Fac/Perm/Co ID #	Date	Doc ID#
44-06	7/22/11	14503

evergreen packaging

Canton Office
175 Main Street • Canton, NC 28716

July 21, 2011

Hand Delivered

Mr. Allen Gaither
North Caolina DENR
Division of Waste Management
2090 US Highway 70
Swannanoa, NC 28778

RE: Design Report for Landfill No. 6 Maintenanve Regrading of Area 6B-Upper, Area 6C-Upper, and Area 6C-Lower. Permit Number 44-06

Dear Mr. Gaither:

Attached for your reference is a copy of the above engineering design report for the surface maintenance of Landfill 6, Areas B-Upper, C-Upper, and C-Lower. Per our phone conversation, these areas require periodic surface maintenance due to the consolidation of the contained waste. This project will utilize off-site soil to re-establish proper surface slope and drainage within each area.

The report includes the engineering design, stability analysis, stormwater management and erosion control, and work plan for the project.

Please let us know if you have any questions regarding this report.

Sincerely,

James A. Giauque
Waste Compliance & Landfill Supervisor
Blue Ridge Paper Products Inc.
Jim.giauque@everpack.com
828-646-2028 Fax 828-646-6892

Paul Dickens
Manager, Environmental, Health & Safety
Blue Ridge Paper Products Inc.
paul.dickens@everpack.com
828-646-6141 Fax 828-646-6892

File:lf6b and c mnt 072111
Attachment

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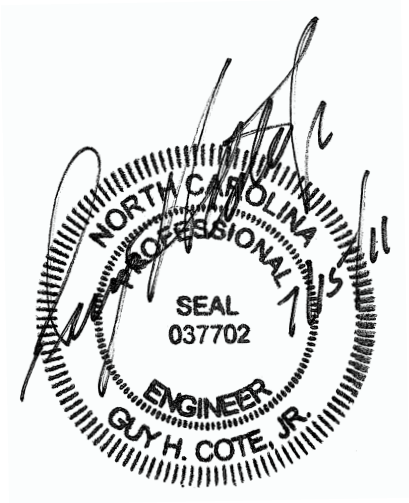
DESIGN REPORT
FOR
LANDFILL NO. 6
MAINTENANCE REGRADING OF
AREA 6B-UPPER, AREA 6C-UPPER, AND
AREA 6C-LOWER
CANTON, NORTH CAROLINA

Prepared for

EVERGREEN PACKAGING
CANTON, NORTH CAROLINA

July 2011



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ATTACHMENT B	ENGINEERING DRAWINGS
ATTACHMENT C	STORMWATER MANAGEMENT PLAN
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ATTACHMENT E	WORK PLAN

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1-1 SITE LOCATION MAP 1-2

1.0 INTRODUCTION

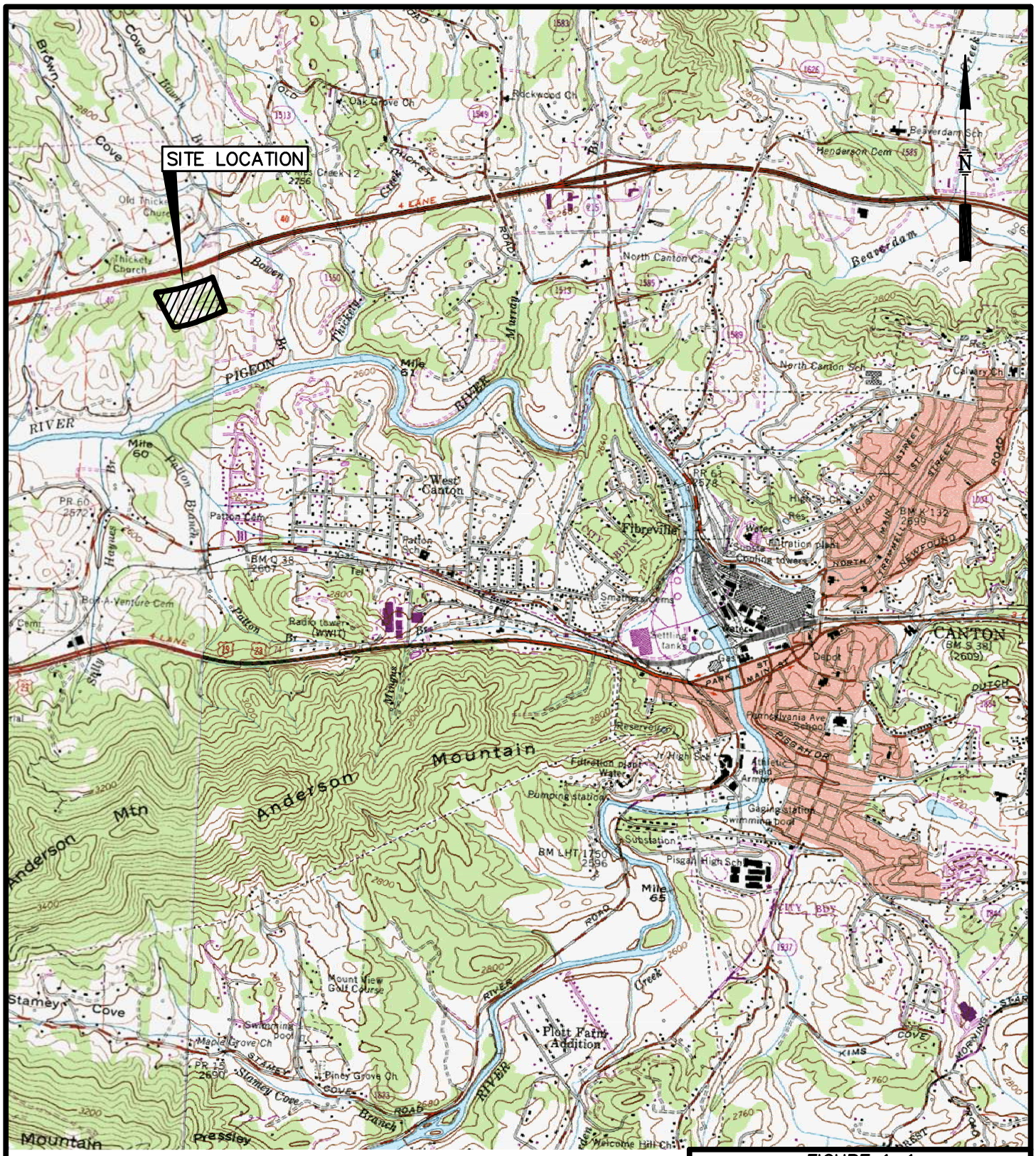
1.1 Facility Information

Facility Name:	Landfill No. 6 Area 6B-Upper, Area 6C-Upper, and Area 6C-Lower
Location:	Incinerator Road Canton, North Carolina
Property Owner:	Evergreen Packaging (Evergreen) 175 Main Street P.O. Box 4000 Canton, NC 28716 Contact: Mr. Jim Giauque Telephone: (828) 646-2028

1.2 Background

Evergreen owns and operates a solid waste landfill for paper mill wastes in Canton, North Carolina. The landfill is known as Landfill No. 6 and is located as shown on Figure 1-1 (USGS, 1978 and 1990). The No. 6 Landfill was permitted under North Carolina Department of Environment and Natural Resources NCDENR Permit # 44-06. The landfill consists of active operations and previously closed filling areas including Area 6B-Upper, Area 6C-Upper, and Area 6C-Lower.

Closure of Areas 6B-Upper, 6C-Upper, and 6C-Lower occurred in 1997. The closure consisted of grading the waste surface to drain, placement, and compaction of cover soil over the waste surface, placement of topsoil, seeding and mulching, and installation of ditches and culverts along the perimeter of the closed areas for runoff control. In the years following the closure, settlement of the waste occurred creating low areas on the cover surface(s). In some cases, the settlement was sufficient to allow ponding of stormwater on portions of the cover(s) following rain events. Evergreen periodically places additional soil on the covers to encourage runoff drainage to the existing stormwater collection system; however, overall the settlement has made consistent drainage of cover surfaces difficult.



BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLES
CANTON, NC (1990)
CLYDE, NC (1978)

1250 0 2500 FEET

FIGURE 1–1
SITE LOCATION MAP
LANDFILL NO. 6
MAINTENANCE REGRADING
EVERGREEN PACKAGING
CANTON, NORTH CAROLINA

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DWG: SITELOC LMN: NONE CTB: SME–STD REV: 7/13/2011

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Evergreen plans to perform maintenance regrading of the cover surfaces for Areas 6B-Upper, 6C-Upper, and 6C-Lower in order to re-establish drainage to the existing perimeter drainageways. The maintenance regrading will involve placement of additional soil over the existing covered areas such that the finished cover slope will be approximately 6 percent to direct runoff from the covers to the existing perimeter drainageways. In order to achieve this slope, it will be necessary to place up to 16 feet of soil over the existing grades.

Evergreen retained the services of Sevee & Maher Engineers, Inc. (SME) to review any potential stability issues with placement of up to 16 feet of soil. SME conducted a stability analysis to confirm the ability to place additional soil cover. This report presents those findings and recommendations for soil placement. In addition, SME has included an erosion and sediment control, and long-term maintenance section.

1.3 Contact Information

The following person will be the Evergreen contact for the maintenance regrading of Areas 6B-Upper, 6C-Upper, and 6C-Lower.

Jim Giauque
Waste Compliance and Landfill Supervisor

Evergreen Packaging
175 Main Street
P.O. Box 4000
Canton, NC 28716

Phone (828)646-2028
Fax (828)646-6892
E-mail jim.giauque@everpack.com

2.0 REGRADING DESIGN

2.1 Concept

The maintenance regrading concept is to establish positive slope drainage for each of the existing cover surfaces for Areas 6B-Upper, 6C-Upper, and 6C-Lower. The regrading will be accomplished by importing soil from off-site and filling over the existing cover areas until slopes of approximately 6 percent are achieved.

The principle goal of the maintenance will be to remove the flattened areas on the existing cover areas where precipitation either ponds or drains poorly. The flattened areas have occurred as result of settlement of the underlying waste since Areas 6B-Upper, 6C-Upper, and 6C-Lower were closed in 1997.

2.2 Site Preparation

Site preparation for maintenance regrading of Areas 6B-Upper, 6C-Upper, and 6C-Lower will consist of stripping the existing vegetation and vegetative soil from the cover surfaces such that the imported soil for the regrading can be placed directly over the soil comprising the existing cover. Existing perimeter drainageways will be inspected, cleaned, and repaired, if necessary. Erosion control measures (see Section 2.6) will be implemented.

2.3 Soil Placement

The soil for the maintenance regrading will come from two sources: (1) off-site borrow from Barber Orchards in Waynesville, North Carolina; and (2) an on-site borrow stockpile resulting from construction of Cell 6D-South in 2010. Both soils have been characterized and are discussed at length in the Design Report for the Landfill No. 6 Area A-West Closure Amendment (SME, 2011). The details of the soil buildup for the regrading are provided on the engineering drawings in Attachment B. The planned regrading will result in new soil thicknesses in the range of 3 to 16 feet. The new soil loads will increase shear stresses in the supporting, underlying waste. To address the new loading condition, SME evaluated the regraded areas for slope stability due to the additional thickness (weight) of the soil cover. The slope stability

analyses indicate Areas 6B-Upper, 6C-Upper, and 6C-Lower will be stable with respect to the soil placement over the existing covers. The geotechnical stability analysis is provided in Attachment D.

Placement of soil for the regrading will be in general accordance with the Engineering Specifications and Work Plan provided in Attachments A and E, respectively. Cross-sections through the regraded areas are provided with the Engineering Drawings located in Attachment B.

2.4 Site Seeding

All areas disturbed during the maintenance regrading will be seeded. Seeding will normally occur between March 1 and October 15. All site grading and surface water runoff control structures such as diversion berms, drainage ditches, stone check dams and culverts will be constructed prior to seeding. Raking, discing, or other acceptable means will be used to loosen the top layer of soil before seeding. Lime and fertilizer will be applied to areas prior to seeding. Application rates for lime and fertilizer will follow the engineering specifications (Attachment A), or, as needed based on testing. If the site is hydroseeded, lime, fertilizer and seed can be applied simultaneously. The seed mixture to be used will follow the engineering specifications. The seed will be applied uniformly with a cyclone seeder, drilled, cultipack seeder, or hydroseeder. Seeds shall not be planted if there is a danger of frost shortly after seed germination. Maximum seeding depth is ¼ inch when using methods other than hydroseeding. Wood fiber, cellulose mulch, or hay mulch will be spread uniformly upon completion of the seedbed preparation, liming, fertilization, and seeding. The mulch may be anchored in-place by uniformly applying an acceptable mulch binder such as Curasol or Terr-Tac. If germination is unsuccessful (less than 75 percent catch) within 30 days of seeding, or there is unsatisfactory catch in the next year, the appropriate areas site will be reseeded in accordance with the seeding specifications contained herein.

2.5 Quality Assurance/Quality Control Program

The maintenance regrading will be performed following regulatory approval. Maintenance regrading for Areas 6B-Upper, 6C-Upper, and 6C-Lower is estimated to take about 2 months,

depending on weather conditions. The owner will utilize qualified personnel or retain the services of a Professional Engineer licensed in the State of North Carolina and familiar with the various aspects of landfill design and closure, to serve as the on-site representative during the regrading. The on-site representative will provide observation of the proposed regrading activities and will be responsible for quality control enforcement and construction documentation at the site. Services of a contractor familiar and experienced with the various aspects of landfill construction will be procured for placement of the off-site and on-site borrow soils used for the regrading.

To control the quality of the soil materials used for the maintenance regrading, a quality assurance/quality control (QA/QC) program will be implemented. The program will include source testing to demonstrate compliance with the materials specifications and construction testing to demonstrate that materials have been properly installed. Section 02200 of the Engineering Specifications outlines the QA/QC Program.

2.5.1 Soil QA/QC.

2.5.1.1 Source Testing

In addition to testing for physical properties, the soil materials used for the maintenance regrading will be tested at the source prior to being delivered on-site, to demonstrate compliance with the chemical characterization. Samples will be collected by the owners representative at the borrow source in accordance with the protocols and frequency of testing presented in the Work Plan in Attachment E.

2.5.2 Weekly Inspection Reports. A weekly inspection report will be prepared by the owner's representative during the maintenance regrading. The reports will include material test results, summary of contractor submittals, summary of weekly progress and progress made to date, and anticipated work items for the following week. Copies of the reports will be provided in the construction certification report.

2.5.3 Photographic Documentation. To provide documentation of the maintenance regrading, photographs will be taken periodically of the closure construction. Copies of the photographs will be provided in the construction certification report.

2.5.4 Record Drawings. Upon completion of the maintenance regrading, a set of as built drawings will be prepared. The drawings will be sealed by a licensed State of North Carolina Professional Engineer and will be submitted to the NCDENR within 60 days of regrading completion.

2.5.5 Final Construction Certification and Report. A final construction report will be submitted to the NCDENR within 60 days following the completion of the maintenance regrading of Areas 6B-Upper, 6C-Upper, and 6C-Lower. The report will include written certification signed by the site representative, that the site has been closed in accordance with the requirements listed in 15A NCAC 13B Rule .0510.

2.6 Stormwater Management/Erosion Control

To evaluate the performance of the existing perimeter ditches for Areas 6B-Upper, 6C-Upper, and 6C-Lower with respect to the maintenance regrading, stormwater runoff calculations for the planned cover surfaces were performed utilizing the methodology outlined by the USDA Soil Conservation Service's (SCS) Technical Release No. 55 (TR-55, Urban Hydrology for Small Watersheds, June 1986 Revision) and a computer program named Hydrocad that uses TR-20. The stormwater calculations used to evaluate the perimeter ditches are included as Attachment C to this document.

Erosion control measures, including the use of erosion control matting, siltation fence, and rock filters will be implemented for the maintenance regrading. In addition, the following erosion control procedures will be followed during construction operations and after the regrading has been completed.

- All erosion and rock filters will be performed in strict accordance with the "North Carolina Erosion and Sediment Control Planning and Design Manual," including the latest data from the SCS.

- The disturbance of existing soil cover will be kept to a minimum during site closure.
- Acceptable existing topsoil will be stripped and stockpiled for reuse as final cover. Topsoil suitable for reuse will be stockpiled on-site in a manner that natural drainage is not obstructed and no off-site sediment damage will result.
- During grading operations, the site will be brought to approximate finish grades and stabilized without extended delays.
- Erosion and sediment control measures such as rock filters, erosion control matting, and siltation fencing will be installed as shown and/or adjusted to suit construction immediately after a cut or fill slope has been created.
- All measures will be inspected after prolonged rainfall events and repairs made as necessary. Sediment deposits will be periodically removed from the upstream side of the silt areas. This sediment will be spread and stabilized in areas of the site not subject to erosion. All measures will be replaced as necessary to provide proper filtration action.
- Immediately following the final grading of the landfill cap all graded or disturbed areas will be seeded to provide a permanent vegetative cover.

2.7 Design Plans and Technical Specifications

Design plans showing the existing site topography for Areas 6B-Upper, 6C-Upper, and 6C-Lower and the planned maintenance regrading contours, design details, and cross-sections are contained in Attachment B. Technical specifications for the maintenance regrading activities are contained in Attachment A.

3.0 LONG-TERM (POST-CLOSURE) MAINTENANCE

The subsections that follow describe the various activities which will be performed to maintain the long-term integrity of the closed landfill areas subsequent to the maintenance regrading.

3.1 Edge-of-Waste Marker

Edge-of-waste (EOW) markers will be replaced, if necessary, delineating the waste boundary. The EOW markers will be permanent signs and will be inspected at the frequency indicated in the Landfill Operations Manual.

3.2 Mowing

To prevent deep-rooted tree growth, the closed portions of the landfill and drainage ditches will be mowed twice annually at a minimum. Mowing will not begin on the regraded areas until grass growth is established. Temporary stone check dams will be removed prior to mowing.

3.3 Site Inspections

The regraded areas will be inspected twice per year for a period of at least three years to assure the cover surface is maintained against erosion and other problems such as animal burrowing. At a minimum, the inspections will include examination of the following items:

- surface drainageways
- surface grading
- grass growth
- erosion rills
- animal burrows

Each inspection will include notation of any problems and recommended remedial actions. The current landfill Operations Manual for maintenance inspection checklist, which can be used to assist in the inspection. Following the three years, an inspection frequency of once per year will be instituted unless major problems develop, whereupon more frequent inspections will be made.

ATTACHMENT A

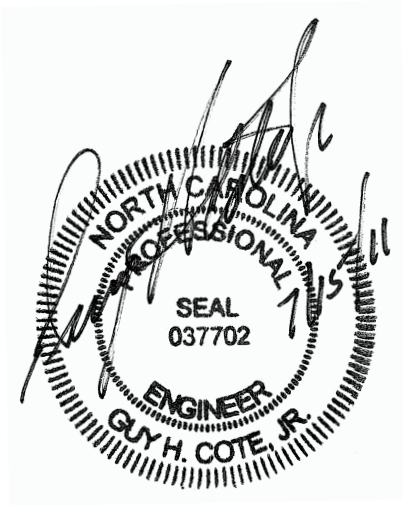
ENGINEERING SPECIFICATIONS

CONSTRUCTION SPECIFICATIONS
FOR
LANDFILL NO. 6
MAINTENANCE REGRADING
AREA 6B-UPPER, AREA 6C-UPPER,
AND AREA 6C-LOWER
CANTON, NORTH CAROLINA

Prepared for

EVERGREEN PACKAGING
CANTON, NORTH CAROLINA

July 2011



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CONTRACT DOCUMENTS AND
CONSTRUCTION SPECIFICATIONS
FOR
LANDFILL NO. 6
MAINTENANCE REGRADING
AREA 6B-UPPER, AREA 6C-UPPER
AND AREA 6C-LOWER
CANTON, NORTH CAROLINA
EVERGREEN PACKAGING

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CONSTRUCTION SPECIFICATIONS
FOR
LANDFILL NO. 6
MAINTENANCE REGRADING
AREA 6B-UPPER, AREA 6C-UPPER
AND AREA 6C-LOWER
CANTON, NORTH CAROLINA
EVERGREEN PACKAGING

BID SCHEDULE

CONSTRUCTION SPECIFICATIONS
FOR
LANDFILL NO. 6
MAINTENANCE REGRADING
AREA 6B-UPPER, AREA 6C-UPPER
AND AREA 6C-LOWER
CANTON, NORTH CAROLINA
EVERGREEN PACKAGING

GENERAL CONTRACTOR

BID SCHEDULE

Item No.	Item and Unit Price Bid	Unit	Engineer's Quantity Estimate	Contractor's Quantity Estimate	Lump Sum Bid	Add/Deduct Per Unit Bid
4.4.1	Mobilization / Demobilization	Lump Sum	1		$	$
4.4.2	Compacted Off-Site Borrow, furnished by Owner and delivered to the site	Cubic Yard	93,000		$	$
4.4.3	Compacted Cover Soil, furnished by Owner, on-site	Cubic Yard	30,500			
4.4.4	Topsoil (4-inch layer)	Cubic Yard	10,500		$	$
4.4.5	Seeding and Mulching	Acres	18.8		$	$
4.4.6	Erosion Control Mat	Square Yard	1450		$	$
4.4.7	Culvert Inlet Rock Filters, furnished by Owner and delivered to site	Each	4		$	$
4.4.8	Stone Check Dams	Each	30		$	$
4.4.9	Performance Bond	Lump Sum	1		$	$
		LUMP SUM TOTAL:			$	$

CONSTRUCTION SPECIFICATIONS
FOR
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MAINTENANCE REGRADING
AREA 6B-UPPER, AREA 6C-UPPER
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CANTON, NORTH CAROLINA
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AND AREA 6C-LOWER
CANTON, NORTH CAROLINA
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DRAWING LIST

Drawing No.	Title
	Cover Sheet
C-101	Site Location Plan
C-102	Existing Conditions Plan
C-103	Area 6B-Upper Maintenance Regrading Plan
C-104	Area 6C-Upper Maintenance Regrading Plan
C-105	Area 6C-Lower Maintenance Regrading Plan
C-300	Erosion Control Sections and Details

CONSTRUCTION SPECIFICATIONS
FOR
LANDFILL NO. 6
MAINTENANCE REGRADING
AREA 6B-UPPER, AREA 6C-UPPER
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LANDFILL NO. 6
MAINTENANCE REGRADING
AREA 6B-UPPER, AREA 6C-UPPER
AND AREA 6C-LOWER
CANTON, NORTH CAROLINA
EVERGREEN PACKAGING

TECHNICAL SPECIFICATIONS

DIVISION 2

Section	Title
02200	EARTHWORK
02270	EROSION CONTROL
02480	SEEDING

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.02 DESCRIPTION OF WORK:

Extent of earthwork is indicated on drawings.

Definition: "Excavation" consists of removal of material encountered to subgrade elevations indicated and subsequent disposal or replacement (backfill) of materials removed.

1.03 QUALITY CONTROL:

A. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

B. Testing and Inspection Service: The Owner shall employ a testing laboratory to perform soil testing of materials at point of source. The Owner shall perform the following analysis on borrow materials used at the site.

- NCDOT #5 Stone:

  - Grain Size (D 422) - 1/5,000 cy

- Off-site Borrow Soil:

  - Grain Size (D 422) - 1/10,000 cy
  - Maximum Dry Density (D 698) – 1/10,000 cy

- Cover Soil:

  - Grain Size (D 422) - 1/10,000 cy
  - Maximum Dry Density (D 698) – 1/10,000 cy

1.04 FIELD QUALITY ASSURANCE

A. Quality Assurance Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed.

Testing shall be as follows:

- NCDOT #5 Stone:

  - Grain Size (D 422) - 1/5,000 cy

- Off-site Borrow Soil:

  - Grain Size (D 422) - 1/5,000 cy or at the discretion of the Engineer
  - In-Place Moisture/Density (D 6938 or D 2937) – 1/5,000 cy/mid-lift or at the discretion of the Engineer

- Cover Soil:

  - Grain Size (D 422) - 1/5,000 cy
  - In-Place Moisture/Density (D 6938 or D 2937) - 5/acre/lift

If in opinion of Owner's Representative, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction, wetting, drying or removal of material as necessary, and testing at no additional expense.

1.05 JOB CONDITIONS:

A. Site Information: Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn therefrom by Contractor. Data are made available for convenience of Contractor.

Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.

B. Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.

Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by Owner's Representative and then only after acceptable temporary utility services have been provided.

Provide minimum of 48-hour notice to Owner's Representative, and receive written notice to proceed before interrupting any utility.

Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

C. Use of Explosives: (None anticipated)

1. General: This work shall consist of furnishing, placing and detonating dynamite in places directed for the excavation of related work items in accordance with these specifications and in reasonably close conformity to the lines and grades shown on the plans or as established.

   All blasting plans shall be approved prior to placing the explosive charges.

   Do not bring explosives onto site or use in work without prior written permission from authorities having jurisdiction.

   The Contractor is solely responsible for the handling, storage, and use of explosive materials.

   The explosives shall be detonated by the propagation or electric method and shall be detonated the same day it is placed.

   No explosives shall be stored on the site overnight.

D. Materials: Dynamite and caps shall be from fresh stock and shall have a maximum strength as specified in the approved blasting plan.

E. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights.

   Operate warning lights as recommended by authorities having jurisdiction.

   Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS:

A. General: Excavations made at the site for the construction of project facilities will generate unspecified quantities of soil materials. These soils will either be suitable or unsuitable for use as fill in the construction of earth-related portions of the project.

   1. Suitable Materials: Those materials generated from outside excavations that satisfy the specifications for the material for which it is to be used (i.e., compacted silt/sand, common borrow, etc.). Specifications for suitable project materials follow.

   2. Unsuitable Materials: Those materials generated from on-site excavations that do not satisfy the specifications for the project materials identified below. Generally these materials will consist of objectionable quantities of vegetation, organic matter, large stones, debris, and frozen material.

B. Off-site Borrow Soil: Off-site borrow soil shall be placed to the lines and dimensions on the Contract Drawings.

C. Cover Soil: Cover soil material shall be placed to the lines and dimensions as shown on the Drawings. The soil shall not contain particles of rock which will not pass the 6-inch square mesh sieve. The soil shall have greater than 20 percent passing the U.S. Standard No. 200 Sieve.

D. NCDOT #5 Stone: Stone used on the upstream side of the rock filters shall be durable, clean angular rock fragments obtained by breaking and crushing rock material, furnished, and placed to the lines and grades as shown on the Drawings. Sieve analysis by weight:

Sieve Designation	% Passing by Weight
1-1/2”	100
1"	90-100
3/4"	20-55
½”	0-10
3/8"	0-5

E. Riprap: Stones used for riprap on the downstream side of the rock filters and for Stone Check Dams shall consist of sound durable rock which will not become disintegrated by exposure to the action of water or weather. Either field stone or rough unhewn quarry stone may be used. Stones size shall be 2 inches to 3 inches.

F. Common Borrow: Shall be earth suitable for embankment construction for use in any filling other than the soil cover. It shall be free of frozen material, perishable rubbish, peat, organic matter, large rock fragments over 12 inches, or other unsuitable material. AASHTO M145 Classifications A-1 through A-5 may be used. Use of other materials as common borrow is at the discretion of the Owner’s Representative and only in approved areas.

G. Topsoil: Shall be the soil material stripped from the areas of 6B-Upper, 6C-Upper, and 6C-Lower.

PART 3 - EXECUTION

3.01 EXCAVATION:

A. Unclassified Excavation includes excavation of materials and obstructions encountered to subgrade elevations indicated, regardless of character.

B. Excavation Classifications: The following classifications of excavation will be made when rock excavation is encountered in work:

C. Earth Excavation includes excavation of pavements and other obstructions visible on ground surface; underground structures, utilities and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as rock or unauthorized excavation.

D. Rock Excavation:

Rock excavation in trenches and pits includes removal and disposal of materials and obstructions encountered which cannot be excavated with a 1.0 cubic yard (heaped) capacity, 42" wide bucket on track-mounted power excavator equivalent to Caterpillar Model 215, rated at not less than 90-HP flywheel power and 30,000 lb. drawbar pull. Trenches in excess of 10'- 0" in width and pits in excess of 30'-0" in either length or width are classified as open excavation.

Rock excavation in open excavations includes removal and disposal of materials and obstructions encountered which cannot be dislodged and excavated with modern track-mounted heavy-duty excavating equipment without drilling, blasting, or ripping. Rock excavation equipment is defined as Caterpillar Model No. 973 or No. 977K, or equivalent track-mounted loader, rated at not less than 170-HP flywheel power and developing 40,000 lb. break-out force (measured in accordance with SAE J732C).

Typical of materials classified as rock are boulders 3 cu. yd. or more in volume, solid rock, rock in ledges, and rock hard cementitious aggregate deposits.

Intermittent drilling, blasting or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation.

Do not perform rock excavation work until material to be excavated has been cross-sectioned and classified and worksheets submitted to the Owner's Representative.

Rock payment lines are limited to the following:

In pipe trenches, 6 inches below invert elevation of pipe and
18 inches wider than inside diameter of pipe, but not less than 3 ft.

In open areas, 24 inches below base grade elevation.

E. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Owner's Representative. Unauthorized excavation, as well as remedial work directed by Owner's Representative, shall be at Contractor's expense.

Backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Owner's Representative.

F. Additional Excavation: When excavation has reached required subgrade elevations, notify Owner's Representative who will make an inspection of conditions. Do not backfill excavations without notifying Owner's Representative.

If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by Owner's Representative.

Removal of unsuitable material and its replacement as directed will be paid on basis of contract conditions relative to changes in work.

G. Stability of Excavations: Slope sides of excavations to comply with federal and local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

Maintain sides and slopes of excavations in safe condition until completion of backfilling.

H. Shoring and Bracing: Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross-braces, in good serviceable condition.

Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.

Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

Provide permanent steel sheet piling or pressure creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops as required and leave permanently in place.

I. Dewatering: Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.

Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

Use appropriate erosion control in temporary ditches, as described in Section 02270, Erosion Control.

J. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage. Cover or seed stockpiles when long-term storage indicates the potential for wind or water erosion from the stockpile. Place silt fence around downstream edge of stockpile to prevent transportation of soil.

Locate and retain soil materials away from edge of excavations. Do not store within drip line of trees indicated to remain.

Dispose of excess soil material and waste materials as herein specified by Owner's Representative.

K. Excavation for Structures: Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

L. Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide a minimum 6" to 9" clearance on both sides of pipe or conduit as indicated on Drawings.

Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations.

Where rock or unsuitable material is encountered, carry excavation 6" below required elevation and backfill with a 6" layer of crushed stone or gravel, as approved by Owner's Representative, prior to installation of pipe.

For pipes or conduit 6" or larger in nominal size, tanks and other work indicated to receive subbase, excavate to subbase depth or, if not otherwise indicated, to 6" below bottom of work to be supported.

Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.

Do not backfill trenches until tests and inspections have been made and backfilling authorized by Owner's Representative. Use care in backfilling to avoid damage or displacement of pipe systems. Owner's Representative must be notified of any intention to backfill trench or otherwise permanently cover pipe.

M. Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35° F. (1°C).

N. Final Grading: The Owner will perform grading in accordance with Contract Drawings, in order to obtain subgrade elevations prior to the placement of the drainage stone and cover soil. During the regrading, the Owner shall fill voids encountered below the subgrade elevations with on-site materials or waste materials.

3.02 COMPACTION:

A. General: Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D 698.

Off-site Borrow Soil: Compact each lift (maximum four feet) at 90 percent maximum density measured from middle of lift.

Cover Soil: Compact each 12” lift of cover soil at 90 percent maximum density.

Maintain these conditions until topsoil is placed.

C. Moisture Control: Moisture content of the cover soil and/or embankments shall be at, but not greater than 4 percent higher than optimum as determined by ASTM D 698 (standard proctor). Where subgrade or layer of soil material must be moisture conditioned to meet the allowable range of water content to achieve compaction, uniformly apply water to surface of subgrade, or layer of soil material. Apply water in

manner to prevent free water appearing on surface during or subsequent to compaction operations.

Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

3.03 BACKFILL AND FILL:

A. General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

In excavations, use satisfactory excavated or borrow material free of frozen material, large stones, brush, roots, sod, or other unsuitable material.

Under grassed areas, use satisfactory excavated or borrow material.

Under piping and conduit, use subbase material where subbase is indicated under piping or conduit; shape to fit bottom 90° of cylinder.

B. Backfill excavations as promptly as work permits, but not until completion of the following:

Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.

Inspection by Owner's Representative, testing, approval, and recording locations of underground utilities.

Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

Removal of trash and debris.

Permanent or temporary horizontal bracing is in place on horizontally supported walls.

C. Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

D. Placement and Compaction: Place backfill and fill materials in layers not more than 15" in loose depth for material compacted by heavy compaction equipment, and not more than 6" in loose depth for material compacted by hand-operated tampers.

Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content within the optimum range as determined by the soil testing at point of source. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

To provide for clod break-up of the cover material, a minimum number of 2 passes will be made with deep-footed pad roller. To eliminate desiccation cracks the surface will be moistened (as necessary) and reworked with 2 passes of a smooth drum roller. Desiccation is defined as moisture content below optimum, or cracks deeper than 1 inch.

The cover soil shall be compacted and smooth drum rolled at the end of each work day to provide for moisture/density testing and prevent ponding of surface water overnight.

The following equipment will be used for compaction of the cover material:

Caterpillar 815F Pad Foot Roller or equivalent equipment approved by the Engineer. Equivalent equipment shall meet the following specifications:

Minimum Operating Weight	45,900 lbs
Maximum Pad Tip Area	18 square inches
Minimum Pad Height	7.5 inches
Minimum Wheel Diameter	40.5 inches

The passage of compaction equipment in either direction (forward or backward) is considered a "pass."

The following equipment will be used to obtain a smooth roll surface:

Caterpillar CS563 Vibratory Drum Roller or equivalent equipment approved by the Engineer. Equivalent equipment shall meet the following specifications:

Minimum Operating Weight	24,500 lbs
Vibration Frequency	1,400 to 1,800 vpm
Centrifugal Force	
High Amplitude	50,000 lbs
Low Amplitude	35,000 lbs
Maximum Drum Width	7.0 feet

Sealing the lifts will encourage runoff from storms, thus limiting development of excessively moist or wet lenses of soil within the barrier layer. The lift surface shall be scarified or otherwise roughened by tracking with a bulldozer prior to placing the next lift of cover soil to promote good bonding between lifts.

3.04 MAINTENANCE:

A. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density prior to further construction.

B. Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn, gravel road, or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.05 DISPOSAL OF EXCESS AND WASTE MATERIALS:

A. Removal to Designated Areas on Owner's Property: Transport acceptable excess excavated material to designated soil storage areas on Owner's property. Stockpile soil and seed or spread and seed as directed by Owner's Representative.

Transport waste material, including unacceptable excavated material, trash, and debris to designated spoil areas on Owner's property and dispose of as directed.

END OF SECTION

SECTION 02270

EROSION CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

Work covered by this Section includes the control of erosion, siltation, and sedimentation.

1.2 PROJECT REQUIREMENTS

A. Prevention: Take every reasonable precaution and do whatever is necessary to avoid any erosion and to prevent silting of rivers, streams, lakes, reservoirs, impoundment's, and drainage ditches and swales.

B. Exposure: The exposure of uncompleted cut slopes, embankments, trench excavations, and site graded areas shall be kept as short as possible. Initiate seeding and other erosion control measures on each segment as soon as reasonably possible.

C. Temporary Protection: Should it become necessary to suspend construction for any length of time, shape all excavated and graded areas in such a manner that runoff will be intercepted and diverted to points where minimal erosion will occur. Provide and maintain temporary erosion and sediment control measures, such as berms, dikes, slope drains, silt stops, and sedimentation basins, until permanent drainage facilities or erosion control features have been completed and are operative.

D. Handling of Fine Material: Fine material placed or exposed during the work shall be so handled and treated as to minimize the possibility of its reaching any surface waters. Use diversion channels, dikes, sediment traps, or any other effective control measures.

E. Silt Stops: Provide silt stops wherever erosion control measures may not be totally capable of controlling erosion, such as in drainage channels and where steep slopes may exist.

F. Special Precautions: Take special precautions in the use of construction equipment to minimize erosion. Do not leave wheel tracks where erosion might begin.

G. Off-Site Erosion Control: The requirements of this Section also apply to Project-related construction activities away from the Project site, such as at borrow pits, off-site storage areas, and haul and work roads.

H. Mulching: Mulching shall follow the seeding operation by not more than 24 hours.

I. Remedial Action: Should any protective measures employed indicate any deficiencies or erosion taking place, immediately provide additional materials, or employ different techniques to correct the situation and to prevent subsequent erosion.

J. Discontinuation: Continue erosion control measures until the permanent measures have been sufficiently established and are capable of controlling erosion on their own.

K. Permits: Comply with all Federal, state and local laws, ordinances, rules, and regulations.

1.03 QUALITY CONTROL:

Provide at least one person who shall be present at all times during erosion control operations and who shall be thoroughly familiar with the types of materials being installed and the best methods for their installation and who shall direct all work performed under this Section.

Material manufacturers and vendors shall be reputable, qualified firms regularly engaged in producing the required types of materials.

Protect and maintain all areas disturbed by the Work, such that erosion is adequately controlled and silt and sediments are not allowed to flow into any watercourse, onto adjacent properties, or into storm drains.

PART 2 - PRODUCTS

2.01 STRAW MULCH:

A. General: Straw mulches shall be reasonably free from swamp grass, weeds, twigs, debris and other deleterious material, and free from rot, mold, primary noxious weed seeds, and rough or woody materials. Mulches containing mature seed of species which would volunteer and be detrimental to the permanent seeding, or would result in overseeding, or would produce growth which is aesthetically unpleasing, is not permitted.

B. Straw Mulch: Properly aired native straw, Sudan grass straw, broomsedge straw, legume straw, or similar straw or grass mowings. When air-dried in the loose state, the contents of the representative bale shall lose not more than fifteen (15) percent of the resulting air-dry weight of the bale. Apply at the rate of 2 tons/ac.

C. Mulch Stabilizers: "Curasol" applied at the rate of 40 gal/ac. or Dow "Mulch Binder" applied at the rate of 45 gal/ac.

D. Permanent Type Mulch Nets: Erosion control turn reinforcement matting as manufactured by North American Green, or equal.

2.02 SEED AND SOD FOR EROSION CONTROL:

A. For Temporary Control Use annual or perennial ryegrass.

B. For Permanent Control See Section "Seeding".

2.03 HAY BALES FOR EROSION CONTROL:

Rectangular shaped bales of straw or straw, weighing at least 40 lbs per bale, free from primary noxious weed seeds and rough or woody materials.

2.04 SILT FENCES:

"Envirofence" by Mirafi, Inc. or an approved equal.

2.05 EROSION CONTROL MATTING:

A. Shall be placed on newly loamed and seeded areas susceptible to erosion or in areas with surface water velocities above 4 feet per second (i.e., drainage swales or channels), as necessary or as indicated on the Contract Drawings, or as directed by the engineer. The matting shall be North American Green SC250, or an approved equivalent.

B. A mulch netting shall be placed over areas that cannot be seeded within the normal growing season, that are not susceptible to severe erosion or high surface water velocities (i.e., sideslopes of dikes). The mulch netting shall be installed over the hay mulch and anchored per the manufacturer's recommendations. The mulch netting shall be Radix manufactured by Tenax or an approved equal.

2.06 STONE CHECK DAMS:

A. Stone check dams shall be constructed of a core of two- to three-inch crushed stone.

B. The stone check dams shall be constructed and placed in ditches as indicated on the Contact Drawings.

2.07 CULVERT INLET ROCK FILTERS:

A. Rock filters shall be constructed of NCDOT #5 stone and a core of two- to three-inch crushed stone.

B. The rock filters shall be constructed and placed in ditches as indicated on the Contact Drawings.

PART 3 - EXECUTION

3.01 STRAW MULCHING:

A. Install straw mulch immediately after each area has been properly prepared. When permanent seed or seed for temporary erosion control is shown prior to placing the mulch, place mulch on seeded areas within 24 hours after seeding. Engineer may authorize the blowing of chopped mulch provided that 95% of the mulch fibers will be 6" or more in length and that it can be applied in such a manner that there will be a minimum amount of matting that would retard the growth of plants. Straw mulch should cover the ground enough to shade it, but the mulch should not be so thick that a person standing cannot see the ground through the mulch. Remove matted mulch or branches.

B. Apply a system of pegs and strings, a chemical stabilizer, or temporary type netting to the mulch, where mild winds may blow the mulch, or when ground slopes exceed 15%, or when otherwise required to maintain the mulch firmly in place. Unless otherwise directed, remove the strings and netting prior to the acceptance of the Work.

C. Apply temporary type netting over the mulch and take whatever measures are necessary to maintain the mulch firmly in place, where high winds exist, or heavy rainstorms are likely, or where ground surfaces are steep, or where other conditions require.

D. The use of permanent type netting is not permitted without the prior approval of Engineer, unless otherwise specified.

3.02 HAY BALES AND SILT FENCES:

A. Provide straw bales or silt fences, as required, for the temporary control of erosion and to stop silt and sediment from reaching surface waters, adjacent properties, or entering catch basins, or damaging the Work.

B. Stake the straw bales as shown in the details to hold them firmly in place. Use a sufficient number of bales to accommodate runoff without causing any flooding and to adequately store any silt, sediment, and debris reaching them (minimum of 1 every 50 feet).

C. Erect silt fences and bury bottom edge in accordance with the manufacturer's recommended installation instructions. Provide a sufficient length of fence to accommodate runoff without causing any flooding and to adequately store any silt, sediment, and debris reaching it.

D. Leave straw bales and silt fences in place until permanent erosion control measures have stopped all erosion and siltation, then remove and dispose of properly.

3.03 MAINTENANCE

If any temporary erosion and sediment control measures are disturbed, repair them immediately. Check erosion control devices weekly and after any heavy rain storms.

If seed is washed out before germination, repair any damage, refertilize, and reseed.

Maintain mulched and matted areas, silt stops, and other temporary control measures until the permanent control measures are established and no further erosion is likely.

END OF SECTION

SECTION 02480

SEEDING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any), apply to the work specified in this Section.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Earthwork: Section 02200

B. Erosion Control: Section 02270

1.03 DESCRIPTION OF WORK: Work specified in this section shall consist of furnishing all labor, materials, and equipment to perform seeding work in conformity with the contract drawings and as specified herein. Excavation, filling, and grading required to establish elevations shown on the Drawings are not specified in this Section. Refer to Section 02200, Earthwork.

1.04 QUALITY ASSURANCE: Subcontract the seeding work to a single firm specializing in landscape work.

A. Source Quality Control:

1. General: Ship landscape materials with certificates of inspection as required by governmental authorities. Comply with governing regulations applicable to landscape materials.

2. Analysis and Standards: Package standard products with manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable or as further specified.

3. Grass Seed: All seed shall be certified as to mixture, germination, and purity, as being in conformity with the following requirements:

a. Each variety of seed shall have a percentage of germination of not less than 80, a percentage of purity of not less than 85, and shall have not more than one percent of weed content.

b. All seed shall be from the same or previous year's crop unless recent tests by an approved testing agency demonstrates that older seed meets the above requirements.

4. Inspection: The Owner's Representative reserves the right to inspect any plant materials either at the place of growth or at the site before planting, for compliance with requirements for name, variety, size, and quality.

1.05 SUBMITTALS

A. Certification: For information only, submit 2 copies of certificates of inspection as required by governmental authorities, and manufacturer's or vendors analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements.

Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery, and while stored at the site.

1.07 JOB CONDITIONS: Contractor must examine the subgrade, verify the elevations, observe the conditions under which work is to be performed and notify the Owner's Representative of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

It shall be the Contractor's responsibility to restore to the line, grade, and surface of all eroded areas with approved material and to keep topsoiled areas in acceptable condition until turf is established and accepted by the Owner's Representative.

Proceed with and complete the seeding work as rapidly as portions of the site become available, working within the required seasonal limitations.

A. Seeding Seasons: Unless variance is requested in writing and approved by the Owner's Representative, seeding shall be done within the following dates:

Permanent Seeding:	March 1 – October 15
Temporary Seeding:	October 16 – February 28

PART 2 - PRODUCTS

A. Vegetative Soil (Topsoil): Vegetative soil shall be loam, sandy loam, silt loam, sandy clay loam, silty clay loam, clay loam, or loamy sand. Vegetative layer shall be fertile, friable soil free of roots stumps, stones larger than 3 inches in diameter, live plants, noxious weeds, and foreign matter. It shall contain more than of 1.5% organic matter by weight and should have a pH of above 3.6 before liming, and should have less than 500 parts per million of soluble salts.

An agronomic study should be performed on all vegetative soil sources planned use on the site. Agronomic testing should be performed by the North Carolina Department of Agriculture soil testing laboratory or by commercial laboratories qualified to perform agronomic testing.

B. Soil Amendments:

1. Lime: Natural limestone containing not less than 90% of total carbonates, ground so that not less than 100% passes a 10-mesh sieve, not less than 90% passes a 20 mesh sieve, and not less than 50% passes a 100 mesh sieve.

2. Fertilizer: Fertilizer shall be a commercial type with 50 percent of the elements derived from organic sources and shall conform to the recommendations of the agronomic testing.

2.02 GRASS MATERIAL:

A. Grass Seed: Provide fresh, clean, new-crop seed complying with the tolerance for purity and germination established by the Official Seed Analysts of North America. Provide seed of the grass species, proportions, and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified.

The seed mixtures shall consist of seeds proportioned by weight as follows:

Permanent Seeding		Temporary Seeding	
Kentucky 31	105 lbs/acre	Annual Rye	40 lbs/acre
Creeping Red Fescue	24 lbs/acre		
Kentucky Blue Grass	24 lbs/acre		
Sericea Lespadeza	24 lbs/acre		
Korean Lespadeza	21 lbs/acre		
Annual Rye	21 lbs/acre		
White Dutch Clover	6 lbs/acre		

2.03 MISCELLANEOUS LANDSCAPE MATERIALS:

A. Mulch for Seeded Areas:

1. Hay or straw mulch shall consist of long fibered hay or straw, reasonably free from noxious weeds and other undesirable material. No material shall be used which is too wet, decayed, or compacted as to inhibit even and uniform spreading. No chopped hay, grass clippings, or other short fibered material shall be used unless directed.

2. Cellulose fiber mulch shall consist of natural wood, recycled paper, or humus cellulose fiber containing no materials which will inhibit seed germination or plant growth. Sufficient non-toxic water soluble green dye shall be added to provide a definite color contrast to the ground surface to aid in even distribution. Cellulose fiber mulch shall be supplied in moisture resistant, sealed bags marked with the manufacturer's name, the air dry weight, and composition of the contents.

B. Mulch Binder: Material for mulch tackifier shall be a non-asphaltic base product, such as Hydro Glass Corporation Hydrotack or an Owner's Representative approved equivalent.

PART 3 - EXECUTION

3.01 SEEDING:

A. Locations: All areas disturbed as a result of construction shall require seeding and mulching.

B. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.

C. Rates of Application: Rates of application for limestone, fertilizer, and grass seed shall be in accordance with the Construction Drawings.

D. The hydraulic spray method shall be used for seeding all areas unless alternative methods are approved by the Owner's Representative.

E. Application Procedure:

1. Hydraulic Spray Method: The hydraulic spray method of sowing seed shall be done with an approved machine operated by a competent crew. Seed and fertilizing materials shall be mixed with water in the tank of the machine and kept thoroughly agitated so the materials are uniformly mixed and suspended in the water at all times during operation. The spraying equipment must be designed and operated to distribute seed and fertilizing materials evenly and uniformly on the designated areas at the required rates. If the Owner's Representative finds the application uneven or otherwise unsatisfactory, he may require the hydraulic spray method to be abandoned and the balance of the work done as specified under another method.

F. Mulching:

1. Cellulose fiber mulch shall be applied as a waterborne slurry. The cellulose fiber and water shall be thoroughly mixed and sprayed on the area to be covered so as to form a uniform mat of mulch at a rate that completely covers the ground.

   Cellulose fiber mulch may be mixed with the proper quantities of seed, fertilizer, and agricultural limestone as required, or may be applied separately the next day after seeding.

2. Areas which cannot be seeded within the growing season shall be temporary seeded and mulched to provide protection to the soil surface. An organic mulch other than wood fiber alone shall be used along with a mulch netting. The areas will be reseeded with permanent seed as soon as seeding dates and weather conditions permit.

G. Erosion Control Blanket:

1. Erosion Control Blanket shall be placed at locations indicated on Contract Drawings. The anchoring of the blanket shall be as indicated on the Contract Drawings and as recommended by the manufacturer. All blankets shall be placed after seeding.

3.02 MAINTENANCE AND ACCEPTANCE:

A. Seeded Areas:

1. Maintain seeded areas by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading, and replanting as required to establish a smooth, acceptable grass growth, free of eroded or bare areas.

2. Seeding, March 1 to October 15, Inclusive: The Contractor shall maintain each seeded area until acceptance of the individual area. Maintenance shall consist of providing protection by erecting necessary signs and barriers and by repairing damaged areas as directed. Damaged areas and areas which do not produce a satisfactory stand of grass shall be repaired to re-establish the condition and grade of the area prior to the original seeding and then refertilized, reseeded and remulched as specified to produce satisfactory results.

   Areas fertilized and seeded by the hydraulic method will be accepted only upon attainment of a reasonable thick uniform stand of not less than 90 percent coverage of permanent grasses, free from sizable thin or bare spots, i.e., 5-foot-diameter or more.

3. Seeding, October 16 to February 28, Inclusive: The Contractor shall maintain each seeded area until acceptance of the individual area. Maintenance shall consist of providing protection by erecting necessary signs or barriers and by repairing damaged areas as directed. Damaged areas shall be repaired by re-establishing the grade of the area prior to damage and by reapplying mulch. Refertilizing and reseeding will not be required during this period. Necessary maintenance or repairs will not be paid for but shall be considered incidental to the Contract. Areas fertilized, seeded, and mulched between October 16 and February 28 will be accepted only upon attainment of a reasonably thick uniform stand of not less than 90 percent coverage of permanent grasses, free from sizable thin or bare spots.

4. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorously growing condition for two cuttings.

5. Immediately reseed areas which show bare spots.

3.03 RESTORATION

A. Restore improvements damaged by or removed by this work to original condition, as acceptable to Owners or other parties or authorities having jurisdiction including but not limited to fences, curbs, signs, trees, shrubs, vegetation, poles, and posts.

END OF SECTION

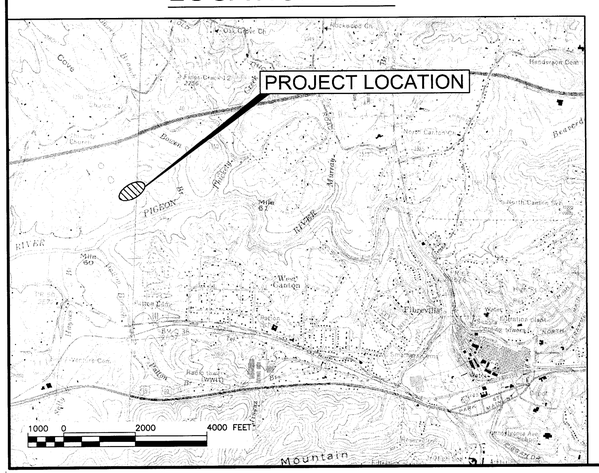
ATTACHMENT B

ENGINEERING DRAWINGS

EVERGREEN PACKAGING
CANTON, NORTH CAROLINA
LANDFILL NO. 6
AREA 6B AND 6C MAINTENANCE REGRADING

TITLE	DRAWING NUMBER
COVER SHEET	
SITE LOCATION PLAN	C-101
EXISTING CONDITIONS PLAN	C-102
AREA 6B-UPPER MAINTENANCE REGRADING PLAN	C-103
AREA 6C-UPPER MAINTENANCE REGRADING PLAN	C-104
AREA 6C-LOWER MAINTENANCE REGRADING PLAN	C-105
EROSION CONTROL SECTIONS & DETAILS	C-300

LOCATION MAP



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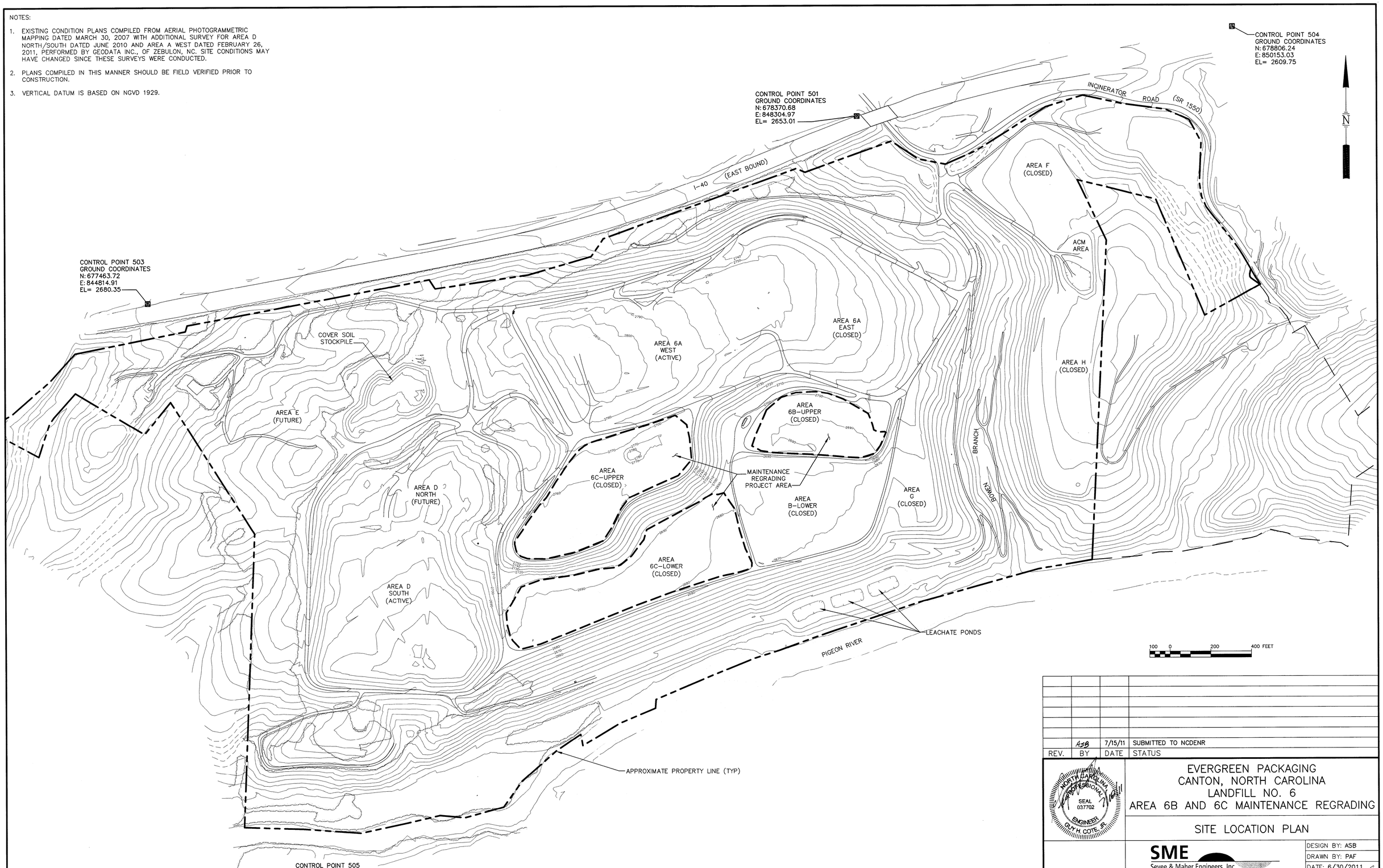
JULY 2011
JOB NO. 11112.01

NOTES:

1. EXISTING CONDITION PLANS COMPILED FROM AERIAL PHOTOGRAMMETRIC MAPPING DATED MARCH 30, 2007 WITH ADDITIONAL SURVEY FOR AREA D NORTH/SOUTH DATED JUNE 2010 AND AREA A WEST DATED FEBRUARY 26, 2011, PERFORMED BY GEODATA INC., OF ZEBULON, NC. SITE CONDITIONS MAY HAVE CHANGED SINCE THESE SURVEYS WERE CONDUCTED.
2. PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.
3. VERTICAL DATUM IS BASED ON NGVD 1929.



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	ASB	7/15/11	SUBMITTED TO NCDENR

NORTH CAROLINA PROFESSIONAL SEAL 037702 ENGINEER GUY H. COTE, JR. 7/15/11

EVERGREEN PACKAGING
CANTON, NORTH CAROLINA
LANDFILL NO. 6
AREA 6B AND 6C MAINTENANCE REGRADING

SITE LOCATION PLAN

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ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
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DATE: 6/30/2011
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LMN: SITE
CTB: SME-STD

JOB NO. 11112.01 DWG FILE 6B-C-SITE

C-101

www.mbtfb.com/ACS8-Chase/Plot/83-C-SITE.dwg, 7/15/2011 10:29:57 AM, ajn

NOTES:

1. EXISTING CONDITION PLANS COMPILED FROM AERIAL PHOTOGRAMMETRIC MAPPING DATED MARCH 30, 2007 WITH ADDITIONAL SURVEY FOR AREA D NORTH/SOUTH DATED JUNE 2010 AND AREA A WEST DATED FEBRUARY 26, 2011, PERFORMED BY GEODATA INC., OF ZEBULON, NC. SITE CONDITIONS MAY HAVE CHANGED SINCE THESE SURVEYS WERE CONDUCTED.
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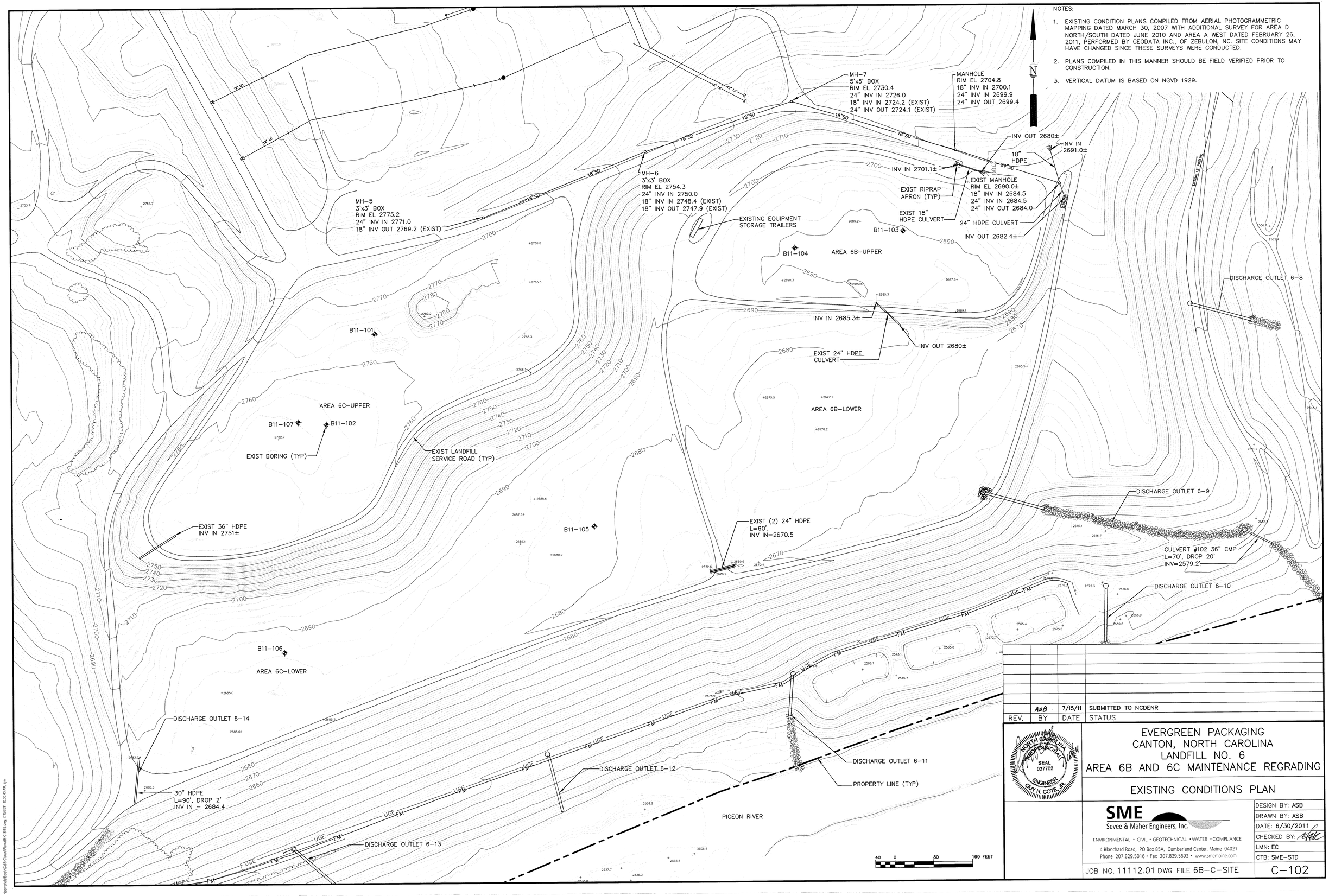

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NORTH CAROLINA PROFESSIONAL SEAL 037702 ENGINEER GLYN H. COTE, JR.

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CANTON, NORTH CAROLINA
LANDFILL NO. 6
AREA 6B AND 6C MAINTENANCE REGRADING

EXISTING CONDITIONS PLAN

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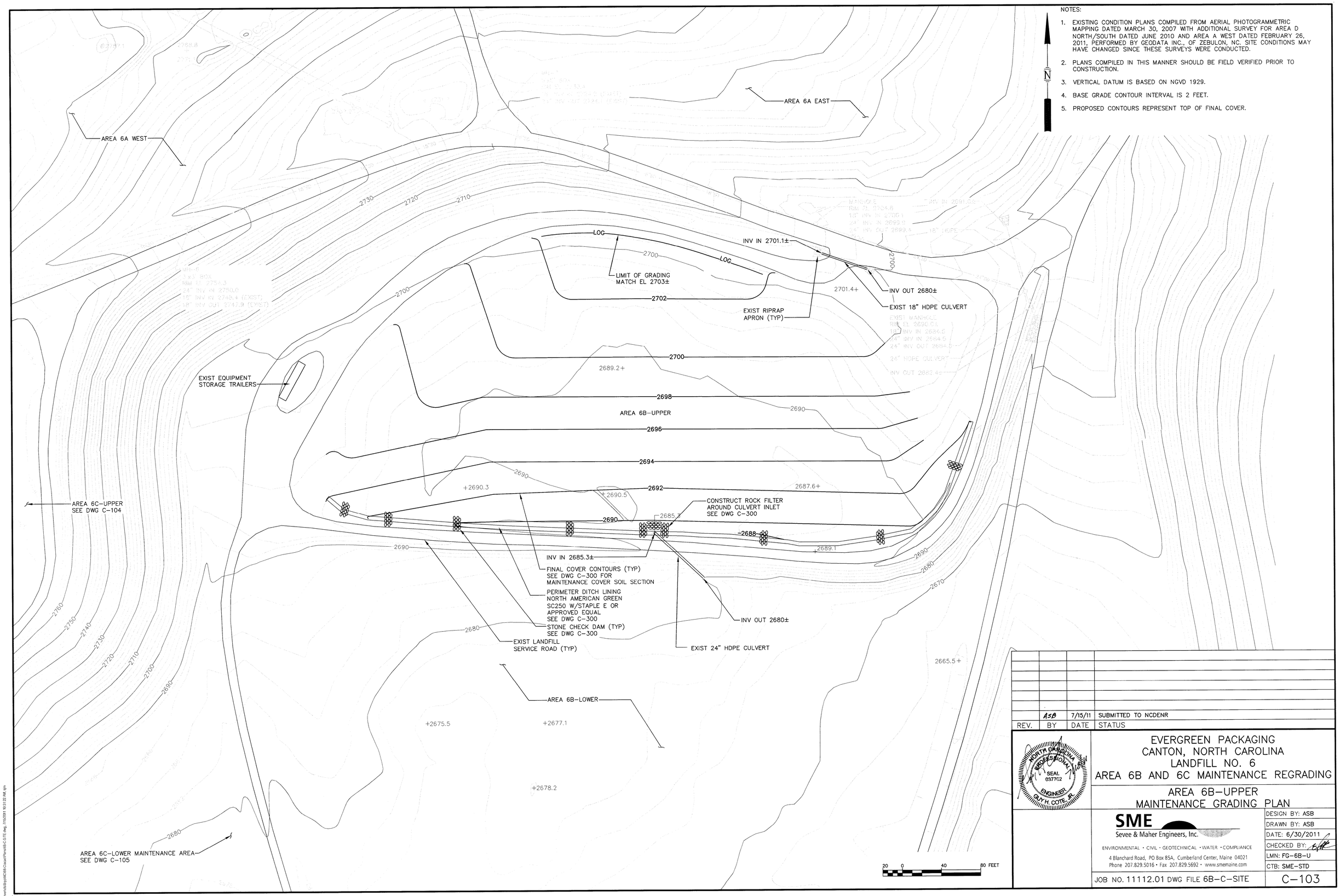
LMN: EC
CTB: SME-STD

JOB NO. 11112.01 DWG FILE 6B-C-SITE

C-102

NOTES:

1. EXISTING CONDITION PLANS COMPILED FROM AERIAL PHOTOGRAMMETRIC MAPPING DATED MARCH 30, 2007 WITH ADDITIONAL SURVEY FOR AREA D NORTH/SOUTH DATED JUNE 2010 AND AREA A WEST DATED FEBRUARY 26, 2011, PERFORMED BY GEODATA INC., OF ZEBULON, NC. SITE CONDITIONS MAY HAVE CHANGED SINCE THESE SURVEYS WERE CONDUCTED.
2. PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.
3. VERTICAL DATUM IS BASED ON NGVD 1929.
4. BASE GRADE CONTOUR INTERVAL IS 2 FEET.
5. PROPOSED CONTOURS REPRESENT TOP OF FINAL COVER.



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LANDFILL NO. 6
AREA 6B AND 6C MAINTENANCE REGRADING

AREA 6B-UPPER
MAINTENANCE GRADING PLAN

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C-103

NOTES:

1. EXISTING CONDITION PLANS COMPILED FROM AERIAL PHOTOGRAMMETRIC MAPPING DATED MARCH 30, 2007 WITH ADDITIONAL SURVEY FOR AREA D NORTH/SOUTH DATED JUNE 2010 AND AREA A WEST DATED FEBRUARY 26, 2011, PERFORMED BY GEODATA INC., OF ZEBULON, NC. SITE CONDITIONS MAY HAVE CHANGED SINCE THESE SURVEYS WERE CONDUCTED.
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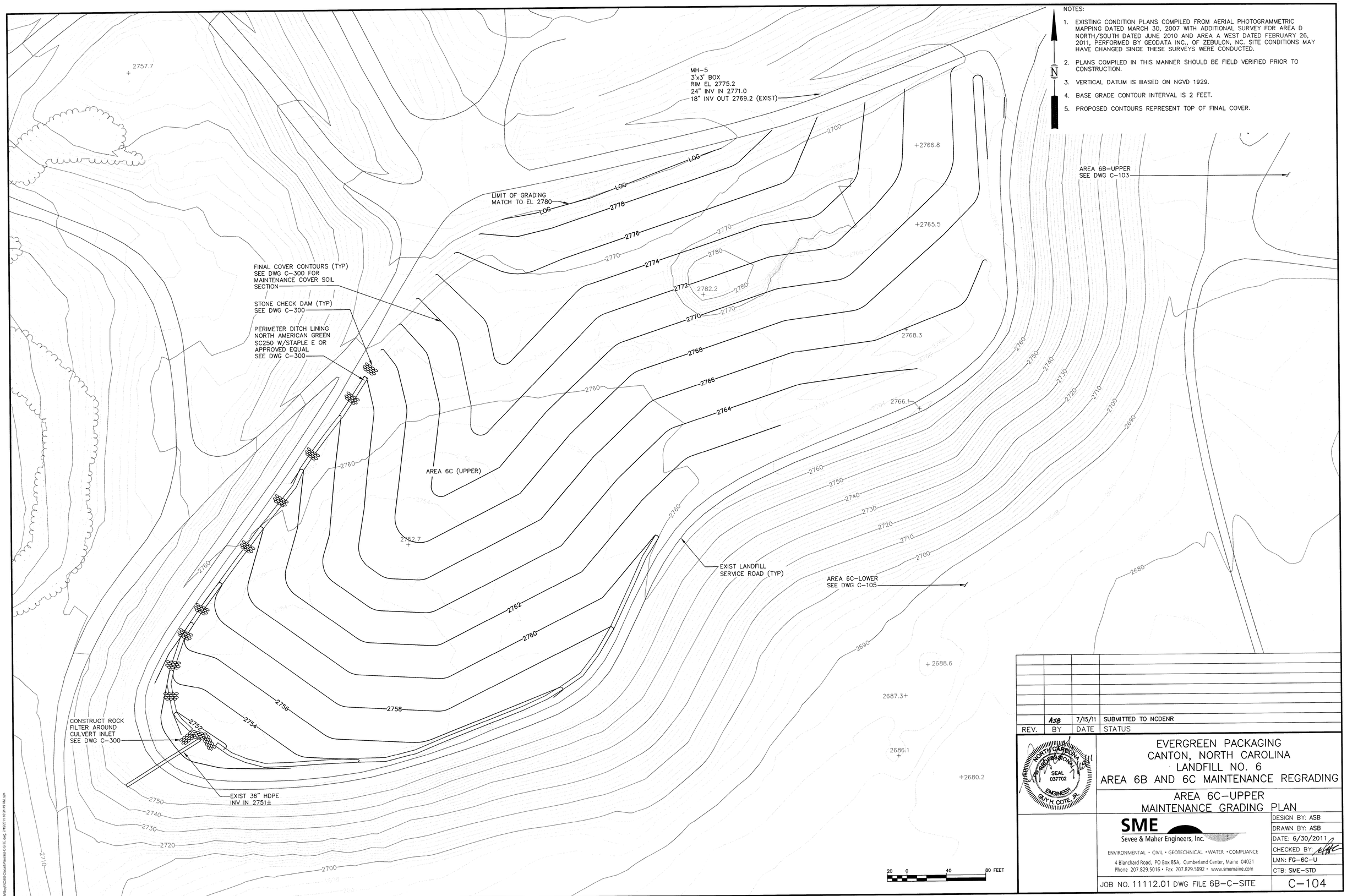

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EVERGREEN PACKAGING
CANTON, NORTH CAROLINA
LANDFILL NO. 6
AREA 6B AND 6C MAINTENANCE REGRADING

AREA 6C-UPPER
MAINTENANCE GRADING PLAN

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C-104

EXIST LANDFILL SERVICE ROAD (TYP)

AREA 6C–UPPER SEE DWG C–104

LIMIT OF GRADING MATCH TO EL 2696

AREA 6B–LOWER

EXIST (2) 24" HDP L=60', INV IN = 2670.5

EXIST 36" HDPE INV IN 2751±

LIMIT OF GRADING MATCH TOE OF EXISTING SLOPE

CONSTRUCT ROCK FILTER AROUND CULVERT INLET SEE DWG C–300

AREA 6C–LOWER

STONE CHECK DAM (TYP) SEE DWG C–300

EXIST LANDFILL SERVICE ROAD (TYP)

FINAL COVER CONTOURS (TYP) SEE DWG C–300 FOR MAINTENANCE COVER SECTION

PERIMETER DITCH LINING NORTH AMERICAN GREEN SC250 W/STAPLE E OR APPROVED EQUAL SEE DWG C–300

CONSTRUCT ROCK FILTER AROUND CULVERT INLET SEE DWG C–300

30" HDPE L=90', DROP 2' INV IN = 2684.4

NOTES:

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2. PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.
3. VERTICAL DATUM IS BASED ON NGVD 1929.
4. BASE GRADE CONTOUR INTERVAL IS 2 FEET.
5. PROPOSED CONTOURS REPRESENT TOP OF FINAL COVER.

20 0 40 80 FEET

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	ASB	7/15/11	SUBMITTED TO NCDENR

NORTH CAROLINA PROFESSIONAL SEAL 037702 ENGINEER GUY H. COTE, JR.

EVERGREEN PACKAGING CANTON, NORTH CAROLINA LANDFILL NO. 6 AREA 6B AND 6C MAINTENANCE REGRADING

AREA 6C–LOWER MAINTENANCE GRADING PLAN

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CTB: SME–STD

JOB NO. 11112.01 DWG FILE 6B–C–SITE

C–105

GENERAL NOTES:

1. THE CONTRACTOR MUST COMPLY WITH ALL APPLICABLE SAFETY PROCEDURES WITH RESPECT TO THE EMPLOYEES OF THE CONTRACTOR AND SUBCONTRACTOR(S) UNDER THE OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA) AND REGULATIONS ISSUED THEREUNDER; AND NORTH CAROLINA STATE LABOR (SAFETY) DEPARTMENT; AND EVERGREEN PACKAGING RULES, PROCEDURES, AND REGULATIONS REGARDING SAFETY.

2. EROSION AND SEDIMENT CONTROL PLAN:

A. PROJECT DESCRIPTION

(1) THIS PROJECT CONSISTS OF MAINTENANCE ACTIVITIES RELATED TO THE GRADING OF COVER SOIL MATERIAL ON LANDFILL CELLS 6B–UPPER, 6C–UPPER, AND 6C–LOWER.

(2) THE PRIMARY MEANS OF EROSION AND SEDIMENT CONTROL WILL BE:

- SILT FENCE
- ROCK FILTERS
- TEMPORARY AND PERMANENT SEEDING OF SLOPES
- TEMPORARY MULCHING OF DISTURBED AREAS
- EROSION CONTROL MATTING

B. SITE DESCRIPTION:

(1) THE TOTAL CELL MAINTENANCE AREA IN THIS PROJECT IS APPROXIMATELY 18.7 ACRES (CELL 6B–UPPER, 3.6 ACRES; CELL 6C–UPPER, 6.8 ACRES; AND CELL 6C–LOWER, 8.3 ACRES). THE SLOPES WITHIN EACH MAINTENANCE AREA ARE NEARLY FLAT TO MODERATE (2% TO 7%).

(2) ADJACENT PROPERTY: MAINTENANCE AREAS ARE LOCATED ENTIRELY WITHIN PROPERTY OWNED BY EVERGREEN PACKAGING.

C. MAINTENANCE AND INSPECTION:

(1) RESPONSIBLE PARTIES: THE CONTRACTOR WILL BE RESPONSIBLE FOR INSTALLATION AND MAINTENANCE OF EROSION AND SEDIMENT CONTROL MEASURES UNTIL THE SITE IS STABILIZED (90% GRASS COVER) AND APPROVED BY EVERGREEN PACKAGING.

(2) MAINTENANCE PLAN:

(a) ALL EROSION AND SEDIMENT CONTROL MEASURES WILL BE CHECKED BY A QUALIFIED INDIVIDUAL FOR STABILITY AND OPERATION AT LEAST ONCE PER WEEK AND FOLLOWING EVERY RUNOFF–PRODUCING RAINFALL. THE CONTRACTOR WILL MAKE ANY NEEDED REPAIRS IMMEDIATELY TO MAINTAIN ALL MEASURES AS DESIGNED.

(b) RECORDS OF INSPECTIONS AND REPAIRS/MAINTENANCE WILL BE KEPT AS REQUIRED BY EVERGREEN PACKAGING'S NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES (NCDENR) GENERAL PERMIT TO DISCHARGE STORMWATER UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES).

(c) ALL PREVIOUSLY SEEDED AREAS THAT DO NOT DEVELOP A SUFFICIENT GROWTH OF GRASS WILL BE FERTILIZED, RESEEDED, AND MULCHED ACCORDING TO THE SPECIFICATIONS TO REPAIR AND MAINTAIN A VIGOROUS, DENSE VEGETATIVE COVER.

D SPECIFICATIONS:

(1) THE CONTRACTOR IS ADVISED THAT PARTICULAR ATTENTION TO EROSION AND SEDIMENT CONTROL IN ACCORDANCE WITH THE SEDIMENTATION CONTROL ACT OF 1973 AS CONTAINED IN THE NORTH CAROLINA ENVIRONMENTAL POLICY ACT (SEPA)–GS113A, ARTICLE 4, IS AN INTEGRAL PART OF THIS WORK.

(2) THE BASIC OBJECTIVE IN EROSION AND SEDIMENT CONTROL SHALL BE TO:

- IDENTIFY CRITICAL AREAS;
- LIMIT THE SIZE OF DISTURBED OR EXPOSED AREAS;
- LIMIT THE TIME OF EXPOSURE OR DURATION OF DISTURBANCE TO AN AREA;
- CONTROL SURFACE WATER RUNOFF OVER EXPOSED AREAS SO AS TO REDUCE EROSION AND SEDIMENT LOSS; AND,
- PLAN AND CONDUCT THE WORK SO AS TO MINIMIZE EXPOSURE TO POSSIBLE EROSION AND OFF–SITE SEDIMENTATION DAMAGE.

(1) ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES WILL BE PERFORMED IN STRICT ACCORDANCE WITH THE "NORTH CAROLINA EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL", INCLUDING THE LATEST DATA FROM THE NATURAL RESOURCE CONSERVATION SERVICE (NRCS).

(2) THE DISTURBANCE OF EXISTING SOIL COVER WILL BE KEPT TO A MINIMUM DURING MAINTENANCE GRADING ACTIVITIES.

(3) FINISHED SURFACES SHALL BE STABILIZED AS SOON AS POSSIBLE. IN NO CASE SHALL ANY DISTURBED/EXPOSED AREAS REMAIN UNPROTECTED FOR MORE THAN 30 DAYS.

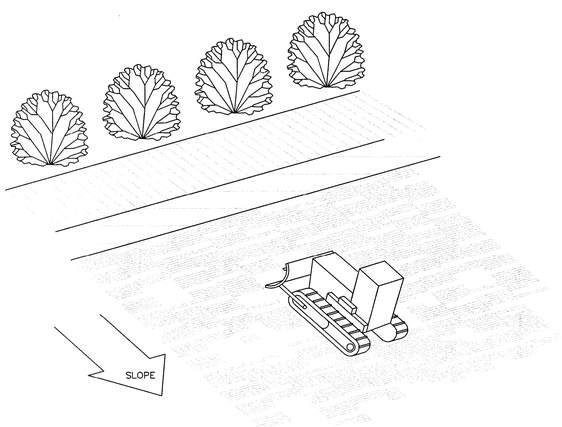
E. CONSTRUCTION SEQUENCE:

(1) EROSION AND SEDIMENT CONTROL MEASURES SUCH AS ROCK FILTERS, EROSION CONTROL MATTING AND SILTATION FENCING WILL BE INSTALLED AS SHOWN AND/OR ADJUSTED TO SUIT CONSTRUCTION IMMEDIATELY AFTER A CUT OR FILL SLOPE HAS BEEN CREATED.

(2) ACCEPTABLE EXISTING TOPSOIL WILL BE STRIPPED AND STOCKPILED FOR REUSE AS FINAL COVER. TOPSOIL SUITABLE FOR REUSE WILL BE STOCKPILED ON–SITE IN A MANNER THAT NATURAL DRAINAGE IS NOT OBSTRUCTED AND PROTECTED SO THAT NO OFF–SITE SEDIMENT DAMAGE WILL RESULT.

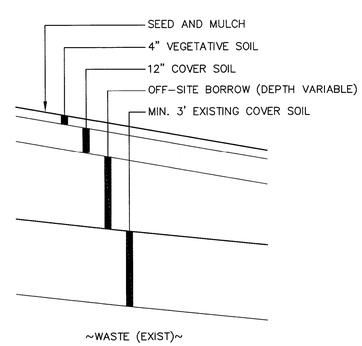
(3) PROCEED WITH EARTHMOVING OPERATIONS, SLOPING THE AREAS TO MEET THE PROPOSED FINAL GRADES.

(4) TEMPORARY MEASURES SHALL BE MAINTAINED UNTIL THE AREA IS SATISFACTORILY STABILIZED BY A GROWTH OF GRASS AND APPROVED BY EVERGREEN PACKAGING. WHEN TEMPORARY MEASURES ARE REMOVED, THE AREA SHALL BE IMMEDIATELY SEEDED AND MULCHED AS NECESSARY.

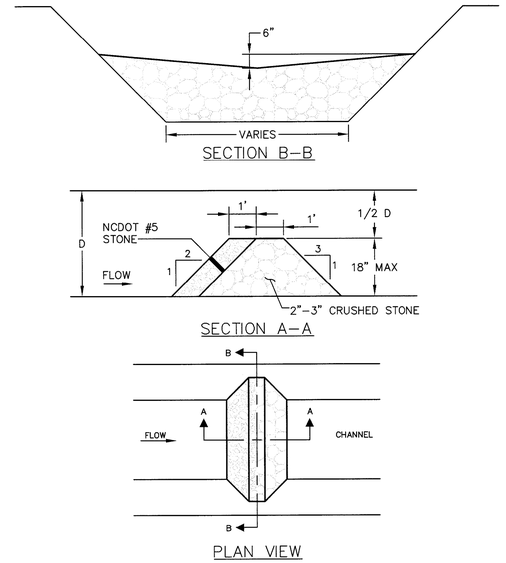


NOTES:
1. SLOPE TRACKING SHALL BE PERFORMED BY CONTRACTOR ON ALL FINISHED AREAS TO BE SEEDED.
2. TRACKING SHALL BE PERFORMED BY RUNNING TRACKED MACHINERY UP AND DOWN SLOPES LEAVING TREAD MARKS PARALLEL TO THE CONTOUR.

SLOPE TRACKING
NTS

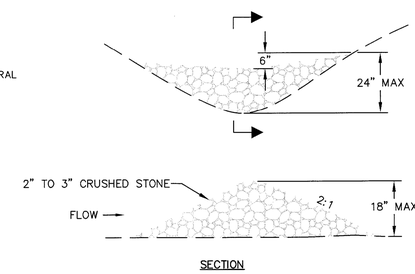


MAINTENANCE COVER SYSTEM
NTS



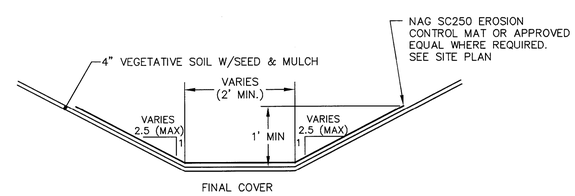
NOTE: SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE HEIGHT OF THE FILTERS. IMMEDIATELY UPON STABILIZATION OF EACH CHANNEL, REMOVE ACCUMULATED SEDIMENT, REMOVE ROCK FILTER AND STABILIZE DISTURBED AREAS.

ROCK FILTER
NTS

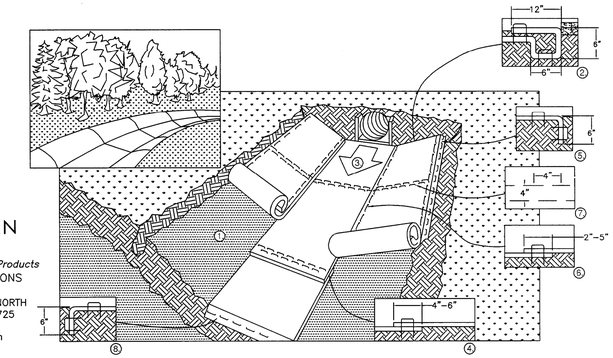


SPACING BETWEEN CHECK DAMS	
"So" FT/FT	"L" FT
0.020	75
0.030	50
0.040	40
0.050	30
0.080	20
0.100	10

STONE CHECK DAM
NTS



GRASS DITCH
NTS



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EROSION CONTROL *Products Guaranteed* SOLUTIONS
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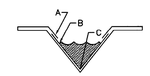
EVANSVILLE, IN 47725
800–772–2040
www.nagreen.com

1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP's), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE RECP's IN A 6" DEEP X 6" WIDE TRENCH WITH APPROXIMATELY 12" OF RECP's EXTENDED BEYOND THE UP–SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP's WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMAPCT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF RECP's BACK OVER SEED AND COMPACTED SOIL. SECURE RECP's OVER COMPACTED SOIL WITH A ROW OF STAPLES SPACED APPROXIMATELY 12" ACROSS THE WIDTH OF THE RECP's.
3. ROLL CENTER RECP's IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. RECP's WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP's MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM™, STAPLES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. PLACE CONSECUTIVE RECP's END OVER END (SHINGLE STYLE) WITH A 4" – 6" OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER TO SECURE RECP's.
5. FULL LENGTH EDGE OF RECP's AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES APPROXIMATELY 12" APART IN A 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. ADJACENT RECP's MUST BE OVERLAPPED APPROXIMATELY 2" – 5" (DEPENDING ON RECP's TYPE) AND STAPLED.
7. IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 4" APART AND 4" ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
8. THE TERMINAL END OF THE RECP's MUST BE ANCHORED WITH A ROW OF STAPLES APPROXIMATELY 12" APART IN A 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.

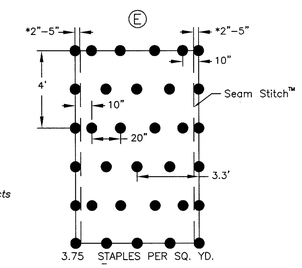
NOTE:
* IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" MAY BE NECESSARY TO PROPERLY ANCHOR THE RECP's.



CRITICAL POINTS
A. OVERLAPS AND SEAMS
B. PROJECTED WATER LINE
C. CHANNEL BOTTOM/SIDE SLOPE VERTICES

NOTE:
* HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE.

CHANNEL INSTALLATION
NTS



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For blankets with the North American Green DOT System™ place staples through each of the dots.

DOT SYSTEM™ STAPLE PATTERN GUIDE
NTS

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NORTH CAROLINA PROFESSIONAL SEAL 037702 ENGINEER GUY H. COTE, JR.

EVERGREEN PACKAGING
CANTON, NORTH CAROLINA
LANDFILL NO. 6
AREA 6B AND 6C MAINTENANCE REGRADING

EROSION CONTROL
SECTIONS AND DETAILS

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JOB NO. 11123.00 DWG FILE 6B–C DETAILS

C–300

ATTACHMENT C

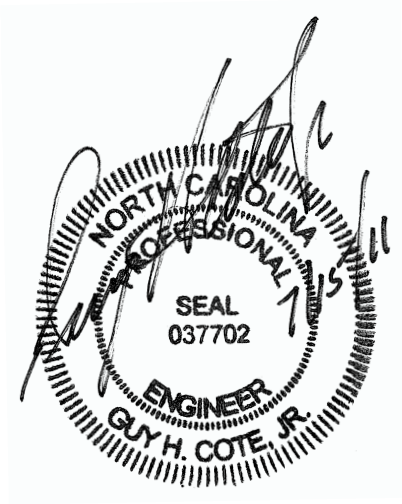
STORMWATER MANAGEMENT PLAN

STORMWATER MANAGEMENT PLAN
FOR
LANDFILL NO. 6
MAINTENANCE REGRADING
AREA 6B-UPPER, AREA 6C-UPPER,
AND AREA 6C-LOWER
CANTON, NORTH CAROLINA

Prepared for

EVERGREEN PACKAGING
CANTON, NORTH CAROLINA

July 2011



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3.0	EROSION CONTROL CALCULATIONS	2
3.1	Turf Reinforcement Matting	2
3.2	Rock Filters	3

LIST OF ATTACHMENTS

ATTACHMENT C-1 STORMWATER FLOW CALCULATIONS
ATTACHMENT C-2 EROSION CONTROL CALCULATIONS

STORMWATER MANAGEMENT PLAN
FOR
LANDFILL NO. 6
MAINTENANCE GRADING
AREA 6B-UPPER, AREA 6C-UPPER,
AND AREA 6C-LOWER
EVERGREEN PACKAGING

1.0 INTRODUCTION

Evergreen Packaging (Evergreen) proposes to conduct maintenance activities related to formerly closed cells at Landfill No. 6, Areas 6B-Upper, 6C-Upper, and 6C-Lower. Approximately 18.8 acres of area will be regraded during the fall of 2011. The maintenance activities will consist of placing off-site borrow soil (variable depth), then 12 inches of cover soil, overlain by a 4-inch vegetative soil layer. The following is an overview of stormwater management and erosion control design considerations and calculations.

2.0 STORMWATER RUNOFF

Stormwater runoff calculations for the site were performed utilizing the methodology outlined by the USDA Soil Conservation Service's Technical Release Number 20 (TR20), February 1992 Revision, and a computer stormwater modeling system entitled "Hydrocad" by Applied Microcomputer Systems of Chocorua, New Hampshire. A 24-hour Type II storm with antecedent moisture Condition II (normal conditions) was used to model the runoff characteristics of the site. Models were created using 2-year and 25-year frequency storm events.

2.1 Cover Maintenance

Maintenance of the cover over portions of the three areas outlined above will re-establish the slopes necessary for proper drainage. Surface water runoff from each area will be directed away to the perimeter ditches. The perimeter ditches will direct clean water runoff to existing culverts installed during the original closure of the cells. All stormwater from the project area eventually discharges to the Pigeon River.

When the regrading is completed, runoff from approximately 5.0 acres will flow from Area 6B-Upper, 9.0 acres will flow from Area 6C-Upper, and runoff from approximately 14.7 acres will flow from Area 6C-Lower (see figure in Attachment C-1). The calculated peak flow generated during the 2-year/24-hour and 25-year/24-hour rain events are contained in Attachment C-1.

3.0 EROSION CONTROL CALCULATIONS

An erosion and sediment control analysis was performed to evaluate the potential for sedimentation as a result of stormwater runoff within the maintenance regrading areas. The analysis incorporated the stormwater calculations by evaluating the runoff velocities in sheet flow, shallow concentrated flow, and concentrated flow areas. Stormwater runoff velocities are greatest within the perimeter ditches which collect runoff from the three maintenance areas. Erosion control measures were implemented to 1) reduce the concentrated flow runoff velocities; 2) reestablish vegetation on disturbed areas; and 3) trap sediments that may come into contact with stormwater.

Stormwater runoff and erosion control calculations suggested that vegetated ditches require temporary stabilization during the growing period. Turf reinforcement matting provides an effective means to reduce runoff velocities by providing a higher roughness coefficient than bare soils while grass cover is established. The erosion control analysis also suggested that permanent turf matting was required in these same areas. Rock filter check dams within the perimeter ditches also help to reduce runoff velocities and trap sediments while stormwater flows through the stone media. Rock filters installed around the culvert inlets provide an added measure of trapping sediment before discharging to downstream waters.

3.1 Turf Reinforcement Matting

Design of the erosion control matting was analyzed using North American Green's (NAG) Erosion Control Material Software Version 4.3. Flow from a 2-year, 24-hour storm event was used to design temporary channel linings and flow from a 25-year, 24-hour storm event was used to design permanent channel linings. The NAG model reports that channel linings are stable with temporary matting SC150 and Staple Pattern D as manufactured by North American Green. However, the SC150 matting is photodegradable after 24 months leaving unstable, vegetated ditches after decomposition. The NAG model reports that the ditches are stable with

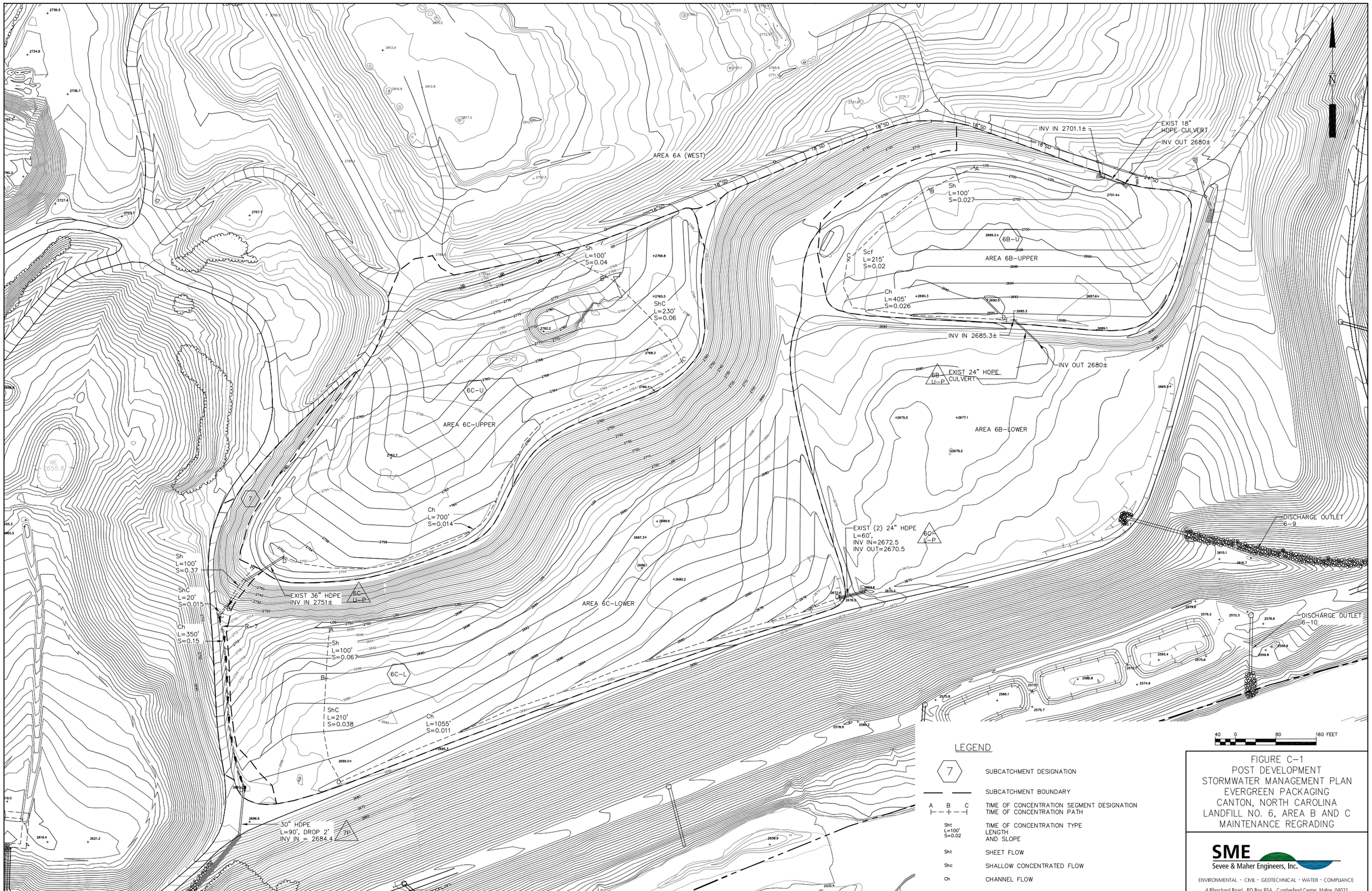
permanent matting SC250 with Staple Pattern E for the temporary and permanent design storm events. Therefore, permanent matting SC250 with Staple Pattern E (or approved equal) is specified for all ditch locations. See the engineering drawings in Attachment B for the mat locations and Attachment C-2 for erosion control calculations.

3.2 Rock Filters

Rock Filters will be installed on the perimeter ditches as a temporary (construction) erosion control measure. Rock filters are also specified around the culvert inlets as an added measure to mitigate sediment from entering the culverts. The rock filters shall be removed after the site is stabilized as approved by the owner or its representative. The locations and stone size are shown on the engineering drawings included in Attachment B of the Design Report.

ATTACHMENT C-1

STORMWATER FLOW CALCULATIONS



LEGEND

7	SUBCATCHMENT DESIGNATION
— —	SUBCATCHMENT BOUNDARY
A B C	TIME OF CONCENTRATION SEGMENT DESIGNATION TIME OF CONCENTRATION PATH
Sht L=100' S=0.02	TIME OF CONCENTRATION TYPE LENGTH AND SLOPE
Sht	SHEET FLOW
Shc	SHALLOW CONCENTRATED FLOW
Ch	CHANNEL FLOW

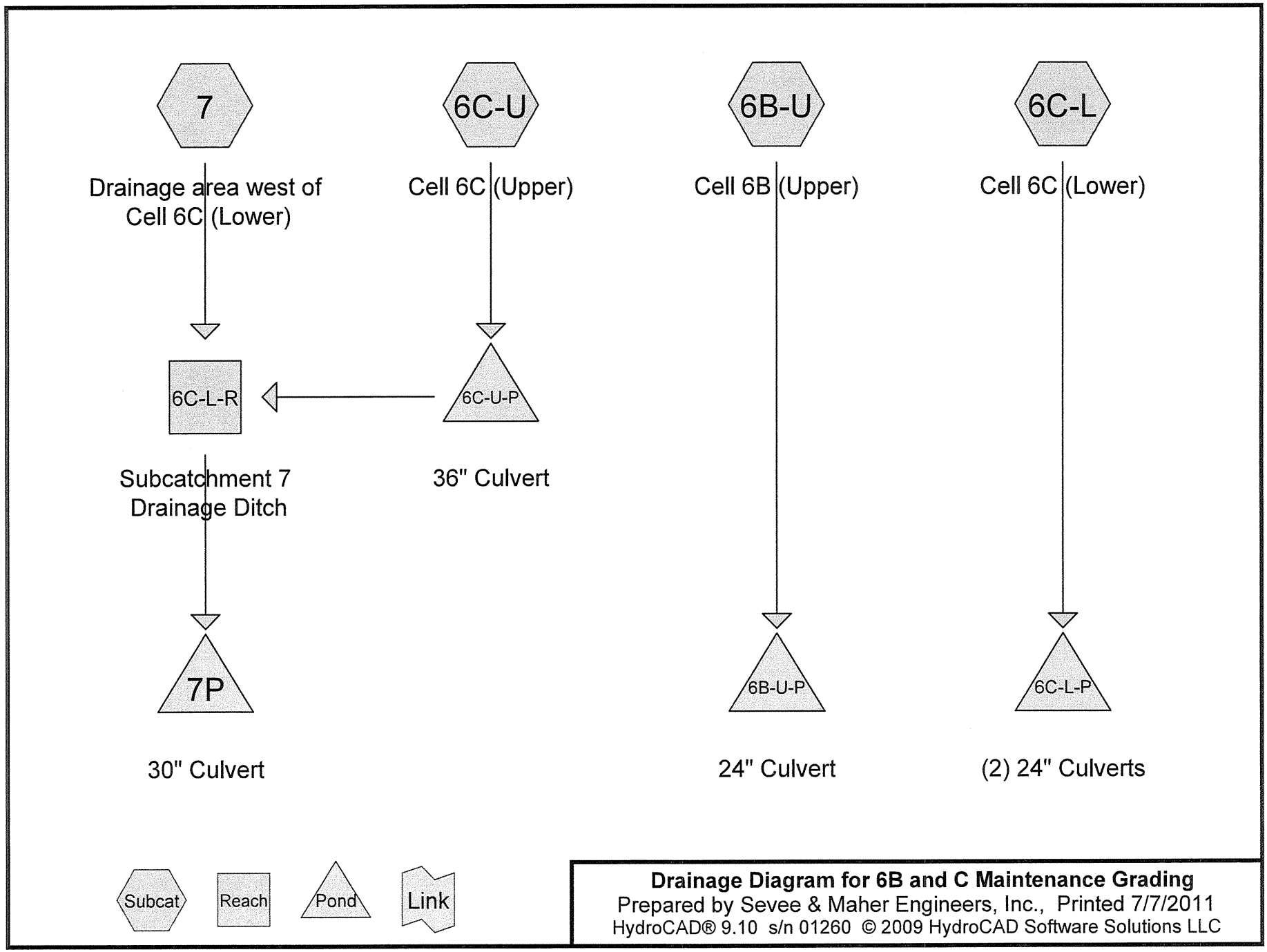
FIGURE C-1
POST DEVELOPMENT
STORMWATER MANAGEMENT PLAN
EVERGREEN PACKAGING
CANTON, NORTH CAROLINA
LANDFILL NO. 6, AREA B AND C
MAINTENANCE REGRADING

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DWG: 6B-C-SITE LMN: SMP-POST CTB: SME-STD REV: 7/7/2011

\\Nserver\cfs\BrppNC\6B-C\acad\Plans\6B-C-SITE.dwg, 7/15/2011 3:24:16 PM, asb, 1:2.09302

2-YEAR/24-HOUR STORM



Drainage Diagram for 6B and C Maintenance Grading
Prepared by Sevee & Maher Engineers, Inc., Printed 7/7/2011
HydroCAD® 9.10 s/n 01260 © 2009 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
27.66	71	Landfill Cover Soil (6B-U, 6C-L, 6C-U, 7)
1.11	89	Gravel roads, HSG C (6B-U, 6C-L, 6C-U, 7)
28.77		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.00	HSG A	
0.00	HSG B	
1.11	HSG C	6B-U, 6C-L, 6C-U, 7
0.00	HSG D	
27.66	Other	6B-U, 6C-L, 6C-U, 7
28.77		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment6B-U: Area 6B (Upper) Runoff Area=5.01 ac 0.00% Impervious Runoff Depth>1.12"
Flow Length=720' Tc=12.7 min CN=72 Runoff=7.50 cfs 0.466 af

Subcatchment6C-L: Area 6C (Lower) Runoff Area=14.74 ac 0.00% Impervious Runoff Depth>1.06"
Flow Length=1,365' Tc=14.5 min CN=71 Runoff=19.52 cfs 1.301 af

Subcatchment6C-U: Area 6C (Upper) Runoff Area=8.09 ac 0.00% Impervious Runoff Depth>1.12"
Flow Length=1,030' Tc=14.6 min CN=72 Runoff=11.35 cfs 0.753 af

Subcatchment7: Drainage area west of Area Runoff Area=0.93 ac 0.00% Impervious Runoff Depth>1.24"
Flow Length=470' Tc=4.8 min CN=74 Runoff=2.11 cfs 0.096 af

Reach 6C-L-R: Subcatchment7 Avg. Flow Depth=0.65' Max Vel=8.77 fps Inflow=11.13 cfs 0.848 af
n=0.030 L=440.0' S=0.1507 '/' Capacity=656.80 cfs Outflow=10.96 cfs 0.847 af

Pond 6B-U-P: 24" Culvert Peak Elev=2,686.70' Storage=161 cf Inflow=7.50 cfs 0.466 af
24.0" Round Culvert n=0.012 L=70.0' S=0.0757 '/' Outflow=7.45 cfs 0.466 af

Pond 6C-L-P: (2) 24" Culverts Peak Elev=2,673.63' Storage=1,503 cf Inflow=19.52 cfs 1.301 af
24.0" Round Culvert x 2.00 n=0.012 L=60.0' S=0.0250 '/' Outflow=18.84 cfs 1.301 af

Pond 6C-U-P: 36" Culvert Peak Elev=2,752.43' Storage=1,061 cf Inflow=11.35 cfs 0.753 af
36.0" Round Culvert n=0.012 L=80.0' S=0.0125 '/' Outflow=10.68 cfs 0.752 af

Pond 7P: 30" Culvert Peak Elev=2,685.97' Storage=842 cf Inflow=10.96 cfs 0.847 af
30.0" Round Culvert n=0.012 L=90.0' S=0.0222 '/' Outflow=10.89 cfs 0.845 af

Total Runoff Area = 28.77 ac Runoff Volume = 2.617 af Average Runoff Depth = 1.09"
100.00% Pervious = 28.77 ac 0.00% Impervious = 0.00 ac

Summary for Subcatchment 6B-U: Area 6B (Upper)

Runoff = 7.50 cfs @ 12.03 hrs, Volume= 0.466 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Storm Rainfall=3.50"

	Area (ac)	CN	Description
*	4.65	71	Landfill Cover Soil
	0.36	89	Gravel roads, HSG C
	5.01	72	Weighted Average
	5.01		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	100	0.0270	0.20		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
3.6	215	0.0200	0.99		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.8	405	0.0260	8.81	229.09	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=2.00' Z= 4.5 '/' Top.W=22.00' n= 0.030 Earth, grassed & winding
12.7	720	Total			

Summary for Subcatchment 6C-L: Area 6C (Lower)

Runoff = 19.52 cfs @ 12.05 hrs, Volume= 1.301 af, Depth> 1.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Storm Rainfall=3.50"

	Area (ac)	CN	Description
*	14.69	71	Landfill Cover Soil
	0.05	89	Gravel roads, HSG C
	14.74	71	Weighted Average
	14.74		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0670	0.20		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.50"
2.6	210	0.0380	1.36		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.5	1,055	0.0110	5.09	81.46	**Trap/Vee/Rect Channel Flow, B-C** Bot.W=0.00' D=2.00' Z= 4.0 '/' Top.W=16.00' n= 0.030 Earth, grassed & winding
14.5	1,365	Total			

Summary for Subcatchment 6C-U: Area 6C (Upper)

Runoff = 11.35 cfs @ 12.05 hrs, Volume= 0.753 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Storm Rainfall=3.50"

	Area (ac)	CN	Description
*	7.57	71	Landfill Cover Soil
	0.52	89	Gravel roads, HSG C
	8.09	72	Weighted Average
	8.09		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	100	0.0400	0.16		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.50"
2.2	230	0.0600	1.71		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
2.1	700	0.0140	5.53	82.94	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=1.50' Z= 4.0 '/' Top.W=16.00' n= 0.030
14.6	1,030	Total			

Summary for Subcatchment 7: Drainage area west of Area 6C (Lower)

Runoff = 2.11 cfs @ 11.94 hrs, Volume= 0.096 af, Depth> 1.24"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Storm Rainfall=3.50"

	Area (ac)	CN	Description
*	0.75	71	Landfill Cover Soil
	0.18	89	Gravel roads, HSG C
	0.93	74	Weighted Average
	0.93		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.3700	0.39		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.50"
0.4	20	0.0150	0.86		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.2	350	0.1500	24.27	655.31	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=3.00' Z= 3.0 '/' Top.W=18.00' n= 0.030
4.8	470	Total			

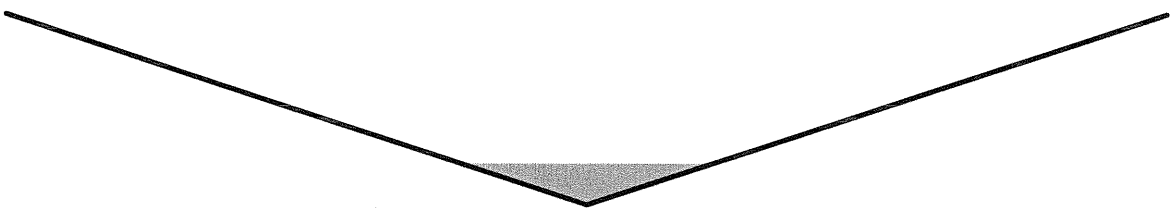
Summary for Reach 6C-L-R: Subcatchment 7 Drainage Ditch

Inflow Area = 9.02 ac, 0.00% Impervious, Inflow Depth > 1.13" for 2-Yr Storm event
Inflow = 11.13 cfs @ 12.08 hrs, Volume= 0.848 af
Outflow = 10.96 cfs @ 12.10 hrs, Volume= 0.847 af, Atten= 2%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.77 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 3.93 fps, Avg. Travel Time= 1.9 min

Peak Storage= 556 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.65'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 656.80 cfs

0.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 440.0' Slope= 0.1507 '/'
Inlet Invert= 2,750.00', Outlet Invert= 2,683.70'



Summary for Pond 6B-U-P: 24" Culvert

Inflow Area = 5.01 ac, 0.00% Impervious, Inflow Depth > 1.12" for 2-Yr Storm event
Inflow = 7.50 cfs @ 12.03 hrs, Volume= 0.466 af
Outflow = 7.45 cfs @ 12.04 hrs, Volume= 0.466 af, Atten= 1%, Lag= 0.8 min
Primary = 7.45 cfs @ 12.04 hrs, Volume= 0.466 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 2,686.70' @ 12.04 hrs Surf.Area= 400 sf Storage= 161 cf

Plug-Flow detention time= 0.1 min calculated for 0.466 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (862.4 - 862.3)

Volume	Invert	Avail.Storage	Storage Description
#1	2,685.30'	11,580 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,685.30	0	0	0
2,686.00	30	10	10
2,688.00	1,090	1,120	1,130
2,690.00	9,360	10,450	11,580

Device	Routing	Invert	Outlet Devices
#1	Primary	2,685.30'	**24.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900

Inlet / Outlet Invert= 2,685.30' / 2,680.00' S= 0.0757 '/' Cc= 0.900
n= 0.012 Corrugated PE, smooth interior

Primary OutFlow Max=7.38 cfs @ 12.04 hrs HW=2,686.69' (Free Discharge)
└**1=Culvert** (Inlet Controls 7.38 cfs @ 3.17 fps)

Summary for Pond 6C-L-P: (2) 24" Culverts

Inflow Area =	14.74 ac,	0.00% Impervious,	Inflow Depth >	1.06"	for 2-Yr Storm event
Inflow =	19.52 cfs @	12.05 hrs,	Volume=	1.301 af	
Outflow =	18.84 cfs @	12.08 hrs,	Volume=	1.301 af,	Atten= 3%, Lag= 1.7 min
Primary =	18.84 cfs @	12.08 hrs,	Volume=	1.301 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 2,673.63' @ 12.08 hrs Surf.Area= 1,840 sf Storage= 1,503 cf

Plug-Flow detention time= 1.1 min calculated for 1.298 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (867.6 - 866.8)

Volume	Invert	Avail.Storage	Storage Description
#1	2,672.00'	33,733 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,672.00	3	0	0
2,674.00	2,255	2,258	2,258
2,676.00	6,100	8,355	10,613
2,678.00	17,020	23,120	33,733

Device	Routing	Invert	Outlet Devices
#1	Primary	2,672.00'	**24.0" Round Culvert X 2.00** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2,672.00' / 2,670.50' S= 0.0250 '/' Cc= 0.900 n= 0.012 Corrugated PE, smooth interior

Primary OutFlow Max=18.52 cfs @ 12.08 hrs HW=2,673.61' (Free Discharge)
└**1=Culvert** (Inlet Controls 18.52 cfs @ 3.41 fps)

Summary for Pond 6C-U-P: 36" Culvert

Inflow Area =	8.09 ac,	0.00% Impervious,	Inflow Depth >	1.12"	for 2-Yr Storm event
Inflow =	11.35 cfs @	12.05 hrs,	Volume=	0.753 af	
Outflow =	10.68 cfs @	12.09 hrs,	Volume=	0.752 af,	Atten= 6%, Lag= 2.3 min
Primary =	10.68 cfs @	12.09 hrs,	Volume=	0.752 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 2,752.43' @ 12.09 hrs Surf.Area= 2,276 sf Storage= 1,061 cf

Plug-Flow detention time= 1.2 min calculated for 0.752 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (864.6 - 863.6)

Volume	Invert	Avail.Storage	Storage Description
#1	2,751.00'	8,870 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,751.00	0	0	0
2,752.00	800	400	400
2,754.00	7,670	8,470	8,870

Device	Routing	Invert	Outlet Devices
#1	Primary	2,751.00'	**36.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2,751.00' / 2,750.00' S= 0.0125 '/' Cc= 0.900 n= 0.012 Corrugated PE, smooth interior

Primary OutFlow Max=10.59 cfs @ 12.09 hrs HW=2,752.42' (Free Discharge)
└**1=Culvert** (Inlet Controls 10.59 cfs @ 3.21 fps)

Summary for Pond 7P: 30" Culvert

Inflow Area = 9.02 ac, 0.00% Impervious, Inflow Depth > 1.13" for 2-Yr Storm event
Inflow = 10.96 cfs @ 12.10 hrs, Volume= 0.847 af
Outflow = 10.89 cfs @ 12.13 hrs, Volume= 0.845 af, Atten= 1%, Lag= 1.2 min
Primary = 10.89 cfs @ 12.13 hrs, Volume= 0.845 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 2,685.97' @ 12.13 hrs Surf.Area= 836 sf Storage= 842 cf

Plug-Flow detention time= 2.8 min calculated for 0.844 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (866.0 - 864.6)

Volume	Invert	Avail.Storage	Storage Description
#1	2,684.00'	4,920 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,684.00	20	0	0
2,686.00	850	870	870
2,688.00	3,200	4,050	4,920

Device	Routing	Invert	Outlet Devices
#1	Primary	2,684.40'	**30.0" Round Culvert** L= 90.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2,684.40' / 2,682.40' S= 0.0222 '/' Cc= 0.900 n= 0.012 Corrugated PE, smooth interior

Primary OutFlow Max=10.75 cfs @ 12.13 hrs HW=2,685.95' (Free Discharge)
└**1=Culvert** (Inlet Controls 10.75 cfs @ 3.35 fps)

25-YEAR/24-HOUR STORM

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment6B-U: Area 6B (Upper) Runoff Area=5.01 ac 0.00% Impervious Runoff Depth>2.99"
Flow Length=720' Tc=12.7 min CN=72 Runoff=20.74 cfs 1.246 af

Subcatchment6C-L: Area 6C (Lower) Runoff Area=14.74 ac 0.00% Impervious Runoff Depth>2.89"
Flow Length=1,365' Tc=14.5 min CN=71 Runoff=55.80 cfs 3.549 af

Subcatchment6C-U: Area 6C (Upper) Runoff Area=8.09 ac 0.00% Impervious Runoff Depth>2.98"
Flow Length=1,030' Tc=14.6 min CN=72 Runoff=31.54 cfs 2.012 af

Subcatchment7: Drainage area west of Area Runoff Area=0.93 ac 0.00% Impervious Runoff Depth>3.18"
Flow Length=470' Tc=4.8 min CN=74 Runoff=5.37 cfs 0.247 af

Reach 6C-L-R: Subcatchment7 Avg. Flow Depth=0.92' Max Vel=11.04 fps Inflow=27.92 cfs 2.258 af
n=0.030 L=440.0' S=0.1507 '/' Capacity=656.80 cfs Outflow=27.66 cfs 2.256 af

Pond 6B-U-P: 24" Culvert Peak Elev=2,688.49' Storage=2,148 cf Inflow=20.74 cfs 1.246 af
24.0" Round Culvert n=0.012 L=70.0' S=0.0757 '/' Outflow=17.66 cfs 1.246 af

Pond 6C-L-P: (2) 24" Culverts Peak Elev=2,676.17' Storage=11,705 cf Inflow=55.80 cfs 3.549 af
24.0" Round Culvert x 2.00 n=0.012 L=60.0' S=0.0250 '/' Outflow=42.51 cfs 3.548 af

Pond 6C-U-P: 36" Culvert Peak Elev=2,753.52' Storage=5,572 cf Inflow=31.54 cfs 2.012 af
36.0" Round Culvert n=0.012 L=80.0' S=0.0125 '/' Outflow=27.02 cfs 2.011 af

Pond 7P: 30" Culvert Peak Elev=2,687.59' Storage=3,702 cf Inflow=27.66 cfs 2.256 af
30.0" Round Culvert n=0.012 L=90.0' S=0.0222 '/' Outflow=25.98 cfs 2.253 af

Total Runoff Area = 28.77 ac Runoff Volume = 7.054 af Average Runoff Depth = 2.94"
100.00% Pervious = 28.77 ac 0.00% Impervious = 0.00 ac

Summary for Subcatchment 6B-U: Area 6B (Upper)

Runoff = 20.74 cfs @ 12.02 hrs, Volume= 1.246 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Storm Rainfall=6.00"

	Area (ac)	CN	Description
*	4.65	71	Landfill Cover Soil
	0.36	89	Gravel roads, HSG C
	5.01	72	Weighted Average
	5.01		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	100	0.0270	0.20		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
3.6	215	0.0200	0.99		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.8	405	0.0260	8.81	229.09	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=2.00' Z= 4.5 '/' Top.W=22.00' n= 0.030 Earth, grassed & winding
12.7	720	Total			

Summary for Subcatchment 6C-L: Area 6C (Lower)

Runoff = 55.80 cfs @ 12.04 hrs, Volume= 3.549 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Storm Rainfall=6.00"

	Area (ac)	CN	Description
*	14.69	71	Landfill Cover Soil
	0.05	89	Gravel roads, HSG C
	14.74	71	Weighted Average
	14.74		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0670	0.20		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.50"
2.6	210	0.0380	1.36		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.5	1,055	0.0110	5.09	81.46	**Trap/Vee/Rect Channel Flow, B-C** Bot.W=0.00' D=2.00' Z= 4.0 '/' Top.W=16.00' n= 0.030 Earth, grassed & winding
14.5	1,365	Total			

Summary for Subcatchment 6C-U: Area 6C (Upper)

Runoff = 31.54 cfs @ 12.04 hrs, Volume= 2.012 af, Depth> 2.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Storm Rainfall=6.00"

	Area (ac)	CN	Description
*	7.57	71	Landfill Cover Soil
	0.52	89	Gravel roads, HSG C
	8.09	72	Weighted Average
	8.09		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	100	0.0400	0.16		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.50"
2.2	230	0.0600	1.71		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
2.1	700	0.0140	5.53	82.94	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=1.50' Z= 4.0 '/' Top.W=16.00' n= 0.030
14.6	1,030	Total			

Summary for Subcatchment 7: Drainage area west of Area 6C (Lower)

Runoff = 5.37 cfs @ 11.93 hrs, Volume= 0.247 af, Depth> 3.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Storm Rainfall=6.00"

	Area (ac)	CN	Description
*	0.75	71	Landfill Cover Soil
	0.18	89	Gravel roads, HSG C
	0.93	74	Weighted Average
	0.93		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	100	0.3700	0.39		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.50"
0.4	20	0.0150	0.86		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.2	350	0.1500	24.27	655.31	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=3.00' Z= 3.0 '/' Top.W=18.00' n= 0.030
4.8	470	Total			

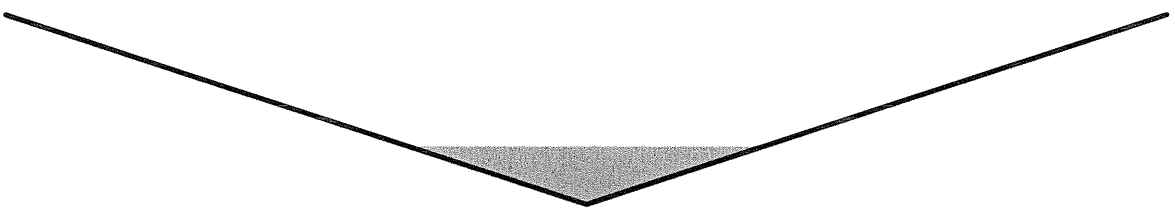
Summary for Reach 6C-L-R: Subcatchment 7 Drainage Ditch

Inflow Area = 9.02 ac, 0.00% Impervious, Inflow Depth > 3.00" for 25-Yr Storm event
Inflow = 27.92 cfs @ 12.10 hrs, Volume= 2.258 af
Outflow = 27.66 cfs @ 12.12 hrs, Volume= 2.256 af, Atten= 1%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 11.04 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 4.62 fps, Avg. Travel Time= 1.6 min

Peak Storage= 1,110 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.92'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 656.80 cfs

0.00' x 3.00' deep channel, n= 0.030 Earth, grassed & winding
Side Slope Z-value= 3.0 '/' Top Width= 18.00'
Length= 440.0' Slope= 0.1507 '/'
Inlet Invert= 2,750.00', Outlet Invert= 2,683.70'



Summary for Pond 6B-U-P: 24" Culvert

Inflow Area = 5.01 ac, 0.00% Impervious, Inflow Depth > 2.99" for 25-Yr Storm event
Inflow = 20.74 cfs @ 12.02 hrs, Volume= 1.246 af
Outflow = 17.66 cfs @ 12.08 hrs, Volume= 1.246 af, Atten= 15%, Lag= 3.6 min
Primary = 17.66 cfs @ 12.08 hrs, Volume= 1.246 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 2,688.49' @ 12.08 hrs Surf.Area= 3,099 sf Storage= 2,148 cf

Plug-Flow detention time= 0.6 min calculated for 1.246 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (834.0 - 833.4)

Volume	Invert	Avail.Storage	Storage Description
#1	2,685.30'	11,580 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,685.30	0	0	0
2,686.00	30	10	10
2,688.00	1,090	1,120	1,130
2,690.00	9,360	10,450	11,580

Device	Routing	Invert	Outlet Devices
#1	Primary	2,685.30'	**24.0" Round Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900

Inlet / Outlet Invert= 2,685.30' / 2,680.00' S= 0.0757 '/' Cc= 0.900
n= 0.012 Corrugated PE, smooth interior

Primary OutFlow Max=17.53 cfs @ 12.08 hrs HW=2,688.46' (Free Discharge)
└─**1=Culvert** (Inlet Controls 17.53 cfs @ 5.58 fps)

Summary for Pond 6C-L-P: (2) 24" Culverts

Inflow Area =	14.74 ac,	0.00% Impervious,	Inflow Depth >	2.89"	for 25-Yr Storm event
Inflow =	55.80 cfs @	12.04 hrs,	Volume=	3.549 af	
Outflow =	42.51 cfs @	12.13 hrs,	Volume=	3.548 af,	Atten= 24%, Lag= 5.4 min
Primary =	42.51 cfs @	12.13 hrs,	Volume=	3.548 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 2,676.17' @ 12.13 hrs Surf.Area= 7,010 sf Storage= 11,705 cf

Plug-Flow detention time= 2.0 min calculated for 3.541 af (100% of inflow)
Center-of-Mass det. time= 1.8 min (838.9 - 837.1)

Volume	Invert	Avail.Storage	Storage Description
#1	2,672.00'	33,733 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,672.00	3	0	0
2,674.00	2,255	2,258	2,258
2,676.00	6,100	8,355	10,613
2,678.00	17,020	23,120	33,733

Device	Routing	Invert	Outlet Devices
#1	Primary	2,672.00'	**24.0" Round Culvert X 2.00** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2,672.00' / 2,670.50' S= 0.0250 '/' Cc= 0.900 n= 0.012 Corrugated PE, smooth interior

Primary OutFlow Max=42.29 cfs @ 12.13 hrs HW=2,676.14' (Free Discharge)
└─**1=Culvert** (Inlet Controls 42.29 cfs @ 6.73 fps)

Summary for Pond 6C-U-P: 36" Culvert

Inflow Area =	8.09 ac,	0.00% Impervious,	Inflow Depth >	2.98"	for 25-Yr Storm event
Inflow =	31.54 cfs @	12.04 hrs,	Volume=	2.012 af	
Outflow =	27.02 cfs @	12.11 hrs,	Volume=	2.011 af,	Atten= 14%, Lag= 4.0 min
Primary =	27.02 cfs @	12.11 hrs,	Volume=	2.011 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 2,753.52' @ 12.11 hrs Surf.Area= 6,014 sf Storage= 5,572 cf

Plug-Flow detention time= 1.8 min calculated for 2.011 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (836.5 - 834.9)

Volume	Invert	Avail.Storage	Storage Description
#1	2,751.00'	8,870 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,751.00	0	0	0
2,752.00	800	400	400
2,754.00	7,670	8,470	8,870

Device	Routing	Invert	Outlet Devices
#1	Primary	2,751.00'	**36.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2,751.00' / 2,750.00' S= 0.0125 '/' Cc= 0.900 n= 0.012 Corrugated PE, smooth interior

Primary OutFlow Max=26.81 cfs @ 12.11 hrs HW=2,753.50' (Free Discharge)
└**1=Culvert** (Inlet Controls 26.81 cfs @ 4.25 fps)

Summary for Pond 7P: 30" Culvert

Inflow Area = 9.02 ac, 0.00% Impervious, Inflow Depth > 3.00" for 25-Yr Storm event
Inflow = 27.66 cfs @ 12.12 hrs, Volume= 2.256 af
Outflow = 25.98 cfs @ 12.18 hrs, Volume= 2.253 af, Atten= 6%, Lag= 3.8 min
Primary = 25.98 cfs @ 12.18 hrs, Volume= 2.253 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 2,687.59' @ 12.18 hrs Surf.Area= 2,716 sf Storage= 3,702 cf

Plug-Flow detention time= 2.2 min calculated for 2.249 af (100% of inflow)
Center-of-Mass det. time= 1.5 min (837.8 - 836.3)

Volume	Invert	Avail.Storage	Storage Description
#1	2,684.00'	4,920 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2,684.00	20	0	0
2,686.00	850	870	870
2,688.00	3,200	4,050	4,920

Device	Routing	Invert	Outlet Devices
#1	Primary	2,684.40'	**30.0" Round Culvert** L= 90.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 2,684.40' / 2,682.40' S= 0.0222 '/' Cc= 0.900 n= 0.012 Corrugated PE, smooth interior

Primary OutFlow Max=25.85 cfs @ 12.18 hrs HW=2,687.57' (Free Discharge)
└**1=Culvert** (Inlet Controls 25.85 cfs @ 5.27 fps)

ATTACHMENT C-2

EROSION CONTROL CALCULATIONS

PROJECT	COMP. BY	JOB NO.
EVERGREEN PACKAGING AREA 6B AND 6C MAINTENANCE REGRADING	ASB	11123.00
	CHK. BY	DATE 7/7/11

TEMPORARY LINING DESIGN

ASSUMPTIONS: DESIGN FOR 2-YR STORM
ASSUME NEARLY BARE GROUND

KNOWNS: CHANNEL GEOMETRY AND PROFILE VARIES
SEE HYDROCAD REPORT AND NAG RESULTS FOR DATA.

RESULTS: USE NORTH AMERICAN GREEN (NAG) SC-250 EROSION CONTROL MATTING W/ STAPLE PATTERN E.
SEE NAG RESULTS ATTACHED TO THIS SHEET

PERMANENT LINING DESIGN

ASSUMPTIONS: DESIGN FOR 25-YR STORM
ASSUME 90% VEGETATIVE COVER

KNOWNS: SEE ABOVE

RESULTS: USE NAG SC-250 EROSION CONTROL MATTING W/ STAPLE PATTERN E.
SEE NAG RESULTS ATTACHED TO THIS SHEET

TEMPORARY CONDITIONS

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10: Area 6C Lower (West Runoff Area=10.42 ac 0.00% Impervious Runoff Depth>1.06"
Flow Length=1,365' Tc=6.3 min CN=71 Runoff=18.86 cfs 0.923 af

Subcatchment 13: Area 6B Upper (West Runoff Area=2.73 ac 0.00% Impervious Runoff Depth>1.18"
Flow Length=720' Tc=5.6 min CN=73 Runoff=5.71 cfs 0.268 af

Subcatchment 15: Area 6C Upper Temporary Runoff Area=8.09 ac 0.00% Impervious Runoff Depth>1.12"
Flow Length=1,030' Tc=5.2 min CN=72 Runoff=16.25 cfs 0.755 af

Total Runoff Area = 21.24 ac Runoff Volume = 1.946 af Average Runoff Depth = 1.10"
100.00% Pervious = 21.24 ac 0.00% Impervious = 0.00 ac

Summary for Subcatchment 10: Area 6C Lower (West Ditch) Temporary

Runoff = 18.86 cfs @ 11.96 hrs, Volume= 0.923 af, Depth> 1.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Storm Rainfall=3.50"

Area (ac)	CN	Description
* 10.37	71	Landfill Cover Soil
0.05	89	Gravel roads, HSG C
10.42	71	Weighted Average
10.42		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.4	100	0.0670	0.69		**Sheet Flow, A-B** Fallow n= 0.050 P2= 3.50"
1.8	210	0.0380	1.95		**Shallow Concentrated Flow, B-C** Nearly Bare & Untilled Kv= 10.0 fps
2.1	1,055	0.0110	8.49	135.76	**Trap/Vee/Rect Channel Flow, B-C** Bot.W=0.00' D=2.00' Z= 4.0 '/' Top.W=16.00' n= 0.018 Earth, clean & straight
6.3	1,365	Total			

NEARLY BARE

Summary for Subcatchment 13: Area 6B Upper (West Ditch) Temporary

Runoff = 5.71 cfs @ 11.95 hrs, Volume= 0.268 af, Depth> 1.18"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Storm Rainfall=3.50"

Area (ac)	CN	Description
* 2.44	71	Landfill Cover Soil
0.29	89	Gravel roads, HSG C
2.73	73	Weighted Average
2.73		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	100	0.0270	0.48		**Sheet Flow, A-B** Fallow n= 0.050 P2= 3.50"
1.6	215	0.0200	2.28		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
0.5	405	0.0260	14.69	381.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=2.00' Z= 4.5 '/' Top.W=22.00' n= 0.018 Earth, clean & straight
5.6	720	Total			

NEARLY BARE

Summary for Subcatchment 15: Area 6C Upper Temporary

Runoff = 16.25 cfs @ 11.94 hrs, Volume= 0.755 af, Depth> 1.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Storm Rainfall=3.50"

	Area (ac)	CN	Description
*	7.57	71	Landfill Cover Soil
	0.52	89	Gravel roads, HSG C
	8.09	72	Weighted Average
	8.09		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	100	0.0400	0.57		**Sheet Flow, A-B** Fallow n= 0.050 P2= 3.50"
1.0	230	0.0600	3.94		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.3	700	0.0140	9.22	138.23	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=1.50' Z= 4.0 '/' Top.W=16.00' n= 0.018 Earth, clean & straight
5.2	1,030	Total			

NEARLY BARE

PERMANENT CONDITIONS

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 8: Area 6C Lower (East Ditch) Runoff Area=4.32 ac 0.00% Impervious Runoff Depth>2.89"
Flow Length=600' Tc=11.0 min CN=71 Runoff=18.42 cfs 1.041 af

Subcatchment 9: Area 6C Lower (West Runoff Area=10.42 ac 0.00% Impervious Runoff Depth>2.89"
Flow Length=1,365' Tc=14.5 min CN=71 Runoff=39.44 cfs 2.509 af

Subcatchment 11: Area 6B Upper (East Ditch) Runoff Area=2.28 ac 0.00% Impervious Runoff Depth>2.99"
Flow Length=400' Tc=9.5 min CN=72 Runoff=10.57 cfs 0.568 af

Subcatchment 12: Area 6B Upper (West Runoff Area=2.73 ac 0.00% Impervious Runoff Depth>3.08"
Flow Length=720' Tc=12.7 min CN=73 Runoff=11.66 cfs 0.701 af

Subcatchment 14: Area 6C Upper Permanent Runoff Area=8.09 ac 0.00% Impervious Runoff Depth>2.98"
Flow Length=1,030' Tc=14.6 min CN=72 Runoff=31.54 cfs 2.012 af

Total Runoff Area = 27.84 ac Runoff Volume = 6.830 af Average Runoff Depth = 2.94"
100.00% Pervious = 27.84 ac 0.00% Impervious = 0.00 ac

Summary for Subcatchment 8: Area 6C Lower (East Ditch) Permanent

DESIGN DITCH LINING FOR WEST SIDE (HIGHER FLOWS)

Runoff = 18.42 cfs @ 12.00 hrs, Volume= 1.041 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Storm Rainfall=6.00"

	Area (ac)	CN	Description
*	4.27	71	Landfill Cover Soil
	0.05	89	Gravel roads, HSG C
	4.32	71	Weighted Average
	4.32		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0670	0.20		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.50"
2.1	225	0.0670	1.81		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	275	0.0250	8.70	208.85	**Trap/Vee/Rect Channel Flow, B-C** Bot.W=4.00' D=2.00' Z= 4.0 '/' Top.W=20.00' n= 0.030 Earth, grassed & winding
11.0	600	Total			

Summary for Subcatchment 9: Area 6C Lower (West Ditch) Permanent

USE 40 CFS FOR HAG MODEL

Runoff = 39.44 cfs @ 12.04 hrs, Volume= 2.509 af, Depth> 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Storm Rainfall=6.00"

	Area (ac)	CN	Description
*	10.37	71	Landfill Cover Soil
	0.05	89	Gravel roads, HSG C
	10.42	71	Weighted Average
	10.42		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	100	0.0670	0.20		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.50"
2.6	210	0.0380	1.36		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
3.5	1,055	0.0110	5.09	81.46	**Trap/Vee/Rect Channel Flow, B-C** Bot.W=0.00' D=2.00' Z= 4.0 '/' Top.W=16.00' n= 0.030 Earth, grassed & winding
14.5	1,365	Total			

Summary for Subcatchment 11: Area 6B Upper (East Ditch) Permanent

DESIGN DITCH LINING FOR WEST SIDE (HIGHER FLOWS)

Runoff = 10.57 cfs @ 11.99 hrs, Volume= 0.568 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Storm Rainfall=6.00"

	Area (ac)	CN	Description
*	2.21	71	Landfill Cover Soil
	0.07	89	Gravel roads, HSG C
	2.28	72	Weighted Average
	2.28		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6	100	0.0340	0.22		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
1.6	165	0.0620	1.74		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.3	135	0.0200	7.73	200.92	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=2.00' Z= 4.5 '/' Top.W=22.00' n= 0.030 Earth, grassed & winding
9.5	400	Total			

Summary for Subcatchment 12: Area 6B Upper (West Ditch) Permanent

USE 12 CFS FOR NAG MODEL

Runoff = 11.66 cfs @ 12.02 hrs, Volume= 0.701 af, Depth> 3.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Storm Rainfall=6.00"

	Area (ac)	CN	Description
*	2.44	71	Landfill Cover Soil
	0.29	89	Gravel roads, HSG C
	2.73	73	Weighted Average
	2.73		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	100	0.0270	0.20		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
3.6	215	0.0200	0.99		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.8	405	0.0260	8.81	229.09	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=2.00' Z= 4.5 '/' Top.W=22.00' n= 0.030 Earth, grassed & winding
12.7	720	Total			

Summary for Subcatchment 14: Area 6C Upper Permanent

USE 32 CFS FOR NAG MODEL

Runoff = 31.54 cfs @ 12.04 hrs, Volume= 2.012 af, Depth> 2.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Storm Rainfall=6.00"

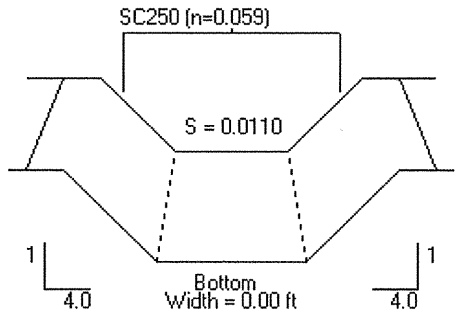
	Area (ac)	CN	Description
*	7.57	71	Landfill Cover Soil
	0.52	89	Gravel roads, HSG C
	8.09	72	Weighted Average
	8.09		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3	100	0.0400	0.16		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.50"
2.2	230	0.0600	1.71		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
2.1	700	0.0140	5.53	82.94	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=1.50' Z= 4.0 '/' Top.W=16.00' n= 0.030
14.6	1,030	Total			

North American Green - ECMDS Version 4.3	7/8/2011	01:38 PM	COMPUTED BY: ASB
PROJECT NAME: Evergreen Packaging	PROJECT NO.: 11123.00		
FROM STATION/REACH:	TO STATION/REACH:	DRAINAGE AREA: Area 6C (Lower)	DESIGN FREQUENCY: 25-Year

HYDRAULIC RESULTS

Discharge (cfs)	Peak Flow Period (hrs)	Velocity (fps)	Area (sq.ft)	Hydraulic Radius(ft)	Normal Depth (ft)
40.0	1.0	2.58	15.49	0.95	1.97



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LINER RESULTS

Reach	Matting Type / Staple Pattern	Stability Analysis	Vegetation Characteristics				Permissible Shear Stress (psf)	Calculated Shear Stress (psf)	Safety Factor	Remarks
			Phase	Class	Type	Density				
Straight	SC250	Vegetation	2	C	Bunch	75-95%	8.00	1.35	5.92	STABLE
	Staple E	Soil	Loam				2.500	0.027	93.83	STABLE

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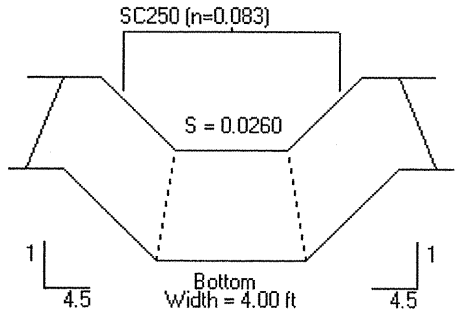
PROJECT NAME: Evergreen Packaging	PROJECT NO.: 11123.00		
FROM STATION/REACH:	TO STATION/REACH:	DRAINAGE AREA: Area 6B (Upper)	DESIGN FREQUENCY: 25-Year

HYDRAULIC RESULTS

Discharge (cfs)	Peak Flow Period (hrs)	Velocity (fps)	Area (sq.ft)	Hydraulic Radius(ft)	Normal Depth (ft)
12.0	1.0	1.91	6.27	0.54	0.82



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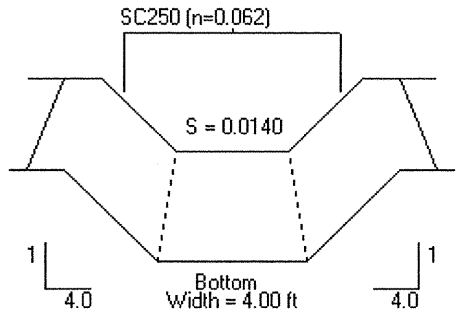
LINER RESULTS

Reach	Matting Type / Staple Pattern	Stability Analysis	Vegetation Characteristics				Permissible Shear Stress (psf)	Calculated Shear Stress (psf)	Safety Factor	Remarks
			Phase	Class	Type	Density				
Straight	SC250	Vegetation	2	C	Bunch	75-95%	8.00	1.33	6.03	STABLE
	Staple E	Soil	Loam				2.500	0.109	22.91	STABLE

North American Green - ECMDS Version 4.3	7/8/2011	01:41 PM	COMPUTED BY: ASB
PROJECT NAME: Evergreen Packaging	PROJECT NO.: 11123.00		
FROM STATION/REACH:	TO STATION/REACH:	DRAINAGE AREA: Area 6C (Upper)	DESIGN FREQUENCY: 25-Year

HYDRAULIC RESULTS

Discharge (cfs)	Peak Flow Period (hrs)	Velocity (fps)	Area (sq.ft)	Hydraulic Radius(ft)	Normal Depth (ft)
32.0	1.0	2.52	12.68	0.84	1.35



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LINER RESULTS

Reach	Matting Type / Staple Pattern	Stability Analysis	Vegetation Characteristics				Permissible Shear Stress (psf)	Calculated Shear Stress (psf)	Safety Factor	Remarks
			Phase	Class	Type	Density				
Straight	SC250	Vegetation	2	C	Bunch	75-95%	8.00	1.18	6.79	STABLE
	Staple E	Soil	Loam				2.500	0.085	29.24	STABLE

ATTACHMENT D

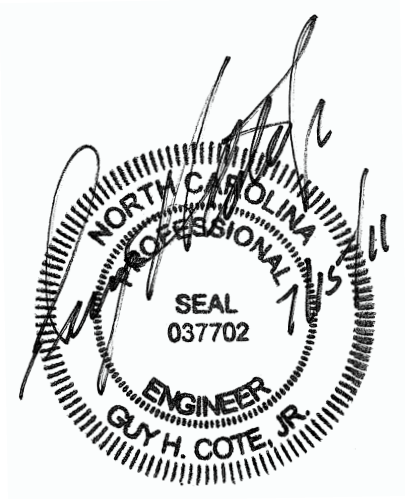
STABILITY ANALYSIS

GEOTECHNICAL EVALUATION
FOR
LANDFILL NO. 6
MAINTENANCE REGRADING OF
AREA 6B-UPPER, AREA 6C-UPPER, AND
AREA 6C-LOWER
CANTON, NORTH CAROLINA

Prepared for

EVERGREEN PACKAGING
CANTON, NORTH CAROLINA

July 2011



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4 Blanchard Road, PO Box 85A, Cumberland Center, ME 04021 • Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

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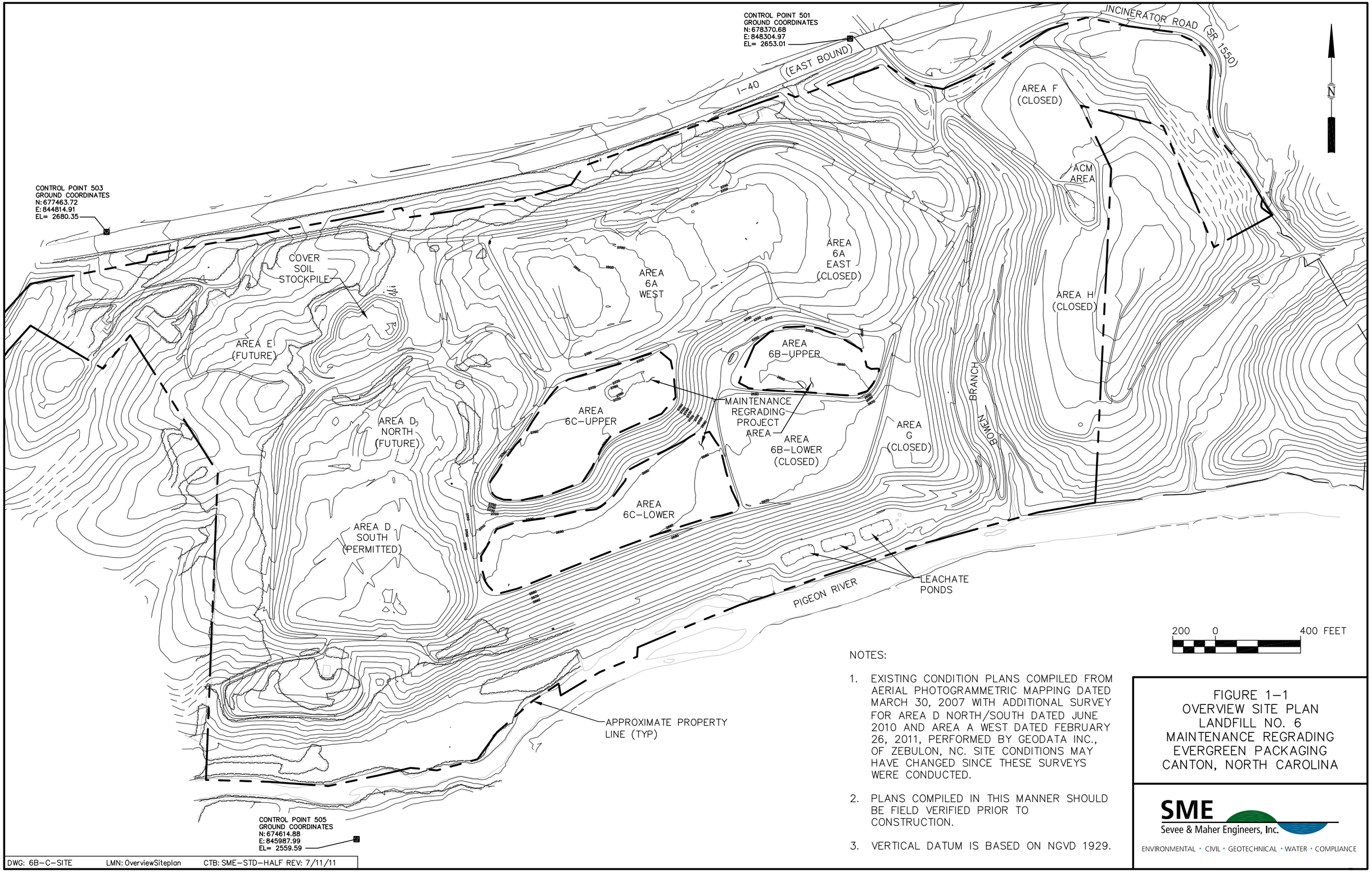
GEOTECHNICAL EVALUATION
MAINTENANCE REGRADING OF AREA 6B-UPPER, AREA 6C-UPPER AND AREA 6C-LOWER
LANDFILL NO. 6
EVERGREEN PACKAGING
CANTON, NORTH CAROLINA

1.0 INTRODUCTION

The No. 6 Landfill at Evergreen Packaging's Canton Mill (Evergreen) includes three closed waste areas known as Area 6B-Upper, Area 6C-Upper and Area 6C-Lower. Figure 1-1 shows the location of the closed areas relative to one another, as well as to other waste areas at the Landfill No. 6. The existing soil covers on Areas 6B-Upper, 6C-Upper, and 6C-Lower have undergone considerable settlement since their construction approximately 14 years ago, leaving the cover surfaces in a near flat condition with poor drainage. The cover settlement was expected based on a geotechnical evaluation conducted as part of the closure design at that time (SME, 1995). Evergreen is proposing maintenance activites to regrade the surface of each cover in order to re-establish stormwater drainage to existing ditches and culverts. The proposed maintenance regrading will involve placement of additional soil over the existing covers to achieve cover slopes of approximately 6 percent. Figure 1-2 shows the existing surface topography for each of the landfill areas as well as the proposed regraded surface topography.

The primary geotechnical concern for placing the additional cover soil over the existing cover soil in Area 6B-Upper, Area 6C-Upper, and Area 6C-Lower is the potential formation of temporary increased pore-water pressures and corresponding reductions in effective stress and shear strength in the underlying waste. Such temporary conditions, if sufficient in extent, could in turn adversely affect landfill slope stability. To understand and avoid development of potentially unstable conditions as result of the regrading, Evergreen authorized Sevee & Maher Engineers, Inc. (SME) to conduct a geotechnical evaluation for the planned maintenance regrading and the potential effects on landfill stability. In June/July 2011 SME conducted the geotechnical evaluation which included drilling borings into the existing cover and waste, laboratory testing of waste specimens recovered from the borings and calculation of slope stability safety factors expected to result from the additional loads caused by the increased cover thickness caused by the regrading. SME also performed estimates of future settlements that are anticipated due to consolidation of the existing waste as result of the new



NOTES:

1. EXISTING CONDITION PLANS COMPILED FROM AERIAL PHOTOGRAMMETRIC MAPPING DATED MARCH 30, 2007 WITH ADDITIONAL SURVEY FOR AREA D NORTH/SOUTH DATED JUNE 2010 AND AREA A WEST DATED FEBRUARY 26, 2011, PERFORMED BY GEODATA INC., OF ZEBULON, NC. SITE CONDITIONS MAY HAVE CHANGED SINCE THESE SURVEYS WERE CONDUCTED.
2. PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.
3. VERTICAL DATUM IS BASED ON NGVD 1929.

FIGURE 1-1
OVERVIEW SITE PLAN
LANDFILL NO. 6
MAINTENANCE REGRADING
EVERGREEN PACKAGING
CANTON, NORTH CAROLINA

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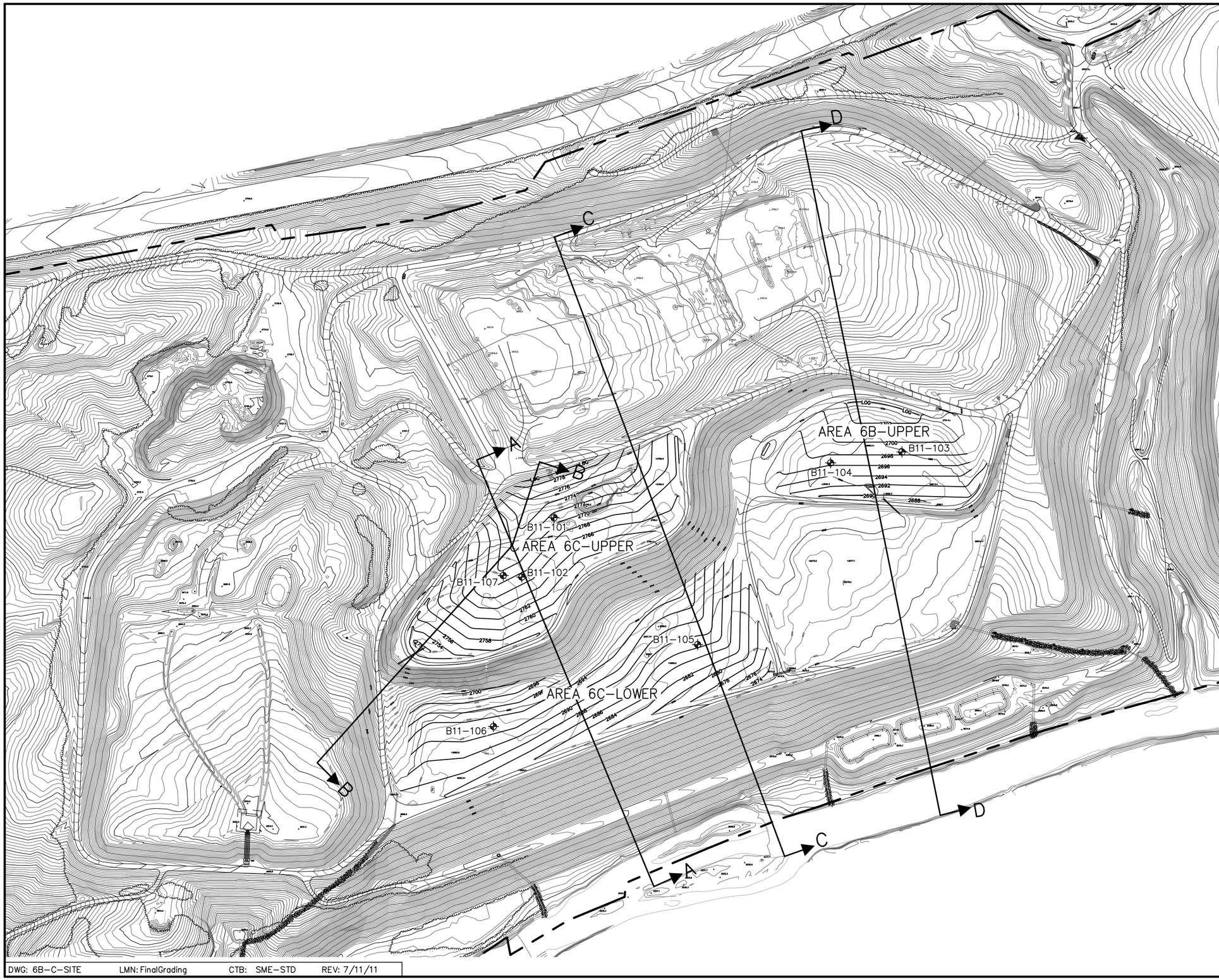

N

LEGEND

EXISTING BORING LOCATION

SLOPE STABILITY CROSS–SECTION LOCATION

150 0 300 FEET

FIGURE 1–2
FINAL GRADING PLAN
LANDFILL NO. 6
MAINTENANCE REGRADING
EVERGREEN PACKAGING
CANTON, NORTH CAROLINA

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loads caused by the maintenance regrading. This Report describes the findings of the slope stability analyses and settlement estimates as well as describes the conditions encountered in seven test borings drilled into the landfill areas and the results of laboratory testing conducted on representative soil and waste specimens collected from the borings.

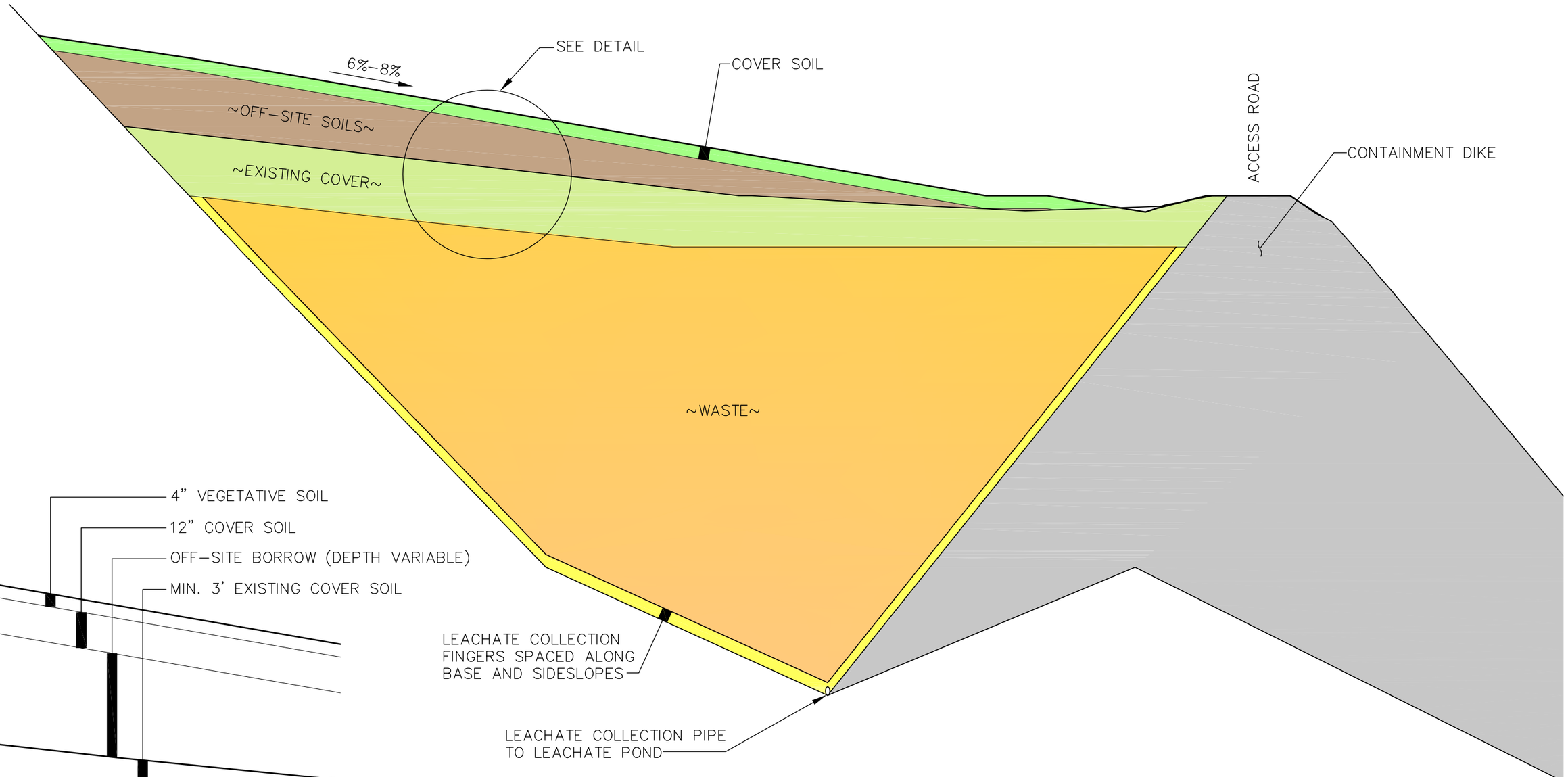
2.0 BACKGROUND

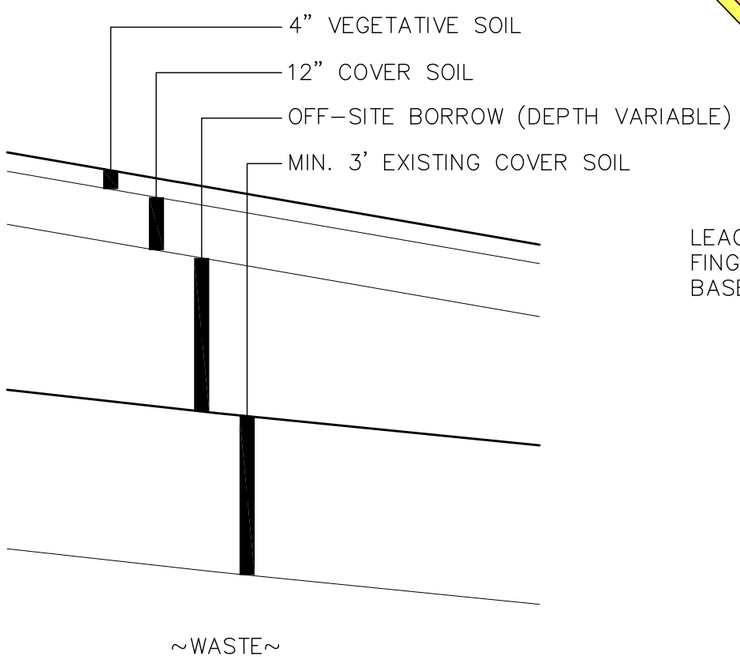
Initial closure of landfill Areas 6B-Upper, 6C-Upper, and 6C-Lower occurred in 1997. The closure consisted of grading the waste surface to drain, placement, and compaction of cover soil over the waste surface, placement of topsoil, seeding and mulching, and installation of ditches and culverts along the perimeter of the closed areas for runoff control. In the years following the closure, settlement of the waste occurred creating low areas on the cover surface(s). In some cases the settlement was sufficient to allow ponding of stormwater on portions of the cover(s) following rain events. Evergreen periodically places additional soil, as part of maintenance activities, on the covers to encourage runoff drainage to the existing stormwater collection system; however, the settlement has made consistent drainage of cover surfaces difficult.

At the time of this Report preparation, Evergreen is closing Landfill Area 6A-West (see Figure 1-1 for location relative to Areas 6B and 6C) by importing soil from an off-site source and using that soil to shape the landfill surface for drainage. The off-site soil will in turn be covered with 12- inches of on-site cover soil to address environmental concerns relative to the off-site soil, as required by North Carolina Department of Environment and Natural Resources (NCDENR). Evergreen plans to use an approach similar to the Area 6A-West cover construction for the maintenance regrading of Areas 6B-Upper, 6C-Upper and 6C-Lower. Figure 2-1 shows the cover cross-section planned to be used for the maintenance regrading. A discussion of each existing covered area and the intended maintenance regrading is presented as follows.

2.1 Area 6B-Upper

Area 6B-Upper is located southeast of Evergreen's active landfill closure operation (i.e. Area 6A-West). Area 6B-Upper encompasses approximately 4 acres and generally slopes north to south. Regrading of Area 6B-Upper will result in finished cover grades of approximately six percent. Figure 1-2 shows the planned surface contours for the regraded cover. Approximately 25,000 cubic yards (cy) of soil (19,000 cy off-site soils and 6,000 cy on-site soil) are expected to be necessary to achieve the regraded cover contours for Area 6B-Upper.





DETAIL

NOT TO SCALE

FIGURE 2–1
LANDFILL COVER MAINTENANCE
CROSS–SECTION
LANDFILL NO. 6
MAINTENANCE REGRADING
EVERGREEN PACKAGING
CANTON, NORTH CAROLINA

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Area 6C-Upper

Area 6C-Upper is located southwest of Area 6A-West. Area 6C-Upper encompasses approximately 8 acres and generally slopes east to west. Regrading of Area 6C-Upper will result in finished cover grades of approximately six percent. Figure 1-2 shows the planned surface contours for the regraded. Approximately 58,000 cy of soil (47,000 cy off-site soil and 11,000 cy on-site soil) are expected to be necessary to achieve the regraded cover contours for Area 6C-Upper.

2.3 Area 6C-Lower

Area 6C-Lower is located south and down slope of Area 6C-Upper. Area 6C-Lower encompasses approximately 9 acres and generally slopes north to south. Regrading of Area 6C-Upper will result in finished cover grades of approximately six percent. Figure 1-2 shows the planned surface contours for the regraded cover. Approximately 41,000 cy of soil (27,000 cy off-site soil and 14,000 cy on-site soil) are expected to be necessary to achieve the regraded cover contours for Area 6C-Lower.

3.0 SUBSURFACE INVESTIGATION

Seven test borings (identified as B11-101 through B11-107) were drilled at the locations shown on Figure 1-2 during the period of June 20, 2011 through June 23, 2011. Two borings each were drilled in Areas 6B-Upper and 6C-Lower and three borings were drilled in Area 6C-Upper. Each boring was made using hollow-stem augers and was backfilled with bentonite chips and cuttings from the borehole(s) upon completion. One piezometer was installed in each Area, with a 5-foot-long screen placed from 7 to 12 feet below existing grade. The piezometers were designated as P11-101, P11-103, and P11-105. Drilling services for the test borings were provided by A. E. Drilling Services, LLC of Greenville, South Carolina. Horizontal and vertical survey of the completed boring locations was provided by Ed Holmes and Associates Land Surveyors, PA of Asheville, North Carolina. Appendix 1 presents exploration logs compiled by SME which describe the conditions encountered in each boring and summarize a portion of the laboratory testing performed.

The boring depths ranged from 22 to 42 feet and generally encountered a layer of cover soil underlain by layers of wastewater treatment sludge, boiler ash and lime mud; no native ground surface or bedrock was encountered in any of the borings. Representative samples were collected from the borings with respect to depth using Standard Penetration Test (SPT) in general accordance with ASTM D 1586. Undisturbed tube samples (in general accordance with ASTM D 1587) of the waste were also collected from several of the borings at various depths. Specimens from the SPT and tube samples were tested in the geotechnical laboratory for physical properties and shear strength. Field vane shear tests (in general accordance with ASTM D 2573) were conducted at various depths in several of the borings to evaluate undrained shear strength. Stand pipe piezometers were installed in borings B11-101, B11-103, and B11-105 to measure the phreatic surface in the waste areas. The depths of in-situ sampling and testing as well as the installation diagrams for each of the piezometers are shown on the boring logs.

3.1 Geotechnical Testing and Sources of Other Information

In situ testing of the in-place cover soil and waste consisted of measuring penetration resistance by way of SPT and undrained shear strength by way of field vane testing and pocket penetrometer testing. Laboratory testing of recovered samples from the borings included measurement of water

content, specific gravity, ash content, density, and shear strength. The methods used for the laboratory testing were as follows:

TABLE 1

LABORATORY TEST METHODS

Test	Test Method
Water Content	ASTM D 2216
Specific Gravity	ASTM D 854
Ash Content	ASTM D 7348
Strength by Triaxial Shear	ASTM D 4767
Density	Volumetric and Gravimetric
Abbreviations ASTM - American Society for Testing and Materials	

The results of the geotechnical testing are provided on the boring logs with respect to depth and in Appendix 1. Sections 3.2 and 3.3 describe the soil and waste conditions encountered in the borings drilled for this Report including discussion of the field and laboratory testing results.

In 1995 SME completed a geotechnical investigation for closure of landfill Areas 6B and 6C (SME, 1995). That investigation focused on characterizing the in-place waste and evaluating slope stability and settlement of the waste due to soil cover placement. The results of that investigation showed adequate slope stability safety factors could be expected for the proposed soil cover. The 1995 work also provided settlement estimates for the cover which ranged from 10 to 15 feet with the time for settlement to occur being estimated as "many years". The large settlements and associated long time frame were a consequence of the lack of waste drainage within the landfill and the high compressibility of the wastewater treatment sludge portion of the waste.

3.2 Existing Cover Soil and Waste Conditions

3.2.1 Existing Cover Soil. The cover soil thickness measured in borings B11-101 through B11-107 ranged from approximately 3 to 17 feet. Samples of the cover soil were visually classified to consist of red to brown silty fine sand. Seven SPT N-values measured in the cover soil ranged from 4 to 10 blows per foot (bpf). Water content testing of a cover soil specimen from boring B11-104 indicated a

water content of 21 percent, which based on observations, was generally consistent with the other cover soils encountered.

3.2.2 Existing Waste. Three predominant waste types were encountered in borings B11-101 through B11-107; wastewater treatment sludge (sludge), boiler ash (ash) and lime mud, collectively referred to as mixed waste or waste for this Report. The thickness of waste investigated ranged from 19 feet in boring B11-102 to 36.5 feet in boring B11-105. Physical properties in the form of water content, ash content, density, and specific gravity were measured on selected samples of waste and exhibited the following ranges and average values with respect to waste type.

TABLE 2

SUMMARY OF WASTE PHYSICAL PROPERTIES(2)

Waste Type	Water Content (WC), percent	Solids Content (SC), percent(1)	Ash content, percent	Density, pounds per cubic foot	Specific Gravity
Sludge	51 – 182 (135)	35 - 66 (43)	49 – 58 (52)	75.7 – 90.1 (81.4)	2.27
Ash	40 – 106 (68)	49 – 72 (60)	63 – 85 (77)	NT	2.23
Lime Mud	2 – 51 (41)	66 – 79 (71)	72 – 79 (77)	NT	2.69 – 2.85 (2.77)

Note:
1. Solids Content, (SC) = 1/ (1+WC)
2. Values are minimum – maximum (average)

Shear strength of undisturbed sludge samples recovered from the borings was measured using the triaxial compression test method. The results of the triaxial testing, including p-q plots are presented in Appendix 2. Interpretation of the triaxial results indicates the sludge exhibits an effective friction angle of approximately 30 degrees and 0 pcf of cohesion for the purpose of stability analyses performed for this Report. This sludge strength is higher than the sludge strength value of approximately 21 degrees used in the 1995 stability analysis, with the change attributed to the consolidation that the in-place sludge has undergone since landfill closure in 1997. The waste settlement has caused densification of the existing waste, particularly the sludge and increased density in turn increases shear strength.

3.3 Groundwater

Standpipe piezometers were installed in borings B11-101, B11-103 and B11-105 for purposes of measuring the approximate position of the phreatic surface in Areas 6B-Upper, 6C-Upper and 6C-Lower. The screened depth interval for each piezometer was purposely positioned near the top of waste in its respective boring to assure that the measured water levels would account for any potential excess pressures caused by the weight of the existing overlying cover soils. Installation diagrams for each of the piezometers are included on the boring logs. The results of the water level monitoring indicate that the water table in Areas 6B-Upper, 6C-Upper and 6C-Lower is approximately 2 to 3 feet below the existing cover surface at the piezometer locations. Based on field observations made at the time of drilling and the topography of the existing covered areas, it is considered reasonable to expect that the phreatic surface is generally shallow (i.e. within 2 to 3 feet of the existing ground surface) over most of Areas 6B-Upper, 6C-Upper and 6C-Lower.

4.0 SLOPE STABILITY EVALUATION

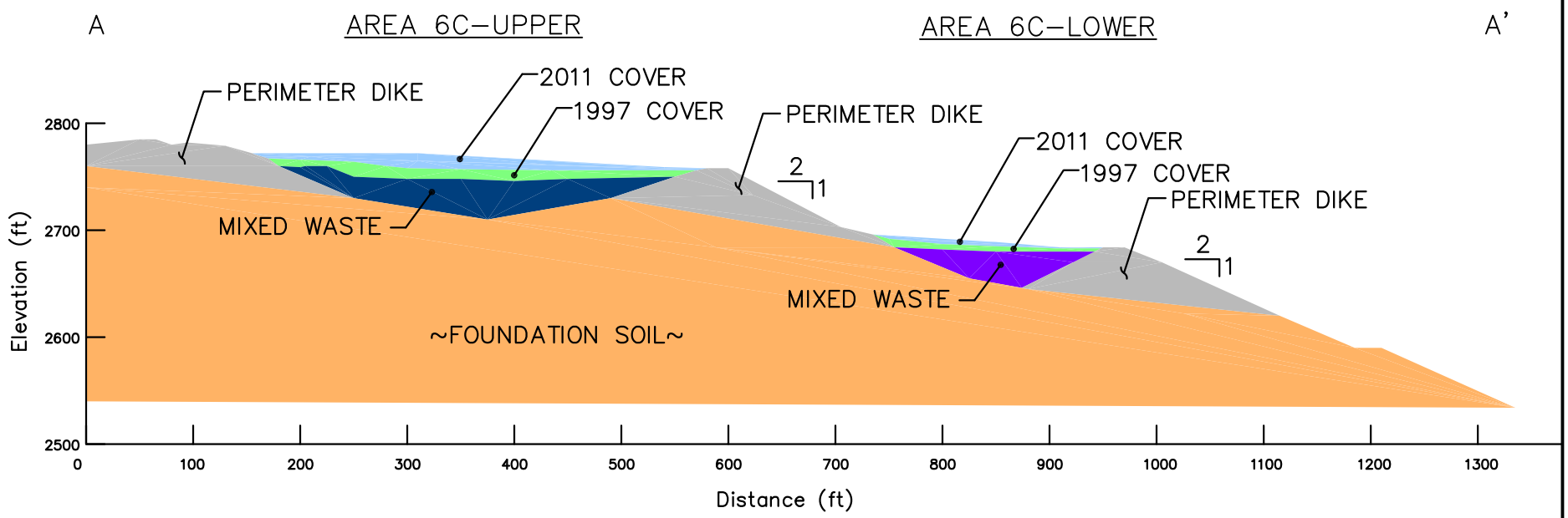
The maintenance regrading for Areas 6B-Upper, 6C-Upper and 6C-Lower is expected to result in placement of up to approximately 16 feet of new regrading soil and cover soil (over the existing cover) based on the planned final grades shown on Figures 1-2. The new cover soil will cause additional shear stresses to be imparted to the underlying waste. Analysis of slope stability is necessary to evaluate the ability of the in-place soil, in-place waste, and surrounding landfill perimeter dike to support the new soil without undergoing unacceptable displacements. Similar slope stability analyses were completed in 1995 (SME, 1995) for Areas 6B-Upper, 6C-Upper and 6C-Lower which supported to the closures completed in 1997. The slope stability analyses completed for this Report follow similar methodologies to those used in 1995 and incorporate the geotechnical information acquired at that time relative to the condition of the existing waste as well as the surrounding site conditions including the perimeter dike(s) that comprise portions of the lateral limits for Areas 6B-Upper, 6C-Upper and 6C-Lower.

4.1 Selection of Slope Stability Parameters

Information necessary for analyzing the slope stability for Areas 6B-Upper, 6C-Upper and 6C-Lower as related to the planned maintenance regrading includes: identification of landfill cross-sections representative of potential worse case cover soil loadings with respect to maintaining the geometric integrity of the landfill; soil and waste density and shear strength; piezometric conditions; and potential seismic loads which could be imparted to the landfill during an earthquake event.

4.1.1 Slope Stability Cross-Sections. Four worst case landfill cross-sections were identified for analysis of slope stability. The cross-sections locations are shown on Figure 1-2. Figure 4-1 shows the slope stability cross-section prepared for location A-A'. Appendix 3 provides similar slope stability cross-sections for locations B-B', C-C' and D-D'. The worst case cross-sections represent landfill areas where the driving forces and associated shear stresses and excess pore-water pressures caused by placement of the new cover soil are expected to be the greatest with respect to the available strength of the in-place waste. The cross-sections include the geometries of the existing dikes and base grades for Areas 6B-Upper, 6C-Upper, and 6C-Lower as understood from previous reports and design drawings which have been reviewed for accuracy by Evergreen.

Material	Unit Weight (pcf)	Shear Strength	
		Internal Friction Angle, j (degrees)	Cohesion, c' (psf)
2011 Cover	125	30	0
1997 Cover	125	30	0
Mixed Waste Area C Upper	100	30	0
Mixed Waste Area C Lower	90	30	0
Perimeter Dike	120	32	115
Foundation Soil	115	31.5	0



AREA 6C UPPER AND LOWER

NOTES:

1. INTERPRETIVE CROSS–SECTION ASSUMES 2H TO 1V INTERIOR AND EXTERIOR PERIMETER DIKE SIDE SLOPES AND 3H TO 1V WASTE SIDESLOPES. IT IS MEANT TO PRESENT THE WORST CASE SLOPE GEOMETRY FOR THE STABILITY ANALYSIS AND MAY NOT REPRESENT THE TOPOGRAPHY SHOWN ON FIGURE 1–2.

2. LOCATION OF CROSS SECTION SHOWN ON FIGURE 1–2.

HORIZONTAL SCALE
75 0 150 FEET

FIGURE 4–1
SLOPE STABILITY CROSS–SECTION A–A'
LANDFILL NO. 6
MAINTENANCE REGRADING
EVERGREEN PACKAGING
CANTON, NORTH CAROLINA

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4.1.2 Density and Shear Strength. Table 3 presents a summary of the densities and shear strength values used to represent the waste and cover soil used in the slope stability analyses. The waste values come from a compilation of density and strength data for work completed in 1995 and for this Report. The density and strength values for the new soil were taken from similar analyses performed in 2011 for closure of landfill Area 6A-West, which used the same off-site soil and on-site soil as planned for use with the maintenance regrading of Areas 6B-Upper, 6C-Upper and 6C-Lower (SME, 2011).

TABLE 3

GEOTECHNICAL PARAMETERS USED FOR SLOPE STABILITY ANALYSES

Material	Wet Density	Effective Strength Parameters	
	γ_t (pcf)	c' (psf)	ϕ' (degrees)
Off-site Borrow Soil (for cover)(1)	125	0	30
On-site Borrow Soil (for cover)(1)	125	0	30
Mixed Waste (2)			
Area 6B-Upper	90	0	30
Area 6C-Upper	100	0	30
Area 6C-Lower	90	0	30
Area 6A-West	90	0	36
Perimeter Dike(3)	120	115	32
Foundation Soil(3)	115	0	31.5

Notes:
1. Values based on evaluation for 6A-West (SME, 2011).
2. Values based on 1995 evaluation for Areas 6B and 6C (SME, 1995) and testing completed for this Report.
3. Values based on material data for Areas 6B and 6C (SME, 1995), previous testing for Area 6B-West (SME, 2006) and published data for mineral soils.
4. ϕ' = effective angle of internal friction, degrees; c' = effective cohesion.

4.1.3 Piezometric Conditions. Standpipe piezometers placed in Areas 6B-Upper, 6C-Upper and 6C-Lower showed the phreatic surface in those areas to be near the existing cover soil surface grade. Previous investigations of Areas 6B-Upper, 6C-Upper and 6C-Lower have indicated the in-place waste is generally saturated and essentially undrained. During placement of the new cover soil, piezometeric conditions, in terms of water pressures within the waste pore spaces, are expected to temporarily increase and be in excess of hydrostatic conditions until drainage of the waste occurs and the pressures dissipate. For this discussion, the time for the increased pore water pressures to occur and then dissipate is referred to as being the short- term condition. The long-term condition will be where drainage has occurred and excess pore water pressures have dissipated such that

hydrostatic conditions have returned. To conservatively model the increase in pore water pressure for the short-term slope stability analyses, the amount of pore water pressure increase in the waste and existing cover at any particular point was assumed to be approximately equivalent to the change in total stress caused by the addition of the new cover soil. This assumption is conservative in that it assumes that no waste drainage has occurred, which results in lower available shear strength within the waste mass. The short-term piezometeric assumption does not apply to the existing perimeter dikes for the landfill areas; the dikes are considered generally incompressible (with respect to the maintenance regrading loads) and as such not subject to consolidation and increased pore water pressure. For evaluation of long-term slope stability the short-term excess pore water condition in the waste was assumed to have fully dissipated leaving the piezometeric conditions to be hydrostatic with the phreatic surface positioned approximately one foot below the proposed final ground surface.

4.1.4 Earthquake Loads. The RCRA Subtitle D *Seismic Design Guidance for Municipal Solid Waste Landfill Facilities* (U.S.EPA, 1995) and *United States National Seismic Hazard Maps* (USGS, 2008) were used to select seismic coefficients for use in the analysis of slope stability when earthquake loads are applied to the Landfill. For the short-term and long-term slope stability conditions, the guidance recommends that a seismic coefficient representative of a peak earthquake acceleration having a 10 percent probability of exceedance in 50 years and 250 years, respectively, be used to complete pseudo-static stability analyses to simulate the effects of applied earthquake forces. For the No. 6 Landfill site, the seismic coefficients are equal to 0.07g for 50 years and 0.14g for 250 years (USGS, 2008). These coefficients are consistent with those used for the 1995 slope stability analyses.

4.2 Analysis of Slope Stability

Slope stability analyses were performed for the planned maintenance regrading of Areas 6B-Upper, 6C-Upper and 6C-Lower. The analyses examined the ability of the existing landfill waste and cover soil to support the new cover soil load without the occurrence of slip-like displacements through the waste mass and landfill perimeter dike(s).

Multiple circular-shaped and wedge-shaped potential slip surfaces, oriented through the new cover soil and existing landfill, were analyzed for factors of safety resisting slope instability using the worst

case slope stability cross-sections discussed in Section 4.1.1 and the soil and waste geotechnical property values presented in Table 3. The analyses included factor of safety calculations for both short-term and long-term conditions. The Bishop Limit Equilibrium Method of slope stability analysis was used to calculate the lowest safety factor for each potential slip surface examined. The slope stability analyses were conducted using the SLOPE/W stability program, which is a computer based algorithm compiled by GEO-SLOPE International, Ltd. of Calgary, Alberta, Canada. SME maintains an active license for use of the SLOPE/W software.

The lowest slope stability safety factors calculated for short-term and long-term loading conditions (including seismic) for each of the worst-case cross-sections and are summarized in Tables 4 and 5. As can be seen from the tables, the lowest safety factors calculated for static, short-term and static, long-term conditions were consistently greater than 1.3 and 1.5, respectively. Static safety factors greater than 1.3 for short-term conditions and static safety factors greater than 1.5 are typically considered acceptable by the geotechnical community for managing uncertainty as related to slope stability. Short-term and long-term slope stability safety factors for seismic conditions were calculated to be in excess of 1.1 and 1.0, respectively. The seismic safety factors are considered technically acceptable and, based on RCRA Subtitle D guidance document (U.S.EPA, 1995) are sufficient to avoid completion of a landfill deformation analysis for the waste deposits. SLOPE/W output files, including graphic representations, for each of the lowest calculated slope stability safety factors for each worse case cross-sections are presented in Appendix 3. SME maintains a record of each of the slope stability analyses completed for review, if desired.

TABLE 4

SUMMARY OF LOWEST CALCULATED SAFETY FACTORS
SHORT-TERM CONDITIONS
AREAS 6B-UPPER, 6C-UPPER AND 6C-LOWER

Cross-Section	Landfill Area	Existing Conditions (Static)	Static Analysis Regraded Condition (Required Min ≥ 1.3)		Seismic Analysis Regraded Condition (Required Min ≥ 1.1)	
			Safety Factor	Location of Slip Surface	Safety Factor	Location of Slip Surface
A-A'	6C-Lower 6C-Upper	2.1 2.4	2.3 2.2	Lower Dike Lower Dike	1.2 1.6	Landfill Mass Cover System
B-B'	6C-Upper	3.2	3.1	Lower Dike	1.7	Landfill Mass
C-C'	6C-Lower	2.2	2.1	Landfill Mass	1.1	Landfill Mass
D-D'	6B-Upper	5.4	3.7	Landfill Mass	1.7	Cover System

TABLE 5

SUMMARY OF LOWEST CALCULATED SAFETY FACTORS
LONG-TERM CONDITIONS
AREAS 6B-UPPER, 6C-UPPER AND 6C-LOWER

Cross-Section	Landfill Area	Existing Conditions (Static)	Static Analysis Regraded Condition (Required Min ≥ 1.5)		Seismic Analysis Regraded Condition (Required Min ≥ 1.0)	
			Safety Factor	Location of Slip Surface	Safety Factor	Location of Slip Surface
A-A'	6C-Lower 6C-Upper	2.1 2.4	1.9 2.1	Lower Dike Lower Dike	1.4 1.6	Lower Dike Lower Dike
B-B'	6C-Upper	3.2	2.9	Lower Dike	1.5	Landfill Mass
C-C'	6C-Lower	2.2	2.0	Lower Dike	1.3	Landfill Mass
D-D'	6B-Upper	5.4	3.7	Landfill Mass	1.5	Landfill Mass

4.3 Slope Stability Findings

- Analysis of the planned maintenance regrading of Areas 6B-Upper, 6C-Upper and 6C-Lower resulted in calculated short-term, static slope stability safety factors equal to or greater than 2.1. Short-term safety factors as low as 1.3 are generally considered adequate to maintain slope stability for short-term applications.

- Analysis of the planned maintenance regrading of Areas 6B-Upper, 6C-Upper and 6C-Lower resulted in calculated long-term, static slope stability safety factors equal to or greater than 1.9. Long-term safety factors as low as 1.5 are generally considered adequate to maintain slope stability for long-term applications.

- Results of the slope stability analyses which included seismic loads indicate that the regraded covers and underling waste in Areas 6B-Upper, 6C-Upper and 6C-Lower are expected to satisfactorily resist the maximum design earthquake accelerations for the No. 6 Landfill area without undergoing any significant deformations.

5.0 SETTLEMENT EVALUATION

The 1995 geotechnical investigation for closure of Areas 6B and 6C (SME.1995) included determination of compression indices for the sludge portion of the waste and estimates of waste settlement as result of the soil cover load which was applied in 2007. The 1995 analyses resulted in estimating post-closure (i.e. after covering) settlements in the range of 3 to 17 feet depending on cover thickness and waste drainage. The time for the bulk of the settlement to occur was estimated to range from 5 to 10 years depending on waste drainage and if enhancements to the waste drainage were made. Observations of Areas 6B-Upper, 6C-Upper and 6C-Lower in the years following the 1997 closures indicated that settlements in the 10 to 15 foot range occurred (smaller settlements near the edge of waste and larger settlements near the centers of the waste areas where waste thickness were greatest). The observations also showed that most of the settlement occurred over a 10-year time frame.

Calculations similar to those performed for the 1995 settlement estimates were completed for this Report and are provided in Appendix 4. The new calculations took into account the compressibility indices for the in-place waste, the thickness of in-place waste at the time of closure, the thickness of the existing soil covers, the distribution of water contents and ash contents (in the borings) with respect to depth and the distribution of waste types as described on the boring logs (see Appendix 1). From this information it was estimated that settlements in the range of up to 7 to 15 feet can be expected for the regraded covers of Areas 6B-Upper, 6C-Upper and 6C-Lower. The majority of the estimated settlement is anticipated to occur over a similar or longer time period as compared to that which occurred following the 1997 closure. As with the 1995 settlement estimates, the large settlements and long settlement times described in this Report are believed to be mainly due to the compressive nature of the sludge component of the waste, the low hydraulic conductivity (poor drainage character) of the sludge and the lack of drainage infrastructure at depth in Areas 6B-Upper, 6C-Upper and 6C-Lower.

6.0 RECOMMENDATIONS

The following recommendations are offered relative to maintaining slope stability during and after the maintenance regrading for Areas 6B-Upper, 6C-Upper and 6C-Lower.

- The off-site borrow soil used for the maintenance regrading should be placed in horizontal lifts not exceeding 4 feet in thickness. The lifts should be advanced from the outer portions of the filling areas toward the area centers. Successive lifts should not be added until the supporting lift is complete. Concentrated equipment activity should be avoided in effort to minimize unbalanced loading of the underlying waste.

- The off-site borrow soil should be placed such that when measured for compaction it exhibits an in-place dry density of at least 90 percent of the Standard Proctor density as determined by ASTM D 698.

- The existing vegetative layer should be removed from the work surface before placement of the off-site borrow soil. The vegetative layer represents a potential weak zone as well as a potential zone of reduced hydraulic conductivity, which could affect cover drainage. For purposes of this report, it seems reasonable that the removed vegetative soil could be reused after completion of the maintenance regrading.

- In the event any low strength (i.e., wet) borrow soil is brought to the landfill areas for regrading, the procedures and recommendations set forth in the Operations Manual (for Area 6A-West) for handling low strength waste should be followed as a means for handling that soil.

- During regrading activites, the perimeter dikes and cover surface areas should be inspected regularly for signs of seepage, cracks, sloughs, leachate boils, displacements and/or any other tell-tale signs that might be indicative of potential impending slope instability.

- Evergreen should avoid equipment usage on the vegetated cover surfaces, including mowers and maintenance equipment, for several days after precipitation events to avoid potential softening of, and damage to the cover soil.

- Due to small surface areas of Areas 6B-Upper, 6C-Upper and 6C-Lower, the fill placement rate may produce excess pore water pressures that could result in localized softening of the waste and/or cover soils prior to achieving the desired finish grades. Moving of the filling operations back-and-forth between filling areas to allow the excess pore water conditions dissipate may be necessary to maintain stability, and should be anticipated.

- The piezometers (P11-101, P11-103, and P11-105) were installed with threaded ends at their top, allowing for additional riser sections to be added. These piezometers should be protected and extended during fill. The piezometers should be read daily and be compared to the piezometeric assumptions used for this Report. A measured water surface in a piezometer that is more than the height of the fill thickness at the same location should be brought to the attention of the project manager, and adjustments to fill placement should be evaluated relative to managing the short-term slope stability conditions.

7.0 CLOSURE

The slope stability analyses, settlement evaluation, findings, and recommendations presented in this Report are limited to the conditions and assumptions described. In the event there are zones of existing low strength waste or areas where excess pore-water pressures exist in Areas 6B-Upper, 6C-Upper and 6C-Lower prior to performing the maintenance regrading, then short-term safety factors could be lower than those described herein, and some localized displacement of the existing waste or cover soil could occur. Should such conditions be encountered, SME requests the opportunity to review the conditions described in this report and provide recommendations for mitigating measures, where appropriate.

REFERENCES

Law, 1982. Revised Report of Geotechnical Exploration and Evaluation and Conceptual Site Development Recommendations, Landfill No. 6.

NAVFAC DM-7.1, May 1982. Soil Mechanics Design Manual 7.1. Department of the Navy.

Sevee & Maher Engineers, Inc., 2006. Landfill Stability Evaluation For Vertical Expansion Area 6A-West.

Sevee & Maher Engineers, Inc., 1999. Landfill Stability Evaluation for Vertical Expansions, Area 6A-East.

Sevee & Maher Engineers, Inc., 1995. Landfill No. 6 Closure Project, Field and Laboratory Investigation Report.

Sevee & Maher Engineers, Inc., 2011. Design Report for Landfill No. 6 Area A West Closure, Canton, North Carolina, prepared for Evergreen Packaging, Canton, North Carolina, April 2011

Sirrine, 1989. Geotechnical Report for Landfill No. 6 Expansion Area A.

U.S. Environmental Protection Agency, Office of Research and Development, 1995. RCRA Subtitle D (258) Seismic Design Guidance for Municipal Solid Waste Facilities, Report No. EPA/600/R-95/051, April 1995, 143p.

APPENDIX 1

BORING LOGS

PROJECT: Evergreen Packaging Regrade Area 6C and 6B		JOB NO.: 11112.00	**BORING NO.: B11-101**
DATE STARTED: 06/20/2011	DATE FINISHED: 06/20/2011	DRILLING METHOD: HSA	
GROUND SURFACE ELEVATION (FT): 2760.57	DRILLING CONTRACTOR: A&E Drilling Services		LOGGED BY: BBJ
BOREHOLE DIA. (IN): 3-1/4-inch	ROCK CORE DIA. (IN): NA		SHEET 1 OF 1

DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPTION	SPT Blow Count (blows/6")	Water Content, %	Pocket Pen. (tsf)	Specific Gravity	Ash Content	P11-101 WELL LOG	DEPTH (FT)
		COVER SOIL: Red-Brown Silty Fine SAND; Trace mica, moist. Est. at 3.0 feet bgs							
5		**PAPER MILL WASTE:**							5
	S-1	Bluish, Lime Mud.	2/6/6/2	41.7	1.5	2.69	78.3		
10									10
	S-2	Black, Sludge, poor recovery, wet.	1/1/1/1	125.8	NA				
15									15
	S-3	Black, Sludge, slightly plastic, moist.	WOHx3/1	137.4	0.25	2.27	56.5		
20									20
	S-4	Similar to above, trace wood chips.	WOHx2/1/1	141.9	0.5				
25								Bentonite Chips	25
	S-5	Similar to above.	WOHx3/ 2	122.3	0.4				
30									30
	S-6	Blue/Black, Lime Mud and Fly Ash, dilatent.	WOH x 4	56.9	< 0.5		78.5		
35									35
	S-7	Black, Sludge, trace wood chips.	2/3/2/3	107.2	0.5				
		Bottom of Exploration at 37 feet bgs							
40									40
45									45
50									50

NOTES:

WOH = weight of hammer

Installed 1" PVC temporary piezometer 5 ft screen 12 to 7 ft bgs.

Water measured 6/24/2011 at 5.79 feet below top of PVC (2.79 feet bgs)

SPT done with an automatic hammer, raw numbers are presented here.

PROJECT: Evergreen Packaging Regrade Area 6C and 6B		JOB NO.: 11112.00		**BORING NO.: B11-102**
DATE STARTED: 06/21/2011	DATE FINISHED: 06/21/2011	DRILLING METHOD: HSA		
GROUND SURFACE ELEVATION (FT): 2755.47		DRILLING CONTRACTOR: A&E Drilling Services		LOGGED BY: BBJ
BOREHOLE DIA. (IN): 3-1/4-inch	ROCK CORE DIA. (IN): NA			SHEET 1 OF 1

DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPTION	SPT Blow Count (blows/6")	Water Content (%)	Pocket Pen. (tsf)	Vane Shear (Peak/Rem) (psf)	Ash Content (%)	WELL LOG	DEPTH (FT)
		COVER SOIL: Red-Brown Silty Fine SAND; Trace mica, moist. Est. at 3.0 feet bgs						No Piezo. Cave 5 to surface	
5		**PAPER MILL WASTE:**							5
	S-1	White/Dark Gray, Lime Mud, moist to damp.	2/1/3/2	42.3	1.25			Bentonite Chips	
	V-1					969/161 1937/161			
10									10
	S-2	White and Gray, Lime Mud, slightly dilatent, saturated.	2/1/2/3	42.8	1.0				
	V-2					2260/323 1614/161			
15									15
	S-3	15.0-15.8: White and Gray, Lime Mud. 15.8-17.0: Red, Silty SAND.	1/2/2/2	42.4			79.3		
20									20
	S-4	20-21: Gray, Lime Mud. 21-22: Red, Silty, SAND.	WOH/2/2/8	27.0					
		Bottom of Exploration at 22 feet bgs							
25									25
30									30
35									35
40									40
45									45
50									50

NOTES:

WOH = weight of hammer

Backfilled hole with bentonite chips to 5 ft bgs, cuttings 5 to ground surface.

SPT done with an automatic hammer, raw numbers are presented here.

PROJECT: Evergreen Packaging Regrade Area 6C and 6B		JOB NO.: 11112.00	**BORING NO.: B11-103**
DATE STARTED: 06/21-2011	DATE FINISHED: 06/21/2011	DRILLING METHOD: HSA	
GROUND SURFACE ELEVATION (FT): 2686.81	DRILLING CONTRACTOR: A&E Drilling Services		LOGGED BY: BBJ
BOREHOLE DIA. (IN): 3-1/4-inch	ROCK CORE DIA. (IN): NA		SHEET 1 OF 1

DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPTION	SPT Blow Count (blows/6")	Water Content (%)	Pocket Pen. (tsf)	Vane Shear (Peak/Rem) (psf)	Ash Content (%)	P11-103 WELL LOG	DEPTH (FT)
		COVER SOIL: Red-Brown Silty Fine SAND;							
5	S-1		4/3/2/3						5
		Est. at 7 feet bgs							
		PAPER MILL WASTE:							
10	S-2	Black, Fly Ash.	3/2/3/5		0.5 to 0.75				10
15	V-1	Assumed to be Fly Ash.				1130/323 1130/242		Bentonite Chips (typ)	15
	S-3	Black, Fly Ash, very dilatent.	WOHx3/1	71.6	dilated		83.4 GS=2.23		
20	V-2	Assumed to be Fly Ash.				1211/323 1453/242		Cave	20
	S-4	Similar to above.	WOHx2/1/1	67.9	dilated				
25	V-3	Assumed to be Fly Ash.				807/242 969/161			25
	S-5	Similar to above.	WOH/1/1/1	71.1	dilated				
30	V-4	Black, Fly Ash.		77.1		1453/323 1614/484			30
	S-6	30 to 30.5: Similar to above. 30.5 to 32: Black, Sludge, moist.	WOH/1/1/1	132.8	0.5 to 0.75				
35	V-5					1614/404 1937/404			35
	S-7	Black, Sludge, wet to moist.	1/2/2/2	91.2	0.75		57.7		
40	U-1	See Tube Opening Summary.							40
	S-8	Black, Sludge, moist.	1/2/2/2	105.7	0.5				
45		Bottom of Exploration at 42 feet bgs							45
50									50

NOTES:

WOH = weight of hammer

Installed 1" PVC temporary piezometer 5 ft screen 12 to 7 ft bgs.

Water measured 6/24/2011 at 6.95 feet below top of PVC (3.95 feet bgs)

GS = Specific Gravity

SPT done with an automatic hammer, raw numbers are presented here.

PROJECT: Evergreen Packaging Regrade Area 6C and 6B		JOB NO.: 11112.00			**BORING NO.: B11-104**
DATE STARTED: 06/21/2011	DATE FINISHED: 06/21/2011	DRILLING METHOD: HSA			
GROUND SURFACE ELEVATION (FT): 2688.98		DRILLING CONTRACTOR: A&E Drilling Services			LOGGED BY: BBJ
BOREHOLE DIA. (IN): 3-1/4-inch	ROCK CORE DIA. (IN): NA				SHEET 1 OF 1

DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPTION	SPT Blow Count (blows/6")	Water Content (%)	Pocket Pen. (tsf)	Specific Gravity	Ash Content (%)	WELL LOG	DEPTH (FT)
		COVER SOIL: Red-Brown Silty Fine SAND; Trace mica, moist.						No Piezo.	
5									5
	S-1	Brown and Red, Silty Fine SAND.	3/4/6/9						
10									10
	S-2	Similar to above, trace gravel.	2/4/5/5	21.6					
15									15
	S-3	Similar to above, trace gravel. Est. at 17+ feet	4/3/3/2						
		PAPER MILL WASTE:						Bentonite Chips and Cave to surface	
20									20
	S-4	Black Ash, Lime Mud and Sludge. (Sludge in Jar sample)	1/1/1/WOH	108					
25									25
	S-5	Black, Sludge, wet to moist.	WOH/1/1/1	149.0					
30	U-1	Upper portion retained for possible future testing. See Tube Opening Summary.		145.9					30
	S-6	Black, Sludge, moist, very light.	1/2/2/3	125.5					
35									35
	S-7	Similar to above.	WOH/1/2/1	140.0					
		Bottom of Exploration at 37 feet bgs							
40									40
45									45
50									50

NOTES:

WOH = weight of hammer

Backfilled hole with bentonite chips to 5 ft bgs, cuttings 5 to ground surface.

SPT done with an automatic hammer, raw numbers are presented here.

PROJECT: Evergreen Packaging Regrade Area 6C and 6B		JOB NO.: 11112.00	**BORING NO.: B11-105**
DATE STARTED: 06/22/2011	DATE FINISHED: 06/22/2011	DRILLING METHOD: HSA	
GROUND SURFACE ELEVATION (FT): 2680.41	DRILLING CONTRACTOR: A&E Drilling Services		LOGGED BY: BBJ
BOREHOLE DIA. (IN): 3-1/4-inch	ROCK CORE DIA. (IN): NA		SHEET 1 OF 1

DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPTION	SPT Blow Count (blows/6")	Water Content (%)	Pocket Pen. (tsf)	Vane Shear (Peak/Rem) (psf)	Ash Content (%)	P11-105 WELL LOG	DEPTH (FT)
		COVER SOIL: Red-Brown Silty Fine SAND;							
5		Est. at 5.5 feet bgs							5
	S-1	**PAPER MILL WASTE:** Black, Fly Ash and Sludge, dry to damp.	2/4/3/3	39.5					
10									10
	S-2	10 to 11: Blue-Gray, Lime Mud, wet. 11 to 12: Black, Sludge, moist.	1/1/1/1	50.5	0.25 to 0.5		72.0 GS = 2.85		
15	V-1	Black, Sludge		51		1614/161 1291/161			15
	U-1	Tube not opened (retained for possible future testing, likely Ash/Sludge Mix).						Bentonite Chips (typ)	
	S-3	Stone in tip of spoon, no recovery.	9/3/2/1						
20									20
	S-4	Black/White, Fly Ash with little Lime, highly dilatent saturated.	WOHx2/1/ WOH	56.9					
25									25
	S-5	Similar to above, wetter, thin sludge layer.	WOH/1/1/1	52.7					
30	V-2					1291/242 1776/404		Cave	30
	S-6	30 to 31: Black, Fly Ash. 31 to 32: Black, Sludge and Fly Ash.	WOHx2/2/2	105.7	0.75 to 1.25		62.9		
35									35
	S-7	Black, Fly Ash, dilatent, saturated.	WOH/12/2/2	51.9			84.7		
40									40
	S-8	Black, Fly Ash, little to some Sludge.	WOH/1/2/3	71.6					
45		Bottom of Exploration at 42 feet bgs.							45
50									50

NOTES:

WOH = weight of hammer

Installed 1" PVC temporary piezometer 5 ft screen 12 to 7 ft bgs.

SPT done with an automatic hammer, raw numbers are presented here.

Water measured 6/24/2011 at 5.08 feet below top of PVC (2.08 feet bgs)

GS = Specific Gravity

PROJECT: Evergreen Packaging Regrade Area 6C and 6B		JOB NO.: 11112.00	**BORING NO.: B11-106**
DATE STARTED: 06/22/2011	DATE FINISHED: 06/22/2011	DRILLING METHOD: HSA	
GROUND SURFACE ELEVATION (FT): 2685.81	DRILLING CONTRACTOR: A&E Drilling Services		LOGGED BY: BBJ
BOREHOLE DIA. (IN): 3-1/4-inch	ROCK CORE DIA. (IN): NA		SHEET 1 OF 1

DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPTION	SPT Blow Count (blows/6")	Water Content (%)	Pocket Pen. (tsf)	Vane Shear (Peak/Rem) (psf)	Ash Content (%)	WELL LOG	DEPTH (FT)
		COVER SOIL						No Piezo.	
		Red and Brown, Silty SAND to Sandy SILT, trace gravel.							
5									5
	S-1		2/3/4/5						
10		10.2 feet bgs							10
	S-2	**PAPER MILL WASTE:**	WHO x 4						
		S-2: Black, Fly Ash, saturated, dilatent.							
15	V-1					484/81 807/242			15
	S-3	Similar to above.	WOR x 4						
20	V-2					807/161 969/242		Bentonite Chips and Cave to surface	20
	S-4	Black, Sludge, little recovery.	1/2/1/2						
25	U-1	See Tube Opening Summary.		1.5528			50.9		25
	S-5	Black, Sludge, wet.	WOHx3/2	153.8	0.5		49.4		
30									30
	S-6	Black, Sludge.	WOHx3/2	151.7	0.25 to 0.5		49.9		
35									35
	S-7	Black, Sludge.	WOHx2/1/2	168.9 163.2			48.6		
		Bottom of Exploration at 37 feet bgs.							
40									40
45									45
50									50

NOTES:

WOH = weight of hammer

SPT done with an automatic hammer, raw numbers are presented here.

PROJECT: Evergreen Packaging Regrade Area 6C and 6B		JOB NO.: 11112.00		**BORING NO.: B11-107**
DATE STARTED: 06/22/2011	DATE FINISHED: 06/23/2011	DRILLING METHOD: HSA		
GROUND SURFACE ELEVATION (FT): 2753.32		DRILLING CONTRACTOR: A&E Drilling Services		LOGGED BY: BBJ
BOREHOLE DIA. (IN): 3-1/4-inch	ROCK CORE DIA. (IN): NA			SHEET 1 OF 1

DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPTION	SPT Blow Count (blows/6")	Water Content (%)	Pocket Pen. (tsf)	Vane Shear (Peak/Rem) (psf)	Ash Content (%)	WELL LOG	DEPTH (FT)
		COVER SOIL: Red-Brown Silty Fine SAND;						No Piezo.	
5									5
	S-1	Red, Silty SAND	2/2/3/3					Bentonite Chips (typ)	
10									10
	S-2	Similar to above, rock in tip of spoon. Est. at 12 feet bgs	2/2/2/2						
		PAPER MILL WASTE:							
15									15
	S-3	Black, Fly Ash and Sludge and Red Silty SAND Wood 16.5 to 17.	1/1/16/50/0.1'						
20		Drilled through wood to 18.5 ft bgs.							20
	S-4	No Recovery, wood in Auger.	3/1/1/2						
25									25
	S-5	Black, Sludge, saturated, very wet.	WOH/1/1/2	182.4	0.3			Cave	
30	V-1					Bent Vane Bad Test			30
	S-6	Black, Sludge, soft.	1/1/1/1	157.4					
35									35
	S-7	Similar to above.	WOHx2/1/2	143					
		Bottom of Exploration at 37 feet bgs							
40									40
45									45
50									50

NOTES:

WOH = weight of hammer

Hole caved to 13 feet bgs, bentonite chips 13 to ground surface.

SPT done with an automatic hammer, raw numbers are presented here.

Evergreen Packaging, Canton, North Carolina
Regrading of Areas 6B-Upper and 6C Upper and Lower

****These two pages are presented as part of Appendix 1 and provide data review of field testing, as presented on the soil boring logs.**

Summary of Field Strength Testing

FIELD VANE SHEAR TESTING RESULTS (Peak, psf)

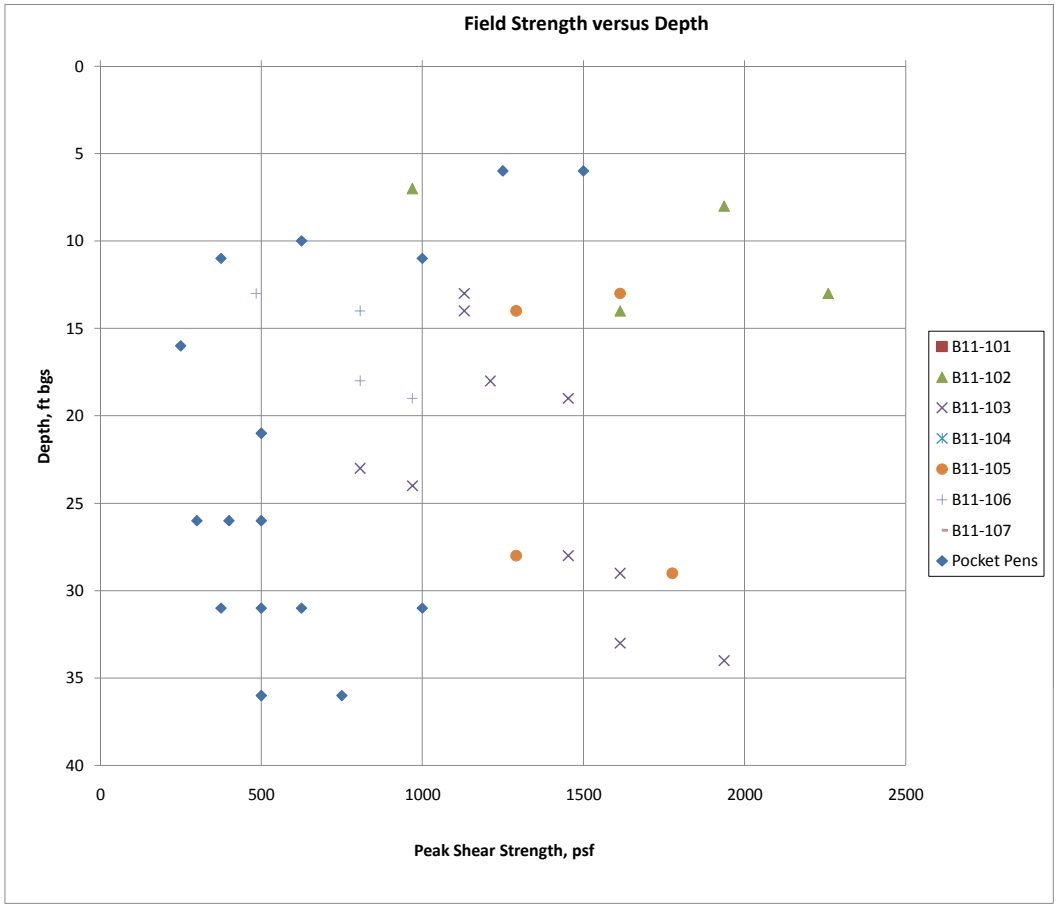
Depth ft bgs	B11-101	B11-102	B11-103	B11-104	B11-105	B11-106	B11-107
7		969					
8		1937					
13		2260	1130		1614	484	
14		1614	1130		1291	807	
18			1211			807	
19			1453			969	
23			807				
24			969				
28			1453		1291		
29			1614		1776		
33			1614				
34			1937				

VANE SHEAR TESTING RESULTS (Remolded, psf)

Depth ft bgs	B11-101	B11-102	B11-103	B11-104	B11-105	B11-106	B11-107
7		161					
8		161					
13		323	323		161	81	
14		161	242		161	242	
18			323			161	
19			242			242	
23			242				
24			161				
28			323		242		
29			484		404		
33							
34							

Pocket Penetrometer, psf (Approximate Shear Strength)

Depth	B11-101	B11-102	B11-103	B11-104	B11-105	B11-106	B11-107
	**NOTE: Below are 1/2 the Pocket Pen Values, since Shear Strength = 1/2 Unconfined Compressive Strength						
6	1500	1250					
10			625				
11		1000			375		
16	250						
21	500						
26	400					500	300
31	500		625		1000	375	
36	500		750				



Evergreen Packaging, Canton, North Carolina
Regrading of Areas 6B-Upper and 6C Upper and Lower

****These two pages are presented as part of Appendix 1 and provide data review of field testing, as presented on the soil boring logs.**

Summary of Field Strength Testing

Values Used in Effective Stress Calculations

	B-11-101	B-11-102	B-11-103	B-11-104	B-11-105	B-11-106	B-11-107
Water Depth =	3	2	4	4	2	2	1
Fill Thickness =	3	3	7	17	5.5	10.2	12
1997 Cover density =	130	Based on 2011 Lab Test Results					
Sludge density =	80						
Lime Density =	115						
Ash Density =	95						

Estimated Existing Vertical Effective Stress, psf)

Depth ft bgs	B-11-101	B-11-102	B-11-103	B-11-104	B-11-105	B-11-106	B-11-107
7		538					
8		590.6					
13		853.6	918.4		753.6	905.6	
14		906.2	951		771.2	938.2	
18			1081.4			1068.6	
19			1114			1101.2	
23			1244.4				
24			1277				
28			1407.4		1212.6		
29			1440		1245.2		
33			1515.3				
34			1532.9				

Lime Mud		Sludge		Fly Ash		1995 Vanes in Sludge	
Eff Stress	Su-Vane	Eff Stress	Su-Vane	Eff Stress	Su-Vane	Eff Stress	Su-Vane
538	969	1515	1614	918	1130	103	1513
591	1937	1533	1937	951	1130	229	281
854	2260	754	1614	1081	1211	355	880
906	1614	771	1291	1114	1453	462	1232
				1244	807	481	528
				1277	969	588	598
				1407	1453		
				1440	1614		
				1213	1291		
				1245	1776		
				906	484		
				938	807		
				1069	807		
				1101	969		

Note, these may not be peak values

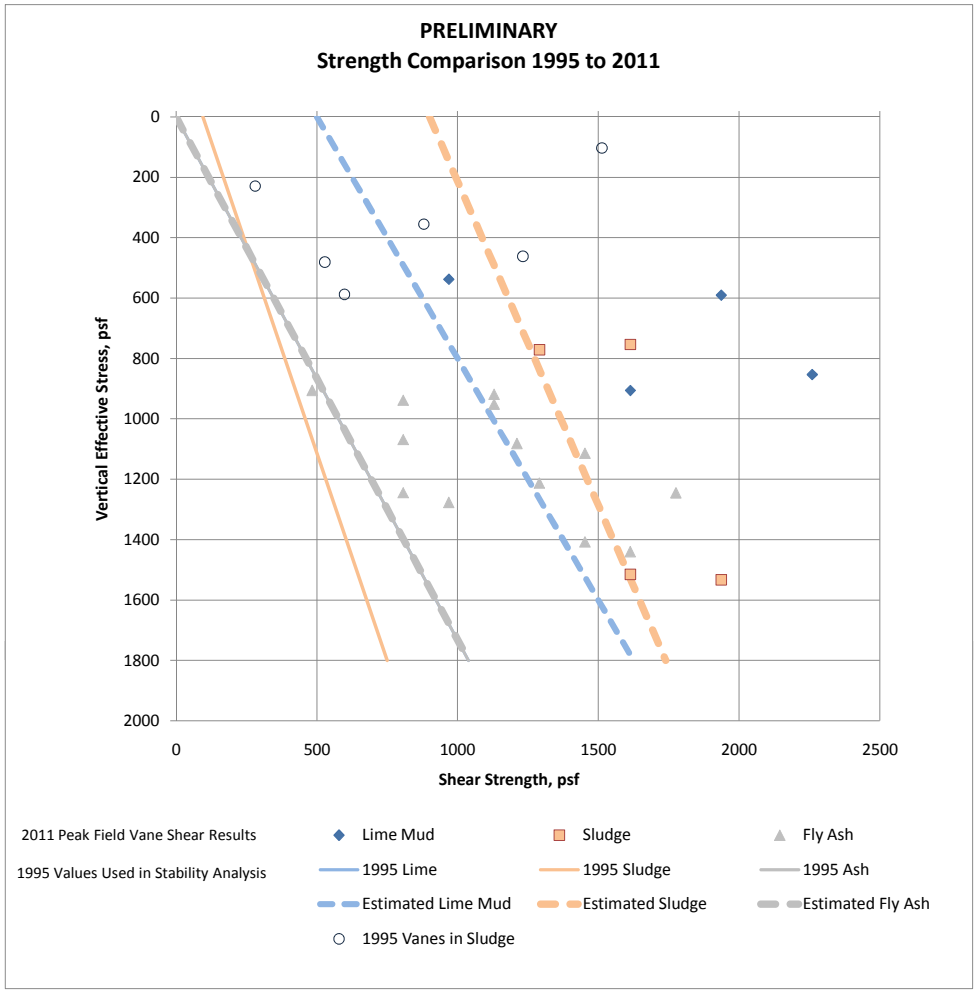
1995 Analysis

	Cohesion	Phi
Lime Mud	0	30
Sludge	95	20
Fly Ash	0	30

Estimated, Based on Field Testing

*Note: These are Peak Values

	Cohesion	Phi
Lime Mud	500	32
Sludge	900	25
Fly Ash	0	30



APPENDIX 2

LABORATORY RESULTS (WATER CONTENT, SPECIFIC GRAVITY, ASH CONTENT, TUBE OPENING SUMMARIES AND TRIAXIAL STRENGTH TESTING)

EVERGREEN PACKAGING

Regrade Area 6C and 6B

WATER CONTENT FROM BORINGS

BORING SAMPLE	DEPTH (ft.)	WT. H20 (g)	DRY SOIL (g)	WATER CONTENT (%)	SOLIDS CONTENT (%)	ASH CONTENT (%)	SPECIFIC GRAVITY	WET DENSITY (pcf)	DRY DENSITY (pcf)
B11-101 S1	5-7	26.43	63.43	41.7	70.6	78.3	2.69		
S2	10-12	39.93	31.73	125.8	44.3				
S3	15-17	45.23	32.92	137.4	42.1	56.5	2.27		
S4	20-22	42.36	29.86	141.9	41.3			81.5	33.7
S5	25-27	41.29	33.76	122.3	45.0				
S6	30-32	35.89	63.04	56.9	63.7	78.5			
S7	35-37	51.2	47.78	107.2	48.3				
B11-102 S1	5-7	31.08	73.48	42.3	70.3				
S2	10-12	26.85	62.75	42.8	70.0				
S3	15-17	32.85	77.45	42.4	70.2	79.3			
S4	20-22	34.48	127.75	27.0	78.7				
B11-103 S3	15-17	56.96	79.57	71.6	58.3	83.4	2.23		
S4	20-22	52.34	77.07	67.9	59.6				
S5	25-27	51.5	72.39	71.1	58.4				
V4	28-30	20.16	26.14	77.1	56.5				
S6	30-32	44.3	33.37	132.8	43.0			80.8	34.7
S7	35-37	47.89	52.53	91.2	52.3	57.7		90.1	47.1
U1	38-40	see tube opening						81.2	
S8	40-42	48.59	45.96	105.7	48.6				
B11-104 S2	10-12	16.88	78.03	21.6	82.2			133.4	109.7
S4	20-22	44.59	41.3	108.0	48.1			80.6	38.8
S5	25-27	54.8	36.79	149.0	40.2			79.8	32
U1	28-30	see tube opening						75.2	
S6	30-32	37.91	30.21	125.5	44.3				
S7	35-37	46.69	33.36	140.0	41.7			83.2	34.7
B11-105 S1	5-7	39.46	99.92	39.5	71.7				
S2	10-12	38.05	75.38	50.5	66.5	72.0	2.85		
V1	13-14.6	38.83	76.15	51.0	66.2				
S4	20-22	82.96	145.87	56.9	63.7				
S5	25-27	62.34	118.34	52.7	65.5				
S6	30-35	68.16	64.47	105.7	48.6	62.9			
S7	35-37	44.02	84.89	51.9	65.9	84.7			
S8	40-42	73.98	103.33	71.6	58.3				
B11-106 U1	23-25	see tube opening				50.9		75.7	
S5	25-27	74.81	48.65	153.8	39.4	49.4		78.6	31
S6	30-32	65.88	43.43	151.7	39.7	49.9		80	31.8
S7A	35-36	62.93	37.25	168.9	37.2				
S7B	36-37	70.49	43.19	163.2	38.0	48.6		83.2	31.6
B11-107 S5	25-27	93.58	51.31	182.4	35.4				
S6	30-32	63.93	40.61	157.4	38.8				
S7	35-37	56.74	39.68	143.0	41.2				

Maine Environmental Laboratory

Report of Analyses

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

Ted Leatherbee
Sevee & Maher Engineers, Inc.
PO Box 85A
Cumberland Ctr., ME 04021

July 07, 2011

Report No.: SAM1692-11

Enclosed are the results of the analyses requested for your samples as received by the laboratory. Samples were received in acceptable condition and analyzed within method holding times. All quality control data was within laboratory acceptance limits unless noted. The Limit of Quantitation (LOQ) is the minimum level for reporting quantitative data. The Limit of Detection (LOD) is the minimum level for reporting estimated data. Data reported between the Limit of Quantitation and Limit of Detection are J flagged as estimated. Maine Environmental Laboratory is certified by Maine (cert. #200904) and New Hampshire NELAP (NHELAP) (cert. #2031). A list of certified parameters is available on request. The results reported herein conform to the most current NELAP standards where applicable unless otherwise narrated in this report. This report shall not be reproduced except in full without the written consent of the laboratory.

The complete report consists of the following sections:

Maine Environmental Laboratory report
Chain of custody form

References

EPA - EPA600/4-79-020, Methods for Chemical Analysis of Water and Wastes, USEPA, Cincinnati, Ohio, March 1983.
SW8 - SW846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, USEPA, third edition, 1986.
STM - Standard Methods for the Examination of Water and Wastewater, 18th edition, APHA,AWWA,WPCF, 1992.
CLP - USEPA CLP Statement of Work for Inorganics, ILMO3.0.
AOA - Official Methods of Analysis of the Association of Official Analytical Chemists, 14th edition, 1984.
EPA2 - EPA/600R-94/111, Methods for the Determination of Metals in Environmental Samples, Supplement 1, May, 1994.
EPA1 - EPA/600/R-93/100 Methods for the Determination of Inorganic Substances in Environmental Samples, Aug. 1993.
HACH - Chemical Oxygen Demand, Method 8000, Hach Handbook of Water Analysis, Hach Chemical Company, 1979.
AST - ASTM D2974-87 Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Organic Soils.

Authorized signature

Herbert S. Kodis, laboratory director

Maine Environmental Laboratory

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Report of Analyses

Ted Leatherbee
Sevee & Maher Engineers, Inc.
PO Box 85A
Cumberland Ctr., ME 04021

July 07, 2011

Report No:	SAM1692-11	Sampler:	T. Leatherbee
Date received:	06/27 & 28/11	Sample matrix:	Solid
Project ID:	Evergreen Packaging Area 6 B-C	Method:	2974D
		Reference:	AST

Ash Content

Data reported on a dry weight basis.

Sample Identification	Results	units	Date Analyzed	LOD	LOQ	Date Sampled	Laboratory Id
B11-101-S1	78.27	%	07/01/11		0.01	06/27/11	SAM169211-01
B11-101-S3	56.51	%	07/01/11		0.01	06/27/11	SAM169211-02
B11-101-S6	78.48	%	07/01/11		0.01	06/27/11	SAM169211-03
B11-102-S3	79.30	%	07/01/11		0.01	06/27/11	SAM169211-04
B11-103-S3	83.39	%	07/01/11		0.01	06/27/11	SAM169211-05
B11-103-S7	57.74	%	07/01/11		0.01	06/27/11	SAM169211-06
B11-105-S2	71.96	%	07/01/11		0.01	06/28/11	SAM169211-07
B11-105-S6	62.94	%	07/01/11		0.01	06/28/11	SAM169211-08
B11-105-S7	84.66	%	07/01/11		0.01	06/28/11	SAM169211-09
B11-106-S5	49.35	%	07/05/11		0.01	06/28/11	SAM169211-10
B11-106-S6	49.91	%	07/05/11		0.01	06/28/11	SAM169211-11
B11-106-S7B	48.59	%	07/05/11		0.01	06/28/11	SAM169211-12
B11-106-U1	50.85	%	07/05/11		0.01	06/28/11	SAM169211-13

ND = not detected J = estimated B = detected in blank S = DLs increased due to sample matrix

RECORD OF TUBE SAMPLE

Project: EVERGREEN PACKAGING
AREA 6 B/C REGRADE

Project No. 11114
Date JULY 11
Tested by EJL

Boring No. B11-106 Sample No. U1
Depth (ft.) 23 to 25

SAMPLE DEPTH IN FEET

Depth (ft)	LABORATORY LOG	in)	SAMPLE DESCRIPTION	Torvane (tsf)	Shear Vane (kPa)	Pocket Pen. (tsf)	W.C. (%)	Can No.	Atter. Limits	Consol	Shear	Other
23		24										
		23										
		22										
		21										
		20					153.3	1a				
		19										
		18										
		17					168.9	2a				
		16										
		15										
							153.7	9				
		14										
		13	Brown fibrous								C	
24		12	SLUDGE								U	
		11	trace ash								2	
		10										
		9										
		8										
							151.4	10				
							149.1	4A				
		7										
		6										
		5									C	
		4									U	
		3									1	
		2										
		1										
25		0					146.4	5A				

	Total Sample	Sample Sections Top	Middle	Bottom
Length of Soil (in)			7.250	7.250
Inside Dia. Of Tube (in)			2.87	2.87
Wt. Tube and Soil (gms)			1459.9	1446.3
Wt. Tube (gms)			531.4	511.3
Wt. Wet Soil (gms)				
Total Unit Wt. (pcf)	75.7	—	75.4	75.9

Notes:

Sevee & Maher Engineers

RECORD OF TUBE SAMPLE

Project: EVERGREEN PACKAGING
AREA 6 B/C REGRADE

Project No.: 11114
Date: JULY 11
Tested by: EJL

Boring No.: B11-103
Sample No.: U1
Depth (ft.): 38 to 40

SAMPLE DEPTH IN FEET	LABORATORY LOG	in)	SAMPLE DESCRIPTION	Torvane (tsf)	Shear Vane (kPa)	Pocket Pen. (tsf)	W.C. (%)	Can No.	Atter. Limits	Consol	Shear	Other
38		24					38.6	7				
		23										
		22									CU 5	
		21										
		20										
		19										
		18										
		17					* 171.4	8				
		16					107.0	3				
		15	Grey ASH AND									
		14	Brown SLUDGE								CU 4	
39		13										
		12										
		11										
		10										
		9					91.2	4				
		8					91.5	1				
		7										
		6									CU 3	
		5										
		4										
		3										
		2										
		1										
40		0					146.4	2				

	Total Sample	Sample Sections Top	Middle	Bottom
Length of Soil (in)		7.875	7.875	7.875
Inside Dia. Of Tube (in)		2.87	2.87	2.87
Wt. Tube and Soil (gms)		1603.3	1701.3	1639.1
Wt. Tube (gms)		561.8	563.5	559.6
Wt. Wet Soil (gms)				
Total Unit Wt. (pcf)	81.2	77.9	85.1	80.7

Notes: * WET FROM TUBE SECTION SITTING UPRIGHT.

Sevee & Maher Engineers

RECORD OF TUBE SAMPLE

Project: EVERGREEN PACKAGING
AREA 6 B/C REGRADE

Project No.: 11114
Date: JULY 11
Tested by: EJL

Boring No.: B11-104
Sample No.: U1
Depth (ft.): 28 to 30

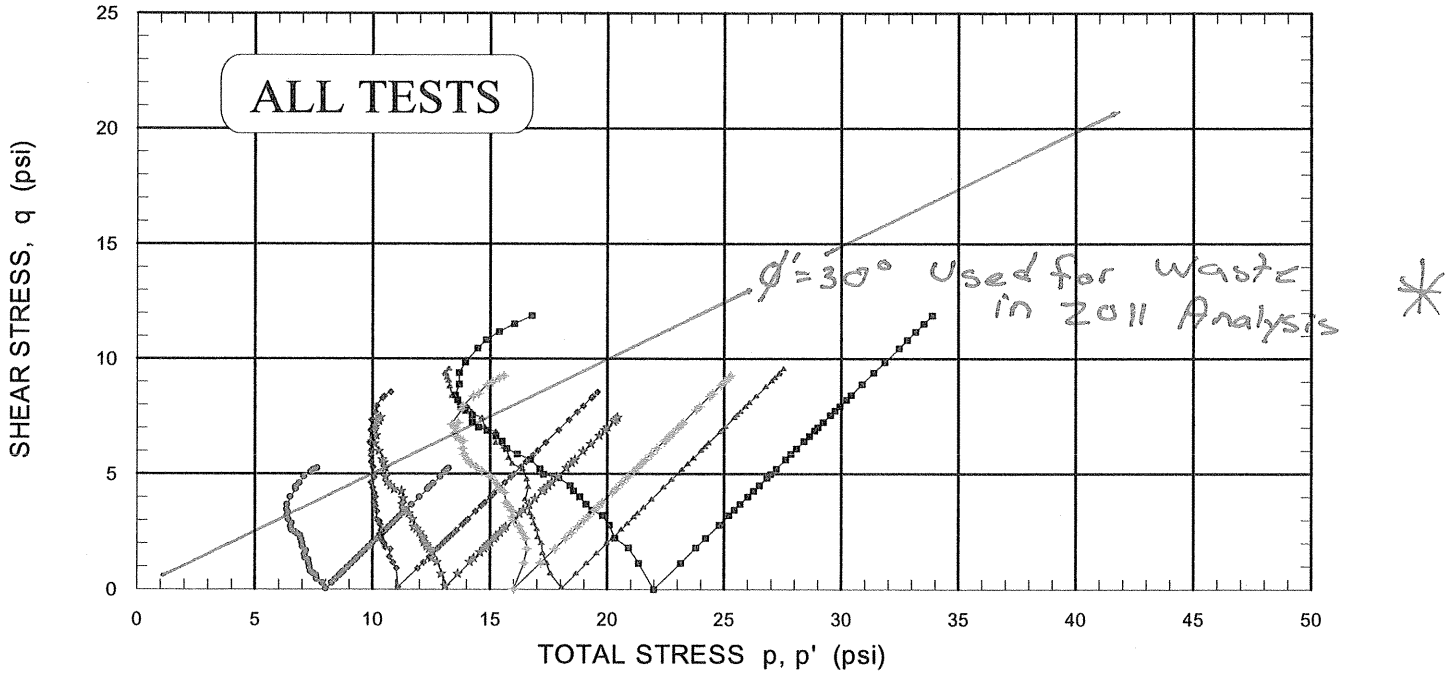
SAMPLE DEPTH IN FEET	LABORATORY LOG	in)	SAMPLE DESCRIPTION	Torvane (tsf)	Shear Vane (kPa)	Pocket Pen. (tsf)	W.C. (%)	Can No.	Atter. Limits	Consol	Shear	Other
28		24										
		23										
		22										
		21										
		20										
		19										
		18										
		17										
		16										
		15										
		14										
29		13										
		12										
		11										
		10										
		9										
		8					146.2	11				
		7	Brown fibrous SLUDGE								CU6	
		6										
		5										
		4										
		3										
		2										
		1										
30		0					145.6	12				

	Total Sample	Sample Sections Top	Middle	Bottom
Length of Soil (in)				8.00
Inside Dia. Of Tube (in)				2.87
Wt. Tube and Soil (gms)				1582.9
Wt. Tube (gms)				560.8
Wt. Wet Soil (gms)				
Total Unit Wt. (pcf)				75.2

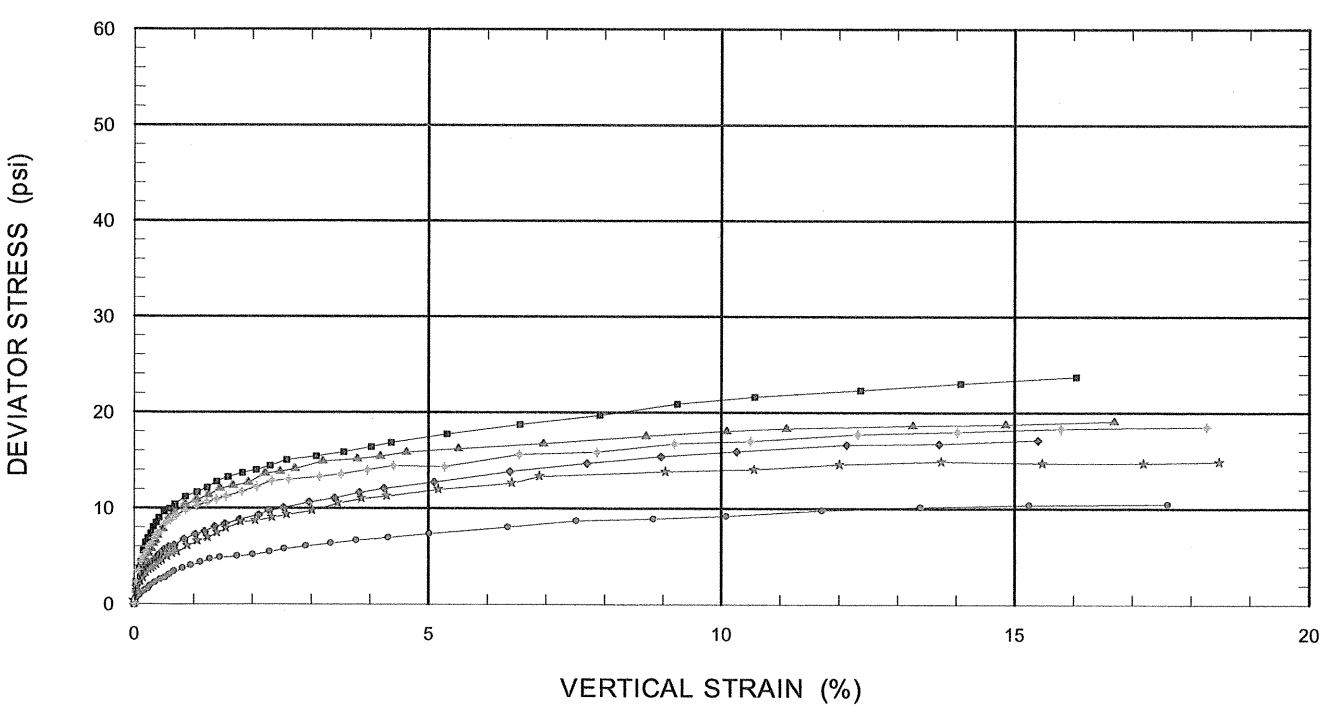
Notes:

Sevee & Maher Engineers

Consolidated Undrained Triaxial Test ASTM D4767

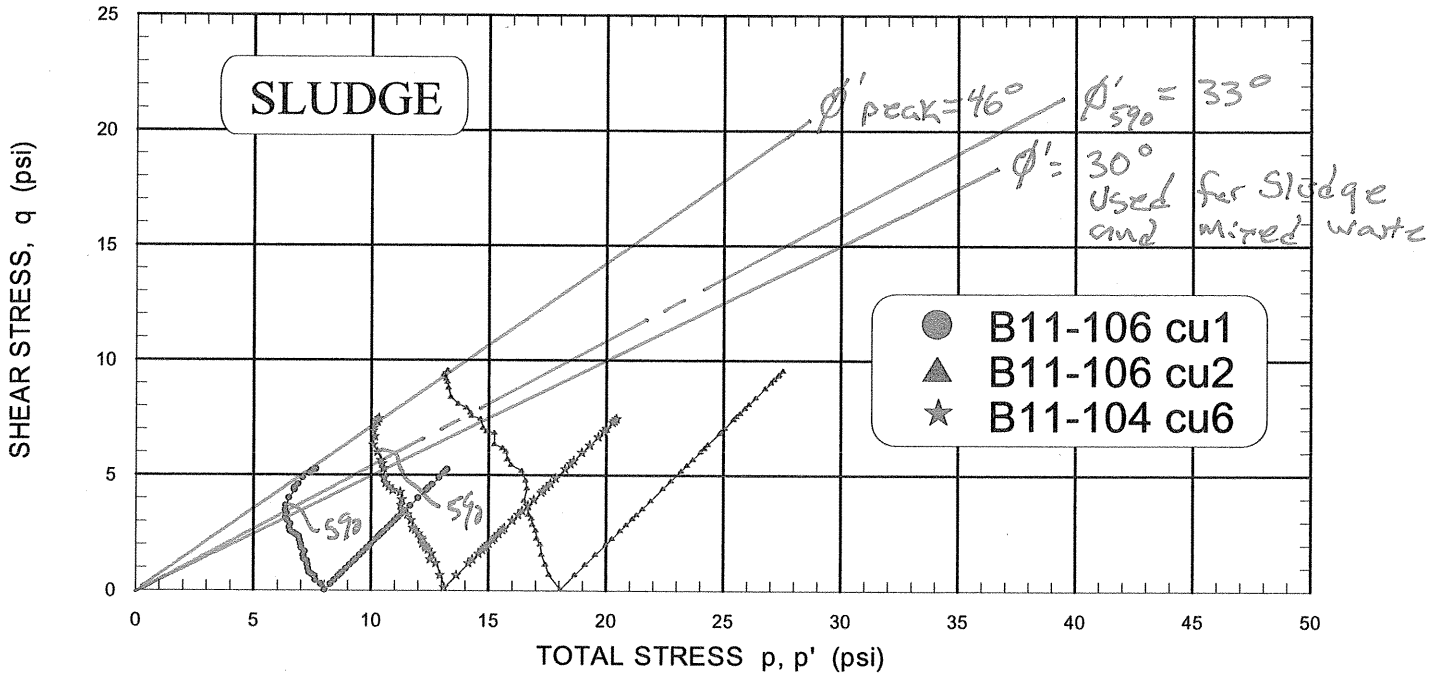


B11-106 cu1
B11-106 cu2
B11-103 cu3
B11-103 cu4
B11-103 cu5
B11-104 cu6

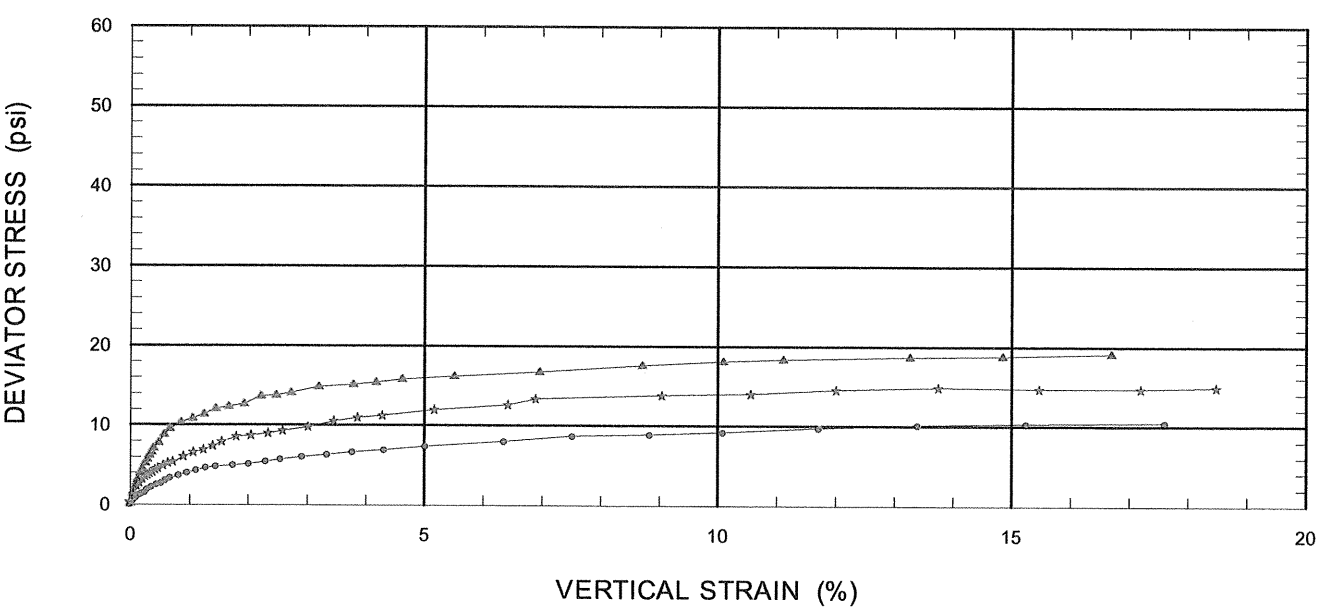


Sevee & Maher Engineers

Consolidated Undrained Triaxial Test ASTM D4767



EVERGREEN PACKAGING		AREA 6 b/c Regrade		
		Brown Fibrous SLUDGE		
SAMPLE No.:		B11-106	B11-106	B11-104
DEPTH (ft.):		24.5	24	29.5
DATE:		29-Jun-11	3-Jul-11	7-Jul-11
TEST No.:		CU-1	CU-2	CU-6
INITIAL	WATER CONTENT (%):	147.8	152.6	145.9
	AREA (in^2):	6.415	6.421	6.324
	HEIGHT (in.):	6.250	6.000	6.188
	DRY DENSITY (pcf):	29.7	29.7	30.7
	SATURATION (%):	88.9	91.7	91.5
	VOID RATIO:	3.7733	3.7781	3.6192
	B-VALUE:	1	1	1
FRESHEAR	WATER CONTENT (%):	133.1	111.4	126.4
	DRY DENSITY (pcf):	32.8	36.6	34.6
	SATURATION (%):	90.9	87.9	92.6
	VOID RATIO:	3.3255	2.8767	3.0979
MINOR PRIN. STRESS (psi):		8	18	13
MAX DEVIATOR STRESS (psi):		10.5	19.1	14.9
RATE OF STRAIN (in./min.):		0.005	0.005	0.005
FINAL WATER CONTENT (%):		133.1	111.4	126.4



Sevee & Maher Engineers

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

PROJECT: Evergreen Packaging
Area 6 B/C Regrade

DESCRIPTION: Brown fibrous SLUDGE

BORING:	B11-106
SAMPLE:	U1
DEPTH (ft.):	24.5
FILE No.:	11114
TEST No.:	CIUC-1
DATE:	6/29/2011
TESTED BY:	EJL

TEST CONDITIONS	
INITIAL DIAL READING (in.):	0.2695
SPECIFIC GRAVITY:	2.27
INITIAL WET WT. (gms):	774.3
INITIAL DRY WT. (gms):	312.5
CELL PRESSURE (psi):	100
BACK PRESSURE (psi):	92
EFFECTIVE CONFINING PRESSURE (psi):	8
PORE PRESSURE @ PRESHEAR (psi):	93.3
AXIAL STRAIN RATE (in./min.):	0.005
MEMBRANE THICKNESS (in.):	0.012

	INITIAL	PRE-SHEAR	FINAL			
HEIGHT (in.):	6.250	6.080		15.8750	15.443	(cm)
AREA (in^2):	6.415	5.976		41.3889	38.5548	(cm^2)
TOTAL DENSITY (pcf):	73.6	76.4				
DRY DENSITY (pcf):	29.7	32.8				
WATER CONTENT (%):	147.8		133.1			
VOLUME TOTAL (cc):	657.05	595.41				
VOLUME SOLIDS (cc):	137.65					
VOLUME VOIDS (cc):	519.40	457.76				
VOID RATIO:	3.7733	3.3255				
SATURATION (%):	88.9	90.9				

TIME (min)	DIAL (in.)	LOAD (lb)	PWP (psi)	DELTA L (in.)	AREA CF	CORR. AREA (sq. in.)	IND LOAD (lbs.)	IND PWP (psi)	DEV STRESS (psi)	SIGMA 3 (psi)	SIGMA 1 (psi)	SIGMA 3' (psi)	SIGMA 1' (psi)	P (psi)	P' (psi)	Q (psi)	STRAIN (%)	A
0	0.2695	20	93.3	0.0000	1.0000	5.98	0.3	0	0.1	8.0	8.1	8.0	8.1	8.0	8.03	0.0	0.00	0.00
0.5	0.2725	23	93.7	0.0030	0.9995	5.98	3.3	0.4	0.6	8.0	8.6	7.6	8.2	8.3	7.88	0.3	0.05	0.72
1	0.2758	25	94.1	0.0063	0.9990	5.98	5.3	0.8	0.9	8.0	8.9	7.2	8.1	8.4	7.64	0.4	0.10	0.90
1.5	0.2787	27	94.3	0.0092	0.9985	5.99	7.3	1.0	1.2	8.0	9.2	7.0	8.2	8.6	7.61	0.6	0.15	0.82
2	0.2815	28	94.5	0.0120	0.9980	5.99	8.3	1.2	1.4	8.0	9.4	6.8	8.2	8.7	7.49	0.7	0.20	0.87
2.5	0.2842	29	94.7	0.0147	0.9976	5.99	9.3	1.4	1.6	8.0	9.6	6.6	8.2	8.8	7.38	0.8	0.24	0.90
3	0.2868	31	94.9	0.0173	0.9972	5.99	11.3	1.6	1.9	8.0	9.9	6.4	8.3	8.9	7.34	0.9	0.28	0.85
4	0.2915	33	95.1	0.0220	0.9964	6.00	13.3	1.8	2.2	8.0	10.2	6.2	8.4	9.1	7.31	1.1	0.36	0.81
5	0.2968	35	95.3	0.0273	0.9955	6.00	15.3	2.0	2.5	8.0	10.5	6.0	8.5	9.3	7.27	1.3	0.45	0.78
6	0.3017	36	95.5	0.0322	0.9947	6.01	16.3	2.2	2.7	8.0	10.7	5.8	8.5	9.4	7.16	1.4	0.53	0.81
7	0.306	38	95.7	0.0365	0.9940	6.01	18.3	2.4	3.0	8.0	11.0	5.6	8.6	9.5	7.12	1.5	0.60	0.79
8	0.3108	40	95.8	0.0413	0.9932	6.02	20.3	2.5	3.4	8.0	11.4	5.5	8.9	9.7	7.19	1.7	0.68	0.74
10	0.3196	42	96.1	0.0501	0.9918	6.03	22.3	2.8	3.7	8.0	11.7	5.2	8.9	9.9	7.05	1.9	0.82	0.76
12	0.328	44	96.3	0.0585	0.9904	6.03	24.3	3.0	4.0	8.0	12.0	5.0	9.0	10.0	7.01	2.0	0.96	0.74
14	0.3375	46	96.5	0.0680	0.9888	6.04	26.3	3.2	4.4	8.0	12.4	4.8	9.2	10.2	6.98	2.2	1.12	0.74
16	0.3478	48	96.7	0.0783	0.9871	6.05	28.3	3.4	4.7	8.0	12.7	4.6	9.3	10.3	6.94	2.3	1.29	0.73
18	0.358	49	96.9	0.0885	0.9854	6.06	29.3	3.6	4.8	8.0	12.8	4.4	9.2	10.4	6.82	2.4	1.46	0.75
21	0.3755	50	97.1	0.1060	0.9826	6.08	30.3	3.8	5.0	8.0	13.0	4.2	9.2	10.5	6.69	2.5	1.74	0.76
24	0.3923	51	97.3	0.1228	0.9798	6.10	31.3	4.0	5.1	8.0	13.1	4.0	9.1	10.6	6.57	2.6	2.02	0.78
27	0.4095	53	97.5	0.1400	0.9770	6.12	33.3	4.2	5.4	8.0	13.4	3.8	9.2	10.7	6.52	2.7	2.30	0.77
30	0.4245	55	97.6	0.1550	0.9745	6.13	35.3	4.3	5.8	8.0	13.8	3.7	9.5	10.9	6.58	2.9	2.55	0.75
35	0.447	57	97.9	0.1775	0.9708	6.16	37.3	4.6	6.1	8.0	14.1	3.4	9.5	11.0	6.43	3.0	2.92	0.76
40	0.4725	59	98.1	0.2030	0.9666	6.18	39.3	4.8	6.4	8.0	14.4	3.2	9.6	11.2	6.38	3.2	3.34	0.76
45	0.499	61	98.2	0.2295	0.9623	6.21	41.3	4.9	6.7	8.0	14.7	3.1	9.8	11.3	6.43	3.3	3.77	0.74
50	0.532	63	98.4	0.2625	0.9568	6.25	43.3	5.1	6.9	8.0	14.9	2.9	9.8	11.5	6.37	3.5	4.32	0.74
60	0.5745	66	98.6	0.3050	0.9498	6.29	46.3	5.3	7.4	8.0	15.4	2.7	10.1	11.7	6.38	3.7	5.02	0.72
75	0.656	71	98.8	0.3865	0.9364	6.38	51.3	5.5	8.0	8.0	16.0	2.5	10.5	12.0	6.52	4.0	6.36	0.68
90	0.727	76	98.9	0.4575	0.9248	6.46	56.3	5.6	8.7	8.0	16.7	2.4	11.1	12.4	6.76	4.4	7.52	0.64
105	0.807	78	99	0.5375	0.9116	6.56	58.3	5.7	8.9	8.0	16.9	2.3	11.2	12.4	6.75	4.4	8.84	0.64
120	0.883	81	99	0.6135	0.8991	6.65	61.3	5.7	9.2	8.0	17.2	2.3	11.5	12.6	6.91	4.6	10.09	0.62
140	0.982	86	99.1	0.7125	0.8828	6.77	66.3	5.8	9.8	8.0	17.8	2.2	12.0	12.9	7.10	4.9	11.72	0.59
160	1.084	90	99	0.8145	0.8660	6.90	70.3	5.7	10.2	8.0	18.2	2.3	12.5	13.1	7.39	5.1	13.40	0.56
182	1.197	93	99	0.9275	0.8475	7.05	73.3	5.7	10.4	8.0	18.4	2.3	12.7	13.2	7.50	5.2	15.25	0.55
210	1.34	96	98.9	1.0705	0.8239	7.25	76.3	5.6	10.5	8.0	18.5	2.4	12.9	13.3	7.66	5.3	17.61	0.53

$\phi'_{5\%} \cong 35°$

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

PROJECT: Evergreen Packaging
Area 6 B/C Regrade

DESCRIPTION: Brown fibrous SLUDGE
BORING: B11-104
SAMPLE: U1
DEPTH (ft.): 29.5
FILE No.: 11114
TEST No.: CIUC-6
DATE: 7/7/2011
TESTED BY: EJL

TEST CONDITIONS

INITIAL DIAL READING (in.):	0.328
SPECIFIC GRAVITY:	2.27
INITIAL WET WT. (gms):	774.9
INITIAL DRY WT. (gms):	315.1
CELL PRESSURE (psi):	98
BACK PRESSURE (psi):	85
EFFECTIVE CONFINING PRESSURE (psi):	13
PORE PRESSURE @ PRESHEAR (psi):	86.3
AXIAL STRAIN RATE (in./min.):	0.005
MEMBRANE THICKNESS (in.):	0.012

	INITIAL	PRE-SHEAR	FINAL			
HEIGHT (in.):	6.188	5.957		15.7163	15.130	(cm)
AREA (in^2):	6.324	5.828		40.8019	37.6012	(cm^2)
TOTAL DENSITY (pcf):	75.4	78.3				
DRY DENSITY (pcf):	30.7	34.6				
WATER CONTENT (%):	145.9		126.38			
VOLUME TOTAL (cc):	641.25	568.89				
VOLUME SOLIDS (cc):	138.82					
VOLUME VOIDS (cc):	502.43	430.07				
VOID RATIO:	3.6192	3.0979				
SATURATION (%):	91.5	92.6				

TIME (min)	DIAL (in.)	LOAD (lb)	PWP (psi)	DELTA L (in.)	AREA CF	CORR. AREA (sq. in.)	IND LOAD (lbs.)	IND PWP (psi)	DEV STRESS (psi)	SIGMA 3 (psi)	SIGMA 1 (psi)	SIGMA 3' (psi)	SIGMA 1' (psi)	P (psi)	P' (psi)	Q (psi)	STRAIN (%)	A
0	0.328	21	86.3	0.0000	1.0000	5.83	1.7	0	0.3	13.0	13.3	13.0	13.3	13.1	13.15	0.1	0.00	0.00
0.5	0.332	27	87.0	0.0040	0.9993	5.83	7.7	0.7	1.3	13.0	14.3	12.3	13.6	13.7	12.96	0.7	0.07	0.53
1	0.335	33	87.7	0.0070	0.9988	5.84	13.7	1.4	2.3	13.0	15.3	11.6	13.9	14.2	12.77	1.2	0.12	0.60
1.5	0.3378	35	88.1	0.0098	0.9984	5.84	15.7	1.8	2.7	13.0	15.7	11.2	13.9	14.3	12.54	1.3	0.16	0.67
2	0.3405	38	88.3	0.0125	0.9979	5.84	18.7	2.0	3.2	13.0	16.2	11.0	14.2	14.6	12.60	1.6	0.21	0.62
2.5	0.3432	40	88.6	0.0152	0.9974	5.84	20.7	2.3	3.5	13.0	16.5	10.7	14.2	14.8	12.47	1.8	0.26	0.65
3	0.3458	41	88.8	0.0178	0.9970	5.85	21.7	2.5	3.7	13.0	16.7	10.5	14.2	14.9	12.36	1.9	0.30	0.67
3.5	0.348	42	88.9	0.0200	0.9966	5.85	22.7	2.6	3.9	13.0	16.9	10.4	14.3	14.9	12.34	1.9	0.34	0.67
4	0.3508	43	89.1	0.0228	0.9962	5.85	23.7	2.8	4.0	13.0	17.0	10.2	14.2	15.0	12.22	2.0	0.38	0.69
4.5	0.3535	45	89.3	0.0255	0.9957	5.85	25.7	3.0	4.4	13.0	17.4	10.0	14.4	15.2	12.19	2.2	0.43	0.68
5	0.3565	46	89.4	0.0285	0.9952	5.86	26.7	3.1	4.6	13.0	17.6	9.9	14.5	15.3	12.18	2.3	0.48	0.68
6	0.3617	48	89.7	0.0337	0.9943	5.86	28.7	3.4	4.9	13.0	17.9	9.6	14.5	15.4	12.05	2.4	0.57	0.69
7	0.3665	50	90	0.0385	0.9935	5.87	30.7	3.7	5.2	13.0	18.2	9.3	14.5	15.6	11.92	2.6	0.65	0.71
8	0.3715	51	90.2	0.0435	0.9927	5.87	31.7	3.9	5.4	13.0	18.4	9.1	14.5	15.7	11.80	2.7	0.73	0.72
10	0.382	55	90.6	0.0540	0.9909	5.88	35.7	4.3	6.1	13.0	19.1	8.7	14.8	16.0	11.73	3.0	0.91	0.71
12	0.392	58	91	0.0640	0.9893	5.89	38.7	4.7	6.6	13.0	19.6	8.3	14.9	16.3	11.58	3.3	1.07	0.72
14	0.4025	60	91.4	0.0745	0.9875	5.90	40.7	5.1	6.9	13.0	19.9	7.9	14.8	16.4	11.35	3.4	1.25	0.74
16	0.412	63	91.7	0.0840	0.9859	5.91	43.7	5.4	7.4	13.0	20.4	7.6	15.0	16.7	11.30	3.7	1.41	0.73
18	0.421	66	91.9	0.0930	0.9844	5.92	46.7	5.6	7.9	13.0	20.9	7.4	15.3	16.9	11.34	3.9	1.56	0.71
21	0.4357	70	92.3	0.1077	0.9819	5.94	50.7	6.0	8.5	13.0	21.5	7.0	15.5	17.3	11.27	4.3	1.81	0.70
24	0.451	71	92.7	0.1230	0.9794	5.95	51.7	6.4	8.7	13.0	21.7	6.6	15.3	17.3	10.94	4.3	2.06	0.74
27	0.4675	73	93	0.1395	0.9766	5.97	53.7	6.7	9.0	13.0	22.0	6.3	15.3	17.5	10.80	4.5	2.34	0.74
30	0.4827	75	93.3	0.1547	0.9740	5.98	55.7	7.0	9.3	13.0	22.3	6.0	15.3	17.7	10.65	4.7	2.60	0.75
35	0.508	78	93.6	0.1800	0.9698	6.01	58.7	7.3	9.8	13.0	22.8	5.7	15.5	17.9	10.58	4.9	3.02	0.75
41	0.534	83	94	0.2060	0.9654	6.04	63.7	7.7	10.6	13.0	23.6	5.3	15.9	18.3	10.58	5.3	3.46	0.73
45	0.5585	86	94.3	0.2305	0.9613	6.06	66.7	8.0	11.0	13.0	24.0	5.0	16.0	18.5	10.50	5.5	3.87	0.73
50	0.5837	88	94.5	0.2557	0.9571	6.09	68.7	8.2	11.3	13.0	24.3	4.8	16.1	18.6	10.44	5.6	4.29	0.73
60	0.6365	93	95	0.3085	0.9482	6.15	73.7	8.7	12.0	13.0	25.0	4.3	16.3	19.0	10.29	6.0	5.18	0.73
75	0.711	98	95.5	0.3830	0.9357	6.23	78.7	9.2	12.6	13.0	25.6	3.8	16.4	19.3	10.12	6.3	6.43	0.73
90	0.739	103	95.8	0.4110	0.9310	6.26	83.7	9.5	13.4	13.0	26.4	3.5	16.9	19.7	10.18	6.7	6.90	0.71
109	0.867	108	96.1	0.5390	0.9095	6.41	88.7	9.8	13.8	13.0	26.8	3.2	17.0	19.9	10.12	6.9	9.05	0.71
120	0.9575	111	96.2	0.6295	0.8943	6.52	91.7	9.9	14.1	13.0	27.1	3.1	17.2	20.0	10.14	7.0	10.57	0.70
143	1.044	116	96.3	0.7160	0.8798	6.62	96.7	10.0	14.6	13.0	27.6	3.0	17.6	20.3	10.30	7.3	12.02	0.69
160	1.1477	120	96.4	0.8197	0.8624	6.76	100.7	10.1	14.9	13.0	27.9	2.9	17.8	20.4	10.35	7.4	13.76	0.68
180	1.25	121	96.4	0.9220	0.8452	6.90	101.7	10.1	14.7	13.0	27.7	2.9	17.6	20.4	10.27	7.4	15.48	0.68
200	1.3525	123	96.4	1.0245	0.8280	7.04	103.7	10.1	14.7	13.0	27.7	2.9	17.6	20.4	10.27	7.4	17.20	0.69
224	1.429	126	96.4	1.1010	0.8152	7.15	106.7	10.1	14.9	13.0	27.9	2.9	17.8	20.5	10.36	7.5	18.48	0.68

$\phi'_{5\%} \cong 36°$

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

PROJECT: Evergreen Packaging

Area 6 B/C Regrade

DESCRIPTION: Brown fibrous SLUDGE

BORING:	B11-106
SAMPLE:	U1
DEPTH (ft.):	24
FILE No.:	11114
TEST No.:	CIUC-2
DATE:	7/3/2011
TESTED BY:	EJL

TEST CONDITIONS

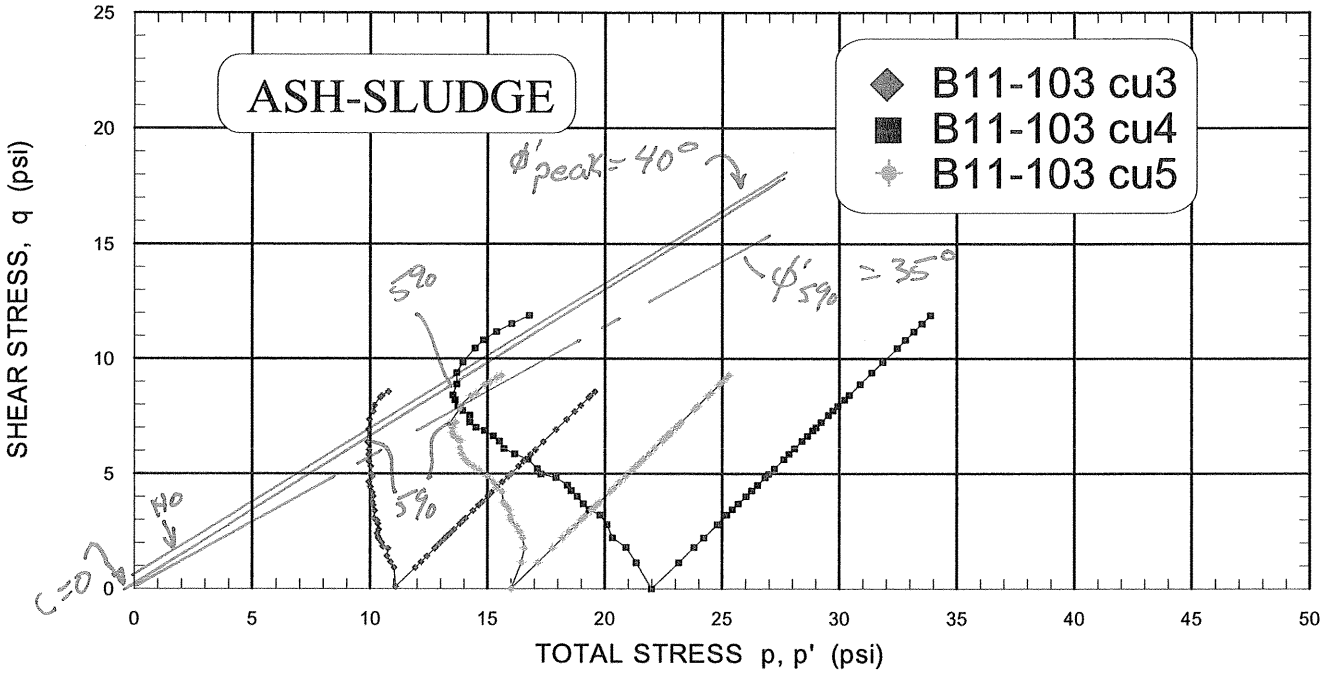
INITIAL DIAL READING (in.):	0.6185
SPECIFIC GRAVITY:	2.27
INITIAL WET WT. (gms):	757.5
INITIAL DRY WT. (gms):	299.9
CELL PRESSURE (psi):	103
BACK PRESSURE (psi):	85
EFFECTIVE CONFINING PRESSURE (psi):	18
PORE PRESSURE @ PRESHEAR (psi):	86.1
AXIAL STRAIN RATE (in./min.):	0.005
MEMBRANE THICKNESS (in.):	0.012

	INITIAL	PRE-SHEAR	FINAL			
HEIGHT (in.):	6.000	5.482		15.2400	13.924	(cm)
AREA (in^2):	6.421	5.702		41.4264	36.7870	(cm^2)
TOTAL DENSITY (pcf):	74.9	77.3				
DRY DENSITY (pcf):	29.7	36.6				
WATER CONTENT (%):	152.55		111.44			
VOLUME TOTAL (cc):	631.34	512.23				
VOLUME SOLIDS (cc):	132.13					
VOLUME VOIDS (cc):	499.21	380.10				
VOID RATIO:	3.7781	2.8767				
SATURATION (%):	91.7	87.9				

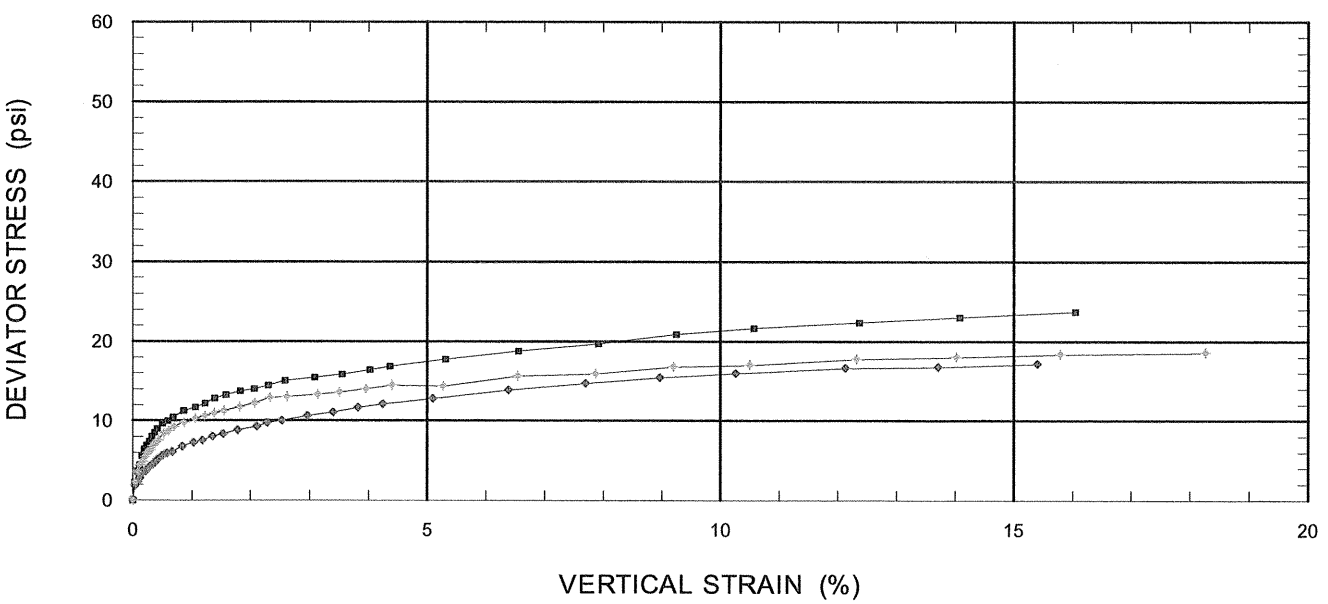
TIME (min)	DIAL (in.)	LOAD (lb)	PWP (psi)	DELTA L (in.)	AREA CF	CORR. AREA (sq. in.)	IND LOAD (lbs.)	IND PWP (psi)	DEV STRESS (psi)	SIGMA 3 (psi)	SIGMA 1 (psi)	SIGMA 3' (psi)	SIGMA 1' (psi)	P (psi)	P' (psi)	Q (psi)	STRAIN (%)	A
0	0.6185	21	86.1	0.0000	1.0000	5.70	0.7	0	0.1	18.0	18.1	18.0	18.1	18.1	18.06	0.1	0.00	0.00
0.5	0.6207	28	87.2	0.0022	0.9996	5.70	7.7	1.1	1.4	18.0	19.4	16.9	18.3	18.7	17.58	0.7	0.04	0.81
1	0.6228	33	87.8	0.0043	0.9992	5.71	12.7	1.7	2.2	18.0	20.2	16.3	18.5	19.1	17.41	1.1	0.08	0.76
1.5	0.625	38	88.4	0.0065	0.9988	5.71	17.7	2.3	3.1	18.0	21.1	15.7	18.8	19.6	17.25	1.6	0.12	0.74
2	0.6272	43	88.9	0.0087	0.9984	5.71	22.7	2.8	4.0	18.0	22.0	15.2	19.2	20.0	17.19	2.0	0.16	0.70
2.5	0.6295	46	89.3	0.0110	0.9980	5.71	25.7	3.2	4.5	18.0	22.5	14.8	19.3	20.2	17.05	2.2	0.20	0.71
3	0.632	50	89.7	0.0135	0.9975	5.72	29.7	3.6	5.2	18.0	23.2	14.4	19.6	20.6	17.00	2.6	0.25	0.69
3.5	0.634	53	90.1	0.0155	0.9972	5.72	32.7	4.0	5.7	18.0	23.7	14.0	19.7	20.9	16.86	2.9	0.28	0.70
4	0.636	56	90.4	0.0175	0.9968	5.72	35.7	4.3	6.2	18.0	24.2	13.7	19.9	21.1	16.82	3.1	0.32	0.69
4.5	0.638	58	90.7	0.0195	0.9964	5.72	37.7	4.6	6.6	18.0	24.6	13.4	20.0	21.3	16.69	3.3	0.36	0.70
5	0.6398	61	91	0.0213	0.9961	5.72	40.7	4.9	7.1	18.0	25.1	13.1	20.2	21.6	16.66	3.6	0.39	0.69
6	0.6446	65	91.5	0.0261	0.9952	5.73	44.7	5.4	7.8	18.0	25.8	12.6	20.4	21.9	16.50	3.9	0.48	0.69
7	0.65	71	91.9	0.0315	0.9943	5.73	50.7	5.8	8.8	18.0	26.8	12.2	21.0	22.4	16.62	4.4	0.57	0.66
8	0.655	75	92.3	0.0365	0.9933	5.74	54.7	6.2	9.5	18.0	27.5	11.8	21.3	22.8	16.57	4.8	0.67	0.65
10	0.6655	80	92.9	0.0470	0.9914	5.75	59.7	6.8	10.4	18.0	28.4	11.2	21.6	23.2	16.39	5.2	0.86	0.65
12	0.6763	83	93.6	0.0578	0.9895	5.76	62.7	7.5	10.9	18.0	28.9	10.5	21.4	23.4	15.94	5.4	1.05	0.69
14	0.687	86	94	0.0685	0.9875	5.77	65.7	7.9	11.4	18.0	29.4	10.1	21.5	23.7	15.79	5.7	1.25	0.69
16	0.698	90	94.4	0.0795	0.9855	5.79	69.7	8.3	12.0	18.0	30.0	9.7	21.7	24.0	15.72	6.0	1.45	0.69
18	0.71	92	94.7	0.0915	0.9833	5.80	71.7	8.6	12.4	18.0	30.4	9.4	21.8	24.2	15.58	6.2	1.67	0.70
21	0.7245	94	95.2	0.1060	0.9807	5.81	73.7	9.1	12.7	18.0	30.7	8.9	21.6	24.3	15.24	6.3	1.93	0.72
24	0.74	100	95.7	0.1215	0.9778	5.83	79.7	9.6	13.7	18.0	31.7	8.4	22.1	24.8	15.23	6.8	2.22	0.70
27	0.754	101	96.1	0.1355	0.9753	5.85	80.7	10.0	13.8	18.0	31.8	8.0	21.8	24.9	14.90	6.9	2.47	0.72
30	0.768	103	96.4	0.1495	0.9727	5.86	82.7	10.3	14.1	18.0	32.1	7.7	21.8	25.1	14.75	7.1	2.73	0.73
35	0.7935	108	96.9	0.1750	0.9681	5.89	87.7	10.8	14.9	18.0	32.9	7.2	22.1	25.4	14.65	7.4	3.19	0.73
41	0.826	110	97.4	0.2075	0.9621	5.93	89.7	11.3	15.1	18.0	33.1	6.7	21.8	25.6	14.27	7.6	3.79	0.75
45	0.8475	112	97.6	0.2290	0.9582	5.95	91.7	11.5	15.4	18.0	33.4	6.5	21.9	25.7	14.21	7.7	4.18	0.75
50	0.872	115	98	0.2535	0.9538	5.98	94.7	11.9	15.8	18.0	33.8	6.1	21.9	25.9	14.02	7.9	4.62	0.75 ← 5%
60	0.9208	118	98.5	0.3023	0.9449	6.03	97.7	12.4	16.2	18.0	34.2	5.6	21.8	26.1	13.70	8.1	5.51	0.77
75	1	123	99.1	0.3815	0.9304	6.13	102.7	13.0	16.8	18.0	34.8	5.0	21.8	26.4	13.38	8.4	6.96	0.78
90	1.096	130	99.6	0.4775	0.9129	6.25	109.7	13.5	17.6	18.0	35.6	4.5	22.1	26.8	13.28	8.8	8.71	0.77
109	1.172	135	99.9	0.5535	0.8990	6.34	114.7	13.8	18.1	18.0	36.1	4.2	22.3	27.0	13.24	9.0	10.10	0.76
120	1.228	138	100.1	0.6095	0.8888	6.42	117.7	14.0	18.3	18.0	36.3	4.0	22.3	27.2	13.17	9.2	11.12	0.76
143	1.346	143	100.3	0.7275	0.8673	6.57	122.7	14.2	18.7	18.0	36.7	3.8	22.5	27.3	13.13	9.3	13.27	0.76
160	1.4325	146	100.4	0.8140	0.8515	6.70	125.7	14.3	18.8	18.0	36.8	3.7	22.5	27.4	13.09	9.4	14.85	0.76
180	1.534	151	100.4	0.9155	0.8330	6.85	130.7	14.3	19.1	18.0	37.1	3.7	22.8	27.5	13.25	9.5	16.70	0.75
															13.86	8	5%	

$\phi'_{5\%} \cong 35°$

Consolidated Undrained Triaxial Test ASTM D4767



EVERGREEN PACKAGING		AREA 6 b/c Regrade		
		Gray ASH and Brown SLUDGE		
SAMPLE No.:		B11-103	B11-103	B11-103
DEPTH (ft.):		39.5	39	38.3
DATE:		3-Jul-11	5-Jul-11	7-Jul-11
TEST No.:		CU-3	CU-4	CU-5
INITIAL	WATER CONTENT (%):	99.1	99.1	105
	AREA (in^2):	6.268	6.462	6.238
	HEIGHT (in.):	6.188	6.250	6.125
	DRY DENSITY (pcf):	41.3	43.3	38.8
	SATURATION (%):	92.7	99.2	90.1
	VOID RATIO:	2.4051	2.2476	2.6228
	B-VALUE:	1	1	1
PRESS-BAR	WATER CONTENT (%):	74.8	70.5	75.3
	DRY DENSITY (pcf):	44.5	50.1	44.7
	SATURATION (%):	78	87.8	79.1
	VOID RATIO:	2.1572	1.8063	2.1432
MINOR PRIN. STRESS (psi):		11	22	16
MAX DEVIATOR STRESS (psi):		17.1	23.8	18.5
RATE OF STRAIN (in./min.):		0.005	0.005	0.005
FINAL WATER CONTENT (%):		74.8	70.5	75.3



Sevee & Maher Engineers

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

PROJECT: Evergreen Packaging

Area 6 B/C Regrade

DESCRIPTION:	Gray Ash and Brown Sludge		TEST CONDITIONS			INITIAL	PRE-SHEAR	FINAL			
BORING:	B11-103	INITIAL DIAL READING (in.):	0.32		HEIGHT (in.):	6.188	5.967		15.7175	15.156	(cm)
SAMPLE:	U1	SPECIFIC GRAVITY:	2.25		AREA (in^2):	6.268	6.027		40.4386	38.8838	(cm^2)
DEPTH (ft.):	39.5	INITIAL WET WT. (gms):	836.2		TOTAL DENSITY (pcf):	82.1	77.8				
FILE No.:	11114	INITIAL DRY WT. (gms):	420.0		DRY DENSITY (pcf):	41.3	44.5				
TEST No.:	CIUC-3	CELL PRESSURE (psi):	96		WATER CONTENT (%):	99.1		74.8			
DATE:	7/3/2011	BACK PRESSURE (psi):	85		VOLUME TOTAL (cc):	635.59	589.33				
TESTED BY:	EJL	EFFECTIVE CONFINING PRESSURE (psi):	11		VOLUME SOLIDS (cc):	186.66					
		PORE PRESSURE @ PRESHEAR (psi):	86.1		VOLUME VOIDS (cc):	448.93	402.67				
		AXIAL STRAIN RATE (in./min.):	0.005		VOID RATIO:	2.4051	2.1572				
		MEMBRANE THICKNESS (in.):	0.012		SATURATION (%):	92.7	78.0				

TIME (min)	DIAL (in.)	LOAD (lb)	PWP (psi)	DELTA L (in.)	AREA CF	CORR. AREA (sq. in.)	IND LOAD (lbs.)	IND PWP (psi)	DEV STRESS (psi)	SIGMA 3 (psi)	SIGMA 1 (psi)	SIGMA 3' (psi)	SIGMA 1' (psi)	P (psi)	P' (psi)	Q (psi)	STRAIN (%)	A
0	0.32	20	86.1	0.0000	1.0000	6.03	1.1	0	0.2	11.0	11.2	11.0	11.2	11.1	11.09	0.1	0.00	0.00
0.5	0.322	30	87.0	0.0020	0.9997	6.03	11.1	0.9	1.8	11.0	12.8	10.1	11.9	11.9	11.02	0.9	0.03	0.49
1	0.3245	33	87.4	0.0045	0.9992	6.03	14.1	1.3	2.3	11.0	13.3	9.7	12.0	12.2	10.87	1.2	0.08	0.56
1.5	0.327	36	87.8	0.0070	0.9988	6.03	17.1	1.7	2.8	11.0	13.8	9.3	12.1	12.4	10.72	1.4	0.12	0.60
2	0.3295	40	88.1	0.0095	0.9984	6.04	21.1	2.0	3.5	11.0	14.5	9.0	12.5	12.7	10.75	1.7	0.16	0.57
2.5	0.3325	41	88.4	0.0125	0.9979	6.04	22.1	2.3	3.7	11.0	14.7	8.7	12.4	12.8	10.53	1.8	0.21	0.63
3	0.3345	43	88.6	0.0145	0.9976	6.04	24.1	2.5	4.0	11.0	15.0	8.5	12.5	13.0	10.49	2.0	0.24	0.63
3.5	0.3373	45	88.9	0.0173	0.9971	6.04	26.1	2.8	4.3	11.0	15.3	8.2	12.5	13.2	10.36	2.2	0.29	0.65
4	0.34	46	89	0.0200	0.9966	6.05	27.1	2.9	4.5	11.0	15.5	8.1	12.6	13.2	10.34	2.2	0.34	0.65
4.5	0.3425	48	89.2	0.0225	0.9962	6.05	29.1	3.1	4.8	11.0	15.8	7.9	12.7	13.4	10.30	2.4	0.38	0.64
5	0.345	50	89.3	0.0250	0.9958	6.05	31.1	3.2	5.1	11.0	16.1	7.8	12.9	13.6	10.37	2.6	0.42	0.62
6	0.3498	53	89.6	0.0298	0.9950	6.06	34.1	3.5	5.6	11.0	16.6	7.5	13.1	13.8	10.31	2.8	0.50	0.62
7	0.3545	55	89.8	0.0345	0.9942	6.06	36.1	3.7	6.0	11.0	17.0	7.3	13.3	14.0	10.28	3.0	0.58	0.62
8	0.36	56	90	0.0400	0.9933	6.07	37.1	3.9	6.1	11.0	17.1	7.1	13.2	14.1	10.16	3.1	0.67	0.64
10	0.37	60	90.3	0.0500	0.9916	6.08	41.1	4.2	6.8	11.0	17.8	6.8	13.6	14.4	10.18	3.4	0.84	0.62
12	0.381	63	90.6	0.0610	0.9898	6.09	44.1	4.5	7.2	11.0	18.2	6.5	13.7	14.6	10.12	3.6	1.02	0.62
14	0.3905	65	90.8	0.0705	0.9882	6.10	46.1	4.7	7.6	11.0	18.6	6.3	13.9	14.8	10.08	3.8	1.18	0.62
16	0.401	68	91	0.0810	0.9864	6.11	49.1	4.9	8.0	11.0	19.0	6.1	14.1	15.0	10.12	4.0	1.36	0.61
18	0.4115	70	91.2	0.0915	0.9847	6.12	51.1	5.1	8.3	11.0	19.3	5.9	14.2	15.2	10.07	4.2	1.53	0.61
21	0.426	73	91.5	0.1060	0.9822	6.14	54.1	5.4	8.8	11.0	19.8	5.6	14.4	15.4	10.01	4.4	1.78	0.61
24	0.4457	76	91.8	0.1257	0.9789	6.16	57.1	5.7	9.3	11.0	20.3	5.3	14.6	15.6	9.94	4.6	2.11	0.61
27	0.4558	79	91.9	0.1358	0.9772	6.17	60.1	5.8	9.7	11.0	20.7	5.2	14.9	15.9	10.07	4.9	2.28	0.60
30	0.471	81	92.1	0.1510	0.9747	6.18	62.1	6.0	10.0	11.0	21.0	5.0	15.0	16.0	10.02	5.0	2.53	0.60
35	0.4967	85	92.4	0.1767	0.9704	6.21	66.1	6.3	10.6	11.0	21.6	4.7	15.3	16.3	10.02	5.3	2.96	0.59
41	0.5225	88	92.7	0.2025	0.9661	6.24	69.1	6.6	11.1	11.0	22.1	4.4	15.5	16.5	9.94	5.5	3.39	0.60
45	0.548	92	93	0.2280	0.9618	6.27	73.1	6.9	11.7	11.0	22.7	4.1	15.8	16.8	9.93	5.8	3.82	0.59
50	0.573	95	93.2	0.2530	0.9576	6.29	76.1	7.1	12.1	11.0	23.1	3.9	16.0	17.0	9.94	6.0	4.24	0.59
60	0.624	100	93.6	0.3040	0.9491	6.35	81.1	7.5	12.8	11.0	23.8	3.5	16.3	17.4	9.88	6.4	5.09	0.59
75	0.701	108	94.1	0.3810	0.9361	6.44	89.1	8.0	13.8	11.0	24.8	3.0	16.8	17.9	9.92	6.9	6.39	0.58
90	0.7795	115	94.5	0.4595	0.9230	6.53	96.1	8.4	14.7	11.0	25.7	2.6	17.3	18.4	9.96	7.4	7.70	0.57
105	0.855	121	94.7	0.5350	0.9103	6.62	102.1	8.6	15.4	11.0	26.4	2.4	17.8	18.7	10.11	7.7	8.97	0.56
120	0.9325	126	94.9	0.6125	0.8974	6.72	107.1	8.8	15.9	11.0	26.9	2.2	18.1	19.0	10.17	8.0	10.26	0.55
142	1.044	133	95	0.7240	0.8787	6.86	114.1	8.9	16.6	11.0	27.6	2.1	18.7	19.3	10.42	8.3	12.13	0.54
160	1.1382	136	95	0.8182	0.8629	6.98	117.1	8.9	16.8	11.0	27.8	2.1	18.9	19.4	10.48	8.4	13.71	0.53
180	1.239	141	94.9	0.9190	0.8460	7.12	122.1	8.8	17.1	11.0	28.1	2.2	19.3	19.6	10.77	8.6	15.40	0.51

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

PROJECT: Evergreen Packaging
Area 6 B/C Regrade

DESCRIPTION: Gray Ash and Brown Sludge
BORING: B11-103
SAMPLE: U1
DEPTH (ft.): 39
FILE No.: 11114
TEST No.: CIUC-4
DATE: 7/5/2011
TESTED BY: EJL

TEST CONDITIONS

INITIAL DIAL READING (in.):	0.6038
SPECIFIC GRAVITY:	2.25
INITIAL WET WT. (gms):	912.9
INITIAL DRY WT. (gms):	458.5
CELL PRESSURE (psi):	107
BACK PRESSURE (psi):	85
EFFECTIVE CONFINING PRESSURE (psi):	22
PORE PRESSURE @ PRESHEAR (psi):	86.1
AXIAL STRAIN RATE (in./min.):	0.005
MEMBRANE THICKNESS (in.):	0.012

	INITIAL	PRE-SHEAR	FINAL			
HEIGHT (in.):	6.250	5.747		15.8750	14.597	(cm)
AREA (in^2):	6.462	6.073		41.6883	39.1773	(cm^2)
TOTAL DENSITY (pcf):	86.1	85.3				
DRY DENSITY (pcf):	43.3	50.1				
WATER CONTENT (%):	99.1		70.5			
VOLUME TOTAL (cc):	661.80	571.89				
VOLUME SOLIDS (cc):	203.78					
VOLUME VOIDS (cc):	458.02	368.10				
VOID RATIO:	2.2476	1.8063				
SATURATION (%):	99.2	87.8				

TIME (min)	DIAL (in.)	LOAD (lb)	PWP (psi)	DELTA L (in.)	AREA CF	CORR. AREA (sq. in.)	IND LOAD (lbs.)	IND PWP (psi)	DEV STRESS (psi)	SIGMA 3 (psi)	SIGMA 1 (psi)	SIGMA 3' (psi)	SIGMA 1' (psi)	P (psi)	P' (psi)	Q (psi)	STRAIN (%)	A
0	0.6038	21	86.1	0.0000	1.0000	6.07	-0.1	0	0.0	22.0	22.0	22.0	22.0	22.0	21.99	0.0	0.00	0.00
0.5	0.606	35	87.9	0.0022	0.9996	6.07	13.9	1.8	2.3	22.0	24.3	20.2	22.5	23.1	21.35	1.1	0.04	0.79
1	0.6085	43	89.0	0.0047	0.9992	6.08	21.9	2.9	3.6	22.0	25.6	19.1	22.7	23.8	20.90	1.8	0.08	0.80
1.5	0.6105	48	90	0.0067	0.9988	6.08	26.9	3.9	4.4	22.0	26.4	18.1	22.5	24.2	20.31	2.2	0.12	0.88
2	0.6128	55	90.8	0.0090	0.9984	6.08	33.9	4.7	5.6	22.0	27.6	17.3	22.9	24.8	20.09	2.8	0.16	0.84
2.5	0.615	60	91.5	0.0112	0.9981	6.08	38.9	5.4	6.4	22.0	28.4	16.6	23.0	25.2	19.80	3.2	0.19	0.84
3	0.6172	63	92.2	0.0134	0.9977	6.09	41.9	6.1	6.9	22.0	28.9	15.9	22.8	25.4	19.34	3.4	0.23	0.89
3.5	0.62	66	92.7	0.0162	0.9972	6.09	44.9	6.6	7.4	22.0	29.4	15.4	22.8	25.7	19.09	3.7	0.28	0.89
4	0.6223	70	93.3	0.0185	0.9968	6.09	48.9	7.2	8.0	22.0	30.0	14.8	22.8	26.0	18.82	4.0	0.32	0.90
4.5	0.6252	73	93.8	0.0214	0.9963	6.10	51.9	7.7	8.5	22.0	30.5	14.3	22.8	26.3	18.56	4.3	0.37	0.90
5	0.628	76	94.2	0.0242	0.9958	6.10	54.9	8.1	9.0	22.0	31.0	13.9	22.9	26.5	18.40	4.5	0.42	0.90
6	0.633	80	95	0.0292	0.9949	6.10	58.9	8.9	9.7	22.0	31.7	13.1	22.8	26.8	17.93	4.8	0.51	0.92
7	0.638	82	95.8	0.0342	0.9940	6.11	60.9	9.7	10.0	22.0	32.0	12.3	22.3	27.0	17.29	5.0	0.60	0.97
8	0.643	85	96.2	0.0392	0.9932	6.11	63.9	10.1	10.5	22.0	32.5	11.9	22.4	27.2	17.13	5.2	0.68	0.97
10	0.6535	90	97	0.0497	0.9914	6.13	68.9	10.9	11.3	22.0	33.3	11.1	22.4	27.6	16.73	5.6	0.86	0.97
12	0.6645	93	97.8	0.0607	0.9894	6.14	71.9	11.7	11.7	22.0	33.7	10.3	22.0	27.9	16.16	5.9	1.06	1.00
14	0.6745	96	98.5	0.0707	0.9877	6.15	74.9	12.4	12.2	22.0	34.2	9.6	21.8	28.1	15.69	6.1	1.23	1.02
16	0.684	100	99	0.0802	0.9860	6.16	78.9	12.9	12.8	22.0	34.8	9.1	21.9	28.4	15.51	6.4	1.40	1.01
18	0.695	103	99.5	0.0912	0.9841	6.17	81.9	13.4	13.3	22.0	35.3	8.6	21.9	28.6	15.24	6.6	1.59	1.01
21	0.709	106	100.1	0.1052	0.9817	6.19	84.9	14.0	13.7	22.0	35.7	8.0	21.7	28.9	14.86	6.9	1.83	1.02
24	0.7225	108	100.6	0.1187	0.9793	6.20	86.9	14.5	14.0	22.0	36.0	7.5	21.5	29.0	14.51	7.0	2.07	1.03
27	0.736	111	101.1	0.1322	0.9770	6.22	89.9	15.0	14.5	22.0	36.5	7.0	21.5	29.2	14.23	7.2	2.30	1.04
30	0.7525	115	101.4	0.1487	0.9741	6.23	93.9	15.3	15.1	22.0	37.1	6.7	21.8	29.5	14.23	7.5	2.59	1.02
35	0.781	118	101.9	0.1772	0.9692	6.27	96.9	15.8	15.5	22.0	37.5	6.2	21.7	29.7	13.93	7.7	3.08	1.02
40	0.808	121	102.3	0.2042	0.9645	6.30	99.9	16.2	15.9	22.0	37.9	5.8	21.7	29.9	13.74	7.9	3.55	1.02
45	0.835	125	102.7	0.2312	0.9598	6.33	103.9	16.6	16.4	22.0	38.4	5.4	21.8	30.2	13.61	8.2	4.02	1.01
50	0.8545	128	103	0.2507	0.9564	6.35	106.9	16.9	16.8	22.0	38.8	5.1	21.9	30.4	13.52	8.4	4.36	1.00
60	0.909	135	103.3	0.3052	0.9469	6.41	113.9	17.2	17.8	22.0	39.8	4.8	22.6	30.9	13.68	8.9	5.31	0.97
75	0.9807	143	103.8	0.3769	0.9344	6.50	121.9	17.7	18.8	22.0	40.8	4.3	23.1	31.4	13.68	9.4	6.56	0.94
90	1.059	151	104	0.4552	0.9208	6.59	129.9	17.9	19.7	22.0	41.7	4.1	23.8	31.9	13.95	9.9	7.92	0.91
105	1.135	161	104.1	0.5312	0.9076	6.69	139.9	18.0	20.9	22.0	42.9	4.0	24.9	32.5	14.46	10.5	9.24	0.86
120	1.211	168	104.1	0.6072	0.8943	6.79	146.9	18.0	21.6	22.0	43.6	4.0	25.6	32.8	14.82	10.8	10.57	0.83
140	1.3145	176	103.9	0.7107	0.8763	6.93	154.9	17.8	22.4	22.0	44.4	4.2	26.6	33.2	15.38	11.2	12.37	0.80
160	1.413	184	103.6	0.8092	0.8592	7.07	162.9	17.5	23.1	22.0	45.1	4.5	27.6	33.5	16.03	11.5	14.08	0.76
180	1.526	193	103.2	0.9222	0.8395	7.23	171.9	17.1	23.8	22.0	45.8	4.9	28.7	33.9	16.78	11.9	16.05	0.72

8.7 590

CONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION TEST

PROJECT: Evergreen Packaging

Area 6 B/C Regrade

DESCRIPTION:	Gray Ash and Brown Sludge	TEST CONDITIONS			INITIAL	PRE-SHEAR	FINAL				
BORING:	B11-103	INITIAL DIAL READING (in.):	0.4	HEIGHT (in.):	6.125	5.825		15.5575	14.796	(cm)	
SAMPLE:	U1	SPECIFIC GRAVITY:	2.25	AREA (in^2):	6.238	5.691		40.2477	36.7173	(cm^2)	
DEPTH (ft.):	38.3	INITIAL WET WT. (gms):	797.2	TOTAL DENSITY (pcf):	79.5	78.3					
FILE No.:	11114	INITIAL DRY WT. (gms):	388.9	DRY DENSITY (pcf):	38.8	44.7					
TEST No.:	CIUC-5	CELL PRESSURE (psi):	101	WATER CONTENT (%):	105		75.3				
DATE:	7/7/2011	BACK PRESSURE (psi):	85	VOLUME TOTAL (cc):	626.15	543.25					
TESTED BY:	EJL	EFFECTIVE CONFINING PRESSURE (psi):	16	VOLUME SOLIDS (cc):	172.83						
		PORE PRESSURE @ PRESHEAR (psi):	86.2	VOLUME VOIDS (cc):	453.32	370.42					
		AXIAL STRAIN RATE (in./min.):	0.005	VOID RATIO:	2.6228	2.1432					
		MEMBRANE THICKNESS (in.):	0.012	SATURATION (%):	90.1	79.1					

TIME (min)	DIAL (in.)	LOAD (lb)	PWP (psi)	DELTA L (in.)	AREA CF	CORR. AREA (sq. in.)	IND LOAD (lbs.)	IND PWP (psi)	DEV STRESS (psi)	SIGMA 3 (psi)	SIGMA 1 (psi)	SIGMA 3' (psi)	SIGMA 1' (psi)	P (psi)	P' (psi)	Q (psi)	STRAIN (%)	A
0	0.4	20	86.2	0.0000	1.0000	5.69	0.1	0	0.0	16.0	16.0	16.0	16.0	16.0	16.01	0.0	0.00	0.00
0.5	0.4023	33	86.9	0.0023	0.9996	5.69	13.1	0.7	2.3	16.0	18.3	15.3	17.6	17.2	16.45	1.2	0.04	0.30
1	0.4048	40	87.4	0.0048	0.9992	5.70	20.1	1.2	3.5	16.0	19.5	14.8	18.3	17.8	16.56	1.8	0.08	0.34
1.5	0.407	45	87.9	0.0070	0.9988	5.70	25.1	1.7	4.4	16.0	20.4	14.3	18.7	18.2	16.50	2.2	0.12	0.39
2	0.4095	48	88.3	0.0095	0.9984	5.70	28.1	2.1	4.9	16.0	20.9	13.9	18.8	18.5	16.36	2.5	0.16	0.43
2.5	0.4118	51	88.7	0.0118	0.9980	5.70	31.1	2.5	5.5	16.0	21.5	13.5	19.0	18.7	16.23	2.7	0.20	0.46
3	0.4142	54	89.2	0.0142	0.9976	5.71	34.1	3.0	6.0	16.0	22.0	13.0	19.0	19.0	15.99	3.0	0.24	0.50
3.5	0.417	56	89.4	0.0170	0.9971	5.71	36.1	3.2	6.3	16.0	22.3	12.8	19.1	19.2	15.96	3.2	0.29	0.51
4	0.4197	59	89.7	0.0197	0.9966	5.71	39.1	3.5	6.8	16.0	22.8	12.5	19.3	19.4	15.92	3.4	0.34	0.51
4.5	0.4222	61	90	0.0222	0.9962	5.71	41.1	3.8	7.2	16.0	23.2	12.2	19.4	19.6	15.80	3.6	0.38	0.53
5	0.4248	63	90.3	0.0248	0.9957	5.72	43.1	4.1	7.5	16.0	23.5	11.9	19.4	19.8	15.67	3.8	0.43	0.54
6	0.43	68	90.8	0.0300	0.9948	5.72	48.1	4.6	8.4	16.0	24.4	11.4	19.8	20.2	15.60	4.2	0.52	0.55
7	0.435	70	91.2	0.0350	0.9940	5.73	50.1	5.0	8.8	16.0	24.8	11.0	19.8	20.4	15.38	4.4	0.60	0.57
8	0.4405	73	91.6	0.0405	0.9930	5.73	53.1	5.4	9.3	16.0	25.3	10.6	19.9	20.6	15.23	4.6	0.70	0.58
10	0.45	76	92.1	0.0500	0.9914	5.74	56.1	5.9	9.8	16.0	25.8	10.1	19.9	20.9	14.99	4.9	0.86	0.60
12	0.461	79	92.7	0.0610	0.9895	5.75	59.1	6.5	10.3	16.0	26.3	9.5	19.8	21.1	14.64	5.1	1.05	0.63
14	0.471	81	93.1	0.0710	0.9878	5.76	61.1	6.9	10.6	16.0	26.6	9.1	19.7	21.3	14.40	5.3	1.22	0.65
16	0.4805	83	93.5	0.0805	0.9862	5.77	63.1	7.3	10.9	16.0	26.9	8.7	19.6	21.5	14.17	5.5	1.38	0.67
18	0.49	85	93.8	0.0900	0.9845	5.78	65.1	7.6	11.3	16.0	27.3	8.4	19.7	21.6	14.03	5.6	1.55	0.67
21	0.5055	88	94.2	0.1055	0.9819	5.80	68.1	8.0	11.7	16.0	27.7	8.0	19.7	21.9	13.87	5.9	1.81	0.68
24	0.5205	91	94.5	0.1205	0.9793	5.81	71.1	8.3	12.2	16.0	28.2	7.7	19.9	22.1	13.82	6.1	2.07	0.68
27	0.5353	95	94.8	0.1353	0.9768	5.83	75.1	8.6	12.9	16.0	28.9	7.4	20.3	22.4	13.84	6.4	2.32	0.67
30	0.5523	96	95	0.1523	0.9739	5.84	76.1	8.8	13.0	16.0	29.0	7.2	20.2	22.5	13.71	6.5	2.61	0.68
35	0.5825	98	95.3	0.1825	0.9687	5.88	78.1	9.1	13.3	16.0	29.3	6.9	20.2	22.6	13.55	6.6	3.13	0.68
40	0.604	100	95.5	0.2040	0.9650	5.90	80.1	9.3	13.6	16.0	29.6	6.7	20.3	22.8	13.49	6.8	3.50	0.68
45	0.63	103	95.7	0.2300	0.9605	5.93	83.1	9.5	14.0	16.0	30.0	6.5	20.5	23.0	13.51	7.0	3.95	0.68
50	0.656	106	95.8	0.2560	0.9561	5.95	86.1	9.6	14.5	16.0	30.5	6.4	20.9	23.2	13.63	7.2	4.39	0.66
60	0.707	106	96	0.3070	0.9473	6.01	86.1	9.8	14.3	16.0	30.3	6.2	20.5	23.2	13.37	7.2	5.27	0.68
75	0.781	115	96.2	0.3810	0.9346	6.09	95.1	10.0	15.6	16.0	31.6	6.0	21.6	23.8	13.81	7.8	6.54	0.64
90	0.8585	118	96.3	0.4585	0.9213	6.18	98.1	10.1	15.9	16.0	31.9	5.9	21.8	23.9	13.84	7.9	7.87	0.64
105	0.9357	125	96.3	0.5357	0.9080	6.27	105.1	10.1	16.8	16.0	32.8	5.9	22.7	24.4	14.28	8.4	9.20	0.60
120	1.0115	128	96.2	0.6115	0.8950	6.36	108.1	10.0	17.0	16.0	33.0	6.0	23.0	24.5	14.50	8.5	10.50	0.59
140	1.118	135	96.2	0.7180	0.8767	6.49	115.1	10.0	17.7	16.0	33.7	6.0	23.7	24.9	14.87	8.9	12.33	0.56
160	1.217	139	96.1	0.8170	0.8597	6.62	119.1	9.9	18.0	16.0	34.0	6.1	24.1	25.0	15.10	9.0	14.03	0.55
180	1.32	144	96	0.9200	0.8421	6.76	124.1	9.8	18.4	16.0	34.4	6.2	24.6	25.2	15.38	9.2	15.79	0.53
208	1.464	149	95.9	1.0640	0.8173	6.96	129.1	9.7	18.5	16.0	34.5	6.3	24.8	25.3	15.57	9.3	18.27	0.52
																7.2	5%	

Evergreen Packaging, Canton, North Carolina
Regrading of Areas 6B-Upper and 6C Upper and Lower

SUMMARY OF LABORATORY TEST RESULTS

Measured Values:	Fly Ash	Sludge	Lime Mud	Cover Soil
Specific Gravity (mg/ml), 2011 Evaluations =	2.20	2.25	2.77	2.75
Measured Spec. Gravity, 2011 =	2.23	2.27	2.77	
1995 values =	2.11	2.25		

Values Used in Effective Stress Calculations

	B11-101	B11-102	B11-103	B11-104	B11-105	B11-106	B11-107
Water Depth =	3	2	4	4	2	2	1
Fill Thickness =	3	3	7	17	5.5	10.2	12

Material Total Densities:

	Average from Split Spoons	Avg from water contents	Avg from Shelby Tubes	Values used in 2011 Analysis	Values from 1995 Analysis
1997 Cover Density =	133.4	130.9	NA	130	125
Sludge Density =	81.4	82.5	77.6	80	75
Lime Density =	NA	114.5	NA	115	105
Ash Density =	NA	93.2	NA	95	95

Misc. Properties:

MINIMUM	Water Content	Solids Content	Ash Content	Total Density	Specific Gravity
Sludge =	51%	35%	49%	75.7	2.27
Lime =	27%	66%	72%	NT	2.69
Ash =	40%	49%	63%	NT	2.23

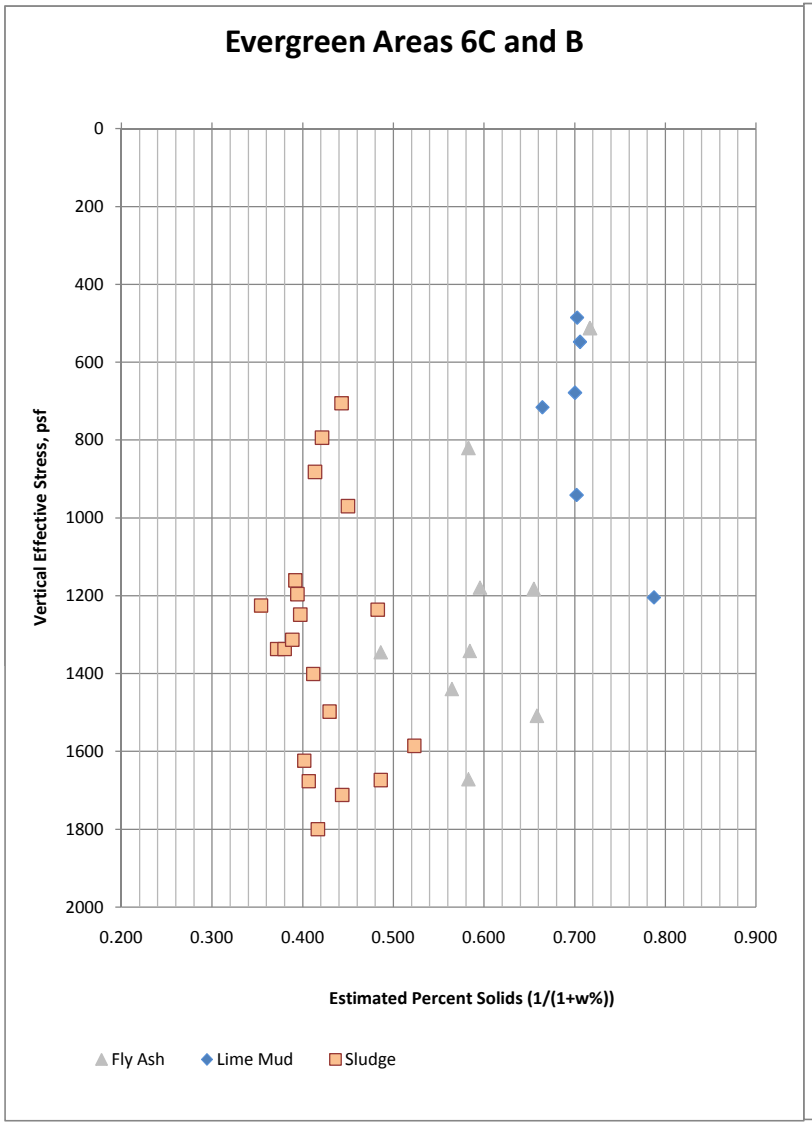
MAXIMUM	Water Content	Solids Content	Ash Content	Total Density	Specific Gravity
Sludge =	182%	66%	58%	90.1	2.27
Lime =	51%	79%	79%	NT	2.85
Ash =	106%	72%	85%	NT	2.23

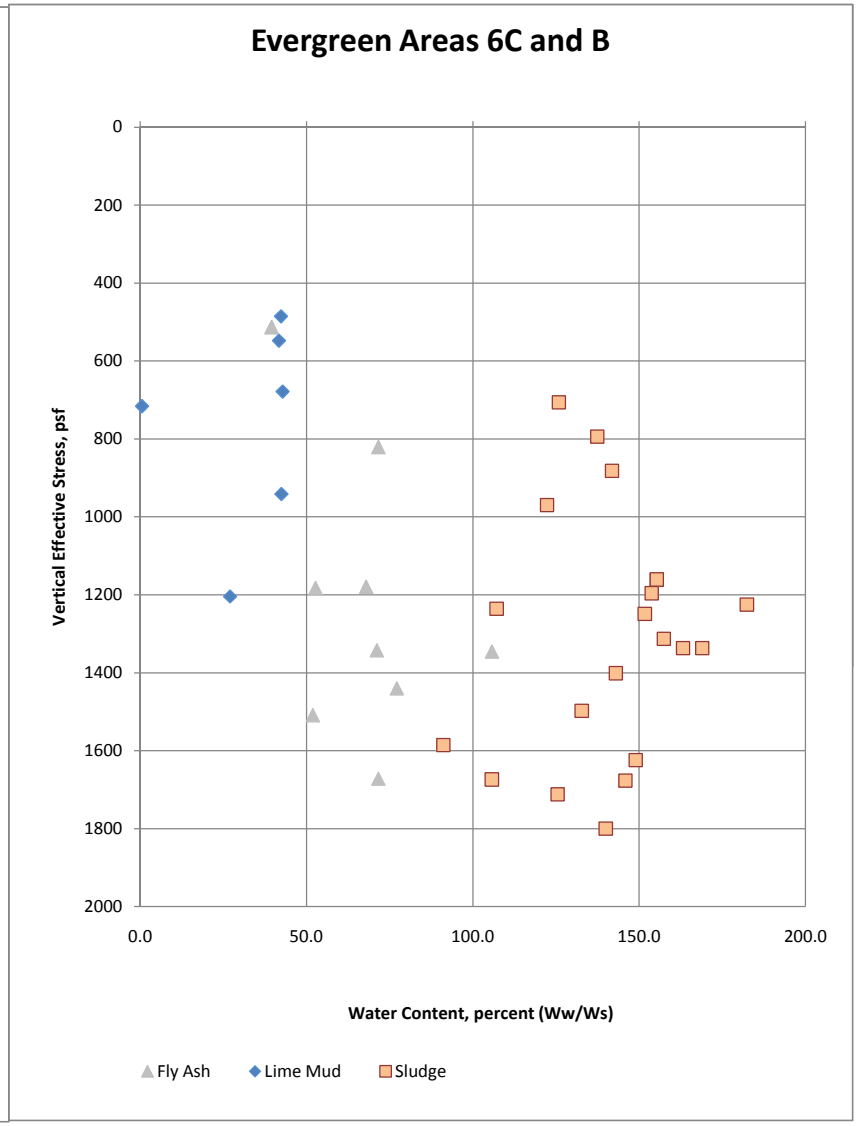
AVERAGE	Water Content	Solids Content	Ash Content	Total Density	Specific Gravity
Sludge =	135%	43%	52%	81.4	2.27
Lime =	41%	71%	77%	NT	2.77
Ash =	68%	60%	77%	NT	2.23

Triaxial Test Results are provided with "Strength Determination"

Evergreen Packaging, Canton, North Carolina
Regrading of Areas 6B-Upper and 6C Upper and Lower

SUMMARY OF LABORATORY TEST RESULTS





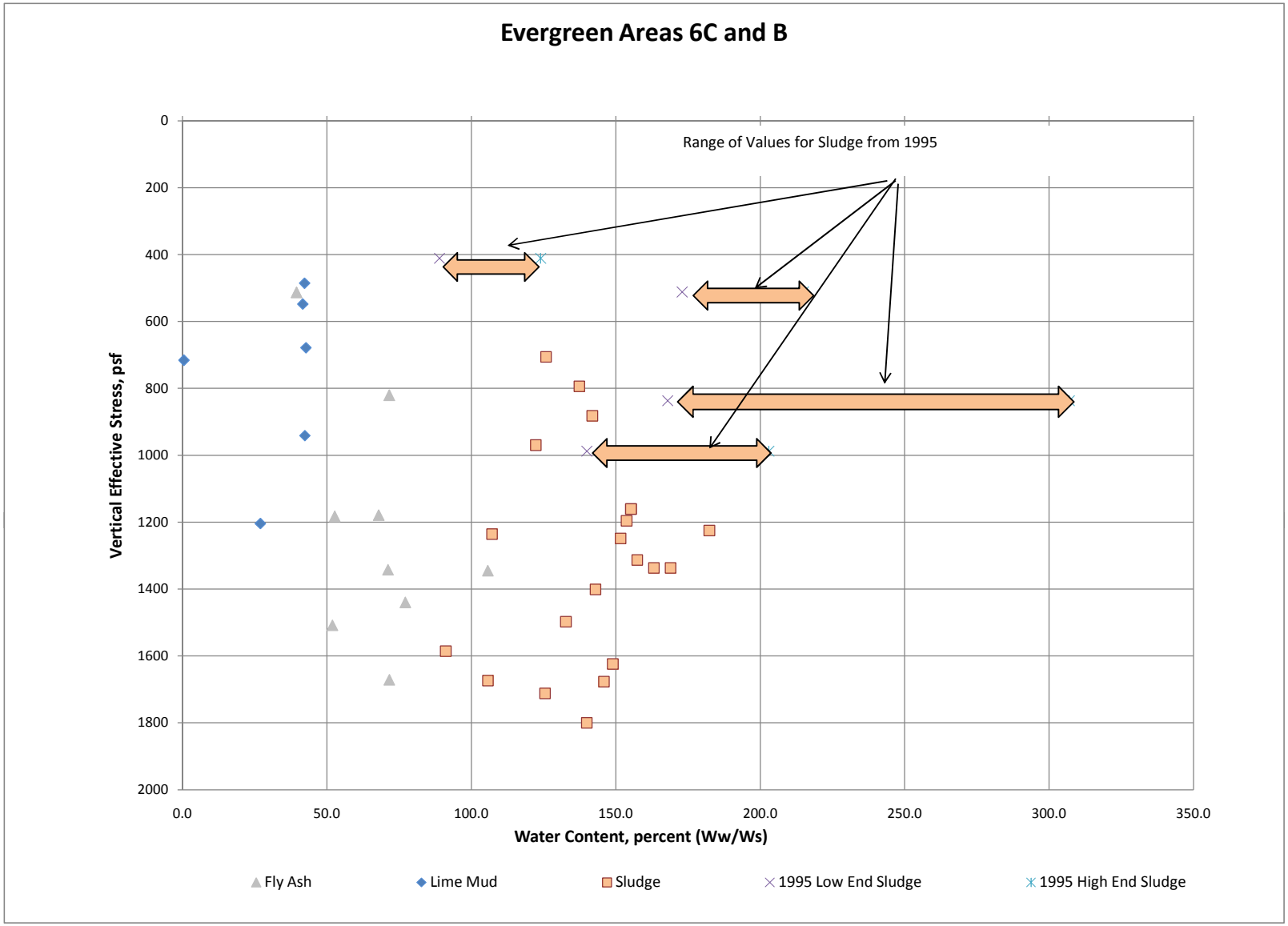
Evergreen Packaging, Canton, North Carolina
Regrading of Areas 6B-Upper and 6C Upper and Lower

SUMMARY OF LABORATORY TEST RESULTS

Landfill Area	Boring	Sample	Depth ft bgs	Effective Stress psf	Material	Water Content (w%,W_{105}) (ASTM D-2374) Ww/Ws	Solids Content (1 / (1 +w%))	Specific Gravity g/ml	Ash Content (ASTM D-2974) W_{550}/W_{105}	Wet Density (Measured) pcf	Dry Density (Measured) pcf	Est. Saturation	Wet Density (Assumed Saturated) pcf	Est. porosity
6 C Upper	B11-101	S-1	5-7	547.8	Lime Mud	41.7%	71%	2.69	78.3%				113.7	54%
		S-2	10-12	705.8	Sludge	125.8%	44%						82.8	78%
		S-3	15-17	793.8	Sludge	137.4%	42%	2.27	56.5%				81.5	79%
		S-4	20-22	881.8	Sludge	141.9%	41%			81.5	33.7	101%	81.0	80%
		S-5	25-27	969.8	Sludge	122.3%	45%						83.2	77%
		S-6	30-32	1102.8	Lime&Fly Ash	56.9%	64%		78.5%					61%
		S-7	35-37	1235.8	Sludge	107.2%	48%						85.3	75%
6 C Upper	B11-102	S-1	5-7	485.4	Lime Mud	42.3%	70%						113.3	54%
		S-2	10-12	678.4	Lime Mud	42.8%	70%						112.9	54%
		S-3	15-17	941.4	Lime Mud	42.4%	70%		79.3%				113.2	54%
		S-4	20-22	1204.4	Lime Mud	27.0%	79%						125.6	43%
6 B Upper	B11-103	S-3	15-17	820.6	Fly Ash	71.6%	58%	2.23	83.4%				91.5	66%
		S-4	20-22	1179.2	Fly Ash	67.9%	60%						92.4	65%
		S-5	25-27	1342.2	Fly Ash	71.1%	58%						91.6	66%
		V-4	28-30	1440	Fly Ash	77.1%	56%						90.2	68%
		S-6	30-32	1497.7	Sludge	132.8%	43%			80.8	34.7	98%	82.0	79%
		S-7	35-37	1585.7	Sludge	91.2%	52%		57.7%	90.1	47.1	104%	88.0	72%
		U-1	38-40		Ash and Sludge	109.0%	48%			81.2	38.8	94%	84.7	75%
		S-8	40-42	1673.7	Sludge	105.7%	49%						85.5	75%
6 B Upper	B11-104	S-2	10-12	993.2	Cover Soil	21.6%	82%			133.4	109.7	105%	130.9	37%
		S-4	20-22	1535.9	Mixed	108.0%	48%			80.6	38.8	90%		NA
		S-5	25-27	1623.9	Sludge	149.0%	40%			79.8	32.1	99%	80.3	80%
		U-1	28-30	1676.7	Sludge	145.9%	41%				30.7	92%	75.5	80%
		S-6	30-32	1711.9	Sludge	125.5%	44%						82.8	78%
		S-7	35-37	1799.9	Sludge	140.0%	42%			83.2	34.7	103%	81.2	79%
6 C Lower	B11-105	S-1	5-7	512.9	Fly Ash	39.5%	72%						102.5	52%
		S-2	10-11	715.9	Lime Mud	50.5%	66%	2.85	72.0%				108.4	58%
		V-1	13-15	768.7	Sludge	51.0%	66%						98.7	59%
		U-1	15-17	856.4	Sludge (?) Tube not opened									
		S-4	20-22	1019.4	Fly Ash, ltl Lime	56.9%								
		S-5	25-27	1182.4	Fly Ash	52.7%	65%						97.1	59%
		S-6	30-32	1345.4	Fly Ash	105.7%	49%		62.9%				84.9	75%
		S-7	35-37	1508.4	Fly Ash	51.9%	66%		84.7%				97.4	59%
		S-8	40-42	1671.4	Fly Ash	71.6%	58%						91.5	66%
6 C Lower	B11-106	U-1	23-25	1160.7	Sludge	155.3%	39%		50.9%	75.7	29.7	94%	79.8	81%
		S-5	25-27	1195.9	Sludge	153.8%	39%		49.4%	78.6	31.0	98%	79.9	81%
		S-6	30-32	1248.7	Sludge	151.7%	40%		49.9%	80	31.8	100%	80.1	81%
		S-7A	35-36	1336.7	Sludge	168.9%	37%						78.6	82%
		S-7B	36-37	1336.7	Sludge	163.2%	38%		48.6%	83.2	31.6	107%	79.1	82%
6 C Upper	B11-107	S-5	25-27	1225.0	Sludge	182.4%	35%						77.7	83%
		S-6	30-32	1313.0	Sludge	157.4%	39%						79.6	81%
		S-7	35-37	1401.0	Sludge	143.0%	41%						80.9	80%

Evergreen Packaging, Canton, North Carolina
Regrading of Areas 6B-Upper and 6C Upper and Lower

SUMMARY OF LABORATORY TEST RESULTS



Evergreen Packaging, Canton, North Carolina
Regrading of Areas 6B-Upper and 6C Upper and Lower

Determination of shear strengths applied to waste materials in the 2011 stability in support of regrading.

MATERIAL PROPERTY DETERMINATION (values NOT used stability analysis)

*Values used in the stability aalysis are based on test results and relative proportions of each material, see the end of page 2 of 2.

1995 Analysis	Density	Cohesion	Phi
Lime Mud	76	0	30
Sludge	76	95	20
Fly Ash	76	0	30
Dikes	130	100	32
Soil	130	0	30

2011 Values	Density	Cohesion	Phi	Source
Lime Mud	115	0	30	1995 value
Sludge	80	0	30	5% strain
Fly Ash	95	0	30	1995 value
Dikes	120	115	32	6A-West
Soil	130	0	30	1995 value

1995 Analysis, Rational for Values (given in prior report)

Lime Mud: No testing; however, it was stated that it should be similar to that of Ash

Sludge: Triaxial compression (CIU - Tests) were performed; yielding efective stress parameters of: C = 0 and phi 41 degrees (peak); and total stress parameters of C = 0 and phi = 20 degrees.

Fly Ash: Triaxial compression (CIU - Tests) were performed; yielding a C = 0 and phi 36 degrees

Area 6A, 2011 Evaluation for Regrading by SME

	Wet Density	Construction/ Operational Period Stability Analysis Parameters[4]		Post-Closure Stability Analysis Parameters		
	γ_t (pcf)	c (psf)	ϕ (degrees)	c' (psf)	ϕ' (degrees)	
Perim. Dikes	115	115	32	115	32	Used Here
Area 6A-West Waste	90	0	36	0	36	

2011 CIU TEST RESULTS (Effective Stress)

			Phi' Value Used in 2011
SLUDGE:			
Peak	0	46	30
5% Strain	0	33	
Sludge/Ash Mix:			
Peak	0	40	
5% Strain	0	35	

Evergreen Packaging, Canton, North Carolina
Regrading of Areas 6B-Upper and 6C Upper and Lower

Determination of shear strengths applied to waste materials in the 2011 stability in support of regrading.

Area Specific Waste Compositions and Strengths:

From the Settlement Analysis, the following average waste compositions were determined:

	Fly Ash	Sludge	Lime Mud	Soil
Area 6 C Upper:	7%	49%	36%	8%
Area 6 B Upper:	38%	57%	4%	0%
Area 6 C Lower:	53%	44%	3%	0%

Using the above wate proportions, the average waste properties are (USED IN STABILITY ANALYSIS):

VALUES CALCULATED, BASED on Waste %s

	Density	Cohesion	Phi
Area 6 C Upper:	98	0	30
Area 6 B Upper:	87	0	30
Area 6 C Lower:	89	0	30

Values Applied in 2011 Analysis of Regrading of 6C Upper and Lower and 6B Upper:

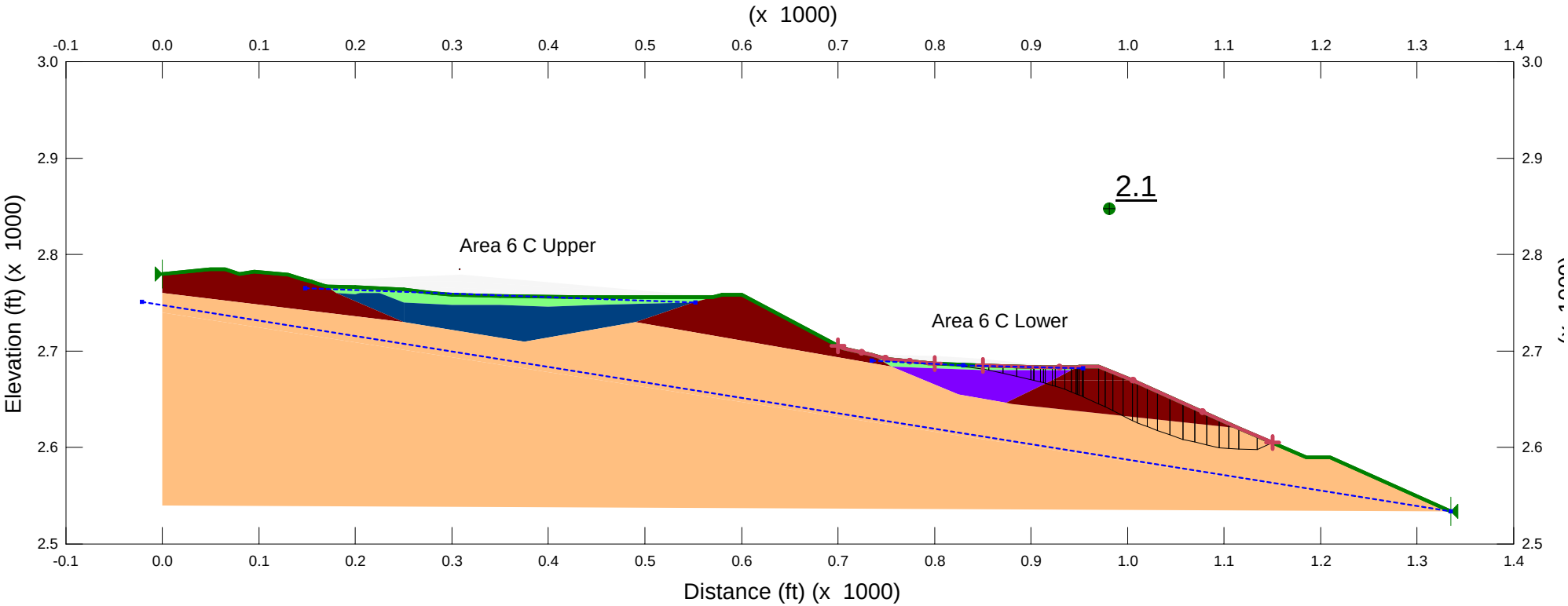
	Density	Cohesion	Phi
Area 6 C Upper:	100	0	30
Area 6 B Upper:	90	0	30
Area 6 C Lower:	90	0	30

APPENDIX 3

SLOPE STABILITY ANALYSES

Title: Evergreen Packaging Date: 7/8/2011 Time: 11:32:43 AM
Directory: \\Nserver\cfs\Brpp\NC\geotech\ File Name: AA-MP100.gsz
Method: Bishop, Ordinary and Janbu
Analysis Name: 6CL-EC-EE-St Description: 6CLower; Existing Conditions; Static
Horizontal EQ Load:

Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Mixed Waste Area C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Mixed Waste Area C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 °
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



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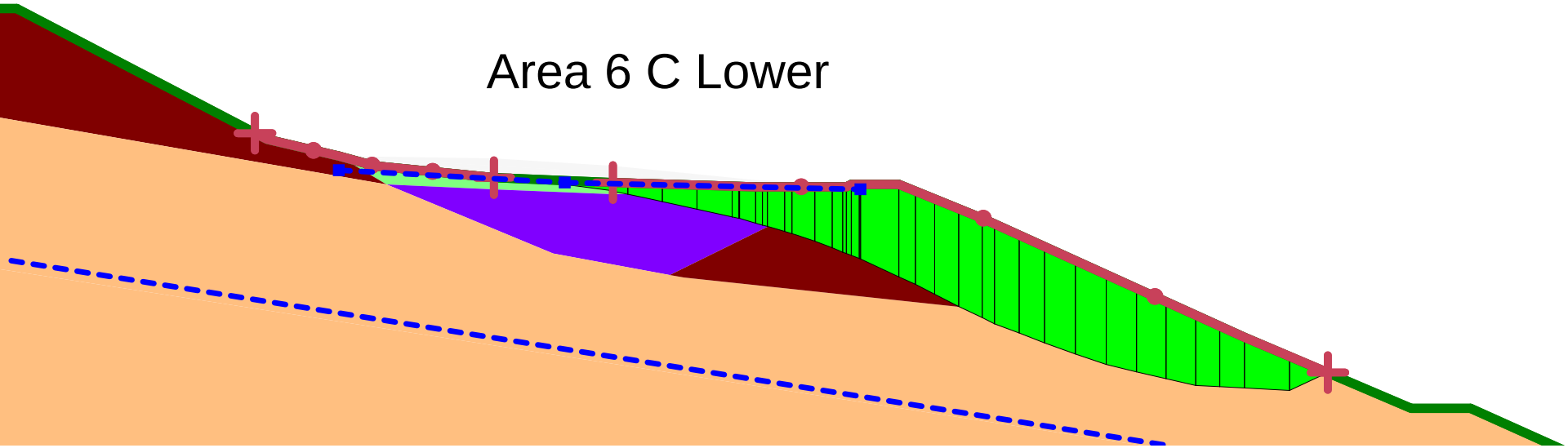
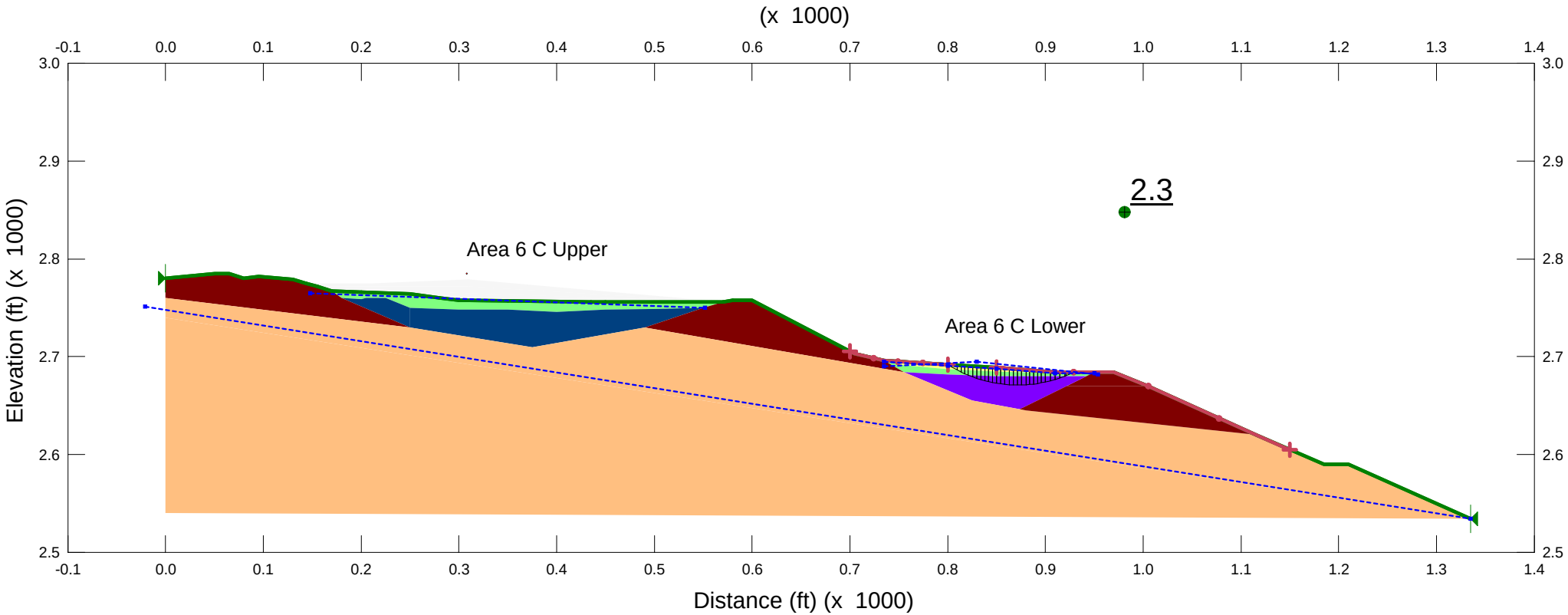
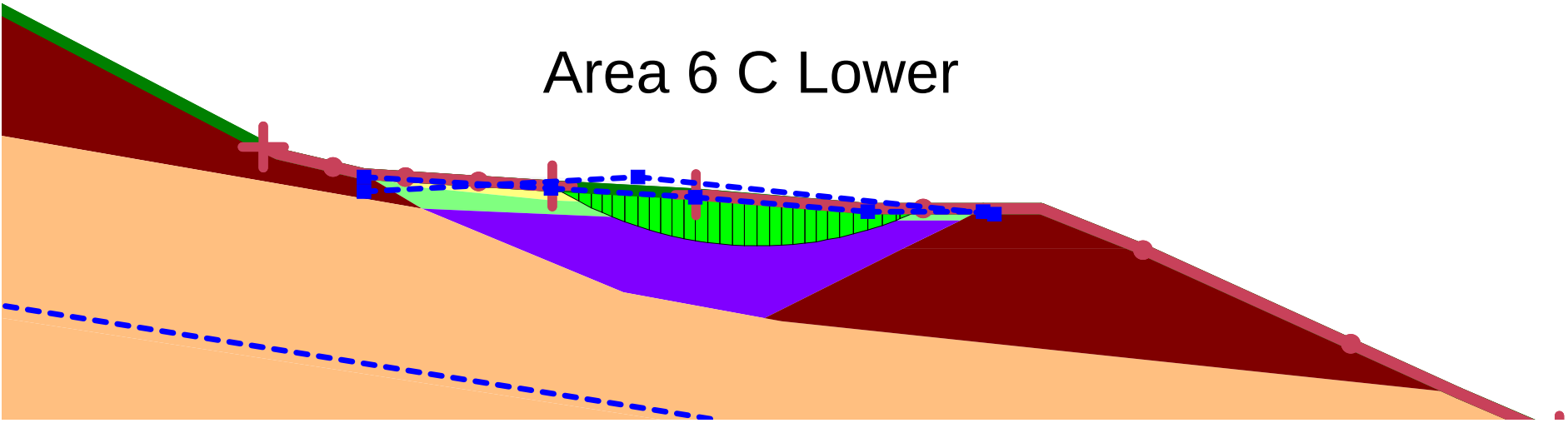


Title: Evergreen Packaging Date: 7/8/2011 Time: 11:32:43 AM
Directory: \\Nserver\cfs\Brpp\NC\geotech\ File Name: AA-MP100.gsz
Method: Bishop, Ordinary and Janbu
Analysis Name: 6CL-O2b-EE-St Description: 6CLower; 100% Fill, 100% Porepressure; Static
Horizontal EQ Load:

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 4
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Mixed Waste Area C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Mixed Waste Area C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



2.3



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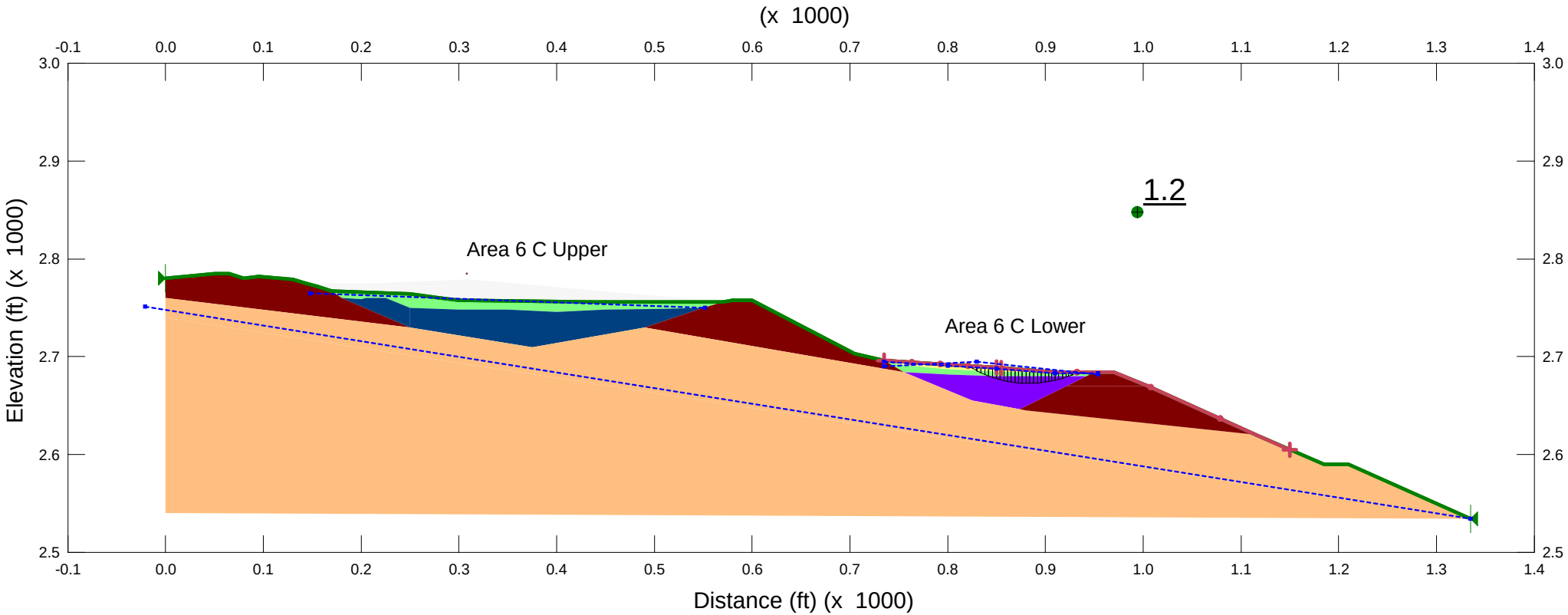
Directory: \\Nserver\cfs\Brpp\NC\geotech\ File Name: AA-MP100.gsz
Method: Bishop, Ordinary and Janbu
Analysis Name: 6CL-O2b-EE-S1 Description: 6CLower; 100% Fill, 100% Porepressure; Seismic
Horizontal EQ Load: 0.07

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 4
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Mixed Waste Area C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Mixed Waste Area C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



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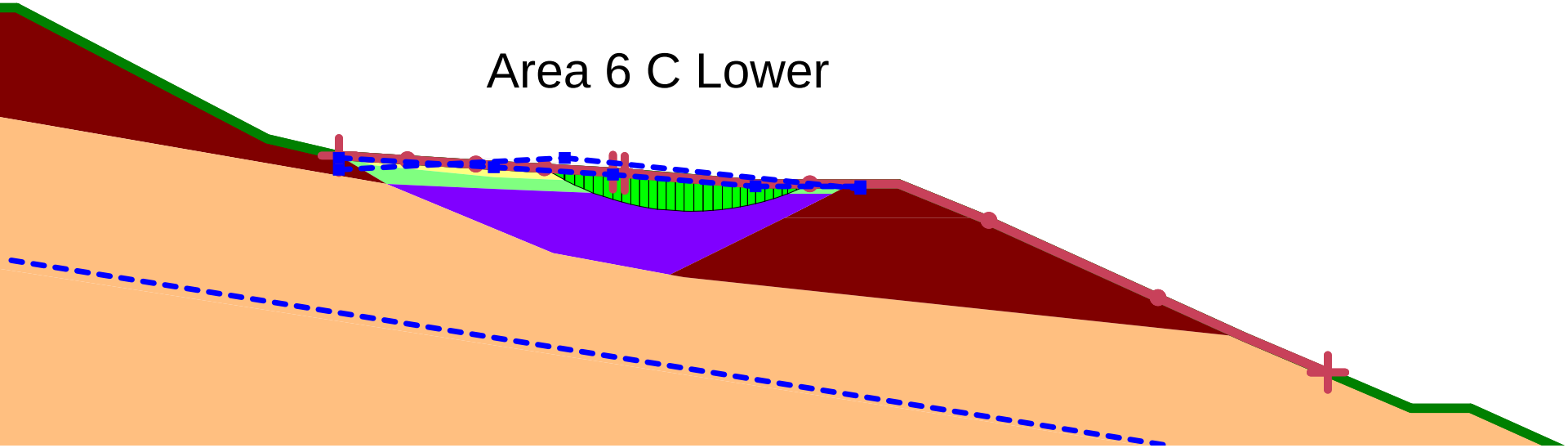
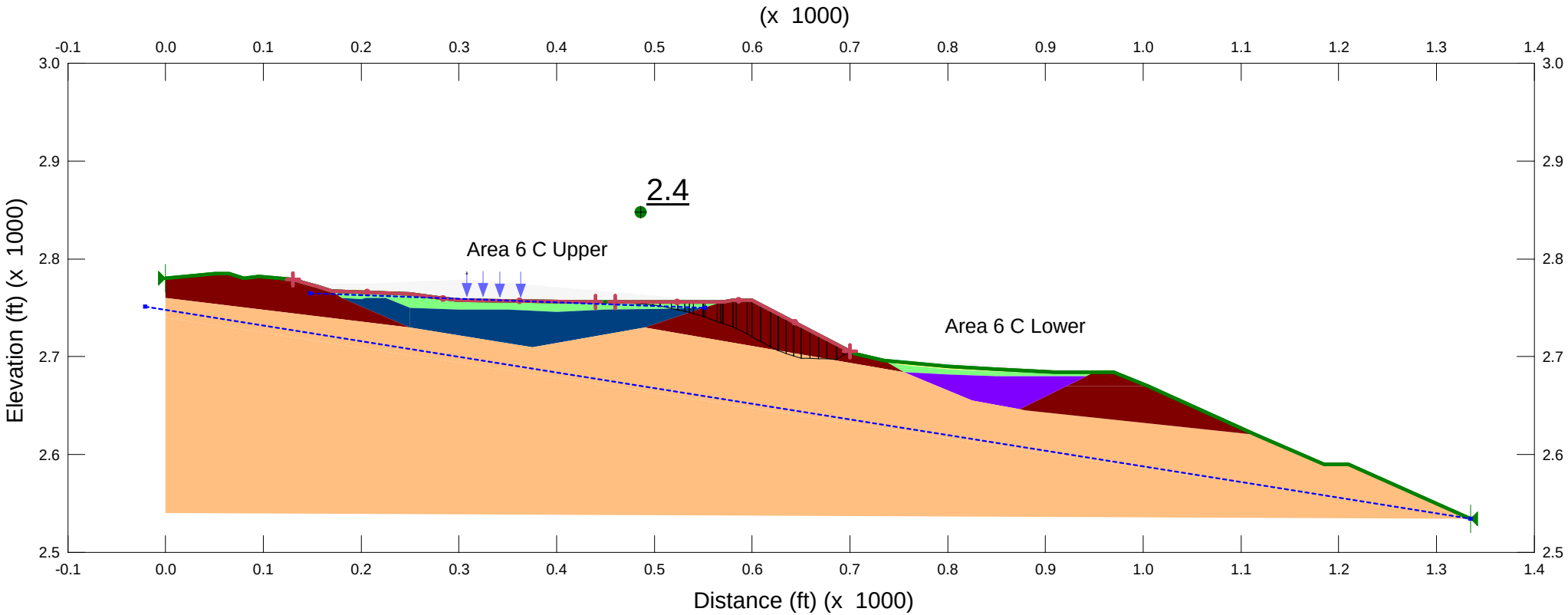


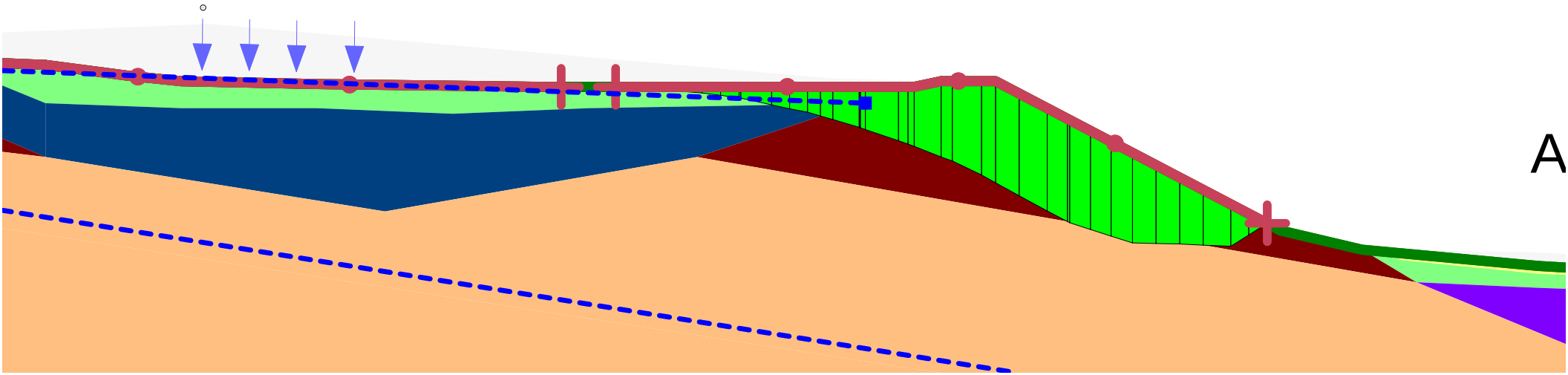
Title: Evergreen Packaging Date: 7/8/2011 Time: 11:32:43 AM
Directory: \\Nserver\cfs\Brpp\NC\geotech\ File Name: AA-MP100.gsz
Method: Bishop, Ordinary and Janbu
Analysis Name: 6CU-EC-EE-St Description: 6CUpper; Existing Conditions; Static
Horizontal EQ Load:

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 °
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



2.4

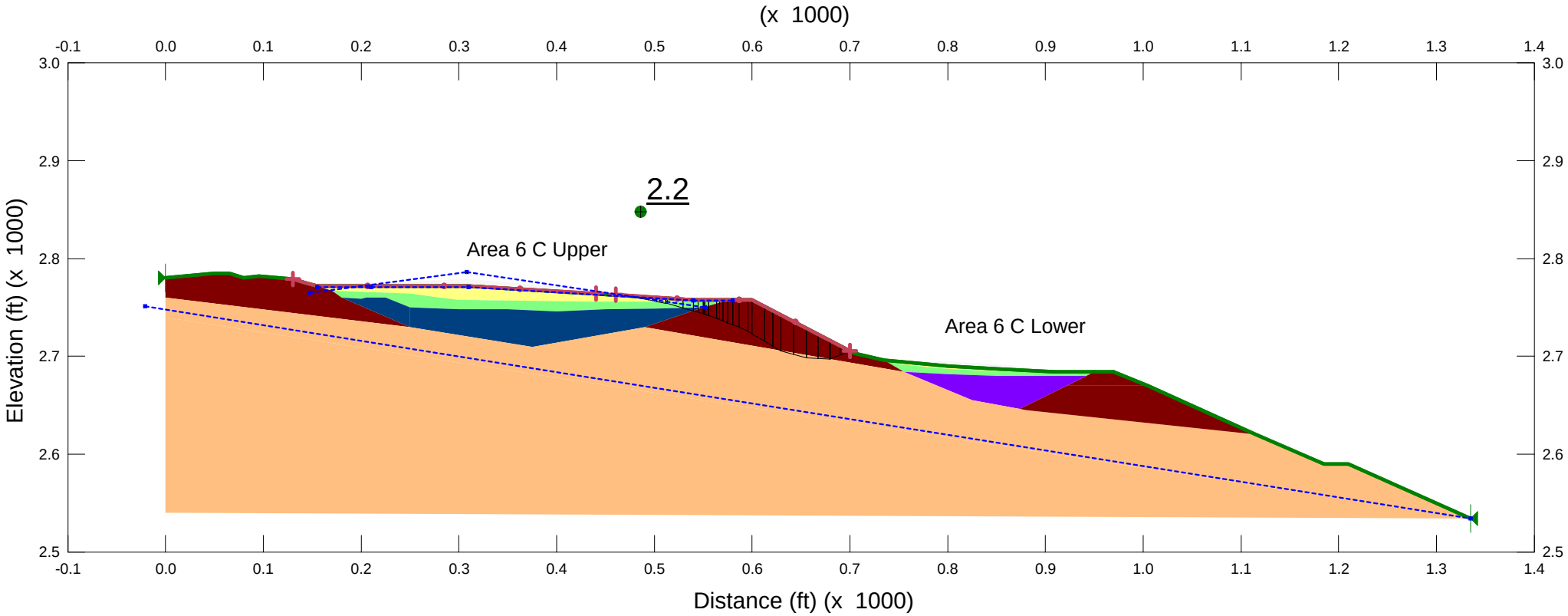
Area 6 C Upper



Title: Evergreen Packaging Date: 7/8/2011 Time: 11:32:43 AM
Directory: \\Nserver\cfs\Brpp\NC\geotech\ File Name: AA-MP100.gsz
Method: Bishop, Ordinary and Janbu
Analysis Name: 6CU-O2b-EE-St Description: 6CUpper; 100% Fill, 100% Pressure Increase; Static

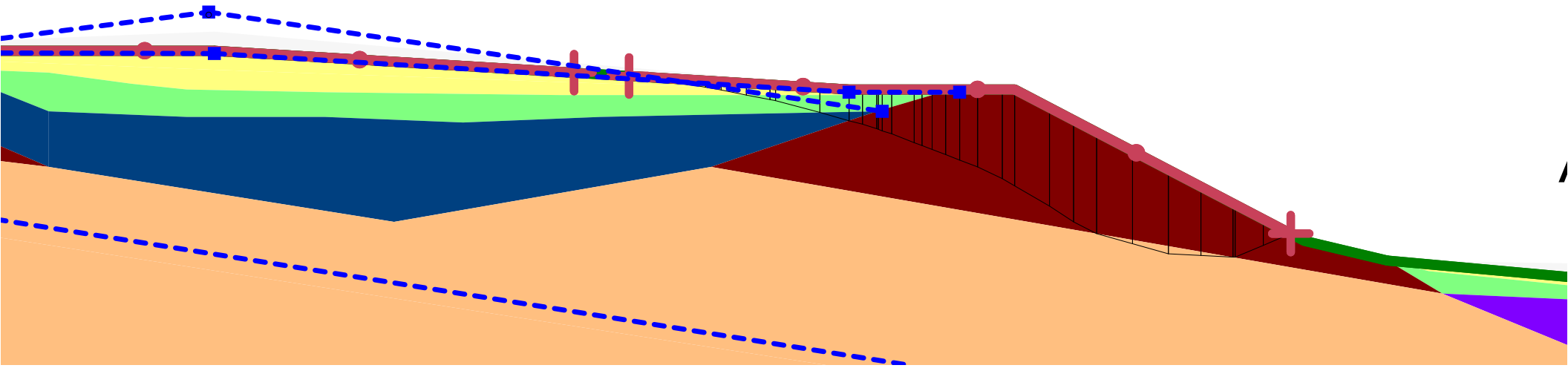
Horizontal EQ Load: 0

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



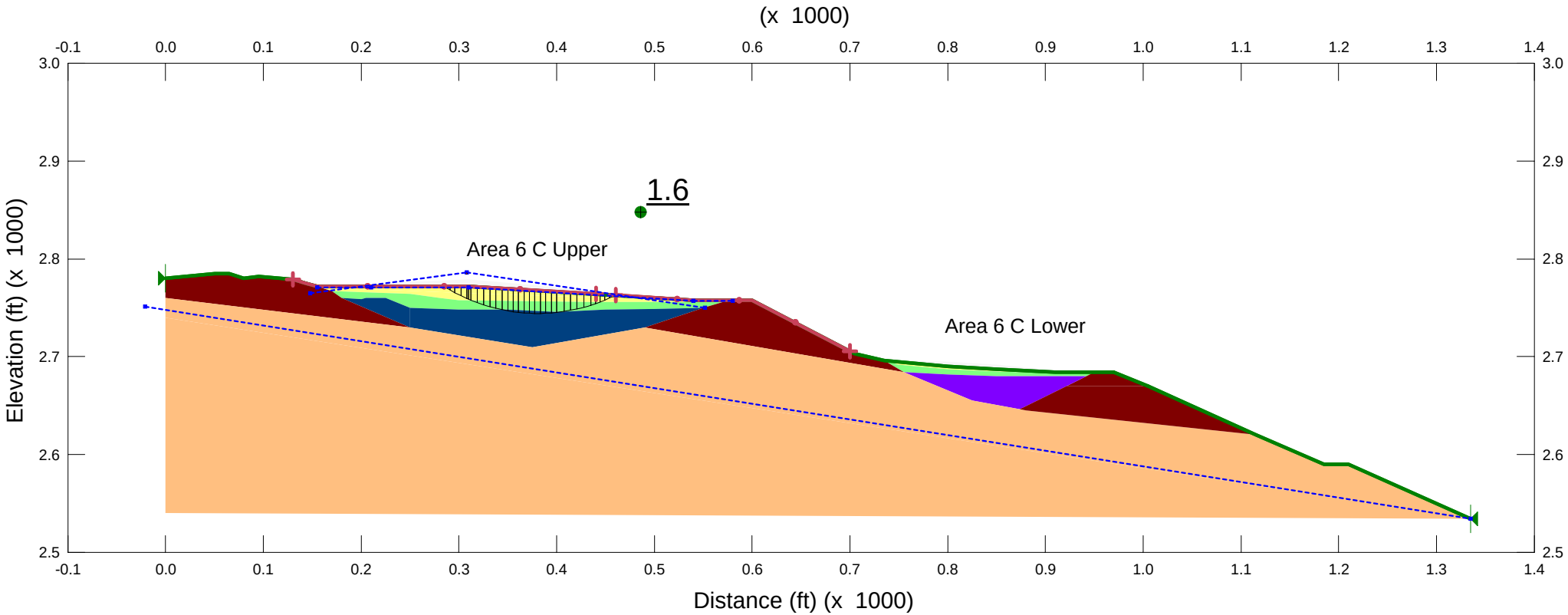
2.2

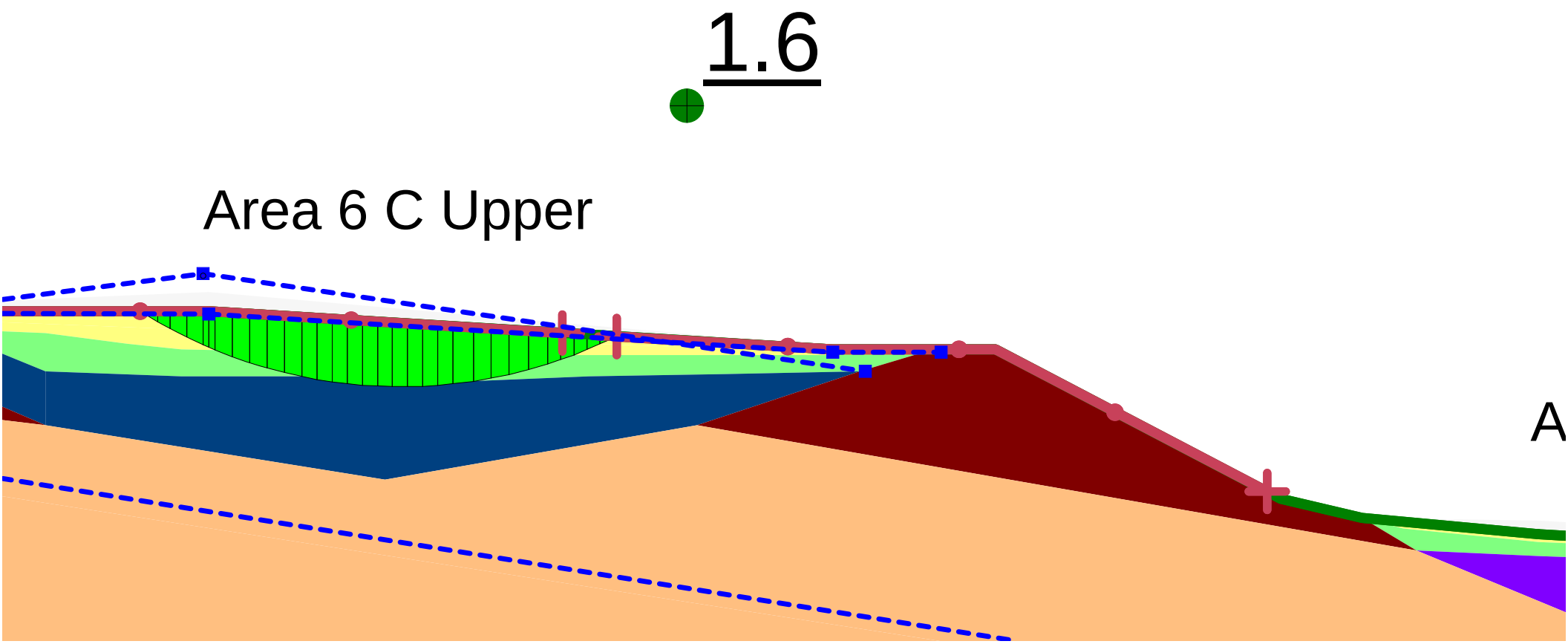
Area 6 C Upper



Title: Evergreen Packaging Date: 7/8/2011 Time: 11:32:43 AM
Directory: \\Nserver\cfs\Brpp\NC\geotech\ File Name: AA-MP100.gsz
Method: Bishop, Ordinary and Janbu
Analysis Name: 6CU-O2b-EE-S1 Description: 6CUpper; 100% Fill, 100% Pressure Increase; Seismic
Horizontal EQ Load: 0.07

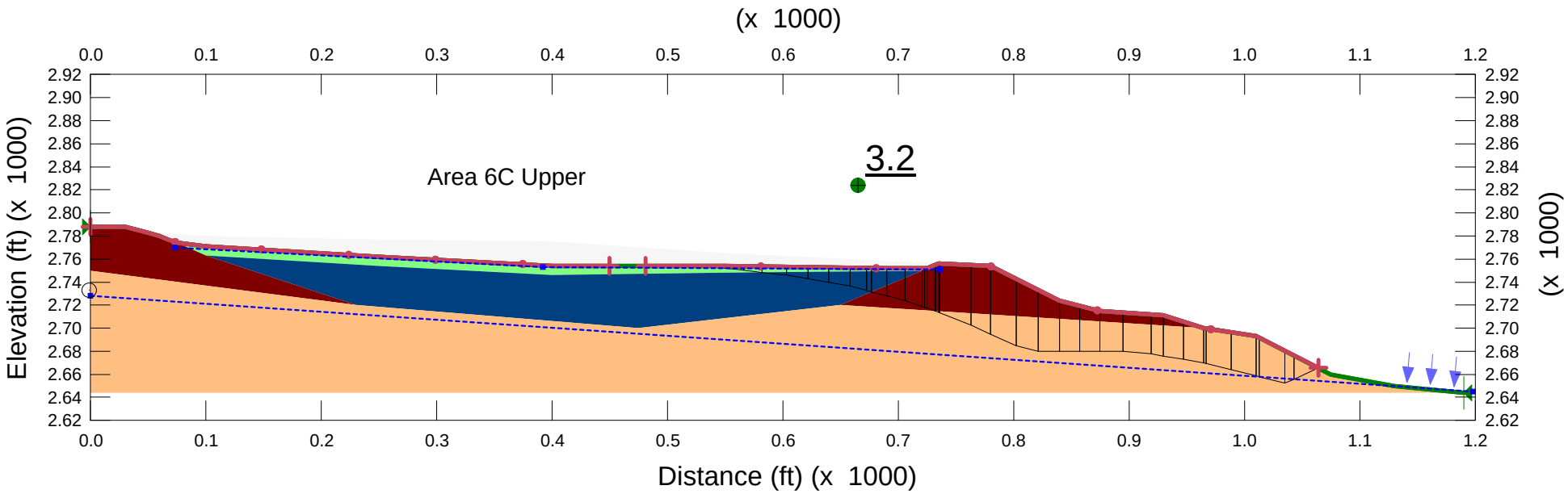
Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2




1.6
Area 6 C Upper
A

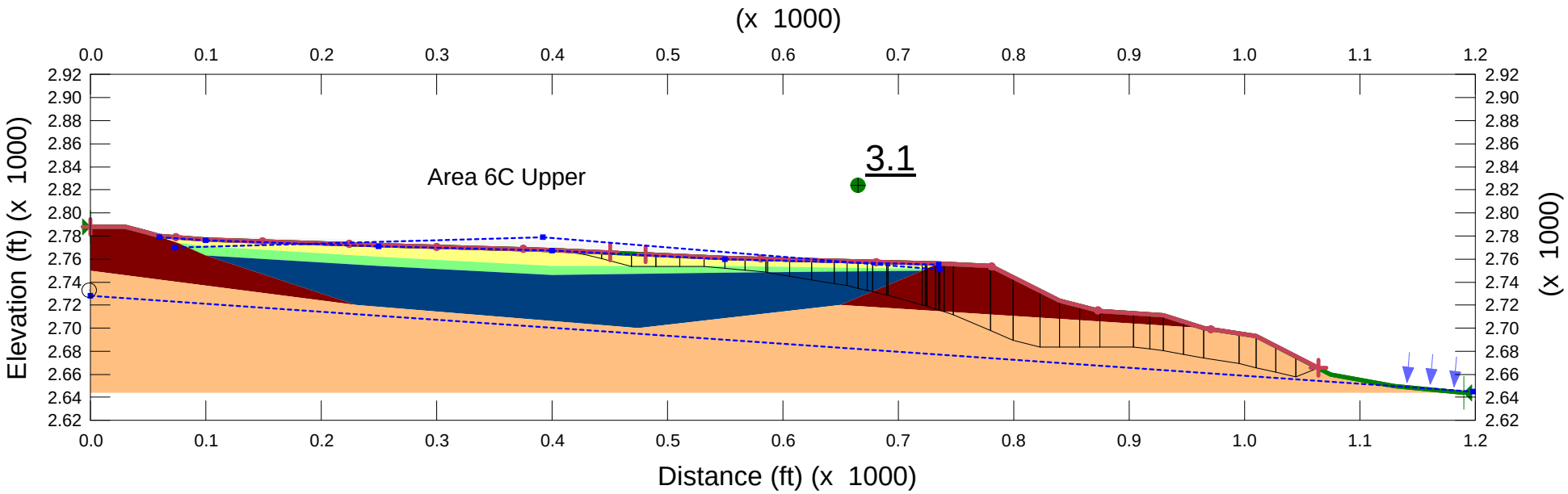
Title: Evergreen Packaging Date: 7/8/2011 Time: 12:59:49 PM
Directory: \\Nserver\cfs\Brpp\NC\geotech\ File Name: BB-MP100.gsz
Method: Bishop, Ordinary and Janbu
Analysis Name: EC-EE-St Description: Existing Conditions; Static
Horizontal EQ Load:

Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



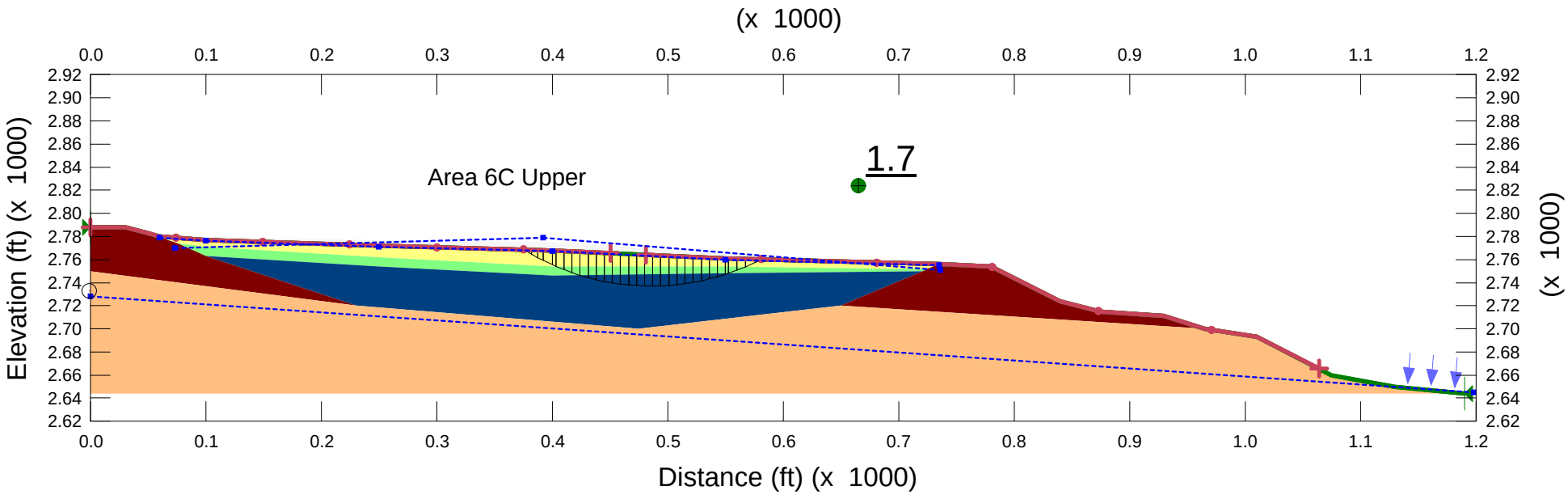
Title: Evergreen Packaging Date: 7/8/2011 Time: 12:59:49 PM
Directory: \\Nserver\cfs\Brpp\NC\geotech\ File Name: BB-MP100.gsz
Method: Bishop, Ordinary and Janbu
Analysis Name: O2b-EE-St Description: Existing Conditions; 100% Fill and 100% excess PWP; Static
Horizontal EQ Load:

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



Title: Evergreen Packaging Date: 7/8/2011 Time: 12:59:49 PM
Directory: \\Nserver\cfs\Brpp\NC\geotech\ File Name: BB-MP100.gsz
Method: Bishop, Ordinary and Janbu
Analysis Name: O2b-EE-S1 Description: Existing Conditions; 100% Fill and 100% excess PWP; Seismic
Horizontal EQ Load: 0.07

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



Title: Evergreen Packaging Date: 7/8/2011 Time: 1:21:12 PM
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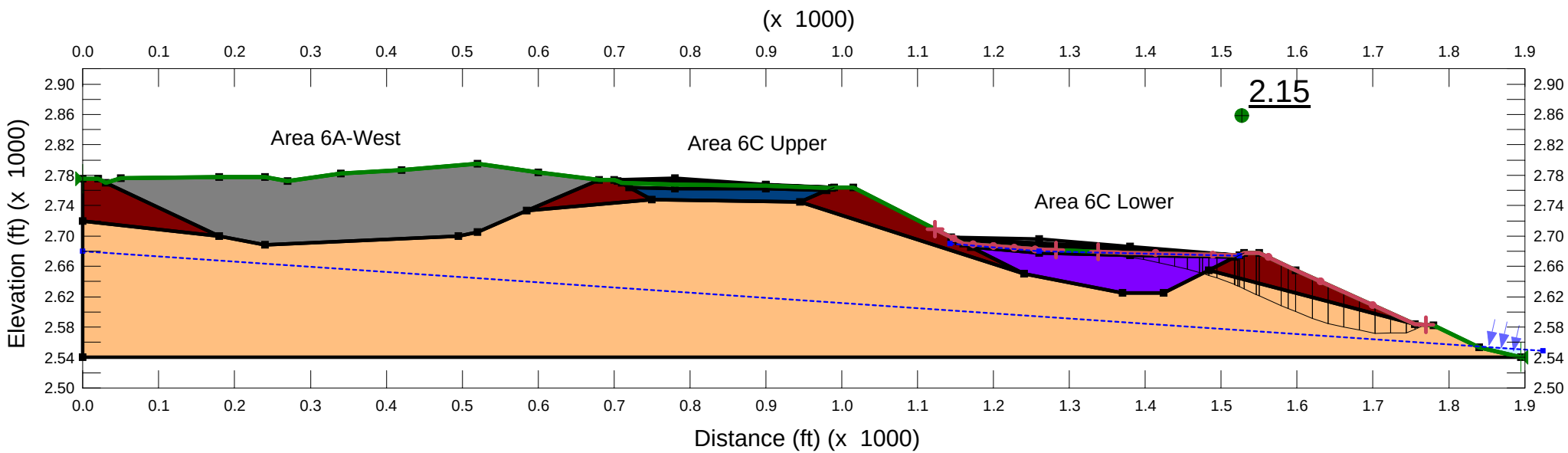
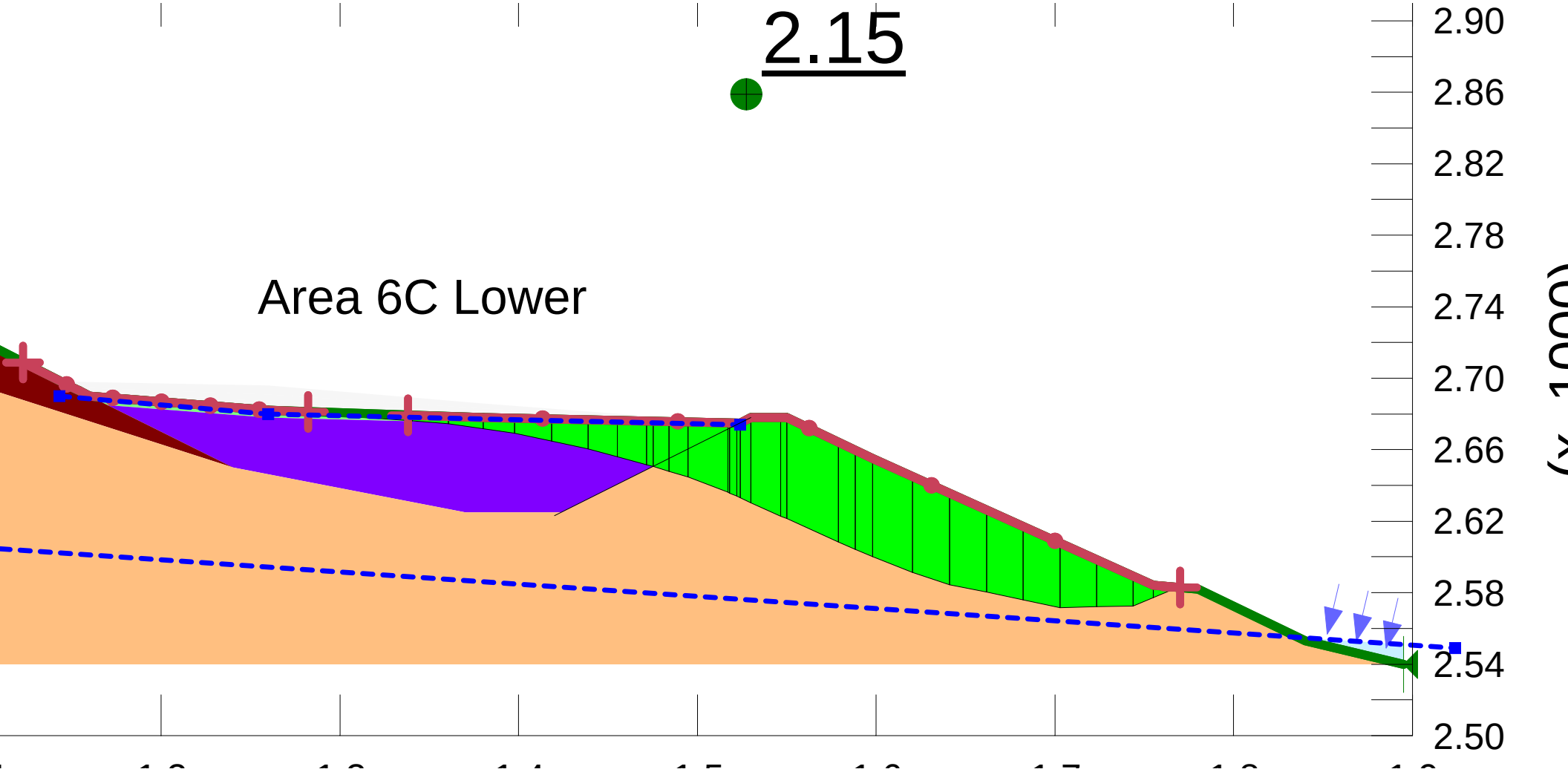
Method: Bishop, Ordinary and Janbu
Analysis Name: 6CL-EC-EE-St Description: Existing Conditions; Static
Horizontal EQ Load:

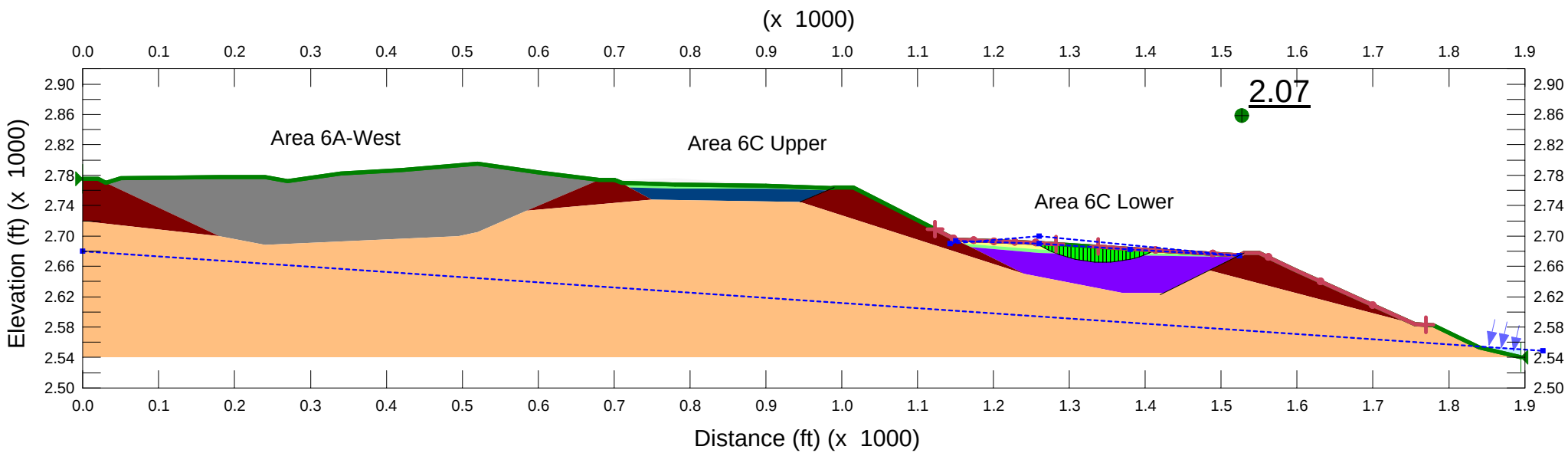
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: 6A-West Waste Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 36 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2

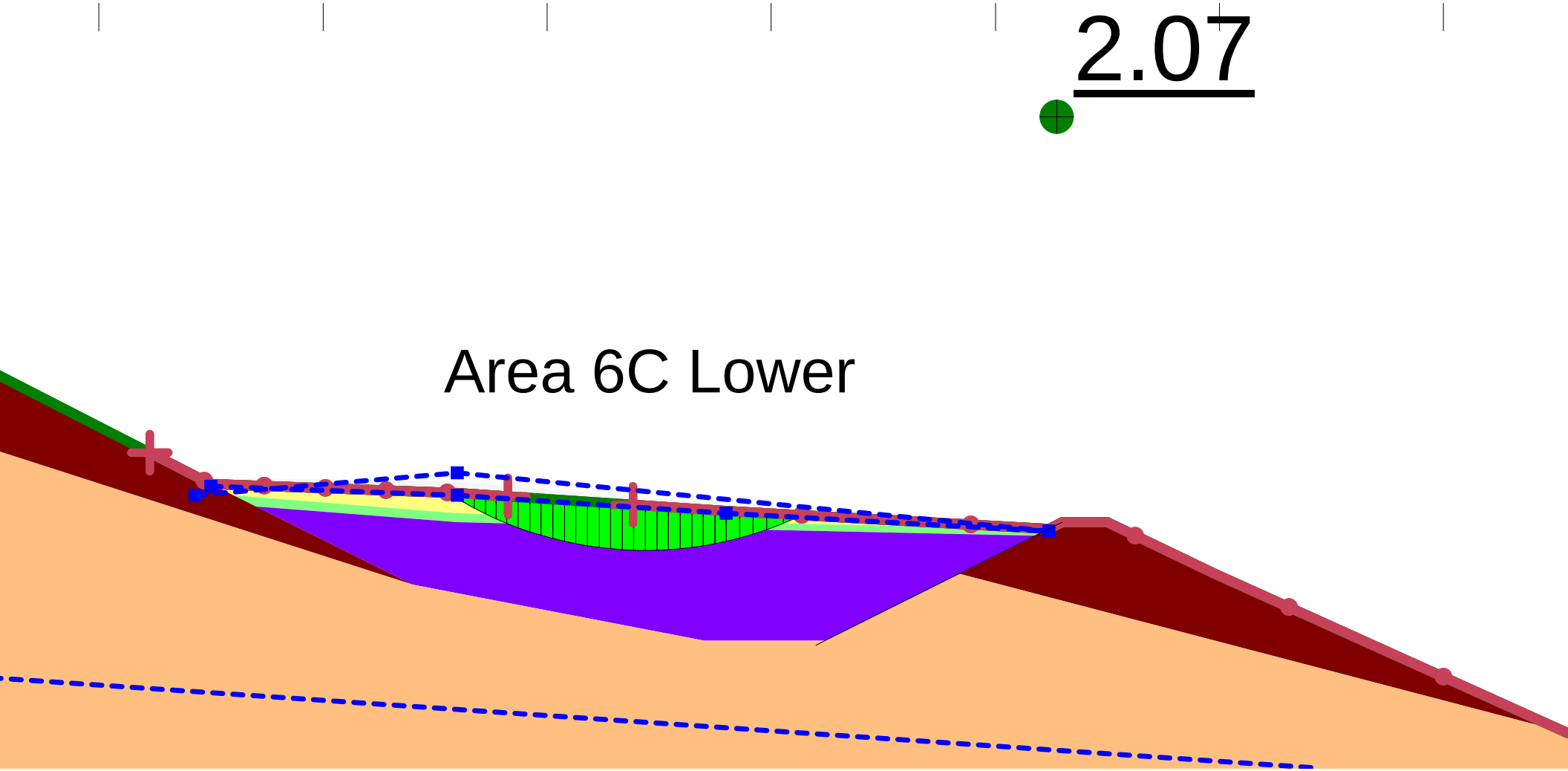



2.15
Area 6C Lower
2.90
2.86
2.82
2.78
2.74
2.70
2.66
2.62
2.58
2.54
2.50

Title: Evergreen Packaging Date: 7/8/2011 Time: 1:21:12 PM
Directory: \\Nserver\cfs\Brpp\NC\geotech\ File Name: CC-MP100.gsz
Method: Bishop, Ordinary and Janbu
Analysis Name: 6CL-Ob2-EE-St Description: Operations; 100% Fill and 100% excess PWP; Static
Horizontal EQ Load:

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: 6A-West Waste Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 36 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2




2.07
Area 6C Lower

Title: Evergreen Packaging Date: 7/8/2011 Time: 3:05:36 PM
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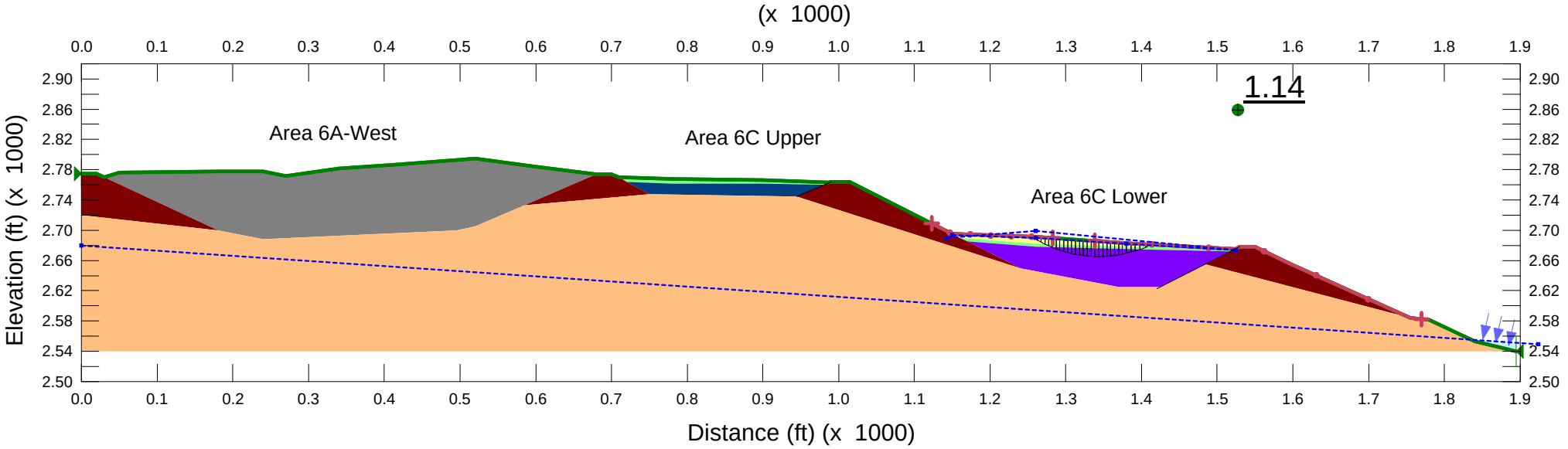
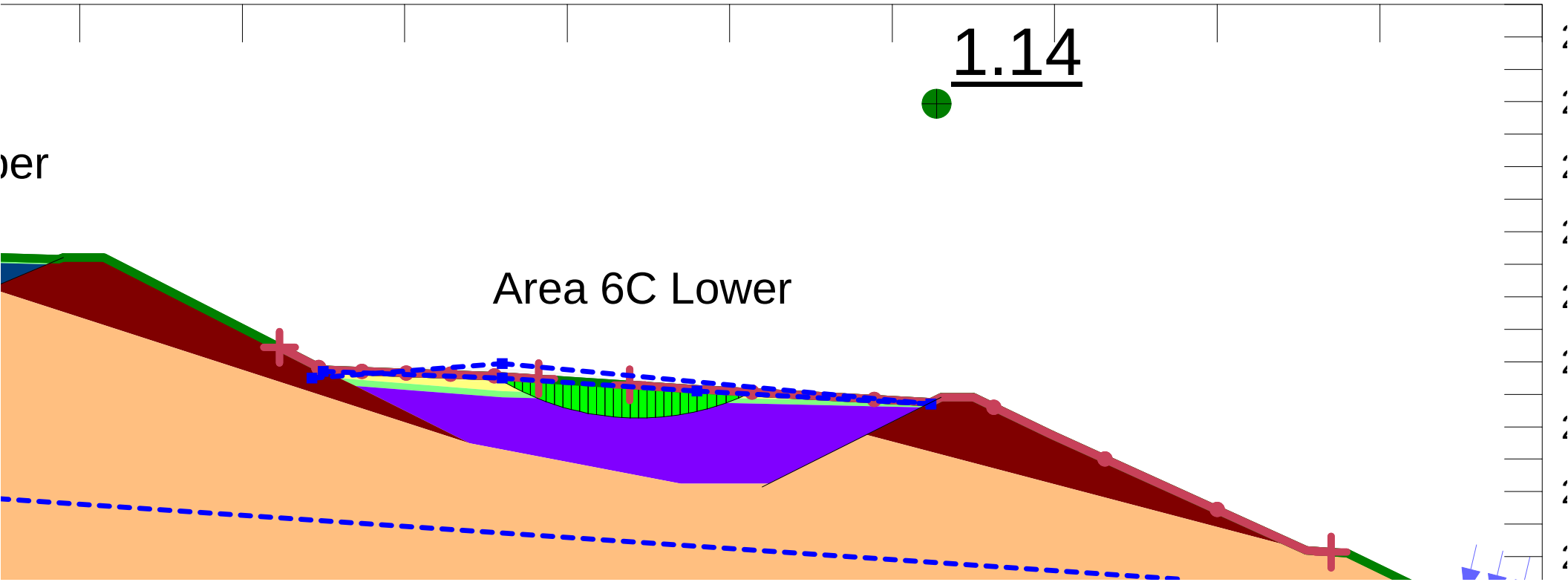
Method: Bishop, Ordinary and Janbu
Analysis Name: 6CL-Ob2-EE-S1 Description: Operations; 100% Fill and 100% excess PWP; Seismic
Horizontal EQ Load: 0.07

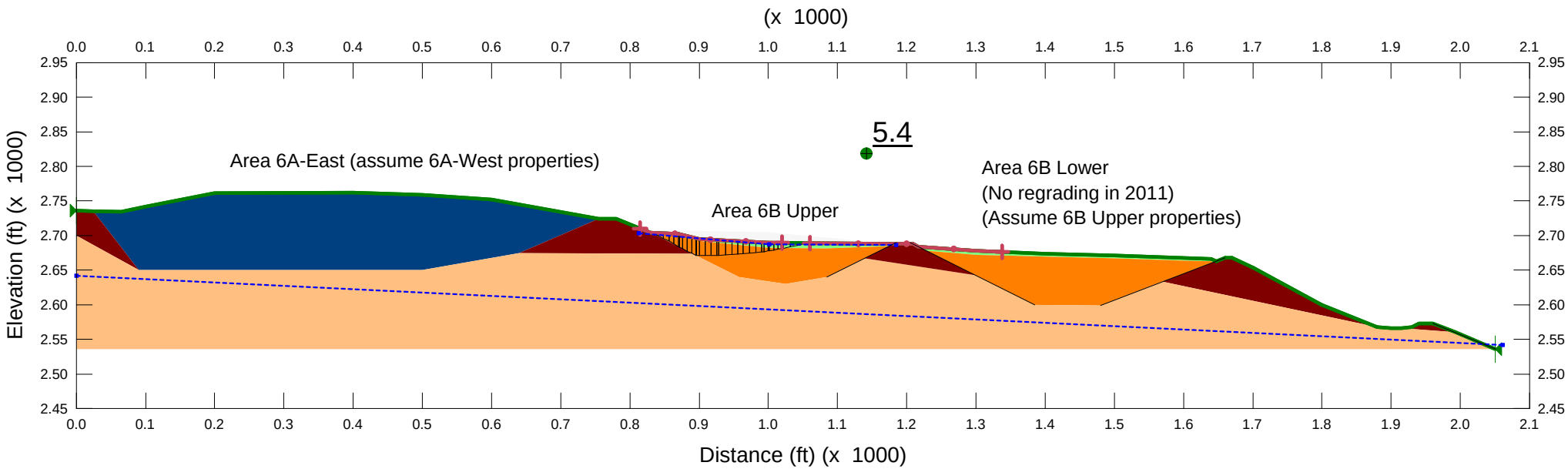
Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: 6A-West Waste Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 36 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2

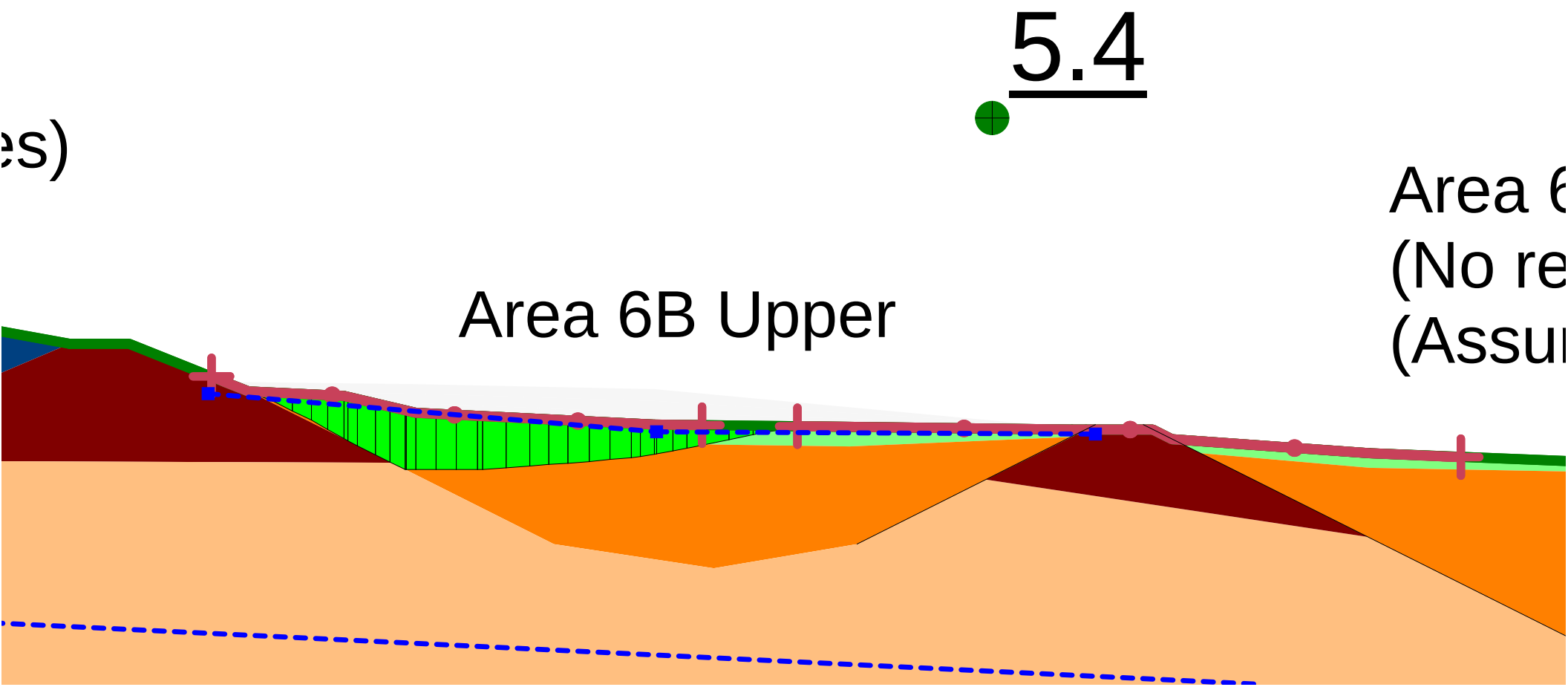



1.14
ber
Area 6C Lower

Title: Evergreen Packaging Date: 7/8/2011 Time: 1:35:33 PM
Directory: \\Nserver\CFS\Brpp\NC\geotech\ File Name: DD-MP100.gsz
Method: Bishop, Ordinary and Janbu
Analysis Name: EC-EE-St
Horizontal EQ Load:

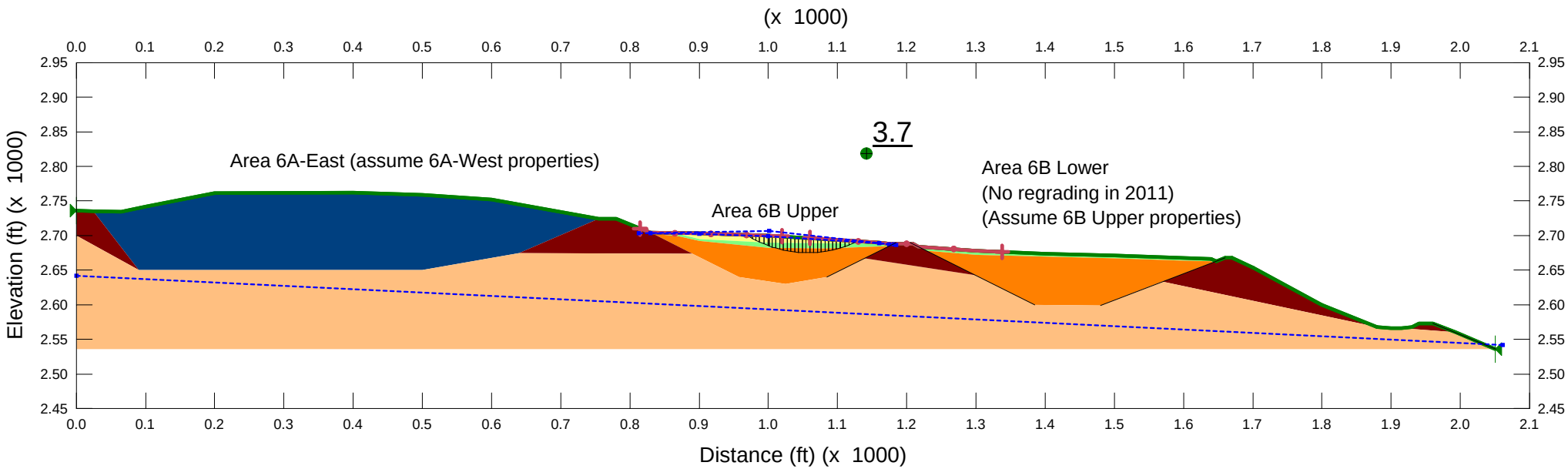
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6B Upper Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2

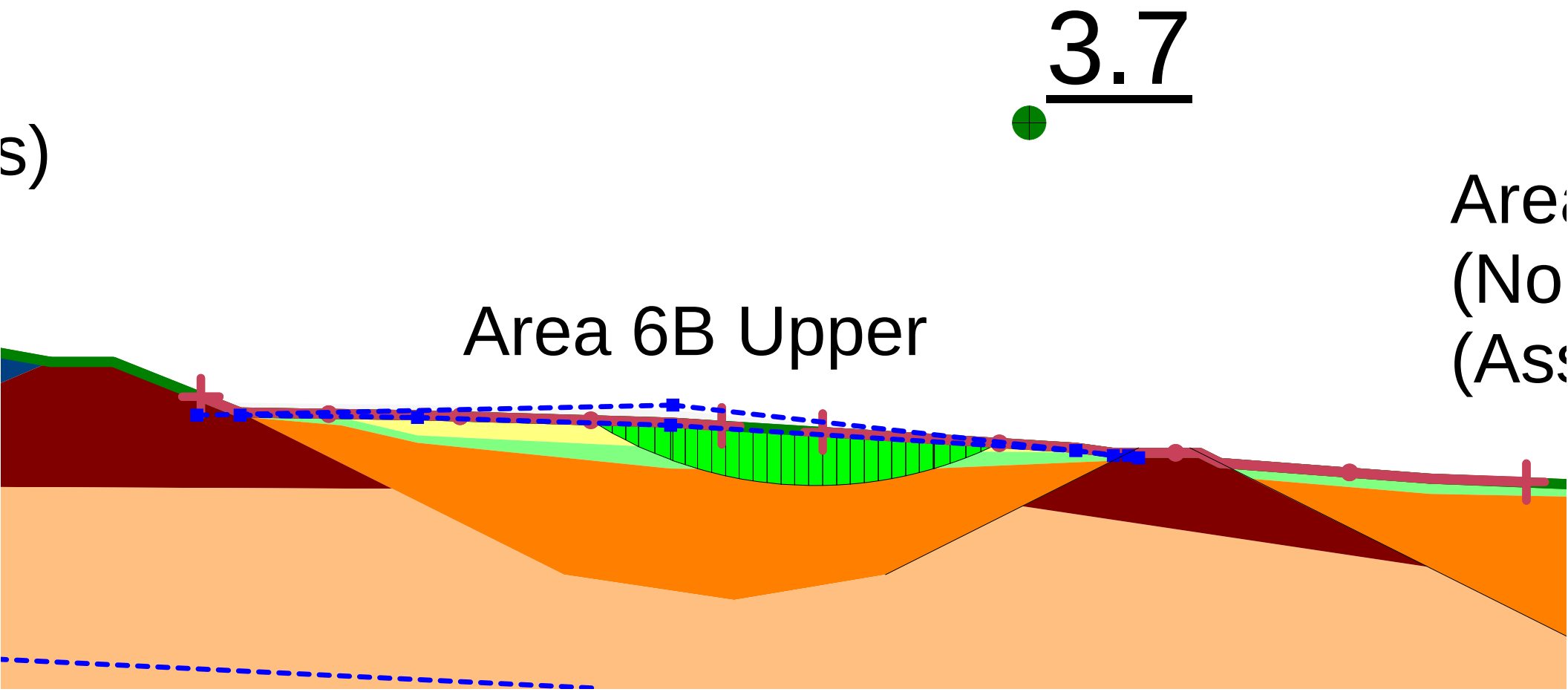



5.4
es)
Area 6
(No re
(Assu
Area 6B Upper

Title: Evergreen Packaging Date: 7/8/2011 Time: 1:35:33 PM
Directory: \\Nserver\CFS\Brpp\NC\geotech\ File Name: DD-MP100.gsz
Method: Bishop, Ordinary and Janbu
Analysis Name: O2b-EE-St
Horizontal EQ Load:

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6B Upper Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2

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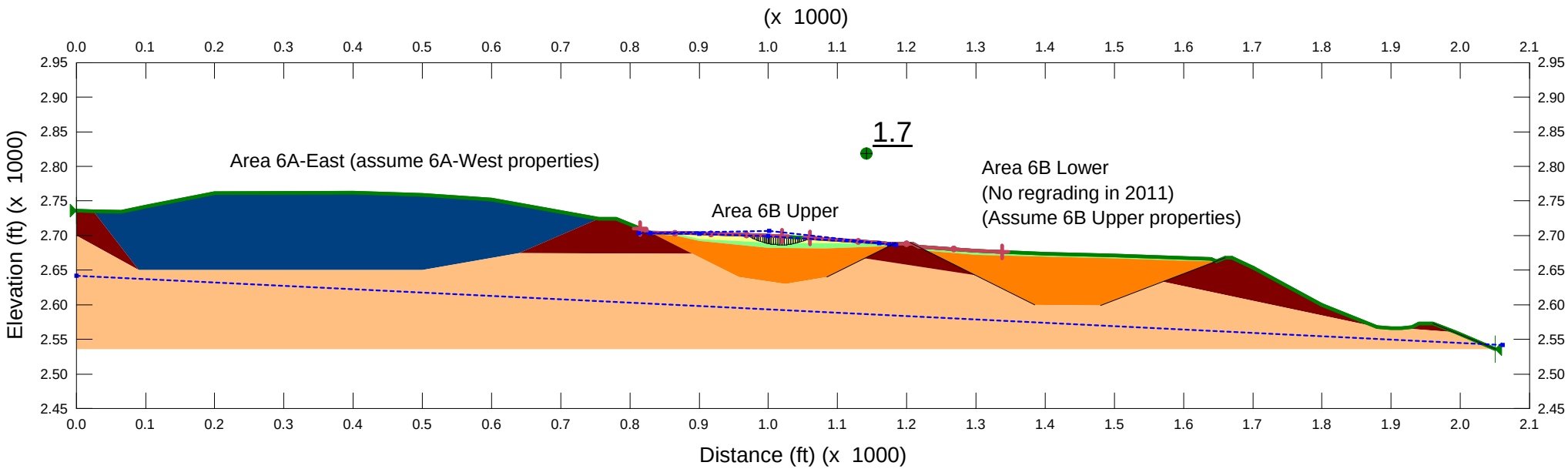
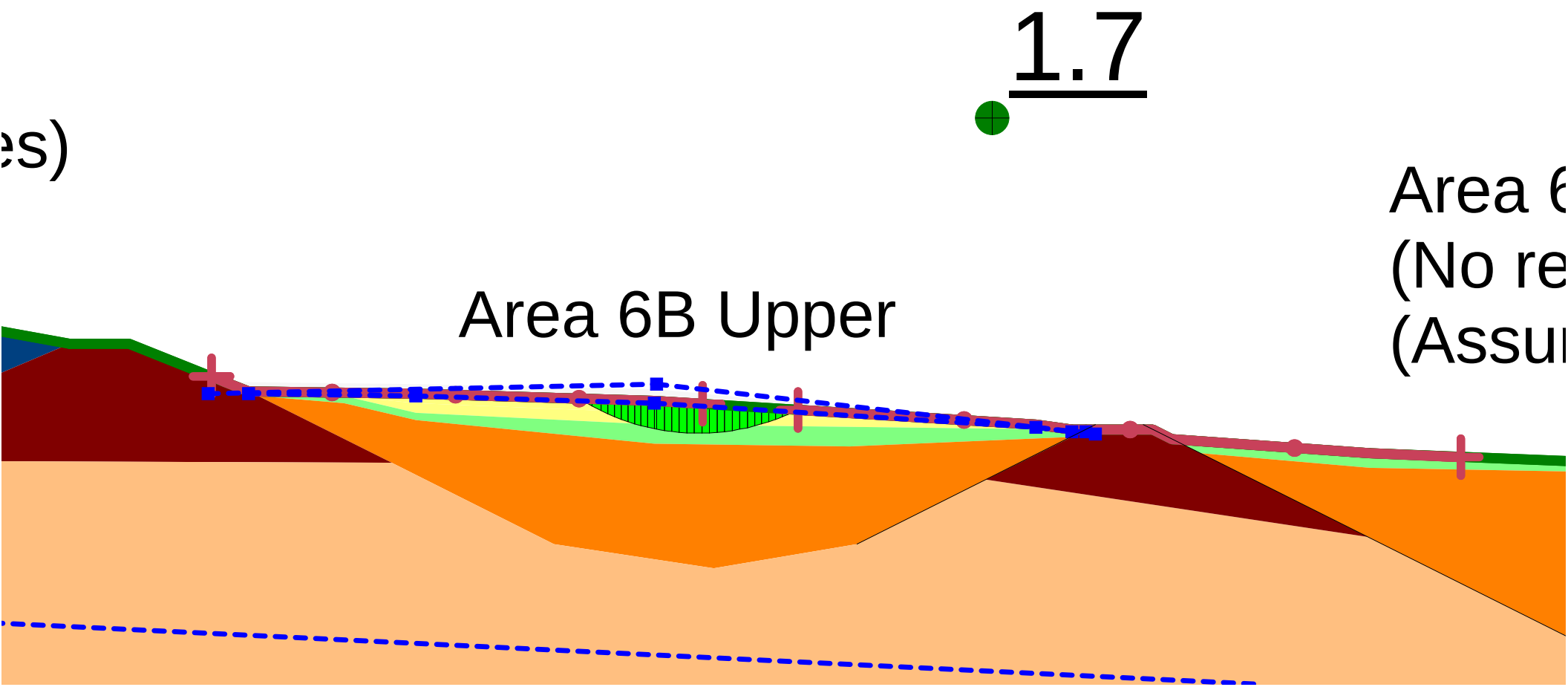
Method: Bishop, Ordinary and Janbu
Analysis Name: O2b-EE-S1
Horizontal EQ Load: 0.07

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6B Upper Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2

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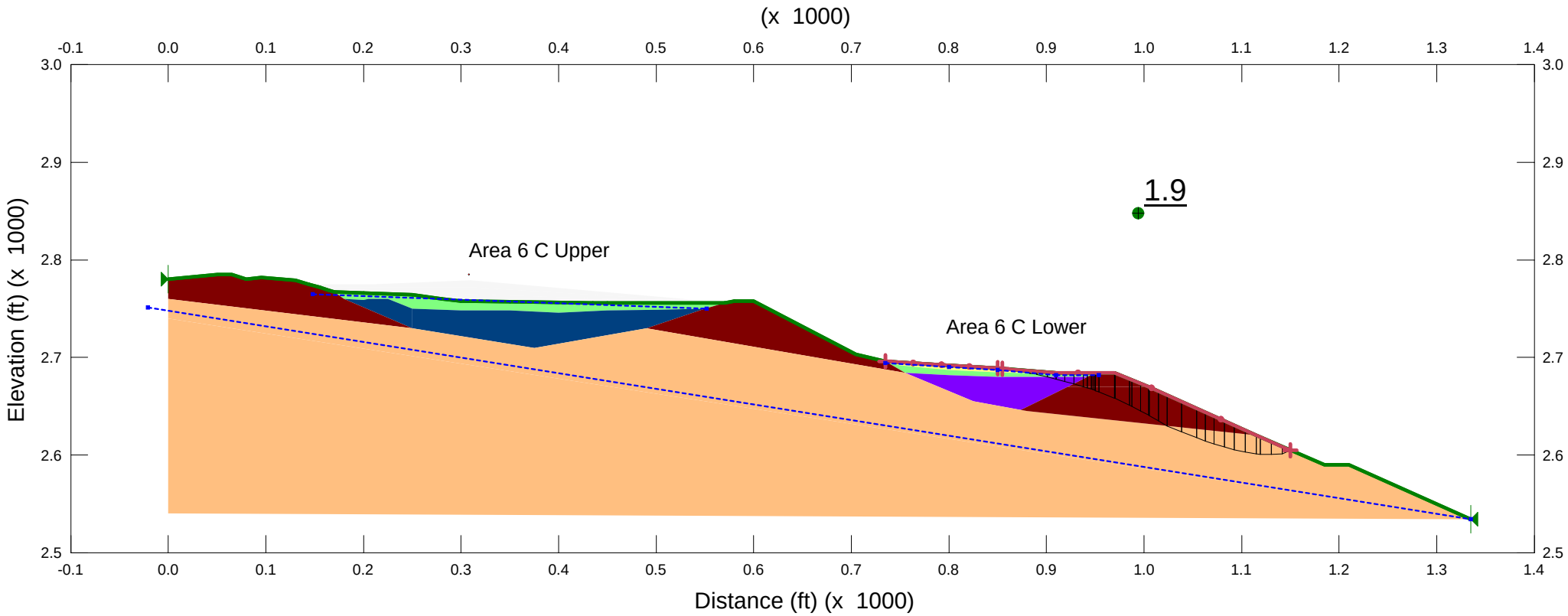
Method: Bishop, Ordinary and Janbu
Analysis Name: 6CL-PC2-EE-St Description: 6CLower; 100% Fill, drained to 2' below grade; Static
Horizontal EQ Load: 0

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Mixed Waste Area C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Mixed Waste Area C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



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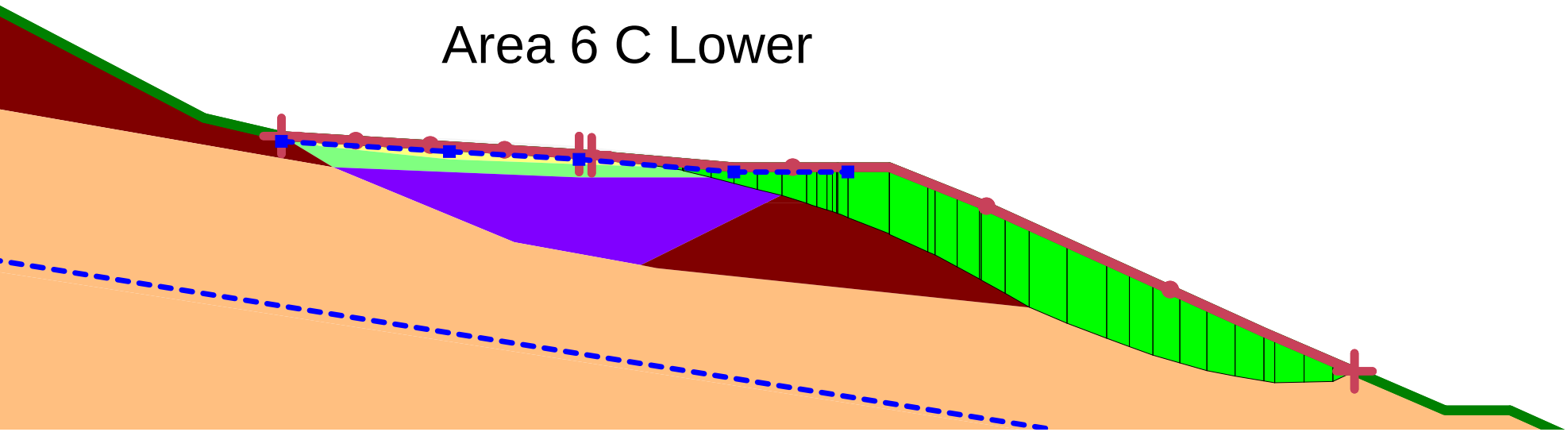

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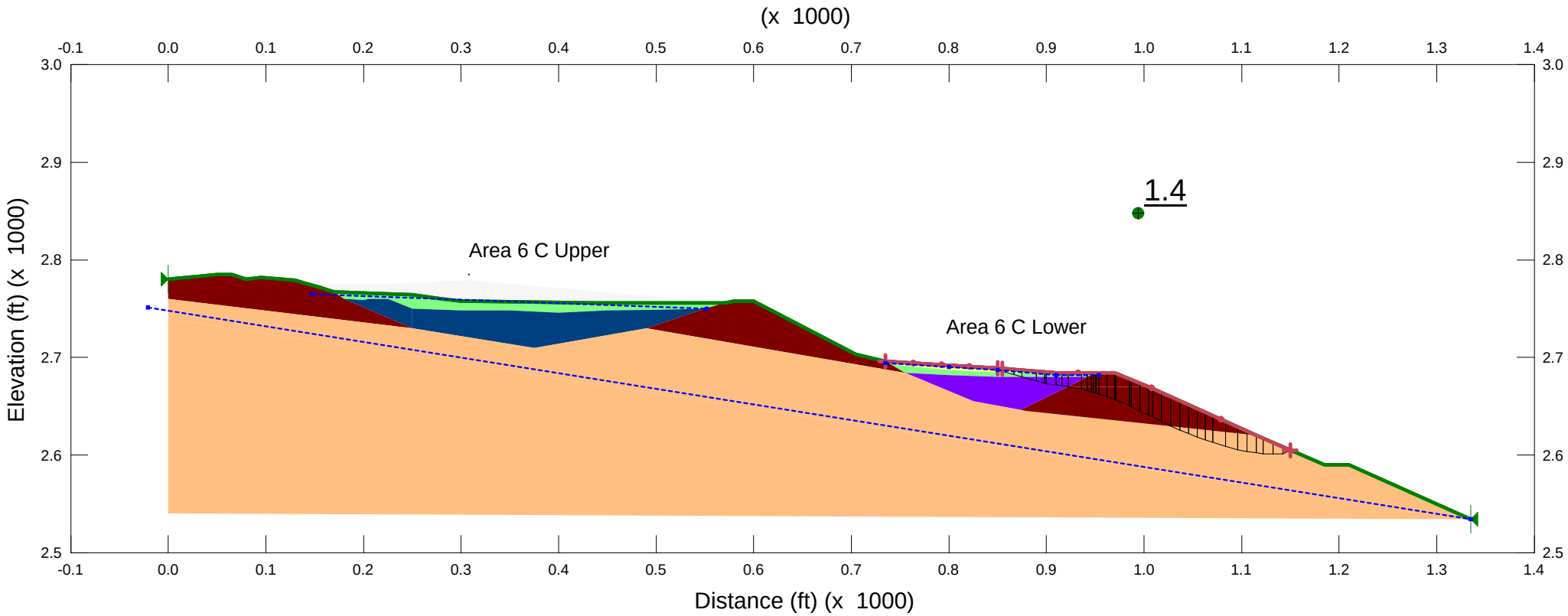
Method: Bishop, Ordinary and Janbu
Analysis Name: 6CL-PC2-EE-S2 Description: 6CLower; 100% Fill, drained to 2' below grade; Seismic
Horizontal EQ Load: 0.14

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Mixed Waste Area C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Mixed Waste Area C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 3
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



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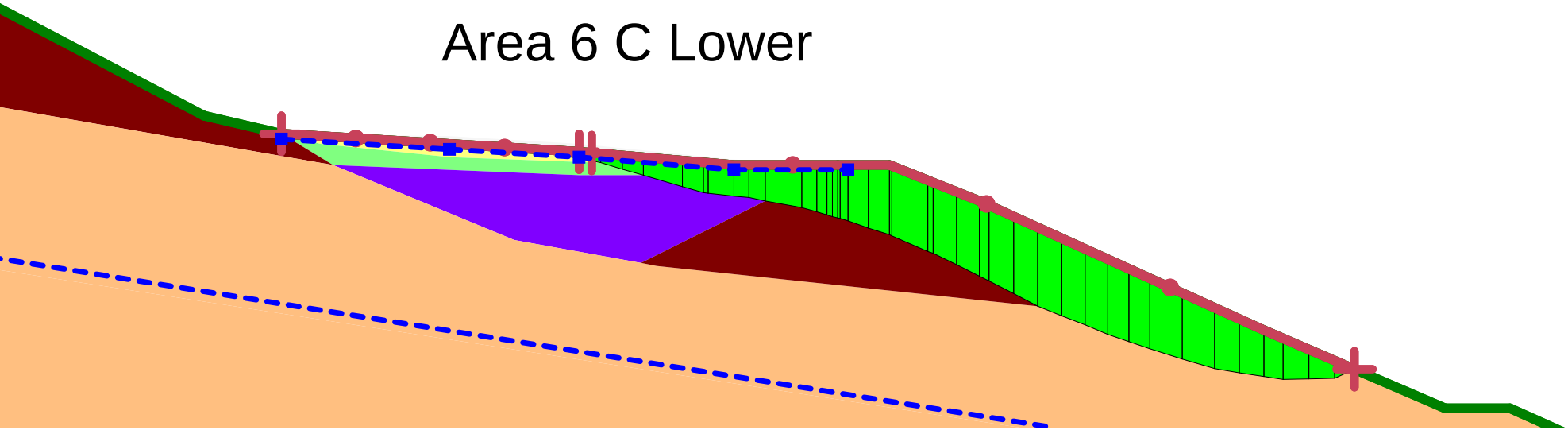
Area 6 C Lower



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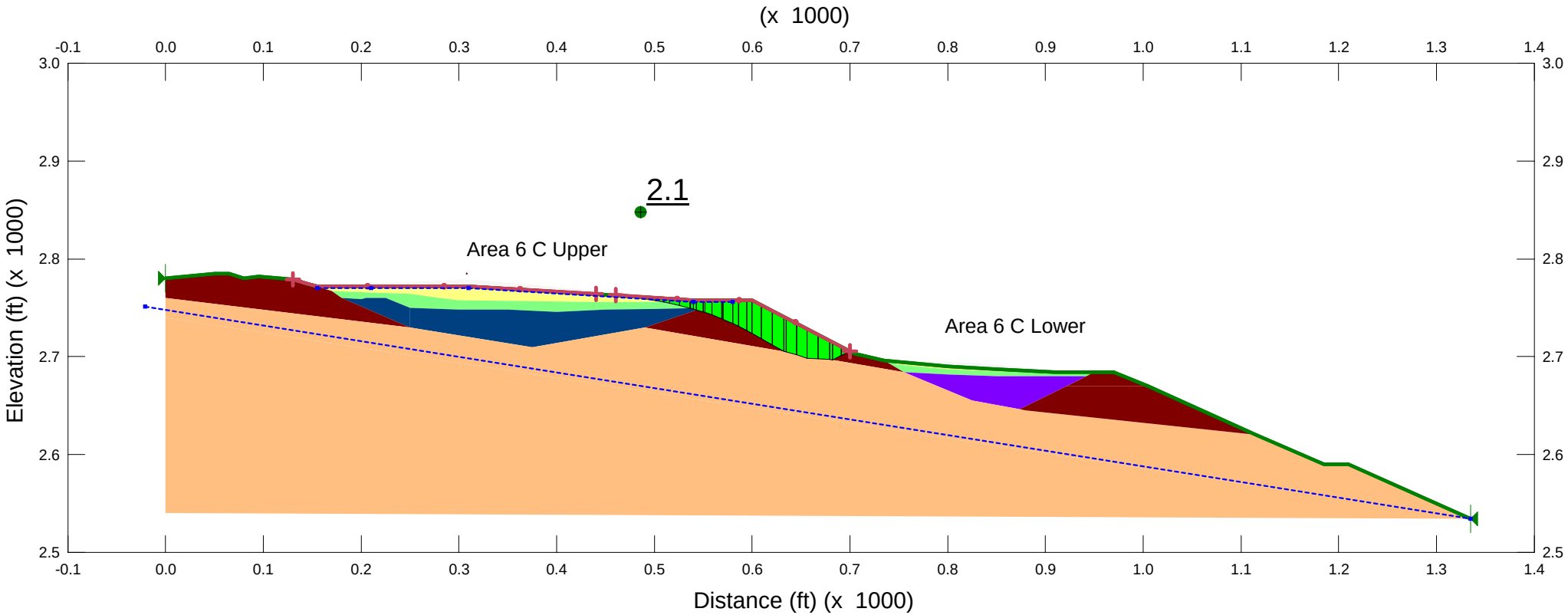
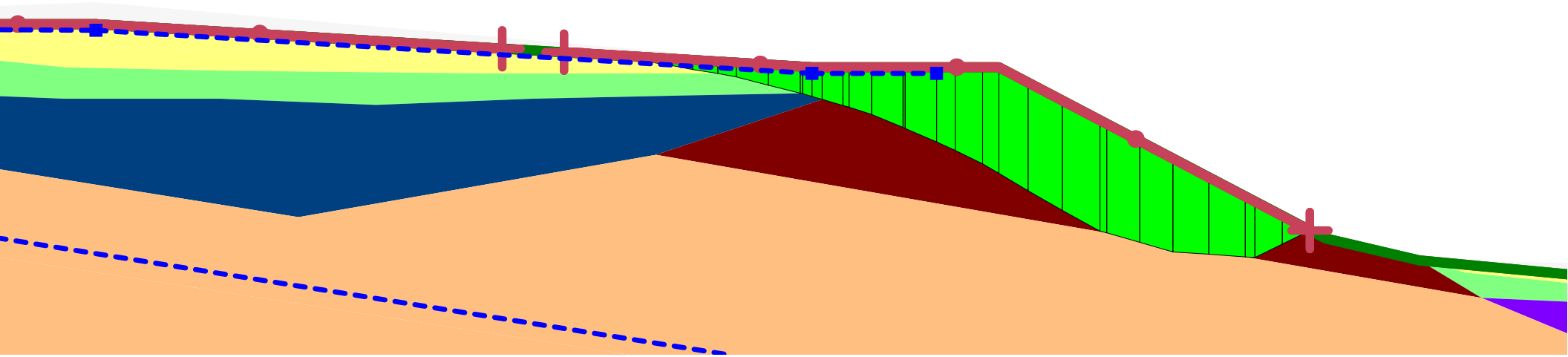
Method: Bishop, Ordinary and Janbu
Analysis Name: 6CU-PC2-EE-St (2) Description: 6CUpper; Post Closure, 100% Fill, PWP at 2 ft below final grade; Static
Horizontal EQ Load:

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



2.1

Area 6 C Upper



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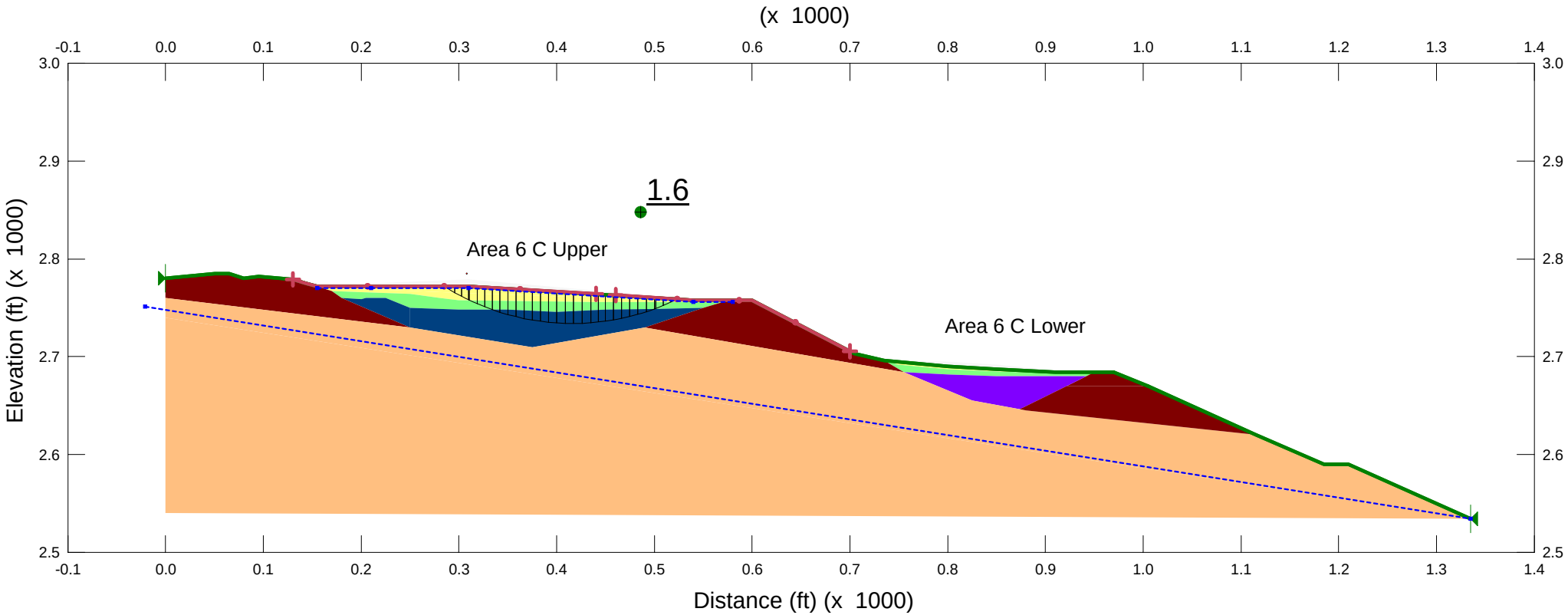
Analysis Name: 6CU-PC2-EE-S2 Description: 6CUpper; Post Closure, 100% Fill, PWP at Existing conditions; Seismic
Horizontal EQ Load: 0.14

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



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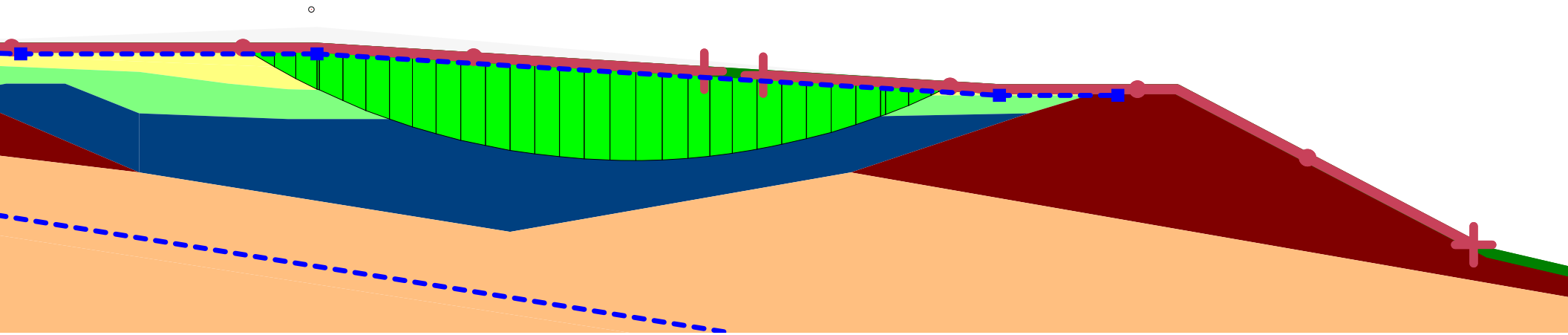
Area 6 C Upper



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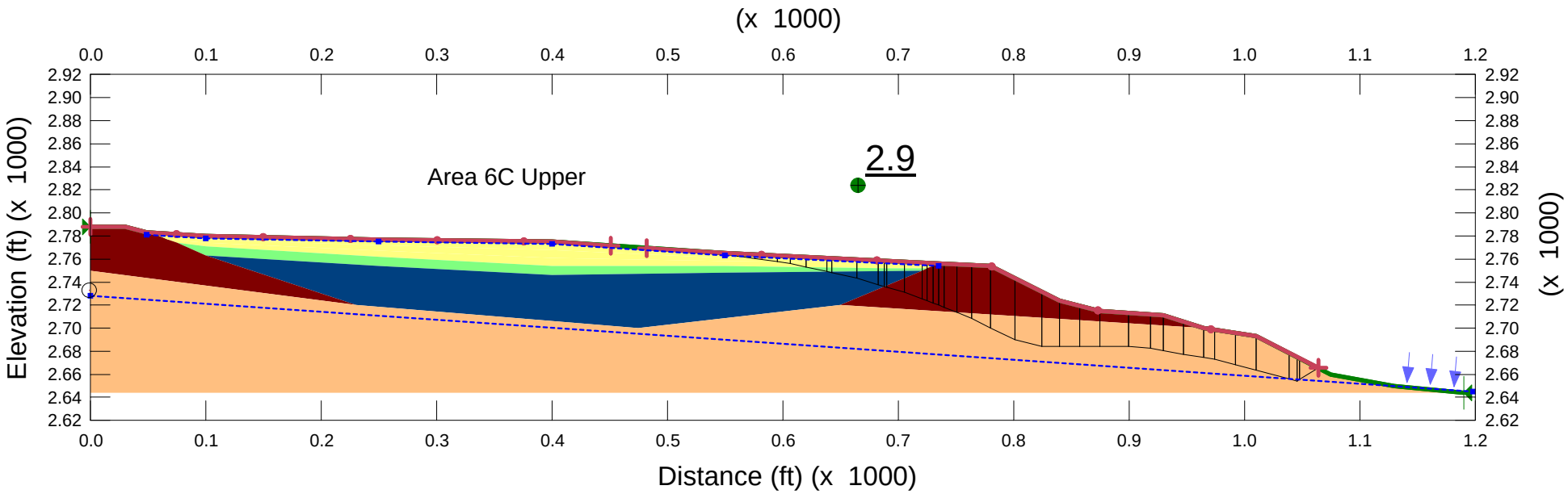
Method: Bishop, Ordinary and Janbu
Analysis Name: PC2-EE-St Description: Post Closure, Static
Horizontal EQ Load:

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



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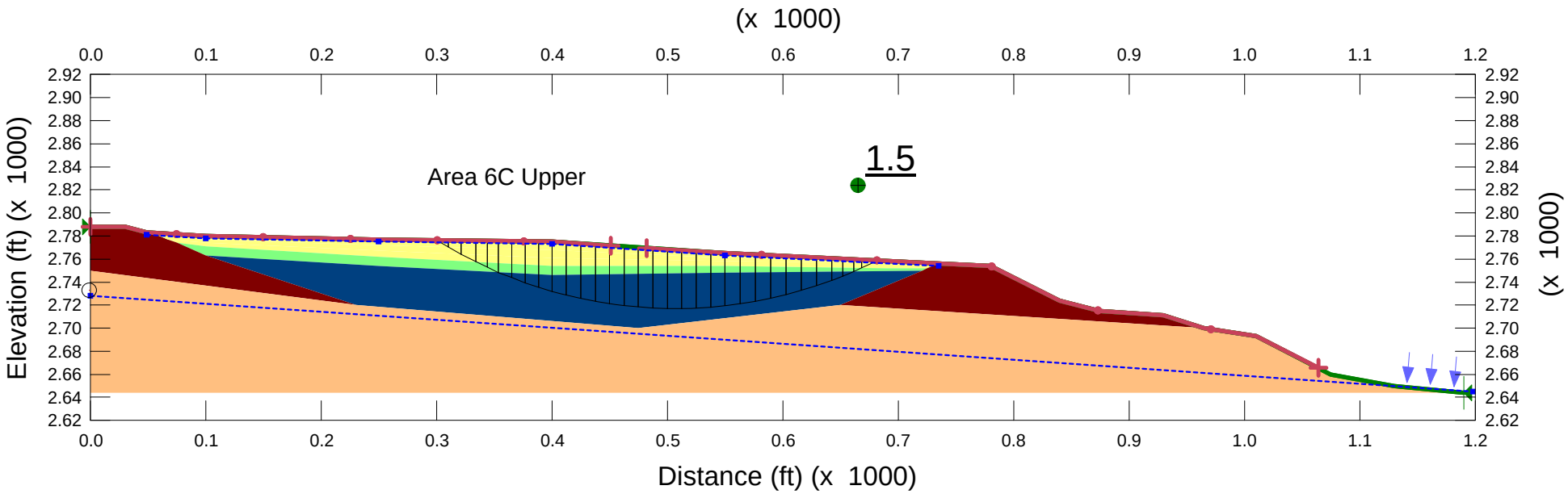
Method: Bishop, Ordinary and Janbu
Analysis Name: PC2-EE-S2 Description: Post Closure, Seismic
Horizontal EQ Load: 0.14

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2



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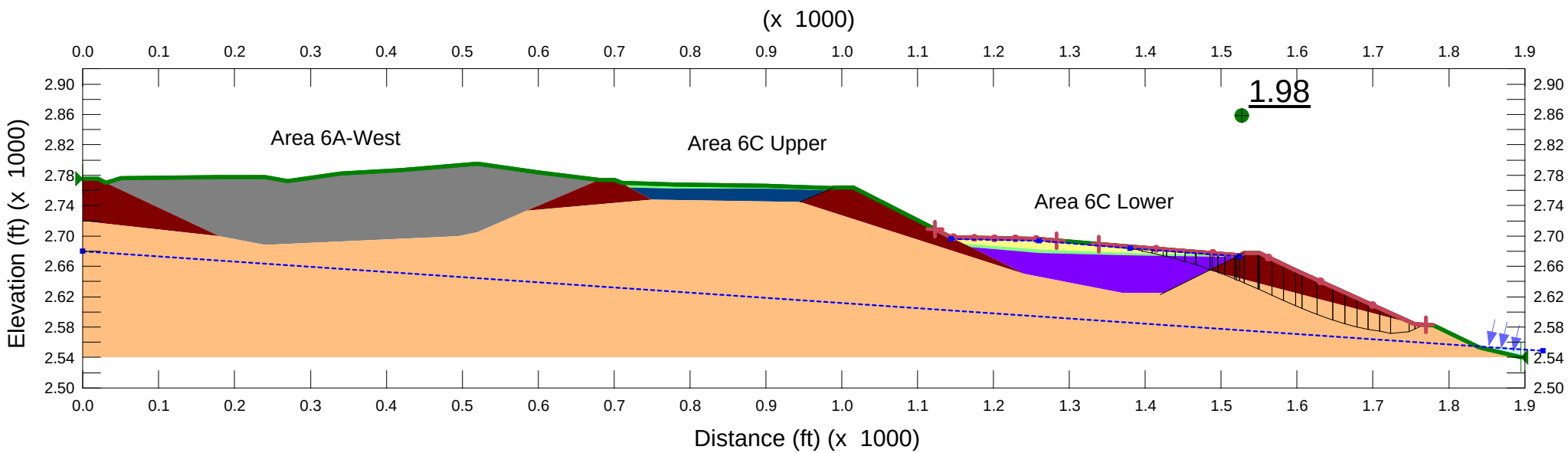
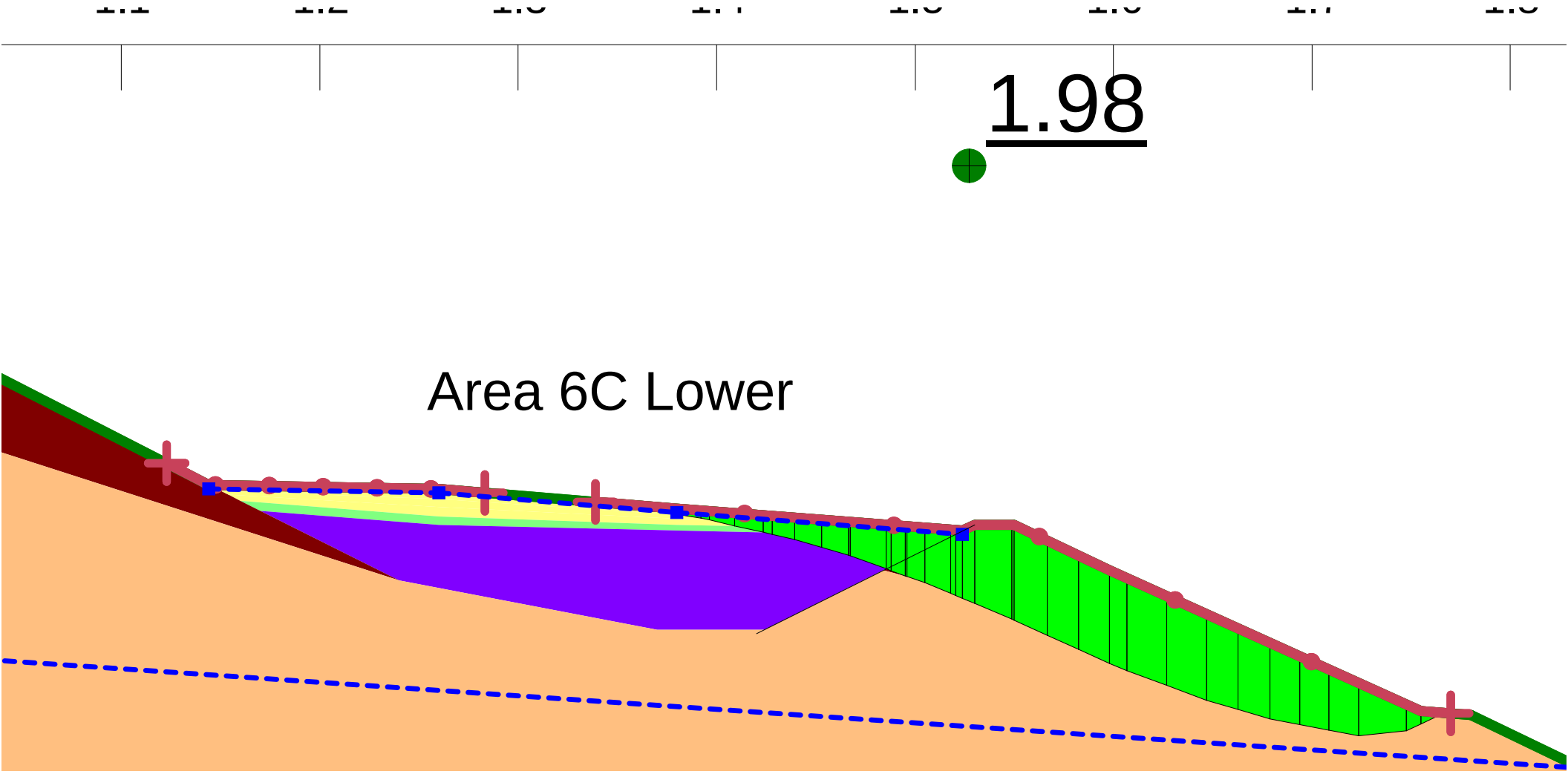
Analysis Name: 6CL-PC2-EE-St Description: Post Closure; Static
Horizontal EQ Load:

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: 6A-West Waste Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 36 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2

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Area 6C Lower

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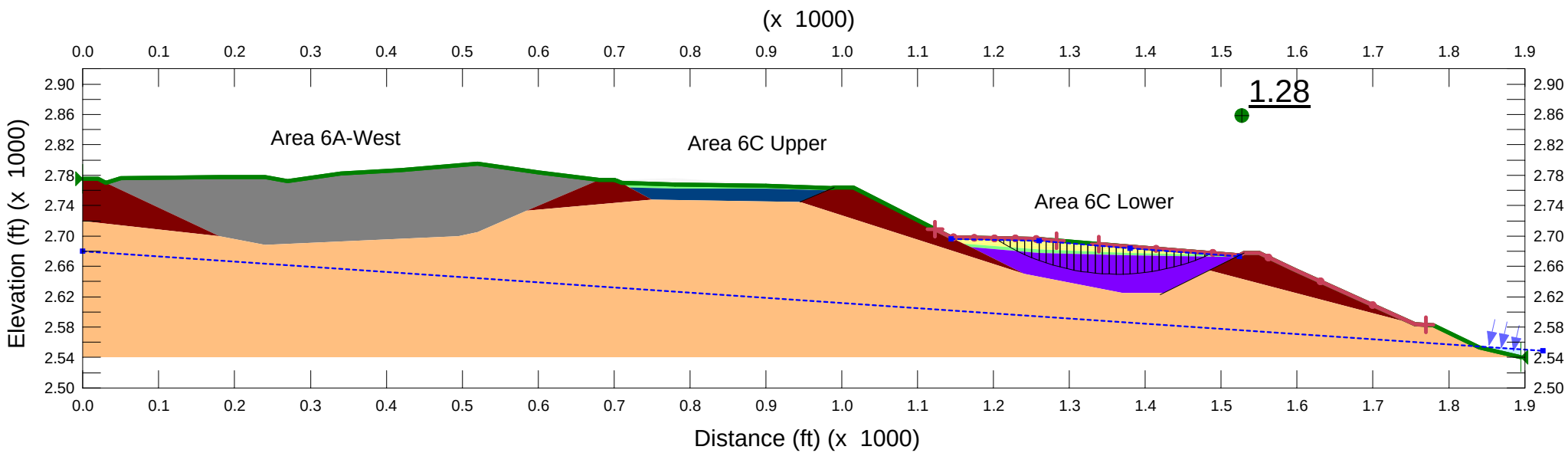
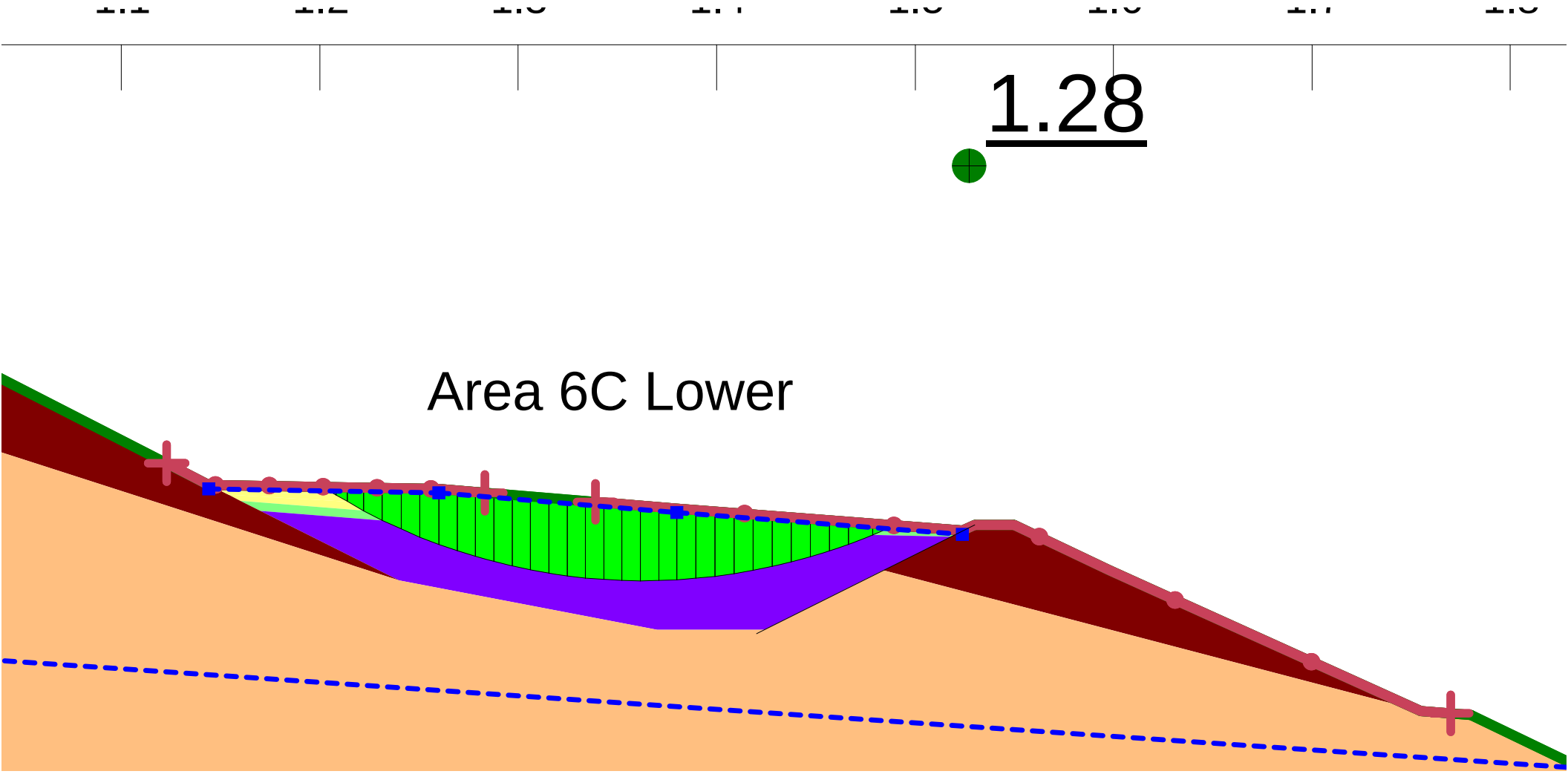
Method: Bishop, Ordinary and Janbu
Analysis Name: 6CL-PC2-EE-S2 Description: Post Closure; Seismic
Horizontal EQ Load: 0.14

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Lower Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: 6A-West Waste Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 36 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2

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Area 6C Lower

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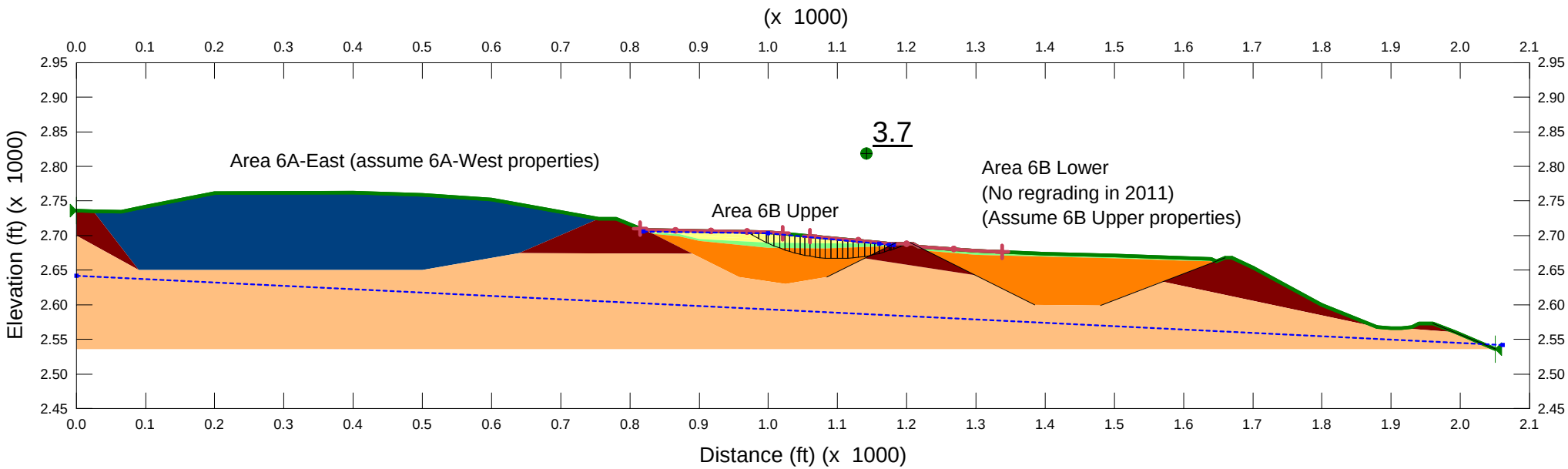
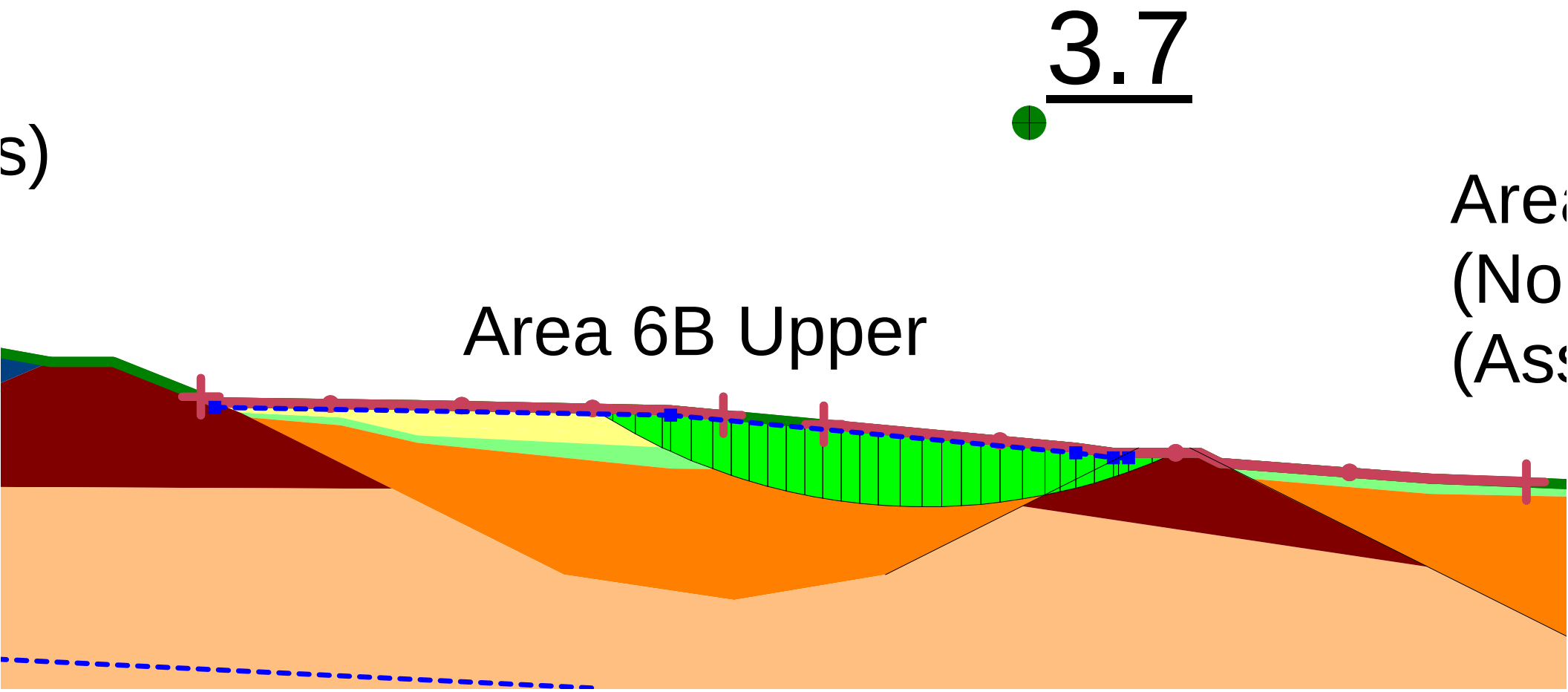
Analysis Name: PC2-EE-St
Horizontal EQ Load:

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6B Upper Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2

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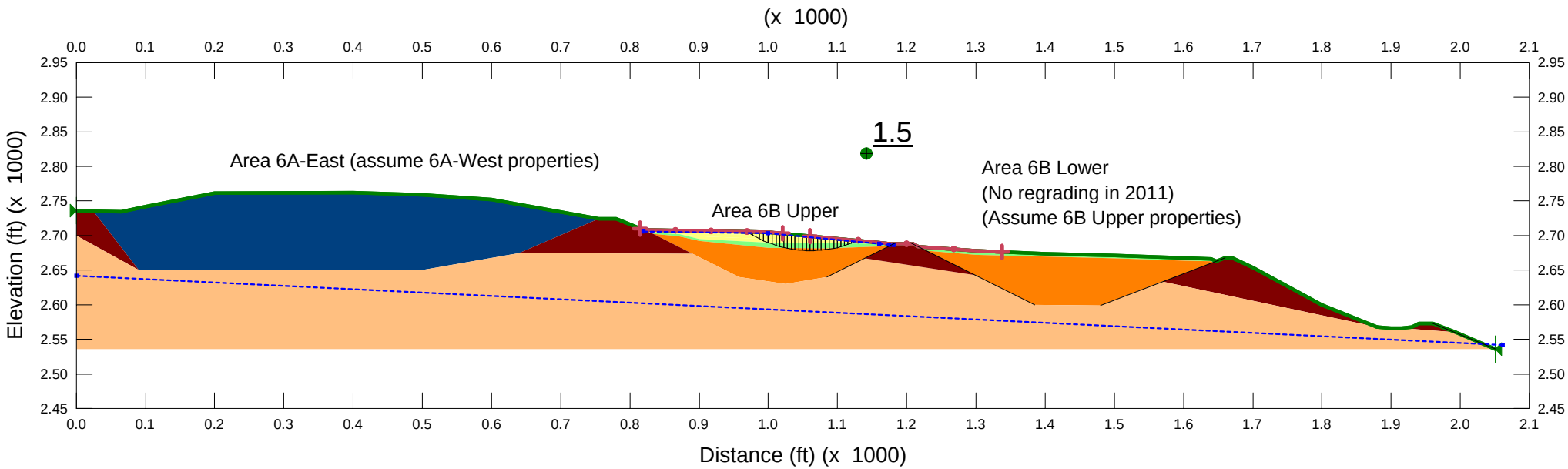
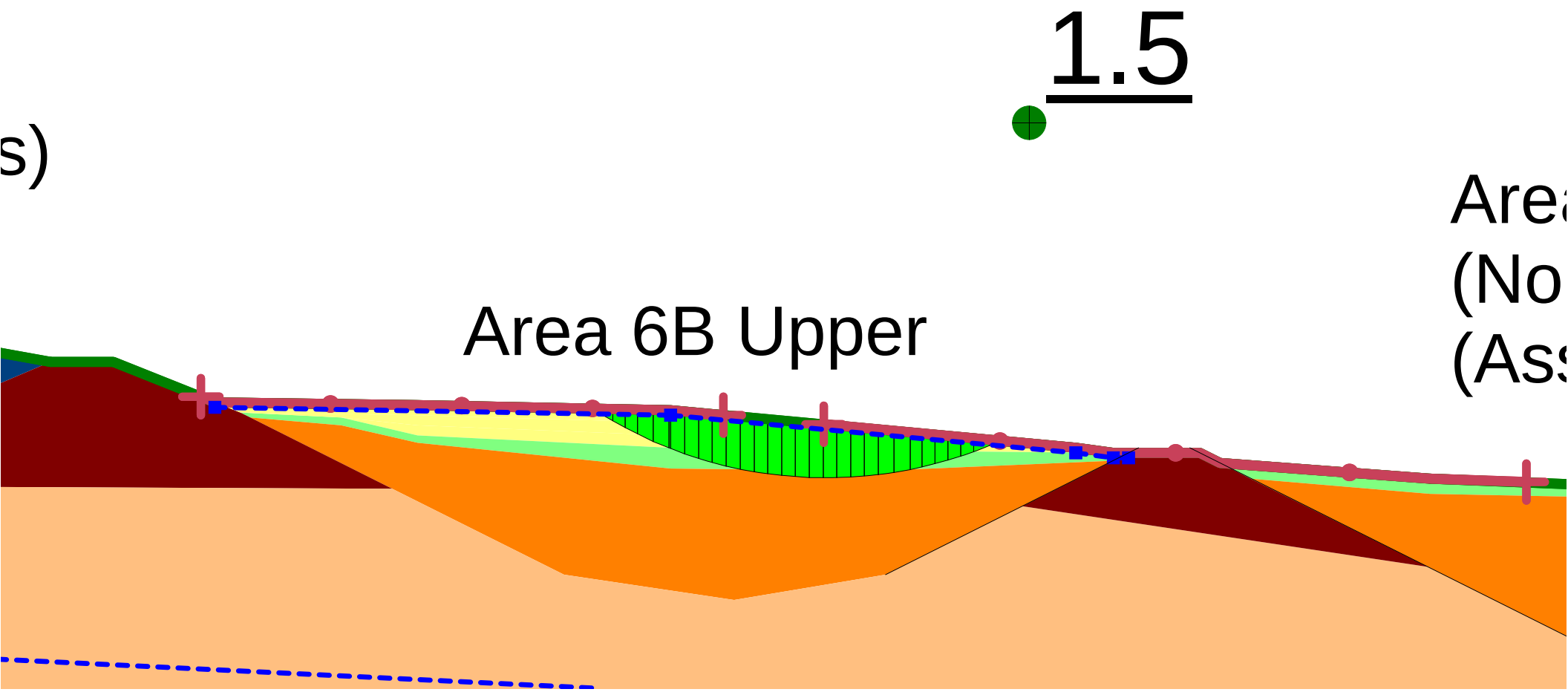
Method: Bishop, Ordinary and Janbu
Analysis Name: PC2-EE-S2
Horizontal EQ Load: 0.14

Name: 2011 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: 1997 Cover Model: Mohr-Coulomb Unit Weight: 125 pcf Unit Wt. Above Water Table: 125 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6C Upper Model: Mohr-Coulomb Unit Weight: 100 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Mixed Waste Area 6B Upper Model: Mohr-Coulomb Unit Weight: 90 pcf Unit Wt. Above Water Table: 90 pcf Cohesion: 0 psf Phi: 30 ° Phi-B: 0 ° Piezometric Line: 1
Name: Perimeter Dike Model: Mohr-Coulomb Unit Weight: 120 pcf Unit Wt. Above Water Table: 120 pcf Cohesion: 115 psf Phi: 32 ° Phi-B: 0 ° Piezometric Line: 2
Name: Foundation Model: Mohr-Coulomb Unit Weight: 115 pcf Unit Wt. Above Water Table: 115 pcf Cohesion: 0 psf Phi: 31.5 ° Phi-B: 0 ° Piezometric Line: 2

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APPENDIX 4

SETTLEMENT ANALYSIS

Evergreen Packaging, Canton, North Carolina
Regrading of Areas 6B-Upper and 6C Upper and Lower

SETTLEMENT ESTIMATES

Drilled Fill Thickness (06/2011)

		Thickness of Materials (Drilled)							Percentage of Each			
Boring	Area	Cover	Fly Ash	Sludge	Lime Mud	Soil	Mix	TOTAL (Waste)	Fly Ash	Sludge	Lime Mud	Soil
B11-101	6CU	3	2	24	8	0	0	34	6%	71%	24%	0%
B11-102	6CU	3	0	0	16	3	0	19	0%	0%	84%	16%
B11-107	6CU	12	4	19	0	2	0	25	16%	76%	0%	8%
Area 6 C Upper, Avg									7%	49%	36%	8%
B11-103	6BU	7	24	11	0	0	0	35	69%	31%	0%	0%
B11-104	6BU	17	0	15	0	0	5	20	8%	83%	8%	0%
Aea 6 B Upper, Avg.									38%	57%	4%	0%
B11-105	6CL	5.5	25.5	9	2	0	0	36.5	70%	25%	5%	0%
B11-106	6CL	10	10	17	0	0	0	27	37%	63%	0%	0%
Area 6 C Lower Avg.									53%	44%	3%	0%

Estimation of Waste and Cover Thickness

		Estimate Total Thickness				From Sections			Assumed Values					
Boring	Area	2011 Ground Elev.	Est Base of Waste (LAW Drawing)	Est Total Thickness	Total Drilled Thickness in 2011	Closest Section Line	Est. Existing Cover Thickness	Drilled Cover Thickness (in 2011)	Existing Cover Thickness	Existing Total Thickness	1995/96 Surface Elevation	Base Of Waste Elevation	**Initial Waste Thickness (Used in Settlement Estimates)**	Change in Elev Pre-Cover to 2011
B11-101	6CU	2760.57	2720	40.6	37	B	10	3	6.5	40	2760	2721	39	0.6
B11-102	6CU	2755.47	2720	35.5	22	B and A	10	3	6.5	40	2755	2715	40	0.5
B11-107	6CU	2753.32	2720	33.3	37	B and A	10	12	11	40	2755	2713	42	-1.7
6CU Average		2756.5	2720	36.5	32				8	40	2756.7	2716	40	-0.2
B11-103	6BU	2686.81	2640	46.8	42	D and E	7	7	7	45	2695	2642	53	-8.2
B11-104	6BU	2688.98	2640	49.0	37	D	7	17	12	45	2695	2644	51	-6.0
6BU Average		2687.9	2640	47.9	39.5				10	45	2695	2643	52	-7.1
B11-105	6CL	2680.41	2635	45.4	42	A	4	5.5	4.75	45	2682	2635	47	-1.6
B11-106	6CL	2685.81	2640	45.8	37	A	4	10	7	40	2688	2646	42	-2.2
6CL Average		2683.1	2638	45.6	40				6	42.5	2685	2641	44	-1.9

Assumed Values; Existing Cover Thickness = Average of Est. Existing Cover Thickness and Drilled Cover Thickness (in 2011)
Assumed Values; Existing Total Thickness = Based on Estimated total thickness and Total drilled thickness in 2011 (manually entered value)
Assumed Values; Base of Waste Elevation = 2011 Ground Elev. - Existing Total Thickness
Assumed Values; Initial Waste Thickness = 1995/96 Surface Elevation - Base of Waste Elevation
Change in Elev Pre-Cover to 2011 = 2011 Ground Elevation - 1995/96 Surface Elevation. NOTE: A + value indicates that currently the surface is higher than the pre-cover surface.

Evergreen Packaging, Canton, North Carolina
Regrading of Areas 6B-Upper and 6C Upper and Lower

SETTLEMENT ESTIMATES

Estimation of Future Settlement (based on above)

	Cover	Fly Ash	Sludge	Lime Mud	Soil
Assumed Consolidation Ratio (CR) =	NA	0.2	0.5	0.2	0.05
Assumed Secondary Consolidation Ratio =	NA	0.05	0.1	0.05	0.005
Assumed Total Unit Weight, 2011, pcf =	130	95	80	115	130
Assumed Total Unit Weight, 1995 pcf =	125	95	75	105	125

S(primary) = CR * Thickness * LOG $\{P_0 + \Delta P)/P_0\}$

S(secondary) = $C\alpha$ * Thickness * LOG (t2 / t1)

Estimated Initial Conditions (this is pre-1997 cover placement)

Boring	Assumed Depth to Water Surface	Assumed Initial Thicknesses (Waste Only): Fly Ash	Sludge	Lime Mud	Soil	Sum of Initial Thickness	Pre-Cover Eff Stress at Mid-Layer	1995/96 Mid-Layer Elevation
B11-101	3	2.3	27.8	9.3	0.0	39.4	598	2740.3
B11-102	2	0.0	0.0	33.3	6.2	39.5	1029	2735.2
B11-107	1	6.7	31.7	0.0	3.3	41.7	475	2734.2
6CU Average	2	3.0	19.8	14.2	3.2	40.2	701	2736.6
B11-103	4	27.6	12.6	0.0	0.0	40.2	779	2674.9
B11-104	4	4.4	44.3	4.4	0.0	53.2	695	2668.4
6BU Average	4	16.0	28.5	2.2	0.0	46.7	737	2671.7
B11-105	2	35.6	12.6	2.8	0.0	51.0	845	2656.5
B11-106	2	19.3	32.8	0.0	0.0	52.1	646	2661.9
6CL Average	2	27.5	22.7	1.4	0.0	51.6	745	2659.2

This assumes the waste is a single layer, with properties based on the proportions of each material present in the 2011 borings); and that the initial conditions had an assumed water surface at the level shown at the left.

Assumed Initial Thicknesses = Percent of each * {Initial Waste Thickness}
Pre-Cover eff stress, uses the 1995 density values

Estimated Existing Conditions

Boring	Assumed Existing Cover Thickness (from above)	Pro-Rated Existing Waste Thicknesses: Fly Ash	Sludge	Lime Mud	Soil	Eff. Stress Due to Existing Cover	Total Stress Due to all cover, above water table	Depth to Initial Mid-layer elevation	Thickness of waste above Initial Mid-Layer	Average Unit Weight of Waste (using 1995 total unit weights)	Eff Stress at mid-layer Due to 2011 Cover Conditions	Current Eff. Stress, in 2011 at mid-layer
B11-101	6.5	2.4	28.2	9.4	0.0	627	845	20.3	13.8	83.2	1023	914
B11-102	6.5	0.0	0.0	33.7	6.3	564	845	20.2	13.7	108.2	1333	1193
B11-107	11.0	6.4	30.4	0.0	3.2	806	1430	19.2	8.2	82.2	1280	968
6CU Average	8.0	2.9	19.5	14.4	3.2	666	1040	19.9	11.9	91.2	1195	1008
B11-103	7.0	30.9	14.1	0.0	0.0	723	910	11.9	4.9	88.7	946	852
B11-104	12.0	3.7	37.5	3.7	0.0	1061	1560	20.6	8.6	79.1	1454	1204
6BU Average	9.5	17.3	25.8	1.9	0.0	892	1235	16.2	6.7	83.9	1209	1037
B11-105	4.8	31.4	11.1	2.5	0.0	446	618	23.9	19.2	90.6	1073	987
B11-106	7.0	14.8	25.2	0.0	0.0	598	910	23.9	16.9	82.4	1091	935
6CL Average	5.9	23.1	18.1	1.2	0.0	522	764	23.9	18.0	86.5	1077	956

Evergreen Packaging, Canton, North Carolina
Regrading of Areas 6B-Upper and 6C Upper and Lower

SETTLEMENT ESTIMATES

Settlement from Pre-Cover to 2011 t1 = 0.5 yrs t2 = 15 yrs

Boring	CR Composite Value	H Initial Thickness of Waste	P_0 Initial Eff Stress at Mid-Layer	ΔP Change in Eff Stress due to Cover (as of June, 2011)	Estimated Consolidation Settlement Due to Existing Cover, feet	Cα Composite Value	Secondary Compression	Estimated Total Settlement	1997 - 2011 Displacement of Waste Surface	Relative Difference
B11-101	0.412	39	598	425	3.8	0.085	5.0	8.8	5.9	148%
B11-102	0.176	40	1029	304	0.8	0.043	2.5	3.3	6.0	55%
B11-107	0.416	42	475	805	7.5	0.084	5.2	12.7	12.7	100%
6CU Average	0.335	40	701	495	3.1	0.071	4.2	7.3	8.2	89%
B11-103	0.450	53	779	167	2.0	0.066	5.2	7.2	15.2	47%
B11-104	0.274	51	695	759	4.5	0.092	6.9	11.4	18.0	63%
6BU Average	0.362	52	737	472	4.1	0.080	6.2	10.2	16.6	62%
B11-105	0.274	47	845	228	1.3	0.062	4.3	5.6	6.3	89%
B11-106	0.389	42	646	445	3.7	0.081	5.1	8.8	9.2	96%
6CL Average	0.332	44	745	332	2.4	0.072	4.7	7.1	7.8	91%
										81% Average

1997 - 2011 Displacement of Waste Surface: Is based on the difference between 2011 and 1997.
Relative Difference: Is = {(Estimated Total Settlement) / (1997 - 2011 Displacement of Waste Surface)}
The average relative difference provides an indication of the validity of tha assumed values.

Estimated Settlement from 2011 to 2041 t1 = 15 yrs t2 = 45 yrs

Boring (Area)	CR Composite Value	H Initial Thickness of Waste	P_0 Initial Eff Stress at Mid-Layer	Estimated 2011 Fill Thickness	ΔP Change in Eff Stress due to Regrading in 2011	Estimated Consolidation Settlement Due to Proposed Cover, feet	Cα Composite Value	Secondary Compression	**Estimated Total Settlement Due to 2011 Regrading**	Applying Relative Difference from above
B11-101	0.412	33.5	914	8	1040	4.6	0.085	0.3	**4.9**	3.3
B11-102	0.176	33.5	1193	15	1950	2.5	0.043	0.3	**2.8**	5.1
B11-107	0.416	29.0	968	15	1950	5.8	0.084	0.6	**6.4**	6.4
6CU Max Fill	0.335	32.0	1008	15	1950	5.0	0.071	0.5	**5.5**	**6.2**
B11-103	0.450	38.0	852	8	1040	5.9	0.066	0.3	**6.2**	13.1
B11-104	0.274	33.0	1204	8	1040	2.4	0.092	0.3	**2.8**	4.4
6BU MAX Fill	0.362	35.5	1037	12	1560	5.1	0.080	0.5	**5.6**	**9.0**
B11-105	0.274	40.3	987	8	1040	3.4	0.062	0.2	**3.7**	4.2
B11-106	0.389	33.0	935	10	1300	4.9	0.081	0.4	**5.2**	5.5
6CL Max Fill	0.332	36.6	956	10	1300	4.5	0.072	0.3	**4.9**	**5.3**

Estimated Range of Maximum Settlements:

	Avg-Stdev	**Avg+Stdev**
Area 6 C Upper:	**4.6**	**7.7**
Area 6B Upper:	**2.9**	**15.2**
Area 6 C Lower:	**4.4**	**6.3**

The Avg Max = 5 to 9 ft, range +/-50%

ATTACHMENT E

WORK PLAN

OFF-SITE BORROW SOIL WORK PLAN FOR LANDFILL NO. 6 MAINTENANCE REGRADING AREA 6B-UPPER, AREA 6C-UPPER, AND AREA 6C-LOWER CANTON, NORTH CAROLINA

Prepared for

EVERGREEN PACKAGING
CANTON, NORTH CAROLINA

July 2011

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

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OFF-SITE BORROW SOIL
WORK PLAN FOR
LANDFILL NO. 6
AREA 6B-UPPER, AREA 6C-UPPER, AND
AREA 6C-LOWER
CANTON, NORTH CAROLINA
EVERGREEN PACKAGING

1.0 INTRODUCTION

1.1 Facility Information

Facility Name:	Landfill No. 6 AREA 6B-UPPER, AREA 6C-UPPER, AND AREA 6C-LOWER
Location:	Incinerator Road Canton, North Carolina
Property Owner:	Evergreen Packaging 175 Main Street P.O. Box 4000 Canton, NC 28716 Contact: Mr. Jim Giauque Telephone: (828) 646-2028

1.2 Purpose

The purpose of this Work Plan is to provide information to the personnel involved in acceptance and placement of off-site borrow soil to be used for maintenance regrading of Landfill No. 6 Areas 6B-Upper, 6C-Upper, and 6C-Lower at Evergreen Packaging's (Evergreen) Landfill facility in Canton, North Carolina. Guidelines for material characterization, sampling, sample analysis, acceptance, transportation, handling, sequencing, and placement procedures are provided herein to be used during this project.

2.0 FACILITY OPERATIONS

2.1 Project Description

This Work Plan is being submitted by Evergreen for maintenance of closed landfill areas Area 6B-Upper, Area 6C-Upper, and Area 6C-Lower. Closure of Areas 6B-Upper, 6C-Upper, and 6C-Lower occurred in 1997. The closure consisted of grading the waste surface to drain, placement, and compaction of cover soil over the waste surface, placement of topsoil, seeding and mulching, and installation of ditches and culverts along the perimeter of the closed areas for runoff control. In the years following the closure, settlement of the waste occurred creating low areas on the cover surface(s) which drain poorly. Evergreen proposes to regrade Areas 6B-Upper, 6C-Upper, and 6C-Lower by importing borrow soil form off-site and using that soil along with on-site cover soil to regrade the existing soil covers to approximately 6 percent. The off-site borrow soil will be overlain by a layer of on-site borrow to prevent direct contact with the off-site borrow soil. An overview site plan and regrading contour plan for Areas 6B-Upper, 6C-Upper, and 6C-Lower are shown in Figures 2-1 and 2-2, respectively This Work Plan contains construction related information such as roles and responsibilities, off-site soil characterization, off-site soil transportation, and off-site soil placement control relative to working with the off-site borrow soil.

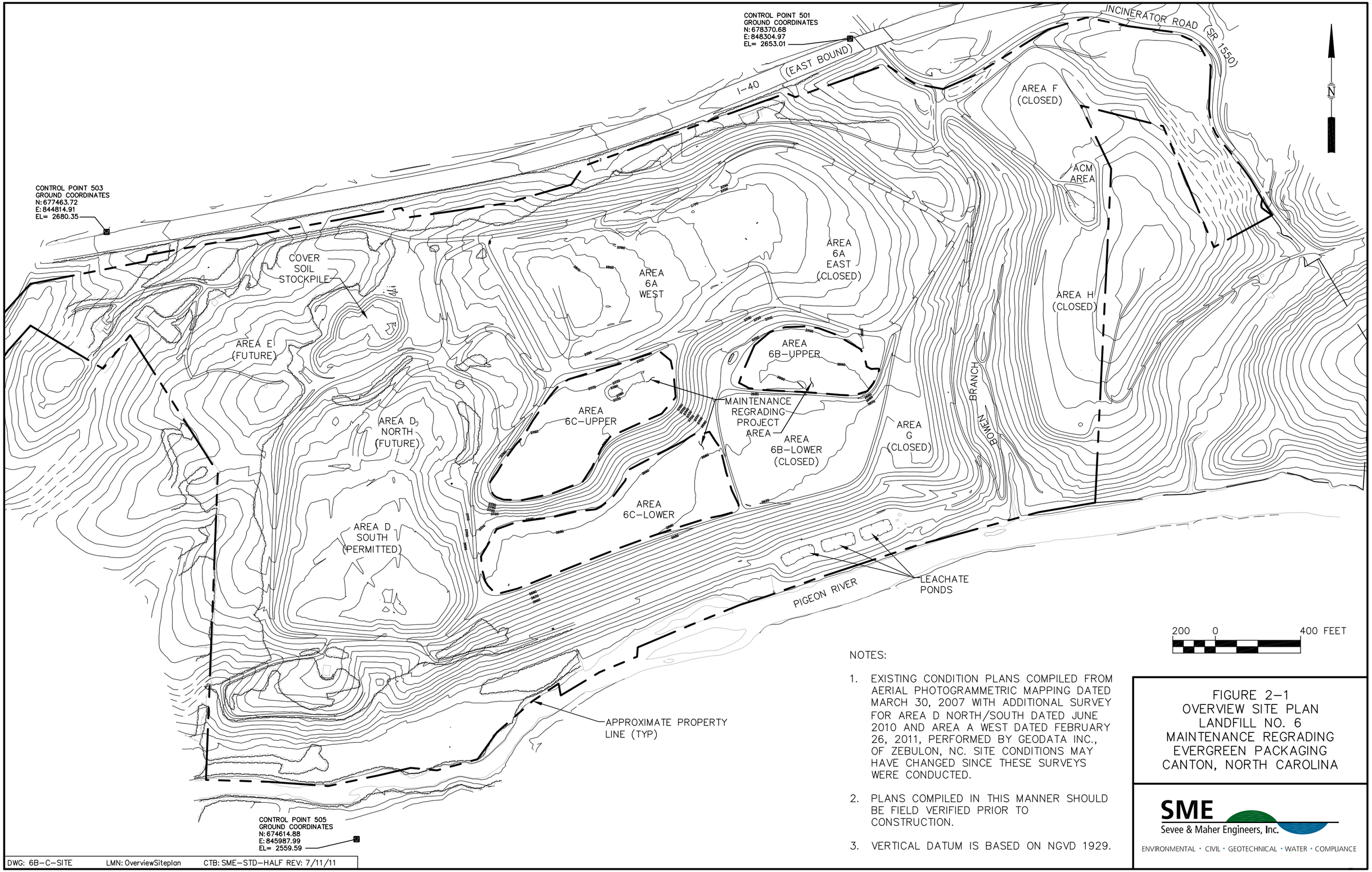
2.2 Working Hours

The operating hours for maintenance regrading of Areas 6B-Upper, 6C-Upper, and 6C-Lower will be set by the Contractor. There are no limits with regards to the number of days or hours in a day the work may proceed. Transportation of off-site borrow soil to the facility will be performed during daylight hours only.

2.3 Personnel Responsibilities

The personnel involved in the maintenance regrading of Areas 6B-Upper, 6C-Upper, and 6C-Lower include:

1. The Owner (Evergreen)
2. The Engineer (Sevee & Maher Engineers, Inc.)



NOTES:

1. EXISTING CONDITION PLANS COMPILED FROM AERIAL PHOTOGRAMMETRIC MAPPING DATED MARCH 30, 2007 WITH ADDITIONAL SURVEY FOR AREA D NORTH/SOUTH DATED JUNE 2010 AND AREA A WEST DATED FEBRUARY 26, 2011, PERFORMED BY GEODATA INC., OF ZEBULON, NC. SITE CONDITIONS MAY HAVE CHANGED SINCE THESE SURVEYS WERE CONDUCTED.
2. PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED PRIOR TO CONSTRUCTION.
3. VERTICAL DATUM IS BASED ON NGVD 1929.

FIGURE 2-1
OVERVIEW SITE PLAN
LANDFILL NO. 6
MAINTENANCE REGRADING
EVERGREEN PACKAGING
CANTON, NORTH CAROLINA

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DWG: 6B-C-SITE LMN: OverviewSiteplan CTB: SME-STD-HALF REV: 7/11/11

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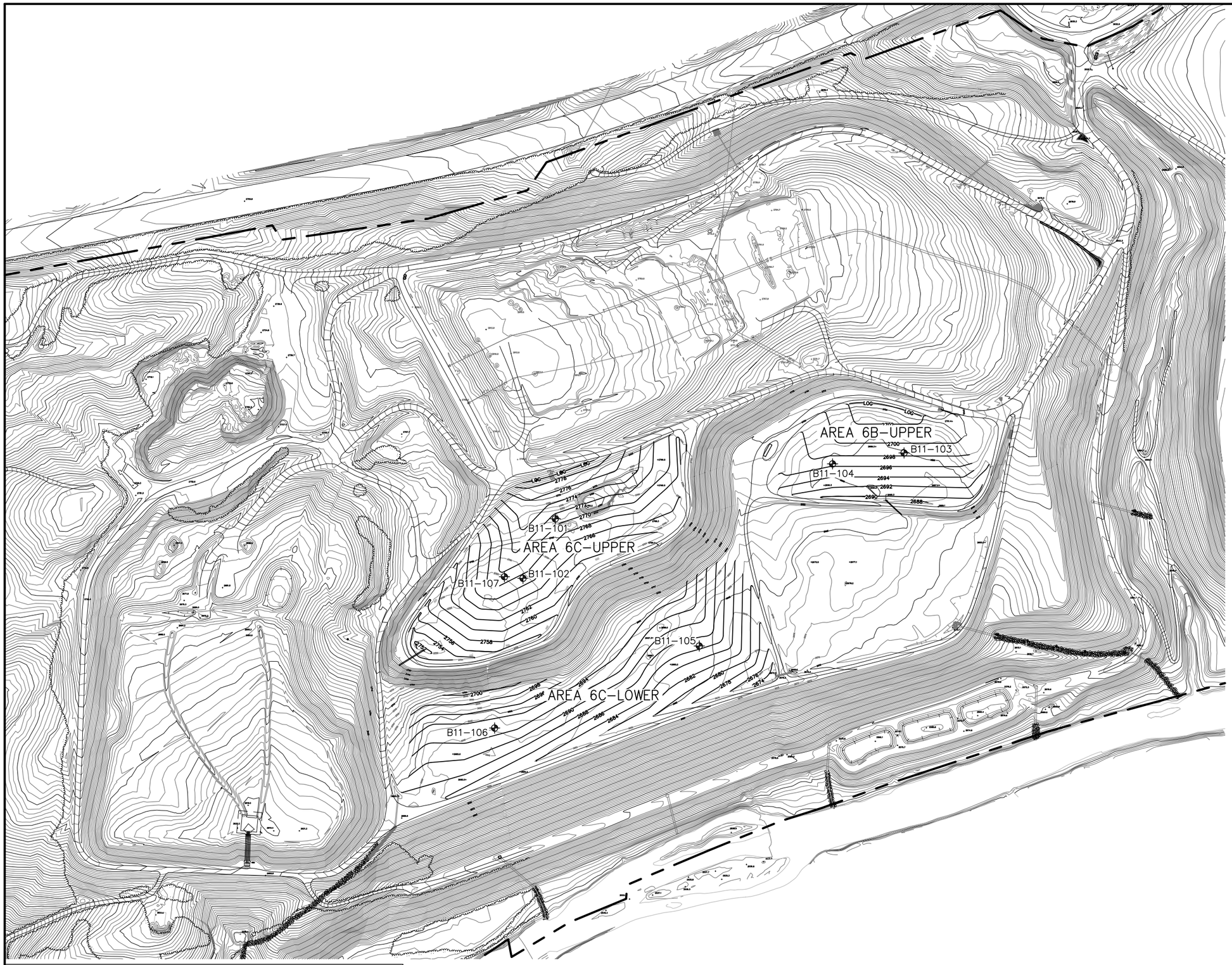

N

LEGEND

EXISTING BORING LOCATION

150 0 300 FEET

FIGURE 2–2
FINAL GRADING PLAN
LANDFILL NO. 6
MAINTENANCE REGRADING
EVERGREEN PACKAGING
CANTON, NORTH CAROLINA

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The Contractor

- Supervisor
- Equipment operator
- Haul vehicle drivers

3. The Off-site Borrow Soils Provider ("Provider")

2.3.1 Personnel/Entities.

2.3.1.1 Owner

The Owner is responsible for securing and assuring compliance with licenses and permits required for the construction project. The responsibility includes control of all Contractor activities at the facility, coordination of work with Evergreen's operations, and project management. In addition the Owner is responsible for providing or assembling a team to provide technical expertise and engineering and submission of appropriate data to the North Carolina Department of Environment and Natural Resources (NCDENR). The Owner, or its representative, will be responsible for weekly construction documentation to the NCDENR which shall include photos and weekly progress reports. The Owner shall be responsible for maintenance of all existing access roads (excluding sweeping of the paved access roads used by the Contractor).

2.3.1.2 Engineer

The engineer is responsible with providing the Owner with oversight of all construction activities, including but not limited to, supplying drawings, specifications, and Work Plan for the Project. The engineer will also be responsible for the following items:

1) Stormwater inspections and reporting;
2) Contractor activities monitoring and submittals of daily construction reports and photos;
3) Conducting weekly on-site meetings with the Owner and Contractor and providing the Owner with weekly minutes and photographs;
4) Train and instruct all personnel in proper facility operations;

5) Collecting soil samples and reporting results; and

6) Providing a final construction documentation report.

2.3.1.3 Contractor

The Contractor is responsible for providing all labor, equipment, and resources necessary to complete the project as shown and described in the contract documents which includes the contract drawings and specifications. The Contractor shall meet all objectives and comply with all requirements of the contract documents, and comply with the provisions of all local, state, federal, or other government laws, permits, or regulations, and this Work Plan.

The Contractor shall:

(1) Assure that all employees are properly trained in operating all equipment required for the work;

(2) Direct and manage all work at Areas 6B-Upper, 6C-Upper, and 6C-Lower and control activities to minimize safety hazards. Coordinate work with the Owner's operators in Landfill No. 6 Area 6D-South, as necessary;

(3) Strictly control the access to Areas 6B-Upper, 6C-Upper, and 6C-Lower at all times; and

(4) Perform the work according to the contract documents and this Work Plan; and

(5) The Contractor shall be responsible creating a sequencing plan that meets the requirements of Section 3.0 of this Work Plan;

(6) Maintenance of any and all traffic control devices required for the project;

(7) Sweeping and/or dust control on all paved and gravel access roads used by the Contractor during the work;

(8) Provide construction documentation for the work including:

- The Contractor shall provide the Owner with a daily load count of material from off-site and on-site. The load count will contain the estimated volume of each haul vehicle;
- Contractor shall perform a topographic survey of Areas 6B-Upper, 6C-Upper, and 6C-Lower after placement of the off-site borrow; and

- Contractor shall provide an ongoing evaluation of the operation and recommend proposed modifications if required or advisable.

(9) The Contractor's Supervisor is charged with directing and overseeing the project to assure that the cover system construction is being implemented according to the contract documents. Responsibilities of the Supervisor include:

- Interfacing with the Owner and coordination of the work with the Owner;
- Directing the overall scheme and schedule of regrading activities;
- Maintaining site records and tracking soil volumes;
- Supervising and training personnel; and
- Supervising the site safety program.

(10) The Contractor's Equipment Operator under the supervision of the Supervisor will be responsible for the daily material placement operations. The Equipment Operator will:

- Direct placement of soil materials;
- Inspect equipment and facilities;
- Abide by established safety rules;
- Maintain site security;
- Immediately note and report unusual events or circumstances;
- Maintain such records as may be required;
- Immediately report any observed and/or imminent environmental impacts to the Supervisor, Engineer, or Owner; and
- Strive to maintain neat and efficient operations.

(11) The Contractor's haul vehicle drivers will be responsible for the proper handling of their loads. All haulers shall affix Ownership identification and/or facility or company logo to all vehicles used in conjunction with the operation of the facility. Speed limits on and off Mill property shall be observed. Tailgates shall be secured and checked before proceeding on road. The drivers shall use extreme caution on Incinerator Road because it is residential in nature. Gaskets and

secondary mechanical locking devices will be required on tailgates to eliminate the possibility of a material spill during waste transport.

2.3.1.4 Off-site Borrow Soils Provider

The Provider is responsible for providing all labor, equipment, and resources necessary to sample, analyze, review, certify, and transport off-site borrow soil from the point of origin, to the No.6 Landfill facility. The Provider shall comply with the provisions of all local, state, federal, or other government laws, permits, or regulations, and this Work Plan.

The Provider shall:

(1) Assure that all employees are properly trained in operating all equipment required for transportation of the off-site borrow soil;

(2) Coordinate work relating to sampling, analysis, certification, and transportation of off-site borrow soil with the Owner and Contractor;

(3) Provide the Owner with a load count of the trucks that deliver soil to Areas 6B-Upper, 6C-Upper, and 6C-Lower on a daily basis; and

(4) Perform the work according to this Work Plan.

2.4 Health, Safety Considerations

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

1. All Contractor employees and associated subcontract personnel will be required to complete all necessary Evergreen training prior to admittance to the site.

2. Only essential personnel will be involved in activities associated with operation of the site.

3. Loading and unloading areas will be maintained firm and level.

4. In the event of an accident, the Supervisor and Owner's representative will be notified immediately. A description of the severity of the injury will be made, and emergency personnel requested, if necessary. The Supervisor will be responsible for notifying emergency personnel.

5. In the event of an environmental emergency, the Operator will notify the Supervisor and Owner's representative. Owner will review the situation and notify all necessary local and state officials.

6. In the event of a spill while transporting off-site borrow soil to the site, the off-site soil shall be treated as a waste and cleaned up immediately.

7. The Contractor is responsible for preparing a Health and Safety Plan for this project. The Owner will provide the Contractor with off-site borrow soil analytical data upon request. The Contractor shall maintain a copy of the Health and Safety Plan on-site at all times. A copy of the Health and Safety Plan will be provided to the Owner upon request.

8. Traffic routing for haul vehicles entering and exiting the site will be coordinated with the mill personnel responsible for the landfill operations.

3.0 OFF-SITE BORROW SOIL CHARACTERIZATION

Off-site borrow soil shall be characterized (sampled, analyzed, and certified) prior to delivery to Areas 6B-Upper, 6C-Upper, and 6C-Lower.

3.1 Sampling

The Provider will provide the Owner with at least 48 hours notice of any soil sampling so that the Owner or the Owner's Representative can observe the soil sampling. A representative sample shall be taken at a rate of at least one test per one-thousand (1,000) cubic yards of soil. This representative sample shall be a composite of at least 4 locations (within a certain area of the stockpiled material). Appropriate clean sampling devices (i.e. disposable metal or plastic spoons, etc.) will be used for soil sampling. The parameters for analytical testing will include the eight RCRA metals and other compounds as deemed necessary. Table 3-1 below indicates the parameters, analytical method, and maximum allowable concentration for acceptance of the material.

TABLE 3-1

OFF-SITE BORROW SOIL
MAXIMUM ALLOWABLE CONCENTRATION

Parameter[1]	Maximum Allowable Concentration (mg/L)
Arsenic	5.0
Barium	100.0
Cadmium	1.0
Chromium	5.0
Lead	5.0
Mercury	0.2
Selenium	1.0
Silver	5.0

Notes
1. All analyses shall be by Toxicity Characteristic Leaching Procedure (TCLP) Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" U.S.EPA Publication SW-846.

The Owner reserves the right to require additional soil analysis parameters and/or decrease the maximum allowable concentrations at any time during the project. The laboratory performing soil analytical testing shall be certified in the State of North Carolina.

The Provider will review analytical results of all soil samples to confirm that they meet the analytical requirements of this Work Plan. The Provider will provide a signed certification stating that the soil was tested in accordance with the procedures listed in this Work Plan and that the results of analytical testing indicate that the soil parameter concentrations are less than or equal to the maximum allowable concentrations listed in the Work Plan.

The Provider shall report to the Owner any tests that fail to meet the analytical requirements listed above. Should failing test be recorded, approximately 500 cubic yards of soil in the area of the failing test will be removed and segregated for disposal at another location. The remaining soil near the removal shall then be tested. In no circumstance shall soil from areas of failing tests be reincorporated or remixed into the stockpile and delivered to Areas 6B-Upper, 6C-Upper, and 6C-Lower.

The Provider will provide the Owner with a signed certification letter and all associated analytical results at lease 48-hours before delivery of the material to the site. One electronic and one paper copy of the certification and analytical data will be provided to the Owner. The Owner will review the certification and analytical results to determine if the material is acceptable for placement within Areas 6B-Upper, 6C-Upper, and 6C-Lower. No material will be delivered to the site without the Owners written approval. The Owner reserves the right to deny acceptance of any and all soil material for any reason.

Off-site borrow shall be soil suitable for placement as landfill cover soil. It shall be free of frozen material, perishable rubbish, peat, and organic matter, large rock fragments over 12 inches, or unsuitable material. The Owner reserves the right to reject material that does not meet these requirements.

3.2 Transportation

After the Owner has approved soil to be delivered to the site, the Provider will be responsible for transportation of off-site borrow soil from its origin to the area of placement within Areas

6B-Upper, 6C-Upper, and 6C-Lower. Transportation of the soil shall be in accordance with all applicable local, county, state, and federal regulations. Transportation of the soil shall be in covered vehicles during daylight hours acceptable to the Contractor. Specific care should be taken while transporting soil on Incinerator Road, as it has several residential homes and children and pets are a common occurrence on this road. Upon reaching Areas 6B-Upper, 6C-Upper, and 6C-Lower, the Contractor will guide the trucks to the location of off-loading. Trucks delivering soil will stay on paved and gravel access ways and will make all attempts to limit tracking of off-site borrow soil on and off the site. The Owner reserves the right to stop delivery of the soil material if it is found that the material is being delivered in a manner that is inconsistent with this plan.

3.3 Placement

Placement of borrow soil is critical to the success of the project. The Contractor will be required to submit a Construction Sequencing Plan to the Owner for approval prior to the start of work. The Contractor will not begin work until the Owner has accepted the Construction Sequencing Plan. The Construction Sequencing Plan shall include drawings and text that detail the Contractors anticipated placement sequencing of the cover system.

The Construction Sequencing Plan must address all items included in Section 4.0 of the geotechnical analysis report. These geotechnical requirements include the placement of borrow soil:

- In lifts that do not exceed 4-feet in thickness;
- With an in-place dry density of at least 90 percent of the standard Proctor density;
- In lifts that advance from outer portions of the Landfill top slope toward the center; and
- Over soil that is not saturated.

The following is a list of additional requirements that must be incorporated into the Construction Sequencing Plan:

- Water coming in contact with borrow soil will not be allowed to flow over cover soil or vegetative soil;

- Stockpiling of borrow soil on-site shall not be allowed;

- The area of exposed borrow soil may not exceed 4 acres at any given time;

- The placement of cover soil shall be in a manner that does not cause unnecessary erosion or sedimentation;

- The Contractor shall provide means of access for Provider vehicles so that these vehicles can deliver borrow soil to the working area without traveling on borrow soil areas;

- The Contractor shall maintain truck washing facilities appropriate for removal of soil from construction vehicles;

- All borrow soil shall be removed from the tires, tracks and undercarriage of construction vehicles before they move from borrow soil to to completed cover soil areas or outside the limits of Areas 6B-Upper, 6C-Upper, and 6C-Lower ;

- The Contractor shall take all actions necessary to prevent vehicles from rutting the cover soil to a depth that would contact the borrow soil; and

- The Contractor must provide dust control measures (i.e. watering) for construction with particular attention paid to controlling dust generated from uncovered borrow soil areas.

The Contractor is responsible for adjusting the work Construction Sequencing Plan as necessary during construction. Any adjustments to this plan must be approved by the Owner. The Owner reserves the right to stop work if it is found that the Contractors work practices do not meet the requirements of the approved Work Plan.