2702 South 1030 West, Suite 10, Salt Lake City, Utah 84119
Ph: 801.270.9400 Fax: 801.270.9401

TRANSMITTAL

DSHW-2021-022586

TO:	Doug Hansen Utah Division of Waste Management and Radiation Control 195 North 1950 West Salt Lake City, Utah 84116	DATE: 11/23/21 IGES JOB #: 00167-013 SENT VIA: Email

We are sending you the following:

Copies	Date	Description
1	11/23/21	Box Elder County Landfill Permit Application
1	11/23/21	Box Elder County Landfill Permit Application Checklist
1	11/23/21	Box Elder County Landfill Permit Appendices

x	For approval		Approved as submitted		Resubmit		Copies for approval
	For your use		Approved as noted		Submit		Copies for distribution
	As requested		Returned for corrections		Return		Corrected prints
	For your review and comment		Other				

Remarks:
Attached is the permit renewal application for Box Elder County regarding their Little Mountain Landfill. The appendices and permit checklist are also included in this transmittal. If you or your staff have any questions, please call at your convenience.

SIGNED: Brett Nicholson

APPLICATION TO RENEW A PERMIT TO OPERATE A CLASS I LANDFILL

Little Mountain Landfill
Box Elder County, Utah

Submitted by:

BOX ELDER COUNTY LANDFILL

Prepared by

IGES, Inc.
2702 South 1030 West, Suite 10
South Salt Lake City, Utah 84119

November 23, 2021

APPLICATION TO RENEW A PERMIT TO OPERATE A CLASS I LANDFILL

Prepared for:

BOX ELDER COUNTY SOLID WASTE (BECSW)

Little Mountain Landfill

Box Elder County, Utah

Prepared by

IGES, INC.

2702. South 1030 West, Suite 10

Salt Lake City, Utah 84119

November 23, 2021

ANNOTATED TABLE OF CONTENTS

INTRODUCTION

This document presents an application to renew a permit to operate solid waste disposal facilities at the Box Elder County Landfill (Little Mountain Landfill), which is owned by Box Elder County and operated by Box Elder County Solid Waste (BECSW). The Little Mountain Landfill is currently operated under permit number 9609R2 issued by the Utah Division of Waste Management and Radiation Control (formerly Solid and Hazardous Waste Control). This permit became effective on December 15, 2011 and expires at midnight on December 14, 2021.

In the nearly ten years that have passed since the current permit was issued for the Little Mountain Landfill, very few changes have taken place other than the increases in annual volumes of wastes and the addition of a Public Convenience Center (PCC). The PCC is a facility that has been utilized by the residential waste haulers to unload solid waste and recyclables. The PCC provides a clean, safe, separate, concrete surface unloading area for residential haulers use only. The PCC safely separates the public/residential haulers away from commercial haulers at the working face of the landfill.

This permit application contains conceptual level engineering sufficient for permitting purposes. This permit application does not represent a lateral expansion to the currently permitted landfill cells. It does; however, contain several small modifications in operational issues at the landfill.

The following items, which have been previously permitted and are part of the operating record of the landfill, will not be discussed in detail in this permit application:

- Alternate Liner – an alternate liner consisting of the low-permeability site soils has been approved for use as a landfill liner at the Little Mountain Landfill. All future landfill cells will be constructed using the previously approved alternate liner.

- Leachate collection and removal system Exemption – due to unique site conditions, Little Mountain Landfill has been exempted from the incorporation of a leachate collection and removal system. All future landfill cells will be constructed without leachate collection and removal systems.

- Groundwater Monitoring Exemption – due to the extreme depth of groundwater, Little Mountain Landfill has been exempted from the UDEQ groundwater monitoring requirements.

- Alternate Daily Cover – an alternative daily cover has also been approved for use at the landfill. BECSW plans to continue to utilize the approved alternate daily cover in their landfilling operations.

- Alternate Final Cover – due to the approval of an alternative landfill liner, an alternative final cover has also been approved. BECSW plans to construct the final cover using the previously approved alternative cover unless an evapotranspiration (ET) cover or a cover utilizing a geosynthetic clay liner (GCL) is approved by the Director.

Appendix H includes copies of previously issued letters from the Utah Division of Waste Management and Radiation Control (formerly the Division of Solid and Hazardous Waste) with respect to previously approved landfill exemptions.

The application has been organized to follow the general outline of R315-302 and R315-310. This organization results in some duplication and repetition of information, but it is intended to simplify the review and approval of the permit application. Part I of this document duplicates the standard form outlining general data pertaining to the site. Part II is a general report that includes a facility description, landfill operations plan, and closure and post-closure care plans

and financial assurance. Part III is the Professional Engineering Report and includes details on the design and geohydrology of the site.

APPLICATION TO RENEW A PERMIT TO OPERATE A CLASS I LANDFILL

Little Mountain Landfill

PART I - GENERAL DATA

Utah Class I and V Permit Application Checklist

Part I General Information APPLICANT: PLEASE COMPLETE ALL SECTIONS.

I. Landfill Type	II. Application Type	
☒ Class I ☐ Class V	☐ New Application ☒ Renewal Application	☐ Facility Expansion ☐ Modification

For Renewal Applications, Facility Expansion Applications and Modifications Enter Current Permit Number 9609R2

III. Facility Name and Location

Name of Facility: Box Elder County Landfill (Little Mountain Landfill)			
Site Address (street or directions to site): 9595 West 6800 North			County: Box Elder County
City: West of Brigham City		Zip Code: 84302	Telephone: (435) 744-2275
Township: 10 N	Range: 3 W	Section(s): 18	Quarter/Quarter Section:	Quarter Section:
Main Gate Latitude: degrees 41 minutes 13 seconds 9		Longitude: degrees 112 minutes 13 seconds 46	

IV. Facility Owner(s) Information

Name of Facility Owner: Box Elder County Municipal Building Authority			
Address (mailing):			
City: Brigham City	State: UT	Zip Code: 84302	Telephone:

V. Facility Operator(s) Information

Name of Facility Operator: Box Elder County Solid Waste			
Address (mailing): 01 South Main Street			
City: Brigham City	State: UT	Zip Code: 84302	Telephone: (435) 744-2275

VI. Property Owner(s) Information

Name of Property Owner: Box Elder County Municipal Building Authority			
Address (mailing):			
City: Brigham City	State: UT	Zip Code: 84302	Telephone:

VII. Contact Information

Owner Contact Name: Gina Nelson		Title: Director	
Address (mailing): 01 South Main Street			
City: Brigham City	State: UT	Zip Code: 84302	Telephone: (435) 744-2275
Email Address: gallen@boxeldercounty.org		Alternative Telephone (cell or other):	(435) 730-3153
Operator Contact Name: Gina Nelson		Title: Director	
Address (mailing): 01 South Main Street			
City: Brigham City	State: UT	Zip Code: 84302	Telephone: (435) 744-2275
Email Address: gallen@boxeldercounty.org		Alternative Telephone (cell or other):	(435) 730-3153
Property Owner Contact Name: Gina Nelson		Title: Director	
Address (mailing): 01 South Main Street			
City: Brigham City	State: UT	Zip Code: 84302	Telephone: (435) 744-2275

Utah Class I and V Permit Application Checklist

Part I General Information (Continued)

VIII. Waste Types (check all that apply)

☐ All non-hazardous solid waste (see R315-315-7(3) for PCB special requirements) **OR** the following specific waste types:

Waste Type	Combined Disposal Unit	Monofill Unit
☒ Municipal Waste	☒	☐
☒ Construction & Demolition	☒	☐
☒ Industrial	☒	☐
☐ Incinerator Ash	☐	☐
☒ Animals	☐	☒
☐ Asbestos	☐	☐
☐ PCB's (R315-315-7(3) only)	☐	☐
☐ Other _____	☐	☐

IX. Facility Area

Facility Area	111	acres
Disposal Area	54	acres
Design Capacity		
Years	46	
Cubic Yards	4355132	
Tons	2573107	

X. Fee and Application Documents

Indicate Documents Attached To This Application

☐ Application Fee: Amount $

☒ Facility Map or Maps ☒ Facility Legal Description ☒ Plan of Operation ☒ Waste Description
☒ Ground Water Report ☒ Closure Design ☒ Cost Estimates ☒ Financial Assurance

Class V Special Requirements

☐ Documents required by UCA 19-6-108(9) and (10)

I HEREBY CERTIFY THAT THIS INFORMATION AND ALL ATTACHED PAGES ARE CORRECT AND COMPLETE.

Signature of Authorized Owner Representative Name typed or printed	Title	Date
	Address	
Email Address	Alternative Telephone (cell or other)	
Signature of Authorized Land Owner Representative (if applicable) Name typed or printed	Title	Date
	Address	
Email Address	Alternative Telephone (cell or other)	
Signature of Authorized Operator Representative (if applicable) Gina Nelson GINA NELSON Name typed or printed	Title Landfill Director	Date 11/22/2021
	Address 01 South Main St. Brigham City Ut 84302	
Email Address gallen@boxeldercounty.org	Alternative Telephone (cell or other) (435) 730-3153	

APPLICATION TO RENEW A PERMIT TO OPERATE A CLASS I LANDFILL

Little Mountain Landfill

PART II - GENERAL REPORT

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1.0 - FACILITY DESCRIPTION

The Box Elder County Landfill (Little Mountain Landfill) is a Class I Landfill owned by Box Elder County and operated by Box Elder County Solid Waste (BECSW). The Little Mountain Landfill is located approximately 21 miles west of Brigham City in a basin approximately 800 feet above the valley floor. The facility is surrounded by ridges on all sides within a small canyon running northwest to the valley floor. The landfill is currently operating under Utah State Department of Environmental Quality Permit Number 9609R2 which expires December 15, 2021. The physical address for the site is 9595 West 6800 North Tremonton, Utah 84337 with site access via paved for all-weather road. The facility is entirely fenced, with public access through the locking gate at the main entrance. There are two locked utility maintenance/fire control gates in the fence; one in the southeast corner overlooking the Great Salt Lake, and one located in the south corner of the fence line. The site is approximately twelve miles northwest of Corinne, Utah, and seventy-five miles north of Salt Lake City. A location map is included on Drawing 1. All permit drawings are included in Appendix A.

1.1 AREA SERVED

Little Mountain Landfill serves all of Box Elder County, with the exception of two Class III landfills: one operated by ATK (Thiokol), in Promontory, Utah and one operated by Nucor, in Plymouth, Utah. Annual waste streams over the last 5 years have been growing at an overall rate of approximately 7%. Box Elder County has seen a population growth of 16.25% since 2010 with 2021 population estimate of 58,326. The population growth rate for 2021 is estimated to be approximately 1.99%. For the calculation of landfill life, a waste growth rate of 7.0% was utilized for the next 5 years with 2.0% being utilized thereafter until the facility capacity is reached. The 7.0% waste increase rate mirrors the most recent scale records with the 2.0% rate more closely following the population growth projections for Box Elder County.

1.2 WASTE TYPES

The Little Mountain Landfill's waste stream averages approximately 158 tons per operational day of which approximately 88% is municipal solid waste (MSW). Commercial and Industrial waste make up approximately 5% while Construction and Demolition (C&D) compromises 7% of total intake. All green waste is diverted to a compost facility located on property near the landfill and operated by a private contractor. Future waste may include non-hazardous wastewater generated by businesses proximate to the Little Mountain facility. The wastewater will be evaporated in the HDPE lined ponds or solidified within the landfill footprint. Any solids remaining from the evaporation of wastewater will be utilized for daily cover or for dust control within the landfill if appropriate.

BECSW is currently recycling tires, white goods, scrap metal with approximately 2,068 tons being recycled in 2020.

1.3 FACILITY HOURS

The operating hours for the facility are 7:30 a.m. to 5:30 p.m. The Facility is open Monday thru Friday with the facility being open two Saturdays a month. The following holidays observed at the Little Mountain facility:

- New Year's Day
- Memorial Day
- Independence Day
- Labor Day
- Thanksgiving Day
- Christmas Day

The following facility information is posted at the gate:

- Landfill Owner
- Days of Landfill Operation
- Hours of Landfill Operation
- Instructional Signs (no scavenging, no hazardous materials, dump in designated areas, etc.)

- Emergency Telephone Numbers

1.4 LANDFILL EQUIPMENT

The following equipment is on site and used in landfill operations:

- Compactor(s) 836 H
- Front End Loader Cat
- IT – 28
- Trackhoe Cat 320
- Mini Ex
- Motor Grader John Deere
- Track Dozer d6R D7
- Roll-off Truck (2)
- (15) roll-off bins
- Water Truck
- Haul Truck

1.5 LANDFILL PERSONNEL

The following persons are responsible for on-site landfill operations at the Little Mountain Landfill:

Landfill Director - The Director is responsible for all matters relating to the Solid Waste Program for Box Elder County, including landfill operations, waste transfer programs, and all recycling functions. The Director ensures all landfill operations are in compliance with the Division of Waste Management and Radiation Control (DWMRC) permit requirements. The Director conducts regular facility inspections and monitors all landfill activities. The Director is responsible for all operational documentation including the annual reports to DWMRC. The Director is responsible for all persons on the site including visitors.

This position requires a B.S. degree from an accredited university in Public Health, Business Management, or Civil Engineering plus 5 years of progressive experience in landfill operations management. Manager of Landfill Operations (MOLO) certification is required within 6 months of hire.

Equipment Operator(s) - The equipment operators are responsible for all day-to-day activities at the landfill. These responsibilities include, waste acceptance and placement, traffic control, safe operation and maintenance of all equipment, visual inspection of incoming waste, random waste screening operations, and general construction as it pertains to landfill operations.

This position requires at least 2 years' experience in the operation and maintenance of heavy equipment. Landfill Operators must possess a Class A Commercial Driver's License.

Scale Operator/Office Assistant - The scale operators are responsible for the initial screening of all incoming waste. With the assistance of the in-house computer program, he/she will track all incoming waste and update records as required. The scale operator is also responsible for all transactions at the scale house, and the receipt of all monies. Additionally, the scale operator assists the Director in the preparation of the annual landfill reports.

This position requires a good working knowledge of computers with a minimum of 1-year experience in office management.

A minimum of (1) equipment operator and (1) scale operator are required to be on site during business hours. During the course of normal operations there are typically one scale operator and two equipment operators on site.

2.0 - LEGAL DESCRIPTION

The legal description of the property Box Elder County owns for development of a landfill is as follows:

Parcel: 04-003-0010

Beginning at a point 525.7 feet north of the southwest corner of Section 18, Township 10 North, Range 3 West, Salt Lake Baseline and Meridian, running north 2,021.4 feet, thence south 89 degrees 30 minutes east 2,037.6 feet, thence south 7 degrees 35 minutes west 92.4 feet, thence south 9 degrees 2 minutes west 547.2 feet, thence South 84 degrees 37 minutes West 1,307 feet, thence North 84 degrees 36 minutes West 563 feet, thence North 88 degrees 38 minutes West 662 feet to the point of beginning, containing 111.72 acres.

The entire property will be developed as a landfill, except for a 25-foot buffer zone around the inside perimeter fence.

A copy of the legal description is included as Appendix B.

3.0 - OPERATIONS PLAN

This Operations Plan has been written to address the requirements of UAC R315-302-2 and briefly describes the operations of the Box Elder County (Little Mountain) Class I Landfill.

A more extensive document titled Box Elder County Landfill Operator's Manual contains detailed information regarding specific operating procedures. The purpose of the manual is to provide the Box Elder County Solid Waste personnel with standard procedures for day-to-day operation of the landfill. A copy of this manual is kept on file at the Landfill. Forms used by BECSW are included in Appendix C.

3.1 SCHEDULE OF CONSTRUCTION

The future development of the Little Mountain Landfill is broken into four excavated Cells and eight discrete closure Phases. The future Cell 1 area is being excavated to provide daily and intermediate cover for current landfilling operations. Phase 1 and Phase 2 areas are nearly to final elevation and will be closed starting in 2022 or 2023. Landfilling operations are concentrated in the Phase 3 and Phase 4 area with Phase 3 being at final elevation in 2024 and Phase 4 being ready for final cover in approximately 2026.

The landfill construction was presented in these Phases to facilitate the evaluation of landfill life, and to bring the landfill to final design elevation to facilitate closure construction. Final cover construction will be an incremental process commencing in 2022 or 2023 once the northwestern side slopes of the landfill reach final elevation.

Soil is stockpiled for use as daily, intermediate, and final cover as necessary to facilitate the development of the landfill cells. BECSW will selectively stockpile soil (if variable soils are encountered) to utilize the lowest permeability soils in the final cover construction.

As each portion of the landfill reaches the final elevation, intermediate cover will be placed. Prior to the construction of any final cover, BECSW will prepare a QA/QC Plan (including drawings) to govern the construction of the final cover. The QA/QC Plan will detail the type of testing (if required) and general construction documentation required to demonstrate that the construction practices are consistent with this permit. Water management structures will be constructed on the final cover as the final cover is placed. Construction of the final cover will take place in 8 separate construction projects. The construction will take place as large areas of the landfill are completed to the final design elevations. The final cover construction will be conducted in the 8 stages to minimize the amount of soils to be stockpiled and the amount of financial assurance required.

3.2 DESCRIPTION OF HANDLING PROCEDURES

3.2.1 General

A waste control program designed to detect and deter attempts to dispose of hazardous and other unacceptable wastes will continue to be implemented at Little Mountain Landfill. The program is designed to protect the health and safety of employees, customers, and the general public, as well as to protect against the contamination of the environment.

The landfill is open for public and private disposal. Signs posted near the landfill entrance clearly indicate (1) the types of wastes that are accepted; (2) the types of wastes not accepted at the site; and (3) the penalty for illegal disposal.

All vehicles delivering wastes to the site must stop at the scale house. Scale house personnel inquire as to the contents of each incoming load to screen for unacceptable materials. Any vehicle suspected of carrying unacceptable materials (liquid waste, sludges, or hazardous waste) are prevented from entering the disposal site unless the driver can provide evidence that the waste is acceptable for disposal at the site. Little Mountain Landfill personnel reserves the right to refuse service to any person with a suspect load. Vehicles carrying unacceptable materials are

required to exit the site without discharging their loads. If a load is suspected of containing unacceptable materials, the following information is recorded: date, time, name of the hauler, driver, telephone number of hauler, vehicle license plate, and source of the waste. The scale house personnel then notifies the working face operator that a load is suspect and that load is further inspected at the landfill tipping area before final disposal is allowed.

After a vehicle leaves the scale house, the vehicle is routed to the appropriate discharge location. Loads are regularly surveyed at the tipping area. If a discharged load contains inappropriate or unacceptable material, the discharger is required to reload the material and remove it from the landfill site. If the discharger is not immediately identified, the area where the unacceptable material was discharged is cordoned off. Unacceptable material is moved to a designated area for identification and preparation for proper disposal.

Depending on the contents of the incoming load, the vehicle is directed to one of several operational areas of the landfill. Large loads of waste are directed to the operational face while small residential loads will be directed to the Public Convenience Center (PCC) for waste disposal and recycling. The operation of the PCC enables the BECSW personnel to largely separate the commercial traffic from the residential haulers. Other operational areas accommodate tires, metal, concrete, dead animals, and green waste.

3.2.2 Waste Acceptance

BECSW uses a solid waste software package entitled "Waste Works". With this program BECSW is able to track all incoming waste as well as bill and receive payment from all customers. When a vehicle with waste stops on the scale; the scale operator identifies the load as to whether it is a commercial hauler, general public, or private individual with an account. The proper codes are entered into the computer identifying the origin, hauler, and account number. All loads larger than a pickup are weighed and charged accordingly. This information is printed on a two-part ticket; the customer receives one copy and one copy is forwarded to the County Auditor's Office for storage. Information regarding all transactions is stored on the in-house computer at the

landfill. All records are backed up on a nightly basis to a county computer located at the Box Elder County Court House. The information stored on the computer serves as the daily log. A monthly summary of all landfill transactions is created and kept on file at the landfill. Any or all transactions may be retrieved as necessary. After each load has been recorded, the driver is directed where to take the load.

Each load is visually inspected as it is discharged. Waste screening is done as needed or scheduled according to the procedures outlined in Section 3.3 Waste Inspection. No open burning or smoking is allowed near the working face.

3.2.3 Waste Disposal

Wastes are dumped at the toe of the work face when possible and spread up the slope in one-to-two-foot lifts, keeping the slope at a maximum of three to one (horizontal to vertical) configuration.

Work face dimensions are kept narrow enough to minimize blowing litter and reduce the amount of material needed for daily cover. Typically, the width of the working face is two and one-half times the width of the compactor blade. This facilitates complete compaction of the waste and keeps the width narrow enough to minimize amount of daily cover required.

Typically, the compactor is operated with the blade facing uphill. Equipment operations across the slope are avoided to minimize the potential of equipment tipping over. In addition to safety concerns, a toe of slope to crest of slope working orientation provides the following benefits:

- Minimizes blowing litter problems
- Increases equipment compactive effectiveness
- Increased visibility for waste placement and compaction
- More uniform waste distribution

The top of the interim surfaces typically ranges from 2 to 5 percent to promote runoff with the cell heights ranging from 8 to 10 feet.

Wastes are compacted by making three to five passes up and down the slope. Compaction reduces litter, differential settlement, and the quantities of cover soil needed. Compaction also extends the life of the site, reduces unit costs, and leaves fewer voids to help reduce vector problems. Care is taken that no holes are left in the compacted waste. Voids are filled with additional waste as they develop.

BECSW staff is preparing to accept waste water for solidification and evaporation at the Little Mountain facility. The solids resulting from the evaporation of water will be utilized as an alternative daily cover (ADC). Shredded tires and paper fines have also been approved as an ADC if the need arises. When the ADC is utilized; it is used for a maximum of six days, at which time all waste is covered with six inches of soil to create a firebreak.

Intermediate cover is applied to all areas of the active cell which will not receive additional waste within 30 days. Intermediate cover consists of an additional 12 inches of soil being placed over the 6 inches of daily cover soil.

3.2.4 Special Wastes

3.2.4.1 Used Oil and Batteries

Little Mountain Landfill is a "Used Oil Recycle Center". When a customer has used oil to dispose of they fill out the form "UTAH DIYer USED OIL LOG" provided by UDEQ. A report generated from this form is turned in quarterly stating the amount of oil deposited and the customer's names. A waste oil furnace is used in the machine shop to dispose of the used oil while providing heat for the shop. Batteries are not accepted at the working face. BECSW provides a pallet near the office where incoming batteries are stored until enough are generated to facilitate delivery to a recycler.

3.2.4.2 Bulky Wastes

White goods are accepted at the landfill and are separated for recycling. All appliances containing refrigerants are segregated in a separate area. Refrigerant is removed and the appliances are loaded into the metal bin for recycling. Used cars are not accepted at the Little Mountain landfill. Persons seeking to dispose of used car bodies are directed to take the car to Western Metals located near Plymouth, Utah.

3.2.4.3 Tires

Little Mountain Landfill accepts small quantities of tires from the general public. Commercial haulers are prohibited from disposing of tires. A total of five passenger tires are accepted free of charge from the public with each load. A fee is assessed for each additional tire over five and for every tire larger than typical passenger size (16" rim). All tires are stored in a designated tire storage area. When sufficient quantities of tires are collected, a tire hauler is called, and the tires are removed from the facility for recycling.

3.2.4.4 Dead Animals

Dead animals are accepted at the landfill. A designated trench is prepared for the acceptance of these animals. They are collected in the trench and a minimum of 6" of cover is placed over the animals at the end of each day. In the event the trench is inaccessible, the dead animals are incorporated into the face of the landfill. The incorporation of the carcasses into the landfill is accomplished by pushing up the toe of the face and depositing the animal in the bottom of the toe; waste is then pushed over the top of the animal.

3.2.4.5 Asbestos Waste

Asbestos waste is not accepted at the Little Mountain facility.

3.2.4.6 Non-Hazardous Waste Water (Procter & Gamble only)

Non-hazardous wastewater will likely be accepted at the landfill for volume reduction. This will be accomplished by one of three methods. The first method is a solidification process, which is done by mixing the water with on-site soils to a consistency that will pass the paint filter test. These soils are then used as daily cover on the working face or stored for future use as intermediate or final cover. The second method is to deposit the wastewater in the evaporation ponds. These ponds were constructed to handle the water during the winter months and when weather conditions will not allow the solidification process to be performed. The third use for the wastewater will be for dust control applications on the landfill site roads and in areas where earthmoving equipment may create dust.

3.2.4.7 Grease Pit and Animal Waste By-Products

Waste from restaurant grease traps and slaughterhouse by-products are not accepted at the landfill.

3.3 WASTE INSPECTION

3.3.1 Landfill Spotting

Learning to identify and exclude prohibited and hazardous waste is necessary for the safe operation of the landfill. The Equipment Operators are required to receive initial and periodic hazardous waste inspection training. Operators are required to obtain the initial 40-hour HAZWOPER Training and attend yearly refresher courses. Certificates of training are kept in the personnel files.

Hazardous wastes have either physical or chemical characteristics that could harm human health or the environment. A waste is considered hazardous if it falls into either of two categories: 1) a listed waste, or 2) a characteristic waste. Hazardous wastes are not accepted at the Little Mountain Landfill.

Small quantity generators (<100 kg/Mo) and household quantities are exempt from hazardous waste regulations. However, hazardous wastes are most likely to enter the landfill mixed in with common household waste. Public education and periodic waste screening are the tools used to minimize the amount of inadvertent hazardous waste entering the landfill.

A detailed description of the waste-screening program can be found in the Landfill Operator's Manual.

3.3.2 Random Waste Screening

Random inspections of incoming loads are conducted according to the schedule established by the Director with one commercial waste hauler per week being selected randomly according to the schedule. If frequent violations are detected, additional random checks are scheduled at the discretion of the Director.

If a suspicious or unknown waste is encountered, the Equipment Operator proceeds with the waste screening as follows:

- The load is directed to the waste screening area
- The waste screening form is completed
- Protective gear is worn by any employee near the waste
- The suspect material is spread out with the compactor or hand tools and visually examined.

Suspicious marking or materials, like the ones listed below, are investigated further:

- Containers labeled hazardous
- Material with unusual amounts of moisture
- Biomedical (red bag) waste
- Unidentified powders, smoke, or vapors
- Liquids, sludges, pastes, or slurries
- Asbestos or asbestos contaminated materials
- Batteries
- Other wastes not accepted by the landfill

The Landfill Director is called if unstable wastes that cannot be handled safely or radioactive wastes are discovered or suspected.

3.3.3 Removal of Hazardous or Prohibited Waste

Should hazardous or prohibited wastes be discovered during random waste screening or during tipping, the waste is removed from the landfill as follows:

The waste is loaded back on the hauler's vehicle. The hauler is then informed of the proper disposal options. If the hauler or generator is no longer on the premises and is known, they are asked to retrieve the waste and informed of the proper disposal options. The Landfill Director arranges to have the waste transported to the proper disposal site and then bill the original hauler or generator.

A record of the removal of all hazardous or prohibited wastes is kept in the site operational records.

3.3.4 Hazardous or Prohibited Waste Discovered After the Fact

If Hazardous or prohibited wastes are discovered in the landfill, the following procedure is used to remove them:

- Access to the area is restricted
- The Landfill Director is immediately notified
- The Equipment Operator removes the waste from the working face if it is safe to do so
- The waste is isolated in a secure area of the landfill and the area cordoned off
- The Fire Marshall's Hazardous Materials Response Team is notified

The DWMRC, the hauler (if known), and the generator (if known) are notified within 24 hours of the discovery. The generator (if known) is responsible for the proper cleanup, transportation, and disposal of the waste.

3.3.5 Notification Procedures

The following agencies and people are contacted if any hazardous materials are discovered at the landfill:

Gina Nelson, Landfill Director .....(435) 730-3153
Box Elder County Sheriff (dispatch).....(435)734-3800
Bear River Health Department.....(435) 734-0845
Director, DWMRC.....(801) 538-6170
Box Elder Co. Fire Marshall .....(435) 734-9441

A record of conversation is completed as each of the entities is contacted. The record of conversation is kept in the site operational records.

3.4 FACILITY MONITORING AND INSPECTION

3.4.1 Groundwater

Little Mountain Landfill does not plan to monitor groundwater. Tahoma Companies, Inc. (Tahoma) completed an exploratory boring extending 300 feet below the landfill bottom and did not encounter groundwater. Based on the minimum depth to groundwater being 300 feet and the low permeability site soils, initial groundwater modeling performed by Tahoma estimated the leachate travel time to be 14,174 years, the landfill is not required to monitor groundwater. These calculations were submitted to the DWMRC and the landfill has been exempted from leachate collection and liner requirements. As a result, groundwater monitoring is not performed as part of the regular monitoring program.

3.4.2 Surface Water

The Little Mountain Landfill Permit Drawings illustrate the locations and details of the surface water drainage control systems for both run-on and run-off. In general, surface water is prevented from running into the active landfill area by berms and a perimeter road. Drawing 2

indicates the location of the storm water basin and associated storm water structures. Calculations of the anticipated run-off data is shown in Appendix D. Run-off from the final cover will be managed by a combination of berms and ditches. The berms will be placed to divert the water around the active area to culverts and a settling pond. Landfill staff will inspect the drainage system monthly. Temporary repairs will be made to any observed deficiencies until permanent repairs can be scheduled. BECSW or a licensed general contractor will repair drainage facilities as required.

3.4.3 Leachate Collection

A leachate collection system will not be installed due to the current liner exemption issued by the DWMRC. In general, the threat of groundwater contamination from leachate is very small because of the great distance between the landfill and groundwater, the relatively low permeability of the soils beneath the landfill, and the low precipitation. Should the landfill have a demonstrated need for a leachate collection system, one will be designed and installed.

Any storm water contacting the MSW in the active cell remains in the active cells due to the highly irregular surface of the landfill.

3.4.4 Landfill Gas

This facility is monitored for methane gas on a quarterly basis. Concentrations of methane gas are measured with a hand-held gas monitor.

Gas readings are recorded at each end of the active cell, the office and shop, the fuel tanks, and other places at random. Readings are recorded on the "Gas Log" sheet and kept on file in the scale house office.

If methane releases are detected in excess of 25 percent of the LEL, in the landfill building or more than 100 percent of LEL at the property boundary, the procedure outlined in the "Explosive Gases" section is followed.

3.4.5 Evaporation Pond Monitoring

The water delivered to the evaporation ponds is characterized prior to delivery to ensure that concentrations of the constituents present in the wastewater are not hazardous. TCLP criteria are used as the basis to determine if the waste water being delivered to the Little Mountain facility are hazardous. Liquid levels in the ponds are observed as each load of liquid is delivered to make sure that the pond has adequate storage capacity. The evaporation ponds are fenced and access to the ponds is through a locked gate. A third evaporation pond may need to be constructed at the Little Mountain facility to help manage the anticipated waste water storage volumes.

3.4.6 General Inspections

Routine inspections are necessary to prevent malfunctions and deterioration, operator errors, and discharges that may cause or lead to release of wastes to the environment or a threat to human health. Equipment Operators are responsible for conducting and recording routine inspections of the landfill facilities according to the following schedule:

Equipment Operators perform pre-operational inspections of all equipment daily. A post-operational inspection is performed at the end of each shift while equipment is cooling down.

All equipment is on a regular maintenance schedule performed by an outside contractor. A computer record of maintenance, repairs, and concerns is kept for each piece of equipment. Oil samples are pulled when each machine is serviced and results are recorded in the maintenance files.

Facility inspections are completed on a quarterly basis. Any needed corrective action items are recorded and the landfill Equipment Operators complete needed repairs. If a problem is of an urgent nature, the problem is corrected immediately.

Scale maintenance is performed annually at a minimum. If specific problems arise before scheduled maintenance, scale maintenance is completed as required. The scale is certified on an annual basis.

3.5 CONTINGENCY AND CORRECTIVE ACTION PLANS

The following sections outline procedures to be followed in case of fire, explosion, groundwater contamination, release of explosive gases, or failure of the storm water management system.

The County Fire Marshal's Hazardous Materials Response Team is contacted in all cases where hazardous materials or materials contaminated with PCB's are suspected to be involved.

3.5.1 Fire

The potential for fire is a concern in all landfills. Little Mountain Landfill staff follows a waste handling procedure to minimize the potential for a landfill fire. If any load comes to the landfill on fire, the driver of the vehicle is directed to a pre-designated area away from the working face. The burning waste is unloaded, spread out, and immediately covered with sufficient amounts of soil to smother the fire. Once the burning waste cools and is deemed safe, the material is then incorporated into the working face. Some loads coming to the landfill may be on fire but not detected until after being unloaded at the working face. If a load of waste that is on fire is unloaded at the working face, the load of waste is immediately removed from the working face, spread out, and covered with soil.

The Box Elder County Fire Department is called if it appears that landfill personnel and equipment cannot contain any fire at the landfill. The Box Elder Fire Department is also called if a fire is burning below the landfill surface or is difficult to reach or isolate.

In case of fire, the DWMRC Director is notified immediately. A written report detailing the event is placed in the operating record within seven days, including any corrective action taken.

3.5.2 Release of Explosive Gases

Methane gas generation and concentration is not anticipated to be a problem at the Little Mountain Landfill. However, due to the production of methane in all landfills, landfill gas levels are monitored quarterly. If a concentration of methane is detected in excess of 25 percent of LEL in a landfill building, 100 percent LEL at the property boundary, or over 100 parts per million in an off-site building, the following procedure is followed:

- Landfill operations cease immediately. The landfill is evacuated if personnel or buildings may be threatened.
- If gas is detected in a building, the doors and windows are opened to allow the gas to escape.
- If off-site buildings or structures appear to be threatened, the Box Elder County Fire Department is called, the property evacuated, and the property owners notified.
- The Landfill Director is called. The release is monitored and a temporary corrective action implemented as soon as possible. Permanent corrective action is completed as soon as practicable.

The DWMRC is notified immediately and a written report submitted within 14 days of detecting the release. The gas levels detected and a description of the steps taken to protect human health are placed in the operating record within seven days of detection. A remediation plan for the methane gas release is place in the operating record within 60 days of detection and the DWMRC Director is notified that the plan has been implemented.

3.5.3 Explosion

If an explosion occurs or seems eminent, all personnel and customers are accounted for and the landfill is evacuated. Corrective action is immediately evaluated and implemented as soon as practicable. The Landfill Director is notified immediately and the Box Elder County Fire Department is called.

If the explosion is the result of methane gas, the gas levels detected and a description of the steps taken to protect human health is placed in the operating record within seven days of detection. A remediation plan for the methane gas release is placed in the operating record within 60 days of detection and the DWMRC Director is notified that the plan has been implemented.

3.5.4 Failure of Run-On/Run-Off Containment

The purpose of the run-on/run-off control systems is to manage the stormwater falling in or near the landfill. Water is diverted away from the landfill using a series of ditches, berms, and roads. These structures are inspected on a regular basis and repaired as needed. Most of the water falling on the working face is unable to flow out of the working area due to surface depressions left by the compactor. All stormwaters falling or flowing near the active landfill cell are prevented from flowing into the active area by diversion berms and ditches.

If the run-on system fails, temporary measures such as temporary berms, ditches, or other methods are used to divert water from the active landfill cell. If a run-off ditch or berm fails, temporary berms or ditches are constructed until a permanent run-off structure can be constructed. Any temporary berms or other structures are checked at least every 2 hours during heavy storm events. Permanent improvements or repairs are made as soon as practicable.

The Landfill Director is notified immediately if a failure of either of the run-on or run-off systems is discovered. The event is fully documented in the operating record, including corrective action within 14 days.

3.5.5 Groundwater Contamination

If groundwater contamination is ever suspected, studies to confirm contamination will be conducted and the extent of contamination documented. This program may include the installation of groundwater monitoring wells. A groundwater monitoring program would be developed and corrective action taken as deemed necessary, with the approval of the Director.

3.6 CONTINGENCY PLAN FOR ALTERNATIVE WASTE HANDLING

The most probable reason for a disruption in the waste handling procedures at the Little Mountain Landfill will be weather related. The landfill may close during periods of inclement weather such as high winds, heavy rain, snow, flooding, or any other weather-related condition that would make travel or operations dangerous. The Little Mountain Landfill may also close for other reasons like fire, natural disaster, etc. In general, the Little Mountain Landfill minimizes the possibility of disruption of waste disposal services from an operational standpoint.

In case of equipment failure, the Box Elder County Road Department will provide the necessary equipment to continue operations while repairs are being made. If the landfill is not operational for any unforeseen reasons, the commercial haulers serving Box Elder County are notified as follows:

Waste Management of Northern Utah .....(801) 731-5542
Brigham City Solid Waste.....(435) 734-2001
Rupp Trucking .....(435) 257-7333
EconoWaste .....(435) 257-5588
Green Disposal .....(801) 392-4950
Waste Connections .....(800) 772-0273

BECSW has a reciprocal agreement with Logan City to provide an alternative site for temporary disposal of municipal solid waste should the need arise.

3.7 MAINTENANCE PLAN

3.7.1 Groundwater Monitoring System

The Little Mountain Landfill is currently exempt from the State of Utah DWMRC default design requirements for leachate collection, landfill liner, and groundwater monitoring because of the

depth to groundwater and the native soils present under the landfill. As a result, no groundwater monitoring system is planned.

3.7.2 Leachate Collection and Recovery System

The Little Mountain Landfill is currently exempt from the State of Utah DWMRC default design requirements for leachate collection, landfill liner, and groundwater monitoring because of the depth to groundwater and the native soils present under the landfill. As a result, no leachate collection and recovery system is planned.

3.7.3 Gas Monitoring System

The Little Mountain Landfill operation is not expected to produce and concentrate significant amounts of landfill gas. No gas collection system is planned. Quarterly gas monitoring is conducted using a handheld meter.

3.8 DISEASE AND VECTOR CONTROL

The vectors encountered at the Little Mountain Landfill are flies, birds, mosquitoes, rodents, skunks, and snakes. Due to the rural location of the landfill, stray house pets are occasionally encountered at the landfill. The program for controlling these vectors is as follows:

3.8.1 Insects

Eliminating breeding areas is essential in the control of insects. Little Mountain Landfill staff minimizes the breeding areas by covering the waste daily and maintaining surfaces to reduce ponded water. The mosquito abatement district personnel assist the landfill as necessary.

3.8.2 Rodents

Reducing potential food sources minimizes rodent populations at the landfill. To date, no significant numbers of mice or rats have been observed. The potential food sources are minimized by properly applying daily cover.

In the event of a significant increase in the number of rodents at the landfill, a professional exterminator will be contacted. The exterminator would then establish an appropriate protocol for pest control in accordance with all county, state, and federal regulations.

3.8.3 Birds

The Little Mountain Landfill has had minimal problems with birds (seagulls). Good landfilling practices of waste compaction, daily covering of active working face, and the minimization of ponded water has to date alleviated most of the bird problems. When the occasional need arises, the birds are encouraged to leave by using cracker and whistler shells.

3.8.4 Household Pets

Because of the landfill location, some stray cats and dogs have wandered onto landfill property. When stray animals are encountered (and can be caught), they are turned over to the animal shelter in Brigham City. If we are unable to apprehend the animals, they are chased off the property.

3.8.5 Wildlife

Little Mountain Landfill has a variety of wildlife located on or near the landfill property. Wildlife includes deer, snakes, foxes, skunks, and coyotes. The only operational problems with wildlife to date have been with an occasional skunk or snake. When problem skunks or snakes are encountered, they are exterminated. If other site wildlife becomes a problem, the landfill staff will coordinate with the Division of Wildlife Resources to provide methods and means to eliminate the problem.

In the event that any of these vectors become an unmanageable problem, the services of a professional exterminator will be employed.

3.8.6 Fugitive Dust

The roads leading to the landfill are paved with site access provided via a maintained gravel access road. Some construction activities and daily traffic produce a certain amount of dust. Landfill activities compounded by the occasional high wind present a periodic fugitive dust problem. If the dust problem elevates above the "minimum avoidable dust level", the landfill personnel will utilize the water truck to apply water to problem areas.

Water is typically applied to the gravel roads leading from the landfill office to the tipping face and at the tipping face. The water is applied as often as needed to control the dust.

The landfill has a limited volume of water available at the site. During the dry summer months, Little Mountain Landfill personnel may augment the dust control water supplies by utilizing the waste water (Procter & Gamble) held in the lined evaporation ponds.

3.8.7 Litter Control

Due to the nature of landfilling operations, litter control is an ongoing issue. Landfill personnel perform routine litter cleanup to keep the landfill and surrounding properties clear of windblown debris.

Whenever possible, the working face is placed downwind so that blowing litter is worked into the landfill face. During windy conditions, landfill personnel minimize the spreading of the waste to reduce the amount of windblown debris

3.9 RECYCLING

Currently, recycling activities at the landfill consists of storage areas and bins to recycle white goods and scrap metal. Little Mountain diverts all green waste to the composting facility near the bottom of the hill north of the landfill entrance. Due in part to the recycling market conditions, the BECSW does not plan to expand the on-site recycling programs.

3.10 TRAINING PROGRAM

As part of the initial training of new employees, the Landfill Operator's Manual is required reading. All personnel are required to review the approved permit annually.

All personnel associated with the operation of the landfill receive training annually. The "Sanitary Landfill Operator Training Course" offered by the Solid Waste Association of North America (SWANA) is required by all employees within 1 year of hire date. Certificates of completion are kept in personnel files. Regular safety and equipment maintenance training sessions are held to ensure that employees are aware of the latest technologies and that good safety practices are used at all times.

3.11 RECORDKEEPING

An operating record is maintained as part of a permanent record on the following items:

- Daily transactions including weight and type of waste for each vehicle
- Deviations from the approved Plan of Operation
- Personnel training and notification procedures
- Landfill gas-monitoring results
- Waste water test results
- Random load inspection log

3.12 SUBMITTAL OF ANNUAL REPORT

BECSW will submit a copy of its annual report to the Director by March 1 of each year for the most recent calendar or fiscal year of facility operation. The annual report will include facility activities during the previous year and will include, at a minimum, the following:

- Name and address of facility
- Calendar or fiscal year covered by the annual report

- Annual quantity, in tons or volume, in cubic yards, and estimated in-place density in pounds per cubic yard of solid waste handled for each type of treatment, storage, or disposal facility, including applicable recycling facilities
- Annual update of required financial assurances mechanism pursuant to Utah Administrative Code R315-309
- Results of gas monitoring
- Training programs completed

3.13 INSPECTIONS

The Landfill Director, or his/her designee, inspects the facility to minimize malfunctions and deterioration, operator errors, and discharges that may cause or lead to the release of wastes to the environment or to a threat to human health. These inspections are conducted on a quarterly basis, at a minimum. An inspection log is kept as part of the operating record. This log includes at least the date and time of inspection, the printed name and handwritten signature of the inspector, a notation of observations made, and the date and nature of any repairs or corrective actions. Inspection records are available to the Director or an authorized representative upon request.

3.14 RECORDING WITH COUNTY RECORDER

Plats and other data, as required by the County Recorder, will be recorded with the Box Elder County Recorder as part of the record of title no later than 60 days after certification of closure.

3.15 STATE AND LOCAL REQUIREMENTS

The Little Mountain Landfill maintains and will continue to maintain compliance with all applicable state and local requirements including zoning, fire protection, water pollution prevention, air pollution prevention, and nuisance control.

3.16 SAFETY

Landfill personnel are required to participate in an ongoing safety program. This program complies with the Occupational Safety and Health Administration (OSHA), and the National Institute of Occupational Safety and Health (NIOSH) regulations as applicable. This program is designed to make the site and equipment as secure as possible and to educate landfill personnel about safe work practices.

The Box Elder County Sheriff's Department, registered under the Utah Emergency Medical Training Council, trains all the landfill employees in First Aid and CPR bi-annually. The name of each person to have a first aid certificate is posted beside the telephone numbers. It is preferable to have one first aid certified personnel on site during all normal operating hours.

3.17 EMERGENCY PROCEDURES

In the event of an accident or any other emergency, the Equipment Operator notifies the Scale Attendant who immediately contacts the Landfill Director and proceeds as directed. If the Landfill Director is not available, the Scale Attendant calls the appropriate emergency number posted by the telephone. The emergency telephone numbers are:

Box Elder County Central Dispatch 911
Fire Department.....(435) 723-5227
Sheriff's Office.....(435) 734-3800
Highway Patrol.....(800) 284-6950
County Fire Marshal.....(435) 734-9441
Brigham City Community Hospital.....(435) 734-9471
Gina Nelson, Landfill Director .....(435) 730-3153

4.0 - CLOSURE PLAN

This section describes the final cover construction, site capacity, schedule of closure implementation, estimated costs for closure, and final inspection procedures for the closure of the Little Mountain Landfill.

4.1 CLOSURE STRATEGY

As the Little Mountain Landfill slowly fills, daily and intermediate cover is systematically placed as required as part of the daily landfill operations. Prior to construction of any final cover, BECSW personnel will submit a QA/QC Plan to the DWMRC for review and approval. The QA/QC Plan will detail the testing and construction documentation necessary during the construction of the final cover.

As portions of the landfill reach the final cover elevation the final lift of daily cover then intermediate cover is placed. During each summer, the areas of the landfill that have reached final design elevation will receive the final cover soils. The future landfill development is divided into 4 Cells to help to illustrate the direction of excavation operations. The establishment of the 8 Closure Phases is somewhat arbitrary since the landfill will be developed, landfilled, and covered in an incremental fashion.

The projected date of the final closure of the entire landfill, based upon current waste streams is in 2043. It is projected that approximately 2.6 million tons of waste (or approximately 4.3 million cubic yards of waste) and 1.1 million cubic yards of cover soils will be placed in the landfill at the time of closure.

The Director will be notified in writing at least 60 days prior to the anticipated last receipt of waste in accordance with R315-302-3(4)(a). Implementation of the closure plan will begin within 30 days after the last receipt of waste. Closure will be completed within 180 days of implementation of closure activities unless an extension has been granted by the Director.

4.2 FINAL COVER DESIGN AND INSTALLATION

The design of the final cover system for the Little Mountain Landfill has been completed and is included in the Permit Drawings. The final cover design described herein is in accordance with current State of Utah regulations criteria. The final cover system is designed to promote the establishment of vegetative cover, minimize infiltration, and percolation of water into the waste, and prevent erosion of the waste throughout the post-closure care period and beyond.

BECSW is in the process of evaluating other final cover construction options that would be more efficient and cost effective while providing the same level of environmental protection. Any proposed alternate final cover system will be submitted to the DWMRC for approval prior to construction.

4.2.1 Seed, Fertilizer and Mulch

The top 6-inches of the cover will be seeded with a mixture of grasses suitable for fast growth in the region, fertilized and mulched. A local, experienced agronomist will be retained to develop an appropriate seed mixture for the seeding of the landfill.

4.2.2 Contouring

The landfill's final grades will be inspected and maintained in order to ensure the cover integrity and conformity with the final cover grades and elevations.

4.3 CERTIFICATION OF CLOSURE AND RECORDKEEPING

A civil engineer registered in the State of Utah will document the final closure construction activities of the landfill. The registered engineer will be employed by BECSW or will be a BECSW hired contractor and will document the landfill was closed according to the DWMRC approved QA/QC Plan. Any amendment or deviation to the QA/QC Plan will be approved by the DWMRC Director and any associated permit modifications will be made. As part of the final cover construction process, the engineer shall also provide closure as-built drawings to the Director within 90 days following completion of the closure activities.

Additionally, the final plats and the amount and location of waste will be recorded on the site title. BECSW personnel will file the notarized plat with the Box Elder County Recorder within 60 days following certification of closure.

5.0 - POST-CLOSURE PLAN

Post closure activities will begin when the final closure is approved is approved by the DWMRC Director. The following presents the post-closure plan for the Little Mountain Landfill.

5.1 MONITORING PROGRAM

The following subsections offer a description of the post-closure monitoring program.

5.1.1 Groundwater Unlined and Lined Landfill

Under the current permit, groundwater is not monitored at the Little Mountain Landfill. No groundwater monitoring is planned for the post-closure care period.

5.1.2 Surface Water - Existing and Future Landfill Operation

Although no surface water sampling activities are scheduled under the current landfill permit, BECSW staff will inspect the surface water management system no less than quarterly. Temporary repairs to any observed structures will be made until permanent repairs can be scheduled. BECSW or a licensed general contractor will replace surface water management structures, as required.

5.1.3 Leachate Collection and Treatment

Under the current permit, leachate collection and treatment is not required. No leachate collection or treatment facility maintenance is planned for the post-closure care period.

5.1.4 Landfill Gas

During the first 30 years of the post-closure care period, BECSW personnel will be responsible for the monitoring of all methane gas monitoring stations, and facility structures. Gas monitoring will occur no less often than quarterly and will be conducted more often if the need arises. In the event that a sample exceeds the regulatory level, BECSW personnel will notify the DWMRC immediately and undertake appropriate corrective actions.

The Little Mountain Landfill is not expected to produce significant amounts of landfill gas and no gas collection system has been designed. Should the landfill have a demonstrated need for a gas collection system, one will be designed and installed. Gas monitoring will be conducted for 30 years after closure. If gas emissions during the post-closure period are shown to be negligible, Box Elder County may request that the DWMRC Director amend the 30-year post closure period for gas monitoring. The cost for gas monitoring is included in the budget for quarterly inspection.

5.2 MAINTENANCE PROGRAM

The following subsections offer a description of the maintenance of installed structures.

5.2.1 Monitoring Systems

5.2.1.1 Groundwater

No groundwater monitoring will be performed; therefore, there will be no ancillary system to maintain.

5.2.1.2 Surface Water

Drainage control problems can result in accelerated erosion of a particular area within the landfill. Differential settlement of drainage control structures can limit their usefulness and may result in a failure to properly direct storm water off-site.

Implementation of a post-closure maintenance program will maintain the integrity of the final drainage system throughout the post-closure maintenance period. The final surface water drainage system will be evaluated and inspected, no less than quarterly, for ponded water and blockage of and damage to drainage structures and swales. Where erosion problems are noted or drainage control structures need repairs, proper maintenance procedures will be implemented as soon as site conditions permit so that further damage is minimized. Damaged drainage pipes and eroded ditch linings will be removed and or replaced.

BECSW staff will inspect the drainage system no less than quarterly. Temporary repairs will be made until permanent repairs can be scheduled. BECSW personnel or a licensed general contractor will repair or replace drainage facilities as required.

5.2.1.3 Leachate Collection and Treatment

No leachate collection and treatment system is currently in use at the Landfill; therefore, there is not a system to maintain.

5.2.1.4 Landfill Gas Collection System

No landfill gas collection system is currently in use at the Landfill; therefore, there is not a system to maintain.

5.3 SCHEDULE OF POST-CLOSURE ACTIVITIES

Post-closure activities, consisting of monitoring and maintaining the final cover and permanent drainage facilities, will be implemented immediately following approval of the final closure.

5.4 CHANGES TO RECORD OF TITLE, LAND USE, AND ZONING

The BECSW will notify the Box Elder County Recorder's Office at any such time when there is a change to the Record of Title, land use plan, or zoning restrictions. In addition, The BECSW will notify the Recorder at that time when the post-closure care period has expired and when a final site use has been accepted by the State DWMRC.

6.0 – FINANCIAL ASSURANCE PLAN

6.1 CLOSURE COST ESTIMATES

Cost estimates for closure are based upon a third-party performing closure activities. The closure cost estimate is for the cost to close the largest area of the landfill requiring final cover. Based upon the existing landfilling operations and the future incrementally nature of the final cover, the more expensive of the following two closure scenarios will govern the amount of financial assurance required:

Immediate closing of the landfill – Closing the existing landfill in the near term would require that the existing footprint be covered with an additional 40 inches of cover soils. The existing footprint of the landfill is approximately 34 acres. The unit cost for soil placement over the existing landfill is very low due to the proximity (located immediately northwest of the existing landfill, no excavation or hauling required) of the cover soils.

Future closing of the landfill – The existing footprint of the landfill will be the largest area open at the Little Mountain Landfill. Starting in 2022 or 2023, the BECSW staff will start incremental closing of the landfill which is planned to consist of eight total Phases.

Details of the closure costs for the Little Mountain Landfill are presented in Appendix E.

6.2 POST-CLOSURE COST ESTIMATES

Cost estimates for post-closure are based upon a third party performing post-closure inspection activities. Post-closure activities will be quarterly site inspections and annual summer maintenance. Details of the post – closure costs for the Little Mountain Landfill are presented in Appendix E.

6.3 FINANCIAL ASSURANCE MECHANISM

The Box Elder County Commissioners have, consistent with a resolution previously passed, established a dedicated account (trust fund) for the financial assurance of the Little Mountain Landfill. The trust fund is with the Utah Public Treasurer's Investment Fund; monthly statements can be obtained through the State Treasurer's office. Based upon previous estimates for closure and post-closure, Box Elder County had placed approximately $847,000 into the financial assurance account as of January 31, 2021.

The updated estimated costs for closure and post-closure care are approximately $865,000 which includes a nearly $80,000 contingency. The money set aside for financial assurance is adequate to fund the future costs. A copy of the January 2021 PTIF statement is included with this permit application as Appendix F.

Money deposited in the trust fund will be used exclusively for closure, post-closure care, and corrective action (if required). The financial assurance requirements for the Little Mountain Landfill will be evaluated annually as part of the required annual report.

APPLICATION TO RENEW A PERMIT TO OPERATE A CLASS I LANDFILL

Little Mountain Landfill

PART III - TECHNICAL AND ENGINEERING REPORT

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1.0 – GENERAL LANDFILL INFORMATION

1.1 PHASED DESIGN

This permit application includes provisions for the full development of the existing landfilling operation utilizing the land immediately adjacent to the currently operating Box Elder County Landfill (Little Mountain Landfill). The landfill development is on land that is within existing permit boundaries and does not represent a lateral expansion. The planned landfill development is estimated to provide operating life of the Little Mountain Landfill until the year 2043.

1.1.1 Estimated Life

The future development of the Little Mountain Landfill has been broken into four additional cells. The Permit Drawings (Appendix A) show the four future cells of the Little Mountain development.

The design airspace for the landfill is approximately 5.5 million cubic yards. The 5.5 million cubic yards of design airspace will include 1.1 million cubic yards of soil. The size of Little Mountain Landfill was limited to 5.5 million cubic yards of total capacity to keep under the State of Utah air quality regulations. Appendix G contains the calculations for landfill life and demonstrates compliance with State of Utah Department of Air Quality regulations.

1.1.2 Liner

Due to the great distance to groundwater and slow permeability of the site soils, semi-arid climate, and high evaporation rate, the Little Mountain Landfill has been exempted from synthetic liner requirements Appendix H contains the correspondence with the DWMRC regarding exemptions. With the continued approval of the Director, the Little Mountain Landfill will not construct a synthetic liner system. IGES has excavated and logged additional test pits at the Little Mountain Landfill. Lab test data confirms previous near surface exploration work at the site performed by Tahoma Companies, Inc. IGES test pit logs and lab data is presented in Appendix I.

1.1.3 Leachate Collection and Treatment System

For reasons described in Section 1.1.2 the existing landfill has also been exempted from the leachate collection and treatment system requirements. With the continued approval of the Director, Little Mountain Landfill will not construct a leachate collection and treatment system.

1.1.4 Fill Method

Wastes are dumped at the toe of the work face and spread up the slope in one-to-two-foot layers, keeping the working slope at a maximum three to one (horizontal to vertical).

Work face dimensions are kept narrow enough to minimize blowing litter and reduce the amount of soil needed for daily cover. However, dimensions should be wide enough to accommodate vehicles bringing garbage into the landfill safely. BECSW has found that the width of the work face should be no less than two and a half times the width of the compactor blade for the best operational efficiencies.

Typically, the compactor is operated with the blade facing uphill. Equipment operations across the slope are avoided to minimize the potential of equipment tipping over. In addition to safety concerns, a toe of slope to crest of slope working orientation provides the following benefits:

- Minimizes blowing litter problems.
- Increases equipment compactive effectiveness.
- Increased visibility for waste placement and compaction.
- More uniform waste distribution.

The top of the surface grade ranges from 2 to 5 percent, and the cell height ranges from 8 to 10 feet.

Wastes are compacted by making three to five passes up and down the slope. Compaction reduces litter, differential settlement, and the quantities of cover soil needed. Compaction also extends the life of the site, reduces unit costs, and leaves fewer voids to help reduce vector problems. Care is taken that no holes are left in the compacted waste. Voids are filled with additional waste as they develop.

1.1.5 Daily and Final Cover

1.1.5.1 Daily and Intermediate Cover

A paper pulp has been approved for use as alternate daily cover at the Little Mountain Landfill. This material is currently being used as daily cover on the active areas of landfilling. In less active areas the waste is covered with a daily cover consisting of the on-site soils. Solids generated by the evaporation of process water will also be utilized as an alternate daily cover where applicable.

Intermediate cover is required to be placed when portions of a Class I unit which will be idle for more than 30 days. The 12 inches of intermediate cover is to minimize the potential for water infiltration, blowing waste and vector problems.

Under the currently permitted final cover, any areas of the landfill with intermediate cover will receive an additional 40 inches of cover soils during final cover construction, for a minimum of 58 inches of soil cover.

1.1.5.2 Final Cover

BECSW proposes to use the previously approved 58-inch soil cover for all areas of the final cover if a demonstration of an alternate evaporative cover cannot be made. BECSW will also evaluate the possibility of utilizing a geosynthetic clay liner (GCL) in the final cover construction if that is economically feasible.

The lowermost portion of a standard final cover system is an "infiltration minimization layer" constructed of a minimum of 18 inches thick of earthen material with a permeability no greater than that of the floor of the landfill unit. Soil samples from test pits at the landfill site have measured permeabilities of 4.18×10^{-6} cm/sec and 3.09×10^{-6} cm/sec. (Tahoma 1996). Therefore, the infiltration layer of the final cover system will be constructed of on-site soils with permeability no greater than 3.09×10^{-6} cm/sec.

The infiltration layer will then be covered with 6" of topsoil which can sustain plant growth.

1.1.6 Elevations of Bottom Liner and Final Cover

As illustrated on the Permit Drawings that are included with this permit application, all landfill liner and landfill cover will consist of site soils. The slope of the bottom of the landfill will be a minimum of 2%. The lowest elevation of the landfill is to be constructed at approximately 4830 feet above mean sea level. The elevation of the future landfill cells may be lowered if the soils encountered near the 4830 elevation are useable for site operations or final cover construction.

The maximum planned elevation for the final cover is 4980 feet above mean sea level. The final cover slopes at approximately 5%.

1.2 MONITORING SYSTEM DESIGN - EXISTING AND FUTURE LANDFILL OPERATION

1.2.1 Groundwater

Little Mountain Landfill is not required to monitor groundwater. Tahoma Companies, Inc. (Tahoma) completed an exploratory boring extending 300 feet below the landfill bottom and did not encounter groundwater. Based on the minimum depth to groundwater being 300 feet and the low permeability site soils, modeling performed by Tahoma estimated the leachate travel time to be 14,174 years. These calculations were submitted to the Utah Division of Solid and Hazardous Waste (DSHW) and the landfill has been exempted from leachate collection and synthetic liner requirements. Appendix H contains correspondence with the Division regarding exemptions. As a result, groundwater monitoring will not be performed as part of the regular monitoring program.

1.2.2 Surface Water

The Little Mountain Landfill Permit Drawings illustrate the locations and details of the surface water drainage control systems for both run-on and run-off. In general, surface water will be prevented from running into the active landfill area by berms. Very little runoff from any active area is anticipated due to the irregular surface left by the teeth of the compactor; a water retention ditch is located to the east of the active area if any runoff is generated. The water

retention ditch does not drain outside the perimeter access road; it currently stores all storm water generated within the access road. Runoff from the final cover will be managed by a combination of berms and ditches.

As the development of the landfill progresses, the construction of the settling pond and a culvert connecting the water retention ditch will be constructed. The berms will be placed to divert the water around the active area to culverts and the settling pond. Landfill staff will inspect the drainage system quarterly. Temporary repairs will be made to observed deficiencies until permanent repairs can be scheduled. BECSW or a licensed general contractor will repair drainage facilities as required.

Runoff from the excavated area will be collected in a detention basin to the northwest of the current landfill. The collected runoff will be used for dust control.

1.2.3 Leachate Collection

A leachate collection system will not be installed due to the current synthetic liner exemption issued by the Division of Waste Management and Radiation Control (DWMRC) formerly the Division of Solid and Hazardous Waste (DSHW). In general, the threat of ground water contamination from leachate is very small because of the great distance between the landfill and groundwater, the relatively low permeability of the soils beneath the landfill, and the low precipitation. Should the landfill have a demonstrated need for a leachate collection system, one will be designed and installed.

Any storm water contacting the MSW in the active cell will remain in the active cell area due to the highly irregular surface of the landfill (and the existing water retention ditch).

1.2.4 Landfill Gas

This facility is monitored for methane gas on a quarterly basis. Concentrations of methane gas are measured with a hand-held gas monitor.

Gas readings will be recorded at each end of the active cell, the office and shop, the fuel tanks, and other places at random. Readings will be recorded on the "Gas Log" sheet and kept on file in the scale house office.

1.3 DESIGN AND LOCATION OF RUN-ON/RUN-OFF CONTROL SYSTEMS

1.3.1 Run-On from a 24-Hour, 25-Year Storm

The design of the Little Mountain Landfill incorporates a run-on control system that can direct the flow away from the active portion of the landfill during the peak discharge of a 24-hour, 25-year storm (2.38 inches, National Oceanic and Atmospheric Association). The purpose of the run-on control is to minimize the amount of surface water entering the landfill facility. Run-on controls prevent: (1) erosion, which may damage the physical structure of the landfill; (2) surface discharge of wastes in solution or suspension; and (3) downward percolation of run-on through wastes, creating leachate. Ditches and berms (perimeter access road) are constructed around the perimeter of the landfill site. Water draining toward the landfill site from the surrounding ridges and slopes are collected in the perimeter ditches and routed into natural drainages outside the landfill.

The proposed locations and typical cross sections of all run-on structures are shown on the Drawings. During the 25-year 24-hour storm event, run-off from surrounding areas that naturally runs toward the landfill from the north, east and south will generate flows of 19.8, 15.2 and 22.0 cfs, respectively. Adjacent to the elevated road berms which intercept surface run-on, the depth of projected flows will not exceed 1.4 feet; as such perimeter berms are constructed to a minimum height of 2 feet. Appendix D presents the analysis of the run-on potential from land adjacent to the landfill.

1.3.2 Run-Off from a 24-Hour, 25-Year Storm (Active Cell)

Based on stormwater calculations for the landfill, dimples created by compacting the waste and cover soils will create sufficient surface detention space to retain all potential run-off from a 24-hour, 25-year storm. Appendix D presents the analysis of the stormwater run-off potential from the active area of the landfill. The construction of the water retention ditch is an added measure of stormwater retention capacity.

1.3.3 Run-Off from a 24-Hour, 25-Year Storm (Area within the Perimeter Access Road)

Stormwater falling within the perimeter access road will flow westward down the 2% cell bottom slope. Currently all stormwater generated within the site access road are stored within the perimeter access road.

As the existing landfill operation rises above the perimeter access road; a stormwater detention basin will be constructed as indicated in the Drawings. The stormwater detention basin will be at least 100 ft. x 100 ft. x 4 ft., providing approximately 300,000 gallons of dust control water when full. The water retention ditch will be hydraulically connected to the stormwater detention basin by a gated culvert leading to a drainage ditch. Water will be selectively released from the water retention ditch to fill the stormwater detention basin. As the detention basin fills it will be monitored to prevent an accidental overflow. Water will be stored in the stormwater detention basin until used for dust control within the access road or evaporated. Appendix D presents the analysis of the stormwater run-off from the area within the perimeter access road.

1.3.4 Run-Off from a 24-Hour, 25-Year Storm (Final Landfill Cover)

Stormwater from the final cover will be managed with a series of berms directing water into perimeter ditches. The perimeter ditches will then direct the water to drop structures that will convey the stormwater into the existing stormwater run-on ditches. The Drawings show the location of pertinent drainage structures. Appendix D presents the analysis of the stormwater run-off from the final cover.

2.0 - GEOHYDROLOGICAL ASSESSMENT

2.1 GEOLOGY AND HYDROLOGY

2.1.1 Regional Geology

Box Elder County is in the northwestern corner of Utah, bordering Idaho on the north, Nevada on the west, Tooele, and Weber Counties on the south, and Cache County on the east. It has a land area of 5,594 square miles, and an additional 800 square miles is submerged under Great Salt Lake.

Elevations in Box Elder County range from 4,210 feet at the Great Salt Lake to 9892 feet in the Raft River Mountains near the Idaho border. Three contrasting land form types occur in the County: 1) Low mudflats and shorelines of Great Salt Lake and the Great Salt Lake Desert, 2) Mountain ranges, and 3) Broad slopes intermediate between the mountain ranges and the lowlands.

Nearly flat lowlands of eastern Box Elder County are underlain by fine-grained, soft soils (silt and clay) with a very shallow (generally less than 10 feet BGL) water table. The soils and water are highly saline, except in portions of the Bear River Valley north of the Great Salt Lake.

Mountainous lands consist of hard, fractured bedrock with a thin veneer of course, mechanically weathered, and eroded soils. Typical rock types are limestone, dolomite, quartzite, and igneous rock. Most of the mountain ranges trend north to south. The Raft River Mountains are an exception; they trend nearly east-west along the northern edge of the County.

Broad slopes intermediate between the mountains and the lowlands consist of coarse granular soils (sand, gravel, cobbles, and boulders) eroded off the mountains. These soils have been moved about by rivers, streams, and lakes to form alluvial fans, lake terraces and other depositional features. From a distance the slopes appear smooth but are cut locally by minor drainages and washes.

2.1.2 Local Geology

The Little Mountain Landfill is on an isolated mountain rising 1,350 feet above the Bear River Valley in the east-central portion of Box Elder County.

The rocks that form Little Mountain are mostly limestones of Mississippian and Pennsylvanian to Permian age (Doelling, 1980). Similar rocks are exposed in mountains located west, north, and east of Bear River Valley. Sediments of the Great Salt Lake cover bedrock to the south of Little Mountain.

At least five bedrock formations are exposed on Little Mountain. The bedrock formations listed from oldest to youngest, are the Jefferson, Lodgepole, Humbug, Great Blue and Oquirrh.

2.2 HYDROGEOLOGY

2.2.1 Ground Water

Little Mountain is an isolated structural and topographic highland surrounded by the lowlands of the Bear River Valley and the Great Salt Lake Desert. Rocks that are present in the mountain are mostly brittle, fractured limestone. Precipitation that falls on the Little Mountain either runs off the steep hillsides, or infiltrates through soils into the fractured limestone.

Water that infiltrates into fractured limestones travels downward under the influence of gravity until it reaches a zone of saturation. The only known zone of saturation near Little Mountain occurs 700 feet below the landfill site in the soils of the surrounding lowlands.

Ground water could occur in a saturated zone of fractured limestone within Little Mountain, but above the surrounding lowland surface. If present, a water table would have a convex upward surface, roughly like the topography of Little Mountain, but with much lower relief. If the top of the water table in the fractured limestone bedrock were significantly higher than ground water elevation under the surrounding lowlands, pressure from the weight of the water would force

fresh ground water through the fractured limestone and out the sides of Little Mountain in a line of springs. This postulated line of freshwater springs would occur around the perimeter of Little Mountain wherever the top of the ground water intersected the hillside.

No line of freshwater springs is present at or near the base of Little Mountain. Therefore, it is unlikely that a significant bedrock aquifer occurs within the mountain.

2.2.2 Surface Water

No surface water is present at the Little Mountain Landfill site. Minor intermittent drainages cross the site from southeast to northwest. All up-gradient surface water is diverted around the landfill site by the perimeter access road and ditches.

2.3 WATER RIGHTS

Records of the Utah Division of Water Rights have been reviewed to obtain information on points of diversion, water use classifications and depths of wells near Little Mountain. No water rights have been claimed atop the mountain, and no water wells have been drilled there. Eight water use claims are valid in the lowlands east and south of Little Mountain. Seven of these are underground drains used for stock watering.

One point of diversion is a four-inch diameter well drilled to a total depth of 22 feet BGL. The well was drilled near the base of Little Mountain, 1.1 miles northeast of the landfill site, near the southwest corner of Section 8, T. 10 N., R. 3 W. The location is at the break in slope between the mountain and adjacent lowlands. Surface elevation of the well is at approximately 4,275 feet, placing the water level elevation (near the bottom of the well) at 4,253 feet. That is about 700 feet below the elevation of the landfill site.

2.4 GROUNDWATER QUALITY

2.4.1 Groundwater Data

No fresh ground water has been found at the landfill site. The nearest water analyses available are of natural hot and warm springs at the base of Little Mountain (Klauk and Budding, 1994). They reported that thermal waters in Box Elder County are found at the faulted boundaries between mountains and lowlands where bedrock is at or near the ground surface.

Two hot springs, with groundwater temperatures more than 20° Centigrade, occur along the southern border or Little Mountain. They are Stinking Hot Springs and Little Mountain Warm Spring.

Water at Stinking Hot Springs is highly saline. Older published measurements of Total Dissolved Solids (TDS) range from 29,000 to 30,400 milligrams per liter (mg/L). Klauk and Budding reported a TDS of 31,080 mg/L. Most of the dissolved chemicals are sodium and chloride, with unusually high concentrations of lithium, bromide, and iodide ions. The high concentrations of chemicals are derived from 1) saline minerals in the surface soils south of Little Mountain, and 2) deeply buried subsurface materials through which the water moves before reaching the surface.

Water from Little Mountain Warm Spring has similar chemical composition to water from Stinking Hot Springs. TDS are 36,110 mg/L, with sodium and chloride as the predominant constituents. Reported concentrations dissolved ions (HCO_3, lithium, strontium, potassium, calcium, and boron—among others) are very similar to analyses from Stinking Hot Springs. Water form Little Mountain Warm Spring and Stinking Hot Springs may travel along the same geological structures and carry dissolved chemicals from the same buried sources.

Tahoma reported three warm springs one to two miles northwest of Little Mountain. Water from each of those springs is less saline (4,352, 9,444 and 9,762 mg/L TDS) than at either

Stinking Hot Springs or Little Mountain Warm Spring. The water temperatures are also lower (19°, 16° and 16° C) at the three measuring points.

Water analyses, temperatures, and orientation of the faults along the west side of Little Mountain suggest that the three warm springs are part of the same ground water system that feeds the two hot springs. Water in the three warm springs is diluted by cooler and fresher surface water from Salt Creek and shallow ground water.

2.4.2 Statistical Analysis

BECSW does not monitor ground water at the Little Mountain Landfill. The hydrogeological assessments for the 1996 landfill permit (Tahoma, 1996) were the first hydrological site evaluation of the Little Mountain Landfill site. The hydrogeological assessment was incorporated in Tahoma's *Request for Exemption from Liner, Leachate Control and Ground Water Monitoring.* This document was submitted to the DSHW on November 29, 1995. State of Utah DSHW correspondence is included as Appendix H.

The basis for obtaining a waiver from ground water monitoring is found in UAC R315-308. The rule states that the requirements "may be suspended by the Director if the owner or operator of a solid waste disposal facility can demonstrate that there is no potential for migration of hazardous constituents from the facility to the ground water during the active life of the facility and the post closure period.

Drilling at the landfill site proved that ground water is not present from the surface to a depth of at least 300 feet BGL, which is the total depth explored through drilling. The HELP3 model showed that the average percolation rate of leachate through the bottom of the Landfill would be 0.06011 inches per year. Travel time calculations shown in the *Request for Exemption* demonstrate that the travel time for leachate to reach 300 feet (the maximum depth of the test boring, and therefore, the minimum proven depth to ground water) would be 14,174 years.

This greatly exceeds the length of time for the active life of the facility plus the post-closure care period.

3.0 - ENGINEERING REPORT

3.1 LOCATION STANDARDS - EXISTING LANDFILL

In addition to the Subtitle D criteria, DWMRC has adopted specific location standards. The Little Mountain Landfill is an existing facility and not subject to the new landfill location standards. The location standard section is included for completeness. The Utah location standards for Municipal Solid Waste Landfills (MSWLFs), as presented in the Solid Waste Permitting and Management Rules (R315-302), are outlined below.

- Land Use Compatibility (UAC R315-302-1(2)a)
  - Not to be located within 1000 feet of Parks and protected areas
  - Not to be located in an ecologically and scientifically significant area
  - Not to be located on prime or unique farmland (no longer required)
  - Not to be located within ¼ mile of existing dwellings, incompatible or historical structures, unless allowed by local land use planning or zoning
  - Not to be located within 5,000 feet of airport runways
  - Not to be located on archeological sites

- Geology (UAC R315-302-1(2)b)
  - Proximity to a Holocene Fault
  - Considerations for constructing in a seismic impact zone
  - Consideration given to unstable areas

- Surface Water (UAC R315-302-1(2)c)
  - Will not affect public water system
  - Will not affect existing lakes, reservoirs, and ponds
  - Cannot be located in a floodplain unless certain criteria are met

- Wetlands (UAC R315-302-1(2)d) Not allowed unless:

  Alternative location has been denied previously

  Will not violate state water quality standard or Clean Water Act

  Will not jeopardize threatened or endangered species

  Will no cause or contribute to significant degradation of the wetlands

- Groundwater (UAC R315-302-1(2)e)

  Groundwater/landfill cell separation

  Sole source aquifer

  Groundwater quality

  Source protection areas

Little Mountain Landfill is an existing facility, so the new landfill location standards don't apply. The following sections present the Utah MSWLF location standards and discuss the status of the Little Mountain Landfill's compliance with those requirements for information.

3.1.1 Land Use Compatibility Requirements

The existing landfill meets all criteria outlined in UAC R315-302-1(2)(a) as shown below. Documentation of the items listed below is found in Appendix J.

3.1.1.1 Little Mountain Landfill Land Use Compatibility

- The facility is not within 1,000 feet of a national, state or county park, monument, or recreation area; designated wilderness or wilderness study area; or wild and scenic river area.

  Source: Bauman, Susan, U.S. Bureau of Land Management, Public Room, Sale Lake City, Utah. See letter dated August 25, 1995.

- The facility is not within an ecologically and scientifically significant natural area, including wildlife management areas and habitat for threatened or endangered species as designated pursuant to the Endangered Species Act of 1982.

  Source: Williams, Robert D., U.S. Fish and Wildlife Service; Salt Lake City, Utah. See letter dated September 22, 1995.

- The facility is not located on farmland classified as "prime" or "unique." Thirteen acres of land in two parcels on the northwest and southeast peripheries of the site have been classified as farmland of "statewide importance" by the U.S. Department of Agriculture Soil Conservation Service under the Prime Farmland Protection Act. About six acres of this land will be used for storage of surplus soil as part of the Landfill, while the remainder will not be developed under this permit. This requirement is no longer required by the DWMRC but is included for informational purposes.

  Source: Domeier, Mike, Utah Department of Agriculture, Salt Lake City, Utah. See letters dated November 9, 1995, and December 29, 1995.

  Source: Jay Hardy, Box Elder County Commissioner. See letter dated January 18, 1996.

  Source: Bohn, Ralph T., Utah Department of Solid and Hazardous Waste, Salt Lake City, Utah. See Letter dated January 29, 1996.

- The facility is not within one-fourth mile of:

  a) Existing permanent dwellings, residential areas, and other incompatible structures such as schools or churches.

  Source: Field investigation by Gary F. Player, Principal Geologist, Tahoma Companies, Inc., July 26, 1995. See memorandum of that date.

b) Historic structures or properties listed or eligible to be listed in the State of National Register of Historic Places.

Source: Dykmann, James L., State of Utah, Utah State Historical Society. See letter dated September 6, 1995.

- The facility is not within 10,000 feet of any airport runway end used by turbojet aircraft or within 5,000 feet of any airport runway used by any piston-type aircraft.

  Source: Fredrickson, Scott, U.S. Federal Aviation Agency, Denver, CO. See letter to him dated October 12, 1995.

- The facility is not within an archaeological site that would violate Section 9-8-204.

  Source: Dykmann, James L., State of Utah, Utah State Historical Society. See letter dated September 6, 1995.

- The facility is not within an area that is at a variance with the Box Elder County land use plan or zoning requirements.

  Source: Beecher, Denton, Zoning Administrator and County Surveyor. See letter to him dated October 13, 1995.

3.1.2 Geology

3.1.2.1 Geologic Hazards

The Utah State Regulations indicate "No new facility or lateral expansion of an existing facility shall be located in a subsidence area, a dam failure flood area, above an underground mine, above a

salt dome, above a salt bed, or on or adjacent to geologic features which could compromise the structural integrity of the facility".

The Little Mountain Landfill is not adjacent to geologic features that could compromise the structural integrity of the facility. The Little Mountain Landfill is not in a subsidence area, a dam failure flood area, and underground a salt dome, a salt bed or mine.

3.1.2.2 Fault Areas

A new landfill may not be located within 200 feet of an active (Holocene) fault. Suzanne Hecker (1993) completed an inventory of active faults in Utah for the Utah Geological Survey. Her map shows that the closest active faults to Little Mountain occur at the western edge of the Wasatch Mountains, east of Brigham City and approximately 10 miles from Little Mountain.

The expected maximum ground acceleration from a large earthquake at this site with a two (2) percent probability of exceedance in 50 years is 0.42g (United States Geologic Survey's (USGS) Earthquake Hazards Program - National Seismic Hazard Mapping Project). These values are estimated ground surface accelerations for a "firm rock" site, which is identified as having a shear-wave velocity of 760 m/sec in the top 30 meters. Sites with different soil types may experience amplification or de-amplification of these values. The site is situated within the International Building Code (IBC) Region 2. Based on our field investigation, it is our opinion the soils at this site are representative of a "stiff soil" profile having an average shear wave velocity $600 \leq \bar{U}_S \leq 1{,}200$ (ft/sec) in the top 100 feet, best represented by IBC Site Class D having Site Coefficients of F_a= 1.13 and F_v=1.71. A summary of the anticipated horizontal acceleration and site coefficients are contained in the following table.

Spectral Period	Mapped Spectral Acceleration, S_s and S_1 (g)	Site Coefficient, F_a and F_v	Mapped Spectral Acceleration x Site Coefficient (g)
0.2 sec (short)	1.372	1.0	1.372
1.0 sec (long)	0.560	1.3	0.728
IBC 1615.1.3 recommends scaling the MCE value by 2/3 to obtain the design spectral response acceleration values.			

3.1.2.3 Seismic Impact Zone

The EPA and the DWMRC define a seismic impact zone as any location with a 10% or greater probability that the maximum horizontal acceleration (MHA) in lithified earth material, expressed as a percentage of the earth's gravitational pull, will exceed 0.10g in 250 years. Tahoma Companies, Inc. conducted a seismic study in 1995 and indicated there was a 10 percent chance in 250 years that the area could experience horizontal accelerations of 0.60g. As mentioned previously, updated mapping by USGS Earthquake Hazards Program – National Seismic Hazard Mapping Project indicates the predicted Maximum Horizontal Acceleration (MHA) at the site is 0.42g. Therefore, the site does lie within a Seismic Impact Zone.

The MHA in lithified earth material is defined in 40 CFR part 258.14 (EPA 1991) as the "maximum expected horizontal acceleration depicted on a seismic hazard map with a 90% or greater probability that the acceleration will not be exceeded in 250 years, or the maximum expected horizontal acceleration based on site specific seismic risk assessment." This definition was adopted in full by the UDEQ. The acceleration value of approximately 0.42g was obtained from the United States Geologic Survey's (USGS) Earthquake Hazards Program – National Seismic Hazard Mapping Project. The value is an estimated ground surface acceleration of a "firm rock" site, which is identified as having a shear-wave velocity of 760 m/sec in the top 30 meters; sites with different

soil types may amplify or de-amplify this value. Section 3.1.2.4 discusses the analyses performed for this permit application and refers to analysis performed by others.

3.1.2.4 Seismic Impact Zone Analysis

A seismic study was performed by Tahoma Companies, Inc. in May of 1996, and was included as attachment 17 to the initial Permit Application for Little Mountain Landfill also dated May 1996. IGES performed a review of Tahoma's seismic study and felt additional analysis should be performed based on the new landfill geometry, more recent and updated data available pertaining to the waste strength properties and the updated MHA value mentioned previously.

Based on the change to the landfill geometry, new cross-sections of the bottom excavation and final cover were generated and used in modeling static and dynamic stability. The most critical sections of the bottom excavation and final cover were modeled. These sections and slope stability modeling are presented in Appendix K.

Municipal Solid Waste (MSW) unit weight and strength properties provided by Tahoma were reviewed. Tahoma had used a value of 50.73 pounds per cubic foot (pcf). Based on the daily cover and compaction processes currently in use at the Little Mountain Landfill we feel 51 pcf is relatively accurate representation of the MSW unit weight.

Based on a large-scale direct shear test performed in-situ to measure strength properties of MSW, Withiam et al, 1995, obtained a friction angle of 30 degrees and a cohesion value of 200 psf. Other work by Kavazanjian et al, 1995, suggest a friction angle of 33 degrees for MSW and a shear strength of 500 psf below a normal stress of 627 psf. Based on this information a value of 30 degrees for the angle of internal friction and 150 psf for the cohesion were used to define the strength properties of the Little Mountain MSW. These parameters compare to MSW strength properties of 20 degrees for the angle of internal friction and 50 pounds per square foot (psf) for cohesion used by Tahoma.

Strength properties of the on-site silt and sandy silt soils were estimated by Tahoma to have a friction angel of 32 degrees and a cohesion of 150 psf as well as a unit weight of 105.5 pcf. No basis for these values, such as laboratory testing, was presented. However, these values seem appropriate for the site soils and no modifications were made. The soil and MSW properties used in the seismic analysis are summarized below.

Property	Soil	MSW
Unit Weight (pcf)	105.5	51
Cohesion (psf)	150	150
Internal Friction Angle (deg.)	32	30

Static and pseudo-static analyses of the slope sections were performed using critical sections of the landfill geometry and the soil and waste parameters outlined previously. Results are presented in Appendix I. The static and pseudo-static slope stability analyses were completed using the computer program SLIDE (v. 5.027).

To estimate the potential amplification of the bedrock or “firm rock” acceleration of 0.42g as it travels up to the surface and then to the top of the Landfill, the simplified approach developed by GeoSyntec (1994) was used. This method uses information from Sing and Sun (1995) and Kavazanjian and Matasovic (1995) in a three-step procedure to estimate the potential amplification. The three-step procedure is outlined as follows:1) classify the soils in the top 100 feet; 2) estimate the free field peak ground surface acceleration; and 3) estimate the peak acceleration at the top of the landfill.

Based on the soil profile identified by Tahoma Companies, Inc. the upper 100 feet of material classifies as a stiff site (stiff to very dense soil according to IBC 2003). Therefore, the free field peak ground surface acceleration is assumed to be approximately equal to the peak bedrock acceleration and the maximum horizontal acceleration (MHA) at the ground surface is considered to be 0.42g using the analytical data from Kavazanjian and Matasovic (1994). Based

on this information and maximum fill height of 100 feet, the peak acceleration at the top of the Landfill was estimated to be 0.51g using the analytical data from and Singh and Sun (1995). Appropriately, an average acceleration of 0.465g was used in the stability analysis and deformation screening performed for the waste mass (Repetto et al., 1993).

Hynes and Franklin (1984) performed several Newmark seismic deformation analyses on embankments using 387 strong motion records and 6 artificial accelerograms. The analyses performed considered the yield accelerations (minimum acceleration to cause failure) of the slope sections evaluated by pseudo-static methods and compared them to the anticipated horizontal embankment accelerations. Based on these analyses performed by Hynes and Franklin, deformations are anticipated to be one foot or less if the yield acceleration is greater than or equal to one-half the horizontal acceleration of the waste mass. Therefore, using a horizontal acceleration of 0.232g (or greater) which results in a pseudo-static factor of safety of 1.0 or greater indicates satisfactory performance of the waste mass under seismic conditions (deformation less than 1 foot).

A summary of the static and seismic (pseudo-static and deformation) analyses is presented below. A graphic presentation of the static and dynamic analysis is provided in Appendix K.

Section	Static Factor of Safety	Pseudo-Static Factor of Safety	Yield Acceleration	Deformation (feet)
A (Excavation)	2.47	1.37	0.40g	<1
B (Final Cover)	2.99	1.57	0.48g	<1
C (Final Cover)	3.14	1.64	0.51g	<1

Typical allowable limits in stability analyses are a minimum factor of safety of 1.5 during static conditions, a minimum factor of safety of 1.0 during pseudo-static (seismic) conditions, and a maximum allowable deformation of 1 foot. Based on the results of the analyses performed

using the planned geometry of the landfill with 3H:1V excavation slopes in the bottom of the landfill and 4H:1V slopes in the final cover, the stability of the slopes is above the minimum standards.

3.1.2.5 Unstable Areas

The owner or operator of a landfill must consider several factors when determining whether and area is unstable. Among them are soil conditions, geologic or geomorphic features, and human-made features or events at the surface and in the subsurface.

Soil conditions at the Little Mountain Landfill site are well suited for construction of a landfill. Little Mountain is an isolated mountain surrounded by the lowlands of Bear River Valley. Soils in this valley consist mainly of silt and clay deposited under ancient Lake Bonneville. These soils are soft and cohesive. Lesser amounts of sand and gravel occur in the flood plain of Bear River and in ancient beach deposits of Lake Bonneville. Drilling on the Salt Lake Desert valley floor has disclosed silt and clay deposits greater than 1,200 feet thick.

Lake Bonneville covered much of Box Elder County, including Little Mountain, during higher stands of the ancient lake. The huge lake left numerous terraces, gravel bars and sand spits along the margins of the hills and mountains, and on the flat surface of the Great Salt Lake Desert. Thick deposits of silt and clay occur on Little Mountain: a test boring at the Little Mountain Landfill site showed that Bonneville clay, silt, and lesser amounts of sand and gravel are present to a depth of at least 200 feet.

Coarser soils occur at the base of steep limestone bedrock slopes on Little Mountain. These sand and gravel soils consist mainly of fragments of weathered limestone and less common sandstone. The coarse fragments have accumulated in talus slopes and alluvial fans along with a mixed matrix of silt and clay.

Bedrock is covered at the landfill site by approximately 200 feet of silt, clay and lesser quantities of sand and gravel deposited by ancient Lake Bonneville. Bedrock is exposed only in the hillsides surrounding the alpine pasture. Steeply sloping hillsides to the southeast and northwest are underlain by limestone of the Great Blue, Humbug and Lodgepole Formation. A northwest to southeast trending line north of the site consists of limestone and sandstone of the Oquirrh Formation. All bedrock units are hard and difficult to erode or excavate.

Bedrock formations in the mountains are very old. The rocks were faulted and folded during several intervals of active compression. Compression of the rocks was caused by collisions between the North American and Pacific tectonic plates along the Pacific coast. The area between eastern California and the Colorado Plateau was gradually pushed into a mountainous highland.

About four million years ago, compression ceased when relative motion of the Pacific tectonic plate along the west coast of North America was directed to the north along the San Andreas fault system. Release of the coastal compression allowed the mountains or western Utah and Nevada to expand from east to west. Portions of the mountains between the eastern Sierra Nevada Mountains of California and the Wasatch Mountains of Utah stayed at relatively high elevations, while other portions collapsed, forming the lowland basins.

Local and onsite geologic and geomorphic features are stable. A small subsidence area approximately 400 feet in diameter and 50 feet deep occurs about 5,000 feet southwest from the center of the Little Mountain Landfill. This feature is a very old solution structure in limestone that has subsequently been partially filled with fine-grained Bonneville soils. The feature is now stabilized by the Bonneville soils.

Further solution of the limestone by ground water is not possible under present conditions. Ground water levels have been proven deeper than 300 feet below the level of the landfill by drilling and are probably much greater.

- The landfill site is about 700 feet above the level of the Bear River Valley.

- Fresh water springs do not occur along the base of the mountain, suggesting that little if any ground water occurs in Little Mountain.

One test boring was drilled to a total depth of 300 feet BGL. The boring was plugged with bentonite clay to eliminate any potential for transmitting surface waters through the Bonneville soils to the underlying fractured limestone

3.1.3 Surface Water

DWMRC has adopted Subtitle D location restrictions for floodplains and wetlands. The Little Mountain Landfill site is not within a floodplain. However, one poorly developed drainage traversed the western boundary of Section 18. The drainage is intermittent, carrying only water from snowmelt or run-off from occasional thunderstorms. All potential run-on water from the drainage will be diverted around the landfill site by shallow ditches or low berms. The Landfill development is not in a wetland.

No permanent impoundments of surface water (except for the 2 evaporation ponds) or perennial streams are present within a one-mile radius of the landfill.

3.1.4 Groundwater Requirements

DWMRC location restrictions with respect to groundwater protection include the following:

- No new facility shall be located at a site where the bottom of the lowest liner is less than 5 feet above historical high level of groundwater in the uppermost aquifer.

- No new facility shall be located over a sole source aquifer as designated in 40 CFR 149.

- No new facility shall be located over groundwater classified as IB under Section R317-6-3.3 (an irreplaceable aquifer).

- A new facility located above any aquifer containing groundwater which has a total dissolved solids (TDSs) content below 1,000 milligrams per liter (mg/l) and does not exceed applicable groundwater quality standards for any contaminant is permitted only where the depth to groundwater is greater than 100 feet. For a TDS content between 1,000 and 3,000 mg/l, the separation must be 50 feet or greater. These separation distance requirements are waived if the landfill is constructed with a composite liner.

- No new facility shall be located in designated drinking water source protection areas or, if no such protection area is designated, within a distance to existing drinking water wells or springs for public water supplies of 250-day groundwater travel time

3.1.4.1 Little Mountain Landfill Groundwater

The lowest point of the bottom of the landfill (4830 feet above mean sea level) is at least 5 feet above any shallow perched groundwater (none observed at the site) and at least 300 feet above the highest potentially usable aquifer. Therefore, the landfill meets the requirements of the groundwater protection location restrictions.

Groundwater beneath the landfill area is of Class I quality, with a TDS of less than 500 mg/l. It is not a sole source or Class IB (irreplaceable aquifer). Usable drinking water wells are generally drilled to greater than 400-foot depths within a 1-mile radius of the site. A groundwater transport study was not conducted as part of this investigation.

With a TDS concentration less than 1,000 mg/L the minimum separation between the lowest elevation of the landfill and groundwater must be at least 100 feet. The test boring drilled at the site showed that the minimum depth to ground water is greater than 300 feet BGL.

Therefore, the minimum separation distances between the landfill bottom and fresh ground water, if present, would be exceeded.

No public water systems or impoundments are present near the landfill site. The landfill development is not part of a watershed used for municipal drinking water, nor is it in a location that could cause contamination to a lake, reservoir, or pond. A covered concrete reservoir tank holding approximately 200,000 gallons of water is present one mile south of the landfill site. The tanks are owned and operated by West Corrine Water Company. Potential run-off from the landfill site could only travel to the northwest, away from the concrete tank.

3.2 CLOSURE PLAN - EXISTING AND FUTURE LANDFILL OPERATION

Section 4 of Part II detail the closure plans for the Little Mountain Landfill.

3.3 POST-CLOSURE PLAN - EXISTING AND FUTURE LANDFILL OPERATION

Section 5 of Part II detail the post-closure plan for the Little Mountain Landfill.

3.4 POST-CLOSURE LAND USE - EXISTING AND FUTURE LANDFILL OPERATION

BECSW will design a post-closure land use plan to be implemented at the Little Mountain Landfill within 5 years prior to the end of the landfill's life. BECSW will select an end use for the landfill consistent with good landfilling practices. The final land use selected for the Little Mountain Landfill will be based upon maintaining a functional landfill cover. Land use activities will be approved by Box Elder County prior to implementation. Typical end uses range from recycling operations (which complement existing operations) to recreational activities. Since the closure of the site may be over 20 years away, it is not currently possible to develop those land use plans to be consistent with surrounding land uses and the needs of the county that may be relevant at that future time.

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Application Checklist

I. **Facility General Information**	
Description of Item	Location In Document
Ia. Information Required for All Class I and V Landfills	
Completed Part I General information Form	Part I
General description of the facility (R315-310-3(1)(b))	Part II – Sect. 1.0
Legal description of property (R315-310-3(1)(c))	Part II – Sect. 2.0 Appendix B
Proof of ownership, lease agreement, or other mechanism (R315-310-3(1)(c))	Part II – Sect. 2.0 Appendix B
Area served by the facility including population (R315-310-3(1)(d))	Part II – Sect 1.1
If the permit application is for a class I landfill a demonstration that the landfill is not a commercial facility	Part I
Waste type and anticipated daily volume (R315-310-3(1)(d))	Part II – Sect. 1.2
Ib. Information Required for All New Or Laterally Expanding Class I and V Landfills	
Intended schedule of construction (R315-302-2(2)(a))	Not Applicable
Name and address of all property owners within 1000 feet of the facility boundary (R315-310-3(2)(a)(i))	Not Applicable
Documentation that a notice of intent to apply for a permit has been sent to all property owners listed above (R315-310-3(2)(ii))	Not Applicable
Name of the local government with jurisdiction over the facility site (R315-310-3(2)(iii))	Not Applicable
Ic. Location Standards for All New Or Laterally Expanding Class I and V Landfills (R315-302-1)	
Documentation that the facility has met the historical survey requirement of R315-302-1(2)(f)	Not Applicable
Land use compatibility (R315-302-1(2)(a))	Not Applicable
Maps showing the existing land use, topography, residences, parks, monuments, recreation areas or wilderness areas within 1000 feet of the site boundary	Not Applicable
Certifications that no ecologically or scientifically significant areas or endangered species are present in site area	Not Applicable
List of airports within five miles of facility and distance to each	Not Applicable
Geology (R315-302-1(2)(b))	Not Applicable
Geologic maps showing significant geologic features, faults, and unstable areas	Not Applicable
Maps showing site soils	Not Applicable
Surface water (R315-302-1(2)(c))	Not Applicable
Magnitude of 24 hour 25 year and 100 year storm events	Not Applicable

I. **Facility General Information**	
Description of Item	Location In Document
Average annual rainfall	Not Applicable
Maximum elevation of flood waters proximate to the facility	Not Applicable
Maximum elevation of flood water from 100 year flood for waters proximate to the facility	Not Applicable
Wetlands (R315-302-1(2)(d))	Not Applicable
Ground water (R315-302-1(2)(e))	Not Applicable
Id. Plan of Operations Requirements for All Class I And V Landfills (R315-310-3(1)(e) and R315-302-2(2))	
Forms and other information as required in R315-302-2(3) including a description of on-site waste handling procedures and an example of the form that will be used to record the weights or volumes of waste received (R315-302-2(2)(b) And R315-310-3(1)(f))	Part II – Sect. 3.0 Appendix C
Schedule for conducting inspections and monitoring, and examples of the forms that will be used to record the results of the inspections and monitoring (R315-302-2(2)(c), R315-302-2(5)(a), and R315-310-3(1)(g))	Part II – Sect 3.0 Appendix C
Contingency plans in the event of a fire or explosion (R315-302-2(2)(d))	Part II – Sect. 3.5
Corrective action programs to be initiated if ground water is contaminated (R315-302-2(2)(e))	Part II – Sect. 3.5
Contingency plans for other releases, e.g. explosive gases or failure of run-off collection system (R315-302-2(2)(f))	Part II – Sect. 3.5
Plan to control fugitive dust generated from roads, construction, general operations, and covering the waste (R315-302-2(2)(g))	Part II – Sect. 3.8
Plan for litter control and collection (R315-302-2(2)(h))	Part II – Sect. 3.8
Description of maintenance of installed equipment (R315-302-2(2)(i))	Part II – Sect. 3.7
Procedures for excluding the receipt of prohibited hazardous or PCB containing wastes (R315-302-2(2)(j))	Part II – Sect. 3.3
Procedures for controlling disease vectors (R315-302-2(2)(k))	Part II – Sect. 3.8
A plan for alternative waste handling (R315-302-2(2)(l))	Part II – Sect. 3.6
A general training plan for site operations (R315-302-2(2)(o))	Part II – Sect. 3.16
Any recycling programs planned at the facility (R315-303-4(6))	Part II – Sect. 3.9
Closure and post-closure care Plan (R315-302-2(2)(m))	Part II – Sect. 4 Part II – Sect. 5
Procedures for the handling of special wastes (R315-315)	Part II – Sect. 3.2.4
Plans and operation procedures to minimize liquids (R315-303-3(1))	Part II – Sect. 3.2
Plans and procedures to address the requirements of R315-303-3(7)(c) through (i) and R315-303-4	Part II – Sect. 1 Part II – Sect. 3

I. **Facility General Information**	
Description of Item	Location In Document
Any other site-specific information pertaining to the plan of operation required by the Director (R315-302-2(2)(p))	Part II – Sect. 3
Ie. Special Requirements for New Or Laterally Expanding Class V Landfill (R315-310-3(3))	
Submit information required by the *Utah Solid and Hazardous Waste Act* Subsections 19-6-108(9) and 19-6-108(10) (R315-310-3(2)(a))	Not Applicable
Note the following information must be provided following issuance of the permit but prior to Director approval to take waste for a new Class V facility.	
Approval from the local government within which the solid waste facility sits	Not Applicable
Approval from the Legislature and the Governor	Not Applicable

II **Facility Technical Information**	
Description of Item	Location In Document
IIa. Maps for All Class I and V Landfills	
Topographic map drawn to the required scale with contours showing the boundaries of the landfill unit, ground water monitoring well locations, gas monitoring points, and the borrow and fill areas (R315-310-4(2)(a)(i))	Appendix A
Most recent U.S. Geological Survey topographic map, 7-1/2 minute series, showing the waste facility boundary; the property boundary; surface drainage channels; any existing utilities and structures within one-fourth mile of the site; and the direction of the prevailing winds (R315-310-4(2)(a)(ii))	Appendix A
IIb. Geohydrological Assessment for All Class I and V Landfills (R315-310-4(2)(b))	
Local and regional geology and hydrology including faults, unstable slopes and subsidence areas on site (R315-310-4(2)(b)(i))	Part III – Sect. 2
Evaluation of bedrock and soil types and properties including permeability rates (R315-310-4(2)(b)(ii))	Part III – Sect. 2
Depth to ground water (R315-310-4(2)(b)(iii))	Part III – Sect. 2
Direction and estimated flow rate of ground water (R315-310-4(2)(b)(iv))	Part III – Sect. 2
Quantity, location, and construction of any private or public wells on-site or within 2,000 feet of the facility boundary (R315-310-4(2)(b)(v))	Part III – Sect. 2
Tabulation of all water rights for ground water and surface water on-site and within 2,000 feet of the facility boundary (R315-310-4(2)(b)(vi))	Part III – Sect. 2
Identification and description of all surface waters on-site and within one mile of the facility boundary (R315-310-4(2)(b)(vii))	Part III – Sect. 2
Background ground water and surface water quality assessment and, for an existing facility, identification of impacts upon the ground water and surface water from leachate discharges (R315-310-4(2)(b)(viii))	Part III – Sect. 2
Ground Water Monitoring (R315-303-3(7)(b) and R315-308)	Part III – Sect. 2

II Facility Technical Information	
Description of Item	Location In Document
Statistical method to be used (R315-308-2(8))	Part III – Sect. 2
Calculation of site water balance (R315-310-4(2)(b)(ix))	Part III – Sect. 1.3
IIc. Engineering Report - Plans, Specifications, And Calculations for All Class I and V Landfills	
Documentation that the facility will meet all of the performance standards of R315-303-2	Part II Part III
Engineering reports required to meet the location standards of R315-302-1 including documentation of any demonstration or exemption made for any location standard (R315-310-4(2)(c)(i))	Part III – Sect. 3
Anticipated facility life and the basis for calculating the facility's life (R315-310-4(2)(c)(ii))	Part III – Sect. 1.1
Cell design to include liner design, cover design, fill methods, elevation of final cover including plans and drawings signed and sealed by a professional engineer registered in the State of Utah (R315-303-3(3), R315-303-3(6) and (7)(a), R315-310-3(1)(b) and R315-310-4(2)(c)(iii))	Part III – Sect. 1.1
Leachate collection system design and calculations showing system meets the requirements of R315-303-3(2)	Part III – Sect. 1.1
Equipment requirements and availability (R315-310-4(2)(c)(iii))	Part II – Sect. 1.4 Part III – Sect. 1.1
Identification of borrow sources for daily and final cover and for soil liners (R315-310-4(2)(c)(iv))	Part III – Sect. 1.1
Run-On and run-off diversion designs (R315-303-3(1)(c), (d) and (e))	Part III – Sect. 1.3
Leachate collection, treatment, and disposal and documentation to show that any treatment system is being or has been reviewed by the Division of Water Quality (R315-310-4(2)(c)(v) and R315-310-3(1)(i))	Part III – Sect. 1.2
Ground water monitoring plan that meets the requirements of Rule R315-308 including well locations, design, and construction (R315-310-4(2)(b)(x) and R315-310-4(2)(c)(vi))	Part III – Sect. 1.2
Landfill gas monitoring and control plan that meets the requirements of Subsection R315-303-3(5) (R315-310-4(2)(c)(vii))	Part III – Sect. 1.2
Slope stability analysis for static and under the anticipated seismic event for the facility (R315-310-4(2)(b)(i) and R315-302-1(2)(b)(ii))	Part III – Sect. 3.1
Design and location of run-on and run-off control systems (R315-310-4(2)(c)(viii))	Part III – Sect. 1.3
IId. Closure Plan for All Class I and V Landfills (R315-310-3(1)(h))	
Closure Plan (R315-302-3(2) and (3))	Part II – Sect. 4
Closure schedule (R315-310-4(2)(d)(i))	Part II – Sect. 4
Design of final cover (R315-303-3(4) and R315-310-4(2)(c)(iii))	Part III – Sect. 1.1
Capacity of site in volume and tonnage (R315-310-4(2)(d)(ii))	Part I
Final inspection by regulatory agencies (R315-310-4(2)(d)(iii))	Part II – Sect. 4.3
IIe. Post-Closure Care Plan for All Class I and V Landfills (R315-310-3(1)(h))	

II **Facility Technical Information**	
Description of Item	Location In Document
Post-Closure Plan (R315-302-3(5) and (6))	Part II – Sect. 5
Site monitoring of landfill gases, ground water, and surface water, if required (R315-310-4(2)(e)(i))	Part II – Sect. 5
Changes to record of title, land use, and zoning restrictions (R315-310-4(2)(e)(v))	Part II – Sect. 5
Maintenance activities to maintain cover and run-on/run-off control systems (R315-310-4(2)(e)(iii))	Part II – Sect. 5
List the name, address, and telephone number of the person or office to contact about the facility during the post-closure care period (R315-310-4(2)(e)(vi))	Part II – Sect. 5
IIf. Financial Assurance for All Class I and V Landfills (R315-310-3(1)(j))	
Identification of closure costs including cost calculations (R315-310-4(2)(d)(iv)) and (R315-302-2(2)(n))	Part II – Sect. 6
Identification of post-closure care costs including cost calculations (R315-310-4(2)(e)(iv))	Part II – Sect. 6
Identification of the financial assurance mechanism that meets the requirements of Rule R315-309 and the date that the mechanism will become effective (R315-309-1(1))	Part II – Sect. 6

APPENDICES

APPENDIX A – Drawings

1. Title Sheet and Location Map
2. General Arrangement
3. Cell Development
4. Cell Excavation
5. Final Cover Grading Plan
6. Closure Phases
7. Elevation View
8. Details

APPENDIX B – Legal Description and Proof of Ownership

APPENDIX C – Landfill Forms

Box Elder County Landfill Daily Log
Daily Checklist
Box Elder County Landfill Operator Inspection Form
Box Elder County Landfill Supervisor Inspection Form
Box Elder County Solid Waste Landfill Gas Log
Box Elder County Solid Waste Random Load Inspection Form

APPENDIX D – Run-On/Run-Off Data Calculations and Drainage Channel Design

APPENDIX E – Closure/Post Closure Costs

APPENDIX F – PTIF Statement

APPENDIX G – Landfill Life

APPENDIX H – DWMRC (Formerly DSHW) Correspondence

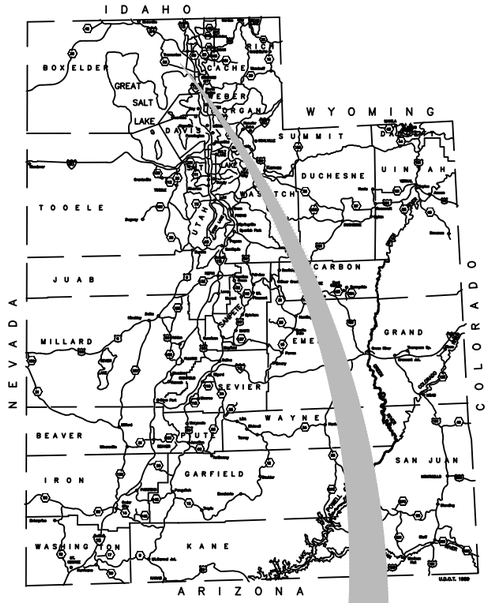
APPENDIX I – Test Pit Logs and Lab Data

APPENDIX J – Land Use

APPENDIX K – Slope Stability

APPENDIX A

BOX ELDER COUNTY LANDFILL
(LITTLE MOUNTAIN LANDFILL)
BOX ELDER COUNTY, UTAH
2021 PERMIT UPDATE



SITE VICINITY MAP - 1"=4000'

SITE MAP - 1"=500'

LIST OF DRAWINGS

1	TITLE SHEET
2	GENERAL ARRANGEMENT
3	CELL DEVELOPMENT
4	CELL EXCAVATION
5	FINAL COVER GRADING PLAN
6	CLOSURE PHASES
7	ELEVATION VIEW
8	DETAILS

REFERENCE:
ADAPTED FROM MAP
PROVIDED BY CLIENT.

BOX ELDER COUNTY SOLID WASTE
9595 W. 6800 N.
BOX ELDER COUNTY, UT
(435)744-2275

CONSULTANTS

IGES
2702 South 1030 West, Suite 10
Salt Lake City, Utah 84119
(801)270-9400 Fax: (801)270-9401

MARK	DATE	DESCRIPTION
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SHEET TITLE

BOX ELDER LANDFILL
TITLE
SHEET

1

REFERENCE:
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0 75 150 300 450
SCALE IN FEET

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BOX ELDER LANDFILL
GENERAL ARANGEMENT

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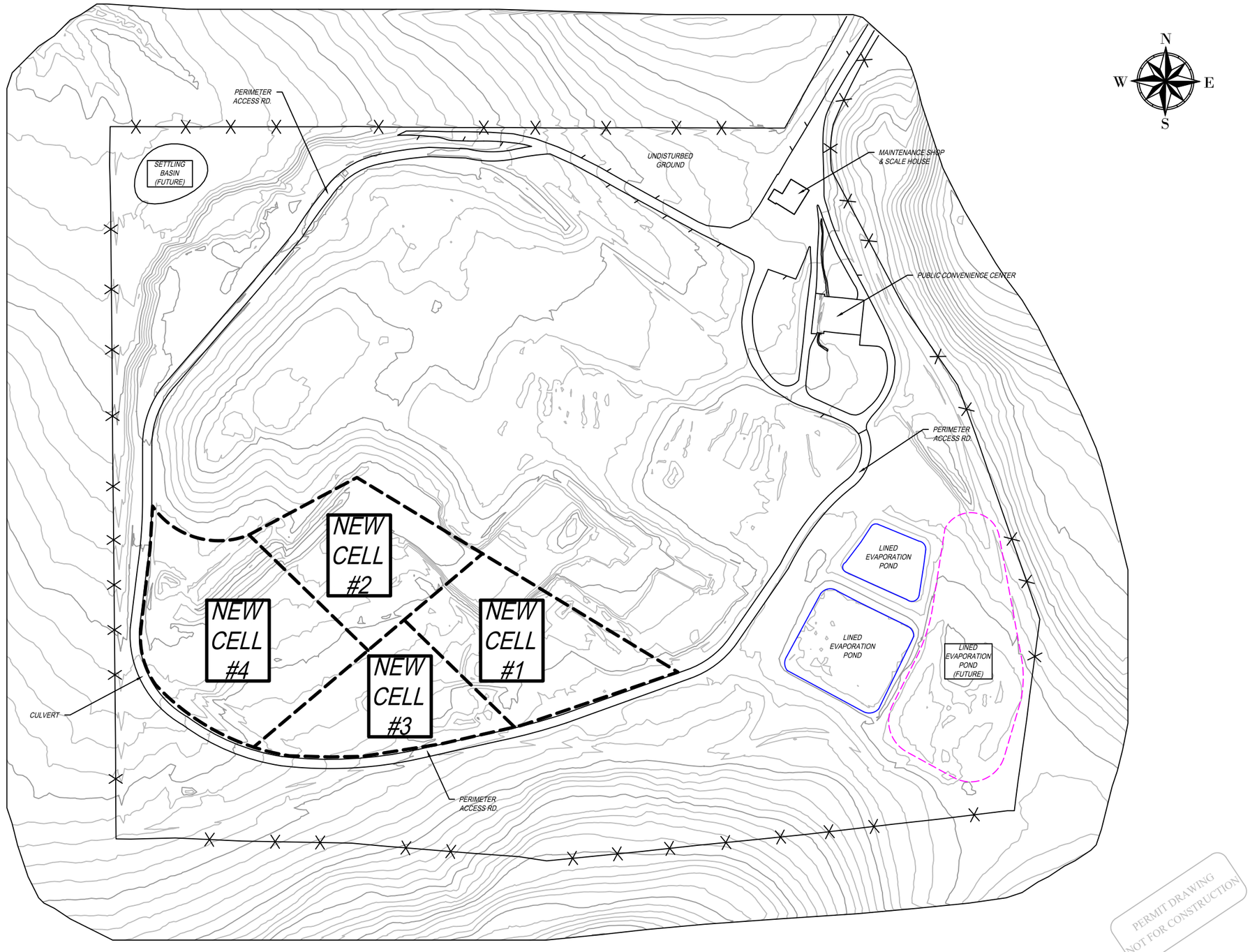

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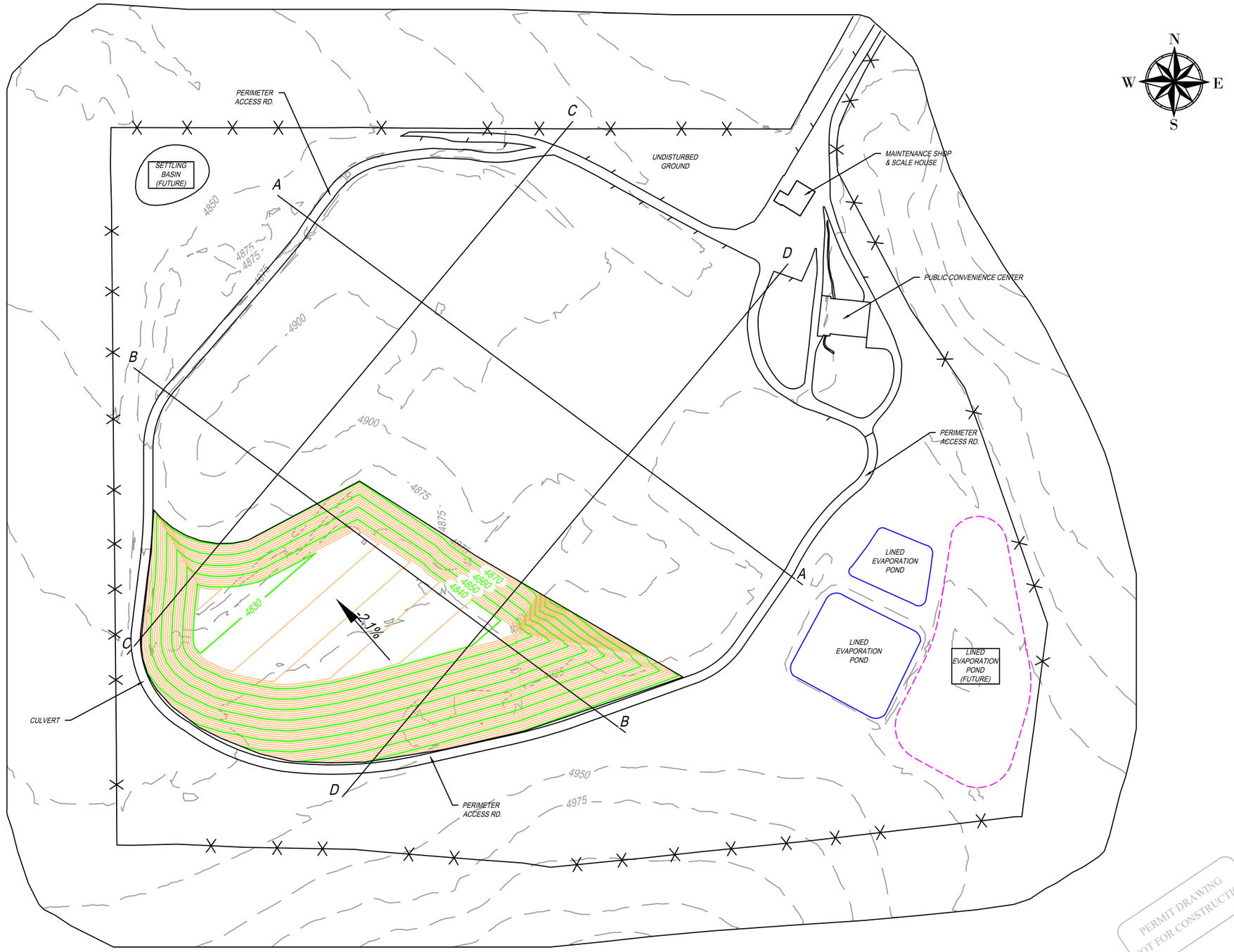
BOX ELDER LANDFILL
CELL DEVELOPMENT

3



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BOX ELDER COUNTY

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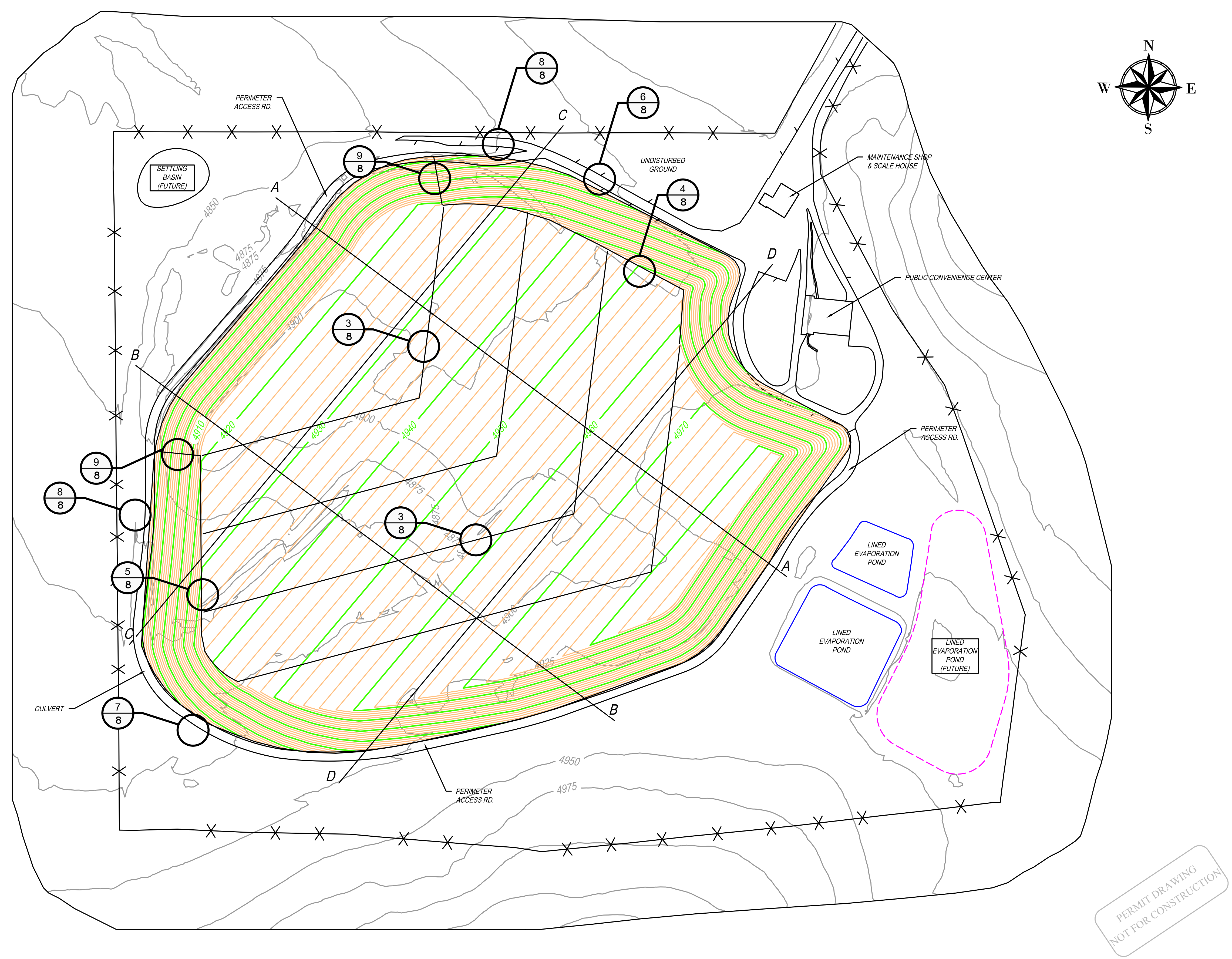
BOX ELDER LANDFILL

CELL EXCAVATION

4



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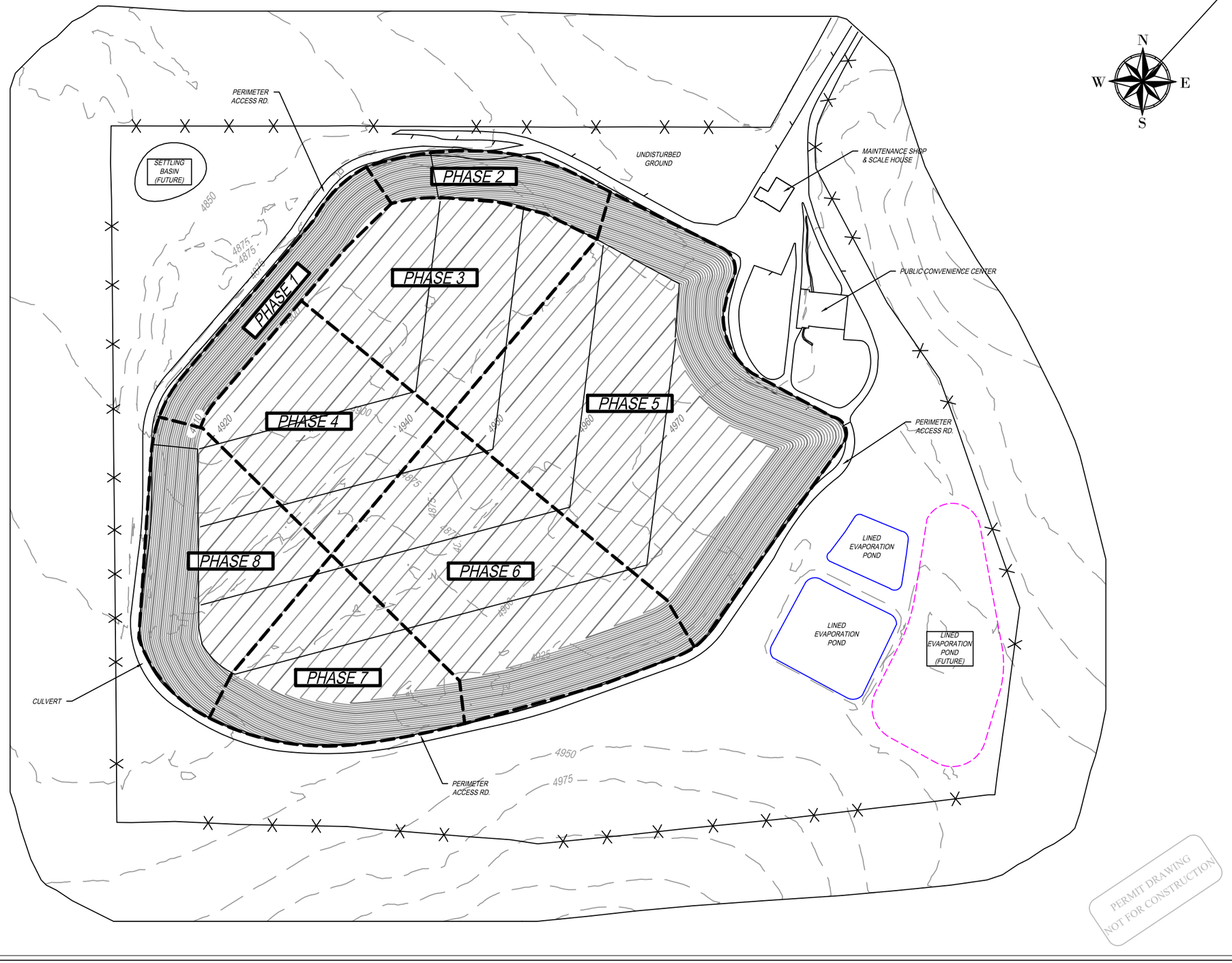
BOX ELDER LANDFILL
FINAL COVER GRADING PLAN

5



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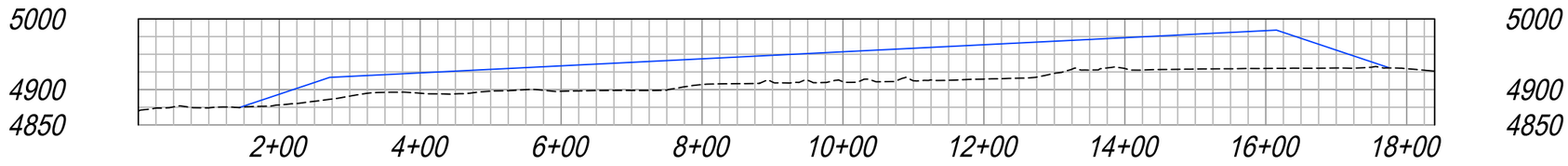
BOX ELDER LANDFILL

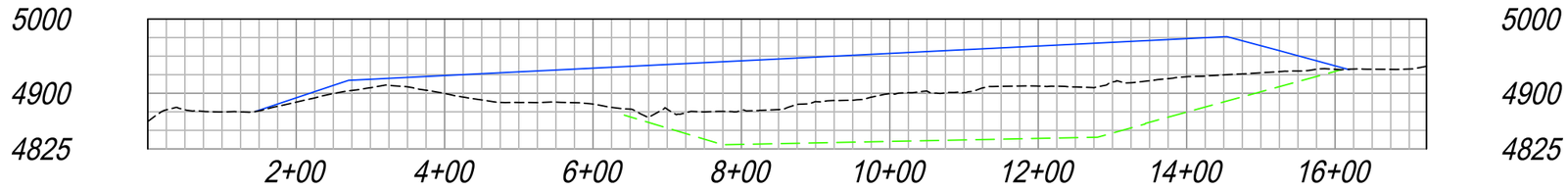
CLOSURE PHASES

6

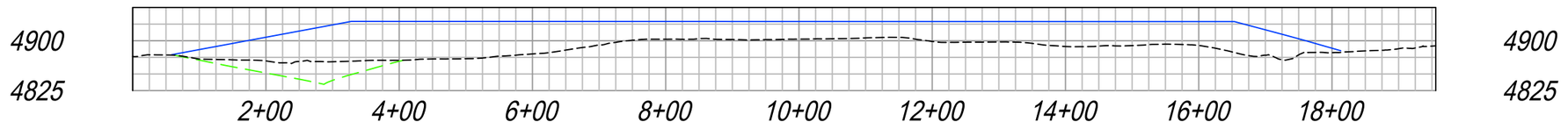
Section A PROFILE



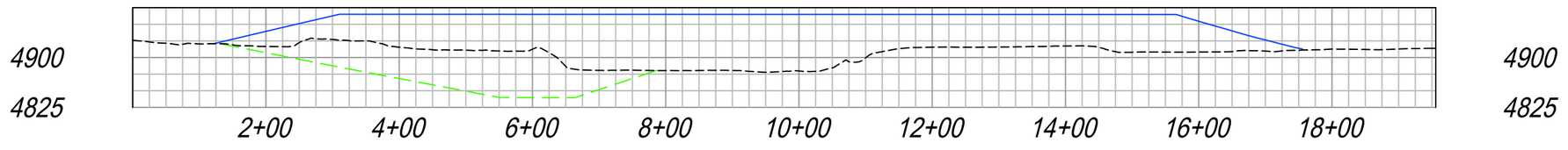
Section B PROFILE



Section C PROFILE



Section D PROFILE



EXISTING GROUND

CELL EXCAVATION

FINAL COVER SURFACE

PERMIT DRAWING
NOT FOR CONSTRUCTION

REFERENCE:
ADAPTED FROM MAP
PROVIDED BY CLIENT.

0 75 150 300 450
SCALE IN FEET

BOX ELDER COUNTY SOLID WASTE
9595 W. 6800 N.
BOX ELDER COUNTY, UT
(435)744-2275

CONSULTANTS

IGES
2702 South 1030 West, Suite 10
Salt Lake City, Utah 84119
(801)270-9400 Fax: (801)270-9401

MARK	DATE	DESCRIPTION
	10/5/21	DRAFT

ISSUE:	
PROJECT NO.:	00167-013
CAD DWG FILE:	00167/013/Drafting/BELF Planning
DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	GA
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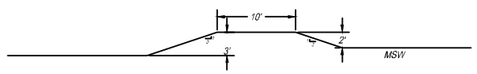
SHEET TITLE

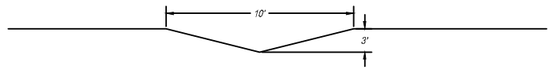
BOX ELDER LANDFILL

ELEVATION VIEW

7



DETAIL (NTS) RUN-ON CONTROL BERM 1/2



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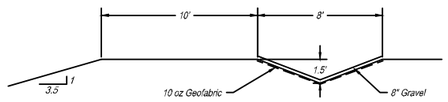
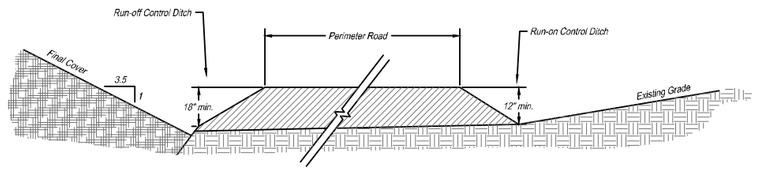
DETAIL (NTS) DIVERSION BERM 3/5

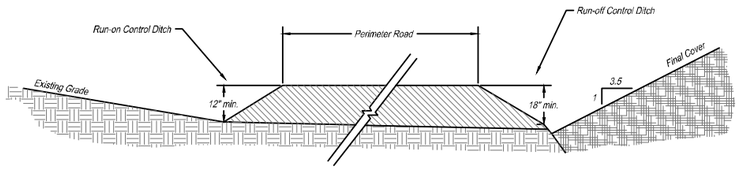
DETAIL (NTS) DIVERSION DITCH 4/5



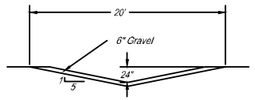
DETAIL (NTS) DIVERSION DITCH 5/5



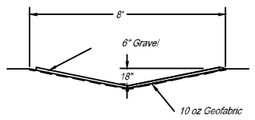
DETAIL (NTS) TYPICAL PERIMETER ROAD SECTION 6/5



DETAIL (NTS) TYPICAL PERIMETER ROAD SECTION 7/5



DETAIL (NTS) DRAINAGE SWALE 8/5



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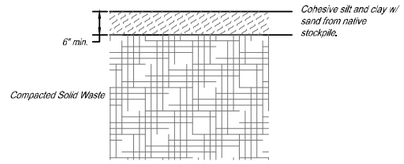
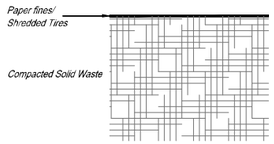
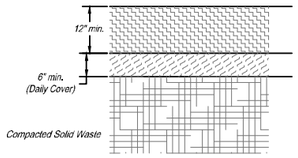


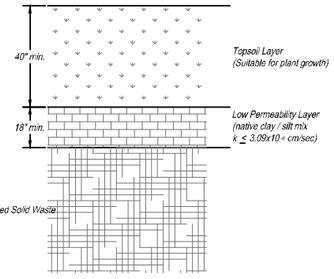
DAILY COVER (NTS) 10/-



ALTERNATE DAILY COVER (NTS) 11/-



INTERMEDIATE COVER (NTS) 12/-



FINAL COVER (NTS) 13/-

REFERENCE:
ADAPTED FROM MAP
PROVIDED BY CLIENT.

0 75 150 300 450
SCALE IN FEET

BOX ELDER COUNTY SOLID WASTE
9595 W. 6800 N.
BOX ELDER COUNTY, UT
(435)744-2275

CONSULTANTS

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2702 South 1030 West, Suite 10
Salt Lake City, Utah 84119
(801)270-9400 Fax: (801)270-9401

MARK	DATE	DESCRIPTION
	10/5/21	DRAFT

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PROJECT NO.:	00167-013
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DRAWN BY:	JAH
DESIGNED BY:	BDM
CHECKED BY:	GA
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SHEET TITLE

BOX ELDER LANDFILL

DETAILS

8

APPENDIX B

085081 Bk 0618 Pg 0572

EXHIBIT A

PARCEL 1: (04-003-0010)
Beginning at a point 525.7 feet North of the Southwest Corner of Section 18, Township 10 North, Range 3 West, SLM, thence running North 2021.4 feet, thence South 09 degrees 30' East 2037.6 feet, thence South 7 degrees 35' West 92.4 feet; thence South 27 degrees 27' East 472.9 feet; thence South 33 degrees 08' East 272.8 feet; thence South 17 degrees 56' East 704.5 feet; thence South 9 degrees 02' West 547.2 feet; thence South 84 degrees 37' West 1307 feet; thence North 84 degrees 36' West 563 feet, thence North 88 degrees 38' West 662 feet to beginning. Together with a right of way through Section 12, Township 10 North, Range 4 West, SLM, and Sections 7 and 18, Township 10 North, Range 3 West, SLM, referred to in Book R, of Misc., at Page 163, records of Box Elder County, Utah.

PARCEL 2: (04-091-0003)
Southeast Quarter of Section 1, Township 10 North, Range 4 West, SLM. Less a 2 Rod strip on the North for road.

All of Grantors right, title and interest in and to all existing easements and rights-of-way, of every type and nature, wherever situate, currently used for the purpose of ingress and egress to the above-described property, including but not limited to any right, title or interest which Grantors may have in or to the following:

Easement dated November 13, 1931, and recorded January 29, 1932 as Entry No. 29619F in Book R of Misc., at Page 163 records of BOX ELDER County, Utah, from PORTLAND CATTLE LOAN COMPANY, INC., A Corp., to S. M. JASPER for a right of way upon and over the following: A right of way two rods wide and bordered on the East by the East line of Section 7, Township 10 North, Range 3 West, SLM, and on the West by a line parallel to two Rods West of said East line of said Section 7, and said right of way shall extend upon and across the East side of Section 7. ALSO a right of way to a certain tract of land located in Section 18, Township 10 North, Range 3 West, SLM, which tract of land is enclosed by a barbed wire fence and contains 112.04 acres, more or less. This right of way shall transverse and extend over portions of Section 12, 7, and 18 located in Township 10 North, Range 3 West, SLM. (Parcel 1)

Together with all water rights appurtenant thereto and all mineral, water, gas, and oil rights owned by Grantors, and together with each and every other type of real property interest owned by Grantors related to or connected with the above-described parcels, including but not limited to all water rights, equipment, pumps, casings, and other items associated with all wells on the property and the following well permits: Permit #29-1802

APR 25 '96 13:17 BOX ELDER COUNTY

Recorded at Request of _____

at _____ M. Fee Paid $_____ _____

by _____ Dep. Book _____ Page _____ Ref.: _____

Mail tax notice to _____ Address _____

H-44257

WARRANTY DEED

STUART A. CORNWALL and CHARLENE L. CORNWALL, TRUSTEES OF THE STUART A. CORNWALL and CHARLENE L. CORNWALL JOINT INTER VIVOS TRUST grantors of Box Elder County, , State of Utah, hereby CONVEY and WARRANT to THE MUNICIPAL BUILDING AUTHORITY OF BOX ELDER COUNTY, UTAH, a body politic of the State of Utah,

grantee, for the sum of TEN DOLLARS, and other good and valuable consideration the following described tract of land in Box Elder County, State of Utah:

As described on Exhibit "A" attached.

085081 Bk 0618 Pg 0571
Leann Adams, Box Elder County Recorder
03/12/1996 2:34pm FEE: .00 Deputy
Rec'd For: HILLAM REST & DBS AGENCY INC

WITNESS, the hand of said grantor, this 12th day of March, A.D. 1996.

Signed in the Presence of

Stuart A. Cornwall
STUART A. CORNWALL

Charlene L. Cornwall
CHARLENE L. CORNWALL

STATE OF UTAH, }
County of Box Elder } ss.

On the 12 day of March, A.D. 1996 personally appeared before me STUART A. CORNWALL and CHARLENE L. CORNWALL, as Trustees of the Stuart A. Cornwall and Charlene L. Cornwall Joint Inter Vivos Trust, the signers of the within instrument, who duly acknowledged to me that they executed the same.

NOTARY PUBLIC
BRENT A. KIRKLAND
20 North Tremonton
Tremonton, Utah 84337
My Commission Expires: 4-25-97
State of Utah

Notary Public.

My commission expires 4-25-97 Residing in Tremonton Ut

APPENDIX C

BOX ELDER COUNTY LANDFILL
DAILY LOG

Date:_____

Vehicle Identification	Gross Weight	Tare Weight	Type of Waste	Fees		Time & Initials
				Collected	Billed	

Daily Checklist

*S*_____

*Date:*_____

Equip/Vehicle#:

	Mon.	*Tues.*	*Wed.*	*Thurs.*	*Fri.*	*Sat.*	*Comments:*
	OK	OK	OK	OK	OK	OK	
Engine oil level							
Transmission oil level							
Coolant level							
Hydraulic oil level							
Final drive oil							
Leaks (oil, air, water, fuel)							
Clean windows, mirrors, lights							
Backup alarm & alarm sensor							
Brakes (foot, park, hand)							
Windshield wipers							
Heater & defroster							
Cab condition							
All grease fittings lubricated							
Cutting edges							
Rollers & Idlers on track							
Cleaned air filter							
Other repairs needed:							

BOX ELDER COUNTY LANDFILL
OPERATOR INSPECTION FORM

INSPECTED BY:_____

LANDFILL SITE:_____ DATE:_____

GENERAL CONDITIONS:_____

_____

_____

_____

SPECIFIC CONDITIONS:

CLOSED COVERED AREA:_____

WORKING FACE: _____

RUN ON/OFF: _____

FENCES: _____

FUEL AND SUPPLIES: _____

IMMEDIATE ACTION ITEMS:_____

_____

_____

INSPECTOR'S SIGNATURE

BOX ELDER COUNTY LANDFILL
SUPERVISOR INSPECTION FORM

INSPECTED BY:_____

LANDFILL SITE:_____ DATE:_____

PERSONNEL ON SHIFT:_____

_____

GENERAL REPORT:_____

_____

_____

_____

SPECIFIC CONDITIONS:

CLOSED COVER MATERIAL:_____

DAILY COVER: _____

RUN ON CONDITIONS: _____

RUN OFF CONDITIONS: _____

FENCES: _____

OFFICE: _____

EQUIPMENT CHECK: _____

CORRECTIVE ACTION NEEDED:_____

_____

_____

_____

SUPERVISOR'S SIGNATURE

Box Elder County Solid Waste
Landfill Gas Log

Landfill Site: _____

Date of Inspection: _____ Time: _____

Test Location:	LEL Reading:	Remarks:
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Weather Conditions: _____

_____ _____

(Inspector) (Verified by:)

Comments:

BOX ELDER COUNTY SOLID WASTE RANDOM LOAD INSPECTION FROM LITTLE MOUNTAIN SITE

Date of Inspection:_____

Owner of Load: _____

Address of Owner:_____

Types of Materials in Load

_____

_____

_____

_____

_____

_____

Approximate Quantity of Load:_____ Tons or

_____ Cu. / Yd. or

_____ Size

_____
Signature of Owner / Carrier

_____
Signature of Inspector

APPENDIX D

Channel Calculator
North

Given Input Data:

Shape	Advanced
Solving for	Flowrate
Slope	0.0520 ft/ft
Manning's n	0.0200
Depth	1.1000 ft
Height	8.0000 ft
Bottom width	0.0000 ft
Left radius	0.0000 ft
Right radius	0.0000 ft
Left slope	1.0000 ft/ft (V/H)
Right slope	0.4500 ft/ft (V/H)

Computed Results:

Flowrate	19.6876 cfs
Velocity	10.0991 fps
Full Flowrate	3908.8766 cfs
Flow area	1.9494 ft2
Flow perimeter	4.2362 ft
Hydraulic radius	0.4602 ft
Top width	3.5444 ft
Area	103.1111 ft2
Perimeter	30.8086 ft
Percent full	13.7500 %

Critical Information

Critical depth	1.5615 ft
Critical slope	0.0080 ft/ft
Critical velocity	5.0119 fps
Critical area	3.9282 ft2
Critical perimeter	6.0133 ft
Critical hydraulic radius	0.6532 ft
Critical top width	5.0314 ft
Specific energy	2.6850 ft
Minimum energy	2.3422 ft
Froude number	2.4008
Flow condition	Supercritical

Graphical Peak Discharge method

Given Input Data:

Description	North Area run-on
Rainfall distribution	Type II
Frequency	25 years
Rainfall, P (24-hours)	2.3800 in
Drainage area	44.3811 ac
Runoff curve number, CN	74
Time of concentration, Tc	21.4478 min
Pond and Swamp Areas	0.0000 % of Area

Computed Results:

Initial abstraction, Ia	0.7027 in
Ia/P	0.2953
Unit peak discharge, qu	527.3983 csm/in
Runoff, Q	0.5420 in
Pond and swamp adjustment, Fp	1.0000
Peak discharge, qp	19.8217 cfs

Channel Calculator
East

Given Input Data:

Shape	Advanced
Solving for	Flowrate
Slope	0.0190 ft/ft
Manning's n	0.0200
Depth	1.2100 ft
Height	8.0000 ft
Bottom width	0.0000 ft
Left radius	0.0000 ft
Right radius	0.0000 ft
Left slope	1.0000 ft/ft (V/H)
Right slope	0.4500 ft/ft (V/H)

Computed Results:

Flowrate	15.3443 cfs
Velocity	6.5051 fps
Full Flowrate	2362.8007 cfs
Flow area	2.3588 ft2
Flow perimeter	4.6598 ft
Hydraulic radius	0.5062 ft
Top width	3.8989 ft
Area	103.1111 ft2
Perimeter	30.8086 ft
Percent full	15.1250 %

Critical Information

Critical depth	1.4133 ft
Critical slope	0.0083 ft/ft
Critical velocity	4.7682 fps
Critical area	3.2181 ft2
Critical perimeter	5.4427 ft
Critical hydraulic radius	0.5913 ft
Critical top width	4.5540 ft
Specific energy	1.8676 ft
Minimum energy	2.1199 ft
Froude number	1.4744
Flow condition	Supercritical

Graphical Peak Discharge method

Given Input Data:

Description	East Area run-on
Rainfall distribution	Type II
Frequency	25 years
Rainfall, P (24-hours)	2.3800 in
Drainage area	37.0498 ac
Runoff curve number, CN	74
Time of concentration, Tc	25.0211 min
Pond and Swamp Areas	0.0000 % of Area

Computed Results:

Initial abstraction, Ia	0.7027 in
Ia/P	0.2953
Unit peak discharge, qu	486.4193 csm/in
Runoff, Q	0.5420 in
Pond and swamp adjustment, Fp	1.0000
Peak discharge, qp	15.2617 cfs

Channel Calculator
South

Given Input Data:

Shape	Advanced
Solving for	Flowrate
Slope	0.0190 ft/ft
Manning's n	0.0200
Depth	1.4000 ft
Height	8.0000 ft
Bottom width	0.0000 ft
Left radius	0.0000 ft
Right radius	0.0000 ft
Left slope	1.0000 ft/ft (V/H)
Right slope	0.4500 ft/ft (V/H)

Computed Results:

Flowrate	22.6392 cfs
Velocity	7.1694 fps
Full Flowrate	2362.8007 cfs
Flow area	3.1578 ft2
Flow perimeter	5.3915 ft
Hydraulic radius	0.5857 ft
Top width	4.5111 ft
Area	103.1111 ft2
Perimeter	30.8086 ft
Percent full	17.5000 %

Critical Information

Critical depth	1.6512 ft
Critical slope	0.0079 ft/ft
Critical velocity	5.1539 fps
Critical area	4.3926 ft2
Critical perimeter	6.3589 ft
Critical hydraulic radius	0.6908 ft
Critical top width	5.3205 ft
Specific energy	2.1988 ft
Minimum energy	2.4768 ft
Froude number	1.5107
Flow condition	Supercritical

Graphical Peak Discharge method

Given Input Data:

Description	South Area run-on
Rainfall distribution	Type II
Frequency	25 years
Rainfall, P (24-hours)	2.3800 in
Drainage area	43.2554 ac
Runoff curve number, CN	74
Time of concentration, Tc	16.5453 min
Pond and Swamp Areas	0.0000 % of Area

Computed Results:

Initial abstraction, Ia	0.7027 in
Ia/P	0.2953
Unit peak discharge, qu	601.0539 csm/in
Runoff, Q	0.5420 in
Pond and swamp adjustment, Fp	1.0000
Peak discharge, qp	22.0170 cfs

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.6 N 112.2314 W 4914 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006
Extracted: Tue Nov 28 2006

Confidence Limits | Seasonality | Location Maps | Other Info | GIS data | Maps | Help | Docs | U.S. Ma

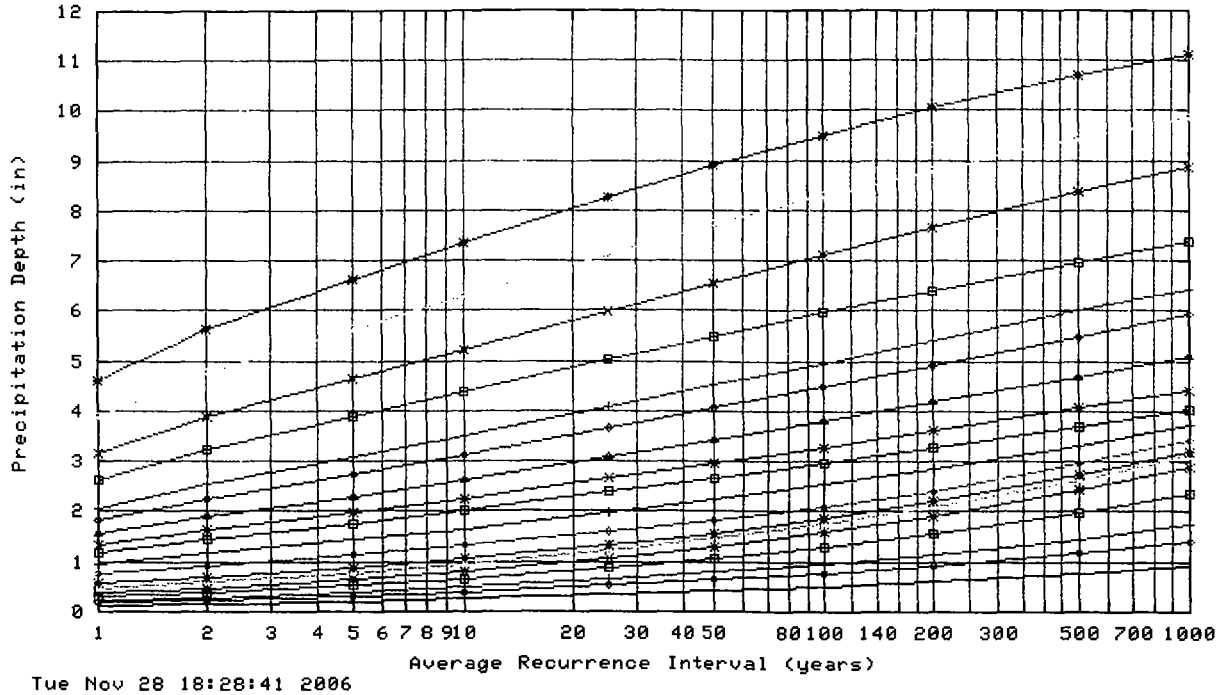
Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.12	0.18	0.22	0.30	0.37	0.47	0.56	0.74	0.95	1.17	1.33	1.55	1.84	2.06	2.63	3.16	3.89	4.60
2	0.15	0.23	0.28	0.38	0.47	0.59	0.69	0.92	1.17	1.44	1.63	1.91	2.26	2.54	3.24	3.88	4.77	5.64
5	0.21	0.32	0.39	0.53	0.65	0.78	0.88	1.13	1.43	1.75	1.97	2.30	2.73	3.07	3.88	4.63	5.64	6.61
10	0.26	0.39	0.49	0.66	0.81	0.95	1.05	1.32	1.66	2.02	2.26	2.62	3.12	3.50	4.38	5.22	6.30	7.34
25	0.34	0.52	0.64	0.86	1.07	1.22	1.32	1.61	1.99	2.38	2.65	3.08	3.65	4.08	5.02	5.99	7.13	8.26
50	0.42	0.63	0.78	1.06	1.31	1.47	1.57	1.84	2.25	2.67	2.96	3.43	4.06	4.52	5.50	6.56	7.73	8.90
100	0.50	0.77	0.95	1.28	1.59	1.76	1.85	2.11	2.54	2.97	3.29	3.80	4.48	4.97	5.96	7.13	8.29	9.50
200	0.61	0.93	1.15	1.54	1.91	2.10	2.19	2.42	2.84	3.28	3.62	4.18	4.91	5.42	6.41	7.67	8.81	10.05
500	0.77	1.18	1.46	1.97	2.43	2.65	2.73	2.96	3.33	3.71	4.08	4.70	5.49	6.01	6.98	8.37	9.44	10.70
1000	0.92	1.41	1.74	2.35	2.91	3.14	3.22	3.45	3.72	4.04	4.43	5.10	5.93	6.45	7.39	8.89	9.86	11.13

Text version of table

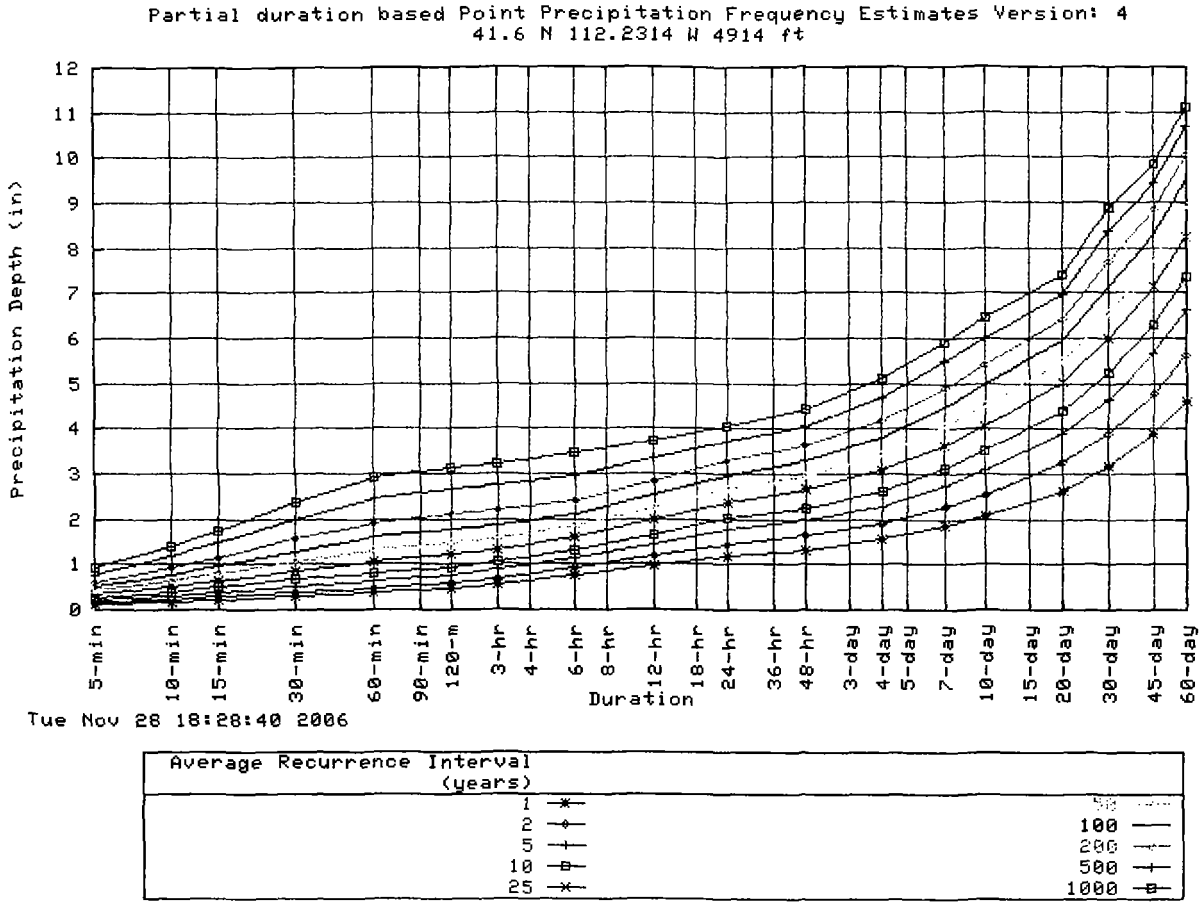
* These precipitation frequency estimates are based on a partial duration series. **ARI** is the Average Recurrence Interval. Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

Partial duration based Point Precipitation Frequency Estimates Version: 4
41.6 N 112.2314 W 4914 ft



Tue Nov 28 18:28:41 2006

Duration			
5-min		48-hr	30-day
10-min	3-hr	4-day	
15-min	6-hr	7-day	60-day
30-min	12-hr	10-day	
60-min	24-hr	20-day	



Confidence Limits -

*** Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)**

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.14	0.21	0.26	0.34	0.43	0.54	0.63	0.82	1.04	1.28	1.46	1.70	2.03	2.26	2.86	3.43	4.20	4.96
2	0.17	0.27	0.33	0.44	0.55	0.67	0.78	1.01	1.28	1.58	1.79	2.09	2.50	2.79	3.52	4.21	5.16	6.08
5	0.24	0.36	0.45	0.61	0.75	0.88	0.99	1.25	1.57	1.92	2.16	2.51	3.01	3.36	4.21	5.01	6.07	7.11
10	0.30	0.45	0.56	0.76	0.94	1.07	1.18	1.47	1.82	2.21	2.47	2.87	3.43	3.83	4.75	5.65	6.78	7.89
25	0.40	0.60	0.74	1.00	1.24	1.39	1.50	1.79	2.19	2.61	2.90	3.36	4.01	4.46	5.45	6.47	7.67	8.87
50	0.48	0.74	0.92	1.23	1.53	1.69	1.78	2.07	2.50	2.92	3.24	3.75	4.46	4.94	5.96	7.09	8.30	9.56
100	0.59	0.90	1.12	1.51	1.87	2.04	2.14	2.39	2.85	3.26	3.60	4.16	4.92	5.43	6.47	7.71	8.91	10.20
200	0.73	1.11	1.37	1.85	2.29	2.48	2.57	2.78	3.23	3.60	3.97	4.58	5.40	5.93	6.97	8.31	9.47	10.80
500	0.95	1.44	1.79	2.41	2.98	3.20	3.29	3.47	3.85	4.08	4.48	5.15	6.05	6.59	7.61	9.09	10.16	11.53
1000	1.16	1.76	2.18	2.94	3.64	3.88	3.95	4.12	4.38	4.47	4.89	5.62	6.55	7.10	8.07	9.68	10.63	12.01

* The **upper** bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are **greater** than.

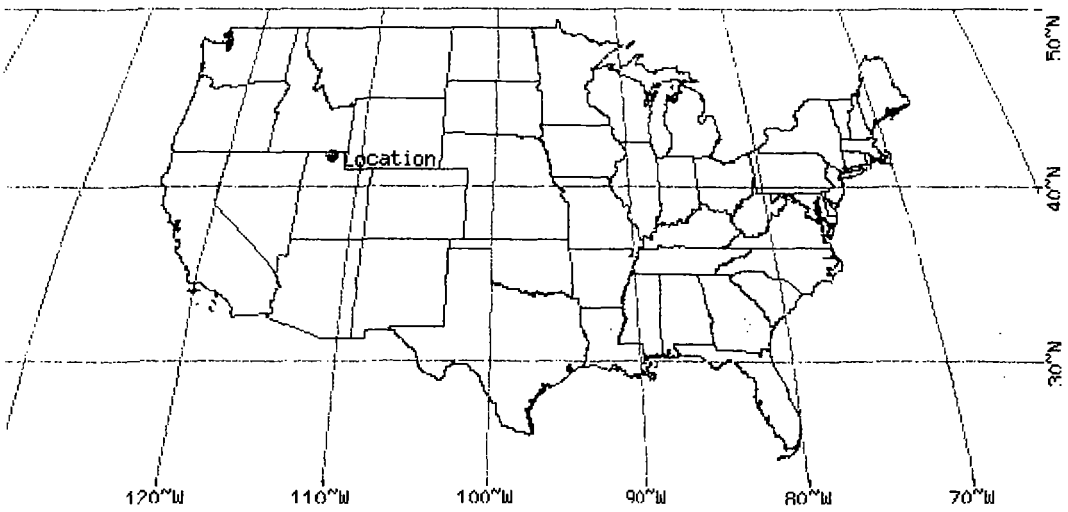
** These precipitation frequency estimates are based on a partial duration series. **ARI** is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

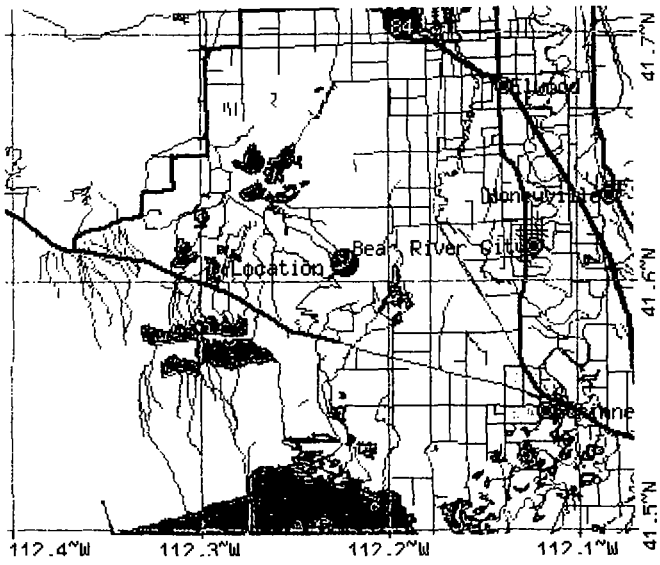
*** Lower bound of the 90% confidence interval**
Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.10	0.16	0.19	0.26	0.32	0.42	0.50	0.68	0.87	1.07	1.22	1.42	1.68	1.88	2.42	2.91	3.60	4.27
2	0.13	0.20	0.25	0.34	0.42	0.53	0.63	0.84	1.08	1.32	1.50	1.75	2.07	2.32	2.98	3.58	4.42	5.23
5	0.18	0.27	0.34	0.46	0.57	0.69	0.79	1.03	1.31	1.61	1.81	2.10	2.49	2.81	3.58	4.28	5.22	6.13
10	0.22	0.34	0.42	0.57	0.70	0.83	0.94	1.19	1.51	1.84	2.06	2.40	2.84	3.19	4.03	4.82	5.83	6.81
25	0.29	0.44	0.55	0.73	0.91	1.05	1.16	1.43	1.79	2.16	2.42	2.80	3.31	3.71	4.62	5.52	6.59	7.65
50	0.34	0.52	0.65	0.87	1.08	1.24	1.34	1.62	2.00	2.42	2.69	3.11	3.67	4.09	5.04	6.04	7.13	8.24
100	0.41	0.62	0.77	1.03	1.28	1.44	1.55	1.82	2.22	2.67	2.96	3.43	4.03	4.49	5.46	6.54	7.64	8.78
200	0.47	0.72	0.89	1.20	1.49	1.67	1.78	2.04	2.44	2.93	3.24	3.74	4.39	4.87	5.84	7.01	8.11	9.28
500	0.57	0.87	1.08	1.46	1.80	1.99	2.13	2.43	2.78	3.28	3.61	4.17	4.87	5.36	6.33	7.60	8.66	9.86
1000	0.66	1.00	1.24	1.67	2.06	2.27	2.41	2.75	3.03	3.55	3.89	4.49	5.23	5.73	6.68	8.02	9.03	10.24

* The **lower** bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are **less** than.
** These precipitation frequency estimates are based on a partial duration maxima series. **ARI** is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

Maps -





These maps were produced using a direct map request from the U.S. Census Bureau Mapping and Cartographic Resources Tiger Map Server.

Please read disclaimer for more information.

LEGEND

State	Connector
County	Stream
Indian Resv	Military Area
Lake/Pond/Ocean	National Park
Street	Other Park
Expressway	City
Highway	County

Scale 1:228583 0 2 4 6 8 mi / 0 2 4 6 8 10 km

*average--true scale depends on monitor resolution

Other Maps/Photographs -

View USGS digital orthophoto quadrangle (DOQ) covering this location from TerraServer; **USGS Aerial Photograph** may also be available
from this site. A DOQ is a computer-generated image of an aerial photograph in which image displacement caused by terrain relief and camera tilts has been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. Visit the USGS for more information.

Watershed/Stream Flow Information -

Find the Watershed for this location using the U.S. Environmental Protection Agency's site.

Climate Data Sources -

Precipitation frequency results are based on data from a variety of sources, but largely NCDC. The following links provide general information
about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study,
please refer to our documentation.

Using the **National Climatic Data Center's (NCDC)** station search engine, locate other climate stations within: +/-30 minutes ...OR... +/-1 degree of this location (41.6/-112.2314). Digital ASCII data can be obtained directly from **NCDC**.

Find Natural Resources Conservation Service (NRCS) SNOTEL (SNOwpack TELemetry) stations by visiting the **Western Regional Climate Center's state-specific SNOTEL station maps**.

Hydrometeorological Design Studies Center
DOC/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910
(301) 713-1669
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Graphical Peak Discharge method

Given Input Data:

Description	North Area run-on
Rainfall distribution	Type II
Frequency	100 years
Rainfall, P (24-hours)	2.9700 in
Drainage area	44.3811 ac
Runoff curve number, CN	74
Time of concentration, Tc	21.3446 min
Pond and Swamp Areas	0.0000 % of Area

Computed Results:

Initial abstraction, Ia	0.7027 in
Ia/P	0.2366
Unit peak discharge, qu	557.8138 csm/in
Runoff, Q	0.8893 in
Pond and swamp adjustment, Fp	1.0000
Peak discharge, qp	34.3982 cfs

Channel Calculator
North Area

Given Input Data:

Shape	Advanced
Solving for	Flowrate
Slope	0.0520 ft/ft
Manning's n	0.0200
Depth	1.3550 ft
Height	8.0000 ft
Bottom width	0.0000 ft
Left radius	0.0000 ft
Right radius	0.0000 ft
Left slope	1.0000 ft/ft (V/H)
Right slope	0.4500 ft/ft (V/H)

Computed Results:

Flowrate	34.3281 cfs
Velocity	11.6050 fps
Full Flowrate	3908.8766 cfs
Flow area	2.9580 ft2
Flow perimeter	5.2182 ft
Hydraulic radius	0.5669 ft
Top width	4.3661 ft
Area	103.1111 ft2
Perimeter	30.8086 ft
Percent full	16.9375 %

Critical Information

Critical depth	1.9504 ft
Critical slope	0.0075 ft/ft
Critical velocity	5.6014 fps
Critical area	6.1285 ft2
Critical perimeter	7.5110 ft
Critical hydraulic radius	0.8159 ft
Critical top width	6.2845 ft
Specific energy	3.4479 ft
Minimum energy	2.9255 ft
Froude number	2.4856
Flow condition	Supercritical

Graphical Peak Discharge method

Given Input Data:

Description	East Area run-on
Rainfall distribution	Type II
Frequency	100 years
Rainfall, P (24-hours)	2.9700 in
Drainage area	37.0498 ac
Runoff curve number, CN	74
Time of concentration, Tc	24.7881 min
Pond and Swamp Areas	0.0000 % of Area

Computed Results:

Initial abstraction, Ia	0.7027 in
Ia/P	0.2366
Unit peak discharge, qu	516.9433 csm/in
Runoff, Q	0.8893 in
Pond and swamp adjustment, Fp	1.0000
Peak discharge, qp	26.6120 cfs

Channel Calculator
East Area

Given Input Data:

Shape	Advanced
Solving for	Flowrate
Slope	0.0190 ft/ft
Manning's n	0.0200
Depth	1.4870 ft
Height	8.0000 ft
Bottom width	0.0000 ft
Left radius	0.0000 ft
Right radius	0.0000 ft
Left slope	1.0000 ft/ft (V/H)
Right slope	0.4500 ft/ft (V/H)

Computed Results:

Flowrate	26.5878 cfs
Velocity	7.4634 fps
Full Flowrate	2362.8007 cfs
Flow area	3.5624 ft2
Flow perimeter	5.7265 ft
Hydraulic radius	0.6221 ft
Top width	4.7914 ft
Area	103.1111 ft2
Perimeter	30.8086 ft
Percent full	18.5875 %

Critical Information

Critical depth	1.7609 ft
Critical slope	0.0077 ft/ft
Critical velocity	5.3223 fps
Critical area	4.9955 ft2
Critical perimeter	6.7812 ft
Critical hydraulic radius	0.7367 ft
Critical top width	5.6739 ft
Specific energy	2.3526 ft
Minimum energy	2.6413 ft
Froude number	1.5260
Flow condition	Supercritical

Graphical Peak Discharge method

Given Input Data:

Description	South Area run-on
Rainfall distribution	Type II
Frequency	100 years
Rainfall, P (24-hours)	2.9700 in
Drainage area	43.2554 ac
Runoff curve number, CN	74
Time of concentration, Tc	16.1648 min
Pond and Swamp Areas	0.0000 % of Area

Computed Results:

Initial abstraction, Ia	0.7027 in
Ia/P	0.2366
Unit peak discharge, qu	638.1617 csm/in
Runoff, Q	0.8893 in
Pond and swamp adjustment, Fp	1.0000
Peak discharge, qp	38.3548 cfs

Channel Calculator
South Area

Given Input Data:

Shape	Advanced
Solving for	Flowrate
Slope	0.0190 ft/ft
Manning's n	0.0200
Depth	1.7060 ft
Height	8.0000 ft
Bottom width	0.0000 ft
Left radius	0.0000 ft
Right radius	0.0000 ft
Left slope	1.0000 ft/ft (V/H)
Right slope	0.4500 ft/ft (V/H)

Computed Results:

Flowrate	38.3529 cfs
Velocity	8.1793 fps
Full Flowrate	2362.8007 cfs
Flow area	4.6890 ft2
Flow perimeter	6.5699 ft
Hydraulic radius	0.7137 ft
Top width	5.4971 ft
Area	103.1111 ft2
Perimeter	30.8086 ft
Percent full	21.3250 %

Critical Information

Critical depth	2.0388 ft
Critical slope	0.0073 ft/ft
Critical velocity	5.7270 fps
Critical area	6.6969 ft2
Critical perimeter	7.8516 ft
Critical hydraulic radius	0.8529 ft
Critical top width	6.5695 ft
Specific energy	2.7457 ft
Minimum energy	3.0582 ft
Froude number	1.5613
Flow condition	Supercritical

41.6°N
112.2314°W

Potential Run-on

North Area

A = 44.4 acres

Depth of flow @ berm
1.35 ft

Q_p - 34.3

East Area

A = 37.0 acres

Q_p = 26 cfs

berm =

South Area

A = 43.3 acres

Depth of flow

BOX ELDER COUNTY - 2001 PERMIT

ACTIVE CELL RUNOFF ASSESSMENT:

COMPACTOR WHEEL DATA:

WHEEL DIAMETER (FT)	6
WHEEL CIRCUMFERENCE (FT)	18.8496
WHEEL WIDTH (FT)	3.92
WHEEL AREA (FT^2)	73.9
WHEEL AREA ($IN.^2$)	10,640.2

COMPACTOR TOOTH DATA:

WIDTH (IN.)	11.6
LENGTH (IN.)	6.5
DEPTH (IN.)	5.9
VOULUME / TOOTH (IN.3)	444.9
TEETH / WHEEL	25
TOTAL VOLUME OF TEETH / WHEEL ($IN.^3$)	11,121.50

DESIGN STORM:

DESIGN STORM EVENT (IN.)	2.52
WHEEL AREA ($IN.^2$)	10,640.2
DESIGN STORM VOLUME / WHEEL AREA ($IN.^3$)	26,813.36

SURFACE DEPRESSION STORAGE:

TOTAL VOLUME OF TEETH / WHEEL ($IN.^3$)	11,121.50
SURFACE STORAGE OF TWO COMPACTOR PASSES*	22,243.00

ACTUAL STORM VOULUME IN EXCESS OF STORAGE:

STORM VOLUME MINUS STORAGE ($IN.^3$)	4,570.36

MODIFIED STORM EVENT (IN.)

STORM VOLUME MINUS STORAGE / WHEEL AREA(IN.3)	4,570.36
STORM INTENSITY (IN.)	0.43

SCS RUNOFF CALCULATIONS:

$Q = (P-I_a)^2/(P-I_a) + S$

Q = Runoff (in)
P = Rainfall (in.)
S = Potential max.retention after runoff begins (in.)
I_a = Initial abstraction (in.)

P =	0.43	0.43
S =	2.5	5.38
$I_a = 0.2S$	0.5	1.08
CN =	80	65
Q =	0.002	0.088

* Typical number of passes of a landfill compactor on MSW is between 3 and 5 times to obtain maximum compaction of the MSW.
Therefore: 2 passes of a compactor is a conservative estimation of the number of surface depressions that would be present on the working area of a landfill.

Culvert Calculator

Entered Data:

Shape	Circular
Number of Barrels	(1) Double Barrel
Solving for	Headwater
Chart Number	1
Scale Number	1
Chart Description	CONCRETE PIPE CULVERT; NO BEVELED RING ENTRANCE
Scale Decsription	SQUARE EDGE ENTRANCE WITH HEADWALL
Flowrate	18.0000 cfs (1/2 of 36 cfs)
Manning's n	0.0130
Roadway Elevation	4578.0000 ft
Inlet Elevation	4575.0000 ft
Outlet Elevation	4574.5000 ft
Diameter	24.0000 in
Length	70.0000 ft
Entrance Loss	0.0000
Tailwater	2.0000 ft

Computed Results:

Headwater	4577.6395 ft From Inlet
Slope	0.0071 ft/ft
Velocity	6.9057 fps

Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Flowrate
Slope	0.0330 ft/ft
Manning's n	0.0700
Depth	26.1495 in
Height	28.0000 in
Bottom width	0.0000 in
Left slope	0.5000 ft/ft
Right slope	0.5000 ft/ft

Computed Results:

Flowrate	36.0001 cfs
Velocity	3.7906 fps
Flow area	9.4972 ft2
Flow perimeter	116.9441 in
Hydraulic radius	11.6944 in
Top width	104.5980 in
Area	10.8889 ft2
Perimeter	125.2198 in
Percent full	93.3911 %

Run-on Control Channel

Critical Information

Critical depth	21.8774 in
Critical slope	0.0854 ft/ft
Critical velocity	5.4156 fps
Critical area	6.6475 ft2
Critical perimeter	97.8387 in
Critical hydraulic radius	9.7839 in
Critical top width	87.5096 in
Specific energy	2.4024 ft
Minimum energy	2.7347 ft
Froude number	0.6402
Flow condition	Subcritical

Cover Run-off Channel

Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Depth of Flow
Flowrate	14.2000 cfs
Slope	0.0500 ft/ft
Manning's n	0.0700
Height	16.0000 in
Bottom width	0.0000 in
Left slope	0.3333 ft/ft
Right slope	0.3333 ft/ft

Computed Results:

Depth	14.4436 in
Velocity	3.2669 fps
Flow area	4.3467 ft2
Flow perimeter	91.3578 in
Hydraulic radius	6.8513 in
Top width	86.6705 in
Area	5.3339 ft2
Perimeter	101.2020 in
Percent full	90.2727 %

Critical Information

Critical depth	12.8214 in
Critical slope	0.0944 ft/ft
Critical velocity	4.1459 fps
Critical area	3.4251 ft2
Critical perimeter	81.0970 in
Critical hydraulic radius	6.0818 in
Critical top width	76.9361 in
Specific energy	1.3695 ft
Minimum energy	1.6027 ft
Froude number	0.7424
Flow condition	Subcritical

Road Way Bypass Culvert

Culvert Calculator

Entered Data:

Shape	Circular
Number of Barrels	1 (2)
Solving for	Headwater
Chart Number	1
Scale Number	1
Chart Description	CONCRETE PIPE CULVERT; NO BEVELED RING ENTRANCE
Scale Decsription	SQUARE EDGE ENTRANCE WITH HEADWALL
Flowrate	7.1000 cfs (½ of 14.2 cfs)
Manning's n	0.0130
Roadway Elevation	4578.0000 ft
Inlet Elevation	4575.0000 ft
Outlet Elevation	4574.8900 ft
Diameter	18.0000 in
Length	20.0000 ft
Entrance Loss	0.0000
Tailwater	0.8300 ft

Computed Results:

Headwater	4576.6522 ft From Inlet
Slope	0.0055 ft/ft
Velocity	4.9994 fps

Manning Pipe Calculator

Roadway Bypass Culvert

Given Input Data:

Shape	Circular
Solving for	Depth of Flow
Diameter	18.0000 in
Flowrate	7.1000 cfs
Slope	0.0055 ft/ft
Manning's n	0.0130

Computed Results:

Depth	13.4939 in
Area	1.7671 ft2
Wetted Area	1.4210 ft2
Wetted Perimeter	37.6850 in
Perimeter	56.5487 in
Velocity	4.9965 fps
Hydraulic Radius	5.4299 in
Percent Full	74.9661 %
Full flow Flowrate	7.7902 cfs
Full flow velocity	4.4084 fps

Critical Information

Critical depth	12.5677 in
Critical slope	0.0063 ft/ft
Critical velocity	5.3402 fps
Critical area	1.3295 ft2
Critical perimeter	35.4098 in
Critical hydraulic radius	5.4068 in
Critical top width	18.0000 in
Specific energy	1.4944 ft
Minimum energy	1.5710 ft
Froude number	0.9208
Flow condition	Subcritical

APPENDIX E

Little Mountain Landfill - Closure Costs

Section 1.0 - Engineering **Largest Area Open**

(AREA OPEN = 1,500,000 FT SQ)

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
1.1	**Topographic Survey**	LS	$3,500	1	$3,500
1.2	**Boundary Survey for Closure**	NA	$0	0	$0
1.3	**Site Evaluation**	NA	$0	1	$0
1.4	**Development of Plans (Cover)**	LS	$5,000	1	$5,000
1.5	**Contract Administration - (Bidding and Award)**	LA	$0	1	$0
1.6	**Administrative Costs - (Certification of Final Cover and Closure Notice)**	LS	$2,000	1	$2,000
1.7	**Project Management - (Construction Observation and Testing)**	LS	$5,000	1	$5,000
1.8	**Monitor Well Consultant Cost**	NA	$0		$0
1.9	**Other Environmental Permit Costs**	NA	$0		$0
				Engineering Subtotal	$15,500

Section 2.0 - Construction **Largest Area Open**

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1	**Final Cover System**				
2.1.1	***Site Preparation/ Site Regrading***	ACRE	$1,500	34.0	$51,000
2.1.2	*Gas Collection Layer/Pipes*	Included below			
2.1.3	*Low permeability Layer (Soil - If Applicable)*				
a	Soil Purchase	NA			$0
b	Soil Processing (load)	NA			$0
c	Soil Transportation	NA			$0
d	Soil Placement	NA			$0
e	Soil Amendment (compact)	NA			$0
2.1.4	***Low permeability Layer (Synthetic - If Applicable)***				
a	Geotextile	NA			$0
b	GCL	NA			$0
c	Geomembrane (HDPE,PVC,LLDPE,etc…)	NA			$0
2.1.5	***Drainage Layer (Soil - If Applicable)***				
a	Geotextile	NA			$0
b	Sand/Gravel	NA			$0
2.1.6	***Drainage Layer (Synthetic - If Applicable)***				
a	Geotextile	NA			$0
b	Geonet/Geocomposite	NA			$0
2.1.7	***Erosion Protection Soil Layer***				
a	Soil Purchase	NA			$0
b	Soil Processing (load)	CY	$0.50	109,707	$54,853
c	Soil Transportation	CY	$1.75	109,707	$191,987
d	Soil Placement	CY	$0.75	109,707	$82,280
e	Soil Amendment (compact)	CY			$0
2.1.8	***Topsiol Layer***				
a	Soil Purchase	NA			$0
b	Soil Processing (load)	CY	$0.50	27,427	$13,713
c	Soil Transportation	CY	$1.75	27,427	$47,997
d	Soil Placement	CY	$0.75	27,427	$20,570
e	Soil Amendment	NA			$0
2.1.9	***Revegetation***				
a	Seeding	ACRE	$800	34.0	$27,200
b	Fertilizing	ACRE	$800	34.0	$27,200
c	Mulch	ACRE	$200	34.0	$6,800
d	Tacifier	ACRE	$200	34.0	$6,800
2.2	**Stormwater Protection Structures**				
a	Culverts	NA			$0
b	Pipes	NA			$0
c	Ditches/Berms	FT	$16	1,500	$24,000
d	Detention Basins	NA	$2	2,500	$5,000
2.3	**Gas Collection System**				
a	Design	NA			$0
b	Additional Gas Collection Wells and Connection	LS	$0	0	$0
2.4	**Leachate Collection System**				
a	Design	NA			$0
b	Additional Equipment / Installation	NA			$0
2.5	**Groundwater Monitoring System**				
a	Monitor Well Installation	NA			$0
b	Monitor Well Abandonment	NA			$0
2.6	**Site Security**				
a	Lighting, signs, etc…	NA		0	$0
b	Fencing and Gates	NA		0	$0
2.7	**Miscellaneous**				
a	Performance Bonds	LS			$0
b	Contract/Legal fees	LS			$0
				Construction Subtotal	$559,400

LS - LUMP SUM
NA - NOT APPLICABLE
EA - EACH
CY - CUBIC YARD
FT - FEET

Total	$574,900
10% Contingency	$57,490
Subtotal Closure Cost	$632,390

LANDFILL POST-CLOSURE COSTS (30 YEARS)

Section 1.0 - Engineering

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
1.1	**Post-Closure Plan**	NA			$0
1.2	**Annual Report** (including results from gas, leachate, and ground water sampling - details of maintenance performed)	LS	$1,000	30	$30,000
a	Quarterly Site Inspections	LS	$640	120	$76,800
b	Plan Update	LS	$1,000	3	$3,000
				Engineering Subtotal	$109,800

Section 2.0 - Gas Collection System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1	**Sample Collection**	LS	$0	0	$0
2.2	**Sample Analysis**	NA	$0	0	$0
2.3	**Report** (Part of Annual Report)				
				Gas Collection System - Sampling Subtotal	$0

Section 3.0 - Leachate Collection System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1	**Sample Collection**	LS	$0	0	$0
2.2	**Sample Analysis**	NA	$0	0	$0
2.3	**Report** (Part of Annual Report)				
				Leachate Collection System - Sampling Subtotal	$0

Section 4.0 - Ground Water Monitoring System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
3.1	**Sample Collection**	LS	$0	0	$0
3.2	**Sample Analysis**	LS	$0	0	$0
3.3	**Report** (Part of Annual Report)				
				Ground Water Collection System - Sampling Subtotal	$0

Section 5.0 - Facility Operations and Maintenance

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
4.1	**Cover**				
a	Soil Replacement (1 every 5 years)	LS	$5,000	6	$30,000
b	Vegetation/Reseeding (1 every 5 years)	LS	$2,000	6	$12,000
4.2	**Storm Water Protection Structures**				
a	Ditch and Culvert Maintenance	LS	$500	30	$15,000
b	Berm and Basin Maintenance	LS	$500	30	$15,000
4.3	**Gas Collection System**				
a	System Operation	NA	$0	0	$0
b	System Repair	LS	$0	0	$0
4.4	**Leachate Collection System**				
a	System Operation	NA	$0	0	$0
b	System Repair	NA	$0	0	$0
4.5	**Ground Water Monitoring System**				
a	System Operation	NA	$0	0	$0
b	System Repair	LS	$0	0	$0
4.6	**Site Security**				
a	Lighting, signs, etc…	LS	$500	30	$15,000
b	Fencing and Gates	LS	$500	30	$15,000
4.7	**Miscellaneous**				
a					
b					
				Facility Operations and Maintenance Subtotal	$102,000

Total	$211,800
10% Contingency	$21,180
Total Post-Closure Cost	$232,980

LITTLE MOUNTAIN LANDFILL CLOSURE AND POST-CLOSURE COSTS

Largest Area Open			
	Section 1.0 - Engineering	$15,500	
	Section 2.0 - Construction	$559,400	
	10% Contingency	$57,490	
	Subtotal		$632,390
Landfill Post-Closure Costs (30 years)			$232,980
TOTAL LANDFILL CLOSURE AND POST-CLOSURE COSTS			$865,370

APPENDIX F

STATEMENT OF ACCOUNT

PTIF

UTAH PUBLIC TREASURERS' INVESTMENT FUND

David Damschen, Utah State Treasurer, Fund Manager
PO Box 142315
350 N State Street, Suite 180
Salt Lake City, Utah 84114-2315
Local Call (801) 538-1042 Toll Free (800) 395-7665
www.treasurer.utah.gov

ESC-BOX ELDER SOLID WASTE
ROGER HARPER
1 S MAIN ST
BRIGHAM CITY UT 84302-2143

Account	Account Period
2113	January 01, 2021 through January 31, 2021

Summary

Beginning Balance	$ 816,909.77	Average Daily Balance	$ 837,232.35
Deposits	$ 30,332.64	Interest Earned	$ 332.64
Withdrawals	$ 0.00	360 Day Rate	0.4614
Ending Balance	$ 847,242.41	365 Day Rate	0.4678

Date	Activity	Deposits	Withdrawals	Balance
01/01/2021	FORWARD BALANCE	$ 0.00	$ 0.00	$ 816,909.77
01/11/2021	tosolidw	$ 30,000.00	$ 0.00	$ 846,909.77
01/31/2021	REINVESTMENT	$ 332.64	$ 0.00	$ 847,242.41
01/31/2021	ENDING BALANCE	$ 0.00	$ 0.00	$ 847,242.41

APPENDIX G

LITTLE MOUNTAIN LANDFILL LIFE

AIRSPACE (AIR QUALITY REGULATION LIMITED)

MSW in Tons	Maximum Airspace (Limited by Air Quality Regs.) =	2,760,000	(Tons)
MSW in Cubic Yards*	Maximum Airspace (Limited by Air Quality Regs.) =	4,609,200	(Yds^3)
Cover Soil	Additional Airspace allotted for soil use =	1,152,300	(Yds^3)
Total Combined Airspace in Cubic Yards	Total Available Airspace (Air Quality Reg. Limited) =	5,761,500	(Yds^3)

AIRSPACE CONSUMPTION 1996 - 2054

Initial Little Mountain Airspace (Cubic Yards) = 5,543,773 (Yds^3)

	Year	Total (Tons)	Waste Water (Tons)	Solid Waste (Tons)	Projected Solid Waste @2.0% growth (Tons)	Solid Waste (Cubic Yards)	Soil (Cubic Yards)	Annual Airspace Consumption (Cubic Yards)	Cumulative Airspace Remaining (Cubic Yards)	
	1997	12,126	0	12,126		20,250	5,063	25,313	5,518,460	
	1998	28,892	0	28,892		48,250	12,062	60,312	5,458,148	
	1999	41,146	3,209	37,937		68,714	17,178	85,892	5,372,256	
	2000	34,384	4,141	30,243		57,421	14,355	71,777	5,300,479	
	2001	71,553	5,718	65,835		119,494	29,873	149,367	5,151,112	
	2002	39,604	5,757	33,847		66,139	16,535	82,673	5,068,439	
	2003	41,960	6,027	35,933		70,073	17,518	87,592	4,980,847	
Years	2004	85,096	5,504	79,592		142,110	35,528	177,638	4,803,209	**
Until	2005	73,300	4,401	68,899		122,411	30,603	153,014	4,650,196	**
Closure	2006	38,460	3,708	34,752		58,036	14,509	72,545	4,577,651	***
1	2007				37,000	61,790	15,448	77,238	4,500,413	
2	2008				37,000	61,790	15,448	77,238	4,423,176	
3	2009				37,000	61,790	15,448	77,238	4,345,938	
4	2010				37,000	61,790	15,448	77,238	4,268,701	
5	2011				37,000	61,790	15,448	77,238	4,191,463	
6	2012				37,000	61,790	15,448	77,238	4,114,226	
7	2013				36,400	60,788	15,197	75,985	4,038,241	
8	2014				38,231	63,846	15,961	79,807	3,958,434	
9	2015				31,357	52,366	13,092	65,458	3,892,976	
10	2016				34,527	57,660	14,415	72,075	3,820,901	
11	2017				37,944	63,366	15,842	79,208	3,741,693	
12	2018				37,093	61,945	15,486	77,432	3,664,261	
13	2019				39,142	65,367	16,342	81,709	3,582,552	
14	2020				44,153	73,736	18,434	92,169	3,490,383	
15	2021		7 % annual increase		47,244	78,897	19,724	98,621	3,391,761	
16	2022				50,551	84,420	21,105	105,525	3,286,237	
17	2023				54,089	90,329	22,582	112,911	3,173,325	
18	2024				57,876	96,652	24,163	120,815	3,052,510	
19	2025				61,927	103,418	25,854	129,272	2,923,238	
20	2026		2% annual increase		63,165	105,486	26,372	131,858	2,791,380	
21	2027				64,429	107,596	26,899	134,495	2,656,885	
22	2028				65,717	109,748	27,437	137,185	2,519,700	
23	2029				67,032	111,943	27,986	139,929	2,379,772	
24	2030				68,372	114,182	28,545	142,727	2,237,044	
25	2031				69,740	116,465	29,116	145,582	2,091,463	
26	2032				71,135	118,795	29,699	148,493	1,942,970	
27	2033				72,557	121,171	30,293	151,463	1,791,506	
28	2034				74,008	123,594	30,898	154,492	1,637,014	
29	2035				75,489	126,066	31,516	157,582	1,479,432	
30	2036				76,998	128,587	32,147	160,734	1,318,698	
31	2037				78,538	131,159	32,790	163,949	1,154,749	
32	2038				80,109	133,782	33,446	167,228	987,522	
33	2039				81,711	136,458	34,114	170,572	816,950	
34	2040				83,345	139,187	34,797	173,984	642,966	
35	2041				85,012	141,971	35,493	177,463	465,503	
36	2042				86,713	144,810	36,202	181,012	284,490	
37	2043				88,447	147,706	36,927	184,633	99,858	

Total Tons Solid Waste (Yds^3) =	2,573,107	
Total Volume Solid Waste (Yds^3) =	4,355,132	
Total Volume of Cover Soils (Yds^3) =		1,088,783

* MSW waste totals include C&D waste

** Spike in Waste caused by a one-time waste inflow from Weber County

*** The last 2 weeks of the year are projected

APPENDIX H

TAHOMA COMPANIES, INCORPORATED ❖ WDBE
444 South Main Street, Suite C-7, Cedar City, Utah 84720 ☎ (801) 865-0131 fax 865-0161

FILE COPY

February 13, 1996:

Mr. Ralph T. Bohn
Manager, Solid Waste Section
Utah Division of Solid and Hazardous Waste
288 North 1460 West
Salt Lake City, Utah 84114-4880

Dear Mr. Bohn:

Thank you for your review of the Request for Exemption from Liner, Leachate Control, and Ground Water Monitoring at the proposed Upper Little Mountain landfill site. We are pleased that your staff agrees that the site appears suitable for use as a landfill without the added expense of liners and other ground water protection facilities.

This letter is intended to provide answers to questions raised in your review dated January 29, 1996. Some of the questions you asked will be answered in greater detail in the Permit Application (PA). Others are addressed in the following Response.

1) Topographic Maps. The landfill and related access roads will be constructed on lands within the USGS 7.5 minute Quadrangle Maps "Tremonton, Utah" and "Bear River City, Utah." Appropriately marked copies of these maps will be included with the PA. A copy of the "Bear River City, Utah" quadrangle map showing the proposed landfill location is included with this Response.

The site and access road have both been photographed by Olympus Aerial Surveys of Salt Lake City. Detailed topographic maps have been prepared at a scale of 1" = 200'. All engineering plans will be prepared utilizing the detailed topographic maps.

2) Boring Log. The test boring was drilled concurrently with a detailed test pit exploration of the landfill site. Undisturbed samples of soils were collected from twelve test pits. All of the test pits were excavated down slope from the test boring, exposing soils stratigraphically equivalent to the first 100 feet of soils penetrated by the test boring. The test pit samples have been tested for permeability, gradation, Atterburg Limits, natural moisture content, optimum moisture content, maximum dry density and specific gravity. The results of the testing will be presented with the PA.

3) Run-On Control. Run-on will be prevented from entering the landfill area. A drainage study and a design for appropriately sized ditches and berms will be presented along with the PA.

4) Final Cover. The Box Elder County Commissioners have agreed to placement of final cover in conformance with state requirements in effect at the time of closure. All final cover placed during the initial five year permit life of the landfill will include 18 inches of low permeability soils (equal to or less than the permeability of the natural soils beneath the landfill) and 40 inches of topsoil to protect the low permeability layer.

5) Faults. The landfill elevation cross section (Figure 7) shows an inactive fault within Little Mountain at the base of the Bonneville lakebed silts. This fault brings together two formations of ancient Paleozoic rocks that were deposited millions of years apart. Hellmut Doelling (1980, pages 73 and 74) stated that the faults bounding the mountain ranges of the Basin and Range Province began to form in Late Tertiary time, but *earlier orogenies (structural events) are mostly responsible for the interior structures of the individual mountain ranges.* The inactive fault within Little Mountain is an interior structure that formed before Late Tertiary time (more than five million years ago). Suzanne Hecker (1993, in Plate 1, Quaternary Faults and Folds, Utah) confirmed that the interior fault at Little Mountain is not active.

The subsurface trace of the inactive fault passes under the northeast corner of the proposed landfill site. This portion of the landfill is underlain by 200 feet of dry Bonneville lakebed silts. The silts were originally deposited under relatively still waters during high stands of ancient Lake Bonneville. As the silts settled to the bottom of the lake, they plugged any openings that could have existed along the fault surface. Therefore, the fault surface has little or no potential to serve as a pathway for downward movement of water or leachate.

Our depiction of the fault on the landfill elevation cross section (Figure 7) was probably in error. A more appropriate way of drawing the fault would have been to stop it the base of the Bonneville soils. In that case, the western contact of Bonneville soils with the Pennsylvanian Oquirhh Formation would be a depositional contact, rather than a fault line. It is most likely that the steeply dipping surface on the Oquirhh rocks represents an erosional surface equivalent to a fault line scarp. The fault line scarp was gradually covered by Bonneville soils during high stands of Bonneville Lake.

Surface exposures of the inactive fault are present on a ridge southeast of the landfill site. These exposures will be inspected in the spring of 1996 and a description of the fault surface included with the PA.

6) Travel Time. The discussion of hydraulic conductivity and HELP model percolation rates provided by the UDSHW is appropriate and useful. Tahoma agrees that these measurements are not directly equivalent.

We also appreciate your statement that "this (leachate) percolation rate is still probably one of the limiting factors in the potential for ground water contamination." In our opinion, the leachate percolation rate is the most important limiting factor.

The HELP program simulates daily water movement into, through and out of a landfill. Surface and subsurface processes are modeled. The surface processes modeled are snowmelt, interception of rainfall by vegetation, surface runoff, and evaporation of water, interception and snow from the surface. The subsurface processes modeled are evaporation of water from the soil, plant transpiration, vertical unsaturated drainage, geomembrane liner leakage and barrier soil liner percolation (not applicable in this case, as no liner was included in model runs), and lateral saturated drainage. In summary, the HELP program considers all sources of water when calculating a percolation rate for the leachate.

Any percolating leachate will descend vertically in unsaturated materials for at least 300 feet, as there are no aquifers present beneath the landfill site in that distance to deflect the flow. Unsaturated hydraulic conductivity in the 200 feet of silty soils at Upper Little Mountain has been calculated to range from 8 to 13 orders of magnitude less than saturated hydraulic conductivity in the same soils using equations included in the *Engineering Documentation for Version 3* of the HELP model and in Maidment, ed., 1992. The calculations that substantiate these unsaturated hydraulic conductivity values are included in the attached Appendix.

Unsaturated hydraulic conductivity of the naturally occurring soils will determine the rate at which leachate initially moves through the soils. This rate is substantially slower than the percolation of leachate out the bottom of the landfill. Once a partial column of soil becomes saturated with leachate, the rate of leachate percolation through the natural soils will increase until percolation is limited by the quantity of leachate available. Percolation at the "leachate front" (the lowermost limit of leachate percolation) will then stabilize at a rate intermediate between the saturated and unsaturated hydraulic conductivities.

The actual rate of infiltration is difficult to determine, but it will be somewhere between the unsaturated hydraulic conductivity (about 10^{-15} cm/second) and the saturated hydraulic conductivity (about 3×10^{-6} cm/second) of the natural soil substrate. The HELP model predicts that only enough leachate will be generated by the landfill to provide moisture to the natural soils at the rate of 4.841×10^{-9} cm/second (equivalent to .06 inches per year), and it is unlikely that leachate will saturate the uniformly layered natural soils any faster than it is generated by the landfill.

Help Model - General. HELP model runs conducted on other landfill models have shown that shortening the growing season by five days would cause less moisture to remain in the upper layers of a closed landfill. The reduction in moisture predicted by the HELP model may be

caused by a reduction in the plant residue decay rate as the soil temperature in the bottom of the evaporative zone falls below 35 degrees Centigrade.

The HELP model has also predicted that evapotranspiration at an open landfill would be slightly higher with the growing season shortened by five days. Evapotranspiration in the model is the sum of both soil evaporation and plant transpiration.

Plant transpiration is equal to zero at an open landfill. Therefore, soil evaporation must increase slightly to account for the increase in evapotranspiration. The increase in soil evaporation in the HELP model occurs because lower soil temperatures (resulting from the shorter growing season) allow more water to be available in the soils.

The selection of a "fair" stand of grass for computing the runoff curve number is appropriate for the landfill site after final closure. Cover types for runoff calculations are defined by the U.S. Department of Agriculture in Technical Release 55 (revised June 1986, p. 2-7). The final cover type at the landfill site will be "pasture, grassland, or range--continuous forage for grazing." Existing conditions at the site are good: "greater than 75% ground cover and lightly or only occasionally grazed."

Correct application of final cover and seed during late autumn will result in germination and growth of at least a fair stand of grass at the closed landfill. A "fair" stand of grass will consist of "50 to 75% ground cover, not heavily grazed."

Thanks again for helping Tahoma Companies and Box Elder County meet our goal of conforming to the landfill regulations at a reasonable cost.

Sincerely,

Gary F. Player
Vice President and Principal Geologist

cc: Rodger Harper
Jay Hardy
Elaine Forbes

K:\CLIENTS\95007-4\CORRES\RESPONSE.WPD

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF SOLID AND HAZARDOUS WASTE

Michael O. Leavitt
Governor
Dianne R. Nielson, Ph.D.
Executive Director
Dennis R. Downs
Director

288 North 1460 West
P.O. Box 144880
Salt Lake City, Utah 84114-4880
(801) 538-6170
(801) 538-6715 Fax
(801) 536-4414 T.D.D.
www.deq.state.ut.us Web

September 9, 1998

Rodger D. Harper, Supervisor
Box Elder County Solid Waste
01 South Main
Brigham City, Utah 84302

RE: Little Mountain Landfill Alternative Daily Cover Request

Dear Mr. Harper:

We have reviewed your request for use of shredded tires as alternative daily cover at the Little Mountain Landfill, as described in your letter of August 24, 1998. Your request is hereby approved. The tire chips used as cover material must be two inches or less in size.

This does not constitute approval of the Little Mountain Landfill as a recycler nor does this constitute approval of tires used for daily cover as recycling.

If you have questions regarding this letter or other solid waste issues, please contact Phil Burns or Ralph Bohn at 538-6170.

Sincerely,

Dennis R. Downs, Executive Secretary
Utah Solid and Hazardous Waste Control Board

DRD/PEB/sm

c: John C. Bailey, M.D., M.S.P.H., Health Off/Dept Director, Bear River Health Dept.

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Box Elder Co Misc

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF SOLID AND HAZARDOUS WASTE

Michael O. Leavitt
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Dianne R. Nielson, Ph.D
Executive Director
Dennis R. Downs
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(801) 536-4414 T.D.D.
www.deq.state.ut.us Web

August 19, 1998

Rodger D. Harper, Supervisor
Box Elder County Solid Waste
01 South Main
Brigham City, Utah 84302

RE: Little Mountain Landfill Alternative Cover Request

Dear Mr. Harper:

We have reviewed your request for use of the plastic sheeting described in your letter of August 12, 1998 as alternative daily cover at the Little Mountain Landfill. Your request is hereby approved. Twelve inches of soil cover should be placed on top of each lift as the lift advances, as is the current procedure. This soil will serve as a fire and insect retardant and provide moisture holding capacity within the landfill.

If you have questions regarding this letter or other solid waste issues, please contact Phil Burns or Ralph Bohn at 538-6170.

Sincerely,

Dennis R. Downs, Executive Secretary
Utah Solid and Hazardous Waste Control Board

DRD/PEB/sm

c: John C. Bailey, M.D., M.S.P.H., Health Off/Dept Director, Bear River Health Dept.

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Box Elder Co Misc

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF SOLID AND HAZARDOUS WASTE

Michael O. Leavitt
Governor
[illegible]ne R. Nielson, Ph.D.
Executive Director
Dennis R. Downs
Director

288 North 1460 West
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Salt Lake City, Utah 84114-4880
(801) 538-6170
(801) 538-6715 Fax
(801) 536-4414 T.D.D.
www.deq.state.ut.us Web

April 13, 1999

Roger D. Harper, Supervisor
Box Elder County Solid Waste
01 South Main
Brigham City, Utah 84302

RE: Little Mountain Landfill Revised Liquids Solidification Request

Dear Mr. Harper:

We have reviewed your revised request for receipt of non-hazardous liquids for solidification at the Little Mountain Landfill, as described in your letter of April 9, 1999. Your request is hereby approved.

Future analyses of the waste water should be performed annually or whenever a process change occurs, and include all RCRA TCLP metals. The material placed in the landfill must pass the paint filter test, in compliance with the Utah Solid Waste Permitting and Management Rules (R315-303-1(1)(b) UAC) and the facility's permit.

Construction of a surface impoundment for storage of the waste water when weather conditions do not permit mixing with soil is proposed. In a letter dated April 7, 1999, the Division of Water Quality deferred review of this proposal to the Division of Solid and Hazardous Waste. As we have discussed with you, the impoundment must be designed and constructed in accordance with the appropriate rules normally administered by the Division of Water Quality.

If you have questions regarding this letter or other solid waste issues, please contact Phil Burns or Ralph Bohn at 538-6170.

Sincerely,

for Dennis R. Downs, Executive Secretary
Utah Solid and Hazardous Waste Control Board

DRD/PEB/ser

c: John C. Bailey, M.D., M.S.P.H., Health Off/Dept Director, Bear River Health Dept.

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FILE: Box Elder Co Upper Little Mtn

State of Utah
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF SOLID AND HAZARDOUS WASTE

Michael O. Leavitt
Governor
Dianne R. Nielson, Ph.D.
Executive Director
Dennis R. Downs
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www.deq.state.ut.us Web

December 22, 1998

Roger D. Harper, Supervisor
Box Elder County Solid Waste
01 South Main
Brigham City, Utah 84302

RE: Little Mountain Landfill Liquids Solidification Request

Dear Mr. Harper:

We have reviewed your request for receipt of non-hazardous liquids for solidification at the Little Mountain Landfill, as described in your letter of November 30, 1998. Your request is hereby approved.

Future analyses of the waste water should be performed annually or whenever a process change occurs, and include all RCRA TCLP metals. The material placed in the landfill must pass the paint filter test, in compliance with the Utah Solid Waste Permitting and Management Rules (R315-303-1(1)(b) UAC) and the facility's permit. In addition, you should contact Kiran Bhayani of the Division of Water Quality at 538-6146 to determine if regulations for impoundments are applicable to your proposed concrete solidification pit.

If you have questions regarding this letter or other solid waste issues, please contact Phil Burns or Ralph Bohn at 538-6170.

Sincerely,

Dennis R. Downs, Executive Secretary
Utah Solid and Hazardous Waste Control Board

DRD/PEB/ser

c: John C. Bailey, M.D., M.S.P.H., Health Off/Dept Director, Bear River Health Dept.

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FILE: Box Elder Co Upper Little Mtn

State of Utah

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF SOLID AND HAZARDOUS WASTE

Michael O. Leavitt
Governor

Dianne R. Nielson, Ph.D.
Executive Director

Dennis R. Downs
Director

288 North 1460 West
P.O. Box 144880
Salt Lake City, Utah 84114-4880
(801) 538-6170 Voice
(801) 538-6715 Fax
(801) 536-4414 T.D.D.

January 29, 1996

FEB 01 1996

Jay E. Hardy
Box Elder County Commissioner
01 South Main St.
Brigham City, Utah 84302

Dear Commissioner Hardy:

Enclosed is our review of the Request for Exemption From Liner, Leachate Control, and Ground Water Monitoring at the proposed Upper Little Mountain landfill site submitted to the Division of Solid and Hazardous Waste on November 29, 1995. The issues presented in this review were discussed with Gary Player of Tahoma Companies at our January 17, 1996 meeting. In general, the proposed site appears suitable for an exemption from the liner, leachate collection, and ground water monitoring requirements provided that the questions raised in this review are satisfactorily answered and that the design and operations plan in the full permit application are adequate.

We have also received Box Elder County's request for the location standard exemption for the six acres of farmland of "statewide importance" at the northwest corner of the site. We have no objection to this exemption, and the request will be included in the public notice and public comment period on the full permit application.

If you have questions regarding permitting procedures, please call me or Phil Burns at 538-6170.

Sincerely,

Ralph T. Bohn, Manager
Solid Waste Section

enclosure

c: John C. Bailey, Director, Bear River Health Department
Gary Player, Tahoma Resources - with enclosure

f:...pburns/wp/box2/revlet
file to: Box Elder County, Upper Little Mountain Correspondence

BOX ELDER COUNTY CLASS I LANDFILL
UPPER LITTLE MOUNTAIN SITE

REVIEW OF REQUEST FOR EXEMPTION FROM LINER, LEACHATE CONTROL AND GROUND WATER MONITORING

January 23, 1996

1) Topographic Maps The only topographic map provided in the exemption request is the regional map on which precipitation is shown (Appendix A). It is not possible to assess the topography of the site from this map. Provide adequate topographic maps of the site as required in R315-310-4(2)(a).

2) Boring Log The boring log (Appendix B) of the boring drilled on site indicates that grab samples were taken. Why were only grab samples taken and not split-spoon or thin-wall samples in the unconsolidated soils and core samples in bedrock? These types of samples could have been laboratory tested for permeability and other properties.

3) Run-On Control Run-on must be prevented from entering the landfill area. The exemption request states that "Tahoma will recommend that a ditch or berm be constructed" along the western perimeter of the landfill (p. 17). Ditches and berms to control run-on must be constructed wherever there is potential for run-on (which appears to be most of the perimeter of the site) and designed to handle the 25-year, 24-hour storm, or a demonstration must be made to show that no run-on can occur. This information must be included in the full permit application. Run-on control is one of the primary considerations in qualifying for an exemption from liner and leachate collection systems and ground water monitoring.

4) Final Cover A final cover of 18 inches of low permeability soils covered with six inches of topsoil is proposed as a final cover for the landfill (p. 18). The two soil samples from test pits that were analyzed for hydraulic conductivity showed values of 3.09×10^{-6} cm/s and 4.18×10^{-6} cm/s, yet a value of 4.2×10^{-5} cm/s was used for the low permeability layer as material texture number 12 in the HELP model. While this value in the model would potentially allow greater percolation through the cap to the waste and is therefore "conservative" in running model simulations, the actual final cover can have no greater permeability than the natural subsoils (R315-303-4(4)(a)(ii)) as acknowledged in the exemption request (p. 18). Therefore the 18-inch low permeability layer of the final cover must be constructed to have no greater hydraulic conductivity than 1×10^{-6} cm/s.

A top soil layer of six inches will not be sufficient to protect the integrity of the low permeability layer. As stated in the Engineering Documentation for Version 3 of the HELP model, the program assumes Darcian flow for vertical drainage through *homogeneous, temporally uniform* soil and waste layers. It does not consider preferential flow through channels such as cracks, root holes, or animal burrows. "As such, the program will tend to overestimate the storage of water during the early part of the simulation and overestimate the

time required for leachate to be generated" (p. 107). Also, while the HELP model does adjust the hydraulic conductivity in the top half of the "evaporative zone" for roots channels, the model does not take into account degradation of the *low permeability layer* by roots, desiccation, or frost. (The model does account for the effects of frozen soil on runoff and evaporation, but not soil permeability or drainage.)

The exemption request document attempts to address the issue of potential effects of vegetation roots and frost penetration by discussing the results of modeling runs done for Emery County in which the topsoil layer was increased to 40 inches in thickness, and in which the permeability of the low permeability layer was increased by a factor of 100 to simulate damage from freezing. In the first case, the approach is invalid because the HELP model does not account for the effects of freezing, desiccation, and root penetration in the low permeability layer; whether a six-inch or 40-inch topsoil layer is modeled, the low permeability layer retains its full integrity in the model. The low permeability layer will be compromised under a six-inch layer of topsoil, but since the model does not account for this little difference would be expected between simulations with six and 40 inches of topsoil. The only effects in the model of increasing the top soil thickness are to decrease runoff and evapotranspiration, thus permitting larger heads and longer sustaining heads since a greater thickness of material below the evaporative zone is free from extraction of water by evapotranspiration. While these larger heads provide a greater pressure gradient to increase the leakage rate through the cover system, this effect is thought to be less important than the degradation of the cover system by freezing, desiccation, and root penetration.

Increasing the permeability of the clay cover in the modeling simulations results in a *uniformly* higher permeability for this material, rather than the cracks and channels that would result from freezing, desiccation, or root penetration. Preferential flow is likely to occur once the clay has been degraded by these processes. Freeze/thaw cycles can cause an increase in hydraulic conductivity of one to two orders of magnitude after only one to two cycles of freezing and thawing (Design and Construction of RCRA/CERCLA Final Covers, 1991, p.20).

The integrity of the low permeability layer cover must be preserved to minimize infiltration of water. This can only be accomplished by covering this with a thickness of topsoil that equals or exceeds the depth of penetration of roots, desiccation, and frost. Therefor a topsoil layer 40 inches thick will be required as part of the final cover.

5) Faults The landfill elevation cross section (Figure 7) shows an inactive fault at the boundary of the Quaternary Bonneville lakebed silts and clays and the Oquirrh Formation, with the fault as the contact between the Oquirrh and Great Blue formations below the lake sediments. How close is the landfill to this fault? Show the location of the landifll on Figure 7. How long ago did movement occur on this fault and how was this age determined? How much potential exists for this fault to serve as a pathway for downward movement of water or leachate?

6) Travel Time In the Request for Exemption document the percolation rate determined from HELP model runs is discussed as being equivalent in nature, and is compared in

magnitude, to hydraulic conductivity (p. 26). This rate is then used in time of travel calculations (p.27). These two "rates" are not equivalent despite apparantly having the same units. Hydraulic conductivity is the proportionality constant (K) in the equation for Darcy's law. It is a function of the medium and the fluid flowing through it and includes the term for intrinsic permeability. It describes the ease with which a fluid can move through a medium under a hydraulic gradient. Hydraulic conductivity (like permeability), has units of velocity, commonly expressed as m/s, ft/s, or gal/day/ft^2. However, it should be noted that although K appears to have dimensions of velocity, this is an artifact due to the cancellation of units. The true dimensions are cm^3/cm^2 s (i.e. volume per unit area per unit time) (Goldman, et al., 1990, Clay Liners for Waste Management Facilities, p. 88).

The percolation rate determined from the HELP model is an amount of fluid generated or released from the lowermost layer of the landfill over a specified period of time, not the rate of movement of that liquid through soil. The time of travel calcualtions should use the hydraulic conductivity of the sediments through which the fluid is flowing, rather than the percolation rate obtained from the HELP model. (Ideally, the unsaturated hydraulic conductivity would be determined and used in this calculation.) The hydraulic conductivity value to be used in this calculation is three orders of magnitude larger than the percolation rate (based on the hydraulic conductivity values determined from test pit samples); this will have the effect of greatly decreasing the calculated travel times. If the percolation rate determined from the HELP model is accurate within even two orders of magnitude, this percolation rate is still probably one of the limiting factors in the potential for groundwater contamination.

7) Help Model - General If a shorter growing season causes less moisture to remain in the upper layers of a closed landfill (p.23), what is the fate of this moisture? Explain why annual evapotranspiration is higher at an open landfill with a shorter growing season (p.23). This effect seems contrary to what would be expected. At this location would a "poor" stand of grass after closure be more appropriate for computing the runoff curve number than a "fair" stand?

APPENDIX I

DATE
STARTED: 4/14/00
COMPLETED: 4/14/00
BACKFILLED: 4/14/00

Box Elder County Landfill

Tremonton, Utah

Project Number 00167-003

IGES Rep: K. Hartley

Rig Type: Rubber Tire Backhoe

TEST PIT NO: TP-1

Sheet 1 of 1

LOCATION

NORTHING EASTING ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit; 10 20 30 40 50 60 70 80 90)
0	0				CL	Lean CLAY with sand - brown, moist to slightly moist, medium stiff, roots to 1' depth				39	19	
1					CH	Fat CLAY - brown with white veins, slightly moist, stiff to very stiff, veins composed of leached salt deposits		12.2		52	33	
	5				CL	Lean CLAY - light tan to white, slightly moist, stiff, light unit weight			66.8	39	15	
2												
3	10					Bottom of Test Pit @ 8 Feet						
4												

LOG OF TEST PITS PLATE 167-003.GPJ IGES.GDT 4/16/01

IGES

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

PLATE 1

DATE
STARTED: 4/14/00
COMPLETED: 4/14/00
BACKFILLED: 4/14/00

Box Elder County Landfill

Tremonton, Utah

Project Number 00167-003

IGES Rep K. Hartley

Rig Type: Rubber Tire Backhoe

TEST PIT NO **TP-2**

Sheet 1 of 1

LOCATION

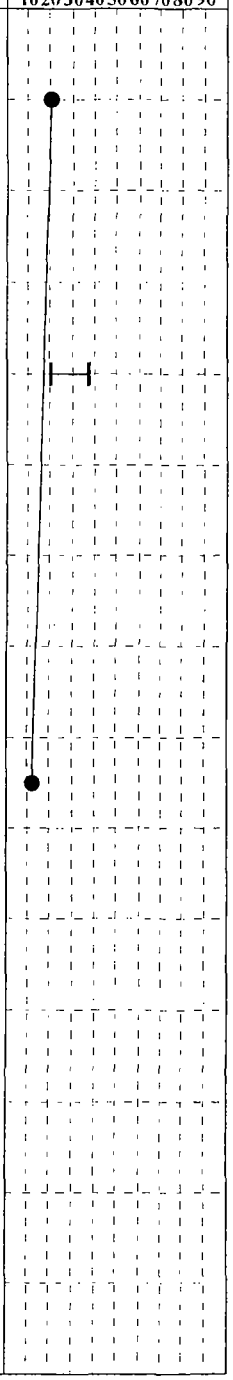
NORTHING EASTING ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index
0	0				CL	Lean CLAY - dark brown, moist medium stiff		20.4			
1					CL	Lean CLAY- tan, moist, medium stiff			54.6	37	17
	5					-slightly moist, stiff to very stiff, with veins of brown lean clay -very stiff to hard below 5'					
2					ML	SILT - brown, slightly moist to moist, medium stiff to stiff		11.8			
3	10					Bottom of Test Pit @ 9 Feet					
4											

Moisture Content and Atterberg Limits

Plastic Limit — Moisture Content — Liquid Limit

10 20 30 40 50 60 70 80 90



IGES

SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

PLATE 2

LOG OF TEST PITS PLATE 167-003.GPJ IGES.GDT 4/16/01

DATE
STARTED: 4/14/00
COMPLETED: 4/14/00
BACKFILLED: 4/14/00

Box Elder County Landfill

Tremonton, Utah

Project Number 00167-003

IGES Rep: K. Hartley

Rig Type: Rubber Tire Backhoe

TEST PIT NO
TP-3
Sheet 1 of 1

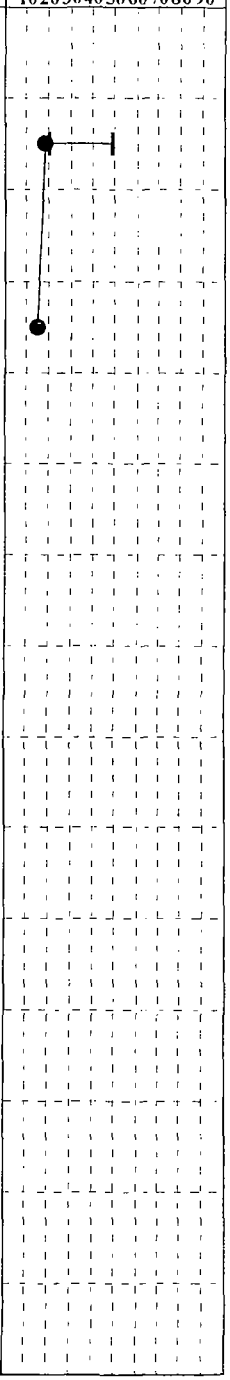
LOCATION
NORTHING EASTING ELEVATION

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index
0	0				CL	Lean CLAY - brown, moist, medium stiff, with roots to 1' depth		18.2		49	29
1					CL-ML	Silty CLAY - moist to slightly moist, medium stiff to stiff, with veins of white salt deposits		14.7			
	5				ML	SILT - brown, mottled white, slightly moist, stiff with large veins of white salt deposits -grades tan to white below 6'			65.5		
2						Bottom of Test Pit @ 7 Feet					
3	10										
4											

Moisture Content and Atterberg Limits

Plastic Limit — Moisture Content — Liquid Limit

10 20 30 40 50 60 70 80 90



IGES

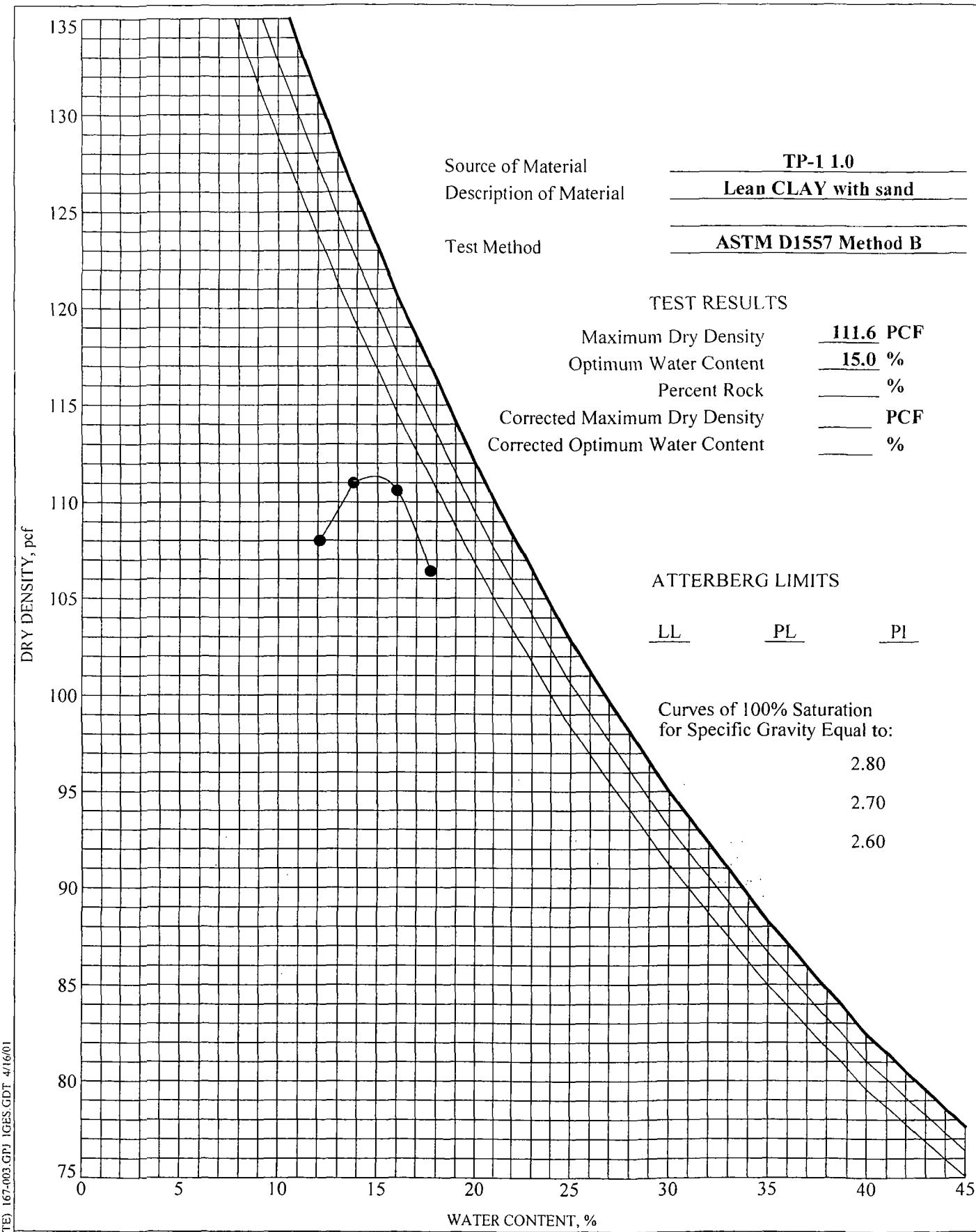
SAMPLE TYPE
- GRAB SAMPLE
- 3" O.D. THIN-WALLED HAND SAMPLER

WATER LEVEL
- MEASURED
- ESTIMATED

NOTES:

PLATE
3

LOG_OF_TEST_PITS_PLATE 167-003.GPJ IGES.GDT 4/16/01



Source of Material: **TP-1 1.0**

Description of Material: **Lean CLAY with sand**

Test Method: **ASTM D1557 Method B**

TEST RESULTS

Maximum Dry Density	**111.6**	**PCF**
Optimum Water Content	**15.0**	**%**
Percent Rock		%
Corrected Maximum Dry Density		PCF
Corrected Optimum Water Content		%

ATTERBERG LIMITS

LL	PL	PI

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

US_COMPACTION_(PLATE) 167-003.GPJ IGES.GDT 4/16/01

IGES

COMPACTION TEST

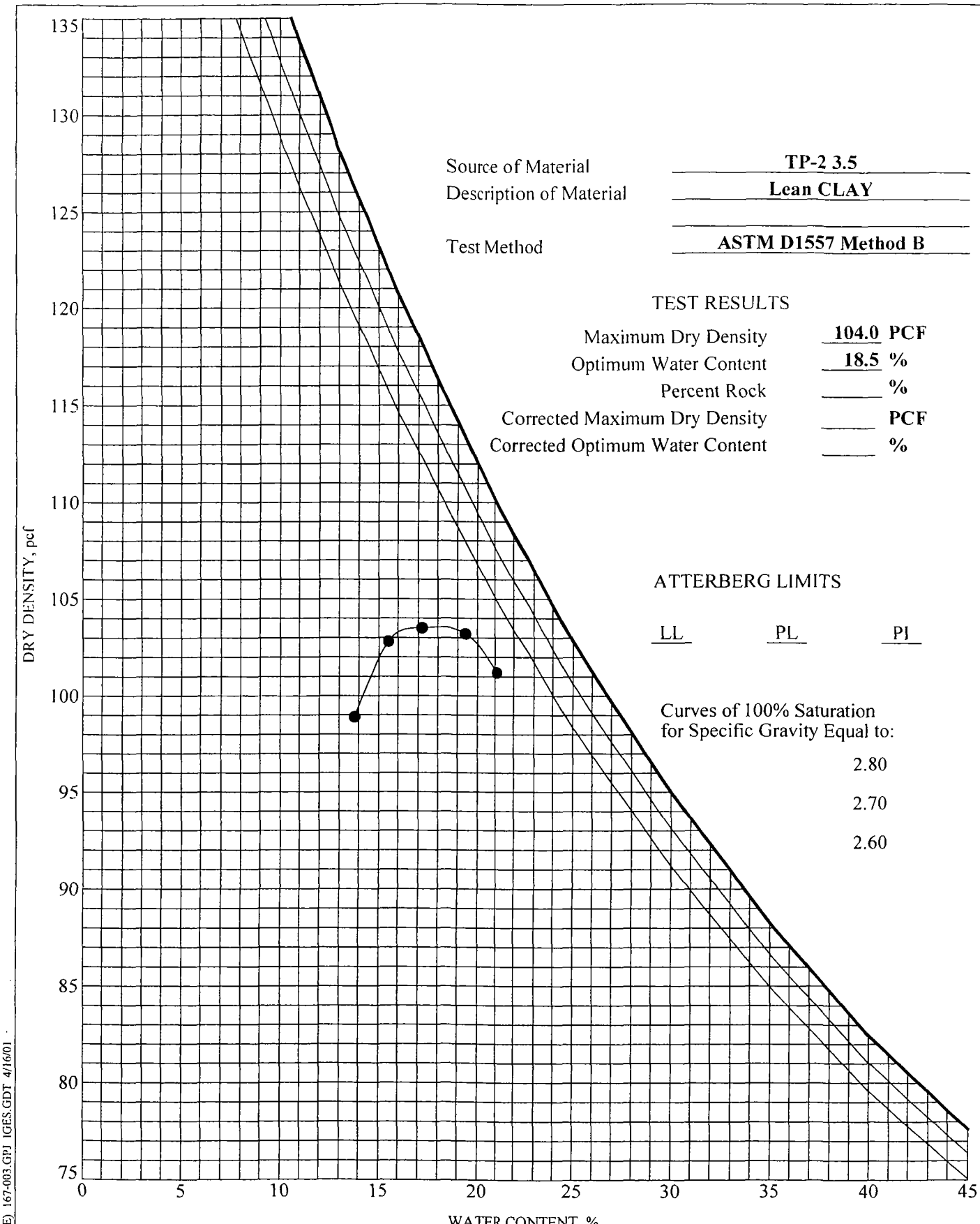
Box Elder County Landfill

Tremonton, Utah

Project Number: 00167-003

PLATE

4



Source of Material	TP-2 3.5
Description of Material	Lean CLAY
Test Method	ASTM D1557 Method B

TEST RESULTS

Maximum Dry Density	104.0	PCF
Optimum Water Content	18.5	%
Percent Rock		%
Corrected Maximum Dry Density		PCF
Corrected Optimum Water Content		%

ATTERBERG LIMITS

LL	PL	PI

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

US_COMPACTION_(PLATE) 167-003.GPJ IGES.GDT 4/16/01

IGES

COMPACTION TEST

Box Elder County Landfill

Tremonton, Utah

Project Number: 00167-003

PLATE 5

APPENDIX J

August 25, 1995

Tahoma Companies, Inc. WDBE
444 S. Main Street
Suite C-7
Cedar City, Utah 84720

Dear Mr. Prevatte

In response to your letter dated August 23, 1995, you requested information, regarding if the following lands contained any national, state or county parks, monuments, or recreation area; wilderness (designated or study area), or wild and scenic river area.

T. 10 N., R. 3 W., SLM
Sec. 18: W1\2

After checking the records on file at this office it was determined that these lands are privately owned and not under the Bureau of Land Management's jurisdiction. Nor are there any federal lands within one thousand feet of the above described land. If you have any further questions please feel free to call, Susan Bauman at (801)539-4001.

Susan Bauman

United States Department of the Interior

FISH AND WILDLIFE SERVICE

UTAH FIELD OFFICE
LINCOLN PLAZA
145 EAST 1300 SOUTH, SUITE 404
SALT LAKE CITY, UTAH 84115

September 22, 1995

SEP 27 1995

Chad M. Prevatte
Tahoma Companies, Incorporated WDBE
444 S. Main Street, Suite C-7
Cedar City, Utah 84720

Dear Mr. Prevatte:

In response to your letter of August 23, 1995 concerning the proposed establishment of a sanitary land fill in Section 18, T.10N., R.3W. SLB&M. in Box Elder County, Utah, the U.S. Fish and Wildlife Service advises that no federally listed threatened or endangered species are known to occur on the project site. If we can be of any further assistance please contact us.

Sincerely,

Robert D. Williams
Assistant Field Supervisor

bcc: Official file
Reading file

JLE/jm:9/22/95
C:\wp51\Consults\EPA-001.rsl
file:EPA/informal/species list

United States
Department of
Agriculture

Natural Resources
Conservation
Service

P. O. Box 11350
Salt Lake City, Utah 84147

November 9, 1995

Mr. Chad Prevatte
Tahoma Companies, Inc.
444 S. Main St. Suite C-7
Cedar City, Utah 84720

Dear Mr. Prevatte:

This letter is to revise the Prime Farmland determination for Section 18, T10N, R3W near the top of Little Mountain.

Our response of October 31, 1995, indicated that there were 13 acres of Prime Farmland. Due to a lack of a dependable irrigation water supply, this should have been designated as Statewide Important Farmland. A revised Form AD-1106 is enclosed.

Mike Domeier

MIKE DOMEIER
Soil Correlator

Enclosure

cc:
Gary Player

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 11/9/95
Name Of Project	Federal Agency Involved
Proposed Land Use ~~Box Elder County Landfill~~ Landfill	County And State Box Elder, Utah
PART II *(To be completed by SCS)*	Date Request Received By SCS

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply – do not complete additional parts of this form).*	Yes	No	Acres Irrigated	Average Farm Size
	XX	☐	0	85

Major Crop(s)	Farmable Land In Govt. Jurisdiction	Amount Of Farmland As Defined in FPPA
Dryland, hay, grain	Acres: %	Acres: 368,000 %
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By SCS

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly				
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site				
PART IV *(To be completed by SCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	0			
B. Total Acres Statewide And Local Important Farmland	13			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	.00004			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	25			
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*				

PART VI *(To be completed by Federal Agency)* Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or a local site assessment)*	160				
TOTAL POINTS *(Total of above 2 lines)*	260				

e Selected:	Date Of Selection:	Was A Local Site Assessment Used? Yes ☐ No ☐

ason For Selection:

United States
Department of
Agriculture

Natural Resources
Conservation
Service

P. O. Box 11350
Salt Lake City, Utah 84147

December 29, 1995

Mr. Chad M. Prevatte
Tahoma Companies Inc.
444 S Main St. Suite C-7
Cedar City, Utah 84720

Dear Mr. Prevatte:

Enclosed are three copies of the soil survey map for the proposed Little Mountain Landfill. On one of the copies I have worked the KeB unit (Kearns silt loam, 1 to 3 percent slopes) which is the Important Farmland units in or near the project site.

If you have any questions, please call me at 524-5064.

Mike Domeier

MIKE DOMEIER
Soil Correlator

Enclosure

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 11/9/95
Name Of Project	Federal Agency Involved
Proposed Land Use ~~Box Elder County Landfill~~ Landfill	County And State Box Elder, Utah
PART II *(To be completed by SCS)*	Date Request Received By SCS

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply – do not complete additional parts of this form).*	Yes	No	Acres Irrigated	Average Farm Size
	XX	☐	0	85

Major Crop(s)	Farmable Land In Govt. Jurisdiction	Amount Of Farmland As Defined in FPPA
Dryland, hay, grain	Acres: %	Acres: 368,000 %
Name Of Land Evaluation System Used	Name Of Local Site Assessment System	Date Land Evaluation Returned By SCS

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly				
B. Total Acres To Be Converted Indirectly				
C. Total Acres In Site				
PART IV *(To be completed by SCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	0			
B. Total Acres Statewide And Local Important Farmland	13			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	.00004			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	25			
PART V *(To be completed by SCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*				

PART VI *(To be completed by Federal Agency)* Assessment Criteria *(These criteria are listed in 7 CFR 658.5(b).*	Maximum Points				
1. Area In Nonurban Use					
2. Perimeter In Nonurban Use					
3. Percent Of Site Being Farmed					
4. Protection Provided By State And Local Government					
5. Distance From Urban Builtup Area					
6. Distance To Urban Support Services					
7. Size Of Present Farm Unit Compared To Average					
8. Creation Of Nonfarmable Farmland					
9. Availability Of Farm Support Services					
10. On-Farm Investments					
11. Effects Of Conversion On Farm Support Services					
12. Compatibility With Existing Agricultural Use					
TOTAL SITE ASSESSMENT POINTS	160				
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100				
Total Site Assessment *(From Part VI above or a local site assessment)*	160				
TOTAL POINTS *(Total of above 2 lines)*	260				

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☐

Reason For Selection:


Sulphur Creek

January 18, 1996

Mr. Phil Burns
Environmental Scientist
Utah Division of Solid and Hazardous Waste
288 North 1460 West
Salt Lake City, Utah 84114-4880

Dear Phil:

Thank you for meeting with our Consultant, Tahoma Companies, Inc. yesterday. It is great to know that our preliminary plans for the Box Elder County landfill are progressing in a manner that will be acceptable to your agency.

We have completed our analysis of the location standards for the Upper Little Mountain site. Mr. Mike Domeier of the Natural Resources Conservation Service (NRCS) identified 13 acres of Important Farmland in two small areas at the northwestern and southeastern edges of the site. This represents 0.00004 percent of the farmland in Box Elder County.

The Important Farmland consists of Kearns silt loam with slopes ranging from 1 to 3 percent. According to the NRCS, approximately twenty five (25) percent of the farmland in Box Elder County has the same or higher relative value.

Box Elder County proposes to refrain from developing the approximately 5 acre patch of Kearns silt loam that occurs at the southeastern edge of the landfill site. The area will be available for use as dry land pasture or for hay production.

Approximately six acres of Kearns silt loam occur at the northwest corner of the landfill site. Box Elder County proposes to dispose of municipal waste on about two acres of the Kearns silt loam. The remainder (approximately four acres) will be utilized for a retention basin to control run-off from within the landfill.

The Box Elder County Commissioners believe that landfill construction is the best way to use this land. The land is too inaccessible and scattered to add significant economic resources to County agriculture.

Please approve our decision to utilize this small area of Important Farmland for construction of the new Box Elder County Landfill.

Sincerely,

Jay E. Hardy
Box Elder County Commissioner

Enclosures:
1) Map of soil types at Upper Little Mountain, Box Elder County
2) USDA Farmland Conversion Impact Rating
3) Correspondence from NRCS, 11/9/95
4) Correspondence from NRCS, 12/29/95

State of Utah

DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF SOLID AND HAZARDOUS WASTE

Michael O. Leavitt
Governor
Dianne R. Nielson, Ph.D.
Executive Director
Dennis R. Downs
Director

288 North 1460 West
P.O. Box 144880
Salt Lake City, Utah 84114-4880
(801) 538-6170 Voice
(801) 538-6715 Fax
(801) 536-4414 T.D.D.

January 29, 1996

FEB 01 1996

Jay E. Hardy
Box Elder County Commissioner
01 South Main St.
Brigham City, Utah 84302

Dear Commissioner Hardy:

Enclosed is our review of the Request for Exemption From Liner, Leachate Control, and Ground Water Monitoring at the proposed Upper Little Mountain landfill site submitted to the Division of Solid and Hazardous Waste on November 29, 1995. The issues presented in this review were discussed with Gary Player of Tahoma Companies at our January 17, 1996 meeting. In general, the proposed site appears suitable for an exemption from the liner, leachate collection, and ground water monitoring requirements provided that the questions raised in this review are satisfactorily answered and that the design and operations plan in the full permit application are adequate.

We have also received Box Elder County's request for the location standard exemption for the six acres of farmland of "statewide importance" at the northwest corner of the site. We have no objection to this exemption, and the request will be included in the public notice and public comment period on the full permit application.

If you have questions regarding permitting procedures, please call me or Phil Burns at 538-6170.

Sincerely,

Ralph T. Bohn, Manager
Solid Waste Section

enclosure

c: John C. Bailey, Director, Bear River Health Department
Gary Player, Tahoma Resources - with enclosure

f:...pburns/wp/box2/revlet
file to: Box Elder County, Upper Little Mountain Correspondence

interoffice
MEMORANDUM

to: File

from: Gary Farnsworth Player

subject: Reconnaissance of Man-Made Structures, Box Elder County Landfill Site, Upper Little Mountain

date: August 4, 1995

I was on location for the last week at the Upper Little Mountain landfill site to conduct geotechnical studies. We dug several test pits and a test boring to 300 feet.

While at the site I took the opportunity to look around for structures. I observed that there are no structures other than livestock fences within a one-mile radius circle centered on the west quarter corner of section 18, T. 10 N., R. 3 W., Salt Lake BL&M.

There are, in fact, no structures within sections 7, 17, 18, 19 and 20 of T. 10 N., R. 3 W., or within sections 12, 13 and 24 of T. 10 N., R. 4 W.

The closest structures to the proposed landfill are in the southwest quarter of section 8, T. 10 N., R. 3 W. These structures are farm buildings on the Bear River Valley floor, approximately 5,700 feet northeast of the northeast corner of the landfill.

Gary F. Player

State of Utah

Department of Community & Economic Development
Division of State History
Utah State Historical Society

Michael O. Leavitt
Governor
Max J. Evans
Director

300 Rio Grande
Salt Lake City, Utah 84101-1182
(801) 533-3500 • FAX: 533-3503 • TDD: 533-3502
cehistry.ushs@email.state.ut.us

September 6, 1995

Chad M. Prevatte
Environmental Scientist
Tahoma Companies, Incorporated WDBE
444 South Main Street, Suite C-7
Cedar City, Utah 84720

RE: Box Elder's Landfill - T10N, R3W, Section 18

In Reply Please Refer to Case No. 95-1120

Dear Mr. Prevatte:

The Utah State Historical Preservation Office received the above referenced cultural resources report on August 25, 1995. After review of the material provided, the Utah Preservation Office recommends that there would be No Effect upon cultural resources by the project.

This information is provided on request to assist with Section 106 responsibilities as specified in 36CFR800. If you have questions, please contact me at (801) 533-3555.

Your humble servant,

James L. Dykmann
Compliance Archaeologist

JLD:95-1120 OR/NE

TAHOMA COMPANIES, INC.
444 SOUTH MAIN STREET, SUITE C-7
CEDAR CITY, UT 84720
(801) 865-0131 FAX 865-0161

October 12, 1995

Scott Fredrickson
FAA
Airports District Office
Suite 300
5440 Roslyn
Denver, CO 80216

Dear Mr. Fredrickson:

I have received your message concerning the location standards for Box Elder County. I am pleased to see that you found Box Elder's landfill site, West ½ of Section 18, Township 10 North, Range 3 West, to be 8.15 nautical miles bearing 108.27 from Brigham City Municipal Airport. This distance is greater than the ten thousand feet required for turbojet aircraft and greater than the 5 miles required before a landfill must notify the affected airport.

It was a pleasure to get such efficient service. Thank you very much.

Sincerely,

Chad M. Prevatte

Chad M. Prevatte
Environmental Scientist

K:\SHARE\CLIENTS\95007-2\CORRES\FAA.WPD

TAHOMA COMPANIES, INC.
444 SOUTH MAIN STREET, SUITE C-7
CEDAR CITY, UT 84720
(801) 865-0131 FAX 865-0161

October 13, 1995

Denton Beecher
Zoning Administrator
County Surveyors
01 S. Main
Bringham City, UT 84302

SUBJECT: ZONING AT PROPOSED LANDFILL SITE

Dear Mr. Beecher:

I spoke with you on Thursday October 12 about the Box Elder County's Little Mountain site (W ½ of Section 18, T 10 N, Range 3 West) zoning requirements. You informed me that the area is unzoned and therefore available for use as the county's future landfill.

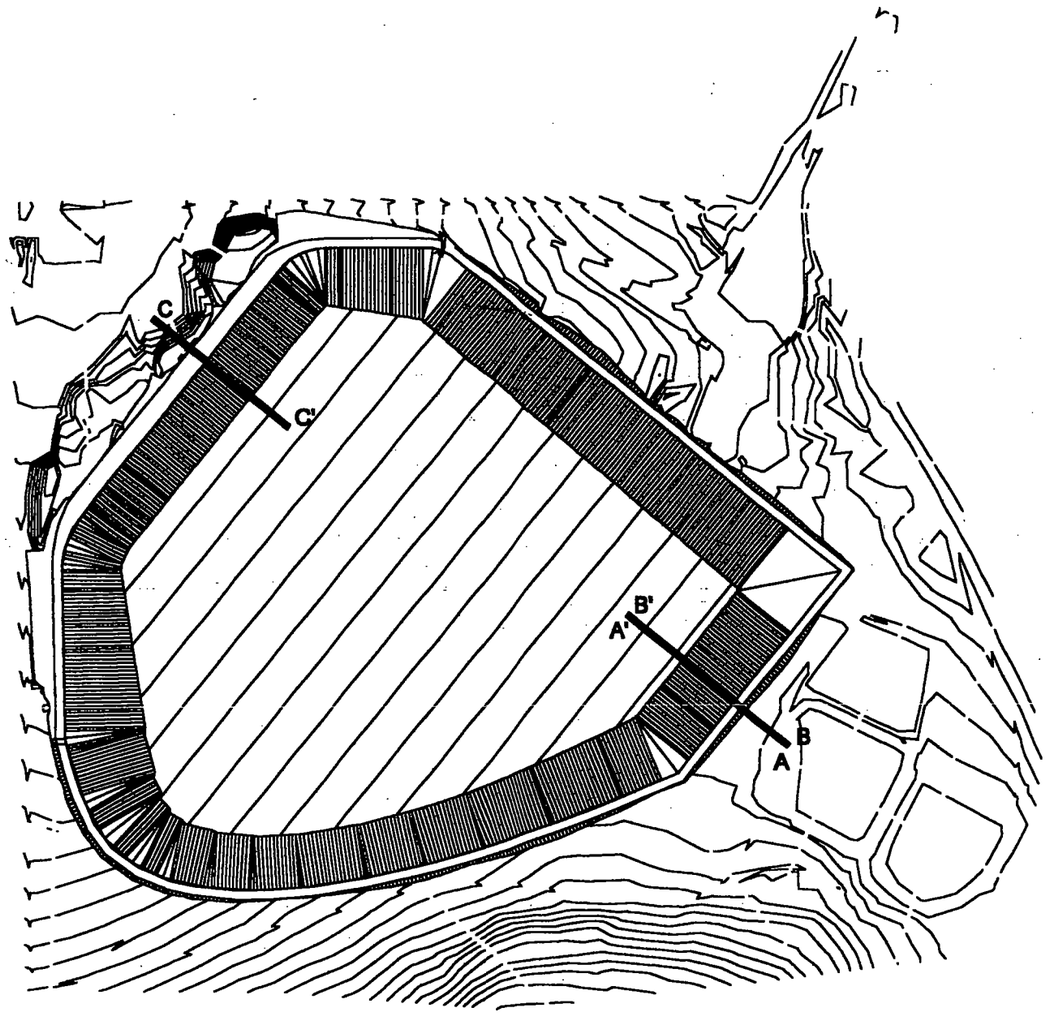
Thank you very much for the information.

Sincerely,

Chad M. Prevatte
Environmental Scientist

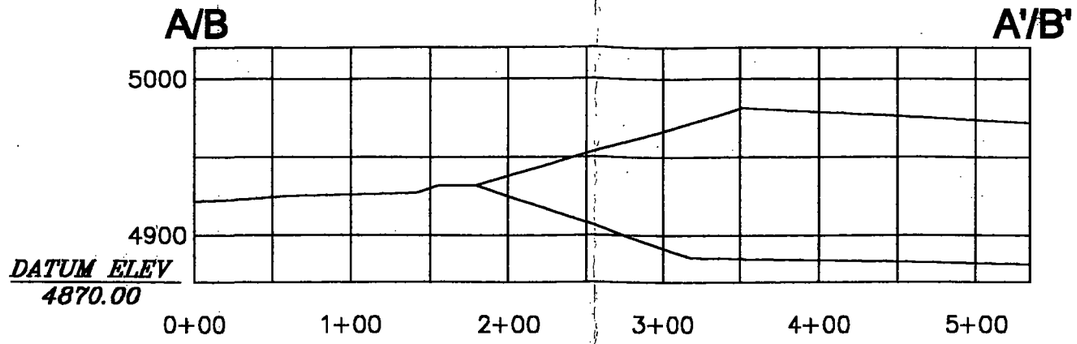
K:\SHARE\CLIENTS\95007-2\CORRES\BEZONE.WPD

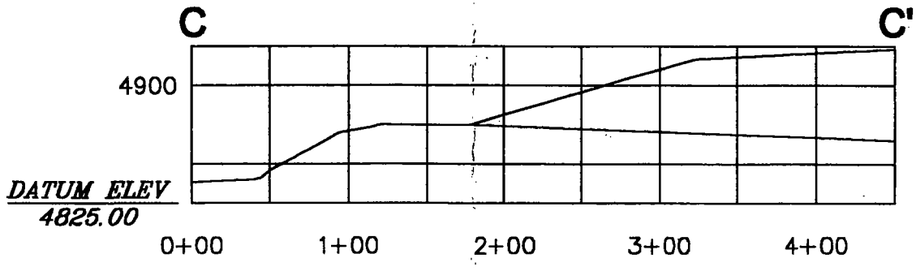
APPENDIX K



0 100' 200' 400' 800'

Scale: 1" = 400'





0 25' 50' 100' 200'

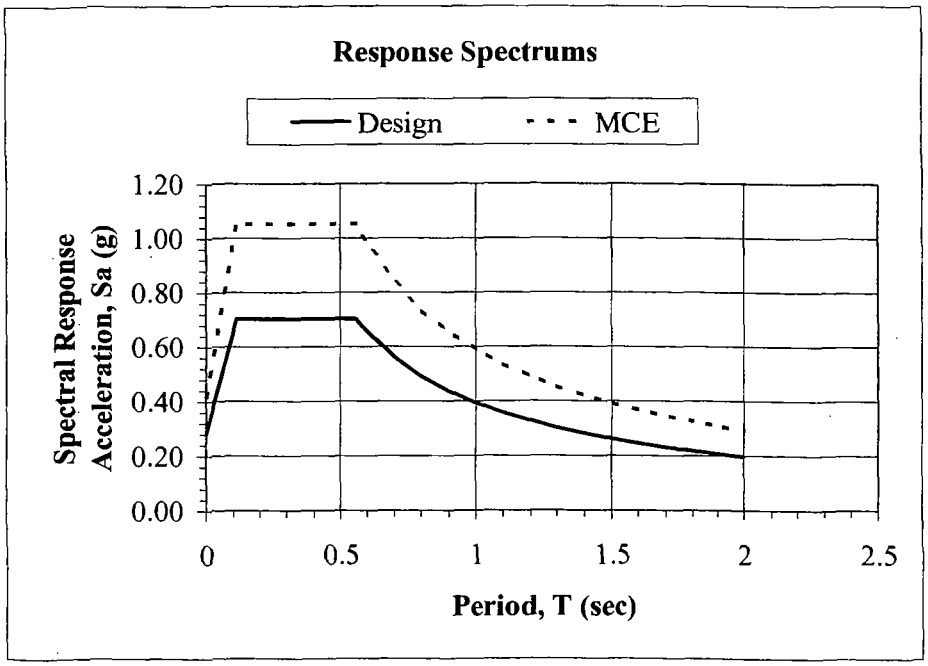
Scale: 1" = 100'

SITE GROUND MOTION [IBC SECTION 1615]

Project: Box Elder Landfill
Latitude = 41.6
Logitude = -112.2314

Number: 00167-008
Date: 11/30/06
By: jah

Ss =	0.936 (g)	The mapped spectral accleration for short periods	[1615.1]
S_1 =	0.344 (g)	The mapped spectral accleration for a 1-second period	
Site Class =	D	Table 16.15.1.1	
Fa =	1.13	Table 1615.1.2(1)	
Fv =	1.71	Table 1615.1.2(2)	
S_{MS} =	1.054	S_{MS} = Fa*Ss	*The maximum considered E.Q. spectral resonse accelerations
S_{M1} =	0.589	S_{M1} = Fv*S_1	for short and 1-second periods [1615.1.2]
MCE/PGA =	**0.421**	**0.4*S_{MS} [Equation 16-42 in accordance with 1802.2.7 and 1615.2.1]**	
S_{DS} =	0.702	S_{DS} = 2/3*S_{MS}	*The design spectral response acceleration
S_{D1} =	0.393	S_{D1} = 2/3*S_{M1}	at short and 1-second periods
T_0 =	0.112	T_0 = 0.2*S_{D1}/S_{DS}	
T_s =	0.559	T_s = S_{D1}/S_{DS}	
ΔT =	0.1	Time step for diagram	



T (sec)	Sa (g)	Sa (MCE) (g)
0	0.28	0.42
0.11	0.70	1.05
0.56	0.70	1.05
0.60	0.65	0.98
0.70	0.56	0.84
0.80	0.49	0.74
0.90	0.44	0.65
1.00	0.39	0.59
1.10	0.36	0.54
1.20	0.33	0.49
1.30	0.30	0.45
1.40	0.28	0.42
1.50	0.26	0.39
1.60	0.25	0.37
1.70	0.23	0.35
1.80	0.22	0.33
1.90	0.21	0.31
2.00	0.20	0.29

Latitude = 41.6
Longitude = -112.2314
MCE Response Spectra for Site Class B
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B - Fa = 1.0 ,Fv = 1.0

Period (sec)	Sa (g)	Sd (inches)
0.000	0.374	0.000
0.074	0.936	0.049
0.200	0.936	0.366
0.368	0.936	1.237
0.400	0.860	1.345
0.500	0.688	1.681
0.600	0.574	2.018
0.700	0.492	2.354
0.800	0.430	2.690
0.900	0.382	3.026
1.000	0.344	3.363
1.100	0.313	3.699
1.200	0.287	4.035
1.300	0.265	4.371
1.400	0.246	4.708
1.500	0.229	5.044
1.600	0.215	5.380
1.700	0.202	5.716
1.800	0.191	6.053
1.900	0.181	6.389
2.000	0.172	6.725

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 41.6
Longitude = -112.2314
Site Modified Response Spectra for Site Class Site Class D
SMs = FaSs and SM1 = FvS1
Site Class D - Fa = 1.126 ,Fv = 1.712

Period (sec)	Sa (g)	Sd (inches)
0.000	0.421	0.000
0.112	1.054	0.129
0.200	1.054	0.412

0.600	0.982	3.454
0.700	0.842	4.030
0.800	0.737	4.605
0.900	0.655	5.181
1.000	0.589	5.757
1.100	0.536	6.332
1.200	0.491	6.908
1.300	0.453	7.484
1.400	0.421	8.059
1.500	0.393	8.635
1.600	0.368	9.211
1.700	0.347	9.786
1.800	0.327	10.362
1.900	0.310	10.938
2.000	0.295	11.513

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 41.6
Longitude = -112.2314
Spectral Response Accelerations Ss and S1
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B - Fa = 1.0 ,Fv = 1.0
Data are based on a 0.05 deg grid spacing

Period (sec)	Sa (g)	
0.2	0.936	Ss, Site Class B
1.0	0.344	S1, Site Class B

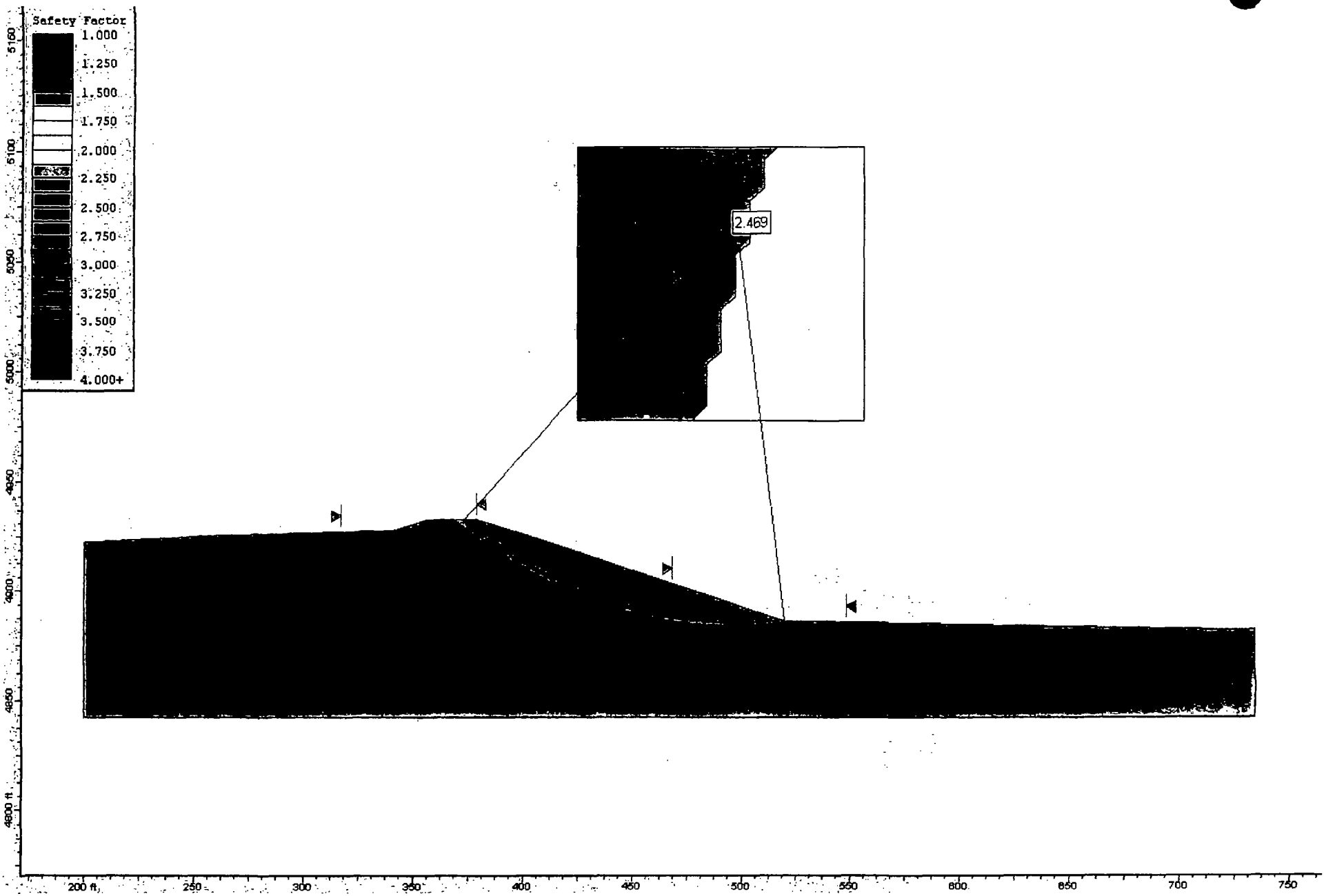
Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 41.6
Longitude = -112.2314
Spectral Response Accelerations SMs and SM1
SMs = FaSs and SM1 = FvS1
Site Class D - Fa = 1.126 ,Fv = 1.712

Period (sec)	Sa (g)	
0.2	1.054	SMs, Site Class D
1.0	0.589	SM1, Site Class D

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 41.6
Longitude = -112.2314
SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class D - Fa = 1.126 ,Fv = 1.712

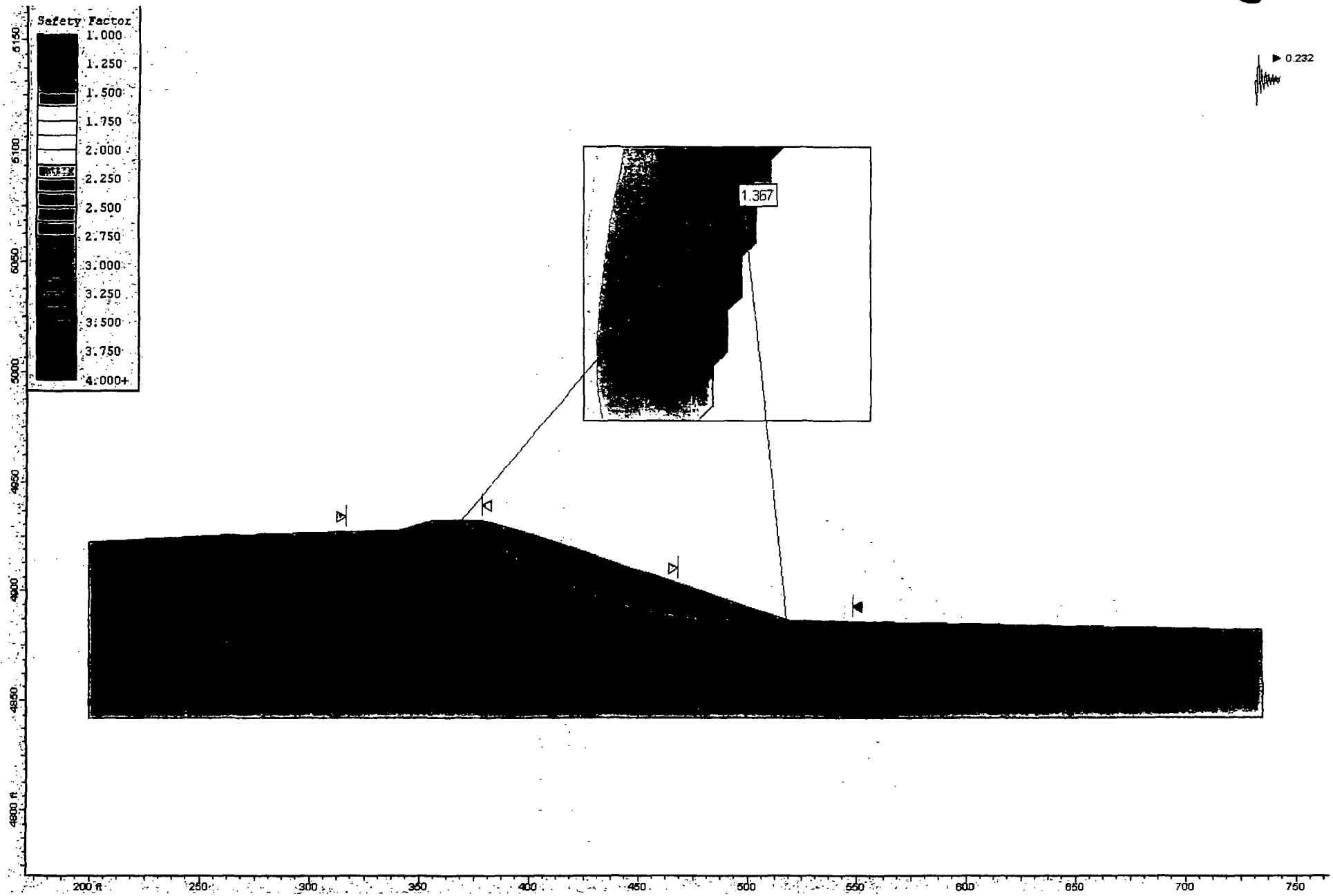
Period (sec)	Sa (g)	
0.2	0.702	SDs, Site Class D
1.0	0.393	SD1, Site Class D

Conterminous 48 States



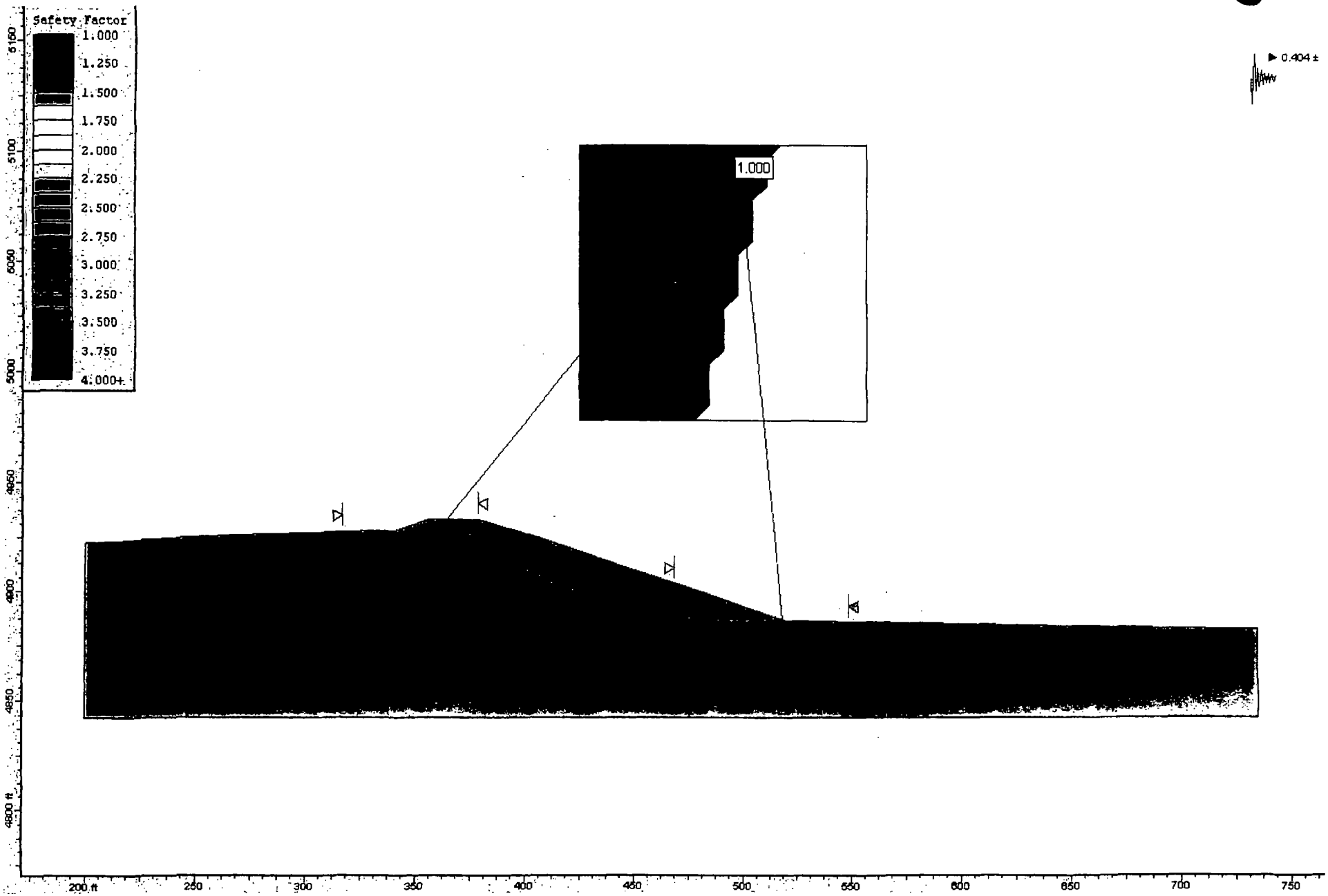
Section A-A – Excavation (Static) FS Min=2.47

PLATE
G-1



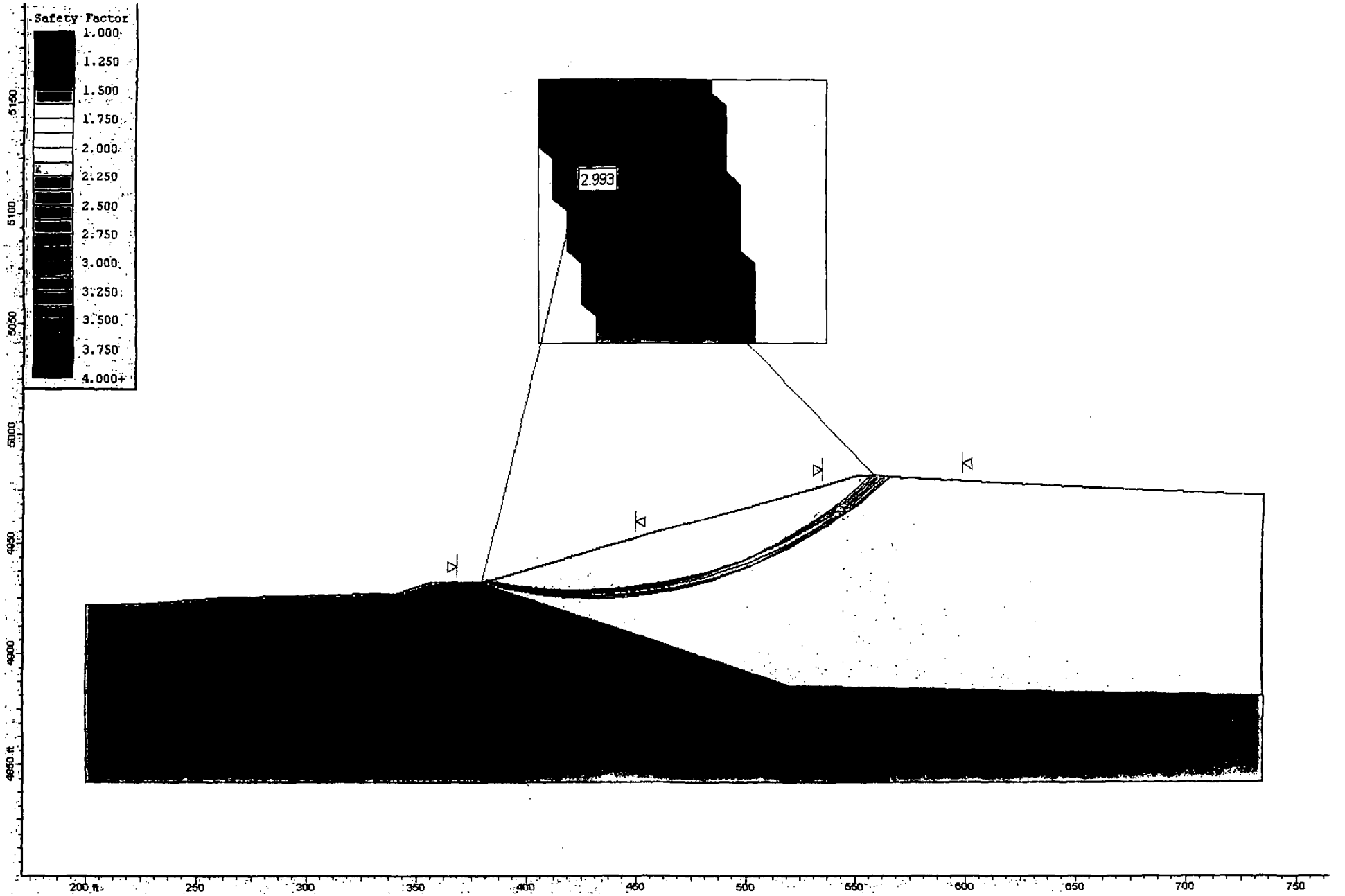
Section A-A – Excavation (Pseudo-static) FS Min=1.37

PLATE
G-2



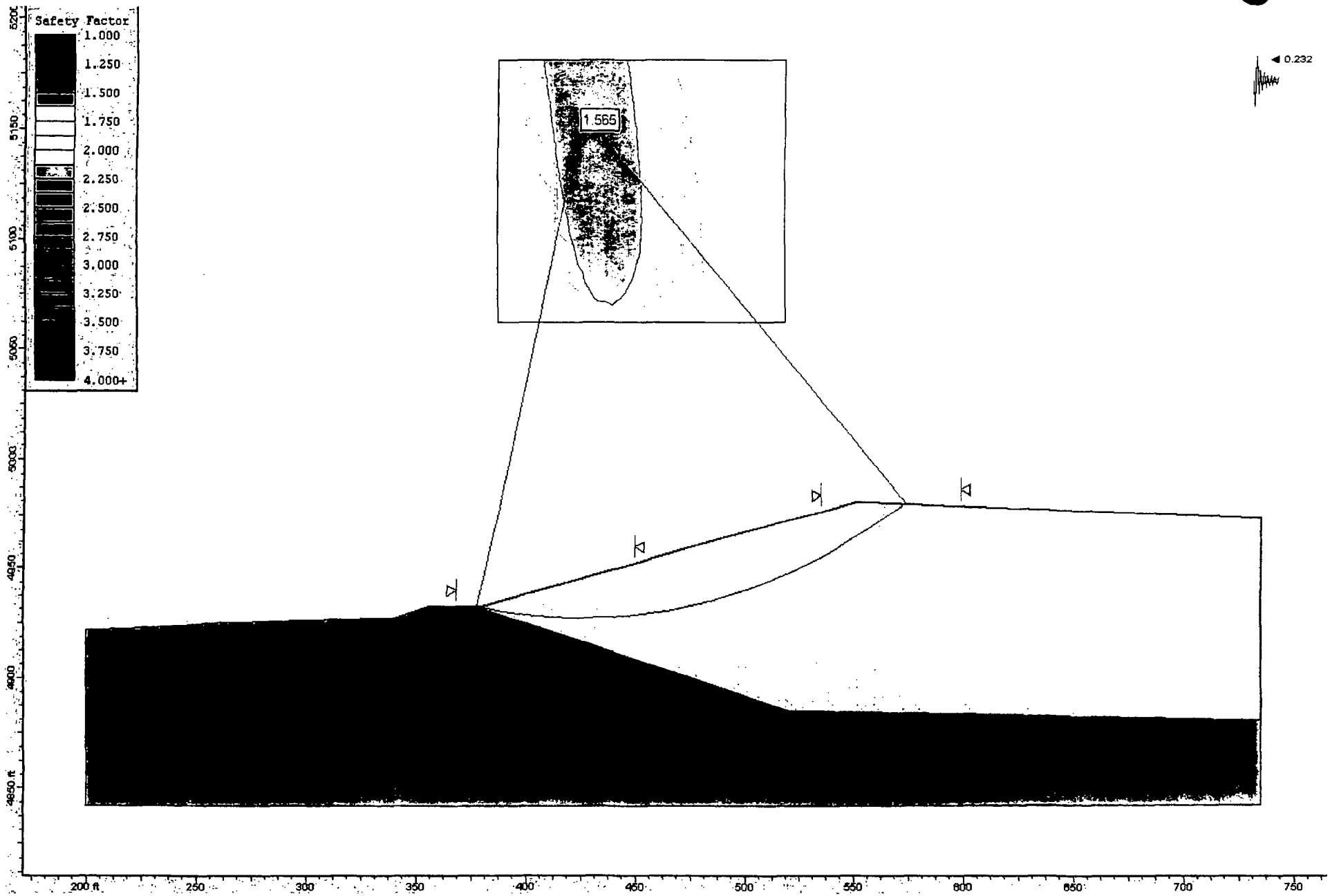
Section A-A – Excavation (Yield Acceleration) k_y=0.3956

PLATE
G-3



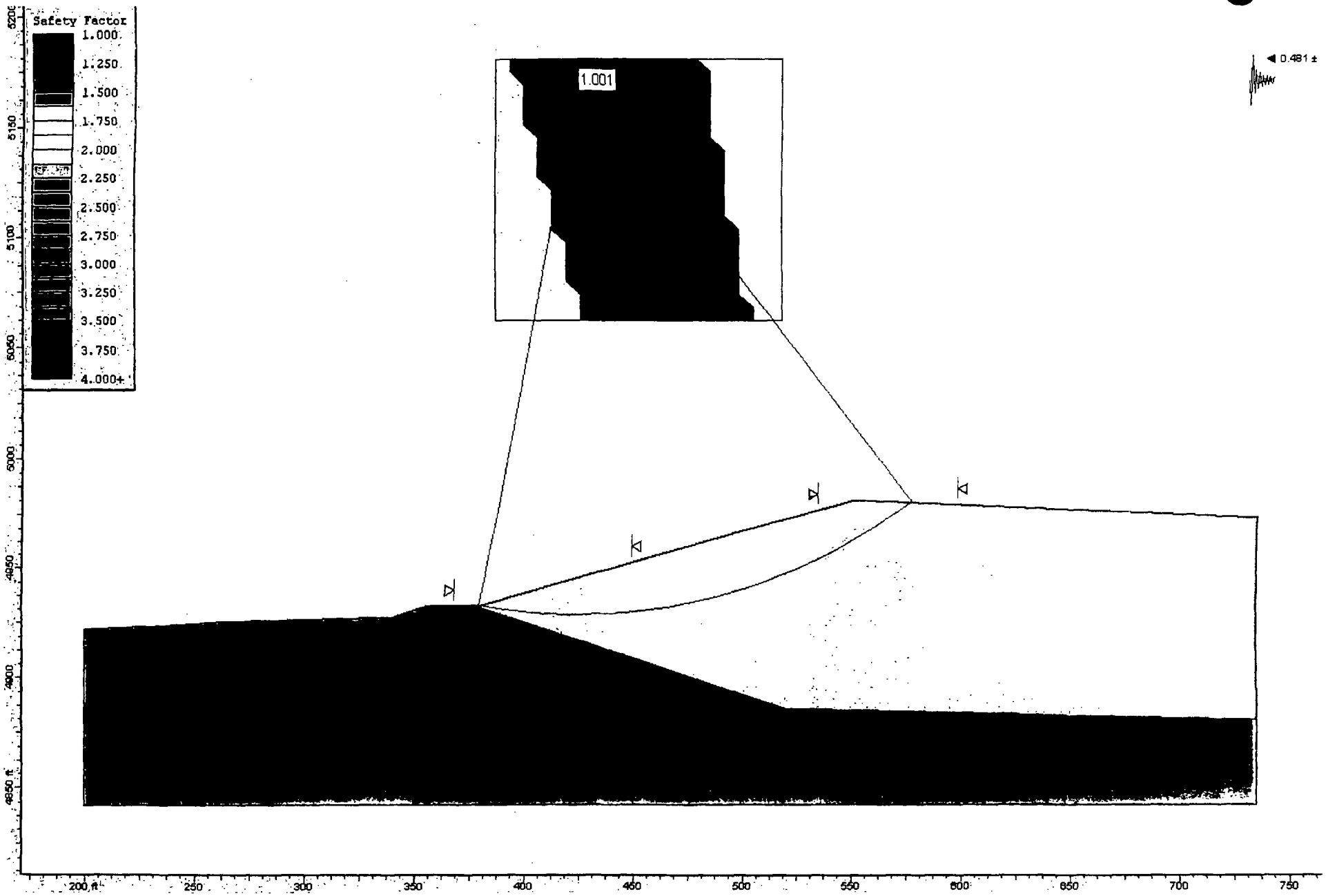
Section B-B – Final Cover (Static) FS Min=2.99

PLATE
G-4



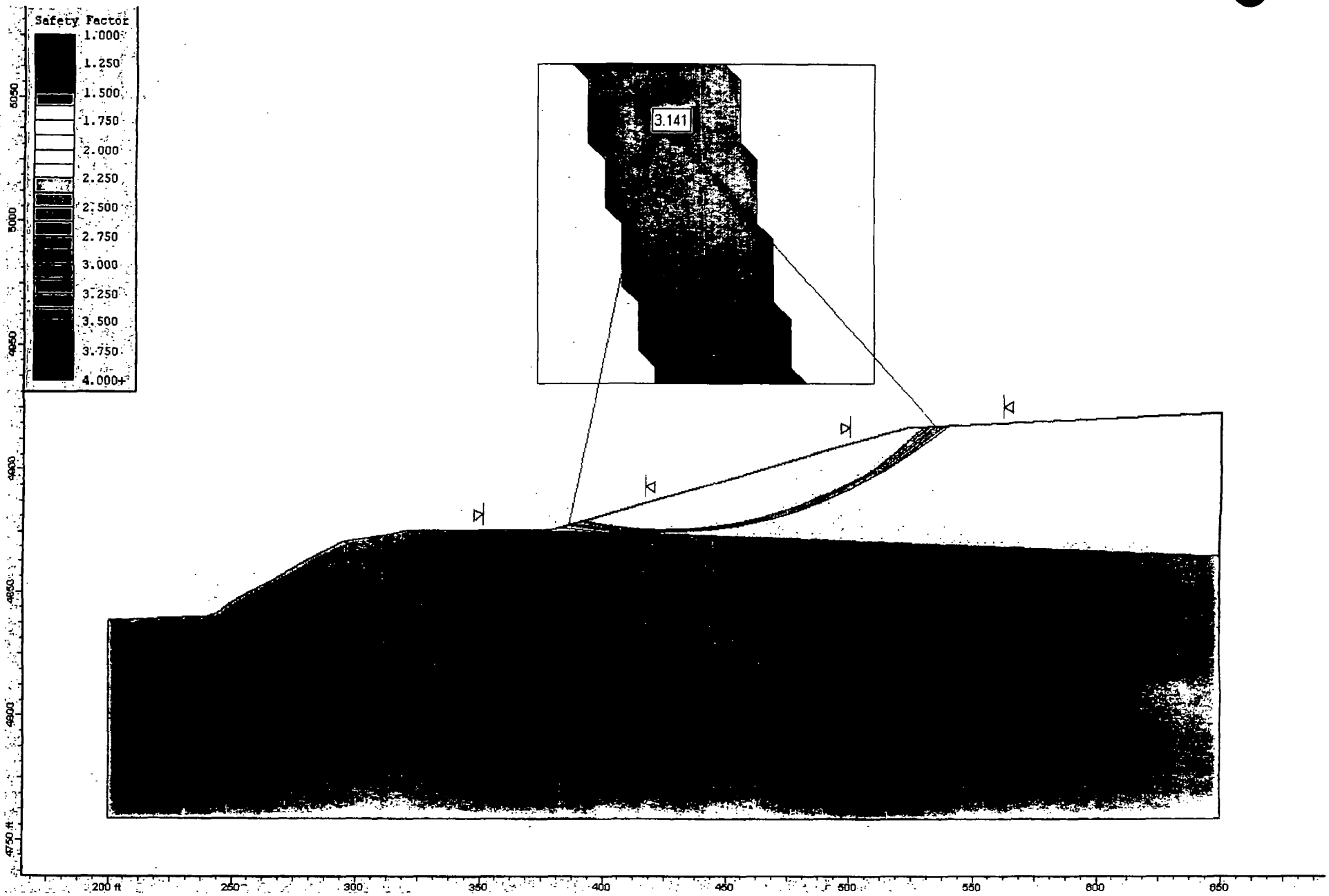
Section B-B – Final Cover (Pseudo-static) FS Min=1.57

PLATE
G-5



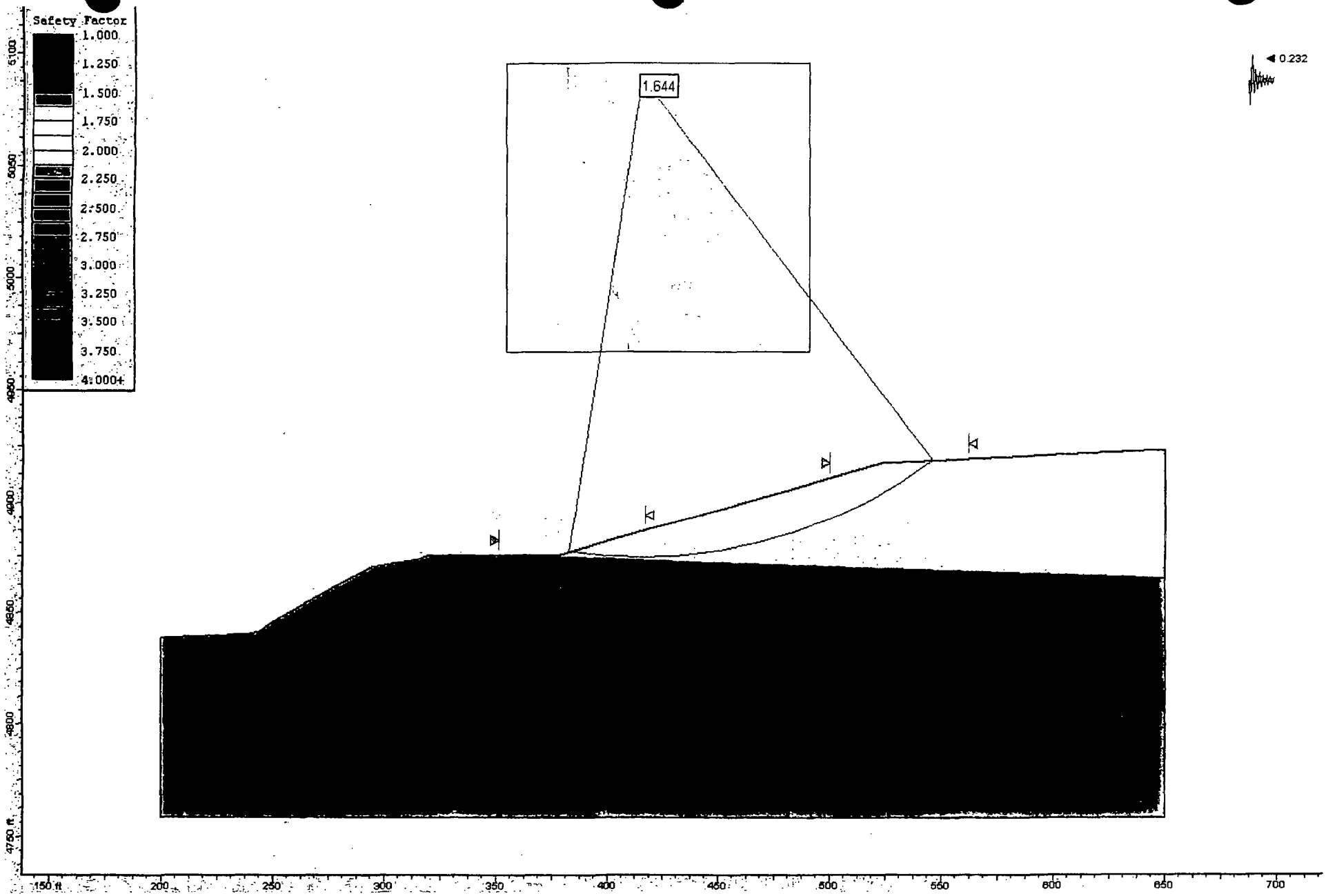
Section B-B – Final Cover (Yield Acceleration) k_y=0.481

PLATE
G-6



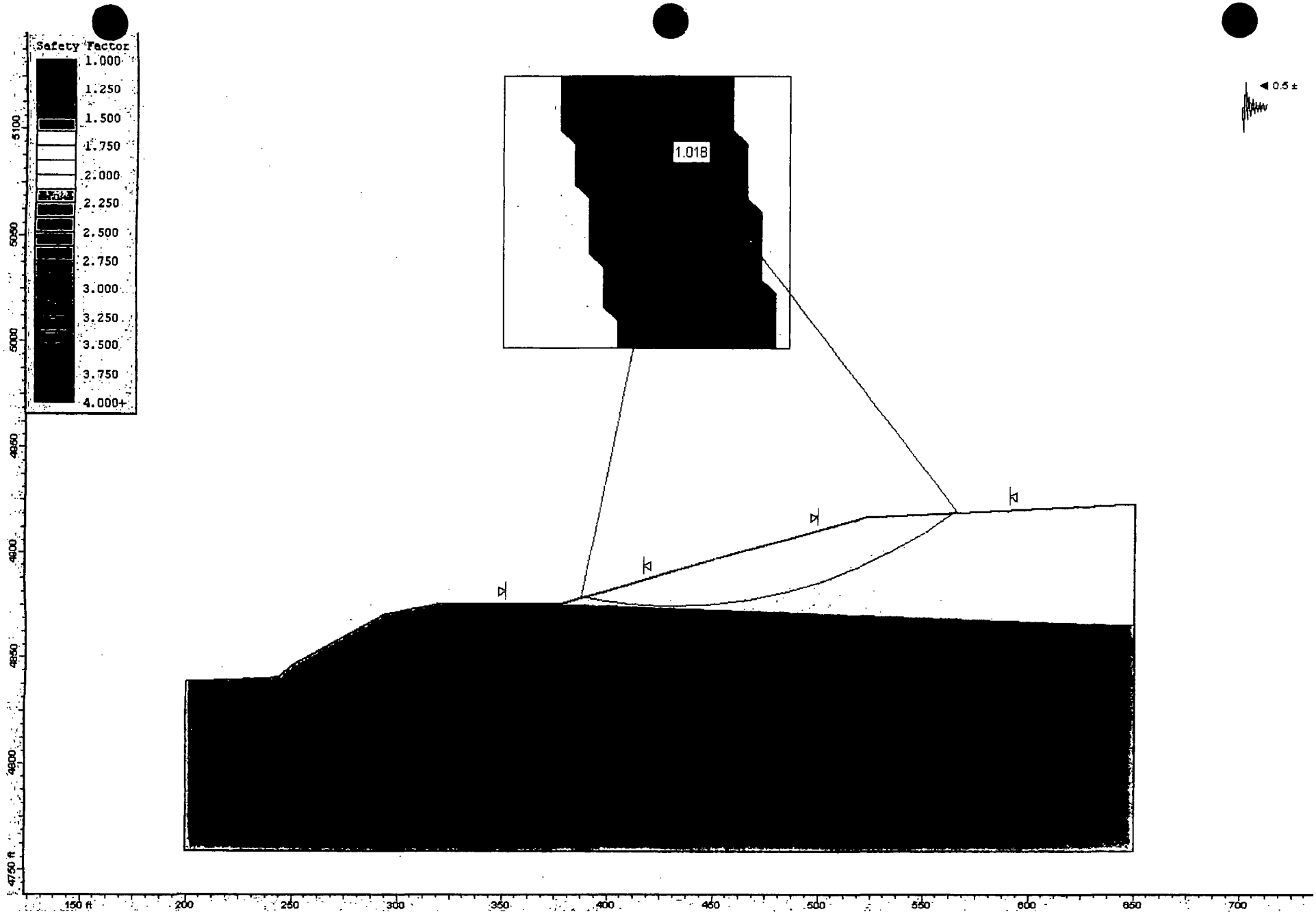
Section C-C – Final Cover (Static) FS Min=3.141

PLATE
G-7



Section C-C – Final Cover (Pseudo-static) FS Min=1.644

PLATE
G-8

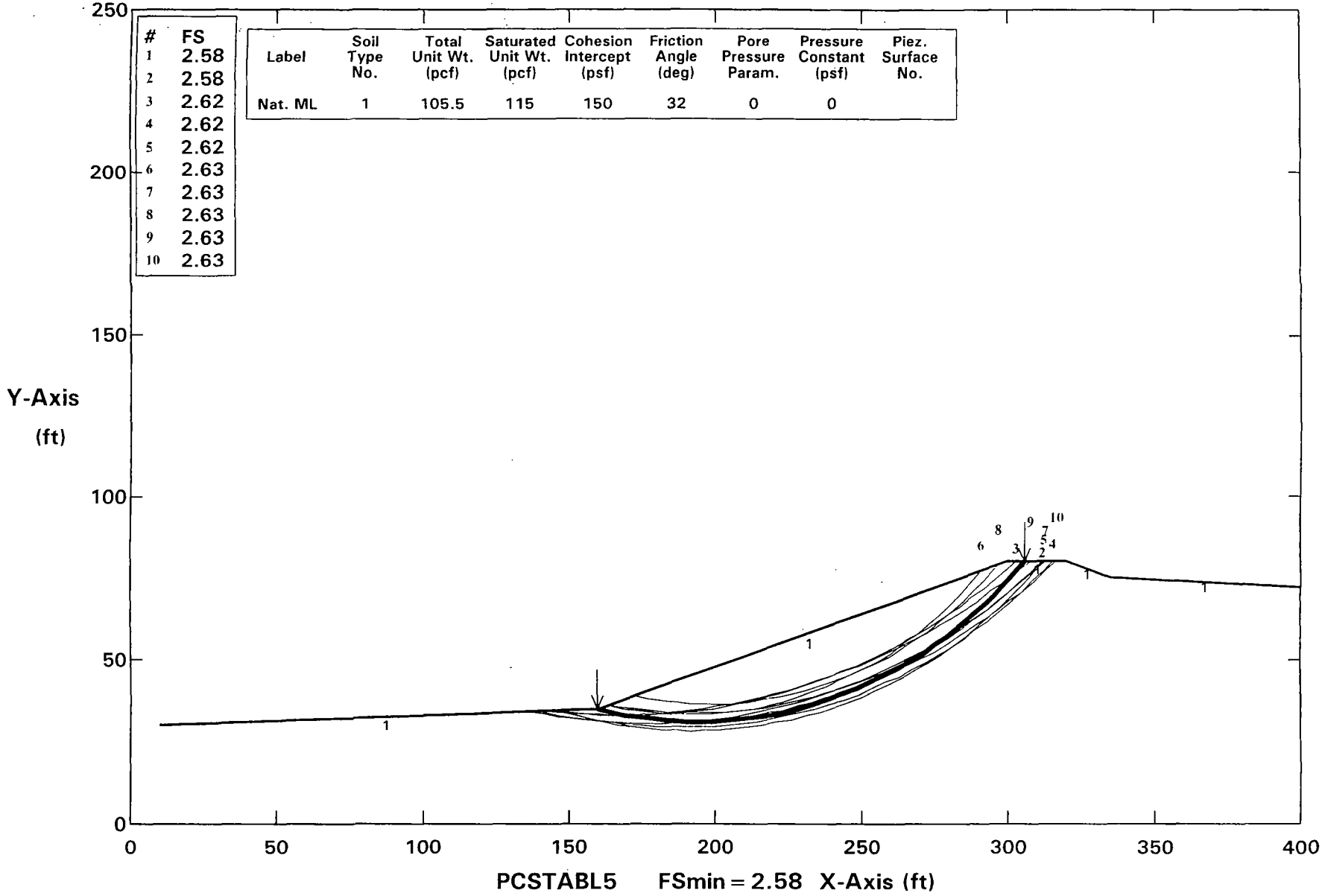


Section C-C – Final Cover (Yield Acceleration) k_y=0.5119

PLATE
G-9

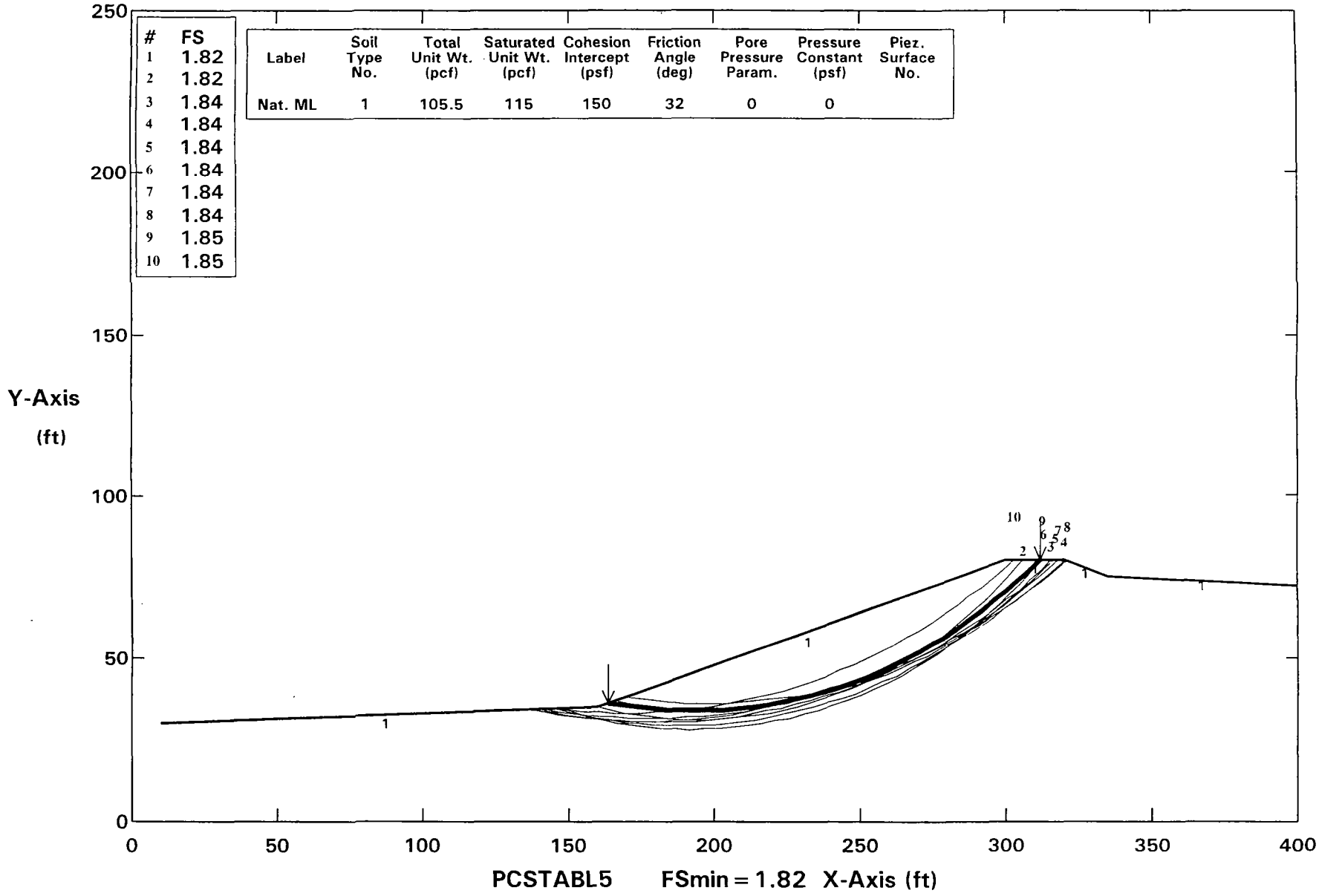
BOX ELDER COUINTY LANDFILL - Section A, Static

Ten Most Critical. A:BXA.PLT



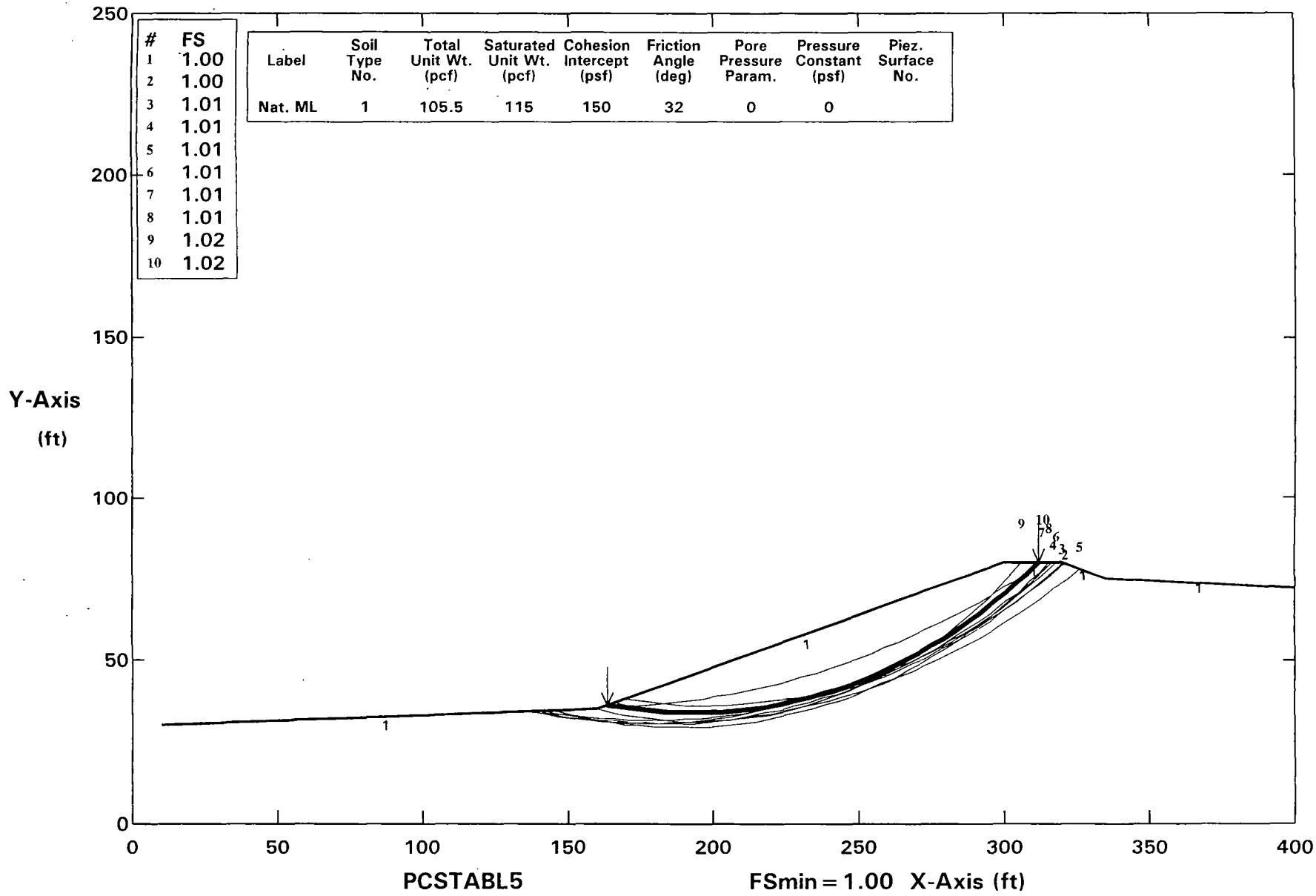
BOX ELDER COUINTY LANDFILL - Section A, Pseudo-static

Ten Most Critical. A:BXAS.PLT



BOX ELDER COUINTY LANDFILL - Section A, Yield Acceleration = 0.42g

Ten Most Critical. A:BXASY.PLT

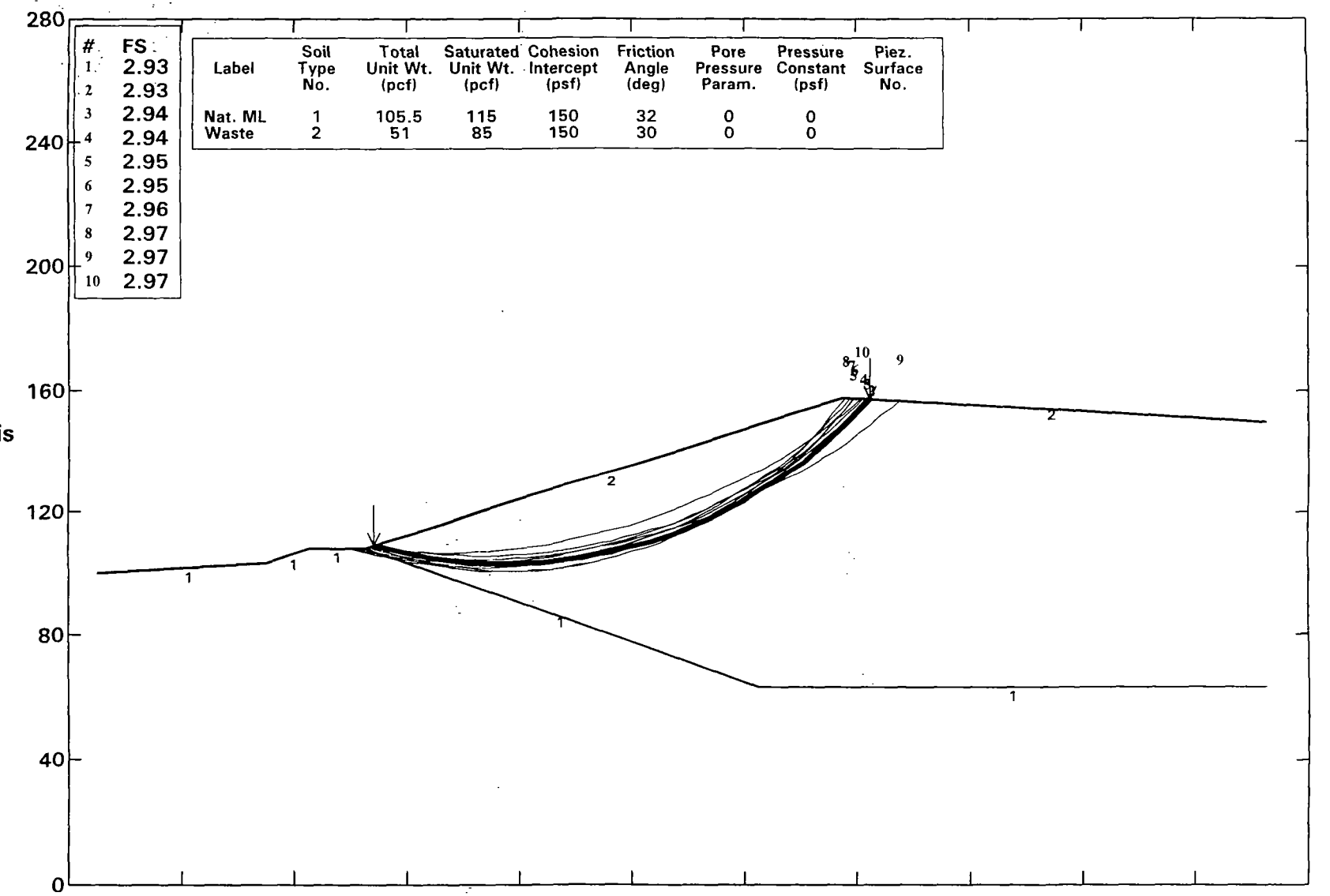


BOX ELDER COUINTY LANDFILL - Section B, Static

Ten Most Critical. A:BXB.PLT

#	FS
1	2.93
2	2.93
3	2.94
4	2.94
5	2.95
6	2.95
7	2.96
8	2.97
9	2.97
10	2.97

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Nat. ML	1	105.5	115	150	32	0	0	
Waste	2	51	85	150	30	0	0	

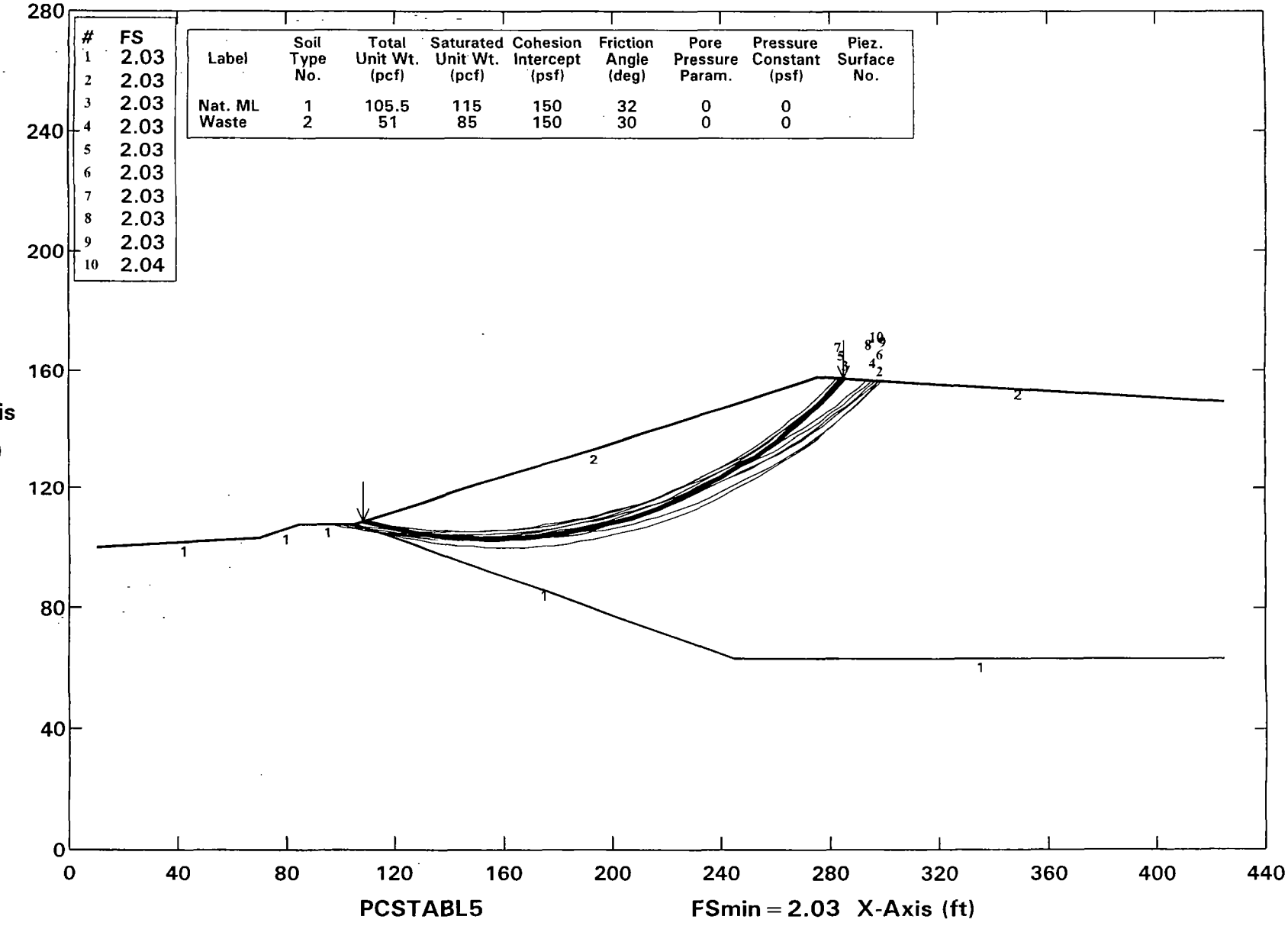


BOX ELDER COUINTY LANDFILL - Section B, Pseudo-Static

Ten Most Critical. A:BXBS.PLT

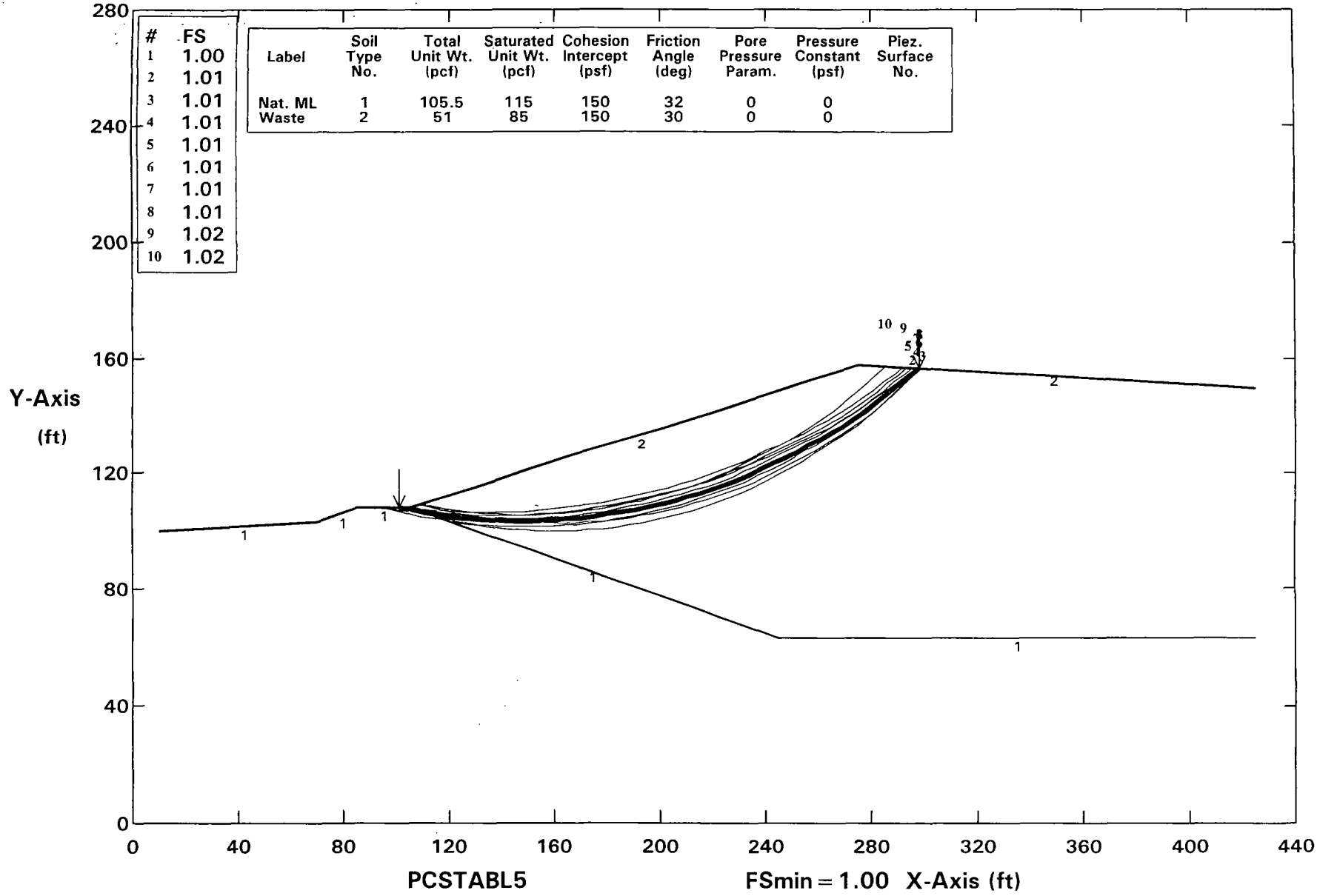
#	FS
1	2.03
2	2.03
3	2.03
4	2.03
5	2.03
6	2.03
7	2.03
8	2.03
9	2.03
10	2.04

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Nat. ML	1	105.5	115	150	32	0	0	
Waste	2	51	85	150	30	0	0	



BOX ELDER COUINTY LANDFILL - Section B, Yield Acceleration = 0.48g

Ten Most Critical. A:BXBSY.PLT



#	FS
1	1.00
2	1.01
3	1.01
4	1.01
5	1.01
6	1.01
7	1.01
8	1.01
9	1.02
10	1.02

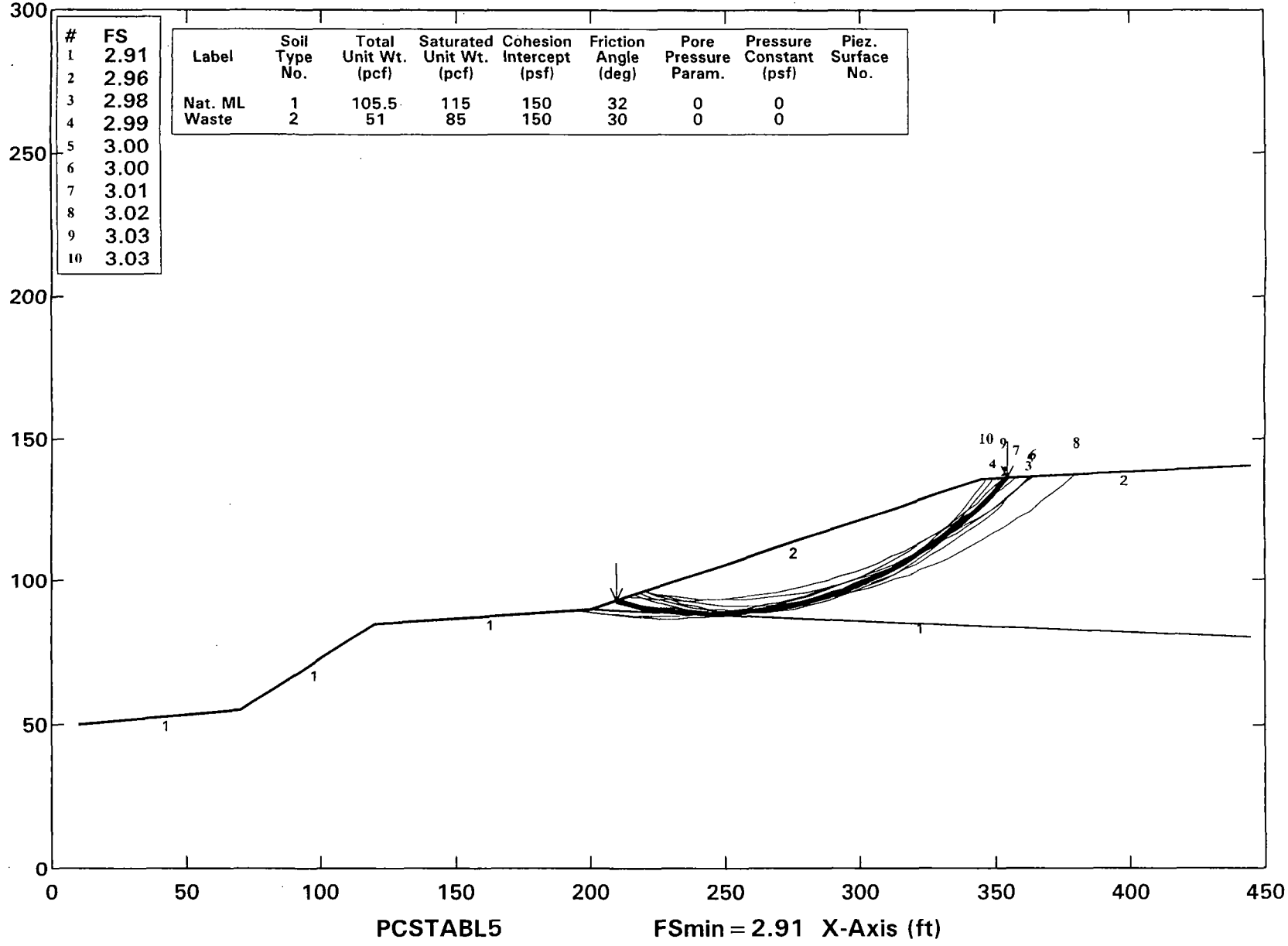
Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Nat. ML	1	105.5	115	150	32	0	0	
Waste	2	51	85	150	30	0	0	

BOX ELDER COUINTY LANDFILL - Section C,Static

Ten Most Critical. A:BXC.PLT

#	FS
1	2.91
2	2.96
3	2.98
4	2.99
5	3.00
6	3.00
7	3.01
8	3.02
9	3.03
10	3.03

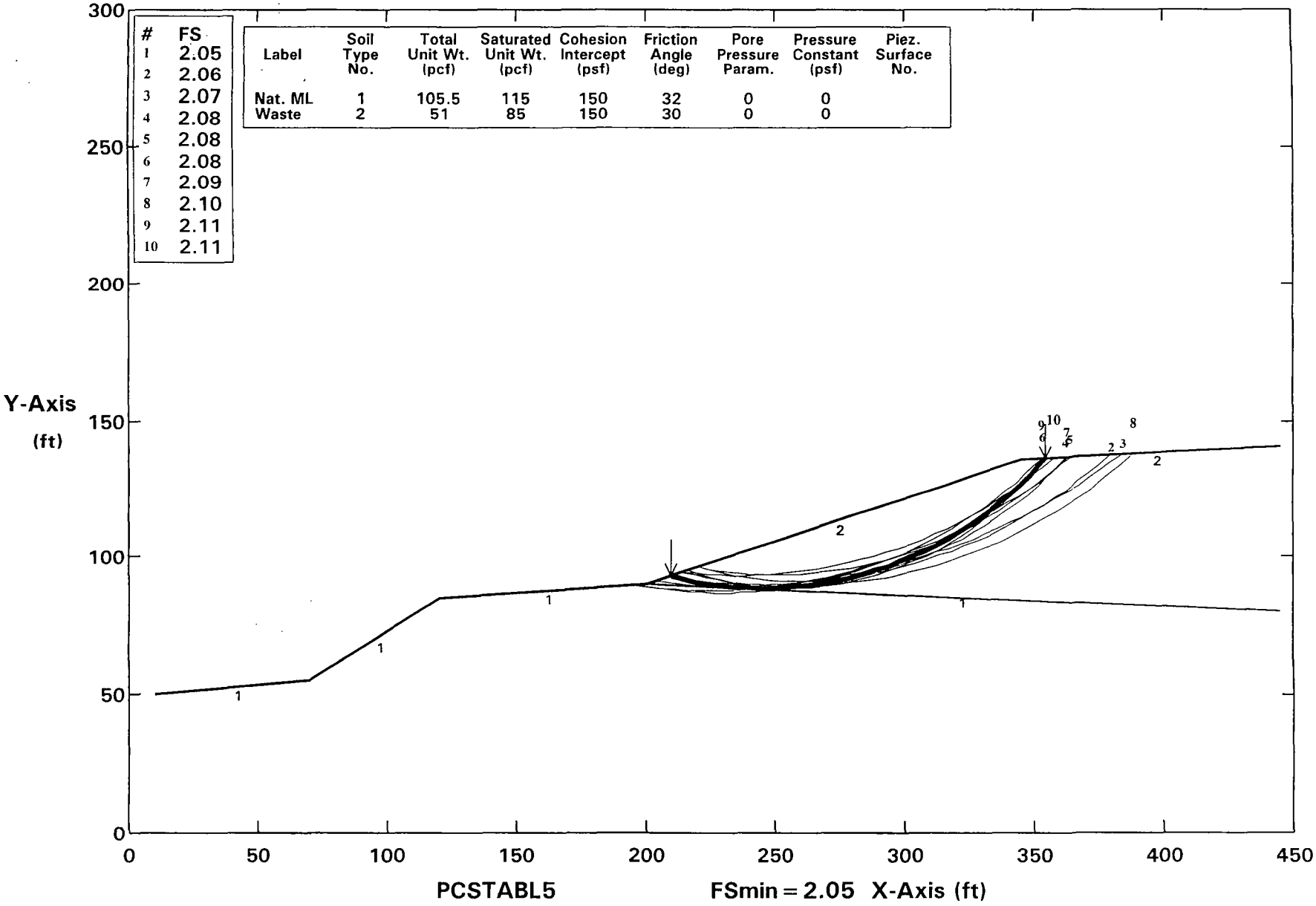
Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Nat. ML	1	105.5	115	150	32	0	0	
Waste	2	51	85	150	30	0	0	



PCSTABL5 FSmin = 2.91 X-Axis (ft)

BOX ELDER COUINTY LANDFILL - Section C,Pseudo-Static

Ten Most Critical. A:BXCS.PLT



BOX ELDER COUINTY LANDFILL - Section C,Yield Acceleration = 0.49g

Ten Most Critical. A:BXCSY.PLT