Canton Mill
Box C-10
Canton, North Carolina 28716

Carmen Johnson

Fac/Perm/Co ID # ~~44-06~~ 44-01 cp | Date 3/20/12 | Doc ID# DIN

Champion
Champion International Corporation

February 10, 1995

Ms. Sherri Hoyt
North Carolina Department of Environment,
Health and Natural Resources
Division of Solid Waste
P.O. Box 27687
Raleigh, North Carolina 27611-7687

Dear Ms. Hoyt:

Attached is a letter from the North Carolina State Board of Registration for Professional Engineers and Land Surveyors demonstrating that Mr. John E. Sevee, of Sevee & Maher Engineers, Inc., has met all requirements for registration in North Carolina. You will recall that Sevee & Maher developed the Canton Mill Landfill #6 Operations Manual.

Please let me know if further information is required at this time.

Sincerely,

James A. Giauque

Attachment

NORTH CAROLINA
STATE BOARD OF REGISTRATION
FOR
PROFESSIONAL ENGINEERS AND LAND SURVEYORS
3620 SIX FORKS ROAD, SUITE 300
RALEIGH, NORTH CAROLINA 27609-7197

January 24, 1995

ADMINISTRATION
(919) 781-9499
VIOLATIONS DIVISION
(919) 571-2990
CONTINUING EDUCATION
(919) 781-9548
FAX
(919) 781-2035

Mr. John E. Sevee, PE
Sevee & Maher Engrs
P. O. Box 85A
Cumberland, ME 04021

Re: PE No. 20589

Dear Mr. Sevee:

The North Carolina Board of Registration for Professional Engineers and Land Surveyors congratulates you on meeting all the requirements for professional registration in North Carolina. You are hereby entitled to practice your profession and use the title:

Professional Engineer

Enclosed is your 1995 Pocket Card which is valid through December 31, 1995, and signifies your registration in North Carolina. Your Certificate of Registration is being prepared and will be forwarded to you by mail when completed.

We wish you success in your professional practice in North Carolina.

For the Board,

Jerry T. Carter

Jerry T. Carter
Executive Secretary

JTC:jsa
Enclosures

Carmen Johnson
~~44-06~~ 3/20/12
44-01(g)

CHAMPION INTERNATIONAL CORPORATION
LANDFILL NO. 6A EAST
CANTON, NORTH CAROLINA

OPERATIONS MANUAL

JANUARY 1995

SEVEE & MAHER ENGINEERS, INC.

Regulatory Agreements

AMENDMENT TO PERMIT NO. 44-06
DATE ISSUED 4-29-94

STATE OF NORTH CAROLINA

DEPARTMENT OF ENVIRONMENT, HEALTH, AND NATURAL RESOURCES

DIVISION OF SOLID WASTE MANAGEMENT

P.O. BOX 27687 RALEIGH, NC 27611

SOLID WASTE PERMIT

Part 2: Permit to Operate

Champion International Corporation
Canton Mill

is hereby issued a permit to operate a

SANITARY LANDFILL

located

on SR 1550 and I-40 in Haywood County

in accordance with Article 9, Chapter 130A, of the General Statutes of North Carolina and all rules promulgated thereunder, and subject to the conditions set forth in the Solid Waste Permit Part 1: Permit to Construct.

James C Coffey

James C. Coffey, Supervisor
Permitting Branch
Solid Waste Section

State of North Carolina
Department of Environment,
Health and Natural Resources
Division of Solid Waste Management

James B. Hunt, Jr., Governor
Jonathan B. Howes, Secretary
William L. Meyer, Director

DEHNR

June 3, 1994

Mr. Derric Brown
Champion International Corporation
Canton Mill
Box C-10
Canton, North Carolina 28716

RE: Solid Waste Permit, Part 2: Permit to Operate
Canton Mill Landfill No. 6, Area A
Permit No. 44-06
Haywood County

Dear Mr. Brown:

The Solid Waste Section has reviewed the CQA documentation for Cell 1, Area A, and has determined that Champion International has met the pre-operative requirements of the Permit to Construct issued 1/9/92. Cell 1, Area A is hereby approved to receive waste. Waste placement should begin in the new lined area as soon as feasible and closure activities begun in Areas B and C.

Should you have any questions regarding this approval, please contact me at (919) 733-0692.

Sincerely,

Sherri C. Hoyt
Environmental Engineer
Solid Waste Section

cc: James Coffey
Julian Foscue
Jan McHargue
Jim Patterson

P.O. Box 27687, Raleigh, North Carolina 27611-7687 Telephone 919-733-4996 FAX 919-715-3605

Operations, Maintenance and Closure

CHAMPION INTERNATIONAL CORPORATION
LANDFILL NO. 6A EAST
CANTON, NORTH CAROLINA

OPERATIONS MANUAL

JANUARY 1995

SEVEE & MAHER ENGINEERS, INC.

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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 NC DEHNR. 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 layer of sand 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 leachate storage pond. From the leachate storage pond, the water flows to the mill's wastewater treatment plant.

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, 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, Champion shall notify the North Carolina Department of Environmental Health and Natural Resources (NC DEHNR) 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;

(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 Champion;
- 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.

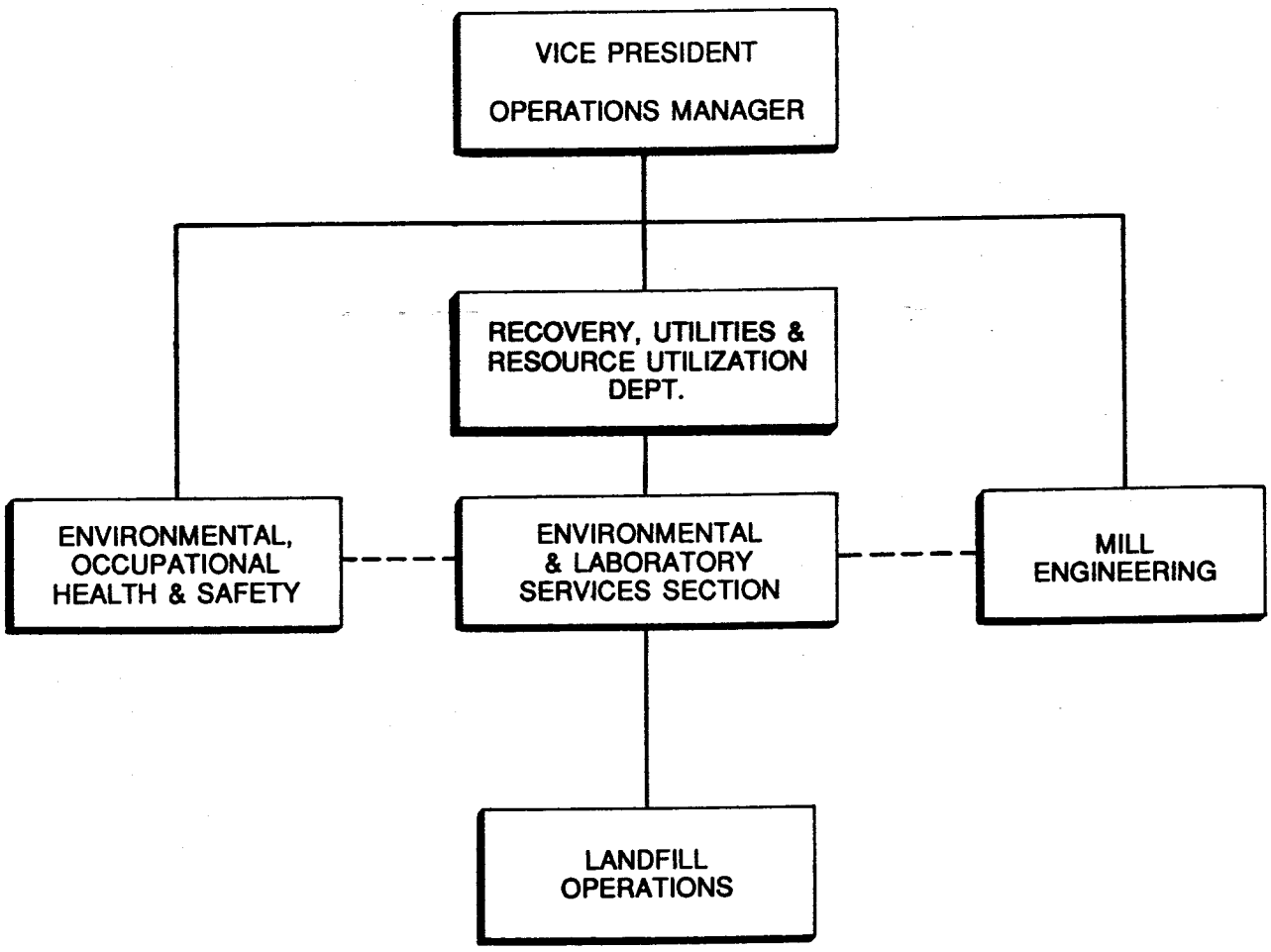

FIGURE 2-1
ORGANIZATION CHART
CHAMPION PAPER CORPORATION
LANDFILL #6 - EAST
CANTON, NORTH CAROLINA

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 NC DEHNR. This responsibility includes periodic site audits and inspections as well as submission of appropriate data to the NC DEHNR.

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 Environmental and Laboratory Services Section (ELS)

ELS personnel are charged with directing and overseeing the daily operation of the landfill to assure that the operating plans are being implemented properly. Responsibilities of the ELS personnel 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.

2.4.2.4 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;
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 ELS section 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 ELS 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 ELS management for a decision on whether it is an acceptable waste.

The landfill operator will also inspect each load. If an un-permitted waste is disposed, the landfill operator shall notify ELS management.

In the event a special waste is generated, the owner will submit waste determination forms to the NC DEHNR 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 waste will be dumped by the haul truck operator and spread by an equipment operator. The landfill operator will spread the waste in lifts 5 to 10 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

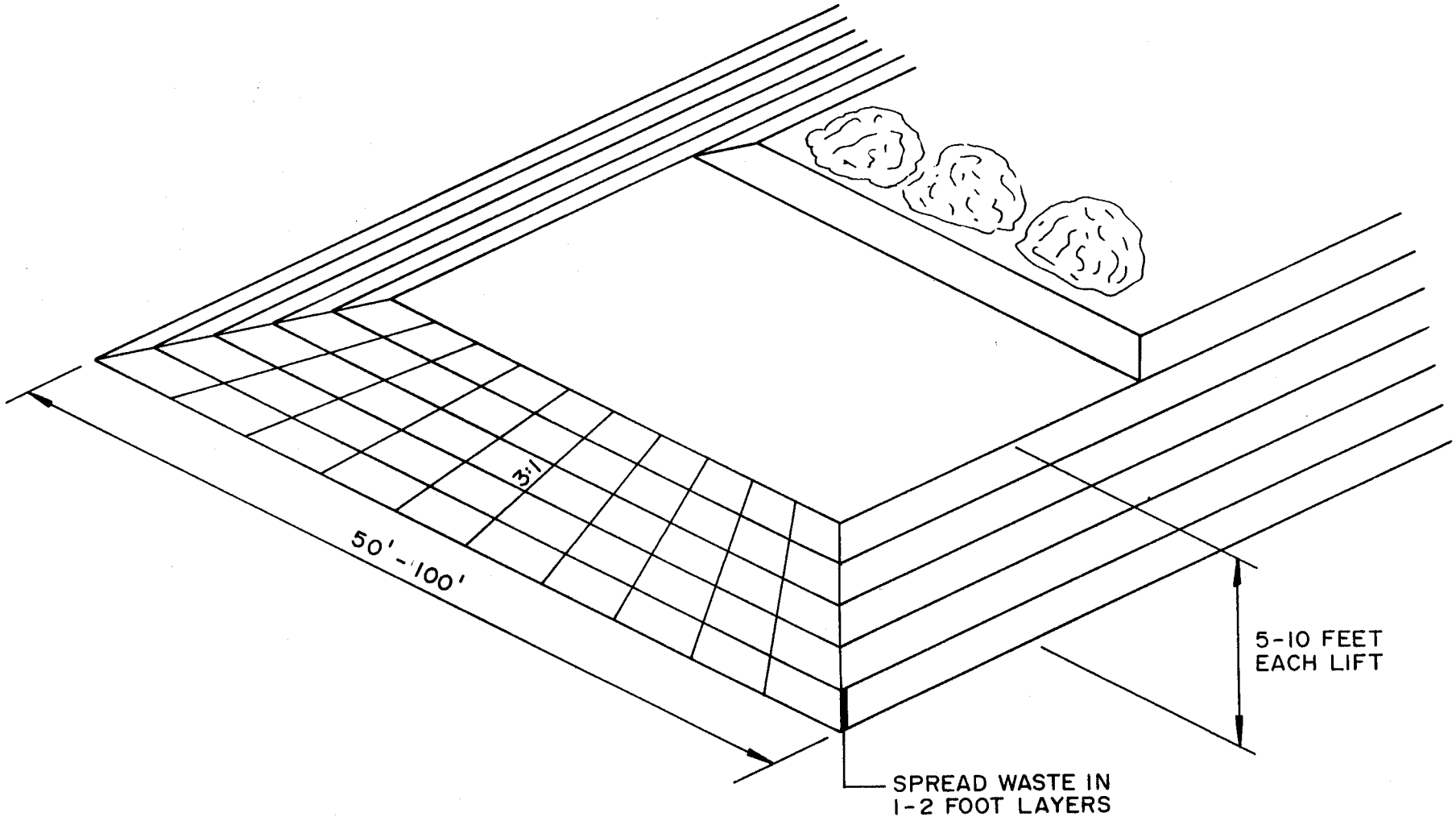

FIGURE 2-2
WASTE PLACEMENT
CHAMPION PAPER CORPORATION
LANDFILL #6 - EAST
CANTON, NORTH CAROLINA

94040

SEVEE & MAHER ENGINEERS

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.

The active area will have containment dikes constructed of a drainable material, i.e. gravel, grit, etc. The dikes will be built to a height of 5 feet or to the height of the waste. When the active area is filled, the operator will move to the next available area. This development will progress until the cell is filled to final grade.

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 toward the center of each cell 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 and wood waste, as discussed above, are straight forward. Certain wastes require special handling to dispose of them. The two wastes which require special handling are lime mud, and boiler ash. The safe disposal of each waste is discussed below.

Lime Mud. Lime mud (calcium carbonate) and slaker dregs are moist when brought out to the landfill and therefore are not dusty nor do they require special care due to hydration. Landfilling of these materials will only require spreading and maintaining a 2 foot separation above the sand blanket over the synthetic liner. These materials should be covered promptly with sludge to prevent their drying and becoming dusty.

Lime mud will amount up to 130,000 cubic yards per year. The frequency of the deliveries is not consistent from week to week, or even month to month. The tendency is for the lime mud to come

in slugs every 2 to 4 weeks. The result is that a slug of lime mud could create problems for the landfill operations. Specifically, the lime mud could make access to the work face difficult until it has had time to drain and setup. Therefore, an area will be designated specifically for slugs of lime mud. The lime mud area will be discussed in more detail in Section 3.0.

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 while maintaining a 2 foot separation above the sand blanket over the synthetic liner. The fly ash is a much finer material and can dry out and become dusty. Landfilling the fly ash should be accomplished by spreading the fly ash and immediately placing a layer of sludge over it. 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. The Landfill permit does not currently permit placement at Cell V. Application for Cell V will be made pending successful operation in Cells III and IV. 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 require the construction of containment dikes and the installation of the necessary leachate transport systems to connect the upper cell to the leachate collection system.

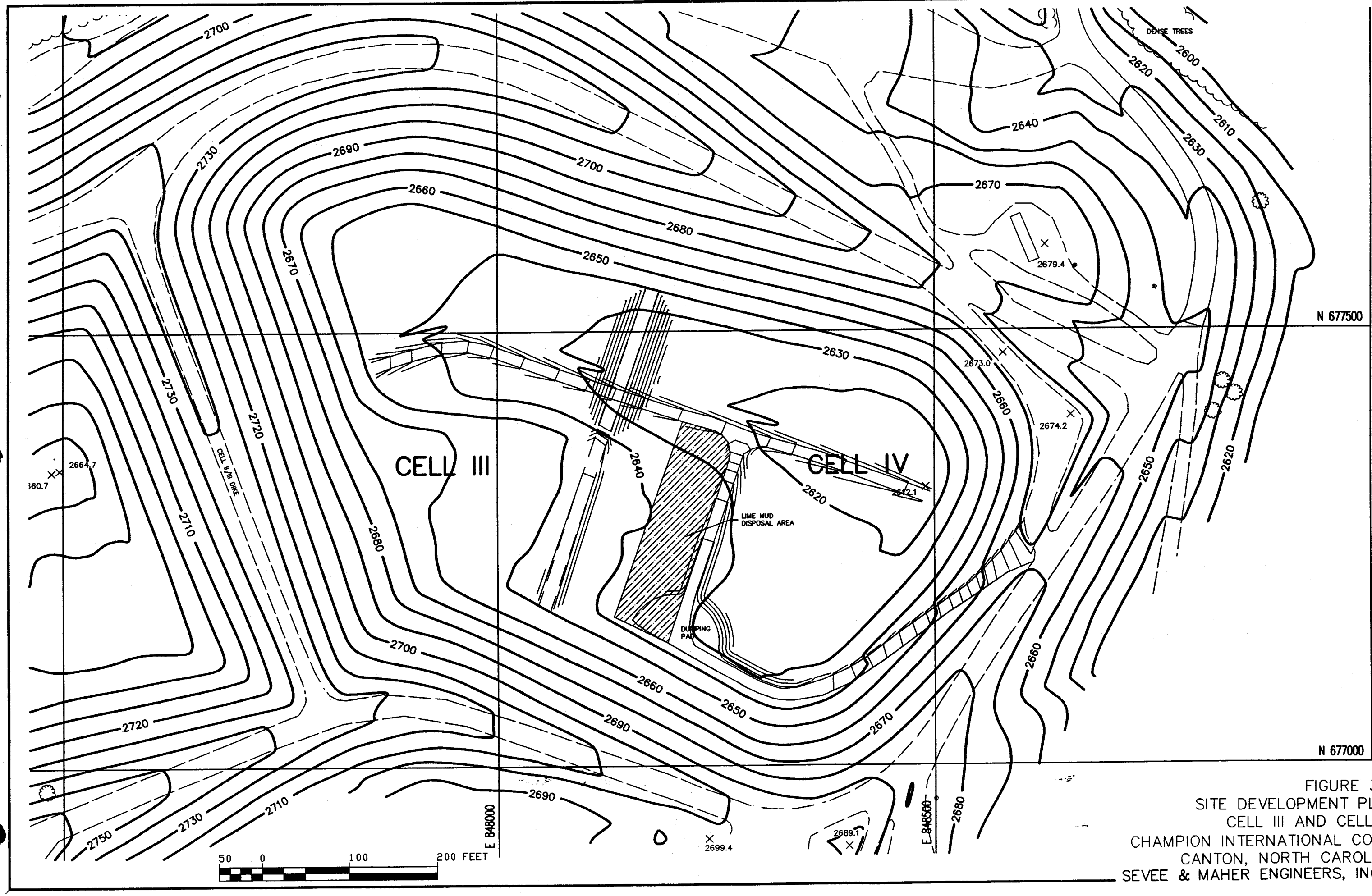

FIGURE 3-1
SITE DEVELOPMENT PLAN
CELL III AND CELL IV
CHAMPION INTERNATIONAL CORP.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.

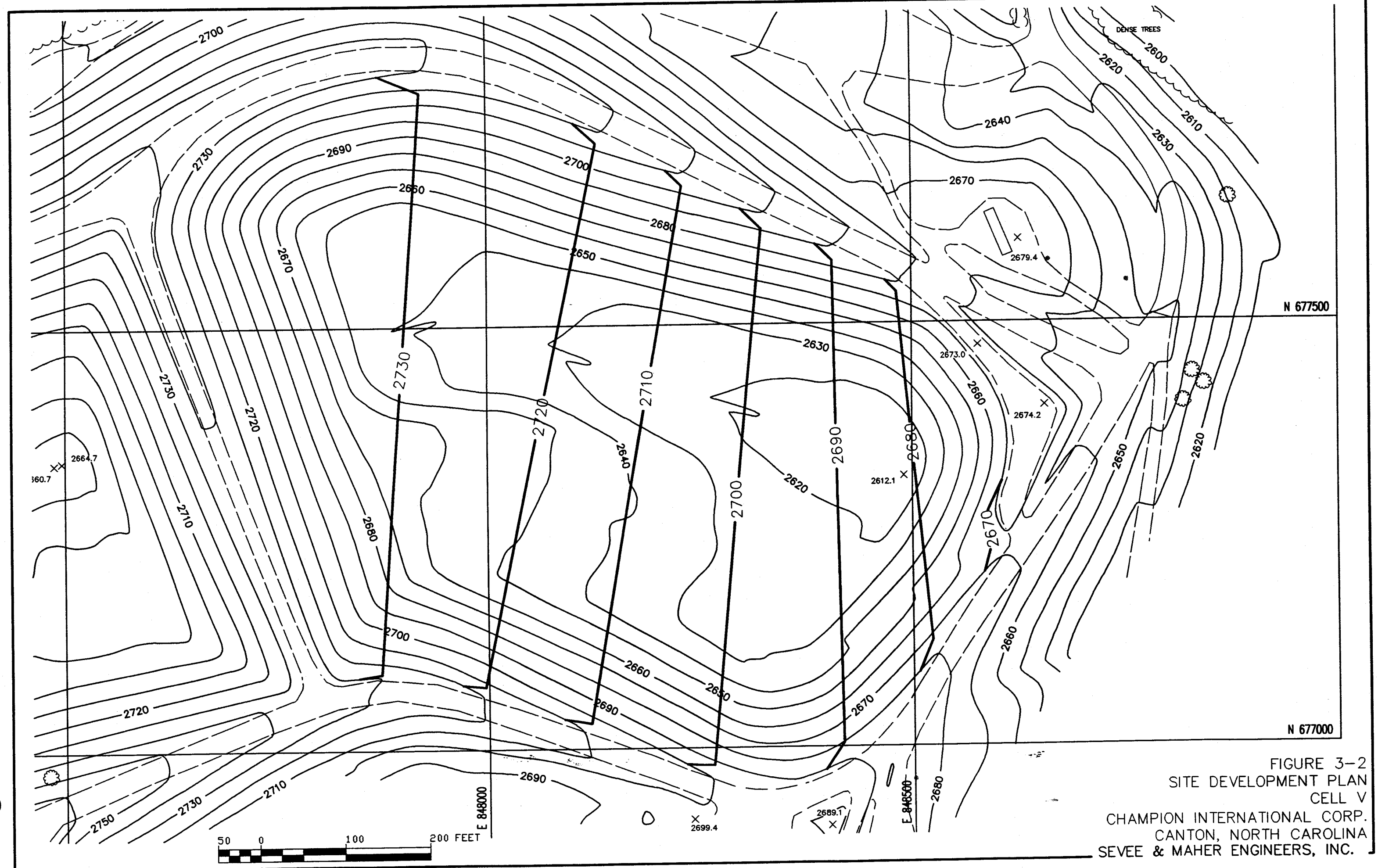

FIGURE 3–2
SITE DEVELOPMENT PLAN
CELL V
CHAMPION INTERNATIONAL CORP.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.

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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 means of gravity flow from Cell IV 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 waste except lime. Lime waste will require special handling and is discussed 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 difficult. 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 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 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. rock dust, 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

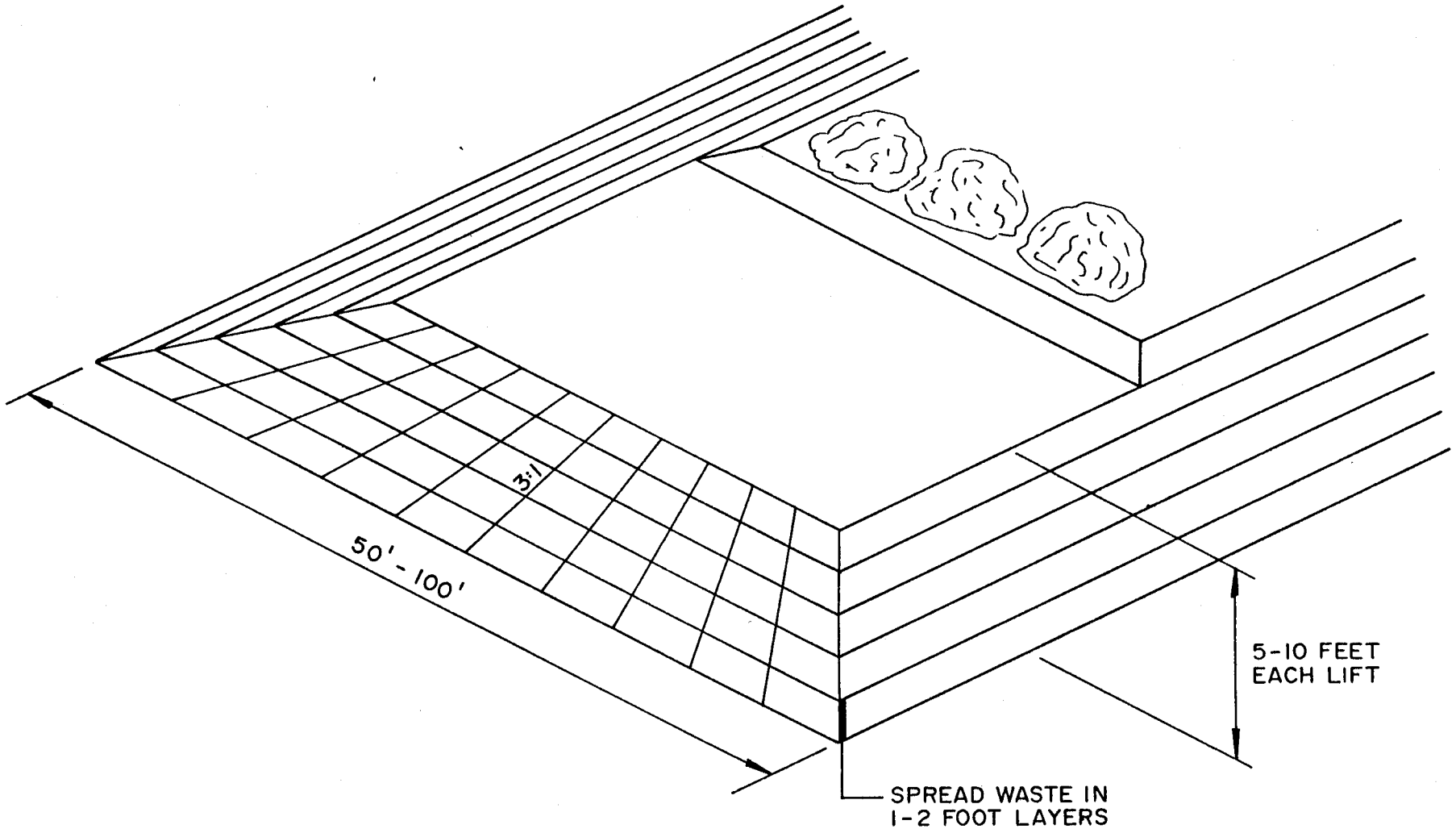


FIGURE 3-3
WASTE PLACEMENT
CHAMPION PAPER CORPORATION
LANDFILL #6 - EAST
CANTON, NORTH CAROLINA

94040

SEVEE & MAHER ENGINEERS

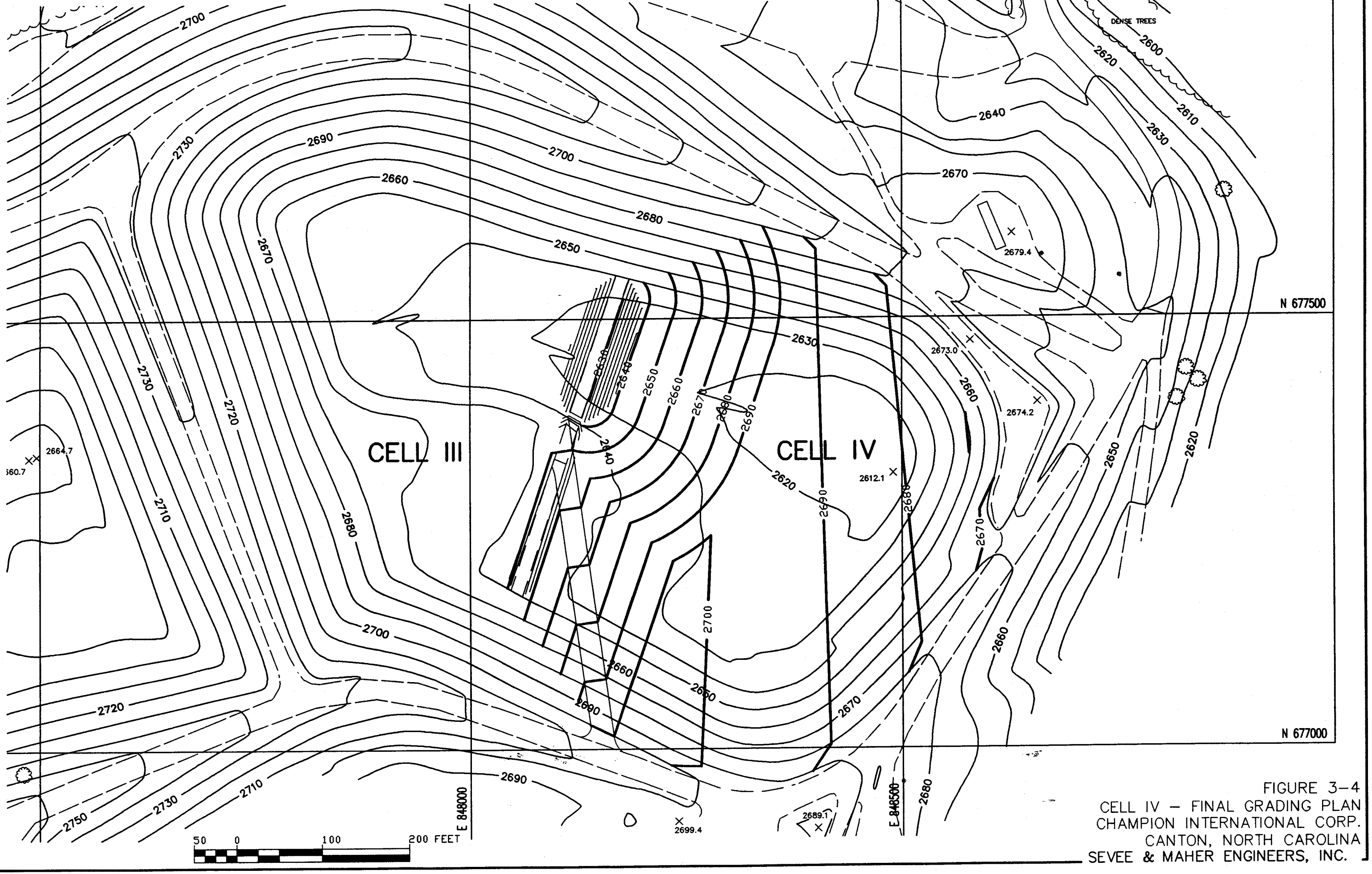


FIGURE 3-4
CELL IV – FINAL GRADING PLAN
CHAMPION INTERNATIONAL CORP.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.

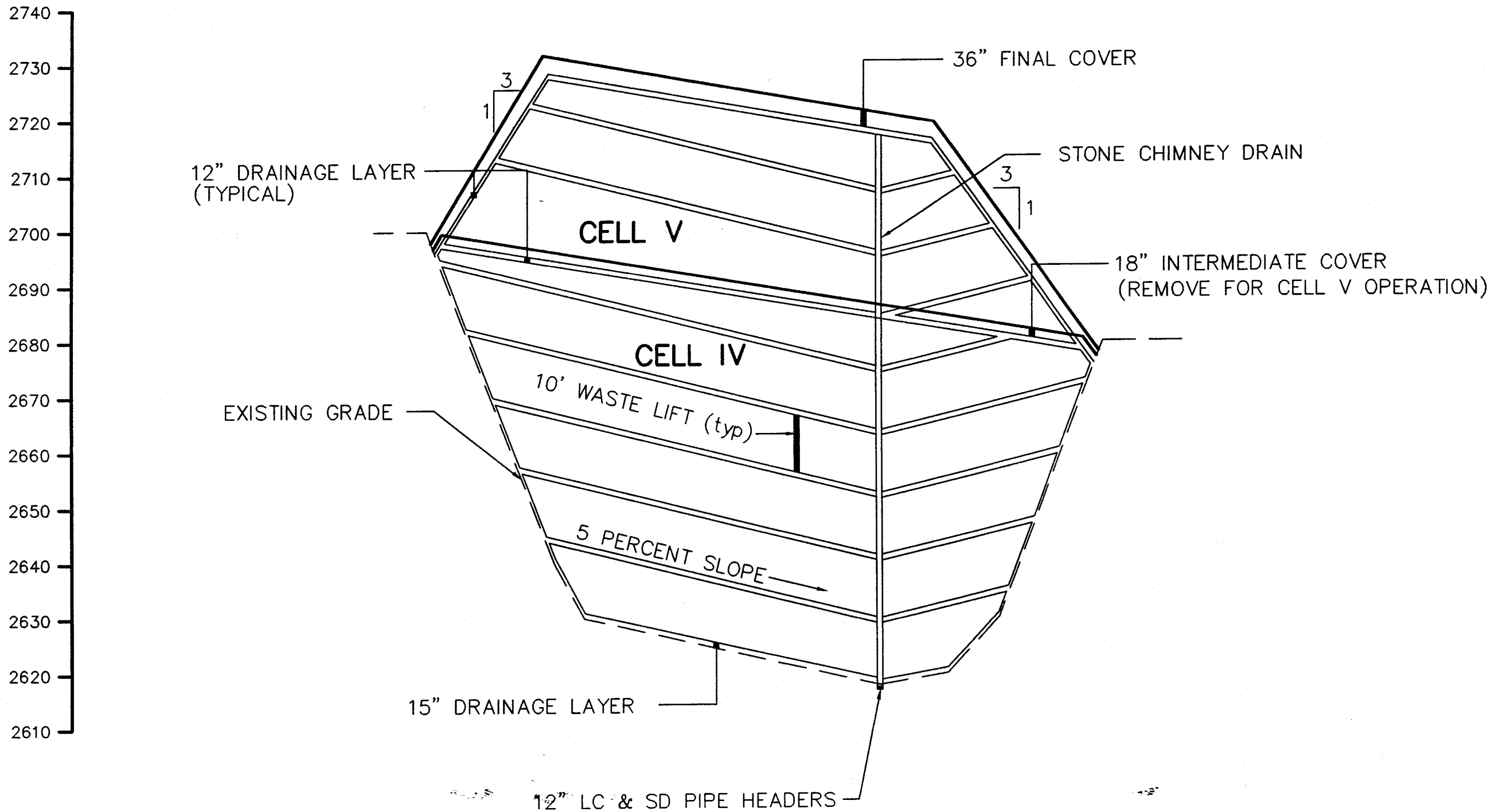
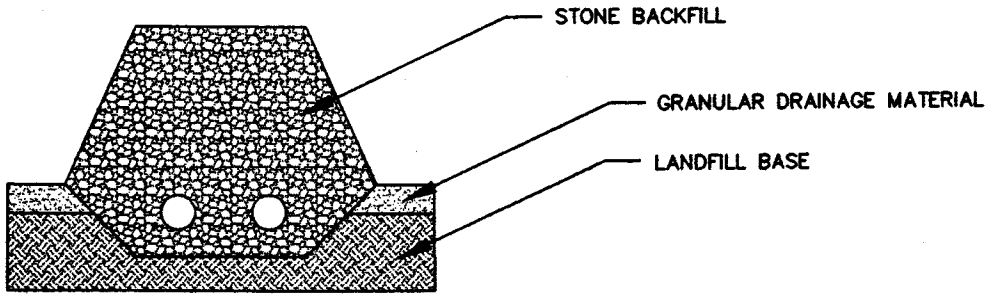
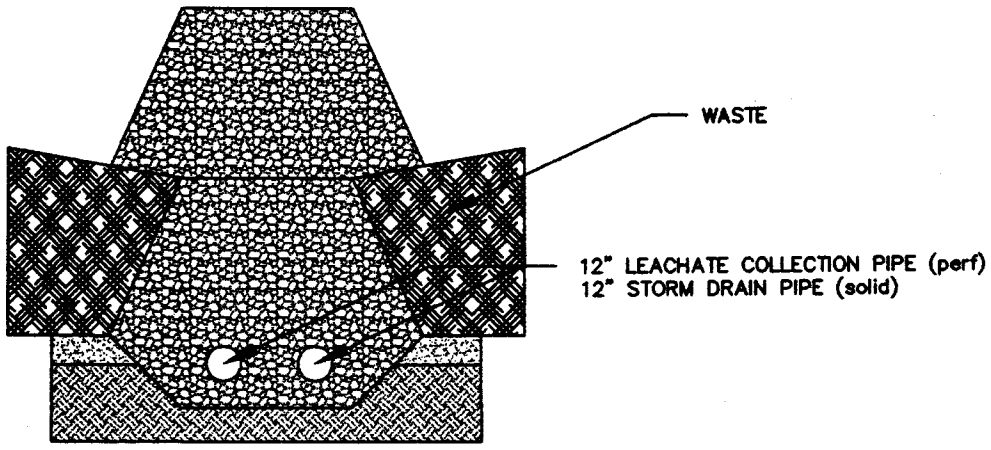


FIGURE 3–5
CELL IV CROSS SECTION
CHAMPION INTERNATIONAL CORP.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.

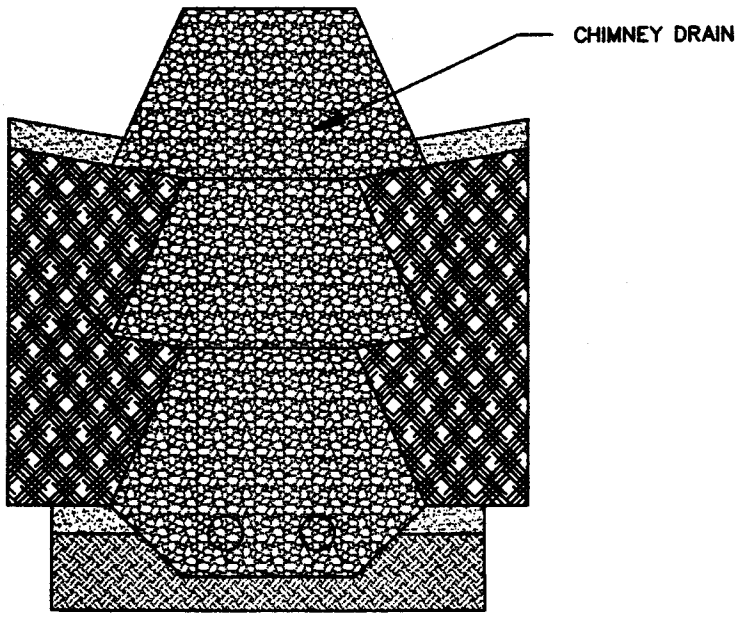
DWG: CS–B SOURCE:



EXISTING LC HEADER SYSTEM



CHIMNEY DRAIN AFTER FIRST 5 FOUT LIFT



CHIMNEY DRAIN AFTER FIRST 10 FOOT LIFT

FIGURE 3-6
CHIMNEY DRAIN
CHAMPION INTERNATIONAL CORP.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.

D: \CHP\NC\ACAD\CHIMNEY Fri Dec 9 15: 33: 48 1994

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. 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 for the disposal of lime mud. Within Cell IV an area will be designated for lime mud at each waste lift. By designating an area, the lime mud will be allowed to drain and not interfere with day-to-day operations when a slug of lime mud is delivered. The criteria for selecting the area will be as follows: (1) the lime mud will be placed a minimum of 50 feet from any outside slope; and (2) a minimum of 2 feet of other waste will be placed over any drainage layers prior to placing the lime mud. The first lime mud area suggested for Cell IV is located in the western half of Cell IV, see Figure 3-1.

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 ELS management and EOHS for appropriate action.

The development of Cell IV will continue to the grades shown on Figure 3-4. Upon completion of Cell IV, intermediate cover will be placed over the waste, with the exception of the west sideslope. The west sideslope will abut active operations in Cell III and, therefore, does not need to be covered. The intermediate cover layer will consist of 18 inches of low permeable soil over a 12-inch granular drainage layer. In addition to the cover, a perimeter drain will be installed along the top elevation of Cell IV. The perimeter drain will serve to remove leachate from the drainage layer beneath the cover and provide a means to connect a leachate collection system on the upper cell. The perimeter drain will be piped down to a manhole east of Area 6A East which flows to the leachate pond. A cross-section of the perimeter drain is shown in Figure 3-7.

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.

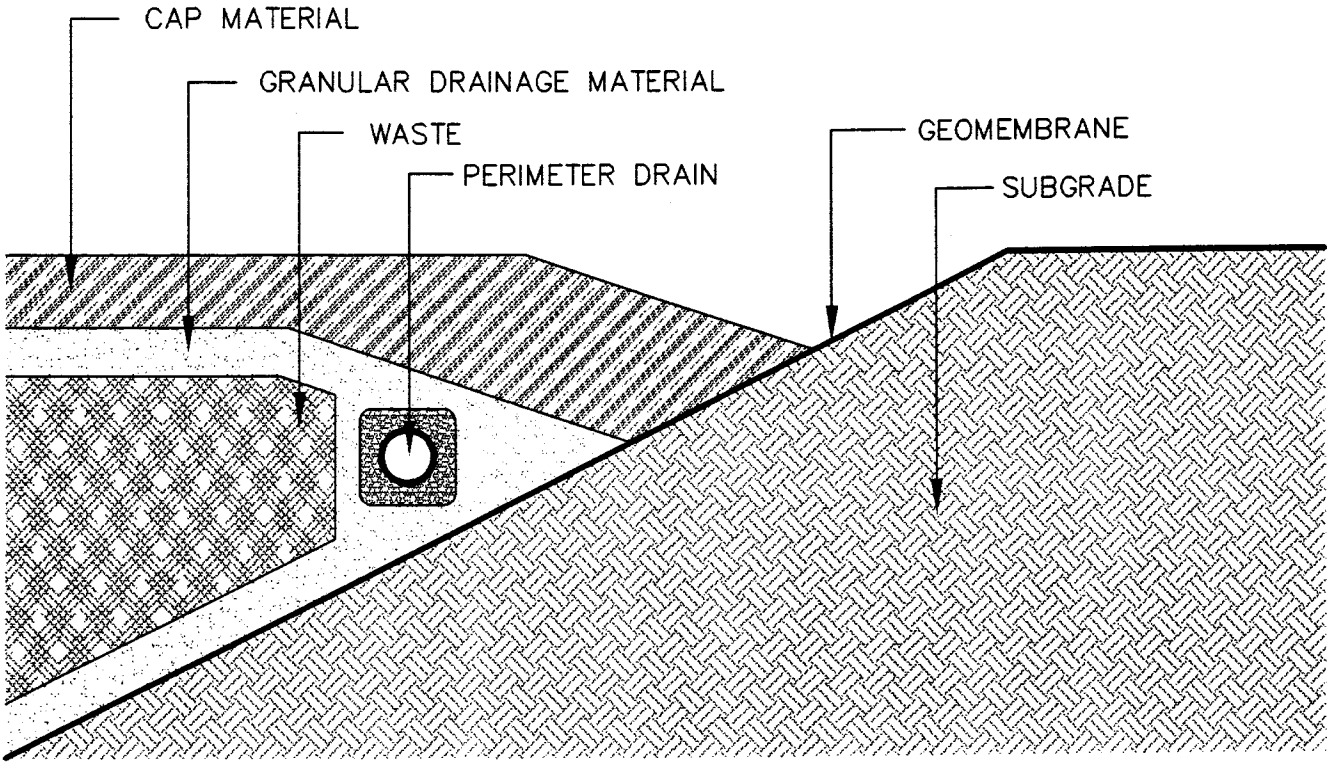


FIGURE 3-7
PERIMETER DRAIN
CHAMPION INTERNATIONAL CORP.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.

DWG: PERIMETER DRAIN SOURCE:

PERIMETE Tue Nov 29 13:54:28 1994

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 3-8. Upon completion of Cell III, the perimeter drain pipe in Cell IV will be extended along the perimeter of Cell III. No cover soil is planned for Cell III, as operations will progress directly to Cell V above Cell III.

3.3 Cell V

After success is demonstrated in Cells III and IV and the necessary permits, if any, for a vertical expansion are secured, operations will move to the upper cell, Cell V. The final grades for Cells III and IV will become the base grade for Cell V. Initially no construction will be necessary to begin operations in Cell V. The operation in Cell V will continue directly above the Cell III area. The development of Cell V, over Cell III, will continue to the grades shown on Figure 3-8. As the waste grades reach near completion over Cell III, the area over Cell IV will be prepared. Upon completion over Cell III, final cover will be placed over the waste.

Preparation of Cell V, over Cell IV, for operations will require the removal of the cover soil down to the drainage layer; construction of a dike and drainage structures.

Control of contaminated water runoff will be facilitated through the use of earthen berms along the perimeter of the cell. Surface runoff will be collected through inlet structures placed at the low points of the cell. The inlet structures will be connected to the perimeter drain pipeline.

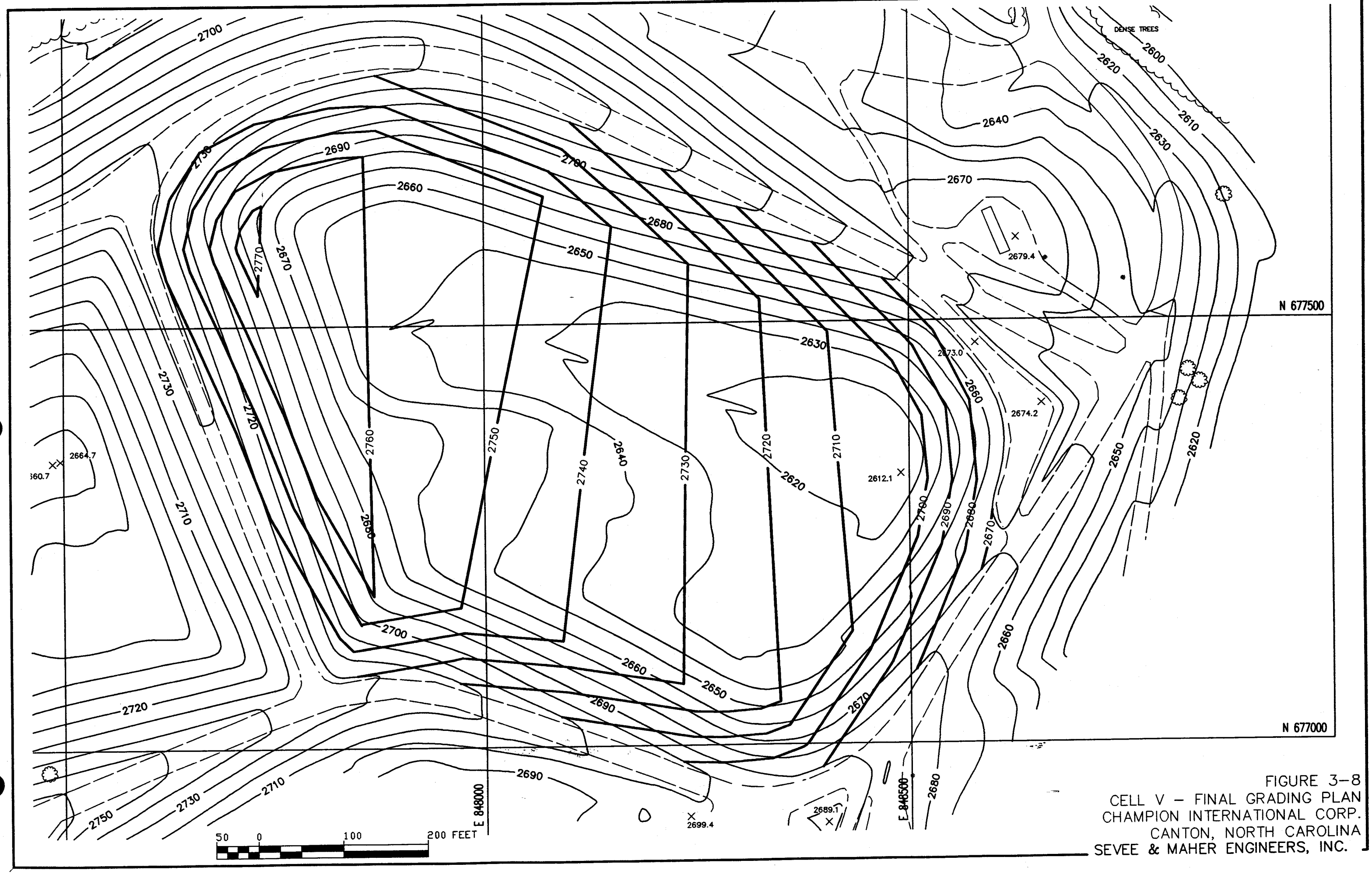


FIGURE 3-8
CELL V – FINAL GRADING PLAN
CHAMPION INTERNATIONAL CORP.
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS, INC.

The development of Cell V, over Cell IV, will continue to the grades shown on Figure 3-8. Upon completion, final cover will be placed over the waste.

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 storage pond 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 ultimate disposal. The capacity of the ponds is 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 remain in 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 or blockage, or the pump station needs maintenance, the pond outlets can be shut off. A gate valve located on the outlet of the pond can be shut off, thereby stopping the flow from entering the pump station. Leachate flow will remain in 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 Champion'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 ELS 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. ELS 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 Champion. 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 if erosion is observed. 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 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 Champion personnel. 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 ELS 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.

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.

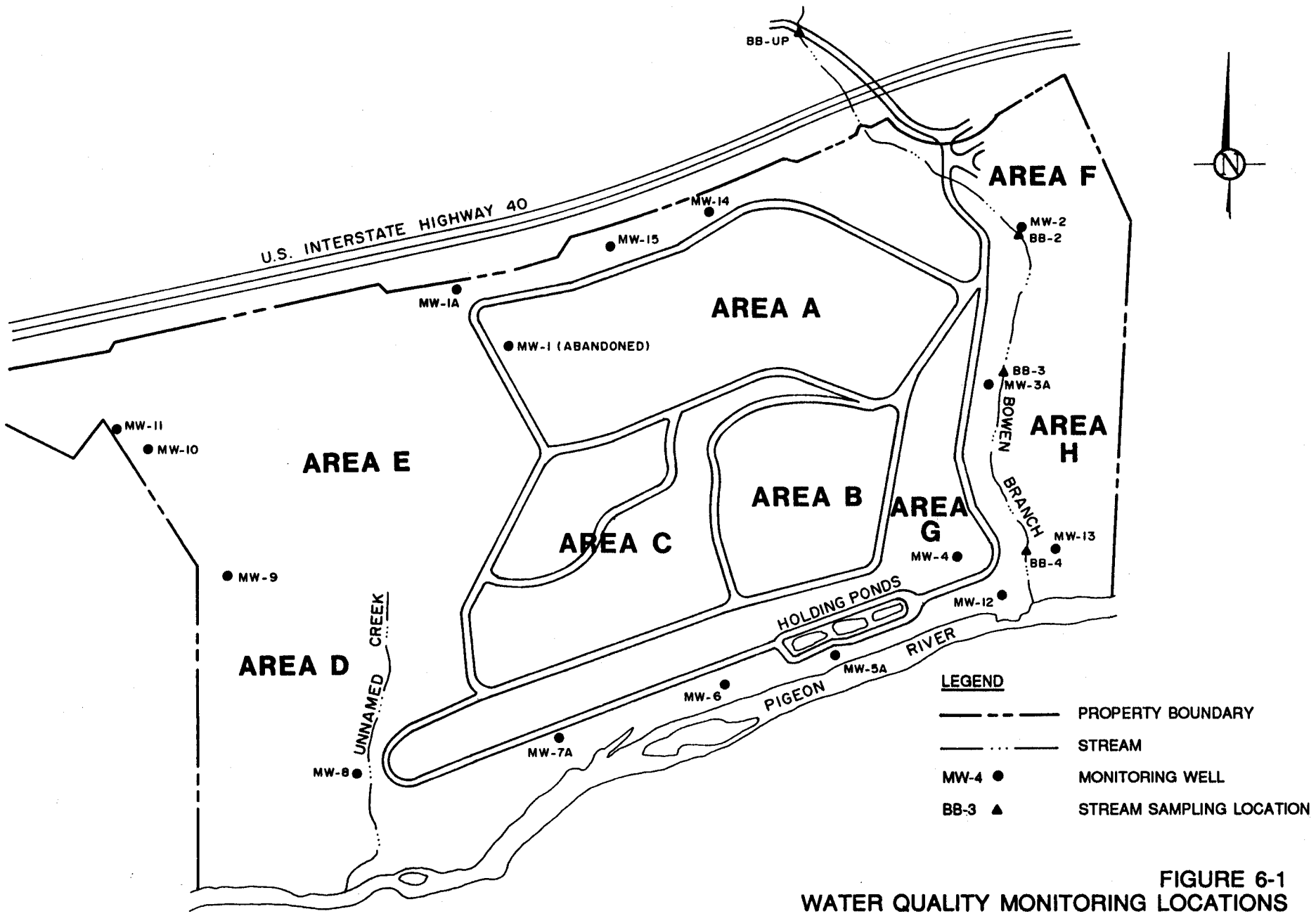


FIGURE 6-1
WATER QUALITY MONITORING LOCATIONS
CHAMPION PAPER CORPORATION
LANDFILL #6 - EAST
CANTON, NORTH CAROLINA
SEVEE & MAHER ENGINEERS

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
Inorganics	
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

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 NC DEHNR. 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) Champion 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) Champion will file an annual report of operation with the NC DEHNR 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 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. Of these objectives, the requirement to deal with future leachate generation is the most important. The final cover system designed for this site will minimize future generation of leachate.

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 final 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.

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 grit or sand.

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) 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 NC DEHNR can be approached to reduce the frequency of sampling and the number of parameters analyzed.

APPENDIX A

WASTE RECEIPT FORMS

LANDFILL
MONTHLY LOAD WEIGHTS

MONTH/YEAR_____

DATE	LIME 25 LOADS P/M	SLUDGE 25 LOADS P/M	FLYASH 20 LOADS P/M	CINDERS 5 LOADS P/M	WOODWASTE 2 LOADS P/M
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
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25					
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28					
29					
30					
31					

APPENDIX B

INSPECTION FORMS

UNDERDRAIN INSPECTION RECORD

INSPECTION BY: _____ DAY | S | M | T | W | T | F | S |

DATE _____

UNDERDRAIN LOCATION: _____ WEATHER _____

_____ TEMP. _____

	PASS	CORRECTIVE ACTION REQUIRED
PIPE OUTLET		
BLOCKAGES	_____	_____
RODENT GUARD	_____	_____
DITCH OUTLET	_____	_____

CORRECTIVE ACTION: _____

_____

MANHOLE		
BLOCKAGES	_____	_____
SILT BUILD-UP	_____	_____
M.H. COVER IN PLACE	_____	_____

CORRECTIVE ACTION: _____

_____

FOLLOW-UP INSPECTIONS OF PREVIOUSLY REPORTED DEFICIENCIES _____

_____

_____

_____

DISTRIBUTION: 1. ELS MANAGEMENT
2. EOHS

SEVEE & MAHER ENGINEERS

Canton Mill
Box C-10
Canton, North Carolina 28716

Champion
Champion International Corporation

Carmen Johnson
Fac/Perm/Co ID # 44-06
Date 3/20/12
Doc ID#
DIN

December 12, 1994

Ms. Sherri C. Hoyt
Environmental Engineer
North Carolina Department of Environment, Health
and Natural Resources
Solid Waste Section
PO Box 27687
Raleigh, NC 27611-7687

Dear Ms. Hoyt:

Champion International Corporation is providing additional information as discussed in our December 5, 1994 telephone conversation regarding the operation of Champion Landfill Number 6 (Permit No. 44-06), Area A-East. Also, as discussed the work described began the week of December 5, 1994, and will continue for several weeks. Area 6A East Solid Waste Permit, Part 1, Permit to Construct was issued January 14, 1992. Subsequently, Solid Waste Permit, Part 2, Permit to Operate, was issued June 3, 1994. This is completion work for efficient operation and management of the cell.

As we also discussed, Champion has retained the services of Sevee & Maher Engineers (SME), Inc. who are located in Maine. SME has significant experience, primarily in the north east, in designing landfills for pulp and paper mills. SME's qualifications are provided in Attachment I. SME has applied for Professional Engineer (P.E.) reciprocity between Maine and North Carolina. SME's request was not received in time for the last P.E. board review; however, P.E. approval is expected in early January.

The following provides a more detailed description of the operational enhancements for Area A East.

LEACHATE COLLECTION SYSTEM (LCS)

The LCS constructed in Landfill No. 6 consists of a 12-inch perforated high density polyethylene (HDPE) pipeline enveloped in a stone aggregate material. A second 12-inch solid wall HDPE pipeline was installed adjacent to the perforated pipeline to serve as a storm drain and future leachate collection pipeline for Landfill No. 6 West. The storm drain pipeline is designed to transport clean water from areas of the landfill not yet in operation. A typical cross-section shown on the engineering drawings from Sirrine indicated the stone and pipe was placed in a shallow swale approximately 8 feet wide.

In addition to the pipelines, a geocomposite material was installed over the entire landfill liner surface. The geocomposite, installed by SLT North America, consists of an 8 oz. non-woven geotextile, heat-bonded to each side of the HDPE drainage net which is approximately 0.25 inches thick. The geocomposite was designed to serve as a pathway for leachate to drain from the entire base and wall areas of the landfill to the leachate pipeline.

SME's review of the LCS which was designed and installed in Landfill No. 6 discovered several opportunities for improvement. The first is the strength of the leachate collection pipeline. The leachate collection pipeline consists of an SDR 11 Class HDPE pipe. The SDR rating provides a means of specifying the class of pipe, and is defined as the outside diameter divided by the wall thickness of the pipe. Therefore, as the SDR class becomes smaller, the pipe becomes stronger. The pipe strength calculations prepared by Sirrine indicate that an SDR 11 piped class is adequate to meet the anticipated loads, assuming the pipe is buried in a trench. The typical cross-section used by Sirrine for the pipeline installation does not meet the guidelines for a trench condition; the typical section utilized applies to a positive projecting condition. A positive projecting condition exists when the pipe receives no lateral support from the adjacent soil. The fact that the pipeline is near the surface and the width of the swale is wide with respect to a standard pipe trench, requires the pipe analysis be done as a positive projecting condition. Analysis of the SDR 11 pipe in a positive projecting condition results in a factor of safety of less than one, i.e. the load on the pipe exceeds the strength of the pipe and the pipe will potentially collapse. The calculation conducted by SME is enclosed as Attachment II.

A positive projection pipe strength calculation would require an HDPE SDR 7.0 leachate collection pipe and an SDR 7.3 pipe class for the stormwater drain. This finding by SME will require removing approximately 700 lineal feet of the existing pipeline, and installing a new pipe. This pipe has essentially the same hydraulic capacity as the existing SDR 11.0 class pipe since they are basically the same inside diameter.

Geocomposites are frequently used in landfill designs because they save landfill volume and can drain water quickly. Typical installations for geocomposites are as groundwater underdrain systems below liners, leak detection systems between liners, or in situations where the geocomposite will be covered soon after placement, but will be effectively replaced by the sand or stone layer.

SME's experience indicates the drainage layer above a primary liner should consist of a layer of clean sand or stone with a network of 6-inch perforated pipe laterals surrounded by a graded filter and embedded within the sand or stone. The granular drainage layer provides a conduit for water to drain away from the waste and also protects the liner from damage due to heavy equipment. The sand sample conductivity test results are shown in Attachment III. The pipe laterals aid in draining the water from the sand and are connected directly to the main leachate pipeline through the use of tees or saddles.

SME recommends the use of a 15-inch layer of granular material over the landfill base and sideslopes, and 6-inch pipe laterals (HDPE SDR 9.3) along with the 12-inch leachate main to serve as the LCS in Landfill No. 6. The sideslopes in the landfill are steep, 2 Horizontal (H) to 1 Vertical (V) slope, but the coefficient of friction is conducive to maintain a sand layer as shown in Attachment IV. The recommendation is to place sand only as high on the slope to meet each waste lift height, i.e. 10 feet, and only in areas of active operation to minimize erosion effects. As each waste lift is completed, an additional wedge of sand will be placed on the sideslope in the area of active operations. Placing more sand than necessary will result in excessive erosion from heavy rainstorms. Some erosion may occur even with limited placement, but maintenance should be minimal. The volume of drainage material necessary to cover the entire base of the landfill is approximately 14,000 cubic yards. The length of 6-inch pipe enveloped in a graded soil filter is approximately 1,550 feet.

Due to the short time schedule to prepare the landfill for operation, only Cell IV will receive the drainage layer in order to begin operations in January 1995. The drainage layer will be placed in Cell III during the summer of 1995. In areas where the geocomposite has been damaged by the wind, the geocomposite will not be repaired but will be effectively replaced by a granular drainage material.

The main leachate pipeline was enveloped in a crushed stone aggregate, ASTM No. 57 specification, and railroad ballast. Samples of the materials sent to SME office were visually observed and laboratory testing for grain size distribution was conducted. SME found both materials are a crushed stone product with ASTM No. 57 stone size to 1.5 inches and the railroad ballast size to 3 inches. A property typical of crushed stone products is they tend to have sharp, angular sides. These types of materials drain very well, however, due to their large size they are not suitable for placement on top of a synthetic liner based on manufacturers guidelines. The likelihood of punctures caused by the large angular stone will increase as the waste becomes deeper. SME has suggested using a material specification around the collection pipes which is less than 1 inch in size. At the time the pipe is replaced the stone will be removed and a smaller stone installed. The volume of material needed for the graded filter around the main leachate pipeline and collection laterals is approximately 570 cubic yards. As an added protection a new 60 mil HDPE liner will be welded over the area underlying the leachate collection system.

In addition to the need to collect and drain away the leachate is the need to properly handle clean surface water from the inactive portions of Area A East. Area A East will be divided into two equal size areas or cells and a small dike placed to physically divide the area. The landfill operation will be contained within one cell until that cell reaches final grade. The inactive area will be collecting clean water, from precipitation which has not contacted waste materials which will be diverted away from the leachate collection system. The handling of clean water will be accomplished by the storm drain pipeline. An inlet will be placed on the storm drain pipeline to collect and transport clean surface water from the inactive area to Bowen Branch. The volume of material needed for the dike construction is estimated to be 3,000 cubic yards. Details for the leachate collection system, surface drainage and sand or gravel layer are shown on the enclosed drawings.

ACCESS ROAD

The filling of Landfill No. 6 Area A East will begin in Cell IV from the bottom and work in discrete waste lifts in an upward direction. The landfill operations will require an access route to the bottom of the landfill. Currently an access route exists on the east end of the landfill down to the base. There are not access routes at the base of the landfill. The current gravel surface on the east end is a thin layer of rock dust underlain by the geocomposite and HDPE liner. The movement of large trucks on the access road will require upgrading the road base material. The road base section will consist of a minimum thickness of 3 feet as detailed in the Access Road and Dike Section and Details Drawing C-301.

SME is also preparing an Operations manual for stormwater and leachate collection and landfill development. It is expected to be completed by December 22 and forwarded to you.

If you have any questions or need additional information, please call me at (704) 646-2028.

Sincerely,

James A. Giauque /jab

James A. Giauque
Process Engineer

JAG/jab

Attachments

Enclosure

LIST OF DRAWINGS

Sheet No.	Title	Drawing No.
1	Cover Sheet	
2	Symbols and Abbreviations	C-100
3	Existing Conditions Plan	C-101
4	Site Development Plan	C-102
5	Leachate Collection System - Sections and Details	C-300
6	Access Road and Dike Sections and Details	C-301

LIST OF ATTACHMENTS

Attachment I

Qualifications for Professional Services, Sevee & Maher Engineers, Inc., Cumberland Center, Maine.

Attachment II

Pipe Strength Calculations, Sevee & Maher Engineers, Inc., Cumberland Center, Maine.

Attachment III

Sand Sample, Hydraulic Conductivity Test Results, Sevee & Maher Engineers, Inc., Cumberland Center, Maine.

Attachment IV

Sand Drainage Layer, Interface Angle Friction, Sevee & Maher Engineers, Inc., Cumberland Center, Maine.

Enclosures

ATTACHMENT I

QUALIFICATION FOR

PROFESSIONAL SERVICES

SEVEE & MAHER ENGINEERS, INC., CUMBERLAND CENTER, MAINE

QUALIFICATIONS FOR PROFESSIONAL SERVICES

Sevee & Maher Engineers, Inc.
Cumberland Center, Maine

SEVEE & MAHER ENGINEERS, INC.

COMPANY DESCRIPTION

Sevee & Maher Engineers, Inc. was formed in 1985, employs 26 personnel, and specializes in: (1) hazardous waste studies and design; (2) siting, designing and permitting new landfills; (3) developing closure plans for existing waste facilities; (4) conducting geohydrologic evaluations; and (5) soil and groundwater remediation. Our business efforts focus on bringing our engineering specialty to meeting our client's requirements.

Sevee & Maher Engineers focuses its services on projects requiring expertise relative to hazardous and solid wastes. Our projects are regulated by CERCLA, RCRA, or related state regulations. Sevee & Maher has extensive experience working with U.S.EPA Region I, Maine Department of Environmental Protection, the New Hampshire Department of Environmental Services, and the New Jersey Department of Environmental Protection and Energy.

COMPANY FOCUS

Sevee & Maher Engineers, Inc. assists the pulp and paper industry by conducting landfill and groundwater engineering projects for several mills in Maine and New Hampshire. Technical efforts for these projects range from landfill siting and design to closure of sites containing PCBs and other chlorinated solvents. Our staff's expertise provides for both timely and cost-effective solutions.

Sevee & Maher has conducted remedial investigations, feasibility studies, and remedial designs at Superfund sites in New England. Sevee & Maher has also provided engineering services during construction and is currently responsible for operating a 20-gpm groundwater treatment system at the McKin Superfund site. Sevee & Maher also has a geotechnical laboratory equipped to perform a broad range of testing for the physical properties of soil in conjunction with hazardous and solid waste projects.

Sevee & Maher has conducted geohydrologic evaluations at several sites containing potential groundwater contaminants including the McKin Superfund Site in Gray, Maine; Auburn Road Superfund Site in Londonderry, New Hampshire; National Semiconductor in South Portland; Lockheed Electronics in Plainfield, New Jersey; and Rockwell International in Lisbon, Maine. Other projects outside the pulp and paper industry include a landfill design for Consolidated Waste Systems (Waste Management, Inc.) in Norridgewock and landfill site searches for Regional Waste Systems in Portland, the Mid-Maine Waste Action Committee, Greater Portland Council of Governments, Southern Maine Regional Waste Commission, and a confidential industrial client. In addition to providing solid waste and geohydrologic services we also offer in-house expertise in civil and geotechnical engineering to augment our ability to execute projects.

ENGINEERING

Although Sevee & Maher's staff include scientists, the corporate focus is directed toward the design and implementation of engineering solutions. Sevee & Maher staff includes experienced design engineers with extensive, real world experience in the design of land disposal facilities and soil and groundwater treatment systems.

CONSTRUCTION OVERSIGHT

Sevee & Maher has broad experience providing construction phase engineering services and construction oversight on a variety of projects involving landfill construction, landfill closure, soil treatment, and groundwater treatment. Sevee & Maher field engineers and technicians have experience on projects involving: (1) the construction of secure landfills using flexible membrane liners; (2) the excavation and treatment of over 30,000 cubic yards of soil to remove volatile organic compounds; and (3) landfill closures and groundwater treatment at Superfund sites.

Sevee & Maher field engineers maintain current health and safety certifications and are experienced in maintaining the construction records and documentation required by the construction contract.

ON-SITE ENVIRONMENTAL TESTING

SME provides extensive testing of air, water, and soil for volatile organic compounds at project sites. This testing uses sophisticated gas chromatography and data handling systems in conjunction with site investigations and remedial construction projects.

During site investigation, many samples can be analyzed quickly to enable the delineation program to be adjusted in the field to allow the contamination to be characterized quickly and efficiently.

The use of the field laboratory allows site investigations to be completed quickly and at less cost than traditional methods using commercial laboratories.

During remedial construction projects the field laboratory is used to verify compliance with permit conditions related to air, water, and soil treatment. The field laboratory provides defensible analytical data, quickly to enable treatment system adjustments to be made when necessary.

SOIL TESTING LABORATORY

Sevee & Maher offers a full range of geotechnical laboratory testing, including: triaxial; shear strength; permeability; compressibility; California bearing ratio; gradation; and index testing.

Sevee & Maher also provides field compaction QA/QC monitoring through the use of nuclear density/moisture meters and sand cone methods. Sevee & Maher owns the following soil testing equipment:

- Triaxial compression frame with five-ton capacity;
- Triaxial confinement pressure board and chamber;
- Three-station triaxial permeability pressure board and chambers;
- One-dimensional consolidation frame;
- Various index testing devices; and
- Troxler Model 3430 nuclear density/moisture meter.

PHILOSOPHY

The goal and philosophy of Sevee & Maher Engineers, Inc. is to provide clients with both timely and quality work. Our efforts have been rewarded through the development of excellent rapport with our clients, as well as state and Federal agencies responsible for environmental permitting and enforcement. We believe that our depth of technical expertise, communication skills and straight forwardness have been responsible for our clients continued success with projects involving regulatory issues.

SEVEE & MAHER ENGINEERS, INC.

SUMMARY OF PERTINENT STAFF QUALIFICATIONS

John E. Sevee, P.E., C.G. - President
B.S. Civil Engineering, University of Vermont, 1971
M.S. Geotechnical Engineering, University of Vermont, 1973
area of expertise: geology, hydrogeology, hazardous waste management, geotechnical engineering and groundwater modeling.

Peter M. Maher, P.E. - Vice President
B.S. Civil Engineering, Clarkson College of Technology, 1974
M.S. Concentration in Soil Chemistry, University of Maine, 1976
area of expertise: landfill design, landfill site searches, groundwater monitoring, solid and hazardous waste management

Guy H. Cote, P.E. - Chief Engineer
B.S. Civil Engineering, Northeastern University, 1980
area of expertise: landfill design, solid and hazardous waste management, groundwater modeling, and computer programming

Matthew W. Muzzy, P.E. - Geo-Environmental Engineer
B.S. Civil Engineering, University of Maine, 1980
M.S. Civil Engineering, Colorado State University, 1983
area of expertise: geotechnical engineering, hydrogeology, solid and hazardous waste management

James S. Atwell, P.E. - Senior Environmental Engineer
B.S. Civil Engineering, University of Maine, 1965
M.S. Civil Engineering, University of Maine, 1966
area of expertise: landfill design and permitting, solid and hazardous waste management

Carol A. White, C.G. - Senior Hydrogeologist
B.A. Geology, Colby College, 1979
M.S. Environmental Science and Engineering, Oregon Groundwater Center, 1991
area of expertise: hydrogeologic investigations and groundwater remediation

Bruce A. Fowler,C.G. - Senior Hydrogeologist
B.S. Geology, Boston University, 1977
M.S. Civil Engineering, University of Vermont, 1984
area of expertise: geologic and hydrogeologic investigations, hazardous waste management, groundwater modeling

Steven E. Patch, P.E. - Project Engineer
B.S. Forestry Engineering, University of Maine, 1980
B.S. Civil Engineering, University of Maine, 1983
area of expertise: landfill design, solid and hazardous waste management

Michael S. Booth, P.E. - Senior Project Engineer
B.S. Civil Engineering, University of Maine 1979
area of expertise: landfill design and permitting, development of landfill closure and remediation plans

Kenneth P. Norton, P.E. - Senior Field Engineer
A.S. Civil Engineering, University of Maine, 1982
B.S. Soil Science, University of Maine, 1982
area of expertise: hydrogeologic investigations, geotechnical engineering, site development and construction management

William C. Metzger - Senior Field Engineer
B.S. Biology, Delaware Valley College, 1977
M.S. Range Science, Colorado State University, 1985
area of expertise: hydrogeologic investigations, microbiology, groundwater quality assessments, hazardous waste investigations

PROJECT SUMMARIES

SEVEE & MAHER ENGINEERS, INC.

LANDFILL-RELATED SERVICES

- LONG-TERM RESIDUAL DISPOSAL PLANNING
- SITE SEARCH FOR NEW LANDFILL
- POTENTIAL LANDFILL SITE EVALUATIONS
- DETAILED SITE INVESTIGATIONS
- GROUNDWATER MODELING
- LANDFILL DESIGN
- PERMIT PREPARATION
- STATE & FEDERAL WETLAND PERMITTING
- CONSTRUCTION MANAGEMENT AND OBSERVATION
- QUALITY CONTROL/QUALITY ASSURANCE TESTING SERVICES
- GEOTECHNICAL/STABILITY EVALUATIONS
- WATER QUALITY MONITORING AND EVALUATIONS
- DATABASE MANAGEMENT
- OPERATIONS ASSISTANCE
- CLOSURE DESIGN AND PERMITTING
- GEOTECHNICAL PROPERTIES TESTING
- REGULATORY REPORTING
- RELICENSE APPLICATIONS
- REGULATORY NEGOTIATIONS
- EXPERT TESTIMONY

SEVEE & MAHER ENGINEERS, INC.

PARTIAL LISTING OF LANDFILL EXPERIENCE

CLIENT	DESCRIPTION
FRASER PAPER COMPANY	Landfill expansion, closure plan, pump station and 7-mile leachate transport line
BOWATER, INC.	Landfill expansion, woodlands landfill design, oily waste area closure plans, leachate transport line, lagoon closures
GEORGIA-PACIFIC	Slope stability, landfill design, geotechnical evaluations, and hydrogeologic consultation
S.D. WARREN, SKOWHEGAN	Landfill expansion, permitting, and landfill geotechnical evaluation
S.D. WARREN, WESTBROOK	Landfill closure and hydrogeologic evaluation
INTERNATIONAL PAPER COMPANY	Woodland dump closures
JAMES RIVER CORPORATION, BERLIN	Landfill closure, site search, 110-acre landfill design and permitting, 26-acre demolition debris landfill design, landfill monitoring
JAMES RIVER CORPORATION, GROVETON	Landfill closure, hydrogeologic evaluation, landfill monitoring
JAMES RIVER CORPORATION, OLD TOWN	Landfill closure, site search, 75-acre landfill design and permitting
KEYES FIBRE	Hydrogeologic evaluation, bark pile closure
LINCOLN PULP AND PAPER COMPANY	Landfill closure, hydrogeologic evaluation
A.C. LAWRENCE	Tannery landfill hydrogeologic evaluation
CONSOLIDATED WASTE SERVICES	Landfill expansion design
IRVING TANNING	Hydrogeologic evaluation, landfill design
KROY TANNING	Sludge lagoon hydrogeologic evaluation
REGIONAL WASTE SYSTEMS, INC., SOUTH PORTLAND	Landfill hydrogeologic evaluation
REGIONAL WASTE SYSTEMS, INC., GORHAM	Site search, 20-acre landfill design
SOUTHERN MAINE REGIONAL WASTE COMMISSION	Site search, landfill design
DELTA CHEMICALS, INC.	Hydrogeologic evaluation and landfill closure design
BOISE CASCADE	Landfill design services
SAWYER ENVIRONMENTAL RECOVERY FACILITY	Landfill expansion design, geotechnical evaluations, and permitting

SEVEE & MAHER ENGINEERS, INC.
PULP & PAPER MILL LANDFILL EXPERIENCE

CLIENT	MILL LOCATION	LANDFILL LOCATION	NO. OF LANDFILLS	TOTAL ACREAGE	PRIMARY WASTE TYPE
James River Corp.	Old Town, ME	Milford, ME	1	26	Sludge
James River Corp.	Old Town, ME	Old Town, ME	1	68	Sludge
James River Corp.	Berlin, NH	Success Township, NH	1	110	Sludge/Trash
James River Corp.	Berlin, NH	Berlin, NH	9	106	Sludge/Bark
James River Corp.	Groveton, NH	Stark, NH	1	10	Sludge/Bark
Great Northern Paper Co.	Millinocket, ME	E. Millinocket, ME	3	160	Sludge/Trash
Great Northern Paper Co.	Nashville, ME	Nashville, ME	1	20	Wood Waste
Great Northern Paper Co.	E. Millinocket, ME	E. Millinocket, ME	1	40	Bark
Great Northern Paper Co.	Portage, ME	Portage, ME	1	10	Wood Waste
Keyes Fibre	Shawmut, ME	Shawmut, ME	1	9	Bark
International Paper Co.	Clayton Lake, ME	Northern ME	6	5	Trash
Boise Cascade Corp.	Rumford, ME	Mexico, ME	1	38	Sludge/Ash
S.D. Warren Co.	Skowhegan, ME	Skowhegan, ME	1	35	Sludge/Ash
S.D. Warren Co.	Skowhegan, ME	Fairfield, ME	1	9	Ash
Georgia-Pacific Corp.	Woodland, ME	Princeton, ME	1	8	Sludge/Bark
Georgia-Pacific Corp.	Woodland, ME	Baileyville, ME	2	64	Sludge/Bark
Lincoln Pulp & Paper Co.	Lincoln, ME	Lincoln, ME	1	56	Sludge/Bark
Fraser Paper Limited	Madawaska, ME	Frenchville, ME	1	23	Sludge

RESUMES

JOHN E. SEVEE

EDUCATION

University of Vermont - B.S. in Civil Engineering, 1971

University of Vermont - M.S in Geotechnical Engineering, 1973

University of Southern Maine - B.A. in Physics, 1994

PROFESSIONAL REGISTRATION

Professional Engineer - Maine, New Hampshire, Massachusetts, Florida, New Jersey, and South Carolina

Certified Geologist - Maine

AFFILIATIONS

Association of Ground Water Scientists and Engineers, National Water Well Association, Member

American Society of Civil Engineers, Member

TAPPI, Technical Association of the Pulp & Paper Industry, Maine-New Hampshire, Member

American Geophysical Union, Member

EMPLOYMENT HISTORY

Currently from 1985 - Sevee & Maher Engineers, Inc. President

1985 from 1979 - E.C. Jordan Company, Portland, Maine, Manager of Earth Sciences and Geohydrologic Services

1979 from 1973 - Ardaman and Associates, Inc., Orlando, Florida, Project Geotechnical Engineer

EXPERIENCE

Directed a variety of hydrological, geohydrological, geotechnical and hazardous waste investigations at CERCLA and RCRA sites. These projects routinely have involved multidisciplinary efforts of laboratory analytical services, solid and hazardous waste engineers, geophysicists, soil boring contractors, monitoring well and piezometer installation contractors, geologists, structural engineers, architects, planners, water resource engineers, biologists, and/or waste water engineers. Managed a department with up to 30 geophysicists, soil scientists, geologists, geohydrologists, and geotechnical engineers. Worked on projects located in Maine, New Hampshire, Massachusetts, Pennsylvania, Ohio, New York, Vermont, Rhode Island, New Jersey, Mississippi, South Carolina, Connecticut, Florida, Louisiana, Alabama, Georgia, Tennessee, Michigan, Illinois, Wisconsin, and various parts of Canada, Russia, Middle East, and South America. Project budgets have ranged in excess of $4-million.

Experience (continued)

Typical projects in various areas of expertise include:

- responsible for field investigations and interpretation of geohydrologic data at uncontrolled hazardous waste sites where heavy metals, solvents, etchants, coal tars and other chemicals were improperly stored and disposed (McKin Superfund site, Auburn Road Superfund site),

- groundwater resource studies requiring interpretation of the geologic setting, analysis of aquifer yield characteristics, fracture analysis, well-head protection, and saltwater intrusion,

- investigations requiring installation of multi-level wells for groundwater flow determination and quality sampling,

- hydrogeologic and contaminant assessments on fourteen Superfund sites,

- land disposal and groundwater recharge investigation involving evaluation of impacts on surface water and groundwater,

- impact assessments for oily waste disposal areas and solid waste landfills,

- tailings pond geotechnical design and impact assessment on groundwater and surface water quality, mine dewatering analyses, injection well design,

- geohydrologic and geotechinical investigations for the siting, design, and license application of solid waste landfills for municipal wastes, hazardous wastes, papermill wastes and ash, including negotiations and public participation during the permitting process,

- responsible for collection and review of water quality and soil quality data and assessment of environmental risk,

- use and development of finite difference and finite element computer models for simulation of groundwater and solute transport,

- a broad variety of geotechnical projects including foundation investigations for buildings, tanks, and heavy industrial facilities, design of earthen dams and retaining walls, and slope stability, and,

- negotiations with state and federal regulatory agencies and permitting assistance.

Formerly adjunct instructor at University of Southern Maine, for Professional Engineer Examination Review Courses; Engineer-in-Training Review Courses; Course in Quantitative Hydrogeology; Contaminant Fate and Transport Seminar

PUBLICATIONS AND PRESENTATIONS

"Shear Strength Anisotropy in a Laminated Silt," Masters Thesis, University of Vermont, 1973.

"Silresim: A Hazardous Waste Case Study." Presented to the Management of Uncontrolled Hazardous Waste Sites Conference, November 29 - December 1, 1982, with John D. Tewhey.

"Cost-Effectiveness Studies of Ground-Water Clean-up at Hazardous Waste Sites." Presented to Conference on Ground-Water Investigations and Policy in Maine, Augusta Civic Center, 1983.

"Use of Computer Groundwater Modeling Techniques in the Design of a Monitoring Program at a Hazardous Waste Superfund Site." Presented to the Fourth National Symposium and Exposition on Aquifer Restoration and Ground Water Monitoring, May 23-25, 1984, with Ron A. Lewis.

"Groundwater Control During Construction of a Roadway Access on Uncontrolled Coal Tar Disposal Site." Presented to Eastern Regional Groundwater Conference, National Water Well Association, 1984, with Earl G. Hill.

"Economic Considerations for Siting Solid Waste Landfills." 1985 TAPPI National Convention, with Richard Saucier.

"Monitoring Wells-A Case History Anthology," Presented to the National Water Well Association Short Course on Ground Water and Unsaturated Zone Monitoring and Sampling, 1985, Portland, Maine.

"Geohydrologic Considerations of Large Wastewater Disposal Systems and High-Density Individual Systems," Presented to 1987 Annual Site Evaluators Meeting, Augusta Civic Center.

"Rehabilitation of Monitoring Wells on an Organic Chemical Spill Site." 1987 Symposium on Standards Development for Ground Water and Vadose Zone Monitoring Systems, ASTM Subcommittee D18.21, with Peter Maher.

"Sources of Groundwater Contamination," March 1988, Maine Section American Society of Civil Engineers, Maine Ground Water Issues.

"Practical Handbook of Ground-Water Monitoring," Editor David Nielson, Lewis Publishers, Inc., 1991, co-author.

"Subdivision Review and Residential Development," Presented to Planners and State Employees of Maine working in areas of groundwater protection; sponsored by Southern Maine Regional Planning Commission, June 1990.

PETER M. MAHER

EDUCATION

Clarkson University, Potsdam, New York - B.S. in Civil and Environmental Engineering, 1974

University of Maine, Orono, Maine - M.S. in Resource Utilization, 1976. Specialization in Soil Chemistry

PROFESSIONAL REGISTRATION

Professional Engineer - Maine

AFFILIATIONS

American Society of Civil Engineers - Chairman Maine Chapter Solid Waste Committee

Technical Association of the Pulp and Paper Industry

EMPLOYMENT HISTORY

Currently from 1985 - Sevee & Maher Engineers, Inc., Vice-President/Principal

1985 from 1983 - E.C. Jordan Company, Portland, Maine, Project Manager

1983 from 1976 - E.C. Jordan Company, Portland, Maine, Project Engineer

1976 from 1974 - University of Maine, Soil Chemistry Lab, Research Assistant

1976 from 1971 - Rochester Gas and Electric Co., Rochester, N.Y., Assistant Engineer

EXPERIENCE

As a principal of Sevee & Maher Engineers, responsible for all aspects of project planning, coordination, management and execution. Project management within the company is divided between the two principals. Projects have included numerous industrial, commercial and quasi-municipal landfills (site location, site investigation, design, permitting, construction monitoring, closure plan preparation, environmental quality monitoring and operations assistance) as well as gravel pit licensing, hazardous waste site remediation, transfer station design and groundwater investigations.

Previously, as a project manager for E.C. Jordan Co., Mr. Maher was responsible for proposal preparation, definition of scope of work, schedule and budget on large multidisciplinary solid and hazardous waste projects. Coordination of activities of various technical departments and negotiations with clients and government regulatory agencies. Typically managed 30 to 40 projects with engineering budgets in excess of $1 million.

As lead technical professional in solid and hazardous waste department, directed the activities of staff involved in the evaluation and design of various solid and hazardous waste projects. Activities included field investigations, report preparation, negotiations with regulators, permitting, process design and preparation of construction plans and specifications.

Designed roadways, force mains, gravity sewers, erosion control facilities, surface and groundwater collection systems, pump stations and grading plans for large industrial landfills. Performed surface and groundwater sampling at solid and hazardous waste sites. Supervised EPA wastewater sampling crews at paper mills, leather tanneries and food processors for toxics analyses.

Typical projects in various areas of expertise include:

- Conducted numerous site searches for landfills for the disposition of sludges, ash, municipal refuse and demolition debris.
- Designed and permitted several large, secure industrial sludge landfills for pulp and paper industry, leather tanning industry and ash landfills for municipal incinerators.
- Remedial investigation, assessment, design and permit preparation for superfund site contaminated with coal tar oil. Developed selected design of groundwater extraction and treatment system.
- Assisted EPA during RCRA development by preparing background documents describing the characteristics, quantities and health effects of various industrial solid wastes.
- Assisted leather tanning industry characterize waste streams and develop management strategies.
- Prepared public informational document characterizing the chemical make-up of paper mill sludge.
- Prepared guidance document for industry and regulators describing the nitrification of food processing industry wastewaters.

PUBLICATIONS

"Minimizing Landfill Liability Through Geohydrology," Presented at the TAPPI Environmental Conference, Orlando, Florida, April 1989 with R. Arnold.

"Rehabilitation of Monitoring Wells on an Organic Chemical Spill Site." 1987 Symposium on Standards Development for Ground Water and Vadose Zone Monitoring Systems, ASTM Subcommittee D18.21, with John Sevee.

"Wastewater Sludge Characteristics and Their Impact Upon Utilization Strategies," Published in Applications of Chemical Engineering Principles in the Forest Products and Related Industries, Vol. 1, 1986 with C.A. Rock and D.K. Phenicie.

"Characterization of Maine Paper Mill Sludges," Presented at the Technical Association of the Pulp and Paper Industry Annual Meeting, Mobile, Alabama, April, 1985, with Dale Phenicie.

"Experience With Landfill Siting and Leachate Collection Design," Presented at the Northeast Regional Meeting of the National Council of the Paper Industry for Air and Stream Improvement, Boston, Massachusetts, November 1, 1984, with Ron Howes.

"Coal Tar Remediation and Highway Construction," Presented at Hazardous Materials Conference, Philadelphia, Pennsylvania, July 14, 1983.

GUY H. COTE

EDUCATION

Northeastern University - B.S. in Civil Engineering, 1980

American Society on Geosynthetics - Short Course on Geomembranes by Jean-Pierre Giroud, February 1987

American Society on Geosynthetics - Short Course on Designing with Geosynthetics by Robert Koerner, February 1987

PROFESSIONAL REGISTRATION

Professional Engineer - Maine

AFFILIATIONS

American Society of Civil Engineers, Associate Member

University of Southern Maine, Instructor, Engineer-in-Training and Professional Engineer Review Courses

Chi Epsilon Honor Society

EMPLOYMENT HISTORY

Currently from 1986 - Sevee & Maher Engineers, Inc., Chief Engineer

1986 from 1980 - E.C. Jordan Company, Portland, Maine, Project Engineer

EXPERIENCE

Directed and been responsible for all phases of solid waste management projects for industrial, municipal and governmental clients. The scope of the projects include: landfill siting, design, permitting, public hearings, operations manuals and construction inspection of solid waste facilities ranging in capacity from 25 to 1000 cubic yards per day. Use of computer aided solutions for landfill design such as EPA's HELP model and the TR-20 model. Has developed several computer-based programs for aiding in landfill design and estimating. Has also been responsible for directing the health and safety program during the field investigations and construction of the groundwater extraction and treatment system at several Superfund sites. Projects routinely have involved coordination with other disciplines: geologists, geotechnical engineers, hydrogeologists, planners, laboratory analytical services, and contractors.

Typical assignments in his various areas of expertise include:

- design and permitting of two municipal solid waste transfer stations and a municipal wastewater sludge composting facility.
- synthetic liner selection and compatibility testing for hazardous waste containment,

Experience (continued)

- peer review of RCRA hazardous waste landfill design guidance manuals for permit writers and permit applicants,
- siting, design and license application of solid waste landfills for papermill sludge, tannery sludge, ash and municipal refuse,
- full time construction monitoring of landfill construction contractor and subcontractors to insure compliance with contract documents,
- review and statistical analysis of groundwater quality data at solid waste disposal sites,
- closure alternatives, evaluation and preliminary design for Superfund sites,
- landfill construction inspections, including placement of soil liners and installation of geomembranes,
- evaluation of landfill operations,
- determining infiltration rates for Subtitle C and D landfill facilities for use in limiting land disposal of certain hazardous wastes,
- public presentations, and expert testimony in public hearings.

PRESENTATIONS

"Solid Waste Operational and Technical Assistance," Presented to various municipalities in Maine, funded through the Maine Department of Environmental Protection, 1984, with Roy A. Koster.

MATTHEW W. MUZZY

EDUCATION

Colorado State University - M.S. in Civil Engineering, 1983

University of Maine - B.S. in Civil Engineering, 1980

University of Maine - A.S. in Forestry, 1975

Special Courses:

Stability Analysis for Earth Slopes, Dams and Waste Disposal Facilities, January 1990 - University of Maine

Designing with Geosynthetics, 1986 - Drexel University

Geotechnical Aspects of Landfill Design, 1985 - University of Wisconsin

New Methods in In-situ Testing, March 1983 - University of Florida, Gainesville

Design of Embankments for Mine Tailings Impoundments, January 1982 - Colorado State University

PROFESSIONAL REGISTRATION

Professional Engineer - Maine
Professional Engineer - Colorado

AFFILIATIONS

American Society of Civil Engineers, Associate Member

Technical Association for the Pulp and Paper Industry, Associate Member

EMPLOYMENT HISTORY

Currently from 1988 - Sevee & Maher Engineers, Inc., Sr. Geo-Environmental Engineer

1983 to 1988 - E.C. Jordan Co., Portland, Maine, Geotechnical/Environmental Engineer

1980 to 1982 - U.S. Bureau of Reclamation, Denver, Colorado, Embankment Dams Engineer

EXPERIENCE

Matt has experience in a variety of geotechnical, groundwater, and environmental projects. He has over 10 years of experience concentrating on: geotechnical and hydrogeologic investigations; groundwater characterization; landfill design; permitting of solid waste disposal facilities, and soil and groundwater remediation. In addition to his technical project role, Matt is a capable speaker and frequently participates in regulatory and public meetings.

Assignments in his various areas of expertise have included:

Experience (continued)

- Site manager and principal engineer for investigation and remediation of chlorinated solvent contaminated soil and groundwater at a former defense contractor site. Responsibilities include implementation of investigations, data interpretation, report preparation, and participation in State and local regulatory meetings.

- Project geo-environmental engineer to evaluate hydrogeology and groundwater quality at an existing alum sludge landfill. Responsibilities included evaluation of slope stability and settlement as related to cover system performance.

- Project manager and geo-environmental engineer for closure of 12 uncontrolled solid waste disposal areas at a pulp and paper mill site. Responsibilities range from interpretation of investigation results to technical negotiations with Department of Environmental Protection.

- Hydrogeologic investigation. Directed a field exploration program in support of a groundwater extraction and treatment system design for the McKin Superfund Site in Gray, Maine. Explorations included a seismic refraction survey, monitoring well installations and a pumping well installation.

- Site selection and landfill design. Project manager and geotechnical engineer for design of a 45-acre paper mill sludge landfill. His responsibilities included evaluation and design of the project leachate collection system and low permeability liner.

- Groundwater evaluation and lagoon design. Project manager and project engineer responsible for an existing landfill groundwater evaluation project which resulted in design and construction of a Hypalon-lined leachate holding pond.

- Long-term sludge performance study. Conducted a study concerning long-term performance of pulp and paper mill sludges. The study involved field sampling and laboratory testing to evaluate future landfill slope performance.

- PCB removal. Project manager on a fast track PCP removal project for a paper mill. Principle responsibilities were project organization which involved scheduling and coordination of field and laboratory efforts. The project final report was used to close the project's regulatory file.

- Landfill settlement and stability evaluation. Geotechnical engineer for designing and permitting a municipal waste boiler ash landfill. Innovative use of the site's natural clays and geohydrology allowed permitting without an engineered liner system.

- Geotechnical evaluation of landfill cover. Project manager and project engineer for clay cover testing for an industrial waste landfill.

PUBLICATIONS/PRESENTATIONS

Matthew W. Muzzy, Cyclic Triaxial Behavior of Montery No. 0 and No. 0/30 Sands, U.S. Department of the Interior, Bureau of Reclamation, June 1983.

Matthew W. Muzzy and Roy A. Koster, Incineration Ash Landfill on a Soft Clay Site, Annual Madison Waste Conference, Madison, Wisconsin, 1986.

Matthew W. Muzzy and James I. Peterson, Geotechnical Properties of Paper Mill Sludge, 1987, TAPPI Environmental Conference, Portland, Oregon.

Richard E. Wardwell, R. Craig Findlay and Matthew W. Muzzy, Seepage Effects of Sedimentation of Fly Ash Slurry, American Society of Civil Engineers Specialty Conference, Fort Collins, Colorado, 1989.

ATTACHMENT II

PIPE STRENGTH CALCULATIONS

SEVEE & MAHER ENGINEERS, INC., CUMBERLAND CENTER MAINE

Attachment 2
Pipe Strength Calculations

Champion Paper Corporation
Pipe Strength Calculation for Landfill #6

Calculation By: Carl Burdick
Date: 11/10/94

Design Parameters:

$OD := \frac{12.75}{12} \cdot ft$ Pipe diameter

$DR := 7.0$ Dimension Ratio

$P := (.375) \cdot in$ $OC := 6$ inches on center $Rows := 2$ Perforation Spec.

$$Wadj := \frac{12 \cdot in}{\left[12 \cdot in - \left(P \cdot \frac{12}{OC} \cdot Rows\right)\right]} \qquad Wadj = 1.14$$

$Hmax := 125 \cdot ft$ Maximum landfill height

$\gamma waste := 80 \cdot \frac{lb}{ft^3}$ Waste density (assume 75 percent is waste)

$\gamma gravel := 125 \cdot \frac{lb}{ft^3}$ Gravel density (assume 25 percent is gravel)

Load on pipe (psi):

$$W := OD \cdot 1 \cdot ft \cdot \frac{Hmax \cdot \gamma waste \cdot .75 + Hmax \cdot \gamma gravel \cdot .25}{144 \cdot in^2}$$ Prism Load (Positive projecting condition)

$W = 84 \cdot \frac{lb}{in^2}$

$Wact := W \cdot Wadj$ Adjust load for perforations

$Wact = 96 \cdot \frac{lb}{in^2}$

Critical Pressure for pipe:

For pipe under 8" For pipe 8" or above

$Pcr := if\left(OD < \frac{8}{12\ ft}, DR^{-3.00585} \cdot 75231.4 \cdot \frac{lb}{in^2}, DR^{-3.06399} \cdot 92144.1 \cdot \frac{lb}{in^2}\right)$ From Sclairpipe manual, an HDPE pipe manf.

$Pcr = 237 \cdot \frac{lb}{in^2}$

Factor of Safety (Recommended minimum 2.3):

$$FS := \frac{Pcr}{Wact}$$

$FS = 2.5$

Champion Paper Corporation
Pipe Strength Calculation for Landfill #6

Calculation By: Carl Burdick
Date: 11/7/94

Design Parameters:

$OD := \frac{12.75}{12} \cdot ft$ Pipe diameter

$DR := 7.3$ Dimension Ratio

$P := (0) \cdot in$ $OC := 0$ inches on center $Rows := 0$ Perforation Spec. (SOLID PIPE)

$$Wadj := \frac{12 \cdot in}{\left[12 \cdot in - \left(P \cdot \frac{12}{OC} \cdot Rows\right)\right]} \qquad Wadj = 1$$

$Hmax := 95 \cdot ft$ Maximum landfill height

$\gamma waste := 80 \cdot \frac{lb}{ft^3}$ Waste density (assume 75 percent is waste)

$\gamma gravel := 125 \cdot \frac{lb}{ft^3}$ Gravel density (assume 25 percent is gravel)

Load on pipe (psi):

$$W := OD \cdot 1 \cdot ft \cdot \frac{Hmax \cdot \gamma waste \cdot .75 + Hmax \cdot \gamma gravel \cdot .25}{144 \cdot in^2}$$ Prism Load (Positive projecting condition)

$W = 64 \cdot \frac{lb}{in^2}$

$Wact := W \cdot Wadj$ Adjust load for perforations

$Wact = 64 \cdot \frac{lb}{in^2}$

Critical Pressure for pipe:

For pipe under 8" For pipe 8" or above

$$Pcr := if\left(OD < \frac{8}{12\ ft}, DR^{-3.00585} \cdot 75231.4 \cdot \frac{lb}{in^2}, DR^{-3.06399} \cdot 92144.1 \cdot \frac{lb}{in^2}\right)$$ From Sclairpipe manual, an HDPE pipe manf.

$Pcr = 209 \cdot \frac{lb}{in^2}$

Factor of Safety (Recommended minimum 2.3):

$$FS := \frac{Pcr}{Wact}$$

$FS = 3.3$

Champion Paper Corporation
Pipe Strength Calculation for Landfill #6

Calculation By: Carl Burdick
Date: 11/10/94

Design Parameters:

$OD := \frac{6.625}{12}\cdot ft$ Pipe diameter

$DR := 7.3$ Dimension Ratio

$P := (.375)\cdot in$ $OC := 6$ inches on center $Rows := 2$ Perforation Spec.

$$Wadj := \frac{12\cdot in}{\left[12\cdot in - \left(P\cdot\frac{12}{OC}\cdot Rows\right)\right]} \qquad Wadj = 1.14$$

$Hmax := 125\cdot ft$ Maximum landfill height

$\gamma waste := 80\cdot\frac{lb}{ft^3}$ Waste density (assume 75 percent is waste)

$\gamma gravel := 125\cdot\frac{lb}{ft^3}$ Gravel density (assume 25 percent is gravel)

Load on pipe (psi):

$$W := OD\cdot 1\cdot ft\cdot\frac{Hmax\cdot\gamma waste\cdot .75 + Hmax\cdot\gamma gravel\cdot .25}{144\cdot in^2}$$ Prism Load (Positive projecting condition)

$W = 44\cdot\frac{lb}{in^2}$

$Wact := W\cdot Wadj$ Adjust load for perforations

$Wact = 50\cdot\frac{lb}{in^2}$

Critical Pressure for pipe:

For pipe under 8" For pipe 8" or above

$$Pcr := if\left(OD<\frac{8}{12\ ft}\cdot, DR^{-3.00585}\cdot 75231.4\cdot\frac{lb}{in^2}, DR^{-3.06399}\cdot 92144.1\cdot\frac{lb}{in^2}\right)$$ From Sclairpipe manual, an HDPE pipe manf.

$Pcr = 191\cdot\frac{lb}{in^2}$

Factor of Safety (Recommended minimum 2.3):

$$FS := \frac{Pcr}{Wact}$$

$FS = 3.8$

ATTACHMENT III

SAND SAMPLE

HYDRAULIC CONDUCTIVITY TEST RESULTS

SEVEE & MAHER ENGINEERS, INC., CUMBERLAND CENTER MAINE

LABORATORY PERMEABILITY TEST

PROJECT NAME: CHAMPION CANTON, N.C. DATE: 18 NOV 94

PROJECT NUMBER: 94040 OPERATOR: EJL

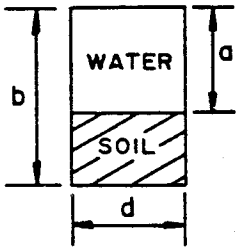
EXPLORATION NO. _____

SAMPLE NO. SAND 2

SAMPLE DEPTH _____ FT.

SAMPLE DESCRIPTION:
LT br m-f SA, tr c-SA

(B)



a = 3.1 in
b = 6.98 in
d = 2.028 in

SOIL VOLUME = $V_S = 0.7854\ d^2\ (b-a)$ = 1253 in³

WT. DRY SOIL & TARE = 561.1 gm

WT. TARE (A-23) = 228.48 gm

WT. DRY SOIL = W_S = 332.62 gm

DENSITY DRY SOIL = $\frac{W_S}{V_S} \times 3.806$ = 101.0 pcf

WATER TEMPERATURE = 14 °C

TIME	WATER LEVEL BELOW TOP OF CYLINDER	ELAPSED TIME (SEC)	h HEAD INCHES
0	0.5		6.48
36.42	1.0	36.42	5.98
	$K_{14} = \frac{3.86}{36.42} \ln \frac{6.48}{5.98} = 8.6 \times 10^{-3}$ in/sec		
	0.5		6.48
1:54.62	2.0	114.62	4.98
	$K_4 = \frac{3.86}{114.62} \ln \frac{6.48}{4.98} = 8.9 \times 10^{-3}$ in/sec		
	0.5		6.48
2:43.36	2.5	163.36	4.48
	$K_4 = \frac{3.86}{163.36} \ln \frac{6.48}{4.48} = 8.8 \times 10^{-3}$ in/sec		

h = DIFFERENCE BETWEEN HEAD WATER AND TAIL WATER AT TIME, t

$k_t = \frac{b-a}{t_2-t_1} \ln \frac{h_1}{h_2}$ = _____

$K_{14_{AVE}} = 8.7 \times 10^{-3}$ in/sec

$= 2.2 \times 10^{-2}$ cm/sec

$k_{10°C} = \frac{1.1709 \text{ centipoise}}{1.3077 \text{ centipoise}} \times \frac{0.9997 \text{ gm/cm}^3}{.99927 \text{ gm/cm}^3} \times k_t$

$k_{10°C}$ = 2.0×10^{-2} cm/sec

= 56 FT/DAY

= _____

in/sec → ft/day multiply by 7200
cm/sec → ft/day multiply by 2834.6

SEVEE & MAHER ENGINEERS

ATTACHMENT IV

SAND DRAINAGE LAYER

SEVEE & MAHER ENGINEERS, INC., CUMBERLAND CENTER MAINE

SEVEE & MAHER ENGINEERS, INC.
Waste Management and Geohydrologic Consultants

December 12, 1994

94040

Champion International Corporation
Attn: Mr. Derric Brown
Environmental Department
7 Champion Drive
Canton, North Carolina 28716

Subject: Landfill #6 - East
Sand Drainage Layer

Dear Mr. Brown:

As requested, we have reviewed the use of sand on the sideslopes at Landfill Area 6A, East. The primary concern is the sand sliding down the slope. A review of the literature indicates the interface friction angle for concrete sand and nonwoven (needle punched) geotextile is 30 degrees, see attached reference. The sand for the project is similar to a concrete sand. Since the interface friction angle is greater than the landfill slope angle of 26 degrees (i.e. 2 Horizontal to 1 Vertical) the sand is not expected to slide off the geotextile.

If you have any questions regarding this information, please do not hesitate to contact me.

Sincerely,
SEVEE & MAHER ENGINEERS, INC.

Guy H. Cote, Jr.
Chief Engineer

Enclosure

4 Blanchard Road • P.O. Box 85A • Cumberland Center, ME 04021 • (207) 829-5016 • FAX (207) 829-5692