Making Our mark for you.
BLUE RIDGE PAPER PRODUCTS INC.

October 8, 1999

Ms Sherri Coghill
North Carolina Department of
Environment and Natural Resources
Solid Waste Section
401 Oberlin Road
Raleigh, North Carolina 27605

RE: Landfill No. 6, Area A East, Cell V

Dear Ms. Coghill:

Blue Ridge Paper Products (BRPP) is requesting approval from the North Carolina Department of Environment and Natural Resources (NCDENR) to expand the landfill operations in Landfill No. 6, Area A East into Cell V. Cell V will be operated as an above-grade fill unlike previous cell operations at Landfill No. 6 that were conducted below the rim elevation of the dike. In preparing this request, BRPP retained the engineering services of Sevee & Maher Engineers, Inc. from Cumberland, Maine. SME has designed and permitted over a dozen paper mill waste landfills utilizing above-grade filling. The landfills are located primarily in the northeastern part of the United States.

The documents enclosed include a geotechnical evaluation and a revised operations manual for Area A East. The geotechnical evaluation was performed on the waste streams, i.e., paper mill sludge, lime mud, ash, etc., in the final landfill configuration. The results of the study indicate that the safety factors calculated for the waste slopes above the rim of Cells III and IV in Area A East meet or exceed US EPA Subtitle D recommended minimum factors of safety. Operation of Cell V will follow the current waste placement practice and include phased closure in order to minimize leachate generation.

If you have questions during your review of the enclosed material, please do not hesitate to call me at 828-646-2028.

Sincerely,

Jim Giauque

Attachments
file:cellv109.doc

Copy: Derric Brown
Guy Cote
Bob Williams

Carmen Johnson
44-06 4/12/12

LANDFILL STABILITY EVALUATION FOR VERTICAL EXPANSIONS AREA 6A-EAST

BLUE RIDGE PAPER PRODUCTS, INC. CANTON, NORTH CAROLINA

OCTOBER 1999

NORTH CAROLINA
PROFESSIONAL
SEAL
205[illegible]
ENGINEER
JOHN E. SEVEE

Prepared by

Sevee & Maher Engineers, Inc.
Cumberland Center, Maine

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LANDFILL STABILITY EVALUATION FOR VERTICAL EXPANSION
AREA 6A-EAST
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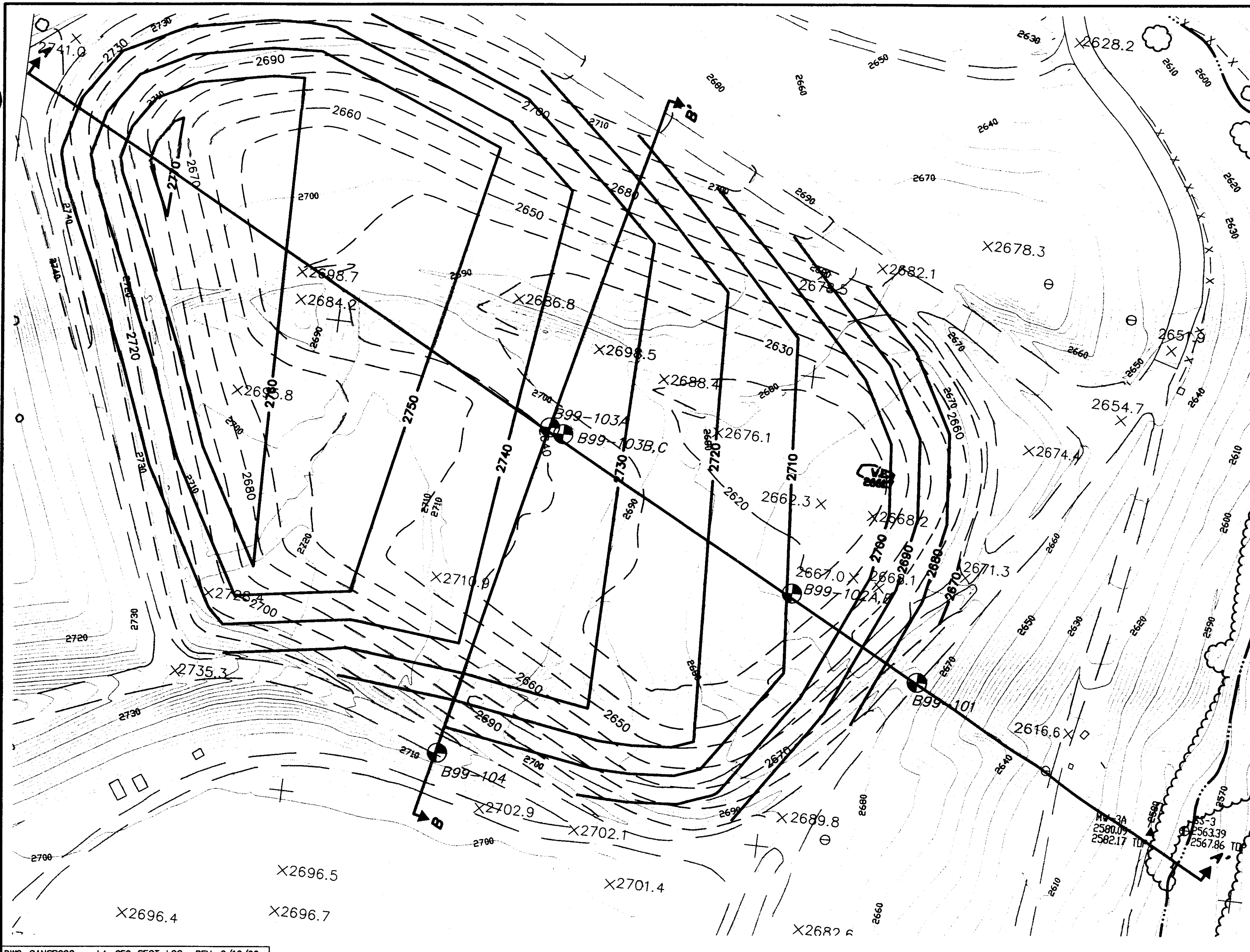
CANTON, NORTH CAROLINA

1.0 INTRODUCTION

Blue Ridge Paper Products, Inc. owns and operates a 240-acre landfill referred to as Landfill #6 in Canton, North Carolina. The landfill is used for the disposal of sludge, lime mud, fly ash, and wood wastes into discrete cells designated A, B, C, F, G, and H. In Areas B, C, F, G and H, the operating method was to dump the waste from the top perimeter of each cell. This resulted in a waste mass which was generally not well drained, with relatively low shear strength. The relatively low shear strength was due to the lack of drainage within the waste and the inability to compact the waste during placement. Because of these conditions, Areas B, C, F, G, and H at the Landfill #6 facility were designed to be filled with waste to no higher than the landfill perimeter dikes.

Area 6A-East, although permitted for final waste grades rising only to the level of the perimeter dikes, has been operated from the outset using practices that keep the waste mass well drained and compacted. The 60-mil HDPE lined area contains a leachate collection system that effectively dewaters the operating area, allowing the deposition of waste directly within the cells. The operation of trucks, crawler tractors, and other equipment on top of the waste material further compacts and consolidates the waste. The waste, therefore, exhibits higher shear strengths than had been typically found in previously operated areas at the Landfill #6 facility. Blue Ridge Paper Products, Inc. retained Sevee & Maher Engineers, Inc. (SME) to evaluate the stability of a redesigned Area 6A-East, with a cell, Cell V, which will be extended vertically above the existing perimeter dikes, with waste sideslopes rising at 3 horizontal to 1 vertical, to a maximum final grade elevation of 2770 feet National Geodetic Vertical Datum (NGVD). The proposed final grading plan of Area 6A-East with Cell V is presented as Figure 1. Components of this stability evaluation include a field exploration program, laboratory testing of waste and



LEGEND

PROPOSED FINAL GRADE CONTOURS

BASE GRADE CONTOUR

EXISTING GRADE CONTOUR BASED ON 5/4/99 AERIAL SURVEY

B99-101 BORING LOCATION

A A' CROSS-SECTION LOCATION

NOTES

INTERPRETIVE GEOTECHNICAL PROFILES SHOWN ON FIGURE 2.

STABILITY CROSS-SECTION A-A' SHOWN ON FIGURE 3.

FIGURE 1
PROFILE AND
CROSS-SECTION LOCATION PLAN
LANDFILL 6A EAST
BLUE RIDGE PAPER PRODUCTS, INC.
CANTON, NORTH CAROLINA

SME
Sevee & Maher Engineers, Inc.

DWG: CANSP992 LA. CFG. SECT-LOC REV. 9/10/99

G:\CPC\NC\volumes\acad\99apr\Cansp992.dwg Fri Sep 10 10:54:00 1999 soil, review of previous site geotechnical evaluations, interpretation of subsurface conditions, and the stability analysis.

In addition to SME's present geotechnical evaluation of the No. 6 Landfill, several other geotechnical investigations have been conducted at the Blue Ridge Paper Products, Inc. facility. Testing has been performed by SME and others on the site wastes, foundation and dike soils. Data from previous SME investigations and those conducted by others were used to augment data collected during SME's current investigation, namely:

- Revised Report of Geotechnical Exploration and Evaluation and Conceptual Site Development Recommendations, Landfill No. 6 (Law, 1982)
- Geotechnical Report for Landfill No. 6 Expansion Area A (Sirrine, 1989)
- Operations Manual, Champion International Corporation Landfill No. 6 East, Canton, North Carolina, (SME, 1995a)
- Landfill No. 6 Closure Report, Field and Laboratory Investigation Report (SME, 1995b)

2.0 FIELD INVESTIGATION

Between June 17, 1999 and June 21, 1999, four borings were drilled within and around Area 6A-East. These boring locations were designated B99-101 through B99-104. Borings B99-101 and B99-104 were drilled into the perimeter dike on the east and south sides, respectively, of Area 6A-East. Borings B99-102 and B99-103 were drilled in the Area 6A-East waste. Drilling was terminated above the existing liner system in Area 6A-East. These borings provided (1) landfill waste and dike material samples for laboratory physical analysis and visual examinations; (2) in-place shear strength data of the waste; (4) standard penetration test (SPT) data of the waste and dike materials; and (4) characterization of the piezometric conditions within the waste and perimeter dikes.

The drilling was performed by Froehling and Robertson, Inc. of Asheville, North Carolina and was monitored by SME. The borings were made using hollow-stem auger casing. Logs of the boring and piezometer installations are presented in Appendix A. The locations of these borings are shown in Figure 1. Samples of the landfill perimeter dikes were collected using split-spoon sampling methods (ASTM Method D 1586). Representative soil samples were selected for moisture content and direct shear testing. The landfill waste samples were collected from the borings using both split-spoon sampling techniques (ASTM Method D 1586), and thin-walled (Shelby) tubes (ASTM Method D 1587). Typically, as each boring advanced through the waste, sampling would alternate between thin-walled tube sampling, split-spoon sampling, and field vane shear testing (ASTM Method D-2573). The results of these tests are included on the boring logs in Appendix A. Representative waste samples were selected for moisture content, ash content, density determination, and consolidated-undrained triaxial strength testing.

Piezometers installed in the borings consisted of 3/4-inch diameter PVC, with a slotted screen section placed at the bottom of the piezometer standpipe. The borehole annulus outside the screens were backfilled with a uniformly graded filter sand. Above each screen sandpack, a bentonite chip seal and a bentonite grout was used to isolate the screen in the borehole and prevent surface water from hydraulically short-circuiting the well. Seven piezometers (B99-101, B99-102A, B99-102B, B99-103A, B99-103B, B99-103C, and B99-104) were installed in the borings to measure water levels in the waste and perimeter dikes. At the waste boring locations (B99-102 and B99-103) multiple piezometers were installed to evaluate piezometric conditions at various depths within the waste. Piezometers B99-102A and B99-102B were installed at boring B99-102, and piezometers B99-103A, B99-103B, and boring B99-103C were installed at B99-103. The letter suffixes for piezometers indicate the relative depth of the well: "A" being the deepest instrument and "B" being shallower than "A", etc. Only single piezometers were installed in the landfill perimeter dikes. It became evident during drilling that a water table did not exist within the dikes and that multiple piezometers were unnecessary at each dike location.

Water levels were measured in the piezometers by Blue Ridge Paper Products, Inc. personnel after their installation for a period from May 25, 1999 to June 11, 1999. After stabilizing, four of the seven piezometers were dry including the two piezometers installed in the perimeter dikes. Piezometers B99-102B, B99-103B, and B99-103C each had a measurable water level located at the approximate screen depth. The water level data collected from the piezometers is presented in Appendix B.

3.0 LABORATORY INVESTIGATION

The borings indicated that the predominant waste materials in Area 6A-East consist of papermill sludge mixed with fly ash and lime mud along with occasional wood chips. The lime mud was both mixed with the sludge and ash, as well as placed in distinct layers. Stone drainage layers were also present, and generally occurred at 10-foot intervals within the waste. Furthermore, the borings located on the perimeter dikes encountered a uniform, medium dense, micaceous silty sand with occasional gravel-sized particles. Testing was performed on selected waste and dike samples in SME's geotechnical laboratory in Cumberland, Maine.

Total unit weights of the waste were measured on thin-walled (Shelby tubes) samples. The wastes were variable but were consistent with the reported landfill waste stream. The wastes in the tube samples consisted of various combinations of sludge mixed with ash, sludge mixed with lime mud, layers of mixed sludge and lime mud, with occasional gravel and wood chips. The total unit weight of the wastes ranged from approximately 70 to 101 pounds per cubic foot (pcf), with an arithmetic average of approximately 80 pcf.

The water content of the waste samples collected ranged from about 51 to 165 percent. The greater water contents were associated with the sludge, whereas the lower water contents were generally associated with the ash and lime mud. Total unit weight was back-calculated using the measured water contents of the waste (assuming saturation) and specific gravity data previously collected on the waste in SME's geotechnical laboratory (SME, 1995b). The average total unit weight of the waste calculated using this method was about 88 pcf. This is about ten percent greater than the average value measured from the Shelby tube samples. The results of the unit weight determination and water content testing, along with data from specific gravity testing performed in 1995, are presented in Appendix C.

Shear strength of the mixed ash, sludge, and lime mud was measured using isotropically consolidated, undrained, triaxial tests with pore pressure measurement (CIUC). The results of the tests are included in Appendix C. CIUC testing of two sludge/ash samples resulted in effective friction angles of about 46 and 58 degrees, assuming no cohesion. A CIUC test performed on a lime mud sample resulted in an effective friction angle of about 40 degrees, assuming no cohesion. These values are generally consistent with previous waste shear strength testing which has shown effective friction angles ranging from about 36 to 45 degrees (Law, 1982; SME, 1995b).

Shear strength of the dike soil was measured using direct simple shear testing on two composite samples from boring B99-101. The soils in B99-101 were representative of the dike materials found in both borings located in the dike. This testing was performed in both a dry and wet condition. The dry condition was intended to simulate the existing field conditions and the wet test as a check of shear strength for a saturated condition due to the silty nature of the dike soil. This testing resulted in effective friction angles of about 40 degrees for the saturated sample. The dry sample was assumed to have no cohesion, which resulted in an apparent bi-modal strength envelope. The results of this testing is presented in Appendix C. These results are generally consistent with previous dike soil strength testing which indicate a range of effective friction angles of about 30 to 40 degrees (Sirrine, 1989; Law, 1982).

4.0 STABILITY EVALUATION

4.1 Selection of Input Parameters

4.1.1 Landfill Wastes. The relevant stability geotechnical properties for the waste were selected based on the laboratory testing reported herein, as well as historical data as discussed in Section 1.0 herein. The total unit weight and effective strength data are tabularized on Table D-1 in Appendix D. The selected effective shear strength of the waste is graphically presented relative to the rest of the available test data in Figure D-1 in Appendix D. The properties selected for the waste were: an average total unit weight of 90 pcf and an average effective friction angle of 36 degrees with no cohesion. Both of these values are conservative estimates based on SME's laboratory testing and on the historical values presented by others.

4.1.2 Perimeter Dikes. The geotechnical data collected on the dike soils from this and previous investigations is tabularized on Table D-2 in Appendix D. The direct shear data is plotted in Figure D-2 of Appendix D, along with available data from previous investigations of borrow source material for the perimeter dike. The geotechnical properties selected for the perimeter dikes were a total unit weight of 120 pcf and a bi-modal effective shear strength envelope. This bimodal shear strength envelope is equivalent to an effective friction angle of 38 degrees with no cohesion, for normal pressures less than 2,200 pounds per square foot (psf), and an effective friction angle of 34 degrees with 260 psf cohesion for normal pressures greater than 2,200 psf. This strength envelope is based on direct shear testing of the dike soils.

4.1.3 Foundation Materials. The foundation soils were assumed to have a slightly lower friction angle than the dike soils since they were not manually compacted. The total unit weight and effective friction angles were selected based on undisturbed tube samples of foundation soils tested by Sirrine, 1989. A total unit weight of 115 pcf and an effective friction angle of 31.5 degrees with no cohesion was selected for use in the stability analysis. The data is graphically presented in Figure D-3, and is tabularized on Table D-3, both in Appendix D.

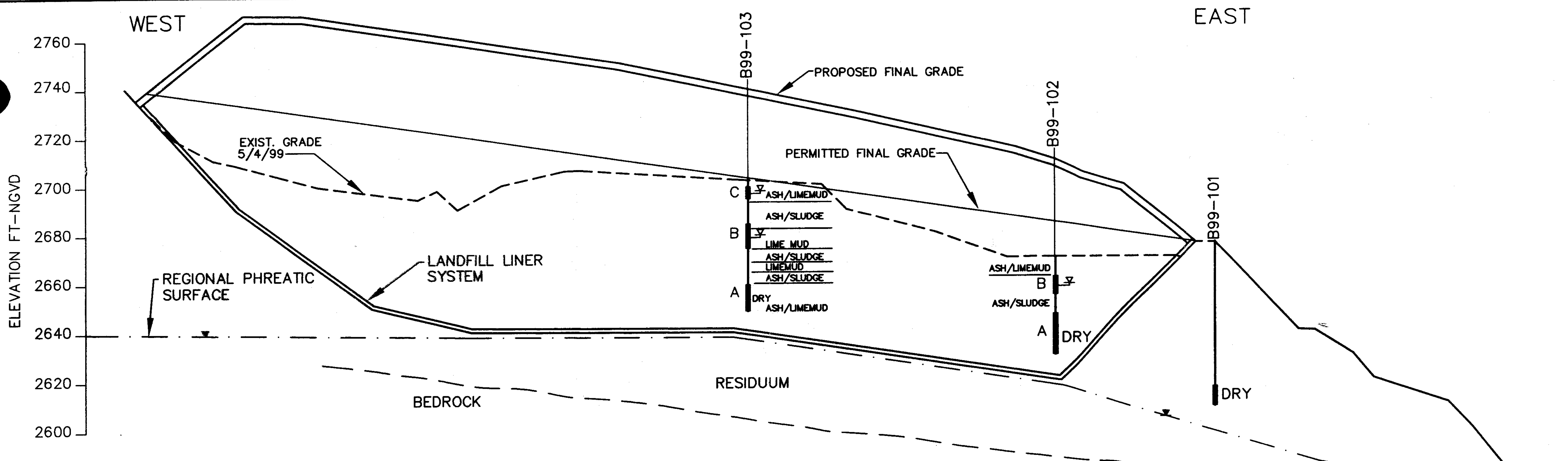
4.1.4 Soil Cover. The soil cover was estimated to have an effective friction angle of 30 degrees with no cohesion and was assumed to have a unit weight of 120 pcf. The shear strength is based on the dike soil testing, since a similar soil is envisioned for the cover.

4.1.5 Piezometric Conditions. A regional phreatic surface, based on water level data presented by Sirrine, 1989 and Law, 1982, was used to develop a groundwater phreatic surface (i.e., water table) in the foundation soils. The dikes were observed to be dry, which is consistent with Area 6A-East being lined and, also, with the Sirrine and Law data. For the stability analysis it was assumed that the phreatic surface in the foundation soils would be at the base of Area 6A-East.

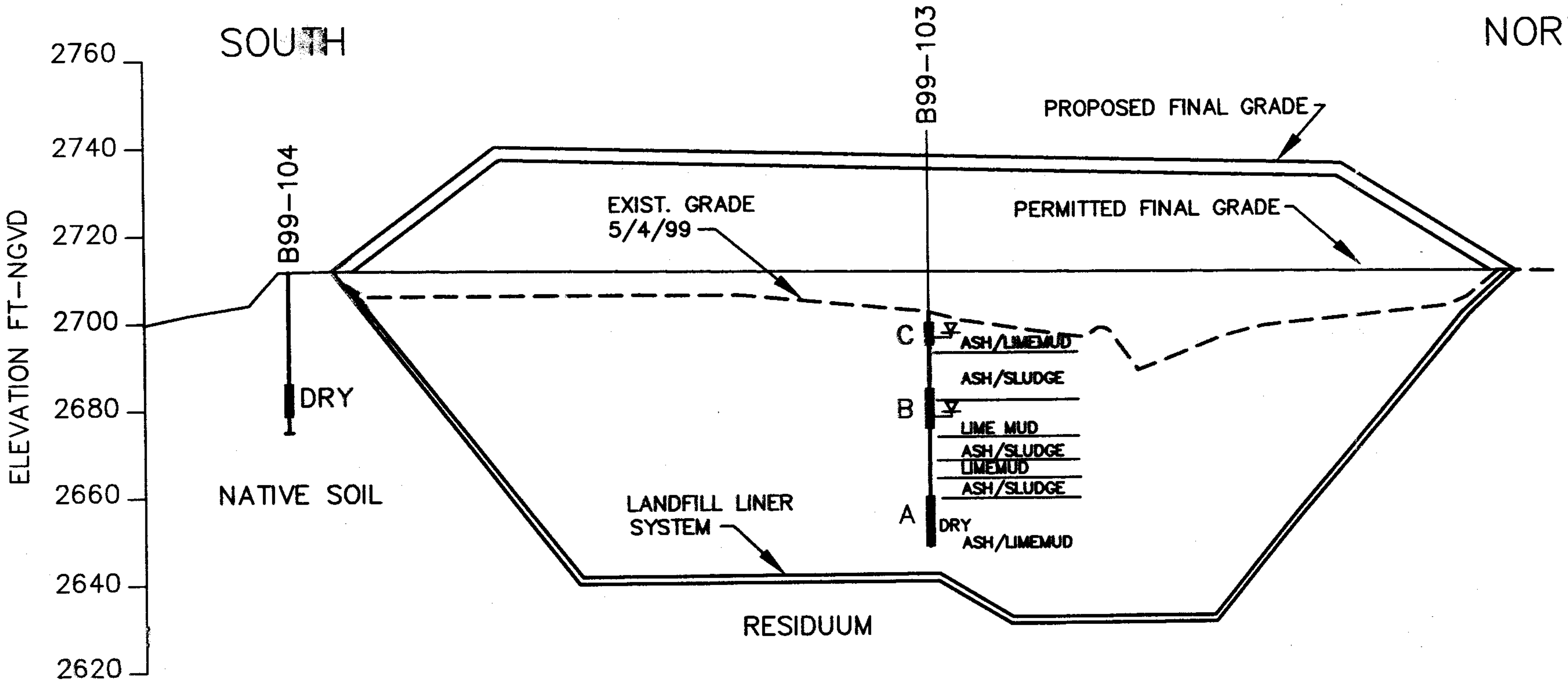
The waste piezometric surfaces in Area 6A-East were based on the recently placed piezometers (B99-101 through B99-104). As shown on Figure 2, two of the five piezometers in the waste are dry and three of the piezometers have a liquid surface that is approximately at the level of the piezometer screen. In order to model this drainage condition in the stability analysis, the waste was discretized in layers with multiple piezometric surfaces. Using this method, the waste at various depths would be affected by different piezometric conditions depending on depth throughout the landfill.

4.2 Selection of Critical Stability Cross-Section

One cross-section (Cross-Section A-A') was selected as representative of the worst-case geometry for Area 6A-East, relative to slope stability. This cross-section is presented as Figure 3. Cross-Section A-A' was selected as critical for the following reasons: (1) it passes through the area with the greatest proposed waste thickness and steepest sloping base grades; and (2) the outboard portion of the perimeter dike in this location has the greatest vertical relief between its top, at Elevation 2678 feet NGVD, and its toe, at Elevation 2560 feet NGVD. Based on the Area 6A-East geometry, other cross-sections would result in higher factors-of-safety than Cross-Section A-A'.



PROFILE A–A'



PROFILE B–B'

NOTES

VERTICAL EXAGGERATION OF GEOTECHNICAL PROFILES IS 5 TO 2.

GEOTECHNICAL PROFILES REPRESENT AN INTERPRETATION OF AVAILABLE BORING DATA, WATER LEVEL MEASUREMENTS AND FIELD OBSERVATIONS. CONDITIONS BETWEEN DATA POINTS MAY VARY FROM THAT SHOWN. GEOTECHNICAL PROFILES SHOULD NOT BE USED FOR DESIGN OR QUANTITY TAKE-OFFS.

SEE FIGURE 1 FOR LOCATION OF GEOTECHNICAL PROFILES.

LEGEND

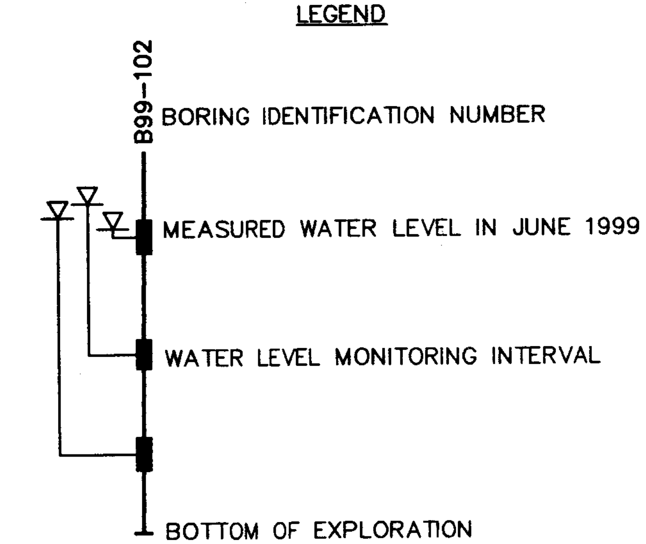


FIGURE 2
INTERPRETIVE GEOTECHNICAL PROFILES
A–A' AND B–B'
LANDFILL 6A–EAST
BLUE RIDGE PAPER PRODUCTS, INC.
CANTON, NORTH CAROLINA

SME
Sevee & Maher Engineers, Inc.

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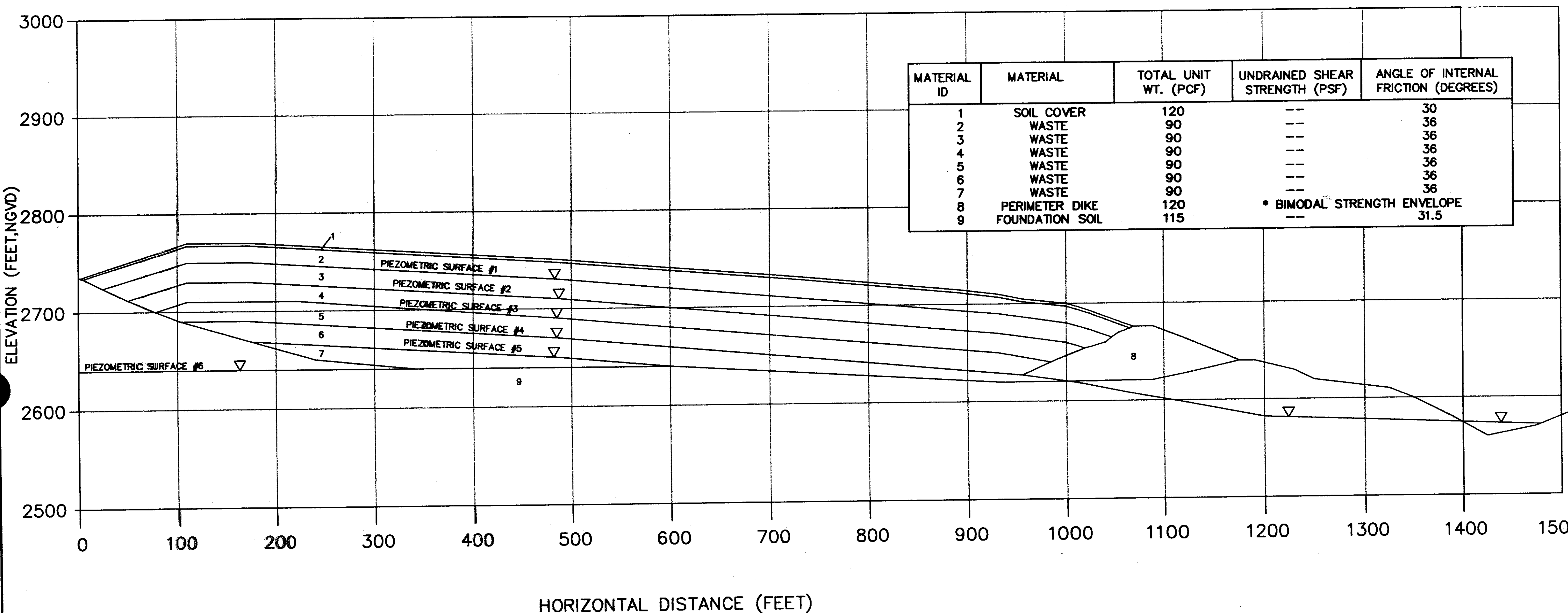

MATERIAL ID	MATERIAL	TOTAL UNIT WT. (PCF)	UNDRAINED SHEAR STRENGTH (PSF)	ANGLE OF INTERNAL FRICTION (DEGREES)
1	SOIL COVER	120	--	30
2	WASTE	90	--	36
3	WASTE	90	--	36
4	WASTE	90	--	36
5	WASTE	90	--	36
6	WASTE	90	--	36
7	WASTE	90	--	36
8	PERIMETER DIKE	120	* BIMODAL STRENGTH ENVELOPE	
9	FOUNDATION SOIL	115	--	31.5

▽ PIEZOMETRIC SURFACE

* SEE FIGURE D-2 IN APPENDIX D

SEE FIGURE 1 FOR LOCATION OF CROSS-SECTION A-A'

FIGURE 3
STABILITY CROSS SECTION A-A'
LANDFILL 6A-EAST
BLUE RIDGE PAPER PRODUCTS, INC.
CANTON, NORTH CAROLINA

SME
Sevee & Maher Engineers, Inc.

DWG: STAB-SECT LA. CFG. REV. 10/6/99

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4.3 Stability Analyses

Effective stress conditions were used in the stability analysis. As described above, shear strengths were selected from the testing of the waste and dike materials. The piezometers installed in the waste and perimeter dike allowed application of piezometric conditions necessary for the effective stress analysis. SME performed both static (i.e., non-earthquake) and seismic (i.e., earthquake) stability analysis for the proposed final grading after closure of Area 6A-East. The seismic analysis consisted of a pseudo-static analysis, in which a horizontal force is applied to the static model in order to simulate an earthquake acceleration. The seismic stability analyses followed the approach outlined in U.S.EPA Subtitle D. Based on the work of Hynes and Franklin, 1984, for a factor of safety greater than or equal to 1.0, it appears that the maximum value of the seismic coefficient to be used in the pseudo-static analysis can be one-half the maximum acceleration determined at the base of the landfill in order to keep permanent cover and embankment deformations less than 12 inches after an earthquake. Six to 12 inches of seismically induced downslope displacement is generally considered tolerable in the current design of landfill liners (Seed and Bonaparte, 1992). The maximum horizontal seismic acceleration at the Area 6A-East site was obtained from Algermissen, et al, 1990. This map provides a maximum acceleration at the bedrock surface of 0.26g in the western North Carolina region, with a 90 percent probability of not being exceeded in 250 years. Based on Hynes and Franklin, 1984, the seismic coefficient to be used in the pseudo-static stability analysis is one-half of 0.26g or 0.13g.

The results of these analyses are included in Appendix E and indicate adequate factors of safety for the proposed final grading configuration. Factors of safety were calculated for two failure scenarios: (1) passing through the waste alone; and (2) passing through the waste, perimeter dike and foundation soil. Minimum factors of safety for the two failure scenarios described above were 2.5 and 1.9, respectively. For the seismic case, minimum factors of safety were 1.7 and 1.3 for the waste failure and waste/dike/foundation failure scenario, respectively. Generally, factors of safety greater than 1.5 for static cases and 1.0 for seismic cases are considered adequate by the professional engineering community. These results meet U.S.EPA Subtitle D recommended minimum factors of safety. Since the seismic factors of safety exceed 1.0, permanent seismic deformations are expected to be satisfactory and will not result in damage to the leachate collection system, liner or landfill slopes (Seed and Bonaparte, 1992).

The infinite-slope case (Lambe and Whitman, 1969) was used to check the stability of the face of the closed landfill and cover. Based on the selected shear strengths, and assuming no seepage on the landfill slope faces, because of the landfill's internal drainage and waste placement procedures, a minimum factor of safety of 1.7 is calculated. This is greater than the required minimum factor of safety of 1.5 and is therefore adequate. This calculation is provided in Appendix E.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the observations made at the landfill, interpretation of the available field and laboratory test data, and the results of the slope stability evaluation completed for this report, the following conclusions have been reached.

- The results of the stability analyses conducted for the proposed final grading plan for the Area 6A-East Landfill exceed generally accepted safety factor requirements for the worst-case stability cross-section analyzed. Accordingly, it is concluded that stable slope, foundation, and waste conditions will be maintained with the proposed final grades and waste streams as presented in this report. Furthermore, the results conform to Subtitle D slope stability requirements.

- Future wastes delivered to the landfill are assumed to consist mainly of the same sludge, ash, and lime mud as has historically been placed in Area 6A-East. It is recommended that if the future waste stream changes in strength or character significantly from that described within this report, that a reevaluation of the landfill stability be conducted.

- It is recommended that mixing of the ash and sludge continue during landfilling operations to maintain stability and otherwise follow the recommendations set forth in the Operations Manual, including the placement of any lower strength waste within the interior portion of the landfill away from the exterior slope faces. A revised Operations Manual including Cell V is attached as Appendix F.

APPENDIX A

BORING LOGS

PROJECT [illegible]	JOB NO. 99063	BORING NO [illegible]
DATE COMPLETED 19 MAY 99	DATE WELLS INSTALLED 19 MAY 99	DRILLING METHOD H.S.A.
GROUND SURFACE ELEVATION (FT) 2701.2	DRILLING CONTRACTOR F&R DRILLING	LOGGED BY EJL
BOREHOLE DIAMETER (IN) 8"	ROCK CORE DIAMETER (IN.) ——	SHEET 1 OF 2

DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPTION	N (BLOWS/FT)	Su_v (PSF)	W.C. (%)	OC (%)	γ_T PCF	INSTRUMENT LOG
								STICK UP 1.35
		1.5 DRAINAGE STONE / STONE						Bent Pellets 2.0
5	S1 R:20"	Blue green Lime Mud w/ black ash	2		60.4			
	VANE	8'		900/342				
10	U1	— — — — —			139**		71	Bentonite grout, pellets, Sand, and Cuttings
15	S2 R:14"	BLACK Sandy SLUDGE w/ black ash	2		146.0	42		
	VANE	18' — — — — —		2020/777				
20	U2	DRAINAGE STONE; NOTE: BOTTOM OF TUBE BENT; ASH and LIME MUD PRESENT @ BOTTOM OF TUBE						
25	S3 R:18"	Blue green LIME MUD trace black ash pockets (MOIST)	2		55.6			
	VANE	28' — — — — —; NOTE: BENT VANES ON SHEAR VANE		*3760/932				Filter SAND 29.0 30.0
30	U3	BLACK SLUDGE and ASH w/ wood chips; — — — — —			138**		~10	
35	S4 R:24"	Blue green LIME MUD (WET)	3		59.0			Bentonite grout.
	VANE	38' — — — — —		2890/839				
40	U4	SLUDGE and ASH; — — — — —; LIME MUD			55**		101	40.5 Bentonite pellets 42.5
45	S5 R:0	PLUG OF WOOD @ TIP OF SPOON	13					Filter Sand
50	S6 R:15	Blue green Lime Mud w/ black ash	7		60.5			
	VANE	51'		*5440/1740				Bot of Piezo @ 49.5'
		WASTE; B.O.E @ 53.0' No REFUSAL						BOE = 53
55								

NOTES γ_T = TOTAL UNIT WEIGHT BASED ON TUBE OPENINGS

Well Construction Consisting of 3/4" dia PVC w/ 5' Slotted Screen

Bore hole caving in upon Auger Removal @ 28'

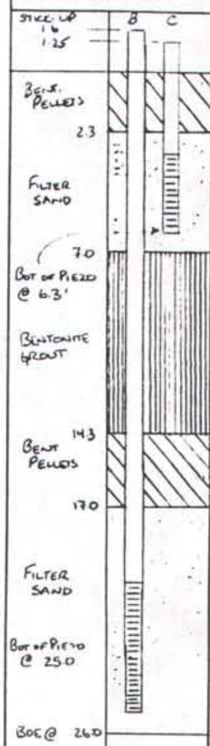
* Bent Vanes on Shear Vane upon Removal

[illegible]

PROJECT BLUE RIDGE PAPER PRODUCTS	JOB NO. 14063	BORING NO. B99-103 B, C
DATE COMPLETED 20 MAI 99	DATE WELLS INSTALLED 20 MAI 99	DRILLING METHOD HSA
GROUND SURFACE ELEVATION (FT)	DRILLING CONTRACTOR F&R DRILLING	LOGGED BY EJL
BOREHOLE DIAMETER (IN) 8"	ROCK CORE DIAMETER (IN.) —	SHEET 2 OF 2

DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPTION					
5							
		SEE PAGE 1 FOR SUBSURFACE DETAILS.					
10							
15							
20							
25							
30							

INSTRUMENT LOG



NOTES

SET OVER ~ 5' AND RE-AUGER HOLE FOR B99-103 B+C PIEZO. INSTALLATION.

PIEZO INSTALLATION CONSISTING OF 3/4" DIA PVC w/ 5' AND 3' SLOTTED SCREEN INTERVAL

PROJECT [illegible] Paper Products	JOB NO. 99063	BORING NO. [illegible]	
DATE COMPLETED 18 MAY 99	DATE WELLS INSTALLED 18 MAY 99	DRILLING METHOD H.S.A.	
GROUND SURFACE ELEVATION (FT) 2712.5	DRILLING CONTRACTOR F&R DRILLING	LOGGED BY EJL	
BOREHOLE DIAMETER (IN) 7"	ROCK CORE DIAMETER (IN) —		SHEET 1 OF 1

DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPTION	N (Blows/ft)	W.C (%)			
5	S1	Brown + red sandy SILT with dessicated rock and mica. Non-plastic	10	24.2			
10	S2	Same w/ increasing gravel, trace silty CLAY lenses.	20	1			
15	S3	⋮	54	9.8			
20	S4	w/ increasing Decomposed rock and mica	95				
25	S5		57	10.7			
30	S6	Same	92				
35	S7	NATIVE	38	14.6			
		B.O.E. @ 37.0 Ft. No Refusal					
40							

INSTRUMENT LOG

DEPTH (FT): 5, 10, 15, 20, 25, 30, 35, 40

NOTES

Well Construction consisting of 3/4" dia PVC Piezometer w/ 5' slotted screen

W.C - Water Content

PROJECT [illegible] PAPER PRODUCTS	JOB NO. 49063	BORING NO. B99-101
DATE COMPLETED 21 MAY 99	DATE WELLS INSTALLED 21 MAY 99	DRILLING METHOD H.S.A.
GROUND SURFACE ELEVATION (FT) 2676.8	DRILLING CONTRACTOR F&R DRILLING	LOGGED BY EJL
BOREHOLE DIAMETER (IN) 7"	ROCK CORE DIAMETER (IN.) —	SHEET ___ OF ___

DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPTION	N (BLOWS/FT)	WC (%)				INSTRUMENT LOG
								STICK UP 1.30'
								BENT PELLETS 2
	S1 R:18"	Red Sandy SILT, trace gravel	20					
10	S2 R:17"	more silt	20	15.8				
	S3 R:14"		17					
20	S4 R:16"	trace gravel	21	14.7				BENT GROUT w/ BORE HOLE CUTTINGS
	S5 R:18"		22					
30	S6 R:19"		36	14.6				
	S7 R:18"	w/ Silty CLAY	21					
40	S8 R:17"		15	20.7				
	S9 R:11"	more sand	14					
50	S10 R:19"		27	18.4				
		55 FILL						
	S11 R:21"	Rd/brown Sandy SILT, trace organics Brown m-f SAND, little silt and gravel	41					BENT PELLETS 57
60	S12 R:21"		43	15.9				60.0 FILTER SAND
	S13 R:20"	67.5 NATIVE	89					67.2
70		BOE @ 67.5 FT REFUSAL						BOTTOM OF PIEZO @ 66.7'
80								

NOTES

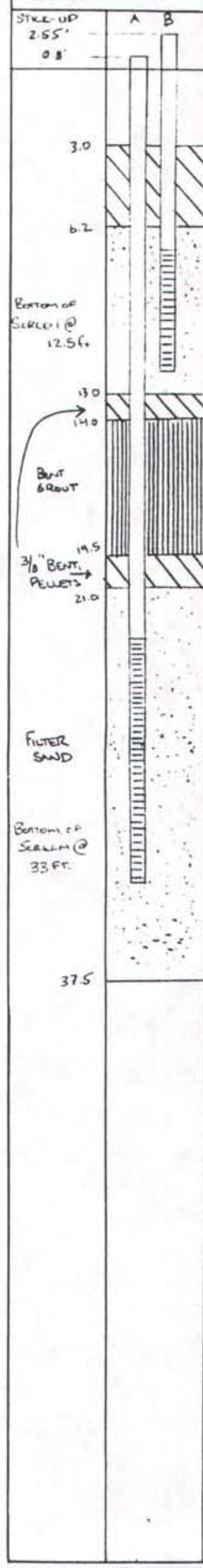
PIEZO CONSTRUCTION CONSISTING OF 3/4" DIA PVC w/ 5' SLOTTED SCREEN.

W.C = WATER CONTENT

PROJECT [illegible] PRODUCTS	JOB NO. 99063	BORING NO [illegible]
DATE COMPLETED 21 MAY 99	DATE WELLS INSTALLED 21 MAY 99	DRILLING METHOD H.S.A.
GROUND SURFACE ELEVATION (FT) 2668.0	DRILLING CONTRACTOR F&R DRILLING	LOGGED BY EJL
BOREHOLE DIAMETER (IN) 8"	ROCK CORE DIAMETER (IN.) ——	SHEET 1 OF ___

DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPTION	N (BLOWS/FT)	S_{uv} (PSF)	WC. (%)	OC (%)	γ_T (PCF)
1.5		DRAINAGE STONE					
5	S1 R 18"	Black ASH and green LIME w/ wood chips @ Bottom of spoon	6		64.4		
	VANE			1927/963			
	U1	SLUDGE & ASH. SOME WOOD			91**		77
10							
	S2 R 12"	coarse sand to fine gravel (VERY WET)	7		12.9		
15	S3 R 12"	Black SLUDGE and ASH	2		108.7	28	
	VANE			622/373			
20	U2	SLUDGE & ASH.					
25	S4 R 24"	SLUDGE & ASH w/ 2" gravel layer	4		81.9	20	
	VANE			2642/1243			
30	U3	SLUDGE & ASH			96**	20	73
35		SLUDGE & ASH					
	U4	37.5 DRAINAGE STONE @ Bottom of TUBE					89
		B.O.E. @ 37.5 Ft. NO REFUSAL					
40							

INSTRUMENT LOG



NOTES ** AVERAGE VALUE FROM TUBE OPENING

γ_T = TOTAL UNIT WEIGHT FROM TUBE SAMPLES

WELL CONSTRUCTION CONSISTING OF 3/4 DIA PVC w/ 5' AND 10' SLOTTED SCREEN

S_{uv} - Undrained SHEAR STRENGTH BY FIELD VANE

WC - WATER CONTENT

OC - ORGANIC CONTENT

APPENDIX B

WATER LEVEL DATABASE

PREPARED: 9/9/99 FOR: BLUE RIDGE PAPER PRODUCTS, INC. CANTON, NORTH CAROLINA	 SEVEE & MAHER ENGINEERS, INC. 4 BLANCHARD ROAD CUMBERLAND CENTER, ME 04021

SAMPLE LOCATION	DATE	WATER LEVEL MEASUREMENT (feet)	WATER LEVEL ELEVATION (feet)
B99-101	RISER ELEVATION:	2678.10	
	5/25/99	D	D
	5/28/99	D	D
	6/1/99	D	D
	6/4/99	D	D
	6/8/99	D	D
	6/11/99	D	D
B99-102A	RISER ELEVATION:	2668.80	
	5/25/99	D	D
	5/28/99	D	D
	6/1/99	D	D
	6/4/99	D	D
	6/8/99	D	D
	6/11/99	D	D
B99-102B	RISER ELEVATION:	2670.55	
	5/25/99	7.68	2662.87
	5/28/99	8.09	2662.46
	6/1/99	8.58	2661.97
	6/4/99	8.68	2661.87
	6/8/99	8.84	2661.71
	6/11/99	8.89	2661.66
B99-103A	RISER ELEVATION:	2702.55	
	5/25/99	D	D
	5/28/99	D	D
	6/1/99	D	D
	6/4/99	D	D
	6/8/99	D	D
	6/11/99	D	D
B99-103B	RISER ELEVATION:	2702.80	
	5/25/99	23.10	2679.70
	5/28/99	20.60	2682.20
	6/1/99	20.70	2682.10
	6/4/99	20.59	2682.21
	6/8/99	20.48	2682.32

SEE END OF REPORT FOR NOTES.

PREPARED: 9/9/99 FOR: BLUE RIDGE PAPER PRODUCTS, INC. CANTON, NORTH CAROLINA	 SEVEE & MAHER ENGINEERS, INC. 4 BLANCHARD ROAD CUMBERLAND CENTER, ME 04021

SAMPLE LOCATION	DATE	WATER LEVEL MEASUREMENT (feet)		WATER LEVEL ELEVATION (feet)
B99-103B		RISER ELEVATION:	2702.80	
	6/11/99	20.53		2682.27
B99-103C		RISER ELEVATION:	2702.45	
	5/25/99	D		D
	5/28/99	5.90		2696.55
	6/1/99	6.02		2696.43
	6/4/99	6.20		2696.25
	6/8/99	6.38		2696.07
	6/11/99	4.96		2697.49
B99-104		RISER ELEVATION:	2713.55	
	5/25/99	D		D
	5/28/99	D		D
	6/1/99	D		D
	6/4/99	D		D
	6/8/99	D		D
	6/11/99	D		D

NOTES :

D = SAMPLING LOCATION DRY

APPENDIX C

LABORATORY TESTING RESULTS

ASH CONTENT

Maine Environmental Laboratory

One Main Street Yarmouth, Maine 04096-1107 Tel (207) 846-6569 Fax (207) 846-9066 e-mail: melab@ime.net

Report of Analyses

Sevee & Maher Eng.
Cumberland, Me
T. Leatherbee

Report Date : 07/12/99
Sampling Tech. : T. Leatherbee
Sample Matrix : Solid
Project : Champion Intl, Canton, N.C. #99063

Method : D-2974
Reference: ASTM

ASH CONTENT

Data reported on a dry weight basis.

Sample ID	OC%	Data	Units	RDL	Date Analyzed	Date Sampled	Laboratory ID
B102 15-16'	28	71.71	%	0.01	07/07/99	07/02/99	SAM30099-01
B102 24-26'	20	80.03	%	0.01	07/07/99	07/02/99	SAM30099-02
102 30.6'	20	79.95	%	0.01	07/07/99	07/02/99	SAM30099-03
03 14-16'	42	57.92	%	0.01	07/07/99	07/02/99	SAM30099-04

WATER CONTENT

MOISTURE CONTENT ANALYSIS

Project BLUE RIDGE PAPER PRODUCTS   Job No. 99066

Location of Project   Date 6/10/99

BORING SAMPLE	DEPTH FT	CAN NO.	WT WET SOIL & CAN	WT DRY SOIL & CAN	WT H2O	WT CAN	WT DRY SOIL	W.C. (%)
B-102	4-6	1	139.53	103.48	36.05	47.49	55.99	64.4
B-102	13-15	2	194.84	177.90	16.94	46.12	131.78	12.9
B-102	15-16	3	124.86	84.32	40.54	47.04	37.28	108.7
B-102	24-26	4	139.67	97.28	42.39	45.52	51.76	81.9
B-103	5-7	5	164.61	120.50	44.11	47.47	73.03	60.4
B-103	14-16	6	151.84	89.88	61.96	47.44	42.44	146.0
B-103	24-26	7	155.23	116.67	38.56	47.31	69.36	55.6
B-103	34-36	8	154.47	114.67	39.8	47.21	67.46	59.0
B-103	48-50	9	167.76	122.50	45.26	47.64	74.86	60.5

FTSME028   REV: 10/07/93

SEVEE & MAHER ENGINEERS

TUBE OPENING

RECORD OF TUBE SAMPLE

Project: BLUE RIDGE PAPER PRODUCTS 1A
CELL 6 EAST
Boring No. B99-103 Sample No. U-4
Depth 39 to 41

File No. 99063
Date 12 JULY 99
Completed by EJL
Checked by

(IN.)	SAMPLE DESCRIPTION	TORVANE (tsf)	SHEAR VANE REM.	POCKET PENETROM. (tsf)	WATER CONTENT (%)	CAN No.	ATT. LIMITS	CONSOL. TEST	STRENGTH TEST	OTHER
24 (39 ft)										
19	SLUDGE + ASH BLACK w/Gr		19 / 6	.3 / .3 / (Gr) 2.2 material	51.2	24				
17	BL SLUDGE		20 / 5	.75 / .6 / .6	57.0	12				
15	"		17 / 9	.4 / .6 / .75	51.8	29				
13	BL/Gr SLUDGE		21 / 6	.9 / .9 / .6	61.0	16				
11	BL/Gr SLUDGE		19 / 6	1.2 / 1.3 / 1.4	51.3	23				
9	BL/Gr SLUDGE		18 / 5	1.1 / 1.25 / 1.2	55.3	30				
8–7					55.2	15				
6–5	Bl/green Lime MUD w/ SLUDGE							CU TEST		
1–0					165.9	25				

SAMPLE DEPTH IN FEET (39–40–41)

	TOTAL SAMPLE	TOP	MIDDLE	BOTTOM
LENGTH OF SOIL (in.)		14.0		8.0
INSIDE DIAM. OF TUBE (in.)				
WT. OF TUBE + WET SOIL (g.)		3442		8666
WT. OF TUBE (g.)		3280		6280
WT. OF WET SOIL (g.)				
TOTAL UNIT WT., γ (pcf)	100.8	103.7		97.8

RECORD OF TUBE SAMPLE

Project: BLUE RIDGE PAPER PRODUCTS A

CELL 6 EAST

Boring No. B99-103 Sample No. U-3

Depth 29 to 31

File No. 99063

Date 12 JUL 99

Completed by EJL

Checked by

Depth (ft)	Laboratory Log	(In.)	Sample Description	Torvane (tsf)	Shear Vane / Rem. (tsf)	Pocket Penetrom (tsf)	Water Content (%)	Can No.	Att. Limits	Consol. Test	Strength Test	Other
29		24										
		23										
		22										
		21										
		20										
		19										
		18										
		17										
		16										
		15										
	BL SLUDGE w/ ASH + WOOD Big chips	14			7 / 4	.5 .8 .3	150.9	3				
		13										
30	"	12			14 / 5	.3 .3 .25	152.8	28				
		11										
		10			43 / 17	.3 .3 .3	138.3	7				
		9										
	"	8			53 / 9	.3 .2 .3	131.8	8				
		7										
		6										
	" w/ smaller wood	5			50 / 13	1.25 1.4 1.5	117.3	32				
		4										
		3										
		2										
		1										
		0										

	Total Sample	Top	Middle	Bottom
Length of soil (in.)	15.0			
Inside diam. of tube (in.)				
Wt. of tube + wet soil (g.)	2894			
Wt. of tube (g.)	1176			
Wt. of wet soil (g.)				
Total unit wt, γ (pcf)	70.2			

RECORD OF TUBE SAMPLE

Project: BLUE RIDGE PAPER PRODUCTS NA

CELL 6 EAST

Boring No. B99-103 Sample No. U-2

Depth 19 to 21

File No. 99063

Date 2 JUNE 99

Completed by EJL

Checked by

LABORATORY LOG	(IN.)	SAMPLE DESCRIPTION	TORVANE (tsf)	SHEAR VANE REM.	POCKET PENETROM. (tsf)	WATER CONTENT (%)	CAN No.	ATT. LIMITS	CONSOL. TEST	STRENGTH TEST	OTHER
19	24										
	23										
	22										
	21										
	20	DEA STONE									
	19	w/ trace									
	18	SLUDGE @									
	17	BOTTOM OF									
	16	TUBE									
	15										
	14										
	13										
20	12										
	11										
	10										
	9					104.5	23				
	8										
	7										
	6	SLUDGE and							8		
	5	ASH.							7		
	4	SET SAMPLE ASIDE									
	3	FOR FUTURE TESTING									
	2										
	1					92.7	24				
	0										

SAMPLE DEPTH IN FEET

	TOTAL SAMPLE	TOP	MIDDLE	BOTTOM
LENGTH OF SOIL (IN.)		13.5		9.0
INSIDE DIAM. OF TUBE (IN.)				
WT. OF TUBE + WET SOIL (g.)		3600		17023
WT. OF TUBE (g.)		927		6807
WT. OF WET SOIL (g.)				10261
TOTAL UNIT WT, γ (pcf)		115.8		66.7

RECORD OF TUBE SAMPLE

Project: C BLUE RIDGE PAPER PRODUCTS VA

CELL 6 EAST

Boring No. B99-103 Sample No. U-1

Depth 9 to 11

File No. 99063

Date 11 JULY 99

Completed by EJL

Checked by

Depth (ft)	Laboratory Log (in.)	Sample Description	Torvane (tsf)	Shear Vane Rem.	Pocket Penetrom (tsf)	Water Content (%)	Can No.	Att. Limits	Consol. Test	Strength Test	Other
9	24										
	23										
	22										
	21										
	20										
	19										
	18										
	17	Dark gray									
	16	SLUDGE w/				137.0	36				
	15	greenish blue									
	14	LIME MUD		34 / 05		138.4	37				
	13	↓									
10	12			20 / 6		120.8	38				
	11										
	10	SLUDGE		21 / 6		128.5	39				
	9										
	8			21 / 5		130.9	40				
	7										
	6			23 / 5		151.2	41				
	5										
	4			24 / 5		165.5	42				
	3										
	2	↓									
	1										
	0										

SAMPLE DEPTH IN FEET

	Total Sample	Sample Sections: Top	Middle	Bottom
Length of soil (in.)	16.250			
Inside diam. of tube (in.)	2.88			
Wt. of tube + wet soil (g.)	3583.0			
Wt. of tube (g.)	1378.0			
Wt. of wet soil (g.)				
Total unit wt, γ (pcf)	70.6			

RECORD OF TUBE SAMPLE

Project: BLUE RIDGE PAPER PRODUCTS SA
CELL 6 EAST
Boring No. B99-107 Sample No. U-4
Depth 35.5 to 37.5

File No. 99063
Date 11 JULY 99
Completed by EJL
Checked by

SAMPLE DEPTH IN FEET

Laboratory Log	(IN.)	Sample Description	Torvane (tsf)	Shear Vane Rem. (tsf)	Pocket Penetrom (tsf)	Water Content (%)	Can No.	Att. Limits	Consol. Test	Strength Test	Other
35.5	24										
	23										
	22										
	21										
	20										
	19										
	18										
	17										
	16										
	15										
	14	V. wet sludge				90.8	27				
	13	w/ ash + woody									
36.5	12	material				98.0	34				
	11										
	10					92.3	35				
	9										
	8										
	7	GEOGRID									
	6										
GRAVEL	5	GRAVEL									
	4	LAYER									
	3										
	2										
	1										
	0										

	Total Sample	Sample Sections: Top	Middle	Bottom
Length of soil (in.)	9.5			
Inside diam. of tube (in.)	2.88			
Wt. of tube + wet soil (g.)	2710.2			
Wt. of tube (g.)	1270.2			
Wt. of wet soil (g.)				
Total unit wt, γ (pcf)	88.6			

RECORD OF TUBE SAMPLE

Project: (BLUE RIDGE PAPER PRODUCTS IA
CELL 6 EAST
Boring No. B99-102 Sample No. U-3
Depth 29 to 31

File No. 99063
Date 28JUNE 99
Completed by EJL
Checked by

Depth (ft)	Laboratory Log (in.)	Sample Description	Torvane (tsf)	Shear Vane / Rem.	Pocket Penetrom. (tsf)	Water Content (%)	Can No.	Att. Limits	Consol. Test	Strength Test	Other
29	24										
	23										
	22										
	21										
	20										
	19	wet @ TOP		2 / 1	0 / 0 / 0	101.8	4				
	18										
	17	Black ASH									
	16	& SLUDGE		36 / 9	.8 / .5 / .5	91.2	17				
	15	occasional									
	14	gravel		65 / 16	.9 / .6 / .8	84.5	33				
	13										
30	12			59 / 9	1.3 / 1.2 / 1.7	105.8	31				
	11										
	10										
	9										
	8										
	7				1.4 / 1.5 / 1.6	88.4	14				
	6	BLACK SLUDGE									
	5	and ASH							CU2		
	4										
	3										
	2										
	1										
	0										

SAMPLE DEPTH IN FEET

	Total Sample	Top	Middle	Bottom
Length of soil (in.)		11.5		7.875
Inside diam. of tube (in.)				
Wt. of tube + wet soil (g.)		2230		1715
Wt. of tube (g.)		793		580.5
Wt. of wet soil (g.)				
Total unit wt, γ (pcf)	79.9	73.1		56.7

RECORD OF TUBE SAMPLE

Project: BLUE RIDGE PAPER PRODUCTS 1A
CELL 6 EAST
Boring No. B99-102 Sample No. U-2
Depth 19 to 21

File No. 99063
Date 24 JUNE 99
Completed by EJL
Checked by

Laboratory Log (IN.)	Sample Description	Torvane (tsf)	Shear Vane Rem.	Pocket Penetrom. (tsf)	Water Content (%)	Can No.	Att. Limits	Consol. Test	Strength Test	Other
24										
23										
22										
21										
20										
19										
18										
17										
16										
15										
14										
13										
12										
11										
10										
9										
8					111.1	11				
7										
6	SLUDGE +							C		
5	ASH trace							U		
4	gravel + woody							1		
3	Material									
2										
1										
0				2.3, 3.2	94.1	12				

SAMPLE DEPTH IN FEET: 19, 20

	Total Sample	Top	Middle	Bottom
Length of soil (in.)				8.625
Inside diam. of tube (in.)				
Wt. of tube + wet soil (g.)				1845.1
Wt. of tube (g.)				680.7
Wt. of wet soil (g.)				
Total unit wt, γ (pcf)				78.9

RECORD OF TUBE SAMPLE

Project: BLUE RIDGE PAPER PRODUCTS
CELL 6 EAST
Boring No. B99-102 Sample No. U-1
Depth 8 to 10

File No. 99063
Date 7 JULY 99
Completed by EJL
Checked by

Laboratory Log (ft)	Log note	(IN.)	Sample Description	Torvane (tsf)	Shear Vane Rem.	Pocket Penetrom (tsf)	Water Content (%)	Can No.	Att. Limits	Consol. Test	Strength Test	Other
8		24										
		23										
		22										
		21										
		20										
		19										
		18										
		17										
		16										
		15										
		14										
	SL, ASH wood	13			14 / 3		80.5	18				
9		12										
	ASH	11	Dark gray		10 / 2	.3 .3 .3	95.9	19				
		10	ASH w/ sludge									
		9	@ Top and		14 / 3	.3 .3 .3	99.2	20				
		8	woody material									
	w/ wood & gravel	7	trace gravel		36 / 6		96.0	21				
		6										
		5					88.3	22				
		4										
		3										
		2					85.6	23				
		1										
10		0										

SAMPLE DEPTH IN FEET

	Total Sample	Sample Sections: Top	Middle	Bottom
Length of soil (in.)	13.750			
Inside diam. of tube (in.)	2.88			
Wt. of tube + wet soil (g.)	2903.2			
Wt. of tube (g.)	1093.0			
Wt. of wet soil (g.)				
Total unit wt, γ (pcf)	77.0			

DIRECT SIMPLE SHEAR

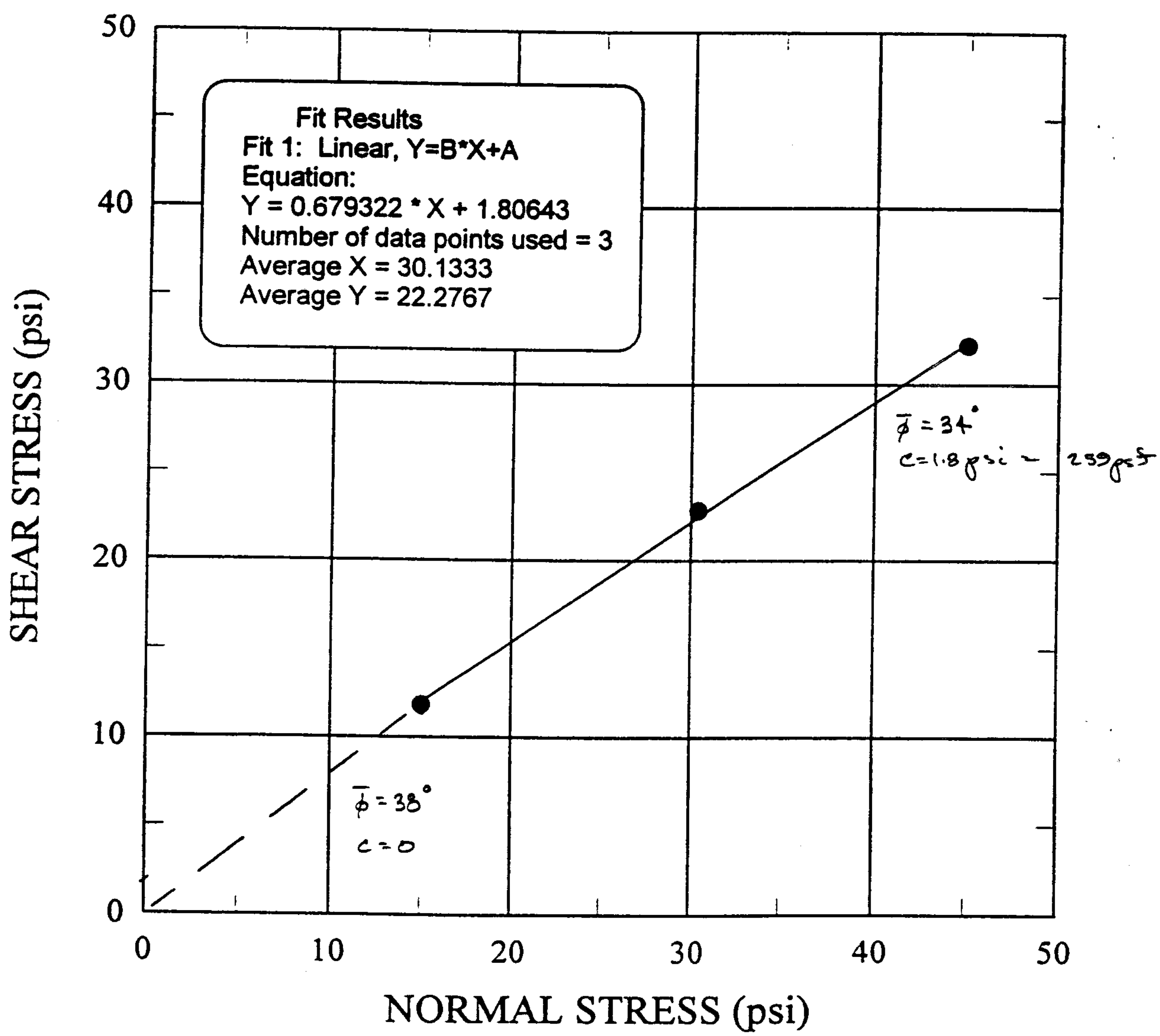
DIRECT SHEAR TEST

PROJECT: BLUE RIDGE PAPER PRODUCTS
Canton, N. Carolina

JOB No: 99063
DATE: JUNE 99
TEST No: DS 1-3

BORING No: B99-101
SAMPLE No: Composite
DEPTH (ft.): 10-60

DESCRIPTION: Rd-brown sandy SILT to silty SAND



DIAMETER= 2.5 in..
AREA= 4.909 sq. in.
NORMAL STRESS= See Graph psi

LOADING RATE= 0.008 in/min
INIT. W.C.= 14.6 %
INIT. TOTAL UNIT WT.= 117 pcf

** Results shown represent Peak Shear Stress
Test run with shear box dry

Sevee & Maher Engineers

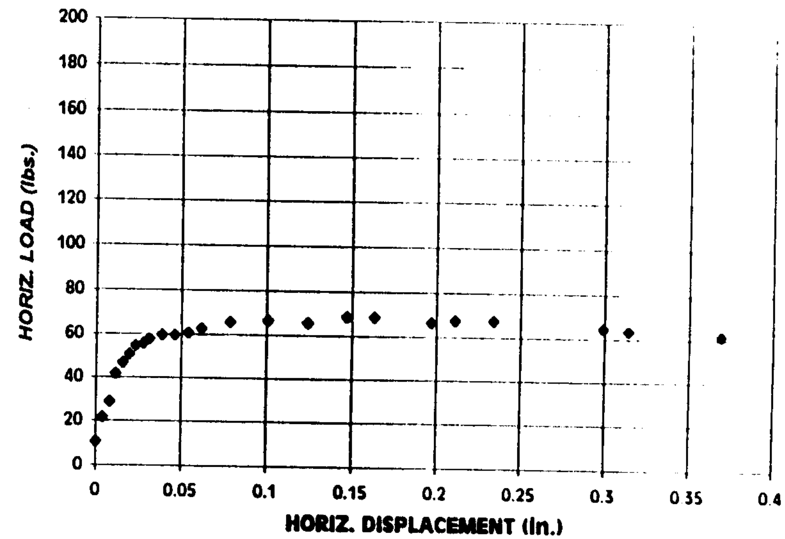
DIRECT SHEAR TEST

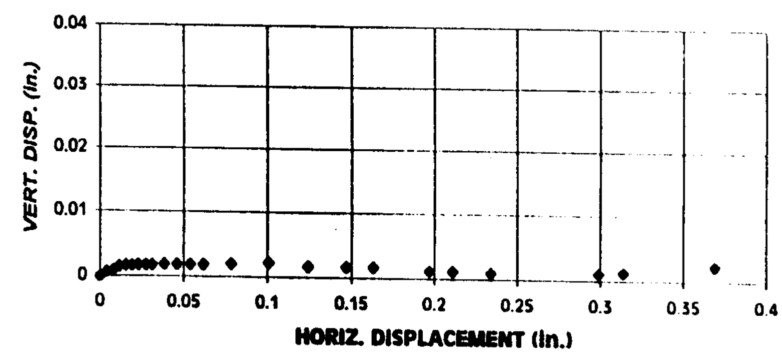
CLIENT: BLUE RIDGE PAPER PRODUCTS
PROJECT: Canton, N. Carolina

SAMPLE DESCRIPTION: Rd-br sandy SILT to silty SAND

BORING:	B99-101		TEST No.:	DS-1	
SAMPLE:	Composite		WEIGHT:	221.7	(gms)
DEPTH:	10-60	(ft.)	INIT. TOTAL UNIT WT.:	117.0	(pcf)
HEIGHT:	1.47	(in.)	INITIAL W.C.:	16.4	(%)
AREA:	4.909	(sq.in.)	NORMAL STRESS:	15	(psi)
			STRAIN RATE:	0.008	(in./min.)

ELASPED TIME (min.)	VERICAL DIAL READING (in.)	VERTICAL DISP. (in.)	HORIZ. DIAL READING (in.)	HORIZ. DISP. (in.)	LOAD CELL READING (lbs.)	SHEAR STRESS (psi)
0	0.9808	0	0.839	0	11	0.00
0.5	0.98	0.0008	0.835	0.004	22	2.24
1	0.9798	0.001	0.831	0.008	29	3.67
1.5	0.9792	0.0016	0.8275	0.0115	42	6.31
2	0.979	0.0018	0.8235	0.0155	47	7.33
2.5	0.979	0.0018	0.8198	0.0192	51	8.15
3	0.9789	0.0019	0.816	0.023	55	8.96
3.5	0.9789	0.0019	0.8115	0.0275	56	9.17
4	0.9789	0.0019	0.808	0.031	58	9.57
5	0.9788	0.002	0.8005	0.0385	60	9.98
6	0.9788	0.002	0.793	0.046	60	9.98
7	0.9788	0.002	0.785	0.054	61	10.19
8	0.9788	0.002	0.7773	0.0617	63	10.59
10	0.9787	0.0021	0.7605	0.0785	66	11.20
13	0.9785	0.0023	0.7382	0.1008	67	11.41
16	0.979	0.0018	0.7148	0.1242	66	11.20
19	0.979	0.0018	0.692	0.147	69	11.82
21	0.979	0.0018	0.6758	0.1632	69	11.82
25	0.9795	0.0013	0.642	0.197	67	11.41
27	0.9795	0.0013	0.628	0.211	68	11.61
30	0.9797	0.0011	0.605	0.234	68	11.61
38	0.9796	0.0012	0.54	0.299	65	11.00
40	0.9794	0.0014	0.525	0.314	64	10.80
47	0.9783	0.0025	0.47	0.369	62	10.39





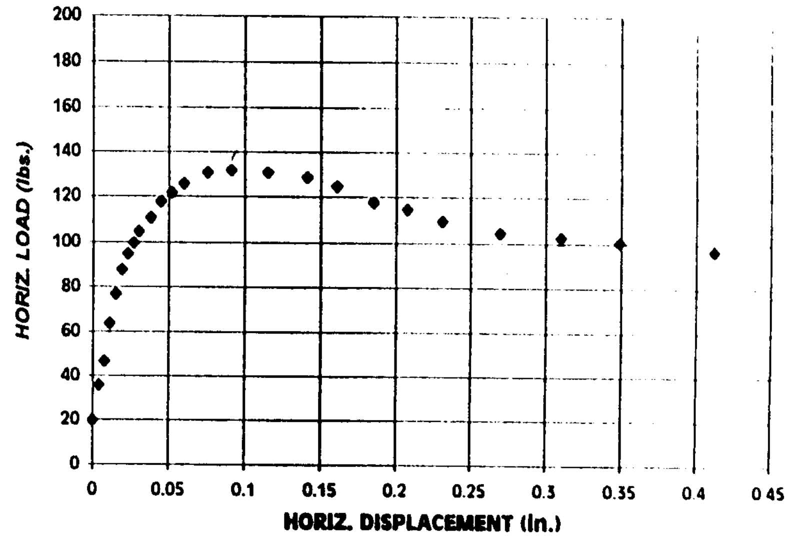
DIRECT SHEAR TEST

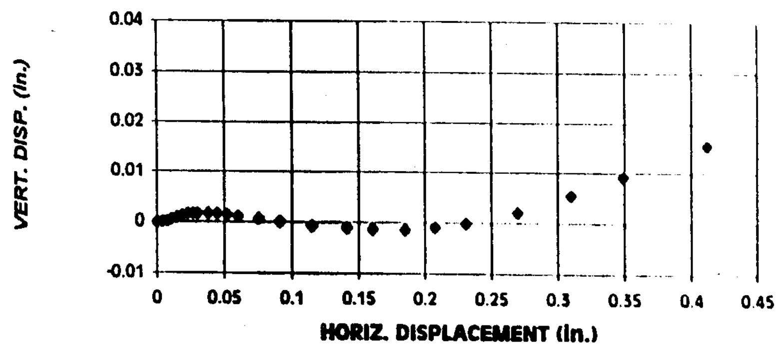
CLIENT: BLUE RIDGE PAPER PRODUCTS
PROJECT: Canton, N. Carolina

SAMPLE DESCRIPTION: Rd-br sandy SILT to silty SAND

BORING:	B99-101		TEST NO.:	DS-2	
SAMPLE:	Composite		WEIGHT:	219.9	(gms)
DEPTH:	10-60	(ft.)	INIT. TOTAL UNIT WT.:	116.1	(pcf)
HEIGHT:	1.47	(in.)	INITIAL W.C.:	16.4	(%)
AREA:	4.909	(sq.in.)	NORMAL STRESS:	30.4	(psi)
			STRAIN RATE:	0.008	(in./min.)

ELASPED TIME (min.)	VERICAL DIAL READING (in.)	VERTICAL DISP. (in.)	HORIZ. DIAL READING (in.)	HORIZ. DISP. (in.)	LOAD CELL READING (lbs.)	SHEAR STRESS (psi)
0	0.954	0	0.84	0	20	0.00
0.5	0.9538	0.0002	0.836	0.004	36	3.26
1	0.9537	0.0003	0.8325	0.0075	47	5.50
1.5	0.9533	0.0007	0.829	0.011	64	8.96
2	0.953	0.001	0.825	0.015	77	11.61
2.5	0.9526	0.0014	0.821	0.019	88	13.85
3	0.9523	0.0017	0.817	0.023	95	15.28
3.5	0.9522	0.0018	0.8133	0.0267	100	16.30
4	0.9522	0.0018	0.81	0.03	105	17.32
5	0.9522	0.0018	0.802	0.038	111	18.54
6	0.9523	0.0017	0.7952	0.0448	118	19.96
7	0.9525	0.0015	0.788	0.052	122	20.78
8	0.9528	0.0012	0.78	0.06	126	21.59
10	0.9532	0.0008	0.7645	0.0755	131	22.61
12	0.9538	0.0002	0.749	0.091	132	22.82
15	0.9546	-0.0006	0.725	0.115	131	22.61
18.5	0.955	-0.001	0.699	0.141	129	22.20
21	0.9552	-0.0012	0.6795	0.1605	125	21.39
24	0.9553	-0.0013	0.655	0.185	118	19.96
27	0.9548	-0.0008	0.6325	0.2075	115	19.35
30	0.954	0	0.609	0.231	110	18.33
35	0.9518	0.0022	0.5704	0.2696	105	17.32
40	0.9484	0.0056	0.53	0.31	103	16.91
45	0.9447	0.0093	0.491	0.349	101	16.50
53	0.9383	0.0157	0.428	0.412	97	15.69





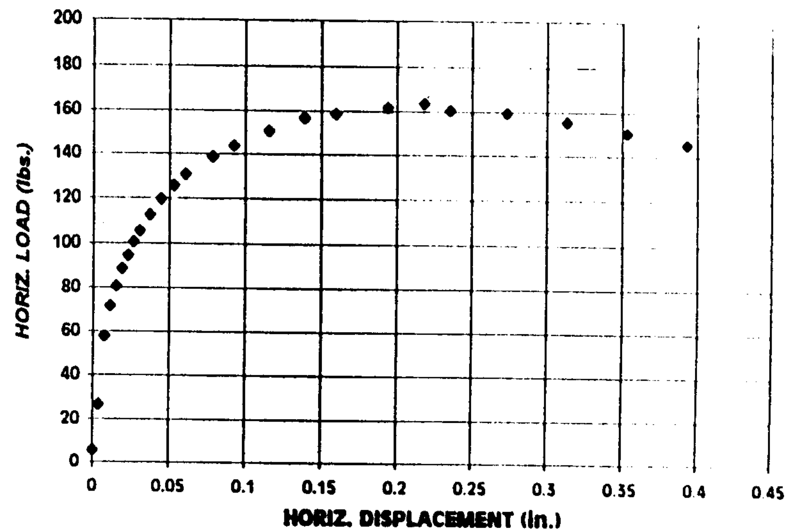
DIRECT SHEAR TEST

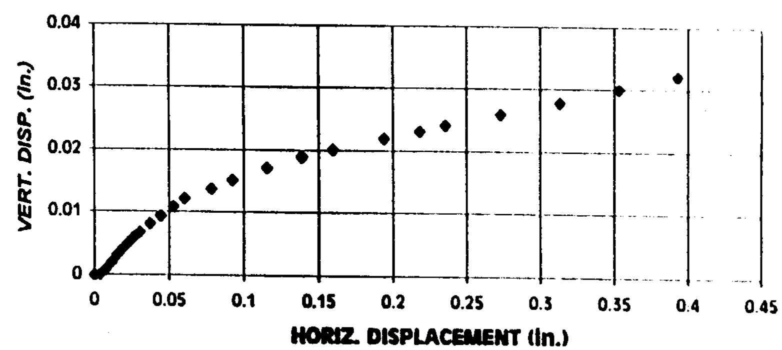
CLIENT: BLUE RIDGE PAPER PRODUCTS
PROJECT: Canton, N. Carolina

SAMPLE DESCRIPTION: Rd-br sandy SILT to silty SAND

BORING:	B99-101		TEST NO.:	DS-3	
SAMPLE:	Composite		WEIGHT:	220.4	(gms)
DEPTH:	10-60	(ft.)	INIT. TOTAL UNIT WT.:	116.4	(pcf)
HEIGHT:	1.47	(in.)	INITIAL W.C.:	16.4	(%)
AREA:	4.909	(sq.in.)	NORMAL STRESS:	45	(psi)
			STRAIN RATE:	0.008	(in./min.)

ELASPED TIME (min.)	VERICAL DIAL READING (in.)	VERTICAL DISP. (in.)	HORIZ. DIAL READING (in.)	HORIZ. DISP. (in.)	LOAD CELL READING (lbs.)	SHEAR STRESS (psi)
0	0.9502	0	0.8345	0	6	0.00
0.5	0.9501	0.0001	0.8308	0.0037	27	4.28
1	0.9493	0.0009	0.8272	0.0073	58	10.59
1.5	0.9482	0.002	0.8233	0.0112	72	13.44
2	0.947	0.0032	0.8194	0.0151	81	15.28
2.5	0.946	0.0042	0.8155	0.019	89	16.91
3	0.945	0.0052	0.8115	0.023	95	18.13
3.5	0.9442	0.006	0.808	0.0265	101	19.35
4	0.9434	0.0068	0.804	0.0305	106	20.37
5	0.942	0.0082	0.7972	0.0373	113	21.80
6	0.9408	0.0094	0.79	0.0445	120	23.22
7	0.9393	0.0109	0.7815	0.053	126	24.44
8	0.938	0.0122	0.774	0.0605	131	25.46
10	0.9364	0.0138	0.756	0.0785	139	27.09
12	0.935	0.0152	0.742	0.0925	144	28.11
15	0.933	0.0172	0.719	0.1155	151	29.54
18	0.9312	0.019	0.6957	0.1388	157	30.76
21	0.93	0.0202	0.675	0.1595	159	31.17
25	0.9282	0.022	0.6405	0.194	162	31.78
28	0.927	0.0232	0.6163	0.2182	164	32.19
30	0.926	0.0242	0.599	0.2355	161	31.57
35	0.9242	0.026	0.5615	0.273	160	31.37
40	0.9223	0.0279	0.5211	0.3134	156	30.56
45	0.9201	0.0301	0.4813	0.3532	151	29.54
50	0.918	0.0322	0.4416	0.3929	146	28.52





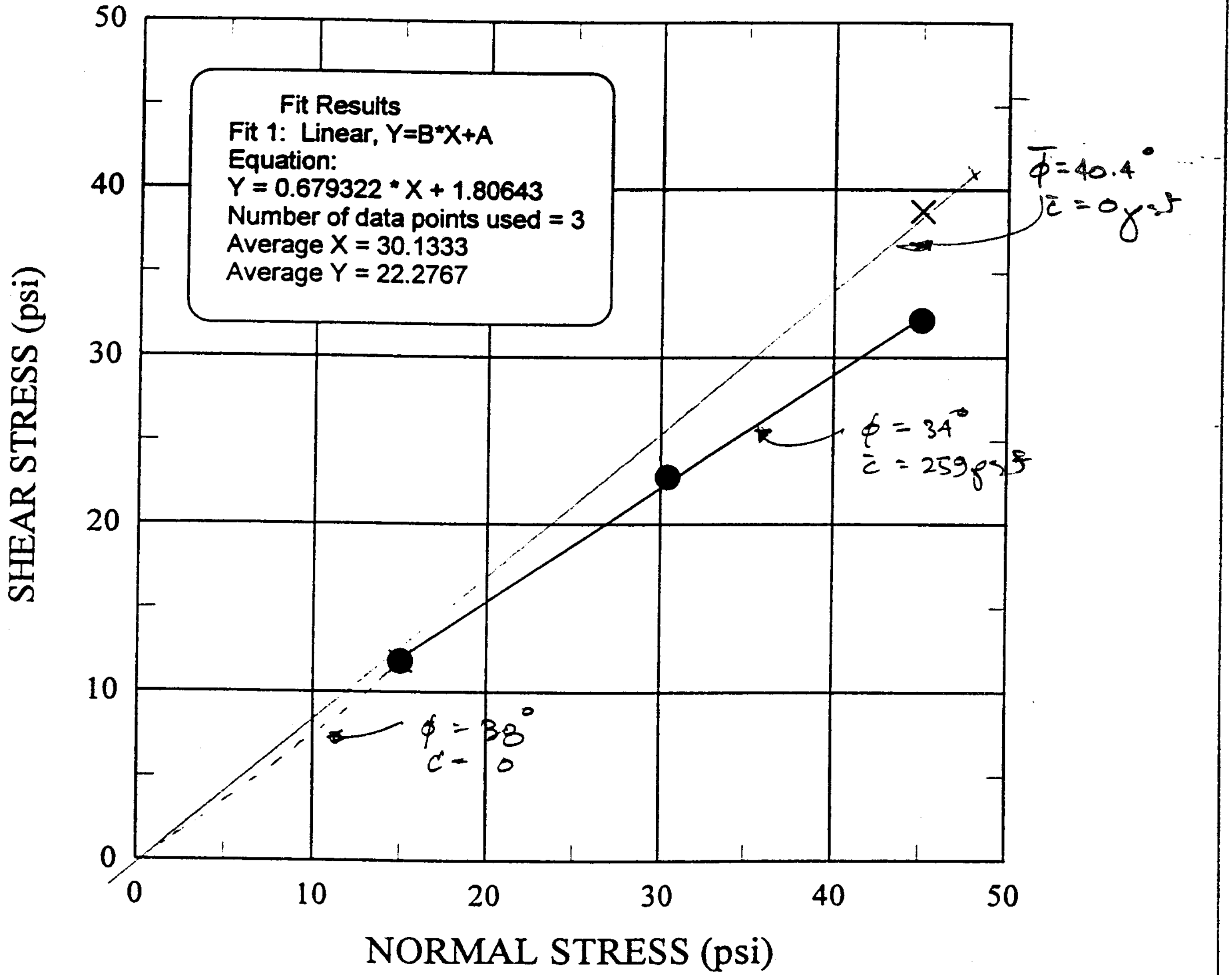
DIRECT SHEAR TEST

PROJECT: BLUE RIDGE PAPER PRODUCTS
Canton, N. Carolina

JOB No: 99063
DATE: JUNE 99
TEST No: DS 1-3

BORING No: B99-101
SAMPLE No: Composite
DEPTH (ft.): 10-60

DESCRIPTION: Rd-brown sandy SILT to silty SAND



DIAMETER= 2.5 in..
AREA= 4.909 sq. in.
ORMAL STRESS= See Graph psi

LOADING RATE= 0.008 in/min
INIT. W.C.= 14.6 %
INIT. TOTAL UNIT WT.= 117 pcf

** Results shown represent Peak Shear Stress
Test run with shear box dry

Sevee & Maher Engineers

DIRECT S[illegible]AR TEST

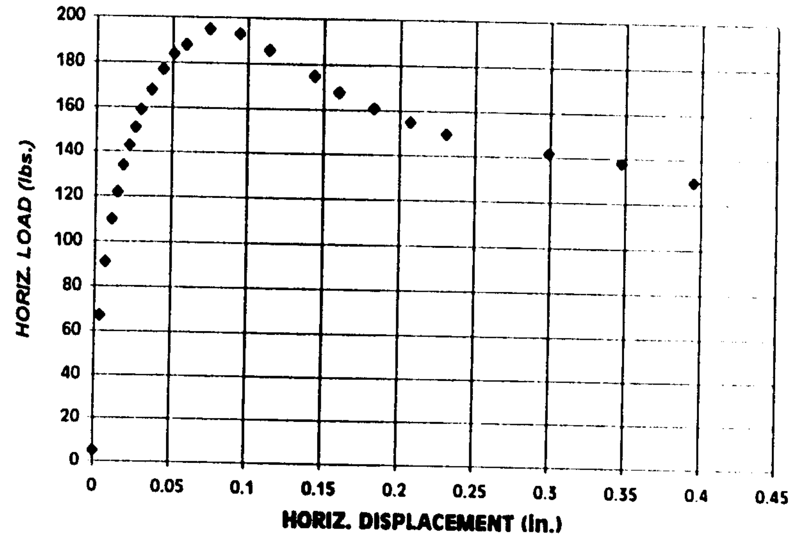
CLIENT: BLUE RIDGE PAPER PRODUCTS
PROJECT: Canton, N. Carolina

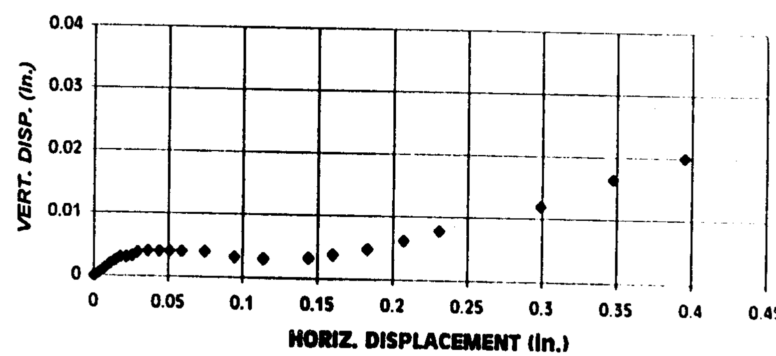
SAMPLE DESCRIPTION: Rd-br sandy SILT to silty SAND

BORING:	B99-101		TEST No.:	DS-5	
SAMPLE:	Composite		WEIGHT:	222	(gms)
DEPTH:	10-60	(ft.)	INIT. TOTAL UNIT WT.:	117.2	(pcf)
HEIGHT:	1.47	(in.)	INITIAL W.C.:	16.4	(%)
AREA:	4.909	(sq.in.)	NORMAL STRESS:	45	(psi)
			STRAIN RATE:	0.008	(in./min.)

ELASPED TIME (min.)	VERICAL DIAL READING (in.)	VERTICAL DISP. (in.)	HORIZ. DIAL READING (in.)	HORIZ. DISP. (in.)	LOAD CELL READING (lbs.)	SHEAR STRESS (psi)
0	0.924	0	0.834	0	5	0.00
0.5	0.9235	0.0005	0.8305	0.0035	67	12.63
1	0.9228	0.0012	0.827	0.007	91	17.52
1.5	0.922	0.002	0.823	0.011	110	21.39
2	0.9215	0.0025	0.8195	0.0145	122	23.83
2.5	0.921	0.003	0.816	0.018	134	26.28
3	0.921	0.003	0.812	0.022	143	28.11
3.5	0.9208	0.0032	0.8082	0.0258	151	29.74
4	0.9202	0.0038	0.8045	0.0295	159	31.37
5	0.92	0.004	0.7975	0.0365	168	33.20
6	0.92	0.004	0.79	0.044	177	35.04
7	0.92	0.004	0.783	0.051	184	36.46
8	0.92	0.004	0.775	0.059	188	37.28
10	0.92	0.004	0.7595	0.0745	195	38.70
12.5	0.9208	0.0032	0.7395	0.0945	193	38.30
15	0.921	0.003	0.72	0.114	186	36.87
18	0.9208	0.0032	0.69	0.144	175	34.63
21	0.9202	0.0038	0.674	0.16	168	33.20
24	0.9193	0.0047	0.651	0.183	161	31.78
27	0.9178	0.0062	0.627	0.207	155	30.56
30	0.9162	0.0078	0.6033	0.2307	150	29.54
40	0.912	0.012	0.535	0.299	142	27.91
45	0.9075	0.0165	0.4865	0.3475	138	27.09
51	0.904	0.02	0.439	0.395	130	25.46

** Note: Test performed with shear box flooded





DIRECT S[illegible]AR TEST

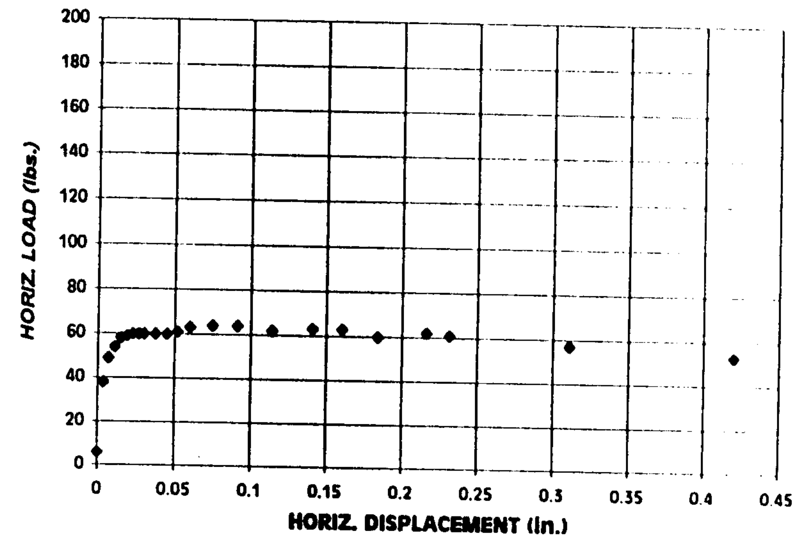
CLIENT: BLUE RIDGE PAPER PRODUCTS
PROJECT: Canton, N. Carolina

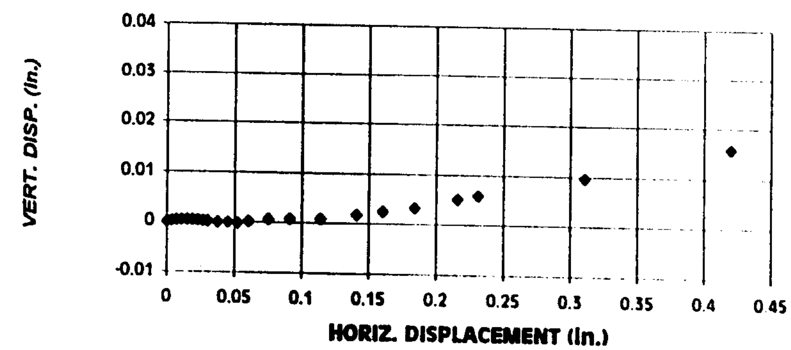
SAMPLE DESCRIPTION: Rd-br sandy SILT to silty SAND

BORING:	B99-101		TEST No.:	DS-4	
SAMPLE:	Composite		WEIGHT:	221.8	(gms)
DEPTH:	10-60	(ft.)	INIT. TOTAL UNIT WT.:	117.1	(pcf)
HEIGHT:	1.47	(in.)	INITIAL W.C.:	16.4	(%)
AREA:	4.909	(sq.in.)	NORMAL STRESS:	15	(psi)
			STRAIN RATE:	0.008	(in./min.)

ELASPED TIME (min.)	VERICAL DIAL READING (in.)	VERTICAL DISP. (in.)	HORIZ. DIAL READING (in.)	HORIZ. DISP. (in.)	LOAD CELL READING (lbs.)	SHEAR STRESS (psi)
0	0.9827	0	0.835	0	6	0.00
0.5	0.9824	0.0003	0.8315	0.0035	38	6.52
1	0.9823	0.0004	0.828	0.007	49	8.76
1.5	0.9822	0.0005	0.824	0.011	54	9.78
2	0.9822	0.0005	0.82	0.015	58	10.59
2.5	0.9822	0.0005	0.816	0.019	59	10.80
3	0.9823	0.0004	0.8124	0.0226	60	11.00
3.5	0.9824	0.0003	0.8085	0.0265	60	11.00
4	0.9825	0.0002	0.805	0.03	60	11.00
5	0.9827	0	0.7975	0.0375	60	11.00
6	0.9827	0	0.79	0.045	60	11.00
7	0.9828	-1E-04	0.783	0.052	61	11.20
8	0.9825	0.0002	0.775	0.06	63	11.61
10	0.982	0.0007	0.76	0.075	64	11.82
12	0.9819	0.0008	0.744	0.091	64	11.82
15	0.9818	0.0009	0.721	0.114	62	11.41
18.5	0.9809	0.0018	0.694	0.141	63	11.61
21	0.9801	0.0026	0.6745	0.1605	63	11.61
24	0.9793	0.0034	0.651	0.184	60	11.00
28	0.9775	0.0052	0.619	0.216	62	11.41
30	0.9767	0.006	0.6035	0.2315	61	11.20
40	0.973	0.0097	0.524	0.311	57	10.39
54	0.9668	0.0159	0.415	0.42	53	9.57

** Note: Test performed with shear box flooded





7/6/99

SEVEE MAHER ENGINEERS

CONSOLIDATED ISOTROPIC UNDRAINED COMPRESSION (CIUC)

CONSOLIDATED-UNDRAINED COMPRESSION (CU) TEST

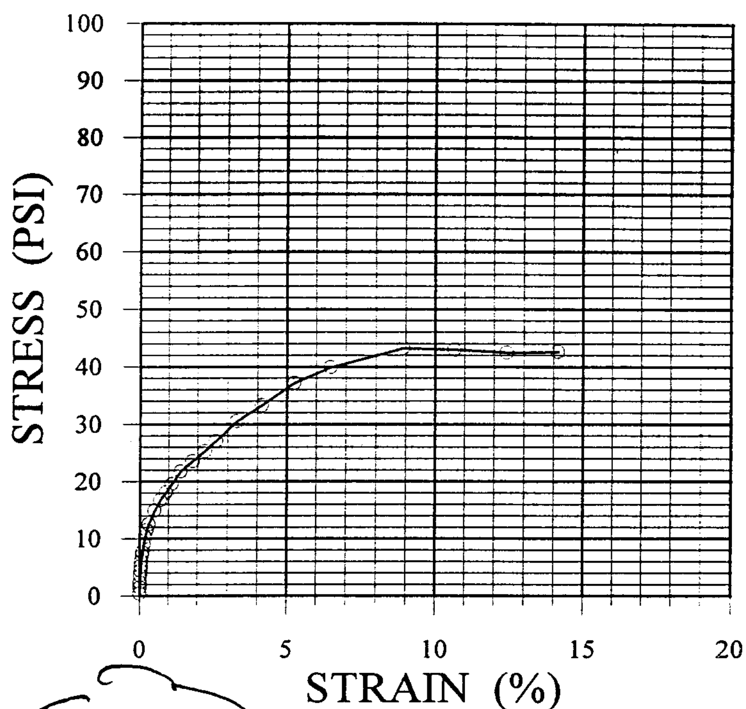
BLUE RIDGE PAPER PRODUCTS

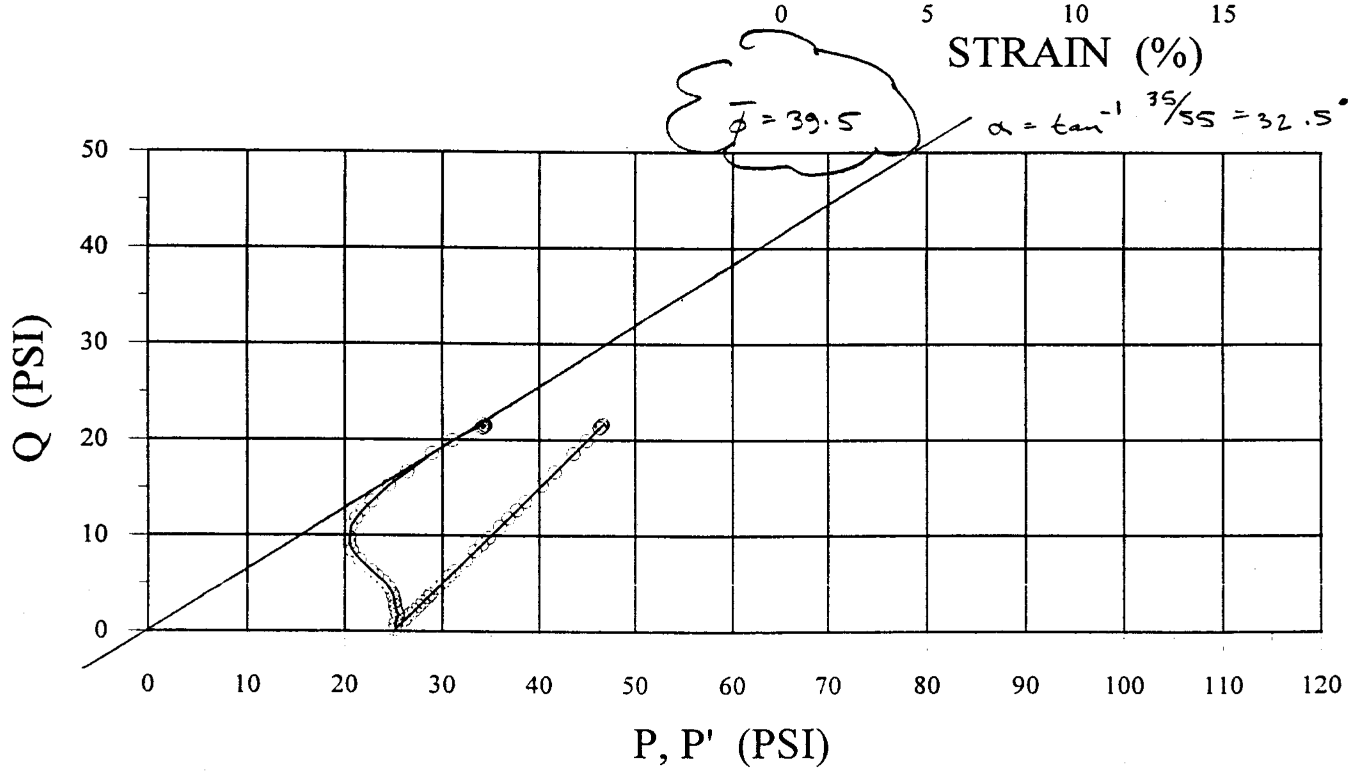
CANTON, N.C.
B99-103, U4
40.5 ft.
CU-2

LIMEMUD

SAMPLE CONDITIONS

FINAL MOISTURE CONTENT:	60.2%
EFF. CONFINING PRESS:	25.0 psi
AXIAL STRAIN RATE:	0.005 in/min
DATE TESTED:	7/13/99





CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

PROJECT:	BLU[illegible]E PAPER PRODUCTS	FILE No.:	99063	INITIAL DIAL READING (in.):	0.0717	CELL PRESSURE (psi)	100
BORING:	B99-103	TEST No.:	CIUC-3	CONSOLIDATED HEIGHT (in.):	5.860	BACK PRESSURE (psi)	75
SAMPLE:	U4	DATE:	7/13/99	CONSOLIDATED AREA (sq.in.):	5.994	EFFECTIVE CONFINING PRESSURE (psi)	25
ELEV. (ft.):	40.5	TESTED BY:	EJL	INITIAL TOTAL UNIT WT. (pcf):	96.1	PORE PRESSURE @ PRESHEAR (psi)	75.2
		PRC (lbs/div)	0.327	INITIAL WATER CONTENT (%):		AXIAL STRAIN RATE (in./min.)	0.005
				FINAL WATER CONTENT (%):	60.2	MEMBRANE THICKNESS (in.)	0.012

TIME (min)	DIAL (in.)	LOAD (div)	PWP (psi)	DELTA L (in.)	AREA CF	CORR. AREA (sq. in.)	IND LOAD (lbs.)	IND PWP (psi)	DEV STRESS (psi)	SIGMA 3 (psi)	SIGMA 1 (psi)	SIGMA 3' (psi)	SIGMA 1' (psi)	P (psi)	P' (psi)	Q (psi)	STRAIN (%)
0	0.0717	66.5	75.2	0.0000	1.0000	5.99	2.0	0.0	0.3	25.0	25.3	25.0	25.3	25.2	25.2	0.2	0.00
0.5	0.0722	86	75.7	0.0005	0.9999	5.99	8.4	0.5	1.4	25.0	26.4	24.5	25.9	25.7	25.2	0.7	0.01
1	0.0727	103	76.1	0.0010	0.9998	6.00	14.0	0.9	2.3	25.0	27.3	24.1	26.4	26.2	25.3	1.2	0.02
1.5	0.0732	125	76.5	0.0015	0.9997	6.00	21.2	1.3	3.5	25.0	28.5	23.7	27.2	26.8	25.5	1.8	0.03
2	0.074	140	77.1	0.0023	0.9996	6.00	26.1	1.9	4.3	25.0	29.3	23.1	27.4	27.2	25.3	2.2	0.04
2.5	0.0747	155	77.6	0.0030	0.9995	6.00	31.0	2.4	5.2	25.0	30.2	22.6	27.8	27.6	25.2	2.6	0.05
3	0.0755	171	78.1	0.0038	0.9994	6.00	36.2	2.9	6.0	25.0	31.0	22.1	28.1	28.0	25.1	3.0	0.06
3.5	0.0767	189	78.7	0.0050	0.9991	6.00	42.1	3.5	7.0	25.0	32.0	21.5	28.5	28.5	25.0	3.5	0.09
4	0.0777	200	79.1	0.0060	0.9990	6.00	45.7	3.9	7.6	25.0	32.6	21.1	28.7	28.8	24.9	3.8	0.10
5	0.08	225	80.1	0.0083	0.9986	6.00	53.9	4.9	9.0	25.0	34.0	20.1	29.1	29.5	24.6	4.5	0.14
6	0.083	249	81.3	0.0113	0.9981	6.01	61.7	6.1	10.3	25.0	35.3	18.9	29.2	30.1	24.0	5.1	0.19
7	0.086	271	82.6	0.0143	0.9976	6.01	68.9	7.4	11.5	25.0	36.5	17.6	29.1	30.7	23.3	5.7	0.24
8	0.09	290	83.7	0.0183	0.9969	6.01	75.1	8.5	12.5	25.0	37.5	16.5	29.0	31.2	22.7	6.2	0.31
11	0.102	334	86.1	0.0303	0.9948	6.03	89.5	10.9	14.9	25.0	39.9	14.1	29.0	32.4	21.5	7.4	0.52
14	0.1135	369	87.8	0.0418	0.9929	6.04	101.0	12.6	16.7	25.0	41.7	12.4	29.1	33.4	20.8	8.4	0.71
17	0.1255	396	88.8	0.0538	0.9908	6.05	109.8	13.6	18.1	25.0	43.1	11.4	29.5	34.1	20.5	9.1	0.92
20	0.137	422.5	89.5	0.0653	0.9889	6.06	118.5	14.3	19.5	25.0	44.5	10.7	30.2	34.8	20.5	9.8	1.11
25	0.1555	466	90.5	0.0838	0.9857	6.08	132.7	15.3	21.8	25.0	46.8	9.7	31.5	35.9	20.6	10.9	1.43
30	0.1795	500.5	90.8	0.1078	0.9816	6.11	144.0	15.6	23.6	25.0	48.6	9.4	33.0	36.8	21.2	11.8	1.84
35	0.2035	535	91	0.1318	0.9775	6.13	155.2	15.8	25.3	25.0	50.3	9.2	34.5	37.7	21.9	12.7	2.25
40	0.225	570	91	0.1533	0.9738	6.16	166.7	15.8	27.1	25.0	52.1	9.2	36.3	38.5	22.7	13.5	2.62
50	0.2655	639	90.9	0.1938	0.9669	6.20	189.3	15.7	30.5	25.0	55.5	9.3	39.8	40.3	24.6	15.3	3.31
60	0.3145	696	90.4	0.2428	0.9586	6.25	207.9	15.2	33.2	25.0	58.2	9.8	43.0	41.6	26.4	16.6	4.14
75	0.3795	779	89.8	0.3078	0.9475	6.33	235.0	14.6	37.1	25.0	62.1	10.4	47.5	43.6	29.0	18.6	5.25
90	0.452	842	89.1	0.3803	0.9351	6.41	255.6	13.9	39.9	25.0	64.9	11.1	51.0	44.9	31.0	19.9	6.49
120	0.594	930	87.7	0.5223	0.9109	6.58	284.4	12.5	43.2	25.0	68.2	12.5	55.7	46.6	34.1	21.6	8.91
140	0.6965	942	87.3	0.6248	0.8934	6.71	288.3	12.1	43.0	25.0	68.0	12.9	55.9	46.5	34.4	21.5	10.66
160	0.8	949.5	87.4	0.7283	0.8757	6.85	290.8	12.2	42.5	25.0	67.5	12.8	55.3	46.2	34.0	21.2	12.43
180	0.901	970.5	87.3	0.8293	0.8585	6.98	297.7	12.1	42.6	25.0	67.6	12.9	55.5	46.3	34.2	21.3	14.15

CONSOLIDATED-UNDRAINED COMPRESSION (CU) TEST

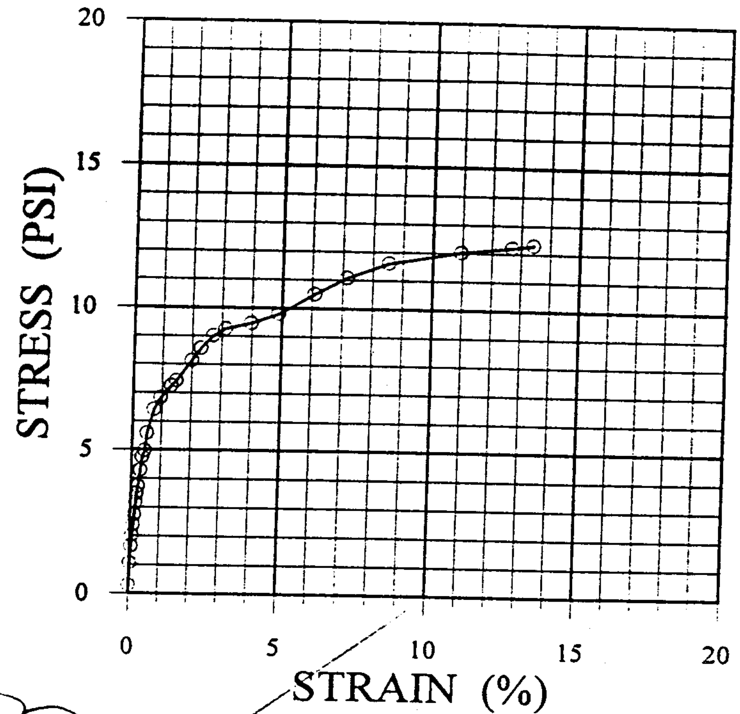
BLUE RIDGE PAPER PRODUCTS

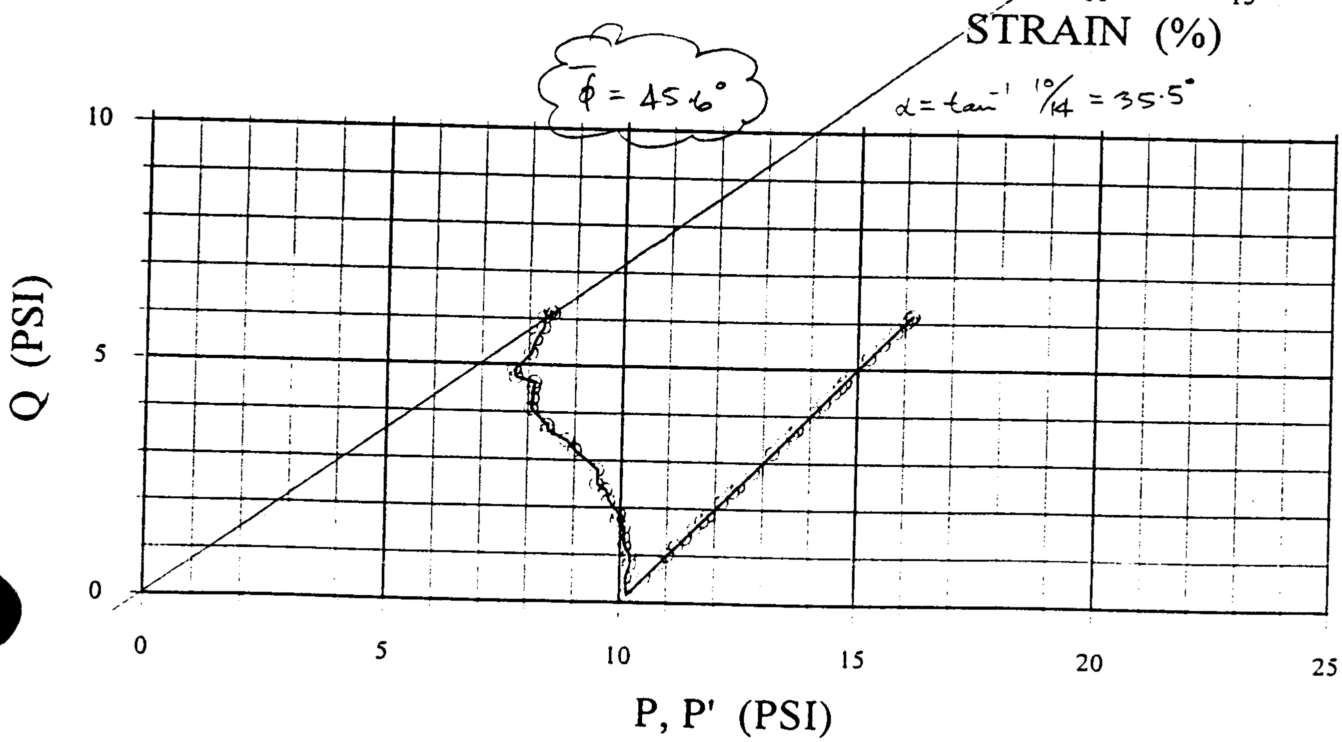
CANTON, N.C.
B99-102, U2
20.5 ft.
CU-1

SLUDGE/ASH

SAMPLE CONDITIONS

FINAL MOISTURE CONTENT:	71.1 %
EFF. CONFINING PRESS:	10.0 psi
AXIAL STRAIN RATE:	0.005 in/min
DATE TESTED:	6/24/99





CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

B[illegible]DGE

PROJECT: PAP[illegible]RODUCTS
BORING: B99-102
SAMPLE: U2
ELEV (ft): 20.5

FILE No.: 99063
TEST No.: CIUC-1
DATE: 6/24/99
TESTED BY: EJL
PRC (lbs/div): 0.327

INITIAL DIAL READING (in.): 0.4025
CONSOLIDATED HEIGHT (in.): 5.970
CONSOLIDATED AREA (sq.in.): 5.588
INITIAL TOTAL UNIT WT. (pcf): 84.98
INITIAL WATER CONTENT (%): 102.6
FINAL WATER CONTENT (%): 71.1

CELL PRESSURE (psi): 108
BACK PRESSURE (psi): 98
EFFECTIVE CONFINING PRESSURE (psi): 10
PORE PRESSURE @ PRESHEAR (psi): 98.9
AXIAL STRAIN RATE (in /min): 0.005
MEMBRANE THICKNESS (in): 0.012

TIME (min)	DIAL (in)	LOAD (div)	PWP (psi)	DELTA L (in)	AREA CF	CORR. AREA (sq. in.)	IND LOAD (lbs.)	IND PWP (psi)	DEV STRESS (psi)	SIGMA 3 (psi)	SIGMA 1 (psi)	SIGMA 3' (psi)	SIGMA 1' (psi)	P (psi)	P' (psi)	Q (psi)	STRAIN (%)
0	0.4025	70	98.9	0.0000	1.0000	5.59	1.6	0.0	0.3	10.0	10.3	10.0	10.3	10.1	10.1	0.1	0.00
0.5	0.4042	83	99.3	0.0017	0.9997	5.59	5.9	0.4	1.0	10.0	11.0	9.6	10.6	10.5	10.1	0.5	0.03
1	0.406	93	99.5	0.0035	0.9994	5.59	9.1	0.6	1.6	10.0	11.6	9.4	11.0	10.8	10.2	0.8	0.06
1.5	0.4075	99.5	99.7	0.0050	0.9992	5.59	11.3	0.8	2.0	10.0	12.0	9.2	11.2	11.0	10.2	1.0	0.08
2	0.409	106	100	0.0065	0.9989	5.59	13.4	1.1	2.4	10.0	12.4	8.9	11.3	11.2	10.1	1.2	0.11
2.5	0.411	112	100.2	0.0085	0.9986	5.60	15.3	1.3	2.7	10.0	12.7	8.7	11.4	11.4	10.1	1.4	0.14
3	0.413	119	100.4	0.0105	0.9982	5.60	17.6	1.5	3.2	10.0	13.2	8.5	11.7	11.6	10.1	1.6	0.18
3.5	0.4145	124.5	100.7	0.0120	0.9980	5.60	19.4	1.8	3.5	10.0	13.5	8.2	11.7	11.7	9.9	1.7	0.20
4	0.417	129	100.8	0.0145	0.9976	5.60	20.9	1.9	3.7	10.0	13.7	8.1	11.8	11.9	10.0	1.9	0.24
5	0.421	138.5	101.3	0.0185	0.9969	5.61	24.0	2.4	4.3	10.0	14.3	7.6	11.9	12.1	9.7	2.1	0.31
6	0.4245	146.5	101.6	0.0220	0.9963	5.61	26.6	2.7	4.7	10.0	14.7	7.3	12.0	12.4	9.7	2.4	0.37
7	0.429	150.4	101.9	0.0265	0.9956	5.61	27.9	3.0	5.0	10.0	15.0	7.0	12.0	12.5	9.5	2.5	0.44
8	0.433	161	102.2	0.0305	0.9949	5.62	31.4	3.3	5.6	10.0	15.6	6.7	12.3	12.8	9.5	2.8	0.51
11	0.4465	175.5	103.1	0.0440	0.9926	5.63	36.1	4.2	6.4	10.0	16.4	5.8	12.2	13.2	9.0	3.2	0.74
14	0.46	183	103.5	0.0575	0.9904	5.64	38.6	4.6	6.8	10.0	16.8	5.4	12.2	13.4	8.8	3.4	0.96
18	0.481	190.5	104.1	0.0785	0.9869	5.66	41.0	5.2	7.2	10.0	17.2	4.8	12.0	13.6	8.4	3.6	1.31
20	0.491	194	104.2	0.0885	0.9852	5.67	42.2	5.3	7.4	10.0	17.4	4.7	12.1	13.7	8.4	3.7	1.48
26	0.522	207	104.9	0.1195	0.9800	5.70	46.4	6.0	8.1	10.0	18.1	4.0	12.1	14.1	8.1	4.1	2.00
30	0.54	215	105.1	0.1375	0.9770	5.72	49.0	6.2	8.6	10.0	18.6	3.8	12.4	14.3	8.1	4.3	2.30
35	0.5645	223.5	105.3	0.1620	0.9729	5.74	51.8	6.4	9.0	10.0	19.0	3.6	12.6	14.5	8.1	4.5	2.71
40	0.5895	228.5	105.4	0.1870	0.9687	5.77	53.4	6.5	9.3	10.0	19.3	3.5	12.8	14.6	8.1	4.6	3.13
50	0.64	233.5	105.9	0.2375	0.9602	5.82	55.1	7.0	9.5	10.0	19.5	3.0	12.5	14.7	7.7	4.7	3.98
61	0.695	241	106.1	0.2925	0.9510	5.88	57.5	7.2	9.8	10.0	19.8	2.8	12.6	14.9	7.7	4.9	4.90
75	0.766	256	106.1	0.3635	0.9391	5.95	62.4	7.2	10.5	10.0	20.5	2.8	13.3	15.2	8.0	5.2	6.09
90	0.829	269	106.3	0.4265	0.9286	6.02	66.7	7.4	11.1	10.0	21.1	2.6	13.7	15.5	8.1	5.5	7.14
105	0.912	282	106.4	0.5095	0.9147	6.11	70.9	7.5	11.6	10.0	21.6	2.5	14.1	15.8	8.3	5.8	8.53
133	1.0565	296	106.6	0.6540	0.8905	6.28	75.5	7.7	12.0	10.0	22.0	2.3	14.3	16.0	8.3	6.0	10.95
153	1.16	304	106.5	0.7575	0.8731	6.40	78.1	7.6	12.2	10.0	22.2	2.4	14.6	16.1	8.5	6.1	12.69
162	1.204	308	106.6	0.8015	0.8657	6.46	79.4	7.7	12.3	10.0	22.3	2.3	14.6	16.2	8.5	6.2	13.43

CONSOLIDATED-UNDRAINED COMPRESSION (CU) TEST

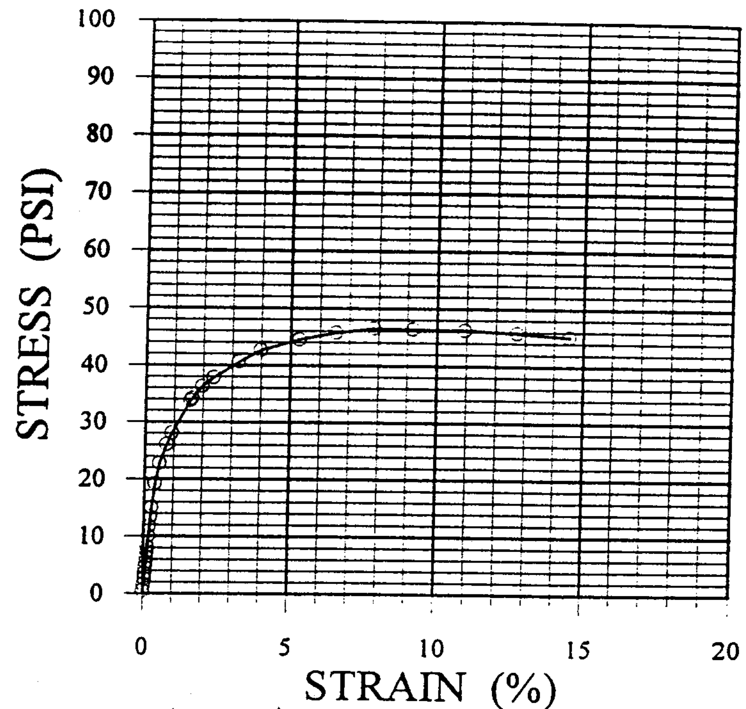
BLUE RIDGE PAPER PRODUCTS

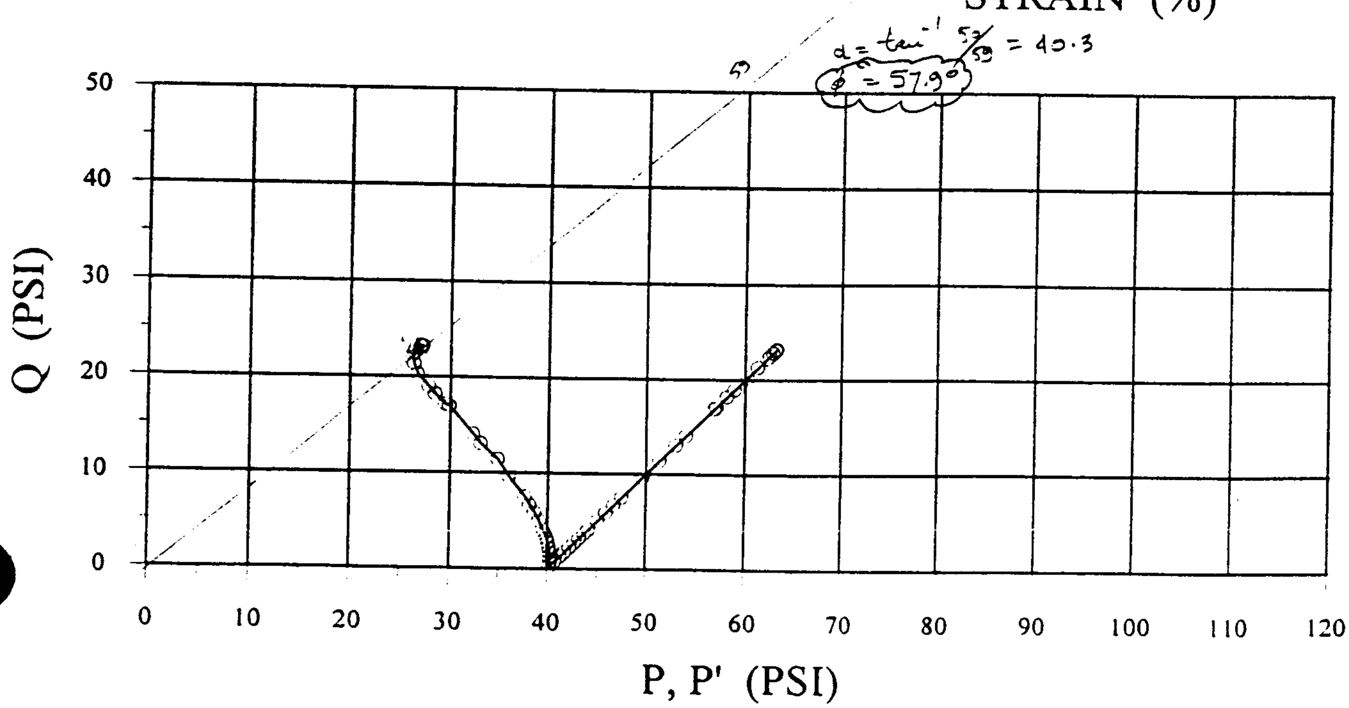
CANTON, N.C.
B99-102, U3
30.6 ft.
CU-2

SLUDGE/ASH

SAMPLE CONDITIONS

FINAL MOISTURE CONTENT:	77.6 %
EFF. CONFINING PRESS:	40.0 psi
AXIAL STRAIN RATE:	0.005 in/min
DATE TESTED:	6/28/99





JOB No: 99063 SEVEE & MAHER ENGINEERS

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

PROJECT:	[illegible]DGE PA[illegible]RODUCTS
BORING	B99-102
SAMPLE	U3
ELEV (ft)	30.6

FILE No.:	99063
TEST No.:	CIUC-2
DATE:	6/28/99
TESTED BY:	EJL
PRC (lbs/div)	0.327

INITIAL DIAL READING (in.):	0.38
CONSOLIDATED HEIGHT (in.):	5.687
CONSOLIDATED AREA (sq.in.):	5.611
INITIAL TOTAL UNIT WT. (pcf):	77.84
INITIAL WATER CONTENT (%):	-
FINAL WATER CONTENT (%):	77.6

CELL PRESSURE (psi)	120
BACK PRESSURE (psi)	80
EFFECTIVE CONFINING PRESSURE (psi)	40
PORE PRESSURE @ PRESHEAR (psi)	80.7
AXIAL STRAIN RATE (in./min.)	0.005
MEMBRANE THICKNESS (in.)	0.012

TIME (min)	DIAL (in.)	LOAD (div)	PWP (psi)	DELTA L (in.)	AREA CF	CORR. AREA (sq. in.)	IND LOAD (lbs.)	IND PWP (psi)	DEV STRESS (psi)	SIGMA 3 (psi)	SIGMA 1 (psi)	SIGMA 3' (psi)	SIGMA 1' (psi)	P (psi)	P' (psi)	Q (psi)	STRAIN (%)
0	0.38	79.5	80.7	0.0000	1.0000	5.61	2.4	0.0	0.4	40.0	40.4	40.0	40.4	40.2	40.2	0.2	0.00
0.5	0.3817	98	81.2	0.0017	0.9997	5.61	8.4	0.5	1.5	40.0	41.5	39.5	41.0	40.7	40.2	0.7	0.03
1	0.3825	116	81.7	0.0025	0.9996	5.61	14.3	1.0	2.5	40.0	42.5	39.0	41.5	41.3	40.3	1.3	0.04
1.5	0.3833	132	82.2	0.0033	0.9994	5.61	19.5	1.5	3.5	40.0	43.5	38.5	42.0	41.7	40.2	1.7	0.06
2	0.384	149	82.8	0.0040	0.9993	5.61	25.1	2.1	4.5	40.0	44.5	37.9	42.4	42.2	40.1	2.2	0.07
2.5	0.385	166	83.4	0.0050	0.9991	5.62	30.6	2.7	5.5	40.0	45.5	37.3	42.8	42.7	40.0	2.7	0.09
3	0.386	182	84	0.0060	0.9989	5.62	35.9	3.3	6.4	40.0	46.4	36.7	43.1	43.2	39.9	3.2	0.11
3.5	0.387	199	84.7	0.0070	0.9988	5.62	41.4	4.0	7.4	40.0	47.4	36.0	43.4	43.7	39.7	3.7	0.12
4	0.3875	213	85.3	0.0075	0.9987	5.62	46.0	4.6	8.2	40.0	48.2	35.4	43.6	44.1	39.5	4.1	0.13
5	0.3895	245	86.6	0.0095	0.9983	5.62	56.5	5.9	10.0	40.0	50.0	34.1	44.1	45.0	39.1	5.0	0.17
6	0.3913	274	87.9	0.0113	0.9980	5.62	66.0	7.2	11.7	40.0	51.7	32.8	44.5	45.9	38.7	5.9	0.20
7	0.393	302	89.2	0.0130	0.9977	5.62	75.1	8.5	13.4	40.0	53.4	31.5	44.9	46.7	38.2	6.7	0.23
8	0.395	330	90.5	0.0150	0.9974	5.63	84.3	9.8	15.0	40.0	55.0	30.2	45.2	47.5	37.7	7.5	0.26
11	0.4012	403	94.3	0.0212	0.9963	5.63	108.1	13.6	19.2	40.0	59.2	26.4	45.6	49.6	36.0	9.6	0.37
14	0.409	465	97.2	0.0290	0.9949	5.64	128.4	16.5	22.8	40.0	62.8	23.5	46.3	51.4	34.9	11.4	0.51
17.5	0.4225	522.5	100.6	0.0425	0.9925	5.65	147.2	19.9	26.0	40.0	66.0	20.1	46.1	53.0	33.1	13.0	0.75
20	0.4325	558	102.4	0.0525	0.9908	5.66	158.8	21.7	28.0	40.0	68.0	18.3	46.3	54.0	32.3	14.0	0.92
29	0.469	661	107.7	0.0890	0.9844	5.70	192.5	27.0	33.8	40.0	73.8	13.0	46.8	56.9	29.9	16.9	1.56
30	0.4725	668.5	108.3	0.0925	0.9837	5.70	195.0	27.6	34.2	40.0	74.2	12.4	46.6	57.1	29.5	17.1	1.63
35	0.492	708	110.4	0.1120	0.9803	5.72	207.9	29.7	36.3	40.0	76.3	10.3	46.6	58.2	28.5	18.2	1.97
40	0.514	737.5	111.8	0.1340	0.9764	5.75	217.5	31.1	37.9	40.0	77.9	8.9	46.8	58.9	27.8	18.9	2.36
50	0.563	791	114.3	0.1830	0.9678	5.80	235.0	33.6	40.5	40.0	80.5	6.4	46.9	60.3	26.7	20.3	3.22
60	0.606	834	115.7	0.2260	0.9603	5.84	249.1	35.0	42.6	40.0	82.6	5.0	47.6	61.3	26.3	21.3	3.97
75	0.681	879	116.8	0.3010	0.9471	5.92	263.8	36.1	44.5	40.0	84.5	3.9	48.4	62.3	26.2	22.3	5.29
90	0.752	912	117.1	0.3720	0.9346	6.00	274.6	36.4	45.7	40.0	85.7	3.6	49.3	62.9	26.5	22.9	6.54
105	0.8255	938	116.8	0.4455	0.9217	6.09	283.1	36.1	46.5	40.0	86.5	3.9	50.4	63.3	27.2	23.3	7.83
120	0.9025	948.7	116.9	0.5225	0.9081	6.18	286.6	36.2	46.4	40.0	86.4	3.8	50.2	63.2	27.0	23.2	9.19
140	1.002	963.5	116.7	0.6220	0.8906	6.30	291.4	36.0	46.3	40.0	86.3	4.0	50.1	63.1	27.1	23.1	10.94
160	1.103	972.5	116.6	0.7230	0.8729	6.43	294.4	35.9	45.8	40.0	85.8	4.1	49.9	62.9	27.0	22.9	12.71
180	1.2058	977.8	116.9	0.8258	0.8548	6.56	296.1	36.2	45.1	40.0	85.1	3.8	48.9	62.6	26.4	22.6	14.52

SPECIFIC GRAVITY

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

Project BLUE RIDGE PAPER PRODUCTS — Job No. 94040

Location of Project North Carolina — Boring No. ______ Sample No. ______

Description of Soil Greenish-grey LIME MUD — Depth of Sample ______

Tested By EJC — Date of Testing 2/6/95

Test no.	1			
Vol. of flask at 20°C	500 ml			
Method of air removal*	VACUUM			
Wt. flask + water + soil = W_{bws}	726.7			
Temperature, °C	22.4			
Wt. flask + water† = W_{bw}	669.7			
Evap. dish no.	A-20			
Wt. evap. dish + dry soil	323.73			
Wt. of evap. dish	230.78			
Wt. of dry soil = W_s	92.95			
$W_w = W_s + W_{bw} - W_{bws}$	35.95			
$G_s = \alpha W_s / W_w$	2.58			

*Indicate vacuum or aspirator for air removal.

†W_{bw} is the weight of the flask filled with water at same temp. ± 1°C as for W_{bws} or value from calibration curve at T of W_{bws}.

Remarks ______

Average specific gravity of soil solids (G_s) = 2.58

Typical values of the correction factor,

T, °C	α	γ_w, g/cm³
16	1.0007	0.99897
18	1.0004	0.99862
20	1.0000	0.99823
22	0.9996	0.99780
24	0.9991	0.99732
26	0.9986	0.99681

Typical values of G_s

Type of soil	G_s
Sand	2.65-2.67
Silty sand	2.67-2.70
Inorganic clay	2.70-2.80
Soils with micas or iron	2.75-3.00
Organic soils	Variable but may be under 2.00

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

Project: BLUE RIDGE PAPER PRODUCTS — Job No. 95024

Location of Project: CANTON N.C. — Boring No. B101 — Sample No. 35

Description of Soil: Brown/black fibrous Sludge w/ash — Depth of Sample: 33.0

Tested By: EJL — Date of Testing: 6/23/95

Test no.	1	2		
Vol. of flask at 20°C				
Method of air removal[a]	VACUUM	VACUUM		
Wt. flask + water + soil = W_{bws}	404.3	407.2		
Temperature, °C	23	23		
Wt. flask + water[b] = W_{bw}	398.82	401.23		
Evap. dish no.				
Wt. evap. dish + dry soil				
Wt. of evap. dish				
Wt. of dry soil = W_s	9.96	10.63		
$W_w = W_s + W_{bw} - W_{bws}$	4.48	4.66		
$G_s = \alpha W_s / W_w$	2.22	2.28		

[a]Indicate vacuum or aspirator for air removal.
[b]W_{bw} is the weight of the flask filled with water at same temp. ± 1°C as for W_{bws} or value from calibration curve at T of W_{bws}.

Remarks ______________________

Average specific gravity of soil solids (G_s) = 2.25

Typical values of the correction factor,

T, C	α	γ_w, g/cm³
16	1.0007	0.99897
18	1.0004	0.99862
20	1.0000	0.99823
22	0.9996	0.99780
24	0.9991	0.99732
26	0.9986	0.99681

Typical values of G_s

Type of soil	G_s
Sand	2.65-2.67
Silty sand	2.67-2.70
Inorganic clay	2.70-2.80
Soils with micas or iron	2.75-3.00
Organic soils	Variable but may be under 2.00

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

Project BLUE RIDGE PAPER PRODUCTS Job No. 95024

Location of Project Canton N.C. Boring No. B101 Sample No. 45

Description of Soil Brown fibrous Sludge w/ash Depth of Sample 41.6

Tested By ESL Date of Testing 6/27/95

Test no.	1	2		
Vol. of flask at 20°C				
Method of air removal*	VACUUM			
Wt. flask + water + soil = W_{bws}	413.8	418.6		
Temperature, °C	23	23		
Wt. flask + water[b] = W_{bw}	398.82	401.23		
Evap. dish no.				
Wt. evap. dish + dry soil				
Wt. of evap. dish				
Wt. of dry soil = W_s	27.4	30.88		
$W_w = W_s + W_{bw} - W_{bws}$	12.42	13.51		
$G_s = \alpha W_s / W_w$	2.21	2.28		

*Indicate vacuum or aspirator for air removal.

[b]W_{bw} is the weight of the flask filled with water at same temp. ± 1°C as for W_{bws} or value from calibration curve at T of W_{bws}.

Remarks

Average specific gravity of soil solids (G_s) = 2.25

Typical values of the correction factor,

T, °C	α	γ_w, g/cm³
16	1.0007	0.99897
18	1.0004	0.99862
20	1.0000	0.99823
22	0.9996	0.99780
24	0.9991	0.99732
26	0.9986	0.99681

Typical values of G_s

Type of soil	G_s
Sand	2.65-2.67
Silty sand	2.67-2.70
Inorganic clay	2.70-2.80
Soils with micas or iron	2.75-3.00
Organic soils	Variable but may be under 2.00

SPECIFIC GRAVITY OF SOIL SOLIDS (G_s)

Project BLUE RIDGE PAPER PRODUCTS 2 Job No. 95024

Location of Project CANTON, N.C. Boring No. B102 Sample No. 1S

Description of Soil Black Ash Depth of Sample 12.2

Tested By EJL Date of Testing 6/29/95

Test no.				
Vol. of flask at 20°C				
Method of air removal*	VACUUM	VACUUM		
Wt. flask + water + soil = W_{bws}	416.2	4260		
Temperature, °C	23	23		
Wt. flask + water[b] = W_{bw}	398.82	401.23		
Evap. dish no.				
Wt. evap. dish + dry soil				
Wt. of evap. dish				
Wt. of dry soil = W_s	3265	47.57		
$W_w = W_s + W_{bw} - W_{bws}$	15.27	22.80		
$G_s = \alpha W_s / W_w$	2.14	2.09		

*Indicate vacuum or aspirator for air removal.
[b]W_{bw} is the weight of the flask filled with water at same temp. ± 1°C as for W_{bws} or value from calibration curve at T of W_{bws}.

Remarks

Average specific gravity of soil solids (G_s) = 2.11

Typical values of the correction factor,

T, °C	α	γ_w, g/cm³
16	1.0007	0.99897
18	1.0004	0.99862
20	1.0000	0.99823
22	0.9996	0.99780
24	0.9991	0.99732
26	0.9986	0.99681

Typical values of G_s

Type of soil	G_s
Sand	2.65-2.67
Silty sand	2.67-2.70
Inorganic clay	2.70-2.80
Soils with micas or iron	2.75-3.00
Organic soils	Variable but may be under 2.00

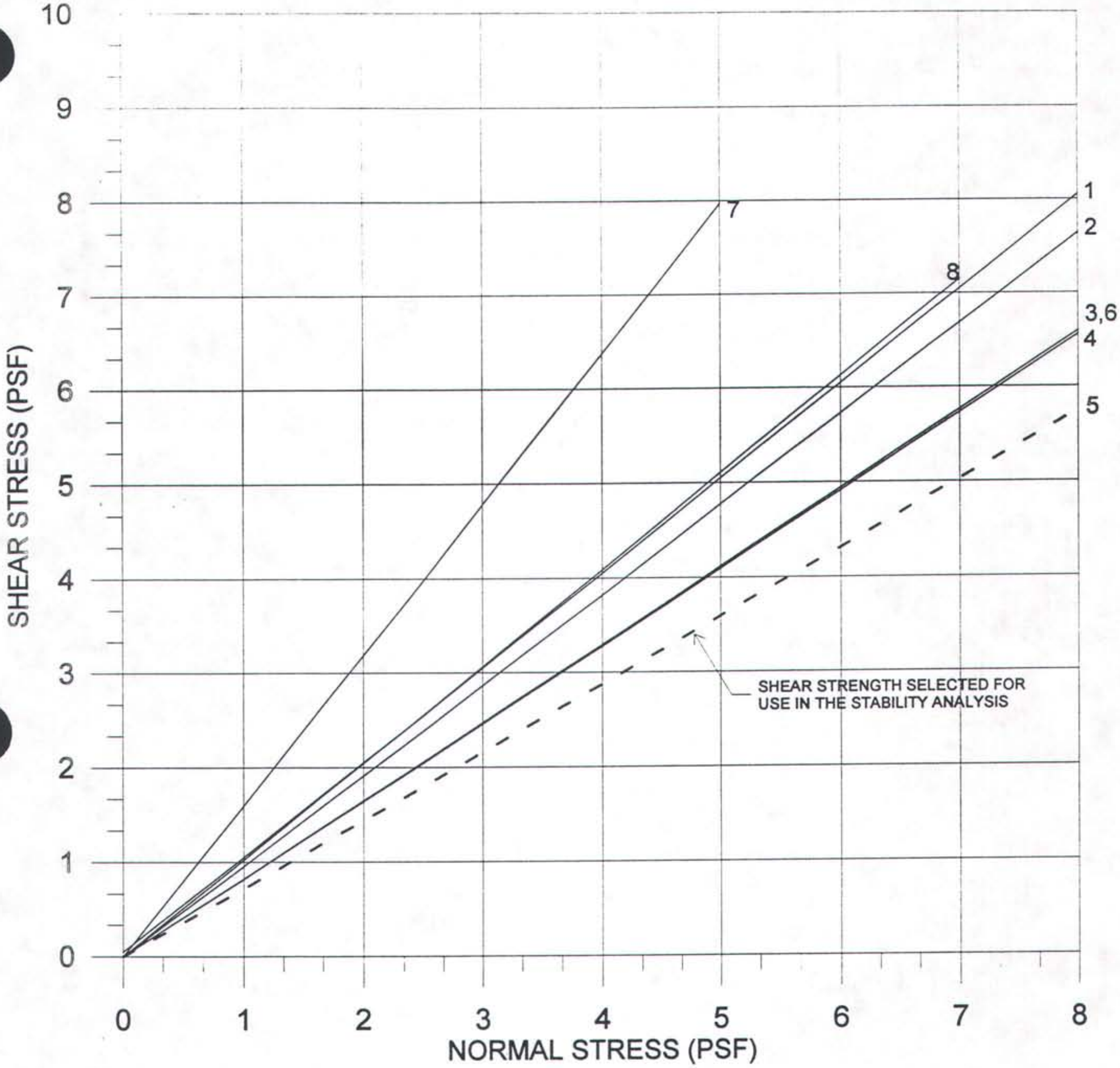
APPENDIX D

GEOTECHNICAL PROPERTIES SUMMARY TABLES AND FIGURES

Table D-1
Summary of Waste Geotechnical Properties Used in the Stability Analysis
Landfill 6A-East
Blue Ridge Paper Products Inc.

Data Source	Boring ID	Sample ID	Depth (ft.below ground)	Total Unit Weight (pcf)	Water Content (%)	Effective Friction Angle (degrees)	Effective Cohesion (psf)	Total Friction Angle (degrees)	Total Stress Cohesion	Description
(1)		Bulk #1		64	160				570	Sludge UU Test
(1)		Bulk #2		82	160				550	Sludge/Ash, UU Test
(1)		Bulk #3		68	90				1100	Sludge/Ash, UU Test
(1)		Sample #1						40	200	Sludge, Compaction Test
(1)		Sample #2								Sludge/Ash, Compaction Test
(2)				55		45	50			Assumed
(3)				76						Used in Report
(3)	B101	3S	32.5	78	79	39.3	0			Sludge/Ash,CIUC
(3)	B101	4S	40.5	80	75	43.7	0			Sludge/Ash,CIUC
(3)	B101	1S	13.5		79	35.7	0			Ash
(3)	B102	1S	12.5		79	39.5	0			Ash, some Sludge
(3)				96	54					Lime mud Density test
(4)	B99-102	U3	30.6	78	77.6	57.9	0			Sludge/Ash,CIUC
(4)	B99-102	U2	20.5	85	71.1	45.6	0			Sludge/Ash,CIUC
(4)	B99-103	U4	40.5	96		39.5	0			Lime mud, CIUC

(1) Sirrine, 1989
(2) Law, 1982
(3) SME, 1995
(4) SME, 1999



1) 45°, 0.05 KSF; LAW 1982, ASSUMED WASTE VALUE

2) 43.7°, 0 KSF; SME 1995, SLUDGE/ASH, CIUC TEST

3) 39.5°, 0 KSF; SME 1995, SLUDGE/ASH, CIUC TEST

4) 39.3°, 0 KSF; SME 1995, SLUDGE/ASH, CIUC TEST

5) 35.7°, 0 KSF; SME 1995, SLUDGE/ASH, CIUC TEST

6) 39.5°, 0 KSF; SME 1999, LIME MUD, CIUC TEST

7) 57.9°, 0 KSF; SME 1999, SLUDGE/ASH, CIUC TEST

8) 45.6°, 0 KSF; SME 1999, SLUDGE/ASH, CIUC TEST

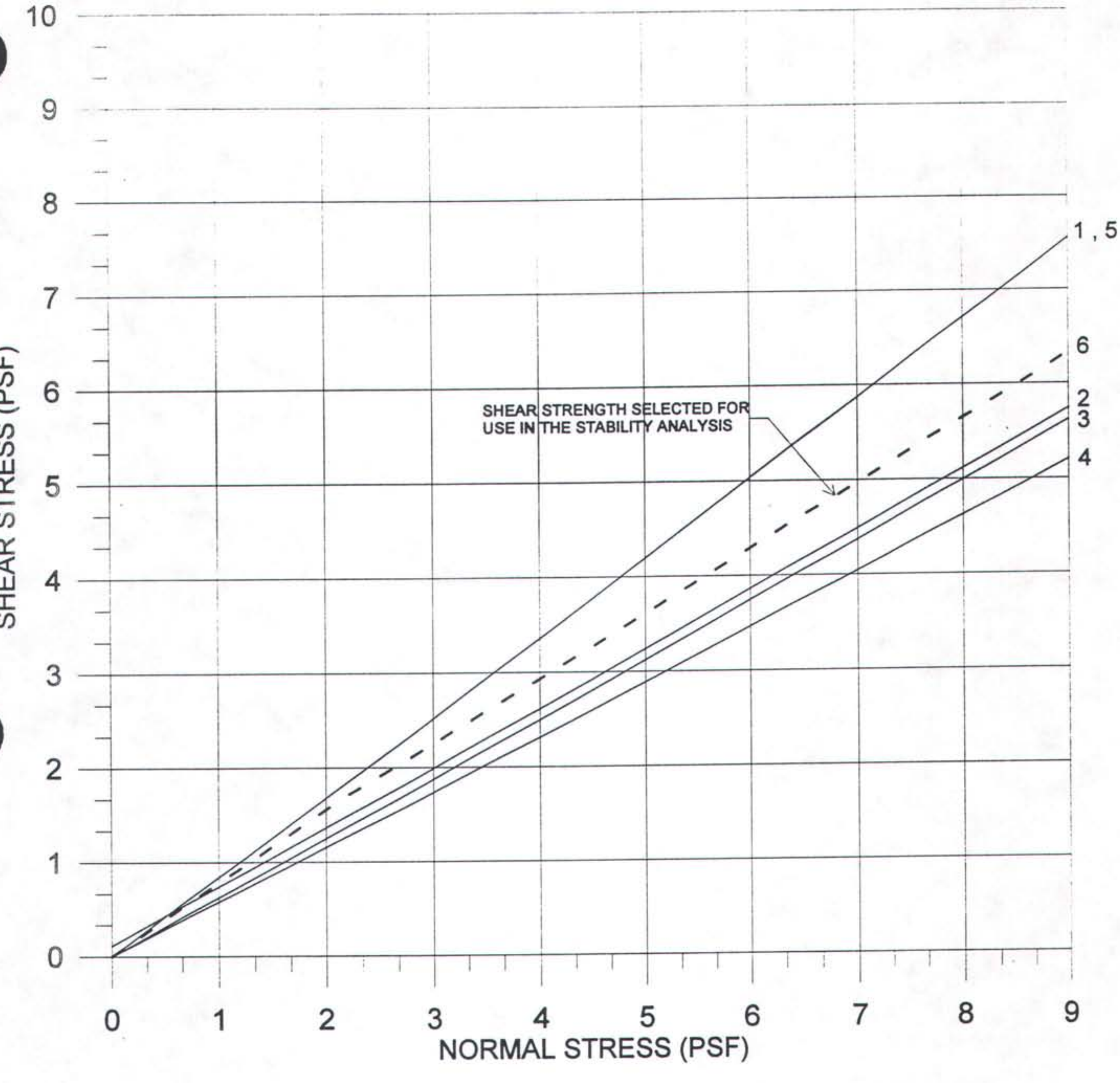
FIGURE D-1
PLOT OF AVAILABLE EFFECTIVE SHEAR STRENGTHS FOR WASTES
LANDFILL NO. 6A-EAST
BLUE RIDGE PAPER PRODUCTS INC.

SEVEE & MAHER ENGINEERS

Table D-2
Summary of Perimeter Dike Geotechnical Properties Used in the Stability Analysis
Landfill 6A-East
Blue Ridge Paper Products Inc.

Data Source	Boring ID	Depth (ft.below ground)	Total Unit Weight[4] (pcf)	Maximum Dry Density (pcf)	Optimum Water Content (%)	Effective Friction Angle (degrees)	Effective Cohesion (psf)	Total Friction Angle (degrees)	Total Stress Cohesion (psf)	Description
(1)	AP-18	18.5-23.5	126	109	15.9					Compaction Test
(1)	AP-14	28.5-38.5	133	117	14.1					Compaction Test
(1)	AP-5	18.5-23.5	127	112	13.9	40	0	20	216	CIUC/Compaction Test
(1)	AP-3	14-20	128	109	18.6					Compaction Test
(1)	AP-1	20-35	127	110	15.5	32	115	18.5	202	CIUC/Compaction Test
(2)	B-8	3-12	127	107	17.9					Compaction Test
(2)	B-10	1-8	131	113	16.3	32	0	19	600	CIUC/Compaction Test
(2)	B-18	1-8	129	111	16.3	30	0	19	900	CIUC/Compaction Test
(2)	B-18	18-23	127	108	17.3					Compaction Test
(3)	B99-101	10-60	117		14.6[5]	34	260			Direct Shear test, run dry,normal stress>15psi
(3)	B99-101	10-60	117		14.6[5]	38	0			Direct Shear test, run dry,normal stress<15psi
(3)	B99-101	10-60	117		16.4[5]	40	0			Direct Shear test, run wet

(1) Sirrine, 1989
(2) Law, 1982
(3) SME, 1999
(4) With the exception of the two direct shear tests, total unit weight is based on max. dry density and optimum water content.
(5) Natural water content.



1) 40°, 0 KSF; SIRRINE 1989, CIUC TEST

2) 32°, 0.115 KSF; SIRRINE 1989, CIUC TEST

3) 32°, 0 KSF; LAW 1982, CIUC TEST

4) 30°, 0 KSF; LAW 1982, CIUC TEST

5) 40°, 0 KSF; SME 1999, DIRECT SHEAR TEST (WET)

6) 38°, 0 KSF FOR NORMAL STRESSES LESS THAN 2.2 KSF
34°, 0.26 KSF FOR NORMAL STRESSES GREATER THAN 2.2 KSF;
SME 1999, DIRECT SHEAR TEST (DRY)

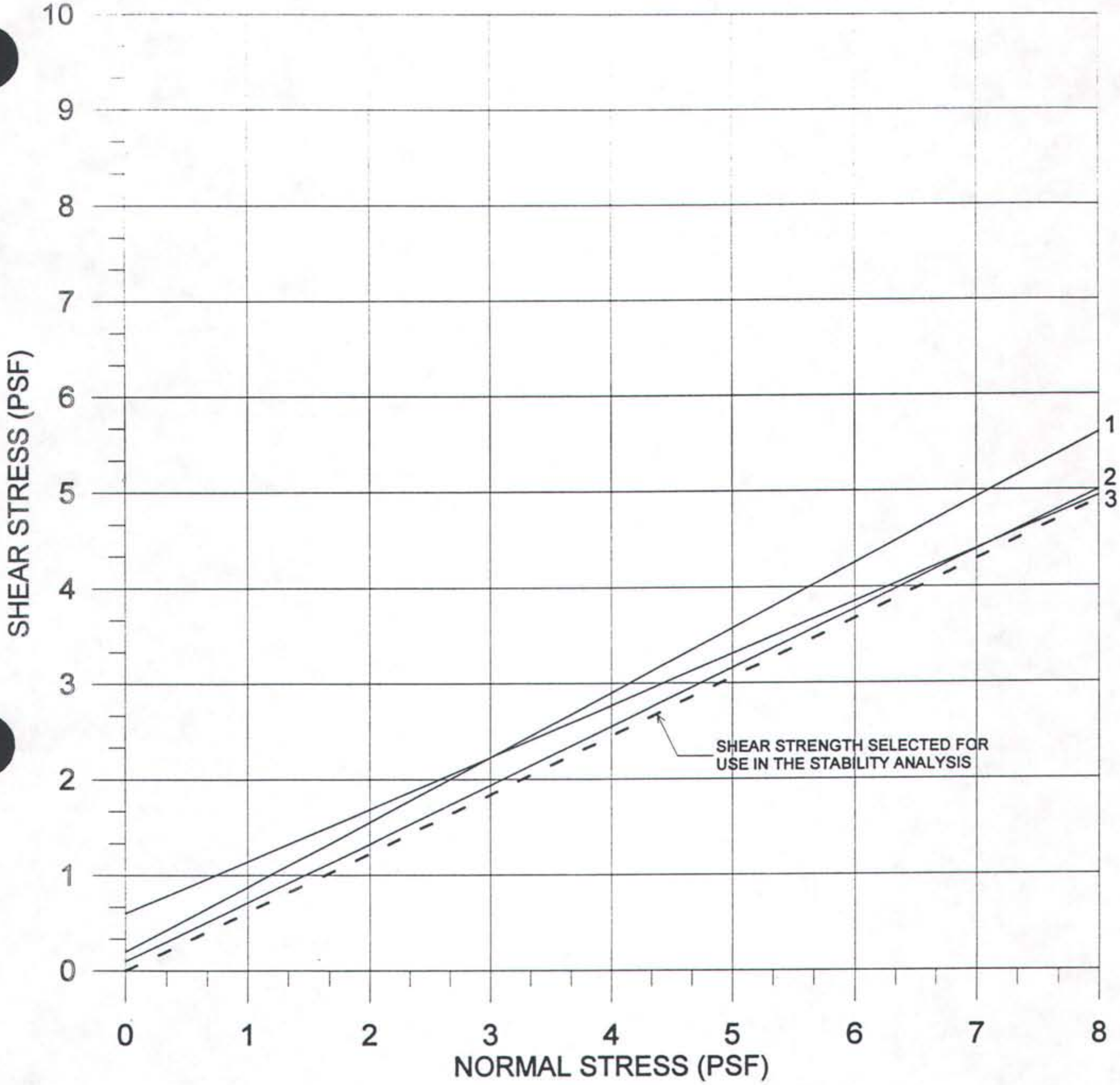
FIGURE D-2
PLOT OF AVAILABLE EFFECTIVE SHEAR STRENGTHS FOR PERIMETER DIKE SOILS
LANDFILL NO. 6A-EAST
BLUE RIDGE PAPER PRODUCTS INC.

SEVEE & MAHER ENGINEERS

Table D-3
Summary of Foundation Soil Geotechnical Properties Used in the Stability Analysis
Landfill 6A-East
Blue Ridge Paper Products Inc.

Data Source	Boring ID	Depth (ft.below ground)	Total Unit Weight (pcf)	Saturated Total Unit Weight (pcf)	Water Content (%)	Effective Friction Angle (degrees)	Effective Cohesion (psf)	Total Friction Angle (degrees)	Total Stress Cohesion (psf)	Description
(1)	B-8	9-11	117	130	13.2	34	200	27.5	300	Undisturbed Sample
(1)	B-10	13-15	104	118	19.7	31.5	100	16.5	400	Undisturbed Sample
(1)	B-11	8-11	124	125	28.3	28.5	600	17.5	800	Undisturbed Sample

(1) Law, 1982



1) 34°, 0.2 KSF; LAW 1982, CIUC TEST

2) 31.5°, 0.1 KSF; LAW 1982, CIUC TEST

3) 28.5°, 0.6 KSF; LAW 1982, CIUC TEST

FIGURE D-3
PLOT OF AVAILABLE EFFECTIVE SHEAR STRENGTHS FOR FOUNDATION SOILS
LANDFILL NO. 6A-EAST
BLUE RIDGE PAPER PRODUCTS INC.

SEVEE & MAHER ENGINEERS

APPENDIX E

XSTABL OUTPUT

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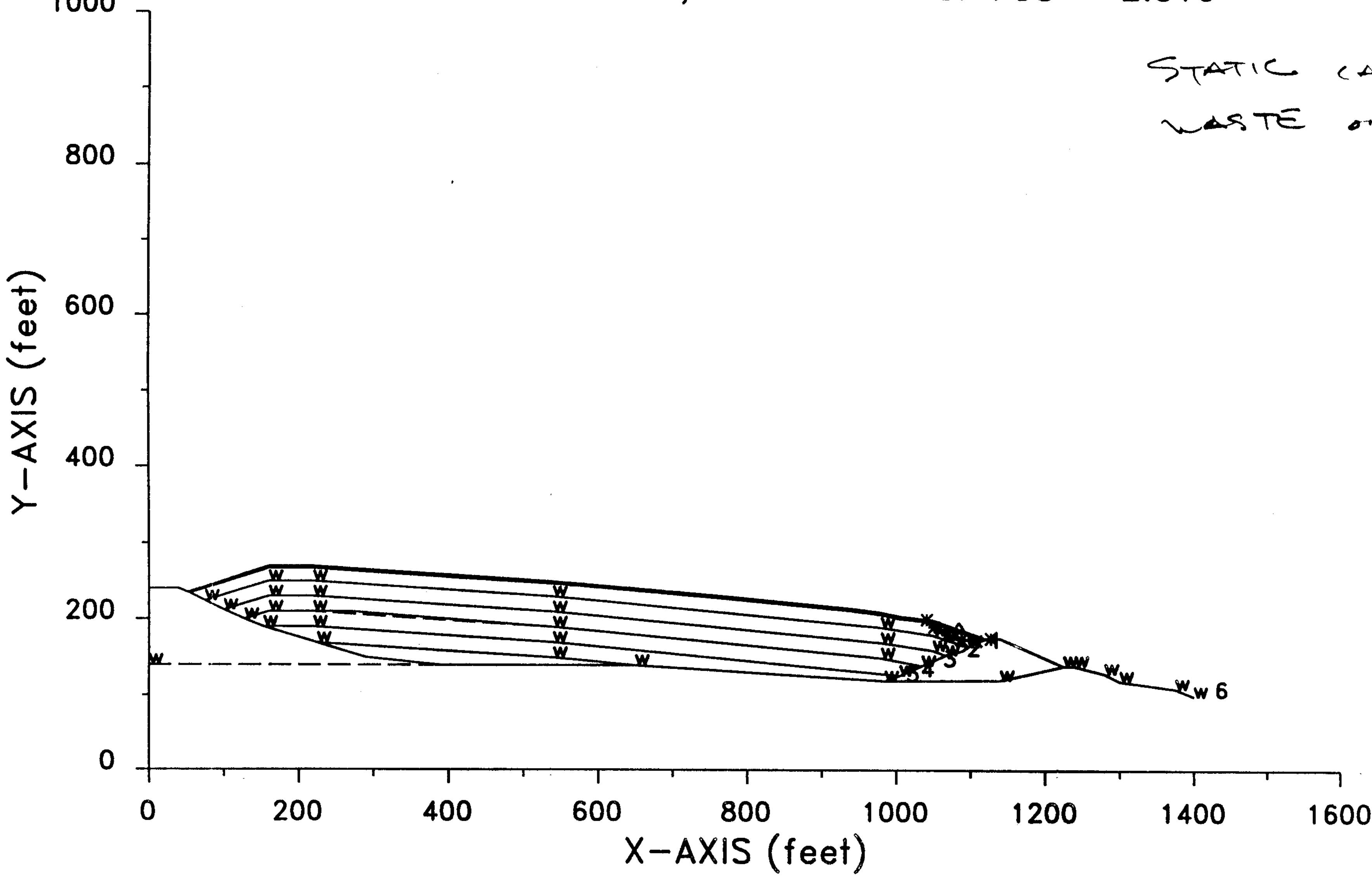
BLUE RIDGE PAPER PRODUCTS CELL 6A EAST SECTION A-A'

5 most critical surfaces, MINIMUM BISHOP FOS = 2.510



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*              X S T A B L              *
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*           Method of Slices            *
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BLUE RIDGE

Problem Description PAPER PRODUCTS **CELL 6A EAST SECTION A-A'**

SEGMENT BOUNDARY COORDINATES

----

18 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	240.0	40.0	240.0	8
2	40.0	240.0	52.0	235.0	8
3	52.0	235.0	160.0	270.0	1
4	160.0	270.0	220.0	270.0	1
5	220.0	270.0	540.0	250.0	1
6	540.0	250.0	780.0	230.0	1
7	780.0	230.0	940.0	215.0	1
8	940.0	215.0	980.0	210.0	1
9	980.0	210.0	1005.0	205.0	1
10	1005.0	205.0	1050.0	200.0	1
11	1050.0	200.0	1120.0	176.0	1
12	1120.0	176.0	1140.0	176.0	8
13	1140.0	176.0	1225.0	140.0	8
14	1225.0	140.0	1240.0	140.0	9
15	1240.0	140.0	1280.0	130.0	9
16	1280.0	130.0	1300.0	120.0	9
17	1300.0	120.0	1375.0	110.0	9
18	1375.0	110.0	1400.0	100.0	9

51 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	52.0	235.0	55.0	234.0	8
2	55.0	234.0	160.0	267.0	2
3	160.0	267.0	220.0	267.0	2
4	220.0	267.0	540.0	247.0	2
5	540.0	247.0	780.0	227.0	2
6	780.0	227.0	940.0	212.0	2
7	940.0	212.0	980.0	207.0	2

8	980.0	207.0	1005.0	202.0	2
9	1005.0	202.0	1050.0	197.0	2
10	1050.0	197.0	1117.0	174.0	2
11	1117.0	174.0	1120.0	176.0	8
12	55.0	234.0	75.0	224.0	8
13	75.0	224.0	160.0	250.0	3
14	160.0	250.0	220.0	250.0	3
15	220.0	250.0	540.0	230.0	3
16	540.0	230.0	980.0	190.0	3
17	980.0	190.0	1050.0	180.0	3
18	1050.0	180.0	1097.0	165.0	3
19	1097.0	165.0	1105.0	170.0	8
20	1105.0	170.0	1117.0	174.0	8
21	75.0	224.0	100.0	212.0	8
22	100.0	212.0	160.0	230.0	4
23	160.0	230.0	220.0	230.0	4
24	220.0	230.0	540.0	210.0	4
25	540.0	210.0	980.0	170.0	4
26	980.0	170.0	1050.0	160.0	4
27	1050.0	160.0	1067.0	154.0	4
28	1067.0	154.0	1090.0	160.0	8
29	1090.0	160.0	1097.0	165.0	8
30	100.0	212.0	128.0	200.0	8
31	128.0	200.0	160.0	210.0	5
32	160.0	210.0	270.0	210.0	5
33	270.0	210.0	540.0	190.0	5
34	540.0	190.0	980.0	150.0	5
35	980.0	150.0	1035.0	140.0	5
36	1035.0	140.0	1067.0	154.0	8
37	128.0	200.0	153.0	190.0	8
38	153.0	190.0	220.0	190.0	6
39	220.0	190.0	540.0	170.0	6
40	540.0	170.0	1005.0	127.0	6
41	1005.0	127.0	1035.0	140.0	8
42	153.0	190.0	225.0	169.0	8
43	225.0	169.0	540.0	150.0	7
44	540.0	150.0	650.0	140.0	7
45	650.0	140.0	985.0	120.0	9
46	985.0	120.0	1005.0	127.0	8
47	985.0	120.0	1140.0	121.0	9
48	1140.0	121.0	1225.0	140.0	9
49	225.0	169.0	290.0	150.0	8
50	290.0	150.0	390.0	140.0	8
51	390.0	140.0	650.0	140.0	9

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	120.0	120.0	.0	30.00	.000	.0	0
2	90.0	90.0	.0	36.00	.000	.0	1
3	90.0	90.0	.0	36.00	.000	.0	1
4	90.0	90.0	.0	36.00	.000	.0	2
5	90.0	90.0	.0	36.00	.000	.0	3
6	90.0	90.0	.0	36.00	.000	.0	4
7	90.0	90.0	.0	36.00	.000	.0	5
8	120.0	120.0	.0	.00	.000	.0	6
9	115.0	115.0	.0	31.50	.000	.0	6

NON-LINEAR MOHR-COULOMB envelope has been specified for 1 soil(s)

Soil Unit # 8

Point No.	Normal Stress (psf)	Shear Stress (psf)
1	.0	.0
2	2160.0	1680.0
3	9000.0	6330.0
4	20000.0	13749.0

6 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 7 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	75.00	224.00
2	160.00	250.00
3	220.00	250.00
4	540.00	230.00
5	980.00	190.00
6	1050.00	180.00
7	1097.00	165.00

Water Surface No. 2 specified by 7 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	100.00	212.00
2	160.00	230.00
3	220.00	230.00
4	540.00	210.00
5	980.00	170.00
6	1050.00	160.00
7	1067.00	154.00

Water Surface No. 3 specified by 6 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)

1	128.00	200.00
2	160.00	210.00
3	220.00	210.00
4	540.00	190.00
5	980.00	150.00
6	1035.00	140.00

Water Surface No. 4 specified by 4 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	153.00	190.00
2	220.00	190.00
3	540.00	170.00
4	1005.00	127.00

Water Surface No. 5 specified by 4 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	225.00	169.00
2	540.00	150.00
3	650.00	140.00
4	985.00	120.00

Water Surface No. 6 specified by 10 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	140.00
2	650.00	140.00
3	985.00	120.00
4	1140.00	121.00
5	1225.00	140.00
6	1240.00	140.00
7	1280.00	130.00
8	1300.00	120.00
9	1375.00	110.00
10	1400.00	100.00

BOUNDARIES THAT LIMIT SURFACE GENERATION HAVE BEEN SPECIFIED

UPPER limiting boundary of 1 segments:

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)
1	1075.0	180.0	1085.0	188.0

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced along the ground surface between x = 1110.0 ft and x = 1130.0 ft

Each surface terminates between x = 950.0 ft and x = 1060.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = 140.0 ft

20.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 6 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	1127.93	176.00
2	1108.13	173.16
3	1088.20	174.84
4	1069.17	180.97
5	1051.99	191.21
6	1041.90	200.90

**** Simplified BISHOP FOS = 2.510 ****

The following is a summary of the TEN most critical surfaces

Problem Description : CHAMPION CELL 6A EAST SECTION A-A'

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	2.510	1105.56	261.48	88.36	1127.93	1041.90	4.400E+06
2.	2.514	1100.76	241.12	66.87	1118.28	1048.18	2.648E+06
3.	2.515	1102.18	251.86	78.34	1121.72	1043.57	3.731E+06
4.	2.529	1105.81	246.03	73.44	1127.93	1049.34	3.231E+06
5.	2.537	1104.32	267.48	94.14	1126.55	1037.73	5.054E+06
6.	2.540	1105.62	276.96	103.39	1127.93	1034.79	5.676E+06
7.	2.544	1104.89	269.56	96.35	1127.93	1036.91	5.279E+06
8.	2.552	1097.60	243.90	69.15	1116.21	1043.69	3.019E+06
9.	2.560	1103.64	257.62	84.97	1127.24	1040.89	4.586E+06
10.	2.582	1102.24	234.88	62.24	1122.41	1051.02	2.629E+06

* * * END OF FILE * * *

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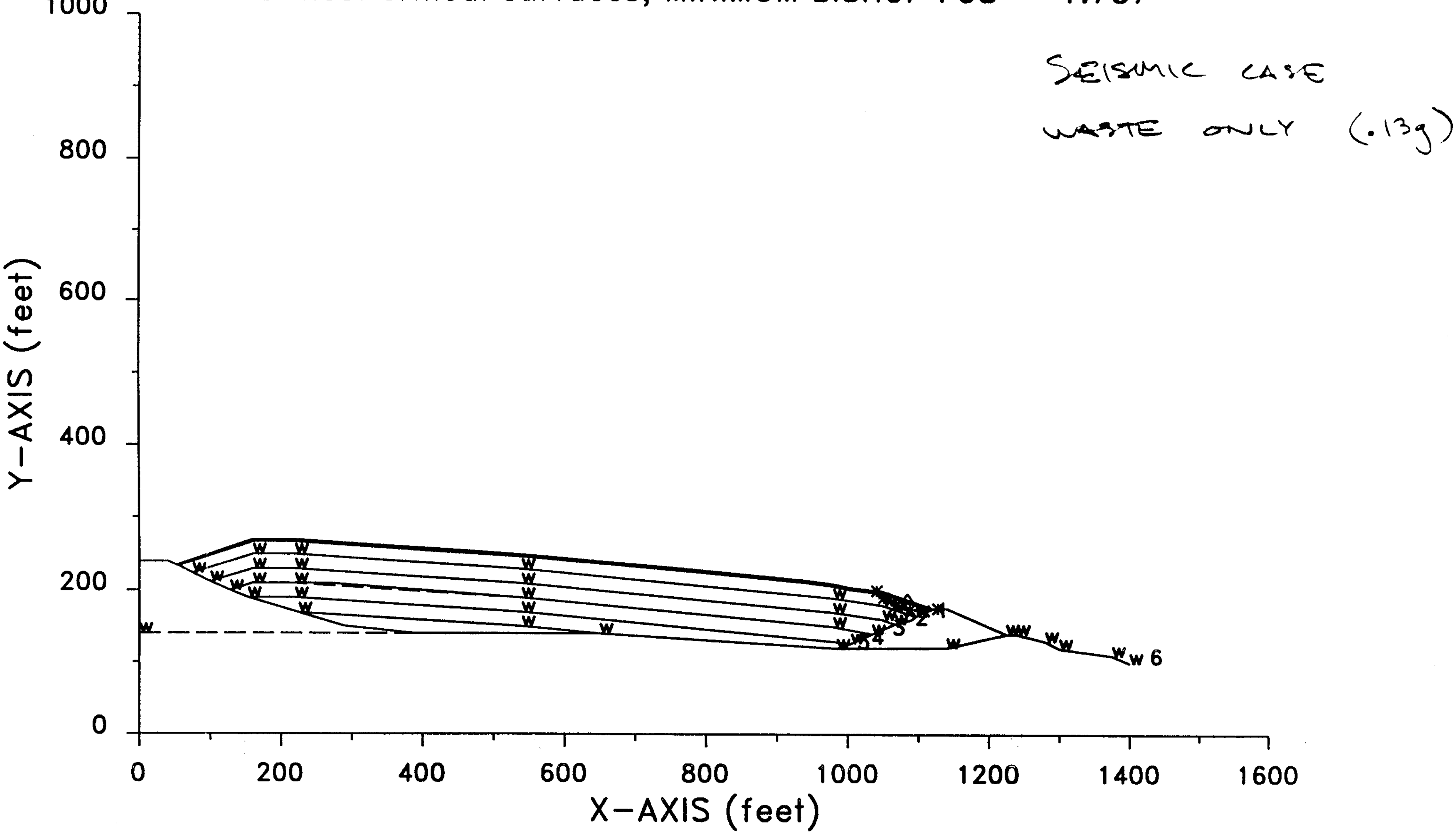
BLUE RIDGE PAPER PRODUCTS

CELL 6A EAST SECTION A–A'

5 most critical surfaces, MINIMUM BISHOP FOS = 1.737



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*               using the                 *
*           Method of Slices              *
*                                         *
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BLUE RIDGE

Problem Description PAPER PRODUCTS **CELL 6A EAST SECTION A-A'**

SEGMENT BOUNDARY COORDINATES

18 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	240.0	40.0	240.0	8
2	40.0	240.0	52.0	235.0	8
3	52.0	235.0	160.0	270.0	1
4	160.0	270.0	220.0	270.0	1
5	220.0	270.0	540.0	250.0	1
6	540.0	250.0	780.0	230.0	1
7	780.0	230.0	940.0	215.0	1
8	940.0	215.0	980.0	210.0	1
9	980.0	210.0	1005.0	205.0	1
10	1005.0	205.0	1050.0	200.0	1
11	1050.0	200.0	1120.0	176.0	1
12	1120.0	176.0	1140.0	176.0	8
13	1140.0	176.0	1225.0	140.0	8
14	1225.0	140.0	1240.0	140.0	9
15	1240.0	140.0	1280.0	130.0	9
16	1280.0	130.0	1300.0	120.0	9
17	1300.0	120.0	1375.0	110.0	9
18	1375.0	110.0	1400.0	100.0	9

51 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	52.0	235.0	55.0	234.0	8
2	55.0	234.0	160.0	267.0	2
3	160.0	267.0	220.0	267.0	2
4	220.0	267.0	540.0	247.0	2
5	540.0	247.0	780.0	227.0	2
6	780.0	227.0	940.0	212.0	2
7	940.0	212.0	980.0	207.0	2

8	980.0	207.0	1005.0	202.0	2
9	1005.0	202.0	1050.0	197.0	2
10	1050.0	197.0	1117.0	174.0	2
11	1117.0	174.0	1120.0	176.0	8
12	55.0	234.0	75.0	224.0	8
13	75.0	224.0	160.0	250.0	3
14	160.0	250.0	220.0	250.0	3
15	220.0	250.0	540.0	230.0	3
16	540.0	230.0	980.0	190.0	3
17	980.0	190.0	1050.0	180.0	3
18	1050.0	180.0	1097.0	165.0	3
19	1097.0	165.0	1105.0	170.0	8
20	1105.0	170.0	1117.0	174.0	8
21	75.0	224.0	100.0	212.0	8
22	100.0	212.0	160.0	230.0	4
23	160.0	230.0	220.0	230.0	4
24	220.0	230.0	540.0	210.0	4
25	540.0	210.0	980.0	170.0	4
26	980.0	170.0	1050.0	160.0	4
27	1050.0	160.0	1067.0	154.0	4
28	1067.0	154.0	1090.0	160.0	8
29	1090.0	160.0	1097.0	165.0	8
30	100.0	212.0	128.0	200.0	8
31	128.0	200.0	160.0	210.0	5
32	160.0	210.0	270.0	210.0	5
33	270.0	210.0	540.0	190.0	5
34	540.0	190.0	980.0	150.0	5
35	980.0	150.0	1035.0	140.0	5
36	1035.0	140.0	1067.0	154.0	8
37	128.0	200.0	153.0	190.0	8
38	153.0	190.0	220.0	190.0	6
39	220.0	190.0	540.0	170.0	6
40	540.0	170.0	1005.0	127.0	6
41	1005.0	127.0	1035.0	140.0	8
42	153.0	190.0	225.0	169.0	8
43	225.0	169.0	540.0	150.0	7
44	540.0	150.0	650.0	140.0	7
45	650.0	140.0	985.0	120.0	9
46	985.0	120.0	1005.0	127.0	8
47	985.0	120.0	1140.0	121.0	9
48	1140.0	121.0	1225.0	140.0	9
49	225.0	169.0	290.0	150.0	8
50	290.0	150.0	390.0	140.0	8
51	390.0	140.0	650.0	140.0	9

ISOTROPIC Soil Parameters

----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Constant (psf)	Water Surface No.
1	120.0	120.0	.0	30.00	.000	.0	0
2	90.0	90.0	.0	36.00	.000	.0	1
3	90.0	90.0	.0	36.00	.000	.0	1
4	90.0	90.0	.0	36.00	.000	.0	2
5	90.0	90.0	.0	36.00	.000	.0	3
6	90.0	90.0	.0	36.00	.000	.0	4
7	90.0	90.0	.0	36.00	.000	.0	5
8	120.0	120.0	.0	.00	.000	.0	6
9	115.0	115.0	.0	31.50	.000	.0	6

NON-LINEAR MOHR-COULOMB envelope has been specified for 1 soil(s)

Soil Unit # 8

Point No.	Normal Stress (psf)	Shear Stress (psf)
1	.0	.0
2	2160.0	1680.0
3	9000.0	6330.0
4	20000.0	13749.0

6 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 7 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	75.00	224.00
2	160.00	250.00
3	220.00	250.00
4	540.00	230.00
5	980.00	190.00
6	1050.00	180.00
7	1097.00	165.00

Water Surface No. 2 specified by 7 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	100.00	212.00
2	160.00	230.00
3	220.00	230.00
4	540.00	210.00
5	980.00	170.00
6	1050.00	160.00
7	1067.00	154.00

Water Surface No. 3 specified by 6 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)

1	128.00	200.00
2	160.00	210.00
3	220.00	210.00
4	540.00	190.00
5	980.00	150.00
6	1035.00	140.00

Water Surface No. 4 specified by 4 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	153.00	190.00
2	220.00	190.00
3	540.00	170.00
4	1005.00	127.00

Water Surface No. 5 specified by 4 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	225.00	169.00
2	540.00	150.00
3	650.00	140.00
4	985.00	120.00

Water Surface No. 6 specified by 10 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	140.00
2	650.00	140.00
3	985.00	120.00
4	1140.00	121.00
5	1225.00	140.00
6	1240.00	140.00
7	1280.00	130.00
8	1300.00	120.00
9	1375.00	110.00
10	1400.00	100.00

A horizontal earthquake loading coefficient
of .130 has been assigned

A vertical earthquake loading coefficient
of .000 has been assigned

BOUNDARIES THAT LIMIT SURFACE GENERATION HAVE BEEN SPECIFIED

UPPER limiting boundary of 1 segments:

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)
1	1075.0	180.0	1085.0	188.0

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced along the ground surface between x = 1110.0 ft
and x = 1130.0 ft

Each surface terminates between x = 950.0 ft
and x = 1060.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = 140.0 ft

20.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 6 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	1127.93	176.00

2	1108.13	173.16
3	1088.20	174.84
4	1069.17	180.97
5	1051.99	191.21
6	1041.90	200.90

**** Simplified BISHOP FOS = 1.737 ****

The following is a summary of the TEN most critical surfaces

Problem Description : CHAMPION CELL 6A EAST SECTION A-A'

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.737	1105.56	261.48	88.36	1127.93	1041.90	4.249E+06
2.	1.741	1105.62	276.96	103.39	1127.93	1034.79	5.481E+06
3.	1.747	1104.32	267.48	94.14	1126.55	1037.73	4.881E+06
4.	1.747	1102.18	251.86	78.34	1121.72	1043.57	3.603E+06
5.	1.750	1104.89	269.56	96.35	1127.93	1036.91	5.099E+06
6.	1.754	1100.76	241.12	66.87	1118.28	1048.18	2.558E+06
7.	1.761	1105.81	246.03	73.44	1127.93	1049.34	3.122E+06
8.	1.768	1105.71	298.21	123.98	1126.55	1027.43	7.225E+06
9.	1.771	1103.64	257.62	84.97	1127.24	1040.89	4.432E+06
10.	1.776	1097.60	243.90	69.15	1116.21	1043.69	2.918E+06

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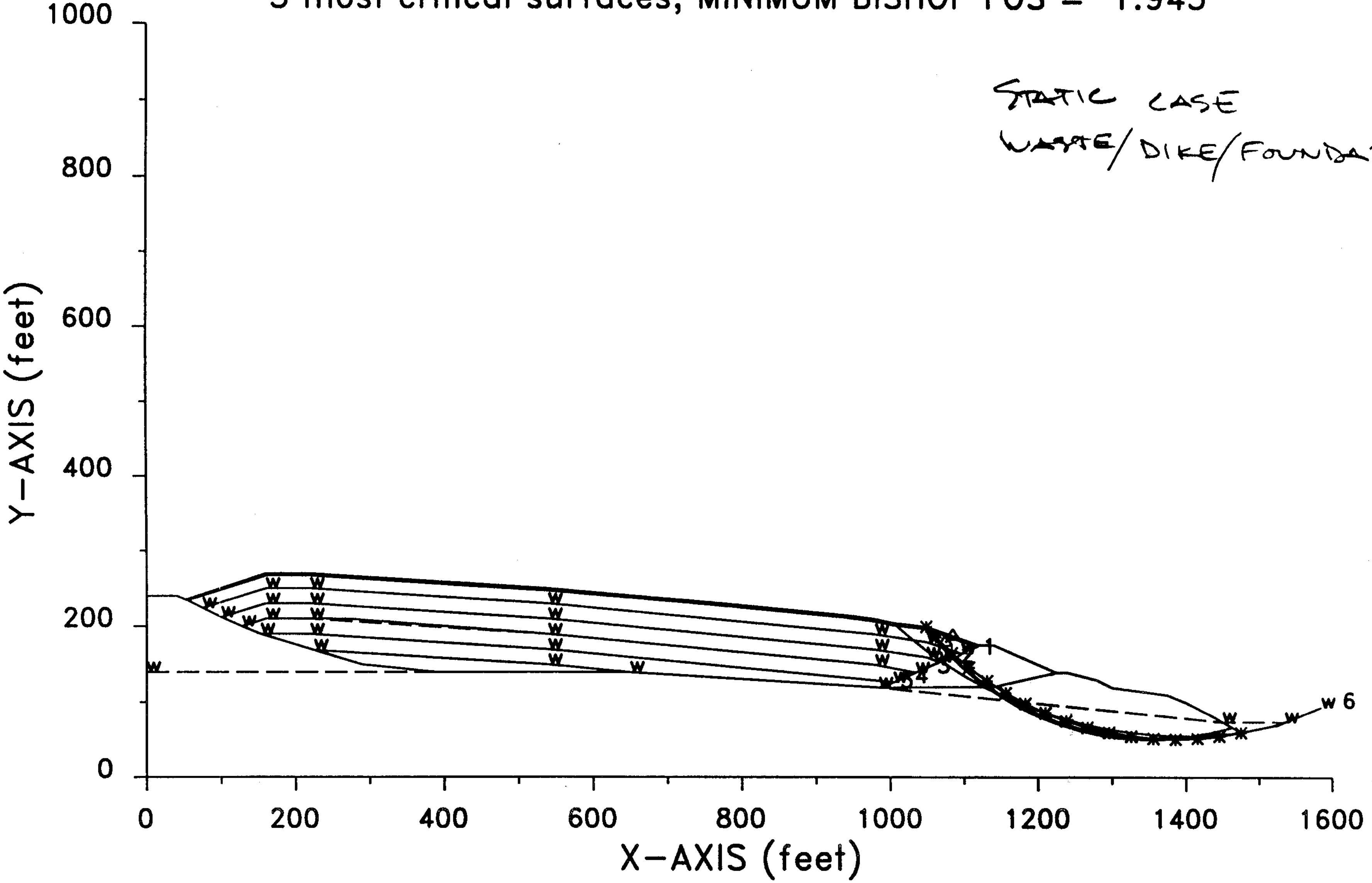
BLUE RIDGE PAPER PRODUCTS CELL 6A EAST SECTION A-A'

5 most critical surfaces, MINIMUM BISHOP FOS = 1.943



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*                                        *
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*              using the                 *
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Problem Description BLUE RIDGE PAPER PRODUCTS CELL 6A EAST SECTION A-A'

SEGMENT BOUNDARY COORDINATES

22 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	240.0	40.0	240.0	8
2	40.0	240.0	52.0	235.0	8
3	52.0	235.0	160.0	270.0	1
4	160.0	270.0	220.0	270.0	1
5	220.0	270.0	540.0	250.0	1
6	540.0	250.0	780.0	230.0	1
7	780.0	230.0	940.0	215.0	1
8	940.0	215.0	980.0	210.0	1
9	980.0	210.0	1005.0	205.0	1
10	1005.0	205.0	1050.0	200.0	1
11	1050.0	200.0	1120.0	176.0	1
12	1120.0	176.0	1140.0	176.0	8
13	1140.0	176.0	1225.0	140.0	8
14	1225.0	140.0	1240.0	140.0	9
15	1240.0	140.0	1280.0	130.0	9
16	1280.0	130.0	1300.0	120.0	9
17	1300.0	120.0	1375.0	110.0	9
18	1375.0	110.0	1400.0	100.0	9
19	1400.0	100.0	1440.0	80.0	9
20	1440.0	80.0	1475.0	60.0	9
21	1475.0	60.0	1525.0	70.0	9
22	1525.0	70.0	1585.0	94.0	9

51 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	52.0	235.0	55.0	234.0	8
2	55.0	234.0	160.0	267.0	2
3	160.0	267.0	220.0	267.0	2

4	220.0	267.0	540.0	247.0	2
5	540.0	247.0	780.0	227.0	2
6	780.0	227.0	940.0	212.0	2
7	940.0	212.0	980.0	207.0	2
8	980.0	207.0	1005.0	202.0	2
9	1005.0	202.0	1050.0	197.0	2
10	1050.0	197.0	1117.0	174.0	2
11	1117.0	174.0	1120.0	176.0	8
12	55.0	234.0	75.0	224.0	8
13	75.0	224.0	160.0	250.0	3
14	160.0	250.0	220.0	250.0	3
15	220.0	250.0	540.0	230.0	3
16	540.0	230.0	980.0	190.0	3
17	980.0	190.0	1050.0	180.0	3
18	1050.0	180.0	1097.0	165.0	3
19	1097.0	165.0	1105.0	170.0	8
20	1105.0	170.0	1117.0	174.0	8
21	75.0	224.0	100.0	212.0	8
22	100.0	212.0	160.0	230.0	4
23	160.0	230.0	220.0	230.0	4
24	220.0	230.0	540.0	210.0	4
25	540.0	210.0	980.0	170.0	4
26	980.0	170.0	1050.0	160.0	4
27	1050.0	160.0	1067.0	154.0	4
28	1067.0	154.0	1090.0	160.0	8
29	1090.0	160.0	1097.0	165.0	8
30	100.0	212.0	128.0	200.0	8
31	128.0	200.0	160.0	210.0	5
32	160.0	210.0	270.0	210.0	5
33	270.0	210.0	540.0	190.0	5
34	540.0	190.0	980.0	150.0	5
35	980.0	150.0	1035.0	140.0	5
36	1035.0	140.0	1067.0	154.0	8
37	128.0	200.0	153.0	190.0	8
38	153.0	190.0	220.0	190.0	6
39	220.0	190.0	540.0	170.0	6
40	540.0	170.0	1005.0	127.0	6
41	1005.0	127.0	1035.0	140.0	8
42	153.0	190.0	225.0	169.0	8
43	225.0	169.0	540.0	150.0	7
44	540.0	150.0	650.0	140.0	7
45	650.0	140.0	985.0	120.0	9
46	985.0	120.0	1005.0	127.0	8
47	985.0	120.0	1140.0	121.0	9
48	1140.0	121.0	1225.0	140.0	9
49	225.0	169.0	290.0	150.0	8
50	290.0	150.0	390.0	140.0	8
51	390.0	140.0	650.0	140.0	9

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	120.0	120.0	.0	30.00	.000	.0	0
2	90.0	90.0	.0	36.00	.000	.0	1
3	90.0	90.0	.0	36.00	.000	.0	1
4	90.0	90.0	.0	36.00	.000	.0	2
5	90.0	90.0	.0	36.00	.000	.0	3
6	90.0	90.0	.0	36.00	.000	.0	4

7	90.0	90.0	.0	36.00	.000	.0	5
8	120.0	120.0	.0	.00	.000	.0	6
9	115.0	115.0	.0	31.50	.000	.0	6

NON-LINEAR MOHR-COULOMB envelope has been specified for 1 soil(s)

Soil Unit # 8

Point No.	Normal Stress (psf)	Shear Stress (psf)
1	.0	.0
2	2160.0	1680.0
3	9000.0	6330.0
4	20000.0	13749.0

6 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 7 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	75.00	224.00
2	160.00	250.00
3	220.00	250.00
4	540.00	230.00
5	980.00	190.00
6	1050.00	180.00
7	1097.00	165.00

Water Surface No. 2 specified by 7 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	100.00	212.00
2	160.00	230.00
3	220.00	230.00
4	540.00	210.00
5	980.00	170.00
6	1050.00	160.00
7	1067.00	154.00

Water Surface No. 3 specified by 6 coordinate points

****
PHREATIC SURFACE,

****

Point No.	x-water (ft)	y-water (ft)
1	128.00	200.00
2	160.00	210.00
3	220.00	210.00
4	540.00	190.00
5	980.00	150.00
6	1035.00	140.00

Water Surface No. 4 specified by 4 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	153.00	190.00
2	220.00	190.00
3	540.00	170.00
4	1005.00	127.00

Water Surface No. 5 specified by 4 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	225.00	169.00
2	540.00	150.00
3	650.00	140.00
4	985.00	120.00

Water Surface No. 6 specified by 6 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	140.00
2	650.00	140.00
3	985.00	120.00
4	1450.00	74.00
5	1535.00	74.00
6	1585.00	94.00

BOUNDARIES THAT LIMIT SURFACE GENERATION HAVE BEEN SPECIFIED

UPPER limiting boundary of 1 segments:

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)
1	1075.0	180.0	1085.0	188.0

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced along the ground surface between x = 1130.0 ft and x = 1475.0 ft

Each surface terminates between x = 100.0 ft and x = 1060.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = 50.0 ft

30.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 17 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	1475.00	60.00
2	1445.41	55.03
3	1415.56	52.03
4	1385.58	51.01
5	1355.60	51.98
6	1325.74	54.92
7	1296.15	59.84
8	1266.94	66.70
9	1238.25	75.47

10	1210.21	86.12
11	1182.93	98.61
12	1156.53	112.86
13	1131.14	128.84
14	1106.86	146.45
15	1083.79	165.64
16	1062.05	186.30
17	1049.36	200.07

**** Simplified BISHOP FOS = 1.943 ****

The following is a summary of the TEN most critical surfaces

Problem Description : CHAMPION CELL 6A EAST SECTION A-A'

	FOS (BISHOP)	Circle Center x-coord (ft)	Circle Center y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.943	1385.17	504.53	453.51	1475.00	1049.36	5.309E+08
2.	1.995	1398.71	648.02	592.95	1475.00	1004.60	7.680E+08
3.	2.028	1352.53	430.83	380.46	1463.10	1050.60	4.769E+08
4.	2.028	1352.60	436.40	385.77	1463.10	1047.94	4.871E+08
5.	2.028	1356.34	446.94	394.85	1463.10	1048.44	4.866E+08
6.	2.032	1348.12	451.68	401.69	1463.10	1033.70	5.416E+08
7.	2.039	1356.85	499.73	445.78	1463.10	1024.42	5.880E+08
8.	2.053	1499.88	898.95	839.32	1475.00	1032.49	7.218E+08
9.	2.056	1383.51	561.26	500.82	1463.10	1035.27	5.626E+08
10.	2.066	1390.77	590.05	528.22	1463.10	1032.79	5.808E+08

* * * END OF FILE * * *

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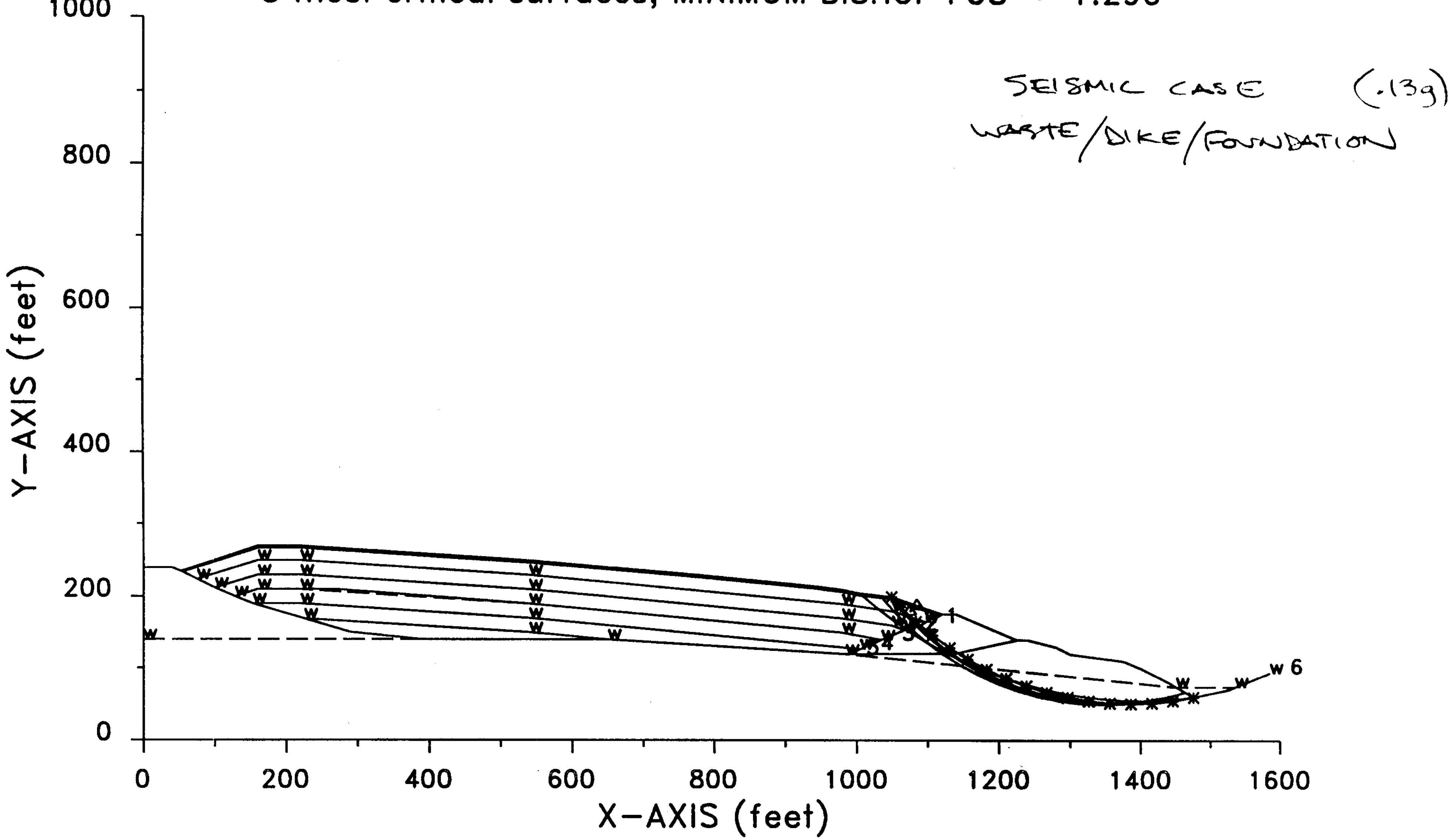
BLUE RIDGE PAPER PRODUCTS CELL 6A EAST SECTION A-A'

5 most critical surfaces, MINIMUM BISHOP FOS = 1.290



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*               X S T A B L               *
*                                         *
*      Slope Stability Analysis           *
*             using the                   *
*          Method of Slices               *
*                                         *
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```

Problem Description BLUE RIDGE PAPER PRODUCTS **CELL 6A EAST SECTION A-A'**

SEGMENT BOUNDARY COORDINATES

----

22 SURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	.0	240.0	40.0	240.0	8
2	40.0	240.0	52.0	235.0	8
3	52.0	235.0	160.0	270.0	1
4	160.0	270.0	220.0	270.0	1
5	220.0	270.0	540.0	250.0	1
6	540.0	250.0	780.0	230.0	1
7	780.0	230.0	940.0	215.0	1
8	940.0	215.0	980.0	210.0	1
9	980.0	210.0	1005.0	205.0	1
10	1005.0	205.0	1050.0	200.0	1
11	1050.0	200.0	1120.0	176.0	1
12	1120.0	176.0	1140.0	176.0	8
13	1140.0	176.0	1225.0	140.0	8
14	1225.0	140.0	1240.0	140.0	9
15	1240.0	140.0	1280.0	130.0	9
16	1280.0	130.0	1300.0	120.0	9
17	1300.0	120.0	1375.0	110.0	9
18	1375.0	110.0	1400.0	100.0	9
19	1400.0	100.0	1440.0	80.0	9
20	1440.0	80.0	1475.0	60.0	9
21	1475.0	60.0	1525.0	70.0	9
22	1525.0	70.0	1585.0	94.0	9

51 SUBSURFACE boundary segments

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)	Soil Unit Below Segment
1	52.0	235.0	55.0	234.0	8
2	55.0	234.0	160.0	267.0	2
3	160.0	267.0	220.0	267.0	2

4	220.0	267.0	540.0	247.0	2
5	540.0	247.0	780.0	227.0	2
6	780.0	227.0	940.0	212.0	2
7	940.0	212.0	980.0	207.0	2
8	980.0	207.0	1005.0	202.0	2
9	1005.0	202.0	1050.0	197.0	2
10	1050.0	197.0	1117.0	174.0	2
11	1117.0	174.0	1120.0	176.0	8
12	55.0	234.0	75.0	224.0	8
13	75.0	224.0	160.0	250.0	3
14	160.0	250.0	220.0	250.0	3
15	220.0	250.0	540.0	230.0	3
16	540.0	230.0	980.0	190.0	3
17	980.0	190.0	1050.0	180.0	3
18	1050.0	180.0	1097.0	165.0	3
19	1097.0	165.0	1105.0	170.0	8
20	1105.0	170.0	1117.0	174.0	8
21	75.0	224.0	100.0	212.0	8
22	100.0	212.0	160.0	230.0	4
23	160.0	230.0	220.0	230.0	4
24	220.0	230.0	540.0	210.0	4
25	540.0	210.0	980.0	170.0	4
26	980.0	170.0	1050.0	160.0	4
27	1050.0	160.0	1067.0	154.0	4
28	1067.0	154.0	1090.0	160.0	8
29	1090.0	160.0	1097.0	165.0	8
30	100.0	212.0	128.0	200.0	8
31	128.0	200.0	160.0	210.0	5
32	160.0	210.0	270.0	210.0	5
33	270.0	210.0	540.0	190.0	5
34	540.0	190.0	980.0	150.0	5
35	980.0	150.0	1035.0	140.0	5
36	1035.0	140.0	1067.0	154.0	8
37	128.0	200.0	153.0	190.0	8
38	153.0	190.0	220.0	190.0	6
39	220.0	190.0	540.0	170.0	6
40	540.0	170.0	1005.0	127.0	6
41	1005.0	127.0	1035.0	140.0	8
42	153.0	190.0	225.0	169.0	8
43	225.0	169.0	540.0	150.0	7
44	540.0	150.0	650.0	140.0	7
45	650.0	140.0	985.0	120.0	9
46	985.0	120.0	1005.0	127.0	8
47	985.0	120.0	1140.0	121.0	9
48	1140.0	121.0	1225.0	140.0	9
49	225.0	169.0	290.0	150.0	8
50	290.0	150.0	390.0	140.0	8
51	390.0	140.0	650.0	140.0	9

ISOTROPIC Soil Parameters
----

9 Soil unit(s) specified

Soil Unit No.	Unit Weight Moist (pcf)	Unit Weight Sat. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Parameter Ru	Pore Pressure Constant (psf)	Water Surface No.
1	120.0	120.0	.0	30.00	.000	.0	0
2	90.0	90.0	.0	36.00	.000	.0	1
3	90.0	90.0	.0	36.00	.000	.0	1
4	90.0	90.0	.0	36.00	.000	.0	2
5	90.0	90.0	.0	36.00	.000	.0	3
6	90.0	90.0	.0	36.00	.000	.0	4

7	90.0	90.0	.0	36.00	.000	.0	5
8	120.0	120.0	.0	.00	.000	.0	6
9	115.0	115.0	.0	31.50	.000	.0	6

NON-LINEAR MOHR-COULOMB envelope has been specified for 1 soil(s)

Soil Unit # 8

Point No.	Normal Stress (psf)	Shear Stress (psf)
1	.0	.0
2	2160.0	1680.0
3	9000.0	6330.0
4	20000.0	13749.0

6 Water surface(s) have been specified

Unit weight of water = 62.40 (pcf)

Water Surface No. 1 specified by 7 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	75.00	224.00
2	160.00	250.00
3	220.00	250.00
4	540.00	230.00
5	980.00	190.00
6	1050.00	180.00
7	1097.00	165.00

Water Surface No. 2 specified by 7 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	100.00	212.00
2	160.00	230.00
3	220.00	230.00
4	540.00	210.00
5	980.00	170.00
6	1050.00	160.00
7	1067.00	154.00

Water Surface No. 3 specified by 6 coordinate points

****
PHREATIC SURFACE,

****

Point No.	x-water (ft)	y-water (ft)
1	128.00	200.00
2	160.00	210.00
3	220.00	210.00
4	540.00	190.00
5	980.00	150.00
6	1035.00	140.00

Water Surface No. 4 specified by 4 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	153.00	190.00
2	220.00	190.00
3	540.00	170.00
4	1005.00	127.00

Water Surface No. 5 specified by 4 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	225.00	169.00
2	540.00	150.00
3	650.00	140.00
4	985.00	120.00

Water Surface No. 6 specified by 6 coordinate points

****
PHREATIC SURFACE,
****

Point No.	x-water (ft)	y-water (ft)
1	.00	140.00
2	650.00	140.00
3	985.00	120.00
4	1450.00	74.00
5	1535.00	74.00
6	1585.00	94.00

A horizontal earthquake loading coefficient
of .130 has been assigned

A vertical earthquake loading coefficient
of .000 has been assigned

BOUNDARIES THAT LIMIT SURFACE GENERATION HAVE BEEN SPECIFIED

UPPER limiting boundary of 1 segments:

Segment No.	x-left (ft)	y-left (ft)	x-right (ft)	y-right (ft)
1	1075.0	180.0	1085.0	188.0

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.

900 trial surfaces will be generated and analyzed.

30 Surfaces initiate from each of 30 points equally spaced along the ground surface between x = 1130.0 ft
and x = 1475.0 ft

Each surface terminates between x = 100.0 ft
and x = 1060.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = 50.0 ft

30.0 ft line segments define each trial failure surface.

ANGULAR RESTRICTIONS

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED BISHOP METHOD * * * * *

The most critical circular failure surface is specified by 17 coordinate points

Point No.	x-surf (ft)	y-surf (ft)
1	1475.00	60.00

2	1445.41	55.03
3	1415.56	52.03
4	1385.58	51.01
5	1355.60	51.98
6	1325.74	54.92
7	1296.15	59.84
8	1266.94	66.70
9	1238.25	75.47
10	1210.21	86.12
11	1182.93	98.61
12	1156.53	112.86
13	1131.14	128.84
14	1106.86	146.45
15	1083.79	165.64
16	1062.05	186.30
17	1049.36	200.07

**** Simplified BISHOP FOS = 1.290 ****

The following is a summary of the TEN most critical surfaces

Problem Description : CHAMPION CELL 6A EAST SECTION A-A'

	FOS (BISHOP)	Circle Center x-coord (ft)	y-coord (ft)	Radius (ft)	Initial x-coord (ft)	Terminal x-coord (ft)	Resisting Moment (ft-lb)
1.	1.290	1385.17	504.53	453.51	1475.00	1049.36	5.066E+08
2.	1.315	1398.71	648.02	592.95	1475.00	1004.60	7.341E+08
3.	1.345	1348.12	451.68	401.69	1463.10	1033.70	5.188E+08
4.	1.345	1352.60	436.40	385.77	1463.10	1047.94	4.663E+08
5.	1.346	1356.34	446.94	394.85	1463.10	1048.44	4.658E+08
6.	1.346	1352.53	430.83	380.46	1463.10	1050.60	4.566E+08
7.	1.348	1356.85	499.73	445.78	1463.10	1024.42	5.632E+08
8.	1.363	1383.51	561.26	500.82	1463.10	1035.27	5.387E+08
9.	1.368	1499.88	898.95	839.32	1475.00	1032.49	6.905E+08
10.	1.368	1428.39	832.75	774.16	1475.00	966.23	9.996E+08

* * * END OF FILE * * *

INFINITE SLOPE CALCULATION

PROJECT	COMP. BY	JOB NO.
INFINITE SLOPE CALCULATION	MSR	99063
	CHK. BY	DATE
		7/20/99

CALCULATE STABILITY OF SOIL COVER AND WASTE OPERATING FACE USING INFINITE SLOPE CALCULATION (LAMB & WHITMAN)

COVER SOIL

ASSUME $\phi = 30^\circ$

FINAL GRADE = 3:1 = $18.4^\circ = i$

$$FOS = \frac{\tan \phi}{\tan i} = \frac{\tan 30}{\tan 18.4} = 1.7$$

WASTE

ASSUME $\phi = 36^\circ$

OPERATING FACE GRADE = 3:1 = $18.4^\circ = i$

$$FOS = \frac{\tan \phi}{\tan i} = \frac{\tan 36}{\tan 18.4} = 2.2$$

THIS ASSUMES NO SEEPAGE ON COVER OR WASTE SIDESLOPES FOS > 1.5 OK

APPENDIX F

OPERATIONS PLAN

BLUE RIDGE PAPER PRODUCTS, INC.
LANDFILL NO. 6A EAST
CANTON, NORTH CAROLINA

OPERATIONS MANUAL

OCTOBER 1999

Prepared by

Sevee & Maher Engineers, Inc.
Cumberland Center, Maine

TABLE OF CONTENTS

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1.0 GENERAL

1.1 Purpose

The purpose of this manual is to provide information to the personnel involved in the operation, maintenance and closure of the Landfill. Guidelines for development and operation are provided herein for Landfill Area 6A East. This document will be revised to describe the development of future phases, as necessary.

It is important to recognize that some of the procedures in this manual may require modification over time as improved methods are developed for carrying out the day to day landfill activities. Changes in procedures must be verified with the Canton mill area management, Environmental Occupational Health and Safety Department (EOHS) and Mill Engineering prior to implementation.

It is equally important for the personnel involved in landfill operations to understand the critical requirements for successful landfill operation and maintenance. Operation of a landfill is primarily a task of managing water. Approximately one million gallons per acre of precipitation falls to the ground in the Canton, North Carolina area on a yearly basis. Management of this and other waters which may be associated with or absorbed by the incoming waste is the principal task of the landfill operations personnel.

The landfill has been designed to collect the precipitation and other water which becomes leachate. It is the operations personnel's goal to insure that maximum leachate collection efficiency is maintained while simultaneously minimizing leachate generation to the extent practical. Minimizing leachate generation is accomplished by separating clean surface runoff from the wastes, encouraging evaporation of leachate and other procedures which are discussed herein.

This manual was prepared with regard to the Solid Waste Rules and Regulations of the North Carolina Department of Environment and National Resources (NCDENR). It includes descriptions of development procedures, landfill operations, site maintenance, safety procedures, monitoring requirements, leachate management and numerous other important procedures which must be adhered to. Everyone associated with the management and operation of the landfill should be familiar with this manual to insure a safe and environmentally secure facility.

1.2 Design Concept

It is not the purpose of this document to provide a detailed account of the design of the landfill, however, a general discussion of the design concept is presented herein. The landfill operations personnel are encouraged to review the Design Reports and Engineering Drawings which provide detailed descriptions of the landfill facilities.

The Landfill incorporates a synthetic liner system beneath the waste to minimize the potential for leakage to the underlying groundwater. The bottom liner consists of 60-mil high density polyethylene (HDPE). A drainage layer with embedded perforated pipe is placed above the HDPE to collect and transport leachate. The perforated pipe network connects through a series of manholes to a gravity sewer line which discharges into a pump station. The pump station pumps the leachate to the mill's wastewater treatment plant. During high leachate flows the leachate storage ponds will be used.

1.3 Development Concept

Landfill Area 6A will be developed in two major phases, Area 6A East and 6A West. Area 6A East was constructed in 1993. Area 6A West is a planned future phase. Area 6A East encompasses approximately 15 acres with an estimated capacity of up to 1.5 million cubic yards. Landfill Area 6A East will be divided into three cells: two base cells and one upper cell placed on top of the lower base cells.

The east portion of 6A East, Cell IV, will occupy approximately 7.5 acres of the site. The west portion of 6A East, Cell III, will occupy the remaining 7.5 acres of the landfill. Development and operation in this manner will allow separation of clean surface water runoff from the waste, thus minimizing leachate generation.

2.0 OPERATIONAL PROCEDURES

2.1 Commencement of Operations

(a) At least 5 business days prior to commencing operation of the new landfill, Blue Ridge Paper Products, Inc. shall notify the NCDENR of the intent to commence operations.

(b) The notice shall include the following:

(1) Facility identification, including permit number;

(2) Date of intended commencement of operations; and

(3) The name and telephone number of the facility manager or other primary contact person.

2.2 Site Access

All vehicles and visitors will enter the site via the gated road which accesses the Landfill. The entrance to the landfill will have a facility sign which includes the following:

- The facility name and permit number;
- The name, address, and telephone number of Blue Ridge Paper Products, Inc.;
- The days and hours that the facility is open to accept waste;
- The type of wastes accepted and not accepted (i.e. "No hazardous or liquid waste accepted"); and

- The penalty for unlawful dumping.

All visitors will check in at the main gate which is located on Main Street. Only approved employees will have unrestricted access to the landfill facility. All others will proceed only after receiving clearance from security at the main gate and landfill management. No visitors will be allowed on-site unaccompanied and the number of visitors will be minimized.

During non-operational hours the gate at the entrance to the site will be locked.

2.3 Operating Hours

The Landfill will normally accept mill wastes seven days per week, and up to a 12-hour per day schedule, depending on daylight hours.

The normal start of the work day for operators will be 6:00 A.M. The operators will perform daily maintenance and move the equipment to the operating area within 1/2 hour of commencement of dumping. An operator shall be present at the operating area at the commencement of dumping.

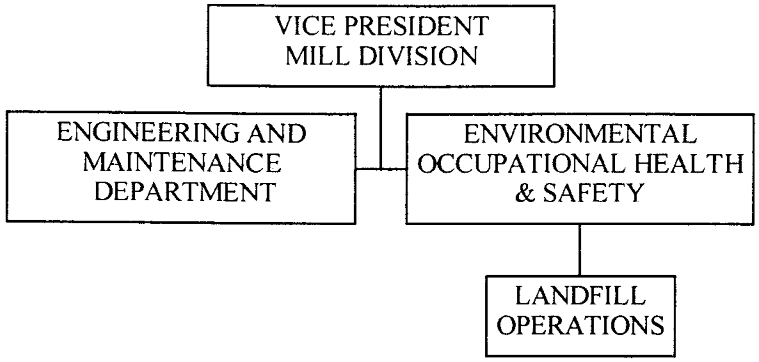
2.4 Personnel Responsibilities

The personnel and departments involved in the operation of the landfill include: 1) EOHS department; 2) Mill Engineering; 3) RURU-Environmental Laboratory Services (ELS); and 4) landfill operations. The organization, responsibilities and tasks conducted by these people are described below.

2.4.1 Organization. An organization chart, Figure 2-1, is presented to outline the chain of command and support groups which include the EOHS Department and Mill Engineering.

FIGURE 2-1

ORGANIZATION CHART



2.4.2 Personnel.

2.4.2.1 Environmental, Occupational Health and Safety Department (EOHS)

This group is responsible for securing and assuring compliance with licenses and permits required for operating the landfill. This responsibility includes quantity estimates of all plant waste brought to the site and environmental monitoring of the landfill in accordance with the conditions of the landfill permit. In addition, the department's responsibility includes assuring that the landfill operation is in compliance with all regulations of the NCDENR. This responsibility includes periodic site audits and inspections as well as submission of appropriate data to the NCDENR.

EOHS personnel are also charged with directing and overseeing the daily operation of the landfill to assure that the operating plans are being implemented properly. Responsibilities of the EOHS personnel in this area include:

a. initiating site development to maintain continuity of operation;
b. directing the overall planning and scheduling of waste placement;
c. maintaining site records and tracking landfill volume consumption;
d. supervising and training personnel; and
e. supervising the site safety program.

In addition, this department is responsible for the maintenance of leachate collection systems, storm water runoff facilities, and roads.

2.4.2.2 Mill Engineering

This group is responsible for overseeing major construction projects at the landfill and providing support services for site maintenance. Major construction projects, such as landfill construction, would be implemented by Mill Engineering.

2.4.2.3 Landfill Operator

The landfill site operators will be responsible for the daily details of landfill operation at the area receiving the wastes. The Operator will:

a. direct placement of the waste by haul vehicle operators;
b. spread and compact wastes;
c. apply cover materials as required;
d. inspect equipment and facilities;
e. abide by established safety rules;
f. maintain site security in conjunction with Canton Mill security;
g. immediately note and report unusual events or circumstances;
h. maintain such records as may be required;
i. immediately report any observed and/or imminent environmental impacts to EOHS department management; and
j. strive to maintain neat and efficient operations.

The mill site operators and drivers of the haul vehicles will be responsible for the proper loading and handling of their loads. While on the landfill site they will comply with the provisions of this manual and directions provided by the Landfill Site Operator.

Problems encountered at the landfill should be reported to the Landfill Team and to EOHS management.

2.5 Health, Safety and Fire Considerations

The following health and safety procedures will be adhered to at the landfill facility:

1. Only essential personnel will be involved in activities associated with operation of the landfill.

2. Prior to personnel entering into manholes or other similar enclosed facilities, the inside air will be tested in accordance with confined space entry procedures.

3. Dumping areas will be maintained firm and level. After directing trucks to the dumping area, the operating personnel will stand clear of the truck.

4. The leachate storage pond gate and manhole access hatches will be locked at all times, except when access is required.

5. Exit ladders will be provided in the leachate storage pond for exit in the event that someone falls in.

6. In the event of an accident involving property damage, the mill security will be notified immediately to generate necessary reports.

7. In the event of an accident involving personal injury, assess the severity of the injury and call emergency personnel by dialing 911 outside the mill, or 2911 in the mill. If injuries are only minor, the injured person must report to the mill medical section.

8. In the event of an environmental emergency, the operator will follow the spill and release reporting procedure or call mill extension 6711.

9. Keep gate locked when area not in use.

In the event of a fire, the following procedures will be implemented:

1. If it is an equipment fire, the fire extinguisher provided with all equipment will be utilized, if feasible, to extinguish the fire.

2. If the fire does not appear to be controllable with a fire extinguisher, or if the fire is associated with the landfilled wastes, the emergency dispatcher at mill extension 2911 will be contacted immediately. The emergency dispatcher will be provided with information concerning the location and extent of the fire.

3. The emergency dispatcher will mobilize the appropriate fire fighting equipment and personnel. All fire personnel should be notified in advance to alert them of the nature of hazards at the landfill so they may be appropriately prepared and equipped.

4. All efforts to keep applied water and fire fighting chemicals within the landfill limits will be made.

5. EOHS department personnel will be notified as soon as possible so that an inspection can be made.

6. Hot ashes on the sludge pile will not be considered a fire hazard unless they are blown by strong winds.

2.6 Equipment Requirements

The following equipment will be available to conduct the daily landfilling activities, place intermediate and final cover, minimize erosion, maintain roads and operate the leachate system:

1. Bulldozer for fine grading;

2. Bulldozer for waste placement and grading;

3. Front-end loader to move cover material and construct temporary berms;

4. Two-way radio communication system.

2.7 Waste Delivery and Acceptance

To assure that all information regarding a waste delivery is accurately recorded, it is necessary to adhere to a "flow control" system. The details of the "flow control" system are described in this Subsection 2.7 and the following Subsection 2.8, as well as Section 7.0 which describes in detail the record keeping and reporting requirements which will be followed by this facility.

Each day, drivers will provide the following information:

1. The types and sources of the waste being delivered;

2. The number of truck loads of each type of waste delivered; and

3. Weights of the trucks according to the established plan.

Landfill personnel will determine if the landfill is permitted for the type and source of waste being delivered, see the following Subsection 2.8. When the truck arrives at the disposal area, the Landfill Operator will direct the unloading of the waste. The driver will return the empty truck to the scales if the vehicle was weighed initially. The scale operator will weigh the empty truck and record the information onto the weight ticket. The weight ticket will be complete at this time. Each day the weight tickets will be obtained from the Scale Operator by Landfill personnel for recording onto the daily accounting forms.

2.8 Waste Inspection Plan

The truck driver will inspect the waste load and determine if the waste is accepted at the landfill. If there is any question as to the waste being accepted at the landfill, the truck driver will notify the EOHS management for a decision on whether it is an acceptable waste.

The landfill operator will also inspect each load. If an unpermitted waste is disposed, the landfill operator shall notify EOHS management.

In the event a special waste is generated, the owner will submit waste determination forms to the NCDENR for approval.

2.9 Waste Placement and Grading

2.9.1 Waste Placement Plan. The following is the waste placement plan. This plan was designed around the nature of the waste disposed at the facility.

The sludge, woodwaste, and lime mud will be dumped by the haul truck operator and spread by an equipment operator. The landfill operator will place the waste in lifts 10 to 15 feet thick. As waste is dumped from the top of the lift the landfill operator will push and spread the waste over the working face, see Figure 2-2. The waste will be spread in layers no greater than 2-feet thick. By spreading the waste in thin layers, the waste is allowed to drain, greater compaction is achieved, and stability of the working face is maintained.

Each lift must be constructed with the ultimate goal of achieving the grades shown on the individual cell grading plans. The grading of each lift must also achieve positive drainage

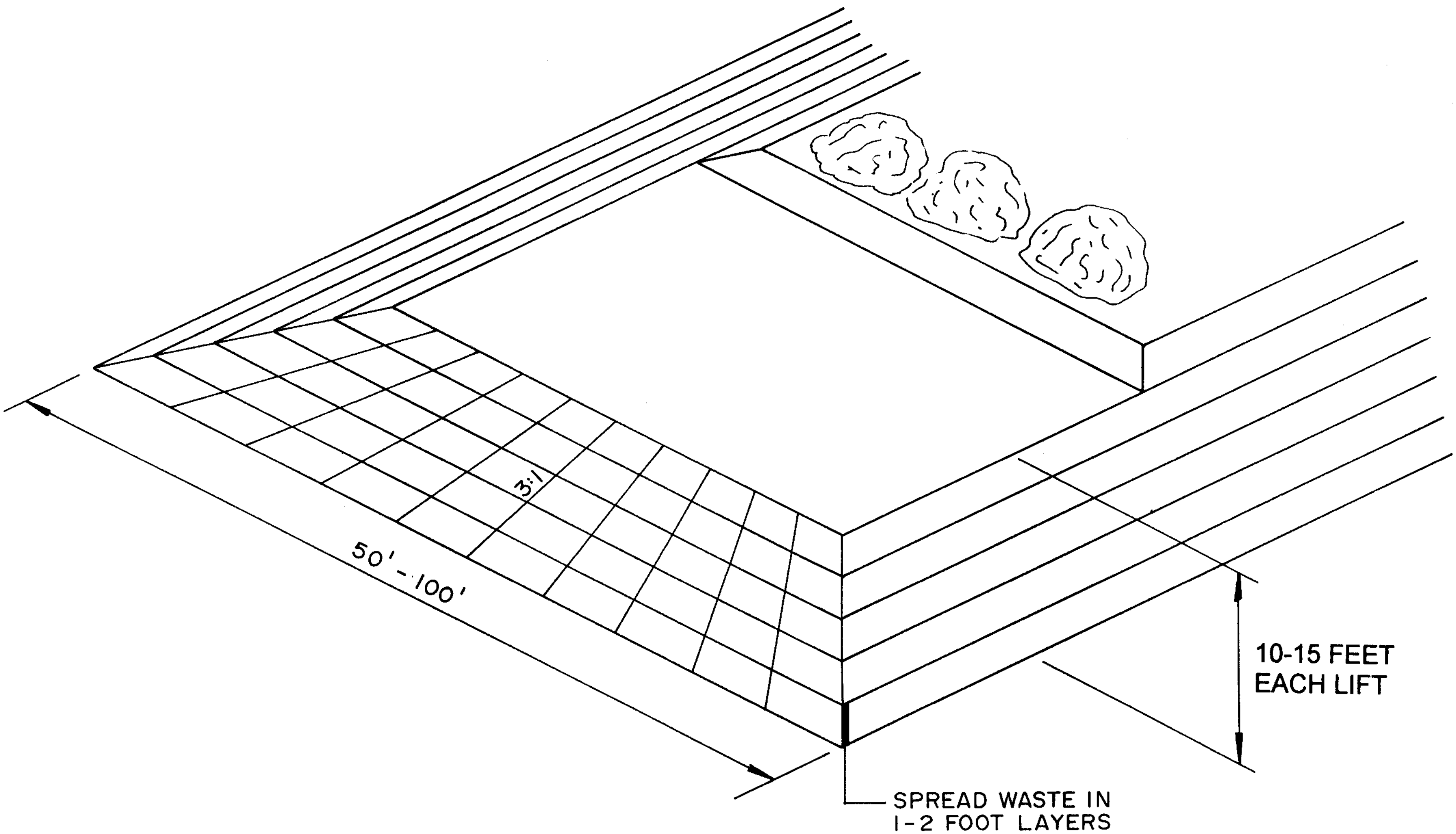


FIGURE 2-2
WASTE PLACEMENT
BLUE RIDGE PAPER PRODUCTS, INC.
CANTON, NORTH CAROLINA

SEVEE & MAHER ENGINEERS

94040

as described in the next section. The next section, Section 3.0, of this manual also describes the staged development of Cells III, IV, and V in detail.

2.9.2 Special Handling of Waste. Landfilling procedures for the sludge, wood waste, and lime mud, as discussed above, are straight forward. Certain wastes require special handling to dispose of them. The waste which requires special handling is boiler ash. The safe disposal of ash is discussed below.

Boiler Ash. Boiler ash will amount to approximately 1,400 cy per week. Two types of ash are brought out to the landfill: cinders; and fly ash. The cinders consist of soil, bark, and charred wood. This material can be landfilled by spreading it over the working face or used as a gravel substitute for roadways on the landfill. The fly ash is a much finer material and can dry out and become dusty. Landfilling the fly ash can be accomplished by spreading the fly ash and immediately placing a layer of sludge over it, depending on the moisture content of the sludge. This will prevent blowing of the ash, and, water from the sludge will eliminate any fly ash from drying and blowing.

2.9.3 Wet Weather. During very wet weather, access to the working face may become difficult. Grit or gravel can be used to provide a stable traffic mat to improve movement of vehicles on the landfill as needed, but the amount of these materials should be held to a minimum.

3.0 LANDFILL DEVELOPMENT

This section describes the development and operation of Landfill Area 6A. Area 6A is divided into two major phases, Landfill Area 6A East and Area 6A West. Area 6A West is not yet prepared to accept waste and therefore is not described herein.

Area 6A East will be subdivided into three cells: two base cells, Cells III and IV, and one upper cell, Cell V, placed on top of the lower base cells. Each base cell will be approximately 7.5 acres in size, with a total capacity of approximately 1 million cubic yards. The location of the base cells is shown on Figure 3-1. The upper cell will be approximately 15 acres, with a capacity of approximately 500,000 cubic yards. The location of the upper cell is shown on Figure 3-2. The primary purpose of this cellular design is to minimize the active operating area of the landfill at any one time and, thereby, minimize potential odor and the quantity of leachate generated.

The development for the base cells was completed as part of the facility construction in 1993 and 1994. Components of the facility include installation of a 60-mil HDPE liner, leachate collection system and underdrain system, and containment dikes. The development of the upper cell will not require the construction of leachate collection structures, but will require installation of stormwater structures as the facility is capped.

3.1 Cell IV

The first cell to be filled will be Cell IV at the lower east end of Area 6A East. Cell IV ranges in depth from 60 to 80 feet and slopes from west to east, as well as towards the center of the landfill. The cell contains a leachate collection system consisting of 15 inches of granular material, and a piping network consisting of 6-inch diameter collection laterals that are connected to a 12-inch diameter transport pipe. The transport pipe will carry the leachate by

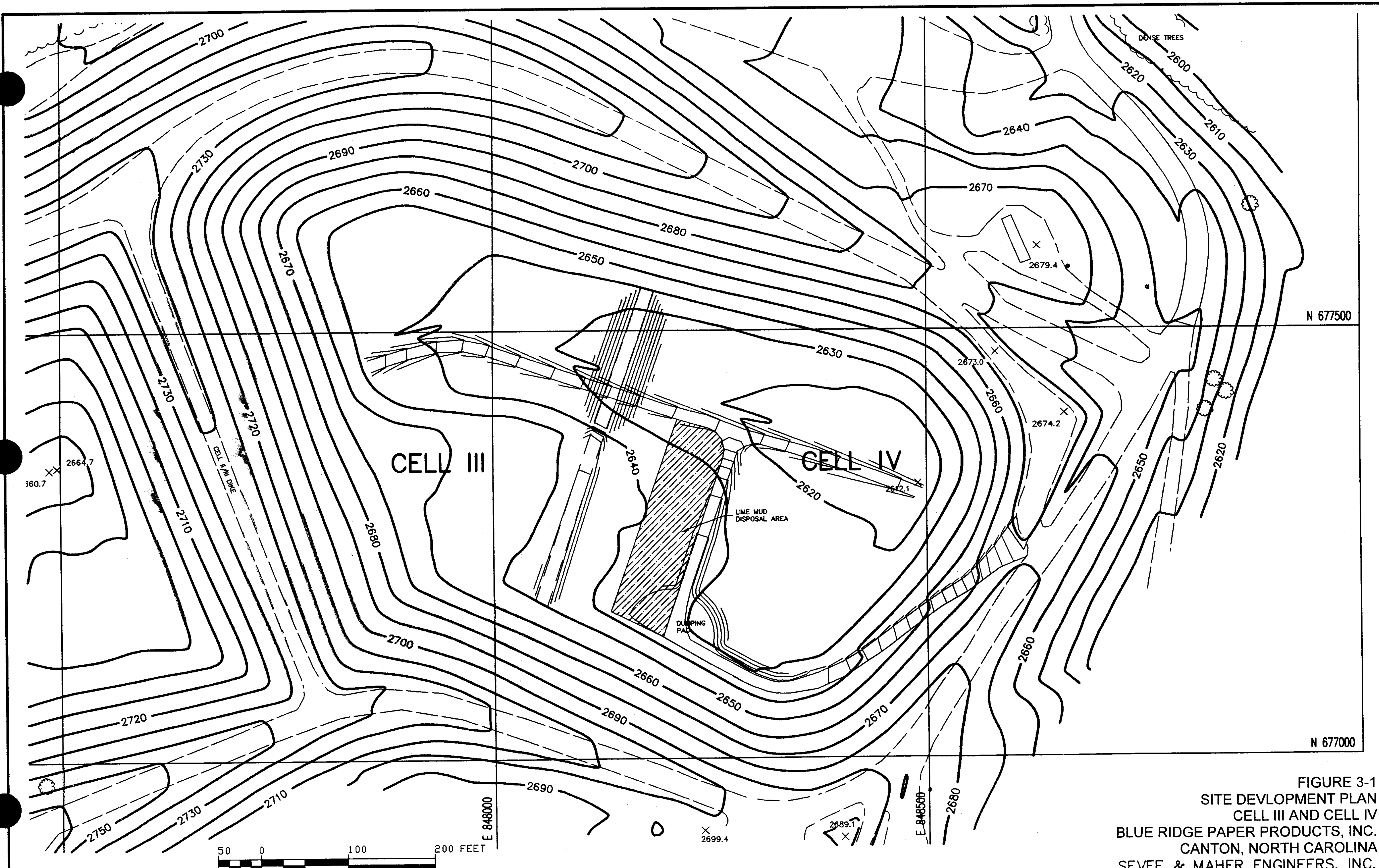
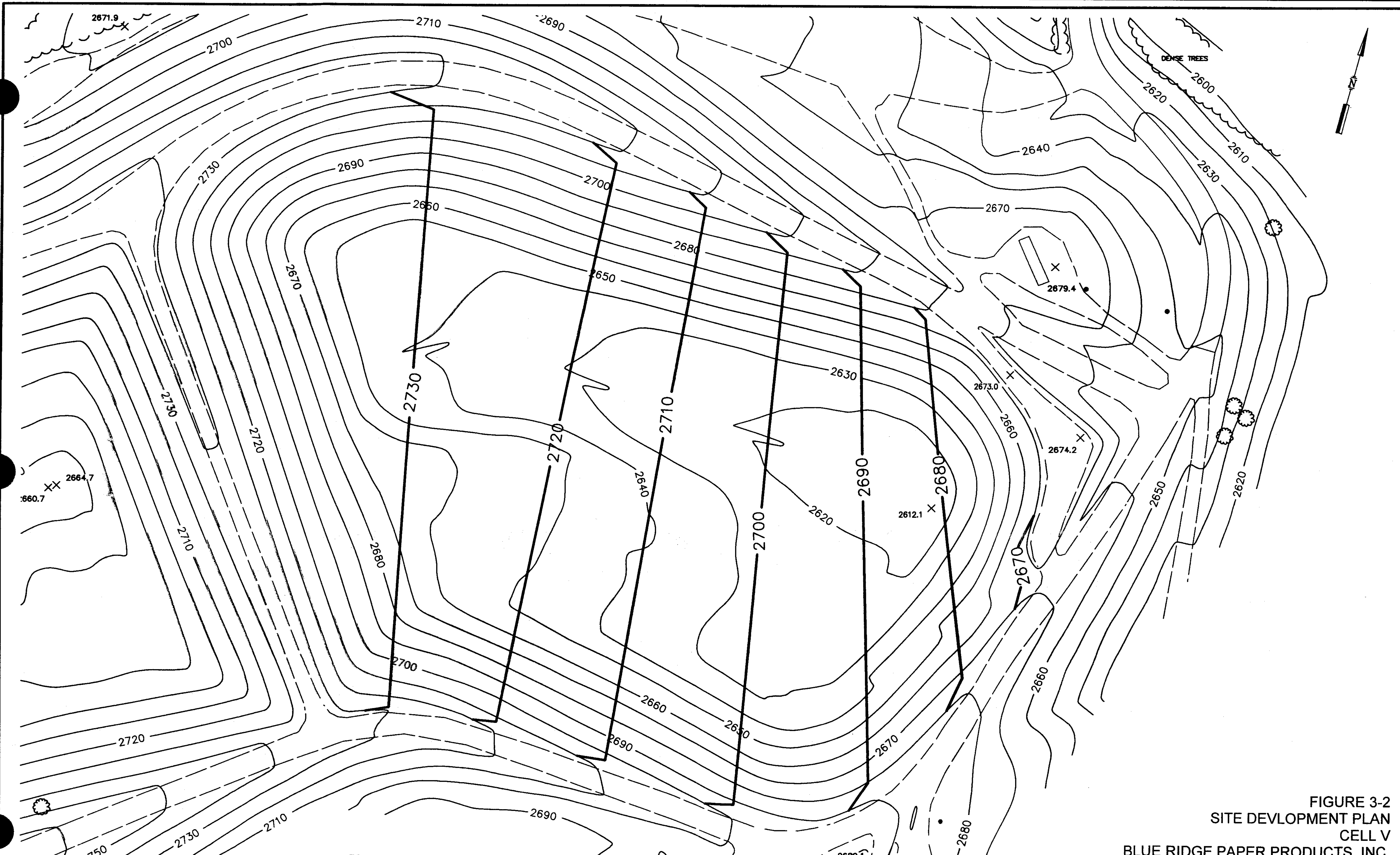


FIGURE 3-1
SITE DEVLOPMENT PLAN
CELL III AND CELL IV
BLUE RIDGE PAPER PRODUCTS, INC.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.



50 0 100 200 FEET

FIGURE 3-2
SITE DEVLOPMENT PLAN
CELL V
BLUE RIDGE PAPER PRODUCTS, INC.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.

DWG. 2-2f LA.CFG. FIG3-2 REV. 7/21/99

means of gravity flow from Cell IV pump station or the to the leachate pond located southeast of Landfill Area 6A. The upper end of the transport pipe in Cell IV will be capped until it is needed for future cells.

A second 12-inch diameter storm drain pipeline is installed parallel to the leachate transport pipeline through Cell IV and continues on into Area 6A West. This pipeline is used to handle surface water runoff from undeveloped areas such as Cell III and Area 6A West. The surface water which enters the storm drain pipeline is transported to a discharge point on Bowen Branch.

The division between Cells III and IV is a soil dike ranging in height from 3 feet to 10 feet. The dike is used to contain leachate within Cell IV and to divert clean surface water from Cell III to the storm drain system.

Landfill operations in Cell IV will begin at the base of the cell along the south side. Cell IV will be accessed from a gravel road at the east end of Cell IV. The access road is approximately 15 feet wide and therefore is limited to a single vehicle traveling at a time. The initial waste lift will consist of any sludge. Lime waste and boiler ash will require special handling and are discussed in Subsection 2.9.2 and later in this section. A dumping platform was placed as part of the construction of Cell IV to provide an initial area to dump from and allow vehicles to turn around to exit. It is important to keep haul vehicles on the access roads during the initial waste lift, since movement on the drainage sand is not recommended. Waste will be dumped by the haul truck operator as directed by the landfill operator. The landfill operator will construct waste lifts up to 10 feet thick and maintain an adequate width on the working face. As waste is dumped from the top of the lift, the landfill operator will push and spread the waste over the working face. The waste will be spread in layers no greater than 2 feet thick. By spreading the waste in thin layers, the waste is allowed to drain, and greater compaction is achieved, see Figure 3-3.

Each lift must be constructed with the ultimate goal of achieving the final grades shown on the individual cell grading plans. The grading plan for Cell IV is shown on Figure 3-4. The grading of each lift must also achieve positive drainage toward the center of the cell where the leachate transport pipe and chimney drain strip are located. A cross-section through Cell IV showing the

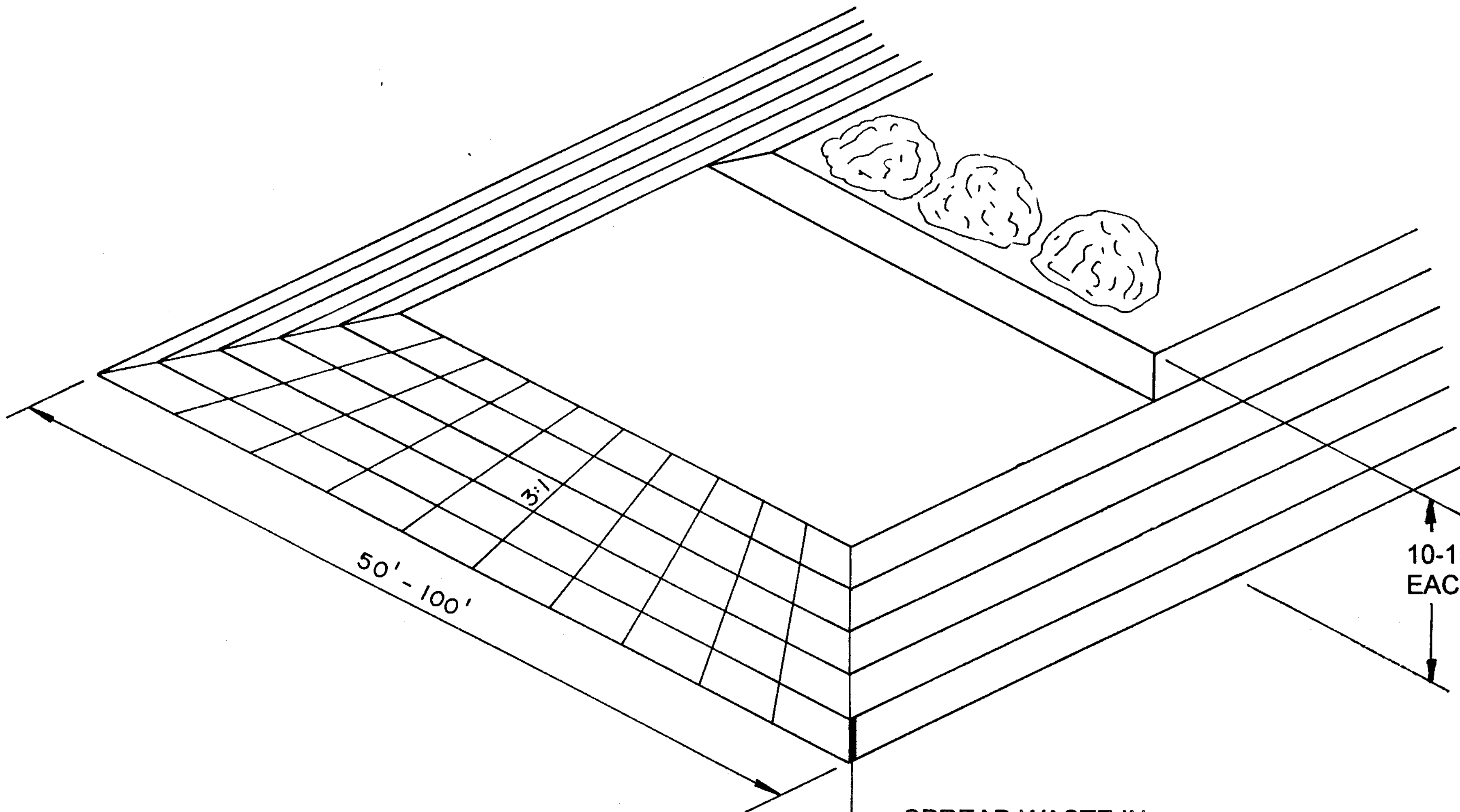


FIGURE 3-3
WASTE PLACEMENT
BLUE RIDGE PAPER PRODUCTS, INC.
CANTON, NORTH CAROLINA

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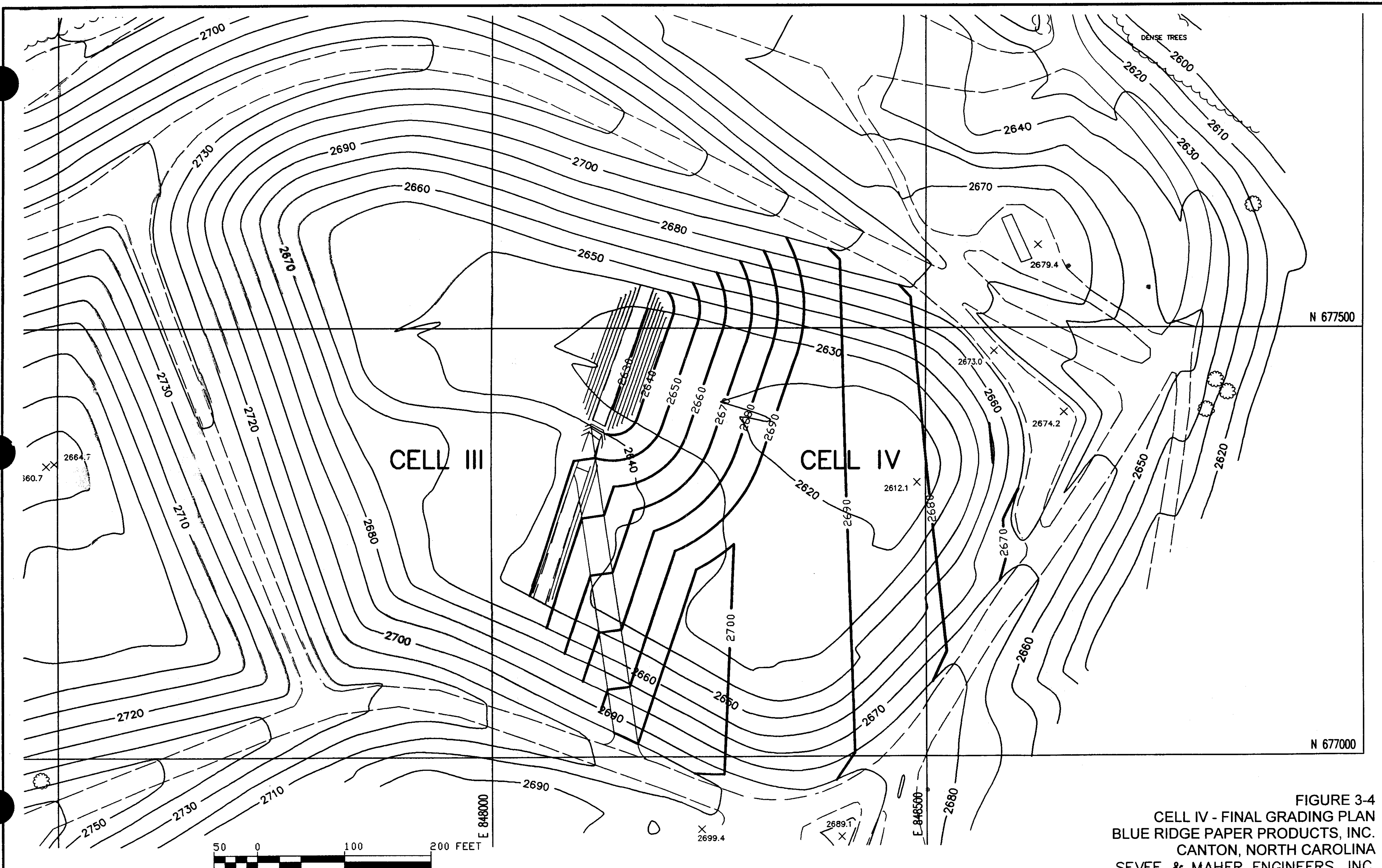

FIGURE 3-4
CELL IV - FINAL GRADING PLAN
BLUE RIDGE PAPER PRODUCTS, INC.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.

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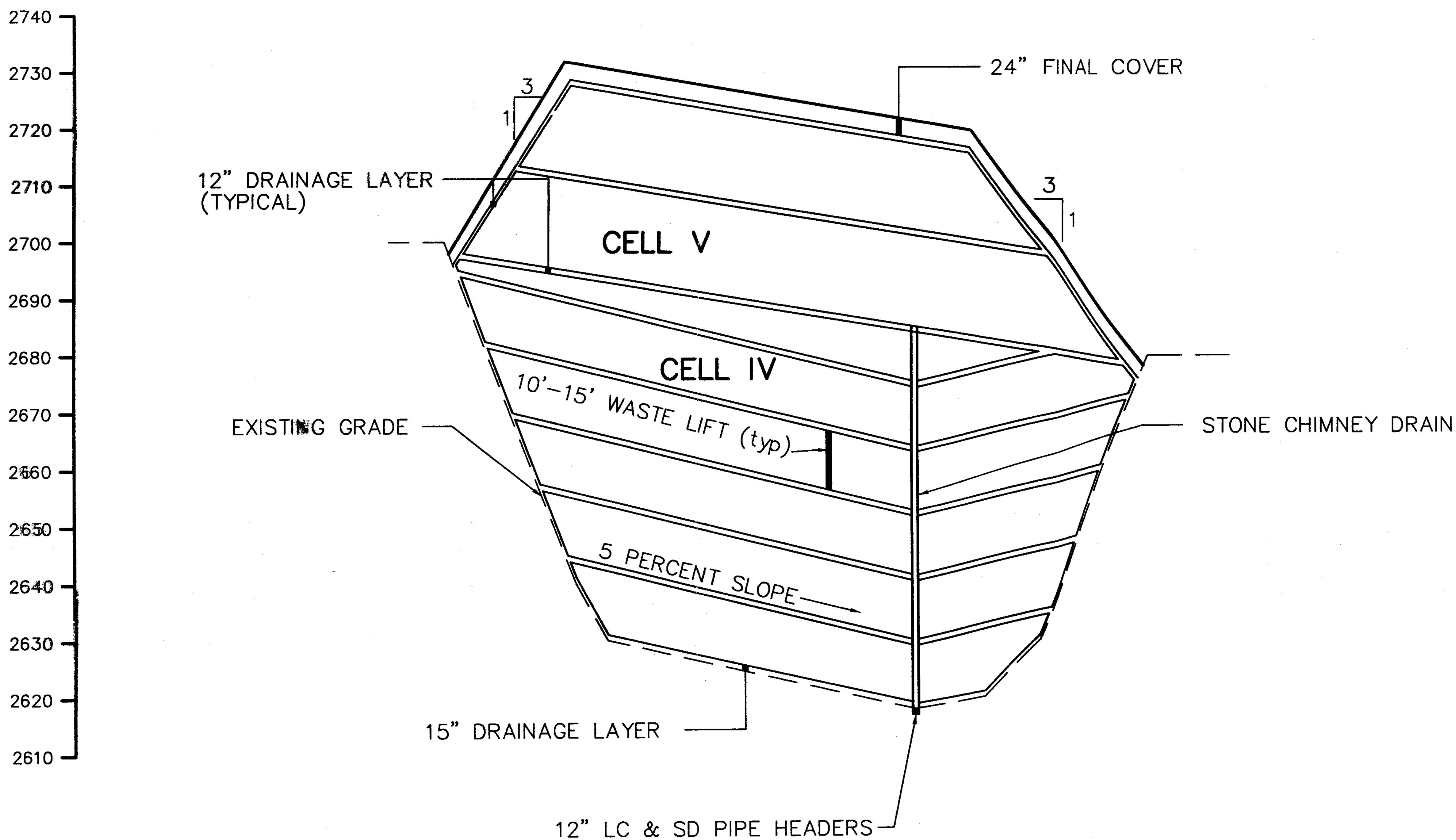
waste lifts and slope towards the center is on Figure 3-5. In addition to meeting proper waste grades, the operators must maintain a 5-foot setback from the Cell III and IV dike. This setback will assure disposal of the waste within the cell area and will also provide additional storage of runoff before it infiltrates into the landfill's leachate collection system below.

A property of papermill sludge is that it contains clay-like materials from the papermaking process. As the sludge is landfilled deeper, the consolidation of the sludge also makes the sludge less permeable; water does not drain as easily. In order to maintain good drainage within the landfill, the top surface of each lift will be covered with a 12-inch thick layer of granular material, i.e. stone, gravel, etc. The drainage layer will aid in draining the next lift of waste, making for a more stable landfill operation. In addition to the drainage layers, the chimney drain strip will be expanded upward in the center of the landfill. The process of expanding the chimney drain strip is shown in Figure 3-6. With each new lift of waste, the chimney drain strip will consist of a 5-foot high dike of drainage stone directly above the previous chimney drain strip. The waste will be landfilled up to the top of the stone. The process repeats again with a 5-foot high dike of drainage stone to within 10 feet of the final grade of the cell. As with the chimney drain strip, the sand drainage layer along the lined sideslopes will also be extended with each new lift of waste.

Special operating procedures will need to be implemented during winter operations. During winter operations, provisions must be made for snow removal to maintain the necessary landfill operations. Waste placement, grading and site cleanliness become more important during the winter since waste such as ungraded frozen sludge can become a barrier to traffic movement. The access road must be plowed and sanded to provide safe travel conditions. Salt should not be used because it may seep into the groundwater and will impact groundwater quality data. Sanding will be the preferred method of road treatment in the winter months. Drainage structures such as culverts should be kept free of ice and snow to assure unrestricted runoff during thaw conditions. ***Any damage to the liner system of the landfill that occurs as a result of construction or operational activities will be reported immediately to EOHS management for appropriate action.***



EXAGGERATED SCALE 5:1

FIGURE 3–5
CELL IV CROSS SECTION
BLUE RIDGE PAPER PRODUCTS, INC.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.

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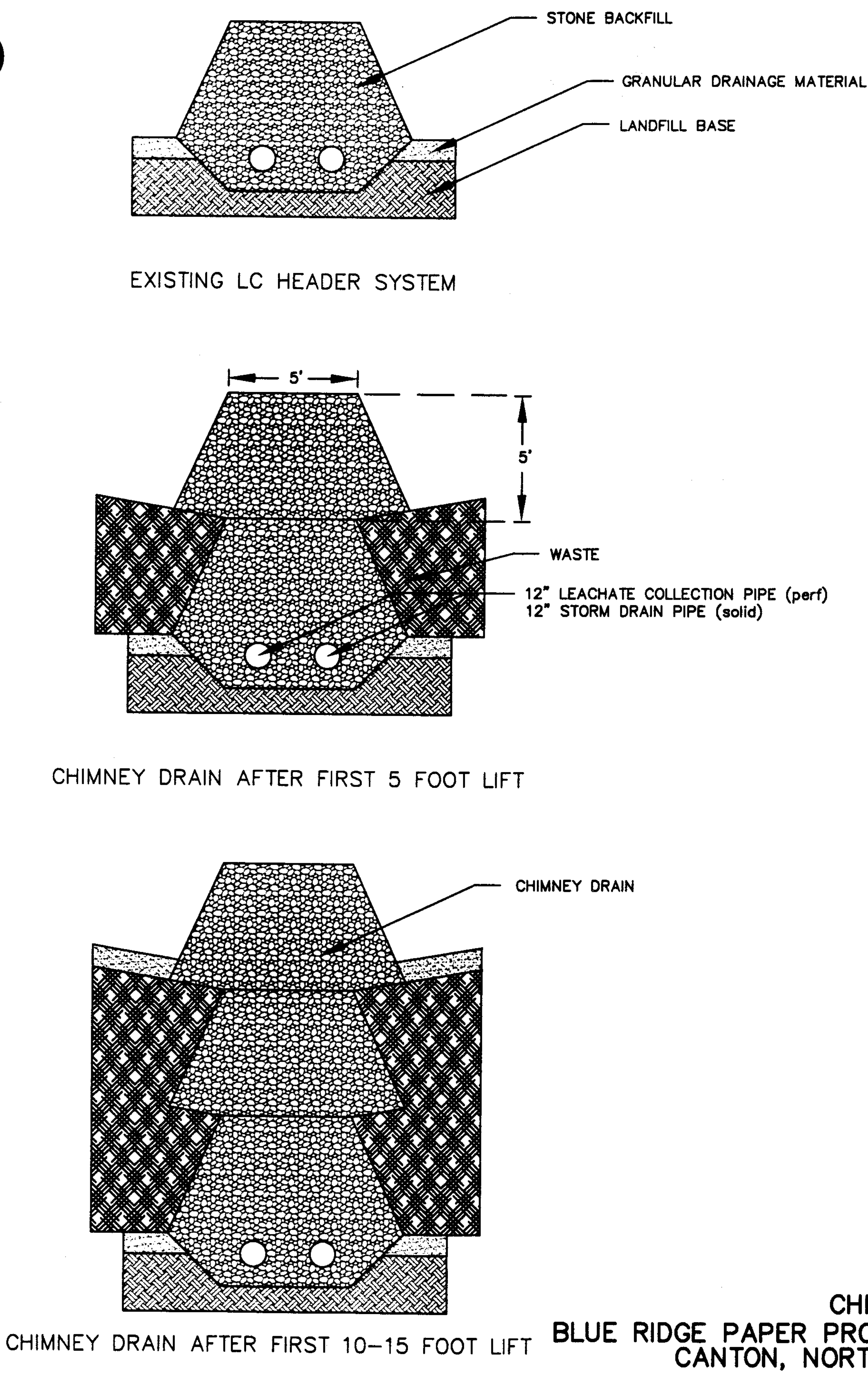


FIGURE 3–6
CHIMNEY DRAIN
BLUE RIDGE PAPER PRODUCTS, INC.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.

The development of Cell IV will continue to the grades shown on Figure 3-4. Upon completion of Cell IV, the operations will move into Cell III.

3.2 Cell III

Cell III development and operations will be very similar to Cell IV previously discussed. Prior to beginning operations in Cell III, the following steps will need to be conducted:

1. The 12-inch diameter leachate transport pipeline in Cell III will be connected to the leachate pipeline projecting from Cell IV. This will involve removing the blind flange from the projecting pipeline from Cell IV, and inserting a short flanged pipe section to complete the pipeline run in Cell III.

2. The storm drain inlet in Cell III will be capped to prevent leachate from entering the stormwater pipeline. The cap will be a blind flange with a gasket for a watertight seal.

3. The installation of 6-inch diameter collection laterals and 15 inches of granular drainage material over the base of Cell III.

Operations will begin at the east end of the base of Cell III. Cell III will be accessed from a road created during waste placement on the west sideslope of Cell IV. The access road will be 24 feet wide to allow two-way traffic flow in and out of the landfill. The development of Cell III will continue to grades shown on Figure 3-2.

3.3 Cell V

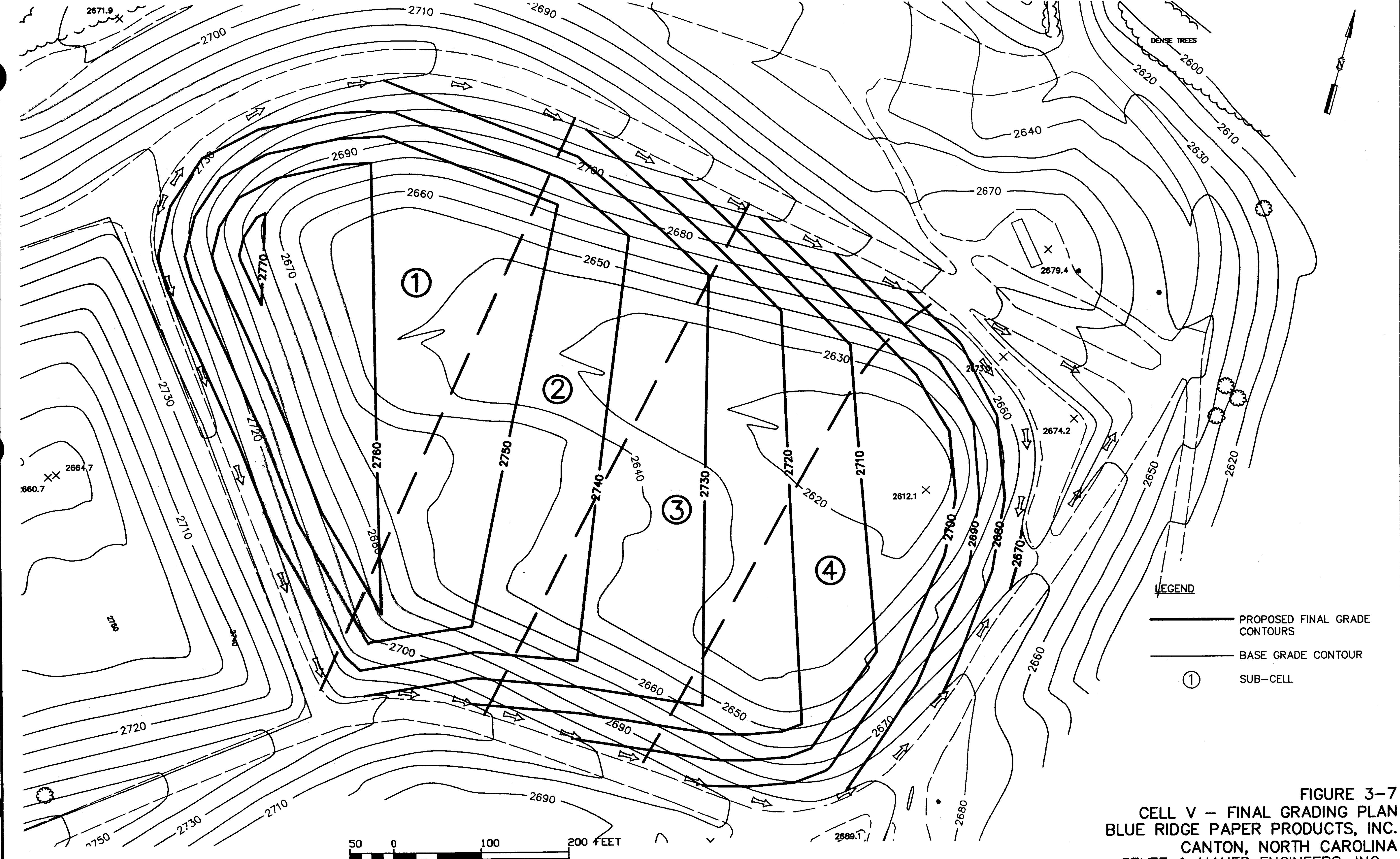
The final cell to be filled within Area A East will be Cell V, located above the previously filled Cells III and IV. Cell V is designed to provide an additional 30 feet of waste thickness to Area A East. The development of Cell V will require operations to proceed in a sub-cell method, i.e. four (4) sub-cells are included within the entire Cell V area, to allow closure of areas reaching final grade. Final closure of the landfill as areas reach final grade will minimize leachate generation and spread capital costs over a period of several years. Figure 3-2 presents the base development plan for Cell V.

Cell V will handle leachate collection through the use of the stone drainage layer located along the perimeter of the landfill. The stone drainage layer is contiguous along the sideslope to the bottom of the landfill. The leachate will drain to the piping system at the bottom which connects to the leachate transport pipeline east of Area A East. The extension of the chimney drain is not proposed within this cell. In addition to the stone drainage layer, the east end of Cell V will continue to serve as a stormwater detention area during operation of sub-cells 1 through 3. Leachate collected at the east end will pass down through the chimney drain to the piping system at the bottom of the landfill.

Cell V operations will require a staged development to bring sections of the landfill to final grade and, thus, limit the amount of leachate generation. Cell V will be filled in four (4) separate sub-cells, each approximately 3 acres in area. Each sub-cell will be filled to the final grading contours, Figure 3-7, and capped prior to moving operations into a new sub-cell.

Landfill operations in Cell V will begin in the western Sub-Cell 1. Access to the western sub-cell will be installed as per the Owner's requirements. Filling of the sub-cell will proceed as discussed in Subsection 3.1.

Upon completion of Sub-Cell 1, final cover will be installed over the waste, with the exception of the east sideslope. The east sideslope will abut the active operations in Sub-Cell 2 and, therefore, does not need to be covered. The final cover layer will consist of 18 inches of low hydraulic conductivity soil over a 12-inch granular drainage layer. The 12-inch granular drainage layer will tie into the stone drainage layer along the perimeter of the landfill. The setbacks for landfill filling in the vicinity of the perimeter will require an increase from the standard of 5 feet of separation between the waste and the top of the containment berm. Occasionally, wetter than normal waste material will be delivered to the landfill for disposal. This type of waste material will not be placed closer than 100 feet from the perimeter of Cell V.



LEGEND

PROPOSED FINAL GRADE CONTOURS

BASE GRADE CONTOUR

① SUB-CELL

FIGURE 3–7
CELL V – FINAL GRADING PLAN
BLUE RIDGE PAPER PRODUCTS, INC.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.

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Development of subsequent sub-cells will proceed to the east for Sub-Cells 2 and 3, and Sub-Cell 4 until Cell V is filled to the final contours presented in Figure 3-7. Upon completion of Cell V or if operational problems are encountered during operation of Cell V, operations will begin in Area A West Cells I and II.

4.0 LEACHATE MANAGEMENT

4.1 Leachate Generation

Leachate will be generated in the landfill through two mechanisms. The major source of leachate will be generated through precipitation falling onto the active landfill areas. Precipitation generated leachate will be minimized through the placement of a soil cover over areas which have reached intermediate grade.

Leachate will also be generated through waste consolidation and subsequent drainage of entrained water. Further discussion concerning the volumes of leachate may be found in the Design Report.

Leachate will be collected through a gridwork of perforated pipes which underlie the waste and drainage layers which are placed between waste lifts. Leachate will flow by gravity to the leachate pump station and storage ponds and the wastewater treatment plant.

4.2 Leachate Storage

The leachate storage ponds utilize a synthetic liner to contain leachate, and have been designed to store leachate for extended periods prior to transportation to the WWTP. The capacity of the ponds is approximately 1.7 million gallons.

4.3 Leachate Flow Control

The leachate transport piping system from the landfill is designed with gate valves to control the flow if necessary. The following scenarios are described with the proper actions to be taken.

The leachate transport system from the leachate ponds to the wastewater treatment plant includes a pump station capable of handling up to 200 gpm of flow. Should this flow be exceeded, the leachate flow above the 200 gpm will be directed to the leachate storage ponds. There are no actions required by the landfill operator for this scenario. Once the flow falls below 200 gpm, the ponds will begin to empty.

In the event the leachate transport pipe from the pump station to the treatment plant develops a leak, pipe break, blockage, or the pump station needs maintenance, the transport pipeline can be shut off. A gate valve located on the outlet of the pond can be opened, thereby allowing the ponds to fill. Leachate flow will remain to the leachate storage ponds for temporary storage.

4.4 Leachate Disposal

The leachate generated during the operation of the secure landfill will be treated by Blue Ridge Paper Products, Inc.'s wastewater treatment facility.

5.0 LANDFILL INSPECTION AND MAINTENANCE

5.1 General

Landfill inspection and maintenance will be an ongoing activity. All personnel will be expected to observe the condition of landfill facilities throughout their workday and notify the EOHS management of areas and equipment which may need repair and maintenance. Formal landfill inspections will be conducted in the spring and fall of each year. Additional inspections may be warranted following unusual climatic or operational events including, but not limited to, major rain storms, flood, fire, hurricane or earthquake. These inspections will follow the inspection forms attached in Appendix B. A description of the inspection items are discussed in the remainder of this section. EOHS management is ultimately responsible to insure that the inspection and maintenance of all landfill facilities and equipment occurs.

5.2 Access Roads

The access roads to the landfill will be maintained by Blue Ridge Paper Products, Inc.. Frequent inspections by the operators, especially during the spring and winter months will be made to insure that these roads are in safe condition.

Internal landfill access roads, including those within the landfill cells, will be maintained as all weather roads. Prompt attention to road repairs is the most cost-effective approach since deterioration becomes increasingly more rapid once it has begun.

5.3 Equipment

Maintenance of equipment and landfill operations vehicles is critical in controlling and maintaining landfill operations. All equipment will be subject to a comprehensive, preventive maintenance program, as specified in the manufacturers specifications. Critical parts or replacement equipment will be identified and obtainable within a short period of time to maintain continuity of operations. Replacement parts with long lead times will be purchased and kept on-site.

5.4 Erosion Control Facilities

Open Areas - Areas outside of the landfill, which have been disturbed will be seeded to prevent erosion. The seeding will be performed in accordance with the seeding schedule contained in the closing plan. Prior to any land disturbing activity greater than 1/2 acre, a soil and erosion plan must be secured by the appropriate mill group (EOHS or Mill Engineering).

Ditches - Areas, which are rip-rapped or otherwise protected, will be repaired as necessary. All ditches, which are not rip-rapped or otherwise protected, will be seeded. All debris and other blockages will be removed from the ditch to allow for unobstructed drainage. Reseeding of the drainage ditches will be necessary from time to time as erosion occurs.

Cover System - Areas, which have received final or intermediate cover, will be reconditioned and reseeded as necessary. In areas which have eroded, the soil will be replaced and seeded.

5.5 Leachate Collection Piping

A cleanout is located at the end of the leachate collection main. This device provides a means to remove blockages within the piping system, should they occur.

5.6 Leachate Storage Pond

To insure the integrity of the leachate storage pond, periodic inspections will be made. Annually, when the pond has been emptied, visual inspection of the liner will be made. Any tears or punctures will be noted and repaired.

5.7 Liner Repair

If tears or punctures occur in the liner within the pond or along the sideslopes of the landfill, they will be repaired as soon as possible. Punctures and tears less than 6 inches in length will be repaired by Blue Ridge Paper Products, Inc. personnel if trained personnel are available. Repairs will involve placement of an overlapping patch (6-inch minimum overlap) which will be tack-welded to the underlying liner. Extra liner will be stored on-site for field repairs. If the liner tear is greater than 6 inches in length, a liner installer will be contacted to make the necessary repairs.

5.8 Landfill Underdrain System

The landfill underdrain system will be inspected on a monthly basis. An inspection form, See Appendix B, will be filled out to document each inspection. The inspection will consist of the following list.

1. Pipe outlets shall be checked for blockages and that the discharge is not eroding the outlet ditch. Any blockages should be removed to provide free flow from the pipe outlet. If erosion should occur, the ditch outlet should be stabilized, i.e. riprapped. The end of the pipe also has a rodent guard to prevent animals from entering the pipe. This should be checked and repaired, if necessary.

2. Inspect the manholes for blockages or silt build-up. For either case the EOHS management should have the manhole cleaned and reinspected.

In addition to a monthly inspection, the underdrains shall be inspected after any major rain storms, floods, fire, hurricane, earthquake or facility failure.

6.0 WATER QUALITY MONITORING

6.1 General

To aid in evaluating the performance of the landfill, a groundwater and surface water monitoring program will be conducted as described herein. The collection, preparation, preservation and delivery of the samples to the laboratory shall be the responsibility of the EOHS. A description of the sampling program is given below.

6.2 Groundwater Monitoring

Fifteen wells will be used for groundwater quality monitoring. The approximate locations for monitoring wells are shown on Figure 6-1. The schedule for monitoring is shown in Table 6-1. Semi-annual samples will be collected in March and November.

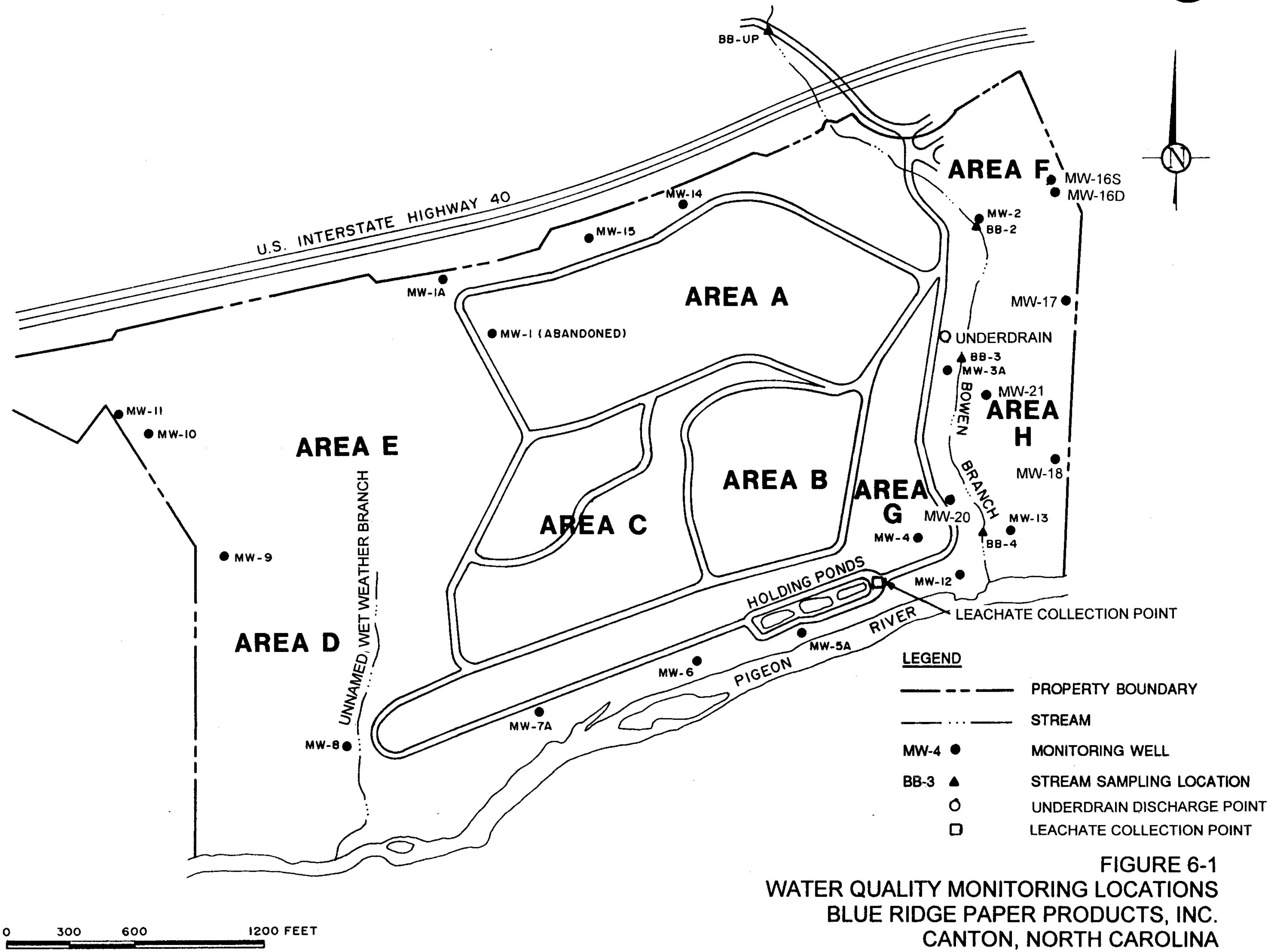


FIGURE 6-1
WATER QUALITY MONITORING LOCATIONS
BLUE RIDGE PAPER PRODUCTS, INC.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS

94040

TABLE 6-1

LANDFILL NO. 6 WATER QUALITY ANALYSES

Parameter	Semi-annually
pH	X
specific conductance	X
temperature	X
water level	X
TOC	X
TOH	X
<u>Inorganics</u> Arsenic	X
Barium	X
Calcium	X
Cadmium	X
Chromium	X
Iron	X
Lead	X
Magnesium	X
Manganese	X
Mercury	X
Nickel	X
Potassium	X
Selenium	X
Silver	X
Sodium	X
Zinc	X
Chloride	X
Fluoride	X
Nitrite (as N)	X
Nitrate (as N)	X
Phenol, Total	X
Sulfate	X
Dissolved solids	X

6.3 Surface Water Sampling

Surface water sampling will be collected at upgradient and downgradient locations. The approximate locations of the four surface water sampling stations are shown on Figure 6-1. Samples will be collected on a semi-annual basis when a sample can be obtained. Samples will be analyzed according to the schedule in Table 6-1.

6.4 Underdrain Monitoring

An underdrain sample will be collected from the underdrain outlet as shown on Figure 6-1. Samples will be collected semi-annually and analyzed according to the schedule in Table 6-1.

7.0 RECORD KEEPING & REPORTING

7.1 General

One of the most important elements of a well run landfill is an efficient record keeping system. For a facility of this nature it requires the timely collection, interpretation and management of large volumes of data. Data collected will be presented in an annual report to the NCDENR. The annual report will include the source, type and volume of waste accepted over the course of the calendar year.

A copy of the permit and operating plan will be maintained at the facility.

7.2 Operating Records and Annual Reports

(a) Blue Ridge Paper Products, Inc. will maintain documentation of all facility operations, including:

(1) Identification of the facility, owner, and operator;

(2) Quantity, type and source(s) of wastes received;

(3) Complete record of inspections, maintenance, repairs, and emergency event response;

(4) Data on all environmental monitoring required at or for Landfill Area 6A;

(b) Blue Ridge Paper Products, Inc. will file an annual report of operation with the NCDENR by July 31 of each year, for the previous 12 months of operation.

7.3 Waste Description

The Landfill is licensed to dispose of wastes which fall into five general categories. Regardless of the type of waste, similar accounting procedures will be used. Accounting will include logging the number of truckloads with regard to waste type and volume.

The five general categories are:

1. Fly ash from multi-fuel boilers;

2. Lime waste;

3. Wastewater treatment plant sludge;

4. Wood waste; and

5. Cinders.

The daily amount of each category of acceptable waste will be recorded on a truckload log sheets. A daily truck weight sample of each waste category will be logged as needed. A copy of the log sheets are included in Appendix A.

8.0 FINAL AND INTERMEDIATE CLOSURE

8.1 General

Closure of the site is a continuing process which includes the following activities:

1. Final grading and shaping;
2. Closure of discontinued channels, pipes or drains;
3. Placement of cover materials;
4. Seeding and fertilizing.

The principle goals of the closing plan for the Landfill are: 1) to minimize future generation of leachate; and 2) to provide a cover system suitable for developing a grass crop which will prevent erosion. The final cover system designed for this site will minimize future generation of leachate, and provide a suitable stormwater management plan which will minimize the potential of erosion.

Inspection and monitoring of closed areas are necessary to detect erosion and to initiate repair for prevention of significant damage to the landfill cover. Uneven settlement may result in ponding or breaks in the cover system, these areas will be rebuilt and/or regraded to restore proposed contours. In addition, maintenance and post-closure care will include periodic mowing to discourage large, deep rooted vegetation which can damage the cover integrity.

8.2 Closure Procedures

The subsections which follow describe the various closure procedures and activities which must be performed.

8.2.1 Grading. The waste will be placed and graded to the elevations shown on the figures provided in Section 3.0 of this report. Prior to seeding, a surveyor will check elevations to insure that the proper grades exist and there are no low areas or depressions within the site. The surveyor will also check the perimeter slopes to be sure they are at the proper grades. Spot elevations will be taken in the surface runoff ditches to insure that proper slopes exist.

8.2.2 Closure of Channels, Pipes, or Drains. The closure of channels, pipes, or drains will be accomplished in a manner which ensures the integrity of the system for the system's design life.

The design life of all components within the landfill is 50 years, typical products which have this life is stainless steel and high density polyethylene (HDPE). Design of the closure should also take into consideration the forces acting on the area of interest.

The site development of Cell V includes several piping systems associated with the proper management of leachate. The closure of inlet structures for Cell V will require the use of properly designed caps with the above mentioned materials and strength requirements.

8.2.3 Final Cover System. The final cover system over the Landfill will consist of three layers. The three layer from top to bottom are:

1. Four inches of cover soil;

2. 36 inches of suitable on-site soils, i.e. residual soils; and

3. 12 inches of granular drainage material.

8.2.4 Seeding. All areas which have been covered will be seeded. Seeding will normally occur between April 30 and September 30. All surface water runoff control facilities such as drainage ditches, berms and culverts are to be constructed prior to seeding. All grading will also be performed prior to seeding. The top layer of soil should be loosened by raking, discing or other acceptable means before seeding. Lime (2 tons/acre or as needed based on testing) and fertilizer (1,000 lbs/acre of 10/10/10 or as needed based on testing) will be harrowed or disced into the soil at a minimum of 3 inches. If the site is hydroseeded, lime, fertilizer and seed can be applied simultaneously. The seed mixture to be used is as shown below.

SEEDING MIXTURE (OR EQUAL)

Tall Fescue (KY 31)	80 lb/acre
Sericea lespedeza	20 lb/acre
Kobe lespedeza	10 lb/acre
	110 lb/acre

The seed will be applied uniformly with a cyclone seeder, drill, cultipack seeder or hydroseeder. Seed should not be planted if there is a danger of frost shortly after seed germination. Maximum seeding depth is 1/4 inch when using methods other than hydroseeding.

8.3 Erosion Control

The following procedures will be used for erosion control on the seeded areas:

- slopes less than 4:1 - Apply unrotted, long-fibered hay, straw or cellulose fiber at a rate of 2 tons per acre. Mulch material should be relatively free of all kinds of weeds, and should be anchored with a tractor drawn implement designed to punch and anchor it into the top 2 inches of soil. Anchoring of the mulch will be performed immediately after placement to minimize loss by wind or water. This method of anchoring should be done on the contour wherever possible.

- slopes steeper than 4:1 - On 4:1 slopes or steeper, the seed will be applied by hydroseeding with a binder or excelsior matting to control erosion. Siltation fences will be installed at the bottom of all seeded slopes. Berms will divert runoff from the top of the slopes to established slopes.

- drainage ditches - The grass-bottomed drainage ditches will be seeded in the same manner as the remainder of the site. The same mulch specified above will be placed in these areas. Staples, lightweight biodegradable paper, plastic or cotton nettings will be placed within the ditches to anchor the mulch.

8.4 Long-Term (Post Closure) Maintenance

The subsections which follow describe the various activities which must be performed to insure the long-term integrity of the landfill subsequent to final closure.

8.4.1 Mowing. To prevent deep rooted tree growth, the closed portions of the landfill and drainage ditches will be mowed at least twice per year.

8.4.2 Site Inspection. Once the landfill is closed, the area will be inspected by the EOHS in the spring and fall of each year for a period of at least three years to insure the cover system integrity is maintained against differential settlement, erosion and other problems. The inspection will include an examination of the following items:

- surface drainageways
- surface grading
- grass growth

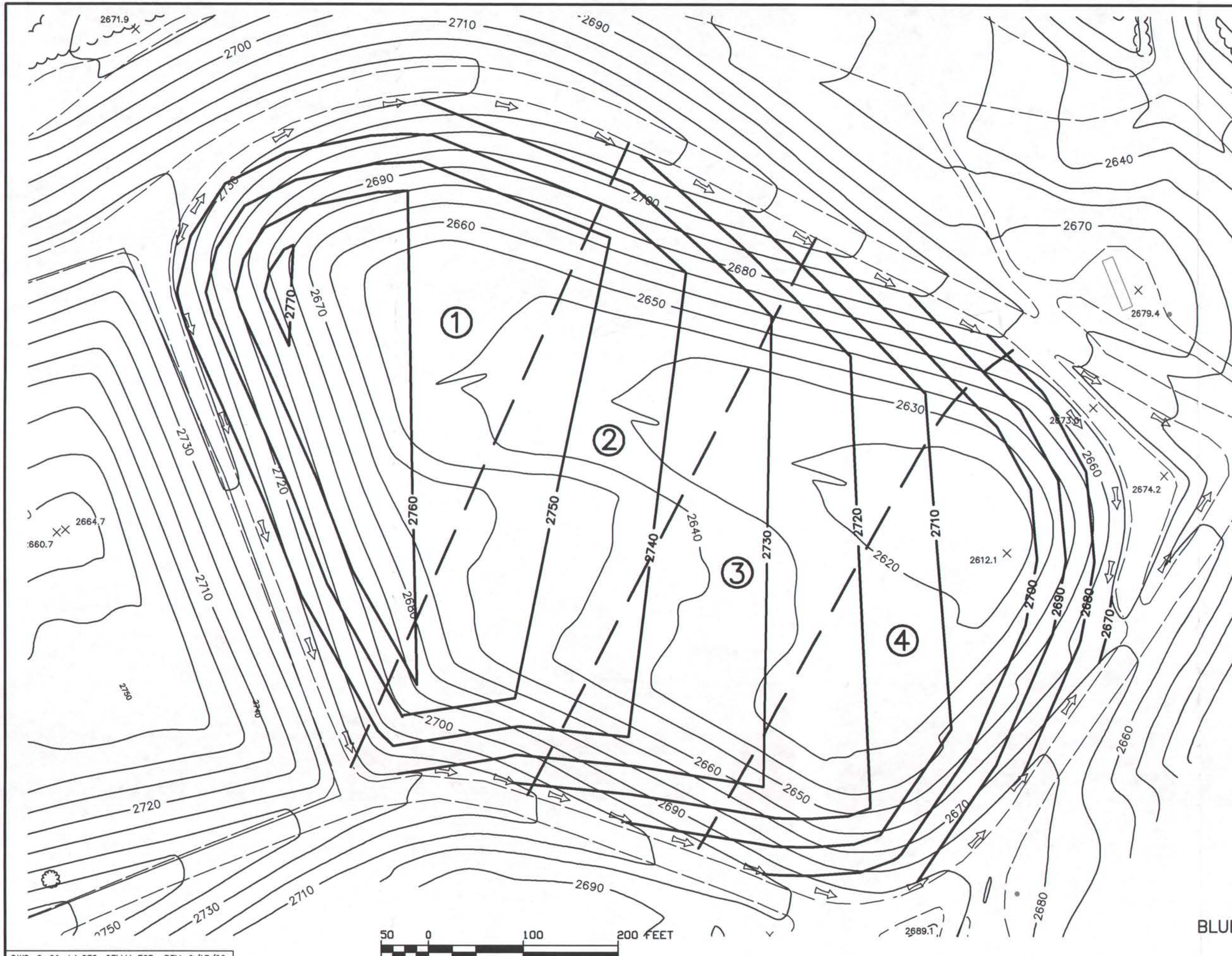
Each inspection will include notation of any problems and recommended remedial actions. Following the three years, an inspection frequency of once per year will be sufficient unless major problems develop, whereupon more frequent inspections will be made.

8.5 Leachate Collection

Leachate collection will continue past the closure of the landfill. The primary source of leachate will be consolidation of waste. The amount of leachate which must be collected, transported and treated will be greatly reduced from that generated during operation of the landfill.

8.6 Water Quality Monitoring

The semi-annual monitoring program described elsewhere in this manual will continue after site closure. After closure, if the concentrations of parameters analyzed stabilize, the NCDENR can be approached to reduce the frequency of sampling and the number of parameters analyzed.



LEGEND

PROPOSED FINAL GRADE CONTOURS

BASE GRADE CONTOUR

① SUB-CELL

FIGURE 3–7
CELL V – FINAL GRADING PLAN
BLUE RIDGE PAPER PRODUCTS, INC.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.

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