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Div of Waste Management
and Radiation Control

JAN - 7 2020

DSHW-2019-018502

Mr. Allan Moore
Solid Waste Manager
Utah Division of Waste Management and Radiation Control (DWMRC)
PO Box 144880
Salt Lake City, Utah 84114-4880

December 31, 2019

Re: Mountain View Landfill – Class V Permit Renewal Application for Asbestos Monofill Transmittal Letter

Dear Mr. Moore:

On behalf of Mountainview Landfill, Inc. (a wholly owned subsidiary of Waste Management of Utah, Inc.), Hansen, Allen & Luce (HAL) has prepared a Class V permit renewal application for the asbestos monofill at the Mountain View Landfill in Salt Lake City, Utah. Please find attached the completed permit application and supporting documents. The permit application has been updated to reflect modifications to the final grading plan of the surrounding landfill that were approved by DWMRC in 2018. The final grading elevations of the monofill have been revised to match the final grading of the surrounding landfill, as described in the permit application. The drainage plan and all other items associated with the existing permit remain unchanged. Please let me know if you have any questions or need additional information.

Sincerely,
HANSEN, ALLEN & LUCE, INC.

Katie Gibson Jacobsen

Katie Gibson Jacobsen, P.E.
Engineer

Cc: Mark Franc, Senior District Manager, Waste Management

Class V
Permit Renewal Application
for an Asbestos Monofill
at
Mountain View Landfill
Salt Lake City, Utah

Prepared by

Hansen, Allen & Luce, Inc.

Prepared for

Waste Management of Utah, Inc.

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I hereby certify that I have reviewed this material and attest that this report has been prepared in accordance with good engineering practices.

Engineer: Katie Gibson Jacobsen, P.E.
Signature: Katie Gibson Jacobsen
Registration Number: 7821397-2202 (Utah)
Date: 12/27/19

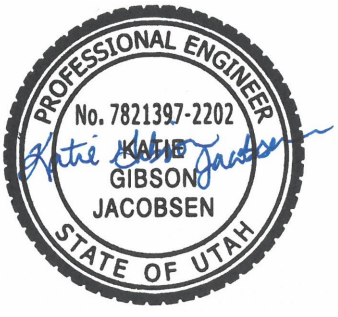

TABLE OF CONTENTS

TABLES

FIGURES

DRAWINGS

APPENDIX

1 INTRODUCTION

This report has been prepared as part of the Class V permit application requirements in accordance with UTAH SOLID WASTE PERMITTING AND MANAGEMENT RULES UTAH ADMINISTRATIVE CODE (R315-301 through 320) for the Mountain View Landfill (MVLF).

Mountain View Landfill (MVLF) desires to obtain a Class V permit renewal for an existing monofill contained within the existing landfill facility which is a permitted Class VI facility. This Class V permit is for a small portion of the landfill and is for the disposal of asbestos containing material (ACM).

This report has been prepared in accordance with applicable Salt Lake Valley Health Department (SLVHD) and UDEQ Regulations. The permit application, and proof of ownership are included in Appendix A. The MVLF is shown on the site location map described as Figure 1 with the proposed ACM monofill location identified in Drawings 3 & 4. In particular, this report discusses soils testing, final cover design, final grading and drainage, and the site operations.

2 BACKGROUND

MVLF (previously known as the Blandfill Landfill) is an existing construction and demolition waste landfill located at 6976 West California Avenue, Salt Lake City, Utah. The site is owned and operated by Mountainview Landfill, Inc. (MLI). MVLF also operates in accordance with Permit 35-017064 renewed by the SLVHD on January 1. 2009 and Conditional Use Permit #410-561 approved by the Salt Lake City Planning Commission on November 21, 2002.

2.1 Description

The landfill site consists of approximately 76 acres. MVLF is shown on the vicinity map included in this report as Figure 2. The landfill encompasses parcel #14-10-300-011, which is owned by MLI. The legal property description is:

Beginning at a point on the north line of California Avenue (1300 South Street) said point being North 00°20'02" East 33.00 feet along quarter section line from the South quarter corner of Section 10, Township 1 South, Range 2 West, Salt Lake Base & Meridian and running thence North 00°20'02" East 1293.12 feet along said quarter Section line to quarter quarter Section line; Thence North 89°53'54" West 2596.31 feet along quarter quarter Section line to the East line of 7200 West Street; Thence South 00°40'16" West 1269.78 feet along said East line; Thence South 44°37'52" East 35.17 feet to said North line; Thence South 89°56'00" East 2578.93 feet to the point of beginning.

Less and excepting the 100' wide Kennecott right of way described as follows:

Beginning at a point on the East line of 7200 West Street, said point being North 00°40'16" East 1327.81 feet along Section line to quarter quarter Section line and South 89°53'54" East 55.00 feet along said quarter quarter section line and South 00°40'16" West 9.28 feet along said East line from the Southwest corner of Section 10, Township 1 South, Range 2 West, Salt Lake Base and Meridian and running thence South 00°40'16" West 101.49 feet along said East line; Thence North 80°50'46" East 688.67 feet to said quarter quarter Section line; Thence North 89°53'43" West 621.74 feet along said quarter quarter Section line; thence South 80°50'46" West 57.71 to the point of beginning

Contains: 73.370 acres (3,326,687 square feet) net of the 100' wide Kennecott right of way

The ultimate landfill footprint will cover the entire site minus 10-foot setbacks on the north and east sides and 30-foot setbacks for perimeter landscaping (plus additional space for permanent facilities) on the south and west sides. The landfill property is described as the South ½ of the Southwest ¼ of Section 10, Township 1 South, Range 2 West, in Salt Lake County, Utah. The landfill has been in operation since April 1985.

The proposed ACM monofill is located within the legal property description of the MVLF and is shown on Drawing 3.

2.2 Soil Conditions

MVLF is located immediately west of the Salt Lake Valley Landfill (SLVLF). MVLF's engineering consultant EMCON/OWT, Inc. (EMCON) previously performed an extensive investigation of subsurface conditions at SLVLF. Because of the proximity of the sites and consistency of local subsurface conditions, it was EMCON's opinion in the 1998 Design and Operation Plan that subsurface conditions at SLVLF are similar to subsurface conditions at MVLF. EMCON's previous work at SLVLF is documented in *Salt Lake Valley Landfill Master Plan* (EMCON, November 1991), which has been submitted to both the SLVHD and UDEQ.

Based on EMCON's previous work at SLVLF, soils in the area are generally Holocene and Quaternary basin-fill deposits of the Jordan Valley consisting primarily of interbedded silty clays and silty sands. The sediments were deposited on the shore of an ancient lake in the area where streams flowed into the lake from the adjacent mountains. Saturated portions of these fluvio-lacustrine sediments are reported to be between approximately 200 to 700 feet thick.

Generally, there are three principal soil horizons beneath the site area, consisting of: 1) surface fine-grained layer; 2) intermediate silty sand horizon, and 3) lower sandy layer. The intermediate silty sand layer and lower sand layer are commonly separated by a clay horizon. The surface fine-grained layer, consisting of silt to clay soils, averages approximately 10 feet thick in the site area. The surface clay layer is punctuated locally by thin stringers of silty and clayey sand. These thin sand and silt stringers are locally saturated, but produce little water. Below the surface fine-grained layer, the intermediate horizon and lower sand layers consist of variably well-graded, silty and poorly graded sands, and gravel and gravely sands at depths from about 3 feet to about 30 feet below the ground surface. These shallow sands are typically water-saturated and form the principal shallow aquifer beneath the site. Groundwater beneath the site is brackish with total dissolved solids in the range of 5,000-35,000 milligrams per liter.

Shallow soil samples were obtained from undeveloped areas of the MLVF to obtain more information on the site-specific subgrade conditions. Samples were also analyzed for ion-exchange capacity, pH, and metals content, consistent with SLVHD Regulations #1, Section 6.3(f). Testing confirmed that subgrade soils are generally silty clays with some clayey sands. Test results are summarized in Table 1 with data sheets included in Appendix B.

Permeability and consolidation testing was also conducted on relatively undisturbed samples. The permeability of near surface soils, based on one sample, is 3.7×10^{-7} centimeters per second (cm/s), which is generally consistent with permeability test results for clay soils at the SLVLF. The compression index (C_c) was estimated to be 0.13 with a preconsolidation pressure of 9 kips per square foot. The values for C_c correspond well to data from the neighboring SLVLF and empirical equations based on Atterberg limits. Assuming a 10-foot-thick compressible clay layer beneath the landfill and relatively incompressible sand beneath that, estimated average foundation settlements due to maximum fill thickness is less than 6 inches and has been neglected in landfill capacity calculations.

MVLF receives an average of 35,000 to 50,000 cubic yards of clean soil annually. Suitable soils are directed to separate stockpiles for future use as landfill final cover. Samples from the existing soil stockpiles were also obtained in March 1998 (SK1 through SK4) and in November 2004 (I, II and III). Stockpile samples vary from clayey gravel (GC) to silty clay (CL), but have very consistent Atterberg limits with plasticity limits ranging from 17 to 19 and liquid limits ranging from 27 to 31. The consistency of the Atterberg limits indicates MVLF site personnel have successfully identified suitable soils for final cover.

2.3 Hydrogeologic Setting

Information on the hydrogeologic setting of MVLF, summarized from the 2005 Annual Ground Water Monitoring Report and 1998 Design and Operations Plan (Plan), is as follows:

> Soils in the area are generally Holocene and Quaternary basin-fill deposits of the Jordan Valley, consisting primarily of interbedded silty clays and silty sands. Three principal soil horizons occur beneath the site: **1)** a surface fine-grained layer; **2)** an intermediate silty sand layer; and **3)** a lower sandy layer. The intermediate silty sand layer and lower sand layer usually are separated by a clay horizon.

The surface fine-grained layer, consisting of silt and clay, averages approximately 10 feet thick in the site area. The layer locally contains thin stringers of silty and clayey sand, which are locally saturated but produce little water.

The intermediate silty sand layer and lower sand layer consist of 'variably well-graded, silty and poorly-graded sands, and gravel and gravely sands, 'at depths between three and 30 feet below ground surface (bgs). These shallow sands typically are water-saturated and form the principal shallow aquifer beneath the site.

Shallow groundwater occurs at an approximate average of 10 feet bgs as shown on Figure 3 from the 2019 Groundwater Monitoring Report. Total Dissolved Solids (TDS) concentrations typically are elevated, with concentrations in area wells of 5,000-33,000 milligrams per liter (mg/l).

Groundwater gradients are very low beneath the MVLF, and flow direction can vary as a result of construction activities in the area. The Plan indicates that during earlier years of MVLF operation, groundwater flowed to the north, toward the Great Salt Lake. Following construction of borrow ponds adjacent to and southeast of the MVLF, groundwater flow direction changed to southward. Construction activities including ponds, stockpiling, and drainage ditches continue to influence local groundwater flow direction.

Groundwater level maps for 1996, 1997, and 1998 indicate flow toward the south-southwest. Maps prepared after 1998 indicate flow toward the south-southeast. The change in flow direction from southwest to southeast after 1998 was attributed to construction of a drainage ditch to the east of the MVLF. The drainage ditch located east of MVLF appears to discharge into Lee Ditch, which is southeast of the MVLF. Lee Ditch appears to have been excavated to a depth comparable to the groundwater levels in MVLF wells, thereby intersecting the groundwater surface and, by allowing groundwater discharge, causing groundwater to flow eastward beneath MVLF toward the ditch. Ditch construction activity reportedly was completed before the 2000 monitoring. The most recent groundwater level map for 2019 indicates flow toward the southwest corner of the landfill property.

3 DESIGN

The following sections discuss the final grading plan, final cover design, and provisions for drainage.

3.1 Grading

The landfill site is relatively flat with elevations ranging from about 4,215 to 4,220 feet mean sea level (MSL). As discussed in Section 2.2, the near-surface soil has a permeability of about 4 x 10^{-7} cm/s. Permeability of native clayey soils at the nearby SLVLF are on the order of 10^{-7} to 10^{-8} cm/s.

No excavation occurs before waste is placed in the landfill. Wastes are placed on the native low-permeability soils. The native low-permeability soils serve as a low-permeability liner below the waste. Although the native low-permeability soils beneath the site would impede the downward movement of leachate within the existing landfill, no leachate has been detected.

A liner and leachate collection system are not required for a Class V (Asbestos Monofill) landfill, such as MVLF. Accordingly, a liner or leachate collection system is not proposed for the future area at MVLF. However, the native low-permeability soils beneath the landfill serve as a natural low-permeability liner and provide waste containment.

The landfill footprint will eventually cover most of the permitted 76 acre site. As shown on Drawing 1, the landfill footprint will cover approximately 74 acres. The footprint will be set back 10 feet along the north and east boundaries and 30 feet along the south and west boundaries. The proposed final elevation is 4,425 feet MSL. The original design of the landfill included a minimum 50-foot-wide top deck with a minimum slope of 5 percent. The design included 2:1 (horzontal:vertical) sideslopes with 25-foot-wide-benches every 40 vertical feet on the north and west sides of the landfill, a pronounced swale along the south facing slope with a flatter slope of 3:1, and a change in slope from 2:1 to 5:1 along the south and east slopes to improve the appearance of the ridgeline from the south. Later, two knolls replaced the single peak from the 1998 Design and Operation Plan to reduce the pyramid shape. The slope variations, swale, and two knolls served no regulatory or engineering design purpose, caused operational issues, and were an inefficient use of the landfill footprint. A design modification was submitted in 2018 and approved. The modification straightens the variable slopes to conform with the typical 2:1 slopes and 25-foot wide benches every 40 vertical feet. The modification also removes the two knoll design feature on top of the facility and replaces it with a single 125-foot to 200-foot wide deck with a 2%-7.5% slope for drainage. The approved design is shown on Drawing 1.

The revised design includes a total landfill air space (waste) of approximately 11.3 million cubic yards (cy). As of the most recent aerial topographic survey on March 3, 2019, approximately 10.2 million cubic yards (cy) of air space has been used since beginning operation in 1985. The site has a remaining capacity of 1.1 million cy. Based on an estimated annual air space usage of 76,500 tons, the landfill has a remaining life of approximately 11.5 years.

The landfill contains an asbestos monofill that was originally permitted to consume 50,000 cubic yards of landfill capacity. The asbestos monofill footprint has not changed, and the top surface of the monofill has been raised to increase the total capacity of the monofill to 177,500 cubic yards. The remaining capacity of the revised monofill is approximately 111,000 cubic yards. The original grading of the monofill is shown on Drawing 2. Revised grading is shown on Drawing 3, and cross-sections are shown on Drawing 4.

3.2 Final Cover Design

3.2.1 Regulatory Requirements

Regulations applicable to the MVLF final cover system are contained in UDEQ Solid Waste Permitting and Management Rules (R315-301 through 320) and the SLVHD's Health Regulations #1, Solid Waste Management Facilities.

UDEQ Rule R315-302-3(2) requires that a landfill be closed in manner that

(a) minimizes the need for further maintenance;
(b) minimizes or eliminates threats to human health and the environment from post-closure escape of solid waste constituents, leachate, landfill gases, contaminated run-off or waste decomposition products to the ground, ground water, surface water, or the atmosphere; and
(c) prepares the facility or unit for the post-closure period

UDEQ Rule R315-305-(5) requires a Class VI landfill such as MVLF to be closed by leveling the wastes to the extent practicable and placing a minimum of two feet of soil cover, including six inches of topsoil. The landfill cover may be seeded with grass, other shallow rooted vegetation or other native vegetation or covered in another manner approved by the Executive Director.

SLVHD Regulations #1 requires a landfill to have a final cover consisting of a compacted layer of cover material, at least 24 inches thick, with the upper 6 inches of a soil composition suitable to sustain plant growth, and the lower portion of material that restricts infiltration to the equivalent of that achieved by 18 inches of low-permeability (1 x 10^{-5} cm/sec or less) soil.

3.2.2 Final Cover

The approved final cover consists of a two-foot-thick layer of soil that is an evaporative soil cover. These covers provide sufficient moisture storage so that the soil moisture can be removed by evaporation. Evaporative covers have been designed and constructed on many landfills in arid and semi-arid regions and effectively reduce infiltration without long-term performance concerns that may be associated with geosynthetic materials or compacted clay covers.

The evaporative cover is designed to store moisture and allow for eventual evaporation and plant transpiration. Little moisture is released to flow into the waste and subgrade soils. The prescriptive standard has a lower moisture holding capacity so the soil barrier does little but to delay the inevitable infiltration into the waste. The semi-arid conditions of Salt Lake City, where evaporation well exceeds precipitation, are well suited for evaporative covers. Note that the landfill is currently in operation without a final cover, and groundwater monitoring has not identified groundwater impacts. In addition to allowing less infiltration, the evaporative cover is much less susceptible to settlement and cracking than a compacted clay cover.

3.3 Drainage

3.3.1 Existing Site Conditions

The area immediately east of the site is the Salt Lake Valley Landfill. North of the site is a wedge-shaped open area bounded by the northern landfill limits and an earth mound (abandoned rail road) traversing diagonally beginning at the northwest corner of the

property. This open area creates additional contributory flow along the northern perimeter of the site. Drainage tributary to the south is minimal due to an existing ditch alongside West California Ave. West of the site is 7200 West and Lee Ditch where most of the site surface runoff will drain.

3.3.2 Design Criteria

The design criteria utilized for determining the surface water runoff is based on the 25-year, 24-hour duration storm event, as required by SLVHD. The proposed drainage system design is based on the final landfill grades shown on Drawing 1.

3.3.3 Hydrologic Analysis

The method used for determining storm runoff is based on Technical Release 55 (TR-55), *Urban Hydrology for Small Watershed,* published by the Natural Resource Conservation (NRCS). Runoff peak flows and storm hydrographs obtained from the hydrologic analysis are based on 25-year, 24-hour frequency storm event and presented in Appendix C.

Precipitation. Rainfall data from the nearest precipitation station (National Weather Service-Salt Lake City Station [SLCS] was used to simulate the storm event at the site. The estimated 25-year, 24-hour precipitation reported from the SLCS is 2.65 inches.

Rainfall Distribution. TR-55 includes four synthetic 24-hour rainfall distributions developed by the NRCS representing various regions of the United States. Based on the geographical location of the site, Type II rainfall distribution was used in the analysis.

Time of Concentration. The time of concentration (T_c) is the time for runoff to travel from the most hydraulically distant point in a drainage subarea to the collection point. Calculation for T_c consists of overland flow or sheet flow, shallow concentrated flow, and open channel flow, or some combination, to the collection point. The T_c calculated for the landfill drainage subareas range from 6 to 8 minutes, approximately 0.1 hour, which is the minimum time concentration allowed by the TR-55 methodology. Open channel flow time is calculated based on flow velocities obtained from Manning's equation.

Overland flow time is determined based on the kinematics equation for sheet flow condition. Travel times for shallow concentrated and open channel flows were calculated based on flow velocities obtained from Manning's equation. Data input for the TR-55 computer analysis are presented in the hydrology calculations.

An approximate T_c for the off-site drainage area was developed based on the topographic features on the US Geological Survey (USGS) map and open channel flow time along the northern perimeter of the site.

Hydrologic Soil Group. Selection of runoff curve numbers (CNs) are based on the hydrologic soil classification, cover type, hydrologic conditions, and antecedent moisture condition. The soils at the site are predominately silty clay loam classified under the Type C under the NRCS soil group system. Based on available soil information and land use, the CN values used for the analysis are as follows:

Area Description	CN
Landfill Top Deck	86
Landfill Side Slope	88
Perimeter / Access Road	90
Undeveloped Area	79

3.3.4 Drainage Improvements

Calculations shown in Appendix C support the following drainage structures. The proposed bench and downdrain systems are designed to handle peak flows (25-year, 24-hour event) for the final closure condition. Benches and downdrains have been conservatively designed assuming that run-off is not conveyed into intermediated downdrains and is directed into downdrains on the western slope. Downdrains on the north and south slopes will actually convey some of the flow and convey water to the perimeter and natural drainage courses. Final improvements are shown on the drainage plan in Appendix C. Calculations included in Appendix C support the following improvements.

Grass-lined Benches. Most of the flow will be collected from side slopes and conveyed via benches. Drop inlets along the benches will be used to convey surface flow to downdrain pipes.

Downdrains. The downdrain system is designed to provide hydraulic capacity of intercepted run-off carried on the bench system. Drop inlets are included as part of the downdrain system. The high velocity flow (average of 30 fps) will be migrated through energy dissipaters or equivalent materials at the bottom of downdrains to minimize erosion.

Perimeter Drainage. Water will be conveyed to the perimeter of the site and into natural drainage courses. The perimeter drainage system will carry some of the run-off and control some run-on.

Culverts. Culverts have been constructed to convey water under 7200 West and California Avenue South to Lee Ditch. Flared end sections will intercept flow from ditches and downdrains. The site's point of discharge is the existing Lee Ditch.

3.4 Sequencing

The asbestos monofill will be constructed and filled adjacent to the MVL C&D fill sequencing. The location and elevation of the monofill is shown on Drawings 3 and 4. Vertical lifts will be placed at a rate and thickness which will be based on waste receipt. The top lift elevation of the monofill will remain as close to the elevation of the surrounding C&D lift as possible.

Soil Cover. Cover will consist of a total of two feet of soil. This material will be taken from on-site stockpiles of clean fill or if necessary, purchased from outside sources. Suitable soils (CL or SC) for the final cover will be determined from test parameters established. A quality assurance plan will be prepared to follow for cap construction. A final construction report for each segment of final cover completed will be submitted to the UDEQ and SLVHD.

3.5 Anticipated Service Life

The revised landfill design includes a total landfill air space (waste) of approximately 11.3 million cubic yards (cy). As of the most recent aerial topographic survey on March 3, 2019, approximately 10.2 million cubic yards (cy) of air space has been used since beginning operation in 1985. The site has a remaining capacity of 1.1 million cy. Based on an estimated annual air space usage of 76,500 tons, the landfill has a remaining life of approximately 11.5 years.

The landfill contains an asbestos monofill that was originally permitted to consume 50,000 cubic yards of landfill capacity. The asbestos monofill footprint has not changed, and the top surface of the monofill has been raised to increase the total capacity of the monofill to 177,500 cubic yards. The remaining capacity of the revised monofill is approximately 111,000 cubic yards. The original grading of the monofill is shown on Drawing 2. Revised grading is shown on Drawing 3, and cross-sections are shown on Drawing 4.

Ongoing engineering reviews will be conducted to continue and monitor the remaining service life.

4 OPERATIONS PLAN

This operations plan has been prepared in fulfillment of SLVHD Health Regulations #1 Solid Waste Management Facilities and UDEQ regulations. Table 2 references the SLVHD Regulations with the applicable sections in this plan.

4.1 Waste Acceptance

Asbestos waste acceptance criteria will be based on the procedures described in Section 4.1.5 of this document.

Operating hours of the facility may range from 6:00AM to 8:00PM. Hours of operation may change to accommodate customer cleanup projects or for other reasons. Relevant hours are posted at the site entrance.

The Class V facility accepts asbestos containing material and is operated as an asbestos monofill. Solid wastes that are not accepted include, but are not limited to, municipal solid waste, medical waste, putrescible waste, fluorescent electrical fixtures and transformers containing polychlorinated biphenyls, tires, drums, and containers with liquid or unrecognizable wastes, and fuel tanks.

4.2 Landfill Equipment

Landfill operations will be managed with the use of heavy construction equipment which currently includes the following:

Bulldozer
Compactor
Rubber Tire Loader
Track Hoe
Water Truck

In the event of equipment breakdown, or operational changes, other equipment may be used to manage disposal of wastes.

Equipment on site will be provided with the following safety devices:

1) Rollover protection devices
2) Seat belts
3) Audible reverse warning devices
4) Fire Extinguishers on all equipment used to manage solid waste or fill cover material
5) Communication equipment

Adequate equipment will be maintained at all times to ensure availability for proper management of the waste material and compliance with SLVHD Section 6.5(k).

4.3 Landfill Personnel

The number of site personnel will be adequate to ensure proper operations and management of the landfill. In addition, a member of management will be available during all hours of operation to handle emergency situations with facility communications equipment. Landfill Personnel include the following:

Landfill District Manager – Patrick Craig
6976 West California Avenue
Salt Lake City, Utah 84104
(801) 250-0555

Operations manager
Equipment operators
Gatehouse personnel
Traffic directors

Laborers, mechanics, and related support personnel will be provided as needed. Current operations require a staff of about four full-time employees during any given work shift. All employees will be required to wear the following at all times in the active areas on site:

1) Hard hat
2) Gloves
3) Safety glasses
4) Safety footwear (steel toe and steel shank)
5) Safety vests

4.4 Training

MVLF utilizes internal as well as external training opportunities, and conducts on-the-job training for new employees, and recurring training to refresh existing employees. Training is conducted on landfill operating procedures, equipment operations, identification and inspection of acceptable and unacceptable wastes, health and safety training, record keeping and reporting, and in related areas. A safety specialist assists in maintaining an updated Site Safety Manual and in instructing employees in the manual's procedures, use of personal safety devices, and use of the protective features of equipment. Equipment operators especially are trained in fire protection, and the use of fire extinguishers, which are mounted on each piece of equipment. Employees are trained on all equipment that they are expected to use in the performance of their jobs. The goal of employee training is to ensure proper and safe operations for employees, and the public users of the site.

4.5 Signage

The landfill entrance gate area has existing signs that indicate the name, permit number, hours of use, penalty for unauthorized use, safety precautions, types of waste accepted and not accepted, and additional information. Signs are used as needed to direct traffic onto roads, control vehicle speed within the landfill, and to indicate unloading areas.

The asbestos monofill area is screened by fencing or berms and posted with warning signs on all four sides. The wording "CAUTION ASBESTOS WASTE" or similar wording is printed on the signs with lettering at least three inches high.

4.6 Waste Inspection Procedures

When vehicles loaded with waste materials arrive at the gate, they must stop at the gatehouse. The gatehouse attendant is trained in waste acceptance procedures. Through a series of questions, the gatehouse attendant determines the nature and general source of the waste materials. A video camera is mounted outside the gatehouse, positioned to allow the attendant to observe the load. A waste receipt ticket is filled out that identifies the account's name, time and date, load description, and the origin of the waste.

If the load is deemed unacceptable, it is rejected, and not allowed to proceed into the landfill. A "Load Rejection Report", is completed by the landfill and provided to SLVHD for regulatory notification.

Loads accepted for disposal are handled in accordance with section 4.15.6 of this document and are again inspected by the equipment operators at the working face.

4.7 Disposal Procedures and Contingency Plans for Fire or Explosion

No open burning will be conducted at any time. If a fire should ignite or explosion occurs, soil from designated stockpiles or other areas maintained near the disposal area will be used to cover any burning waste. The water truck may be used to spray water on the fire as necessary. At the same time that site personnel are responding to the fire, emergency response agencies such as the fire department will be called in to assist as needed.

Verification of grades and elevations will be performed by certified surveyors on an as needed basis. Typically, this occurs once a year when annual aerial topographic map is prepared.

4.8 Surface Water Management

Run-on and run-off will be controlled through use of berms, ditches, and erosion control efforts. Lee Ditch and Kersey Creek are the nearest surface water bodies and both feed the Great Salt Lake. The active portion of the landfill is maintained at a higher grade than surrounding areas and soil berms are constructed as necessary to direct surface water from the active portion of the landfill. The soil berms and grading techniques employed effectively isolate portion of the landfill where waste may be exposed.

Surface water run-off from the facility is collected in a series of trenches constructed around the perimeter of the facility. These trenches convey surface water to unnamed surface water control ditches and Lee Creek located north and west of the property.

MVLF manages stormwater consistent with the requirements of the General Industrial stormwater Discharge Permit. As required, a stormwater pollution prevention plan and stormwater monitoring plan have been prepared for MVLF.

The limits of landfill are outside the 100-year flood plan as shown on Figure 4 available from Salt Lake County FEMA Database. The limits of landfill are also outside wetlands as depicted on Figure 5 from the National Wetlands Inventory Database.

4.9 Litter, Odor, Vector, and Dust Control

Temporary litter fencing will be deployed as needed to contain blowing paper and plastics. Litter will be cleaned up by laborers as needed to maintain a safe and orderly appearance. Prevailing winds are from the southwest.

Odors are not expected, due to the inert nature of the waste. Placement of cover soil over certain types of waste also will act to control any odors. Disease vectors, rats, or flies are not expected to be an issue, due to the inert nature of waste.

Dust will be controlled by watering. Water is pumped into the water truck from an onsite water well. If no water is available from the well an off-site water source will be used. A Fugitive Dust Control Plan reviewed by UDEQ is included in Appendix A-4.

4.10 Noise Levels

All on-site equipment is equipped with mufflers. Noise levels will be minimized to prevent levels beyond the property line exceeding allowable limits set forth in the SLVHD Regulations #1.

4.11 Explosive Gas Monitoring

Although C&D waste disposal sites generally do not generate significant amounts of explosive gas (landfill gas), a monitoring program will continue to be conducted. The monitoring program is in place to ensure that landfill gas, measured as methane, generated by the waste does not create a hazardous

condition. Landfill personnel have been trained in the use and calibration of a methane detector for monitoring the surface of the landfill. Gas monitoring at MVLF was started in March 1997 and is performed quarterly by landfill personnel. The methane detector is recalibrated every quarter before monitoring and a minimum of two locations approximately thirty feet up the landfill slope, various locations at the top of landfill, the site buildings, and the corners of the fill are selected for monitoring each quarter. The results of the monitoring program are recorded on a Methane Monitoring Form and are kept on site.

If gas levels do exceed 25 percent of the lower explosive limit (LEL) within any structure or the LEL at the landfill's property line, MVLF shall:

1) Immediately take necessary steps to ensure the immediate protection of human health and safety;
2) Immediately notify the SLVHD of the gas levels detected and the remediation steps which have already been taken;
3) Within 14 days, submit to the SLVHD for approval an ongoing remediation plan for the gas accumulation. The plan will describe the nature and extent of the problem and the proposed remedy. The plan will be implemented upon approval of the SLVHD.

4.12 Groundwater Monitoring

Groundwater from five on-site monitoring wells is sampled annually and analyzed by a Utah Certified Laboratory. Groundwater monitoring since 1985 has not indicated any impact to groundwater from the disposal of waste at this site.

A Groundwater Monitoring Plan dated August 2001 presents the groundwater monitoring program for MVLF. This plan incorporates monitoring elements approved by SLVHD to provide environmental protection during and after development. The plan further uses monitoring locations selected on the basis of hydrogeologic conditions to provide early detection of a potential release from the facility and corrective action programs to be initiated if groundwater is contaminated.

4.13 Spill Prevention

A spill prevention control and countermeasure plan has been prepared for MVLF.

4.14 Recordkeeping Procedures

The landfill will continue to maintain a site Operating Record that will be available for inspection by the SLVHD and UDEQ. The operating record will include at least the following information:

- Amounts and types of waste accepted at the facility
- Unacceptable waste notifications
- Random load inspections
- Survey information regarding the filled areas of the landfill
- Groundwater and gas monitoring results
- Training procedures and documentation of training
- Site Facility Inspections (see Appendix A)

4.15 Special Operating Requirements for Asbestos Containing Materials

The site will operate in accordance with the SLVHD, UDEQ and USEPA requirements.

4.15.1 Additional Operating Record Requirement.

In accordance with SLVHD regulations, MVLF will keep an additional operating record containing the identity of persons who have disposed asbestos waste at the landfill and the amount of asbestos waste each person has disposed at the landfill. The documentation will consist copy of the non-hazardous waste manifest or Waste Shipment Record in accordance with 40 CFR 61.154 (e)(1).

4.15.2 Asbestos Waste Separation From Existing Solid Waste

Asbestos waste cells will not be located directly on top of existing solid waste. Prior to placing ACM over any area containing solid waste, the area will receive 2 feet of clean soil consistent with final cover.

4.15.3 Location Mapping Requirement

In accordance with SLVHD regulations, MVLF will provide to the SLVHD, and keep on file, a plat map showing the exact location of all asbestos disposal areas.

4.15.4 Handling

Regulated asbestos-containing material to be disposed of in MVLF asbestos monofill shall be handled, transported, and disposed in a manner that will not permit the release of asbestos fibers into the air and must otherwise comply with Code of Federal Regulations, Title 40, Part 61, Section 154.

4.15.5 Material and Containerizing Requirements

MVLF does not accept regulated asbestos-containing material unless the waste has been adequately wetted and containerized to meet UDEQ and SLVHD regulations including:

a. Regulated asbestos-containing material is adequately wetted when its moisture content prevents fiber release.
b. Regulated asbestos-containing material is properly containerized when it is placed in double plastic bags of 6-mil or thicker, sealed in such a way to be leak-proof and air-tight, and the amount of void space or air in the bags is minimized. Regulated asbestos-containing material slurries must be packaged in leak-proof and air-tight rigid containers if such slurries are too heavy for the plastic bag containers. Upon submittal of a request, including documentation demonstrating safety, the Executive Secretary may authorize other proper methods of containment which may include double bagging, plastic-lined cardboard containers, plastic-lined metal containers, or the use of vacuum trucks for the transport of slurry.
c. MVLF requires that all containers holding regulated asbestos-containing material be labeled with the name of the waste generator, the location where the waste was generated, and tagged with a warning label indicating that the containers hold regulated asbestos-containing material.

4.15.6 Disposal Standards.

MVLF applies the following standards to the disposal of Regulated Asbestos-Containing Material;

a. Upon entering the disposal site, the transporter of the regulated asbestos-containing material must notify the scalehouse operator that the load contains regulated asbestos-containing material by presenting the waste shipment record. MVLF will verify quantities received, sign off on the waste shipment record, and send a copy of the waste shipment record to the generator within 30 days.

b. Upon receipt of the regulated asbestos-containing material, the MVLF inspects the loads to verify that the regulated asbestos-containing material is properly contained in leak-proof containers and labeled appropriately. MVLF will notify the Salt Lake Valley Health Department and the Utah Department of Environmental Quality Executive Secretary if it is believed that the regulated asbestos-containing material is in a condition that may cause fiber release during disposal. If the wastes are not properly containerized, and the load is accepted, MVLF will thoroughly soak the regulated asbestos-containing material with a water spray prior to unloading, rinse out the truck, and immediately cover the regulated asbestos-containing material with material which prevents fiber release prior to compacting the regulated asbestos-containing material in the landfill.

c. During deposition and covering of the regulated asbestos-containing material, MVLF will:
   i. Prepare a separate area of the landfill (monofill) to receive the regulated asbestos-containing material.
   ii. Assure asbestos waste is unloaded in a way that minimizes breaking of containers or bags. As necessary, MVLF may require the ACM hauler to notify the facility of the time and date the asbestos waste will be transported and the volume of asbestos to be disposed so that the facility operator can oversee the unloading.
   iii. Within 18 hours or at the end of the operating day, completely cover the containerized regulated asbestos-containing material with sufficient care to avoid breaking the containers with a minimum of six inches of material containing no regulated asbestos-containing material. If the regulated asbestos-containing material is improperly containerized, it will be completely covered immediately with six inches of material containing no regulated asbestos-containing material; and
   iv. Cover all ACM daily with a cover material using material such as soil that is free of asbestos, debris or other objects that may puncture the asbestos containing bags or containers. Asbestos will be covered with two feet (61 centimeters) of cover material if equipment will be driven over the disposal area or site or six inches (15.2 centimeters) of cover material if equipment will not be driven over the disposal area.

d. MVLF will provide barriers adequate to control public access. MVLF will:
   i. limit access to the regulated asbestos-containing material management site to no more than two entrances by gates that can be locked when left unattended and by fencing adequate to restrict access by the general public; and;
   ii. place warning signs at the entrances and at intervals no greater than 330 feet along the perimeter of the sections where regulated asbestos-containing material is deposited that comply with the requirements of 40 CFR 61.154(b).

5 CLOSURE AND POST CLOSURE

This section describes the tasks involved for implementing closure and post-closure maintenance of MVLF.

5.1 Closure

This preliminary plan reviews sequencing cover design, grading, and discusses closure cost and financial assurance.

5.1.1 Sequencing

The landfill will be closed in stages as portions reach final grade. Areas will be closed after they reach final grade. A Quality Assurance Plan for construction of final cover will be prepared. Upon completion of each segment of final cover, a final construction report will be completed.

5.1.2 Cover Design

The approved final cover consists of a two-foot thick layer of soils. As discussed in Section 3.2, the approved cover meets the SLVHD Health Regulations and the UDEQ Regulations including:

- Minimizing further maintenance
- Minimizing threats to human health and the environment by minimizing infiltration
- Preparing the facility for post closure period

The final cover will be vegetated to minimize erosion and maximize evapotranspiration.

5.1.3 Grading

Final grades are 2:1 with 25-foot-wide benches every 40 vertical feet. The top of the landfill is a 125-foot to 200-foot wide deck with 2%-7.5% slopes for drainage. The final elevation is about 4,425 feet MSL. Benches intercept surface water and generally slope to the west.

5.1.4 Drainage

Run-off is controlled by a system of drainage benches and downdrains as discussed in Section 3.4.4. Drainage improvements include:

- Culverts to convey water to Lee Ditch

The system has been designed for peak flows from the 25-year, 24-hour storm.

5.1.5 Closure Costs

Financial assurance is based on a worst-case closure area. Worst-case closure costs include two feet of cover soil, ditch and bench grading, and vegetation. The estimated worst-case closure costs are summarized in Table 3. The costs include final features, such as downdrains and culverts, shown on the Final Grading and Drainage Plan (Drawing 1).

5.2 Post Closure Maintenance

The post closure maintenance plan describes the tasks necessary to implement the post closure maintenance requirements. The plan includes:

- Monitoring and control systems operating during the post-closure maintenance period
- Inspection and maintenance procedures for the closed landfill
- Emergency response plan
- Estimated post-closure maintenance costs

5.2.1 Final Cover Integrity

This program will involve making repairs to the cover as necessary to correct the effects of settling, subsidence, erosion, and other events. A post closure maintenance program will be instituted at the landfill to verify that the final cover retains its integrity. The final cover areas will be routinely evaluated and inspected for:

- Evidence of erosion
- Ponded water
- Odor
- Exposed refuse
- Cracks
- Settlement
- Slope failure
- Leachate seeps

Cracks in the final cover will be repaired. Any erosion damage, which may occur as a result of extremely heavy rainfall, will be repaired. Temporary berms, ditches, and straw mulch will be used as needed to prevent further erosion damage to soil cover areas until site conditions permit replacement of eroded soil and reseeding of vegetation.

5.2.2 Drainage System

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

A post closure maintenance program will be implemented so that the integrity of the final drainage system is maintained throughout the post closure maintenance period. The final drainage system will be routinely evaluated and inspected for ponded water, and blockage of and damage to drainage structures. In areas where erosion problems are noted or drainage control structures need to be repaired, proper maintenance procedures will be implemented to prevent further damage.

Inspections and any maintenance will be conducted by landfill personnel.

5.2.3 Vegetative Cover

The condition of vegetation will be monitored annually. Inspections will identify areas of irregular color or growth deficiency. During future inspections, the spread of these conditions will be noted.

5.2.4 Groundwater Monitoring Network

The groundwater monitoring system will remain in service throughout the closure and post-closure periods. Upon determination by local, state, and federal agencies that

groundwater monitoring is no longer necessary, the system will be decommissioned. The wells will be decommissioned consistent with applicable local and state regulations.

Groundwater monitoring wells will be inspected for signs of failure or deterioration during each sampling event. If damage is discovered, the nature and extent of the problem will be recorded. A decision will be made to repair or replace the well. (Possible repairs include redevelopment, chemical treatment, partial casing replacement or repair, resealing of the annulus, or pumping and testing.) If a well needs to be replaced, it will be properly decommissioned well destruction. Inspections and maintenance will be performed by landfill personnel.

5.2.5 Post-Closure Cost Estimate

The post-closure maintenance cost estimate shown in Table 3 was prepared based on the post-closure maintenance plan presented in this section. The post-closure maintenance cost estimate includes the cost of materials, equipment, labor, and administration. The post-closure maintenance costs are assumed to continue for at least 30 years after closure. The estimated total post-closure maintenance costs are summarized in Table 3.

5.2.6 Post-Closure Care Period Contact

Contact the following individual about the facility during the post-closure care period:

Mark W. Franc, Area Engineer
6976 West California Avenue
Salt Lake City, Utah 84104
801-726-7052

REFERENCES

AquAeTer. December 2002. Groundwater Monitoring Report for Mountain View Landfill.

AquAeTer. August 2001. Groundwater Monitoring Plan for Mountain View Landfill.

EMCON Associates. June 11, 1998. Design and Operations Plan, Blandfill Landfill.

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Hansen, Allen, & Luce, Inc. August 2018. Mountain View Landfill – Final Grading Modification.

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Mountain View Landfill. March 2009. Spill Prevention and Countermeasure Plan.

Mountain View Landfill. June 2009. Stormwater Pollution Prevention Plan and Stormwater Pollution Prevention Permit UTR000533.

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Pipe Culvert analysis computer program. Version 1.7 Copyright © 1986. Dodson & Associates

Salt Lake County Engineering & Flood Control. (www.slco.org/pn/eng/flood/html/fplains.html)

Salt Lake Valley Health Department Regulations #1, Solid Waste Management Facilities.

Siegel, R.A.August 2001. Groundwater Monitoring Plan for Mountain View Landfill 1975. STABL User Manual. Purdue University, Joint Highway Research Project JHRP-75-9

The Carel Corporation. November 2019. Groundwater Monitoring Report, 2019 Annual Monitoring Event, Mountain View Landfill. Project 19-11-32.

Utah Department of Environmental Quality Solid Waste Permitting and Management Rules, R315-301 to 320

TABLES

Table 1

Summary of Soils Laboratory Testing

Summary of Soils Laboratory Testing				Grain Size		Atterberg Limits		Compaction Test (ASTM 1557)		Permeability Test	
Sample Number	**Dry Inplace Density**	**USCS Classification**	**Moisture Content (%)**	**Percent Passing #4 (%)**	**Percent Passing #200 (%)**	**Liquid Limit (LL)**	**Plasticity Limit (PL)**	**Maximum Dry Density (pcf)**	**Optimum Moisture Content (%)**	**Remolding Criteria**	**Coefficient of Permeability k (cm/sec)**
a. Bucket 2		SC	22.5	80	48	27	18				
b. Bucket 3		CL	28.1	96	84	38	20				
c. Bucket 4		CL	30.3	100	96	44	22				
d. Bucket SK1		SC	21.7	81	47	29	18				
e. Bucket SK2		SC	16.6	77	44	28	17	124.0	9.5		
f. Bucket SK3		CL	25.6	92	68	31	19				
g. Bucket SK4		GC	19.0	64	32	27	17	127.3	7.8	90%RC@OMC+2	5.00E-06
h. Core #1	92.1	CL	28.3								
i. Core #2			17.9								
j. Core #3	89.7	CL or SC	28.3								
k. Core #4	84.8	CL	33.9								3.70E-07
l. Sample #I	104.7	SC	17.8	83.8	46.6	26	18	116.7	13.5		
m. Sample #2	102.6	CL	13.6	85.6	54.9	27	18	114.5	14		
n. Sample #3	106.7	SC	14.1	81.3	46.0	25	17	118.7	12.5		

NOTE:
Samples were sent to EMCON/OWT, Inc.'s Soil Lab. Samples a-k were sampled in March 1998and samples l-n were sampled in November 2004.
Core samples have slightly higher moisture and are probably more accurate.
RC = relative compaction
OMC = optimum moisture content

Table 2

SLVHD Regulations Cross Reference

County Regulation	Description	Operations Plan Section
6.1	Restricted siting locations	N/A
6.2	Department approval and bond requirements	N/A
6.3	Report and approval requirements for permit	N/A
6.4	Plan Approval	N/A
6.5	Minimum design and operating requirements	See Below
6.5.a	Verification of acceptable incoming waste	4.1
6.5.a.1	Inspection of at least 10 percent of incoming loads	4.6
6.5.a.2	Inspection of all suspicious loads	4.6
6.5.a.3	Keeping of records of inspections	4.6
6.5.a.4	Training of personnel to recognize unauthorized waste	4.4
6.5.a.5	Notification of department solid waste not accepted into site	4.6
6.5.b	Shall not accept any hazardous or liquid waste	4.1
6.5.c	Health and safety of individuals	4.4
6.5.c.1	Safety manual	4.4
6.5.c.2	Personal safety devices	4.3, 4.4
6.5.c.3	Safety manual	4.2, 4.4
6.5.c.4	Communication equipment for emergency situations	4.3
6.5.d	Qualified personnel during all hours of operation	4.4
6.5.e	Control of public access	4.5
6.5.f	Signage	4.5
6.5.g	Record keeping	4.14
6.5.h	Vector, dust, and odor control	4.9
6.5.I	Passability of on-site roads	4.5
6.5.j	Designated areas for offloading	4.7
6.5.k	Available equipment for trenching, compaction and covering	4.2
6.5.l	Liner system	3.1
6.5.m	Minimization of working waste face	4.7
6.5.n	Daily cover	4.7
6.5.o	Salvaging	4.7
6.5.p	Noise levels	4.10
6.5.q	Open burning	4.7
6.5.r	Leachate collection	3.1
6.5.s	Waste not deposited on surface water or in groundwater	4.8
6.5.t	Surface water run-off and run-on control	4.8
6.6	Methane monitoring requirements	4.11
6.7	Groundwater and surface water monitoring requirements	4.12

Table 3

Mountain View Landfill
Worst Case Closure and Post-Closure Maintenance and Care
Financial Assurance Cost Estimate
October 2019

Inflation factor 1.02436

Worst Case Exit Closure Cost

Description	Units	Prior Year Unit Cost	Updated Unit Cost	Quantity	Prior Year Cost	Updated Cost
Final Cap Construction – *50.2 Acres*						
Contractor Mobilization/demobilization	EA	$24,932.62	$25,539.98	1	$24,932.62	$25,539.98
24" Cover material purchase/place/compact)	CY	$6.23	$6.38	161979	$1,009,129.17	$1,033,711.56
Hydroseeding		$623.32	$638.50	50.2	$31,290.66	$32,052.90
Grading – Ditches & Swales	ACRE	$15.58	$15.96	6400	$99,712.00	$102,140.98
Surveys	LF	$4,363.21	$4,469.50	1	$4,363.21	$4,469.50
QA/QC and soils testing	LS	$3,116.58	$3,192.50	50.2	$156,452.32	$160,263.49
Closure Report and Certification	ACRE	$12,466.31	$12,769.99	1	$12,466.31	$12,769.99
Deed/Records Filing	EA	$3,116.58	$3,192.50	1	$3,116.58	$3,192.50
Building/Facilities Demobilization	EA	$31,165.78	$31,924.98	1	$31,165.78	$31,924.98
Fencing and Site Security	EA	$6,233.16	$6,385.00	1	$6,233.16	$6,385.00
					Total Exit Closure Site Costs =	**$1,412,450.88**

Notes:

1. Worst case closure assumes 50.2 acres of final cap to build at closure or at an intermediate closure condition.
2. Final cap consists of 24-inches of CL or SC soils as determined by ASTM and seeded with native grass seed.
3. Soils for final cover obtained from on-site stockpiles.

Annual Post Closure Maintenance & Care Cost

Description	Units	Prior Year Unit Cost	Updated Unit Cost	Annual Quantity	Prior Year Annual Cost	Updated Cost
Site Maintenance						
Misc. Grading and repair of final cap	HR	$154.64	$158.41	40	$6,185.60	$6,336.28
Reseeding and fertilizing of final cap	ACRE	$1,113.38	$1,140.50	1	$1,113.38	$1,140.50
Mowing and weed control	ACRE	$154.64	$158.41	63	$9,742.32	$9,979.64
Drainage repair/maintenance	HR	$154.64	$158.41	20	$3,092.80	$3,168.14
Miscellaneous maintenance	HR	$55.67	$57.03	20	$1,113.40	$1,140.52
Monitoring						
Annual inspections & report	HR	$105.15	$107.71	40	$4,206.00	$4,308.46
Groundwater sampling	HR	$84.12	$86.17	40	$3,364.80	$3,446.77
Groundwater sample analyses	EA	$371.13	$380.17	7	$2,597.91	$2,661.20
Annual reporting	HR	$98.97	$101.38	20	$1,979.40	$2,027.62
Annual surface water sampling	HR	$74.23	$76.04	20	$1,484.60	$1,520.76
Surface water sample analyses	EA	$18.56	$19.01	4	$74.24	$76.05
Annual reporting	HR	$105.15	$107.71	20	$2,103.00	$2,154.23
Landfill gas monitoring	HR	$55.67	$57.03	24	$1,336.08	$1,368.63
					Initial Annual Post-Closure Care & Maintenance Costs =	**$39,328.80**
					Post-Closure Care & Maintenance Period (Years) =	30
					30-Year Total Post-Closure Care & Maintenance Costs =	**$1,179,863.89**

Notes:

1. Post-Closure assumes a 30-year post closure period on the completed landfill footprint of 63 acres.
2. A total of seven groundwater sample points (five wells, one field duplicate, and one trip blank) are sampled annually for constituents listed in Mountain View Landfill Groundwater Monitoring Plan dated August 2001.
3. Surface water monitoring occurs quarterly.

Total Required Financial Assurance Bond Amount =	**$2,592,315**

FIGURES

Figure 1

Site Location Map

the group
EMCON/OWT Solid Waste Services

0 1 2
SCALE - Miles

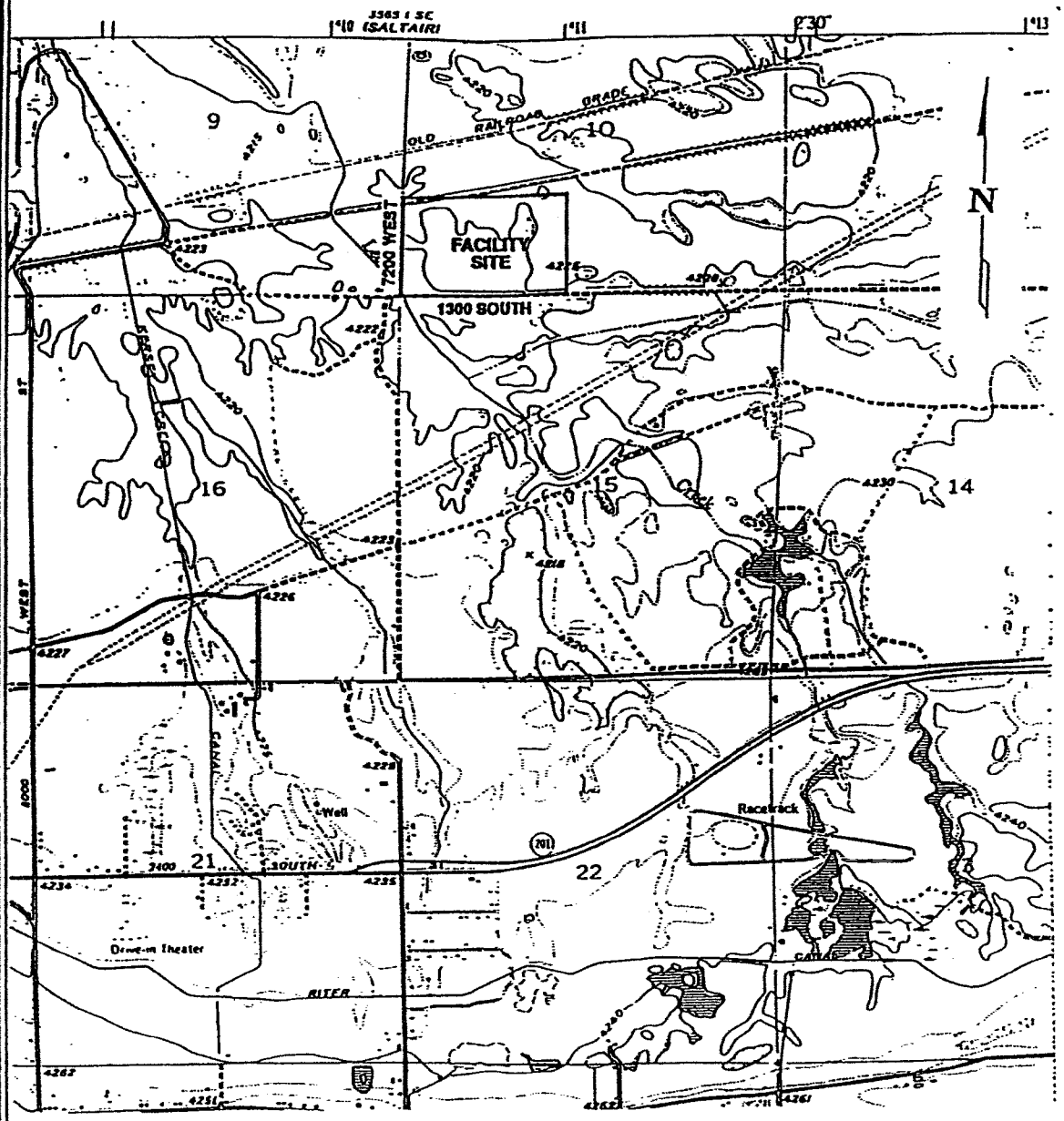
DATE	NOV. 2000
DWN	S.E.R.
APPR	
REV	
PROJECT NO	801569

FIGURE 1
WASTE MANAGEMENT, INC.
MOUNTAIN VIEW LANDFILL
SALT LAKE CITY, UTAH

SITE LOCATION MAP

Figure 2

Vicinity Map



0 1000 2000 4000 6000

APPROXIMATE SCALE IN FEET

Reference: U.S.G.S. Quadrangle Map of Magna, Utah 1975

MOUNTAIN VIEW LANDFILL

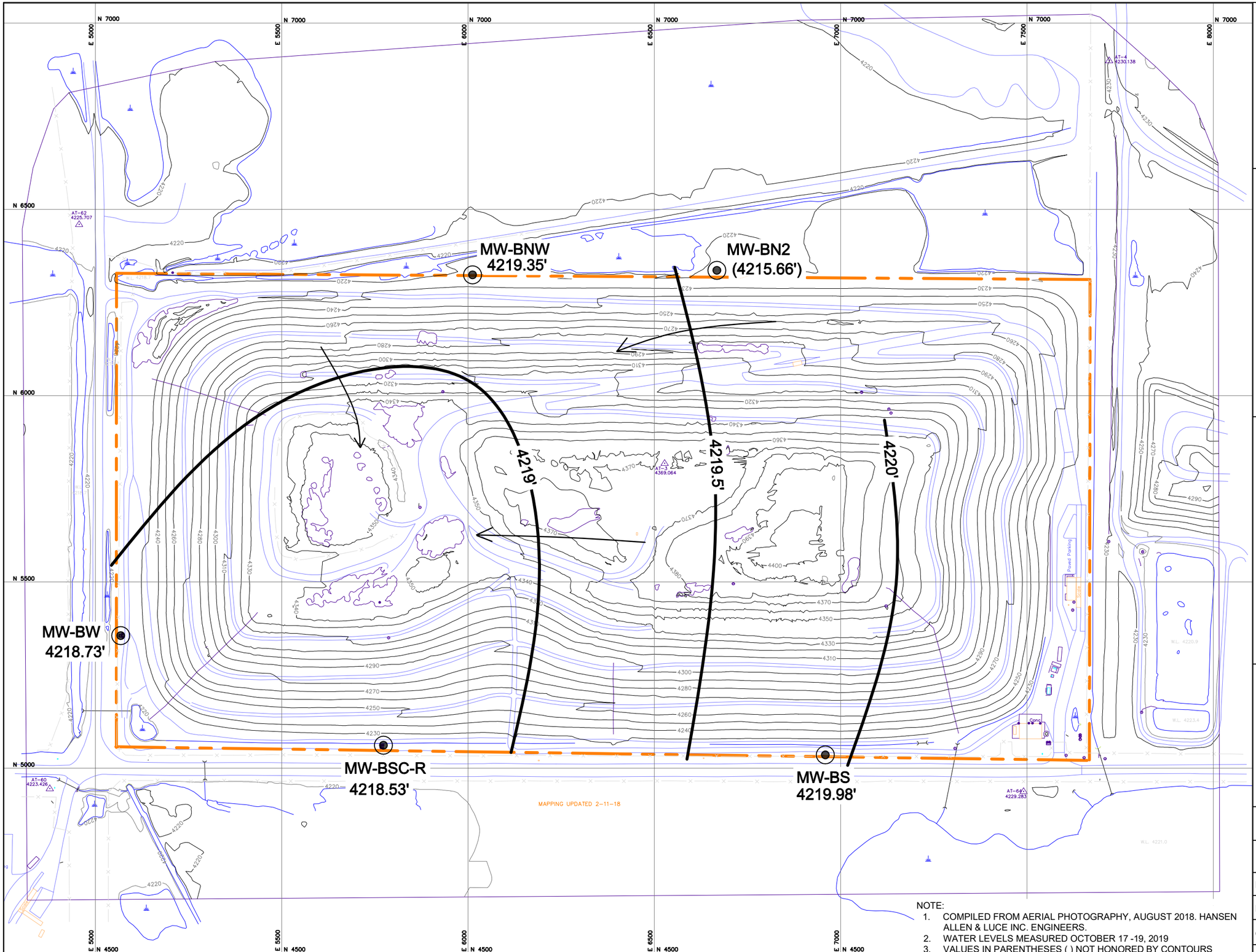
VICINITY MAP

Figure 2

DATE:	PROJECT NO.:	DRAWING NO.:
DEC 2000		

Figure 3

Groundwater Contour Map



NOTE:
1. COMPILED FROM AERIAL PHOTOGRAPHY, AUGUST 2018. HANSEN ALLEN & LUCE INC. ENGINEERS.
2. WATER LEVELS MEASURED OCTOBER 17 -19, 2019
3. VALUES IN PARENTHESES ( ) NOT HONORED BY CONTOURS

The CAREL CORPORATION

136 Pecan Street, Keller, TX 76248

LEGEND:

- PERMIT BOUNDARY
- SURFACE CONTOURS
- GROUNDWATER CONTOUR
- MONITOR WELL

N

SCALE:

0 75 250

FEET

GROUNDWATER CONTOUR MAP

OCTOBER 2019

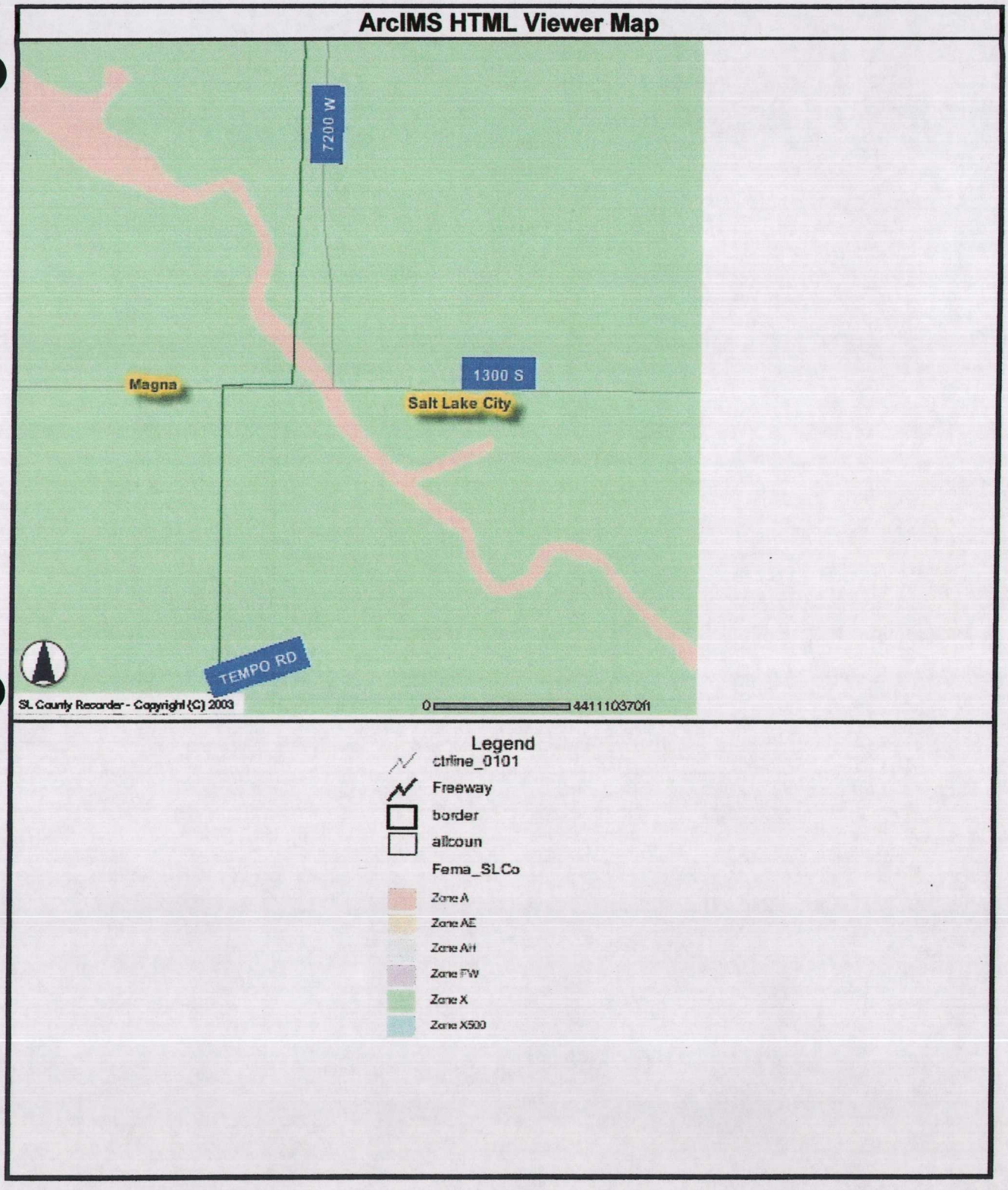
MOUNTAIN VIEW LANDFILL

SALT LAKE CITY, UTAH

DATE DRAFTED: November 14, 2019	REV. NO.:
FILENAME: I:\UTAH\Mountain View\Contour Maps\2019 Contour Map.dwg	
DESIGNED BY: CMT	FIGURE:
DRAWN BY: KTC	3
CHECKED BY:	
APPROVED BY:	

Figure 4

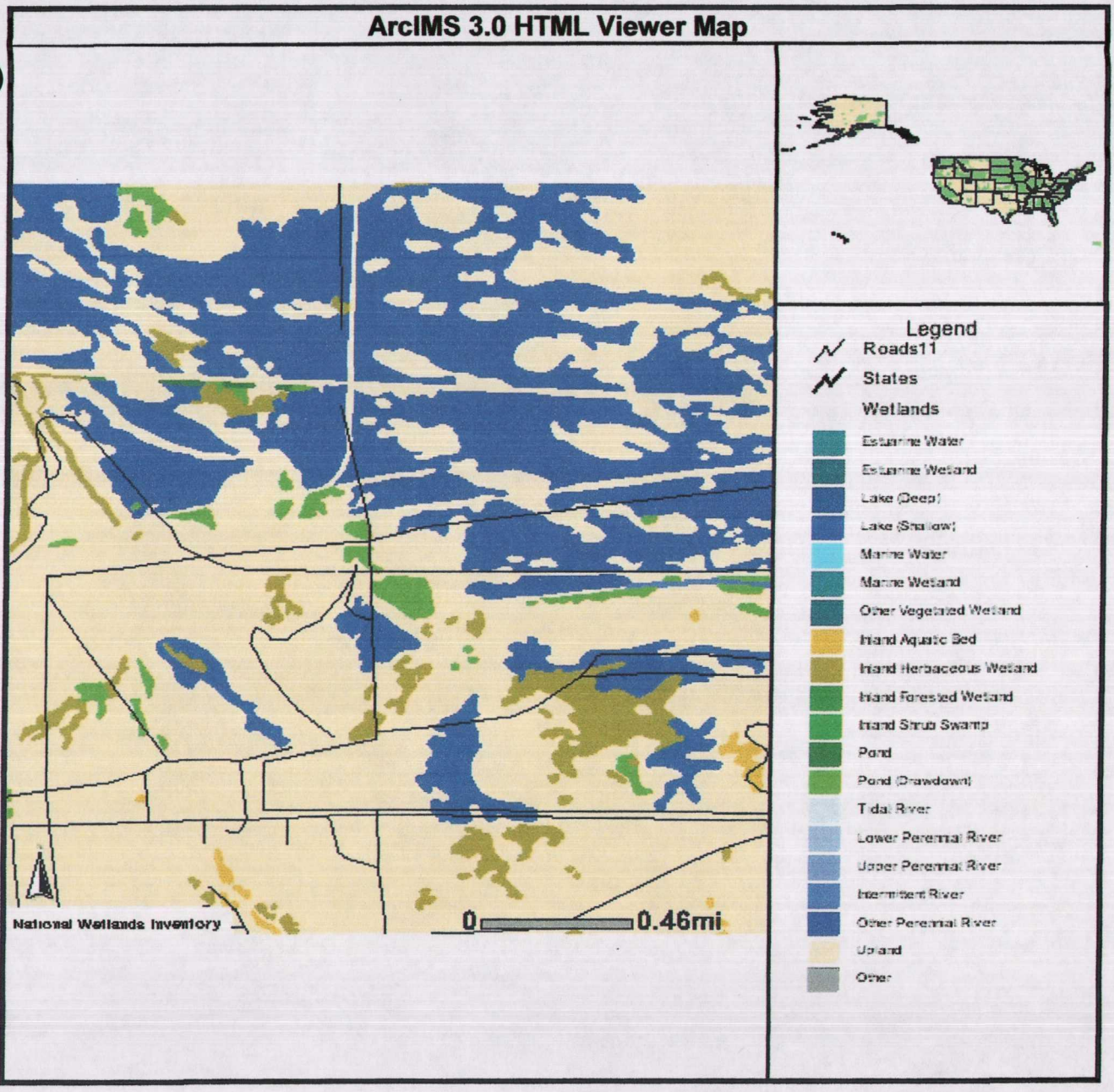
Floodplain Map



.../com.esri.esrimap.Esrimap?ServiceName=SLCoFEMA&ClientVersion=4.0&Form=True&En9/2/2003

Figure 5

Wetlands Map


ArcIMS 3.0 HTML Viewer Map
National Wetlands Inventory
0
0.46mi
Legend
Roads11
States
Wetlands
Estuarine Water
Estuarine Wetland
Lake (Deep)
Lake (Shallow)
Marine Water
Marine Wetland
Other Vegetated Wetland
Inland Aquatic Bed
Inland Herbaceous Wetland
Inland Forested Wetland
Inland Shrub Swamp
Pond
Pond (Drawdown)
Tidal River
Lower Perennial River
Upper Perennial River
Intermittent River
Other Perennial River
Upland
Other

DRAWINGS

Drawing 1

Final Grading and Drainage

APPROXIMATE LANDFILL FOOTPRINT

WELL BNW

WELL BN2

2-24" RCP WITH FLARED END SECTION

NORTH WEST DETENTION POND

24" CMP

18" CMP

12" CMP

2% TYP.

2:1 TYP.

40' WIDE ACCESS ROAD MAX. GRADE = 5.8%

7.5% TYP.

PROVIDE CROWN WITH 2% MIN SLOPE

25' WIDE BENCH WITH DITCH

7200 WEST STREET

WESTERN PERIMETER DITCH

24" RCP WITH FLARED END SECTION

SOUTH WEST DETENTION POND

SOUTHERN PERIMETER DITCH

WELL BSC

WELL BS

WEST CALIFORNIA AVENUE

SOUTH EAST DETENTION POND

DETENTION POND

OFFICE SCALES

MAINT. SHOP

WATER SUPPLY WELL

FACILITY FUEL TANK

18.24 ACRES FINAL COVER IN PLACE

5.71 ACRES COVER TO BE RE-OPENED

PROPERTY BOUNDARY

100 0 100 200 FEET

FILE NAME: PROJECTS\290 - WASTE MANAGEMENT\03.300 - MOUNTAIN VIEW PERMIT MODIFICATION\CAD\WORKING DRAWINGS\CLOSURE DESIGN.DWG
FILE DATE: 8.29.2018 16:41:06 (CAM)

10/07

HANSEN ALLEN & LUCE ENGINEERS

PROFESSIONAL ENGINEER — GARDON L. JONES — No. 5048470-2202 — 8/29/2018 — STATE OF UTAH

PROJECT ENGINEER

DESIGNED	GLJ	3				
DRAFTED	GDS	2				
CHECKED	GLJ	1				
DATE	AUGUST 2018	NO.	DATE	REVISIONS	BY	APVD.

SCALE: NOT TO SCALE

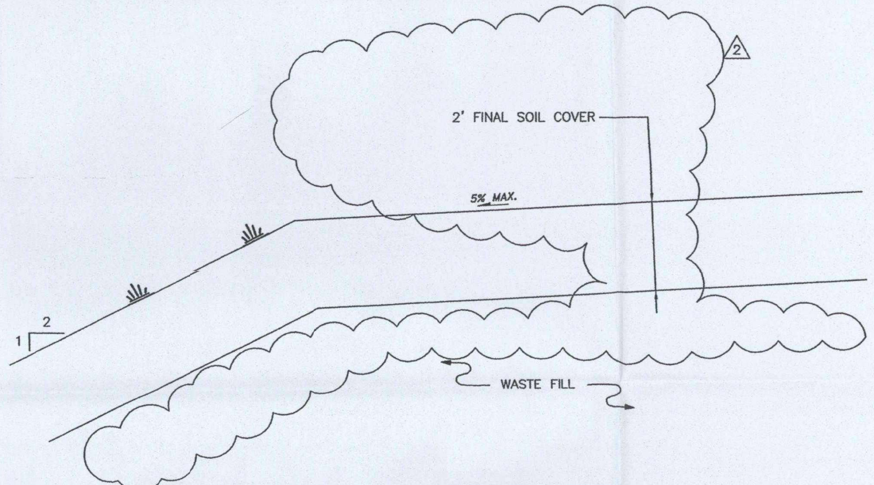
WASTE MANAGEMENT

MOUNTAIN VIEW LANDFILL FACILITY

MOUNTAIN VIEW PERMIT MODIFICATIONS
FINAL GRADING PLAN

SHEET 1

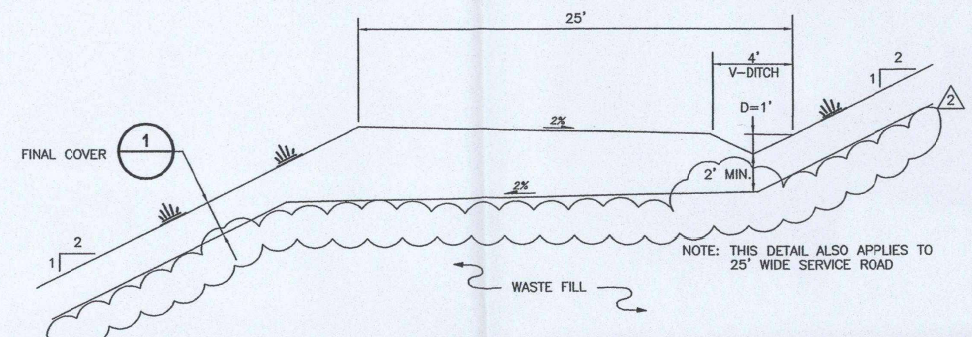
290.03.300



TYPICAL FINAL COVER

DETAIL 1

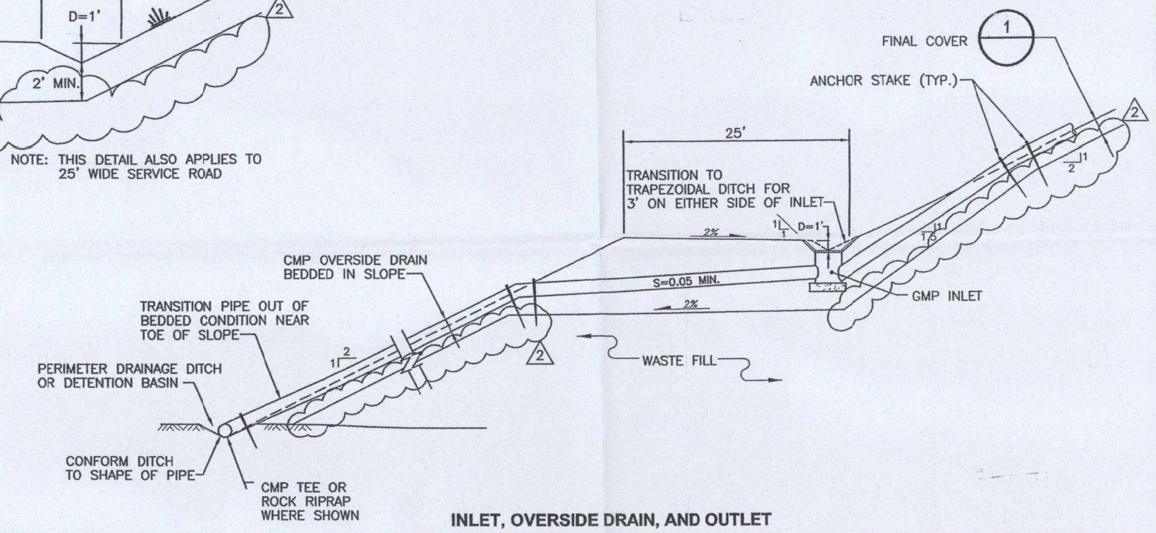
SCALE: 1" = 2'



25' WIDE BENCH WITH DITCH

DETAIL 4

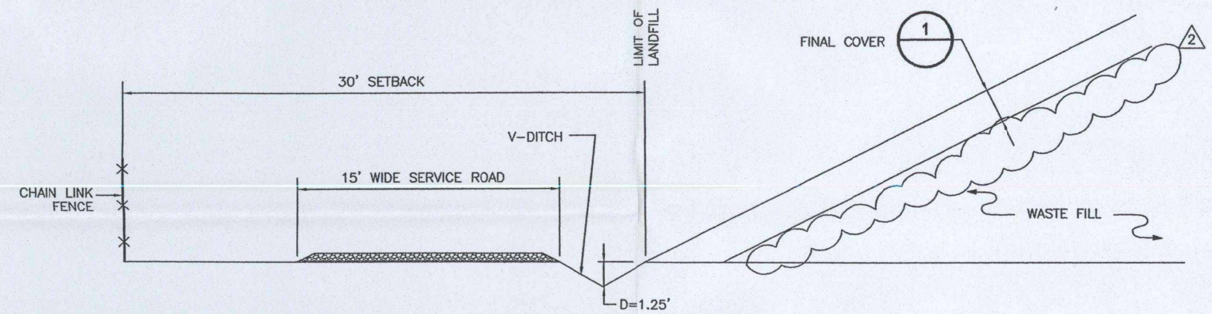
SCALE: 1" = 5'



INLET, OVERSIDE DRAIN, AND OUTLET

DETAIL 5

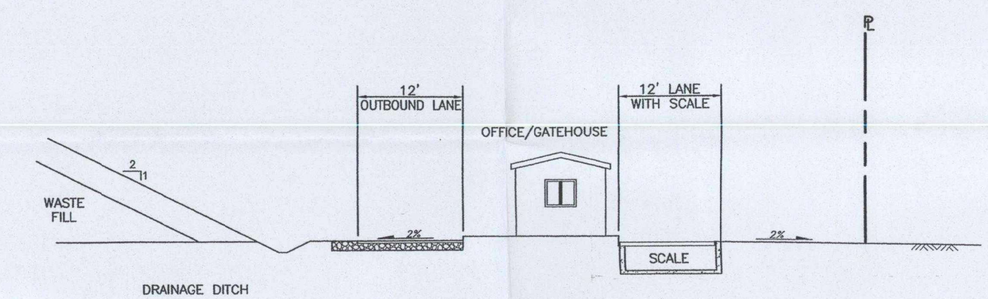
SCALE: 1" = 10'



WEST PERIMETER DETAIL

DETAIL 2

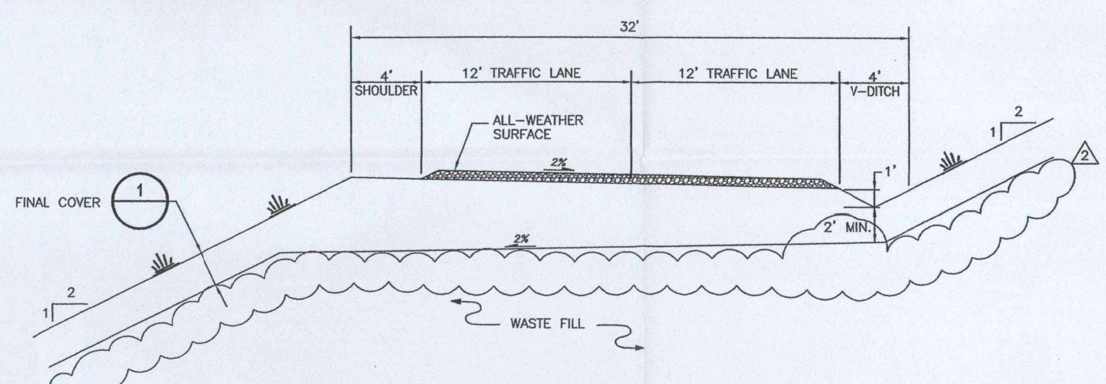
SCALE: 1" = 5'



ENTRANCE FACILITIES

DETAIL 6

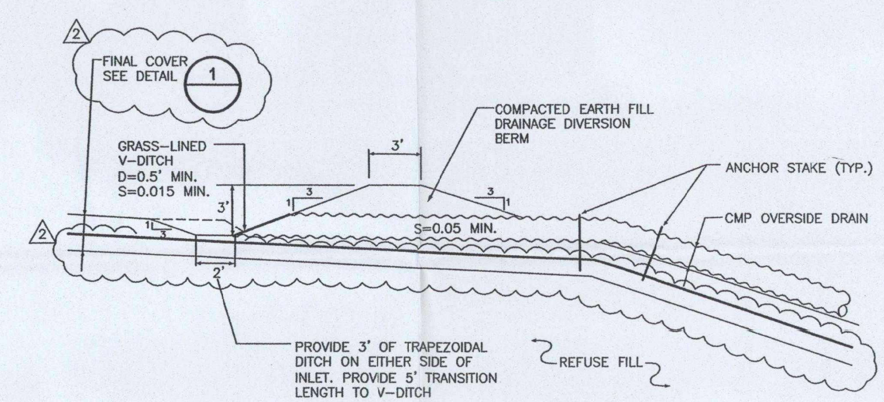
N.T.S.



ACCESS ROAD

DETAIL 3

SCALE: 1" = 5'



DRAINAGE DIVERSION BERM AND INLET (TOP OF LANDFILL)

DETAIL 7

SCALE: 1" = 5'

PROFESSIONAL ENGINEER NO. 4865328 GARTH ROBERT BOWERS STATE OF UTAH

For revision △ & △ changes

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
2	1/10/06	REV. FINAL COVER THICKNESS	KLT	RDH	RDH	RDH
1	9/22/03	REV. DETAILS 5, 6 ADDED DETAIL 7	KLT	RDH	RDH	RDH

DATE OF ISSUE APR 1998 — DWN BY CKF/SER — DES BY DH — CHK BY — APP BY

Shaw™ EMCON/OWT, Inc.

WASTE MANAGEMENT, INC.
MOUNTAIN VIEW LANDFILL
SALT LAKE CITY, UTAH

DETAILS

DRAWING NO. 4

PROJECT NO. 844008

Drawing 2

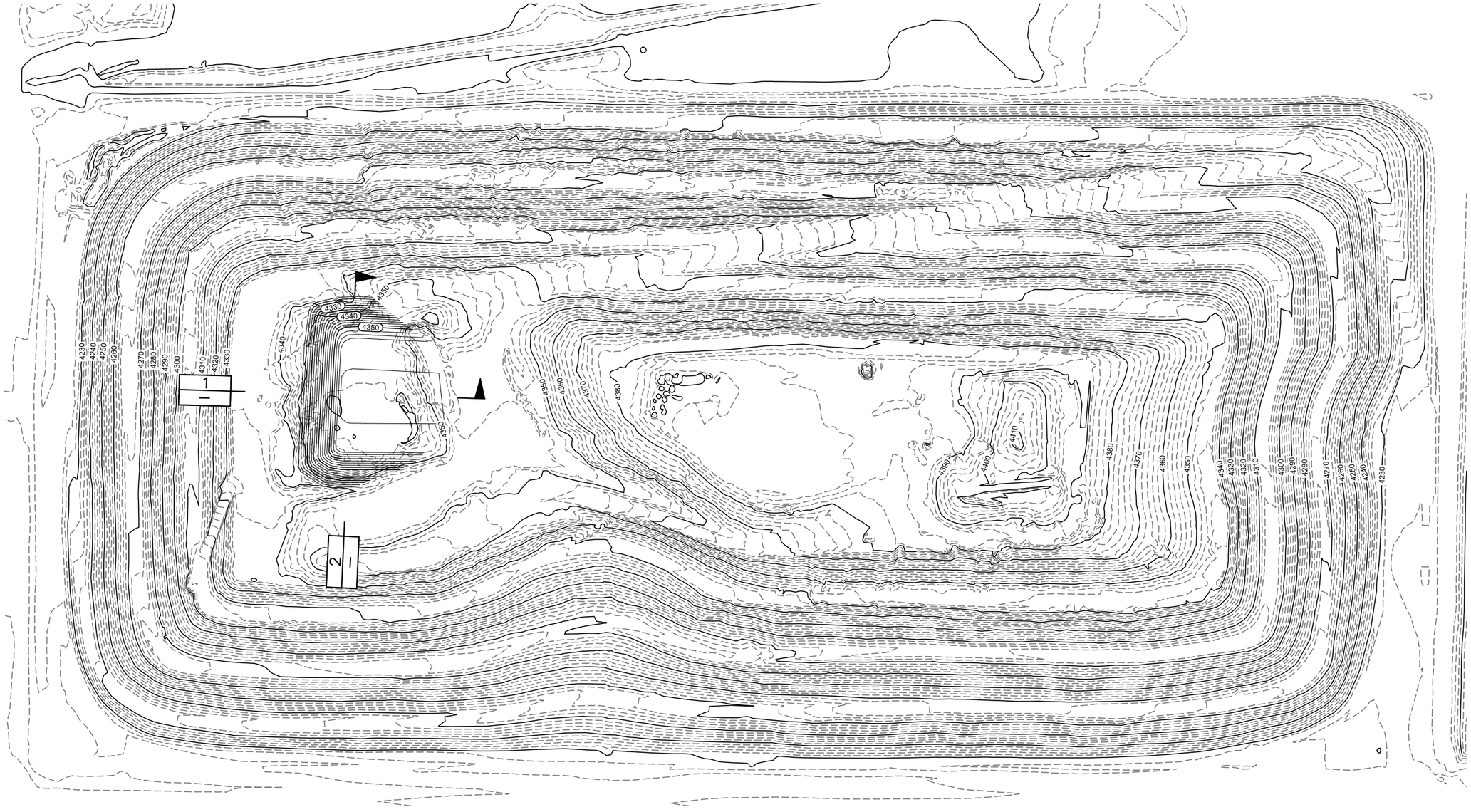
Original Asbestos Monofill Disposal Area Grading

Drawing 3

Revised Asbestos Monofill Disposal Area Grading

Drawing 4

Asbestos Disposal Area Sections



FILE NAME: PROJECTS\290 – WASTE MANAGEMENT\03.300 – MOUNTAIN VIEW PERMIT MODIFICATION\CAD\WORKING DRAWINGS\ISOPACH.DWG
FILE DATE: 8.16.2018 12:38:07 (GDS)

10/07

HANSEN ALLEN & LUCE, Inc. ENGINEERS

PROJECT ENGINEER

DESIGNED GLJ	3					
DRAFTED GDS	2					
CHECKED GLJ	1					
DATE NOVEMBER 2019	NO.	DATE	REVISIONS		BY	APVD.

SCALE: NOT TO SCALE

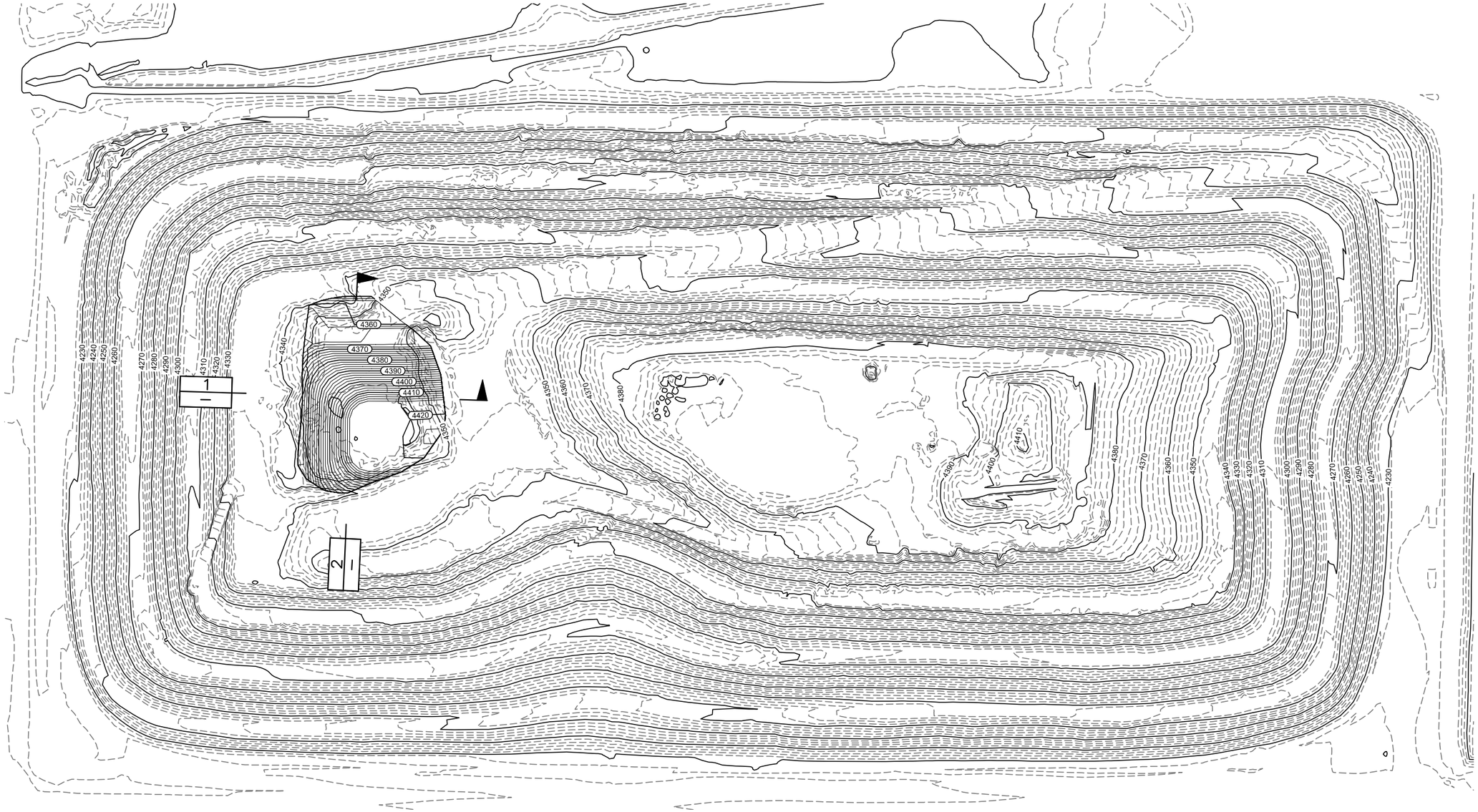
WASTE MANAGEMENT

MOUNTAIN VIEW LANDFILL FACILITY

MOUNTAIN VIEW ASBESTOS PERMIT UPDATE
MARCH 03, 2019 TOPOGRAPHIC MAP
ORIGINAL ASBESTOS DISPOSAL AREA

SHEET 2

290.03.301



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FILE DATE: 8.16.2018 12:38:07 (GDS)

10/07

HANSEN ALLEN & LUCE, Inc. ENGINEERS

PROJECT ENGINEER

DESIGNED GLJ	3				
DRAFTED GDS	2				
CHECKED GLJ	1				
DATE NOVEMBER 2019	NO.	DATE	REVISIONS	BY	APVD.

SCALE
NOT TO SCALE

WASTE MANAGEMENT

MOUNTAIN VIEW LANDFILL FACILITY

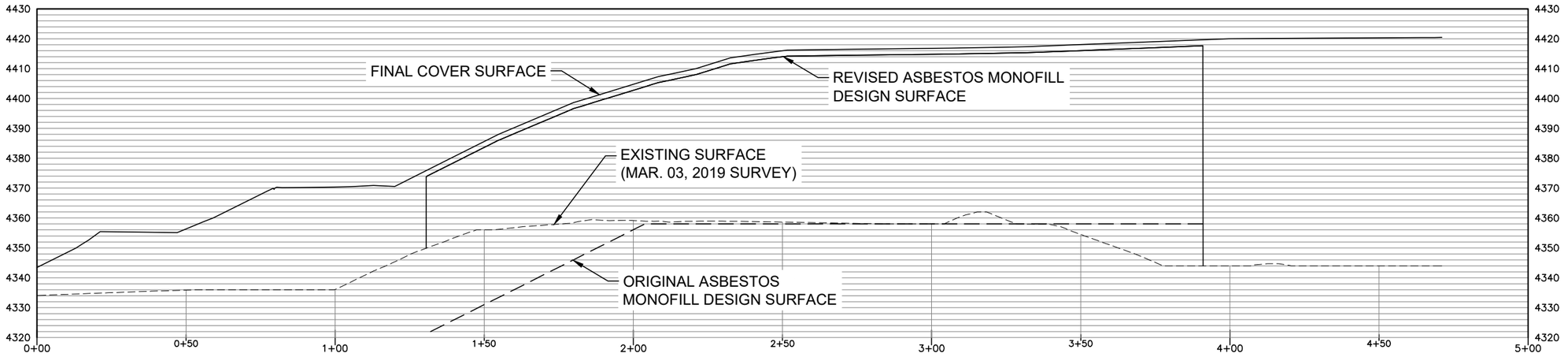
MOUNTAIN VIEW ASBESTOS PERMIT UPDATE
MARCH 03, 2019 TOPOGRAPHIC MAP
REVISED ASBESTOS DISPOSAL AREA

SHEET
3

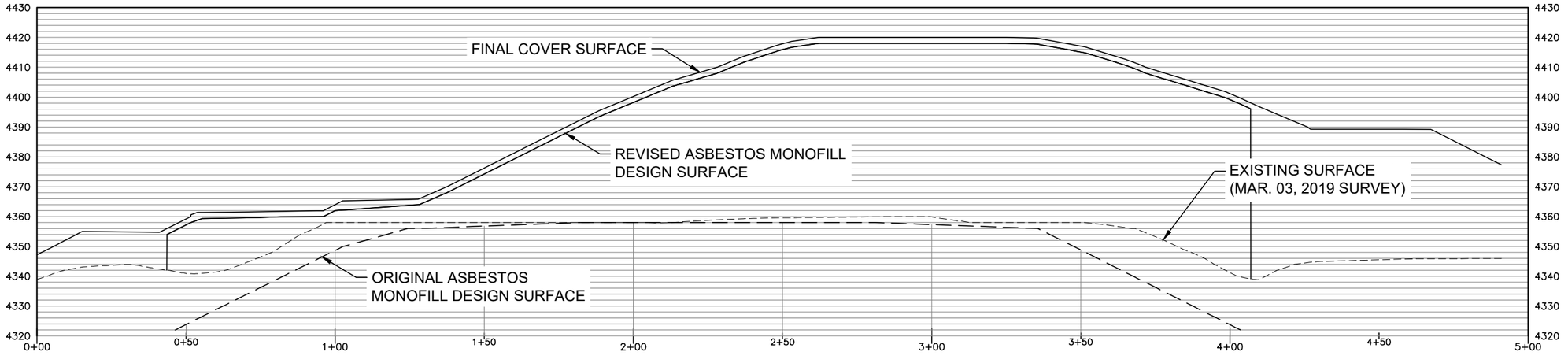
290.03.301

ADDITIONAL CAPACITY OF REVISED ASBESTOS MONOFILL DESIGN SURFACE = 127,500 C.Y.

REMAINING CAPACITY OF REVISED ASBESTOS MONOFILL DESIGN SURFACE = 111,258 C.Y.



SECTION 1
N.T.S. —



SECTION 2
N.T.S. —

FILE NAME: PROJECTS\290 – WASTE MANAGEMENT\03.300 – MOUNTAIN VIEW PERMIT MODIFICATION\CAD\WORKING DRAWINGS\ISOPACH.DWG
FILE DATE: 8.16.2018 12:38:07 (GDS)

HANSEN ALLEN & LUCE, Inc. ENGINEERS

PROJECT ENGINEER

DESIGNED GLJ
DRAFTED GDS
CHECKED GLJ
DATE NOVEMBER 2019

NO.	DATE	REVISIONS	BY	APVD.
3				
2				
1				

SCALE NOT TO SCALE

WASTE MANAGEMENT

MOUNTAIN VIEW LANDFILL FACILITY

MOUNTAIN VIEW ASBESTOS PERMIT UPDATE
MARCH 03, 2019 TOPOGRAPHIC MAP
ASBESTOS DISPOSAL AREA SECTIONS

SHEET 4
290.03.301

10/07

APPENDIX

Appendix A

Facility Records

A-1 Permit Renewal Application

Utah Class I and V Permit Application Checklist

Part I General Information APPLICANT: PLEASE COMPLETE ALL SECTIONS.

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

For Renewal Applications, Facility Expansion Applications and Modifications Enter Current Permit Number 0906

III. Facility Name and Location

Name of Facility
Mountain View Landfill

Site Address (street or directions to site)	County
6976 West California Avenue	Salt Lake

City	Zip Code	Telephone
Salt Lake City	84104	801-250-0555

Township	Range	Section(s)	Quarter/Quarter Section	Quarter Section
1 S	2 W	10	S1/2	SW

Main Gate Latitude	degrees	minutes	seconds	Longitude	degrees	minutes	seconds
	40	44	25		112	3	14

IV. Facility Owner(s) Information

Name of Facility Owner
Mountainview Landfill, Inc.

Address (mailing)
6976 West California Avenue

City	State	Zip Code	Telephone
Salt Lake City	UT	84104	801-250-0555

V. Facility Operator(s) Information

Name of Facility Operator
Same as Section IV

Address (mailing)

City	State	Zip Code	Telephone

VI. Property Owner(s) Information

Name of Property Owner
Same as Section IV

Address (mailing)

City	State	Zip Code	Telephone

VII. Contact Information

Owner Contact Name	Title
Brad Kloos	District Manager

Address (mailing)
6976 West California Avenue

City	State	Zip Code	Telephone
Salt Lake City	UT	84104	801-250-0555

Email Address	Alternative Telephone (cell or other)
bkloos@wm.com	801-330-7478

Operator Contact Name	Title
Brad Kloos	District Manager

Address (mailing)
6976 West California Avenue

City	State	Zip Code	Telephone
Salt Lake City	UT	84104	801-250-0555

Email Address	Alternative Telephone (cell or other)
bkloos@wm.com	801-330-7478

Property Owner Contact Name	Title
Brad Kloos	District Manager

Address (mailing)
6976 West California Avenue

City	State	Zip Code	Telephone
Salt Lake City	UT	84104	801-250-0555

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..... _____ acres

Disposal Area..... _____ acres

Design Capacity

Years..... _____

Cubic Yards..... 177,500

Tons..... _____

X. Fee and Application Documents

Indicate Documents Attached To This Application ☒ Application Fee: Amount $ 100.00

☒ 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 Mark W. Franc Name typed or printed	Title Area Engineer	Date
	Address 6976 W. California Avenue, Salt Lake City, UT 84104	
Email Address mfranc@wm.com	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) Name typed or printed	Title	Date
	Address	
Email Address	Alternative Telephone (cell or other)	

Utah Class I and V Permit Application Checklist

Important Note: The following checklist is for the permit application and addresses only the requirements of the Division of Waste Management and Radiation Control. Other federal, state, or local agencies may have requirements that the facility must meet. The applicant is responsible to be informed of, and meet, any applicable requirements. Examples of these requirements may include obtaining a conditional use permit, a business license, or a storm water permit. The applicant is reminded that obtaining a permit under the *Solid Waste Permitting and Management Rules* does not exempt the facility from these other requirements. Please take note of the heading of each section for the facilities that the section applies to.

An application for a permit to construct and operate a landfill is the documentation that the landfill will be located, designed, constructed, operated, and closed in compliance with the requirements of Utah Administrative Code R315-301 through 320 (*Utah Solid Waste Permitting and Management Rules*) and Utah Code Annotated 19-6-101 through 126 (*Utah Solid and Hazardous Waste Act*). The application should be written to be understandable by regulatory agencies, landfill operators, and the general public. The application should also be written so that the landfill operator, after reading it, will be able to operate the landfill according to the requirements with a minimum of additional training.

Copies of the *Solid Waste Permitting and Management Rules*, the *Utah Solid and Hazardous Waste Act*, along with many other useful guidance documents can be obtained by contacting the Division of Waste Management and Radiation Control at 801-536-0200. Most of these documents are available on the Division's web page at https://deq.utah.gov/division-waste-management-radiation-control. Guidance documents can be found at the solid waste section portion of the web page.

Part II **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 (See form above)	
General description of the facility (R315-310-3(1)(b))	
Legal description of property (R315-310-3(1)(c))	
Proof of ownership, lease agreement, or other mechanism (R315-310-3(1)(c))	
Area served by the facility including population (R315-310-3(1)(d))	
If the permit application is for a class I landfill a demonstration that the landfill is not a commercial facility	
Waste type and anticipated daily volume (R315-310-3(1)(d))	
Ib. Information Required for All New Or Laterally Expanding Class I and V Landfills	
Intended schedule of construction (R315-302-2(2)(a))	
Name and address of all property owners within 1000 feet of the facility boundary (R315-310-3(2)(a)(i))	
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))	
Name of the local government with jurisdiction over the facility site (R315-310-3(2)(iii))	

I. **Facility General Information**	
Description of Item	Location In Document
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)	
Land use compatibility (R315-302-1(2)(a))	
Maps showing the existing land use, topography, residences, parks, monuments, recreation areas or wilderness areas within 1000 feet of the site boundary	
Certifications that no ecologically or scientifically significant areas or endangered species are present in site area	
List of airports within five miles of facility and distance to each	
Geology (R315-302-1(2)(b))	
Geologic maps showing significant geologic features, faults, and unstable areas	
Maps showing site soils	
Surface water (R315-302-1(2)(c))	
Magnitude of 24 hour 25 year and 100 year storm events	
Average annual rainfall	
Maximum elevation of flood waters proximate to the facility	
Maximum elevation of flood water from 100 year flood for waters proximate to the facility	
Wetlands (R315-302-1(2)(d))	
Ground water (R315-302-1(2)(e))	
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))	
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))	
Contingency plans in the event of a fire or explosion (R315-302-2(2)(d))	
Corrective action programs to be initiated if ground water is contaminated (R315-302-2(2)(e))	
Contingency plans for other releases, e.g. explosive gases or failure of run-off collection system (R315-302-2(2)(f))	
Plan to control fugitive dust generated from roads, construction, general operations, and covering the waste (R315-302-2(2)(g))	

I. **Facility General Information**	
Description of Item	Location In Document
Plan for litter control and collection (R315-302-2(2)(h))	
Description of maintenance of installed equipment (R315-302-2(2)(i))	
Procedures for excluding the receipt of prohibited hazardous or PCB containing wastes (R315-302-2(2)(j))	
Procedures for controlling disease vectors (R315-302-2(2)(k))	
A plan for alternative waste handling (R315-302-2(2)(l))	
A general training plan for site operations (R315-302-2(2)(o))	
Any recycling programs planned at the facility (R315-303-4(6))	
Closure and post-closure care Plan (R315-302-2(2)(m))	
Procedures for the handling of special wastes (R315-315)	
Plans and operation procedures to minimize liquids (R315-303-3(1))	
Plans and procedures to address the requirements of R315-303-3(7)(c) through (i) and R315-303-4	
Any other site-specific information pertaining to the plan of operation required by the Director (R315-302-2(2)(p))	
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))	
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	
Approval from the Legislature and the Governor	

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))	
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))	
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))	

***II* Facility Technical Information**	
Description of Item	Location In Document
Evaluation of bedrock and soil types and properties including permeability rates (R315-310-4(2)(b)(ii))	
Depth to ground water (R315-310-4(2)(b)(iii))	
Direction and estimated flow rate of ground water (R315-310-4(2)(b)(iv))	
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))	
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))	
Identification and description of all surface waters on-site and within one mile of the facility boundary (R315-310-4(2)(b)(vii))	
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))	
Ground Water Monitoring (R315-303-3(7)(b) and R315-308)	
Statistical method to be used (R315-308-2(8))	
Calculation of site water balance (R315-310-4(2)(b)(ix))	
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	
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))	
Anticipated facility life and the basis for calculating the facility's life (R315-310-4(2)(c)(ii))	
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))	
Leachate collection system design and calculations showing system meets the requirements of R315-303-3(2)	
Equipment requirements and availability (R315-310-4(2)(c)(iii))	
Identification of borrow sources for daily and final cover and for soil liners (R315-310-4(2)(c)(iv))	
Run-On and run-off diversion designs (R315-303-3(1)(c), (d) and (e))	
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))	

***II* Facility Technical Information**	
Description of Item	Location In Document
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))	
Landfill gas monitoring and control plan that meets the requirements of Subsection R315-303-3(5) (R315-310-4(2)(c)(vii))	
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))	
Design and location of run-on and run-off control systems (R315-310-4(2)(c)(viii))	
IId. Closure Plan for All Class I and V Landfills (R315-310-3(1)(h))	
Closure Plan (R315-302-3(2) and (3))	
Closure schedule (R315-310-4(2)(d)(i))	
Design of final cover (R315-303-3(4) and R315-310-4(2)(c)(iii))	
Capacity of site in volume and tonnage (R315-310-4(2)(d)(ii))	
Final inspection by regulatory agencies (R315-310-4(2)(d)(iii))	
IIe. Post-Closure Care Plan for All Class I and V Landfills (R315-310-3(1)(h))	
Post-Closure Plan (R315-302-3(5) and (6))	
Site monitoring of landfill gases, ground water, and surface water, if required (R315-310-4(2)(e)(i))	
Changes to record of title, land use, and zoning restrictions (R315-310-4(2)(e)(v))	
Maintenance activities to maintain cover and run-on/run-off control systems (R315-310-4(2)(e)(iii))	
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))	
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))	
Identification of post-closure care costs including cost calculations (R315-310-4(2)(e)(iv))	
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))	

A-2 Proof of Ownership

29 Dec 98

BB Date 1/4/99

ARTICLES OF AMENDMENT
to the
ARTICLES OF INCORPORATION
of
BLANDFILL, INC.

DEC 23 1998

To the Division of Corporation and Commercial Code
State of Utah

Pursuant to the provisions of the Utah Revised Business Corporation Act, BLANDFIL, INC., a Utah business corporation (the "Company"), does hereby adopt the following Article of Amendment:

Article I.

The name of the Company shall be changed to "Mountainview Landfill, Inc." by amending Article I of the Articles of Incorporation to read as follows:

"Article I: The name shall be "Mountainview Landfill, Inc.""

Article II.

The amendment was adopted on December 21, 1998.

Article III.

The total shares outstanding are 100 shares of common stock, all of which were entitled to vote on the amendment, and all of which voted in favor of the amendment.

BLANDFILL, INC.

By: [signature]
Name: BRYAN J. BLANDFIELD
Title: VICE PRESIDENT

::ODMA\PCDOCS\HOUSTON\610539\1

800044606

After Recording Mail To:
Mountainview Landfill
c/o Waste Management Inc.
8310 South Valley Highway, Suite 200
Inglewood, Colorado 80112

QUIT CLAIM DEED

SALT LAKE CITY CORPORATION, 451 South State St., Rm. 245, Salt Lake City, Utah 84111, a Utah municipal corporation, "**GRANTOR**", hereby quit claims to, **MOUNTAINVIEW LANDFILL, INC.**, c/o Waste Management Inc., 8310 South Valley Highway, Suite 200, Inglewood, CO 80112, as "**GRANTEE**", for the sum of TEN AND NO/100THS DOLLARS ($10.00), and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, all of its right, title and interest in and to the following parcel(s) of land situated in Salt Lake County, State of Utah, more particularly described as follows:

EXHIBIT "A" attached hereto and by this reference made a part hereof.

To intent of this deed is to reconvey to the Grantee, property erroneously conveyed to Grantor by that certain Special Warranty Deed, dated Feburary 5th, 2001, and recorded October 17th, 2001 in Book 8512, Pages 5317 & 18.

DATED 2-2-03

SALT LAKE CITY CORPORATION

BY _____
MAYOR

ATTEST AND COUNTERSIGN:

Beverly Jones
DEPUTY CITY RECORDER

APPROVED AS TO FORM
Salt Lake City Attorney's Office

BY _____

dated 1-23-02

SALT LAKE CITY, UTAH
CORPORATE SEAL

RECORDED

FEB 06 2002

CITY RECORDER

BK8568PG3195

STATE OF UTAH)
)ss
COUNTY OF SALT LAKE)

The foregoing instrument was acknowledged before me this 3 day of Feb, 2002, by ROSS C. ANDERSON, in his capacity as MAYOR of SALT LAKE CITY CORPORATION, a Utah municipal corporation.

NOTARY PUBLIC
CHRISTINE K. CORDWELL
451 SO. STATE ST., RM 306
SALT LAKE CITY, UT 84111
MY COMMISSION EXPIRES
FEBRUARY 15, 2005
STATE OF UTAH

Christine K. Cordwell
NOTARY PUBLIC, residing in
Salt Lake County, Utah

STATE OF UTAH)
)ss
COUNTY OF SALT LAKE)

The foregoing instrument was acknowledged before me this day of Feb. 16th 2002, by Beverly Jones in her capacity as DEPUTY CITY RECORDER of SALT LAKE CITY CORPORATION, a Utah municipal corporation.

Pamela M. Johnson
NOTARY PUBLIC, residing in
Salt Lake County, Utah

NOTARY PUBLIC
STATE OF UTAH
My Commission Expires
April 8, 2002
PAMELA M. JOHNSON
451 S. State Street, Rm. 215
Salt Lake City, Utah 84111

LAND SURVEYORS
505 SOUTH MAIN STREET
BOUNTIFUL, UTAH 84010
(801) 295-7500

JAN.2, 1997

BLANDFILL
COMBINED DESCRIPTION NET OF
1300 SOUTH STREET RIGHT OF WAY AND
7200 WEST STREET RIGHT OF WAY

BEGINNING AT A POINT ON THE NORTH RIGHT OF WAY LINE OF 1300 SOUTH STREET, SAID POINT BEING NORTH 0°20'13" EAST 42.00 FEET ALONG QUARTER SECTION LINE FROM THE SOUTH QUARTER CORNER OF SECTION 10, TOWNSHIP 1 SOUTH, RANGE 2 WEST, SALT LAKE BASE AND MERIDIAN AND RUNNING THENCE NORTH 0°20'13" EAST 1284.27 FEET ALONG SAID QUARTER SECTION LINE TO QUARTER-QUARTER SECTION LINE; THENCE NORTH 89°54'08" WEST 2596.29 FEET ALONG SAID QUARTER-QUARTER SECTION LINE TO A POINT ON THE EAST RIGHT OF WAY LINE OF 7200 WEST STREET, SAID POINT BEING NORTH 0°40'30" EAST 1327.77 FEET ALONG SECTION LINE AND SOUTH 89°54'08" EAST 55.00 FEET ALONG SAID QUARTER-QUARTER SECTION LINE FROM THE SOUTHWEST CORNER OF SAID SECTION 10; THENCE SOUTH 0°40'30" WEST 1260.74 FEET ALONG SAID EAST RIGHT OF WAY LINE; THENCE SOUTH 44°37'45" EAST 35.17 FEET ALONG RIGHT OF WAY LINE TO THE NORTH RIGHT OF WAY LINE OF 1300 SOUTH STREET; THENCE SOUTH 89°56'00" EAST 2578.88 FEET ALONG SAID NORTH RIGHT OF WAY LINE TO THE POINT OF BEGINNING. (BASIS OF BEARING: NORTH 89°56'00" WEST 2659.13 FEET ALONG SECTION LINE)

affects parcel # 14-10-300-011

CONTAINS:76.692 ACRES

REGISTERED LAND SURVEYOR
JOHN W.
FRANCOM
No. 4861
STATE OF UTAH

EXHIBIT "A"

A-3 Reserved

A-4 Fugitive Dust Control Plan

Utah!
Where ideas connect

Department of Environmental Quality
Division of Air Quality

Michael O. Leavitt
Governor

Dianne R. Nielson, Ph.D.
Executive Director

Richard W. Sprott
Director

150 North 1950 West
P.O. Box 144820
Salt Lake City, Utah 84114-4820
(801) 536-4000
(801) 536-4099 Fax
(801) 536-4414 T.D.D.
www.deq.utah.gov

DAQC-428-2003

March 17, 2003

Gary Carter, P.E., Environmental Engineer
Secor International Inc.
308 East 4500 South, Suite 100
Salt Lake City, Utah 84107-3975

Dear Mr. Carter:

Re: Fugitive Dust Control Plan submitted February 24, 2003 - Utah Administrative Code (UAC) R307309-4. Fugitive Emissions and Fugitive Dust – Mountain View Landfill (MVLF)- Salt Lake County

A Fugitive Dust Control Plan (Plan), dated June 24, 2002, was received by the Division of Air Quality from Secor International Inc.(Secor) in behalf of Waste Management of Utah, Inc. for the Mountain View Landfill (MVLF) operation. The site is located on 77 acres at 6976 West California Ave, Salt Lake City, Salt Lake County, Utah. The operation at the MVLF is a permanent project.

It does not appear that MVLF is currently subject to a Notice of Intent and Approval Order according to Utah Administrative Code (UAC) R-307-401. Under the present operation parameters, the emissions from the MVLF can be assumed to be below the five- ton threshold.

The fugitive dust control plan submitted appears to fulfill Waste Management of Utah, Inc.'s requirement to submit a fugitive dust control plan in accordance with UAC R307-309-4 at this time. Please be advised that any track-out from the landfill onto a public, paved road, must also be controlled.

This notice does not relieve Waste Management of Utah, Inc. of its obligations to comply with all other applicable provisions of the UAC.

Failure to fully implement the Fugitive Dust Control Plan and/or failure to comply with the applicable requirements of the UAC or permit conditions may result in compliance actions, notices of violation and associated penalties.

If you have any questions regarding this notice, please contact Gisela Jensen at (801) 536-4406.

When responding refer to the date on this letter.

Sincerely,

Jeff Dean, Compliance Manager
Division of Air Quality

JND:GIJ:aj

cc: Salt Lake Valley Health Department

FUGITIVE DUST CONTROL AT THE MOUNTAIN VIEW LANDFILL

WASTE MANAGEMENT

Mountain View Landfill

6976 West California Avenue
Salt Lake City, Utah

February 19, 2003

SECOR

SECOR
INTERNATIONAL
INCORPORATED

www.secor.com
308 East 4500 South, Suite 100
Murray, Utah 84107-3975
801-268-7100 TEL
801-268-7118 FAX

February 19, 2003

Mr. Richard Sprott
Director, Division of Air Quality
Utah Department of Environmental Quality
150 North 1950 West
Salt Lake City, Utah 84114

Re.: Fugitive Dust Control at the Mountain View Landfill

Dear Mr. Sprott:

This letter is provided to the Division of Air Quality (DAQ) in order to confirm compliance with Title R307-205-2, Fugitive Emissions for the Mountain View Landfill (MVLF). The MVLF is approximately 77 acres located at 6976 West California Avenue, Salt Lake City, Utah. MVLF is a construction and demolition landfill that has been in operation since April 1985 under various owners. Since July 1998 MVLF has been owned and operated by Waste Management of Utah, Inc. The MVLF receives demolition and construction waste as defined by Title R3315-301-2. Wastes that are acceptable for receipt at MVLF include bricks, concrete, other masonry materials, soil, asphalt, rock, untreated lumber, rebar, tree stumps, building materials, packaging, and rubble resulting from construction, remodeling, repair, and demolition operations on pavement, houses, commercial buildings, and other structures. The facility does not receive asbestos, contaminated soils, tanks resulting from remediation or cleanup at any release or spill, waste paints, solvents, sealers, adhesives, or similar hazardous or potentially hazardous materials. The only source of airborne emissions at MVLF is fugitive dust.

Enclosed with this letter is a Fugitive Dust Control Plan for MVLF to meet the requirements of Title R307-205-2. It is our understanding that MVLF is subject to the requirements of Title R307-205, but is not subject to Title R307-401, Notice of Intent and Approval Order. We request a reply from DAQ that confirms MVLF is not subject to Title R307-401 and that the content of the enclosed Fugitive Dust Control Plan meets the requirements of Title R307-205.

Should you have any questions regarding this letter or the Fugitive Dust Control Plan, please feel free to contact me at 327-7821.

Sincerely,
ON BEHALF OF THE MOUNTAIN VIEW LANDFILL
SECOR International Incorporated

Gary A. Carter, P.E.
Environmental Engineer

cc: Stacy Anderson – Waste Management
Patrick Craig – Waste Management
Len Butler – Waste Management
Kevin Bertrand - SECOR International Incorporated

Enclosure

Fugitive Dust Control Plan
Mountain View Landfill
Salt Lake City, Utah

The primary sources of fugitive dust at the MVLF are haul roads, disturbed areas and stockpiles. The following control measures shall be implemented at MVLF to minimize the creation of fugitive dust:

- The vehicle speed limit for paved and unpaved roads and disturbed areas will be 15 miles per hour. Vehicle speed limit signs are posted to control speeds.
- Watering of haul roads shall be conducted as necessary to control fugitive dust.
- Fugitive emissions from land clearing, overburden removal, and disturbed areas at the landfill shall be controlled by watering as necessary.
- Active and inactive landfill material stockpiles shall be watered as necessary to control fugitive emissions.
- Watering of the soil or alternative cover will be done as necessary to control fugitive emissions.
- Vegetation growth will be initiated and maintained on closed landfill areas to minimize fugitive dust emissions.

A-5 Site Facility Inspection Form

MOUNTAIN VIEW LANDFILL
Quarterly Permit Facility Inspection

Signature_____ Date_____

ITEM	YES/NO	COMMENTS
Have wastes been placed in the appropriate locations?		
Have wastes been properly compacted?		
Are wastes being covered to prevent fires?		
Are the facility fences, gates, and other access controls in good condition?		
Are the facility roads maintained to provide safe and reliable access to the disposal area?		
Are the facility run-on/off controls in good condition and not blocked?		
Is final and intermediate cover in good condition?		
Is litter being picked up as necessary?		
Is the daily operating record being completed as required?		

Appendix B

Soils Testing

Table 1

Summary of Soils Laboratory Testing

Summary of Soils Laboratory Testing				Grain Size		Atterberg Limits		Compaction Test (ASTM 1557)		Permeability Test	
Sample Number	Dry Inplace Density	USCS Classification	Moisture Content (%)	Percent Passing #4 (%)	Percent Passing #200 (%)	Liquid Limit (LL)	Plasticity Limit (PL)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Remolding Criteria	Coefficient of Permeability k (cm/sec)
a. Bucket 2		SC	22.5	80	48	27	18				
b. Bucket 3		CL	28.1	96	84	38	20				
c. Bucket 4		CL	30.3	100	96	44	22				
d. Bucket SK1		SC	21.7	81	47	29	18				
e. Bucket SK2		SC	16.6	77	44	28	17	124.0	9.5		
f. Bucket SK3		CL	25.6	92	68	31	19				
g. Bucket SK4		GC	19.0	64	32	27	17	127.3	7.8	90%RC@OMC+2	5.00E-06
h. Core #1	92.1	CL	28.3								
i. Core #2			17.9								
j. Core #3	89.7	CL or SC	28.3								
k. Core #4	84.8	CL	33.9								3.70E-07
l. Sample #I	104.7	SC	17.8	83.8	46.6	26	18	116.7	13.5		
m. Sample #2	102.6	CL	13.6	85.6	54.9	27	18	114.5	14		
n. Sample #3	106.7	SC	14.1	81.3	46.0	25	17	118.7	12.5		

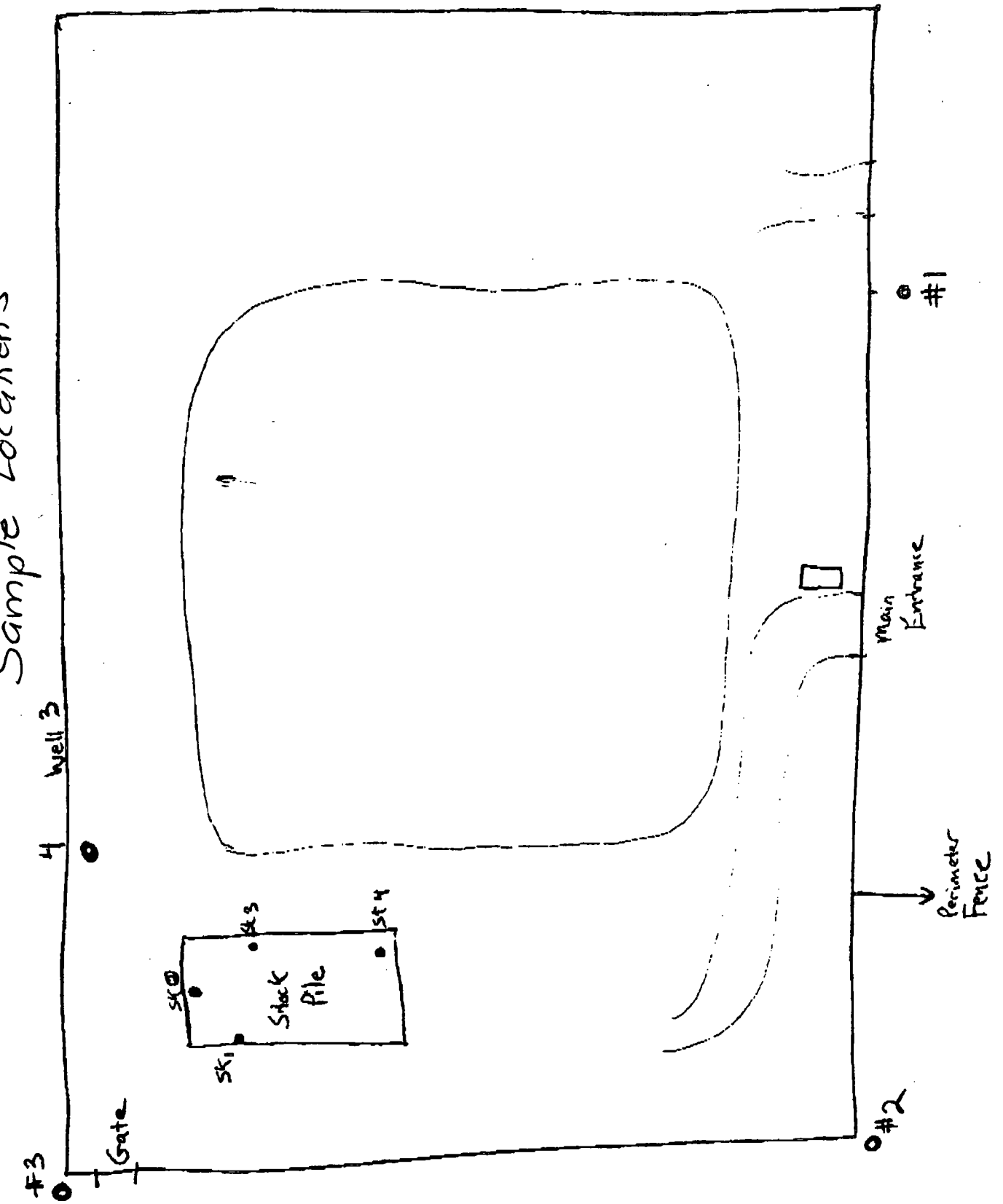
NOTE:
Samples were sent to EMCON/OWT, Inc.'s Soil Lab. Samples a-k were sampled in March 1998and samples l-n were sampled in November 2004.
Core samples have slightly higher moisture and are probably more accurate.
RC = relative compaction
OMC = optimum moisture content

You will receive 11 Samples.

No bucket sample for #1.

22045-013.002

To: Von Hullings
Emcon
408-437-9526



TESTING BY EMCON

GRAIN SIZE DISTRIBUTION

ASTM D422

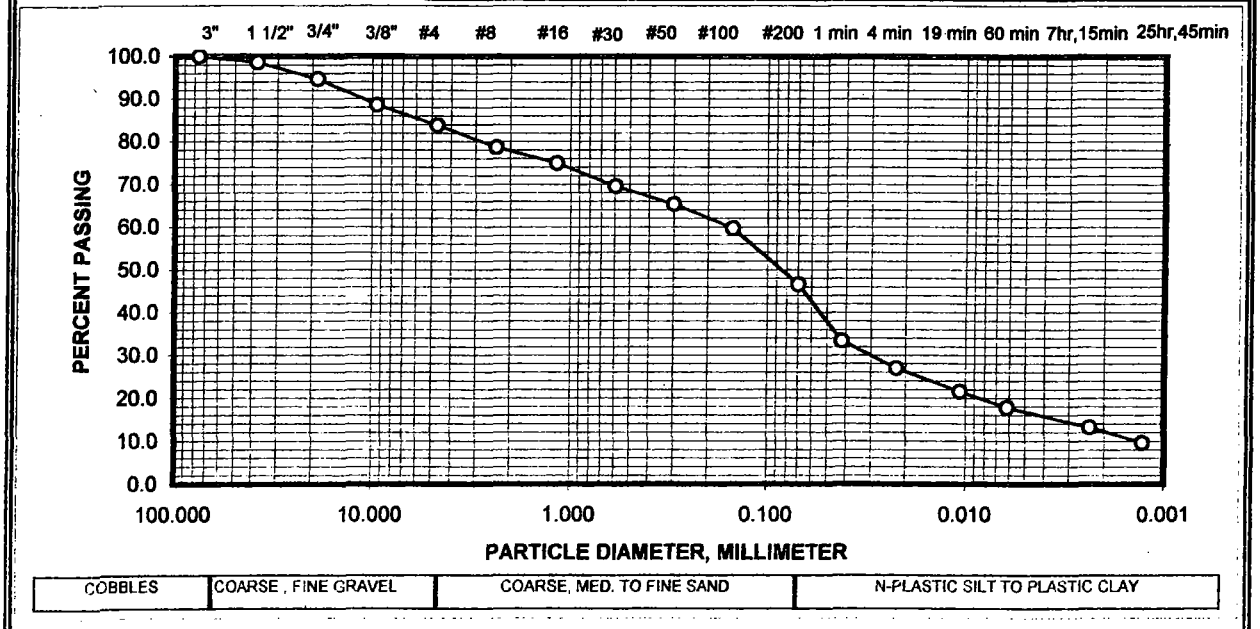
Shaw™ EMCON/OWT, Inc.

A Shaw Group Company

PROJECT NAME:	MT. VIEW LANDFILL	PROJECT NO.:	102094
SAMPLE NO.:	SAMPLE # I	DATE:	11/09/04
DESCRIPTION:	CLAYEY SAND WITH GRAVEL, BROWN.	TECH.:	DGC

UNIFIED SOIL CLASSIFICATION:	SC	CORRECTIONS:			
Moisture Content Determination:		1 1/2"	98.6	Dry Wt Used, Hydrom:	50.9
Pan Number:	#500	3/4"	94.7	Est. Sp. Gr., (2.60-2.80):	2.61
Pan + Wet Soil, gms.	910.9	3/8"	88.6	Temp.,(18-23) °C:	21
Pan + Dry Soil, gms.	787.2	D_{60}	0.155	Zero Correction	5.0
Wt. of Pan, gms.	92.6	D_{30}	0.030	Miniscus Correction:	0.5
Wt. of Dry Soil, gms.	694.6	D_{10}	0.001	Liquid Limit:	26
Wt. of Water, gms.	123.7	C_U	113.04	Plasticity Index:	8
Water content, %.	17.8	C_C	4.20	High; Mod.; Low; NP:	

SIEVE SIZE (U.S. STANDARD)	PARTICLE SIZE, (inches)	PARTICLES DIAMETER, (mm)	WEIGHT RETAINED (gms)	ACCUMULATED WEIGHT RETAINED (gms)	WEIGHT PASSING (gms)	PERCENT PASSING (%)
5"	5.000	127.00		0	694.6	100.0
3"	3.000	76.20		0	694.6	100.0
1 1/2"	1.500	38.10		0	694.6	98.6
3/4"	0.750	18.90		0	694.6	94.7
3/8"	0.375	9.52	0.0	0	694.6	88.6
#4	0.185	4.70	37.4	37.4	657.2	83.8
#8	0.093	2.36	40.3	77.7	616.9	78.7
#16	0.046	1.17	29.4	107.1	587.5	74.9
#30	0.023	0.59	42.5	149.6	545	69.5
#50	0.012	0.30	32.8	182.4	512.2	65.3
#100	0.006	0.15	44.1	226.5	468.1	59.7
#200	0.003	0.07	102.9	329.4	365.2	46.6
		0.0420	1 min.		42	33.4
Bulb 152H HYDROMETER TEST WITH DISPERSING AGENT		0.0223	4 min.		35	27.0
		0.0107	19 min.		29	21.5
		0.0062	60 min.		25	17.8
		0.0024	7hr., 15min.		20	13.3
		0.0013	25hr., 45min.		16	9.6



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ATTERBERG LIMITS

ASTM D4318

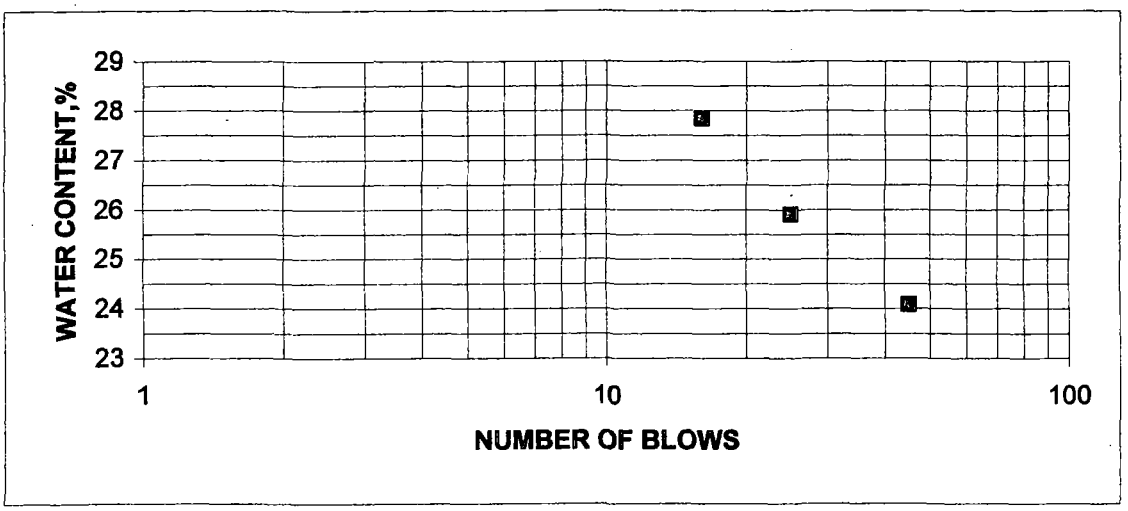
Shaw EMCON/OWT, Inc.

A Shaw Group Company

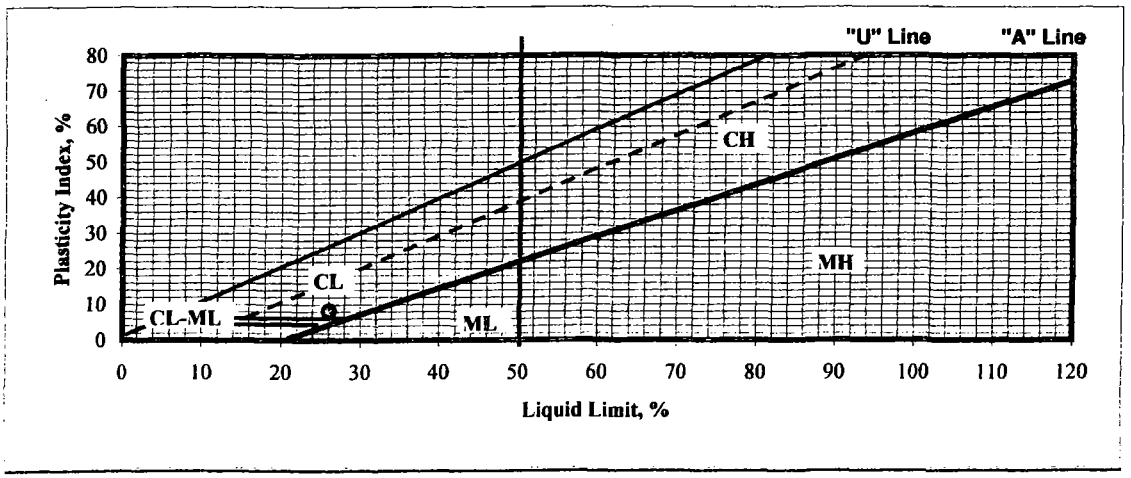
Project Name:	MT. VIEW LANDFILL	**Lab. No.:**	04-076	**Proj. No.:**	102094
Sample No.:	SAMPLE # I	**Depth, ft.:**	BULK	**Date:**	11/10/04
Description:	CLAYEY SAND WITH GRAVEL, BROWN.			**Tested By:**	DGC
				Checked By:	

*/	Liquid Limit			Plastic Limit		
Can Number	D-6	C-1	B-3	A-5	B-1	
Weight of Can + Wet Soil, gms.	68.58	65.03	68.98	47.87	47.44	
Weight of Can + Dry Soil, gms.	61.46	58.24	60.96	45.48	45.13	
Weight of Can, gms.	31.90	32.03	32.16	32.04	32.11	
Weight of Dry Soil, gms.	29.56	26.21	28.80	13.44	13.02	
Weight of Water, gms.	7.12	6.79	8.02	2.39	2.31	
Water Content, %	24.1	25.9	27.8	17.8	17.7	
Number of Blows	45	25	16			

Unified Soil Classification SC



LL=	26	PL=	18	PI=	8



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SPECIFIC GRAVITY

ASTM D854

Shaw™ EMCON/OWT, Inc.
A Shaw Group Company

PROJ. NAME:	MT. VIEW LF.	PROJ. NO.:	102094	DATE:	11/11/04
SAMPLE NO.:	SAMPLE # I	DEPTH, FT.:	BULK	TESTED BY:	DGC
DESCRIPTION:	CLAYEY SAND WITH GRAVEL, BROWN.			CORRECTED BY:	

LABORATORY MEASUREMENTS:

TRIAL NUMBER	1	2	3
FLASK NUMBER	A	A	A
WEIGHT OF FLASK + WATER + SOIL	735.8	734.8	733.8
TEMP., DEGREE C	28.0	35.0	40.0
WEIGHT OF FLASK + WATER	657.3	656.2	655.2
WEIGHT OF DRY SOIL USED, GRAMS	127.04	127.04	127.04

SPECIFIC GRAVITY OF WATER:

C	0	1	2	3	4	5	6	7	8	9
10	0.9997	0.9966	0.9995	0.9994	0.9993	0.9991	0.9990	0.9988	0.9986	0.9984
20	0.9982	0.9980	0.9978	0.9976	0.9973	0.9971	0.9968	0.9965	0.9963	0.9960
30	0.9957	0.9954	0.9951	0.9947	0.9944	0.9941	0.9937	0.9934	0.9930	0.9926
40	0.9922	0.9919	0.9915	0.9911	0.9907	0.9902	0.9898	0.9894	0.9890	0.9885

LABORATORY CALCULATIONS:

TRIAL NUMBER	1	2	3
SPEC. GRAVITY OF WATER @ T	0.9963	0.9941	0.9922
GT* Ws	126.57	126.29	126.05
W1 - W2	78.50	78.60	78.60
Ws - (W1 - W2)	48.54	48.44	48.44
Gs = GT * Ws / Ws - (W1 - W2)	2.61	2.61	2.60

Average Specific Gravity:	2.61

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COMPACTION TEST

Shaw™ EMCON/OWT, Inc.
A Shaw Group Company

☐ ASTM D1557
☒ ASTM D698

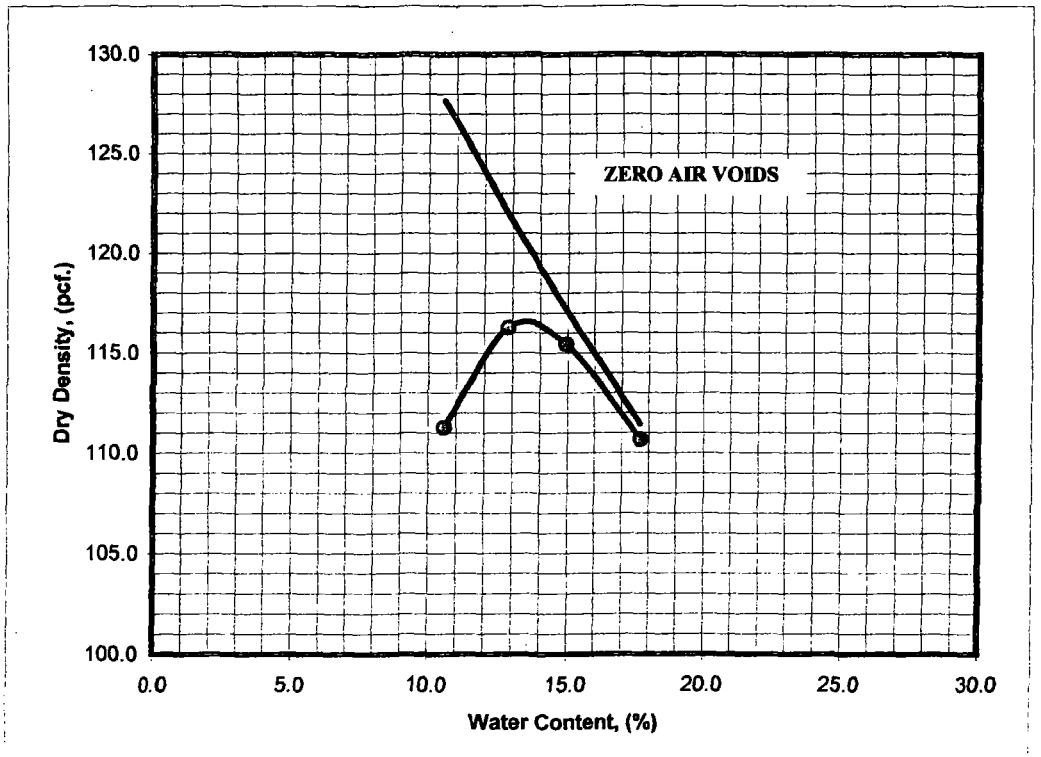
Checked By:

Project Name:	MT. VIEW LF.	Proj. No.:	102094	Lab. No.:	04-076
Sample No.:	SAMPLE # I	Depth, ft.:	BULK	Tested By:	DGC
Description:	CLAYEY SAND WITH GRAVEL, BROWN.			Date:	11/10/04

Vol., Mold, cf.:	0.03333	Hammer Weight,:	5.5 lbs.	Hammer Drop:	12"
No. of Layers:	3	Blows/Layer:	25	ASTM Designation: Method:	"B"

Trial Number		-6	-4	-2	Nat.	
Container Number		Q	#6	Y-5	A-1	
Wet Soil + Container	(gms.)	923.60	953.30	731.70	881.20	
Dry Soil + Container	(gms.)	853.10	868.00	644.00	776.00	
Container Weight	(gms.)	185.50	204.20	56.90	181.00	
Weight of Water	(gms.)	70.50	85.30	87.70	105.20	
Weight of Dry Soil	(gms.)	667.60	663.80	587.10	595.00	
Moisture Content	(%)	10.6	12.9	14.9	17.7	
Wet Soil + Mold	(gms.)	3711	3835	3857	3820	
Weight of Mold	(gms.)	1851	1851	1851	1851	
Wet Weight of Soil	(lbs.)	4.10	4.37	4.42	4.34	
Wet Unit Weight	(pcf.)	123.0	131.2	132.7	130.2	
Dry Unit Weight	(pcf.)	111.3	116.3	115.4	110.7	

Maximum Dry Density, pcf.:	116.7
Opt. Moisture Content, %:	13.5
Est. Specific Gravity:	2.61



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HYDRAULIC CONDUCTIVITY

EMCON/OWT, Inc. — A Shaw Group Company

ASTM D5084

PROJECT NAME:	MOUNTAIN VIEW LANDFILL	LAB. NUMBER:	04-076
SAMPLE NUMBER:	SAMPLE # I	PROJECT NUMBER:	102094
DESCRIPTION:	CLAYEY SAND WITH GRAVEL, BROWN.	SAMPLE DEPTH:	REMOLDED
CHECKED BY:		DATE:	11/19/04
		TESTED BY:	DGC

Remolded to 90% of max. dry density (ASTM D698) at opt. -2% water content.

SAMPLE DATA		BEFORE TEST	AFTER TEST	OVEN DRY		
DIAMETER	(cm)	7.28	7.23	TARE NUMBER		A-1
HEIGHT	(cm)	6.40	6.40	WT. OF TARE+WET SOIL	(gm)	620.90
VOLUME	(cc)	266.264	262.619	WT. OF TARE+DRY SOIL	(gm)	530.30
WT. OF WET SOIL	(gm)	499.0	537.5	WT. OF TARE	(gm)	83.40
WT. OF DRY SOIL	(gm)	446.9	446.9	WT. OF WATER	(gm)	90.60
WT. OF WATER	(gm)	52.1	90.6	WT. OF DRY SOIL	(gm)	446.9
MOISTURE CONTENT	(%)	11.7	20.3	WATER CONTENT	(%)	20.3
DRY DENSITY	(pcf)	104.73	106.19	LAB. MAX. DRY DENSITY	(pcf)	116.7
VOID RATIO	(e)	0.56	0.53	OPT. WATER CONTENT	(%)	13.5
SATURATION	(s)	54.8	99.1	RELATIVE COMPACTION	(%)	90
POROSITY	(h)	0.3569	0.3480	SPECIFIC GRAVITY	(est.)	2.61

PRESSURE DATA DURING PERMEABILITY TEST:

"B" parameter	0.98		Area of Burette:	0.6 sq. cm.
CONFINING PRESS.	55 psi		Temp. Correction:	0.976 21 °C
BACK PRESS. (bot)	50 psi		BACK PRESS. (top)	50 psi.
AVERAGE CONSOL. PRESSURE:	5.0 psi			
PERMEANT:	*TAP WATER*			

DATE	TIME	ELAPSED TIME (sec)	STATUS RESET	BURETTE READING					
				TOP PRESS. (psi.)		BOTTOM PRESS. (psi.)		CHAMBER PRESS.,(psi.)	COMMENTS
SATURATION:									**Skempton's "B"**
11/19/2004	7:30			50.0		50.0		51.0	49.7
11/19/2004	11:54							61.0	59.5
CONSOLIDATION:				TOP (cm)	ΔT (cm.)	BOT. (cm)	ΔB (cm.)	CHAMBER (cm)	
PERMEABILITY:									
11/22/2004	6:04	RESET	R	0.5		39.5		12.7	**Hydraulic Cond., (cm/sec.)**
11/22/2004	6:07	180		10.3		28.6		12.7	1.9E-04
11/22/2004	6:08	RESET	R	0.7		39.6		12.7	Hydraulic Cond., (cm/sec.)
11/22/2004	6:11	180		11.3		28.8		12.7	2.0E-04
11/22/2004	6:12	RESET	R	0.3		39.5		12.7	Hydraulic Cond., (cm/sec.)
11/22/2004	6:15	180		10.8		28.6		12.7	2.0E-04
11/22/2004	6:16	RESET	R	0.6		39.5		12.7	Hydraulic Cond., (cm/sec.)
11/22/2004	6:19	180		11.1		28.8		12.7	2.0E-04
									δγχ93πμ

GRAIN SIZE DISTRIBUTION

ASTM D422

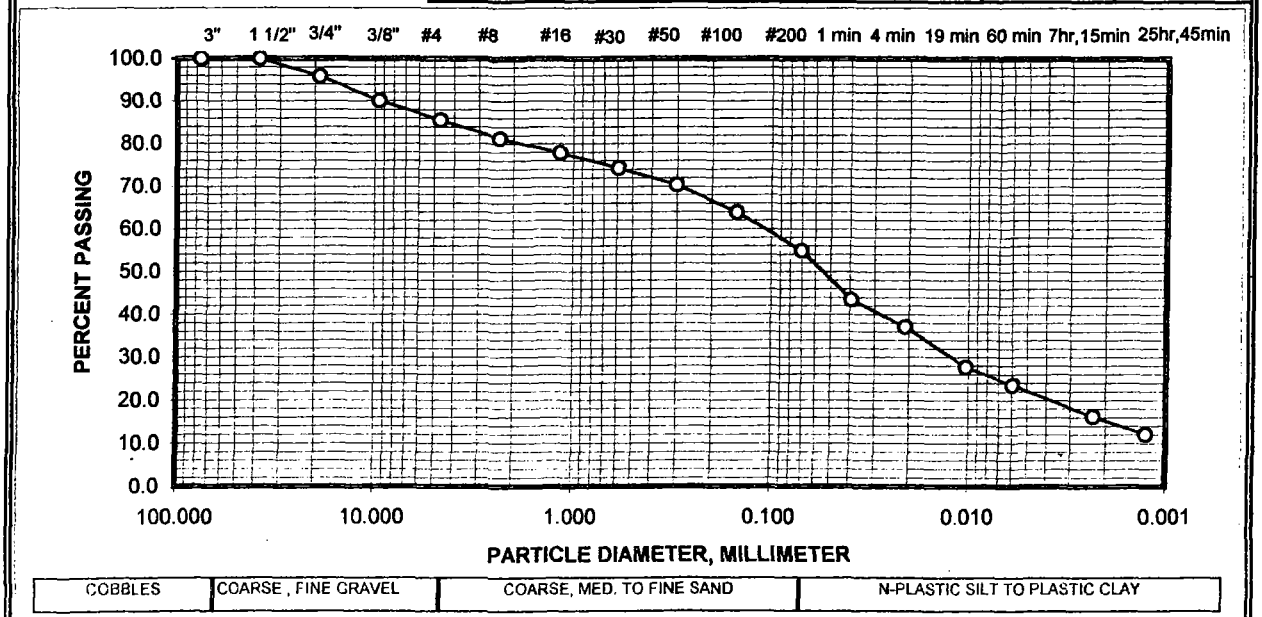
Shaw™ EMCON/OWT, Inc.

A Shaw Group Company

PROJECT NAME:	MT. VIEW LANDFILL	PROJECT NO.:	102094
SAMPLE NO.:	SAMPLE # II	DATE:	11/09/04
DESCRIPTION:	SANDY LEAN CLAY, BROWN.	TECH.:	DGC

UNIFIED SOIL CLASSIFICATION:	CL	CORRECTIONS:			
Moisture Content Determination:		1 1/2"	100.0	Dry Wt Used, Hydrom:	52.4
Pan Number:	#510	3/4"	95.8	Est. Sp. Gr., (2.60-2.80):	2.64
Pan + Wet Soil, gms.	910.5	3/8"	90.1	Temp.,(18-23) °C:	21
Pan + Dry Soil, gms.	812.4	D_{60}	0.108	Zero Correction	5.0
Wt. of Pan, gms.	89.0	D_{30}	0.012	Miniscus Correction:	0.5
Wt. of Dry Soil, gms.	723.4	D_{10}	#DIV/0!	Liquid Limit:	27
Wt. of Water, gms.	98.1	C_U	#DIV/0!	Plasticity Index:	9
Water content, %.	13.6	C_C	#DIV/0!	High; Mod.; Low; NP:	

SIEVE SIZE (U.S. STANDARD)	PARTICLE SIZE, (inches)	PARTICLES DIAMETER, (mm)	WEIGHT RETAINED (gms)	ACCUMULATE WEIGHT RETAINE (gms)	WEIGHT PASSING (gms)	PERCENT PASSING (%)
5"	5.000	127.00		0	723.4	100.0
3"	3.000	76.20		0	723.4	100.0
1 1/2"	1.500	38.10		0	723.4	100.0
3/4"	0.750	18.90		0	723.4	95.8
3/8"	0.375	9.52	0.0	0	723.4	90.1
#4	0.185	4.70	36.5	36.5	686.9	85.6
#8	0.093	2.36	34.5	71	652.4	81.3
#16	0.046	1.17	27.1	98.1	625.3	77.9
#30	0.023	0.59	29.0	127.1	596.3	74.3
#50	0.012	0.30	31.8	158.9	564.5	70.3
#100	0.006	0.15	52.0	210.9	512.5	63.8
#200	0.003	0.07	72.1	283	440.4	54.9
		0.0395	1 min.		47	43.4
Bulb 152H HYDROMETER TEST WITH DISPERSING AGENT		0.0209	4 min.		41	37.2
		0.0103	19 min.		32	27.7
		0.0060	60 min.		28	23.6
		0.0023	7hr., 15min.		21	16.2
		0.0013	25hr., 45min.		17	12.0



COBBLES	COARSE , FINE GRAVEL	COARSE, MED. TO FINE SAND	N-PLASTIC SILT TO PLASTIC CLAY

δγχ93σϖ

ATTERBERG LIMITS

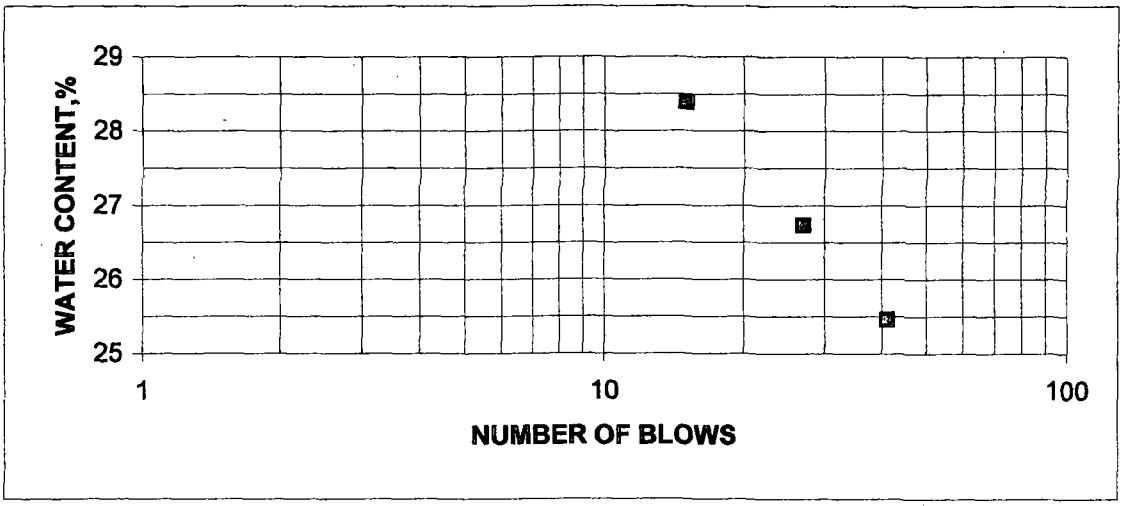
ASTM D4318

Shaw EMCON/OWT, Inc.
A Shaw Group Company

Project Name:	MT. VIEW LANDFILL	**Lab. No.:**	04-076	**Proj. No.:**	102094
Sample No.:	SAMPLE # II	**Depth, ft.:**	BULK	**Date:**	11/10/04
Description:	SANDY LEAN CLAY, BROWN.			**Tested By:**	DGC
				Checked By:	

*/	Liquid Limit			Plastic Limit		
Can Number	G-6	C-2	B-6	A-8	J-6	
Weight of Can + Wet Soil, gms.	63.65	64.81	68.67	48.58	48.84	
Weight of Can + Dry Soil, gms.	57.22	57.91	60.56	46.03	46.24	
Weight of Can, gms.	31.97	32.10	31.99	31.86	31.92	
Weight of Dry Soil, gms.	25.25	25.81	28.57	14.17	14.32	
Weight of Water, gms.	6.43	6.90	8.11	2.55	2.60	
Water Content, %	25.5	26.7	28.4	18.0	18.2	
Number of Blows	41	27	15			

Unified Soil Classification **CL**



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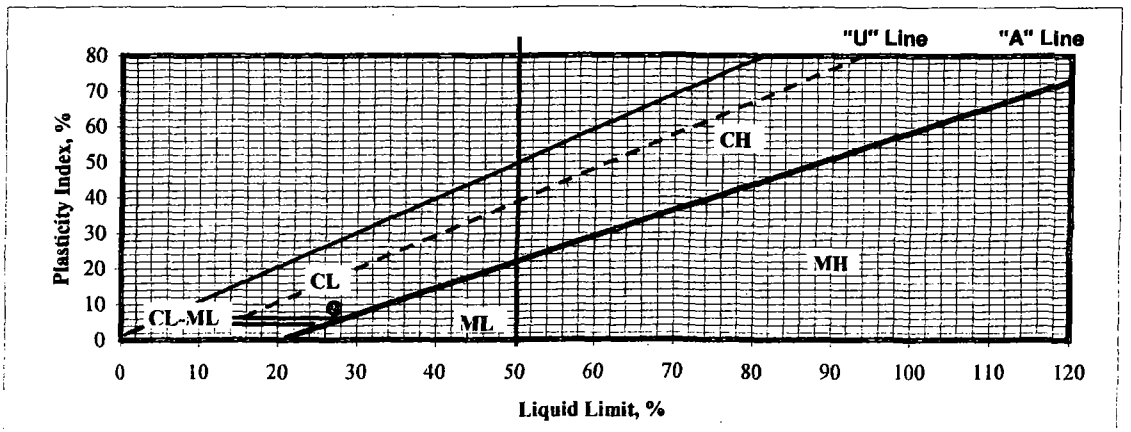

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SPECIFIC GRAVITY

ASTM D854

Shaw™ EMCON/OWT, Inc.
A Shaw Group Company

PROJ. NAME:	MT. VIEW LF.	**PROJ. NO.:**	102094	**DATE:**	11/11/04
SAMPLE NO.:	SAMPLE # II	**DEPTH, FT.:**	BULK	**TESTED BY:**	DGC
DESCRIPTION:	SANDY LEAN CLAY, BROWN.			**CORRECTED BY:**	

LABORATORY MEASUREMENTS:

TRIAL NUMBER	1	2	3
FLASK NUMBER	C	C	C
WEIGHT OF FLASK + WATER + SOIL	743.0	742.0	741.4
TEMP., DEGREE C	29.0	36.0	41.0
WEIGHT OF FLASK + WATER	662.0	661.0	660.0
WEIGHT OF DRY SOIL USED, GRAMS	130.01	130.01	130.01

SPECIFIC GRAVITY OF WATER:

C	0	1	2	3	4	5	6	7	8	9
10	0.9997	0.9966	0.9995	0.9994	0.9993	0.9991	0.9990	0.9988	0.9986	0.9984
20	0.9982	0.9980	0.9978	0.9976	0.9973	0.9971	0.9968	0.9965	0.9963	0.9960
30	0.9957	0.9954	0.9951	0.9947	0.9944	0.9941	0.9937	0.9934	0.9930	0.9926
40	0.9922	0.9919	0.9915	0.9911	0.9907	0.9902	0.9898	0.9894	0.9890	0.9885

LABORATORY CALCULATIONS:

TRIAL NUMBER	1	2	3
SPEC. GRAVITY OF WATER @ T	0.9960	0.9937	0.9919
GT* Ws	129.49	129.19	128.96
W1 - W2	81.00	81.00	81.40
Ws - (W1 - W2)	49.01	49.01	48.61
Gs = GT * Ws / Ws - (W1 - W2)	2.64	2.64	2.65

Average Specific Gravity:	2.64

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COMPACTION TEST

Shaw™ EMCON/OWT, Inc.
A Shaw Group Company

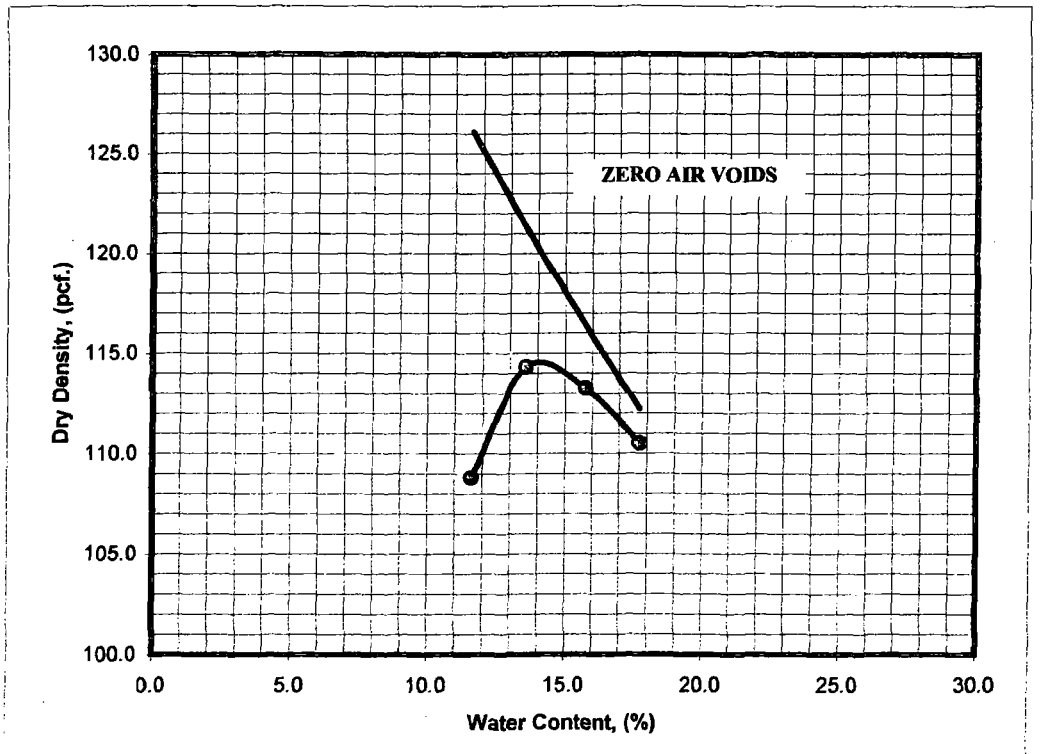
☐ ASTM D1557
☒ ASTM D698

Project Name:	MT. VIEW LF.	**Proj. No.:**	102094	**Checked By:**	
Sample No.:	SAMPLE # II	**Depth, ft.:**	BULK	**Lab. No.:**	04-076
Description:	SANDY LEAN CLAY, BROWN.			**Tested By:**	DGC
				Date:	11/11/04

Vol., Mold, cf.:	0.03333	**Hammer Weight,:**	5.5 lbs.	**Hammer Drop:**	12"
No. of Layers:	3	**Blows/Layer:**	25	**ASTM Designation:**	
				Method:	"B"

Trial Number		-2	Nat.	2	4	
Container Number		C	D	A	B	
Wet Soil + Container	(gms.)	818.50	766.50	760.20	745.70	
Dry Soil + Container	(gms.)	745.00	688.20	671.80	650.00	
Container Weight	(gms.)	111.50	111.00	110.70	110.20	
Weight of Water	(gms.)	73.50	78.30	88.40	95.70	
Weight of Dry Soil	(gms.)	633.50	577.20	561.10	539.80	
Moisture Content	(%)	11.6	13.6	15.8	17.7	
Wet Soil + Mold	(gms.)	3687	3814	3833	3818	
Weight of Mold	(gms.)	1851	1851	1851	1851	
Wet Weight of Soil	(lbs.)	4.05	4.33	4.37	4.34	
Wet Unit Weight	(pcf.)	121.4	129.8	131.1	130.1	
Dry Unit Weight	(pcf.)	108.8	114.3	113.2	110.5	

Maximum Dry Density, pcf.:	114.5
Opt. Moisture Content, %:	14.0
Est. Specific Gravity:	2.64



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HYDRAULIC CONDUCTIVITY

EMCON/OWT, Inc. — A Shaw Group Company

ASTM D5084

PROJECT NAME:	MOUNTAIN VIEW LANDFILL	LAB. NUMBER:	04-076
SAMPLE NUMBER:	SAMPLE # II	PROJECT NUMBER:	102094
DESCRIPTION:	SANDY LEAN CLAY, BROWN.	SAMPLE DEPTH:	REMOLDED
CHECKED BY:		DATE:	11/19/04
		TESTED BY:	DGC

Remolded to 90% of max. dry density (ASTM D698) at opt. -2% water content.

SAMPLE DATA		BEFORE TEST	AFTER TEST	OVEN DRY		
DIAMETER	(cm)	7.28	7.20	TARE NUMBER		V-7
HEIGHT	(cm)	6.40	6.37	WT. OF TARE+WET SOIL	(gm)	616.10
VOLUME	(cc)	266.264	259.223	WT. OF TARE+DRY SOIL	(gm)	523.40
WT. OF WET SOIL	(gm)	491.7	530.5	WT. OF TARE	(gm)	85.60
WT. OF DRY SOIL	(gm)	437.8	437.8	WT. OF WATER	(gm)	92.70
WT. OF WATER	(gm)	53.9	92.70	WT. OF DRY SOIL	(gm)	437.8
MOISTURE CONTENT	(%)	12.3	21.2	WATER CONTENT	(%)	21.2
DRY DENSITY	(pcf)	102.60	105.39	LAB. MAX. DRY DENSITY	(pcf)	114.5
VOID RATIO	(e)	0.61	0.56	OPT. WATER CONTENT	(%)	14.0
SATURATION	(s)	53.7	99.3	RELATIVE COMPACTION	(%)	90
POROSITY	(h)	0.3772	0.3603	SPECIFIC GRAVITY	(est.)	2.64

PRESSURE DATA DURING PERMEABILITY TEST:

"B" parameter	0.97		Area of Burette:	0.6	sq. cm.
CONFINING PRESS.	55	psi	Temp. Correction:	0.976	21 °C
BACK PRESS. (bot)	50	psi	BACK PRESS. (top)	50	psi.
AVERAGE CONSOL. PRESSURE:	5.0	psi			
PERMEANT:	*TAP WATER*				

DATE	TIME	ELAPSED TIME (sec)	STATUS RESET	BURETTE READING TOP PRESS. (psi.)	ΔT (cm.)	BOTTOM PRESS. (psi.)	ΔB (cm.)	CHAMBER PRESS.,(psi.)	COMMENTS
SATURATION:									**Skempton's "B"**
11/19/2004	7:37			50.0		50.0		51.0	49.8
11/19/2004	12:02							61.0	59.5
CONSOLIDATION:				TOP (cm)	ΔT (cm.)	BOT. (cm)	ΔB (cm.)	CHAMBER (cm)	
PERMEABILITY:									
11/22/2004	6:05	RESET	R	1.6		39.5		10.3	**Hydraulic Cond., (cm/sec.)**
11/22/2004	6:27	1320		11.8		29.1		10.2	2.7E-05
11/22/2004	6:28	RESET	R	1.6		39.5		10.2	Hydraulic Cond., (cm/sec.)
11/22/2004	6:50	1320		11.8		29.2		10.2	2.7E-05
11/22/2004	6:52	RESET	R	1.6		39.6		10.2	Hydraulic Cond., (cm/sec.)
11/22/2004	7:14	1320		11.9		29.3		10.2	2.7E-05
11/22/2004	7:15	RESET	R	1.7		39.4		10.2	Hydraulic Cond., (cm/sec.)
11/22/2004	7:37	1320		11.9		29.2		10.2	2.7E-05
									δγχ93πμ

GRAIN SIZE DISTRIBUTION

ASTM D422

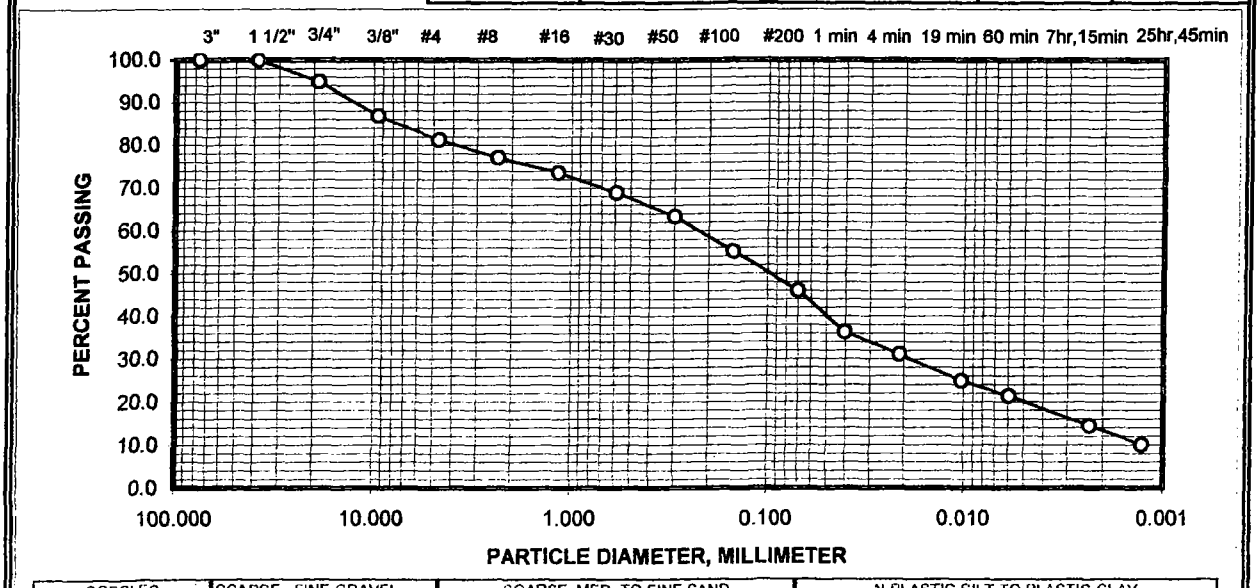
Shaw™ EMCON/OWT, Inc.

A Shaw Group Company

PROJECT NAME:	MT. VIEW LANDFILL	PROJECT NO.:	102094
SAMPLE NO.:	SAMPLE # III	DATE:	11/09/04
DESCRIPTION:	CLAYEY SAND WITH GRAVEL, BROWN.	TECH.:	DGC

UNIFIED SOIL CLASSIFICATION:	SC	CORRECTIONS:			
Moisture Content Determination:		1 1/2"	100.0	Dry Wt Used, Hydrom:	52.6
Pan Number:	#508	3/4"	94.9	Est. Sp. Gr., (2.60-2.80):	2.62
Pan + Wet Soil, gms.	995.8	3/8"	86.8	Temp.,(18-23) °C:	21
Pan + Dry Soil, gms.	883.9	D_{60}	0.225	Zero Correction	5.0
Wt. of Pan, gms.	92.1	D_{30}	0.019	Miniscus Correction:	0.5
Wt. of Dry Soil, gms.	791.8	D_{10}	#DIV/0!	Liquid Limit:	25
Wt. of Water, gms.	111.9	C_U	#DIV/0!	Plasticity Index:	8
Water content, %.	14.1	C_C	#DIV/0!	High; Mod.; Low; NP:	

SIEVE SIZE (U.S. STANDARD)	PARTICLE SIZE, (inches)	PARTICLES DIAMETER, (mm)	WEIGHT RETAINED (gms)	ACCUMULATED WEIGHT RETAINED (gms)	WEIGHT PASSING (gms)	PERCENT PASSING (%)
5"	5.000	127.00		0	791.8	100.0
3"	3.000	76.20		0	791.8	100.0
1 1/2"	1.500	38.10		0	791.8	100.0
3/4"	0.750	18.90		0	791.8	94.9
3/8"	0.375	9.52	0.0	0	791.8	86.8
#4	0.185	4.70	50.1	50.1	741.7	81.3
#8	0.093	2.36	38.2	88.3	703.5	77.1
#16	0.046	1.17	32.0	120.3	671.5	73.6
#30	0.023	0.59	42.5	162.8	629	69.0
#50	0.012	0.30	51.1	213.9	577.9	63.4
#100	0.006	0.15	74.2	288.1	503.7	55.2
#200	0.003	0.07	84.2	372.3	419.5	46.0
		0.0401	1 min.		47	36.3
Bulb 152H HYDROMETER TEST WITH DISPERSING AGENT		0.0212	4 min.		41	31.0
		0.0103	19 min.		34	24.9
		0.0060	60 min.		30	21.4
		0.0023	7hr., 15min.		22	14.4
		0.0013	25hr., 45min.		17	10.1



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ATTERBERG LIMITS

ASTM D4318

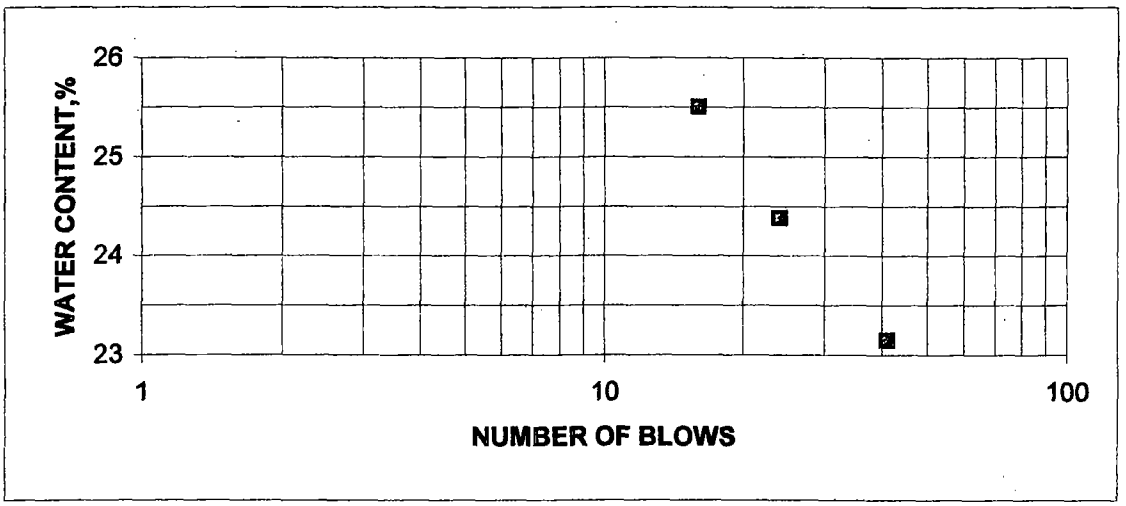
Shaw EMCON/OWT, Inc.

A Shaw Group Company

Project Name:	MT. VIEW LANDFILL	**Lab. No.:**	04-076	**Proj. No.:**	102094
Sample No.:	SAMPLE # III	**Depth, ft.:**	BULK	**Date:**	11/10/04
Description:	CLAYEY SAND WITH GRAVEL, BROWN.			**Tested By:**	DGC
				Checked By:	

*/	Liquid Limit			Plastic Limit		
Can Number	B-8	M-4	B-7	E-4	F-6	
Weight of Can + Wet Soil, gms.	68.52	66.57	67.75	52.80	53.10	
Weight of Can + Dry Soil, gms.	61.67	59.76	60.45	49.74	50.02	
Weight of Can, gms.	32.08	31.83	31.83	31.79	31.92	
Weight of Dry Soil, gms.	29.59	27.93	28.62	17.95	18.10	
Weight of Water, gms.	6.85	6.81	7.30	3.06	3.08	
Water Content, %	23.1	24.4	25.5	17.0	17.0	
Number of Blows	41	24	16			

Unified Soil Classification **SC**



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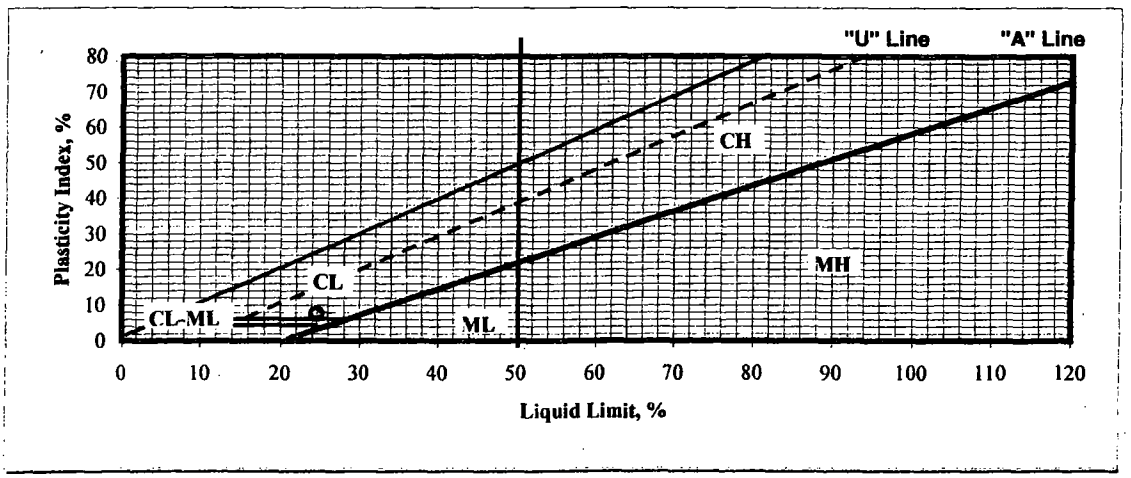

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SPECIFIC GRAVITY

ASTM D854

Shaw™ EMCON/OWT, Inc.
A Shaw Group Company

PROJ. NAME:	MT. VIEW LF.	**PROJ. NO.:**	102094	**DATE:**	11/11/04
SAMPLE NO.:	SAMPLE # III	**DEPTH, FT.:**	BULK	**TESTED BY:**	DGC
DESCRIPTION:	CLAYEY SAND WITH GRAVEL, BROWN.			**CORRECTED BY:**	

LABORATORY MEASUREMENTS:

TRIAL NUMBER	1	2	3
FLASK NUMBER	A	A	A
WEIGHT OF FLASK + WATER + SOIL	737.8	737.1	734.6
TEMP., DEGREE C	27.0	34.0	47.0
WEIGHT OF FLASK + WATER	657.4	656.4	653.6
WEIGHT OF DRY SOIL USED, GRAMS	130.06	130.06	130.06

SPECIFIC GRAVITY OF WATER:

C	0	1	2	3	4	5	6	7	8	9
10	0.9997	0.9966	0.9995	0.9994	0.9993	0.9991	0.9990	0.9988	0.9986	0.9984
20	0.9982	0.9980	0.9978	0.9976	0.9973	0.9971	0.9968	0.9965	0.9963	0.9960
30	0.9957	0.9954	0.9951	0.9947	0.9944	0.9941	0.9937	0.9934	0.9930	0.9926
40	0.9922	0.9919	0.9915	0.9911	0.9907	0.9902	0.9898	0.9894	0.9890	0.9885

LABORATORY CALCULATIONS:

TRIAL NUMBER	1	2	3
SPEC. GRAVITY OF WATER @ T	0.9965	0.9944	0.9894
GT* Ws	129.60	129.33	128.68
W1 - W2	80.40	80.70	81.00
Ws - (W1 - W2)	49.66	49.36	49.06
Gs = GT * Ws / Ws - (W1 - W2)	2.61	2.62	2.62

Average Specific Gravity:	**2.62**

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COMPACTION TEST

Shaw™ EMCON/OWT, Inc.
A Shaw Group Company

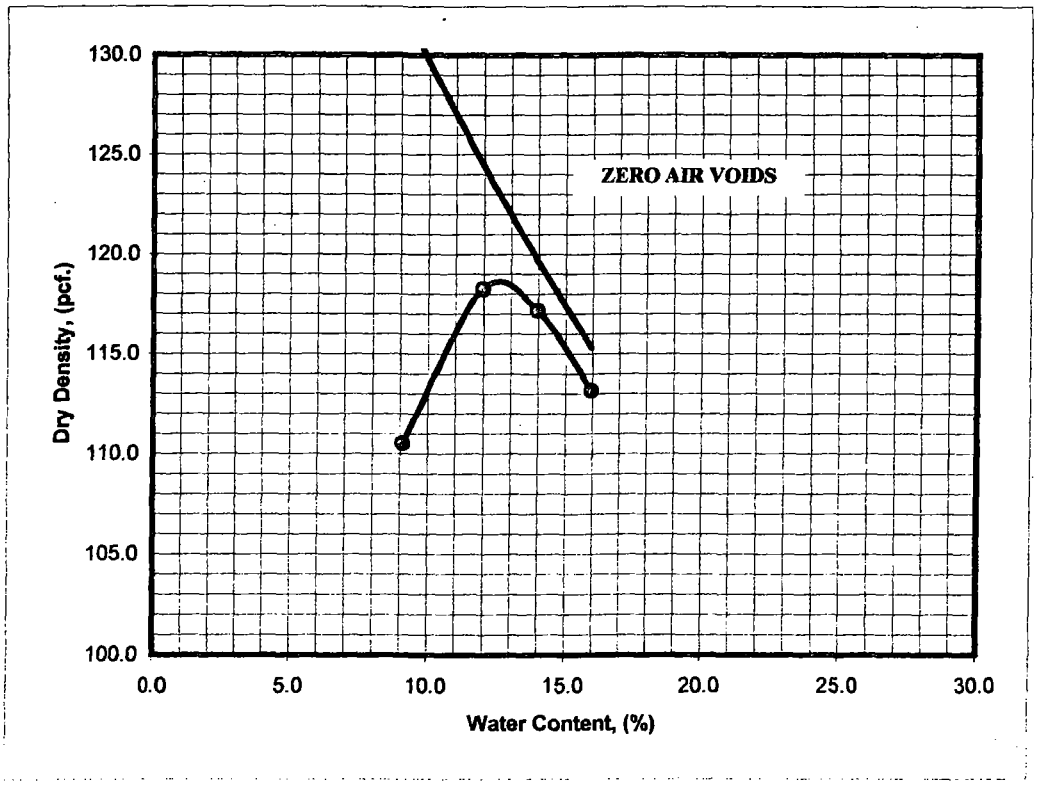
☐ ASTM D1557
▩ ASTM D698

Checked By:

Project Name:	MT. VIEW LF.	**Proj. No.:**	102094	**Lab. No.:**	04-076
Sample No.:	SAMPLE # III	**Depth, ft.:**	BULK	**Tested By:**	DGC
Description:	CLAYEY SAND WITH GRAVEL, BROWN.			**Date:**	11/10/04
Vol., Mold, cf.:	0.03333	**Hammer Weight,:**	5.5 lbs.	**Hammer Drop:**	12"
No. of Layers:	3	**Blows/Layer:**	25	**ASTM Designation:**	
				Method:	"B"

Trial Number		-4	-2	Nat.	2	
Container Number		M-7	C	B	A-1	
Wet Soil + Container	(gms.)	958.40	782.50	777.70	921.50	
Dry Soil + Container	(gms.)	885.80	710.80	695.90	819.70	
Container Weight	(gms.)	85.40	111.50	110.20	181.50	
Weight of Water	(gms.)	72.60	71.70	81.80	101.80	
Weight of Dry Soil	(gms.)	800.40	599.30	585.70	638.20	
Moisture Content	(%)	9.1	12.0	14.0	16.0	
Wet Soil + Mold	(gms.)	3674	3853	3870	3835	
Weight of Mold	(gms.)	1851	1851	1851	1851	
Wet Weight of Soil	(lbs.)	4.02	4.41	4.45	4.37	
Wet Unit Weight	(pcf.)	120.6	132.4	133.5	131.2	
Dry Unit Weight	(pcf.)	110.5	118.3	117.2	113.2	

Maximum Dry Density, pcf.:	118.7
Opt. Moisture Content, %:	12.5
Est. Specific Gravity:	2.62



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HYDRAULIC CONDUCTIVITY

EMCON/OWT, Inc. — A Shaw Group Company

ASTM D5084

PROJECT NAME:	MOUNTAIN VIEW LANDFILL	LAB. NUMBER:	04-076
SAMPLE NUMBER:	SAMPLE # III	PROJECT NUMBER:	102094
DESCRIPTION:	CLAYEY SAND WITH GRAVEL, BROWN.	SAMPLE DEPTH:	REMOLDED
CHECKED BY:		DATE:	11/19/04
		TESTED BY:	DGC

Remolded to 90% of max. dry density (ASTM D698) at opt. -2% water content.

SAMPLE DATA		BEFORE TEST	AFTER TEST	OVEN DRY		
DIAMETER	(cm)	7.28	7.22	TARE NUMBER		D-1
HEIGHT	(cm)	6.40	6.40	WT. OF TARE+WET SOIL	(gm)	623.50
VOLUME	(cc)	266.264	261.893	WT. OF TARE+DRY SOIL	(gm)	536.20
WT. OF WET SOIL	(gm)	503.5	542.5	WT. OF TARE	(gm)	81.00
WT. OF DRY SOIL	(gm)	455.2	455.2	WT. OF WATER	(gm)	87.30
WT. OF WATER	(gm)	48.3	87.30	WT. OF DRY SOIL	(gm)	455.2
MOISTURE CONTENT	(%)	10.6	19.2	WATER CONTENT	(%)	19.2
DRY DENSITY	(pcf)	106.68	108.46	LAB. MAX. DRY DENSITY	(pcf)	118.7
VOID RATIO	(e)	0.53	0.51	OPT. WATER CONTENT	(%)	12.5
SATURATION	(s)	52.2	99.0	RELATIVE COMPACTION	(%)	90
POROSITY	(h)	0.3475	0.3366	SPECIFIC GRAVITY	(est.)	2.62

PRESSURE DATA DURING PERMEABILITY TEST:

"B" parameter	0.98		Area of Burette:	0.6	sq. cm.
CONFINING PRESS.	55	psi	Temp. Correction:	0.976	21 °C
BACK PRESS. (bot)	50	psi	BACK PRESS. (top)	50	psi.
AVERAGE CONSOL. PRESSURE:	5.0	psi			
PERMEANT:	*TAP WATER*				

DATE	TIME	ELAPSED TIME (sec)	STATUS RESET	BURETTE READING					
				TOP PRESS. (psi.)		BOTTOM PRESS. (psi.)		CHAMBER PRESS.,(psi.)	COMMENTS
SATURATION:									**Skempton's "B"**
11/19/2004	7:43			50.0		50.0		51.0	49.8
11/19/2004	12:17							61.0	59.6
CONSOLIDATION:				TOP (cm)	ΔT (cm.)	BOT. (cm)	ΔB (cm.)	CHAMBER (cm)	
PERMEABILITY:									
11/22/2004	6:06	RESET	R	1.7		39.6		13.6	**Hydraulic Cond., (cm/sec.)**
11/22/2004	6:17	660		12.4		28.8		13.6	5.8E-05
11/22/2004	6:18	RESET	R	1.7		38.7		13.6	Hydraulic Cond., (cm/sec.)
11/22/2004	6:29	660		12.0		28.5		13.5	5.6E-05
11/22/2004	6:30	RESET	R	1.7		39.6		13.5	Hydraulic Cond., (cm/sec.)
11/22/2004	6:41	660		12.1		29.2		13.5	5.5E-05
11/22/2004	6:42	RESET	R	1.6		39.6		13.5	Hydraulic Cond., (cm/sec.)
11/22/2004	6:53	660		12.0		29.2		13.5	5.5E-05
11/22/2004	6:54	RESET	R	1.7		39.6		13.5	Hydraulic Cond., (cm/sec.)
11/22/2004	7:05	660		12.1		29.2		13.5	5.5E-05
									δγχ93πμ

MOISTURE - DENSITY TEST

ASTM D2216

EMCON

PROJECT NAME: BLAND FILL **DATE:** 3/10/98

PROJ. NUMBER: 22045-013.002 **TESTED BY:** RMM **CORRECTED BY:** DGC

REFERENCE NUMBER:		1	2	3	4			
SAMPLE NUMBER:		CORE#1	CORE#2	CORE#3	CORE#4			
SPECIFIC GRAVITY, EST.		2.70	2.70	2.70	2.70			
DEPTH,	(feet)							
DIAMETER,	(inches)	2.875		2.875	2.866			
LENGHT,	(inches)	3.65		3.92	2.85			
VOLUME,	(cu. feet)	0.013712		0.014727	0.010627			

WATER CONTENT DETERMINATION:

TARE NUMBER:		Q	#14	A	X-20			
WET WT. + TARE,	(gms.)	920.00	691.20	949.60	638.00			
DRY WT. + TARE,	(gms.)	758.10	611.60	780.00	499.30			
WT. OF TARE,	(gms.)	185.54	167.40	180.90	90.30			
WT. OF WATER,	(gms.)	161.90	79.60	169.60	138.70			
WT. OF DRY SOIL,	(gms.)	572.56	444.20	599.10	409.00			
WATER CONTENT,	(%)	28.3	17.9	28.3	33.9			

DENSITY DETERMINATION:

TOTAL WET WT.,	(gms.)	734.46		768.70	547.70			
WET DENSITY	(pcf.)	118.1		115.1	113.6			
DRY DENSITY,	(pcf.)	92.1		89.7	84.8			
VOID RATIO,	(e)	0.8303		0.8786	0.9857			
POROSITY,	(η)	0.4536		0.4677	0.4964			

USCS and or Visual Classification:

1	SILTY CLAY, LIGHT BROWN.
2	SILTY CLAY, LIGHT BROWN.
3	SILTY CLAY, BROWN.

NOTE: ***A specific gravity of 2.7 was used in calculating porosity.***

δγχ93μχδδ

GRAIN SIZE DISTRIBUTION

ASTM D422

EMCON

PROJ. NAME:	BLAND FILL	**PROJECT NO.:**	22045-013.002	**LAB #:**	98-025
SAMPLE NO.:	BUCKET-2	**DEPTH, FT.:**	BULK	**TESTED BY:**	RMM
DESCRIPTION:	CLAYEY SAND, BROWN WITH GRAVELS, SOME ROOTS.			**DATE:**	3/5/98

MOISTURE CONTENT DETERMINATION: **CHECKED BY:** DGC

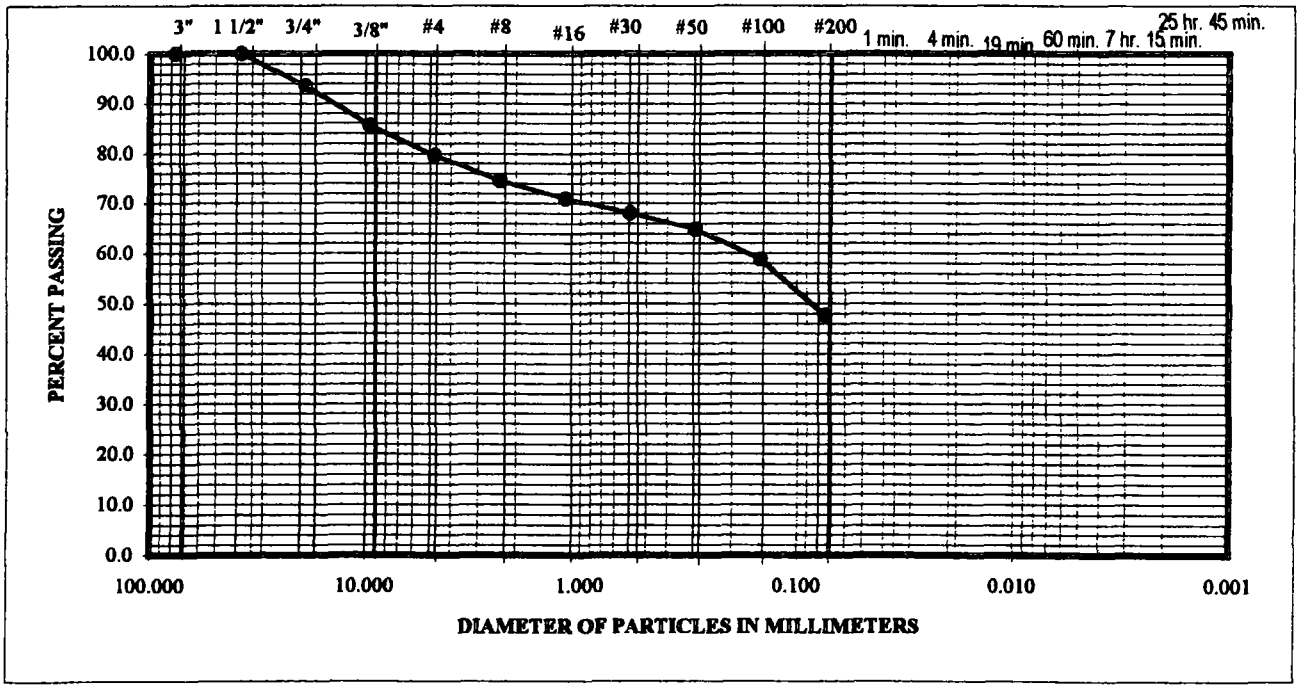
PAN ID	#43	(gm)
PAN+WET SOIL	1676.50	(gm)
PAN+DRY SOIL	1400.70	(gm)
PAN WEIGHT	175.73	(gm)
DRY SOIL	1224.97	(gm)
% MOISTURE	22.5	(%)

TOTAL DRY WEIGHT: 1224.97

TOTAL DRY WEIGHT USED FOR HYDROM.:

HYDROMETER & TEMP. CORRECTION:

SIEVE SIZE (U.S. STANDARD)	PARTICLE INCHES (inch.)	DIAMETER MILLIMETER (mm)	WEIGHT RETAINED (gm)	ACCUMULATED WGT. RETAINED (gm)	WEIGHT PASSING (gm)	PERCENT PASSING
5"					1224.97	100.0
3"	3.0	76.2			1224.97	100.0
1 1/2"	1.5	38.1			1224.97	100.0
3/4"	0.7	18.9	79.61	79.61	1145.36	93.5
3/8"	0.371	9.42	98.28	177.89	1047.08	85.5
#4	0.185	4.70	72.63	250.52	974.45	79.5
#8	0.093	2.36	61.80	312.32	912.65	74.5
#16	0.046	1.17	43.55	355.87	869.10	70.9
#30	0.0232	0.59	36.13	392.00	832.97	68.0
#50	0.0116	0.30	38.44	430.44	794.53	64.9
#100	0.0058	0.15	75.37	505.81	719.16	58.7
#200	0.0029	0.07	135.94	641.75	583.22	47.6
HYDROMETER:		0.037				
		0.019				
		0.009				
		0.005				
		0.002				
		0.001				



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GRAIN SIZE DISTRIBUTION

ASTM D422

EMCON

PROJ. NAME: BLAND FILL **PROJECT NO.:** 22045-013.002 **LAB #:** 98-025

SAMPLE NO.: BUCKET-3 **DEPTH, FT.:** BULK **TESTED BY:** RMM

DESCRIPTION: SANDY CLAY, BROWN SOME GRAVELS AND ROOTS. **DATE:** 3/5/98

MOISTURE CONTENT DETERMINATION: **CHECKED BY:** DGC

PAN ID	Y-6	(gm)
PAN+WET SOIL	1011.10	(gm)
PAN+DRY SOIL	801.80	(gm)
PAN WEIGHT	57.14	(gm)
DRY SOIL	744.66	(gm)
% MOISTURE	28.1	(%)

TOTAL DRY WEIGHT: 744.66

TOTAL DRY WEIGHT USED FOR HYDROM.:

HYDROMETER & TEMP. CORRECTION:

SIEVE SIZE (U.S. STANDARD)	PARTICLE INCHES (inch.)	DIAMETER MILLIMETER (mm)	WEIGHT RETAINED (gm)	ACCUMULATED WGT. RETAINED (gm)	WEIGHT PASSING (gm)	PERCENT PASSING
5"					744.66	100.0
1"	3.0	76.2			744.66	100.0
3/4"	1.5	38.1			744.66	100.0
1/2"	0.7	18.9			744.66	100.0
3/8"	0.371	9.42	13.42	13.42	731.24	98.2
#4	0.185	4.70	16.95	30.37	714.29	95.9
#8	0.093	2.36	15.49	45.86	698.80	93.8
#16	0.046	1.17	9.30	55.16	689.50	92.6
#30	0.0232	0.59	6.51	61.67	682.99	91.7
#50	0.0116	0.30	7.30	68.97	675.69	90.7
#100	0.0058	0.15	13.03	82.00	662.66	89.0
#200	0.0029	0.07	41.02	123.02	621.64	83.5
HYDROMETER:		0.037				
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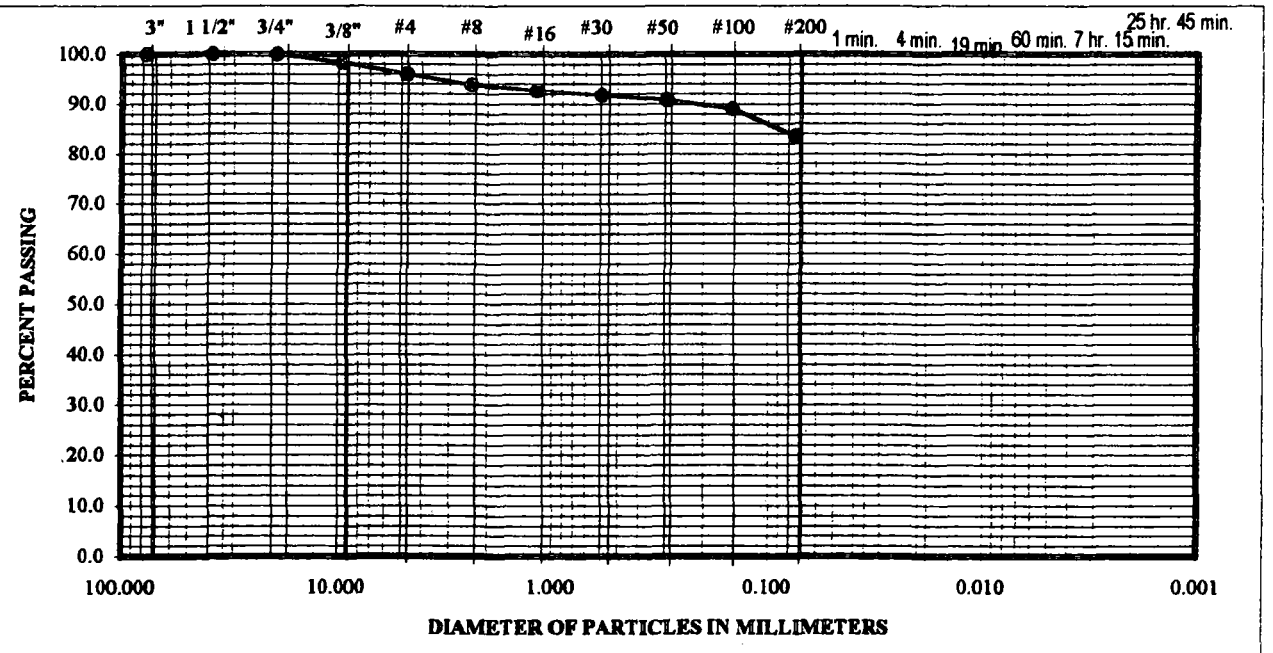
		0.009				
		0.005				
		0.002				
		0.001				



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emcon

GRAIN SIZE DISTRIBUTION
ASTM D422

PROJ. NAME: BLAND FILL **PROJECT NO.:** 22045-013.002 **LAB #:** 98-025
SAMPLE NO.: BUCKET-4 **DEPTH, FT.:** BULK **TESTED BY:** RMM
DESCRIPTION: SILTY CLAY, BROWN SOME SAND AND ROOTS. **DATE:** 3/5/98

MOISTURE CONTENT DETERMINATION: **CHECKED BY:** DGC

PAN ID	#86	(gm)
PAN+WET SOIL	801.40	(gm)
PAN+DRY SOIL	633.30	(gm)
PAN WEIGHT	78.22	(gm)
DRY SOIL	555.08	(gm)
% MOISTURE	30.3	(%)

TOTAL DRY WEIGHT: 555.08
TOTAL DRY WEIGHT USED FOR HYDROM.:
HYDROMETER & TEMP. CORRECTION:

SIEVE SIZE (U.S. STANDARD)	PARTICLE INCHES (inch.)	DIAMETER MILLIMETER (mm)	WEIGHT RETAINED (gm)	ACCUMULATED WGT. RETAINED (gm)	WEIGHT PASSING (gm)	PERCENT PASSING
5"					555.08	100.0
1"	3.0	76.2			555.08	100.0
3/4"	1.5	38.1			555.08	100.0
1/2"	0.7	18.9			555.08	100.0
3/8"	0.371	9.42			555.08	100.0
#4	0.185	4.70			555.08	100.0
#8	0.093	2.36	0.37	0.37	554.71	99.9
#16	0.046	1.17	0.59	0.96	554.12	99.8
#30	0.0232	0.59	0.78	1.74	553.34	99.7
#50	0.0116	0.30	1.06	2.80	552.28	99.5
#100	0.0058	0.15	2.21	5.01	550.07	99.1
#200	0.0029	0.07	17.57	22.58	532.50	95.9
HYDROMETER:		0.037				
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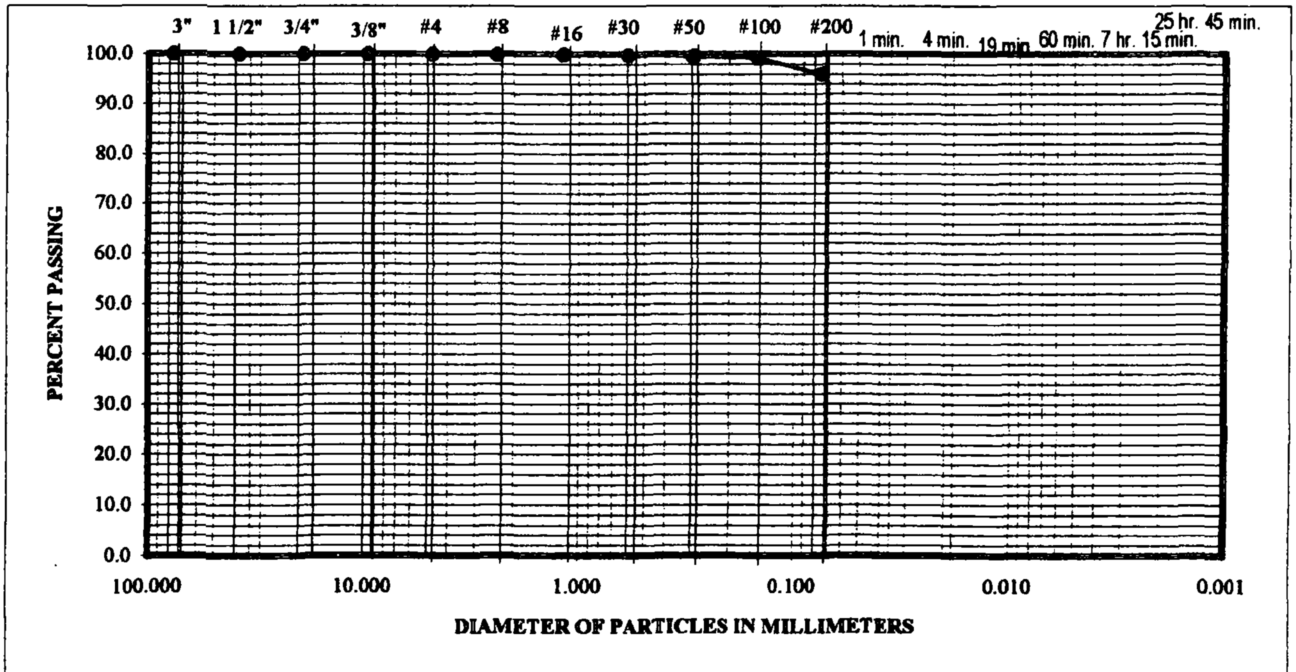
		0.009				
		0.005				
		0.002				
		0.001				



GRAIN SIZE DISTRIBUTION

ASTM D422

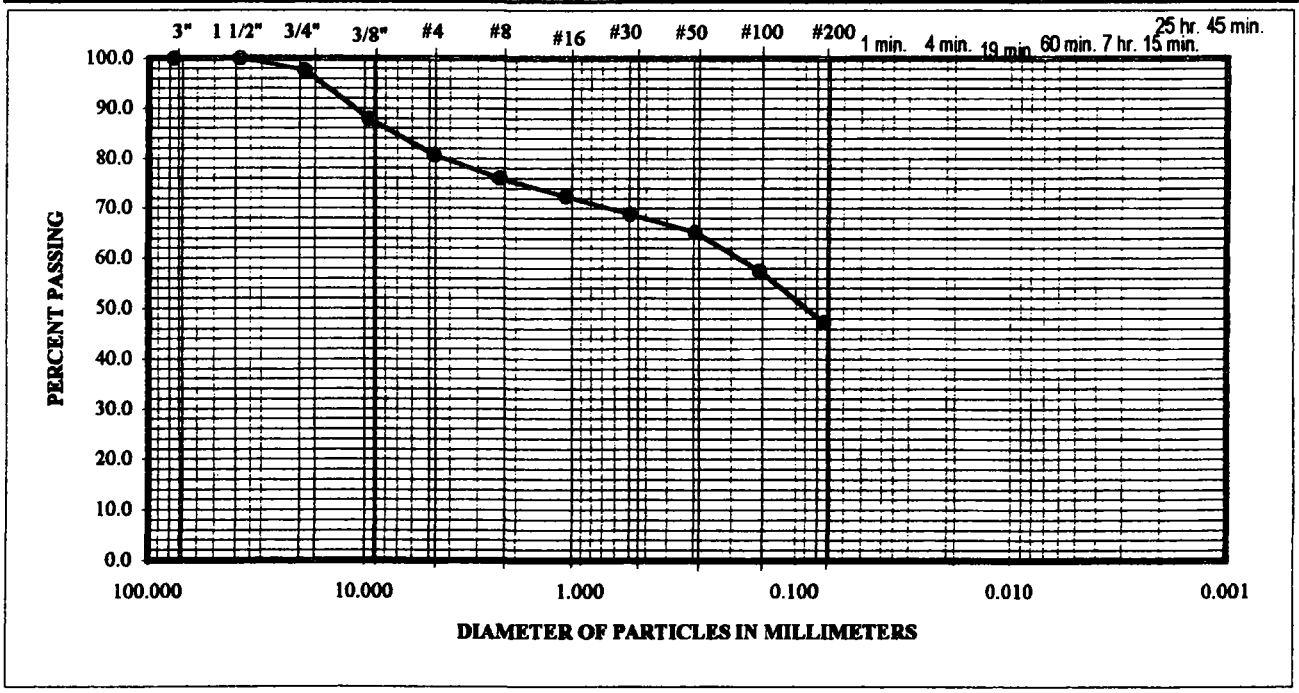
EMCON

PROJ. NAME:	BLAND FILL	**PROJECT NO.:**	22045-013.002	**LAB #:**	98-025
SAMPLE NO.:	BUCKET-SK1	**DEPTH, FT.:**	BULK	**TESTED BY:**	RMM
DESCRIPTION:	CLAYEY SAND, BROWN WITH GRAVELS.			**DATE:**	3/10/98

MOISTURE CONTENT DETERMINATION: **CHECKED BY:** DGC

PAN ID	#82	(gm)		
PAN+WET SOIL	992.10	(gm)	**TOTAL DRY WEIGHT:**	752.38
PAN+DRY SOIL	828.60	(gm)	**TOTAL DRY WEIGHT USED FOR HYDROM.:**	
PAN WEIGHT	76.22	(gm)	**HYDROMETER & TEMP. CORRECTION:**	
DRY SOIL	752.38	(gm)		
% MOISTURE	21.7	(%)		

SIEVE SIZE (U.S. STANDARD)	PARTICLE INCHES (inch.)	DIAMETER MILLIMETER (mm)	WEIGHT RETAINED (gm)	ACCUMULATED WGT. RETAINED (gm)	WEIGHT PASSING (gm)	PERCENT PASSING
5"					752.38	100.0
3"	3.0	76.2			752.38	100.0
1 1/2"	1.5	38.1			752.38	100.0
3/4"	0.7	18.9	17.80	17.80	734.58	97.6
3/8"	0.371	9.42	73.96	91.76	660.62	87.8
#4	0.185	4.70	54.49	146.25	606.13	80.6
#8	0.093	2.36	34.30	180.55	571.83	76.0
#16	0.046	1.17	27.16	207.71	544.67	72.4
#30	0.0232	0.59	26.72	234.43	517.95	68.8
#50	0.0116	0.30	27.49	261.92	490.46	65.2
#100	0.0058	0.15	58.37	320.29	432.09	57.4
#200	0.0029	0.07	76.50	396.79	355.59	47.3
HYDROMETER:		0.037				
		0.019				
		0.009				
		0.005				
		0.002				
		0.001				



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GRAIN SIZE DISTRIBUTION

ASTM D422

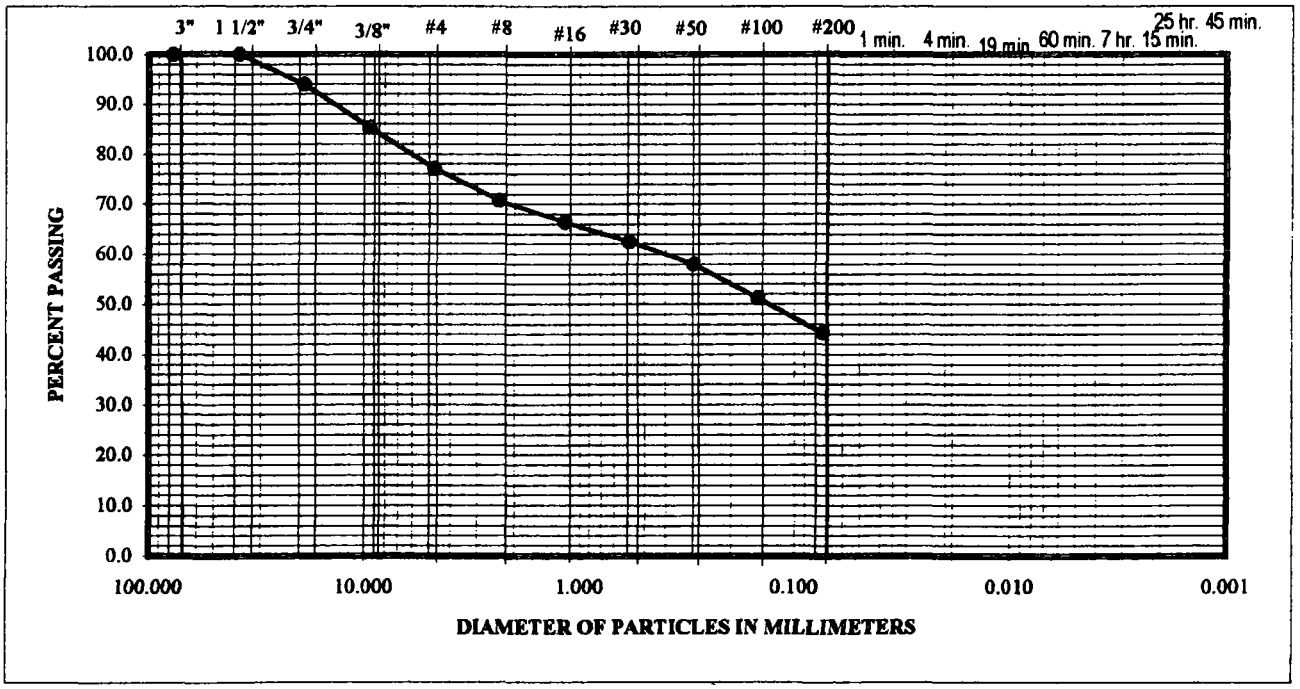
EMCON

PROJ. NAME:	BLAND FILL	**PROJECT NO.:**	22045-013.002	**LAB #:**	98-025
SAMPLE NO.:	BUCKET-SK2	**DEPTH, FT.:**	BULK	**TESTED BY:**	RMM
DESCRIPTION:	CLAYEY SAND, BROWN WITH GRAVELS.			**DATE:**	3/5/98

MOISTURE CONTENT DETERMINATION: **CHECKED BY:** DGC

PAN ID	#82	(gm)		
PAN+WET SOIL	1140.70	(gm)	**TOTAL DRY WEIGHT:**	912.61
PAN+DRY SOIL	988.80	(gm)	**TOTAL DRY WEIGHT USED FOR HYDROM.:**	
PAN WEIGHT	76.19	(gm)	**HYDROMETER & TEMP. CORRECTION:**	
DRY SOIL	912.61	(gm)		
% MOISTURE	16.6	(%)		

SIEVE SIZE (U.S. STANDARD)	PARTICLE INCHES (inch.)	DIAMETER MILLIMETER (mm)	WEIGHT RETAINED (gm)	ACCUMULATED WGT. RETAINED (gm)	WEIGHT PASSING (gm)	PERCENT PASSING
5"					912.61	100.0
3"	3.0	76.2			912.61	100.0
1 1/2"	1.5	38.1			912.61	100.0
3/4"	0.7	18.9	55.29	55.29	857.32	93.9
3/8"	0.371	9.42	79.43	134.72	777.89	85.2
#4	0.185	4.70	74.66	209.38	703.23	77.1
#8	0.093	2.36	57.67	267.05	645.56	70.7
#16	0.046	1.17	39.75	306.80	605.81	66.4
#30	0.0232	0.59	36.07	342.87	569.74	62.4
#50	0.0116	0.30	40.87	383.74	528.87	58.0
#100	0.0058	0.15	62.52	446.26	466.35	51.1
#200	0.0029	0.07	63.28	509.54	403.07	44.2
HYDROMETER:		0.037				
		0.019				
		0.009				
		0.005				
		0.002				
		0.001				



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GRAIN SIZE DISTRIBUTION
ASTM D422

emcon

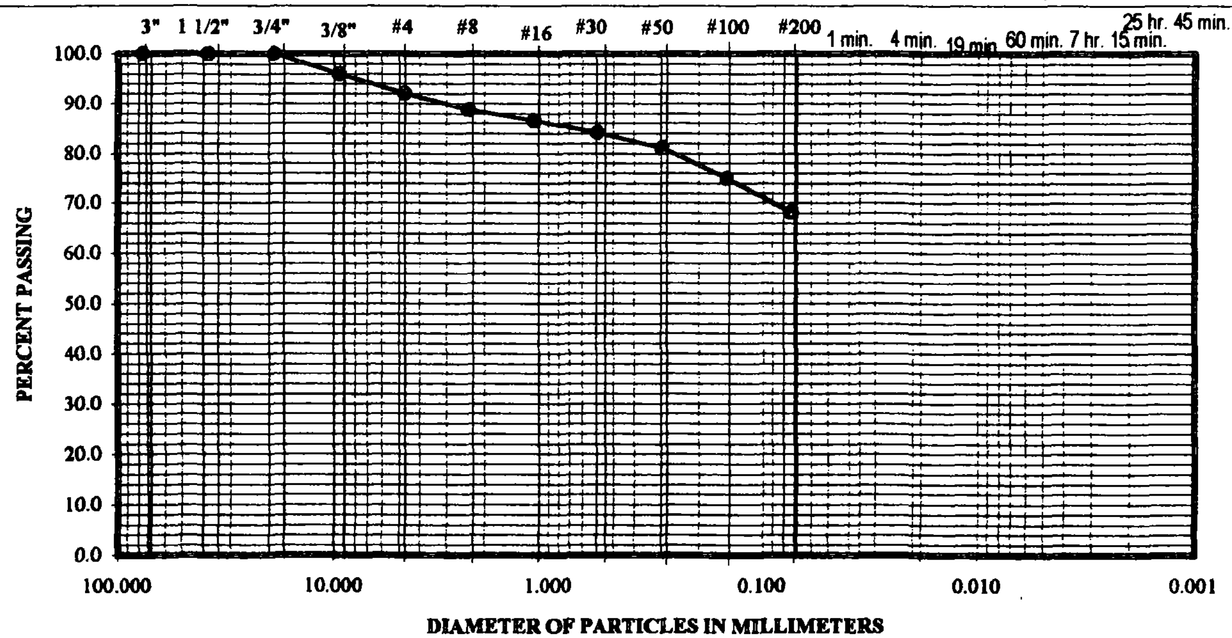
PROJ. NAME: BLAND FILL **PROJECT NO.:** 22045-013.002 **LAB #:** 98-025
SAMPLE NO.: BUCKET-SK3 **DEPTH, FT.:** BULK **TESTED BY:** RMM
DESCRIPTION: SANDY CLAY, BROWN, SOME GRAVELS. **DATE:** 3/10/98

MOISTURE CONTENT DETERMINATION: **CHECKED BY:** DGC

PAN ID	#93	(gm)
PAN+WET SOIL	1068.30	(gm)
PAN+DRY SOIL	886.60	(gm)
PAN WEIGHT	176.17	(gm)
DRY SOIL	710.43	(gm)
% MOISTURE	25.6	(%)

TOTAL DRY WEIGHT: 710.43
TOTAL DRY WEIGHT USED FOR HYDROM.:
HYDROMETER & TEMP. CORRECTION:

SIEVE SIZE (U.S. STANDARD)	PARTICLE INCHES (inch.)	DIAMETER MILLIMETER (mm)	WEIGHT RETAINED (gm)	ACCUMULATED WGT. RETAINED (gm)	WEIGHT PASSING (gm)	PERCENT PASSING
5"					710.43	100.0
3"	3.0	76.2			710.43	100.0
1 1/2"	1.5	38.1			710.43	100.0
3/4"	0.7	18.9			710.43	100.0
3/8"	0.371	9.42	28.69	28.69	681.74	96.0
#4	0.185	4.70	28.54	57.23	653.20	91.9
#8	0.093	2.36	23.09	80.32	630.11	88.7
#16	0.046	1.17	15.36	95.68	614.75	86.5
#30	0.0232	0.59	17.17	112.85	597.58	84.1
#50	0.0116	0.30	21.85	134.70	575.73	81.0
#100	0.0058	0.15	43.33	178.03	532.40	74.9
#200	0.0029	0.07	48.31	226.34	484.09	68.1
HYDROMETER:		0.037				
		0.019				
		0.009				
		0.005				
		0.002				
		0.001				



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GRAIN SIZE DISTRIBUTION

ASTM D422

EMCON

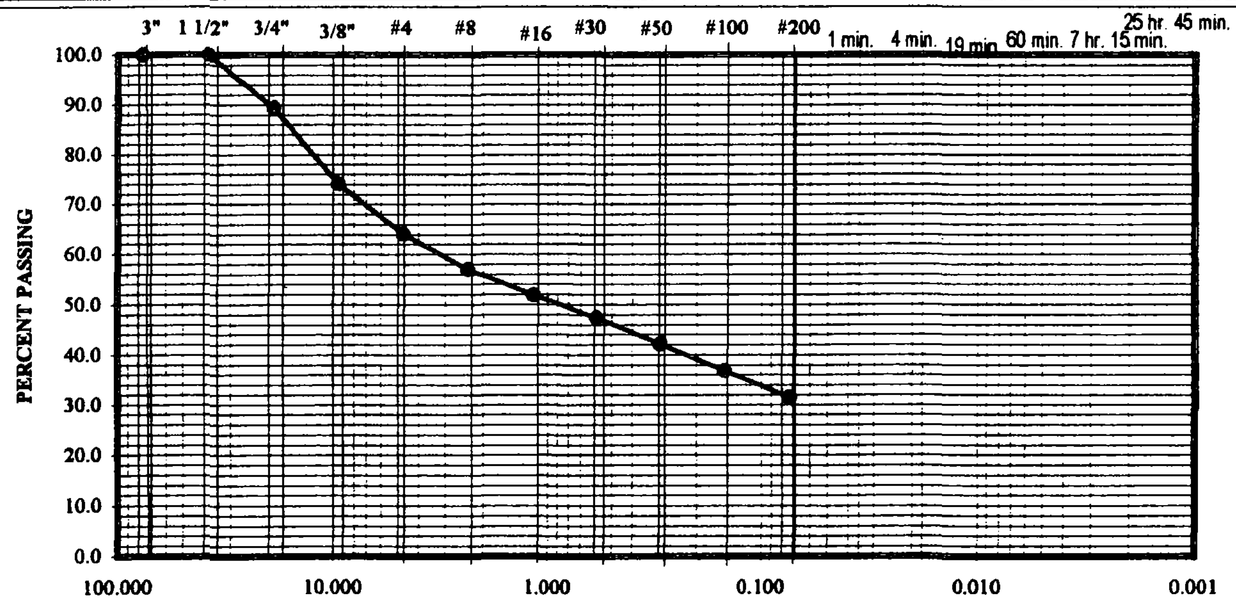
PROJ. NAME: BLAND FILL **PROJECT NO.:** 22045-013.002 **LAB #:** 98-025
SAMPLE NO.: BUCKET-SK4 **DEPTH, FT.:** BULK **TESTED BY:** RMM
DESCRIPTION: CLAYEY GRAVEL, BROWN WITH SAND. **DATE:** 3/10/98

MOISTURE CONTENT DETERMINATION: **CHECKED BY:** DGC

PAN ID	#94	(gm)
PAN+WET SOIL	1502.70	(gm)
PAN+DRY SOIL	1290.60	(gm)
PAN WEIGHT	176.24	(gm)
DRY SOIL	1114.36	(gm)
% MOISTURE	19.0	(%)

TOTAL DRY WEIGHT: 1114.36
TOTAL DRY WEIGHT USED FOR HYDROM.:
HYDROMETER & TEMP. CORRECTION:

SIEVE SIZE (U.S. STANDARD)	PARTICLE INCHES (inch.)	DIAMETER MILLIMETER (mm)	WEIGHT RETAINED (gm)	ACCUMULATED WGT. RETAINED (gm)	WEIGHT PASSING (gm)	PERCENT PASSING
5"					1114.36	100.0
3"	3.0	76.2			1114.36	100.0
1 1/2"	1.5	38.1			1114.36	100.0
3/4"	0.7	18.9	118.09	118.09	996.27	89.4
3/8"	0.371	9.42	170.29	288.38	825.98	74.1
#4	0.185	4.70	111.32	399.70	714.66	64.1
#8	0.093	2.36	79.68	479.38	634.98	57.0
#16	0.046	1.17	56.81	536.19	578.17	51.9
#30	0.0232	0.59	50.32	586.51	527.85	47.4
#50	0.0116	0.30	57.88	644.39	469.97	42.2
#100	0.0058	0.15	60.10	704.49	409.87	36.8
#200	0.0029	0.07	59.02	763.51	350.85	31.5
HYDROMETER:		0.037				
		0.019				
		0.009				
		0.005				
		0.002				
		0.001				



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ATTERBERG LIMITS

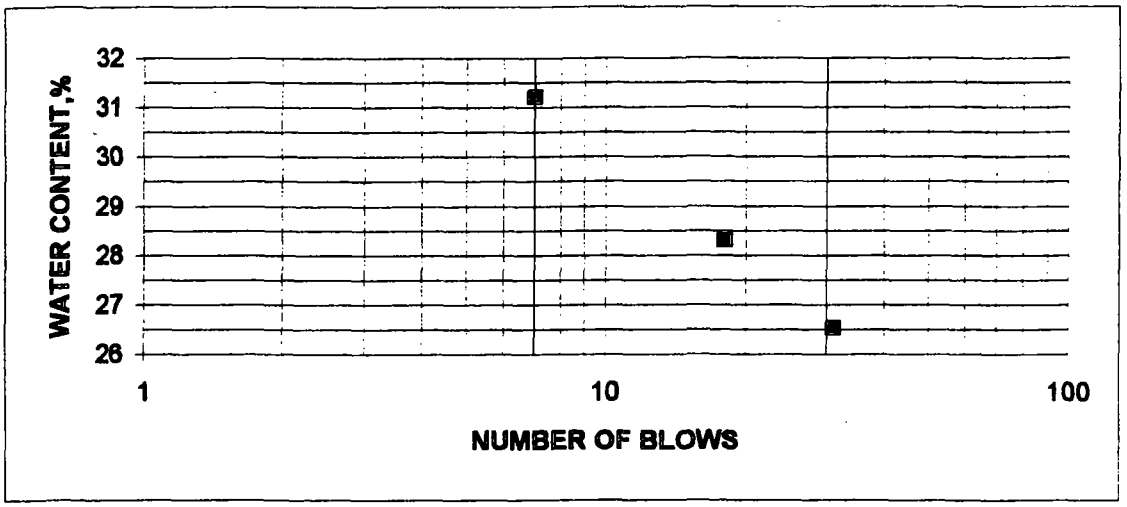
ASTM D4318

EMCON

Project Name:	BLAND FILL	**Lab. No.:**	98-025	**Proj. No.:**	22045-013.002
Sample No.:	BUCKET #2	**Depth, ft.:**		**Date:**	3/5/98
Description:	CLAYEY SAND, BROWN WITH GRAVELS, SOME ROOTS			**Tested By:**	RMM
				Checked By:	DGC

	Liquid Limit			Plastic Limit		
Can Number	#11	#7	#8	#2	#15	
Weight of Can + Wet Soil, gms.	75.97	69.70	69.64	45.61	46.34	
Weight of Can + Dry Soil, gms.	65.47	60.42	59.67	42.86	43.53	
Weight of Can, gms.	25.89	27.63	27.72	27.53	27.91	
Weight of Dry Soil, gms.	39.58	32.79	31.95	15.33	15.62	
Weight of Water, gms.	10.50	9.28	9.97	2.75	2.81	
Water Content, %	26.5	28.3	31.2	17.9	18.0	
Number of Blows	31	18	7			

Unified Soil Classification SC



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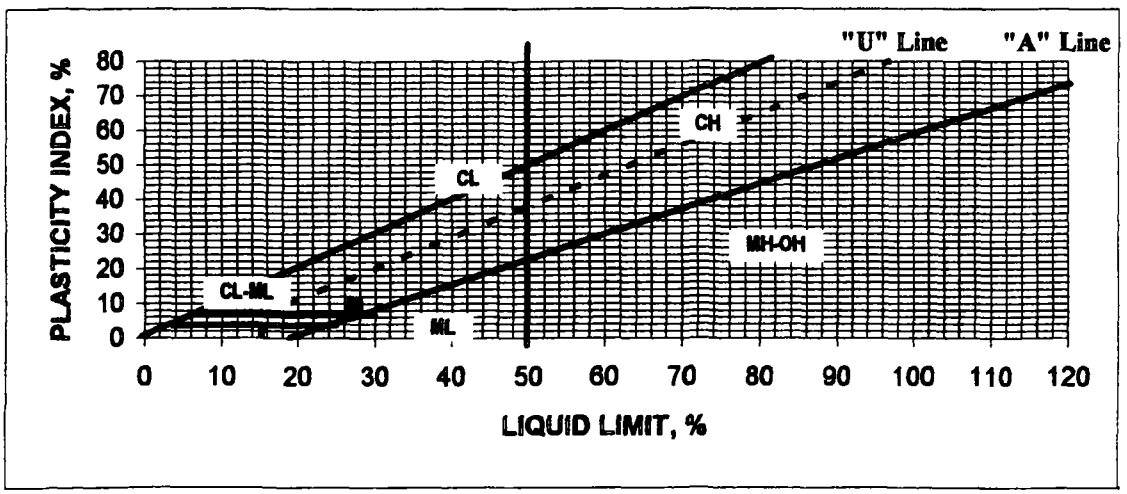

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ATTERBERG LIMITS

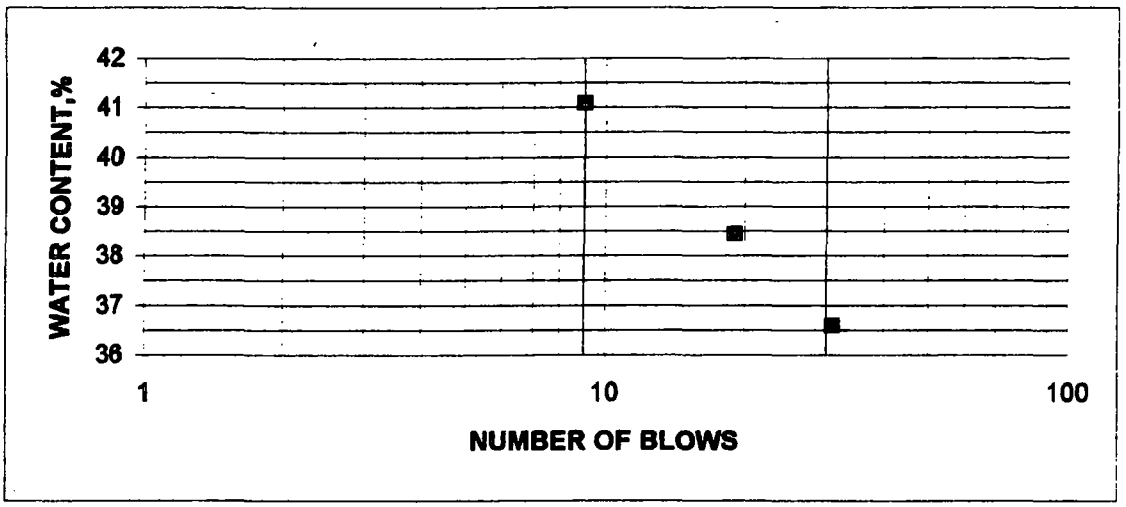
ASTM D4318

EMCON

Project Name:	BLAND FILL	**Lab. No.:**	98-025	**Proj. No.:**	22045-013.002
Sample No.:	BUCKET #3	**Depth, ft.:**		**Date:**	3/5/98
Description:	SANDY CLAY, BROWN, SOME GRAVELS AND ROOTS.			**Tested By:**	RMM
				Checked By:	DGC

	Liquid Limit			Plastic Limit		
Can Number	#6	F	#12	#3	#4	
Weight of Can + Wet Soil, gms.	74.42	73.48	67.60	46.02	44.36	
Weight of Can + Dry Soil, gms.	61.66	60.36	55.67	42.81	41.66	
Weight of Can, gms.	26.79	26.23	26.63	26.50	27.89	
Weight of Dry Soil, gms.	34.87	34.13	29.04	16.31	13.77	
Weight of Water, gms.	12.76	13.12	11.93	3.21	2.70	
Water Content, %	36.6	38.4	41.1	19.7	19.6	
Number of Blows	31	19	9			

Unified Soil Classification **CL**



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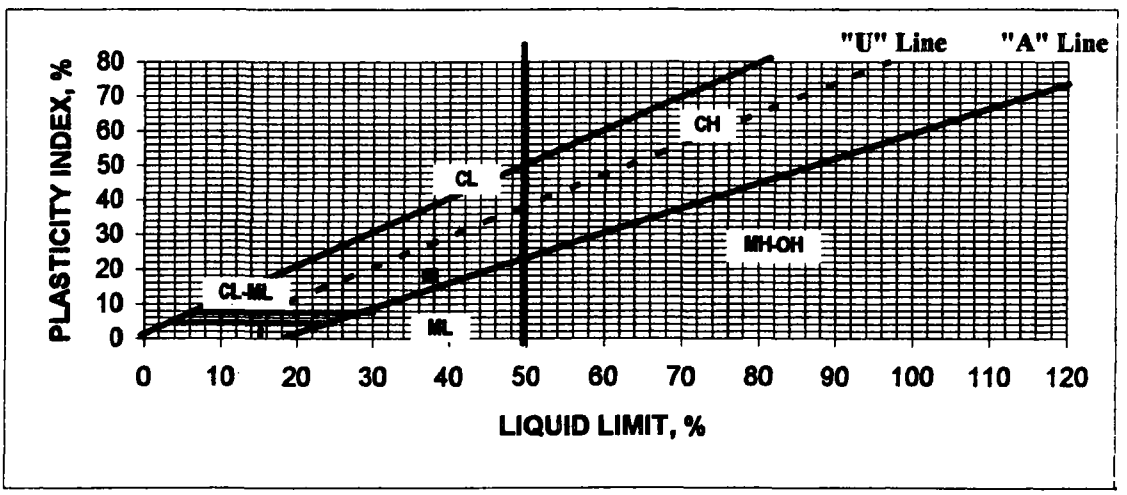

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ATTERBERG LIMITS

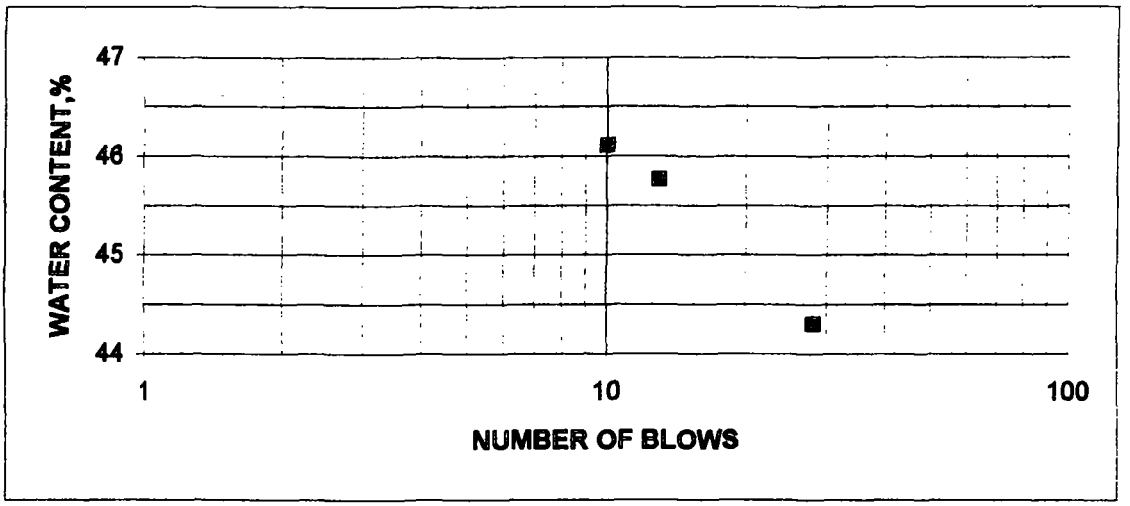
ASTM D4318

EMCON

Project Name:	BLAND FILL	**Lab. No.:**	98-025	**Proj. No.:**	22045-013.002
Sample No.:	BUCKET #4	**Depth, ft.:**		**Date:**	3/5/98
Description:	SILTY CLAY, BROWN, SOME SAND AND ROOTS.			**Tested By:**	RMM
				Checked By:	DGC

	Liquid Limit			Plastic Limit		
Can Number	#10	#89	#1	#16	B	
Weight of Can + Wet Soil, gms.	71.35	66.13	67.67	41.93	41.73	
Weight of Can + Dry Soil, gms.	58.13	53.93	55.01	39.17	39.03	
Weight of Can, gms.	28.29	27.27	27.55	26.72	26.87	
Weight of Dry Soil, gms.	29.84	26.66	27.46	12.45	12.16	
Weight of Water, gms.	13.22	12.20	12.66	2.76	2.70	
Water Content, %	44.3	45.8	46.1	22.2	22.2	
Number of Blows	28	13	10			

Unified Soil Classification **CL**



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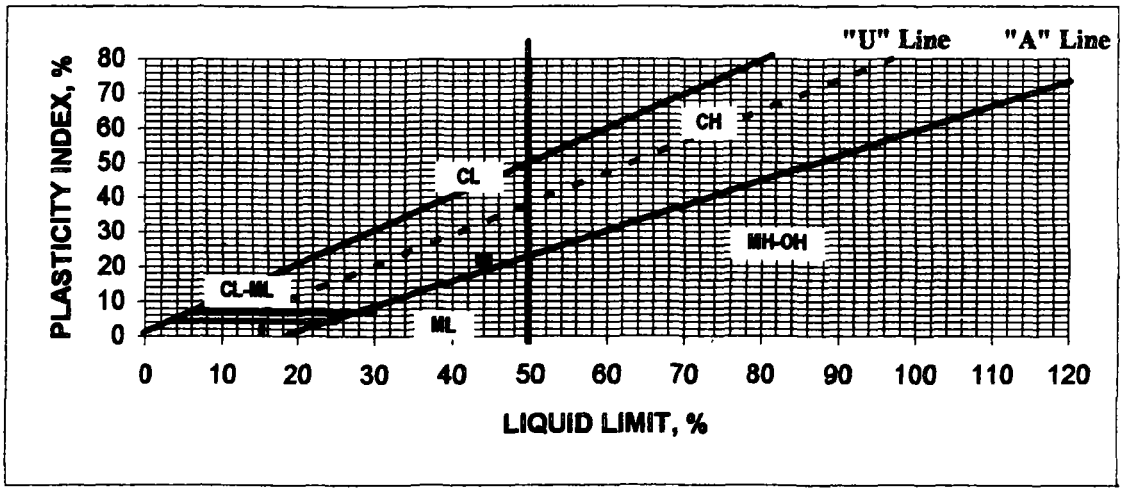

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ATTERBERG LIMITS

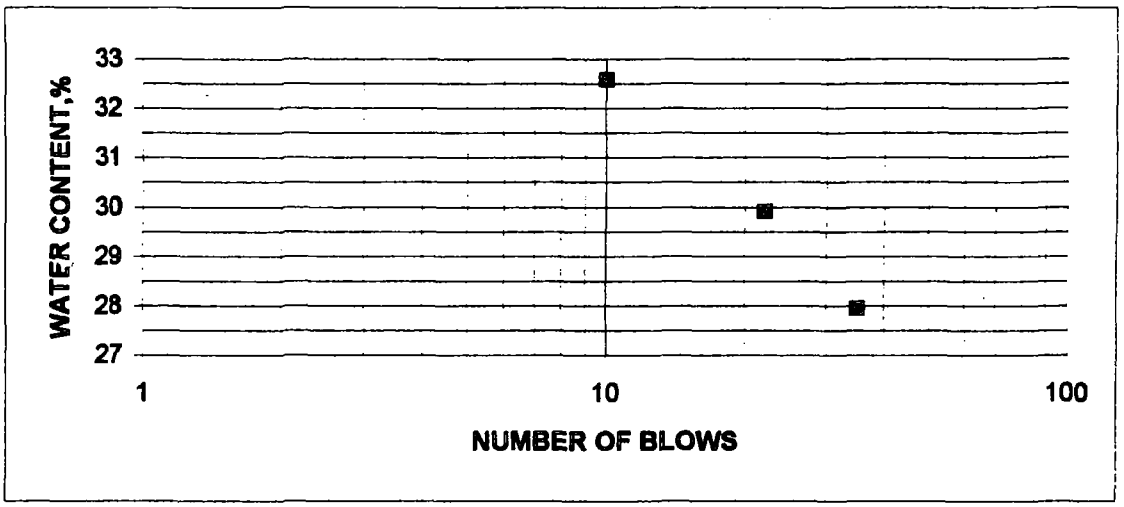
ASTM D4318

EMCON

Project Name:	BLAND FILL	**Lab. No.:**	98-025	**Proj. No.:**	22045-013.002
Sample No.:	BUCKET SK1	**Depth, ft.:**		**Date:**	3/10/98
Description:	CLAYEY SAND, BROWN WITH GRAVELS.			**Tested By:**	RMM
				Checked By:	DGC

	Liquid Limit			Plastic Limit		
Can Number	#6	#12	#3	F	#14	
Weight of Can + Wet Soil, gms.	72.85	73.41	75.61	48.59	47.78	
Weight of Can + Dry Soil, gms.	62.78	62.64	63.54	45.14	44.73	
Weight of Can, gms.	26.75	26.63	26.49	26.23	27.88	
Weight of Dry Soil, gms.	36.03	36.01	37.05	18.91	16.85	
Weight of Water, gms.	10.07	10.77	12.07	3.45	3.05	
Water Content, %	27.9	29.9	32.6	18.2	18.1	
Number of Blows	35	22	10			

Unified Soil Classification **SC**



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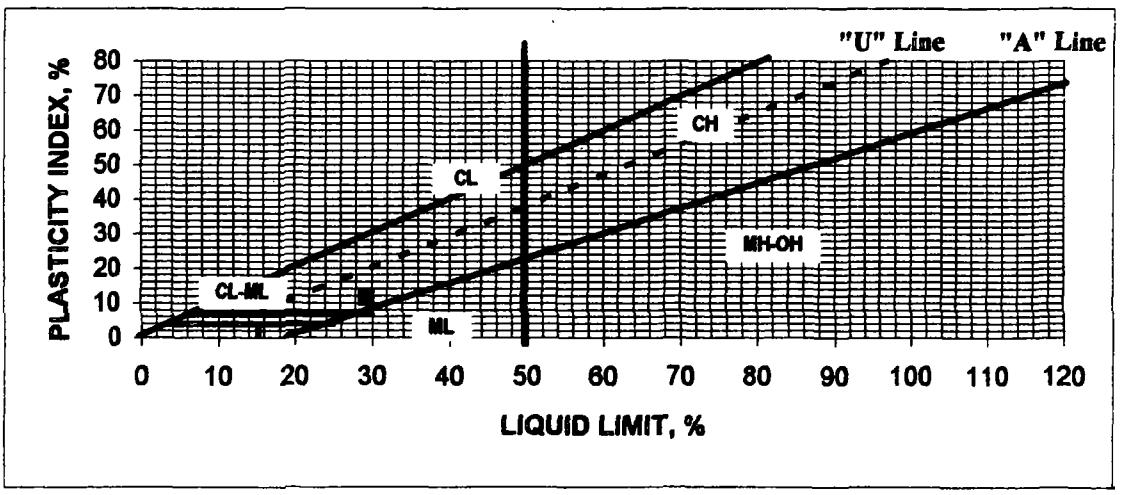

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ATTERBERG LIMITS

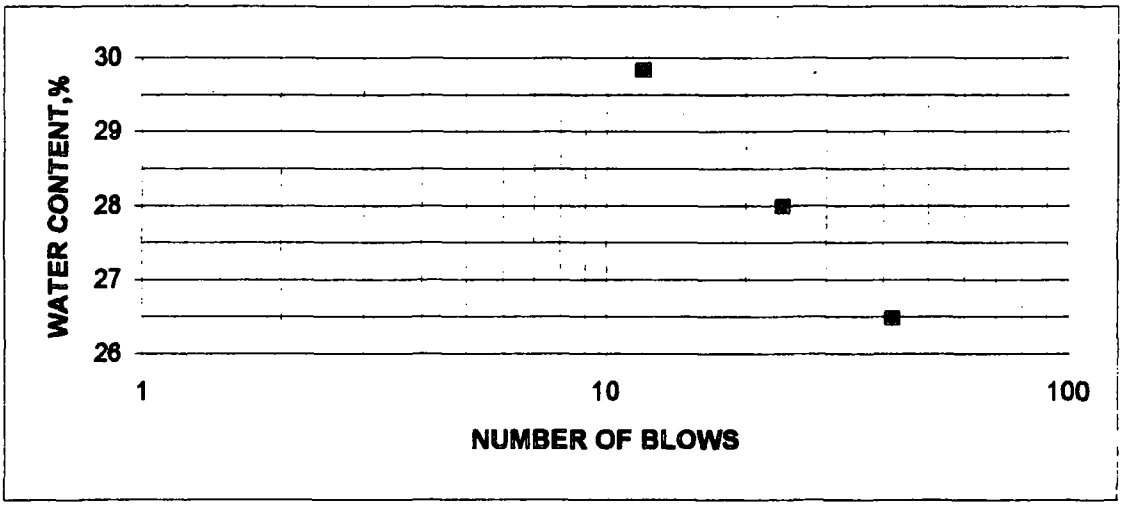
ASTM D4318

EMCON

Project Name:	BLAND FILL	**Lab. No.:**	98-025	**Proj. No.:**	22045-013.002
Sample No.:	BUCKET SK2	**Depth, ft.:**		**Date:**	3/5/98
Description:	CLAYEY SAND, BROWN WITH GRAVELS.			**Tested By:**	RMM
				Checked By:	DGC

	Liquid Limit			Plastic Limit		
Can Number	D	E	G	#13	C	
Weight of Can + Wet Soil, gms.	71.12	74.96	72.07	45.33	42.26	
Weight of Can + Dry Soil, gms.	61.76	64.45	61.82	42.82	39.94	
Weight of Can, gms.	26.41	26.90	27.46	27.87	26.24	
Weight of Dry Soil, gms.	35.35	37.55	34.36	14.95	13.70	
Weight of Water, gms.	9.36	10.51	10.25	2.51	2.32	
Water Content, %	26.5	28.0	29.8	16.8	16.9	
Number of Blows	42	24	12			

Unified Soil Classification **SC**



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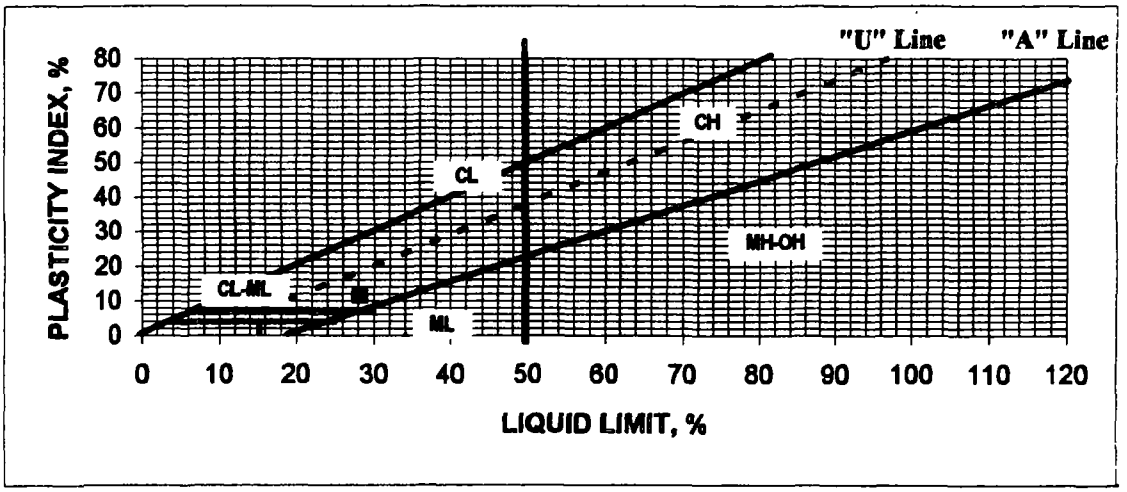

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ATTERBERG LIMITS

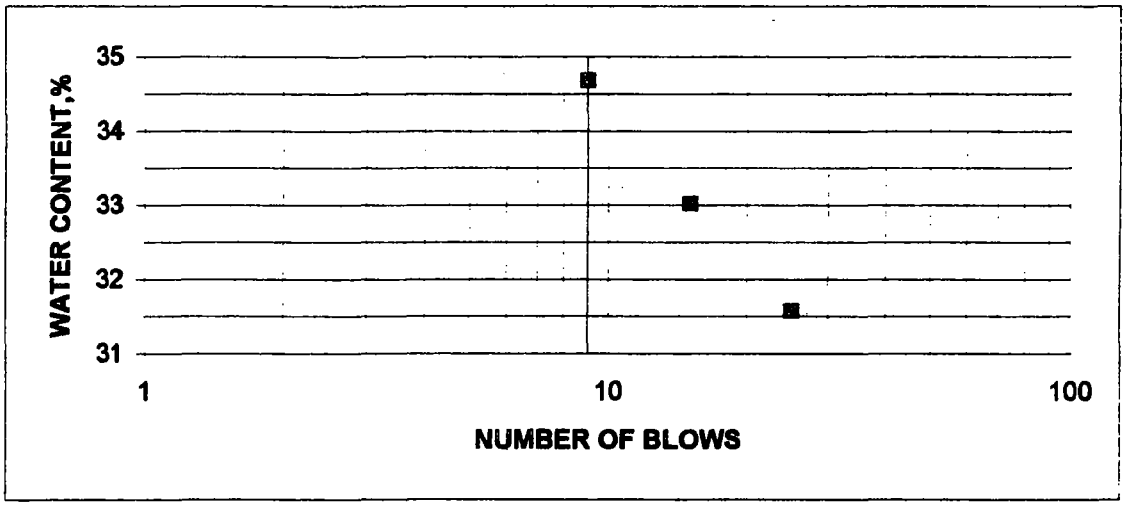
ASTM D4318

EMCON

Project Name:	BLAND FILL	**Lab. No.:**	98-025	**Proj. No.:**	22045-013.002
Sample No.:	BUCKET SK3	**Depth, ft.:**		**Date:**	3/10/98
Description:	SANDY CLAY, BROWN, SOME GRAVELS.			**Tested By:**	RMM
				Checked By:	DGC

	Liquid Limit			Plastic Limit		
Can Number	#10	#1	#16	#89	B	
Weight of Can + Wet Soil, gms.	79.67	79.84	71.15	42.21	44.67	
Weight of Can + Dry Soil, gms.	67.34	67.11	59.71	39.88	41.82	
Weight of Can, gms.	28.28	28.55	26.72	27.26	26.87	
Weight of Dry Soil, gms.	39.06	38.56	32.99	12.62	14.95	
Weight of Water, gms.	12.33	12.73	11.44	2.33	2.85	
Water Content, %	31.6	33.0	34.7	18.5	19.1	
Number of Blows	25	15	9			

Unified Soil Classification **CL**



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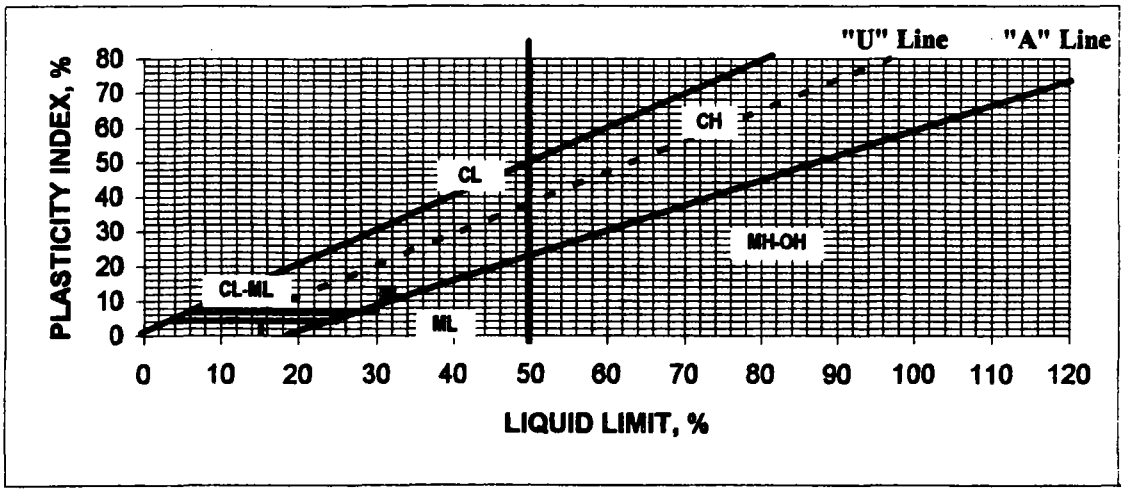

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ATTERBERG LIMITS

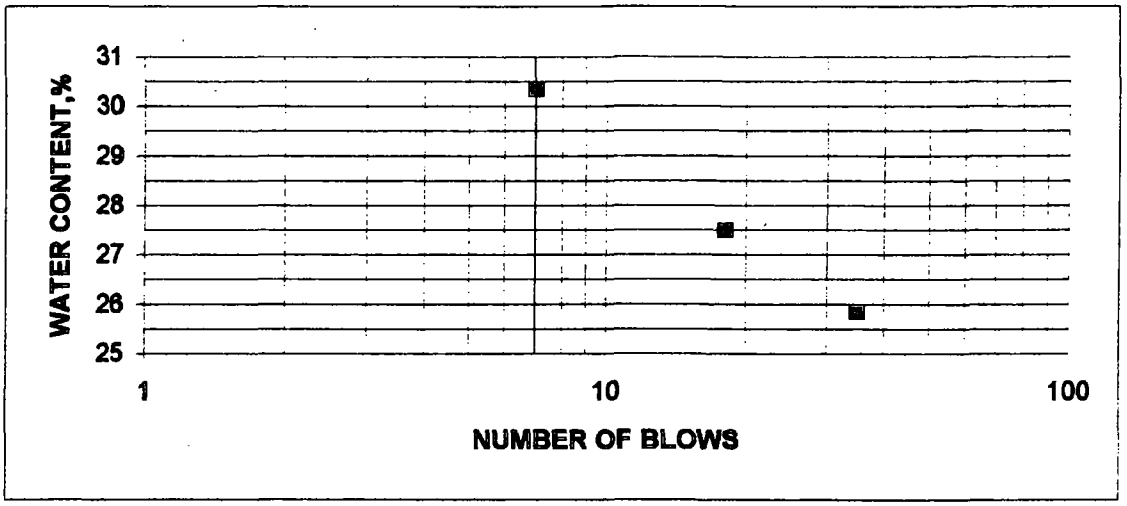
ASTM D4318

EMCON

Project Name:	BLAND FILL	**Lab. No.:**	98-025	**Proj. No.:**	22045-013.002
Sample No.:	BUCKET SK4	**Depth, ft.:**		**Date:**	3/10/98
Description:	CLAYEY GRAVEL, BROWN WITH SAND.			**Tested By:**	RMM
				Checked By:	DGC

	Liquid Limit			Plastic Limit		
Can Number	G	#13	E	C	D	
Weight of Can + Wet Soil, gms.	77.51	78.52	71.24	46.51	42.65	
Weight of Can + Dry Soil, gms.	67.23	67.60	60.92	43.51	40.26	
Weight of Can, gms.	27.46	27.87	26.90	26.24	26.43	
Weight of Dry Soil, gms.	39.77	39.73	34.02	17.27	13.83	
Weight of Water, gms.	10.28	10.92	10.32	3.00	2.39	
Water Content, %	25.8	27.5	30.3	17.4	17.3	
Number of Blows	35	18	7			

Unified Soil Classification **GC**



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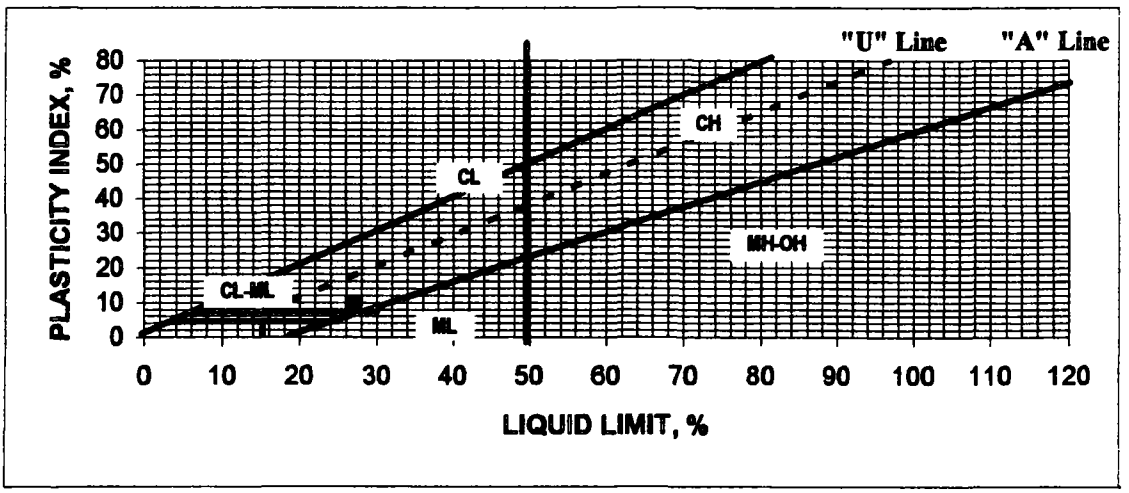

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COMPACTION TEST

☐ ASTM D698 ☒ ASTM D1557

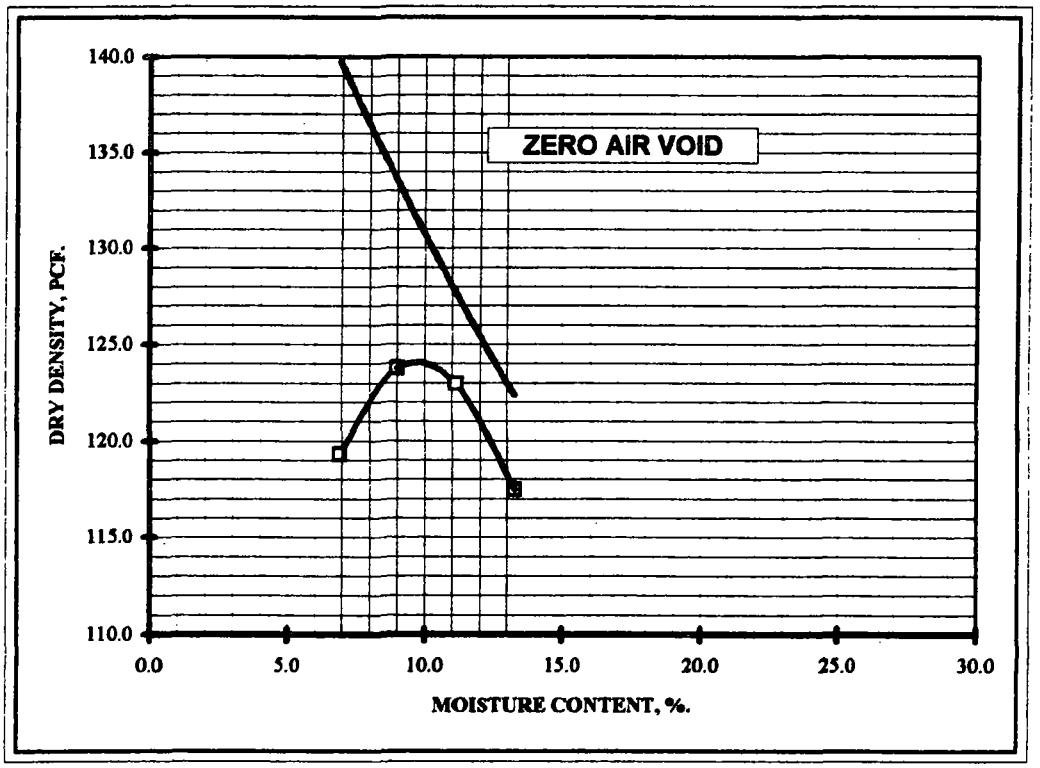
EMCON

				Checked By:	DGC
Project Name:	BLAND FILL	Proj. No.:	22045-013.002	Lab. No.:	98-025
Sample No.:	BUCKET SK 2	Depth, ft.:		Tested By:	RMM
Description:	CLAYEY SAND, BROWN WITH GRAVELS.			Date:	3/10/98

Vol., Mold, cf.:	0.03333	Hammer Weight,:	10.0 lbs.	Hammer Drop:	18"
No. of Layers:	5	Blows/Layer:	25	ASTM Designation: Method:	"B"

Trial Number		-4	-2	Air Dry	2	
Container Number		R-2	W-4	#69	A-50	
Wet Soil + Container	(gms.)	1276.50	1411.60	1141.40	1169.90	
Dry Soil + Container	(gms.)	1201.70	1304.70	1038.90	1046.80	
Container Weight	(gms.)	119.00	117.87	117.77	118.54	
Weight of Water	(gms.)	74.80	106.90	102.50	123.10	
Weight of Dry Soil	(gms.)	1082.70	1186.83	921.13	928.26	
Moisture Content	(%)	6.9	9.0	11.1	13.3	
Wet Soil + Mold	(gms.)	3919	4030	4056	4002	
Weight of Mold	(gms.)	1990	1990	1990	1990	
Wet Weight of Soil	(lbs.)	4.25	4.50	4.55	4.44	
Wet Unit Weight	(pcf.)	127.6	134.9	136.6	133.1	
Dry Unit Weight	(pcf.)	119.3	123.8	123.0	117.5	

Maximum Dry Density, pcf.:	124.0
Optimum Moisture Content:	9.5
Est. Specific Gravity:	2.65



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COMPACTION TEST

EMCON

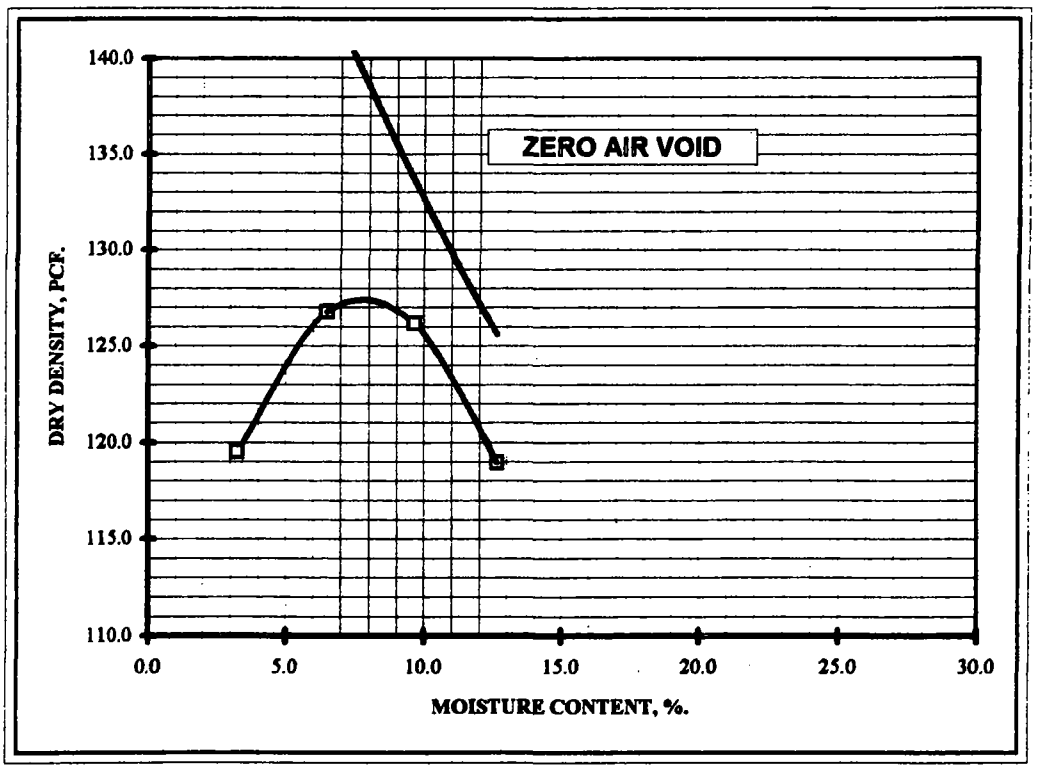
☐ ASTM D698 ☒ ASTM D1557

				Checked By:	DGC
Project Name:	BLAND FILL	Proj. No.:	22045-013.002	Lab. No.:	98-025
Sample No.:	SK4	Depth, ft.:		Tested By:	RMM
Description:	CLAYEY GRAVEL, BROWN WITH SAND.			Date:	3/17/98

Vol., Mold, cf.:	0.07502	Hammer Weight,:	10.0 lbs.	Hammer Drop:	18"
No. of Layers:	5	Blows/Layer:	56	ASTM Designation: Method:	"C"

Trial Number		-6	-3	Air Dry	3	
Container Number		E-5	W-4	R-2	#66	
Wet Soil + Container	(gms.)	1335.90	1170.80	1182.60	1331.30	
Dry Soil + Container	(gms.)	1297.50	1106.40	1089.00	1195.70	
Container Weight	(gms.)	118.82	117.88	118.97	124.16	
Weight of Water	(gms.)	38.40	64.40	93.60	135.60	
Weight of Dry Soil	(gms.)	1178.68	988.52	970.03	1071.54	
Moisture Content	(%)	3.3	6.5	9.6	12.7	
Wet Soil + Mold	(gms.)	7010	7405	7517	7371	
Weight of Mold	(gms.)	2810	2810	2810	2810	
Wet Weight of Soil	(lbs.)	9.26	10.13	10.38	10.06	
Wet Unit Weight	(pcf.)	123.4	135.0	138.3	134.0	
Dry Unit Weight	(pcf.)	119.5	126.8	126.2	119.0	

Maximum Dry Density, pcf.:	127.3
Optimum Moisture Content:	7.8
Est. Specific Gravity:	2.70



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PERMEABILITY TEST

ASTM D5084

emcon

LAB. NUMBER:	98-031		
PROJECT NAME:	BLAND FILL	**PROJECT NUMBER:**	22045-013.002
SAMPLE NUMBER:	SK-2	**SAMPLE DEPTH:**	REMOLDED
DESCRIPTION:	CLAYEY SAND, BROWN WITH GRAVELS.	**DATE:**	3/26/98
CHECKED BY:		**TESTED BY:**	DGC

* Remolded to 90% of max. dry density at opt. + 2% water content.

SAMPLE DATA		BEFORE TEST	AFTER TEST	OVEN DRY		
DIAMETER	(cm)	7.28	7.21	TARE NUMBER		#1
HEIGHT	(cm)	6.36	6.20	WT. OF TARE+WET SOIL	(gm)	628.20
VOLUME	(cc)	264.6	253.01	WT. OF TARE+DRY SOIL	(gm)	555.30
WT. OF WET SOIL	(gm)	530.4	549.3	WT. OF TARE	(gm)	78.90
WT. OF DRY SOIL	(gm)	476.4	476.4	WT. OF WATER	(gm)	72.90
WT. OF WATER	(gm)	54.0	72.9	WT. OF DRY SOIL	(gm)	476.4
MOISTURE CONTENT	(%)	11.3	15.3	WATER CONTENT	(%)	15.3
DRY DENSITY	(pcf)	112.3	117.5	LAB. MAX. DRY DENSITY	(pcf)	124.0
VOID RATIO	(e)	0.4719	0.4074	OPT. WATER CONTENT	(%)	9.5
SATURATION	(s)	63.7	99.5	RELATIVE COMPACTION	(%)	91
POROSITY	(h)	0.3206	0.2895	SPECIFIC GRAVITY	(est.)	2.65

PRESSURE DATA DURING PERMEABILITY TEST:

"B" parameter 0.98 — Area of Burette: 0.6 sq. cm.

CONFINING PRESS. 55 psi

BACK PRESS. (bot) 51 psi — BACK PRESS. (top) 49 psi.

AVERAGE CONSOL. PRESSURE: 5 psi

PERMEANT: WATER

DATE	TIME	ELAPSED TIME (sec)	H (cm)	BURETTE READING: TOP PRESS. (psi.)		BOTTOM PRESS. (psi.)		CHAMBER PRESS.,(psi.)	COMMENTS
SATURATION:									Skempton's "B"
3/26/98	7:32			50.0		50.0		51.0	49.9
3/26/98	13:22							61.0	59.7
CONSOLIDATION:				TOP (cm)	DT (cm)	BOTTOM (cm)	DB (cm)	CHAMBER (cm)	
PERMEABILITY:									
3/27/98	6:13	RESET		0.3		39.7		19.9	PERM., (cm/sec.)
3/27/98	7:25	4320		9.2		31.0		19.4	1.1E-06
3/27/98	8:40	4500		16.6		23.7		19.3	9.6E-07
3/27/98	9:58	4680		22.8		17.4		19.1	8.6E-07
3/27/98	11:30	5520		29.1		11.0		19.1	8.1E-07
3/27/98	12:36	3960		33.0		7.2		19.0	7.5E-07
3/27/98	13:26	3000		35.7		4.4		19.0	7.5E-07
3/27/98	14:05	2340		37.8		2.3		19.0	7.6E-07
									$\delta\gamma\chi 93\pi\mu$

PERMEABILITY TEST

ASTM D5084

EMCON

		LAB. NUMBER:	98-025
PROJECT NAME:	BLAND FILL	PROJECT NUMBER:	22045-013.002
SAMPLE NUMBER:	CORE #4	SAMPLE DEPTH:	UNDISTURBED
DESCRIPTION:	SILTY CLAY, LIGHT BROWN WITH ROOTS.	DATE:	3/10/98
CHECKED BY:		TESTED BY:	DGC

SAMPLE DATA		BEFORE TEST	AFTER TEST	OVEN DRY		
DIAMETER	(cm)	7.28	7.30	TARE NUMBER		x-20
HEIGHT	(cm)	7.23	7.23	WT. OF TARE+WET SOIL	(gm)	650.00
VOLUME	(cc)	300.795	302.45	WT. OF TARE+DRY SOIL	(gm)	499.30
WT. OF WET SOIL	(gm)	547.7	559.7	WT. OF TARE	(gm)	90.30
WT. OF DRY SOIL	(gm)	409.0	409.0	WT. OF WATER	(gm)	150.70
WT. OF WATER	(gm)	138.7	150.7	WT. OF DRY SOIL	(gm)	409.0
MOISTURE CONTENT	(%)	33.9	36.8	WATER CONTENT	(%)	36.8
DRY DENSITY	(pcf)	84.8	84.4	LAB. MAX. DRY DENSITY	(pcf)	
VOID RATIO	(e)	0.9857	0.9966	OPT. WATER CONTENT	(%)	
SATURATION	(s)	92.9	99.8	RELATIVE COMPACTION	(%)	
POROSITY	(h)	0.4964	0.4992	SPECIFIC GRAVITY	(est.)	2.7

PRESSURE DATA DURING PERMEABILITY TEST:

"B" parameter 0.99 Area of Burette: 0.6 sq. cm.

CONFINING PRESS. 55 psi

BACK PRESS. (bot) 51 psi BACK PRESS. (top) 49 psi.

AVERAGE CONSOL. PRESSURE: 5 psi

PERMEANT: WATER

DATE	TIME	ELAPSED TIME (sec)	H (cm)	BURETTE READING					
				TOP PRESS. (psi.)		BOTTOM PRESS. (psi.)		CHAMBER PRESS.,(psi.)	COMMENTS
SATURATION:									Skempton's "B"
3/10/98	10:07			50.0		50.0		51.0	50.1
3/10/98	14:10							61.0	60.0
CONSOLIDATION:				TOP (cm)	DT (cm)	BOTTOM (cm)	DB (cm)	CHAMBER (cm)	
PERMEABILITY:									
3/11/98	6:30	RESET		0.5		39.0		16.9	PERM., (cm/sec.)
3/11/98	7:20	3000		2.7		36.8		16.9	4.3E-07
3/11/98	8:14	3240		4.7		34.8		16.9	3.7E-07
3/11/98	9:23	4140		7.1		32.4		16.9	3.6E-07
3/11/98	10:58	5700		10.4		29.1		16.9	3.7E-07
3/11/98	13:02	7440		14.5		25.0		16.9	3.7E-07
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CONSOLIDATION

ASTM D2435

Project Name:	BLAND LANDFILL	**Proj. No.:**	22045-013.002
Sample No.:	CORE #4 @ APPROX. 5" FROM BOT. OF TUBE.	**Tested By:**	DGC.
Description:	SILTY CLAY, LIGHT BROWN WITH ROOTS.	**Date:**	3/5/98

*** Sample was flooded with water at the start of test.**

Consol. No.:	#321
Diameter, in.	2.42
Thickness, in.	1.00
Soil Wet Wt., gms.	134.55
Water Content, %	33.4
Dry Density, pcf.	83.6
Initial Sat.	88.6
Final Sat.	99.9

Tare Number	ABC
Wet Wt. of Soil +Tare, gms.	208.49
Dry Wt. of Soil + Tare, gms.	178.83
Weight of Tare, gms.	77.94
Weight of Water, gms.	29.66
Weight of Dry Soil, gms.	100.89
Final Water Content, %	29.4
Est. Specific Gravity	2.70

LOAD ksf.	DIAL .0001 in.	APPLIED CORRECTIONS	HEIGHT, inches.	CONSOL %	DENSITY pcf.	VOID RATIO
0.000	0.0000	0.0000	1.0000	0.00	83.6	1.0163
0.125	0.0082	0.0000	0.9918	0.82	84.3	0.9997
0.250	0.0121	0.0000	0.9879	1.21	84.6	0.9919
0.500	0.0157	0.0000	0.9843	1.57	84.9	0.9846
1.000	0.0238	0.0000	0.9762	2.38	85.6	0.9683
2.000	0.0333	0.0000	0.9667	3.33	86.4	0.9491
4.000	0.0530	0.0000	0.9470	5.30	88.2	0.9094
8.000	0.0772	0.0000	0.9228	7.72	90.6	0.8606
16.000	0.1158	0.0000	0.8842	11.58	94.5	0.7828
32.000	0.1576	0.0000	0.8424	15.76	99.2	0.6985
8.000	0.1508	0.0000	0.8492	15.08	98.4	0.7122
1.000	0.1287	0.0000	0.8713	12.87	95.9	0.7568
0.125	0.1101	0.0000	0.8899	11.01	93.9	0.7943

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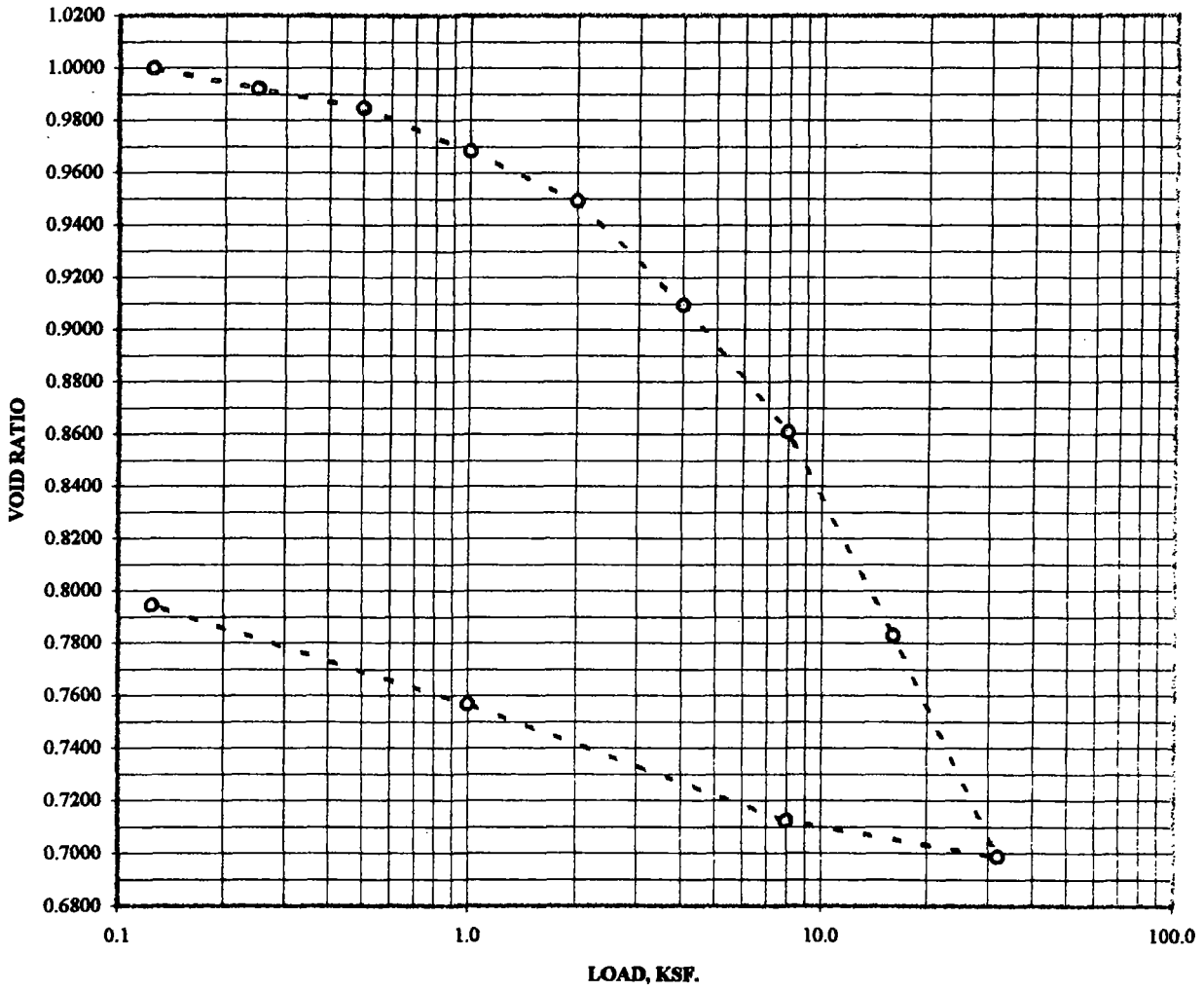
CONSOLIDATION

ASTM D2435

Project Name:	BLAND LANDFILL	**Proj. No.:**	22045-013.002
Sample No.:	CORE #4 @ APPROX. 5" FROM BOT. OF TUBE.	**Tested By:**	DGC.
Description:	SILTY CLAY, LIGHT BROWN WITH ROOTS.	**Date:**	3/5/98



0.00

*** Sample was flooded with water at the start of test.**

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CONSOLIDATION - TIME vs. DEFORMATION CURVE

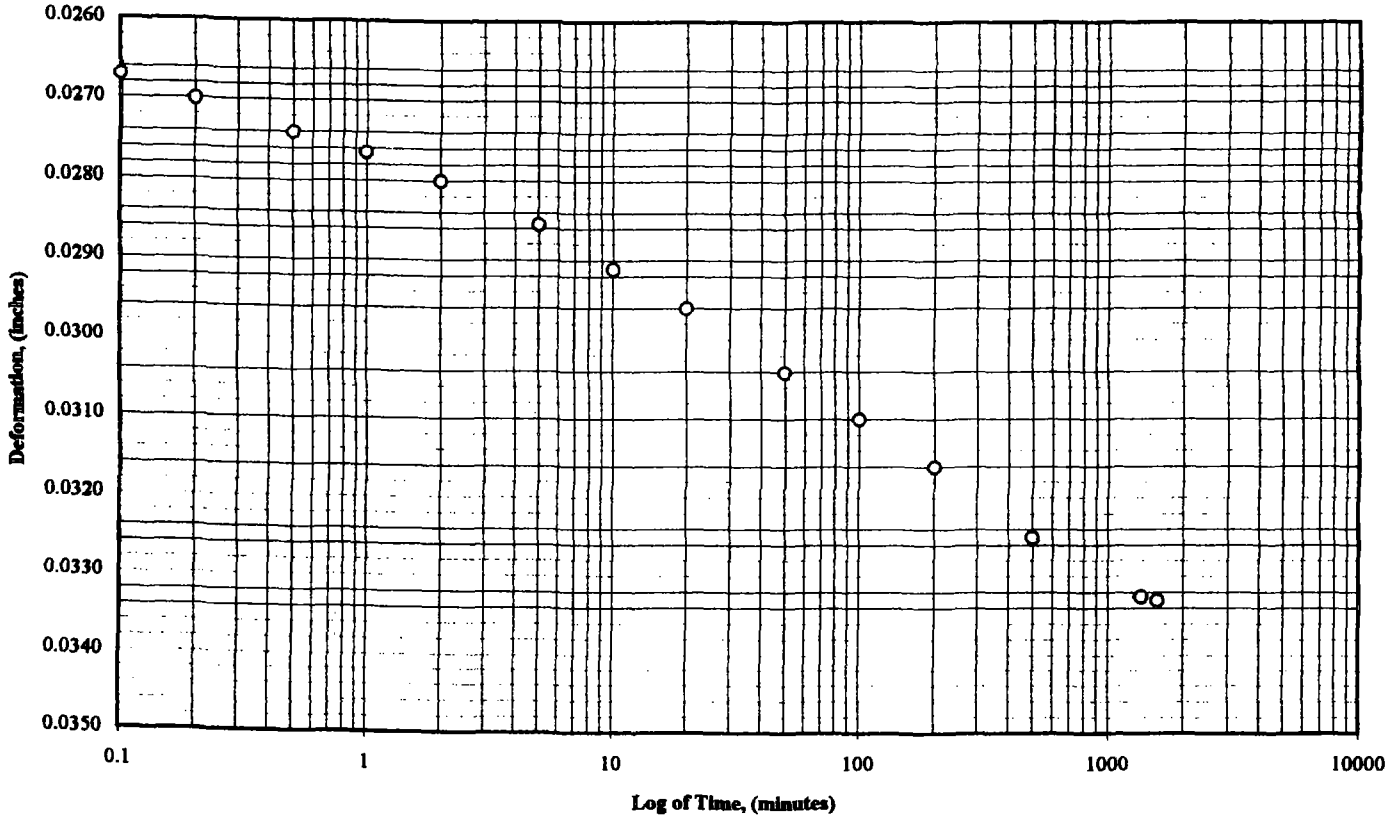
PROJECT NAME: BLAND LANDFILL
SAMPLE NUMBER: CORE #4
SAMPLE DESCRIPTION: SILTY CLAY, LIGHT BROWN WITH ROOTS.

PROJ. NUMBER: 22045-013.002
DEPTH, ft.: 5" FROM BOT. OF TUBE

LAB. NUMBER: 98-025
TESTED BY: DGC
DATE: 3/10/98

* Initial dial gauge reading at 0.0 ksf. load is at .0000.

LOAD, ksf.:	2.00
Time, min.	Deformation, in.
0.1	0.0267
0.2	0.0270
0.5	0.0274
1	0.0277
2	0.0280
5	0.0286
10	0.0291
20	0.0296
50	0.0304
100	0.0310
200	0.0316
500	0.0325
1363	0.0333
1583	0.0333



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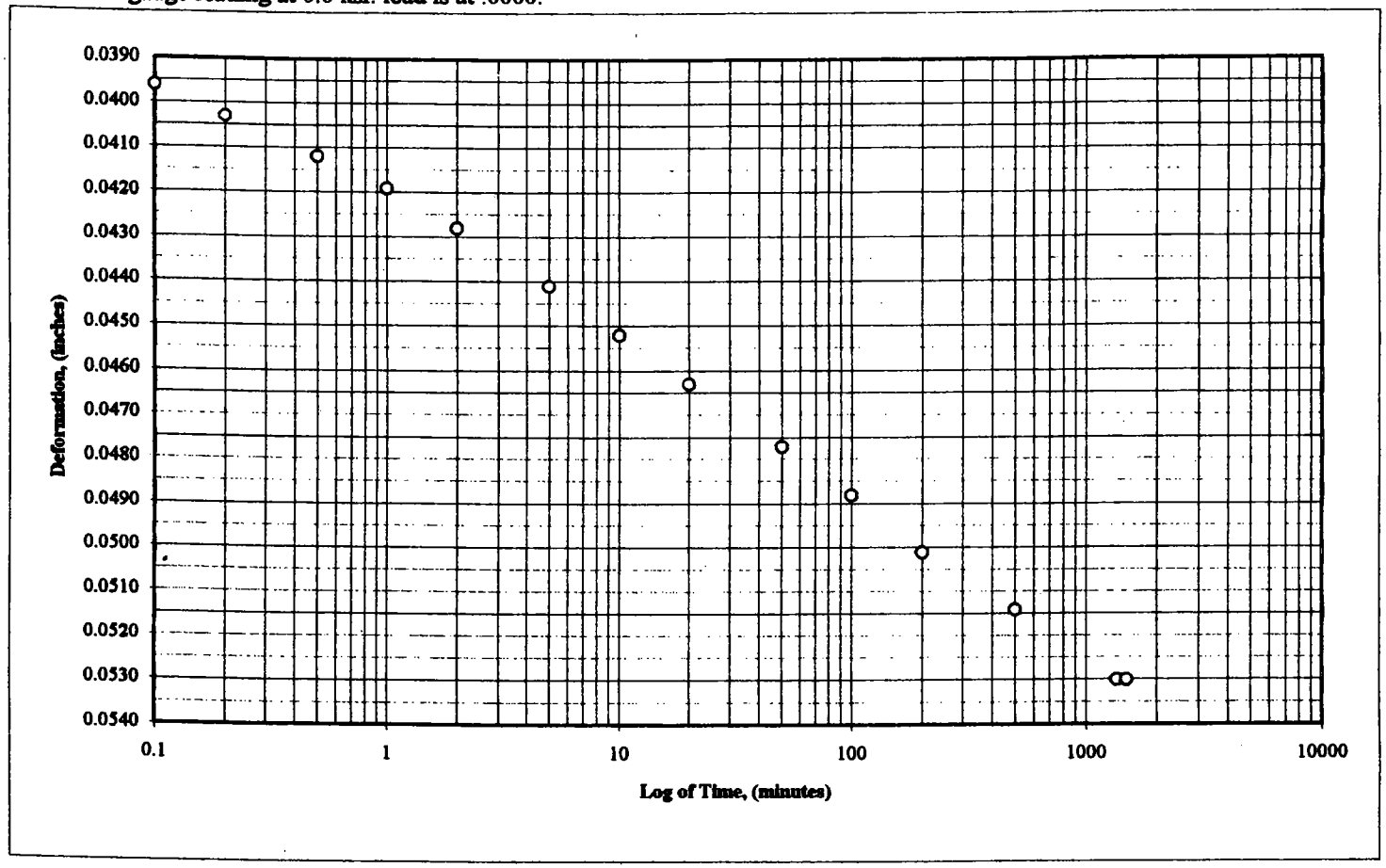
CONSOLIDATION - TIME vs. DEFORMATION CURVE

PROJECT NAME: BLAND LANDFILL **PROJ. NUMBER:** 22045-013.002 **LAB. NUMBER:** 98-025
SAMPLE NUMBER: CORE #4 **DEPTH, ft.:** 5" FROM BOT. OF TUBE **TESTED BY:** DGC
SAMPLE DESCRIPTION: SILTY CLAY, LIGHT BROWN WITH ROOTS. **DATE:** 3/11/98

* Initial dial gauge reading at 0.0 ksf. load is at .0000.

LOAD, ksf.:	4.00
Time, min.	Deformation, in.
0.1	0.0396
0.2	0.0403
0.5	0.0412
1	0.0419
2	0.0428
5	0.0441
10	0.0452
20	0.0463
50	0.0477
100	0.0488
200	0.0501
500	0.0514
1354	0.0530
1486	0.0530



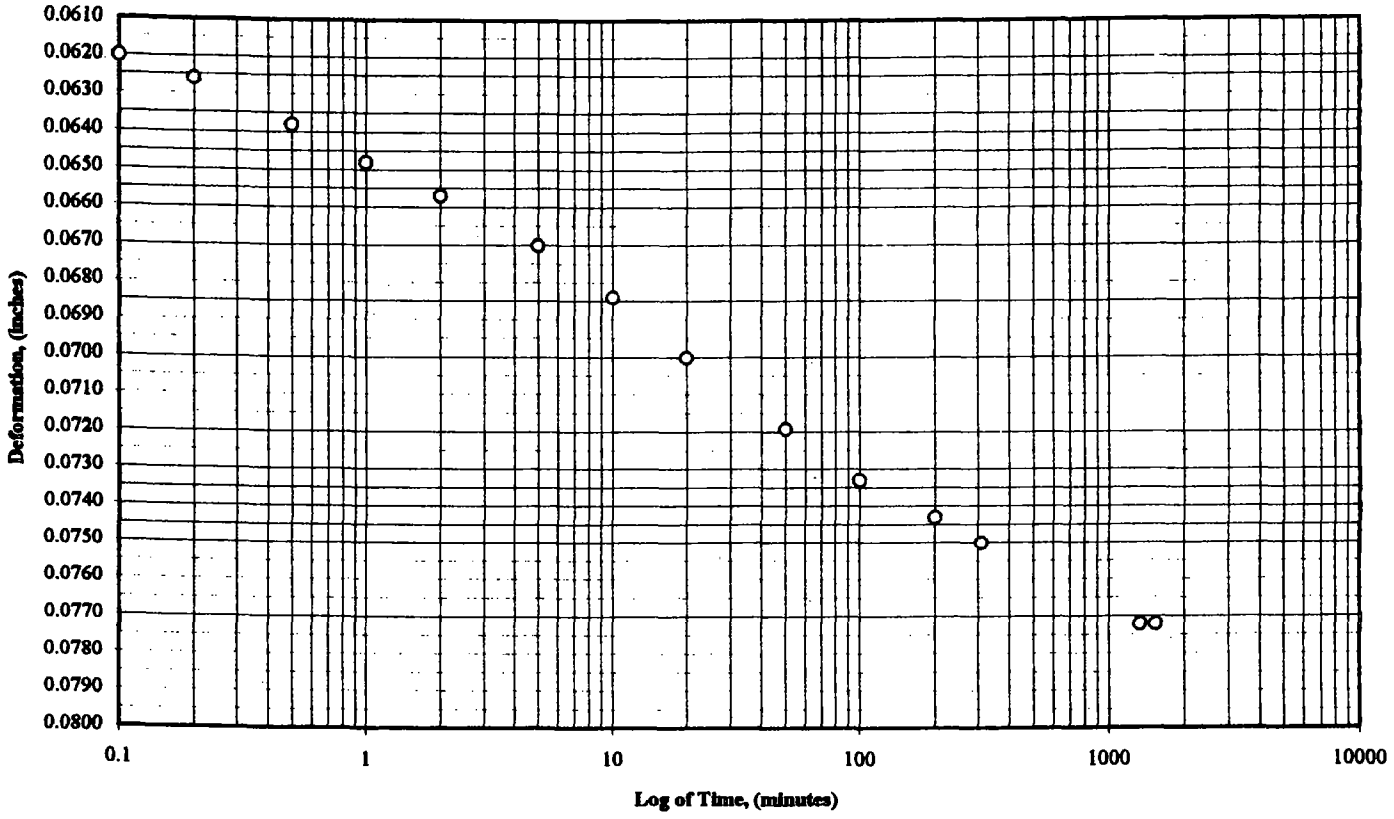
δγχ93ρεω.

CONSOLIDATION - TIME vs. DEFORMATION CURVE

PROJECT NAME: BLAND LANDFILL **PROJ. NUMBER:** 22045-013.002 **LAB. NUMBER:** 98-025
SAMPLE NUMBER: CORE #4 **DEPTH, ft.:** 5" FROM BOT. OF TUBE **TESTED BY:** DGC
SAMPLE DESCRIPTION: SILTY CLAY, LIGHT BROWN WITH ROOTS. **DATE:** 3/12/98

* Initial dial gauge reading at 0.0 ksf. load is at .0000.

LOAD, ksf.:	8.00
Time, min.	Deformation, in.
0.1	0.0620
0.2	0.0626
0.5	0.0638
1	0.0648
2	0.0657
5	0.0670
10	0.0684
20	0.0700
50	0.0719
100	0.0733
200	0.0743
310	0.0750
1340	0.0772
1545	0.0772



δγχ93ρεω.

TESTING BY COOPER

COOPER TESTING LABS, INC.

1951-X Colony Street
Mountain View, CA 94043

fax (415) 968-4228
phone (415) 968-9472

FAX TRANSMITTAL COVER SHEET

TO: Dinka / Don Hummings

FROM: DC

DATE: 3/24

NUMBER OF PAGES (INCLUDING THIS COVER) 2

REMARKS:

Don,

Please send the purchase order (from risk managment) to Sacramento office.

Thanks,

Doug

If you do not receive all pages, please call
(415) 968-9472

Falling Head Permeability
ASTM D 5084
Cooper Testing Lab, Inc.

Job No:	104-046	Boring:		Date:	03/24/98
Client:	Emcon	Sample:	SK-4	By:	DC
Project:	22045-013.002	Depth:			
Soil:	brown clayey GRAVEL w/sand				

Sample Pressures: Max. Hydraulic
Cell: 73 psi Bot. Cap: 68 psi Top Cap: 68 psi Gradient: 6

Elapsed Time (min)	Head, (in)	Permeability cm/sec
0	24.0	Start of Test
6	22.4	6.3 x 10E-6
27	20.1	4.8 x 10E-6
130	10.0	4.9 x 10E-6
187	7.2	4.7 x 10E-6
272	3.6	5.1 x 10E-6

Average Permeability: 5 x 10E-6 cm/sec

Sample Data:	Initial		Final
Height, in.:	4.00		3.92
Diameter, in.:	4.00		3.95
Area, in2:	12.57		12.25
Volume, in3:	50.27		48.04
Total Volume, cc:	823.70		787.17
Vol of Solids, cc:	566.57		566.57
Vol. of Voids, cc:	257.13		220.61
Void Ratio:	0.45		0.39
Porosity, %:	31.22		28.03
Saturation, %	60.05		95.24
Sp. Gravity:	2.65	assumed	2.65
Wet Weight, gm:	1655.8		1711.5
Dry Weight, gm:	1501.4		1501.4
Tare, gm:	0.00		0.00
Moisture, %:	10.3		14.0
Dry Density, pcf:	113.7		119.0

Remarks: Remolded to 90% of 127.3 pcf @ 9.6%, (opt +2%)

TESTING BY A & L GREAT LAKES

ACCOUNT NUM 96994

A & L GREAT LAKES LABORATORIES, INC.

3505 Conestoga Drive • Fort Wayne, Indiana 46808-4413 • Phone (219)483-4759 • FAX (219)483-5274

REPORT OF ANALYSIS

TO: EMCON
P O BOX 340914
SACRAMENTO, CA 95834

DATE RECEIVED: 3/23/98
DATE REPORTED: 3/27/98
PAGE: 1
P.O. NUMBER: 5202100

RE: 22092001009 PROJ #

LAB NO.	SAMPLE ID	ANALYSIS	RESULT	UNIT	METHOD
39518	SK-3	Water Holding Capacity @ 1/3 Bar	27.52	%	MSA Part 1 (1965) pp 273-278
		Water Holding Capacity @ 15 Bar	11.54	%	MSA Part 1 (1965) pp 273-278
39519	SK-4	Water Holding Capacity @ 1/3 Bar	19.52	%	MSA Part 1 (1965) pp 273-278
		Water Holding Capacity @ 15 Bar	7.42	%	MSA Part 1 (1965) pp 273-278

ACCOUNT NUM 96994

A & L GREAT LAKES LABORATORIES, INC.

3505 Conestoga Drive • Fort Wayne, Indiana 46808-4413 • Phone (219)483-4759 • FAX (219)483-5274

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LAB NO.	SAMPLE ID	ANALYSIS	RESULT	UNIT	METHOD
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		Water Holding Capacity @ 15 Bar	11.54	%	MSA Part 1 (1965) pp 273-278
39519	SK-4	Water Holding Capacity @ 1/3 Bar	19.52	%	MSA Part 1 (1965) pp 273-278
		Water Holding Capacity @ 15 Bar	7.42	%	MSA Part 1 (1965) pp 273-278

TESTING BY COLUMBIA ANALYTICAL

ANALYTICAL DATA QC WORKSHEET

EMCON

PROJECT No. 22045-013.002
CLIENT/PROJECT Blandfill landfill
EPA METHOD metals
LABORATORY CAS-S
Reporting limits (check one): MDLs/PQLs_____ MRLs X

LAB No. S9800540
CHEMIST Lisa Fernandez
PROJ. MGR. Don Hullings
OFFICE SJ
DATE 4-15-98

Sample ID	Assoc. QC or Field Sample	Date Sampled	Extraction Holding Time: 180 Days 28 days Hz	Analysis HoldingTime: 180 Days 28 days Hz	Extracted/ Analyzed Within Holding Time		Compounds Detected		Surrogate Recovery Within Limits	
(A) FIELD SAMPLES			Date Extracted	Date Analyzed	Yes	No	Yes	No	Yes	No
BF-2		3-7-98	3/20,23	3/23,24	X		X		NA	
BF-3		↓	↓	↓	↓		↓		↓	
BF-4		↓	↓	↓	↓		↓		↓	

(B) FIELD QC SAMPLES (Field blanks, trip blanks, field duplicates)

QC Sample ID	Assoc. Field Sample	Date Extracted	Date Analyzed	Compounds Detected		Surrogate Recovery Within Limits		MS/DMS (LCS/DLCS) Within Limits		RPD Within Limits	
(C) LAB QC SAMPLES (Method blanks, matrix spikes, laboratory control samples)				Yes	No	Yes	No	Yes	No	Yes	No
MB		3/20,23	3/20,24		X	NA		NA		NA	

Comments:

ANALYTICAL DATA QC WORKSHEET

PROJECT No. 22045-013.002
CLIENT/PROJECT Blandfill Landfill
EPA METHOD inorganics
LABORATORY CAS_S + K
Reporting limits (check one): MDLs/PQLs_____ MRLs X

LAB No. S9800540/K9801545
CHEMIST Lisa Fernandez
PROJ. MGR. Don Hillings
OFFICE SJ
DATE 4-15-98

Sample ID	Assoc. QC or Field Sample	Date Sampled	Extraction Holding Time: _____ Days CN -only	Analysis HoldingTime: _____ Days	Extracted/ Analyzed Within Holding Time		Compounds Detected		Surrogate Recovery Within Limits	
(A) FIELD SAMPLES			Date Extracted	Date Analyzed	Yes	No	Yes	No	Yes	No
BF-2		3-7-98	3-12-98	3/13-23	X		X		NA	
BF-3		↓	↓	↓	↓		↓		↓	
BF-4		↓	↓	↓	↓		↓		↓	

B) FIELD QC SAMPLES (Field blanks, trip blanks, field duplicates)

C) LAB QC SAMPLES (Method blanks, matrix spikes, laboratory control samples)

QC Sample ID	Assoc. Field Sample	Date Extracted	Date Analyzed	Compounds Detected		Surrogate Recovery Within Limits		MS/DMS (LCS/DLCS) Within Limits		RPD Within Limits	
				Yes	No	Yes	No	Yes	No	Yes	No
MB		3-1[illegible]	3/13-18		X	NA		NA		NA	

Comments:

Columbia Analytical Services, Inc.

March 25, 1998 Service Request No.: S9800540

Rich Haughey
EMCON
1921 Ringwood Avenue
San Jose, CA 95131

RE: Blandfill Landfill/22045-013.002

Dear Mr. Haughey:

The following pages contain analytical results for sample(s) received by the laboratory on March 11, 1998. Results of sample analyses are followed by Appendix A which contains sample custody documentation and quality assurance deliverables requested for this project. The work requested has been assigned the Service Request No. listed above. To help expedite our service, please refer to this number when contacting the laboratory.

Analytical results were produced by procedures consistent with Columbia Analytical Services' (CAS) Quality Assurance Manual (with any deviations noted). Signature of this CAS Analytical Report below confirms that pages 2 through 12, following, have been thoroughly reviewed and approved for release in accord with CAS Standard Operating Procedure ADM-DatRev3.

Please feel welcome to contact me should you have questions or further needs.

Sincerely,

Steven L. Green
Project Chemist

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

A2LA	American Association for Laboratory Accreditation
ASTM	American Society for Testing and Materials
BOD	Biochemical Oxygen Demand
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAM	California Assessment Metals
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
COD	Chemical Oxygen Demand
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DLCS	Duplicate Laboratory Control Sample
DMS	Duplicate Matrix Spike
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
IC	Ion Chromatography
ICB	Initial Calibration Blank sample
ICP	Inductively Coupled Plasma atomic emission spectrometry
ICV	Initial Calibration Verification sample
J	Estimated concentration. The value is less than the MRL, but greater than or equal to the MDL. If the value is equal to the MRL, the result is actually <MRL before rounding.
LCS	Laboratory Control Sample
LUFT	Leaking Underground Fuel Tank
M	Modified
MBAS	Methylene Blue Active Substances
MCL	Maximum Contaminant Level. The highest permissible concentration of a substance allowed in drinking water as established by the U. S. EPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
MS	Matrix Spike
MTBE	Methyl tert-Butyl Ether
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the paper industry for Air and Stream Improvement
ND	Not Detected at or above the method reporting/detection limit (MRL/MDL)
NIOSH	National Institute for Occupational Safety and Health
NTU	Nephelometric Turbidity Units
ppb	Parts Per Billion
ppm	Parts Per Million
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SIM	Selected Ion Monitoring
SM	Standard Methods for the Examination of Water and Wastewater, 18th Ed., 1992
STLC	Solubility Threshold Limit Concentration
SW	Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Ed., 1986 and as amended by Updates I, II, IIA, and IIB.
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
T	Trace level. The concentration of an analyte that is less than the PQL but greater than or equal to the MDL. If the value is equal to the PQL, the result is actually <PQL before rounding.
TRPH	Total Recoverable Petroleum Hydrocarbons
TSS	Total Suspended Solids
TTLC	Total Threshold Limit Concentration
VOA	Volatile Organic Analyte(s)

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S9800540
Project:	Blandfill Landfill/22045-013.002	**Date Collected:**	3/7/98
Sample Matrix:	Soil	**Date Received:**	3/11/98

Total Metals

Sample Name:	BF-2	Units:	mg/Kg (ppm)
Lab Code:	S9800540-001	Basis:	Wet
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	8800	
Arsenic	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	ND	
Barium	EPA 3050BM	6010A	1	1	3/20/98	3/23/98	100	
Cadmium	EPA 3050BM	6010A	0.5	1	3/20/98	3/23/98	0.7	
Calcium	EPA 3050BM	6010A	20	1	3/20/98	3/23/98	47000	
Chromium	EPA 3050BM	6010A	1	1	3/20/98	3/23/98	14	
Copper	EPA 3050BM	6010A	1	1	3/20/98	3/23/98	35	
Iron	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	11000	
Lead	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	21	
Magnesium	EPA 3050BM	6010A	20	1	3/20/98	3/23/98	11000	
Manganese	EPA 3050BM	6010A	1	1	3/20/98	3/23/98	270	
Nickel	EPA 3050BM	6010A	2	1	3/20/98	3/23/98	9	
Potassium	EPA 3050BM	6010A	50	1	3/20/98	3/23/98	3300	
Selenium	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	ND	
Silver	EPA 3050BM	6010A	2	1	3/20/98	3/23/98	ND	
Sodium	EPA 3050BM	6010A	50	1	3/20/98	3/23/98	320	
Zinc	EPA 3050BM	6010A	2	1	3/20/98	3/23/98	70	
Mercury	EPA 3050BM	7470	0.4	1	3/23/98	3/24/98	ND	

1322/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S9800540
Project:	Blandfill Landfill/22045-013.002	**Date Collected:**	3/7/98
Sample Matrix:	Soil	**Date Received:**	3/11/98

Total Metals

Sample Name:	BF-3	**Units:**	mg/Kg (ppm)
Lab Code:	S9800540-002	**Basis:**	Wet
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	9400	
Arsenic	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	ND	
Barium	EPA 3050BM	6010A	1	1	3/20/98	3/23/98	110	
Cadmium	EPA 3050BM	6010A	0.5	1	3/20/98	3/23/98	0.5	
Calcium	EPA 3050BM	6010A	20	1	3/20/98	3/23/98	47000	
Chromium	EPA 3050BM	6010A	1	1	3/20/98	3/23/98	14	
Copper	EPA 3050BM	6010A	1	1	3/20/98	3/23/98	15	
Iron	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	13000	
Lead	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	14	
Magnesium	EPA 3050BM	6010A	20	1	3/20/98	3/23/98	10000	
Manganese	EPA 3050BM	6010A	1	1	3/20/98	3/23/98	290	
Nickel	EPA 3050BM	6010A	2	1	3/20/98	3/23/98	12	
Potassium	EPA 3050BM	6010A	50	1	3/20/98	3/23/98	3700	
Selenium	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	ND	
Silver	EPA 3050BM	6010A	2	1	3/20/98	3/23/98	ND	
Sodium	EPA 3050BM	6010A	50	1	3/20/98	3/23/98	940	
Zinc	EPA 3050BM	6010A	2	1	3/20/98	3/23/98	53	
Mercury	EPA 3050BM	7470	0.4	1	3/23/98	3/24/98	ND	

1322/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	Service Request:	S9800540
Project:	Blandfill Landfill/22045-013.002	Date Collected:	3/7/98
Sample Matrix:	Soil	Date Received:	3/11/98

Total Metals

Sample Name:	BF-4	Units:	mg/Kg (ppm)
Lab Code:	S9800540-003	Basis:	Wet
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	8900	
Arsenic	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	ND	
Barium	EPA 3050BM	6010A	1	1	3/20/98	3/23/98	230	
Cadmium	EPA 3050BM	6010A	0.5	1	3/20/98	3/23/98	ND	
Calcium	EPA 3050BM	6010A	20	1	3/20/98	3/23/98	67000	
Chromium	EPA 3050BM	6010A	1	1	3/20/98	3/23/98	11	
Copper	EPA 3050BM	6010A	1	1	3/20/98	3/23/98	15	
Iron	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	10000	
Lead	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	13	
Magnesium	EPA 3050BM	6010A	20	1	3/20/98	3/23/98	15000	
Manganese	EPA 3050BM	6010A	1	1	3/20/98	3/23/98	350	
Nickel	EPA 3050BM	6010A	2	1	3/20/98	3/23/98	11	
Potassium	EPA 3050BM	6010A	50	1	3/20/98	3/23/98	4000	
Selenium	EPA 3050BM	6010A	5	1	3/20/98	3/23/98	ND	
Silver	EPA 3050BM	6010A	2	1	3/20/98	3/23/98	ND	
Sodium	EPA 3050BM	6010A	50	1	3/20/98	3/23/98	470	
Zinc	EPA 3050BM	6010A	2	1	3/20/98	3/23/98	57	
Mercury	EPA 3050BM	7470	0.4	1	3/23/98	3/24/98	ND	

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	Service Request:	S9800540
Project:	Blandfill Landfill/22045-013.002	Date Collected:	NA
Sample Matrix:	Soil	Date Received:	NA

Total Metals

Sample Name:	Method Blank	Units:	mg/Kg (ppm)
Lab Code:	S980320-MB	Basis:	Wet
Test Notes:			

Analyte	Prep Method	Analysis Method	MRL	Dilution Factor	Date Prepared	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050BM	6010A	5	1	3/20/98	3/20/98	ND	
Arsenic	EPA 3050BM	6010A	5	1	3/20/98	3/20/98	ND	
Barium	EPA 3050BM	6010A	1	1	3/20/98	3/20/98	ND	
Cadmium	EPA 3050BM	6010A	0.5	1	3/20/98	3/20/98	ND	
Calcium	EPA 3050BM	6010A	20	1	3/20/98	3/20/98	ND	
Chromium	EPA 3050BM	6010A	1	1	3/20/98	3/20/98	ND	
Copper	EPA 3050BM	6010A	1	1	3/20/98	3/20/98	ND	
Iron	EPA 3050BM	6010A	5	1	3/20/98	3/20/98	ND	
Lead	EPA 3050BM	6010A	5	1	3/20/98	3/20/98	ND	
Magnesium	EPA 3050BM	6010A	20	1	3/20/98	3/20/98	ND	
Manganese	EPA 3050BM	6010A	1	1	3/20/98	3/20/98	ND	
Nickel	EPA 3050BM	6010A	2	1	3/20/98	3/20/98	ND	
Potassium	EPA 3050BM	6010A	50	1	3/20/98	3/20/98	ND	
Selenium	EPA 3050BM	6010A	5	1	3/20/98	3/20/98	ND	
Silver	EPA 3050BM	6010A	2	1	3/20/98	3/20/98	ND	
Sodium	EPA 3050BM	6010A	50	1	3/20/98	3/20/98	ND	
Zinc	EPA 3050BM	6010A	2	1	3/20/98	3/20/98	ND	
Mercury	EPA 3050BM	7470	0.4	1	3/23/98	3/24/98	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	K9801545
Project:	Blandfill Landfill/22045-013.002	**Date Collected:**	3/7/98
Sample Matrix:	Soil	**Date Received:**	3/11/98
		Date Extracted:	3/17/98
		Date Analyzed:	3/18/98

Cation Exchange Capacity
EPA Method 9081
Units: mEq/100g
As Received Basis

Sample Name	Lab Code	MRL	Result
BF-2	K9801545-001	0.1	18.8
BF-3	K9801545-002	0.1	18.7
BF-4	K9801545-003	0.1	18.0
Method Blank	K9801545-MB	0.1	ND

1AMRL/102594

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S9800540
Project:	Blandfill Landfill/22045-013.002	**Date Collected:**	3/7/98
Sample Matrix:	Soil	**Date Received:**	3/11/98

Inorganic Parameters

Sample Name:	BF-2		
Lab Code:	S9800540-001	Basis:	Wet
Test Notes:			

Analyte	Units	Analysis Method	MRL	Dilution Factor	Date Digested	Date Analyzed	Result	Result Notes
Cyanide	mg/Kg (ppm)	335.3	1	1	3/12/98	3/13/98	ND	
pH	pH UNITS	150.1	—	1	NA	3/23/98	4.79	

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S9800540
Project:	Blandfill Landfill/22045-013.002	**Date Collected:**	3/7/98
Sample Matrix:	Soil	**Date Received:**	3/11/98

Inorganic Parameters

Sample Name:	BF-3		
Lab Code:	S9800540-002	Basis:	Wet
Test Notes:			

Analyte	Units	Analysis Method	MRL	Dilution Factor	Date Digested	Date Analyzed	Result	Result Notes
Cyanide	mg/Kg (ppm)	335.3	1	1	3/12/98	3/13/98	ND	
pH	pH UNITS	150.1	—	1	NA	3/23/98	5.48	

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S9800540
Project:	Blandfill Landfill/22045-013.002	**Date Collected:**	3/7/98
Sample Matrix:	Soil	**Date Received:**	3/11/98

Inorganic Parameters

Sample Name: BF-4
Lab Code: S9800540-003 Basis: Wet
Test Notes:

Analyte	Units	Analysis Method	MRL	Dilution Factor	Date Digested	Date Analyzed	Result	Result Notes
Cyanide	mg/Kg (ppm)	335.3	1	1	3/12/98	3/13/98	ND	
pH	pH UNITS	150.1	—	1	NA	3/23/98	6.38	

1S22/020597p

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON	**Service Request:**	S9800540
Project:	Blandfill Landfill/22045-013.002	**Date Collected:**	NA
Sample Matrix:	Soil	**Date Received:**	NA

Inorganic Parameters

Sample Name:	Method Blank		
Lab Code:	S9800540-MB	Basis:	Wet
Test Notes:			

Analyte	Units	Analysis Method	MRL	Dilution Factor	Date Digested	Date Analyzed	Result	Result Notes
Cyanide	mg/Kg (ppm)	335.3	1	1	3/12/98	3/13/98	ND	

1522/020597p

APPENDIX A

EMCON - San Jose

CHAIN OF CUSTODY / LABORATORY ANALYSIS REQUEST FORM

EMCON
1921 Ringwood Avenue, San Jose, CA 95131 (408) 453-7300 FAX (408) 437-9526

S98000540

Date 3/10/98 Page 1 of 1

Project Name: Blandfill Landfill
Project Number: 22045-013.002
Project Manager: Rich Haughey

Company/Address: EMCON
San Jose, CA

Phone:

Sampler's Signature:

Sample I.D.	Date	Time	LAB I.D.	Sample Matrix	Number of Containers	Analysis Requested: PH	Cation Exchange Capacity	Metals	Cyanide								REMARKS
																	Preservations
BF-2	3/7		1	Soil	1	X	X	X	x								
BF-3	3/7		2	Soil	1	X	X	X	x								
BF-4	3/7		3	Soil	1	X	X	X	x								
				Soil		X	X	X	x								

Relinquished By	Received By
Signature	Signature MOISES ESPARZA
Printed Name	Printed Name CAS
Firm	Firm
Date/Time 3/11/98	Date/Time 3/11/98 1320

Relinquished By	Received By
Signature	Signature
Printed Name	Printed Name
Firm	Firm

TURNAROUND REQUIREMENTS

24 hr ____ 48 hr ____ 5 day
X Standard (~10-15 working days)
____ Provide Verbal Preliminary Results
____ Provide FAX Preliminary Results
Requested Report Date 3/24/98

REPORT REQUIREMENTS

X I. Routine Report
____ II. Report (includes DUP, MS MSD, as required, may be charged as samples)
____ III. Data Validation Report (includes All Raw Data)
____ RWQCB (MDLs/PQLs/TRACE#)

INVOICE INFORMATION

P.O. # ____
Bill to EMCON

SAMPLE RECEIPT

Shipping VIA: ____
Shipping #: ____
Condition: ____
Lab No: ____

Special Instructions/Comments:

Metals to be tested for are as follows; Aluminum, Calcium, Copper, Cyanide, Iron, Manganese Magnesium, Nickel, Potassium, Sodium, Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, Silver, and Zinc.

20 g subsampled into 4oz jar for KLAB. KS 3/11/98

R16

SETTLEMENT CALCULATIONS

COMPUTATION SHEET

PROJECT TITLE: Blandfill PROJECT NO: 22645-013.00

DESCRIPTION: Subgrade Settlement Estimate SHEET ____ OF ____

PREP. BY: D. Hullings DATE: 4-15-98 CHKD BY: ____ DATE: ____

Estimate settlement of underlying subgrade using

$$S = \frac{C_c H}{1+e_o} \log\left(\frac{P_o + \Delta P}{P_o}\right)$$

Assumptions:

- Upper clayey clayey is 10 feet thick (based on Eastlake valley Landfill) but also consider 20 feet thick
- $C_c = 0.128$ (based on actual test for Blandfill - material well with empirical equations and similar SLVL data)
- $e_o = 1.02$ (from lab data)
- Preconsolidation Pressure is 9 ksf from data. Also consider $P_c = 4.5$ ksf from SLVL data.
- ΔP is based on maximum fill height of 200 feet and a moist unit weight of 115 pcf
- Neglect settlement due to recompression

Calculations:

$$S = \frac{(0.128)(10\text{ ft})}{(1+1.02)} \log\left[\frac{(200\text{ ft})(115\text{ pcf})}{9{,}000\text{ psf}}\right] = 0.23\text{ ft} = 2.7"$$

Thickness (ft)	P_c (ksf)	Settlement (inches)
10	9.0	2.7
10	4.5	4.7
20	9.0	5.5
20	4.5	9.5

Bland fill Settlement Analysis - Christopher Sather

Previous values → from Salt Lake Valley Landfill (Master Plan Volume II November, 1991)

Sample (ST-2) ⇒ P_c = 4.1 ksf
LL = 32 P_o = 1.2 ksf
OCR = 3.4
C_c = 0.162
C_c = .198 (empirical)

Sample (ST-4) ⇒ P_c = 4.7 ksf
LL = 35 P_o = 1.6 ksf
OCR = 2.9
C_c = 0.250
C_c = 0.225 (empirical)

Sample (ST-5) ⇒ P_c = 2.7 ksf
LL = 38 P_o = 1.8 ksf
OCR = 1.5
C_c = 0.260
C_c = .252 (empirical)

$C_c = 0.009(LL - 10)$

→ for normally consol. clays.

$$S = \frac{C_c H}{1+e_o} \log\left(\frac{P_o + \Delta P}{P_o}\right)$$

↓ initial void ratio

New data

$C_c = 0.007(LL - 7)$ → remolded clays (Rendon-Herrero, 1980)

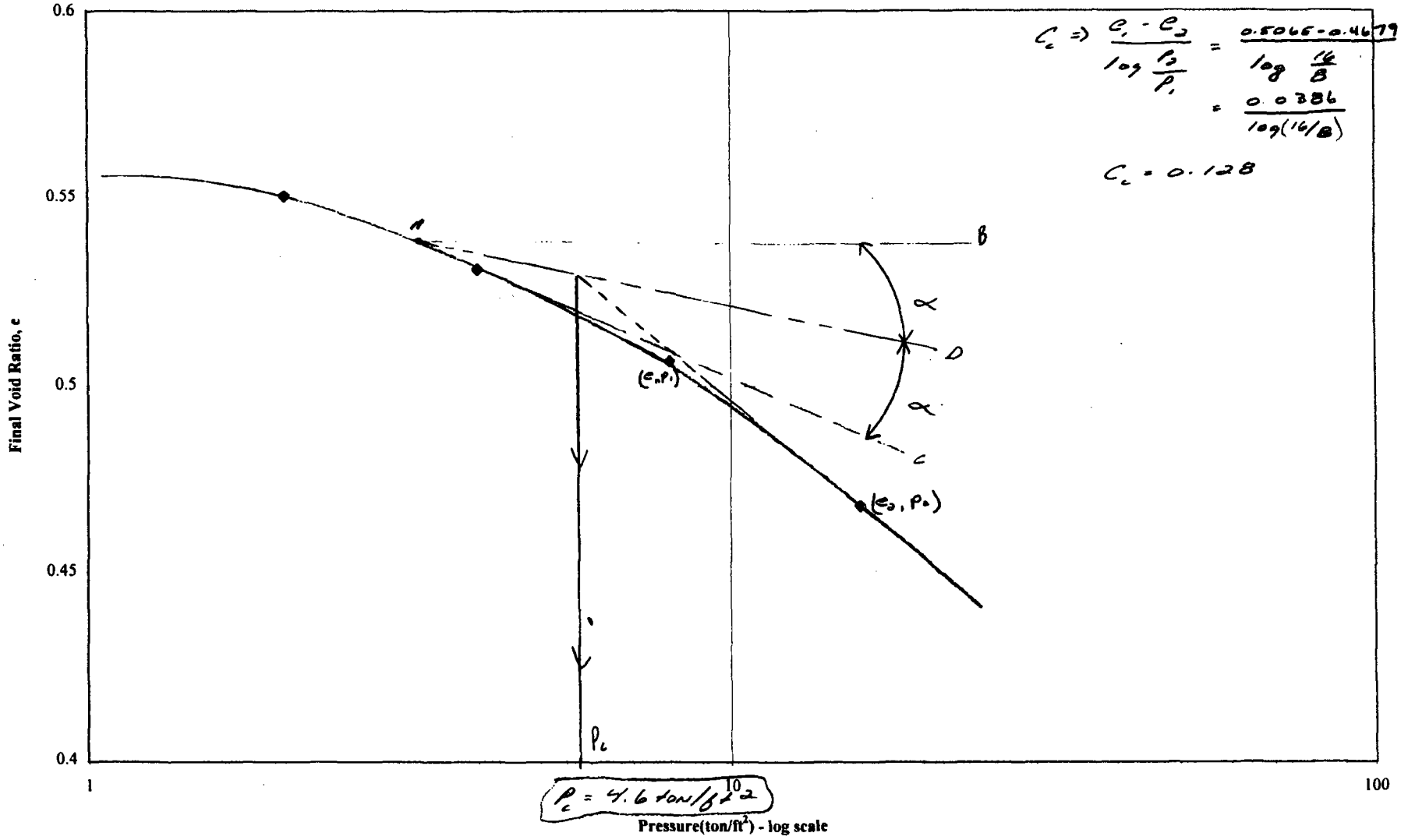
Sample #		LL	C_c (empirical)
Bulk	SA 1	29	0.154
	SA 2	28	0.147
	SA 3	31	0.168
	SA 4	20	0.147

no LL data for core samples → consolidation test was performed on core # 4.

$$H_s = W_s / \left(\frac{\pi}{4} D^2\right) G_s \gamma_w = \frac{2.24026\ lb}{\left(\frac{\pi}{4}\right)(3.43)^2 \frac{ft^2}{144 in^2}(2.70)(62.4\ \frac{lb}{ft^3})}$$

$$= 0.4163\ in.$$

Final Void Ratio Versus Pressure



CONSOLIDATION TEST

(Void ratio-pressure and coefficient of consolidation calculation)

Description of soil Blandford - 5:15 Clay Light Brown Location Utah

Specimen diameter 2.42 in. Initial specimen height, $H_{t(i)}$ 1.0 in.

Moisture content: Beginning of test 33.4 (%) End of test 29.4 %

Weight of dry soil specimen 100.89 G_s 2.70 Height of solids, H_s 1.0574 cm = 0.4163 in.

Pressure, p (ton/ft^2) (1)	Final dial reading (in.) (2)	Change in specimen height (in.) (3)	Final specimen height, $H_{t(f)}$ (in.) (4)	Height of void, H_v (in.) (5)	Final void ratio, e (6)	Average height during consolidation, $H_{t(av)}$ (in.) (7)	Fitting time (sec) t_{90} (8)	Fitting time (sec) t_{50} (9)	c_v from $\times 10^{-3}$ (in.^{2}/sec) t_{90} (10)	c_v from $\times 10^{-3}$ (in.^{2}/sec) t_{50} (11)
0	1.000		1.000	0.8698	0.5837					
		0.0333				0.9834	240	1740	0.854	0.027
2	0.0333		0.9667	0.8365	0.5504					
		0.0197				0.9569	303.6		0.639	
4	0.0530		0.9470	0.8168	0.5307					
		0.0342				0.9349	317.4	306	0.583	0.150
8	0.0772		0.9228	0.7926	0.5065					
		0.0386				0.9035	345.6		0.501	
16	0.1158		0.8842	0.754	0.4679					

Consolidation Test

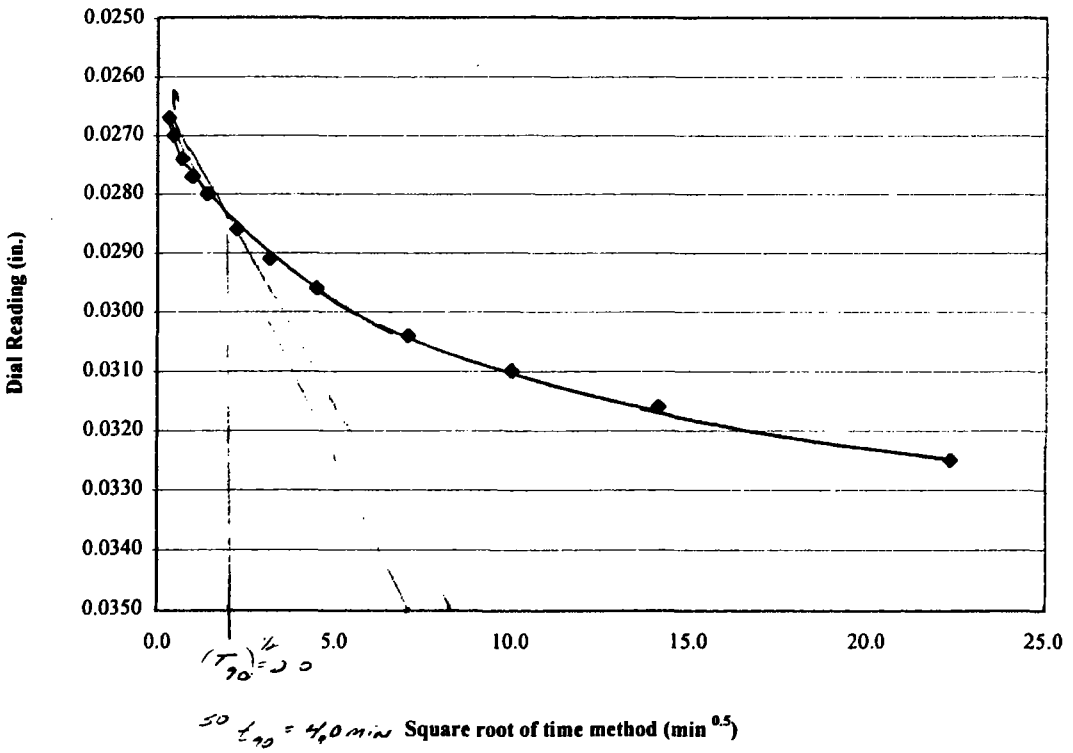
Blandfill

Description of Soil: Silty Clay, Light Brown with Roots

Pressure on Specimen: 2.00 KSF

Time after load application, t(min.)	Square root of time (min.)	Vertical Dial Reading (in.)
0.1	0.3	0.0267
0.2	0.4	0.0270
0.5	0.7	0.0274
1	1.0	0.0277
2	1.4	0.0280
5	2.2	0.0286
10	3.2	0.0291
20	4.5	0.0296
50	7.1	0.0304
100	10.0	0.0310
200	14.1	0.0316
500	22.4	0.0325
1363	36.9	0.0333
1583	39.8	0.0333

T_{90} by square root of time method



Consolidation Test

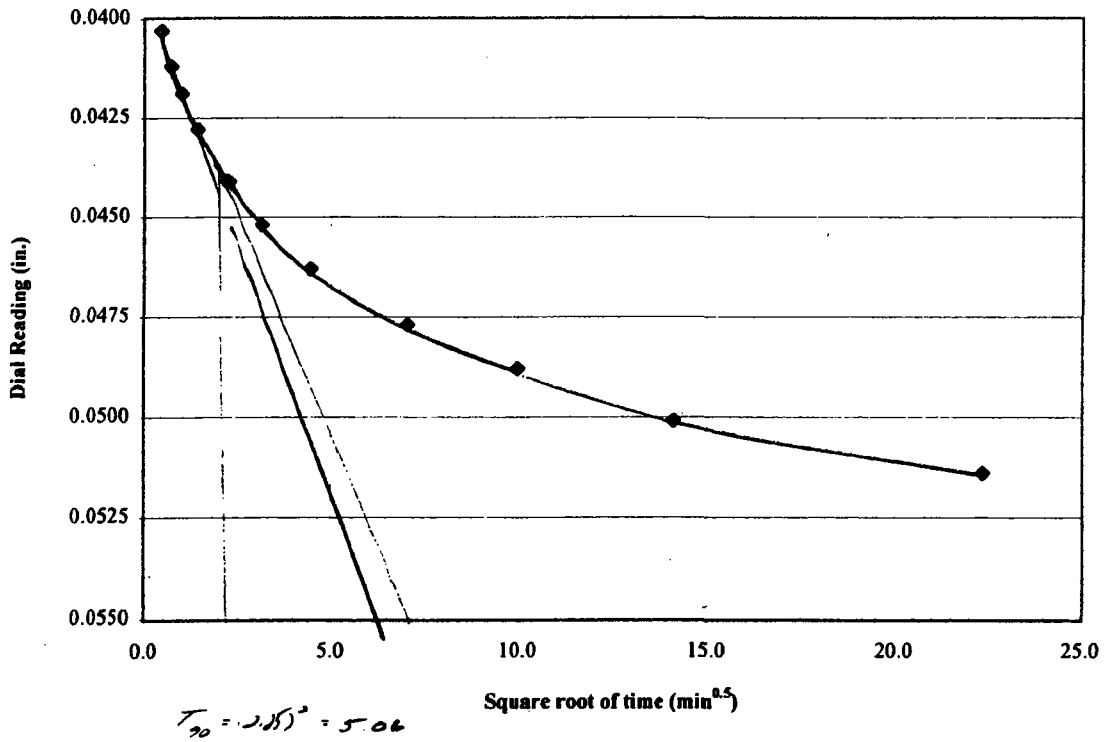
Blandfill

Description of Soil: Silty Clay, Light Brown with Roots

Pressure on Specimen: 4.00 KSF

Time after load application, t(min.)	Square root of time (min.)	Vertical Dial Reading (in.)
0.1	0.3	0.0396
0.2	0.4	0.0403
0.5	0.7	0.0412
1	1.0	0.0419
2	1.4	0.0428
5	2.2	0.0441
10	3.2	0.0452
20	4.5	0.0463
50	7.1	0.0477
100	10.0	0.0488
200	14.1	0.0501
500	22.4	0.0514
1354	36.8	0.0530
1486	38.5	0.0530

T_{90} Method by square root of time method



$T_{90} = (2.15)^2 = 5.06$

Consolidation Test

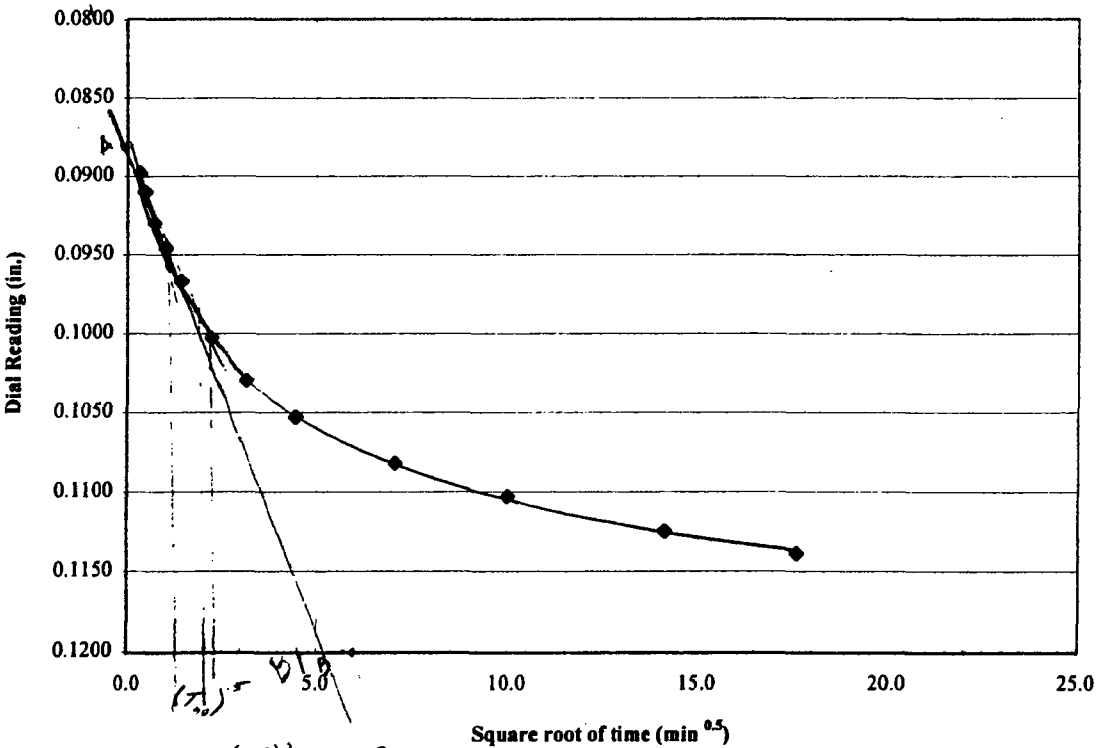
Blandfill

Description of Soil: Silty Clay, Light Brown with Roots

Pressure on Specimen: 8.00 KSF

Time after load application, t(min.)	Square root of time (min.)	Vertical Dial Reading (in.)
0.1	0.3	0.0620
0.2	0.4	0.6260
0.5	0.7	0.0638
1	1.0	0.0648
2	1.4	0.0657
5	2.2	0.0670
10	3.2	0.0684
20	4.5	0.0700
50	7.1	0.0719
100	10.0	0.0733
200	14.1	0.0743
310	17.6	0.0750
1340	36.6	0.0772
1545	39.3	0.0772

T_{90} by square root of time method



$T_{90} = (2.3)^2 = 5.29$ min.

240 sec

Consolidation Test

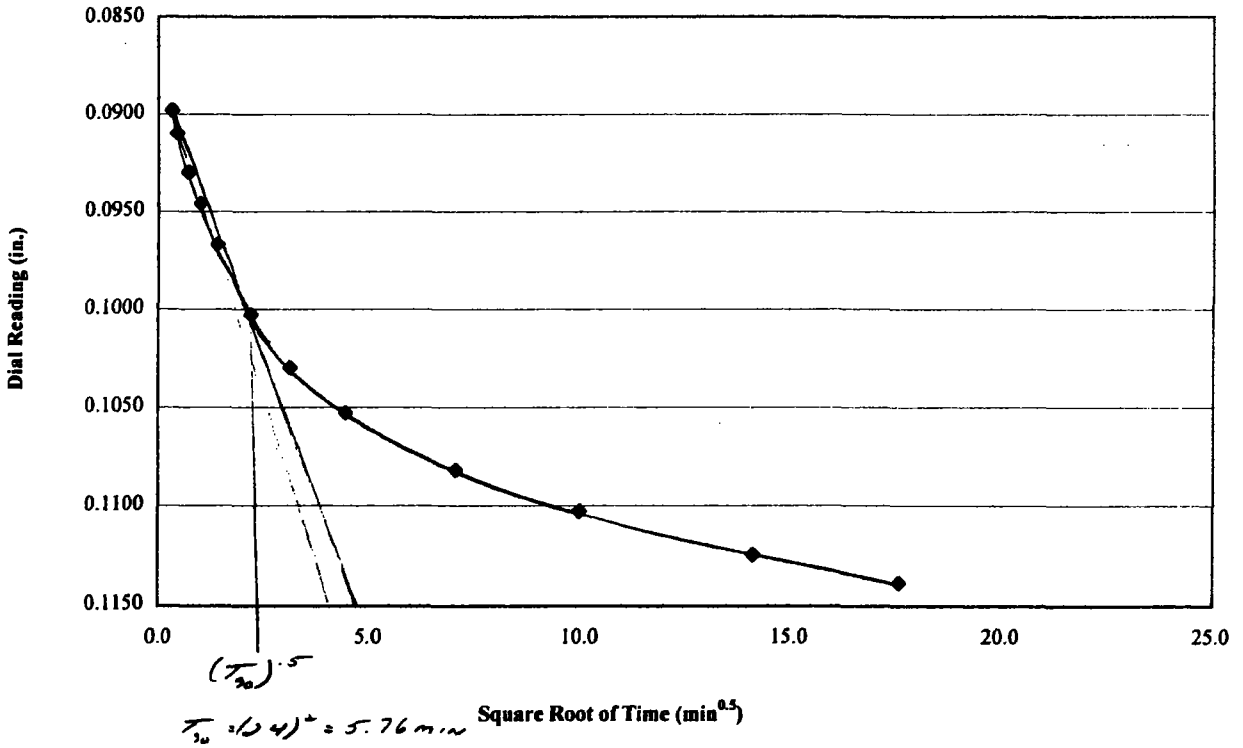
Blandfill

Description of Soil: Silty Clay, Light Brown with Roots

Pressure on Specimen: 16.00 KSF

Time after load application, t(min.)	Square root of time (min.)	Vertical Dial Reading (in.)
0.1	0.3	0.0898
0.2	0.4	0.0910
0.5	0.7	0.0930
1	1.0	0.0946
2	1.4	0.0967
5	2.2	0.1003
10	3.2	0.1030
20	4.5	0.1053
50	7.1	0.1082
100	10.0	0.1103
200	14.1	0.1125
310	17.6	0.1139
1408	37.5	0.1157
1661	40.8	0.1158

T_{90} by square root of time method



Consolidation Test

Blandfill

Description of Soil — Silty Clay, Light Brown with Roots

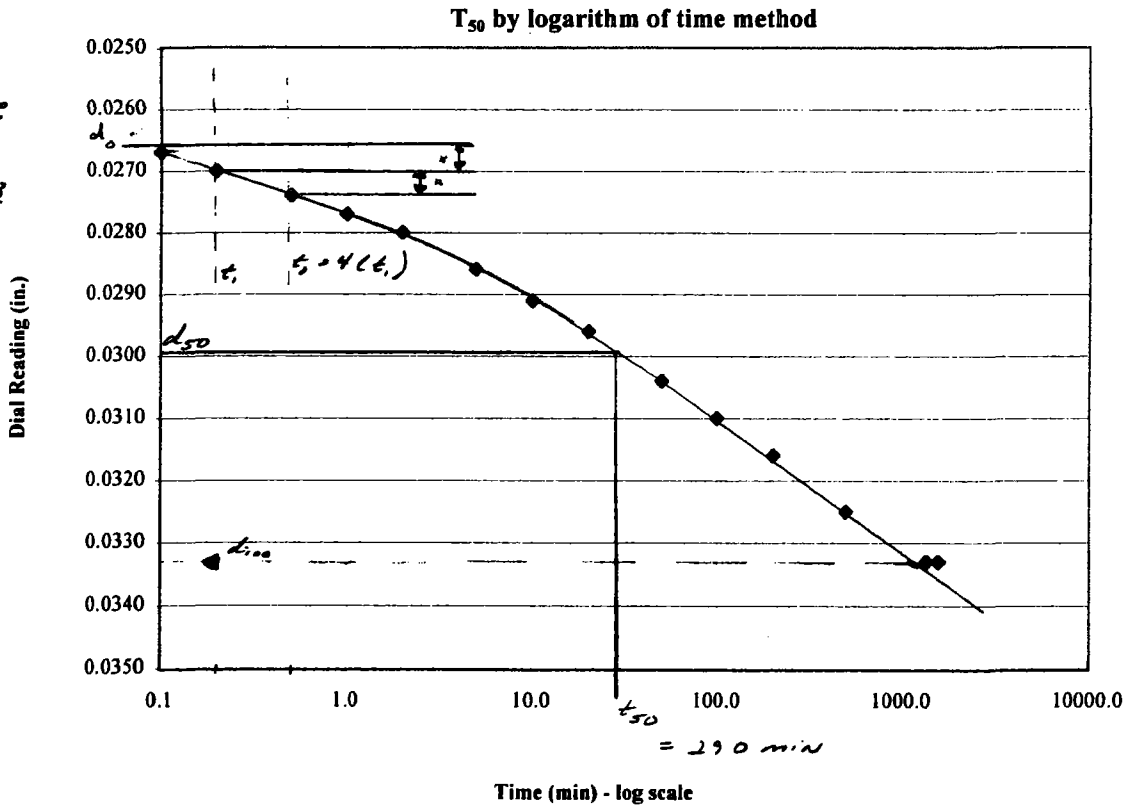
Pressure on Specimen — 2.00 KSF

Time after load application, t(min.)	Square root of time (min.)	Vertical Dial Reading (in.)
0.1	0.3	0.0267
0.2	0.4	0.0270
0.5	0.7	0.0274
1	1.0	0.0277
2	1.4	0.0280
5	2.2	0.0286
10	3.2	0.0291
20	4.5	0.0296
50	7.1	0.0304
100	10.0	0.0310
200	14.1	0.0316
500	22.4	0.0325
1363	36.9	0.0333
1583	39.8	0.0333

$= \frac{d_0 + d_{100}}{2}$

$= \frac{.0265 + .1333}{2}$

$= .02995$



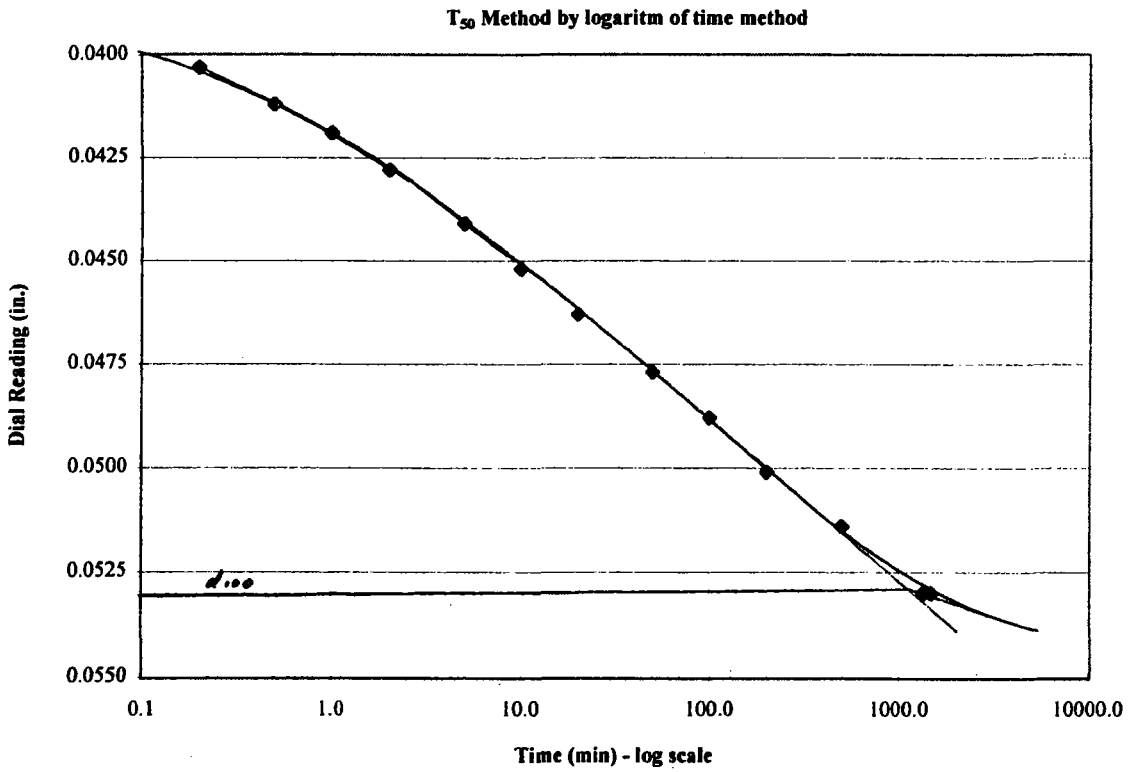
Consolidation Test

Blandfill

Description of Soil: Silty Clay, Light Brown with Roots

Pressure on Specimen: 4.00 KSF

Time after load application, t(min.)	Square root of time (min.)	Vertical Dial Reading (in.)
0.1	0.3	0.0396
0.2	0.4	0.0403
0.5	0.7	0.0412
1	1.0	0.0419
2	1.4	0.0428
5	2.2	0.0441
10	3.2	0.0452
20	4.5	0.0463
50	7.1	0.0477
100	10.0	0.0488
200	14.1	0.0501
500	22.4	0.0514
1354	36.8	0.0530
1486	38.5	0.0530



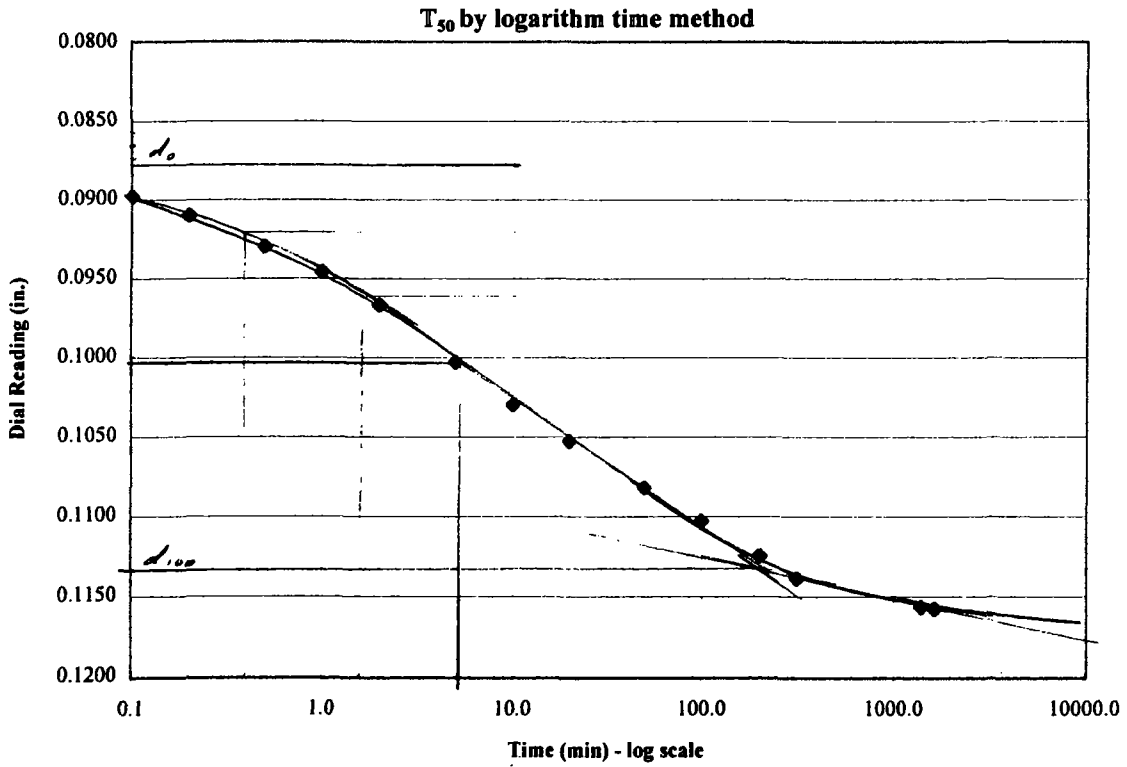
Consolidation Test

Blandfill

Description of Soil: Silty Clay, Light Brown with Roots

Pressure on Specimen: 8.00 KSF

Time after load application, t(min.)	Square root of time (min.)	Vertical Dial Reading (in.)
0.1	0.3	0.0620
0.2	0.4	0.6260
0.5	0.7	0.0638
1	1.0	0.0648
2	1.4	0.0657
5	2.2	0.0670
10	3.2	0.0684
20	4.5	0.0700
50	7.1	0.0719
100	10.0	0.0733
200	14.1	0.0743
310	17.6	0.0750
1340	36.6	0.0772
1545	39.3	0.0772



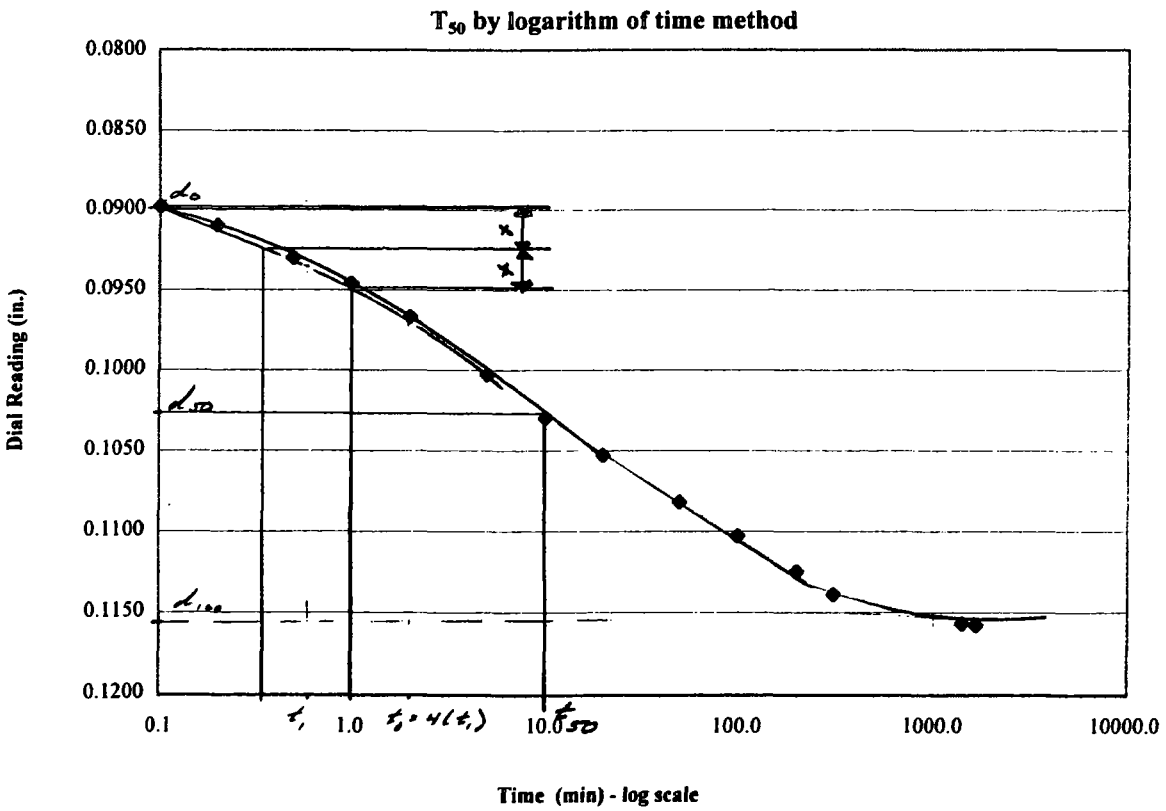
Consolidation Test

Blandfill

Description of Soil: Silty Clay, Light Brown with Roots

Pressure on Specimen: 16.00 KSF

Time after load application, t(min.)	Square root of time (min.)	Vertical Dial Reading (in.)
0.1	0.3	0.0898
0.2	0.4	0.0910
0.5	0.7	0.0930
1	1.0	0.0946
2	1.4	0.0967
5	2.2	0.1003
10	3.2	0.1030
20	4.5	0.1053
50	7.1	0.1082
100	10.0	0.1103
200	14.1	0.1125
310	17.6	0.1139
1408	37.5	0.1157
1661	40.8	0.1158



Appendix C

Drainage Analysis

CONTENTS

CONTENTS (Continued)

HYDRAULIC CALCULATIONS

LIST OF TABLES AND FIGURES

Tables

Figures

1 INTRODUCTION

This drainage analysis was prepared in conjunction with the revised grading plan for the Mountain View Landfill (formerly Blandfill Landfill) in Salt Lake County, Utah. The objective of this analysis is to provide a basis for the surface drainage system of the revised landfill configuration that would meet the requirements for the phased development and closure period of the site.

The design criteria and methodology established in the previous Drainage Report prepared by EMCON in November 1997 were also adopted in this drainage analysis.

Existing Site Condition

The Mountain View Landfill site is an existing construction and demolition (Class VI) landfill, see Figure C-1, Vicinity Map. Natural topography of the site and surrounding areas gently slopes towards the northwest. Existing fill at the central portion of the site builds out at elevation 4,350 feet above mean sea level (msl). Surrounding ground is relatively flat ranging from 4,220 feet msl and 4217 feet msl at the north/northwest and southwest of the site, respectively.

The area immediately east of the site is occupied by the Salt Lake Valley Landfill. North of the site is a wedge-shaped open area bound by the northern fill limit and an earth mound (abandoned railroad) traversing diagonally beginning at the northwest corner of the property. This open area creates additional contributory flow along the northern perimeter of the site. Drainage tributary to the south is minimal due to an existing ditch alongside 1300 South Street. West of the site is 7200 West Street and Lee Creek where most of the site surface runoff will drain.

The landfill development will occupy approximately 76 acres of land with a new entrance facility located in the southeast corner of the site. The entrance facility is comprised of an all-weather access road and an entrance area that includes a scalehouse, truck scale, an office trailer with employee parking, and a maintenance shop.

Proposed Development

The landfill development will occupy approximately 74 acres of land with a new entrance facility located in the southeast corner of the site. The entrance facility will have a paved entrance area that includes a scalehouse, two truck scales, an office trailer with employee parking, and a maintenance shop with truck wash pad.

The final landfill slopes will be constructed no steeper than 2:1 (horizontal to vertical) slope ratio, with 25-foot wide benches at 50-foot vertical increments. A minimum final surface slope of 5 percent at the landfill deck area will be used to provide sufficient slope for runoff after landfill settlement. Diversion berms on top deck of the landfill and drainage ditches on landfill benches will be provided to convey runoff to overside drains and drainage ditches along the perimeter of the landfill. Collected runoff will then be routed through detention ponds before being released off-site. Run-on storm flow from an off-site area north of the landfill and a small portion of the northeast corner of the landfill will be diverted away from the site and conveyed through a drainage pipe across 7200 West Street.

Several detention ponds are proposed at the perimeter of the landfill. These ponds will be used for sediment control and runoff detention. Pond outlet structures will drain collected storm water in the ponds to existing drainage facilities along the south and west perimeter of the site. Locations of drainage facilities are shown on the landfill development drawings and drainage map.

2 HYDROLOGY ANALYSIS

The method used for the hydrologic analysis of the proposed landfill development is based on the Technical Release 55 (TR-55), *Urban Hydrology for Small Watershed* published by the Natural Resources Conservation Service (NRCS). Runoff peak flows and storm hydrographs obtained from the hydrologic analysis are based on the 25-year, 24-hour frequency storm event and presented in Appendix C-1.

Precipitation

Rainfall data from the nearest precipitation station (National Weather Service-Salt Lake City Station [SLCS]) was used to simulate the storm event at the site. The estimated 25-year, 24-hour precipitation reported from the SLCS is 2.65 inches.

Rainfall Distribution

TR-55 includes four synthetic 24-hour rainfall distributions developed by the NRCS representing various regions of the United States. Based on the geographical location of the site, Type II rainfall distribution and antecedent moisture condition (AMC) II was used in the analysis.

Time of Concentration

The time of concentration (T_c) is the time for runoff to travel from the most hydraulically distant point in a drainage subarea to reach the collection point. Calculation for T_c consists of overland flow or sheet flow, shallow concentrated flow, and open channel flow, or some combination, to the collection point. The T_c calculated for the landfill drainage subarea ranges from 6 to 8 minutes, approximately 0.1 hour, the minimum time concentration allowed for the TR-55 computer program.

Overland flow times were calculations based on the kinematic equation for sheet flow condition Travel times for shallow concentrated and open channel flows were calculated based on flow velocities obtained from Manning's equation. Data input for the TR-55 computer analysis are presented in the hydrology calculations.

An approximate T_c for the off-site drainage area was developed based on the topographic features shown on the US Geological Survey (USGS) map and open channel flow time along the northern perimeter of the site.

Hydrologic Soil Group

Selection of runoff CNs area based on the hydrologic soil classification, cover type, hydrologic conditions, and antecedent moisture condition. The soils at the site are predominantly silty clay loam classified as Type C under the NRCS soil group system. Based on available soil information and land use, the CN values used for the analysis are

Area Description	CN
Landfill Top Deck	86
Landfill Side Slope	88
Perimeter/Access Road	90
Undeveloped Area	79

Drainage Areas

Tributary areas to drainage ditches/downdrains and detention ponds are divided into subareas as shown on Figure C-2, Drainage Map. Drainage subareas to drainage facilities are as follows:

Subarea Designation	Drainage Facilities	Detention Pond
A & B	North Perimeter Ditch, LF Drainage Benches, Crossdrains and Downdrains	
C	West Perimeter Ditch, LF Drainage Benches, Crossdrains and Downdrains	
A, B, & C		Northwest Detention Pond
D & E	South Perimeter Ditch, LF Drainage Benches, Crossdrains and Downdrains	Southwest Detention Pond
F	East Perimeter Ditch LF Drainage Benches, Crossdrains and Downdrains	Southeast Detention Pond
G	North Diversion Ditch	
K	North Diversion Ditch	

3 HYDRAULIC ANALYSIS

Estimated peak flows obtained from the hydrologic evaluation of drainage subareas were used for designing the proposed storm water drainage system for the landfill development. Drainage control facilities for the landfill consist of diversion berm with drainage ditch on the top deck area, a V-ditch on landfill benches, a trapezoidal ditch on the access road and perimeter bench, pipe downdrains on side slope areas, and pipe crossdrains on landfill benches. Drainage ditches along the perimeter of the landfill were analyzed with erosion control mat lining or equivalent protective material for protection against soil erosion. Drainage conveyance structures were sized or checked for capacity using Manning's equation for open channel.

Proposed detention ponds at the landfill perimeter were analyzed to determine required storage capacity during the design storm event. The combined flows from tributary areas to detention ponds as shown on the drainage map waer analyzed based on the TR-55 computer program. Results of the hydrologic evaluation for inflow to detention ponds are presented in Appendix C-1. Hydraulic analyses of drainage structures and detention ponds are included in Appendix C-2.

The summary of landfill drainage structures and detention ponds is presented in Tables C-1 and 2, respectively.

4 CONCLUSIONS

The drainage facilities proposed for the new landfill development are designed to handle the 25-year, 24-hour frequency storm event. Periodic maintenance and best management practices should be implemented throughout the development phase of the landfill to maintain hydraulic capacities of proposed drainage facilities.

Drainage ditches with flow velocities of 5 fps or less should be lined with grass. Drainage ditches with greater than 5 fps flow velocities should be lined with erosion control mat or equivalent protective material for protection against erosion. Drainage ditches along access road with steep grades should be lined with concrete. Pipe downdrains on the landfill side slopes are designed to convey flow to perimeter drainage facilities and should be provided with energy dissipator or transition section at pipe outlet for protection against erosion. Crossdrains on landfill benches and access road may be metal or concrete pipe with minimum pipe cover for vehicular traffic.

Sediments are expected to be generated during the active phase of landfill development. During the wet season, erosion and sediment control devices such as sediment traps and silt fences should be used to minimize sediment transport to downstream drainage facilities and detention ponds. Sediment production is expected to decline when portions of the landfill are closed and vegetated.

Proposed detention ponds were analyzed for the design storm event and have sufficient capacity to pass the storm runoff volume through the pond. Due to limited pond capacity, all detention ponds should be desilted after storm events to provide maximum storage for the next storm and prevent an overtopping condition. Outlet pipes for the ponds should be inspected and any obstructions should be removed to make certain that outlet structure will properly function.

TABLES

Table C-1

Mountain View Landfill
Salt Lake County, Utah

Summary of Drainage Facilities

Drainage Area	Design Q (cfs)	Drainage Structure	Type
A1	1	LF Bench Ditch	DD-A
	1	LF Access Road	DD-C
	2	Crossdrain/Downdrain	12" CMP-T
A2	5	North Perimeter Ditch	DD-D
A3	3	LF Access Road	DD-C
	3	LF Bench Ditch	DD-A
	6	Crossdrain/Downdrain	12" CMP-T
B1	4	LF Bench Ditch	DD-A
	4	Crossdrain/Downdrain	12" CMP
B2	6	LF Bench Ditch	DD-A
	3	LF Access Road	DD-C
	13	Crossdrain/Downdrain	18" CMP
B3	3	LF Bench Ditch	DD-A
	16	Crossdrain/Downdrain	24" CMP-T
B4	15	North Perimeter Ditch	DD-D
C5b	34	North Perimeter Ditch	DD-E
	34	Crossdrain/Inlet to Northwest Detention Pond	30" CMP-RR
C1	3	Top Deck LF Bench	DD-B
	3	LF Access Road	DD-C
	6	Crossdrain/Downdrain	18" CMP

Table C-1 (continued)

Mountain View Landfill
Salt Lake County, Utah

Summary of Drainage Facilities

Drainage Area	Design Q (cfs)	Drainage Structure	Type
C2	2	LF Bench Ditch	DD-A
	8	Crossdrain/Downdrain	18" CMP
C3	4	North LF Bench Ditch	DD-A
	4	West LF Bench Ditch	DD-A
	16	Crossdrain/Downdrain	24" CMP
C4	6	North LF Bench Ditch	DD-A
	6	West LF Bench Ditch	DD-A
	28	Crossdrain/Downdrain	24" CMP
C5a	6	West Perimeter Ditch	DD-D
	34	Crossdrain/Inlet to Northwest Detention Pond	30" CMP-RR
C6	3	Northwest Detention Pond	
D1	6	Top Deck Diversion Berm	DD-B
	6	Crossdrain/Downdrain	18" CMP
D2	3	LF Bench Ditch	DD-A
	9	Crossdrain/Downdrain	18" CMP
D3	3	LF Bench Ditch	DD-A
	12	Crossdrain/Downdrain	18" CMP
D4	2	LF Bench Ditch	DD-A
	14	Crossdrain/Downdrain	18" CMP-T
D5	17	South Perimeter Ditch	DD-E
E1	7	Top Deck Diversion Berm & LF Bench Ditch	DD-B & DD-A

Table C-1 (continued)

Mountain View Landfill
Salt Lake County, Utah

Summary of Drainage Facilities

Drainage Area	Design Q (cfs)	Drainage Structure	Type
	7	Crossdrain/Downdrain	18" CMP
E2	6	LF Bench Ditch	DD-A
	13	Crossdrain/Downdrain	18" CMP
E3	7	LF Bench Ditch	DD-A
	20	Crossdrain/Downdrain	24" CMP
E4	6	LF Bench Ditch	DD-A
	26	Crossdrain/Inlet to Southwest Detention Pond	24" CMP
E5	24	South Perimeter Ditch	DD-E
	24	Crossdrain/Inlet to Southwest Detention Basin	24" CMP-RR
E6	3	Southwest Detention Pond	
F1	5	East LF Bench Ditch	DD-A
	1	South LF Bench Ditch	DD-A
	6	Crossdrain/Downdrain	18" CMP
F2	4	East LF Bench Ditch	DD-A
	3	South LF Bench Ditch	DD-A
	13	Crossdrain/Downdrain	18" CMP
F3	5	East LF Bench Ditch	DD-A
	3	South LF Bench Ditch	DD-A
	21	Downdrain/Inlet to Southeast Detention Pond	24" CMP-RR
F4	8	East Perimeter Ditch	DD-D
	4	South Perimeter Ditch	DD-D

Table C-1 (continued)

Mountain View Landfill
Salt Lake County, Utah

Summary of Drainage Facilities

Drainage Area	Design Q (cfs)	Drainage Structure	Type
	12	Ditch/Inlet to Southeast Detention Pond	DD-D
G1	4	North Diversion Ditch	
K1[2]	18	North Diversion Ditch	

Notes:

1. Locations of drainage facilities are shown on Drawing 1 - Landfill Final Grading and Drainage Plan.
2. From 1997 Drainage Report.

Abbreviations:

DD-A = Drainage Ditch-Type A, "V"-shaped, grass-lined, d=1.0', z=2:1
DD-B = Drainage Ditch-Type B, Trapezoidal shape, grass-lined, d=1.0', b=1', z=2:1 & 5:1
DD-C = Drainage Ditch-Type C, Trapezoidal shape, concrete-lined, d=1.0', b=1', z=2:1
DD-D = Drainage Ditch-Type D, Trapezoidal shape, grass-lined, d=1.5', b=1', z=2:1
DD-E = Drainage Ditch-Type E, Trapezoidal shape, ECM/grass-lined, d=1.5', b=2', z=2:1
CMP = Corrugated Metal Pipe
CMP-T = Corrugated Metal Pipe with tee outlet
CMP-RR = Corrugated Metal Pipe with rock riprap outlet
cfs = cubic feet per second

Table C-2

Mountain View Landfill
Salt Lake County, Utah

Summary of Detention Ponds

	Northwest Detention Pond	Southwest Detention Pond	Southeast Detention Pond
Peak Inflow (cfs)	77.0	48.0	33.0
Pond Volume (ac-ft)	1.7	1.5	0.6
Dead Storage (ac-ft)	0	0	0
Peak Storm Storage (ac-ft)	1.1	0.9	0.4
Peak Outflow (cfs)	40	25	20
Outlet Structure	2 - 24" RCP	1 - 24" RCP	1 - 24" RCP

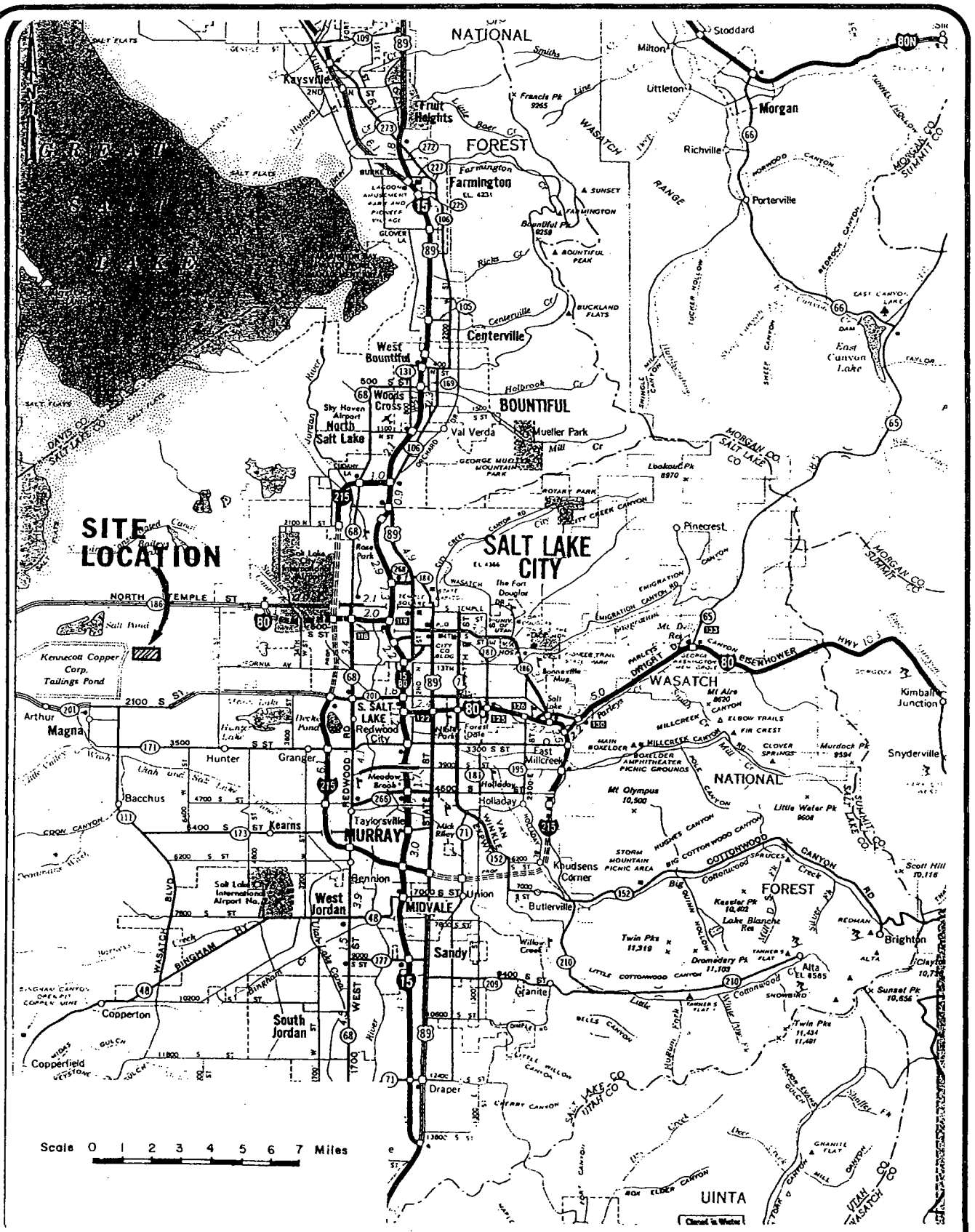
Notes:

1. Locations of detention ponds are shown on Drawing 1 - Landfill Final Grading and Drainage Plan.

Abbreviations:

ac-ft = acre feet
cfs = cubic feet per second
RCP = Reinforced Concrete Pipe

FIGURES



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Dimscale: 1 Ltscale: 0.5 Psltscale: 1

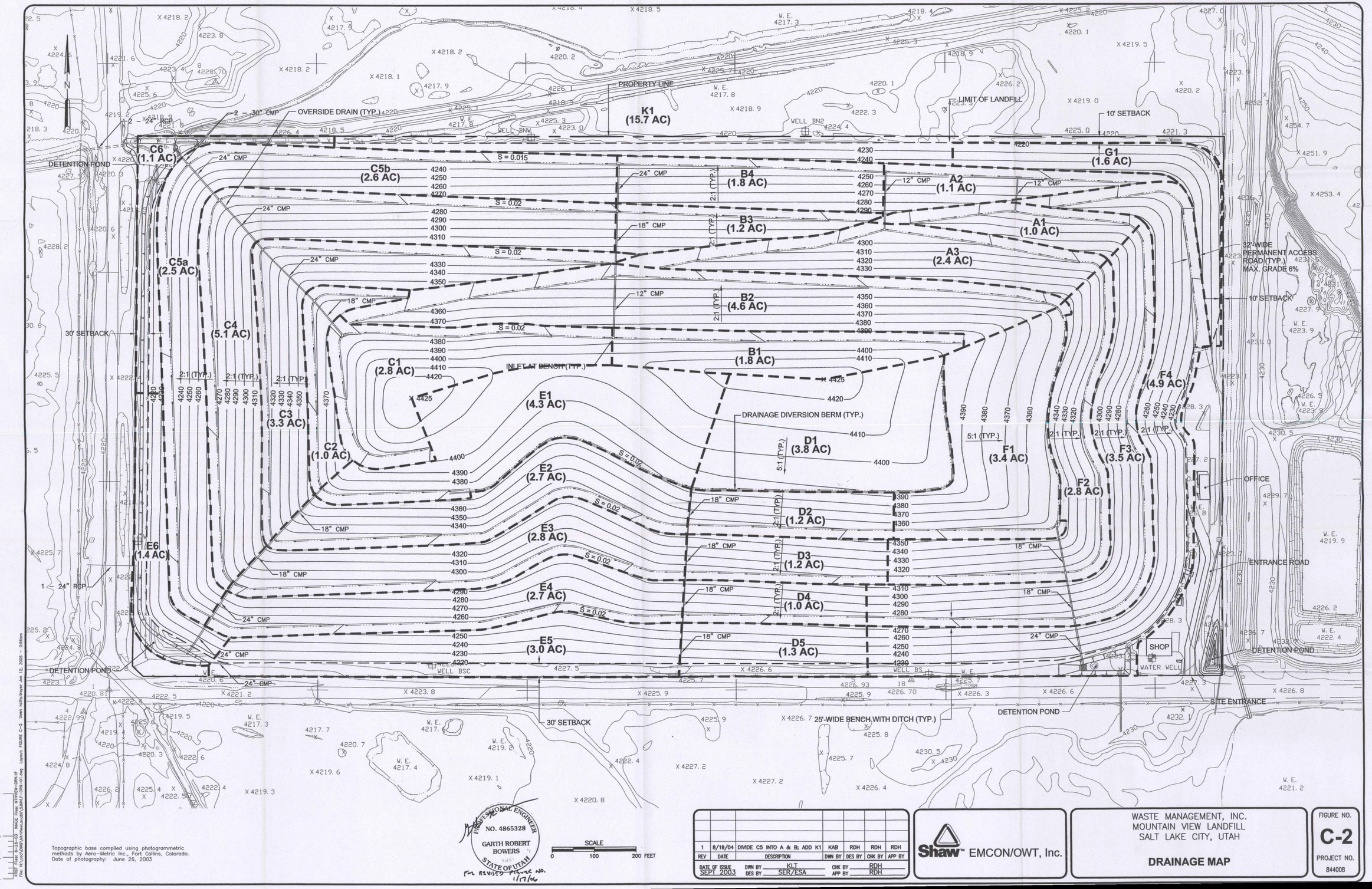
1" 1/2" 0" 1"

Shaw° EMCON/OWT, Inc.

DATE	FEB. 2000
DWN	KLT
APP	ESA
REV	0
PROJECT NO.	801569

FIGURE C-1
MOUNTAIN VIEW LANDFILL
SALT LAKE COUNTY, UTAH

VICINITY MAP



Topographic base compiled using photogrammetric methods by Aero-Metric Inc., Fort Collins, Colorado.
Date of photography: June 26, 2003

PROFESSIONAL ENGINEER
NO. 4865328
GARTH ROBERT BOWERS
STATE OF UTAH

For revised figure no. 1/17/06

SCALE
0 100 200 FEET

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
1	8/19/04	DIVIDE C5 INTO A & B; ADD K1	KAB	RDH	RDH	RDH

DATE OF ISSUE SEPT 2003 | DWN BY KLT | DES BY SER/ESA | CHK BY RDH | APP BY RDH

Shaw EMCON/OWT, Inc.

WASTE MANAGEMENT, INC.
MOUNTAIN VIEW LANDFILL
SALT LAKE CITY, UTAH

DRAINAGE MAP

FIGURE NO. **C-2**
PROJECT NO. 844008

1" 1/2" 0" 1"
REF # Date: 8-Jul-03 IMAGE Files: MVNEW-DRN.tif
File: N:\cad\OWE\MtnView\Land\SALKLF-DRN-01.dwg Layout: FIGURE C-2 User: kathy.troyer Jan 12, 2006 - 9:56cm

APPENDIX C-1

HYDROLOGY CALCULATIONS

PRECIPITATION DATA

ESTIMATED RETURN PERIODS FOR SHORT DURATION PRECIPITATION
(inches)

Station: Saint George Elevation: 2760
Latitude: 37° 07' Longitude: 113° 34'

RETURN PERIOD (years)	DURATION 5 Min	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	12 Hr	24 Hr
1	.17	.26	.32	.45	.57	.58	.60	.63	.66	.69
2	.23	.35	.44	.62	.78	.80	.83	.88	.93	.98
5	.31	.48	.61	.85	1.07	1.12	1.17	1.29	1.40	1.51
10	.37	.58	.74	1.02	1.29	1.35	1.40	1.54	1.66	1.79
25	.46	.72	.91	1.26	1.60	1.67	1.73	1.89	2.03	2.18
50	.55	.85	1.07	1.49	1.88	1.95	2.02	2.18	2.33	2.48
100	.61	.95	1.20	1.67	2.11	2.19	2.26	2.45	2.62	2.79

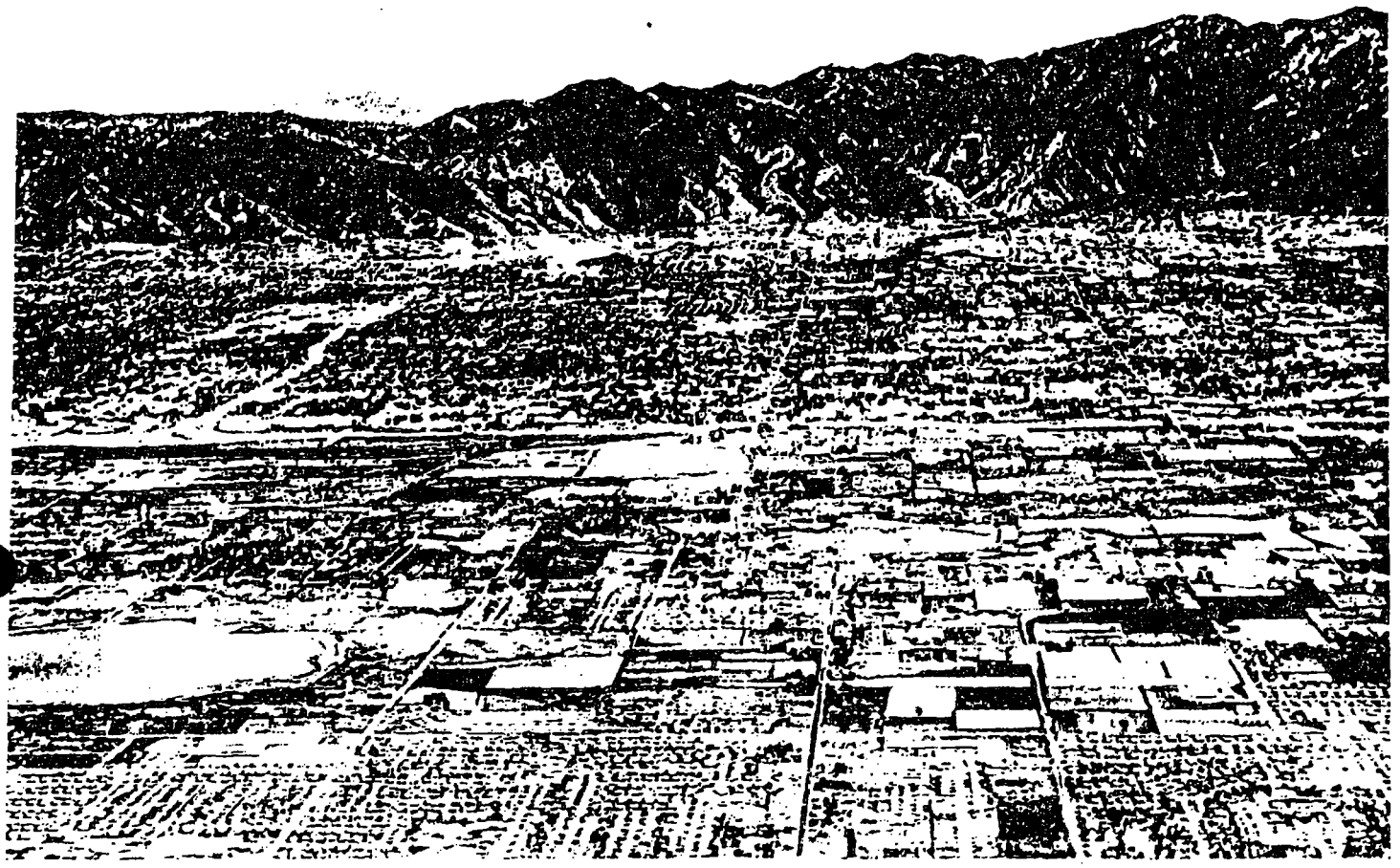
Station: Salt Lake City Elevation: 4300
Latitude: 40° 46' Longitude: 111° 53'

RETURN PERIOD (years)	DURATION 5 Min	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	12 Hr	24 Hr
1	.14	.21	.27	.37	.47	.54	.61	.78	.93	1.09
2	.15	.23	.30	.41	.52	.62	.72	.96	1.18	1.40
5	.17	.27	.34	.47	.59	.74	.88	1.23	1.54	1.87
10	.18	.27	.35	.48	.61	.79	.97	1.40	1.79	2.19
25	.20	.31	.39	.55	.69	.92	1.13	1.67	2.15	2.65
50	.22	.34	.43	.60	.76	1.02	1.26	1.88	2.43	3.00
100	.23	.36	.46	.64	.81	1.10	1.38	2.08	2.70	3.35

HYDROLOGIC SOIL TYPE MAP

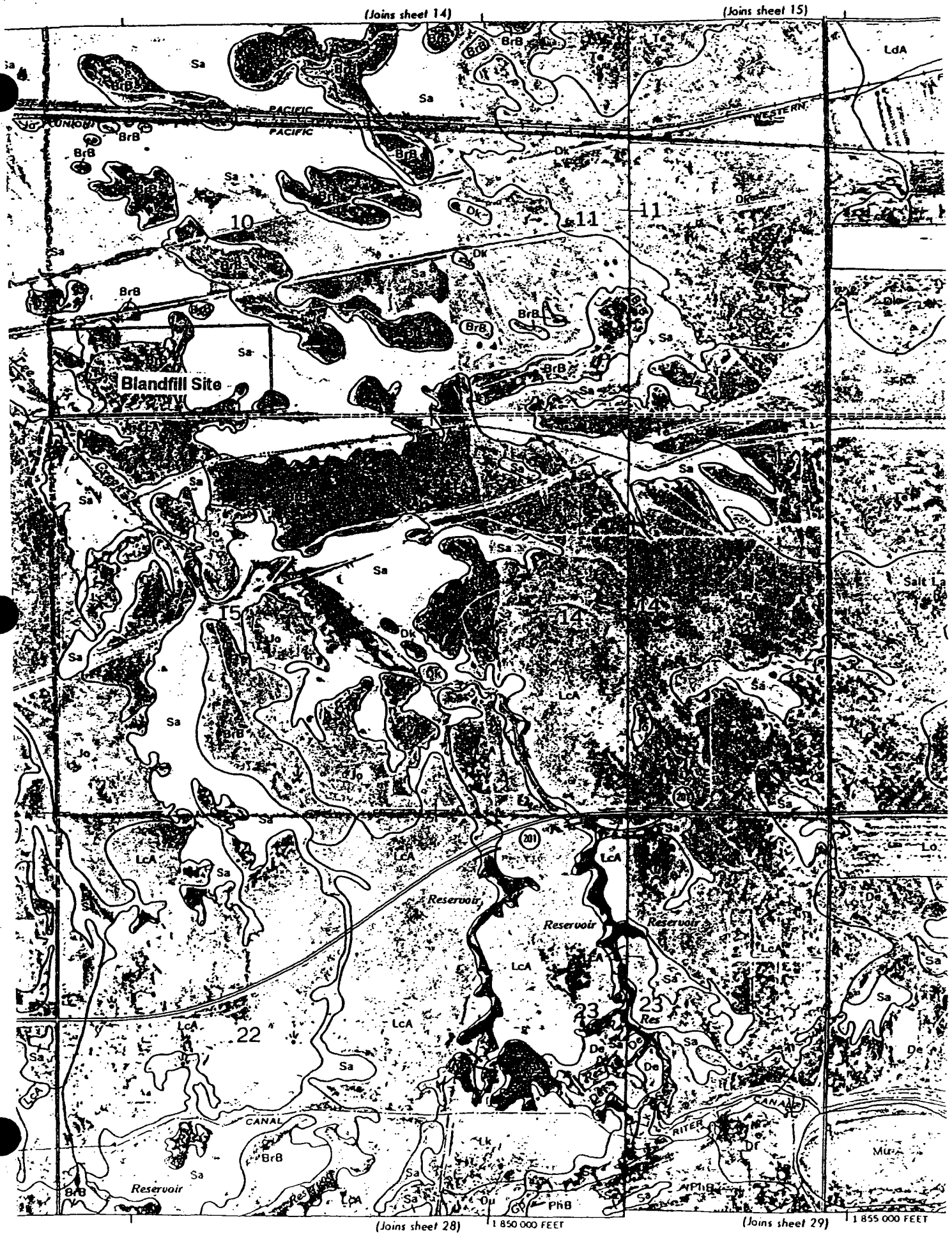
SOIL SURVEY OF

Salt Lake Area, Utah



United States Department of Agriculture
Soil Conservation Service
In cooperation with
Utah Agricultural Experiment Station

Issued April 1974


(Joins sheet 14)
(Joins sheet 15)
Blandfill Site
PACIFIC
WESTERN
Reservoir
CANAL
RIVER
(Joins sheet 28)
1 850 000 FEET
(Joins sheet 29)
1 855 000 FEET

TR-55 DATA INPUT

MOUNTAIN VIEW LANDFILL
Salt Lake County, Utah

Drainage Analysis
TR-55 Data Input

Subarea Designation	Description	Type of Cover	Area	Weighted CN	Elev Start	Elev End	Δ Elev	Distance	S	To	V	Tt	Tc
			ac		ft	ft	ft	ft	ft/ft	hr	fps	hr	hr
A1	LF Sideslope, Bench, Acc Rd	Fair grass,gravel	1.0	88	4310	4277	33.0	75	0.440	0.041			
					4277	4275	2.0	140	0.014		2.4	0.016	0.057
A2	LF Sideslope, Perimeter Bench	Fair grass, gravel	1.1	88	4274	4249	25.0	50	0.500	0.028			
					4249	4244	5.0	320	0.016		4.5	0.020	0.048
A3	LF Sideslope, Bench	Fair grass, gravel	2.4	88	4350	4306	44.0	85	0.518	0.043			
					4306	4294	12.0	390	0.031		3.4	0.032	0.075
B1	LF Top Deck	Fair grass	1.8	86	4425	4393	32.0	90	0.356	0.052			
					4393	4383	10.0	500	0.020		3.9	0.036	0.088
B2	LF Sideslope, Bench, Acc Rd	Fair grass, gravel	4.6	88	4391	4344	47.0	100	0.470	0.050			
					4344	4329	15.0	830	0.018		4.2	0.055	0.105
B3	LF Sideslope, Bench	Fair grass, gravel	1.2	88	4310	4287	23.0	50	0.460	0.029			
					4287	4280	7.0	320	0.022		3.8	0.023	0.053
B4	LF Sideslope, Perimeter Bench	Fair grass, gravel	1.8	88	4290	4245	45.0	100	0.450	0.051			
					4245	4235	10.0	640	0.016		5.9	0.030	0.082
C5b	LF Sideslope, Perimeter Bench	Fair grass, gravel	2.6	88	4280	4235	45.0	90	0.500	0.045			
					4235	4225	10.0	1050	0.010		6.1	0.048	0.093
C1	LF Top Deck, Bench, Acc Rd	Fair grass, gravel	2.8	86	4410	4377	33.0	95	0.347	0.055			
					4377	4370	7.0	350	0.020		3.6	0.027	0.082
C2	LF Sideslope, Bench, Acc Rd	Fair grass, gravel	1.0	88	4381	4360	21.0	45	0.467	0.027			
					4360	4355	5.0	270	0.019		3.2	0.023	0.050
C3	LF Sideslope, Bench	Fair grass, gravel	3.3	88	4364	4320	44.0	100	0.440	0.052			
					4320	4310	10.0	580	0.017		3.7	0.044	0.095
C4	LF Sideslope, Bench	Fair grass, gravel	5.1	88	4322	4275	47.0	100	0.470	0.050			
					4275	4260	15.0	800	0.019		4.3	0.052	0.102

MOUNTAIN VIEW LANDFILL
Salt Lake County, Utah

Drainage Analysis
TR-55 Data Input

Subarea Designation	Description	Type of Cover	Area	Weighted CN	Elev Start	Elev End	Δ Elev	Distance	S	To	V	Tt	Tc
			ac		ft	ft	ft	ft	ft/ft	hr	fps	hr	hr
C5a	LF Sideslope, Perimeter Bench	Fair grass, gravel	2.5	88	4275	4239	36.0	80	0.450	0.043			
					4239	4225	14.0	920	0.015		6.8	0.038	0.081
C6	LF Sideslope, Perimeter Bench	Fair grass, gravel	1.1	90	4226	4219	7.0	20	0.350	0.016			
	Northwest Detention Pond				4219	4217	2.0	200	0.010		3.0	0.019	0.034
D1	LF Top Deck	Fair grass	3.8	86	4425	4388	37.0	260	0.142	0.175			
					4388	4382	6.0	300	0.020		3.9	0.021	0.196
D2	LF Sideslope, Bench	Fair grass, gravel	1.2	88	4390	4355	35.0	80	0.438	0.043			
					4355	4342	13.0	490	0.027		4.1	0.033	0.077
D3	LF Sideslope, Bench	Fair grass, gravel	1.2	88	4355	4315	40.0	85	0.471	0.044			
					4315	4302	13.0	490	0.027		4.1	0.033	0.078
D4	LF Sideslope, Bench	Fair grass, gravel	1.0	88	4312	4275	37.0	75	0.493	0.039			
					4275	4266	9.0	450	0.020		3.3	0.038	0.077
D5	LF Sideslope, Perimeter Bench	Fair grass, gravel	1.3	88	4275	4226	49.0	105	0.467	0.053			
					4226	4224	2.0	450	0.004		3.7	0.034	0.086
E1	LF Top Deck	Fair grass	4.3	86	4405	4375	30.0	170	0.176	0.114			
					4375	4364	11.0	640	0.017		4.3	0.041	0.156
E2	LF Sideslope, Bench	Fair grass, gravel	2.7	88	4375	4336	39.0	120	0.325	0.068			
					4336	4322	14.0	740	0.019		4.3	0.048	0.116
E3	LF Sideslope, Bench	Fair grass, gravel	2.8	88	4336	4297	39.0	120	0.325	0.068			
					4297	4280	17.0	830	0.020		4.5	0.051	0.119
E4	LF Sideslope, Bench	Fair grass, gravel	2.7	88	4297	4260	37.0	110	0.336	0.062			
					4260	4243	17.0	870	0.020		4.3	0.056	0.118
E5	LF Sideslope, Perimeter Bench	Fair grass, gravel	3.0	88	4255	4222	33.0	80	0.413	0.044			
					4222	4220	2.0	550	0.004		4.0	0.038	0.083

MOUNTAIN VIEW LANDFILL
Salt Lake County, Utah

Drainage Analysis
TR-55 Data Input

Subarea Designation	Description	Type of Cover	Area	Weighted CN	Elev Start	Elev End	Δ Elev	Distance	S	To	V	Tt	Tc
			ac		ft	ft	ft	ft	ft/ft	hr	fps	hr	hr
E6	LF Sideslope, Perimeter Bench	Fair grass, gravel	1.4	90	4240	4220	20.0	40	0.500	0.024			0.024
	Southwest Detention Pond												
F1	LF Sideslope, Bench	Fair grass, gravel	3.4	88	4398	4350	48.0	240	0.200	0.143			
					4350	4345	5.0	290	0.017		3.9	0.021	0.164
F2	LF Sideslope, Bench	Fair grass, gravel	2.8	88	4350	4310	40.0	80	0.500	0.041			
					4310	4303	7.0	440	0.016		3.6	0.034	0.075
F3	LF Sideslope, Bench	Fair grass, gravel	3.5	88	4310	4270	40.0	80	0.500	0.041			
					4270	4261	9.0	590	0.015		3.5	0.047	0.088
F4	LF Sideslope, Perimeter Bench	Fair grass, gravel	4.9	88	4282	4240	42.0	90	0.467	0.047			
	Southeast Detention Pond				4240	4230	10.0	950	0.011		3.5	0.075	0.122
G1	LF Sideslope, Diversion Ditch	Fair grass	1.6	88	4250	4220	30.0	60	0.500	0.033			0.033

Notes:
1. See Figure E-2 - Drainage Map, for subarea delineation and drainage path locations.
2. Subarea time of concentration includes overland and shallow concentrated/ditch flow times.
3. Subareas with less than 0.1 hr time of concentration were rounded to the nearest 0.1 hr for computer data input.

Abbreviations:
CN = Curve Number
V = flow velocity
L = length of ditch or pipe
S = slope of ditch or pipe
To = overland travel time
Tt = travel time for shallow concentrated/ditch flow to point of concentration
Tc = time of concentration
ac = acres
cfs = cubic feet per second
ft = feet
ft/sec = feet per second
hr = hour

DRAINAGE SUBAREA CALCULATIONS

Shaw EMCON/OWT, INC

QUANTITY CALCULATIONS

PROJECT TITLE: Mountain View Lanfill, UT — PROJECT NO.: 844008
CALCULATIONS FOR: Drainage Areas — TASK NO.: 1000000
SCALE: 1" = 100' — TOPO DATE: — PAGE: — OF:

AREA OR CONTOUR	PLANIMETER READING (Acres) 1	2	AVERAGE	AREA (Acres)	MID-CONTOUR AVERAGE (Sq. ft.)	CONTOUR INTERVAL (Ft.)	VOLUME (Cu.yd.)
A1	1.018	1.028	1.0				
A2	1.135	1.132	1.1				
A3	2.448	2.437	2.4				
B1	1.811	1.811	1.8				
B2	4.640	4.647	4.6				
B3	1.192	1.181	1.2				
B4	1.786	1.776	1.8				
C1	2.825	2.832	2.8				
C2	0.957	0.957	1.0				
C3	3.309	3.295	3.3				
C4	5.110	5.092	5.1				
C5	5.128	5.135	5.1				
C6	1.089	1.089	1.1				
D1	3.750	3.758	3.8				
D2	1.253	1.242	1.2				
D3	1.213	1.213	1.2				
D4	1.032	1.032	1.0				
D5	1.345	1.338	1.3				
TOTAL					TOTAL		

BY: ESA — DATE: 8/4/03 — REMARKS:
CHKD: — DATE: — REMARKS:

Shaw EMCON/OWT, INC

QUANTITY CALCULATIONS

PROJECT TITLE: Mountain View Lanfill, UT | PROJECT NO. 844008
CALCULATIONS FOR: Drainage Areas | TASK NO. 1000000
SCALE: 1" = 100' | TOPO DATE: | PAGE: | OF:

AREA OR CONTOUR	PLANIMETER READING (Acres) 1	2	AVERAGE	AREA (Acres)	MID-CONTOUR AVERAGE (Sq. ft.)	CONTOUR INTERVAL (Ft.)	VOLUME (Cu.yd.)
E1	4.298	4.298	4.3				
E2	2.733	2.747	2.7				
E3	2.854	2.840	2.8				
E4	2.740	2.726	2.7				
E5	2.950	2.971	3.0				
E6	1.445	1.445	1.4				
F1	3.434	3.462	3.4				
F2	2.868	2.822	2.8				
F3	3.516	3.498	3.5				
F4	4.850	4.871	4.9				
G1	1.548	1.580	1.6				
TOTAL					TOTAL		

BY: ESA | DATE 8/4/03 | REMARKS
CHKD: | DATE | REMARKS

SUBAREA PEAK FLOWS (A through G)

TABULAR HYDROGRAPH METHOD Version 2.10

ct : Mountain View LF User: Shaw Date: 08-06-2003

y : Salt Lake State: UT Checked: ____ Date: ________

itle: Drainage Analysis

watershed area: 0.026 sq mi Rainfall type: II Frequency: 25 years

	Subareas							
	A1	A2	A3	B1	B2	B3	B4	C5b
(sq mi)	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
all(in)	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
number	88	88	88	86	88	88	88	88
f(in)	1.51	1.51	1.51	1.37	1.51	1.51	1.51	1.51
rs)	0.06	0.05	0.08	0.09	0.10	0.05	0.08	0.09
(Used)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
oOutlet	0.06	0.05	0.05	0.05	0.05	0.05	0.00	0.00
(Used)	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00
	0.10	0.10	0.10	0.12	0.10	0.10	0.10	0.10

Total Flow	Subarea Contribution to Total Flow (cfs) A1	A2	A3	B1	B2	B3	B4	C5b
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
10	1	1	2	1	1	1	1	2
22	2P	2	4	2	3	2	3	4
34P	2	3P	6P	4P	6	3P	4P	6P
28	2	2	4	2	9P	2	3	4
15	1	1	1	1	8	1	1	1
8	0	0	1	1	4	0	1	1
5	0	0	1	0	2	0	1	1
4	0	0	1	0	2	0	0	1
2	0	0	0	0	1	0	0	1
1	0	0	0	0	1	0	0	0
1	0	0	0	0	1	0	0	0
1	0	0	0	0	1	0	0	0
1	0	0	0	0	1	0	0	0
1	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0

TABULAR HYDROGRAPH METHOD Version 2.10

ct : Mountain View LF User: Shaw Date: 08-06-2003

y : Salt Lake State: UT Checked: ____ Date: ________

itle: Drainage Analysis

l watershed area: 0.025 sq mi Rainfall type: II Frequency: 25 years

	Subareas					
	C1	C2	C3	C4	C5a	C6
(sq mi)	0.00	0.00	0.01	0.01	0.00	0.00
all(in)	2.7	2.7	2.7	2.7	2.7	2.7
number	86	88	88	88	88	90
f(in)	1.37	1.51	1.51	1.51	1.51	1.67
rs)	0.08	0.05	0.09	0.10	0.08	0.03
(Used)	0.10	0.10	0.10	0.10	0.10	0.10
ToOutlet	0.01	0.01	0.00	0.00	0.00	0.00
(Used)	0.00	0.00	0.00	0.00	0.00	0.00
	0.12	0.10	0.10	0.10	0.10	0.08
(Used)	0.12	0.10	0.10	0.10	0.10	0.10

Total Flow	Subarea Contribution to Total Flow (cfs) C1	C2	C3	C4	C5a	C6
0	0	0	0	0	0	0
0	0	0	0	0	0	0
1	0	0	0	1	0	0
13	2	1	3	4	2	1
25	4	2P	5	8	4	2
37P	6P	2	8P	12P	6P	3P
24	4	2	5	7	4	2
9	1	1	2	3	1	1
5	1	0	1	2	1	0
4	1	0	1	1	1	0
4	1	0	1	1	1	0
4	1	0	1	1	1	0
2	0	0	1	1	0	0
2	0	0	1	1	0	0
1	0	0	0	1	0	0
1	0	0	0	1	0	0
1	0	0	0	1	0	0
1	0	0	0	1	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

TABULAR HYDROGRAPH METHOD Version 2.10

ect : Mountain View LF User: Shaw Date: 08-06-2003

ty : Salt Lake State: UT Checked: ____ Date: _____
itle: Drainage Analysis

l watershed area: 0.013 sq mi Rainfall type: II Frequency: 25 years

	Subareas				
	D1	D2	D3	D4	D5
(sq mi)	0.01	0.00	0.00	0.00	0.00
fall(in)	2.7	2.7	2.7	2.7	2.7
e number	86	88	88	88	88
ff(in)	1.37	1.51	1.51	1.51	1.51
ırs)	0.20	0.08	0.08	0.08	0.12
(Used)	0.20	0.10	0.10	0.10	0.10
ToOutlet	0.01	0.00	0.00	0.00	0.00
(Used)	0.00	0.00	0.00	0.00	0.00
	0.12	0.10	0.10	0.10	0.10

Total Flow	Subarea Contribution to Total Flow (cfs)				
	D1	D2	D3	D4	D5
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
6	2	1	1	1	1
11	3	2	2	2P	2
17P	6P	3P	3P	2	3P
14	6	2	2	2	2
8	4	1	1	1	1
2	2	0	0	0	0
1	1	0	0	0	0
1	1	0	0	0	0
1	1	0	0	0	0
1	1	0	0	0	0
1	1	0	0	0	0
1	1	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

TABULAR HYDROGRAPH METHOD Version 2.10

ct : Mountain View LF User: Shaw Date: 08-06-2003

cy : Salt Lake State: UT Checked: ____ Date: ________
itle: Drainage Analysis

l watershed area: 0.026 sq mi Rainfall type: II Frequency: 25 years

	Subareas					
	E1	E2	E3	E4	E5	E6
(sq mi)	0.01	0.00	0.00	0.00	0.00	0.00
fall(in)	2.7	2.7	2.7	2.7	2.7	2.7
e number	86	88	88	88	88	90
ff(in)	1.37	1.51	1.51	1.51	1.51	1.67
ars)	0.16	0.12	0.12	0.12	0.08	0.02
(Used)	0.20	0.10	0.10	0.10	0.10	0.10
ToOutlet	0.01	0.00	0.00	0.00	0.00	0.00
(Used)	0.00	0.00	0.00	0.00	0.00	0.00
	0.12	0.10	0.10	0.10	0.10	0.08
(Used)	0.12	0.10	0.10	0.10	0.10	0.10

Total Flow	Subarea Contribution to Total Flow (cfs) E1	E2	E3	E4	E5	E6
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
11	2	2	2	2	2	1
22	3	4	4	4	5	2
37P	7P	6P	7P	6P	7P	4P
25	7	4	4	4	4	2
10	4	1	1	1	2	1
7	2	1	1	1	1	1
6	2	1	1	1	1	0
5	1	1	1	1	1	0
5	1	1	1	1	1	0
3	1	0	1	0	1	0
1	1	0	0	0	0	0
1	1	0	0	0	0	0
1	1	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

TABULAR HYDROGRAPH METHOD Version 2.10

ct : Mountain View LF User: Shaw Date: 08-06-2003

y : Salt Lake State: UT Checked: ____ Date: _____
itle: Drainage Analysis

l watershed area: 0.023 sq mi Rainfall type: II Frequency: 25 years

	Subareas			
	F1	F2	F3	F4
(sq mi)	0.01	0.00	0.01	0.01
Fall(in)	2.7	2.7	2.7	2.7
e number	88	88	88	88
Ff(in)	1.51	1.51	1.51	1.51
ırs)	0.16	0.08	0.09	0.13
(Used)	*0.20*	*0.10*	*0.10*	*0.10*
ToOutlet	0.00	0.00	0.00	0.00
(Used)	0.00	0.00	0.00	0.00
	0.10	0.10	0.10	0.10

Total Flow	Subarea Contribution to Total Flow (cfs)			
	F1	F2	F3	F4
0	0	0	0	0
0	0	0	0	0
1	0	0	0	1
11	2	2	3	4
20	3	4	5	8
33P	6P	7P	8P	12P
22	6	4	5	7
10	4	1	2	3
6	2	1	1	2
4	1	1	1	1
4	1	1	1	1
4	1	1	1	1
4	1	1	1	1
3	1	0	1	1
1	0	0	0	1
1	0	0	0	1
1	0	0	0	1
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

TABULAR HYDROGRAPH METHOD Version 2.10

ct : Mountain View LF User: Shaw Date: 08-06-2003

:y : Salt Lake State: UT Checked: ____ Date: _____
itle: Drainage Analysis

l watershed area: 0.002 sq mi Rainfall type: II Frequency: 25 years

---------- Subareas ----------

	G1
(sq mi)	0.00
fall(in)	2.7
e number	88
ff(in)	1.51
irs)	0.03
(Used)	0.10
roOutlet	0.00
	0.10

Total Flow	Subarea Contribution to Total Flow (cfs) G1
0	0
0	0
0	0
1	1
2	2
4P	4P
2	2
1	1
1	1
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0

Peak Flow

COMBINED FLOW TO

NORTHWEST DETENTION POND

TABULAR HYDROGRAPH METHOD Version 2.10

ect : Mountain View LF User: Shaw Date: 08-06-2003

.y : Salt Lake State: UT Checked: ____ Date: _____
.tle: Combined Flow to Northwest Detention Pond

. watershed area: 0.050 sq mi Rainfall type: II Frequency: 25 years

	Subareas		
	A1-A3	B1-B4	C1-C6
(sq mi)	0.01	0.01	0.03
:all(in)	2.7	2.7	2.7
e number	88	88	88
:f(in)	1.51	1.51	1.51
ırs)	0.08	0.11	0.10
(Used)	0.10	0.10	0.10
ToOutlet	0.05	0.00	0.00
(Used)	0.00	0.00	0.00
	0.10	0.10	0.10

Total Flow	Subarea Contribution to Total Flow (cfs)		
	A1-A3	B1-B4	C1-C6
2	0	1	1
2	0	1	1
4	1	1	2
25	4	7	14
49	7	14	28
77P	11P	22P	44P
48	7	14	27
16	2	5	9
11	2	3	6
9	1	3	5
8	1	2	5
7	1	2	4
6	1	2	3
5	1	1	3
4	1	1	2
4	1	1	2
3	0	1	2
3	0	1	2
3	0	1	2
2	0	1	1
2	0	1	1
2	0	1	1
2	0	1	1
2	0	1	1
1	0	0	1
1	0	0	1
1	0	0	1
1	0	0	1
1	0	0	1
1	0	0	1
1	0	0	1
0	0	0	0

COMBINED FLOW TO

SOUTHWEST DETENTION POND

TABULAR HYDROGRAPH METHOD Version 2.10

ct : Mountain View LF User: Shaw Date: 08-06-2003

y : Salt Lake State: UT Checked: ____ Date: _____
itle: Combined Flow to Southwest Detention Pond

l watershed area: 0.040 sq mi Rainfall type: II Frequency: 25 years

	Subareas	
	D1-D5	E1-E6
(sq mi)	0.01	0.03
fall(in)	2.7	2.7
e number	88	88
ff(in)	1.51	1.51
rs)	0.20	0.17
(Used)	0.20	0.20
ToOutlet	0.00	0.00
	0.10	0.10

Total Flow	Subarea Contribution to Total Flow (cfs)	
	D1-D5	E1-E6
1	0	1
2	1	1
3	1	2
12	4	8
24	8	16
44	15	29
48P	16P	32P
29	10	19
15	5	10
10	3	7
8	3	5
6	2	4
5	2	3
4	1	3
3	1	2
3	1	2
3	1	2
3	1	2
3	1	2
2	1	1
2	1	1
2	1	1
2	1	1
1	0	1
1	0	1
1	0	1
1	0	1
1	0	1
1	0	1
1	0	1
0	0	0
0	0	0

Peak Flow

COMBINED FLOW TO

SOUTHEAST DETENTION POND

TABULAR HYDROGRAPH METHOD Version 2.10

ct : Mountain View LF User: Shaw Date: 08-06-2003

y : Salt Lake State: UT Checked: ____ Date: _____
itle: Combined Flow to Southeast Detention Pond

l watershed area: 0.023 sq mi Rainfall type: II Frequency: 25 years

	Subareas			
	F1	F2	F3	F4
(sq mi)	0.01	0.00	0.01	0.01
fall(in)	2.7	2.7	2.7	2.7
e number	88	88	88	88
ff(in)	1.51	1.51	1.51	1.51
ırs)	0.16	0.08	0.09	0.13
(Used)	0.20	0.10	0.10	0.10
ToOutlet	0.00	0.00	0.00	0.00
(Used)	0.00	0.00	0.00	0.00
	0.10	0.10	0.10	0.10

Total Flow	Subarea Contribution to Total Flow (cfs)			
	F1	F2	F3	F4
0	0	0	0	0
0	0	0	0	0
1	0	0	0	1
11	2	2	3	4
20	3	4	5	8
33P	6P	7P	8P	12P
22	6	4	5	7
10	4	1	2	3
6	2	1	1	2
4	1	1	1	1
4	1	1	1	1
4	1	1	1	1
4	1	1	1	1
3	1	0	1	1
1	0	0	0	1
1	0	0	0	1
1	0	0	0	1
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

APPENDIX C-2

HYDRAULIC CALCULATIONS

DETENTION POND VOLUME

Mountain View Landfill
Salt Lake County, Utah

Detention Pond Volume

	A1 (ac)	A2 (ac)	D (ac)	V (ac-ft)
Northwest Detention Pond	0.235	0.450	5.0	1.68
Southwest Detention Pond	0.203	0.436	5.0	1.56
Southeast Detention Pond	0.068	0.176	5.0	0.59

Notes:

1. Basin inboard slopes approximately 2:1 (horizontal:vertical).
2. Pond volume is based on volume formula, $V = ((A1 + A2 + (A1+A2)^{0.5})/3 (D)$, where:
   - V = volume, in acre-feet
   - A1 = base area, in acres
   - A2 = top area, in acres
   - D = average depth, in feet

Abbreviations:

- ac-ft = acre-feet
- cfs = cubic per second
- ft = feet

Shaw EMCON/OWT, INC

QUANTITY CALCULATIONS

PROJECT TITLE: Mtn View LF | PROJECT NO.: 844088
CALCULATIONS FOR: Pond Volume | TASK NO.: 1000000
SCALE: 1" = 100' | TOPO DATE: | PAGE: | OF:

AREA OR CONTOUR	PLANIMETER READING (Sq. ft.) 1	2	AVERAGE	AREA (Acres)	MID-CONTOUR AVERAGE (Sq. ft.)	CONTOUR INTERVAL (ft.)	VOLUME (Cu.yd.)
NW Detention Pond							
4215	10,540	9,920	10,230	0.235			
4220	19,375	19,840	19,608	0.450			
SW Detention Pond							
4215	8,990	8,680	8,835	0.203			
4220	18,910	19,065	18,988	0.436			
SE Detention Pond							
4217	2,945	2,945	2,945	0.068			
4222	7,750	7,595	7,673	0.176			
TOTAL					TOTAL		

BY: ESA | DATE: 8/7/03 | REMARKS:
CHKD: | DATE: | REMARKS:

NORTHWEST DETENTION POND

STORAGE VOLUME FOR DETENTION BASINS Version 2.10

Proj : Mountain View LF User: Shaw Date: 08-06-2003

City : Salt Lake State: UT Checked: ____ Date: _____
Title: Northwest Detention Pond

Drainage Area: .0505 Sq miles Rainfall Frequency: 25 years
Rainfall-Type: II
Runoff: 1.5 inches
Peak Inflow: 77.00 cfs
Peak Outflow: 40.00 cfs
Detention Basin Storage Volume: 0.41 inches or 1.1 acre feet

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: Mtn View LF, UT

Comment: NW Detention Pond - Outlet Pipe

Solve For Actual Depth

Given Input Data:

Diameter.....	2.00 ft
Slope.....	0.0150 ft/ft
Manning's n.....	0.015
Discharge.....	20.00 cfs (x 2 = 40 cfs)

Computed Results:

Depth.....	1.39 ft
Velocity.....	8.55 fps
Flow Area.....	2.34 sf
Critical Depth....	1.61 ft
Critical Slope....	0.0108 ft/ft
Percent Full.....	69.72 %
Full Capacity.....	24.01 cfs
QMAX @.94D.....	25.83 cfs
Froude Number.....	1.34 (flow is Supercritical)

SOUTHWEST DETENTION POND

STORAGE VOLUME FOR DETENTION BASINS Version 2.10

User: Shaw Date: 08-06-2003

ct : Mountain View LF

y : Salt Lake State: UT Checked: ____ Date: _____

tle: Southwest Detention Pond

Drainage Area: .0397 Sq miles Rainfall Frequency: 25 years
Rainfall-Type: II
Runoff: 1.5 inches
Peak Inflow: 48.00 cfs
Peak Outflow: 25.00 cfs
Detention Basin Storage Volume: 0.41 inches or 0.9 acre feet

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: Mtn View LF, UT

Comment: SW Detention Pond - Outlet Pipe

Solve For Actual Depth

Given Input Data:

Diameter.....	2.00 ft
Slope.....	0.0150 ft/ft
Manning's n.....	0.015
Discharge.....	25.00 cfs

Computed Results:

Depth.....	1.72 ft
Velocity.....	8.68 fps
Flow Area.....	2.88 sf
Critical Depth....	1.76 ft
Critical Slope....	0.0146 ft/ft
Percent Full.....	86.24 %
Full Capacity.....	24.01 cfs
QMAX @.94D.....	25.83 cfs
Froude Number.....	1.06 (flow is Supercritical)

SOUTHEAST DETENTION POND

: Mountain View LF

User: Shaw Date: 08-06-2003

: Salt Lake State: UT Checked: ____ Date: _____

tle: Southeast Detention Pond

rainage Area: .0229 Sq miles Rainfall Frequency: 25 years
ainfall-Type: II
unoff: 1.5 inches
eak Inflow: 33.00 cfs
eak Outflow: 20.00 cfs
etention Basin Storage Volume: 0.36 inches or 0.4 acre feet

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: Mtn View LF, UT

Comment: SE Detention Pond - Outlet Pipe

Solve For Actual Depth

Given Input Data:

Diameter.....	2.00 ft
Slope.....	0.0100 ft/ft
Manning's n.....	0.015
Discharge.....	20.00 cfs

Computed Results:

Depth.....	1.68 ft
Velocity.....	7.11 fps
Flow Area.....	2.81 sf
Critical Depth....	1.61 ft
Critical Slope....	0.0108 ft/ft
Percent Full.....	83.90 %
Full Capacity.....	19.61 cfs
QMAX @.94D.....	21.09 cfs
Froude Number.....	0.91 (flow is Subcritical)

TOP DECK

DIVERSION BERM

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: Mtn View LF, UT

Description: Top Deck Diversion Berm

Solve For Depth

Given Constant Data;

Z-Left.....	5.00
Z-Right.....	2.00
Mannings 'n'.....	0.020

ıble Input Data	Minimum	Maximum	Increment By
:om Width	0.00	1.00	1.00
ınel Slope	0.0100	0.0200	0.0050
ınel Discharge	1.00	10.00	1.00

RIABLE				VARIABLE COMPUTED	VARIABLE COMPUTED		
ottom idth ft	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	Channel Depth ft	Channel Discharge cfs	Velocity fps
.00	5.00	2.00	0.020	0.0100	0.35	1.00	2.27
.00	5.00	2.00	0.020	0.0100	0.24	1.00	2.21
.00	5.00	2.00	0.020	0.0150	0.33	1.00	2.65
.00	5.00	2.00	0.020	0.0150	0.22	1.00	2.56
.00	5.00	2.00	0.020	0.0200	0.31	1.00	2.95
.00	5.00	2.00	0.020	0.0200	0.20	1.00	2.84
.00	5.00	2.00	0.020	0.0100	0.46	2.00	2.70
.00	5.00	2.00	0.020	0.0100	0.34	2.00	2.66
.00	5.00	2.00	0.020	0.0150	0.43	2.00	3.15
.00	5.00	2.00	0.020	0.0150	0.31	2.00	3.09
.00	5.00	2.00	0.020	0.0200	0.40	2.00	3.51
.00	5.00	2.00	0.020	0.0200	0.29	2.00	3.43
.00	5.00	2.00	0.020	0.0100	0.54	3.00	2.99
.00	5.00	2.00	0.020	0.0100	0.41	3.00	2.96
.00	5.00	2.00	0.020	0.0150	0.50	3.00	3.48
.00	5.00	2.00	0.020	0.0150	0.38	3.00	3.44
.00	5.00	2.00	0.020	0.0200	0.47	3.00	3.88
.00	5.00	2.00	0.020	0.0200	0.35	3.00	3.82
00	5.00	2.00	0.020	0.0100	0.60	4.00	3.21
00	5.00	2.00	0.020	0.0100	0.47	4.00	3.19
.00	5.00	2.00	0.020	0.0150	0.55	4.00	3.74
.00	5.00	2.00	0.020	0.0150	0.43	4.00	3.70
.00	5.00	2.00	0.020	0.0200	0.52	4.00	4.17
.00	5.00	2.00	0.020	0.0200	0.40	4.00	4.12
.00	5.00	2.00	0.020	0.0100	0.65	5.00	3.40
.00	5.00	2.00	0.020	0.0100	0.52	5.00	3.38
00	5.00	2.00	0.020	0.0150	0.60	5.00	3.96
00	5.00	2.00	0.020	0.0150	0.48	5.00	3.92
00	5.00	2.00	0.020	0.0200	0.57	5.00	4.41
00	5.00	2.00	0.020	0.0200	0.45	5.00	4.37
00	5.00	2.00	0.020	0.0100	0.69	6.00	3.56
00	5.00	2.00	0.020	0.0100	0.57	6.00	3.54
00	5.00	2.00	0.020	0.0150	0.64	6.00	4.14
00	5.00	2.00	0.020	0.0150	0.52	6.00	4.11
00	5.00	2.00	0.020	0.0200	0.61	6.00	4.61
00	5.00	2.00	0.020	0.0200	0.49	6.00	4.58
00	5.00	2.00	0.020	0.0100	0.74	7.00	3.70
00	5.00	2.00	0.020	0.0100	0.61	7.00	3.68
00	5.00	2.00	0.020	0.0150	0.68	7.00	4.30
00	5.00	2.00	0.020	0.0150	0.56	7.00	4.28

ARIABLE				VARIABLE COMPUTED		VARIABLE COMPUTED	
ottom idth ft	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	Channel Depth ft	Channel Discharge cfs	Velocity fps
.00	5.00	2.00	0.020	0.0200	0.65	7.00	4.79
.00	5.00	2.00	0.020	0.0200	0.52	7.00	4.76
.00	5.00	2.00	0.020	0.0100	0.77	8.00	3.82
.00	5.00	2.00	0.020	0.0100	0.65	8.00	3.81
.00	5.00	2.00	0.020	0.0150	0.72	8.00	4.45
.00	5.00	2.00	0.020	0.0150	0.59	8.00	4.43
.00	5.00	2.00	0.020	0.0200	0.68	8.00	4.96
.00	5.00	2.00	0.020	0.0200	0.55	8.00	4.93
.00	5.00	2.00	0.020	0.0100	0.81	9.00	3.94
.00	5.00	2.00	0.020	0.0100	0.68	9.00	3.92
.00	5.00	2.00	0.020	0.0150	0.75	9.00	4.58
.00	5.00	2.00	0.020	0.0150	0.62	9.00	4.56
.00	5.00	2.00	0.020	0.0200	0.71	9.00	5.11
.00	5.00	2.00	0.020	0.0200	0.58	9.00	5.08
.00	5.00	2.00	0.020	0.0100	0.84	10.00	4.04
.00	5.00	2.00	0.020	0.0100	0.71	10.00	4.03
.00	5.00	2.00	0.020	0.0150	0.78	10.00	4.71
.00	5.00	2.00	0.020	0.0150	0.65	10.00	4.69
.00	5.00	2.00	0.020	0.0200	0.74	10.00	5.24
.00	5.00	2.00	0.020	0.0200	0.61	10.00	5.22

LF BENCH

DRAINAGE DITCH

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: Mtn View LF, UT

Description: LF Bench Drainage Ditch

Solve For Depth

Given Constant Data;

Bottom Width.....	0.00
Z-Left.....	2.00
Z-Right.....	2.00

able Input Data	Minimum	Maximum	Increment By
nings 'n'	0.020	0.030	0.005
nnel Slope	0.0100	0.0300	0.0050
nnel Discharge	1.00	10.00	1.00

			VARIABLE	VARIABLE	COMPUTED	VARIABLE	COMPUTED
ottom idth ft	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	Channel Depth ft	Channel Discharge cfs	Velocity fps
.00	2.00	2.00	0.020	0.0100	0.44	1.00	2.53
.00	2.00	2.00	0.025	0.0100	0.48	1.00	2.14
.00	2.00	2.00	0.030	0.0100	0.52	1.00	1.87
.00	2.00	2.00	0.020	0.0150	0.41	1.00	2.95
.00	2.00	2.00	0.025	0.0150	0.45	1.00	2.49
.00	2.00	2.00	0.030	0.0150	0.48	1.00	2.17
.00	2.00	2.00	0.020	0.0200	0.39	1.00	3.28
.00	2.00	2.00	0.025	0.0200	0.42	1.00	2.78
.00	2.00	2.00	0.030	0.0200	0.45	1.00	2.42
.00	2.00	2.00	0.020	0.0250	0.37	1.00	3.57
.00	2.00	2.00	0.025	0.0250	0.41	1.00	3.02
.00	2.00	2.00	0.030	0.0250	0.44	1.00	2.63
.00	2.00	2.00	0.020	0.0300	0.36	1.00	3.82
.00	2.00	2.00	0.025	0.0300	0.39	1.00	3.23
.00	2.00	2.00	0.030	0.0300	0.42	1.00	2.82
.00	2.00	2.00	0.020	0.0100	0.58	2.00	3.01
.00	2.00	2.00	0.025	0.0100	0.63	2.00	2.55
.00	2.00	2.00	0.030	0.0100	0.67	2.00	2.22
.00	2.00	2.00	0.020	0.0150	0.53	2.00	3.50
.00	2.00	2.00	0.025	0.0150	0.58	2.00	2.96
.00	2.00	2.00	0.030	0.0150	0.62	2.00	2.59
.00	2.00	2.00	0.020	0.0200	0.51	2.00	3.90
.00	2.00	2.00	0.025	0.0200	0.55	2.00	3.30
.00	2.00	2.00	0.030	0.0200	0.59	2.00	2.88
.00	2.00	2.00	0.020	0.0250	0.49	2.00	4.24
.00	2.00	2.00	0.025	0.0250	0.53	2.00	3.59
.00	2.00	2.00	0.030	0.0250	0.57	2.00	3.13
.00	2.00	2.00	0.020	0.0300	0.47	2.00	4.54
.00	2.00	2.00	0.025	0.0300	0.51	2.00	3.84
.00	2.00	2.00	0.030	0.0300	0.55	2.00	3.35
.00	2.00	2.00	0.020	0.0100	0.67	3.00	3.33
.00	2.00	2.00	0.025	0.0100	0.73	3.00	2.82
.00	2.00	2.00	0.030	0.0100	0.78	3.00	2.46
.00	2.00	2.00	0.020	0.0150	0.62	3.00	3.88
.00	2.00	2.00	0.025	0.0150	0.68	3.00	3.28
.00	2.00	2.00	0.030	0.0150	0.72	3.00	2.86
.00	2.00	2.00	0.020	0.0200	0.59	3.00	4.32
.00	2.00	2.00	0.025	0.0200	0.64	3.00	3.65
.00	2.00	2.00	0.030	0.0200	0.69	3.00	3.19
.00	2.00	2.00	0.020	0.0250	0.57	3.00	4.70

			VARIABLE	VARIABLE	COMPUTED	VARIABLE	COMPUTED
ottom idth ft	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	Channel Depth ft	Channel Discharge cfs	Velocity fps
.00	2.00	2.00	0.025	0.0250	0.61	3.00	3.97
.00	2.00	2.00	0.030	0.0250	0.66	3.00	3.46
.00	2.00	2.00	0.020	0.0300	0.55	3.00	5.03
.00	2.00	2.00	0.025	0.0300	0.59	3.00	4.25
.00	2.00	2.00	0.030	0.0300	0.64	3.00	3.71
.00	2.00	2.00	0.020	0.0100	0.75	4.00	3.58
.00	2.00	2.00	0.025	0.0100	0.81	4.00	3.03
.00	2.00	2.00	0.030	0.0100	0.87	4.00	2.64
.00	2.00	2.00	0.020	0.0150	0.69	4.00	4.17
.00	2.00	2.00	0.025	0.0150	0.75	4.00	3.52
.00	2.00	2.00	0.030	0.0150	0.81	4.00	3.07
.00	2.00	2.00	0.020	0.0200	0.66	4.00	4.64
.00	2.00	2.00	0.025	0.0200	0.71	4.00	3.93
.00	2.00	2.00	0.030	0.0200	0.76	4.00	3.42
.00	2.00	2.00	0.020	0.0250	0.63	4.00	5.05
.00	2.00	2.00	0.025	0.0250	0.68	4.00	4.27
.00	2.00	2.00	0.030	0.0250	0.73	4.00	3.72
.00	2.00	2.00	0.020	0.0300	0.61	4.00	5.40
.00	2.00	2.00	0.025	0.0300	0.66	4.00	4.57
.00	2.00	2.00	0.030	0.0300	0.71	4.00	3.99
.00	2.00	2.00	0.020	0.0100	0.81	5.00	3.78
.00	2.00	2.00	0.025	0.0100	0.88	5.00	3.20
.00	2.00	2.00	0.030	0.0100	0.95	5.00	2.79
.00	2.00	2.00	0.020	0.0150	0.75	5.00	4.41
.00	2.00	2.00	0.025	0.0150	0.82	5.00	3.73
.00	2.00	2.00	0.030	0.0150	0.88	5.00	3.25
.00	2.00	2.00	0.020	0.0200	0.71	5.00	4.91
.00	2.00	2.00	0.025	0.0200	0.78	5.00	4.15
.00	2.00	2.00	0.030	0.0200	0.83	5.00	3.62
.00	2.00	2.00	0.020	0.0250	0.68	5.00	5.34
.00	2.00	2.00	0.025	0.0250	0.74	5.00	4.51
.00	2.00	2.00	0.030	0.0250	0.80	5.00	3.94
.00	2.00	2.00	0.020	0.0300	0.66	5.00	5.71
.00	2.00	2.00	0.025	0.0300	0.72	5.00	4.83
00	2.00	2.00	0.030	0.0300	0.77	5.00	4.22
00	2.00	2.00	0.020	0.0100	0.87	6.00	3.96
00	2.00	2.00	0.025	0.0100	0.95	6.00	3.35
00	2.00	2.00	0.030	0.0100	1.01	6.00	2.92
00	2.00	2.00	0.020	0.0150	0.81	6.00	4.61
00	2.00	2.00	0.025	0.0150	0.88	6.00	3.90

ottom Width ft	Z-Left (H:V)	Z-Right (H:V)	VARIABLE Mannings 'n'	VARIABLE Channel Slope ft/ft	COMPUTED Channel Depth ft	VARIABLE Channel Discharge cfs	COMPUTED Velocity fps
.00	2.00	2.00	0.030	0.0150	0.94	6.00	3.40
.00	2.00	2.00	0.020	0.0200	0.76	6.00	5.14
.00	2.00	2.00	0.025	0.0200	0.83	6.00	4.34
.00	2.00	2.00	0.030	0.0200	0.89	6.00	3.79
.00	2.00	2.00	0.020	0.0250	0.73	6.00	5.58
.00	2.00	2.00	0.025	0.0250	0.80	6.00	4.72
.00	2.00	2.00	0.030	0.0250	0.85	6.00	4.12
.00	2.00	2.00	0.020	0.0300	0.71	6.00	5.98
.00	2.00	2.00	0.025	0.0300	0.77	6.00	5.06
.00	2.00	2.00	0.030	0.0300	0.82	6.00	4.41
.00	2.00	2.00	0.020	0.0100	0.92	7.00	4.12
.00	2.00	2.00	0.025	0.0100	1.00	7.00	3.48
.00	2.00	2.00	0.030	0.0100	1.07	7.00	3.04
.00	2.00	2.00	0.020	0.0150	0.85	7.00	4.79
.00	2.00	2.00	0.025	0.0150	0.93	7.00	4.05
.00	2.00	2.00	0.030	0.0150	0.99	7.00	3.54
.00	2.00	2.00	0.020	0.0200	0.81	7.00	5.34
.00	2.00	2.00	0.025	0.0200	0.88	7.00	4.52
.00	2.00	2.00	0.030	0.0200	0.94	7.00	3.94
.00	2.00	2.00	0.020	0.0250	0.78	7.00	5.80
.00	2.00	2.00	0.025	0.0250	0.84	7.00	4.91
.00	2.00	2.00	0.030	0.0250	0.90	7.00	4.28
.00	2.00	2.00	0.020	0.0300	0.75	7.00	6.21
.00	2.00	2.00	0.025	0.0300	0.82	7.00	5.26
.00	2.00	2.00	0.030	0.0300	0.87	7.00	4.59
.00	2.00	2.00	0.020	0.0100	0.97	8.00	4.26
.00	2.00	2.00	0.025	0.0100	1.05	8.00	3.60
.00	2.00	2.00	0.030	0.0100	1.13	8.00	3.14
.00	2.00	2.00	0.020	0.0150	0.90	8.00	4.96
.00	2.00	2.00	0.025	0.0150	0.98	8.00	4.19
.00	2.00	2.00	0.030	0.0150	1.05	8.00	3.66
.00	2.00	2.00	0.020	0.0200	0.85	8.00	5.52
.00	2.00	2.00	0.025	0.0200	0.93	8.00	4.67
.00	2.00	2.00	0.030	0.0200	0.99	8.00	4.07
.00	2.00	2.00	0.020	0.0250	0.82	8.00	6.00
.00	2.00	2.00	0.025	0.0250	0.89	8.00	5.08
.00	2.00	2.00	0.030	0.0250	0.95	8.00	4.43
.00	2.00	2.00	0.020	0.0300	0.79	8.00	6.43
.00	2.00	2.00	0.025	0.0300	0.86	8.00	5.44
.00	2.00	2.00	0.030	0.0300	0.92	8.00	4.74

ottom dth ft	Z-Left (H:V)	Z-Right (H:V)	VARIABLE Mannings 'n'	VARIABLE Channel Slope ft/ft	COMPUTED Channel Depth ft	VARIABLE Channel Discharge cfs	COMPUTED Velocity fps
.00	2.00	2.00	0.020	0.0100	1.01	9.00	4.38
.00	2.00	2.00	0.025	0.0100	1.10	9.00	3.71
.00	2.00	2.00	0.030	0.0100	1.18	9.00	3.23
.00	2.00	2.00	0.020	0.0150	0.94	9.00	5.10
.00	2.00	2.00	0.025	0.0150	1.02	9.00	4.32
.00	2.00	2.00	0.030	0.0150	1.09	9.00	3.77
.00	2.00	2.00	0.020	0.0200	0.89	9.00	5.68
.00	2.00	2.00	0.025	0.0200	0.97	9.00	4.81
.00	2.00	2.00	0.030	0.0200	1.04	9.00	4.19
.00	2.00	2.00	0.020	0.0250	0.85	9.00	6.18
.00	2.00	2.00	0.025	0.0250	0.93	9.00	5.23
.00	2.00	2.00	0.030	0.0250	0.99	9.00	4.56
.00	2.00	2.00	0.020	0.0300	0.82	9.00	6.62
.00	2.00	2.00	0.025	0.0300	0.90	9.00	5.60
.00	2.00	2.00	0.030	0.0300	0.96	9.00	4.88
.00	2.00	2.00	0.020	0.0100	1.05	10.00	4.50
.00	2.00	2.00	0.025	0.0100	1.15	10.00	3.81
.00	2.00	2.00	0.030	0.0100	1.23	10.00	3.32
.00	2.00	2.00	0.020	0.0150	0.98	10.00	5.24
.00	2.00	2.00	0.025	0.0150	1.06	10.00	4.43
.00	2.00	2.00	0.030	0.0150	1.14	10.00	3.87
.00	2.00	2.00	0.020	0.0200	0.93	10.00	5.84
.00	2.00	2.00	0.025	0.0200	1.01	10.00	4.94
.00	2.00	2.00	0.030	0.0200	1.08	10.00	4.31
.00	2.00	2.00	0.020	0.0250	0.89	10.00	6.35
.00	2.00	2.00	0.025	0.0250	0.97	10.00	5.37
.00	2.00	2.00	0.030	0.0250	1.03	10.00	4.68
.00	2.00	2.00	0.020	0.0300	0.86	10.00	6.79
.00	2.00	2.00	0.025	0.0300	0.93	10.00	5.75
.00	2.00	2.00	0.030	0.0300	1.00	10.00	5.01

ACCESS ROAD

DRAINAGE DITCH

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: Mtn View LF, UT

Description: LF Access Rd

Solve For Depth

Given Constant Data;

Bottom Width.....	0.00
Z-Left.....	2.00
Z-Right.....	2.00
Channel Slope.....	0.0600

ıble Input Data	Minimum	Maximum	Increment By
ıings 'n'	0.015	0.020	0.005
ınel Discharge	1.00	10.00	1.00

ɔttom idth ft	Z-Left (H:V)	Z-Right (H:V)	VARIABLE Mannings 'n'	VARIABLE Channel Slope ft/ft	COMPUTED Channel Depth ft	VARIABLE Channel Discharge cfs	COMPUTED Velocity fps
.00	2.00	2.00	0.015	0.0600	0.29	1.00	6.15
.00	2.00	2.00	0.020	0.0600	0.32	1.00	4.96
.00	2.00	2.00	0.015	0.0600	0.37	2.00	7.31
.00	2.00	2.00	0.020	0.0600	0.41	2.00	5.89
.00	2.00	2.00	0.015	0.0600	0.43	3.00	8.09
.00	2.00	2.00	0.020	0.0600	0.48	3.00	6.52
.00	2.00	2.00	0.015	0.0600	0.48	4.00	8.69
.00	2.00	2.00	0.020	0.0600	0.53	4.00	7.01
.00	2.00	2.00	0.015	0.0600	0.52	5.00	9.19
.00	2.00	2.00	0.020	0.0600	0.58	5.00	7.41
.00	2.00	2.00	0.015	0.0600	0.56	6.00	9.62
.00	2.00	2.00	0.020	0.0600	0.62	6.00	7.76
.00	2.00	2.00	0.015	0.0600	0.59	7.00	10.00
.00	2.00	2.00	0.020	0.0600	0.66	7.00	8.06
.00	2.00	2.00	0.015	0.0600	0.62	8.00	10.34
.00	2.00	2.00	0.020	0.0600	0.69	8.00	8.33
.00	2.00	2.00	0.015	0.0600	0.65	9.00	10.65
.00	2.00	2.00	0.020	0.0600	0.72	9.00	8.58
.00	2.00	2.00	0.015	0.0600	0.68	10.00	10.93
00	2.00	2.00	0.020	0.0600	0.75	10.00	8.81

PERIMETER BENCH

DRAINAGE DITCH

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: Mtn View LF, UT

Description: LF Perimeter Ditch

Solve For Depth

Given Constant Data;

Z-Left..... 2.00
Z-Right..... 2.00

able Input Data	Minimum	Maximum	Increment By
tom Width	1.00	2.00	1.00
nings 'n'	0.020	0.025	0.005
nnel Slope	0.0050	0.0200	0.0050
nnel Discharge	10.00	30.00	2.00

IABLE			VARIABLE	VARIABLE	COMPUTED	VARIABLE	COMPUTED
ttom dth t	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	Channel Depth ft	Channel Discharge cfs	Velocity fps
.00	2.00	2.00	0.020	0.0050	0.98	10.00	3.47
.00	2.00	2.00	0.020	0.0050	0.81	10.00	3.41
.00	2.00	2.00	0.025	0.0050	1.08	10.00	2.94
.00	2.00	2.00	0.025	0.0050	0.91	10.00	2.89
.00	2.00	2.00	0.020	0.0100	0.83	10.00	4.49
.00	2.00	2.00	0.020	0.0100	0.68	10.00	4.38
.00	2.00	2.00	0.025	0.0100	0.92	10.00	3.81
.00	2.00	2.00	0.025	0.0100	0.76	10.00	3.73
.00	2.00	2.00	0.020	0.0150	0.76	10.00	5.23
.00	2.00	2.00	0.020	0.0150	0.61	10.00	5.07
.00	2.00	2.00	0.025	0.0150	0.84	10.00	4.43
.00	2.00	2.00	0.025	0.0150	0.69	10.00	4.32
.00	2.00	2.00	0.020	0.0200	0.71	10.00	5.82
.00	2.00	2.00	0.020	0.0200	0.57	10.00	5.63
.00	2.00	2.00	0.025	0.0200	0.79	10.00	4.93
.00	2.00	2.00	0.025	0.0200	0.64	10.00	4.79
.00	2.00	2.00	0.020	0.0050	1.06	12.00	3.64
.00	2.00	2.00	0.020	0.0050	0.89	12.00	3.58
00	2.00	2.00	0.025	0.0050	1.17	12.00	3.08
00	2.00	2.00	0.025	0.0050	0.99	12.00	3.04
.00	2.00	2.00	0.020	0.0100	0.91	12.00	4.71
.00	2.00	2.00	0.020	0.0100	0.75	12.00	4.61
.00	2.00	2.00	0.025	0.0100	1.00	12.00	3.99
.00	2.00	2.00	0.025	0.0100	0.84	12.00	3.91
.00	2.00	2.00	0.020	0.0150	0.83	12.00	5.48
.00	2.00	2.00	0.020	0.0150	0.67	12.00	5.34
.00	2.00	2.00	0.025	0.0150	0.91	12.00	4.64
.00	2.00	2.00	0.025	0.0150	0.75	12.00	4.54
.00	2.00	2.00	0.020	0.0200	0.77	12.00	6.09
.00	2.00	2.00	0.020	0.0200	0.62	12.00	5.92
.00	2.00	2.00	0.025	0.0200	0.86	12.00	5.16
.00	2.00	2.00	0.025	0.0200	0.70	12.00	5.04
.00	2.00	2.00	0.020	0.0050	1.13	14.00	3.78
.00	2.00	2.00	0.020	0.0050	0.96	14.00	3.73
.00	2.00	2.00	0.025	0.0050	1.25	14.00	3.20
.00	2.00	2.00	0.025	0.0050	1.07	14.00	3.16
.00	2.00	2.00	0.020	0.0100	0.97	14.00	4.90
.00	2.00	2.00	0.020	0.0100	0.81	14.00	4.80
.00	2.00	2.00	0.025	0.0100	1.07	14.00	4.14
.00	2.00	2.00	0.025	0.0100	0.90	14.00	4.08

RIABLE			VARIABLE	VARIABLE	COMPUTED	VARIABLE	COMPUTED
ottom idth ft	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	Channel Depth ft	Channel Discharge cfs	Velocity fps
.00	2.00	2.00	0.020	0.0150	0.89	14.00	5.70
.00	2.00	2.00	0.020	0.0150	0.73	14.00	5.57
.00	2.00	2.00	0.025	0.0150	0.98	14.00	4.82
.00	2.00	2.00	0.025	0.0150	0.81	14.00	4.73
.00	2.00	2.00	0.020	0.0200	0.83	14.00	6.34
.00	2.00	2.00	0.020	0.0200	0.68	14.00	6.18
.00	2.00	2.00	0.025	0.0200	0.92	14.00	5.37
.00	2.00	2.00	0.025	0.0200	0.76	14.00	5.26
.00	2.00	2.00	0.020	0.0050	1.20	16.00	3.91
.00	2.00	2.00	0.020	0.0050	1.02	16.00	3.86
.00	2.00	2.00	0.025	0.0050	1.33	16.00	3.31
.00	2.00	2.00	0.025	0.0050	1.14	16.00	3.28
.00	2.00	2.00	0.020	0.0100	1.03	16.00	5.06
.00	2.00	2.00	0.020	0.0100	0.86	16.00	4.98
.00	2.00	2.00	0.025	0.0100	1.14	16.00	4.29
.00	2.00	2.00	0.025	0.0100	0.96	16.00	4.23
.00	2.00	2.00	0.020	0.0150	0.94	16.00	5.89
.00	2.00	2.00	0.020	0.0150	0.78	16.00	5.77
00	2.00	2.00	0.025	0.0150	1.04	16.00	4.99
00	2.00	2.00	0.025	0.0150	0.87	16.00	4.91
.00	2.00	2.00	0.020	0.0200	0.88	16.00	6.56
.00	2.00	2.00	0.020	0.0200	0.72	16.00	6.41
.00	2.00	2.00	0.025	0.0200	0.98	16.00	5.55
.00	2.00	2.00	0.025	0.0200	0.81	16.00	5.45
.00	2.00	2.00	0.020	0.0050	1.27	18.00	4.03
.00	2.00	2.00	0.020	0.0050	1.08	18.00	3.98
.00	2.00	2.00	0.025	0.0050	1.39	18.00	3.41
00	2.00	2.00	0.025	0.0050	1.21	18.00	3.38
00	2.00	2.00	0.020	0.0100	1.09	18.00	5.22
00	2.00	2.00	0.020	0.0100	0.91	18.00	5.14
00	2.00	2.00	0.025	0.0100	1.20	18.00	4.42
00	2.00	2.00	0.025	0.0100	1.02	18.00	4.36
00	2.00	2.00	0.020	0.0150	0.99	18.00	6.07
00	2.00	2.00	0.020	0.0150	0.83	18.00	5.96
00	2.00	2.00	0.025	0.0150	1.10	18.00	5.14
00	2.00	2.00	0.025	0.0150	0.92	18.00	5.06
00	2.00	2.00	0.020	0.0200	0.93	18.00	6.76
00	2.00	2.00	0.020	0.0200	0.77	18.00	6.62
00	2.00	2.00	0.025	0.0200	1.03	18.00	5.72
00	2.00	2.00	0.025	0.0200	0.86	18.00	5.62

RIABLE			VARIABLE	VARIABLE	COMPUTED	VARIABLE	COMPUTED
ɔttom idth ft	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	Channel Depth ft	Channel Discharge cfs	Velocity fps
.00	2.00	2.00	0.020	0.0050	1.33	20.00	4.14
.00	2.00	2.00	0.020	0.0050	1.14	20.00	4.09
.00	2.00	2.00	0.025	0.0050	1.46	20.00	3.50
.00	2.00	2.00	0.025	0.0050	1.27	20.00	3.47
.00	2.00	2.00	0.020	0.0100	1.14	20.00	5.36
.00	2.00	2.00	0.020	0.0100	0.96	20.00	5.28
.00	2.00	2.00	0.025	0.0100	1.26	20.00	4.54
.00	2.00	2.00	0.025	0.0100	1.07	20.00	4.48
.00	2.00	2.00	0.020	0.0150	1.04	20.00	6.24
.00	2.00	2.00	0.020	0.0150	0.87	20.00	6.13
.00	2.00	2.00	0.025	0.0150	1.15	20.00	5.28
.00	2.00	2.00	0.025	0.0150	0.97	20.00	5.21
.00	2.00	2.00	0.020	0.0200	0.98	20.00	6.94
.00	2.00	2.00	0.020	0.0200	0.81	20.00	6.81
.00	2.00	2.00	0.025	0.0200	1.08	20.00	5.88
.00	2.00	2.00	0.025	0.0200	0.91	20.00	5.79
.00	2.00	2.00	0.020	0.0050	1.38	22.00	4.24
.00	2.00	2.00	0.020	0.0050	1.19	22.00	4.20
.00	2.00	2.00	0.025	0.0050	1.52	22.00	3.58
00	2.00	2.00	0.025	0.0050	1.33	22.00	3.56
00	2.00	2.00	0.020	0.0100	1.19	22.00	5.49
.00	2.00	2.00	0.020	0.0100	1.01	22.00	5.42
.00	2.00	2.00	0.025	0.0100	1.31	22.00	4.65
.00	2.00	2.00	0.025	0.0100	1.13	22.00	4.60
.00	2.00	2.00	0.020	0.0150	1.09	22.00	6.39
.00	2.00	2.00	0.020	0.0150	0.91	22.00	6.29
.00	2.00	2.00	0.025	0.0150	1.20	22.00	5.41
.00	2.00	2.00	0.025	0.0150	1.02	22.00	5.34
.00	2.00	2.00	0.020	0.0200	1.02	22.00	7.11
.00	2.00	2.00	0.020	0.0200	0.85	22.00	6.99
.00	2.00	2.00	0.025	0.0200	1.12	22.00	6.02
.00	2.00	2.00	0.025	0.0200	0.95	22.00	5.93
.00	2.00	2.00	0.020	0.0050	1.43	24.00	4.33
.00	2.00	2.00	0.020	0.0050	1.25	24.00	4.29
.00	2.00	2.00	0.025	0.0050	1.58	24.00	3.66
.00	2.00	2.00	0.025	0.0050	1.38	24.00	3.64
.00	2.00	2.00	0.020	0.0100	1.23	24.00	5.61
.00	2.00	2.00	0.020	0.0100	1.05	24.00	5.55
.00	2.00	2.00	0.025	0.0100	1.36	24.00	4.75
.00	2.00	2.00	0.025	0.0100	1.17	24.00	4.70

RIABLE			VARIABLE	VARIABLE	COMPUTED	VARIABLE	COMPUTED
ottom idth ft	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	Channel Depth ft	Channel Discharge cfs	Velocity fps
.00	2.00	2.00	0.020	0.0150	1.13	24.00	6.53
.00	2.00	2.00	0.020	0.0150	0.95	24.00	6.44
.00	2.00	2.00	0.025	0.0150	1.24	24.00	5.53
.00	2.00	2.00	0.025	0.0150	1.06	24.00	5.46
.00	2.00	2.00	0.020	0.0200	1.06	24.00	7.27
.00	2.00	2.00	0.020	0.0200	0.89	24.00	7.15
.00	2.00	2.00	0.025	0.0200	1.17	24.00	6.15
.00	2.00	2.00	0.025	0.0200	0.99	24.00	6.07
.00	2.00	2.00	0.020	0.0050	1.48	26.00	4.42
.00	2.00	2.00	0.020	0.0050	1.29	26.00	4.38
.00	2.00	2.00	0.025	0.0050	1.63	26.00	3.74
.00	2.00	2.00	0.025	0.0050	1.44	26.00	3.71
.00	2.00	2.00	0.020	0.0100	1.28	26.00	5.73
.00	2.00	2.00	0.020	0.0100	1.10	26.00	5.66
.00	2.00	2.00	0.025	0.0100	1.41	26.00	4.84
.00	2.00	2.00	0.025	0.0100	1.22	26.00	4.80
.00	2.00	2.00	0.020	0.0150	1.17	26.00	6.66
.00	2.00	2.00	0.020	0.0150	0.99	26.00	6.58
.00	2.00	2.00	0.025	0.0150	1.29	26.00	5.64
00	2.00	2.00	0.025	0.0150	1.11	26.00	5.58
00	2.00	2.00	0.020	0.0200	1.10	26.00	7.42
.00	2.00	2.00	0.020	0.0200	0.92	26.00	7.31
.00	2.00	2.00	0.025	0.0200	1.21	26.00	6.28
.00	2.00	2.00	0.025	0.0200	1.03	26.00	6.20
.00	2.00	2.00	0.020	0.0050	1.53	28.00	4.50
.00	2.00	2.00	0.020	0.0050	1.34	28.00	4.47
.00	2.00	2.00	0.025	0.0050	1.68	28.00	3.81
.00	2.00	2.00	0.025	0.0050	1.49	28.00	3.79
.00	2.00	2.00	0.020	0.0100	1.32	28.00	5.83
.00	2.00	2.00	0.020	0.0100	1.14	28.00	5.77
.00	2.00	2.00	0.025	0.0100	1.45	28.00	4.94
.00	2.00	2.00	0.025	0.0100	1.26	28.00	4.90
.00	2.00	2.00	0.020	0.0150	1.21	28.00	6.79
.00	2.00	2.00	0.020	0.0150	1.03	28.00	6.71
.00	2.00	2.00	0.025	0.0150	1.33	28.00	5.74
.00	2.00	2.00	0.025	0.0150	1.15	28.00	5.69
.00	2.00	2.00	0.020	0.0200	1.13	28.00	7.56
.00	2.00	2.00	0.020	0.0200	0.96	28.00	7.45
.00	2.00	2.00	0.025	0.0200	1.25	28.00	6.40
.00	2.00	2.00	0.025	0.0200	1.07	28.00	6.32

RIABLE			VARIABLE	VARIABLE	COMPUTED	VARIABLE	COMPUTED
ttom dth t	Z-Left (H:V)	Z-Right (H:V)	Mannings 'n'	Channel Slope ft/ft	Channel Depth ft	Channel Discharge cfs	Velocity fps
00	2.00	2.00	0.020	0.0050	1.58	30.00	4.58
00	2.00	2.00	0.020	0.0050	1.38	30.00	4.55
00	2.00	2.00	0.025	0.0050	1.73	30.00	3.87
00	2.00	2.00	0.025	0.0050	1.54	30.00	3.85
00	2.00	2.00	0.020	0.0100	1.36	30.00	5.94
00	2.00	2.00	0.020	0.0100	1.17	30.00	5.88
.00	2.00	2.00	0.025	0.0100	1.50	30.00	5.02
.00	2.00	2.00	0.025	0.0100	1.31	30.00	4.98
.00	2.00	2.00	0.020	0.0150	1.24	30.00	6.91
.00	2.00	2.00	0.020	0.0150	1.06	30.00	6.83
.00	2.00	2.00	0.025	0.0150	1.37	30.00	5.85
.00	2.00	2.00	0.025	0.0150	1.19	30.00	5.79
.00	2.00	2.00	0.020	0.0200	1.17	30.00	7.69
.00	2.00	2.00	0.020	0.0200	0.99	30.00	7.59
.00	2.00	2.00	0.025	0.0200	1.29	30.00	6.51
.00	2.00	2.00	0.025	0.0200	1.11	30.00	6.44

PIPE DOWNDRAIN

AND

CROSSDRAIN

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: Mt View LF, UT

Description: Crossdrain/Downdrain

Solve For Actual Depth

Given Constant Data;

Diameter.....	1.00
Mannings n.....	0.024

ıble Input Data	Minimum	Maximum	Increment By
›e	0.0500	0.1000	0.0100
:harge	1.00	5.00	1.00

	VARIABLE		VARIABLE COMPUTED	COMPUTED	COMPUTED	
ameter ft	Channel Slope ft/ft	Mannings 'n'	Discharge cfs	Depth ft	Velocity fps	Capacity Full cfs
..00	0.0500	0.024	1.00	0.33	4.47	4.32
..00	0.0600	0.024	1.00	0.31	4.77	4.73
..00	0.0700	0.024	1.00	0.30	5.05	5.11
..00	0.0800	0.024	1.00	0.29	5.29	5.46
..00	0.0900	0.024	1.00	0.28	5.52	5.79
1.00	0.1000	0.024	1.00	0.27	5.73	6.10
1.00	0.1100	0.024	1.00	0.27	5.93	6.40
1.00	0.0500	0.024	2.00	0.48	5.39	4.32
1.00	0.0600	0.024	2.00	0.45	5.77	4.73
1.00	0.0700	0.024	2.00	0.43	6.11	5.11
1.00	0.0800	0.024	2.00	0.42	6.41	5.46
1.00	0.0900	0.024	2.00	0.41	6.69	5.79
1.00	0.1000	0.024	2.00	0.39	6.96	6.10
1.00	0.1100	0.024	2.00	0.38	7.20	6.40
1.00	0.0500	0.024	3.00	0.61	5.94	4.32
1.00	0.0600	0.024	3.00	0.58	6.37	4.73
1.00	0.0700	0.024	3.00	0.55	6.76	5.11
1.00	0.0800	0.024	3.00	0.53	7.11	5.46
1.00	0.0900	0.024	3.00	0.51	7.44	5.79
.00	0.1000	0.024	3.00	0.50	7.74	6.10
1.00	0.1100	0.024	3.00	0.48	8.02	6.40
1.00	0.0500	0.024	4.00	0.76	6.24	4.32
1.00	0.0600	0.024	4.00	0.71	6.75	4.73
1.00	0.0700	0.024	4.00	0.67	7.19	5.11
1.00	0.0800	0.024	4.00	0.64	7.59	5.46
1.00	0.0900	0.024	4.00	0.61	7.95	5.79
1.00	0.1000	0.024	4.00	0.59	8.29	6.10
1.00	0.1100	0.024	4.00	0.57	8.60	6.40
Jnable to compute this instance.						
1.00	0.0600	0.024	5.00	0.89	6.80	4.73
1.00	0.0700	0.024	5.00	0.80	7.41	5.11
1.00	0.0800	0.024	5.00	0.75	7.88	5.46
1.00	0.0900	0.024	5.00	0.72	8.29	5.79
1.00	0.1000	0.024	5.00	0.69	8.67	6.10
1.00	0.1100	0.024	5.00	0.67	9.01	6.40

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: Mtn View LF, UT

Description: Crossdrain/Downdrain

Solve For Actual Depth

Given Constant Data;

Diameter.....	1.50
Mannings n.....	0.024

able Input Data	Minimum	Maximum	Increment By
pe	0.0500	0.0800	0.0100
charge	5.00	20.00	1.00

ameter ft	VARIABLE Channel Slope ft/ft	Mannings 'n'	VARIABLE Discharge cfs	COMPUTED Depth ft	COMPUTED Velocity fps	COMPUTED Capacity Full cfs
..50	0.0500	0.024	5.00	0.65	6.77	12.72
..50	0.0600	0.024	5.00	0.62	7.24	13.94
..50	0.0700	0.024	5.00	0.60	7.66	15.05
..50	0.0800	0.024	5.00	0.57	8.04	16.09
..50	0.0500	0.024	6.00	0.72	7.09	12.72
..50	0.0600	0.024	6.00	0.69	7.59	13.94
..50	0.0700	0.024	6.00	0.66	8.04	15.05
..50	0.0800	0.024	6.00	0.63	8.44	16.09
..50	0.0500	0.024	7.00	0.79	7.37	12.72
..50	0.0600	0.024	7.00	0.75	7.90	13.94
1.50	0.0700	0.024	7.00	0.72	8.36	15.05
1.50	0.0800	0.024	7.00	0.69	8.79	16.09
1.50	0.0500	0.024	8.00	0.86	7.61	12.72
1.50	0.0600	0.024	8.00	0.81	8.16	13.94
1.50	0.0700	0.024	8.00	0.78	8.65	15.05
1.50	0.0800	0.024	8.00	0.75	9.09	16.09
1.50	0.0500	0.024	9.00	0.93	7.81	12.72
1.50	0.0600	0.024	9.00	0.88	8.38	13.94
1.50	0.0700	0.024	9.00	0.84	8.90	15.05
.50	0.0800	0.024	9.00	0.80	9.36	16.09
.50	0.0500	0.024	10.00	1.00	7.97	12.72
1.50	0.0600	0.024	10.00	0.94	8.58	13.94
1.50	0.0700	0.024	10.00	0.89	9.11	15.05
1.50	0.0800	0.024	10.00	0.86	9.60	16.09
1.50	0.0500	0.024	11.00	1.08	8.10	12.72
1.50	0.0600	0.024	11.00	1.00	8.74	13.94
1.50	0.0700	0.024	11.00	0.95	9.30	15.05
1.50	0.0800	0.024	11.00	0.91	9.80	16.09
1.50	0.0500	0.024	12.00	1.16	8.19	12.72
1.50	0.0600	0.024	12.00	1.07	8.87	13.94
1.50	0.0700	0.024	12.00	1.01	9.46	15.05
1.50	0.0800	0.024	12.00	0.97	9.98	16.09
1.50	0.0500	0.024	13.00	1.26	8.20	12.72
1.50	0.0600	0.024	13.00	1.15	8.96	13.94
1.50	0.0700	0.024	13.00	1.08	9.59	15.05
1.50	0.0800	0.024	13.00	1.02	10.14	16.09
Unable to compute this instance.						
1.50	0.0600	0.024	14.00	1.24	8.99	13.94
1.50	0.0700	0.024	14.00	1.14	9.68	15.05
1.50	0.0800	0.024	14.00	1.08	10.26	16.09

ameter ft	VARIABLE Channel Slope ft/ft	Mannings 'n'	VARIABLE COMPUTED Discharge cfs	COMPUTED Depth ft	COMPUTED Velocity fps	COMPUTED Capacity Full cfs
Unable to compute this instance.						
Unable to compute this instance.						
1.50	0.0700	0.024	15.00	1.22	9.71	15.05
1.50	0.0800	0.024	15.00	1.15	10.35	16.09
Unable to compute this instance.						
Unable to compute this instance.						
1.50	0.0700	0.024	16.00	1.34	9.60	15.05
1.50	0.0800	0.024	16.00	1.22	10.38	16.09
Unable to compute this instance.						
Unable to compute this instance.						
Unable to compute this instance.						
1.50	0.0800	0.024	17.00	1.32	10.29	16.09
Unable to compute this instance.						
Unable to compute this instance.						
Unable to compute this instance.						
Unable to compute this instance.						
Unable to compute this instance.						
Unable to compute this instance.						
Unable to compute this instance.						
Unable to compute this instance.						
Unable to compute this instance.						
Unable to compute this instance.						
Unable to compute this instance.						

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: Mtn View LF, UT

Description: Crossdrain/Downdrain

Solve For Actual Depth

Given Constant Data;

Diameter.....	2.00
Mannings n.....	0.024

ıble Input Data	Minimum	Maximum	Increment By
ɔe	0.0500	0.0800	0.0100
ɔharge	15.00	30.00	1.00

VARIABLE	VARIABLE	VARIABLE	COMPUTED	COMPUTED	COMPUTED
ameter ft	Channel Slope ft/ft	Mannings 'n'	Discharge cfs	Depth ft	Velocity fps	Capacity Full cfs
2.00	0.0500	0.024	15.00	1.06	8.92	27.40
2.00	0.0600	0.024	15.00	1.00	9.55	30.02
2.00	0.0700	0.024	15.00	0.96	10.12	32.42
2.00	0.0800	0.024	15.00	0.92	10.63	34.66
2.00	0.0500	0.024	16.00	1.10	9.06	27.40
2.00	0.0600	0.024	16.00	1.04	9.71	30.02
2.00	0.0700	0.024	16.00	0.99	10.29	32.42
2.00	0.0800	0.024	16.00	0.95	10.81	34.66
2.00	0.0500	0.024	17.00	1.14	9.19	27.40
2.00	0.0600	0.024	17.00	1.08	9.85	30.02
2.00	0.0700	0.024	17.00	1.03	10.44	32.42
2.00	0.0800	0.024	17.00	0.99	10.98	34.66
2.00	0.0500	0.024	18.00	1.18	9.31	27.40
2.00	0.0600	0.024	18.00	1.12	9.99	30.02
2.00	0.0700	0.024	18.00	1.06	10.59	32.42
2.00	0.0800	0.024	18.00	1.02	11.14	34.66
2.00	0.0500	0.024	19.00	1.23	9.42	27.40
2.00	0.0600	0.024	19.00	1.15	10.11	30.02
2.00	0.0700	0.024	19.00	1.10	10.73	32.42
.00	0.0800	0.024	19.00	1.06	11.29	34.66
2.00	0.0500	0.024	20.00	1.27	9.52	27.40
2.00	0.0600	0.024	20.00	1.19	10.23	30.02
2.00	0.0700	0.024	20.00	1.14	10.86	32.42
2.00	0.0800	0.024	20.00	1.09	11.43	34.66
2.00	0.0500	0.024	21.00	1.31	9.61	27.40
2.00	0.0600	0.024	21.00	1.23	10.34	30.02
2.00	0.0700	0.024	21.00	1.17	10.98	32.42
2.00	0.0800	0.024	21.00	1.12	11.56	34.66
2.00	0.0500	0.024	22.00	1.36	9.70	27.40
2.00	0.0600	0.024	22.00	1.27	10.44	30.02
2.00	0.0700	0.024	22.00	1.21	11.09	32.42
2.00	0.0800	0.024	22.00	1.16	11.68	34.66
2.00	0.0500	0.024	23.00	1.40	9.77	27.40
2.00	0.0600	0.024	23.00	1.31	10.53	30.02
2.00	0.0700	0.024	23.00	1.24	11.20	32.42
2.00	0.0800	0.024	23.00	1.19	11.80	34.66
2.00	0.0500	0.024	24.00	1.45	9.83	27.40
2.00	0.0600	0.024	24.00	1.35	10.61	30.02
2.00	0.0700	0.024	24.00	1.28	11.30	32.42
2.00	0.0800	0.024	24.00	1.22	11.91	34.66

ameter ft	VARIABLE Channel Slope ft/ft	Mannings 'n'	VARIABLE Discharge cfs	COMPUTED Depth ft	COMPUTED Velocity fps	COMPUTED Capacity Full cfs
2.00	0.0500	0.024	25.00	1.50	9.89	27.40
2.00	0.0600	0.024	25.00	1.39	10.69	30.02
2.00	0.0700	0.024	25.00	1.32	11.39	32.42
2.00	0.0800	0.024	25.00	1.26	12.01	34.66
2.00	0.0500	0.024	26.00	1.55	9.92	27.40
2.00	0.0600	0.024	26.00	1.44	10.76	30.02
2.00	0.0700	0.024	26.00	1.36	11.47	32.42
2.00	0.0800	0.024	26.00	1.29	12.11	34.66
2.00	0.0500	0.024	27.00	1.61	9.94	27.40
2.00	0.0600	0.024	27.00	1.48	10.81	30.02
2.00	0.0700	0.024	27.00	1.39	11.55	32.42
2.00	0.0800	0.024	27.00	1.33	12.20	34.66
2.00	0.0500	0.024	28.00	1.68	9.93	27.40
2.00	0.0600	0.024	28.00	1.53	10.86	30.02
2.00	0.0700	0.024	28.00	1.43	11.61	32.42
2.00	0.0800	0.024	28.00	1.36	12.28	34.66
2.00	0.0500	0.024	29.00	1.77	9.85	27.40
2.00	0.0600	0.024	29.00	1.58	10.88	30.02
2.00	0.0700	0.024	29.00	1.48	11.67	32.42
2.00	0.0800	0.024	29.00	1.40	12.35	34.66
Unable to compute this instance.						
2.00	0.0600	0.024	30.00	1.64	10.89	30.02
2.00	0.0700	0.024	30.00	1.52	11.72	32.42
2.00	0.0800	0.024	30.00	1.44	12.42	34.66

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: Mtn View LF, UT

Description: Crossdrain/Downdrain

Solve For Actual Depth

Given Constant Data;

Diameter..... 2.50
Mannings n..... 0.024

able Input Data	Minimum	Maximum	Increment By
pe	0.0500	0.0800	0.0100
charge	25.00	40.00	1.00

.ameter ft	VARIABLE Channel Slope ft/ft	Mannings 'n'	VARIABLE COMPUTED Discharge cfs	COMPUTED Depth ft	COMPUTED Velocity fps	COMPUTED Capacity Full cfs
2.50	0.0500	0.024	25.00	1.25	10.14	49.68
2.50	0.0600	0.024	25.00	1.19	10.85	54.42
2.50	0.0700	0.024	25.00	1.14	11.49	58.78
2.50	0.0800	0.024	25.00	1.10	12.07	62.84
2.50	0.0500	0.024	26.00	1.28	10.24	49.68
2.50	0.0600	0.024	26.00	1.22	10.96	54.42
2.50	0.0700	0.024	26.00	1.16	11.61	58.78
2.50	0.0800	0.024	26.00	1.12	12.20	62.84
2.50	0.0500	0.024	27.00	1.31	10.33	49.68
2.50	0.0600	0.024	27.00	1.24	11.07	54.42
2.50	0.0700	0.024	27.00	1.19	11.72	58.78
2.50	0.0800	0.024	27.00	1.14	12.32	62.84
2.50	0.0500	0.024	28.00	1.34	10.42	49.68
2.50	0.0600	0.024	28.00	1.27	11.17	54.42
2.50	0.0700	0.024	28.00	1.22	11.83	58.78
2.50	0.0800	0.024	28.00	1.17	12.43	62.84
2.50	0.0500	0.024	29.00	1.37	10.51	49.68
2.50	0.0600	0.024	29.00	1.30	11.26	54.42
2.50	0.0700	0.024	29.00	1.24	11.93	58.78
2.50	0.0800	0.024	29.00	1.19	12.55	62.84
2.50	0.0500	0.024	30.00	1.40	10.59	49.68
2.50	0.0600	0.024	30.00	1.32	11.36	54.42
2.50	0.0700	0.024	30.00	1.27	12.04	58.78
2.50	0.0800	0.024	30.00	1.22	12.65	62.84
2.50	0.0500	0.024	31.00	1.43	10.68	49.68
2.50	0.0600	0.024	31.00	1.35	11.45	54.42
2.50	0.0700	0.024	31.00	1.29	12.13	58.78
2.50	0.0800	0.024	31.00	1.24	12.76	62.84
2.50	0.0500	0.024	32.00	1.46	10.75	49.68
2.50	0.0600	0.024	32.00	1.38	11.53	54.42
2.50	0.0700	0.024	32.00	1.31	12.23	58.78
2.50	0.0800	0.024	32.00	1.26	12.86	62.84
2.50	0.0500	0.024	33.00	1.49	10.83	49.68
2.50	0.0600	0.024	33.00	1.40	11.62	54.42
2.50	0.0700	0.024	33.00	1.34	12.32	58.78
2.50	0.0800	0.024	33.00	1.29	12.96	62.84
2.50	0.0500	0.024	34.00	1.52	10.90	49.68
2.50	0.0600	0.024	34.00	1.43	11.70	54.42
2.50	0.0700	0.024	34.00	1.36	12.41	58.78
2.50	0.0800	0.024	34.00	1.31	13.05	62.84

ameter ft	VARIABLE Channel Slope ft/ft	Mannings 'n'	VARIABLE COMPUTED Discharge cfs	COMPUTED Depth ft	COMPUTED Velocity fps	COMPUTED Capacity Full cfs
2.50	0.0500	0.024	35.00	1.55	10.97	49.68
2.50	0.0600	0.024	35.00	1.46	11.77	54.42
2.50	0.0700	0.024	35.00	1.39	12.49	58.78
2.50	0.0800	0.024	35.00	1.33	13.15	62.84
2.50	0.0500	0.024	36.00	1.58	11.03	49.68
2.50	0.0600	0.024	36.00	1.48	11.85	54.42
2.50	0.0700	0.024	36.00	1.41	12.58	58.78
2.50	0.0800	0.024	36.00	1.36	13.24	62.84
2.50	0.0500	0.024	37.00	1.61	11.09	49.68
2.50	0.0600	0.024	37.00	1.51	11.92	54.42
2.50	0.0700	0.024	37.00	1.44	12.66	58.78
2.50	0.0800	0.024	37.00	1.38	13.32	62.84
2.50	0.0500	0.024	38.00	1.64	11.15	49.68
2.50	0.0600	0.024	38.00	1.54	11.99	54.42
2.50	0.0700	0.024	38.00	1.46	12.73	58.78
2.50	0.0800	0.024	38.00	1.40	13.41	62.84
2.50	0.0500	0.024	39.00	1.67	11.21	49.68
2.50	0.0600	0.024	39.00	1.57	12.06	54.42
2.50	0.0700	0.024	39.00	1.49	12.81	58.78
2.50	0.0800	0.024	39.00	1.43	13.49	62.84
2.50	0.0500	0.024	40.00	1.70	11.26	49.68
2.50	0.0600	0.024	40.00	1.59	12.12	54.42
2.50	0.0700	0.024	40.00	1.51	12.88	58.78
2.50	0.0800	0.024	40.00	1.45	13.56	62.84