353.93      318.36
   10      367.97      332.60
   11      381.72      347.12
   12      395.87      361.26
   13      405.77      378.64
   14      411.58      397.78
   15      425.36      412.27
   16      426.37      413.90
      ***     2.536    ***
Failure Surface Specified By 18 Coordinate Points
  Point     X-Surf      Y-Surf
   No.       (ft)        (ft)
    1       86.80      325.03
    2       92.29      319.98
    3      108.99      308.98
    4      125.76      298.08
    5      141.49      285.72
    6      159.80      277.68
    7      225.54      247.90
    8      356.87      248.94
    9      367.59      265.83
   10      378.00      282.90
   11      383.67      302.08
   12      385.38      322.01
   13      397.60      337.83
   14      406.71      355.64
   15      420.43      370.19
   16      430.39      387.54
   17      436.87      406.46
   18      442.27      414.68
      ***     2.561    ***
Failure Surface Specified By 17 Coordinate Points
  Point     X-Surf      Y-Surf
   No.       (ft)        (ft)
    1       88.38      325.56
    2      104.01      317.64
    3      118.18      303.53
    4      133.23      290.36
    5      222.78      249.78
    6      311.08      247.68
    7      323.62      263.25
    8      334.87      279.80
    9      342.28      298.37
   10      352.31      315.67
   11      364.16      331.79
   12      376.79      347.29
   13      386.02      365.04
   14      400.12      379.22
   15      414.11      393.52
   16      422.83      411.51
   17      424.32      413.80
      ***     2.562    ***
```

Failure Surface Specified By 14 Coordinate Points

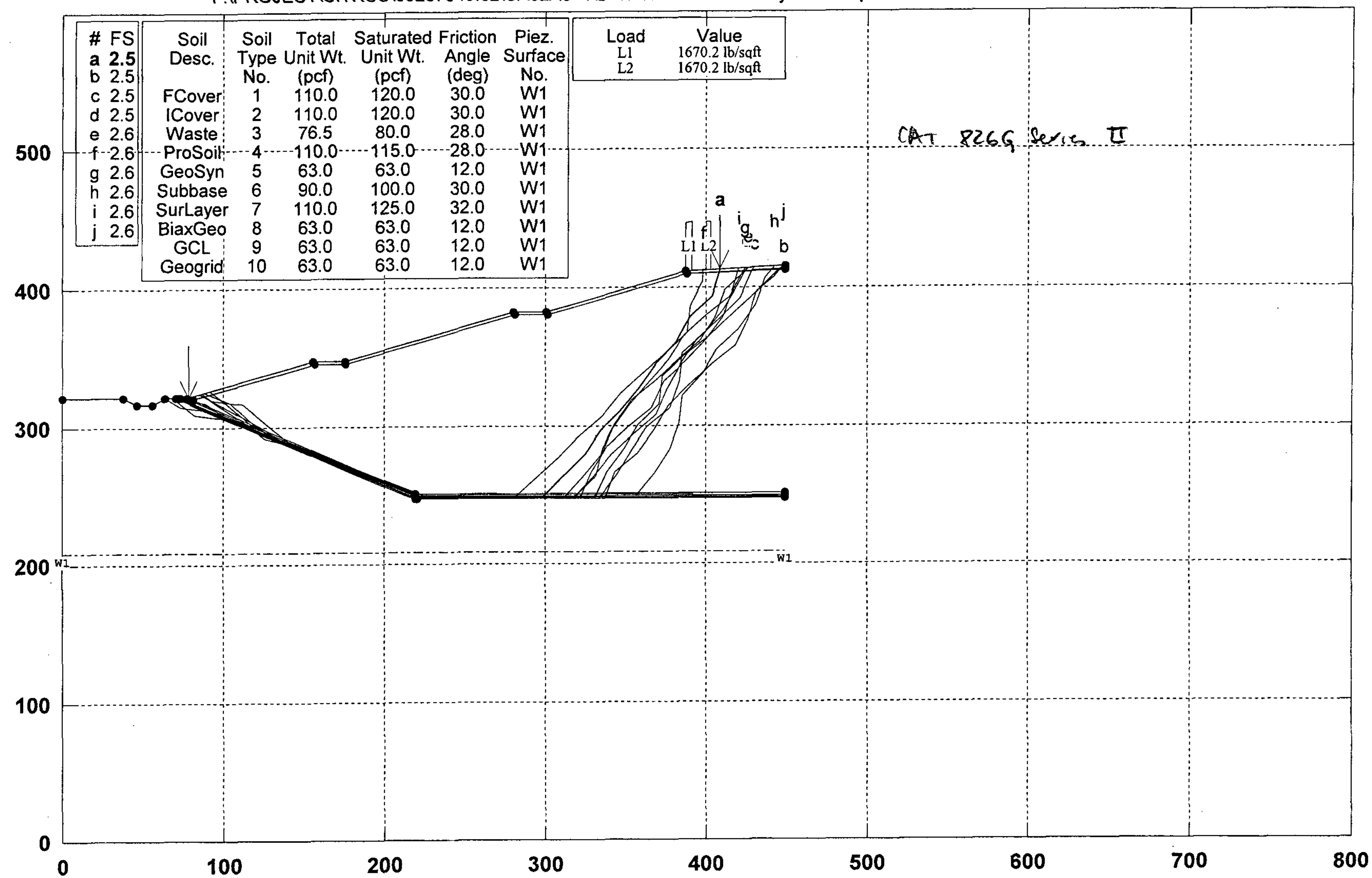
Point No.	X-Surf (ft)	Y-Surf (ft)
1	70.68	321.84
2	87.24	314.11
3	224.39	247.89
4	340.56	249.57
5	348.31	268.00
6	357.04	286.00
7	368.87	302.12
8	376.10	320.77
9	389.69	335.44
10	396.72	354.17
11	410.86	368.31
12	424.15	383.26
13	434.76	400.21
14	441.22	414.63
***	2.564	***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	84.64	324.31
2	92.45	319.48
3	112.23	316.55
4	126.54	302.57
5	140.85	288.60
6	223.28	247.39
7	321.79	248.31
8	328.77	267.05
9	338.39	284.58
10	351.94	299.29
11	366.08	313.44
12	373.58	331.98
13	387.00	346.81
14	400.18	361.85
15	410.83	378.78
16	416.43	397.98
17	420.42	413.61
***	2.598	***

Citrus County Phase 3 Expansion West Final Buildout Side Slope

F:\PROJECT\CITRUS\09207049.02\CA32A6~1\BWFINAL.PL2 Run By: Dominique H. Bramlett, P.E. 8/31/2009 11:35AM



#	FS
a	**2.5**
b	2.5
c	2.5
d	2.5
e	2.6
f	2.6
g	2.6
h	2.6
i	2.6
j	2.6

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
FCover	1	110.0	120.0	30.0	W1
ICover	2	110.0	120.0	30.0	W1
Waste	3	76.5	80.0	28.0	W1
ProSoil	4	110.0	115.0	28.0	W1
GeoSyn	5	63.0	63.0	12.0	W1
Subbase	6	90.0	100.0	30.0	W1
SurLayer	7	110.0	125.0	32.0	W1
BiaxGeo	8	63.0	63.0	12.0	W1
GCL	9	63.0	63.0	12.0	W1
Geogrid	10	63.0	63.0	12.0	W1

Load	Value
L1	1670.2 lb/sqft
L2	1670.2 lb/sqft

STABL6H FSmin=2.5

Safety Factors Are Calculated By The Modified Janbu Method

SCS ENGINEERS

**** STABL6H ****
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 8/31/2009
Time of Run: 11:35AM
Run By: Dominique H. Bramlett, P.E.
Input Data Filename: F:bwfinal.
Output Filename: F:bwfinal.OUT
Plotted Output Filename: F:bwfinal.PLT
PROBLEM DESCRIPTION Citrus County Phase 3 Expansion
West Final Buildout Side Slope

BOUNDARY COORDINATES
15 Top Boundaries
41 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	321.70	37.60	321.70	7
2	37.60	321.70	46.60	316.70	7
3	46.60	316.70	56.20	316.70	7
4	56.20	316.70	63.70	321.70	7
5	63.70	321.70	70.20	321.80	7
6	70.20	321.80	71.30	321.90	8
7	71.30	321.90	72.40	321.90	5
8	72.40	321.90	73.40	321.90	10
9	73.40	321.90	77.70	322.00	4
10	77.70	322.00	155.70	348.00	1
11	155.70	348.00	175.70	348.00	1
12	175.70	348.00	280.00	383.00	1
13	280.00	383.00	300.70	383.00	1
14	300.70	383.00	387.70	412.00	1
15	387.70	412.00	448.80	415.00	1
16	80.30	320.70	156.10	346.00	2
17	156.10	346.00	176.10	346.00	2
18	176.10	346.00	281.10	381.00	2
19	281.10	381.00	301.10	381.00	2
20	301.10	381.00	388.10	410.00	2
21	388.10	410.00	448.80	413.00	2
22	77.70	322.00	80.30	320.70	4
23	80.90	320.40	156.10	345.50	3
24	156.10	345.50	176.10	345.50	3
25	176.10	345.50	281.10	380.50	3
26	281.10	380.50	301.10	380.50	3
27	301.10	380.50	388.20	409.50	3
28	388.20	409.50	448.80	412.50	3
29	80.30	320.70	80.90	320.40	4
30	80.90	320.40	219.70	251.00	4
31	219.70	251.00	448.80	251.00	4
32	73.40	321.90	219.30	249.00	10
33	219.30	249.00	448.80	249.00	5
34	72.40	321.90	219.10	248.50	5
35	219.10	248.50	219.30	249.00	5
36	71.30	321.90	219.00	248.00	8
37	219.00	248.00	448.80	248.00	9
38	219.00	248.00	219.30	247.50	8
39	219.30	247.50	448.80	247.50	8
40	70.20	321.80	219.90	247.00	7
41	219.90	247.00	448.80	247.00	7

ISOTROPIC SOIL PARAMETERS
10 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	1
2	110.0	120.0	.0	30.0	.00	.0	1

3	76.5	80.0	.0	28.0	.00	.0	1
4	110.0	115.0	.0	28.0	.00	.0	1
5	63.0	63.0	.0	12.0	.00	.0	1
6	90.0	100.0	.0	30.0	.00	.0	1
7	110.0	125.0	.0	32.0	.00	.0	1
8	63.0	63.0	.0	12.0	.00	.0	1
9	63.0	63.0	.0	12.0	.00	.0	1
10	63.0	63.0	.0	12.0	.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 No.	X-Water (ft)	Y-Water (ft)
1	.00	208.50
2	448.80	208.50

BOUNDARY LOAD(S)
2 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	387.70	390.92	1670.2	.0
2	399.84	403.06	1670.2	.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 Sliding Block Surfaces, Has Been Specified.
100 Trial Surfaces Have Been Generated.
3 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 20.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	79.00	318.80	216.40	250.10	3.00
2	222.70	248.70	227.70	248.70	3.00
3	232.70	248.70	392.20	248.70	3.00

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 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.13	322.14
2	84.12	316.16
3	223.88	248.08
4	298.93	247.90
5	311.33	263.59
6	324.13	278.96
7	333.79	296.46
8	347.08	311.41
9	358.66	327.72
10	368.90	344.90
11	381.83	360.16
12	390.13	378.35
13	403.42	393.31
14	408.25	412.71
15	408.55	413.02

*** 2.468 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	69.09	321.78
2	80.92	316.76
3	99.19	308.62
4	226.90	247.27
5	336.97	247.28
6	343.26	266.27

7	357.40	280.41
8	368.38	297.13
9	376.75	315.29
10	390.21	330.09
11	404.07	344.51
12	418.15	358.71
13	426.16	377.03
14	430.99	396.44
15	444.52	411.17
16	448.24	414.97

*** 2.481 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	91.39	326.56
2	102.12	316.49
3	116.63	302.72
4	133.50	291.99
5	227.55	248.22
6	316.37	247.66
7	329.68	262.59
8	340.70	279.28
9	354.84	293.43
10	368.65	307.89
11	375.49	326.69
12	384.09	344.74
13	394.18	362.01
14	407.92	376.54
15	420.80	391.85
16	427.92	410.53
17	429.79	414.07

*** 2.505 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	67.22	321.75
2	68.93	321.14
3	88.68	317.95
4	104.05	305.15
5	223.45	248.92
6	333.27	247.34
7	344.30	264.02
8	353.21	281.93
9	363.26	299.22
10	377.34	313.42
11	383.78	332.36
12	385.32	352.30
13	399.15	366.75
14	410.31	383.34
15	419.44	401.14
16	425.16	413.84

*** 2.532 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	68.76	321.78
2	82.49	309.32
3	102.27	306.36
4	226.82	247.28
5	318.13	248.58
6	331.49	263.46
7	335.50	283.06
8	343.05	301.57
9	353.93	318.36
10	367.97	332.60
11	381.72	347.12
12	395.87	361.26

13	405.77	378.64
14	411.58	397.78
15	425.36	412.27
16	426.37	413.90

*** 2.573 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	63.96	321.70
2	73.59	315.28
3	93.32	311.97
4	227.44	248.50
5	280.94	248.04
6	294.75	262.51
7	308.50	277.04
8	320.99	292.65
9	334.77	307.15
10	346.32	323.47
11	360.40	337.68
12	374.26	352.10
13	387.86	366.76
14	390.03	386.65
15	397.82	405.06
16	397.93	412.50

*** 2.574 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	88.38	325.56
2	104.01	317.64
3	118.18	303.53
4	133.23	290.36
5	222.78	249.78
6	311.08	247.68
7	323.62	263.25
8	334.87	279.80
9	342.28	298.37
10	352.31	315.67
11	364.16	331.79
12	376.79	347.29
13	386.02	365.04
14	400.12	379.22
15	414.11	393.52
16	422.83	411.51
17	424.32	413.80

*** 2.599 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	86.80	325.03
2	92.29	319.98
3	108.99	308.98
4	125.76	298.08
5	141.49	285.72
6	159.80	277.68
7	225.54	247.90
8	356.87	248.94
9	367.59	265.83
10	378.00	282.90
11	383.67	302.08
12	385.38	322.01
13	397.60	337.83
14	406.71	355.64
15	420.43	370.19
16	430.39	387.54
17	436.87	406.46
18	442.27	414.68

*** 2.601 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	84.64	324.31
2	92.45	319.48
3	112.23	316.55
4	126.54	302.57
5	140.85	288.60
6	223.28	247.39
7	321.79	248.31
8	328.77	267.05
9	338.39	284.58
10	351.94	299.29
11	366.08	313.44
12	373.58	331.98
13	387.00	346.81
14	400.18	361.85
15	410.83	378.78
16	416.43	397.98
17	420.42	413.61

*** 2.634 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	86.61	324.97
2	94.95	317.47
3	110.90	305.41
4	125.17	291.39
5	144.30	285.58
6	224.76	248.25
7	330.16	247.70
8	337.65	266.25
9	349.10	282.65
10	357.90	300.61
11	370.72	315.96
12	372.64	335.87
13	386.34	350.44
14	400.45	364.61
15	414.34	379.00
16	428.01	393.60
17	442.14	407.75
18	447.92	414.96

*** 2.641 ***

PHASE 3 FINAL BUILD-OUT SLOPE, WEST SIDE					
WEST SIDE SECTION - SLOPE STABILITY LINE SEGMENT COORDINATES					
LINE	**X**	**Y**	**X**	**Y**	**SOIL**
SEGMENT					
1TOP	0.0	321.7	37.6	321.7	7
2TOP	37.6	321.7	46.6	316.7	7
3TOP	46.6	316.7	56.2	316.7	7
4TOP	56.2	316.7	63.7	321.7	7
5TOP	63.7	321.7	70.2	321.8	7
6TOP	70.2	321.8	71.3	321.9	8
7TOP	71.3	321.9	72.4	321.9	5
8TOP	72.4	321.9	73.4	321.9	10
9TOP	73.4	321.9	77.7	322.0	4
10TOP	77.7	322.0	155.7	348.0	1
11TOP	155.7	348.0	175.7	348.0	1
12TOP	175.7	348.0	280.0	383.0	1
13TOP	280.0	383.0	300.7	383.0	1
14TOP	300.7	383.0	387.7	412.0	1
15TOP	387.7	412.0	448.8	415.0	1
16	80.3	320.7	156.1	346.0	2
17	156.1	346.0	176.1	346.0	2
18	176.1	346.0	281.1	381.0	2
19	281.1	381.0	301.1	381.0	2
20	301.1	381.0	388.1	410.0	2
21	388.1	410.0	448.8	413.0	2
22	77.7	322.0	80.3	320.7	4
23	80.9	320.4	156.1	345.5	3
24	156.1	345.5	176.1	345.5	3
25	176.1	345.5	281.1	380.5	3
26	281.1	380.5	301.1	380.5	3
27	301.1	380.5	388.2	409.5	3
28	388.2	409.5	448.8	412.5	3
29	80.3	320.7	80.9	320.4	4
30	80.9	320.4	219.7	251.0	4
31	219.7	251.0	448.8	251.0	4
32	73.4	321.9	219.3	249.0	10
33	219.3	249.0	448.8	249.0	5
34	72.4	321.9	219.1	248.5	5
35	219.1	248.5	219.3	249	5
36	71.3	321.9	219	248	8
37	219.0	248.0	448.8	248.0	9
38	219.0	248.0	219.3	247.5	8
39	219.3	247.5	448.8	247.5	8
40	70.2	321.8	219.9	247.0	7
41	219.9	247.0	448.8	247.0	7

SOIL DESIGNATIONS

1 Final Cover
2 Initial Cover
3 Waste
4 Protective Soil Cover
5 Geosynthetic Layer
6 Existing Soil (Subbase)
7 Surficial Layer
8 Biaxial Geogrid
9 GCL
10 Geogrid

WATER TABLE

EL 208.5FT NGVD

EQUIPMENT LOADING

Caterpillar Performance Handbook

Edition 33

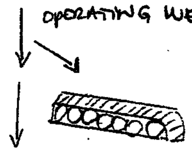
CATERPILLAR®

SOURCE; CATERPILLAR PERFORMANCE HANDBOOK
EDITION 33

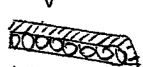
MODEL	D8R Series II WHA		D9R WHA		D10R WHA	
Flywheel Power	231 kW	310 hp	306 kW	410 hp	433 kW	580 hp
Operating Weight*	—		—		65 764 kg	144,986 lb
Power Shift Clutch Brake OPERATING	—		48 425 kg	106,664 lb	—	
Power Shift Differential Steer WEIGHT	37 875 kg	83,500 lb	49 567 kg	109,180 lb	—	
Engine Model	3406E TA		3408E TA		3412E TA	
Rated Engine RPM	2000		1900		1800	
No. of Cylinders	6		8		12	
Bore	137 mm	5.4"	137 mm	5.4"	137 mm	5.4"
Stroke	165 mm	6.5"	152 mm	6"	152 mm	6"
Displacement TRACK	14.6 L	893 in³	18 L	1099 in³	27 L	1649 in³
Track Rollers (Each Side) WIDTH	8		8		8	
Width of Standard Track Shoe	560 mm	1'10"	610 mm	2'0"	610 mm	2'0"
Length of Track on Ground TRACK	3.21 m	10'6"	3.47 m	11'5"	3.88 m	12'9"
Ground Contact Area (w/Std. Shoe) LENGTH	3.57 m²	5544 in²	4.24 m²	6569 in²	4.74 m²	7347 in²
Track Gauge	2.08 m	6'10"	2.25 m	7'5"	2.55 m	8'4"
GENERAL DIMENSIONS: TRACK						
Height (Stripped Top)** GAUGE	2.67 m	8'9"	3.00 m	9'10"	3.217 m	10'6"
Height (To Top of ROPS Canopy)	3.51 m	11'6"	3.99 m	13'1"	4.36 m	14'3"
Height (To Top of ROPS Cab)	3.51 m	11'6"	3.82 m	12'6"	4.10 m	13'5"
Overall Length (with Blade & Ripper)	—		—		9.39 m	30'10"
(without Blade & Ripper)	—		—		5.33 m	17'6"
Overall Length (with SU Blade)***	6.91 m	22'8"	6.84 m	22'5"	—	
(without Blade)	4.93 m	16'2"	5.18 m	17'0"	—	
Width (Over Trunnion)	3.05 m	10'0"	3.30 m	10'10"	3.72 m	12'2"
Width (without Trunnion — Std. Shoe)	2.70 m	8'8"	2.93 m	9'8"	3.16 m	10'4"
Ground Clearance	606 mm	1'11"	591 mm	1'11"■	615 mm	2'0.2"■
Blade Types and Widths:						
Angle Straight	4.99 m	16'4"	—		—	
Full 25° Angle	4.52 m	14'10"	—		—	
Universal	4.26 m	14'0"	4.65 m	15'3"	5.26 m	17'3"
Semi-U	3.94 m	12'11"	4.31 m	14'2"	4.86 m	15'11"
Fuel Tank Refill Capacity	625 L	165 U.S. gal	818 L	216 U.S. gal	1109 L	293 U.S. gal

* Operating Weight includes ROPS canopy, operator, lubricants, coolant, full fuel tank, hydraulic controls and fluids, semi universal blade with tilt, back-up alarm, seat belts, lights, rigid drawbar and front towing device.
— D8R and D9R equipped with track guides, ROPS/FOPS cab, single shank ripper and SU blade.
— D10R includes 10 SU blade single shank ripper and ROPS cab.
** Height (stripped top) — without ROPS canopy, exhaust, seat back or other easily removed encumbrances.
*** Includes drawbar.
■ SAE J1234.

OPERATING WEIGHT = 83,500 lb

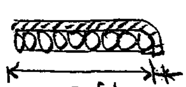


41,750 lb/track



41,750 lb/track

Stress per track



10.5 ft

1.83 ft

$A = 10.5 \times 1.83 = 19.22\ ft^2$

$\text{Stress loading} = F/A = \frac{41{,}750}{19.22} = 2172.78\,psf$

826G Series II

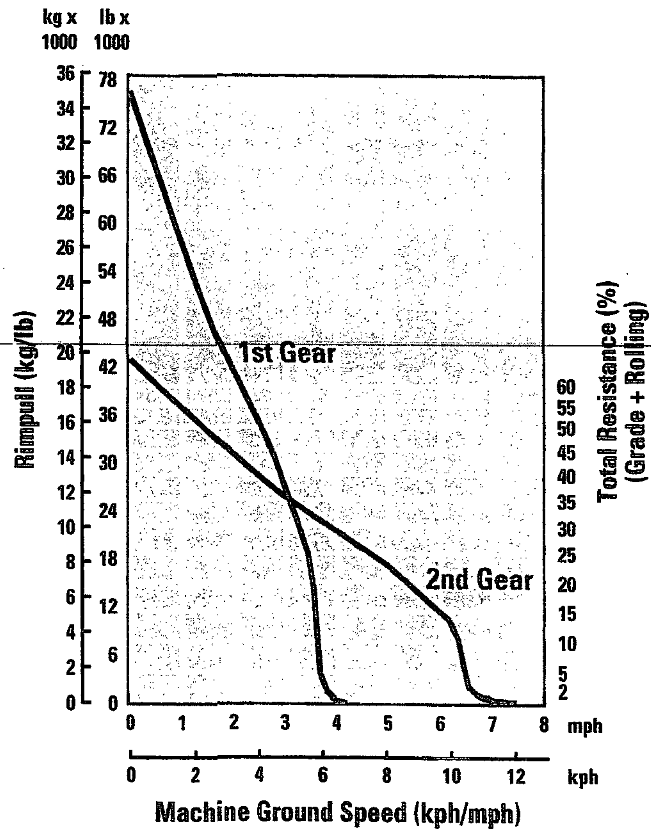
Landfill Compactor

CAT

Engine

Engine Model	Cat 3406E ATAAC Diesel	
Gross Power	283 kW	380 hp
Flywheel Power	253 kW	340 hp
Net Power ISO 3046-2	253 kW	340 hp
Net Power ISO 9249	253 kW	340 hp
SAE J1349	253 kW	340 hp
EEC 80/1269	253 kW	340 hp
DIN 70020	327 PS	
Peak Torque (Net) @ 1200 RPM	1671 N•m	1232.5 ft-lb
Torque Rise	28 %	
Bore	137 mm	5.4 in
Stroke	165 mm	6.5 in
Displacement	14.6 L	893 in³

- Meets U.S. Environmental Protection Agency Tier 2 emissions regulations and Stage II EU Emissions Directive 97/68/EC.



Transmission

Forward 1	5.8 kph	3.6 mph
Forward 2	9.7 kph	6 mph
Reverse 1	6.6 kph	4.1 mph
Reverse 2	10.6 kph	6.6 mph

Hydraulic System

Vane Pump Output @ 2000 RPM and 6900 kPa (1000 psi)	102 L/min	26.5 gal/min
Relief Valve Setting	24 100 kPa	3,500 psi
Lift Cylinder Bore × Stroke	114.3 mm × 576 mm	4.49 in × 22.68 in

Axles

Front	Planetary – Fixed
Oscillating Rear	Planetary – Oscillating ±5°

Brakes

Standards	Meet OSHA, SAE J1473 Dec 84, ISO 3450-1985 standards.

Wheels – Plus Tip Teeth with Abrasion Resistant Material (ARM)

Drum Width	1200 mm	3.94 ft
Drum Diameter	1532 mm	5.03 ft
Diameter with Tips	1850 mm	6.07 ft
Tips per Wheel	25	

Wheels – Traction Tip Wheel with Abrasion Resistant Material (ARM)

Drum Width	1200 mm	3.94 ft
Drum Diameter	1532 mm	5.03 ft
Diameter with Tips	1732 mm	5.7 ft
Tips per Wheel	45	

Wheels – Chevron-Pattern, Chopper Blades

Drum Width	1200 mm	3.94 ft
Drum Diameter	1532 mm	5.03 ft
Diameter with Blades	1850 mm	6.07 ft
Blades per Wheel	25	

- Other wheel options available through customizing.

Straight Blade

Width Over End Bits	4502 mm	14.77 ft
Moldboard Length	4287 mm	14.06 ft
Height	1898 mm	6.23 ft
Lift Speed at Rated RPM	440 m/sec	1.42 ft/sec
Cutting Edges (2), Reversible, End Section Length (Each)	1773.4 mm	5.83 ft
Cutting Edges (2), Reversible, Width × Thickness	254 mm × 25 mm	10 in × 1 in
End Bits (2), Self-sharpening, Length (Each)	472 mm	19 in
End Bits (2), Self-sharpening, Width × Thickness	254 mm × 25 mm	10 in × 1 in

- See your Cat dealer for other blade options.

Service Refill Capacities

Fuel Tank	630 L	166.5 gal
Cooling System	83 L	21.9 gal
Crankcase	34 L	9 gal
Transmission	62 L	16.4 gal
Differentials and Final Drives – Front	90 L	23.8 gal
Differentials and Final Drives – Rear	90 L	23.8 gal
Hydraulic Tank	88 L	23.2 gal

Weights

Maximum Operating Weight	36 967 kg	81,498 lb

- Machine configured with heaviest options, 80 kg (176 lb) operator and full fuel tank.

Cab

ROPS/FOPS	Meets SAE and ISO standards.

- Caterpillar cab and Rollover Protective Structure/Falling Object Protective Structure (ROPS/FOPS) are standard in North America, Europe and Japan.
- Standard air conditioning system contains environmentally-friendly R134a refrigerant.
- ROPS meets SAE J394, SAE 1040 APR88 and ISO 3471-1986 standards.
- FOPS meets SAE J231 JAN81 and ISO 3449-194 standards.

Sound Performance

Standards	Meets ANSI/SAE and ISO standards.

- The operator sound exposure Leq (equivalent sound pressure level) measured according to the work cycle procedures specified in ANSI/SAE J1166 OCT98 is 80 dB(A), for the cab offered by Caterpillar, when properly installed, maintained and tested with the doors and windows closed.
- Hearing protection may be needed when operating with an open operator station and cab (when not properly maintained or doors/windows open) for extended periods or in noisy environment.
- The exterior sound pressure level for the standard machine measured at a distance of 15 m (49.2 ft) according to the test procedures specified in SAE J88 JUN86 mid-gear-moving operation is 80 dB(A).
- The sound power level for the following configurations when measured according to the static test procedure and conditions specified in ISO 6393:1988 are:

  Standard Configuration 111 dB(A)

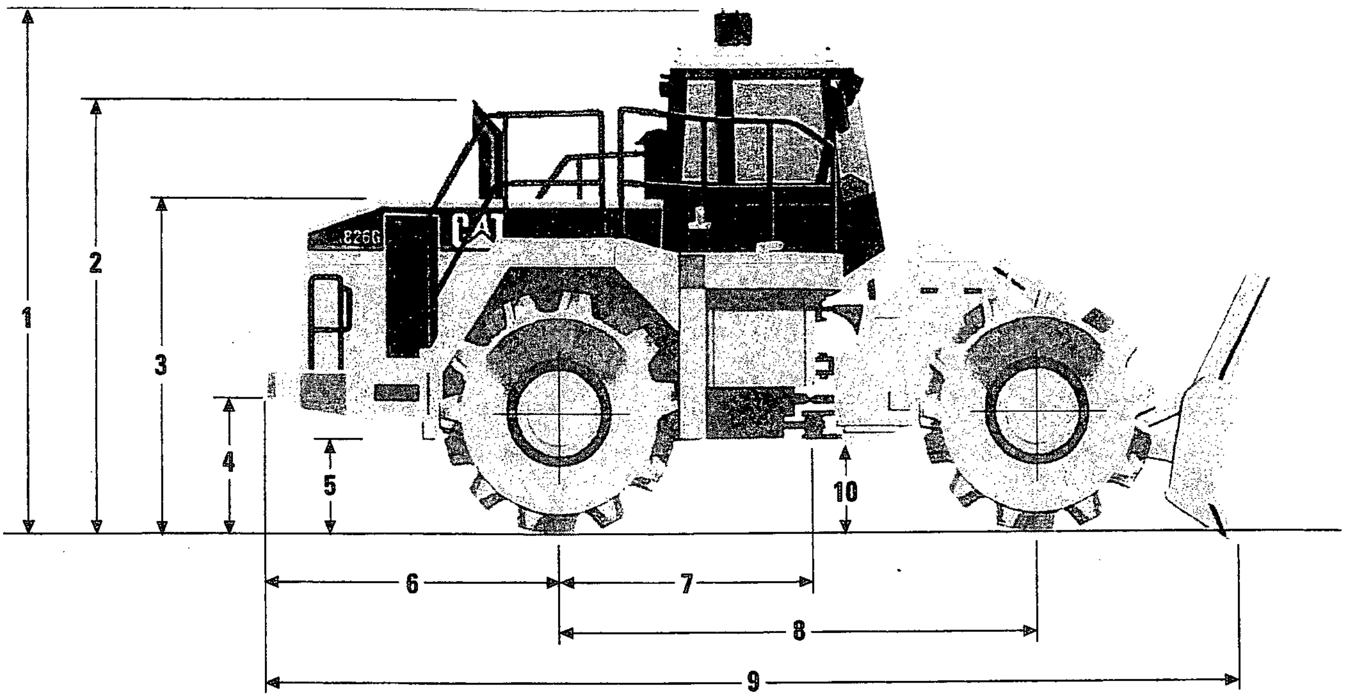
  Optional Sound Suppression 109 dB(A)

Dimensions

Width over Wheels	3800 mm	12.47 ft
Width over Endbits (Blade)	4502 mm	~~14.77 ft~~
Turning Radius – Inside	3221 mm	10.58 ft
Turning Radius – Outside	7333 mm	24.06 ft

Dimensions

All dimensions are approximate.



1	Height to Top of Cab with A/C	4191.1 mm	13.75 ft
2	Height to Top of Exhaust Pipe	3830 mm	12.57 ft
3	Height to Top of Hood	2700.51 mm	8.86 ft
4	Ground Clearance to Counterweight	1032.5 mm	3.38 ft
5	Height to Bottom of Ladder	709.9 mm	2.33 ft
6	Center Line of Rear Axle to Edge of Counterweight	2624 mm	8.61 ft
7	Center Line of Rear Axle to Hitch	1850 mm	6.07 ft
8	Wheelbase	3700 mm	12.14 ft
9	Length with Blade on Ground	8268 mm	27.13 ft
10	Ground Clearance	489 mm	1.6 ft

Operating weight 81,498 lb

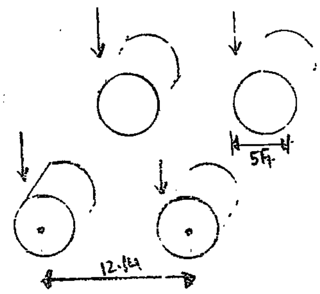
Weight Distribution

52% Rear

48% front

Rear = 42,378.96 lb

front = 39,119.04 lb

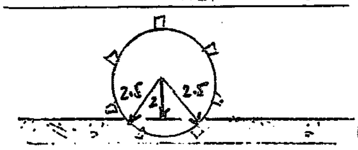


Drum width = 3.94 ft

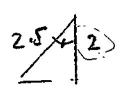
Drum dia = 5.03 ft

Wheel base = 12.14 ft

'Is' or ' Contact Area



Depth of Embedment

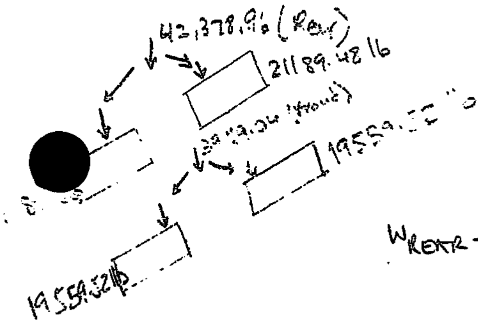


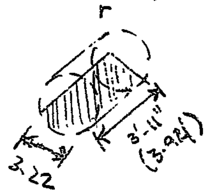
$\cos\phi = \frac{2}{2.5} \Rightarrow \phi_1 = 36.87$

$\phi_2 = 36.87$

73.74°

$\phi = \frac{s}{r} \Rightarrow s = 73.74\left(\frac{2\pi}{360}\right)2.5 = 3.22$





$W_{REAR} = \frac{21189.48}{(3.22)(3.94)} = 1670.20$ psf

$W_{FRONT} = \frac{19559.52}{...} = 1541.72$ psf

ATTACHMENT J-3

REFERENCE MATERIALS

5. GENERAL BEARING CAPACITY EQUATION

With *general shear failures*, the soil resists an increased load until a sudden failure occurs. *Local shear failure* occurs in looser, more compressible soils and at high bearing pressures. The boundaries between these types of behavior are not distinct, and the methods of calculating general shear failure are commonly used for most soil conditions.

The *ultimate* (or *gross*) *bearing capacity* for a shallow wall footing is given by Eq. 36.1, which is known as the *Terzaghi-Meyerhof equation*. The equation is valid for both sandy and clayey soils. p_q is an additional surface surcharge, if any.

$$q_{\text{ult}} = \tfrac{1}{2}\rho g B N_\gamma + cN_c + (p_q + \rho g D_f)N_q \quad \text{[SI]} \qquad 36.1(a)$$

$$q_{\text{ult}} = \tfrac{1}{2}\gamma B N_\gamma + cN_c + (p_q + \gamma D_f)N_q \quad \text{[U.S.]} \qquad 36.1(b)$$

Various researchers have made improvements on the theory supporting this equation, leading to somewhat different terms and sophistication in evaluating N_γ, N_c, and N_q. The approaches differ in the assumptions made of the shape of the failure zone beneath the footing. However, the general form of the equation is the same in most cases.

Figure 36.2 and Table 36.2 can be used to evaluate the *capacity factors* N_γ, N_c, and N_q in Eq. 36.1. Alternatively, Table 36.3 can be used. The bearing capacity factors in Table 36.2 are based on Terzaghi's 1943 studies. The values in Table 36.3 are based on Meyerhof's 1955 studies and others, and have been widely used. Other values are also in use.

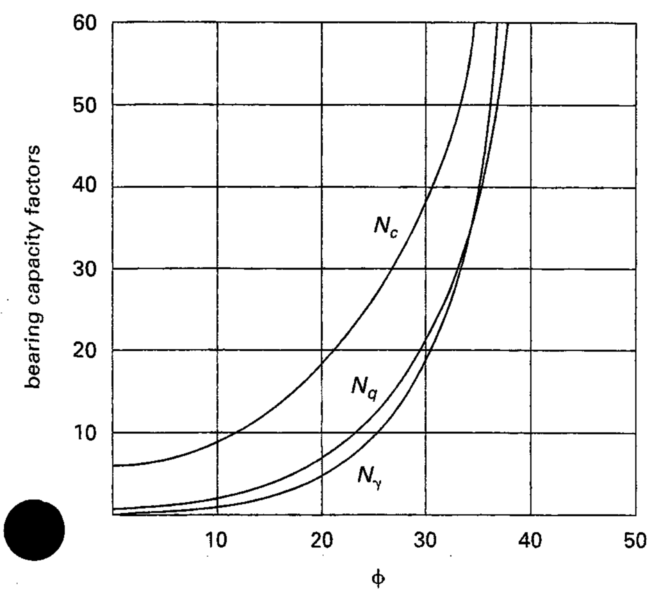


Figure 36.2 Terzaghi Bearing Capacity Factors

Table 36.2 Terzaghi Bearing Capacity Factors for General Shear[a]

Friction Angle

ϕ	N_c	N_q	N_γ
0	5.7	1.0	0.0
5	7.3	1.6	0.5
10	9.6	2.7	1.2
15	12.9	4.4	2.5
20	17.7	7.4	5.0
25	25.1	12.7	9.7
30	37.2	22.5	19.7
34	52.6	36.5	35.0
35	57.8	41.4	42.4
40	95.7	81.3	100.4
45	172.3	173.3	297.5
48	258.3	287.9	780.1
50	347.5	415.1	1153.2

[a]Do not use linear interpolation.

Table 36.3 Meyerhof and Vesic Bearing Capacity Factors for General Shear[a]

ϕ	N_c	N_q	N_γ	N_γ[b]
0	5.14	1.0	0.0	0.0
5	6.5	1.6	0.07	0.5
10	8.3	2.5	0.37	1.2
15	11.0	3.9	1.1	2.6
20	14.8	6.4	2.9	5.4
25	20.7	10.7	6.8	10.8
30	30.1	18.4	15.7	22.4
32	35.5	23.2	22.0	30.2
34	42.2	29.4	31.2	41.1
36	50.6	37.7	44.4	56.3
38	61.4	48.9	64.1	78.0
40	75.3	64.2	93.7	109.4
42	93.7	85.4	139.3	155.6
44	118.4	115.3	211.4	224.6
46	152.1	158.5	328.7	330.4
48	199.3	222.3	526.5	496.0
50	266.9	319.1	873.9	762.9

[a]Do not use linear interpolation.
[b]As predicted by the Vesic equation, $N_\gamma = 2(N_q + 1)\tan\phi$.

Equation 36.1 is appropriate for a foundation in a continuous wall footing. Corrections for various footing geometries, called *shape factors*, are presented in Tables 36.4 and 36.5 using the parameters identified in Fig. 36.3. The bearing capacity factors N_c and N_γ are multiplied by the appropriate shape factors when they are used in Eq. 36.1.

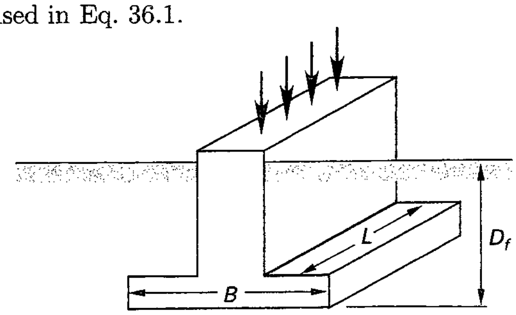


Figure 36.3 Spread Footing Dimensions

Geotechnical

Table 36.4 *N_c Bearing Capacity Factor Multipliers for Various Values of B/L*

B/L	multiplier
1 (square)	1.25
0.5	1.12
0.2	1.05
0.0	1.00
1 (circular)	1.20

Table 36.5 *N_γ Multipliers for Various Values of B/L*

B/L	multiplier
1 (square)	0.85
0.5	0.90
0.2	0.95
0.0	1.00
1 (circular)	0.70

Several researchers have recommended corrections to N_c to account for footing depth. (Corrections to N_q for footing depth have also been suggested. No corrections to N_γ for footing depth have been suggested.) There is considerable variation in the method of calculating this correction, if it is used at all. A multiplicative correction factor, d_c, which is used most often, has the form

$$d_c = 1 + \frac{KD_f}{B} \qquad 36.2$$

K is a constant for which values of 0.2 and 0.4 have been proposed. The depth factor correction is applied to N_c along with the shape factor correction in Eq. 36.1.

Once the ultimate bearing capacity is determined, it is corrected by the *overburden*, giving the *net bearing capacity*. This is the net pressure the soil can support beyond the pressure applied by the existing overburden.

$$q_{\text{net}} = q_{\text{ult}} - \rho g D_f \qquad \text{[SI]} \qquad 36.3(a)$$

$$q_{\text{net}} = q_{\text{ult}} - \gamma D_f \qquad \text{[U.S.]} \qquad 36.3(b)$$

The *allowable bearing capacity* is determined by dividing the net capacity by a factor of safety. The safety factor accounts for the uncertainties in evaluating soil properties and anticipated loads, and also on the amount of risk involved in building the structure. A safety factor between 2 and 3 (based on q_{net}) is common for average conditions. Smaller safety factors are sometimes used for transient load conditions such as from wind and seismic forces.

$$q_a = \frac{q_{\text{net}}}{F} \qquad 36.4$$

6. BEARING CAPACITY OF CLAY

Clay is often soft and fairly impermeable. When loads are first applied to saturated clay, the pore pressure increases. For a short time, this pore pressure does not dissipate, and the angle of internal friction should be taken as $\phi = 0°$. This is known as the $\phi = 0°$ case or the *undrained case*, which is the critical condition for saturated clays. As discussed in Chap. 35, the undrained shear strength of clays is equal to the cohesion, which is one-half of the unconfined compressive strength.

$$S_u = c = \frac{S_{uc}}{2} \qquad 36.5$$

If $\phi = 0°$, then $N_\gamma = 0$ and $N_q = 1$. If there is no surface surcharge (i.e., $p_q = 0$), the ultimate bearing capacity is given by Eq. 36.6.

$$q_{\text{ult}} = cN_c + \rho g D_f \qquad \text{[SI]} \qquad 36.6(a)$$

$$q_{\text{ult}} = cN_c + \gamma D_f \qquad \text{[U.S.]} \qquad 36.6(b)$$

$$q_{\text{net}} = q_{\text{ult}} - \rho g D_f = cN_c \qquad \text{[SI]} \qquad 36.7(a)$$

$$q_{\text{net}} = q_{\text{ult}} - \gamma D_f = cN_c \qquad \text{[U.S.]} \qquad 36.7(b)$$

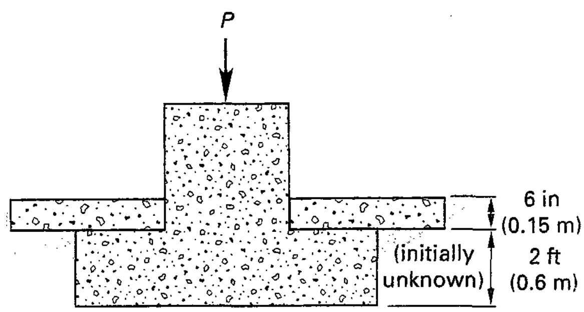
The allowable clay loading is based on a factor of safety, which is typically taken as 3 for clay.

$$q_a = \frac{q_{\text{net}}}{F} \qquad 36.8$$

From Eqs. 36.6 and 36.7, it is evident that the cohesion term dominates the bearing capacity in cohesive soil.

Example 36.1

An individual square column footing carries an 83,800 lbf (370 kN) dead load and a 75,400 lbf (335 kN) live load. The unconfined compressive strength of the supporting clay is 0.84 tons/ft^2 (80 kPa), and its specific weight is $\gamma = 115$ lbf/ft^3 ($\rho = 1840$ kg/m^3). The footing whose upper surface is flush with the original grade is covered by a 6.0 in (0.15 m) thick basement slab. The footing thickness is initially unknown. Neglect depth correction factors. Do not design the structural steel. Specify the footing size and thickness.



SI Solution

The strategy for determining the depth and width of the footing is to calculate the allowable bearing pressure, assume a width and depth that will support the dead load and live load, and then compare the actual

REFERENCE MATERIALS

December 16, 2004
File No. 09199056.13

MEMORANDUM

TO: John Banks, P.E.

FROM: Dominique Rudajev, P.E.

SUBJECT: Citrus County Central Landfill
Slope Stability Analysis

As part of the detailed design calculations, the slope stability analysis was performed based on the proposed interim (1^{st} terrace) and final grading plans. The slope stability analysis was prepared based on the Phase 2 Expansion Slope Stability Analysis dated January 2002 and previous geotechnical information that had been collected at the Landfill by others. Included in this report is an overview of available subsurface information from the previous geotechnical investigations and slope stability analyses for selected critical cross-sections of the interim and final proposed Landfill slopes. Detailed computer printouts and graphs supporting this stability analysis are included with the report.

The Citrus County Sanitary Landfill is located on State Road 44 West of Inverness in the southwest quadrant of Citrus County. The maximum bottom depth of the Landfill is approximately 80 feet below natural land surface (EL 40). The groundwater table is at least 30 feet below the proposed bottom liner system per Universal Engineering Sciences' report dated November 2001.

The proposed side slopes will advance upward at a 3H to 1V to a maximum height of 250 feet NGVD (National Geodetic Vertical Datum). The Landfill will be comprised of a series of 40-foot wide terraces (includes perimeter access road and swale) approximately every 25 feet. Refer to the attached north and south cross sections.

REVIEW OF GEOTECHNICAL SOIL DATA

The geotechnical soil data used in Phase 1A design was reviewed prior to conducting the slope stability analysis. The geotechnical investigation and site evaluation was presented in the geotechnical report entitled "Geotechnical Investigation for Citrus County Central Landfill New Disposal Cell" prepared by Universal Engineering Sciences, Inc dated on November 15, 2001. The boring location plan, boring logs and laboratory test results conducted by Universal Engineering Sciences, Inc is provided in Appendix B.

SLOPE STABILITY ANALYSIS

The slope stability was evaluated using a computer program called STEDwin 2.5. This program that uses two-dimensional limit equilibrium methods to calculate a factor of safety (FS) against shear failure for slope sections analyzed. This program is able to use an automatic search routine to generate multiple shear failure surfaces for both circular failures and clock modes until the surface with the lowest FS-value is found.

To calculate minimum factor of safety for the site, stability analyses were preformed for selected slope sections assuming:

- Circular failure surface under static conditions; and
- Block-type failure under static conditions.

Based on the EPA regulatory requirements regarding factors of safety for slope stability, the minimum acceptable factor of safety value for the static and seismic analyses are 1.5 and 1.3, respectively. These minimum acceptable values can also be found in the USEPA (1988) publication "Guide to Technical Resources for the Design of Landfill Disposal Facilities".

SELECTION OF CRITICAL CROSS-SECTIONS

Two (2) critical landfill cross-sections were chosen for the slope stability analysis. The critical sections were selected based on the locations of the slopes with respect to the slope heights and slope lengths that comprise the proposed final build-out. The locations of these 2 sections are shown in Appendix C. The profiles of these sections are presented in the computer graphical printouts.

SELECTION OF SOIL PARAMETERS

The in-place unit weight of the waste material, daily cover soils, and water was estimated assuming a typical waste composition and typical waste moisture contents. The waste composition was taken from a Florida Department of Environmental Protection (FDEP) publication entitled "Solid Waste Management in Florida 200-2001". Initial moisture contents were estimated based upon the type of waste material and typical waste moisture contents. The waste composition matrix for Citrus County and typical moisture contents are contained in Appendix D.

The shear strength properties of the materials selected for each of the sections were based on assumed values presented in the new soil report and in the previous slope stability report(s). Based on the site-specific conditions and experience in dealing with these soil/geosynthetic materials, these values are conservative for the purpose of this analysis. A summary of the selected unit weights and shear strength parameters (friction angle and cohesion values) obtained from these previous studies is provided in Table 1.

Table 1: Material Soil Data

Material Group	Unit Weight γ_{moist} (pcf)	Unit Weight γ_{sat} (pcf)	Effective Shear Strength (Peak Values)	
			c' (pcf)	ϕ' (deg)
Final Cover/Soil Cap	110.0	120.0	0	30
Intermediate/Cover Soil	110.0	120.0	0	30
Municipal Waste[1]	60.0	80.0	0	28
Protective Soil Cover	110.0	115.0	0	28
Geosynthetic Layer[2]	63.0	63.0	0	22
Existing Soil (Subbase)	90.0	100.0	0	30
Surficial Layer	110.0	125.0	0	32

[1]It should be noted that the municipal solid waste strength values are reasonably close to typical average values. A higher unit weight of the waste of 80 pcf was used assuming saturation conditions.
[2]The shear strength value used for geosynthetic layers are based on conservative literature values and past experience. Adhesion was assumed to be zero to be conservative.

SELECTION OF EQUIPMENT

A CAT D8R Series II Waste Handling Arrangement (WHA) was assumed in the slope stability analysis for equipment loading. The equipment loading calculations are included in Appendix F.

SLOPE STABILITY ANALYSIS RESULTS

The slope stability analyses was performed with a 1.5-foot thick protective soil cover installed over the full length of the liner system. Two waste lengths were used for the analysis. Graphs that depict the most critical failure surface for each scenario are presented in Appendix H and I. A summary of the results is provided in Table 2.

Table 2: Summary of Results

	Failure Mode - Circular		Failure Mode - Block	
	Without Load	With Load	Without Load	With Load
North Side (1st Bench)	1.86	1.39		
North Side (Final Build-out)	2.29	2.21	3.69	3.55
South Side (1st Bench)	1.93	1.74		
South Side (Final Build-out)	2.33	2.28	3.29	3.18

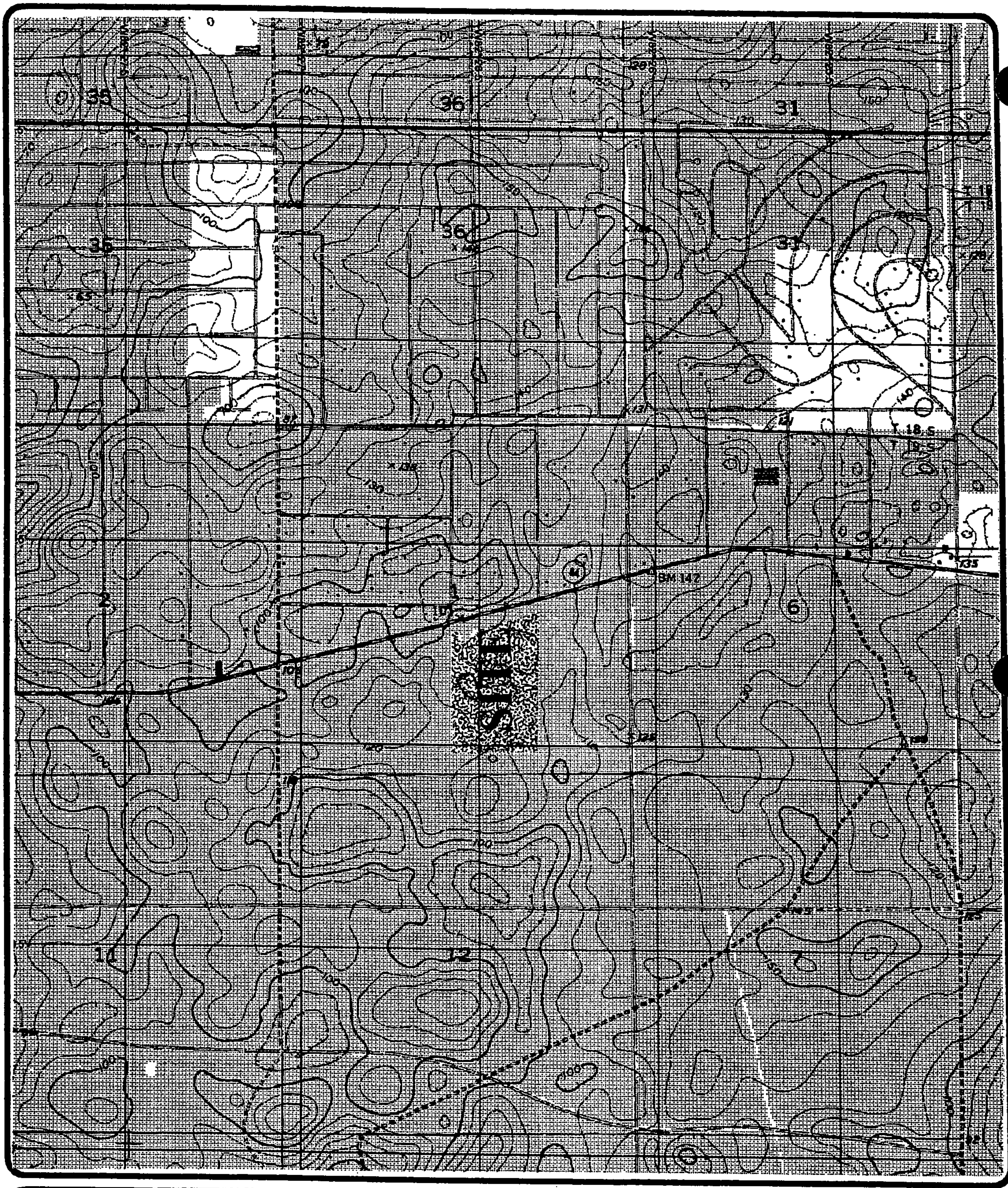
CONCLUSIONS

Based on the results of the slope analyses, it is concluded that the factors of safety obtained were all greater than the minimum value of 1.5 and 1.3 (temporary condition) under static conditions. Therefore, the existing slope configuration is stable under static conditions and meets the federal EPA technical guidance criteria for stability.

APPENDIX A

DETAILED SOIL MAP
AND
USGS – TOPOGRAPHIC MAP

(SOURCE: UNIVERSAL ENGINEERING SCIENCES GEOTECHNICAL INVESTIGATION FOR CITRUS COUNTY CENTRAL LANDFILL NEW DISPOSAL CELL S.R. 44 CITRUS COUNTY, FL, DATED NOVEMBER 15, 2001)



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CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

SITE LOCATION MAP

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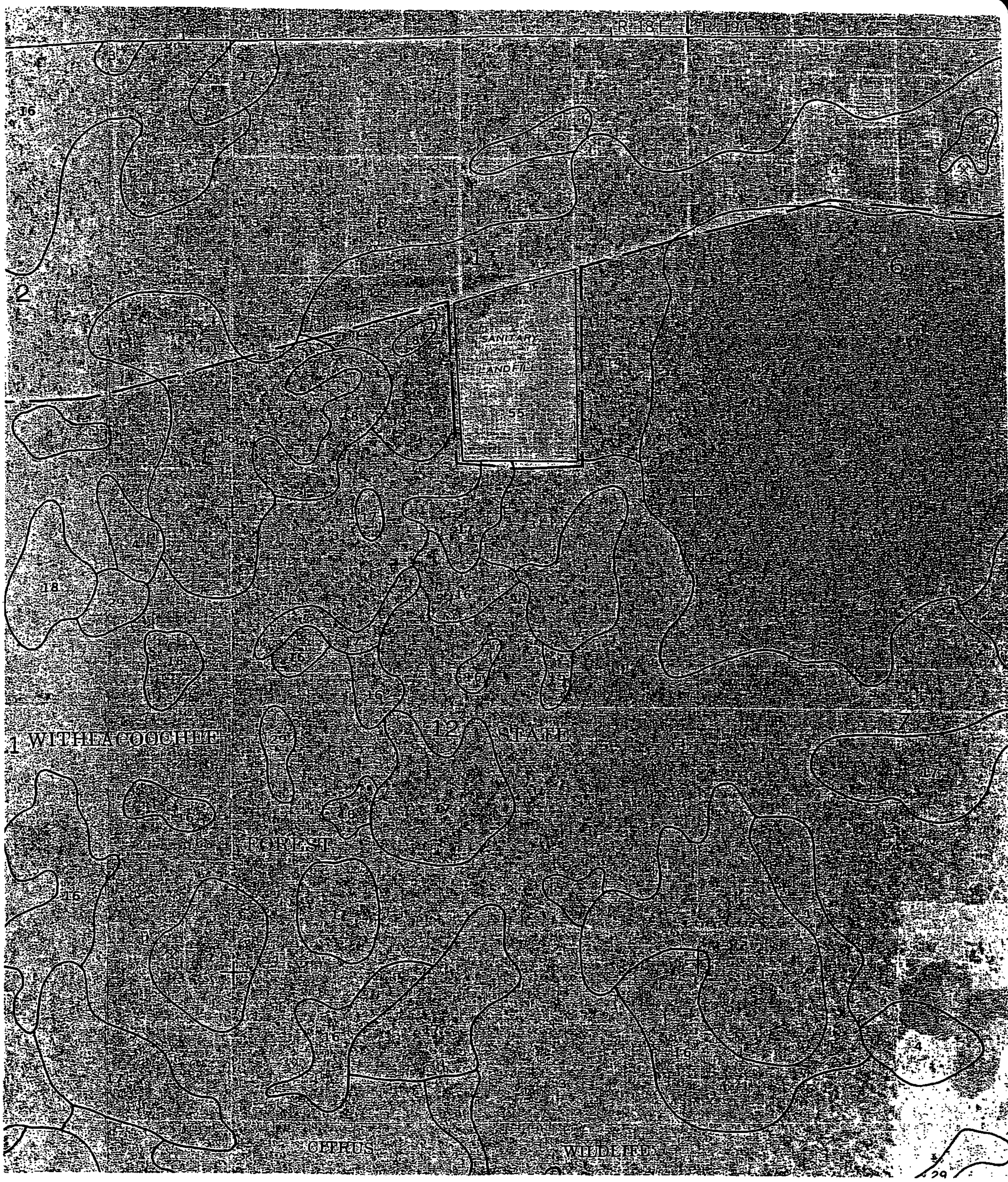

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CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

SOIL SURVEY MAP

DRAWN BY:	DATE: 11/16/01	CHECKED BY: ES	DATE: 11/19/01
SCALE: NTS	ORDER NO: 26081-001	REPORT NO: 21607	PAGE NO: A - 2

APPENDIX B

BORING LOCATION PLAN,

BORING LOGS AND LABORATORY TEST RESULTS

(SOURCE: UNIVERSAL ENGINEERING SCIENCES GEOTECHNICAL INVESTIGATION FOR CITRUS COUNTY CENTRAL LANDFILL NEW DISPOSAL CELL S.R. 44 CITRUS COUNTY, FL, DATED NOVEMBER 15, 2001)

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GEOTECHNICAL INVESTIGATION
FOR
CITRUS COUNTY CENTRAL LANDFILL
NEW DISPOSAL CELL
S.R. 44
CITRUS COUNTY, FL

ORDER NO. 26081-001-01
REPORT NO. 21607

Prepared by:

Universal Engineering Sciences, Inc.
4475 SW 35th Terrace
Gainesville, FL 32608
(352) 372-3392

November 15, 2001

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November 15, 2001

SCS Engineers
3012 U.S. Highway 301 North, Suite 700
Tampa, FL 33619-2242

Attention: Mr. Bruce Clark, P.E., D.E.F.

Reference: Citrus County Central Landfill
New 9.5 Acre Waste Disposal Cell
S.R. 44
Citrus County, FL
Order No. 26081-001-01 Report No. 21607

Dear Mr. Clark:

Universal Engineering Sciences, Inc., has completed the subsurface investigation and engineering evaluation for the proposed construction at the above referenced location. Our investigation was performed in accordance with our proposal No.21447, which was authorized by Raymond J. Dever, P.E., D.E.F. with SCS Engineers on October 9, 2001.

This report contains the results of our investigations, an engineering interpretation of these with respect to the project characteristics described to us, and recommendations for side slopes excavations and filling, foundation design and site preparation.

We appreciate the opportunity to have worked with you on this project and look forward to a continued association. If you have any questions concerning this report or if we may further assist you as your plans proceed, please contact us.

Respectfully submitted,

UNIVERSAL ENGINEERING SCIENCES, INC.

Eduardo Suarez
Project Engineer

Thomas A. Boatman, P.E.
Senior Project Engineer
Florida P.E. No: 56030

Jack W. Ray
Regional Manager

ES/TAB/JWR:es (2)

4475 S.W. 35th Terrace • Gainesville, FL 32608 • (352) 372-3392 • Fax (352) 336-7914

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Order No. 26081-001-01
Report No. 21607

1.0 INTRODUCTION

1.1 GENERAL

In this report, we present the results of the subsurface investigation of the site for the proposed New Disposal Cell for the Citrus County Landfill in Citrus County, FL. We have divided this report into the following sections:

- SCOPE OF SERVICES - Defines what we did
- FINDINGS - Describes what we encountered
- RECOMMENDATIONS - Describes what we encourage you to do
- LIMITATIONS - Describes the restrictions inherent in this report
- SUMMARY - Reviews the material in this report
- APPENDICES - Presents support materials referenced in this report.

2.0 SCOPE OF SERVICES

2.1 PROJECT DESCRIPTION

We understand this project will consist of a new disposal cell for the Citrus County central landfill. The maximum anticipated height of the landfill is approximately 100 feet above natural land surface with the maximum bottom depth of 80 feet below natural land surface.

The project information was provided by Bruce Clark which included a copy of a site plan with existing footprint of the landfill. The area for the proposed construction is approximately 9.5 acres.

The project is located on State Road 44 west of Inverness in the southwest quadrant of Citrus County. Site topography is shown on the U.S.G.S. topographical map presented in Appendix A.

Our recommendations are based upon the above considerations. If any of this information is incorrect or if you anticipate any changes, inform Universal Engineering Sciences so that we may review our recommendations.

2.2 PURPOSE

The purposes of this investigation were:

- to investigate the general subsurface conditions at the site;

- to interpret and review the subsurface conditions with respect to the proposed construction; and

- to provide geotechnical engineering recommendations for side slope stability for excavation of native soil and slope of waste material, estimated bearing capacity, settlement, and groundwater elevation.

This report presents an evaluation of site conditions on the basis of traditional geotechnical procedures for site characterization. The recovered samples were not examined, either visually or analytically, for chemical composition or environmental hazards. Universal Engineering Sciences would be pleased to perform these services, if you desire.

2.3 USDA SOIL SURVEY DATA AND USGS SITE TOPOGRAPHY.

Review of the USDA Soil Conservation Service (SCS) Soil Survey of Citrus County indicated that the landfill is located on a SCS classification of Lake Series. This nearly level to moderately, excessive drained, rapidly permeable to moderately rapid permeable soils are formed in sandy marine, eolian, or fluvial deposits. SCS soil map unit descriptions generally compare favorably with our findings for this site. An SCS site map as well as a USGS site topography for the area of the proposed construction are shown in Appendix A.

2.4 FIELD INVESTIGATION

The subsurface conditions were investigated with ten borings advanced to depths of 30 to 120 feet, while performing the Standard Penetration Test.

We performed the Standard Penetration Test in each of the borings according to the procedures of ASTM D-1586, with continuous sampling performed, to detect slight variations in the soil profile. The basic procedure for the Standard Penetration Test is as follows: A standard split-barrel sampler is driven into the soil by a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler 1-foot, after seating 6 inches, is designated the penetration resistance, or N-value; this value is an index to soil strength and consistency.

The general location of each boring is shown on the attached drawing. You should consider the indicated depths and locations to be approximate.

Jar samples of the soils encountered will be held in our laboratory for your inspection for 90 days and then discarded, unless we are notified otherwise.

2.5 LABORATORY INVESTIGATION

The soil samples recovered from the soil test borings were returned to our laboratory and then an engineer visually examined and reviewed the field descriptions. We selected representative soil samples for laboratory testing consisting of soil gradation determinations, Atterberg Limits tests, wash No. 200 sieve analyses, permeability tests, and LBR test.

We performed these tests to aid in classifying the soils and to help to evaluate the general engineering characteristics of the site soils. See Appendix C: Summary of Laboratory Test Results and Description of Testing Procedures, for further data and explanations.

3.0 FINDINGS

3.1 SURFACE CONDITIONS

A Universal Engineering Sciences engineer performed a visual site inspection of the subject property to gain a "hands-on" familiarity with the project area.

The site is located on S. R. 44 in Citrus County, FL. The existing site is the current county landfill, with a fill mound approximately 60 feet high on the north end of the site.

3.2 GENERAL GEOLOGY

The subject area lies on the eastern flank of the Brooksville Ridge, igneous and metamorphic basement rocks are overlain by 4,000 feet of sedimentary rocks. Generally, these sedimentary rocks are composed of a thick sequence of carbonates (limestones and dolomite) which are overlain clastics that include quartz, silts, clayey sands and clays. Eocene age limestones and dolomite known as the Ocala Group and the Avon Park Limestone cap this thick sequence. Within the Brooksville Ridge the Ocala Group and the Avon Park Limestone are capped by a highly variable sands and clayey sand ranging in thickness from 10 to over 100 feet in some areas.

The general hydrogeology of Citrus County includes an unconfined surficial aquifer and the Florida aquifer. The top of the Floridan Aquifer is defined as the first consistent limestone below which no clay confining bed occurs. The configuration of the top of the aquifer is highly variable due to erosion and dissolution in the limestone that forms its upper boundary.

3.3 SUBSURFACE CONDITIONS

The boring locations and detailed subsurface conditions are illustrated in Appendix B: Boring Location Plan and Boring Logs. The classifications and descriptions shown on the logs are generally based upon visual characterizations of the recovered soil samples and a limited number of laboratory tests. Also, see Appendix B: Soils Classification Chart, for further explanation of the symbols and placement of data on the Boring Logs.

Groundwater was encountered at approximately 120 feet below the existing ground surface. Based on the Potentiometric Surface Map from U.S. Geological Survey, the Citrus County Soils Survey, and in-situ soils, we estimate the groundwater level will be 5 msl. It should be noted that the borings were preformed during a period of below normal rainfall for Central Florida.

The soil profile in the subject area consists of loose to medium dense tan to brown fine SAND from surface grade to a depth of approximately 20 to 25 feet below surface grade, where a 10 to 15 feet of medium dense orange and gray clayey SAND is present. Beneath this layer there typically lies a medium dense to very dense orange to tan or white fine SAND to the maximum boring depth of 120 feet. Lenses of gray and orange slightly clayey SAND were encountered from 50 to 60 feet below grade.

4.0 RECOMMENDATIONS

4.1 GENERAL

The following recommendations are made based upon a review of the attached soil test data, our understanding of the proposed construction, and experience with similar projects and subsurface conditions. If plans change from those discussed previously, we request the opportunity to review and possibly amend our recommendations with respect to those changes.

Additionally, if subsurface conditions are encountered during construction which were not encountered in the borings, report those conditions immediately to us for observation and recommendations.

In this section of the report, we present our detailed recommendations for side slope stability for excavation of native soil and slope of waste material, estimated bearing capacity and settlement, site preparation, and construction related services.

4.2 LANDFILL

4.2.1 Foundation Bearing Capacity

We understand that the maximum anticipated height of the landfill is approximately 100 feet above the natural land surface with maximum bottom depth of 80 feet below natural land surface. We estimate that the additional height of 180 feet of fill will add approximately 9,000 psf of load onto the excavated subgrade. The maximum allowable net soil bearing pressure for the excavated subgrade will be approximately 15,000 pounds per square foot (psf), resulting in a factor of safety of more than 1.5. Net bearing pressure is defined as the soil bearing pressure at the base of the foundation in excess of the natural overburden pressure.

4.2.2 Settlement Estimates

Post-construction settlement of the structure will be influenced by several interrelated factors, such as (1) subsurface stratification and strength/compressibility characteristics of the bearing soils; (2) landfill size, bearing level, applied loads, and resulting bearing pressures beneath the landfill; (3) site preparation and earthwork construction techniques used by the contractor, and (4) external factors, including but not limited to vibration from offsite sources and groundwater fluctuations beyond those normally anticipated for the naturally-occurring site and soil conditions which are present.

Due to the sandy nature of the surficial soils and the anticipated fill, after the landfill operations, we expect a significant portion of settlement to be elastic in nature and occur relatively quickly, on application of the loads, during and immediately following construction. We estimate that the additional height of fill will add approximately 9,000 psf of load onto the subgrade. We used strain analysis to estimate the amount of additional settlement that can be anticipated. We estimate that the additional landfill will result in approximately less than 6 inches of additional settlement. Differential settlement is estimated to be 3 inches or less.

Differential settlement results from differences in applied bearing pressures and the variations in the compressibility characteristics of the subsurface soils. The settlement calculations are based upon the use of stress strain theory and assuming short term end of construction.

We recommend positive drainage be established and maintained on the site during construction. We further recommend permanent measures be constructed to maintain positive drainage from the site throughout the life of the project.

4.2.3 Landfill Slope Stability

For the existing and the proposed subgrade conditions, and the landfill geometry, we performed slope stability analysis. We used the STABL computer program for the analysis of slope stability by a two-dimensional limiting equilibrium method.

Graphic output indicating the minimum factor of safety for the ten most critical of the trial failure surfaces examined are attached in appendix D. Safety factor were calculated by the modified Bishop method. Assuming properties for landfill waste material, we estimate a factor of safety of 1.3, using an slope of 2H:1V for the additional waste material.

4.2.4 Subgrade Slope Stability

For the excavated native soils, we performed slope stability analysis. We determine the factor of safety for different sides slope for excavated native soils. We used STABL computer program for the analysis of the slope stability.

Appendix D show the different graphic output indicating the ten most critical of the trial failure surfaces examined and their factor of safety. Safety factor were calculated by the modified Bishop method. We computed the factor of safety for side slopes starting from 0.5H:1V to 2H:1V. We estimate a factor of safety of 1.3 for excavated native soil with a slope of 1.5H:1V.

4.3 FILL SUITABILITY

We believe the onsite soils resulting from excavations will vary, in terms of their suitability for use as engineered backfill and fill. The layer of brown and tan fine sand (approximately 7 percent soil fines, Unified Soil Classification " SM") will be the most suitable for use as engineered fill. These soils may require some moisture conditioning to facilitate compaction. The clayey sands with less than 30 percent soil fines (Unified Soil Classification "SC") can be used as fill but will require stringent moisture control during placement and compaction, particularly during rainy periods. Very clayey sands, sandy clays and clays should not be used as fill.

4.4 CONSTRUCTION RELATED SERVICES

We recommend the owner retain Universal Engineering Sciences to perform construction materials tests and observations on this project. The geotechnical engineering design does not end with the advertisement of the construction documents. The design is an on-going process throughout construction. Because of our familiarity with the site conditions and the intent of the engineering design, we are most qualified to address problems that might arise during construction in a timely and cost-effective manner.

5.0 LIMITATIONS

During the early stages of most construction projects, geotechnical issues not addressed in this report may arise. Because of the natural limitations inherent in working with the subsurface, it is not possible for a geotechnical engineer to predict and address all possible problems. An Association of Engineering Firms Practicing in the Geosciences (ASFE) publication, "Important Information About Your Geotechnical Engineering Report" appears in Appendix E, and will help explain the nature of geotechnical issues.

Further, we present documents in Appendix E: Constraints and Restrictions, to bring to your attention the potential concerns and the basic limitations of a typical geotechnical report.

6.0 SUMMARY

We understand this project will consist of a new disposal cell for the Citrus County central landfill. The maximum anticipated height of the landfill is approximately 100 feet above natural land surface with the maximum bottom depth of 80 feet below natural land surface.

We have performed field and laboratory investigations to provide geotechnical engineering recommendations for side slope stability for excavation of native soil and slope of waste material, estimated bearing capacity, settlement, and groundwater elevation.

We generally encountered medium dense sandy soils with lenses of clayey sands. These soils should provide good support for the landfill. we estimate the groundwater level will be 5 msl. The geotechnical investigation did not detect any significant indicators of any zones of especially loose or soft soils.

We recommend good practice site preparation procedures. These procedures include: proof-rolling and compacting the subgrade.

We hope this report meets your needs and discusses the problems associated with the proposed landfill. We would be pleased to meet with you and discuss any geotechnical engineering aspects of the project.

APPENDIX A

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CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

SITE LOCATION MAP

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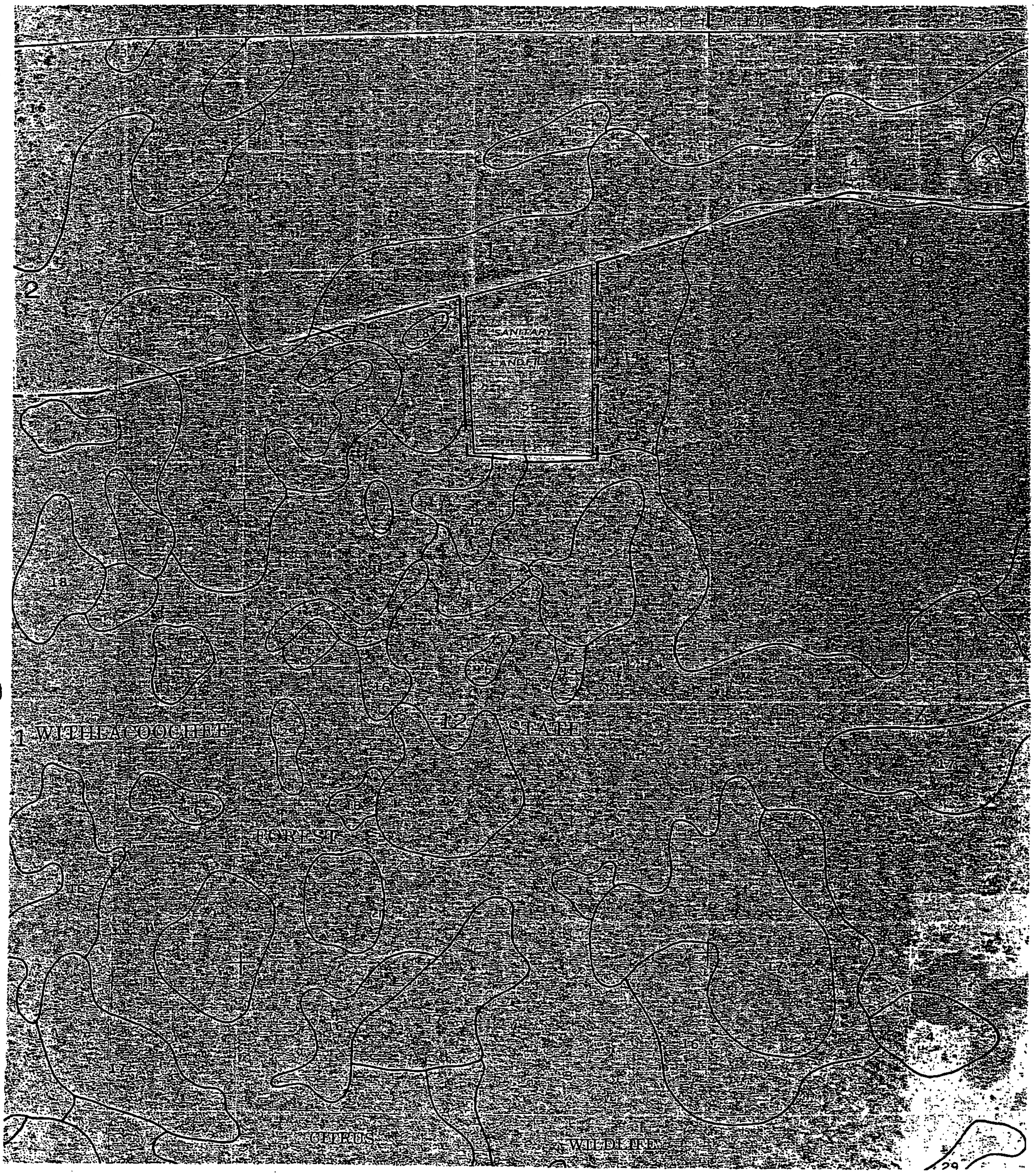

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CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

SOIL SURVEY MAP

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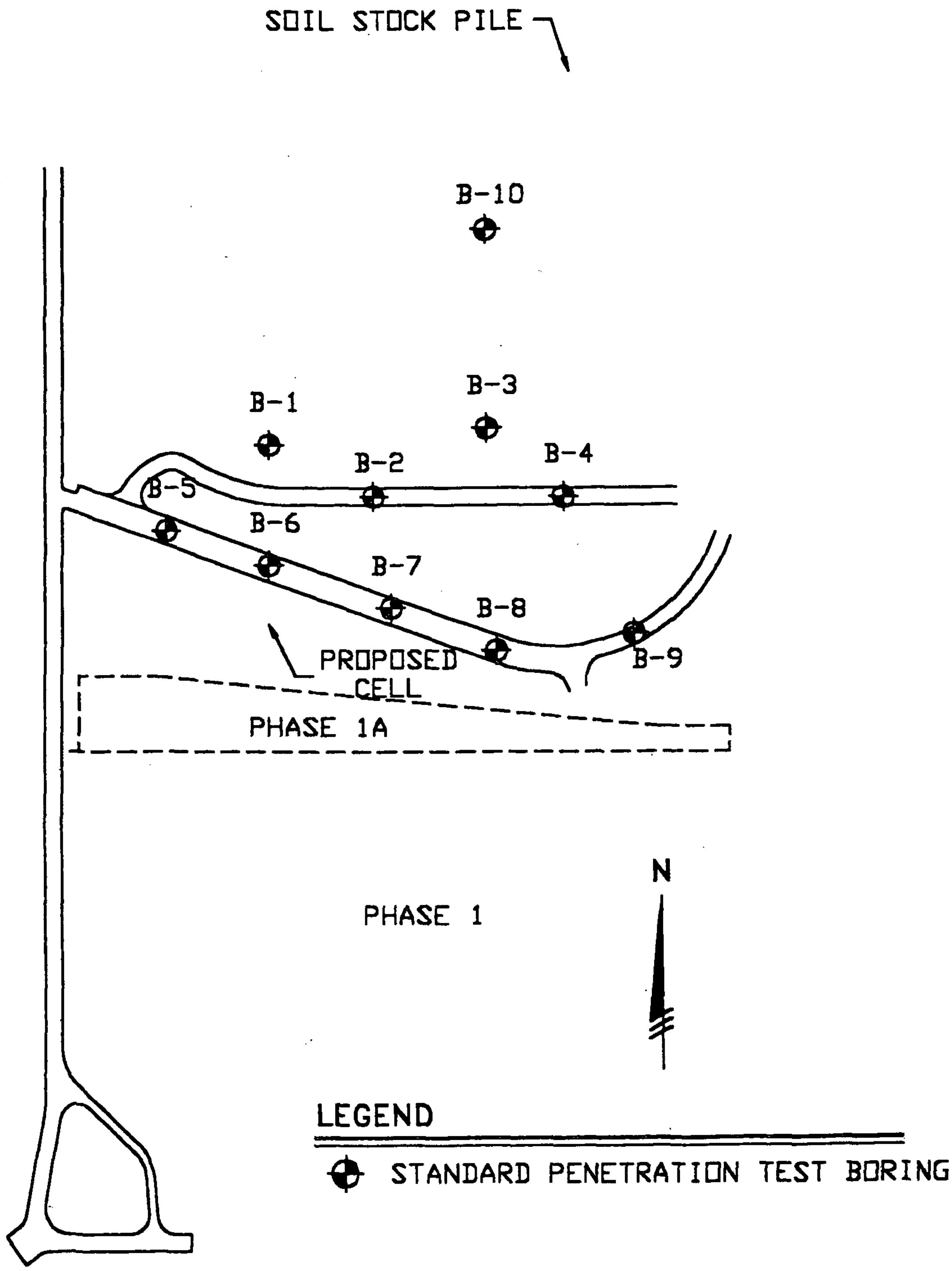
APPENDIX B



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CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING LOCATION PLAN

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 26081-001-01
REPORT NO.: 21607
PAGE: B-2

[illegible]T: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: B-1 SHEET: 1 of 2
SECTION: TOWNSHIP: RANGE:

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft):
WATER TABLE (ft): NE
DATE OF READING: 10/31/01
EST. WSWT (ft):

DATE STARTED: 10/31/01
DATE FINISHED: 10/31/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING: ASTMD-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 orange to tan fine SAND [SP/SM]						
	☒	5-2-2	4									
						Woodchips & clay						
5	☒	1-2-2	4									
						Asphalt, rock, trace of phosphate & brown sand						
10	☒	5-13-20	33									
						Loose to medium dense brown fine SAND [SP]						
15	☒	7-4-4	8				4					
	☒	4-5-6	11									
25	☒	4-5-10	15									
						Medium dense brown fine SAND [SP]						
30	☒	3-6-8	14									
						Dense orange fine SAND [SP/SM]						
35	☒	12-18-24	42									
						Medium dense orange CLAYEY SAND [SC]						
40	☒	13-11-12	23				20					
						Medium dense orange fine SAND [SP/SM]						
45	☒	5-7-8	15									
50	☒	10-15-18	33									
	☒	9-13-14	27									
						Very dense orange to tan fine SAND [SM]						
60	☒	22-29-30	59									

BL2I

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	26081-001-01
REPORT NO.:	21607
PAGE:	B-3

PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: **B-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 LL	PI	K (FT./DAY)	ORG. CONT. (%)
60						Very dense tan to orange fine SAND [SM] (Continued)						
65	X	17-30-40	70									
70	X	15-32-34	66									
75	X	50 for 4"	50+									
80	X	50 for 3"	50+				17					
85	X	50 for 3"	50+									
90	X	50 for 4"	50+			Boring terminated at 90'						

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	26081-001-01
REPORT NO.:	21607
PAGE:	B-4

: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

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

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft):
WATER TABLE (ft): NE
DATE OF READING: 11/05/01
EST. WSWT (ft):

DATE STARTED: 11/5/01
DATE FINISHED: 11/5/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING: ASTMD-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						Medium dense brown to orange fine SAND [SP]						
	X	5-6-7	13									
5	X	2-4-6	10									
10	X	5-7-12	19									
15	X	2-4-6	10				3					
	X	3-5-12	17									
25	X	4-6-12	18									
30	X	4-12-12	24									
						Medium dense orange fine CLAYEY SAND [SC]						
35	X	4-8-9	17				19		22	21		
40	X	5-14-16	30									
						Dense to very dense orange fine SAND [SM/SP]						
45	X	10-15-23	38				8					
50	X	15-15-18	33									
	X	11-20-30	50									
60	X	16-26-26	52									

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BORING LOG

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PAGE:	B-5

PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: B-2
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 LL	ATTERBERG LIMITS PI	K (FT./ DAY)	ORG. CONT. (%)
60						Dense to very dense orange fine SAND [SM/SP]						
65	X	10-30-31	61									
						Dense to very dense tan & orange fine CLAYEY SAND [SC]						
70	X	10-24-32	56									
75	X	13-20-33	53									
80	X	13-14-14	28									
85	X	9-11-11	22				19					
90	X	8-15-15	30									
						Boring terminated at 90'						

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

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REPORT NO.: 21607
PAGE: B-6

PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: B-3 SHEET: 1 of 2
SECTION: TOWNSHIP: RANGE:

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft):
WATER TABLE (ft): NE
DATE OF READING: 10/29/01
EST. WSWT (ft):

DATE STARTED: 10/29/01
DATE FINISHED: 10/29/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING: ASTMD-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						Orange SAND						
	X	2-2-2	4			Loose to medium dense gray & orange very CLAYEY SAND [SC]						
5	X	2-2-5	7				35		34	17		
10	X	5-10-12	22									
15	X	5-5-10	15			Medium dense gray CLAYEY SAND [SC]						
20	X	2-5-5	10									
25	X	4-7-10	17			Medium dense light gray SAND [SP/SM]	10					
30	X	5-10-13	23			Medium dense tan SAND [SM]						
35	X	6-12-18	30			Dense light gray SAND [SP/SM]						
40	X	5-13-16	29									
45	X	5-16-23	39			Dense tan SAND [SP/SM]						
						tan SAND						
50	X	10-22-26	48									
55	X	6-9-12	21									
60	X	11-15-18	33									

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BORING LOG

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PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: B-3 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 LL	ATTERBERG LIMITS PI	K (FT./DAY)	ORG. CONT. (%)
60						Dense tan SAND (Continued)						
65												
70												
75						Very dense tan to white fine SAND [SP/SM]						
80						Boring terminated at 80'						

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

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PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: B-4 SHEET: 1 of 2
SECTION: TOWNSHIP: RANGE:

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft):
WATER TABLE (ft): 115.0
DATE OF READING:
EST. WSWT (ft):

DATE STARTED: 10/30/01
DATE FINISHED: 10/30/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING: ASTMD-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												
	X	1-2-1	3			Very loose to loose orange fine SAND [SP/SM]						
5	X	1-1-2	3				9					
10	X	8-8-10	18									
15	X	7-7-7	14			Medium dense tan to yellow SAND [SP/SM]						
20	X	5-10-12	22				8					
25	X	8-8-18	26									
30	X	7-7-9	16			Medium dense tan SAND [SP/SM]						
						Medium dense tan fine SAND [SP/SM]						
35	X	9-12-15	27									
40	X	13-22-24	46									
45	X	11-17-22	39				8					
50	X	12-14-18	32									
55	X	12-13-17	30									
						Medium dense to dense white SAND [SP/SM]						
60	X	6-7-8	15									
65	X	12-16-20	36									

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BORING LOG

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PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: **B-4** 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 LL	PI	K (FT./DAY)	ORG. CONT. (%)
65						Medium dense to dense white SAND [SP/SM] (Continued)						
70	X	11-18-22	40				10					
75	X	16-16-16	32									
80	X	20-24-31	55									
85	X	12-20-25	45									
90	X	18-18-26	44									
95	X	15-19-32	51									
100	X	18-22-32	54									
105	X	20-25-35	60									
110	X	22-29-35	64									
115	X	22-30-36	66	▼								
120	X	20-30-39	69			Boring terminated at 120'						

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

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PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: B-5 SHEET: 1 of 2
SECTION: TOWNSHIP: RANGE:

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft):
WATER TABLE (ft):
DATE OF READING:
EST. WSWT (ft):

DATE STARTED: 10/29/01
DATE FINISHED: 10/30/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING:

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						Brown SAND						
	X	12-15-10	25			Limerock base						
						Medium dense brown to tan SAND [SP/SM]						
5	X	3-8-14	22									
10	X	8-10-14	24			Medium dense dark brown silty SAND [SP/SM]	7					
15	X	2-2-3	5			Loose tan fine SAND [SP/SM]						
20	X	3-5-7	12			Loose orange very CLAYEY SAND [SC]	33		31	25		
25	X	3-6-7	13									
						Loose orange fine CLAYEY SAND [SC]	17					
30	X	4-5-6	11			Medium tan fine SAND [SP/SM]						
35	X	6-6-6	12									
40	X	4-6-10	16			Medium dense tan to white fine SAND [SP/SM]						
45	X	6-8-9	17									
50	X	5-6-9	15									
55	X	5-6-8	14									
						Medium dense gray CLAYEY SAND [SC]						
60	X	5-6-6	12									

BL2I

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		PROJECT NO.: 26081-001-01
		REPORT NO.: 21607
		PAGE: B-11

PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: B-5 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 LL	PI	K (FT./ DAY)	ORG. CONT. (%)
60						Medium dense gray CLAYEY SAND [SC] (Continued)						
						Medium dense gray & orange CLAYEY SAND [SC]						
65	X	5-6-10	16									
70	X	6-6-8	14									
						Medium dense tan to white fine SAND [SM]						
75	X	8-11-11	22				15					
80	X	10-12-12	24									
85	X	12-16-20	36									
90	X	13-23-26	49									
						Boring terminated at 90'						

DLC1

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PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: B-6   SHEET: 1 of 2
SECTION: TOWNSHIP: RANGE:

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft):   DATE STARTED: 11/1/01
WATER TABLE (ft): 100.0   DATE FINISHED: 11/1/01
DATE OF READING: 11/01/01   DRILLED BY: J. STILLSON
EST. WSWT (ft):   TYPE OF SAMPLING: ASTMD-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						Brown SAND						
	X	2-3-4	7			Loose orange very CLAYEY SAND [SC]						
5	X	4-5-7	12									
						Medium dense orange CLAYEY SAND [SC]	24					
10	X	4-5-7	12			Medium dense tan orange fine SAND [SP/SM]						
15	X	4-6-8	14									
						Medium dense gray CLAYEY SAND [SC]						
20	X	5-7-10	17									
25	X	5-7-7	14				28		29	21		
						Medium dense gray & orange slightly CLAYEY SAND [SC]						
30	X	5-7-7	14									
35	X	4-8-10	18									
						Dense to very dense tan fine SAND [SP/SM]						
40	X	13-16-18	34									
45	X	12-15-16	31									
50	X	10-16-20	36									
55	X	11-19-22	41				9					
60	X	12-17-17	34									

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

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REPORT NO.: 21607
PAGE: B-13

PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: B-6
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 LL	PI	K (FT./ DAY)	ORG. CONT. (%)
60						Very dense tan fine SAND [SP/SM]						
65	X	15-26-30	56									
70	X	17-27-34	61									
75	X	18-30-36	66									
80	X	50 for 4"	50+									
85	X	50 for 3"	50+									
90	X	50 for 3"	50+				12				3	
95	X	15-18-50	68									
100	X	25-35-45	80	▼			9					
105	X	50 for 3"	50+			Boring terminated at 105'						

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UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.:	26081-001-01
REPORT NO.:	21607
PAGE:	B-14

PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

BORING DESIGNATION: **B-7** SHEET: **1 of 1**
SECTION: TOWNSHIP: RANGE:

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft):
WATER TABLE (ft): NE
DATE OF READING: 11/02/01
EST. WSWT (ft):

DATE STARTED: 11/2/01
DATE FINISHED: 11/2/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING: ASTMD-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						Loose to medium dense tan to yellow fine SAND [SP/SM]						
	X	2-3-4	7									
5	X	4-4-5	9									
10	X	5-12-12	24									
15	X	7-8-12	20				8					
20	X	8-15-33	48									
25	X	10-30-40	70									
30	X	9-20-25	45									
35	X	50 for 3"	50+									
						Very dense orange SAND [SP/SM]						
40	X	50 for 3"	50+									
45	X	22-26-39	65				8					
50	X	18-26-28	54									
55	X	15-35-45	80									
						Boring terminated at 55'						

DLC1

UNIVERSAL ENGINEERING SCIENCES BORING LOG	PROJECT NO.: 26081-001-01 REPORT NO.: 21607 PAGE: B-15

PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

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

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft):
WATER TABLE (ft): NE
DATE OF READING: 10/29/01
EST. WSWT (ft):

DATE STARTED: 10/29/01
DATE FINISHED: 10/29/01
DRILLED BY: R. WOODARD
TYPE OF SAMPLING: ASTMD-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						Tan SAND						
	X	2-3-4	7									
						Medium dense white SAND [SP/SM]						
5	X	5-6-7	13									
10	X	5-6-7	13				8					
15	X	5-7-9	16									
20	X	5-8-9	17									
						Medium dense tan & orange SAND [SP/SM]						
25	X	5-11-14	25									
30	X	6-11-13	24									
						Dense white & orange CLAYEY SAND [SC]						
35	X	13-19-23	42				17					
						Dense white SAND [SP/SM]						
40	X	13-19-25	44				10				2	
						Boring terminated at 40'						

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

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PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

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

CLIENT: SCS ENGINEERS

LOCATION: SEE BORING LOCATION PLAN

REMARKS:

GS ELEVATION(ft):
WATER TABLE (ft): NE
DATE OF READING: 11/05/01
EST. WSWT (ft):

DATE STARTED: 11/5/01
DATE FINISHED: 11/5/01
DRILLED BY: J. STILLSON
TYPE OF SAMPLING: ASTMD-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						Medium dense brown fine SAND [SM]	14					
	X	10-10-20	30									
	X	5-7-10	17			Medium dense white fine SAND [SP/SM]						
5												
	X	4-8-8	16									
10												
	X	5-5-12	17				9					
15						Medium dense white to tan fine SAND [SP/SM]						
	X	6-8-9	17									
20												
	X	8-13-13	26									
25												
	X	8-9-10	19									
30						Medium dense tan fine SAND [SP/SM]						
	X	6-10-20	30									
35												
	X	8-10-18	28									
40												
	X	8-10-12	22									
45						Boring terminated at 45'						

BL2I

UNIVERSAL ENGINEERING SCIENCES
BORING LOG

PROJECT NO.: 26081-001-01
REPORT NO.: 21607
PAGE: B-17

PROJECT: CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FLORIDA

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

CLIENT: SCS ENGINEERS
LOCATION: SEE BORING LOCATION PLAN
REMARKS:

GS ELEVATION(ft):
WATER TABLE (ft): NE
DATE OF READING: 10/29/01
EST. WSWT (ft):

DATE STARTED: 10/29/01
DATE FINISHED: 10/29/01
DRILLED BY: R. WOODARD
TYPE OF SAMPLING: ASTMD-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 to medium dense orange & tan very CLAYEY SAND [SC]						
	X	4-4-4	8									
5	X	8-8-11	19				31					
10	X	4-10-12	22									
15	X	5-8-11	19									
20	X	9-29-25	54									
25	X	5-8-12	20									
						Very dense orange & tan SAND [SP/SM]						
30	X	8-30-35	65									
						Boring terminated at 30'						

BL2I

UNIVERSAL
ENGINEERING SCIENCES

KEY TO BORING LOGS

SYMBOLS

22	Number of Blows of a 140-lb Weight Falling 30 In. Required to Drive Standard Spoon One Foot
WOR	Weight of Drill Rods
S	Thin-Wall Shelby Tube Undisturbed Sampler Used
90% Rec.	Percent Core Recovery from Rock Core-Drilling Operations
	Sample Taken at this Level
	Sample Not Taken at this Level
	Change in Soil Strata
	Free Ground Water Level
	Seasonal High Ground Water Level

RELATIVE DENSITY
(sand-silt)

Very Loose - Less Than 4 Blows/Ft.
Loose - 4 - 10 Blows/Ft.
Medium - 10 to 30 Blows/Ft.
Dense - 30 to 50 Blows/Ft.
Very Dense - More Than 50 Blows/Ft.

CONSISTENCY
(clay)

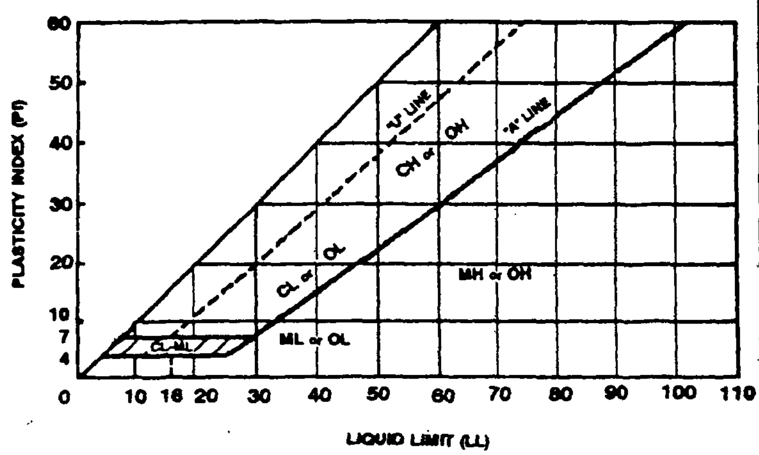
Very Soft - Less Than 2 Blows/Ft.
Soft - 2 to 4 Blows/Ft.
Medium - 4 to 8 Blows/Ft.
Stiff - 8 to 15 Blows/Ft.
Very Stiff - 15 to 30 Blows/Ft.
Hard - More Than 30 Blows/Ft.

UNIFIED CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE-GRAINED SOILS More than 50% retained on No. 200 sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes No. 200 sieve*	SILTS AND CLAYS Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays or high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

* Based on the material pasing the 3-in. (75-mm) sieve.

PLASTICITY CHART



APPENDIX C

SUMMARY OF LABORATORY RESULTS

PROJECT: Citrus County Central Landfill
Citrus County, FL
CLIENT: SCS Engineers

ORDER NO: 26081-001-01
REPORT NO: 21607
DATE: 11/16/01

BORING NO	SAMPLE DEPTH (FT)	SOIL DESCRIPTION	SAMPLE TYPE*	NATURAL MOISTURE (%)	ATTERBERG LIMITS		COEFFICIENT OF PERMEABILITY (FT/DAY)	SIEVE ANALYSIS (% passing)						AASHTO SOIL CLASSIFICATION	UNIFIED SOIL CLASSIFICATION
					LIQUID LIMIT (%)	PLASTICITY INDEX (%)		No. 4	No. 10	No. 40	No. 60	No. 100	No. 200		
B-1	4	Brown fine SAND	SS					81	80	77	66	28	4		SP
B-1	9	Orange slight clayey SAND	SS					100	100	99	87	48	20		SC
B-1	17	Tan to orange fine SAND	SS					100	100	98	76	33	17		SM
B-2	4	Brown to orange fine SAND	SS					100	100	99	85	34	3		SP
B-2	8	Orange fine slightly clayey SAND	SS		22	1							19		SC
B-2	10	Orange fine SAND	SS					100	100	99	84	34	8		SP-SM
B-2	18	Tan and orange fine SAND	SS					100	100	97	78	30	19		SC
B-3	5	Gray and Orange clayey SAND	SS		34	17							35		SC
B-3	25	Light gray SAND	SS					100	100	99	93	47	10		SP-SM
B-4	5	Orange fine SAND	SS					99	99	99	90	42	9		SP-SM

*SS-Split Spoon
ST-Shelby Tube
A-Auger

UNIVERSAL
ENGINEERING SCIENCES
4475 SW 35th Terrace, Gainesville, FL. 32608
(352) 372-3392

SUMMARY OF LABORATORY RESULTS

PROJECT: Citrus County Central Landfill
Citrus County, FL
CLIENT: SCS Engineers

ORDER NO: 26081-001-01
REPORT NO: 21607
DATE: 11/16/01

BORING NO	SAMPLE DEPTH (FT)	SOIL DESCRIPTION	SAMPLE TYPE*	NATURAL MOISTURE (%)	ATTERBERG LIMITS		COEFFICIENT OF PERMEABILITY (FT/DAY)	SIEVE ANALYSIS (% passing)						AASHTO SOIL CLASSIFICATION	UNIFIED SOIL CLASSIFICATION
					LIQUID LIMIT (%)	PLASTICITY INDEX (%)		No. 4	No. 10	No. 40	No. 60	No. 100	No. 200		
B-4	50	Tan fine SAND	SS					100	100	999	84	28	8		SP-SM
B-4	70	Orange slight clayey SAND	SS					100	100	99	84	26	10		SP-SM
B-5	10	Dark brown silty SAND	SS					99	98	96	82	37	7		SP-SM
B-5	20	Orange clayey SAND	SS		31	6							33		SC
B-5	25	Orange slightly clayey SAND	SS					100	100	98	86	43	17		SC
B-5	75	Tan and white SAND	SS					100	100	99	92	41	15		S[illegible]
B-6	5	Orange fine clayey SAND	SS					100	100	99	93	59	24		SC
B-6	25	Gray clayey SAND	SS		29	8							28		SM
B-6	55	Tan fine SAND	SS					100	100	98	89	36	9		SM
B-6	95	Tan fine SAND	SS	46											SM

*SS-Split Spoon
ST-Shelby Tube
A-Auger

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SUMMARY OF LABORATORY RESULTS

PROJECT: Citrus County Central Landfill
Citrus County, FL
CLIENT: SCS Engineers

ORDER NO: 26081-001-01
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BORING NO.	SAMPLE DEPTH (FT)	SOIL DESCRIPTION	SAMPLE TYPE*	NATURAL MOISTURE (%)	ATTERBERG LIMITS		COEFFICIENT OF PERMEABILITY (FT/DAY)	SIEVE ANALYSIS (% passing)						AASHTO SOIL CLASSIFICATION	UNIFIED SOIL CLASSIFICATION
					LIQUID LIMIT (%)	PLASTICITY INDEX (%)		No. 4	No. 10	No. 40	No. 60	No. 100	No. 200		
B-6	90	Tan fine SAND	SS				3.1						12		SP-M
B-6	100	White SAND	SS					100	100	98	79	27	9		SP-SM
B-7	20	Yellow SAND	SS					100	100	97	82	30	8		SP-SM
B-7	45	Orange SAND	SS					100	100	97	79	27	8		SP-SM
B-8	10	White SAND	SS					100	100	98	80	28	8		SP-SM
B-8	35	White and orange SAND	SS					100	100	98	78	30	17		SM
B-8	40	White fine SAND	SS				2.2						10		SM
B-9	2	Brown fine SAND	SS					94	93	90	79	37	14		SM
B-9	15	White SAND	SS					98	97	95	74	21	9		SP-SM
B-10	5	Orange tan fine SAND	SS					100	100	99	93	59	31		SC

*SS-Split Spoon
ST-Shelby Tube
A-Auger

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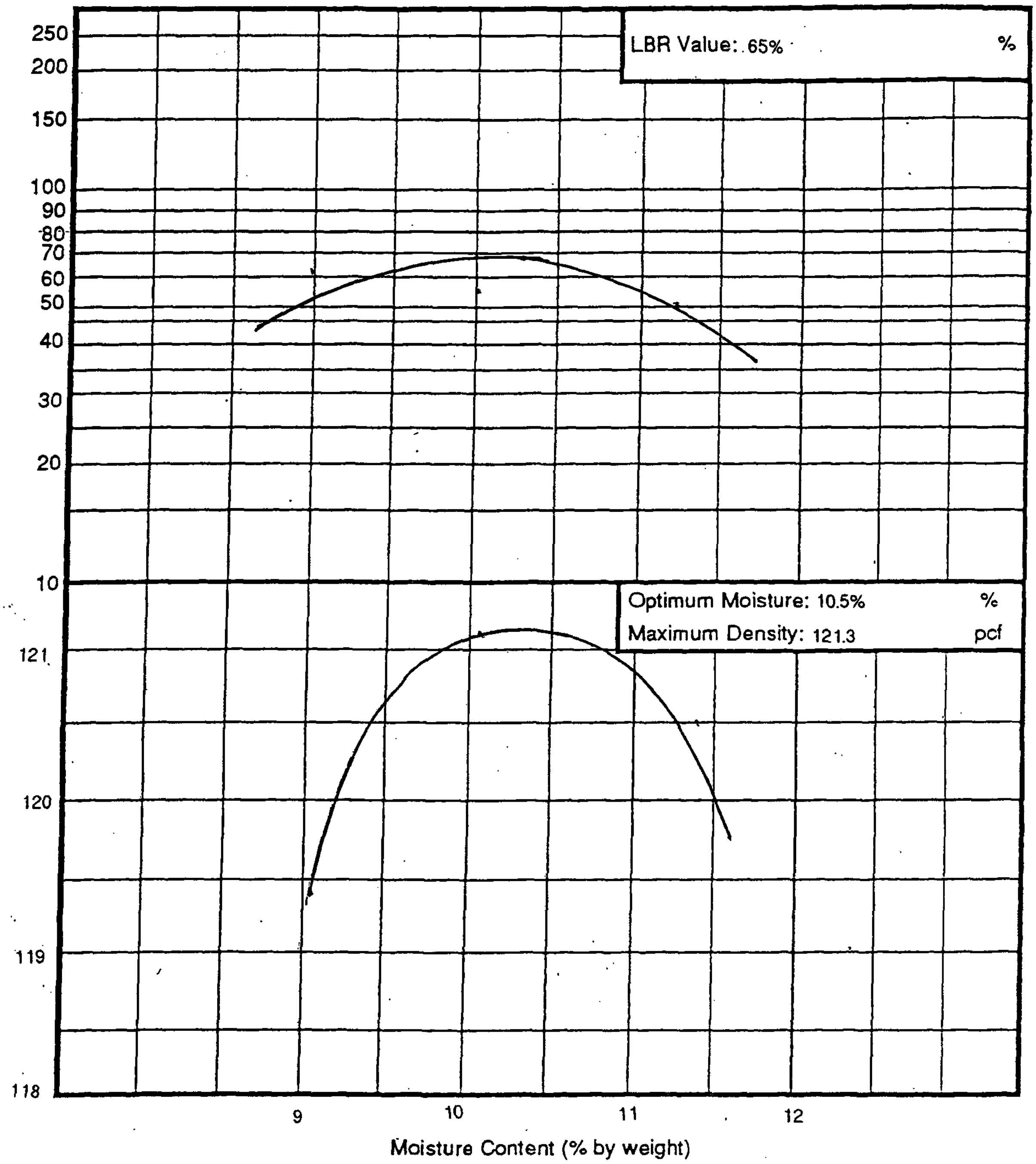


Sample No.:

Location: STOCKPILE

Soil Description: WHITE SILTY CLAYEY SAND

Project Requirement:

UNIVERSAL
ENGINEERING SCIENCES

CITRUS COUNTY CENTRAL LANDFILL
S.R. 44
CITRUS COUNTY, FL

LIMEROCK BEARING RATIO

DRAWN BY:	DATE:	CHECKED BY:	DATE:
SCALE:	ORDER NO:	REPORT NO:	PAGE NO:

DESCRIPTION OF LABORATORY TESTING PROCEDURES

SOIL GRADATION TEST ASTM D-442

The soil gradation test is performed by passing a representative soil sample over a standard set of nested sieves. The percentage of the soil grains retained on each sieve are measured and a grain size distribution curve is determined.

ATTERBERG LIMITS TEST ASTM D-4318

The Atterberg Limits are the upper and lower limits of the range of water content over which a soil exhibits plastic behavior, and are defined as the liquid limit and plastic limit, respectively.

The liquid limit is determined as follows: The soil is mixed with distilled water to form a thick paste, which is then placed in a brass cup which is mounted on an edge pivot and rests initially on a rubber base. The base in then leveled off horizontally and divided by cutting a groove with a standard tool. The two halves of the soil gradually flow together as the cup is repeatedly dropped onto its base at a specified rate. The liquid limit is defined as the water content at which 25 blows are required to close the groove over a distance of 1/2 inch.

The plastic limit is determined as follow: The soil is mixed with distilled water until it can be molded. A ball of soil is then rolled into a thread 1/8 inch in diameter between the hand and a glass plate. The soil is molded together again and the process repeated until the thread crumbles when its diameter is 1/8 inch. The water content of the crumbled soil is determined and defined as the plastic limit.

WASH 200 TEST

The Wash 200 test is performed by passing a representative soil sample over a No. 200 sieve and rinsing with water. The percentage of the soil grains passing this sieve is then calculated.

LABORATORY PERMEABILITY TEST

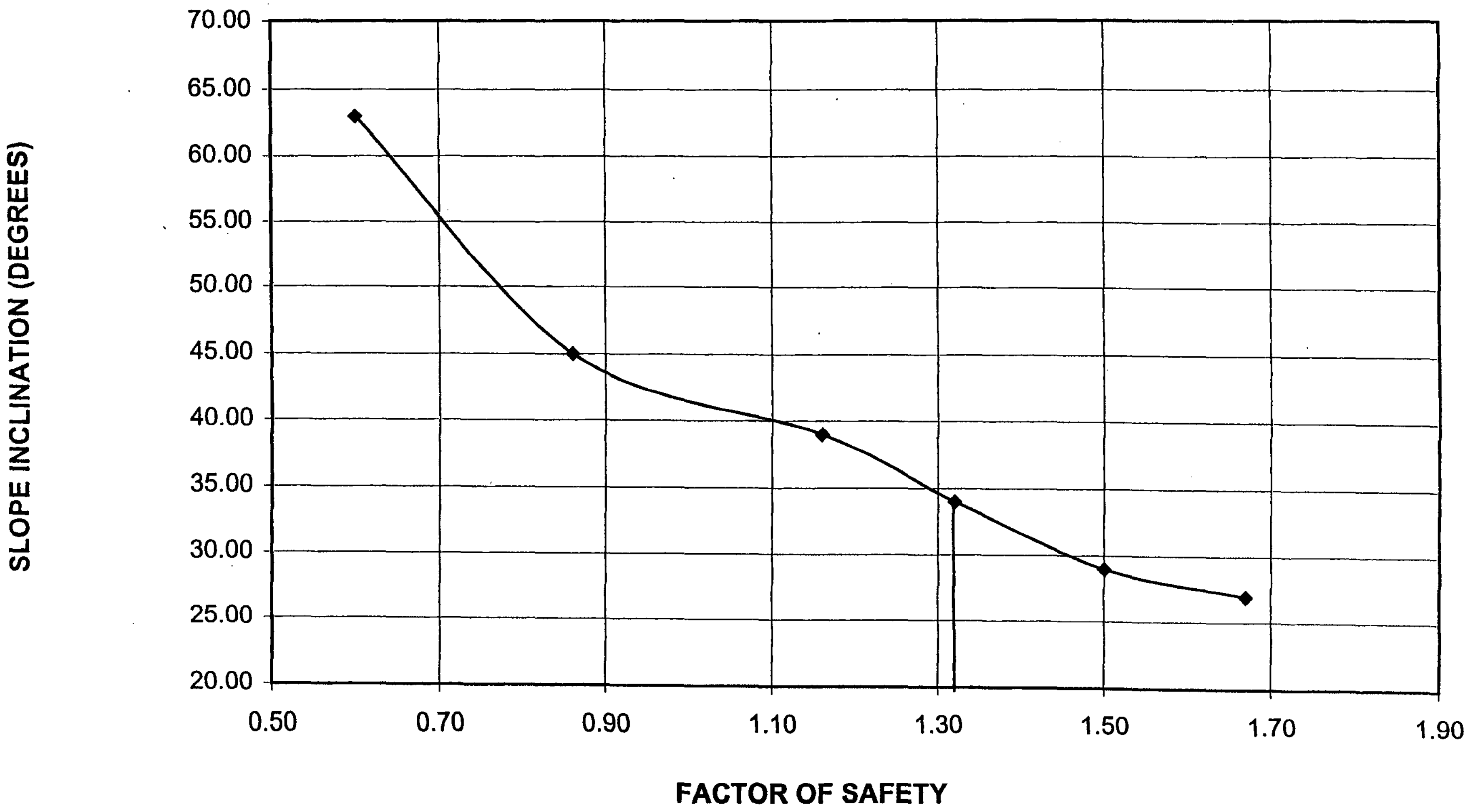
The laboratory permeability test is a Falling Head Test that is performed on soil samples recovered from this site. The data recovered from this test are used to calculate Darcy's Coefficient of Permeability (k) of the soil.

LIMEROCK BEARING RATIO - FM 5-515

This test method is intended for the determination of the bearing value of soils when they are compacted in the laboratory at moistures varying from the dry to wet side of optimum. The samples are compacted using a 10-pound hammer dropped from a height of 18 inches. The test is useful for evaluating limerock and other soils used for base, stabilized subgrade, and subgrade or embankment material encountered.

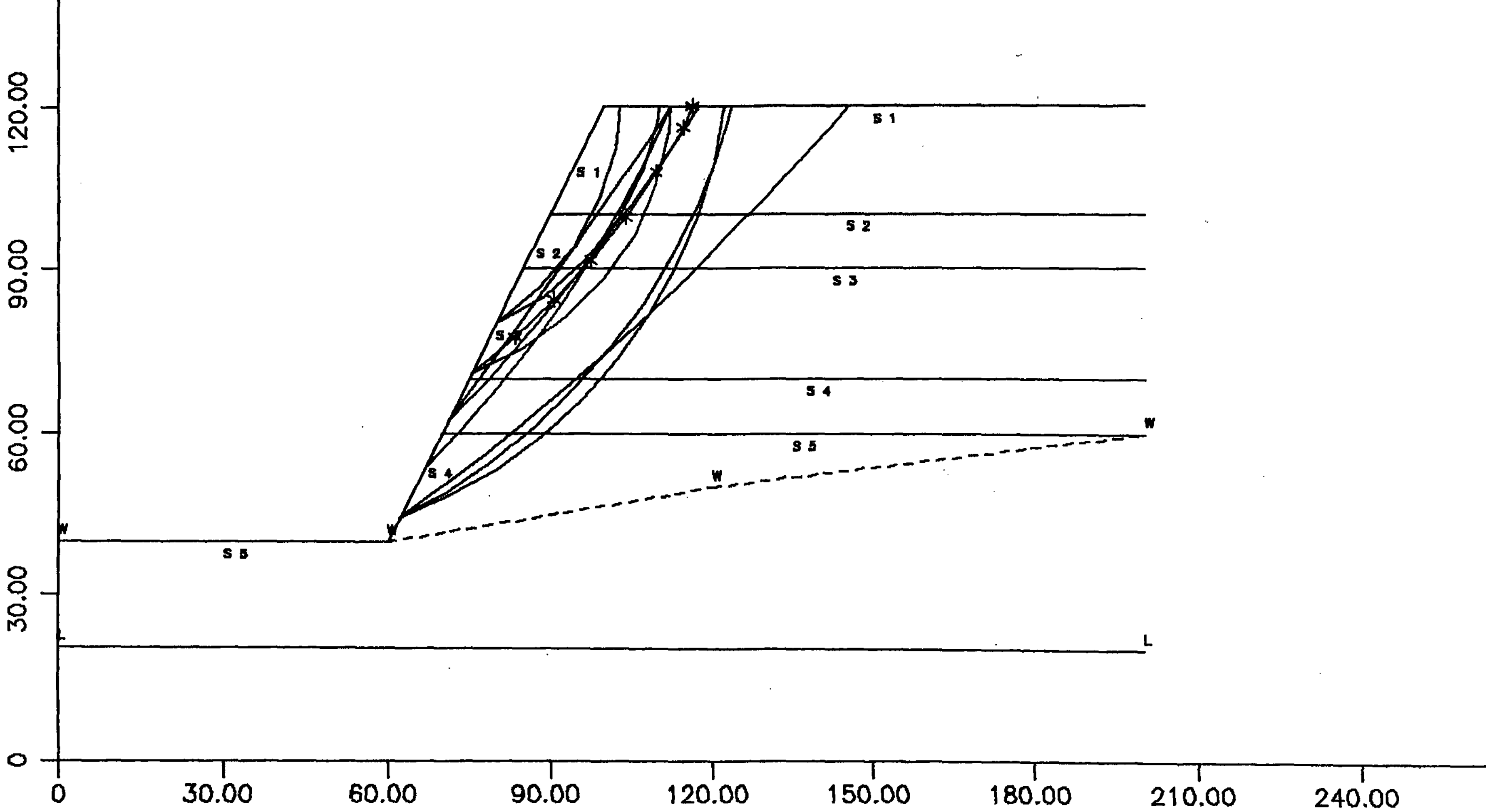
APPENDIX D

CITRUS CO LANDFILL- SLOPE STABILITY ANALYSIS



Soil	Moist Unit Weight	Saturated Unit Weight	Cohesion	Friction Angle
1	110.000	120.000	0.000	36.000
2	115.000	125.000	350.000	20.000
3	110.000	120.000	0.000	33.000
4	115.000	125.000	500.000	25.000
5	110.000	120.000	0.000	38.000

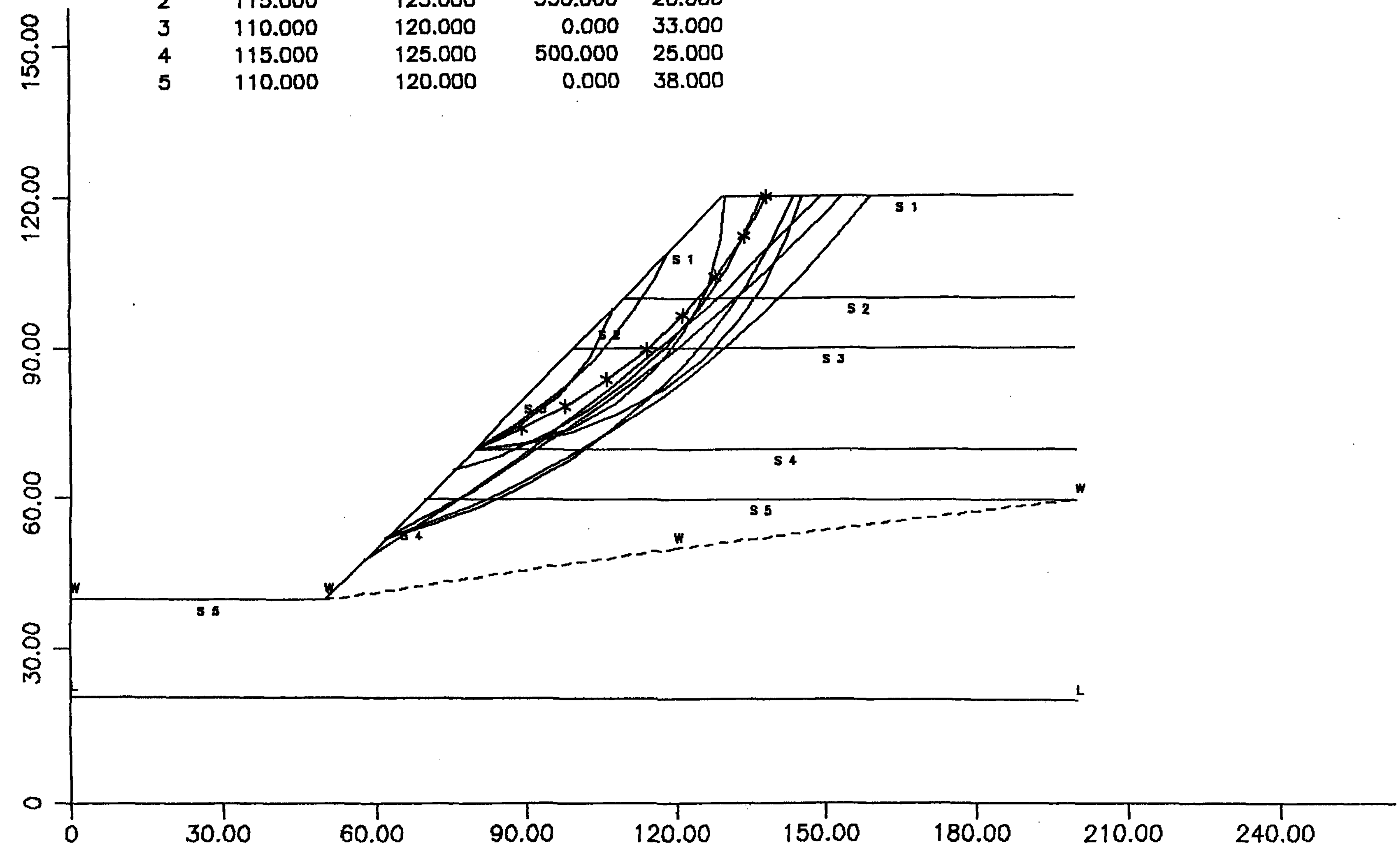
Minimum Factor of Safety 0.598



CITRUS COUNTY CENTRAL LANDFILL 0.5H:1V

Soil	Moist Unit Weight	Saturated Unit Weight	Cohesion	Friction Angle
1	110.000	120.000	0.000	36.000
2	115.000	125.000	350.000	20.000
3	110.000	120.000	0.000	33.000
4	115.000	125.000	500.000	25.000
5	110.000	120.000	0.000	38.000

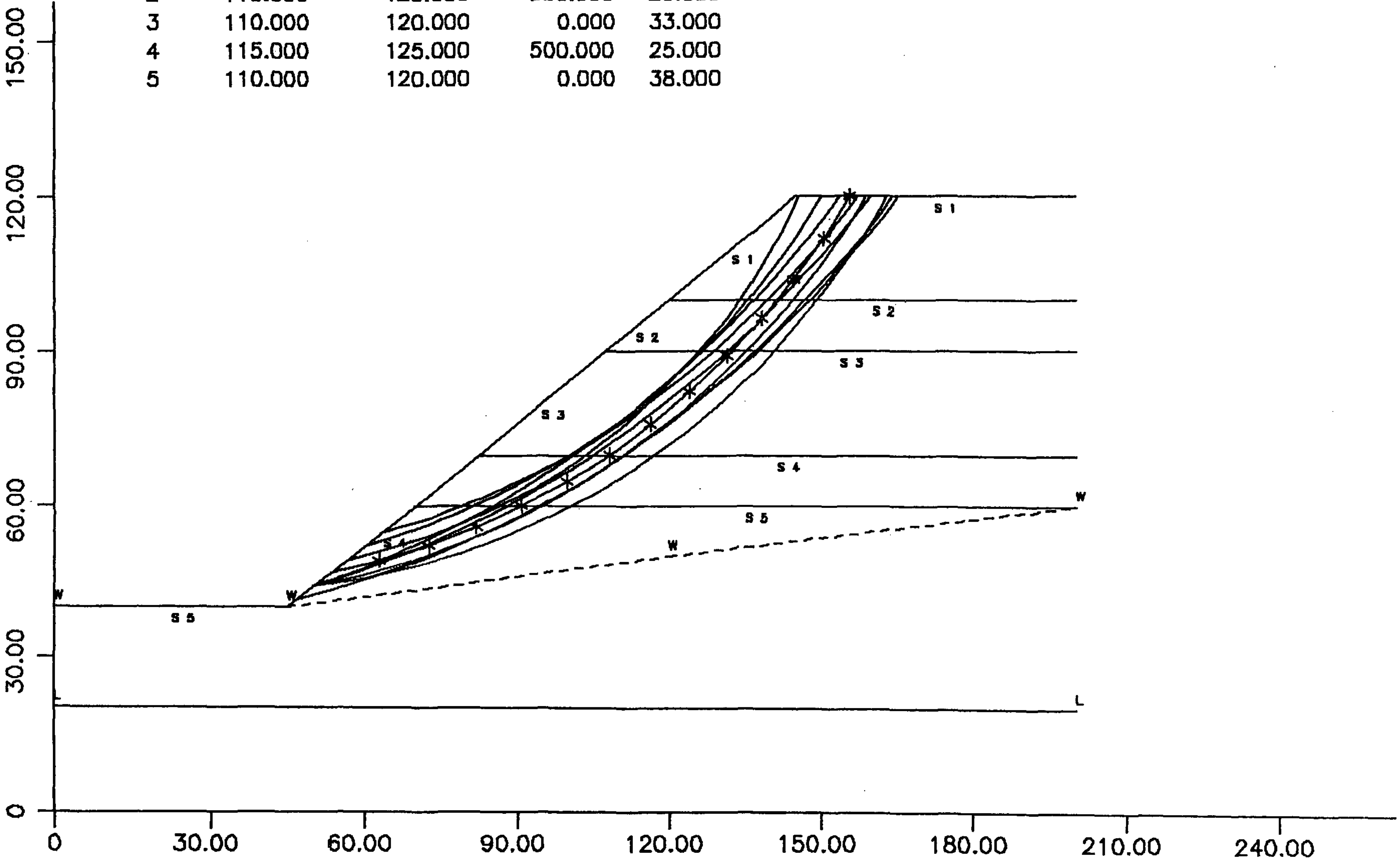
Minimum Factor of Safety 0.855



CITRUS COUNTY CENTRAL LANDFILL - SLOPE 1H:1V

Minimum Factor of Safety 1.157

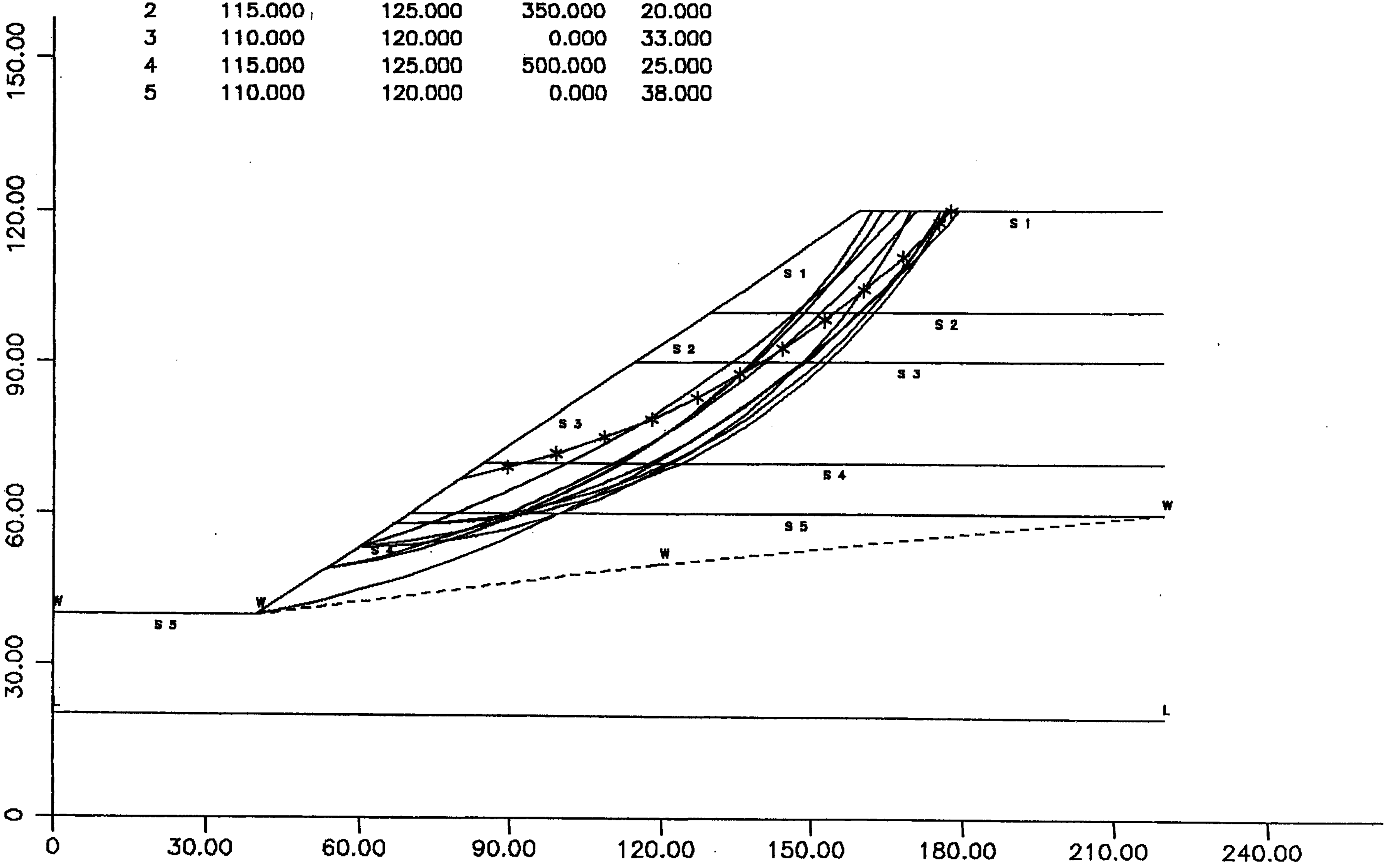
Soil	Moist Unit Weight	Saturated Unit Weight	Cohesion	Friction Angle
1	110.000	120.000	0.000	36.000
2	115.000	125.000	350.000	20.000
3	110.000	120.000	0.000	33.000
4	115.000	125.000	500.000	25.000
5	110.000	120.000	0.000	38.000



CITRUS COUNTY CENTRAL LANDFILL - SLOPE 1.25H:1V

Soil	Moist Unit Weight	Saturated Unit Weight	Cohesion	Friction Angle
1	110.000	120.000	0.000	36.000
2	115.000	125.000	350.000	20.000
3	110.000	120.000	0.000	33.000
4	115.000	125.000	500.000	25.000
5	110.000	120.000	0.000	38.000

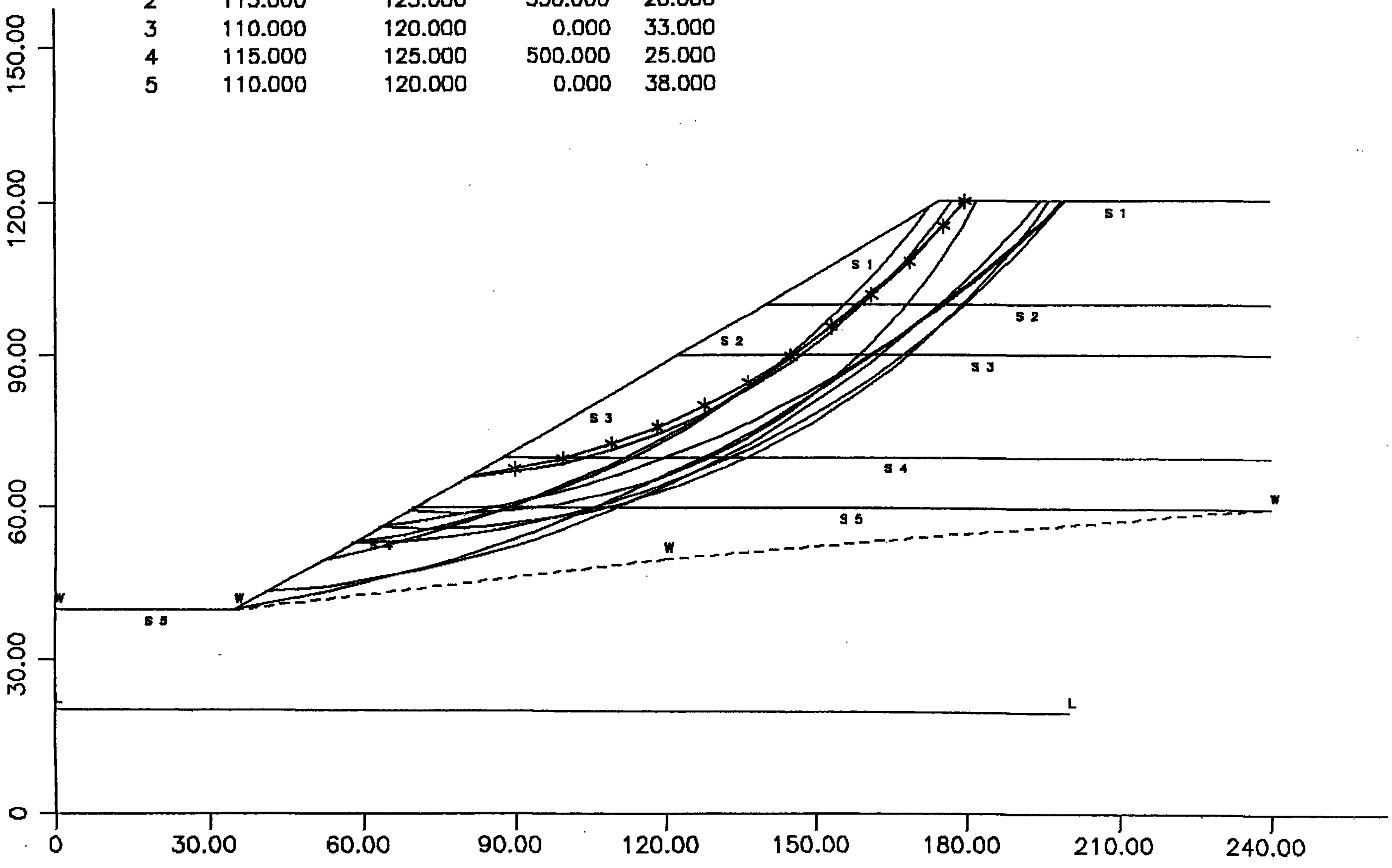
Minimum Factor of Safety 1.320



CITRUS COUNTY CENTRAL LANDFILL - SLOPE 1.5H:1V

Soil	Moist Unit Weight	Saturated Unit Weight	Cohesion	Friction Angle
1	110.000	120.000	0.000	36.000
2	115.000	125.000	350.000	20.000
3	110.000	120.000	0.000	33.000
4	115.000	125.000	500.000	25.000
5	110.000	120.000	0.000	38.000

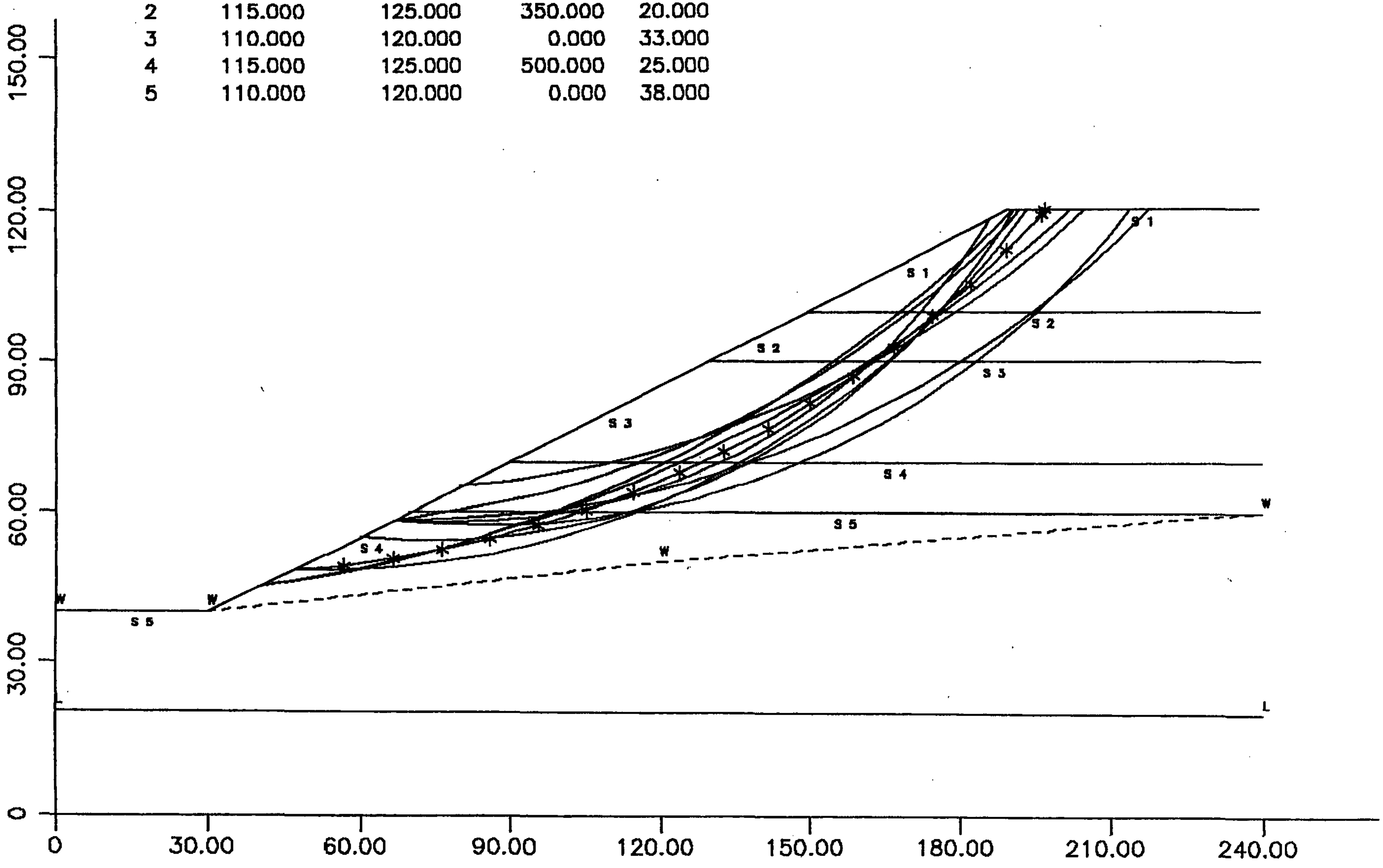
Minimum Factor of Safety 1.498



CITRUS COUNTY CENTRAL LANDFILL - SLOPE 1.75H:1V

Soil	Moist Unit Weight	Saturated Unit Weight	Cohesion	Friction Angle
1	110.000	120.000	0.000	36.000
2	115.000	125.000	350.000	20.000
3	110.000	120.000	0.000	33.000
4	115.000	125.000	500.000	25.000
5	110.000	120.000	0.000	38.000

Minimum Factor of Safety 1.666



CITRUS COUNTY CENTRAL LANDFILL - SLOPE 2H:1V

** STABL/G **

Slope Stability Program
Portions of this program (c) 1992
by
GEOSOFT
1442 Lincoln Avenue, Suite 146
Orange, CA 92665
U.S.A.

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION CITRUS COUNTY CENTRAL LANDFILL - SLOPE 1
.5H:1V

BOUNDARY COORDINATES

6 Top Boundaries
10 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	40.00	40.00	40.00	5
2	40.00	40.00	85.00	70.00	4
3	85.00	70.00	115.00	90.00	3
4	115.00	90.00	130.00	100.00	2
5	130.00	100.00	160.00	120.00	1
6	160.00	120.00	220.00	120.00	1
7	130.00	100.00	220.00	100.00	2
8	115.00	90.00	220.00	90.00	3
9	85.00	70.00	220.00	70.00	4
10	70.00	60.00	220.00	60.00	5

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	36.0	.00	.0	0
2	115.0	125.0	350.0	20.0	.00	.0	0
3	110.0	120.0	.0	33.0	.00	.0	0
4	115.0	125.0	500.0	25.0	.00	.0	0
5	110.0	120.0	.0	38.0	.00	.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	40.00
2	40.00	40.00
3	120.00	50.00
4	220.00	60.00

Searching Routine Will Be Limited To An Area Defined By 1 Boundaries Of Which The First 1 Boundaries Will Deflect Surfaces Upward

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)
1	.00	20.00	220.00	20.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 20.00 ft.
and X = 80.00 ft.

Each Surface Terminates Between X = 120.00 ft.
and X = 180.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 ft.

10.00 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 Bishop Method * *

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.00	66.67
2	89.75	68.90
3	99.36	71.65
4	108.82	74.89
5	118.10	78.63
6	127.16	82.85
7	136.00	87.54
8	144.57	92.69
9	152.86	98.28
10	160.85	104.30
11	168.50	110.73
12	175.81	117.55
13	178.18	120.00

Circle Center At X = 42.4 ; Y = 253.2 and Radius, 190.3

*** 1.320 ***

Individual data on the 19 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	5.0	628.6	.0	.0	.0	.0	.0	.0	.0
[illegible]	4.7	1723.1	.0	.0	.0	.0	.0	.0	.0
[illegible]	3.8	2125.5	.0	.0	.0	.0	.0	.0	[illegible]
4	5.8	4333.7	.0	.0	.0	.0	.0	.0	[illegible]
5	9.5	9842.9	.0	.0	.0	.0	.0	.0	.0
6	6.2	8021.7	.0	.0	.0	.0	.0	.0	.0
7	3.1	4455.0	.0	.0	.0	.0	.0	.0	.0

8	9.1	14539.4	.0	.0	.0	.0	.0	.0	.0
9	2.8	4949.6	.0	.0	.0	.0	.0	.0	.0
10	6.0	10885.6	.0	.0	.0	.0	.0	.0	.0
[illegible]	4.1	7685.2	.0	.0	.0	.0	.0	.0	.0
[illegible]	4.5	8501.6	.0	.0	.0	.0	.0	.0	.0
13	8.3	15685.4	.0	.0	.0	.0	.0	.0	.0
14	2.3	4247.3	.0	.0	.0	.0	.0	.0	.0
15	4.9	8840.8	.0	.0	.0	.0	.0	.0	.0
16	.8	1489.9	.0	.0	.0	.0	.0	.0	.0
17	7.7	10520.3	.0	.0	.0	.0	.0	.0	.0
18	7.3	4713.0	.0	.0	.0	.0	.0	.0	.0
19	2.4	318.2	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.33	48.89
2	63.08	51.14
3	72.70	53.86
4	82.18	57.04
5	91.50	60.67
6	100.63	64.75
7	109.55	69.26
8	118.25	74.21
9	126.69	79.56
10	134.87	85.32
11	142.76	91.46
12	150.34	97.98
13	157.60	104.86
14	164.52	112.08
15	171.08	119.63
16	171.37	120.00

Circle Center At X = 11.7 ; Y = 251.6 and Radius, 206.9

*** 1.323 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	60.00	53.33
2	69.92	54.61
3	79.74	56.48
4	89.44	58.94
5	98.96	61.98
6	108.29	65.58
7	117.38	69.75
8	126.20	74.46
9	134.73	79.68

10	142.92	85.42
11	150.75	91.64
12	158.19	98.32
13	165.22	105.43
14	171.80	112.96
15	177.25	120.00

Circle Center At X = 43.9 ; Y = 218.2 and Radius, 165.7

*** 1.328 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.33	48.89
2	63.17	50.69
3	72.88	53.09
4	82.42	56.08
5	91.76	59.65
6	100.87	63.79
7	109.70	68.48
8	118.23	73.70
9	126.42	79.44
10	134.24	85.66
11	141.67	92.36
12	148.67	99.50
13	155.21	107.06
14	161.29	115.01
15	164.64	120.00

Circle Center At X = 29.0 ; Y = 209.8 and Radius, 162.8

*** 1.334 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	40.00	40.00
2	49.78	42.10
3	59.46	44.59
4	69.04	47.47
5	78.49	50.73
6	87.81	54.36
7	96.97	58.36
8	105.97	62.73

9	114.79	67.45
10	123.41	72.52
11	131.82	77.93
12	140.01	83.67
13	147.96	89.73
14	155.66	96.11
15	163.10	102.79
16	170.27	109.76
17	177.16	117.01
18	179.77	120.00

Circle Center At X = -7.6 ; Y = 285.2 and Radius, 249.8

*** 1.335 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	53.33	48.89
2	63.18	50.62
3	72.90	52.99
4	82.44	55.98
5	91.77	59.57
6	100.85	63.76
7	109.65	68.52
8	118.11	73.84
9	126.22	79.70
10	133.93	86.07
11	141.22	92.91
12	148.05	100.22
13	154.39	107.95
14	160.23	116.07
15	162.68	120.00

Circle Center At X = 31.4 ; Y = 202.5 and Radius, 155.2

*** 1.345 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	66.67	57.78
2	76.66	58.11
3	86.60	59.23
4	96.42	61.13

5	106.05	63.81
6	115.44	67.24
7	124.54	71.40
8	133.27	76.27
9	141.59	81.82
10	149.45	88.01
11	156.79	94.80
12	163.57	102.15
13	169.74	110.02
14	175.28	118.34
15	176.20	120.00

Circle Center At X = 67.5 ; Y = 184.0 and Radius, 126.2

*** 1.350 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	60.00	53.33
2	69.99	53.70
3	79.93	54.87
4	89.73	56.83
5	99.34	59.59
6	108.70	63.11
7	117.75	67.37
8	126.42	72.36
9	134.66	78.02
10	142.41	84.34
11	149.63	91.26
12	156.27	98.74
13	162.28	106.73
14	167.62	115.18
15	170.15	120.00

Circle Center At X = 60.5 ; Y = 177.0 and Radius, 123.7

*** 1.360 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	66.67	57.78
2	76.67	57.85
3	86.63	58.74

4	96.48	60.45
5	106.16	62.95
6	115.60	66.24
7	124.75	70.30
8	133.52	75.09
9	141.88	80.58
10	149.76	86.74
11	157.11	93.52
12	163.87	100.89
13	170.01	108.78
14	175.49	117.15
15	177.04	120.00

Circle Center At X = 70.8 ; Y = 179.7 and Radius, 121.9

*** 1.366 ***

Failure Surface Specified By 14 Coordinate Points

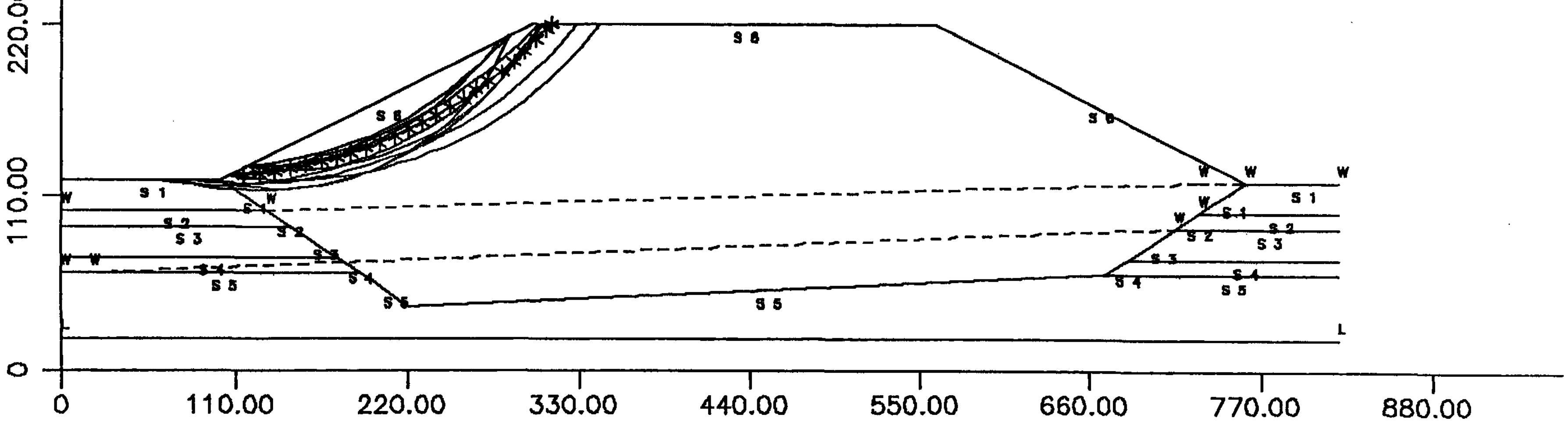
Point No.	X-Surf (ft)	Y-Surf (ft)
1	60.00	53.33
2	69.54	56.34
3	78.94	59.74
4	88.20	63.53
5	97.28	67.70
6	106.19	72.25
7	114.90	77.17
8	123.39	82.44
9	131.66	88.07
10	139.69	94.03
11	147.46	100.33
12	154.96	106.94
13	162.17	113.86
14	168.06	120.00

Circle Center At X = -7.0 ; Y = 282.9 and Radius, 239.2

*** 1.367 ***

Soil	Moist Unit Weight	Saturated Unit Weight	Cohesion	Friction Angle
1	110.000	120.000	0.000	36.000
2	115.000	125.000	350.000	20.000
3	110.000	120.000	0.000	33.000
4	115.000	125.000	500.000	25.000
5	110.000	120.000	0.000	38.000
6	50.000	60.000	100.000	25.000

Minimum Factor of Safety 1.306



CITRUS COUNTY CENTRAL LANDFILL - EMBANKMENT

** STABL/G **

Slope Stability Program
Portions of this program (c) 1992
by
GEOSOFT
1442 Lincoln Avenue, Suite 146
Orange, CA 92665
U.S.A.

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:
Input Data Filename:
Output Filename:
Plotted Output Filename:

PROBLEM DESCRIPTION Embankment citrus county landfill

BOUNDARY COORDINATES

5 Top Boundaries
23 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	120.00	100.00	120.00	1
2	100.00	120.00	300.00	220.00	6
3	300.00	220.00	560.00	220.00	6
4	560.00	220.00	760.00	120.00	6
5	760.00	120.00	820.00	120.00	1
6	100.00	120.00	130.00	100.00	1
7	.00	100.00	130.00	100.00	2
8	730.00	100.00	760.00	120.00	1
9	730.00	100.00	820.00	100.00	2
10	130.00	100.00	145.00	90.00	2
11	.00	90.00	145.00	90.00	3
12	715.00	90.00	730.00	100.00	2
13	715.00	90.00	820.00	90.00	3
14	145.00	90.00	175.00	70.00	3
15	.00	70.00	175.00	70.00	4
16	685.00	70.00	715.00	90.00	3
17	685.00	70.00	820.00	70.00	4
18	175.00	70.00	190.00	60.00	4

19	.00	60.00	190.00	60.00	5
20	670.00	60.00	685.00	70.00	4
21	670.00	60.00	820.00	60.00	5
22	190.00	60.00	220.00	40.00	5
23	220.00	40.00	670.00	60.00	5

ISOTROPIC SOIL PARAMETERS

6 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	36.0	.00	.0	0
2	115.0	125.0	350.0	20.0	.00	.0	0
3	110.0	120.0	.0	33.0	.00	.0	0
4	115.0	125.0	500.0	25.0	.00	.0	0
5	110.0	120.0	.0	38.0	.00	.0	0
6	50.0	60.0	100.0	25.0	.00	.0	0

2 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 4 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	100.00
2	130.00	100.00
3	730.00	120.00
4	820.00	120.00

Piezometric Surface No. 2 Specified by 6 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	.00	60.00
2	19.00	60.00
3	715.00	90.00
4	730.00	100.00
5	760.00	120.00
6	820.00	120.00

Searching Routine Will Be Limited To An Area Defined By 1 Boundaries Of Which The First 1 Boundaries Will Deflect Surfaces Upward

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)
1	.00	20.00	820.00	20.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

100 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 50.00 ft. and X = 150.00 ft.

Each Surface Terminates Between X = 250.00 ft. and X = 350.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 40.00 ft.

10.00 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 Bishop Method * *

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.56	122.78
2	115.53	123.50
3	125.47	124.55
4	135.38	125.92
5	145.24	127.62
6	155.03	129.64
7	164.75	131.97

8	174.40	134.62
9	183.95	137.59
10	193.39	140.86
11	202.73	144.44
12	211.95	148.32
13	221.03	152.51
14	229.97	156.98
15	238.76	161.75
16	247.39	166.80
17	255.86	172.13
18	264.14	177.73
19	272.23	183.60
20	280.13	189.74
21	287.83	196.12
22	295.31	202.75
23	302.57	209.63
24	309.61	216.74
25	312.63	220.00

Circle Center At X = 88.4 ; Y = 428.6 and Radius, 306.4

*** 1.306 ***

Individual data on the 25 slices

Slice No.	Width Ft (m)	Weight Lbs (kg)	Water Force Top Lbs (kg)	Water Force Bot Lbs (kg)	Tie Force Norm Lbs (kg)	Tie Force Tan Lbs (kg)	Earthquake Force Hor Lbs (kg)	Earthquake Force Ver Lbs (kg)	Surcharge Load Lbs (kg)
1	10.0	1063.0	.0	.0	.0	.0	.0	.0	.0
2	9.9	3095.2	.0	.0	.0	.0	.0	.0	.0
3	9.9	4941.0	.0	.0	.0	.0	.0	.0	.0
4	9.9	6594.3	.0	.0	.0	.0	.0	.0	.0
5	9.8	8050.6	.0	.0	.0	.0	.0	.0	.0
6	9.7	9306.9	.0	.0	.0	.0	.0	.0	.0
7	9.6	10361.2	.0	.0	.0	.0	.0	.0	.0
8	9.6	11213.3	.0	.0	.0	.0	.0	.0	.0
9	9.4	11864.1	.0	.0	.0	.0	.0	.0	.0
10	9.3	12315.8	.0	.0	.0	.0	.0	.0	.0
11	9.2	12572.3	.0	.0	.0	.0	.0	.0	.0
12	9.1	12638.5	.0	.0	.0	.0	.0	.0	.0
13	8.9	12520.8	.0	.0	.0	.0	.0	.0	.0
14	8.8	12226.8	.0	.0	.0	.0	.0	.0	.0
15	8.6	11765.4	.0	.0	.0	.0	.0	.0	.0
16	8.5	11146.4	.0	.0	.0	.0	.0	.0	.0
17	8.3	10381.2	.0	.0	.0	.0	.0	.0	.0
18	8.1	9481.8	.0	.0	.0	.0	.0	.0	.0
19	7.9	8461.6	.0	.0	.0	.0	.0	.0	.0
20	7.7	7334.7	.0	.0	.0	.0	.0	.0	.0
21	7.5	6116.3	.0	.0	.0	.0	.0	.0	.0
[illegible]	4.7	3247.5	.0	.0	.0	.0	.0	.0	.0
[illegible]	2.6	1491.8	.0	.0	.0	.0	.0	.0	.0
24	7.0	2397.6	.0	.0	.0	.0	.0	.0	.0
25	3.0	246.8	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.33	120.00
2	93.28	118.95
3	103.26	118.27
4	113.25	117.95
5	123.25	118.01
6	133.24	118.42
7	143.21	119.21
8	153.14	120.36
9	163.03	121.87
10	172.85	123.75
11	182.60	125.98
12	192.26	128.57
13	201.81	131.52
14	211.26	134.81
15	220.57	138.45
16	229.75	142.42
17	238.77	146.73
18	247.63	151.37
19	256.31	156.33
20	264.81	161.61
21	273.10	167.19
22	281.19	173.08
23	289.05	179.25
24	296.69	185.71
25	304.08	192.45
26	311.21	199.46
27	318.09	206.72
28	324.69	214.22
29	329.41	220.00

Circle Center At X = 116.8 ; Y = 390.4 and Radius, 272.5

*** 1.332 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.56	122.78
2	115.48	124.03
3	125.36	125.59
4	135.18	127.44
5	144.95	129.59
6	154.64	132.04
7	164.26	134.77
8	173.79	137.80
9	183.23	141.11

10	192.56	144.71
11	201.78	148.58
12	210.87	152.74
13	219.84	157.17
14	228.67	161.86
15	237.35	166.82
16	245.88	172.05
17	254.25	177.52
18	262.44	183.25
19	270.46	189.23
20	278.30	195.44
21	285.94	201.89
22	293.39	208.56
23	300.63	215.46
24	305.11	220.00

Circle Center At X = 69.1 ; Y = 451.0 and Radius, 330.3

*** 1.335 ***

Failure Surface Specified By 24 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	128.33
2	126.59	127.11
3	136.57	126.42
4	146.57	126.26
5	156.56	126.64
6	166.52	127.55
7	176.41	128.99
8	186.22	130.96
9	195.90	133.44
10	205.44	136.45
11	214.81	139.95
12	223.97	143.95
13	232.91	148.44
14	241.60	153.40
15	250.00	158.81
16	258.11	164.66
17	265.89	170.94
18	273.33	177.63
19	280.40	184.70
20	287.08	192.14
21	293.35	199.93
22	299.20	208.04
23	304.61	216.45
24	306.63	220.00

Circle Center At X = 144.5 ; Y = 313.2 and Radius, 187.0

*** 1.351 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	61.11	120.00
2	71.02	118.65
3	80.97	117.68
4	90.96	117.11
5	100.95	116.92
6	110.95	117.12
7	120.94	117.71
8	130.89	118.68
9	140.79	120.05
10	150.64	121.80
11	160.41	123.93
12	170.09	126.43
13	179.67	129.32
14	189.12	132.57
15	198.45	136.19
16	207.62	140.17
17	216.63	144.50
18	225.47	149.18
19	234.12	154.20
20	242.57	159.55
21	250.80	165.23
22	258.80	171.22
23	266.57	177.52
24	274.09	184.11
25	281.34	191.00
26	288.32	198.16
27	295.02	205.59
28	301.42	213.27
29	306.60	220.00

Circle Center At X = 100.8 ; Y = 374.0 and Radius, 257.0

*** 1.367 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	128.33
2	126.67	128.34
3	136.65	128.86
4	146.60	129.91
5	156.48	131.47
6	166.26	133.54

7	175.92	136.12
8	185.44	139.20
9	194.78	142.77
10	203.92	146.82
11	212.84	151.34
12	221.51	156.32
13	229.91	161.74
14	238.02	167.60
15	245.81	173.86
16	253.27	180.53
17	260.37	187.57
18	267.09	194.98
19	273.41	202.72
20	278.03	209.02

Circle Center At X = 121.6 ; Y = 320.1 and Radius, 191.9

*** 1.377 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	94.44	120.00
2	104.18	117.72
3	114.04	116.05
4	123.98	114.99
5	133.97	114.54
6	143.97	114.70
7	153.94	115.48
8	163.85	116.86
9	173.65	118.86
10	183.30	121.45
11	192.78	124.63
12	202.05	128.39
13	211.07	132.71
14	219.81	137.57
15	228.23	142.97
16	236.30	148.87
17	244.00	155.25
18	251.29	162.10
19	258.14	169.38
20	264.54	177.07
21	270.45	185.13
22	275.85	193.55
23	280.73	202.28
24	285.06	211.29
25	285.69	212.85

Circle Center At X = 136.3 ; Y = 277.2 and Radius, 162.7

*** 1.399 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	116.67	128.33
2	126.60	129.45
3	136.49	130.95
4	146.31	132.83
5	156.06	135.08
6	165.70	137.71
7	175.24	140.71
8	184.66	144.08
9	193.94	147.80
10	203.07	151.88
11	212.04	156.31
12	220.83	161.08
13	229.42	166.19
14	237.82	171.62
15	246.00	177.37
16	253.95	183.44
17	261.66	189.80
18	269.12	196.46
19	276.32	203.40
20	283.25	210.61
21	284.87	212.44

Circle Center At X = 92.7 ; Y = 386.7 and Radius, 259.5

*** 1.400 ***

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.56	122.78
2	115.47	121.50
3	125.44	120.63
4	135.42	120.14
5	145.42	120.06
6	155.42	120.37
7	165.39	121.08
8	175.33	122.19
9	185.22	123.69
10	195.04	125.59
11	204.77	127.87
12	214.41	130.54
13	223.94	133.58

14	233.33	137.01
15	242.58	140.81
16	251.68	144.97
17	260.60	149.48
18	269.33	154.35
19	277.86	159.57
20	286.18	165.12
21	294.28	170.99
22	302.13	177.18
23	309.73	183.68
24	317.06	190.48
25	324.12	197.56
26	330.89	204.92
27	337.37	212.54
28	343.21	220.00

Circle Center At X = 142.5 ; Y = 371.4 and Radius, 251.4

*** 1.401 ***

Failure Surface Specified By 29 Coordinate Points

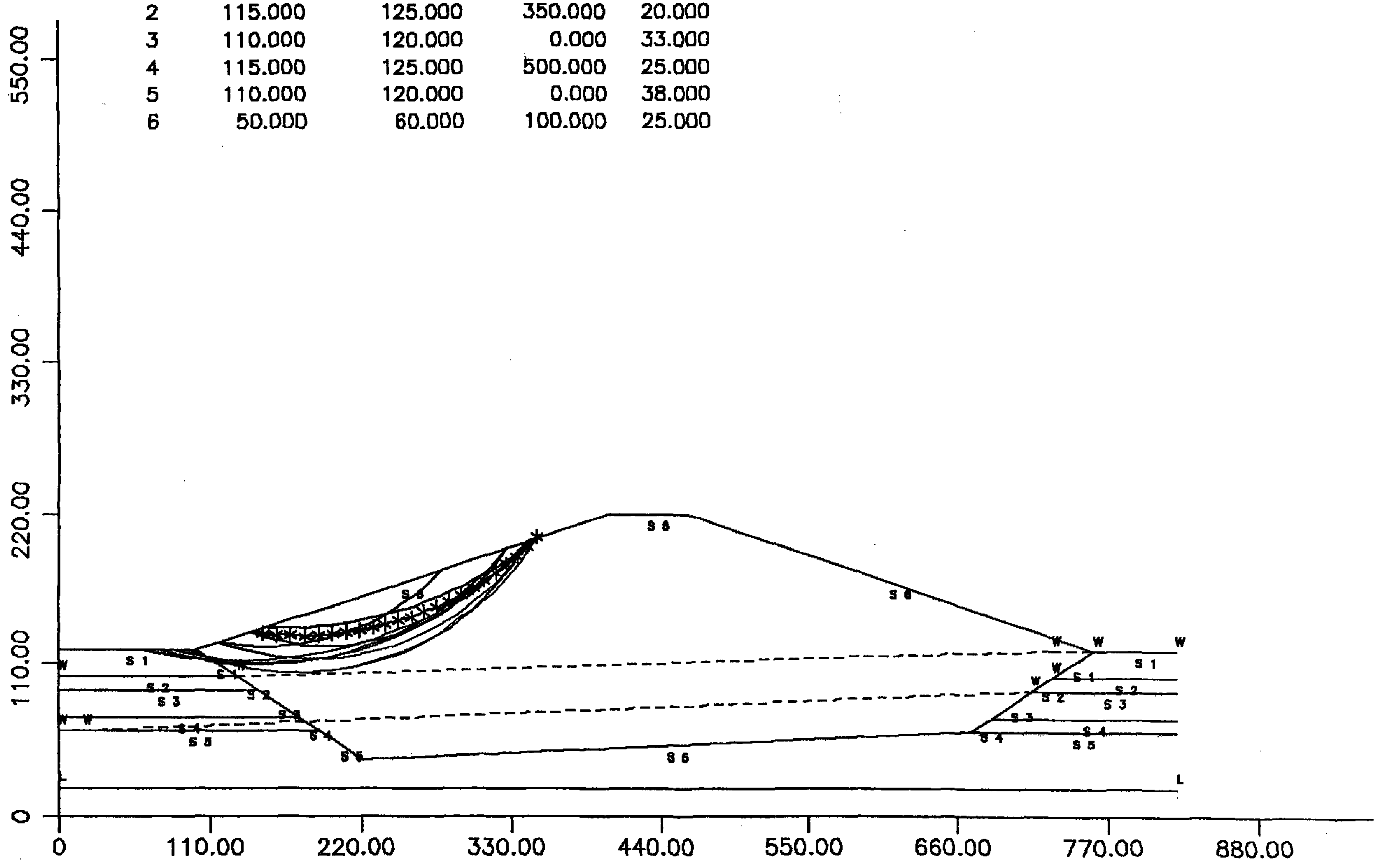
Point No.	X-Surf (ft)	Y-Surf (ft)
1	72.22	120.00
2	81.97	117.76
3	91.81	115.98
4	101.72	114.68
5	111.69	113.86
6	121.68	113.52
7	131.68	113.66
8	141.67	114.27
9	151.61	115.36
10	161.48	116.93
11	171.27	118.97
12	180.95	121.48
13	190.50	124.45
14	199.90	127.87
15	209.12	131.74
16	218.14	136.05
17	226.95	140.79
18	235.52	145.94
19	243.83	151.50
20	251.87	157.45
21	259.61	163.77
22	267.04	170.47
23	274.15	177.51
24	280.90	184.88
25	287.30	192.57
26	293.31	200.55
27	298.94	208.82
28	304.17	217.35
29	305.62	220.00

```
Circle Center At X =  123.8 ; Y =  322.0  and Radius,  208.5

     ***     1.407   ***
```

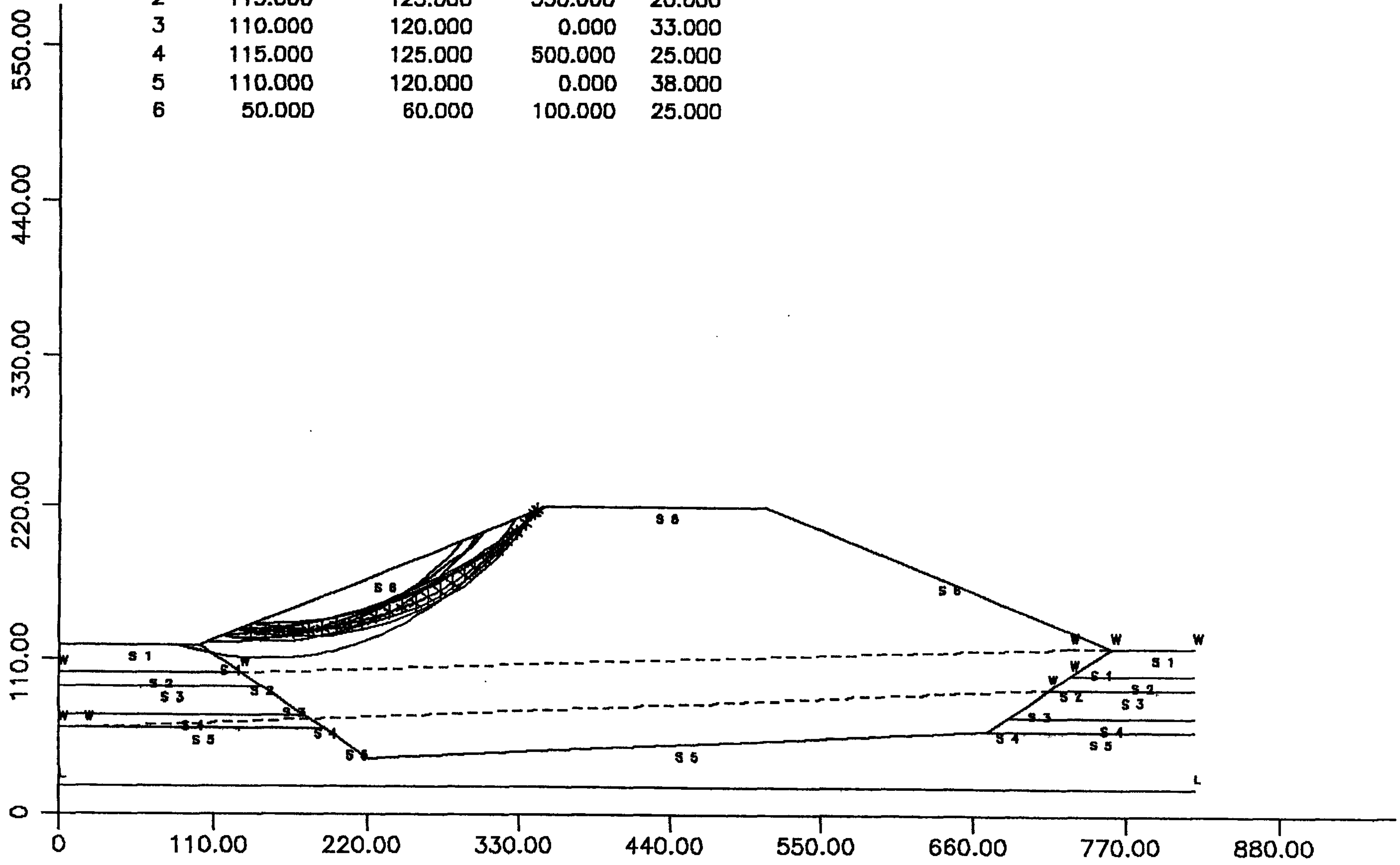
Minimum Factor of Safety 1.935

Soil	Moist Unit Weight	Saturated Unit Weight	Cohesion	Friction Angle
1	110.000	120.000	0.000	36.000
2	115.000	125.000	350.000	20.000
3	110.000	120.000	0.000	33.000
4	115.000	125.000	500.000	25.000
5	110.000	120.000	0.000	38.000
6	50.000	60.000	100.000	25.000



Minimum Factor of Safety 1.607

Soil	Moist Unit Weight	Saturated Unit Weight	Cohesion	Friction Angle
1	110.000	120.000	0.000	36.000
2	115.000	125.000	350.000	20.000
3	110.000	120.000	0.000	33.000
4	115.000	125.000	500.000	25.000
5	110.000	120.000	0.000	38.000
6	50.000	60.000	100.000	25.000



APPENDIX E

IMPORTANT INFORMATION
ABOUT YOUR
GEOTECHNICAL ENGINEERING REPORT

More construction problems are caused by site subsurface conditions than any other factor. As troublesome as subsurface problems can be, their frequency and extent have been lessened considerably in recent years, due in large measure to programs and publications of ASFE/ The Association of Engineering Firms Practicing in the Geosciences.

The following suggestions and observations are offered to help you reduce the geotechnical-related delays, cost-overruns and other costly headaches that can occur during a construction project.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

A geotechnical engineering report is based on a subsurface exploration plan designed to incorporate a unique set of project-specific factors. These typically include: the general nature of the structure involved, its size and configuration; the location of the structure on the site and its orientation; physical concomitants such as access roads, parking lots, and underground utilities, and the level of additional risk which the client assumed by virtue of limitations imposed upon the exploratory program. To help avoid costly problems, consult the geotechnical engineer to determine how any factors which change subsequent to the date of the report may affect its recommendations.

Unless your consulting geotechnical engineer indicates otherwise, *your geotechnical engineering report should not be used*:

- When the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership, or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems which may develop if they are not consulted after factors considered in their report's development have changed.

MOST GEOTECHNICAL "FINDINGS" ARE PROFESSIONAL ESTIMATES

Site exploration identifies actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are extrapolated by geotechnical engineers who then render an opinion about overall subsurface conditions, their likely reaction to proposed construction activity, and appropriate foundation design. Even under optimal circumstances actual conditions may differ from those inferred to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. *Nothing can be done to prevent the unanticipated, but steps can be taken to help minimize their impact.* For this reason, *most experienced owners retain their geotechnical consultants through the construction stage*, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

SUBSURFACE CONDITIONS CAN CHANGE

Subsurface conditions may be modified by constantly-changing natural forces. Because a geotechnical engineering report is based on conditions which existed at the time of subsurface exploration, *construction decisions should not be based on a geotechnical engineering report whose adequacy may have been affected by time.* Speak with the geotechnical consultant to learn if additional tests are advisable before construction starts.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Geotechnical engineers' reports are prepared to meet the specific needs of specific individuals. A report prepared for a consulting civil engineer may not be adequate for a construction contractor, or even some other consulting civil engineer. Unless indicated otherwise, this report was prepared expressly for the client involved and expressly for purposes indicated by the client. Use by any other persons for any purpose, or by the client for a different purpose, may result in problems. *No individual other than the client should apply this report for its intended purpose without first conferring with the geotechnical engineer. No person should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.*

CONSTRAINTS AND RESTRICTIONS

WARRANTY

Universal Engineering Sciences has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices, and makes no other warranty either expressed or implied as to the professional advice provided in the report.

UNANTICIPATED SOIL CONDITIONS

The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur between these borings.

The nature and extent of variations between borings may not become known until excavation begins. If variations appear, we may have to re-evaluate our recommendations after performing on-site observations and noting the characteristics of any variations.

CHANGED CONDITIONS

We recommend that the specifications for the project require that the contractor immediately notify Universal Engineering Sciences, as well as the owner, when subsurface conditions are encountered that are different from those present in this report.

No claim by the contractor for any conditions differing from those anticipated in the plans, specifications, and those found in this report, should be allowed unless the contractor notifies the owner and Universal Engineering Sciences of such changed conditions. Further, we recommend that all foundation work and site improvements be observed by a representative of Universal Engineering Sciences to monitor field conditions and changes, to verify design assumptions and to evaluate and recommend any appropriate modifications to this report.

MISINTERPRETATION OF SOIL ENGINEERING REPORT

Universal Engineering Sciences is responsible for the conclusions and opinions contained within this report based upon the data relating only to the specific project and location discussed herein. If the conclusions or recommendations based upon the data presented are made by others, those conclusions or recommendations are not the responsibility of Universal Engineering Sciences.

CHANGED STRUCTURE OR LOCATION

This report was prepared in order to aid in the evaluation of this project and to assist the architect or engineer in the design of this project. If any changes in the design or location of the structure as outlined in this report are planned, or if any structures are included or added that are not discussed in the report, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions modified or approved by Universal Engineering Sciences.

USE OF REPORT BY BIDDERS

Bidders who are examining the report prior to submission of a bid are cautioned that this report was prepared as an aid to the designers of the project and it may affect actual construction operations.

Bidders are urged to make their own soil borings, test pits, test caissons or other investigations to determine those conditions that may affect construction operations. Universal Engineering Sciences cannot be responsible for any interpretations made from this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which will affect construction operations.

STRATA CHANGES

Strata changes are indicated by a definite line on the boring logs which accompany this report. However, the actual change in the ground may be more gradual. Where changes occur between soil samples, the location of the change must necessarily be estimated using all available information and may not be shown at the exact depth.

OBSERVATIONS DURING DRILLING

Attempts are made to detect and/or identify occurrences during drilling and sampling, such as: water level, boulders, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation of driving resistance, obstructions, etc.; however, lack of mention does not preclude their presence.

WATER LEVELS

Water level readings have been made in the drill holes during drilling and they indicate normally occurring conditions. Water levels may not have been stabilized at the last reading. This data has been reviewed and interpretations made in this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, tides, and other factors not evident at the time measurements were made and reported. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based upon such assumptions of variations.

LOCATION OF BURIED OBJECTS

All users of this report are cautioned that there was no requirement for Universal Engineering Sciences to attempt to locate any man-made buried objects during the course of this exploration and that no attempt was made by Universal Engineering Sciences to locate any such buried objects. Universal Engineering Sciences cannot be responsible for any buried man-made objects which are subsequently encountered during construction that is not discussed within the text of this report.

TIME

This report reflects the soil conditions at the time of investigation. If the report is not used in a reasonable amount of time, significant changes to the site may occur and additional reviews may be required.

APPENDIX C

LOCATION OF SECTIONS ANALYZED

FOR SLOPE STABILITY

APPENDIX D

WASTE COMPOSITION MATRIX
AND
TYPICAL MOISTURE CONTENTS

Estimated Waste Properties Moisture Content
Moisture Content & Waste Density
Central Landfill
Citrus County

	% Total	Wet	% Moisture	Dry	Ref. Waste
		(tons)	(See Note 2)	(tons)	(See Note 2)
Metals	10	15,857.5	3.0	15,395.6	Other Metal
Plastic	4	6,343.0	2.0	6,218.6	Plastic
Other Paper	8	12,686.0	5.0	12,081.9	Carboard
Misc	11	17,443.3	25.0	13,954.6	
Newspaper	5	7,928.8	6.0	7,480.0	Paper
Glass	2	3,171.5	2.0	3,109.3	Glass
Yard Trash	16	25,372.0	60.0	15,857.5	
Tires	1	1,585.8	2.0	1,554.7	
C&D	35	55,501.3	15.0	48,262.0	Rubbish
Food Waste	6	9,514.5	70.0	5,596.8	Food Waste
Textile	2	3,171.5	10.0	2,883.2	Textile
	100	158,575.1		132,394.2	

Total Tons	229,819 tons	Landfill	69% See Note 1
Landfill	158,575 tons	Recycled	31%
Recycled	71,244 tons	Combustion	0%
Combustion	0 tons		

Percent Moisture		**Waste Density**	
Wet	158,575 Tons	Wet	60 lb/ft^3
Dry	132,394 Tons	Moisture	17 %
Moisture	17 %	Dry	51 lb/ft^3

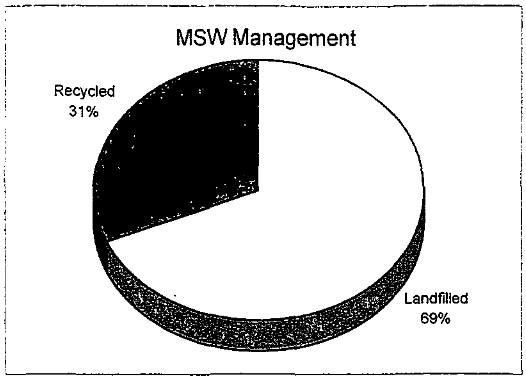
Note
1) Source: Waste Composition - FDEP "Solid Waste Management in Florida 2001-2002"
2) Source: Waste Moisture Contents - "Intergrated Solid Waste Management"
1993 ed Chapter 4 ISBN 0-07-063237-5

Citrus County
(Jan. 1, 2000 - Dec. 31, 2000)

1. Population [1] — 118,085

2. MSW Management (tons) [2]

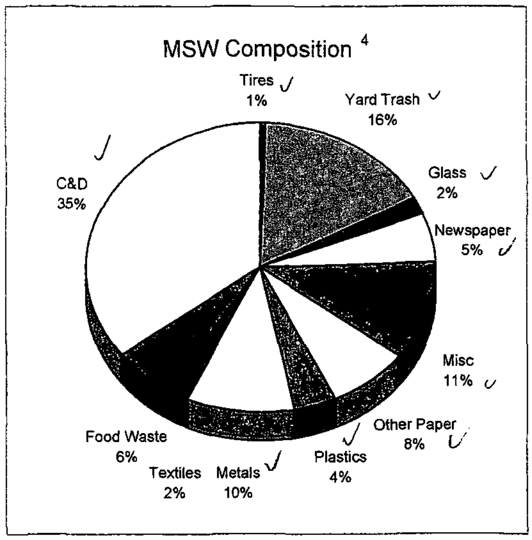
A. Landfilled	157,638
B. Combusted	0
C. Recycled	72,181
D. Total	229,819
E. Total Pounds per Capita Per Day [1]	10.66



3. MSW Collected & Recycled

A. Minimum Five Wastes [3]	Collected (tons)	Recycled (%)
1. Newspaper	12,408	29
2. Glass	4,688	11
3. Aluminum Cans	1,530	50
4. Plastic Bottles	2,218	6
5. Steel Cans	1,984	4

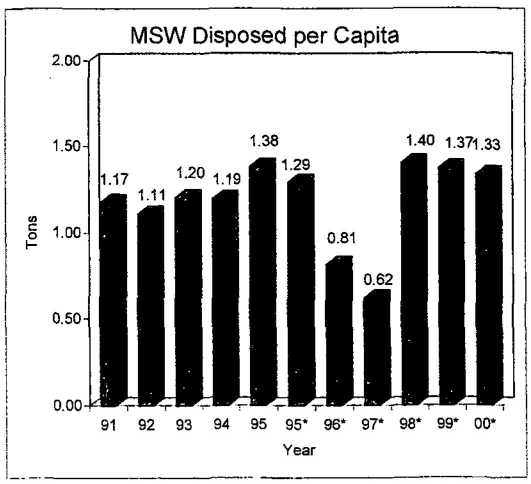
B. Special Wastes [5]	Collected (tons)	Recycled (%)
1. C&D Debris	81,111	0
2. Yard Trash	37,500	94
3. White Goods	1,575	67
4. Tires	1,350	70
5. Process Fuel	0	0
C. Other Wastes	85,455	35
D. Total Recycling Rate(%)		31
E. Adjusted Recycling Rate (%) [5,6]		30



F. Waste Reduction Per Capita (%)
(A negative number indicates an increase in the MSW disposal rate per capita.)

1. Base Year: July 1988-June 1989	-11
2. Base Year: July 1989-June 1990	-13
3. Base Year: July 1990-June 1991	-14
4. Base Year: July 1991-June 1992	-21
5. Base Year: July 1992-June 1993	-11
6. Base Year: July 1993-June 1994	-12

G. Participation in Recycling [7]	Units	Percent [8]
1. Single-family Curbside	54,127	0
2. Multi-family Curbside [9]	2,973	0
3. Commercial [10]	4,577	
a) Scheduled collection	NR	
b) On call collection	NR	



[1] Official 2000Governor's Office estimate.
[2] From 2001 - 2002 Recycling and Education grant applications.
[3] The Legislature established a goal of 50 percent for each material by the end of 1994.
[4] Some materials have been combined: Metals include Aluminum Cans, Steel Cans, Ferrous and Non-ferrous metals, and White Goods; Other Paper includes Corrugated, Office and Other Paper; and Plastics include Plastic Bottles and Other Plastics.
[5] The total of Special Wastes can count towards no more than one half of the recycling goal for each county.
[6] The legislature established a goal of 30 percent by the end of 1994 for all counties with a population of over 75,000.
[7] Participation means availability and usage of recycling services (As of June 1999).
[8] Percentage of total county units (single/multi-family dwellings and commercial establishments) participating in recycling.
[9] Includes apartments, condominiums and others.
[10] May also include government and institutional.
* Calendar year data.

FDEP
1/31/2003

http://www.dep.state.fl.us/waste/categories/recycling/pages/01.htm
1999-2000 Annual Report (Solid Waste Management).

INTEGRATED SOLID WASTE MANAGEMENT

Engineering Principles and Management Issues

1993 Edition

George Tchobanoglous

Professor of Civil and Environmental Engineering
University of California, Davis

Hilary Theisen

Vice President
Brown & Caldwell, Consulting Engineers

Samuel Vigil

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California Polytechnic State University
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McGraw-Hill, Inc.
New York St. Louis San Francisco Auckland Bogotá
Caracas Lisbon London Madrid Mexico City Milan
Montreal New Delhi San Juan Singapore
Sydney Tokyo Toronto

ISBN 0-07-063237-5

referred to in the solid waste literature incorrectly as density. In U.S. customary units density is expressed correctly as slug/ft^3.) Because the specific weight of MSW is often reported as *loose, as found in containers, uncompacted, compacted*, and the like, the basis used for the reported values should always be noted. Specific weight data are often needed to assess the total mass and volume of waste that must be managed. Unfortunately, there is little or no uniformity in the way solid waste specific weights have been reported in the literature. Frequently, no distinction has been made between uncompacted or compacted specific weights. Typical specific weights for various wastes as found in containers, compacted, or uncompacted are reported in Table 4-1.

TABLE 4-1
Typical specific weight and moisture content data for residential, commercial, industrial, and agricultural wastes

	Specific weight, lb/yd^3		Moisture content, % by weight	
Type of waste	Range	Typical	Range	Typical
Residential (uncompacted)				
Food wastes (mixed)	220–810	490	50–80	70
Paper	70–220	150	4–10	6
Cardboard	70–135	85	4–8	5
Plastics	70–220	110	1–4	2
Textiles	70–170	110	6–15	10
Rubber	170–340	220	1–4	2
Leather	170–440	270	8–12	10
Yard wastes	100–380	170	30–80	60
Wood	220–540	400	15–40	20
Glass	270–810	330	1–4	2
Tin cans	85–270	150	2–4	3
Aluminum	110–405	270	2–4	2
Other metals	220–1940	540	2–4	3
Dirt, ashes, etc.	540–1685	810	6–12	8
Ashes	1095–1400	1255	6–12	6
Rubbish	150–305	220	5–20	15
Residential yard wastes				
Leaves (loose and dry)	50–250	100	20–40	30
Green grass (loose and moist)	350–500	400	40–80	60
Green grass (wet and compacted)	1000–1400	1000	50–90	80
Yard waste (shredded)	450–600	500	20–70	50
Yard waste (composted)	450–650	550	40–60	50
Municipal				
In compactor truck	300–760	500	15–40	20
In landfill				
Normally compacted	610–840	760	15–40	25
Well compacted	995–1250	1010	15–40	25
Commercial				
Food wastes (wet)	800–1600	910	50–80	70
Appliances	250–340	305	0–2	1

(continued)

APPENDIX E

ESTIMATED COMPOSITE WASTE, SOIL AND WATER WEIGHT

Estimated Composite Waste & Soil & Water Weight
Central Landfill
Citrus County, Florida

	WASTE & DAILY & WATER					CLOSURE CAP & INTERMEDIATE & DRAINAGE SAND						
	Height	Dry	Moisture	Total	Stress		Height	Dry	Moisture	Total	Stress	
	(ft)	(lb/ft³)	(%)	(lb/ft³)	(lb/ft³)		(ft)	(lb/ft³)	(%)	(lb/ft³)	(lb/ft²)	
Closure Cap	--	--	--	--	--	--	2.0	103.7	17.0	121.3	242.7	
Intermed	--	--	--	--	--	--	1.5	103.7	17.0	121.3	182.0	
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	17.0	121.3	60.7							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	17.0	121.3	60.7							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	17.0	121.3	60.7							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	17.0	121.3	60.7							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	17.0	121.3	60.7							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	17.0	121.3	60.7							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	17.0	121.3	60.7							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	17.0	121.3	60.7							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	17.0	121.3	60.7							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	17.0	121.3	60.7							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	17.0	121.3	60.7							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	17.0	121.3	60.7							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	17.0	121.3	60.7							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	10.5	114.6	57.3							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	10.5	114.6	57.3							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	10.5	114.6	57.3							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	10.5	114.6	57.3							
waste	10.0	51.5	40.0	72.1	721.0							
daily	0.5	103.7	10.5	114.6	57.3							
waste	10.0	51.5	40.0	72.1	721.0							
Drain Sand	--	--	--	--	--	--	0.5	103.7	10.5	114.6	57.3	
	199.0 ft		Up to 40%.		14773.5 lb/ft²		4.0 ft				481.9 lb/ft²	

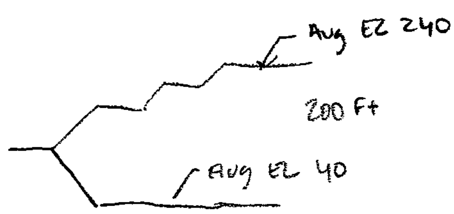
Total Height	199.0 ft (Daily+waste)	Total Stress	14773 psf (Daily+waste)
	4.0 ft (Cap,Intermed,Sand)		482 psf (Cap, Intermed,Sand)
	203.0 ft (Bottom to Final Cap)		15255 psf (Bottom to Final Cap)

Soil		**Initial Waste**		**Composite Unit Weight** **Daily Cover + Waste + Moisture**	
Dry Weight	103.7 lb/ft³	Dry Weight	51 lb/ft³		
Moisture	17 %	Moisture	17 %		
Total Weight[1]	121.3 lb/ft³	Total Weight	60 lb/ft³	Total Stress	14773 lb/ft²
				Height	199.0 ft
				Comp. Weight	~~74~~ lb/ft³

From Universal Engineering Sciences.

USE 80 lb/Ft³

Notes: 1. Source: Universal Engineering Sciences Geotechnical Investigation for Citrus County Central Landfill New Disposal Cell S.R. 44 Citrus County, FL Dated November 15, 2001
2. Use Composite Weight = 80 lbs/ft³



THIS IS A VERY HIGH UNIT WEIGHT (VERY WET)

APPENDIX F

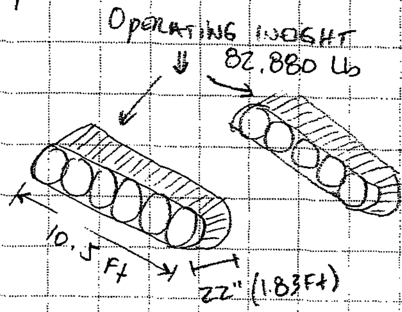
EQUIPMENT LOADING

SCS ENGINEERS

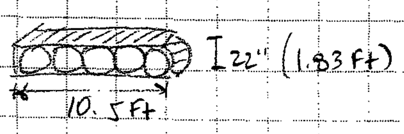
SHEET ______ OF ______

CLIENT Citrus County	PROJECT Operations Permit Renewal	JOB NUMBER 09199056.13
SUBJECT Equipment Loading	BY DHR	DATE 12/14/04
	CHECKED	DATE

Given: Equipment CAT D8R Series II WHA (waste handling Arrangement)



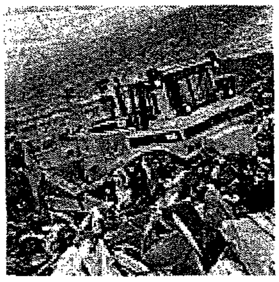
Stress per track



$$\text{Stress (loading)} = F/A = \frac{41{,}440\ \text{lb}}{(10.5)(1.83)} = 2156.65\ \text{lb}/\text{Ft}^2$$

D8R SERIES II WH TRACK-TYPE TRACTORS

--- Select a Model ---



D8R SERIES II WH

The Cat Track-Type Tractor waste handling arrangement machines are purpose built for landfill operations. Special guarding and cooling systems are standard on these machines to help them withstand the harsh operating conditions in the landfill.

D8R SERIES II WH DETAILED SPECIFICATIONS

Engine

Engine Model	Cat 3406E
Gross Power	338 hp / 252 kW
Flywheel Power	310 hp / 231 kW
Number of Cylinders	6
RPM	2000 RPM / 2000 RPM
Bore	5.4 in / 137 mm
Stroke	6.5 in / 165 mm
Displacement	893 in3 / 14.6 L

Weights

Operating Weight	82880 lb / 37630 kg

Blades

Blade Type	SU, U
SU-Blade Capacity with Trash Rack	26.1 yd3 / 19.9 m3
SU-Blade Width	12.9 ft / 3.94 m
U-Blade Capacity with Trash Rack	32.4 yd3 / 24.8 m3
U-Blade Width	14 ft / 4.26 m
LGP SU-Blade Capacity with Trash Rack	27.6 yd3 / 21.1 m3

Undercarriage

Track Rollers/Side	8
Track Width	1.83 ft / 560 mm
Track Gauge	81.89 in / 2080 mm
Length of Track on Ground	10.5 ft / 3.21 mm
Ground Contact Area	5544 in2 / 3.58 m2

Dimensions

Ground Clearance	21 in / 528 mm
Width Over Trunnions	10 ft / 3.05 m

http://catused.cat.com/equipment/view-equipment-detail.htm?equipmentPk=Eq1.427861E

Width without Trunnions (Standard Shoe)	8.67 ft / 2.7 m
Height (Stripped Top)	8.75 ft / 2.67 m
Height ROPS/Canopy	11.5 ft / 3510 mm
Overall Length Basic Tractor	14.9 ft / 4.55 m
Overall Length with Blade	20.75 ft / 6.398 m

APPENDIX G

LINE SEGMENT COORDINATES

NORTH SIDE SECTION

SLOPE STABILITY LINE SEGMENT COORDINATES – NORTH 1st BERM SIDE					
LINE	X	Y	X	Y	SOIL
SEGMENT					
1TOP	200.0000	225.0000	210.0000	225.0000	7
2TOP	210.0000	225.0000	218.0000	221.0000	7
3TOP	218.0000	221.0000	228.0000	221.0000	7
4TOP	228.0000	221.0000	236.0000	225.0000	7
5TOP	236.0000	225.0000	246.0000	225.0000	7
6TOP	246.0000	225.0000	249.5093	228.5093	7
7TOP	249.5093	228.5093	250.2546	229.2546	6
8TOP	250.2546	229.2546	250.6273	229.6273	5
9TOP	250.6273	229.6273	251.0000	230.0000	4
10TOP	251.0000	230.0000	253.0000	230.0000	4
11TOP	253.0000	230.0000	255.0000	228.0000	4
12TOP	255.0000	228.0000	355.5000	261.5000	1
13TOP	355.5000	261.5000	383.5000	261.2200	1
14TOP	383.5000	261.2200	388.0000	259.7200	1
15TOP	388.0000	259.7200	392.0000	259.7200	1
16TOP	392.0000	259.7200	396.5000	261.2200	1
17TOP	396.5000	261.2200	761.9300	261.2200	1
18	257.5298	226.7351	355.8148	259.4968	2
19	355.8148	259.4968	383.1657	259.2232	2
20	383.1657	259.2232	387.6754	257.7200	2
21	387.6754	257.7200	392.3246	257.7200	2
22	392.3246	257.7200	396.8246	259.2200	2
23	396.8246	259.2200	761.9300	259.2200	2
24	255.0000	228.0000	257.5298	226.7351	4
25	258.1623	226.4189	355.8935	258.9959	3
26	355.8935	258.9959	383.0821	258.7241	3
27	383.0821	258.7241	387.5943	257.2200	3
28	387.5943	257.2200	392.4057	257.2200	3
29	392.4057	257.2200	396.9057	258.7200	3
30	396.9057	258.7200	761.9300	258.7200	3
31	257.5298	226.7351	258.1623	226.4189	4
32	258.1623	226.4189	431.0000	140.0000	4
33	431.0000	140.0000	761.9300	140.0000	4
34	250.6273	229.6273	430.8820	139.5000	5
35	430.8820	139.5000	761.9300	139.5000	5
36	250.2546	229.2546	430.7639	139.0000	6
37	430.7639	139.0000	761.9300	139.0000	6
38	249.5093	228.5093	430.5279	138.0000	7
39	430.5279	138.0000	761.9300	138.0000	7

SLOPE STABILITY BLOCK COORDINATES – NORTH SIDE					
LINE	X	Y	X	Y	WIDTH
SEGMENT					
1	255.8807	227.5597	430.1044	140.4478	0.25
2	432.0000	140.0000	433.0000	140.0000	0.25
3	434.0000	140.0000	657.4882	140.0000	0.25

SLOPE STABILITY LINE SEGMENT COORDINATES – NORTH SIDE					
LINE SEGMENT	X	Y	X	Y	SOIL
1TOP	200.0000	225.0000	210.0000	225.0000	7
2TOP	210.0000	225.0000	218.0000	221.0000	7
3TOP	218.0000	221.0000	228.0000	221.0000	7
4TOP	228.0000	221.0000	236.0000	225.0000	7
5TOP	236.0000	225.0000	246.0000	225.0000	7
6TOP	246.0000	225.0000	249.5093	228.5093	7
7TOP	249.5093	228.5093	250.2546	229.2546	6
8TOP	250.2546	229.2546	250.6273	229.6273	5
9TOP	250.6273	229.6273	251.0000	230.0000	4
10TOP	251.0000	230.0000	253.0000	230.0000	4
11TOP	253.0000	230.0000	255.0000	228.0000	4
12TOP	255.0000	228.0000	355.5000	261.5000	1
13TOP	355.5000	261.5000	383.5000	261.2200	1
14TOP	383.5000	261.2200	388.0000	259.7200	1
15TOP	388.0000	259.7200	392.0000	259.7200	1
16TOP	392.0000	259.7200	467.8400	285.0000	1
17TOP	467.8400	285.0000	495.8400	284.7200	1
18TOP	495.8400	284.7200	500.3400	283.2200	1
19TOP	500.3400	283.2200	504.3400	283.2200	1
20TOP	504.3400	283.2200	591.4300	312.2500	1
21TOP	591.4300	312.2500	761.9300	321.2013	1
22	257.5298	226.7351	355.8148	259.4968	2
23	355.8148	259.4968	383.1657	259.2232	2
24	383.1657	259.2232	387.6754	257.7200	2
25	387.6754	257.7200	392.3246	257.7200	2
26	392.3246	257.7200	468.1548	282.9968	2
27	468.1548	282.9968	495.5057	282.7232	2
28	495.5057	282.7232	500.0154	281.2200	2
29	500.0154	281.2200	504.6646	281.2200	2
30	504.6646	281.2200	591.8054	310.2670	2
31	591.8054	310.2670	761.9300	319.1985	2
32	255.0000	228.0000	257.5298	226.7351	4
33	258.1623	226.4189	355.8935	258.9959	3
34	355.8935	258.9959	383.0821	258.7241	3
35	383.0821	258.7241	387.5943	257.2200	3
36	387.5943	257.2200	392.4057	257.2200	3
37	392.4057	257.2200	468.2335	282.4959	3
38	468.2335	282.4959	495.4221	282.2241	3
39	495.4221	282.2241	499.9343	280.7200	3
40	499.9343	280.7200	504.7457	280.7200	3
41	504.7457	280.7200	591.8993	309.7712	3
42	591.8993	309.7712	761.9300	318.6978	3
43	257.5298	226.7351	258.1623	226.4189	4
44	258.1623	226.4189	431.0000	140.0000	4
45	431.0000	140.0000	761.9300	140.0000	4
46	250.6273	229.6273	430.8820	139.5000	5

47	430.8820	139.5000	761.9300	139.5000	5
48	250.2546	229.2546	430.7639	139.0000	6
49	430.7639	139.0000	761.9300	139.0000	6
50	249.5093	228.5093	430.5279	138.0000	7
51	430.5279	138.0000	761.9300	138.0000	7

SLOPE STABILITY BLOCK COORDINATES – NORTH SIDE					
LINE	**X**	**Y**	**X**	**Y**	**WIDTH**
SEGMENT					
1	255.8807	227.5597	430.1044	140.4478	0.25
2	432.0000	140.0000	433.0000	140.0000	0.25
3	434.0000	140.0000	657.4882	140.0000	0.25

SOUTH SIDE SECTION

SLOPE STABILITY LINE SEGMENT COORDINATES – SOUTH 1st BERM SIDE					
LINE	X	Y	X	Y	SOIL
SEGMENT					
1TOP	200.0000	210.0000	207.0000	210.0000	7
2TOP	207.0000	210.0000	255.0000	194.0000	7
3TOP	255.0000	194.0000	335.0000	194.0000	7
4TOP	335.0000	194.0000	413.0000	220.0000	7
5TOP	413.0000	220.0000	423.0000	220.0000	7
6TOP	423.0000	220.0000	426.5093	223.5093	7
7TOP	426.5093	223.5093	427.2546	224.2546	6
8TOP	427.2546	224.2546	427.6273	224.6273	5
9TOP	427.6273	224.6273	428.0000	225.0000	4
10TOP	428.0000	225.0000	430.0000	225.0000	4
11TOP	430.0000	225.0000	432.0000	223.0000	4
12TOP	432.0000	223.0000	513.0000	250.0000	1
13TOP	513.0000	250.0000	541.0000	249.7200	1
14TOP	541.0000	249.7200	545.5000	248.2200	1
15TOP	545.5000	248.2200	549.5000	248.2200	1
16TOP	549.5000	248.2200	554.0000	249.7200	1
17TOP	554.0000	249.7200	1848.5200	249.7200	1
18	434.5298	221.7351	513.3148	247.9968	2
19	513.3148	247.9968	540.6657	247.7232	2
20	540.6657	247.7232	545.1754	246.2200	2
21	545.1754	246.2200	549.8246	246.2200	2
22	549.8246	246.2200	554.3246	247.7200	2
23	554.3246	247.7200	1848.5200	247.7200	2
24	432.0000	223.0000	434.5298	221.7351	4
25	435.1623	221.4189	513.3935	247.4959	3
26	513.3935	247.4959	540.5821	247.2241	3
27	540.5821	247.2241	545.0943	245.7200	3
28	545.0943	245.7200	549.9057	245.7200	3
29	549.9057	245.7200	554.4057	247.2200	3
30	554.4057	247.2200	1848.5200	247.2200	3
31	434.5298	221.7351	435.1623	221.4189	4
32	435.1623	221.4189	598.0000	140.0000	4
33	598.0000	140.0000	1848.5200	140.0000	4
34	427.6273	224.6273	597.8820	139.5000	5
35	597.8820	139.5000	1848.5200	139.5000	5
36	427.2546	224.2546	597.7639	139.0000	6
37	597.7639	139.0000	1848.5200	139.0000	6
38	426.5093	223.5093	597.5279	138.0000	7
39	597.5279	138.0000	1848.5200	138.0000	7

SLOPE STABILITY BLOCK COORDINATES – SOUTH SIDE					
LINE	X	Y	X	Y	WIDTH
SEGMENT					
1	432.9021	222.5490	597.1072	140.4464	0.25
2	599.0000	140.0000	600.0000	140.0000	0.25
3	601.0000	140.0000	1200.0000	140.0000	0.25

SLOPE STABILITY LINE SEGMENT COORDINATES – SOUTH SIDE					
LINE	X	Y	X	Y	SOIL
SEGMENT					
1TOP	200.0000	210.0000	207.0000	210.0000	7
2TOP	207.0000	210.0000	255.0000	194.0000	7
3TOP	255.0000	194.0000	335.0000	194.0000	7
4TOP	335.0000	194.0000	413.0000	220.0000	7
5TOP	413.0000	220.0000	423.0000	220.0000	7
6TOP	423.0000	220.0000	426.5093	223.5093	7
7TOP	426.5093	223.5093	427.2546	224.2546	6
8TOP	427.2546	224.2546	427.6273	224.6273	5
9TOP	427.6273	224.6273	428.0000	225.0000	4
10TOP	428.0000	225.0000	430.0000	225.0000	4
11TOP	430.0000	225.0000	432.0000	223.0000	4
12TOP	432.0000	223.0000	513.0000	250.0000	1
13TOP	513.0000	250.0000	541.0000	249.7200	1
14TOP	541.0000	249.7200	545.5000	248.2200	1
15TOP	545.5000	248.2200	549.5000	248.2200	1
16TOP	549.5000	248.2200	629.8400	275.0000	1
17TOP	629.8400	275.0000	657.8400	274.7200	1
18TOP	657.8400	274.7200	662.3400	273.2200	1
19TOP	662.3400	273.2200	666.3400	273.2200	1
20TOP	666.3400	273.2200	746.6800	300.0000	1
21TOP	746.6800	300.0000	774.6800	299.7200	1
22TOP	774.6800	299.7200	779.1800	298.2200	1
23TOP	779.1800	298.2200	783.1800	298.2200	1
24TOP	783.1800	298.2200	908.5200	340.0000	1
25TOP	908.5200	340.0000	1848.5200	329.2840	1
26	434.5298	221.7351	513.3148	247.9968	2
27	513.3148	247.9968	540.6657	247.7232	2
28	540.6657	247.7232	545.1754	246.2200	2
29	545.1754	246.2200	549.8246	246.2200	2
30	549.8246	246.2200	630.1548	272.9968	2
31	630.1548	272.9968	657.5057	272.7232	2
32	657.5057	272.7232	662.0154	271.2200	2
33	662.0154	271.2200	666.6646	271.2200	2
34	666.6646	271.2200	746.9948	297.9968	2
35	746.9948	297.9968	774.3457	297.7232	2
36	774.3457	297.7232	778.8554	296.2200	2
37	778.8554	296.2200	783.5046	296.2200	2
38	783.5046	296.2200	908.8334	337.9963	2
39	908.8334	337.9963	1848.4972	327.2841	2
40	432.0000	223.0000	434.5298	221.7351	4
41	435.1623	221.4189	513.3935	247.4959	3
42	513.3935	247.4959	540.5821	247.2241	3
43	540.5821	247.2241	545.0943	245.7200	3
44	545.0943	245.7200	549.9057	245.7200	3
45	549.9057	245.7200	630.2335	272.4959	3
46	630.2335	272.4959	657.4221	272.2241	3

47	657.4221	272.2241	661.9343	270.7200	3
48	661.9343	270.7200	666.7457	270.7200	3
49	666.7457	270.7200	747.0735	297.4959	3
50	747.0735	297.4959	774.2621	297.2241	3
51	774.2621	297.2241	778.7743	295.7200	3
52	778.7743	295.7200	783.5857	295.7200	3
53	783.5857	295.7200	908.9118	337.4954	3
54	908.9118	337.4954	1848.4915	326.7842	3
55	434.5298	221.7351	435.1623	221.4189	4
56	435.1623	221.4189	598.0000	140.0000	4
57	598.0000	140.0000	1848.5200	140.0000	4
58	427.6273	224.6273	597.8820	139.5000	5
59	597.8820	139.5000	1848.5200	139.5000	5
60	427.2546	224.2546	597.7639	139.0000	6
61	597.7639	139.0000	1848.5200	139.0000	6
62	426.5093	223.5093	597.5279	138.0000	7
63	597.5279	138.0000	1848.5200	138.0000	7

SLOPE STABILITY BLOCK COORDINATES – SOUTH SIDE					
LINE	**X**	**Y**	**X**	**Y**	**WIDTH**
SEGMENT					
1	432.9021	222.5490	597.1072	140.4464	0.25
2	599.0000	140.0000	600.0000	140.0000	0.25
3	601.0000	140.0000	1200.0000	140.0000	0.25

APPENDIX H

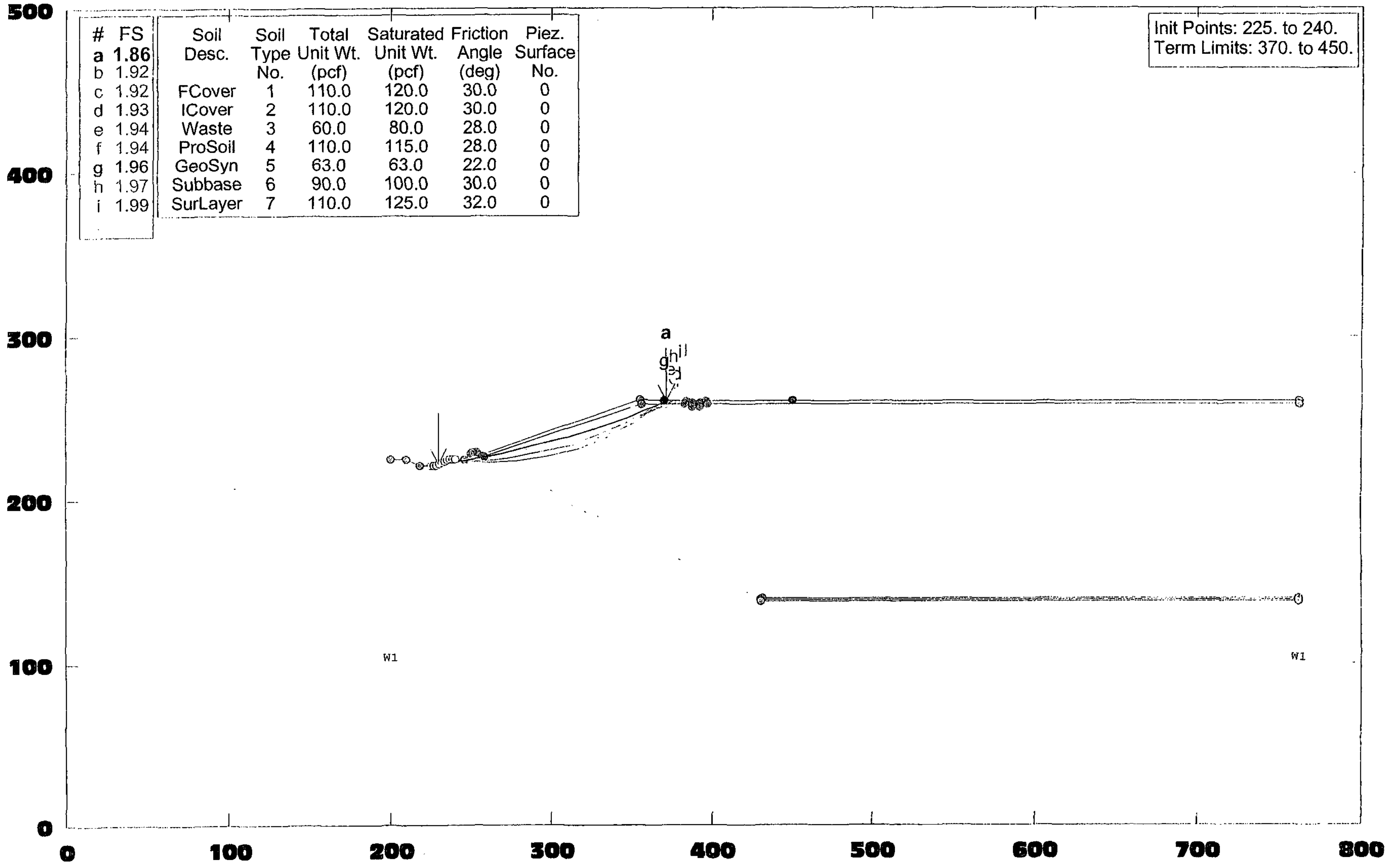
CIRCULAR SLOPE STABILITY ANALYSES

NORTH SIDE SECTION

WITHOUT EQUIPMENT LOAD

Central Landfill North Side - Citrus Co.

F:\PROJECT\CITRUS\09199056.13\SLOPES~1\NORTH1.PL2   Run By: Dominique Rudajev   12/15/2004   3:19PM



#	FS
a	**1.86**
b	1.92
c	1.92
d	1.93
e	1.94
f	1.94
g	1.96
h	1.97
i	1.99

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
FCover	1	110.0	120.0	30.0	0
ICover	2	110.0	120.0	30.0	0
Waste	3	60.0	80.0	28.0	0
ProSoil	4	110.0	115.0	28.0	0
GeoSyn	5	63.0	63.0	22.0	0
Subbase	6	90.0	100.0	30.0	0
SurLayer	7	110.0	125.0	32.0	0

STABL6H FSmin=1.86

Safety Factors Are Calculated By The Modified Bishop Method

SCS ENGINEERS

** STABL6H **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 12/15/2004
Time of Run: 3:30PM
Run By: Dominique Rudajev
Input Data Filename: F:north1.
Output Filename: F:north1.OUT
Plotted Output Filename: F:north1.PLT
PROBLEM DESCRIPTION Central Landfill North Side - Citrus Co.
BOUNDARY COORDINATES
17 Top Boundaries
39 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	200.00	225.00	210.00	225.00	7
2	210.00	225.00	218.00	221.00	7
3	218.00	221.00	228.00	221.00	7
4	228.00	221.00	236.00	225.00	7
5	236.00	225.00	246.00	225.00	7
6	246.00	225.00	249.51	228.51	7
7	249.51	228.51	250.25	229.25	6
8	250.25	229.25	250.63	229.63	5
9	250.63	229.63	251.00	230.00	4
10	251.00	230.00	253.00	230.00	4
11	253.00	230.00	255.00	228.00	4
12	255.00	228.00	355.50	261.50	1
13	355.50	261.50	383.50	261.22	1
14	383.50	261.22	388.00	259.72	1
15	388.00	259.72	392.00	259.72	1
16	392.00	259.72	396.50	261.22	1
17	396.50	261.22	761.93	261.22	1
18	257.53	226.74	355.81	259.50	2
19	355.81	259.50	383.17	259.22	2
20	383.17	259.22	387.68	257.72	2
21	387.68	257.72	396.82	259.22	2
22	396.82	259.22	761.93	259.22	2
23	396.82	259.22	761.93	259.22	2
24	255.00	228.00	257.53	226.74	4
25	258.16	226.42	355.89	259.00	3
26	355.89	259.00	383.08	258.72	3
27	383.08	258.72	387.59	257.22	3
28	387.59	257.22	392.41	257.22	3
29	392.41	257.22	396.91	258.72	3
30	396.91	258.72	761.93	258.72	3
31	257.53	226.74	258.16	226.42	4
32	258.16	226.42	431.00	140.00	4
33	431.00	140.00	761.93	140.00	4
34	250.63	229.63	430.88	139.50	5
35	430.88	139.50	761.93	139.50	5
36	250.25	229.25	430.76	139.00	6
37	430.76	139.00	761.93	139.00	6
38	249.51	228.51	430.53	138.00	7
39	430.53	138.00	761.93	138.00	7

ISOTROPIC SOIL PARAMETERS
7 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	0
2	110.0	120.0	.0	30.0	.00	.0	0
3	60.0	80.0	.0	28.0	.00	.0	0
4	110.0	115.0	.0	28.0	.00	.0	0
5	63.0	63.0	.0	22.0	.00	.0	0

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  6    90.0    100.0        .0     30.0     .00        .0      0
  7   110.0    125.0        .0     32.0     .00        .0      0
 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        200.00      108.50
     2        761.93      108.50
BOUNDARY LOAD(S)
     1 Load(s) Specified
 Load        X-Left      X-Right     Intensity     Deflection
  No.         (ft)        (ft)      (lb/sqft)        (deg)
   1         591.43      600.06       1436.4          .0
 NOTE - Intensity Is Specified As A Uniformly Distributed
        Force Acting On A Horizontally Projected Surface.
 SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
1000 Trial Surfaces Have Been Generated.
 100 Surfaces Initiate From Each Of 10 Points Equally Spaced
 Along The Ground Surface Between  X = 225.00 ft.
                               and  X = 240.00 ft.
 Each Surface Terminates Between   X = 370.00 ft.
                              and  X = 450.00 ft.
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =   .00 ft.
 20.00 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 Bishop Method * *
       Failure Surface Specified By  9 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        230.00      222.00
           2        249.79      224.92
           3        269.44      228.61
           4        288.94      233.06
           5        308.25      238.26
           6        327.35      244.20
           7        346.20      250.88
           8        364.78      258.28
           9        371.66      261.34
       Circle Center At X =  164.5 ; Y =  733.8  and Radius,  516.0
             ***     1.856   ***
       Failure Surface Specified By  9 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        228.33      221.17
           2        248.03      224.65
           3        267.62      228.65
           4        287.11      233.17
           5        306.46      238.21
           6        325.68      243.76
           7        344.74      249.82
           8        363.63      256.38
           9        376.61      261.29
       Circle Center At X =  107.4 ; Y =  963.1  and Radius,  751.7
             ***     1.920   ***
       Failure Surface Specified By  9 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        233.33      223.67
           2        253.32      224.36
           3        273.21      226.43
           4        292.91      229.90
```

```
     5        312.32      234.72
     6        331.35      240.89
     7        349.90      248.36
     8        367.88      257.12
     9        375.15      261.30
Circle Center At X =  233.5 ; Y =  510.5  and Radius,   286.8
      ***      1.921     ***
Failure Surface Specified By  9 Coordinate Points
   Point      X-Surf      Y-Surf
    No.        (ft)        (ft)
     1        230.00      222.00
     2        249.84      224.55
     3        269.56      227.87
     4        289.13      231.97
     5        308.53      236.84
     6        327.73      242.46
     7        346.68      248.84
     8        365.38      255.95
     9        377.87      261.28
Circle Center At X =  175.1 ; Y =  727.6  and Radius,   508.6
      ***      1.933     ***
Failure Surface Specified By  9 Coordinate Points
   Point      X-Surf      Y-Surf
    No.        (ft)        (ft)
     1        228.33      221.17
     2        248.29      222.53
     3        268.12      225.08
     4        287.77      228.82
     5        307.16      233.73
     6        326.22      239.79
     7        344.88      246.98
     8        363.08      255.27
     9        374.48      261.31
Circle Center At X =  215.6 ; Y =  554.9  and Radius,   334.0
      ***      1.938     ***
Failure Surface Specified By  9 Coordinate Points
   Point      X-Surf      Y-Surf
    No.        (ft)        (ft)
     1        228.33      221.17
     2        248.32      221.79
     3        268.21      223.90
     4        287.89      227.48
     5        307.25      232.52
     6        326.17      238.98
     7        344.57      246.82
     8        362.33      256.02
     9        370.98      261.35
Circle Center At X =  229.9 ; Y =  490.0  and Radius,   268.8
      ***      1.942     ***
Failure Surface Specified By  9 Coordinate Points
   Point      X-Surf      Y-Surf
    No.        (ft)        (ft)
     1        238.33      225.00
     2        258.23      222.96
     3        278.23      223.37
     4        298.02      226.22
     5        317.32      231.48
     6        335.82      239.06
     7        353.26      248.85
     8        369.37      260.70
     9        370.06      261.35
Circle Center At X =  264.9 ; Y =  385.8  and Radius,   163.0
      ***      1.961     ***
Failure Surface Specified By  9 Coordinate Points
   Point      X-Surf      Y-Surf
    No.        (ft)        (ft)
     1        228.33      221.17
```

2	248.31	222.15
3	268.18	224.40
4	287.87	227.92
5	307.29	232.68
6	326.37	238.68
7	345.03	245.88
8	363.19	254.26
9	376.18	261.29

Circle Center At X = 223.0 ; Y = 534.2 and Radius, 313.1
*** 1.971 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	233.33	223.67
2	253.33	224.12
3	273.25	225.93
4	293.00	229.09
5	312.48	233.59
6	331.62	239.40
7	350.32	246.50
8	368.49	254.85
9	380.23	261.25

Circle Center At X = 236.7 ; Y = 517.5 and Radius, 293.8
*** 1.988 ***

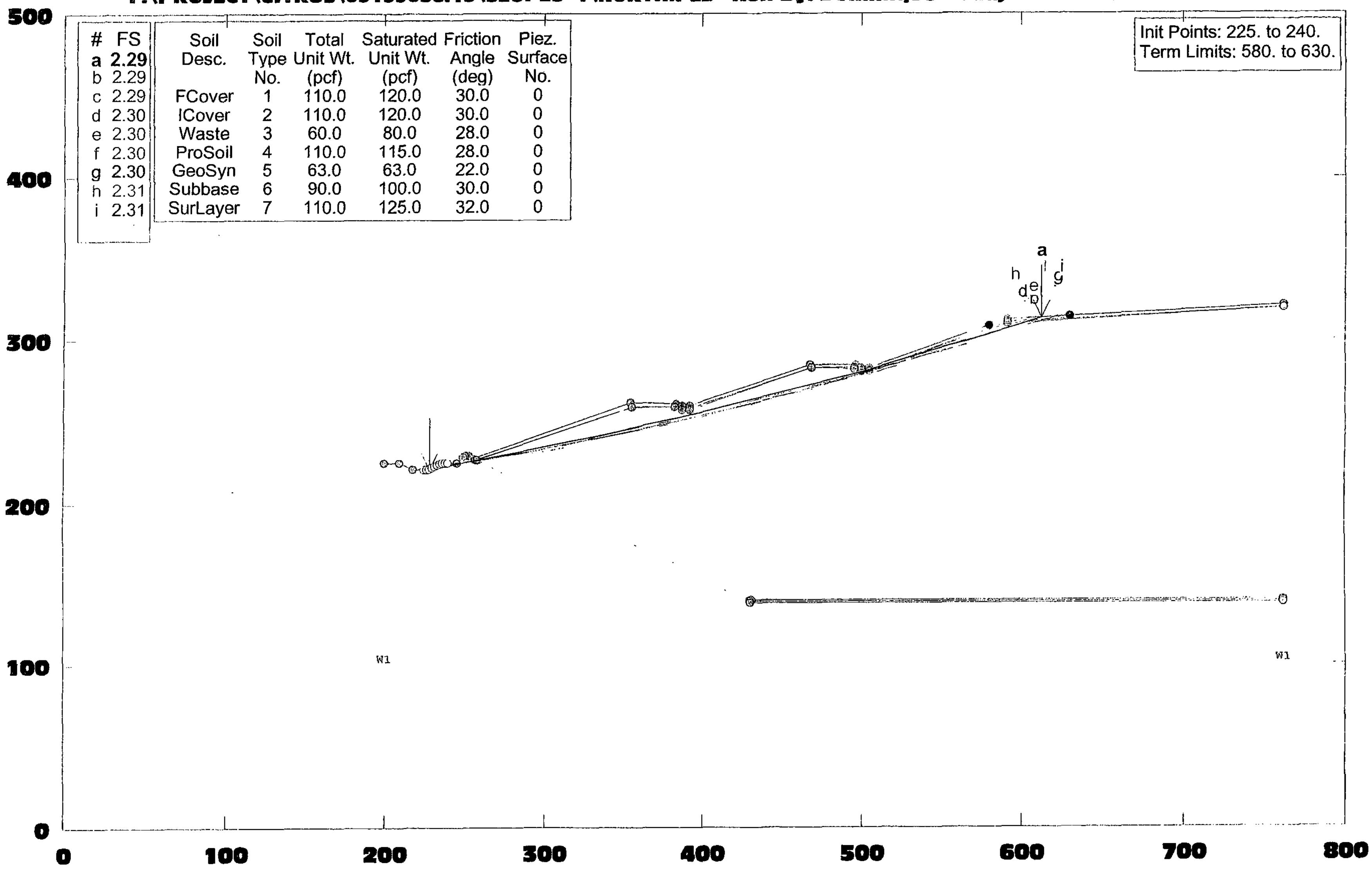
Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	231.67	222.83
2	251.48	225.58
3	271.19	228.94
4	290.79	232.94
5	310.25	237.55
6	329.56	242.78
7	348.68	248.61
8	367.62	255.06
9	383.77	261.13

Circle Center At X = 155.2 ; Y = 848.5 and Radius, 630.4
*** 2.011 ***

Central Landfill North Side - Citrus Co.

F:\PROJECT\CITRUS\09199056.13\SLOPES~1\NORTH.PL2 Run By: Dominique Rudajev 12/15/2004 11:50AM



#	FS
a	**2.29**
b	2.29
c	2.29
d	2.30
e	2.30
f	2.30
g	2.30
h	2.31
i	2.31

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
FCover	1	110.0	120.0	30.0	0
ICover	2	110.0	120.0	30.0	0
Waste	3	60.0	80.0	28.0	0
ProSoil	4	110.0	115.0	28.0	0
GeoSyn	5	63.0	63.0	22.0	0
Subbase	6	90.0	100.0	30.0	0
SurLayer	7	110.0	125.0	32.0	0

STABL6H FSmin=2.29

Safety Factors Are Calculated By The Modified Bishop Method

SCS ENGINEERS

**** STABL6H ****
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 12/15/2004
Time of Run: 11:50AM
Run By: Dominique Rudajev
Input Data Filename: F:north.
Output Filename: F:north.OUT
Plotted Output Filename: F:north.PLT
PROBLEM DESCRIPTION Central Landfill North Side - Citrus Co.
BOUNDARY COORDINATES
21 Top Boundaries
51 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	200.00	225.00	210.00	225.00	7
2	210.00	225.00	218.00	221.00	7
3	218.00	221.00	228.00	221.00	7
4	228.00	221.00	236.00	225.00	7
5	236.00	225.00	246.00	225.00	7
6	246.00	225.00	249.51	228.51	7
7	249.51	228.51	250.25	229.25	6
8	250.25	229.25	250.63	229.63	5
9	250.63	229.63	251.00	230.00	4
10	251.00	230.00	253.00	230.00	4
11	253.00	230.00	255.00	228.00	4
12	255.00	228.00	355.50	261.50	1
13	355.50	261.50	383.50	261.22	1
14	383.50	261.22	388.00	259.72	1
15	388.00	259.72	392.00	259.72	1
16	392.00	259.72	467.84	285.00	1
17	467.84	285.00	495.84	284.72	1
18	495.84	284.72	500.34	283.22	1
19	500.34	283.22	504.34	283.22	1
20	504.34	283.22	591.43	312.25	1
21	591.43	312.25	761.93	321.20	1
22	257.53	226.74	355.81	259.50	2
23	355.81	259.50	383.17	259.22	2
24	383.17	259.22	387.68	257.72	2
25	387.68	257.72	392.32	257.72	2
26	392.32	257.72	468.15	283.00	2
27	468.15	283.00	495.51	282.72	2
28	495.51	282.72	500.02	281.22	2
29	500.02	281.22	504.66	281.22	2
30	504.66	281.22	591.81	310.27	2
31	591.81	310.27	761.93	319.20	2
32	255.00	228.00	257.53	226.74	4
33	258.16	226.42	355.89	259.00	3
34	355.89	259.00	383.08	258.72	3
35	383.08	258.72	387.59	257.22	3
36	387.59	257.22	392.41	257.22	3
37	392.41	257.22	468.23	282.50	3
38	468.23	282.50	495.42	282.22	3
39	495.42	282.22	499.93	280.72	3
40	499.93	280.72	504.75	280.72	3
41	504.75	280.72	591.90	309.77	3
42	591.90	309.77	761.93	318.70	3
43	257.53	226.74	258.16	226.42	4
44	258.16	226.42	431.00	140.00	4
45	431.00	140.00	761.93	140.00	4
46	250.63	229.63	430.88	139.50	5
47	430.88	139.50	761.93	139.50	5
48	250.25	229.25	430.76	139.00	6
49	430.76	139.00	761.93	139.00	6

50	249.51	228.51	430.53	138.00	7
51	430.53	138.00	761.93	138.00	7

ISOTROPIC SOIL PARAMETERS

7 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	0
2	110.0	120.0	.0	30.0	.00	.0	0
3	60.0	80.0	.0	28.0	.00	.0	0
4	110.0	115.0	.0	28.0	.00	.0	0
5	63.0	63.0	.0	22.0	.00	.0	0
6	90.0	100.0	.0	30.0	.00	.0	0
7	110.0	125.0	.0	32.0	.00	.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	200.00	108.50
2	761.93	108.50

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	591.43	600.06	1436.4	.0

NOTE - Intensity Is Specified As A Uniformly Distributed Force Acting On A Horizontally Projected Surface.

SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

1000 Trial Surfaces Have Been Generated.

100 Surfaces Initiate From Each Of 10 Points Equally Spaced Along The Ground Surface Between X = 225.00 ft. and X = 240.00 ft.

Each Surface Terminates Between X = 580.00 ft. and X = 630.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = .00 ft.

20.00 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 Bishop Method * *

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	228.33	221.17
2	248.03	224.65
3	267.70	228.25
4	287.35	231.99
5	306.97	235.85
6	326.57	239.83
7	346.14	243.94
8	365.69	248.18
9	385.21	252.55
10	404.70	257.04
11	424.16	261.66
12	443.59	266.40
13	462.98	271.27
14	482.35	276.27
15	501.68	281.38
16	520.99	286.63
17	540.25	292.00
18	559.48	297.49
19	578.68	303.10
20	597.84	308.85

21	612.55	313.36

Circle Center At X = -300.3 ; Y = 3271.5 and Radius, 3095.8

*** 2.285 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	230.00	222.00
2	249.78	224.99
3	269.52	228.17
4	289.24	231.53
5	308.92	235.08
6	328.57	238.81
7	348.18	242.72
8	367.76	246.82
9	387.29	251.10
10	406.79	255.56
11	426.24	260.21
12	445.65	265.04
13	465.01	270.04
14	484.33	275.24
15	503.59	280.61
16	522.81	286.16
17	541.97	291.89
18	561.08	297.80
19	580.13	303.89
20	599.12	310.16
21	607.79	313.11

Circle Center At X = -79.5 ; Y = 2334.8 and Radius, 2135.3

*** 2.288 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	230.00	222.00
2	249.81	224.75
3	269.59	227.73
4	289.33	230.92
5	309.04	234.33
6	328.71	237.96
7	348.33	241.81
8	367.91	245.88
9	387.45	250.16
10	406.94	254.66
11	426.37	259.38
12	445.75	264.31
13	465.08	269.46
14	484.35	274.83
15	503.55	280.40
16	522.70	286.19
17	541.78	292.20
18	560.79	298.41
19	579.73	304.84
20	598.59	311.47
21	602.29	312.82

Circle Center At X = -7.7 ; Y = 2005.2 and Radius, 1798.9

*** 2.290 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	231.67	222.83
2	251.48	225.58
3	271.26	228.54
4	291.00	231.72
5	310.71	235.13
6	330.38	238.75
7	350.01	242.60
8	369.59	246.67
9	389.12	250.95

10	408.61	255.45
11	428.05	260.17
12	447.43	265.11
13	466.75	270.26
14	486.02	275.63
15	505.22	281.22
16	524.36	287.02
17	543.44	293.03
18	562.44	299.26
19	581.38	305.70
20	600.24	312.35
21	601.40	312.77

Circle Center At X = -3.4 ; Y = 1994.2 and Radius, 1786.9

*** 2.295 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	228.33	221.17
2	248.16	223.80
3	267.95	226.66
4	287.72	229.74
5	307.44	233.05
6	327.12	236.59
7	346.77	240.35
8	366.37	244.33
9	385.92	248.54
10	405.42	252.97
11	424.87	257.62
12	444.27	262.50
13	463.61	267.60
14	482.89	272.91
15	502.11	278.45
16	521.26	284.21
17	540.35	290.18
18	559.36	296.38
19	578.31	302.79
20	597.18	309.41
21	607.26	313.08

Circle Center At X = 8.0 ; Y = 1957.2 and Radius, 1750.0

*** 2.295 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	228.33	221.17
2	247.99	224.84
3	267.63	228.62
4	287.26	232.49
5	306.86	236.45
6	326.44	240.51
7	346.01	244.67
8	365.55	248.92
9	385.07	253.26
10	404.57	257.70
11	424.05	262.24
12	443.51	266.87
13	462.94	271.60
14	482.35	276.42
15	501.74	281.33
16	521.10	286.34
17	540.44	291.44
18	559.75	296.64
19	579.04	301.93
20	598.30	307.32
21	617.53	312.80
22	620.99	313.80

Circle Center At X = -516.3 ; Y = 4256.3 and Radius, 4103.3

*** 2.298 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	228.33	221.17
2	248.04	224.58
3	267.73	228.11
4	287.39	231.77
5	307.03	235.55
6	326.65	239.44
7	346.24	243.46
8	365.81	247.60
9	385.35	251.86
10	404.86	256.23
11	424.35	260.73
12	443.81	265.35
13	463.24	270.09
14	482.64	274.95
15	502.01	279.92
16	521.35	285.02
17	540.66	290.23
18	559.94	295.57
19	579.18	301.02
20	598.39	306.59
21	617.56	312.28
22	622.91	313.90

Circle Center At X = -316.4 ; Y = 3425.3 and Radius, 3250.1

*** 2.302 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	230.00	222.00
2	249.84	224.52
3	269.65	227.29
4	289.42	230.32
5	309.15	233.60
6	328.83	237.14
7	348.47	240.94
8	368.05	244.98
9	387.59	249.29
10	407.06	253.84
11	426.47	258.65
12	445.82	263.71
13	465.11	269.01
14	484.32	274.57
15	503.46	280.38
16	522.52	286.43
17	541.50	292.73
18	560.40	299.28
19	579.21	306.07
20	596.35	312.51

Circle Center At X = 45.8 ; Y = 1754.3 and Radius, 1543.3

*** 2.307 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	228.33	221.17
2	248.07	224.40
3	267.78	227.78
4	287.47	231.29
5	307.14	234.94
6	326.78	238.72
7	346.39	242.64
8	365.97	246.70
9	385.53	250.90
10	405.05	255.23
11	424.55	259.70
12	444.01	264.31

13	463.44	269.05
14	482.83	273.92
15	502.20	278.93
16	521.52	284.08
17	540.81	289.36
18	560.07	294.78
19	579.28	300.33
20	598.46	306.01
21	617.59	311.83
22	624.52	313.99

Circle Center At X = -225.3 ; Y = 3049.7 and Radius, 2864.7

*** 2.310 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	231.67	222.83
2	251.53	225.17
3	271.36	227.75
4	291.16	230.58
5	310.92	233.65
6	330.65	236.97
7	350.33	240.53
8	369.96	244.33
9	389.55	248.37
10	409.09	252.66
11	428.57	257.18
12	447.99	261.95
13	467.36	266.96
14	486.66	272.20
15	505.89	277.68
16	525.05	283.40
17	544.15	289.35
18	563.17	295.54
19	582.11	301.97
20	600.96	308.63
21	614.08	313.44

Circle Center At X = 52.2 ; Y = 1833.1 and Radius, 1620.3

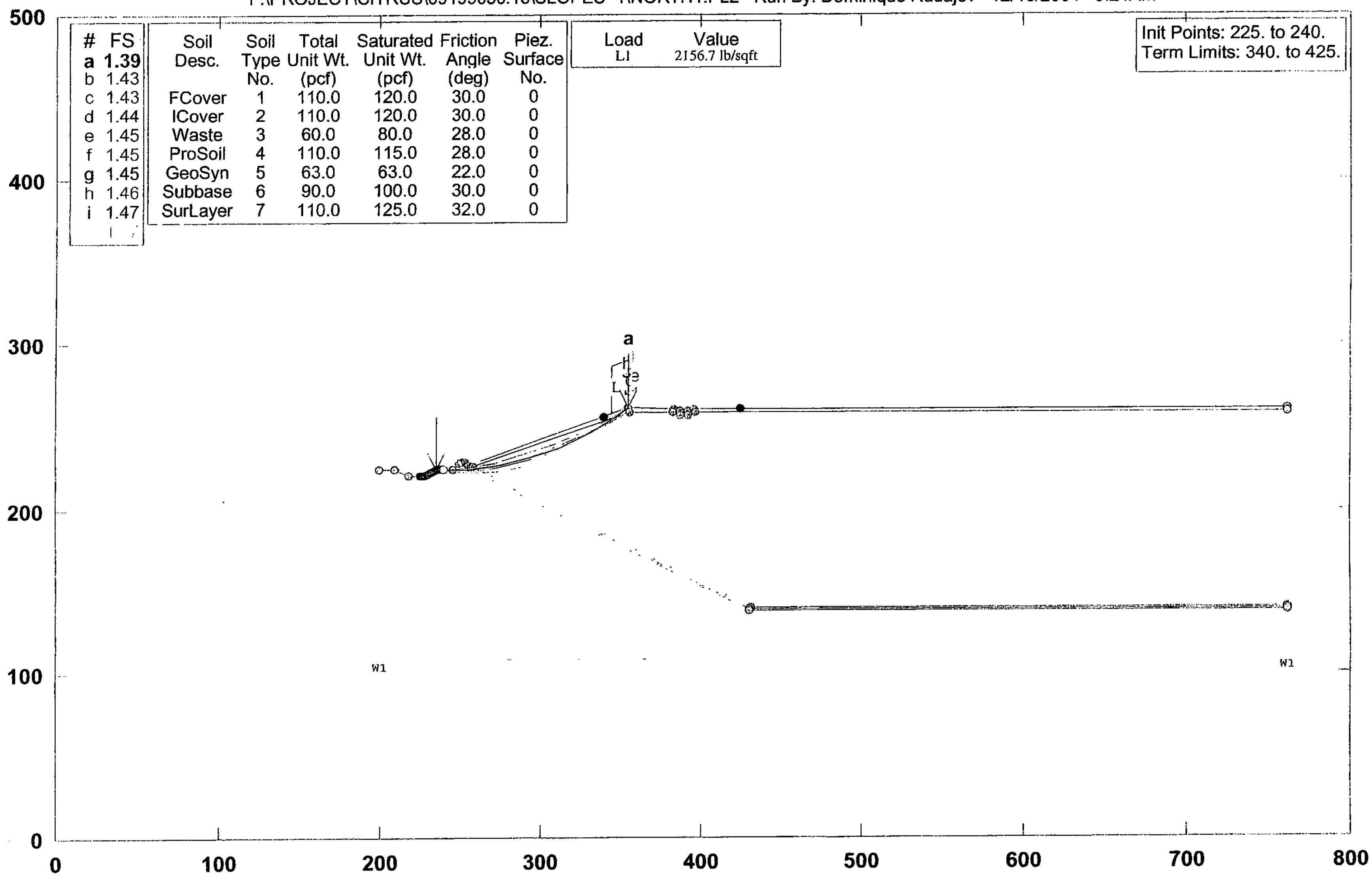
*** 2.314 ***

NORTH SIDE SECTION

WITH EQUIPMENT LOAD

Central Landfill North Side - Citrus Co.

F:\PROJECT\CITRUS\09199056.13\SLOPES~1\NORTH1.PL2 Run By: Dominique Rudajev 12/16/2004 9:24AM



STABL6H FSmin=1.39

Safety Factors Are Calculated By The Modified Bishop Method

SCS ENGINEERS

** STABL6H **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 12/16/2004
Time of Run: 9:24AM
Run By: Dominique Rudajev
Input Data Filename: F:north1.
Output Filename: F:north1.OUT
Plotted Output Filename: F:north1.PLT
PROBLEM DESCRIPTION Central Landfill North Side - Citrus Co.
BOUNDARY COORDINATES
17 Top Boundaries
39 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	200.00	225.00	210.00	225.00	7
2	210.00	225.00	218.00	221.00	7
3	218.00	221.00	228.00	221.00	7
4	228.00	221.00	236.00	225.00	7
5	236.00	225.00	246.00	225.00	7
6	246.00	225.00	249.51	228.51	7
7	249.51	228.51	250.25	229.25	6
8	250.25	229.25	250.63	229.63	5
9	250.63	229.63	251.00	230.00	4
10	251.00	230.00	253.00	230.00	4
11	253.00	230.00	255.00	228.00	4
12	255.00	228.00	355.50	261.50	1
13	355.50	261.50	383.50	261.22	1
14	383.50	261.22	388.00	259.72	1
15	388.00	259.72	392.00	259.72	1
16	392.00	259.72	396.50	261.22	1
17	396.50	261.22	761.93	261.22	1
18	257.53	226.74	355.81	259.50	2
19	355.81	259.50	383.17	259.22	2
20	383.17	259.22	387.68	257.72	2
21	387.68	257.72	396.82	259.22	2
22	396.82	259.22	761.93	259.22	2
23	396.82	259.22	761.93	259.22	2
24	255.00	228.00	257.53	226.74	4
25	258.16	226.42	355.89	259.00	3
26	355.89	259.00	383.08	258.72	3
27	383.08	258.72	387.59	257.22	3
28	387.59	257.22	392.41	257.22	3
29	392.41	257.22	396.91	258.72	3
30	396.91	258.72	761.93	258.72	3
31	257.53	226.74	258.16	226.42	4
32	258.16	226.42	431.00	140.00	4
33	431.00	140.00	761.93	140.00	4
34	250.63	229.63	430.88	139.50	5
35	430.88	139.50	761.93	139.50	5
36	250.25	229.25	430.76	139.00	6
37	430.76	139.00	761.93	139.00	6
38	249.51	228.51	430.53	138.00	7
39	430.53	138.00	761.93	138.00	7

ISOTROPIC SOIL PARAMETERS
7 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	0
2	110.0	120.0	.0	30.0	.00	.0	0
3	60.0	80.0	.0	28.0	.00	.0	0
4	110.0	115.0	.0	28.0	.00	.0	0
5	63.0	63.0	.0	22.0	.00	.0	0

6	90.0	100.0	.0	30.0	.00	.0	0
7	110.0	125.0	.0	32.0	.00	.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	200.00	108.50
2	761.93	108.50

BOUNDARY LOAD(S)
1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	345.00	355.50	2156.7	.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.
5000 Trial Surfaces Have Been Generated.
100 Surfaces Initiate From Each Of 50 Points Equally Spaced
Along The Ground Surface Between X = 225.00 ft.
and X = 240.00 ft.
Each Surface Terminates Between X = 340.00 ft.
and X = 425.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 ft.
20.00 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 Bishop Method * *
Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	235.10	224.55
2	255.10	225.07
3	274.94	227.58
4	294.43	232.05
5	313.38	238.44
6	331.61	246.68
7	348.92	256.70
8	355.58	261.50

Circle Center At X = 239.9 ; Y = 425.2 and Radius, 200.7
*** 1.393 ***
Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	231.74	222.87
2	251.70	223.98
3	271.50	226.83
4	290.97	231.42
5	309.95	237.70
6	328.32	245.62
7	345.92	255.13
8	355.57	261.50

Circle Center At X = 229.1 ; Y = 450.3 and Radius, 227.4
*** 1.433 ***
Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	233.27	223.63
2	253.21	225.18
3	272.97	228.26
4	292.43	232.88
5	311.47	238.99
6	329.98	246.56
7	347.85	255.55

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     8         357.64       261.48
 Circle Center At X =  223.4 ; Y =  480.6  and Radius,  257.2
       ***       1.434     ***
 Failure Surface Specified By  8 Coordinate Points
   Point       X-Surf       Y-Surf
    No.         (ft)         (ft)
     1         232.65       223.33
     2         252.65       223.52
     3         272.52       225.78
     4         292.06       230.08
     5         311.04       236.37
     6         329.28       244.58
     7         346.57       254.63
     8         356.00       261.50
 Circle Center At X =  240.7 ; Y =  416.8  and Radius,  193.7
       ***       1.442     ***
 Failure Surface Specified By  8 Coordinate Points
   Point       X-Surf       Y-Surf
    No.         (ft)         (ft)
     1         233.57       223.79
     2         253.50       225.49
     3         273.25       228.65
     4         292.72       233.24
     5         311.80       239.23
     6         330.39       246.60
     7         348.39       255.31
     8         359.07       261.46
 Circle Center At X =  220.2 ; Y =  497.5  and Radius,  274.1
       ***       1.446     ***
 Failure Surface Specified By  8 Coordinate Points
   Point       X-Surf       Y-Surf
    No.         (ft)         (ft)
     1         231.12       222.56
     2         251.11       223.16
     3         270.96       225.67
     4         290.47       230.06
     5         309.47       236.29
     6         327.79       244.31
     7         345.27       254.04
     8         356.07       261.49
 Circle Center At X =  234.9 ; Y =  431.7  and Radius,  209.2
       ***       1.454     ***
 Failure Surface Specified By  8 Coordinate Points
   Point       X-Surf       Y-Surf
    No.         (ft)         (ft)
     1         231.74       222.87
     2         251.59       225.30
     3         271.24       229.03
     4         290.60       234.04
     5         309.59       240.31
     6         328.13       247.81
     7         346.14       256.51
     8         354.16       261.05
 Circle Center At X =  204.5 ; Y =  526.7  and Radius,  305.1
       ***       1.454     ***
 Failure Surface Specified By  8 Coordinate Points
   Point       X-Surf       Y-Surf
    No.         (ft)         (ft)
     1         231.74       222.87
     2         251.73       223.39
     3         271.57       225.89
     4         291.07       230.34
     5         310.03       236.69
     6         328.27       244.89
     7         345.61       254.86
     8         354.37       261.12
 Circle Center At X =  236.5 ; Y =  424.7  and Radius,  201.9
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*** 1.463 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	235.71	224.86
2	255.65	223.22
3	275.62	224.25
4	295.28	227.94
5	314.27	234.21
6	332.26	242.96
7	348.92	254.02
8	357.42	261.48

Circle Center At X = 257.9 ; Y = 373.0 and Radius, 149.7

*** 1.465 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	230.82	222.41
2	250.78	223.63
3	270.57	226.48
4	290.07	230.95
5	309.13	237.00
6	327.64	244.59
7	345.46	253.66
8	358.11	261.47

Circle Center At X = 225.9 ; Y = 466.3 and Radius, 244.0

*** 1.466 ***

Central Landfill North Side - Citrus Co.

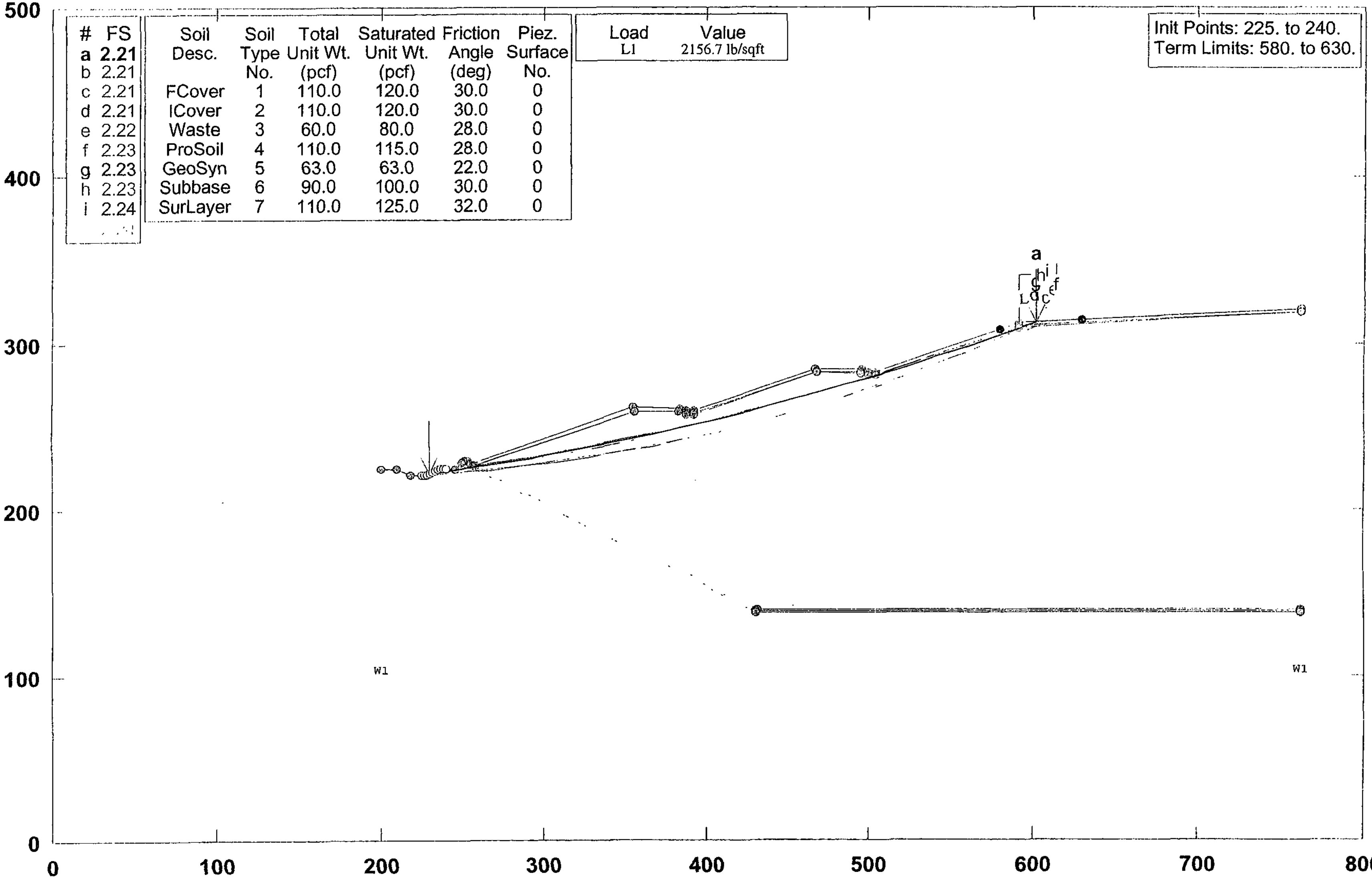
F:\PROJECT\CITRUS\09199056.13\SLOPES~1\NORTH.PL2 Run By: Dominique Rudajev 12/16/2004 9:18AM

#	FS
a	**2.21**
b	2.21
c	2.21
d	2.21
e	2.22
f	2.23
g	2.23
h	2.23
i	2.24

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
FCover	1	110.0	120.0	30.0	0
ICover	2	110.0	120.0	30.0	0
Waste	3	60.0	80.0	28.0	0
ProSoil	4	110.0	115.0	28.0	0
GeoSyn	5	63.0	63.0	22.0	0
Subbase	6	90.0	100.0	30.0	0
SurLayer	7	110.0	125.0	32.0	0

Load	Value
L1	2156.7 lb/sqft

Init Points: 225. to 240.
Term Limits: 580. to 630.



STABL6H FSmin=2.21

Safety Factors Are Calculated By The Modified Bishop Method

SCS ENGINEERS

**** STABL6H ****
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 12/16/2004
Time of Run: 9:18AM
Run By: Dominique Rudajev
Input Data Filename: F:north.
Output Filename: F:north.OUT
Plotted Output Filename: F:north.PLT
PROBLEM DESCRIPTION Central Landfill North Side - Citrus Co.
BOUNDARY COORDINATES
21 Top Boundaries
51 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	200.00	225.00	210.00	225.00	7
2	210.00	225.00	218.00	221.00	7
3	218.00	221.00	228.00	221.00	7
4	228.00	221.00	236.00	225.00	7
5	236.00	225.00	246.00	225.00	7
6	246.00	225.00	249.51	228.51	7
7	249.51	228.51	250.25	229.25	6
8	250.25	229.25	250.63	229.63	5
9	250.63	229.63	251.00	230.00	4
10	251.00	230.00	253.00	230.00	4
11	253.00	230.00	255.00	228.00	4
12	255.00	228.00	355.50	261.50	1
13	355.50	261.50	383.50	261.22	1
14	383.50	261.22	388.00	259.72	1
15	388.00	259.72	392.00	259.72	1
16	392.00	259.72	467.84	285.00	1
17	467.84	285.00	495.84	284.72	1
18	495.84	284.72	500.34	283.22	1
19	500.34	283.22	504.34	283.22	1
20	504.34	283.22	591.43	312.25	1
21	591.43	312.25	761.93	321.20	1
22	257.53	226.74	355.81	259.50	2
23	355.81	259.50	383.17	259.22	2
24	383.17	259.22	387.68	257.72	2
25	387.68	257.72	392.32	257.72	2
26	392.32	257.72	468.15	283.00	2
27	468.15	283.00	495.51	282.72	2
28	495.51	282.72	500.02	281.22	2
29	500.02	281.22	504.66	281.22	2
30	504.66	281.22	591.81	310.27	2
31	591.81	310.27	761.93	319.20	2
32	255.00	228.00	257.53	226.74	4
33	258.16	226.42	355.89	259.00	3
34	355.89	259.00	383.08	258.72	3
35	383.08	258.72	387.59	257.22	3
36	387.59	257.22	392.41	257.22	3
37	392.41	257.22	468.23	282.50	3
38	468.23	282.50	495.42	282.22	3
39	495.42	282.22	499.93	280.72	3
40	499.93	280.72	504.75	280.72	3
41	504.75	280.72	591.90	309.77	3
42	591.90	309.77	761.93	318.70	3
43	257.53	226.74	258.16	226.42	4
44	258.16	226.42	431.00	140.00	4
45	431.00	140.00	761.93	140.00	4
46	250.63	229.63	430.88	139.50	5
47	430.88	139.50	761.93	139.50	5
48	250.25	229.25	430.76	139.00	6
49	430.76	139.00	761.93	139.00	6

50	249.51	228.51	430.53	138.00	7
51	430.53	138.00	761.93	138.00	7

ISOTROPIC SOIL PARAMETERS

7 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	0
2	110.0	120.0	.0	30.0	.00	.0	0
3	60.0	80.0	.0	28.0	.00	.0	0
4	110.0	115.0	.0	28.0	.00	.0	0
5	63.0	63.0	.0	22.0	.00	.0	0
6	90.0	100.0	.0	30.0	.00	.0	0
7	110.0	125.0	.0	32.0	.00	.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	200.00	108.50
2	761.93	108.50

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	591.43	601.93	2156.7	.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.

1000 Trial Surfaces Have Been Generated.

100 Surfaces Initiate From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 225.00 ft.
and X = 240.00 ft.

Each Surface Terminates Between X = 580.00 ft.
and X = 630.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 ft.

20.00 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 Bishop Method * *

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	230.00	222.00
2	249.81	224.75
3	269.59	227.73
4	289.33	230.92
5	309.04	234.33
6	328.71	237.96
7	348.33	241.81
8	367.91	245.88
9	387.45	250.16
10	406.94	254.66
11	426.37	259.38
12	445.75	264.31
13	465.08	269.46
14	484.35	274.83
15	503.55	280.40
16	522.70	286.19
17	541.78	292.20
18	560.79	298.41
19	579.73	304.84
20	598.59	311.47
21	602.29	312.82

Circle Center At X = -7.7 ; Y = 2005.2 and Radius, 1798.9
*** 2.206 ***
Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	230.00	222.00
2	249.78	224.99
3	269.52	228.17
4	289.24	231.53
5	308.92	235.08
6	328.57	238.81
7	348.18	242.72
8	367.76	246.82
9	387.29	251.10
10	406.79	255.56
11	426.24	260.21
12	445.65	265.04
13	465.01	270.04
14	484.33	275.24
15	503.59	280.61
16	522.81	286.16
17	541.97	291.89
18	561.08	297.80
19	580.13	303.89
20	599.12	310.16
21	607.79	313.11

Circle Center At X = -79.5 ; Y = 2334.8 and Radius, 2135.3
*** 2.212 ***
Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	228.33	221.17
2	248.16	223.80
3	267.95	226.66
4	287.72	229.74
5	307.44	233.05
6	327.12	236.59
7	346.77	240.35
8	366.37	244.33
9	385.92	248.54
10	405.42	252.97
11	424.87	257.62
12	444.27	262.50
13	463.61	267.60
14	482.89	272.91
15	502.11	278.45
16	521.26	284.21
17	540.35	290.18
18	559.36	296.38
19	578.31	302.79
20	597.18	309.41
21	607.26	313.08

Circle Center At X = 8.0 ; Y = 1957.2 and Radius, 1750.0
*** 2.212 ***
Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	231.67	222.83
2	251.48	225.58
3	271.26	228.54
4	291.00	231.72
5	310.71	235.13
6	330.38	238.75
7	350.01	242.60
8	369.59	246.67
9	389.12	250.95
10	408.61	255.45

```
    11        428.05      260.17
    12        447.43      265.11
    13        466.75      270.26
    14        486.02      275.63
    15        505.22      281.22
    16        524.36      287.02
    17        543.44      293.03
    18        562.44      299.26
    19        581.38      305.70
    20        600.24      312.35
    21        601.40      312.77
Circle Center At X =    -3.4 ; Y = 1994.2  and Radius, 1786.9
       ***     2.214    ***
Failure Surface Specified By 21 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
     1        228.33      221.17
     2        248.03      224.65
     3        267.70      228.25
     4        287.35      231.99
     5        306.97      235.85
     6        326.57      239.83
     7        346.14      243.94
     8        365.69      248.18
     9        385.21      252.55
    10        404.70      257.04
    11        424.16      261.66
    12        443.59      266.40
    13        462.98      271.27
    14        482.35      276.27
    15        501.68      281.38
    16        520.99      286.63
    17        540.25      292.00
    18        559.48      297.49
    19        578.68      303.10
    20        597.84      308.85
    21        612.55      313.36
Circle Center At X = -300.3 ; Y = 3271.5  and Radius, 3095.8
       ***     2.222    ***
Failure Surface Specified By 21 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
     1        231.67      222.83
     2        251.53      225.17
     3        271.36      227.75
     4        291.16      230.58
     5        310.92      233.65
     6        330.65      236.97
     7        350.33      240.53
     8        369.96      244.33
     9        389.55      248.37
    10        409.09      252.66
    11        428.57      257.18
    12        447.99      261.95
    13        467.36      266.96
    14        486.66      272.20
    15        505.89      277.68
    16        525.05      283.40
    17        544.15      289.35
    18        563.17      295.54
    19        582.11      301.97
    20        600.96      308.63
    21        614.08      313.44
Circle Center At X =    52.2 ; Y = 1833.1  and Radius, 1620.3
       ***     2.232    ***
Failure Surface Specified By 21 Coordinate Points
  Point       X-Surf      Y-Surf
```

No.	(ft)	(ft)
1	228.33	221.17
2	248.29	222.51
3	268.21	224.23
4	288.10	226.33
5	307.95	228.80
6	327.75	231.65
7	347.49	234.87
8	367.16	238.47
9	386.76	242.43
10	406.29	246.77
11	425.73	251.48
12	445.07	256.55
13	464.32	261.98
14	483.46	267.78
15	502.49	273.95
16	521.39	280.47
17	540.17	287.34
18	558.82	294.57
19	577.33	302.15
20	595.69	310.08
21	601.64	312.79

Circle Center At X = 167.3 ; Y = 1276.8 and Radius, 1057.4
*** 2.233 ***
Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	231.67	222.83
2	251.64	223.96
3	271.58	225.49
4	291.48	227.41
5	311.35	229.71
6	331.17	232.41
7	350.93	235.50
8	370.62	238.98
9	390.25	242.85
10	409.79	247.10
11	429.24	251.74
12	448.60	256.75
13	467.86	262.15
14	487.01	267.93
15	506.04	274.08
16	524.94	280.61
17	543.72	287.51
18	562.35	294.78
19	580.84	302.41
20	599.17	310.40
21	604.70	312.95

Circle Center At X = 184.3 ; Y = 1236.7 and Radius, 1015.0
*** 2.235 ***
Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	228.33	221.17
2	248.28	222.62
3	268.20	224.43
4	288.08	226.59
5	307.92	229.09
6	327.72	231.95
7	347.46	235.15
8	367.14	238.70
9	386.76	242.59
10	406.31	246.83
11	425.77	251.42
12	445.16	256.34
13	464.45	261.60
14	483.65	267.21

15	502.75	273.15
16	521.74	279.42
17	540.62	286.03
18	559.38	292.97
19	578.01	300.24
20	596.51	307.83
21	608.89	313.17

Circle Center At X = 155.5 ; Y = 1355.9 and Radius, 1137.0
*** 2.236 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	230.00	222.00
2	249.92	223.74
3	269.82	225.79
4	289.68	228.14
5	309.50	230.81
6	329.28	233.78
7	349.01	237.06
8	368.68	240.65
9	388.30	244.55
10	407.86	248.74
11	427.34	253.24
12	446.76	258.05
13	466.09	263.15
14	485.35	268.56
15	504.52	274.26
16	523.60	280.27
17	542.58	286.57
18	561.46	293.16
19	580.24	300.04
20	598.91	307.22
21	614.40	313.46

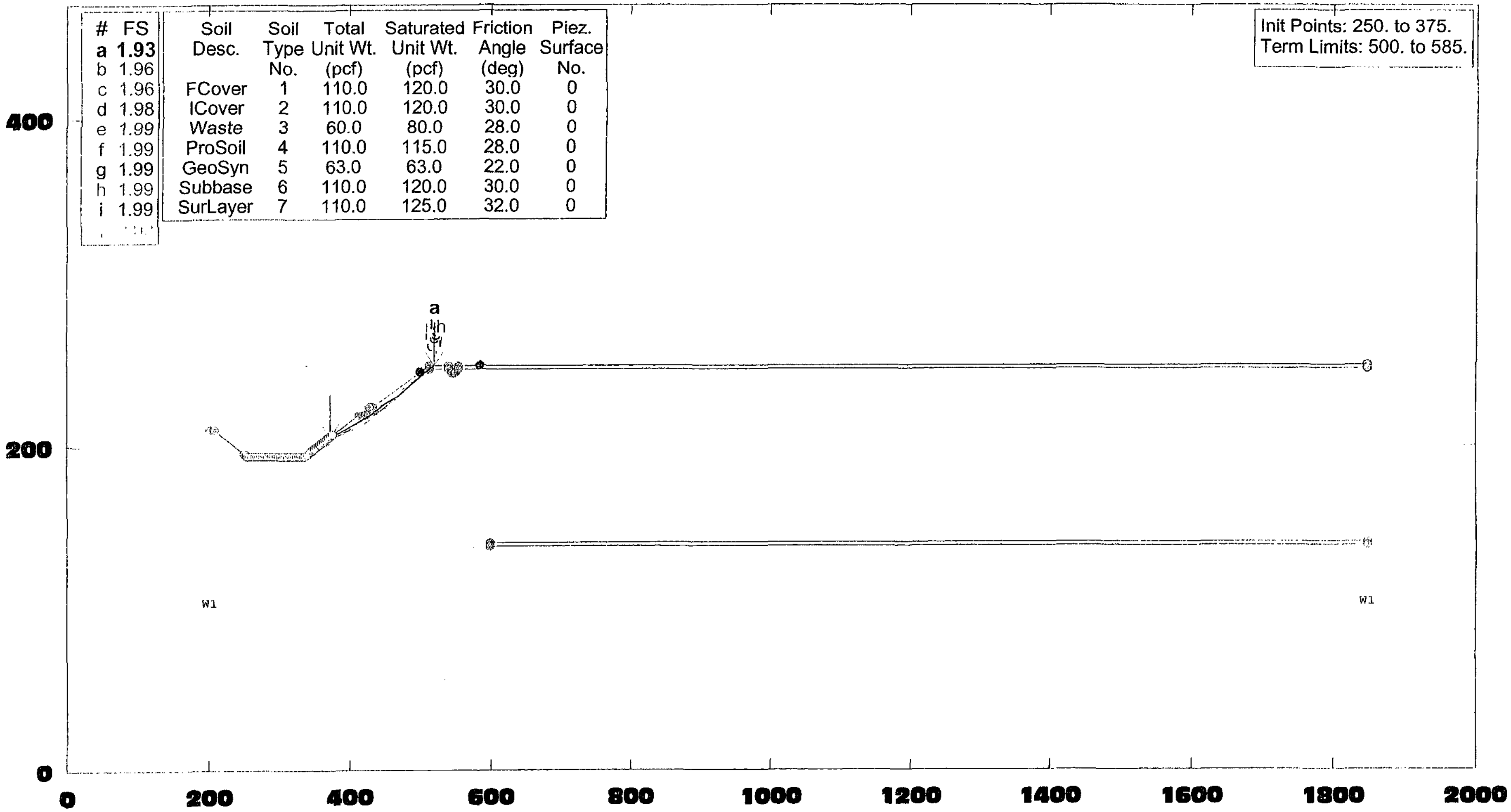
Circle Center At X = 128.2 ; Y = 1503.6 and Radius, 1285.7
*** 2.242 ***

SOUTH SIDE SECTION

WITHOUT EQUIPMENT LOAD

Central Landfill South Side - Citrus Co.

F:\PROJECT\CITRUS\09199056.13\SLOPES~1\SOUTH1.PL2 Run By: Dominique Rudajev 12/15/2004 4:30PM



#	FS
a	**1.93**
b	1.96
c	1.96
d	1.98
e	1.99
f	1.99
g	1.99
h	1.99
i	1.99

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
FCover	1	110.0	120.0	30.0	0
ICover	2	110.0	120.0	30.0	0
Waste	3	60.0	80.0	28.0	0
ProSoil	4	110.0	115.0	28.0	0
GeoSyn	5	63.0	63.0	22.0	0
Subbase	6	110.0	120.0	30.0	0
SurLayer	7	110.0	125.0	32.0	0

STABL6H FSmin=1.93

Safety Factors Are Calculated By The Modified Bishop Method

SCS ENGINEERS

**** STABL6H ****
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 12/15/2004
Time of Run: 4:30PM
Run By: Dominique Rudajev
Input Data Filename: F:south1.
Output Filename: F:south1.OUT
Plotted Output Filename: F:south1.PLT
PROBLEM DESCRIPTION Central Landfill South Side - Citrus Co.
BOUNDARY COORDINATES
17 Top Boundaries
39 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	200.00	210.00	207.00	210.00	7
2	207.00	210.00	255.00	194.00	7
3	255.00	194.00	335.00	194.00	7
4	335.00	194.00	413.00	220.00	7
5	413.00	220.00	423.00	220.00	7
6	423.00	220.00	426.51	223.51	7
7	426.51	223.51	427.25	224.25	6
8	427.25	224.25	427.63	224.63	5
9	427.63	224.63	428.00	225.00	4
10	428.00	225.00	430.00	225.00	4
11	430.00	225.00	432.00	223.00	4
12	432.00	223.00	513.00	250.00	1
13	513.00	250.00	541.00	249.72	1
14	541.00	249.72	545.50	248.22	1
15	545.50	248.22	549.50	248.22	1
16	549.50	248.22	554.00	249.72	1
17	554.00	249.72	1848.52	249.72	1
18	434.53	221.74	513.31	248.00	2
19	513.31	248.00	540.67	247.72	2
20	540.67	247.72	545.18	246.22	2
21	545.18	246.22	549.82	246.22	2
22	549.82	246.22	554.32	247.72	2
23	554.32	247.72	1848.52	247.72	2
24	432.00	223.00	434.53	221.74	4
25	435.16	221.42	513.39	247.50	3
26	513.39	247.50	540.58	247.22	3
27	540.58	247.22	545.09	245.72	3
28	545.09	245.72	549.91	245.72	3
29	549.91	245.72	554.41	247.22	3
30	554.41	247.22	1848.52	247.22	3
31	434.53	221.74	435.16	221.42	4
32	435.16	221.42	598.00	140.00	4
33	598.00	140.00	1848.52	140.00	4
34	427.63	224.63	597.88	139.50	5
35	597.88	139.50	1848.52	139.50	5
36	427.25	224.25	597.76	139.00	6
37	597.76	139.00	1848.52	139.00	6
38	426.51	223.51	597.53	138.00	7
39	597.53	138.00	1848.52	138.00	7

ISOTROPIC SOIL PARAMETERS
7 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	0
2	110.0	120.0	.0	30.0	.00	.0	0
3	60.0	80.0	.0	28.0	.00	.0	0
4	110.0	115.0	.0	28.0	.00	.0	0
5	63.0	63.0	.0	22.0	.00	.0	0

```
  6   110.0    120.0        .0      30.0      .00         .0      0
  7   110.0    125.0        .0      32.0      .00         .0      0
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        200.00      108.50
    2       1848.52      108.50
BOUNDARY LOAD(S)
     1 Load(s) Specified
 Load         X-Left      X-Right     Intensity     Deflection
  No.          (ft)        (ft)       (lb/sqft)       (deg)
  1          540.00      548.63       1436.4          .0
NOTE - Intensity Is Specified As A Uniformly Distributed
       Force Acting On A Horizontally Projected Surface.
SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
 100 Surfaces Initiate From Each Of 50 Points Equally Spaced
 Along The Ground Surface Between  X = 250.00 ft.
                             and   X = 375.00 ft.
 Each Surface Terminates Between   X = 500.00 ft.
                             and   X = 585.00 ft.
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =   .00 ft.
 20.00 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 Bishop Method * *
       Failure Surface Specified By  9 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        372.45      206.48
           2        392.06      210.42
           3        411.55      214.88
           4        430.93      219.86
           5        450.16      225.34
           6        469.24      231.33
           7        488.16      237.83
           8        506.89      244.82
           9        519.55      249.93
       Circle Center At X =  233.5 ; Y =  948.6  and Radius,   755.1
             ***     1.928    ***
       Failure Surface Specified By 10 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        346.94      197.98
           2        366.52      202.05
           3        386.00      206.57
           4        405.38      211.52
           5        424.64      216.90
           6        443.78      222.71
           7        462.78      228.95
           8        481.64      235.61
           9        500.34      242.70
          10        518.25      249.95
       Circle Center At X =  175.0 ; Y = 1073.4  and Radius,   892.1
             ***     1.955    ***
       Failure Surface Specified By 10 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1        359.69      202.23
           2        379.33      206.05
           3        398.84      210.43
```

```
      4          418.22       215.37
      5          437.45       220.86
      6          456.52       226.91
      7          475.40       233.50
      8          494.08       240.64
      9          512.55       248.31
     10          516.25       249.97
Circle Center At X =   237.0 ; Y =   886.0  and Radius,   694.7
      ***       1.960    ***
Failure Surface Specified By 10 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
      1          354.59       200.53
      2          374.17       204.60
      3          393.67       209.05
      4          413.08       213.90
      5          432.38       219.13
      6          451.58       224.75
      7          470.65       230.74
      8          489.61       237.12
      9          508.43       243.88
     10          524.17       249.89
Circle Center At X =   161.0 ; Y = 1182.2  and Radius, 1000.6
      ***       1.978    ***
Failure Surface Specified By 11 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
      1          336.74       194.58
      2          356.39       198.26
      3          375.95       202.44
      4          395.40       207.13
      5          414.71       212.30
      6          433.89       217.97
      7          452.92       224.13
      8          471.79       230.77
      9          490.48       237.89
     10          508.98       245.49
     11          519.08       249.94
Circle Center At X =   202.5 ; Y =   965.7  and Radius,   782.7
      ***       1.987    ***
Failure Surface Specified By 10 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
      1          349.49       198.83
      2          369.07       202.91
      3          388.53       207.51
      4          407.87       212.62
      5          427.07       218.23
      6          446.11       224.34
      7          464.99       230.95
      8          483.68       238.06
      9          502.18       245.65
     10          509.08       248.69
Circle Center At X =   203.6 ; Y =   947.0  and Radius,   762.2
      ***       1.988    ***
Failure Surface Specified By 10 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
      1          364.80       203.93
      2          384.50       207.35
      3          404.10       211.36
      4          423.56       215.98
      5          442.87       221.19
      6          462.01       226.99
      7          480.96       233.37
      8          499.71       240.32
      9          518.24       247.85
```

10	522.87	249.90

Circle Center At X = 263.1 ; Y = 849.2 and Radius, 653.3
*** 1.990 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	375.00	207.33
2	394.55	211.55
3	414.03	216.09
4	433.43	220.94
5	452.75	226.10
6	471.99	231.58
7	491.13	237.37
8	510.18	243.46
9	529.06	249.84

Circle Center At X = 124.2 ; Y = 1416.7 and Radius, 1235.1
*** 1.992 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	339.29	195.43
2	358.97	198.99
3	378.53	203.13
4	397.97	207.84
5	417.26	213.13
6	436.38	218.99
7	455.32	225.42
8	474.06	232.40
9	492.59	239.93
10	510.89	248.01
11	515.02	249.98

Circle Center At X = 229.0 ; Y = 861.8 and Radius, 675.4
*** 1.994 ***

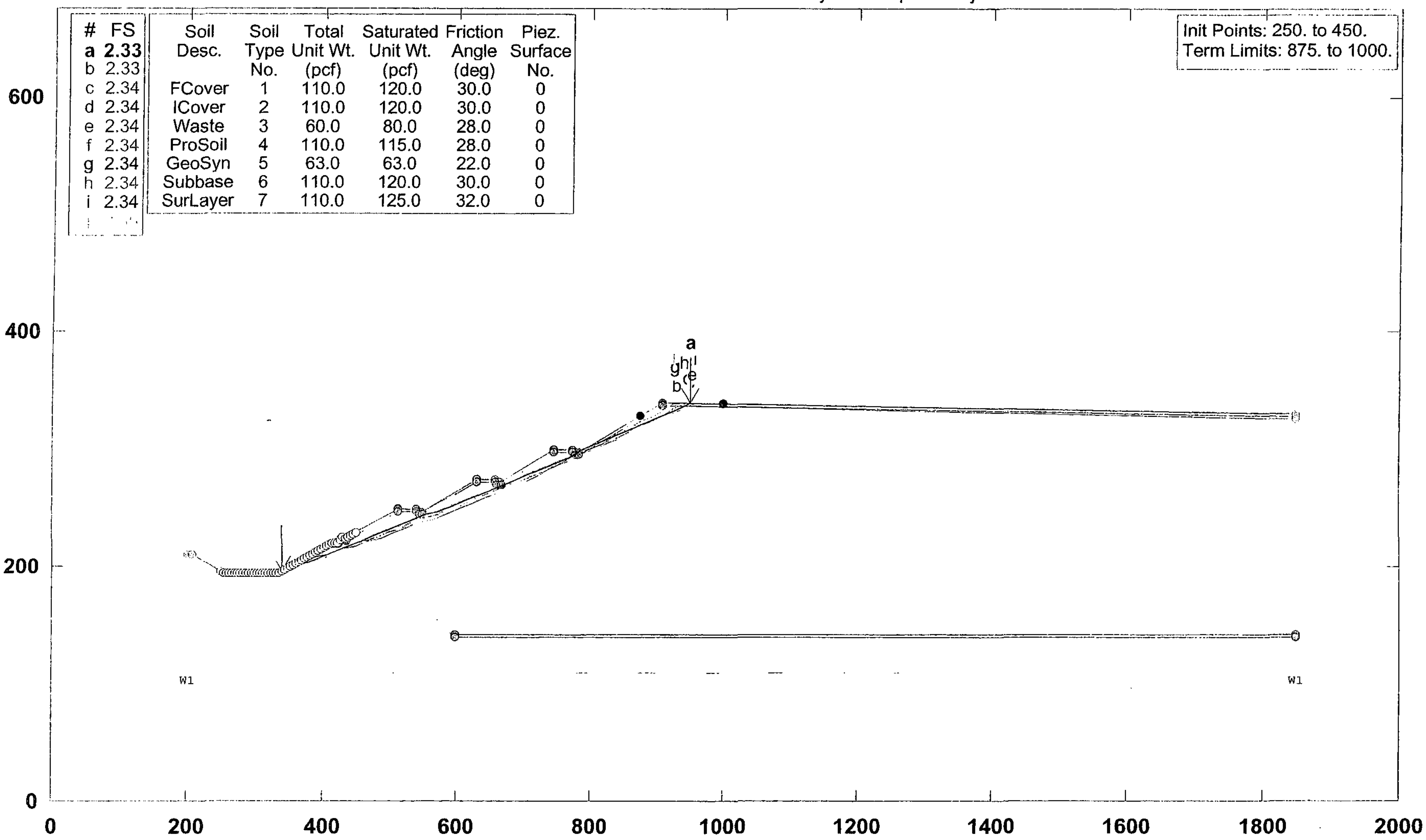
Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	369.90	205.63
2	389.67	208.68
3	409.27	212.64
4	428.66	217.52
5	447.81	223.30
6	466.67	229.96
7	485.19	237.50
8	503.35	245.89
9	508.11	248.37

Circle Center At X = 314.6 ; Y = 630.3 and Radius, 428.3
*** 2.016 ***

Central Landfill South Side - Citrus Co.

F:\PROJECT\CITRUS\09199056.13\SLOPES~1\SOUTH.PL2 Run By: Dominique Rudajev 12/15/2004 12:49PM



STABL6H FSmin=2.33

Safety Factors Are Calculated By The Modified Bishop Method

** STABL6H **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 12/15/2004
Time of Run: 12:49PM
Run By: Dominique Rudajev
Input Data Filename: F:south.
Output Filename: F:south.OUT
Plotted Output Filename: F:south.PLT
PROBLEM DESCRIPTION Central Landfill South Side - Citrus Co.
BOUNDARY COORDINATES
25 Top Boundaries
63 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	200.00	210.00	207.00	210.00	7
2	207.00	210.00	255.00	194.00	7
3	255.00	194.00	335.00	194.00	7
4	335.00	194.00	413.00	220.00	7
5	413.00	220.00	423.00	220.00	7
6	423.00	220.00	426.51	223.51	7
7	426.51	223.51	427.25	224.25	6
8	427.25	224.25	427.63	224.63	5
9	427.63	224.63	428.00	225.00	4
10	428.00	225.00	430.00	225.00	4
11	430.00	225.00	432.00	223.00	4
12	432.00	223.00	513.00	250.00	1
13	513.00	250.00	541.00	249.72	1
14	541.00	249.72	545.50	248.22	1
15	545.50	248.22	549.50	248.22	1
16	549.50	248.22	629.84	275.00	1
17	629.84	275.00	657.84	274.72	1
18	657.84	274.72	662.34	273.22	1
19	662.34	273.22	666.34	273.22	1
20	666.34	273.22	746.68	300.00	1
21	746.68	300.00	774.68	299.72	1
22	774.68	299.72	779.18	298.22	1
23	779.18	298.22	783.18	298.22	1
24	783.18	298.22	908.52	340.00	1
25	908.52	340.00	1848.52	329.28	1
26	434.53	221.74	513.31	248.00	2
27	513.31	248.00	540.67	247.72	2
28	540.67	247.72	545.18	246.22	2
29	545.18	246.22	549.82	246.22	2
30	549.82	246.22	630.15	273.00	2
31	630.15	273.00	657.51	272.72	2
32	657.51	272.72	662.02	271.22	2
33	662.02	271.22	666.66	271.22	2
34	666.66	271.22	746.99	298.00	2
35	746.99	298.00	774.35	297.72	2
36	774.35	297.72	778.86	296.22	2
37	778.86	296.22	783.50	296.22	2
38	783.50	296.22	908.83	338.00	2
39	908.83	338.00	1848.50	327.28	2
40	432.00	223.00	434.53	221.74	4
41	435.16	221.42	513.39	247.50	3
42	513.39	247.50	540.58	247.22	3
43	540.58	247.22	545.09	245.72	3
44	545.09	245.72	549.91	245.72	3
45	549.91	245.72	630.23	272.50	3
46	630.23	272.50	657.42	272.22	3
47	657.42	272.22	661.93	270.72	3
48	661.93	270.72	666.75	270.72	3
49	666.75	270.72	747.07	297.50	3

50	747.07	297.50	774.26	297.22	3
51	774.26	297.22	778.77	295.72	3
52	778.77	295.72	783.59	295.72	3
53	783.59	295.72	908.91	337.50	3
54	908.91	337.50	1848.49	326.78	3
55	434.53	221.74	435.16	221.42	4
56	435.16	221.42	598.00	140.00	4
57	598.00	140.00	1848.52	140.00	4
58	427.63	224.63	597.88	139.50	5
59	597.88	139.50	1848.52	139.50	5
60	427.25	224.25	597.76	139.00	6
61	597.76	139.00	1848.52	139.00	6
62	426.51	223.51	597.53	138.00	7
63	597.53	138.00	1848.52	138.00	7

ISOTROPIC SOIL PARAMETERS
7 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	0
2	110.0	120.0	.0	30.0	.00	.0	0
3	60.0	80.0	.0	28.0	.00	.0	0
4	110.0	115.0	.0	28.0	.00	.0	0
5	63.0	63.0	.0	22.0	.00	.0	0
6	110.0	120.0	.0	30.0	.00	.0	0
7	110.0	125.0	.0	32.0	.00	.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED
Unit Weight of Water = 62.40
Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	200.00	108.50
2	1848.52	108.50

BOUNDARY LOAD(S)
1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	908.52	917.15	1436.4	.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.
SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
100 Surfaces Initiate From Each Of 50 Points Equally Spaced
Along The Ground Surface Between X = 250.00 ft.
and X = 450.00 ft.
Each Surface Terminates Between X = 875.00 ft.
and X =1000.00 ft.
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 ft.
20.00 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 Bishop Method * *
Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	339.80	195.60
2	359.33	199.89
3	378.86	204.19
4	398.39	208.52
5	417.91	212.87
6	437.43	217.24
7	456.94	221.62
8	476.45	226.03

9	495.95	230.46
10	515.45	234.91
11	534.94	239.38
12	554.43	243.87
13	573.92	248.38
14	593.40	252.91
15	612.87	257.46
16	632.34	262.03
17	651.81	266.63
18	671.27	271.24
19	690.73	275.87
20	710.18	280.52
21	729.63	285.19
22	749.07	289.89
23	768.50	294.60
24	787.94	299.33
25	807.36	304.08
26	826.79	308.86
27	846.20	313.65
28	865.61	318.47
29	885.02	323.30
30	904.42	328.15
31	923.82	333.03
32	943.21	337.92
33	949.56	339.53

Circle Center At X = ****** ; Y = ****** and Radius, ******

*** 2.327 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	384.69	210.56
2	404.39	214.03
3	424.07	217.59
4	443.74	221.23
5	463.39	224.95
6	483.02	228.76
7	502.64	232.66
8	522.24	236.63
9	541.82	240.70
10	561.39	244.84
11	580.94	249.07
12	600.47	253.39
13	619.98	257.79
14	639.47	262.27
15	658.94	266.84
16	678.39	271.49
17	697.82	276.22
18	717.23	281.04
19	736.62	285.94
20	755.99	290.93
21	775.34	296.00
22	794.66	301.15
23	813.97	306.38
24	833.25	311.70
25	852.50	317.10
26	871.74	322.59
27	890.95	328.15
28	910.13	333.80
29	929.29	339.54
30	930.01	339.75

Circle Center At X = -411.1 ; Y = 4785.0 and Radius, 4643.1

*** 2.331 ***

Failure Surface Specified By 32 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	347.96	198.32
2	367.57	202.24

3	387.17	206.21
4	406.77	210.22
5	426.35	214.27
6	445.93	218.37
7	465.50	222.51
8	485.05	226.70
9	504.60	230.93
10	524.14	235.20
11	543.67	239.52
12	563.19	243.88
13	582.69	248.28
14	602.19	252.73
15	621.68	257.23
16	641.16	261.76
17	660.63	266.34
18	680.09	270.97
19	699.53	275.64
20	718.97	280.35
21	738.40	285.10
22	757.81	289.90
23	777.22	294.74
24	796.61	299.63
25	816.00	304.56
26	835.37	309.53
27	854.73	314.55
28	874.08	319.61
29	893.41	324.72
30	912.74	329.86
31	932.05	335.05
32	948.61	339.54

Circle Center At X = ****** ; Y = 8922.8 and Radius, 8895.2

*** 2.337 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	360.20	202.40
2	379.87	206.05
3	399.52	209.76
4	419.16	213.54
5	438.79	217.38
6	458.40	221.28
7	478.01	225.25
8	497.60	229.28
9	517.17	233.38
10	536.73	237.54
11	556.28	241.77
12	575.82	246.05
13	595.34	250.41
14	614.85	254.82
15	634.34	259.30
16	653.81	263.84
17	673.28	268.45
18	692.72	273.12
19	712.16	277.86
20	731.57	282.65
21	750.97	287.51
22	770.36	292.44
23	789.72	297.42
24	809.08	302.47
25	828.41	307.59
26	847.73	312.77
27	867.03	318.01
28	886.32	323.31
29	905.58	328.67
30	924.83	334.10
31	944.06	339.59

Circle Center At X = -746.6 ; Y = 6223.3 and Radius, 6121.8

*** 2.337 ***

Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	347.96	198.32
2	367.50	202.58
3	387.04	206.86
4	406.57	211.15
5	426.10	215.47
6	445.62	219.81
7	465.14	224.16
8	484.66	228.54
9	504.17	232.93
10	523.68	237.35
11	543.18	241.78
12	562.68	246.24
13	582.17	250.71
14	601.66	255.20
15	621.14	259.71
16	640.62	264.25
17	660.10	268.80
18	679.57	273.37
19	699.04	277.96
20	718.50	282.57
21	737.95	287.20
22	757.41	291.85
23	776.85	296.52
24	796.30	301.21
25	815.73	305.91
26	835.17	310.64
27	854.60	315.39
28	874.02	320.16
29	893.44	324.94
30	912.85	329.75
31	932.26	334.57
32	951.67	339.42
33	952.02	339.50

Circle Center At X = ****** ; Y = ****** and Radius, ******

*** 2.337 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	347.96	198.32
2	367.66	201.74
3	387.35	205.27
4	407.02	208.88
5	426.68	212.59
6	446.31	216.40
7	465.93	220.30
8	485.52	224.29
9	505.10	228.38
10	524.66	232.57
11	544.19	236.85
12	563.71	241.22
13	583.20	245.69
14	602.68	250.26
15	622.13	254.91
16	641.55	259.66
17	660.96	264.51
18	680.34	269.45
19	699.69	274.48
20	719.03	279.61
21	738.33	284.83
22	757.61	290.14
23	776.87	295.55
24	796.10	301.05
25	815.30	306.64

```
     26          834.48       312.33
     27          853.62       318.11
     28          872.74       323.98
     29          891.83       329.94
     30          910.89       336.00
     31          922.78       339.84
Circle Center At X = -349.8 ; Y = 4270.9  and Radius, 4131.9
      ***      2.338    ***
Failure Surface Specified By 30 Coordinate Points
   Point         X-Surf       Y-Surf
    No.           (ft)         (ft)
      1          368.37       205.12
      2          388.13       208.17
      3          407.88       211.35
      4          427.61       214.64
      5          447.31       218.05
      6          467.00       221.58
      7          486.66       225.23
      8          506.31       229.00
      9          525.92       232.89
     10          545.52       236.90
     11          565.09       241.02
     12          584.63       245.27
     13          604.15       249.63
     14          623.64       254.11
     15          643.11       258.71
     16          662.54       263.43
     17          681.95       268.26
     18          701.33       273.22
     19          720.67       278.29
     20          739.99       283.47
     21          759.27       288.78
     22          778.52       294.20
     23          797.74       299.74
     24          816.93       305.39
     25          836.07       311.16
     26          855.19       317.05
     27          874.27       323.05
     28          893.31       329.17
     29          912.31       335.40
     30          925.46       339.81
Circle Center At X = -125.0 ; Y = 3465.6  and Radius, 3297.5
      ***      2.341    ***
Failure Surface Specified By 29 Coordinate Points
   Point         X-Surf       Y-Surf
    No.           (ft)         (ft)
      1          401.02       216.01
      2          420.71       219.55
      3          440.38       223.16
      4          460.04       226.83
      5          479.68       230.58
      6          499.31       234.40
      7          518.93       238.29
      8          538.54       242.25
      9          558.13       246.28
     10          577.70       250.38
     11          597.26       254.54
     12          616.81       258.78
     13          636.34       263.09
     14          655.85       267.46
     15          675.35       271.91
     16          694.84       276.42
     17          714.31       281.01
     18          733.76       285.66
     19          753.19       290.38
     20          772.61       295.17
     21          792.01       300.04
```

22	811.39	304.96
23	830.76	309.96
24	850.11	315.03
25	869.43	320.17
26	888.75	325.37
27	908.04	330.65
28	927.31	335.99
29	940.30	339.64

Circle Center At X = -584.1 ; Y = 5751.8 and Radius, 5622.7
*** 2.343 ***
Failure Surface Specified By 33 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	335.71	194.24
2	355.30	198.30
3	374.87	202.40
4	394.44	206.53
5	414.00	210.69
6	433.56	214.89
7	453.11	219.11
8	472.65	223.37
9	492.18	227.66
10	511.71	231.99
11	531.23	236.34
12	550.74	240.73
13	570.25	245.15
14	589.75	249.60
15	609.24	254.08
16	628.72	258.59
17	648.20	263.14
18	667.67	267.72
19	687.13	272.33
20	706.58	276.97
21	726.03	281.65
22	745.47	286.36
23	764.90	291.09
24	784.32	295.86
25	803.73	300.67
26	823.14	305.50
27	842.54	310.37
28	861.93	315.27
29	881.31	320.20
30	900.69	325.16
31	920.06	330.15
32	939.41	335.18
33	955.80	339.46

Circle Center At X = ****** ; Y = ****** and Radius, ******
*** 2.344 ***
Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	433.67	223.56
2	453.50	226.21
3	473.30	229.02
4	493.08	232.00
5	512.83	235.14
6	532.55	238.45
7	552.25	241.91
8	571.92	245.54
9	591.55	249.34
10	611.16	253.29
11	630.73	257.41
12	650.27	261.68
13	669.77	266.12
14	689.23	270.72
15	708.66	275.48
16	728.04	280.40

17	747.39	285.48
18	766.69	290.72
19	785.95	296.12
20	805.16	301.68
21	824.32	307.40
22	843.44	313.27
23	862.51	319.31
24	881.53	325.50
25	900.50	331.84
26	919.41	338.35
27	923.60	339.83

Circle Center At X = 122.6 ; Y = 2624.8 and Radius, 2421.3

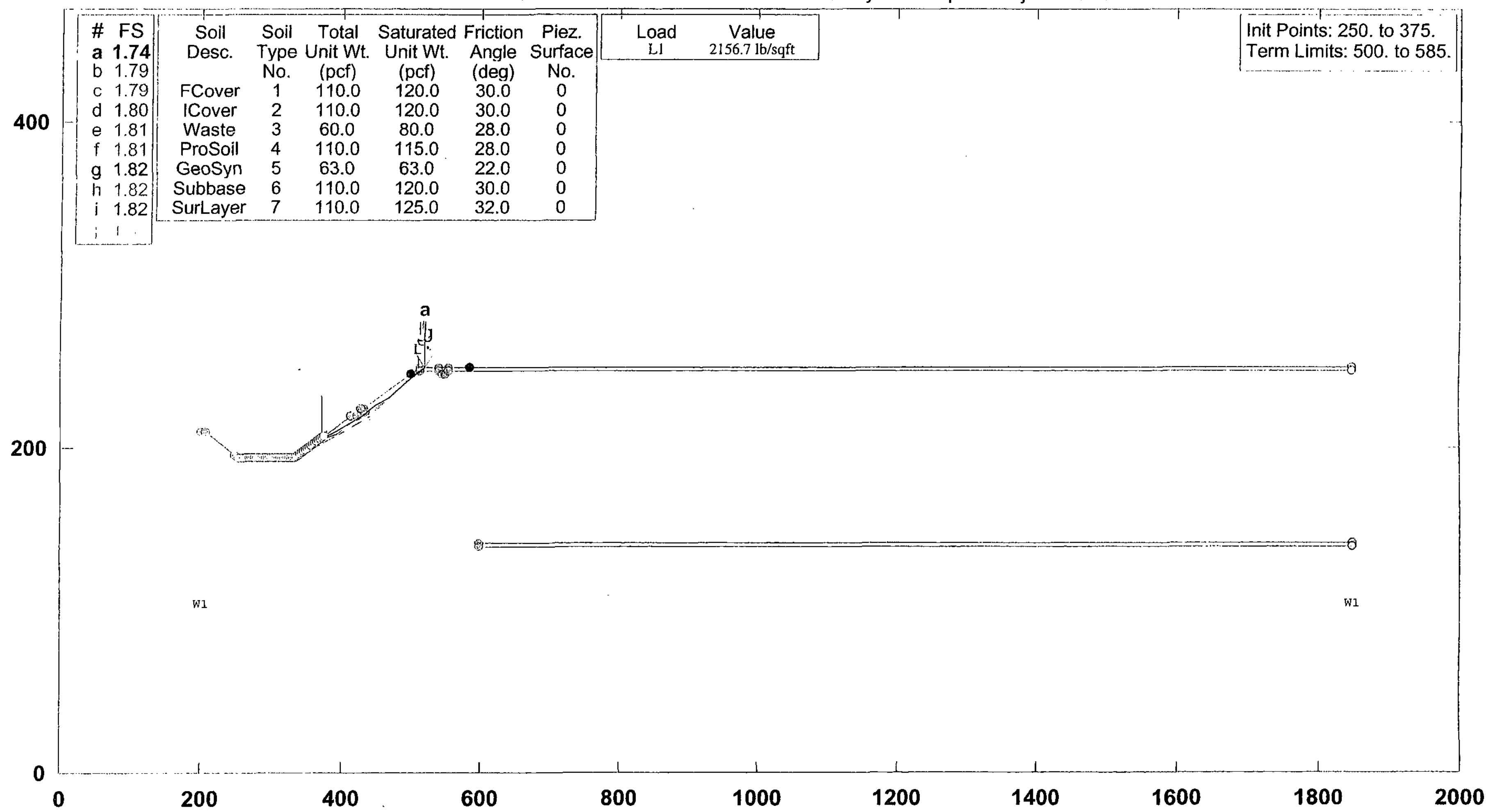
*** 2.345 ***

SOUTH SIDE SECTION

WITH EQUIPMENT LOAD

Central Landfill South Side - Citrus Co.

F:\PROJECT\CITRUS\09199056.13\SLOPES~1\SOUTH1.PL2 Run By: Dominique Rudajev 12/16/2004 9:36AM



#	FS
a	**1.74**
b	1.79
c	1.79
d	1.80
e	1.81
f	1.81
g	1.82
h	1.82
i	1.82

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
FCover	1	110.0	120.0	30.0	0
ICover	2	110.0	120.0	30.0	0
Waste	3	60.0	80.0	28.0	0
ProSoil	4	110.0	115.0	28.0	0
GeoSyn	5	63.0	63.0	22.0	0
Subbase	6	110.0	120.0	30.0	0
SurLayer	7	110.0	125.0	32.0	0

Load	Value
L1	2156.7 lb/sqft

Init Points: 250. to 375.
Term Limits: 500. to 585.

STABL6H FSmin=1.74

Safety Factors Are Calculated By The Modified Bishop Method

** STABL6H **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 12/16/2004
Time of Run: 9:36AM
Run By: Dominique Rudajev
Input Data Filename: F:south1.
Output Filename: F:south1.OUT
Plotted Output Filename: F:south1.PLT
PROBLEM DESCRIPTION Central Landfill South Side - Citrus Co.
BOUNDARY COORDINATES
17 Top Boundaries
39 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	200.00	210.00	207.00	210.00	7
2	207.00	210.00	255.00	194.00	7
3	255.00	194.00	335.00	194.00	7
4	335.00	194.00	413.00	220.00	7
5	413.00	220.00	423.00	220.00	7
6	423.00	220.00	426.51	223.51	7
7	426.51	223.51	427.25	224.25	6
8	427.25	224.25	427.63	224.63	5
9	427.63	224.63	428.00	225.00	4
10	428.00	225.00	430.00	225.00	4
11	430.00	225.00	432.00	223.00	4
12	432.00	223.00	513.00	250.00	1
13	513.00	250.00	541.00	249.72	1
14	541.00	249.72	545.50	248.22	1
15	545.50	248.22	549.50	248.22	1
16	549.50	248.22	554.00	249.72	1
17	554.00	249.72	1848.52	249.72	1
18	434.53	221.74	513.31	248.00	2
19	513.31	248.00	540.67	247.72	2
20	540.67	247.72	545.18	246.22	2
21	545.18	246.22	549.82	246.22	2
22	549.82	246.22	554.32	247.72	2
23	554.32	247.72	1848.52	247.72	2
24	432.00	223.00	434.53	221.74	4
25	435.16	221.42	513.39	247.50	3
26	513.39	247.50	540.58	247.22	3
27	540.58	247.22	545.09	245.72	3
28	545.09	245.72	549.91	245.72	3
29	549.91	245.72	554.41	247.22	3
30	554.41	247.22	1848.52	247.22	3
31	434.53	221.74	435.16	221.42	4
32	435.16	221.42	598.00	140.00	4
33	598.00	140.00	1848.52	140.00	4
34	427.63	224.63	597.88	139.50	5
35	597.88	139.50	1848.52	139.50	5
36	427.25	224.25	597.76	139.00	6
37	597.76	139.00	1848.52	139.00	6
38	426.51	223.51	597.53	138.00	7
39	597.53	138.00	1848.52	138.00	7

ISOTROPIC SOIL PARAMETERS
7 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	0
2	110.0	120.0	.0	30.0	.00	.0	0
3	60.0	80.0	.0	28.0	.00	.0	0
4	110.0	115.0	.0	28.0	.00	.0	0
5	63.0	63.0	.0	22.0	.00	.0	0

6	110.0	120.0	.0	30.0	.00	.0	0
7	110.0	125.0	.0	32.0	.00	.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	200.00	108.50
2	1848.52	108.50

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	510.00	520.50	2156.7	.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.

5000 Trial Surfaces Have Been Generated.

100 Surfaces Initiate From Each Of 50 Points Equally Spaced
Along The Ground Surface Between X = 250.00 ft.
and X = 375.00 ft.

Each Surface Terminates Between X = 500.00 ft.
and X = 585.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 ft.

20.00 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 Bishop Method * *

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	372.45	206.48
2	392.06	210.42
3	411.55	214.88
4	430.93	219.86
5	450.16	225.34
6	469.24	231.33
7	488.16	237.83
8	506.89	244.82
9	519.55	249.93

Circle Center At X = 233.5 ; Y = 948.6 and Radius, 755.1

*** 1.738 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	364.80	203.93
2	384.50	207.35
3	404.10	211.36
4	423.56	215.98
5	442.87	221.19
6	462.01	226.99
7	480.96	233.37
8	499.71	240.32
9	518.24	247.85
10	522.87	249.90

Circle Center At X = 263.1 ; Y = 849.2 and Radius, 653.3

*** 1.790 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	369.90	205.63
2	389.76	208.02
3	409.48	211.32
4	429.03	215.53

```
      5        448.37      220.64
      6        467.45      226.63
      7        486.24      233.50
      8        504.69      241.22
      9        522.76      249.79
     10        522.97      249.90
 Circle Center At X =   328.0 ; Y =   637.3  and Radius,   433.7
       ***      1.792    ***
 Failure Surface Specified By 10 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
     1         354.59       200.53
     2         374.38       203.44
     3         394.05       207.08
     4         413.56       211.46
     5         432.90       216.56
     6         452.03       222.39
     7         470.93       228.93
     8         489.57       236.17
     9         507.93       244.10
    10         520.13       249.93
 Circle Center At X =   287.0 ; Y =   730.1  and Radius,   533.9
       ***      1.801    ***
 Failure Surface Specified By 10 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
     1         359.69       202.23
     2         379.33       206.05
     3         398.84       210.43
     4         418.22       215.37
     5         437.45       220.86
     6         456.52       226.91
     7         475.40       233.50
     8         494.08       240.64
     9         512.55       248.31
    10         516.25       249.97
 Circle Center At X =   237.0 ; Y =   886.0  and Radius,   694.7
       ***      1.809    ***
 Failure Surface Specified By  9 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
     1         372.45       206.48
     2         392.42       207.62
     3         412.27       210.08
     4         431.91       213.83
     5         451.27       218.87
     6         470.25       225.18
     7         488.77       232.71
     8         506.76       241.46
     9         521.59       249.91
 Circle Center At X =   365.1 ; Y =   510.0  and Radius,   303.6
       ***      1.814    ***
 Failure Surface Specified By 10 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
     1         354.59       200.53
     2         374.17       204.60
     3         393.67       209.05
     4         413.08       213.90
     5         432.38       219.13
     6         451.58       224.75
     7         470.65       230.74
     8         489.61       237.12
     9         508.43       243.88
    10         524.17       249.89
 Circle Center At X =   161.0 ; Y = 1182.2  and Radius, 1000.6
       ***      1.816    ***
```

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	346.94	197.98
2	366.52	202.05
3	386.00	206.57
4	405.38	211.52
5	424.64	216.90
6	443.78	222.71
7	462.78	228.95
8	481.64	235.61
9	500.34	242.70
10	518.25	249.95

Circle Center At X = 175.0 ; Y = 1073.4 and Radius, 892.1

*** 1.822 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	336.74	194.58
2	356.39	198.26
3	375.95	202.44
4	395.40	207.13
5	414.71	212.30
6	433.89	217.97
7	452.92	224.13
8	471.79	230.77
9	490.48	237.89
10	508.98	245.49
11	519.08	249.94

Circle Center At X = 202.5 ; Y = 965.7 and Radius, 782.7

*** 1.823 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	367.35	204.78
2	387.25	206.80
3	407.00	209.92
4	426.55	214.12
5	445.85	219.40
6	464.82	225.73
7	483.41	233.10
8	501.56	241.49
9	517.49	249.96

Circle Center At X = 340.8 ; Y = 565.5 and Radius, 361.7

*** 1.834 ***

Central Landfill South Side - Citrus Co.

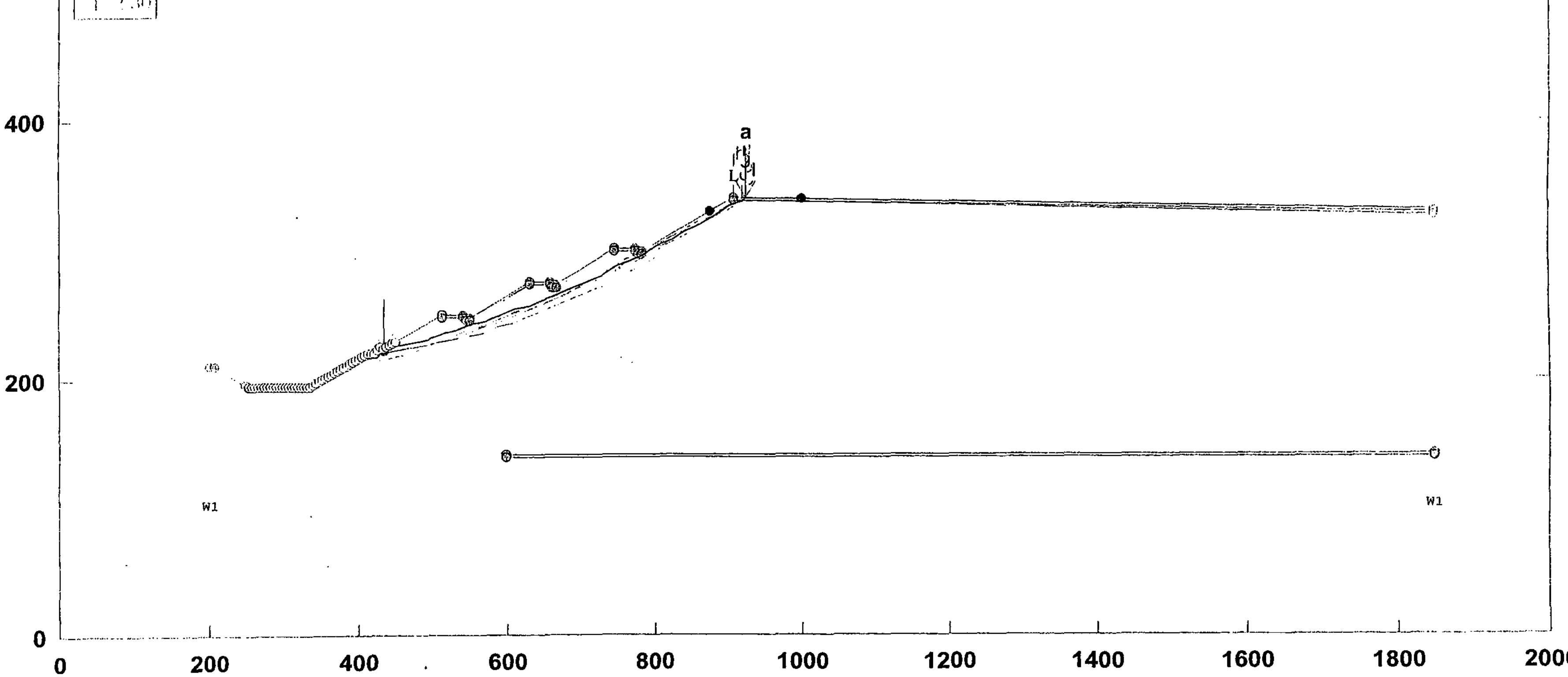
F:\PROJECT\CITRUS\09199056.13\SLOPES~1\SOUTH.PL2 Run By: Dominique Rudajev 12/16/2004 9:29AM

#	FS
a	**2.28**
b	2.29
c	2.29
d	2.29
e	2.29
f	2.30
g	2.30
h	2.30
i	2.30
j	2.30

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
FCover	1	110.0	120.0	30.0	0
ICover	2	110.0	120.0	30.0	0
Waste	3	60.0	80.0	28.0	0
ProSoil	4	110.0	115.0	28.0	0
GeoSyn	5	63.0	63.0	22.0	0
Subbase	6	110.0	120.0	30.0	0
SurLayer	7	110.0	125.0	32.0	0

Load	Value
L1	2156.7 lb/sqft

Init Points: 250. to 450.
Term Limits: 875. to 1000.



STABL6H FSmin=2.28
Safety Factors Are Calculated By The Modified Bishop Method

SCS ENGINEERS

**** STABL6H ****
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 12/16/2004
Time of Run: 9:29AM
Run By: Dominique Rudajev
Input Data Filename: F:south.
Output Filename: F:south.OUT
Plotted Output Filename: F:south.PLT
PROBLEM DESCRIPTION Central Landfill South Side - Citrus Co.
BOUNDARY COORDINATES
25 Top Boundaries
63 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	200.00	210.00	207.00	210.00	7
2	207.00	210.00	255.00	194.00	7
3	255.00	194.00	335.00	194.00	7
4	335.00	194.00	413.00	220.00	7
5	413.00	220.00	423.00	220.00	7
6	423.00	220.00	426.51	223.51	7
7	426.51	223.51	427.25	224.25	6
8	427.25	224.25	427.63	224.63	5
9	427.63	224.63	428.00	225.00	4
10	428.00	225.00	430.00	225.00	4
11	430.00	225.00	432.00	223.00	4
12	432.00	223.00	513.00	250.00	1
13	513.00	250.00	541.00	249.72	1
14	541.00	249.72	545.50	248.22	1
15	545.50	248.22	549.50	248.22	1
16	549.50	248.22	629.84	275.00	1
17	629.84	275.00	657.84	274.72	1
18	657.84	274.72	662.34	273.22	1
19	662.34	273.22	666.34	273.22	1
20	666.34	273.22	746.68	300.00	1
21	746.68	300.00	774.68	299.72	1
22	774.68	299.72	779.18	298.22	1
23	779.18	298.22	783.18	298.22	1
24	783.18	298.22	908.52	340.00	1
25	908.52	340.00	1848.52	329.28	1
26	434.53	221.74	513.31	248.00	2
27	513.31	248.00	540.67	247.72	2
28	540.67	247.72	545.18	246.22	2
29	545.18	246.22	549.82	246.22	2
30	549.82	246.22	630.15	273.00	2
31	630.15	273.00	657.51	272.72	2
32	657.51	272.72	662.02	271.22	2
33	662.02	271.22	666.66	271.22	2
34	666.66	271.22	746.99	298.00	2
35	746.99	298.00	774.35	297.72	2
36	774.35	297.72	778.86	296.22	2
37	778.86	296.22	783.50	296.22	2
38	783.50	296.22	908.83	338.00	2
39	908.83	338.00	1848.50	327.28	2
40	432.00	223.00	434.53	221.74	4
41	435.16	221.42	513.39	247.50	3
42	513.39	247.50	540.58	247.22	3
43	540.58	247.22	545.09	245.72	3
44	545.09	245.72	549.91	245.72	3
45	549.91	245.72	630.23	272.50	3
46	630.23	272.50	657.42	272.22	3
47	657.42	272.22	661.93	270.72	3
48	661.93	270.72	666.75	270.72	3
49	666.75	270.72	747.07	297.50	3

50	747.07	297.50	774.26	297.22	3
51	774.26	297.22	778.77	295.72	3
52	778.77	295.72	783.59	295.72	3
53	783.59	295.72	908.91	337.50	3
54	908.91	337.50	1848.49	326.78	3
55	434.53	221.74	435.16	221.42	4
56	435.16	221.42	598.00	140.00	4
57	598.00	140.00	1848.52	140.00	4
58	427.63	224.63	597.88	139.50	5
59	597.88	139.50	1848.52	139.50	5
60	427.25	224.25	597.76	139.00	6
61	597.76	139.00	1848.52	139.00	6
62	426.51	223.51	597.53	138.00	7
63	597.53	138.00	1848.52	138.00	7

ISOTROPIC SOIL PARAMETERS

7 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	0
2	110.0	120.0	.0	30.0	.00	.0	0
3	60.0	80.0	.0	28.0	.00	.0	0
4	110.0	115.0	.0	28.0	.00	.0	0
5	63.0	63.0	.0	22.0	.00	.0	0
6	110.0	120.0	.0	30.0	.00	.0	0
7	110.0	125.0	.0	32.0	.00	.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	200.00	108.50
2	1848.52	108.50

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	908.52	919.02	2156.7	.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.

5000 Trial Surfaces Have Been Generated.

100 Surfaces Initiate From Each Of 50 Points Equally Spaced Along The Ground Surface Between X = 250.00 ft. and X = 450.00 ft.

Each Surface Terminates Between X = 875.00 ft. and X =1000.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = .00 ft.

20.00 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 Bishop Method * *

Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	433.67	223.56
2	453.50	226.21
3	473.30	229.02
4	493.08	232.00
5	512.83	235.14
6	532.55	238.45
7	552.25	241.91
8	571.92	245.54
9	591.55	249.34

10	611.16	253.29
11	630.73	257.41
12	650.27	261.68
13	669.77	266.12
14	689.23	270.72
15	708.66	275.48
16	728.04	280.40
17	747.39	285.48
18	766.69	290.72
19	785.95	296.12
20	805.16	301.68
21	824.32	307.40
22	843.44	313.27
23	862.51	319.31
24	881.53	325.50
25	900.50	331.84
26	919.41	338.35
27	923.60	339.83

Circle Center At X = 122.6 ; Y = 2624.8 and Radius, 2421.3
*** 2.275 ***
Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	384.69	210.56
2	404.39	214.03
3	424.07	217.59
4	443.74	221.23
5	463.39	224.95
6	483.02	228.76
7	502.64	232.66
8	522.24	236.63
9	541.82	240.70
10	561.39	244.84
11	580.94	249.07
12	600.47	253.39
13	619.98	257.79
14	639.47	262.27
15	658.94	266.84
16	678.39	271.49
17	697.82	276.22
18	717.23	281.04
19	736.62	285.94
20	755.99	290.93
21	775.34	296.00
22	794.66	301.15
23	813.97	306.38
24	833.25	311.70
25	852.50	317.10
26	871.74	322.59
27	890.95	328.15
28	910.13	333.80
29	929.29	339.54
30	930.01	339.75

Circle Center At X = -411.1 ; Y = 4785.0 and Radius, 4643.1
*** 2.285 ***
Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	437.76	224.92
2	457.65	226.94
3	477.53	229.18
4	497.38	231.63
5	517.20	234.31
6	536.98	237.21
7	556.74	240.33
8	576.46	243.66
9	596.14	247.22

10	615.78	250.99
11	635.38	254.98
12	654.93	259.19
13	674.44	263.61
14	693.89	268.25
15	713.30	273.10
16	732.64	278.17
17	751.93	283.45
18	771.16	288.95
19	790.33	294.66
20	809.43	300.58
21	828.47	306.71
22	847.44	313.05
23	866.33	319.60
24	885.16	326.36
25	903.90	333.33
26	920.88	339.86

Circle Center At X = 265.6 ; Y = 2021.6 and Radius, 1805.0
*** 2.287 ***
Failure Surface Specified By 27 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	441.84	226.28
2	461.69	228.67
3	481.53	231.24
4	501.34	233.98
5	521.12	236.90
6	540.88	240.00
7	560.61	243.28
8	580.31	246.74
9	599.98	250.37
10	619.61	254.17
11	639.21	258.16
12	658.78	262.31
13	678.30	266.65
14	697.79	271.16
15	717.23	275.84
16	736.63	280.70
17	755.99	285.73
18	775.30	290.93
19	794.56	296.31
20	813.78	301.86
21	832.94	307.58
22	852.05	313.48
23	871.11	319.54
24	890.11	325.78
25	909.06	332.18
26	927.95	338.76
27	930.71	339.75

Circle Center At X = 185.4 ; Y = 2441.4 and Radius, 2230.0
*** 2.289 ***
Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	368.37	205.12
2	388.13	208.17
3	407.88	211.35
4	427.61	214.64
5	447.31	218.05
6	467.00	221.58
7	486.66	225.23
8	506.31	229.00
9	525.92	232.89
10	545.52	236.90
11	565.09	241.02
12	584.63	245.27
13	604.15	249.63

14	623.64	254.11
15	643.11	258.71
16	662.54	263.43
17	681.95	268.26
18	701.33	273.22
19	720.67	278.29
20	739.99	283.47
21	759.27	288.78
22	778.52	294.20
23	797.74	299.74
24	816.93	305.39
25	836.07	311.16
26	855.19	317.05
27	874.27	323.05
28	893.31	329.17
29	912.31	335.40
30	925.46	339.81

Circle Center At X = -125.0 ; Y = 3465.6 and Radius, 3297.5

*** 2.291 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	347.96	198.32
2	367.66	201.74
3	387.35	205.27
4	407.02	208.88
5	426.68	212.59
6	446.31	216.40
7	465.93	220.30
8	485.52	224.29
9	505.10	228.38
10	524.66	232.57
11	544.19	236.85
12	563.71	241.22
13	583.20	245.69
14	602.68	250.26
15	622.13	254.91
16	641.55	259.66
17	660.96	264.51
18	680.34	269.45
19	699.69	274.48
20	719.03	279.61
21	738.33	284.83
22	757.61	290.14
23	776.87	295.55
24	796.10	301.05
25	815.30	306.64
26	834.48	312.33
27	853.62	318.11
28	872.74	323.98
29	891.83	329.94
30	910.89	336.00
31	922.78	339.84

Circle Center At X = -349.8 ; Y = 4270.9 and Radius, 4131.9

*** 2.295 ***

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	409.18	218.73
2	429.14	220.00
3	449.08	221.54
4	469.00	223.34
5	488.90	225.40
6	508.76	227.71
7	528.60	230.29
8	548.39	233.13
9	568.15	236.22

```
    10          587.87       239.57
    11          607.54       243.18
    12          627.16       247.05
    13          646.74       251.17
    14          666.25       255.54
    15          685.71       260.18
    16          705.10       265.06
    17          724.43       270.20
    18          743.69       275.59
    19          762.88       281.23
    20          781.99       287.12
    21          801.02       293.26
    22          819.98       299.65
    23          838.84       306.29
    24          857.62       313.17
    25          876.31       320.30
    26          894.90       327.67
    27          913.40       335.28
    28          924.04       339.82
Circle Center At X =   321.5 ; Y = 1747.1  and Radius, 1530.9
       ***      2.295    ***
Failure Surface Specified By 26 Coordinate Points
  Point        X-Surf       Y-Surf
   No.          (ft)         (ft)
     1          433.67       223.56
     2          453.56       225.71
     3          473.42       228.07
     4          493.25       230.64
     5          513.06       233.43
     6          532.83       236.43
     7          552.57       239.64
     8          572.28       243.06
     9          591.94       246.70
    10          611.57       250.54
    11          631.15       254.60
    12          650.69       258.87
    13          670.19       263.34
    14          689.63       268.03
    15          709.02       272.92
    16          728.36       278.02
    17          747.64       283.33
    18          766.87       288.85
    19          786.03       294.57
    20          805.13       300.50
    21          824.17       306.63
    22          843.14       312.97
    23          862.04       319.51
    24          880.87       326.25
    25          899.63       333.19
    26          917.17       339.90
Circle Center At X =   243.6 ; Y = 2076.5  and Radius, 1862.6
       ***      2.298    ***
Failure Surface Specified By 30 Coordinate Points
  Point        X-Surf       Y-Surf
   No.          (ft)         (ft)
     1          368.37       205.12
     2          388.17       207.92
     3          407.95       210.86
     4          427.71       213.94
     5          447.45       217.17
     6          467.17       220.53
     7          486.86       224.03
     8          506.52       227.68
     9          526.16       231.46
    10          545.77       235.38
    11          565.36       239.45
    12          584.91       243.65
```

13	604.43	247.99
14	623.93	252.47
15	643.38	257.09
16	662.81	261.85
17	682.20	266.75
18	701.56	271.78
19	720.88	276.96
20	740.16	282.27
21	759.40	287.72
22	778.61	293.30
23	797.77	299.02
24	816.89	304.88
25	835.97	310.87
26	855.01	317.00
27	874.01	323.27
28	892.95	329.67
29	911.86	336.21
30	922.14	339.84

Circle Center At X = -14.4 ; Y = 2984.5 and Radius, 2805.6

*** 2.300 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	388.78	211.93
2	408.66	214.06
3	428.53	216.39
4	448.37	218.90
5	468.18	221.60
6	487.98	224.48
7	507.74	227.55
8	527.47	230.81
9	547.17	234.25
10	566.84	237.87
11	586.48	241.68
12	606.07	245.67
13	625.63	249.85
14	645.15	254.21
15	664.63	258.76
16	684.06	263.48
17	703.45	268.39
18	722.79	273.48
19	742.08	278.76
20	761.33	284.21
21	780.52	289.84
22	799.65	295.65
23	818.73	301.65
24	837.76	307.82
25	856.72	314.17
26	875.63	320.70
27	894.47	327.40
28	913.25	334.28
29	927.82	339.78

Circle Center At X = 170.9 ; Y = 2330.8 and Radius, 2130.1

*** 2.301 ***

APPENDIX I

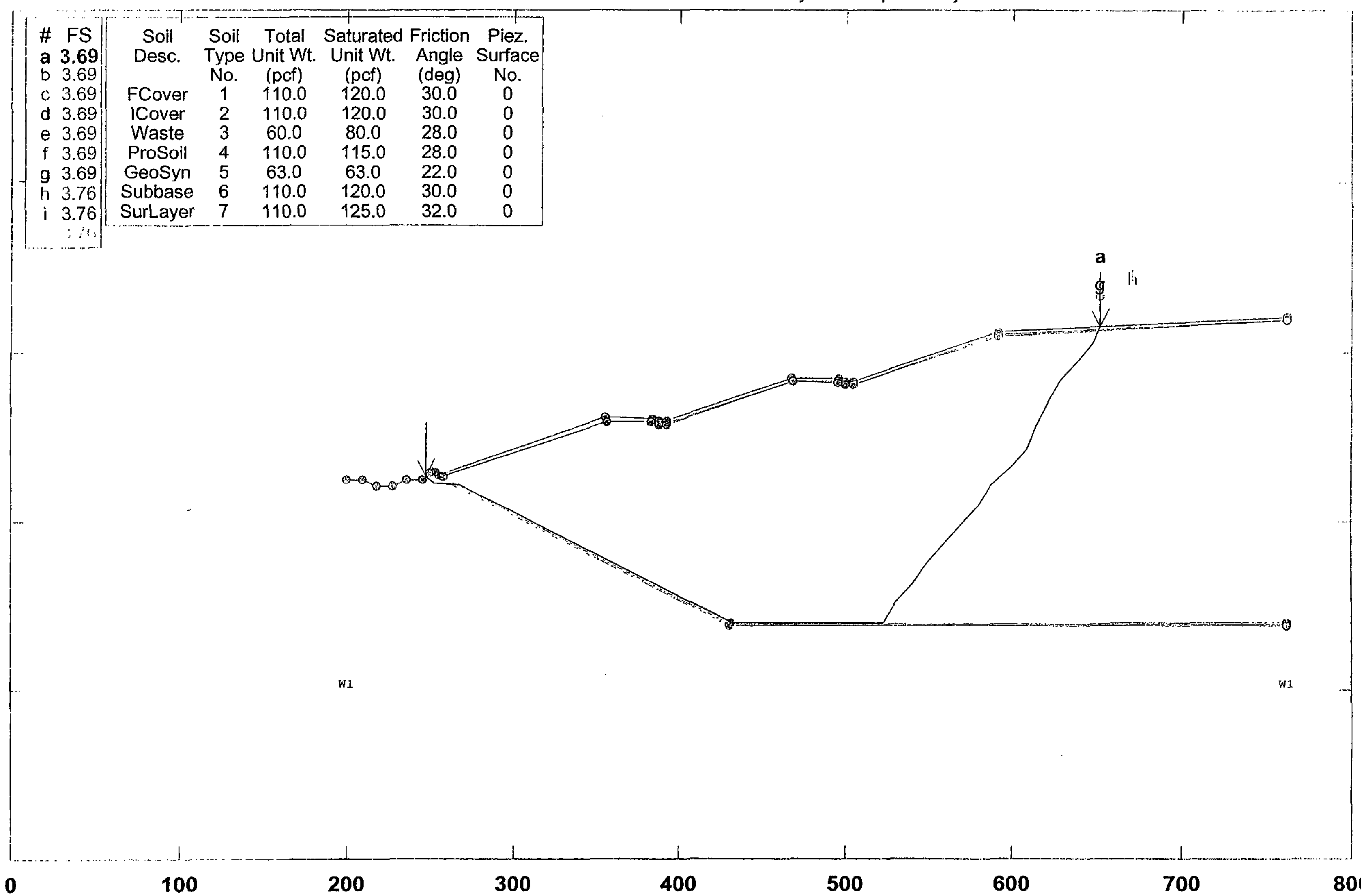
BLOCK SLOPE STABILITY ANALYSES

NORTH SIDE SECTION

WITHOUT EQUIPMENT LOAD

Central Landfill North Side - Citrus Co.

F:\PROJECT\CITRUS\09199056.13\SLOPES~1\NORTHBLK.PL2 Run By: Dominique Rudajev 12/15/2004 1:19PM



STABL6H FSmin=3.69

Safety Factors Are Calculated By The Modified Janbu Method

SCS ENGINEERS

**** STABL6H ****
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 12/15/2004
Time of Run: 1:19PM
Run By: Dominique Rudajev
Input Data Filename: F:northblk.
Output Filename: F:northblk.OUT
Plotted Output Filename: F:northblk.PLT
PROBLEM DESCRIPTION Central Landfill North Side - Citrus Co.
BOUNDARY COORDINATES
21 Top Boundaries
51 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	200.00	225.00	210.00	225.00	7
2	210.00	225.00	218.00	221.00	7
3	218.00	221.00	228.00	221.00	7
4	228.00	221.00	236.00	225.00	7
5	236.00	225.00	246.00	225.00	7
6	246.00	225.00	249.51	228.51	7
7	249.51	228.51	250.25	229.25	6
8	250.25	229.25	250.63	229.63	5
9	250.63	229.63	251.00	230.00	4
10	251.00	230.00	253.00	230.00	4
11	253.00	230.00	255.00	228.00	4
12	255.00	228.00	355.50	261.50	1
13	355.50	261.50	383.50	261.22	1
14	383.50	261.22	388.00	259.72	1
15	388.00	259.72	392.00	259.72	1
16	392.00	259.72	467.84	285.00	1
17	467.84	285.00	495.84	284.72	1
18	495.84	284.72	500.34	283.22	1
19	500.34	283.22	504.34	283.22	1
20	504.34	283.22	591.43	312.25	1
21	591.43	312.25	761.93	321.20	1
22	257.53	226.74	355.81	259.50	2
23	355.81	259.50	383.17	259.22	2
24	383.17	259.22	387.68	257.72	2
25	387.68	257.72	392.32	257.72	2
26	392.32	257.72	468.15	283.00	2
27	468.15	283.00	495.51	282.72	2
28	495.51	282.72	500.02	281.22	2
29	500.02	281.22	504.66	281.22	2
30	504.66	281.22	591.81	310.27	2
31	591.81	310.27	761.93	319.20	2
32	255.00	228.00	257.53	226.74	4
33	258.16	226.42	355.89	259.00	3
34	355.89	259.00	383.08	258.72	3
35	383.08	258.72	387.59	257.22	3
36	387.59	257.22	392.41	257.22	3
37	392.41	257.22	468.23	282.50	3
38	468.23	282.50	495.42	282.22	3
39	495.42	282.22	499.93	280.72	3
40	499.93	280.72	504.75	280.72	3
41	504.75	280.72	591.90	309.77	3
42	591.90	309.77	761.93	318.70	3
43	257.53	226.74	258.16	226.42	4
44	258.16	226.42	431.00	140.00	4
45	431.00	140.00	761.93	140.00	4
46	250.63	229.63	430.88	139.50	5
47	430.88	139.50	761.93	139.50	5
48	250.25	229.25	430.76	139.00	6
49	430.76	139.00	761.93	139.00	6

50	249.51	228.51	430.53	138.00	7
51	430.53	138.00	761.93	138.00	7

ISOTROPIC SOIL PARAMETERS

7 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	0
2	110.0	120.0	.0	30.0	.00	.0	0
3	60.0	80.0	.0	28.0	.00	.0	0
4	110.0	115.0	.0	28.0	.00	.0	0
5	63.0	63.0	.0	22.0	.00	.0	0
6	110.0	120.0	.0	30.0	.00	.0	0
7	110.0	125.0	.0	32.0	.00	.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	200.00	108.50
2	761.93	108.50

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	591.43	600.06	1436.4	.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

1000 Trial Surfaces Have Been Generated.

3 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 15.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	255.88	227.56	430.10	140.45	.25
2	432.00	140.00	433.00	140.00	.25
3	434.00	140.00	657.49	140.00	.25

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 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.60	226.60
2	252.33	222.66
3	267.31	221.97
4	432.08	140.06
5	522.65	140.04
6	530.74	152.67
7	541.14	163.47
8	549.19	176.13
9	559.52	187.01
10	569.79	197.94
11	579.77	209.14
12	588.03	221.66
13	598.64	232.27
14	609.00	243.12
15	614.12	257.21
16	620.57	270.76
17	628.15	283.70
18	638.45	294.61
19	648.11	306.08

```
   20         651.67      315.41
      ***      3.686    ***
Failure Surface Specified By 20 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
    1         247.60      226.60
    2         252.33      222.66
    3         267.31      221.97
    4         432.08      140.06
    5         522.65      140.04
    6         530.74      152.67
    7         541.14      163.47
    8         549.19      176.13
    9         559.52      187.01
   10         569.79      197.94
   11         579.77      209.14
   12         588.03      221.66
   13         598.64      232.27
   14         609.00      243.12
   15         614.12      257.21
   16         620.57      270.76
   17         628.15      283.70
   18         638.45      294.61
   19         648.11      306.08
   20         651.67      315.41
      ***      3.686    ***
Failure Surface Specified By 20 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
    1         247.60      226.60
    2         252.33      222.66
    3         267.31      221.97
    4         432.08      140.06
    5         522.65      140.04
    6         530.74      152.67
    7         541.14      163.47
    8         549.19      176.13
    9         559.52      187.01
   10         569.79      197.94
   11         579.77      209.14
   12         588.03      221.66
   13         598.64      232.27
   14         609.00      243.12
   15         614.12      257.21
   16         620.57      270.76
   17         628.15      283.70
   18         638.45      294.61
   19         648.11      306.08
   20         651.67      315.41
      ***      3.686    ***
Failure Surface Specified By 20 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
    1         247.60      226.60
    2         252.33      222.66
    3         267.31      221.97
    4         432.08      140.06
    5         522.65      140.04
    6         530.74      152.67
    7         541.14      163.47
    8         549.19      176.13
    9         559.52      187.01
   10         569.79      197.94
   11         579.77      209.14
   12         588.03      221.66
   13         598.64      232.27
   14         609.00      243.12
```

15	614.12	257.21
16	620.57	270.76
17	628.15	283.70
18	638.45	294.61
19	648.11	306.08
20	651.67	315.41

*** 3.686 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.60	226.60
2	252.33	222.66
3	267.31	221.97
4	432.08	140.06
5	522.65	140.04
6	530.74	152.67
7	541.14	163.47
8	549.19	176.13
9	559.52	187.01
10	569.79	197.94
11	579.77	209.14
12	588.03	221.66
13	598.64	232.27
14	609.00	243.12
15	614.12	257.21
16	620.57	270.76
17	628.15	283.70
18	638.45	294.61
19	648.11	306.08
20	651.67	315.41

*** 3.686 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.60	226.60
2	252.33	222.66
3	267.31	221.97
4	432.08	140.06
5	522.65	140.04
6	530.74	152.67
7	541.14	163.47
8	549.19	176.13
9	559.52	187.01
10	569.79	197.94
11	579.77	209.14
12	588.03	221.66
13	598.64	232.27
14	609.00	243.12
15	614.12	257.21
16	620.57	270.76
17	628.15	283.70
18	638.45	294.61
19	648.11	306.08
20	651.67	315.41

*** 3.686 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.60	226.60
2	252.33	222.66
3	267.31	221.97
4	432.08	140.06
5	522.65	140.04
6	530.74	152.67
7	541.14	163.47
8	549.19	176.13
9	559.52	187.01

10	569.79	197.94
11	579.77	209.14
12	588.03	221.66
13	598.64	232.27
14	609.00	243.12
15	614.12	257.21
16	620.57	270.76
17	628.15	283.70
18	638.45	294.61
19	648.11	306.08
20	651.67	315.41

*** 3.686 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	249.80	228.80
2	262.69	221.83
3	275.40	213.87
4	290.08	210.78
5	303.34	203.77
6	432.20	140.00
7	554.02	140.10
8	564.47	150.87
9	574.96	161.59
10	585.56	172.20
11	596.07	182.91
12	604.19	195.52
13	614.77	206.15
14	620.04	220.19
15	630.43	231.01
16	638.64	243.56
17	647.79	255.45
18	656.67	267.54
19	664.93	280.06
20	667.93	294.75
21	669.47	309.68
22	670.71	316.41

*** 3.763 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	249.80	228.80
2	262.69	221.83
3	275.40	213.87
4	290.08	210.78
5	303.34	203.77
6	432.20	140.00
7	554.02	140.10
8	564.47	150.87
9	574.96	161.59
10	585.56	172.20
11	596.07	182.91
12	604.19	195.52
13	614.77	206.15
14	620.04	220.19
15	630.43	231.01
16	638.64	243.56
17	647.79	255.45
18	656.67	267.54
19	664.93	280.06
20	667.93	294.75
21	669.47	309.68
22	670.71	316.41

*** 3.763 ***

Failure Surface Specified By 22 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

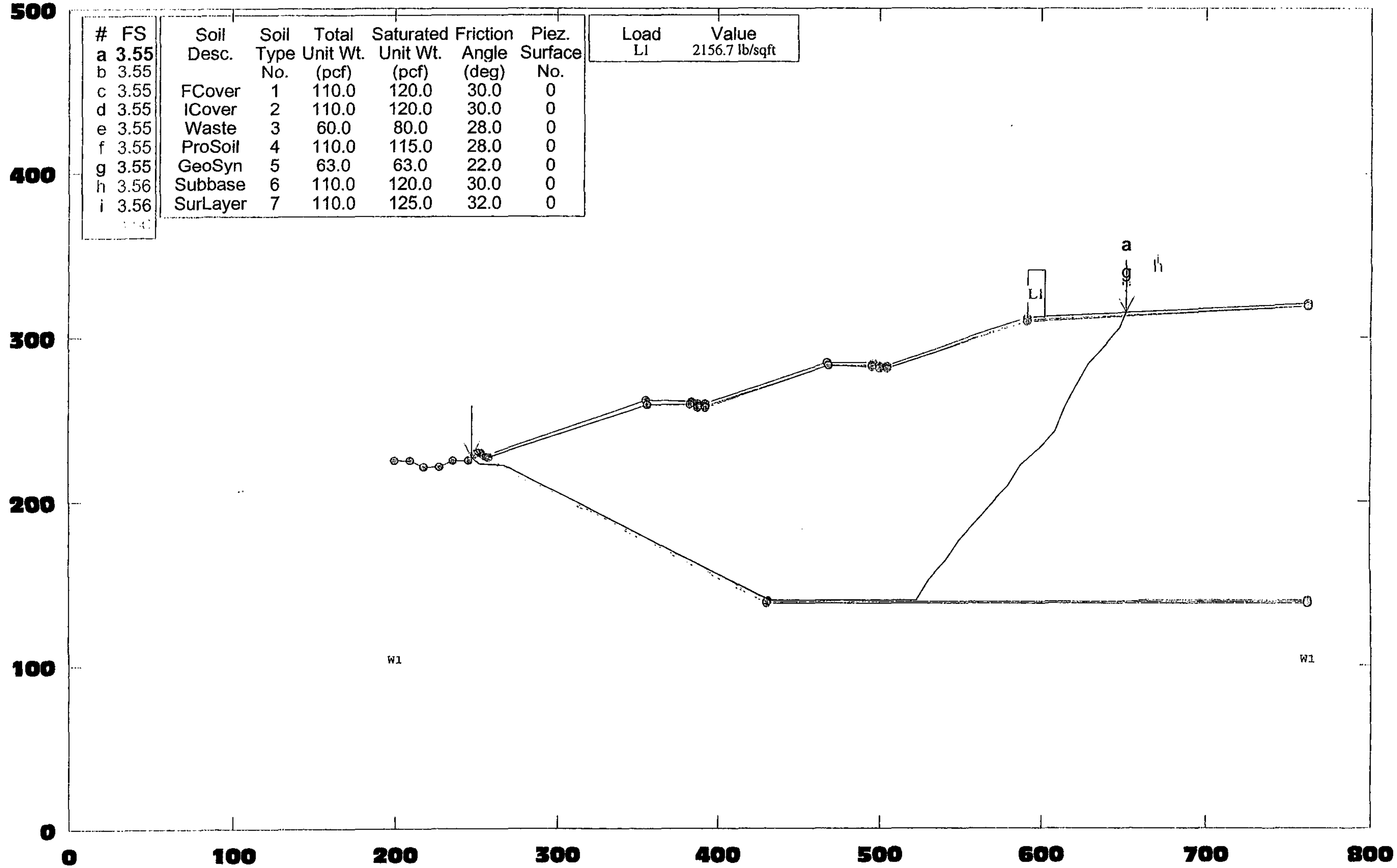
1		249.80	228.80
2		262.69	221.83
3		275.40	213.87
4		290.08	210.78
5		303.34	203.77
6		432.20	140.00
7		554.02	140.10
8		564.47	150.87
9		574.96	161.59
10		585.56	172.20
11		596.07	182.91
12		604.19	195.52
13		614.77	206.15
14		620.04	220.19
15		630.43	231.01
16		638.64	243.56
17		647.79	255.45
18		656.67	267.54
19		664.93	280.06
20		667.93	294.75
21		669.47	309.68
22		670.71	316.41
	***	3.763	***

NORTH SIDE SECTION

WITH EQUIPMENT LOAD

Central Landfill North Side - Citrus Co.

F:\PROJECT\CITRUS\09199056.13\SLOPES~1\NORTHBLK.PL2 Run By: Dominique Rudajev 12/16/2004 9:44AM



#	FS
a	3.55
b	3.55
c	3.55
d	3.55
e	3.55
f	3.55
g	3.55
h	3.56
i	3.56

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
FCover	1	110.0	120.0	30.0	0
ICover	2	110.0	120.0	30.0	0
Waste	3	60.0	80.0	28.0	0
ProSoil	4	110.0	115.0	28.0	0
GeoSyn	5	63.0	63.0	22.0	0
Subbase	6	110.0	120.0	30.0	0
SurLayer	7	110.0	125.0	32.0	0

Load	Value
L1	2156.7 lb/sqft

STABL6H FSmin=3.55

Safety Factors Are Calculated By The Modified Janbu Method

SCS ENGINEERS

** **STABL6H** **
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 12/16/2004
Time of Run: 9:44AM
Run By: Dominique Rudajev
Input Data Filename: F:northblk.
Output Filename: F:northblk.OUT
Plotted Output Filename: F:northblk.PLT
PROBLEM DESCRIPTION Central Landfill North Side - Citrus Co.
BOUNDARY COORDINATES
21 Top Boundaries
51 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	200.00	225.00	210.00	225.00	7
2	210.00	225.00	218.00	221.00	7
3	218.00	221.00	228.00	221.00	7
4	228.00	221.00	236.00	225.00	7
5	236.00	225.00	246.00	225.00	7
6	246.00	225.00	249.51	228.51	7
7	249.51	228.51	250.25	229.25	6
8	250.25	229.25	250.63	229.63	5
9	250.63	229.63	251.00	230.00	4
10	251.00	230.00	253.00	230.00	4
11	253.00	230.00	255.00	228.00	4
12	255.00	228.00	355.50	261.50	1
13	355.50	261.50	383.50	261.22	1
14	383.50	261.22	388.00	259.72	1
15	388.00	259.72	392.00	259.72	1
16	392.00	259.72	467.84	285.00	1
17	467.84	285.00	495.84	284.72	1
18	495.84	284.72	500.34	283.22	1
19	500.34	283.22	504.34	283.22	1
20	504.34	283.22	591.43	312.25	1
21	591.43	312.25	761.93	321.20	1
22	257.53	226.74	355.81	259.50	2
23	355.81	259.50	383.17	259.22	2
24	383.17	259.22	387.68	257.72	2
25	387.68	257.72	392.32	257.72	2
26	392.32	257.72	468.15	283.00	2
27	468.15	283.00	495.51	282.72	2
28	495.51	282.72	500.02	281.22	2
29	500.02	281.22	504.66	281.22	2
30	504.66	281.22	591.81	310.27	2
31	591.81	310.27	761.93	319.20	2
32	255.00	228.00	257.53	226.74	4
33	258.16	226.42	355.89	259.00	3
34	355.89	259.00	383.08	258.72	3
35	383.08	258.72	387.59	257.22	3
36	387.59	257.22	392.41	257.22	3
37	392.41	257.22	468.23	282.50	3
38	468.23	282.50	495.42	282.22	3
39	495.42	282.22	499.93	280.72	3
40	499.93	280.72	504.75	280.72	3
41	504.75	280.72	591.90	309.77	3
42	591.90	309.77	761.93	318.70	3
43	257.53	226.74	258.16	226.42	4
44	258.16	226.42	431.00	140.00	4
45	431.00	140.00	761.93	140.00	4
46	250.63	229.63	430.88	139.50	5
47	430.88	139.50	761.93	139.50	5
48	250.25	229.25	430.76	139.00	6
49	430.76	139.00	761.93	139.00	6

50	249.51	228.51	430.53	138.00	7
51	430.53	138.00	761.93	138.00	7

ISOTROPIC SOIL PARAMETERS

7 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	0
2	110.0	120.0	.0	30.0	.00	.0	0
3	60.0	80.0	.0	28.0	.00	.0	0
4	110.0	115.0	.0	28.0	.00	.0	0
5	63.0	63.0	.0	22.0	.00	.0	0
6	110.0	120.0	.0	30.0	.00	.0	0
7	110.0	125.0	.0	32.0	.00	.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	200.00	108.50
2	761.93	108.50

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	591.43	601.93	2156.7	.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 Sliding Block Surfaces, Has Been Specified.

1000 Trial Surfaces Have Been Generated.

3 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 15.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	255.88	227.56	430.10	140.45	.25
2	432.00	140.00	433.00	140.00	.25
3	434.00	140.00	657.49	140.00	.25

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 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.60	226.60
2	252.33	222.66
3	267.31	221.97
4	432.08	140.06
5	522.65	140.04
6	530.74	152.67
7	541.14	163.47
8	549.19	176.13
9	559.52	187.01
10	569.79	197.94
11	579.77	209.14
12	588.03	221.66
13	598.64	232.27
14	609.00	243.12
15	614.12	257.21
16	620.57	270.76
17	628.15	283.70
18	638.45	294.61
19	648.11	306.08
20	651.67	315.41

*** 3.554 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.60	226.60
2	252.33	222.66
3	267.31	221.97
4	432.08	140.06
5	522.65	140.04
6	530.74	152.67
7	541.14	163.47
8	549.19	176.13
9	559.52	187.01
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11	579.77	209.14
12	588.03	221.66
13	598.64	232.27
14	609.00	243.12
15	614.12	257.21
16	620.57	270.76
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9	559.52	187.01
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12	588.03	221.66
13	598.64	232.27
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15	614.12	257.21
16	620.57	270.76
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Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.60	226.60
2	252.33	222.66
3	267.31	221.97
4	432.08	140.06
5	522.65	140.04
6	530.74	152.67
7	541.14	163.47
8	549.19	176.13
9	559.52	187.01
10	569.79	197.94
11	579.77	209.14
12	588.03	221.66
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14	609.00	243.12
15	614.12	257.21

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18	638.45	294.61
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*** 3.554 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.60	226.60
2	252.33	222.66
3	267.31	221.97
4	432.08	140.06
5	522.65	140.04
6	530.74	152.67
7	541.14	163.47
8	549.19	176.13
9	559.52	187.01
10	569.79	197.94
11	579.77	209.14
12	588.03	221.66
13	598.64	232.27
14	609.00	243.12
15	614.12	257.21
16	620.57	270.76
17	628.15	283.70
18	638.45	294.61
19	648.11	306.08
20	651.67	315.41

*** 3.554 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.60	226.60
2	252.33	222.66
3	267.31	221.97
4	432.08	140.06
5	522.65	140.04
6	530.74	152.67
7	541.14	163.47
8	549.19	176.13
9	559.52	187.01
10	569.79	197.94
11	579.77	209.14
12	588.03	221.66
13	598.64	232.27
14	609.00	243.12
15	614.12	257.21
16	620.57	270.76
17	628.15	283.70
18	638.45	294.61
19	648.11	306.08
20	651.67	315.41

*** 3.554 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	247.60	226.60
2	252.33	222.66
3	267.31	221.97
4	432.08	140.06
5	522.65	140.04
6	530.74	152.67
7	541.14	163.47
8	549.19	176.13
9	559.52	187.01
10	569.79	197.94

11	579.77	209.14
12	588.03	221.66
13	598.64	232.27
14	609.00	243.12
15	614.12	257.21
16	620.57	270.76
17	628.15	283.70
18	638.45	294.61
19	648.11	306.08
20	651.67	315.41

*** 3.554 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	249.22	228.22
2	252.71	224.73
3	263.32	214.13
4	277.15	208.33
5	291.23	203.15
6	305.48	198.48
7	320.14	195.28
8	333.62	188.71
9	432.21	139.90
10	543.99	139.97
11	553.17	151.83
12	563.66	162.55
13	573.15	174.17
14	583.74	184.79
15	594.25	195.49
16	600.97	208.90
17	607.96	222.17
18	616.10	234.77
19	623.19	247.99
20	633.80	258.60
21	641.59	271.41
22	651.72	282.48
23	658.15	296.03
24	668.75	306.64
25	670.14	316.38

*** 3.563 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	249.22	228.22
2	252.71	224.73
3	263.32	214.13
4	277.15	208.33
5	291.23	203.15
6	305.48	198.48
7	320.14	195.28
8	333.62	188.71
9	432.21	139.90
10	543.99	139.97
11	553.17	151.83
12	563.66	162.55
13	573.15	174.17
14	583.74	184.79
15	594.25	195.49
16	600.97	208.90
17	607.96	222.17
18	616.10	234.77
19	623.19	247.99
20	633.80	258.60
21	641.59	271.41
22	651.72	282.48
23	658.15	296.03
24	668.75	306.64

25	670.14	316.38
***	3.563	***

Failure Surface Specified By 25 Coordinate Points

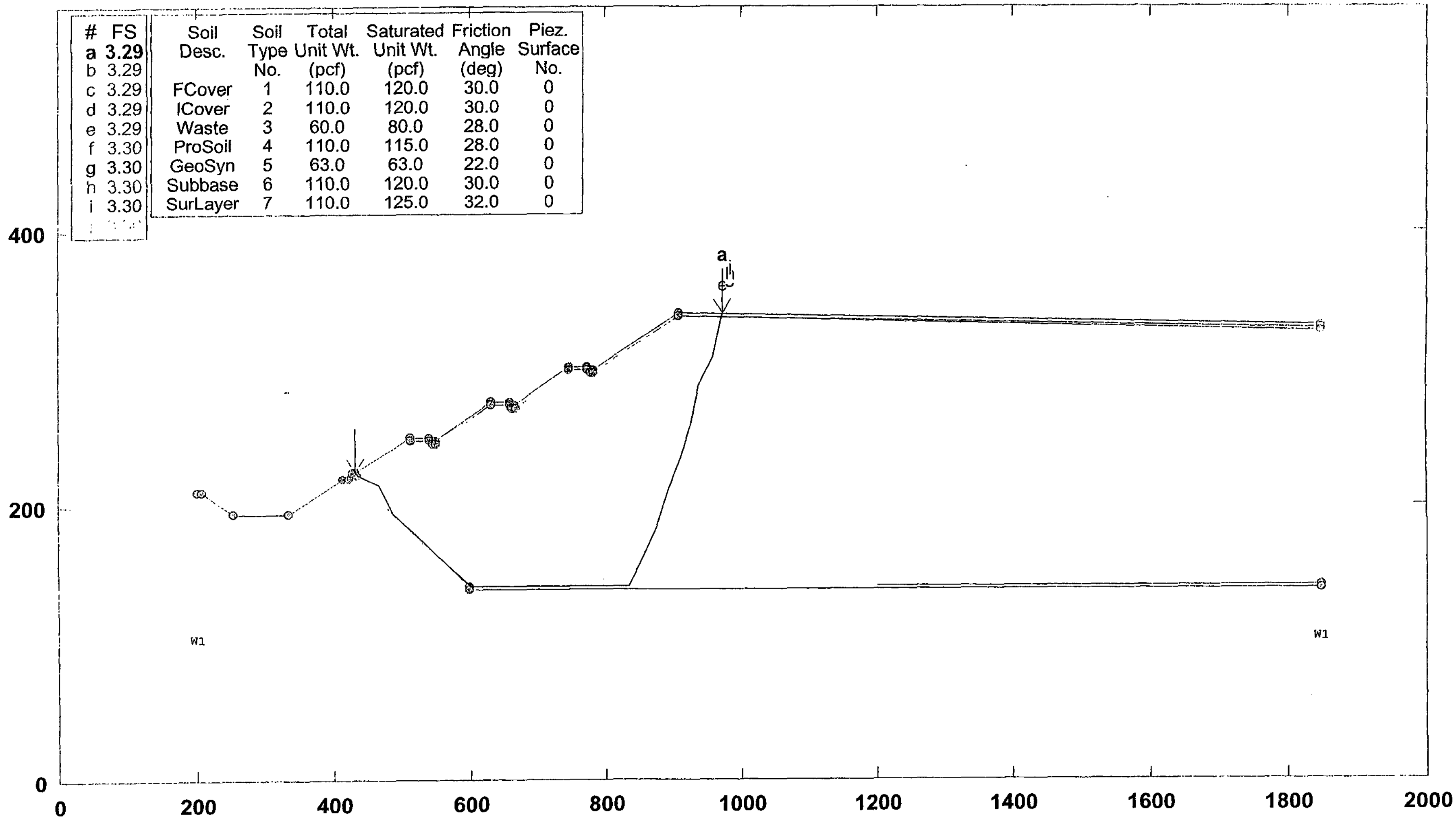
Point No.	X-Surf (ft)	Y-Surf (ft)
1	249.22	228.22
2	252.71	224.73
3	263.32	214.13
4	277.15	208.33
5	291.23	203.15
6	305.48	198.48
7	320.14	195.28
8	333.62	188.71
9	432.21	139.90
10	543.99	139.97
11	553.17	151.83
12	563.66	162.55
13	573.15	174.17
14	583.74	184.79
15	594.25	195.49
16	600.97	208.90
17	607.96	222.17
18	616.10	234.77
19	623.19	247.99
20	633.80	258.60
21	641.59	271.41
22	651.72	282.48
23	658.15	296.03
24	668.75	306.64
25	670.14	316.38
***	3.563	***

SOUTH SIDE SECTION

WITHOUT EQUIPMENT LOAD

Central Landfill South Side - Citrus Co.

F:\PROJECT\CITRUS\09199056.13\SLOPES~1\SOUTHBLK.PL2   Run By: Dominique Rudajev   12/15/2004   1:21PM



#	FS
a	**3.29**
b	3.29
c	3.29
d	3.29
e	3.29
f	3.30
g	3.30
h	3.30
i	3.30

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
FCover	1	110.0	120.0	30.0	0
ICover	2	110.0	120.0	30.0	0
Waste	3	60.0	80.0	28.0	0
ProSoil	4	110.0	115.0	28.0	0
GeoSyn	5	63.0	63.0	22.0	0
Subbase	6	110.0	120.0	30.0	0
SurLayer	7	110.0	125.0	32.0	0

STABL6H FSmin=3.29

Safety Factors Are Calculated By The Modified Janbu Method

SCS ENGINEERS

**** STABL6H ****
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 12/15/2004
Time of Run: 1:21PM
Run By: Dominique Rudajev
Input Data Filename: F:southblk.
Output Filename: F:southblk.OUT
Plotted Output Filename: F:southblk.PLT
PROBLEM DESCRIPTION Central Landfill South Side - Citrus Co.
BOUNDARY COORDINATES
25 Top Boundaries
63 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	200.00	210.00	207.00	210.00	7
2	207.00	210.00	255.00	194.00	7
3	255.00	194.00	335.00	194.00	7
4	335.00	194.00	413.00	220.00	7
5	413.00	220.00	423.00	220.00	7
6	423.00	220.00	426.51	223.51	7
7	426.51	223.51	427.25	224.25	6
8	427.25	224.25	427.63	224.63	5
9	427.63	224.63	428.00	225.00	4
10	428.00	225.00	430.00	225.00	4
11	430.00	225.00	432.00	223.00	4
12	432.00	223.00	513.00	250.00	1
13	513.00	250.00	541.00	249.72	1
14	541.00	249.72	545.50	248.22	1
15	545.50	248.22	549.50	248.22	1
16	549.50	248.22	629.84	275.00	1
17	629.84	275.00	657.84	274.72	1
18	657.84	274.72	662.34	273.22	1
19	662.34	273.22	666.34	273.22	1
20	666.34	273.22	746.68	300.00	1
21	746.68	300.00	774.68	299.72	1
22	774.68	299.72	779.18	298.22	1
23	779.18	298.22	783.18	298.22	1
24	783.18	298.22	908.52	340.00	1
25	908.52	340.00	1848.52	329.28	1
26	434.53	221.74	513.31	248.00	2
27	513.31	248.00	540.67	247.72	2
28	540.67	247.72	545.18	246.22	2
29	545.18	246.22	549.82	246.22	2
30	549.82	246.22	630.15	273.00	2
31	630.15	273.00	657.51	272.72	2
32	657.51	272.72	662.02	271.22	2
33	662.02	271.22	666.66	271.22	2
34	666.66	271.22	746.99	298.00	2
35	746.99	298.00	774.35	297.72	2
36	774.35	297.72	778.86	296.22	2
37	778.86	296.22	783.50	296.22	2
38	783.50	296.22	908.83	338.00	2
39	908.83	338.00	1848.50	327.28	2
40	432.00	223.00	434.53	221.74	4
41	435.16	221.42	513.39	247.50	3
42	513.39	247.50	540.58	247.22	3
43	540.58	247.22	545.09	245.72	3
44	545.09	245.72	549.91	245.72	3
45	549.91	245.72	630.23	272.50	3
46	630.23	272.50	657.42	272.22	3
47	657.42	272.22	661.93	270.72	3
48	661.93	270.72	666.75	270.72	3
49	666.75	270.72	747.07	297.50	3

50	747.07	297.50	774.26	297.22	3
51	774.26	297.22	778.77	295.72	3
52	778.77	295.72	783.59	295.72	3
53	783.59	295.72	908.91	337.50	3
54	908.91	337.50	1848.49	326.78	3
55	434.53	221.74	435.16	221.42	4
56	435.16	221.42	598.00	140.00	4
57	598.00	140.00	1848.52	140.00	4
58	427.63	224.63	597.88	139.50	5
59	597.88	139.50	1848.52	139.50	5
60	427.25	224.25	597.76	139.00	6
61	597.76	139.00	1848.52	139.00	6
62	426.51	223.51	597.53	138.00	7
63	597.53	138.00	1848.52	138.00	7

ISOTROPIC SOIL PARAMETERS

7 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	0
2	110.0	120.0	.0	30.0	.00	.0	0
3	60.0	80.0	.0	28.0	.00	.0	0
4	110.0	115.0	.0	28.0	.00	.0	0
5	63.0	63.0	.0	22.0	.00	.0	0
6	110.0	120.0	.0	30.0	.00	.0	0
7	110.0	125.0	.0	32.0	.00	.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	200.00	108.50
2	1848.52	108.50

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	908.52	917.15	1436.4	.0

NOTE - Intensity Is Specified As A Uniformly Distributed Force Acting On A Horizontally Projected Surface.

SURCHARGE BOUNDARY LOAD DATA HAS BEEN SUPPRESSED

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

1000 Trial Surfaces Have Been Generated.

3 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 30.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	432.90	222.55	597.11	140.45	.25
2	599.00	140.00	600.00	140.00	.25
3	601.00	140.00	1200.00	140.00	.25

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 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	433.03	223.34
2	437.07	222.19
3	466.26	215.28
4	488.29	194.93
5	599.96	139.92
6	835.24	140.11
7	854.95	162.73

8	875.31	184.76
9	891.05	210.31
10	910.41	233.22
11	925.89	258.91
12	937.38	286.63
13	958.55	307.88
14	969.99	335.61
15	972.48	339.27

*** 3.286 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	433.03	223.34
2	437.07	222.19
3	466.26	215.28
4	488.29	194.93
5	599.96	139.92
6	835.24	140.11
7	854.95	162.73
8	875.31	184.76
9	891.05	210.31
10	910.41	233.22
11	925.89	258.91
12	937.38	286.63
13	958.55	307.88
14	969.99	335.61
15	972.48	339.27

*** 3.286 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	433.03	223.34
2	437.07	222.19
3	466.26	215.28
4	488.29	194.93
5	599.96	139.92
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Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
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10	910.41	233.22
11	925.89	258.91
12	937.38	286.63
13	958.55	307.88
14	969.99	335.61
15	972.48	339.27

*** 3.286 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	433.03	223.34
2	437.07	222.19
3	466.26	215.28
4	488.29	194.93
5	599.96	139.92
6	835.24	140.11
7	854.95	162.73
8	875.31	184.76
9	891.05	210.31
10	910.41	233.22
11	925.89	258.91
12	937.38	286.63
13	958.55	307.88
14	969.99	335.61
15	972.48	339.27

*** 3.286 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	435.10	224.03
2	457.59	205.76
3	485.97	196.02
4	599.04	140.12
5	840.80	140.06
6	861.25	162.01
7	882.46	183.23
8	897.01	209.46
9	909.15	236.90
10	925.66	261.94
11	946.76	283.27
12	966.52	305.84
13	978.80	333.21
14	984.71	339.13

*** 3.299 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	435.10	224.03
2	457.59	205.76
3	485.97	196.02
4	599.04	140.12
5	840.80	140.06
6	861.25	162.01
7	882.46	183.23
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*** 3.299 ***

SOUTH SIDE SECTION

WITH EQUIPMENT LOAD

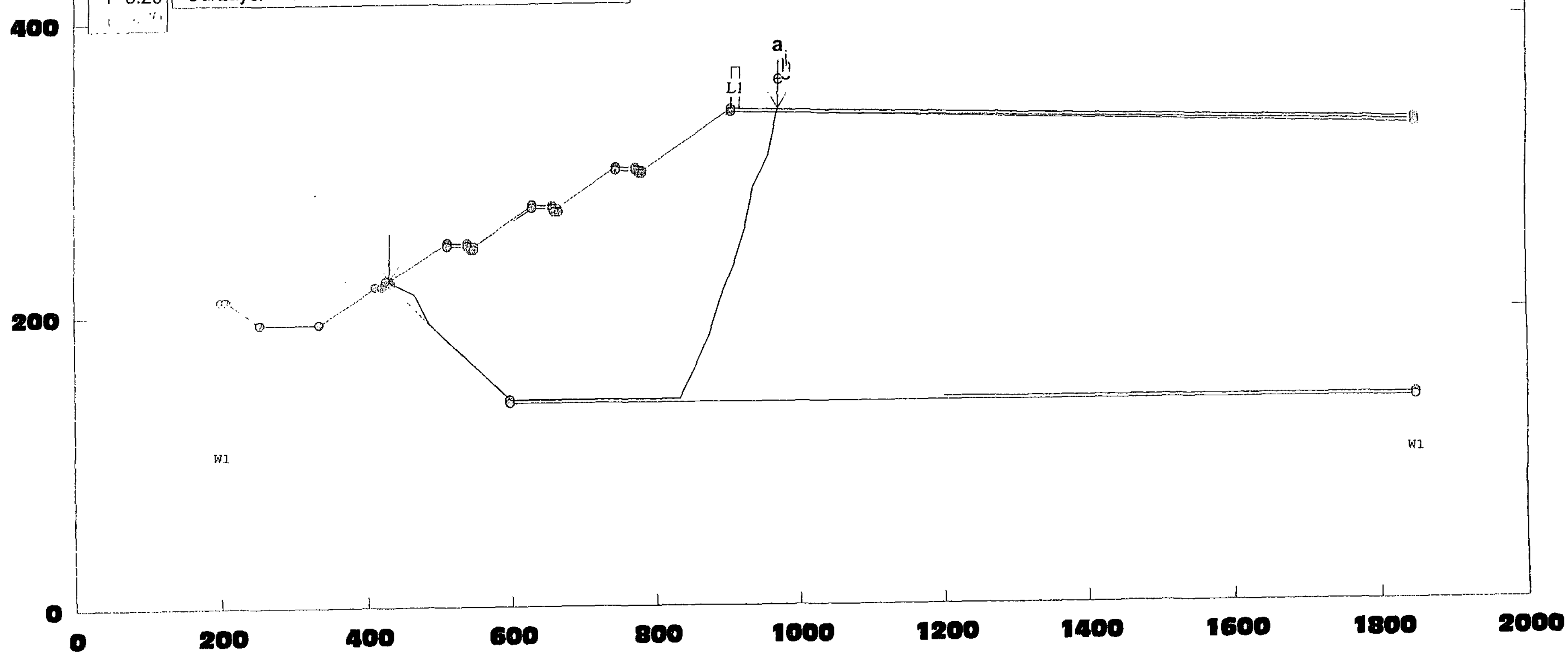
Central Landfill South Side - Citrus Co.

F:\PROJECT\CITRUS\09199056.13\SLOPES~1\SOUTHBLK.PL2 Run By: Dominique Rudajev 12/16/2004 9:47AM

#	FS
a	**3.18**
b	3.18
c	3.18
d	3.18
e	3.18
f	3.20
g	3.20
h	3.20
i	3.20

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Friction Angle (deg)	Piez. Surface No.
FCover	1	110.0	120.0	30.0	0
ICover	2	110.0	120.0	30.0	0
Waste	3	60.0	80.0	28.0	0
ProSoil	4	110.0	115.0	28.0	0
GeoSyn	5	63.0	63.0	22.0	0
Subbase	6	110.0	120.0	30.0	0
SurLayer	7	110.0	125.0	32.0	0

Load	Value
L1	2156.7 lb/sqft



STABL6H FSmin=3.18

Safety Factors Are Calculated By The Modified Janbu Method

SCS ENGINEERS

**** STABL6H ****
by
Purdue University
--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 12/16/2004
Time of Run: 9:47AM
Run By: Dominique Rudajev
Input Data Filename: F:southblk.
Output Filename: F:southblk.OUT
Plotted Output Filename: F:southblk.PLT
PROBLEM DESCRIPTION Central Landfill South Side - Citrus Co.
BOUNDARY COORDINATES
25 Top Boundaries
63 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	200.00	210.00	207.00	210.00	7
2	207.00	210.00	255.00	194.00	7
3	255.00	194.00	335.00	194.00	7
4	335.00	194.00	413.00	220.00	7
5	413.00	220.00	423.00	220.00	7
6	423.00	220.00	426.51	223.51	7
7	426.51	223.51	427.25	224.25	6
8	427.25	224.25	427.63	224.63	5
9	427.63	224.63	428.00	225.00	4
10	428.00	225.00	430.00	225.00	4
11	430.00	225.00	432.00	223.00	4
12	432.00	223.00	513.00	250.00	1
13	513.00	250.00	541.00	249.72	1
14	541.00	249.72	545.50	248.22	1
15	545.50	248.22	549.50	248.22	1
16	549.50	248.22	629.84	275.00	1
17	629.84	275.00	657.84	274.72	1
18	657.84	274.72	662.34	273.22	1
19	662.34	273.22	666.34	273.22	1
20	666.34	273.22	746.68	300.00	1
21	746.68	300.00	774.68	299.72	1
22	774.68	299.72	779.18	298.22	1
23	779.18	298.22	783.18	298.22	1
24	783.18	298.22	908.52	340.00	1
25	908.52	340.00	1848.52	329.28	1
26	434.53	221.74	513.31	248.00	2
27	513.31	248.00	540.67	247.72	2
28	540.67	247.72	545.18	246.22	2
29	545.18	246.22	549.82	246.22	2
30	549.82	246.22	630.15	273.00	2
31	630.15	273.00	657.51	272.72	2
32	657.51	272.72	662.02	271.22	2
33	662.02	271.22	666.66	271.22	2
34	666.66	271.22	746.99	298.00	2
35	746.99	298.00	774.35	297.72	2
36	774.35	297.72	778.86	296.22	2
37	778.86	296.22	783.50	296.22	2
38	783.50	296.22	908.83	338.00	2
39	908.83	338.00	1848.50	327.28	2
40	432.00	223.00	434.53	221.74	4
41	435.16	221.42	513.39	247.50	3
42	513.39	247.50	540.58	247.22	3
43	540.58	247.22	545.09	245.72	3
44	545.09	245.72	549.91	245.72	3
45	549.91	245.72	630.23	272.50	3
46	630.23	272.50	657.42	272.22	3
47	657.42	272.22	661.93	270.72	3
48	661.93	270.72	666.75	270.72	3
49	666.75	270.72	747.07	297.50	3

50	747.07	297.50	774.26	297.22	3
51	774.26	297.22	778.77	295.72	3
52	778.77	295.72	783.59	295.72	3
53	783.59	295.72	908.91	337.50	3
54	908.91	337.50	1848.49	326.78	3
55	434.53	221.74	435.16	221.42	4
56	435.16	221.42	598.00	140.00	4
57	598.00	140.00	1848.52	140.00	4
58	427.63	224.63	597.88	139.50	5
59	597.88	139.50	1848.52	139.50	5
60	427.25	224.25	597.76	139.00	6
61	597.76	139.00	1848.52	139.00	6
62	426.51	223.51	597.53	138.00	7
63	597.53	138.00	1848.52	138.00	7

ISOTROPIC SOIL PARAMETERS

7 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	110.0	120.0	.0	30.0	.00	.0	0
2	110.0	120.0	.0	30.0	.00	.0	0
3	60.0	80.0	.0	28.0	.00	.0	0
4	110.0	115.0	.0	28.0	.00	.0	0
5	63.0	63.0	.0	22.0	.00	.0	0
6	110.0	120.0	.0	30.0	.00	.0	0
7	110.0	125.0	.0	32.0	.00	.0	0

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 2 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	200.00	108.50
2	1848.52	108.50

BOUNDARY LOAD(S)

1 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (lb/sqft)	Deflection (deg)
1	908.52	919.02	2156.7	.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 Sliding Block Surfaces, Has Been Specified.

1000 Trial Surfaces Have Been Generated.

3 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 30.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	432.90	222.55	597.11	140.45	.25
2	599.00	140.00	600.00	140.00	.25
3	601.00	140.00	1200.00	140.00	.25

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 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	433.03	223.34
2	437.07	222.19
3	466.26	215.28
4	488.29	194.93
5	599.96	139.92
6	835.24	140.11
7	854.95	162.73
8	875.31	184.76

9	891.05	210.31
10	910.41	233.22
11	925.89	258.91
12	937.38	286.63
13	958.55	307.88
14	969.99	335.61
15	972.48	339.27
***	3.183	***

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4	599.04	140.12
5	840.80	140.06
6	861.25	162.01
7	882.46	183.23
8	897.01	209.46
9	909.15	236.90
10	925.66	261.94
11	946.76	283.27
12	966.52	305.84
13	978.80	333.21
14	984.71	339.13

*** 3.197 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	435.10	224.03
2	457.59	205.76
3	485.97	196.02
4	599.04	140.12
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ATTACHMENT J-4

KARST SENSITIVE AREA ASSESSMENT SUMMARY DATED DECEMBER 18, 2008

(IN RESPONSE TO RAI No. 2 ITEM 39: PLEASE PROVIDE A COPY OF THE SINKHOLE CONDUCTED IN CONJUNCTION WITH THE ERP APPLICATION)

Citrus County Landfill

Karst Sensitive Area Assessment Summary

December 18, 2008

In response to the Florida Department of Environmental Protection item 13 of the request for additional information for the Phase III expansion Environmental Resource Permit, Mr. Robert L. Westly, P.G., of SCS Engineers (SCS) has performed a karst sensitive area assessment. The following summarizes his assessment by repeating and responding to the specific requests of item 13, which is signed and sealed as certification of the assessment findings.

13. Pursuant to Basis of Review Section 6.4.1 b., please provide the following items:

- **Please provide any history of sink holes or karst formation in the perimeter swale and in the DRA-5 stormwater pond based on (1) solid waste facility or County documentation. (2) appropriate data base(s) such as the FDEP data base at http://www.dep.state.fl.us/geologictopic/sinkhole.htm; (3) geotechnical work and (4) NRCS soils map.**

  Response: Based on a conversation with Mr. Prime DeVaughn, the Foreman and Field Crew Leader for the landfill since beginning of operations, no sinkholes have occurred either in the perimeter swale or DRA-5. However, a small subsidence feature (a few feet wide and deep) occurred approximately 2 years ago in DRA-3, and was photographed by the County.

  SCS reviewed the photography of the subsidence feature and concluded that the feature appears to be a sinkhole described in the U.S. Geological Survey Water-Resources Investigations Report 85-4126 as a cover subsidence sinkhole. This type of sinkhole is caused by raveling of surficial sands into an underlying void(s) (e.g., solution pipes, fractures, or other openings). In areas in Citrus County along the Brooksville Ridge, where the landfill is located, the sand mantle is relatively thick and cover-subsidence sinkholes may be only a few feet in diameter and depth. This occurs because, in the absence of a clay cap over the limestone, cavities in the limestone are filled with sand before the sinkhole can grow to large size. The lack of this clay cap at the landfill site should not allow the opportunity for development of large and deep sinkholes that allow direct connection of the Floridan aquifer to land surface.

  Review of the FDEP sinkhole data base indicates that the closest other recorded sinkhole is approximately 0.4 miles from the north side of the landfill. A geotechnical study performed by Universal Engineering Sciences[1] advanced 10 borings at the landfill to depths of 30 to 120 feet at the landfill. Sands and slightly clayey sands were observed to 120 feet below land surface (bls) and groundwater was encountered at approximately 100 feet bls. The geotechnical study did not report finding any indication of subsidence or sinkhole features.

The National Cooperative Soil Survey for the landfill area indicates approximately 86 percent of the natural soils at the landfill are Group A soils and indicates that the remaining 14 percent are Group C soils. Group A soils are deep well-drained to excessively-drained sands. Group C soils are those which have a layer that impedes downward movement of water or are finer grained and thus transmit water more slowly. Most of the soils at the landfill are Group A soils.

SCS reviewed photolineations in the vicinity of the landfill early in its development. The photolineations in the region around the landfill do not cross the landfill. Lineations crossing the landfill would suggest the potential for sinkholes along the lineations, but these are not present. Also, there is a pre-existing photolineament study and supplemental lineament study prepared by Post, Buckley, Schuh and Jernigan, Inc., (PBS&J report)[2] of the landfill area. None of the lineations pass through the landfill. Further, the PBS&J report concluded that there are no active sinkholes or solution features near the landfill.

- **Based on the determination, a professional geologist should certify whether or not the perimeter swale system and the DRA-5 are located in a karst sensitive area, and justify.**

Response: SCS reviewed a report prepared by Jones Edmunds and Associates (JEA report) for the Southwest Florida Water Management District (SWFWMD) regarding karst-sensitive areas[3] to address this comment. The report established seven criteria that JEA determined have attributes that possess a strong correlation with the presence of sinkholes and provides regional maps of southwest Florida, including Citrus County, that indicate areas ranked from low to high likelihood of sinkhole development. The Citrus County landfill is located in a region that ranks toward the high end of the likelihood

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[1] Universal Engineering Sciences. *Geotechnical Investigation for Citrus County Central Landfill New Disposal Cell S.R. 44 Citrus County, Florida.* November 15, 2001.

[2] Post, Buckley, Schuh & Jernigan, Inc. *Citrus County Central Sanitary Landfill Expansion Site Groundwater Monitoring Plan.* Prepared for Board of County Commissioners, Citrus County, August 1988.

[3] Jones Edmunds and Associates. *Modeling Karst-Sensitive Area in Southwest Florida.* ESRI Paper No. 1608.

scale that the JEA report established for sinkhole development. The report advises that the evaluation was based on areas of 400 x400 meters (approximately 40-acre areas) and should be used for planning rather than examined at the site-specific level. However, the landfill is located on about 140 acres which may make it appropriate to examine the site using the criteria established in the report. These seven criteria and their estimated values at the landfill include:

- Elevation of the Top of the Floridan Aquifer - per the PBS&J report[4] natural land surface elevation at the landfill is between 100-135 feet NGVD; the top of the Floridan aquifer is located at 40-175 feet depth per PBS&J report; therefore, the elevation of top of Floridan aquifer at the landfill may range between +60 feet NGVD to -40 feet NGVD.

- Thickness of the Surficial Aquifer - Floridan aquifer is the surficial aquifer at the landfill and the criterion does not apply under these circumstances.

- Thickness of Overburden - as indicated above, the depth to the top of the Floridan aquifer, i.e., the thickness of the overburden, at the landfill is between 40 to 175 feet.

- Thickness of the Hawthorn Group Layer - not present at the landfill.

- Distance from Top of Floridan Aquifer and its Potentiometric Surface – based on potentiometric maps of the SWFWMD, the potentiometric surface at the landfill is approximately +5 feet NGVD.

- Soil Type – 86 percent Group A; 14 percent Group C.

- Marine Terraces – landfill probably located on the Wicomico marine terrace.

SCS compared the applicable criteria values for the landfill to statistics presented in the JEA report.

Areas within the SWFWMD with the top of the Floridan aquifer located between +40 and -60 feet NGVD had sinkhole occurrences ranging from approximately 0.1 to 0.65 sinkholes per 100 acres, with the 0.65 value the maximum observed rate of occurrence. The landfill has had one sinkhole over 140 acres or approximately 0.7 sinkholes per 100 acres.

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[4] Post, Buckley, Schuh & Jernigan, Inc. *Citrus County Central Sanitary Landfill Expansion Site Groundwater Monitoring Plan.* Prepared for Board of County Commissioners, Citrus County, August 1988.

The overburden at the landfill ranges from 40 to 174 feet. The SWFWMD area that includes overburden in this range has approximately 0.05 to 0.02 sinkholes per 100 acres. Again, this is compared to 0.7 sinkholes per 100 acres at the landfill.

The Floridan potentiometric surface at the landfill is about +5 feet NGVD while the top of the Floridan varies between about +60 to -40 feet NGVD. Based on JEA's evaluation, this potential range of difference suggests a low likelihood of sinkhole development at the landfill.

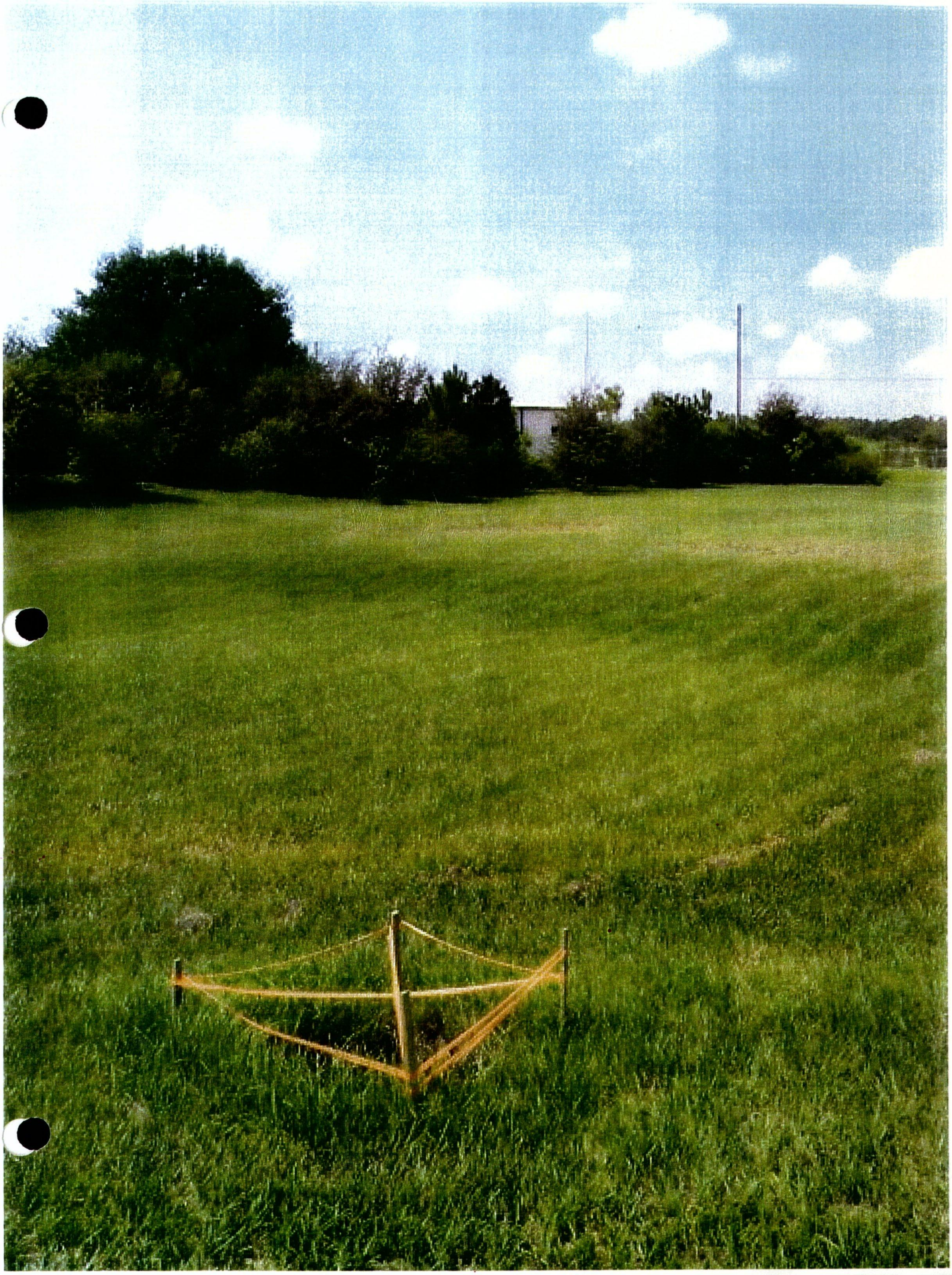
Based on the above discussion and information available, the JEA report indicates that, relative to four of the seven criteria, the landfill is located in an area of the SWFWMD where, statistically, a greater number of sinkholes would be expected to occur . However, one criterion indicates relative low frequency of sinkhole occurrence and two criteria do not apply.

Based on these findings, SCS believes the landfill is located in a karst-sensitive region of Florida but it is not possible to separately assess the swale and DRA-5 area in accordance with the JEA report statistics. Consequently, it not possible to certify that the swale and DRA-5 are located in a specific karst-sensitive area. One naturally occurring sinkhole has occurred at the landfill but outside of the swale and DRA-5 area since beginning. It did not result in a direct connection between the Floridan aquifer and land surface. This is due to the slow development of cavities in the underlying limestone, low Floridan aquifer potentiometric level, lack of the presence of the Hawthorn Group, and the characteristics of the overlying mantle of sands and soils. It is possible that other sinkholes of similar characteristics may open in the future associated with water-driven raveling of sands in the DRAs; however, these can be repaired by proper backfilling without threatening the water quality of the Floridan aquifer. It is anticipated that backfilling will be performed using an inverted-filter design to stabilize land surface and allow continue operation of the DRAs in accordance with engineering design.

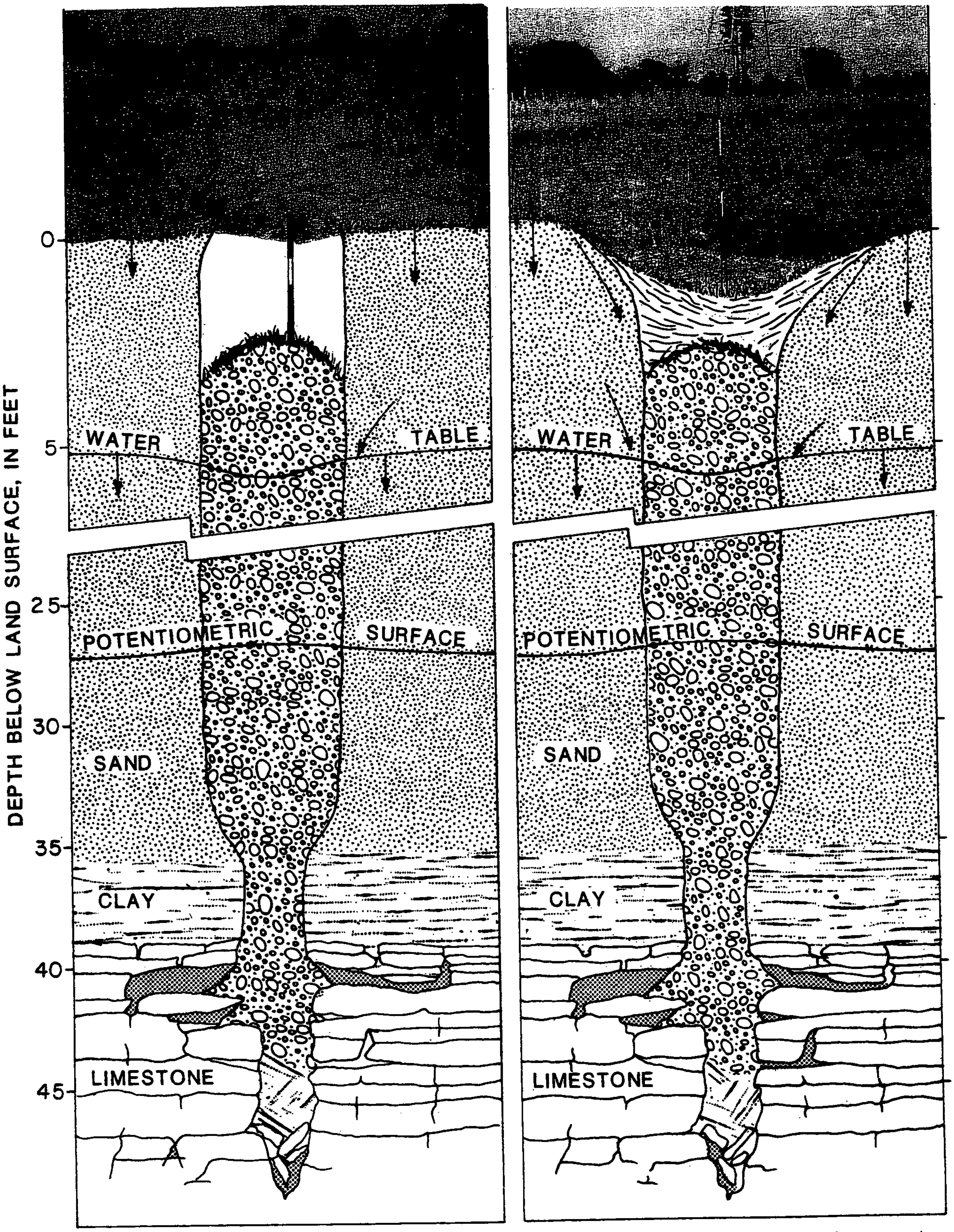
Robert L. Westly
12/19/08

Robert L. Westly, Florida PG117

PHOTOGRAPHS



U.S. GEOLOGICAL SURVEY WATER-RESOURCES INVESTIGATIONS REPORT 85-4126



c. Piping of cohesionless sand into cavity. Time: Hours - days.

d. Modification of sinkhole by surface erosion. Time: Ten years.

sinkhole. (From Sinclair, in press.)

ATTACHMENT J-5

SINKHOLE POTENTIAL ASSESSMENT

John A. Banks, PE
License No. 39297
6/26/09

ATTACHMENT J-5

The information provided in this attachment is supplemental to the "Karst Sensitive Area Assessment Summary," dated December 18, 2008 previously submitted to the Florida Department of Environmental Protection (FDEP) and included in this Attachment. The information provided below is responsive to Comment No. 9 of FDEP's correspondence requesting additional information (RAI #3), dated April 3, 2009.

GEOTECHNICAL INVESTIGATIONS

Three geotechnical investigations have been performed at the landfill that provide information regarding potential sinkhole development. These are briefly discussed below.

LEACHATE RISER PIPE AREA

The County investigated one area on May 1, 2009 where observations of the riser pipes indicated the possibility of the presence of loose sands or other anomalies indicating potentially unstable areas. This area is located in the vicinity of the leachate riser pipes and was investigated because of apparent deflections of portions of the pipes. The County performed two cone penetrometer investigations, one adjacent to the Phase 1/1A pipe group (CPT #1), and one approximately 400 feet to the north (CPT#2) (see Drawing 1). The piezocone sounding graphs and related standard soil behavior tables showing the types of sediments to 100 feet below grade are included in this Attachment. Review of these data indicates that no zones of extremely soft/loose soils or voids were encountered at either location.

PHASE 3 AREA

Findings of the Universal Engineering Sciences (Universal) November 15, 2001, geotechnical investigation report were evaluated relative to potential occurrence of sinkholes and briefly summarized in the previously submitted "Karst Sensitive Area Assessment Summary" dated December 18, 2008. The Universal investigation included advancement of 10 Standard Penetration Test (SPT) borings to depths of 30 to 120 feet below grade in the area of the proposed Phase 3 expansion (see Drawing 1). The data indicate that this area of the landfill is underlain by loose to medium dense sandy soils with lenses of clayey sands. Very loose sands (hammer blow counts of less than 4 per foot of penetration) were observed in one boring, but this occurred within the upper five feet of the boring and was followed by medium dense sediments to the termination of the boring at 120 feet below grade. The investigation did not observe conditions indicating the presence of sinkholes or insipient sinkholes.

DRAINAGE RETENTION AREAS (DRA)

During November 2008, Tierra performed a limited geotechnical exploration of the existing drainage retention areas (DRAs) of the landfill by installing five STP borings to depths of 30 to 45 feet below grade at various locations in the DRAs (see Drawing 1). The SPT borings were installed to evaluate general subsurface conditions, groundwater level characteristics, and develop recommendations for hydrogeologic parameters for stormwater design purposes. Findings indicated the DRAs are underlain by two strata; an upper strata of loose to dense sand with traces of clay underlain by a strata of medium dense, slightly clayey fine sand. Review of the boring logs indicated that no very loose sands or voids were encountered to the maximum depth of 45 feet. Although this exploratory work was relatively shallow, there was no indication of the presence of sinkholes or insipient sinkholes.

POTENTIAL SINKHOLE OCCURRENCE AND DIMENSIONS

As previously reported in the Karst Sensitive Area Assessment Summary, dated December 18, 2008 (attached), only one sinkhole has occurred at the landfill. Based on photography provided by the County, the sinkhole was a few feet in diameter and a few feet deep (see Drawing 1 for location of this feature). SCS reviewed available sinkhole records for a five-mile radius around the landfill to assess the historical occurrence of sinkholes in the area and what the statistical maximum dimensions would be for potential future sinkholes.

SCS reviewed the Florida Geological Survey (FGS) sinkhole database and the FDEP sinkhole database to evaluate the sinkhole occurrences both on-site and in the vicinity of the site (within a five-mile radius). The information obtained included latitude, longitude, date of occurrence, shape, dimensions, soil types, and additional comments.

The sinkhole databases were downloaded and the information was imported into a Geographical Information System (GIS) map (Figure 1). A five-mile radius from the edge of the landfill was placed on the map and the sinkholes located within that boundary were used in the evaluation. Twenty-one sinkholes have been reported within five miles of the landfill (not including the on-site sinkhole discussed above). These have been reported over a 26-year period, with the closest of these approximately 0.4 miles from the north side of the landfill. The data for three of the sinkholes listed in Table 1 were obtained from the FDEP sinkhole database and did not have dimensional data listed. However, dimensions are listed for the 18 sinkholes included in the FGS database and were used to estimate the statistically largest sinkhole anticipated potentially to occur at the landfill.

Table 1 includes the sinkhole dimensions and statistics used to predict the probably maximum size of sinkholes that occur at the landfill. The maximum anticipated dimensions were calculated using the confidence function of Microsoft Excel™ to obtain the standard deviation and confidence intervals for the arithmetic means of the dimension data listed in Table 1. The results indicate that the mean dimensions of the 18 sinkholes with reported data are 5.47 feet long, by 3.847 feet wide, by 5 feet deep. The calculated Confidence intervals (95%) were added to the means to calculate the anticipated maximum dimensions.

The likely size of a potential sinkhole was estimated based on the size of the reported sinkholes within a five mile radius and using a 95% confidence level. The statistical results, as listed in Table 1, indicate that there is a 95% chance that a sinkhole occurring within the five-mile radius from the landfill will be less than 8.04 feet across.

ENGINEERING DESIGN ADDRESSING POTENTIAL SINKHOLE OCCURRENCE

SCS believes the chance a sinkhole would form under the liner system of the Phase 3 expansion is very small. We base this opinion on the spacial frequency of the known sinkholes in the area and the known mechanisms that cause sinkhole formation (i.e., water infiltration or <u>significant</u> fluctuations in groundwater elevations). We would not expect either of these mechanisms to occur under an impervious liner system. Also, SCS is not aware of any reported cases of sinkhole formation under a liner system.

Nevertheless, we have proposed an additional geosynthetic reinforcement layer (i.e., biaxial geogrid) under the entire liner system. We have included supporting calculations for the specified product, specification, and revised details to incorporate this element into the project design.

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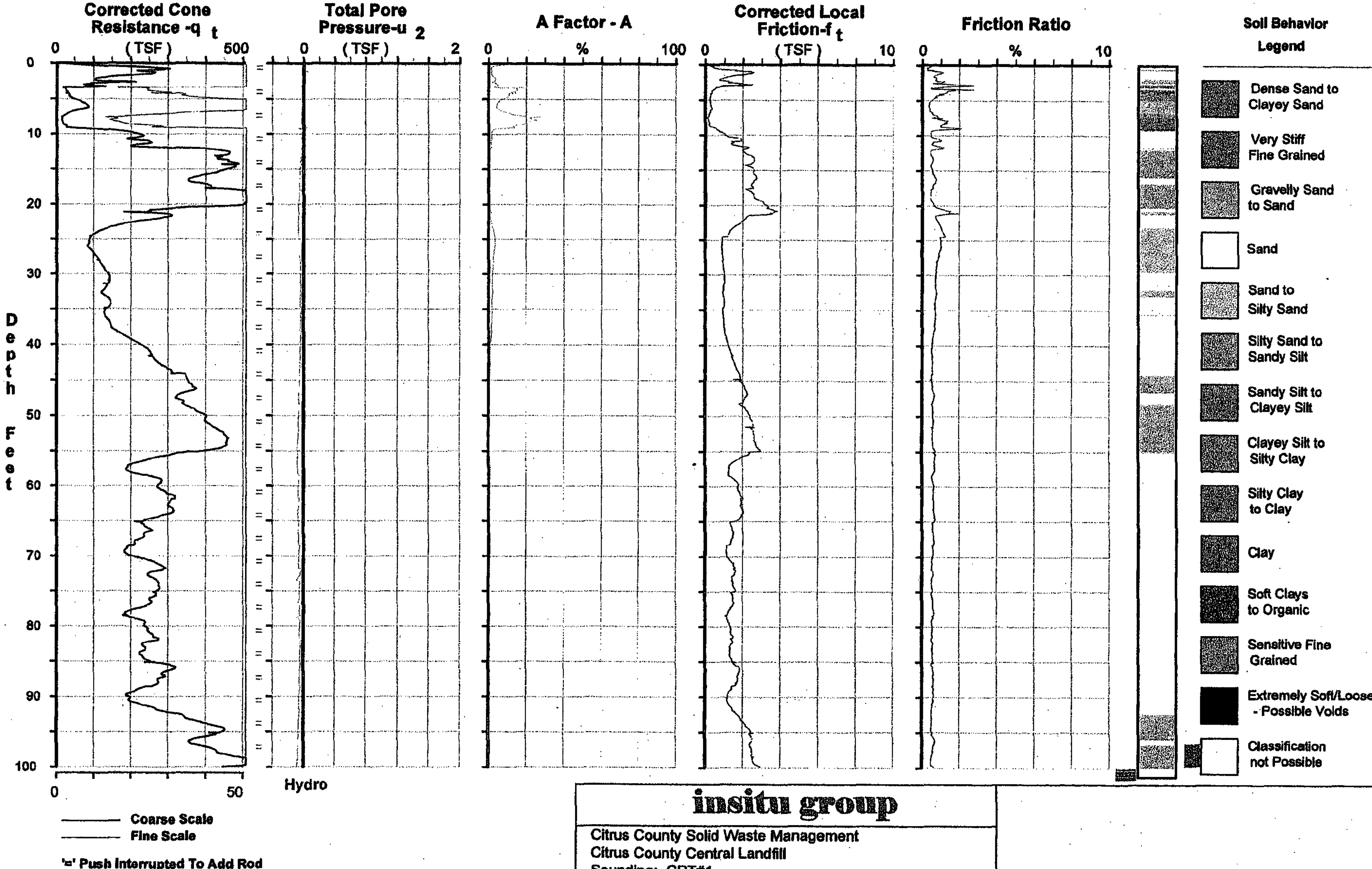
PIEZOCONE SOUNDING CPT#1



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Citrus County Solid Waste Management
Citrus County Central Landfill
Sounding: CPT#1
Test-Date 05-01-2009 09:54:28

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STANDARD SOIL BEHAVIOR TABLE

Depth (Feet)	Soil Behavior Type	Qc (TSF)	Lf (TSF)	N (#)	Vertical Effective Stress (TSF)	Relative Density (%)	Friction Angle (Degrees)	Constrained Modulus (TSF)	Undrained Shear Strength (TSF)	Sens.	Comp.	OCR
1	SAND	261.8	1.66	51	.045	>85%	>43	575.9	–	–	–	–
2	SAND	137.66	1.05	27	.091	>85%	>43	302.8	–	–	–	–
3	SAND TO SILTY SAND	98.4	1.16	24	.139	65%-85%	>43	216.4	–	–	–	–
4	SILTY SAND TO SANDY SILT	29.02	0.3	9	.188	50%-58%	37-39	63.7	–	–	–	–
5	SAND TO SILTY SAND	49.97	0.24	12	.236	50%-58%	39-41	109.9	–	–	–	–
6	SAND TO SILTY SAND	78.4	0.29	19	.284	58%-65%	39-41	172.4	–	–	–	–
7	SILTY SAND TO SANDY SILT	33.48	0.2	11	.333	42%-50%	35-37	73.5	–	–	–	–
8	SANDY SILT TO CLAYEY SILT	16.12	0.16	6	.386	35-42%	31-33	35.4	–	–	–	–
9	SAND TO SILTY SAND	73.46	0.51	18	.434	50%-58%	37-39	161.5	–	–	–	–
10	SAND	218	1.29	43	.479	>85%	41-43	479.5	–	–	–	–
11	SAND	230.19	1.55	45	.525	>85%	41-43	506.3	–	–	–	–
12	GRAVELLY SAND TO SAND	365.15	2.09	59	.569	>85%	>43	803.2	–	–	–	–
13	GRAVELLY SAND TO SAND	442.81	2.49	72	.613	>85%	>43	974.1	–	–	–	–
14	GRAVELLY SAND TO SAND	470.44	2.39	77	.657	>85%	>43	1034.9	–	–	–	–
15	GRAVELLY SAND TO SAND	442.02	2.58	72	.701	>85%	>43	972.3	–	–	–	–
16	SAND	372.52	2.67	73	.747	>85%	41-43	819.5	–	–	–	–
17	GRAVELLY SAND TO SAND	393.17	2.49	64	.791	>85%	41-43	864.8	–	–	–	–
18	GRAVELLY SAND TO SAND	504.76	2.4	82	.835	>85%	>43	1110.4	–	–	–	–
19	GRAVELLY SAND TO SAND	566.59	2.84	92	.879	>85%	>43	1246.4	–	–	–	–
20	SAND	409.59	3.35	80	.924	>85%	41-43	901	–	–	–	–
21	SAND	268.81	3.1	53	.97	>85%	39-41	591.2	–	–	–	–
22	SAND	239.89	1.96	47	1.016	>85%	39-41	527.7	–	–	–	–
23	SAND TO SILTY SAND	146.24	1.47	36	1.064	58%-65%	37-39	321.6	–	–	–	–
24	SAND TO SILTY SAND	100.04	1.09	24	1.112	50%-58%	35-37	220	–	–	–	–
25	SAND TO SILTY SAND	88.02	0.87	21	1.16	50%-58%	33-35	193.5	–	–	–	–
26	SAND TO SILTY SAND	90.05	0.87	22	1.209	50%-58%	33-35	198	–	–	–	–
27	SAND TO SILTY SAND	104.91	0.91	26	1.257	50%-58%	35-37	230.7	–	–	–	–
28	SAND TO SILTY SAND	117.37	0.91	29	1.305	50%-58%	35-37	258.1	–	–	–	–
29	SAND	129.57	0.96	25	1.351	50%-58%	35-37	284.9	–	–	–	–
30	SAND	139.51	0.99	27	1.397	50%-58%	35-37	306.8	–	–	–	–
31	SAND	136.54	0.97	27	1.442	50%-58%	35-37	300.4	–	–	–	–
32	SAND TO SILTY SAND	124.8	0.94	30	1.49	50%-58%	35-37	274.5	–	–	–	–
33	SAND	136.58	0.97	27	1.536	50%-58%	35-37	300.4	–	–	–	–
34	SAND	140.75	0.97	28	1.582	50%-58%	35-37	309.6	–	–	–	–
35	SAND	128.92	0.93	25	1.627	50%-58%	33-35	283.6	–	–	–	–
36	SAND	136.95	0.96	27	1.673	50%-58%	35-37	301.2	–	–	–	–
37	SAND	147.96	1	29	1.719	50%-58%	35-37	325.4	–	–	–	–
38	SAND	171.78	1.03	34	1.764	50%-58%	35-37	377.8	–	–	–	–
39	SAND	206.94	1.15	40	1.81	58%-65%	35-37	455.2	–	–	–	–
40	SAND	239.11	1.28	47	1.856	58%-65%	37-39	525.9	–	–	–	–

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Citrus County Solid Waste Management
Citrus County Central Landfill
Sounding # CPT#1
Test Date Test-Date 05-01-2009 09:54:28

STANDARD SOIL BEHAVIOR TABLE

Depth (Feet)	Soil Behavior Type	Qc (TSF)	Lf (TSF)	N (#)	Vertical Effective Stress (TSF)	Relative Density (%)	Friction Angle (Degrees)	Constrained Modulus (TSF)	Undrained Shear Strength (TSF)	Sens.	Comp.	OCR
41	SAND	255.87	1.4	50	1.901	65%-85%	37-39	562.8	–	–	–	–
42	SAND	273.17	1.53	53	1.947	65%-85%	37-39	600.9	–	–	–	–
43	SAND	301.91	1.7	59	1.992	65%-85%	37-39	664.1	–	–	–	–
44	GRAVELLY SAND TO SAND	345.7	1.81	56	2.036	>85%	37-39	760.4	–	–	–	–
45	GRAVELLY SAND TO SAND	358.87	2.02	58	2.08	>85%	37-39	789.4	–	–	–	–
46	GRAVELLY SAND TO SAND	353.87	2.18	58	2.124	>85%	37-39	778.5	–	–	–	–
47	SAND	327.44	2.09	64	2.17	65%-85%	37-39	720.3	–	–	–	–
48	GRAVELLY SAND TO SAND	347.82	1.97	57	2.214	65%-85%	37-39	765.1	–	–	–	–
49	GRAVELLY SAND TO SAND	384.86	2.29	63	2.258	>85%	37-39	846.6	–	–	–	–
50	GRAVELLY SAND TO SAND	399.11	2.47	65	2.302	>85%	37-39	877.9	–	–	–	–
51	GRAVELLY SAND TO SAND	421.34	2.5	69	2.346	>85%	37-39	926.9	–	–	–	–
52	GRAVELLY SAND TO SAND	449.1	2.6	73	2.39	>85%	37-39	988	–	–	–	–
53	GRAVELLY SAND TO SAND	455.83	2.66	74	2.434	>85%	37-39	1002.7	–	–	–	–
54	GRAVELLY SAND TO SAND	411.38	2.69	67	2.478	>85%	37-39	905	–	–	–	–
55	SAND	285.09	2.02	56	2.524	58%-65%	35-37	627.1	–	–	–	–
56	SAND	212.58	1.41	42	2.569	50%-58%	35-37	467.6	–	–	–	–
57	SAND	192.73	1.24	38	2.615	50%-58%	33-35	423.9	–	–	–	–
58	SAND	257.15	1.39	50	2.661	58%-65%	35-37	565.7	–	–	–	–
59	SAND	275.2	1.71	54	2.706	58%-65%	35-37	605.4	–	–	–	–
60	SAND	291.1	1.79	57	2.752	58%-65%	35-37	640.4	–	–	–	–
61	SAND	311.66	1.92	61	2.797	58%-65%	35-37	685.5	–	–	–	–
62	SAND	303.23	1.92	59	2.843	58%-65%	35-37	667	–	–	–	–
63	SAND	302.78	1.98	59	2.889	58%-65%	35-37	666.1	–	–	–	–
64	SAND	242.04	1.59	47	2.934	50%-58%	35-37	532.4	–	–	–	–
65	SAND	241.18	1.4	47	2.98	50%-58%	35-37	530.6	–	–	–	–
66	SAND	240.07	1.46	47	3.026	50%-58%	33-35	528.1	–	–	–	–
67	SAND	215.15	1.35	42	3.071	50%-58%	33-35	473.2	–	–	–	–
68	SAND	190.5	1.1	37	3.117	42%-50%	33-35	419	–	–	–	–
69	SAND	199.88	1.16	39	3.163	42%-50%	33-35	439.7	–	–	–	–
70	SAND	260.9	1.41	51	3.208	50%-58%	35-37	573.8	–	–	–	–
71	SAND	279.33	1.56	55	3.254	50%-58%	35-37	614.5	–	–	–	–
72	SAND	252.99	1.47	49	3.299	50%-58%	33-35	556.4	–	–	–	–
73	SAND	273.19	1.47	53	3.345	50%-58%	35-37	601	–	–	–	–
74	SAND	269.83	1.49	53	3.391	50%-58%	33-35	593.5	–	–	–	–
75	SAND	257.32	1.47	50	3.436	50%-58%	33-35	566	–	–	–	–
76	SAND	245.12	1.43	48	3.482	50%-58%	33-35	539.2	–	–	–	–
77	SAND	192.59	1.19	38	3.528	42%-50%	33-35	423.6	–	–	–	–
78	SAND	215.56	1.18	42	3.573	42%-50%	33-35	474.2	–	–	–	–
79	SAND	239.34	1.33	47	3.619	50%-58%	33-35	526.5	–	–	–	–
80	SAND	252.45	1.39	49	3.665	50%-58%	33-35	555.3	–	–	–	–

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Citrus County Solid Waste Management
Citrus County Central Landfill
Sounding # CPT#1
Test Date Test-Date 05-01-2009 09:54:28

STANDARD SOIL BEHAVIOR TABLE

Depth (Feet)	Soil Behavior Type	Qc (TSF)	Lf (TSF)	N (#)	Vertical Effective Stress (TSF)	Relative Density (%)	Friction Angle (Degrees)	Constrained Modulus (TSF)	Undrained Shear Strength (TSF)	Sens.	Comp.	OCR
81	SAND	258.27	1.41	50	3.71	50%-58%	33-35	568.1	--	--	--	--
82	SAND	235.03	1.32	46	3.756	50%-58%	33-35	516.9	--	--	--	--
83	SAND	227.51	1.32	44	3.801	42%-50%	33-35	500.5	--	--	--	--
84	SAND	263.58	1.5	52	3.847	50%-58%	33-35	579.8	--	--	--	--
85	SAND	306.84	1.79	60	3.893	50%-58%	33-35	675	--	--	--	--
86	SAND	281.3	1.71	55	3.938	50%-58%	33-35	618.8	--	--	--	--
87	SAND	263.64	1.57	52	3.984	50%-58%	33-35	579.9	--	--	--	--
88	SAND	212.05	1.31	41	4.03	42%-50%	31-33	466.4	--	--	--	--
89	SAND	192.69	1.18	38	4.075	35%-42%	31-33	423.8	--	--	--	--
90	SAND	230.98	1.3	45	4.121	42%-50%	33-35	508	--	--	--	--
91	SAND	293.66	1.56	57	4.167	50%-58%	33-35	645.9	--	--	--	--
92	GRAVELLY SAND TO SAND	356.46	1.92	58	4.211	58%-65%	35-37	784.1	--	--	--	--
93	GRAVELLY SAND TO SAND	426.52	2.23	69	4.255	65%-85%	35-37	938.2	--	--	--	--
94	GRAVELLY SAND TO SAND	428.88	2.41	70	4.298	65%-85%	35-37	943.5	--	--	--	--
95	SAND	363.53	2.43	71	4.344	58%-65%	35-37	799.6	--	--	--	--
96	GRAVELLY SAND TO SAND	404.64	2.4	66	4.388	65%-85%	35-37	890.1	--	--	--	--
97	GRAVELLY SAND TO SAND	461.97	2.48	75	4.432	65%-85%	35-37	1016.2	--	--	--	--
98	GRAVELLY SAND TO SAND	530.75	2.61	86	4.476	>85%	35-37	1167.5	--	--	--	--
99	GRAVELLY SAND TO SAND	443.19	2.92	72	4.52	65%-85%	35-37	975	--	--	--	--
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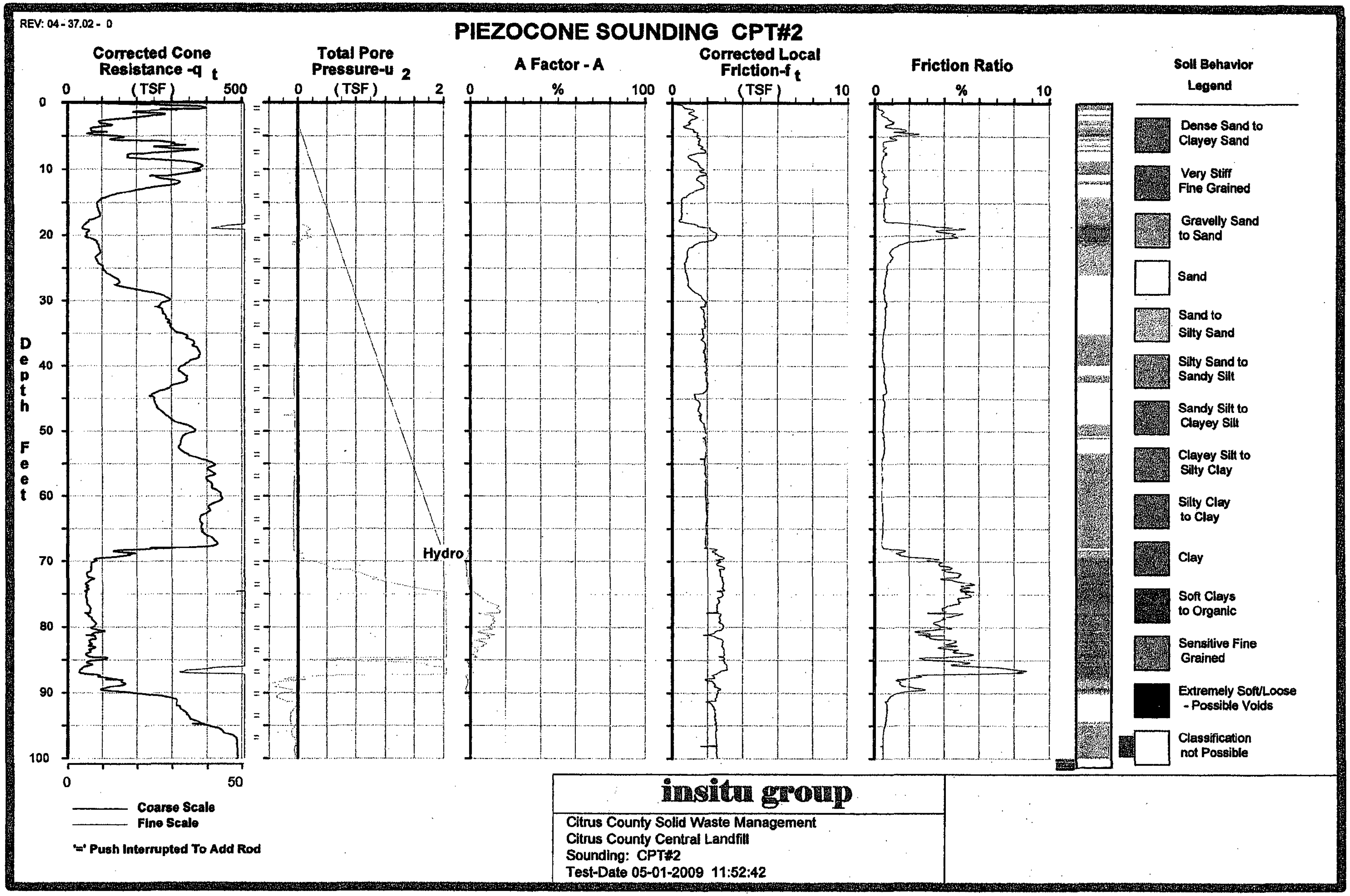
Citrus County Solid Waste Management
Citrus County Central Landfill
Sounding # CPT#1
Test Date Test-Date 05-01-2009 09:54:28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Depth Feet
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10
20
30
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60
70
80
90
100
0
50
Hydro
Soil Behavior Legend
Dense Sand to Clayey Sand
Very Stiff Fine Grained
Gravelly Sand to Sand
Sand
Sand to Silty Sand
Silty Sand to Sandy Silt
Sandy Silt to Clayey Silt
Clayey Silt to Silty Clay
Silty Clay to Clay
Clay
Soft Clays to Organic
Sensitive Fine Grained
Extremely Soft/Loose - Possible Voids
Classification not Possible
Coarse Scale
Fine Scale
'=' Push Interrupted To Add Rod
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Citrus County Solid Waste Management
Citrus County Central Landfill
Sounding: CPT#2
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STANDARD SOIL BEHAVIOR TABLE

Depth (Feet)	Soil Behavior Type	Qc (TSF)	Lf (TSF)	N (#)	Vertical Effective Stress (TSF)	Relative Density (%)	Friction Angle (Degrees)	Constrained Modulus (TSF)	Undrained Shear Strength (TSF)	Sens.	Comp.	OCR
1	GRAVELLY SAND TO SAND	308.9	0.96	50	.043	>85%	>43	679.5	–	–	–	–
2	SAND	218.18	1.19	43	.089	>85%	>43	479.9	–	–	–	–
3	SAND TO SILTY SAND	105.92	0.91	26	.137	65%-85%	>43	232.9	–	–	–	–
4	SILTY SAND TO SANDY SILT	78.58	1.12	26	.164	58%-65%	41-43	172.8	–	–	–	–
5	SAND TO SILTY SAND	119.15	1.46	29	.19	65%-85%	>43	262.1	–	–	–	–
6	SAND	277.81	1.54	54	.214	>85%	>43	611.1	–	–	–	–
7	SAND	303.02	1.75	59	.238	>85%	>43	666.6	–	–	–	–
8	SAND	192.39	1.04	38	.261	>85%	>43	423.2	–	–	–	–
9	GRAVELLY SAND TO SAND	355.38	1.43	58	.285	>85%	>43	781.7	–	–	–	–
10	GRAVELLY SAND TO SAND	367.05	1.72	60	.309	>85%	>43	807.4	–	–	–	–
11	SAND	281.01	1.52	55	.333	>85%	>43	618.2	–	–	–	–
12	SAND	304.17	1.68	59	.356	>85%	>43	669	–	–	–	–
13	SAND	193.73	1.37	38	.38	>85%	41-43	426.2	–	–	–	–
14	SAND TO SILTY SAND	113.65	0.69	28	.406	58%-65%	39-41	249.9	–	–	–	–
15	SAND TO SILTY SAND	87.34	0.5	21	.433	58%-65%	39-41	192.1	–	–	–	–
16	SAND TO SILTY SAND	89.49	0.49	22	.459	58%-65%	37-39	196.8	–	–	–	–
17	SAND TO SILTY SAND	82.88	0.45	20	.485	58%-65%	37-39	182.2	–	–	–	–
18	SILTY SAND TO SANDY SILT	52.72	1.05	17	.512	50%-58%	35-37	115.9	–	–	–	–
19	CLAYEY SILT TO SILTY CLAY	52.21	2.18	26	.543	–	–	–	3.49	2.3	0	>6
20	CLAYEY SILT TO SILTY CLAY	60.98	2.41	30	.574	–	–	–	4.08	2.5	0	>6
21	SILTY SAND TO SANDY SILT	86.19	1.48	28	.6	50%-58%	37-39	189.5	–	–	–	–
22	SAND TO SILTY SAND	92.82	0.86	23	.627	50%-58%	37-39	204.1	–	–	–	–
23	SAND TO SILTY SAND	83.98	0.8	21	.653	50%-58%	37-39	184.7	–	–	–	–
24	SAND TO SILTY SAND	91.6	0.71	22	.679	50%-58%	37-39	201.5	–	–	–	–
25	SAND TO SILTY SAND	105	0.73	26	.706	50%-58%	37-39	230.9	–	–	–	–
26	SAND	130.62	0.83	26	.729	58%-65%	37-39	287.3	–	–	–	–
27	SAND	144.84	0.88	28	.753	58%-65%	37-39	318.6	–	–	–	–
28	SAND	207.99	1.14	41	.777	>85%	39-41	457.5	–	–	–	–
29	SAND	279.18	1.64	55	.801	>85%	41-43	614.1	–	–	–	–
30	SAND	271.69	1.8	53	.824	>85%	41-43	597.6	–	–	–	–
31	SAND	270.19	1.74	53	.848	>85%	39-41	594.3	–	–	–	–
32	SAND	282.15	1.79	55	.872	>85%	41-43	620.6	–	–	–	–
33	SAND	292.74	1.83	57	.896	>85%	41-43	644	–	–	–	–
34	SAND	303.93	1.74	59	.92	>85%	41-43	668.5	–	–	–	–
35	GRAVELLY SAND TO SAND	340.8	1.72	55	.943	>85%	41-43	749.7	–	–	–	–
36	GRAVELLY SAND TO SAND	361.14	1.82	59	.967	>85%	41-43	794.4	–	–	–	–
37	GRAVELLY SAND TO SAND	373.75	1.81	61	.991	>85%	41-43	822.2	–	–	–	–
38	GRAVELLY SAND TO SAND	376.24	1.86	61	1.015	>85%	41-43	827.7	–	–	–	–
39	GRAVELLY SAND TO SAND	344.37	1.9	56	1.038	>85%	41-43	757.6	–	–	–	–
40	SAND	322.4	1.91	63	1.062	>85%	39-41	709.2	–	–	–	–

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STANDARD SOIL BEHAVIOR TABLE

Depth (Feet)	Soil Behavior Type	Qc (TSF)	Lf (TSF)	N (#)	Vertical Effective Stress (TSF)	Relative Density (%)	Friction Angle (Degrees)	Constrained Modulus (TSF)	Undrained Shear Strength (TSF)	Sens.	Comp.	OCR
41	GRAVELLY SAND TO SAND	337.57	1.92	55	1.086	>85%	39-41	742.5	–	–	–	–
42	SAND	326.62	1.98	64	1.11	>85%	39-41	718.5	–	–	–	–
43	SAND	280.92	1.94	55	1.134	>85%	39-41	618	–	–	–	–
44	SAND	245.9	1.37	48	1.157	>85%	39-41	540.9	–	–	–	–
45	SAND	251.45	1.5	49	1.181	>85%	39-41	553.1	–	–	–	–
46	SAND	261.43	1.5	51	1.205	>85%	39-41	575.1	–	–	–	–
47	SAND	283.36	1.59	55	1.229	>85%	39-41	623.3	–	–	–	–
48	SAND	312.12	1.69	61	1.252	>85%	39-41	686.5	–	–	–	–
49	GRAVELLY SAND TO SAND	358.59	1.84	58	1.276	>85%	39-41	788.8	–	–	–	–
50	GRAVELLY SAND TO SAND	336.61	1.86	55	1.3	>85%	39-41	740.5	–	–	–	–
51	SAND	324.91	1.86	63	1.324	>85%	39-41	714.7	–	–	–	–
52	SAND	321.42	1.9	63	1.348	>85%	39-41	707	–	–	–	–
53	GRAVELLY SAND TO SAND	349.08	1.88	57	1.371	>85%	39-41	767.9	–	–	–	–
54	GRAVELLY SAND TO SAND	401.39	1.8	65	1.395	>85%	39-41	883	–	–	–	–
55	GRAVELLY SAND TO SAND	406.22	1.86	66	1.419	>85%	39-41	893.6	–	–	–	–
56	GRAVELLY SAND TO SAND	411.12	1.87	67	1.443	>85%	39-41	904.4	–	–	–	–
57	GRAVELLY SAND TO SAND	403.75	1.87	66	1.466	>85%	39-41	888.2	–	–	–	–
58	GRAVELLY SAND TO SAND	417.82	1.87	68	1.49	>85%	39-41	919.1	–	–	–	–
59	GRAVELLY SAND TO SAND	436.94	1.86	71	1.514	>85%	39-41	961.2	–	–	–	–
60	GRAVELLY SAND TO SAND	427.69	1.91	70	1.538	>85%	39-41	940.8	–	–	–	–
61	GRAVELLY SAND TO SAND	405.1	1.92	66	1.562	>85%	39-41	891.1	–	–	–	–
62	GRAVELLY SAND TO SAND	390.24	1.95	64	1.585	>85%	39-41	858.4	–	–	–	–
63	GRAVELLY SAND TO SAND	380.51	1.94	62	1.609	>85%	39-41	837	–	–	–	–
64	GRAVELLY SAND TO SAND	384.41	1.91	63	1.633	>85%	39-41	845.6	–	–	–	–
65	GRAVELLY SAND TO SAND	394.72	1.91	64	1.657	>85%	39-41	868.3	–	–	–	–
66	GRAVELLY SAND TO SAND	421.51	1.86	69	1.68	>85%	39-41	927.2	–	–	–	–
67	SAND	317.01	2.04	62	1.704	>85%	37-39	697.3	–	–	–	–
68	SAND TO SILTY SAND	159.86	2.52	39	1.73	50%-58%	35-37	351.6	–	–	–	–
69	SANDY SILT TO CLAYEY SILT	78.36	2.68	31	1.759	35-42%	31-33	172.3	–	–	–	–
70	CLAYEY SILT TO SILTY CLAY	67.88	2.74	33	1.791	–	–	–	4.37	2.4	0	6
71	SILTY CLAY to CLAY	59.19	2.73	39	1.822	–	–	–	3.77	2.1	.01	6
72	CLAYEY SILT TO SILTY CLAY	62.52	2.84	31	1.853	–	–	–	3.99	2.2	0	6
73	SILTY CLAY to CLAY	55.12	2.85	36	1.884	–	–	–	3.49	1.9	.01	6
74	CLAYS	52.08	2.79	51	1.916	–	–	–	3.27	1.8	.02	6
75	SILTY CLAY to CLAY	54.3	2.61	35	1.947	–	–	–	3.42	2	.01	6
76	CLAYEY SILT TO SILTY CLAY	61.54	2.49	30	1.978	–	–	–	3.91	2.4	0	6
77	CLAYEY SILT TO SILTY CLAY	60.09	2.52	29	2.009	–	–	–	3.81	2.3	0	6
78	CLAYEY SILT TO SILTY CLAY	71.82	2.66	35	2.041	–	–	–	4.6	2.6	0	6
79	CLAYEY SILT TO SILTY CLAY	75.62	2.83	37	2.072	–	–	–	4.86	2.6	0	6
80	SANDY SILT TO CLAYEY SILT	79.97	2.25	31	2.101	<35%	31-33	175.8	–	–	–	–

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STANDARD SOIL BEHAVIOR TABLE

Depth (Feet)	Soil Behavior Type	Qc (TSF)	Lf (TSF)	N (#)	Vertical Effective Stress (TSF)	Relative Density (%)	Friction Angle (Degrees)	Constrained Modulus (TSF)	Undrained Shear Strength (TSF)	Sens.	Comp.	OCR
81	CLAYEY SILT TO SILTY CLAY	68.81	2.74	34	2.132	–	–	–	4.39	2.5	0	6
82	CLAYEY SILT TO SILTY CLAY	68.15	2.86	33	2.163	–	–	–	4.34	2.3	0	6
83	VERY STIFF FINE GRAINED	58.42	2.89	57	2.195	–	–	–	3.67	2	.01	6
84	SANDY SILT TO CLAYEY SILT	78.79	2.91	31	2.223	<35%	29-31	173.2	–	–	–	–
85	CLAYS	50.32	3.06	49	2.255	–	–	–	3.11	1.6	.02	6
86	CLAYEY SILT TO SILTY CLAY	59.31	2.49	29	2.286	–	–	–	3.72	2.3	0	6
87	SAND TO SILTY SAND	139.16	2.15	34	2.312	35%-42%	33-35	306.1	–	–	–	–
88	SILTY SAND TO SANDY SILT	125.82	2.5	41	2.339	35%-42%	31-33	276.7	–	–	–	–
89	SAND TO SILTY SAND	204.04	2.53	50	2.365	50%-58%	35-37	448.8	–	–	–	–
90	SAND	308.04	2.27	60	2.389	65%-85%	37-39	677.6	–	–	–	–
91	SAND	319.42	2.31	62	2.412	65%-85%	37-39	702.6	–	–	–	–
92	SAND	340.07	2.4	66	2.436	65%-85%	37-39	748.1	–	–	–	–
93	SAND	362.52	2.42	71	2.46	65%-85%	37-39	797.5	–	–	–	–
94	GRAVELLY SAND TO SAND	410.44	2.45	67	2.484	>85%	37-39	902.9	–	–	–	–
95	GRAVELLY SAND TO SAND	458.85	2.44	75	2.507	>85%	37-39	1009.4	–	–	–	–
96	GRAVELLY SAND TO SAND	484.05	2.48	79	2.531	>85%	37-39	1064.8	–	–	–	–
97	GRAVELLY SAND TO SAND	485.44	2.44	79	2.555	>85%	37-39	1067.9	–	–	–	–
98	GRAVELLY SAND TO SAND	486.41	2.49	79	2.579	>85%	37-39	1070	–	–	–	–
99	GRAVELLY SAND TO SAND	484.54	2.51	79	2.603	>85%	37-39	1065.9	–	–	–	–
100.1	END OF SOUNDING	468.88										

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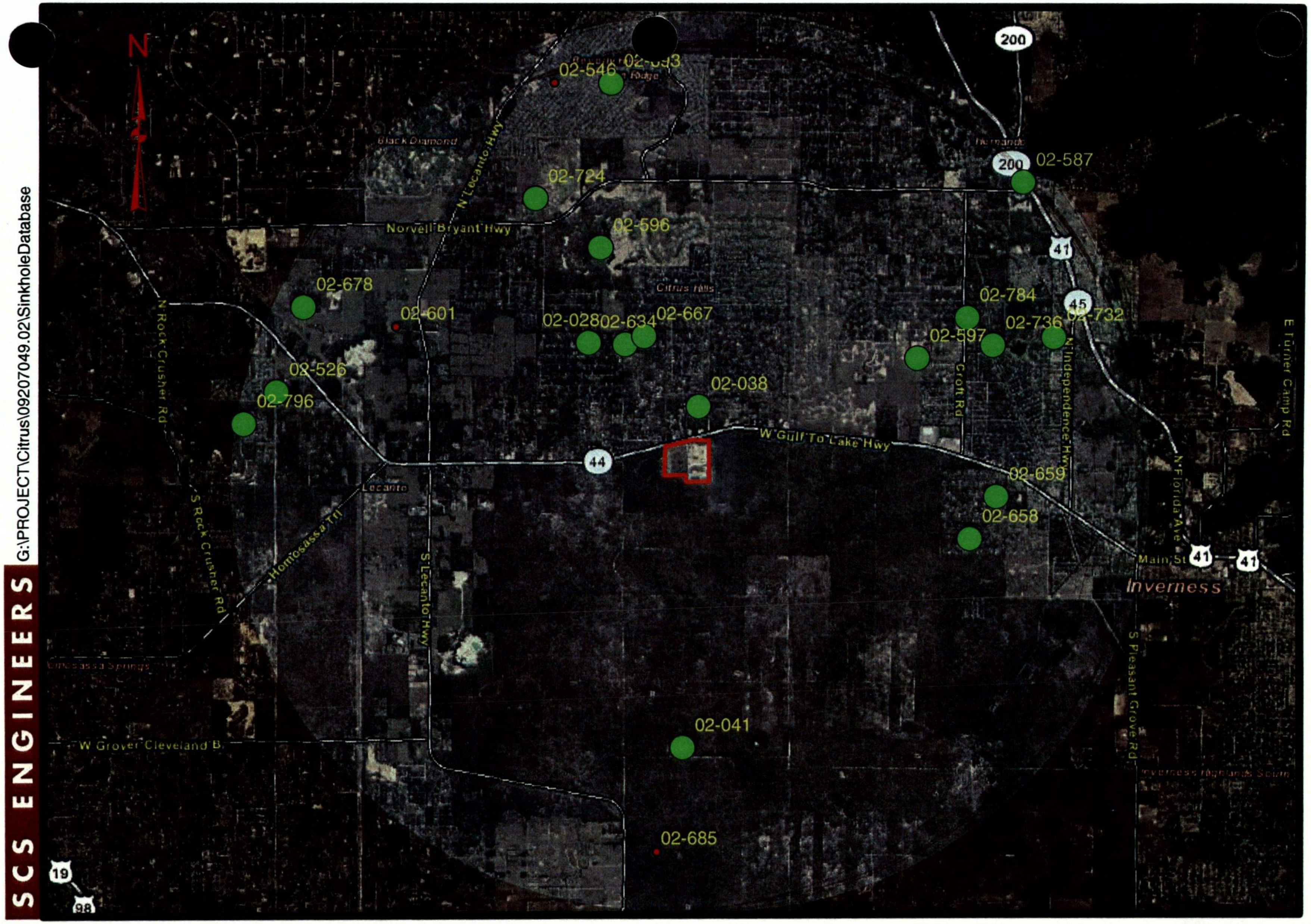

Figure 1. Proximal Sinkhole Inventory Map, Central Landfill, Citrus County, Florida

0 | 4,250 | 8,500 | 17,000 | 25,500 | 34,000 Feet

Legend

- Florida Geological Survey's Sinkhole Record Location
- Florida Department of Environmental Protection's Sinkhole Record Location
- Indicates land area within 5 miles of the Central Landfill's property boundary

Table 1. Summary of Proximal Sinkhole Records, Central Landfill, Citrus County, FL

Reference Number	Occurrence Date	Longitude			Latitude			Land Survey System			Sinkhole Parameters					Comments
		Dec. Deg.	Min.	Sec.	Dec. Deg.	Min.	Sec.	Township	Range	Section	Shape	X (Feet)	Y (Feet)	Z (Feet)	Soil Type	
02-028	6/14/2003	-82.457778	27	28	28.8725	52	21	18S	18E	35	C	2	2	3	UNKNOWN	SH FORMED IN MIDDLE OF PEARSON ST. SWP030614-3596. END. . . . .
02-038	5/17/1995	-82.436675	26	12.0304	28.86171	51	42.1562	19S	18E	1	E	10	2	4	CLEAN SANDY CLAY	AREA HAS A HISTORY OF SH'S. END. . . . . .
02-041	9/12/1995	-82.439637	26	22.6928	28.803132	48	11.454	19S	18E	25	C	3	3	4	FINE SAND	END. . . . . . .
02-526	8/16/1982	-82.517222	31	2	28.863889	51	50	18S	18E	31	C	4	4	4	UNKNOWN	NEAR- 525. IN LINE WITH525. END. . . . .
02-587	12/12/1984	-82.375	22	30	28.9	54	0	18S	19E	26	E	4	2	12	SAND	NO COMMENTS. END. . . . . .
02-596	7/13/1985	-82.455675	27	20.4292	28.888634	53	19.0822	18S	18E	26	U	4	0	0	SANDY	PARTLY UNDER HOUSE. END. . . . . .
02-597	9/8/1985	-82.395	23	42	28.87	52	12	19S	19E	3	C	18.5	15.25	10	SAND-MED	CRACKS BEHIND TREE SHOW THAT SINK WOULD BE. CIRCULAR IF NOT FOR THE TREE.. EST. OF TIME OF OCCURANCE BET. 2:30 AM-8:00 A.M.. END. . . .
02-634	10/22/1986	-82.450833	27	3	28.872222	52	20	18S	18E	36	C	4	4	0.5	UNKNOWN	BILL WILSON VISITED THE SITE. REPORT IN FILE.. . . . . .
02-658	5/28/1988	-82.384804	23	5.293	28.83912	50	20.8323	19S	19E	14	C	1	1	2	SAND	. . . .
02-659	5/28/1988	-82.379722	22	47	28.846389	50	47	19S	19E	11	C	6	6	7	SAND	. . . .
02-667	8/8/1988	-82.447222	26	50	28.873611	52	25	18S	18E	36	C	1	1	1	TOPSOIL	NO COMMENTS. . . . . . .
02-678	9/14/1988	-82.512222	30	44	28.878333	52	42	18S	18E	29	C	8	8	3	UNKNOWN	HEAVY RAINFALL OCCURRED DURING WEEK. SINKHOLE LOCATED NEAR 579, 679. . . . . .
02-693	12/2/1988	-82.45377	27	13.5711	28.916746	55	0.2848	18S	18E	14	C	1	1	3	UNKNOWN	. . . .
02-724	9/21/1988	-82.468056	28	5	28.896944	53	49	18S	18E	22	C	3	3	3	SAND	. . . .
02-732	1/25/1989	-82.368889	22	8	28.873611	52	25	18S	19E	36	C	1	1	4	SAND	NO COMENTS. . . . . . .
02-736	3/8/1989	-82.380556	22	50	28.872222	52	20	19S	19E	2	E	4	2	1	SAND	SINK LOCATED NEAR 597. . . . . . .
02-784	4/3/1991	-82.385556	23	8	28.876944	52	37	18S	19E	35	C	4	4	4	SANDY	HOLE REOPENED ON APRIL 23 SFTER HEAVY RAINS.. . . . . . .
02-796	4/26/1991	-82.52337	31	24.1304	28.858447	51	30.4094	19S	18E	6	E	20	10	25	SAND	Witness described sinkhole as chimney.. . . . . . .
02-546*	5/15/1983	-82.46444	27	52	28.91667	55	0	-18	17	6						
02-601*	9/25/1985	-82.49444	29	40	28.875	52	30	-18	17	36						
02-685*	10/18/1988	-82.44444	26	40	28.78528	47	7	-19	17	35						

	X	Y	Z
Mean Value	5.47	3.847	5
Standard Deviation	5.56	3.851	5.9
Confidence	2.57	1.779	2.7
Maximum Value	8.04	5.626	7.7

Notes:

1. Data obtained from the Florida Geological Survey's Sinkhole Database unless otherwise specified.

2. Data with an asterisk (02-546*) was obtained from the Florida Department of Environmental Protection sinkhole database and does not include sinkhole parameters or comments.

3. Reference numbers are assigned by the Florida DOT and correspond to the sinkhole labels in Figure ()

4. Sinkhole Shape Key:

C = Circular

E = Elongated

U = Unknown

5. Sinkhole Parameters: X = Length, Y = Width, Z = Depth

Citrus County Landfill

Karst Sensitive Area Assessment Summary

December 18, 2008

In response to the Florida Department of Environmental Protection item 13 of the request for additional information for the Phase III expansion Environmental Resource Permit, Mr. Robert L. Westly, P.G., of SCS Engineers (SCS) has performed a karst sensitive area assessment. The following summarizes his assessment by repeating and responding to the specific requests of item 13, which is signed and sealed as certification of the assessment findings.

13. Pursuant to Basis of Review Section 6.4.1 b., please provide the following items:

- **Please provide any history of sink holes or karst formation in the perimeter swale and in the DRA-5 stormwater pond based on (1) solid waste facility or County documentation. (2) appropriate data base(s) such as the FDEP data base at <u>http://www.dep.state.fl.us/geologictopic/sinkhole.htm</u>; (3) geotechnical work and (4) NRCS soils map.**

<u>Response:</u> Based on a conversation with Mr. Prime DeVaughn, the Foreman and Field Crew Leader for the landfill since beginning of operations, no sinkholes have occurred either in the perimeter swale or DRA-5. However, a small subsidence feature (a few feet wide and deep) occurred approximately 2 years ago in DRA-3, and was photographed by the County.

SCS reviewed the photography of the subsidence feature and concluded that the feature appears to be a sinkhole described in the U.S. Geological Survey Water-Resources Investigations Report 85-4126 as a cover subsidence sinkhole. This type of sinkhole is caused by raveling of surficial sands into an underlying void(s) (e.g., solution pipes, fractures, or other openings). In areas in Citrus County along the Brooksville Ridge, where the landfill is located, the sand mantle is relatively thick and cover-subsidence sinkholes may be only a few feet in diameter and depth. This occurs because, in the absence of a clay cap over the limestone, cavities in the limestone are filled with sand before the sinkhole can grow to large size. The lack of this clay cap at the landfill site should not allow the opportunity for development of large and deep sinkholes that allow direct connection of the Floridan aquifer to land surface.

Review of the FDEP sinkhole data base indicates that the closest other recorded sinkhole is approximately 0.4 miles from the north side of the landfill. A geotechnical study performed by Universal Engineering Sciences[1] advanced 10 borings at the landfill to depths of 30 to 120 feet at the landfill. Sands and slightly clayey sands were observed to 120 feet below land surface (bls) and groundwater was encountered at approximately 100 feet bls. The geotechnical study did not report finding any indication of subsidence or sinkhole features.

The National Cooperative Soil Survey for the landfill area indicates approximately 86 percent of the natural soils at the landfill are Group A soils and indicates that the remaining 14 percent are Group C soils. Group A soils are deep well-drained to excessively-drained sands. Group C soils are those which have a layer that impedes downward movement of water or are finer grained and thus transmit water more slowly. Most of the soils at the landfill are Group A soils.

SCS reviewed photolineations in the vicinity of the landfill early in its development. The photolineations in the region around the landfill do not cross the landfill. Lineations crossing the landfill would suggest the potential for sinkholes along the lineations, but these are not present. Also, there is a pre-existing photolineament study and supplemental lineament study prepared by Post, Buckley, Schuh and Jernigan, Inc., (PBS&J report)[2] of the landfill area. None of the lineations pass through the landfill. Further, the PBS&J report concluded that there are no active sinkholes or solution features near the landfill.

- **Based on the determination, a professional geologist should certify whether or not the perimeter swale system and the DRA-5 are located in a karst sensitive area, and justify.**

Response: SCS reviewed a report prepared by Jones Edmunds and Associates (JEA report) for the Southwest Florida Water Management District (SWFWMD) regarding karst-sensitive areas[3] to address this comment. The report established seven criteria that JEA determined have attributes that possess a strong correlation with the presence of sinkholes and provides regional maps of southwest Florida, including Citrus County, that indicate areas ranked from low to high likelihood of sinkhole development. The Citrus County landfill is located in a region that ranks toward the high end of the likelihood

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[1] Universal Engineering Sciences. *Geotechnical Investigation for Citrus County Central Landfill New Disposal Cell S.R. 44 Citrus County, Florida.* November 15, 2001.

[2] Post, Buckley, Schuh & Jernigan, Inc. *Citrus County Central Sanitary Landfill Expansion Site Groundwater Monitoring Plan.* Prepared for Board of County Commissioners, Citrus County, August 1988.

[3] Jones Edmunds and Associates. *Modeling Karst-Sensitive Area in Southwest Florida.* ESRI Paper No. 1608.

scale that the JEA report established for sinkhole development. The report advises that the evaluation was based on areas of 400 x400 meters (approximately 40-acre areas) and should be used for planning rather than examined at the site-specific level. However, the landfill is located on about 140 acres which may make it appropriate to examine the site using the criteria established in the report. These seven criteria and their estimated values at the landfill include:

- Elevation of the Top of the Floridan Aquifer - per the PBS&J report[4] natural land surface elevation at the landfill is between 100-135 feet NGVD; the top of the Floridan aquifer is located at 40-175 feet depth per PBS&J report; therefore, the elevation of top of Floridan aquifer at the landfill may range between +60 feet NGVD to -40 feet NGVD.

- Thickness of the Surficial Aquifer - Floridan aquifer is the surficial aquifer at the landfill and the criterion does not apply under these circumstances.

- Thickness of Overburden - as indicated above, the depth to the top of the Floridan aquifer, i.e., the thickness of the overburden, at the landfill is between 40 to 175 feet.

- Thickness of the Hawthorn Group Layer - not present at the landfill.

- Distance from Top of Floridan Aquifer and its Potentiometric Surface – based on potentiometric maps of the SWFWMD, the potentiometric surface at the landfill is approximately +5 feet NGVD.

- Soil Type – 86 percent Group A; 14 percent Group C.

- Marine Terraces – landfill probably located on the Wicomico marine terrace.

SCS compared the applicable criteria values for the landfill to statistics presented in the JEA report.

Areas within the SWFWMD with the top of the Floridan aquifer located between +40 and -60 feet NGVD had sinkhole occurrences ranging from approximately 0.1 to 0.65 sinkholes per 100 acres, with the 0.65 value the maximum observed rate of occurrence. The landfill has had one sinkhole over 140 acres or approximately 0.7 sinkholes per 100 acres.

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[4] Post, Buckley, Schuh & Jernigan, Inc. *Citrus County Central Sanitary Landfill Expansion Site Groundwater Monitoring Plan.* Prepared for Board of County Commissioners, Citrus County, August 1988.

The overburden at the landfill ranges from 40 to 174 feet. The SWFWMD area that includes overburden in this range has approximately 0.05 to 0.02 sinkholes per 100 acres. Again, this is compared to 0.7 sinkholes per 100 acres at the landfill.

The Floridan potentiometric surface at the landfill is about +5 feet NGVD while the top of the Floridan varies between about +60 to -40 feet NGVD. Based on JEA's evaluation, this potential range of difference suggests a low likelihood of sinkhole development at the landfill.

Based on the above discussion and information available, the JEA report indicates that, relative to four of the seven criteria, the landfill is located in an area of the SWFWMD where, statistically, a greater number of sinkholes would be expected to occur . However, one criterion indicates relative low frequency of sinkhole occurrence and two criteria do not apply.

Based on these findings, SCS believes the landfill is located in a karst-sensitive region of Florida but it is not possible to separately assess the swale and DRA-5 area in accordance with the JEA report statistics. Consequently, it not possible to certify that the swale and DRA-5 are located in a specific karst-sensitive area. One naturally occurring sinkhole has occurred at the landfill but outside of the swale and DRA-5 area since beginning. It did not result in a direct connection between the Floridan aquifer and land surface. This is due to the slow development of cavities in the underlying limestone, low Floridan aquifer potentiometric level, lack of the presence of the Hawthorn Group, and the characteristics of the overlying mantle of sands and soils. It is possible that other sinkholes of similar characteristics may open in the future associated with water-driven raveling of sands in the DRAs; however, these can be repaired by proper backfilling without threatening the water quality of the Floridan aquifer. It is anticipated that backfilling will be performed using an inverted-filter design to stabilize land surface and allow continue operation of the DRAs in accordance with engineering design.

Robert L. Westly
12/19/08

Robert L. Westly, Florida PG117

SCS ENGINEERS			
		SHEET 1	of 3
CLIENT Citrus County	PROJECT Phase 3 Expansion	JOB NO. 09207049.02	
SUBJECT Design of Liner System Reinforcement for Potential Sinkholes		BY DAW	DATE 6/22/2009
		CHECKED [signature]	DATE 6/25/09

REFERENCES:

1. "Landfill Liner Support Over Yielding Foundations", by Terence G. Sheridan (referred to as Sheridan's Paper)
2. Citrus County RAI #2 Pipe Crushing Calculations
3. Citrus County RAI #2 Global Stability Calculations

DEFINITIONS:

B_1 - Diameter of the depression for the soil layer (sinkhole)
H_{C1} - Critical height of the soil arch
r_1 - Radius of the depression for the soil layer (sinkhole)
θ_1 - Half apex angle of the cone of soil within the soil layer
r_2 - radius at the base of the waste layer that remains unsupported
H_1 - Soil layer thickness
H_2 - Waste layer thickness
γ_1 - Soil unit weight
γ_2 - Waste unit weight
ϕ_1 - Soil friction angle
ϕ_2 - Waste friction angle
ϕ_1' - Conversion from soil friction angle to ratio of (H_{C1}/B_1) using Figure 2 in Sheridan's Paper
ϕ_2' - Conversion from waste friction angle to ratio of (H_{C2}/B_2) using Figure 2 in Sheridan's Paper
FS - Factor of safety
H_{C2} - Critical height of the soil arch within the waste layer
B_2 - Diameter of the unsupported foundation at the base of the waste layer
θ_2 - Half apex angle of the cone of soil within the waste layer
P_N - Pressure over yielding area at the base of the soil layer
τ_{all} - Maximum allowable strain in the liner system
τ_R - Multiaxial rupture strain in the liner system
T_R - Tensile strength required in a single layer of geogrid to support the lining system above the yielding foundation
Ω - Dimensionless factor used in determining T_R (from table 2 of Sheridan's Paper)
LTADS - Long term allowable design strength
T_{ULT} - Ultimate tensile strength, ($T_{ST}AT\tau_{all}$ in Sheridan's Paper, from product specifications)
T_{CR} - Creep reduced tensile strength (from product specifications)
FS_{CR} - Factor of safety for creep for the required design life
FS_D - Factor of safety for durability to account for chemical and biological degradation
FS_{ID} - Factor of safety for installation damage
FS_{JNTS} - Factor of safety for joints at roll ends

SCS ENGINEERS

SHEET 2 of 3

CLIENT	PROJECT	JOB NO.
Citrus County	Phase 3 Expansion	09207049.02

SUBJECT	BY	DATE
Design of Liner System Reinforcement for Potential Sinkholes	DAW	6/22/2009
	CHECKED [signature]	DATE 6/25/09

INPUT:

Max Design Height of Waste (H_2) =	135.00 feet	(from Pipe Crushing Calculations)
Friction Angle of Waste (ϕ_2) =	28.00 degrees	(from Global Stability Calculations)
Unit Weight of Waste (γ_2) =	76.50 lb/ft^3	(from Global Stability Calculations)
Thickness of Drainage Sand (H_1) =	2.00 feet	(from Pipe Crushing Calculations)
Friction Angle of Drainage Sand (ϕ_1) =	28.00 degrees	(from Global Stability Calculations)
Unit Weight of Drainage Sand (γ_1) =	110.00 lb/ft^3	(from Global Stability Calculations)
Design Diameter of Sinkhole (B_1) =	8.04 feet	
Design Radius of Sinkhole (r_1) =	4.02 feet	

STEP 1: DETERMINE THE CRITICAL HEIGHT (H_{c1})

Step 1a. Calculate ϕ_1' using Figure 2 of Sheridan's Paper. $\phi_1 = 0.60 \times \phi_1'$ for a sandy drainage sand as shown in Figure 2.

ϕ_1' = 46.67 degrees $\phi_1' = \phi_1/0.60$ (ϕ' is located in Figure 2 of Sheridan's paper)
(ϕ_1 is shown as θ in Figure 2 of Sheridan's Paper)

Step 1b. Use the value of ϕ_1' calculated from Figure 2 to determine the value of H_{c1}/B_1

H_{c1}/B_1 = 0.94 (from Figure 2 of Sheridan's paper)

Therefore, H_{c1} = 7.56 feet $H_{c1} = 0.94 \times B_1$

STEP 2: DETERMINE THE HALF APEX ANGLE (θ_1) OF THE SOIL CONE WITHIN THE DRAINAGE SAND

The half apex angle of the soil cone within the drainage sand above the bottom liner system (θ_1 in Figure 1 of Sheridan's paper) = $\tan^{-1}(r_1/H_{c1})$

θ_1 = 28.01 degrees $\theta_1 = \tan^{-1}(r_1/H_{c1})$ (from page 6, Step 2 of Sheridan's paper)

STEP 3: DETERMINE THE RADIUS (r_2) OF THE SOIL CONE WITHIN THE WASTE LAYER THAT IS UNSUPPORTED BY THE ARCH WITHIN THE SOIL LAYER

r_2 = 2.96 feet Using the equation $r_2 = (r_1/H_{c1}) \times (H_{c1}-H_1)$ from page 6, Step 3 of Sheridan's paper)

STEP 4: DETERMINE THE RATIO BETWEEN THE CRITICAL HEIGHT (Hc_2) OF THE SOIL ARCH WITHIN THE WASTE AND DIAMETER (B_2) OF THE UNSUPPORTED FOUNDATION AT THE BASE OF THE WASTE LAYER

Step 4a. Calculate ϕ_2' using Figure 2 of Sheridan's Paper. $\phi_2 = 0.60 \times \phi_2'$ for a sandy drainage sand as shown in Figure 2.

ϕ_2' = 46.67 degrees $\phi_2' = \phi_2/0.60$ (ϕ' is located in Figure 2 of Sheridan's paper)
(ϕ_2 is shown as θ in Figure 2 of Sheridan's Paper)

Step 4b. Use the value of ϕ_2' calculated from Figure 2 to determine the value of H_{c2}/B_2

H_{c2}/B_2 =	0.94	(from Figure 2 of Sheridan's paper)
B_2 =	5.91 feet	($B_2 = 2 \times r_2$) (r_2 determined in Step 3)
H_{c2} =	5.56 feet	$H_{c2} = 0.94 \times B_2$

STEP 5: DETERMINE THE HALF APEX ANGLE (θ_2) OF THE SOIL CONE WITHIN THE WASTE LAYER

θ_2 = 28.01 degrees Using the equation $\theta_2 = \tan^{-1}(r_2/H_{c2})$ from page 7, Step 5 of Sheridan's paper)

SCS ENGINEERS				
			SHEET 3 of 3	
CLIENT Citrus County	PROJECT Phase 3 Expansion		JOB NO. 09207049.02	
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STEP 6: DETERMINE THE PRESSURE (PN) OVER YIELDING AREA AT THE BASE OF THE SOIL LAYER

Using the equation $P_N = (1/3) \times [\gamma_1 \times ((r_1/\tan\theta_1) - (r_1 - H_1\tan\theta_1)^3/(r_1^2\tan\theta_1)) + \gamma_2 \times (r_1 - H_1\tan\theta_1)^3/(r_1^2\tan\theta_2)]$ from page 7, Step 5 of Sheridan's paper)

$P_N =$ 243.55 lb/ft^2

STEP 7: ASSUME A STRAIN (τ_{all}) VALUE FOR THE BOTTOM LINER SYSTEM

Assumed Yield Strain, τ_R =	10 %	(from statement on page 2 (Strain) of Sheridan's Paper)
Factor of Safety, FS =	2	
Strain in Bottom Liner System, τ_{all} =	5 %	(the strain limit on the project is 5% to maintain a factor of safety of 2)

STEP 8: DETERMINE THE TENSILE STRENGTH (T_R) REQUIRED FOR THE BOTTOM LINER SYSTEM ABOVE A YIELDING FOUNDATION

The dimensionless parameter Ω is determined using Table 2 in Sheridan's Paper

For τ_{all} = 5%, Ω =	0.97	(interpolated from Table 2 in Sheridan's Paper)
Required Tensile Strength, T_R* =	1,899.42 lb/ft	$T_R = 2 \times P_N \times r_1 \times \Omega$ (from page 8, Step 8 of Sheridan's paper)

*Note: The tensile strength of the geogrid must be compatible with the maximum allowable strain (τ_{all}) in the liner system.

STEP 9: ESTABLISH STRENGTH FACTORS FOR THE MIRAGRID 5XT FROM TENCATE

Design Strain for geogrid =	5 %	(from Product Specification for biaxial geogrid Miragrid 5XT-BD from Tencate)
Tensile Strength for geogrid @ 5% =	1,740.00 lb/ft	(from Product Specification for biaxial geogrid Miragrid 5XT-BD from Tencate)
Creep Reduced Tensile Strength. T_{CR} =	2,580.00 lb/ft	(from Product Specification for biaxial geogrid Miragrid 5XT-BD from Tencate)
Ultimate Tensile Strength, T_{ULT} =	4,300.00 lb/ft	(from Product Specification for biaxial geogrid Miragrid 5XT-BD from Tencate)

*Note: All Tensile Strength values are taken from the lower of the machine direction and cross machine direction tensile strengths.

STEP 10: ESTABLISH FACTORS OF SAFETY FOR LONG-TERM ALLOWABLE DESIGN STRENGTH FOR THE SELECTED GEOGRID

Creep Factor of Safety, FS_{CR} =	1.48	($FS_{CR} = T_{ULT}/T_{CR}$, Step 9 of Sheridan Paper)
Installation Factor of Safety, FS_{ID} =	1.05	(from design example in Sheridan paper)
Degradation Factor of Safety, FS_D =	1.00	(from design example in Sheridan paper)
Joint Factor of Safety, FS_{JNTS} =	1.00	(from design example in Sheridan paper)

STEP 11: DETERMINE THE LONG TERM ALLOWABLE DESIGN STRENGTH (LTADS) OF THE SELECTED GEOGRID

T_{ULT} = Short Term Tensile Strength (per GRI GG1) measured at the maximum allowable strain (τ_{all})

$$LTADS = \frac{T_{ULT}}{FS_{CR} \times FS_D \times FS_{ID} \times FS_{JNTS}}$$

LTADS = 2,761.90 lb/ft

STEP 12: DETERMINE IF THE SELECTED GEOGRID IS ADEQUATE

LTADS =	2,761.90 lb/ft	(Long Term Allowable Design Strength, from Sheridan Paper)
T_R =	1,899.42 lb/ft	

SINCE LTADS > TR, THE SELECTED GEOGRID IS ADEQUATE

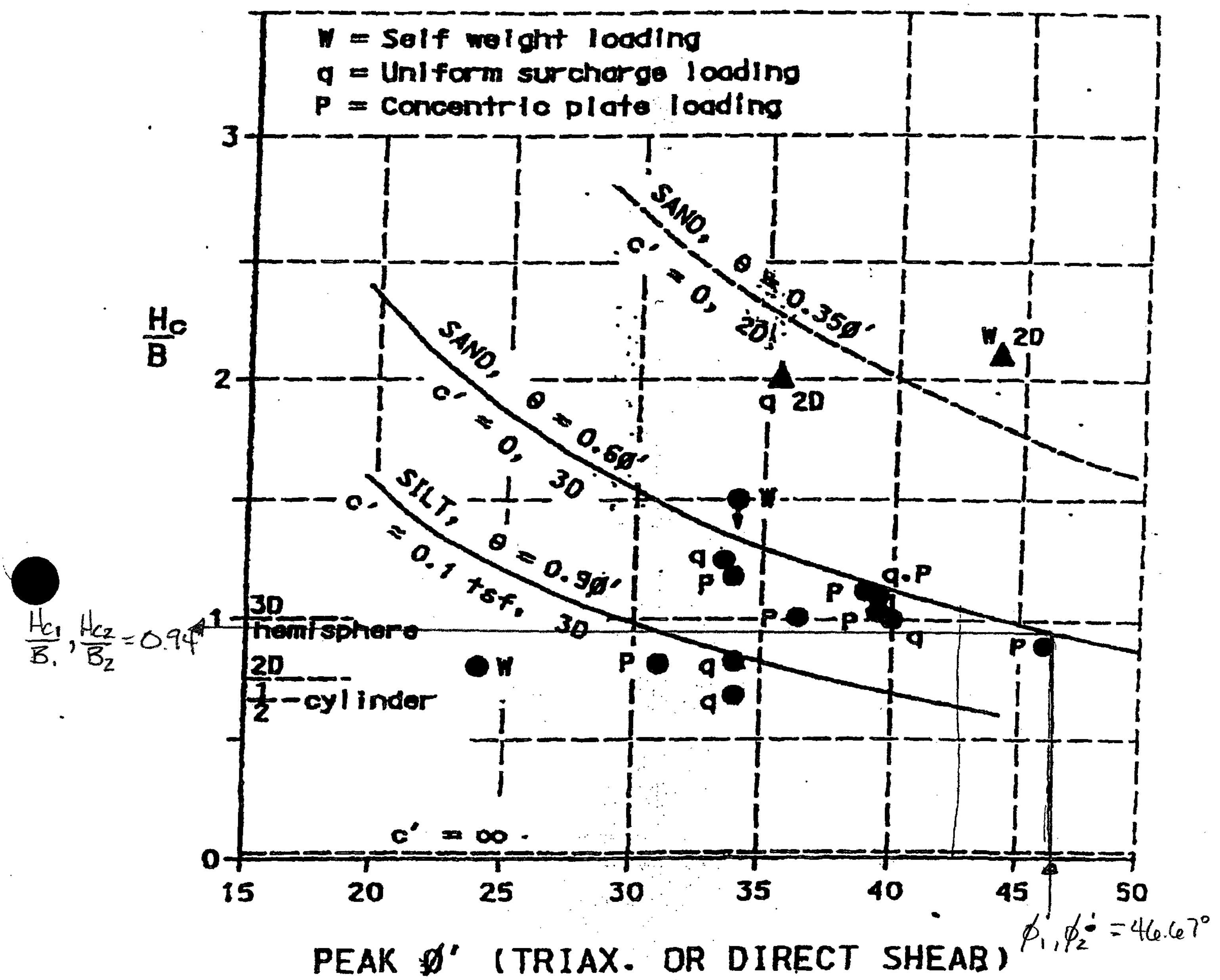


FIGURE 2 - DATA FROM TABLE 8, WITH EQUATION (8) CURVES FOR DESIGN

SCS ENGINEERS

SHEET ____ OF ____

CLIENT	PROJECT	JOB NO.
Citrus County	Phase 3 Expansion	09207049.02

SUBJECT	BY	DATE
Soil Arching Figure	DAW	6/22/2009
	CHECKED JB	DATE 6/25/09

$\theta_1 = 28.01°$

$\theta_2 = 28.01°$

$H_{C1} = 7.56\,FT$

$H_{C2} = 5.56\,FT$

$H_1 = 2.0\,FT$

$H_2 = 135.0\,FT$

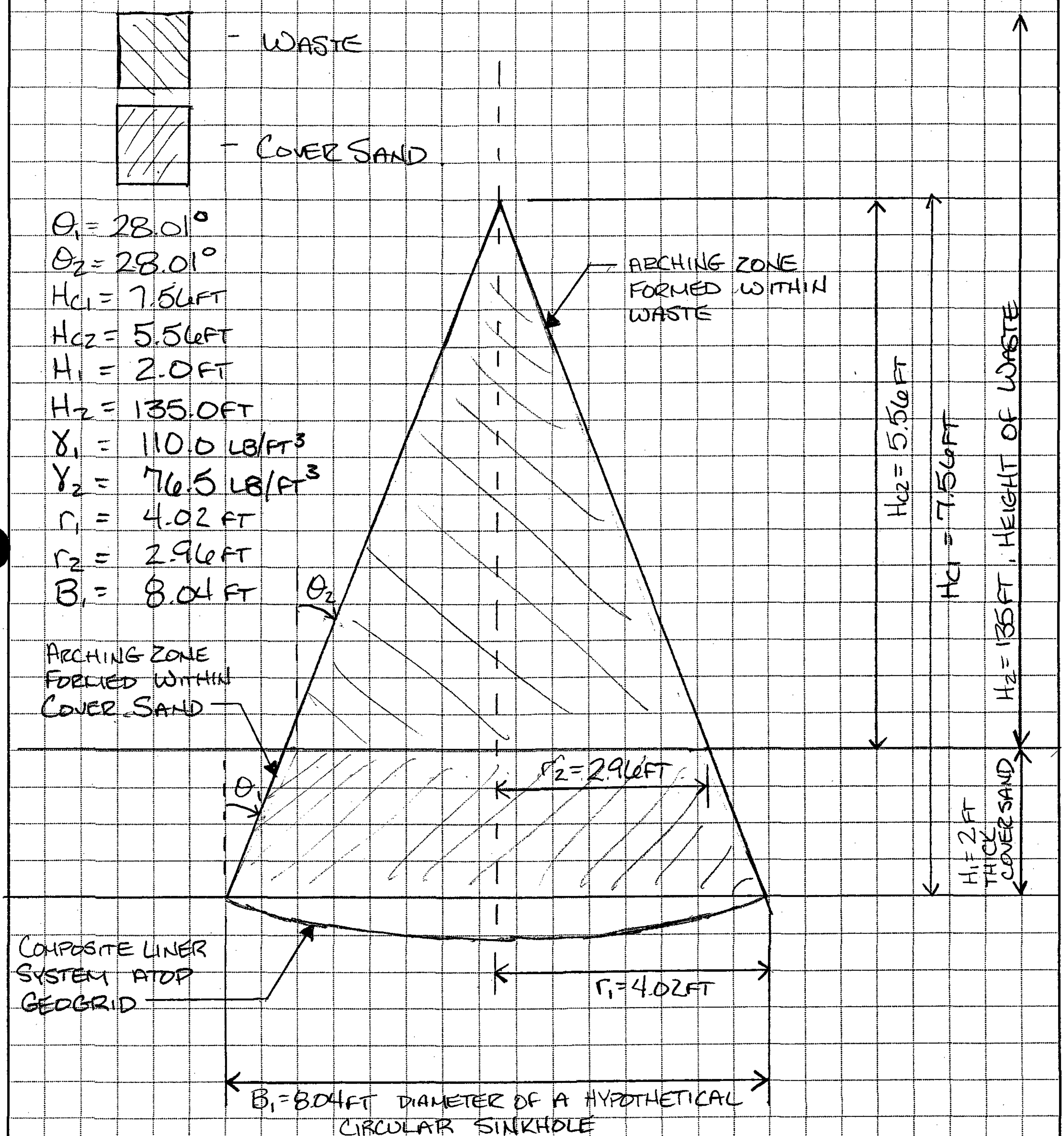
$\gamma_1 = 110.0\ LB/FT^3$

$\gamma_2 = 76.5\ LB/FT^3$

$r_1 = 4.02\,FT$

$r_2 = 2.96\,FT$

$B_1 = 8.04\,FT$



Copy of Sheridan's Paper
"Landfill Liner Support over Yielding Foundations"

Landfill Liner Support Over Yielding Foundations

by

Terence G. Sheridan

ABSTRACT

Federal and state regulations require that the foundation of a landfill be capable of supporting the landfill and the structural components of the landfill. Where landfills are located over yielding foundations, such as existing landfills, karst terrains and old mine tunnels, the subgrade must be designed to insure the integrity of the landfill's structural components. This paper summarizes the history of this engineering application and reviews the design methodology utilized for this application. A design example is included.

Landfill Liner Support Over Yielding Foundations

Table of Contents

1.0 INTRODUCTION

Today all operating municipal solid waste landfills are required to have a composite liner and leachate collection system at their base. Regulations require that these landfill components be constructed over a stable foundation. In many instances however, the underlying subgrade has the potential for differential settlement and collapse.

The site selection process for a landfill is complex. Local economies and tax structures, host fees, infrastructure, geology, hydrogeology, nimby (not in my backyard groups) and a variety of other forces and factors influence the process. Often the most challenging site from an engineering perspective turns out to be the selection that best serves the common good,

In 1987, a barge was loaded with bailed waste from Islip New York. Many months and many miles later, the barge having found no landfill that would accept the waste, arrived back in Islip. The town council, the consulting engineer and the state regulatory agency all agreed that the best solution was to construct a new landfill above the old capped landfill. This resulted in the first landfill liner support installation.

In the late 1980's and early 1990's all the states in the country upgraded their landfill liner system regulations. This left many essential landfills out of compliance. While upgraded cells could be constructed on adjoining property, the airspace above the landfill sideslopes to be closed was a valuable asset no one wanted to abandon. In many instances, it was in the best interest of all involved to design a "modern" landfill on the sideslope of the landfill to be capped.

To date dozens of landfills have been constructed over existing landfills, karst topography and old mine tunnels. The leachate collection systems are monitored to insure that the landfills are operating as designed. A few landfills have installed strain monitoring systems below the new liner system. At the Babylon Landfill in New York and the Sawyer Landfill in Maine, strain readings have indicated that one layer of uniaxial geogrid has reduced liner strains to well below the design limit.

This paper reviews the design methodology utilized when landfills are sited above subgrades with the potential for differential settlement and collapse. Subsidence issues and engineering solutions will be discussed. A design example is also presented for review.

2.0 SUBSIDENCE

The single most important and influential parameter in a liner support design is the selection of the foundation criteria. In cases where the landfills are located over old mines or karst topography, predicting settlements is straightforward. Old mine maps and local sinkhole data can be used to develop a subsidence model. Landfills below liner systems are more difficult to characterize. Subsidence associated with decomposition and decay will depend on many factors and will vary not only between landfills, but within a single landfill. Recognizing that there is no direct method to predict settlement one must rely on experience and documented performance to insure that the design is conservative.

From the beginning it was recognized that a localized subsidence would pose the greatest risk to the structural components within the landfill's liner system. Since 1987 liner support projects have assumed a complete loss of bearing capacity immediately below the new liner system. At first, the dimension was based on the potential collapse of a "white good" near the surface of the landfill, (often referred to as the "refrigerator theory"). As time went on, the typical void diameter of six feet was adopted as the engineering state of practice based on the successful performance of previous designs.

3.0 STRAIN

Liner support applications are based on a strain limited design. The strain at which the geomembrane ruptures controls the design. An HDPE geomembrane, the predominant landfill liner because of its resistance to chemical degradation, will elongate significantly before breaking when stretched in one direction. However, when subjected to multiaxial elongation, rupture occurs in the 10%-16% strain range. In a strain limited design, the factor of safety should be applied to the minimum rupture strain. As a result, the current state of practice for liner support applications is to utilize a safety factor equal to 2 and design at a strain limit of 5 percent.

4.0 SOIL ARCHING

In 1936, Karl Terzaghi published his seminal work on soil arching. The University of Florida performed an extensive series of experiments further defining the mechanics of soil arching in 1961. At the Waterways Experiment Station (WES), the U.S. Army Corps of Engineers (USACE) performed a comprehensive set of large scale arching experiments in 1965. Each study supports and refines the work and conclusions carried forward from previous experiments. A brief, simplified overview of some of the conclusions found in these reports follows:

- When the bearing pressure below a soil is removed (the large scale experiments utilized a trapdoor configuration), the soil will arch over a cavity centered at the midpoint of the yielding zone.
- The pressure over the yielding zone (trap door) will be less than the average vertical stress due to the weight of the soil layer.
- The pressure immediately outside the perimeter of the yielding zone will be greater than the average vertical stress due to the weight of the soil layer.
- This arching condition is permanent.
- Above a given height (the apex of the arch), all loads whether they be from the weight of soil or from a surcharge will arch around the cavity and have no impact on the pressures measured immediately above the yielding zone.
- 3-dimensional arching (yielding zone in the shape of a circle) is more efficient than 2-dimensional arching (yielding zone in the shape of an infinitely long trench).
- The pressure over the yielding zone is equal to the weight of the mass within the arch, if the height of the soil (and waste) exceeds the apex of the arch.
- The dimensions of the cavity formed by the arch are dependent on the soil strength.
- The approximate shape of the arch is triangular rather than spherical. As a result, a yielding zone in the shape of a circle would produce an arch in the shape of a cone rather than a half sphere.

The subsidence model provides the geometry necessary to analyze the arching phenomenon. The data collected in the experiments discussed above allows one to predict the normal force transferred to the geosynthetic reinforcing material within the landfill liner system.

5.0 TENSION MEMBRANE THEORY

The tensioned membrane theory was first developed by J. P.Giroud to determine the tensile strength required in a geosynthetic supporting a soil layer over a void. Later Giroud along with Bonparte, Beech and Gross, combined Terzaghi's arching theory with the tension membrane theory and laid the foundation for landfill liner support technology. Essentially, the tension membrane equation enables one to transfer a uniformly distributed normal force into a horizontal reinforcing material that will sag to a given strain limit.

The relationship between tension and strain in a liner support design is revealing. As the strain limit is reduced, the required tensile strength increases. As a result, in a strain based design, the factor of safety is applied directly and indirectly to the allowable strain and the required tension respectively.

6.0 SUMMARY OF DESIGN PROCEDURE

Combining the work performed at the University of Florida with Terzaghi's original work and the experiments conducted by the Army Corps, one can now correlate the shape of the soil arch to the strength of the soil. This is particularly helpful when there is more than one strata of soil within the arching zone. For landfill liner support applications, one has the ability to calculate the dimensions of the arch within the soil liner system above the geogrid and the dimensions of the arch within the waste above the soil liner system. (See Figure 1).

Figure 2 provides the relationship between the width of the yielding zone and the height of the soil arch based on the soil strength parameter. Using this figure one can determine the dimensions of the arch within the soil and waste layers. This will enable one to determine the uniform normal pressure over the yielding area at the base of the liner system. Using Giroud's tension membrane equation one can then calculate the required geogrid tension at the allowable strain limit. Finally, one can select the appropriate geogrid. A step by step procedure along with a design example follows.

Step 1

- Determine the ratio between the critical height (H_{cl}) of the soil arch and the diameter (B_1) of the depression for the soil layer.

$$B_1 = 2r_1$$

$$\frac{H_{cl}}{B_1} \text{ (from Figure 2)}$$

Step 2

- Determine the half apex angle θ_1 of the cone of soil within the soil layer.

$$H_{cl} = B_1(H_{cl} / B_1)$$

$$\theta_1 = Tan^{-1}(r_1 / H_{cl})$$

Step 3

- Determine the radius (r_2) at the base of the waste layer that remains unsupported by the arch within the soil layer.

$$\frac{r_1}{H_{cl}} = \frac{r_2}{H_{cl} - H_1}$$

$$r_2 = \frac{r_1(H_{cl} - H_1)}{H_{cl}}$$

7.0 LANDFILL LINER SUPPORT DESIGN METHODOLOGY

Parameters

Soil Layer Thickness	H_1 (ft)
Waste Layer Thickness	H_2 (ft)
AVG Soil Unit Weight	γ_1 (lbs/cf)
Waste Unit Weight	γ_2 (lbs/cf)
AVG Soil Friction Angle	ϕ_1 (degrees)
Waste Friction Angle	ϕ_2 (degrees)
Surcharge	q (lbs/cf)
Radius of Depression	r_1 (ft)
Multi Axial Rupture Strain of Liner	τ_R
Factor of Safety	FS
Design Life	Life

Step 4

- Determine the ratio between the critical height (H_{c2}) of the soil arch within the waste and the diameter (B_2) of the unsupported foundation at the base of the waste layer.

$$B_2 = 2r_2$$

$$\frac{H_{c2}}{B_2} \text{ (From Figure 2)}$$

Step 5

- Determine the half apex angle (θ_2) of the cone of soil within the waste layer.

$$H_{c2} = B_2(H_{c2}/B_2)$$

$$\theta_2 = Tan^{-1}(r_2/H_{c2})$$

Step 6

- Determine the pressure (P_N) over the yielding area at the base of the soil layer.

$$P_N = 1/3\left[\gamma_1\left(\frac{r_1}{Tan\theta_1} - \frac{(r_1 - H_1 Tan\theta_1)^3}{r_1^2 Tan\theta_1}\right) + \gamma_2\frac{(r_1 - H_1 Tan\theta_1)^3}{r_1^2 Tan\theta_2}\right]$$

Step 7

- Establish the maximum allowable strain $\left(\tau_{ALL}\right)$ in the liner system.
  Note: On liner support applications, it is the state of practice to apply the Factor of Safety (FS) to the multiaxial rupture strain (τ_R). Typically the Factor of Safety (FS) is equal to 2.

$$\tau_{ALL} = \frac{\tau_R}{FS}$$

Step 8

- Determi e the Tensile Strength $\left(T_R\right)$ required in a single layer of geogrid to suppo t the lining system above the yielding foundation.

  Note: The Tensile Strength of the geogrid must be compatible with the maximum allowable strain $\left(\tau_{ALL}\right)$ in the Liner System.

  Ω at τ_{ALL} *(From Table 2)*

$$T_R = 2P_N r_1 \Omega$$

Step 9

- Determine the Long Term Allowable Design Strength (LTADS) of the selected Geogrid.

$$\text{LTADS} = \frac{T_{ST} AT \tau_{ALL}}{FS_{CR} \times FS_D \times FS_{ID} \times FS_{JNTS}}$$

where

$T_{ST} AT \tau_{ALL}$ = Short Term Tensile Strength (per GRI GG1) measured at the maximum allowable strain $\left(\tau_{ALL}\right)$

Step 9 (cont.)

FS_{CR} = Factor of Safety for creep to correlate the short term tensile strength (T_{ST}) at a specified strain (τ_{ALL}) to the Creep Limited Tensile Strength for the required design life (Life) (per ASTM D5262)

FS_D = Factor of Safety for Durability to account for chemical and biological degradation (per GRI GG4)

FS_{ID} = Factor of Safety for Installation Damage (per GRI GG4)

FS_{JNT} = Factor of Safety for Joints at roll ends (per GRI GG4)

Step 10

- Determine if the selected geogrid is adequate

$$LTADS \geq T_R$$

8.0 Design Example Problem

A new landfill is to be constructed on the sideslope of a closed landfill. The liner system will consist of a 2 foot thick clay layer immediately below a 60 mil HDPE geomembrane. A one foot thick sand layer acts as a leachate collection system above the geomembrane. A non-woven filter geotextile is located between the leachate collection system and an overlying 6 inch soil layer. The liner system will support one hundred feet of waste. The engineering parameters for the soil and waste are as follows:

	Thickness (ft.)	Unit Weight (lbs/cf)	Effective Friction Angle (degrees)
Clay	2	130	28
Sand	1	120	32
General Fill	.5	120	32
MSW	100	70	25

Decomposition and decay in the old landfill will impact the structural integrity at the foundation of the new landfill. A conservative assumption regarding bearing capacity will be analyzed to assure that the integrity of the liner system is not compromised. It will be assumed that a circular area with a 6 foot diameter looses all its bearing capacity at the base of the liner system. The strain limit on the project will be 5 percent to reflect a minimum factor of safety equal to 2.

A. Determine the long-term allowable design strength of a single layer of uniaxial geogrid required to support the liner system in the new landfill.

B. If no connector is available to transfer the ultimate tensile strength of the geogrid through a joint at the end of a roll, determine the overlap length required for the material.

8.1 Design Example Solution

A. Calculate long-term allowable design strength for the geogrid

Parameters

Soil Layer thickness $H_1 = 3.5$ ft.

Waste Layer thickness $H_2 = 100$ ft.

Average Soil Unit Weight (γ_1)

$$\gamma_1 = \frac{2(130)+1(120)+.5(120)}{3.5} = 126 \text{ lbs/cf}$$

Waste Unit Weight $\gamma_2 = 70$ lbs/cf

AVG Soil Friction Angle (ϕ_1)

8.1 Design Example Solution (Cont.)

$$\phi = Tan^{-1}\left[\frac{2(Tan28°)+1(Tan32°)+.5(Tan32°)}{3.5}\right] = 29.7°$$

Waste Friction Angle $\phi_2 = 25°$

Surcharge $q = 0$

Radius of Depression $r_1 = 3$ ft.

Multiaxial Rupture Strain of Liner $\tau_R = 10\%$

Factor of Safety FS = 2

Design Life Life = 100 years

Step 1

$B_1 = 2(3\,ft.) = 6ft.$

$\frac{H_{c1}}{B_1} = 1.0$ *(from figure 2)*

Step 2

$H_{c1} = 6$ ft. $(1.0) = 6$ ft.

$\theta_1 = Tan^{-1}(3\,ft./6\,ft.) = 26.6°$

8.1 Design Example Solution (Cont.)

Step 3

$$r_2 = \frac{3ft(6ft.-3.5ft)}{6ft.} = 1.25 \text{ ft.}$$

Step 4

$$B_2 = 2(1.25ft.) = 2.5 \text{ ft.}$$

$$\frac{H_{c2}}{B_2} = 1.25 \text{ (from figure 2)}$$

Step 5

$$H_{c2} = 2.5 \text{ ft. } (1.25) = 3.13 \text{ ft.}$$

$$\theta_2 = Tan^{-1}(1.25ft./3.13ft.) = 21.8°$$

Step 6

$$Tan\theta_1 = .50$$

$$Tan\theta_2 = .40$$

$$P_N = \tfrac{1}{3}\left[126\left(\frac{3}{.50} - \frac{(3-3.5(.50))^3}{3^2(.50)}\right) + 70\left[\frac{(3-3.5(.50))^3}{3^2(.40)}\right]\right]$$

$$P_N = 247 \text{ lbs./sf}$$

8.1 Design Example Solution (Cont.)

Step 7

τ_{ALL} = 10%/2

τ_{ALL} = 5%

Step 8

$\Omega = .97$ *(from Table 2)*

$T_R = 2(247 lbs/sf)(3 ft.)(.97)$

$T_R = 1438 lbs/ft.$

Step 9

$T_{ST}\ AT\ \tau_{ALL} = 3400$ lbs./ft.

$FS_{CR} = \dfrac{\text{Short Term Tensile Strength at 5\% Strain (GRI GG1)}}{\text{100 year Creep Limited Strength at 5\% Strain (ASTM D5262)}}$

$\dfrac{3400 \text{ lbs/ft.}}{1760 \text{ lbs/ft.}} = 1.93$

FS_D = 1.0
FS_{ID} = 1.05 (in Clay Backfill)
FS_{JNT} = 1.0

$LTADS = \dfrac{3400 lbs/ft}{1.93x1.0x1.05x1.0} = 1677$ lbs/ft.

Step 10

1677 lbs/ft $\geq$ 1438 lbs/ft. ok

Notes:

- The geogrid should be placed at the base of the clay layer
- The height of the waste exceeds the height of the soil arch and therefore the arching equation is valid and the effect of any surcharges at the top of the landfill can be ignored.

B. Calculate the overlap distance

$$L = \frac{FS_{po} LTADS}{2C_i N Tan\delta}$$

L = Geogrid embedment length on each side of reinforcing zone (ft.)

FS_{po} = Factor of Safety for Pullout (dimensionless)

FS_{po} = 1.5

C_i = Pullout interaction coefficient (dimensionless)

C_i = .58 (see Table 1)

N = Effective normal pressure (lbs./sf.)

N: One must consider the possibility of the loss of bearing capacity during the operational life of the landfill. A conservative assumption could be made that the normal force should be calculated with 2 feet of waste above the liner system.

N = 3.5 ft.(126 lbs./cf.) + 2 ft. (70 lbs./cf.) = 581 lbs/sf

δ = Effective friction angle of soil in contact with geogrid (degrees)

$$\delta = Tan^{-1}\left[\frac{Tan25^\circ + Tan28^\circ}{2}\right] = 26.5^\circ$$

$$L = \frac{1.5(1438)}{2(.58)(581)Tan26.5^\circ} = 6.5 ft.$$

Total overlap length = 6.5 ft + 6 ft + 6.5 ft = 19 ft.

Summary

Over the last decade, the performance of landfill liners built over yielding foundations has been well documented. Strain measurement systems and leachate collection systems indicate that a layer of uniaxial geogrid has supported the structural components of landfills constructed over challenging subgrades. The characterization and model for the foundation is the most important component of the design. Experience and precedence need to be combined with a site specific analysis when setting the parameters for a foundation comprised of municipal solid waste. The design objective is focused on limiting the strain in the liner system and soil arching and tension membrane theories are the back-bone of the design procedure. This paper discussed these issues and presented a design solution and example problem.

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TABLE 1

	CRUSHED STONE						CONCRETE SAND						SILTY SAND		
Depth	1100HS & 1400HS			1500, 1600 & 1700HS			1100HS & 1400HS			1500, 1600 & 1700HS			1100,1400,1500, 1600 & 1700HS		
	C_i	F^*	α	C_i	F^*	α	C_i	F^*	α	C_i	F^*	α	C_i	F^*	α
0 - 2'	0.95	0.66	1	1	0.7	1	0.9	0.61	1	1	0.67	1	0.8	0.46	1
2' - 4'	0.9	0.63	1	0.95	0.66	1	0.8	0.54	1	0.85	0.57	1	0.65	0.38	1
> 4'	0.8	0.56	1	0.85	0.6	1	0.75	0.5	1	0.8	0.54	1	0.58	0.33	1

Definition of Values in accordance with AASHTO and FHWA Demo 82 are as follows:

Ci is defined as the coefficient of interaction for pullout,

F* is defined as the pullout resistance factor and is equal to Ci times the tangent of the soil friction angle,

α is defined as the scale effect correction factor to account for nonlinear stress reduction over the embedded length of the geosynthetic.

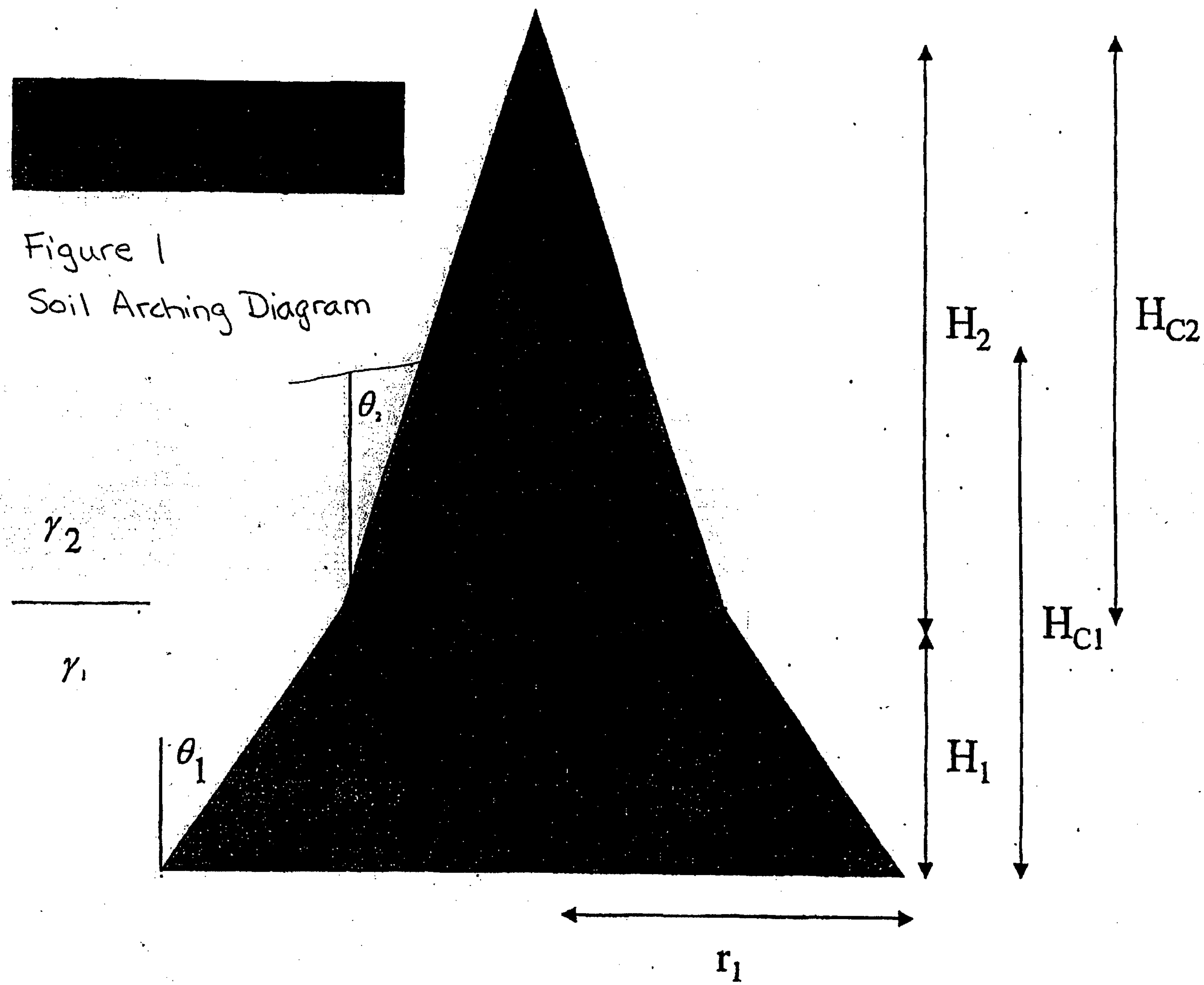
TABLE 2
Values of Ω as a Function of Deflection or Strain

y/b or $y/(2r)$	ε(%)	Ω	y/b or $y/(2r)$	ε(%)	Ω
0·000	0·000	∞	0·242	15·00	0·64
0·010	0·027	12·51	0·250	15·91	0·62
0·020	0·107	6·26	0·260	17·15	0·61
0·030	0·240	4·18	0·270	18·43	0·60
0·040	0·425	3·15	0·280	19·75	0·59
0·050	0·663	2·53	0·282	20·00	0·58
0·060	0·960	2·11	0·290	21·10	0·58
0·061	1·000	2·07	0·300	22·50	0·57
0·070	1·30	1·82	0·310	23·93	0·56
0·080	1·70	1·60	0·317	25·00	0·55
0·087	2·00	1·47	0·320	25·39	0·55
0·090	2·15	1·43	0·330	26·89	0·54
0·100	2·65	1·30	0·340	28·43	0·54
0·107	3·00	1·23	0·350	30·00	0·53
0·110	3·20	1·19	0·360	31·60	0·53
0·120	3·80	1·10	0·370	33·23	0·52
0·123	4·00	1·08	0·380	34·90	0·52
0·130	4·45	1·03	0·381	35·00	0·52
0·138	5·00	0·97	0·390	36·60	0·52
0·140	5·15	0·96	0·400	38·32	0·51
0·150	5·90	0·91	0·410	40·00	0·52
0·151	6·00	0·90	0·420	41·86	0·51
0·160	6·69	0·86	0·430	43·67	0·51
0·164	7·00	0·84	0·437	45·00	0·50
0·170	7·54	0·82	0·440	45·51	0·50
0·175	8·00	0·80	0·450	47·38	0·50
0·180	8·43	0·78	0·460	49·27	0·50
0·186	9·00	0·76	0·464	50·00	0·50
0·190	9·36	0·75	0·470	51·18	0·50
0·197	10·00	0·73	0·480	53·13	0·50
0·200	10·35	0·72	0·490	55·00	0·50
0·210	11·37	0·70	0·500	57·08	0·50
0·216	12·00	0·69	0·562	70·00	0·50
0·220	12·44	0·68	0·631	85·00	0·51
0·230	13·56	0·66	0·696	100·00	0·53
0·240	14·71	0·64	0·819	130·00	0·56

This table also gives values of the strain as a function of the deflection, and vice versa. (See also Fig. 10.) Notations: Ω = dimensionless factor used for the calculation of the tension in the geosynthetic; y = geosynthetic deflection; b = width of the infinitely long void; $2r$ = diameter of the circular void; and ε = geosynthetic strain. (Note: in the case of a circular void, the values of ε and Ω given in this table are approximate.)

[redacted]

Figure 1
Soil Arching Diagram



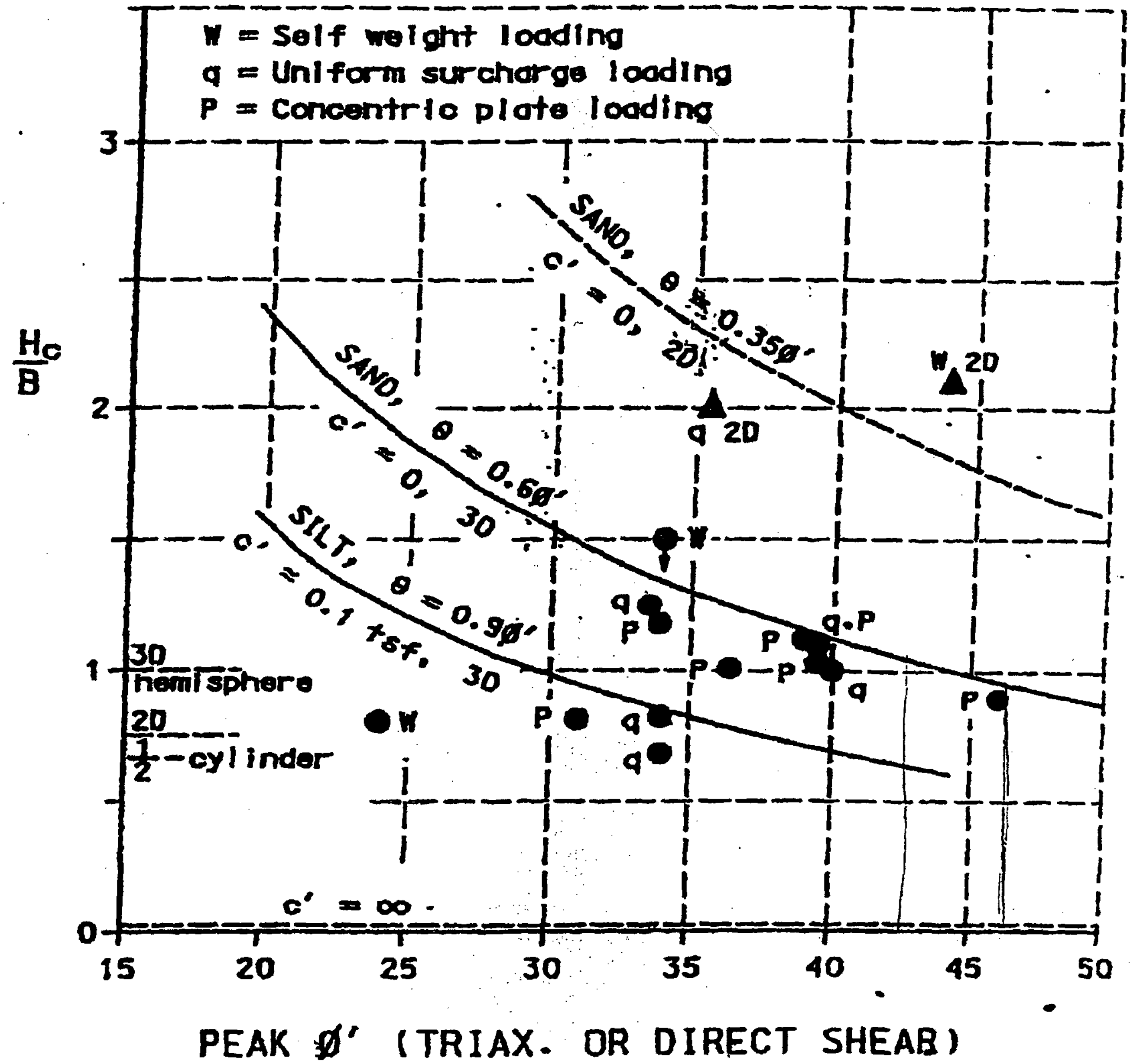


FIGURE 2 - DATA FROM TABLE 8, WITH EQUATION (8) CURVES FOR DESIGN

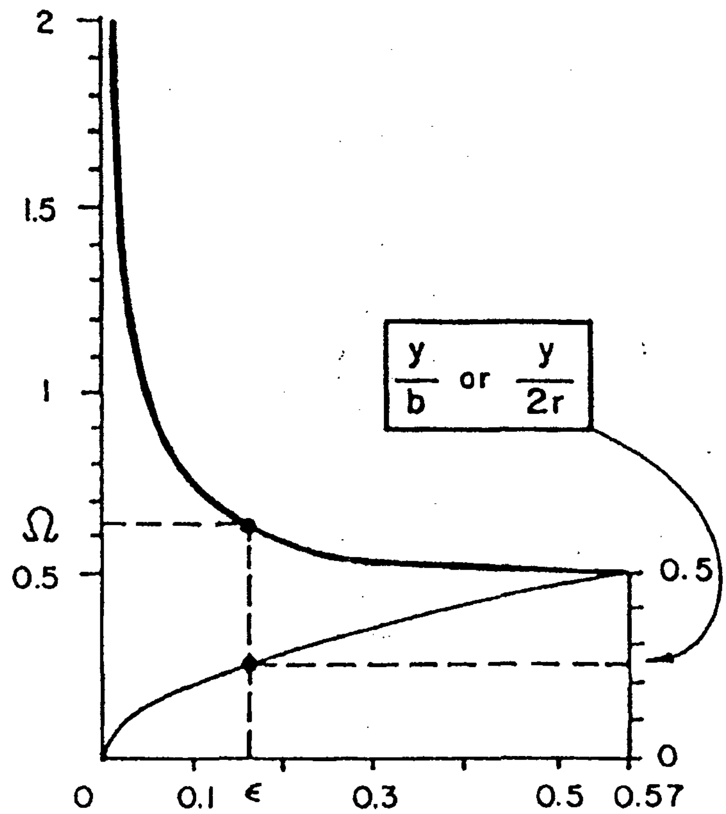


Figure 3 **Dimensionless Factor Ω**

SECTION K

VERTICAL EXPANSION OF LANDFILLS

Section K of the permit application does not apply to the Citrus County Central Landfill Construction Permit Application since a vertical expansion of an existing landfill is not planned and is designated as "Not Applicable" on the State of Florida Department of Environmental Protection Application for a Permit to Construct, Operate, Modify or Close a Solid Waste Management Facility Application Form 62-701.900(1), which is attached at the beginning of this permit application report.

SECTION L

LANDFILL OPERATIONS REQUIREMENTS

L.1 TRAINED OPERATORS

In accordance with Rule 62-701.500(1), F.A.C., key supervisory staff at the Citrus County Central Landfill has received Landfill Operator Certification Training. Operator training certificates and hours completed as previously indicated are provided in Attachment E-2 within this Construction Permit Application.

As required by Rule 62-701.320(15), F.A.C. a State-certified Landfill Operator will be onsite when waste is received for disposal at the Citrus County Central Landfill and a trained spotter will be onsite during all times when waste is deposited at the landfill working face to detect any unauthorized wastes.

Operator training includes a 24-hour course and 16 hours of continuing education every three years. Spotter training includes an 8-hour course and 4 hours of continuing education every three years. Operator and spotter training courses will be attended as offered by the University of Florida Center for Training, Research and Education for Environmental Occupations (TREEO) and through other FDEP approved sources. A listing of TREEO training courses and schedules is available at www.treeo.ufl.edu.

L.2 LANDFILL OPERATION PLAN

A new Operations Plan was submitted with the Operations Permit Modification for the closed 10-Acre Landfill Proposed New Class III Disposal Operation Pending Permit No.: 21375-012-SO/MM, will also apply to the Phase 3 expansion area. The revisions to the Operations Plan submitted with the Phase 2 expansion area includes the addition of language in Section 2.4 regarding the collection of lead acid batteries and modifications to Section 2.8.2, and 7.5 describing the new Alternate Daily Cover (ADC) material.

The Operations Plan will be updated to include the Phase 3 Expansion Area and submitted to the FDEP when the Citrus County Board of County Commissioners (BOCC) applies for an Operation Permit for the Phase 3 Expansion Area.

L.2.a Citrus County Central Landfill Organization and Responsibilities

Citrus County owns the Citrus County Central Landfill and is the applicant for the permit application to construct Phase 3. Other responsibilities and organization as described in the Operations Plan will also apply to the Phase 3 expansion area. There has been no change to this subsection.

L.2.b Contingency Plan

A revised Contingency Plan was provided in the Operation Permit Modification for the closed 10-acre Landfill Proposed New Class III Disposal Operation pending permit number 21375-012-SO/MM, will also apply to the Phase 3 expansion area.

L.2.c Waste Type Control

Waste type control is described in the Operations Plan. There has been no change to this subsection.

L.2.d Weighing Incoming Waste

The method of weighing incoming waste is described in the Operations Plan. There has been no change to this subsection.

L.2.e Vehicle Traffic Control

Vehicle traffic control is described in the Operations Plan. There has been no change to this subsection.

L.2.f Method and Sequence of Filling Waste

The County currently operates a 26-acre Class I disposal area that includes Phase 1, Phase 1A and Phase 2 cells. The progression of cells and filling of waste has generally been from the south end of the property to the north. The elevation of the waste is brought up in lifts, with the south end typically being higher relative to the north end. Filling in an area is balanced considering maintaining safe waste slopes (maximum of 4:1), minimizing flat area and overall waste height.

From the south end, the top of the landfill is sloped downward gradually to the north where it coincides with the leading edge of Phase 2 at the floor of the cell. As filling progresses towards the north, intermediate cover is placed as soon as practical on completed fill areas, where no additional waste will be deposited within 180 days. After cover placement, the County initiates grading of the east and west slopes of the landfill to promote storm water runoff into the main ditches paralleling the landfill on both sides. The filling plans for Phase 2 are shown in the April 2005 Citrus County Central Class I Landfill Operations Permit Renewal Application in Attachment E-1.

Filling operations will progress to Phase 3 once FDEP approves the construction of the Phase 3 expansion area. The Phase 3 area has been divided into three cells of roughly 2.2 acres each. Filling of Phase 3 will begin in the east end of the cell and proceed towards the west end of the cell as indicated on the conceptual filling sequenc~~eing~~ drawing for Phase 3 located in Attachment F-3. Citrus County BOCC will submit detailed fill sequence with the Operation Permit Application for Phase 3.

The first lift of material placed above the liner and leachate collection system will consist of select waste, will be a minimum of 4 feet in thickness, and will be placed prior to using conventional compacting and heavy equipment. After placement of the initial layer, additional waste will be spread in 2-foot lifts and compacted to approximately 1 foot in thickness. The eastern portion of Phase 3 will be sloped to promote stormwater runoff to the east end. A minimum 2 percent slope will be provided from west to east. A sump area will be provided so the stormwater can be pumped to the east perimeter ditch. Daily cell construction will proceed in a westward direction until all of Phase 3 is above Elevation 78 ft NGVD. Filling of Phase 3 and daily cell construction will then continue as waste is placed higher against the existing Phase 2 slope. During the filling of each cell a rain tarp system will be employed to cover the exposed cell bottom and sideslopes where operations are not occurring. The rain tarp will be placed such that the area not being filled will be protected and stormwater diverted from the leachate system to the existing channels using portable pumps. In addition, a daily cover material will be placed on the working face during non working hours as required to minimize leachate generation.

As the Phase 3 approaches the waste elevation in Phase 2, placement of additional waste will continue until maximum design elevations are attained, including placement of some waste on top of the existing phases. A drawing showing the final buildout is given in Attachment F-4.

L.2.g Waste Compaction and Application of Cover

The revised Operations Plan included as Attachment 2 of the Operation Permit Modification for the closed 10-acre Landfill Proposed New Class III Disposal Operation pending permit number 21375-012-SO/MM will also apply to the Phase 3 expansion area. The new Operations Plan revisions to sections 2.8.2, and 7.5 address waste compaction and the application of cover has been modified to describe the new ADC material.

L.2.h Operations of Gas, Leachate, and Stormwater Controls

~~The Operations Plan addresses the operations of gas, leachate, and stormwater controls. There has been no change to this subsection.~~The revised Operations Plan submitted with the Interim Gas Collection and Control System, Response to RAI No. 1 Pending Permit Modification No. 21375-016-SO/MM addresses the changes to the operations of gas. No substantial change is proposed.

L.2.i Water Quality Monitoring

The Operations Plan addresses the water quality monitoring. There has been no change to this subsection. See Attachment M-1 for the new Water Quality Leachate Monitoring Plan, November 2008, prepared by JE&A.

L.2.j Maintaining and Cleaning the Leachate Collection System

The Operations addresses the maintenance and cleaning of the leachate collection system. There has been no change to this subsection.

L.3 OPERATING RECORD

The Operations Plan addresses operating records that will be kept at Citrus County Central Landfill. There has been no change to this subsection.

L.4 WASTE RECORDS

The Operations Plan addresses waste records that will be kept at the Citrus County Central Landfill. There has been no change to this subsection.

L.5 ACCESS CONTROLS

The Operations Plan addresses the access controls at the Citrus County Central Landfill. There has been no change to this subsection.

L.6 LOAD CHECKING PROGRAM

To monitor the waste received at the Citrus County Central Landfill, a load checking program has been implemented. The Operations Plan describes the load-checking program. There has been no change to this subsection.

L.7 SPREADING AND COMPACTING WASTE

The procedures for filling and compacting of the initial waste lifts over the liner, and the remaining layers on top of the initial lifts, are addressed in the Operations Plan. There has been no change to this subsection.

L.7.a Waste Layer Thickness and Compaction Frequencies

There has been no change to this subsection.

L.7.b First Layer Thickness

There has been no change to this subsection.

L.7.c Slopes and Lift Depth

There has been no change to this subsection.

L.7.d Working Face

There has been no change to this subsection.

L.7.e Initial Cover Controls

The revised Operations Plan included as Attachment 2 of the Operation Permit Modification for the closed 10-acre Landfill Proposed New Class III Disposal Operation pending permit number 21375-012-SO/MM will also apply to the Phase 3 expansion area. The new Operations Plan revisions to Section 2.8.2, and 7.5 describe the use of the proposed spray-on alternate initial cover material.

L.7.f Initial Cover Frequency

The frequency for applying cover is at the end of each working day. There has been no change to this subsection.

L.7.g Intermediate Cover

An intermediate cover in addition to the initial cover will be applied and maintained within seven days of cell completion if additional solid waste will not be deposited within 180 days of cell completion. There has been no change to this subsection.

L.7.h Final Cover

Areas that have been filled to design dimensions will receive final cover within 180 days after attaining final elevation in accordance with the closure plan for the Citrus County Central Landfill. There has been no change to this subsection.

L.7.i Scavenging and Salvaging

There has been no change to this subsection.

L.7.j Litter Policing

Litter policing is employed to keep litter from leaving the working area of the landfill. There has been no change to this subsection.

L.7.k Erosion Control Procedures

There has been no change to this subsection.

L.8 LEACHATE MANAGEMENT

L.8.a Leachate Monitoring and Sampling

~~Revisions to Specific Condition E.9.b(2) for the sampling frequency of CBOD5, TSS and Nitrate-N, from weekly to monthly, will also apply to the Phase 3 expansion area. This modification was approved by FDEP in an email to the County dated July 9, 2007. A copy of this email was included with the Request for Additional Information 1 of the Operation Permit Modification for the closed 10-acre Landfill Proposed New Class III Disposal Operation~~

~~pending permit number 21375-012-SO/MM as Attachment 4.~~See Attachment M-1 for the new Water Quality Leachate Monitoring Plan, November 2008, prepared by JE&A.

L.8.b Operation and Maintenance of the Leachate Collection and Removal System

There has been no change to this subsection.

L.8.c Procedures for Managing Leachate upon Regulation Changes

There has been no change to this subsection.

L.8.d Offsite Discharge and Treatment of Leachate

There has been no change to this subsection.

L.8.e Contingency Plan

A revised Contingency Plan was provided in the Operation Permit Modification for the closed 10-acre Landfill Proposed New Class III Disposal Operation pending permit number 21375-012-SO/MM, will also apply to the Phase 3 expansion area.

L.8.f Recording Leachate Generation

There has been no change to this subsection.

L.8.g Precipitation and Leachate Comparison

There has been no change to this subsection.

L.8.h Leachate Collection System Cleaning

There has been no change to this subsection. The leachate collection pipes as shown on the drawings will be cleaned and maintained, as necessary, through the cleanout riser pipes. The leachate collection pipes may be cleaned by flushing or be inspected by video recording in accordance with Rule 62-701.500(8)(h), F.A.C.

L.9 GAS MONITORING PROGRAM

No change is proposed; refer to the revised Operations Plan submitted with the Interim Gas Collection and Control System, Response to RAI No. 1 Pending Permit Modification No. 21375-016-SO/MM.~~No changes are proposed to the existing gas monitoring program.~~

L.10 STORMWATER MANAGEMENT SYSTEM

The stormwater management system for Phase 3 is similar to the system currently used for the Phase 1/1A, and Phase 2 disposal areas. The only major change is that the existing temporary storm water holding basin north of Phase 2 will be demolished to make way for the construction of the Phase 3 cell. A new, permanent drainage channel will be constructed north of and adjacent to the Phase 3 cell. Some runoff from future intermediate areas of the new cell will be directed to this new channel. During initial filling stormwater will be pumped into the side channels via 2 diesel driven hydraulic pumps. Refer to Attachment H-7 for the stormwater calculations. The revised Operations Plan submitted with the Interim Gas Collection and Control System, Response to RAI No. 1 Pending Permit Modification No. 21375-016-SO/MM will be expanded to include the Phase 3, with the submittal of the new Operations Permit Application.

L.11 EQUIPMENT AND OPERATION

There are no changes to this subsection.

L.11.a Operating Equipment

As discussed in Operations Plan, the site must have sufficient equipment to ensure proper operation of the landfill for excavating, spreading, compacting and covering waste. Although the make, model and year of equipment will change over time, the equipment used in operation will include:

- Two landfill compactors
- One self-loading scraper
- One bulldozer
- Two wheel loaders
- One water truck
- One fuel truck
- One water trailer
- Two dump trucks

In addition the site will have auxiliary vehicles including:

- One roll-off truck
- Several pickup trucks
- Several utility vehicles
- Several trailers

Normal maintenance will be performed on site. Major maintenance item repairs (e.g., engine, transmissions, and auxiliary drives) will be handled either at the maintenance facilities or at off-site service facilities.

L.11.b Reserve Equipment

As discussed in the Operations Plan there is sufficient redundancy in the equipment to maintain normal operations even during emergency operating conditions. Rental equipment is readily available if it becomes necessary to replace or supplement the equipment available on site. There has been no change to this subsection.

L.11.c Communications Equipment

There has been no change to this subsection.

L.11.d Dust Control

There has been no change to this subsection.

L.11.e Fire Protection

There has been no change to this subsection.

L.11.f Litter Control

There has been no change to this subsection.

L.11.g Signs

There has been no change to this subsection.

L.12 ALL-WEATHER ACCESS ROAD

All-weather roads, passable and safe under normal operating conditions, will be maintained to prevent dust, rutting or loss of traction. The facility access roads are surfaced with asphaltic concrete. There has been no change to this subsection

L.13 ADDITIONAL RECORDKEEPING

Operating records, such as permits, plans, inspections and other are maintained on site at the Citrus County Central Landfill.

L.13.a Permit Application Development

The landfill maintains all information including site investigations, construction records, operation records, inspections, permit applications and permits.

L.13.b Monitoring Information

The landfill maintains all monitoring records on groundwater, surface water, weather and landfill gas. Copies are submitted to FDEP on a regular basis.

L.13.c Remaining Site Life Estimates

The calculations located in Attachment F-5 indicate the Phase 2 area has an estimated life to April 2015.

Phase 3 will provide an additional 4.3 years of site life thus, the remaining life through Phase 3 has an estimated life to August 2019 as shown in the calculations located in Attachment F-5.

L.13.d Archiving and Retrieving Records

The operating records are maintained at the Citrus County Central Landfill throughout the design of the landfill.

SECTION M

WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS

M.1 WATER QUALITY AND LEACHATE MONITORING PLAN

The Citrus County Central Landfill ~~80-acre Landfill Expansion Groundwater~~ Water Quality and Leachate Monitoring Plan, ~~is on file with FDEP, and made part of this permit application by reference. In addition, this plan was reviewed in July 2007~~ November 2008 by Jones, Edmunds & Associates, Inc. (JE&A) is included as Attachment M-1.

M.1.a Signed, Dated and Sealed Plan

The above-referenced Groundwater Monitoring Plan and the Review are based on the information obtained in the hydrogeological investigation and were signed, sealed and dated by the P.E. or P.G. who prepared it.

M.1.b Performing Sampling and Analysis

Sampling and analysis of groundwater, leachate and surface water is described in the Water Quality And Leachate Monitoring Plan. Revisions to Specific Condition E.9.b(2) for the sampling frequency of CBOD5, TSS and Nitrate-N, from weekly to monthly, will also apply to the Phase 3 expansion area. This modification was approved by FDEP in an email to the County dated July 9, 2007. A copy of this email was included with the Request for Additional Information 1 of the Operation Permit Modification for the closed 10-acre Landfill Proposed New Class III Disposal Operation pending permit number 21375-012-SO/MM as Attachment 4

M.1.c Ground Water Monitoring Requirements

M.1.c.1 Location of Detection Wells

There are no detection wells at the Citrus County Central Landfill and no~~No~~ detection wells are currently planned to be constructed.

M.1.c.2 Downgradient Compliance Well

There are currently seven compliance wells (MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, and MW-17) positioned at the edge of the zone of discharge, which is the compliance line boundary. One compliance well (MW-20) north of the Phase 3 Expansion Area is currently planned to be constructed. The approximate location is shown on Figure 2 of the Monitoring Plan. The well will be installed 100 feet from the edge of waste on the zone of discharge compliance line.

M.1.c.3 Background Wells

There are currently four background wells (MW-1R, MW-2, MW-3, and MW-7). MW-1R is downgradient from the Phase 3 Expansion area and is proposed to be used as a pieziometer in the new monitoring network. Therefore the proposed network will have three background wells (MW-2, MW-3, and MW-7).

~~Results of previous monitoring indicate a westerly groundwater flow direction across the site within the Surficial Aquifer System. Accordingly, no new background groundwater monitoring wells are currently planned to be constructed.~~The only laterally continuous aquifer at the Citrus County Central Landfill is the unconfined Floridan aquifer.

M.1.c.4 Monitoring Well Location Information

The location of the monitoring wells is shown on the site plan located in Attachment 1 of the WQLMP document.~~Attachment F-1 of the Construction Permit Application Drawings.~~ One compliance well (MW-20) north of the Phase 3 Expansion Area is currently planned to be constructed. The approximate location is shown on Figure 2 of the Monitoring Plan. The well will be installed 100 feet from the edge of waste on the zone of discharge compliance line.

Well MW-1R is downgradient of the Phase 3 Expansion Area. The well will be re-designated as a piezometer and used to provide water levels only. Water level measurements will be collected semiannually in conjunction with the continuous-round measurements.

M.1.c.5 Well Spacing

There are no changes to this subsection.

M.1.c.6 Well Screen Locations

The well screen for the proposed well MW-20 will be positioned to intersect the water table during normal seasonal fluctuation. A construction diagram for proposed compliance well MW-20 is provided as Figure 3 in the Monitoring Plan. The screen will be positioned between 15 ft and -5 ft NGVD.

M.1.c.7 Abandoning Monitoring Wells

There are no changes to the subsection.

M.1.c.8 Detection Sensors

No detection sensors are used at the Citrus County Central Landfill therefore this subsection is not applicable.

M.1.d Surface Water Monitoring Requirements

There are no changes to this subsection.

M.1.e Leachate Sampling Locations Proposed

~~The drawings (Attachment F-1)~~ Attachment 1 of the Water Quality and leachate Monitoring Plan provides the ~~indicate~~ locations for collecting samples of leachate from the Phase 3 disposal area. Leachate can be sampled from the above-ground pipe access pad located at land surface on the west end of the cell at the leachate manifold crossing. At the piping access pad, sampling access is provided ~~as follows:~~

- ~~I~~in the discharge pipe from each leachate pump through a valved port on each pipe where it exits the 24-inch diameter riser pipe.

M.1.f Initial and Routine Sampling Frequency and Requirements

M.1.f.1 Initial Background Ground Water and Surface Water Sampling

There are no changes to this subsection.

M.1.f.2 Routine Leachate Sampling and Analysis

Leachate will be sampled and analyzed annually for the parameters listed in Rule 62-701.510 (8) (c) and (d), F.A.C.

M.1.f.3 Routine Monitor Well Sampling and Analysis

There are no changes to this subsection.

M.1.f.4 Routine Surface Water Sampling and Analysis

There are no changes to this subsection.

M.1.g Procedures for Implementing Evaluation Monitoring, Prevention Measures and Corrective Action

There are no changes to this section.

M.1.h Water Quality Monitoring Report

M.1.h.1 Semi-annual Report Requirements

There are no changes to this subsection.

M.1.h.2 Biennial Report Requirements

There are no changes to this subsection.

ATTACHMENT M-1

WATER QUALITY AND LEACHATE MONITORING PLAN, JE&A, NOVEMBER 2008

CITRUS COUNTY CENTRAL LANDFILL

WATER QUALITY AND LEACHATE MONITORING PLAN

DEP PERMIT NO. 21375-008-SO/01

Prepared by:

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November 2008

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11/21/08

WATER QUALITY AND LEACHATE MONITORING PLAN FOR THE CITRUS COUNTY CENTRAL LANDFILL

This Water Quality and Leachate Monitoring Plan has been prepared to update the monitoring program for the Citrus Central Landfill in response to the construction of the Phase 3 Expansion. This monitoring plan follows the format of Part M—Water Quality and Leachate Monitoring Requirements—of the State of Florida Application for a Permit to Construct, Operate, Modify, or Close a Solid Waste Management Facility. Proposed modifications to the previous monitoring plan—as outlined in Permit # 21375-008-SO/01—are:

- The background well MW-1R will be re-designated as a piezometer. Water levels will be collected semiannually in conjunction with the compliance monitoring events.
- A new compliance well—MW-20—will be installed to monitor the northern compliance line boundary of the Phase 3 Expansion.

A site map that shows the groundwater and leachate monitoring network with the proposed changes is provided as Attachment 1.

1. WATER QUALITY AND LEACHATE MONITORING PLAN

a. Sign and Seal

The water quality monitoring plan has been signed, dated, and sealed in accordance with Chapter 62-701.510(2)(a), FAC.

b. Sampling and Analysis

All sampling and analysis have been performed in accordance with Chapter 62-160, FAC; 62-701.510(2)(b), FAC; the FDEP Standard Operating Procedures for Field Activities (FDEP-SOP-001/01); the FDEP Standard Operating Procedures for Laboratory Activities (FDEP-SOP-002/01); and the current Permit No. 21375-008-SO/01.

c. Groundwater Monitoring Requirements

(1) There are no detection wells in the Groundwater Monitoring Plan.

(2) There are seven compliance wells—MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, and MW-17—in the existing monitoring network. One additional compliance well—MW-20—is proposed along the northern zone of discharge boundary for the Phase 3 Expansion as shown on Attachment 1. The proposed monitoring network will have eight compliance wells. Table 1.c compares the current monitoring network

outlined in Permit # 21375-008-SO/01 and the proposed monitoring network.

(3) Four background wells—MW-1R, MW-2, MW-3, and MW-7—are included in the existing monitoring network. MW-1R is downgradient from the Phase 3 Expansion area and is proposed to be used as a piezometer in the new monitoring network. The proposed network will have three background wells—MW-2, MW-3, and MW-7.

(4) A site map showing the locations of each groundwater monitoring well in the proposed monitoring network is presented as Attachment 1. Attachment 2 is a table that includes well construction information for all wells—existing and proposed.

(5) Well spacing is less than 500 feet across the downgradient direction of groundwater flow and approximately 1,500 feet apart across the upgradient direction of groundwater flow in the uppermost aquifer—the Floridan aquifer—within the zone of discharge.

(6) The screened intervals of the monitoring wells were positioned to encounter the water table of the unconfined Floridan aquifer throughout normal seasonal fluctuation.

(7) Unused wells and piezometers will be abandoned properly, as specified in Rule 62-532.440, FAC, and the rules of the Southwest Florida Water Management District.

(8) There are no detection sensors at the Citrus Central Landfill.

Table 1.c. Existing and Proposed Monitoring Networks.

Existing Network	Proposed Network
Background wells	
MW-1R	MW-2
MW-2	MW-3
MW-3	MW-7
MW-7	
Compliance Wells	
MW-10	MW-10
MW-11	MW-11
MW-12	MW-12
MW-13	MW-13
MW-14	MW-14
MW-15	MW-15
MW-17	MW-17

	MW-20

Assessment Wells

MW-18	MW-18
MW-19	MW-19

Intermediate Well

MW-6	MW-6

Piezometers

MW-4R	MW-4R
MW-5	MW-5
MW-8R	MW-8R
MW-9	MW-9
MW-16	MW-16
MW-AA	MW-AA
MW-B	MW-B
MW-E	MW-E
PZ-1	PZ-1
PZ-2	PZ-2
	MW-1R

d. Surface Water Monitoring Requirements

Surface water is only required to be sampled if there is a discharge off of the Citrus County Central Landfill Property as required by Specific Condition Part E.8 of the Current Permit. The sample will be collected from the body of water from which the discharge occurred.

e. Leachate Sampling Locations

Samples for leachate influent are collected from the master lift station for Phase 1/1A and from the primary pump sampling port for the Phase 2. Leachate influent samples for the Phase 3 Expansion will be collected from the sampling port at the top of the side slope riser pipes.

Samples for leachate effluent are collected from the discharge from the chlorine contact tank.

f. Sampling Frequency and Requirements

(1) Newly installed wells and replacement wells will be sampled for the parameters listed in Rules 62-701.510(8)(a) and (8)(b), FAC, within 1 week of well completion and development.

(2) Leachate Influent, Effluent, and Treatment Plant Sludge sampling parameters and frequency:

(a) Leachate influent samples will be collected annually for the parameters listed in Table f(2)(a). A composite sample may be collected combining each of phases, except that individual samples must be collected from each location for the analysis of volatile organic compounds.

Table f(2)(a) Leachate Influent Sampling Parameters	
Field Parameters	Laboratory Parameters
Specific Conductivity	Total Ammonia –N
pH	Bicarbonate
Dissolved Oxygen	Chlorides
Colors and Sheens (by observation)	Iron
	Mercury
	Nitrate
	Sodium
	Total Dissolved Solids (TDS)
	Those parameters listed in 40 CFR Part 258, Appendix II

(b) Leachate effluent samples are collected as outlined in Table f(2)(b) with results reported quarterly. Leachate effluent is analyzed annually for the parameters listed in 40 CFR Part 258, Appendix I, except during the annual sampling event before a permit renewal, at which time the effluent needs to be analyzed for the parameters listed in 40 CFR Part 258, Appendix II.

Table f(2)(b) Leachate Effluent Sampling Parameters and Frequency	
Parameter	Sampling Frequency
Flow	Daily
pH	Daily
$CBOD_5$	Monthly
TSS	Monthly
Nitrate –N	Monthly
Chloride	Quarterly
Sodium	Quarterly
TDS	Quarterly
Total Ammonia-N	Quarterly
Benzene	Quarterly
Toluene	Quarterly

Ethlybenzene	Quarterly
Total Xylenes	Quarterly
Vinyl Chloride	Quarterly
Ethylene dibromide (EDB)	Quarterly
Total Trihalomethanes	Semi-annually
Arsenic	Annually
Barium	Annually
Cadmium	Annually
Chromium	Annually
Iron	Annually
Mercury	Annually
Lead	Annually
Selenium	Annually
Silver	Annually

(c) Waste Sludge from the leachate treatment plant shall be sampled annually for the parameters listed below:

- Toxicity Characteristics Leaching Potential Test (TCLP) for the organics
- Metals and Pesticides listed in 40 CFR Part 261.24, Table 1
- pH (standard units)
- Solids (percent)

(3) Background, Compliance, Intermediate, and Assessment well analytical parameters and sampling frequency:

(a) All background wells—MW-2, MW-3, and MW-7—will be sampled semiannually for the parameters listed in Table f(3)(a).

Table f(3)(a) Background Well Sampling Parameters	
Field Parameters	Laboratory Parameters
Static Water Levels	Total Ammonia -N
Specific Conductivity	Chlorides
pH	Iron
Dissolved Oxygen	Mercury
Turbidity	Nitrate
Temperature	Sodium
Colors and Sheens (by observation)	Total Dissolved Solids (TDS)
	Those parameters listed in 40 CFR Part 258, Appendix I

(b) All compliance wells—MW-10, MW-11, MW-12, MW-13, MW-14, MW-15, MW-17, and proposed well MW-20—will be sampled semiannually for the parameters listed in Table f(3)(b). Note: These are the same parameters required for the background wells.

Table f(3)(b) Compliance Well Sampling Parameters	
Field Parameters	Laboratory Parameters
Static Water Levels	Total Ammonia -N
Specific Conductivity	Chlorides
pH	Iron
Dissolved Oxygen	Mercury
Turbidity	Nitrate
Temperature	Sodium
Colors and Sheens (by observation)	Total Dissolved Solids (TDS)
	Those parameters listed in 40 CFR Part 258, Appendix I

(c) The intermediate well—MW-6—will be sampled semiannually for the parameters listed in Table f(3)(c).

Table f(3)(c) Intermediate Well Sampling Parameters	
Field Parameters	Laboratory Parameters
Static Water Levels	Total Ammonia -N
Specific Conductivity	Chlorides
pH	Iron
Dissolved Oxygen	Mercury
Turbidity	Nitrate
Temperature	Sodium
Colors and Sheens (by observation)	Total Dissolved Solids (TDS)
	Fecal Coliform
	Total Trihalomethanes
	Those parameters listed in 40 CFR Part 258, Appendix I

(d) Assessment wells—MW-18 and MW-19—will be sampled semiannually for the parameters listed in Table f(3)(d).

Table f(3)(d) Assessment Well Sampling Parameters	
Field Parameters	Laboratory Parameters
Static Water Levels	Benzene
Specific Conductivity	Methylene Chloride
pH	Vinyl Chloride
Dissolved Oxygen	

Turbidity	
Temperature	
Colors and Sheens (by observation)	

(4) Surface water is only required to be sampled if there is a discharge off of the Citrus County Central Landfill Property as required by Specific Condition Part E.8 of the Current Permit. If discharge off of the property occurs, samples will be collected for the parameters listed in Table f(4).

Table f(4). Surface Water Sampling Parameters

Field Parameters	Laboratory Parameters
Specific Conductivity	Unionized Ammonia
pH	Total Hardness
Dissolved Oxygen	Total Phosphates
Turbidity	Chlorophyll A
Temperature	Copper
Colors and Sheens (by observation)	Iron
	Mercury
	Nitrate
	Total Organic Carbon (TOC)
	Total Nitrogen
	Chemical Oxygen Demand (COD)
	Fecal Coliform
	Biochemical Oxygen Demand (BOD5)
	Total Dissolved Solids (TDS)
	Total Suspended Solids (TSS)
	Zinc
	Those parameters listed in 40 CFR Part 258, Appendix I

g. <u>Evaluation Monitoring, Prevention Measures, and Corrective Action</u>

(1) Groundwater Corrective Actions

If at any time analyses from the groundwater detect parameters which are significantly above the background water quality or which are at levels above the Department's water quality standards or criteria specified in Chapter 62-520, FAC at the edge of the Zone of Discharge, the well will be resampled within 30 days after the sampling data are received to confirm the data. If the data are confirmed, the FDEP will be notified in writing within 14 days of this finding. Upon notification by the FDEP, evaluation monitoring will be initiated in accordance with Rule 62-701.510(7) FAC.

(2) Leachate Influent Corrective Actions

If the annual leachate influent sampling analysis reports a contaminant that exceeds the regulatory level listed in 40 CFR Part 261.24, monthly sampling shall be initiated. The Department will be notified within 24 hours of confirmation of the contamination and written correspondence detailing the exceedence and proposed remediation will follow within 7 days. Monthly sampling will continue until 3 consecutive months have no regulatory exceedences.

(3) Leachate Effluent Corrective Actions

If in any 2 consecutive months of leachate effluent sampling, the same listed parameter exceeds the regulatory level, discharge to the percolation ponds will cease and off-site disposal will be initiated. Off-site disposal shall continue until acceptable leachate treatment is again demonstrated and approved by the Department.

(4) Surface Water Corrective Actions

Surface Water is only sampled on a per discharge event. The Department will be notified within 24 hours of discovery of a discharge event.

h. Water Quality Monitoring Report Requirements

Groundwater monitoring is required and has been completed in accordance with Rule 62-701.510(9), FAC.

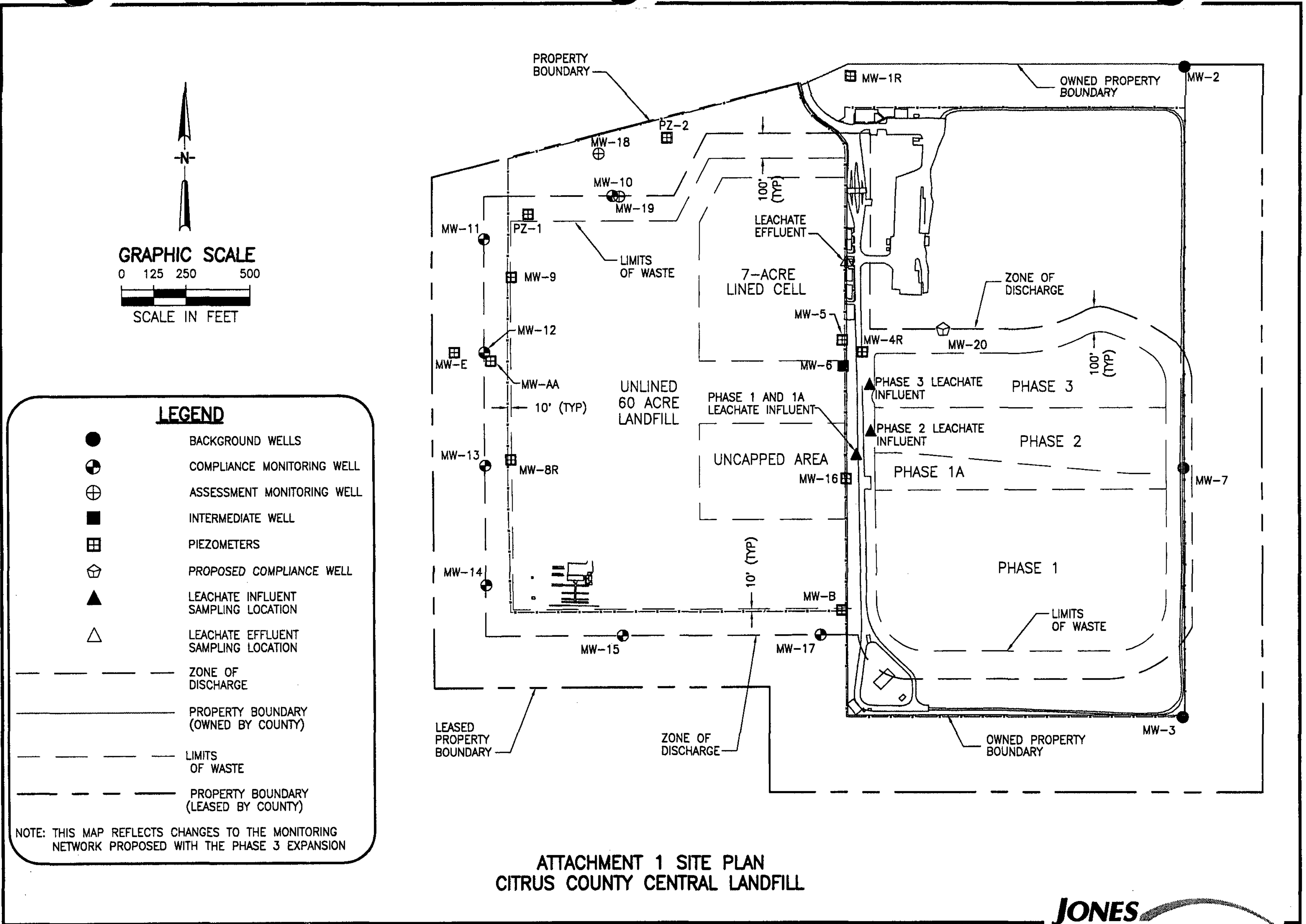
(1) Groundwater compliance monitoring reports are submitted to FDEP semi-annually in accordance with the current permit (FDEP Permit No.21375-008-SO/01). Additionally, these reports are submitted in accordance with the requirements of Chapter 62-701.510(9) (a), FAC. Compliance monitoring reporting due dates are outlined in Table h.

Table h. FDEP Reporting Deadlines	
Groundwater Sampling	
July-December Semiannual Event	January 15th
January-June Semiannual Event	July 15th
Leachate	
Annual Influent	January 15th
Annual Treated Effluent	January 15th
Annual Treatment Plant Sludge	January 15th

Surface Water	
Discharge Event	within 30 days of receipt of results

(2) Groundwater biennial reports are submitted to FDEP in accordance with the current permit (FDEP Permit No. 21375-008-SO/01). Additionally, these reports are submitted in accordance with the requirements of Chapter 62-701.510(9) (b), FAC.

A technical report signed, sealed, and dated by a P.G. or P.E. will be submitted to the FDEP every 2 years. The most recent report summarized data from the Second Semiannual 2004 through the First Semiannual 2007 sampling events. The report will summarize and interpret the water quality, water level measurements, and leachate quality collected during the past 2 years.



ATTACHMENT 1 SITE PLAN
CITRUS COUNTY CENTRAL LANDFILL

JONES EDMUNDS

03860-018-01

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ATTACHMENT 2
CITRUS COUNTY CENTRAL LANDFILL
WELL CONSTRUCTION DETAILS

Well Name	Well Designation	Date Installed	Top of Casing Elevation (Ft. NGVD)	Ground Elevation (Ft. NGVD)	Total Depth (Ft. BLS)	Total Depth (Ft. BTOC)	Screen Details					Filter Pack (Silica Sand)	Well Location	
							Length (Ft.)	Depth (Ft. BLS)		Elevation (Ft. NGVD)			Northing (Ft.)	Easting (Ft.)
								Top	Bottom	Top	Bottom			
MW-AA[1]	Piezometer	NR	106.11	104.7	116	NR	10	106	116	0.1	-9.9	NR	NR	NR
MW-B[1]	Piezometer	NR	111.94	111.1	128	NR	20	108	128	3.9	-16.1	NR	NR	NR
MW-E[1]	Piezometer	NR	109.88	107.0	118	NR	20	98	118	11.9	-8.1	NR	NR	NR
MW-1R[1]	Peizometer[3]	NR	118.08	115.3	125	NR	10	115	125	3.1	-6.9	NR	NR	NR
MW-2[1]	Background	NR	136.29	133.5	161	NR	15	146	161	-9.7	-24.7	NR	NR	NR
MW-3[1]	Background	NR	120.47	119.7	119	NR	15	104	119	16.5	1.5	NR	NR	NR
MW-4R	Piezometer	11/9/05	119.33	119.71	125.0	124.6	20	105.0	125.0	14.7	-5.3	NR	1642794.06	515836.95
MW-5[1]	Piezometer	NR	121.14	118.6	120	NR	10	110	120	11.1	1.1	NR	NR	NR
MW-6[1]	Intermediate	NR	118.48	115.8	122	NR	10	112	122	6.5	-3.5	NR	NR	NR
MW-7[1]	Background	NR	128.66	NR	137	NR	20	117	137	11.7	-8.3	NR	NR	NR
MW-8R[1]	Piezometer	NR	118.13	NR	128	NR	20	108	128	10.1	-9.9	NR	NR	NR
MW-9[1]	Piezometer	NR	113.55	NR	121	NR	20	101	121	12.6	-7.5	NR	NR	NR
MW-10	Compliance	11/2/05	113.51	114.05	120.5	118.6	20	100.5	120.5	14.9	-5.1	20/30	1643658.80	514808.73
MW-11	Compliance	11/2/05	104.83	105.17	112.0	111.5	20	92.0	112.0	13.3	-6.7	Gravel	1643432.56	514300.80
MW-12	Compliance	11/2/05	103.49	103.98	110.0	108.8	20	90.0	110.0	14.7	-5.3	20/30	1642972.51	514307.73
MW-13	Compliance	11/10/05	112.04	112.55	120.0	118.8	20	100.0	120.0	13.2	-6.8	20/30	1642402.16	514320.79
MW-14	Compliance	11/10/05	108.63	109.09	116.0	115.9	20	96.0	116.0	12.7	-7.3	20/30	1641950.73	514332.03
MW-15	Compliance	11/10/05	123.71	124.15	130.0	129.5	20	110.0	130.0	14.2	-5.8	20/30	1641702.99	514864.91
MW-16	Piezometer	10/31/05	119.81	120.22	127.0	126.5	20	107.0	127.0	13.3	-6.7	20/30	1642141.07	515781.53
MW-17	Compliance	11/3/05	110.98	111.50	118.0	117.6	20	98.0	118.0	13.4	-6.6	20/30	1641705.53	515647.01
MW-18	Assessment	1/23/07	115.98	116.28	120.0	119.6	20	100.0	120.0	16.4	-3.6	20/30	1643745.78	514731.67
MW-19	Assessment	1/22/07	113.64	114.04	140.0	139.6	10	130.0	140.0	-16.0	-26.0	20/30	1643659.75	514817.07
MW-20[2]	Compliance	proposed	~118.5	~119	~124	~123.5	20	~104	~124	15.0	-5.0	20/30	~1643068.7	~516100.2
PZ-1	Piezometer	1/26/07	111.12	111.42	120.0	119.6	20	100.0	120.0	11.5	-8.5	20/30	1643505.21	514454.92
PZ-2	Piezometer	1/24/07	117.00	117.19	120.0	119.6	20	100.0	120.0	17.4	-2.6	20/30	1643832.98	515021.33

BLS = Below Land Surface

BTOC = Below Top of Casing

NR = Not recorded

Ft. = Feet

NGVD = National Geodetic Vertical Datum

Notes:

[1] Well Construction and Elevation information obtained from the Two-Year Groundwater Monitoring Report for Years 1997 and 1998, prepared by CH2MHill

[2] Well MW-20 is proposed; well will be installed to position the screen interval between 15 and -5 ft NGVD. Total depths and location are approximate and will be updated after surveying.

[3] Well MW-1R changed from background to piezometer with the Phase 3 Expansion

Elevation and survey data complied from a Nature Coast Land Surveying, Inc. survey dated December 16, 2005 and from a Terrence J. Brannan Land Surveyor Inc. survey dated March 22, 2007

SECTION N

SPECIAL WASTE HANDLING REQUIREMENTS

N.1 MOTOR VEHICLES

Motor vehicles are not currently accepted for disposal at the Citrus County Central Landfill. Should motor vehicles be accepted for disposal in the future they will be handled and disposed of in compliance with applicable rules and regulations.

N.2 SHREDDED WASTE

The Class I landfill does not shred waste.

N.3 ASBESTOS

There are no changes to this subsection.

N.4 CONTAMINATED SOIL

There are no changes to this subsection.

N.5 BIOLOGICAL WASTE

There are no changes to this subsection.

SECTION O

LANDFILL GAS MANAGEMENT SYSTEM REQUIREMENTS

O.1 LANDFILL GAS MANAGEMENT SYSTEM

Currently, the Citrus County Central Landfill does ~~not~~ exceed the 2.5 million megagram design capacity emission threshold as stated in the New Source Performance Standards (NSPS) Regulation §60.752. ~~Therefore, the landfill is not subject to the NSPS standards and subsequently is not required to install a landfill gas (LFG) collection and control system.~~ The landfill currently has a Title V permit and is complying with NSPS standards.

A Tier 2 analysis was conducted in 2006. The results indicate the site will not exceed the 50 megagrams threshold for at least the next five year permit renewal.

The old, closed 60-acre landfill area does contain passive LFG venting and flaring facilities to prevent potential off-site migration of odors.

A proposed interim Gas Collection and Control System (GCCS) is being proposed as a minor operations permit modification in December 2008 which will include tie-ins to the existing leachate collection and removal system (LCRS) risers on the east side of the active landfill and connect to an above ground header; below ground header will be required for portions of the header that cross access roads to the landfill; collected LFG will be routed to a blower/flare station where it will be combusted in a candlestick flare. The GCCS will operate under negative pressure and the candlestick flare will combust up to 700 scfm of LFG collected from the landfill.

The LFG management system at the site currently consists of passive vents installed in the old closed 60-acre landfill, which serves to minimize the potential for off-site migration of LFG. The interim GCCS proposed within Phase 1 and 1A is a voluntary active LFG collection and control system that is being installed to proactively reduce methane emissions to the atmosphere. This system is not required by the Federal New Source Performance Standards.

O.1.a Concentrations of Combustible Gases

This subsection is not applicable.

O.1.b Site-specific Design

This subsection is not applicable.

O.1.c Reducing Gas Pressure

This subsection is not applicable.

O.1.d Liner, Leachate Control System or Final Cover Non-Interference

This subsection is not applicable.

O.2 LANDFILL GAS MONITORING

On a quarterly basis, gas monitoring of ambient points and soil probes occurs in order to comply with the LEL limits set forth in Rule 62-701.530(1)(a)(1) and the interior gas pressure reduction rule stated in Rule 62-701.530(1)(a)(3). Ambient points are located in on-site structures such as the scale house, leachate pretreatment plant, etc. Soil probes are installed along each property boundary of the facility.

Section 9 of the Citrus County Central Class I Operations Plan includes documentation describing the locations of both the ambient monitoring points and the soil monitoring probes and construction details for the soil monitoring probes. The results of the quarterly monitoring are submitted to the Department.

As a result of the landfill expansion, one LFG monitoring probe (GP-19) is proposed along the north eastern perimeter of the landfill. The proposed probe will be constructed similar to the existing probes. The location of the proposed probe, as well as proposed construction detail, is shown on the attached permit drawings.

O.3 LANDFILL GAS REMEDIATION AND ODOR REMEDIATION PLANS

In the event that the LEL is exceeded during quarterly monitoring, Citrus County shall submit to the Department a gas remediation plan and have it implemented within 60 days of the exceedance detection.

In the event that an objectionable odor caused by LFG is detected, a routine odor-monitoring program will be implemented. If the odor-monitoring program confirms the existence of objectionable odors, then an odor remediation plan shall be submitted to the Department. Upon approval by the Department, the odor remediation plan shall be implemented within 30 days.

O.4 LANDFILL GAS RECOVERY FACILITIES

This section is not applicable since there are no landfill gas recovery facilities at Citrus County Central Landfill.

SECTION P

LANDFILL CLOSURE REQUIREMENTS

P.1 CLOSURE SCHEDULE REQUIREMENTS

P.1.a Notice of Closure to FDEP

In accordance with Rule 62-701.600(2)(a), F.A.C. at least one year prior to the projected date when wastes will no longer be accepted at the Citrus County Central Landfill, Citrus County BOCC will provide to FDEP and the local pollution control agency a written notice with a schedule for cessation of waste acceptance and closure of the landfill. However, if unforeseen circumstances do not allow the one year notification, notice will be provided as soon as the need to close the facility becomes apparent

P.1.b Notice to Users

In accordance with Rule 62-701.600(2)(b), F.A.C. at least 120 days prior to the date when wastes will no longer be accepted at the Citrus County Central Landfill the following steps will be taken:

1. All users will be notified of the intent to close, date of closing, alternative disposal sites and the person responsible for the closing.

2. Signs will be posted at the entrance of the facility containing the above information. These signs will be maintained throughout the closing period.

However, if unforeseen circumstances do not allow the 120 day notice, notice will be provided as soon as the need to close the facility becomes apparent.

P.1.c Notice to Public

In accordance with Rule 62-701.600(2)(c), F.A.C. within 10 days prior to the date when wastes will no longer be accepted at the Citrus County Central Landfill, a notice of intent to close the facility will be published in the legal advertising section of a newspaper of general circulation in Citrus County, as required by Rule 62-701.600(2)(c), F.A.C. Proof of publication in the newspaper will then be provided to FDEP within seven days of the publication.

P.2 CLOSURE PERMIT GENERAL REQUIREMENTS

Citrus County BOCC will submit an application to FDEP for final closure of the Citrus County Central Landfill at least 90 days before the date when wastes will no longer be accepted. The application will include Item Numbers P.2.a and P.2.b listed below.

P.2.a Closure Application

At least 90 days before the date when wastes will no longer be accepted, the Citrus County BOCC will submit an application for final closure to the FDEP.

P.2.b Closure Plan

This Construction Permit Application includes a Closure Plan that includes the following:~~The final grading plan will for the Phase 3 will be submitted with the Operations Permit Renewal Application. When applicable, the closure permit application will contain:~~

1. A closure report
2. A closure design plan
3. A closure operation plan
4. Closure procedures
5. A plan for long-term care
6. Demonstration of proof of financial responsibility for long term care

Refer to Attachment F-4 for the final build out plan and Attachment P-1 for the Closure Plan

P.3 CLOSURE REPORT REQUIREMENTS

At least 90 days before the date when wastes will no longer be accepted at the Citrus County Central Landfill, the Citrus County BOCC will submit a report for final closure to FDEP with the application for final closure pursuant to Rule 62-701.600, F.A.C. The report will include the information required in Items Numbers P.3.a, P.3.b, P.3.c, P.3.d and P.3.e listed below.

P.3.a General Information Requirements

The report of final closure will address the following:

1. Identification of the landfill.
2. Location, description, and vicinity map.
3. Total acreage of waste disposal areas and total acreage of landfill property.
4. Legal description of property on which the landfill is located.
5. History of the landfill to include dates of construction and a description of the location and sequence of fill operations.

6. Identification of the types of wastes disposed of in the completed landfill based on records, composition studies, operator memory, major waste depositors, special handling records, and other services.

P.3.b Geotechnical Report and Water Quality Monitoring Plan

A geotechnical investigation report and water quality monitoring plan will be prepared for submittal with the closure permit application required by Rule 62-701.330(3), F.A.C.

P.3.c Land Use

An updated land use information report will be prepared for submittal with the closure permit application indicating identification of adjacent landowners, zoning, present land use, and roads, highways right-of-ways, or easements.

P.3.d Gas Migration

A report on actual or potential gas migration at the Citrus County Central Landfill including detailed descriptions of test and investigational methods will be prepared.

P.3.e Effectiveness of Landfill Design

Per Rule 62-701.600(4)(e), F.A.C. a report that assesses the effectiveness of the landfill design and operation will be conducted that includes:

- Results of geotechnical investigation.
- Effects of surface water runoff, drainage patterns and storm water controls.
- Extent and effects of methane gas migration, lower explosive limit percentage readings in migration paths and description of the gas venting system.
- Condition of existing cover, thickness and types of soils or materials used for cover and effectiveness of cover material as a leachate control mechanism.
- The nature and characteristics of the waste disposed of at the landfill.

P.4 CLOSURE DESIGN REQUIREMENTS

A closure design plan consisting of engineering plans and a report on closing procedures that apply to the final closing of the waste disposal units will be submitted at least 90 days before the date when wastes will no longer be accepted. The design will include:

1. Plan drawing showing phases of site closing.
2. Drawings showing existing topography as proposed final grades.

3. Provisions to close units when they reach approved final dimensions.

4. Final elevations before settlement.

5. Final Side Slope Design.

6. Final cover installation plan to including:

   (a) CQA plan for installing and testing final cover.

   (b) Schedule for installing final cover after final receipt of waste.

   (c) Description of drought-resistant species to be used in the vegetative cover.

   (d) Top gradient design to maximize runoff and minimize erosion.

   (e) Provisions for cover material to be used for final cover maintenance.

7. Final Cover Design - the final cover design will comply with Chapter 62-701.600(5)(g). The design will address:

   (a) Protective soil layer design.

   (b) Barrier soil layer design.

   (c) Erosion control vegetation.

   (d) Geomembrane/soil barrier layer design.

   (e) Geosynthetic clay liner design if used.

   (f) Stability analysis of the cover system and the disposed waste.

8. Proposed method of storm water control according to Chapter 62-25 F.A.C.

9. Proposed method of access control.

10. Description of proposed final use of the closed landfill if applicable.

11. Description of the proposed gas management system, which complies with the current Rule.

P.5 CLOSURE OPERATION PLAN

A Closure Plan will be submitted at least 90 days before the date when wastes will no longer be accepted. The plan will include:

1. Detailed description of actions that will be taken to close the landfill.

2. Time schedule for completion of closing and long term care.

3. Description of method for demonstrating financial responsibility.

4. Listing of any additional equipment and/or personnel needed to complete closure.

5. Development and implementation of the water quality monitoring plan required by the Rule.

6. Development and implementation of a routine gas monitoring program as required in the Rule.

P.6 TEMPORARY CLOSURE

Temporary closure of the landfill is proposed to minimize leachate generation in the disposal area and to facilitate the timely use of available earth construction material at the site. Temporary closure will be accomplished concurrent with waste placement in the landfill. Areas that have reached final elevations will receive a 12-inch thick intermediate earth cover or temporary cover until such time that final cover is placed over the area.

ATTACHMENT P-1

CLOSURE PLAN

ATTACHMENT P-1

CLOSURE PLAN

INTRODUCTION

The closure plan for the Citrus County Central Landfill is consistent with the closure requirements of rule 62-701 F.A.C.

The Citrus County Central Landfill Class I disposal area consisting of Phases 1, 1A, 2 and 3 covers an area of approximately 31 acres. It is anticipated that closure construction will occur when final elevations are reached for this area. The County may at some point in the future, desire to perform a partial closure prior to complete filling of the permitted area. Should the County desire to pursue this approach, the County will submit an application for a Closure Construction Permit.

CLOSURE PLAN

General

Closure activities will include:

- Placement of a liner bedding layer.
- Installation of a capping system.
- Construction of drainage culverts and control structures.
- Placement of final cover and the establishment of vegetative cover.

Closure activities will be completed by a qualified contractor or by County forces. The Contractor will be selected by competitive bid process and will be required to supply all equipment and personnel for the closure construction.

Closure Performance Standard

The closure plan has been developed for closing the landfill in a manner that will minimize the need for further maintenance. Closure will also minimize threats to human health and the environment from waste constituents or waste byproducts, such as leachate and landfill gas (LFG).

Closure of the Citrus County Central Landfill is designed to control the release of solid waste and waste decomposition products. The design features that control these releases are:

- A final cap that minimizes surface water and stormwater infiltration into the landfill. This cap will consist of existing intermediate cover, six (6) inches of soil liner bedding, a flexible membrane liner (FML), a geonet/geotextile drainage layer, a soil protective layer consisting of eighteen (18) inches of common fill sandy soil, and a six (6) inch topsoil layer that will support the local species of grasses. The FML will be composed of the same or similar material type as the base liner.

- A LFG management system will consist of vertical gas vents that are installed in the waste.

In addition, closure will minimize the need for post-closure maintenance because of the following design features:

- Promotion of positive drainage by using top slopes of 4 percent and side slopes of a maximum of 3 horizontal to 1 vertical.
- Vegetation of the top surface and slopes via installation of sod.
- Allowance in the design for settlement of all closure components that will be located over waste. This feature will be achieved by using components that are flexible and that tolerate settlement (e.g., flexible pipes).

Performance standards will be met through the proper design and construction of the final cap, of the grading and erosion protection measures, of the stormwater management system features, and of the LFG management control system. All construction activities will be documented and proper quality control and quality assurance will be performed. To determine the stability of the closure cap system, side slope stability calculations were performed. These calculations are included in Attachment J-2. The calculations show that the closure system is stable as designed. It is anticipated that the first closure project will include Phases 1, 1A, 2 and parts of Phase 3.

Closure of Landfill Disposal Areas

The Citrus County Central Landfill continues to accept waste in Phases 1, 1A and 2. Intermediate cover elevations are to be brought to final design elevation to allow for settlement and to provide room for the final cap system.

Temporary drainage and erosion control features, including swales and/or let down pipes and energy dissipators, will be installed as specific areas reach final grade.

Closure Cap Design

The Citrus County Central Landfill individual disposal units will be closed and secured with a final cap designed to accomplish the following goals:

- Reduce or minimize infiltration of precipitation through the top surface of the landfill (the primary goal of the final cap).
- Minimize amount of maintenance.
- Control landfill decomposition byproducts (e.g., leachate, LFG).

- Promote efficient drainage while preventing excess erosion of the final cover.
- Allow for settling and subsidence while maintaining the integrity of the cap system.
- Control vectors (e.g., rats, birds).

The layers included in the proposed closure cap and their associated thicknesses are described below from top to bottom. The final topographic contours of the closed landfill through Phase 3 is included in the Final Buildout of Phases 1, 1A, 2 and 3 Plan included in Attachment F-4.

- The **vegetative cover** will consist of a commercially grown sod.
- The **topsoil layer** will consist of six (6) inches of soil capable of supporting the local species of sod grasses. This may include on-site soils amended with composted yard waste mulch fines.
- The **protective soil layer** will consist of 18-inches of local sandy soils. It is a protective covering over the cap and will provide secondary support to the vegetative layer.
- The **drainage layer** above the low permeability cap will consist of 200 mil thick geocomposite drainage product. Its function will be to promote positive drainage of rainfall infiltration from the protective layer off the low permeability cap to stormwater collection features.
- The **low permeability layer** will consist of a 40-mil textured FML. The FML will significantly reduce the amount of infiltration passing through the topsoil and cover soil layers and into the waste material. The reduction in the amount of infiltration through the waste will ultimately reduce the amount of leachate generated.
- The **bedding layer** will consist of a minimum of 6-inches of clean sandy soil prepared from the existing intermediate cover.

The top slopes of the cover will be four (4) percent, and the maximum side slopes will be 3 horizontal to 1 vertical.

Surface and Stormwater Management System

Each aspect of the surface water and stormwater management system is discussed below:

- **Hydrology:** The land surrounding the landfill is highly pervious. The majority of the surface water flow into the existing detention area quickly percolates into the ground.
- **Erosion Control:** The final slopes on top of the closed landfill will be designed for 4 percent. The sideslopes will be a maximum 3 horizontal to 1 vertical, with a perimeter road and curb installed along the toe of slope of the landfill for access and

erosion control. Benches are spaced at a maximum of 40 vertical feet intervals to minimize sheet flow distances.

- **Runoff Control System:** Landfill surface water runoff is generated from the top and sideslopes of the landfill. All stormwater falling on the sideslopes will be allowed to sheet flow down the next bench a maximum of 120 feet. The benches will intercept runoff flowing down the sideslopes of the landfill to minimize erosion. The benches will convey runoff to drop inlets constructed at appropriate intervals. A series of stormwater pipes will be installed to convey the stormwater to the DRA or perimeter ditch. Surface water runoff from the landfill reaching the toe of the slope will be controlled by a perimeter curb. The curb will intercept surface water runoff from the landfill, and discharge it to the DRA via notches and paved flumes. All stormwater pipes will be installed with FDOT standard energy dissipating U-type endwalls. This surface water management system will be designed to accommodate a 24-hr, 25-yr storm event.

In summary, the stormwater control system will include:

- Stormwater collection swales to collect runoff from the landfill and convey it off to minimize erosion.
- Energy dissipators.
- Sideslope benches with swales.
- Culverts and control structure systems.
- The existing perimeter ditches and dry retention area.

CLOSURE/POST-CLOSURE COST ESTIMATE

Attachment S-1 lists the closure cost estimates for the current operation phases including Phase 3.

RECORDATION

Immediately after the closure of all disposal units at the Citrus County Landfill, the County shall record a notation on the deed to the landfill facility property and notify the Department that the notation has been recorded and a copy has been placed in the operating record. The notation on the deed shall notify any potential purchaser of the property that the land was used as a landfill facility and its use is restricted under the closure plan approved by the FDEP.

SECTION Q

CLOSURE PROCEDURES

This section is not applicable for this permit application since it does not include landfill closure. Prior to closure, Citrus County will apply for a permit for closure in accordance with the requirements of this section.

Q.1 SURVEY MONUMENTS

Several survey monuments already exist at the Citrus County Central Landfill and additional survey monuments are not required for the Phase 3 expansion.

Q.2 FINAL SURVEY REPORT

A final topographic survey will be performed after closure is complete to confirm that final contours and elevations are in accordance with the plans as approved in the closure permit.

Q.3 CERTIFICATION OF CLOSURE CONSTRUCTION COMPLETION

A certification of closure construction completion, signed, dated, and sealed by a professional engineer will be provided to the FDEP upon completion of closure in accordance with Rule 62-701.610(4), FAC.

Q.4 DECLARATION TO THE PUBLIC

After closing operations are inspected and approved by the FDEP, a declaration to the public in the deed records in the office of Clerk of Citrus County, Florida will be published in accordance with Rule 62-701.610(5), FAC.

Q.5 OFFICIAL DATE OF CLOSING

In accordance with Rule 62-701.610(6), FAC, the FDEP will determine the official date of closing.

Q.6 USE OF CLOSED LANDFILL AREAS

Consultation with the FDEP is required prior to conducting activities at closed landfills in accordance with Rule 62-701.610(7), FAC.

Q.7 RELOCATION OF WASTES

Permission from the FDEP is required to move waste from one point to another within the footprint of the waste disposal area in accordance with Rule 62-701.610(8), FAC.

SECTION R

LONG TERM CARE REQUIREMENTS

R.1 GAS COLLECTION AND MONITORING

The gas collection and monitoring system will be maintained for the duration of the long-term care period as required by Rule 62-701.620(5), FAC.

R.2 RIGHT OF PROPERTY ACCESS

No changes are proposed; in accordance with Rule 62-701.620(4), F.A.C, the Citrus County BOCC will retain the right of entry to the landfill property for the long-term care period, after termination of solid waste operations, for inspection, monitoring and maintenance of the site

R.3 SUCCESSORS IN INTEREST

No changes are proposed; if any person or entity, other than the Citrus County BOCC, acquires the ownership or operation of the landfill, they shall be subject to all requirements of the landfill permit and applicable regulations, including maintenance, and provide proof of financial responsibility as required by Rule 62-701.620(5) FAC.

R.4 REPLACEMENT OF MONITORING DEVICES

No changes are proposed; if a monitoring well or monitoring point cited by the permit is destroyed or becomes inoperable, the landfill owner or operator shall immediately upon discovery, notify the FDEP in writing. Inoperative monitoring devices shall be replaced with functioning devices within 60 days of the discovery or as required by Rule 62-701.620(7), FAC.

R.5 COMPLETION OF LONG-TERM CARE

Upon completion of the long-term care period, the owner or operator will certify to the FDEP that the long-term care was completed in accordance with the closure plan as permitted. The certification will be signed and sealed by a professional engineer.

SECTION S

FINANCIAL RESPONSIBILITY REQUIREMENTS

S.1 COST ESTIMATES

Citrus County is required by Rule 62-701.630, FAC, to provide FDEP a description of the financial mechanism that demonstrates proof of financial assurance for closure and long-term care of the facility.

Each year, closure and long-term care cost estimates will be prepared for the facility in accordance with Rule 62-701.630(3) and (4), FAC. In preparing the closure cost estimates, the following assumptions are to be made:

- The closure cost estimates include the permitted areas of the landfill.
- Construction of the closure will be performed under contract by a private contractor.
- The cost estimates are prepared for the time period during the landfill operation when the extent and manner of the landfill's operation make closing the most expensive.
- The closure cost estimate assumes a geomembrane cover system over all of Phase 3.
- Long-term care costs include land surface care, landfill gas control, leachate control, groundwater and surface water monitoring, and administration.

Refer to Attachment S-1 for the Financial Assurance calculations.

S.2 ANNUAL COST ESTIMATES

An annual cost adjustment will be provided to FDEP in accordance with Rule 62-701.630(4) FAC. The estimate will address closure and long-term care costs, as well as corrective action costs, if required.

S.3 FUNDING MECHANISMS

Citrus County BOCC has a financial funding mechanism for the closure and long-term care of Citrus County Central Landfill currently on file with FDEP. To comply with the requirements of Rule 62-701.630(4), F.A.C., Citrus County submits annual adjustments to FDEP for the cost estimates for the closure and long term-care of the Citrus County Central Landfill.

ATTACHMENT S-1

FINANCIAL ASSURANCE COST ESTIMATE

DEP Form #	62-701.900(28)
Form Title	Financial Assurance Cost Estimate Form
Effective Date	05-27-01
DEP Application No.	(Filled by DEP)

Florida Department of Environmental Protection

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, FL 32399-2400

FINANCIAL ASSURANCE COST ESTIMATE FORM

Date: December 10, 2008 Date of FDEP Approval: ______

I. GENERAL INFORMATION:

Facility Name: Citrus County Central Landfill WACS or GMSID #.: SWD/53/49723

Permit / Application No.: ______ Expiration Date: ______

Facility Address: State Road 44, 3 miles east of Lecanto

Permittee: Citrus County Board of County Commissioners

Mailing Address: P.O. box 340 Lecanto, FL 34460

Latitude: 28 51'07" Longitude: 82 26'12" or UTM: ______

Solid Waste Disposal Units Included in Estimate:

Phase / Cell	Acres	Date Unit Began Accepting Waste	Design Life of Unit From Date of Initial Receipt of Waste
3	6.65		NA
2	6	Mid- 2005	10
1/1A	19.1	1991	14
Old LF	60		Closed

SOUTHWEST DISTRICT TAMPA
DEC 10 2008
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Total Landfill Acreage included in this estimate. 31.2 Closure 91.2 Long-Term Care

Type of Landfill: X Class I ______ Class III ______ C&D Debris

II. TYPE OF FINANCIAL ASSURANCE DOCUMENT (Check Type)

______ Letter of Credit *

______ Performance Bond *

______ Guaranty Bond *

______ Insurance Certificate

X Escrow Account

______ Financial Test

*Indicates mechanisms that require use of a Standby Trust Fund Agreement

III. ESTIMATE ADJUSTMENT

40 CFR Part 264 Subpart H as adopted by reference in Rule 62-701.630, Florida Administrative Code sets forth the method of annual cost estimate adjustment. Cost estimates may be adjusted by using an inflation factor or by recalculating the maximum costs of closure in current dollars. Select on of the methods of cost estimate adjustment below.

(a) Inflation Factor Adjustment

Inflation adjustment using an inflation factor may only be made when a Department approved closure cost estimate exists and no changes have occurred in the facility operation which would necessitate modification to the closure plan. The inflation factor is derived from the most recent Implicit Price Deflator for Gross National Product published by the U.S. Department of Commerce in its survey of Current Business. The inflation factor is the result of dividing the latest published annual Deflator by the Deflator for the previous year. The inflation factor may also be obtained from the Solid Waste Financial Coordinator at (850)-488-0300.

This adjustment is based on the Department approved closure cost estimate dated: ____________

Latest Department Approved Closure Cost Estimate:		Current Year Inflation Factor		Inflation Adjusted Closure Cost Estimate:
____________	x	____________	=	$0.00

This adjustment is based on the Department approved long-term care cost estimate dated: ____________

Latest Department Approved Annual Long-Term Care Cost Estimate:		Current Year Inflation Factor		Inflation Adjusted Annual Long-Term Care Cost Estimate
____________	x	____________	=	$0.00
Number of Years of Long Term Care Remaining:			x	30
Inflation Adjusted Long-Term Care Cost Estimate:			=	$0.00

(b) Recalculate Estimates (see section V)

IV. CERTIFICATION BY ENGINEER

This is to certify that the Financial Assurance Cost Estimates pertaining to the engineering features of the this solid waste management facility have been examined by me and found to conform to engineering principals applicable to such facilities. In my professional judgement, the cost Estimates are a true, correct and complete representation of the financial liabilities for closing and long-term care of the facility and comply with the requirements of Florida Administrative Code (F.A.C.), Rule 62-701.630 and all other Department of Environmental Protection rules, and statutes of the State of Florida. It is understood that the Financial Assurance Cost Estimates shall be submitted to the Department **annually**, revised or adjusted as required by Rule 62-701.630(4), F.A.C.

X Bramlett 12/9/03
Signature of Engineer

Dominique H. Bramlett, P.E., Senior Project Engineer
Name & Title (please type)

____
Florida Registration Number (affix seal)

SCS Engineers
4041 Park Oaks Blvd. Suite 100
Tampa, Florida 33610
Mailing Address

813-621-0080
Telephone Number

Susan J Metcalfe
Signature of Owner/Operator

Susan J. Metcalfe, Director, Div of Solid Waste Mgmt.
Name & Title (please type)

(352) 527-7671
Telephone Number

V. RECALCULATE ESTIMATED CLOSING COST

For the time period in the landfill operation when the extent and manner of its operation makes closing **most expensive**.

**** Third Party Estimate / Quote must be provided for each item**
**** Costs must be for a third party providing all material and labor**

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
1. Proposed Monitoring Wells	(Do not include wells already in existence.)			
	EA			$0
2. Slope and Fill (bedding layer between waste and barrier layer): N/A				
Fine Grading	SY	169,397	$0.17	$28,797
Placement and Spreading	CY	56,466	$1.85	$104,462
Compaction	CY	56,466	$0.46	$25,974
Off Site Material (12")	CY	56,466	$4.50	$254,097
Delivery	CY			$0
			Subtotal Slope and Fill:	$413,000
3. Cover Material (Barrier Layer):				
Off-Site Clay	CY	0.00	$0.00	$0
Synthetics - 40 mil	SF	1,524,573	$0.58	$884,252
Synthetics - GCL	SY	0.00	$0.00	$0
Synthetics - Geonet (Geocomposite)	SF	1,524,573	$0.58	$884,252
Synthetics - Other	SY	0	$0.00	$0
			Subtotal Barrier Layer Cover:	$1,769,000
4. Top Soil Cover: (18" protective soil + 6" topsoil)				
Off-Site Material	CY	112,931	$4.50	$508,190
Delivery +Spread	CY	112,931	$2.45	$276,681
Delivery +Spread	CY			$0
			Subtotal Top Soil Cover	$785,000

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
5. Vegetative Layer				
Sodding	SY	169,397	$2.19	$370,979
Hydroseeding	AC	0.00	$0.00	$0
Fertilizer	AC	0	$0.00	$0
Mulch	AC	0.00	$0.00	$0
Other	SY	0	$0.00	$0
			Subtotal Vegetative Layer:	$371,000
6. Stormwater Control System:				
Earthwork	CY	4,206	$4.50	$18,927
Grading	SY	0	$0.00	$0
Piping	LF	4,428	$12.79	$56,648
Ditches	LF	0.00	$0.00	$0
Berms	LF	5678	$1.81	$10,277
Control Structures	EA	14	$3,608.00	$50,512
Other	LS	1	$9,625.00	$9,625
			Subtotal Stormwater Controls:	$146,000
7. Gas Controls: Passive				
Vents (2 per acre)	EA	70	$5,307.50	$371,525
Self -Igniter Flares	EA			$0
Monitoring Probes	EA	1	$2,775.00	$2,775
NSPS/Title V requirements	LS			$0
			Subtotal Passive Gas Control:	$374,000

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
8. Gas Control: Active Extraction		**N/A**		
Traps	EA	0	$0.00	$0
Sump	EA	0	$0.00	$0
Flare Assembly	EA	0	$0.00	$0
Flame Arrestor	EA	0	$0.00	$0
Mist Eliminator	EA	0	$0.00	$0
Flow Meter	EA	0	$0.00	$0
Blowers	EA	0	$0.00	$0
Collection System	LF	0	$0.00	$0
Other (describe)		0	$0.00	$0
			Subtotal Active Gas Extraction:	$0
9. Security System				
Fencing	LF	0	$0.00	$0
Gate(s)	EA	0	$0.00	$0
Sign(s)	EA	0	$0.00	$0
			Subtotal Security System:	$0
10. Engineering:				
Closure Plan report	LS	1	$182,745	$182,745
Certified Engineer	LS		$0.00	$0
NSPS/Title V Air Permit	LS	1	$2,553.00	$2,553
Final Survey	LS	1	$8,139.00	$8,139
Certification of Closure	LS	1	$13,050	$13,050
Other (detail)	LS		$0.00	$0
			Subtotal Engineering:	$206,000

11. Professional Services

	Contract Management		Quality Assurance		
	Hours	LS	Hours	LS	TOTAL
P.E. Supervisor	160	17,920	40	4,480	$22,400
On-Site Engineer	480	40,800	200	17,000	$57,800
Office Engineer	200	17,000	200	17,000	$34,000
On-site Technician			840	50400	$50,400
Administrative cost	60	3,240			$3,240
Reimbursables		27,639		6,026	$33,665

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
Quality Assurance Testing	LS	1	40,000	$40,000

Subtotal Professional Services: $242,000

Subtotal of 1-11 Above: $4,306,000

12. Contingency 15 % of Total 15.00%

Closing Cost Subtotal: $4,951,900

13. Site Specific Costs (explain)

Mobilization (10% of Sub-Total 1-11)	$430,600
Waste Tire Facility	$9,775
Materials Recovery Facility	$0
Special Wastes	$0
Leachate Disposal for One Year	$24,724
Other (Bonds & Insurance 2% of Sub-Total 1-11)	$86,120

Subtotal Site Specific Costs: $551,220

TOTAL CLOSING COSTS: $5,503,120

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
MAR - 5 2009
SOUTHWEST DISTRICT
TAMPA

VI. ANNUAL COST FOR LONG-TERM CARE

(Check Term Length)

_____ 5 years _____ 20 years __X__ 30 years _____ Other

See 62-701.600(1)a.1., 62-701.620(1), 62-701.630(3)a. and 62-701.730(11)b. F.A.C. for required term length. For landfills certified closed and Department accepted, enter the remaining long-term care length as "Other" and provide years remaining.

**** Third Party Estimate / Quote must be provided for each item**
**** Costs must be for a third party providing all material and labor**

All items must be addressed. Attach a detailed explanation for all items marked not applicable (N/A).

DESCRIPTION	Sampling Frequency (events/yr.)	Number of Wells	$/Well/Event	$ / Year
1. Groundwater Monitoring (62-701.510(6), and (8)(a))				
Monthly (Gradient)	12			$0
Quarterly	4		$0.00	$0
Semi-Annual	2	**14**	$941.79	**$26,370**
Annual	1	**14**	$422.86	**$5,920**
		Subtotal Groundwater Monitoring:		**$32,290**
2. Surface Water Monitoring (62-701.510(4), and (8)(b))				
Monthly	12			$0
Quarterly	4			$0
Semi-Annual	2			$0
Annual	1			$0
		Subtotal Surface Water Monitoring:		$0
3. Gas Monitoring				
Monthly	12		$0.00	$0.00
Quarterly	4	**19**	$56.06	**$4,261**
Semi-Annual	2		$0.00	$0.00
Annual	1		$0.00	$0.00
		Subtotal Gas Monitoring:		**$4,261**

DESCRIPTION	Sampling Frequency (events/yr.)	Number of Wells	$/Well/Event	$ / Year
4. Leachate Monitoring (62-701.510(5), (6)(b) and 62-701.510(8)(c))				
Monthly	12	0	$0.00	$0.00
Quarterly	4	**3**	**$321.43**	**$3,857**
Semi-Annual	2	0	$0.00	$0.00
Annual	1	1	$1,064	$1,064
Weekly	52	0	$0.00	$0.00
		Subtotal Leachate Monitoring:		**$4,921**

DESCRIPTION	UNIT	QUANTITY	UNIT COST	ANNUAL COST
5. Leachate Collection/Treatment Systems Maintenance				
Maintenance				
Collection Pipes	LS	1.0	$7,150	$7,150
Sumps, Traps	EA	0	$0.00	$0.00
Lift Stations	EA	10	$275	$2,750
Cleaning	LS	0	$0.00	$0.00
Tanks	EA	4	$625	$2,500
Impoundments				
Liner Repair	SY	0	$0.00	$0
Sludge Removal	CY			$0
Treatment Systems	CY	0	$0.00	$0
Batch Plant	EA	0	$0.00	$0
Spray Aerators	EA	0	$0.00	$0
Disposal				
On-site Impoundment	1000 gallon	432	**$57.23**	**$24,730**
Sub-Total Leachate Collection /Treatment System Maintenance:				**$37,130**

6. Leachate Collection/Treatment Systems Administrative:

Operation		Hours	$/Hour	Total
Ops.Supervisor (1 day per month for reports)	HR	96	$95.00	$9,120
On-Site Engineer	HR	0	$0.00	$0.00
Office Engineer	HR	32	$112	$3,584
On-site Technician (WWTP Operator 12 hrs./week)	HR	312	$85.00	$26,520
Materials	LS	0	$0.00	$0.00
Subtotal Leachate Collection/Treatment System Administrative:				$39,224

7. Maintenance of Groundwater Monitoring Wells

Monitoring Wells	EA	15	$40.00	$600
Replacement	EA	1.0	$1,037	$1,037
Abandonment	EA			$0.00
Subtotal Groundwater Monitoring Well Maintenance:				$1,637

DESCRIPTION	UNIT	QUANTITY	UNIT COST	ANNUAL COST
8. Gas System Maintenance				
Piping, Vents	EA	57	$120	$6,840
Blowers	EA	0	$0.00	$0.00
Flaring Units	EA	7	$120	$840
Meters, Valves	EA	0	$0.00	$0.00
Compressors	EA	0	$0.00	$0.00
Flame Arrestors	EA	0	$0.00	$0.00
Replace monitoring probes	EA	1	$185	$185.00
Subtotal Gas System:				$7,865
9. Landscape				
Mowing	AC	145	$50.52	$7,330
Fertilizer	AC	0	$0.00	$0.00
Subtotal Landscape Maintenance:				$7,330

DESCRIPTION	UNIT	QUANTITY	UNIT COST	ANNUAL COST
10. Erosion Control & Cover Maintenance				
Sodding	SY	0	$0.00	$0
Regrading	LS	1	$213	$213
Liner Repair	LS	1	$1,769	$1,769
Clay	CY	0	$0.00	$0.00
		Subtotal Erosion Control and Cover Maintenance:		$1,982
11. Storm Water Management System Maintenance				
Conveyance Maintenance	LS	1	$9,421	$9,421
		Subtotal Storm Water System Maintenance:		$9,421
12. Security System Maintenance				
Fences	LF	50	$13.08	$654
Gate(s)	EA			$0
Sign(s)	EA			$0
		Subtotal Security System:		$654
13. Utilities	LS			$0
14. Administrative				
Site Manager	HR	48	$112	$5,376
On-Site Engineer	HR			$0
Office Engineer	HR	0	$0.00	$0.00
Clerical	HR	48	$54	$2,592
Other (consulting)		1	$2,040.00	$2,040
		Subtotal Administrative:		$10,008
15. Contingency	% of Total	156,723	5%	$8,000
		Subtotal Contingency:		$8,000

16. Site Specific Costs (explain)

	UNIT COST	
	LS	
	LS	$0
ANNUAL LONG-TERM CARE COST ($/Year):		**$164,723**
NUMBER OF YEARS OF LONG-TERM CARE		30
TOTAL LONG-TERM CARE COST ($):		**$4,941,676**

SCS ENGINEERS

SHEET ______ OF ______

CLIENT Citrus County	PROJECT Phase 3 Expansion	JOB NO. 09207049.02
SUBJECT Financial Assurance Long Term Care Costs	BY DHB	DATE 2/20/09
RAI No 2	CHECKED [illegible]	DATE 3/4/09

Gas Monitoring

Number of gas monitoring wells = 19
monitored quarterly = 4x per year
cost/well/event = $56.06 (refer to original submittal)

$\therefore$ 19 wells x $\frac{\$56.06}{\text{well}\cdot\text{event}}$ x 4 events = $4,260.56

Leachate Monitoring

Number of leachate locations 3
monitored quarterly = 4x per year
cost/well/event = $321.43 (refer to original submittal)

$\therefore$ 3 locations x $\frac{\$321.43}{\text{well}\cdot\text{event}}$ x 4 events = $3857.16

Leachate Collection/treatment Systems Maintenance Disposal

Refer to item 13 of closing cost. = $24,724 (includes hauling & disposal)

$\frac{\$24,724}{432} = \underline{\underline{\$57.23}}$

SCS ENGINEERS

SHEET 1 OF

CLIENT Citrus County	PROJECT Phase 3 expansion	JOB NO. 09207049.02

SUBJECT Financial Assurance - Closing cost RAI - 1	BY DHB	DATE 10/02/08
	CHECKED	DATE 12/1/08

2. Slope and fill (Phase I, IA, II & III)

Cost of off-site soils - $4.50/CY (material & freight) (Attachment - 1)
Reference: Crystal River Quarries, Frank Colitz
2961 S. Lecanto Hwy
Lecanto FL 34461
352-746-4300
Alternate # 352-795-2409

Volume required per Calcs dated 7-24-08 : 56,466 CY

Total cost : $ 4.50 / CY × 56,466 CY = $ 254,097 ✓

4. Top soil cover

Cost of off-site soils - $4.50/CY (material + freight) (Attachment 1)
Reference: Crystal River Quarries, Frank Colitz
2961 S. Lecanto Hwy
Lecanto FL 34461
352-746-4300
Alternate # 352-795-2409

Volume required per Calcs dated 7.24.08 = 112,931 CY

Total cost $ 4.50 / CY × 112,931 CY = $ 508,190 ✓

SCS ENGINEERS

SHEET 2 OF ____

CLIENT Citrus County	PROJECT Phase 3 expansion	JOB NO. 09207049.02
SUBJECT Financial Assurance Closing Cost RAI-1	BY DHB	DATE 10/02/08
	CHECKED	DATE 12/5/08

6. STORMWATER Control System

cost of off-soils - $4.50/CY (material + freight) -(Attachment 1)

Reference : Crystal River Quarries Frank Coltz
2961 S. Lecanto Hwy.
Lecanto, FL 34461
352-746-4300
Alternate # 352-795-2409

Volume required per calcs dated 7.24.08 = 4,206 CY (Berms)

total cost = $\frac{\$4.50}{CY}$ × 4,206 CY = $\boxed{\$18,927}$

Piping cost $51,498 per calcs dated 7.24.08

Assume 10% for installation cost

Total cost = $51,498 × 1.10 = $\boxed{\$56,648}$ ← includes material + installation

on a LF basis = $\frac{\$56,648}{4,428 \text{ LF}}$ = $12.79

Control structures $45,920 per calcs dated 7.24.08

Assume 10% for installation cost

Total cost = $45,920 × 1.10 = $\boxed{\$50,512}$ ← includes material + installation

on a per EA basis = $\frac{\$50,512}{14}$ = $3608

SCS ENGINEERS

SHEET 3 OF

CLIENT Citrus County	PROJECT Phase 3 expansion	JOB NO. 09207049.02
SUBJECT Financial assurance - Closing Cost RAI - 1	BY DHB	DATE 10/2/08
	CHECKED	DATE 12/5/08

Other - Catch Basins

$8,750 per calcs dated 7/24/08

Assume 10% for installation cost

Total cost = $8,750 x 1.10 = $\boxed{\$9,625}$ ← includes material + installation

13. Site Specific costs

Leachate Disposal for a year

Total closure Area = 31.2 acres + 7 acres = 38.2 acres.

Average leachate Flow = 31 gpd/ac.

A letter dated July 8, 2005 from SCS Engineers to FDEP include backup calculations for the closure cost estimate based on adding to the cost for one year of offsite leachate disposal at the post closure annual average generation rate.

IN ADDITION, this average leachate rate was approved in 2005 (letter dated July 12, 2005) and in 2006 (letter dated Oct. 31, 2006).

$31 \frac{gpd}{ac} \times 365 \frac{days}{yr} \times 38.2\ ac = 432,233\ gal/yr$

Hauling: $\frac{\$0.05}{gal} \times 432,233 \frac{gal}{yr} = \$21,612$

Disposal $\frac{\$0.0072}{gal} \times 432,233 \frac{gal}{yr} = \$3,112$

$\boxed{\$24,724}$

SCS ENGINEERS

SHEET 4 OF

CLIENT Citrus County	PROJECT Phase 3 Expansion	JOB NO. 09207049.02
SUBJECT Financial Assurance Long term Care - RAI - 1	BY DHB	DATE 10/2/08
	CHECKED [illegible]	DATE 12/5/08

1. Groundwater Monitoring

per calcs dated 8/4/08 Attachment 1 pg 4 of 4.

line item 2 : $17,685 includes - Quarterly leachate effluent
semi-annual effluent
semi-annual groundwater

line item 3 : $4,500 includes Quarterly leachate effluent

line item 4 : $23,605 include Annual leachate influent
Annual effluent
Annual sludge
semi annual effluent
semi-annual groundwater
Quarterly leachate effluent.

We can deduce the cost of the semi annual effluent / groundwater testing by subtracting line item 3 from line item 2

$17,685 - $4500 = $13,185 / event ← semi-annual testing
13,185/14 = 941.79/well

We can deduce the cost of the annual testing by subtracting line item 4 from line item 2.

$23,605 - $17,685 = $5,920 ← annual testing
5920 /14 = 422.86 /well

Quarterly is line item 3 x 4

leachate monitoring was moved to item 4. leachate monitoring quarterly event

SCS ENGINEERS

SHEET 5 OF

CLIENT Citrus County	PROJECT Phase 3 Expansion	JOB NO. 09207049.02
SUBJECT Financial Assurance - Long Term care RAI - 1	BY DHB	DATE 10/3/08
	CHECKED	DATE

5. Leachate collection / Treatment systems Maintenance

on-site impoundment : monthly base rate : \$ 698.50 (see calcs dated 7/24/08)
total annual cost : \$ 12 x \$698.50 = \$ 8,382
Avg. leachate Flow: 31 gpd/ac (based upon approved quantity).

total closure area = 31.2 acres + 7 acres = 38.2 acres

$31 \frac{gpd}{ac} \times 365$ days $\times$ 38.2 acres = 432,233 gal/yr

Unit cost per 1,000 gallons = \$ 8,382 / 432 = \$ 19.40

Total cost = $\boxed{\$\ 8{,}383}$

Attachment - 1

CRYSTAL RIVER QUARRIES, INC.

P.O. BOX 216
Crystal River, Florida
34423-0216

TELEPHONES
Office (352) 795-2409
(352) 795-2828 Fax (352) 795-6499

FAX COVER PAGE

DATE: 10/2/08

TO: Dominique Bramlett
SCS Eng.
FAX 1-813-623-6757

FROM: Frank Colitz

RE: Overburden Price /delivered price

Number of pages transmitted
(Including cover page)
1

The price of overburden from my Company's Lecanto Mine to the Citrus County Landfill will be $4.50 per cubic yard. This price will be good to January 1, 2009.

In case message is not received as transmitted, please call
(352) 795-2409 Fax (352)795-6499

SCS ENGINEERS

SHEET 1 OF 19

CLIENT: CITRUS COUNTY	PROJECT: CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02
SUBJECT: FINANCIAL ASSURANCE	BY: VPB	DATE: 7-29-08
CLOSING COST	CHECKED: DHB	DATE: 7/29/08

OBJECTIVE: TO ESTIMATE THE CLOSING COST FOR CITRUS COUNTY CENTRAL LANDFILL PHASE 3

REFERENCES:

- 2008 RS MEANS
- E-MAIL FROM BOB TRIKLER (GEO-SYNTHETICS, INC.)
- FDOT LONG RANGE ESTIMATING SYSTEM
- E-MAIL FROM DAN DIETRICH, EI (ADVANCED DRAINAGE SYSTEMS, INC.
- COST ESTIMATE BY LANDFILL SERVICE
- SCS ENGINEERS FEE SCHEDULE
- ENTERPRISE CAR RENTAL RATE
- HUSS DRILLING COST ESTIMATE
- E-MAIL FROM SUSAN METCALFE (CITRUS COUNTY)
- ORANGE COUNTY SCHEDULE OF VALUES

SCS ENGINEERS

SHEET 2 OF 19

CLIENT	PROJECT	JOB NO.
CITRUS COUNTY	CITRUS COUNTY CENTRAL LANDFILL PHASE 3	09207049.02

SUBJECT	BY	DATE
FINANCIAL ASSURANCE CLOSING COST	JPB	7-24-08
	CHECKED: [illegible]	DATE: 7/29/08

1. PROPOSED MONITORING WELLS

NO NEW MONITORING WELLS PROPOSED

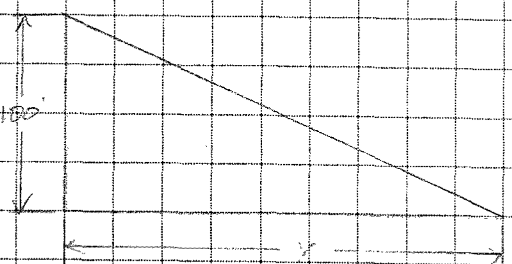
2. SLOPE AND FILL (PHASE I, IA, II & III)

- AREA FOR CAUD = 1,464,462 SF (SEE ATTACHMENT 4)

- SIDESLOPE FACTOR

FLAT TOP AREA = 262,251 SF

SIDESLOPE = 1,464,462 SF - 262,251 SF = 1,202,211 SF



SLOPE = $\frac{1}{3}$ = $\frac{\text{RISE}}{\text{RUN}}$ = [illegible]

X = (100)·(3) = 300 FT

y = $\sqrt{(100)^2 + (300)^2}$ = 316.25'

PERCENT TO ADD TO FOOTPRINT TO ACCOUNT FOR SIDESLOPES

$= \frac{316.25 - 300}{300} \times 100\%$ = [illegible]

REVISED AREA = (1,202,211 SF) · ([illegible]) + 262,251 SF

= 1,262,322 SF + 262,251 SF

= 1,524,573 SF = 169,3[illegible] SY

GEOMEMBRANE BEDDING 12" [illegible]

VOLUME OF [illegible] BEDDING

VOLUME = (1,524,573 SF) · (12 IN) · $\left(\frac{1 \text{ FT}}{12 \text{ IN}}\right) \cdot \left(\frac{1 \text{ CY}}{27 \text{ CF}}\right)$

= $\boxed{56,466 \text{ CY}}$

SCS ENGINEERS

CLIENT	PROJECT	JOB NO.
CITRUS COUNTY	CITRUS COUNTY CENTRAL LANDFILL PHASE 3	09207049.02

SUBJECT	BY	DATE
FINANCIAL ASSURANCE	JPB	7-24-08
CLOSING COST	CHECKED DHB	DATE 7/29/08

FINE GRADING

AREA = 169,397 SY

UNIT COST = $0.17/SY (SEE ATTACHMENT 2)

TOTAL COST = 169,397 SY × $0.17/SY = $\boxed{\$28,797}$

PLACEMENT AND SPREADING

VOLUME = 56,466 CY

UNIT COST = $1.85/CY (SEE ATTACHMENT 3)

TOTAL COST = 56,466 CY × $1.85/CY = $\boxed{\$104,462}$

COMPACTION

VOLUME = 56,466 CY

UNIT COST = $0.46/CY (SEE ATTACHMENT 4)

TOTAL COST = 56,466 CY × $0.46/CY = $\boxed{\$25,974}$

SCS ENGINEERS

CLIENT	PROJECT	JOB NO.
CITRUS COUNTY	CITRUS COUNTY CENTRAL LANDFILL PHASE 3	09207249.02

SUBJECT	BY	DATE
FINANCIAL ASSURANCE	VPB	7-24-08
CLOSING COST	CHECKED OHB	DATE 7/29/08

3. COVER MATERIAL (BARRIER LAYER)

SYNTHETICS - 40 MIL

AREA = 1,524,573 SF

UNIT COST:

MATERIAL	\$0.30/SF	(SEE ATTACHMENT 5)
INSTALLATION	\$0.28/SF	
	\$0.58/SF	

TOTAL COST 1,524,573 SF × \$0.58/SF = $\boxed{\$884,252}$

SYNTHETICS - GEOCOMPOSITE

AREA = 1,524,573 SF

UNIT COST:

MATERIAL	\$0.38/SF	(SEE ATTACHMENT 5)
INSTALLATION	\$0.20/SF	
	\$0.58/SF	

TOTAL COST: 1,524,573 SF × \$0.58/SF = $\boxed{\$884,252}$

4. TOP SOIL COVER

AREA = 1,524,573 SF

THICKNESS OF COVER SOIL = 2 FEET

VOLUME = 1,524,573 SF × 2 FEET = 3,049,146 CF
= 112,931 CY

SCS ENGINEERS

CLIENT Citrus County	PROJECT Citrus County Central Landfill Phase 3	JOB NO. 09207049.02
SUBJECT Financial Assurance	BY JPB	DATE 7-24-08
Closing Cost	CHECKED DHB	DATE 7/29/08

UNIT COST: \$2.45 /CY (SEE ATTACHMENT 6)

TOTAL COST: 112,931 CY × \$2.45/CY = $\boxed{\$276,681}$

5. VEGETATIVE LAYER

AREA: 169,397 SY

UNIT COST: \$2.19 /SY (SEE ATTACHMENT 7)

TOTAL COST: 169,397 SY × \$2.19/SY = $\boxed{\$370,979}$

6. STORMWATER CONTROL SYSTEM

PIPING

TOTAL LENGTHS:
12" ADS PIPES = 943 FT
18" ADS PIPES = 2,235 FT
24" ADS PIPES = 1,250 FT
(SEE ATTACHMENT 8)

UNIT COST:
12" ADS PIPE = \$5.90/FT
18" ADS PIPE = \$10.90/FT
24" ADS PIPE = \$17.25/FT
(SEE ATTACHMENT 9)

TOTAL COSTS:
12" ADS PIPES = 943 FT × \$5.90/FT = \$5,563.70
18" ADS PIPES = 2,235 FT × \$10.90/FT = \$24,361.50
24" ADS PIPES = 1,250 FT × \$17.25/FT = \$21,562.50
\$51,487.70

SCS ENGINEERS

SHEET 6 OF 19

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL	JOB NO. 09207049.02
SUBJECT FINANCIAL ASSURANCE	BY JPB	DATE 7-24-08
CLOSING COST	CHECKED DMB	DATE 7/29/08

TOTAL LENGTH OF ALL DOWNCHUTE PIPES = 4,428 FT

UNIT COST: $51,487.70/4,428 FT = $11.63/FT

TOTAL COST: 4,428 FT × $11.63/FT = $\boxed{\$51,498}$

BERMS

CROSS-SECTIONAL AREA = (2 FT × 20 FT)/2 = 20 SF
(SEE ATTACHMENT 10 FOR DIAGRAM)

TOTAL LENGTH OF STORMWATER BERMS = 5,678 FT

TOTAL VOLUME = 20 SF × 5,678 FT = 113,560 CF/27 = 4,206

UNIT COST PER CY: $2.45/CY (SEE ATTACHMENT 11)

TOTAL COST: 4,206 CY × $2.45/CY = $10,304.70

UNIT COST PER LF: $10,304.70/5,678 FT = $1.81/FT

TOTAL COST: 5,678 FT × $1.81/FT = $\boxed{\$10,277}$

CONTROL STRUCTURES

ENERGY DISSIPATORS: 14

UNIT COST: $3,280.00 EA (SEE ATTACHMENT 12)

TOTAL COST: 14 × $3,280.00 = $\boxed{\$45,920}$

SCS ENGINEERS

CLIENT	PROJECT	JOB NO.
CITRUS COUNTY	CITRUS COUNTY CENTRAL LANDFILL PHASE 3	09207049.02

SUBJECT	BY	DATE
FINANCIAL ASSURANCE	JPB	7-24-08
CLOSING COST	CHECKED DWS	DATE 7/29/08

OTHER: CATCH BASIN

NUMBER OF INLINE DRAIN: 5
NUMBER OF DRAIN BASIN: 4

UNIT COST:
30" NYLOPLAST INLINE DRAIN: \$750/EA
30" NYLOPLAST DRAIN BASIN: \$1,250/EA
} (SEE ATTACHMENT 13)

TOTAL COST: 5 x \$750 = \$3,750
4 x \$1,250 = \$5,000
$\boxed{\$8,750}$

7. GAS CONTROLS: PASSIVE

VENTS: ASSUME 2 GAS VENTS PER ACRE WILL BE INSTALLED
35 ACRES → 2 x 35 = 70 VENTS

ASSUME EACH VENT WILL BE 55 FT
70 x 55 = 3,850 FT

UNIT COST: \$96.50/LF (SEE ATTACHMENT 19)
TOTAL COST: 3,850 FT x \$96.50 = $\boxed{\$371,525}$
UNIT COST PER VENT \$371,525/70 = \$5,307.50 EA

SCS ENGINEERS

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02	
SUBJECT FINANCIAL ASSURANCE		BY JPB	DATE 7-24-08
CLOSING COST		CHECKED DHB	DATE 7/29/08

MONITORING PROBES:

1 NEW MONITORING PROBE

COST TO INSTALL 1 MONITORING PROBE = $\boxed{\$2,775.00}$

(SEE ATTACHMENT 17)

NSPS/Title V requirements: (SEE SHEET 13 OF 19 CLOSING COST)

8. GAS CONTROL: ACTIVE EXTRACTION

THIS LANDFILL DOES NOT HAVE AN ACTIVE LANDFILL GAS COLLECTION AND CONTROL SYSTEM. HENCE ITEM 8 IS NOT APPLICABLE

9. SECURITY SYSTEM

CITRUS COUNTY CENTRAL LANDFILL HAS FENCING AND GATES FOR THE ENTRY/EXIT OF GARBAGE TRUCKS AND RESIDENTIAL VEHICLES THAT HAUL WASTE TO THE LANDFILL. HENCE, NO NEW SECURITY SYSTEM ARRANGEMENTS NEED TO BE MADE

SCS ENGINEERS

CLIENT Citrus County	PROJECT Citrus County Central Landfill Phase 3	JOB NO. 09207049.02
SUBJECT Financial Assurance	BY JPB	DATE 7-24-08
Closing Cost	CHECKED DWB	DATE 7/29/08

10. ENGINEERING

10 (i) CLOSURE PLAN REPORT
(ASSUME 2 MONTHS TO COMPLETE)

MAN POWER	HOURS	RATE *	COMMENTS
STAFF ENGINEER	80	\$85/HR	(CLOSURE DESIGN/SPECS)
DRAFTING	50	\$70/HR	(DESIGN DRAWINGS)
SR. PROJ. ENGINEER	40	\$112/HR	(OVERSEE CLOSURE DESIGN/SPECS)
ADMIN	25	\$54/HR	(WORD PROCESS)
PROJ. DIRECTOR	15	\$185/HR	(CHECK/SIGN/SEAL)
	TOTAL	\$18,905	

REIMBURSABLES

FAXES: $\frac{6 \text{ pgs}}{\text{wk}} \times \frac{4 \text{ wk}}{1 \text{ month}} \times 2$ MONTHS $\times$ 2 COPIES = 96 pgs

UNIT COST: \$5 - FIRST PAGE
\$1 - EACH ADDITIONAL PAGE (SEE ATTACHMENT 14)

96 PAGES → \$5.00 + (\$1 × 95) = \$100.00

XEROX

$\frac{5 \text{ pg}}{\text{letter}} \times \frac{2 \text{ letters}}{\text{wk}} \times \frac{4 \text{ wks}}{1 \text{ month}} \times 2$ MONTHS $\times$ 4 COPIES = 320 pgs

UNIT COST: \$0.10/PAGE (SEE ATTACHMENT 14)

320 × \$0.10 = \$32.00

* SEE ATTACHMENT 14

SCS ENGINEERS

SHEET 10 OF 19

CLIENT	PROJECT	JOB NO.
CITRUS COUNTY	CITRUS COUNTY CENTRAL LANDFILL PHASE 3	09207049.02

SUBJECT	BY	DATE
FINANCIAL ASSURANCE	JPB	7-24-08
CLOSING COST	CHECKED DMB	DATE 7/29/08

CAD REPRODUCTIONS : 100 SHEETS

UNIT COST : $2.00/SHEET

100 × $2.00 = $200.00

CAD USAGE : 50 HRS.

UNIT COST : $20/HR (SEE ATTACHMENT 14)

50 HRS × $\frac{\$20}{HR}$ = $1,000

PERMITS : $ 7,500 FOR CLASS I LANDFILL CLOSURE PERMIT

SURVEY : $3,500/AC (SEE ATTACHMENT 15)

TOTAL AREA IN ACRES : 35 ACRES

TOTAL COST : $3,500/AC × 35 ACRES = $122,500

SUM OF REIMBURSABLES = $131,332

G & A = $ 19,700 (15% OF REIMBURSABLES)

$151,032

TOTAL COST FOR CLOSURE PLAN : $18,905 + $151,032

= $169,937

SCS ENGINEERS

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02	
SUBJECT FINANCIAL ASSURANCE		BY JPB	DATE 7-24-08
CLOSING COST		CHECKED DHB	DATE 7/29/08

10(ii) FDEP COORDINATION
(ASSUME 1 MONTH TO RESPOND)

MANPOWER	HOURS	RATE	COMMENTS
STAFF ENGINEER	20	\$85/HR	RESPONSE TO FDEP
DRAFTING	16	\$70/HR	CHANGES TO DRAWING
SR. PROJECT ENGINEER	12	\$112/HR	CHECK RESPONSES
PROJECT DIRECTOR	8	\$185/HR	CHECK/SIGN/SEAL
	TOTAL	\$5,644	

REIMBURSABLES

FAXES : $\frac{2 \text{ PAGES}}{\text{WK}} \times \frac{4 \text{ WK}}{1 \text{ MONTH}} \times 1 \text{ MONTH} \times 2 \text{ COPIES} = 16 \text{ PAGES}$

UNIT COST : \$5 - FIRST PAGE
\$1 - EACH ADDITIONAL PAGE (SEE ATTACHMENT 14)

TOTAL COST OF FAXES : \$5 + (15 × \$1) = \$20

CAD REPRODUCTIONS : 50 SHEETS

UNIT COS: \$2.00/SHEET

50 × \$2.00 = \$100.00

COMPUTER TIME - CADD : 10 HOURS

UNIT COST : \$20/HR (SEE ATTACHMENT 14)

10 HRS × \$20/HR = \$200

SCS ENGINEERS

SHEET 12 OF 19

CLIENT	PROJECT	JOB NO.
CITRUS COUNTY	CITRUS COUNTY CENTRAL LANDFILL PHASE 3	09207049.02

SUBJECT	BY	DATE
FINANCIAL ASSURANCE	JPB	7-24-08
CLOSING COST	CHECKED DHB	DATE 7/24/08

SUM OF REIMBURSABLES : $320
G & A : $48 (15% REIMBURSABLES)
$368

TOTAL FOR 10(ii) = $5,644 + $368
= $6,012

10(iii) BIDDING

MANPOWER	HOURS	RATE *	COMMENTS
STAFF ENGINEER	20	$85/HR	RESPONSE TO BIDDERS, QUESTIONS
SR. PROJECT ENGINEER	18	$112/HR	REVIEW RESPONSE TO BIDDERS QUES
PROJ. DIRECTOR	4	$135/HR	CHECK/SIGN/SEAL
DRAFTING	8	$70/HR	REPRODUCE BID DRAWINGS
ADMIN	8	$54/HR	
	TOTAL =	$5,448	

REIMBURSABLES

FAX : $\frac{2\text{ PG}}{\text{FAX}}$ × 12 FAXES × 2 COPIES = 48 PAGES

UNIT COST : $5 - FIRST PAGE
$1 - EACH ADDITIONAL PAGE (SEE ATTACHMENT 14)

TOTAL COST OF FAXES : $5 + (47 × $1) = $52

XEROX : 200 PAGES (BID PAGES) × 12 (BIDDERS) = 2,400 PAGES

UNIT COST : $0.10/SHEET (SEE ATTACHMENT 14)

TOTAL COST OF XEROX : 2,400 × $0.10 = $240

* SEE ATTACHMENT 14

SCS ENGINEERS

SHEET 13 OF 19

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02	
SUBJECT FINANCIAL ASSURANCE		BY JPB	DATE 7-24-08
CLOSING COST		CHECKED DHB	DATE 7/29/08

CAD REPRODUCTION: 20 PAGES × 12 BIDDERS = 240 PAGES
UNIT COST: $2.00/PAGE
TOTAL COST OF CADD REPRODUCTION: 240 × $2.00 = $480

COMPUTER CAD TIME: 8 HR
UNIT COST: $20/HR (SEE ATTACHMENT 14)
TOTAL COST OF CAD TIME: 8 × $20 = $160

SHIPPING: 12 BID PACKAGES × $\left(\frac{\$20}{\text{PACKAGE}}\right)$ = $240

TOTAL REIMBURSABLES: $1,172
G & A: $176 (15% REIMBURSABLES)
$1,348

TOTAL FOR 10(iii) BIDDING = $5,448 + $1,348 = $6,796

TOTAL FOR CLOSURE PLAN REPORT: 10(i) + 10(ii) + 10(iii)
= $169,937 + $6,012 + $6,796
= $\boxed{\$182,745}$

7. NSPS/TITLE V AIR PERMIT

MANPOWER	HOURS	RATE*	COMMENTS
STAFF ENGINEER	16	$85/HR	PRODUCE REPORT
SR. PROJ. ENGINEER	5	$135/HR	REVIEW REPORT
PROJ. DIRECTOR	1	$185/HR	SIGN/SEAL
		TOTAL: $2,220	

$2,220.00 +
REIMBURSABLES (15%) $333.00
TOTAL = $\boxed{\$2,553}$

* SEE ATTACHMENT 14

SCS ENGINEERS

CLIENT: CITRUS COUNTY	PROJECT: CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02
SUBJECT: FINANCIAL ASSURANCE	BY: JPB	DATE: 7-24-08
CLOSING COST	CHECKED: VHB	DATE: 7/24/08

10. C FINAL SURVEY

MANPOWER	HOURS	RATE	COMMENTS
STAFF ENGINEER	16	\$85/HR	COORDINATION WITH SURVEYOR
SR. PROJ. ENGINEER	2	\$112/HR	REVIEW WORK ORDER TO THE SURVEYOR
	TOTAL	\$1,584	

REIMBURSABLES

AERIAL SURVEY : \$5,700 (SEE ATTACHMENT 15)
15% REIMBURSABLES : \$855
\$6,555

TOTAL FOR FINAL SURVEY = \$1,584 + \$6,555 = $\boxed{\$8,139}$

10. d CERTIFICATION OF CLOSURE

MANPOWER	HOURS	RATE	COMMENTS
STAFF ENGINEER	80	\$85/HR	PREPARE CLOSURE REPORT
DRAFTING	25	\$70/HR	ANY RE-DESIGN / AS-BUILT
SR. PROJ. ENGINEER	16	\$112/HR	REVIEW CLOSURE REPORT
ADMIN ASSISTANCE	10	\$54/HR	PRODUCTION SUPPORT
PROJECT DIRECTOR	4	\$185/HR	CHECK, SIGN, SEAL
	TOTAL	\$11,622	

REIMBURSABLES

FAXES : $\frac{1\text{ FAX}}{\text{WK}} \times \frac{2\text{ PG}}{\text{FAX}} \times 8\text{ WKS} \times 3\text{ COPIES} = 48$

UNIT COST : \$5.00 - FIRST PAGE
\$1.00 - EACH ADDITIONAL SHEET (SEE ATTACHMENT 1

TOTAL COST TO FAX : \$5 + (47 × \$1.00) = \$52.00

SCS ENGINEERS

SHEET 15 OF 19

CLIENT: CITRUS COUNTY	PROJECT: CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02
SUBJECT: FINANCIAL ASSURANCE	BY: JPB	DATE: 7-24-08
CLOSING COST	CHECKED: DHG	DATE: 7/24/08

XEROX : 250 PAGES × 8 COPIES = 2,000 PAGES
↓
CERT. OF
CLOSURE REPORT

UNIT COST : $0.10/PAGE (SEE ATTACHMENT 14)

TOTAL COST TO XEROX : 2,000 × $0.10 = $200

GRAPHICS (CAD REPRODUCTION)

15 SHEET × 8 COPIES = 120 SHEETS

UNIT COST : $2.00/SHEET

TOTAL COST OF GRAPHICS : 120 × $2.00 = $240

COMPUTER CAD TIME : 25 HOURS

UNIT COST : $40/HR

TOTAL COST OF CAD USAGE : 25 × $20 = $500

POSTAGE : $100, EQUIPMENT SUPPLIES = $250

TOTAL REIMBURSABLES = $1,242
G&A = $186 (15% REIMBURSABLES)
TOT = $1,428

TOTAL FOR ITEM 10.d = $11,622 + $1,428
= $\boxed{\$13,050}$

SCS ENGINEERS

SHEET 16 OF 19

CLIENT	PROJECT	JOB NO.
CITRUS COUNTY	CITRUS COUNTY CENTRAL LANDFILL PHASE 3	09207049.02

SUBJECT	BY	DATE
FINANCIAL ASSURANCE	JPB	7-24-08
CLOSING COST	CHECKED WHB	DATE 7/29/08

11. PROFESSIONAL SERVICES

11a. CONTRACT MANAGEMENT

ASSUME 3 MONTHS FOR CLOSURE

$3 \text{ MONTHS} \times \frac{4 \text{ WK}}{\text{MO}} \times \frac{5 \text{ DAY}}{\text{WK}} \times \frac{8 \text{ HR}}{\text{DAY}} = 480 \text{ HRS.}$

MANPOWER	HRS.	RATE	COMMENTS
SR. PROJ. ENGINEER	160	$112/HR	PROJ. MANAGEMENT
STAFF ENG. (ON-SITE)	480	$85/HR	ON-SITE FULL TIME
OFFICE ENGINEER	200	$85/HR	PROJ. TECHNICAL SUPPORT
ADMIN	60	$54/HR	OFFICE SUPPORT
	TOT. =	$78,960	

REIMBURSABLES

RENTAL CAR: $3 \text{ MONTHS} \times \frac{30 \text{ DAYS}}{\text{MONTH}} \times \frac{\$39^{*}}{\text{DAY}} = \$3,510$

CELL PHONE: $180 \text{ DAYS} \times \frac{\$5}{\text{DAY}} = \$900$

MEALS: $180 \text{ DAYS} \times \frac{\$28}{\text{DAY}} = \$5,040$

LODGING: $180 \text{ DAYS} \times \frac{\$80}{\text{DAY}} = \$14,400$

FAX: $\frac{4 \text{ PAGES}}{\text{WK}} \times 12 \text{ WKS} \times 3 \text{ COPIES} = 144$

* SEE ATTACHMENT 16

SCS ENGINEERS

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02
SUBJECT FINANCIAL ASSURANCE	BY JPB	DATE 7-24-08
CLOSING COST	CHECKED DHB	DATE 7/29/08

UNIT COST TO FAX: \$5 - 1st PAGE
\$1 - EACH ADDITIONAL PAGE (SEE ATTACHMENT 14)

TOTAL COST TO FAX: \$5 + (143 × \$1.00) = \$148

XEROX: $\frac{10 \text{ PAGE}}{\text{WK}}$ × 12 WKS × 3 copies = 360

UNIT COST TO XEROX: \$0.10/PAGE (SEE ATTACHMENT 14)

TOTAL COST TO XEROX: 360 × \$0.10 = \$36

TOTAL REIMBURSABLES = \$24,034
G & A = \$3,605 (15% REIMBURSABLES)
\$27,639

TOTAL FOR 11.a = \$78,960 + \$27,639
= $\boxed{\$106,599}$

11.b QUALITY ASSURANCE (ASSUME 1 MONTH FOR LINER INSTALLATION)

MANPOWER	HR	RATE	COMMENTS
STAFF ENGINEER	200	\$85/HR	CONSTRUCTION QA (ON-SITE)
OFFICE ENGINEER	200	\$85/HR	OFFICE, TECHNICAL SUPPORT
SR. PROJ. ENG.	40	\$112/HR	P.E. SUPERVISOR
	TOT. =	\$38,480	

SCS ENGINEERS

SHEET 18 OF 19

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO.
SUBJECT FINANCIAL ASSURANCE	BY JPB	DATE 7-24-08
CLOSING COST	CHECKED WHB	DATE 7/24/08

REIMBURSABLES:

EQUIPMENT AND SUPPLIES = $2,000

MEALS = 30 day × $28/DAY = $840

LODGING = 30 day × $80/DAY = $2,400

TOTAL REIMBURSABLES = $5,240

15% REIMBURSABLES = $786

TOTAL = $6,026

ON-SITE TECHNICIAN:

$\frac{10\ HR}{DAY} \times \frac{7\ DAYS}{WK} \times \frac{4\ WK}{1\ MO} \times 3\ MO = 840$ HOURS

UNIT COST: $60/HR (SEE ATTACHMENT 14)

TOTAL COST: 840 HOURS × $60/HR = $50,400

TOTAL FOR 11.b = $38,480 + $6,026 + $50,400

= $\boxed{\$94,906}$

TOTAL FOR 11 = COST FOR 11a + COST FOR 11b

= $106,599 + $94,906

= $\boxed{\$201,505}$

QUALITY ASSURANCE TESTING:

ASSUME A LUMP SUM COST OF $40,000

SCS ENGINEERS

SHEET 19 OF 19

CLIENT	PROJECT	JOB NO.	
SUBJECT		BY JPB	DATE 7/29/08
		CHECKED DMB	DATE 7/29/08

12. CONTINGENCY

15% OF ITEMS 1-11 = 0.15 × \$3,515,000
= \$527,250

CLOSING COST SUBTOTAL: \$3,515,000 + \$527,250 = $\boxed{\$4,042,250}$

13. SITE SPECIFIC COSTS:

MOBILIZATION (10% OF ITEMS 1-11) = 0.10 × \$3,515,000
= \$351,500

WASTE TIRE FACILITY = \$9,775 (SEE ATTACHMENT 18)

LEACHATE DISPOSAL FOR ONE YEAR:

LEACHATE AMOUNT:

$$0.47 \frac{GAL}{MIN}^{**} \times \frac{60\ MIN}{1\ HR} \times \frac{24\ HR}{1\ DAY} \times \frac{365\ DAYS}{1\ YR} = 247,032 \frac{GAL}{YR}$$

$$\text{HAULING: } \frac{\$0.05}{GAL} \times 247,032 \frac{GAL}{YR} = \$12,351.60$$

$$\text{DISPOSAL: } \frac{\$0.0072}{GAL} \times 247,032 \frac{GAL}{YR} = \$1,778.63$$

$\boxed{\$14,130}$

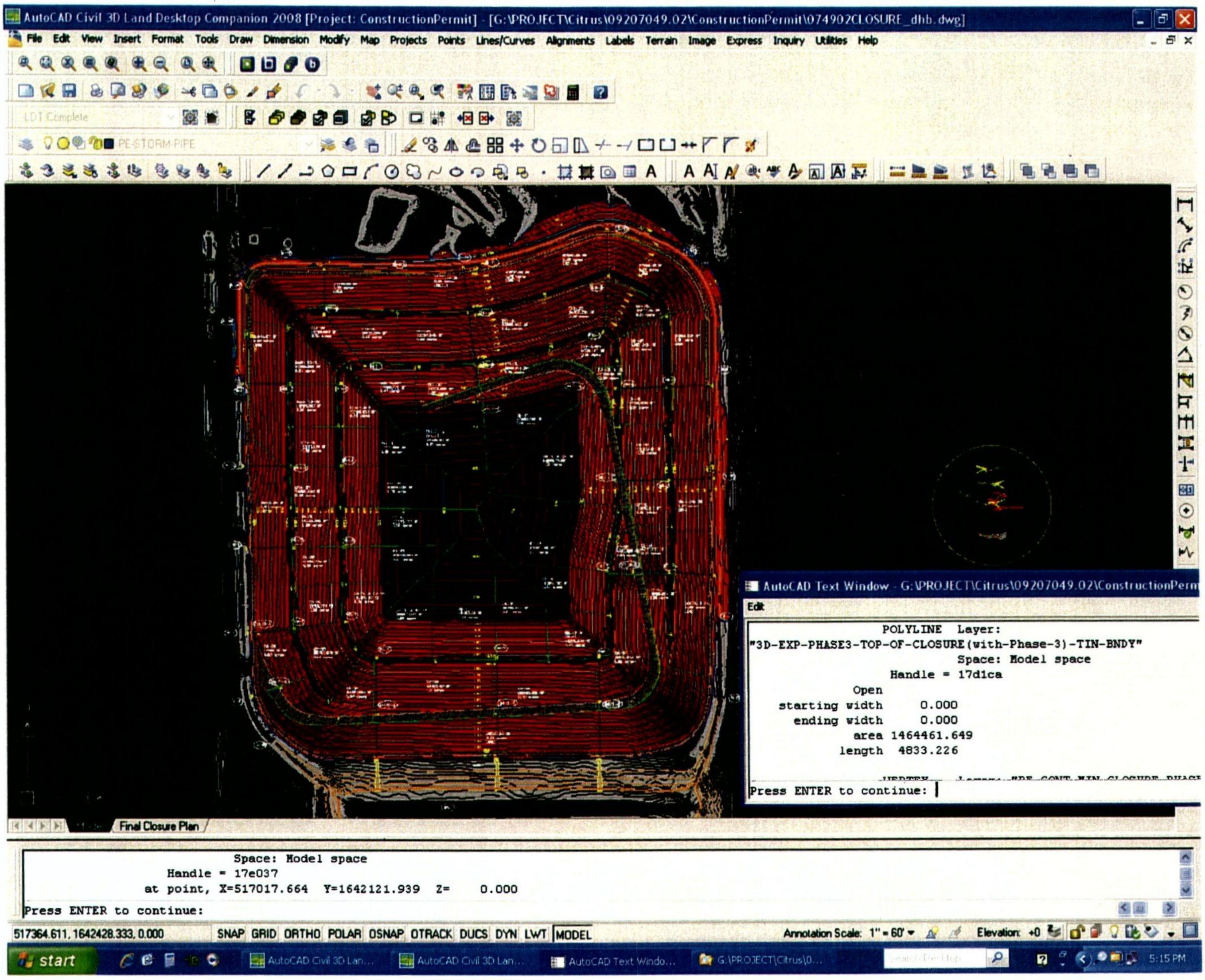
OTHER (BONDS & INSURANCE 2% OF SUB-TOTAL 1-11)
= 0.02 × \$3,515,000 = \$70,300

SUBTOTAL SITE SPECIFIC COSTS: $\boxed{\$445,710}$

TOTAL CLOSING COSTS: $\boxed{\$4,487,960}$

** PER HELP MODEL, AVERAGE DAILY LEACHATE COLLECTED, SEE SECTION H3

ATTACHMENT 1



31 14 Earth Stripping and Stockpiling

31 14 13 – Soil Stripping and Stockpiling

31 14 13.23 Topsoil Stripping and Stockpiling		Crew	Daily Output	Labor-Hours	Unit	Material	2008 Bare Costs Labor	Equipment	Total	Total Incl O&P
0010	**TOPSOIL STRIPPING AND STOCKPILING**									
0020	200 H.P. dozer, ideal conditions	B-10B	2300	.005	C.Y.		.19	.47	.66	.80
0100	Adverse conditions	"	1150	.010			.38	.93	1.31	1.60
0200	300 HP dozer, ideal conditions	B-10M	3000	.004			.15	.46	.61	.73
0300	Adverse conditions	"	1650	.007			.27	.84	1.11	1.34
1400	Loam or topsoil, remove and stockpile on site									
1420	6" deep, 200' haul	B-10B	865	.014	C.Y.		.51	1.24	1.75	2.13
1430	300' haul		520	.023			.85	2.06	2.91	3.56
1440	500' haul		225	.053			1.95	4.76	6.71	8.20
1450	Alternate method: 6" deep, 200' haul		5090	.002	S.Y.		.09	.21	.30	.36
1460	500' haul		1325	.009	"		.33	.81	1.14	1.40

31 22 Grading

31 22 16 – Fine Grading

31 22 16.10 Finish Grading		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	**FINISH GRADING**									
0012	Finish grading area to be paved with grader, small area	B-11L	400	.040	S.Y.		1.40	1.34	2.74	3.61
0016	Finish grading lagoon bottoms		4	4	M.S.F.		140	134	274	360
0100	Large area		2000	.008	S.Y.		.28	.27	.55	.72
0200	Grade subgrade for base course, roadways		3500	.005	"		.16	.15	.31	.41
0210	Fine grade, top of lagoon banks for compaction		30	.533	M.S.F.		18.70	17.80	36.50	48
1020	For large parking lots	B-32C	5000	.010	S.Y.		.34	.36	.70	.92
1050	For small irregular areas	"	2000	.024			.85	.91	1.76	2.30
1100	Fine grade for slab on grade, machine	B-11L	1040	.015			.54	.51	1.05	1.39
1150	Hand grading	B-18	700	.034			1.06	.05	1.11	1.71
1200	Fine grade granular base for sidewalks and bikeways	B-62	1200	.020			.66	.12	.78	1.14
2550	Hand grade select gravel	2 Clab	60	.267	C.S.F.		8.05		8.05	12.55
3000	Hand grade select gravel, including compaction, 4" deep	B-18	555	.043	S.Y.		1.34	.07	1.41	2.16
3100	6" deep		400	.060			1.86	.10	1.96	3
3120	8" deep		300	.080			2.47	.13	2.60	3.99
3300	Finishing grading slopes, gentle	B-11L	8900	.002			.06	.06	.12	.17
3310	Steep slopes		7100	.002			.08	.08	.16	.20
3312	Steep slopes, large quantities		64	.250	M.S.F.		8.75	8.35	17.10	22.50

31 23 Excavation and Fill

31 23 16 – Excavation

31 23 16.13 Excavating, Trench		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	**EXCAVATING, TRENCH**									
0011	Or continuous footing									
0020	Common earth with no sheeting or dewatering included									
0050	1' to 4' deep, 3/8 C.Y. excavator	B-11C	150	.107	B.C.Y.		3.74	1.90	5.64	7.80
0060	1/2 C.Y. excavator	B-11M	200	.080			2.80	1.70	4.50	6.15
0062	3/4 C.Y. excavator	B-12F	270	.059			2.11	2.04	4.15	5.45
0090	4' to 6' deep, 1/2 C.Y. excavator	B-11M	200	.080			2.80	1.70	4.50	6.15
0100	5/8 C.Y. excavator	B-12Q	250	.064			2.28	1.99	4.27	5.65
0110	3/4 C.Y. excavator	B-12F	300	.053			1.90	1.83	3.73	4.91
[illegible]	1 C.Y. hydraulic excavator	B-12A	400	.040			1.42	1.62	3.04	3.96
[illegible]	1-1/2 C.Y. excavator	B-12B	540	.030			1.05	1.54	2.59	3.30
[illegible]	1/2 C.Y. excavator, truck mounted	B-12J	200	.080			2.85	4.66	7.51	9.50

ATTACHMENT 3

31 23 23 – Fill

31 23 23.17 General Fill

		Crew	Daily Output	Labor-Hours	Unit	Material	Labor (2008 Bare Costs)	Equipment (2008 Bare Costs)	Total (2008 Bare Costs)	Total Incl O&P
0010	**GENERAL FILL**									
0011	Spread dumped material, no compaction									
0020	By dozer, no compaction	B-10B	1000	.012	L.C.Y.		.44	1.07	1.51	1.85
0100	By hand	1 Clab	12	.667	"		20		20	31.50
0150	Spread fill, from stockpile with 2-1/2 C.Y. F.E. loader									
0170	130 H.P., 300' haul	B-10P	600	.020	L.C.Y.		.73	1.49	2.22	2.76
0190	With dozer 300 H.P., 300' haul	B-10M	600	.020	"		.73	2.31	3.04	3.66
0400	For compaction of embankment, see Div. 31 23 23.23									
0500	Gravel fill, compacted, under floor slabs, 4" deep	B-37	10000	.005	S.F.	.29	.15	.01	.45	.57
0600	6" deep		8600	.006		.44	.18	.02	.64	.77
0700	9" deep		7200	.007		.73	.21	.02	.96	1.15
0800	12" deep		6000	.008		1.02	.25	.02	1.29	1.53
1000	Alternate pricing method, 4" deep		120	.400	E.C.Y.	22	12.75	1.08	35.83	45
1100	6" deep		160	.300		22	9.55	.81	32.36	39.50
1200	9" deep		200	.240		22	7.65	.65	30.30	36.50
1300	12" deep		220	.218		22	6.95	.59	29.54	35.50
1500	For fill under exterior paving, see Div. 32 11 23.23									
1600	For flowable fill, see Div. 03 31 05.35									

31 23 23.18 Hauling

		Crew	Daily Output	Labor-Hours	Unit	Material	Labor (2008 Bare Costs)	Equipment (2008 Bare Costs)	Total (2008 Bare Costs)	Total Incl O&P
0010	**HAULING**									
0011	Excavated or borrow, loose cubic yards									
0012	no loading included, highway haulers									
0020	8 C.Y. dump truck, 1/4 mile round trip, 5.0 loads/hr.	B-34A	195	.041	L.C.Y.		1.26	1.58	2.84	3.68
0030	1/2 mile round trip, 4.1 loads/hr.		160	.050			1.53	1.93	3.46	4.49
0040	1 mile round trip, 3.3 loads/hr.		130	.062			1.88	2.37	4.25	5.50
0100	2 mile round trip, 2.6 loads/hr.		100	.080			2.45	3.09	5.54	7.20
0150	3 mile round trip, 2.1 loads/hr.		80	.100			3.06	3.86	6.92	9
0200	4 mile round trip, 1.8 loads/hr.		70	.114			3.50	4.41	7.91	10.25
0310	12 C.Y. dump truck, 1/4 mile round trip 3.7 loads/hr.	B-34B	288	.028			.85	1.75	2.60	3.24
0320	1/2 mile round trip, 3.2 loads/hr.		250	.032			.98	2.01	2.99	3.73
0330	1 mile round trip 2.7, loads/hr.		210	.038			1.17	2.39	3.56	4.43
0400	2 mile round trip, 2.2 loads/hr.		180	.044			1.36	2.79	4.15	5.15
0450	3 mile round trip, 1.9 loads/hr.		170	.047			1.44	2.96	4.40	5.50
0500	4 mile round trip, 1.6 loads/hr.		125	.064			1.96	4.02	5.98	7.45
0540	5 mile round trip, 1 load/hr.		78	.103			3.14	6.45	9.59	11.95
0550	10 mile round trip, 0.60 load/hr.		58	.138			4.22	8.65	12.87	16.10
0560	20 mile round trip, 0.4 load/hr.		39	.205			6.30	12.90	19.20	24
0600	16.5 C.Y. dump trailer, 1 mile round trip, 2.6 loads/hr.	B-34C	280	.029			.87	2.02	2.89	3.57
0700	2 mile round trip, 2.1 loads/hr.		225	.036			1.09	2.51	3.60	4.44
1000	3 mile round trip, 1.8 loads/hr.		193	.041			1.27	2.93	4.20	5.20
1100	4 mile round trip, 1.6 loads/hr.		172	.047			1.42	3.28	4.70	5.80
1110	5 mile round trip, 1 load/hr.		108	.074			2.27	5.25	7.52	9.25
1120	10 mile round trip, .60 load/hr.		80	.100			3.06	7.05	10.11	12.50
1130	20 mile round trip, .4 load/hr.		54	.148			4.53	10.45	14.98	18.50
1150	20 C.Y. dump trailer, 1 mile round trip, 2.5 loads/hr.	B-34D	325	.025			.75	1.78	2.53	3.12
1200	2 mile round trip, 2 loads/hr.		260	.031			.94	2.22	3.16	3.90
1220	3 mile round trip, 1.7 loads/hr.		221	.036			1.11	2.61	3.72	4.58
1240	4 mile round trip, 1.5 loads/hr.		195	.041			1.26	2.96	4.22	5.20
1245	5 mile round trip, 1.1 load/hr.		143	.056			1.71	4.04	5.75	7.10
1250	10 mile round trip, .75 load/hr.		110	.073			2.23	5.25	7.48	9.20
1255	20 mile round trip, .5 load/hr.		78	.103			3.14	7.40	10.54	13
1300	Hauling in medium traffic, add								20%	20%

ATTACHMENT

31 23 23.20 Hauling

31 23 23.20 Hauling		Crew	Daily Output	Labor-Hours	Unit	Material	2008 Bare Costs Labor	Equipment	Total	Total Incl O&P
1628	cycle 1 mile	B-34B	168	.048	L.C.Y.		1.46	2.99	4.45	[illegible]
1630	cycle 2 miles		156	.051			1.57	3.22	4.79	[illegible]
1632	cycle 4 miles		132	.061			1.85	3.81	5.66	[illegible]
1634	cycle 6 miles		120	.067			2.04	4.19	6.23	[illegible]
1636	cycle 8 miles		108	.074			2.27	4.66	6.93	[illegible]
1640	25 MPH ave, cycle 4 miles		144	.056			1.70	3.49	5.19	[illegible]
1642	cycle 6 miles		132	.061			1.85	3.81	5.66	[illegible]
1644	cycle 8 miles		120	.067			2.04	4.19	6.23	[illegible]
1650	30 MPH ave, cycle 4 miles		144	.056			1.70	3.49	5.19	[illegible]
1652	cycle 6 miles		132	.061			1.85	3.81	5.66	[illegible]
1654	cycle 8 miles		120	.067			2.04	4.19	6.23	[illegible]
1660	35 MPH ave, cycle 4 miles		156	.051			1.57	3.22	4.79	[illegible]
1662	cycle 6 miles		144	.056			1.70	3.49	5.19	[illegible]
1664	cycle 8 miles		132	.061			1.85	3.81	5.66	[illegible]
1666	cycle 10 miles		120	.067			2.04	4.19	6.23	[illegible]
1668	cycle 20 miles		84	.095			2.91	6	8.91	[illegible]
1670	cycle 40 miles		60	.133			4.08	8.40	12.48	[illegible]
1672	40 MPH, cycle 6 miles		144	.056			1.70	3.49	5.19	[illegible]
1674	cycle 8 miles		132	.061			1.85	3.81	5.66	[illegible]
1676	cycle 10 miles		120	.067			2.04	4.19	6.23	[illegible]
1678	cycle 20 miles		96	.083			2.55	5.25	7.80	[illegible]
1680	cycle 30 miles		72	.111			3.40	7	10.40	[illegible]
1682	cycle 40 miles		60	.133			4.08	8.40	12.48	[illegible]
1684	cycle 50 miles		60	.133			4.08	8.40	12.48	[illegible]
1694	45 MPH ave, cycle 8 miles		144	.056			1.70	3.49	5.19	[illegible]
1696	cycle 10 miles		132	.061			1.85	3.81	5.66	[illegible]
1698	cycle 20 miles		96	.083			2.55	5.25	7.80	[illegible]
1700	cycle 30 miles		84	.095			2.91	6	8.91	[illegible]
1702	cycle 40 miles		72	.111			3.40	7	10.40	[illegible]
1704	cycle 50 miles		60	.133			4.08	8.40	12.48	[illegible]
1706	50 MPH ave, cycle 10 miles		132	.061			1.85	3.81	5.66	[illegible]
1708	cycle 20 miles		108	.074			2.27	4.66	6.93	8.60
1710	cycle 30 miles		84	.095			2.91	6	8.91	11.10
1712	cycle 40 miles		72	.111			3.40	7	10.40	12.95
1714	cycle 50 miles		60	.133			4.08	8.40	12.48	15.50
2000	Hauling, 8 CY truck, small project cost per hour	B-34A	8	1	Hr.		30.50	38.50	69	90
2100	12 CY Truck	B-34B	8	1	"		30.50	63	93.50	117

31 23 23.23 Compaction

31 23 23.23 Compaction		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	**COMPACTION**									
5000	Riding, vibrating roller, 6" lifts, 2 passes	B-10Y	3000	.004	E.C.Y.		.15	.16	.31	[illegible]
5020	3 passes		2300	.005			.19	.20	.39	[illegible]
5040	4 passes		1900	.006			.23	.25	.48	[illegible]
5060	12" lifts, 2 passes		5200	.002			.08	.09	.17	.23
5080	3 passes		3500	.003			.13	.13	.26	.34
5100	4 passes		2600	.005			.17	.18	.35	.46
5600	Sheepsfoot or wobbly wheel roller, 6" lifts, 2 passes	B-10G	2400	.005			.18	.42	.60	.74
5620	3 passes		1735	.007			.25	.58	.83	1.03
5640	4 passes		1300	.009			.34	.77	1.11	1.38
5680	12" lifts, 2 passes		5200	.002			.08	.19	.27	.34
5700	3 passes		3500	.003			.13	.29	.42	.51
5720	4 passes		2600	.005			.17	.39	.56	.69
6000	Towed sheepsfoot or wobbly wheel roller, 6" lifts, 2 passes	B-10D	10000	.001			.04	.15	.19	.23

ATTACHMENT 5

Belen, Joyce

From: Bramlett, Dominique
Sent: Thursday, May 29, 2008 2:47 PM
To: Belen, Joyce
Cc: Banks, John
Subject: FW: Citrus Co

FYI.
Thanks, Dom

Dominique H. Bramlett, P.E.
SCS ENGINEERS
4041 Park Oaks Blvd, Suite 100
Tampa, FL 33610
Phone: (813) 621-0080
Fax: (813) 623-6757
Email: dbramlett@scsengineers.com
Website: www.scsengineers.com

From: Bob Trexler [mailto:bobt@geo-synthetics.com]
Sent: Thursday, May 29, 2008 2:41 PM
To: Bramlett, Dominique
Subject: RE: Citrus Co

Bob Trexler
Geo-Synthetics, Inc.
9227 Memorial Pines Way
Spring, TX 77379
Office Phone: 281-257-2405
Cell Phone: 262-442-3101
FAX #: 281-257-4235
bobt@geo-synthetics.com
www.geo-synthetics.com/installation

Dominique,
Please use the following prices for your budgetary pricing update on the Citrus County LF Closure. Please also keep in mind that the pricing I am giving you today, 5/29/08, are based on current raw material prices. When the actual project is closer to going Iout for formal bnids, I would recommend that you get a new estimate, as petrolium based raw materials like liners and geocomposites can skyrocket rather rapidly as you are seeing at the pumps. Your current budgetary prices are as follows:

Price to supply only approximately 1,412,471 sq ft of 40 mil textured LLDE liner at .30 per sq ft delivered. Price for installation only at .28 per sq ft.

Price to supply only approximately 1,074,051 sq ft of 200 mil net with 2 sides of 6 oz geotextile bonded at .38 per sq ft. Price for installation at .20 per sq ft.

Please let me know if you have any additional questions.

Regards,

ATTACHMENT 6

31 23 23.18 Hauling		Crew	Daily Output	Labor-Hours	Unit	Material	2008 Bare Costs Labor	Equipment	Total	Total Incl O&P
1400	Heavy traffic, add				L.C.Y.				30%	30%
1600	Grading at dump, or embankment if required, by dozer	B-10B	1000	.012			.44	1.07	1.51	1.85
1800	Spotter at fill or cut, if required	1 Clab	8	1	Hr.		30.50		30.50	47
2000	Off highway haulers									
2010	22 C.Y. rear/bottom dump, 1000' rnd trip, 4.5 loads/hr.	B-34F	645	.012	L.C.Y.		.38	1.69	2.07	2.45
2020	1/2 mile round trip, 4.2 loads/hr.		600	.013			.41	1.81	2.22	2.63
2030	1 mile round trip, 3.9 loads/hr.		555	.014			.44	1.96	2.40	2.84
2040	2 mile round trip, 3.3 loads/hr.		470	.017			.52	2.32	2.84	3.36
2050	34 C.Y. rear or bottom dump, 1000' round trip, 4 loads/hr.	B-34G	885	.009			.28	1.61	1.89	2.20
2060	1/2 mile round trip, 3.8 loads/hr.		840	.010			.29	1.70	1.99	2.32
2070	1 mile round trip, 3.5 loads/hr.		775	.010			.32	1.84	2.16	2.51
2080	2 mile round trip, 3.0 loads/hr.		665	.012			.37	2.14	2.51	2.93
2090	42 C.Y. rear or bottom bump, 1000' round trip, 3.8 loads/hr.	B-34H	1040	.008			.24	1.46	1.70	1.96
2100	1/2 mile round trip, 3.6 loads/hr.		980	.008			.25	1.55	1.80	2.09
2110	1 mile round trip, 3.3 loads/hr.		900	.009			.27	1.69	1.96	2.27
2120	2 mile round trip, 2.8 loads/hr.		765	.010			.32	1.98	2.30	2.68
2130	60 C.Y. rear or bottom dump, 1000' round trip, 3.6 loads/hr.	B-34J	1400	.006			.17	1.40	1.57	1.81
2140	1/2 mile round trip, 3.4 loads/hr.		1325	.006			.18	1.48	1.66	1.91
2150	1 mile round trip, 3.1 loads/hr.		1200	.007			.20	1.63	1.83	2.11
2160	2 mile round trip, 2.6 loads/hr.		1015	.008			.24	1.93	2.17	2.49
3000	Rough terrain or steep grades, add to above								100%	
4500	Dust control, light	B-59	1	8	Day		245	400	645	820
4501	Heavy	″	.50	16			490	805	1,295	1,650
4600	Haul road maintenance	B-86A	1	8			320	535	855	1,075
4700	Highway hauling beyond 20 miles, per loaded mile, minimum				Mile				1.32	1.45
4750	Maximum				″				2.40	2.64

31 23 23.19 Backfill, Airport Subgrade		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	**BACKFILL, AIRPORT SUBGRADE**									
0100	Backfill, dozer, sand & gravel, 12" depth ,300' haul, no compaction	B-10M	4500	.003	S.Y.		.10	.31	.41	.49
0200	13" depth		4155	.003			.11	.33	.44	.53
0300	14" depth		3860	.003			.11	.36	.47	.57
0400	15" depth		3600	.003			.12	.39	.51	.61
0500	16" depth		3375	.004			.13	.41	.54	.65
0600	17" depth		3175	.004			.14	.44	.58	.69
0700	18" depth		3000	.004			.15	.46	.61	.73
0800	19" depth		2845	.004			.15	.49	.64	.78
0900	20" depth		2700	.004			.16	.51	.67	.81
1100	22" depth		2455	.005			.18	.57	.75	.89
1200	23" depth		2350	.005			.19	.59	.78	.93
1300	24" depth		2250	.005			.20	.62	.82	.98
1400	26" depth		2075	.006			.21	.67	.88	1.06
1500	28" depth		1930	.006			.23	.72	.95	1.14
1600	30" depth		1800	.007			.24	.77	1.01	1.22
1700	32" depth		1690	.007			.26	.82	1.08	1.30
1800	34" depth		1590	.008			.28	.87	1.15	1.38
1900	36" depth		1500	.008			.29	.93	1.22	1.47
2000	38" depth		1420	.008			.31	.98	1.29	1.55
2100	40" depth		1350	.009			.33	1.03	1.36	1.63
2200	42" depth		1285	.009			.34	1.08	1.42	1.71
2300	44" depth		1230	.010			.36	1.13	1.49	1.78
2400	46" depth		1175	.010			.37	1.18	1.55	1.87
2500	48" depth		1125	.011			.39	1.23	1.62	1.95

ATTACHMENT 7

1/2

Date: 2/5/2007 1:18:58 PM

FDOT Long Range Estimating System - Production
R4: Project Details Composite Report
By Version

Project: WIDART-4-UN-BB **Letting Date:** 01/2099

Description: WIDEN EXISTING 2 LANE ARTERIAL TO 4 LANES UNDIVIDED, ADD 1 LANE TO EACH SIDE, 5' PAVED SHOULDERS.

District: 09 **County:** 99 DISTRICT/STATE WIDE

Project Manager: DALE STANLEY

Version 1-P Project Grand Total **$2,770,042.99**

Description: WIDEN EXISTING 2 LANE ARTERIAL TO 4 LANES UNDIVIDED, ADD 1 LANE TO EACH SIDE, 5' PAVED SHOULDERS, RESURFACE EXISTING 2 LANES.

Pay Items

Pay Item	Description	Total Unit Quantity	Weighted Avg. Unit Price	Total Amount
101-1	MOBILIZATION	10.00 %		$247,276.64
102-1	MAINTENANCE OF TRAFFIC	10.00 %		$224,796.94
104-4	MOWING	1.20 AC	$76.93	$92.32
104-10-1	HAY OR STRAW BALE (18" X 18" X 36")	528.00 EA	$7.53	$3,975.84
104-11	TURBIDITY BARRIER FLOATING	100.00 LF	$10.54	$1,054.00
104-12	TURBIDITY BARRIER STAKED	100.00 LF	$3.96	$396.00
104-13-1	SILT FENCE STAKED (TYPE III)	10,560.00 LF	$1.35	$14,256.00
104-15	PREVENTION DEVICE SOIL TRACKING	1.00 EA	$3,121.06	$3,121.06
110-1-1	CLEARING & GRUBBING	9.71 AC	$15,887.81	$154,270.64
120-1	EXCAVATION REGULAR	4,840.00 CY	$7.24	$35,041.60
120-2-2	EXCAVATION BORROW (TRUCK MEASURE)	24,733.87 CY	$22.04	$545,134.49
160-4	STABILIZATION TYPE B	25,813.33 SY	$4.45	$114,869.32
285-704	BASE OPTIONAL (BASE GROUP 04)	6,253.87 SY	$13.10	$81,925.70
285-709	BASE OPTIONAL (BASE GROUP 09)	14,467.20 SY	$18.52	$267,932.54

ATTACHMENT 7

2/2

327-70-15	MILL EXIST ASPH PAVT (2 3/4" AVG DEPTH)	14,080.00 SY	$2.84	$39,987.20
334-1-23	SUPERPAVE ASPH CONC (TRAF C)(PG76-22)	322.67 TN	$98.19	$31,682.97
334-1-24	SUPERPAVE ASPH CONC (TRAF D)(PG76-22)	5,420.80 TN	$103.24	$559,643.39
337-7-22	ASPH CONC FC(INC BIT) FC-5(PG76-22)	1,157.38 TN	$122.48	$141,755.90
400-2-2	CONC CLASS II (ENDWALLS)	36.00 CY	$1,190.26	$42,849.36
425-1-541	INLETS (DT BOT) (TYPE D) (<10')	1.00 EA	$4,421.37	$4,421.37
425-2-71	MANHOLES (J-7) (<10')	1.00 EA	$7,182.00	$7,182.00
430-171-140	PIPE CULV(OPT MATL) (ROUND)(42"SS)	56.00 LF	$169.00	$9,464.00
430-171-142	PIPE CULV(OPT MATL) (ROUND)(54"SS)	200.00 LF	$239.47	$47,894.00
430-172-138	PIPE CULV(OPT MATL) (ROUND)(36"CD)	64.00 LF	$131.86	$8,439.04
430-174-129	PIPE CULV(OPT MATL) (ROUND)(24"SD)	152.00 LF	$99.78	$15,166.56
430-942-38	PIPE DESILTING (36" CD)	168.00 LF	$10.90	$1,831.20
430-944-29	PIPE DESILTING (24" SD)	800.00 LF	$6.46	$5,168.00
430-984-129	MITERED END SECT (OPTIONAL RD) (24" SD)	10.00 EA	$1,971.43	$19,714.30
546-72-51	RUMBLE STRIP (GROUND-IN) (16" MIN. W)	2.00 PM	$1,102.57	$2,205.14
550-10-220	FENCING, TYPE B(5.1-6.0) STANDARD	600.00 LF	$12.93	$7,758.00
550-60-234	GATE (TYPE B) SLIDING/CANT(18.1-20' OPEN)	1.00 EA	$1,889.92	$1,889.92
570-2	SEED & MULCH	32,853.33 SY	$0.29	$9,527.47
570-3	SEED GRASS (PERMANENT TYPE)	407.27 LB	$4.41	$1,796.06
570-4	MULCH MATERIAL	27.15 TN	$110.61	$3,003.06
575-1	SODDING	8,690.67 SY	$2.19	$19,032.57
700-40-1	SIGN SINGLE POST (LESS THAN 12)	2.00 AS	$269.84	$539.68
700-40-2	SIGN SINGLE POST (12 - 25)	20.00 AS	$897.64	$17,952.80
700-41-10	SIGN MULTI POST (50 OR LESS)	2.00 AS	$3,307.06	$6,614.12
700-46-11	SGN EXISTING (REMOVE) (SINGLE POST)	20.00 AS	$25.71	$514.20

ATTACHMENT 8

Citrus County Phase 3 Expansion
Complete Pipe Input

```
        Name: N1-2L            From Node: N1-2L          Length(ft): 19.00
       Group: BASE               To Node: N1-2                Count: 1
                                                  Friction Equation: Average Conveyance
              UPSTREAM         DOWNSTREAM        Solution Algorithm: Automatic
    Geometry: Circular         Circular                        Flow: Both
    Span(in): 12.00            12.00              Entrance Loss Coef: 0.50
    Rise(in): 12.00            12.00                  Exit Loss Coef: 0.00
  Invert(ft): 146.500          144.100                Bend Loss Coef: 0.50
 Manning's N: 0.012000         0.012000            Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000            0.000                Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000            0.000               Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
        Name: N1-2R            From Node: N1-2R          Length(ft): 19.00
       Group: BASE               To Node: N1-2                Count: 1
                                                  Friction Equation: Average Conveyance
              UPSTREAM         DOWNSTREAM        Solution Algorithm: Automatic
    Geometry: Circular         Circular                        Flow: Both
    Span(in): 12.00            12.00              Entrance Loss Coef: 0.50
    Rise(in): 12.00            12.00                  Exit Loss Coef: 0.00
  Invert(ft): 146.500          144.100                Bend Loss Coef: 0.50
 Manning's N: 0.035000         0.035000            Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000            0.000                Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000            0.000               Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
        Name: N1/1-2           From Node: N1-1           Length(ft): 125.00
       Group: BASE               To Node: N1-2                Count: 1
                                                  Friction Equation: Average Conveyance
              UPSTREAM         DOWNSTREAM        Solution Algorithm: Automatic
    Geometry: Circular         Circular                        Flow: Both
    Span(in): 18.00            18.00              Entrance Loss Coef: 0.00
    Rise(in): 18.00            18.00                  Exit Loss Coef: 0.00
  Invert(ft): 179.100          144.100                Bend Loss Coef: 0.50
 Manning's N: 0.012000         0.012000            Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000            0.000                Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000            0.000               Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
        Name: N1/2-S-1         From Node: N1-2           Length(ft): 110.00
       Group: BASE               To Node: S-1                 Count: 1
                                                  Friction Equation: Average Conveyance
              UPSTREAM         DOWNSTREAM        Solution Algorithm: Automatic
    Geometry: Circular         Circular                        Flow: Both
    Span(in): 24.00            24.00              Entrance Loss Coef: 0.00
    Rise(in): 24.00            24.00                  Exit Loss Coef: 1.00
  Invert(ft): 144.100          115.880                Bend Loss Coef: 0.00
 Manning's N: 0.012000         0.012000            Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000            0.000                Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000            0.000               Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
        Name: N10/1-2            From Node: N10-1              Length(ft): 140.00
       Group: BASE                 To Node: N10-2                   Count: 1
                                                        Friction Equation: Average Conveyance
              UPSTREAM       DOWNSTREAM                Solution Algorithm: Automatic
    Geometry: Circular       Circular                                Flow: Both
    Span(in): 18.00          18.00                     Entrance Loss Coef: 0.00
    Rise(in): 18.00          18.00                         Exit Loss Coef: 0.00
  Invert(ft): 179.100        144.100                       Bend Loss Coef: 0.50
 Manning's N: 0.012000       0.012000                    Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000          0.000                        Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000          0.000                      Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
        Name: N10/2-S10          From Node: N10-2              Length(ft): 110.00
       Group: BASE                 To Node: S-10                    Count: 1
                                                        Friction Equation: Average Conveyance
              UPSTREAM       DOWNSTREAM                Solution Algorithm: Automatic
    Geometry: Circular       Circular                                Flow: Both
    Span(in): 18.00          18.00                     Entrance Loss Coef: 0.00
    Rise(in): 18.00          18.00                         Exit Loss Coef: 1.00
  Invert(ft): 144.100        117.900                       Bend Loss Coef: 0.00
 Manning's N: 0.012000       0.012000                    Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000          0.000                        Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000          0.000                      Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
        Name: N11-3L             From Node: N11-3L             Length(ft): 19.00
       Group: BASE                 To Node: N11-3                   Count: 1
                                                        Friction Equation: Average Conveyance
              UPSTREAM       DOWNSTREAM                Solution Algorithm: Automatic
    Geometry: Circular       Circular                                Flow: Both
    Span(in): 12.00          12.00                     Entrance Loss Coef: 0.50
    Rise(in): 12.00          12.00                         Exit Loss Coef: 0.00
  Invert(ft): 181.500        179.100                       Bend Loss Coef: 0.50
 Manning's N: 0.012000       0.012000                    Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000          0.000                        Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000          0.000                      Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
        Name: N11-3R             From Node: N11-3R             Length(ft): 19.00
       Group: BASE                 To Node: N11-3                   Count: 1
                                                        Friction Equation: Average Conveyance
              UPSTREAM       DOWNSTREAM                Solution Algorithm: Automatic
    Geometry: Circular       Circular                                Flow: Both
```

```
     Span(in): 12.00          12.00                Entrance Loss Coef: 0.50
     Rise(in): 12.00          12.00                    Exit Loss Coef: 0.00
   Invert(ft): 181.500        179.100                  Bend Loss Coef: 0.50
  Manning's N: 0.012000       0.012000              Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                   Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                 Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
---------------------------------------------------------------------------------------------------
         Name: N11-4L           From Node: N11-4L            Length(ft): 19.00
        Group: BASE               To Node: N11-4                  Count: 1
                                                      Friction Equation: Average Conveyance
               UPSTREAM       DOWNSTREAM             Solution Algorithm: Automatic
     Geometry: Circular       Circular                             Flow: Both
     Span(in): 12.00          12.00                Entrance Loss Coef: 0.50
     Rise(in): 12.00          12.00                    Exit Loss Coef: 0.00
   Invert(ft): 146.500        144.100                  Bend Loss Coef: 0.50
  Manning's N: 0.012000       0.012000              Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                   Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                 Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
---------------------------------------------------------------------------------------------------
         Name: N11-4R           From Node: N11-4R            Length(ft): 19.00
        Group: BASE               To Node: N11-4                  Count: 1
                                                      Friction Equation: Average Conveyance
               UPSTREAM       DOWNSTREAM             Solution Algorithm: Automatic
     Geometry: Circular       Circular                             Flow: Both
     Span(in): 12.00          12.00                Entrance Loss Coef: 0.50
     Rise(in): 12.00          12.00                    Exit Loss Coef: 0.00
   Invert(ft): 146.500        144.100                  Bend Loss Coef: 0.50
  Manning's N: 0.012000       0.012000              Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                   Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                 Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
---------------------------------------------------------------------------------------------------
         Name: N11/2-3          From Node: N11-2             Length(ft): 75.00
        Group: BASE               To Node: N11-3                  Count: 1
                                                      Friction Equation: Average Conveyance
               UPSTREAM       DOWNSTREAM             Solution Algorithm: Automatic
     Geometry: Circular       Circular                             Flow: Both
     Span(in): 18.00          18.00                Entrance Loss Coef: 0.50
     Rise(in): 18.00          18.00                    Exit Loss Coef: 0.00
   Invert(ft): 203.000        179.100                  Bend Loss Coef: 0.50
  Manning's N: 0.012000       0.012000              Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                   Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                 Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
--------------------------------------------------------------------------------------------
         Name: N11/3-4            From Node: N11-3           Length(ft): 130.00
        Group: BASE                 To Node: N11-4                Count: 1
                                                      Friction Equation: Average Conveyance
              UPSTREAM       DOWNSTREAM              Solution Algorithm: Automatic
     Geometry: Circular      Circular                              Flow: Both
     Span(in): 18.00         18.00                   Entrance Loss Coef: 0.00
     Rise(in): 18.00         18.00                       Exit Loss Coef: 0.00
   Invert(ft): 179.100       144.100                     Bend Loss Coef: 0.50
   Manning's N: 0.012000     0.012000                 Outlet Ctrl Spec: Use dc or tw
  Top Clip(in): 0.000        0.000                     Inlet Ctrl Spec: Use dn
  Bot Clip(in): 0.000        0.000                   Stabilizer Option: None


Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall


--------------------------------------------------------------------------------------------
         Name: N11/4-S11          From Node: N11-4           Length(ft): 120.00
        Group: BASE                 To Node: S-11                 Count: 1
                                                      Friction Equation: Average Conveyance
              UPSTREAM       DOWNSTREAM              Solution Algorithm: Automatic
     Geometry: Circular      Circular                              Flow: Both
     Span(in): 24.00         24.00                   Entrance Loss Coef: 0.00
     Rise(in): 24.00         24.00                       Exit Loss Coef: 1.00
   Invert(ft): 144.100       118.400                     Bend Loss Coef: 0.00
   Manning's N: 0.012000     0.012000                 Outlet Ctrl Spec: Use dc or tw
  Top Clip(in): 0.000        0.000                     Inlet Ctrl Spec: Use dn
  Bot Clip(in): 0.000        0.000                   Stabilizer Option: None


Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall


--------------------------------------------------------------------------------------------
         Name: N12/1-2            From Node: N12-1           Length(ft): 160.00
        Group: BASE                 To Node: N12-2                Count: 1
                                                      Friction Equation: Average Conveyance
              UPSTREAM       DOWNSTREAM              Solution Algorithm: Automatic
     Geometry: Circular      Circular                              Flow: Both
     Span(in): 18.00         18.00                   Entrance Loss Coef: 0.50
     Rise(in): 18.00         18.00                       Exit Loss Coef: 0.00
   Invert(ft): 179.100       144.100                     Bend Loss Coef: 0.50
   Manning's N: 0.012000     0.012000                 Outlet Ctrl Spec: Use dc or tw
  Top Clip(in): 0.000        0.000                     Inlet Ctrl Spec: Use dn
  Bot Clip(in): 0.000        0.000                   Stabilizer Option: None


Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall


--------------------------------------------------------------------------------------------
         Name: N12/2-S12          From Node: N12-2           Length(ft): 110.00
        Group: BASE                 To Node: S-12                 Count: 1
                                                      Friction Equation: Average Conveyance
              UPSTREAM       DOWNSTREAM              Solution Algorithm: Automatic
     Geometry: Circular      Circular                              Flow: Both
     Span(in): 18.00         18.00                   Entrance Loss Coef: 0.00
     Rise(in): 18.00         18.00                       Exit Loss Coef: 1.00
   Invert(ft): 144.100       117.600                     Bend Loss Coef: 0.00
   Manning's N: 0.012000     0.012000                 Outlet Ctrl Spec: Use dc or tw
  Top Clip(in): 0.000        0.000                     Inlet Ctrl Spec: Use dn
```

```
 Bot Clip(in): 0.000          0.000                   Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
         Name: N13/1-2           From Node: N13-1            Length(ft): 125.00
        Group: BASE                To Node: N13-2                 Count: 1
                                                       Friction Equation: Average Conveyance
              UPSTREAM        DOWNSTREAM              Solution Algorithm: Automatic
     Geometry: Circular       Circular                              Flow: Both
     Span(in): 18.00          18.00                   Entrance Loss Coef: 0.50
     Rise(in): 18.00          18.00                       Exit Loss Coef: 0.00
   Invert(ft): 179.100        144.100                     Bend Loss Coef: 0.50
  Manning's N: 0.012000       0.012000                  Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                      Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                    Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
         Name: N13/2-S-13        From Node: N13-2            Length(ft): 117.00
        Group: BASE                To Node: S-13                  Count: 1
                                                       Friction Equation: Average Conveyance
              UPSTREAM        DOWNSTREAM              Solution Algorithm: Automatic
     Geometry: Circular       Circular                              Flow: Both
     Span(in): 18.00          18.00                   Entrance Loss Coef: 0.00
     Rise(in): 18.00          18.00                       Exit Loss Coef: 1.00
   Invert(ft): 144.100        117.000                     Bend Loss Coef: 0.00
  Manning's N: 0.012000       0.012000                  Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                      Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                    Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
         Name: N2-2L             From Node: N2-2L            Length(ft): 19.00
        Group: BASE                To Node: N2-2                  Count: 1
                                                       Friction Equation: Average Conveyance
              UPSTREAM        DOWNSTREAM              Solution Algorithm: Automatic
     Geometry: Circular       Circular                              Flow: Both
     Span(in): 12.00          12.00                   Entrance Loss Coef: 0.50
     Rise(in): 12.00          12.00                       Exit Loss Coef: 0.00
   Invert(ft): 146.500        144.100                     Bend Loss Coef: 0.50
  Manning's N: 0.012000       0.012000                  Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                      Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                    Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
         Name: N2-2R             From Node: N2-2R            Length(ft): 19.00
```

```
        Group: BASE                To Node: N2-2                   Count: 1
                                                       Friction Equation: Average Conveyance
              UPSTREAM         DOWNSTREAM             Solution Algorithm: Automatic
     Geometry: Circular        Circular                             Flow: Both
     Span(in): 12.00           12.00                  Entrance Loss Coef: 0.50
     Rise(in): 12.00           12.00                      Exit Loss Coef: 0.00
   Invert(ft): 146.500         144.100                    Bend Loss Coef: 0.50
  Manning's N: 0.012000        0.012000                 Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000           0.000                     Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000           0.000                   Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
         Name: N2/1-2            From Node: N2-1              Length(ft): 127.00
        Group: BASE                To Node: N2-2                   Count: 1
                                                       Friction Equation: Average Conveyance
              UPSTREAM         DOWNSTREAM             Solution Algorithm: Automatic
     Geometry: Circular        Circular                             Flow: Both
     Span(in): 18.00           18.00                  Entrance Loss Coef: 0.00
     Rise(in): 18.00           18.00                      Exit Loss Coef: 0.00
   Invert(ft): 179.100         144.100                    Bend Loss Coef: 0.50
  Manning's N: 0.012000        0.012000                 Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000           0.000                     Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000           0.000                   Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
         Name: N2/2-4            From Node: N2-2              Length(ft): 91.00
        Group: BASE                To Node: N2-4                   Count: 1
                                                       Friction Equation: Average Conveyance
              UPSTREAM         DOWNSTREAM             Solution Algorithm: Automatic
     Geometry: Circular        Circular                             Flow: Both
     Span(in): 24.00           24.00                  Entrance Loss Coef: 0.00
     Rise(in): 24.00           24.00                      Exit Loss Coef: 1.00
   Invert(ft): 144.100         119.000                    Bend Loss Coef: 0.00
  Manning's N: 0.012000        0.012000                 Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000           0.000                     Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000           0.000                   Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
         Name: N2/4-S-2          From Node: N2-4              Length(ft): 18.00
        Group: BASE                To Node: S-2                    Count: 1
                                                       Friction Equation: Average Conveyance
              UPSTREAM         DOWNSTREAM             Solution Algorithm: Automatic
     Geometry: Circular        Circular                             Flow: Both
     Span(in): 24.00           24.00                  Entrance Loss Coef: 0.50
     Rise(in): 24.00           24.00                      Exit Loss Coef: 1.00
   Invert(ft): 119.000         115.000                    Bend Loss Coef: 0.00
  Manning's N: 0.012000        0.012000                 Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000           0.000                     Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000           0.000                   Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:

Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
        Name: N3/2-S-3            From Node: N3-2              Length(ft): 67.00
       Group: BASE                  To Node: S-3                    Count: 1
                                                         Friction Equation: Average Conveyance
              UPSTREAM       DOWNSTREAM                 Solution Algorithm: Automatic
    Geometry: Circular       Circular                                 Flow: Both
    Span(in): 18.00          18.00                      Entrance Loss Coef: 0.50
    Rise(in): 18.00          18.00                          Exit Loss Coef: 1.00
  Invert(ft): 123.000        115.000                        Bend Loss Coef: 0.00
 Manning's N: 0.012000       0.012000                    Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000          0.000                        Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000          0.000                       Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
        Name: N4/1-3              From Node: N4-1              Length(ft): 136.00
       Group: BASE                  To Node: N4-3                   Count: 1
                                                         Friction Equation: Average Conveyance
              UPSTREAM       DOWNSTREAM                 Solution Algorithm: Automatic
    Geometry: Circular       Circular                                 Flow: Both
    Span(in): 18.00          18.00                      Entrance Loss Coef: 0.50
    Rise(in): 18.00          18.00                          Exit Loss Coef: 1.00
  Invert(ft): 179.100        139.000                        Bend Loss Coef: 0.00
 Manning's N: 0.012000       0.012000                    Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000          0.000                        Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000          0.000                       Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
        Name: N4/3-DRA            From Node: N4-3              Length(ft): 106.00
       Group: BASE                  To Node: DRA                    Count: 1
                                                         Friction Equation: Average Conveyance
              UPSTREAM       DOWNSTREAM                 Solution Algorithm: Automatic
    Geometry: Circular       Circular                                 Flow: Both
    Span(in): 24.00          24.00                      Entrance Loss Coef: 0.50
    Rise(in): 24.00          24.00                          Exit Loss Coef: 1.00
  Invert(ft): 139.000        114.000                        Bend Loss Coef: 0.00
 Manning's N: 0.012000       0.012000                    Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000          0.000                        Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000          0.000                       Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
        Name: N6/1-3              From Node: N6-1              Length(ft): 104.00
       Group: BASE                  To Node: N6-3                   Count: 1
                                                         Friction Equation: Average Conveyance
              UPSTREAM       DOWNSTREAM                 Solution Algorithm: Automatic
    Geometry: Circular       Circular                                 Flow: Both
    Span(in): 18.00          18.00                      Entrance Loss Coef: 0.00
```

```
     Rise(in): 18.00            18.00                       Exit Loss Coef: 1.00
   Invert(ft): 179.100          149.000                     Bend Loss Coef: 0.00
  Manning's N: 0.012000         0.012000                  Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000            0.000                      Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000            0.000                    Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
         Name: N6/3-DRA          From Node: N6-3              Length(ft): 139.00
        Group: BASE                To Node: DRA                    Count: 1
                                                       Friction Equation: Average Conveyance
             UPSTREAM           DOWNSTREAM            Solution Algorithm: Automatic
     Geometry: Circular         Circular                            Flow: Both
     Span(in): 24.00            24.00                 Entrance Loss Coef: 0.50
     Rise(in): 24.00            24.00                     Exit Loss Coef: 1.00
   Invert(ft): 149.000          114.000                   Bend Loss Coef: 0.00
  Manning's N: 0.012000         0.012000                Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000            0.000                    Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000            0.000                  Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
         Name: N8-3L             From Node: N8-3L             Length(ft): 19.00
        Group: BASE                To Node: N8-3                   Count: 1
                                                       Friction Equation: Average Conveyance
             UPSTREAM           DOWNSTREAM            Solution Algorithm: Automatic
     Geometry: Circular         Circular                            Flow: Both
     Span(in): 12.00            12.00                 Entrance Loss Coef: 0.50
     Rise(in): 12.00            12.00                     Exit Loss Coef: 0.00
   Invert(ft): 146.500          144.100                   Bend Loss Coef: 0.50
  Manning's N: 0.012000         0.012000                Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000            0.000                    Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000            0.000                  Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
         Name: N8-3R             From Node: N8-3R             Length(ft): 19.00
        Group: BASE                To Node: N8-3                   Count: 1
                                                       Friction Equation: Average Conveyance
             UPSTREAM           DOWNSTREAM            Solution Algorithm: Automatic
     Geometry: Circular         Circular                            Flow: Both
     Span(in): 12.00            12.00                 Entrance Loss Coef: 0.50
     Rise(in): 12.00            12.00                     Exit Loss Coef: 0.00
   Invert(ft): 146.500          144.100                   Bend Loss Coef: 0.50
  Manning's N: 0.012000         0.012000                Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000            0.000                    Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000            0.000                  Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
         Name: N8/2-3              From Node: N8-2              Length(ft): 132.00
        Group: BASE                  To Node: N8-3                   Count: 1
                                                        Friction Equation: Average Conveyance
               UPSTREAM       DOWNSTREAM               Solution Algorithm: Automatic
     Geometry: Circular       Circular                               Flow: Both
     Span(in): 18.00          18.00                    Entrance Loss Coef: 0.50
     Rise(in): 18.00          18.00                        Exit Loss Coef: 0.00
   Invert(ft): 180.000        144.100                      Bend Loss Coef: 0.50
  Manning's N: 0.012000       0.012000                   Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                       Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                     Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
         Name: N8/3-S-8            From Node: N8-3              Length(ft): 107.00
        Group: BASE                  To Node: S-8                    Count: 1
                                                        Friction Equation: Average Conveyance
               UPSTREAM       DOWNSTREAM               Solution Algorithm: Automatic
     Geometry: Circular       Circular                               Flow: Both
     Span(in): 24.00          24.00                    Entrance Loss Coef: 0.00
     Rise(in): 24.00          24.00                        Exit Loss Coef: 1.00
   Invert(ft): 144.100        116.620                      Bend Loss Coef: 0.00
  Manning's N: 0.012000       0.012000                   Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                       Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                     Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
         Name: N9-3L               From Node: N9-3L             Length(ft): 19.00
        Group: BASE                  To Node: N9-3                   Count: 1
                                                        Friction Equation: Average Conveyance
               UPSTREAM       DOWNSTREAM               Solution Algorithm: Automatic
     Geometry: Circular       Circular                               Flow: Both
     Span(in): 12.00          12.00                    Entrance Loss Coef: 0.50
     Rise(in): 12.00          12.00                        Exit Loss Coef: 0.00
   Invert(ft): 181.500        179.100                      Bend Loss Coef: 0.50
  Manning's N: 0.012000       0.012000                   Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                       Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                     Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Headwall

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
         Name: N9-3R               From Node: N9-3R             Length(ft): 19.00
        Group: BASE                  To Node: N9-3                   Count: 1
                                                        Friction Equation: Average Conveyance
               UPSTREAM       DOWNSTREAM               Solution Algorithm: Automatic
     Geometry: Circular       Circular                               Flow: Both
     Span(in): 12.00          12.00                    Entrance Loss Coef: 0.50
     Rise(in): 12.00          12.00                        Exit Loss Coef: 0.00
   Invert(ft): 181.500        179.100                      Bend Loss Coef: 0.50
  Manning's N: 0.012000       0.012000                   Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                       Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                     Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
        Name: N9-4L              From Node: N9-4L            Length(ft): 19.00
       Group: BASE                 To Node: N9-4                  Count: 1
                                                      Friction Equation: Average Conveyance
              UPSTREAM        DOWNSTREAM             Solution Algorithm: Automatic
    Geometry: Circular        Circular                             Flow: Both
    Span(in): 12.00           12.00                  Entrance Loss Coef: 0.50
    Rise(in): 12.00           12.00                      Exit Loss Coef: 0.00
 Invert(ft): 146.500          144.100                    Bend Loss Coef: 0.50
 Manning's N: 0.012000        0.012000                Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000           0.000                    Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000           0.000                   Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
        Name: N9-4R              From Node: N9-4R            Length(ft): 19.00
       Group: BASE                 To Node: N9-4                  Count: 1
                                                      Friction Equation: Average Conveyance
              UPSTREAM        DOWNSTREAM             Solution Algorithm: Automatic
    Geometry: Circular        Circular                             Flow: Both
    Span(in): 12.00           12.00                  Entrance Loss Coef: 0.50
    Rise(in): 12.00           12.00                      Exit Loss Coef: 0.00
 Invert(ft): 146.500          144.100                    Bend Loss Coef: 0.50
 Manning's N: 0.120000        0.012000                Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000           0.000                    Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000           0.000                   Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular CMP: Mitered to slope

Downstream FHWA Inlet Edge Description:
Circular: Beveled ring, 45° bevels

```
        Name: N9/2-3             From Node: N9-2             Length(ft): 55.00
       Group: BASE                 To Node: N9-3                  Count: 1
                                                      Friction Equation: Average Conveyance
              UPSTREAM        DOWNSTREAM             Solution Algorithm: Automatic
    Geometry: Circular        Circular                             Flow: Both
    Span(in): 18.00           18.00                  Entrance Loss Coef: 0.50
    Rise(in): 18.00           18.00                      Exit Loss Coef: 0.00
 Invert(ft): 208.000          179.100                    Bend Loss Coef: 0.50
 Manning's N: 0.012000        0.012000                Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000           0.000                    Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000           0.000                   Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
        Name: N9/3-4             From Node: N9-3             Length(ft): 124.00
       Group: BASE                 To Node: N9-4                  Count: 1
```

```
                                                    Friction Equation: Average Conveyance
               UPSTREAM       DOWNSTREAM           Solution Algorithm: Automatic
     Geometry: Circular       Circular                           Flow: Both
     Span(in): 18.00          18.00                Entrance Loss Coef: 0.00
     Rise(in): 18.00          18.00                    Exit Loss Coef: 0.00
   Invert(ft): 179.100        144.100                  Bend Loss Coef: 0.50
  Manning's N: 0.012000       0.012000              Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                  Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
         Name: N9/4-S-9          From Node: N9-4            Length(ft): 110.00
        Group: BASE                To Node: S-9                  Count: 1
                                                     Friction Equation: Average Conveyance
               UPSTREAM       DOWNSTREAM            Solution Algorithm: Automatic
     Geometry: Circular       Circular                            Flow: Both
     Span(in): 24.00          24.00                 Entrance Loss Coef: 0.00
     Rise(in): 24.00          24.00                     Exit Loss Coef: 1.00
   Invert(ft): 144.100        117.000                   Bend Loss Coef: 0.00
  Manning's N: 0.012000       0.012000               Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                   Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                 Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
         Name: S/2-3             From Node: S-2             Length(ft): 70.00
        Group: BASE                To Node: S-3                  Count: 2
                                                     Friction Equation: Average Conveyance
               UPSTREAM       DOWNSTREAM            Solution Algorithm: Automatic
     Geometry: Circular       Circular                            Flow: Both
     Span(in): 24.00          24.00                 Entrance Loss Coef: 1.00
     Rise(in): 24.00          24.00                     Exit Loss Coef: 0.50
   Invert(ft): 115.000        115.000                   Bend Loss Coef: 0.00
  Manning's N: 0.012000       0.012000               Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                   Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                 Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

```
         Name: S12-S-W1          From Node: S-12            Length(ft): 40.00
        Group: BASE                To Node: S-W1                 Count: 2
                                                     Friction Equation: Average Conveyance
               UPSTREAM       DOWNSTREAM            Solution Algorithm: Automatic
     Geometry: Circular       Circular                            Flow: Both
     Span(in): 24.00          24.00                 Entrance Loss Coef: 1.00
     Rise(in): 24.00          24.00                     Exit Loss Coef: 0.50
   Invert(ft): 117.600        117.500                   Bend Loss Coef: 0.00
  Manning's N: 0.012000       0.012000               Outlet Ctrl Spec: Use dc or tw
 Top Clip(in): 0.000          0.000                   Inlet Ctrl Spec: Use dn
 Bot Clip(in): 0.000          0.000                 Stabilizer Option: None
```

Upstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:
Circular Concrete: Square edge w/ headwall

ATTACHMENT 9

Belen, Joyce

From: Bramlett, Dominique
Sent: Thursday, May 29, 2008 4:52 PM
To: Belen, Joyce
Cc: Banks, John
Subject: FW: Citrus cost estimate

Joyce,
Here is the cost for the pipes and inlets.
Thanks, Dom-

Dominique H. Bramlett, P.E.
SCS ENGINEERS
4041 Park Oaks Blvd, Suite 100
Tampa, FL 33610
Phone: (813) 621-0080
Fax: (813) 623-6757
Email: dbramlett@scsengineers.com
Website: www.scsengineers.com

From: Dan Dietrich [mailto:Dan.Dietrich@ads-pipe.com]
Sent: Thursday, May 29, 2008 4:46 PM
To: Bramlett, Dominique
Subject: RE: Citrus cost estimate

Dominique,

Here's a estimate for the following materials:

4" N-12 WT pipe .90/ft
6" N-12 WT pipe 2.00/ft
8" N-12 WT pipe 3.45/ft
10" N-12 WT pipe 5.20/ft
12" N-12 WT pipe 5.90/ft
15" N-12 WT pipe 7.80/ft
18" N-12 WT pipe 10.90/ft
24" N-12 WT pipe 17.25/ft
30" N-12 WT pipe 25.25/ft

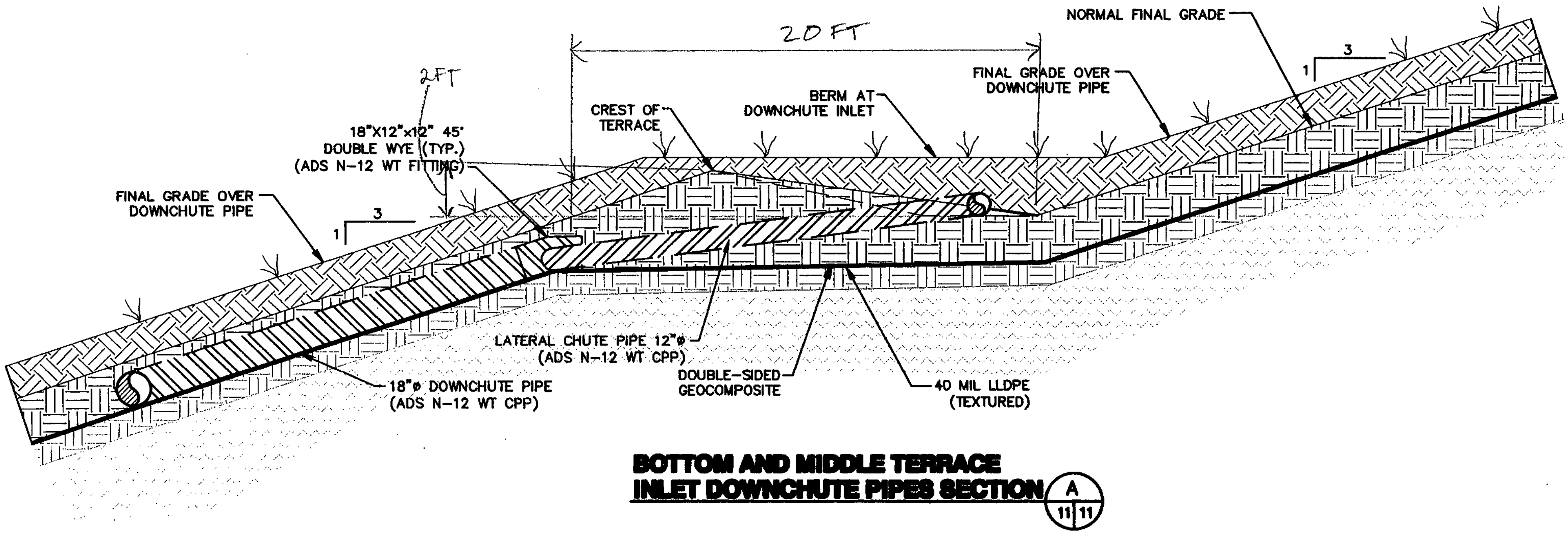
30" Nyloplast Inline Drain 750/ea
30" Nyloplast Drain Basin (Height<5') 1250/ea

Give me a call if you have any further questions. Thanks.

Dan Dietrich, E.I.
Sales Engineer
Advanced Drainage Systems, Inc.
Cell: (813) 569-8082
Fax: (813) 354-3575
www.ads-pipe.com
www.stormtech.com

From: Bramlett, Dominique [mailto:DBramlett@SCSEngineers.com]
Sent: Thursday, May 29, 2008 2:55 PM
To: Dan Dietrich

ATTACHMENT 10



BOTTOM AND MIDDLE TERRACE INLET DOWNCHUTE PIPES SECTION A 11 | 11

ATTACHMENT 11

31 23 23.18 Hauling		Crew	Daily Output	Labor-Hours	Unit	Material	2008 Bare Costs Labor	Equipment	Total	Total Incl O&P
1400	Heavy traffic, add				L.C.Y.				30%	30%
1600	Grading at dump, or embankment if required, by dozer	B-10B	1000	.012			.44	1.07	1.51	1.85
1800	Spotter at fill or cut, if required	1 Clab	8	1	Hr.		30.50		30.50	47
2000	Off highway haulers									
2010	22 C.Y. rear/bottom dump, 1000′ rnd trip, 4.5 loads/hr.	B-34F	645	.012	L.C.Y.		.38	1.69	2.07	2.45
2020	1/2 mile round trip, 4.2 loads/hr.		600	.013			.41	1.81	2.22	2.63
2030	1 mile round trip, 3.9 loads/hr.		555	.014			.44	1.96	2.40	2.84
2040	2 mile round trip, 3.3 loads/hr.		470	.017			.52	2.32	2.84	3.36
2050	34 C.Y. rear or bottom dump, 1000′ round trip, 4 loads/hr.	B-34G	885	.009			.28	1.61	1.89	2.20
2060	1/2 mile round trip, 3.8 loads/hr.		840	.010			.29	1.70	1.99	2.32
2070	1 mile round trip, 3.5 loads/hr.		775	.010			.32	1.84	2.16	2.51
2080	2 mile round trip, 3.0 loads/hr.		665	.012			.37	2.14	2.51	2.93
2090	42 C.Y. rear or bottom bump, 1000′ round trip, 3.8 loads/hr.	B-34H	1040	.008			.24	1.46	1.70	1.96
2100	1/2 mile round trip, 3.6 loads/hr.		980	.008			.25	1.55	1.80	2.09
2110	1 mile round trip, 3.3 loads/hr.		900	.009			.27	1.69	1.96	2.27
2120	2 mile round trip, 2.8 loads/hr.		765	.010			.32	1.98	2.30	2.68
2130	60 C.Y. rear or bottom dump, 1000′ round trip, 3.6 loads/hr.	B-34J	1400	.006			.17	1.40	1.57	1.81
2140	1/2 mile round trip, 3.4 loads/hr.		1325	.006			.18	1.48	1.66	1.93
2150	1 mile round trip, 3.1 loads/hr.		1200	.007			.20	1.63	1.83	2.11
2160	2 mile round trip, 2.6 loads/hr.		1015	.008			.24	1.93	2.17	2.49
3000	Rough terrain or steep grades, add to above								100%	
4500	Dust control, light	B-59	1	8	Day		245	400	645	820
4501	Heavy	"	.50	16			490	805	1,295	1,650
4600	Haul road maintenance	B-86A	1	8			320	535	855	1,075
4700	Highway hauling beyond 20 miles, per loaded mile, minimum				Mile				1.32	1.45
4750	Maximum				"				2.40	2.64

31 23 23.19 Backfill, Airport Subgrade		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	**BACKFILL, AIRPORT SUBGRADE**									
0100	Backfill, dozer, sand & gravel, 12″ depth ,300′ haul, no compaction	B-10M	4500	.003	S.Y.		.10	.31	.41	.49
0200	13″ depth		4155	.003			.11	.33	.44	.53
0300	14″ depth		3860	.003			.11	.36	.47	.57
0400	15″ depth		3600	.003			.12	.39	.51	.61
0500	16″ depth		3375	.004			.13	.41	.54	.65
0600	17″ depth		3175	.004			.14	.44	.58	.69
0700	18″ depth		3000	.004			.15	.46	.61	.73
0800	19″ depth		2845	.004			.15	.49	.64	.78
0900	20″ depth		2700	.004			.16	.51	.67	.81
1100	22″ depth		2455	.005			.18	.57	.75	.89
1200	23″ depth		2350	.005			.19	.59	.78	.93
1300	24″ depth		2250	.005			.20	.62	.82	.98
1400	26″ depth		2075	.006			.21	.67	.88	1.06
1500	28″ depth		1930	.006			.23	.72	.95	1.14
1600	30″ depth		1800	.007			.24	.77	1.01	1.22
1700	32″ depth		1690	.007			.26	.82	1.08	1.30
1800	34″ depth		1590	.008			.28	.87	1.15	1.38
1900	36″ depth		1500	.008			.29	.93	1.22	1.47
2000	38″ depth		1420	.008			.31	.98	1.29	1.55
2100	40″ depth		1350	.009			.33	1.03	1.36	1.63
2200	42″ depth		1285	.009			.34	1.08	1.42	1.71
2300	44″ depth		1230	.010			.36	1.13	1.49	1.78
2400	46″ depth		1175	.010			.37	1.18	1.55	1.87
2500	48″ depth		1125	.011			.39	1.23	1.62	1.95

ATTACHMENT 12

Florida Department of Transportation
Item Average Unit Cost
From 2007/01/01 to 2007/12/31

Contract Type: ('CC') STATEWIDE
Displaying: VALID ITEMS WITH HITS
From: 0100 To: 1999999999

Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
0430200 40	1	$4,000.00	$12,000.00	3.000	EA	N	FLARED END SECTION, CONCRETE, 42"
0430200 42	2	$5,750.00	$17,250.00	3.000	EA	N	FLARED END SECTION, CONCRETE, 54"
0430600025	1	$4,564.37	$18,257.48	4.000	EA	N	U-ENDWALL, STD 260, 1:6 SLP, 18"
0430600125	1	$4,216.38	$4,216.38	1.000	EA	N	U-ENDWALL, STD 260, 1:4 SLP, 18"
0430602125	2	$3,665.38	$10,996.14	3.000	EA	N	U-ENDWALL,W \GRATE,STD 260,1:4 SLP,18"
0430602129	1	$4,700.00	$14,100.00	3.000	EA	N	U-ENDWALL,W \GRATE,STD 260,1:4 SLP,24"
0430610125	2	$1,471.90	$35,325.54	24.000	EA	N	U-ENDWALL,STD 261,1:4 SLP, 18"
0430610129	1	$1,399.78	$15,397.58	11.000	EA	N	U-ENDWALL,STD 261,1:4 SLP, 24"
0430610133	1	$1,507.45	$3,014.90	2.000	EA	N	U-ENDWALL,STD 261,1:4 SLP, 30"
0430610323	1	$1,000.00	$2,000.00	2.000	EA	N	U-ENDWALL,STD 261,1:2 SLP, 15"
0430611025	2	$3,030.53	$12,122.12	4.000	EA	N	U-ENDWALL,STD 261,BAFFLES,1:6 SLP, 18"
0430611125	5	$2,016.70	$78,651.31	39.000	EA	N	U-ENDWALL, BAFFLES,STD 261,1:4 SLP, 18"
0430611129	1	$2,800.00	$8,400.00	3.000	EA	N	U-ENDWALL, BAFFLES,STD 261,1:4 SLP, 24"
0430611133	1	$3,800.00	$3,800.00	1.000	EA	N	U-ENDWALL /BAFFLES,STD 261, 1:4 SLP,30"
0430611225	5	$4,376.26	$30,633.85	7.000	EA	N	U-ENDWALL, BAFFLES, STD 261,1:3 SLP,18"
0430611323	2	$2,000.00	$6,000.00	3.000	EA	N	U-ENDWALL, BAFFLES, STD 261,1:2 SLP,15"
0430611325	7	$2,467.42	$118,435.94	48.000	EA	N	U-ENDWALL, BAFFLES, STD 261,1:2 SLP,18"
0430611329	3	$3,280.00	$22,960.00	7.000	EA	N	U-ENDWALL, BAFFLES,STD 261,1:2 SLP,24"
0430611333	1	$2,128.26	$2,128.26	1.000	EA	N	U-ENDWALL, BAFFLES,STD 261,1:2 SLP,30"
0430612025	2	$3,838.33	$103,634.84	27.000	EA	N	U-ENDWALL, GRATE, STD 261,1:6 SLP,18"
0430612029	1	$5,349.09	$10,698.18	2.000	EA	N	U-ENDWALL, GRATE, STD 261,1:6 SLP,24"
0430612033	1	$4,500.00	$4,500.00	1.000	EA	N	U-ENDWALL, GRATE, STD 261,1:6 SLP, 30"
0430613025	1	$4,921.16	$4,921.16	1.000	EA	N	U-ENDWALL,BAF& GRATE,STD 261,1:6 SLP,18"
0430613029	1	$3,107.50	$3,107.50	1.000	EA	N	U-ENDWALL,BAF& GRATE,STD 261,1:6 SLP,24"
0430613125	1	$4,921.16	$4,921.16	1.000	EA	N	U-ENDWALL,BAF& GRATE,STD 261,1:4 SLP,18"
0430613133	2	$3,585.00	$14,340.00	4.000	EA	N	U-ENDWALL,BAF& GRATE,STD 261,1:4 SLP,30"
0430613225	1	$2,500.00	$2,500.00	1.000	EA	N	U-ENDWALL,BAF& GRATE,STD 261,1:3 SLP,18"
0430613233	1	$3,938.00	$3,938.00	1.000	EA	N	U-ENDWALL,BAF& GRATE,STD 261,1:3 SLP,30"
0430721425	2	$69.43	$90,741.65	1,307.000	LF	N	PI SLOT OR PERF CULV, OPTIONAL, 18" SS
0430721429	2	$74.97	$392,856.00	5,240.000	LF	N	PI SLOT OR PERF CULV, OPTIONAL, 24" SS
0430721433	1	$85.00	$222,870.00	2,622.000	LF	N	PI SLOT OR PERF CULV, OPTIONAL, 30" SS
0430721438	1	$93.00	$123,690.00	1,330.000	LF	N	PI SLOT OR PERF CULV, OPTIONAL, 36" SS
0430821 33	1	$535.00	$3,210.00	6.000	EA	N	CLEANING & SEALING EXIST PIPE JNT,30" SS
0430821 44	1	$2,500.00	$32,500.00	13.000	EA	N	CLEANING & SEALING EXIST PIPE JNT,66",SS
0430830	14	$280.74	$200,027.07	712.500	CY	N	PIPE FILLING AND PLUGGING

Attachment - 13

Bramlett, Dominique

From: Dan Dietrich [Dan.Dietrich@ads-pipe.com]
Sent: Thursday, May 29, 2008 4:46 PM
To: Bramlett, Dominique
Subject: RE: Citrus cost estimate

Dominique,

Here's a estimate for the following materials:

4" N-12 WT pipe .90/ft
6" N-12 WT pipe 2.00/ft
8" N-12 WT pipe 3.45/ft
10" N-12 WT pipe 5.20/ft
12" N-12 WT pipe 5.90/ft
15" N-12 WT pipe 7.80/ft
18" N-12 WT pipe 10.90/ft
24" N-12 WT pipe 17.25/ft
30" N-12 WT pipe 25.25/ft

30" Nyloplast Inline Drain 750/ea
30" Nyloplast Drain Basin (Height<5') 1250/ea

Give me a call if you have any further questions. Thanks.

Dan Dietrich, E.I.
Sales Engineer
Advanced Drainage Systems, Inc.
Cell: (813) 569-8082
Fax: (813) 354-3575
www.ads-pipe.com
www.stormtech.com

From: Bramlett, Dominique [mailto:DBramlett@SCSEngineers.com]
Sent: Thursday, May 29, 2008 2:55 PM
To: Dan Dietrich
Cc: Belen, Joyce
Subject: Citrus cost estimate

Dan,
Please provide me cost estimates for ADS pipe (4-inch through 30-inch) and 30-inch diameter inlets (3ft in depth and 4ft in depth).
Thanks, Dominique

Dominique H. Bramlett, P.E.
SCS ENGINEERS
4041 Park Oaks Blvd, Suite 100
Tampa, FL 33610
Phone: (813) 621-0080
Fax: (813) 623-6757
Email: dbramlett@scsengineers.com
Website: www.scsengineers.com

ATTACHMENT 14 1/2

SCS ENGINEERS FEE SCHEDULE

(Effective July 1, 2008 through June 30, 2009)

	Rate/Hour ($)
Principal/Office Director	195
Project Director	185
Senior Project Advisor	145
Senior Project Manager	145
Project Manager	135
Senior Project Professional	112
Senior Superintendent	110
Project Professional	92
Designer	98
O&M Superintendent	95
Staff Professional	85
Senior Technician 2	85
Senior Technician 1	65
Associate Staff Professional	72
Draftsperson	70
Technician	60
Office Services Manager	75
Secretarial/Clerical	54

1. The hourly rates are effective through June 30, 2009. Work performed thereafter is subject to a new Fee Schedule issued for the period beginning July 1, 2009.

2. The above rates include salary, overhead, administration, and profit. Other direct expenses, such as analyses of air, water and soil samples, reproduction, travel, subsistence, subcontractors, computers, and other reimbursable fees, are billed in accordance with the attached reimbursables fee schedule or cost, plus 15 percent for administration.

3. For special situations, such as expert court testimony, hourly rates for principals of the firm will be on an individually-negotiated basis.

ATTACHMENT 14 2/2

SCS ENGINEERS
REIMBURSABLES FEE SCHEDULE
(Effective July 1, 2008 through June 30, 2009)

ADMINISTRATION/MILEAGE	**Unit Cost ($)**	**Unit**
Reimbursable		
Vehicle Mileage	0.585	mile
Truck Usage	$70	day
Faxes	5	1st Page
	1	each additional page
Reproduction (Xerox)	0.10	each
Reproduction (Color Copies)	1.25	each
CAD Usage	20	hour

EQUIPMENT/FIELD SUPPLIES	**Rate ($)**	**Unit**
Sampling Trailer, Field Equipped	200	Day

Field-equipped sampling trailer includes equipment and supplies for soil and groundwater sampling, decontamination, health and safety, logs, packing and shipping, and miscellaneous uses.

Pontoon Boat	400	Day
Calibration:		
Conductivity Standards *	1	Ounce
Isobutylene *	1	Liter
Methane in Air OVA Calibration Gas *	1	Liter
Pentane in Air *	1	Liter
pH Buffer Solutions (4,7,10) *	1	Ounce
Decontamination Equipment:		
Brushes *	5	Day
Distilled/Deionized Water *	1	Gallon
Isopropyl Alcohol *	1	Ounce
Liquinox Soap Concentrate *	1	Ounce
Plastic Buckets *	5	Day
Poly Sheeting *	1	Square Foot

ATTACHMENT 15

02 21 Surveys

02 21 13 – Site Surveys

02 21 13.09 Topographical Surveys		Crew	Daily Output	Labor-Hours	Unit	Material	2008 Bare Costs Labor	Equipment	Total	Total Incl O&P
0010	TOPOGRAPHICAL SURVEYS									
0020	Topographical surveying, conventional, minimum	A-7	3.30	7.273	Acre	17	305	21	343	505
0100	Maximum	A-8	.60	53.333	"	52	2,175	115	2,342	3,500

02 21 13.13 Boundary and Survey Markers		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	BOUNDARY AND SURVEY MARKERS									
0300	Lot location and lines, large quantities, minimum	A-7	2	12	Acre	30	500	34.50	564.50	840
0320	Average	"	1.25	19.200		48	800	55	903	1,350
0400	Small quantities, maximum	A-8	1	32	↓	64	1,300	69	1,433	2,150
0600	Monuments, 3′ long	A-7	10	2.400	Ea.	30	100	6.90	136.90	195
0800	Property lines, perimeter, cleared land	"	1000	.024	L.F.	.03	1	.07	1.10	1.65

02 21 13.16 Aerial Surveys		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	AERIAL SURVEYS									
1500	Aerial surveying, including ground control, minimum fee, 10 acres				Total					5,700
1510	100 acres									9,500
1550	From existing photography, deduct				↓					1,370
1600	2′ contours, 10 acres				Acre					460
1650	20 acres									315
1800	50 acres									95
1850	100 acres				↓					85
2150	For 1′ contours and									
2160	dense urban areas, add to above				Acre					40%
3000	Inertial guidance system for									
3010	locating coordinates, rent per day				Ea.					4,000

02 32 Geotechnical Investigations

02 32 13 – Subsurface Drilling and Sampling

02 32 13.10 Boring and Exploratory Drilling		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	BORING AND EXPLORATORY DRILLING									
0020	Borings, initial field stake out & determination of elevations	A-6	1	16	Day		615	69	684	1,025
0100	Drawings showing boring details				Total		233.10		233.10	340.20
0200	Report and recommendations from P.E.						525		525	766.50
0300	Mobilization and demobilization, minimum	B-55	4	6	↓		180	231	411	535
0350	For over 100 miles, per added mile		450	.053	Mile		1.60	2.06	3.66	4.74
0600	Auger holes in earth, no samples, 2-1/2″ diameter		78.60	.305	L.F.		9.15	11.80	20.95	27
0650	4″ diameter		67.50	.356			10.65	13.70	24.35	31.50
0800	Cased borings in earth, with samples, 2-1/2″ diameter		55.50	.432		17.40	12.95	16.70	47.05	57.50
0850	4″ diameter	↓	32.60	.736		27.50	22	28.50	78	95.50
1000	Drilling in rock, "BX" core, no sampling	B-56	34.90	.458			15.60	37	52.60	64.50
1050	With casing & sampling		31.70	.505		17.40	17.15	41	75.55	90.50
1200	"NX" core, no sampling		25.92	.617			21	50	71	87
1250	With casing and sampling	↓	25	.640	↓	21	22	51.50	94.50	114
1400	Borings, earth, drill rig and crew with truck mounted auger	B-55	1	24	Day		720	925	1,645	2,150
1450	Rock using crawler type drill	B-56	1	16	"		545	1,300	1,845	2,250
1500	For inner city borings add, minimum									10%
1510	Maximum									20%

02 32 19 – Exploratory Excavations

02 32 19.10 Test Pits		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	TEST PITS									
0020	Hand digging, light soil	1 Clab	4.50	1.778	C.Y.		54		54	83.50
0100	Heavy soil	"	2.50	3.200	↓		97		97	151

LAURA

Enterprise Rates
ATTACHMENT 16

FLORIDA CUSTOMER RATES SIS081A/C1

Cust# G90097 SCS ENGINEERS** GRBR: 4209 Default Type:
Billing Type: RATES

	Car Class	Rate Amount	Rate Type Description	Unlimited Miles	Free Miles	Excess Mileage Charge
mpact	CCAR	32.99	Daily	Y		
	CCAR	181.99	Weekly	Y		
	CCAR	719.99	Monthly	N	2500	20
	ICAR	35.99	Daily	Y		
t/	ICAR	198.99	Weekly	Y		
	ICAR	775.99	Monthly	N	2500	20
ndard	SCAR	38.99	Daily	Y		
	SCAR	214.99	Weekly	Y		
	SCAR	839.99	Monthly	N	2500	20
vertible	STAR	56.99	Daily	N	150	20

\+

large SUV 75.99 daily

F3=Exit F4=Prompt F6=Prompt/Address F12=Previous F21=Billing Contact
F22=Business Contact

only standard size and
bigger have cruise control

ATTACHMENT 17

HD HUSS Drilling

Client:SCS Engineers
Attn:Joyce Belen
Date:7/24/08
Fax / Email: (813)623-6757
Quote Page 1 of 1
Cost Estimate for drilling:Citrus County Landfill-Lecanto
HDI #0835-08

				EST /UNIT	PRICE	TOTAL
MOBILIZATION/DEMOBILIZATION				Lecanto		$ 600.00
MONITORING PROBE (Includes: Screen, Riser, Seal & Grout)						
	Diameter 1" **(1x80')**			80.0 /ft	20.00 /ft	$ 1,600.00
STANDARD PENETRATION TESTING						
SPT	5' Interval	0 - 50'	**(NONE)**	0.0 /ft	10.00 /ft	$ -
		50' - 100'	**(NONE)**	0.0 /ft	14.00 /ft	$ -
SPT	Continuous	0 - 50'	**(NONE)**	0.0 /ft	16.00 /ft	$ -
		50 - 100'	**(NONE)**	0.0 /ft	20.00 /ft	$ -
AUGER BORINGS (S.Stem 3")				0.0 /ft	8.00 /ft	$ -
SURFACE CASING (6" PVC)				0.0 /ft	35.00 /ft	$ -
WELL COMPLETION OPTIONS						
12" Manhole Cover w/4" Concrete Square Pad				0.0 /ea	150.00 /ea	$ -
8" Manhole Cover w/4" Concrete Square Pad				0.0 /ea	125.00 /ea	$ -
4" PVC Concrete Filled Bollards				4.0 /ea	75.00 /ea	$ 300.00
6" Square Protective Casing w/Square Pad				1.0 /ea	250.00 /ea	$ 250.00
1" Seals				1.0 /ea	25.00 /ea	$ 25.00
ADDITIONAL ITEMS						
Drilling by the Hour				0.0 /hr	225.00 /hr	$ -
Well Development Moyno-Rig pump or Sub.			**(ESTIMATE)**	0.0 /hr.	175.00 /hr.	$ -
Steam Decontamination			**(ESTIMATE)**	0.0 /hr.	175.00 /hr.	$ -
Jack Hammer Rental				0.0 /dy	115.00 /dy	$ -
Stand By Time				0.0 /hr.	175.00 /hr.	$ -
Site Clean Up/Drumming Cuttings			**(ESTIMATE)**	0.0 /hr.	175.00 /hr.	$ -
Concrete/Asphalt Cutting & Removal				0.0 /hr.	175.00 /hr.	$ -
Drums (DOT 17H)			**(ESTIMATE)**	0.0 /ea.	50.00 /ea.	$ -
Hotel & Per Diem (3 man crew)				0.0 /dy	300.00 /dy	$ -
Permits **(S.W.F.W.M.D)**				0.0 /ea	75.00 /ea	$ -
				Total Estimate		$ 2,775.00

*This bid is an estimate only and the invoice will reflect the actual work performed.

File Name: Bid-Short2.xls

ATTACHMENT 18

Belen, Joyce

From: Bramlett, Dominique
Sent: Friday, July 25, 2008 4:26 PM
To: Belen, Joyce
Subject: FW: leachate costs

-----Original Message-----
From: Susan Metcalfe [mailto:Susan.Metcalfe@bocc.citrus.fl.us]
Sent: Friday, July 25, 2008 3:20 PM
To: Bramlett, Dominique
Subject: RE: leachate costs

Dominique
Site Specific Costs - FDEP form item 13
Waste Tire Facility
This is to clean out the storage area one time. Maximum storage = 115 tons. Current bid price (Wheelabrator 07/08) $85/ton . Line item total $9775.

Leachate Disposal 1 year.
I don't have the leachate generation numbers for after closure, but the rates I gave you yesterday are correct. 12 x $698.50 (CC Utilities monthly base rate charge) + hauling x gallons at $0.05 per gallon (Clean Harbors 7/07 bid price good for 3 years) + disposal x gallons at $0.0072 per gallon.

Leachate collection/treatment system maintenance - FDEP form item 5 I don't remember why we had an additional amount for disposal here. Please do the math as described above and maybe we will find that they wanted the transport in item 13 and disposal in item 5.

Site Specific Costs - FDEP form item 16
Ground Water Remediation - as I recall we decided not to include the costs of well construction, initial sampling and Site Assessment Report prep here. This was the amount to add for routine monitoring costs for 2 more wells to the existing number of wells. Do we have the current correct # (14 wells that require sampling) in the form Section VI Item 1? If so, I would leave the +2 here in remediation at a unit cost of (JEA is calculating this and will have it by early next week). I'm sure that the unit cost in the last form is NOT correct.

(That unit cost should be applied in Section VI Item 1 to be consistent)

Susie

ATTACHMENT 19

Schedule of Values
JOB # 12207037.00
Orange County - Class III, Cell I

Work Completed to Date

DRAFT as of 5/1/08

	A	B	C	D	E	F	G	H	I
ITEM #	BID ITEM	UNITS	BID QUANTITY	UNIT COST	ORIGINAL CONTRACT AMOUNT	QUANTITY THIS MONTH	TOTAL THIS MONTH	QUANTITY TO DATE	TOTAL TO DATE
001a	Mobilization	ls	1	$20,000.00	$20,000.00	0.00	$0.00	0.00	$0.00
001b	Demobilization	ls	1	$10,000.00	$10,000.00	0	$0.00	0.00	$0.00
2	Indemnification	ls	1	$100.00	$100.00	0	$0.00	0.00	$0.00
3	Project Survey	ls	1	$14,500.00	$14,500.00	0	$0.00	0.00	$0.00
004a	36" Bore w/6" PVC Casing	lf	2,250	$96.50	$217,125.00	0	$0.00	0.00	$0.00
004b	Boring Refusal	lf	215	$65.00	$13,975.00	0	$0.00	0.00	$0.00
004c	Hourly Drilling Rate	Hour	40	$750.00	$30,000.00	0	$0.00	0.00	$0.00
004d	Drilling Standby Time	Hour	40	$625.00	$25,000.00	0	$0.00	0.00	$0.00
004e	Gas Extraction Well Wellhead	ea	43	$1,150.00	$49,450.00	0	$0.00	0.00	$0.00
005a	4" HDPE SDR 17 Pipe	lf	4,400	$17.00	$74,800.00	0	$0.00	0.00	$0.00
005b	6" HDPE SDR 17 Pipe	lf	1,130	$21.00	$23,730.00	0	$0.00	0.00	$0.00
005c	8" HDPE SDR 17 Pipe	lf	2,750	$26.00	$71,500.00	0	$0.00	0.00	$0.00
005d	2" HDPE Airline, SDR 11, Pipe	lf	1,200	$2.00	$2,400.00	0	$0.00	0.00	$0.00
005e	2" HDPE Forcemain, SDR 11 Pipe	lf	500	$2.00	$1,000.00	0	$0.00	0.00	$0.00
006a	8" Flange	ea	1	$1,300.00	$1,300.00	0	$0.00	0.00	$0.00
006a	10" Flange	ea	1	$1,450.00	$1,450.00	0	$0.00	0.00	$0.00
006b	Cut-in to Existing - 2" Header	ea	1	$1,270.00	$1,270.00	0	$0.00	0.00	$0.00
006b	Cut-in to Existing - 4" Header	ea	2	$1,300.00	$2,600.00	0	$0.00	0.00	$0.00
006b	Cut-in to Existing - 6" Header	ea	7	$1,500.00	$10,500.00	0	$0.00	0.00	$0.00
006b	Cut-in to Existing - 8" Header	ea	9	$1,650.00	$14,850.00	0	$0.00	0.00	$0.00
006c	6" Valve	ea	1	$1,900.00	$1,900.00	0	$0.00	0.00	$0.00
006c	8" Valve	ea	1	$2,500.00	$2,500.00	0	$0.00	0.00	$0.00
006d	CMP Road Casing	lf	190	$65.00	$12,350.00	0	$0.00	0.00	$0.00
006e	12" Condensate Trap	ea	1	$10,500.00	$10,500.00	0	$0.00	0.00	$0.00
006f	Discharge Tie-in - 4"	ea	3	$3,800.00	$11,400.00	0	$0.00	0.00	$0.00
006g	Abandonment Cut & Cap	ea	3	$1,200.00	$3,600.00	0	$0.00	0.00	$0.00
7	Project Record Documentation	ls	1	$3,700.00	$3,700.00	0	$0.00	0.00	$0.00
8	Seeding and Mulching	ls	1	$13,500.00	$13,500.00	0.00	$0.00	0.00	$0.00
	Totals				$645,000.00		$0.00		$0.00

SCS ENGINEERS

SHEET 1 OF 15

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02
SUBJECT FINANCIAL ASSURANCE	BY JPB	DATE 7-29-08
LONG-TERM CARE COST	CHECKED DHB	DATE 7/29/08

OBJECTIVE: TO ESTIMATE THE LONG-TERM CARE COST FOR CITRUS COUNTY CENTRAL LANDFILL PHASE 3.

REFERENCES:

- TASK AUTHORIZATION EIGHT TO MASTER AGREEMENT (APRIL 26, 2005)
- PRICE QUOTE FROM TEST AMERICA
- PERMIT FROM THE FDEP
- PLAN SHOWING EXISTING & PROPOSED LANDFILL GAS MONITORING PROBES.
- SCS ENGINEERS FEE SCHEDULE
- GOOGLE MAP
- MAPQUEST
- 2008 RS MEANS
- ENTERPRISE RENTAL CAR RATE SHEET
- JONES EDMUNDS & ASSOCIATES MONITOR WELL COMPLETION REPORT
- E-MAIL BY BOB TREXLER (GEO-SYNTHETICS, INC.)
- E-MAIL BY DAN DIETRICH, EI (ADVANCED DRAINAGE SYSTEMS, INC.)
- FDOT ITEM AVERAGE UNIT COST
- QUOTE BY RALPH CALISTRI (FLORIDA JETCLEAN)
- QUOTES BY HUSS DRILLING
- E-MAIL FROM SUSIE METCALFE (CITRUS COUNTY)

SCS ENGINEERS

SHEET 2 OF 15

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL	JOB NO. 09207049.02
SUBJECT FINANCIAL ASSURANCE	BY JPB	DATE 8/4/08
LONG-TERM CARE COST	CHECKED	DATE

(1) GROUNDWATER MONITORING

TOTAL NUMBER OF GROUNDWATER MONITORING WELLS = 14
(SEE ATTACHMENT 1, PAGE 1 OF 4)

UNIT COST: (SEE ATTACHMENT 1, PAGE 4 OF 4)
QUARTERLY LEACHATE EFFLUENT: \$4,500 PER EVENT
\$4,500/14 = \$321.43 /EVENT/WELL

SEMI-ANNUAL LEACHATE EFFLUENT:
\$17,685 - \$4,500 = \$13,185 PER EVENT
\$13,185/14 = \$941.79 /EVENT/WELL

ANNUAL LEACHATE EFFLUENT:
\$23,605 - \$4,500 - \$13,185 = \$5,920 PER EVENT
\$5,920/14 = \$422.86 /EVENT/WELL

TOTAL COST: 4 × 14 × \$321.43 = \$18,000
2 × 14 × \$941.79 = \$26,370
1 × 14 × \$422.86 = \$5,920

\$50,290

(2) SURFACE WATER MONITORING
- NO LONG-TERM CARE COSTS ANTICIPATED FOR SURFACE WATER MONITORING

(3) GAS MONITORING
QUARTERLY MONITORING: TOTAL NUMBER OF GAS PROBES FOR MONITORING = 18 (SEE ATTACHMENT 3)

UNIT COST:
ASSUME 8 HR DAY FOR GAS PROBE MONITORING
(3 HR DRIVE + MONITORING TIME)

$\frac{8\ HR}{DAY} \times \frac{\$77}{HR}$ (SEE ATTACHMENT 4) = \$616.00

SCS ENGINEERS

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02
SUBJECT FINANCIAL ASSURANCE	BY VPB	DATE 8-4-08
LONG-TERM CARE COST	CHECKED	DATE

2 HOURS STAFF TO DO REPORT AND 1 HOUR INTERNAL REVIEW BY UPPER MANAGEMENT: (SEE ATTACHMENT 4)

$\frac{\$54}{HR} \times 2\ HRS = \$108$

$\frac{\$145}{HR} \times 1\ HR = \$145$

VEHICLE MILEAGE:

152.8 MILES (TO SITE & RETURN) (SEE ATTACHMENT 5) + 20 MILES (DRIVE ON SITE) = 172.8 MILES

(SEE ATTACHMENT 4)

COST FOR MILEAGE = 172.8 MILES × \$0.585/MILE = \$101.09

CAR RENTAL: \$39.00/DAY (SEE ATTACHMENT 8)

TOTAL: \$616.00 + \$108 + \$145 + \$101.09 + \$39.00 = \$1,009.09

UNIT COST/PROBE/EVENT = \$1,009.09/18 = \$56.06

TOTAL COST: $\frac{\$56.06}{\text{PROBE EVENT}}$ × 18 PROBES × 4 SAMPLING EVENTS PER YEAR

= $\boxed{\$4,036.00}$

4. LEACHATE MONITORING

ANNUAL LEACHATE MONITORING

- AS PER 62-701.510(6)(c), ROUTINE LEACHATE SAMPLING SHOULD BE DONE ON AN ANNUAL BASIS.

ASSUME IT WOULD TAKE 4 HOURS TO PERFORM TESTING
2 HOURS (DRIVE BACK & FORTH) + 2 HOURS TO TEST

COST TO TEST 1 WELL FOR LEACHATE INFLUENT: \$616.00
(SEE ATTACHMENT 2 FOR PRICE QUOTE FROM TEST AMERICA)

SCS ENGINEERS

SHEET 4 OF 15

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02	
SUBJECT FINANCIAL ASSURANCE		BY JPB	DATE 7-24-08
LONG-TERM CARE COST		CHECKED DHS	DATE 7/29/08

COST FOR ADDITIONAL CHARGES:

COMPOSTING FEE FOR LEACHATE: $25.00

EQUIPMENT: $50.00 (DAILY)

SERVICES - SAMPLING
$75.00/HOUR × 4 HOURS = $300.00

TRAVEL: $0.50/MILE
TOTAL MILES PER TRIP: 73.39 MILES (SEE ATTACHMENT 6)
TOTAL TRAVEL COST (BACK & FORTH):
$0.50/MILE × 73.39 × 2 = $73.39

TOTAL COST FOR ADDITIONAL SERVICES:
$25.00 + $50.00 + $300.00 + $73.39 = $448.39

COST FOR ANNUAL LEACHATE SAMPLING
$616.00 + $448.39 = $\boxed{\$1,064}$

5. LEACHATE COLLECTION/TREATMENT SYSTEMS MAINTENANCE

MAINTENANCE: 1,300 FEET 8" COLLECTION PIPES
500 FEET 24" HDPE RISERS
4 TANKS

QUOTE FROM RALPH CALISTRI OF FLORIDA JETCLEAN (SEE ATTACHMENT 15) SHOWS A TOTAL COST OF $9,900.00 TO CLEAN AND VIDEO-TAPE 1,300 FEET OF 8" COLLECTION PIPES AND 500 FEET OF 24" HDPE RISERS. FOR CALCULATION PURPOSES, THE TOTAL COST IS DIVIDED BY THE TOTAL LENGTH OF BOTH THE COLLECTION PIPES AND HDPE RISERS (WHICH ARE COUNTED AS "LIFT STATIONS").

SCS ENGINEERS

SHEET 5 OF 15

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02
SUBJECT FINANCIAL ASSURANCE	BY JPB	DATE 7-24-08
LONG-TERM CARE COST	CHECKED DHB	DATE 7/29/08

TOTAL COST OF HIGH PRESSURE WATER-JETTING AND EXPLOSION-PROOF VIDEO INSPECTION OF ROUGHLY 1,800 FT NEW 8" & 24" LEACHATE COLLECTION PIPING: $9,900.00

$\frac{\$9,900}{1,800\text{ FT}} = \$5.50/\text{FT}$ (ATTACHMENT 15)

COLLECTION PIPES

TOTAL LENGTH OF 8" COLLECTION PIPES = 1,300 FT

UNIT COST: $5.50/FT

TOTAL COST: 1,300 FT × $5.50/FT = $\boxed{\$7,150}$

LIFT STATIONS

TOTAL LENGTH OF 24" HDPE RISERS = 500 FT

UNIT COST: $5.50/FT

TOTAL COST: 500 FT × $5.50/FT = $\boxed{\$2,750}$

(Ph. I & IA: 4, Ph. 2: 3, Ph. 3: 3)

NUMBER OF RISERS = 10 UNIT COST: $2,750/10 = $\boxed{\$275}$

TANKS (INCLUDES PUMP STATIONS)

NUMBER OF TANKS: 4

COST TO CLEAN TANKS: $\boxed{\$2,500}$

UNIT COST PER TANK: $2,500/4 = $625

ON-SITE IMPOUNDMENT

MONTHLY BASE RATE: $698.50 (SEE ATTACHMENT 19)

TOTAL ANNUAL COST: 12 × $698.50 = $8,382

LEACHATE QUANTITY: 247,000

UNIT COST PER 1,000 GALLONS = $8,382/247 = $33.94

TOTAL COST: $\boxed{\$8,383}$

SCS ENGINEERS

CLIENT: CITRUS COUNTY	PROJECT: CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02
SUBJECT: FINANCIAL ASSURANCE	BY: JPB	DATE: 7-24-08
LONG-TERM CARE COST	CHECKED: DHB	DATE: 7/29/08

6. LEACHATE COLLECTION / TREATMENT SYSTEMS ADMINISTRATIVE:

OPERATIONS SUPERVISOR

ASSUME 1 DAY/MONTH FOR PREPARING MONTHLY PROGRESS REPORTS FOR OPERATIONS SUPERVISOR.

$$\frac{1 \text{ DAY}}{\text{MONTH}} \times \frac{8 \text{ HR}}{\text{DAY}} \times \frac{12 \text{ MONTHS}}{\text{YEAR}} = 96 \text{ HOURS}$$

RATE = \$95.00 HOURLY RATE FOR O&M SUPERINTENDENT (SEE ATTACHMENT 4)

$$\text{TOTAL} = 96 \times \$95.00 = \boxed{\$9{,}120}$$

OFFICE ENGINEER

ASSUME AN OFFICE ENGINEER VISITS THE SITE QUARTERLY TO OVERSEE THE MAINTENANCE OPERATIONS.

$$\text{TOTAL HOURS} = \frac{8 \text{ HR}}{\text{DAY}} \times \frac{4 \text{ DAYS}}{\text{YEAR}} = 32 \text{ HOURS}$$

RATE = \$112/HR (SEE ATTACHMENT 4)

$$\text{TOTAL} = 32 \times \$112.00 = \boxed{\$3{,}584}$$

ON-SITE TECHNICIAN

ASSUME ON-SITE TECHNICIAN SPENDS 1 HOUR PER DAY 6 DAYS PER WEEK TO DO MAINTENANCE WORK

$$\text{HOURS} = \frac{1 \text{ HOUR}}{\text{DAY}} \times \frac{6 \text{ DAYS}}{\text{WEEK}} \times \frac{52 \text{ WEEKS}}{\text{YEAR}} = 312 \text{ HOURS}$$

SCS ENGINEERS

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02	
SUBJECT FINANCIAL ASSURANCE		BY JPB	DATE 7-24-08
LONG-TERM CARE COST		CHECKED DHB	DATE 7/24/08

RATE = \$85/HR HOURLY RATE FOR SENIOR TECHNICIAN (SEE ATTACHMENT 4)

TOTAL = 312 HOURS x \$85/HR = $\boxed{\$26,520}$

TOTAL OPERATION COST:
\$9,120 + \$3,584 + \$26,520 = $\boxed{\$39,224}$

7. MAINTENANCE OF GROUNDWATER MONITORING WELLS

MONITORING WELLS

ASSUME MONITORING WELLS REQUIRE REGULAR MAINTENANCE CHECK EVERY SIX MONTHS.

LABOR: ASSUME IT TAKES 4 HOURS AND 1 TECHNICIAN ROUTINE MAINTENANCE OF ALL WELLS.

RATE = \$60.00/HR (SEE ATTACHMENT 4)

$$\text{TOTAL COST} = 1 \text{ TECH} \times \frac{4 \text{ HRS}}{6 \text{ MONTHS}} \times \frac{12 \text{ MONTHS}}{\text{YR}} \times \frac{\$60}{\text{HR, TECH}}$$

$$= \boxed{\$480.00}$$

TOTAL NUMBER OF GROUNDWATER MONITORING WELLS = 12 (SEE ATTACHMENT 1)

$$\text{MONITORING COST PER WELL} = \frac{\$480}{12} = \$40/\text{WELL}$$

SCS ENGINEERS

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02	
SUBJECT FINANCIAL ASSURANCE		BY JPB	DATE 7-24-08
LONG-TERM CARE COST		CHECKED DHB	DATE 7/24/08

REPLACEMENT

ASSUME 1 GW MONITORING WELL IS REPLACED EVERY FIVE YEARS.

ASSUME DEPTH OF WELL TO BE 120 FT

- SEE ATTACHMENT 9 FOR A MONITORING WELL COMPLETION REPORT FROM APRIL 3, 2007 SHOWING A TYPICAL WELL DEPTH OF 120 FEET

COST TO INSTALL A GROUNDWATER MONITORING WELL = \$5,185.00 (SEE ATTACHMENT 17)

ANNUAL COST: \$5,185.00 / 5 = $\boxed{\$1,037}$

8. GAS SYSTEM MAINTENANCE

PIPING, VENTS

TOTAL VENTS = 44 OLD LF
+ 70 PHASE I, IA, II & III
114

ASSUME HALF OF THESE VENTS NEED MAINTENANCE EVERY YEAR = 57 VENTS

COST FOR MAINTENANCE: ASSUME IT TAKES 1 HR. PER VENT FOR 2 TECHNICIANS TO CHECK THE VENT FOR ANY MAINTENANCE ISSUES.

TOTAL COST = $\frac{1 \text{ HR}}{\text{VENT}}$ x 2 TECHNICIANS x 57 VENTS x $\frac{\$60}{\text{HR. TECH}}$

= \$6,840

SCS ENGINEERS

SHEET 9 OF 15

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02	
SUBJECT FINANCIAL ASSURANCE		BY JPB	DATE 7-24-08
LONG-TERM CARE COST		CHECKED DHB	DATE 7/24/08

UNIT COST = $\frac{\$6,840}{57 \text{ VENTS}}$ = $\boxed{\$120/\text{VENT}}$

FLARING UNITS

ASSUME 10% OF THE TOTAL FLARING UNITS NEED MAINTENANCE PER YEAR.

TOTAL FLARING UNITS THAT NEED MAINTENANCE = 70 × 0.1
= 7

ASSUME IT TAKES 2 HOURS FOR 1 TECHNICIAN PER UNIT FOR MAINTENANCE.

TOTAL = 7 UNITS × $\frac{2 \text{ HRS}}{\text{UNIT}}$ × $\frac{\$60}{\text{HR.TECH}}$ × 1 TECH = \$840

UNIT COST = $\frac{\$840}{7 \text{ UNITS}}$ = $\boxed{\frac{\$120}{\text{UNIT}}}$

REPLACE MONITORING PROBES

ASSUME THE MONITORING PROBE WILL BE REPLACED TWICE WITHIN THE NEXT 30 YEARS.

UNIT COST TO REPLACE 1 MONITORING PROBE
= \$2,775.00 (SEE ATTACHMENT 18)

COST TO REPLACE 2 MONITORING WELLS = 2 × \$2,775.00
= \$5,550.00

ANNUAL COST: \$5,550.00 / 30 = $\boxed{\$185.00}$

SCS ENGINEERS

SHEET 10 OF 15

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02
SUBJECT FINANCIAL ASSURANCE	BY JPB	DATE 7-24-08
LONG-TERM CARE COST	CHECKED DHB	DATE 7/29/08

9. LANDSCAPE

<u>MOWING</u>

TOTAL AREA = 145 ACRES

UNIT COST: RS MEANS 2008 HEAVY CONSTRUCTION COST DATA (SEE ATTACHMENT 7)

COST: \$0.58 / 1,000 SF

TOTAL COST = $\frac{\$0.58}{1{,}000\ SF} \times 145\ AC \times \frac{43{,}560\ SF}{AC}$

= \$3,663

ASSUME MOWING TWICE PER YEAR

\$3,663 × 2 = \$7,326

UNIT COST: $\frac{\$7{,}326}{145\ AC}$ = \$50.52 / AC

TOTAL COST = \$50.52 × 145 = $\boxed{\$7{,}330}$

10. EROSION CONTROL AND COVER MAINTENANCE

<u>REGRADING</u>

ASSUME 1% OF TOTAL ACREAGE = 0.01 × 125,172 SY = 1,252 SY

UNIT COST: \$0.17 / SY (SEE ATTACHMENT 10

TOTAL COST: 1,252 SY × \$0.17 / SY = $\boxed{\$213}$

SCS ENGINEERS

SHEET 11 OF 15

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02	
SUBJECT FINANCIAL ASSURANCE		BY JPB	DATE 7-24-08
LONG-TERM CARE COST		CHECKED DHR	DATE 7/29/08

LINER REPAIR

ASSUME 1% OF THE LINER IS REPAIRED EVERY 5 YEARS.

AREA = 1,524,573 SF × 0.01 = 15,246 SF

UNIT COST: \$0.30 - MATERIAL
\$0.28 - INSTALLATION } SEE ATTACHMENT 11
\$0.58

TOTAL COST EVERY 5 YEARS = 15,246 SF × \$0.58/SF
= \$8,843

TOTAL ANNUAL COST: \$8,843 / 5 = $\boxed{\$1,769}$

11. STORMWATER MANAGEMENT SYSTEM MAINTENANCE

CONVEYANCE MAINTENANCE

A) PIPES

ASSUME 500 FT OF PIPE TO BE REPLACED PER YEAR

UNIT COST: (SEE ATTACHMENT 12)
AVERAGE UNIT COST OF 12", 18" & 24" ADS PIPES
= (\$5.90/FT + \$10.90/FT + \$17.25/FT)/3
= \$17.03/FT

TOTAL COST: 500 FT × \$17.03/FT = $\boxed{\$8,515}$

SCS ENGINEERS

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02
SUBJECT FINANCIAL ASSURANCE	BY JPB	DATE 7-24-08
LONG-TERM CARE COST	CHECKED VHG	DATE 7/29/08

(B) CONTROL STRUCTURES

- ENERGY DISSIPATOR
  - ASSUME 1 REPLACED EVERY 5 YEARS

UNIT COST: \$3,280.00 EA (SEE ATTACHMENT 14)

ANNUAL COST: \$3,280 / 5 = $\boxed{\$656}$

- CATCH BASIN
  - ASSUME 1 REPLACED EVERY 5 YEARS

UNIT COST: \$1,250/EA (SEE ATTACHMENT 12)

ANNUAL COST: \$1,250/5 = $\boxed{\$250}$

TOTAL COST FOR ITEM 11:

\$8,515 + \$656 + \$250 = $\boxed{\$9,421}$

SCS ENGINEERS

SHEET 13 OF 15

CLIENT Citrus County	PROJECT Citrus County Central Landfill Phase 3	JOB NO. 09207049.02
SUBJECT Financial Assurance	BY JPB	DATE 7-24-08
Long-Term Care Cost	CHECKED MHB	DATE 7/29/08

12. <u>SECURITY SYSTEM MAINTENANCE</u>

FENCES: ESTIMATE 50 LF OF FENCE REQUIRES REPAIR OR REPLACEMENT

UNIT COST: \$13.08/LF (SEE ATTACHMENT 13)

TOTAL COST: 50 FT × \$13.08 = $\boxed{\$654}$

13. <u>UTILITIES</u>

NO COST INCLUDED FOR THIS ITEM. COST ASSOCIATED WITH PUMPS ARE INCLUDED IN LEACHATE TREATMENT SYSTEM MAINTENANCE COSTS - ITEM 5.

14. <u>ADMINISTRATIVE</u>

ASSUME 4 HOURS/MONTH FOR SITE MANAGER TO OVERSEE ALL THE SITE OPERATIONS.

$$\text{TOTAL HOURS} = \frac{4\ \text{HR}}{\text{MONTH}} \times \frac{12\ \text{MONTHS}}{\text{YEAR}} = \frac{48\ \text{HRS}}{\text{YR}}$$

RATE: \$112/HR (SEE ATTACHMENT 4)
HOURLY RATE FOR SENIOR PROJECT PROFESSIONAL

$$\text{TOTAL} = \frac{48\ \text{HOURS}}{\text{YEAR}} \times \frac{\$112}{\text{HR}} = \boxed{\$5{,}376}$$

SCS ENGINEERS

SHEET 14 OF 15

CLIENT CITRUS COUNTY	PROJECT CITRUS COUNTY CENTRAL LANDFILL PHASE 3	JOB NO. 09207049.02
SUBJECT FINANCIAL ASSURANCE	BY JPB	DATE 7-24-08
LONG-TERM CARE COST	CHECKED VHB	DATE 7/24/08

CLERICAL

ASSUME 4 HR/MONTH ADMIN SUPPORT FOR TYPING REPORTS/OTHER COMPUTER SUPPORT.

$$\text{TOTAL HOURS} = \frac{4\ \text{HR}}{\text{MO}} \times \frac{12\ \text{MO}}{\text{YR}} = 48\ \text{HR/YR}$$

RATE = \$54/HR (SEE ATTACHMENT 4)

$$\text{TOTAL} = \frac{48\ \text{HR}}{\text{YR}} \times \frac{\$54}{\text{HR}} = \boxed{\$2,592}$$

OFFICE

ASSUME 24 HOURS FOR PLANNING AND ISSUE RESOLUTION

HOURLY RATE FOR AN OFFICE ENGINEER = \$85/HR (SEE ATTACHMENT 4)

$$\text{TOTAL COST} = \$85/\text{HR} \times 24\ \text{HOURS} = \boxed{\$2,040}$$

SUBTOTAL ADMINISTRATIVE:

$$\$5,376 + \$2,592 + \$2,040 = \boxed{\$10,008}$$

SCS ENGINEERS

SHEET 15 OF 15

CLIENT Citrus County	PROJECT Citrus County Central Landfill Phase 3	JOB NO. 09207049.02
SUBJECT Financial Assurance	BY JPB	DATE 7-24-08
Long-Term Care Cost	CHECKED [illegible]	DATE 7/24/08

15. CONTINGENCY

5% OF ITEMS 1 – 14 = 0.05 × \$154,175
= \$7,709
≈ $\boxed{\$8,000}$

16. SITE SPECIFIC COSTS : NONE

ANNUAL LONG-TERM CARE COST (\$/YEAR) : $\boxed{\$162,175}$

NUMBER OF YEARS OF LONG-TERM CARE : 30

TOTAL LONG-TERM CARE COST (\$) : $\boxed{\$4,865,242}$

ATTACHMENT 1
1/4

**TASK AUTHORIZATION EIGHT
TO MASTER AGREEMENT
FOR SOLID WASTE ENGINEERING,
PLANNING AND ENVIRONMENTAL SERVICES
RFQ 077-04 SWM**

This Task Authorization Eight to Master Agreement dated April 26, 2005, between Citrus County ("County") and Jones, Edmunds & Associates, Inc. ("Engineer"), is the scope of services and fees to provide environmental services related to performing compliance monitoring and reporting for the County's solid waste management facility located in Lecanto, Florida.

WITNESSETH:

WHEREAS, the County desires to retain the Engineer for this service, and

WHEREAS, THE Engineer is willing to provide such services;

NOW THEREFORE, the parties covenant and agree as follows:

I. SCOPE OF SERVICES:

The Citrus County Central Landfill is operated under the Florida Department of Environmental Protection (FDEP) permit 21375008-SO/01. The FDEP permit requires routine compliance monitoring of the active and closed landfills. This task authorization addresses the effort necessary to comply with the FDEP compliance monitoring requirements as specified in the current permit.

The Engineer will provide the specific services as outlined in this paragraph, as follows:

- Collection and analysis of leachate influent samples (annual).
- Collection and analysis of leachate effluent samples (quarterly, semiannual, annual).
- Collection and analysis of leachate sludge samples (annual).
- Collection and analysis of groundwater samples (semiannual). This includes monitoring wells MW-1R, MW-2, MW-3, MW-6, MW-7, MW-10, MW-11, MW-12, MW-13, MW-14, M2-15, MW-17, MW-18 and MW-19.
- All analyses shall be for the parameters listed in the FDEP permit dated April 24, 2007.
- Measurement of groundwater elevations within all monitoring wells during semiannual sampling event as required by the facility permit. This includes monitoring wells MW-1R, MW-2, MW-3, MW-6, MW-7, MW-10, MW-AA, MW-12, MW-13, M2-14, MW-15, MW-17 and water-level-only wells MW-4R, MW-5, MW-8R, MW-AA, MW-B, MW-E, MW-9, MW-16, PZ-1 and PZ-2.

ATTACHMENT 1
2/4

- Compilation and reporting of monthly leachate data on a quarterly basis. Data to be provided to Jones Edmunds by the County (see exclusion below).
- Preparation of compliance monitoring reports (quarterly, semiannual, annual).
- Preparation of semiannual groundwater contour maps as required by the facility permit.
- Submittal of analytical data to FDEP in Validator electronic format and hard copy to the County.
- Respond to FDEP questions concerning compliance monitoring (including typical report review questions, should substantial additional effort be necessary we will contact you as to how to proceed).

The following items are specifically excluded from the scope of services:

1. Daily and monthly leachate sampling and analysis as required by the FDEP permit is not included. It is assumed that the County will continue to collect this data without assistance from Jones Edmunds. However, Jones Edmunds will incorporate this data into the quarterly leachate monitoring reports as listed above. Recording and reporting of leachate volumes will continue to be performed by the County with no assistance from Jones Edmunds.
2. The County is not required to submit a Groundwater Monitoring Plan Evaluation (GWMPE) during the time frame of this authorization. The next GWMPE is due to the FDEP February 1, 2010. Therefore, no effort has been included for preparation of a GWMPE.
3. Landfill gas monitoring is not included in this scope of services. It is assumed that gas monitoring as required by the FDEP will be performed by the County or others.

II. COMPENSATION:

For consideration of providing the services outlined in the Scope of Services, the Engineer will be paid in accordance with "not to exceed cost" fee method pursuant to the master agreement.

The total not to exceed fee will be $ 49,930.00 . (See attached schedule.)

III. TIME OF PERFORMANCE:

The Engineer shall complete the Scope of Services as outlined herein between October 1, 2007 and September 30, 2008.

ATTACHMENT 1

APPROVED 3/4

SEP 11 2007

BOARD OF COUNTY COMMISSIONERS

IN WITNESS WHEREOF, the parties hereto have caused these presents to be executed by their duly qualified representative, this ____________ day of ________________, 2007.

"COUNTY"

Citrus County Board of County Commissioners

Witness:

By: Glenda Brown

By: Dennis Damato
Dennis Damato
Chairman

"ENGINEER"

Jones, Edmunds & Associates, Inc.

Witness:

By:____________________

By: Robert C. Edmunds
Robert C. Edmunds, P.E.
Executive Vice President

DMT
8/17/07

ATTACHMENT 1
4/4

Table 1

Citrus County

Task Authorization 8 - 2007/2008 Landfill Compliance Monitoring and Reporting

Prepared by JDL -January, 2003

TASK	Project Manager	Senior Prof Sci	Project Scientist	Scientist Intern	Senior CADD tech	CADD Tech	Technician	Clerical	Labor Fee	Laboratory Sub	ODC's	TOTALS
Contract rate	150	180	120	90	90	75	70	50				
1) Fourth Quarter 2007 - Quarterly leachate effluent	6		2	16			8	3	$ 3,290	$ 350	$ 500	$ 4,140
2) First Quarter 2008 - Quarterly leachate effluent, semiannual effluent, semiannual groundwater	10	1	6	28	1	3	50	4	$ 8,935	$ 7,750	$ 1,000	$ 17,685
3) Second Quarter 2008 - Quarterly leachate effluent	6		2	20			8	3	$ 3,650	$ 350	$ 500	$ 4,500
4) Third Quarter 2008 - Annual leachate influent, quarterly effluent, semiannual effluent, annual effluent, annual sludge, semiannual groundwater	10	1	6	36	1	3	60	4	$ 10,355	$ 12,250	$ 1,000	$ 23,605
									$ -	$ -		$ -
TOTAL HOURS	32	2	16	100	2	6	126	14	$26,230	$20,700	$3,000	$49,930

$4,500 → QUARTERLY LEACHATE EFFLUENT

$17,685 → QUARTERLY LEACHATE EFFLUENT
+ SEMI-ANNUAL EFFLUENT

$23,605 → QUARTERLY LEACHATE EFFLUENT
+ SEMI-ANNUAL EFFLUENT
+ ANNUAL LEACHATE EFFLUENT

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ATTACHMENT 2

1/3

TestAmerica Tampa
6712 Benjamin Road
Suite 100
Tampa, FL 33634

Tel: (813) 885-7427
Fax: (813) 885-7049
www.testamericainc.com

May 30, 2008

Ms. Dominique Bramlett
SCS Engineers
4041 Park Oaks Blvd
Suite 100
Tampa, FL 33610
DBramlett@SCSEngineers.com

Subject: Request for Proposal
Citrus County Landfill
Quote Number: 66002177

Dear Ms. Dominique Bramlett,

On behalf of TestAmerica Laboratories, Inc., and its affiliates, I am pleased to submit pricing for the Citrus County Landfill. TestAmerica is eager to support this commitment by making our personnel and analytical laboratory resources available to you. As the largest environmental laboratory company in the world TestAmerica offers a full range of analytical services in one company.

We thank you for choosing TestAmerica Laboratories, and we look forward to working with you for this project. The following quotation contains a detailed price breakdown, as well as any notes and clarifications pertaining to your project. This quotation is subject to TestAmerica's Standard Terms and Conditions, unless otherwise agreed upon in writing. Should you have any further questions or require additional information about our analytical services, please feel free to contact me at 813-885-7427 or via email at the address listed below.

Sincerely,

Tina Fritz
Customer Service Manager
tina.fritz@testamericainc.com
813-918-9088

TestAmerica Tampa
6712 Benjamin Road
Suite 100
Tampa, FL 33634

ATTACHMENT 2
2/3

Prepared for:
Ms. Dominique Bramlett
SCS Engineers
4041 Park Oaks Blvd
Suite 100
Tampa, FL 33610
DBramlett@SCSEngineers.com

Prepared by	Fritz, Tina
Date	5/30/2008
Expiration Date	8/29/2008
Est. Start Date	

Project: Citrus County Landfill *Quote Number: 66002177 - 0*

Surface Water - Stormwater Discharge **TAT: 10_Days (Business Days)**

Matrix	Method	Test Description	Quantity	Unit Price	Extended Price
Water	365.4	Total Phosphorus	1	$ 25.00	$ 25.00
Water	353.2	Nitrogen, Nitrate	1	$ 25.00	$ 25.00
Water	SM 5310C	Total Organic Carbon	1	$ 40.00	$ 40.00
Water	351.2	Nitrogen, Total Kjeldahl	1	$ 30.00	$ 30.00
Water	Total Nitrogen	Total Nitrogen	1	$ 10.00	$ 10.00
Water	SM 5220D	Chemical Oxygen Demand	1	$ 25.00	$ 25.00
Water	SM 9222D	Fecal Coliform (6 hour hold time)	1	$ 40.00	$ 40.00
Water	SM 5210B	5 Day BOD test	1	$ 40.00	$ 40.00
Water	SM 2540C	Total Dissolved Solids	1	$ 18.00	$ 18.00
Water	SM 2540D	Total Suspended Solids	1	$ 18.00	$ 18.00
Water	200.7 Rev 4.4	Appendix 1 Metals + Iron	1	$ 100.00	[illegible].00
Water	8260B	8260 Appendix I Compounds	1	$ 90.00	$ 90.00
Water	8011	EDB and DBCP	1	$ 60.00	$ 60.00

Surface Water - Stormwater Discharge **TAT: 10_Days (Business Days)** **(to be analyzed by Pensacola)**

Matrix	Method	Test Description	Quantity	Unit Price	Extended Price
Water	1631E	Low Level Mercury and Field Blank	1	$ 180.00	$ 180.00
		Total Surface Water - Stormwater Discharge			**$ 741.00**

Leachate Influent **TAT: 10_Days (Business Days)**

Matrix	Method	Test Description	Quantity	Unit Price	Extended Price
Water	350.1	Ammonia	1	$ 20.00	$ 20.00
Water	353.2	Nitrogen, Nitrate	1	$ 25.00	$ 25.00
Water	SM 2540C	Total Dissolved Solids	1	$ 18.00	$ 18.00
Water	200.7 Rev 4.4	Appendix 1 Metals + Iron and Sodium	1	$ 100.00	$ 100.00
Water	8260B	8260 Appendix I Compounds	2	$ 90.00	$ 180.00
Water	8011	EDB and DBCP	1	$ 60.00	$ 60.00
Water	SM 2320B	Bicarbonate	1	$ 15.00	$ 15.00
Water	300.0	Chloride	1	$ 18.00	$ 18.00

Leachate Influent **TAT: 10_Days (Business Days)** **(to be analyzed by Pensacola)**

Matrix	Method	Test Description	Quantity	Unit Price	Extended Price

TestAmerica Tampa
6712 Benjamin Road
Suite 100
Tampa, FL 33634

ATTACHMENT 2
3/3

Prepared for:
Ms. Dominique Bramlett
SCS Engineers
4041 Park Oaks Blvd
Suite 100
Tampa, FL 33610
DBramlett@SCSEngineers.com

Prepared by	Fritz, Tina
Date	5/30/2008
Expiration Date	8/29/2008
Est. Start Date	

Project: Citrus County Landfill *Quote Number: 66002177 - 0*

Leachate Influent **TAT: 10_Days (Business Days)** **(to be analyzed by Pensacola)**

Matrix	Method	Test Description	Quantity	Unit Price	Extended Price
Water	1631E	Low Level Mercury and Field Blank	1	$ 180.00	$ 180.00
		Total Leachate Influent			**$ 616.00**

Quote Other Charges

Description	Quantity	Unit Price	Extended Price
Compositing fee for Leachate Influent	1	$ 25.00	$ 25.00
Equipment - Decon - Daily	1	$ 50.00	$ 50.00
Services - Sampling (hourly)	1	$ 75.00	$ 75.00
Travel - Mileage (estimated per trip)	100	$ 0.50	$ 50.00
Total Other Charge			**$ 200.00**

Total Other Charges	**$ 200.00**
Total Analysis Charges	**$ 5,579.00**
Grand Total for Quote 66002177	**$ 5,779.00**

**Quoted charges do not include sales tax. Applicable sales tax will be added to invoices where required by law.

ATTACHMENT 4
1/2

SCS ENGINEERS FEE SCHEDULE

(Effective July 1, 2008 through June 30, 2009)

	Rate/Hour ($)
Principal/Office Director	195
Project Director	185
Senior Project Advisor	145
Senior Project Manager	145
Project Manager	135
Senior Project Professional	112
Senior Superintendent	110
Project Professional	92
Designer	98
O&M Superintendent	95
Staff Professional	85
Senior Technician 2	85
Senior Technician 1	65
Associate Staff Professional	72
Draftsperson	70
Technician	60
Office Services Manager	75
Secretarial/Clerical	54

1. The hourly rates are effective through June 30, 2009. Work performed thereafter is subject to a new Fee Schedule issued for the period beginning July 1, 2009.

2. The above rates include salary, overhead, administration, and profit. Other direct expenses, such as analyses of air, water and soil samples, reproduction, travel, subsistence, subcontractors, computers, and other reimbursable fees, are billed in accordance with the attached reimbursables fee schedule or cost, plus 15 percent for administration.

3. For special situations, such as expert court testimony, hourly rates for principals of the firm will be on an individually-negotiated basis.

ATTACHMENT 4
2/2

SCS ENGINEERS
REIMBURSABLES FEE SCHEDULE
(Effective July 1, 2008 through June 30, 2009)

ADMINISTRATION/MILEAGE	Unit Cost ($)	Unit
Reimbursable		
Vehicle Mileage	0.585	mile
Truck Usage	$70	day
Faxes	5	1st Page
	1	each additional page
Reproduction (Xerox)	0.10	each
Reproduction (Color Copies)	1.25	each
CAD Usage	20	hour

EQUIPMENT/FIELD SUPPLIES	Rate ($)	Unit
Sampling Trailer, Field Equipped	200	Day

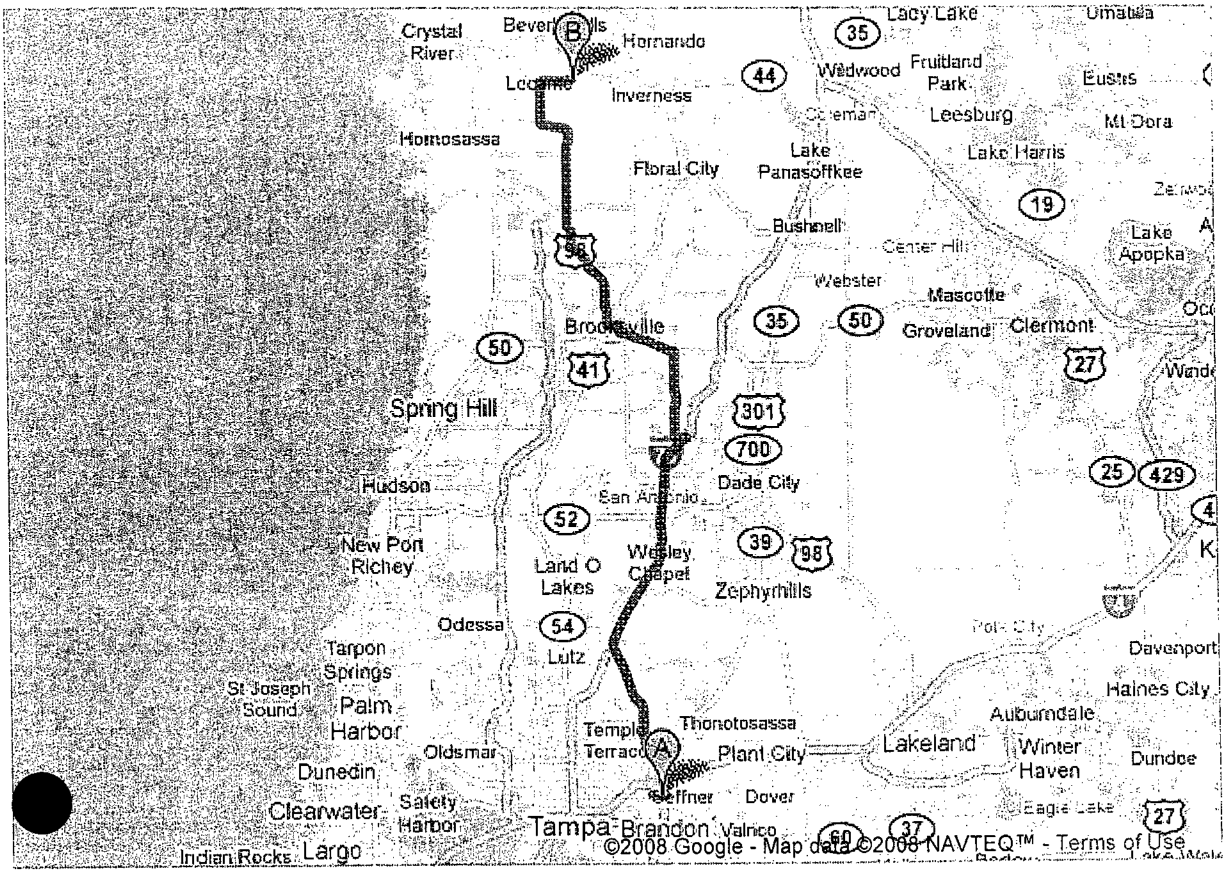
Field-equipped sampling trailer includes equipment and supplies for soil and groundwater sampling, decontamination, health and safety, logs, packing and shipping, and miscellaneous uses.

Pontoon Boat	400	Day
Calibration:		
Conductivity Standards *	1	Ounce
Isobutylene *	1	Liter
Methane in Air OVA Calibration Gas *	1	Liter
Pentane in Air *	1	Liter
pH Buffer Solutions (4,7,10) *	1	Ounce
Decontamination Equipment:		
Brushes *	5	Day
Distilled/Deionized Water *	1	Gallon
Isopropyl Alcohol *	1	Ounce
Liquinox Soap Concentrate *	1	Ounce
Plastic Buckets *	5	Day
Poly Sheeting *	1	Square Foot

ATTACHMENT 5

1/2

Google Maps



Park Oaks Blvd
Tampa, FL 33610

Drive: 76.4 mi – about 1 hour 34 mins

1.	Head **south** on **Park Oaks Blvd** toward **Dr Martin Luther King Jr Blvd E**	305 ft
2.	Turn **right** at **Dr Martin Luther King Jr Blvd E**	0.5 mi
3.	Make a **U-turn** at **Cragmont Dr**	1.1 mi
4.	Turn **left** to merge onto **I-75 N**	33.6 mi
5.	Take exit **293** for **CR-41 N**	0.1 mi
6.	Turn **right** at **Blanton Rd/CR-41 N**	1.0 mi
7.	Slight **right** at **Lake Iola Rd**	1.0 mi
8.	Continue on **Spring Lake Hwy**	6.1 mi
9.	Turn **left** at **US-98 N**	5.7 mi
10.	Turn **left** at **US-41 S/US-98 N** Continue to follow US-98 N	1.0 mi
11.	Turn **right** at **US-98**	7.8 mi
12.	Turn **right** at **Citrus Way**	3.1 mi
13.	Continue on **S Lecanto Hwy**	12.6 mi
14.	Turn **right** at **W Gulf to Lake Hwy**	2.7 mi

ATTACHMENT 5 2/2

230 W Gulf to Lake Hwy
Lecanto, FL 34461

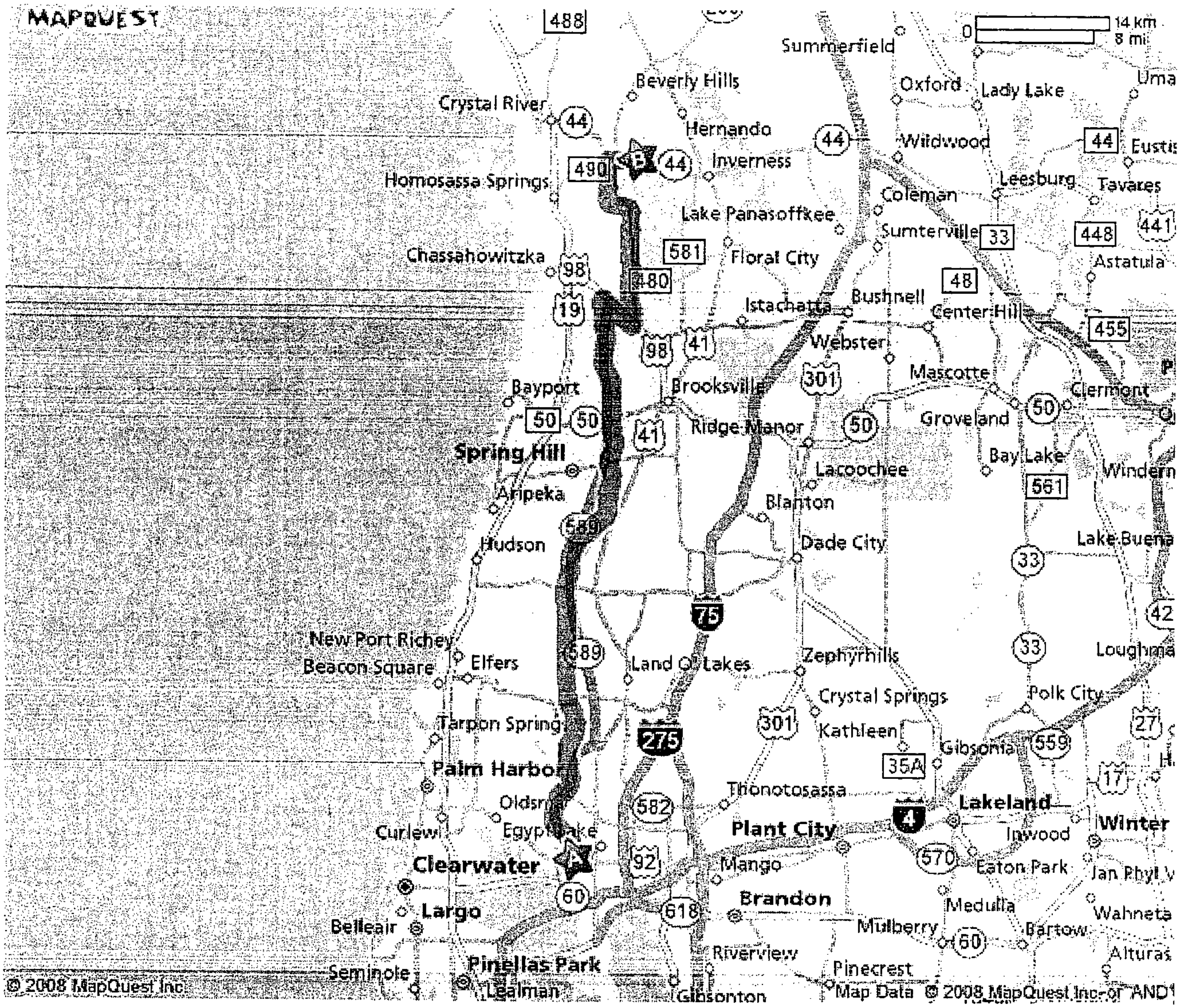
These directions are for planning purposes only. You may find that construction projects, traffic, or other events may cause road conditions to differ from the map results.

ATTACHMENT 6

Estimated Time: 1 hour 20 minutes Estimated Distance: 73.39 miles

B: 230 W Gulf to Lake Hwy, Lecanto, FL 34461-9201

Total Time: 1 hour 20 minutes Total Distance: 73.39 miles



Directions and maps are informational only. We make no warranties on the accuracy of their content, road conditions or route usability or expeditiousness. You assume all risk of use. MapQuest and its suppliers shall not be liable to you for any loss or delay resulting from your use of MapQuest. Your use of MapQuest means you agree to our Terms of Use

ATTACHMENT 7

32 01 90 – Operation and Maintenance of Planting

32 01 90.19 Mowing		Crew	Daily Output	Labor-Hours	Unit	Material	2008 Bare Costs Labor	Equipment	Total	Total Incl O&P
2010	Traffic safety flashing truck for highway/airport median mowing	A-2B	1	8	Day		235	179	414	560
4000	Lawn mowing, improved areas, 16" hand push	1 Clab	48	.167	M.S.F.		5.05		5.05	7.85
4050	Power mower, 18" - 22"		65	.123			3.72		3.72	5.80
4100	22" - 30"		110	.073			2.20		2.20	3.42
4150	30" - 32"		140	.057			1.73		1.73	2.69
4160	Riding mower, 36" - 44"	B-66	300	.027			1.01	.73	1.74	2.32
4170	48" - 58"	"	480	.017			.63	.46	1.09	1.45
4175	Mowing with tractor & attachments									
4180	3 gang reel, 7'	B-66	930	.009	M.S.F.		.32	.24	.56	.75
4190	5 gang reel, 12'		1200	.007			.25	.18	.43	.58
4200	Cutter or sickle-bar, 5', rough terrain		210	.038			1.44	1.04	2.48	3.32
4210	Cutter or sickle-bar, 5', smooth terrain		340	.024			.89	.64	1.53	2.05
4220	Drainage channel, 5' sickle bar		5	1.600	Mile		60.50	43.50	104	139
4250	Lawnmower, rotary type, sharpen (all sizes)	1 Clab	10	.800	Ea.		24		24	37.50
4260	Repair or replace part		7	1.143	"		34.50		34.50	54
5000	Edge trimming with weed whacker		5760	.001	L.F.		.04		.04	.07
32 01 90.23 Pruning										
0010	**PRUNING**									
0020	1-1/2" caliper	1 Clab	84	.095	Ea.		2.88		2.88	4.48
0030	2" caliper		70	.114			3.46		3.46	5.40
0040	2-1/2" caliper		50	.160			4.84		4.84	7.55
0050	3" caliper		30	.267			8.05		8.05	12.55
0060	4" caliper, by hand	2 Clab	21	.762			23		23	36
0070	Aerial lift equipment	B-85	38	1.053			34	22	56	77
0100	6" caliper, by hand	2 Clab	12	1.333			40.50		40.50	62.50
0110	Aerial lift equipment	B-85	20	2			64.50	42	106.50	146
0200	9" caliper, by hand	2 Clab	7.50	2.133			64.50		64.50	100
0210	Aerial lift equipment	B-85	12.50	3.200			103	67	170	233
0300	12" caliper, by hand	2 Clab	6.50	2.462			74.50		74.50	116
0310	Aerial lift equipment	B-85	10.80	3.704			119	77.50	196.50	270
0400	18" caliper by hand	2 Clab	5.60	2.857			86.50		86.50	134
0410	Aerial lift equipment	B-85	9.30	4.301			139	90	229	315
0500	24" caliper, by hand	2 Clab	4.60	3.478			105		105	164
0510	Aerial lift equipment	B-85	7.70	5.195			167	109	276	380
0600	30" caliper, by hand	2 Clab	3.70	4.324			131		131	203
0610	Aerial lift equipment	B-85	6.20	6.452			208	135	343	470
0700	36" caliper, by hand	2 Clab	2.70	5.926			179		179	279
0710	Aerial lift equipment	B-85	4.50	8.889			287	186	473	645
0800	48" caliper, by hand	2 Clab	1.70	9.412			285		285	445
0810	Aerial lift equipment	B-85	2.80	14.286			460	299	759	1,050
32 01 90.24 Shrub Pruning										
0010	**SHRUB PRUNING**									
6700	Prune, shrub bed	1 Clab	7	1.143	M.S.F.		34.50		34.50	54
6710	Shrub under 3' height		190	.042	Ea.		1.27		1.27	1.98
6720	4' height		90	.089			2.69		2.69	4.18
6730	Over 6'		50	.160			4.84		4.84	7.55
7350	Prune trees from ground		20	.400			12.10		12.10	18.80
7360	High work		8	1			30.50		30.50	47
32 01 90.26 Watering										
0010	**WATERING**									
0900	Water lawn or planting bed with hose, 1" of water	1 Clab	16	.500	M.S.F.		15.15		15.15	23.50
0910	50' soaker hoses, in place		82	.098			2.95		2.95	4.59

LAURA

Enterprise Rates

ATTACHMENT 8

FLORIDA

CUSTOMER RATES

Cust# G90097 SCS ENGINEERS** SIS081A/C1
Billing Type: RATES GRBR: 4209 Default Type:

Car Class	Rate Amount	Rate Type Description	Unlimited Miles	Free Miles	Excess Mileage Charge
CCAR	32.99	Daily	Y		
CCAR	181.99	Weekly	Y		
CCAR	719.99	Monthly	N	2500	20
ICAR	35.99	Daily	Y		
ICAR	198.99	Weekly	Y		
ICAR	775.99	Monthly	N	2500	20
SCAR	38.99	Daily	Y		
SCAR	214.99	Weekly	Y		
SCAR	839.99	Monthly	N	2500	20
STAR	56.99	Daily	N	150	20

mpact
d
ndard
vertible

F3=Exit F4=Prompt F6=Prompt/Address F12=Previous F21=Billing Contact
F22=Business Contact

large SUV 75.99 daily

only standard size and bigger have cruise control

ATTACHMENT 9

DEP Form # 62-522.900(3)
Form Title MONITOR WELL COMPLETION REPORT
Effective Date ______
DEP Application No.______ (Filled in by DEP)

Florida Department of Environmental Protection
Twin Towers Office Bldg. 2600 Blair Stone Road Tallahassee, Florida 32399-2400

MONITOR WELL COMPLETION REPORT

DATE: 4/3/2007

INSTALLATION NAME: Citrus County Central Landfill

DEP PERMIT NUMBER: 21375-008-SO/01 GMS NUMBER: ______

WELL NUMBER: MW-18 WELL NAME: MW-18

DESIGNATION: Background ______ Detection ______ Compliance X Assessment

LATITUDE/LONGITUDE: N 1643745.78 E 514731.67

AQUIFER MONITORED: Floridan

INSTALLATION METHOD: Mud rotary

INSTALLED BY: Huss Drilling

TOTAL DEPTH: 120 ft (bls) DEPTH OF SCREEN: 100-120 ft (bls)

SCREEN LENGTH: 20 ft SCREEN SLOT SIZE: 0.01 in SCREEN TYPE: sch.40 slotted PVC

NG DIAMETER: 2 in CASING TYPE: sch. 40 PVC

LENGTH OF CASING: 100 ft FILTER PACK MATERIAL: 20/30 clean silica sand

TOP OF CASING ELEVATION (MSL): 115.98 ft

GROUND SURFACE ELEVATION (MSL): 116.28 ft

COMPLETION DATE: 1/23/2007

DESCRIBE WELL DEVELOPMENT: Initial development by air sparging was conducted by the drillers, additional development with a Grundfos pump Was conducted before initial sampling.

POST DEVELOPMENT WATER LEVER ELEVATION (MSL): 5.81 ft

DATE AND TIME MEASURED: 2/28/2007 12:36 PM

REMARKS: (soils information, stratigraphy, etc.) : ______

REPORT PREPARED BY: Troy Hays, Jones Edmunds & Associates, 352-377-5821
(name, company, phone number)

NOTE: PLEASE ATTACH BORING LOG. *(bls)= Below Land Surface*

ATTACHMENT 10

31 14 Earth Stripping and Stockpiling

31 14 13 – Soil Stripping and Stockpiling

31 14 13.23 Topsoil Stripping and Stockpiling		Crew	Daily Output	Labor-Hours	Unit	Material	2008 Bare Costs Labor	Equipment	Total	Total Incl O&P
0010	**TOPSOIL STRIPPING AND STOCKPILING**									
0020	200 H.P. dozer, ideal conditions	B-10B	2300	.005	C.Y.		.19	.47	.66	.80
0100	Adverse conditions	″	1150	.010			.38	.93	1.31	1.60
0200	300 HP dozer, ideal conditions	B-10M	3000	.004			.15	.46	.61	.73
0300	Adverse conditions	″	1650	.007			.27	.84	1.11	1.34
1400	Loam or topsoil, remove and stockpile on site									
1420	6″ deep, 200′ haul	B-10B	865	.014	C.Y.		.51	1.24	1.75	2.13
1430	300′ haul		520	.023			.85	2.06	2.91	3.56
1440	500′ haul		225	.053			1.95	4.76	6.71	8.20
1450	Alternate method: 6″ deep, 200′ haul		5090	.002	S.Y.		.09	.21	.30	.36
1460	500′ haul		1325	.009	″		.33	.81	1.14	1.40

31 22 Grading

31 22 16 – Fine Grading

31 22 16.10 Finish Grading		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	**FINISH GRADING**									
0012	Finish grading area to be paved with grader, small area	B-11L	400	.040	S.Y.		1.40	1.34	2.74	3.61
0016	Finish grading lagoon bottoms		4	4	M.S.F.		140	134	274	360
0100	Large area		2000	.008	S.Y.		.28	.27	.55	.72
0200	Grade subgrade for base course, roadways		3500	.005	″		.16	.15	.31	.41
0210	Fine grade, top of lagoon banks for compaction		30	.533	M.S.F.		18.70	17.80	36.50	48
1020	For large parking lots	B-32C	5000	.010	S.Y.		.34	.36	.70	.92
1050	For small irregular areas	″	2000	.024			.85	.91	1.76	2.30
1100	Fine grade for slab on grade, machine	B-11L	1040	.015			.54	.51	1.05	1.39
1150	Hand grading	B-18	700	.034			1.06	.05	1.11	1.71
1200	Fine grade granular base for sidewalks and bikeways	B-62	1200	.020			.66	.12	.78	1.14
2550	Hand grade select gravel	2 Clab	60	.267	C.S.F.		8.05		8.05	12.55
3000	Hand grade select gravel, including compaction, 4″ deep	B-18	555	.043	S.Y.		1.34	.07	1.41	2.16
3100	6″ deep		400	.060			1.86	.10	1.96	3
3120	8″ deep		300	.080			2.47	.13	2.60	3.99
3300	Finishing grading slopes, gentle	B-11L	8900	.002			.06	.06	.12	.17
3310	Steep slopes		7100	.002			.08	.08	.16	.20
3312	Steep slopes, large quantities		64	.250	M.S.F.		8.75	8.35	17.10	22.50

31 23 Excavation and Fill

31 23 16 – Excavation

31 23 16.13 Excavating, Trench		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	**EXCAVATING, TRENCH**									
0011	Or continuous footing									
0020	Common earth with no sheeting or dewatering included									
0050	1′ to 4′ deep, 3/8 C.Y. excavator	B-11C	150	.107	B.C.Y.		3.74	1.90	5.64	7.80
0060	1/2 C.Y. excavator	B-11M	200	.080			2.80	1.70	4.50	6.15
0062	3/4 C.Y. excavator	B-12F	270	.059			2.11	2.04	4.15	5.45
0090	4′ to 6′ deep, 1/2 C.Y. excavator	B-11M	200	.080			2.80	1.70	4.50	6.15
0100	5/8 C.Y. excavator	B-12Q	250	.064			2.28	1.99	4.27	5.65
0110	3/4 C.Y. excavator	B-12F	300	.053			1.90	1.83	3.73	4.91
0120	1 C.Y. hydraulic excavator	B-12A	400	.040			1.42	1.62	3.04	3.96
0130	1-1/2 C.Y. excavator	B-12B	540	.030			1.05	1.54	2.59	3.30
0300	1/2 C.Y. excavator, truck mounted	B-12J	200	.080			2.85	4.66	7.51	9.50

ATTACHMENT 11

Belen, Joyce

From:	Bramlett, Dominique
Sent:	Thursday, May 29, 2008 2:47 PM
To:	Belen, Joyce
Cc:	Banks, John
Subject:	FW: Citrus Co

FYI.
Thanks, Dom

Dominique H. Bramlett, P.E.
SCS ENGINEERS
4041 Park Oaks Blvd, Suite 100
Tampa, FL 33610
Phone: (813) 621-0080
Fax: (813) 623-6757
Email: dbramlett@scsengineers.com
Website: www.scsengineers.com

From: Bob Trexler [mailto:bobt@geo-synthetics.com]
Sent: Thursday, May 29, 2008 2:41 PM
To: Bramlett, Dominique
Subject: RE: Citrus Co

Bob Trexler
Geo-Synthetics, Inc.
9227 Memorial Pines Way
Spring, TX 77379
Office Phone: 281-257-2405
Cell Phone: 262-442-3101
FAX #: 281-257-4235
bobt@geo-synthetics.com
www.geo-synthetics.com/installation

Dominique,
Please use the following prices for your budgetary pricing update on the Citrus County LF Closure. Please also keep in mind that the pricing I am giving you today, 5/29/08, are based on current raw material prices. When the actual project is closer to going Iout for formal bnids, I would recommend that you get a new estimate, as petrolium based raw materials like liners and geocomposites can skyrocket rather rapidly as you are seeing at the pumps. Your current budgetary prices are as follows:

Price to supply only approximately 1,412,471 sq ft of 40 mil textured LLDE liner at .30 per sq ft delivered.
Price for installation only at .28 per sq ft.

Price to supply only approximately 1,074,051 sq ft of 200 mil net with 2 sides of 6 oz geotextile bonded at .38 per sq ft. Price for installation at .20 per sq ft.

Please let me know if you have any additional questions.

Regards,

ATTACHMENT 12

Bramlett, Dominique

From: Dan Dietrich [Dan.Dietrich@ads-pipe.com]
Sent: Thursday, May 29, 2008 4:46 PM
To: Bramlett, Dominique
Subject: RE: Citrus cost estimate

Dominique,

Here's a estimate for the following materials:

4" N-12 WT pipe .90/ft
6" N-12 WT pipe 2.00/ft
8" N-12 WT pipe 3.45/ft
10" N-12 WT pipe 5.20/ft
12" N-12 WT pipe 5.90/ft
15" N-12 WT pipe 7.80/ft
18" N-12 WT pipe 10.90/ft
24" N-12 WT pipe 17.25/ft
30" N-12 WT pipe 25.25/ft

12 → 342 ft x $5.90
18 → 2,717 ft x $10.90
24 → [illegible]

30" Nyloplast Inline Drain 750/ea
30" Nyloplast Drain Basin (Height<5') 1250/ea 9

Give me a call if you have any further questions. Thanks.

Dan Dietrich, E.I.
Sales Engineer
Advanced Drainage Systems, Inc.
Cell: (813) 569-8082
Fax: (813) 354-3575
www.ads-pipe.com
www.stormtech.com

From: Bramlett, Dominique [mailto:DBramlett@SCSEngineers.com]
Sent: Thursday, May 29, 2008 2:55 PM
To: Dan Dietrich
Cc: Belen, Joyce
Subject: Citrus cost estimate

Dan,
Please provide me cost estimates for ADS pipe (4-inch through 30-inch) and 30-inch diameter inlets (3ft in depth and 4ft in depth).
Thanks, Dominique

Dominique H. Bramlett, P.E.
SCS ENGINEERS
4041 Park Oaks Blvd, Suite 100
Tampa, FL 33610
Phone: (813) 621-0080
Fax: (813) 623-6757
Email: dbramlett@scsengineers.com
Website: www.scsengineers.com

ATTACHMENT 13

Florida Department of Transportation
Item Average Unit Cost
From 2007/01/01 to 2007/12/31

Contract Type: ('CC') STATEWIDE
Displaying: VALID ITEMS WITH HITS
From: 0100 To: 1999999999

Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
0550 10150	2	$11.57	$1,216,727.68	105,185.600	LF	N	FENCING, TYPE A, 8.1-10.0', STANDARD
0550 10220	20	$13.08	$498,877.75	38,130.000	LF	N	FENCING, TYPE B, 5.1-6.0, STANDARD
0550 10221	1	$18.25	$85,008.50	4,658.000	LF	N	FENCING, TYPE B, 5.1-6.0, W/ BARB ATTMT
0550 10222	14	$16.46	$1,290,275.97	78,369.600	LF	N	FENCING, TYPE B, 5.1-6.0, W/ VINYL COAT
0550 10228	3	$12.91	$13,413.00	1,039.000	LF	N	FENCING, TYPE B, 5.1-6.0, RESET EXISTING
0550 10240	2	$32.62	$21,987.00	674.000	LF	N	FENCING, TYPE B, 7.1-8.0', STANDARD
0550 10250	1	$19.50	$4,446.00	228.000	LF	N	FENCING, TYPE B, 8.1-10.0', STANDARD FEA
0550 10343	1	$100.00	$156,000.00	1,560.000	LF	N	FENCING, TYPE R, 7.1-8.0, W/FULL ENCLOS
0550 10353	2	$405.11	$195,262.46	482.000	LF	N	FENCING, TYPE R, 8.1-10', W/FULL ENCLOS
0550 10918	1	$73.50	$1,470.00	20.000	LF	N	FENCING,SPECIAL TYP, 0.0-5.0', RESET EXI
0550 10929	2	$29.23	$201,074.00	6,880.000	LF	N	FENCING, SPECIAL TYPE, 5.1-6.0', SPECIAL
0550 60124	1	$1,100.00	$1,100.00	1.000	EA	N	FENCE GATE,TYP A, DBL, 18.1-20.' OPENING
0550 60127	1	$2,500.00	$2,500.00	1.000	EA	N	FENCE GATE,TYP A,DBL, > THAN 30' OPENING
0550 60211	2	$865.00	$1,730.00	2.000	EA	N	FENCE GATE,TYP B,SGL, 0- 6.0' OPENING
0550 60212	1	$1,500.00	$4,500.00	3.000	EA	N	FENCE GATE,TYP B,SGL,6.1-12.0' OPENING
0550 60222	3	$1,337.78	$12,040.00	9.000	EA	N	FENCE GATE,TYP B, DBL, 6.1-12.0' OPENING
0550 60223	3	$2,023.36	$20,233.63	10.000	EA	N	FENCE GATE,TYP B, DBL,12.1-18.0' OPENING
0550 60224	5	$1,295.18	$22,018.11	17.000	EA	N	FENCE GATE,TYP B, DBL,18.1-20.0' OPENING
0550 60225	5	$2,356.67	$35,350.00	15.000	EA	N	FENCE GATE,TYP B, DBL, 20.1-24' OPENING
0550 60227	1	$6,300.00	$6,300.00	1.000	EA	N	FENCE GATE,TYP B,DBL, > THAN 30' OPENING
0550 60232	1	$1,200.00	$1,200.00	1.000	EA	N	FENCE GATE,TYP B,SLIDE/CANT,6.1-12'OPEN
0550 60233	4	$3,037.50	$18,225.00	6.000	EA	N	FENCE GATE,TYP B,SLIDE/CANT,12.1-18'OPEN
0550 60234	3	$2,334.00	$11,670.00	5.000	EA	N	FENCE GATE,TYP B,SLIDE/CANT,18.1-20'OPEN
0550 60235	2	$4,250.00	$8,500.00	2.000	EA	N	FENCE GATE,TYP B,SLIDE/CANT,20.1-24'OPEN
0550 60236	1	$3,700.00	$33,300.00	9.000	EA	N	FENCE GATE,TYP B,SLIDE/CANT,24.1-30'OPEN
0550 60925	2	$3,295.20	$16,476.00	5.000	EA	N	GATE, SPECIAL, DOUBLE, 20.1-24' OPENING
0550 60933	1	$6,558.00	$6,558.00	1.000	EA	N	GATE,SPECIAL,SLIDING/CANT, 12.1-18' OPEN
0550 60934	1	$7,580.00	$15,160.00	2.000	EA	N	FENCE GATE,SPL,SLIDE/CANT,18.1-20'OPEN
0550 60935	1	$7,500.00	$22,500.00	3.000	EA	N	FENCE GATE,SPL,SLIDE/CANT,20.1-24'OPEN
0555 1 1	52	$20.67	$3,389,539.19	163,946.000	LF	N	DIRECTIONAL BORE, LESS THAN 6"
0555 1 2	41	$24.95	$1,127,550.58	45,200.000	LF	N	DIRECTIONAL BORE, 6" TO < 12"
0555 1 3	2	$131.96	$47,770.00	362.000	LF	N	DIRECTIONAL BORE, 12" TO < 18"
0555 1 6	1	$802.00	$789,970.00	985.000	LF	N	DIRECTIONAL BORE, 36" TO < 48"
0556 1 2	3	$251.65	$124,065.00	493.000	LF	N	JACK AND BORE, CASE DIA 6"TO<12"
0556 1 4	4	$232.07	$381,760.70	1,645.000	LF	N	JACK AND BORE, CASE DIA 18"TO<24"

ATTACHMENT 14

Florida Department of Transportation
Item Average Unit Cost
From 2007/01/01 to 2007/12/31

Contract Type: ('CC') STATEWIDE
Displaying: VALID ITEMS WITH HITS
From: 0100 To: 1999999999

Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
0430200 40	1	$4,000.00	$12,000.00	3.000	EA	N	FLARED END SECTION, CONCRETE, 42"
0430200 42	2	$5,750.00	$17,250.00	3.000	EA	N	FLARED END SECTION, CONCRETE, 54"
0430600025	1	$4,564.37	$18,257.48	4.000	EA	N	U-ENDWALL, STD 260, 1:6 SLP, 18"
0430600125	1	$4,216.38	$4,216.38	1.000	EA	N	U-ENDWALL, STD 260, 1:4 SLP, 18"
0430602125	2	$3,665.38	$10,996.14	3.000	EA	N	U-ENDWALL,W \GRATE,STD 260,1:4 SLP,18"
0430602129	1	$4,700.00	$14,100.00	3.000	EA	N	U-ENDWALL,W \GRATE,STD 260,1:4 SLP,24"
0430610125	2	$1,471.90	$35,325.54	24.000	EA	N	U-ENDWALL,STD 261,1:4 SLP, 18"
0430610129	1	$1,399.78	$15,397.58	11.000	EA	N	U-ENDWALL,STD 261,1:4 SLP, 24"
0430610133	1	$1,507.45	$3,014.90	2.000	EA	N	U-ENDWALL,STD 261,1:4 SLP, 30"
0430610323	1	$1,000.00	$2,000.00	2.000	EA	N	U-ENDWALL,STD 261,1:2 SLP, 15"
0430611025	2	$3,030.53	$12,122.12	4.000	EA	N	U-ENDWALL,STD 261,BAFFLES,1:6 SLP, 18"
0430611125	5	$2,016.70	$78,651.31	39.000	EA	N	U-ENDWALL, BAFFLES,STD 261,1:4 SLP, 18"
0430611129	1	$2,800.00	$8,400.00	3.000	EA	N	U-ENDWALL, BAFFLES,STD 261,1:4 SLP, 24"
0430611133	1	$3,800.00	$3,800.00	1.000	EA	N	U-ENDWALL /BAFFLES,STD 261, 1:4 SLP,30"
0430611225	5	$4,376.26	$30,633.85	7.000	EA	N	U-ENDWALL, BAFFLES, STD 261,1:3 SLP,18"
0430611323	2	$2,000.00	$6,000.00	3.000	EA	N	U-ENDWALL, BAFFLES, STD 261,1:2 SLP,15"
0430611325	7	$2,467.42	$118,435.94	48.000	EA	N	U-ENDWALL, BAFFLES, STD 261,1:2 SLP,18"
0430611329	3	$3,280.00	$22,960.00	7.000	EA	N	U-ENDWALL, BAFFLES,STD 261,1:2 SLP,24"
0430611333	1	$2,128.26	$2,128.26	1.000	EA	N	U-ENDWALL, BAFFLES,STD 261,1:2 SLP,30"
0430612025	2	$3,838.33	$103,634.84	27.000	EA	N	U-ENDWALL, GRATE, STD 261,1:6 SLP,18"
0430612029	1	$5,349.09	$10,698.18	2.000	EA	N	U-ENDWALL, GRATE, STD 261,1:6 SLP,24"
0430612033	1	$4,500.00	$4,500.00	1.000	EA	N	U-ENDWALL, GRATE, STD 261,1:6 SLP, 30"
0430613025	1	$4,921.16	$4,921.16	1.000	EA	N	U-ENDWALL,BAF& GRATE,STD 261,1:6 SLP,18"
0430613029	1	$3,107.50	$3,107.50	1.000	EA	N	U-ENDWALL,BAF& GRATE,STD 261,1:6 SLP,24"
0430613125	1	$4,921.16	$4,921.16	1.000	EA	N	U-ENDWALL,BAF& GRATE,STD 261,1:4 SLP,18"
0430613133	2	$3,585.00	$14,340.00	4.000	EA	N	U-ENDWALL,BAF& GRATE,STD 261,1:4 SLP,30"
0430613225	1	$2,500.00	$2,500.00	1.000	EA	N	U-ENDWALL,BAF& GRATE,STD 261,1:3 SLP,18"
0430613233	1	$3,938.00	$3,938.00	1.000	EA	N	U-ENDWALL,BAF& GRATE,STD 261,1:3 SLP,30"
0430721425	2	$69.43	$90,741.65	1,307.000	LF	N	PI SLOT OR PERF CULV, OPTIONAL, 18" SS
0430721429	2	$74.97	$392,856.00	5,240.000	LF	N	PI SLOT OR PERF CULV, OPTIONAL, 24" SS
0430721433	1	$85.00	$222,870.00	2,622.000	LF	N	PI SLOT OR PERF CULV, OPTIONAL, 30" SS
0430721438	1	$93.00	$123,690.00	1,330.000	LF	N	PI SLOT OR PERF CULV, OPTIONAL, 36" SS
0430821 33	1	$535.00	$3,210.00	6.000	EA	N	CLEANING & SEALING EXIST PIPE JNT,30" SS
0430821 44	1	$2,500.00	$32,500.00	13.000	EA	N	CLEANING & SEALING EXIST PIPE JNT,66",SS
0430830	14	$280.74	$200,027.07	712.500	CY	N	PIPE FILLING AND PLUGGING

ATTACHMENT 15
1/3

Belen, Joyce

From: floridajetclean@tampabay.rr.com
Sent: Wednesday, July 23, 2008 1:21 PM
To: Belen, Joyce
Subject: Re: Citrus County Central Landfill
Attachments: SCS Citrus County Phase 3.doc

Importance: High

Please find our proposal attached. We are anticipating the need to use our normal high-pressure jetting equipment for the 8" lines and a larger machine, producing higher flows but less pressure, for the 24" pipes. As such, the price reflects the likely need to use both machines for the cleaning. We can re-evaluate and adjust once on site.

Thanks.

Ralph Calistri - Florida Jetclean
---- "Belen wrote:
> Ralph,
>
> I'm working on Financial Assurance cost estimates for Citrus County
> Central Landfill. Can you give me a maintenance cost to clean and
> videotape a total of 1,300 feet of 8" collection pipes and 500 feet of
> 24" HDPE risers? The permit requires this job to be done no later
> than August 1, 2009. Please contact me if you have further questions.
> Thank you.
>
>
> Joyce Belen, E.I.
>
> Staff Professional
>
>
>
> SCS ENGINEERS
>
> 4041 Park Oaks Blvd
>
> Suite 100
>
> Tampa, FL 33610
>
> Phone: (813) 621-0080
>
> Fax: (813) 623-6757
>
> E-mail: jbelen@scsengineers.com <mailto:rdever@scsengineers.com>
>
> http://www.scsengineers.com <http://www.scsengineers.com/>
>
>

ATTACHMENT 15

2/3

FLORIDA JETCLEAN

HIGH PRESSURE WATER JETTING – VACUUM EXTRACTION – PIPELINE TV INSPECTION - PIPE LOCATING – NO DIG REPAIRS

19019 Fern Meadow Loop
Lutz, FL 33558
www. floridajetclean.com

TEL : 800-226-8013
FAX : 813-926-4616

PROPOSAL

DATE : 7/23/2008
TO : Joyce Belen – SCS Engineers
FROM : Ralph Calistri (floridajetclean@tampabay.rr.com)
SUBJECT : Citrus County Landfill Phase 3 Expansion

Thank you for your inquiry. We confirm our capability and interest in carrying out this work for SCS Engineers at the Citrus County Landfill.

FLORIDA JETCLEAN specializes in leachate collection system maintenance and inspection, and has developed a considerable amount of specific expertise in this field over the last 12 years. Our company has worked at an extensive number of landfills in Florida, Georgia, the Carolinas, Delaware, and westward to Arkansas. We have worked with most engineering companies active in this field, and have also fostered excellent working relationships with the regulatory authorities. We use modified jetting equipment designed to achieve extended pipe distances found in landfill environments and our explosion proof camera equipment complies with OSHA and regulatory mandates for methane environments. Substantial references are available on request.

Based on the information provided in your email, we quote as follows:

High-pressure water-jetting and explosion-proof video-inspection of roughly 1,800' of new 8" & 24" leachate collection piping at the above location $ 9,900.00

The proposal is subject to the following :

- The above pipe cleaning covers normal routine silt removal. Pipes affected by heavy, irregular, silting may require additional hourly billing.
- An adequate, no charge, on site water supply for jetcleaning.
- Continuity of access allowing work to be carried out on a single mobilization
- Exposed and opened cleanouts/manholes at ground level
- Standby time chargeable at $200.00 per hour should delays not of our making delay progress e.g. bad weather, access problems, high leachate flow levels etc.
- Pricing is unrelated to actual or achieved footages but on the number of setups required and the time we anticipate being on site.
- Current technology limitations may preclude the use of tractor video systems (range 1250') in 8" lines restricted to cleanout access. If a push video system has to be used, we will be limited to a maximum 500' from each point of entry.

ATTACHMENT 15

3/3

- Our equipment and procedures fully meet OSHA and DEP requirements. In particular our video inspection equipment is certified Class 1, Division 1, Groups C & D (i.e. explosion proof). This is mandated in methane piping by OSHA.
- Video log and report together with video tapes will be provided after completion.

Regards,

Ralph Calistri – Florida Jetclean

ATTACHMENT 16

1/2

FLORIDA JETCLEAN

HIGH PRESSURE WATER JETTING – VACUUM EXTRACTION – PIPELINE TV INSPECTION - PIPE LOCATING – NO DIG REPAIRS

19019 Fern Meadow Loop
Lutz, FL 33558
www. floridajetclean.com

TEL : 800-226-8013
FAX : 813-926-4616

PROPOSAL

DATE : 7/23/2008
TO : Joyce Belen – SCS Engineers
FROM : Ralph Calistri (floridajetclean@tampabay.rr.com)
SUBJECT : Putnam County Landfill – Phase 2, Cell 3 Expansion

Thank you for your inquiry. We confirm our capability and interest in carrying out this work for SCS Engineers at the Putnam County Landfill.

FLORIDA JETCLEAN specializes in leachate collection system maintenance and inspection, and has developed a considerable amount of specific expertise in this field over the last 12 years. Our company has worked at an extensive number of landfills in Florida, Georgia, the Carolinas, Delaware, and westward to Arkansas. We have worked with most engineering companies active in this field, and have also fostered excellent working relationships with the regulatory authorities. We use modified jetting equipment designed to achieve extended pipe distances found in landfill environments and our explosion proof camera equipment complies with OSHA and regulatory mandates for methane environments. Substantial references are available on request.

Based on the information provided in your email, we quote as follows:

1) High-pressure water-jetting and explosion-proof video-inspection of roughly 8,374' of new 8" leachate collection piping at the above location $ 15,073.00

2) Vacuum truck to remove silt and debris from pump stations or sump areas upon completion (if required) $ 2,500.00 / day

The proposal is subject to the following :

- The above pipe cleaning covers normal routine silt removal. Pipes affected by heavy, irregular, silting may require additional hourly billing.
- An adequate, no charge, on site water supply for jetcleaning.
- No debris pumping included. Water generated by jetcleaning activities will be flushed downstream toward sump areas and pump stations. Vacuum extraction from these areas is available at additional charge designated above.
- Continuity of access allowing work to be carried out on a single mobilization
- Exposed and opened cleanouts/manholes at ground level

ATTACHMENT 16

2/2

- Standby time chargeable at $200.00 per hour should delays not of our making delay progress e.g. bad weather, access problems, high leachate flow levels etc.
- Pricing is unrelated to actual or achieved footages but on the number of setups required and the time we anticipate being on site.
- Current technology limitations may preclude the use of tractor video systems (range 1250') in 8" lines restricted to cleanout access. If a push video system has to be used, we will be limited to a maximum 500' from each point of entry.
- Our equipment and procedures fully meet OSHA and DEP requirements. In particular our video inspection equipment is certified Class 1, Division 1, Groups C & D (i.e. explosion proof). This is mandated in methane piping by OSHA.
- Video log and report together with video tapes will be provided after completion.

Regards - Ralph Calistri – Florida Jetclean

ATTACHMENT 17

HD HUSS Drilling

Client:SCS Engineers
Attn:Joyce Belen
Date:7/24/08
Fax / Email: (813)623-6757
Quote Page 1 of 1
Cost Estimate for drilling:Citrus County Landfill-Lecanto
HDI #0839-08

				EST /UNIT	PRICE	TOTAL
MOBILIZATION/DEMOBILIZATION			Lecanto			$ 600.00
***If rock is encountered an additional $20.00/ft will be charged**						
MONITORING WELLS (Includes: Screen, Riser, Seal & Grout)						
	Diameter 2" **(1x120')**	0 - 50'		50.0 /ft	24.00 /ft	$ 1,200.00
		50' - 100'		70.0 /ft	28.00 /ft	$ 1,960.00
STANDARD PENETRATION TESTING						
SPT	5' Interval	0 - 50'	**(NONE)**	0.0 /ft	10.00 /ft	$ -
		50' - 100'	**(NONE)**	0.0 /ft	14.00 /ft	$ -
SPT	Continuous	0 - 50'	**(NONE)**	0.0 /ft	16.00 /ft	$ -
		50 - 100'	**(NONE)**	0.0 /ft	20.00 /ft	$ -
AUGER BORINGS (S.Stem 3")				0.0 /ft	8.00 /ft	$ -
SURFACE CASING (6" PVC)				0.0 /ft	35.00 /ft	$ -
WELL COMPLETION OPTIONS						
12" Manhole Cover w/4" Concrete Square Pad				0.0 /ea	150.00 /ea	$ -
8" Manhole Cover w/4" Concrete Square Pad				0.0 /ea	125.00 /ea	$ -
4" PVC Concrete Filled Bollards				4.0 /ea	75.00 /ea	$ 300.00
4" Square Protective Casing w/Square Pad				1.0 /ea	200.00 /ea	$ 200.00
2" Sanitary Locking Seals				1.0 /ea	25.00 /ea	$ 25.00
ADDITIONAL ITEMS						
Drilling by the Hour				0.0 /hr	225.00 /hr	$ -
Well Development Moyno-Rig pump or Sub.			**(ESTIMATE)**	2.0 /hr.	175.00 /hr.	$ 350.00
Steam Decontamination			**(ESTIMATE)**	1.0 /hr.	175.00 /hr.	$ 175.00
Jack Hammer Rental				0.0 /dy	115.00 /dy	$ -
Stand By Time				0.0 /hr.	175.00 /hr.	$ -
Site Clean Up/Drumming Cuttings			**(ESTIMATE)**	0.0 /hr.	175.00 /hr.	$ -
Concrete/Asphalt Cutting & Removal				0.0 /hr.	175.00 /hr.	$ -
Drums (DOT 17H)			**(ESTIMATE)**	0.0 /ea.	50.00 /ea.	$ -
Hotel & Per Diem (3 man crew)				1.0 /dy	300.00 /dy	$ 300.00
Permits **(S.W.F.W.M.D)**				1.0 /ea	75.00 /ea	$ 75.00
				Total Estimate		$ 5,185.00

*This bid is an estimate only and the invoice will reflect the actual work performed.

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ATTACHMENT 18

HD HUSS Drilling

Client:SCS Engineers
Attn:Joyce Belen
Date:7/24/08
Fax / Email: (813)623-6757
Quote Page 1 of 1
Cost Estimate for drilling:Citrus County Landfill-Lecanto
HDI #0835-08

				EST /UNIT	PRICE	TOTAL	
MOBILIZATION/DEMOBILIZATION				Lecanto		$	600.00
MONITORING PROBE (Includes: Screen, Riser, Seal & Grout)							
Diameter 1" **(1x80')**				80.0 /ft	20.00 /ft	$	1,600.00
STANDARD PENETRATION TESTING							
SPT	5' Interval	0 - 50'	**(NONE)**	0.0 /ft	10.00 /ft	$	-
		50' - 100'	**(NONE)**	0.0 /ft	14.00 /ft	$	-
SPT	Continuous	0 - 50'	**(NONE)**	0.0 /ft	16.00 /ft	$	-
		50 - 100'	**(NONE)**	0.0 /ft	20.00 /ft	$	-
AUGER BORINGS (S.Stem 3")				0.0 /ft	8.00 /ft	$	-
SURFACE CASING (6" PVC)				0.0 /ft	35.00 /ft	$	-
WELL COMPLETION OPTIONS							
12" Manhole Cover w/4" Concrete Square Pad				0.0 /ea	150.00 /ea	$	-
8" Manhole Cover w/4" Concrete Square Pad				0.0 /ea	125.00 /ea	$	-
4" PVC Concrete Filled Bollards				4.0 /ea	75.00 /ea	$	300.00
6" Square Protective Casing w/Square Pad				1.0 /ea	250.00 /ea	$	250.00
1" Seals				1.0 /ea	25.00 /ea	$	25.00
ADDITIONAL ITEMS							
Drilling by the Hour				0.0 /hr	225.00 /hr	$	-
Well Development Moyno-Rig pump or Sub.			**(ESTIMATE)**	0.0 /hr.	175.00 /hr.	$	-
Steam Decontamination			**(ESTIMATE)**	0.0 /hr.	175.00 /hr.	$	-
Jack Hammer Rental				0.0 /dy	115.00 /dy	$	-
Stand By Time				0.0 /hr.	175.00 /hr.	$	-
Site Clean Up/Drumming Cuttings			**(ESTIMATE)**	0.0 /hr.	175.00 /hr.	$	-
Concrete/Asphalt Cutting & Removal				0.0 /hr.	175.00 /hr.	$	-
Drums (DOT 17H)			**(ESTIMATE)**	0.0 /ea.	50.00 /ea.	$	-
Hotel & Per Diem (3 man crew)				0.0 /dy	300.00 /dy	$	-
Permits **(S.W.F.W.M.D)**				0.0 /ea	75.00 /ea	$	-
				Total Estimate		$	2,775.00

*This bid is an estimate only and the invoice will reflect the actual work performed.

File Name: Bid-Short2.xls

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ATTACHMENT 19

Belen, Joyce

From: Bramlett, Dominique
Sent: Friday, July 25, 2008 4:26 PM
To: Belen, Joyce
Subject: FW: leachate costs

-----Original Message-----
From: Susan Metcalfe [mailto:Susan.Metcalfe@bocc.citrus.fl.us]
Sent: Friday, July 25, 2008 3:20 PM
To: Bramlett, Dominique
Subject: RE: leachate costs

Dominique
Site Specific Costs - FDEP form item 13
Waste Tire Facility
This is to clean out the storage area one time. Maximum storage = 115 tons. Current bid price (Wheelabrator 07/08) $85/ton . Line item total $9775.

Leachate Disposal 1 year.
I don't have the leachate generation numbers for after closure, but the rates I gave you yesterday are correct. 12 x $698.50 (CC Utilities monthly base rate charge) + hauling x gallons at $0.05 per gallon (Clean Harbors 7/07 bid price good for 3 years) + disposal x gallons at $0.0072 per gallon.

Leachate collection/treatment system maintenance - FDEP form item 5 I don't remember why we had an additional amount for disposal here. Please do the math as described above and maybe we will find that they wanted the transport in item 13 and disposal in item 5.

Site Specific Costs - FDEP form item 16
Ground Water Remediation - as I recall we decided not to include the costs of well construction, initial sampling and Site Assessment Report prep here. This was the amount to add for routine monitoring costs for 2 more wells to the existing number of wells. Do we have the current correct # (14 wells that require sampling) in the form Section VI Item 1? If so, I would leave the +2 here in remediation at a unit cost of (JEA is calculating this and will have it by early next week). I'm sure that the unit cost in the last form is NOT correct.

(That unit cost should be applied in Section VI Item 1 to be consistent)

Susie

LARGE NUMBER

OF MAPS

SCANNED

SEPARATELY