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December 23, 1994

GLE65614.PP.PM

Mr. Paul Kozol
Wisconsin Department of
Natural Resources
101 South Webster
Madison, WI 53707

Dear Mr. Kozol:

Subject: Landfill Closure Report
Onalaska Municipal Landfill Site Remediation
U.S. EPA Contract No. 68-W8-0040, WA No. 47-5RL5

Enclosed are two copies of the closure report for the Onalaska Landfill site. This report documents the construction of the new cap for the landfill in accordance with NR 516. The design plans and specifications were prepared in 1992. Based on the observations made by our field staff during the construction of the cap and review of test data and contour maps, we believe that the completed work generally conforms to the subcontract documents and that the integrity of the design concept, as reflected in the subcontract documents, has been implemented and preserved by the construction subcontractors.

Should you have any questions about the report, please contact me at (414) 272-2426.

Sincerely,

CH2M HILL

Steve Keith

Steve Keith, P.E.
Site Manager

MKE1001554C.WP5
Enclosures
cc: Stephen Nathan/PO/U.S. EPA (without attachments)
Brigitte Manzke/CO/U.S. EPA (without attachments)
Kevin Adler/WAM/U.S. EPA (2 copies)
William Hubbard/APM/CH2M HILL (without attachments)
Jim Russell/CH2M HILL
Cherie Wilson/PA/CH2M HILL

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# Closure Report

# Onalaska Municipal Landfill Cap Remedial Action

**Prepared For**
***U.S. Environmental Protection Agency***

Prepared by
**CH2M HILL**

December 1994

# Introduction

The purpose of this report is to document closure of the Onalaska Municipal Landfill cap reconstruction. The existing cap was reconstructed to comply with NR 504 of the Wisconsin Administrative Code in accordance with the Record of Decision (ROD) for this site. CH2M HILL was the prime contractor to the U.S. Environmental Protection Agency (EPA) for cap design and construction. Construction activities began in May 1993 and were completed in the summer of 1994. A final site inspection was conducted on November 21, 1994.

This report describes cap reconstruction activities and end-of-construction conditions; it is intended to satisfy the reporting requirements found in NR 516.07 of the Wisconsin Administrative Code. The closure documentation required by NR 516.07, including engineering plans, photographs, and soil analytical test results, is contained in the appendixes to this report.

# Background

The Onalaska Municipal Landfill is located in Onalaska Township, a rural area near La Crosse, Wisconsin. It occupies a former gravel pit covering about 11 acres. The Town of Onalaska owned the site and was licensed to operate a municipal landfill there from 1969 until the Wisconsin Department of Natural Resources (WDNR) ordered its closure in 1980. About 7 acres of the landfill were used for open-pit disposal of a mixture of municipal, commercial, and industrial wastes. A disposal area for liquid industrial wastes was also designated. Open burning of waste solvents occurred randomly at the landfill until 1971, when the WDNR prohibited all open burning.

In the spring of 1978, the WDNR issued an order to the township to submit an in-field conditions report for the landfill because the landfill did not meet Wisconsin solid waste codes. In April 1978, downgradient groundwater contamination was detected. On October 19, 1978, Warzyn Engineering submitted a plan of operation for phased abandonment of the landfill. The final order for closing the landfill was issued in September 1980; the closure proceeded in phases and the cap was placed in July 1982.

On May 2, 1983, an EPA Potential Hazardous Waste Site inspection report was submitted. In September 1984, the Onalaska Landfill was placed on the National Priority List with a hazard ranking of 42.97.

The remedial investigation (RI) was conducted during 1989. The results of the investigation are presented in the RI Report (October 1989). The feasibility study (FS) presented remedial alternatives based on risk to human health and the environment. The FS Report was completed in December 1989.

## Selected Remedial Action

The ROD was signed by the EPA on August 14, 1990. The selection of the remedial action (RA) for the site is documented in the ROD. As part of the RA, the ROD required that the landfill cap be reconstructed to comply with NR 504.07. The ROD also specified a groundwater extraction and treatment system, soil venting, and groundwater monitoring. Those activities are not covered in this document.

## Construction Documents

CH2M HILL prepared the following documents as part of the remedial design (RD):

*Subcontract Documents for Landfill Cap Remedial Action Onalaska Township, Wisconsin, Volume I of II: Specifications and Drawings* (June 1993), provides technical construction requirements for the soil cover, landfill gas collection system, and fence.

*Subcontract Documents for the Landfill Cap Remedial Action Onalaska Township, Wisconsin, Volume II of II: Reports* (June 1993), provides selected geoenvironmental data from previous investigations.

*Addendum No. 1 to the Subcontract Documents for the Landfill Cap Remedial Action Onalaska Township, Wisconsin* (July 1, 1992), contains changes, additions, and deletions to the subcontract documents for the landfill cap RA dated June 1992.

*Addendum No. 2 to the Subcontract Documents for the Landfill Cap Remedial Action Onalaska Township, Wisconsin* (October 26, 1992), contains changes, additions, and deletions to the subcontract documents for the landfill cap RA dated June 1992.

*Addendum No. 3 to the Subcontract Documents for the Landfill Cap Remedial Action Onalaska Township, Wisconsin* (November 13, 1992), contains changes, additions, and deletions to the subcontract documents for the landfill cap RA dated June 1992.

*Construction Quality Assurance Plan—Landfill Cap Remedial Action for the Onalaska Municipal Landfill Site* (June 1992), presents the approach for implementing requirements of the contract documents and for monitoring construction quality control (QC).

## Prime Contractor, Subcontractor, and Sub-subcontractors

CH2M HILL acted as the prime contractor for the Onalaska cap reconstruction and performed the work under EPA Contract No. 68-W8-0040. CH2M HILL received EPA consent to award Subcontract No. 31 to Roy F. Weston (Weston) on January 26, 1993. Weston hired sub-subcontractors to assist in the performance of the subcontract work.

The prime contractor, subcontractor, and sub-subcontractors performing work at the site are identified as follows.

Prime Contractor:

CH2M HILL
411 East Wisconsin Avenue, Suite 1600
Milwaukee, Wisconsin 53202
(414) 272-2426

Cap Construction Subcontractors:

Roy F. Weston, Inc.
Three Hawthorn Parkway, Suite 400
Vernon Hills, Illinois 60061-1450

CH2M HILL Quality Assurance Testing
Twin City Testing Corporation
2710 Commerce Street
La Crosse, Wisconsin 54603

Trucking Services Sub-subcontractors:

Midwest Trucking
Route 2, Box 3
Bloomer, Wisconsin 54724

Surveying Services Sub-subcontractors:

Enviroscience
6474 City West Parkway
Eden Prairie, Minnesota 55344

Geotechnical Services (Drilling & QC Testing) Sub-subcontractors:

Braun Intertec Engineering, Inc.
510 Fisherman's Road
La Crosse, Wisconsin 54603

Fencing Sub-subcontractors:

Moe Fencing
P.O. Box 536
Holmen, Wisconsin 54636-0536

Installation of Precast Endwall Sub-subcontractors:

R.J. Sullivan
225 North 3rd Street, Suite 200
La Crosse, Wisconsin 54602

Earth Moving Sub-subcontractors

James Thieding Construction, Inc.
250 Main Street
Loganville, Wisconsin 53943

## Construction Management and Record Keeping

CH2M HILL provided full-time construction management and inspection for each phase of construction. Construction management personnel were responsible for administering the construction contract in the field and observing and documenting construction activities. Construction management personnel maintained records of construction activities in field books; photographic records of each phase of construction were also maintained. Field books and photographs are currently maintained with project files in CH2M HILL's Milwaukee office or archive repository.

During cap construction, various other records were also maintained including the daily construction diary, correspondence, phone records, memorandums, transmittals, progress reports, contract clarifications, contract modifications, payment requests, and analytical and field test results. These are also maintained with the project files in CH2M HILL's Milwaukee office or archive repository.

## Cap Construction

The majority of the Onalaska Municipal Landfill cap reconstruction occurred between May 17 and November 29, 1993. Some reseeding and regrading occurred in the spring of 1994. Cap reconstruction included constructing a multilayer cap over the existing soil cap, a passive landfill gas venting system, and a site perimeter fence; and revegetating the new cap. Unless otherwise noted, construction was performed in general accordance with the applicable specifications in the subcontract documents or as shown on the approved construction drawings.

Figure 1 illustrates a typical cap cross section. The cap subgrade consists of:

- Grading layer
- Type II geotextile
- 6-inch working surface

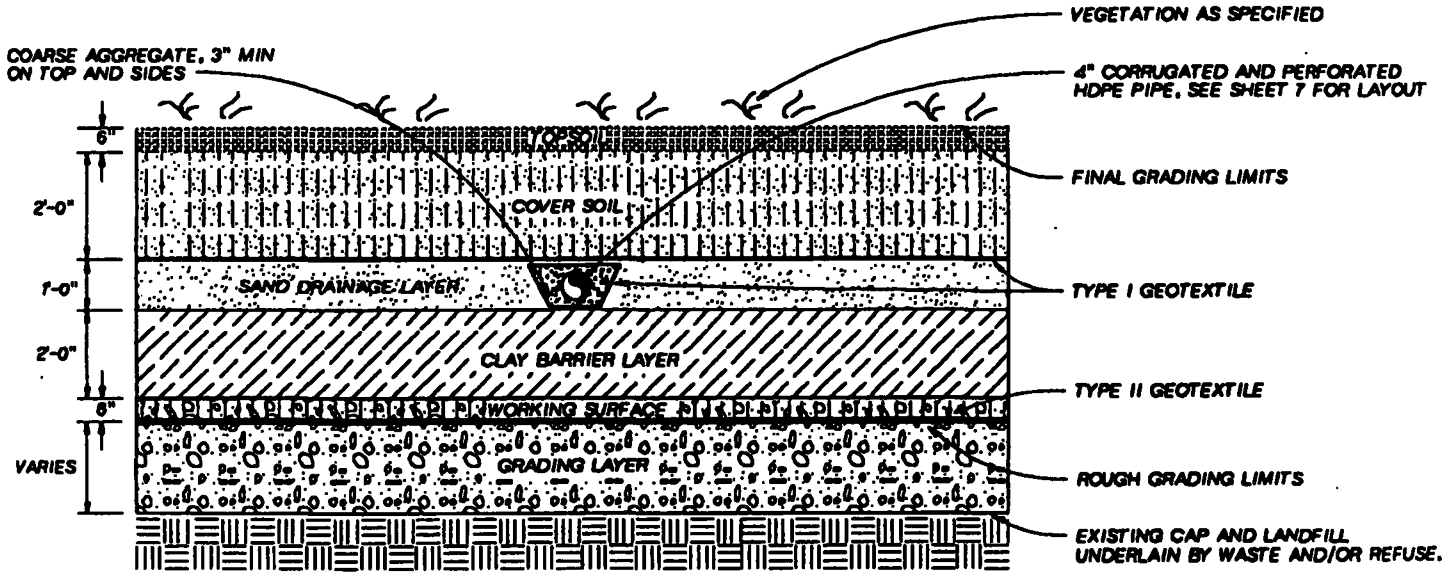


FIGURE 1
**Typical Cap Cross Section**

CH2M HILL

- Minimum of 2 feet of clay
- 12-inch sand drainage layer
- Type I geotextile
- 2 feet of cover soil
- 6 inches of topsoil

A clay test pad was constructed and tested to assess clay layer construction methods. Cap construction activities are presented in the following section.

## Mobilization

Weston mobilized and demobilized equipment and personnel to the site in stages. The general mobilization by CH2M HILL and Weston began the week of May 17, 1993. The following equipment was mobilized to the site over the course of the project:

- One personnel decontamination trailer
- Two office trailers (for CH2M HILL and Weston)
- Three water storage tanks
- One Fabco D5C Cat dozer
- Two Cat D8H dozers
- Two Cat 627B scrapers
- One Ford F800 truck-mounted drill rig
- One Hyster C850B vibratory roller
- One Cat 416 loader/backhoe
- One Cat 320L backhoe
- One Trojan 1900 front-end loader
- One Hyster V13 roller
- One Cat 413 scraper
- One Cat 966C front-end loader
- One Hyster C852B sheepsfoot roller
- One Cat RR250 rotovator
- One Hamm 2310SD smooth-drum roller
- One Case 1150E dozer
- One Cat 950 front-end loader
- Thirteen miscellaneous Mack, Ford, and other 18CY dump trucks
- One Vermer 1220 wood chipper
- One 1,000-gallon GMC 7000 water truck
- One Case 1840 Uniloader and mechanical broom

The personnel decontamination and field trailers were staged at the southeast corner of the site. Personnel entering or leaving the exclusion zone passed through the decontamination area. Vehicles that came in contact with contaminated soil were decontaminated at the decon pad before leaving the exclusion zone.

## Clearing, Grubbing, Stripping, and Demolition

The site was cleared between May 29 and June 4, 1993. The Cat D5C and D8H dozers and the Cat 627B scraper were used for grading, clearing, and scraping. No deviations from specifications were noted. Vegetative debris generated during site clearing was disposed of offsite.

Before grading began, the topsoil on the existing cap was stripped and stockpiled for future use. The topsoil stockpile was located on the northeast corner of the site and on adjacent portions of the Sportsman's Club area.

## General Earthwork Construction Method

The landfill was not proofrolled to detect soft or loose zones. A number of precipitation events occurred at the beginning of cap construction. The rain created muddy conditions and heavy equipment sank to its axles. Proofrolling the site was not pursued because individual soft zones were not evident. The equipment getting stuck in the mud indicated a condition across the site which could not reasonably be repaired by excavation and filling.

Subgrade compaction was checked in the field using a Troxler Model 3401 nuclear density gauge. At least one test was performed for every 5,000 cubic yards of material placed. Compaction requirements were generally achieved after the material was spread and tracked using the dozers. If soil densities appeared to be decreasing or if they did not meet the specified requirements, the contractor was notified and the questionable area reworked.

Elevations were checked routinely by the subcontractor during construction. A laser survey beacon system using elevation target markers was located in areas of work. When specified elevations were achieved, the beacon system signalled the operators. Surveys were performed to confirm subgrade elevations. Contour maps of the various layers of the cap, stamped by a certified surveyor, are in Appendix A.

Precipitation during construction sometimes raised the moisture content too high. Materials were backdragged and leveled to allow them to dry before being placed.

## Rough Grading

Rough grading of the existing cap (including portions of waste) and construction of the access road and decontamination pad took place between May 17 and July 28, 1993.

Rough grading consisted of cutting and filling the existing cap to achieve a 4 to 5 percent slope. In areas where grading layer material was added, the material was transported to the site in dump trucks. Trucks were routed so that they operated on imported fill; thus, decontamination of individual trucks was not required. Imported material was spread using the Cat D5C and D8H dozers and the Trojan 1900 front-end loader. The Hyster C850B vibratory roller was used to compact the grading layer. After one thick lift or two to three thinner lifts were placed, the area was rolled using the vibratory roller.

The landfill gas collection system, including the interceptor trench, collection trenches, and vents was installed during the rough-grading work and before the working surface was placed. Geotextile placement, pipe installation, and backfilling was completed following trench excavation. Soil excavated from the trench was stockpiled. After trenching was completed, the stockpile was pushed toward the center of the cap and blended with the existing cap material. The Cat 320L backhoe was used for trenching. The Trojan 1900 front-end loader was used to backfill the trenches with imported granular earthfill. A clay trench cap was placed on the collector trenches, compacted by the Hyster C850B vibratory roller, and covered with Type II geotextile. The interceptor trenches were covered with Type I geotextile.

Rough grade and interceptor and collection trench construction were generally conducted under Level D (Occupational Safety and Health Act [OSHA] CFR 1910.120) conditions. In some instances during the excavation and placement of the interceptor pipe, waste was exposed. In those instances, personnel operated under Level B (OSHA CFR 1910.120) conditions. The waste excavated from the trench was stockpiled and ultimately spread over the central area of the landfill prior to cap construction. In areas where excavation below the existing grade was necessary during grading (e.g., during gas interceptor trench construction), the subcontractor upgraded his crew to Level C (OSHA CFR 1910.120) conditions. Intrusive grading was performed using the Cat D5C dozer. During intrusive activities, the subcontractor constantly monitored the breathing zone for volatile emissions and the lower explosive limit. Although waste materials were encountered, no volatile emission or explosive limits above background were detected.

## Type II Geotextile Layer and Working Surface

The Type II geotextile and working surface were placed between July 19 and 28, 1993. About 12,300 tons of working surface material were imported.

The geotextile and strip drains were placed first. The Cat 320 backhoe and Cat D5C dozer were used to haul and place the geotextile. The geotextile was unrolled in a north-to-south alignment, anchored to the subgrade by securing pins and washers, and covered immediately with earthfill. The earthfill was transported to the site in dump trucks, spread using the Trojan 1900 front-end loader and Cat D5C dozer, and tracked into place by the dozer. After the material was placed in 6-inch maximum loose lifts, the earthfill was compacted using the Hyster C850B vibratory roller.

## Landfill Gas Monitoring Wells

Construction of the landfill gas monitoring wells took place on July 28 and July 29, 1993. The wells were drilled by Braun Intertec Engineering using the Ford F800 truck-mounted drill rig. Piping was installed and the gravel, sand, bentonite layers, and caps were placed. Concrete was placed around the monitoring wells later, after the subgrade was complete.

The location of landfill gas monitoring wells LG1, LG2, and LG3 was changed before construction began. The overall performance of the landfill gas monitoring system is not expected to change (Construction Modification Request No. 2).

## Clay Test Pad

Construction of two clay test pads took place between August 2 and August 14, 1993. The purpose of the test pads was to investigate construction equipment, materials, and procedures for clay barrier placement. The objective was to produce a dense and homogeneous layer of clay with a hydraulic conductivity at or below $1 \times 10^{-7}$ cm/sec, as required by NR 504.

Before pad construction began, clay materials were tested to determine if they met specifications. The materials were evaluated based on the test results including sieve analysis, Atterberg Limits, and Modified Proctor compaction and hydraulic conductivity. An acceptable material was selected and further tested using the test pads.

Dimensions of the two test pads were 100 by 100 feet and about 1 foot deep. The first test pad was constructed using a clay that was close to the optimum moisture content. The clay was placed in 6-inch-maximum loose lifts and compacted to 90 percent relative compaction using the towed sheepsfoot roller (roller feet were set at 6 inches high). The final surface was flattened using the Hamm 2310SD smooth-drum roller. The second test pad was divided in half. Half the pad was constructed in the same manner as the first pad, except the moisture content of the clay was 1 percent wetter than optimum. The other half of the test pad was constructed by placing the clay in 1-foot loose lifts. After the clay was placed, it was compacted using the towed sheepsfoot roller. The final surface was sealed using the Hamm 2310SD smooth-drum roller.

Three Shelby tube samples were collected. One was collected from the first test pad and each half of the second test pad and tested to evaluate the permeability of the clay as placed. Results of the permeability testing indicated permeabilities of the test pad ranged from $1.1 \times 10^{-8}$ to $6.6 \times 10^{-8}$ cm/sec, demonstrating that proposed materials and methods would meet NR 504 requirements. Based on the results, clay layer construction proceeded following test pad materials methods. The moisture content of the placed clay was not to fall outside the range used in test pad construction, and 90 percent relative compaction had to be maintained. Moisture content and dry density were measured regularly during construction. Compaction test results that deviated from the specifications were checked by performing a permeability test on a Shelby tube sample from the area in question.

Actual construction of the clay layer varied slightly from the test pad methods. First, there was no rotovator available to blend the clay before compaction during test pad construction while a rotovator was used during cap construction. Use of the rotovator during cap construction is expected to have decreased the size of clods and macropores, and thereby decreased clay permeability. The second variation was that two sheepsfoot rollers were used in construction of the clay layer, instead of the one sheepsfoot roller used to construct the test pad. The additional sheepsfoot roller was a heavier piece of equipment and was expected to result in a higher compaction effort and a less permeable clay layer.

## Clay Layer

Construction of the clay layer took place between August 2 and September 11, 1993. About 45,500 tons of material were brought onsite for clay layer construction. The clay was brought onsite in dump trucks and either placed directly or stockpiled onsite before it was spread.

The clay was placed beginning on the east side of the landfill and proceeded west in the shape of a horseshoe. Clay in the horseshoe center was placed last. Clay was dumped at the edges of the fill and pushed into place in 6-inch loose lifts using the Cat D5C and Case 1150E dozers. The Cat RR250 rotovator blended the clay and the towed sheepsfoot roller compacted the clay. The Hyster C852B sheepsfoot roller (roller feet were set at 8 inches high) was used for final compaction. The Hamm 2310SD smooth-drum roller sealed the surface after final compaction. The clay was placed and covered almost immediately, thereby reducing the potential for clay desiccation and cracking.

Plan views of the clay layer's final grades for each 1-foot-thickness are shown in Appendix A.

## Sand Drainage Layer

The sand drainage layer was placed between August 23 and September 11, 1993. Material for the sand layer was excavated from the borrow pit at the Sportsman's Club property and brought onsite in dump trucks. About 25,300 tons of sand were placed.

Initial testing of the borrow source indicated that it did not meet specifications. After consultation with the WDNR and U.S. EPA, it was decided that the source would be accepted (see CMR No. 4).

The sand was spread into 8-inch loose lifts using the Cat D5C and Case 1150E dozers and the Cat 950 front-end loader. The sand was compacted using the Hamm 2310SD smooth-drum roller. Drains in the sand layer were installed during construction of the sand layer. The sand layer was covered with a Type I geotextile following drain placement.

## Cover Soil and Topsoil Layers

Cover soil and topsoil were imported and placed over the site between September 20 and November 1, 1993. About 41,570 tons of cover soil and an unspecified amount of topsoil were placed.

Cover soil was hauled to the site from a farm near the site on County Road Z in dump trucks. Topsoil was imported from two sources because of its limited availability in the area. Topsoil was hauled from the County Road Z farm and one commercial borrow pit. It was also available from the stockpile onsite. Topsoil was brought onsite and blended before it was placed to achieve specifications. The cover and topsoil layers were leveled, graded, and tracked into place in 8-inch loose lifts using the Cat 950 front-end loader and the Cat D5C and Case 1150E dozers.

Topsoil outside of specifications was accepted for construction of the topsoil layer. Construction Modification Request No. 7 discusses why this topsoil was accepted.

Landfill drains, precast headwalls, and concrete flush mounts for the extraction system vent pipes were installed after placement of the topsoil layer.

A plan view of the final grades is contained in Appendix A.

## Seeding

The cap surface topsoil was fertilized and seeded during the week ending November 12, 1993. A soil sample was submitted to Dairyland Laboratories in Arcadia, Wisconsin, and tested to determine fertilizer requirements. Fertilizer was applied in the proportions recommended by the soil testing laboratory. Fertilizer addition recommendations by an agricultural laboratory served as the basis for fertilizer quantities.

In-place seed proportions and quantities were confirmed based on visual inspection of seed placed into distribution hoppers. The WDNR was allowed to add wild prairie grass seed to the hoppers to enhance indigenous species growth. The site was then disked and covered with straw mulch.

Seeding the cap followed subcontract specifications with one exception: dormant seed and native seed were used instead of Seed Mix No. 20 or annual rye grass (Contract Modification Request No. 5).

## Fence Installation

Fence construction was not started before Weston began demobilization in November of 1993. The split-rail fence was constructed in April and May of 1994 along the northern and southern property lines: The site signs were placed at the same time the fence was constructed.

The fence alignment was selected to provide stable posts outside the limits of the landfill. Fence post holes were excavated using 6-inch power augers and enlarged as necessary using a manual, post-hole digger. Most of the concrete for the fence posts was brought to the site in a ready-mix truck.

### RA Waste Disposal

Items including disposable personal protective equipment (Tyvek suits, gloves, and glove liners), waste generated during personnel and equipment decontamination, a decon pad, and drummed solid and liquid wastes generated during RD were placed on top of the existing cap and covered by the new cap.

### Demobilization

Equipment was demobilized from the site gradually, as pieces were no longer required. Primary equipment, supplies, and trailers were removed by November 29, 1993. The decontamination pad was removed in August, 1994 and disposed of at the Minnesota Industrial Containment Facility (landfill) in Rosemount, Minnesota.

## Contract Modifications

Modifications to the subcontract were required to perform work in addition to the scope of the original subcontract or to address deviations from the subcontract documents. Seven separate Contract Modification Requests (CMRs), numbered 1 through 7, and one field order were initiated. CMR Nos. 1, 2, 4, 5, and 7 resulted in a change in the way the cap was constructed. These are discussed in the following sections. All CMRs are included as Appendix B.

### CMR No. 1

This modification directed the subcontractor to test the physical characteristics of a borrow source from adjacent property (i.e., Sportsman's Club property). Initial sampling indicated earthfill from the Sportsman's Club borrow pit had greater percentages of fine-grained materials and, therefore, a lower permeability than specified. Subsequent testing showed the earthfill to be within specifications (see ''Constant Head Permeability'' section of Appendix C).

### CMR No. 2

This modification required a change in the location of landfill gas monitoring wells LG1, LG2, and LG3. Primarily for the sake of convenience, the well locations were moved before construction began. Mr. Hubley, owner of the property adjacent to several well locations, contended that the initially proposed locations were on his property and not within the limits of the parcel to be transferred to the township. This was confirmed by the EPA. In order to keep the gas wells within the confines of the appropriate property, the well locations were moved. The overall performance of the landfill gas extraction system is not expected to change. The final locations of the landfill gas monitoring wells are shown on the site plans contained in Appendix A.

(CMR No. 3 was not related to cap construction).

### CMR No. 4

This modification required that the sand drainage layer material be obtained from the borrow pit on the Sportsman's Club property. Discussions among the WDNR, CH2M HILL, and Weston determined use of this source material would be acceptable if the permeability was at least $10^{-4}$ cm/sec for all samples and that the log average for all permeabilities was at least $10^{-3}$ cm/sec. In addition, no more than 3 percent of the total weight of material should pass through a No. 200 sieve. Based on initial sampling, it was thought that this material would have lower in-place permeability than specified in the subcontract documents. Results of testing during excavation determined that the excavated material closely approximated specifications for permeability (see ''Constant Head Permeability'' section of Appendix C).

### CMR No. 5

This modification required the use of seed that was not listed in the specifications. Instead of Seed Mix No. 20 or annual rye grass seed, dormant and native seeds were used to reseed the cap. The request was accepted to accommodate local groups (WDNR and Scout Troop) that wanted native seed used, and to allow seeding before Weston began demobilizing in the fall of 1993. This change was made with the stipulation that if seeding is unsatisfactory, Weston will reseed the landfill cap at Weston's cost.

(CMR No. 6 was not related to cap construction.)

### CMR No. 7

This modification required the use of earthfill for the topsoil layer that did not meet specifications. The material proposed was accepted because it was deemed to be representative of productive soils from the region. Amendments to the soil were employed to make it an acceptable quality.

## Analysis and Discussion of Soil Testing

Construction QC testing at the Onalaska Municipal Landfill was designed to verify that the materials used in construction met specifications and that the methods of construction were acceptable. Weston conducted QC sampling on a regular basis. CH2M HILL collected quality assurance (QA) samples at a fraction of the frequency of Weston's QC samples to observe and verify Weston's sampling and construction activities. Results of QC testing by WESTON (Braun) are presented in Appendix C. Results of QC testing by CH2M HILL (Twin City) are presented in Appendix D.

The QC testing schedule is contained in the first volume of the subcontract documents, Section 01400, Table 1. The QA testing schedule is contained in the *Construction Quality Assurance Plan* (June 1992). Soil testing results and vendor-provided data on Type I and II geotextile properties to demonstrate they met specifications are contained in Appendixes C through F.

## Soil Analyses During Construction

In accordance with NR 516, analyses of the clay layer, sand layer, cover layer, and topsoil were conducted. The tests conducted for each layer are as follows:

**Clay Layer**

- Dry Density
- Moisture Content
- Atterberg Limits
- Grain Size-Sieve Analysis
- Hydraulic Conductivity
- Moisture Density Curve

**Sand Layer**

- Grain Size-Sieve Analysis
- Hydraulic Conductivity

**Cover Layer**

- Grain Size-Sieve Analysis
- Hydraulic Conductivity

**Topsoil Layer**

- pH, K, N, P
- USDA Classification

## Testing Frequency

The frequency of QC and QA testing is listed in Table 1.

## Design Criteria

Table 1 also summarizes the design criterion and the overall test results for the materials used in subgrade construction.

The design criteria for the testing placement of the subgrade materials are based on strength requirements, the test pad materials and methods, and requirements of NR 504. Test results were evaluated based on the following pass/fail criteria:

- Moisture content is acceptable if between optimum moisture content and 3 percent wet of optimum
- Dry density is acceptable if greater than 90 percent relative compaction
- Permeability test results are acceptable if less than $10^{-7}$ cm/sec

## Results

Test results are summarized in Table 1. Test data are presented in Appendixes C, D, E, and F.

The majority of the soil testing results for cap materials are presented in Appendix C. The following prefixes were used for the various soil materials:

**CL** - Clay source samples (CL-1 through CL-3 are source samples)
**TC** - Trench clay and clay layer (TC-1 through TC-9 = clay layer; TC-10 through TC-15 = trench clay)
**SL** - Sand layer
**TW** - Thinwall (Shelby Tube) samples of clay layer
**BC** - Base course
**TS** - Cover soil

Locations of in-place testing of clay are shown on Figure 1 of Appendix C. Samples identified with the CT prefix are locations of in-place density tests conducted by Braun. results of these tests are presented in the section "Compaction Tests" in Appendix C. Sample locations identified with the VT prefix are locations of in-place density tests conducted by Twin City Testing and are presented in Appendix D.

## Discussion

Geotechnical tests performed before and during construction show that the soil materials used in this cap will perform as required. More discussion regarding each layer is presented below.

# Table 1
## Soil Testing Summary

| Layer | Situation | Test | Frequency | Specification (2) | Results | Data Location in Appendix C |
|---|---|---|---|---|---|---|
| **Clay**<br>NR516.05(1) | As-placed | Dry density | Every 100 ft/lift | 90% RC | Passed | Compaction |
| | | Moisture content | Every 100 ft/lift | ------- | Performed | Compaction |
| | | Atterberg limits | 1/acre/ft thick | 20%<LL<55%;10<PI<30 | Accepted | Thinwall Tests |
| | | Grain size | 1/acre/ft thick | 100%<1";80%<#4;70%<#200 | Passed | Thinwall Tests |
| | | Moisture content | 1/acre/ft thick | ------- | Performed | Thinwall Tests |
| | | Dry density | 1/acre/ft thick | 90% RC | Passed | Compaction |
| | | Hydraulic conductivity | 1/3 acres/ft thick | 1x10-7 cm/sec | Passed | Thinwall Tests |
| | As-received | Moisture-density curve | Every 5,000 cy | ------- | Performed | Proctor (TC) |
| | | Atterberg limits | Every 5,000 cy | 20%<LL<55%;10<PI<30 | Accepted | Atterberg Limits |
| | | Grain size | Every 5,000 cy | 100%<1";80%<#4;70%<#200 | Passed | Hydrometer |
| **Sand**<br>NR516.05(2) | As-received | Grain size | Every 1,000 cy | 2%<#200 | Passed | Gradations |
| | | Hydraulic conductivity | Every 2,500 cy | >1x10-2 cm/sec | Accepted (1) | Const. Head K |
| **Cover**<br>NR516.05(4) | As-received | Grain size | Every 1,000 cy | Classification = loam | Accepted | Hydrometer |
| **Topsoil**<br>NR516.05(5) | As-received | pH, K, N, P | 2 total | ------- | Performed | Topsoil Tests |
| | | USDA Classification | 2 total | Representative of productive soils in the area | Accepted | Classification |

(1) Not all samples passed, but material was accepted due to the WDNR/EPA preference for the Sportsman's Club borrow source.

(2) Specifications per subcontract documents, developed from NR516 and NR 504.07.

### *Clay Layer*

The clay material used in this cap comes from an offsite borrow source. It is a slightly more plastic clay than the specifications required. The Unified Classification System designates it as a medium to high plasticity clay (CH). The liquid limit (LL) of this material ranges from 43 to 79 percent water, with the average being 59 percent (4 percent higher than specified). The plasticity index (PI) of this soil ranged from 27 to 56 percent water with an average of 39 percent (9 percent higher than specified). More than 50 percent by weight passed the number 200 sieve on the samples that were tested. The minimum amount passing the number 200 sieve is 25 percent. The specification called for the hydraulic conductivity to be less than $1 \times 10^{-7}$ cm/sec. All tests provided hydraulic conductivity that is equal or lower than the specification.

This material was accepted for use in the clay cap even though it was more plastic than specified. It was accepted because the contractor demonstrated that it could be placed in a manner that produced a homogeneous, dense layer with a hydraulic conductivity that was $1 \times 10^{-7}$ cm/sec or lower.

### *Sand Drainage Layer*

Material used in the sand drainage layer came from a borrow pit created on the property of the Sportsman Club, adjacent to the landfill. It is generally classified as a poorly graded sand, ranging in size from medium to fine, with some silt.

This material varies in its characteristics depending upon location but generally meets the specifications. The sample initially removed for borrow pit certification showed a hydraulic conductivity that was less than the minimum allowed value of $1 \times 10^{-2}$ cm/sec. However, a reevaluation of the cap performance with a lower hydraulic conductivity in the sand drainage layer showed that this material would be acceptable considering the benefits of using material located so close to the landfill.

As the borrow pit was excavated and the material used in the cap, it was found to have a higher hydraulic conductivity than the initial tests had indicated. The tests performed during construction show that the hydraulic conductivity of the sand drainage layer is very close to the specified value. As a result the sand drainage layer is expected to generally perform as designed.

### *Cover Layer*

Material used in the cover layer is classified as silty sand or sandy silt (SM or mL) in the Unified Classification System. The cover layer serves to support the vegetative cover by holding moisture for the root zone, and it serves to protect the clay layer from damage by frost. The specification for cover layer calls for a loam soil. This material meets that classification. The material also meets the performance needs.

### *Topsoil*

Topsoil in place at the site is representative of topsoil materials in the area. It consists of silty sand and sandy silt. However, the material being used does not come from a topsoil source, it is earthfill, with little or no organic material. Amendments added to the material have improved the fertility of this material and have made it acceptable to support vegetative growth. Amendments were added as recommended, and the vegetation has taken hold to produce an acceptable stand of healthy grass.

## Site Inspection

On November 18, 1993, work assignment manager (WAM), Kevin Adler, site manager (SM) Steve Keith/CH2M HILL, and WDNR representative Edward Brick, toured the site to view the finished landfill cap construction during the final site inspection. At that time, the landfill cap work was complete excluding fencing and vent caps. The fencing and vent cap work was completed in the spring of 1994.

On December 22, 1993, the contractor was issued a notice of substantial completion stating that, with the exception of the grass establishment, fence, signs, and trees, all elements of the project were constructed in accordance with and had met the intent of the contract documents. The notice also stated that the requirements of the grass specifications were not met and required that the site be maintained until sufficient vegetation is established.

A final inspection was held at the site on November 21, 1994. Present for the inspection were Kevin Adler/U.S. EPA, Paul Kozol/WDNR, and Steve Keith/CH2M HILL. No significant issues were identified other than that of the plantings west of the capped area.

### Cover Inspections

Cover inspections will be performed quarterly, concurrent with groundwater sampling events. During each inspection, damaged areas will be identified and their locations will be recorded on a site plan. During inspection, attention will be directed to areas that:

- Are washed out or are otherwise subjected to erosion damage
- Have settled
- Contain vegetation appearing sparse or distressed

Inspection results, including the site plan, written descriptions, and actions that have been taken or are to be taken, will be presented to the EPA with the next scheduled quarterly progress report.

# APPENDIX A
# CAP LAYER CONTOUR AND CROSS-SECTION MAPS

Appendix A provided under separate cover.

# APPENDIX B
# CONTRACT MODIFICATIONS

twin city testing
corporation
2710 COMMERCE STREET
LA CROSSE, WI 54603
PHONE 608/781-5330

**REPORT OF:** MECHANICAL ANALYSIS

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** JULY 29, 1993

**REPORTED TO:**
CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

---

LABORATORY No. 8300-93-220

SCOPE OF WORK: The scope of our work was limited to performing mechanical analysis of the submitted sample in accordance with ASTM:C136.

SAMPLE NUMBER: 1

SAMPLE DESCRIPTION: Sand, coarse grained, brown (SP)

SOURCE OF MATERIAL: Sportsmen's Club Property

MECHANICAL ANALYSIS:

| | | PROJECT SPECIFICATIONS: |
|---|---|---|
| Passing 1 1/2" | 100 | - |
| 1" | 95 | - |
| 3/4" | 93 | - |
| 1/2" | 87 | - |
| 3/8" | 81 | - |
| #4 | 64 | 100 |
| #10 | 44 | 90-100 |
| #40 | 9 | 20-70 |
| #100 | 3.58 | 0-20 |
| #200 | 2.72 | 0-2 |

REMARKS:

The above sample was submitted by CH2M Hill (Don Olson) and was submitted to our laboratory on July 28, 1993. The sample does not meet project gradation specifications.

CH2M HILL
RECEIVED
AUG 3 1993

Geo File
Field File
[illegible]

CAP_C6320

Twin City Testing Corporation

CH2M HILL
Engineers
Planners
Economists
Scientists

GLO65614.CM.CM.

July 15, 1993

Transmittal No. P-031

Mr. Michael T. Riley
Roy F. Weston, Inc.
W8560 County Road Z
Onalaska, WI 54650

Subject: Subcontract No. 31
Onalaska Landfill Cap
Landfill Gas Monitoring Wells, Relocation

Dear Mr. Riley,

Attached please find a copy of Contract Drawing Sheet 7 amended to show the relocation of Landfill Gas Monitoring Wells LG1, 2 and 3. We have staked the locations in the field. We assume that the relocations will not cause any change in cost to the work. Please inform us before starting the work if this is not the case.

In an unrelated matter, note that the present elevations of the landfill gas interceptor at nodes IT2 and IT3 will be acceptable. We may later request that the caps at these locations be switched. Until then, assume that the capping will be as shown in the Drawings.

Thank you for your assistance in these matters.

Sincerely,

Donald J. Olson, P.E.
Construction Manager

File No. CAP.C6320-2

Copy: Steve Keith/GLO
GLO Files w/o Drawing copy
Bill Hubbard/GLO
Field Files w/ Drawing copy

CH2M HILL Milwaukee Office 310 West Wisconsin Avenue, Suite 700
P.O. Box 2090 Milwaukee, Wisconsin 53201-2090 414.272.2426
Fax 414 272 4408

MEMO

To: Bill Hubbard/GLO

From: Don Olson/ONAL

Date: 26 July 1993

Subj: Onalaska Landfill Remediation - CAP

File: CAP.C6320-3

Copy: Steve Keith/GLO Files ~~Field Files~~

I talked to Dave Woyicki of Trempealeau Electric Coop late last week about the cost to relocate the temporary power at the landfill. He said the cost to relocate one pole at today's prices with today's rules would be about $400.00. However, the prices quoted to CH2M Hill and Weston earlier were lower due to some rule changes. He would charge us at those rates, not the new rates.

The cost to relocate the 800 feet of single phase power had been pegged at $675 (plus tax) based on three poles relocated to the Hubley property line. In actuality, if the relocation had only involved a single pole, the cost would have been in the range of 33% of the full proposal, in other words, $225.00 plus tax. Under Weston's plan they would move only one pole. The one on Hubley's property could, according to Woyicki, stay in place and have some of the cap fill material placed around it. The next existing pole to the south (on the edge of the landfill itself) would require relocation. The next pole to the south could remain in place and not be in the way of Weston's work.

Weston seems willing to accept the $225.00 (plus tax) as a deduct from the Contract Amount. This could be included in the GWT Pad Acceleration and Temp Power Installation mod. They are very eager to get this thing done and paid for. Let me know if you need other information. Will you send mod to Weston in Chicago for execution?

CM. 06320-3

CH2M HILL
Engineers
Planners
Economists
Scientists

GLO65614.CM.CM.

17 August 1993

Transmittal No. P-040

Mr. Michael T. Riley
Roy F. Weston, Inc.
W8650 County Road Z
Onalaska, WI 54650

Subject: Subcontract No. 31
Onalaska Landfill Cap
Use of Sportsmen's Club Property for Sand Drainage Layer

Dear Mr. Riley,

You have shown an interest and willingness to use the material beneath the Sportsmen's Club Property (east of the landfill site) for the Sand Drainage Layer. Samples taken from the property indicate that it does not meet all the specified requirements, but that it is likely permeable enough for the purposes of the project. You have indicated that you would be able to use the material. We hereby accept the material for that use. Note that during installation the permeability of test samples must be shown to be at least 5.0 x 10 -4 cm/sec for all samples and that the log average of all permeabilities must be at least 1.0 x 10 -3 cm/sec. In addition, no more than 3% of the total weight of all samples should pass a No. 200 sieve. Should sampling during sand installation consistently show failure to meet these criteria, we reserve the right to call for the use of off-site material which complies with the Specifications.

Should these criteria be acceptable to you, you may proceed to investigate the availability of the property. We anticipate that all aspects of the use of the property and the sand will be obtained at no extra cost to us or to the EPA or State of Wisconsin.

We are available to discuss this letter and your intentions at your convenience.

CH2M HILL Milwaukee Office 310 West Wisconsin Avenue, Suite 700 414.272.2426
P.O. Box 2090 Milwaukee, Wisconsin 53201-2090 Fax 414.272.4408

Sincerely,

Donald J. Olson, P.E.
Construction Manager

File No. CAP:C6320-03

Copy: Steve Keith/GLO Bill Hubbard/GLO
Field Files

then to glo files

CH2M HILL
Engineers
Planners
Economists
Scientists

GLO65614.CM.CM.

17 September 1993

Transmittal No. P-045

Mr. Michael T. Riley
Roy F. Weston, Inc.
W8650 County Road Z
Onalaska, WI 54650

Subject: Subcontract No. 31
Onalaska Landfill Cap
Sportsmen's Club Property; Sand Drainage Layer

Dear Mr. Riley,

In response to your letters dated 26 and 31 August 1993 and 10 September 1993 on the referenced issue, we understand that the situation was resolved as follows. The requirement in your agreement with the 15 Sportsmen's Club to fill the void to original grade has been withdrawn. The responsibility for that work has been accepted by WDNR. WDNR will fill the void either with dredge material or imported material.

You will take the sand needed for the drainage layer and deposit it on the cap. This material will be compacted as specified. You will take the required number of samples of sand necessary for testing. There will be no extra cost under Subcontract No. 31. Please inform me if these are not the facts pertaining to this situation.

Sincerely,

Donald J. Olson, P.E.
Construction Manager

File No. CAP.C6320-04

| | | |
|---|---|---|
| Copy: | Steve Keith/GLO | Bill Hubbard/GLO |
| | GLO Files | Field Files |

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Roy F. Weston, Inc.
Suite 400
3 Hawthorn Parkway
Vernon Hills, Illinois 60061-1450
708-918-4000 • Fax 708-918-4055

22 December 1993

Mr. Don Olson
CH2M Hill
W8650 CTH Z
Onalaska, Wisconsin 54650

Re: Onalaska Landfill Cap Remediation
Change Order for Material Quantity Below Contract

Dear Mr. Olson:

According to Article 14.1 (a) of the Subcontract documents for the above referenced project, Roy F. Weston, Inc. (WESTON®) is notifying you of significant change in cover soil material quantities encountered during contract execution. The table below presents the deviation from contract for this material.

| Material Description | Specified Volume (tons) | As-Placed Volume (tons) | Deviation (%) |
|---|---|---|---|
| Cover Soil | 63,000 | 41,571.64 | (34) |

WESTON believes renegotiation of the unit price for cover soil is forthcoming. A letter, which includes WESTON's revised unit price for material and corresponding cost documentation, will follow shortly.

If you have any questions regarding this matter please contact me or Mike Riley at (708) 918-4000.

Very truly yours,

ROY F. WESTON, INC.

Matt Crain

Matthew T. Crain
Project Manager

JAN 4 1994

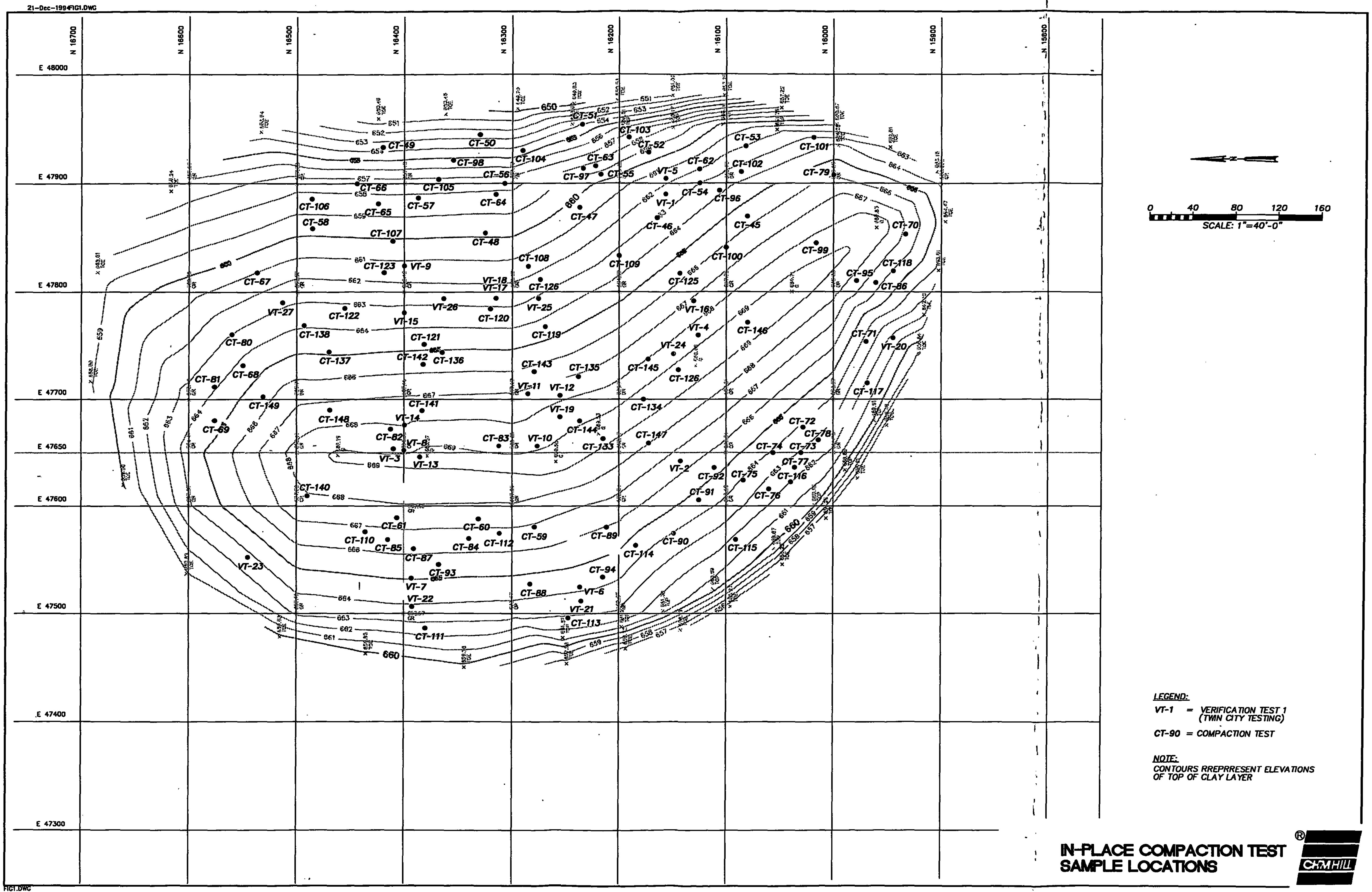
proj. ~~file~~ GLO 65614 cm cm

CH01\PUBLIC\CRD\12514.LT1

file CAP C6320-06

cc: Steve Keith field file
Bill Hubbard

# APPENDIX C
# GEOTECHNICAL TESTING SERVICES REPORT-BRAUN



LEGEND:

VT-1 = VERIFICATION TEST 1 (TWIN CITY TESTING)

CT-90 = COMPACTION TEST

NOTE:

CONTOURS RREPRRESENT ELEVATIONS OF TOP OF CLAY LAYER

## IN-PLACE COMPACTION TEST SAMPLE LOCATIONS

CH2M HILL

# GEOTECHNICAL TESTING SERVICES

## Landfill Cap Remedial Action

## Onalaska Municipal Landfill

## Onalaska Township, Wisconsin

## Project BNDX-93-037A

**BRAUN**℠
INTERTEC

**Braun Intertec Corporation**
520 Fisherman's Road
La Crosse, Wisconsin 54603-1215
608-781-7277 Fax: 781-7279

*Engineers and Scientists Serving the Built and Natural Environments*℠

November 22, 1993

Project BNDX-93-037A

Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60061

Dear Mr. Crain:

Re: Geotechnical Testing Services for the Landfill Cap Remedial Action at the Onalaska Municipal Landfill Site in Onalaska Township, Wisconsin

Attached are copies of field and laboratory tests completed for the above-referenced project. For your convenience, we are providing you with three bound copies for your use.

It has been a pleasure being of service to you on this project. If you have any questions or need additional information, please call Mr. Paul Nelson at (608) 781-7277.

Sincerely,

Paul T. Nelson
Senior Project Engineer

Enclosures

cc: Braun Intertec
Rochester

ptn:dc

**BRAUN**℠
INTERTEC

**Braun Intertec Corporation**
520 Fisherman's Road
La Crosse, Wisconsin 54603-1215
608-781-7277 Fax: 781-7279

*Engineers and Scientists Serving the Built and Natural Environments*℠

RECEIVED
JAN 10 1994
ROY F. WESTON
VERNON HILLS, IL

January 7, 1994

Project BNDX-93-037A

Mr. A. Steven Hausler, Jr.
Roy F. Weston, Inc.
Three Hawthorn Parkway - Suite 400
Vernon Hills, IL 60061

Dear Mr. Hausler:

Re: Onalaska Landfill Cap Remediation Geotechnical Testing Final Reports

In response to your inquiry on missing data items, I have information on the following items:

- Nuclear density test data for clay layer on September 13, 1993, and nuclear density test data for sand layer on September 22, 1993, have been located and mailed to you.

- With regard to moisture density relationships for sand samples SL-1 through 6, 12, 14, 16, 17 and 19 through 21, here are the reasons for not performing the test:

  Sand samples 1 through 6 were presented for gradation only. Sand samples 12, 14, 16, 17 and 19 through 21 were not tested because sand samples before and after these numbers were similar in results and would be unnecessary duplications.

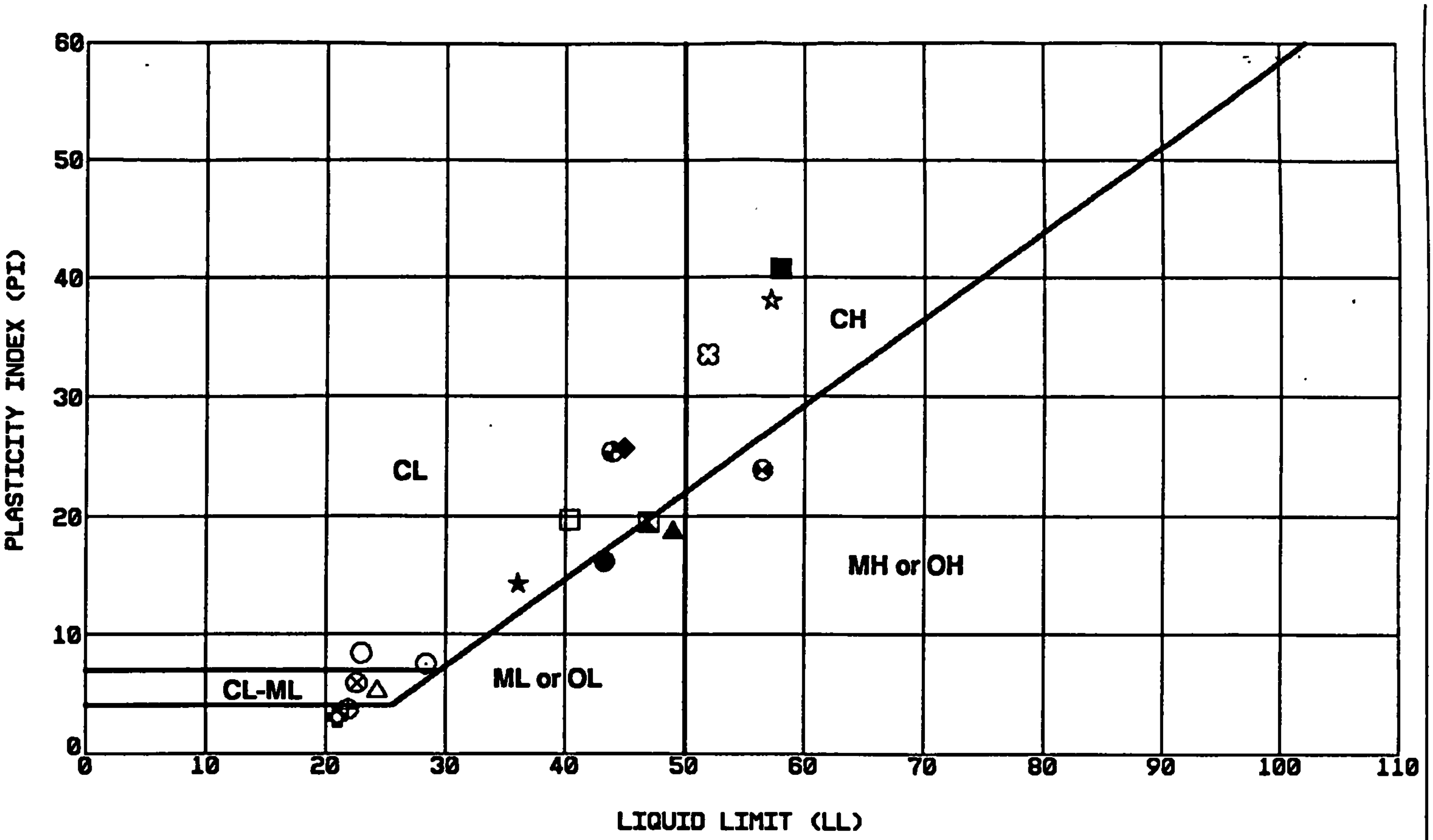
- Gradation data for sand samples SL-4, 9, 10 and 15 were not tested for the same reasons stated above—to avoid unnecessary duplication as adjacent sand sample tests would be the same.

I hope these explanations resolve the question of missing data. If you have any questions, please call me at (608) 781-7277.

Sincerely,

Thomas LoBianco
Laboratory Supervisor

# ATTERBERG LIMITS



| LEGEND: | | LL | PL | PI |
|---|---|---|---|---|
| ● | CL-1 | 43 | 27 | 16 |
| ⊠ | CL-2 | 47 | 28 | 19 |
| ▲ | CL-3 | 49 | 30 | 19 |
| ★ | TC-1 | 36 | 22 | 14 |
| ⊙ | TC-10 | 28 | 21 | 8 |
| ✿ | TC-11 | 21 | 18 | 3 |
| ○ | TC-12 | 23 | 15 | 8 |
| △ | TC-13 | 24 | 19 | 5 |
| ⊗ | TC-14 | 23 | 17 | 6 |
| ⊕ | TC-15 | 22 | 18 | 4 |
| □ | TC-3 | 40 | 21 | 20 |
| ⨂ | TC-4 | 57 | 33 | 24 |
| ◍ | TC-5 | 44 | 19 | 25 |
| ☆ | TC-6 | 57 | 19 | 38 |
| ✠ | TC-7 | 52 | 18 | 34 |
| ■ | TC-8 | 58 | 17 | 41 |
| ◆ | TC-9 | 45 | 19 | 26 |

**BRAUN PROJECT NO: BNDX-93-037A**

**November 1993**

Onalaska Municipal Landfill Site - Onalaska, WI

*ATTERBERG LIMITS' RESULTS*

**FIGURE 1**

**Braun Intertec La Crosse, WI**

# CONSTANT HEAD PERMEABILITY

# CONSTANT HEAD PERMEABILITY
# (ASTM D2434)

| | | | |
|---|---|---|---|
| Project No: | BNDX-93-037A | Date: | 8/05/93 |
| Boring No: | n/a | Technician: | tbt |
| Sample No: | SL-01 | | |
| Depth (ft.): | n/a | | |
| Classification: | SP, Poorly graded sand, fine to medium grained, brown | | |
| Std / Mod Proctor: | n/a | | |

| | | |
|---|---|---|
| Diameter Sample, D | 4.00 | in |
| Length of Sample, l | 4.36 | in |
| Area Of Sample, A | 81.1 | cm2 |
| Maximum Density | 111.5 | pcf |
| Optimum Moisture | 13.5 | % |
| Distance Between Manometers, L | 11.1 | cm |
| Volume of Sample, V | 897.8 | cm3 |

MOISTURE:

| | Before | After |
|---|---|---|
| Tare Number | 55 | 48n |
| Weight of wet soil + Tare (g) | 1949.60 | 2197.90 |
| Weight of dry soil + Tare (g) | 1899.10 | 1899.10 |
| Weight of Tare (g) | 369.70 | 369.70 |
| Weight of dry soil (g) | 1529.40 | 1529.40 |
| Moisture Content (%) | 3.3% | 19.5% |

| | |
|---|---|
| Dry Density (p.c.f.) | 106.4 |
| Relative Compaction | 95.4% |

TEST DATA:

| Trial # | Time (t) Seconds | Head (h) cm | Discharge (Q) (CC) | Temperature (T) (c) | Temperature Correction (R) | Coefficient of Permeability k=QLR tAh {cm/sec} |
|---|---|---|---|---|---|---|
| 1 | 57 | 178.5 | 52.00 | 17.6 | 1.0634 | 7.4E-04 |
| 2 | 61 | 178.5 | 55.00 | 17.6 | 1.0634 | 7.3E-04 |
| 3 | 55 | 178.5 | 51.00 | 17.6 | 1.0634 | 7.5E-04 |
| 4 | 56 | 178.5 | 50.00 | 17.6 | 1.0634 | 7.2E-04 |
| Average | | | | | | 7.4E-04 |

Geotechnical Lab Manager

# CONSTANT HEAD PERMEABILITY
# (ASTM D2434)

| | | | |
|---|---|---|---|
| Project No: | BNDX-93-037A | Date: | 8/05/93 |
| Boring No: | n/a | Technician: | tbt |
| Sample No: | SL-02 | | |
| Depth (ft.): | n/a | | |
| Classification: | SP, Poorly graded sand, fine to medium grained, brown | | |
| Std / Mod Proctor: | n/a | | |

| | | |
|---|---|---|
| Diameter Sample, D | 4.00 | in |
| Length of Sample, l | 4.36 | in |
| Area Of Sample, A | 81.1 | cm2 |
| Maximum Density | 111.5 | pcf |
| Optimum Moisture | 13.5 | % |
| Distance Between Manometers, L | 11.1 | cm |
| Volume of Sample, V | 897.8 | cm3 |

MOISTURE:

| | Before | After |
|---|---|---|
| Tare Number | 55 | 48n |
| Weight of wet soil + Tare (g) | 1922.52 | 2088.50 |
| Weight of dry soil + Tare (g) | 1885.96 | 1811.60 |
| Weight of Tare (g) | 369.70 | 369.70 |
| Weight of dry soil (g) | 1516.26 | 1441.90 |
| Moisture Content (%) | 2.4% | 19.2% |

| | |
|---|---|
| Dry Density (p.c.f.) | 105.5 |
| Relative Compaction | 94.6% |

TEST DATA:

| Trial # | Time (t) Seconds | Head (h) cm | Discharge (Q) (CC) | Temperature (T) (c) | Temperature Correction (R) | Coefficient of Permeability k=QLR tAh {cm/sec} |
|---|---|---|---|---|---|---|
| 1 | 16 | 178.5 | 241.00 | 17.6 | 1.0634 | 1.2E-02 |
| 2 | 16 | 178.5 | 245.00 | 17.6 | 1.0634 | 1.2E-02 |
| 3 | 16 | 178.5 | 241.00 | 17.6 | 1.0634 | 1.2E-02 |
| 4 | 14 | 178.5 | 231.00 | 17.6 | 1.0634 | 1.3E-02 |
| Average | | | | | | 1.2E-02 |

Geotechnical Lab Manager

# CONSTANT HEAD PERMEABILITY
# (ASTM D2434)

| | | | |
|---|---|---|---|
| Project No: | BNDX-93-037A | Date: | 8/10/93 |
| Boring No: | n/a | Technician: | tbt |
| Sample No: | SL-04 | | |
| Depth (ft.): | n/a | | |
| Classification: | SP, Poorly graded sand, fine to medium grained, brown | | |
| Std / Mod Proctor: | n/a | | |

| | | |
|---|---|---|
| Diameter Sample, D | 4.00 | in |
| Length of Sample, l | 4.36 | in |
| Area Of Sample, A | 81.1 | cm2 |
| Maximum Density | 111.5 | pcf |
| Optimum Moisture | 13.5 | % |
| Distance Between Manometers, L | 11.1 | cm |
| Volume of Sample, V | 897.8 | cm3 |

MOISTURE:

| | Before | After |
|---|---|---|
| Tare Number | 55 | 48n |
| Weight of wet soil + Tare (g) | 1949.60 | 2157.40 |
| Weight of dry soil + Tare (g) | 1878.30 | 1878.30 |
| Weight of Tare (g) | 369.70 | 369.70 |
| Weight of dry soil (g) | 1508.60 | 1508.60 |
| Moisture Content (%) | 4.7% | 18.5% |

| | |
|---|---|
| Dry Density (p.c.f.) | 104.9 |
| Relative Compaction | 94.1% |

TEST DATA:

| Trial # | Time (t) Seconds | Head (h) cm | Discharge (Q) (CC) | Temperature (T) (c) | Temperature Correction (R) | Coefficient of Permeability k=QLR tAh {cm/sec} |
|---|---|---|---|---|---|---|
| 1 | 10 | 178.5 | 231.00 | 15.1 | 1.1247 | 1.9E-02 |
| 2 | 12 | 178.5 | 248.00 | 15.2 | 1.1223 | 1.8E-02 |
| 3 | 11 | 178.5 | 238.00 | 15.1 | 1.1247 | 1.8E-02 |
| 4 | 11 | 178.5 | 228.00 | 15.1 | 1.1247 | 1.8E-02 |
| Average | | | | | | 1.8E-02 |

frm\123:chp-2

Geotechnical Lab Manager

# CONSTANT HEAD PERMEABILITY
## (ASTM D2434)

| | | | |
|---|---|---|---|
| **Project No:** | BNDX-93-037A | **Date:** | 9/27/93 |
| **Boring No:** | n/a | **Technician:** | dvk |
| **Sample No:** | SL-05 | | |
| **Depth (ft.):** | n/a | | |
| **Classification:** | SP, Poorly graded sand, fine to medium grained, brown | | |
| **Std / Mod Proctor:** | n/a | | |

| | | |
|---|---|---|
| Diameter Sample, D | 4.00 | in |
| Length of Sample, l | 4.35 | in |
| Area Of Sample, A | 81.1 | cm2 |
| Maximum Density | 111.5 | pcf |
| Optimum Moisture | 13.5 | % |
| Distance Between Manometers, L | 11.1 | cm |
| Volume of Sample, V | 895.8 | cm3 |

MOISTURE:

| | Before | After |
|---|---|---|
| Tare Number | 55 | 48n |
| Weight of wet soil + Tare (g) | 1949.60 | 2197.90 |
| Weight of dry soil + Tare (g) | 1899.10 | 1899.10 |
| Weight of Tare (g) | 369.70 | 369.70 |
| Weight of dry soil (g) | 1529.40 | 1529.40 |
| Moisture Content (%) | 3.3% | 19.5% |

| | |
|---|---|
| Dry Density (p.c.f.) | 106.7 |
| Relative Compaction | 95.7% |

TEST DATA:

| Trial # | Time (t) Seconds | Head (h) cm | Discharge (Q) (CC) | Temperature (T) (c) | Temperature Correction (R) | Coefficient of Permeability k=QLR tAh {cm/sec} |
|---|---|---|---|---|---|---|
| 1 | 19 | 178.5 | 238.00 | 14.6 | 1.1811 | 1.1E-02 |
| 2 | 19 | 178.5 | 242.00 | 14.6 | 1.1370 | 1.1E-02 |
| 3 | 19 | 178.5 | 234.00 | 14.6 | 1.1370 | 1.1E-02 |
| 4 | 19 | 178.5 | 236.00 | 14.6 | 1.1370 | 1.1E-02 |
| Average | | | | | | 1.1E-02 |

Geotechnical Lab Manager

# CONSTANT HEAD PERMEABILITY
# (ASTM D2434)

Project No: BNDX-93-037A
Date: 9/27/93
Boring No: n/a
Technician: dvk
Sample No: SL-06
Depth (ft.): n/a
Classification: SP, Poorly graded sand, fine to medium grained, brown
Std / Mod Proctor: n/a

| | | |
|---|---|---|
| Diameter Sample, D | 4.00 | in |
| Length of Sample, l | 4.35 | in |
| Area Of Sample, A | 81.1 | cm2 |
| Maximum Density | 111.5 | pcf |
| Optimum Moisture | 13.5 | % |
| Distance Between Manometers, L | 11.1 | cm |
| Volume of Sample, V | 895.8 | cm3 |

MOISTURE:

| | Before | After |
|---|---|---|
| Tare Number | 55 | 48n |
| Weight of wet soil + Tare (g) | 1949.60 | 2197.90 |
| Weight of dry soil + Tare (g) | 1899.10 | 1899.10 |
| Weight of Tare (g) | 369.70 | 369.70 |
| Weight of dry soil (g) | 1529.40 | 1529.40 |
| Moisture Content (%) | 3.3% | 19.5% |

| | |
|---|---|
| Dry Density (p.c.f.) | 106.7 |
| Relative Compaction | 95.7% |

TEST DATA:

| Trial # | Time (t) Seconds | Head (h) cm | Discharge (Q) (CC) | Temperature (T) (c) | Temperature Correction (R) | Coefficient of Permeability k=QLR tAh {cm/sec} |
|---|---|---|---|---|---|---|
| 1 | 14 | 178.5 | 234.00 | 14.6 | 1.1811 | 1.5E-02 |
| 2 | 14 | 178.5 | 239.00 | 14.6 | 1.1370 | 1.4E-02 |
| 3 | 14 | 178.5 | 244.00 | 14.6 | 1.1370 | 1.5E-02 |
| 4 | 15 | 178.5 | 236.00 | 14.6 | 1.1370 | 1.4E-02 |
| Average | | | | | | 1.5E-02 |

fm\123:chp-2

Geotechnical Lab Manager

# CONSTANT HEAD PERMEABILITY
## (ASTM D2434)

| | | | |
|---|---|---|---|
| **Project No:** | BNDX-93-037A | **Date:** | 10/19/93 |
| **Boring No:** | n/a | **Technician:** | gsh |
| **Sample No:** | SL-16 | | |
| **Depth (ft.):** | n/a | | |
| **Classification:** | SP, Poorly graded sand, fine to medium grained, brown | | |
| **Std / Mod Proctor:** | n/a | | |

| | | |
|---|---|---|
| Diameter Sample, D | 4.00 | in |
| Length of Sample, l | 4.35 | in |
| Area Of Sample, A | 81.1 | cm2 |
| Maximum Density | 111.5 | pcf |
| Optimum Moisture | 13.5 | % |
| Distance Between Manometers, L | 11.1 | cm |
| Volume of Sample, V | 895.8 | cm3 |

MOISTURE:

| | Before | After |
|---|---|---|
| Tare Number | 55 | 48n |
| Weight of wet soil + Tare (g) | 2020.90 | 2157.20 |
| Weight of dry soil + Tare (g) | 1986.20 | 1986.20 |
| Weight of Tare (g) | 421.90 | 421.90 |
| Weight of dry soil (g) | 1564.30 | 1564.30 |
| Moisture Content (%) | 2.2% | 10.9% |

| | |
|---|---|
| Dry Density (p.c.f.) | 109.2 |
| Relative Compaction | 97.9% |

TEST DATA:

| Trial # | Time (t) Seconds | Head (h) cm | Discharge (Q) (CC) | Temperature (T) (c) | Temperature Correction (R) | Coefficient of Permeability k=QLR tAh {cm/sec} |
|---|---|---|---|---|---|---|
| 1 | 37 | 178.5 | 240.00 | 12.8 | 1.1811 | 5.8E-03 |
| 2 | 37 | 178.5 | 236.00 | 12.8 | 1.1811 | 5.8E-03 |
| 3 | 37 | 178.5 | 232.00 | 12.8 | 1.1811 | 5.6E-03 |
| 4 | 38 | 178.5 | 237.00 | 12.8 | 1.1811 | 5.6E-03 |
| Average | | | | | | 5.7E-03 |

Geotechnical Lab Manager

# CONSTANT HEAD PERMEABILITY
# (ASTM D2434)

Project No: BNDX-93-037A
Date: 10/19/93
Boring No: n/a
Technician: gsh
Sample No: SL-17
Depth (ft.): n/a
Classification: SP, Poorly graded sand, fine to medium grained, brown
Std / Mod Proctor: n/a

| | | |
|---|---|---|
| Diameter Sample, D | 4.00 | in |
| Length of Sample, l | 4.35 | in |
| Area Of Sample, A | 81.1 | cm2 |
| Maximum Density | 111.5 | pcf |
| Optimum Moisture | 13.5 | % |
| Distance Between Manometers, L | 11.1 | cm |
| Volume of Sample, V | 895.8 | cm3 |

MOISTURE:

| | Before | After |
|---|---|---|
| Tare Number | 55 | 48n |
| Weight of wet soil + Tare (g) | 2243.50 | 2357.20 |
| Weight of dry soil + Tare (g) | 2204.80 | 2204.80 |
| Weight of Tare (g) | 469.10 | 469.10 |
| Weight of dry soil (g) | 1735.70 | 1735.70 |
| Moisture Content (%) | 2.2% | 8.8% |

| | |
|---|---|
| Dry Density (p.c.f.) | 121.2 |
| Relative Compaction | 108.7% |

TEST DATA:

| Trial # | Time (t) Seconds | Head (h) cm | Discharge (Q) (CC) | Temperature (T) (c) | Temperature Correction (R) | Coefficient of Permeability k=QLR tAh {cm/sec} |
|---|---|---|---|---|---|---|
| 1 | 46 | 178.5 | 233.00 | 12.8 | 1.1811 | 4.5E-03 |
| 2 | 47 | 178.5 | 233.00 | 12.8 | 1.1811 | 4.5E-03 |
| 3 | 48 | 178.5 | 236.00 | 12.8 | 1.1811 | 4.4E-03 |
| 4 | 49 | 178.5 | 235.00 | 12.8 | 1.1811 | 4.4E-03 |
| Average | | | | | | 4.5E-03 |

Geotechnical Lab Manager

# CONSTANT HEAD PERMEABILITY
## (ASTM D2434)

| | | | |
|---|---|---|---|
| Project No: | BNDX-93-037A | Date: | 10/19/93 |
| Boring No: | n/a | Technician: | gsh |
| Sample No: | SL-18 | | |
| Depth (ft.): | n/a | | |
| Classification: | SP, Poorly graded sand, fine to medium grained, brown | | |
| Std / Mod Proctor: | n/a | | |

| | | |
|---|---|---|
| Diameter Sample, D | 4.00 | in |
| Length of Sample, l | 4.35 | in |
| Area Of Sample, A | 81.1 | cm2 |
| Maximum Density | 111.5 | pcf |
| Optimum Moisture | 13.5 | % |
| Distance Between Manometers, L | 11.1 | cm |
| Volume of Sample, V | 895.8 | cm3 |

MOISTURE:

| | Before | After |
|---|---|---|
| Tare Number | 55 | 48n |
| Weight of wet soil + Tare (g) | 1970.50 | 2157.20 |
| Weight of dry soil + Tare (g) | 1942.80 | 1942.80 |
| Weight of Tare (g) | 316.00 | 316.00 |
| Weight of dry soil (g) | 1626.80 | 1626.80 |
| Moisture Content (%) | 1.7% | 13.2% |

| | |
|---|---|
| Dry Density (p.c.f.) | 113.6 |
| Relative Compaction | 101.9% |

TEST DATA:

| Trial # | Time (t) Seconds | Head (h) cm | Discharge (Q) (CC) | Temperature (T) (c) | Temperature Correction (R) | Coefficient of Permeability k=QLR tAh {cm/sec} |
|---|---|---|---|---|---|---|
| 1 | 13 | 178.5 | 240.00 | 12.8 | 1.1811 | 1.7E-02 |
| 2 | 13 | 178.5 | 233.00 | 12.8 | 1.1811 | 1.6E-02 |
| 3 | 13 | 178.5 | 234.00 | 12.8 | 1.1811 | 1.6E-02 |
| 4 | 14 | 178.5 | 239.00 | 12.8 | 1.1811 | 1.6E-02 |
| Average | | | | | | 1.6E-02 |

Geotechnical Lab Manager

# FALLING HEAD PERMEABILITY

**BRAUN**℠
INTERTEC

**Braun Intertec Corporation**
6801 Washington Avenue South
P.O. Box 39108
Minneapolis, Minnesota 55439-0108
612-941-5600 Fax: 941-4151

*Engineers and Scientists Serving*
*the Built and Natural Environments*®

**Project:** BNDX-93-037A

**Date:** 7/1/93

**Boring:** n/a **Sample:** CL-01 **Depth:** n/a

**Sample Description:** ML-Silt

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 603.20 | Wt Specimen + Tare Wet: | 746.60 |
| Wt. Specimen + Tare Dry: | 479.50 | Wt. Specimen + Tare Dry: | 561.37 |
| Wt. Tare: | 0.00 | Wt. Tare: | 164.06 |
| Moisture Content: | 25.8% | Moisture Content: | 46.6% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.82 in | Area, A: | 40.30 cm2 | Initial Wt. (gm): | 502.90 |
| Initial Ht.: | 7.4 cm | Initial Dry Unit Wt.: | 83.7 pcf | Initial Saturation: | 68.8% |
| Final Ht., L: | 8.2 cm | Final Dry Unit Wt.: | 75.3 pcf | Final Saturation: | 101.8% |
| Sp. Gravity: | 2.700 | | | | |

Burette Area, a (cm2): 0.73

Differential pressure: 2.0 psi = 140.7 cm H2O

Consolidation Pressure (psi): 5.0

Overburden: 720.0 psf

kempton's B coeficient: .96

Operating Pressures (psi): Cell: 65.0 Head: 62.0 Tail: 60.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 36.50 | 15.00 | 162.18 | | | | |
| Final | 39540 | 35.40 | 15.90 | | 160.18 | 161.2 | 19.6 | |
| Result | | | | | | | | 2.3E-08 |
| Initial | 0 | 35.40 | 15.90 | 160.18 | | | | |
| Final | 41040 | 34.20 | 16.60 | | 158.28 | 159.2 | 19.4 | |
| Result | | | | | | | | 2.2E-08 |
| Initial | 0 | 34.20 | 16.60 | 158.28 | | | | |
| Final | 22440 | 33.60 | 17.10 | | 157.18 | 157.7 | 19.2 | |
| Result | | | | | | | | 2.3E-08 |
| Initial | 0 | 33.60 | 17.10 | 157.18 | | | | |
| Final | 67320 | 32.00 | 18.60 | | 154.08 | 155.6 | 18.9 | |
| Result | | | | | | | | 2.2E-08 |
| Average Permeability | | | | | | | | 2.3E-08 |
| Assigned Permeability | | | | | | | | |

Remarks: The specific gravity was assumed for the purpose of saturation calculations.
ASTM D5084 (Method C: Falling Head, Rising Tailwater)

Geotechnical Lab Manager

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**Project:** BNDX-93-037A

**Date:** 7/1/93

**Boring:** n/a

**Sample:** CL-02

**Depth:** n/a

**Sample Description:** ML, Silt

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 542.00 | Wt Specimen + Tare Wet: | 756.60 |
| Wt. Specimen + Tare Dry: | 427.40 | Wt. Specimen + Tare Dry: | 561.31 |
| Wt. Tare: | 0.00 | Wt. Tare: | 163.80 |
| Moisture Content: | 26.8% | Moisture Content: | 49.1% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.82 in | Area, A: | 40.30 cm2 | Initial Wt. (gm): | 501.40 |
| Initial Ht.: | 7.3 cm | Initial Dry Unit Wt.: | 84.5 pcf | Initial Saturation: | 72.8% |
| Final Ht., L: | 8.3 cm | Final Dry Unit Wt.: | 73.8 pcf | Final Saturation: | 103.4% |
| Sp. Gravity: | 2.700 | | | | |

Burette Area, a (cm2): 0.73

Differential pressure: 2.0 psi = 140.7 cm H2O

Consolidation Pressure (psi): 5.0

Overburden: 720.0 psf

Skempton's B coeficient: 1.0

Operating Pressures (psi): Cell: 65.0 Head: 62.0 Tail: 60.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 46.50 | 10.90 | 176.28 | | | | |
| Final | 57420 | 44.20 | 13.00 | | 171.88 | 174.1 | 21.0 | |
| Result | | | | | | | | 3.3E-08 |
| Initial | 0 | 30.50 | 24.90 | 146.28 | | | | |
| Final | 41040 | 29.30 | 26.20 | | 143.78 | 145.0 | 17.5 | |
| Result | | | | | | | | 3.2E-08 |
| Initial | 0 | 28.90 | 26.20 | 143.38 | | | | |
| Final | 22440 | 28.20 | 26.90 | | 141.98 | 142.7 | 17.2 | |
| Result | | | | | | | | 3.3E-08 |
| Initial | 0 | 28.20 | 26.70 | 142.18 | | | | |
| Final | 67140 | 26.00 | 28.60 | | 138.08 | 140.1 | 16.9 | |
| Result | | | | | | | | 3.3E-08 |
| Average Permeability | | | | | | | | 3.3E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
ASTM D5084 (Method C: Falling Head, Rising Tailwater)

Geotechnical Lab Manager

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**Project:** BNDX-93-037A

**Date:** 7/1/93

**Boring:** n/a

**Sample:** CL-03

**Depth:** n/a

**Sample Description:** ML, Silt

Initial
Wt Specimen + Tare Wet: 512.30
Wt. Specimen + Tare Dry: 407.30
Wt. Tare: 0.00
Moisture Content: 25.8%

Final
Wt Specimen + Tare Wet: 767.70
Wt. Specimen + Tare Dry: 574.60
Wt. Tare: 160.80
Moisture Content: 46.7%

Diameter: 2.82 in
Initial Ht.: 7.3 cm
Final Ht., L: 8.2 cm
Sp. Gravity: 2.700

Area, A: 40.30 cm2
Initial Dry Unit Wt.: 83.9 pcf
Final Dry Unit Wt.: 74.8 pcf

Initial Wt. (gm): 498.10
Initial Saturation: 69.1%
Final Saturation: 100.7%

Burette Area, a (cm2): 0.73
onsolidation Pressure (psi): 5.0
kempton's B coeficient: 1.0
Operating Pressures (psi): Cell: 65.0

Differential pressure: 2.0 psi = 140.7 cm H2O
Overburden: 720.0 psf
Head: 62.0
Tail: 60.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 38.50 | 17.30 | 161.88 | | | | |
| Final | 63600 | 33.90 | 21.70 | | 152.88 | 157.4 | 19.2 | |
| Result | | | | | | | | 6.7E-08 |
| Initial | 0 | 54.00 | 5.30 | 189.38 | | | | |
| Final | 15600 | 52.70 | 6.70 | | 186.68 | 188.0 | 22.9 | |
| Result | | | | | | | | 6.8E-08 |
| Initial | 0 | 52.70 | 6.70 | 186.68 | | | | |
| Final | 66660 | 47.10 | 11.80 | | 175.98 | 181.3 | 22.1 | |
| Result | | | | | | | | 6.6E-08 |
| Initial | 0 | 47.10 | 11.80 | 175.98 | | | | |
| Final | 28860 | 44.80 | 14.20 | | 171.28 | 173.6 | 21.2 | |
| Result | | | | | | | | 7.0E-08 |
| Average Permeability | | | | | | | | 6.8E-08 |
| Assigned Permeability | | | | | | | | |

emarks: The specific gravity was assumed for the purpose of saturation calculations.
ASTM D5084 (Method C: Falling Head, Rising Tailwater)

Geotechnical Lab Manager

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**Project:** BNDX-93-037A **Date:** 9/02/93

**Boring:** **Sample #:** CL-04 **Depth:**

**Description:** ML, Silt

| Initial | | Final | |
|---|---|---|---|
| **Wt Specimen + Tare Wet** | 75.56 | **Wt Specimen + Tare Wet** | 654.85 |
| **Wt. Specimen + Tare Dry** | 66.13 | **Wt. Specimen + Tare Dry** | 535.64 |
| **Wt. Tare** | 20.42 | **Wt. Tare** | 133.81 |
| **Moisture Content** | 20.6% | **Moisture Content** | 29.7% |

| | | | | | |
|---|---|---|---|---|---|
| **Diameter** | 2.81 in | **Area A =** | 40.01 cm2 | **Initial Wt. (gms)** | 541.96 |
| **Initial Ht.** | 7.3 cm | **Initial Dry Unit Wt.** | 96.3 pcf | **Initial Saturation** | 74.3% |
| **Final Ht. L =** | 7.5 cm | **Final Dry Unit Wt.** | 93.7 pcf | **Final Saturation** | 100.4% |
| **Sp. Gravity** | 2.700 | | | | |

**Burette Area a = 1 cm2** 1.0000 **Differential pressure** 1.0 **psi =** 70.3 **cm**

**Consolidation Pressure (psi)** 5.0 **Overburden** 720.0 **psf**

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| **Initial** | 0 | 7.90 | 15.60 | 78.04 | | | | |
| **Final** | 57480 | 9.50 | 14.00 | | 74.84 | 76.4 | 10.2 | |
| **Result** | | | | | | | | 6.8E−08 |
| **Initial** | 0 | 9.50 | 14.00 | 74.84 | | | | |
| **Final** | 31860 | 10.30 | 13.10 | | 73.14 | 74.0 | 9.9 | |
| **Result** | | | | | | | | 6.7E−08 |
| **Initial** | 0 | 5.40 | 18.30 | 83.24 | | | | |
| **Final** | 58440 | 7.10 | 16.50 | | 79.74 | 81.5 | 10.9 | |
| **Result** | | | | | | | | 6.9E−08 |
| **Initial** | 0 | 7.10 | 16.50 | 79.74 | | | | |
| **Final** | 29580 | 7.90 | 15.60 | | 78.04 | 78.9 | 10.5 | |
| **Result** | | | | | | | | 6.8E−08 |
| **Average Permeability** | | | | | | | | 6.8E−08 |
| **Assigned Permeability** | | | | | | | | |

**Skempton's B coeficient =** 1.0

**Operating Pressures (psi):** Cell 60.0 Head 56.0 Tail 55.0

**Remarks:** ASTM D 5084 (Method C: Falling head, Rising Tailwater), Specific gravity was assumed for calculations.

Geotechnical Lab Manager

# COMPACTION TESTS

**BRAUN℠**
**INTERTEC**

**Braun Intertec Corporation**
520 Fisherman's Road
La Crosse, Wisconsin 54603-1215
608-781-7277 Fax: 781-7279

*Engineers and Scientists Serving the Built and Natural Environments*

# REPORT OF FIELD COMPACTION TESTS

**Date:** August 13, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6/10/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 5.1 | 132.7 | 95.0 | 95.0 | A |
| 2 | 6/10/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 4.1 | 135.9 | 97.0 | 95.0 | A |
| 3 | 6/10/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 5.0 | 134.2 | 96.0 | 95.0 | A |
| 4 | 6/10/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 4.3 | 138.3 | 99.0 | 95.0 | A |
| 5 | 6/10/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 4.3 | 124.9 | 64.3 | 75.0 | B |
| 6 | 6/10/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 3.4 | 127.2 | 69.2 | 75.0 | B |
| 7 | 6/10/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 3.8 | 124.6 | 63.6 | 75.0 | B |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 1 | Water Treatment Holding Tank Subgrade, 12' S and 12' E of NE Corner | 648.0' |
| 2 | Water Treatment Holding Tank Subgrade, 15' S and 18' E of NW Corner | 648.0' |
| 3 | Water Treatment Holding Tank Subgrade, 18' N and 12' E of SW Corner | 649.0' |
| 4 | Water Treatment Holding Tank Subgrade, 12' N and 8' W of SE Corner | 649.0' |
| 5 | Water Treatment Holding Tank Subgrade, 16' S and 20' W of NE Corner | 649.5' |
| 6 | Water Treatment Holding Tank Subgrade, 20' N and 18' E of SW Corner | 650.5' |
| 7 | Water Treatment Holding Tank Subgrade, 25' N and 20' W of SE Corner | 650.5' |

1. Fill
2.

A. Test Results Comply With Specifications.
B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

**BRAUN**℠
**INTERTEC**

**Braun Intertec Corporation**
520 Fisherman's Road
La Crosse, Wisconsin 54603-1215
608-781-7277 Fax: 781-7279

*Engineers and Scientists Serving the Built and Natural Environments*℠

# REPORT OF FIELD COMPACTION TESTS

**Date:** August 13, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 6/11/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 4.3 | 122.9 | 60.0 | 75.0 | B |
| 9 | 6/11/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 4.7 | 120.4 | 54.1 | 75.0 | B |
| 10 | 6/11/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 5.1 | 127.5 | 70.0 | 75.0 | B |
| 11 | 6/11/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 5.2 | 123.2 | 60.5 | 75.0 | B |
| 12 | 6/11/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 4.9 | 130.1 | 75.2 | 75.0 | A |
| 13 | 6/11/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 4.5 | 129.1 | 73.1 | 75.0 | B |
| 14 | 6/11/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 4.2 | 122.8 | 59.6 | 75.0 | B |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 8 | Water Treatment Holding Tank Subgrade, 8' S and 6' W of NW Corner | 651.0' |
| 9 | Water Treatment Holding Tank Subgrade, 10' N and 8' E of SW Corner | 652.0' |
| 10 | Water Treatment Holding Tank Subgrade, 40' S and 35' E of NE Corner | 652.0' |
| 11 | Water Treatment Holding Tank Subgrade, 30' N and 8' W of SE Corner | 652.5' |
| 12 | Water Treatment Holding Tank Subgrade, 6' N and 35' E of SE Corner | 652.5' |
| 13 | Water Treatment Holding Tank Subgrade, 35' S and 25' E of NW Corner | 653.0' |
| 14 | Water Treatment Holding Tank Subgrade, 30' S and 12' W of NE Corner | 654.0' |

1. Fill    A. Test Results Comply With Specifications.
2.    B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

**BRAUN℠**
**INTERTEC**

**Braun Intertec Corporation**
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La Crosse, Wisconsin 54603-1215
608-781-7277 Fax: 781-7279

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# REPORT OF FIELD COMPACTION TESTS

**Date:** August 13, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 6/14/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 4.9 | 130.9 | 93.5 | 95.0 | B |
| 16 | 6/14/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 4.3 | 132.4 | 94.5 | 95.0 | B |
| 17 | 6/14/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 4.8 | 137.7 | 98.4 | 95.0 | A |
| 18 | 6/14/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 5.7 | 137.0 | 98.0 | 95.0 | A |
| 19 | 6/14/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 4.6 | 133.3 | 95.5 | 95.0 | A |
| | | | | | | | | | | |
| | | | | | | | | | | |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 15 | Water Treatment Holding Tank Subgrade, 12' N and 25' W of SE Corner | 655.0' |
| 16 | Water Treatment Holding Tank Subgrade, 30' S and 20' W of SE Corner | 655.0' |
| 17 | Water Treatment Holding Tank Subgrade, 12' S and 15' E of NW Corner | 655.0' |
| 18 | Water Treatment Holding Tank Subgrade, 12' N and 15' W of SW Corner | 655.0' |
| 19 | Water Treatment Holding Tank Subgrade, 35' S and 40' E of NE Corner | 655.0' |
| | | |
| | | |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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INTERTEC

**Braun Intertec Corporation**
520 Fisherman's Road
La Crosse, Wisconsin 54603-1215
608-781-7277 Fax: 781-7279

*Engineers and Scientists Serving the Built and Natural Environments®*

# REPORT OF FIELD COMPACTION TESTS

**Date:** August 13, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 26 | 6/24/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 8.1 | 133.9 | 96.0 | 95.0 | A |
| 27 | 6/24/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 8.4 | 134.1 | 96.0 | 95.0 | A |
| 28 | 6/24/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 7.9 | 133.4 | 95.0 | 95.0 | A |
| 29 | 6/24/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 7.6 | 134.2 | 96.0 | 95.0 | A |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 26 | 15' N and 10' E of SW Corner Treatment Facility Pad | 652.0' |
| 27 | 15' N and 15' W of SE Corner Treatment Facility Pad | 652.0' |
| 28 | 25' N and 15' E of SW Corner Treatment Facility Pad | 652.0' |
| 29 | 25' N and 20' W of SE Corner Treatment Facility Pad | 652.0' |
| | | |
| | | |
| | | |

1. Fill
2.

A. Test Results Comply With Specifications.
B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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# REPORT OF FIELD COMPACTION TESTS

**Date:** August 13, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 6/23/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 7.2 | 133.6 | 96.0 | 95.0 | A |
| 21 | 6/23/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 8.1 | 132.6 | 95.0 | 95.0 | A |
| 22 | 6/23/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 6.8 | 135.8 | 97.0 | 95.0 | A |
| 23 | 6/23/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 8.1 | 135.0 | 96.0 | 95.0 | A |
| 24 | 6/23/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 7.0 | 136.3 | 97.0 | 95.0 | A |
| 25 | 6/23/93 | BC-2 | Crushed L.S. | 8.2 | 139.9 | 8.2 | 136.5 | 97.0 | 95.0 | A |
|  |  |  |  |  |  |  |  |  |  |  |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 20 | 10' N and 10' E of SW Corner Treatment Facility Pad | 651.0' |
| 21 | 10' N and 10' W of SE Corner Treatment Facility Pad | 651.0' |
| 22 | 30' N and 15' W of SW Corner Treatment Facility Pad | 651.0' |
| 23 | 30' N and 15' E of SE Corner Treatment Facility Pad | 651.0' |
| 24 | 40' N and 20' W of SW Corner Treatment Facility Pad | 651.0' |
| 25 | 40' N and 20' E of SE Corner Treatment Facility Pad | 651.0' |
|  |  |  |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

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Laboratory Supervisor

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# REPORT OF FIELD COMPACTION TESTS

**Date:** August 12, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 8/3/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 36.9 | 87.8 | 93.0 | 90.0 | A |
| 31 | 8/3/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 31.7 | 90.0 | 95.1 | 90.0 | A |
| 32 | 8/3/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 39.7 | 87.9 | 93.1 | 90.0 | A |
| 33 | 8/3/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 31.6 | 90.0 | 95.0 | 90.0 | A |
| 34 | 8/3/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 34.8 | 88.5 | 93.3 | 90.0 | A |
| 35 | 8/3/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 34.4 | 89.5 | 94.4 | 90.0 | A |
| 36 | 8/3/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 36.7 | 87.7 | 90.4 | 90.0 | A |

X Nuclear Method ASTM D 2922-81
____ Sand Cone Method ASTM D 1556-82

____ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 30 | N Test Pad, 50' From S End (Single Pack) | Top of Clay Liner |
| 31 | N Test Pad, 75' From S End (Single Pack) | Top of Clay Liner |
| 32 | N Test Pad, 30' From S End | Top of Clay Liner |
| 33 | N Test Pad, 100' From S End | Top of Clay Liner |
| 34 | N Test Pad, 150' From S End | Top of Clay Liner |
| 35 | N Test Pad, 125' From S End | Top of Clay Liner |
| 36 | S Test Pad, 3' S From N End | Top of Clay Liner |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

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Thomas LoBianco
Laboratory Supervisor

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# REPORT OF FIELD COMPACTION TESTS

**Date:** August 12, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 8/3/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 28.5 | 95.8 | 101.0 | 90.0 | A |
| 38 | 8/3/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 29.2 | 94.7 | 99.8 | 90.0 | A |
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X Nuclear Method ASTM D 2922-81

___ Sand Cone Method ASTM D 1556-82

___ Standard Proctor ASTM D 698-78

X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 37 | S Test Pad, 15' S From N End | Top of Clay Liner |
| 38 | S Test Pad, 25' S From N End | Top of Clay Liner |
| | | |
| | | |
| | | |
| | | |
| | | |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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# REPORT OF FIELD COMPACTION TESTS

**Date:** August 12, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 39 | 8/3/93 | BC-5 | Base Course | 8.6 | 135.0 | 6.6 | 131.7 | 97.6 | 95.0 | A |
| 40 | 8/3/93 | BC-5 | Base Course | 8.6 | 135.0 | 4.5 | 132.9 | 98.5 | 95.0 | A |
| 41 | 8/3/93 | BC-5 | Base Course | 8.6 | 135.0 | 5.1 | 133.1 | 98.7 | 95.0 | A |
| 42 | 8/3/93 | BC-5 | Base Course | 8.6 | 135.0 | 4.7 | 131.4 | 97.4 | 95.0 | A |
| 43 | 8/3/93 | BC-5 | Base Course | 8.6 | 135.0 | 4.4 | 134.9 | 100.0 | 95.0 | A |
| 44 | 8/3/93 | BC-5 | Base Course | 8.6 | 135.0 | 4.2 | 134.4 | 99.6 | 95.0 | A |
| | | | | | | | | | | |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82

___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 39 | 20' W of S End of N Test Pad on Base Course | Top of Working Surface |
| 40 | 25' W of Midpoint of N Test Pad on Base Course | Top of Working Surface |
| 41 | 20' W of N End of N Test Pad on Base Course | Top of Working Surface |
| 42 | 100' E of N End of N Test Pad on Base Course | Top of Working Surface |
| 43 | 125' E of Midpoint of N Test Pad on Base Course | Top of Working Surface |
| 44 | 100' E and 50' S of S End of N Test Pad on Base Course | Top of Working Surface |
| | | |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

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Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 45 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 26.7 | 94.6 | 99.7 | 90.0 | A |
| 46 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 32.2 | 95.0 | 100.3 | 90.0 | A |
| 47 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 32.7 | 94.7 | 99.8 | 90.0 | A |
| 48 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 38.4 | 85.5 | 90.2 | 90.0 | A |
| 49 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 43.7 | 85.4 | 90.1 | 90.0 | A |
| 50 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 37.1 | 85.7 | 90.4 | 90.0 | A |
| 51 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 35.6 | 85.7 | 90.4 | 90.0 | A |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82

___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 45 | E Side W Edge, 100' N of S End | First Lift |
| 46 | E Side W Edge, 200' N of S End | First Lift |
| 47 | E Side W Edge, 300' N of S End | First Lift |
| 48 | E Side W Edge, 400' N of S End | First Lift |
| 49 | E Side E Edge, 400' N of S End | First Lift |
| 50 | E Side E Edge, 300' N of S End | First Lift |
| 51 | E Side E Edge, 200' N of S End | First Lift |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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**Project No:** BNDX-93-037A

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Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 52 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.1 | 95.4 | 100.6 | 90.0 | A |
| 53 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.7 | 88.5 | 93.3 | 90.0 | A |
| 54 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 22.2 | 97.7 | 103.1 | 90.0 | A |
| 55 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 24.9 | 98.5 | 103.9 | 90.0 | A |
| 56 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 30.6 | 90.9 | 95.8 | 90.0 | A |
| 57 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 31.3 | 90.6 | 95.6 | 90.0 | A |
| 58 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 29.0 | 93.2 | 98.2 | 90.0 | A |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 52 | E Side E Edge, 200' N of S End | First Lift |
| 53 | E Side E Edge, 100' N of S End | First Lift |
| 54 | E Side Center, 100' N of S End | First Lift |
| 55 | E Side Center, 200' N of S End | First Lift |
| 56 | E Side Center, 300' N of S End | First Lift |
| 57 | E Side Center, 400' N of S End | First Lift |
| 58 | E Side Center, 500' N of S End | First Lift |

1. Fill
2.

A. Test Results Comply With Specifications.
B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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# REPORT OF FIELD COMPACTION TESTS

**Date:** August 13, 1993

**Project No:** BNDX-93-037A

**Client:**
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Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 59 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 23.5 | 97.3 | 102.6 | 90.0 | A |
| 60 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 32.8 | 88.6 | 93.5 | 90.0 | A |
| 61 | 8/11/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 32.4 | 90.7 | 95.6 | 90.0 | A |
|  |  |  |  |  |  |  |  |  |  |  |
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X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 59 | W Edge Center, 100' N From S End | First Lift |
| 60 | W Edge Center, 200' N From S End | First Lift |
| 61 | W Edge Center, 300' N From S End | First Lift |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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# REPORT OF FIELD COMPACTION TESTS

**Date:** August 18, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
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Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 62 | 8/12/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 29.2 | 94.5 | 99.6 | 90.0 | A |
| 63 | 8/12/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 28.1 | 93.6 | 98.7 | 90.0 | A |
| 64 | 8/12/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.7 | 92.0 | 97.0 | 90.0 | A |
| 65 | 8/12/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 22.3 | 97.2 | 102.5 | 90.0 | A |
| 66 | 8/12/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 28.6 | 96.1 | 101.4 | 90.0 | A |
| 67 | 8/12/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 26.4 | 94.7 | 99.8 | 90.0 | A |
| 68 | 8/12/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 30.8 | 98.4 | 103.8 | 90.0 | A |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82

___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 62 | E Side, 100' N of S End | 2nd Lift |
| 63 | E Side, 200' N of S End | 2nd Lift |
| 64 | E Side, 300' N of S End | 2nd Lift |
| 65 | E Side, 400' N of S End | 2nd Lift |
| 66 | E Side, 500' N of S End | 2nd Lift |
| 67 | NE End E Side | 1st Lift |
| 68 | 100' N From NE End | 1st Lift |

1. Fill
2.

A. Test Results Comply With Specifications.
B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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Vernon Hills, IL 60164

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Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 69 | 8/12/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 29.7 | 87.6 | 92.3 | 90.0 | A |
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X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 69 | 200' N of NE End E Side | Ist Lift |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

**BRAUN**℠
**INTERTEC**

**Braun Intertec Corporation**
520 Fisherman's Road
La Crosse, Wisconsin 54603-1215
608-781-7277 Fax: 781-7279

*Engineers and Scientists Serving the Built and Natural Environments*

# REPORT OF FIELD COMPACTION TESTS

**Date:** August 18, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 70 | 8/13/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 29.0 | 94.0 | 99.1 | 90.0 | A |
| 71 | 8/13/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 24.8 | 97.3 | 102.6 | 90.0 | A |
| 72 | 8/13/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.6 | 93.8 | 98.9 | 90.0 | A |
| 73 | 8/13/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 25.9 | 94.4 | 99.6 | 90.0 | A |
| 74 | 8/13/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 24.7 | 94.3 | 99.5 | 90.0 | A |
| 75 | 8/13/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 26.2 | 95.9 | 101.1 | 90.0 | A |
| 76 | 8/13/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 25.9 | 98.3 | 103.7 | 90.0 | A |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 70 | SW Corner W Side | 1st Lift |
| 71 | 100' N of SW Corner W Side Inside Edge | 1st Lift |
| 72 | 200' N of SW Corner Inside Edge W Side | 2nd Lift |
| 73 | 300' N of SW Corner Middle W Side | 2nd Lift |
| 74 | 400' N of SW Corner Inside Edge W Side | 2nd Lift |
| 75 | 500' N of SW Corner Middle W Side | 2nd Lift |
| 76 | 600' N of SW Corner Inside Edge | 2nd Lift |

1. Fill
2.

A. Test Results Comply With Specifications.
B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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# REPORT OF FIELD COMPACTION TESTS

**Date:** August 18, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 77 | 8/13/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 28.0 | 93.6 | 98.6 | 90.0 | A |
| 78 | 8/13/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.3 | 95.0 | 100.2 | 90.0 | A |
| 79 | 8/13/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 26.9 | 96.6 | 101.9 | 90.0 | A |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 77 | 300' N of SW Corner Inside Edge W Side | 2nd Lift |
| 78 | 500' N of SW Corner Inside Edge W Side | 2nd Lift |
| 79 | E Side SE Corner | 2nd Lift |
| | | |
| | | |
| | | |
| | | |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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*Engineers and Scientists Serving*
*the Built and Natural Environments*

# REPORT OF FIELD COMPACTION TESTS

**Date:** August 30, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska,. WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 87 | 8/24/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 24.2 | 89.2 | 94.0 | 90.0 | A |
| 88 | 8/24/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 23.0 | 96.6 | 101.8 | 90.0 | A |
| 89 | 8/24/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 23.0 | 95.3 | 100.5 | 90.0 | A |
| 90 | 8/24/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 28.3 | 91.3 | 96.3 | 90.0 | A |
| 91 | 8/24/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 28.3 | 92.0 | 97.0 | 90.0 | A |
| 92 | 8/24/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 31.0 | 89.8 | 94.7 | 90.0 | A |
| | | | | | | | | | | |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevatio |
|---|---|---|
| 87 | W Side S End | 2nd Lift |
| 88 | 100' N of S End | 2nd Lift |
| 89 | 200' N of S End | 2nd Lift |
| 90 | 300' N of S End | 2nd Lift |
| 91 | 400' N of S End | 2nd Lift |
| 92 | 500' N of S End | 2nd Lift |
| | | |

1\. Fill A. Test Results Comply With Specifications.
2\. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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*the Built and Natural Environments*

# REPORT OF FIELD COMPACTION TESTS

**Date:** August 23, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 80 | 8/21/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 31.2 | 91.4 | 96.3 | 90.0 | A |
| 81 | 8/21/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 30.7 | 89.4 | 94.2 | 90.0 | A |
| 82 | 8/21/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 30.1 | 90.1 | 95.0 | 90.0 | A |
| 83 | 8/21/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 34.0 | 86.0 | 90.7 | 90.0 | A |
| 84 | 8/21/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 31.0 | 91.4 | 96.4 | 90.0 | A |
| 85 | 8/21/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 33.5 | 87.2 | 92.0 | 90.0 | A |
| 86 | 8/21/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 30.1 | 91.9 | 97.0 | 90.0 | A |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 80 | E Side, 300' S of NE End | 2nd Lift |
| 81 | E Side, 200' S of NE End | 2nd Lift |
| 82 | E Side, 100' S of NE End | 2nd Lift |
| 83 | W Side, 300' S of NW End | 2nd Lift |
| 84 | W Side, 200' S of NW End | 2nd Lift |
| 85 | W Side, 100' S of NW End | 2nd Lift |
| 86 | S End Center | 2nd Lift |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

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Laboratory Supervisor

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*Engineers and Scientists Serving the Built and Natural Environments*

# REPORT OF FIELD COMPACTION TESTS

**Date:** August 30, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 93 | 8/25/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 26.7 | 91.8 | 96.8 | 90.0 | A |
| 94 | 8/25/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 24.0 | 96.9 | 102.2 | 90.0 | A |
| 95 | 8/25/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.0 | 90.4 | 95.3 | 90.0 | A |
| 96 | 8/25/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 21.5 | 91.9 | 96.9 | 90.0 | A |
| 97 | 8/25/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 22.6 | 94.6 | 99.8 | 90.0 | A |
| 98 | 8/25/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 19.7 | 96.2 | 101.5 | 90.0 | A |
|  |  |  |  |  |  |  |  |  |  |  |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 93 | W Side 100' S of N End | 2nd Lift |
| 94 | W Side N End | 2nd Lift |
| 95 | E Side N End | 2nd Lift |
| 96 | E Side 100' S of N End | 2nd Lift |
| 97 | E Side 200' S of N End | 2nd Lift |
| 98 | E Side 300' S of N End | 2nd Lift |
|  |  |  |

1. Fill    A. Test Results Comply With Specifications.
2.    B. Test Results Do Not Comply With Specifications.

NOTES:

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# REPORT OF FIELD COMPACTION TESTS

**Date:** August 30, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 99 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.0 | 96.4 | 101.6 | 90.0 | A |
| 100 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 30.1 | 88.8 | 93.7 | 90.0 | A |
| 101 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 28.1 | 92.2 | 97.2 | 90.0 | A |
| 102 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 30.7 | 85.2 | 90.0 | 90.0 | A |
| 103 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 24.1 | 98.2 | 103.5 | 90.0 | A |
| 104 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 33.9 | 85.4 | 90.0 | 90.0 | A |
| 105 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.8 | 92.5 | 97.5 | 90.0 | A |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 99 | E Side S End | 2nd Lift |
| 100 | E Side 100' N of S End | 2nd Lift |
| 101 | E Side 200' N of S End | Final Lift |
| 102 | E Side 300' N of S End | Final Lift |
| 103 | E Side 400' N of S End | Final Lift |
| 104 | E Side 500' N of S End | Final Lift |
| 105 | E Side 600' N of S End | Final Lift |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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# REPORT OF FIELD COMPACTION TESTS

**Date:** August 30, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 106 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.8 | 88.2 | 93.0 | 90.0 | A |
| 107 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 36.6 | 84.8 | 90.0 | 90.0 | A |
| 108 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 29.0 | 87.8 | 92.6 | 90.0 | A |
| 109 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 29.9 | 90.1 | 95.0 | 90.0 | A |
| 110 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 26.8 | 93.2 | 98.2 | 90.0 | A |
| 111 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 30.4 | 90.3 | 95.2 | 90.0 | A |
| 112 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 28.0 | 93.3 | 98.3 | 90.0 | A |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82

___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 106 | E Side Inside Edge 200' N of S End | E Side Final Lift |
| 107 | E Side Inside Edge 100' N of S End | E Side 2nd Lift |
| 108 | W Side N End | E Side 2nd Lift |
| 109 | 100' S of N End | E Side 2nd Lift |
| 110 | 200' S of N End | W Side Final Lift |
| 111 | 300' S of N End | W Side Final Lift |
| 112 | 400' S of N End | W Side Final Lift |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

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# REPORT OF FIELD COMPACTION TESTS

**Date:** August 30, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 113 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 26.1 | 96.8 | 102.1 | 90.0 | A |
| 114 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 32.6 | 85.5 | 90.2 | 90.0 | A |
| 115 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 22.2 | 96.3 | 101.6 | 90.0 | A |
| 116 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 25.2 | 88.0 | 92.8 | 90.0 | A |
| 117 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.0 | 89.5 | 94.4 | 90.0 | A |
| 118 | 8/26/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 26.7 | 93.9 | 99.0 | 90.0 | A |
|  |  |  |  |  |  |  |  |  |  |  |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 113 | W Side 500' S of N End | Final Lift |
| 114 | W Side 600' S of N End | Final Lift |
| 115 | W Side 680' S of N End Outside Edge | Final Lift |
| 116 | W Side 750' S of N End Outside Edge | Final Lift |
| 117 | W Side S End | Final Lift |
| 118 | W Side 50' E of S End | Final Lift |
|  |  |  |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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# REPORT OF FIELD COMPACTION TESTS

**Date:** September 23, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 119 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 22.7 | 97.9 | 103.2 | 90.0 | A |
| 120 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 25.9 | 88.5 | 93.3 | 90.0 | A |
| 121 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.4 | 95.2 | 100.4 | 90.0 | A |
| 122 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 24.4 | 92.0 | 97.0 | 90.0 | A |
| 123 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 23.0 | 94.7 | 99.8 | 90.0 | A |
| 124 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 24.5 | 87.7 | 92.5 | 90.0 | A |
| 125 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 22.9 | 99.1 | 104.5 | 90.0 | A |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 119 | E of Center of Landfill Cap, Midpoint | Final Lift |
| 120 | E of Center of Landfill Cap, 100' S of Midpoint | Final Lift |
| 121 | E of Center of Landfill Cap, 200' S of Midpoint | Final Lift |
| 122 | E of Center of Landfill Cap, 300' S of Midpoint | Final Lift |
| 123 | E of Center of Landfill Cap, 400' S of Midpoint | Final Lift |
| 124 | Center of Landfill Cap, Midpoint | Final Lift |
| 125 | W of Center of Landfill Cap, Midpoint | Final Lift |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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INTERTEC

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# REPORT OF FIELD COMPACTION TESTS

**Date:** September 23, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 126 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 28.0 | 94.1 | 99.2 | 90.0 | A |
| 127 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 29.2 | 92.1 | 97.1 | 90.0 | A |
| 128 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 33.4 | 88.0 | 92.8 | 90.0 | A |
| 129 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.6 | 91.4 | 96.4 | 90.0 | A |
| 130 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 24.4 | 91.9 | 96.9 | 90.0 | A |
| 131 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 30.9 | 87.3 | 92.0 | 90.0 | A |
| 132 | 9/2/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 25.8 | 93.7 | 98.7 | 90.0 | A |

X Nuclear Method ASTM D 2922-81

___ Sand Cone Method ASTM D 1556-82

___ Standard Proctor ASTM D 698-78

X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 126 | W of Center of Landfill Cap, Midpoint | 2nd Lift |
| 127 | W of Center of Landfill Cap, 100' N of Midpoint | 2nd Lift |
| 128 | W of Center of Landfill Cap, 200' N of Midpoint | 2nd Lift |
| 129 | W of Center of Landfill Cap, 100' S of Midpoint | 2nd Lift |
| 130 | W of Center of Landfill Cap, 200' S of Midpoint | 2nd Lift |
| 131 | W of Center of Landfill Cap, 300' S of Midpoint | 2nd Lift |
| 132 | W of Center of Landfill Cap, 400' S of Midpoint | Final Lift |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

**BRAUN℠**
INTERTEC

Braun Intertec Corporation
520 Fisherman's Road
La Crosse, Wisconsin 54603-1215
608-781-7277 Fax: 781-7279

*Engineers and Scientists Serving the Built and Natural Environments*

# REPORT OF FIELD COMPACTION TESTS

**Date:** September 23, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 133 | 9/8/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 29.2 | 92.1 | 97.1 | 90.0 | A |
| 134 | 9/8/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 33.4 | 88.0 | 92.8 | 90.0 | A |
| 135 | 9/8/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.6 | 91.4 | 96.4 | 90.0 | A |
| 136 | 9/8/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 24.4 | 91.9 | 96.9 | 90.0 | A |
| 137 | 9/8/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 30.9 | 87.3 | 92.0 | 90.0 | A |
| 138 | 9/8/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 25.8 | 93.7 | 98.8 | 90.0 | A |
| 139 | 9/8/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 28.1 | 94.1 | 99.2 | 90.0 | A |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 133 | Center of Landfill Cap, 200' S of Midpoint | Final Lift |
| 134 | E Side of Landfill Cap, 100' S of Midpoint | Final Lift |
| 135 | E Side of Landfill Cap, 300' S of Midpoint | Final Lift |
| 136 | E Side of Landfill Cap, 400' S of Midpoint | Final Lift |
| 137 | E Side of Landfill Cap, 500' S of Midpoint | Final Lift |
| 138 | E Side of Landfill Cap, 100' N of Midpoint | Final Lift |
| 139 | E Side of Landfill Cap, 200' N of Midpoint | Final Lift |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

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# REPORT OF FIELD COMPACTION TESTS

**Date:** September 23, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 140 | 9/10/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 23.8 | 100.7 | 106.2 | 90.0 | A |
| 141 | 9/10/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 35.9 | 82.3 | 86.8 | 90.0 | B |
| 142 | 9/10/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 35.1 | 82.8 | 87.3 | 90.0 | B |
| 143 | 9/10/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 30.1 | 85.5 | 90.1 | 90.0 | A |
| 144 | 9/10/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 27.4 | 93.1 | 98.1 | 90.0 | A |
| 145 | 9/10/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 24.0 | 93.7 | 98.8 | 90.0 | A |
| 146 | 9/10/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 33.3 | 87.6 | 92.4 | 90.0 | A |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 140 | Center of Landfill Cap, 700' N of Midpoint | First Lift |
| 141 | E Side of Landfill Cap, 300' N of Midpoint | Final Lift |
| 142 | E Side of Landfill Cap, 400' N of Midpoint | Final Lift |
| 143 | E Side of Landfill Cap, 500' N of Midpoint | Final Lift |
| 144 | W Side of Landfill Cap, 100' N of Midpoint | Final Lift |
| 145 | W Side of Landfill Cap, 200' N of Midpoint | Final Lift |
| 146 | W Side of Landfill Cap, 300' N of Midpoint | Final Lift |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

**BRAUN**℠
INTERTEC

**Braun Intertec Corporation**
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La Crosse, Wisconsin 54603-1215
608-781-7277 Fax: 781-7279

*Engineers and Scientists Serving the Built and Natural Environments*

# REPORT OF FIELD COMPACTION TESTS

**Date:** September 23, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 147 | 9/10/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 25.1 | 93.6 | 98.6 | 90.0 | A |
| 148 | 9/10/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 32.3 | 83.3 | 87.8 | 90.0 | B |
| 149 | 9/10/93 | CL-2 | Lean Clay | 25.4 | 94.8 | 32.4 | 88.1 | 92.9 | 90.0 | A |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82
___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 147 | W Side of Landfill Cap, 400' N of Midpoint | Final Lift |
| 148 | W Side of Landfill Cap, 500' N of Midpoint | Final Lift |
| 149 | Center of Landfill Cap, 600' N of Midpoint | lst Lift |
| | | |
| | | |
| | | |
| | | |

1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES:

cc:

Thomas LoBianco
Laboratory Supervisor

**BRAUN**℠
INTERTEC

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520 Fisherman's Road
La Crosse, Wisconsin 54603-1215
608-781-7277 Fax: 781-7279

*Engineers and Scientists Serving*
*the Built and Natural Environments*

# REPORT OF FIELD COMPACTION TESTS

**Date:** November 11, 1993

**Project No:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
COMPACTION TESTING
Onalaska Municipal Landfill Site
Onalaska, WI

| Test No. | Date | Soil I.D.# | Classification | Optimum Moisture | Max. Lab Dry Density (PCF) | In Place % Moisture | In Place Dry Density (PCF) | Percent Compaction | Specified Compaction | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 157 | 11/8/93 | BC-5 | Crushed L.S. | 8.6 | 135.0 | 2.9 | 135.7 | 100.7 | 95.0 | A |
| 158 | 11/8/93 | BC-5 | Crushed L.S. | 8.6 | 135.0 | 3.7 | 134.4 | 99.6 | 95.0 | A |
| 159 | 11/8/93 | BC-5 | Crushed L.S. | 8.6 | 135.0 | 4.5 | 136.0 | 100.8 | 95.0 | A |
| 160 | 11/8/93 | BC-5 | Crushed L.S. | 8.6 | 135.0 | 3.5 | 134.0 | 99.2 | 95.0 | A |
| 161 | 11/8/93 | BC-5 | Crushed L.S. | 8.6 | 135.0 | 3.9 | 133.1 | 98.6 | 95.0 | A |
| 162 | 11/8/93 | BC-5 | Crushed L.S. | 8.6 | 135.0 | 4.9 | 133.5 | 98.9 | 95.0 | A |
| 163 | 11/8/93 | BC-5 | Crushed L.S. | 8.6 | 135.0 | 3.8 | 134.3 | 99.3 | 95.0 | A |

X Nuclear Method ASTM D 2922-81
___ Sand Cone Method ASTM D 1556-82

___ Standard Proctor ASTM D 698-78
X Modified Proctor ASTM D 1557-78

Bench Mark:

| Test No. | Test Location | Elevation |
|---|---|---|
| 157 | Sportman's Club Road, Entrance Off County Hwy Z | F.G. |
| 158 | Sportman's Club Road, 200' S of Entrance Off County Hwy Z | F.G. |
| 159 | Sportman's Club Road, 400' S of Entrance Off County Hwy Z | F.G. |
| 160 | Sportman's Club Road, 600' S of Entrance Off County Hwy Z | F.G. |
| 161 | Sportman's Club Road, 700' S and 150' W of Entrance Off County Hwy Z | F.G. |
| 162 | Sportman's Club Road, 700' S and 250' W of Entrance Off County Hwy Z | F.G. |
| 163 | Sportman's Club Road, S of Landfill Entrance Gate | F.G. |

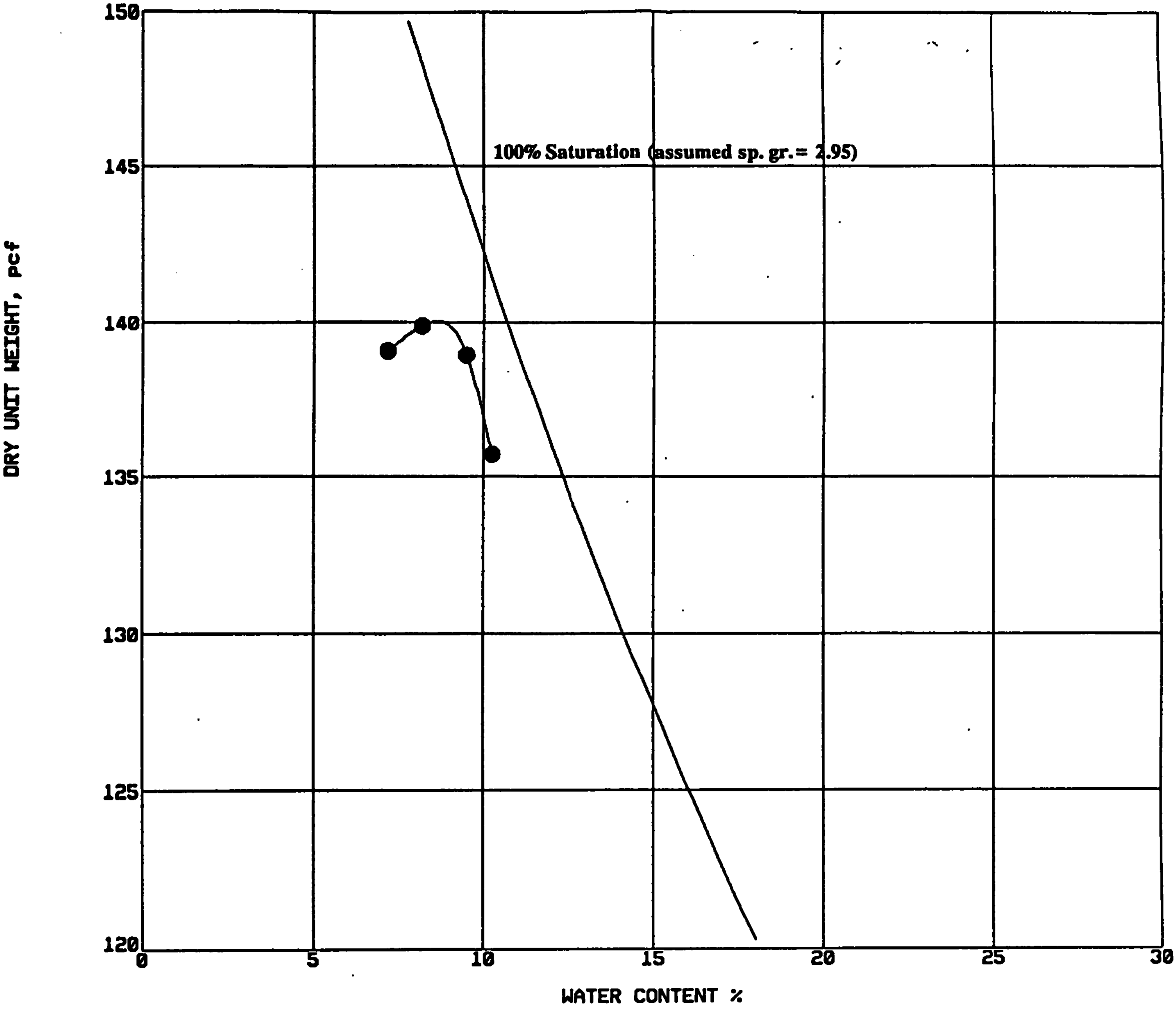
1. Fill A. Test Results Comply With Specifications.
2. B. Test Results Do Not Comply With Specifications.

NOTES: F.G. = Finished Grade

cc:

Thomas LoBianco
Laboratory Supervisor

# PROCTOR TESTS



| LEGEND: Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|
| ● BC-2 | | | 139.9 | 8.2 |

**BRAUN PROJECT NO: BNDX-93-037A**

November 1993

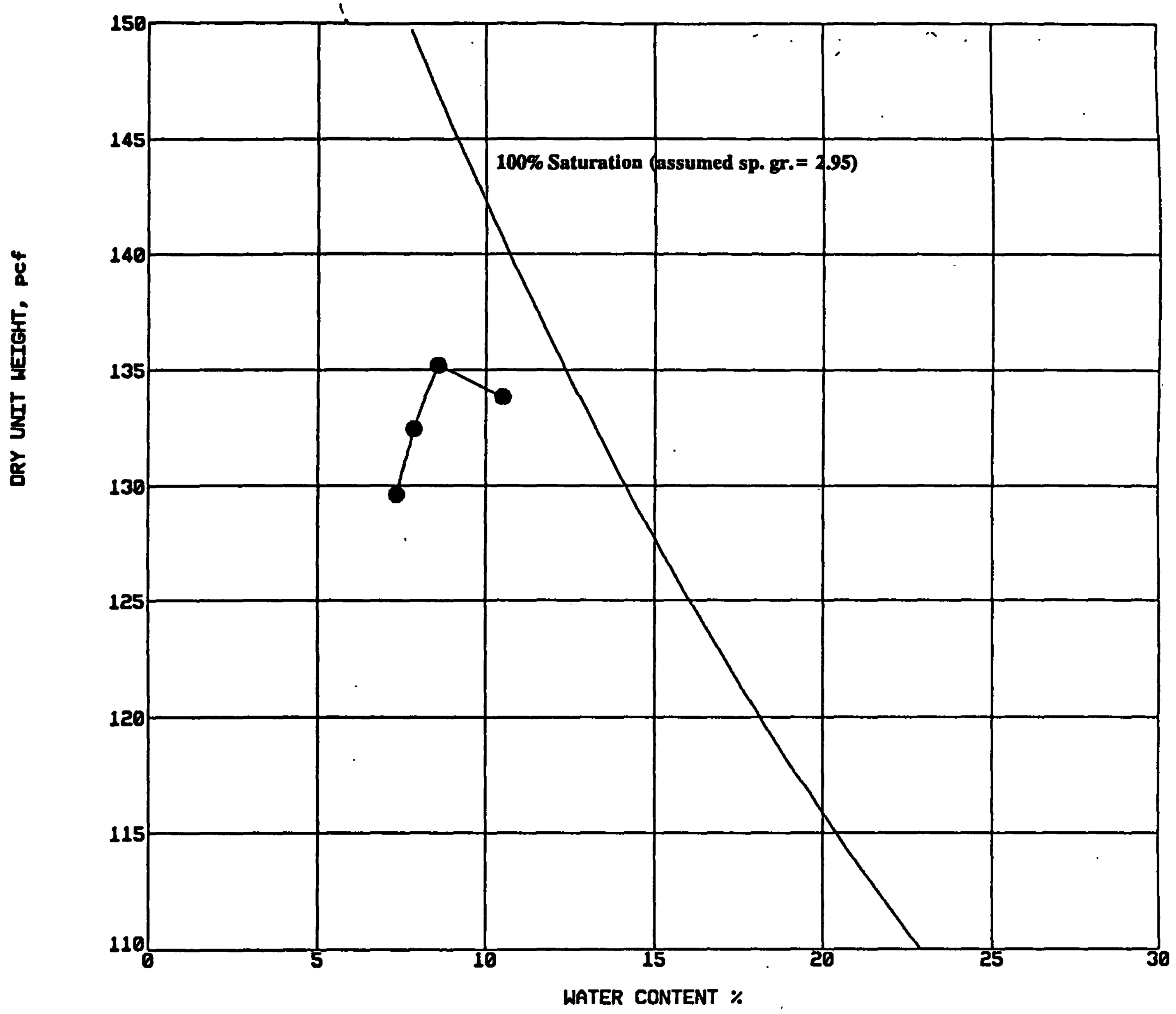
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 698)*

FIGURE 1

Braun Intertec La Crosse, WI

Geotechnical Testing Services



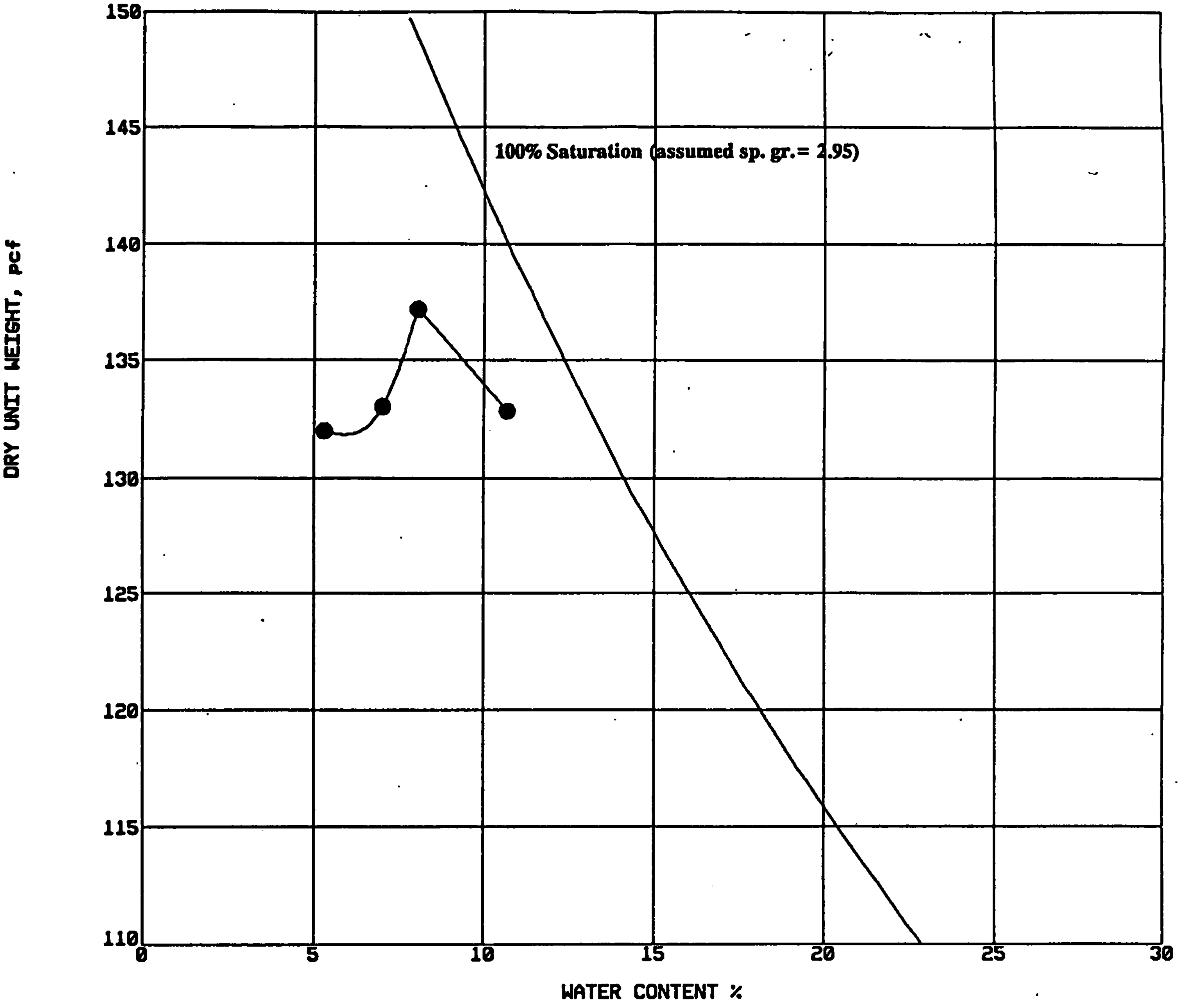
| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | BC-5 | C | GRADE I CRUSHED STONE | 135.0 | 8.8 |

**BRAUN PROJECT NO: BNDX-93-037A** **November 1993**

Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 1557)* FIGURE 1

**Braun Intertec La Crosse, WI** **Geotechnical Testing Services**



| LEGEND: Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|
| ● BC-6 | C | GRADE I CRUSHED STONE | 137.0 | 8.0 |

**BRAUN PROJECT NO: BNDX-93-037A**

November 1993

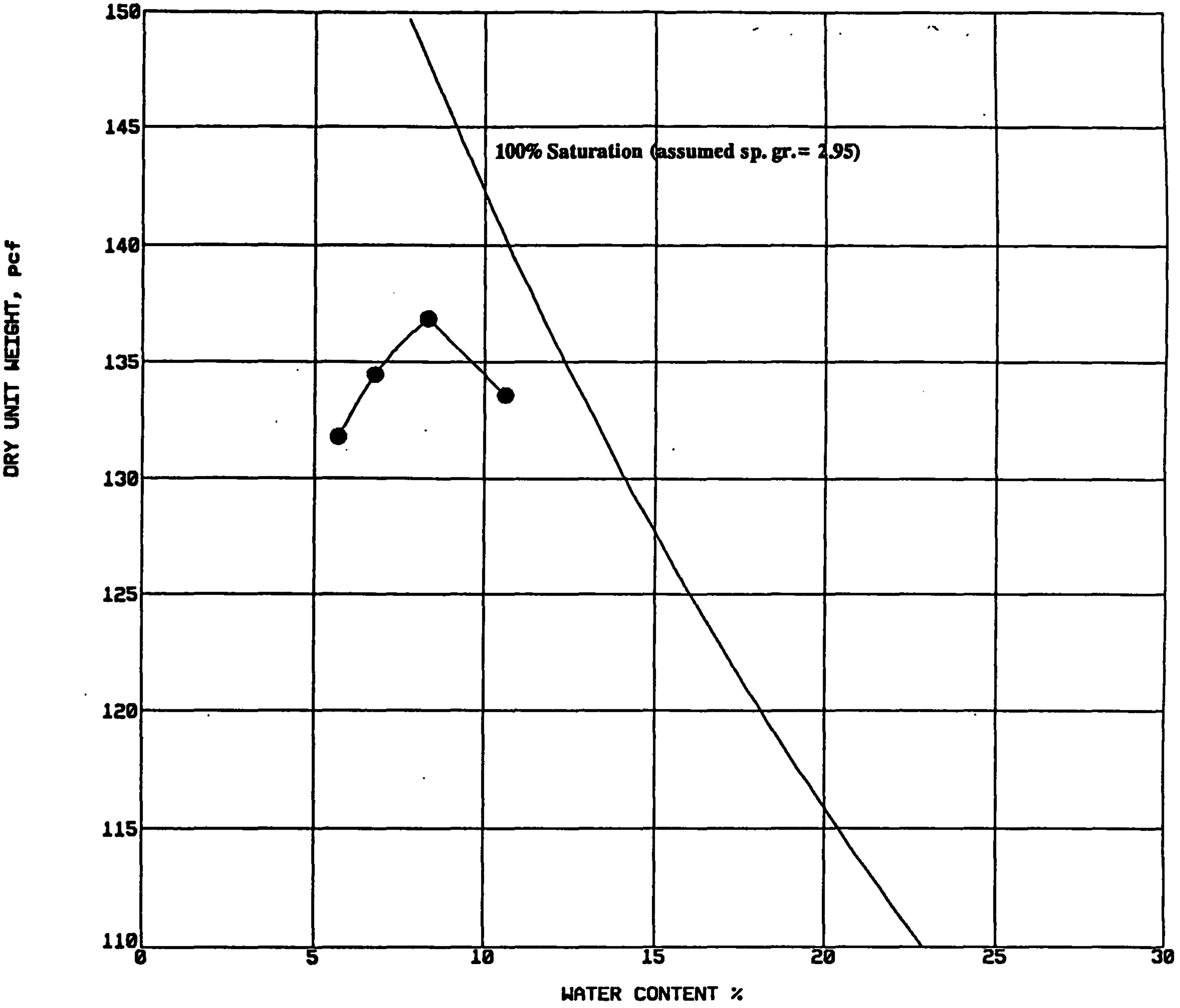
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 1557)*

FIGURE 1

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



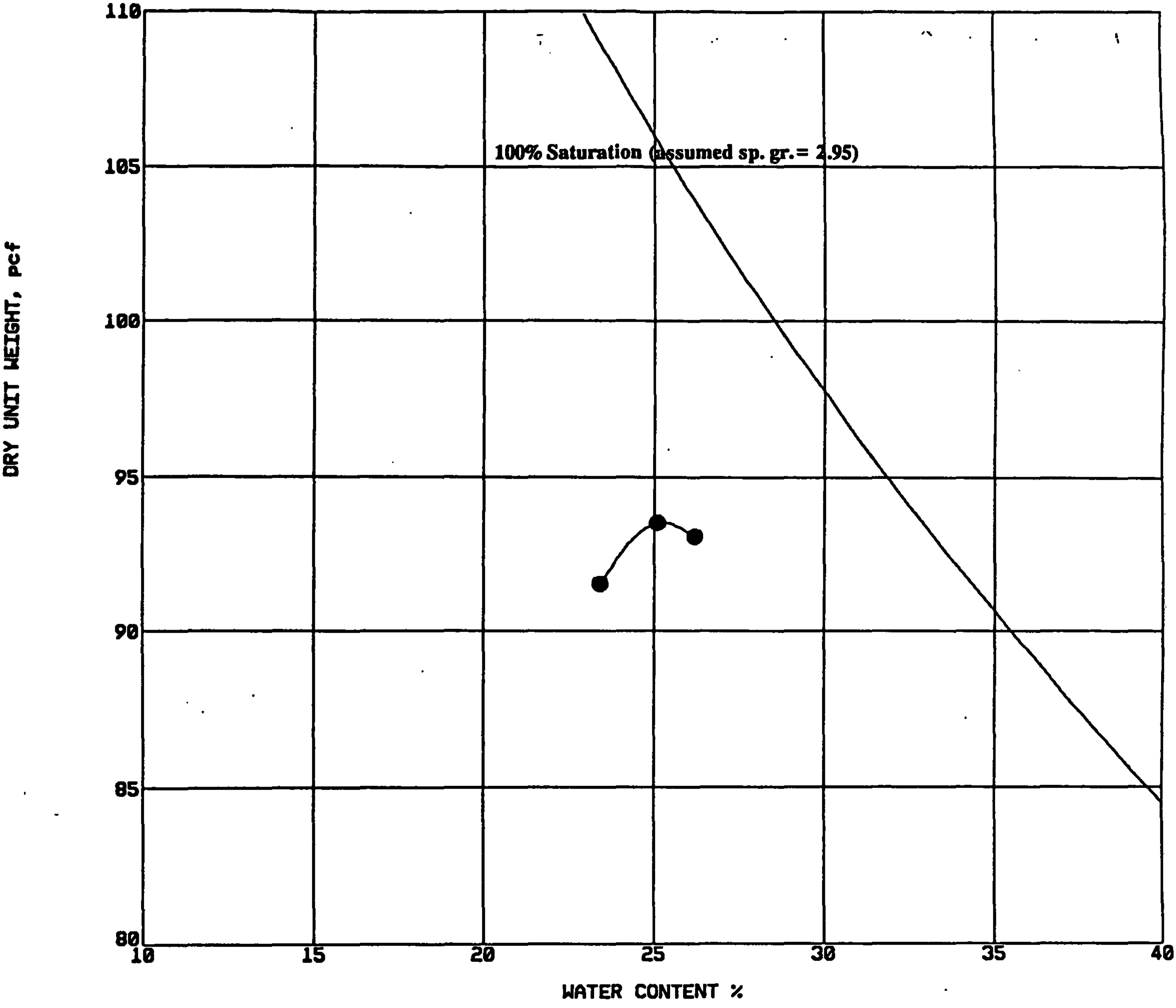
| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | BC-7 | C | GRADE I CRUSHED STONE | 136.7 | 8.3 |

**BRAUN PROJECT NO: BNDX-93-037A** **November 1993**

Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 1557)* **FIGURE 1**

**Braun Intertec La Crosse, WI** **Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | CL-1 | A | ML SILT, brown | 93.5 | 25.4 |

**BRAUN PROJECT NO: BNDX-93-037A**

**November 1993**

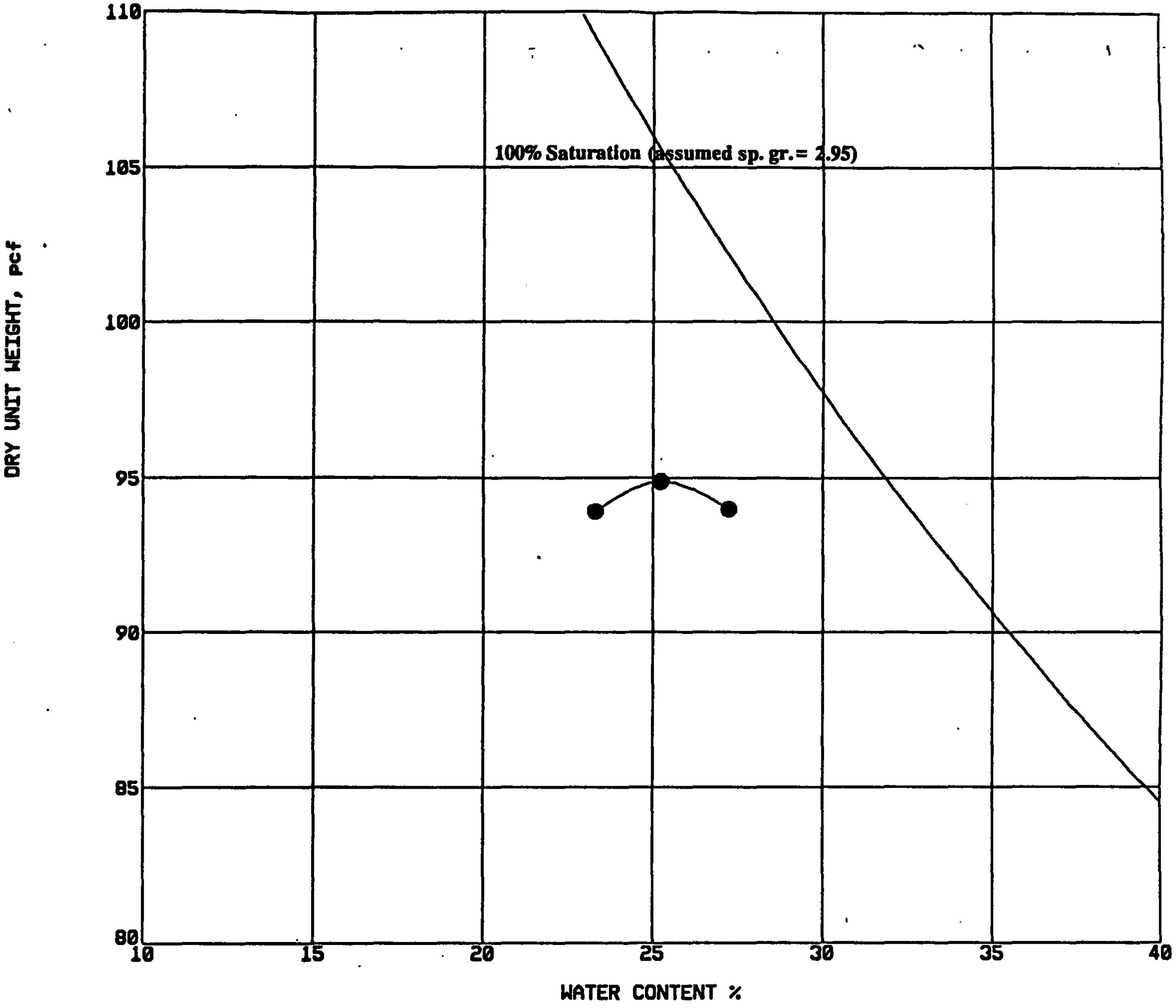
**Onalaska Municipal Landfill Site - Onalaska, WI**

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 698)*

FIGURE 1

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | CL-2 | A | ML SILT, brown | 94.8 | 25.4 |

**BRAUN PROJECT NO: BNDX-93-037A**

November 1993

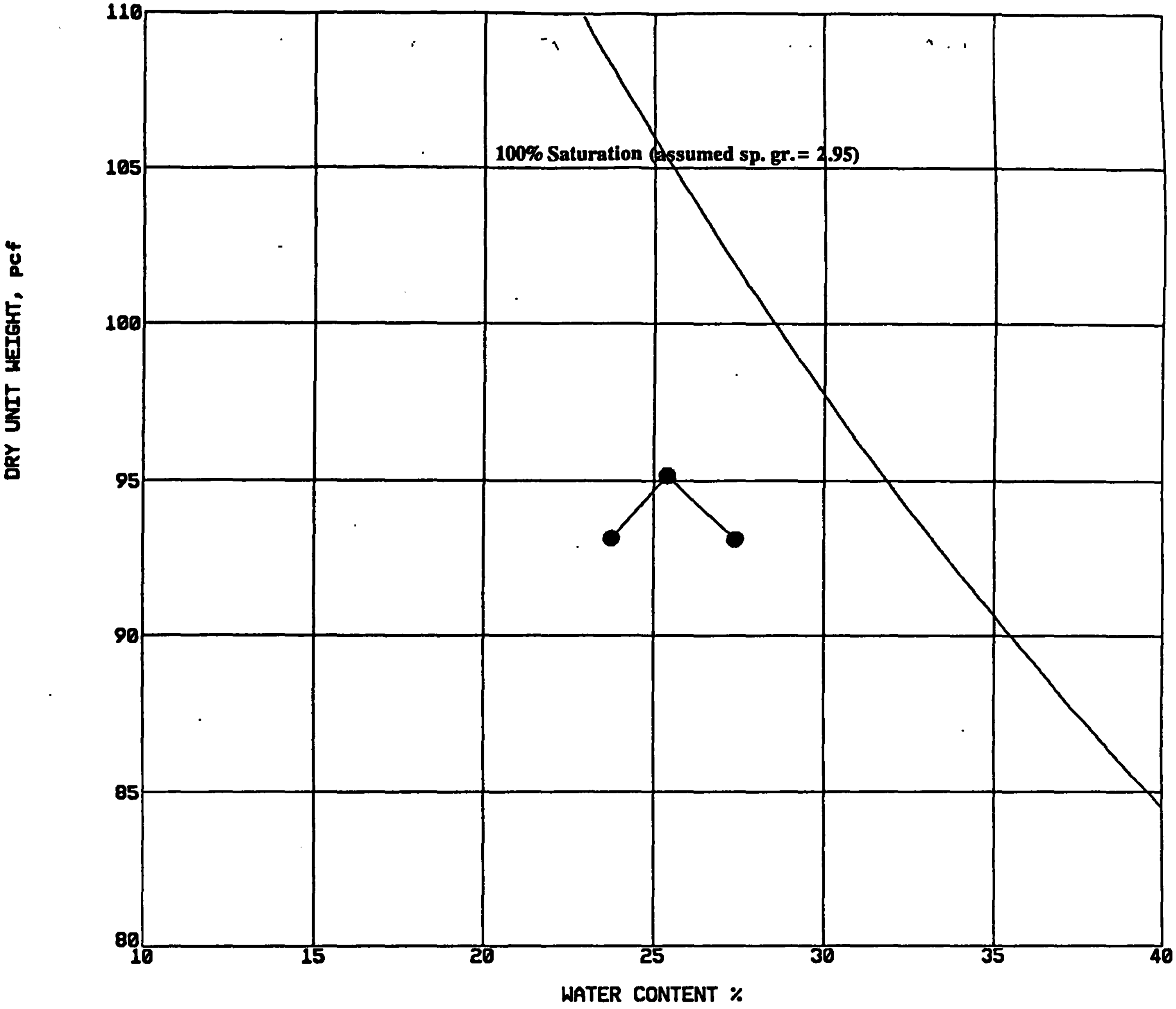
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 698)*

FIGURE 1

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



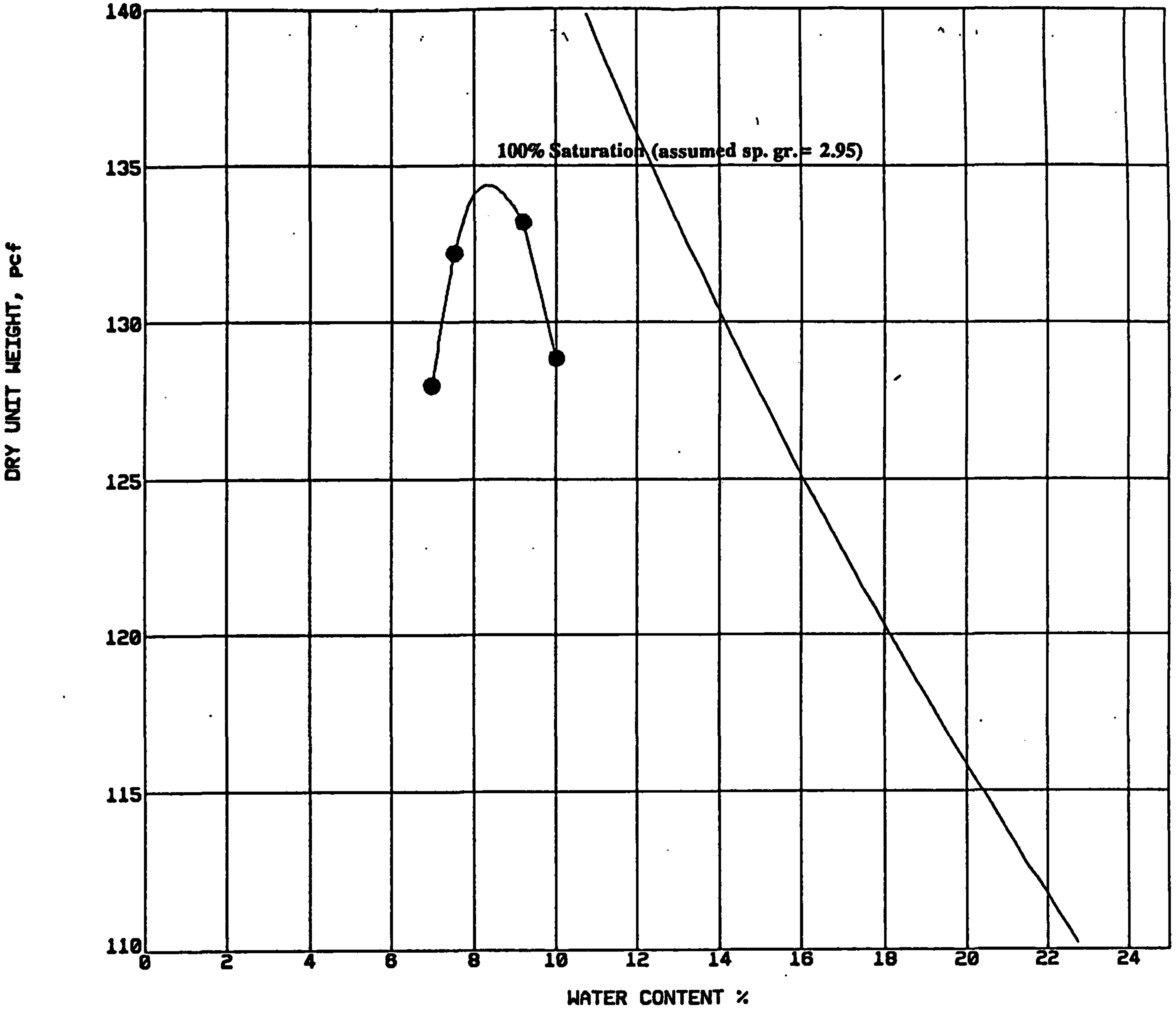
| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | CL-3 | A | ML SILT, brown | 95.1 | 25.7 |

**BRAUN PROJECT NO: BNDX-93-037A** **November 1993**

Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 698)* FIGURE 1

**Braun Intertec La Crosse, WI** **Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | SL-7 | a | SP POORLY GRADED SAND with GRAVEL, red-brown | 133.5 | 8.4 |

**BRAUN PROJECT NO: BNDX-93-037A**

**November 1993**

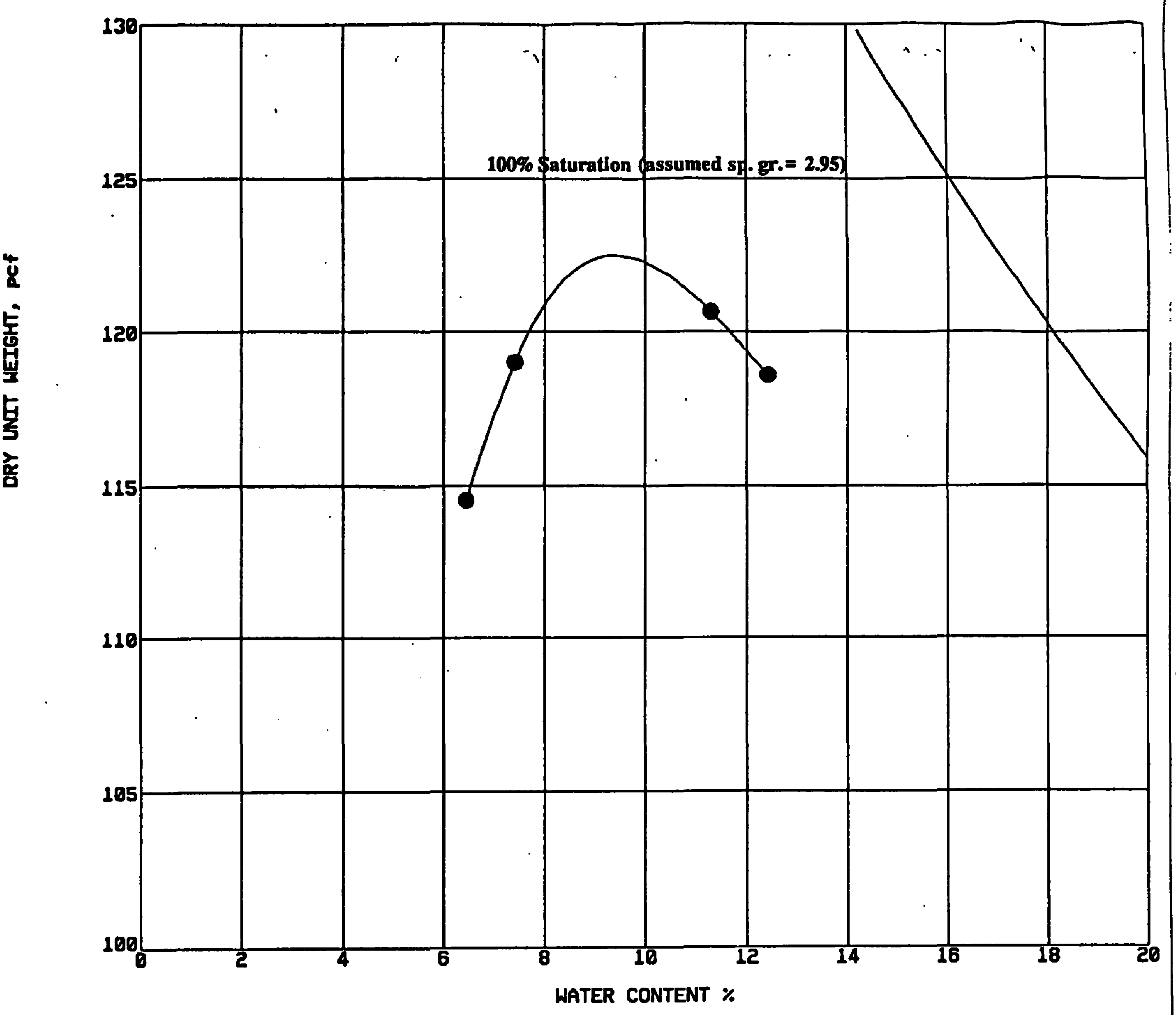
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 1557)*

**FIGURE 1**

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | SL-8 | a | SP POORLY GRADED SAND with GRAVEL, brown | 121.0 | 10.2 |

**BRAUN PROJECT NO: BNDX-93-037A**

**November 1993**

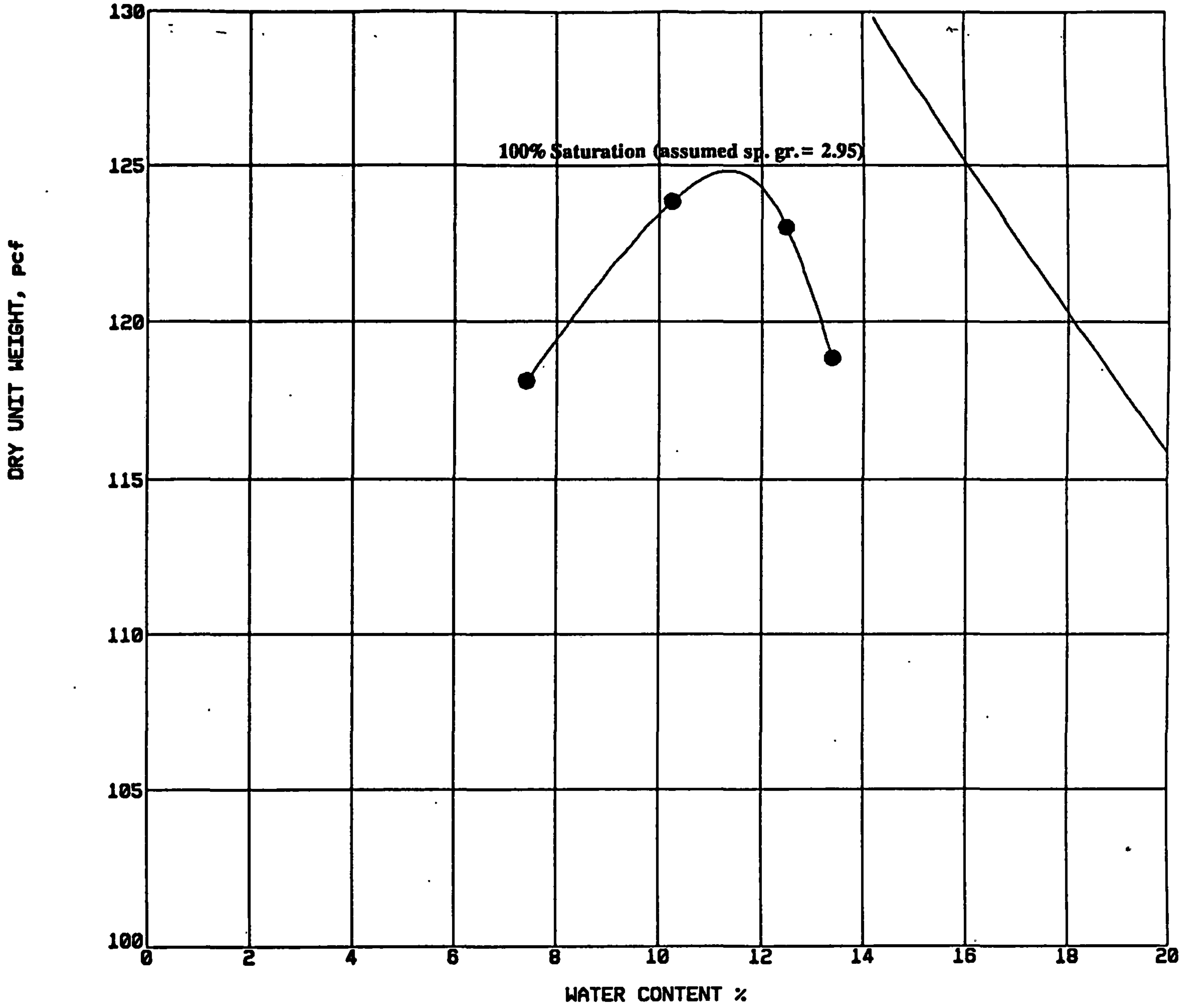
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 1557)*

**FIGURE 1**

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | SL-9 | a | SP POORLY GRADED SAND, m-c grained, red-brown | 124.4 | 11.2 |

**BRAUN PROJECT NO: BNDX-93-037A**

**November 1993**

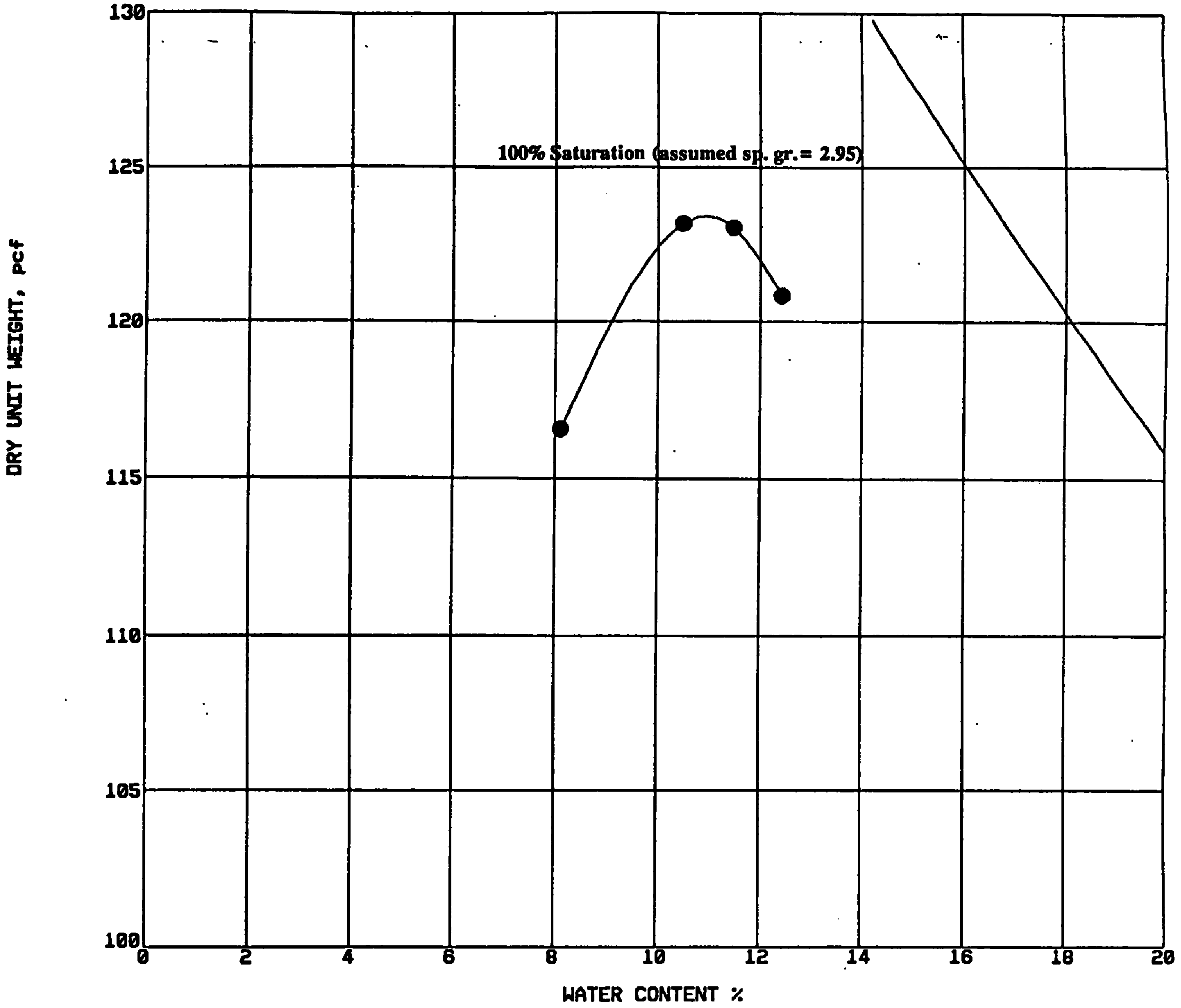
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 1557)*

**FIGURE 1**

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



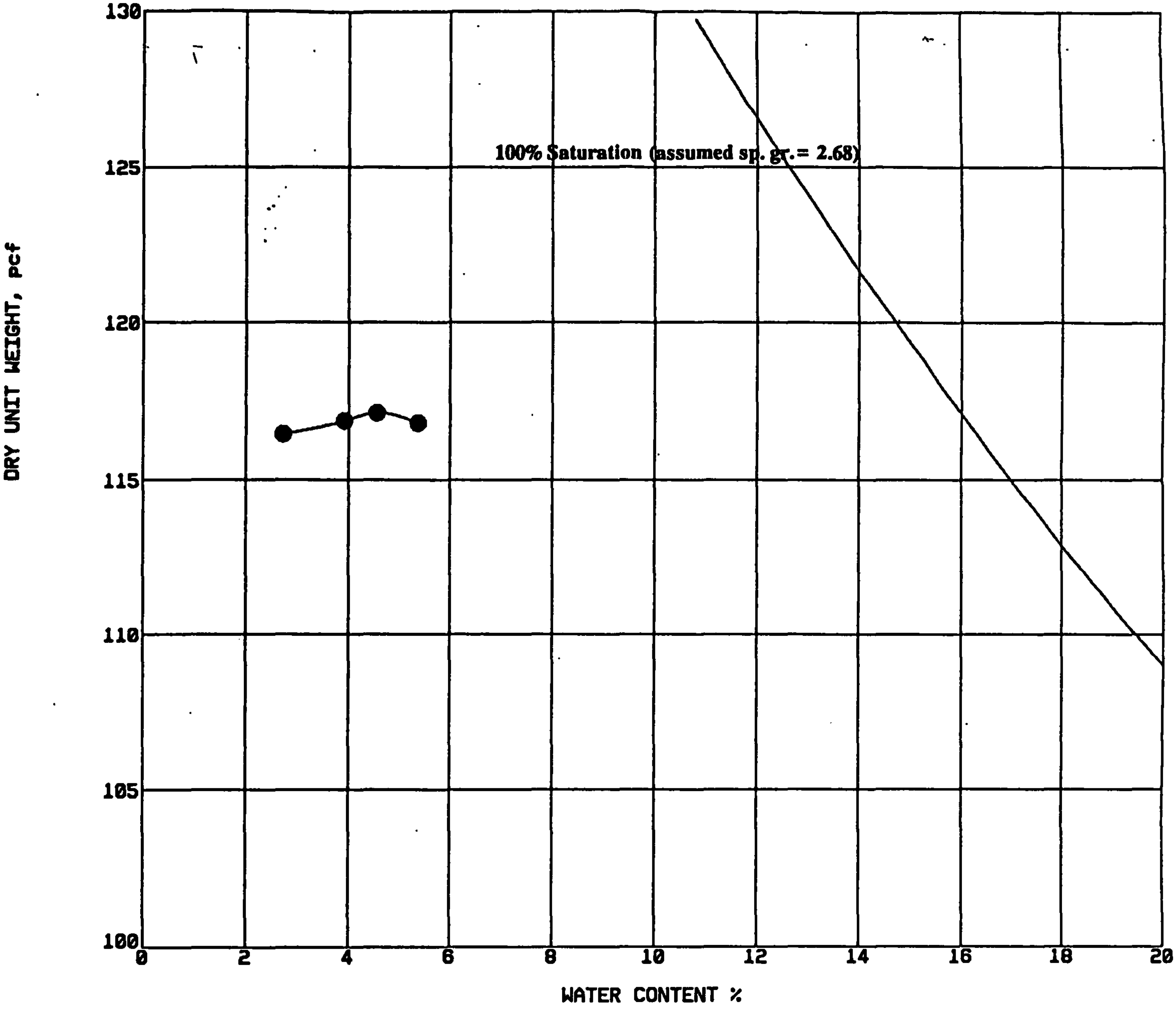
| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | SL-10 | a | SP POORLY GRADED SAND, m-c grained, red-brown | 123.4 | 10.9 |

**BRAUN PROJECT NO: BNDX-93-037A** **November 1993**

Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 1557)* **FIGURE 1**

**Braun Intertec La Crosse, WI** **Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | SL-11 | c | SP POORLY GRADED SAND with GRAVEL, m-c grained | 117.0 | 4.6 |

**BRAUN PROJECT NO: BNDX-93-037A**

**November 1993**

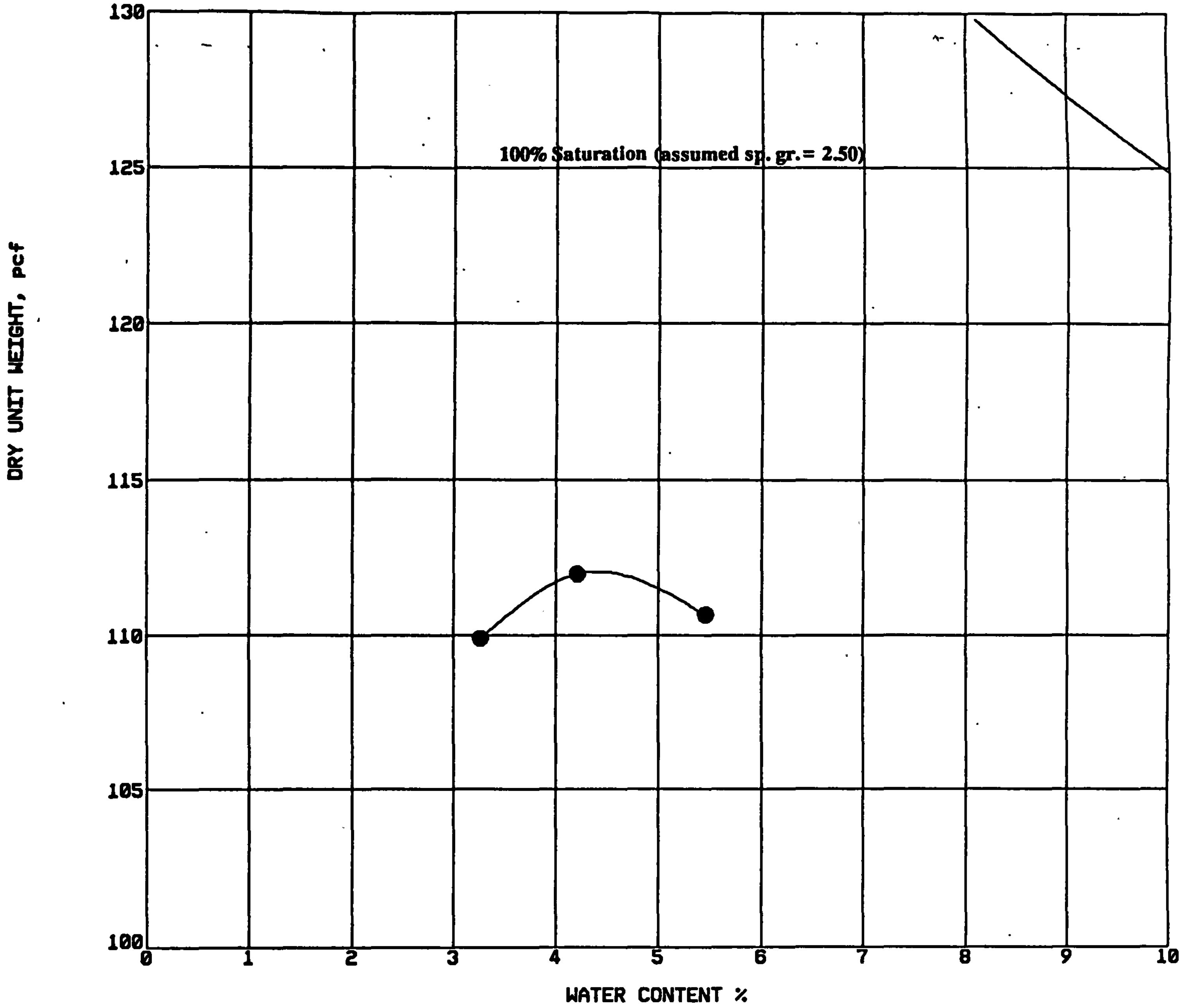
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 1557)*

**FIGURE 1**

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



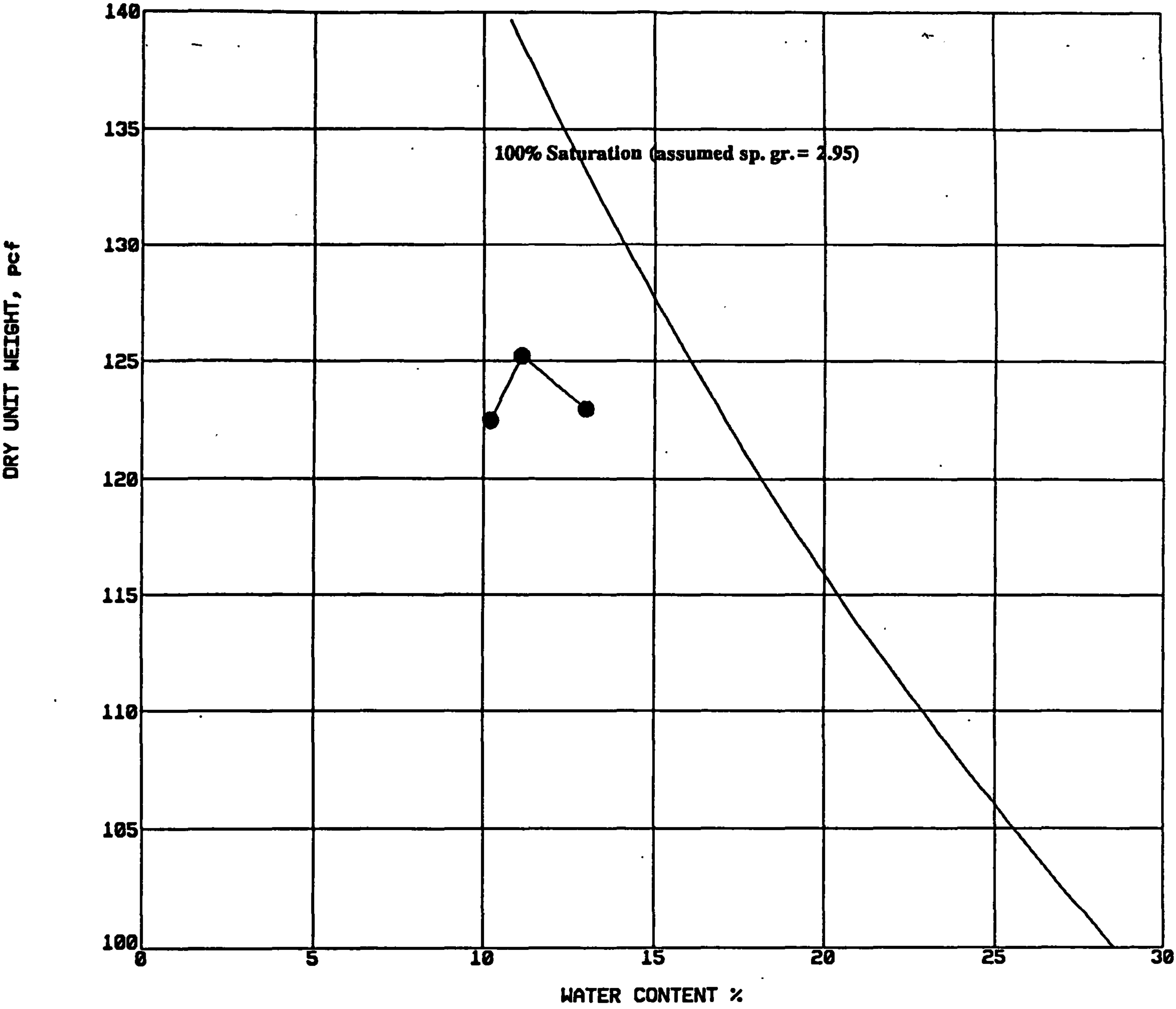
| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | SL-13 | c | SP POORLY GRADED SAND, medium grained | 112.1 | 4.5 |

**BRAUN PROJECT NO: BNDX-93-037A** **November 1993**

Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 1557)* FIGURE 1

**Braun Intertec La Crosse, WI** **Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | SL-15 | A | SP POORLY GRADED SAND, f-m grained, brown | 125.1 | 11.1 |

**BRAUN PROJECT NO: BNDX-93-037A**

**November 1993**

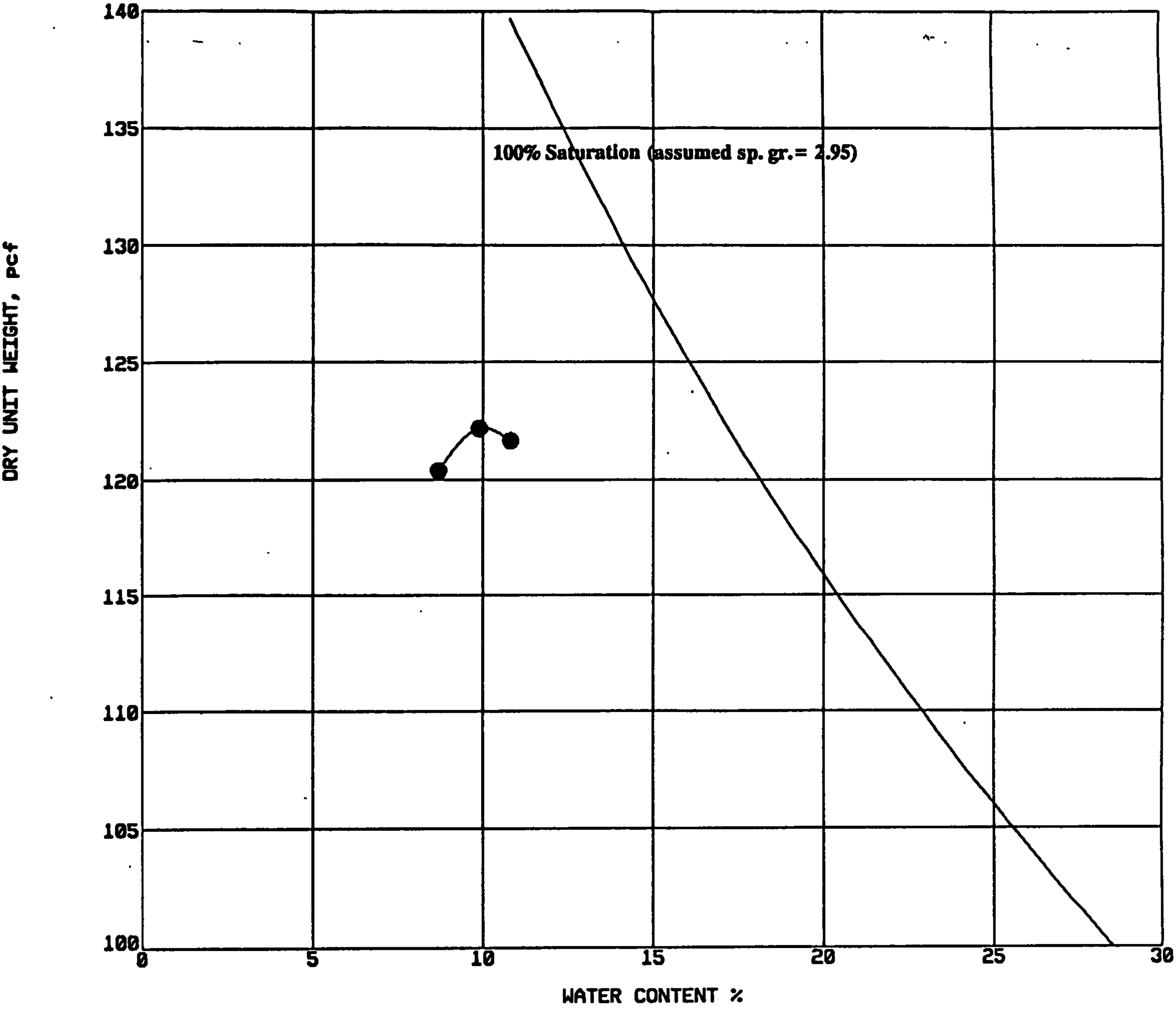
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 698)*

FIGURE 1

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | SL-18 | A | SP POORLY GRADED SAND, f-m grained, brown | 122.2 | 9.8 |

**BRAUN PROJECT NO: BNDX-93-037A**

**November 1993**

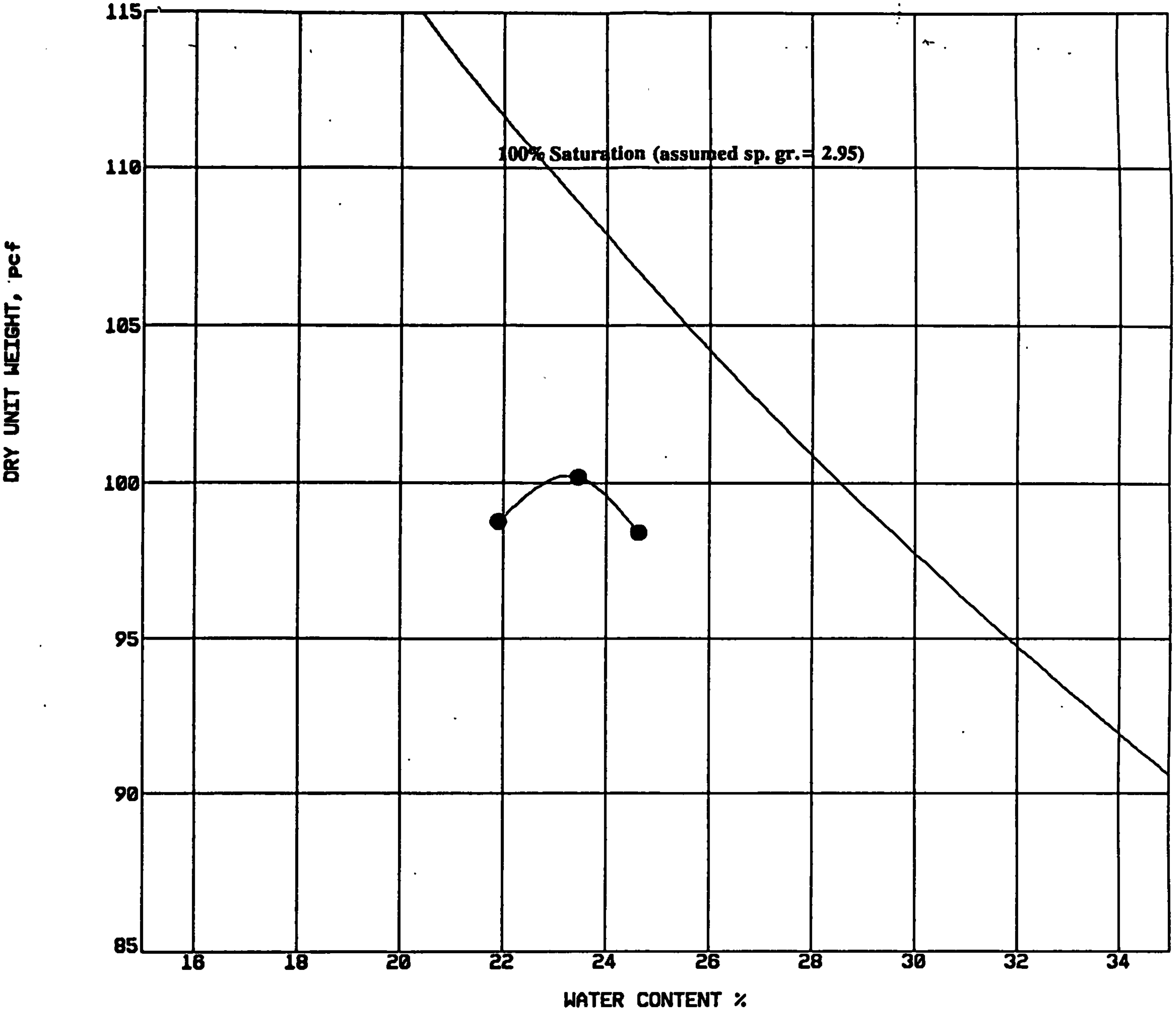
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 698)*

**FIGURE 1**

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | TC-1 | A | CL LEAN CLAY, brown | 100.7 | 23.1 |

**BRAUN PROJECT NO: BNDX-93-037A**

**October 1993**

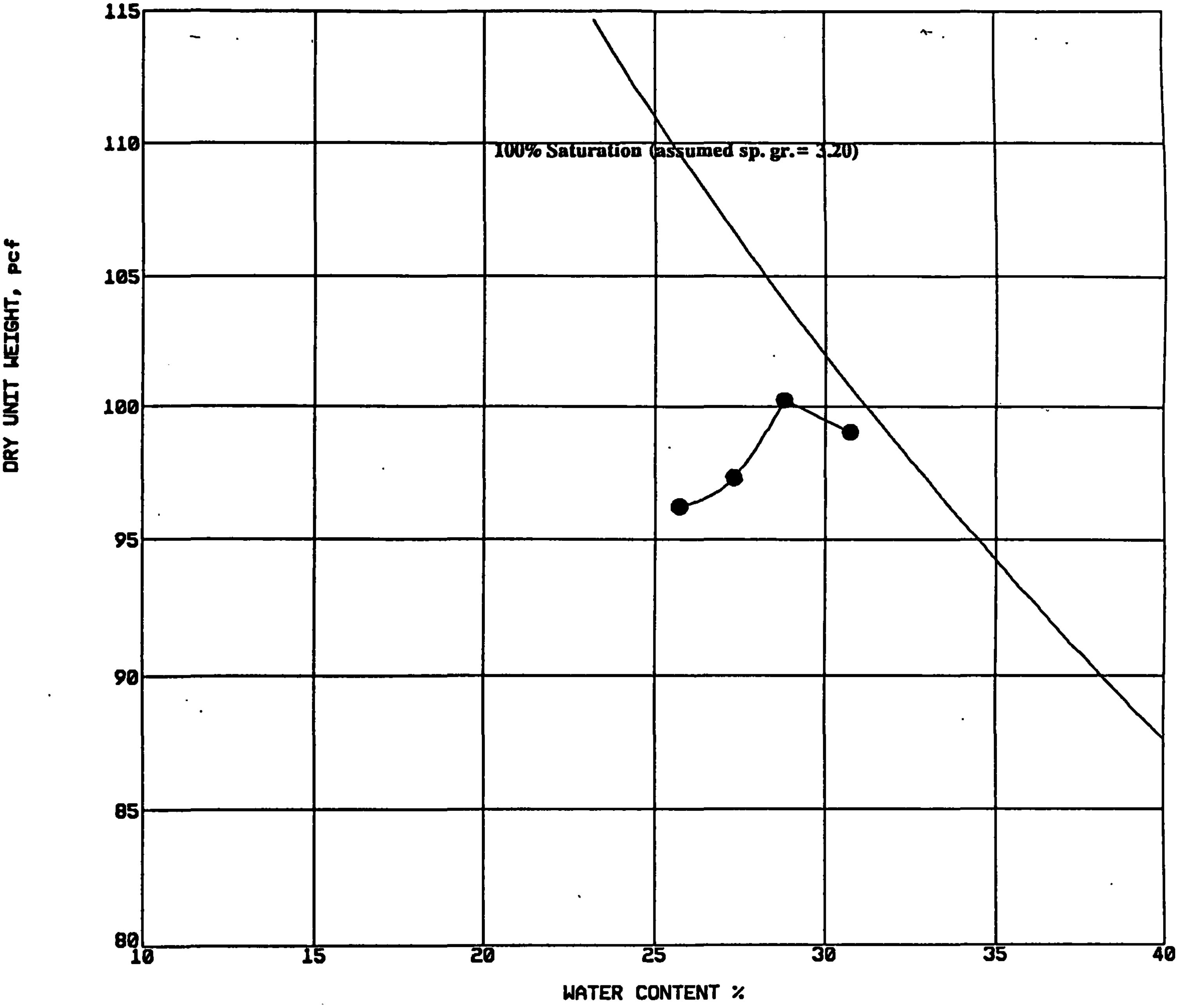
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 1557)*

**FIGURE 1**

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | TC-2 | A | CL LEAN CLAY, brown | 100.0 | 28.8 |

**BRAUN PROJECT NO: BNDX-93-037A**

**November 1993**

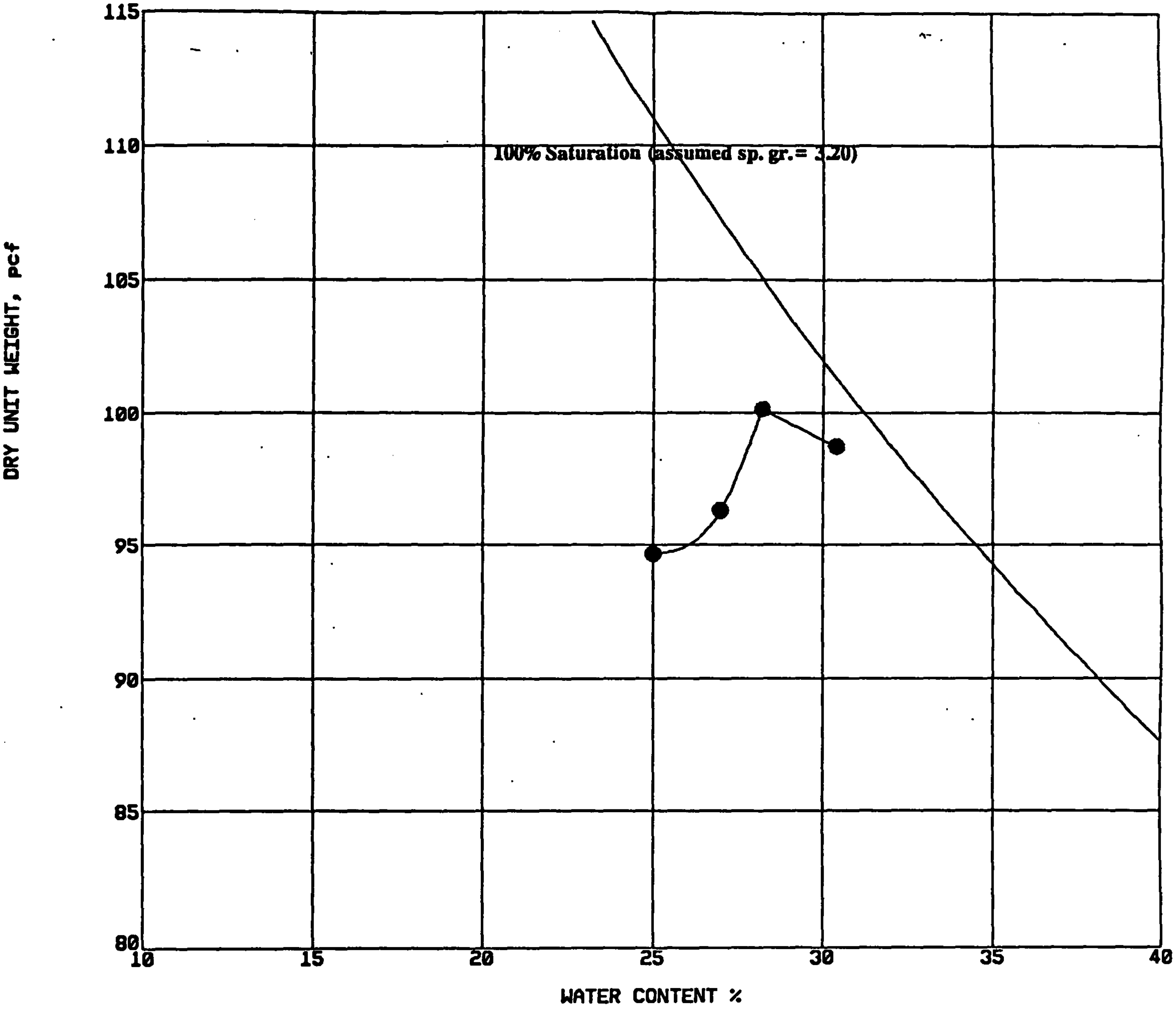
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 698)*

**FIGURE 1**

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



| LEGEND: Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|
| ● TC-3 | A | CL LEAN CLAY, brown | 99.9 | 28.2 |

**BRAUN PROJECT NO: BNDX-93-037A**

**November 1993**

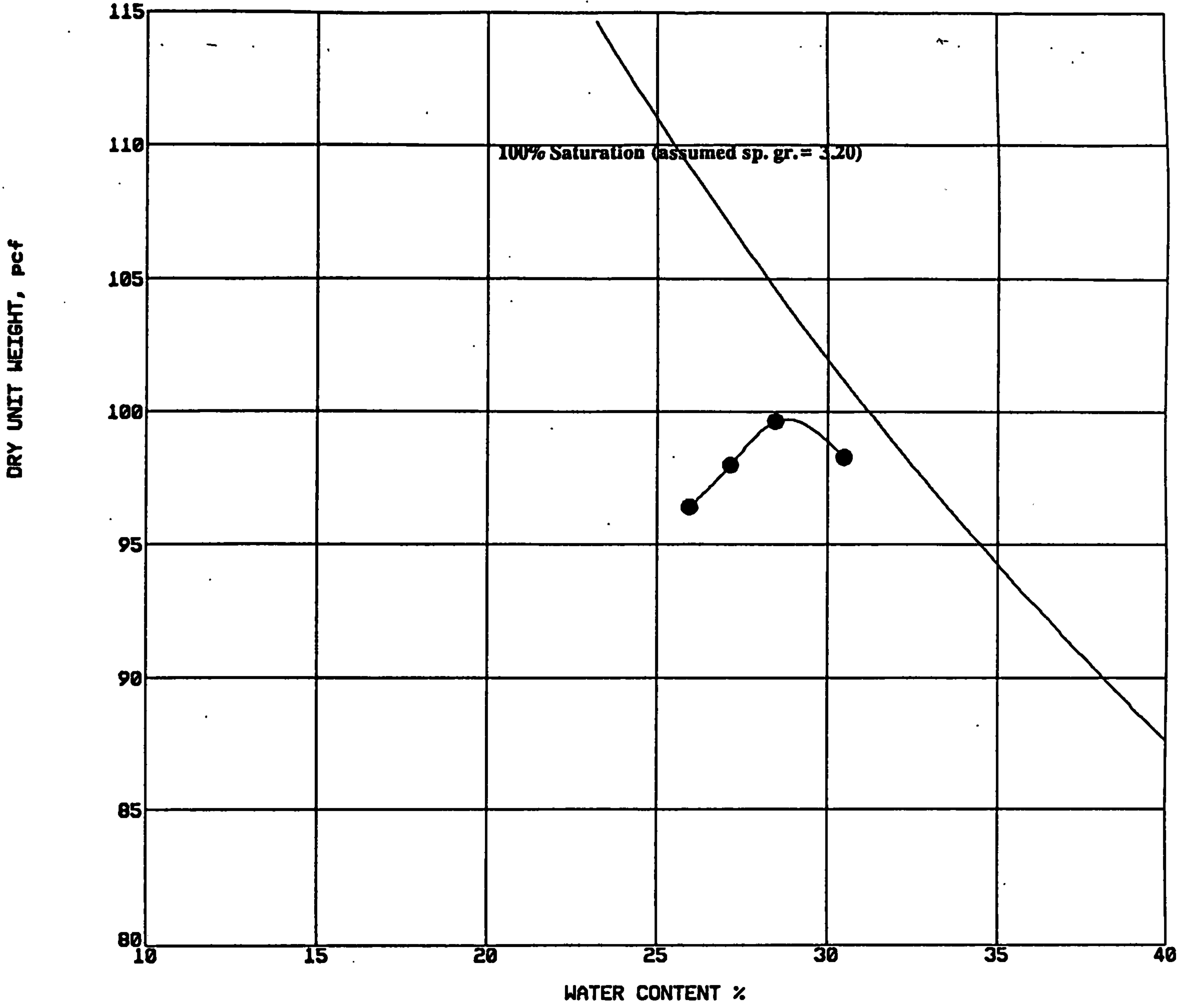
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 698)*

FIGURE 1

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | TC-4 | A | MH ELASTIC SILT, brown | 99.5 | 28.4 |

**BRAUN PROJECT NO: BNDX-93-037A**

**November 1993**

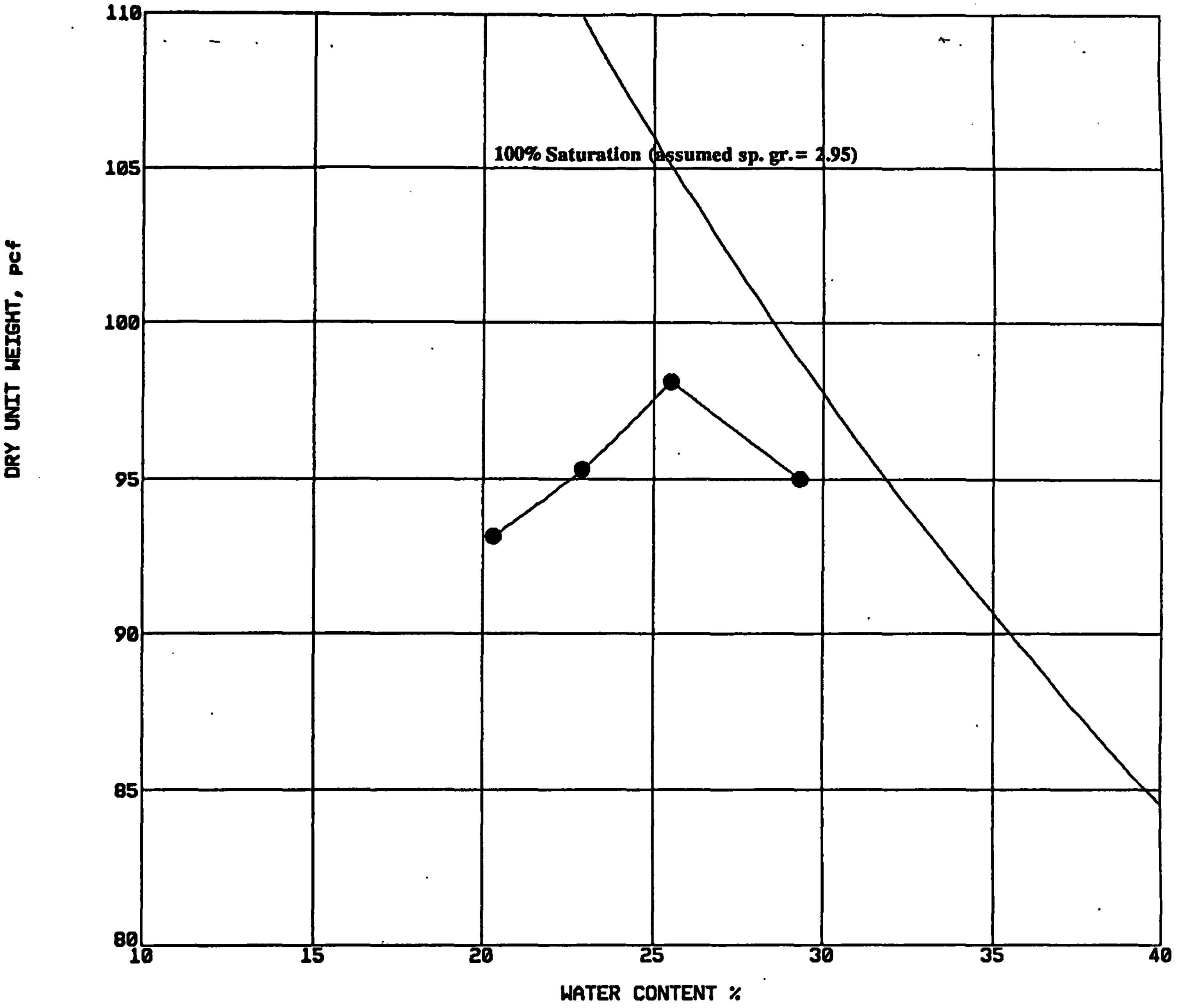
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 698)*

**FIGURE 1**

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | TC-6 | A | CH FAT CLAY, brown | 98.1 | 25.5 |

**BRAUN PROJECT NO: BNDX-93-037A**

**November 1993**

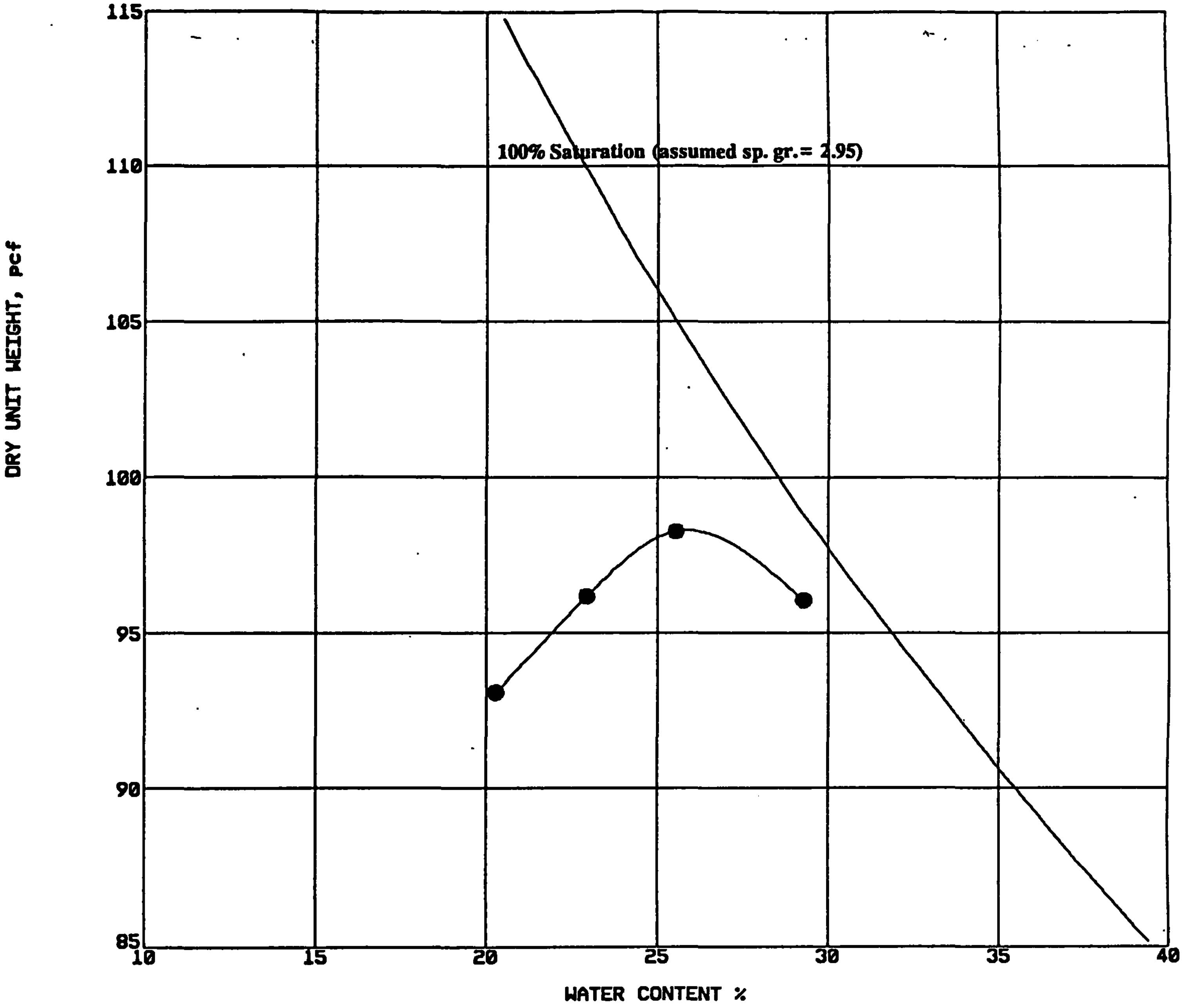
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 698)*

FIGURE 1

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | TC-7 | A | CH FAT CLAY, brown | 98.2 | 25.5 |

**BRAUN PROJECT NO: BNDX-93-037A**

**October 1993**

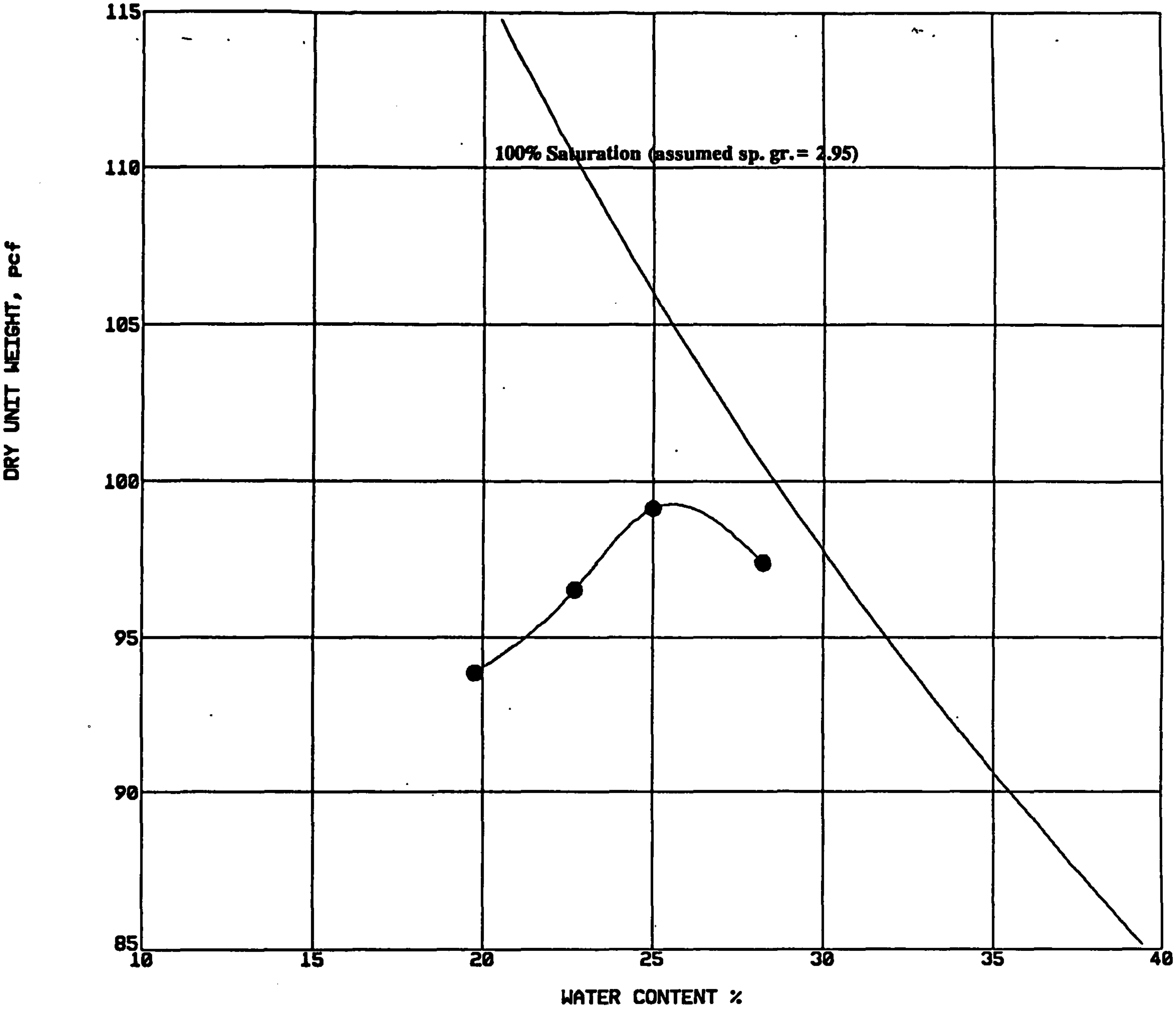
Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 1557)*

**FIGURE 1**

**Braun Intertec La Crosse, WI**

**Geotechnical Testing Services**



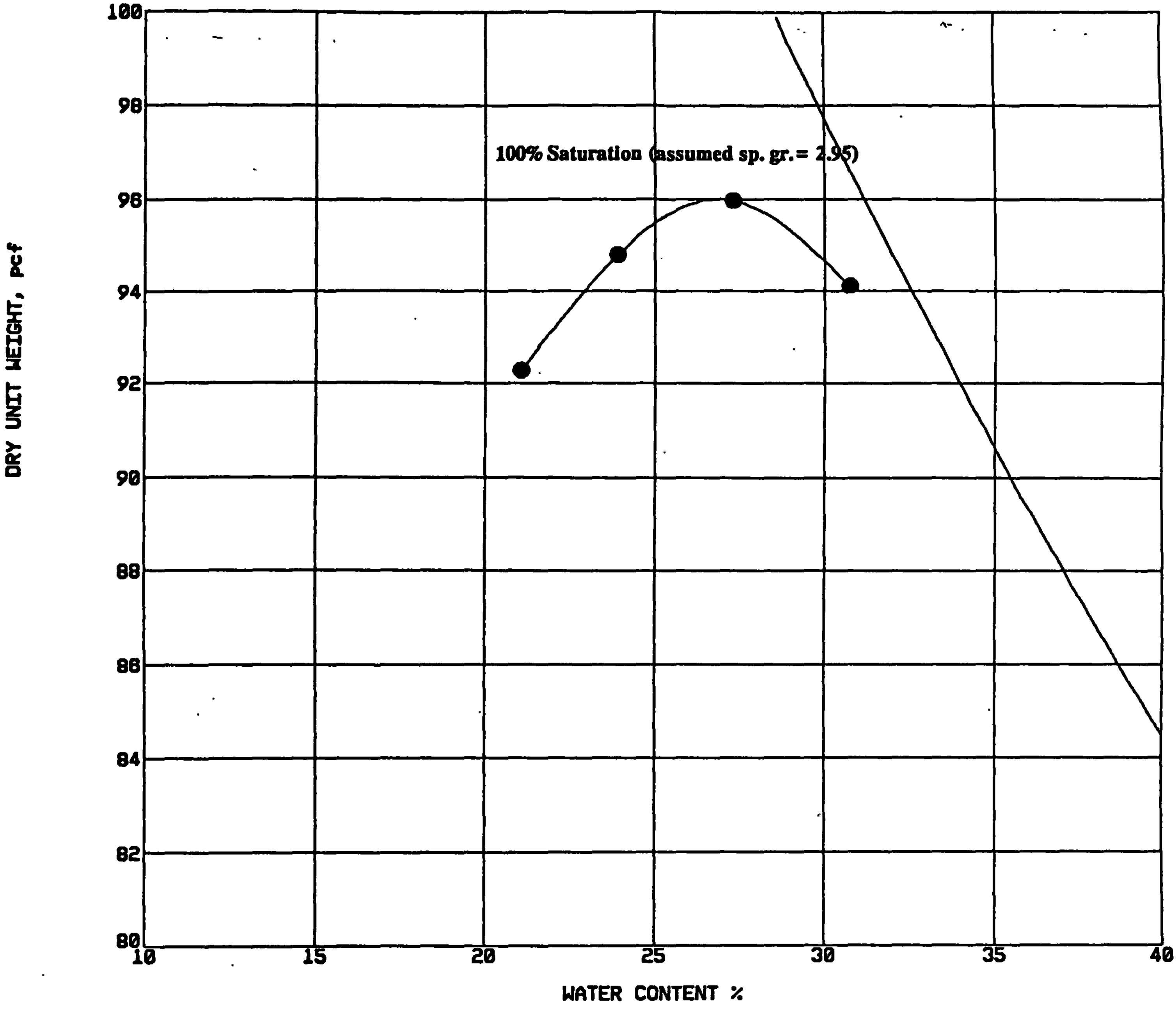
| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | TC-8 | A | CH FAT CLAY, brown | 99.0 | 25.0 |

**BRAUN PROJECT NO: BNDX-93-037A** October 1993

Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 1557)* **FIGURE 1**

**Braun Intertec La Crosse, WI** **Geotechnical Testing Services**



| LEGEND: | Pt. | Method | Classification | Maximum Dry Unit Weight, pcf | Optimum Water Content % |
|---|---|---|---|---|---|
| ● | TC-9 | A | CL LEAN CLAY, brown | 95.9 | 27.3 |

RAUN PROJECT NO: BNDX-93-037A

October 1993

Onalaska Municipal Landfill Site - Onalaska, WI

*LABORATORY COMPACTION CHARACTERISTICS OF SOIL (ASTM D 1557)*

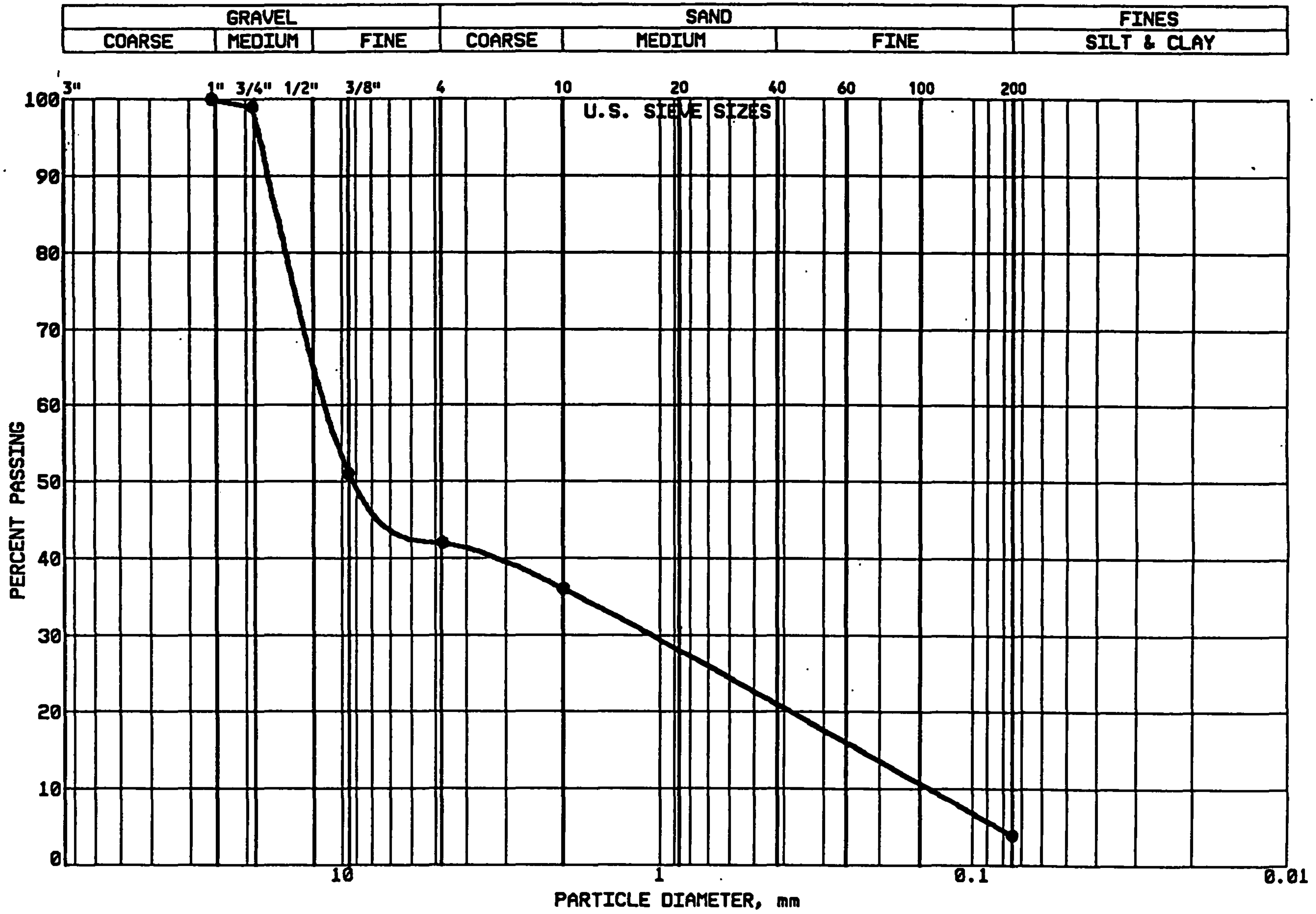
FIGURE 1

Braun Intertec La Crosse, WI

Geotechnical Testing Services

# GRADATIONS

## GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

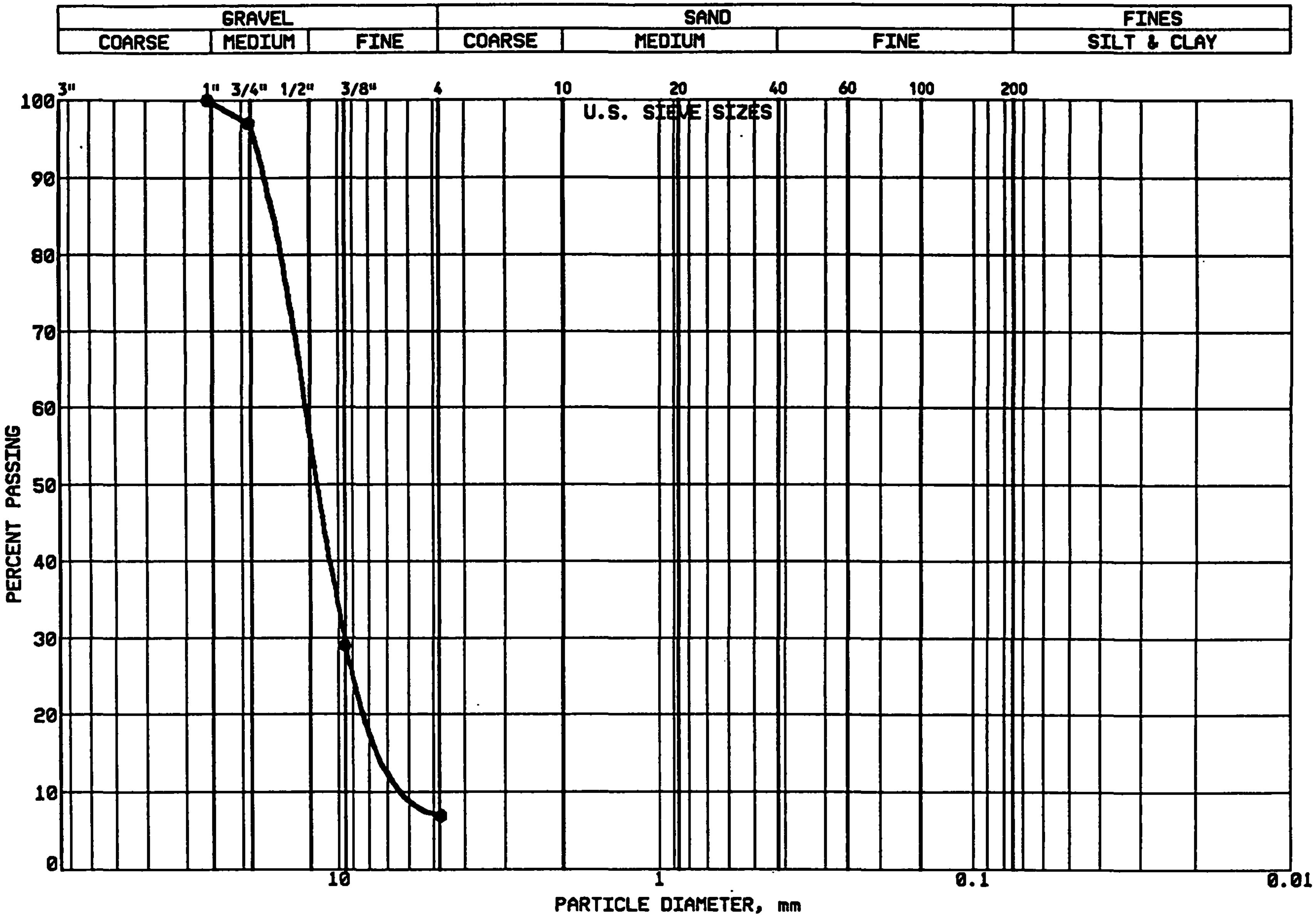
SAMPLE NO.: BC-1

| | |
|---|---|
| GRAVEL | 58.0 % |
| SAND | 38.0 % |
| SILT AND CLAY | 4.0 % |
| Cu | 77.9 |
| Cc | 0.8 |

**CLASSIFICATION:**
GRADE #1 CRUSHED STONE,

D60=10.82 D30=1.08 D10=0.14

## GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

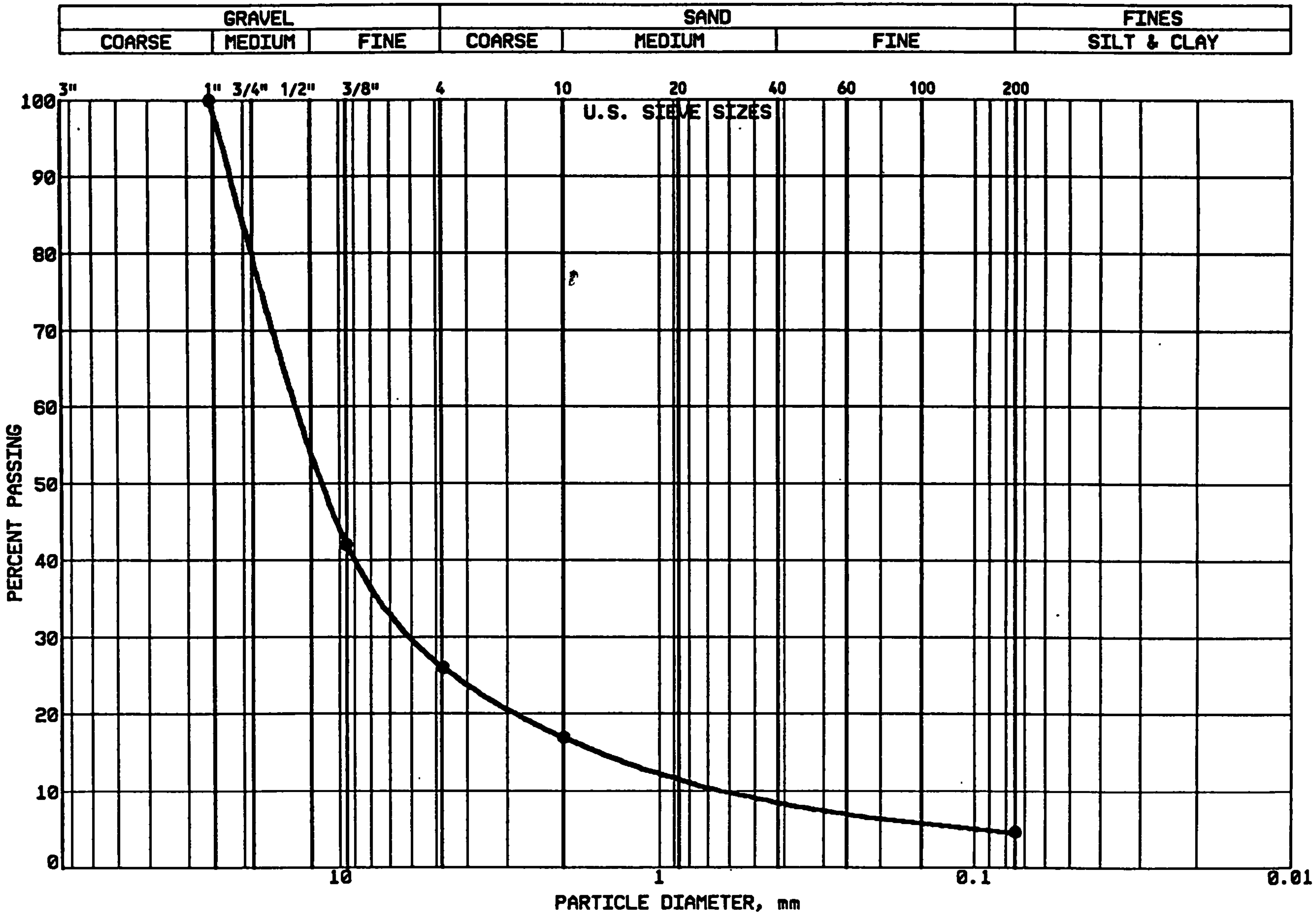
SAMPLE NO.: BC-2

| | |
|---|---|
| GRAVEL | 93.0 % |
| SAND | % |
| SILT AND CLAY | % |
| Cu | |
| Cc | |

**CLASSIFICATION:**
GRADE #1 CRUSHED STONE,

D60=13.03 D30=9.60 D10=5.22

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** **BNDX-93-037A**

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

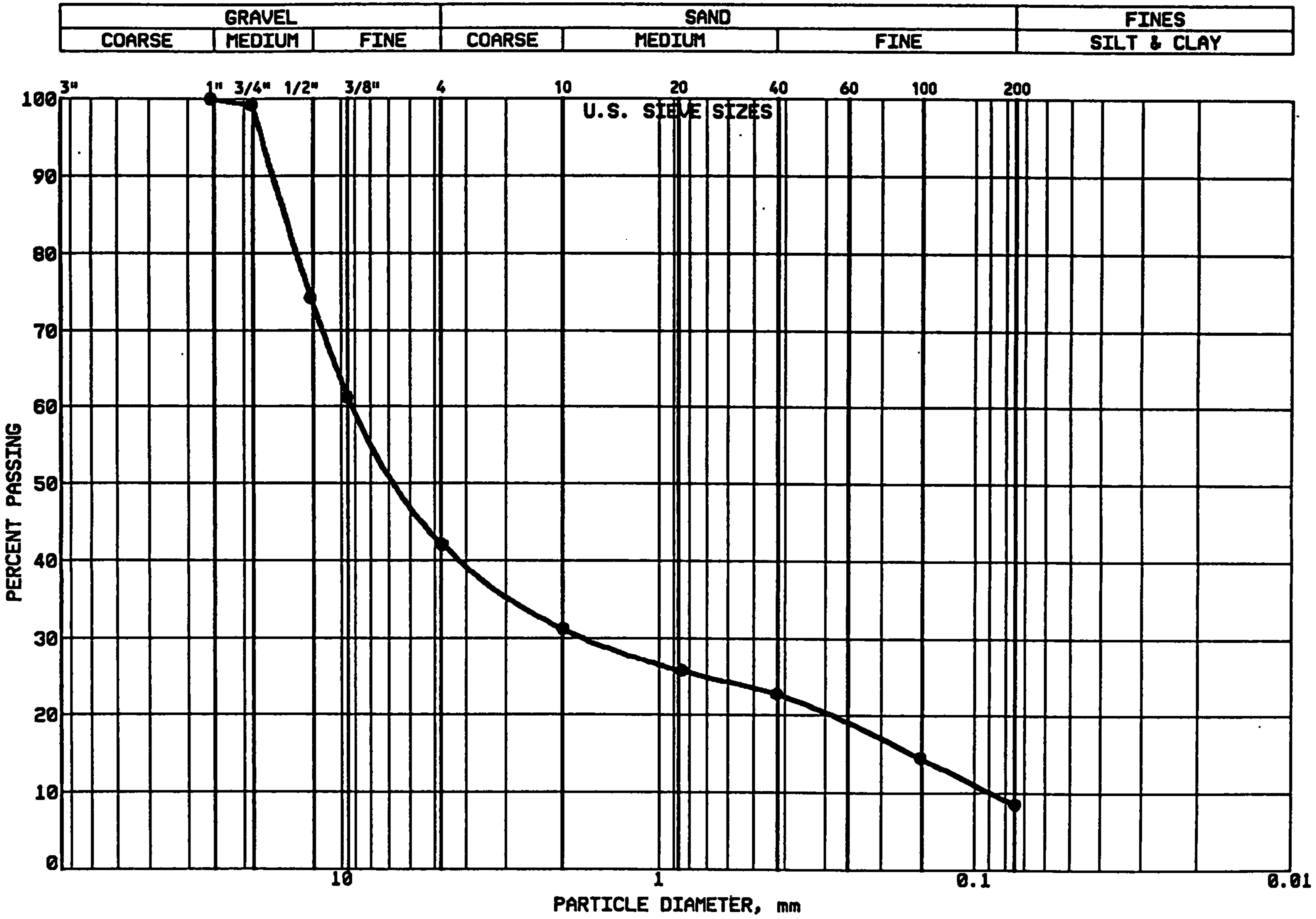
SAMPLE NO.: BC-3

| | |
|---|---|
| GRAVEL | 74.0 % |
| SAND | 21.3 % |
| SILT AND CLAY | 4.7 % |
| Cu | 41.8 |
| Cc | 8.0 |

**CLASSIFICATION:**
GRADE #1 CRUSHED STONE,

D60=12.89 D30=5.65 D10=0.31

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** **BNDX-93-037A**
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE NO.: BC-4

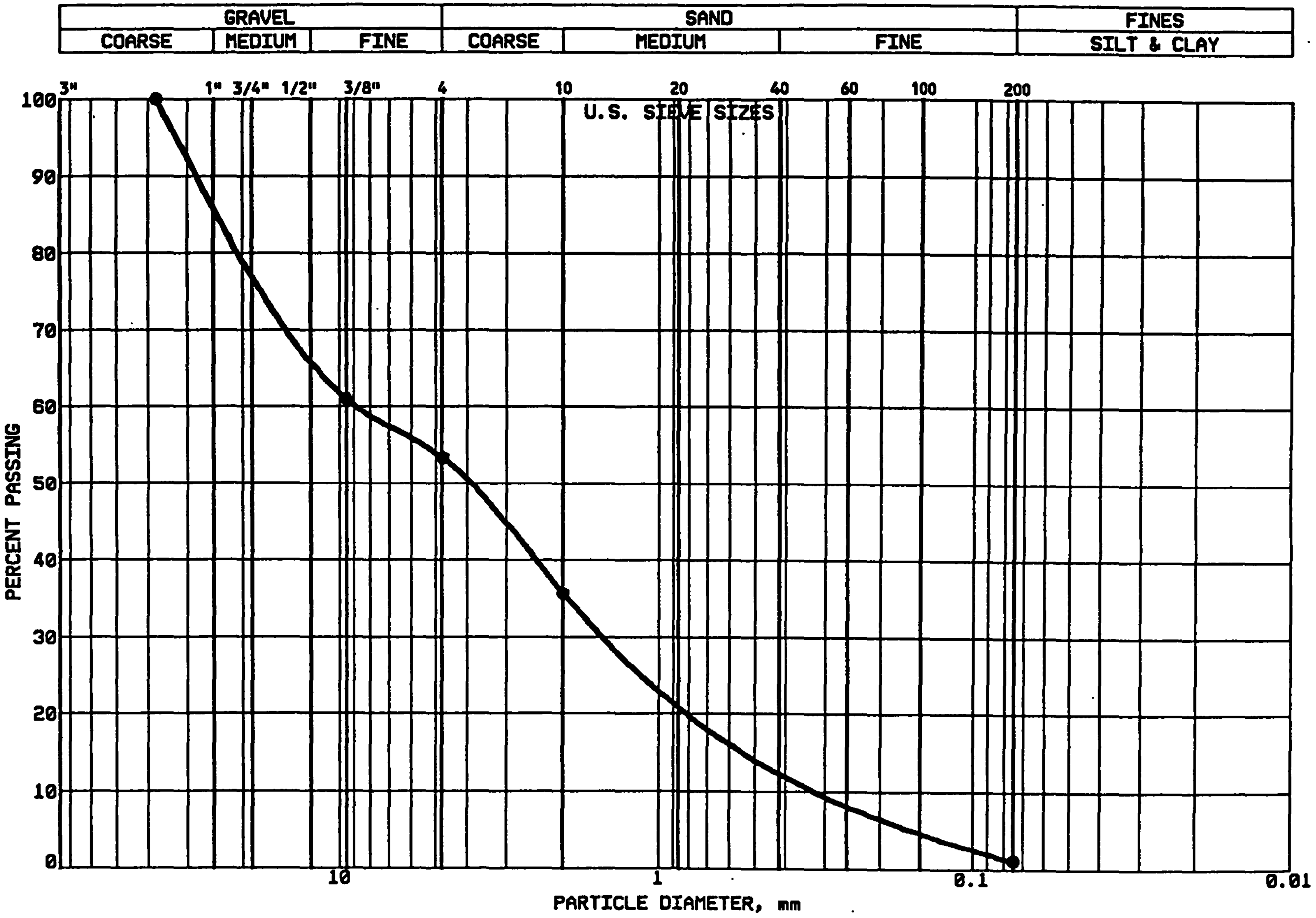
| | |
|---|---|
| GRAVEL | 58.0 % |
| SAND | 33.4 % |
| SILT AND CLAY | 8.6 % |
| Cu | 103.2 |
| Cc | 3.4 |

**CLASSIFICATION:**

,

D60=9.10 D30=1.65 D10=0.09

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

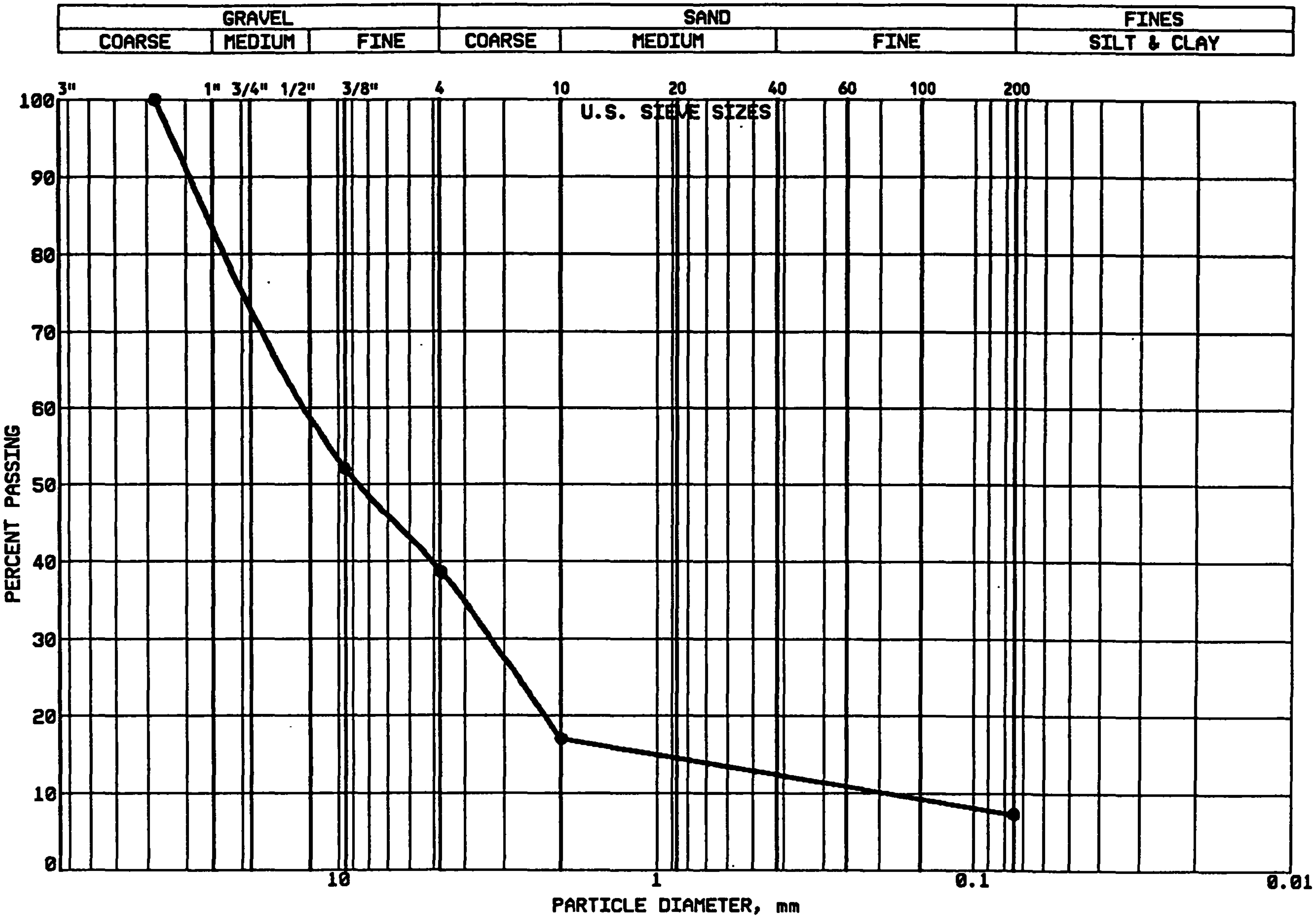
SAMPLE NO.: BC-5

| | |
|---|---|
| GRAVEL | 46.7 % |
| SAND | 52.1 % |
| SILT AND CLAY | 1.2 % |
| Cu | 50.0 |
| Cc | 0.9 |

**CLASSIFICATION:**
GRADE I CRUSHED STONE,

D60=8.68 D30=1.17 D10=0.17

# GRAIN SIZE ACCUMULATION CURVE



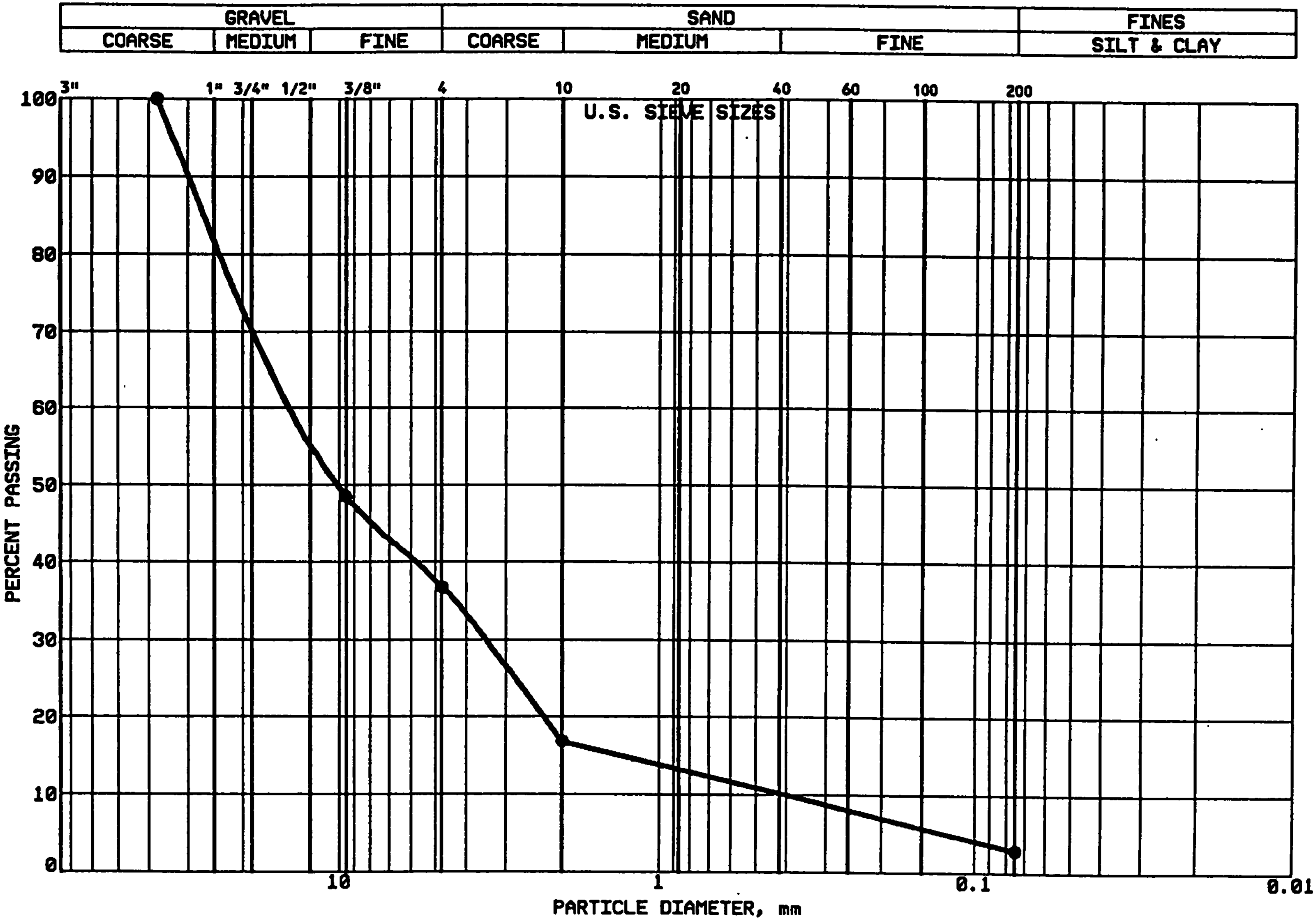
**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI
SAMPLE NO.: BC-6

| | |
|---|---|
| GRAVEL | 61.4 % |
| SAND | 31.2 % |
| SILT AND CLAY | 7.4 % |
| Cu | 66.0 |
| Cc | 5.2 |

**CLASSIFICATION:**
GRADE I CRUSHED STONE,

D60=11.94 D30=3.36 D10=0.18

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** **BNDX-93-037A**
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

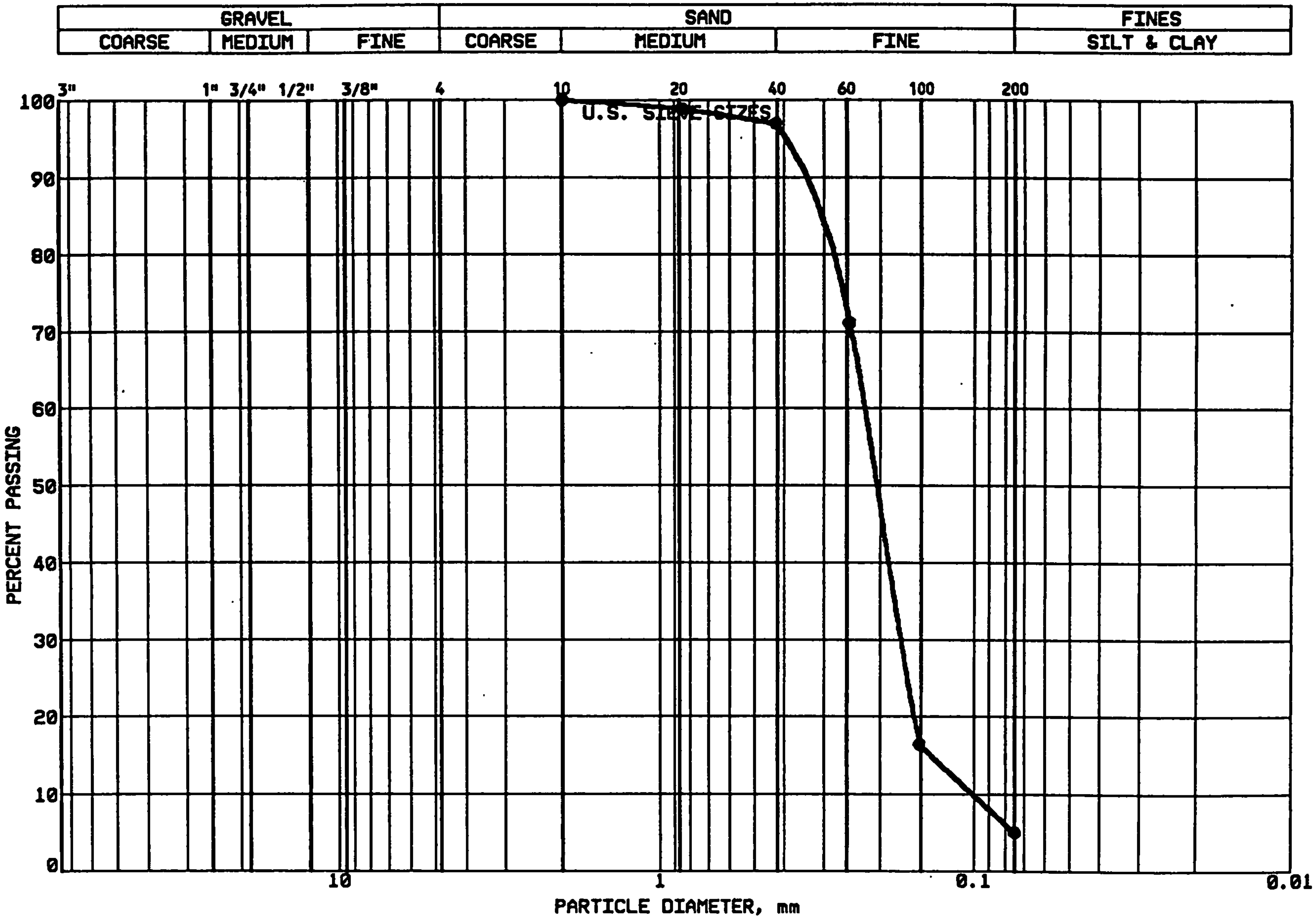
SAMPLE NO.: BC-7

| | |
|---|---|
| GRAVEL | 63.3 % |
| SAND | 33.7 % |
| SILT AND CLAY | 3.0 % |
| Cu | 32.9 |
| Cc | 2.5 |

**CLASSIFICATION:**
GRADE I CRUSHED STONE,

D60=12.91 D30=3.55 D10=0.39

## GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

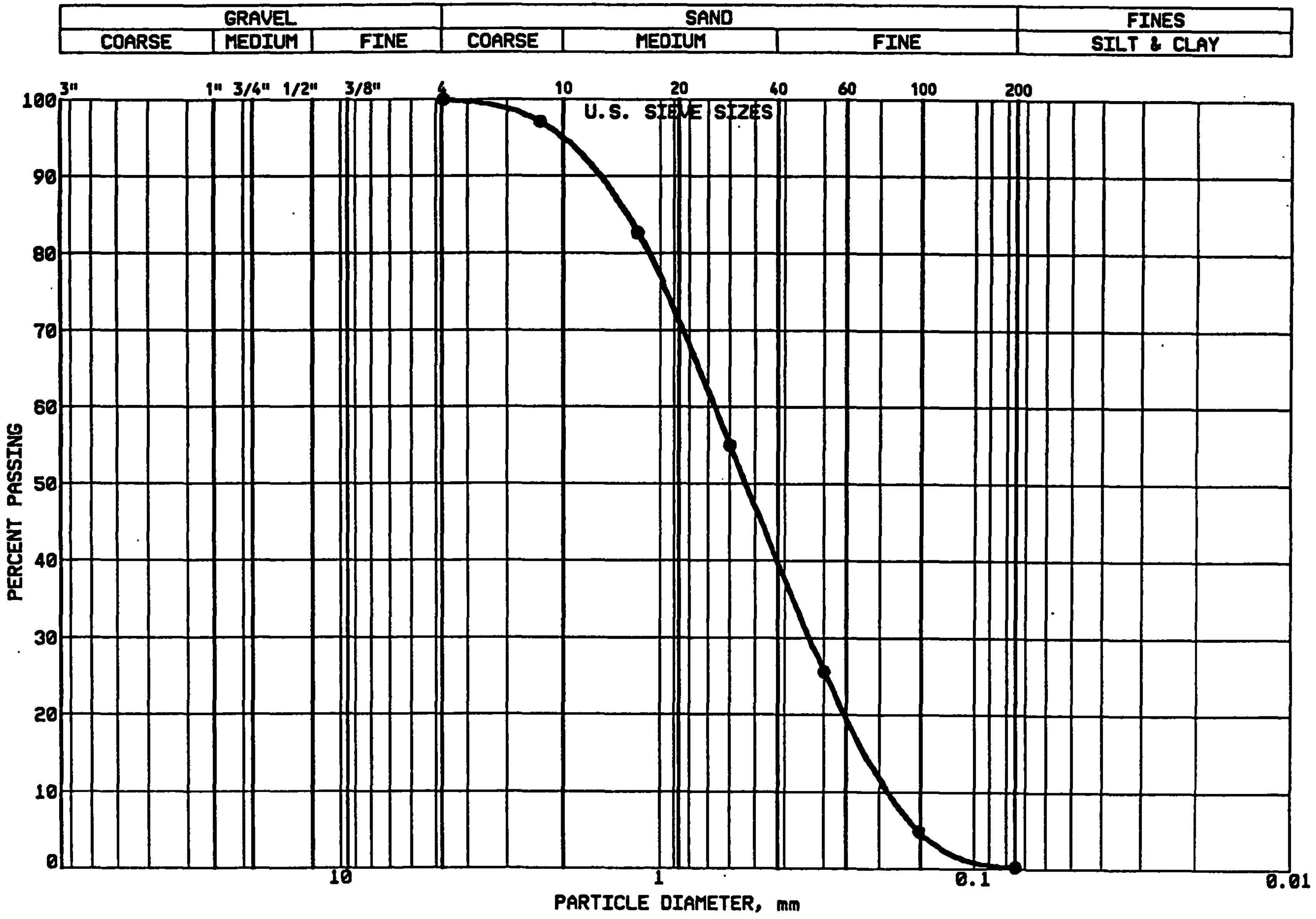
SAMPLE NO.: G-1

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 94.9 % |
| SILT AND CLAY | 5.1 % |
| Cu | 2.2 |
| Cc | 1.3 |

**CLASSIFICATION:**
SP-SM POORLY GRADED SAND
with SILT, fine grained,

D60=0.23 D30=0.17 D10=0.10

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** **BNDX-93-037A**

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE NO.: G-2

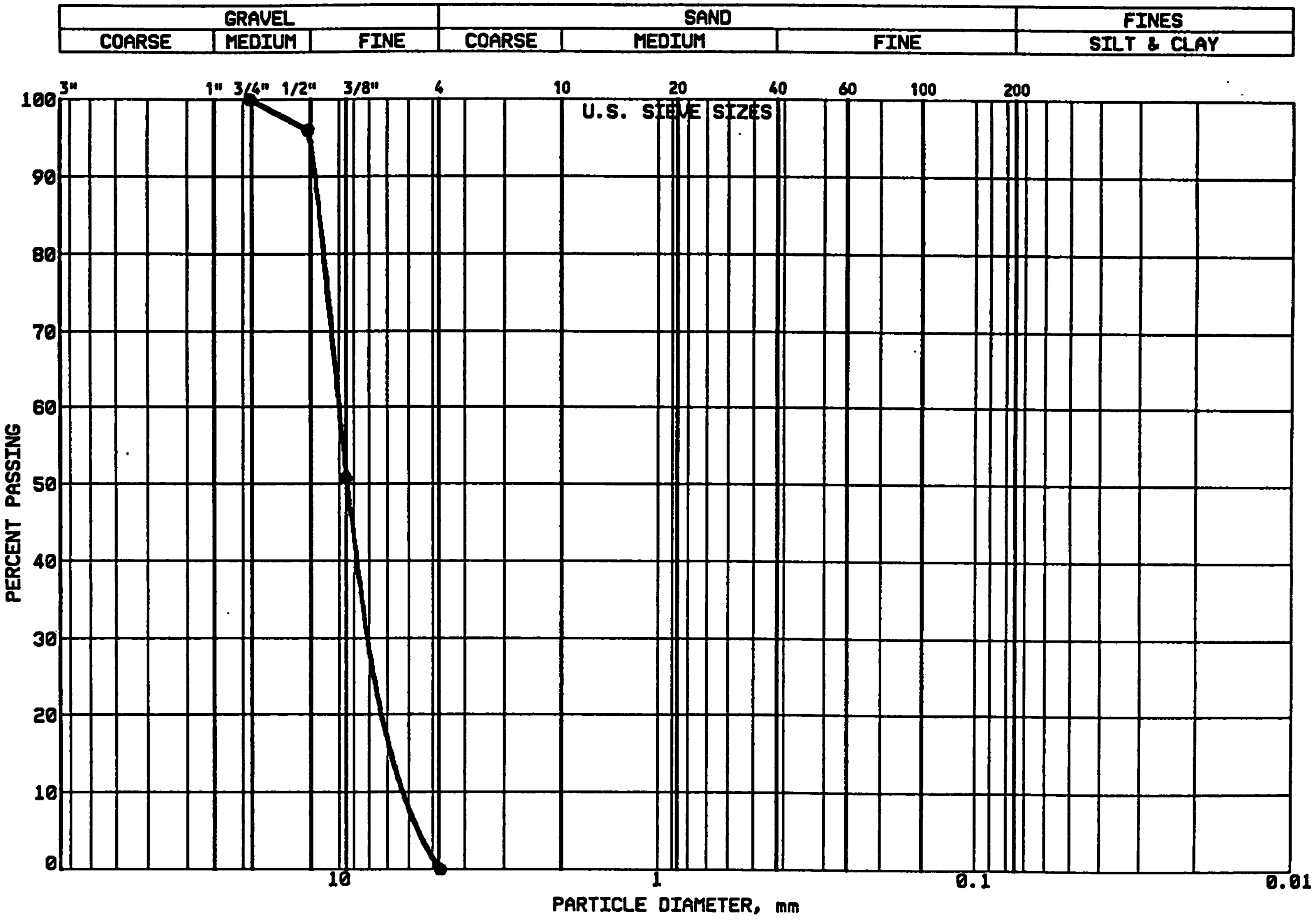
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 99.7 % |
| SILT AND CLAY | 0.3 % |
| Cu | 3.8 |
| Cc | 0.9 |

**CLASSIFICATION:**

SP POORLY GRADED SAND,
fine to medium
grained,brown

D60=0.68 D30=0.33 D10=0.18

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

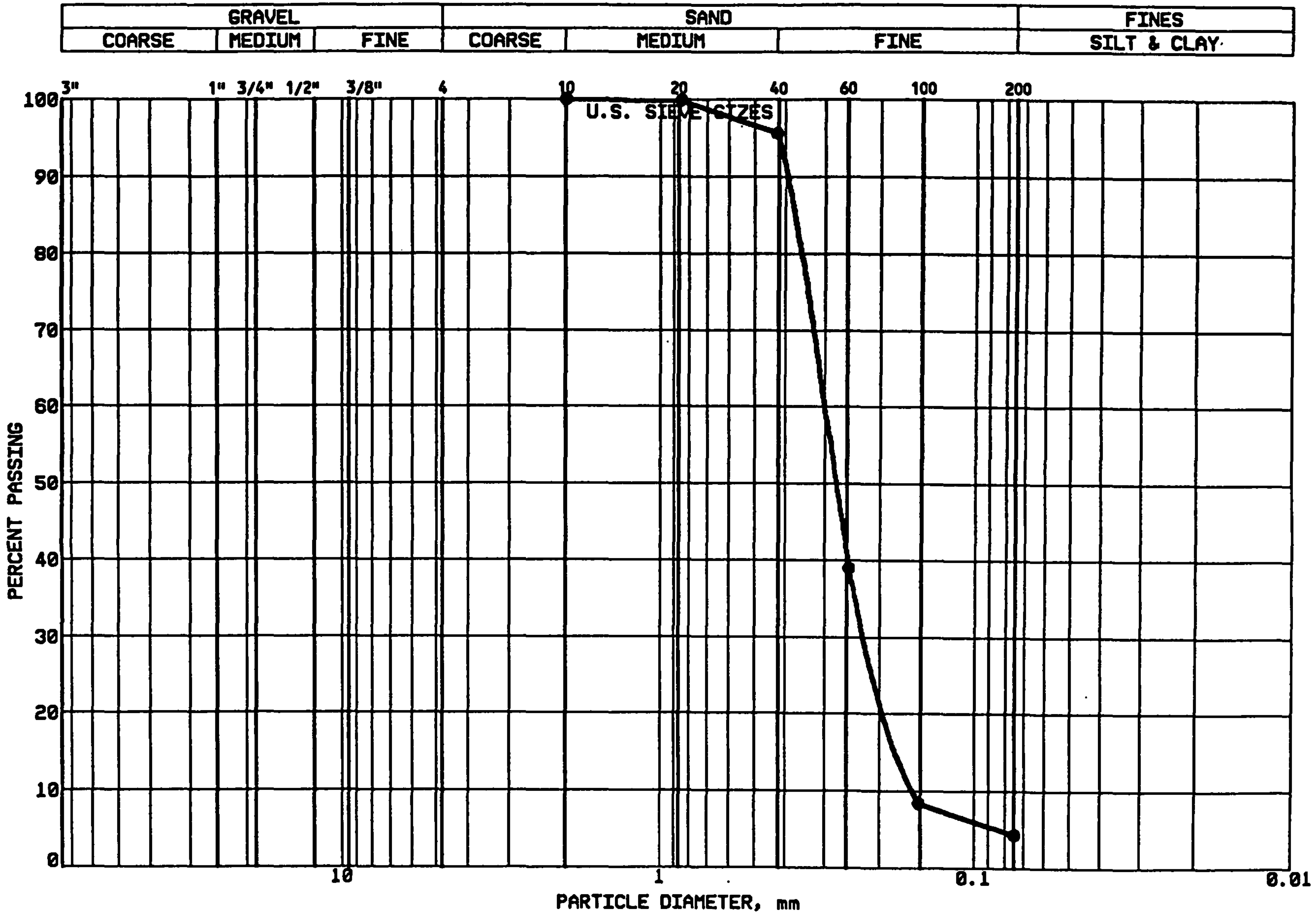
SAMPLE NO.: G-3

| | |
|---|---|
| GRAVEL | 100.0 % |
| SAND | % |
| SILT AND CLAY | % |
| Cu | |
| Cc | |

**CLASSIFICATION:**
1/2" - 1/4" #7 STONE,

D60=10.05 D30=7.16 D10=5.45

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** **BNDX-93-037A**

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

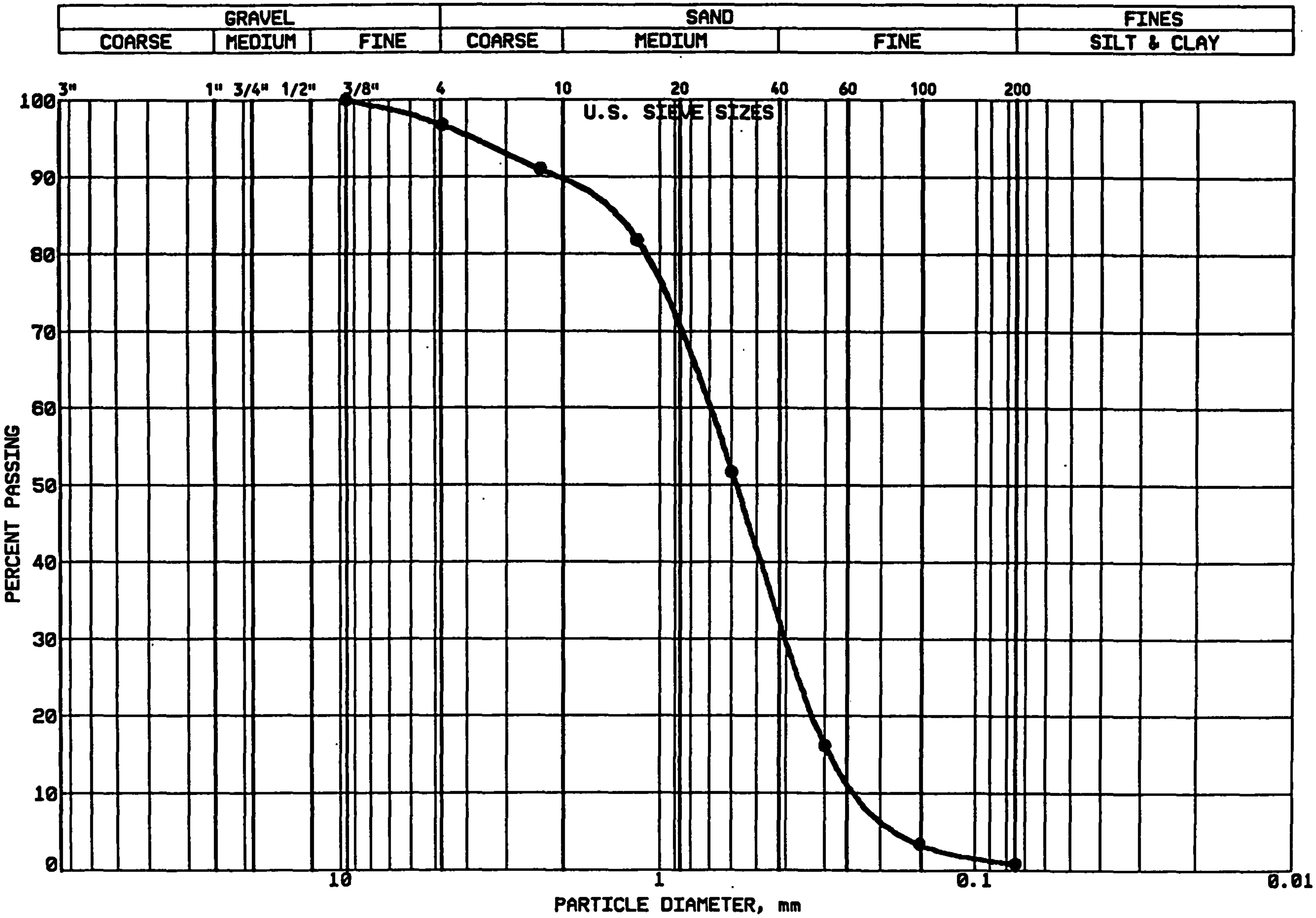
SAMPLE NO.: G-4

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 95.6 % |
| SILT AND CLAY | 4.4 % |
| Cu | 2.0 |
| Cc | 1.0 |

**CLASSIFICATION:**
SP POORLY GRADED SAND,
fine grained, brown

D60=0.30 D30=0.22 D10=0.15

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** **BNDX-93-037A**
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

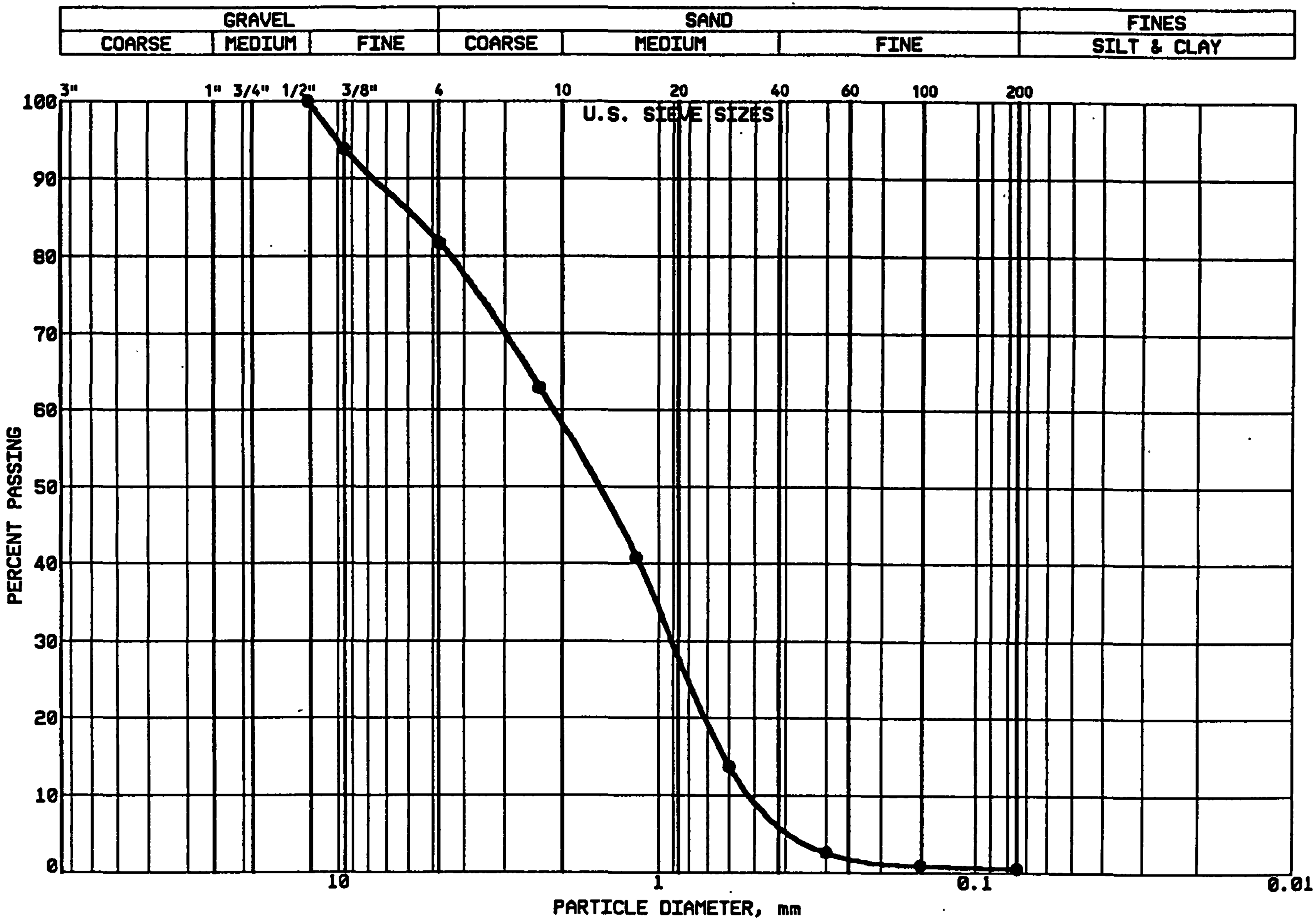
SAMPLE NO.: SL-1

| | |
|---|---|
| GRAVEL | 3.2 % |
| SAND | 95.9 % |
| SILT AND CLAY | 0.9 % |
| Cu | 3.4 |
| Cc | 1.0 |

**CLASSIFICATION:**
SP POORLY GRADED SAND,
fine to medium
grained,brown

D60=0.72 D30=0.39 D10=0.21

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

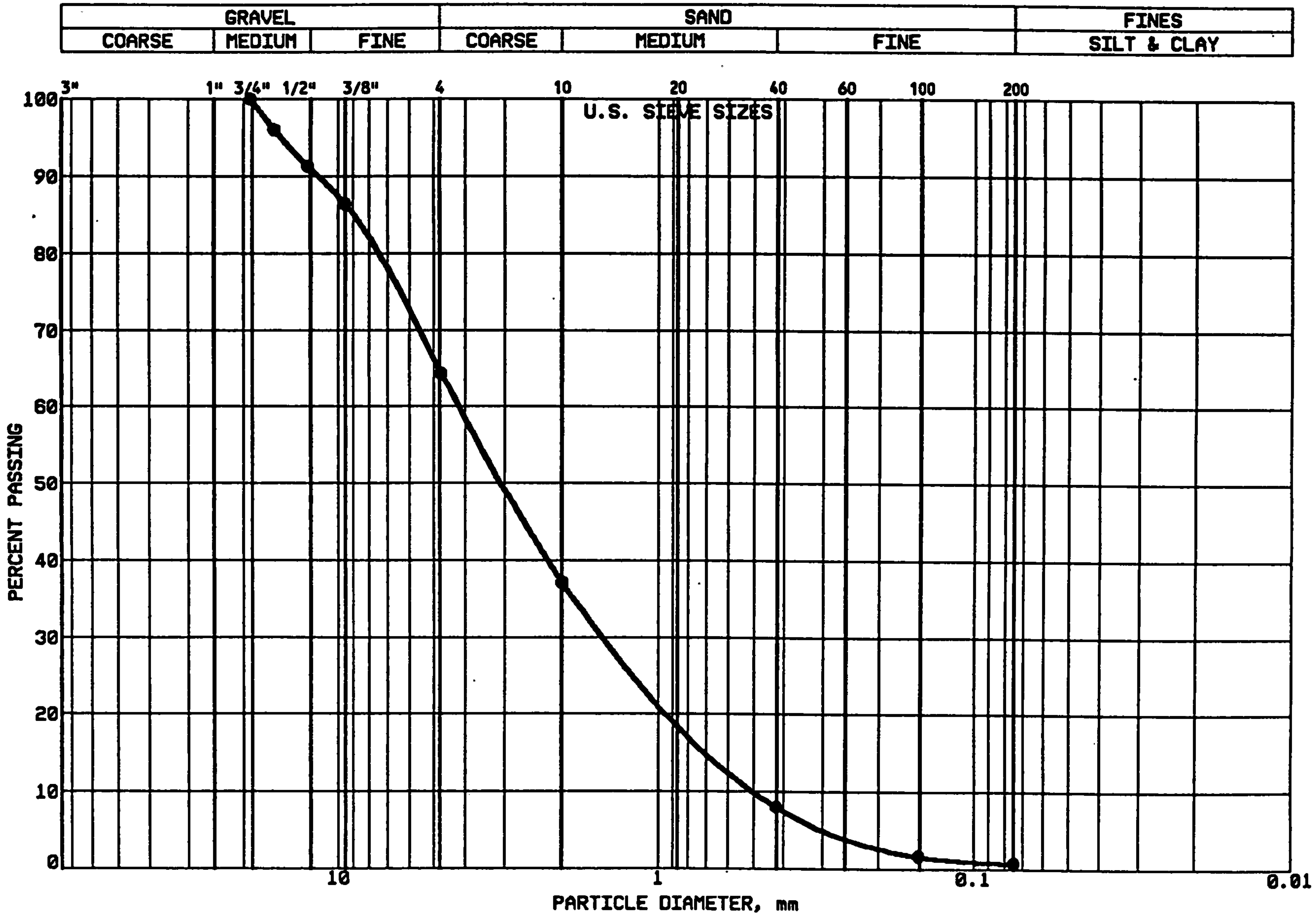
SAMPLE NO.: SL-2

| | |
|---|---|
| GRAVEL | 18.4 % |
| SAND | 81.0 % |
| SILT AND CLAY | 0.6 % |
| Cu | 4.6 |
| Cc | 0.8 |

**CLASSIFICATION:**
SP POORLY GRADED SAND with GRAVEL, medium to coarse grained, red-brown

D60=2.16 D30=0.90 D10=0.47

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE NO.: SL-3

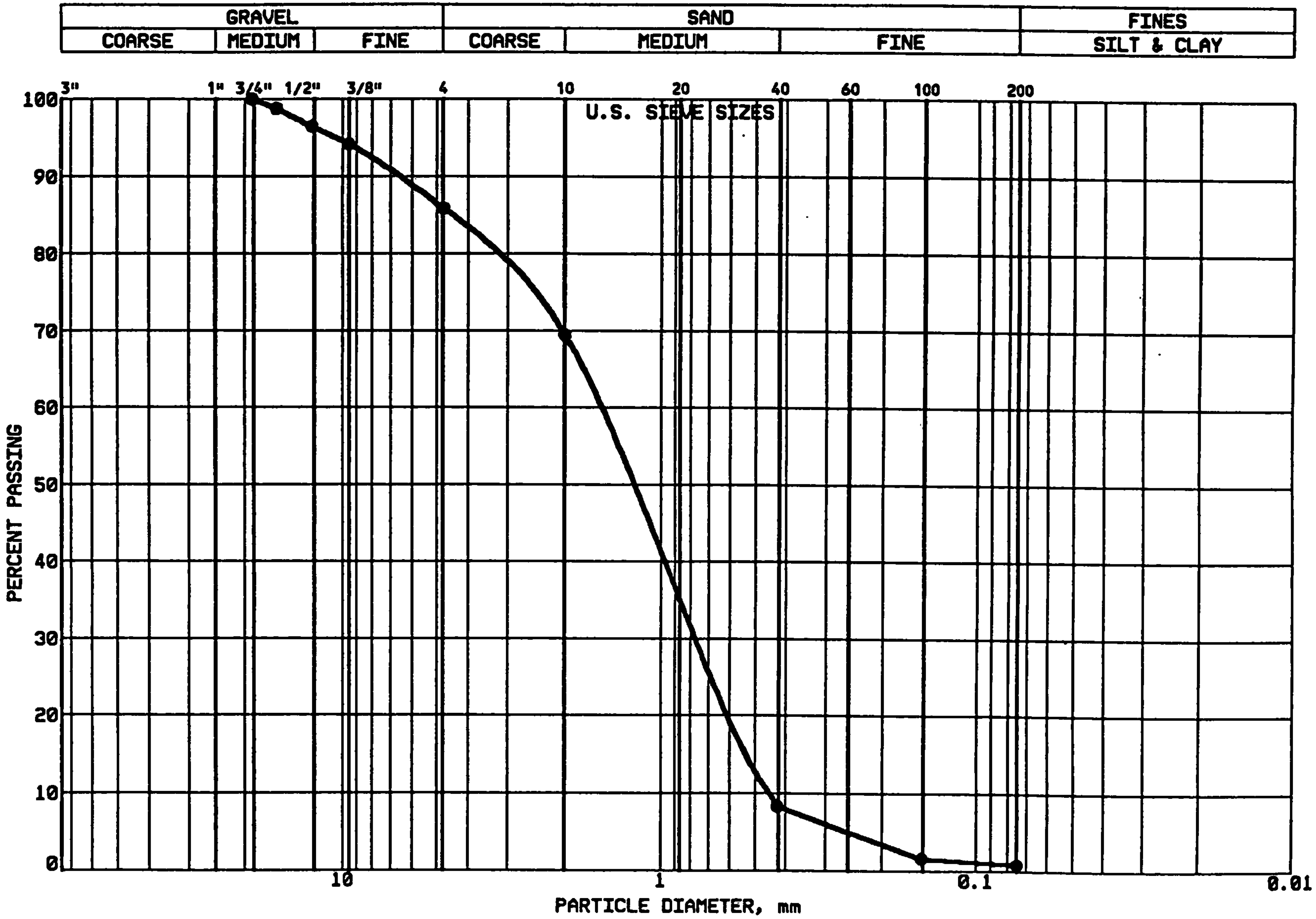
| | |
|---|---|
| GRAVEL | 35.7 % |
| SAND | 63.5 % |
| SILT AND CLAY | 0.8 % |
| Cu | 8.8 |
| Cc | 1.0 |

**CLASSIFICATION:**

SP POORLY GRADED SAND with GRAVEL, coarse grained, red

D60=4.14 D30=1.37 D10=0.47

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

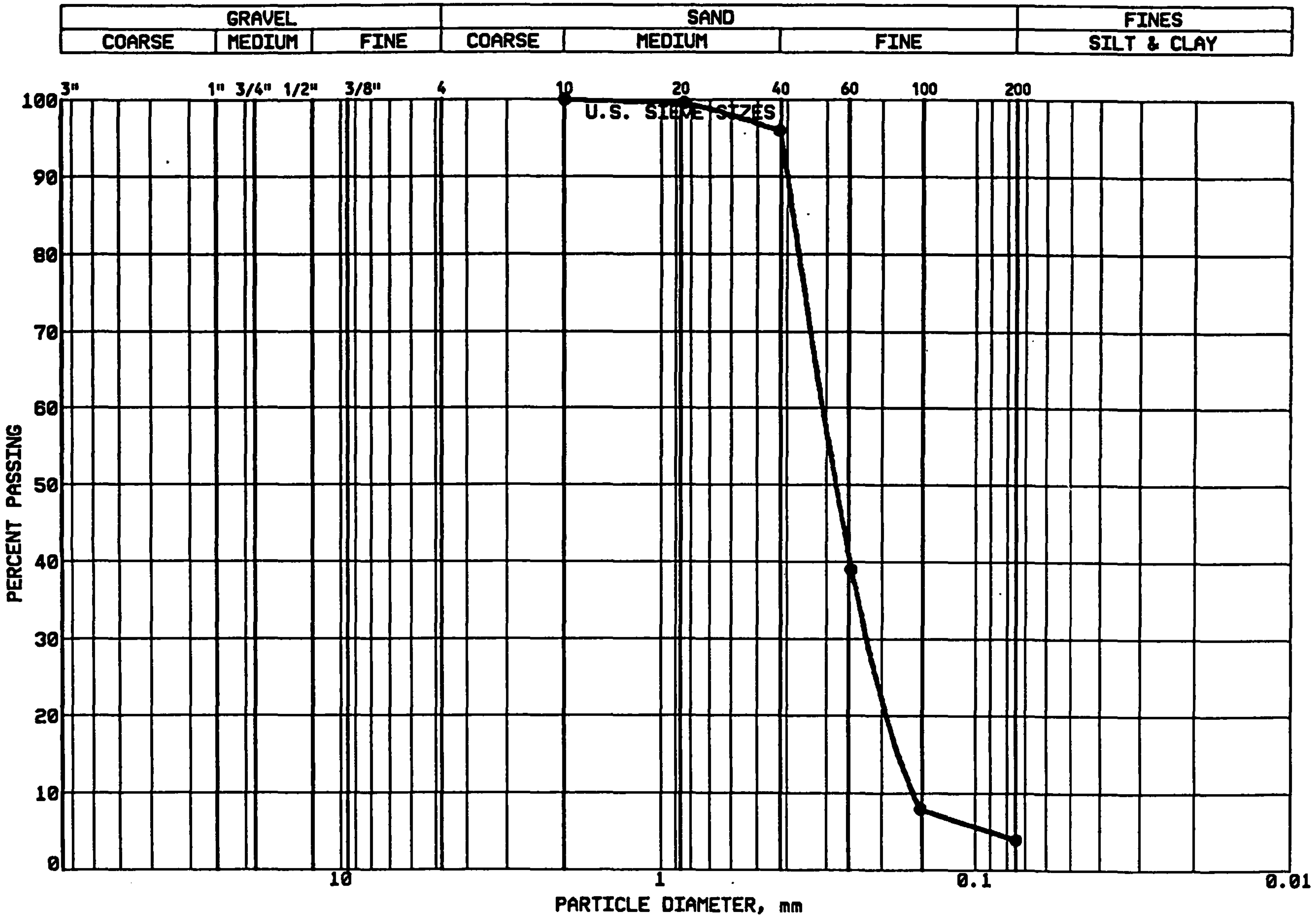
SAMPLE NO.: SL-5

| | |
|---|---|
| GRAVEL | 14.2 % |
| SAND | 84.9 % |
| SILT AND CLAY | 0.9 % |
| Cu | 3.6 |
| Cc | 0.8 |

**CLASSIFICATION:**
SP POORLY GRADED SAND with GRAVEL, medium to coarse grained,

D60=1.58 D30=0.74 D10=0.44

## GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

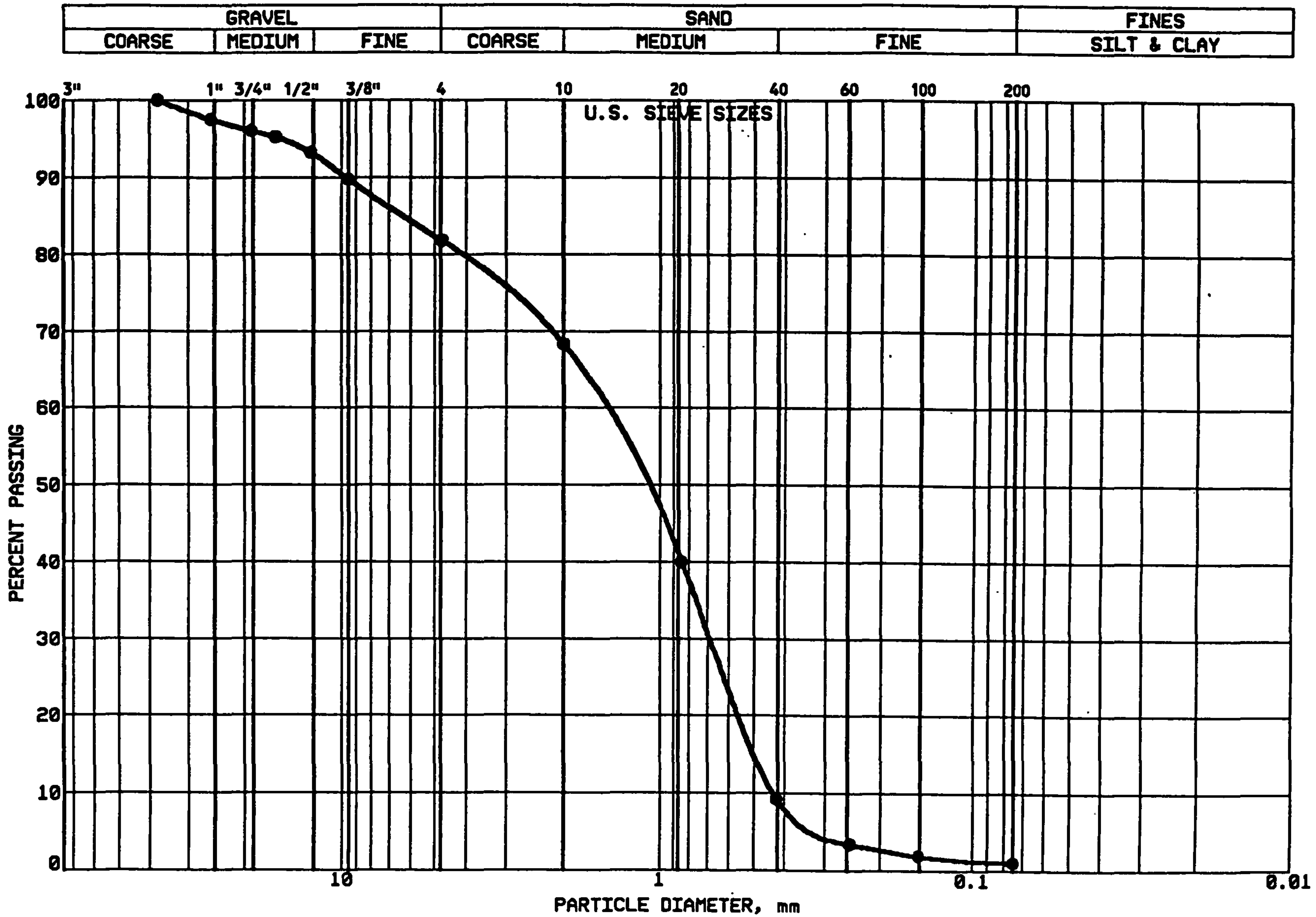
SAMPLE NO.: SL-6

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 96.0 % |
| SILT AND CLAY | 4.0 % |
| Cu | 2.0 |
| Cc | 1.0 |

**CLASSIFICATION:**
SP POORLY GRADED SAND,
fine grained, brown

D60=0.30 D30=0.22 D10=0.16

## GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE NO.: SL-7

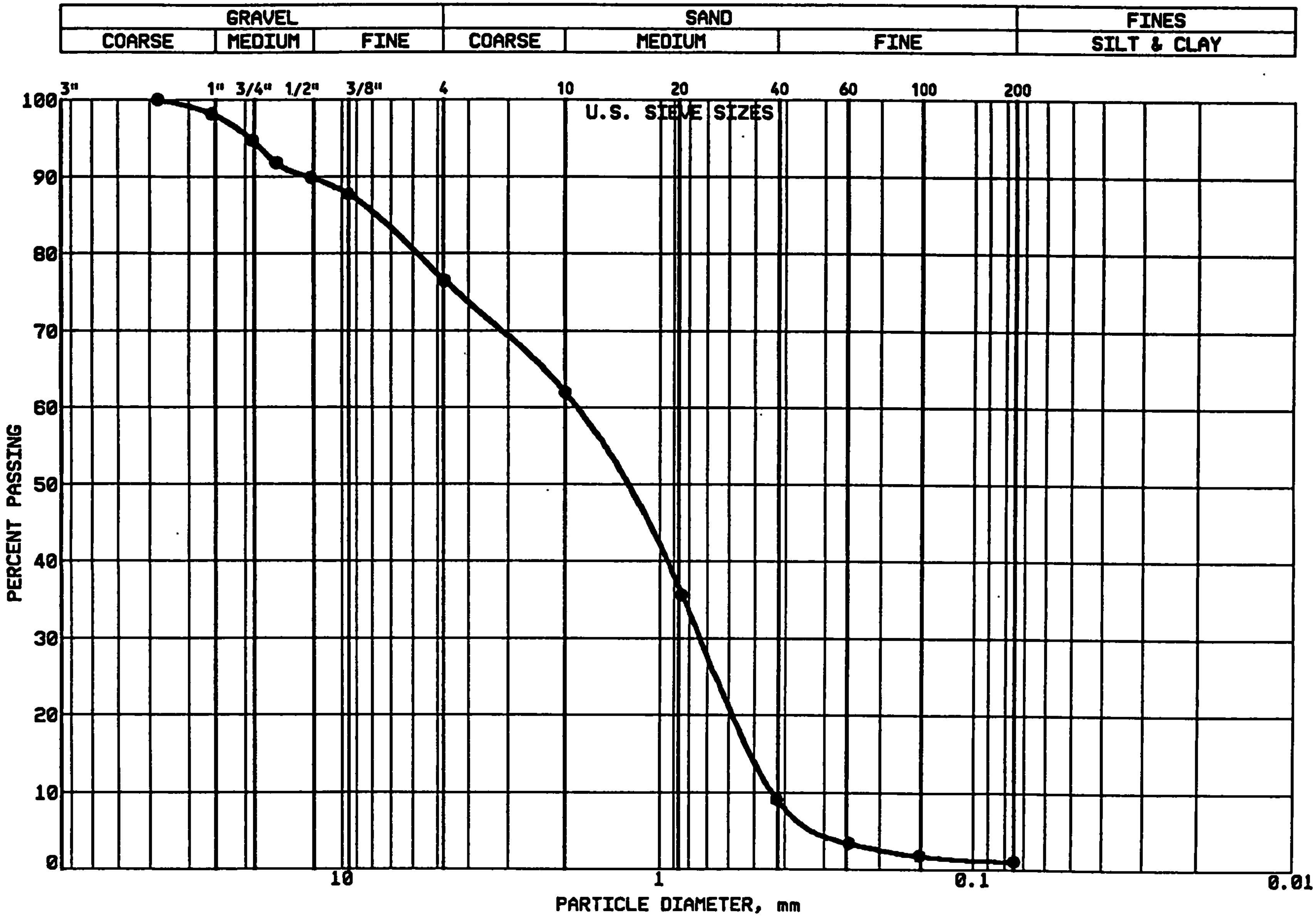
| | |
|---|---|
| GRAVEL | 18.2 % |
| SAND | 80.7 % |
| SILT AND CLAY | 1.1 % |
| Cu | 3.6 |
| Cc | 0.7 |

**CLASSIFICATION:**

SP POORLY GRADED SAND with GRAVEL, medium to coarse grained, red-brown

D60=1.56 D30=0.68 D10=0.43

## GRAIN SIZE ACCUMULATION CURVE



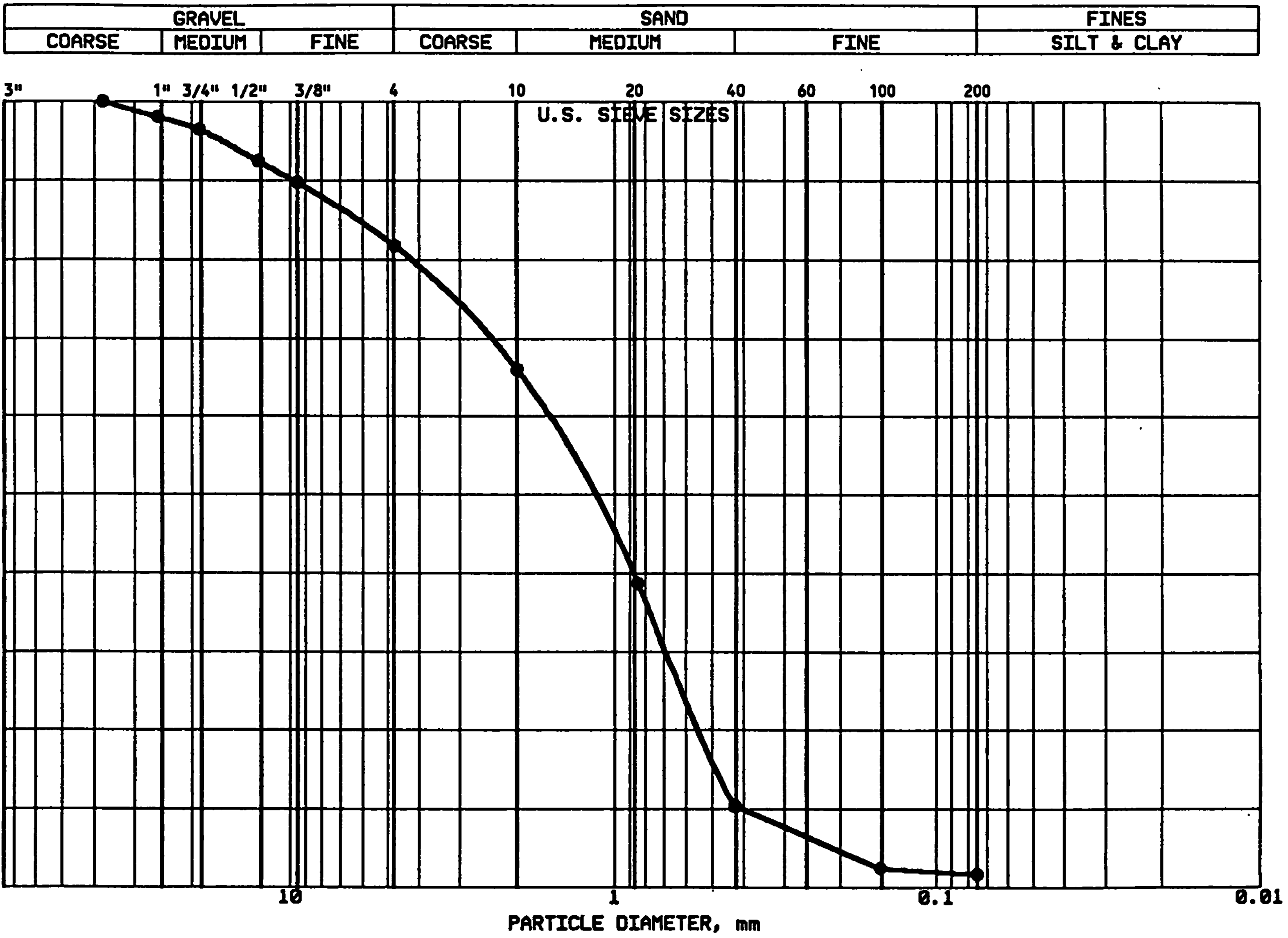
**PROJECT:** **BNDX-93-037A**
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI
SAMPLE NO.: SL-8

| | |
|---|---|
| GRAVEL | 23.6 % |
| SAND | 75.2 % |
| SILT AND CLAY | 1.2 % |
| Cu | 4.3 |
| Cc | 0.7 |

**CLASSIFICATION:**
SP POORLY GRADED SAND with GRAVEL, medium to coarse grained, brown

D60=1.87 D30=0.73 D10=0.43

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE NO.: SL-11

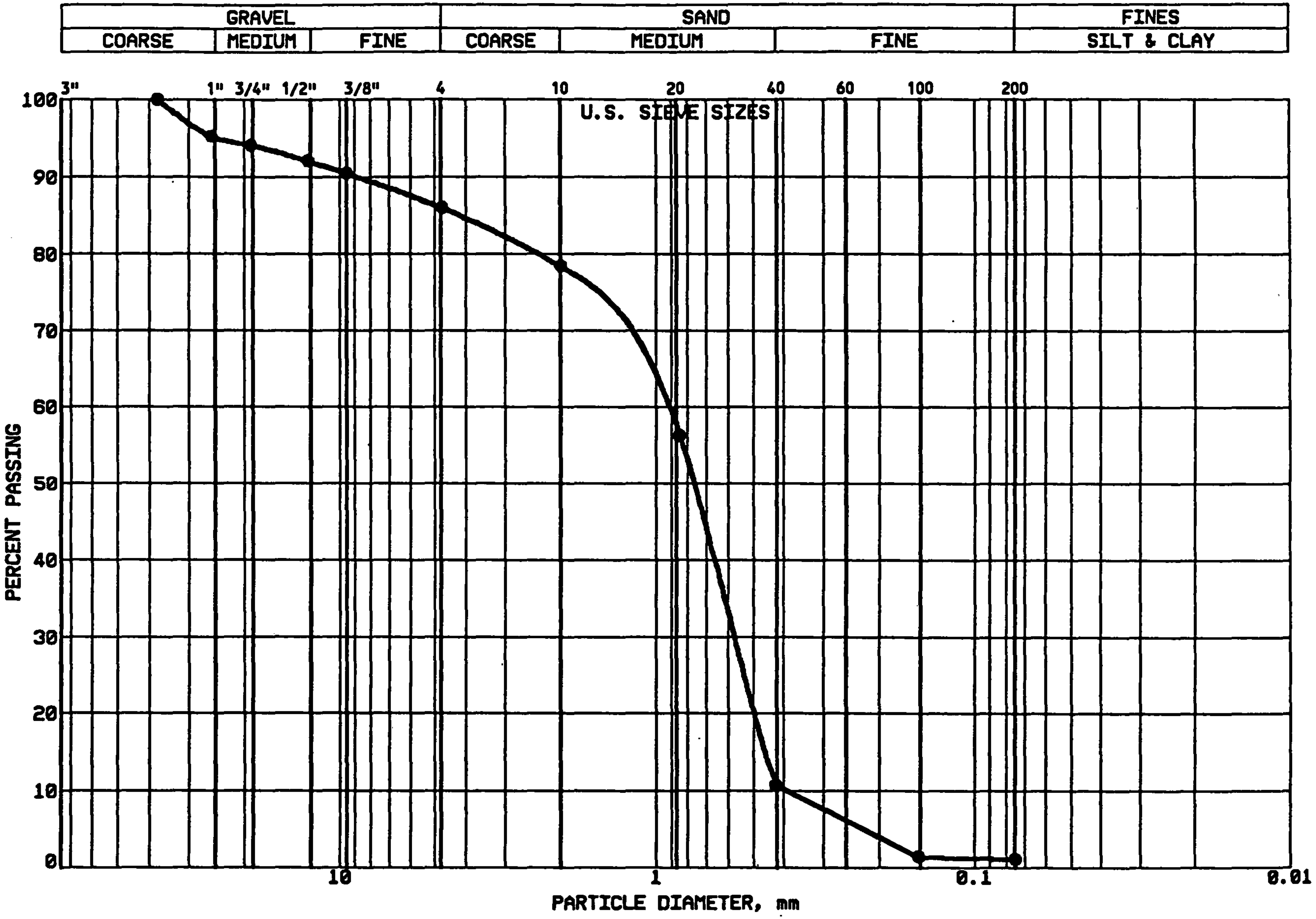
| | |
|---|---|
| GRAVEL | 18.3 % |
| SAND | 80.0 % |
| SILT AND CLAY | 1.7 % |
| Cu | 4.1 |
| Cc | 0.7 |

**CLASSIFICATION:**

SP POORLY GRADED SAND with GRAVEL, medium to coarse grained,

D60=1.66 D30=0.69 D10=0.40

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

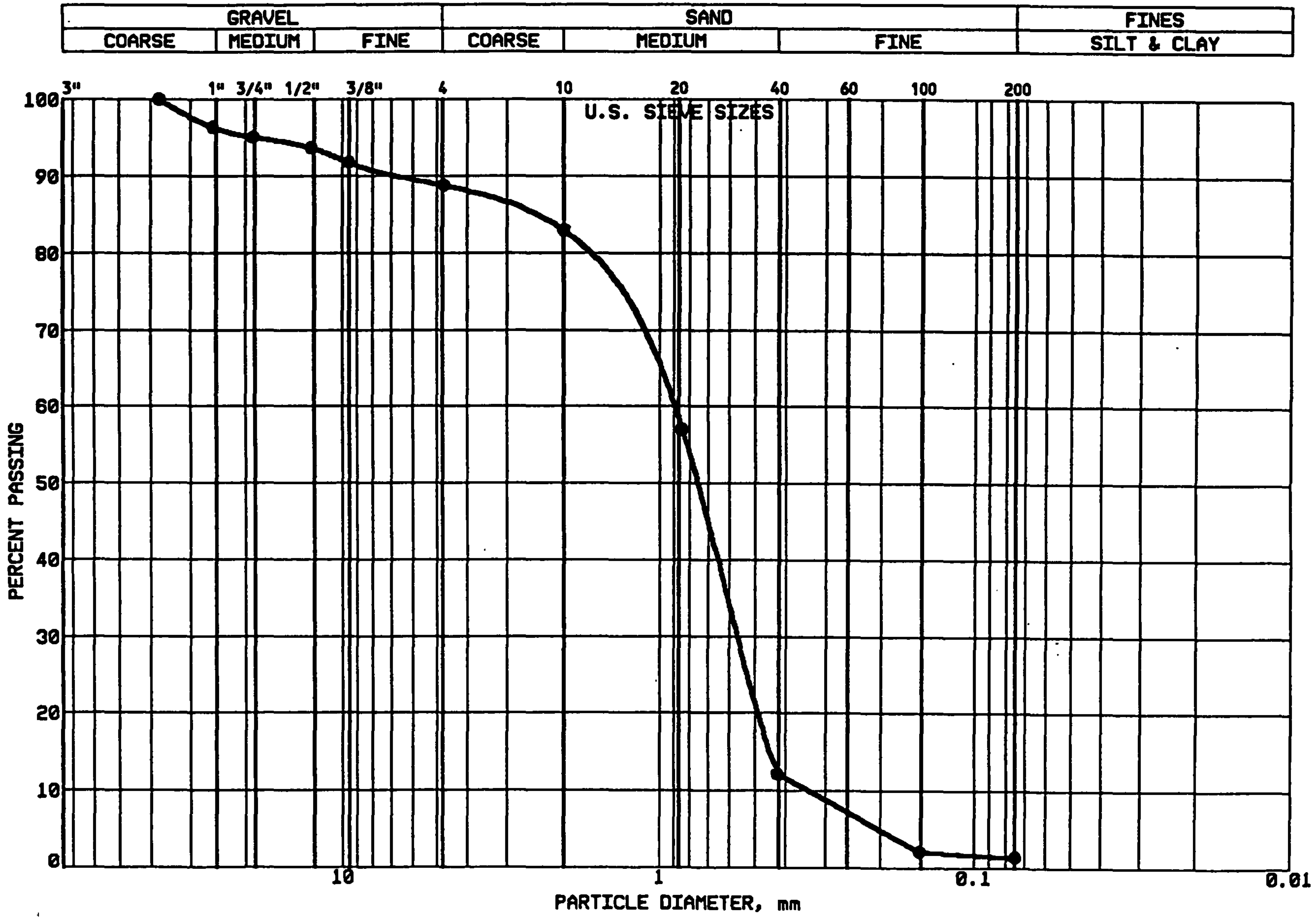
SAMPLE NO.: SL-12

| | |
|---|---|
| GRAVEL | 14.0 % |
| SAND | 84.8 % |
| SILT AND CLAY | 1.2 % |
| Cu | 2.5 |
| Cc | 0.9 |

**CLASSIFICATION:**
SP POORLY GRADED SAND with GRAVEL, medium to coarse grained,

D60=0.98 D30=0.57 D10=0.39

## GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

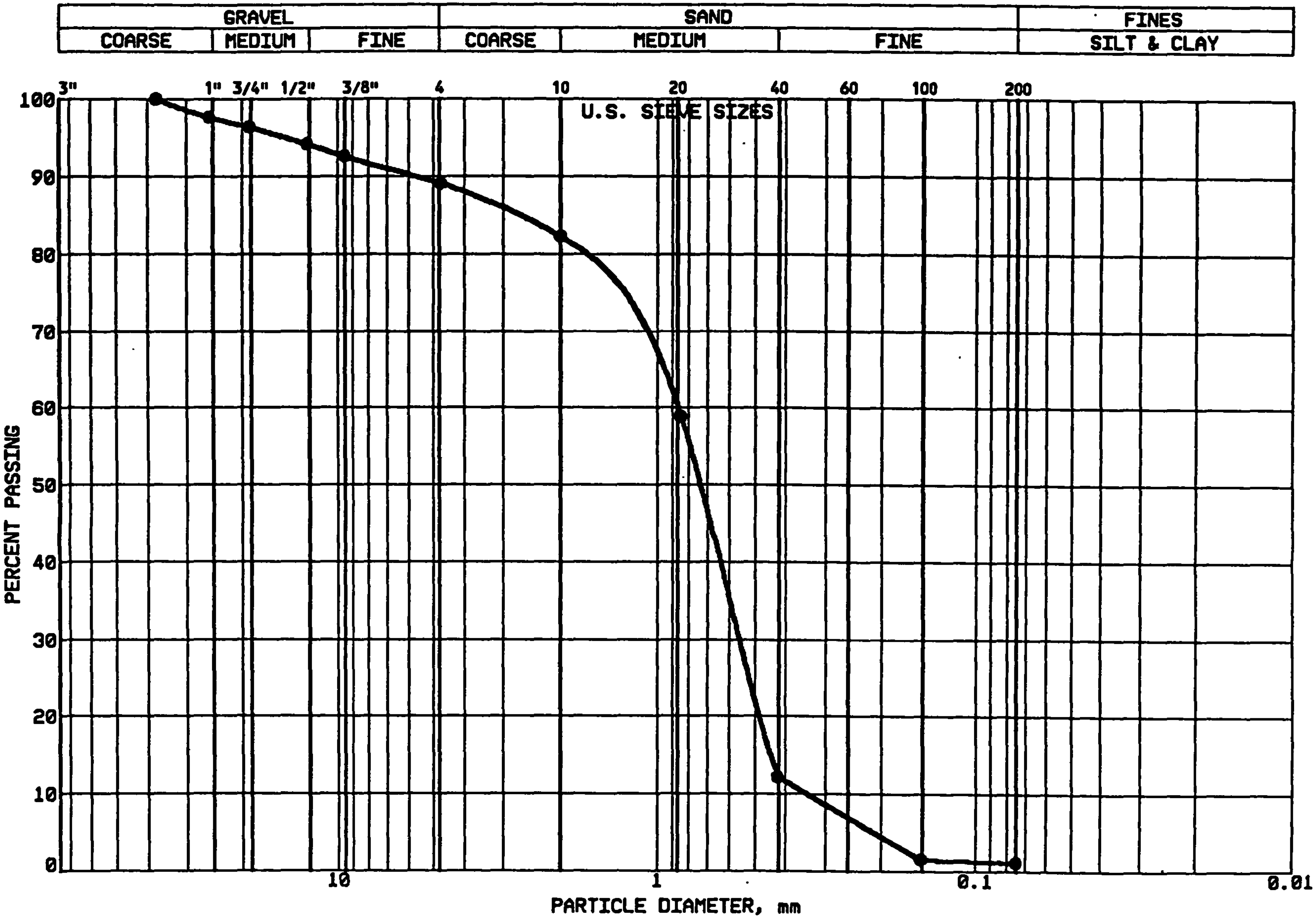
SAMPLE NO.: SL-13

| | |
|---|---|
| GRAVEL | 11.2 % |
| SAND | 87.3 % |
| SILT AND CLAY | 1.5 % |
| Cu | 2.8 |
| Cc | 1.0 |

**CLASSIFICATION:**
SP POORLY GRADED SAND,
medium grained,

D60=0.94 D30=0.56 D10=0.34

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE NO.: SL-14

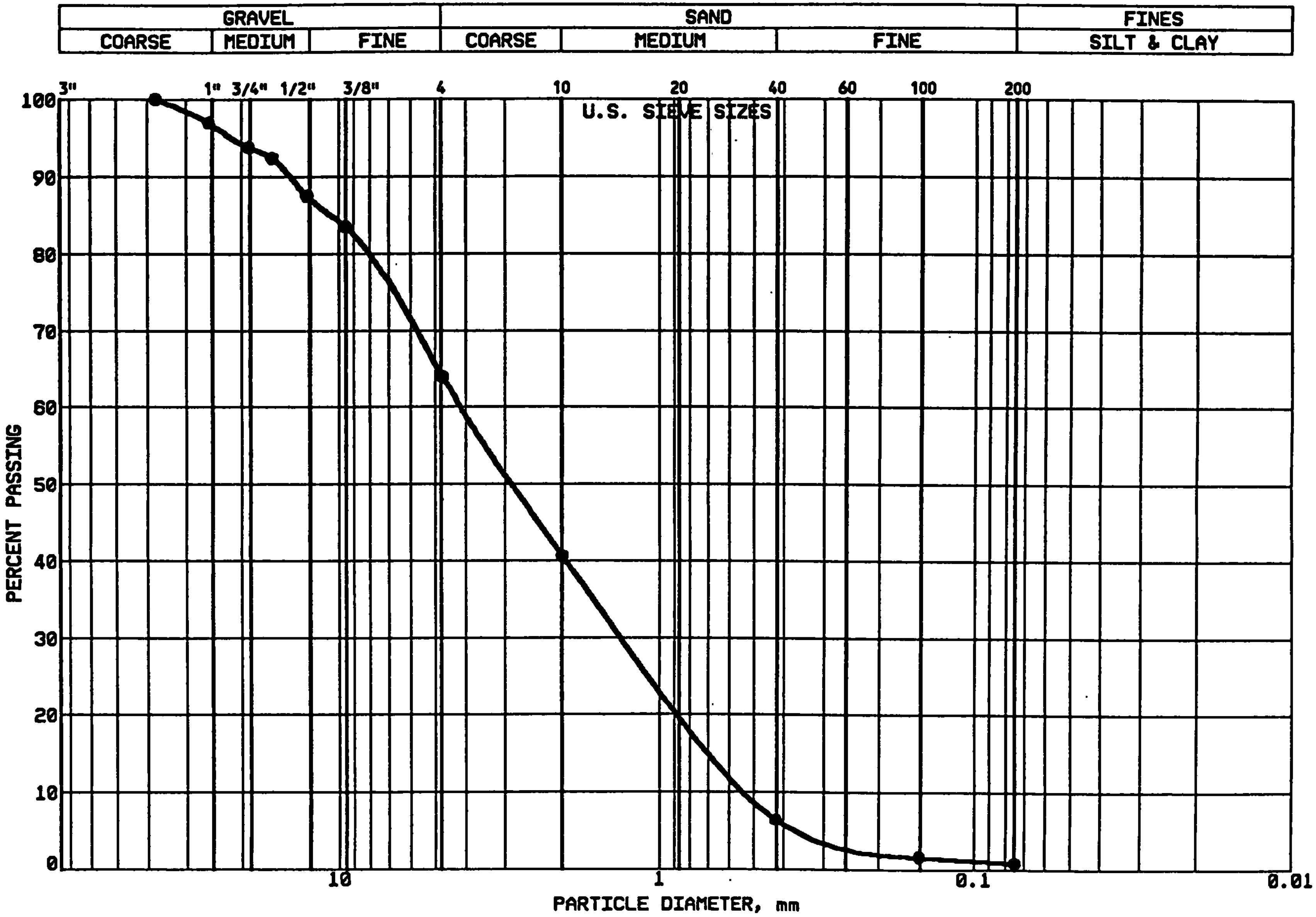
| | |
|---|---|
| GRAVEL | 10.9 % |
| SAND | 87.9 % |
| SILT AND CLAY | 1.2 % |
| Cu | 2.6 |
| Cc | 1.0 |

**CLASSIFICATION:**

SP POORLY GRADED SAND,
medium grained,

D60=0.88 D30=0.55 D10=0.34

# GRAIN SIZE ACCUMULATION CURVE



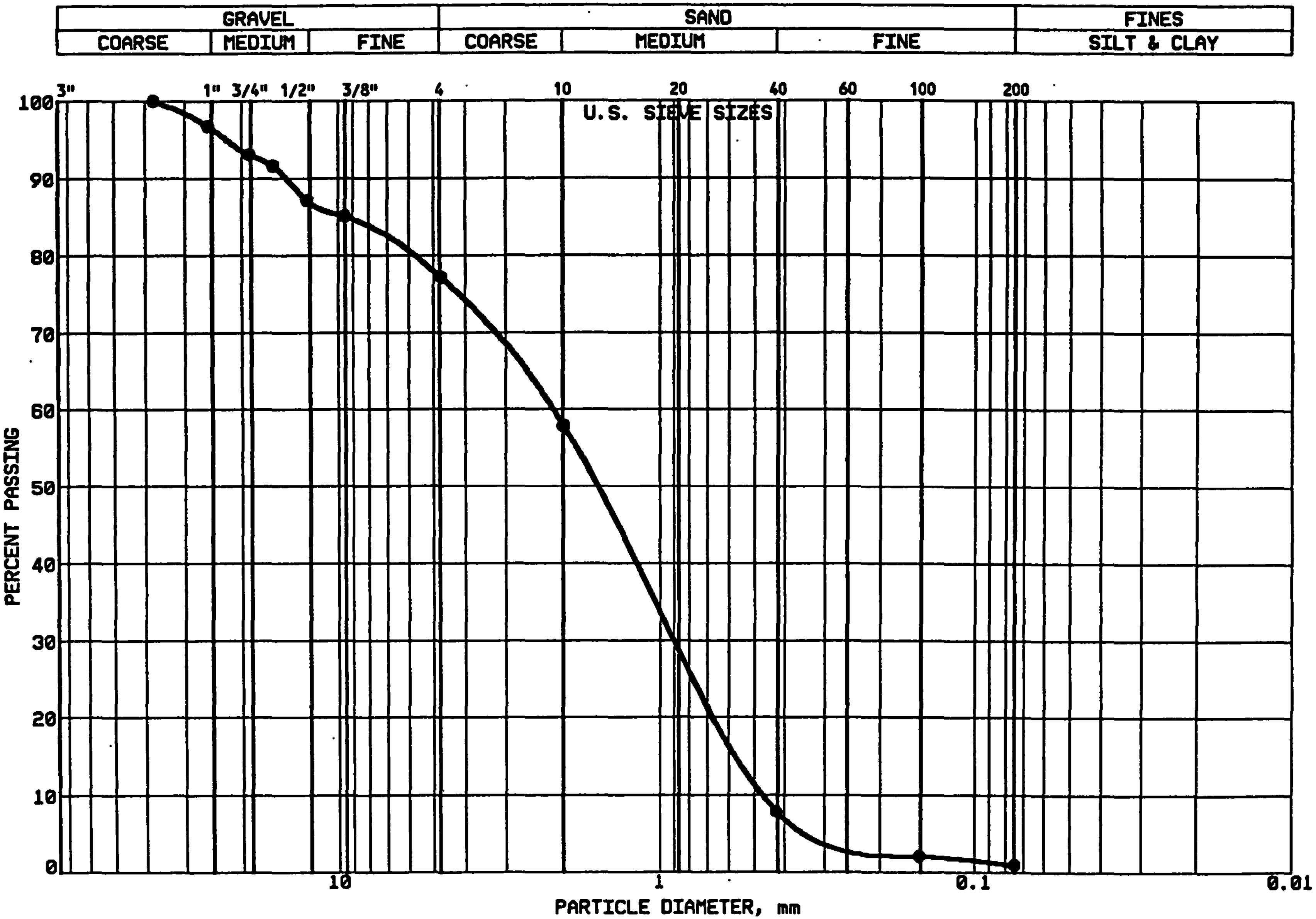
**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI
SAMPLE NO.: SL-16

| | |
|---|---|
| GRAVEL | 36.1 % |
| SAND | 63.0 % |
| SILT AND CLAY | 0.9 % |
| Cu | 8.2 |
| Cc | 0.7 |

**CLASSIFICATION:**
SP POORLY GRADED SAND,
fine to medium
grained, brown

D60=4.11 D30=1.24 D10=0.50

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

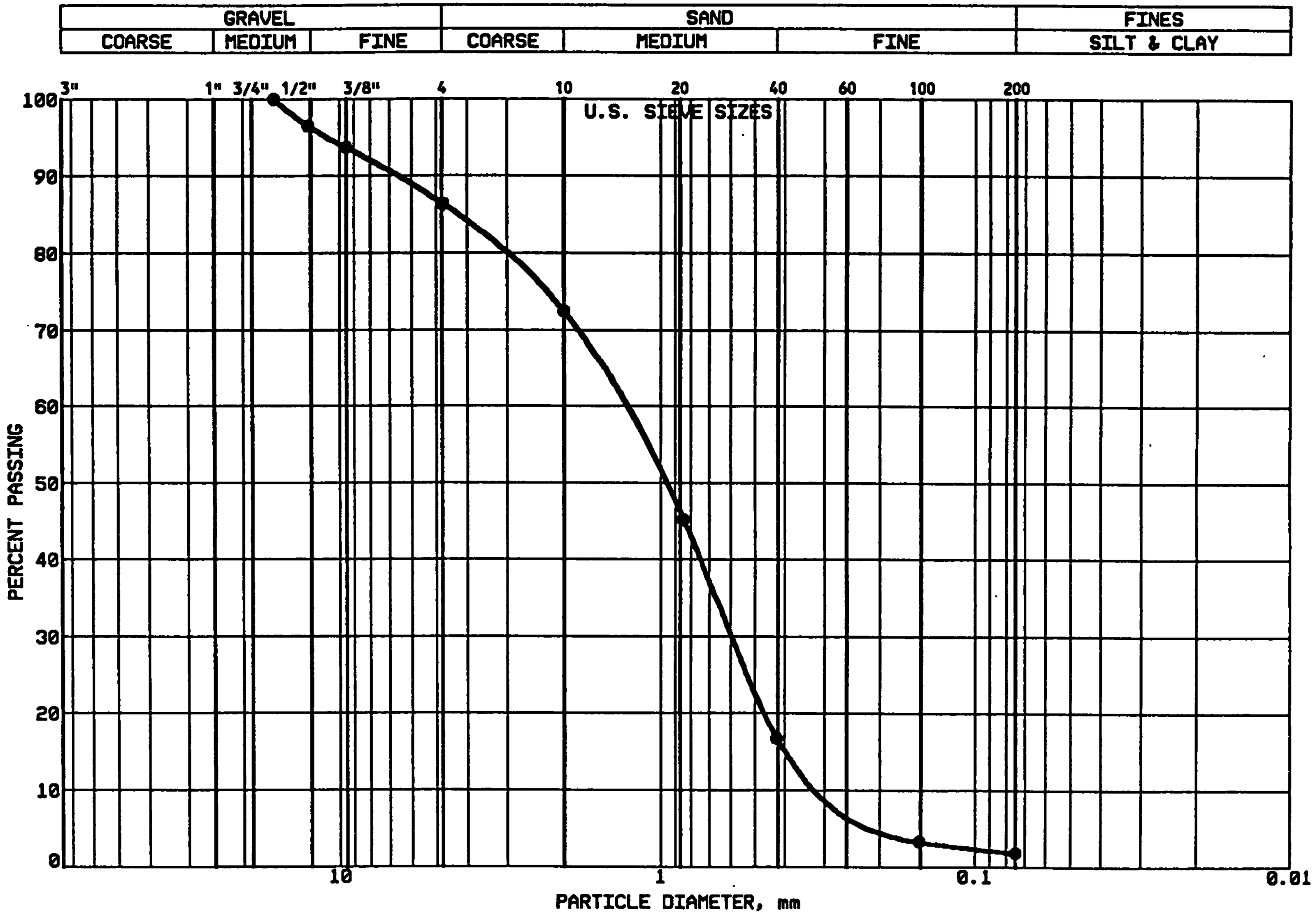
SAMPLE NO.: SL-17

| | |
|---|---|
| GRAVEL | 22.9 % |
| SAND | 76.1 % |
| SILT AND CLAY | 1.0 % |
| Cu | 4.8 |
| Cc | 0.7 |

**CLASSIFICATION:**
SP POORLY GRADED SAND,
fine to medium
grained, brown

D60=2.20 D30=0.84 D10=0.45

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE NO.: SL-18

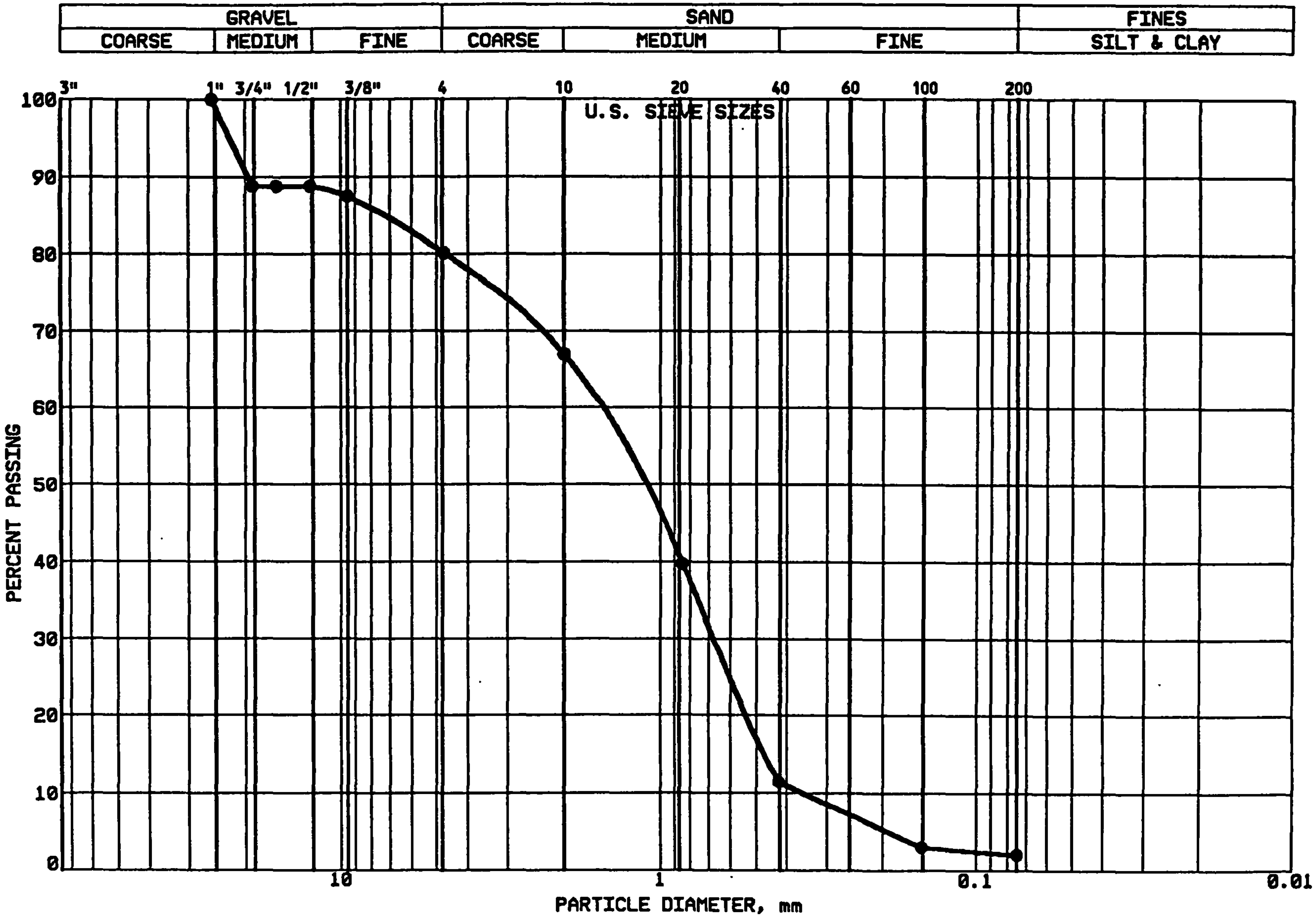
| | |
|---|---|
| GRAVEL | 13.7 % |
| SAND | 84.4 % |
| SILT AND CLAY | 1.9 % |
| Cu | 5.4 |
| Cc | 1.0 |

**CLASSIFICATION:**

SP POORLY GRADED SAND,
fine to medium
grained, brown

D60=1.35 D30=0.59 D10=0.25

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

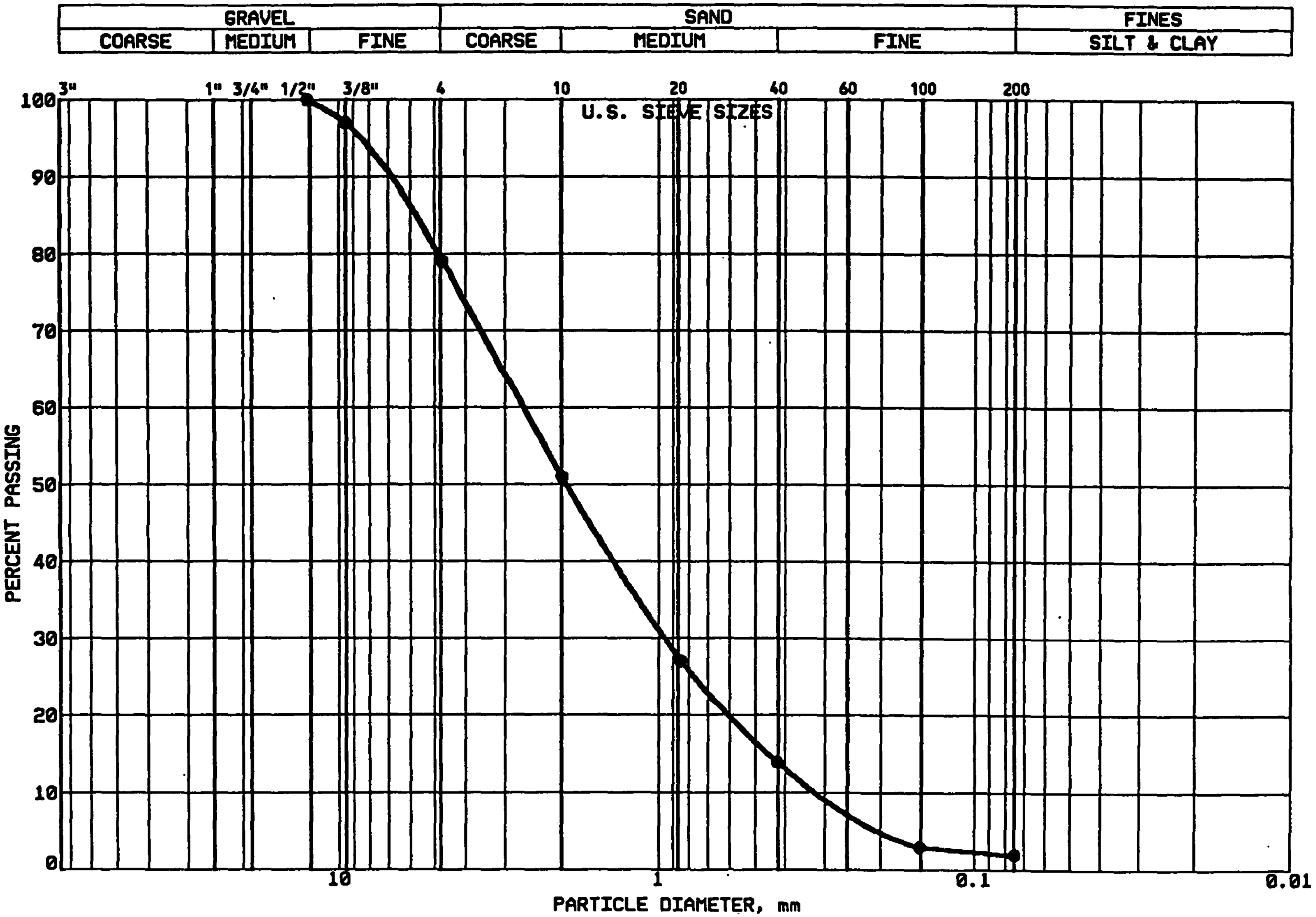
SAMPLE NO.: SL-19

| | |
|---|---|
| GRAVEL | 19.9 % |
| SAND | 78.0 % |
| SILT AND CLAY | 2.1 % |
| Cu | 4.6 |
| Cc | 0.8 |

**CLASSIFICATION:**
SP POORLY GRADED SAND,
fine to medium
grained, brown

D60=1.61 D30=0.67 D10=0.35

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE NO.: SL-20

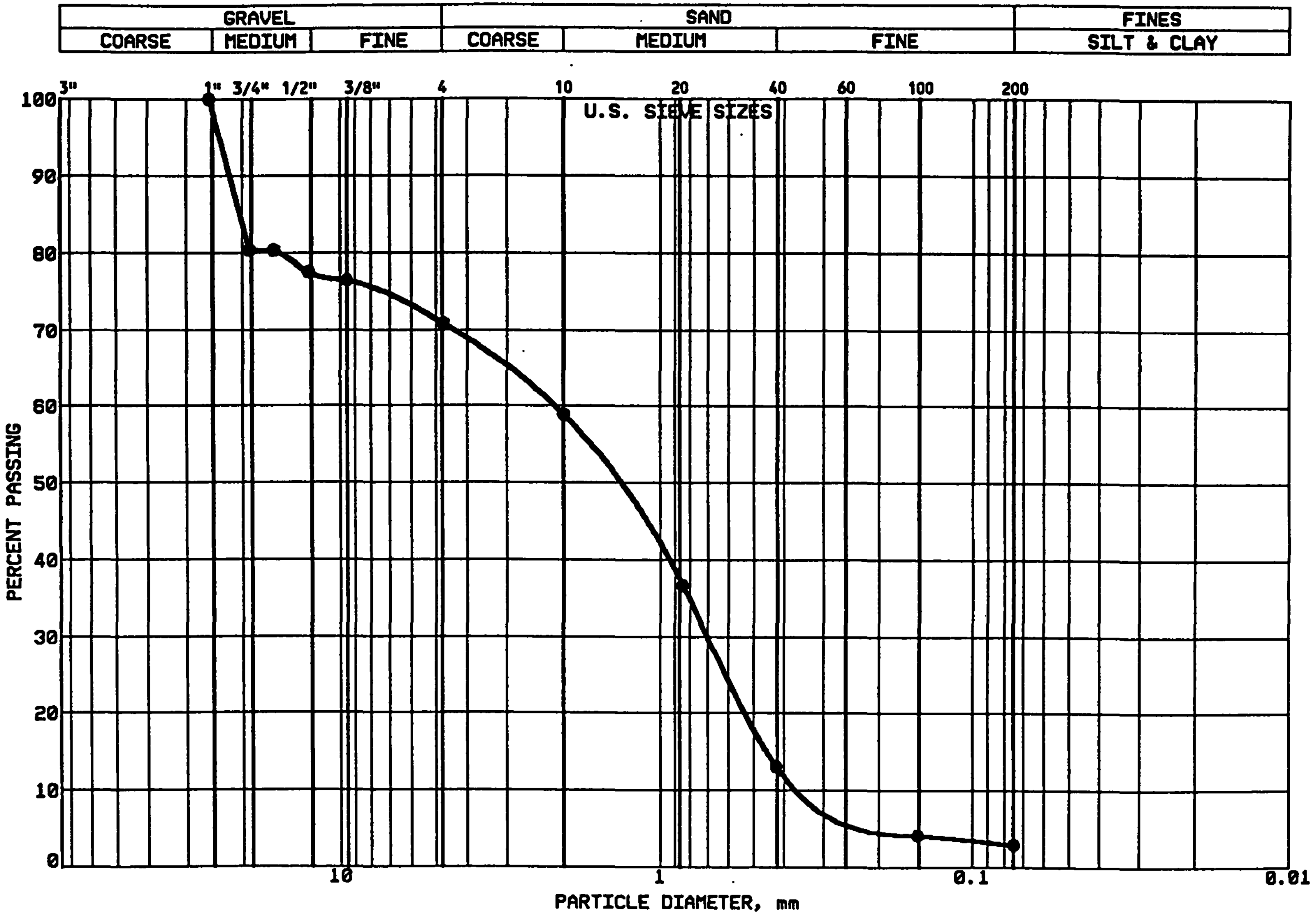
| | |
|---|---|
| GRAVEL | 21.0 % |
| SAND | 77.0 % |
| SILT AND CLAY | 2.0 % |
| Cu | 9.1 |
| Cc | 1.2 |

**CLASSIFICATION:**

SP POORLY GRADED SAND, fine to medium grained, brown

D60=2.64 D30=0.95 D10=0.29

# GRAIN SIZE ACCUMULATION CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE NO.: SL-21

| | |
|---|---|
| GRAVEL | 29.2 % |
| SAND | 67.8 % |
| SILT AND CLAY | 3.0 % |
| Cu | 7.3 |
| Cc | 0.8 |

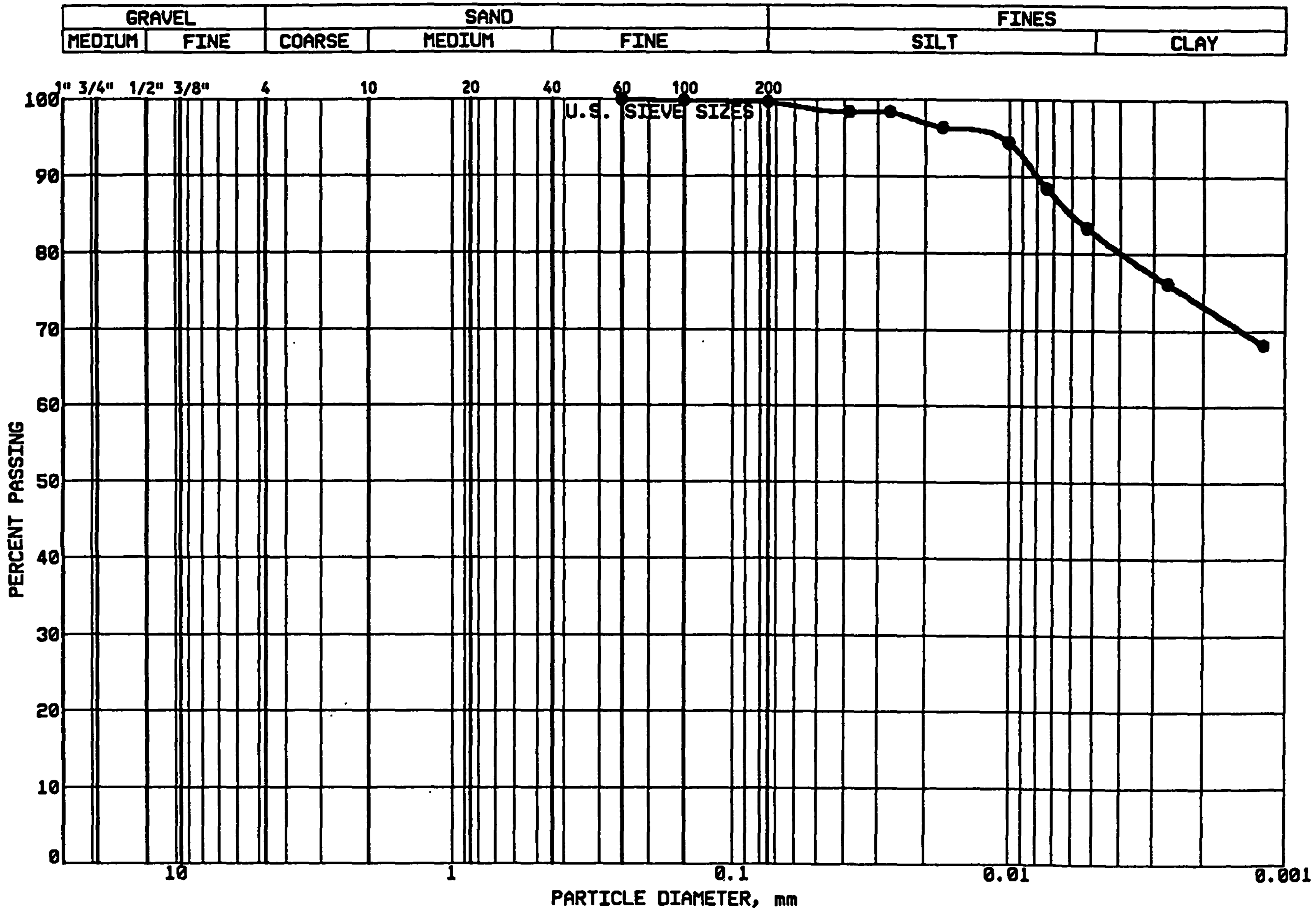
**CLASSIFICATION:**

SP POORLY GRADED SAND,
fine to medium
grained, brown

D60=2.17 D30=0.70 D10=0.30

# HYDROMETER ANALYSIS

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: CL-1

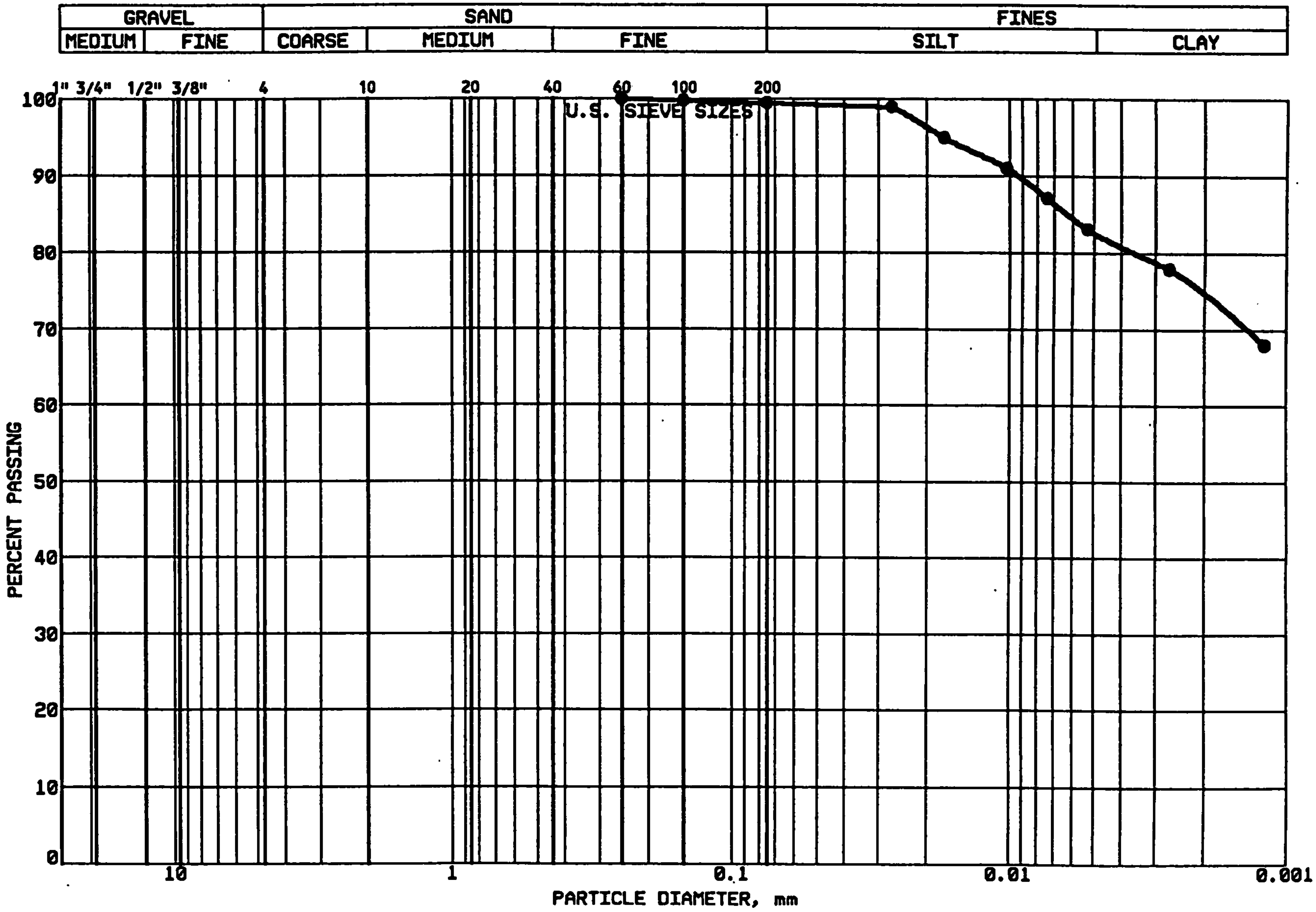
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 0.3 % |
| SILT | 17.0 % |
| CLAY | 82.7 % |

**CLASSIFICATION:**
ML SILT,brown

D60=
D30=
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: CL-2

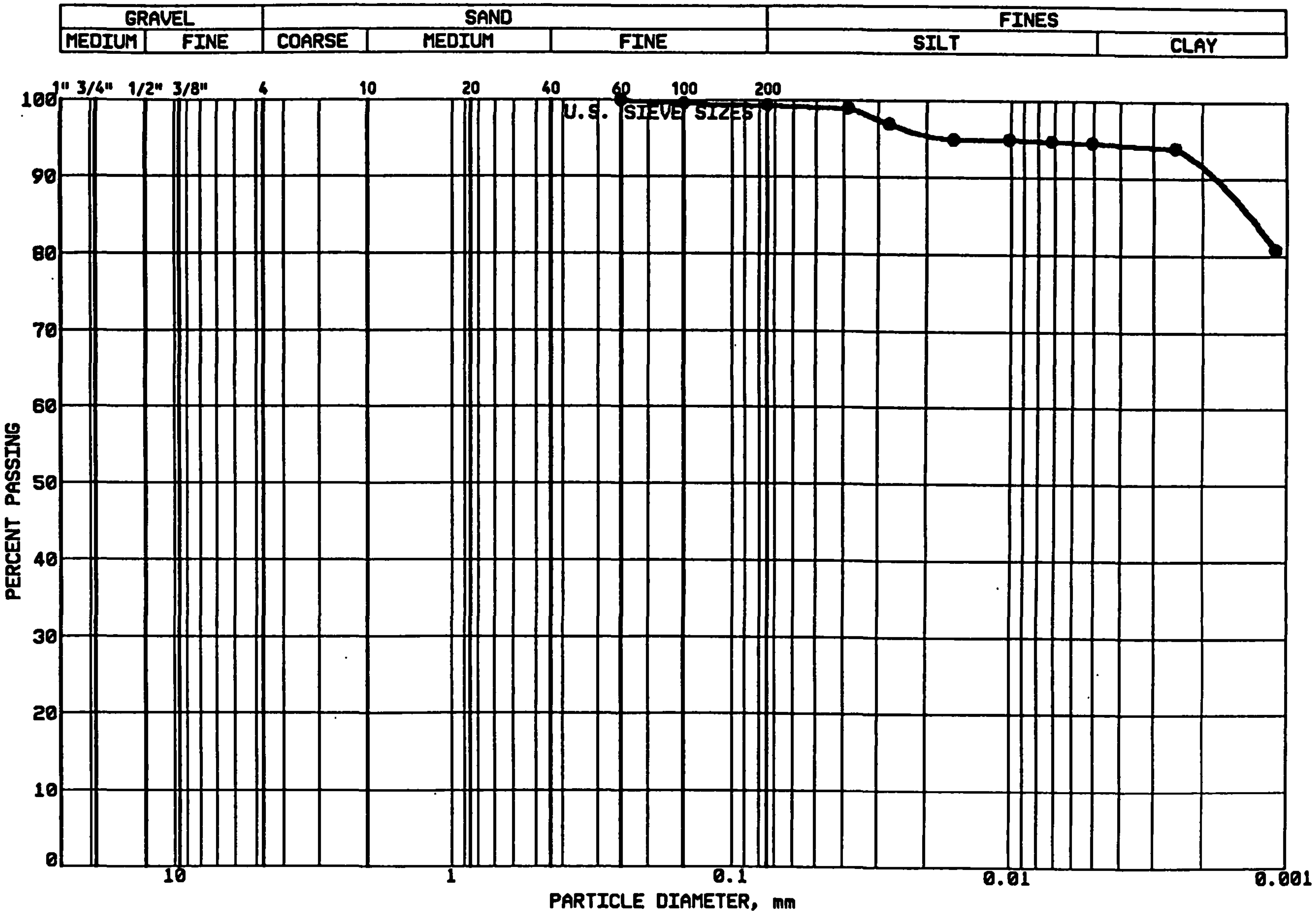
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 0.5 % |
| SILT | 16.8 % |
| CLAY | 82.7 % |

**CLASSIFICATION:**
ML SILT,brown

D60=
D30=
D10=

Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: CL-3

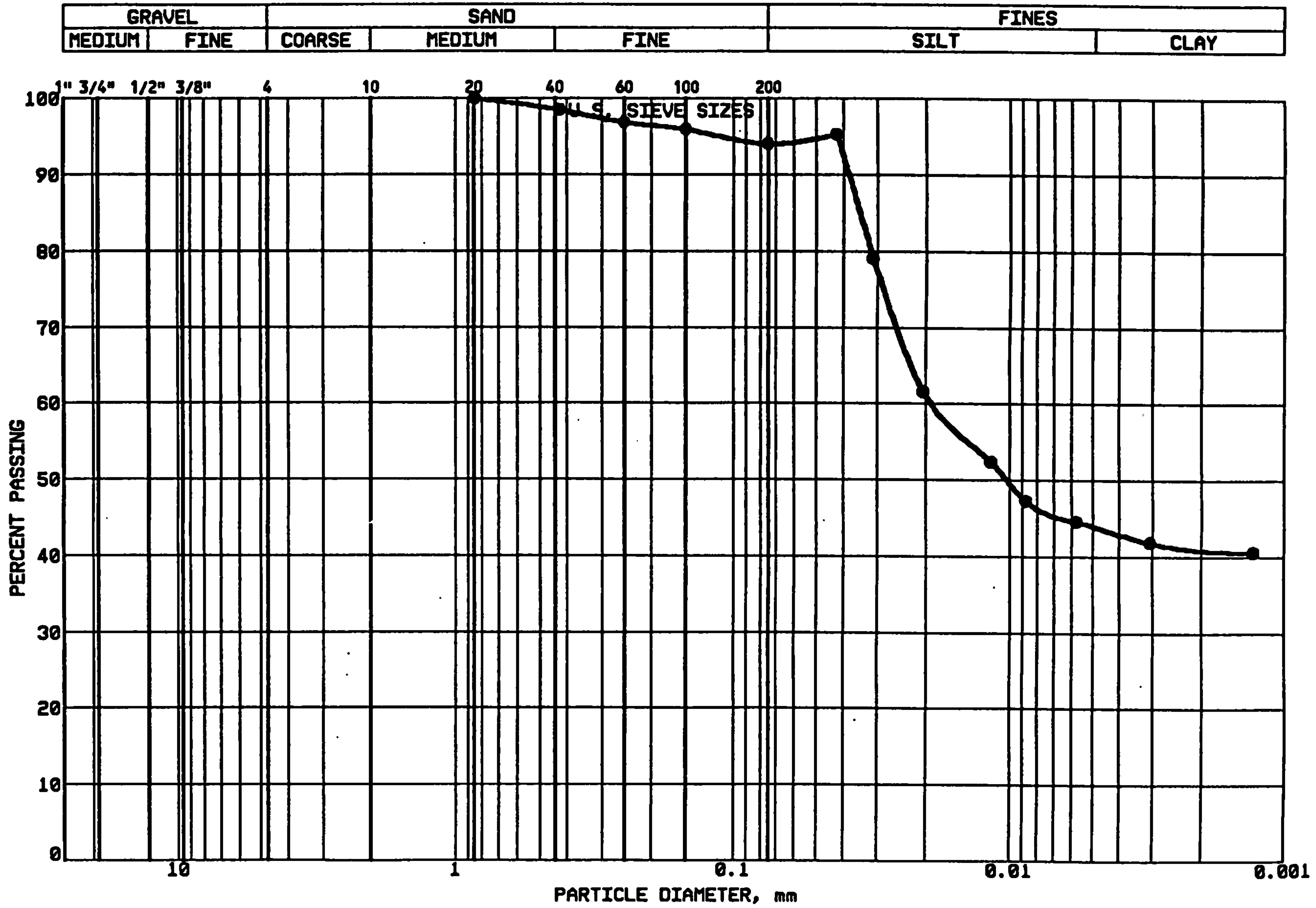
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 0.6 % |
| SILT | 4.8 % |
| CLAY | 94.6 % |

**CLASSIFICATION:**
ML SILT, brown

D60=
D30=
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TC-1

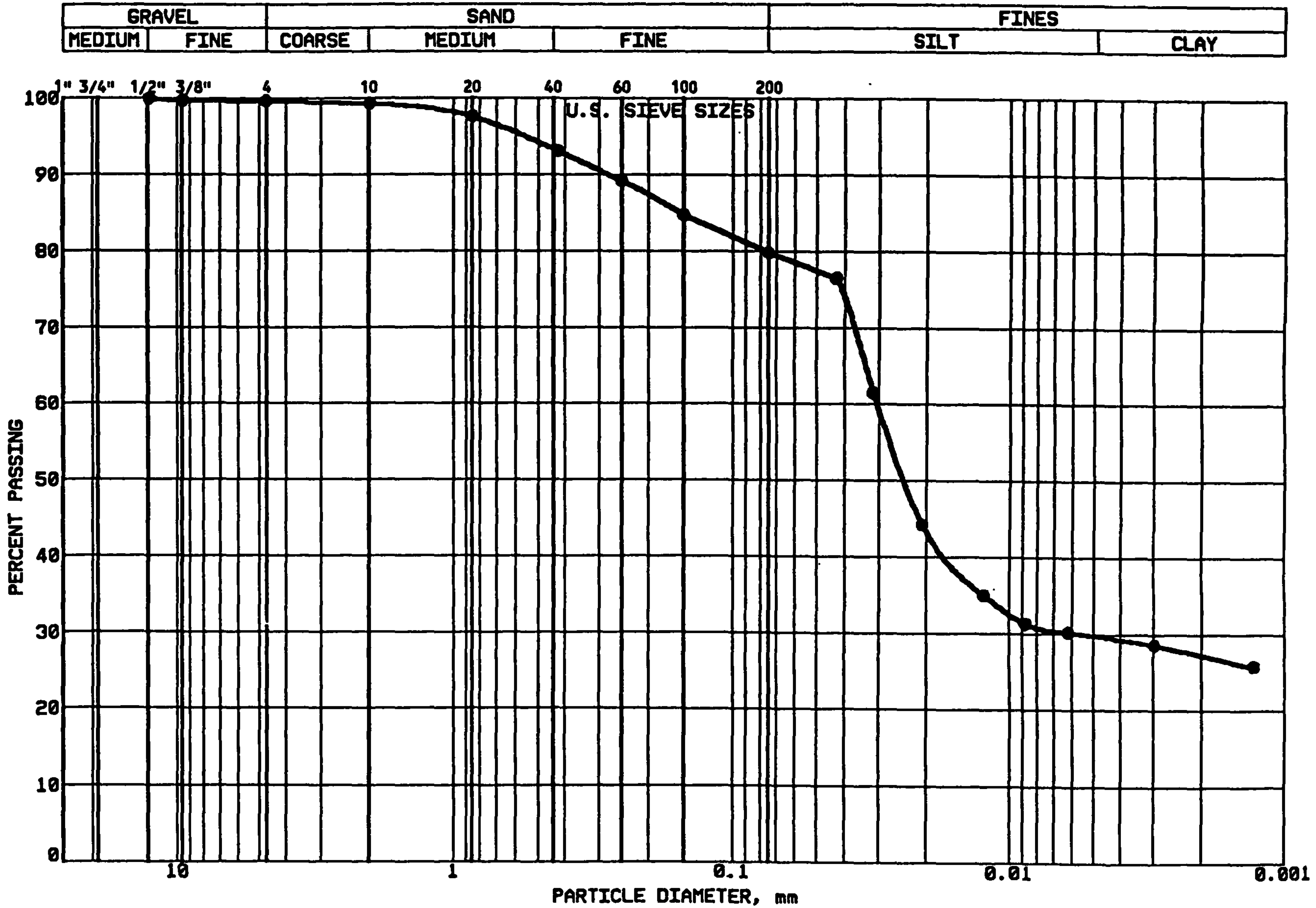
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 5.9 % |
| SILT | 50.1 % |
| CLAY | 44.0 % |

**CLASSIFICATION:**
CL LEAN CLAY, brown

D60=0.019
D30=
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TC-2

| | |
|---|---|
| GRAVEL | 0.4 % |
| SAND | 19.8 % |
| SILT | 50.1 % |
| CLAY | 29.7 % |

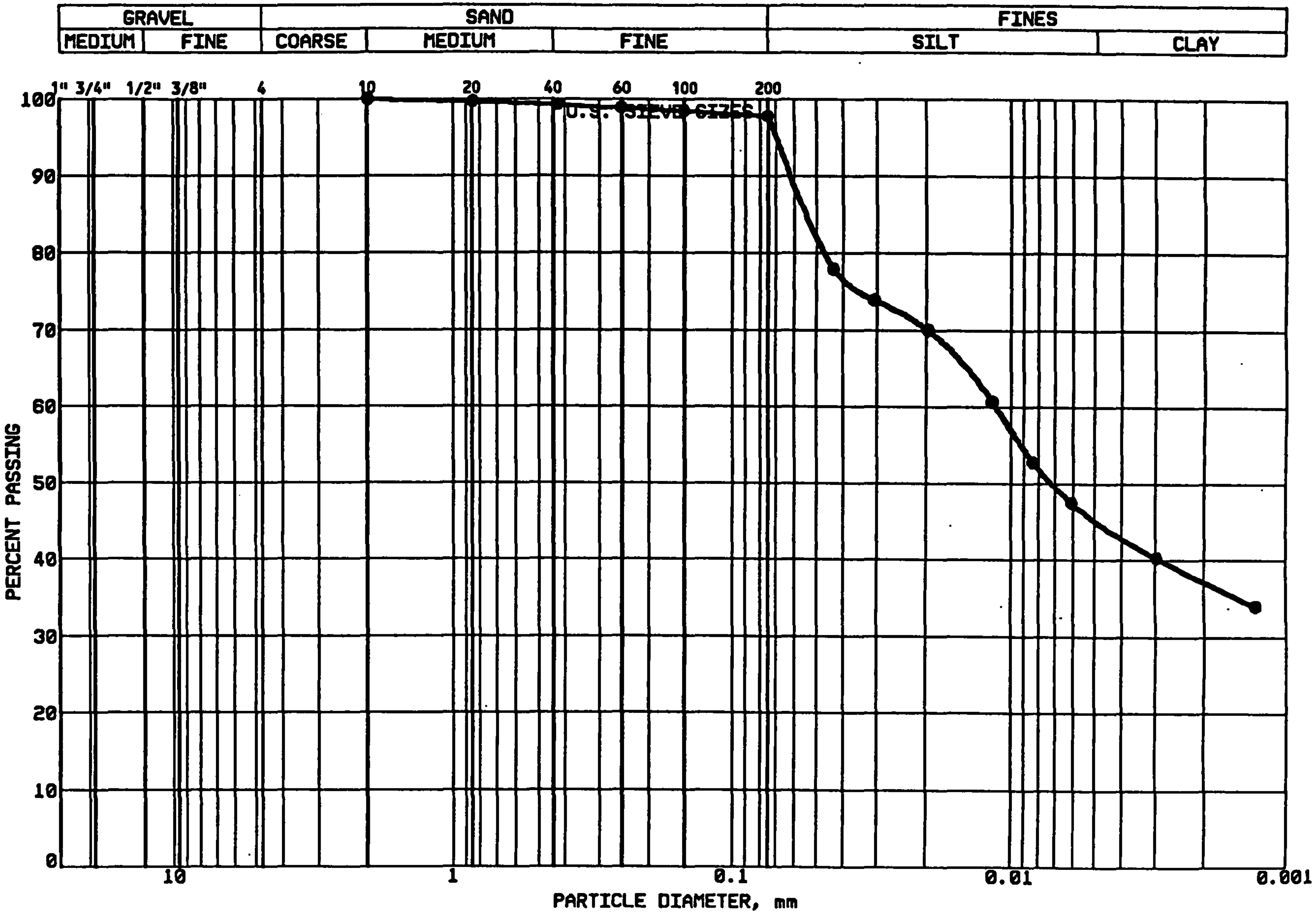
**CLASSIFICATION:**

CL LEAN CLAY, brown

D60=0.031
D30=0.006
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TC-3

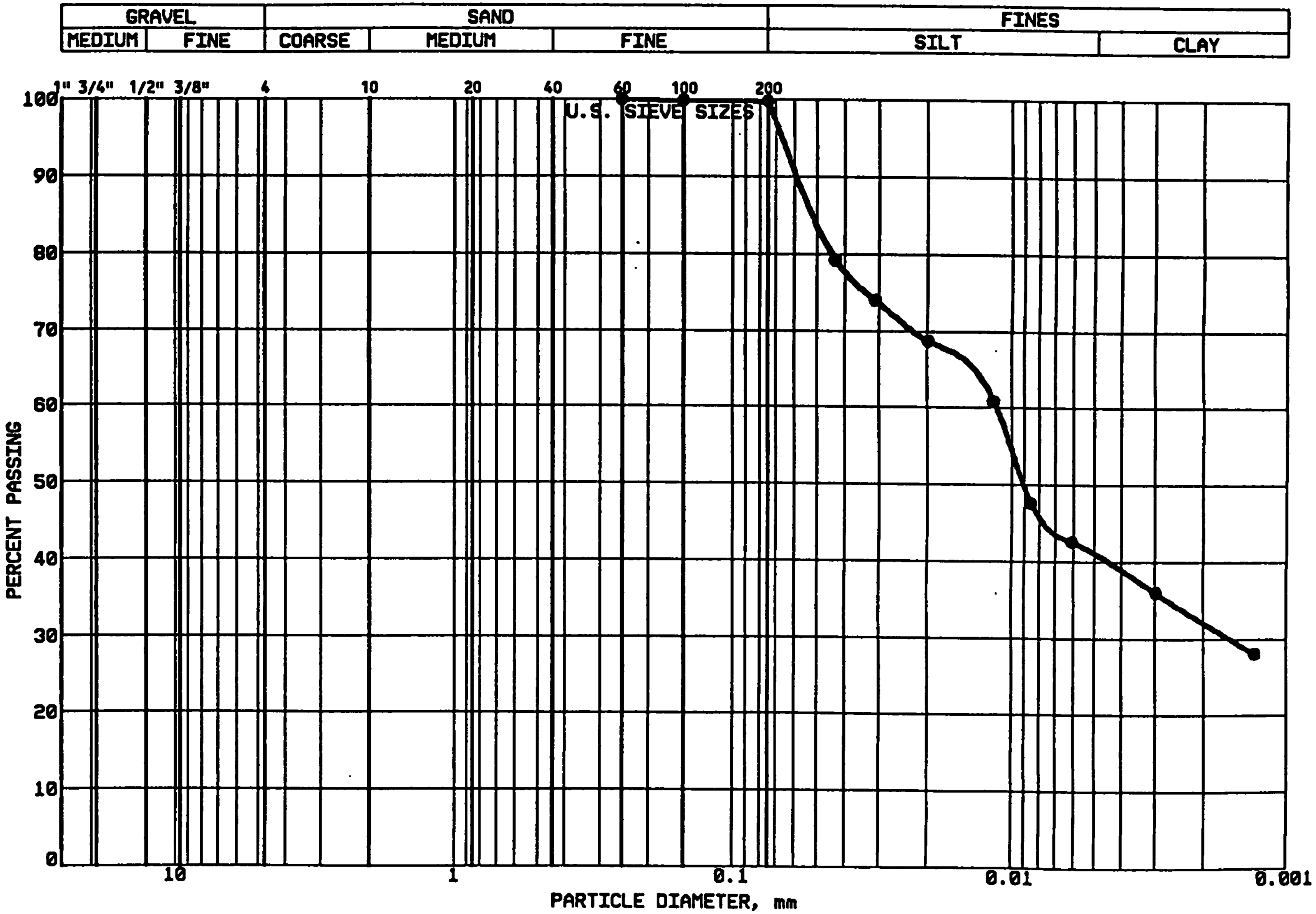
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 2.2 % |
| SILT | 52.3 % |
| CLAY | 45.5 % |

**CLASSIFICATION:**
CL LEAN CLAY,brown

D60=0.011
D30=
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TC-4

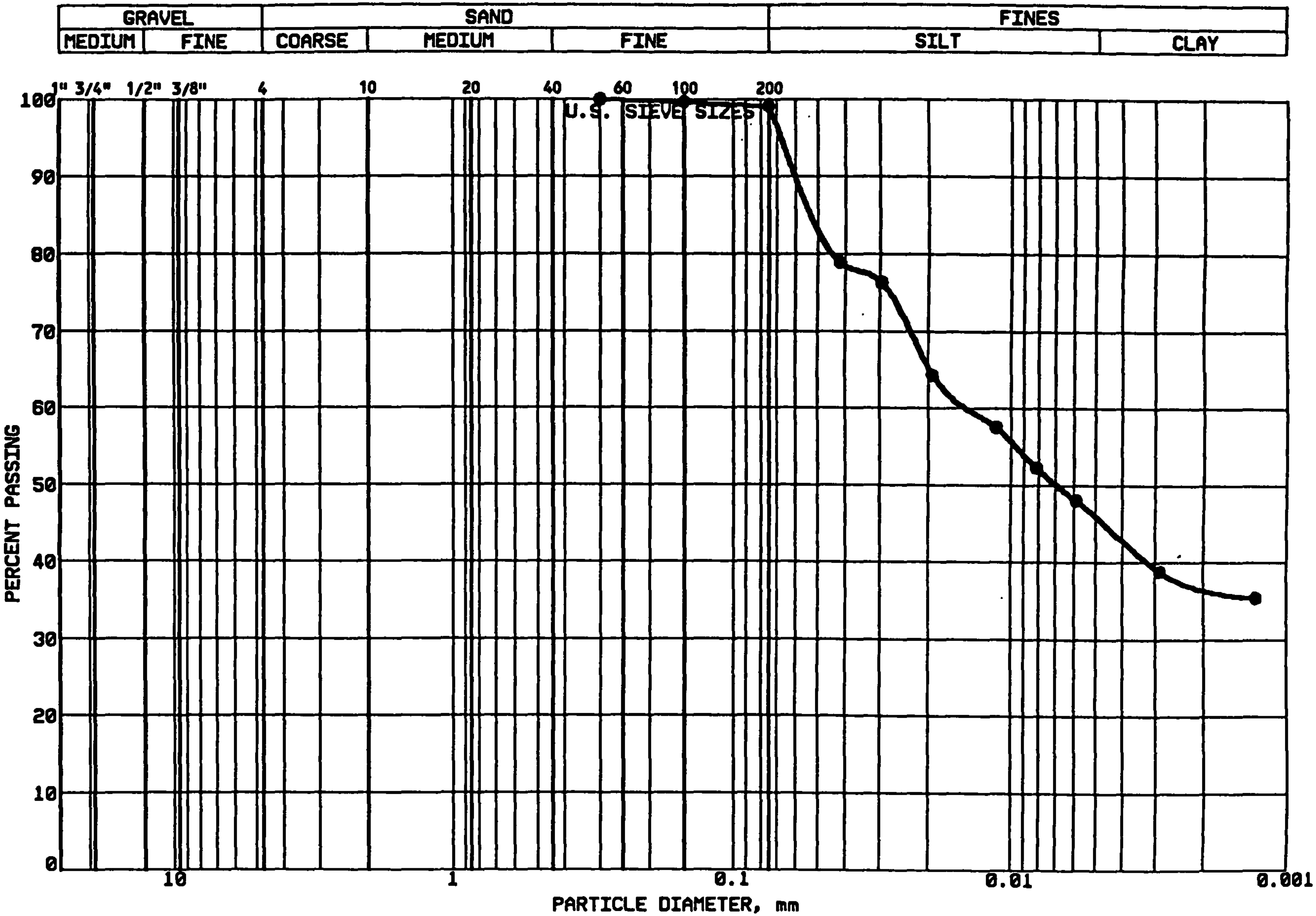
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 0.2 % |
| SILT | 59.0 % |
| CLAY | 40.8 % |

**CLASSIFICATION:**
MH ELASTIC SILT,brown

D60=0.012
D30=0.002
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TC-5

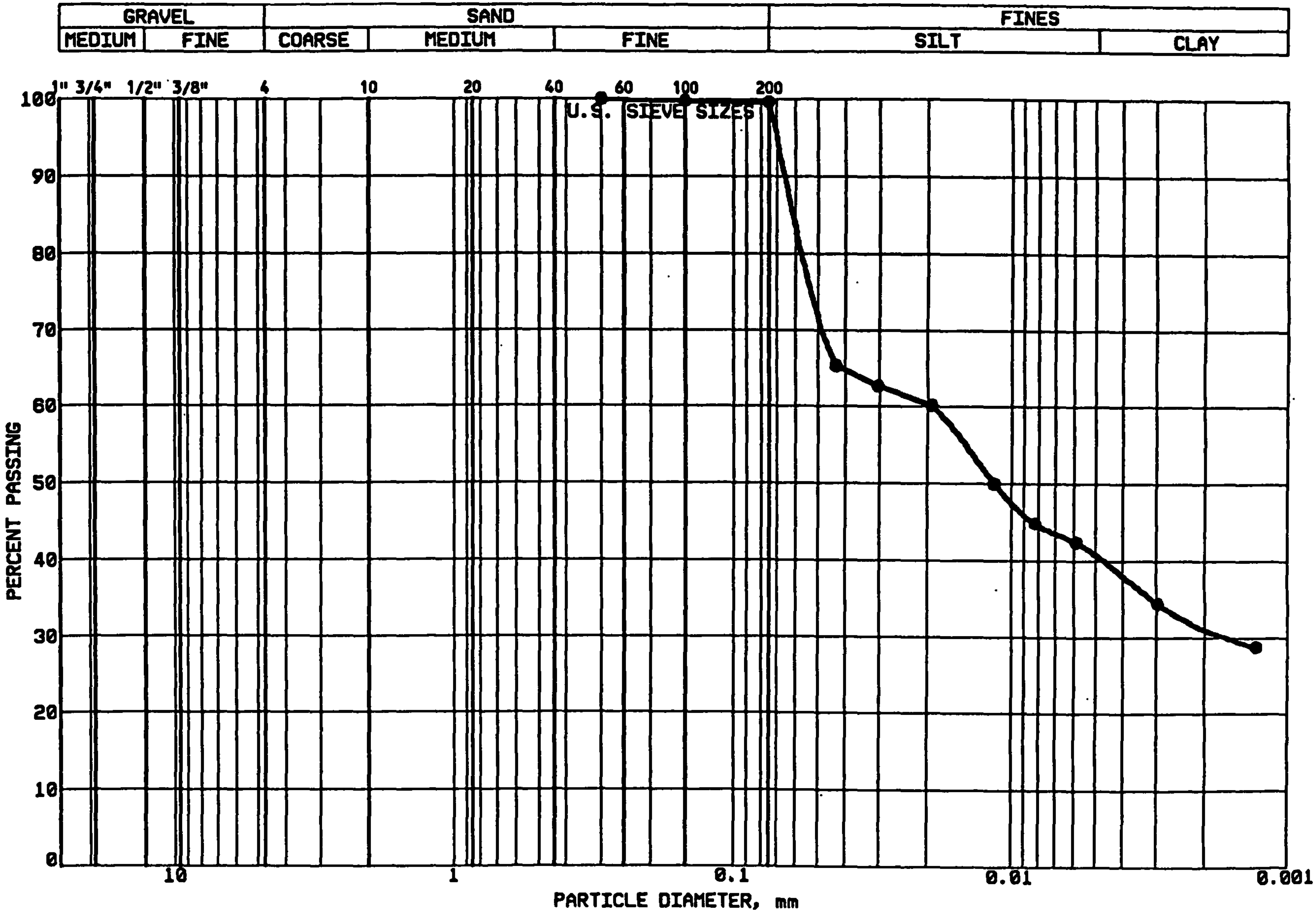
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 0.9 % |
| SILT | 53.2 % |
| CLAY | 45.9 % |

**CLASSIFICATION:**
CL LEAN CLAY,brown

D60=0.014
D30=
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TC-6

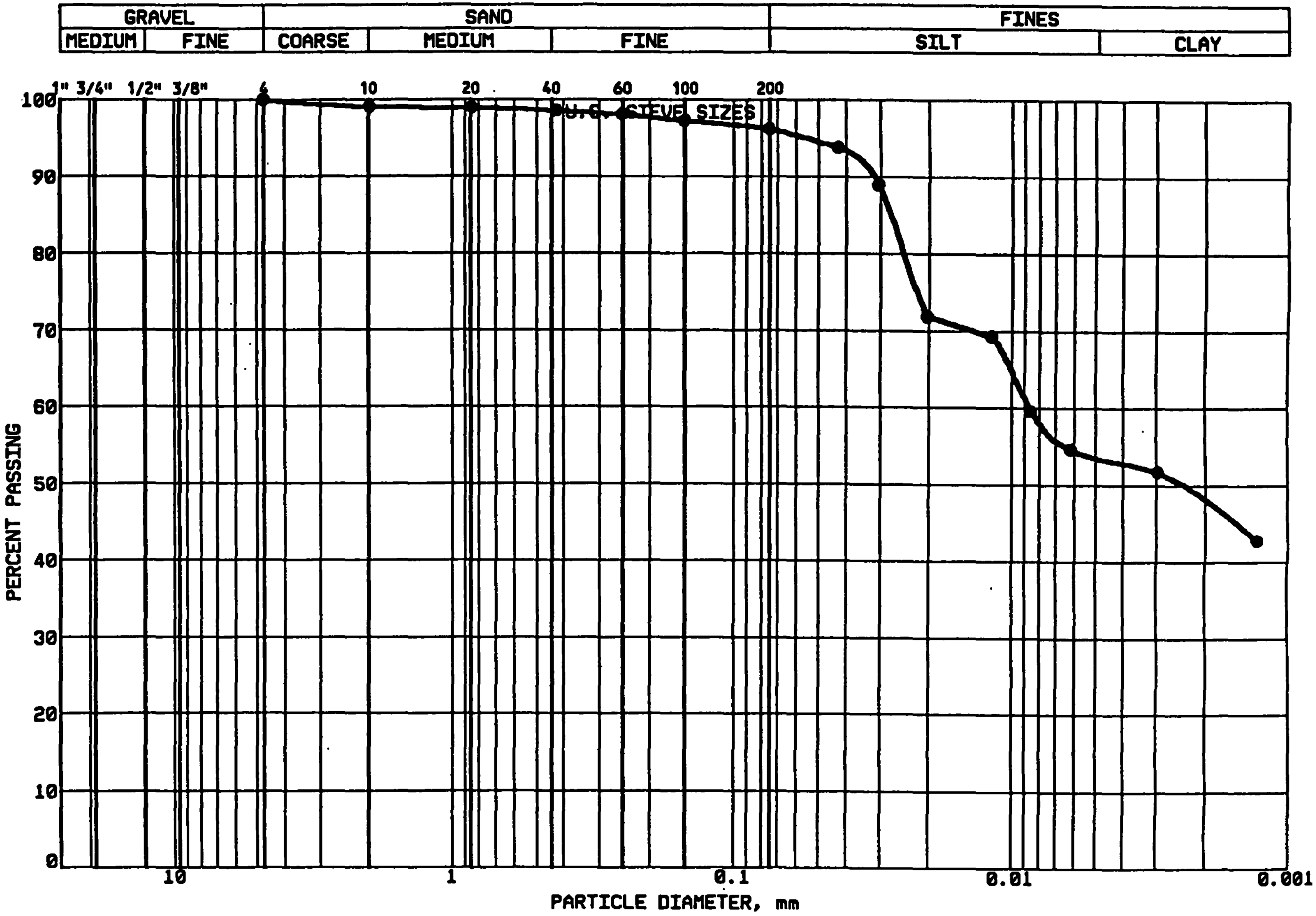
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 0.4 % |
| SILT | 59.1 % |
| CLAY | 40.5 % |

**CLASSIFICATION:**
CH FAT CLAY, brown

D60=0.019
D30=0.002
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

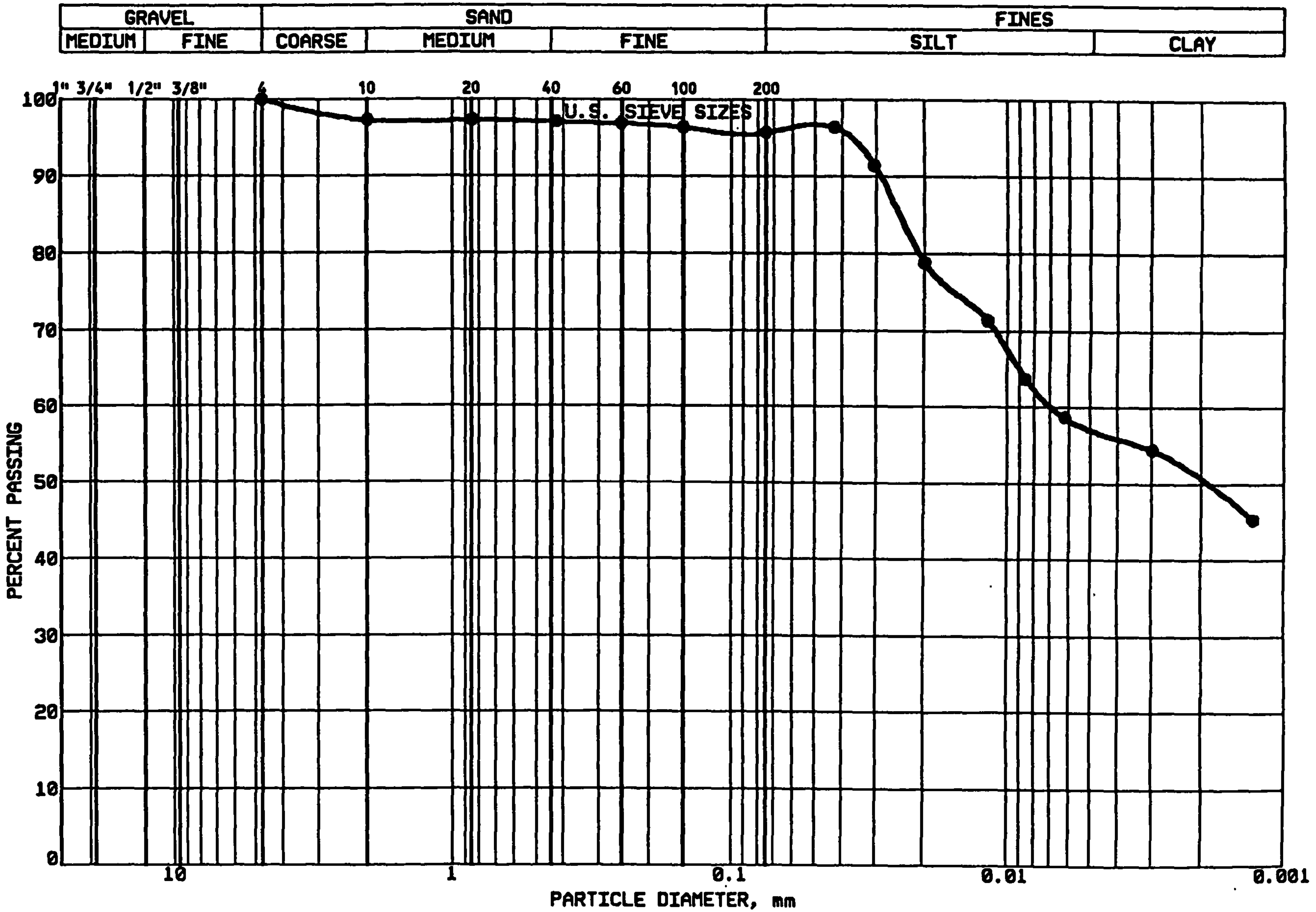
SAMPLE: TC-7

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 3.8 % |
| SILT | 42.4 % |
| CLAY | 53.8 % |

**CLASSIFICATION:**
CH FAT CLAY,brown

D60=0.009
D30=
D10=
Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TC-8

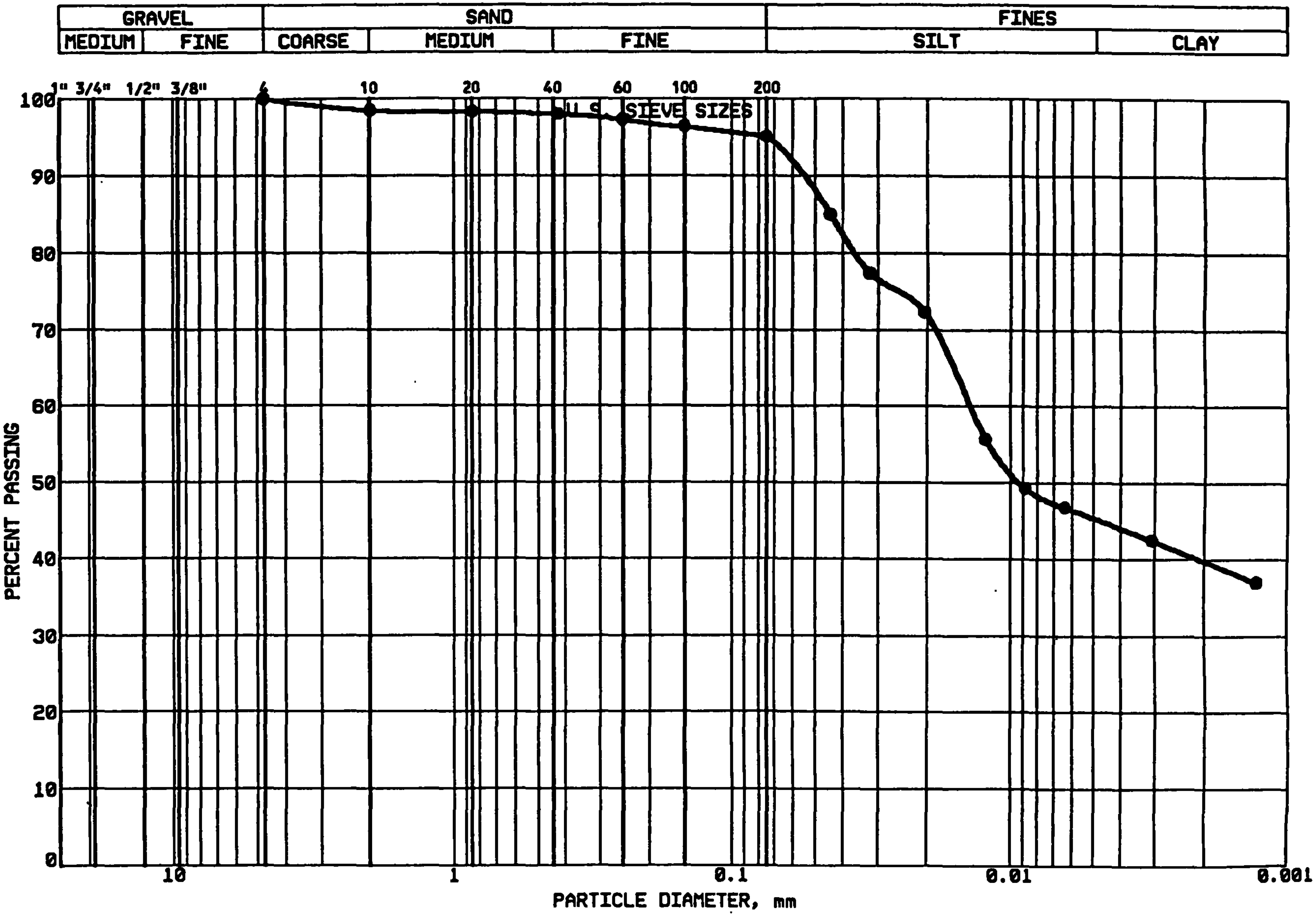
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 4.3 % |
| SILT | 38.2 % |
| CLAY | 57.5 % |

**CLASSIFICATION:**
CH FAT CLAY, brown

D60=0.007
D30=
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TC-9

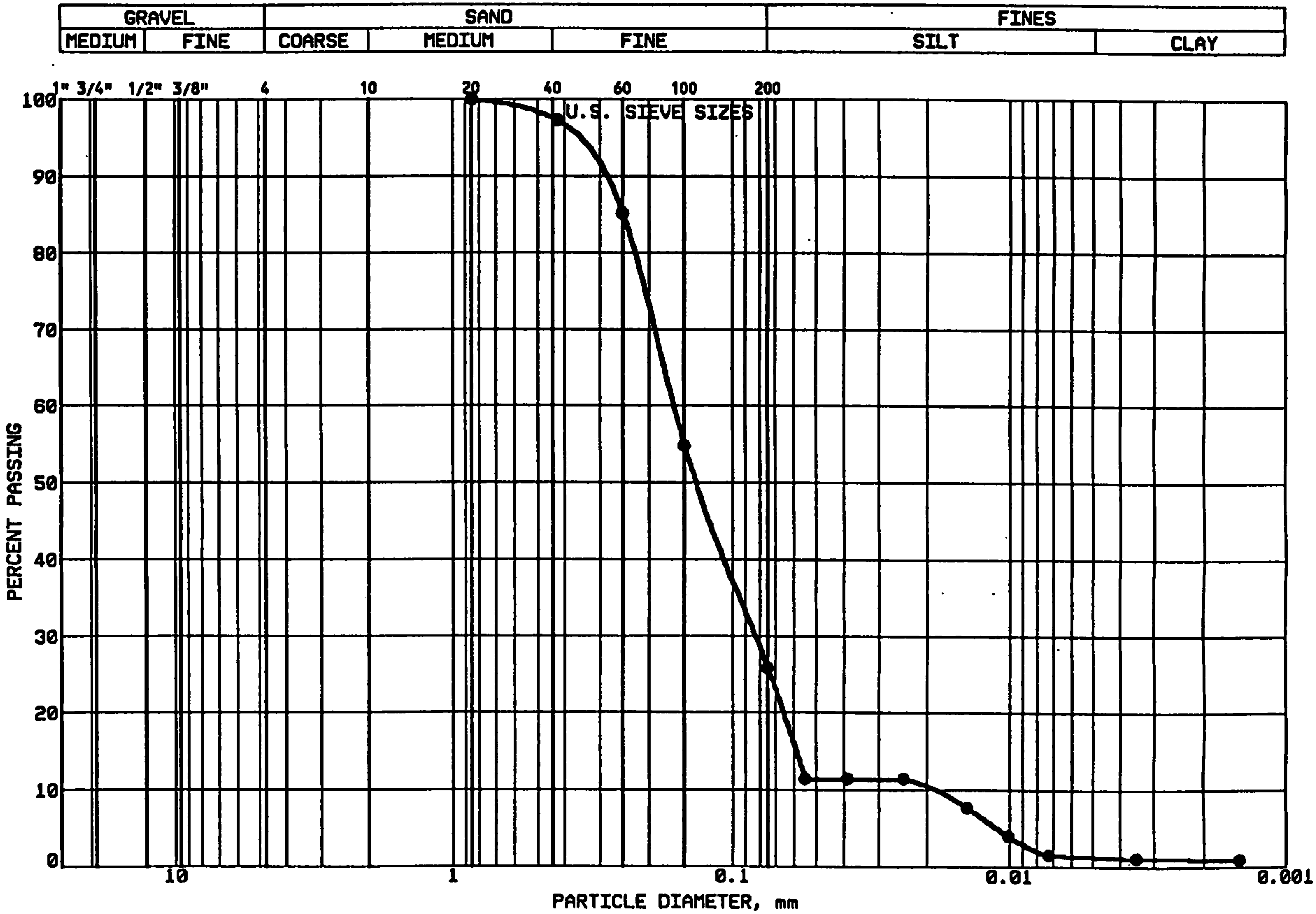
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 4.9 % |
| SILT | 49.8 % |
| CLAY | 45.3 % |

**CLASSIFICATION:**
CL LEAN CLAY, brown

D60=0.014
D30=
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-1

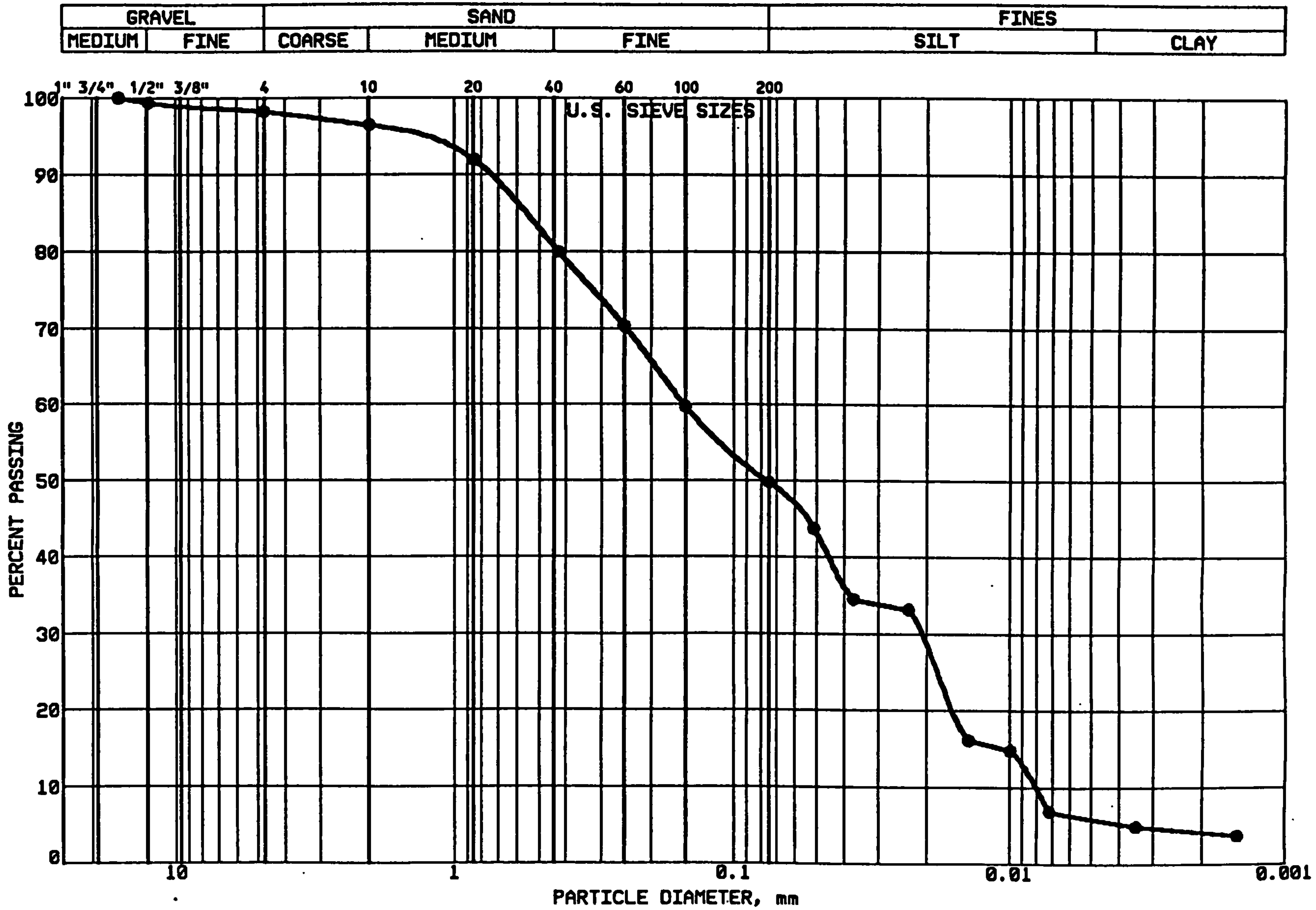
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 74.2 % |
| SILT | 24.4 % |
| CLAY | 1.4 % |

**CLASSIFICATION:**
SM SILTY SAND, fine grained,black

D60=0.164
D30=0.083
D10=0.020

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-2

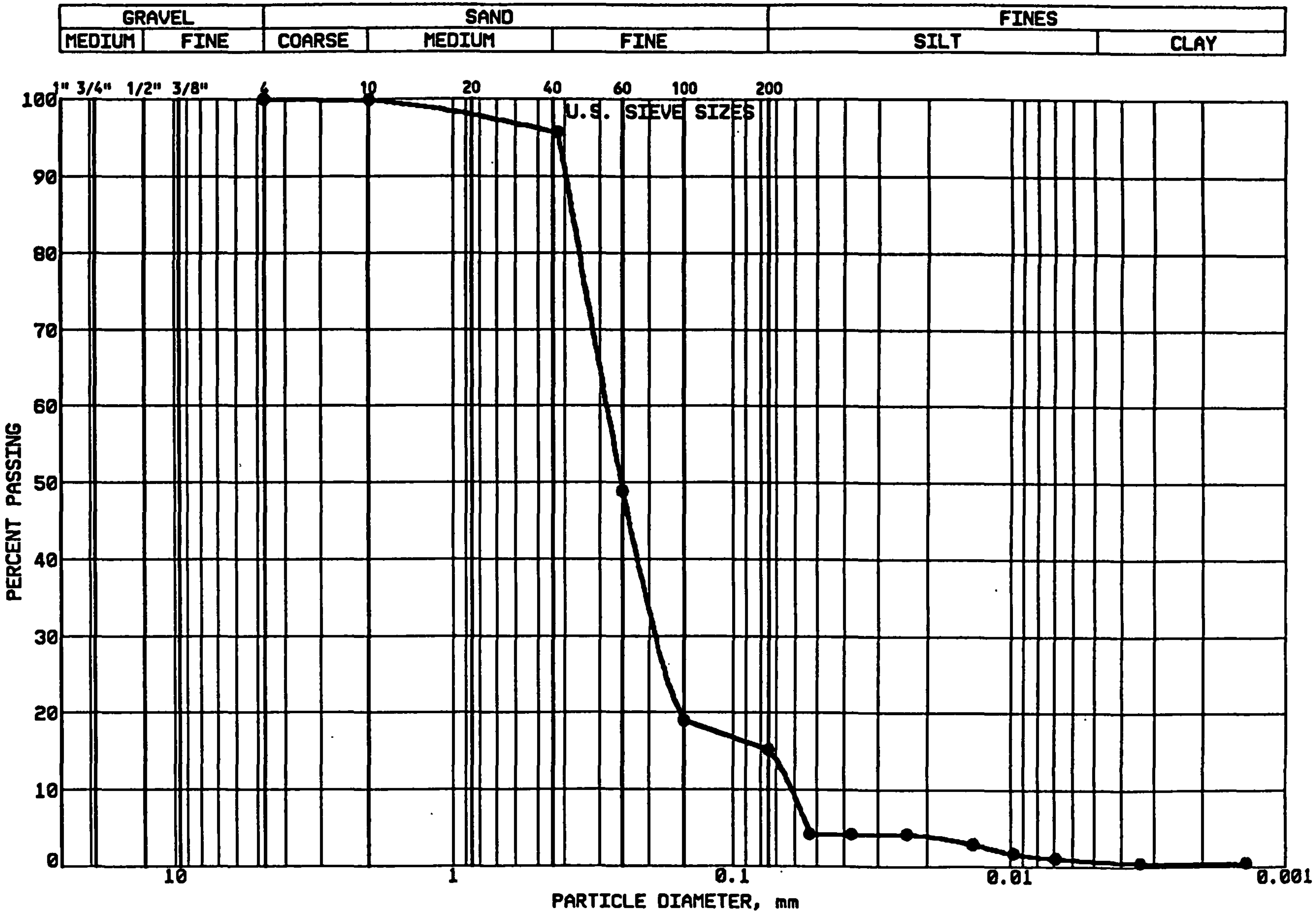
| | |
|---|---|
| GRAVEL | 1.7 % |
| SAND | 48.5 % |
| SILT | 43.8 % |
| CLAY | 6.0 % |

**CLASSIFICATION:**
ML SILT, gray-brown

D60=0.152
D30=0.021
D10=0.008

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-3

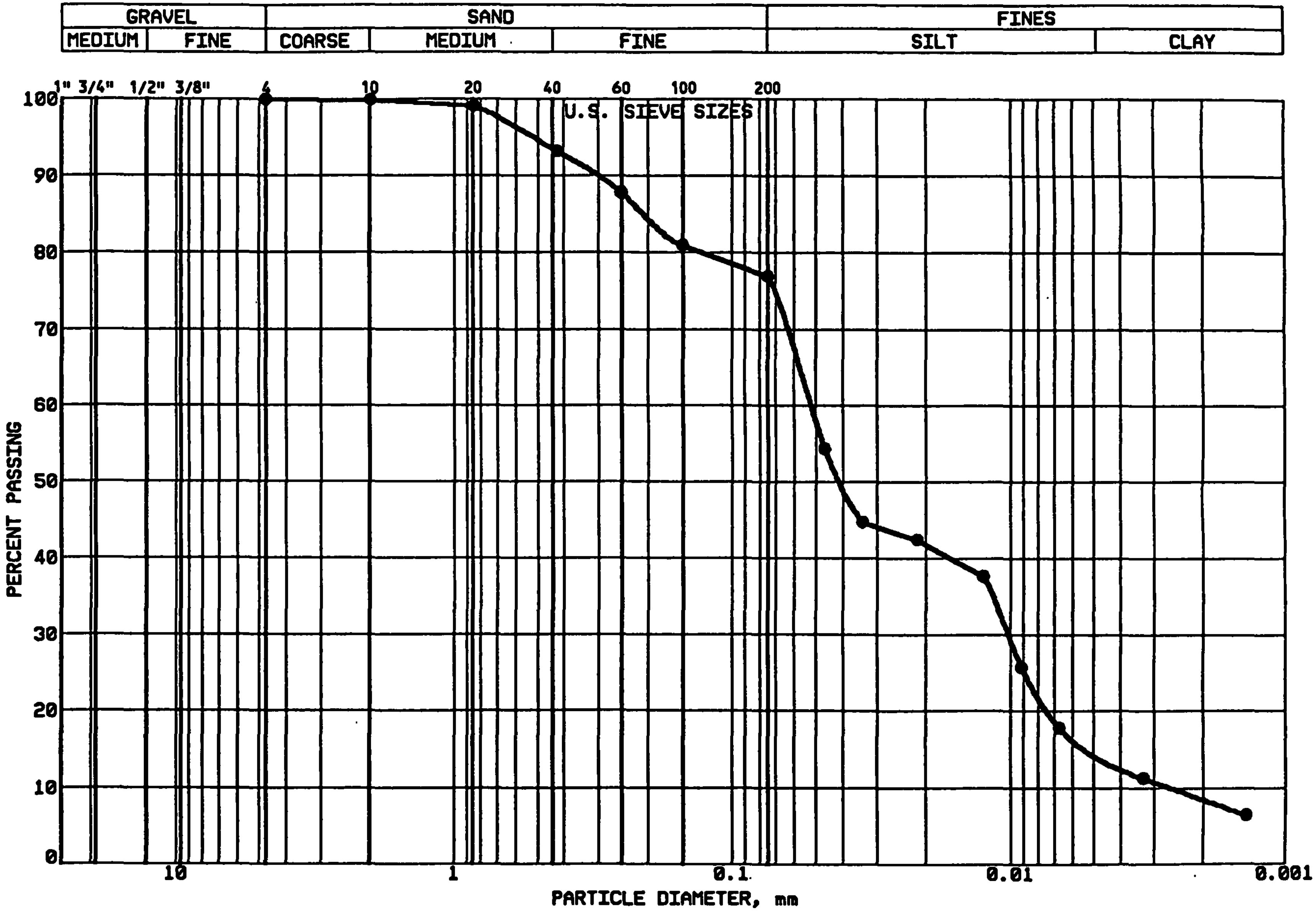
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 84.8 % |
| SILT | 14.3 % |
| CLAY | 0.9 % |

**CLASSIFICATION:**
SM SILTY SAND, fine grained, brown

D60=0.284
D30=0.181
D10=0.064

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-4

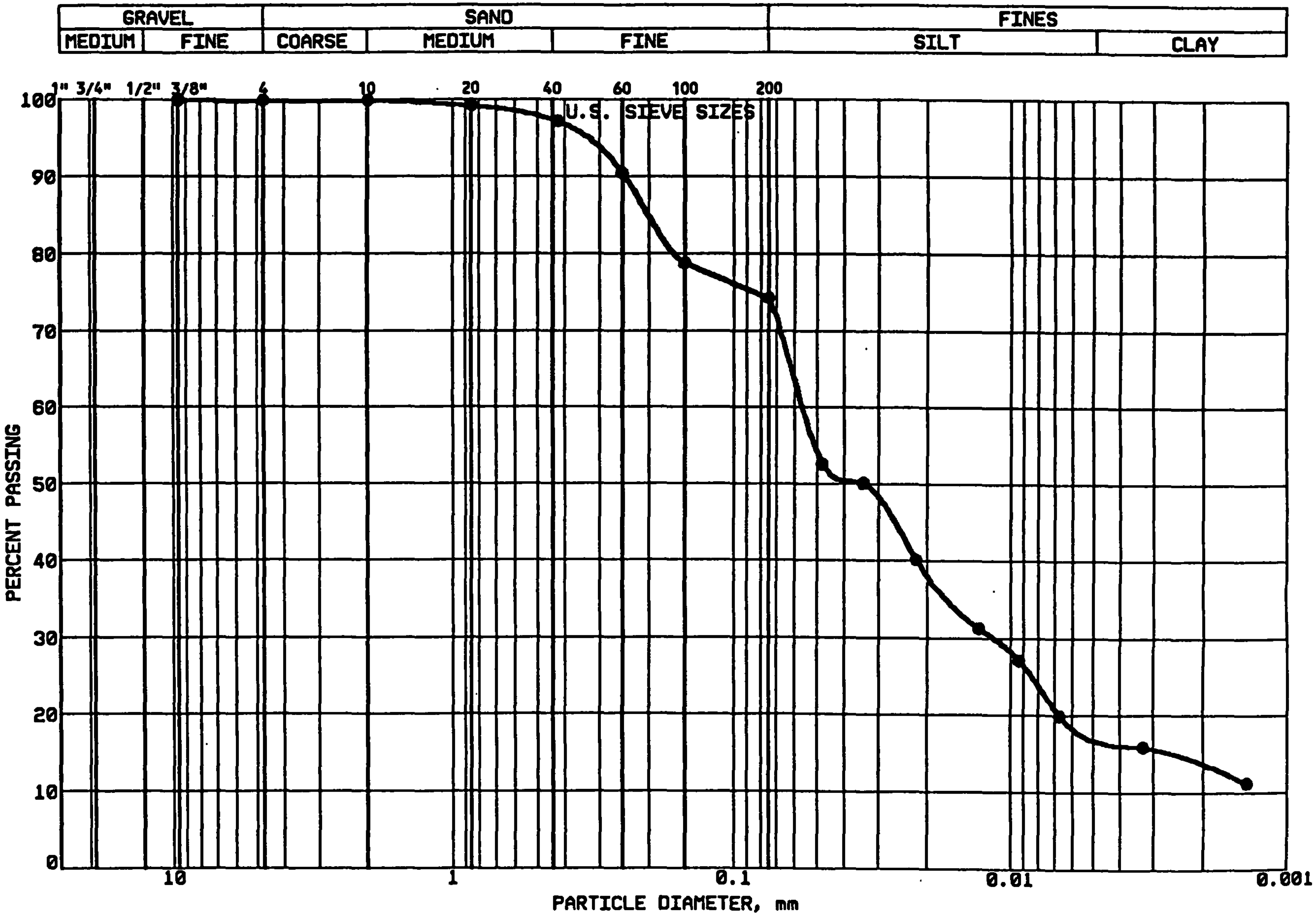
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 23.1 % |
| SILT | 61.7 % |
| CLAY | 15.2 % |

**CLASSIFICATION:**
ML SILT with SAND, black

D60=0.053
D30=0.010
D10=0.003

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-5

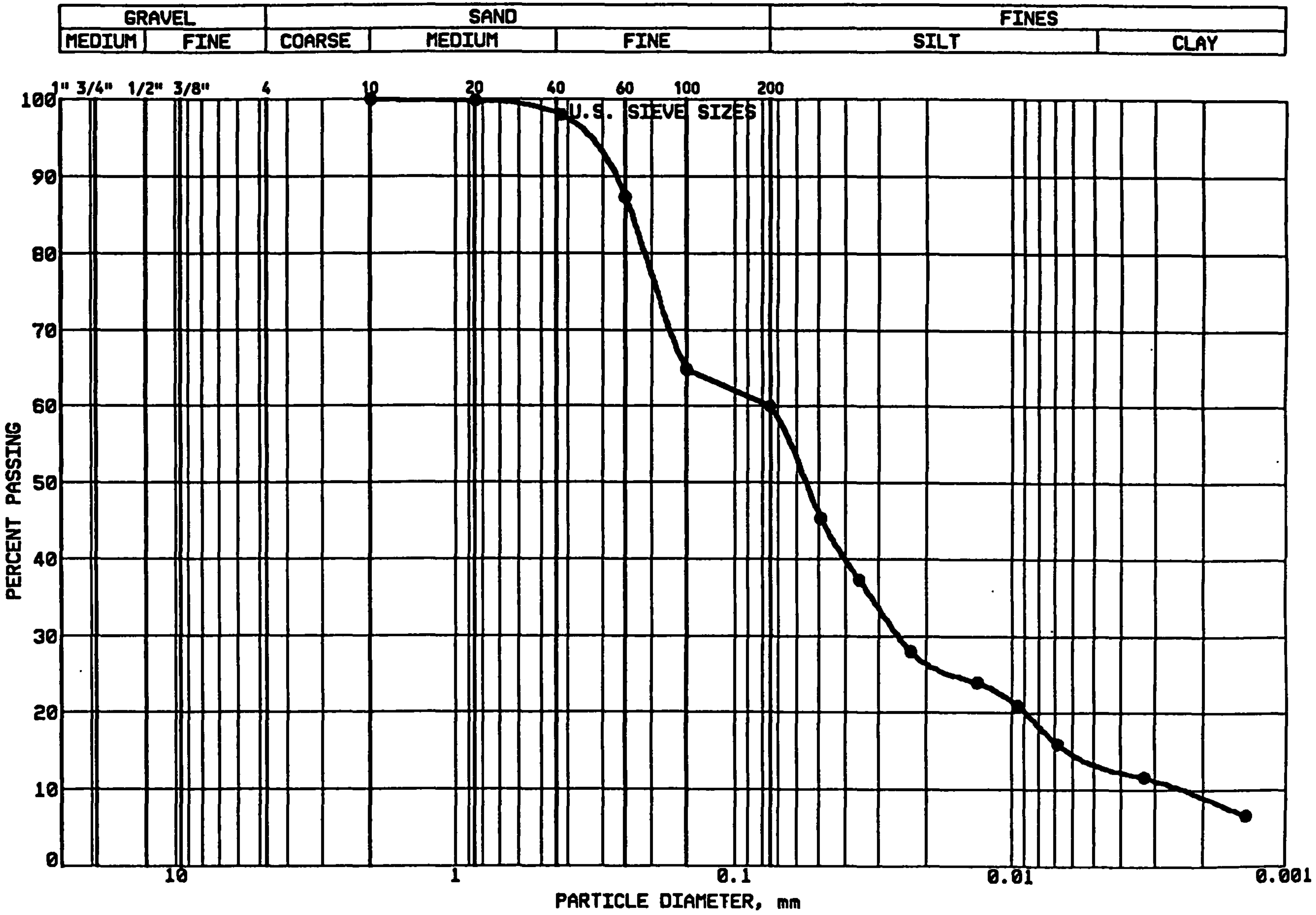
| | |
|---|---|
| GRAVEL | 0.1 % |
| SAND | 25.7 % |
| SILT | 55.9 % |
| CLAY | 18.3 % |

**CLASSIFICATION:**
ML SANDY SILT,brown

D60=0.056
D30=0.012
D10=

Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-6

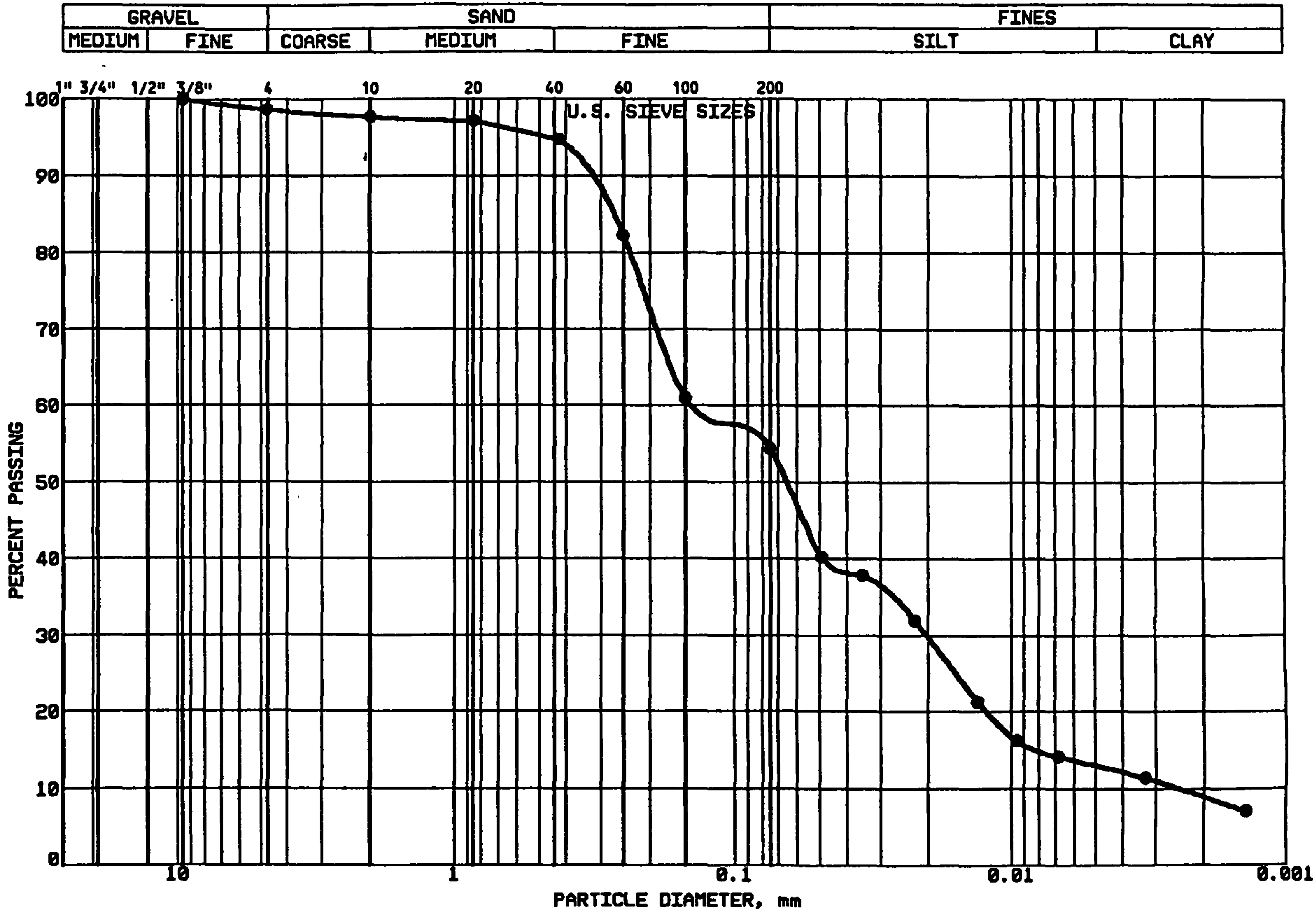
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 40.0 % |
| SILT | 45.8 % |
| CLAY | 14.2 % |

**CLASSIFICATION:**
ML SANDY SILT,brown

D60=0.075
D30=0.025
D10=0.003

Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-7

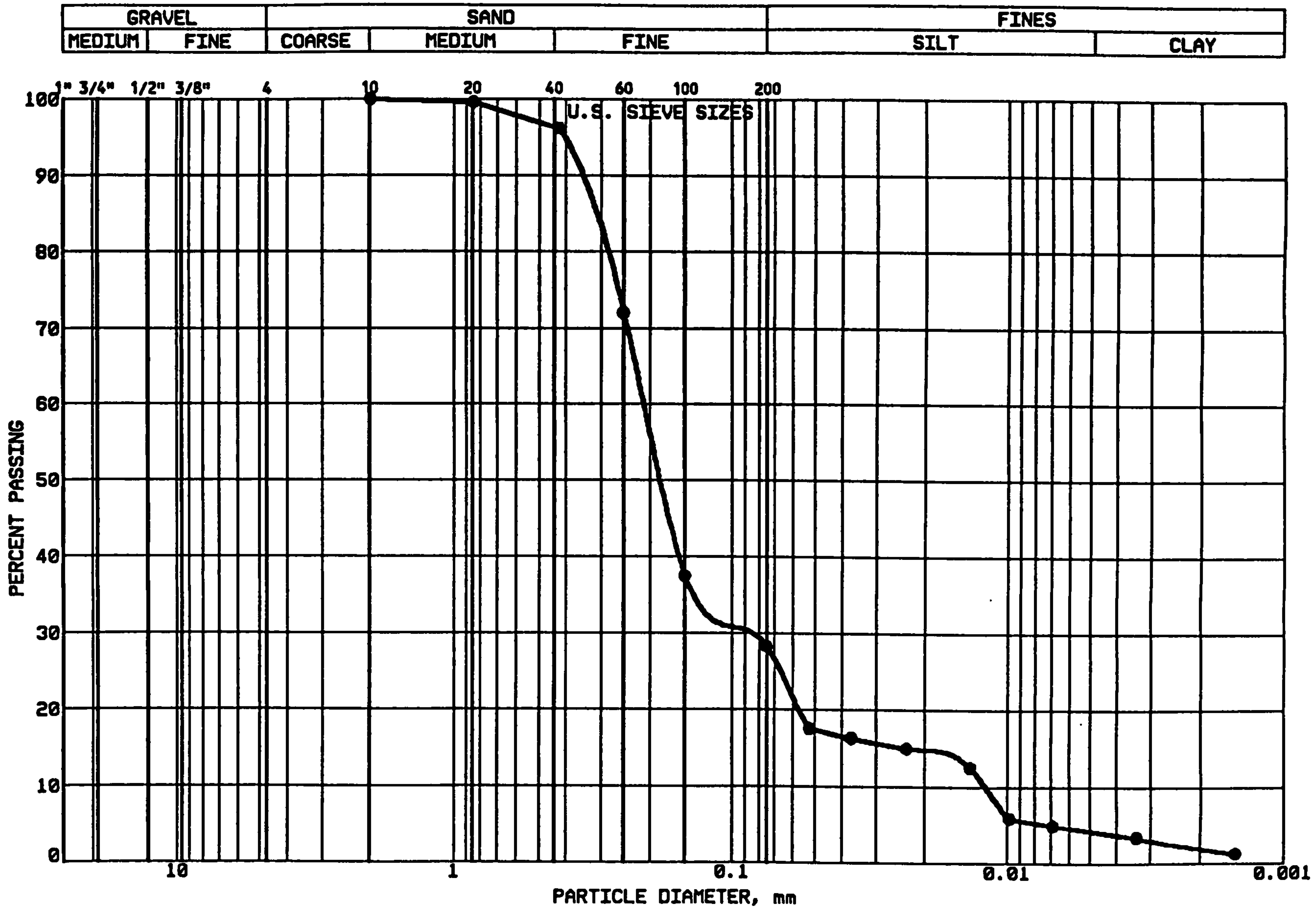
| | |
|---|---|
| GRAVEL | 1.3 % |
| SAND | 44.3 % |
| SILT | 41.3 % |
| CLAY | 13.1 % |

**CLASSIFICATION:**
ML SANDY SILT, brown

D60=0.135
D30=0.021
D10=0.003

Cu=
Cc=

# GRAIN SIZE - HYD[illegible]TER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-8

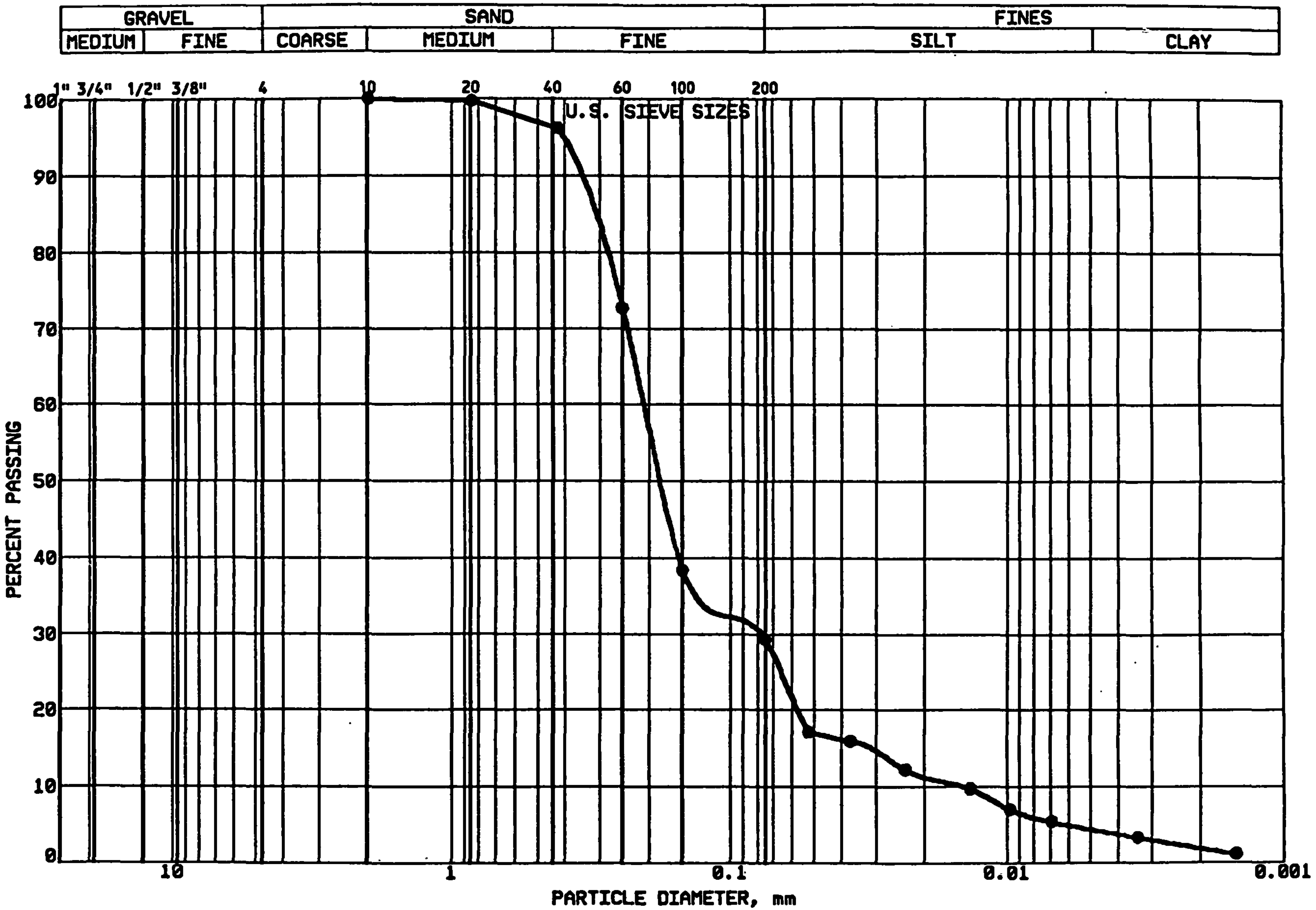
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 71.8 % |
| SILT | 23.9 % |
| CLAY | 4.3 % |

**CLASSIFICATION:**
SM SILTY SAND, brown

D60=0.209
D30=0.086
D10=0.012

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-9

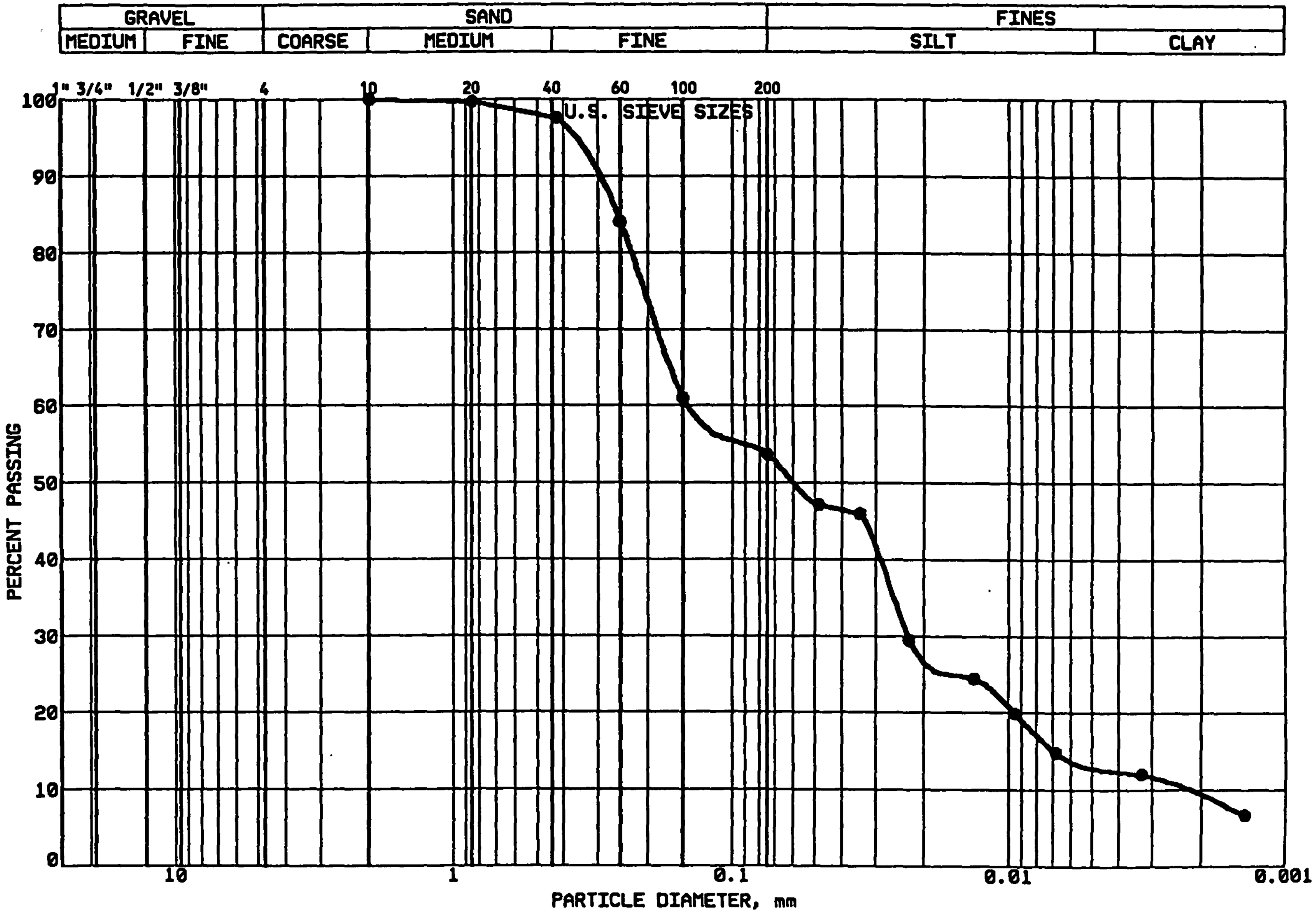
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 70.7 % |
| SILT | 24.8 % |
| CLAY | 4.5 % |

**CLASSIFICATION:**
SM SILTY SAND, brown

D60=0.207
D30=0.079
D10=0.014

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-10

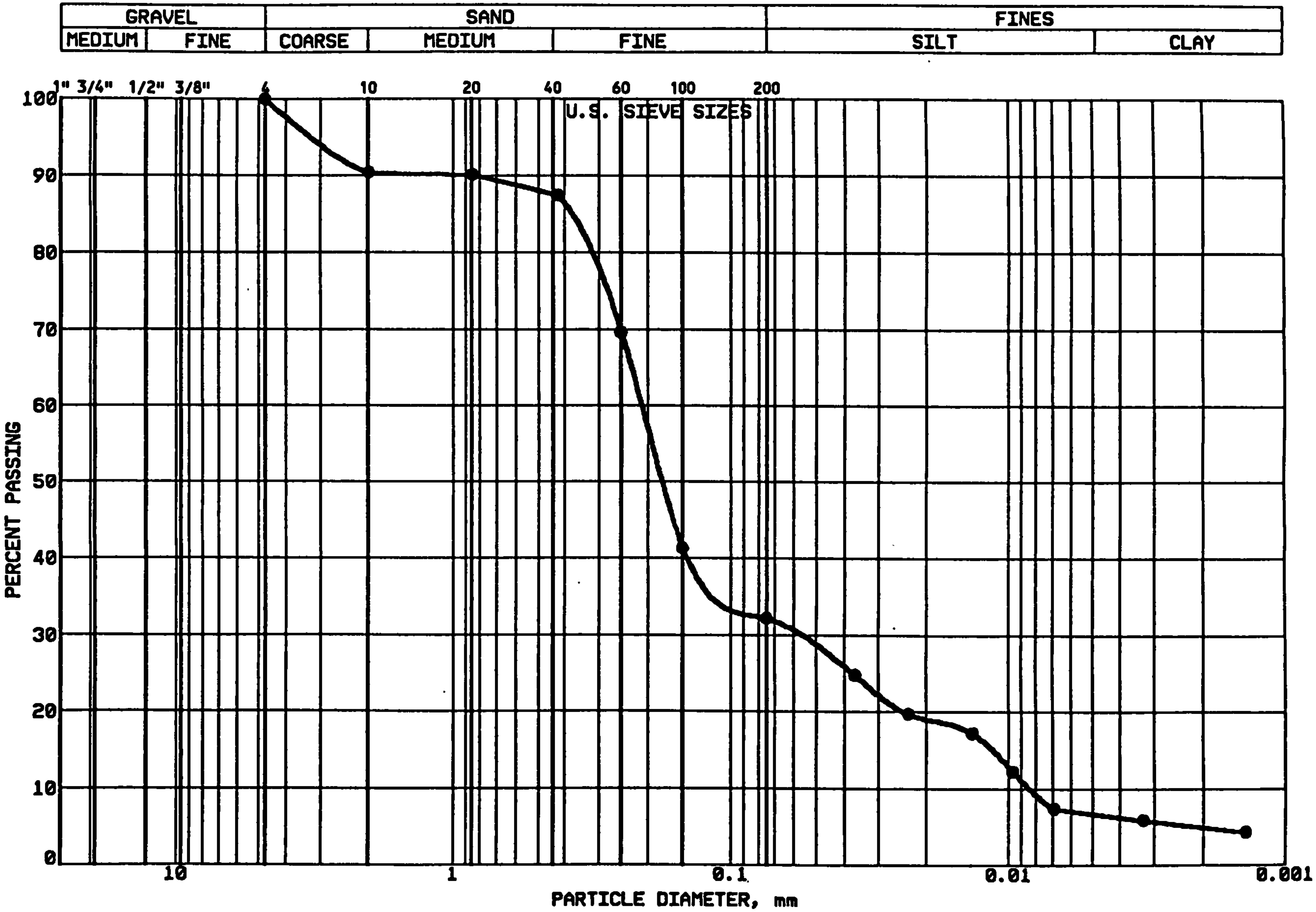
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 46.3 % |
| SILT | 40.0 % |
| CLAY | 13.7 % |

**CLASSIFICATION:**
ML SANDY SILT, brown

D60=0.136
D30=0.023
D10=0.002

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-11

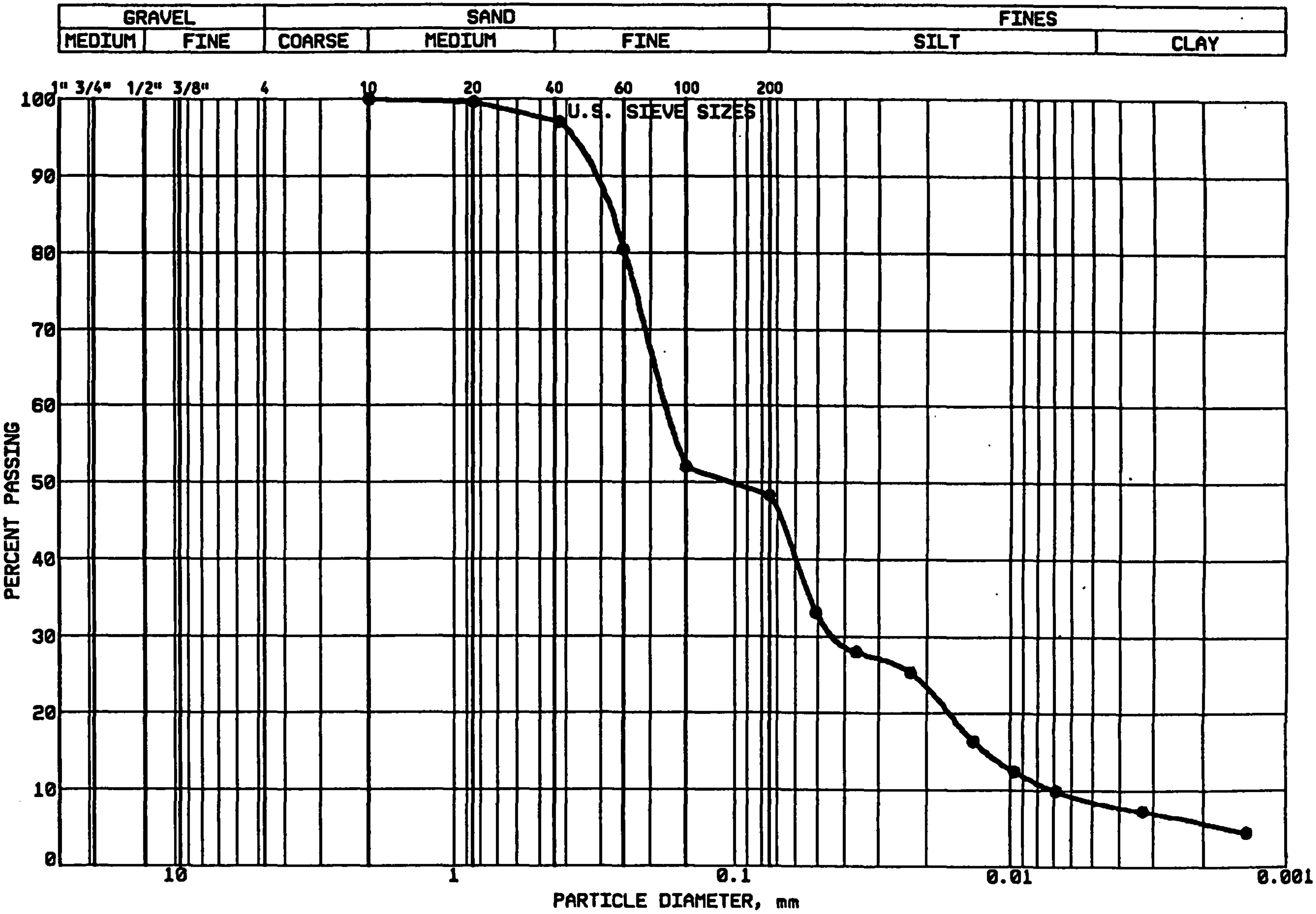
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 67.8 % |
| SILT | 25.4 % |
| CLAY | 6.8 % |

**CLASSIFICATION:**
SM SILTY SAND, brown

D60=0.210
D30=0.061
D10=0.008

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-12

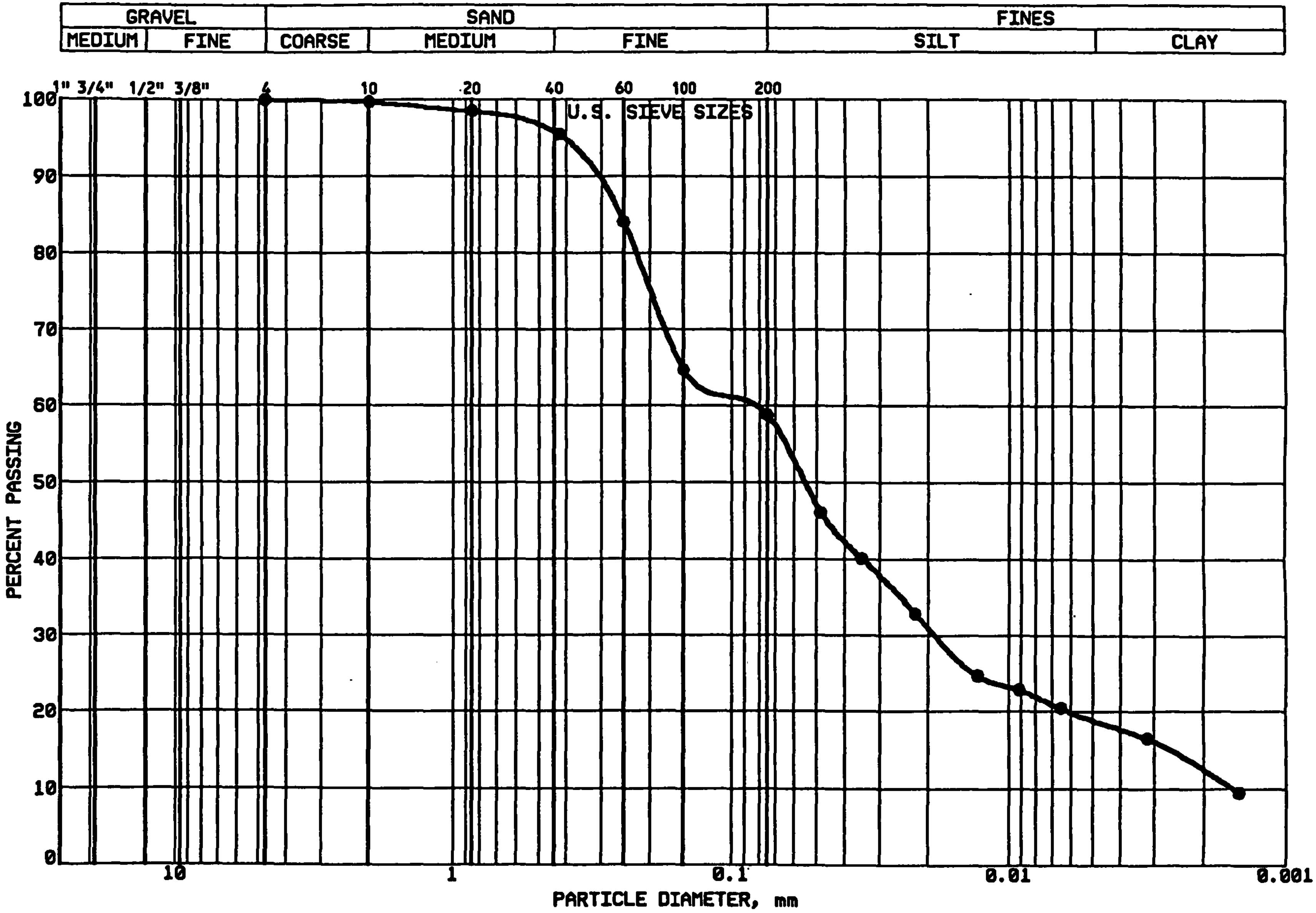
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 51.7 % |
| SILT | 39.4 % |
| CLAY | 8.9 % |

**CLASSIFICATION:**
SM SILTY SAND,brown

D60=0.173
D30=0.041
D10=0.007

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-13

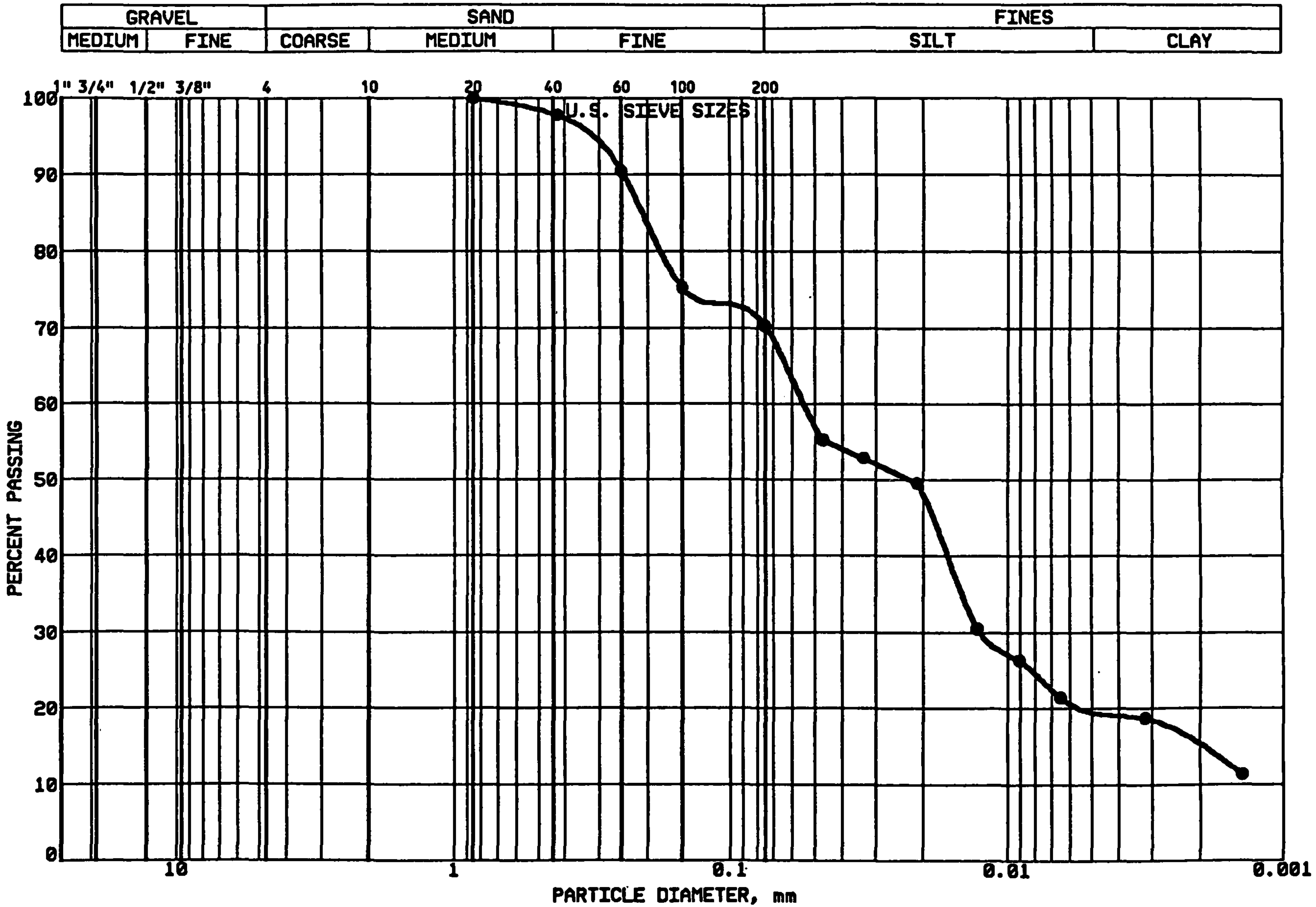
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 41.2 % |
| SILT | 39.7 % |
| CLAY | 19.1 % |

**CLASSIFICATION:**
ML SANDY SILT, brown

D60=0.086
D30=0.019
D10=0.002

Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A

Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-14

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 29.8 % |
| SILT | 49.7 % |
| CLAY | 20.5 % |

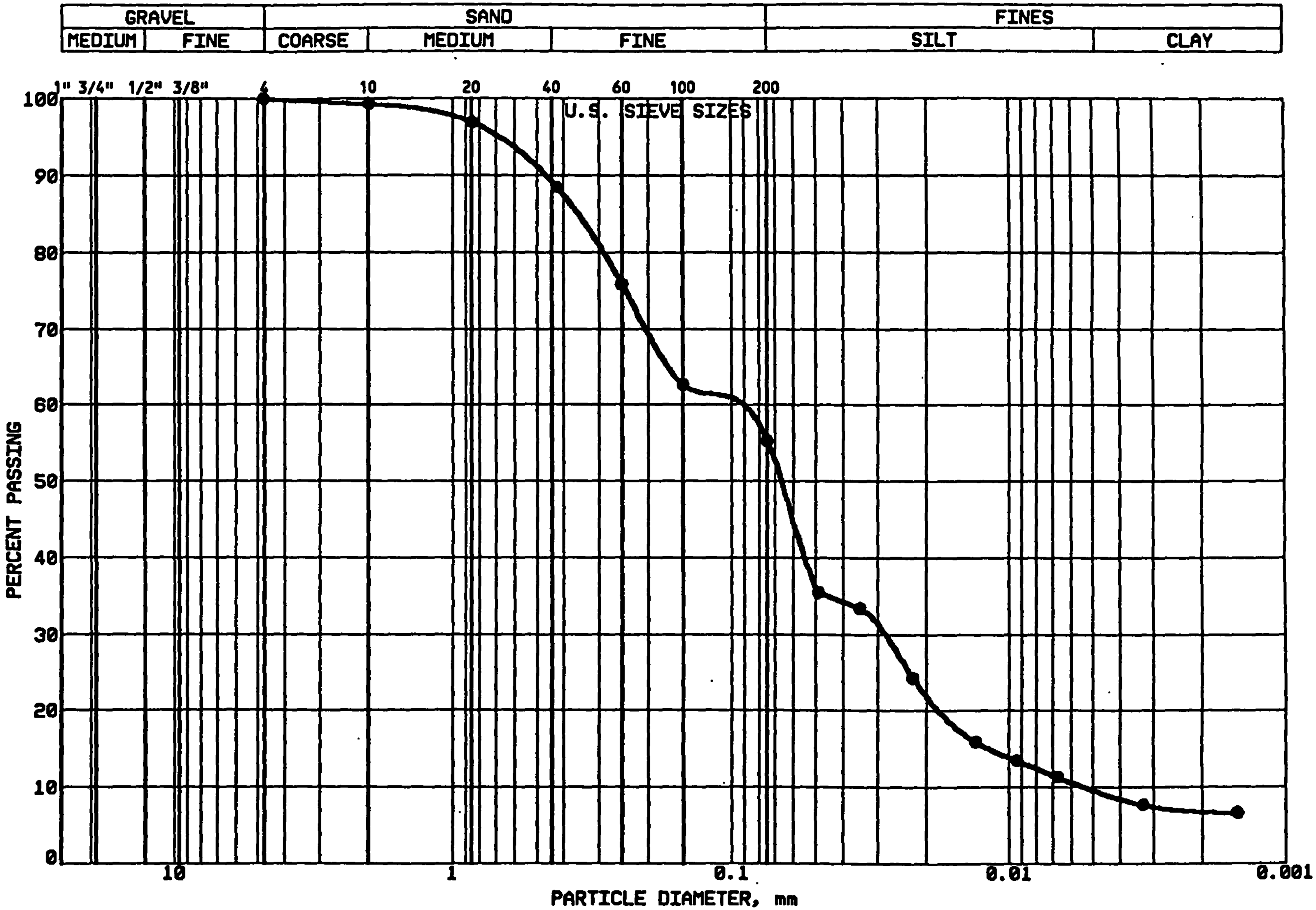
**CLASSIFICATION:**

ML SILT with SAND, brown

D60=0.055
D30=0.012
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

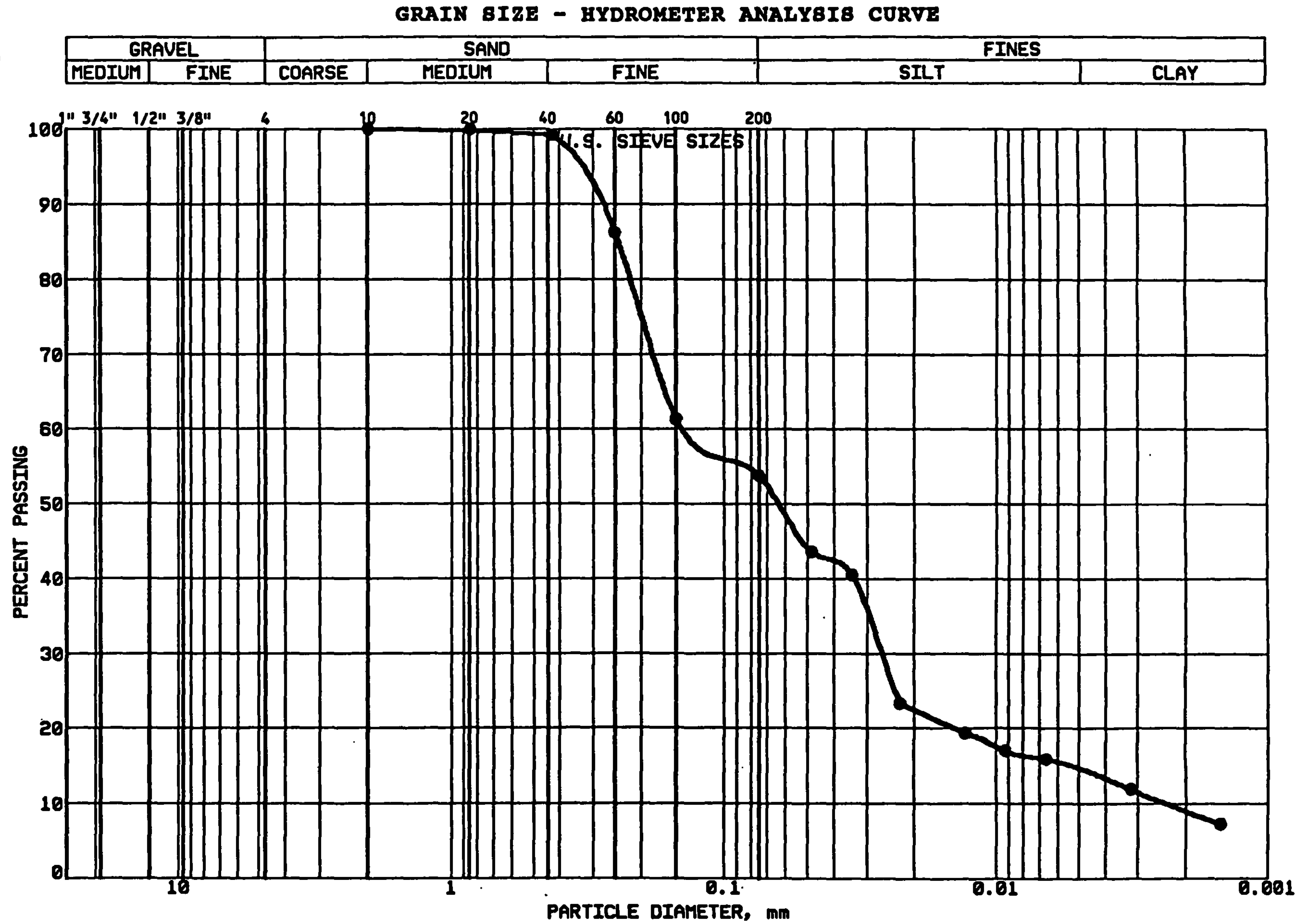
SAMPLE: TS-15

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 44.7 % |
| SILT | 45.4 % |
| CLAY | 9.9 % |

**CLASSIFICATION:**
ML SANDY SILT, brown

D60=0.117
D30=0.030
D10=0.005

Cu=
Cc=



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-18

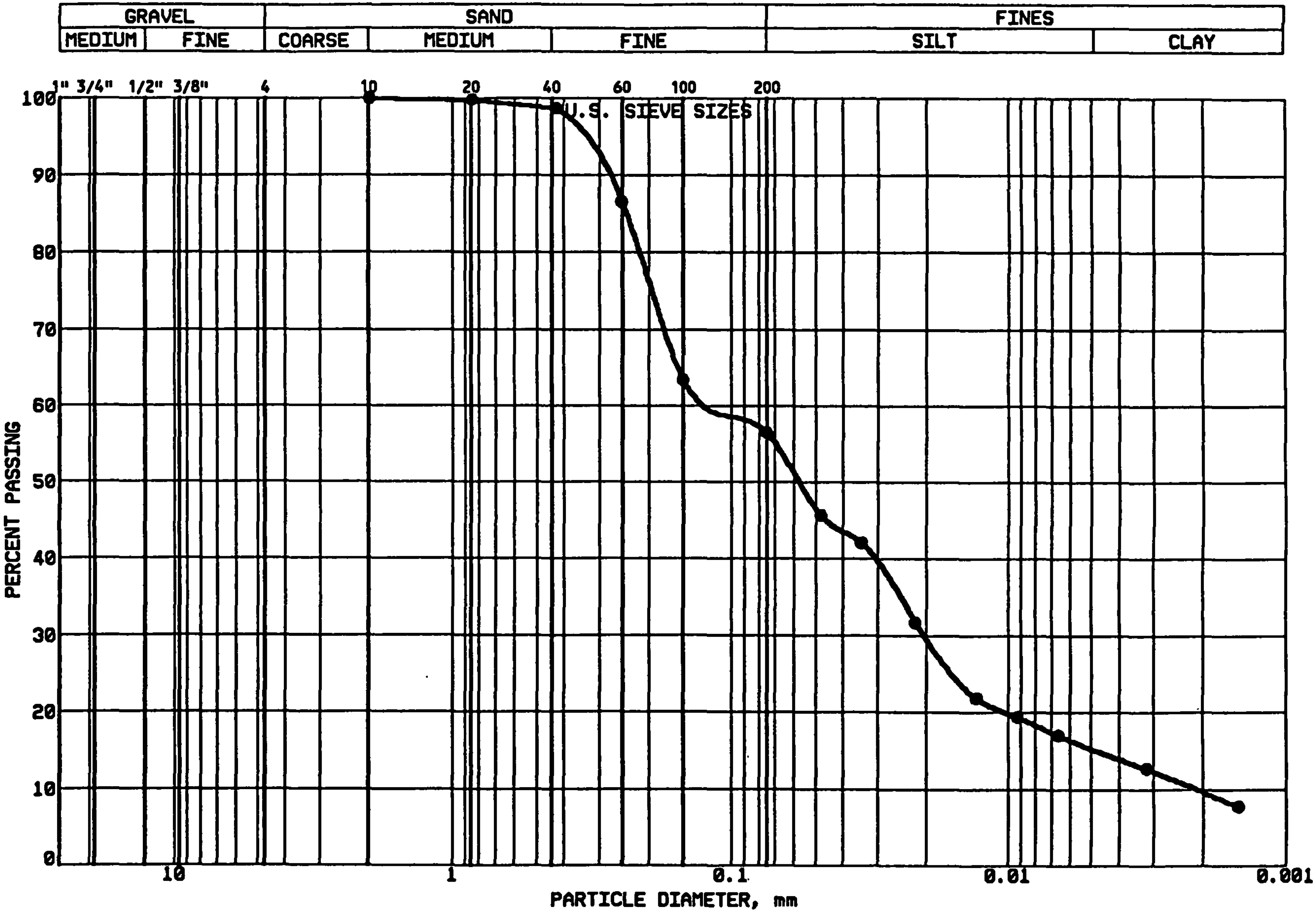
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 46.2 % |
| SILT | 39.3 % |
| CLAY | 14.5 % |

**CLASSIFICATION:**
ML SANDY SILT,brown

D60=0.133
D30=0.027
D10=0.002

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-17

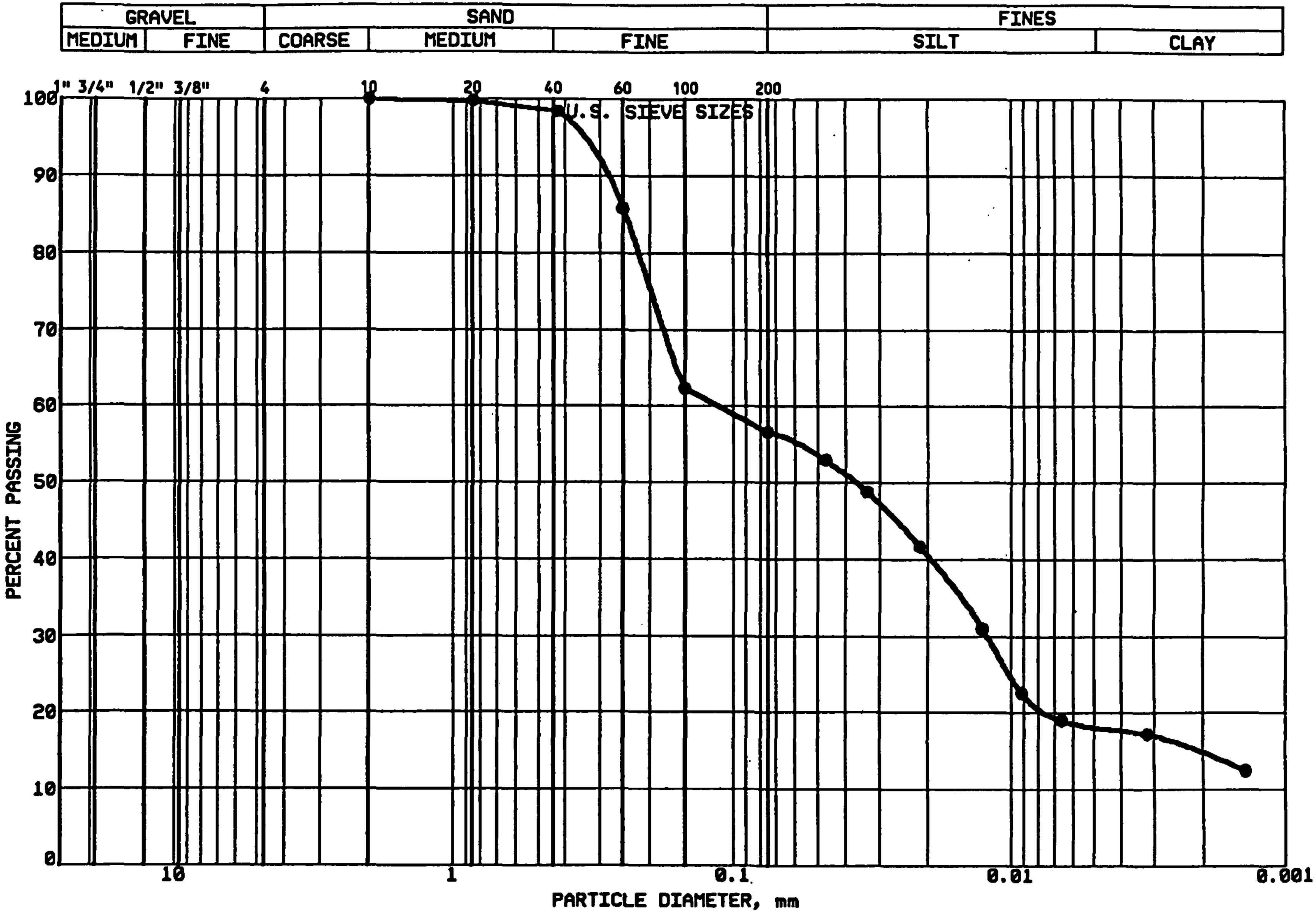
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 43.5 % |
| SILT | 41.0 % |
| CLAY | 15.5 % |

**CLASSIFICATION:**
ML SANDY SILT,brown

D60=0.107
D30=0.020
D10=0.002

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**PROJECT:** BNDX-93-037A
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TS-18

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 43.4 % |
| SILT | 38.2 % |
| CLAY | 18.4 % |

**CLASSIFICATION:**
ML SANDY SILT, brown

D60=0.113
D30=0.012
D10=

Cu=
Cc=

# THINWALL TESTS

**BRAUN℠**
**INTERTEC**

**Braun Intertec Engineering, Inc.**
**310 Service Court Northeast**
**Rochester, Minnesota 55906-3446**
**507-281-2515 Fax: 281-5303**

*Engineers and Scientists Serving*
*the Built and Natural Environments*

**Project:** BNDX–93–037A
ASTM D 5084, Method C

**Date:** 8/17/93

**Boring:**

**Sample:** TW–1

**Depth:**

**Sample Description:** CH, Fat clay, olive gray, wet

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 45.87 | Wt Specimen + Tare Wet: | 719.90 |
| Wt. Specimen + Tare Dry: | 39.31 | Wt. Specimen + Tare Dry: | 562.11 |
| Wt. Tare: | 20.80 | Wt. Tare: | 124.51 |
| Moisture Content: | 35.4% | Moisture Content: | 36.1% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.84 in | Area, A: | 40.87 cm2 | Initial Wt. (gm): | 581.42 |
| Initial Ht.: | 7.7 cm | Initial Dry Unit Wt.: | 85.2 pcf | Initial Saturation: | 97.8% |
| Final Ht., L: | 7.7 cm | Final Dry Unit Wt.: | 85.2 pcf | Final Saturation: | 99.5% |
| Sp. Gravity: | 2.700 | | | | |

Burette Area, a (cm2): 0.73
Differential pressure: 2.0 psi = 140.7 cm H2O
Consolidation Pressure (psi): 5.0
Overburden: 720.0 psf
Skempton's B coeficient: 1.0
Operating Pressures (psi): Cell: 65.0 Head: 62.0 Tail: 60.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 42.00 | 16.30 | 166.38 | | | | |
| Final | 29820 | 41.60 | 16.70 | | 165.58 | 166.0 | 21.6 | |
| Result | | | | | | | | 1.1E–08 |
| Initial | 0 | 41.60 | 16.70 | 165.58 | | | | |
| Final | 58320 | 40.80 | 17.50 | | 163.98 | 164.8 | 21.4 | |
| Result | | | | | | | | 1.1E–08 |
| Initial | 0 | 43.10 | 15.20 | 168.58 | | | | |
| Final | 45480 | 42.50 | 15.80 | | 167.38 | 168.0 | 21.8 | |
| Result | | | | | | | | 1.1E–08 |
| Initial | 0 | 42.50 | 15.80 | 167.38 | | | | |
| Final | 38220 | 42.00 | 16.30 | | 166.38 | 166.9 | 21.7 | |
| Result | | | | | | | | 1.1E–08 |
| Average Permeability | | | | | | | | 1.1E–08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

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*Engineers and Scientists Serving the Built and Natural Environment*

**Project:** BNDX-93-037A
ASTM D 5084, Method C

**Date:** 8/16/93

**Boring:** ______ **Sample:** TW-02 **Depth:** ______

**Sample Description:** CH, Fat clay, olive, wet

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 64.15 | Wt Specimen + Tare Wet: | 750.60 |
| Wt. Specimen + Tare Dry: | 53.50 | Wt. Specimen + Tare Dry: | 581.21 |
| Wt. Tare: | 20.26 | Wt. Tare: | 133.80 |
| Moisture Content: | 32.0% | Moisture Content: | 37.9% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.84 in | Area, A: | 40.87 cm2 | Initial Wt. (gm): | 596.60 |
| Initial Ht.: | 3.2 in | Initial Dry Unit Wt.: | 86.0 pcf | Initial Saturation: | 90.2% |
| Final Ht., L: | 3.3 in | Final Dry Unit Wt.: | 83.4 pcf | Final Saturation: | 100.1% |
| Sp. Gravity: | 2.700 | | | | |

Burette Area, a (cm2): 0.73
Differential pressure: 2.0 psi = 140.7 cm H2O
Consolidation Pressure (psi): 5.0
Overburden: 720.0 psf
Skempton's B coeficient: 1.0
Operating Pressures (psi): Cell: 70.0 Head: 67.0 Tail: 65.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 45.70 | 13.40 | 172.98 | | | | |
| Final | 29880 | 45.30 | 13.90 | | 172.08 | 172.5 | 52.9 | |
| Result | | | | | | | | 1.3E-08 |
| Initial | 0 | 45.30 | 13.90 | 172.08 | | | | |
| Final | 58380 | 44.40 | 14.80 | | 170.28 | 171.2 | 52.5 | |
| Result | | | | | | | | 1.3E-08 |
| Initial | 0 | 47.00 | 12.00 | 175.68 | | | | |
| Final | 45540 | 46.30 | 12.80 | | 174.18 | 174.9 | 53.7 | |
| Result | | | | | | | | 1.4E-08 |
| Initial | 0 | 46.30 | 12.80 | 174.18 | | | | |
| Final | 38100 | 45.70 | 13.40 | | 172.98 | 173.6 | 53.2 | |
| Result | | | | | | | | 1.3E-08 |
| Average Permeability | | | | | | | | 1.3E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

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**Project:** BNDX-93-037A

**Date:** 8/31/93

**Boring:** n/a

**Sample:** TW-03

**Depth:** n/a

**Sample Description:** CH, Fat clay, olive gray, moist

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 71.75 | Wt Specimen + Tare Wet: | 287.55 |
| Wt. Specimen + Tare Dry: | 60.33 | Wt. Specimen + Tare Dry: | 222.50 |
| Wt. Tare: | 22.19 | Wt. Tare: | 35.15 |
| Moisture Content: | 29.9% | Moisture Content: | 34.7% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.82 in | Area, A: | 40.30 cm2 | Initial Wt. (gm): | 429.66 |
| Initial Ht.: | 2.3 in | Initial Dry Unit Wt.: | 88.1 pcf | Initial Saturation: | 89.3% |
| Final Ht., L: | 2.4 in | Final Dry Unit Wt.: | 85.8 pcf | Final Saturation: | 98.1% |
| Sp. Gravity: | 2.680 | | | | |

Burette Area, a (cm2): 0.73

Differential pressure: 1.0 psi = 70.3 cm H2O

Consolidation Pressure (psi): 5.0

Overburden: 720.0 psf

Skempton's B coeficient: 1.0

Operating Pressures (psi): Cell: 70.0 Head: 66.0 Tail: 65.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 54.40 | 4.50 | 120.24 | | | | |
| Final | 26340 | 52.50 | 6.40 | | 116.44 | 118.3 | 19.8 | |
| Result | | | | | | | | 6.6E-08 |
| Initial | 0 | 52.50 | 6.40 | 116.44 | | | | |
| Final | 59400 | 48.30 | 10.60 | | 108.04 | 112.2 | 18.8 | |
| Result | | | | | | | | 6.8E-08 |
| Initial | 0 | 48.30 | 10.60 | 108.04 | | | | |
| Final | 120120 | 41.10 | 17.90 | | 93.54 | 100.8 | 16.9 | |
| Result | | | | | | | | 6.5E-08 |
| Initial | 0 | 41.10 | 17.90 | 93.54 | | | | |
| Final | 53340 | 38.10 | 20.80 | | 87.64 | 90.6 | 15.2 | |
| Result | | | | | | | | 6.6E-08 |
| Average Permeability | | | | | | | | 6.6E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

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**Project:** BNDX–93–037A

**Date:** 8/26/93

**Boring:**

**Sample:** TW–04

**Depth:**

**Sample Description:** CL, Lean clay, olive brown, moist

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 74.07 | Wt Specimen + Tare Wet: | 556.84 |
| Wt. Specimen + Tare Dry: | 61.96 | Wt. Specimen + Tare Dry: | 457.45 |
| Wt. Tare: | 21.42 | Wt. Tare: | 127.27 |
| Moisture Content: | 29.9% | Moisture Content: | 30.1% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.82 in | Area, A: | 40.30 cm2 | Initial Wt. (gm): | 434.68 |
| Initial Ht.: | 2.2 in | Initial Dry Unit Wt.: | 91.1 pcf | Initial Saturation: | 95.9% |
| Final Ht., L: | 2.2 in | Final Dry Unit Wt.: | 91.1 pcf | Final Saturation: | 96.6% |
| Sp. Gravity: | 2.680 | | | | |

Burette Area, a (cm2): 0.73

Differential pressure: 1.0 psi = 70.3 cm H2O

Consolidation Pressure (psi): 5.0

Overburden: 720.0 psf

Skempton's B coeficient: 1.0

Operating Pressures (psi): Cell: 70.0 Head: 66.0 Tail: 65.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 22.70 | 33.20 | 59.84 | | | | |
| Final | 57660 | 18.60 | 37.10 | | 51.84 | 55.8 | 9.8 | |
| Result | | | | | | | | 1.3E–07 |
| Initial | 0 | 41.90 | 14.30 | 97.94 | | | | |
| Final | 83820 | 32.20 | 23.70 | | 78.84 | 88.4 | 15.5 | |
| Result | | | | | | | | 1.3E–07 |
| Initial | 0 | 32.20 | 23.70 | 78.84 | | | | |
| Final | 79560 | 25.00 | 30.90 | | 64.44 | 71.6 | 12.6 | |
| Result | | | | | | | | 1.3E–07 |
| Initial | 0 | 25.00 | 30.90 | 64.44 | | | | |
| Final | 28920 | 22.70 | 33.20 | | 59.84 | 62.1 | 10.9 | |
| Result | | | | | | | | 1.3E–07 |
| Average Permeability | | | | | | | | 1.3E–07 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

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**Project:** BNDX-93-037A

**Date:** 8/24/93

**Boring:**

**Sample:** TW-06

**Depth:**

**Sample Description:** CH, Fat clay, olive brown, wet

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 61.51 | Wt Specimen + Tare Wet: | 550.41 |
| Wt. Specimen + Tare Dry: | 51.70 | Wt. Specimen + Tare Dry: | 441.60 |
| Wt. Tare: | 20.01 | Wt. Tare: | 130.15 |
| Moisture Content: | 31.0% | Moisture Content: | 34.9% |

| | | | |
|---|---|---|---|
| Diameter: 2.83 in | Area, A: 40.58 cm2 | Initial Wt. (gm): | 411.70 |
| Initial Ht.: 2.2 in | Initial Dry Unit Wt.: 88.6 pcf | Initial Saturation: | 92.6% |
| Final Ht., L: 2.2 in | Final Dry Unit Wt.: 86.5 pcf | Final Saturation: | 99.6% |
| Sp. Gravity: 2.700 | | | |

Burette Area, a (cm2): 0.73

Differential pressure: 1.0 psi = 70.3 cm H2O

Consolidation Pressure (psi): 5.0

Overburden: 720.0 psf

Skempton's B coeficient: 1.0

Operating Pressures (psi): Cell: 70.0 Head: 66.0 Tail: 65.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 53.70 | 5.40 | 118.64 | | | | |
| Final | 67200 | 49.80 | 9.40 | | 110.74 | 114.7 | 20.5 | |
| Result | | | | | | | | 5.2E-08 |
| Initial | 0 | 49.80 | 9.40 | 110.74 | | | | |
| Final | 83820 | 45.30 | 13.80 | | 101.84 | 106.3 | 19.0 | |
| Result | | | | | | | | 5.0E-08 |
| Initial | 0 | 45.30 | 13.80 | 101.84 | | | | |
| Final | 79560 | 41.40 | 17.60 | | 94.14 | 98.0 | 17.5 | |
| Result | | | | | | | | 5.0E-08 |
| Initial | 0 | 41.40 | 17.60 | 94.14 | | | | |
| Final | 31500 | 39.90 | 19.00 | | 91.24 | 92.7 | 16.6 | |
| Result | | | | | | | | 5.0E-08 |
| Average Permeability | | | | | | | | 5.0E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

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**Project:** BNDX-93-037A
**Date:** 9/01/93

**Boring:** n/a
**Sample:** TW-07
**Depth:** n/a

**Sample Description:** CH, Fat clay, olive brown, moist

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 56.60 | Wt Specimen + Tare Wet: | 901.20 |
| Wt. Specimen + Tare Dry: | 47.66 | Wt. Specimen + Tare Dry: | 710.90 |
| Wt. Tare: | 20.08 | Wt. Tare: | 130.09 |
| Moisture Content: | 32.4% | Moisture Content: | 32.8% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.84 in | Area, A: | 40.87 cm2 | Initial Wt. (gm): | 760.00 |
| Initial Ht.: | 3.9 in | Initial Dry Unit Wt.: | 89.0 pcf | Initial Saturation: | 97.9% |
| Final Ht., L: | 3.9 in | Final Dry Unit Wt.: | 89.0 pcf | Final Saturation: | 99.0% |
| Sp. Gravity: | 2.700 | | | | |

Burette Area, a (cm2): 0.73
Differential pressure: 1.0 psi = 70.3 cm H2O
Consolidation Pressure (psi): 5.0
Overburden: 720.0 psf
Skempton's B coeficient: 1.0
Operating Pressures (psi): Cell: 70.0 Head: 66.0 Tail: 65.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 43.20 | 15.20 | 98.34 | | | | |
| Final | 57600 | 41.80 | 16.50 | | 95.64 | 97.0 | 9.8 | |
| Result | | | | | | | | 4.3E-08 |
| Initial | 0 | 41.80 | 16.50 | 95.64 | | | | |
| Final | 88140 | 39.70 | 18.50 | | 91.54 | 93.6 | 9.5 | |
| Result | | | | | | | | 4.4E-08 |
| Initial | 0 | 46.20 | 12.10 | 104.44 | | | | |
| Final | 79620 | 44.10 | 14.20 | | 100.24 | 102.3 | 10.4 | |
| Result | | | | | | | | 4.5E-08 |
| Initial | 0 | 43.90 | 14.50 | 99.74 | | | | |
| Final | 28920 | 43.20 | 15.20 | | 98.34 | 99.0 | 10.0 | |
| Result | | | | | | | | 4.3E-08 |
| Average Permeability | | | | | | | | 4.4E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

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**Project:** BNDX-93-037A

**Date:** 9/10/93

**Boring:**

**Sample:** TW-09

**Depth:**

**Sample Description:** CH, Fat clay

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 76.38 | Wt Specimen + Tare Wet: | 665.70 |
| Wt. Specimen + Tare Dry: | 64.00 | Wt. Specimen + Tare Dry: | 538.50 |
| Wt. Tare: | 21.91 | Wt. Tare: | 127.31 |
| Moisture Content: | 29.4% | Moisture Content: | 30.9% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.83 in | Area, A: | 40.58 cm2 | Initial Wt. (gm): | 532.33 |
| Initial Ht.: | 2.7 in | Initial Dry Unit Wt.: | 91.3 pcf | Initial Saturation: | 96.0% |
| Final Ht., L: | 2.7 in | Final Dry Unit Wt.: | 91.3 pcf | Final Saturation: | 101.0% |
| Sp. Gravity: | 2.650 | | | | |

Burette Area, a (cm2): 0.73
Differential pressure: 1.0 psi = 70.3 cm H2O
Consolidation Pressure (psi): 5.0
Overburden: 720.0 psf
Skempton's B coeficient: 1.0
Operating Pressures (psi): Cell: 70.0 Head: 66.0 Tail: 65.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 53.20 | 5.20 | 118.34 | | | | |
| Final | 51660 | 52.70 | 5.80 | | 117.24 | 117.8 | 17.0 | |
| Result | | | | | | | | 1.1E-08 |
| Initial | 0 | 52.70 | 5.80 | 117.24 | | | | |
| Final | 62760 | 52.00 | 6.40 | | 115.94 | 116.6 | 16.8 | |
| Result | | | | | | | | 1.1E-08 |
| Initial | 0 | 52.00 | 6.40 | 115.94 | | | | |
| Final | 33960 | 51.70 | 6.80 | | 115.24 | 115.6 | 16.7 | |
| Result | | | | | | | | 1.1E-08 |
| Initial | 0 | 51.70 | 6.80 | 115.24 | | | | |
| Final | 59340 | 51.00 | 7.40 | | 113.94 | 114.6 | 16.5 | |
| Result | | | | | | | | 1.2E-08 |
| Average Permeability | | | | | | | | 1.1E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

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**Project:** BNDX-93-037A

**Date:** 9/12/93

**Boring:**

**Sample:** TW-11

**Depth:**

**Sample Description:** CH, Fat clay

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 78.56 | Wt Specimen + Tare Wet: | 287.55 |
| Wt. Specimen + Tare Dry: | 66.34 | Wt. Specimen + Tare Dry: | 224.10 |
| Wt. Tare: | 21.99 | Wt. Tare: | 35.50 |
| Moisture Content: | 27.6% | Moisture Content: | 33.6% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.82 in | Area, A: | 40.30 cm2 | Initial Wt. (gm): | 432.97 |
| Initial Ht.: | 2.3 in | Initial Dry Unit Wt.: | 91.2 pcf | Initial Saturation: | 89.8% |
| Final Ht., L: | 2.4 in | Final Dry Unit Wt.: | 87.4 pcf | Final Saturation: | 99.9% |
| Sp. Gravity: | 2.650 | | | | |

Burette Area, a (cm2): 0.73

Differential pressure: 1.0 psi = 70.3 cm H2O

Consolidation Pressure (psi): 5.0

Overburden: 720.0 psf

Skempton's B coeficient: 1.0

Operating Pressures (psi): Cell: 70.0 Head: 66.0 Tail: 65.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 29.50 | 27.40 | 72.44 | | | | |
| Final | 13020 | 28.60 | 28.20 | | 70.74 | 71.6 | 11.9 | |
| Result | | | | | | | | 9.9E-08 |
| Initial | 0 | 28.60 | 28.20 | 70.74 | | | | |
| Final | 52200 | 25.30 | 31.40 | | 64.24 | 67.5 | 11.2 | |
| Result | | | | | | | | 1.0E-07 |
| Initial | 0 | 25.30 | 31.40 | 64.24 | | | | |
| Final | 27000 | 23.80 | 33.00 | | 61.14 | 62.7 | 10.4 | |
| Result | | | | | | | | 1.0E-07 |
| Initial | 0 | 23.80 | 33.00 | 61.14 | | | | |
| Final | 55140 | 20.90 | 36.00 | | 55.24 | 58.2 | 9.7 | |
| Result | | | | | | | | 1.0E-07 |
| Average Permeability | | | | | | | | 1.0E-07 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

**BRAUN℠**
**INTERTEC**

**Braun Intertec Corporation**
6801 Washington Avenue South
P.O. Box 39108
Minneapolis, Minnesota 55439-0108
612-941-5600 Fax: 941-4151

*Engineers and Scientists Serving the Built and Natural Environments*

**Project:** BNDX-93-037A

**Date:** 9/12/93

**Boring:** ______ **Sample:** TW-13 **Depth:** ______

**Sample Description:** CH, Fat clay

Initial
Wt Specimen + Tare Wet: 74.02
Wt. Specimen + Tare Dry: 61.90
Wt. Tare: 21.31
Moisture Content: 29.9%

Final
Wt Specimen + Tare Wet: 672.00
Wt. Specimen + Tare Dry: 535.49
Wt. Tare: 90.04
Moisture Content: 30.6%

Diameter: 2.82 in
Initial Ht.: 2.9 in
Final Ht., L: 2.9 in
Sp. Gravity: 2.700

Area, A: 40.30 cm2
Initial Dry Unit Wt.: 92.9 pcf
Final Dry Unit Wt.: 92.0 pcf

Initial Wt. (gm): 569.89
Initial Saturation: 99.2%
Final Saturation: 99.5%

Burette Area, a (cm2): 0.73
Consolidation Pressure (psi): 5.0
Skempton's B coeficient: 1.0
Operating Pressures (psi): Cell: 70.0 Head: 66.5 Tail: 65.0

Differential pressure: 1.5 psi = 105.5 cm H2O
Overburden: 720.0 psf

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 34.80 | 20.20 | 120.11 | | | | |
| Final | 15300 | 34.20 | 20.80 | | 118.91 | 119.5 | 16.2 | |
| Result | | | | | | | | 4.4E-08 |
| Initial | 0 | 34.20 | 20.80 | 118.91 | | | | |
| Final | 85740 | 30.70 | 23.90 | | 112.31 | 115.6 | 15.6 | |
| Result | | | | | | | | 4.5E-08 |
| Initial | 0 | 30.70 | 23.90 | 112.31 | | | | |
| Final | 111660 | 26.60 | 27.60 | | 104.51 | 108.4 | 14.7 | |
| Result | | | | | | | | 4.3E-08 |
| Initial | 0 | 26.60 | 27.60 | 104.51 | | | | |
| Final | 43740 | 25.10 | 29.10 | | 101.51 | 103.0 | 13.9 | |
| Result | | | | | | | | 4.5E-08 |
| Average Permeability | | | | | | | | 4.4E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

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Minneapolis, Minnesota 55439-0108
612-941-5600 Fax: 941-4151

*Engineers and Scientists Serving*
*the Built and Natural Environments*℠

**Project:** BNDX–93–037A
**Date:** 9/22/93
**Boring:**
**Sample #:** TW–14
**Depth:**
**Description:** CH, Fat clay

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet | 71.34 | Wt Specimen + Tare Wet | 636.30 |
| Wt. Specimen + Tare Dry | 59.65 | Wt. Specimen + Tare Dry | 515.69 |
| Wt. Tare | 20.25 | Wt. Tare | 114.65 |
| Moisture Content | 29.7% | Moisture Content | 30.1% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter | 2.83 in | Area A = | 40.58 cm2 | Initial Wt. (gms) | 514.37 |
| Initial Ht. | 6.6 cm | Initial Dry Unit Wt. | 92.0 pcf | Initial Saturation | 96.5% |
| Final Ht. L = | 6.6 cm | Final Dry Unit Wt. | 92.0 pcf | Final Saturation | 97.8% |
| Sp. Gravity | 2.700 | | | | |

Burette Area a = 1 cm2 1.0000 Differential pressure 1.5 psi = 105.5 cm
Consolidation Pressure (psi) 5.0 Overburden 720.0 psf

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 5.70 | 19.90 | 119.71 | | | | |
| Final | 15300 | 6.00 | 19.70 | | 119.21 | 119.5 | 18.0 | |
| Result | | | | | | | | 2.2E–08 |
| Initial | 0 | 6.00 | 19.70 | 119.21 | | | | |
| Final | 85740 | 7.20 | 18.50 | | 116.81 | 118.0 | 17.8 | |
| Result | | | | | | | | 1.9E–08 |
| Initial | 0 | 7.20 | 18.50 | 116.81 | | | | |
| Final | 111600 | 8.80 | 17.00 | | 113.71 | 115.3 | 17.4 | |
| Result | | | | | | | | 2.0E–08 |
| Initial | 0 | 8.80 | 17.00 | 113.71 | | | | |
| Final | 43800 | 9.50 | 16.40 | | 112.41 | 113.1 | 17.1 | |
| Result | | | | | | | | 2.1E–08 |
| Average Permeability | | | | | | | | 2.1E–08 |
| Assigned Permeability | | | | | | | | |

Skempton's B coeficient = 1.0
Operating Pressures (psi): Cell 70.0 Head 66.5 Tail 65.0
Remarks:

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**Project:** BNDX-93-037A

**Date:** 9/22/93

**Boring:**

**Sample:** TW-15

**Depth:**

**Sample Description:** CH, Fat clay

Initial

Wt Specimen + Tare Wet: 64.70
Wt. Specimen + Tare Dry: 54.99
Wt. Tare: 21.95
Moisture Content: 29.4%

Final

Wt Specimen + Tare Wet: 585.07
Wt. Specimen + Tare Dry: 471.60
Wt. Tare: 133.93
Moisture Content: 33.6%

Diameter: 2.83 in
Initial Ht.: 2.3 in
Final Ht., L: 2.3 in
Sp. Gravity: 2.700

Area, A: 40.58 cm2
Initial Dry Unit Wt.: 89.2 pcf
Final Dry Unit Wt.: 88.1 pcf

Initial Wt. (gm): 438.42
Initial Saturation: 89.3%
Final Saturation: 99.4%

Burette Area, a (cm2): 0.73
Consolidation Pressure (psi): 5.0
Skempton's B coeficient: 1.0
Operating Pressures (psi): Cell: 70.0

Differential pressure: 0.5 psi = 35.2 cm H2O
Overburden: 720.0 psf

Head: 65.5

Tail: 65.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 31.30 | 25.60 | 40.87 | | | | |
| Final | 15720 | 30.70 | 26.20 | | 39.67 | 40.3 | 6.8 | |
| Result | | | | | | | | 1.0E-07 |
| Initial | 0 | 30.70 | 26.20 | 39.67 | | | | |
| Final | 55800 | 28.80 | 28.20 | | 35.77 | 37.7 | 6.4 | |
| Result | | | | | | | | 9.9E-08 |
| Initial | 0 | 28.80 | 28.20 | 35.77 | | | | |
| Final | 26580 | 27.90 | 29.10 | | 33.97 | 34.9 | 5.9 | |
| Result | | | | | | | | 1.0E-07 |
| Initial | 0 | 27.90 | 29.10 | 33.97 | | | | |
| Final | 233340 | 21.90 | 35.10 | | 21.97 | 28.0 | 4.7 | |
| Result | | | | | | | | 9.9E-08 |
| Average Permeability | | | | | | | | 1.0E-07 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

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*Engineers and Scientists Serving the Built and Natural Environments*

**Project:** BNDX-93-037A

**Date:** 9/22/93

**Boring:**

**Sample:** TW-17

**Depth:**

**Sample Description:** CH, Fat clay

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 73.53 | Wt Specimen + Tare Wet: | 606.30 |
| Wt. Specimen + Tare Dry: | 59.77 | Wt. Specimen + Tare Dry: | 473.25 |
| Wt. Tare: | 20.09 | Wt. Tare: | 133.93 |
| Moisture Content: | 34.7% | Moisture Content: | 39.2% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.82 in | Area, A: | 40.30 cm2 | Initial Wt. (gm): | 455.45 |
| Initial Ht.: | 2.5 in | Initial Dry Unit Wt.: | 83.5 pcf | Initial Saturation: | 92.7% |
| Final Ht., L: | 2.5 in | Final Dry Unit Wt.: | 81.5 pcf | Final Saturation: | 100.0% |
| Sp. Gravity: | 2.680 | | | | |

Burette Area, a (cm2): 0.73
Differential pressure: 1.5 psi = 105.5 cm H2O
Consolidation Pressure (psi): 5.0
Overburden: 720.0 psf
Skempton's B coeficient: 1.0
Operating Pressures (psi): Cell: 70.0 Head: 66.5 Tail: 65.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 14.10 | 42.60 | 77.01 | | | | |
| Final | 29040 | 13.40 | 43.30 | | 75.61 | 76.3 | 11.9 | |
| Result | | | | | | | | 3.7E-08 |
| Initial | 0 | 13.40 | 43.30 | 75.61 | | | | |
| Final | 59880 | 11.90 | 44.70 | | 72.71 | 74.2 | 11.5 | |
| Result | | | | | | | | 3.8E-08 |
| Initial | 0 | 11.90 | 44.70 | 72.71 | | | | |
| Final | 27480 | 11.30 | 45.30 | | 71.51 | 72.1 | 11.2 | |
| Result | | | | | | | | 3.5E-08 |
| Initial | 0 | 11.30 | 45.30 | 71.51 | | | | |
| Final | 57240 | 9.90 | 46.50 | | 68.91 | 70.2 | 10.9 | |
| Result | | | | | | | | 3.8E-08 |
| Average Permeability | | | | | | | | 3.7E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

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*Engineers and Scientists Serving the Built and Natural Environments*℠

**Project:** BNDX–93–037A

**Date:** 9/27/93

**Boring:**

**Sample:** TW–18

**Depth:**

**Sample Description:** CH, Fat clay

| | | | |
|---|---|---|---|
| **Initial** | | **Final** | |
| Wt Specimen + Tare Wet: | 83.30 | Wt Specimen + Tare Wet: | 494.30 |
| Wt. Specimen + Tare Dry: | 69.11 | Wt. Specimen + Tare Dry: | 398.15 |
| Wt. Tare: | 20.60 | Wt. Tare: | 130.20 |
| Moisture Content: | 29.3% | Moisture Content: | 35.9% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.84 in | Area, A: | 40.87 cm2 | Initial Wt. (gm): | 357.27 |
| Initial Ht.: | 1.9 in | Initial Dry Unit Wt.: | 89.9 pcf | Initial Saturation: | 90.3% |
| Final Ht., L: | 1.9 in | Final Dry Unit Wt.: | 85.7 pcf | Final Saturation: | 100.3% |
| Sp. Gravity: | 2.700 | | | | |

Burette Area, a (cm2): 0.73

Differential pressure: 1.0 psi = 70.3 cm H2O

Consolidation Pressure (psi): 5.0

Overburden: 720.0 psf

Skempton's B coeficient: 1.0

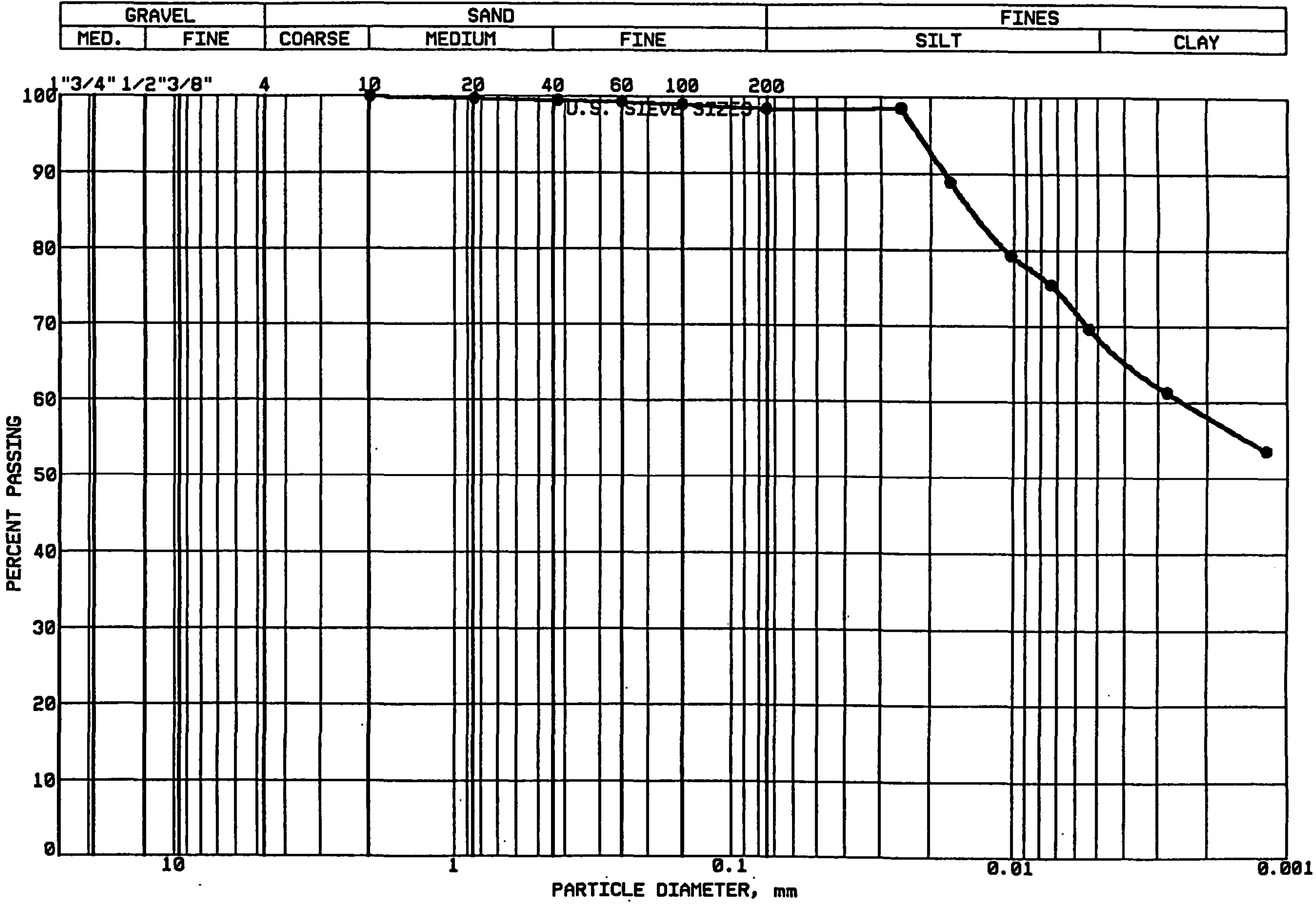
Operating Pressures (psi): Cell: 70.0 Head: 66.0 Tail: 65.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 40.50 | 16.00 | 94.84 | | | | |
| Final | 28920 | 40.10 | 16.40 | | 94.04 | 94.4 | 19.2 | |
| Result | | | | | | | | 1.3E–08 |
| Initial | 0 | 40.10 | 16.40 | 94.04 | | | | |
| Final | 60000 | 39.20 | 17.10 | | 92.44 | 93.2 | 18.9 | |
| Result | | | | | | | | 1.3E–08 |
| Initial | 0 | 39.20 | 17.10 | 92.44 | | | | |
| Final | 27420 | 38.80 | 17.50 | | 91.64 | 92.0 | 18.7 | |
| Result | | | | | | | | 1.4E–08 |
| Initial | 0 | 38.80 | 17.50 | 91.64 | | | | |
| Final | 57300 | 38.00 | 18.20 | | 90.14 | 90.9 | 18.4 | |
| Result | | | | | | | | 1.3E–08 |
| Average Permeability | | | | | | | | 1.3E–08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN INTERTEC**

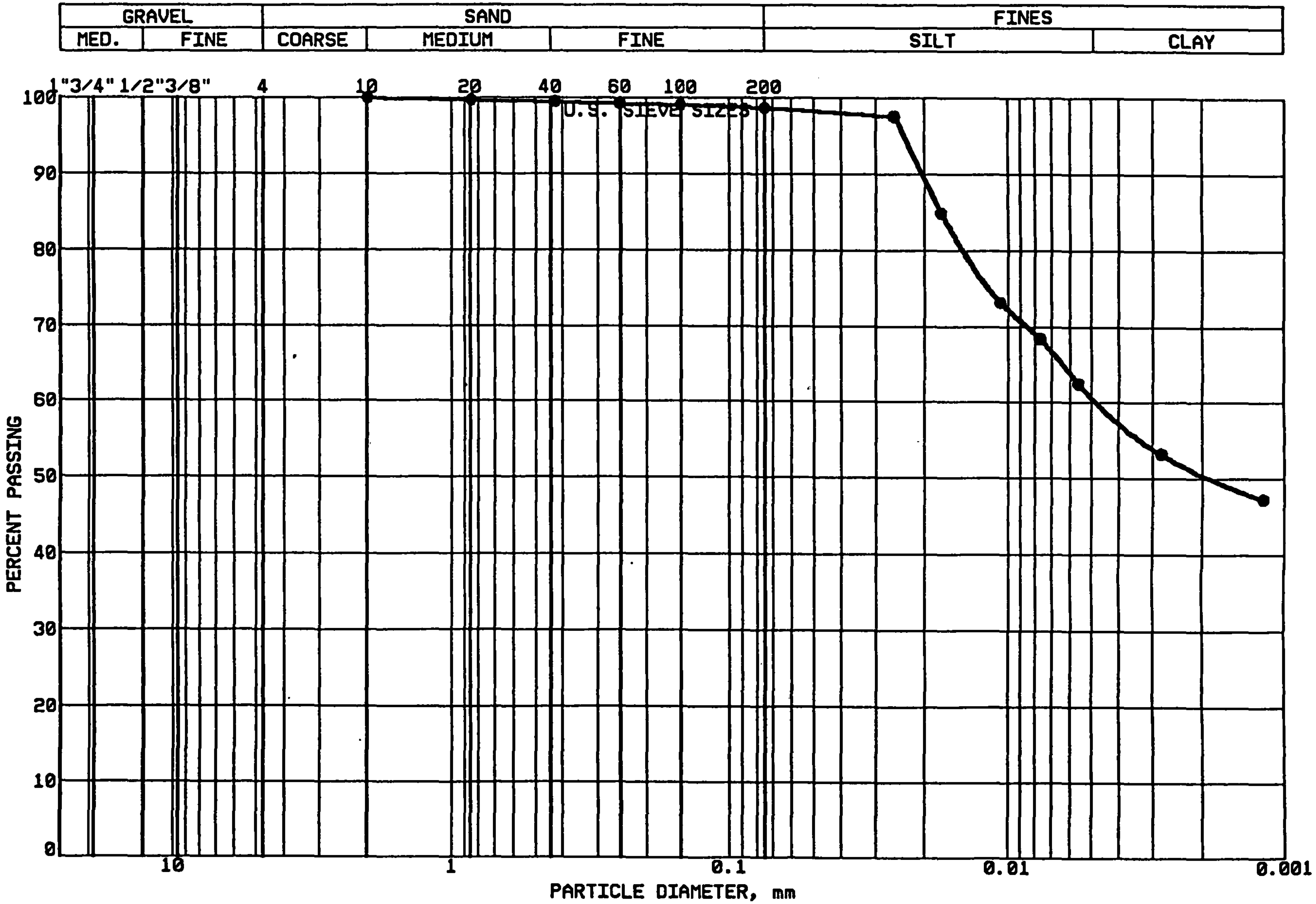
<u>PROJECT:</u> BNDX-93-037A
Onalaska Landfill
Wisconsin, Onalaska
BORING: TW-01

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.5 % |
| SILT | 29.9 % |
| CLAY | 68.6 % |

<u>CLASSIFICATION:</u>
CH, Fat clay,olive

D60=0.002
D30=
D10=
Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
INTERTEC

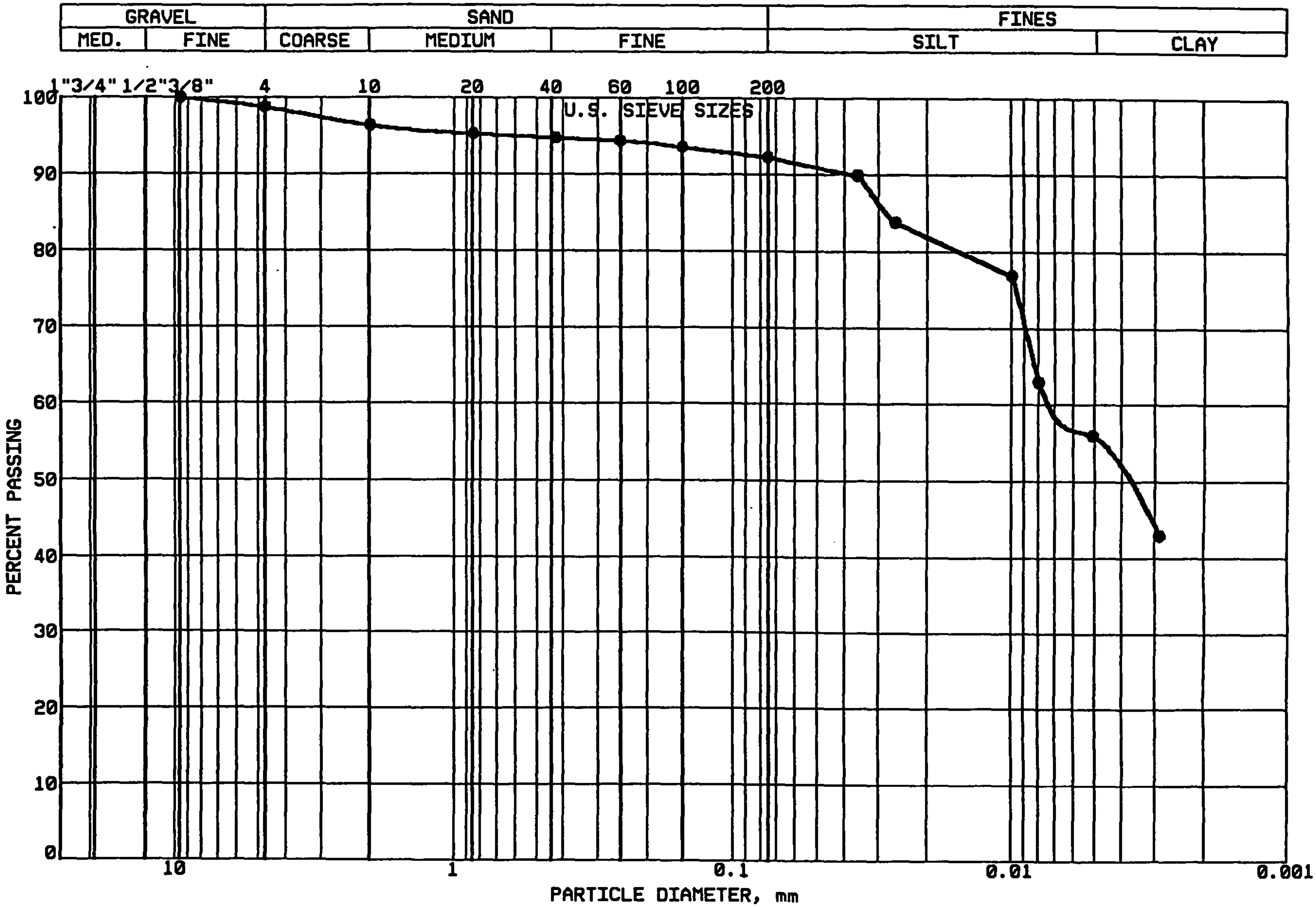
**PROJECT:** BNDX-93-037A
Onalaska Landfill
Wisconsin, Onalaska
BORING: TW-02

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.3 % |
| SILT | 37.7 % |
| CLAY | 61.0 % |

**CLASSIFICATION:**
CH, Fat clay,olive

D60=0.005
D30=
D10=
Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
**INTERTEC**

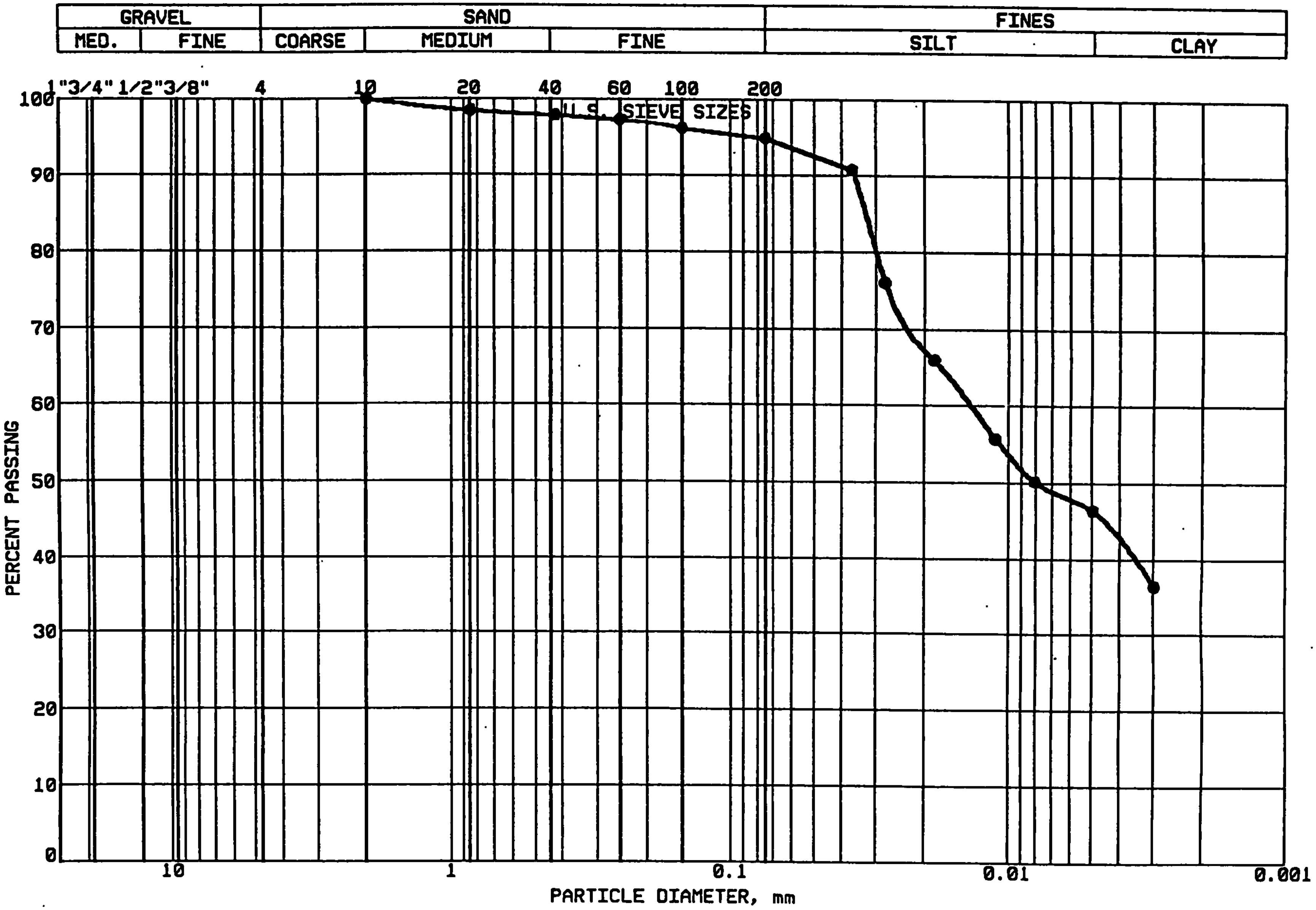
PROJECT: BNDX-93-037A
Onalaska Landfill
Wisconsin, Onalaska
BORING: TW-03

| | |
|---|---|
| GRAVEL | 1.2 % |
| SAND | 6.5 % |
| SILT | 36.8 % |
| CLAY | 55.5 % |

CLASSIFICATION:
CH, Fat clay,olive brown

D60=0.007
D30=
D10=
Cu=
Cc=

# GRAIN SIZE - HYDI TER ANALYSIS CURVE



**BRAUN**
INTERTEC

**PROJECT:** BNDX-93-037A
Onalaska Landfill

Wisconsin, Onalaska
BORING: TW-04

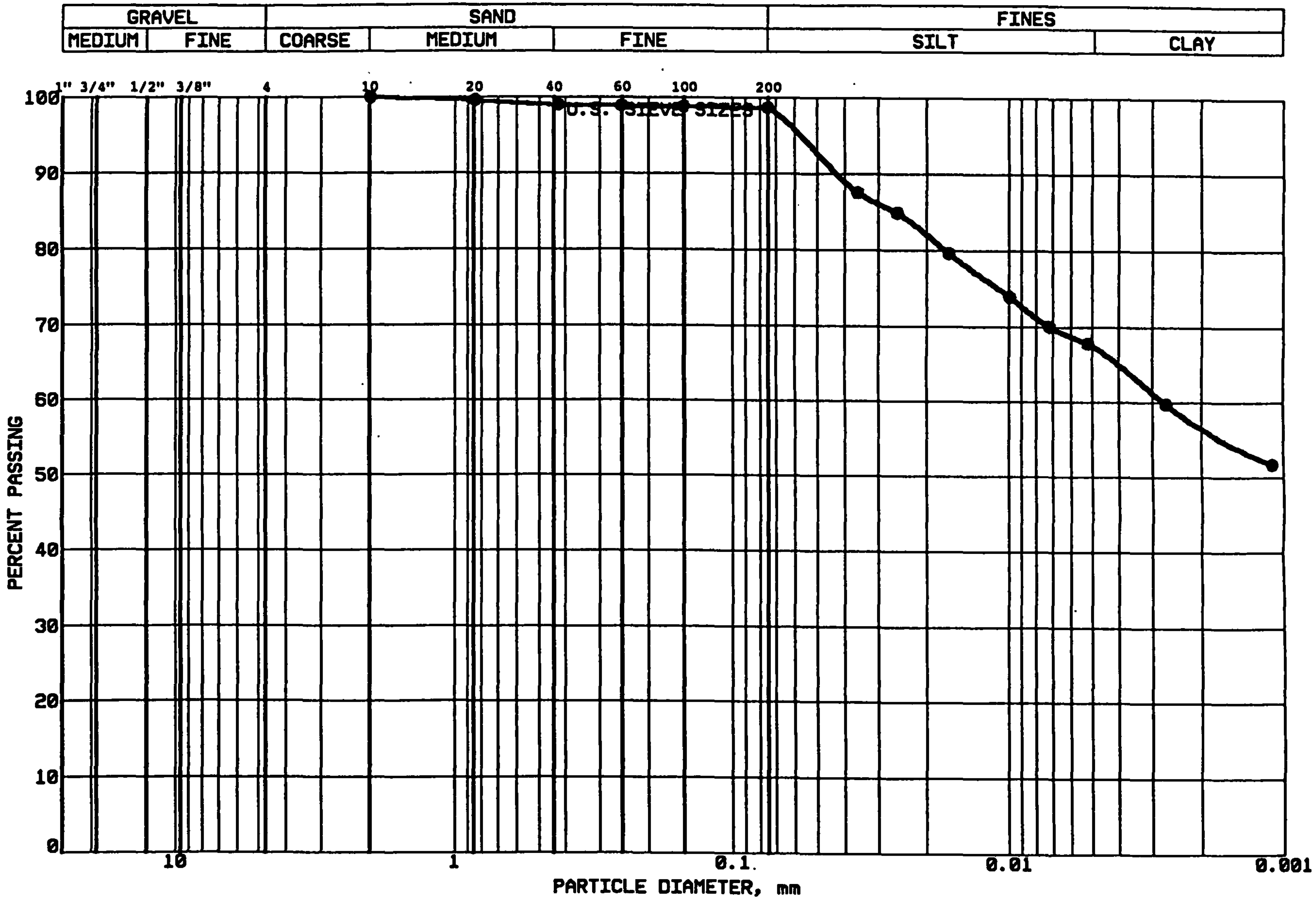
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 5.1 % |
| SILT | 48.4 % |
| CLAY | 46.5 % |

**CLASSIFICATION:**
CL, Lean clay,olive brown

D60=0.014
D30=0.002
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
ENGINEERING TESTING

**PROJECT:** BNDX-93-037A
Geotechnical Testing Services
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: TW-5

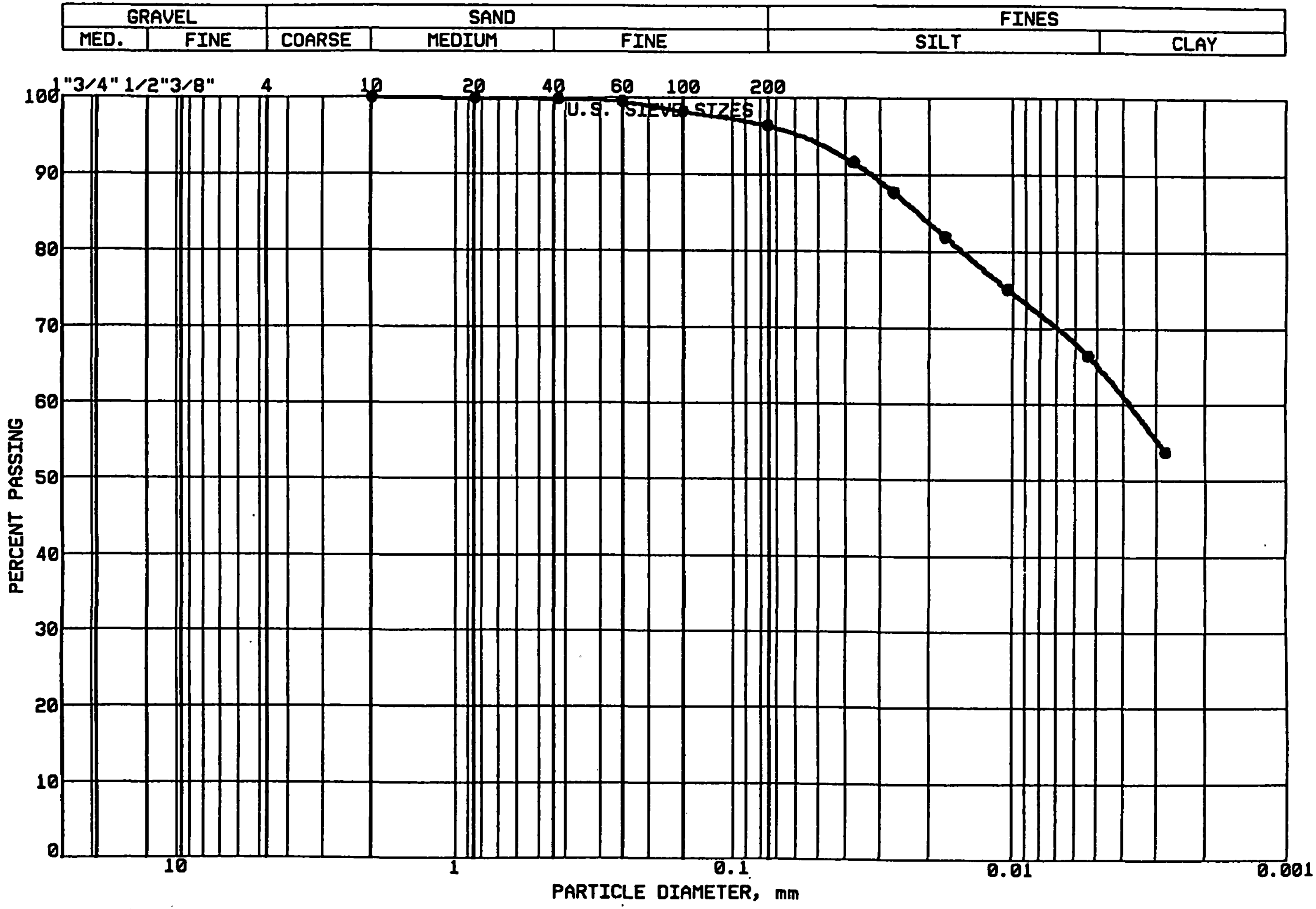
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.3 % |
| SILT | 31.4 % |
| CLAY | 67.3 % |

**CLASSIFICATION:**
CH FAT CLAY,brown

D60=0.003
D30=
D10=

Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
INTERTEC

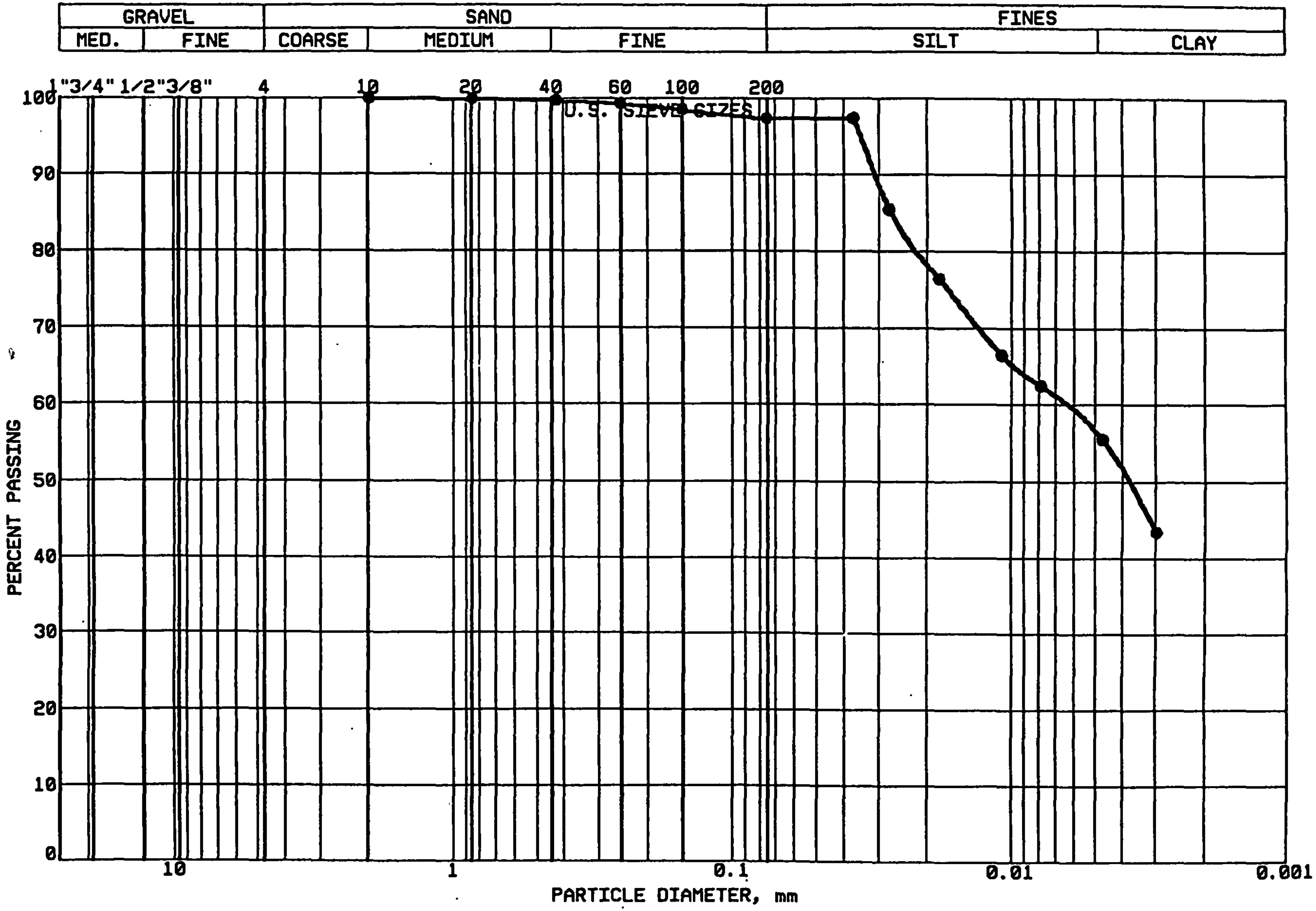
**PROJECT:** BNDX-93-037A
Onalaska Landfill
Wisconsin, Onalaska
BORING: TW-06

|  |  |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 3.6 % |
| SILT | 31.5 % |
| CLAY | 64.9 % |

**CLASSIFICATION:**
CH, Fat clay,olive brown

D60=0.004 Cu=
D30= Cc=
D10=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
INTERTEC

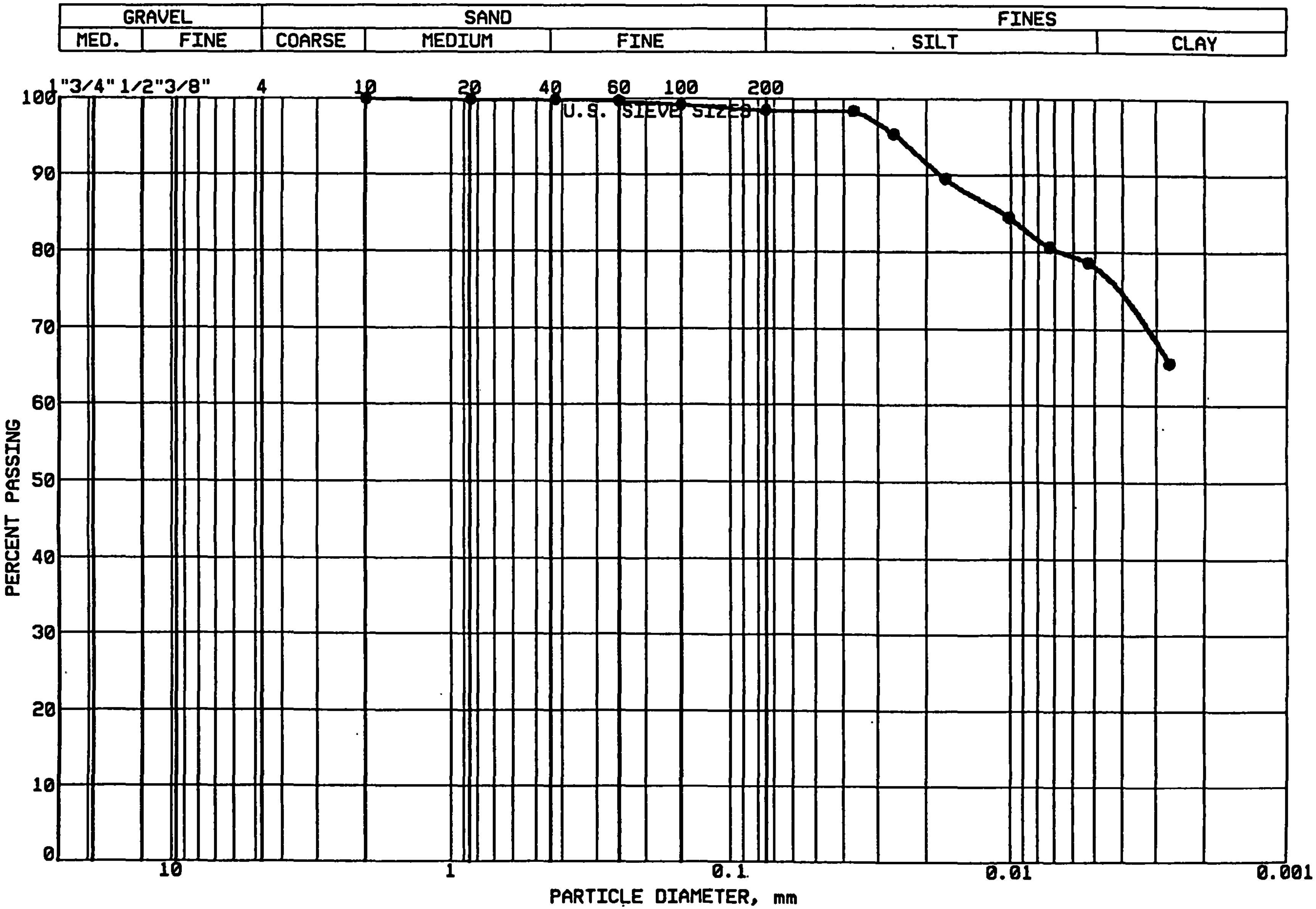
PROJECT: BNDX-93-037A
Onalaska Landfill
Wisconsin, Onalaska
BORING: TW-07

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 2.6 % |
| SILT | 41.1 % |
| CLAY | 56.3 % |

CLASSIFICATION:
CH, Fat clay,olive brown

D60=0.007
D30=
D10=
Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
INTERTEC

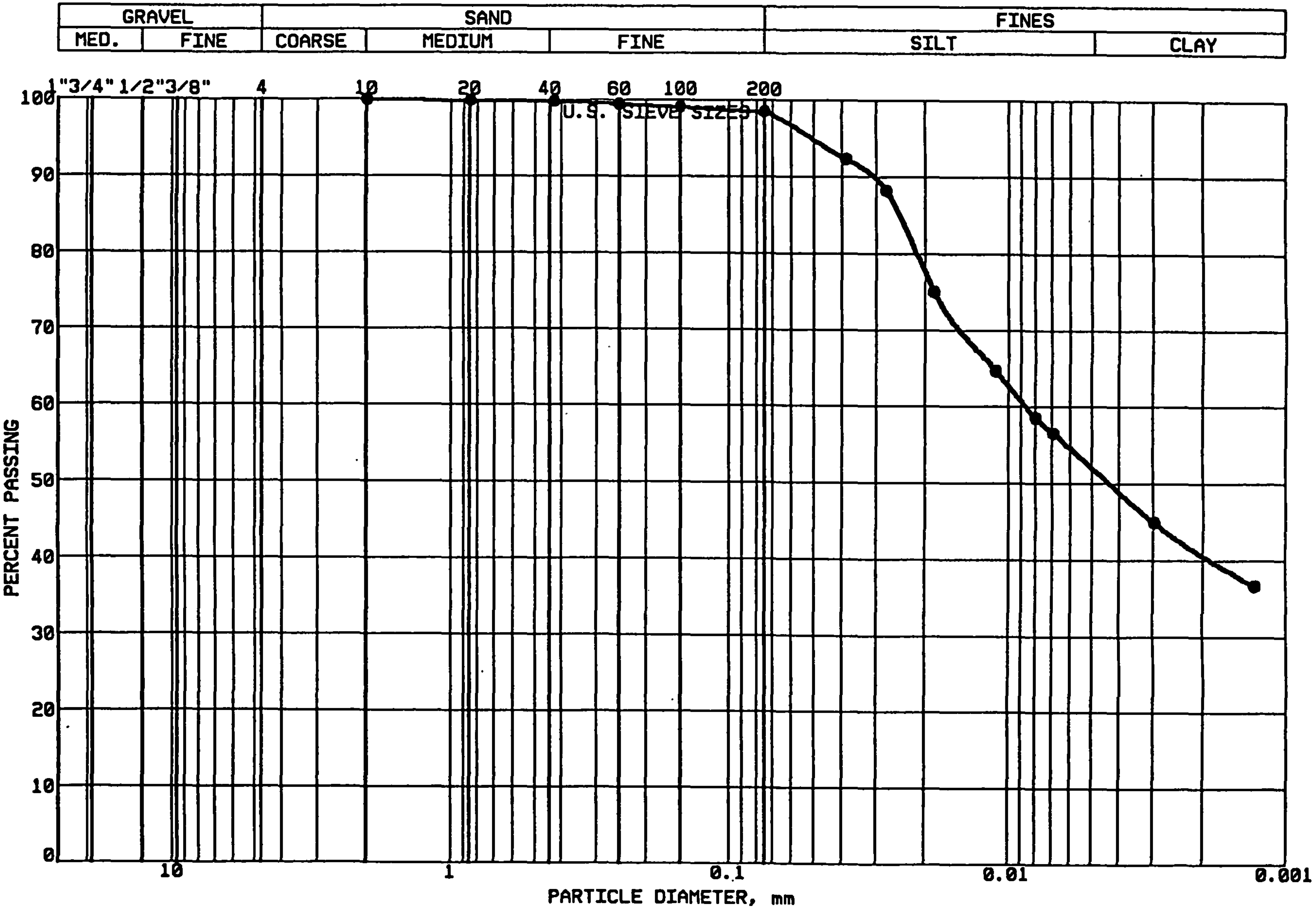
| | |
|---|---|
| PROJECT: | BNDX-93-037A |
| Onalaska Landfill | |
| Wisconsin, Onalaska | |
| BORING: | TW-08 |

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.5 % |
| SILT | 21.0 % |
| CLAY | 77.5 % |

CLASSIFICATION:
CH, Fat clay,olive brown

D60=0.002
D30=
D10=
Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN INTERTEC**

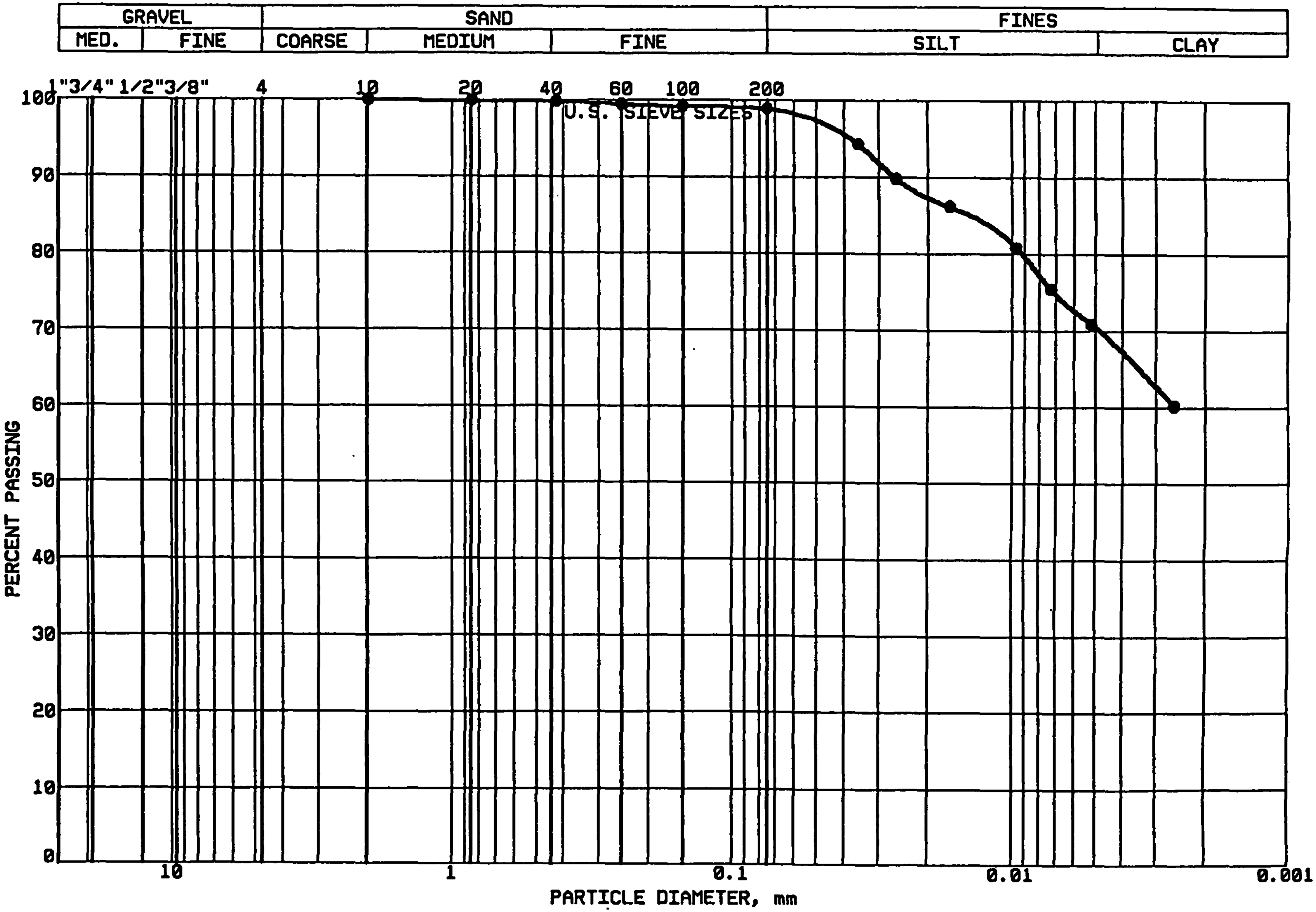
PROJECT: BNDX-93-037A
Onalaska Landfill
Wisconsin, Onalaska
BORING: TW-09

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.5 % |
| SILT | 46.4 % |
| CLAY | 52.1 % |

CLASSIFICATION:
CH, Fat clay,olive brown

D60=0.009
D30=
D10=
Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
INTERTEC

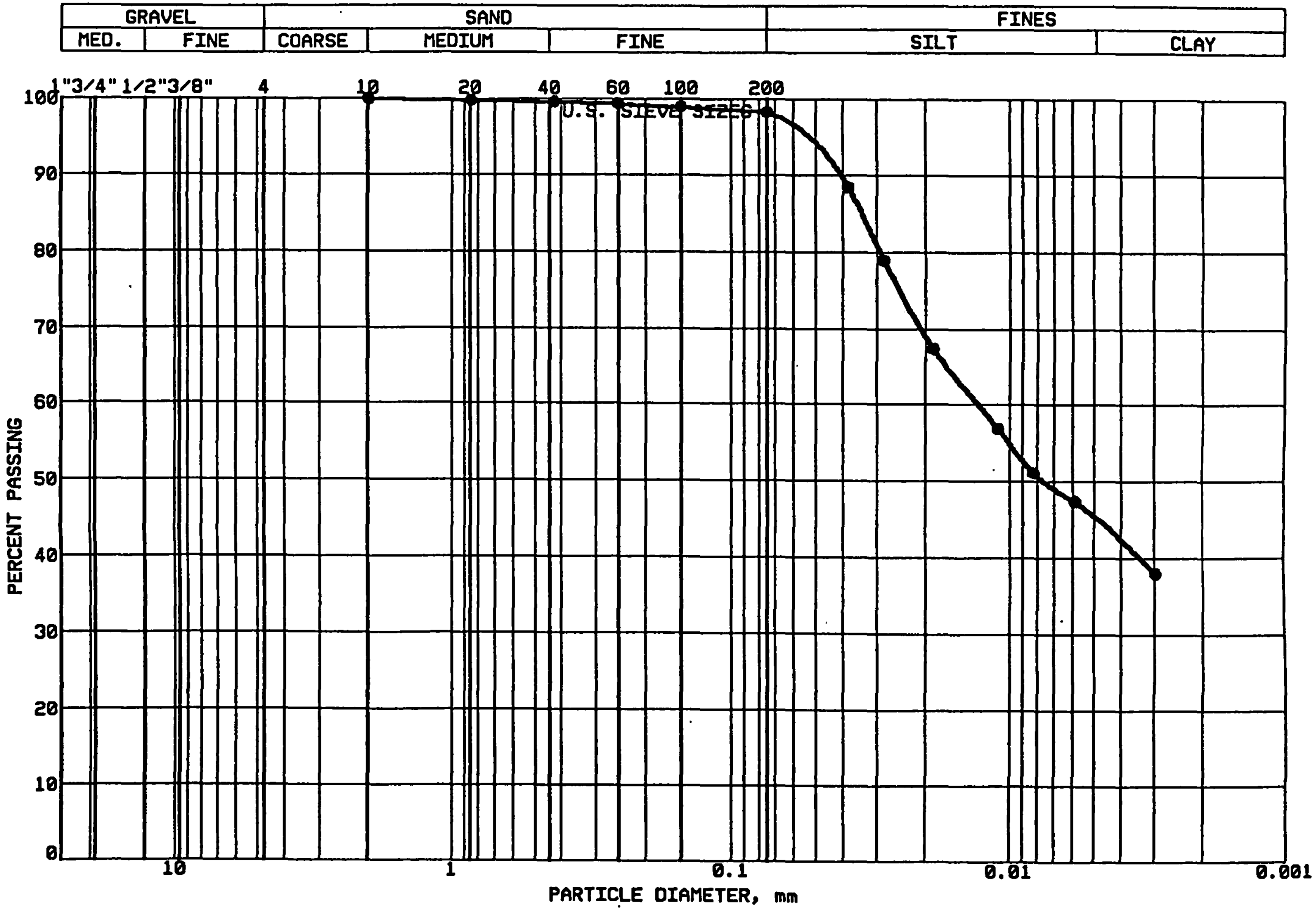
PROJECT: BNDX-93-037A
Onalaska Landfill
Wisconsin, Onalaska
BORING: TW-10

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.1 % |
| SILT | 28.6 % |
| CLAY | 70.3 % |

CLASSIFICATION:
CH, Fat clay,olive brown

D60=0.003
D30=
D10=
Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
**INTERTEC**

**PROJECT:** BNDX-93-037A
Onalaska Landfill

Wisconsin, Onalaska
BORING: TW-11

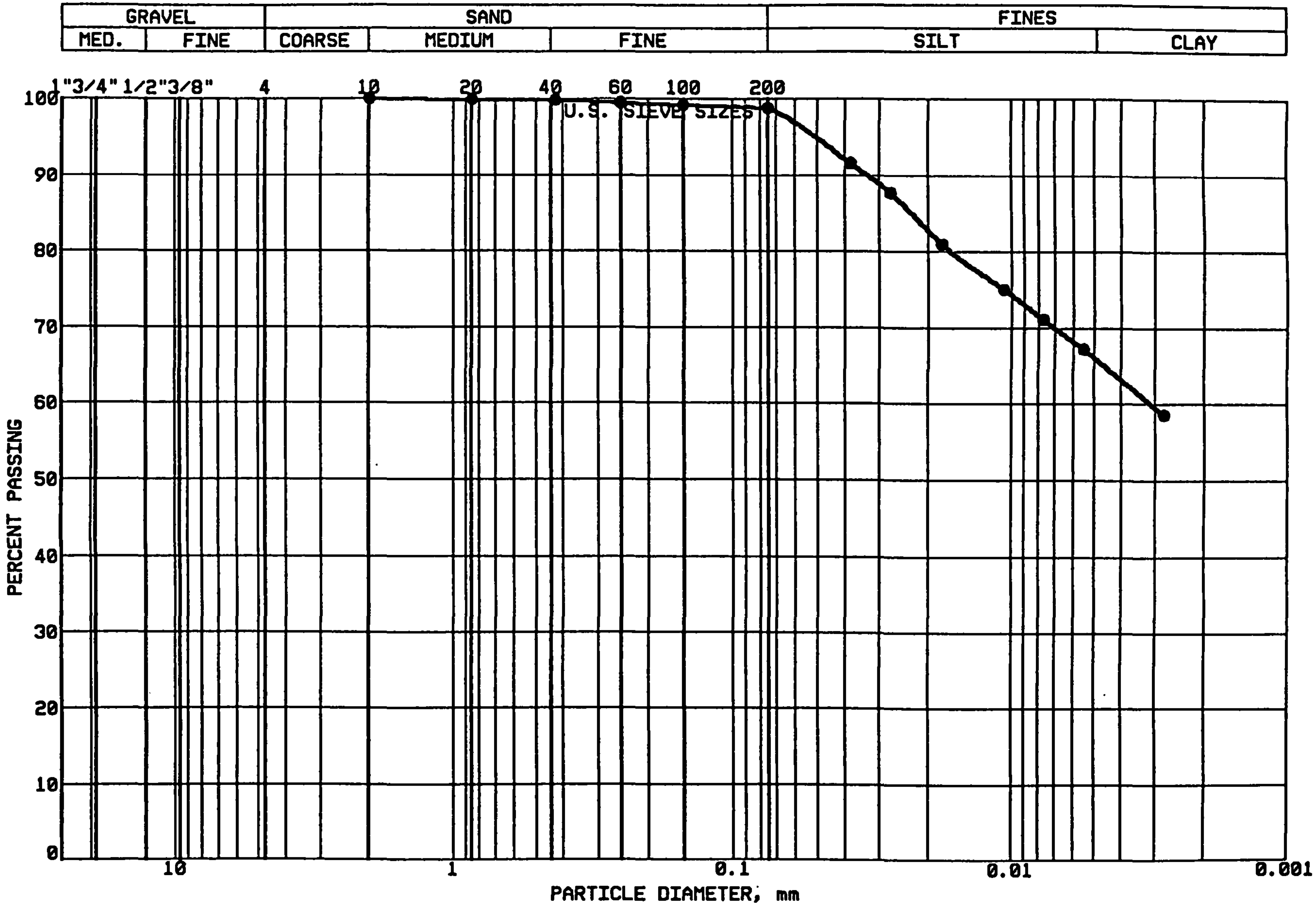
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.7 % |
| SILT | 53.2 % |
| CLAY | 45.1 % |

**CLASSIFICATION:**
CH, Fat clay, olive brown

D60=0.013
D30=0.001
D10=

Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
INTERTEC

**PROJECT:** BNDX-93-037A
Onalaska Landfill

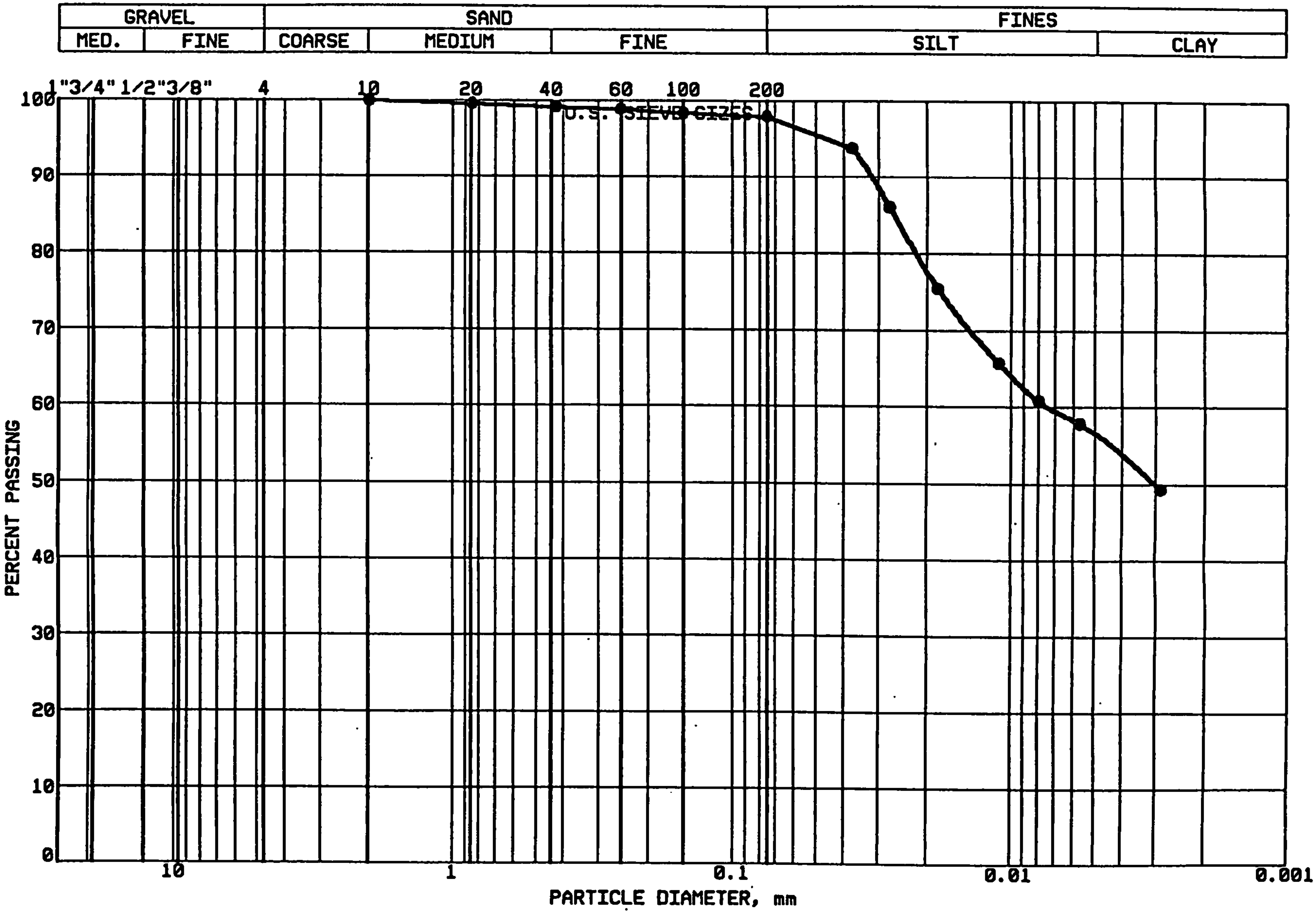
Wisconsin, Onalaska
BORING: TW-12

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.2 % |
| SILT | 32.8 % |
| CLAY | 66.0 % |

**CLASSIFICATION:**
CH, Fat clay,olive brown

D60=0.003
D30=
D10=
Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN INTERTEC**

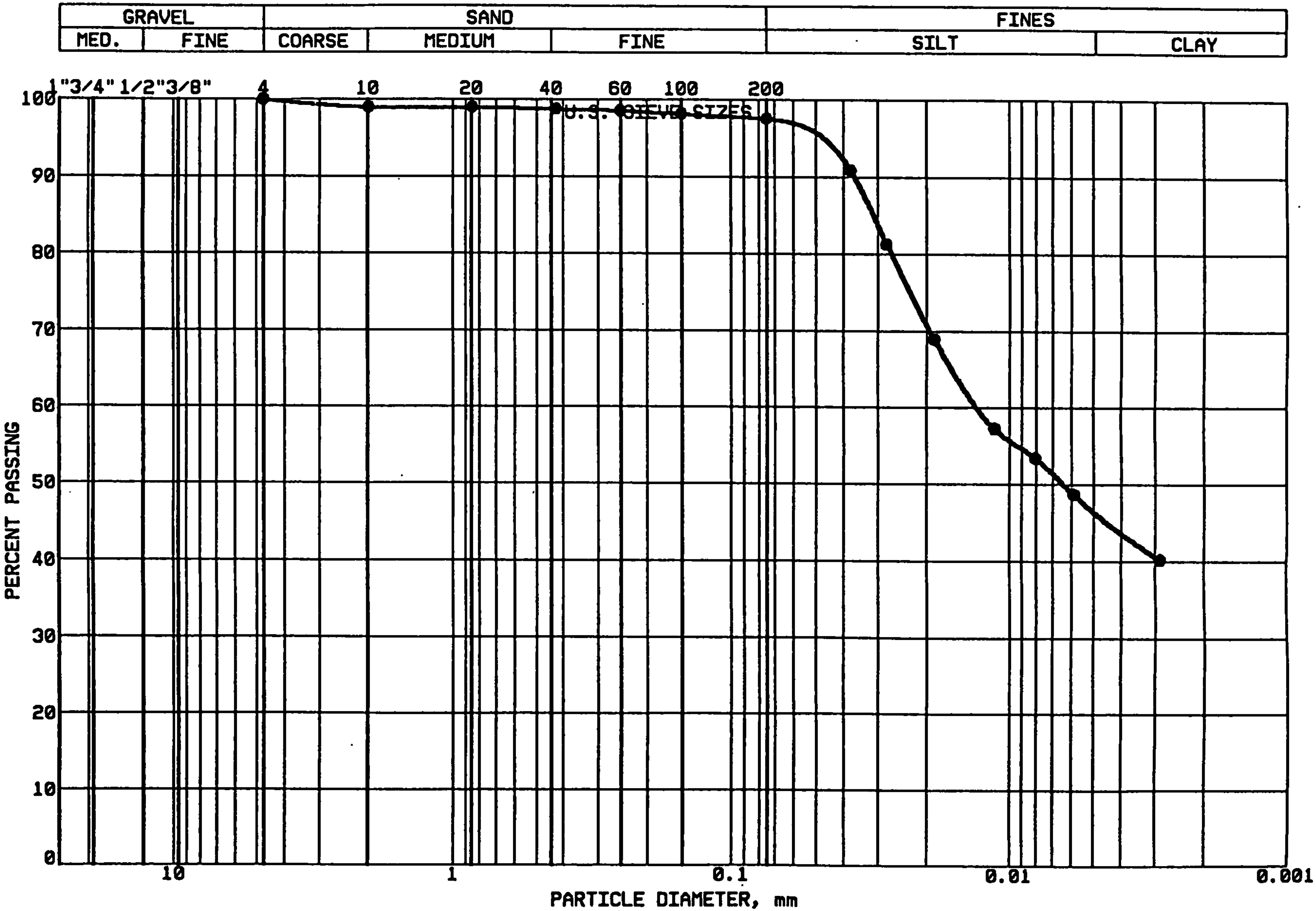
**PROJECT:** BNDX-93-037A
Onalaska Landfill
Wisconsin, Onalaska
BORING: TW-13

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 2.0 % |
| SILT | 41.7 % |
| CLAY | 56.3 % |

**CLASSIFICATION:**
CH, Fat clay,olive brown

D60=0.007
D30=
D10=
Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
INTERTEC

**PROJECT:** BNDX-93-037A
Onalaska Landfill

Wisconsin, Onalaska
BORING: TW-14

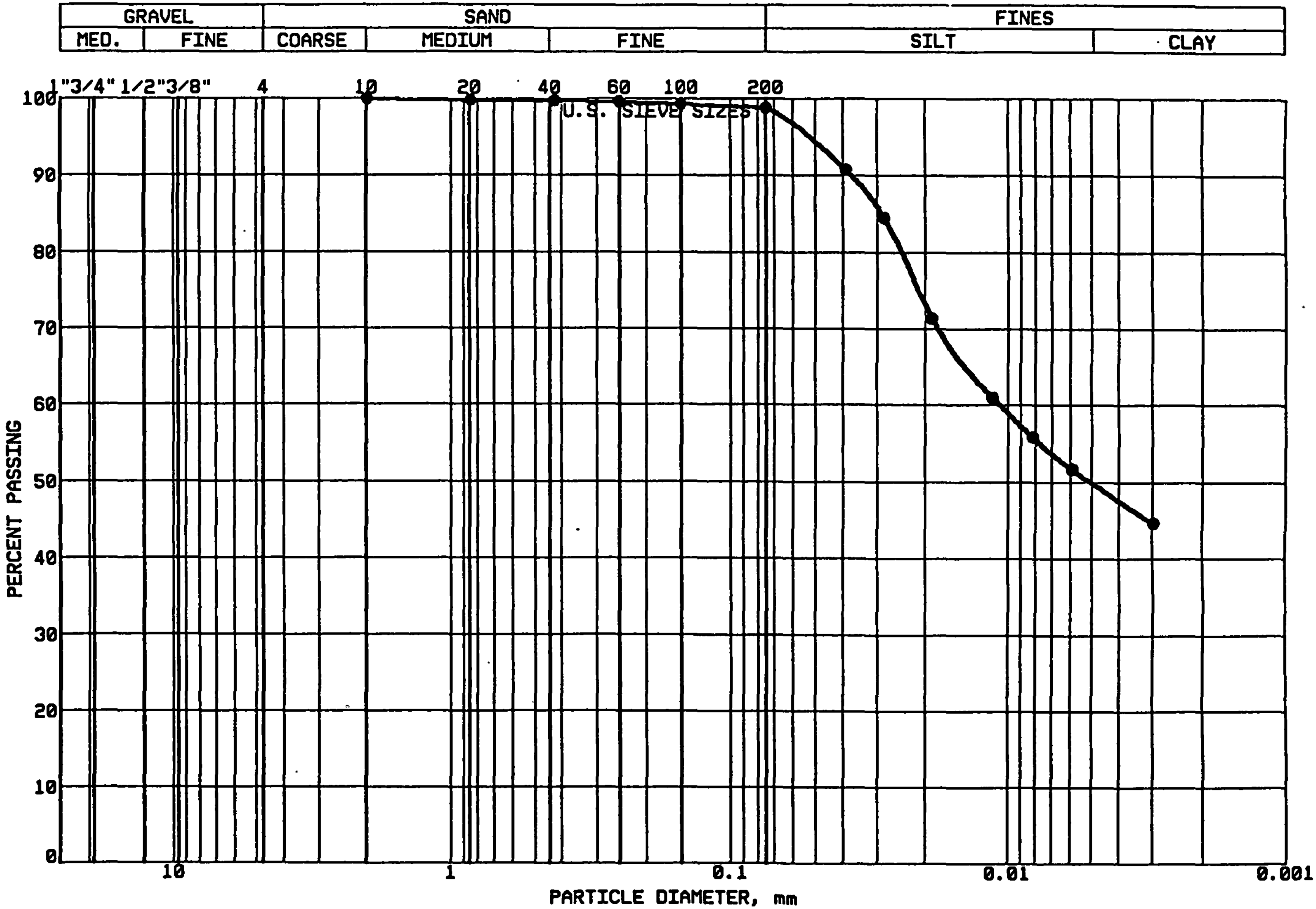
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 2.4 % |
| SILT | 50.9 % |
| CLAY | 46.7 % |

**CLASSIFICATION:**
CH, Fat clay,olive brown

D60=0.013
D30=
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN INTERTEC**

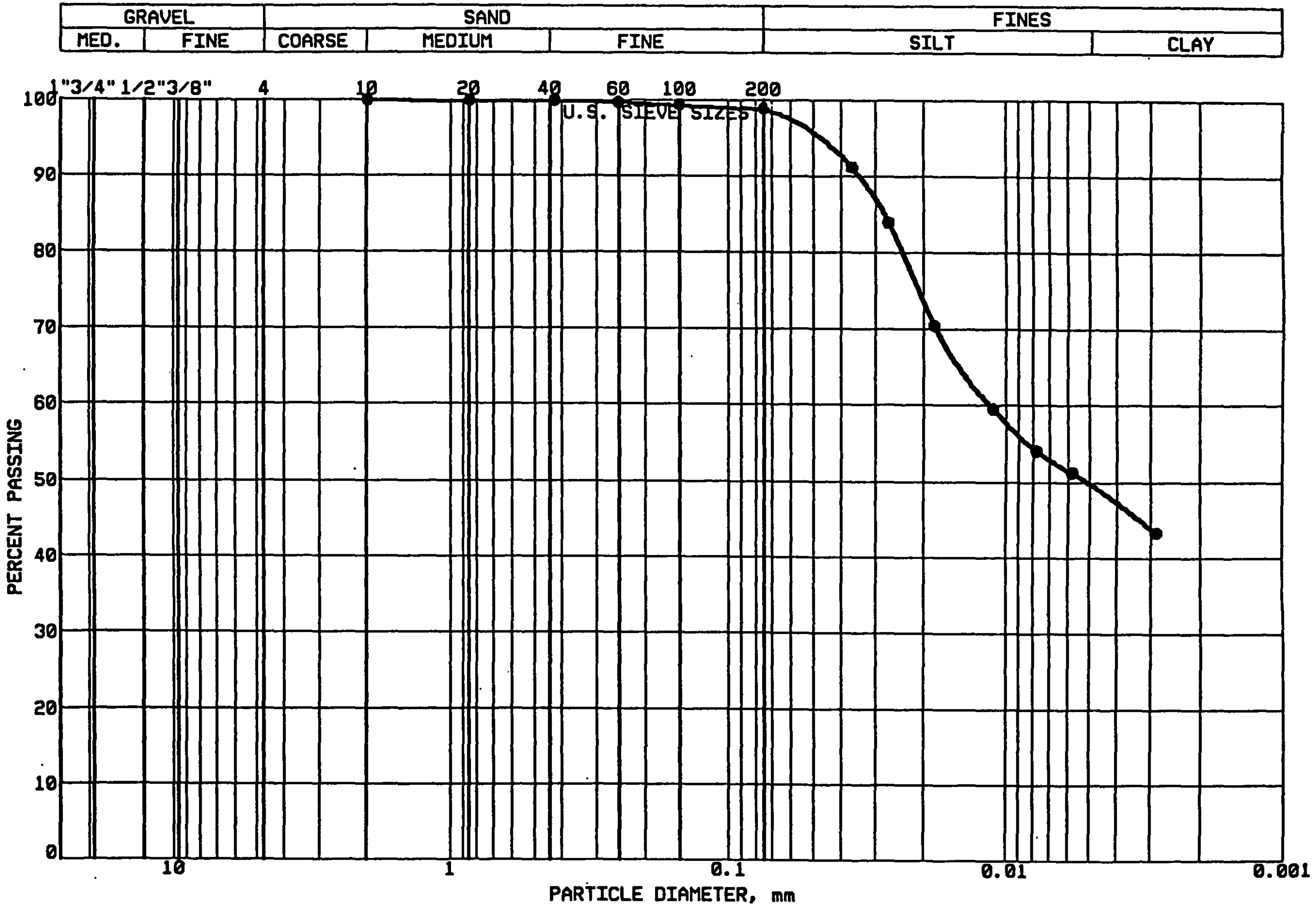
**PROJECT:** BNDX-93-037A
Onalaska Landfill
Wisconsin, Onalaska
BORING: TW-15

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.2 % |
| SILT | 48.7 % |
| CLAY | 50.1 % |

**CLASSIFICATION:**
CH, Fat clay,olive brown

D60=0.011
D30=
D10=
Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
INTERTEC

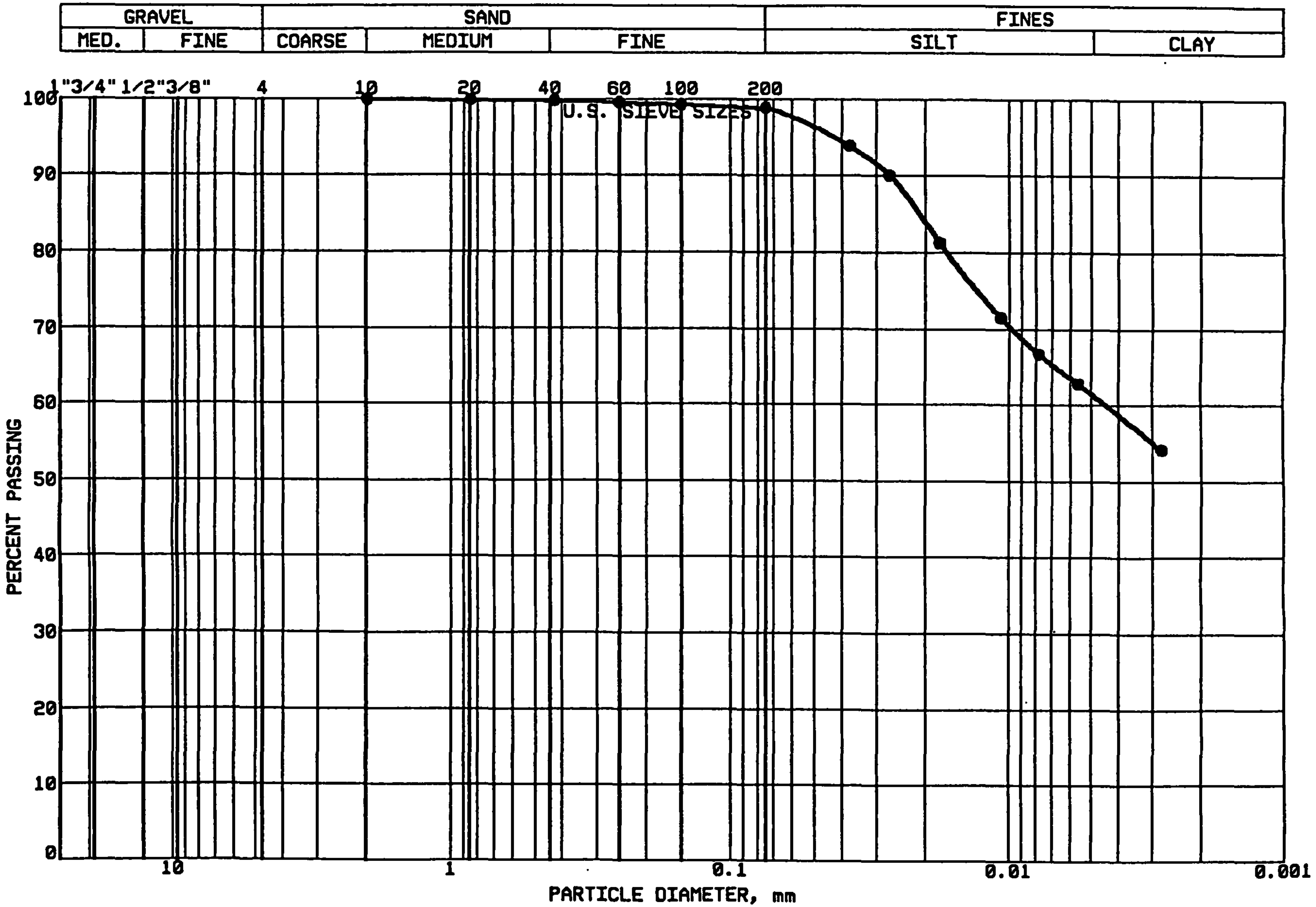
**PROJECT:** BNDX-93-037A
Onalaska Landfill
Wisconsin, Onalaska
BORING: TW-16

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.1 % |
| SILT | 49.3 % |
| CLAY | 49.6 % |

**CLASSIFICATION:**
CH, Fat clay,olive brown

D60=0.012
D30=
D10=
Cu=
Cc=

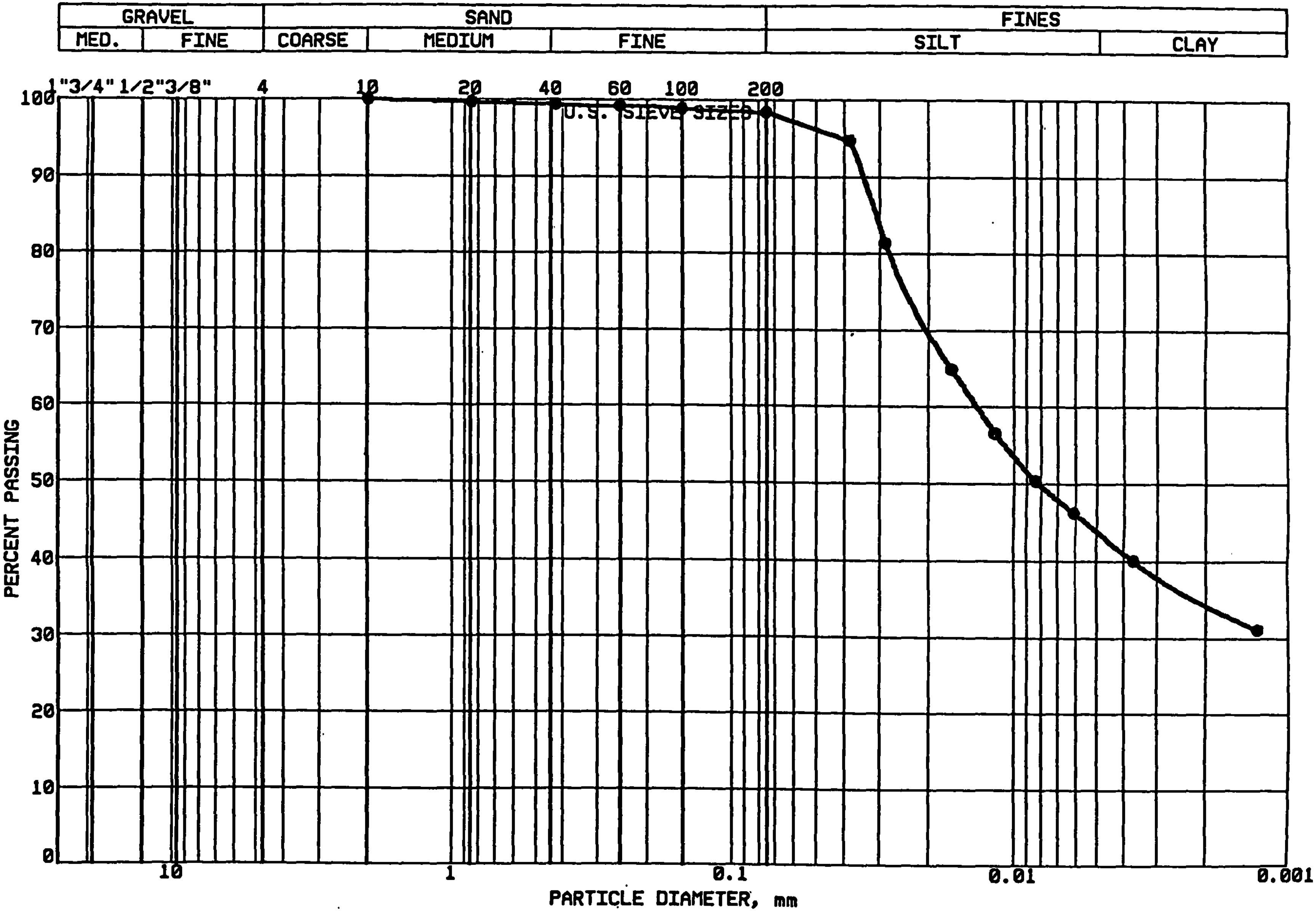
## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
INTERTEC

| | | | | |
|---|---|---|---|---|
| **PROJECT:** BNDX-93-037A | GRAVEL | 0.0 % | **CLASSIFICATION:** | |
| Onalaska Landfill | SAND | 1.1 % | CH, Fat clay, olive brown | |
| Wisconsin, Onalaska | SILT | 37.5 % | D60=0.005 | Cu= |
| BORING: TW-17 | CLAY | 61.4 % | D30=<br>D10= | Cc= |

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



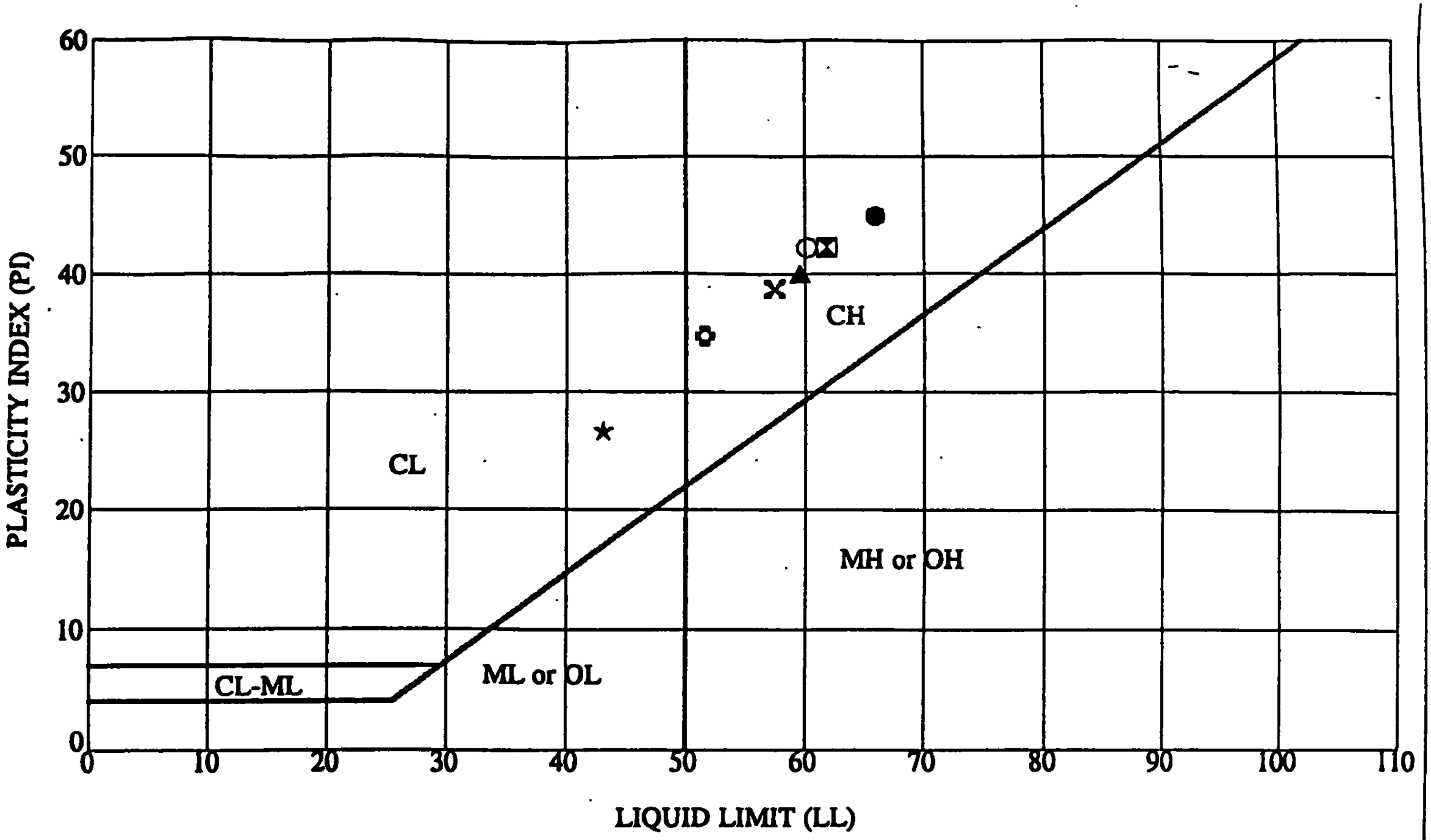
**BRAUN**
**INTERTEC**

PROJECT: BNDX-93-037A
Onalaska Landfill
Wisconsin, Onalaska
BORING: TW-18

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.6 % |
| SILT | 54.6 % |
| CLAY | 43.8 % |

CLASSIFICATION:
CH, Fat clay,olive brown

D60=0.014
D30=
D10=
Cu=
Cc=



| LEGEND: | Depth | LL | PI |
|---|---|---|---|
| ● TW-01 | | 66 | 45 |
| ☒ TW-02 | | 62 | 42 |
| ▲ TW-03 | | 60 | 40 |
| ★ TW-04 | | 43 | 27 |
| ✕ TW-06 | | 58 | 39 |
| ✿ TW-07 | | 52 | 35 |
| ○ TW-08 | | 60 | 42 |

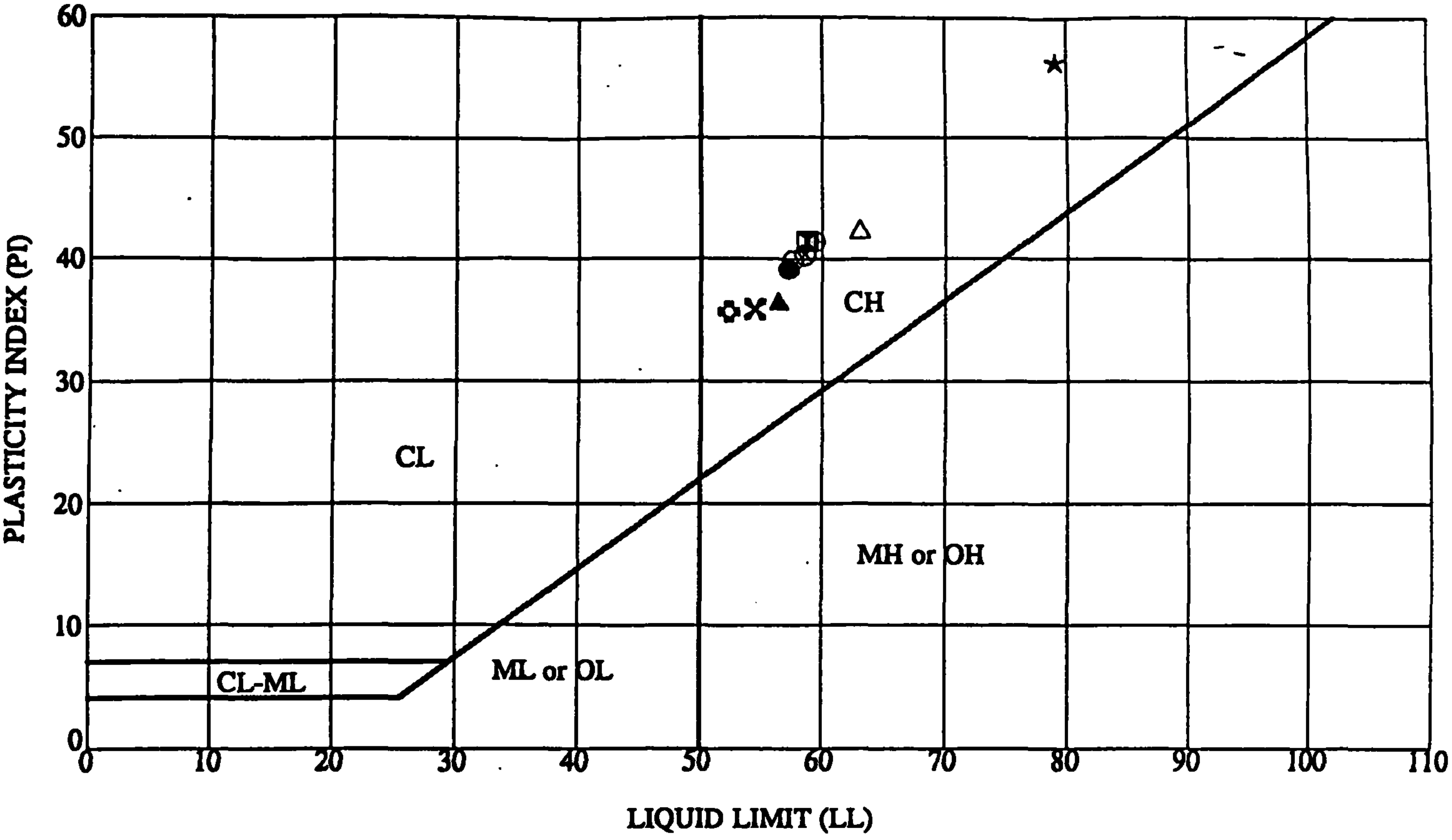
BRAUN PROJECT NO: BNDX-93-037A

September 1993

Onalaska Landfill - Wisconsin, Onalaska

**BRAUN**
INTERTEC

## ATTERBERG LIMITS' RESULTS



| LEGEND: | Depth | LL | PI |
|---|---|---|---|
| ● TW-09 | | 57 | 39 |
| ☒ TW-10 | | 59 | 41 |
| ▲ TW-11 | | 57 | 37 |
| ★ TW-12 | | 79 | 56 |
| ✕ TW-13 | | 55 | 36 |
| ✿ TW-14 | | 52 | 36 |
| ○ TW-15 | | 58 | 40 |
| △ TW-16 | | 63 | 42 |
| ⊗ TW-17 | | 59 | 40 |
| ⊕ TW-18 | | 59 | 41 |

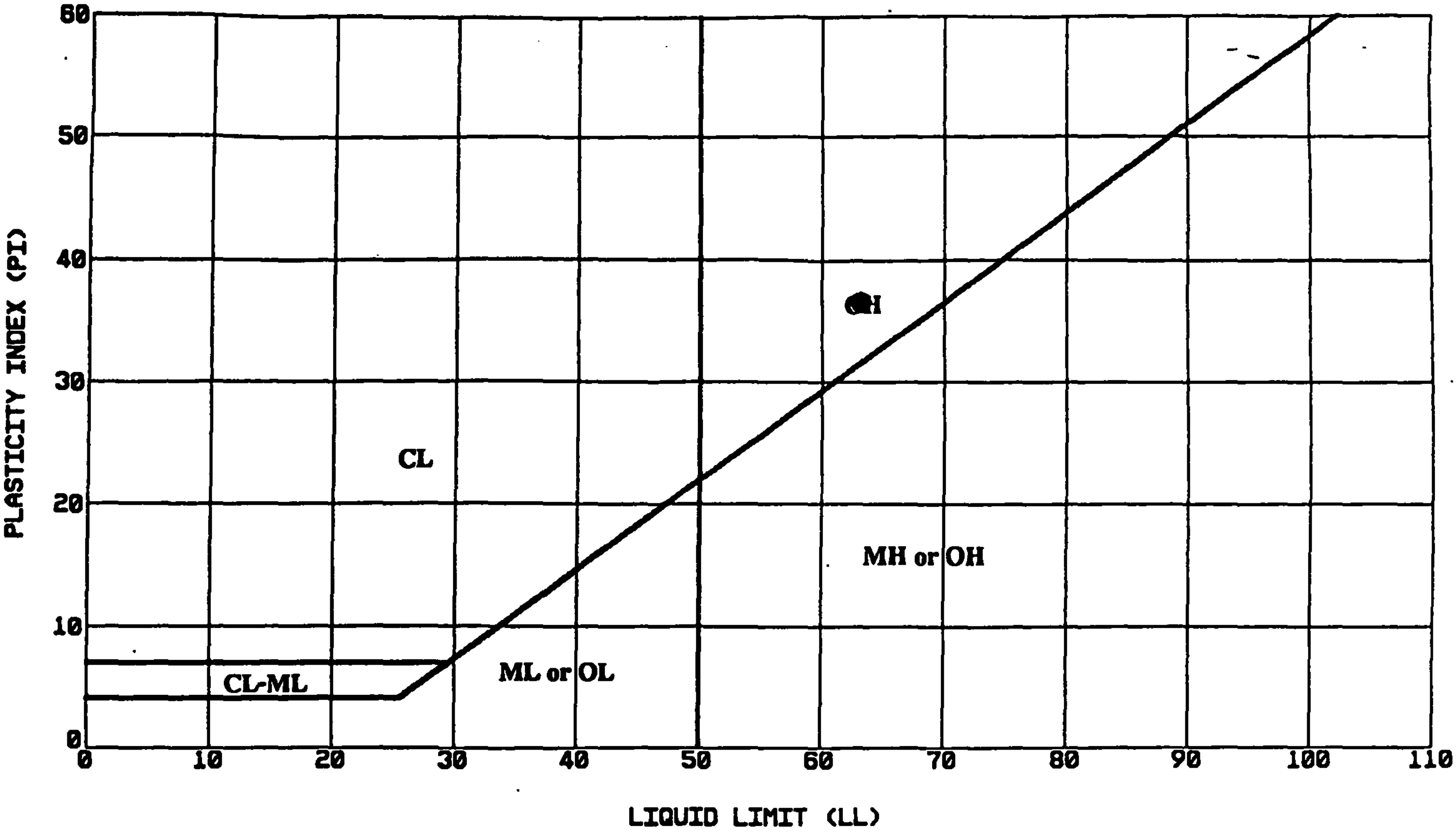
BRAUN PROJECT NO: BNDX-93-037A

October 1993

Onalaska Landfill - Wisconsin, Onalaska

BRAUN INTERTEC

# ATTERBERG LIMITS' RESULTS



LEGEND:

| | | LL | PL | PI |
|---|---|---|---|---|
| ● | TW-5 | 63 | 27 | 37 |

**BRAUN PROJECT NO: BNDX-93-037A**

**September 1993**

**Onalaska Municipal Landfill Site - Onalaska, WI**

***ATTERBERG LIMITS' RESULTS***

**FIGURE 1**

**Braun Intertec Engineering, Inc. Rochester, Minnesota**

# SUMMARY OF MATERIAL PROPERTIES
## Onalaska Landfill - Wisconsin, Onalaska
## PROJECT NO: BNDX-93-037A

| POINT IDENTIFICATION | DEPTH | ASTM CLASSIFICATION | LL % | PI % | FINES % | WATER CONTENT % | DRY DENSITY pcf | SPECIFIC GRAVITY |
|---|---|---|---|---|---|---|---|---|
| TW-01 | 0.00 | CH | 66 | 45 | 99 | | | |
| TW-02 | 0.00 | CH | 62 | 42 | 99 | | | |
| TW-03 | 0.00 | CH | 60 | 40 | 92 | | | |
| TW-04 | 0.00 | CL | 43 | 27 | 95 | | | |
| TW-06 | 0.00 | CH | 58 | 39 | 96 | | | |
| TW-07 | 0.00 | CH | 52 | 35 | 97 | | | |
| TW-08 | 0.00 | CH | 60 | 42 | 99 | 38 | | |

# TOPSOIL FERTILITY

869855

| LAB FARM NO. | |
|---|---|
| STATE COUNTY<br>WI 32 | ACCOUNT NO.<br>1 |
| CEIVED<br>3/93 | DATE PROCESSED<br>10/25/93 |

SUBMITTED BY:

CASH SALE

Dairyland Laboratories, Inc.
ARCADIA, WISCONSIN
54612

GROWER:

WESTON INC
W8650 CTH Z
ONALASKA , WI 54650

* This report meets requirements for WI ASCS Cost-Sharing.

| IDENTIFICATION |
|---|
| Field<br>CS |
| Acres |
| Soil Name (or subsoil group)<br>GROUP E |
| Plow Depth 6.5 |

| LABORATORY ANALYSIS | | | | | | | | | | | | | | LAB USE | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample No. | Text Code | Est. CEC | Soil pH | O.M. % | P ppm | K ppm | Ca ppm | Mg ppm | B ppm | Mn ppm | ZN ppm | $SO_4$-S ppm | S Avail. Index | Sample Density g/cm³ | Buffer Code |
| 1 | 1 | | 7.0 | 0.1 | 24 | 29 | | | | | | | | 1.47 | N.R. |

* Graph represents the most demanding crop in Option 1 for P and K:

CRP, GRASS

| | Very Low | Low | Medium | High | Very High | Excessively High |
|---|---|---|---|---|---|---|
| * Phosphorus | ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ | ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ | ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ | ▮▮▮▮▮▮▮▮▮▮ | | |
| * Potassium | ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮ | ▮▮▮▮▮▮▮▮▮▮ | | | | |
| Calcium | | | | | | |
| Magnesium | | | | | | |
| Boron | | | | | | |
| Manganese | | | | | | |
| Zinc | | | | | | |
| Sulfur Avail. Index | | | | | | |

| OPTION 1: | | | | | RECOMMENDATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Soil Test Interpretation | | Nutrient Needs | | | Fertilizer Replacement Credit 1/ | | | Nutrients to Apply | | |
| Cropping Year | Crop to be Grown | Crop Yield Goal | P | K | N | $P_2O_5$ lbs./a | $K_2O$ | N | $P_2O_5$ lbs./a | $K_2O$ | N | $P_2O_5$ lbs./a | $K_2O$ |
| 1 | CRP, GRASS | | H | L | 30 | | 10 | | | | 30 | | 10 |
| | CRP, GRASS | | H | L | 30 | | 10 | | | | 30 | | 10 |
| | CRP, GRASS | | H | L | 30 | | 10 | | | | 30 | | 10 |

Lime required for this rotation to reach pH 5.6 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

| OPTION 2: | | | | | RECOMMENDATIONS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Soil Test Interpretation | | Nutrient Needs | | | Fertilizer Replacement Credit 1/ | | | Nutrients to Apply | | |
| Cropping Year | Crop to be Grown | Crop Yield Goal | P | K | N | $P_2O_5$ lbs./a | $K_2O$ | N | $P_2O_5$ lbs./a | $K_2O$ | N | $P_2O_5$ lbs./a | $K_2O$ |
| 1 | CORN, FIELD | 140.50 bu/a | OPT | VL | 120 | 55 | 50 | | | | 120 | 55 | 50 |
| 2 | OATS | 75.00 bu/a | OPT | VL | 60 | 30 | 105 | | | | 60 | 30 | 105 |
| 3 | ALFALFA | 5.05 T/a | L | VL | 30 | 75 | 270 | | | | 30 | 75 | 270 |

Lime required for this rotation to reach pH 6.8 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

1. These credits are determined from information provided relative to legume-sod plowdown and manure application.
Note: If spring nitrogen availability test has been run, subtract the nitrogen credit from crop nitrogen needs.

## COMMENTS SECTION

N.R. = Not required for calculation of lime requirement when the soil pH is 6.6 or higher.
If the alfalfa stand will be maintained for more than three years, increase topdressed potash by 20 percent.
If corn is harvested for silage, apply an additional 30 lb P2O5/A and 90 lb K2O/A to the subsequent crop.
Where barley or oats are underseeded with a legume forage, reduce Nitrogen by 50%.
Because of the low Potassium buffering capacity of this soil, this field should be retested every two years.
Starter fertilizer (e.g. 10+20+20 lb/A N+P2O5+K2O) is advisable for row crops on soils slow to warm in the Spring.
Apply 30 lbs N/A in seeding year for alfalfa, red clover and trefoil on sandy soils.
The Nitrogen recommendation should be applied in sidedressed or split application on sandy soils.
Soil name for this field was not specified. More specific recommendations are possible if the soil name is provided.

870088

| STATE COUNTY | ACCOUNT NO. |
|---|---|
| WI 32 | 1 |
| DATE RECEIVED | DATE PROCESSED |
| 30/93 | 11/ 1/93 |

SUBMITTED BY:

CASH SALE

Dairyland Laboratories, Inc.
ARCADIA, WISCONSIN 54612

GROWER:

WESTON
W8650 CTH Z
ONALASKA , WI 54650

* This report meets requirements for WI ASCS Cost-Sharing.

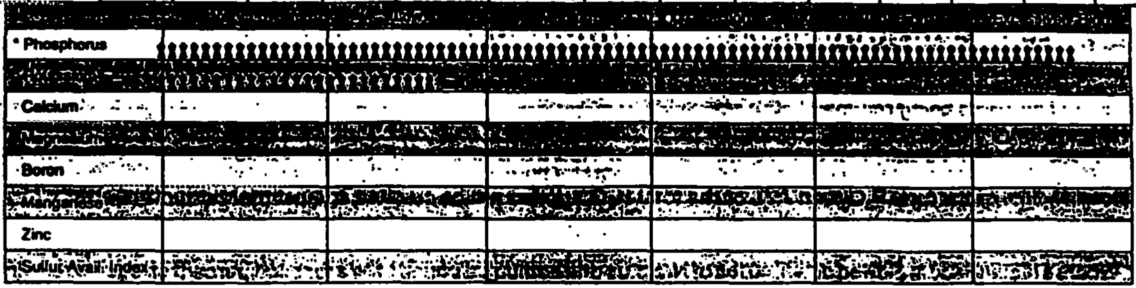
|  |  |
|---|---|
| Field | 1 |
| Acres |  |
| Soil Name (or subsoil group) | GROUP E |
| Plow Depth | 6.5 |

LABORATORY ANALYSIS

| Sample No. | Text Code | Est. CEC | Soil pH | O.M. % | P ppm | K ppm | Ca ppm | Mg ppm | B ppm | Mn ppm. | ZN ppm | $SO_4$-S ppm | S Avail. Index | Sample Density g/cm³ | Buffer Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 |  | 6.2 | 1.1 | 39 | 49 |  |  |  |  |  |  |  | 1.37 | 6.9 |

* Graph represents the most demanding crop in Option 1 for P and K:

CRP, GRASS



RECOMMENDATIONS

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N lbs/a | Nutrient Needs $P_2O_5$ lbs/a | Nutrient Needs $K_2O$ lbs/a | Fertilizer Replacement Credit 1/ N lbs/a | Fertilizer Replacement Credit 1/ $P_2O_5$ lbs/a | Fertilizer Replacement Credit 1/ $K_2O$ lbs/a | Nutrients to Apply N lbs/a | Nutrients to Apply $P_2O_5$ lbs/a | Nutrients to Apply $K_2O$ lbs/a |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CRP, GRASS |  | EH | L | 30 |  | 10 |  |  |  | 30 |  | 10 |
| 2 | CRP, GRASS |  | EH | L | 30 |  | 10 |  |  |  | 30 |  | 10 |
| 3 | CRP, GRASS |  | EH | L | 30 |  | 10 |  |  |  | 30 |  | 10 |

Lime required for this rotation to reach pH 5.6 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

OPTION 2 RECOMMENDATIONS

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N lbs/a | Nutrient Needs $P_2O_5$ lbs/a | Nutrient Needs $K_2O$ lbs/a | Fertilizer Replacement Credit 1/ N lbs/a | Fertilizer Replacement Credit 1/ $P_2O_5$ lbs/a | Fertilizer Replacement Credit 1/ $K_2O$ lbs/a | Nutrients to Apply N lbs/a | Nutrients to Apply $P_2O_5$ lbs/a | Nutrients to Apply $K_2O$ lbs/a |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CORN, FIELD | 140.50 bu/a | H | L | 120 | 25 | 45 |  |  |  | 120 | 25 | 45 |
| 2 | OATS | 75.00 bu/a | EH | L | 60 |  | 100 |  |  |  | 60 |  | 100 |
| 3 | ALFALFA | 5.05 T/a | H | VL | 30 | 30 | 270 |  |  |  | 30 | 30 | 270 |

Lime required for this rotation to reach pH 6.8 is 2.0 T/a of 60-69 lime or 1.0 T/a 80-89 lime.

1. These credits are determined from information provided relative to legume-sod plowdown and manure application.
Note: If spring nitrogen availability test has been run, subtract the nitrogen credit from crop nitrogen needs.

COMMENTS SECTION

If the alfalfa stand will be maintained for more than three years, increase topdressed potash by 20 percent.
Where barley or oats are underseeded with a legume forage, reduce Nitrogen by 50%.
Because of the low Potassium buffering capacity of this soil, this field should be retested every two years.
Starter fertilizer (e.g. 10+20+20 lb/A N+P205+K20) is advisable for row crops on soils slow to warm in the Spring.
Apply 30 lbs N/A in seeding year for alfalfa, red clover and trefoil on sandy soils.
The Nitrogen recommendation should be applied in sidedressed or split application on sandy soils.
If corn is harvested for silage, apply 90 lb K20/A to the subsequent crop.
Soil name for this field was not specified. More specific recommendations are possible if the soil name is provided.

870088

| STATE - COUNTY | ACCOUNT NO. |
|---|---|
| WI 32 | 1 |
| ECEIVED | DATE PROCESSED |
| 10/93 | 11/ 1/93 |

SUBMITTED BY:

CASH SALE

Dairyland Laboratories, Inc.
ARCADIA, WISCONSIN
54612

GROWER:

WESTON
W8650 CTH Z
ONALASKA , WI 54650

* This report meets requirements for WI ASCS Cost-Sharing.

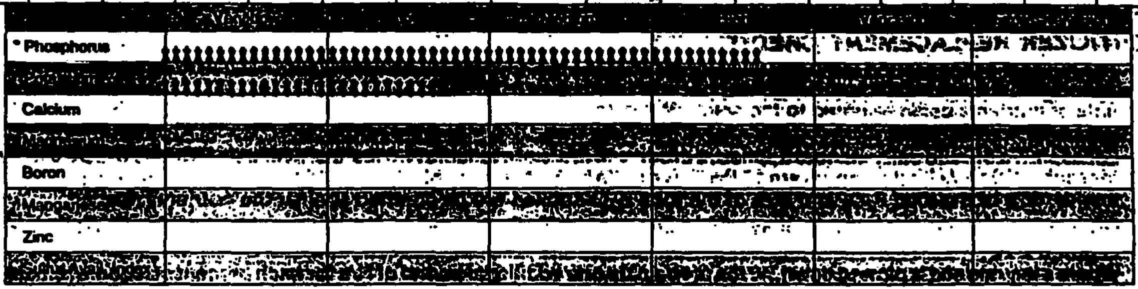
| | |
|---|---|
| Field | 2 |
| Acres | |
| Soil Name (or subsoil group) | GROUP E |
| Plow Depth | 6.5 |

LABORATORY ANALYSIS

| Sample No. | Text Code | Est. CEC | Soil pH | O.M. % | P ppm | K ppm | Ca ppm | Mg ppm | B ppm | Mn ppm | ZN ppm | $SO_4$-S ppm | S Avail. Index | Sample Density g/cm³ | Buffer Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 1 | | 6.6 | 1.1 | 23 | 34 | | | | | | | | 1.29 | N.R. |

* Graph represents the most demanding crop in Option 1 for P and K:

CRP, GRASS



RECOMMENDATIONS

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs $P_2O_5$ | Nutrient Needs $K_2O$ | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ $P_2O_5$ | Fertilizer Replacement Credit 1/ $K_2O$ | Nutrients to Apply N | Nutrients to Apply $P_2O_5$ | Nutrients to Apply $K_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a |
| 1 | CRP, GRASS | | H | L | 30 | | 10 | | | | 30 | | 10 |
| 2 | CRP, GRASS | | H | L | 30 | | 10 | | | | 30 | | 10 |
| 3 | CRP, GRASS | | H | L | 30 | | 10 | | | | 30 | | 10 |

Lime required for this rotation to reach pH 5.6 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

RECOMMENDATIONS

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs $P_2O_5$ | Nutrient Needs $K_2O$ | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ $P_2O_5$ | Fertilizer Replacement Credit 1/ $K_2O$ | Nutrients to Apply N | Nutrients to Apply $P_2O_5$ | Nutrients to Apply $K_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a |
| 1 | CORN, FIELD | 140.50 bu/a | OPT | VL | 120 | 55 | 50 | | | | 120 | 55 | 50 |
| 2 | OATS | 75.00 bu/a | OPT | VL | 60 | 30 | 105 | | | | 60 | 30 | 105 |
| 3 | ALFALFA | 5.05 T/a | L | VL | 30 | 75 | 270 | | | | 30 | 75 | 270 |

Lime required for this rotation to reach pH 6.8 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

1. These credits are determined from information provided relative to legume-sod plowdown and manure application.
Note: If spring nitrogen availability test has been run, subtract the nitrogen credit from crop nitrogen needs.

COMMENTS SECTION

N.R. = Not required for calculation of lime requirement when the soil pH is 6.6 or higher.
If the alfalfa stand will be maintained for more than three years, increase topdressed potash by 20 percent.
If corn is harvested for silage, apply an additional 30 lb P2O5/A and 90 lb K2O/A to the subsequent crop.
Where barley or oats are underseeded with a legume forage, reduce Nitrogen by 50%.
Because of the low Potassium buffering capacity of this soil, this field should be retested every two years.
Starter fertilizer (e.g. 10+20+20 lb/A N+P2O5+K2O) is advisable for row crops on soils slow to warm in the Spring.
Apply 30 lbs N/A in seeding year for alfalfa, red clover and trefoil on sandy soils.
The Nitrogen recommendation should be applied in sidedressed or split application on sandy soils.
Soil name for this field was not specified. More specific recommendations are possible if the soil name is provided.

870088

[redacted]

| STATE | COUNTY | ACCOUNT NO. |
|---|---|---|
| WI | 32 | 1 |

| RECEIVED | DATE PROCESSED |
|---|---|
| 30/93 | 11/ 1/93 |

SUBMITTED BY:

CASH SALE

Dairyland Laboratories, Inc.
ARCADIA, WISCONSIN
54612

GROWER:

WESTON
W8650 CTH Z
ONALASKA , WI 54650

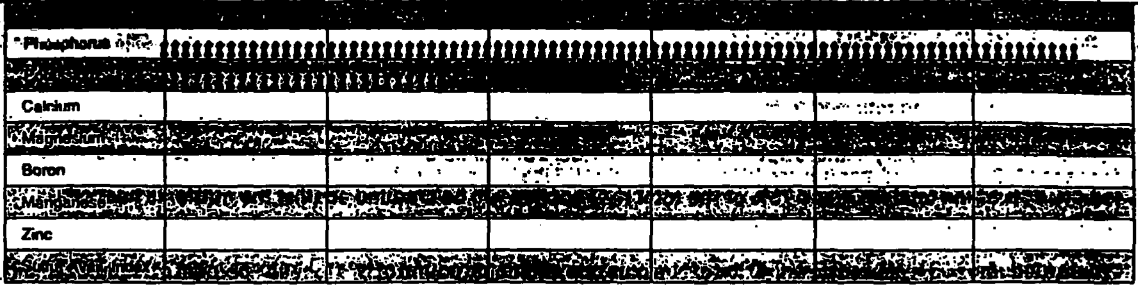
* This report meets requirements for WI ASCS Cost-Sharing.

|  |  |
|---|---|
| Field | 3 |
| Acres |  |
| Soil Name (or subsoil group) | GROUP E |
| Plow Depth | 6.5 |

| Sample No. | Text Code | Est. CEC | Soil pH | O.M. % | P ppm | K ppm | Ca ppm | Mg ppm | B ppm | Mn ppm | ZN ppm | SO₄-S ppm | S Avail. Index | Sample Density g/cm³ | Buffer Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 1 |  | 7.0 | 1.1 | 30 | 50 |  |  |  |  |  |  |  | 1.35 | N.R. |

* Graph represents the most demanding crop in Option 1 for P and K:

CRP, GRASS



| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs P₂O₅ lbs/a | Nutrient Needs K₂O | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ P₂O₅ lbs/a | Fertilizer Replacement Credit 1/ K₂O | Nutrients to Apply N | Nutrients to Apply P₂O₅ lbs/a | Nutrients to Apply K₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CRP, GRASS |  | EH | L | 30 |  | 10 |  |  |  | 30 |  | 10 |
| 2 | CRP, GRASS |  | EH | L | 30 |  | 10 |  |  |  | 30 |  | 10 |
| 3 | CRP, GRASS |  | EH | L | 30 |  | 10 |  |  |  | 30 |  | 10 |

Lime required for this rotation to reach pH 5.6 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

OPTION 2 — RECOMMENDATIONS

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs P₂O₅ lbs/a | Nutrient Needs K₂O | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ P₂O₅ lbs/a | Fertilizer Replacement Credit 1/ K₂O | Nutrients to Apply N | Nutrients to Apply P₂O₅ lbs/a | Nutrients to Apply K₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CORN, FIELD | 140.50 bu/a | OPT | L | 120 | 55 | 45 |  |  |  | 120 | 55 | 45 |
| 2 | OATS | 75.00 bu/a | OPT | L | 60 | 30 | 100 |  |  |  | 60 | 30 | 100 |
| 3 | ALFALFA | 5.05 T/a | OPT | L | 30 | 65 | 265 |  |  |  | 30 | 65 | 265 |

Lime required for this rotation to reach pH 6.8 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

1. These credits are determined from information provided relative to legume-sod plowdown and manure application.
Note: If spring nitrogen availability test has been run, subtract the nitrogen credit from crop nitrogen needs.

COMMENTS SECTION

N.R. = Not required for calculation of lime requirement when the soil pH is 6.6 or higher.
If the alfalfa stand will be maintained for more than three years, increase topdressed potash by 20 percent.
If corn is harvested for silage, apply an additional 30 lb P2O5/A and 90 lb K2O/A to the subsequent crop.
Where barley or oats are underseeded with a legume forage, reduce Nitrogen by 50%.
Because of the low Potassium buffering capacity of this soil, this field should be retested every two years.
Starter fertilizer (e.g. 10+20+20 lb/A N+P2O5+K2O) is advisable for row crops on soils slow to warm in the Spring.
Apply 30 lbs N/A in seeding year for alfalfa, red clover and trefoil on sandy soils.
The Nitrogen recommendation should be applied in sidedressed or split application on sandy soils.
Soil name for this field was not specified. More specific recommendations are possible if the soil name is provided.

670088

| STATE | COUNTY | ACCOUNT NO |
|---|---|---|
| WI | 32 | 1 |

| DATE RECEIVED | DATE PROCESSED |
|---|---|
| 10/30/93 | 11/ 1/93 |

SUBMITTED BY:

CASH SALE

Dairyland Laboratories, Inc.
ARCADIA, WISCONSIN
54612

BROKER:

WESTON
W8650 CTH Z
ONALASKA , WI 54650

* This report meets requirements for WI ASCS Cost-Sharing.

Field
4

Acres

Soil Name (or subsoil group)
GROUP E

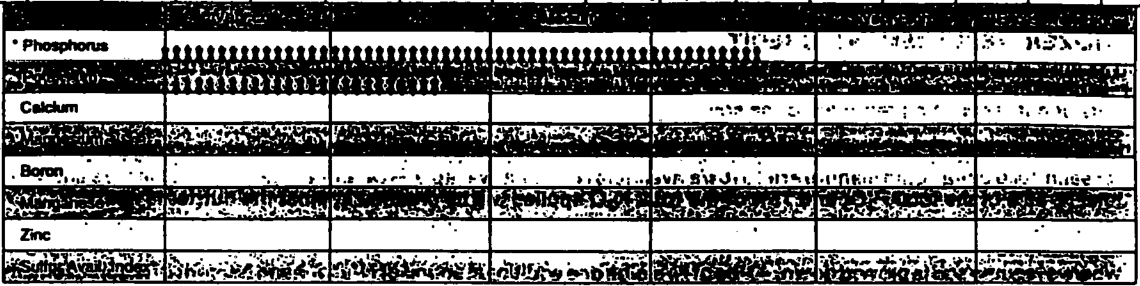
Plow Depth 6.5

LABORATORY ANALYSIS

| Sample No. | Text Code | Est. CEC | Soil pH | O.M. % | P ppm | K ppm | Ca ppm | Mg ppm | B ppm | Mn ppm | ZN ppm | $SO_4$-S ppm | S Avail. Index | Sample Density g/cm³ | Buffer Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 1 | | 6.8 | 1.0 | 19 | 35 | | | | | | | | 1.26 | N.R. |

* Graph represents the most demanding crop in Option 1 for P and K.

CRP, GRASS



OPTION

RECOMMENDATIONS

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs $P_2O_5$ | Nutrient Needs $K_2O$ | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ $P_2O_5$ | Fertilizer Replacement Credit 1/ $K_2O$ | Nutrients to Apply N | Nutrients to Apply $P_2O_5$ | Nutrients to Apply $K_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a |
| 1 | CRP, GRASS | | H | L | 30 | | 10 | | | | 30 | | 10 |
| 2 | CRP, GRASS | | H | L | 30 | | 10 | | | | 30 | | 10 |
| 3 | CRP, GRASS | | H | L | 30 | | 10 | | | | 30 | | 10 |

Lime required for this rotation to reach pH 5.6 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

OPTION 2

RECOMMENDATIONS

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs $P_2O_5$ | Nutrient Needs $K_2O$ | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ $P_2O_5$ | Fertilizer Replacement Credit 1/ $K_2O$ | Nutrients to Apply N | Nutrients to Apply $P_2O_5$ | Nutrients to Apply $K_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a | lbs./a |
| 1 | CORN, FIELD | 140.50 bu/a | L | VL | 120 | 70 | 50 | | | | 120 | 70 | 50 |
| 2 | OATS | 75.00 bu/a | L | VL | 60 | 40 | 105 | | | | 60 | 40 | 105 |
| 3 | ALFALFA | 5.05 T/a | L | VL | 30 | 75 | 270 | | | | 30 | 75 | 270 |

Lime required for this rotation to reach pH 6.8 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

1. These credits are determined from information provided relative to legume-sod plowdown and manure application.
Note: If spring nitrogen availability test has been run, subtract the nitrogen credit from crop nitrogen needs.

COMMENTS SECTION

N.R. = Not required for calculation of lime requirement when the soil pH is 6.6 or higher.
If the alfalfa stand will be maintained for more than three years, increase topdressed potash by 20 percent.
If corn is harvested for silage, apply an additional 30 lb P2O5/A and 90 lb K2O/A to the subsequent crop.
Where barley or oats are underseeded with a legume forage, reduce Nitrogen by 50%.
Because of the low Potassium buffering capacity of this soil, this field should be retested every two years.
Starter fertilizer (e.g. 10+20+20 lb/A N+P2O5+K2O) is advisable for row crops on soils slow to warm in the Spring.
Apply 30 lbs N/A in seeding year for alfalfa, red clover and trefoil on sandy soils.
The Nitrogen recommendation should be applied in sidedressed or split application on sandy soils.
Soil name for this field was not specified. More specific recommendations are possible if the soil name is provided.

870088 **SUBMITTED BY:**

CASH SALE

Dairyland Laboratories, Inc.
ARCADIA, WISCONSIN

**GROWER:**

WESTON
W8650 CTH Z
ONALASKA , WI 54650

| STATE | COUNTY | ACCOUNT NO. |
|---|---|---|
| WI | 32 | 1 |

| [illegible]ECEIVED | DATE PROCESSED |
|---|---|
| [illegible]0/93 | 11/ 1/93 |

*This report meets requirements for WI ASCS Cost-Sharing.

Field: 5

Acres

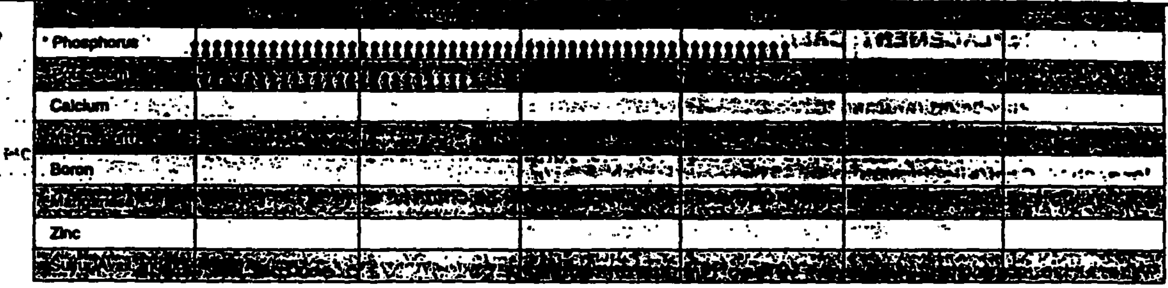
Soil Name (or subsoil group): GROUP E

Plow Depth 6.5

| Sample No. | Test Code | Est. CEC | Soil pH | O.M. % | P ppm | K ppm | Ca ppm | Mg ppm | B ppm | Mn ppm | ZN ppm | $SO_4$-S ppm | S Avail. Index | Sample Density g/cm³ | Buffer Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 1 |  | 6.9 | 1.2 | 23 | 40 |  |  |  |  |  |  |  | 1.28 | N.R. |

* Graph represents the most demanding crop in Option 1 for P and K:

CRP, GRASS



**OPTION 1** **RECOMMENDATIONS**

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs $P_2O_5$ lbs/a | Nutrient Needs $K_2O$ | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ $P_2O_5$ lbs/a | Fertilizer Replacement Credit 1/ $K_2O$ | Nutrients to Apply N | Nutrients to Apply $P_2O_5$ lbs/a | Nutrients to Apply $K_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CRP, GRASS |  | H | L | 30 |  | 10 |  |  |  | 30 |  | 10 |
| - | CRP, GRASS |  | H | L | 30 |  | 10 |  |  |  | 30 |  | 10 |
|  | CRP, GRASS |  | H | L | 30 |  | 10 |  |  |  | 30 |  | 10 |

Lime required for this rotation to reach pH 5.6 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

**OPTION 2** **RECOMMENDATIONS**

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs $P_2O_5$ lbs/a | Nutrient Needs $K_2O$ | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ $P_2O_5$ lbs/a | Fertilizer Replacement Credit 1/ $K_2O$ | Nutrients to Apply N | Nutrients to Apply $P_2O_5$ lbs/a | Nutrients to Apply $K_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CORN, FIELD | 140.50 bu/a | OPT | VL | 120 | 55 | 50 |  |  |  | 120 | 55 | 50 |
| 2 | OATS | 75.00 bu/a | OPT | VL | 60 | 30 | 105 |  |  |  | 60 | 30 | 105 |
| 3 | ALFALFA | 5.05 T/a | L | VL | 30 | 75 | 270 |  |  |  | 30 | 75 | 270 |

Lime required for this rotation to reach pH 6.8 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

1. These credits are determined from information provided relative to legume-sod plowdown and manure application.
Note: If spring nitrogen availability test has been run, subtract the nitrogen credit from crop nitrogen needs.

**COMMENTS SECTION**

N.R. = Not required for calculation of lime requirement when the soil pH is 6.6 or higher.
If the alfalfa stand will be maintained for more than three years, increase topdressed potash by 20 percent.
If corn is harvested for silage, apply an additional 30 lb P2O5/A and 90 lb K2O/A to the subsequent crop.
Where barley or oats are underseeded with a legume forage, reduce Nitrogen by 50%.
Because of the low Potassium buffering capacity of this soil, this field should be retested every two years.
Starter fertilizer (e.g. 10+20+20 lb/A N+P2O5+K2O) is advisable for row crops on soils slow to warm in the Spring.
Apply 30 lbs N/A in seeding year for alfalfa, red clover and trefoil on sandy soils.
The Nitrogen recommendation should be applied in sidedressed or split application on sandy soils.
Soil name for this field was not specified. More specific recommendations are possible if the soil name is provided.

7291A 3/92

870088

| STATE | COUNTY | ACCOUNT NO. |
|---|---|---|
|  | 2 | 1 |
|  | EIVED | DATE PROCESSED |
|  | 10/[illegible]/93 | 11/ 1/93 |

SUBMITTED BY:

CASH SALE

Dairyland Laboratories, Inc.
ARCADIA, WISCONSIN
54612

GROWER:

WESTON
W8650 CTH Z
ONALASKA , WI 54650

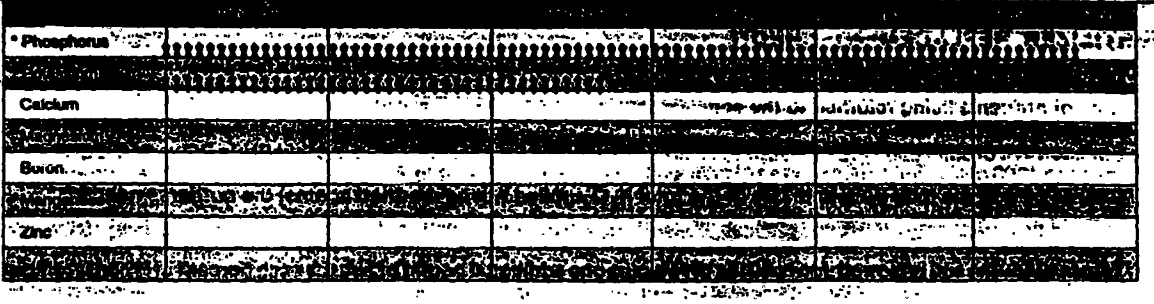
* This report meets requirements for WI ASCS Cost-Sharing.

| | |
|---|---|
| Field | 6 |
| Acres | |
| Soil Name (or subsoil group) | GROUP E |
| Plow Depth | 6.5 |

| Sample No. | Test Code | Est. CEC | Soil pH | O.M. % | P ppm | K ppm | Ca ppm | Mg ppm | B ppm | Mn ppm | ZN ppm | $SO_4$-S ppm | S Avail. Index | Sample Density g/cm³ | Buffer Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 1 | | 6.2 | 0.9 | 29 | 71 | | | | | | | | 1.36 | 7.0 |

* Graph represents the most demanding crop in Option 1 for P and K:

CRP, GRASS



| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs $P_2O_5$ lbs/a | Nutrient Needs $K_2O$ | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ $P_2O_5$ lbs/a | Fertilizer Replacement Credit 1/ $K_2O$ | Nutrients to Apply N | Nutrients to Apply $P_2O_5$ lbs/a | Nutrients to Apply $K_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CRP, GRASS | | EH | OPT | 30 | | | | | | 30 | | |
| 2 | CRP, GRASS | | EH | OPT | 30 | | | | | | 30 | | |
| 3 | CRP, GRASS | | EH | OPT | 30 | | | | | | 30 | | |

Lime required for this rotation to reach pH 5.6 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

RECOMMENDATIONS

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs $P_2O_5$ lbs/a | Nutrient Needs $K_2O$ | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ $P_2O_5$ lbs/a | Fertilizer Replacement Credit 1/ $K_2O$ | Nutrients to Apply N | Nutrients to Apply $P_2O_5$ lbs/a | Nutrients to Apply $K_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CORN, FIELD | 140.50 bu/a | OPT | OPT | 120 | 55 | 35 | | | | 120 | 55 | 35 |
| 2 | OATS | 75.00 bu/a | OPT | OPT | 60 | 30 | 90 | | | | 60 | 30 | 90 |
| 3 | ALFALFA | 5.05 T/a | OPT | L | 30 | 65 | 265 | | | | 30 | 65 | 265 |

Lime required for this rotation to reach pH 6.8 is 1.0 T/a of 60-69 lime or 1.0 T/a 80-89 lime.

1. These credits are determined from information provided relative to legume-sod plowdown and manure application.
Note: If spring nitrogen availability test has been run, subtract the nitrogen credit from crop nitrogen needs.

COMMENTS SECTION

If the alfalfa stand will be maintained for more than three years, increase topdressed potash by 20 percent.
If corn is harvested for silage, apply an additional 30 lb P2O5/A and 90 lb K2O/A to the subsequent crop.
Where barley or oats are underseeded with a legume forage, reduce Nitrogen by 50%.
Because of the low Potassium buffering capacity of this soil, this field should be retested every two years.
Starter fertilizer (e.g. 10+20+20 lb/A N+P2O5+K2O) is advisable for row crops on soils slow to warm in the Spring.
Apply 30 lbs N/A in seeding year for alfalfa, red clover and trefoil on sandy soils.
The Nitrogen recommendation should be applied in sidedressed or split application on sandy soils.
Soil name for this field was not specified. More specific recommendations are possible if the soil name is provided.

870088

SUBMITTED BY:

CASH SALE

Dairyland Laboratories, Inc.
ARCADIA, WISCONSIN
54612

GROWER:

WESTON
W8650 CTH Z
ONALASKA , WI 54650

| STATE | COUNTY | ACCOUNT NO. |
|---|---|---|
| WI | 32 | 1 |

| VED | DATE PROCESSED |
|---|---|
| 93 | 11/ 1/93 |

*This report meets requirements for WI ASCS Cost-Sharing.

Field 7

Acres

Soil Name (or subsoil group) GROUP E

Plow Depth 6.5

| Sample No. | Test Code | Est. CEC | Soil pH | O.M. % | P ppm | K ppm | Ca ppm | Mg ppm | B ppm | Mn ppm | ZN ppm | SO4-S ppm | S Avail. Index | Sample Density g/cm³ | Buffer Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 1 | | 6.8 | 1.0 | 24 | 46 | | | | | | | | 1.28 | N.R. |

*Graph represents the most demanding crop in Option 1 for P and K:

CRP, GRASS

| | |
|---|---|
| *Phosphorus | |
| | |
| Calcium | |
| | |
| Boron | |
| | |
| Zinc | |

OPTION 1

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs P₂O₅ lbs./a | Nutrient Needs K₂O | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ P₂O₅ lbs./a | Fertilizer Replacement Credit 1/ K₂O | Nutrients to Apply N | Nutrients to Apply P₂O₅ lbs./a | Nutrients to Apply K₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CRP, GRASS | | H | L | 30 | | 10 | | | | 30 | | 10 |
| 2 | CRP, GRASS | | H | L | 30 | | 10 | | | | 30 | | 10 |
| | CRP, GRASS | | H | L | 30 | | 10 | | | | 30 | | 10 |

Lime required for this rotation to reach pH 5.6 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

OPTION 2 RECOMMENDATIONS

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs P₂O₅ lbs./a | Nutrient Needs K₂O | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ P₂O₅ lbs./a | Fertilizer Replacement Credit 1/ K₂O | Nutrients to Apply N | Nutrients to Apply P₂O₅ lbs./a | Nutrients to Apply K₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CORN, FIELD | 140.50 bu/a | OPT | L | 120 | 55 | 45 | | | | 120 | 55 | 45 |
| 2 | OATS | 75.00 bu/a | OPT | L | 60 | 30 | 100 | | | | 60 | 30 | 100 |
| 3 | ALFALFA | 5.05 T/a | L | VL | 30 | 75 | 270 | | | | 30 | 75 | 270 |

Lime required for this rotation to reach pH 6.8 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

1. These credits are determined from information provided relative to legume-sod plowdown and manure application.
Note: If spring nitrogen availability test has been run, subtract the nitrogen credit from crop nitrogen needs.

COMMENTS SECTION

N.R. = Not required for calculation of lime requirement when the soil pH is 6.6 or higher.
If the alfalfa stand will be maintained for more than three years, increase topdressed potash by 20 percent.
If corn is harvested for silage, apply an additional 30 lb P2O5/A and 90 lb K2O/A to the subsequent crop.
Where barley or oats are underseeded with a legume forage, reduce Nitrogen by 50%.
Because of the low Potassium buffering capacity of this soil, this field should be retested every two years.
Starter fertilizer (e.g. 10+20+20 lb/A N+P2O5+K2O) is advisable for row crops on soils slow to warm in the Spring.
Apply 30 lbs N/A in seeding year for alfalfa, red clover and trefoil on sandy soils.
The Nitrogen recommendation should be applied in sidedressed or split application on sandy soils.
Soil name for this field was not specified. More specific recommendations are possible if the soil name is provided.

870088

| STATE COUNTY | ACCOUNT NO. |
|---|---|
| WI 32 | 1 |
| **DATE RECEIVED** | **DATE PROCESSED** |
| 30/93 | 11/ 1/93 |

SUBMITTED BY:
CASH SALE

**Dairyland Laboratories, Inc.**
ARCADIA, WISCONSIN

GROWER:
WESTON
W8650 CTH Z
ONALASKA , WI 54650

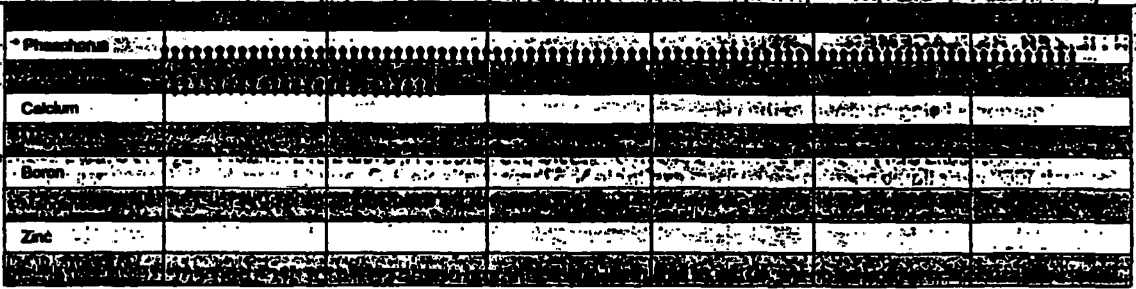
* This report meets requirements for WI ASCS Cost-Sharing.

| | |
|---|---|
| Field | 8 |
| Acres | |
| Soil Name (or subsoil group) | GROUP E |
| Plow Depth | 6.5 |

| Sample No. | Test Code | Est. CEC | Soil pH | O.M. % | P ppm | K ppm | Ca ppm | Mg ppm | B ppm | Mn ppm | ZN ppm | $SO_4$-S ppm | S Avail. Index | Sample Density g/cm³ | Buffer Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | 1 | | 6.0 | 0.8 | 33 | 58 | | | | | | | | 1.36 | 7.0 |

* Graph represents the most demanding crop in Option 1 for P and K:

CRP, GRASS



OPTION 1 RECOMMENDATIONS

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs $P_2O_5$ lbs./a | Nutrient Needs $K_2O$ | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ $P_2O_5$ lbs./a | Fertilizer Replacement Credit 1/ $K_2O$ | Nutrients to Apply N | Nutrients to Apply $P_2O_5$ lbs./a | Nutrients to Apply $K_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CRP, GRASS | | EH | L | 30 | | 10 | | | | 30 | | 10 |
| 2 | CRP, GRASS | | EH | L | 30 | | 10 | | | | 30 | | 10 |
| 3 | CRP, GRASS | | EH | L | 30 | | 10 | | | | 30 | | 10 |

Lime required for this rotation to reach pH 5.6 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

OPTION 2 RECOMMENDATIONS

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs $P_2O_5$ lbs./a | Nutrient Needs $K_2O$ | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ $P_2O_5$ lbs./a | Fertilizer Replacement Credit 1/ $K_2O$ | Nutrients to Apply N | Nutrients to Apply $P_2O_5$ lbs./a | Nutrients to Apply $K_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CORN, FIELD | 140.50 bu/a | H | L | 120 | 25 | 45 | | | | 120 | 25 | 45 |
| 2 | OATS | 75.00 bu/a | H | L | 60 | 15 | 100 | | | | 60 | 15 | 100 |
| 3 | ALFALFA | 5.05 T/a | OPT | L | 30 | 65 | 265 | | | | 30 | 65 | 265 |

Lime required for this rotation to reach pH 6.8 is 1.0 T/a of 60-69 lime or 1.0 T/a 80-89 lime.

1. These credits are determined from information provided relative to legume-sod plowdown and manure application.
Note: If spring nitrogen availability test has been run, subtract the nitrogen credit from crop nitrogen needs.

COMMENTS SECTION

If the alfalfa stand will be maintained for more than three years, increase topdressed potash by 20 percent.
Where barley or oats are underseeded with a legume forage, reduce Nitrogen by 50%.
Because of the low Potassium buffering capacity of this soil, this field should be retested every two years.
Starter fertilizer (e.g. 10+20+20 lb/A N+P2O5+K2O) is advisable for row crops on soils slow to warm in the Spring.
Apply 30 lbs N/A in seeding year for alfalfa, red clover and trefoil on sandy soils.
The Nitrogen recommendation should be applied in sidedressed or split application on sandy soils.
If corn is harvested for silage, apply 90 lb K2O/A to the subsequent crop.
Soil name for this field was not specified. More specific recommendations are possible if the soil name is provided.

870088 SUBMITTED BY:

CASH SALE

Dairyland Laboratories, Inc.
ARCADIA, WISCONSIN

GROWER:

WESTON
W8650 CTH Z
ONALASKA , WI 54650

| STATE | COUNTY | ACCOUNT NO. |
|---|---|---|
| WI | 32 | 1 |

| DATE RECEIVED | DATE PROCESSED |
|---|---|
| /93 | 11/ 1/93 |

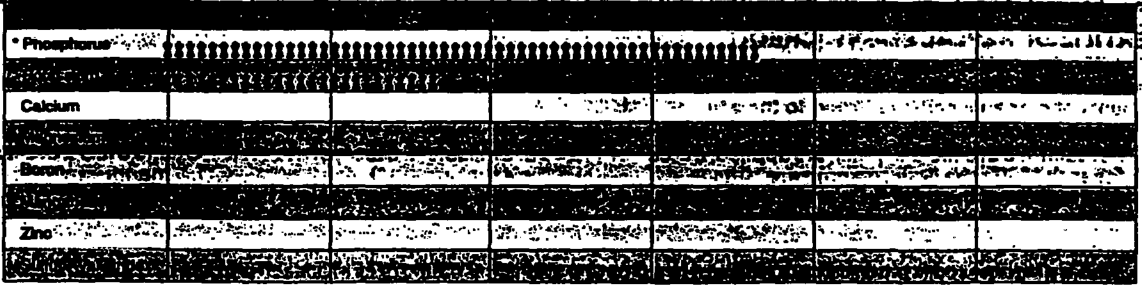
* This report meets requirements for WI ASCS Cost-Sharing.

| | |
|---|---|
| Field | 9 |
| Acres | |
| Soil Name (or subsoil group) | GROUP A |
| Plow Depth | 6.5 |

| Sample No. | Text Code | Est. CEC | Soil pH | O.M. % | P ppm | K ppm | Ca ppm | Mg ppm | B ppm | Mn ppm | ZN ppm | $SO_4$-S ppm | S Avail. Index | Sample Density g/cm³ | Buffer Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 2 | | 8.0 | 1.0 | 12 | 66 | | | | | | | | 1.27 | N.R. |

* Graph represents the most demanding crop in Option 1 for P and K:

CRP, GRASS



| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs $P_2O_5$ lbs./a | Nutrient Needs $K_2O$ | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ $P_2O_5$ lbs./a | Fertilizer Replacement Credit 1/ $K_2O$ | Nutrients to Apply N | Nutrients to Apply $P_2O_5$ lbs./a | Nutrients to Apply $K_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CRP, GRASS | | H | L | 30 | | 20 | | | | 30 | | 20 |
| 2 | CRP, GRASS | | H | L | 30 | | 20 | | | | 30 | | 20 |
| | CRP, GRASS | | H | L | 30 | | 20 | | | | 30 | | 20 |

Lime required for this rotation to reach pH 5.6 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

RECOMMENDATIONS

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs $P_2O_5$ lbs./a | Nutrient Needs $K_2O$ | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ $P_2O_5$ lbs./a | Fertilizer Replacement Credit 1/ $K_2O$ | Nutrients to Apply N | Nutrients to Apply $P_2O_5$ lbs./a | Nutrients to Apply $K_2O$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | CORN, FIELD | 140.50 bu/a | OPT | L | 180 | 55 | 55 | | | | 180 | 55 | 55 |
| 2 | OATS | 75.00 bu/a | OPT | L | 60 | 30 | 110 | | | | 60 | 30 | 110 |
| 3 | ALFALFA | 5.05 T/a | OPT | VL | 30 | 65 | 280 | | | | 30 | 65 | 280 |

Lime required for this rotation to reach pH 6.8 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

1. These credits are determined from information provided relative to legume-sod plowdown and manure application.
Note: If spring nitrogen availability test has been run, subtract the nitrogen credit from crop nitrogen needs.

COMMENTS SECTION

N.R. = Not required for calculation of lime requirement when the soil pH is 6.6 or higher.
If the alfalfa stand will be maintained for more than three years, increase topdressed potash by 20 percent.
If corn is harvested for silage, apply an additional 30 lb P2O5/A and 90 lb K2O/A to the subsequent crop.
Where barley or oats are underseeded with a legume forage, reduce Nitrogen by 50%.
Starter fertilizer (e.g. 10+20+20 lb/A N+P2O5+K2O) is advisable for row crops on soils slow to warm in the Spring.
Apply 30 lbs N/A in seeding year for alfalfa, red clover and trefoil on sandy soils.
Soil name for this field was not specified. More specific recommendations are possible if the soil name is provided.

870088

SUBMITTED BY:

CASH SALE

Dairyland Laboratories, Inc.
ARCADIA, WISCONSIN

GROWER:

WESTON
W8650 CTH Z
ONALASKA , WI 54650

| STATE COUNTY | ACCOUNT NO. |
|---|---|
| WI 32 | 1 |

| DATE RECEIVED | DATE PROCESSED |
|---|---|
| 0/93 | 11/ 1/93 |

* This report meets requirements for WI ASCS Cost-Sharing.

Field ID: 10

Acres

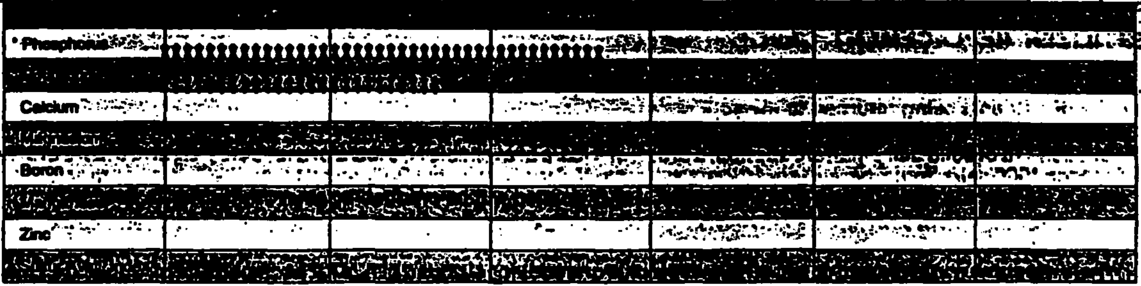
Soil Name (or subsoil group): GROUP A

Plow Depth: 6.5

| Sample No. | Text. Code | Est. CEC | Soil pH | O.M. % | P ppm | K ppm | Ca ppm | Mg ppm | B ppm | Mn ppm | ZN ppm | SO₄-S ppm | S Avail. Index | Sample Density g/cm³ | Buffer Code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 2 | | 8.2 | 0.9 | 10 | 65 | | | | | | | | 1.21 | N.R. |

* Graph represents the most demanding crop in Option 1 for P and K:

CRP, GRASS



| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs P₂O₅ | Nutrient Needs K₂O | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ P₂O₅ | Fertilizer Replacement Credit 1/ K₂O | Nutrients to Apply N | Nutrients to Apply P₂O₅ | Nutrients to Apply K₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | lbs./a | | | lbs./a | | | lbs./a | | |
| 1 | CRP, GRASS | | OPT | L | 30 | | 20 | | | | 30 | | 20 |
| 2 | CRP, GRASS | | OPT | L | 30 | | 20 | | | | 30 | | 20 |
| | CRP, GRASS | | OPT | L | 30 | | 20 | | | | 30 | | 20 |

Lime required for this rotation to reach pH 5.6 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

OPTION 2 RECOMMENDATIONS

| Cropping Year | Crop to be Grown | Crop Yield Goal | Soil Test Interpretation P | Soil Test Interpretation K | Nutrient Needs N | Nutrient Needs P₂O₅ | Nutrient Needs K₂O | Fertilizer Replacement Credit 1/ N | Fertilizer Replacement Credit 1/ P₂O₅ | Fertilizer Replacement Credit 1/ K₂O | Nutrients to Apply N | Nutrients to Apply P₂O₅ | Nutrients to Apply K₂O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | lbs./a | | | lbs./a | | | lbs./a | | |
| 1 | CORN, FIELD | 140.50 bu/a | OPT | L | 180 | 55 | 55 | | | | 180 | 55 | 55 |
| 2 | OATS | 75.00 bu/a | L | L | 60 | 40 | 110 | | | | 60 | 40 | 110 |
| 3 | ALFALFA | 5.05 T/a | L | VL | 30 | 75 | 280 | | | | 30 | 75 | 280 |

Lime required for this rotation to reach pH 6.8 is NO T/a of 60-69 lime or NO T/a 80-89 lime.

1. These credits are determined from information provided relative to legume-sod plowdown and manure application.
   Note: If spring nitrogen availability test has been run, subtract the nitrogen credit from crop nitrogen needs.

COMMENTS SECTION

N.R. = Not required for calculation of lime requirement when the soil pH is 6.6 or higher.
If the alfalfa stand will be maintained for more than three years, increase topdressed potash by 20 percent.
If corn is harvested for silage, apply an additional 30 lb P2O5/A and 90 lb K2O/A to the subsequent crop.
Where barley or oats are underseeded with a legume forage, reduce Nitrogen by 50%.
Starter fertilizer (e.g. 10+20+20 lb/A N+P2O5+K2O) is advisable for row crops on soils slow to warm in the Spring.
Apply 30 lbs N/A in seeding year for alfalfa, red clover and trefoil on sandy soils.
Soil name for this field was not specified. More specific recommendations are possible if the soil name is provided.

# CLASSIFICATIONS TESTS

**BRAUN**℠
INTERTEC

**Braun Intertec Corporation**
520 Fisherman's Road
La Crosse, Wisconsin 54603-1215
608-781-7277 Fax: 781-7279

*Engineers and Scientists Serving the Built and Natural Environments*

## Aggregate Quality Testing

| | | | |
|---|---|---|---|
| **Date:** | November 1, 1993 | **Project No.:** | BNDX-93-037A |

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

---

| | | | |
|---|---|---|---|
| Sampled By: | Braun Intertec/TLB | Source: | On Site |
| Date Sampled: | 10/14/93 | Classification: | Sandy Loam |
| Date Received: | 10/14/93 | Sample No.: | G-8 |

Mechanical Analysis

| Sieve | Results | Specifications |
|---|---|---|
| 1" | | |
| 3/4" | | |
| 5/8" | | |
| 1/2" | | |
| 3/8" | | |
| #4 | | |
| #10 | | |
| #20 | | |
| #40 | | |
| #80 | | |
| #200 | 33 | |

Deleterious Substances and other Characteristics

1. CA Spall, %
2. FA Shale, %
3. Total Spall, %
4. Crushing, %
5. L.A. Abrasion Loss (ASTM C 131/C 535), %
6. Specific Gravity (ASTM C 127/C 128)
   - B.O.D.
   - B.S.S.D.
   - Absorption, %
7. Insoluble Residue
   - \- No. 200, %
   - \+ No. 200, %
   - Total Insoluble, %
8. Flat and Elongated Pieces (CRD C 119), %
9. Clay Lumps and Friable Pieces (ASTM C 142), %
10. Soundness Loss (ASTM C 88), %

---

Remarks: Results of this material for identification only.

cc:

Thomas LoBianco
Laboratory Supervisor

**BRAUN℠**
INTERTEC

**Braun Intertec Corporation**
520 Fisherman's Road
La Crosse, Wisconsin 54603-1215
608-781-7277 Fax: 781-7279

*Engineers and Scientists Serving the Built and Natural Environments*

## Aggregate Quality Testing

**Date:** November 1, 1993

**Project No.:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

---

**Sampled By:** Braun Intertec/TLB
**Date Sampled:** 10/14/93
**Date Received:** 10/14/93
**Source:** On Site
**Classification:** Sandy Loam
**Sample No.:** G-9

Mechanical Analysis

| Sieve | Results | Specifications |
|---|---|---|
| 1" | | |
| 3/4" | | |
| 5/8" | | |
| 1/2" | | |
| 3/8" | | |
| #4 | | |
| #10 | | |
| #20 | | |
| #40 | | |
| #80 | | |
| #200 | 34 | |

Deleterious Substances and other Characteristics

1. CA Spall, %
2. FA Shale, %
3. Total Spall, %
4. Crushing, %
5. L.A. Abrasion Loss (ASTM C 131/C 535), %
6. Specific Gravity (ASTM C 127/C 128)
    - B.O.D.
    - B.S.S.D.
    - Absorption, %
7. Insoluble Residue
    - \- No. 200, %
    - \+ No. 200, %
    - Total Insoluble, %
8. Flat and Elongated Pieces (CRD C 119), %
9. Clay Lumps and Friable Pieces (ASTM C 142), %
10. Soundness Loss (ASTM C 88), %

---

Remarks: Results of this material for identification only.

cc:

Thomas LoBianco
Laboratory Supervisor

**BRAUN℠**
**INTERTEC**

**Braun Intertec Corporation**
520 Fisherman's Road
La Crosse, Wisconsin 54603-1215
608-781-7277 Fax: 781-7279

*Engineers and Scientists Serving the Built and Natural Environment*

# Aggregate Quality Testing

**Date:** November 1, 1993

**Project No.:** BNDX-93-037A

**Client:**
Mr. Matt Crain
Roy F. Weston, Inc.
Three Hawthorne Parkway - Suite 400
Vernon Hills, IL 60164

**Project Description:**
Landfill Cap Remedial Action
Onalaska Municipal Landfill Site
Onalaska, WI

---

**Sampled By:** Braun Intertec/TLB
**Date Sampled:** 10/14/93
**Date Received:** 10/14/93
**Source:** On Site
**Classification:** Sandy Loam
**Sample No.:** G-10

---

**Mechanical Analysis**

| Sieve | Results | Specifications |
|---|---|---|
| 1" | | |
| 3/4" | | |
| 5/8" | | |
| 1/2" | | |
| 3/8" | | |
| #4 | | |
| #10 | | |
| #20 | | |
| #40 | | |
| #80 | | |
| #200 | 22 | |

**Deleterious Substances and other Characteristics**

1. CA Spall, %
2. FA Shale, %
3. Total Spall, %
4. Crushing, %
5. L.A. Abrasion Loss (ASTM C 131/C 535), %
6. Specific Gravity (ASTM C 127/C 128)
    - B.O.D.
    - B.S.S.D.
    - Absorption, %
7. Insoluble Residue
    - \- No. 200, %
    - \+ No. 200, %
    - Total Insoluble, %
8. Flat and Elongated Pieces (CRD C 119), %
9. Clay Lumps and Friable Pieces (ASTM C 142), %
10. Soundness Loss (ASTM C 88), %.

---

**Remarks:** Results of this material for identification only.

cc:

Thomas LoBianco
Laboratory Supervisor

# APPENDIX D
# GEOTECHNICAL TESTING SERVICES VERIFICATION REPORT-TWIN CITY TESTING

twin city testing

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE - DENSITY CURVE

**SAMPLE NO.** 1

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:** CH2M Hill

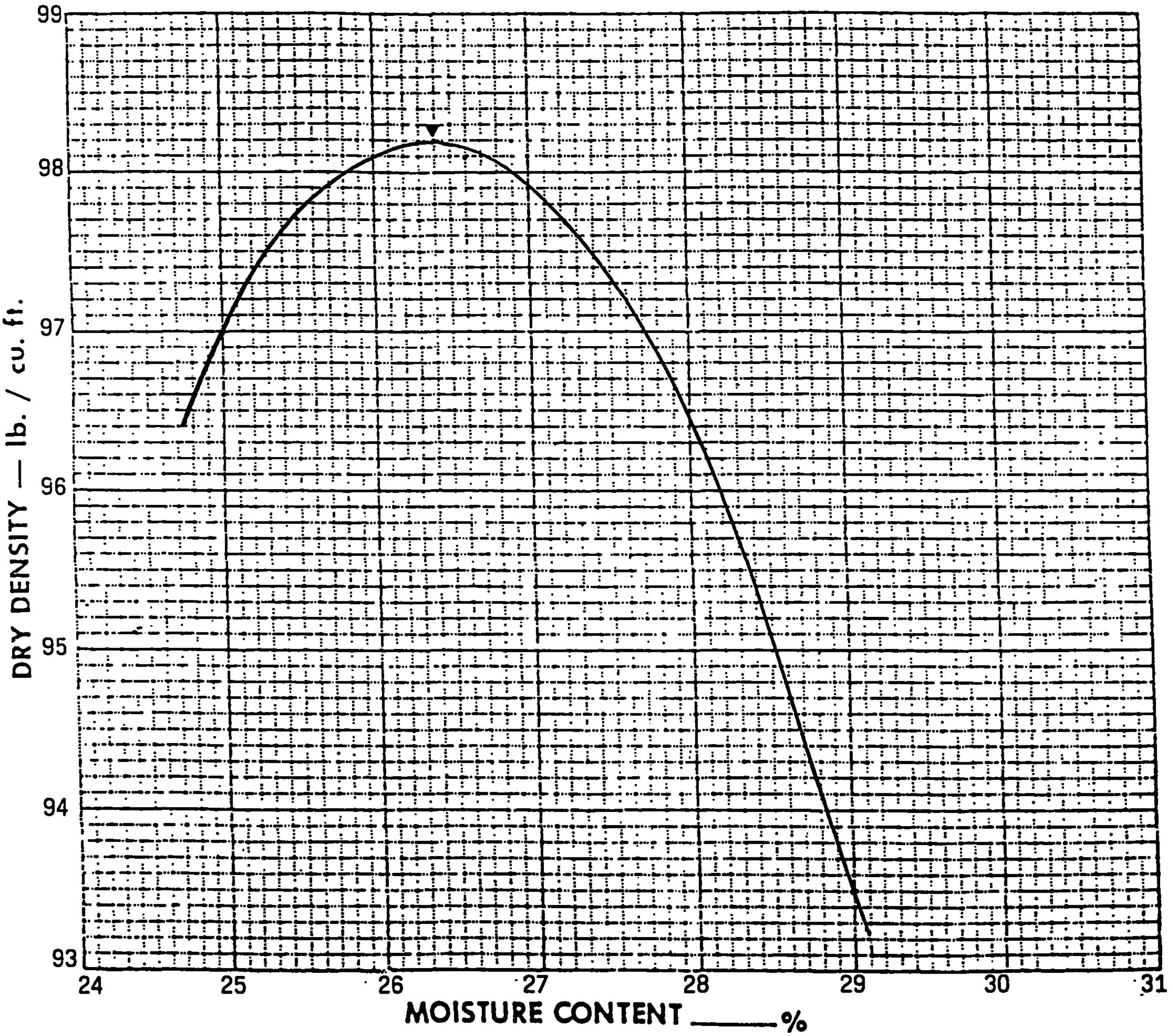
**LABORATORY NO.** 8300-93-220

**METHOD OF TEST:** ASTM:D1557-91, Method "A"

**TYPE OF MATERIAL:** Fat Clay, brown (CH)

**MAXIMUM DENSITY:** 98.2 lb./cu. ft.

**OPTIMUM MOISTURE** 26.4 %



Twin City Testing

By Hank Klo

twin city testing
2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE - DENSITY CURVE

**SAMPLE NO.** 2

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

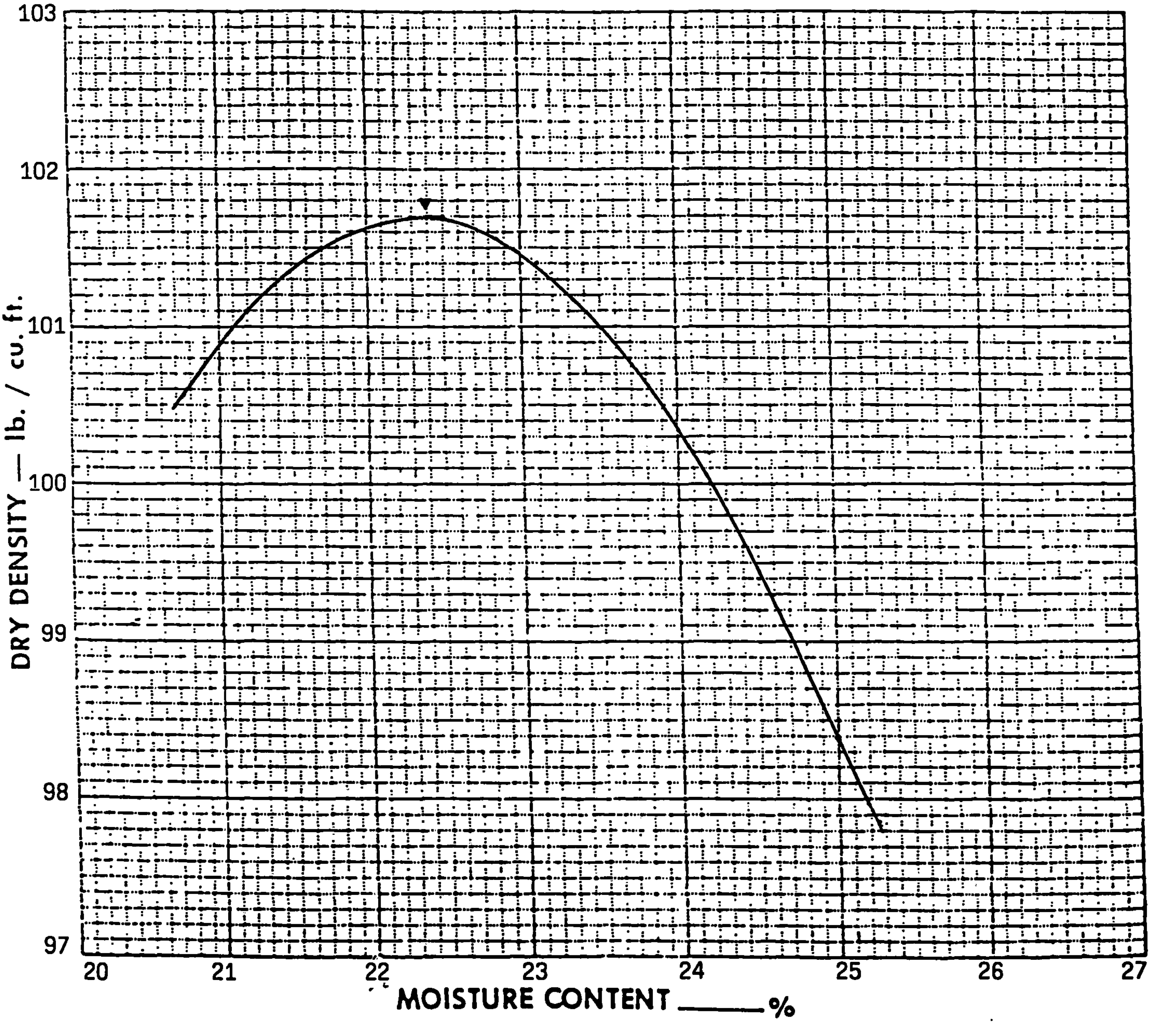
**REPORTED TO:** -CH2M Hill

**LABORATORY NO.** 8300-93-220

**METHOD OF TEST:** ASTM:D1557-91, Method "A"

**TYPE OF MATERIAL:** Fat Clay, brown (CH)

**MAXIMUM DENSITY:** 101.7 lb./cu. ft. **OPTIMUM MOISTURE** 22.4 %



Twin City Testing

By Hank Klee

twin city testing

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE-DENSITY CURVE

SAMPLE NO. 3

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:** -CH2M Hill

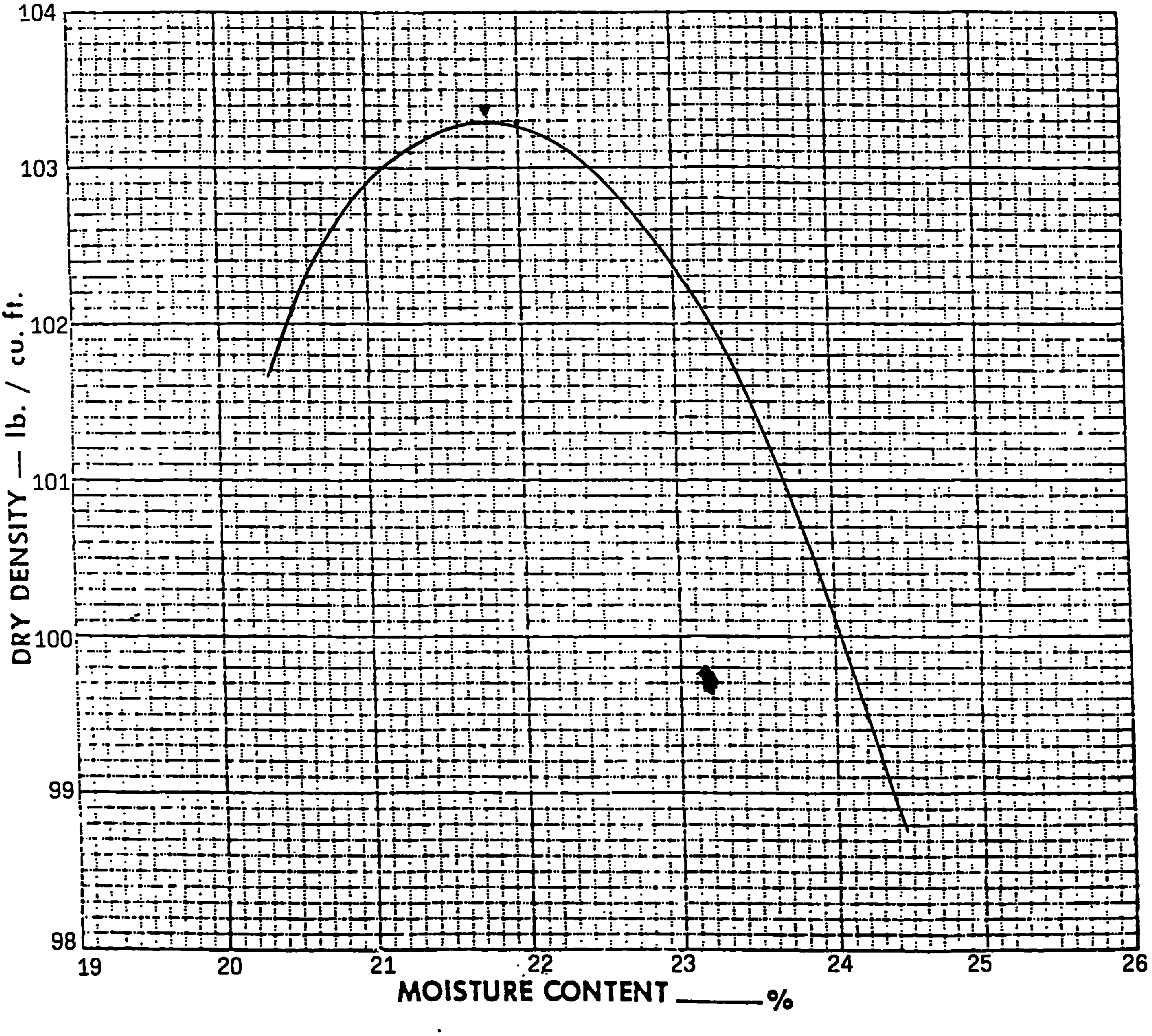
**LABORATORY NO.** 8300-93-220

**METHOD OF TEST:** ASTM:D1557-91, Method "A"

**TYPE OF MATERIAL:** Fat Clay, brown (CH)

**MAXIMUM DENSITY:** 103.3 lb./cu. ft.

**OPTIMUM MOISTURE** 21.8 %



Twin City Testing

By

twin city testing

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE-DENSITY CURVE

SAMPLE NO. 4

PROJECT: LANDFILL CAP WORK
ONALASKA, WISCONSIN

DATE: October 4, 1993

REPORTED TO: -CH2M Hill

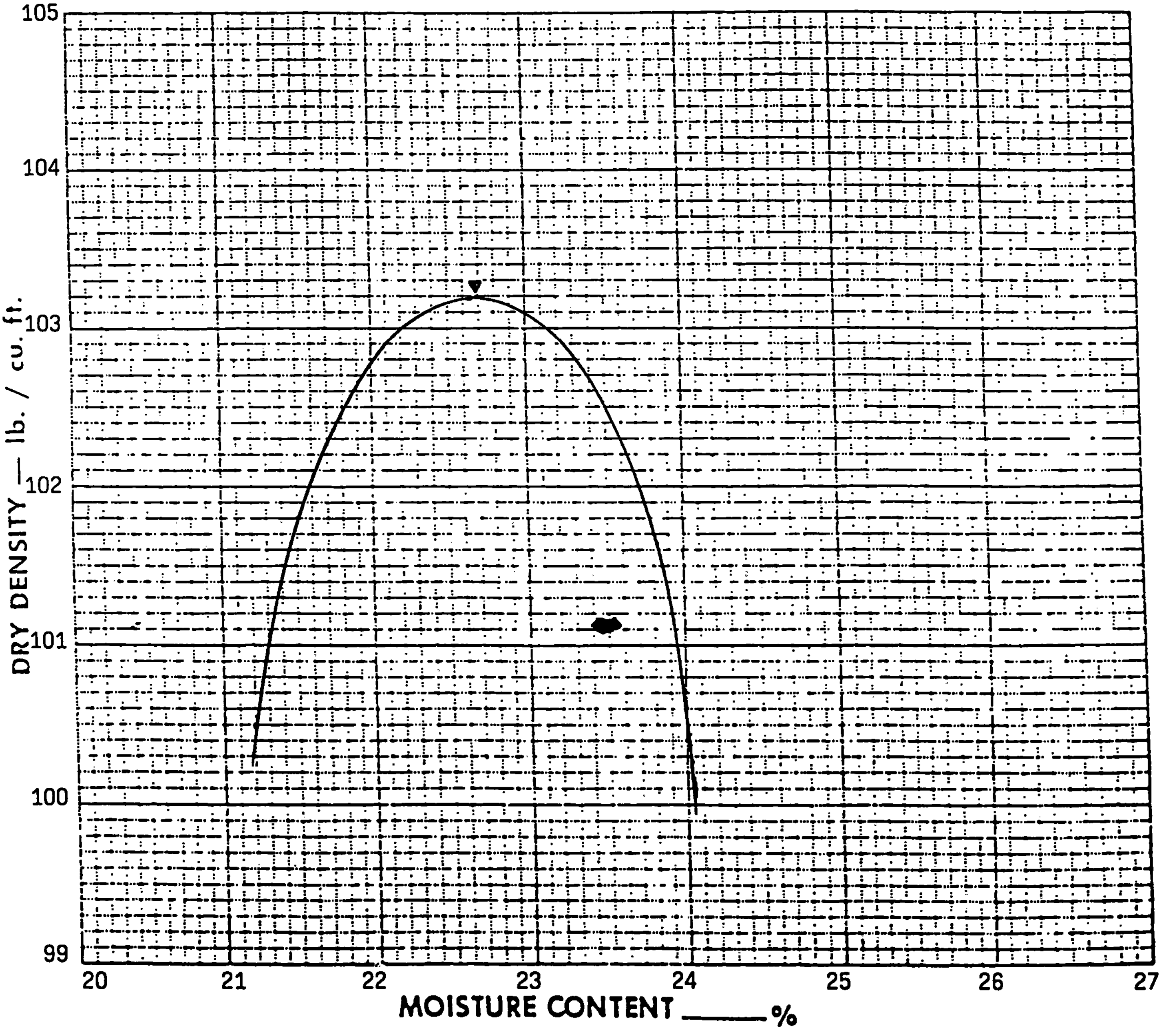
LABORATORY NO. 8300-93-220

METHOD OF TEST: ASTM:D1557-91, Method "A"

TYPE OF MATERIAL: Fat Clay, brown (CH)

MAXIMUM DENSITY: 103.2 lb./cu. ft.

OPTIMUM MOISTURE 22.7 %



Twin City Testing

By Hank Klo

twin city testing

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE - DENSITY CURVE

SAMPLE NO. 5

PROJECT: LANDFILL CAP WORK
ONALASKA, WISCONSIN

DATE: October 4, 1993

REPORTED TO: -CH2M Hill

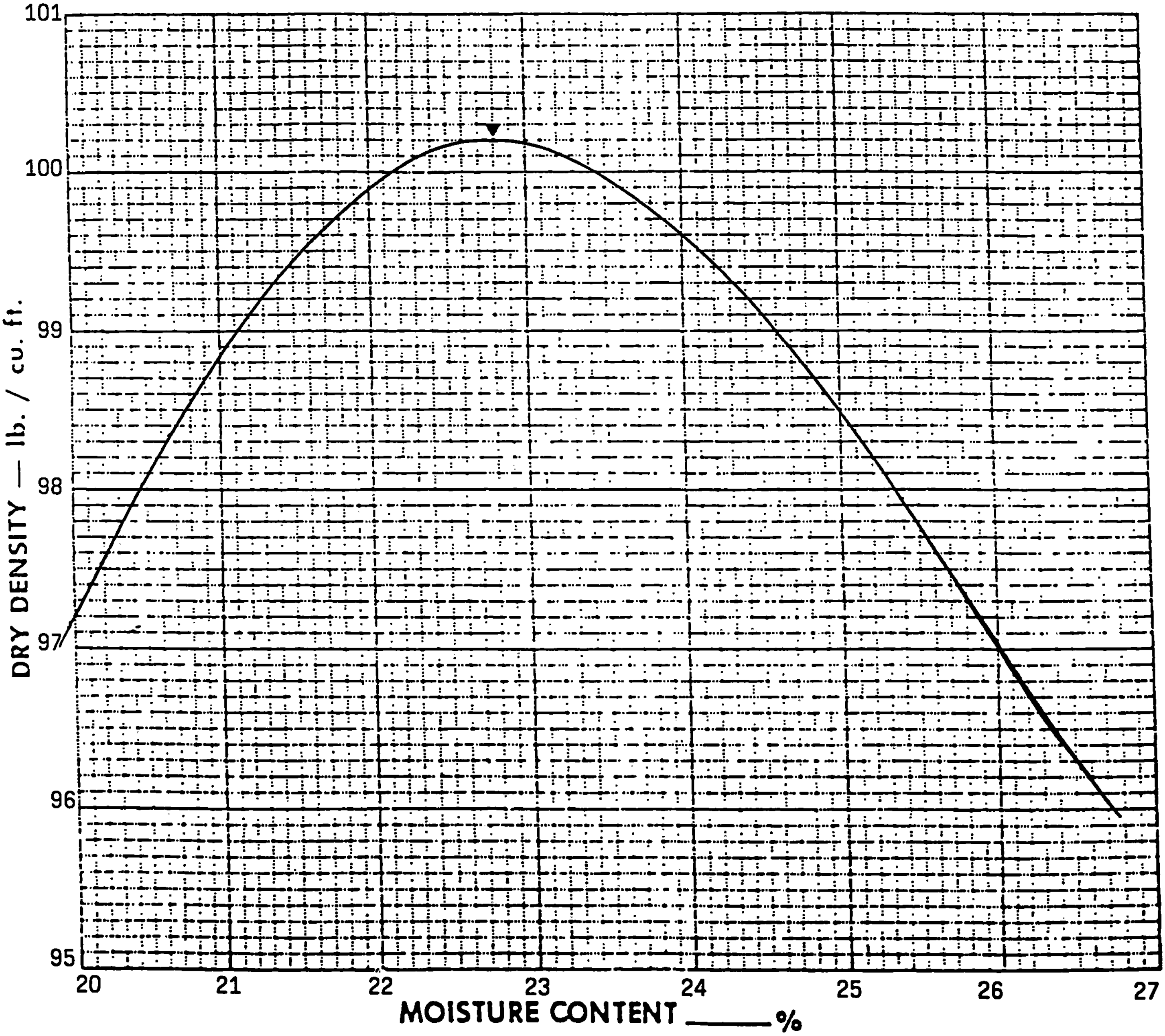
LABORATORY NO. 8300-93-220

METHOD OF TEST: ASTM:D1557-91, Method "A"

TYPE OF MATERIAL: Fat Clay, brown (CH)

MAXIMUM DENSITY: 100.2 lb./cu. ft.

OPTIMUM MOISTURE 22.8 %



Twin City Testing

By Hank Klo

twin city testing

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE - DENSITY CURVE

**SAMPLE NO.** 6

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 4, 1993

**REPORTED TO:** -CH2M Hill

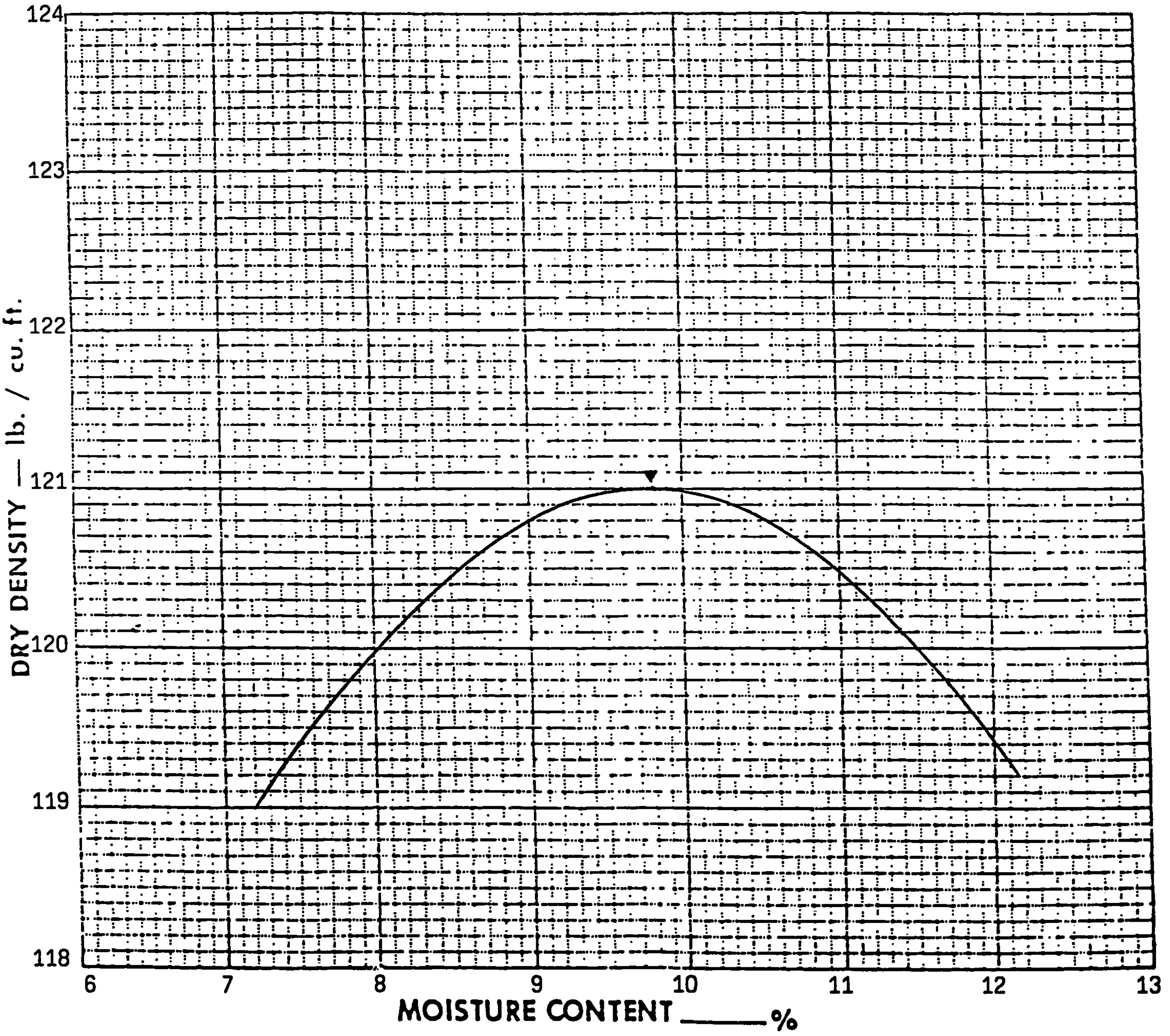
**LABORATORY NO.** 8300-93-220

**METHOD OF TEST:** ASTM:D1557-91, Method "A"

**TYPE OF MATERIAL:** Sand, medium to coarse grained, brown (SP)

**MAXIMUM DENSITY:** 121.0 lb./cu. ft.

**OPTIMUM MOISTURE** 9.8 %



Twin City Testing

By Hank

twin city testing
corporation
2710 COMMERCE STREET
LA CROSSE, WI 54603
PHONE 608/781-5330

**REPORT OF:** MECHANICAL ANALYSIS

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** JULY 29, 1993

**REPORTED TO:**

CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

LABORATORY No. 8300-93-220

SCOPE OF WORK: The scope of our work was limited to performing mechanical analysis of the submitted sample in accordance with ASTM C136.

SAMPLE NUMBER: 1

SAMPLE DESCRIPTION: Sand, coarse grained, brown (SP)

SOURCE OF MATERIAL: Sportsmen's Club Property

MECHANICAL ANALYSIS: PROJECT SPECIFICATIONS:

| | | |
|---|---|---|
| Passing 1 1/2" | 100 | - |
| 1" | 95 | - |
| 3/4" | 93 | - |
| 1/2" | 87 | - |
| 3/8" | 81 | - |
| #4 | 64 | 100 |
| #10 | 44 | 90-100 |
| #40 | 9 | 20-70 |
| #100 | 3.58 | 0-20 |
| #200 | 2.72 | 0-2 |

REMARKS:

The above sample was submitted by CH2M Hill (Don Olson) and was submitted to our laboratory on July 28, 1993. The sample does not meet project gradation specifications.

Twin City Testing Corporation

By Hank

**twin city testing corporation**
2710 COMMERCE STREET
LA CROSSE, WI 54603
PHONE 608/781-5330

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:**
CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

LABORATORY No. 8300-93-220

SCOPE OF WORK: The scope of our work was limited to performing a mechanical analysis, atterberg limits and moisture contents of the submitted samples in accordance with ASTM:C136, ASTM:D4318 and ASTM:D2216.

| | | | |
|---|---|---|---|
| SAMPLE NUMBER: | 1 | 2 | 3 |
| SAMPLE DESCRIPTION: | Fat Clay, brown (CH) | Fat Clay, brown (CH) | Fat Clay, brown (CH) |
| MOISTURE CONTENT: | 26.7% | 26.2% | 26.2% |
| S E OF MATERIAL: | On site material | On site material | On site material |
| MOISTURE DENSITY DETERMINATION: | See attached curve | See attached curve | See attached curve |
| ATTERBERG LIMITS: | | | |
| Liquid Limit | 58 | 58 | 58 |
| Plastic Limit | 27 | 28 | 26 |
| Plasticity Index | 31 | 30 | 32 |
| MECHANICAL ANALYSIS: | | | |
| Passing #4 | 100 | 100 | 100 |
| #10 | 100 | 100 | 100 |
| #40 | 99 | 99 | 99 |
| #100 | 97 | 97 | 98 |
| #200 | 96 | 96 | 97 |

REMARKS:
The above samples were obtained by Twin City Testing Corporation and were submitted to our laboratory on August 27 and September 2, 1993.

Twin City Testing Corporation
By

**twin city testing corporation**
2710 COMMERCE STREET
LA CROSSE, WI 54603
PHONE 608/781-5330

PROJECT: LANDFILL CAP WORK
ONALASKA, WISCONSIN

DATE: October 5, 1993

REPORTED TO: CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

ABORATORY No. 8300-93-220

| | | |
|---|---|---|
| SCOPE OF WORK: | The scope of our work was limited to performing atterberg limits and modified proctors of the submitted samples in accordance with ASTM D4318 and ASTM D1557. | |
| SAMPLE NUMBER: | 4 | 5 |
| SAMPLE DESCRIPTION: | Fat Clay, brown (CH) | Fat Clay, brown (CH) |
| SOURCE OF MATERIAL: | On site material | On site material |
| MOISTURE DENSITY DETERMINATION: | See attached curve | See attached curve |
| ATTERBERG LIMITS: | | |
| Liquid Limit | 53 | 53 |
| Plastic Limit | 25 | 25 |
| Plasticity Index | 28 | 28 |

REMARKS:

The above samples were obtained by Twin City Testing Corporation and were submitted to our laboratory on September 23, 1993.

Twin City Testing Corporation

By Hank Klee

twin city testing

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE-DENSITY CURVE

**SAMPLE NO.** 1

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:** -CH2M Hill

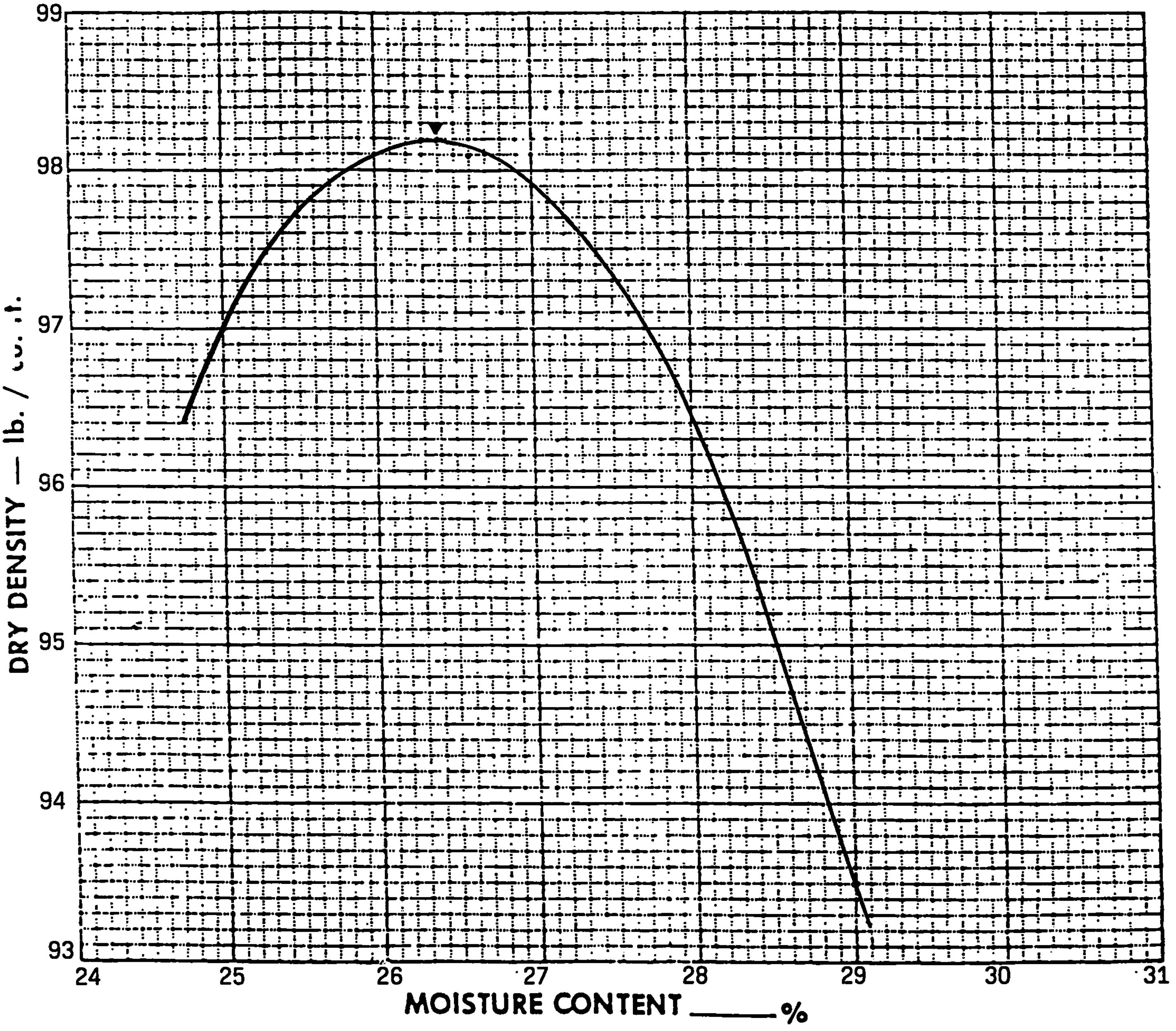
**LABORATORY NO.** 8300-93-220

**METHOD OF TEST:** ASTM:D1557-91, Method "A"

**TYPE OF MATERIAL:** Fat Clay, brown (CH)

**MAXIMUM DENSITY:** 98.2 lb./cu. ft.

**OPTIMUM MOISTURE** 26.4 %



Twin City Testing

By Hank Klo

G-232(2/84)

**twin city testing**

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE - DENSITY CURVE

**SAMPLE NO.** 2

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:** -CH2M Hill

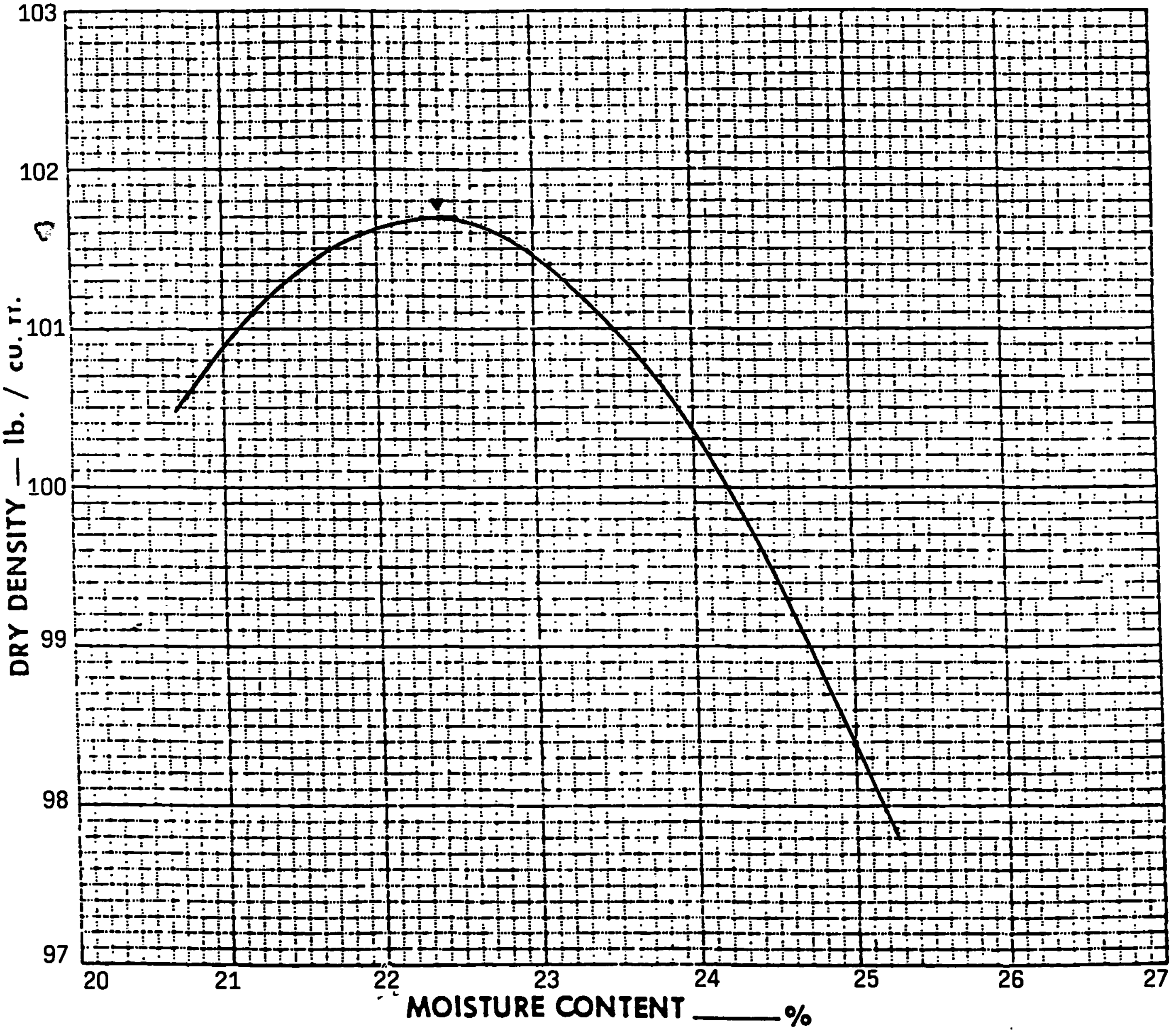
**LABORATORY NO.** 8300-93-220

**METHOD OF TEST:** ASTM:D1557-91, Method "A" Proc

**TYPE OF MATERIAL:** Fat Clay, brown (CH)

**MAXIMUM DENSITY:** 101.7 lb./cu. ft.

**OPTIMUM MOISTURE** 22.4 %



**Twin City Testing**

**By** Hank Klee

G-232(2/84)

**twin city testing**

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE - DENSITY CURVE

**SAMPLE NO.** 3

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:** -CH2M Hill

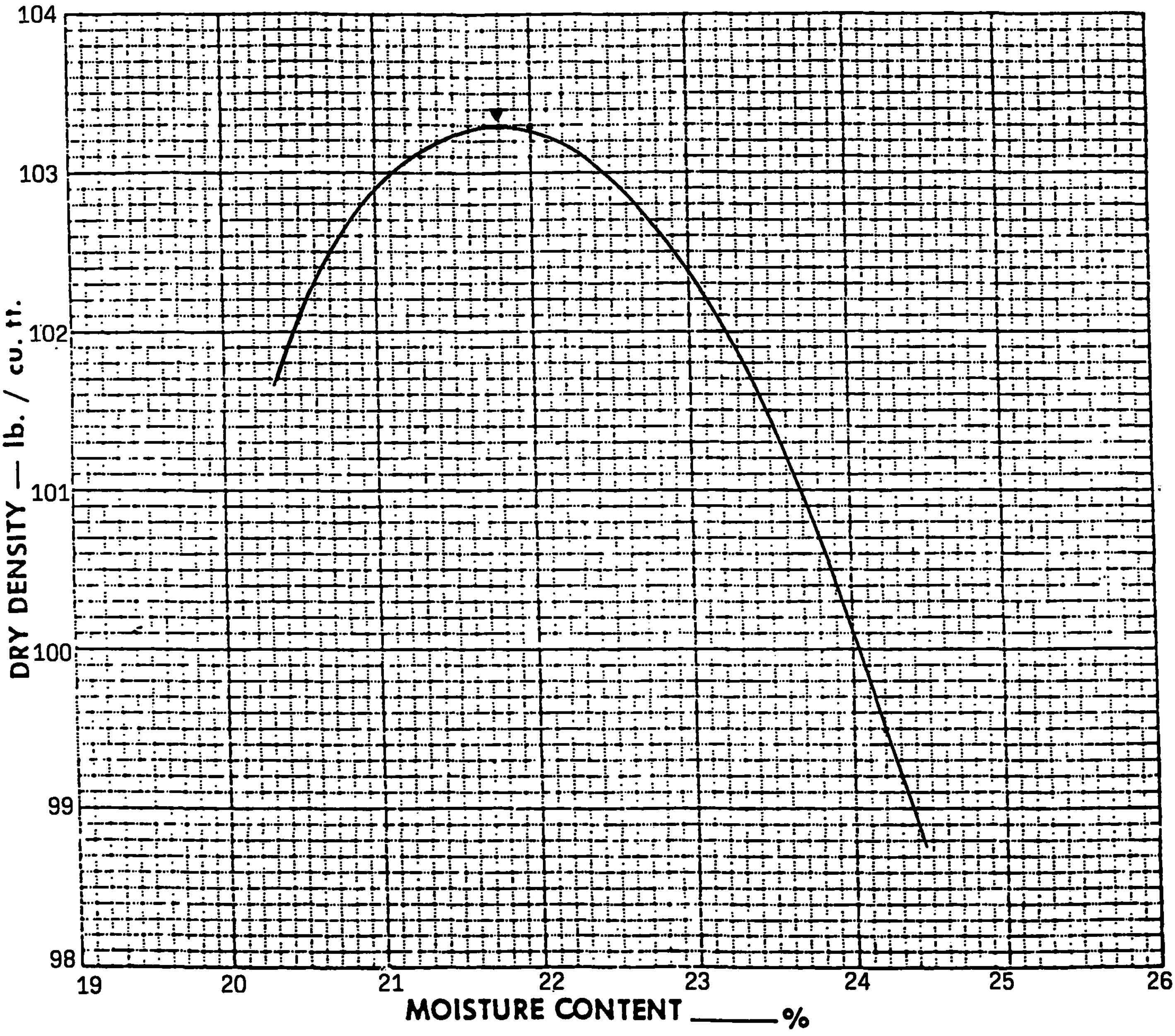
**LABORATORY NO.** 8300-93-220

**METHOD OF TEST:** ASTM:D1557-91, Method "A"

**TYPE OF MATERIAL:** Fat Clay, brown (CH)

**MAXIMUM DENSITY:** 103.3 lb./cu. ft.

**OPTIMUM MOISTURE** 21.8 %



Twin City Testing

By Hank Klo

**twin city testing**

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE - DENSITY CURVE

**SAMPLE NO.** 4

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 4, 1993

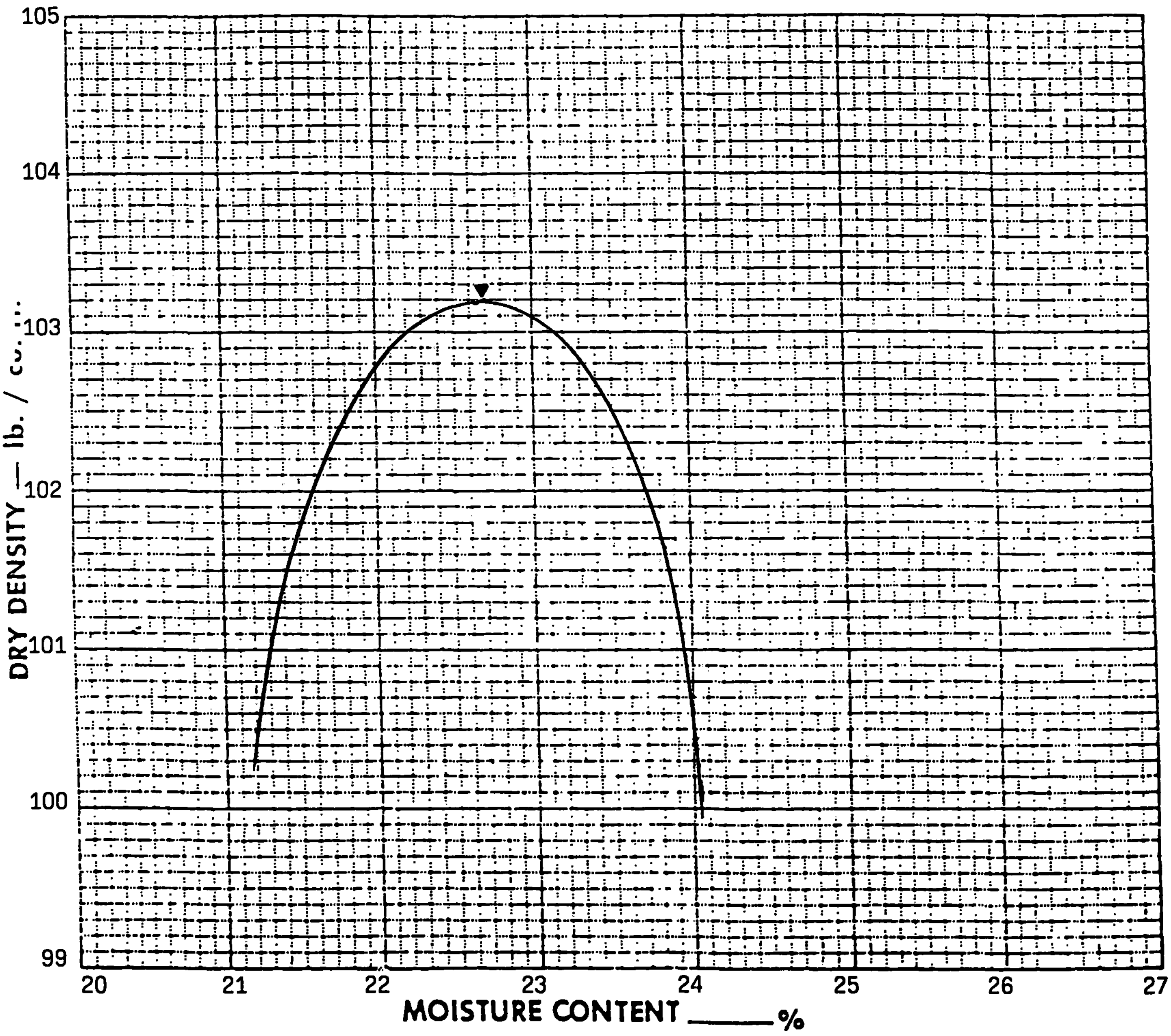
**REPORTED TO:** -CH2M Hill

**LABORATORY NO.** 8300-93-220

**METHOD OF TEST:** ASTM:D1557-91, Method "A"

**TYPE OF MATERIAL:** Fat Clay, brown (CH)

**MAXIMUM DENSITY:** 103.2 lb./cu. ft. **OPTIMUM MOISTURE** 22.7 %



Twin City Testing

By Hank Klo

twin city testing
2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE-DENSITY CURVE

**SAMPLE NO.** 5

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 4, 1993

**REPORTED TO:** -CH2M Hill

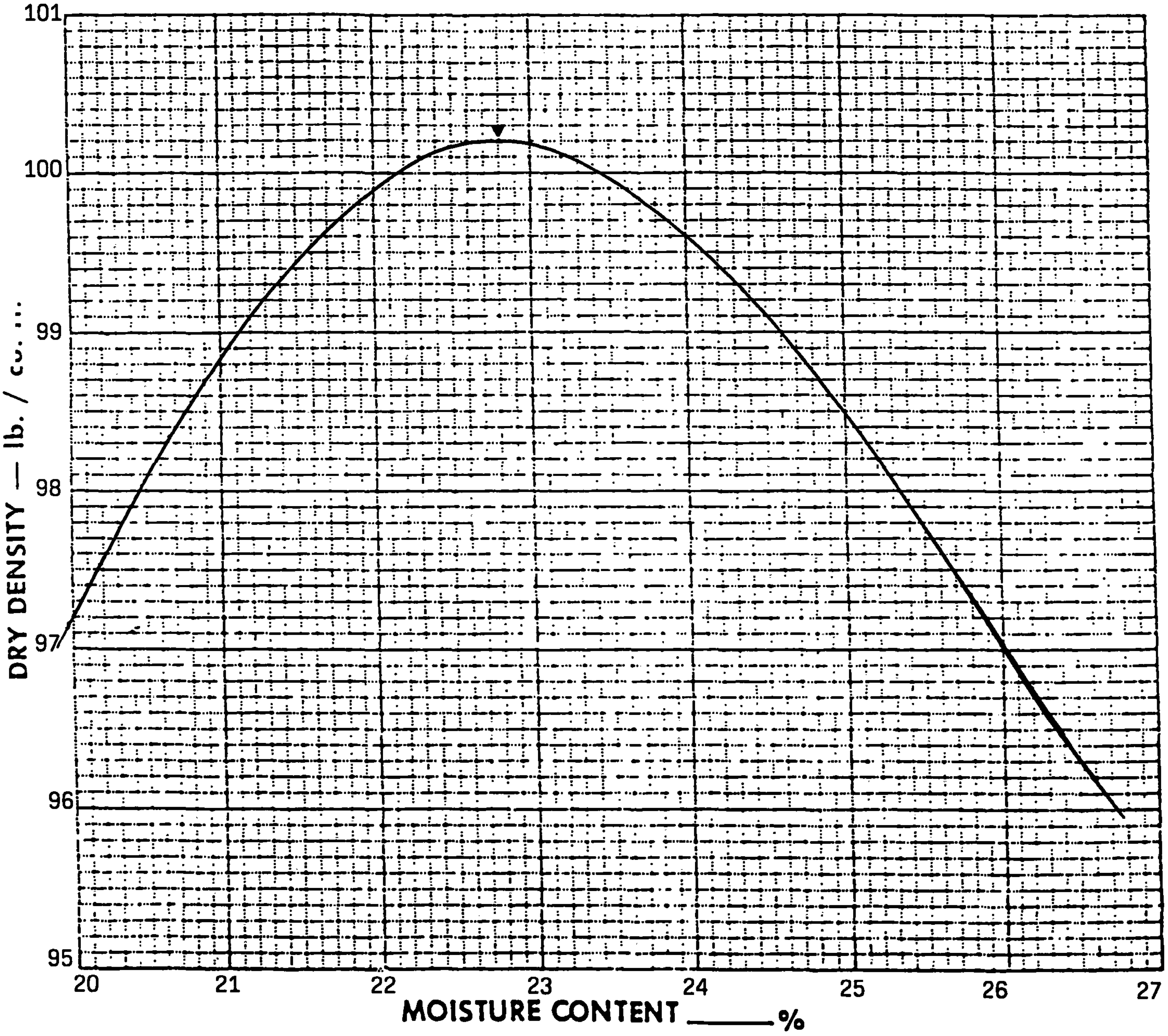
**LABORATORY NO.** 8300-93-220

**METHOD OF TEST:** ASTM:D1557-91, Method "A"

**TYPE OF MATERIAL:** Fat Clay, brown (CH)

**MAXIMUM DENSITY:** 100.2 lb./cu. ft.

**OPTIMUM MOISTURE** 22.8 %



Twin City Testing

By Hank Klo

twin city testing
corporation
2710 COMMERCE STREET
LA CROSSE, WI 54603
PHONE 608/781-5330

**REPORT OF:** MECHANICAL ANALYSIS

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 4, 1993

**REPORTED TO:**
CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

LABORATORY No. 8300-93-220

SCOPE OF WORK: The scope of our work was limited to performing a mechanical analysis and a modified proctor of the submitted sample in accordance with ASTM:C136 and ASTM:D1557.

SAMPLE NUMBER: 6

SAMPLE DESCRIPTION: Sand, medium to coarse grained, brown (SP)

SOURCE OF MATERIAL: On site material - Sand drainage layer

MOISTURE DENSITY DETERMINATION: See attached curve

MECHANICAL ANALYSIS:

| | | |
|---|---|---|
| Passing | #4 | 87 |
| | #10 | 70 |
| | #40 | 8.92 |
| | #100 | 1.62 |
| | #200 | 0.76 |

REMARKS:

The above sample was obtained by Twin City Testing Corporation and was submitted to our laboratory on September 23, 1993.

Twin City Testing Corporation
By

twin city testing

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE - DENSITY CURVE

**SAMPLE NO.** 6

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 4, 1993

**REPORTED TO:** -CH2M Hill

**LABORATORY NO.** 8300-93-220

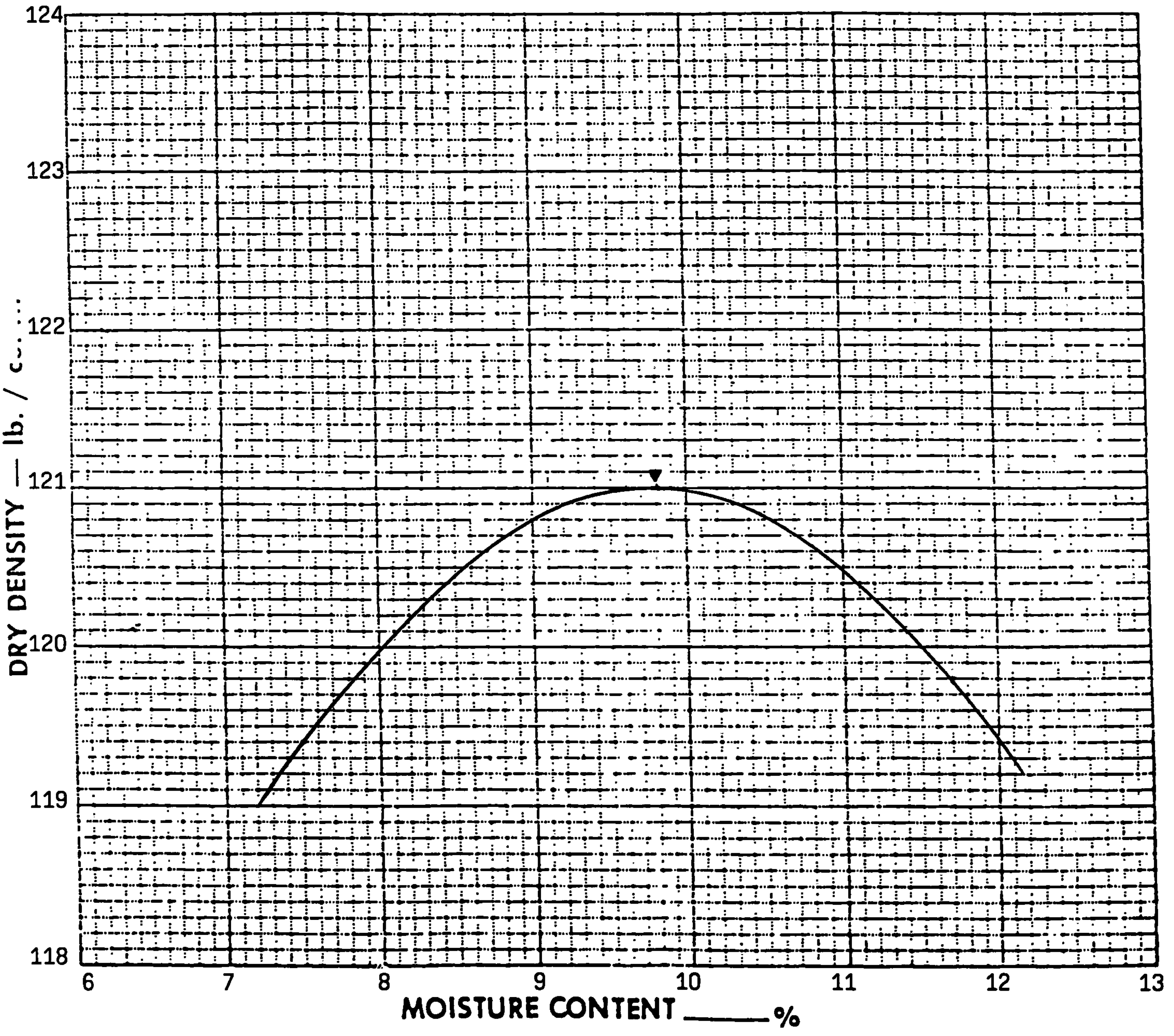
**METHOD OF TEST:** ASTM:D1557-91, Method "A"

proc

**TYPE OF MATERIAL:** Sand, medium to coarse grained, brown (SP)

**MAXIMUM DENSITY:** 121.0 lb./cu. ft.

**OPTIMUM MOISTURE** 9.8 %



Twin City Testing

By Hank

**twin city testing**

2710 Commerce Street
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**REPORT OF:** DENSITY TESTS OF COMPACTED FILL

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:** CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

**LABORATORY No.** 8300-93-220

| | | | | |
|---|---|---|---|---|
| **TEST NUMBER:** | | 1 | 2 | 3 |
| **DATE TAKEN:** | | 8-27-93 | 8-27-93 | 8-27-93 |
| **UNIFIED SOIL CLASSIFICATION:** (Moisture Density Sample Number) | | Fat Clay, brown (CH)-1 | Fat Clay, brown (CH)-1 | Fat Clay, brown (CH)-1 |
| **LOCATION:** | | 9'E of CT4 | 20'N and 5'E of CT13 | 3'N and 10'E of CT6 |
| **ELEVATION OF TESTS:** | | 662' | At Grade | 668.5' |
| **DEPTH BELOW EXISTING GRADE:** | | At Grade | At Grade | At Grade |
| **FIELD DENSITY DETERMINATION:** | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | |
| Dry Density | (pcf) | 96 | 95 | 95 |
| Moisture Content | (%) | 21.9 | 23.5 | 22.8 |
| Plus #4 Material | (%) | None | None | None |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | | |
| Method | ASTM:D1557-91, Method "A", (-#4 Basis) | | | |
| Maximum Dry Density | (pcf) | 98.2 | 98.2 | 98.2 |
| Optimum Moisture | (%) | 26.4 | 26.4 | 26.4 |
| **COMPACTION TEST RESULTS:** | | | | |
| Compaction | (%) | 97 | 97 | 97 |
| Specified Compaction | (%) | 95 | 95 | 95 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction meets specifications at the above test areas.

Twin City Testing

By Hank Kl

twin city testing
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Phone 608/781-5330

REPORT OF: **DENSITY TESTS OF COMPACTED FILL**

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:** CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

**LABORATORY No.** 8300-93-220

| | | | | | |
|---|---|---|---|---|---|
| **TEST NUMBER:** | | 4 | 5 | 6 | 7 |
| **DATE TAKEN:** | | 9-2-93 | 9-2-93 | 9-2-93 | 9-2-93 |
| **UNIFIED SOIL CLASSIFICATION:** (Moisture Density Sample Number) | | Fat Clay, brown (CH)-2 | Fat Clay, brown (CH)-2 | Fat Clay, brown (CH)-2 | Fat Clay, brown (CH)-2 |
| **LOCATION:** | | 21'E of CT8 | 24'E of CT4 | 33'W of CT12 | 18'W of CT11 |
| **ELEVATION OF TESTS:** | | 667' | 661' | 663' | 665' |
| **DEPTH BELOW EXISTING GRADE:** | | 1" | 1" | 1" | 1" |
| **FIELD DENSITY DETERMINATION:** | | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | | |
| Dry Density | (pcf) | 94 | 90 | 94 | 96 |
| Moisture Content | (%) | 24.6 | 29.3 | 24.7 | 25.0 |
| Plus #4 Material | (%) | None | None | None | None |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | | | |
| Method | ASTM:D1557-91, Method "A", (-#4 Basis) | | | | |
| Maximum Dry Density | (pcf) | 101.7 | 101.7 | 101.7 | 101.7 |
| Optimum Moisture | (%) | 22.4 | 22.4 | 22.4 | 22.4 |
| **COMPACTION TEST RESULTS:** | | | | | |
| Compaction | (%) | 92 | 89 | 92 | 94 |
| Specified Compaction | (%) | 95 | 95 | 95 | 95 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction is below specifications at the above test areas.

Twin City Testing

By Hank Klee

SG-222 (3/84)

**twin city testing**

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

**REPORT OF:** DENSITY TESTS OF COMPACTED FILL

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:** CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

**LABORATORY No.** 8300-93-220

| | | | |
|---|---|---|---|
| **TEST NUMBER:** | | 8 | 9 |
| **DATE TAKEN:** | | 9-2-93 | 9-2-93 |
| **UNIFIED SOIL CLASSIFICATION:** (Moisture Density Sample Number) | | Fat Clay, brown (CH)-2 | Fat Clay, brown (CH)-2 |
| **LOCATION:** | | 9'E of CT6 | 20'E of CT2 |
| **ELEVATION OF TESTS:** | | 668' | 661.5' |
| **DEPTH BELOW EXISTING GRADE:** | | 1" | 1" |
| **FIELD DENSITY DETERMINATION:** | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | |
| Dry Density | (pcf) | 91 | 92 |
| Moisture Content | (%) | 26.2 | 25.1 |
| Plus #4 Material | (%) | None | None |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | |
| Method | ASTM:D1557-91, Method "A", (-#4 Basis) | | |
| Maximum Dry Density | (pcf) | 101.7 | 101.7 |
| Optimum Moisture | (%) | 22.4 | 22.4 |
| **COMPACTION TEST RESULTS:** | | | |
| Compaction | (%) | 90 | 91 |
| Specified Compaction | (%) | 95 | 95 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction is below specifications at the above test areas.

Twin City Testing

By Hank Klee

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## REPORT OF: DENSITY TESTS OF COMPACTED FILL

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 4, 1993

**REPORTED TO:** CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

LABORATORY No. 8300-93-220

| | | | | |
|---|---|---|---|---|
| **TEST NUMBER:** | | ~~10~~ | ~~11~~ | ~~12~~ |
| **DATE TAKEN:** | | 9-8-93 | 9-8-93 | 9-8-93 |
| **UNIFIED SOIL CLASSIFICATION:** (Moisture Density Sample Number) | | Fat Clay, brown (CH)-2 | Fat Clay, brown (CH)-2 | Fat Clay, brown (CH)-2 |
| **LOCATION:** | | 20'N of CT7 | 25'N and 50'E of CT7 | 50'E of CT7 |
| **ELEVATION OF TESTS:** | | 669' | 667' | 667' |
| **DEPTH BELOW EXISTING GRADE:** | | 1" | 1" | At surface |
| **FIELD DENSITY DETERMINATION:** | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | |
| Dry Density | (pcf) | 93 | 90 | 91 |
| Moisture Content | (%) | 26.0 | 28.7 | 27.4 |
| Plus #4 Material | (%) | None | None | None |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | | |
| Method | ASTM:D1557-91, Method "A, (-#4 Basis) | | | |
| Maximum Dry Density | (pcf) | 101.7 | 101.7 | 101.7 |
| Optimum Moisture | (%) | 22.4 | 22.4 | 22.4 |
| **COMPACTION TEST RESULTS:** | | | | |
| Compaction | (%) | 91 | 89 | 89 |
| Specified Compaction | (%) | 90 | 90 | 90 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction meets specifications at test area 10, but is below specifications at the other test areas.

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Phone 608/781-5330

## REPORT OF: DENSITY TESTS OF COMPACTED FILL

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 4, 1993

**REPORTED TO:** CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

LABORATORY No. 8300-93-220

| | | | | | |
|---|---|---|---|---|---|
| **TEST NUMBER:** | | 13 | 14 | 15 | 16 |
| **DATE TAKEN:** | | 9-10-93 | 9-10-93 | 9-10-93 | 9-10-93 |
| **UNIFIED SOIL CLASSIFICATION:** (Moisture Density Sample Number) | | Fat Clay, brown (CH)-4 | Fat Clay, brown (CH)-4 | Fat Clay, brown (CH)-4 | Fat Clay, brown (CH)-4 |
| **LOCATION:** | | 12'S of CT6 | 25'E of CT6 | 20'W of CT2 | 40'E of CT8 |
| **ELEVATION OF TESTS:** | | 669.5' | 669' | 663' | 667.5' |
| **DEPTH BELOW EXISTING GRADE:** | | 1" | 1" | 1" | 1" |
| **FIELD DENSITY DETERMINATION:** | | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | | |
| Dry Density | (pcf) | 88 | 88 | 94 | 94 |
| Moisture Content | (%) | 31.5 | 31.5 | 26.0 | 23.1 |
| Plus #4 Material | (%) | None | None | None | None |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | | | |
| Method | ASTM:D1557-91, Method "A, (-#4 Basis) | | | | |
| Maximum Dry Density | (pcf) | 103.2 | 103.2 | 103.2 | 103.2 |
| Optimum Moisture | (%) | 22.7 | 22.7 | 22.7 | 22.7 |
| **COMPACTION TEST RESULTS:** | | | | | |
| Compaction | (%) | 85 | 85 | 91 | 92 |
| Specified Compaction | (%) | 90 | 90 | 90 | 90 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction meets specifications at test areas 15 and 16, but is below specifications at the other test areas.

Twin City Testing
By Hank Klar

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LaCrosse, WI 54603
Phone 608/781-5330

**REPORT OF:** DENSITY TESTS OF COMPACTED FILL

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 4, 1993

**REPORTED TO:** CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

LABORATORY No. 8300-93-220

| | | | | |
|---|---|---|---|---|
| **TEST NUMBER:** | | 17 | 18 | 19 |
| **DATE TAKEN:** | | 9-23-93 | 9-24-93 | 9-24-93 |
| **UNIFIED SOIL CLASSIFICATION:** (Moisture Density Sample Number) | | Fat Clay, brown (CH)-5 | Fat Clay, brown (CH)-5 | Fat Clay, brown (CH)-5 |
| **LOCATION:** | | 12'N of CT3 | 12'N of CT3 | 27'E of CT7 |
| **ELEVATION OF TESTS:** | | 662' | 662' | 668.3' |
| **DEPTH BELOW EXISTING GRADE:** | | 1" | 1" | 1" |
| **FIELD DENSITY DETERMINATION:** | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | |
| Dry Density | (pcf) | 91 | 91 | 91 |
| Moisture Content | (%) | 29.6 | 28.2 | 28.9 |
| Plus #4 Material | (%) | None | None | None |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | | |
| Method | ASTM:D1557-91, Method "A, (-#4 Basis) | | | |
| Maximum Dry Density | (pcf) | 100.2 | 100.2 | 100.2 |
| Optimum Moisture | (%) | 22.8 | 22.8 | 22.8 |
| **COMPACTION TEST RESULTS:** | | | | |
| Compaction | (%) | 91 | 91 | 91 |
| Specified Compaction | (%) | 90 | 90 | 90 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction meets specifications at the above test areas.

Twin City Testing
By

**twin city testing**

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Phone 608/781-5330

## REPORT OF: DENSITY TESTS OF COMPACTED FILL

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 4, 1993

**REPORTED TO:** CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

**LABORATORY No.** 8300-93-220

| | | | | | |
|---|---|---|---|---|---|
| **TEST NUMBER:** | | 20 | 21 | 22 | 23 |
| **DATE TAKEN:** | | 9-28-93 | 9-28-93 | 9-28-93 | 9-28-93 |
| **UNIFIED SOIL CLASSIFICATION:** (Moisture Density Sample Number) | | Sand, medium to coarse grained, brown (SP)-6 | Sand, medium to coarse grained, brown (SP)-6 | Sand, medium to coarse grained, brown (SP)-6 | Sand, medium to coarse grained, brown (SP)-6 |
| **LOCATION:** | | Sand drainage layer - 45'E of PD16 | Sand drainage layer - 41'W of CT12 | Sand drainage layer - 48'W of CT11 | Sand drainage layer - 20'S of CT10 |
| **ELEVATION OF TESTS:** | | Top of Sand | Top of Sand | Top of Sand | Top of Sand |
| **DEPTH BELOW EXISTING GRADE:** | | 1" | 2" | Surface | Surface |
| **FIELD DENSITY DETERMINATION:** | | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | | |
| Dry Density | (pcf) | 118 | 112 | 114 | 116 |
| Moisture Content | (%) | 3.5 | 4.1 | 2.8 | 2.9 |
| Plus #4 Material | (%) | Trace | Trace | Trace | Trace |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | | | |
| Method | ASTM:D1557-91, Method "A, (-#4 Basis) | | | | |
| Maximum Dry Density | (pcf) | 121.0 | 121.0 | 121.0 | 121.0 |
| Optimum Moisture | (%) | 9.8 | 9.8 | 9.8 | 9.8 |
| **COMPACTION TEST RESULTS:** | | | | | |
| Compaction | (%) | 97 | 92 | 94 | 96 |
| Specified Compaction | (%) | 85 | 85 | 85 | 85 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction meets specifications at the above test areas.

Twin City Testing

By Hank Kle

SG-222 (3/84)

**twin city testing**

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

## REPORT OF: DENSITY TESTS OF COMPACTED FILL

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 13, 1993

**REPORTED TO:** CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

LABORATORY No. 8300-93-220

| | | | | | |
|---|---|---|---|---|---|
| TEST NUMBER: | | 24 | 25 | 26 | 27 |
| DATE TAKEN: | | 10-7-93 | 10-7-93 | 10-7-93 | 10-7-93 |
| UNIFIED SOIL CLASSIFICATION: (Moisture Density Sample Number) | | Sand, medium to coarse grained, brown (SP)-6 | Sand, medium to coarse grained, brown (SP)-6 | Sand, medium to coarse grained, brown (SP)-6 | Sand, medium to coarse grained, brown (SP)-6 |
| LOCATION: | | 33'N of CT8 on top of sand drainage layer | 24'S of CT3 on top of sand drainage layer | 39'S of CT2 on top of sand drainage layer | 21'S of CT1 on top of sand drainage layer |
| ELEVATION OF TESTS: | | 670' | 664' | 664.5' | 663.5' |
| DEPTH BELOW EXISTING GRADE: | | 1" | 1" | 1" | 1" |
| **FIELD DENSITY DETERMINATION:** | | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | | |
| Dry Density | (pcf) | 117 | 115 | 113 | 111 |
| Moisture Content | (%) | 1.9 | 2.8 | 2.2 | 3.9 |
| Plus #4 Material | (%) | Trace | Trace | Trace | Trace |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | | | |
| Method | ASTM:D1557-91, Method "A, (-#4 Basis) | | | | |
| Maximum Dry Density | (pcf) | 121.0 | 121.0 | 121.0 | 121.0 |
| Optimum Moisture | (%) | 9.8 | 9.8 | 9.8 | 9.8 |
| **COMPACTION TEST RESULTS:** | | | | | |
| Compaction | (%) | 97 | 95 | 94 | 92 |
| Specified Compaction | (%) | 85 | 85 | 85 | 85 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction meets specifications at the above test areas.

Twin City Testing

By Hank Kle

SG-222 (3/84)

**Huntingdon**
Consulting Engineers Environmental Scientists

**Twin City Testing Corporation**
3906 Commerce Court Southwest
Rochester, Minnesota 55902-1252
(507) 288-7060
Fax (507) 288-5718

PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

<u>LABORATORY TEST DATA</u>

DATE: 08-20-93
LAB. NO. 4800-03-074
8300-92-220

| | | |
|---|---|---|
| SAMPLE NUMBER | 1 | 2 |
| DATE SAMPLED | 08-20-93 | 08-20-93 |
| SAMPLE LOCATION | Thinwall Tube (Bottom Portion) | Thinwall Tube Top Portion) |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Fat Clay, reddish brown (CH) | Lean Clay, brownish gray (CL) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 8-9 | 8-9 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.58 | 2.53 |
| Specimen Diameter (inches) | 2.83 | 2.83 |
| Dry Density (PCF) | 86.3 | 101.1 |
| Percent of Max. Density | | |
| Moisture Content (%) | 36.1 | 23.2 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | -8 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $3 \times 10^{-9}$ | $7.3 \times 10^{-8}$ |
| K @ 20°C (ft/min) | | |

CAP. C 7432

**Huntingdon**
Consulting Engineers Environmental Scientists

**Twin City Testing Corporation**
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(507)288-7060
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PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 08-20-93
LAB. NO. 4800-03-074
8300-93-220

| | | |
|---|---|---|
| SAMPLE NUMBER | 3 | 4 |
| SAMPLE LOCATION | 7' E of CT4 | N16200<br>E47800 |
| ELEVATION | 662.0' | 663.5' |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Fat Clay, reddish brown (CH) | Fat Clay, reddish brown (CH) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 7-8 | 7-8 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 3.0 | 2.55 |
| Specimen Diameter (inches) | 2.85 | 2.86 |
| Dry Density (PCF) | 91.4 | 92.7 |
| Percent of Max. Density | - | - |
| Moisture Content (%) | 30.5 | 28.3 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $9.0 \times 10^{-9}$ | $1.6 \times 10^{-8}$ |
| K @ 20°C (h/min) | | |

**Huntingdon**
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PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

**LABORATORY TEST DATA**

DATE: 08-20-93
LAB. NO. 4800-03-074
8300-93-220

| | | |
|---|---|---|
| SAMPLE NUMBER | 5 | 6 |
| SAMPLE LOCATION | E47500<br>N16400 | 10' N & 35' W of CT12 |
| ELEVATION | 664.0' | 664.0' |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Fat Clay, reddish brown (CH) | Fat Clay, reddish brown (CH) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 7-8 | 7-8 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.81 | 2.66 |
| Specimen Diameter (inches) | 2.81 | 2.82 |
| Dry Density (PCF) | 97.6 | 93.2 |
| Percent of Max. Density | - | - |
| Moisture Content (%) | 26.1 | 28.4 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $6.0 \times 10^{-9}$ | $2.5 \times 10^{-8}$ |
| K @ 20°C (h/min) | | |

**Huntingdon**
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3908 Commerce Court Southwest
Rochester, Minnesota 55902-1252
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Fax: (507) 288-5715

PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 08-20-93
LAB. NO. 4800-03-074
8300-93-220

| | | |
|---|---|---|
| SAMPLE NUMBER | 7 | 8 |
| SAMPLE LOCATION | 50' E of CT7 | 25'E of CT7 |
| ELEVATION | 667.0' | 667.0' |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Fat Clay, reddish brown (CH) | Fat Clay, reddish brown (CH) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 7-8 | 7-8 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.64 | 2.63 |
| Specimen Diameter (inches) | 2.81 | 2.81 |
| Dry Density (PCF) | 92.4 | 92.8 |
| Percent of Max. Density | - | - |
| Moisture Content (%) | 29.9 | 28.5 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $4.2 \times 10^{-8}$ | $1.3 \times 10^{-8}$ |
| K @ 20°C (h/min) | | |

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PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 11-03-93
LAB. NO. 4800-03-074
8300-93-220

| | | |
|---|---|---|
| SAMPLE NUMBER | 9 | 10 |
| DATE SAMPLED | 09-23-93 | 09-23-93 |
| SAMPLE LOCATION | 1 | 2 |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Lean Clay, brownish gray (CL) | Lean Clay, brownish gray (CL) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 8-9 | 8-9 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.50 | 2.50 |
| Specimen Diameter (inches) | 2.75 | 2.78 |
| Dry Density (PCF) | 87.5 | 88.0 |
| Percent of Max. Density | - | - |
| Moisture Content (%) | 35.3 | 33.0 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $3.0 \times 10^{-9}$ | $1.0 \times 10^{-8}$ |
| K @ 20°C (ft/min) | | |

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PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 11-03-93
LAB. NO. 4800-03-074
8300-93-220

| | | |
|---|---|---|
| SAMPLE NUMBER | 11 | 12 |
| DATE SAMPLED | 09-23-93 | 09-23-93 |
| SAMPLE LOCATION | 3 | 4 |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Lean Clay, brownish gray (CL) | Lean Clay, brownish gray (CL) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 8-9 | 8-9 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.52 | 2.60 |
| Specimen Diameter (inches) | 2.78 | 2.81 |
| Dry Density (PCF) | 96.0 | 101.6 |
| Percent of Max. Density | - | - |
| Moisture Content (%) | 20.8 | 25.9 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $5.0 \times 10^{-9}$ | $1.6 \times 10^{-8}$ |
| K @ 20°C (ft/min) | | |

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PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 11-03-93
LAB. NO. 4800-03-074
8300-93-220

| | | |
|---|---|---|
| SAMPLE NUMBER | 13 | 14 |
| DATE SAMPLED | 09-23-93 | 09-23-93 |
| SAMPLE LOCATION | 5 | 6 |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Lean Clay, brownish gray (CL) | Lean Clay, brownish gray (CL) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 7-8 | 7-8 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.53 | 2.66 |
| Specimen Diameter (inches) | 2.84 | 2.78 |
| Dry Density (PCF) | 94.0 | 90.4 |
| Percent of Max. Density | - | - |
| Moisture Content (%) | 28.4 | 29.0 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $4.0 \times 10^{-9}$ | $1.3 \times 10^{-8}$ |
| K @ 20°C (ft/min) | | |

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PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 11-03-93
LAB. NO. 4800-03-074
8300-93-220

| | |
|---|---|
| SAMPLE NUMBER | 15 |
| DATE SAMPLED | 09-10-93 |
| SAMPLE LOCATION | 40'E of CT 8 |
| ELEVATION | 667.5' |
| Type of Sample | Thinwall |
| Soil Classification (ASTM:D2487) | Lean Clay,<br>brownish gray<br>(CL) |
| In-Place Moisture Content(%) | |
| Moisture-Density Relation of Soil (ASTM:D698) | |
| Max. Dry Density (PCF) | |
| Optimum Moisture Content (%) | |
| Permeability Test | |
| Trial No. | 7-8 |
| Type of Test | Falling Head |
| Type of Specimen | Undisturbed |
| Specimen Height (inches) | 2.50 |
| Specimen Diameter (inches) | 2.80 |
| Dry Density (PCF) | 95.3 |
| Percent of Max. Density | - |
| Moisture Content (%) | |
| Max. Head Differential (CM) | 152.4 |
| Confining Pressure (Effective - PSI) | 2 |
| Water Temperature (°C) | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $1.2 \times 10^{-8}$ |
| K @ 20°C (ft/[illegible] | |

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PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 11-03-93
LAB. NO. 4800-03-074
8300-93-220

| | | |
|---|---|---|
| SAMPLE NUMBER | 16 | 17 |
| DATE SAMPLED | 09-11-93 | 09-11-93 |
| SAMPLE LOCATION | 25'E of CT 8 | 20'W of CT 4 |
| ELEVATION | 668.0' | 663.0' |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Lean Clay, brownish gray (CL) | Lean Clay, brownish gray (CL) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 8-9 | 8-9 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.66 | 2.31 |
| Specimen Diameter (inches) | 2.83 | 2.79 |
| Dry Density (PCF) | 98.0 | 95.4 |
| Percent of Max. Density | - | - |
| Moisture Content (%) | - | - |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | 3.0 x 10$^{-9}$ | 8.0 x 10$^{-9}$ |
| K @ 20°C (ft/min) | | |

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PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 11-03-93
LAB. NO. 4800-03-074
8300-93-220

| | | |
|---|---|---|
| SAMPLE NUMBER | 18 | 19 |
| DATE SAMPLED | 09-28-93 | 09-28-93 |
| SAMPLE LOCATION | 60'N of CT 9 | 30'N of CT 8 |
| ELEVATION | | |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Lean Clay, brownish gray (CL) | Lean Clay, brownish gray (CL) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 7-8 | 7-8 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.50 | 2.72 |
| Specimen Diameter (inches) | 2.75 | 2.81 |
| Dry Density (PCF) | 89.2 | 96.5 |
| Percent of Max. Density | 35.0 | 28.0 |
| Moisture Content (%) | - | - |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | 7.0 x $10^{-9}$ | 1.1 x $10^{-8}$ |
| K @ 20°C (ft/min) | | |

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PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

**LABORATORY TEST DATA**

DATE: 08-20-93
LAB. NO. 4800-03-074
8300-92-220

| | | |
|---|---|---|
| SAMPLE NUMBER | 1 | 2 |
| DATE SAMPLED | 08-20-93 | 08-20-93 |
| SAMPLE LOCATION | Thinwall Tube (Bottom Portion) | Thinwall Tube Top Portion) |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Fat Clay, reddish brown (CH) | Lean Clay, brownish gray (CL) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 8-9 | 8-9 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.58 | 2.53 |
| Specimen Diameter (inches) | 2.83 | 2.83 |
| Dry Density (PCF) | 86.3 | 101.1 |
| Percent of Max. Density | | |
| Moisture Content (%) | 36.1 | 23.2 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | -8 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $3 \times 10^{-9}$ | $7.3 \times 10^{-8}$ |
| K @ 20°C (h/min) | | |

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PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 08-20-93
LAB. NO. 4800-03-074
8300-93-220

| | | |
|---|---|---|
| SAMPLE NUMBER | 3 | 4 |
| SAMPLE LOCATION | 7' E of CT4 | N16200<br>E47800 |
| ELEVATION | 662.0' | 663.5' |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Fat Clay, reddish brown (CH) | Fat Clay, reddish brown (CH) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 7-8 | 7-8 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 3.0 | 2.55 |
| Specimen Diameter (inches) | 2.85 | 2.86 |
| Dry Density (PCF) | 91.4 | 92.7 |
| Percent of Max. Density | - | - |
| Moisture Content (%) | 30.5 | 28.3 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $9.0 \times 10^{-9}$ | $1.6 \times 10^{-8}$ |
| K @ 20°C (h/min) | | |

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PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 08-20-93
LAB. NO. 4800-03-074
8300-93-220

| | | |
|---|---|---|
| SAMPLE NUMBER | 5 | 6 |
| SAMPLE LOCATION | E47500<br>N16400 | 10' N & 35' W of CT12 |
| ELEVATION | 664.0' | 664.0' |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Fat Clay, reddish brown (CH) | Fat Clay, reddish brown (CH) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 7-8 | 7-8 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.81 | 2.66 |
| Specimen Diameter (inches) | 2.81 | 2.82 |
| Dry Density (PCF) | 97.6 | 93.2 |
| Percent of Max. Density | - | - |
| Moisture Content (%) | 26.1 | 28.4 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $6.0 \times 10^{-9}$ | $2.5 \times 10^{-8}$ |
| K @ 20°C (h/min) | | |

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PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 08-20-93
LAB. NO. 4800-03-074
8300-93-220

| | | |
|---|---|---|
| SAMPLE NUMBER | 7 | 8 |
| SAMPLE LOCATION | 50' E of CT7 | 25'E of CT7 |
| ELEVATION | 667.0' | 667.0' |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Fat Clay, reddish brown (CH) | Fat Clay, reddish brown (CH) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 7-8 | 7-8 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.64 | 2.63 |
| Specimen Diameter (inches) | 2.81 | 2.81 |
| Dry Density (PCF) | 92.4 | 92.8 |
| Percent of Max. Density | - | - |
| Moisture Content (%) | 29.9 | 28.5 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $4.2 \times 10^{-8}$ | $1.3 \times 10^{-8}$ |
| K @ 20°C (h/min) | | |

file CAP.C

Job No. 8300-93-220

Boring No. - Sample No. 1 Depth: -

Classification (ASTM:D2487) (CL)

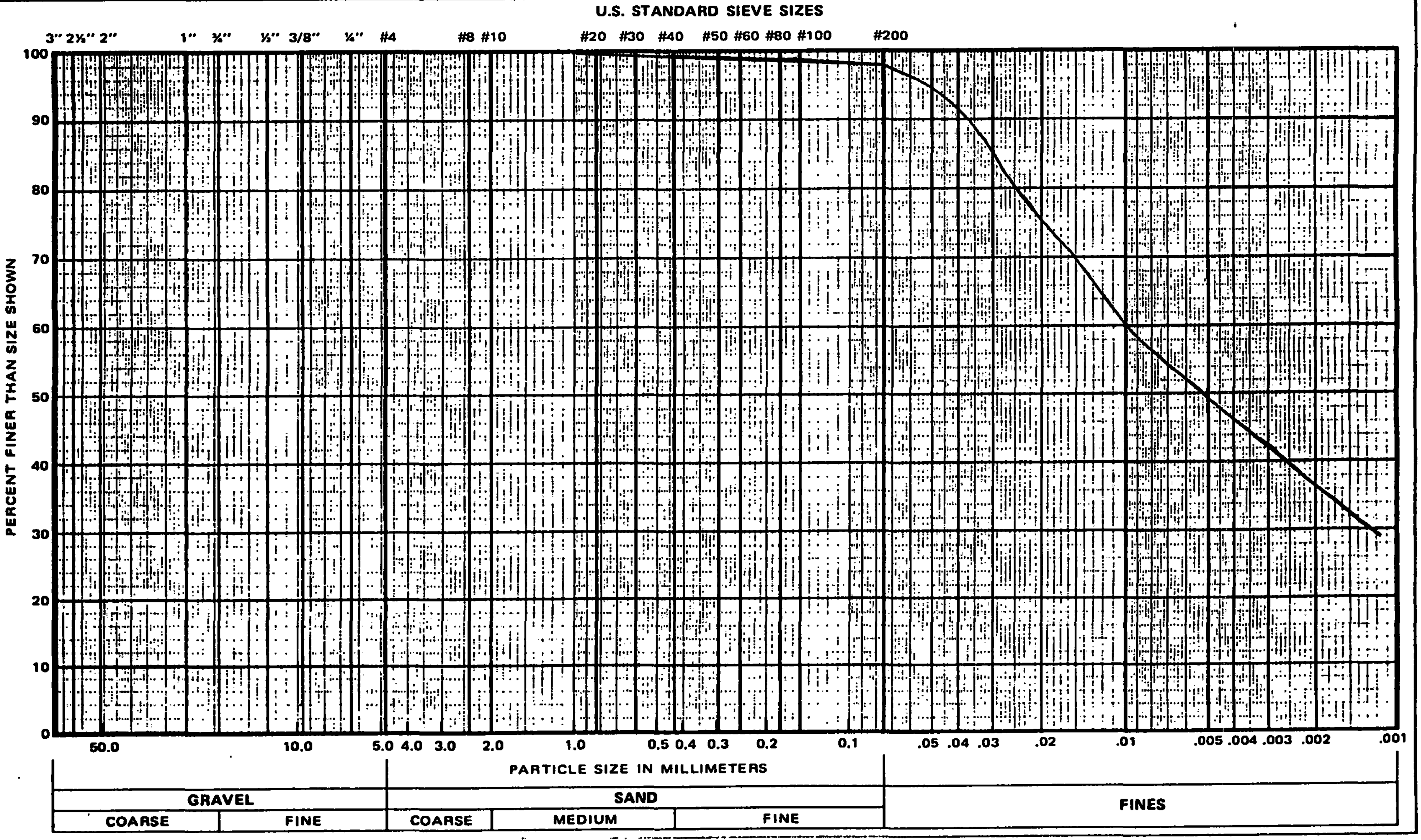
Description Lean Clay, brown

**twin city testing corporation**
3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

Project: LANDFILL CAP WORK
ONALASKA, WISCONSIN

Reported To: CH2M Hill - Donald J. Olson

## GRAIN SIZE DISTRIBUTION CURVE



Job No. 8300-93-220

Boring No. - Sample No. 2 Depth: -

Classification (ASTM:D2487) (CL)

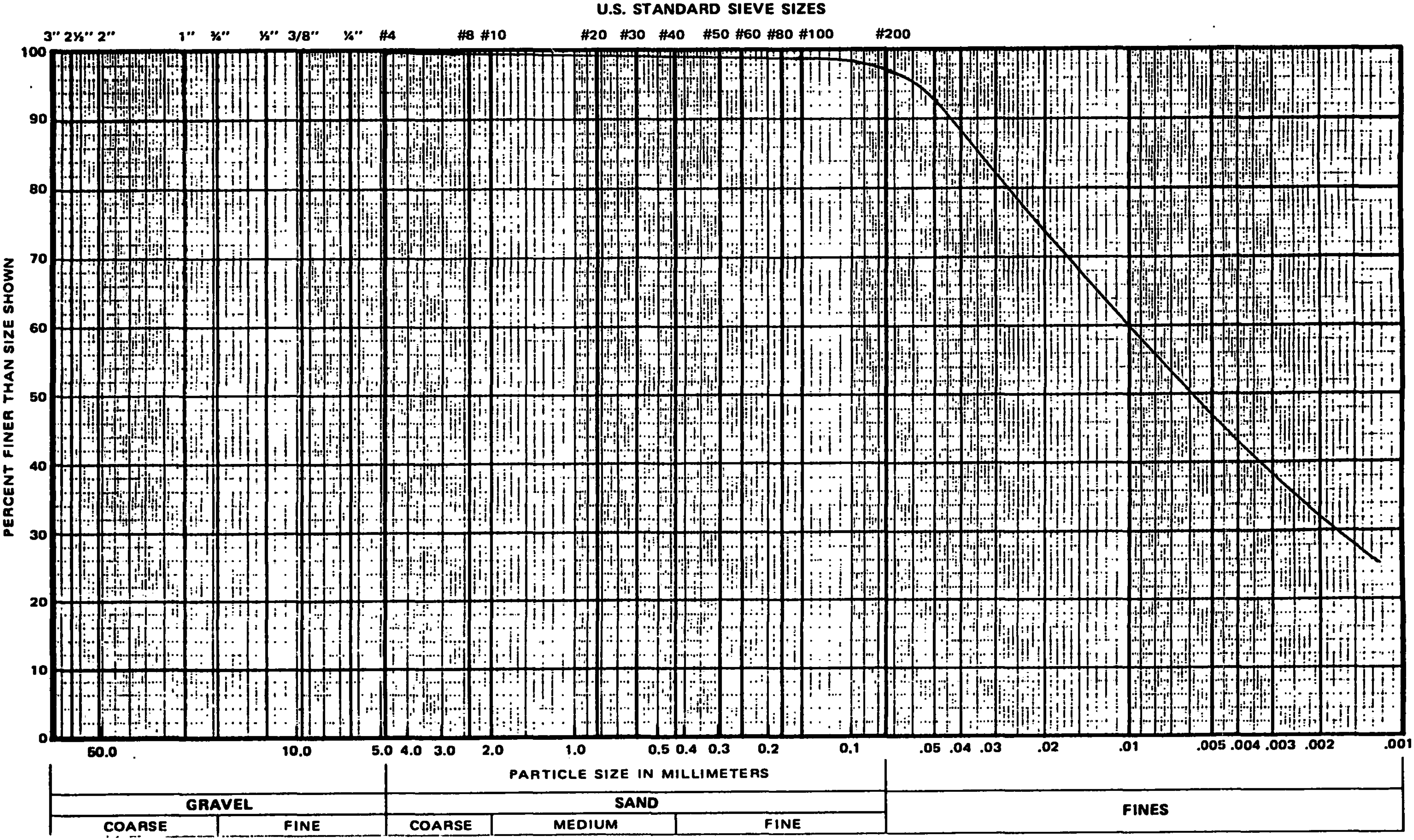
Description Lean Clay, brown

**twin city testing corporation**
3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

Project: LANDFILL CAP WORK
ONALASKA, WISCONSIN

Reported To: CH2M Hill - Donald J. Olson

# GRAIN SIZE DISTRIBUTION CURVE



**Job No.** 8300-93-220

**Boring No.** - **Sample No.** 3 **Depth:** -

**Classification (ASTM:D2487)** (CL)

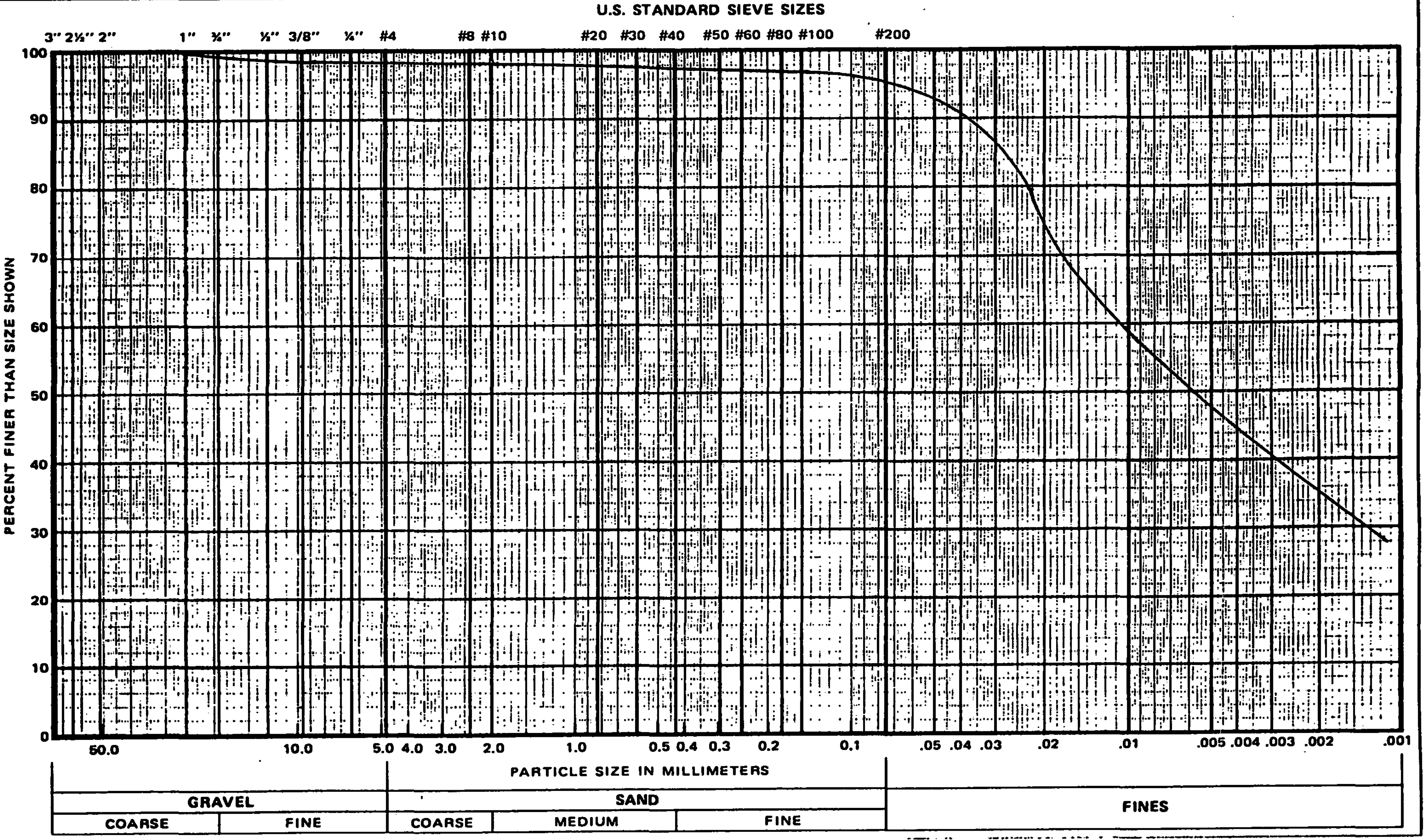
**Description** Lean Clay, brown

**twin city testing corporation**
3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

**Project:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**Reported To:** CH2M Hill - Donald J. Olson

## GRAIN SIZE DISTRIBUTION CURVE



Job No. 8300-93-220

Boring No. - Sample No. 4 Depth: -

Classification (ASTM:D2487) (CL)

Description Lean Clay, brown

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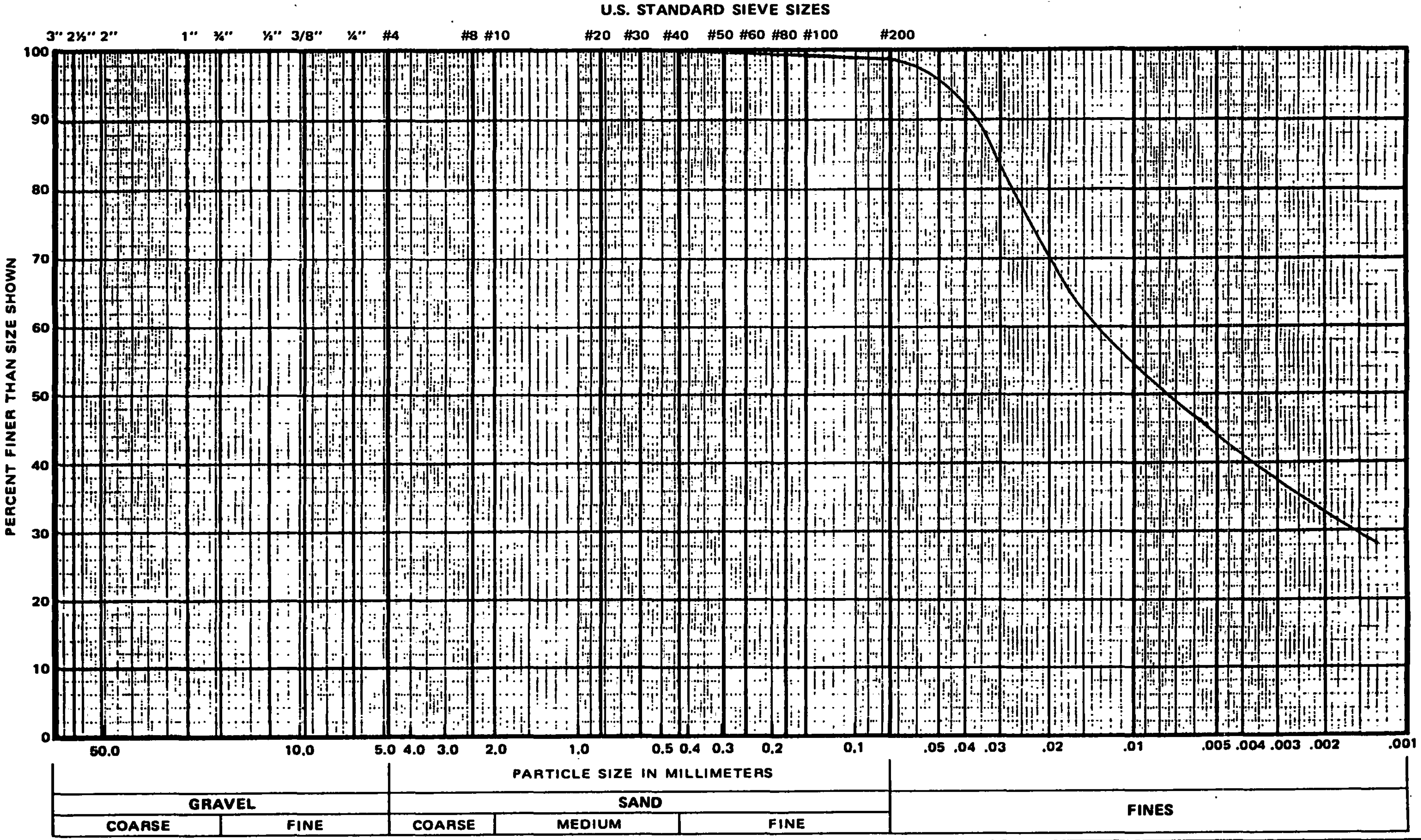
ROCHESTER, MN 55902
PHONE 507/288-7060

Project: LANDFILL CAP WORK
ONALASKA, WISCONSIN

Reported To: CH2M Hill - Donald J. Olson

## GRAIN SIZE DISTRIBUTION CURVE



Job No. 8300-93-220
Boring No. - Sample No. 5 Depth: -
Classification (ASTM:D2487) (CL)
Description Lean Clay, brown

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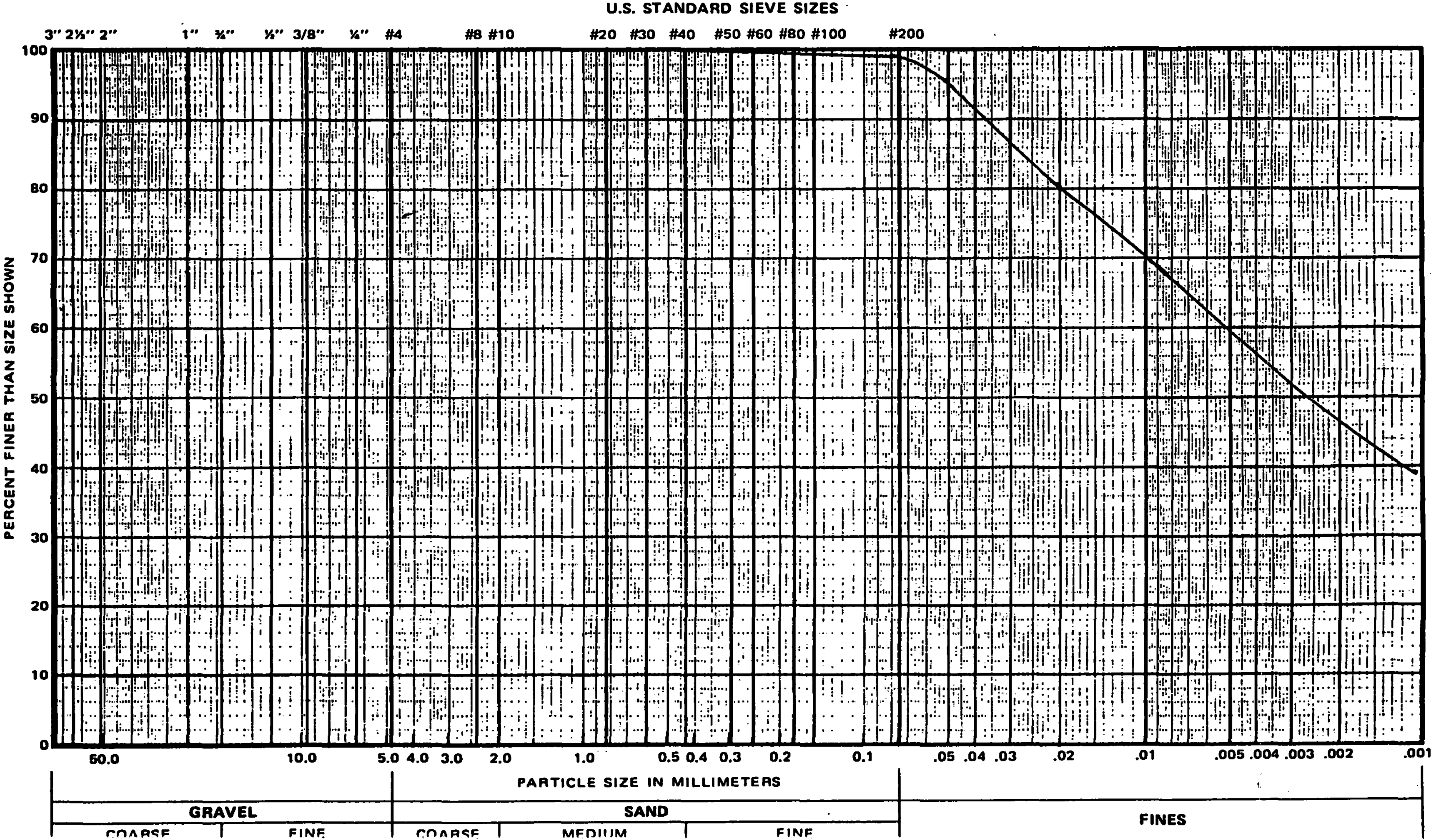
3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

Project: LANDFILL CAP WORK
ONALASKA, WISCONSIN
Reported To: CH2M Hill - Donald J. Olson

## GRAIN SIZE DISTRIBUTION CURVE



Job No. 8300-93-220

Boring No.______ Sample No. ST1-Top

Classification (ASTM:D2487) (CL)

Description Lean Clay, brown

**twin city testing corporation**
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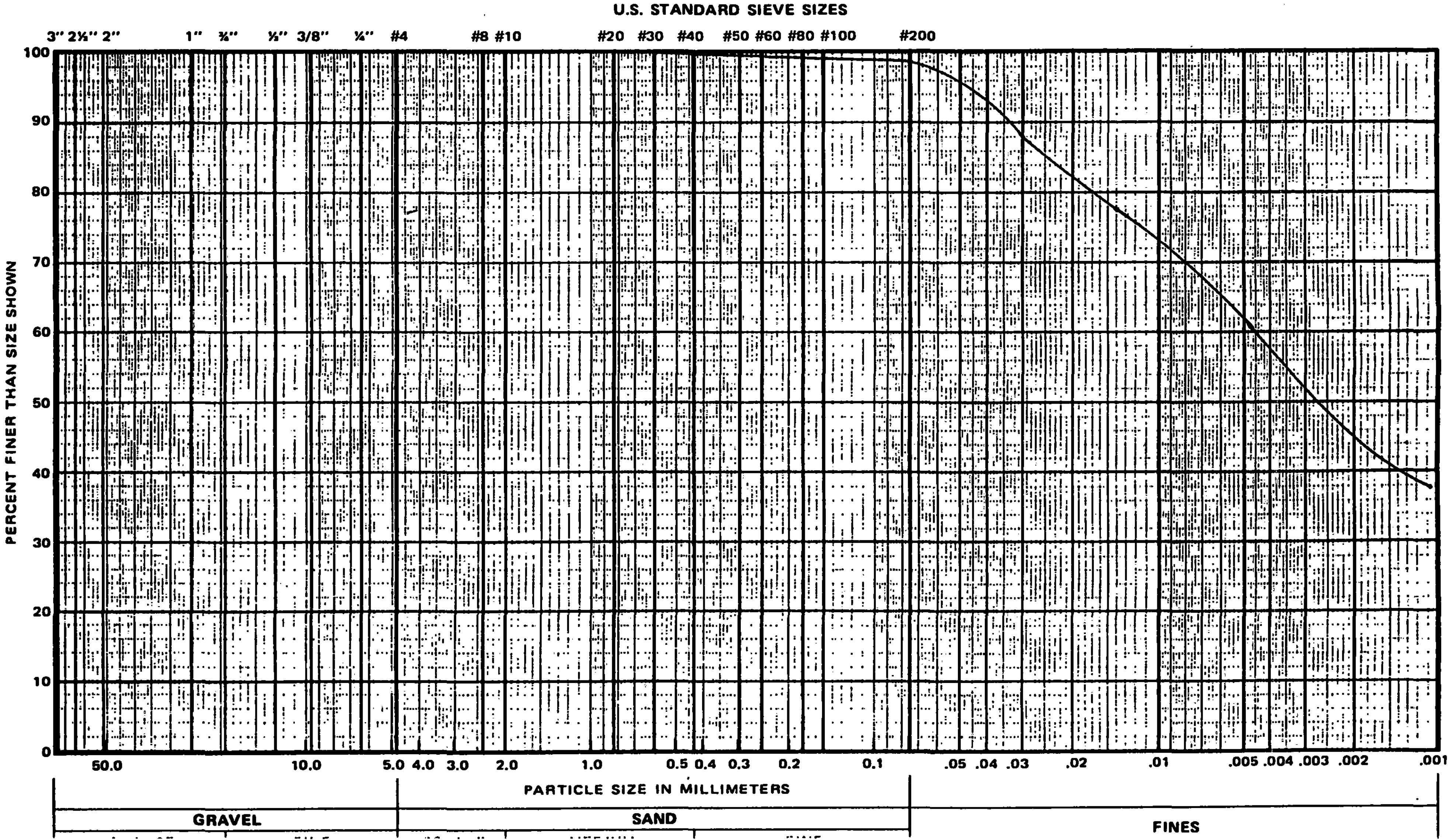
ROCHESTER, MN 55902
PHONE 507/288-7060

Project: LANDFILL CAP WORK
ONALASKA, WISCONSIN

Reported To: CH2M Hill - Donald J. Olson

## GRAIN SIZE DISTRIBUTION CURVE



Job No. 8300-93-220

Boring No. ______ Sample No. ST1-Bottom

Classification (ASTM:D2487) (CL-ML)

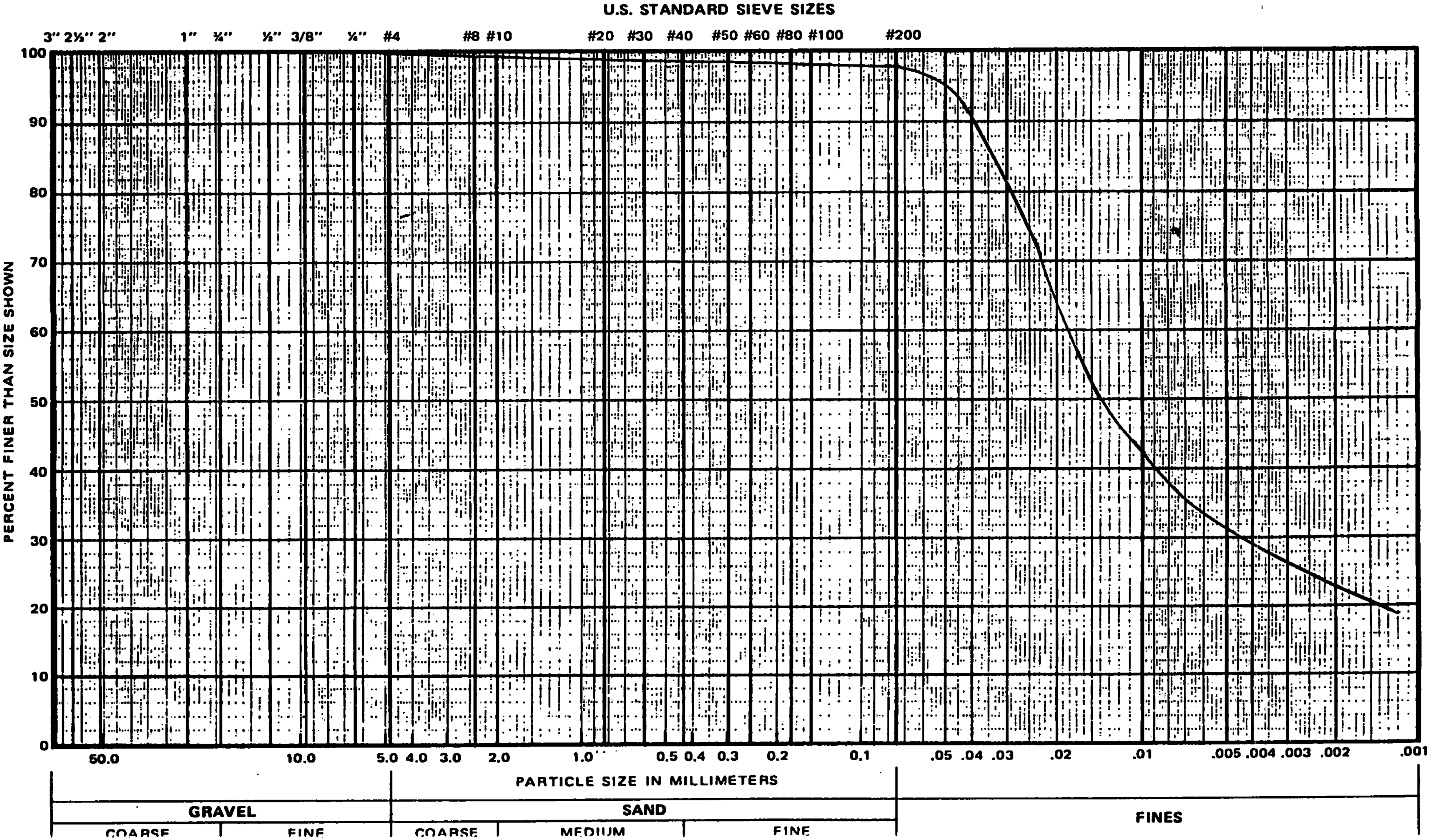
Description Silty Clay

**twin city testing corporation**
3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

Project: LANDFILL CAP WORK
ONALASKA, WISCONSIN

Reported To: CH2M Hill - Donald J. Olson

## GRAIN SIZE DISTRIBUTION CURVE



Job No. 8300-93-220

Boring No. - Sample No. 5 Depth: -

Classification (ASTM:D2487) (CL)

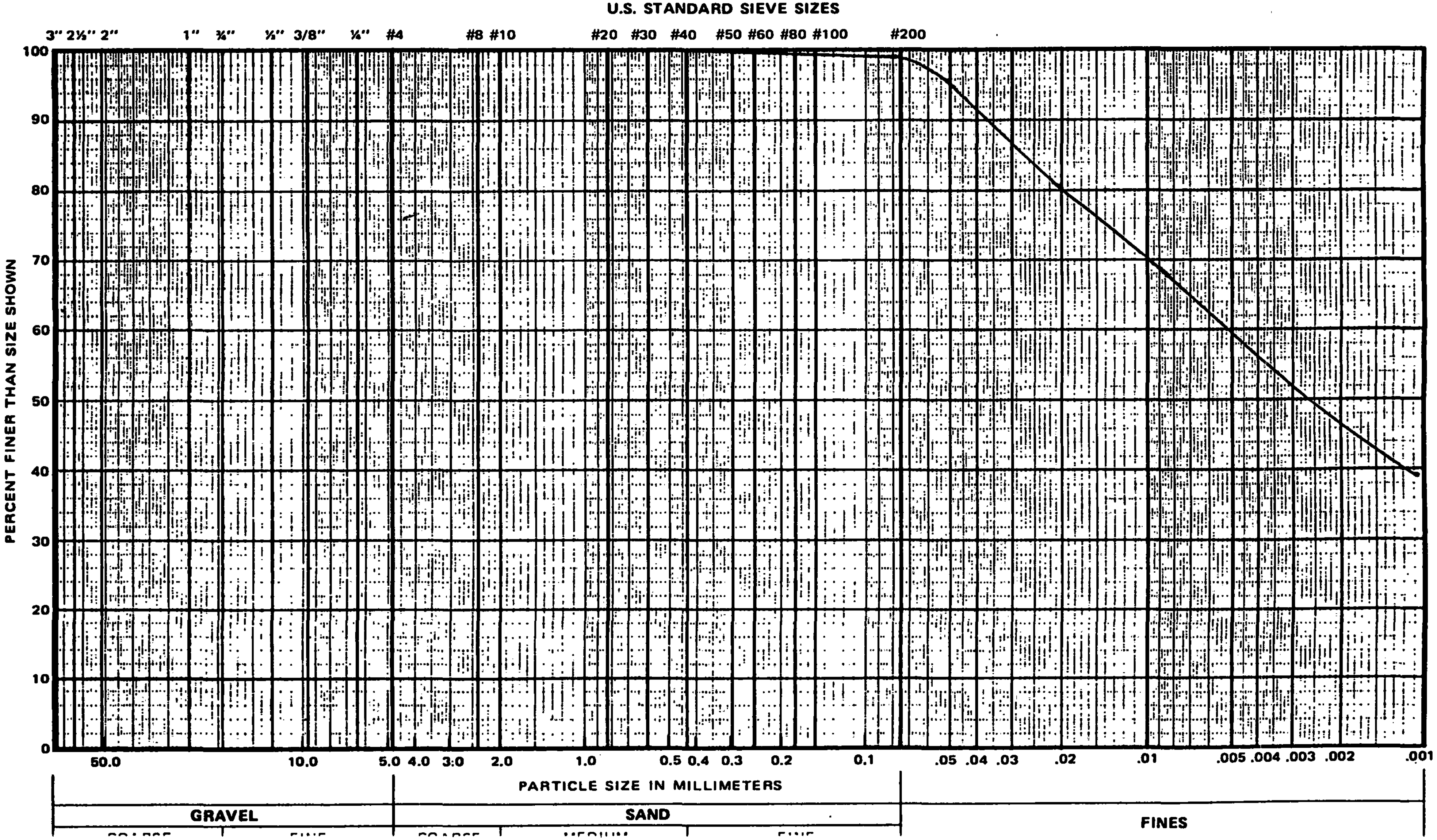
Description Lean Clay, brown

**twin city testing corporation**
3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

Project: LANDFILL CAP WORK
ONALASKA, WISCONSIN

Reported To: CH2M Hill - Donald J. Olson

## GRAIN SIZE DISTRIBUTION CURVE



**Job No.** 8300-93-220

**Boring No.**______ **Sample No.** ST1-Top

**Classification (ASTM:D2487)** (CL)

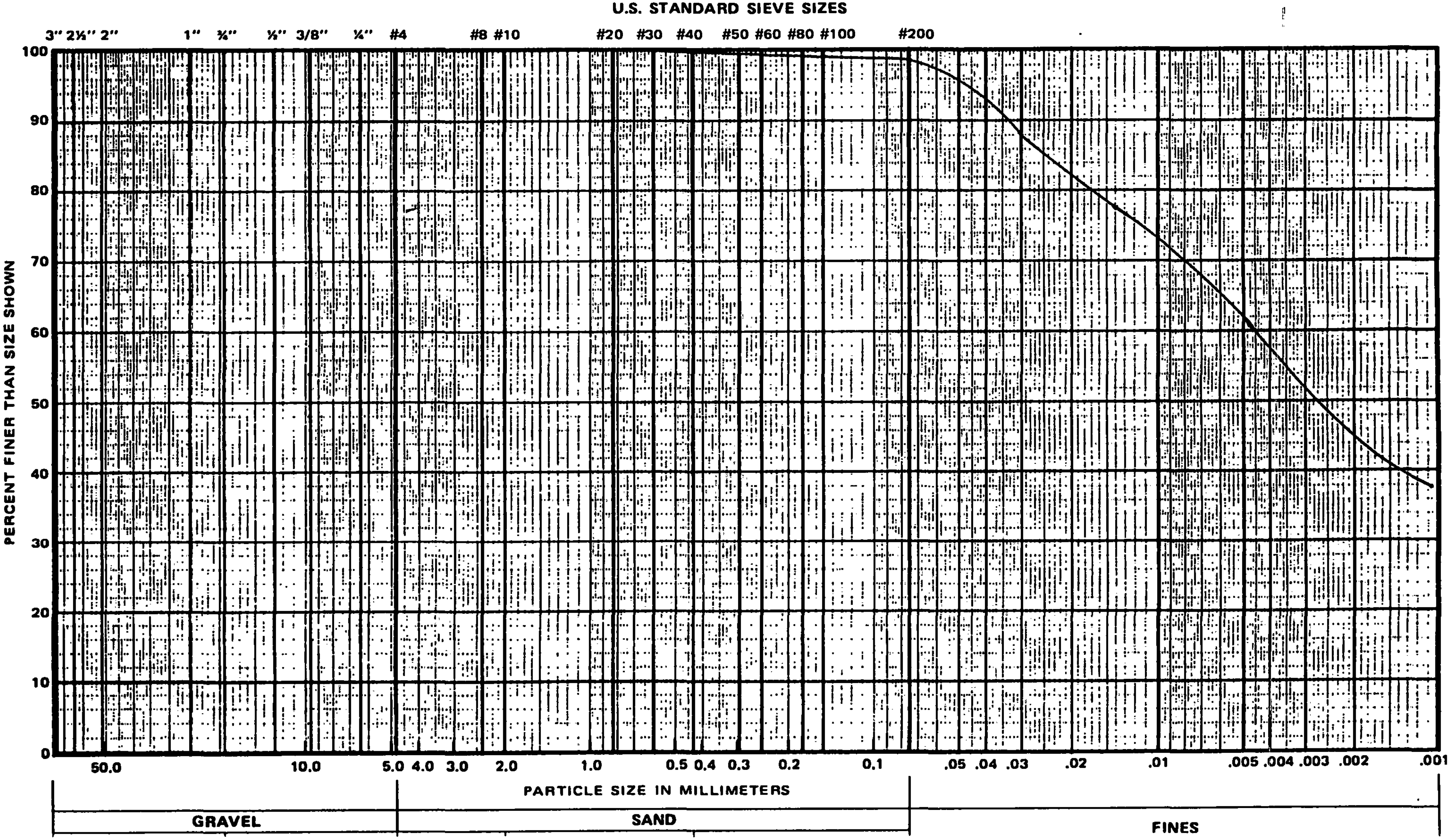
**Description** Lean Clay, brown

**twin city testing corporation**
3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

**Project:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**Reported To:** CH2M Hill - Donald J. Olson

## GRAIN SIZE DISTRIBUTION CURVE



Job No. 8300-93-220

Boring No.______ Sample No. ST1-Bottom

Classification (ASTM:D2487) (CL-ML)

Description Silty Clay

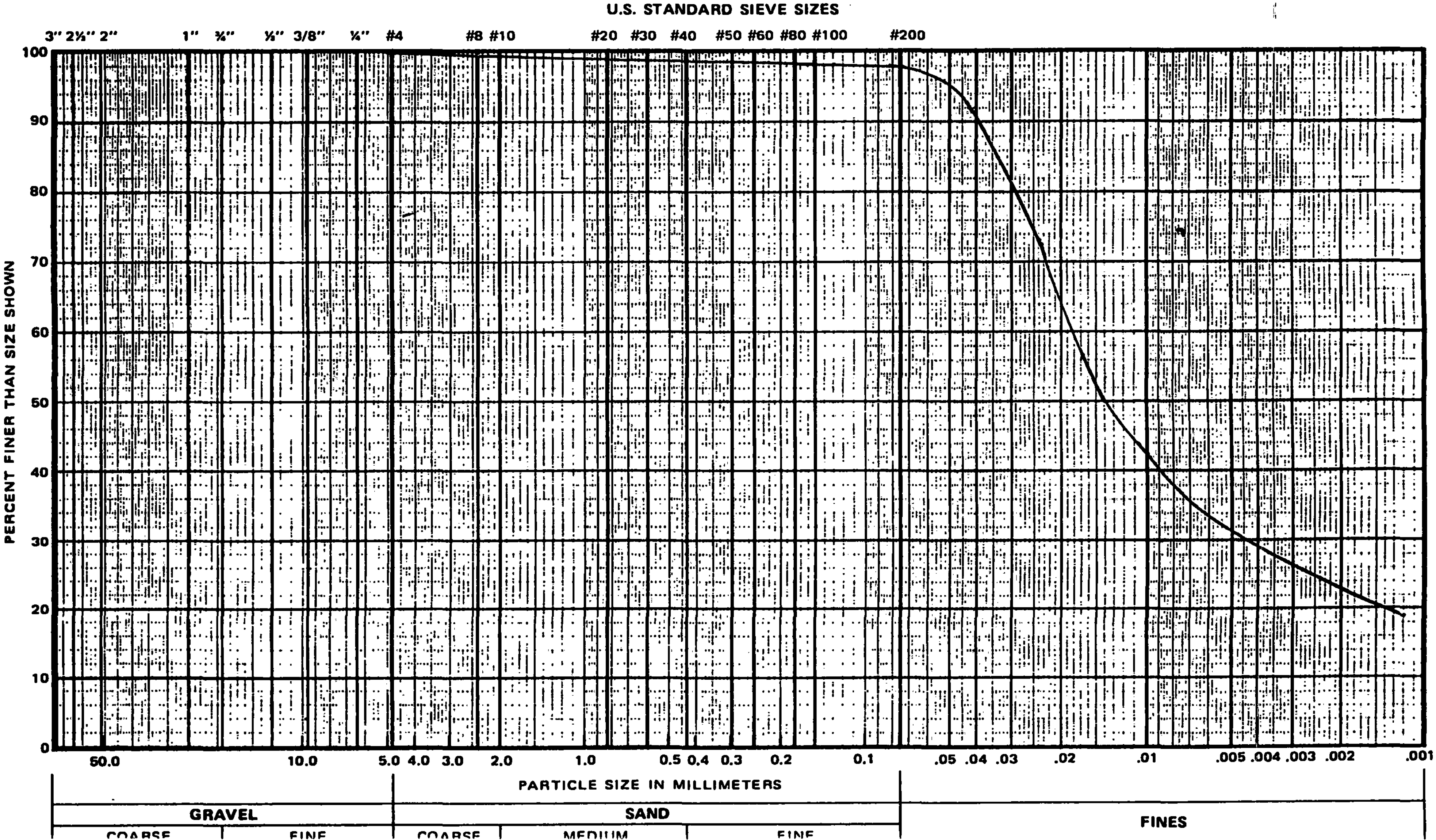
**twin city testing corporation**

3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

Project: LANDFILL CAP WORK
ONALASKA, WISCONSIN

Reported To: CH2M Hill - Donald J. Olson

## GRAIN SIZE DISTRIBUTION CURVE



Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 1

| | |
|---|---|
| To DON OLSON | From CATHY BARNER |
| Co. | Co. |
| Dept. | Phone # |
| Fax # | Fax # |

608 783 0902

ance with the requirements for standard compaction unless special compaction is called for on the plans or in the contract.

Embankment material shall not be compacted when the moisture content is such as to cause excessive rutting by the hauling equipment, or excessive displacement or distortion under the compacting equipment. Where such conditions exist, the materials shall be allowed to dry prior to compacting. When necessary, drying of such materials shall be accelerated by aeration or manipulation by means of blade graders, harrows, discs or other appropriate equipment.

When the embankment material does not contain sufficient moisture to compact properly, water shall be added in quantities deemed necessary to aid and accelerate and to secure effective compaction.

Embankment materials which are placed outside the limits of an assumed one-to-one slope extending outward and downward from the outer limits of the finished shoulder line shall be compacted to a density not less than the density contemplated for standard compaction, except that the engineer may waive this density requirement for unstable materials permitted to be placed in embankments outside the above designated slopes.

**207.3.6.2 Standard Compaction.** The material for the embankment shall be deposited, spread and leveled, as hereinbefore provided, in layers generally not exceeding eight inches in thickness before compaction. Each layer of the embankment shall be compacted to the degree that no further appreciable consolidation is evidenced under the action of the compaction equipment. The required compaction shall be attained for each layer before any material for a succeeding layer is placed thereon.

The compaction shall be performed by specialized compaction equipment, supplemented by hauling and leveling equipment routed and distributed over each layer of the fill to make use of the compaction afforded thereby; unless the engineer determines that the compaction attained by the use of only the hauling and leveling equipment is satisfactory and sufficient. Should the engineer determine that such compaction is satisfactory and sufficient, specialized compaction equipment will not be required. Should the engineer determine that the compaction is not satisfactory or sufficient, specialized compaction equipment shall be used to accomplish the compaction.

Specialized compaction equipment shall include tamping rollers, pneumatic-tire rollers, vibratory rollers or other types of equipment designed for compaction which will produce the required results in the materials encountered and be subject to the approval of the engineer.

Tamping rollers, when used for compaction, shall exert a weight of not less than 150 pounds per square inch of tamping surface on each tamping foot in a transverse row.

Pneumatic-tire rollers or other equipment, when used for compaction, shall have a weight of not less than 150 pounds per linear inch of overall rolling width.

**207.3.6.3 Special Compaction.** Upon the properly prepared ground surface, the material for the embankment shall be deposited, spread and leveled, as hereinbefore provided, in layers generally not exceeding eight inches in thickness before compaction, except that when the material being compacted is of a granular nature and the compacting equipment is adaptable for the purpose, the thickness of the layer may be increased to a maximum of 12 inches provided the required density is obtained. Except as provided in Subsections 207.3.2, 207.3.3, 207.3.4 and 207.3.5, each layer of the spread and leveled material shall be compacted, by means of suitable compaction equipment, to not less than the specified density before the succeeding layer is placed.

All embankment material placed within the limits of assumed one-to-one slopes extending outward and downward from the outer limits of the finished shoulder lines shall be compacted to not less than the density specified for the embankment and the embankment material placed outside such assumed slopes shall be compacted as specified in Subsection 207.3.6.1.

CAP C 7432
~~CAP C8740~~ field

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therwise provided in the

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of embankments shall be
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ıbankment, except when
nature and contain only

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gin at the lowest point of
constructed in layers by
al layers shall be spread
arallel with the finished
rected The thickness of
, g y not exceeding
:ra ling equipment.
single layer may be con-
hauling equipment while

es excavated across wet
ping the fill material. The
sufficiently close to the
move any displaced peat
t toe. The fill material as
ry to effectively displace
ment. Where temporary
zontal dimensions desig-
e embankment advances.
mbankment constructed
icable.

consists of rock, broken
eight-inch layers imprac-
ot exceeding in thickness
individual pieces are so
with smaller stones and

by the hydraulic method,
the pertinent provisions

ing of wet marshes, con-
be compacted in accord-

CH2M HILL
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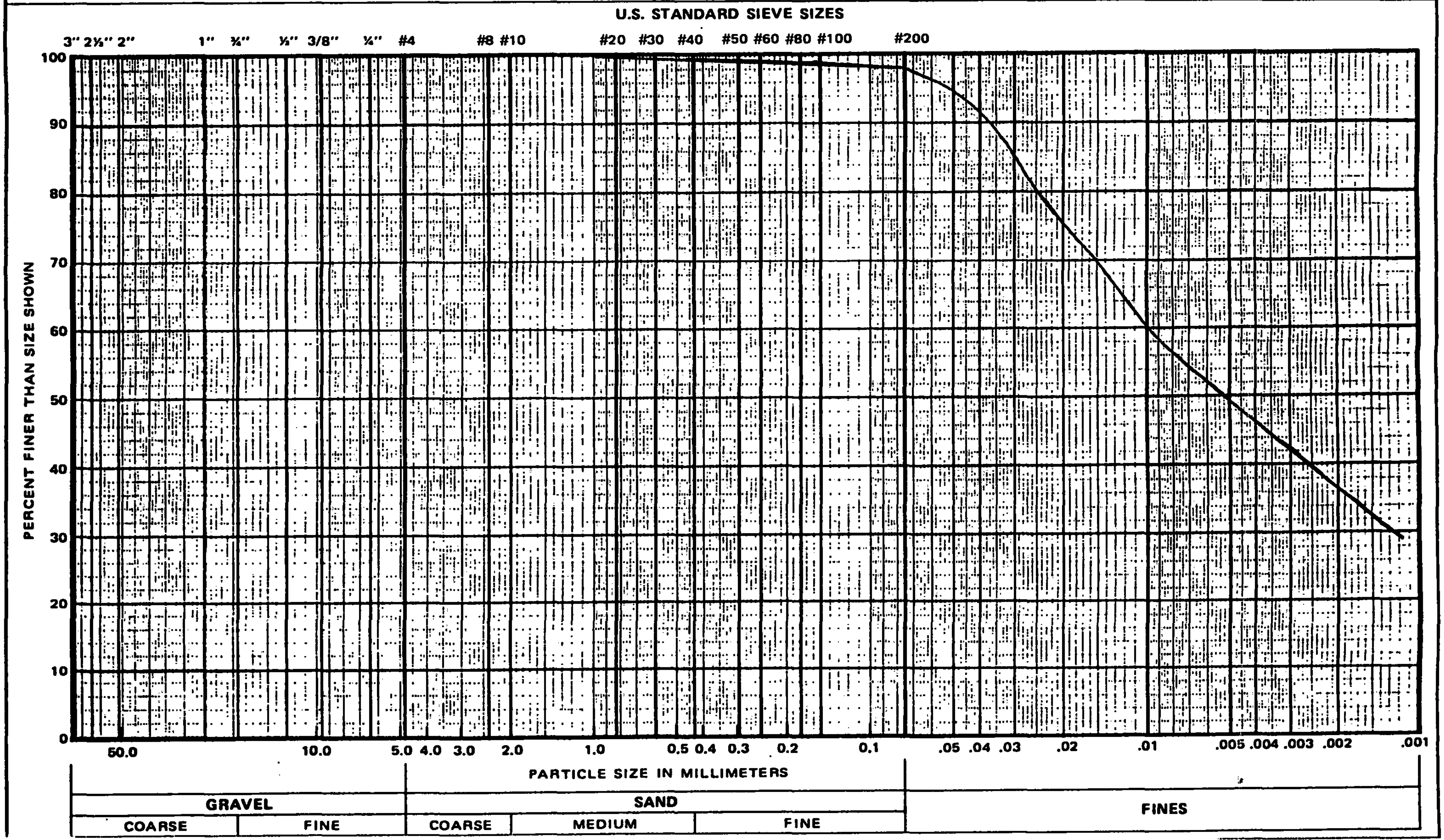
**twin city testing corporation**
3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

Job No. 8300-93-220
Boring No. - Sample No. 1 Depth: CAP C7432
Classification (ASTM:D2487) (CL)
Description Lean Clay, brown

Project: LANDFILL CAP WORK
ONALASKA, WISCONSIN
Reported To: CH2M Hill - Donald J. Olson

## GRAIN SIZE DISTRIBUTION CURVE



Job No. 8300-93-220

Boring No. - Sample No. 2 Depth: -

Classification (ASTM:D2487) (CL)

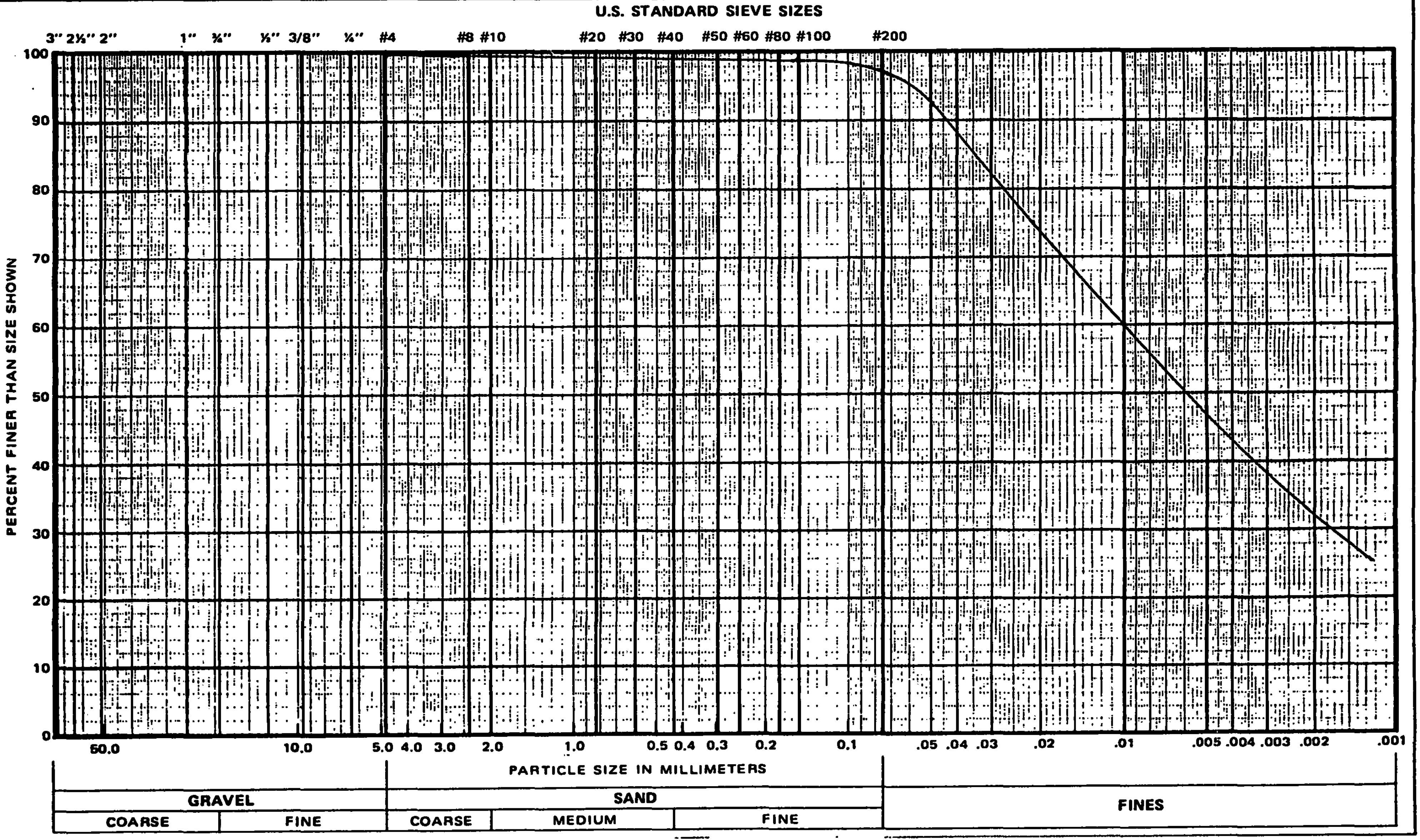
Description Lean Clay, brown

**twin city testing**
**corporation**
3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

Project: LANDFILL CAP WORK
ONALASKA, WISCONSIN

Reported To: CH2M Hill - Donald J. Olson

## GRAIN SIZE DISTRIBUTION CURVE



Job No. 8300-93-220

Boring No. - Sample No. 3 Depth: -

Classification (ASTM:D2487) (CL)

Description Lean Clay, brown

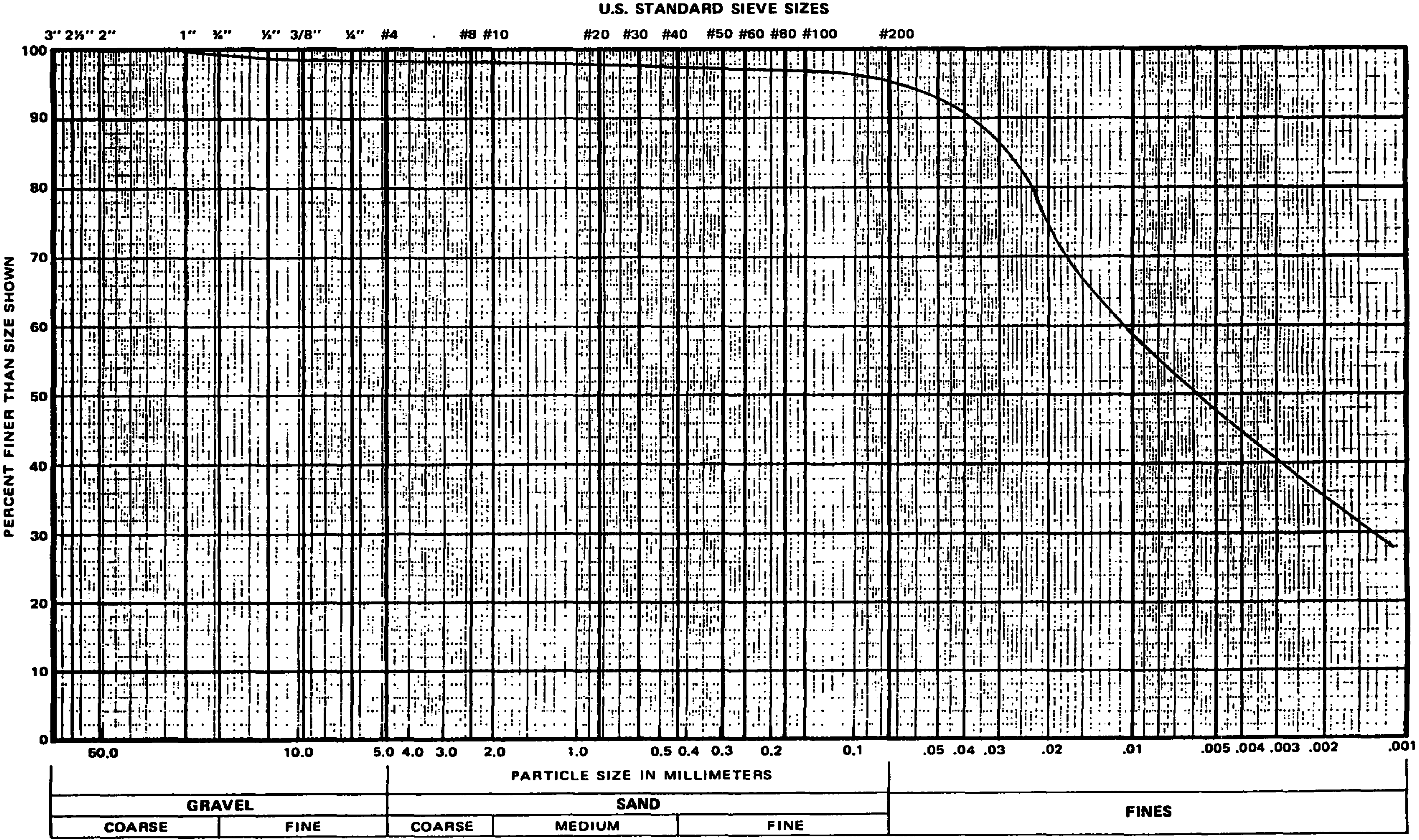
**twin city testing corporation**

3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

Project: LANDFILL CAP WORK
ONALASKA, WISCONSIN

Reported To: CH2M Hill - Donald J. Olson

## GRAIN SIZE DISTRIBUTION CURVE



Job No. 8300-93-220

Boring No. - Sample No. 4 Depth: -

Classification (ASTM:D2487) (CL)

Description Lean Clay, brown

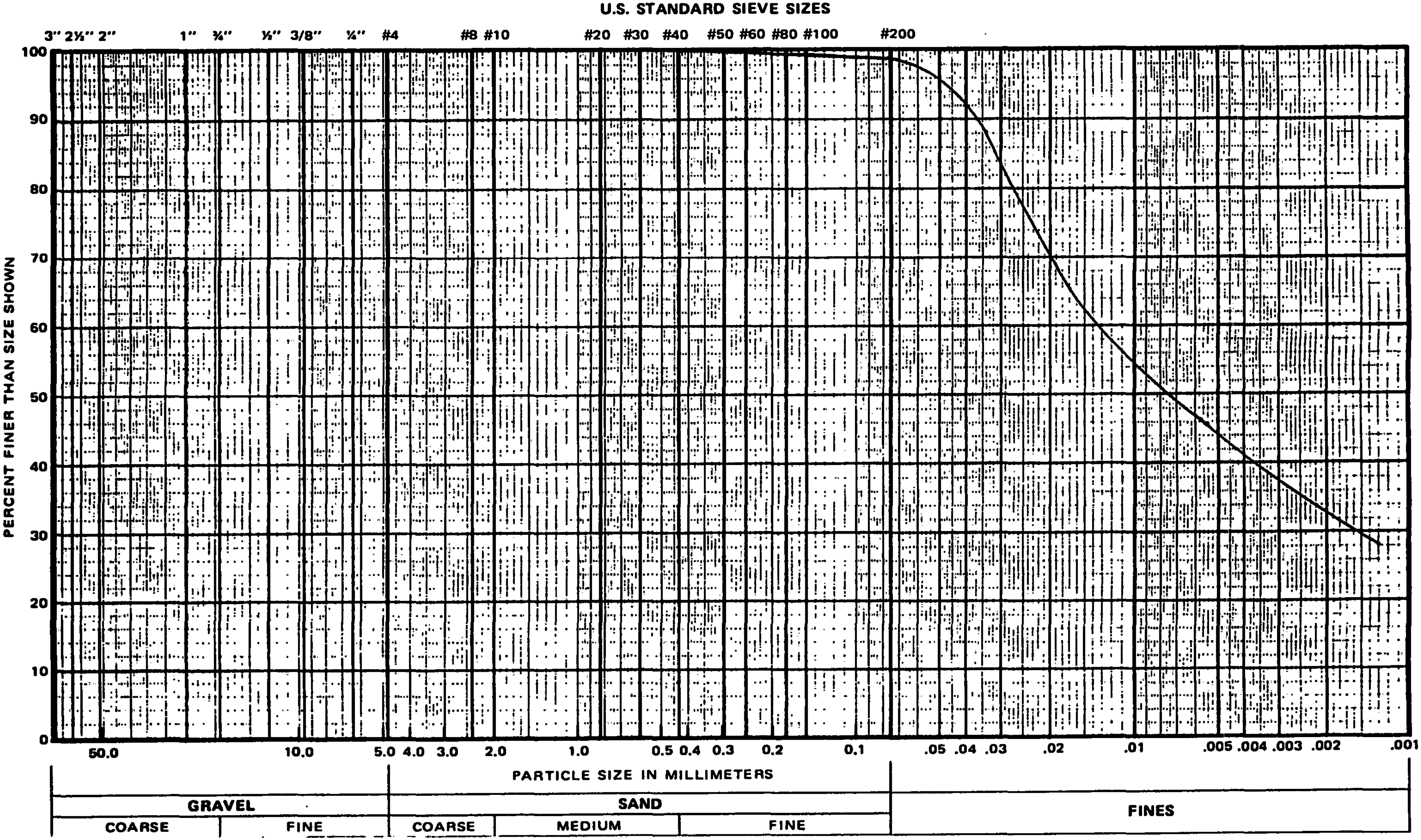
**twin city testing corporation**

3908 COMMERCE COURT S.W.
ROCHESTER, MN 55902
PHONE 507/288-7060

Project: LANDFILL CAP WORK
ONALASKA, WISCONSIN

Reported To: CH2M Hill - Donald J. Olson

## GRAIN SIZE DISTRIBUTION CURVE



twin city testing

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE-DENSITY CURVE

SAMPLE NO. 4

PROJECT: LANDFILL CAP WORK
ONALASKA, WISCONSIN

DATE: October 4, 1993

REPORTED TO: -CH2M Hill

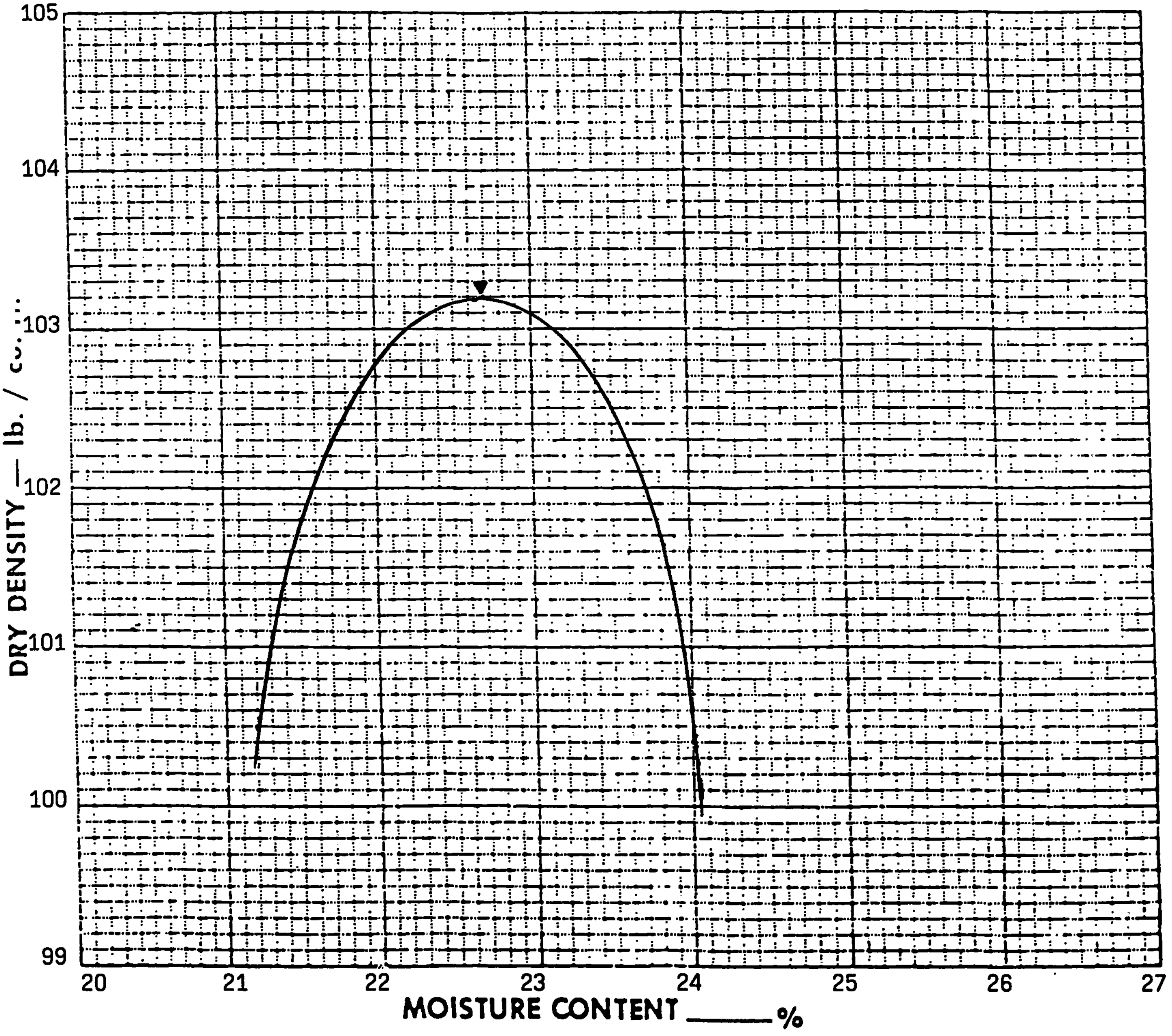
LABORATORY NO. 8300-93-220

METHOD OF TEST: ASTM:D1557-91, Method "A"

TYPE OF MATERIAL: Fat Clay, brown (CH)

MAXIMUM DENSITY: 103.2 lb./cu. ft.

OPTIMUM MOISTURE 22.7 %



Twin City Testing

By Hank Klo

twin city testing

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE - DENSITY CURVE

**SAMPLE NO.** 5

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 4, 1993

**REPORTED TO:** -CH2M Hill

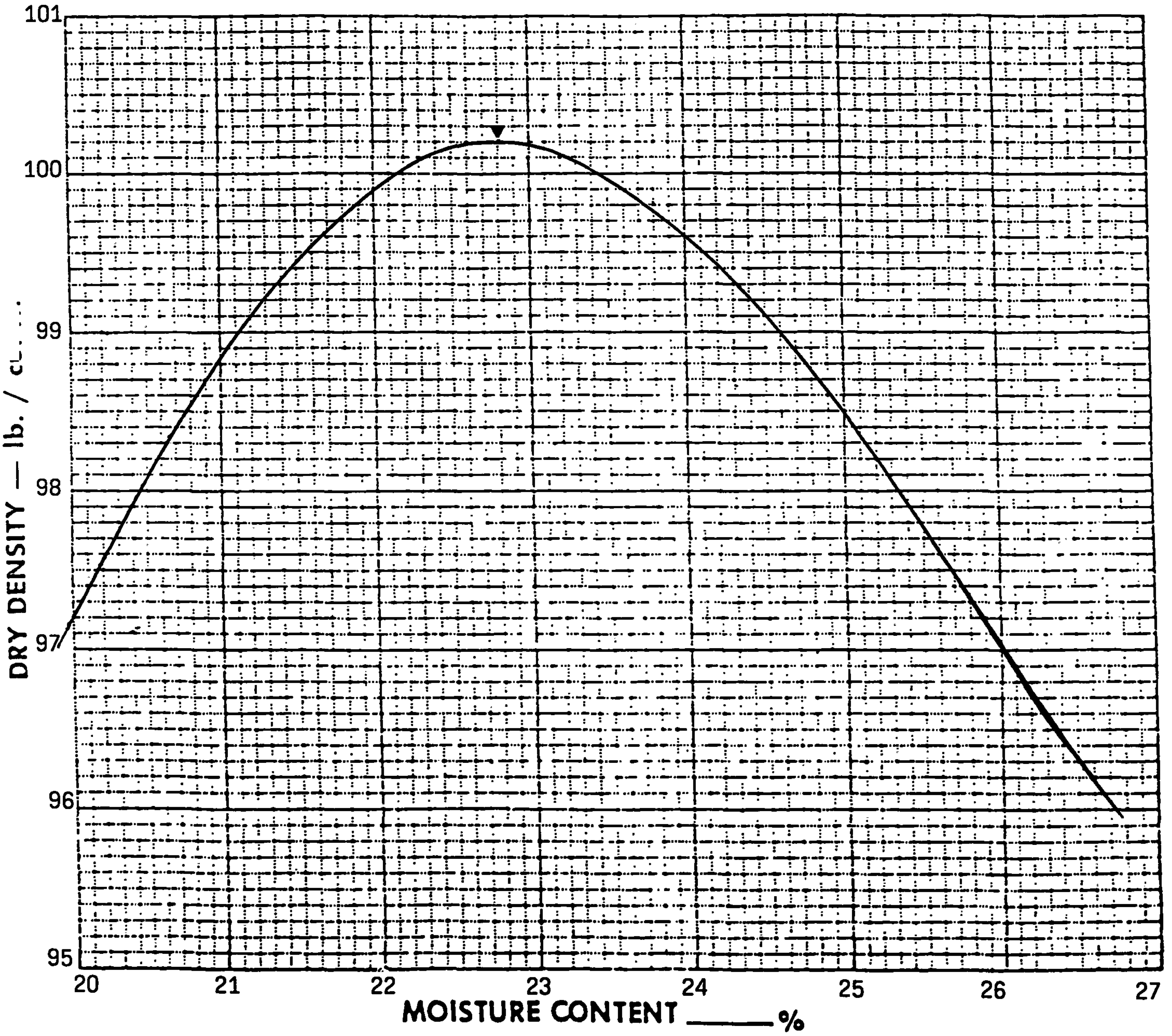
**LABORATORY NO.** 8300-93-220

**METHOD OF TEST:** ASTM:D1557-91, Method "A"

**TYPE OF MATERIAL:** Fat Clay, brown (CH)

**MAXIMUM DENSITY:** 100.2 lb./cu. ft.

**OPTIMUM MOISTURE** 22.8 %



Twin City Testing

By Hank Klo

**twin city testing corporation**
2710 COMMERCE STREET
LA CROSSE, WI 54603
PHONE 608/781-5330

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 5, 1993

**REPORTED TO:**
CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

ABORATORY No. 8300-93-220

SCOPE OF WORK: The scope of our work was limited to performing atterberg limits and modified proctors of the submitted samples in accordance with ASTM:D4318 and ASTM:D1557.

| | | |
|---|---|---|
| SAMPLE NUMBER: | 4 | 5 |
| SAMPLE DESCRIPTION: | Fat Clay, brown (CH) | Fat Clay, brown (CH) |
| SOURCE OF MATERIAL: | On site material | On site material |
| MOISTURE DENSITY DETERMINATION: | See attached curve | See attached curve |
| ATTERBERG LIMITS: | | |
| Liquid Limit | 53 | 53 |
| Plastic Limit | 25 | 25 |
| Plasticity Index | 28 | 28 |

REMARKS:

The above samples were obtained by Twin City Testing Corporation and were submitted to our laboratory on September 23, 1993.

Twin City Testing Corporation
By

**twin city testing corporation**
2710 COMMERCE STREET
LA CROSSE, WI 54603
PHONE 608/781-5330

**REPORT OF:** MECHANICAL ANALYSIS

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 4, 1993

**REPORTED TO:**
CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

---

LABORATORY No. 8300-93-220

SCOPE OF WORK: The scope of our work was limited to performing a mechanical analysis and a modified proctor of the submitted sample in accordance with ASTM:C136 and ASTM:D1557.

SAMPLE NUMBER: 6

SAMPLE DESCRIPTION: Sand, medium to coarse grained, brown (SP)

SOURCE OF MATERIAL: On site material - Sand drainage layer

MOISTURE DENSITY DETERMINATION: See attached curve

MECHANICAL ANALYSIS:

| | |
|---|---|
| Passing #4 | 87 |
| #10 | 70 |
| #40 | 8.92 |
| #100 | 1.62 |
| #200 | 0.76 |

REMARKS:

The above sample was obtained by Twin City Testing Corporation and was submitted to our laboratory on September 23, 1993.

Twin City Testing Corporation
By Hank

twin city testing

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE - DENSITY CURVE

SAMPLE NO. 6

PROJECT: LANDFILL CAP WORK
ONALASKA, WISCONSIN

DATE: October 4, 1993

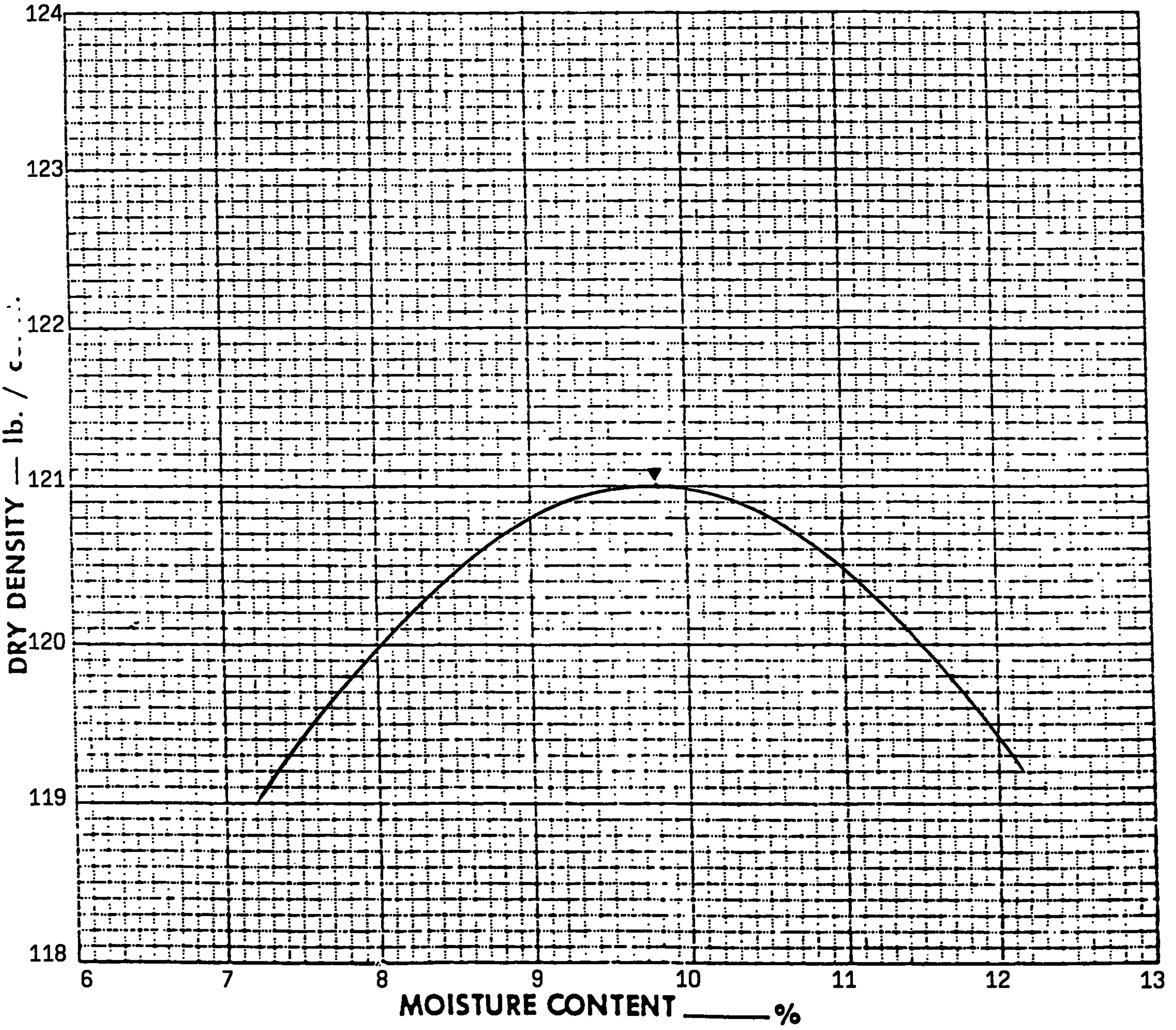
REPORTED TO: -CH2M Hill

LABORATORY NO. 8300-93-220

METHOD OF TEST: ASTM:D1557-91, Method "A"

TYPE OF MATERIAL: Sand, medium to coarse grained, brown (SP)

MAXIMUM DENSITY: 121.0 lb./cu. ft. OPTIMUM MOISTURE 9.8 %



Twin City Testing

By Hank

twin city testing

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

REPORT OF: DENSITY TESTS OF COMPACTED FILL

PROJECT: LANDFILL CAP WORK
ONALASKA, WISCONSIN

DATE: October 4, 1993

REPORTED TO: CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

LABORATORY No. 8300-93-220

| | | | | |
|---|---|---|---|---|
| TEST NUMBER: | | 10 | 11 | 12 |
| DATE TAKEN: | | 9-8-93 | 9-8-93 | 9-8-93 |
| UNIFIED SOIL CLASSIFICATION: (Moisture Density Sample Number) | | Fat Clay, brown (CH)-2 | Fat Clay, brown (CH)-2 | Fat Clay, brown (CH)-2 |
| LOCATION: | | 20'N of CT7 | 25'N and 50'E of CT7 | 50'E of CT7 |
| ELEVATION OF TESTS: | | 669' | 667' | 667' |
| DEPTH BELOW EXISTING GRADE: | | 1" | 1" | At surface |
| FIELD DENSITY DETERMINATION: | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | |
| Dry Density | (pcf) | 93 | 90 | 91 |
| Moisture Content | (%) | 26.0 | 28.7 | 27.4 |
| Plus #4 Material | (%) | None | None | None |
| LABORATORY MOISTURE-DENSITY RELATION OF SOIL: | | | | |
| Method | ASTM:D1557-91, Method "A, (-#4 Basis) | | | |
| Maximum Dry Density | (pcf) | 101.7 | 101.7 | 101.7 |
| Optimum Moisture | (%) | 22.4 | 22.4 | 22.4 |
| COMPACTION TEST RESULTS: | | | | |
| Compaction | (%) | 91 | 89 | 89 |
| Specified Compaction | (%) | 90 | 90 | 90 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction meets specifications at test area 10, but is below specifications at the other test areas.

Twin City Testing
By

**twin city testing**

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

REPORT OF: **DENSITY TESTS OF COMPACTED FILL**

PROJECT: LANDFILL CAP WORK
ONALASKA, WISCONSIN

DATE: October 4, 1993

REPORTED TO: CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

LABORATORY No. 8300-93-220

| | | | | | |
|---|---|---|---|---|---|
| **TEST NUMBER:** | | 13 | 14 | 15 | 16 |
| **DATE TAKEN:** | | 9-10-93 | 9-10-93 | 9-10-93 | 9-10-93 |
| **UNIFIED SOIL CLASSIFICATION:** (Moisture Density Sample Number) | | Fat Clay, brown (CH)-4 | Fat Clay, brown (CH)-4 | Fat Clay, brown (CH)-4 | Fat Clay, brown (CH)-4 |
| **LOCATION:** | | 12'S of CT6 | 25'E of CT6 | 20'W of CT2 | 40'E of CT8 |
| **ELEVATION OF TESTS:** | | 669.5' | 669' | 663' | 667.5' |
| **DEPTH BELOW EXISTING GRADE:** | | 1" | 1" | 1" | 1" |
| **FIELD DENSITY DETERMINATION:** | | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | | |
| Dry Density | (pcf) | 88 | 88 | 94 | 94 |
| Moisture Content | (%) | 31.5 | 31.5 | 26.0 | 23.1 |
| Plus #4 Material | (%) | None | None | None | None |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | | | |
| Method | ASTM:D1557-91, Method "A, (-#4 Basis) | | | | |
| Maximum Dry Density | (pcf) | 103.2 | 103.2 | 103.2 | 103.2 |
| Optimum Moisture | (%) | 22.7 | 22.7 | 22.7 | 22.7 |
| **COMPACTION TEST RESULTS:** | | | | | |
| Compaction | (%) | 85 | 85 | 91 | 92 |
| Specified Compaction | (%) | 90 | 90 | 90 | 90 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction meets specifications at test areas 15 and 16, but is below specifications at the other test areas.

Twin City Testing

By

**twin city testing**

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

## REPORT OF: DENSITY TESTS OF COMPACTED FILL

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 4, 1993

**REPORTED TO:** CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

---

LABORATORY No. 8300-93-220

| | | | | |
|---|---|---|---|---|
| **TEST NUMBER:** | | 17 | 18 | 19 |
| **DATE TAKEN:** | | 9-23-93 | 9-24-93 | 9-24-93 |
| **UNIFIED SOIL CLASSIFICATION:**<br>(Moisture Density Sample Number) | | Fat Clay,<br>brown<br>(CH)-5 | Fat Clay,<br>brown<br>(CH)-5 | Fat Clay,<br>brown<br>(CH)-5 |
| **LOCATION:** | | 12'N of CT3 | 12'N of CT3 | 27'E of CT7 |
| **ELEVATION OF TESTS:** | | 662' | 662' | 668.3' |
| **DEPTH BELOW EXISTING GRADE:** | | 1" | 1" | 1" |
| **FIELD DENSITY DETERMINATION:** | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | |
| Dry Density | (pcf) | 91 | 91 | 91 |
| Moisture Content | (%) | 29.6 | 28.2 | 28.9 |
| Plus #4 Material | (%) | None | None | None |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | | |
| Method | ASTM:D1557-91, Method "A, (-#4 Basis) | | | |
| Maximum Dry Density | (pcf) | 100.2 | 100.2 | 100.2 |
| Optimum Moisture | (%) | 22.8 | 22.8 | 22.8 |
| **COMPACTION TEST RESULTS:** | | | | |
| Compaction | (%) | 91 | 91 | 91 |
| Specified Compaction | (%) | 90 | 90 | 90 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction meets specifications at the above test areas.

Twin City Testing

By

**twin city testing**

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

## REPORT OF: DENSITY TESTS OF COMPACTED FILL

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 4, 1993

**REPORTED TO:** CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

**LABORATORY No.** 8300-93-220

| | | | | | |
|---|---|---|---|---|---|
| **TEST NUMBER:** | | 20 | 21 | 22 | 23 |
| **DATE TAKEN:** | | 9-28-93 | 9-28-93 | 9-28-93 | 9-28-93 |
| **UNIFIED SOIL CLASSIFICATION:** (Moisture Density Sample Number) | | Sand, medium to coarse grained, brown (SP)-6 | Sand, medium to coarse grained, brown (SP)-6 | Sand, medium to coarse grained, brown (SP)-6 | Sand, medium to coarse grained, brown (SP)-6 |
| **LOCATION:** | | Sand drainage layer - 45'E of PD16 | Sand drainage layer - 41'W of CT12 | Sand drainage layer - 48'W of CT11 | Sand drainage layer - 20'S of CT10 |
| **ELEVATION OF TESTS:** | | Top of Sand | Top of Sand | Top of Sand | Top of Sand |
| **DEPTH BELOW EXISTING GRADE:** | | 1" | 2" | Surface | Surface |
| **FIELD DENSITY DETERMINATION:** | | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | | |
| Dry Density | (pcf) | 118 | 112 | 114 | 116 |
| Moisture Content | (%) | 3.5 | 4.1 | 2.8 | 2.9 |
| Plus #4 Material | (%) | Trace | Trace | Trace | Trace |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | | | |
| Method | ASTM:D1557-91, Method "A, (-#4 Basis) | | | | |
| Maximum Dry Density | (pcf) | 121.0 | 121.0 | 121.0 | 121.0 |
| Optimum Moisture | (%) | 9.8 | 9.8 | 9.8 | 9.8 |
| **COMPACTION TEST RESULTS:** | | | | | |
| Compaction | (%) | 97 | 92 | 94 | 96 |
| Specified Compaction | (%) | 85 | 85 | 85 | 85 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction meets specifications at the above test areas.

**Twin City Testing**

**By**

**twin city testing**

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

CH2M HILL
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OCT 18 1993

CAP. C 7432

Cover Soil

**REPORT OF:** DENSITY TESTS OF COMPACTED FILL

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** October 13, 1993

**REPORTED TO:** CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

LABORATORY No. 8300-93-220

| | | | | | |
|---|---|---|---|---|---|
| **TEST NUMBER:** | | 24 | 25 | 26 | 27 |
| **DATE TAKEN:** | | 10-7-93 | 10-7-93 | 10-7-93 | 10-7-93 |
| **UNIFIED SOIL CLASSIFICATION:** (Moisture Density Sample Number) | | Sand, medium to coarse grained, brown (SP)-6 | Sand, medium to coarse grained, brown (SP)-6 | Sand, medium to coarse grained, brown (SP)-6 | Sand, medium to coarse grained, brown (SP)-6 |
| **LOCATION:** | | 33'N of CT8 on top of sand drainage layer | 24'S of CT3 on top of sand drainage layer | 39'S of CT2 on top of sand drainage layer | 21'S of CT1 on top of sand drainage layer |
| **ELEVATION OF TESTS:** | | 670' | 664' | 664.5' | 663.5' |
| **DEPTH BELOW EXISTING GRADE:** | | 1" | 1" | 1" | 1" |
| **FIELD DENSITY DETERMINATION:** | | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | | |
| Dry Density | (pcf) | 117 | 115 | 113 | 111 |
| Moisture Content | (%) | 1.9 | 2.8 | 2.2 | 3.9 |
| Plus #4 Material | (%) | Trace | Trace | Trace | Trace |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | | | |
| Method | ASTM:D1557-91, Method "A, (-#4 Basis) | | | | |
| Maximum Dry Density | (pcf) | 121.0 | 121.0 | 121.0 | 121.0 |
| Optimum Moisture | (%) | 9.8 | 9.8 | 9.8 | 9.8 |
| **COMPACTION TEST RESULTS:** | | | | | |
| Compaction | (%) | 97 | 95 | 94 | 92 |
| Specified Compaction | (%) | 85 | 85 | 85 | 85 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction meets specifications at the above test areas.

Twin City Testing

By

CH2M HILL

# ROUTING OF SUBCONTRACTOR'S SUBMITTALS

Date: 8/16/93

Project: ONALASKA
Project No. GLO65614.CM.SD
Subcontractor: WESTON
Submittal No.:
Date of Subcontractors Transmittal 7-29-93

**IS HEREBY TRANSMITTED FOR ACTION:**

Item: Clay Source Material Data
Spec. Section: 02200

| TO | INITIALS AND DATE | TARGET DATE |
|---|---|---|
| 1. Cathy Barnet (original reviewer) | | NON GIVEN |
| 2. Routed to JBR on 8/13/93 | JBR 8/16/93 | |
| 3. | | |
| 4. | | |
| 5. | | |
| 6. | | |

**COMMENTS:** (use additional pages if necessary) The Subcontractor has failed to test the clay barrier material at optimum moisture content and at 3% above optimum moisture content, for permeability. The Subcontractor tested the material at about optimum and at about 1% above optimum. Both of these tests passed the specified permeability criteria of $1 \times 10^{-7}$ cm/s. All other source testing results passed the specified criteria ~~permeability~~. The clay barrier source material is tentatively accepted based on the above. However, final acceptance will be based on the Contractor's Quality Assurance testing as specified in Section 02200.

JR

FORM 296
REV 4/93 Subcontract Use
GLO65614.CM.PP Form 296 4-16-93lml

THIS ORIGINAL IS A 2-PART FORM

CH2M HILL

# TRANSMITTAL OF SUBCONTRACTOR'S SUBMITTAL
# (ATTACH TO EACH SUBMITTAL)

Date: 29 July 93

TO: Stevan M. Keith, P.E.
CH2M HILL, Inc.
310 W. Wisconsin Avenue, Suite 700
P.O. Box 2090
Milwaukee, Wisconsin 53201

Transmittal No.:
Submittal No.: 0022
☒ New Submittal ☐ Resubmittal
Previous Submittal No.:

FROM: Roy F. Weston, Inc.
Subcontractor
Three Hawthorn Parkway, Suite 400
Vernon Hills, Illinois 60061

Project: Onalaska Landfill Cap Remediation
Project No.: 05310-011-001
Specification Section No.: 02200
*(Cover only one section with each transmittal)*

Submittal For: ☐ Shop Drawings ☒ Material Data ☐ Samples ☐ O & M Manual Information
☐ Proposed Substitution ☐ Other

*The following items are hereby submitted for review and action:*

| | DESCRIPTION OF ITEM SUBMITTED *(TYPE, SIZE, MODEL NUMBER, ETC.)* | MFG. OR CONTR. CAT., DRAWING OR BROCHURE NO. | NO. OF COPIES | SPEC. SEC. NO. |
|---|---|---|---|---|
| 1 | Clay Material Data | | 5 | 02200 |

**Submittal Type:** ☐ **Shop Drawing**
☒ ~~**Sample**~~ Data

**Review is only for limited purposes set forth in the Contract Documents.**

**APPROVED: (For Incorporation in the Work)**
☐ **Approved as Submitted**
☒ **Approved as Noted**

**DISAPPROVED: (Resubmittal Required)**
☐ **Make Corrections**
☐ **As Noted, Develop Replacement**

**INCOMPLETE: (Resubmittal Required)**
☐ **Complete and Resubmit**
☐ **Submit Missing Portions**

**By** _______ 8/16/93
**CH2M HILL** **Date**

I certify, that the above submitted items have been reviewed in detail and are correct and in strict conformance with the subcontract drawings and specifications except as otherwise stated, are stamped accordingly.

CH2M HILL
RECEIVED
JUL 29 1993

JD

file CAP. C6230-022

field file
Geo file
Cathy Barnett

Roy F. Weston, Inc.
Name of Subcontractor

Signature of Subcontractor

FORM 295
REV 5/93 SUBCONTRACT USE
GLO65624 CM PP Form 295 5/93 5 7-93lml

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**Braun Intertec Corporation**
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Minneapolis, Minnesota 55439-0108
612-941-5600 Fax: 941-4151

*Engineers and Scientists Serving the Built and Natural Environments℠*

**Project:** BNDX-93-037A

**Date:** 7/1/93

**Boring:** n/a

**Sample:** P-1

**Depth:** n/a

**Sample Description:** CL-Lean clay, gray

Initial
Wt Specimen + Tare Wet: 603.20
Wt. Specimen + Tare Dry: 479.50
Wt. Tare: 0.00
Moisture Content: 25.8%

4.3% ~ optimum

Final
Wt Specimen + Tare Wet: 746.60
Wt. Specimen + Tare Dry: 561.37
Wt. Tare: 164.06
Moisture Content: 46.6%

Diameter: 2.82 in
Initial Ht.: 7.4 cm
Final Ht., L: 8.3 cm
Sp. Gravity: 2.700

Area, A: 40.30 cm2
Initial Dry Unit Wt.: 83.7 pcf ↙ 88%
Final Dry Unit Wt.: 74.6 pcf

Initial Wt. (gm): 502.90
Initial Saturation: 68.8%
Final Saturation: 100.1%

Burette Area, a (cm2): 0.73
Consolidation Pressure (psi): 5.0
Skempton's B coeficient: .96
Operating Pressures (psi): Cell: 65.0

Differential pressure: 2.0 psi = 140.7 cm H2O
Overburden: 720.0 psf
Head: 62.0
Tail: 60.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 36.50 | 15.00 | 162.18 | | | | |
| Final | 39540 | 35.40 | 15.90 | | 160.18 | 161.2 | 19.4 | |
| Result | | | | | | | | 2.4E-08 |
| Initial | 0 | 35.40 | 15.90 | 160.18 | | | | |
| Final | 41040 | 34.20 | 16.60 | | 158.28 | 159.2 | 19.2 | |
| Result | | | | | | | | 2.2E-08 |
| Initial | 0 | 34.20 | 16.60 | 158.28 | | | | |
| Final | 22440 | 33.60 | 17.10 | | 157.18 | 157.7 | 19.0 | |
| Result | | | | | | | | 2.3E-08 |
| Initial | 0 | 33.60 | 17.10 | 157.18 | | | | |
| Final | 67320 | 32.00 | 18.60 | | 154.08 | 155.6 | 18.8 | |
| Result | | | | | | | | 2.2E-08 |
| Average Permeability | | | | | | | | 2.3E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
ASTM D 5084 (Method C: Falling Head, Rising Tailwater) ✓

Geotechnical Lab Manager

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**Project:** BNDX-93-037A

**Date:** 7/1/93

**Boring:** n/a

**Sample:** P-2

**Depth:** n/a

**Sample Description:** CL-Lean clay, gray

| | Initial | | Final |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 542.00 | Wt Specimen + Tare Wet: | 756.60 |
| Wt. Specimen + Tare Dry: | 427.40 | Wt. Specimen + Tare Dry: | 561.31 |
| Wt. Tare: | 0.00 | Wt. Tare: | 163.80 |
| Moisture Content: | 26.8% | Moisture Content: | 49.1% |

? X 1.3% ✓

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.82 in | Area, A: | 40.30 cm2 | Initial Wt. (gm): | 501.40 |
| Initial Ht.: | 7.3 cm | Initial Dry Unit Wt.: | 84.5 pcf 99% | Initial Saturation: | 72.8% |
| Final Ht., L: | 8.4 cm | Final Dry Unit Wt.: | 72.9 pcf | Final Saturation: | 101.2% |
| Sp. Gravity: | 2.700 | | | | |

Burette Area, a (cm2): 0.73
Differential pressure: 2.0 psi = 140.7 cm H2O
Consolidation Pressure (psi): 5.0
Overburden: 720.0 psf
Skempton's B coeficient: 1.0
Operating Pressures (psi): Cell: 65.0 Head: 62.0 Tail: 60.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 46.50 | 10.90 | 176.28 | | | | |
| Final | 57420 | 44.20 | 13.00 | | 171.88 | 174.1 | 20.7 | |
| Result | | | | | | | | 3.3E-08 |
| Initial | 0 | 30.50 | 24.90 | 146.28 | | | | |
| Final | 41040 | 29.30 | 26.20 | | 143.78 | 145.0 | 17.3 | |
| Result | | | | | | | | 3.2E-08 |
| Initial | 0 | 28.90 | 26.20 | 143.38 | | | | |
| Final | 22440 | 28.20 | 26.90 | | 141.98 | 142.7 | 17.0 | |
| Result | | | | | | | | 3.3E-08 |
| Initial | 0 | 28.20 | 26.70 | 142.18 | | | | |
| Final | 67140 | 26.00 | 28.60 | | 138.08 | 140.1 | 16.7 | |
| Result | | | | | | | | 3.3E-08 |
| Average Permeability | | | | | | | | 3.3E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
ASTM D 5084 (Method C: Falling Head, Rising Tailwater)

Geotechnical Lab Manager

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**Project:** BNDX-93-037A
**Date:** 7/1/93

**Boring:** n/a
**Sample:** P-3
**Depth:** n/a

**Sample Description:** CL-Lean clay, gray

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 512.30 | Wt Specimen + Tare Wet: | 767.70 |
| Wt. Specimen + Tare Dry: | 407.30 | Wt. Specimen + Tare Dry: | 565.57 |
| Wt. Tare: | 0.00 | Wt. Tare: | 160.80 |
| Moisture Content: | 25.8% | Moisture Content: | 49.9% |

x 0.3%

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.82 in | Area, A: | 40.30 cm2 | Initial Wt. (gm): | 498.10 |
| Initial Ht.: | 7.3 cm | Initial Dry Unit Wt.: | 83.9 pcf | Initial Saturation: | 69.1% |
| Final Ht., L: | 8.5 cm | Final Dry Unit Wt.: | 72.2 pcf | Final Saturation: | 101.1% |
| Sp. Gravity: | 2.700 | | | | |

88%

Burette Area, a (cm2): 0.73
Differential pressure: 2.0 psi = 140.7 cm H2O
Consolidation Pressure (psi): 5.0
Overburden: 720.0 psf
Skempton's B coeficient: 1.0
Operating Pressures (psi): Cell: 65.0 Head: 62.0 Tail: 60.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 38.50 | 17.30 | 161.88 | | | | |
| Final | 63600 | 33.90 | 21.70 | | 152.88 | 157.4 | 18.5 | |
| Result | | | | | | | | 6.9E-08 |
| Initial | 0 | 54.00 | 5.30 | 189.38 | | | | |
| Final | 15600 | 52.70 | 6.70 | | 186.68 | 188.0 | 22.1 | |
| Result | | | | | | | | 7.1E-08 |
| Initial | 0 | 52.70 | 6.70 | 186.68 | | | | |
| Final | 66660 | 47.10 | 11.80 | | 175.98 | 181.3 | 21.3 | |
| Result | | | | | | | | 6.8E-08 |
| Initial | 0 | 47.10 | 11.80 | 175.98 | | | | |
| Final | 28860 | 44.80 | 14.20 | | 171.28 | 173.6 | 20.4 | |
| Result | | | | | | | | 7.2E-08 |
| Average Permeability | | | | | | | | 7.0E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
ASTM D 5084 (Method C: Falling Head, Rising Tailwater)

David Ouellett
Geotechnical Lab Manager

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# Laboratory Compaction Characteristics of Soil (Proctor)

**Date:** July 6, 1993

**Project:** BNDX-93-037A

**Client:**
Roy F. Weston, Inc.
One Weston Way
West Chester, PA 19380-1499

**Description:**
Onalaska Landfill
Onalaska, Wisconsin

---

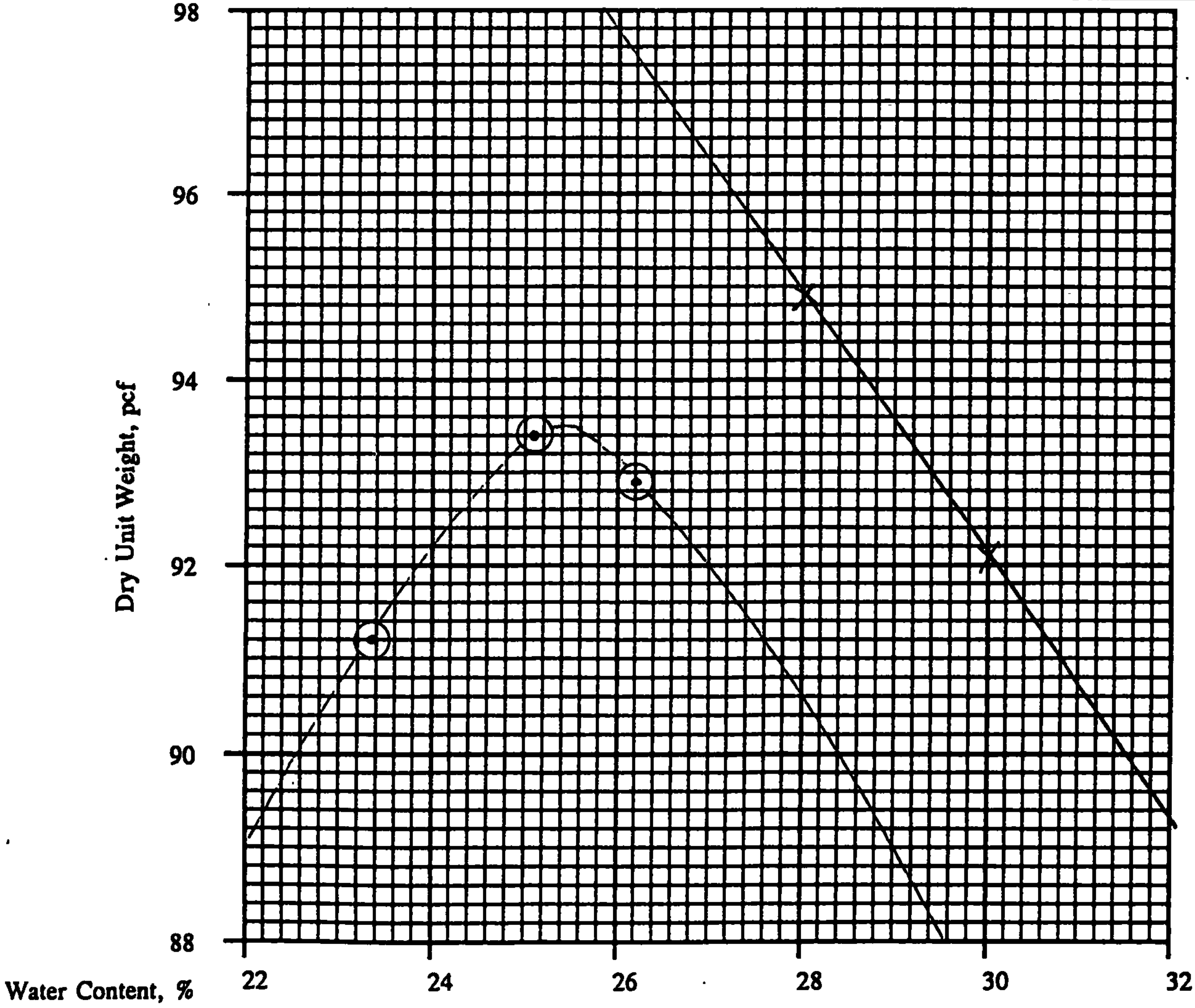
**Field Data:**

Date Sampled : 5/10/93
Sampled By : St. Joe Contractors
Classification : CL - Lean clay, brown
Test Number : P-1 (Sample Bag 1)
Location Sampled : Onalaska Landfill, Wisconsin

**Laboratory Data:**

ASTM D: 1557-91
As Received Water Content: --
Sieve Data, % on 3/4": --
Size of "Oversize": --
Procedure: A
Prep. Method: Dry
% 3/4"-3/8": --
Percent Oversize: --
Date Tested: 6/18/93
Rammer Type: Sector
% 3/8" - #4: --
Spec. Gravity: 2.65

| | Curve Values | | Corrected Values (ASTM D 4718) | |
|---|---|---|---|---|
| Maximum Dry Unit Weight, pcf | 93.5 | pcf | 93½ | pcf |
| Optimum Water Content, % | 25.4 ✓ | % | 25½ | % |



$\gamma_m \cong 117$ pcf

**Zero Air Voids**

**(Saturation) Curve**

**S.G.=2.65**
**(Assumed)**

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# Laboratory Compaction Characteristics of Soil (Proctor)

**Date:** July 6, 1993

**Project:** BNDX-93-037A

**Client:**
Roy F. Weston, Inc.
One Weston Way
West Chester, PA 19380-1499

**Description:**
Onalaska Landfill
Onalaska, Wisconsin

---

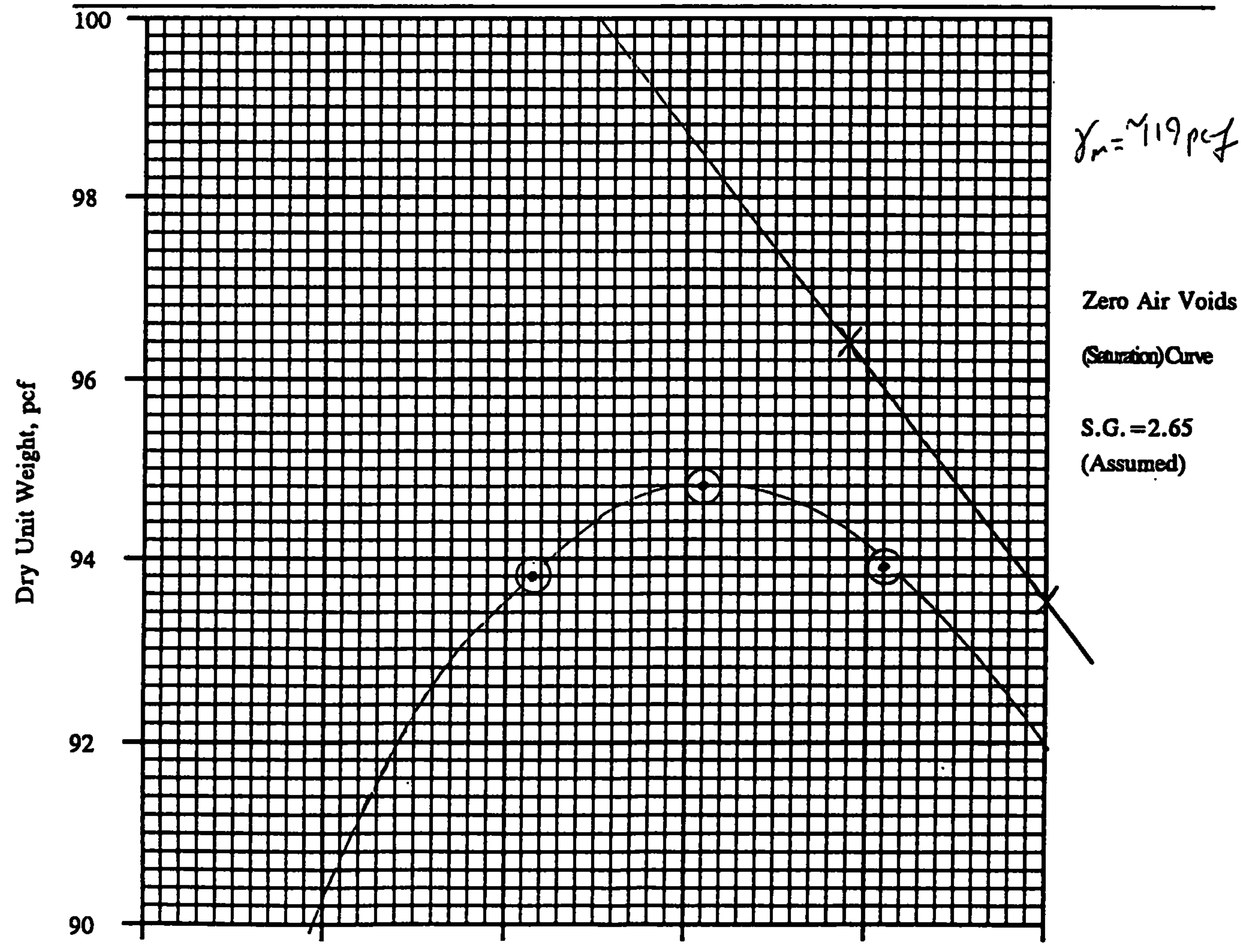
**Field Data:**

| | | | |
|---|---|---|---|
| Date Sampled | : 5/10/93 | Test Number | : P-2 (Sample Bag 2) |
| Sampled By | : St. Joe Contractors | Location Sampled | : Onalaska Landfill, Wisconsin |
| Classification | : CL - Lean clay, brown | | |

**Laboratory Data:**

| | | | | | |
|---|---|---|---|---|---|
| ASTM D: | 1557-91 | Procedure: | A | Date Tested: | 6/18/93 |
| As Received Water Content: | -- | Prep. Method: | Dry | Rammer Type: | Sector |
| Sieve Data, % on 3/4": | -- | % 3/4"-3/8": | -- | % 3/8" - #4: | -- |
| Size of "Oversize": | -- | Percent Oversize: | -- | Spec. Gravity: | 2.65 |

| | Curve Values | | Corrected Values (ASTM D 4718) | |
|---|---|---|---|---|
| Maximum Dry Unit Weight, pcf | 94.8 | pcf | 95 | pcf |
| Optimum Water Content, % | 25.4 ✓ | % | 25½ | % |



$\gamma_r = \sim 119$ pcf

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# Laboratory Compaction Characteristics of Soil (Proctor)

**Date:** July 6, 1993

**Project:** BNDX-93-037A

**Client:**
Roy F. Weston, Inc.
One Weston Way
West Chester, PA 19380-1499

**Description:**
Onalaska Landfill
Onalaska, Wisconsin

---

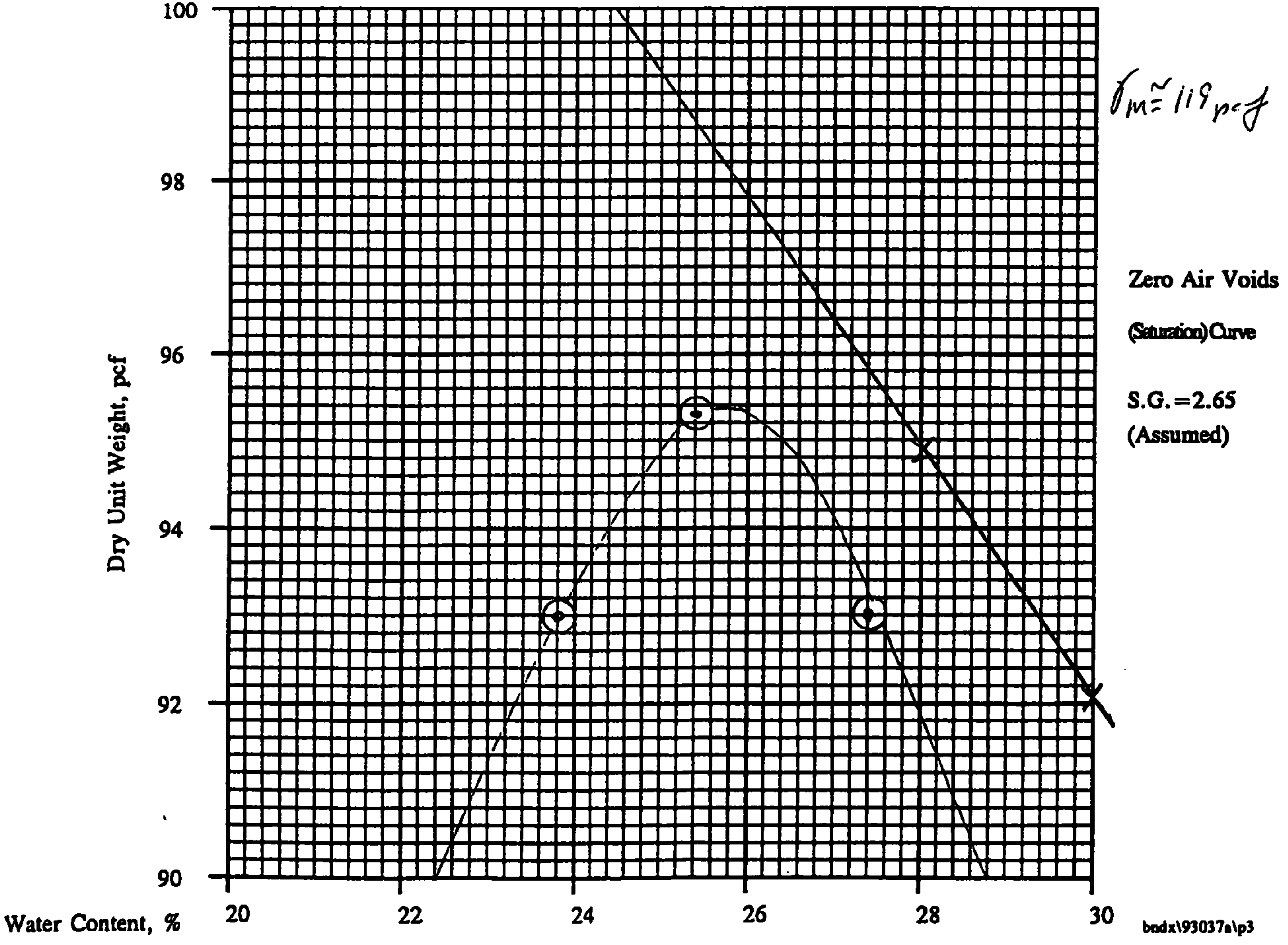
**Field Data:**

Date Sampled : 5/10/93
Sampled By : St. Joe Contractors
Classification : CL - Lean clay, brown
Test Number : P-3 (Sample Bag 3)
Location Sampled : Onalaska Landfill, Wisconsin

**Laboratory Data:**

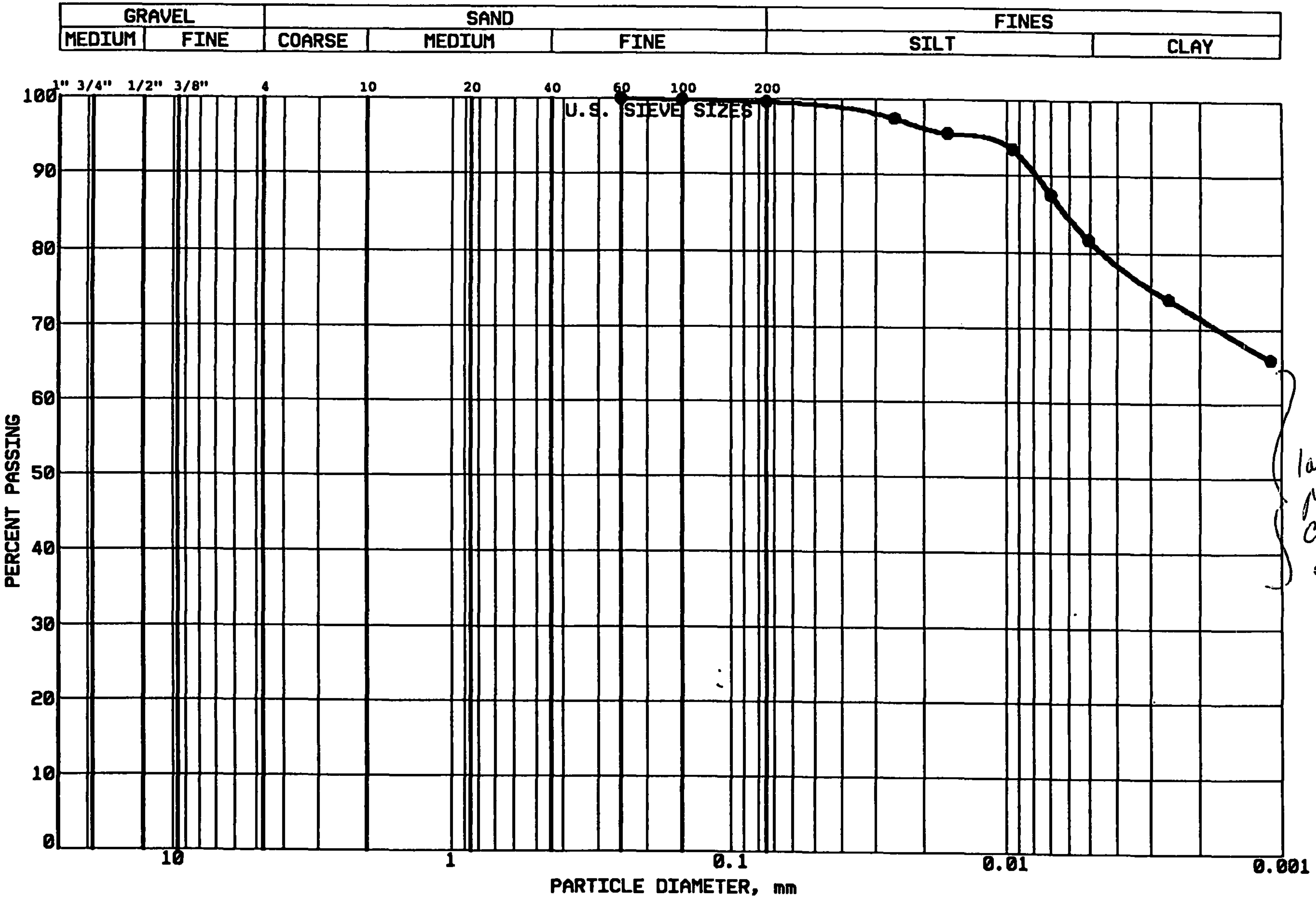
ASTM D: 1557-91
As Received Water Content: --
Sieve Data, % on 3/4": --
Size of "Oversize": --
Procedure: A
Prep. Method: Dry
% 3/4"-3/8": --
Percent Oversize: --
Date Tested: 6/18/93
Rammer Type: Sector
% 3/8" - #4: --
Spec. Gravity: 2.65

| | Curve Values | | Corrected Values (ASTM D 4718) | |
|---|---|---|---|---|
| Maximum Dry Unit Weight, pcf | 95.1 | pcf | 95 | pcf |
| Optimum Water Content, % | 25.7 ✓ | % | 25½ | % |



γm≈ 119 pcf

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



large percentage of clay < 0.001mm!

**BRAUN**
ENGINEERING TESTING

**PROJECT:** BNDX-93-037A
Geotechnical Testing Services
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: 1

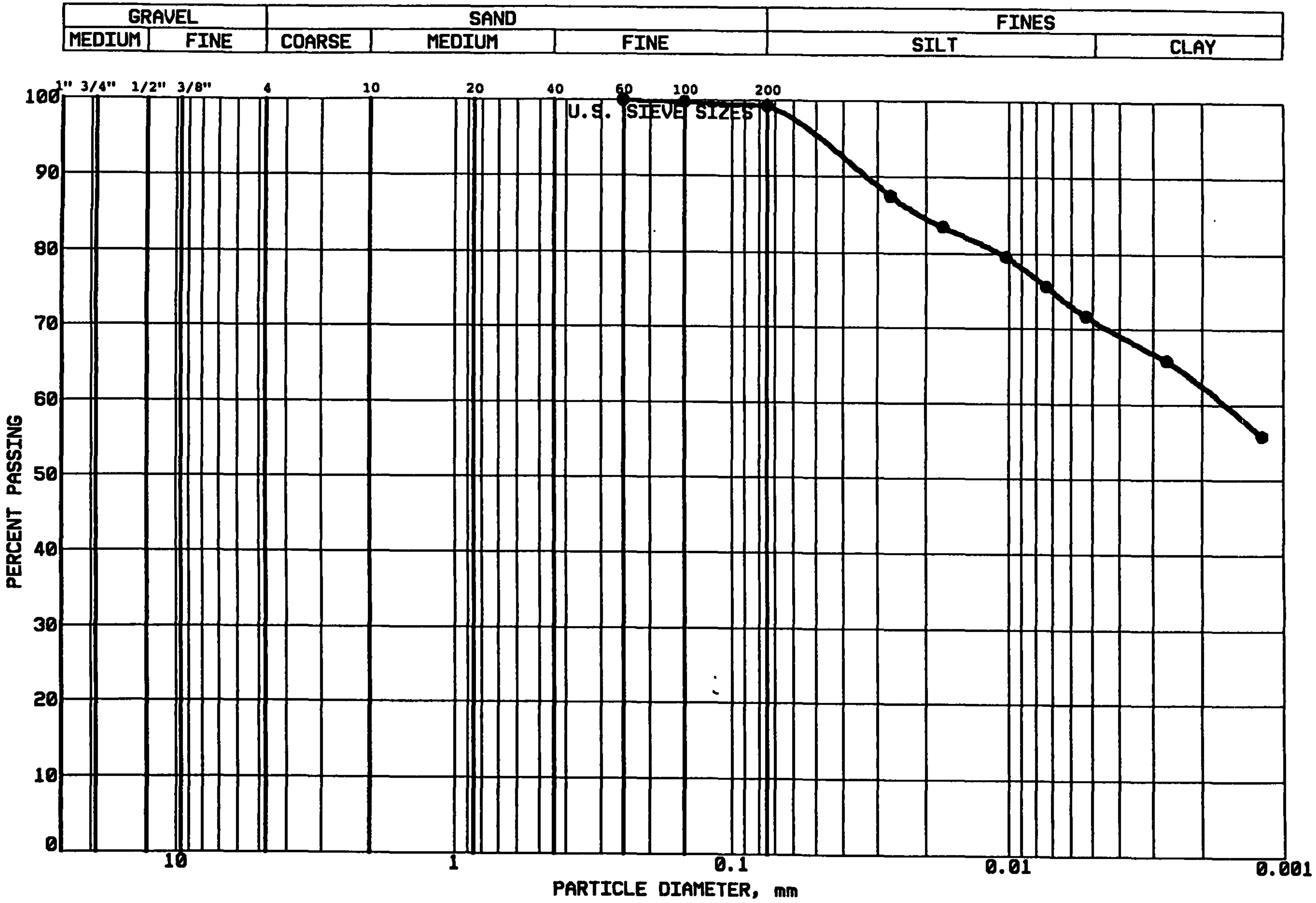
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 0.4 % |
| SILT | 18.1 % |
| CLAY | 81.5 % |

**CLASSIFICATION:**
CL LEAN CLAY,brown

D60=
D30=
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



✓

**BRAUN**
ENGINEERING TESTING

**PROJECT:** BNDX-93-037A
Geotechnical Testing Services
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: 2

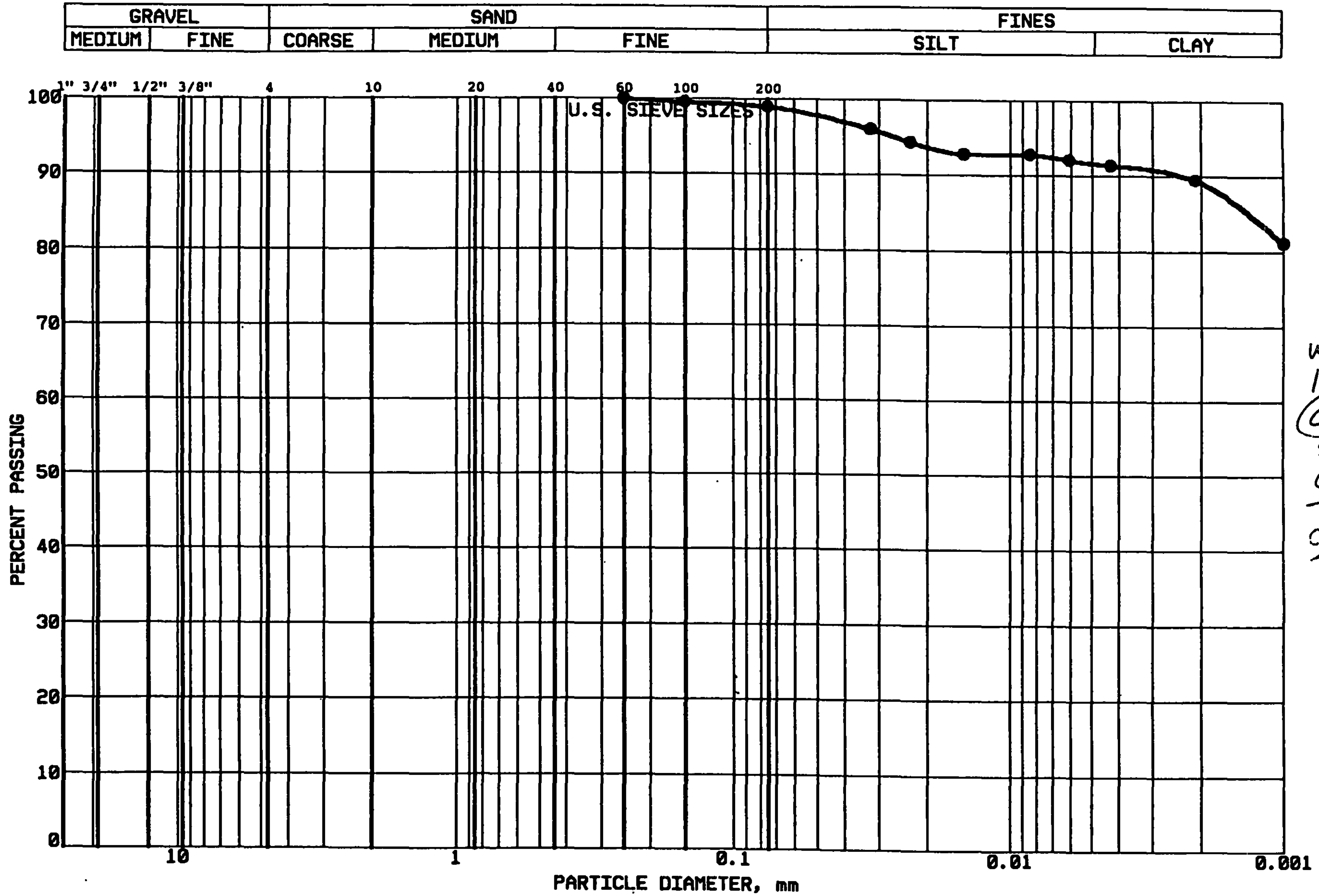
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 0.7 % |
| SILT | 28.2 % |
| CLAY | 71.1 % |

**CLASSIFICATION:**
CL LEAN CLAY,brown

D60=0.002
D30=
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



wow!
lots of
colloid
size
clay and
other material

**BRAUN**
ENGINEERING TESTING

**PROJECT:** BNDX-93-037A
Geotechnical Testing Services
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: 3

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.0 % |
| SILT | 7.3 % |
| CLAY | 91.7 % |

**CLASSIFICATION:**
CL LEAN CLAY,brown

D60=
D30=
D10=
Cu=
Cc=

# ATTERBERG LIMITS DATA SHEET

PROJECT # [illegible]-93-0374 ENGINEER TCB

LOC. ____ ELV. ____ SAM. 2 TW # ____ DATE ____________

LIQUID LIMIT DATA

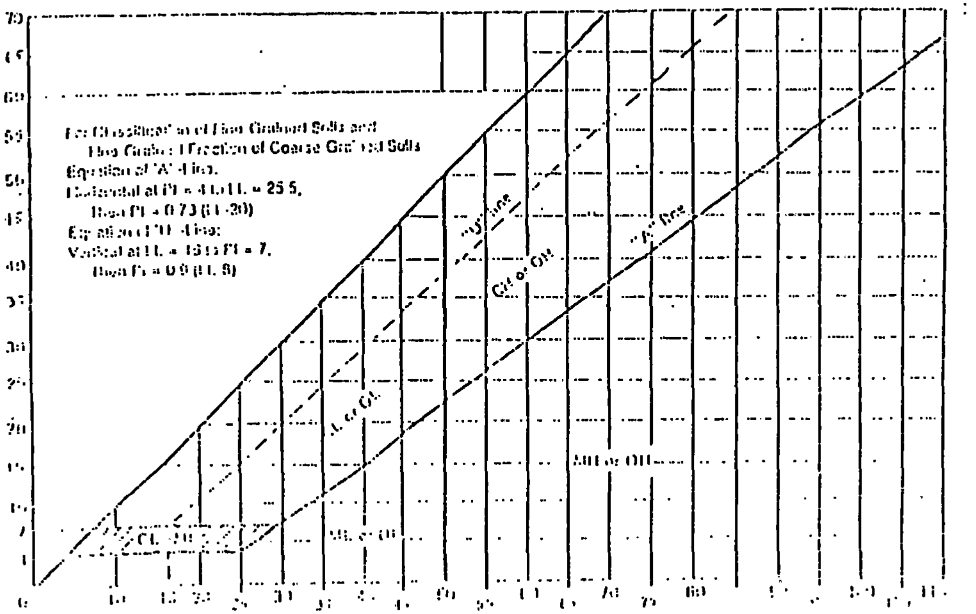
| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Tare # | 2 | 4 | 6 | | |
| Tare + Wt Wgt | 33.18 | 32.92 | 32.82 | | |
| Tare + Dry Wgt | 27.37 | 27.33 | 27 | | |
| Tare | 15.28 | 15.26 | 15.11 | | |
| Dry Wgt | 12.07 | 12.07 | 12.19 | | |
| Water | 5.81 | 5.59 | 5.46 | | |
| M/C % | 48 | 46 | 44 | | |
| Blows | 22 | 27 | 34 | | |

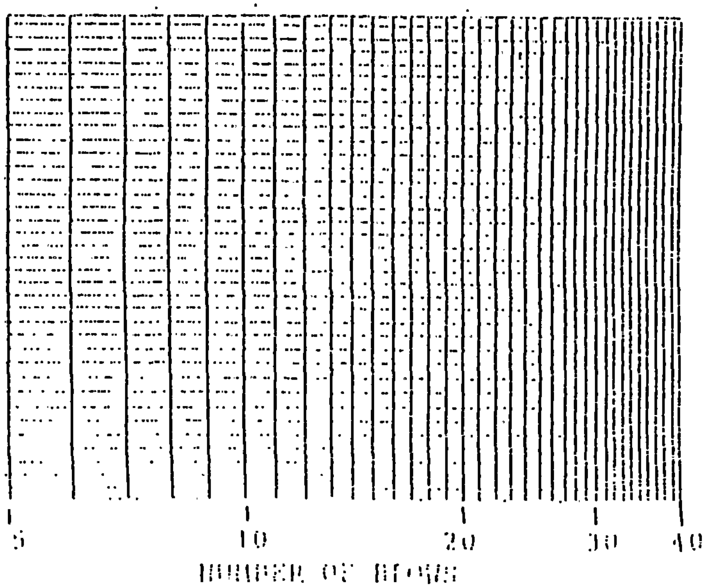
PLASTIC LIMIT DATA

| | 1 | 2 | 3 | Nat. m/c |
|---|---|---|---|---|
| Tare # | 1 | 3 | 5 | |
| Tare + Wt Wgt | 25.11 | 24.91 | 24.73 | |
| Tare + Dry Wgt | 22.88 | 22.83 | 22.71 | |
| Tare | 15.16 | 15.20 | 15.19 | |
| Dry Wgt | 7.72 | 7.63 | 7.52 | |
| Water | 2.23 | 2.08 | 2.02 | |
| M/C % | 29 | 27 | 26 | |

LL 46 ✓
PL 27 ✓
PI 19 ✓
NAT. M/C % ________
SOIL TYPE ________

} CL material





# ATTERBERG LIMITS DATA SHEET

PROJECT # ENDS-93-037A ENGINEER TCB

LOC._____ ELV._____ SAM. 1 TW #_____ DATE__________

|  | LIQUID<br>1 | LIMIT<br>2 | DATA<br>3 | 4 | 5 |
|---|---|---|---|---|---|
| Tare # | 1 | 2 | 3 |  |  |
| Tare + Wt Wgt | 32.81 | 32.50 | 32.16 |  |  |
| Tare + Dry Wgt | 27.33 | 27.19 | 27.24 |  |  |
| Tare | 15.16 | 15.16 | 15.16 |  |  |
| Dry Wgt | 12.17 | 12.03 | 12.08 |  |  |
| Water | 5.48 | 5.14 | 4.92 |  |  |
| M/C % | 45.1 | 43.3 | 40.7 |  |  |
| Blows | 26 | 26 | 33 |  |  |

|  | PLASTIC<br>1 | LIMIT<br>2 | 3 | DATA<br>Nat. m/c |
|---|---|---|---|---|
| Tare # | 1 | 5 | 2 |  |
| Tare + Wt Wgt | 24.92 | 24.05 | 23.72 |  |
| Tare + Dry Wgt | 22.22 | 22.19 | 22.04 |  |
| Tare | 15.28 | 15.19 | 15.17 |  |
| Dry Wgt | 7.5 | 7.0 | 6.87 |  |
| Water | 2.7 | 1.86 | 1.68 |  |
| M/C % | 28 | 26 | 24 |  |

LL 43.0 ✓

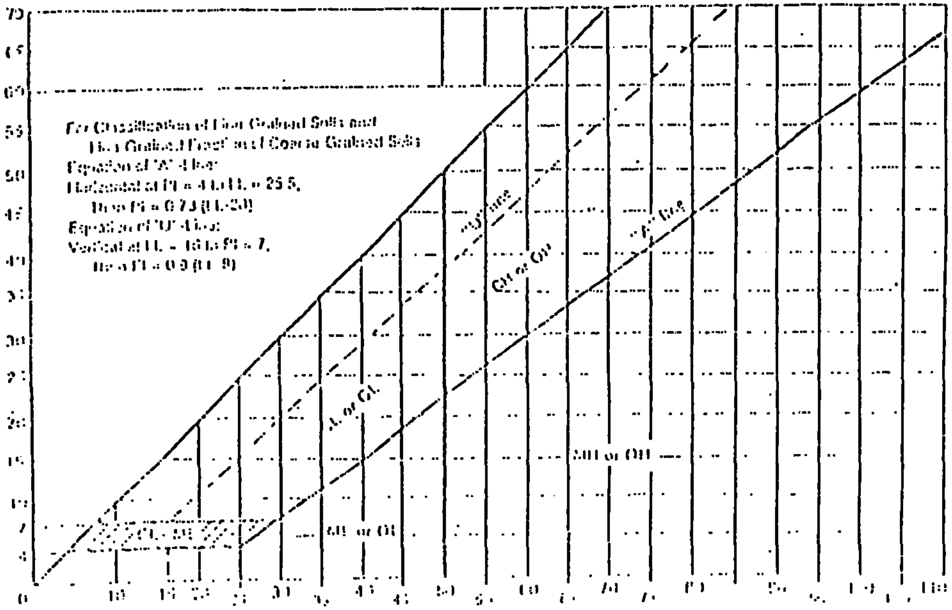
PL 26.0 ✓

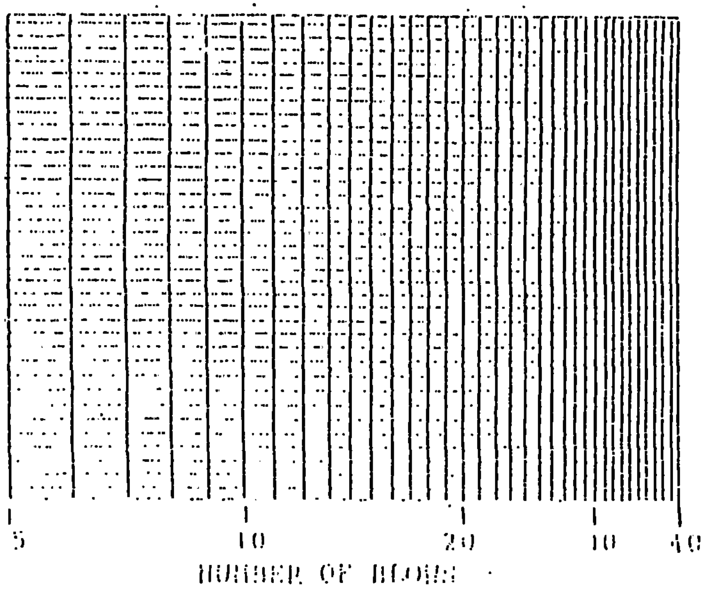
PI 17.0 ✓

NAT. M/C %________

SOIL TYPE [illegible]

} C.L material





# ATTERBERG LIMITS DATA SHEET

PROJECT # Bldr-92 0377 ENGINEER TD

LOC. ____ ELV. ____ SAM. 3 TW # ____ DATE ____

| | LIQUID 1 | LIMIT 2 | DATA 3 | 4 | 5 |
|---|---|---|---|---|---|
| Tare # | | B | | | |
| Tare + Wt Wgt | 33.54 | 33.28 | 32.94 | | |
| Tare + Dry Wgt | 27.39 | 27.35 | 27.26 | | |
| Tare | 15.24 | 15.18 | 15.16 | | |
| Dry Wgt | 12.15 | 12.17 | 12.1 | | |
| Water | 6.15 | 5.93 | 5.68 | | |
| M/C % | 51 | 49 | 47 | | |
| Blows | 20 | 26 | 33 | | |

| | PLASTIC 1 | LIMIT 2 | DATA 3 | Nat. m/c |
|---|---|---|---|---|
| Tare # | | | | |
| Tare + Wt Wgt | 25.48 | 25.13 | 24.92 | |
| Tare + Dry Wgt | 23.03 | 22.89 | 22.81 | |
| Tare | 15.21 | 15.17 | 15.19 | |
| Dry Wgt | 7.82 | 7.72 | 7.62 | |
| Water | 2.25 | 2.24 | 2.11 | |
| M/C % | 31 | 29 | 28 | |

LL 49 ✓

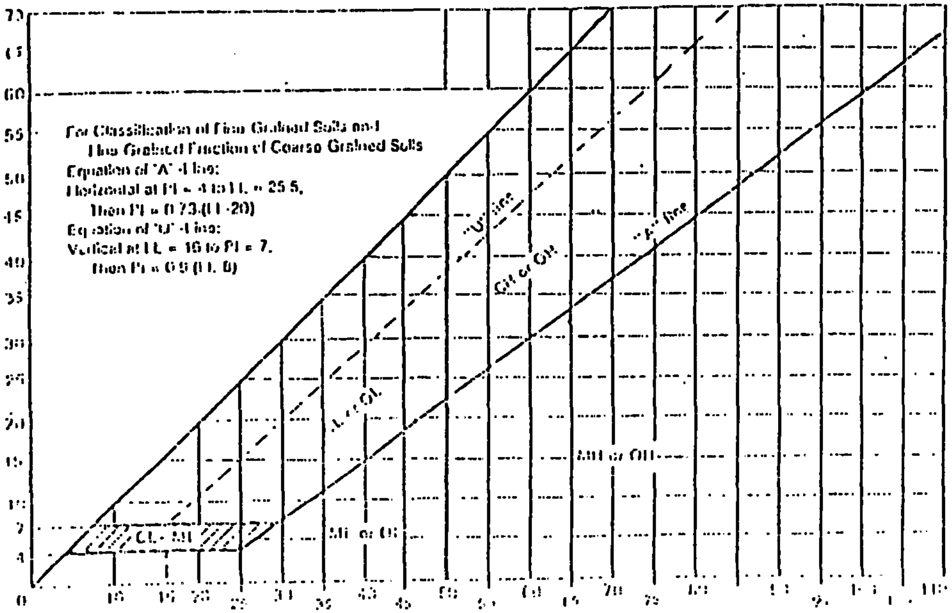
PL 29 ✓

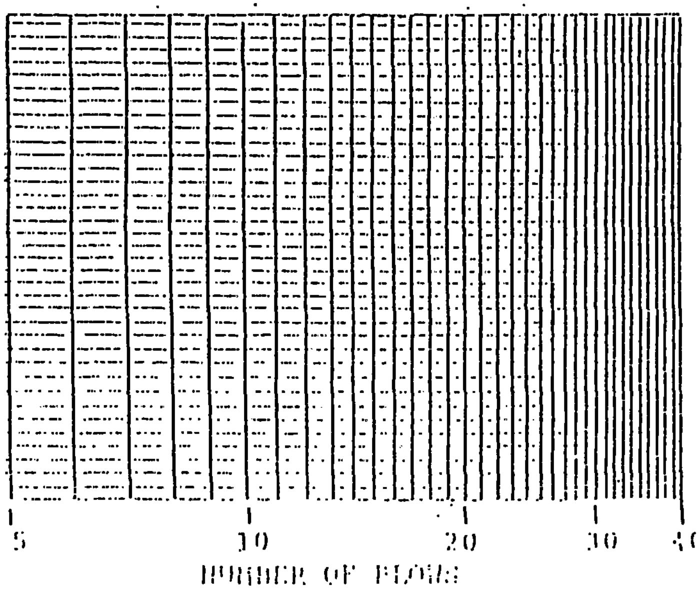
PI 20 ✓

} CL

NAT. M/C % ____

SOIL TYPE ____





**Huntingdon**
Consulting Engineers Environmental Scientists

**Twin City Testing Corporation**
3908 Commerce Court Southwest
Rochester, Minnesota 55902-1252
(507) 288-7060
Fax: (507) 288-5718

PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 08-20-93
LAB. NO. 4800-03-074

| | | |
|---|---|---|
| SAMPLE NUMBER | 1 | 2 |
| DATE SAMPLED | 08-20-93 | 08-20-93 |
| SAMPLE LOCATION | Thinwall Tube (Bottom Portion) | Thinwall Tube Top Portion) |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Fat Clay, reddish brown (CH) | Lean Clay, brownish gray (CL) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 8-9 | 8-9 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.58 | 2.53 |
| Specimen Diameter (inches) | 2.83 | 2.83 |
| Dry Density (PCF) | 86.3 | 101.1 |
| Percent of Max. Density | | |
| Moisture Content (%) | 36.1 | 23.2 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | -8 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $3 \times 10^{-9}$ | $7.3 \times 10^{-8}$ |
| K @ 20°C (ft/min) | | |

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GAC C 7432

SEP 21 1993

Copy:
J. Russell
S. Keith
GLC File
Field File

**Huntingdon**
Consulting Engineers Environmental Scientists

**Twin City Testing Corporation**
3908 Commerce Court Southwest
Rochester, Minnesota 55902-1252
(507)288-7060
Fax: (507)288-5718

PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 08-20-93
LAB. NO. 4800-03-074

| | | |
|---|---|---|
| SAMPLE NUMBER | 3 | 4 |
| SAMPLE LOCATION | 7' E of CT4 | N16200<br>E47800 |
| ELEVATION | 662.0' | 663.5' |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Fat Clay, reddish brown (CH) | Fat Clay, reddish brown (CH) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 7-8 | 7-8 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 3.0 | 2.55 |
| Specimen Diameter (inches) | 2.85 | 2.86 |
| Dry Density (PCF) | 91.4 | 92.7 |
| Percent of Max. Density | - | - |
| Moisture Content (%) | 30.5 | 28.3 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | 9.0 x $10^{-9}$ | 1.6 x $10^{-8}$ |
| K @ 20°C (h/min) | | |

**Huntingdon**
Consulting Engineers Environmental Scientists

**Twin City Testing Corporation**
3908 Commerce Court Southwest
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PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

LABORATORY TEST DATA

DATE: 08-20-93
LAB. NO. 4800-03-074

| SAMPLE NUMBER | 5 | 6 |
|---|---|---|
| SAMPLE LOCATION | E47500<br>N16400 | 10' N & 35' W of CT12 |
| ELEVATION | 664.0' | 664.0' |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Fat Clay, reddish brown (CH) | Fat Clay, reddish brown (CH) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 7-8 | 7-8 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.81 | 2.66 |
| Specimen Diameter (inches) | 2.81 | 2.82 |
| Dry Density (PCF) | 97.6 | 93.2 |
| Percent of Max. Density | - | - |
| Moisture Content (%) | 26.1 | 28.4 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $6.0 \times 10^{-9}$ | $2.5 \times 10^{-8}$ |
| K @ 20°C (h/min) | | |

**Huntingdon**
Consulting Engineers Environmental Scientists

**Twin City Testing Corporation**
3908 Commerce Court Southwest
Rochester, Minnesota 55902-1252
(507) 288-7060
Fax: (507) 288-5718

PROJECT: LANDFILL CAP
ONALASKA, WISCONSIN

REPORT TO: CH2M HILL CENTRAL, INC.

<u>LABORATORY TEST DATA</u>

DATE: 08-20-93
LAB. NO. 4800-03-074

| | | |
|---|---|---|
| SAMPLE NUMBER | 7 | 8 |
| SAMPLE LOCATION | 50' E of CT7 | 25'E of CT7 |
| ELEVATION | 667.0' | 667.0' |
| Type of Sample | Thinwall | Thinwall |
| Soil Classification (ASTM:D2487) | Fat Clay, reddish brown (CH) | Fat Clay, reddish brown (CH) |
| In-Place Moisture Content(%) | | |
| Moisture-Density Relation of Soil (ASTM:D698) | | |
| Max. Dry Density (PCF) | | |
| Optimum Moisture Content (%) | | |
| Permeability Test | | |
| Trial No. | 7-8 | 7-8 |
| Type of Test | Falling Head | Falling Head |
| Type of Specimen | Undisturbed | Undisturbed |
| Specimen Height (inches) | 2.64 | 2.63 |
| Specimen Diameter (inches) | 2.81 | 2.81 |
| Dry Density (PCF) | 92.4 | 92.8 |
| Percent of Max. Density | - | - |
| Moisture Content (%) | 29.9 | 28.5 |
| Max. Head Differential (CM) | 152.4 | 152.4 |
| Confining Pressure (Effective - PSI) | 2 | 2 |
| Water Temperature (°C) | 21 | 21 |
| Coefficient of Permeability K @ 20°C (cm/sec) | $4.2 \times 10^{-8}$ | $1.3 \times 10^{-8}$ |
| K @ 20°C (h/min) | | |

**MEMORANDUM** CH2M HILL

**TO:** Don Olson/Onalaska

**COPIES:** Cathy Barnett/GLO

**FROM:** Jim Russell/GLO

**DATE:** September 3, 1993

**SUBJECT:** Landfill Cap Remedial Action

**PROJECT:** GLO65614.CM.SD

CH2M HILL
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CAP.C.7432 field
SEP 7 1993
copy. WESTON

I have reviewed your memorandum of August 23, 1993 regarding the Shelby Tube results and whether or not the Subcontractor needs to compact the clay barrier material at a specific moisture content. Please note that the specifications do not require a specific moisture content for the compaction of the clay barrier layer. In general, the clay barrier layer is to be compacted with that equipment and at those moisture contents (as determined by the test pad construction) that will achieve a permeability of 1 X 10-7 cm/s or less and a relative compaction of 90 percent.

The Earthwork Specifications call for a CL or CH material with a LL of between 20 and 55 percent and a PI of between 10 and 30 percent. The source investigation data submitted by Weston on July 29, 1993 met this criteria. The source investigation data also included permeability data that met the 1 X 10-7 cm/s or less criteria and proctor compaction data.

The data submitted with your August 23 memorandum indicates that the clay at the Shelby tube locations meets the permeability requirement. However, the clay has a high plasticity with a LL of between 62 and 66 percent and a PI of between 42 and 45 percent. This clay is very different than that tested during the source investigation and for which Weston submitted source data on July 29 (and received CH2M HILL approval for use on August 16). In addition, because there is no proctor data it is not possible to determine if the 90 percent relative compaction criteria are being met.

Because at least some of the material Weston is currently importing does not appear to meet specification (and does not resemble the material that CH2M HILL approved for use) it is recommended that additional Proctors, Atterberg Limits, and Permeability tests (as specified in the QC Specification for the Source Investigation) be run to determine the optimum moisture content and compaction characteristics of the high plasticity clay. CH2M HILL would be in a position to evaluate the suitability of the material at that time. Weston is currently assuming risk since the high plasticity clay is not desirable from a workability standpoint or from a long term performance standpoint (e.g., the high plasticity clay may dry and desiccate more readily than a lower plasticity clay).

Lets discuss. If you can't reach me please try Cathy.

**twin city testing**

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

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CA[illegible]C7432
hold
SEP 20 1993

**REPORT OF:** DENSITY TESTS OF COMPACTED FILL

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:** CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

**LABORATORY No.** 8300-93-220

| | | | | |
|---|---|---|---|---|
| **TEST NUMBER:** | | 1 | 2 | 3 |
| **DATE TAKEN:** | | 8-27-93 | 8-27-93 | 8-27-93 |
| **UNIFIED SOIL CLASSIFICATION:** (Moisture Density Sample Number) | | Fat Clay, brown (CH)-1 | Fat Clay, brown (CH)-1 | Fat Clay, brown (CH)-1 |
| **LOCATION:** | | 9'E of CT4 | 20'N and 5'E of CT13 | 3'N and 10'E of CT6 |
| **ELEVATION OF TESTS:** | | 662' | At Grade | 668.5' |
| **DEPTH BELOW EXISTING GRADE:** | | At Grade | At Grade | At Grade |
| **FIELD DENSITY DETERMINATION:** | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | |
| Dry Density | (pcf) | 96 | 95 | 95 |
| Moisture Content | (%) | 21.9 | 23.5 | 22.8 |
| Plus #4 Material | (%) | None | None | None |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | | |
| Method | ASTM:D1557-91, Method "A", (-#4 Basis) | | | |
| Maximum Dry Density | (pcf) | 98.2 | 98.2 | 98.2 |
| Optimum Moisture | (%) | 26.4 | 26.4 | 26.4 |
| **COMPACTION TEST RESULTS:** | | | | |
| Compaction | (%) | 97 | 97 | 97 |
| Specified Compaction | (%) | ~~95~~ 90 | ~~95~~ 90 | ~~95~~ 90 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction meets specifications at the above test areas.

Twin City Testing
By Hank Kl

**twin city testing**
2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

## REPORT OF: DENSITY TESTS OF COMPACTED FILL

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:**
CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

**LABORATORY No.** 8300-93-220

| | | | | | |
|---|---|---|---|---|---|
| **TEST NUMBER:** | | 4 | 5 | 6 | 7 |
| **DATE TAKEN:** | | 9-2-93 | 9-2-93 | 9-2-93 | 9-2-93 |
| **UNIFIED SOIL CLASSIFICATION:** (Moisture Density Sample Number) | | Fat Clay, brown (CH)-2 | Fat Clay, brown (CH)-2 | Fat Clay, brown (CH)-2 | Fat Clay, brown (CH)-2 |
| **LOCATION:** | | 21'E of CT8 | 24'E of CT4 | 33'W of CT12 | 18'W of CT11 |
| **ELEVATION OF TESTS:** | | 667' | 661' | 663' | 665' |
| **DEPTH BELOW EXISTING GRADE:** | | 1" | 1" | 1" | 1" |
| **FIELD DENSITY DETERMINATION:** | | | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | | | |
| Dry Density | (pcf) | 94 | 90 | 94 | 96 |
| Moisture Content | (%) | 24.6 | 29.3 | 24.7 | 25.0 |
| Plus #4 Material | (%) | None | None | None | None |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | | | |
| Method | ASTM:D1557-91, Method "A", (-#4 Basis) | | | | |
| Maximum Dry Density | (pcf) | 101.7 | 101.7 | 101.7 | 101.7 |
| Optimum Moisture | (%) | 22.4 | 22.4 | 22.4 | 22.4 |
| **COMPACTION TEST RESULTS:** | | | | | |
| Compaction | (%) | 92 | 89 | 92 | 94 |
| Specified Compaction | (%) | ~~95~~ 90 | ~~95~~ 90 | ~~95~~ 90 | ~~95~~ 90 |

Jo

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction is below specifications at ~~the above~~ test area~~s~~. #5

Twin City Testing
By Hank Klee

twin city testing
2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# REPORT OF: DENSITY TESTS OF COMPACTED FILL

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:** CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

**LABORATORY No.** 8300-93-220

| | | | |
|---|---|---|---|
| **TEST NUMBER:** | | 8 | 9 |
| **DATE TAKEN:** | | 9-2-93 | 9-2-93 |
| **UNIFIED SOIL CLASSIFICATION:** (Moisture Density Sample Number) | | Fat Clay, brown (CH)-2 | Fat Clay, brown (CH)-2 |
| **LOCATION:** | | 9'E of CT6 | 20'E of CT2 |
| **ELEVATION OF TESTS:** | | 668' | 661.5' |
| **DEPTH BELOW EXISTING GRADE:** | | 1" | 1" |
| **FIELD DENSITY DETERMINATION:** | | | |
| Method | Density in Place in Nuclear Density Method "B" ASTM:D2922-81 (-#4 Basis) | | |
| Dry Density | (pcf) | 91 | 92 |
| Moisture Content | (%) | 26.2 | 25.1 |
| Plus #4 Material | (%) | None | None |
| **LABORATORY MOISTURE-DENSITY RELATION OF SOIL:** | | | |
| Method | ASTM:D1557-91, Method "A", (-#4 Basis) | | |
| Maximum Dry Density | (pcf) | 101.7 | 101.7 |
| Optimum Moisture | (%) | 22.4 | 22.4 |
| **COMPACTION TEST RESULTS:** | | | |
| Compaction | (%) | 90 | 91 |
| Specified Compaction | (%) | ~~95~~ 90 | ~~95~~ 90 |

**ATTENTION:** Density tests are valid at the location and elevation of the test only. No representation is made as to the adequacy of fill and compaction at locations and elevations other than those tested. The test locations and number of tests were selected by CH2M Hill. Compaction is ~~below~~ at or above specifications at the above test areas.

Twin City Testing
By Hank Klee

SG-222 (3/84)

twin city testing
corporation
2710 COMMERCE STREET
LA CROSSE, WI 54603
PHONE 608/781-5330

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CAP C7432
SEP 20 1993

field
glw

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:**
CH2M Hill
Attn: Mr. Donald J. Olson
P.O. Box 594
Onalaska, WI 54650

LABORATORY No. 8300-93-220

SCOPE OF WORK: The scope of our work was limited to performing a mechanical analysis, atterberg limits and moisture contents of the submitted samples in accordance with ASTM:C136, ASTM:D4318 and ASTM:D2216.

| SAMPLE NUMBER: | 1 | 2 | 3 | |
|---|---|---|---|---|
| SAMPLE DESCRIPTION: | Fat Clay, brown (CH) | Fat Clay, brown (CH) | Fat Clay, brown (CH) | |
| MOISTURE CONTENT: | 26.7% | 26.2% | 26.2% | |
| S CE OF MATERIAL: | On site material | On site material | On site material | |
| MOISTURE DENSITY DETERMINATION: | See attached curve | See attached curve | See attached curve | |
| ATTERBERG LIMITS: | | | | spec. |
| Liquid Limit | 58 | 58 | 58 | 20-55 |
| Plastic Limit | 27 | 28 | 26 | |
| Plasticity Index | 31 | 30 | 32 | 10-30 |
| MECHANICAL ANALYSIS: | | | | |
| Passing #4 | 100 | 100 | 100 | |
| #10 | 100 | 100 | 100 | |
| #40 | 99 | 99 | 99 | |
| #100 | 97 | 97 | 98 | |
| #200 | 96 | 96 | 97 | |

REMARKS:

The above samples were obtained by Twin City Testing Corporation and were submitted to our laboratory on August 27 and September 2, 1993.

Twin City Testing Corporation

By Hank Klos

twin city testing

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE-DENSITY CURVE

**SAMPLE NO.** 1

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:** -CH2M Hill

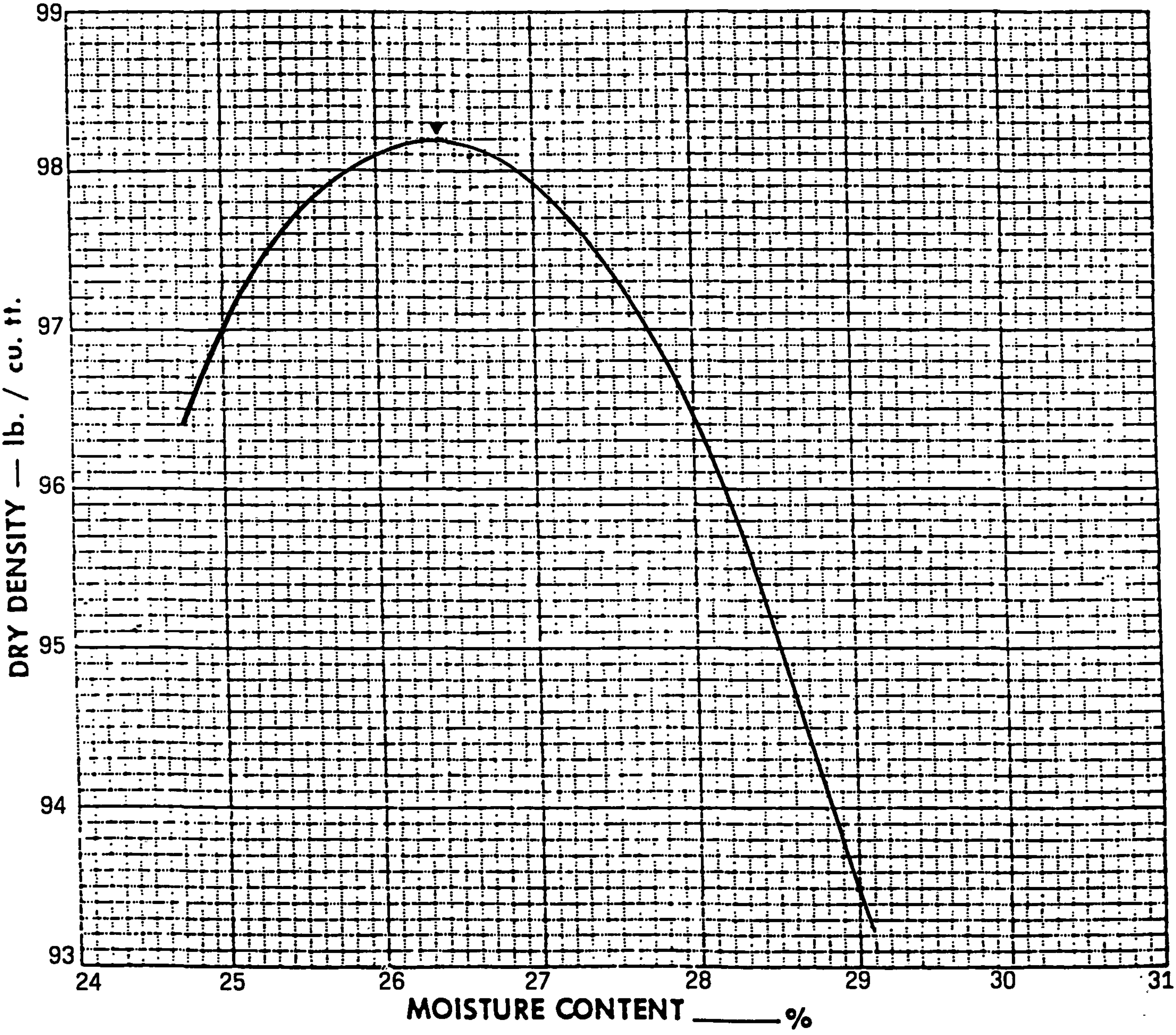
**LABORATORY NO.** 8300-93-220

**METHOD OF TEST:** ASTM:D1557-91, Method "A"

**TYPE OF MATERIAL:** Fat Clay, brown (CH)

**MAXIMUM DENSITY:** 98.2 lb./cu. ft.

**OPTIMUM MOISTURE** 26.4 %



Twin City Testing

By Hank Klo

G-232(2/84)

**twin city testing**

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE - DENSITY CURVE

**SAMPLE NO.** 2

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:** -CH2M Hill

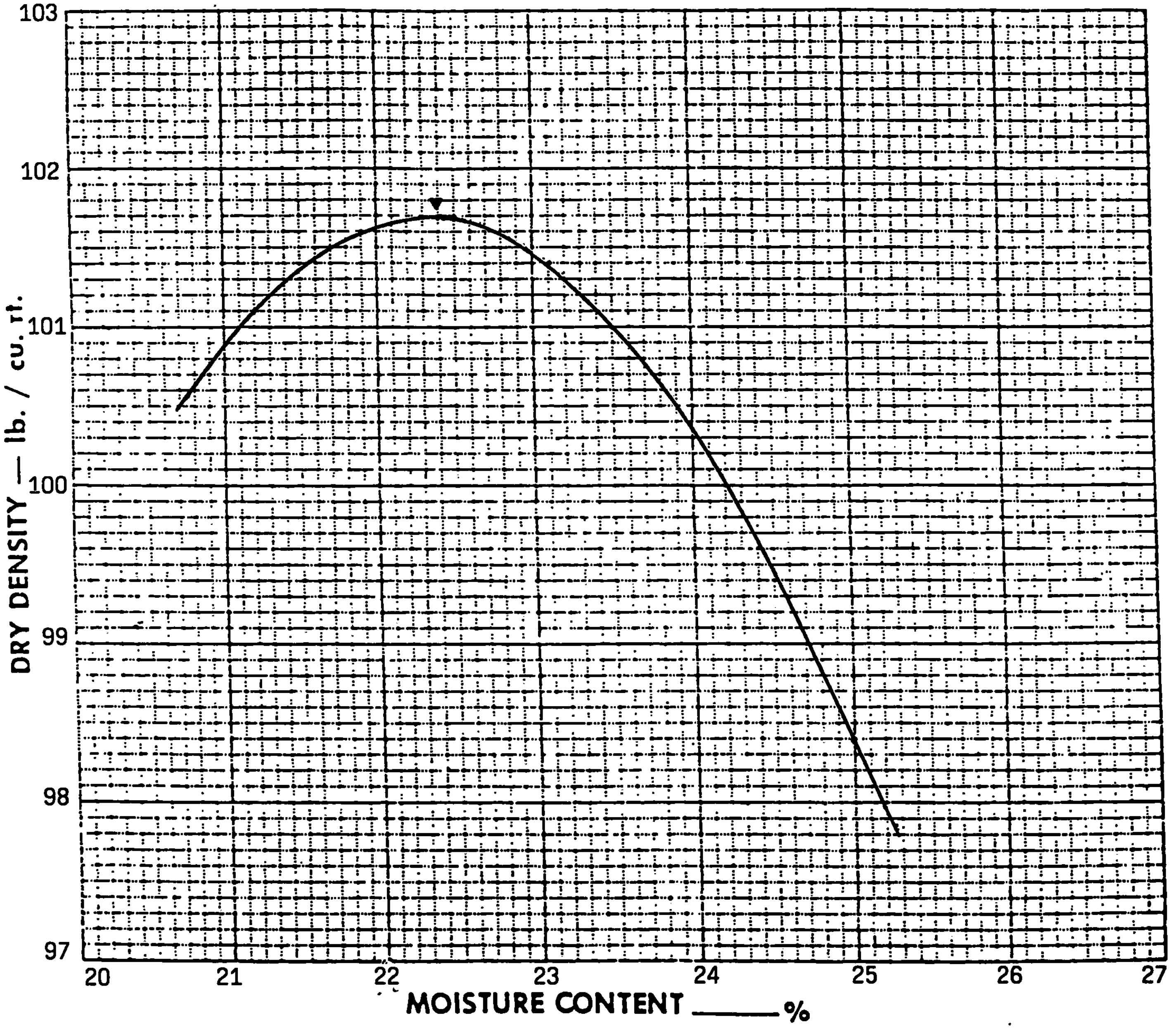
**LABORATORY NO.** 8300-93-220

**METHOD OF TEST:** ASTM:D1557-91, Method "A"

**TYPE OF MATERIAL:** Fat Clay, brown (CH)

**MAXIMUM DENSITY:** 101.7 lb./cu. ft.

**OPTIMUM MOISTURE** 22.4 %



Twin City Testing

By Hank Klee

G-232(2/84)

twin city testing

2710 Commerce Street
LaCrosse, WI 54603
Phone 608/781-5330

# MOISTURE - DENSITY CURVE

**SAMPLE NO.** 3

**PROJECT:** LANDFILL CAP WORK
ONALASKA, WISCONSIN

**DATE:** September 14, 1993

**REPORTED TO:** -CH2M Hill

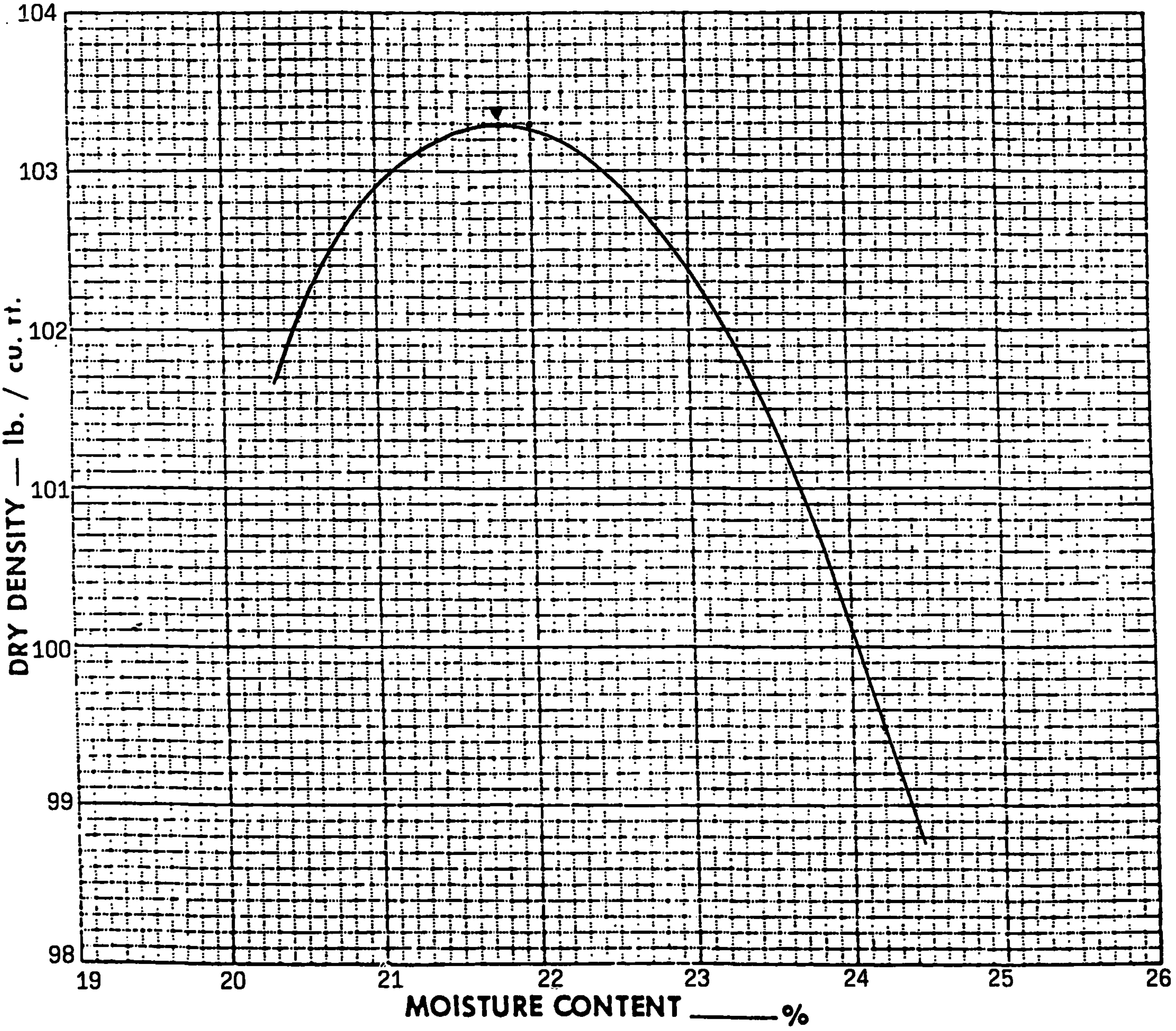
**LABORATORY NO.** 8300-93-220

**METHOD OF TEST:** ASTM:D1557-91, Method "A"

**TYPE OF MATERIAL:** Fat Clay, brown (CH)

**MAXIMUM DENSITY:** 103.3 lb./cu. ft.

**OPTIMUM MOISTURE** 21.8 %



Twin City Testing

By Hank Klo

G-232(2/84)

CH2M HILL

GLO65614.CM.CM.

05 August 1993

Transmittal No. P-039

Mr. Michael T. Riley
Roy F. Weston, Inc.
W8560 County Road Z
Onalaska, WI 54650

Subject: Subcontract No. 31
Onalaska Landfill Cap
Compaction Equipment; Clay

Dear Mr. Riley,

We must insist upon the use of a sheepsfoot roller which meets the requirements of the specifications. The sheepsfoot roller in use today has tines which are about 5-inches deep. Specifications Article 02200, paragraph 2.21, Compaction Equipment, calls for the use of a roller with tines equal to or greater than the specified lift thickness, which in this case is 6-inches. This roller is to provide appropriate kneading action on the clay. Please provide the specified equipment.

In addition the specs. call for the use of a smooth roller on the final lift after sheepsfoot rolling is complete in order to produce a smooth surface. We will expect such a device to be available when needed.

Sincerely,

Donald J. Olson, P.E.
Construction Manager

File No. CAP.C7432

Copy: Steve Keith/GLO
GLO Files
Jim Russell/GLO
Field Files

by weight passes the No. 200 sieve. The material shall have a minimum liquid limit of 20 percent and a minimum plasticity index of 10 percent.

## 2.7 SAND DRAINAGE LAYER MATERIAL

A. Natural sand, manufactured sand, or a combination thereof conforming to the gradation requirements presented below and having an inplace permeability of 1 × $10^{-3}$ cm/s or greater when compacted to 85 percent relative compaction. ADD No 2

GLO65
02200

| Sieve Size | Percent Passing by Weight |
|---|---|
| No. 4 | 100 |
| No. 10 | 90–100 |
| No. 20 | 70–100 |
| No. 40 | 20–70 |
| No. 100 | 0–20 |
| No. 200 | 0–2 |

Post-It™ brand fax transmittal memo 7671 | # of pages ▸ 1

| | |
|---|---|
| To HANK KLOS | From Olson |
| Co. TCT | Co. CH2M Hill |
| Dept. | Phone # |
| Fax # | Fax # |

Can you do anything with the permeability issue in your lab w/ my sample? Do we have such a test in the contract Please call 783 0840

file CAP. C7432
~~R~~ GLO files
field file

fax # 781 3752

CH2M HILL

GLO65614.CM.CM.

03 August 1993

Transmittal No. P-038

Mr. Michael T. Riley
Roy F. Weston, Inc.
W8560 County Road Z
Onalaska, WI 54650

Subject: Subcontract No. 31
Onalaska Landfill Cap
Clay Test Pad Installation

Dear Mr. Riley,

As per our conversation of 02 August, you are aware that it is our opinion that the clay test pads installed thus far were not installed in compliance with the specifications. There was no rotovator available to condition the clay before compaction and the sheepsfoot compactor does not seem to have the ability to knead and compact the material. It is possible that the geotechnical test results will show that the clay and its compaction are within the specified bounds. However, the intent of the test pads was to show not only these results, but also the viability of the methods and machinery used to obtain the results. We cannot determine the viability of the specified methods because they were not employed.

We have agreed to observe clay installation done later in other areas of the cap and in closer compliance with the specifications. We may accept those observations and associated test results as substitutes for the data which was intended to come from the test pads themselves.

We understand your intent to show that the installation of clay in 1-foot thick layers can meet the permeability and compaction criteria shown in the specs. We are dubious that 1-foot layers will be viable, but we will listen to your request. We also understand that you may opt to proceed with clay barrier layer installation prior to the completion of tests on the clay pads (or their substitutes). We have no overt problem with this. You must understand that proceeding in this way will be completely at Weston's risk. If the geotechnical sampling and/or analysis eventually show that the material or methods will not provide the required results, you will be responsible for removal of all clay which does not comply with the specs. This will be done at no cost to the Contractor or the Owner. We will insist that if you proceed with clay barrier installation prior to the time the material and methods results are known and accepted, the clay must be installed in 6-inch layers in accordance with the specs. As we understood our conversation, you agree with the above-mentioned concepts. If this is not the case, please inform us immediately.

Sincerely,

Donald J. Olson, P.E.
Construction Manager

File No. CAP.C7432

Copy:
Steve Keith/GLO
GLO Files
Cathy Barnett/GLO
Jim Russell/GLO
Field Files

# MEMORANDUM

**CH2M HILL**

**TO:** Don Olson

**COPIES:** Steve Keith
Seth Bryson
Jim Russell

**FROM:** Cathy Barnett

**DATE:** August 3, 1993

**SUBJECT:** Onalaska Services During Construction—Clay Barrier

**PROJECT:** GLO65614.CM.SD

| | |
|---|---|
| Post-it™ brand fax transmittal memo 7671 | # of pages ▸ 3 |
| To Don Olson | From Cathy Barnett |
| Co. | Co. |
| Dept. | Phone # |
| Fax # | Fax # |

CH2M HILL
RECEIVED
field file
CAP.C7432_
AUG 3 1993

Several issues have come up regarding the clay barrier layer material and the clay test pad. I would like to summarize the issues as they have been related to me and to discuss some additional concerns I have regarding the clay barrier.

- Weston has completed their QC testing and submitted the results as required on July 29, 1993. As far as I know, CH2M HILL has not performed QA testing on the material. The subcontract documents require that CH2M HILL approve the source prior to Weston commencing the test pad. However, Weston has elected to take the risk and begin construction of the test pad, anticipating that the material will be acceptable.

- The QC testing required for the clay source investigation includes the following:

  -3 Grain Size
  -3 Moisture-Density
  -3 Atterberg Limits
  -2 Remolded Hydraulic Conductivity

  The hydraulic conductivity testing is supposed to be performed on clay samples remolded to 90 percent relative compaction (RC), one at optimum moisture content and one at 3 percentage points above optimum.

  The submittal is complete and satisfies the specifications except the clay samples for the hydraulic conductivity were remolded to 88% RC at 0.3% above optimum, 89% RC at 1.3% above optimum, and 88% RC at 0.3% optimum. The resulting hydraulic conductivities do satisfy the required maximum permeability of 1 x $10^{-7}$ cm/sec.

Because the conditions that the samples were remolded to are generally *less* favorable to impermeability than those specified, I anticipate that the clay source material will be acceptable. However, final acceptance is dependent on the results of CH2M HILL's QA testing and the clay test pad.

- Weston submitted the *Clay Test Pad Schedule/Procedure* to Don Olson on July 29. This procedure discusses the construction of the two clay test pads. However, the details do not include any discussion of moisture content. The specifications require in 02200—3.6(C)(4) that one clay test pad be constructed at optimum moisture content and one be constructed at 3 percentage points above optimum. While this range was not tested by Weston as part of their QC, it is essential that these moisture contents be maintained during construction of the clay test pad. The fact that the remolded samples at about optimum moisture passed the permeability requirements does not mean that the field test pads will perform in the same manner. The results of field test pads often vary from laboratory testing—this is the reason that field testing is required.

  Based on a brief discussion I had yesterday with Mike Reilly/Weston, I do not believe that they intend to construct a test pad at 3 percent above optimum. The clay material is coming in from the source at approximately optimum moisture content. This may be great for the eventual construction of the clay barrier layer, but until the test pad is complete, we will not know. Mike Reilly was concerned that such conditioning of the clay may be difficult. He could be right—proper conditioning of the clay can be difficult especially if the subcontractor does not have the right type of construction equipment. Per Don Olson yesterday, the subcontractor does not have the required rotovator on site.

- The *Clay Test Pad Schedule/Procedure* also indicates that Weston will construct half of one of the test pads using a one-foot thick lift as opposed to the 6-inch lift required by the specifications. The results of the clay test pad may show that the thicker lift is acceptable. Some things to watch:

  -Does the entire depth satisfy the density requirement? Weston may have to cut down in the lift in order to test the entire thickness.

  -Do the rotovation methods provide proper conditioning of the clay material? Are the clods broken down through the full depth? If moisture is added, is it distributed through the entire lift?

The construction operations should be observed carefully to note what types of equipments, number of passes, etc., are used to construct the test pad so that if the results are positive, these methods can be transferred to construction of the clay barrier layer.

Seth Bryson will be in the field tomorrow to observe clay test pads construction procedures. Please call if you have any questions about this memorandum.

# APPENDIX E
# TEST PAD TEST RESULTS

**BRAUN**℠
INTERTEC

**Braun Intertec Engineering, Inc.**
310 Service Court Northeast
Rochester, Minnesota 55906-3446
507-281-2515 Fax: 281-5303

*Engineers and Scientists Serving the Built and Natural Environments*

**Project:** BNDX-93-037A
ASTM D 5084, Method C

**Date:** 8/17/93

**Boring:**

**Sample:** TW-1

**Depth:**

**Sample Description:** CH, Fat clay, olive gray, wet

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 45.87 | Wt Specimen + Tare Wet: | 719.90 |
| Wt. Specimen + Tare Dry: | 39.31 | Wt. Specimen + Tare Dry: | 562.11 |
| Wt. Tare: | 20.80 | Wt. Tare: | 124.51 |
| Moisture Content: | 35.4% | Moisture Content: | 36.1% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.84 in | Area, A: | 40.87 cm2 | Initial Wt. (gm): | 581.42 |
| Initial Ht.: | 7.7 cm | Initial Dry Unit Wt.: | 85.2 pcf | Initial Saturation: | 97.8% |
| Final Ht., L: | 7.7 cm | Final Dry Unit Wt.: | 85.2 pcf | Final Saturation: | 99.5% |
| Sp. Gravity: | 2.700 | | | | |

Burette Area, a (cm2): 0.73
Differential pressure: 2.0 psi = 140.7 cm H2O
Consolidation Pressure (psi): 5.0
Overburden: 720.0 psf
Skempton's B coeficient: 1.0
Operating Pressures (psi): Cell: 65.0 Head: 62.0 Tail: 60.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 42.00 | 16.30 | 166.38 | | | | |
| Final | 29820 | 41.60 | 16.70 | | 165.58 | 166.0 | 21.6 | |
| Result | | | | | | | | 1.1E-08 |
| Initial | 0 | 41.60 | 16.70 | 165.58 | | | | |
| Final | 58320 | 40.80 | 17.50 | | 163.98 | 164.8 | 21.4 | |
| Result | | | | | | | | 1.1E-08 |
| Initial | 0 | 43.10 | 15.20 | 168.58 | | | | |
| Final | 45480 | 42.50 | 15.80 | | 167.38 | 168.0 | 21.8 | |
| Result | | | | | | | | 1.1E-08 |
| Initial | 0 | 42.50 | 15.80 | 167.38 | | | | |
| Final | 38220 | 42.00 | 16.30 | | 166.38 | 166.9 | 21.7 | |
| Result | | | | | | | | 1.1E-08 |
| Average Permeability | | | | | | | | 1.1E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

**BRAUN℠**
**INTERTEC**

Braun Intertec Engineering, Inc.
310 Service Court Northeast
Rochester, Minnesota 55906-3446
507-281-2515 Fax: 281-5303

*Engineers and Scientists Serving the Built and Natural Environments*

**Project:** BNDX-93-037A
ASTM D 5084, Method C

**Date:** 8/16/93

**Boring:**

**Sample:** TW-02

**Depth:**

**Sample Description:** CH, Fat clay, olive, wet

**Initial**

Wt Specimen + Tare Wet: 64.15
Wt. Specimen + Tare Dry: 53.50
Wt. Tare: 20.26
Moisture Content: 32.0%

**Final**

Wt Specimen + Tare Wet: 750.60
Wt. Specimen + Tare Dry: 581.21
Wt. Tare: 133.80
Moisture Content: 37.9%

Diameter: 2.84 in
Initial Ht.: 3.2 in
Final Ht., L: 3.3 in
Sp. Gravity: 2.700

Area, A: 40.87 cm2
Initial Dry Unit Wt.: 86.0 pcf
Final Dry Unit Wt.: 83.4 pcf

Initial Wt. (gm): 596.60
Initial Saturation: 90.2%
Final Saturation: 100.1%

Burette Area, a (cm2): 0.73
Consolidation Pressure (psi): 5.0
Skempton's B coeficient: 1.0
Operating Pressures (psi): Cell: 70.0

Differential pressure: 2.0 psi = 140.7 cm H2O
Overburden: 720.0 psf

Head: 67.0

Tail: 65.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 45.70 | 13.40 | 172.98 | | | | |
| Final | 29880 | 45.30 | 13.90 | | 172.08 | 172.5 | 52.9 | |
| Result | | | | | | | | 1.3E-08 |
| Initial | 0 | 45.30 | 13.90 | 172.08 | | | | |
| Final | 58380 | 44.40 | 14.80 | | 170.28 | 171.2 | 52.5 | |
| Result | | | | | | | | 1.3E-08 |
| Initial | 0 | 47.00 | 12.00 | 175.68 | | | | |
| Final | 45540 | 46.30 | 12.80 | | 174.18 | 174.9 | 53.7 | |
| Result | | | | | | | | 1.4E-08 |
| Initial | 0 | 46.30 | 12.80 | 174.18 | | | | |
| Final | 38100 | 45.70 | 13.40 | | 172.98 | 173.6 | 53.2 | |
| Result | | | | | | | | 1.3E-08 |
| Average Permeability | | | | | | | | 1.3E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

**BRAUN℠**
**INTERTEC**

**Braun Intertec Corporation**
6801 Washington Avenue South
P.O. Box 39108
Minneapolis, Minnesota 55439-0108
612-941-5600 Fax: 941-4151

*Engineers and Scientists Serving the Built and Natural Environments℠*

**Project:** BNDX-93-037A

**Date:** 8/31/93

**Boring:** n/a

**Sample:** TW-03

**Depth:** n/a

**Sample Description:** CH, Fat clay, olive gray, moist

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 71.75 | Wt Specimen + Tare Wet: | 287.55 |
| Wt. Specimen + Tare Dry: | 60.33 | Wt. Specimen + Tare Dry: | 222.50 |
| Wt. Tare: | 22.19 | Wt. Tare: | 35.15 |
| Moisture Content: | 29.9% | Moisture Content: | 34.7% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.82 in | Area, A: | 40.30 cm2 | Initial Wt. (gm): | 429.66 |
| Initial Ht.: | 2.3 in | Initial Dry Unit Wt.: | 88.1 pcf | Initial Saturation: | 89.3% |
| Final Ht., L: | 2.4 in | Final Dry Unit Wt.: | 85.8 pcf | Final Saturation: | 98.1% |
| Sp. Gravity: | 2.680 | | | | |

Burette Area, a (cm2): 0.73

Differential pressure: 1.0 psi = 70.3 cm H2O

Consolidation Pressure (psi): 5.0

Overburden: 720.0 psf

Skempton's B coeficient: 1.0

Operating Pressures (psi): Cell: 70.0 Head: 66.0 Tail: 65.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 54.40 | 4.50 | 120.24 | | | | |
| Final | 26340 | 52.50 | 6.40 | | 116.44 | 118.3 | 19.8 | |
| Result | | | | | | | | 6.6E−08 |
| Initial | 0 | 52.50 | 6.40 | 116.44 | | | | |
| Final | 59400 | 48.30 | 10.60 | | 108.04 | 112.2 | 18.8 | |
| Result | | | | | | | | 6.8E−08 |
| Initial | 0 | 48.30 | 10.60 | 108.04 | | | | |
| Final | 120120 | 41.10 | 17.90 | | 93.54 | 100.8 | 16.9 | |
| Result | | | | | | | | 6.5E−08 |
| Initial | 0 | 41.10 | 17.90 | 93.54 | | | | |
| Final | 53340 | 38.10 | 20.80 | | 87.64 | 90.6 | 15.2 | |
| Result | | | | | | | | 6.6E−08 |
| Average Permeability | | | | | | | | 6.6E−08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

**BRAUN**℠
INTERTEC

**Braun Intertec Corporation**
6801 Washington Avenue South
P.O. Box 39108
Minneapolis, Minnesota 55439-0108
612-941-5600 Fax: 941-4151

*Engineers and Scientists Serving*
*the Built and Natural Environments*®

**Project:** BNDX–93–037A

**Date:** 8/26/93

**Boring:**

**Sample:** TW–04

**Depth:**

**Sample Description:** CL, Lean clay, olive brown, moist

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 74.07 | Wt Specimen + Tare Wet: | 556.84 |
| Wt. Specimen + Tare Dry: | 61.96 | Wt. Specimen + Tare Dry: | 457.45 |
| Wt. Tare: | 21.42 | Wt. Tare: | 127.27 |
| Moisture Content: | 29.9% | Moisture Content: | 30.1% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.82 in | Area, A: | 40.30 cm2 | Initial Wt. (gm): | 434.68 |
| Initial Ht.: | 2.2 in | Initial Dry Unit Wt.: | 91.1 pcf | Initial Saturation: | 95.9% |
| Final Ht., L: | 2.2 in | Final Dry Unit Wt.: | 91.1 pcf | Final Saturation: | 96.6% |
| Sp. Gravity: | 2.680 | | | | |

Burette Area, a (cm2): 0.73

Differential pressure: 1.0 psi = 70.3 cm H2O

Consolidation Pressure (psi): 5.0

Overburden: 720.0 psf

Skempton's B coeficient: 1.0

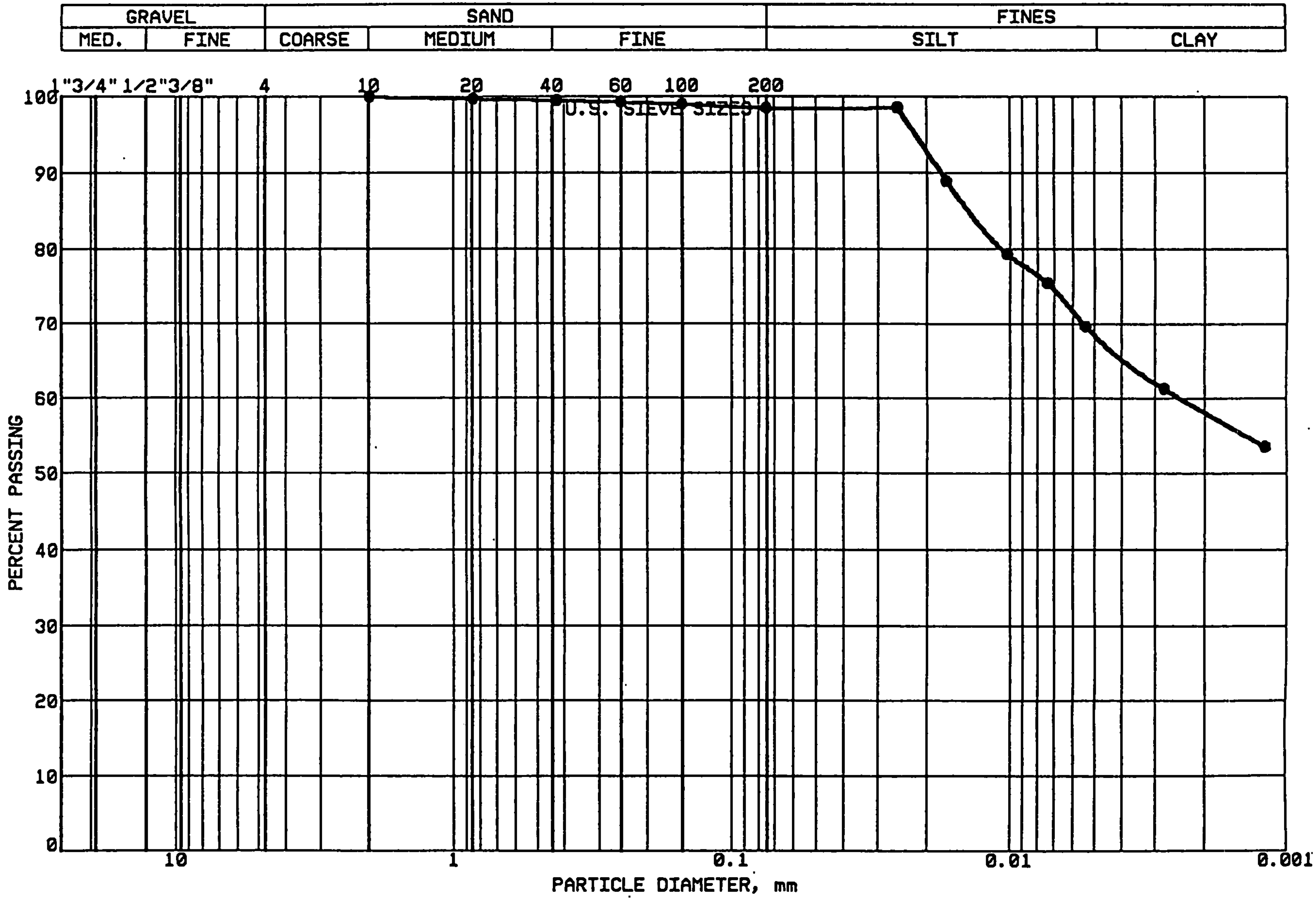
Operating Pressures (psi): Cell: 70.0 Head: 66.0 Tail: 65.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 22.70 | 33.20 | 59.84 | | | | |
| Final | 57660 | 18.60 | 37.10 | | 51.84 | 55.8 | 9.8 | |
| Result | | | | | | | | 1.3E–07 |
| Initial | 0 | 41.90 | 14.30 | 97.94 | | | | |
| Final | 83820 | 32.20 | 23.70 | | 78.84 | 88.4 | 15.5 | |
| Result | | | | | | | | 1.3E–07 |
| Initial | 0 | 32.20 | 23.70 | 78.84 | | | | |
| Final | 79560 | 25.00 | 30.90 | | 64.44 | 71.6 | 12.6 | |
| Result | | | | | | | | 1.3E–07 |
| Initial | 0 | 25.00 | 30.90 | 64.44 | | | | |
| Final | 28920 | 22.70 | 33.20 | | 59.84 | 62.1 | 10.9 | |
| Result | | | | | | | | 1.3E–07 |
| Average Permeability | | | | | | | | 1.3E–07 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
Skempton's B parameter was constant.

Geotechnical Lab Manager

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN INTERTEC**

**PROJECT:** BNDX-93-037A
Onalaska Landfill

Wisconsin, Onalaska
BORING: TW-01

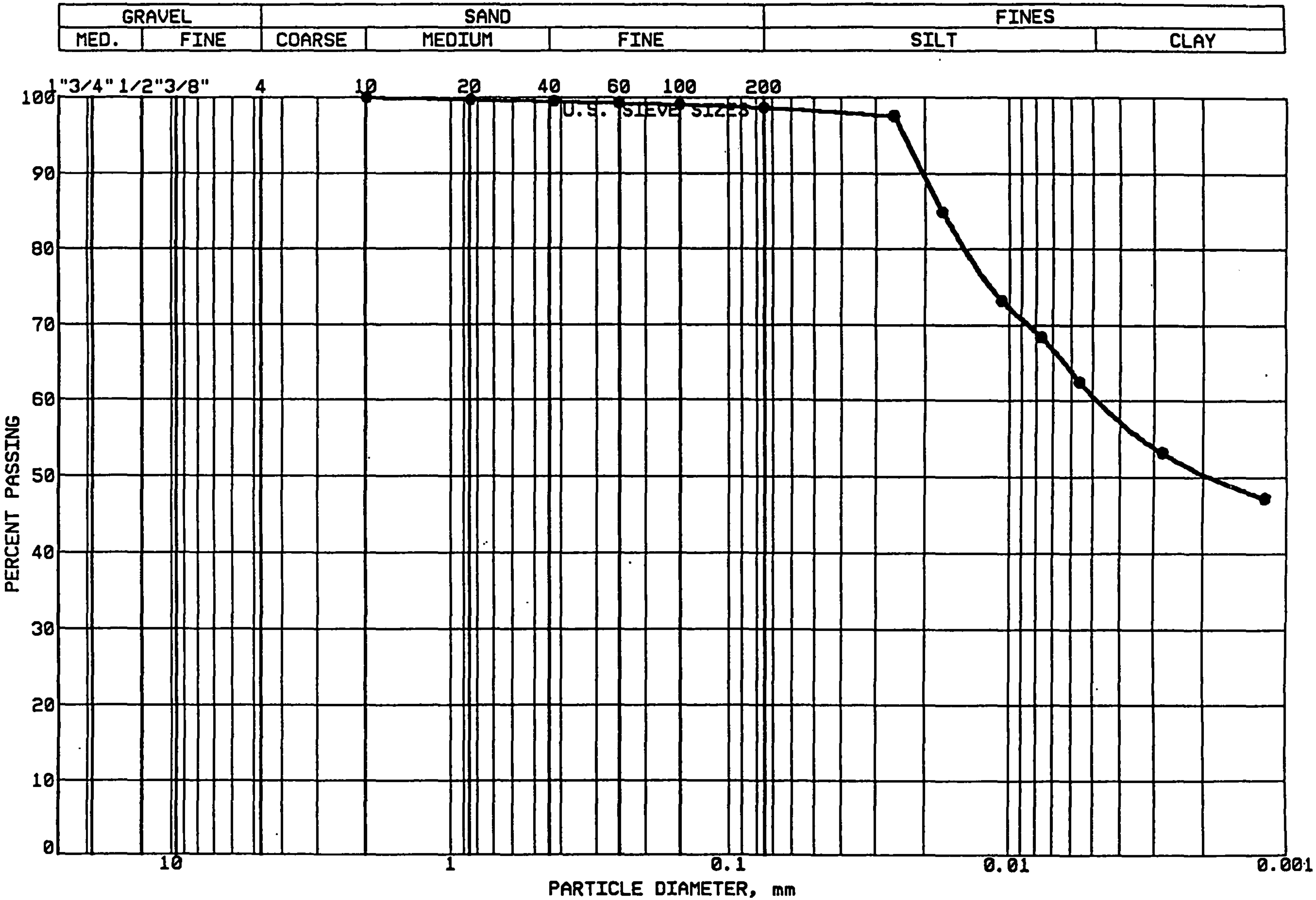
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.5 % |
| SILT | 29.9 % |
| CLAY | 68.6 % |

**CLASSIFICATION:**
CH, Fat clay,olive

D60=0.002
D30=
D10=

Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN INTERTEC**

PROJECT: BNDX-93-037A
Onalaska Landfill

Wisconsin, Onalaska
BORING: TW-02

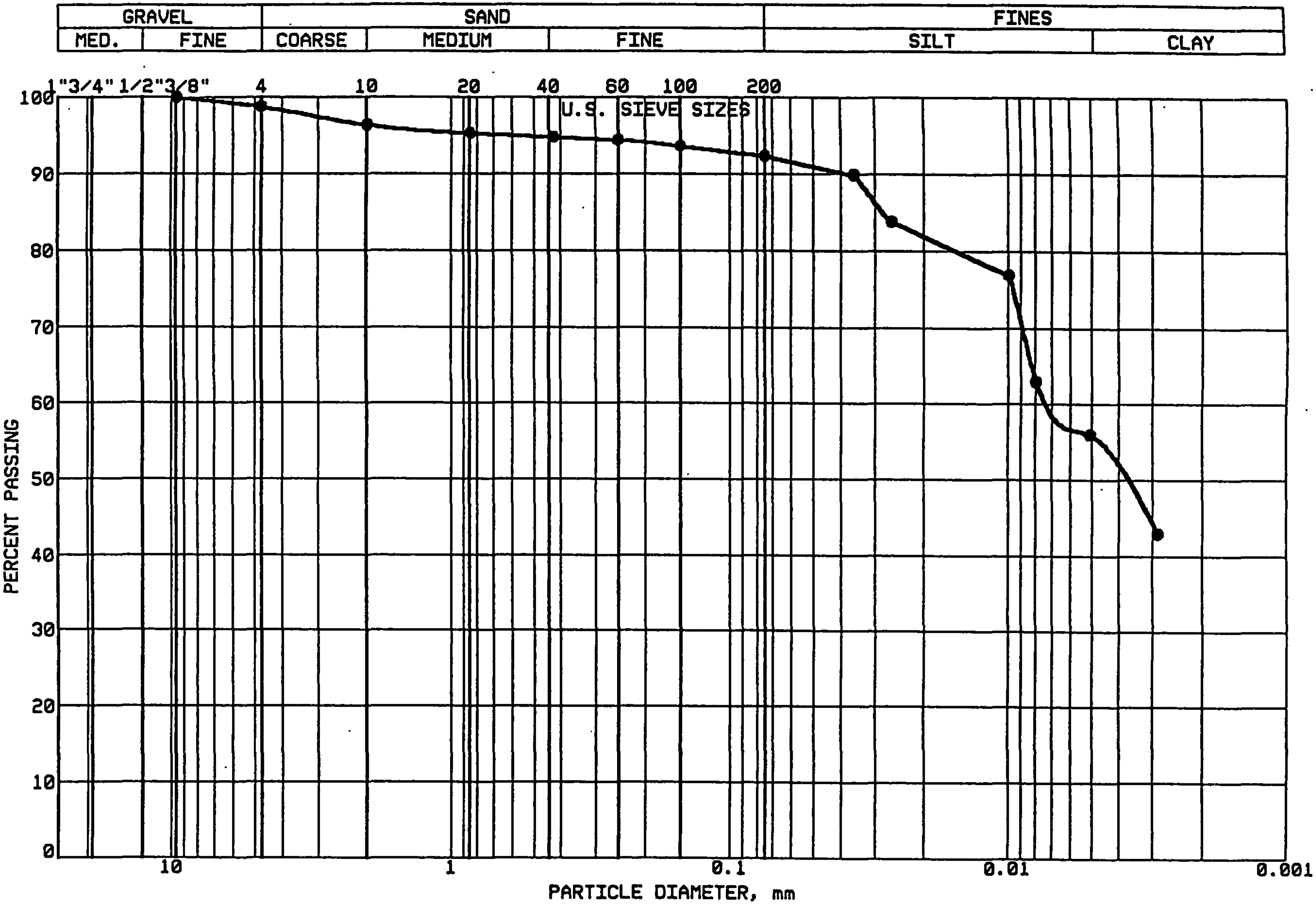
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.3 % |
| SILT | 37.7 % |
| CLAY | 61.0 % |

CLASSIFICATION:
CH, Fat clay,olive

D60=0.005
D30=
D10=

Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
INTERTEC

PROJECT: BNDX-93-037A
Onalaska Landfill

Wisconsin, Onalaska
BORING: TW-03

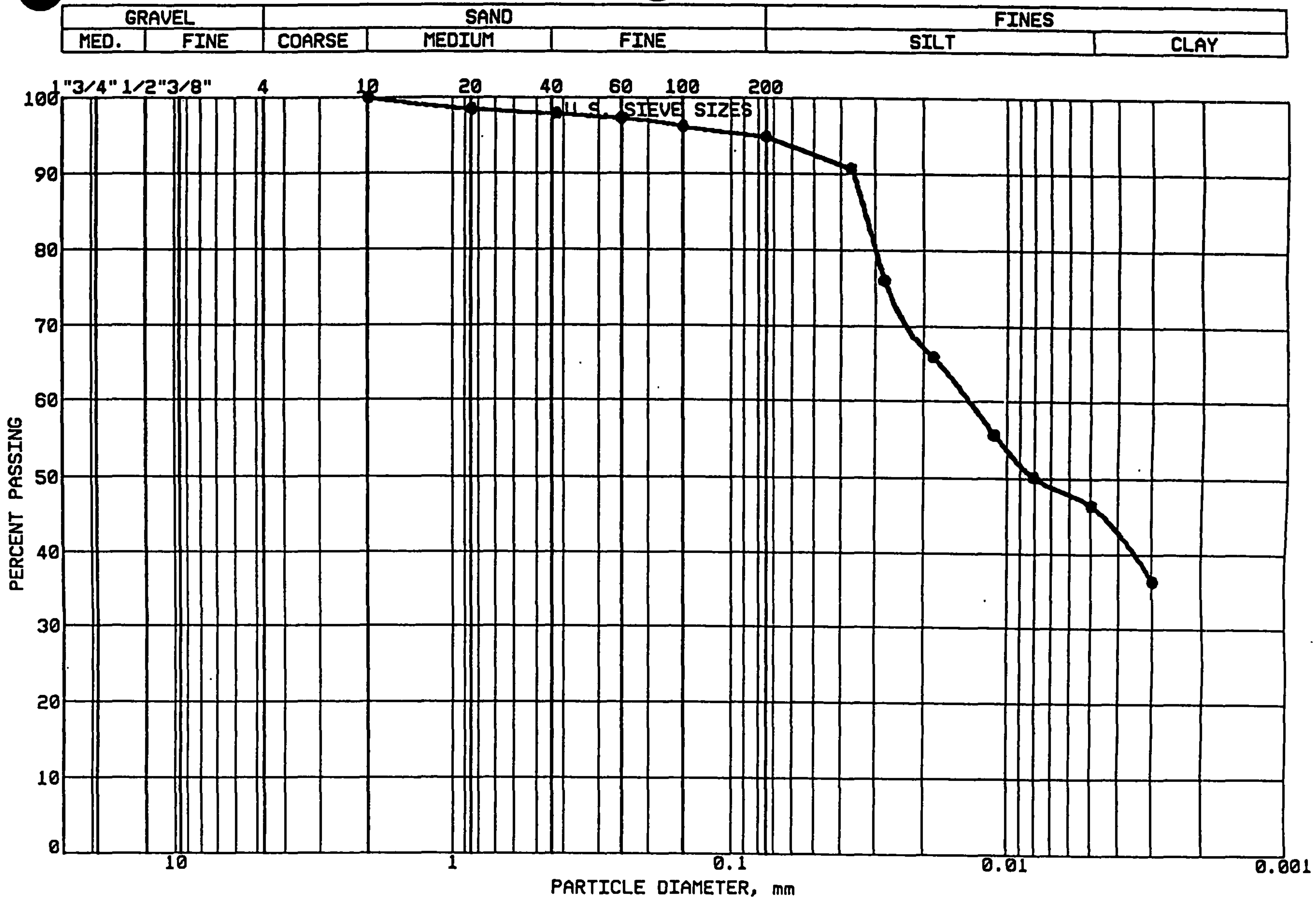
| | |
|---|---|
| GRAVEL | 1.2 % |
| SAND | 6.5 % |
| SILT | 36.8 % |
| CLAY | 55.5 % |

CLASSIFICATION:
CH, Fat clay,olive brown

D60=0.007
D30=
D10=

Cu=
Cc=

## GRAIN SIZE - HYD[illegible]ETER ANALYSIS CURVE



BRAUN™ INTERTEC

**PROJECT:** BNDX-93-037A
Onalaska Landfill
Wisconsin, Onalaska
BORING: TW-04

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 5.1 % |
| SILT | 48.4 % |
| CLAY | 46.5 % |

**CLASSIFICATION:**
CL, Lean clay,olive brown

D60=0.014
D30=0.002
D10=

Cu=
Cc=

# APPENDIX F
# CLAY BORROW SOURCE TEST RESULTS

CH2M HILL

# TRANSMITTAL OF SUBCONTRACTOR'S SUBMITTAL
# (ATTACH TO EACH SUBMITTAL)

TO: Stevan M. Keith, P.E.
CH2M HILL, Inc.
310 W. Wisconsin Avenue, Suite 700
P.O. Box 2090
Milwaukee, Wisconsin 53201

Date: 29 July 93
Transmittal No.:
Submittal No.: 0022
☒ New Submittal ☐ Resubmittal
Previous Submittal No.:

FROM: Roy F. Weston, Inc.
Subcontractor

Three Hawthorn Parkway, Suite 400
Vernon Hills, Illinois 60061

Project: Onalaska Landfill Cap Remediation
Project No.: 05310-011-001
Specification Section No.: 02200
*(Cover only one section with each transmittal)*

Submittal For: ☐ Shop Drawings ☒ Material Data ☐ Samples ☐ O & M Manual Information
☐ Proposed Substitution ☐ Other

*The following items are hereby submitted for review and action:*

| | DESCRIPTION OF ITEM SUBMITTED *(TYPE, SIZE, MODEL NUMBER, ETC.)* | MFG. OR CONTR. CAT., DRAWING OR BROCHURE NO. | NO. OF COPIES | SPEC. SEC. NO. |
|---|---|---|---|---|
| 1 | Clay Material Data | | 5 | 02200 |
| | | | | |
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| | | | | |

I certify, that the above submitted items have been reviewed in detail and are correct and in strict conformance with the subcontract drawings and specifications except as otherwise stated, are stamped accordingly.

RECEIVED CH2M HILL jo

file CAP . C6230 - 022

JUL 29 1993

field file
Geo file
Cathy Barnett

Roy F. Weston, Inc.
Name of Subcontractor

Signature of Subcontractor

FORM 295
REV 5/93 SUBCONTRACT USE
GLO65624 CM PP Form 295 5/93 5 7-93lml

**BRAUN**℠
INTERTEC

**Braun Intertec Corporation**
6801 Washington Avenue South
P.O. Box 39108
Minneapolis, Minnesota 55439-0108
612-941-5600 Fax: 941-4151

*Engineers and Scientists Serving the Built and Natural Environments*℠

**Project:** BNDX–93–037A
**Date:** 7/1/93

**Boring:** n/a
**Sample:** P–1
**Depth:** n/a

**Sample Description:** CL–Lean clay, gray

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 603.20 | Wt Specimen + Tare Wet: | 746.60 |
| Wt. Specimen + Tare Dry: | 479.50 | Wt. Specimen + Tare Dry: | 561.37 |
| Wt. Tare: | 0.00 | Wt. Tare: | 164.06 |
| Moisture Content: | 25.8% | Moisture Content: | 46.6% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.82 in | Area, A: | 40.30 cm2 | Initial Wt. (gm): | 502.90 |
| Initial Ht.: | 7.4 cm | Initial Dry Unit Wt.: | 83.7 pcf | Initial Saturation: | 68.8% |
| Final Ht., L: | 8.3 cm | Final Dry Unit Wt.: | 74.6 pcf | Final Saturation: | 100.1% |
| Sp. Gravity: | 2.700 | | | | |

Burette Area, a (cm2): 0.73
Differential pressure: 2.0 psi = 140.7 cm H2O
Consolidation Pressure (psi): 5.0
Overburden: 720.0 psf
Skempton's B coeficient: .96
Operating Pressures (psi): Cell: 65.0 Head: 62.0 Tail: 60.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 36.50 | 15.00 | 162.18 | | | | |
| Final | 39540 | 35.40 | 15.90 | | 160.18 | 161.2 | 19.4 | |
| Result | | | | | | | | 2.4E–08 |
| Initial | 0 | 35.40 | 15.90 | 160.18 | | | | |
| Final | 41040 | 34.20 | 16.60 | | 158.28 | 159.2 | 19.2 | |
| Result | | | | | | | | 2.2E–08 |
| Initial | 0 | 34.20 | 16.60 | 158.28 | | | | |
| Final | 22440 | 33.60 | 17.10 | | 157.18 | 157.7 | 19.0 | |
| Result | | | | | | | | 2.3E–08 |
| Initial | 0 | 33.60 | 17.10 | 157.18 | | | | |
| Final | 67320 | 32.00 | 18.60 | | 154.08 | 155.6 | 18.8 | |
| Result | | | | | | | | 2.2E–08 |
| Average Permeability | | | | | | | | 2.3E–08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
ASTM D 5084 (Method C: Falling Head, Rising Tailwater)

Geotechnical Lab Manager

**BRAUN℠**
INTERTEC

**Braun Intertec Corporation**
6801 Washington Avenue South
P.O. Box 39108
Minneapolis, Minnesota 55439-0108
612-941-5600 Fax: 941-4151

*Engineers and Scientists Serving the Built and Natural Environments*

**Project:** BNDX-93-037A

**Date:** 7/1/93

**Boring:** n/a

**Sample:** P-2

**Depth:** n/a

**Sample Description:** CL-Lean clay, gray

| | Initial | | Final |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 542.00 | Wt Specimen + Tare Wet: | 756.60 |
| Wt. Specimen + Tare Dry: | 427.40 | Wt. Specimen + Tare Dry: | 561.31 |
| Wt. Tare: | 0.00 | Wt. Tare: | 163.80 |
| Moisture Content: | 26.8% | Moisture Content: | 49.1% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.82 in | Area, A: | 40.30 cm2 | Initial Wt. (gm): | 501.40 |
| Initial Ht.: | 7.3 cm | Initial Dry Unit Wt.: | 84.5 pcf | Initial Saturation: | 72.8% |
| Final Ht., L: | 8.4 cm | Final Dry Unit Wt.: | 72.9 pcf | Final Saturation: | 101.2% |
| Sp. Gravity: | 2.700 | | | | |

Burette Area, a (cm2): 0.73

Differential pressure: 2.0 psi = 140.7 cm H2O

Consolidation Pressure (psi): 5.0

Overburden: 720.0 psf

Skempton's B coeficient: 1.0

Operating Pressures (psi): Cell: 65.0 Head: 62.0 Tail: 60.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 46.50 | 10.90 | 176.28 | | | | |
| Final | 57420 | 44.20 | 13.00 | | 171.88 | 174.1 | 20.7 | |
| Result | | | | | | | | 3.3E-08 |
| Initial | 0 | 30.50 | 24.90 | 146.28 | | | | |
| Final | 41040 | 29.30 | 26.20 | | 143.78 | 145.0 | 17.3 | |
| Result | | | | | | | | 3.2E-08 |
| Initial | 0 | 28.90 | 26.20 | 143.38 | | | | |
| Final | 22440 | 28.20 | 26.90 | | 141.98 | 142.7 | 17.0 | |
| Result | | | | | | | | 3.3E-08 |
| Initial | 0 | 28.20 | 26.70 | 142.18 | | | | |
| Final | 67140 | 26.00 | 28.60 | | 138.08 | 140.1 | 16.7 | |
| Result | | | | | | | | 3.3E-08 |
| Average Permeability | | | | | | | | 3.3E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
ASTM D 5084 (Method C: Falling Head, Rising Tailwater).

Geotechnical Lab Manager

**BRAUN℠**
**INTERTEC**

**Braun Intertec Corporation**
6801 Washington Avenue South
P.O. Box 39108
Minneapolis, Minnesota 55439-0108
612-941-5600 Fax: 941-4151

*Engineers and Scientists Serving the Built and Natural Environments®*

**Project:** BNDX-93-037A

**Date:** 7/1/93

**Boring:** n/a **Sample:** P-3 **Depth:** n/a

**Sample Description:** CL-Lean clay, gray

| Initial | | Final | |
|---|---|---|---|
| Wt Specimen + Tare Wet: | 512.30 | Wt Specimen + Tare Wet: | 767.70 |
| Wt. Specimen + Tare Dry: | 407.30 | Wt. Specimen + Tare Dry: | 565.57 |
| Wt. Tare: | 0.00 | Wt. Tare: | 160.80 |
| Moisture Content: | 25.8% | Moisture Content: | 49.9% |

| | | | | | |
|---|---|---|---|---|---|
| Diameter: | 2.82 in | Area, A: | 40.30 cm2 | Initial Wt. (gm): | 498.10 |
| Initial Ht.: | 7.3 cm | Initial Dry Unit Wt.: | 83.9 pcf | Initial Saturation: | 69.1% |
| Final Ht., L: | 8.5 cm | Final Dry Unit Wt.: | 72.2 pcf | Final Saturation: | 101.1% |
| Sp. Gravity: | 2.700 | | | | |

Burette Area, a (cm2): 0.73 Differential pressure: 2.0 psi = 140.7 cm H2O

Consolidation Pressure (psi): 5.0 Overburden: 720.0 psf

Skempton's B coeficient: 1.0

Operating Pressures (psi): Cell: 65.0 Head: 62.0 Tail: 60.0

| | Time (t) sec | H1 cm | H2 cm | hi cm | hf cm | havg cm | Hydraulic Gradient | Method C K cm/sec |
|---|---|---|---|---|---|---|---|---|
| Initial | 0 | 38.50 | 17.30 | 161.88 | | | | |
| Final | 63600 | 33.90 | 21.70 | | 152.88 | 157.4 | 18.5 | |
| Result | | | | | | | | 6.9E-08 |
| Initial | 0 | 54.00 | 5.30 | 189.38 | | | | |
| Final | 15600 | 52.70 | 6.70 | | 186.68 | 188.0 | 22.1 | |
| Result | | | | | | | | 7.1E-08 |
| Initial | 0 | 52.70 | 6.70 | 186.68 | | | | |
| Final | 66660 | 47.10 | 11.80 | | 175.98 | 181.3 | 21.3 | |
| Result | | | | | | | | 6.8E-08 |
| Initial | 0 | 47.10 | 11.80 | 175.98 | | | | |
| Final | 28860 | 44.80 | 14.20 | | 171.28 | 173.6 | 20.4 | |
| Result | | | | | | | | 7.2E-08 |
| Average Permeability | | | | | | | | 7.0E-08 |
| Assigned Permeability | | | | | | | | |

**Remarks:** The specific gravity was assumed for the purpose of saturation calculations.
ASTM D 5084 (Method C: Falling Head, Rising Tailwater)

Geotechnical Lab Manager

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# Laboratory Compaction Characteristics of Soil (Proctor)

**Date:** July 6, 1993

**Project:** BNDX-93-037A

**Client:**
Roy F. Weston, Inc.
One Weston Way
West Chester, PA 19380-1499

**Description:**
Onalaska Landfill
Onalaska, Wisconsin

---

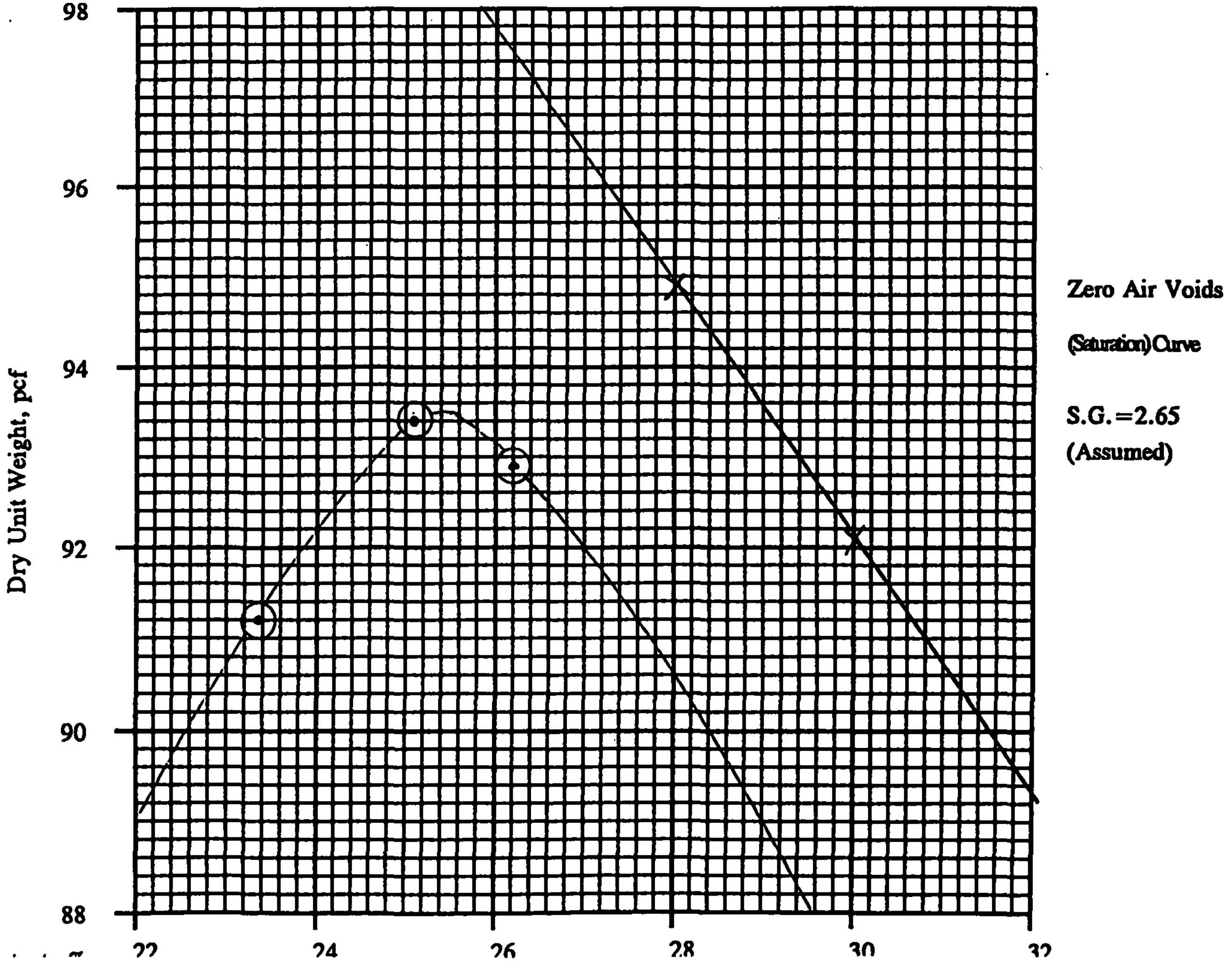
**Field Data:**

| | | | |
|---|---|---|---|
| Date Sampled | : 5/10/93 | Test Number | : P-1 (Sample Bag 1) |
| Sampled By | : St. Joe Contractors | Location Sampled | : Onalaska Landfill, Wisconsin |
| Classification | : CL - Lean clay, brown | | |

**Laboratory Data:**

| | | | | | |
|---|---|---|---|---|---|
| ASTM D: | 1557-91 | Procedure: | A | Date Tested: | 6/18/93 |
| As Received Water Content: | -- | Prep. Method: | Dry | Rammer Type: | Sector |
| Sieve Data, % on 3/4": | -- | % 3/4"-3/8": | -- | % 3/8" - #4: | -- |
| Size of "Oversize": | -- | Percent Oversize: | -- | Spec. Gravity: | 2.65 |

| | Curve Values | | Corrected Values (ASTM D 4718) | |
|---|---|---|---|---|
| Maximum Dry Unit Weight, pcf | 93.5 | pcf | 93½ | pcf |
| Optimum Water Content, % | 25.4 | % | 25½ | % |



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# Laboratory Compaction Characteristics of Soil (Proctor)

**Date:** July 6, 1993

**Project:** BNDX-93-037A

**Client:**
Roy F. Weston, Inc.
One Weston Way
West Chester, PA 19380-1499

**Description:**
Onalaska Landfill
Onalaska, Wisconsin

---

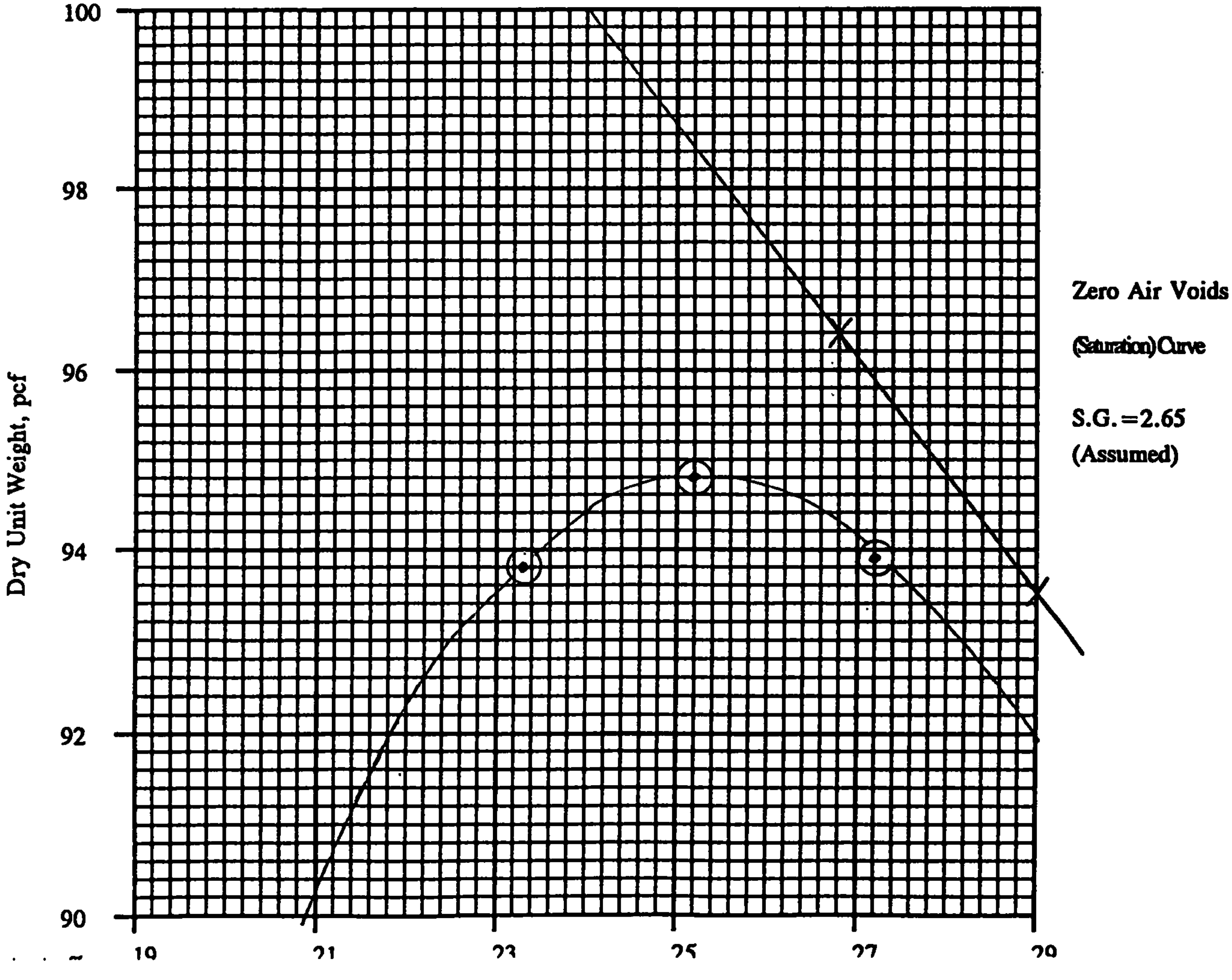
**Field Data:**

| | | | | | |
|---|---|---|---|---|---|
| Date Sampled | : | 5/10/93 | Test Number | : | P-2 (Sample Bag 2) |
| Sampled By | : | St. Joe Contractors | Location Sampled | : | Onalaska Landfill, Wisconsin |
| Classification | : | CL - Lean clay, brown | | | |

**Laboratory Data:**

| | | | | | |
|---|---|---|---|---|---|
| ASTM D: | 1557-91 | Procedure: | A | Date Tested: | 6/18/93 |
| As Received Water Content: | -- | Prep. Method: | Dry | Rammer Type: | Sector |
| Sieve Data, % on 3/4": | -- | % 3/4"-3/8": | -- | % 3/8" - #4: | -- |
| Size of "Oversize": | -- | Percent Oversize: | -- | Spec. Gravity: | 2.65 |

| | Curve Values | | Corrected Values (ASTM D 4718) | |
|---|---|---|---|---|
| Maximum Dry Unit Weight, pcf | 94.8 | pcf | 95 | pcf |
| Optimum Water Content, % | 25.4 | % | 25½ | % |



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# Laboratory Compaction Characteristics of Soil (Proctor)

**Date:** July 6, 1993

**Project:** BNDX-93-037A

**Client:**
Roy F. Weston, Inc.
One Weston Way
West Chester, PA 19380-1499

**Description:**
Onalaska Landfill
Onalaska, Wisconsin

---

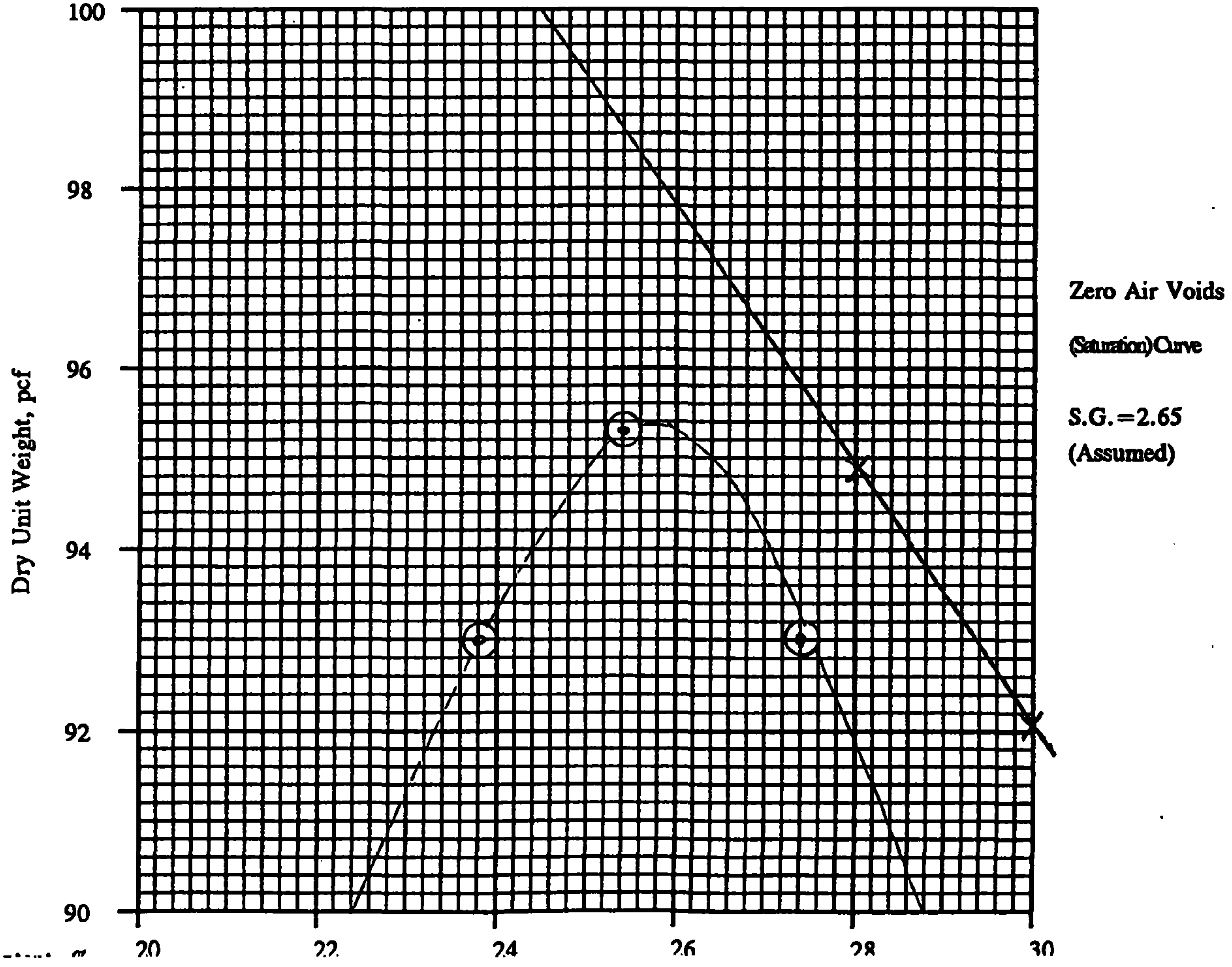
**Field Data:**

| | | | |
|---|---|---|---|
| Date Sampled : | 5/10/93 | Test Number : | P-3 (Sample Bag 3) |
| Sampled By : | St. Joe Contractors | Location Sampled : | Onalaska Landfill, Wisconsin |
| Classification : | CL - Lean clay, brown | | |

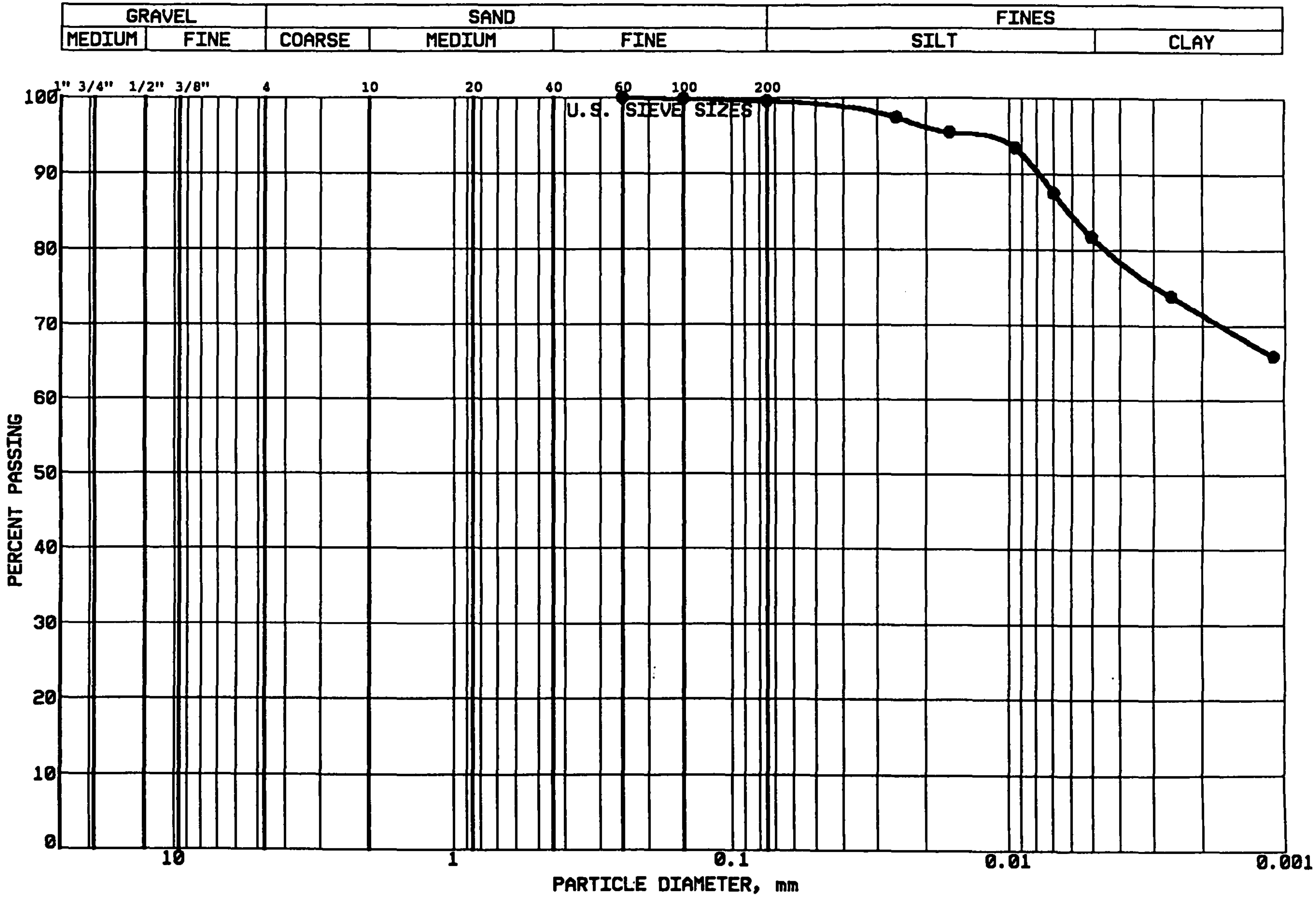
**Laboratory Data:**

| | | | | | |
|---|---|---|---|---|---|
| ASTM D: | 1557-91 | Procedure: | A | Date Tested: | 6/18/93 |
| As Received Water Content: | -- | Prep. Method: | Dry | Rammer Type: | Sector |
| Sieve Data, % on 3/4": | -- | % 3/4"-3/8": | -- | % 3/8" - #4: | -- |
| Size of "Oversize": | -- | Percent Oversize: | -- | Spec. Gravity: | 2.65 |

| | Curve Values | | Corrected Values (ASTM D 4718) | |
|---|---|---|---|---|
| Maximum Dry Unit Weight, pcf | 95.1 | pcf | 95 | pcf |
| Optimum Water Content, % | 25.7 | % | 25½ | % |



# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
ENGINEERING TESTING

**PROJECT:** BNDX-93-037A
Geotechnical Testing Services
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: 1

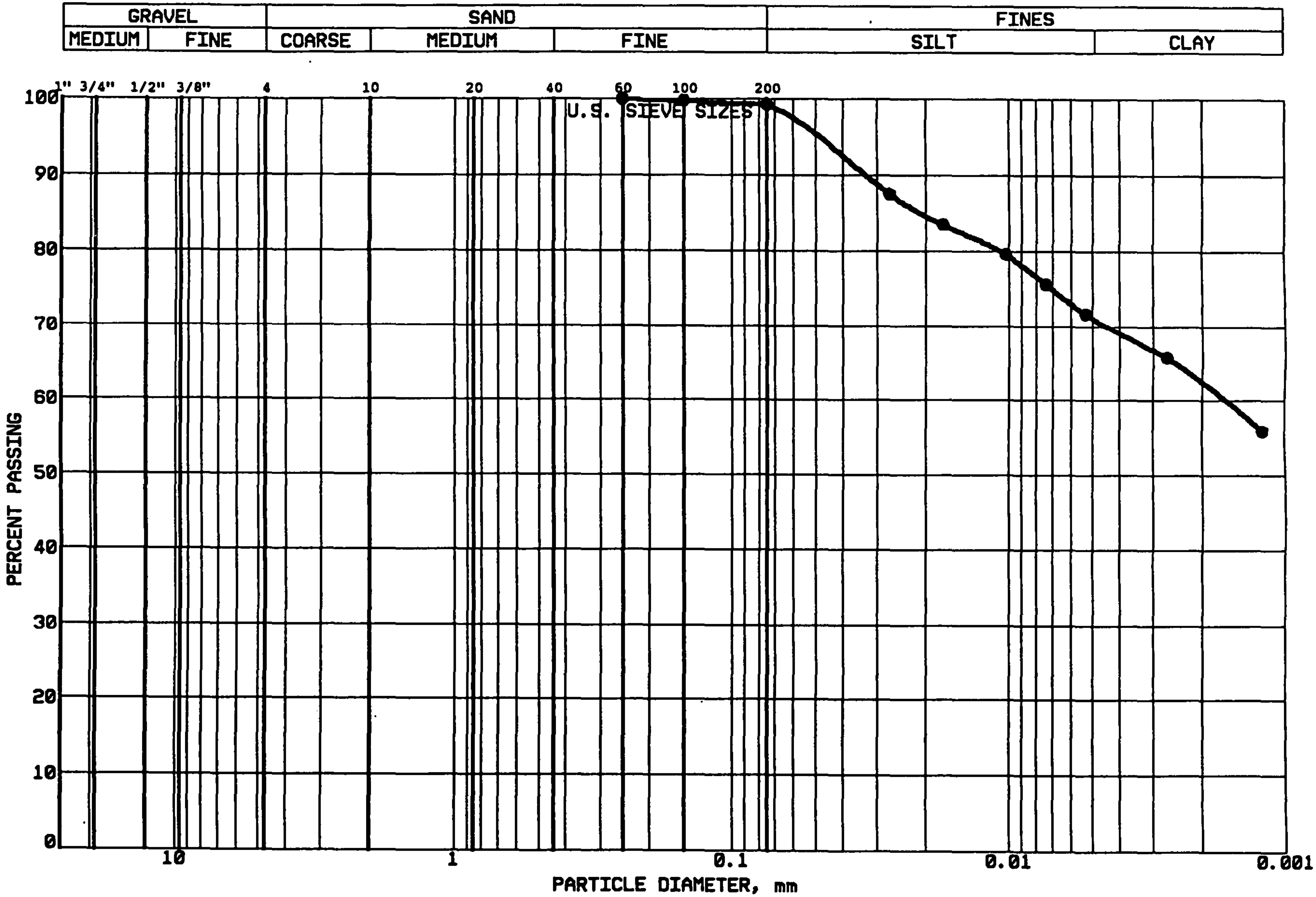
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 0.4 % |
| SILT | 18.1 % |
| CLAY | 81.5 % |

**CLASSIFICATION:**
CL LEAN CLAY,brown

D60=
D30=
D10=

Cu=
Cc=

## GRAIN SIZE - HYDROMETER ANALYSIS CURVE



RAUN
ENGINEERING TESTING

**PROJECT:** BNDX-93-037A
Geotechnical Testing Services
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: 2

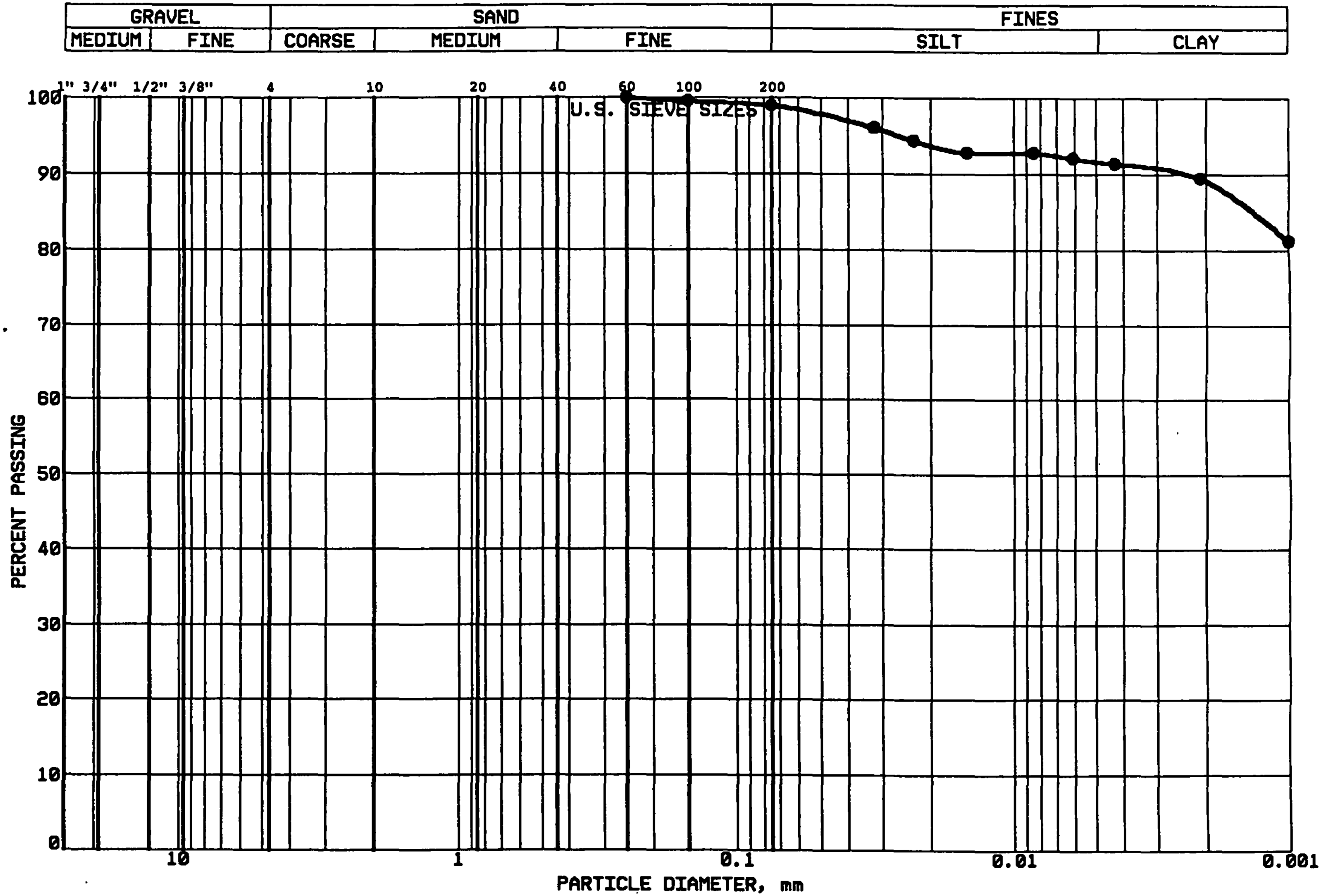
| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 0.7 % |
| SILT | 28.2 % |
| CLAY | 71.1 % |

**CLASSIFICATION:**
CL LEAN CLAY, brown

D60=0.002
D30=
D10=

Cu=
Cc=

# GRAIN SIZE - HYDROMETER ANALYSIS CURVE



**BRAUN**
ENGINEERING TESTING

**PROJECT:** BNDX-93-037A
Geotechnical Testing Services
Onalaska Municipal Landfill Site
Onalaska, WI

SAMPLE: 3

| | |
|---|---|
| GRAVEL | 0.0 % |
| SAND | 1.0 % |
| SILT | 7.3 % |
| CLAY | 91.7 % |

**CLASSIFICATION:**
CL LEAN CLAY,brown

D60=
D30=
D10=

Cu=
Cc=

# ATTERBERG ITS DATA SHEET

PROJECT # [illegible]-95-0374 ENGINEER TCB

LOC. ____ ELV. ____ SAM. 2 TW # ____ DATE ____

| | LIQUID LIMIT DATA 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Tare # | 2 | 4 | 6 | | |
| Tare + Wt Wgt | 33.18 | 32.92 | 32.82 | | |
| Tare + Dry Wgt | 27.37 | 27.33 | 27 | | |
| Tare | 15.28 | 15.26 | 15.71 | | |
| Dry Wgt | 12.07 | 12.07 | 12.19 | | |
| Water | 5.81 | 5.59 | 5.46 | | |
| M/C % | 48 | 46 | 44 | | |
| Blows | 22 | 27 | 34 | | |

| | PLASTIC LIMIT DATA 1 | 2 | 3 | Nat. m/c |
|---|---|---|---|---|
| Tare # | 1 | 3 | 5 | |
| Tare + Wt Wgt | 25.11 | 24.91 | 24.73 | |
| Tare + Dry Wgt | 22.88 | 22.83 | 22.71 | |
| Tare | 15.16 | 15.20 | 15.19 | |
| Dry Wgt | 7.72 | 7.63 | 7.52 | |
| Water | 2.23 | 2.08 | 2.02 | |
| M/C % | 29 | 27 | 26 | |

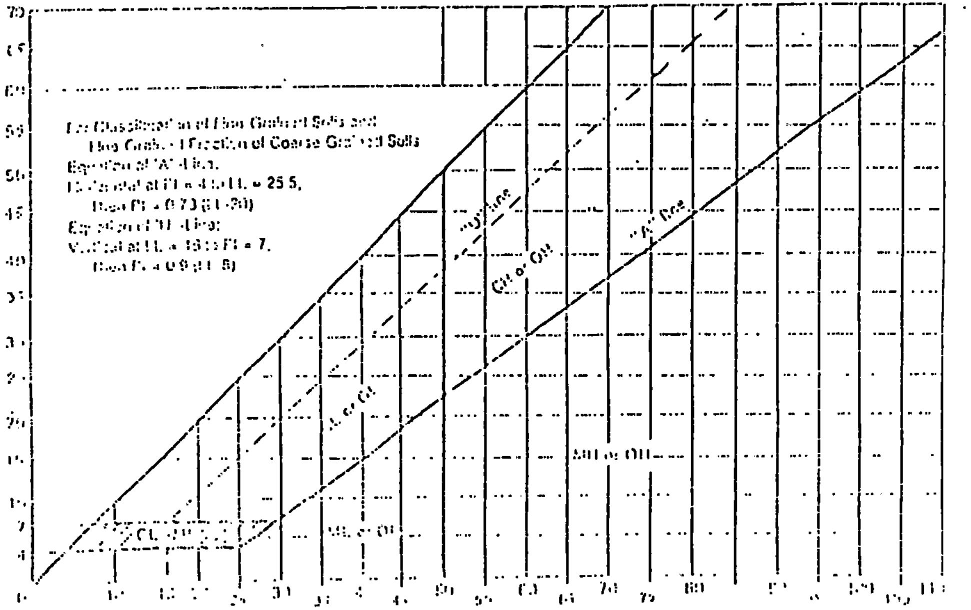
LL 46

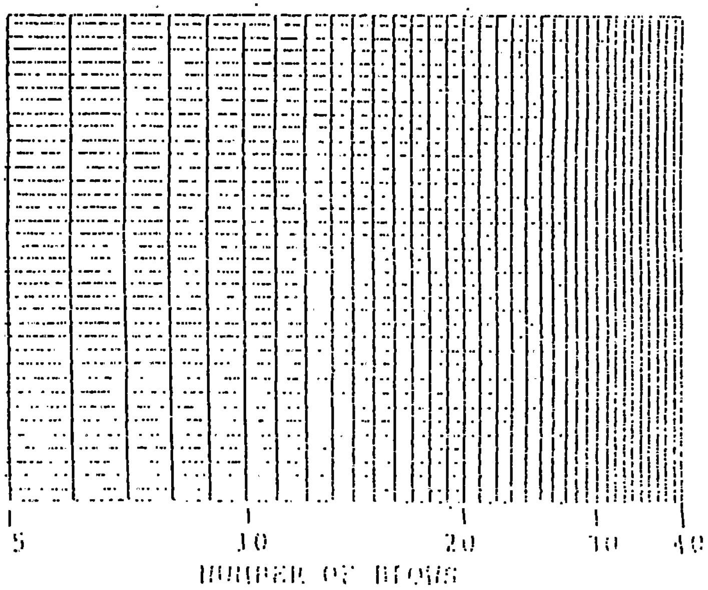
PL 27

PI 19

NAT. M/C % ____

SOIL TYPE ____





# ATTERBERG ITS DATA SHEET

PROJECT # GND2-93-037A ENGINEER TCB

LOC._____ ELV._____ SAM. 1 TW #_____ DATE__________

LIQUID LIMIT DATA

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Tare # | 1 | 2 | 3 | | |
| Tare + Wt Wgt | 32.81 | 32.50 | 32.16 | | |
| Tare + Dry Wgt | 27.33 | 27.19 | 27.24 | | |
| Tare | 15.16 | 15.16 | 15.16 | | |
| Dry Wgt | 12.17 | 12.03 | 12.08 | | |
| Water | 5.48 | 5.12 | 4.92 | | |
| M/C % | 45.0 | 43.3 | 40.7 | | |
| Blows | 20 | 26 | 33 | | |

PLASTIC LIMIT DATA

| | 1 | 2 | 3 | Nat. m/c |
|---|---|---|---|---|
| Tare # | 1 | 5 | 2 | |
| Tare + Wt Wgt | 24.92 | 24.05 | 23.72 | |
| Tare + Dry Wgt | 22.82 | 22.19 | 22.04 | |
| Tare | 15.28 | 15.19 | 15.17 | |
| Dry Wgt | 7.5 | 7.0 | 6.87 | |
| Water | 2.1 | 1.86 | 1.68 | |
| M/C % | 28 | 26 | 24 | |

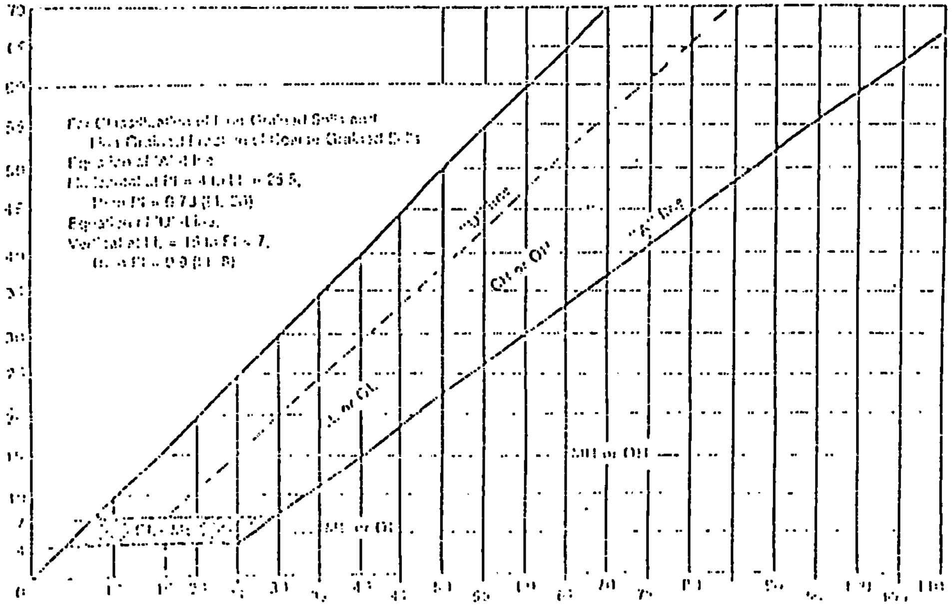
LL 43.0

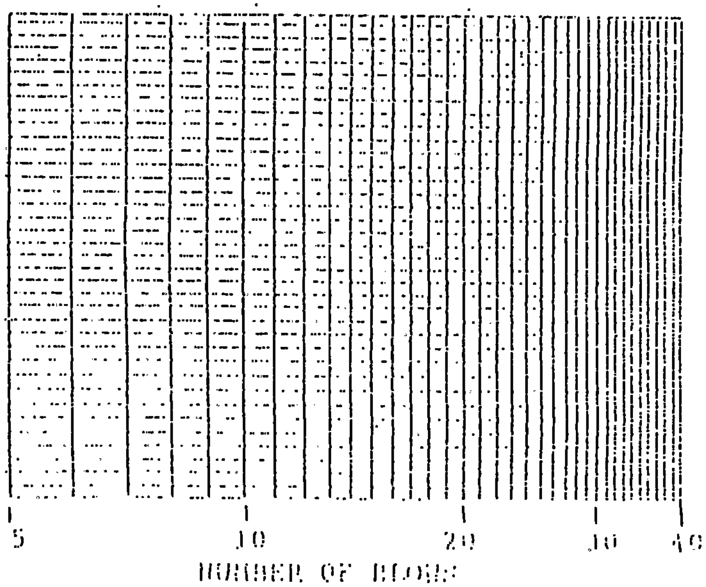
PL 26.0

PI 17.0

NAT. M/C %__________

SOIL TYPE__________





# ATTERBERG LIMITS DATA SHEET

PROJECT # [illegible]-92 0377 ENGINEER [illegible]

LOC.____ ELV.____ SAM. 3 TW #____ DATE____

|  | LIQUID 1 | LIMIT 2 | DATA 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Tare #** |  | B |  |  |  |
| **Tare + Wt Wgt** | 33.54 | 33.28 | 32.94 |  |  |
| **Tare + Dry Wgt** | 27.39 | 27.35 | 27.26 |  |  |
| **Tare** | 15.24 | 15.18 | 15.16 |  |  |
| **Dry Wgt** | 12.15 | 12.17 | 12.1 |  |  |
| **Water** | 6.15 | 5.93 | 5.68 |  |  |
| **M/C %** | 51 | 49 | 47 |  |  |
| **Blows** | 25 | 26 | 33 |  |  |

|  | PLASTIC 1 | LIMIT 2 | 3 | DATA Nat. m/c |
|---|---|---|---|---|
| **Tare #** |  |  |  |  |
| **Tare + Wt Wgt** | 25.48 | 25.13 | 24.92 |  |
| **Tare + Dry Wgt** | 23.03 | 22.89 | 22.81 |  |
| **Tare** | 15.21 | 15.17 | 15.19 |  |
| **Dry Wgt** | 7.82 | 7.72 | 7.62 |  |
| **Water** | 2.45 | 2.24 | 2.11 |  |
| **M/C %** | 31 | 29 | 28 |  |

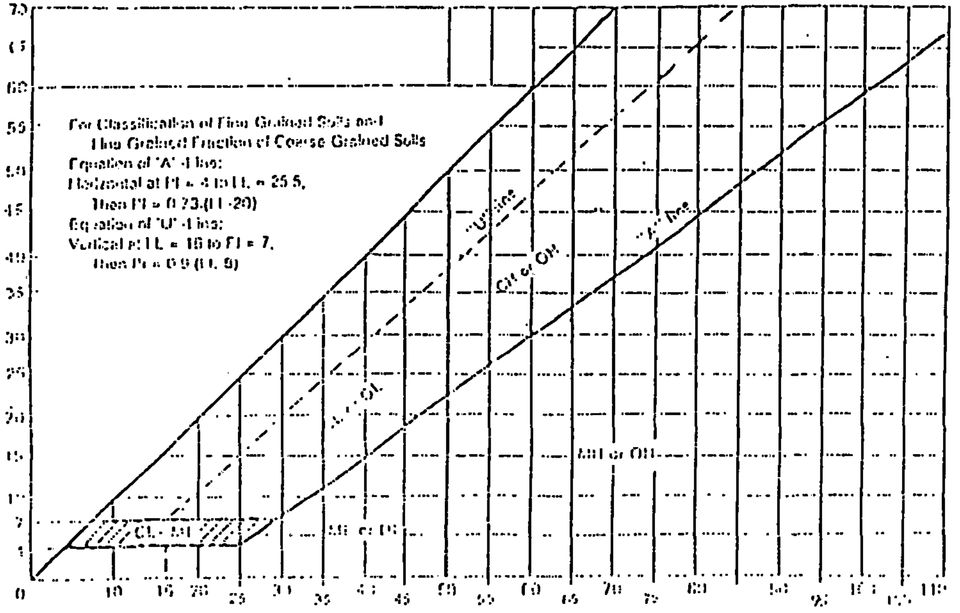
LL 49

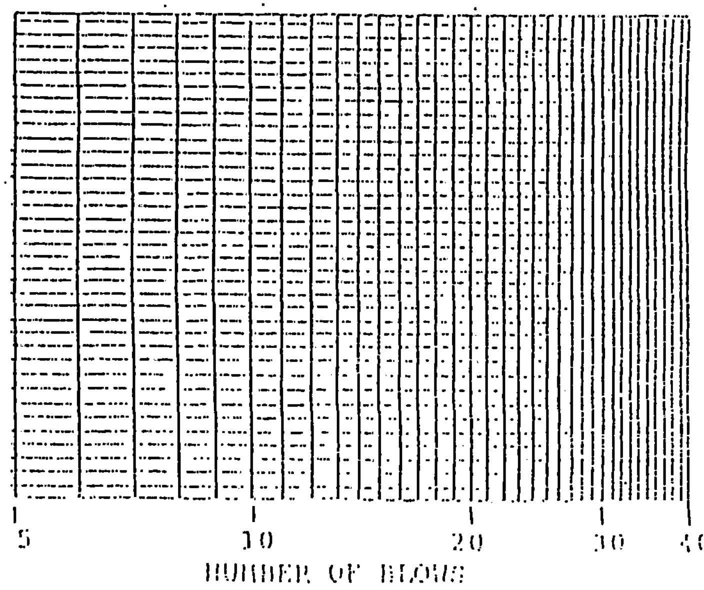
PL 29

PI 20

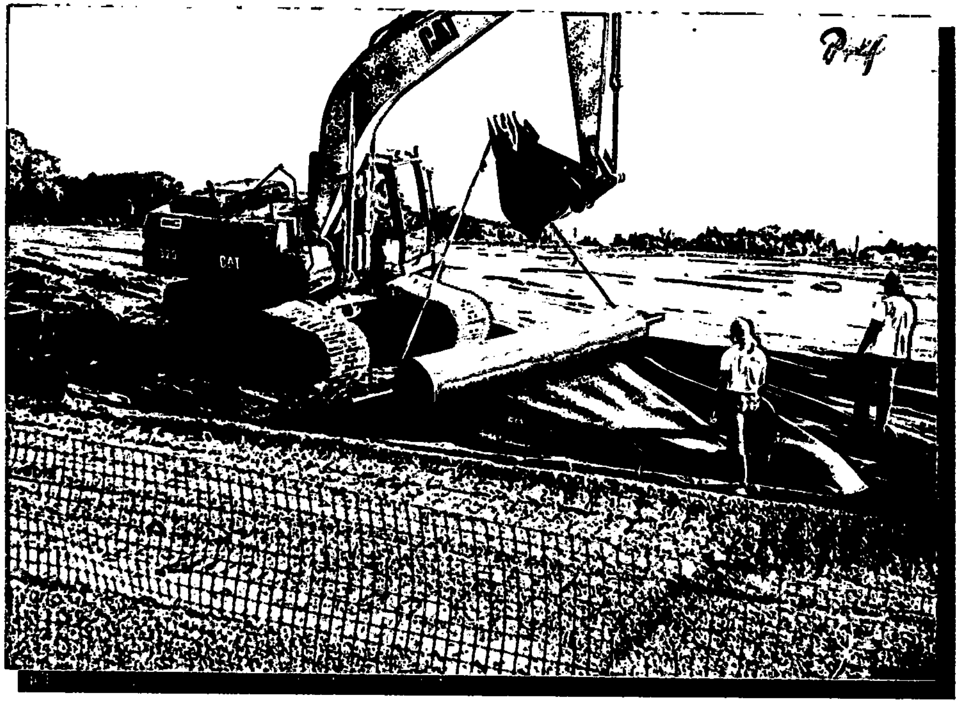
NAT. M/C %____

SOIL TYPE____

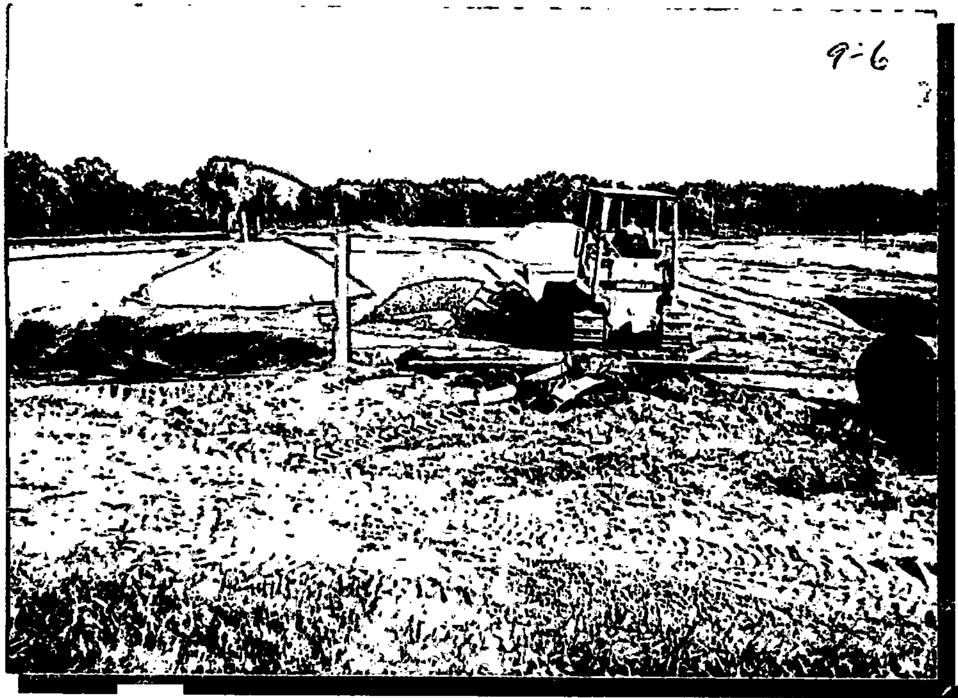




# APPENDIX G
# PHOTOGRAPHIC LOG



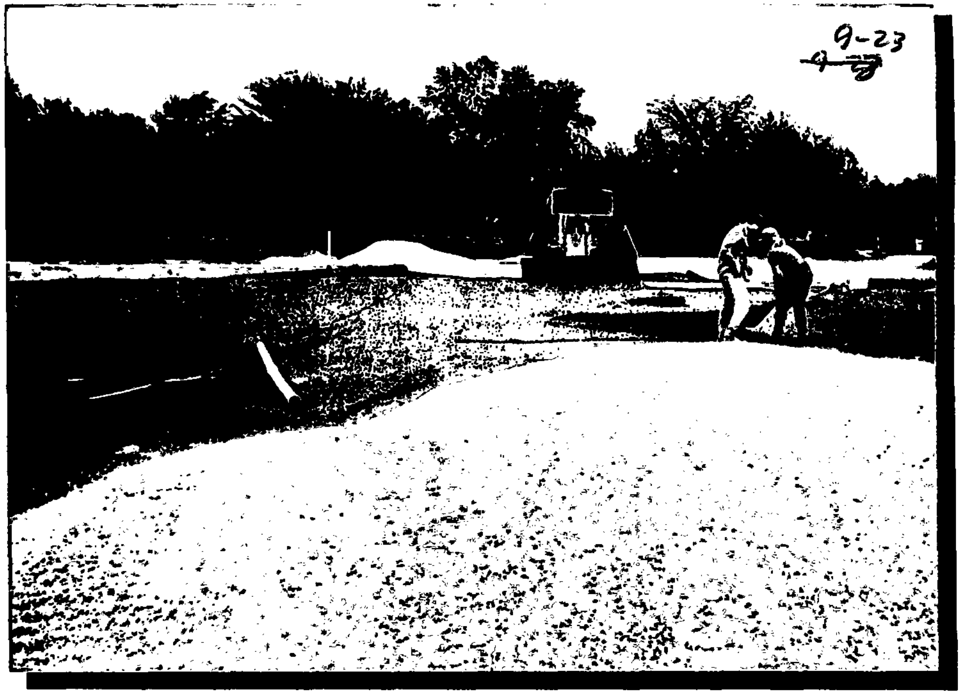
1. Placing Type II geotextile over initial grade.



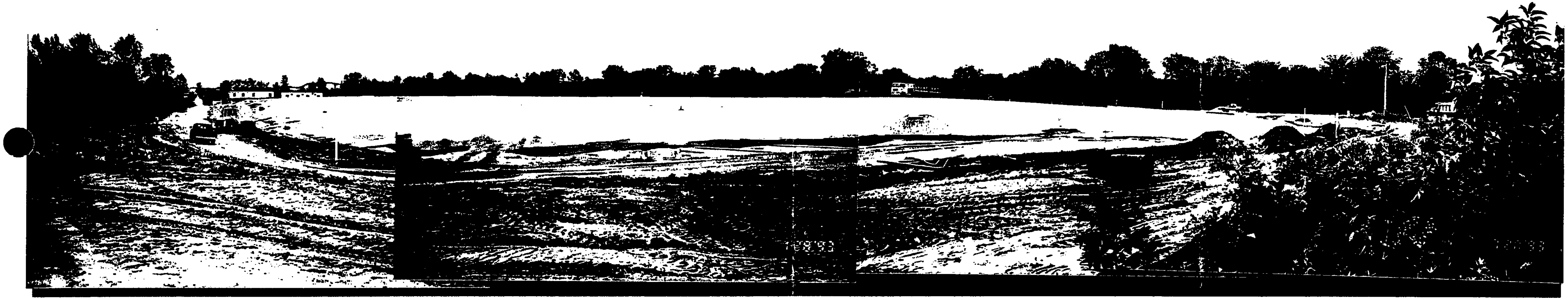
2. Placing working surface material over Type II geotextile.

3. Placing working surface material over Type II geotextile.

4. Placing working surface material over Type II geotextile.



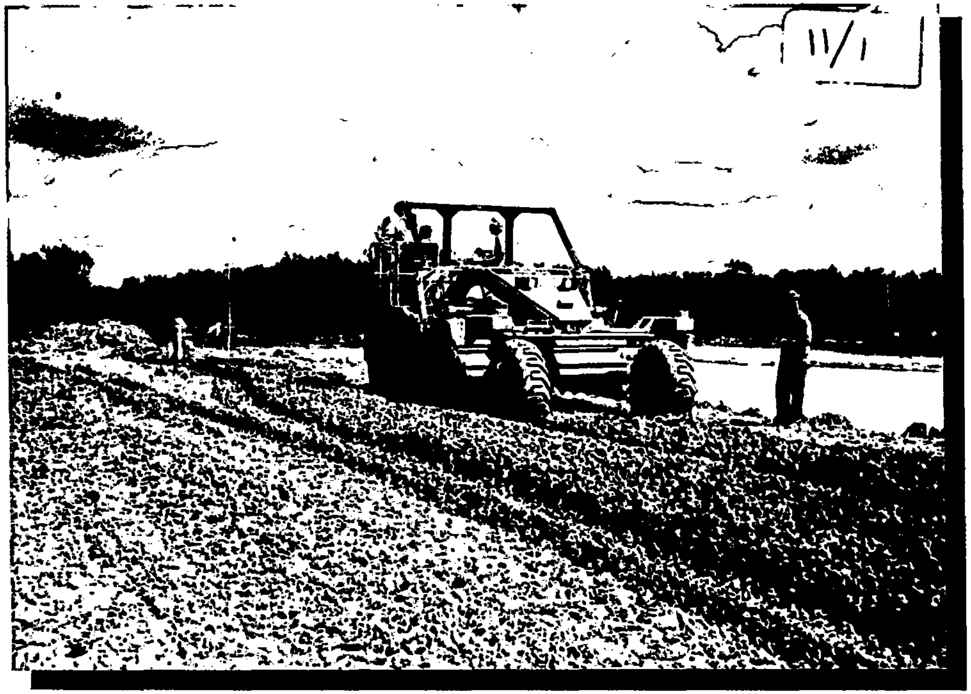
5. Placing geotextile and working surface.



10/5

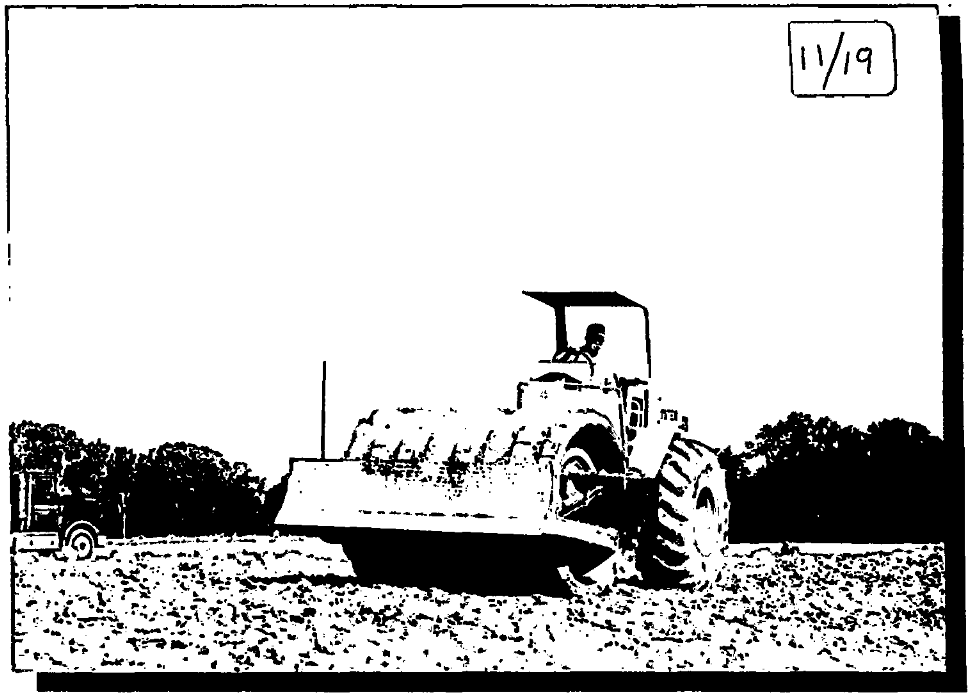
10/7

6. Working surface placed.



11/1

7. Rotovator breaking clay clods.

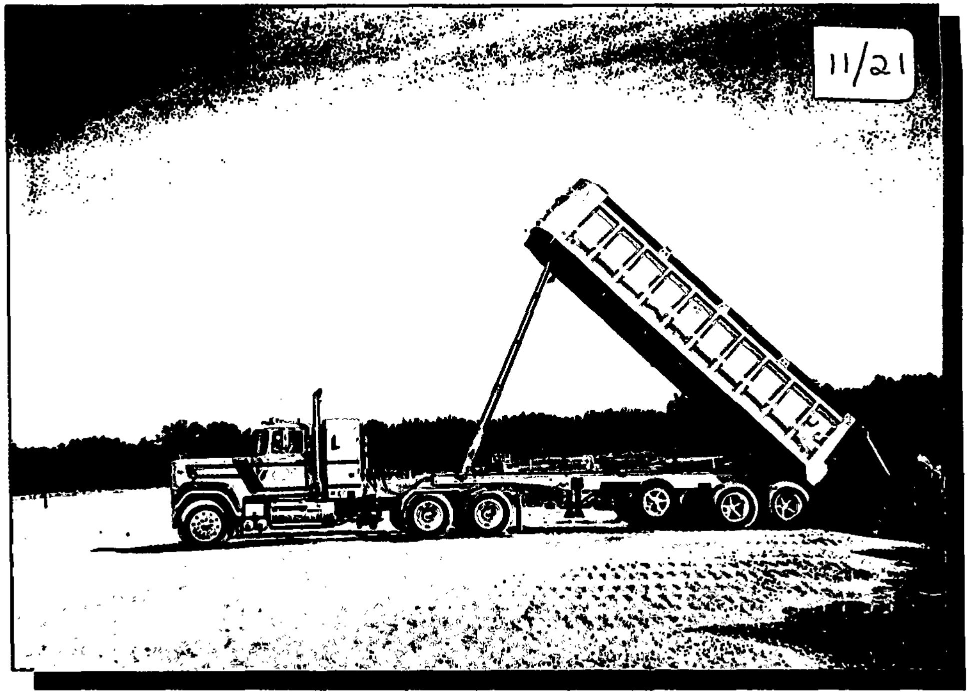


11/19

8. Sheeps foot roller compacting clay layer.

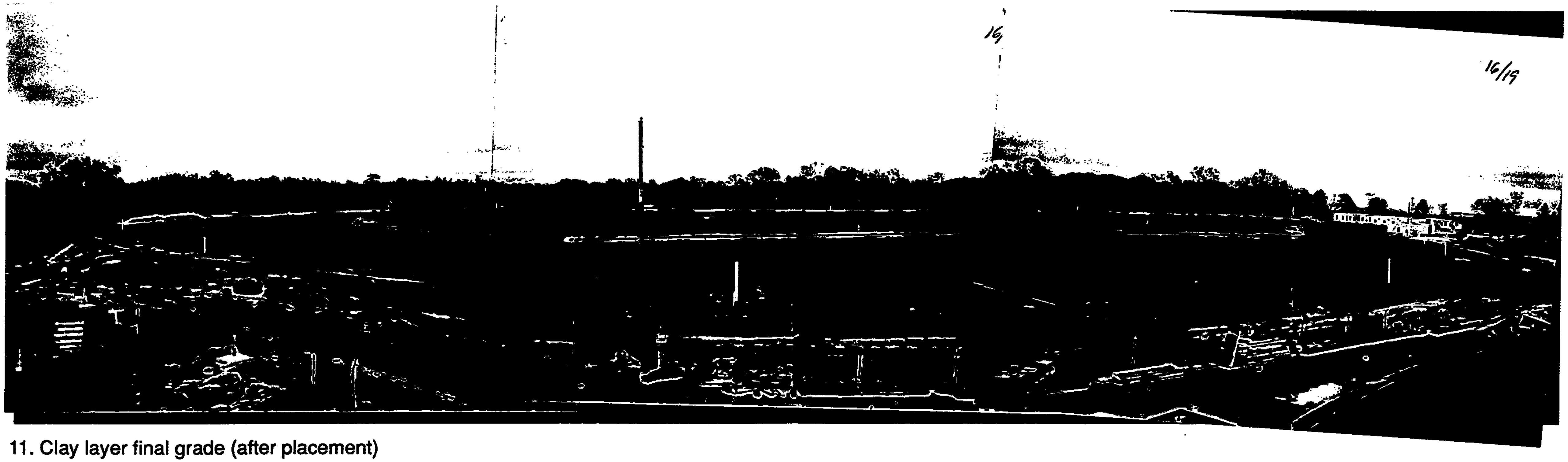
11/20

9. Cat DSC dozer working clay layer.

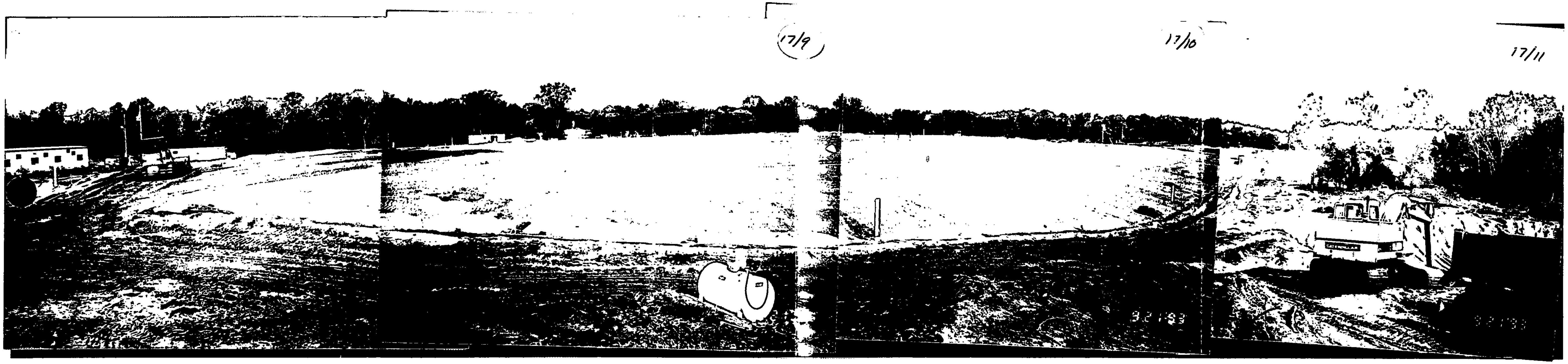


11/21

10. Clay being placed over the working surface.



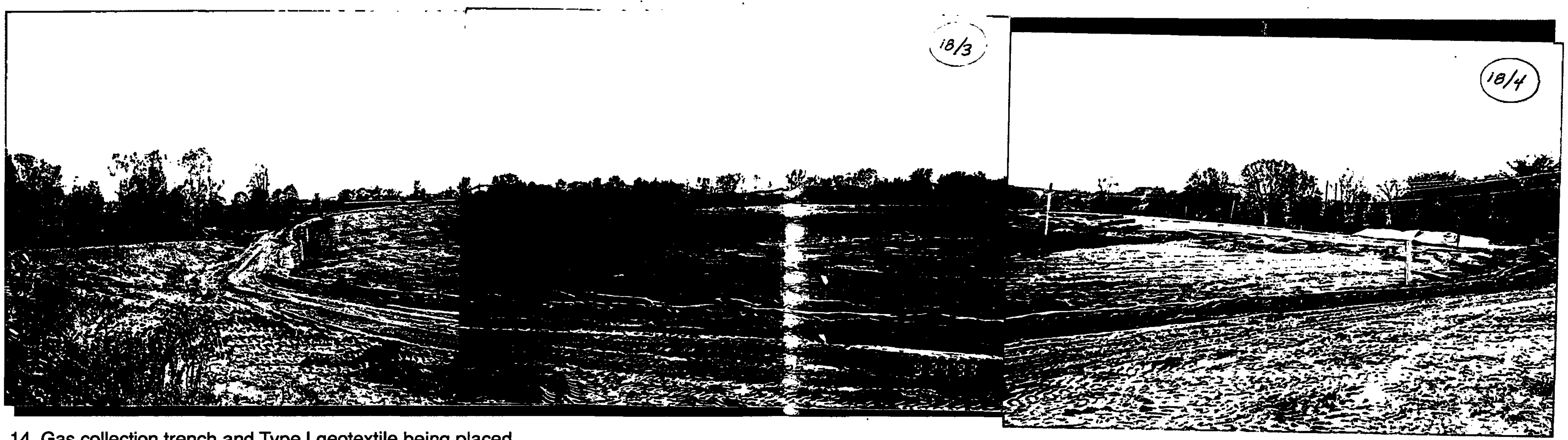
11. Clay layer final grade (after placement)



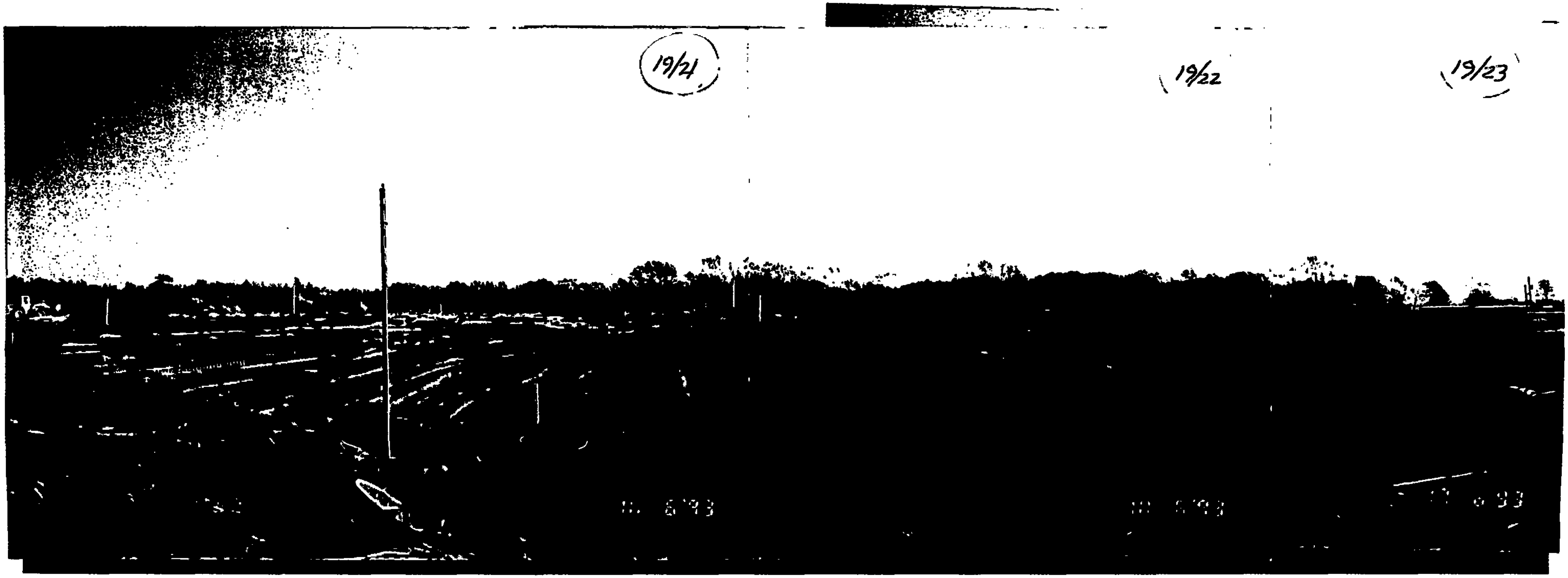
12. Sand drainage layer - placement almost complete.

18/9

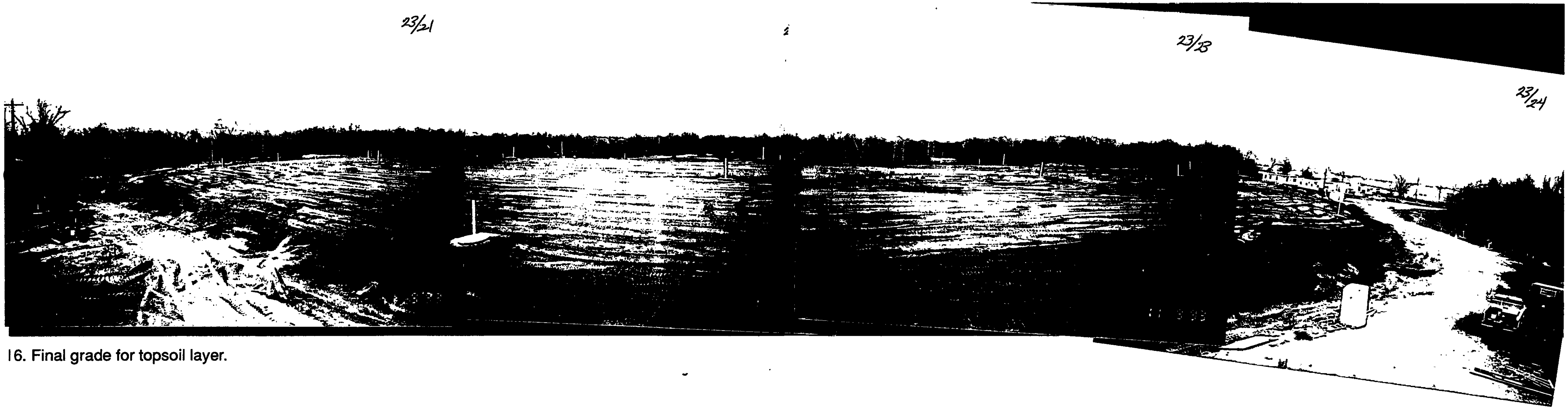
13. Coversoil and Type I geotextile placed over sand drainage layer.



14. Gas collection trench and Type I geotextile being placed.



15. Cover soil ____ placed over Type I geotextile.



16. Final grade for topsoil layer.

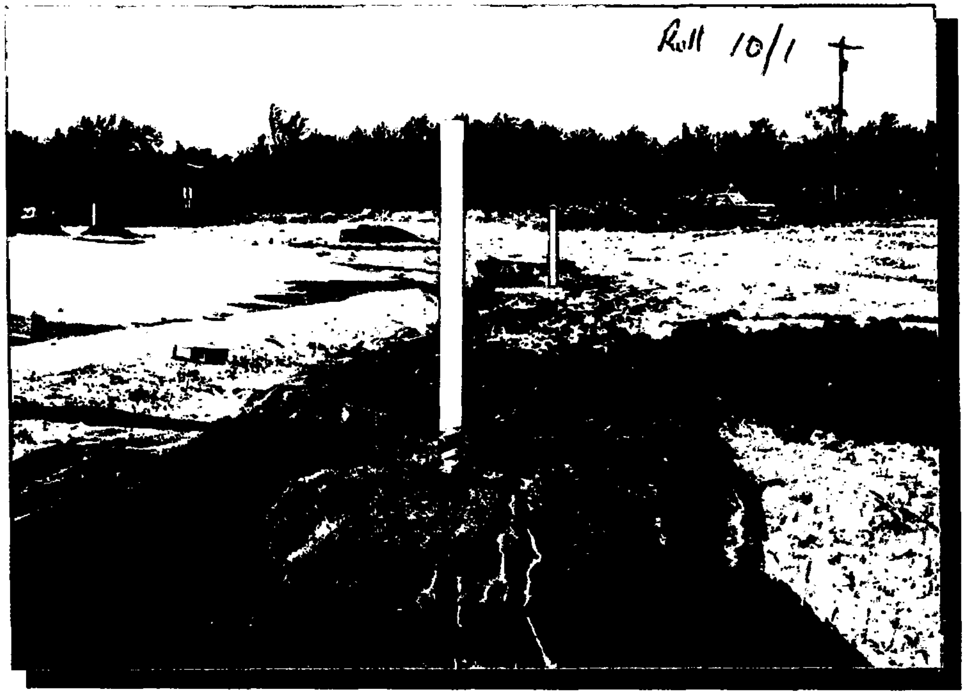
23/33

17. Seeding and mulching the cap.

23/31

18. Seeding and mulching the cap.

19. Cap after seeding and mulching.



20. Construction of landfill gas interceptor trench.

21. Construction of landfill gas interceptor trench.

# APPENDIX H
# CONSTRUCTION PLANS

# LANDFILL CAP REMEDIAL ACTION

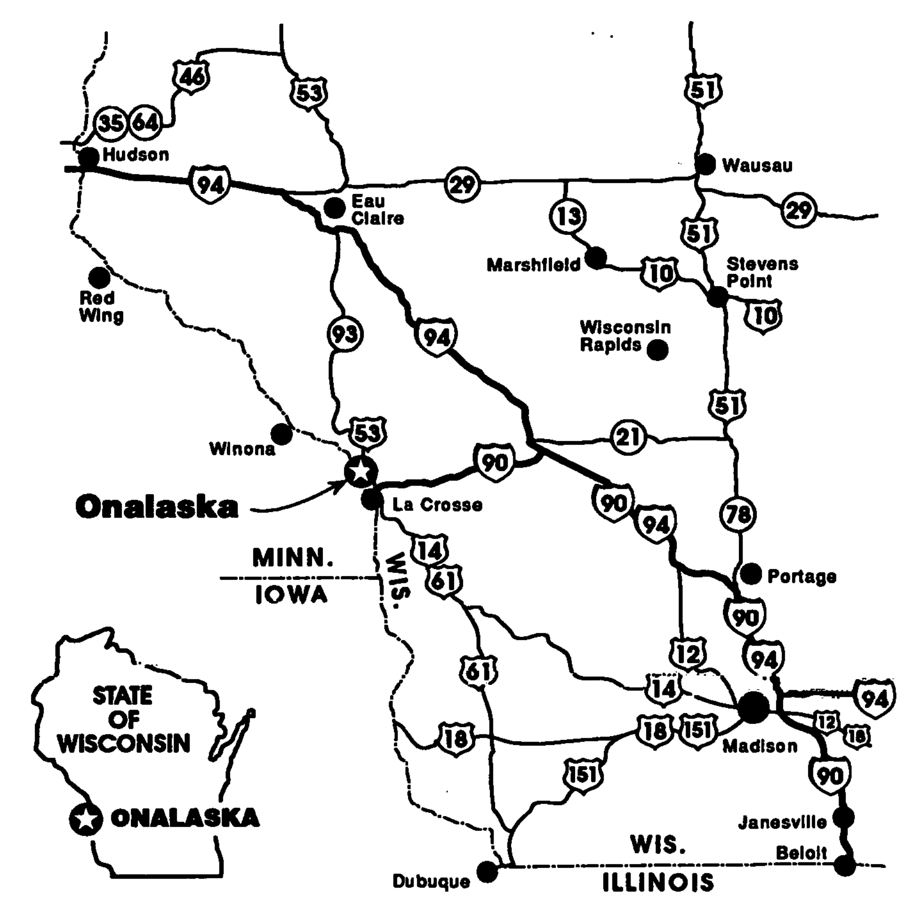
## Onalaska Township, Wisconsin

EPA

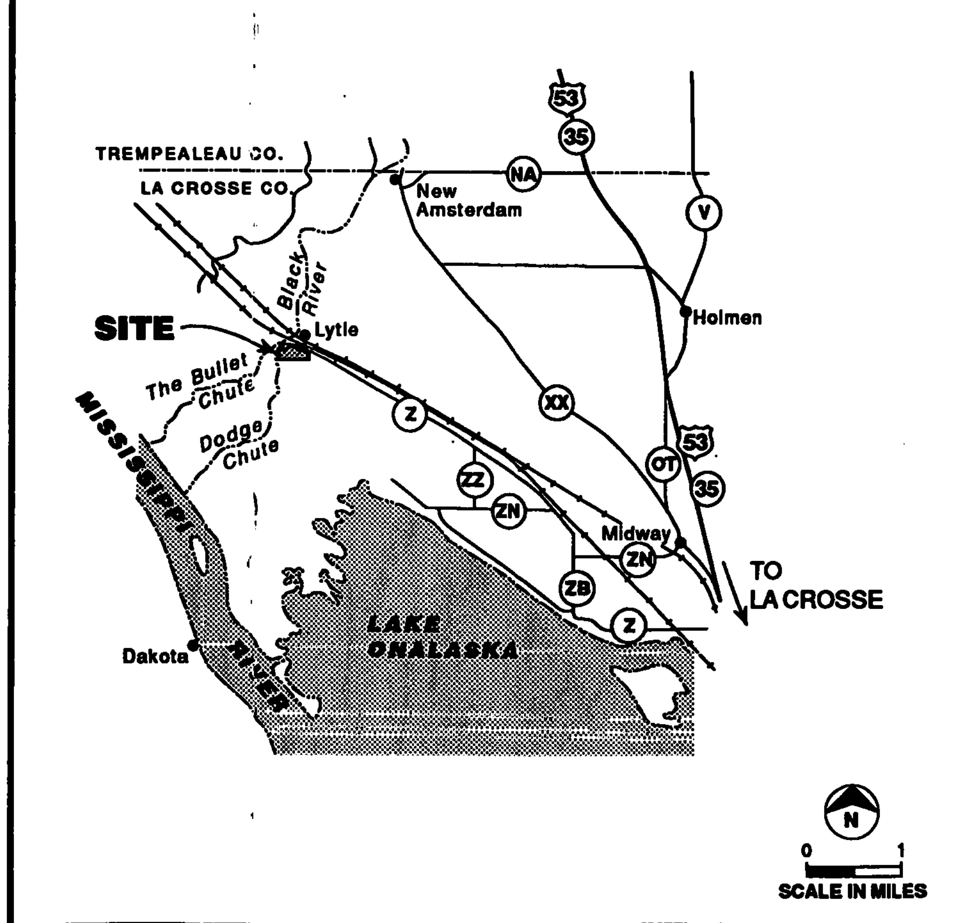
WISCONSIN
DEPT. OF NATURAL RESOURCES

| SHEET NUMBER | TITLE |
|---|---|
| 1 | TITLE, INDEX OF DRAWINGS, LOCATION & VICINITY MAPS |
| 2 | LEGEND, ABBREVIATIONS |
| 3 | GENERAL SITE PLAN |
| 4 | DEMOLITION PLAN |
| 5 | ROUGH GRADING PLAN |
| 6 | FINAL GRADING PLAN |
| 7 | DRAINAGE PIPING, LANDFILL GAS PIPING |
| 8 | RESTORATION PLAN |
| 9 | TYPICAL CAP SECTION DETAILS |
| 10 | APRON ENDWALL, PIPE NODE DETAILS |
| 11 | WELL DETAILS |
| 12 | LANDFILL GAS VENT AND TRENCH DETAILS |
| 13 | SILT FENCE, ACCESS ROAD, AND CULVERT DETAILS |
| 14 | DECONTAMINATION PAD DETAILS |
| 15 | SIGN, CEDAR FENCE, AND TREE PLANTING DETAILS |
| 16-23 | LANDFILL CAP SECTIONS |

## SITE VICINITY MAP



## SITE LOCATION MAP



CH2M HILL

DSGN M.W. Paddock
DR M.M. Schuetz
CHK C.A. Lawrence
APVD J.B. Russell

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LANDFILL CAP REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

ONALASKA LANDFILL, ONALASKA, WI
**TITLE**
**INDEX OF DRAWINGS**
**LOCATION & VICINITY MAPS**

SHEET 1
DWG NO.
DATE MARCH 1992
PROJ NO. GLO65602

GLO65602.LC.P3 COVER 22x34 6-1-92mms

# CIVIL LEGEND

| EXISTING | THIS SUBCONTRACT | |
|---|---|---|
| - - - 96.5 - - - | ——96.5—— | CONTOUR LINE |
| | ⊘ 93.6 | SPOT ELEVATION |
| ⊤⊤ | ⊤⊤ | GROUND SLOPE DESIGNATION |
| 5+00 | 5+00 | ROAD CENTERLINE STATIONING |
| - - - - - | | GRAVEL ROAD |
| ═══ | ═══ | EXISTING ROADS TO REMAIN |
| >——< | >——< | CULVERT |
| ■ CB | ■ CB | CATCH BASIN, STORMWATER INLET |
| ● | ● | MANHOLE |
| ● | ● | ELECTRICAL MANHOLE |
| □ | □ | ELECTRICAL HANDHOLE |
| ┼ | ┼ | AREA-LIGHTING BASE |
| △ | | SURVEY BASE LINE MONUMENT |
| ⊗ | ⊗ | STRUCTURE LOCATION POINT |
| ⊗ MW3 | ⊗ MW3 | GROUNDWATER MONITORING WELL |
| —— ··· ——→ | —— ··· ——→ | DRAINAGE WAY OR DITCH |
| | — — — — | DRAWING MATCH LINE |
| —·—·— | —·—·— | CENTERLINE, BUILDING, ROAD, ETC. |
| □ OR ○ | □ OR ○ | STRUCTURE |
| [- - -] | [- - -] | GRAVEL AREA |
| —•——•— | | EXISTING FENCE TO REMAIN |
| —o——o— | —o——o— | TEMPORARY FENCE |
| ——\/—— | ——\/—— | GATE (SHOWN WITH FENCE TYPES ABOVE) |
| ——/—— | ——/—— | POWER POLE WITH GUY SUPPORT |
| ——•——P—— | ——•——P—— | OVERHEAD POWER LINE |
| ——T—— | | UNDERGROUND TELEPHONE LINE |
| | [— — — —] | STAGING AREA |
| | ——///—— | SILT FENCE |
| o | | FOUND IRON PIPE |
| | ▽ | WATER SURFACE |
| ✿ | | EXISTING TREES AND SHRUBS |
| | ❋ | EXISTING TREES AND SHRUBS TO BE REMOVED |

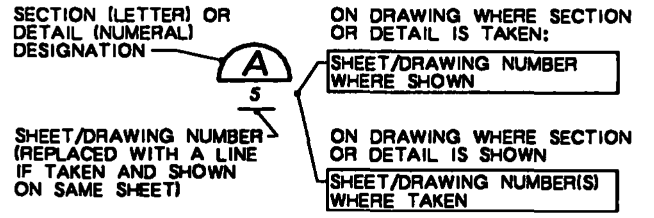
| | |
|---|---|
| ▦ | EARTH |
| ▩ | TOPSOIL |
| ░ | SAND |
| ▨ | CLAY |
| ▥ | COVER SOIL |
| ▦ | WORKING SURFACE |
| ▒ | GRADING LAYER |
| ▩ | COARSE AGGREGATE |
| ⦀ | LIMITS OF TOPSOIL AND SEEDING (UNLESS OTHERWISE NOTED) |
| ▲ | PROJECT BENCH MARK |
| △ | PI (POINT OF INTERSECTION) |
| 35.7 △ | VPI (VERTICAL POINT OF INTERSECTION) AND FINISH GRADE ELEVATION |
| △ | HORIZONTAL CONTROL POINT |
| ⊙ | RADIAL POINT |
| ⊗ LG-1 | LANDFILL GAS MONITORING WELL NEST |
| ⊙ | EXTRACTION WELL |
| □ | DI (DROP INLET) |
| ◎ HI | SET 1" IRON PIPE |
| ● | SET PK NAIL |
| ⊚ | SET LEAD PLUG WITH TACK |
| ③ | AIR MONITORING STATION |

**CURVE DATA**

R = RADIUS
DEL = DELTA
L = LENGTH
T = TANGENT
LC = LONG CHORD

PI = POINT OF INTERSECTION
PC = POINT OF CURVATURE
PT = POINT OF TANGENCY

| | |
|---|---|
| ═╪═╪═ | RAILROAD TRACKS |
| ɋ | SIGN |
| ☼ | LIGHT STANDARD |
| —— - - —— | PROPERTY LINE/RIGHT OF WAY |
| —o—x—o— | CHAIN-LINK RAILING |
| - - - - - - | EASEMENT LINE |
| ———·——— | STREET CENTERLINE |
| ——————— | SURVEY OR SUBDIVISION BOUNDARY |
| —— — —— | CONSTRUCTION STAGING AREA |
| ▩ | DEMOLITION AND/OR REMOVAL |



DETAIL AND SECTION DESIGNATION

# CIVIL ABBREVIATIONS

| | |
|---|---|
| A | ABANDONED |
| AGG | AGGREGATE |
| APPROX | APPROXIMATE |
| BM | BENCHMARK |
| C | MALE CONNECTOR |
| C/L | CENTERLINE |
| CMP | CORREGATED METAL PIPE |
| D | DEEP |
| DI | DROP INLET |
| DECON | DECONTAMINATION |
| DIA | DIAMETER |
| E | EAST OR EASTING |
| EXST | EXISTING |
| EXT | EXTENSION |
| FC | FEMALE CONNECTOR |
| FMC | FLUSH MOUNT COVER |
| GW | GROUNDWATER |
| HDPE | HIGH DENSITY POLYETHYLENE |
| I.D | INSIDE DIAMETER |
| INV | INVERT |
| M | MEDIUM |
| MAX | MAXIMUM |
| MIN | MINIMUM |
| N | NORTH OR NORTHING |
| NA | NOT APPLICABLE |
| NTS | NOT TO SCALE |
| OBSC | OBSCURED |
| PVC | POLY VINYL CHLORIDE |
| RAD | RADIUS |
| RD | ROAD |
| S | SHALLOW |
| TYP | TYPICAL |

CH2M HILL

| | | NO. | DATE | REVISION | BY | APVD |
|---|---|---|---|---|---|---|
| DSGN | MW PADDOCK | | | | | |
| DR | PT KUTZ | | | | | |
| CHK | MA SCHMIEGE | | | | | |
| APVD | JB RUSSELL | | | | | |

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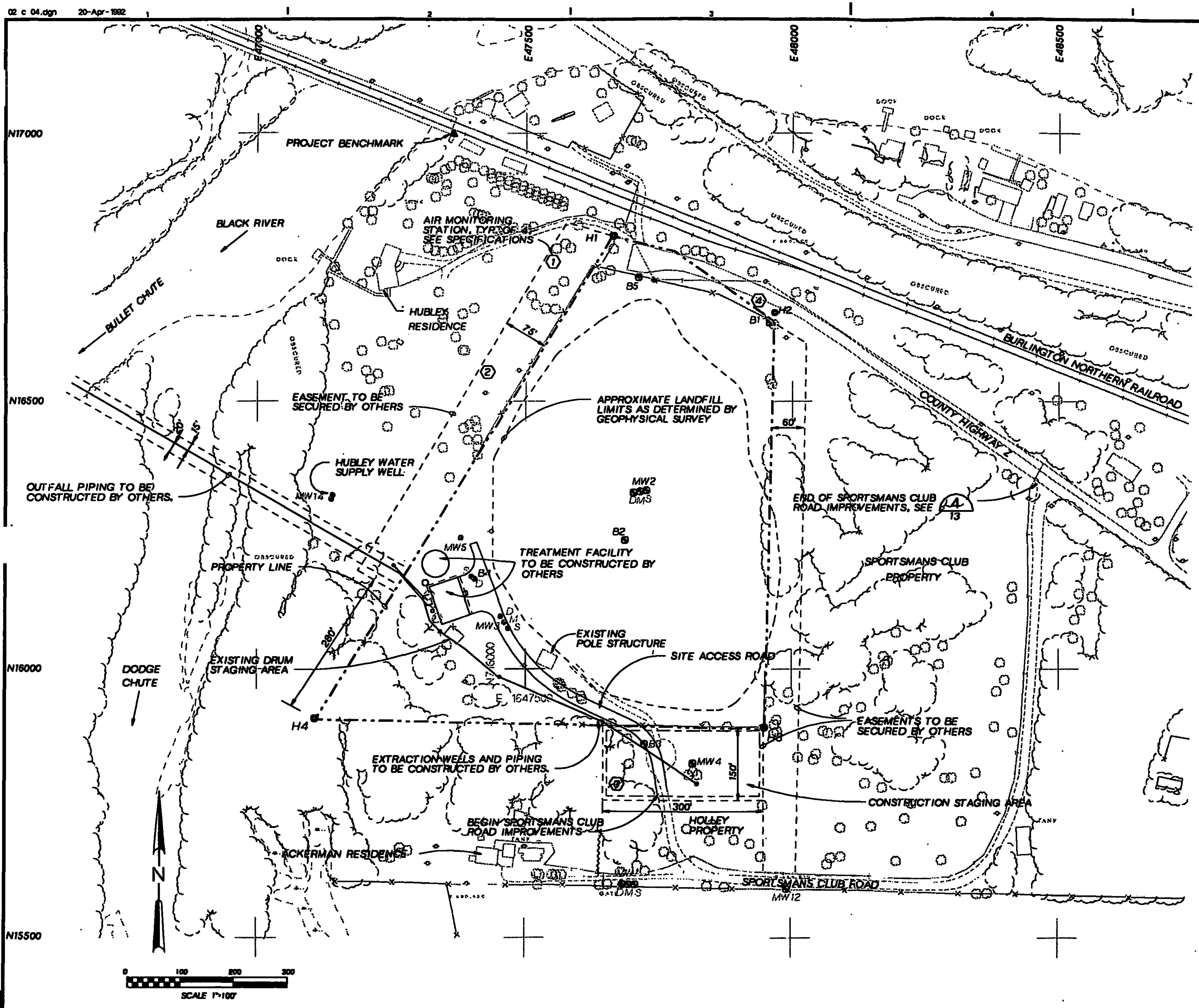
LANDFILL CAP REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

## LEGEND AND ABBREVIATIONS

SHEET 2
DWG NO. 02-G-01
DATE JUNE 1992
PROJ NO. GLO65602.LC



VERTICAL CONTROL

PROJECT BENCHMARK:

CHISELED "X" IN THE SOUTHEAST WINGWALL ON THE RAILROAD TRESTLE, ELEVATION = 657.09

VERTICAL DATUM BASIS IS USGS 1929. ELEVATION ESTABLISHED BY OTHERS FROM THE FOLLOWING LA CROSSE COUNTY BENCHMARKS:

1. PK NAIL IN FRONT OF MARY JANE FRITZ COTTAGE W8602 LYTLE ROAD, ELEVATION 660.02.
2. CHISELED SQUARE IN SE CORNER OF CURBING AROUND ONALASKA TOWNSHIP HONOR ROLL MEMORIAL AT INTERSECTION OF COUNTY ROAD ZN AND COUNTY ROAD OT, ELEVATION 653.03.

HORIZONTAL CONTROL

| POINT | NORTHING | EASTING | DESCRIPTION |
|---|---|---|---|
| H1 | 16809.40 | 47660.98 | 1" IRON PIPE |
| H2 | 16665.53 | 47965.52 | 1" IRON PIPE |
| H3 | 15887.77 | 47950.28 | 1" IRON PIPE |
| H4 | 15906.08 | 47109.21 | 1" IRON PIPE |

HORIZONTAL DATUM BASIS IS ASSUMED PROJECT COORDINATE GRID SYSTEM. TRANSFORMATION TO WISCONSIN STATE PLANE 2 ZONE COORDINATES CAN BE ACCOMPLISHED BY ADDING 700,000 TO THE NORTHING AND 1,600,000 TO THE EASTING.

NOTES:

1. CONSTRUCTION LIMITS COINCIDE WITH PROPERTY LINE AND/OR EASEMENTS UNLESS OTHERWISE NOTED.
2. BASE MAPPING BY MARTINEZ CORPORATION. SITE WAS FLOWN ON 11-11-88. ORIGINAL MAPPING WAS PREPARED AT A SCALE OF 1"=100'.
3. SUBCONTRACTOR MUST SHARE THE SITE, INCLUDING THE STAGING AREA WITH OTHER SUBCONTRACTORS. SCHEDULING OF WORK IS CRITICAL. SEE SPECIFICATIONS.

CH2M HILL

DSGN MW PADDOCK
DR PT KUTZ
CHK MA SCHMIEGE
APVD JB RUSSELL

| NO. | DATE | REVISION | BY | APVD |
|---|---|---|---|---|
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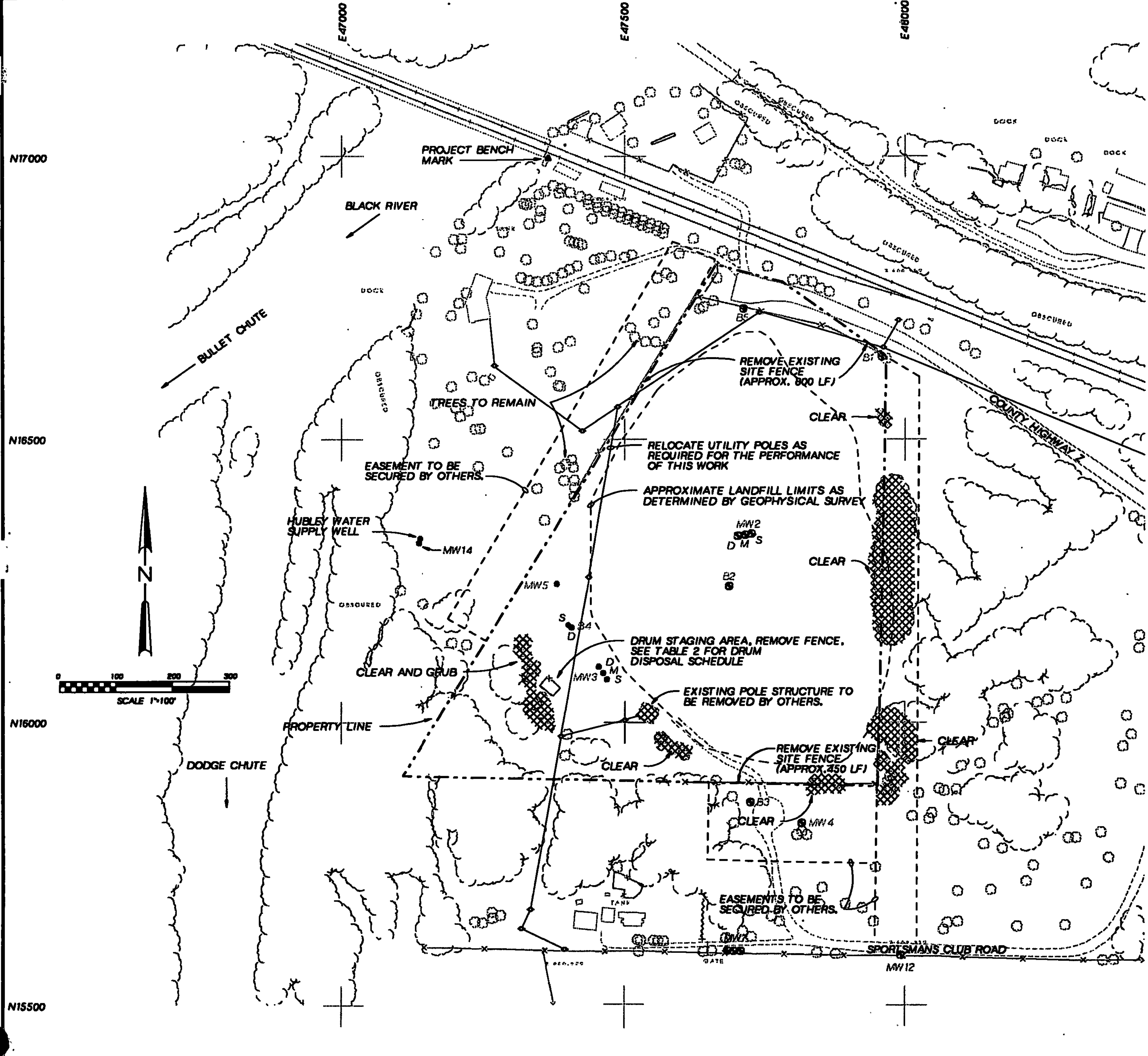
LANDFILL CAP REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

# GENERAL SITE PLAN

SHEET 3
DWG NO. 02-C-04
DATE JUNE 1992
PROJ NO. GLO65502.LC



## TABLE 1

### MONITORING WELL ABANDONMENT, EXTENSION, AND FLUSH MOUNT SCHEDULE

| MONITORING WELL NUMBER | COORDS. NORTHING EASTING | APPROX. TOTAL DEPTH (FT) | APPROX. EXISTING GRND.ELEV AT WELL | TOP OF WELL CASING ELEV. (FT) | ROUGH GRADE ELEV. AT WELL (FT) | FINAL GRADE ELEV. AT WELL (FT) | ACTION |
|---|---|---|---|---|---|---|---|
| B-1 | 16646.3<br>47957.3 | 35 | 660.1 | 662.9 | 660.1 | NA | A |
| B-2 | 16240.2<br>47685.4 | 54 | 664.7 | 666.6 | 665.0 | NA | A |
| B-3 | 15859.5<br>47722.1 | 30 | 659.4 | 660.6 | 659.4 | NA | A |
| B-4S | 16171.6<br>47399.9 | 22 | 654.8 | 656.2 | 654.5 | NA | A |
| B-4D | 16169.9<br>47402.6 | 52 | 654.6 | 656.2 | 654.5 | NA | A |
| B-5 | 16731.4<br>47709.9 | 23 | 659.9 | 661.9 | 659.9 | NA | A |
| MW-2S | 16332.9<br>47725.4 | 28 | 661.8 | 663.8 | 664.0 | 669.5 | EXT |
| MW-2M | 16331.3<br>47713.9 | 78 | 662.3 | 664.3 | 663.5 | 670.0 | EXT |
| MW-2D | 16329.6<br>47700.6 | 134 | 662.2 | 664.4 | 663.0 | 670.7 | EXT |
| MW-3S | 16074.5<br>47468.1 | 18 | 653.4 | 655.9 | 653.4 | NA | A |
| MW-3M | 16086.3<br>47461.0 | 80 | 653.2 | 654.9 | 653.2 | NA | A |
| MW-3D | 16098.1<br>47454.5 | 140 | 653.5 | 655.7 | 653.5 | NA | A |
| MW-5 | 16244.1<br>47380.1 | 22 | 655.8 | 658.9 | 655.8 | 655.0 | FMC |
| MW-14 | 16324.0<br>47140.0 | 16 | 654.4 | 656.2 | 654.4 | 654.4 | FMC |

**NOTES:**

1. GROUNDWATER MONITORING WELLS DESIGNATED FOR ABANDONMENT SHALL BE ABANDONED PER THE REQUIREMENTS OF NR141.
2. GROUNDWATER MONITORING WELLS 4,7,AND 12 REQUIRE NO ACTION.
3. SEE $\frac{1}{11}$ FOR MONITORING WELL EXTENSION CONSTRUCTION.
4. SEE $\frac{2}{11}$ FOR FLUSH MOUNT COVER CONSTRUCTION.
5. *THE HUBLEY WATER SUPPLY WELL IS ADJACENT TO MW 14. CARE SHALL BE TAKEN DURING INSTALLATION OF THE FLUSH MOUNT COVER AT MW14 TO PREVENT DAMAGE TO THIS WELL.*
6. *REMOVE AND DISPOSE OF ALL DEBRIS ONSITE AS DIRECTED BY THE CONTRACTOR.*

## TABLE 2

### DRUM DISPOSAL SCHEDULE

| FIELD MARKINGS | QUANTITY |
|---|---|
| "DRILL CUTTINGS" | 10 |
| "DISPOSABLE CLOTHING" | 4 |
| "DISPOSABLE CLOTHING AND REFUSE" | 2 |
| "TEST PIT REFUSE" | 3 |
| "DECON PAD WATER" | 2 |
| "LAB GLASSWARE" | 1 |

**NOTES**

1. *DRUM CONTENTS SHALL BE EMPTIED ON SITE AND DISPOSED OF BENEATH THE LANDFILL CAP GRADING LAYER.*
2. *EMPTIED DRUMS SHALL BE CRUSHED FLAT AND DISPOSED OF BENEATH THE LANDFILL CAP GRADING LAYER.*

CH2M HILL

| | |
|---|---|
| DSGN | MW PADDOCK |
| DR | PT KUTZ |
| CHK | MA SCHMIEGE |
| APVD | JB RUSSELL |

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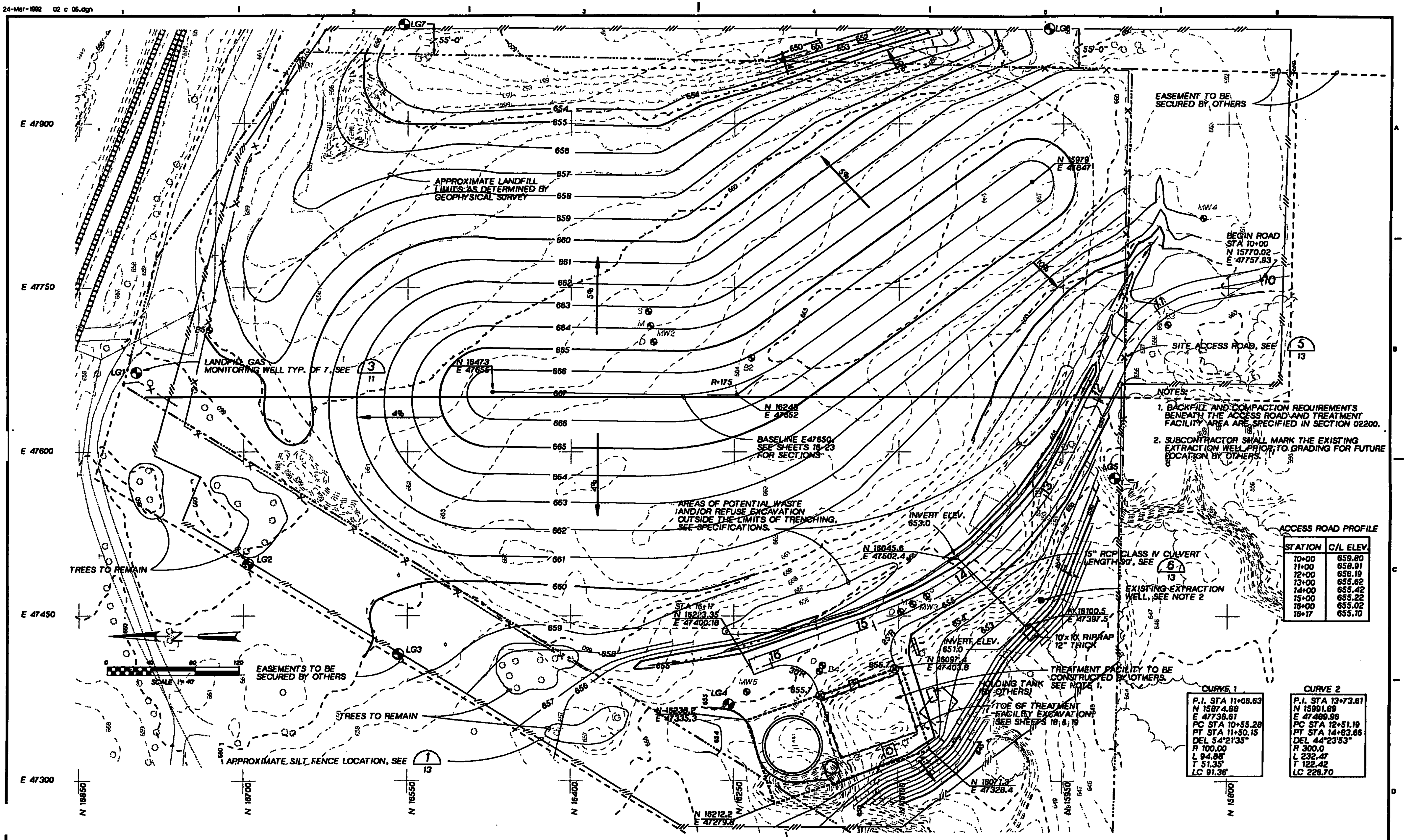
LANDFILL CAP REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

# DEMOLITION PLAN
# MONITORING WELL ACTION SCHEDULE
# DRUM DISPOSAL SCHEDULE

SHEET 4
DWG NO. 02-C-05
DATE JUNE 1992
PROJ NO. GLO65602.LC

24-Mar-1992 02 c 06.dgn



NOTES:

1. BACKFILL AND COMPACTION REQUIREMENTS BENEATH THE ACCESS ROAD AND TREATMENT FACILITY AREA ARE SPECIFIED IN SECTION 02200.
2. SUBCONTRACTOR SHALL MARK THE EXISTING EXTRACTION WELL PRIOR TO GRADING FOR FUTURE LOCATION BY OTHERS.

ACCESS ROAD PROFILE

| STATION | C/L ELEV. |
|---|---|
| 10+00 | 659.80 |
| 11+00 | 658.91 |
| 12+00 | 656.19 |
| 13+00 | 655.62 |
| 14+00 | 655.42 |
| 15+00 | 655.22 |
| 16+00 | 655.02 |
| 16+17 | 655.10 |

CURVE 1

P.I. STA 11+06.63
N 15874.88
E 47738.61
PC STA 10+55.28
PT STA 11+50.15
DEL 54°21'35"
R 100.00
L 94.88'
T 51.35'
LC 91.36'

CURVE 2

P.I. STA 13+73.61
N 15991.89
E 47489.96
PC STA 12+51.19
PT STA 14+83.66
DEL 44°23'53"
R 300.0
L 232.47
T 122.42
LC 226.70

CH2M HILL

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| DSGN | MW PADDOCK<br>JB RUSSELL | | | | | | |
| DR | PT KUTZ | | | | | | |
| CHK | MA SCHMIEGE | | | | | | |
| APVD | JB RUSSELL | NO. | DATE | REVISION | BY | APVD | |

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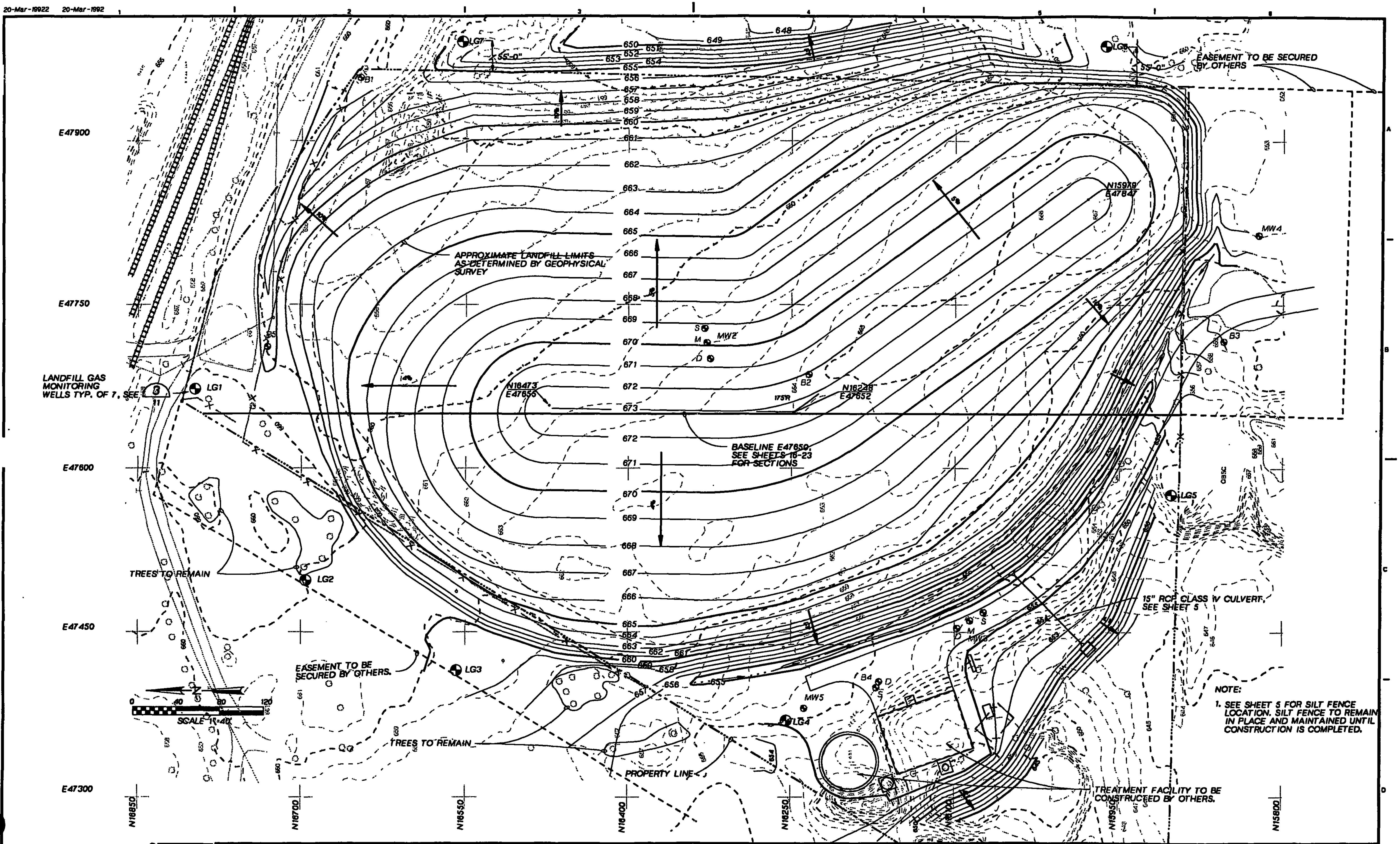
LANDFILL CAP REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

## ROUGH GRADING PLAN

SHEET 5
DWG NO. 02-C-06
DATE JUNE 1992
PROJ NO. GLO65602.LC

20-Mar-19922 20-Mar-1992



NOTE:

1. SEE SHEET 5 FOR SILT FENCE LOCATION. SILT FENCE TO REMAIN IN PLACE AND MAINTAINED UNTIL CONSTRUCTION IS COMPLETED.

CH2M HILL

| | | | | | | |
|---|---|---|---|---|---|---|
| DSGN MW PADDOCK | | | | | | |
| DR PT KUTZ | | | | | | |
| CHK MA SCHMIEGE | | | | | | |
| APVD JB RUSSELL | NO. | DATE | REVISION | BY | APVD | |

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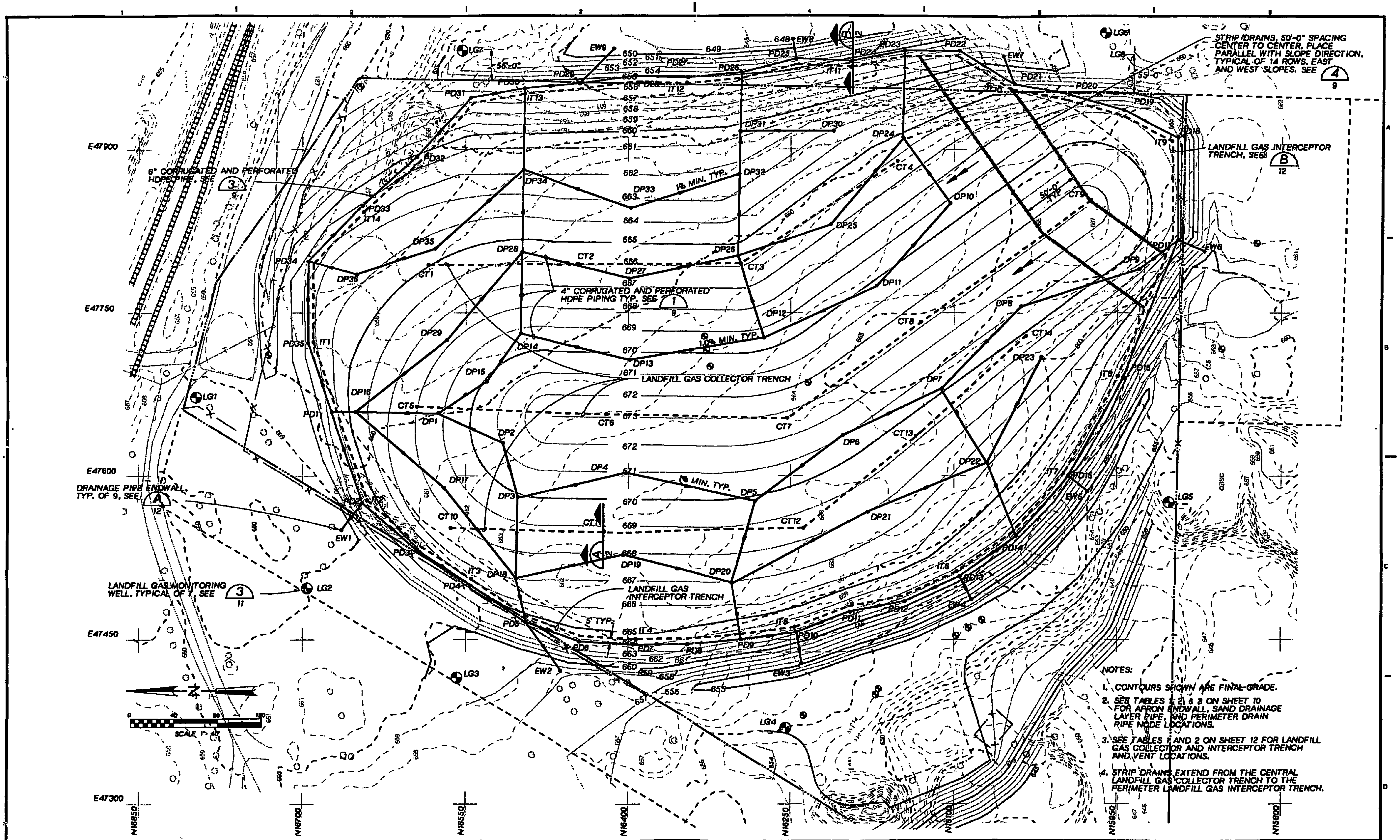
LANDFILL CAP REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

FINAL GRADING PLAN

SHEET 6
DWG NO. 02-C-07
DATE JUNE 1992
PROJ NO. GLO65602.LC



NOTES:

1. CONTOURS SHOWN ARE FINAL GRADE.
2. SEE TABLES 1, 2 & 3 ON SHEET 10 FOR APRON ENDWALL, SAND DRAINAGE LAYER PIPE, AND PERIMETER DRAIN PIPE NODE LOCATIONS.
3. SEE TABLES 1 AND 2 ON SHEET 12 FOR LANDFILL GAS COLLECTOR AND INTERCEPTOR TRENCH AND VENT LOCATIONS.
4. STRIP DRAINS EXTEND FROM THE CENTRAL LANDFILL GAS COLLECTOR TRENCH TO THE PERIMETER LANDFILL GAS INTERCEPTOR TRENCH.

CH2M HILL

DSGN MW PADDOCK
JB RUSSELL
DR MW PADDOCK
PT KUTZ
CHK MA SCHMIEGE
PP STECKER
APVD JB RUSSELL

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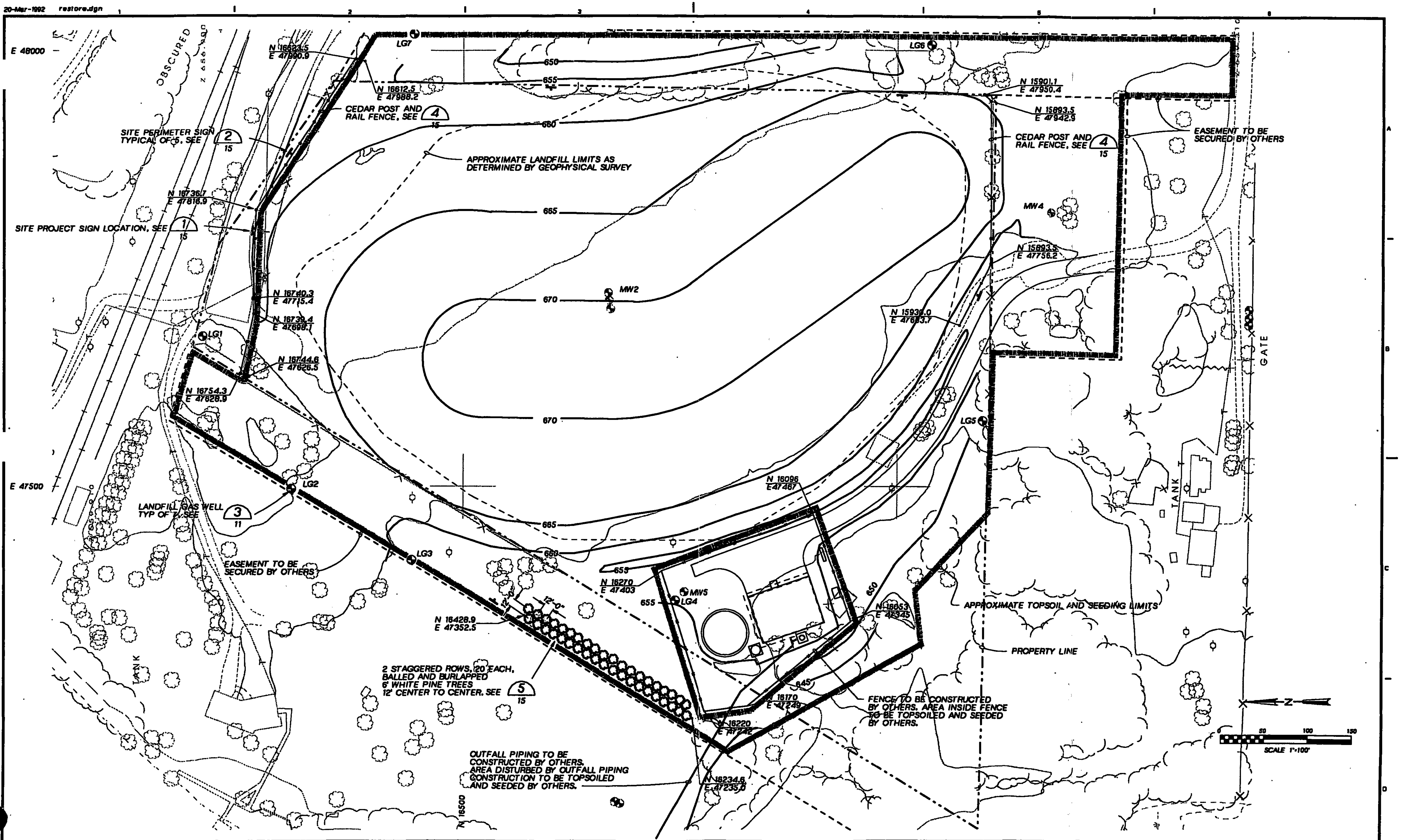
LANDFILL CAP REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

SAND DRAINAGE LAYER PIPING
LANDFILL GAS PIPING

SHEET 7
DWG NO. 02-C-08
DATE JUNE 1992
PROJ NO. GLO65602.LC

20-Mar-1992 restore.dgn



CH2M HILL

DSGN MW PADDOCK
DR MW PADDOCK PT KUTZ
CHK MA SCHMIEGE
APVD JB RUSSELL

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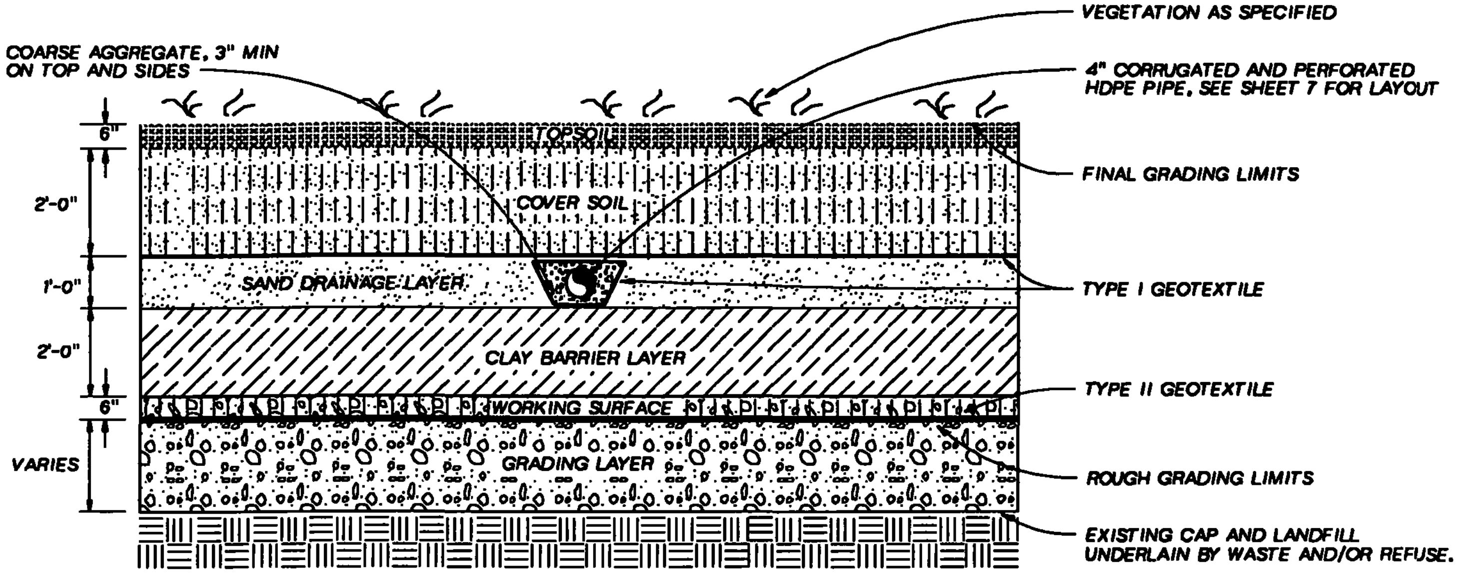
LANDFILL CAP REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

RESTORATION PLAN

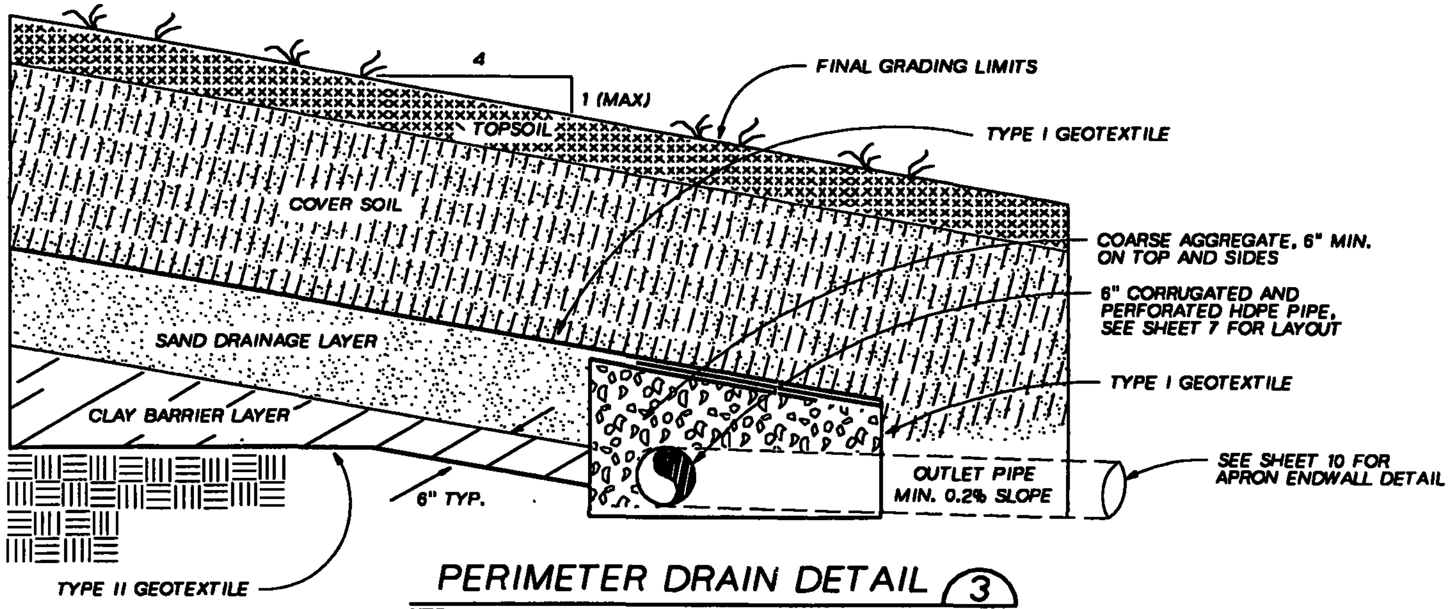
SHEET 8
DWG NO. 02-C-13
DATE JUNE 1992
PROJ NO. GLO55502.LC

22-Apr-1992 02 c 09.dgn



TYPICAL CAP CROSS SECTION DETAIL 1

NTS 16

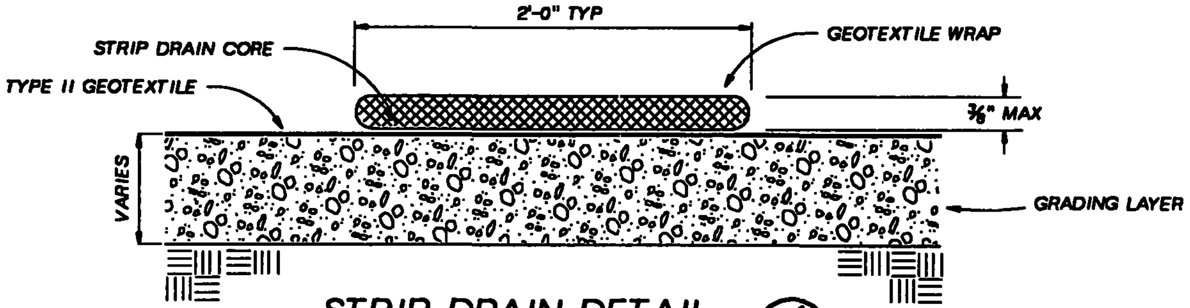


PERIMETER DRAIN DETAIL 3

NTS 7,16

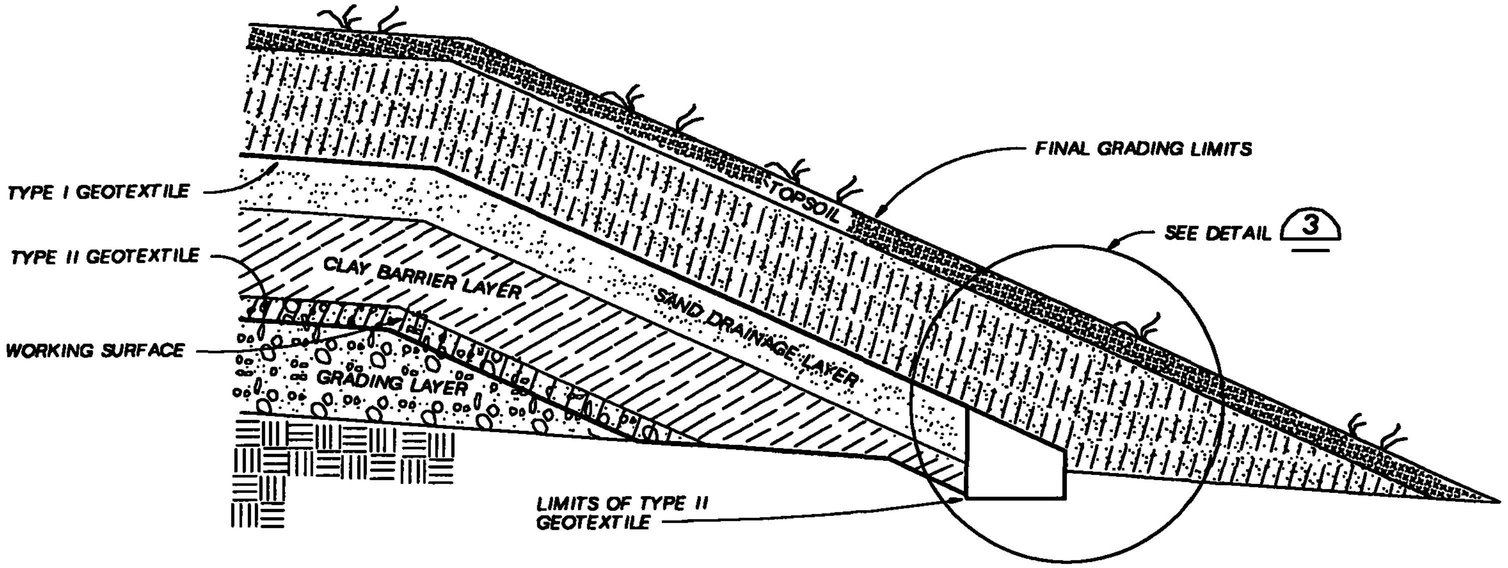
NOTE:

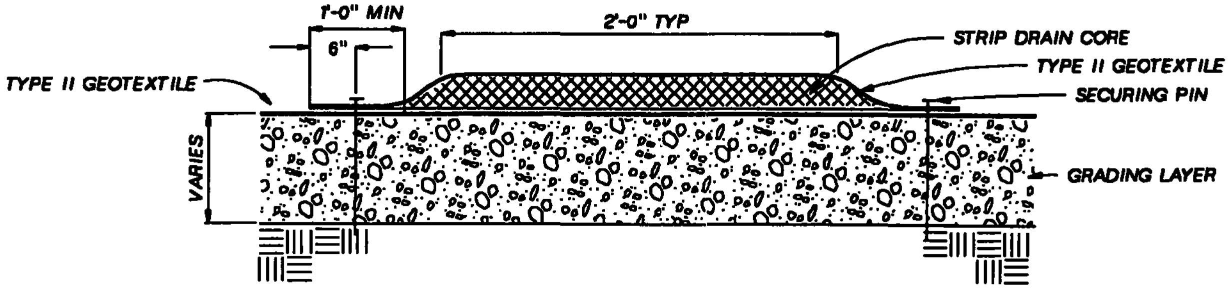
1. ALL GEOTEXTILES SHALL OVERLAP A MINIMUM OF 2'.
2. SEE TABLE 2 OF SHEET 10 FOR PERIMETER DRAIN PIPE NODE ELEVATIONS. SLOPE PERIMETER DRAIN PIPE UNIFORMLY BETWEEN NODES.



STRIP DRAIN DETAIL 4

NTS 7





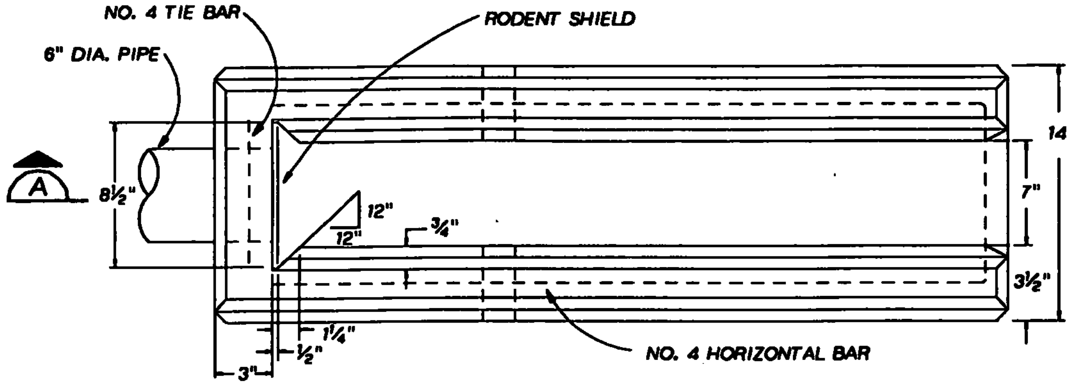
ALTERNATIVE STRIP DRAIN DETAIL 5

NTS

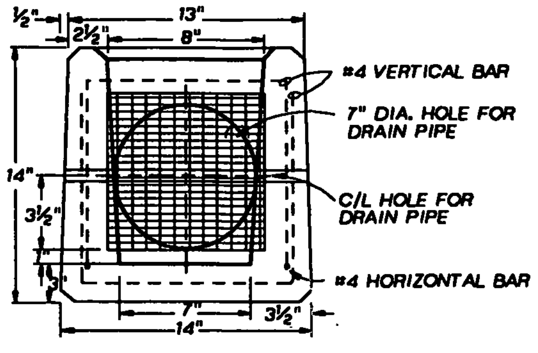
TYPICAL PERIMETER CAP CROSS SECTION DETAIL 2

NTS

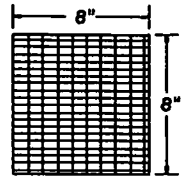
| CH2M HILL | DSGN MW PADDOCK<br>DR PT KUTZ<br>CHK IH JOHNSON<br>APVD JB RUSSELL | NO. | DATE | REVISION | BY | APVD | REUSE OF DOCUMENTS | BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY. | LANDFILL CAP REMEDIAL ACTION<br>ONALASKA MUNICIPAL LANDFILL SITE<br>ONALASKA TOWNSHIP, WISCONSIN | TYPICAL CAP SECTION DETAILS<br>PERIMETER DRAIN DETAIL<br>STRIP DRAIN DETAILS | SHEET 9<br>DWG NO. 02-C-09<br>DATE JUNE 1992<br>PROJ NO. GLO65602.LC |
|---|---|---|---|---|---|---|---|---|---|---|---|



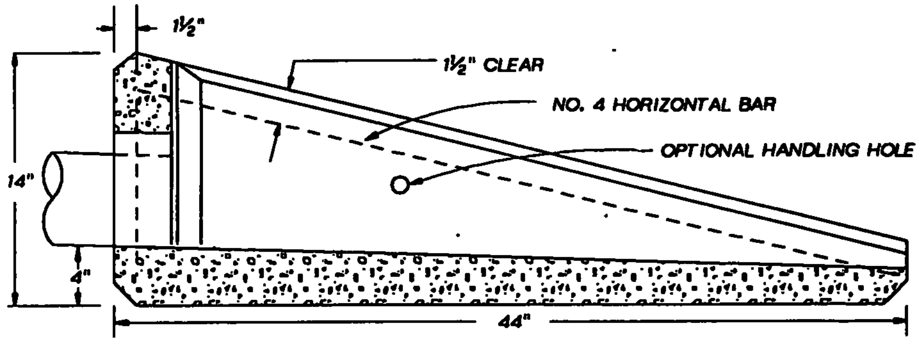
PLAN VIEW



END VIEW



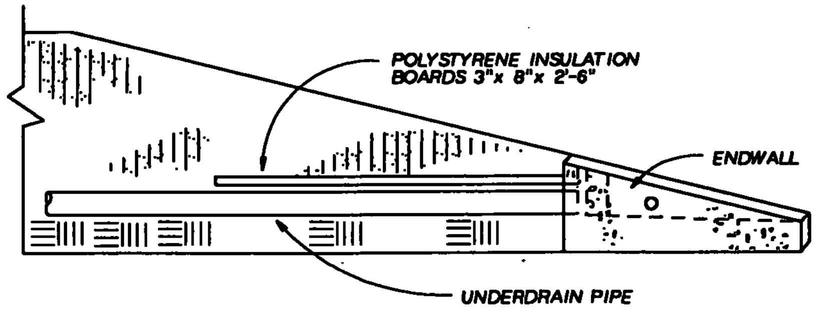
* APPROXIMATE DIMENSION
SCREEN MUST SNUGLY FIT
IN THE ENDWALL AS SHOWN.



CONCRETE APRON ENDWALL FOR UNDERDRAIN

## SECTION A

NTS

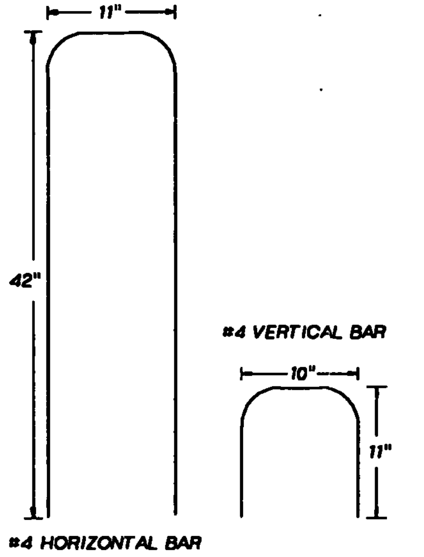


## INSTALLATION DETAIL 1

NTS 7

NOTES:

1. CONCRETE SHALL HAVE A DESIGN STRENGTH OF 3,000 PSI AT 28 DAYS. INSULATION BOARDS SHALL HAVE AN INSULATION VALUE OF NOT LESS THAN 7.
2. ALTERNATIVE DESIGNS WHICH PROVIDE EQUIVALENT CAPACITY AND STRENGTH MAY BE USED WHEN APPROVED BY CONTRACTOR. ENDWALL MAY BE EITHER PRECAST OR CAST IN PLACE CONCRETE.
3. THE PERIMETER DRAIN PIPE SHALL BE FULLY INSERTED AND SEALED INTO THE ENDWALL WITH CEMENT MORTAR PRIOR TO BACKFILLING AROUND THE STRUCTURE.
4. THE RODENT SHIELD SHALL BE GALVENIZED MESH OR EQUIVALENT WITH 1/3 INCH SQUARE NOMINAL OPENINGS. SECURELY FASTEN MESH TO ENDWALL AS APPROVED BY CONTRACTOR.



## BAR STEEL REINFORCEMENT DETAILS 2

NTS

## TABLE 1

ENDWALL PIPE NODES

| NODE | N | E | ELEV |
|---|---|---|---|
| EW1 | 16664 | 47550 | 660.0 |
| EW2 | 16463 | 47423 | 658.2 |
| EW3 | 16429 | 47240 | 655.0 |
| EW4 | 16084 | 47486 | 655.0 |
| EW5 | 15977 | 47586 | 655.0 |
| EW6 | 15871 | 47807 | 661.0 |
| EW7 | 16054 | 47985 | 657.0 |
| EW8 | 16248 | 47999 | 648.0 |
| EW9 | 16413 | 47992 | 649.5 |

## TABLE 2

SAND DRAINAGE LAYER PIPE NODES

| NODE | N | E | NODE | N | E |
|---|---|---|---|---|---|
| DP1 | 16567 | 47658 | DP19 | 16404 | 47528 |
| DP2 | 16516 | 47631 | DP20 | 16304 | 47502 |
| DP3 | 16502 | 47580 | DP21 | 16179 | 47567 |
| DP4 | 16402 | 47603 | DP22 | 16070 | 47612 |
| DP5 | 16283 | 47577 | DP23 | 16020 | 47709 |
| DP6 | 16202 | 47638 | DP24 | 16147 | 47910 |
| DP7 | 16111 | 47681 | DP25 | 16212 | 47832 |
| DP8 | 16038 | 47756 | DP26 | 16298 | 47802 |
| DP9 | 15930 | 47790 | DP27 | 16399 | 47782 |
| DP10 | 16103 | 47850 | DP28 | 16498 | 47806 |
| DP11 | 16171 | 47774 | DP29 | 16568 | 47725 |
| DP12 | 16274 | 47727 | PD30 | 16212 | 47917 |
| DP13 | 16399 | 47707 | DP31 | 16296 | 47917 |
| DP14 | 16500 | 47731 | DP32 | 16297 | 47877 |
| DP15 | 16531 | 47687 | DP33 | 16398 | 47846 |
| DP16 | 16651 | 47659 | DP34 | 16497 | 47881 |
| DP17 | 16570 | 47589 | DP35 | 16579 | 47809 |
| DP18 | 16504 | 47506 | DP36 | 16650 | 47786 |

NOTE:

1. PROVIDE ½" ± (TYP) OF SAND DRAINAGE LAYER MATERIAL FOR BEDDING BENEATH THE SAND DRAINAGE LAYER PIPING.

## TABLE 3

PERIMETER DRAIN PIPE NODES

| NODE | N | E | ELEV | NODE | N | E | ELEV |
|---|---|---|---|---|---|---|---|
| PD1 | 16675 | 47660 | 659.7 | PD19 | 15945 | 47936 | 663.2 |
| PD2 | 16645 | 47575 | 660.5 | PD20 | 15995 | 47950 | 661.0 |
| PD3 | 16595 | 47532 | 661.0 | PD21 | 16045 | 47959 | 658.5 |
| PD4 | 16545 | 47500 | 660.5 | PD22 | 16095 | 47990 | 654.0 |
| PD5 | 16495 | 47467 | 659.5 | PD23 | 16145 | 47992 | 650.5 |
| PD6 | 16445 | 47447 | 659.5 | PD24 | 16195 | 47980 | 649.5 |
| PD7 | 16395 | 47442 | 659.0 | PD25 | 16245 | 47978 | 648.5 |
| PD8 | 16345 | 47447 | 658.5 | PD26 | 16295 | 47972 | 649.0 |
| PD9 | 16295 | 47452 | 658.0 | PD27 | 16345 | 47966 | 649.5 |
| PD10 | 16245 | 47457 | 657.0 | PD28 | 16395 | 47965 | 649.8 |
| PD11 | 16195 | 47477 | 657.5 | PD29 | 16445 | 47960 | 650.3 |
| PD12 | 16145 | 47488 | 656.0 | PD30 | 16495 | 47956 | 651.0 |
| PD13 | 16095 | 47507 | 655.5 | PD31 | 16545 | 47947 | 653.0 |
| PD14 | 16045 | 47547 | 656.5 | PD32 | 16595 | 47893 | 656.0 |
| PD15 | 15995 | 47602 | 656.0 | PD33 | 16645 | 47848 | 657.5 |
| PD16 | 15945 | 47690 | 656.5 | PD34 | 16695 | 47798 | 658.5 |
| PD17 | 15895 | 47817 | 662.8 | PD35 | 16695 | 47725 | 658.5 |
| PD18 | 15895 | 47912 | 663.9 | PD36 | - | - | - |

CH2M HILL

| | | | | | |
|---|---|---|---|---|---|
| DSGN MW PADDOCK | | | | | |
| DR PT KUTZ | | | | | |
| CHK MA SCHMIEGE | | | | | |
| APVD JB RUSSELL | NO. | DATE | REVISION | BY | APVD |

BAR IS ONE INCH ON ORIGINAL DRAWING.
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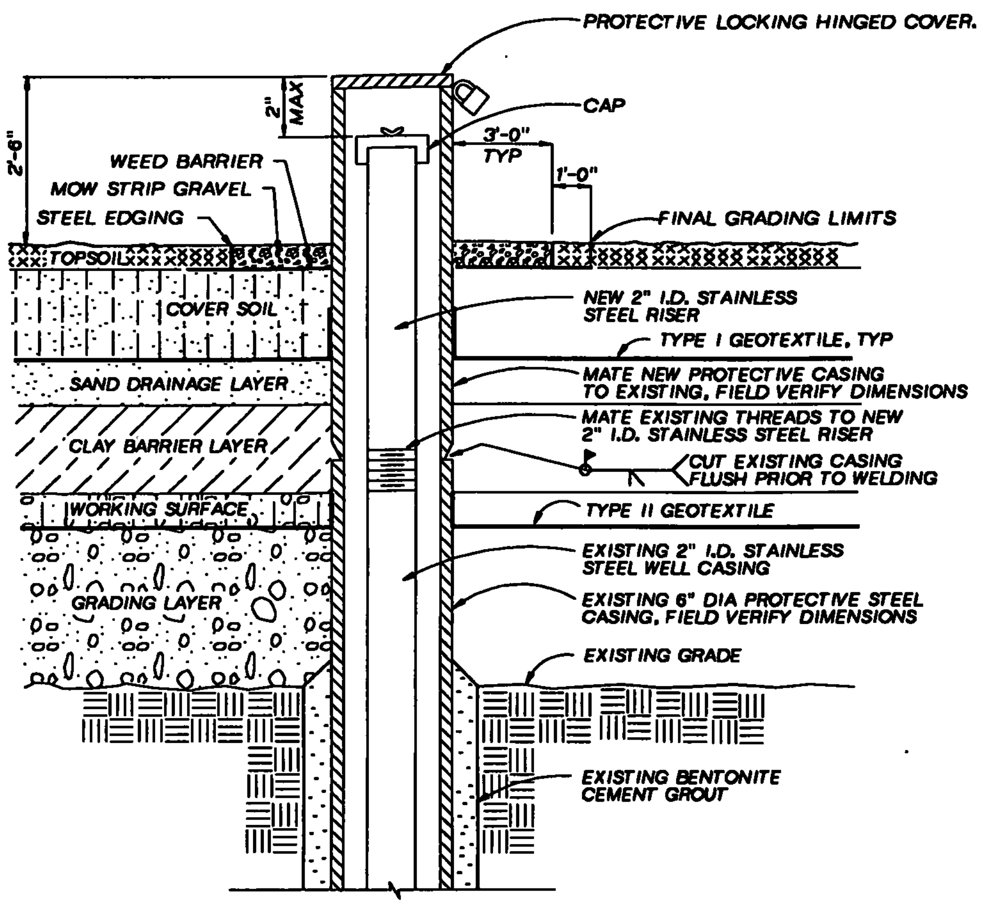
LANDFILL CAP REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

# APRON ENDWALL DETAIL PIPE NODE DETAILS

SHEET 10
DWG NO. 02-C-12
DATE JUNE 1992
PROJ NO. GLO65602.LC



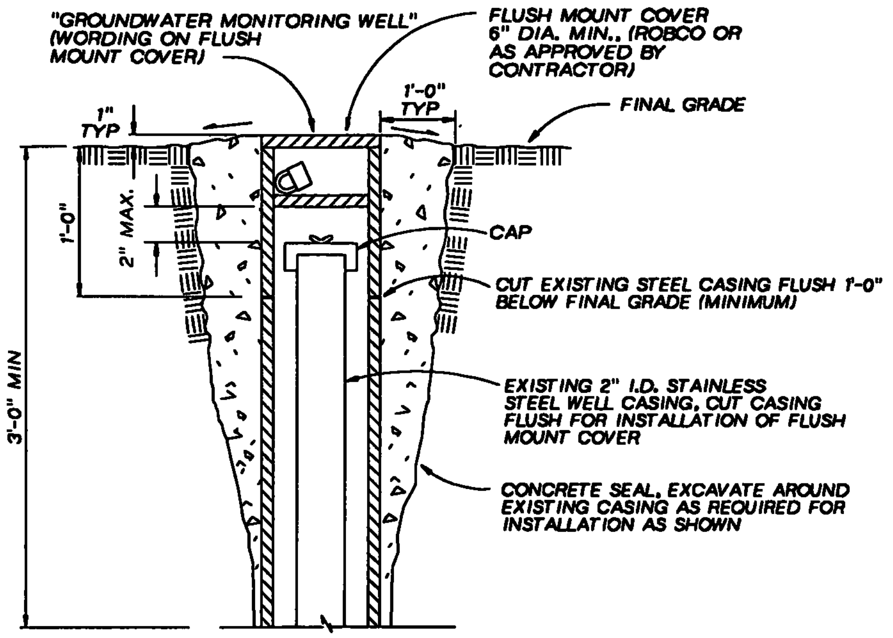
## GROUNDWATER MONITORING WELL EXTENSION DETAIL

1
4

NTS

NOTE:

1. THE PROTECTIVE LOCKING HINGED COVER SHALL BE PAINTED SAFETY YELLOW AS SPECIFIED.



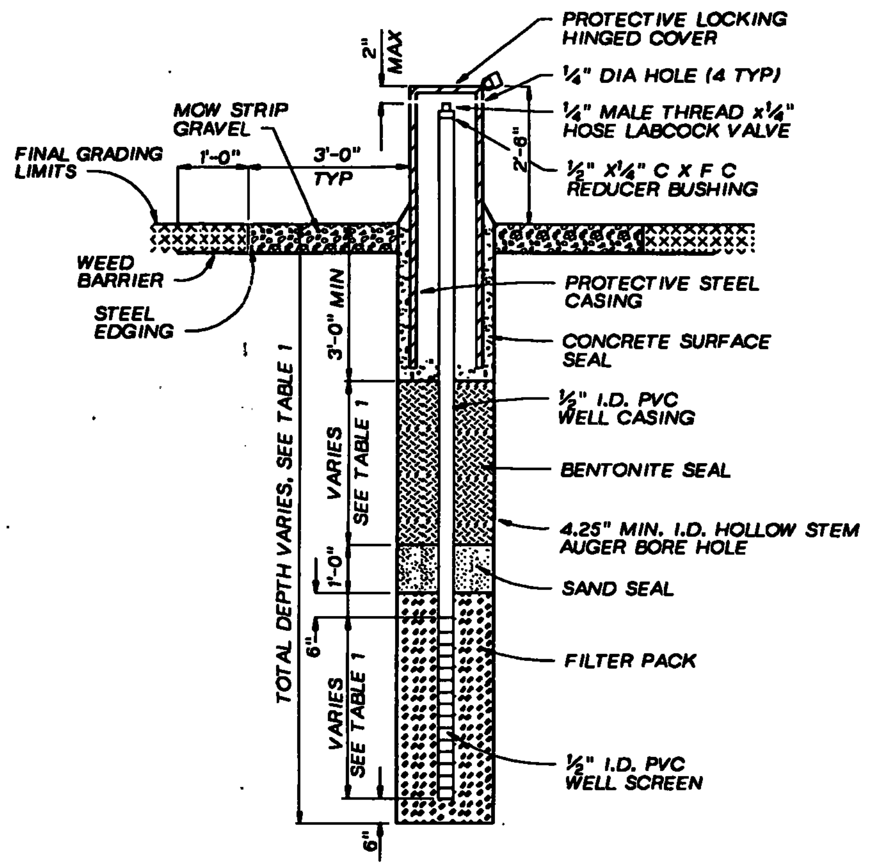
## GROUNDWATER MONITORING WELL FLUSH MOUNT COVER DETAIL

2
4

NTS

NOTE:

1. THE CONCRETE SEAL SHALL BE INSTALLED AROUND THE FLUSH MOUNT COVER AND SHALL NOT BE PLACED BETWEEN THE FLUSH MOUNT COVER AND THE WELL CASING.



## LANDFILL GAS MONITORING WELL DETAIL

3
5,6,7,8

NTS

| TABLE 1 | | | | | |
|---|---|---|---|---|---|
| LANDFILL GAS MONITORING WELL DETAILS | | | | | |
| LANDFILL GAS MONITORING WELL | NORTHING EASTING | TOTAL DEPTH (FT) | SCREENED LENGTH (FT) | BENTONITE SEAL LENGTH (FT) | TYPE OF PROTECTIVE COVER |
| LG1 | N 16797<br>E 47672 | 15.0 | 8.0 | 2.0 | FMC |
| LG2 | N 16696<br>E 47497 | 15.0 | 8.0 | 2.0 | FMC |
| LG3 | N 16558<br>E 47415 | 14.5 | 8.0 | 1.5 | FMC |
| LG4 | N 16254<br>E 47369 | 8.5 | 2.0 | 1.5 | EXT |
| LG5 | N 15903<br>E 47576 | 8.5 | 2.0 | 1.5 | EXT |
| LG6 | N 15961<br>E 48007 | 15.0 | 8.0 | 2.0 | EXT |
| LG7 | N 16556<br>E 48019 | 8.5 | 2.0 | 1.5 | EXT |

NOTES:

1. LANDFILL GAS MONITORING WELL DEPTHS AND INSTALLATION DETAILS SHOWN ARE APPROXIMATE AND/OR ESTIMATED. ACTUAL DEPTHS AND FINAL INSTALLATION DETAILS WILL BE DETERMINED IN THE FIELD BY THE CONTRACTOR.
2. WELL SCREEN OPENINGS SHALL BE FACTORY SLOTTED 0.06 INCH WIDTH AND CONTINUOUS. PROVIDE 2 SQUARE INCHES OF INTAKE AREA PER FOOT OF WELL SCREEN MINIMUM.
3. THE PROTECTIVE LOCKING HINGED COVER SHALL BE PAINTED SAFETY YELLOW AS SPECIFIED.
4. FLUSH MOUNT COVERS FOR LANDFILL GAS MONITORING WELLS LG1, LG2, AND LG3 SHALL CONFORM TO DETAILS 2 AND 3 12 WITH A 6" DIA. MIN. COVER AND A MIN. COVER EMBEDMENT DEPTH OF 12". PLACE PIPE SLEEVE BETWEEN WELL CASING AND CONCRETE. CONCRETE SURFACE SEAL TO A DEPTH OF 3'-0". "GAS MONITORING WELL" WORDING ON FLUSH MOUNT COVER.
5. 4-¼"DIA HOLES SHALL BE LOCATED AND FIELD DRILLED BY THE SUBCONTRACTOR ON LANDFILL GAS MONITORING WELL EXTENSION COVERS, SEE 3

CH2M HILL

| | | NO. | DATE | REVISION | BY | APVD |
|---|---|---|---|---|---|---|
| DSGN | JB RUSSELL | | | | | |
| DR | PA LLANAS<br>PT KUTZ | | | | | |
| CHK | MA SCHMIEGE | | | | | |
| APVD | JB RUSSELL | | | | | |

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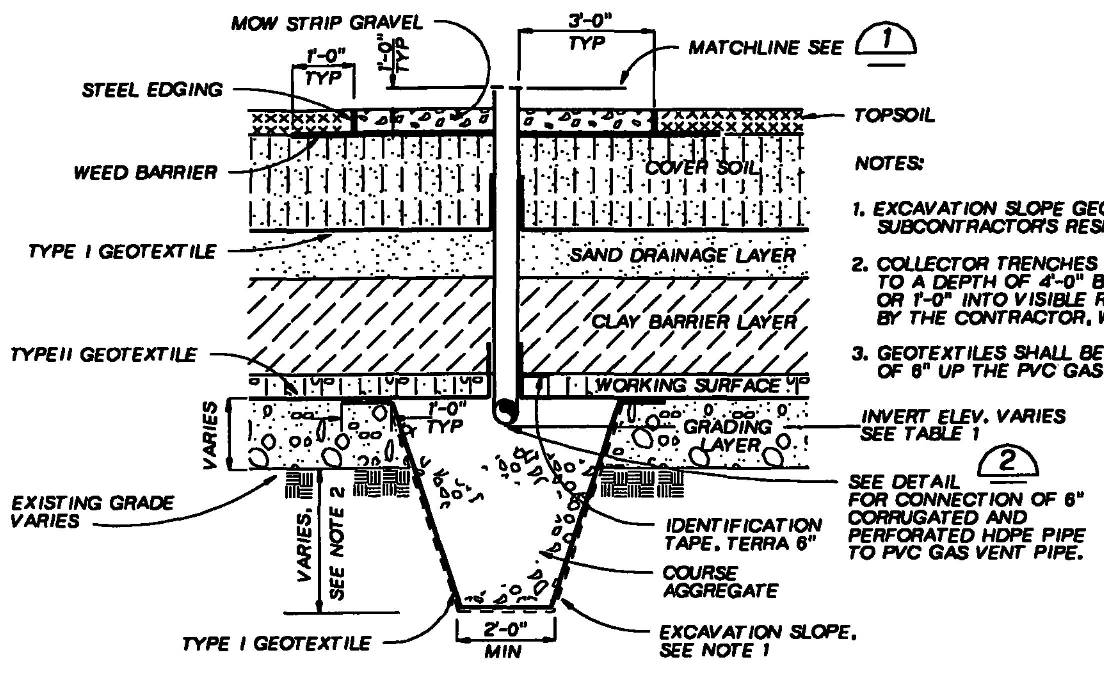
LANDFILL CAP REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

WELL DETAILS

SHEET 11
DWG NO. 02-C-10
DATE JUNE 1992
PROJ NO. GLO55602.LC

02 c 11.dgn 21-Apr-1992



NOTES:

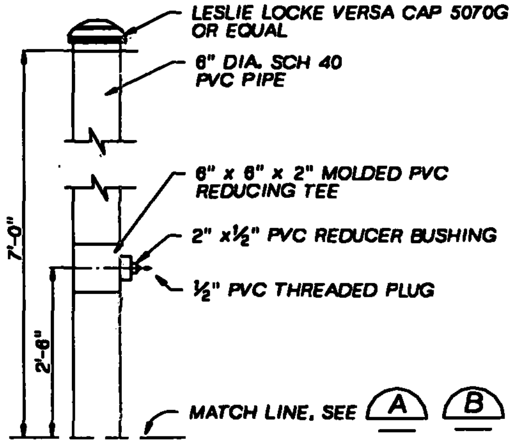
1. EXCAVATION SLOPE GEOMETRY IS THE SUBCONTRACTOR'S RESPONSIBILITY.
2. COLLECTOR TRENCHES SHALL BE EXCAVATED TO A DEPTH OF 4'-0" BELOW EXISTING GRADE OR 1'-0" INTO VISIBLE REFUSE AS DIRECTED BY THE CONTRACTOR, WHICHEVER IS SHALLOWER.
3. GEOTEXTILES SHALL BE EXTENDED A MINIMUM OF 6" UP THE PVC GAS VENT PIPE AS SHOWN.

## LANDFILL GAS COLLECTOR TRENCH SECTION (A)

NTS 7, 17-22

| TABLE 1 | | | |
|---|---|---|---|
| COLLECTOR TRENCH AND VENT LOCATIONS | | | |
| NODE POINT | COORDINATES | | ELEVATIONS |
| | N | E | GAS VENT PIPE INV. |
| CT1 * | 16584.7 | 47794.1 | 658.6 |
| CT2 * | 16448.1 | 47794.8 | 659.5 |
| CT3 * | 16296.2 | 47795.5 | 659.5 |
| CT4 * | 16153.3 | 47888.5 | 659.5 |
| CT5 * | 16594.2 | 47644.0 | 661.5 |
| CT6 * | 16419.2 | 47656.4 | 666.5 |
| CT7 * | 16254.5 | 47652.9 | 666.5 |
| CT8 * | 16129.5 | 47742.1 | 666.5 |
| CT9 * | 15975.4 | 47852.8 | 666.5 |
| CT10 * | 16562.9 | 47552.4 | 660.5 |
| CT11 * | 16423.1 | 47548.4 | 662.3 |
| CT12 * | 16240.1 | 47552.4 | 662.0 |
| CT13 * | 16134.1 | 47637.5 | 662.6 |
| CT14 * | 16035.1 | 47728.5 | 661.6 |

* INDICATES PVC GAS VENT LOCATION

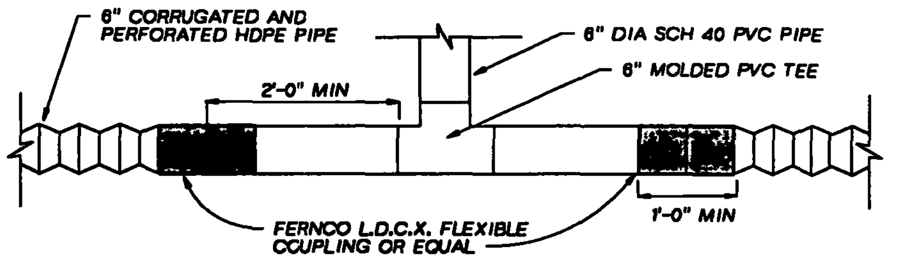


NOTE:

1. ALL PVC JOINTS SHALL BE SOLVENT WELDED EXCEPT PLUG

## PVC GAS VENT DETAIL (1)

NTS

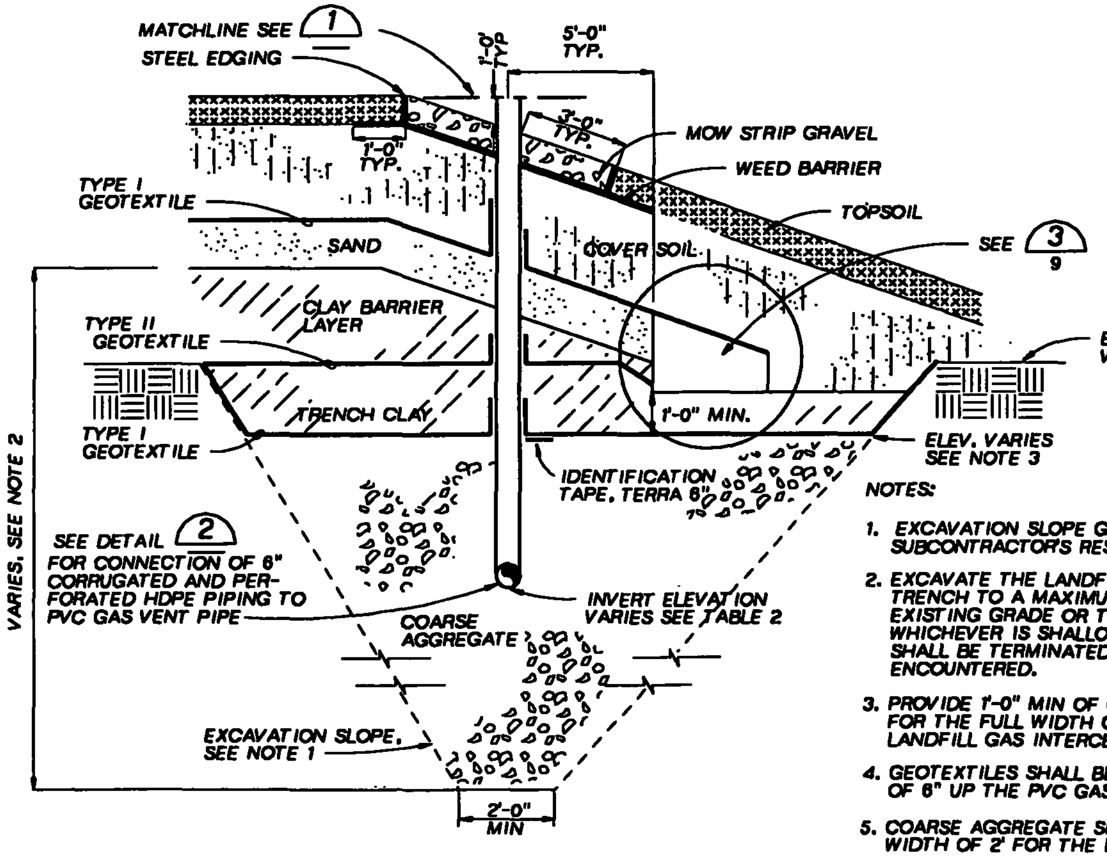


NOTES:

1. ALL PVC JOINTS SHALL BE SOLVENT WELDED.
2. SEE TABLE 1 AND 2 FOR PVC LANDFILL GAS VENT INVERT ELEVATIONS.

## PVC GAS VENT CONNECTION DETAIL (2)

NTS



NOTES:

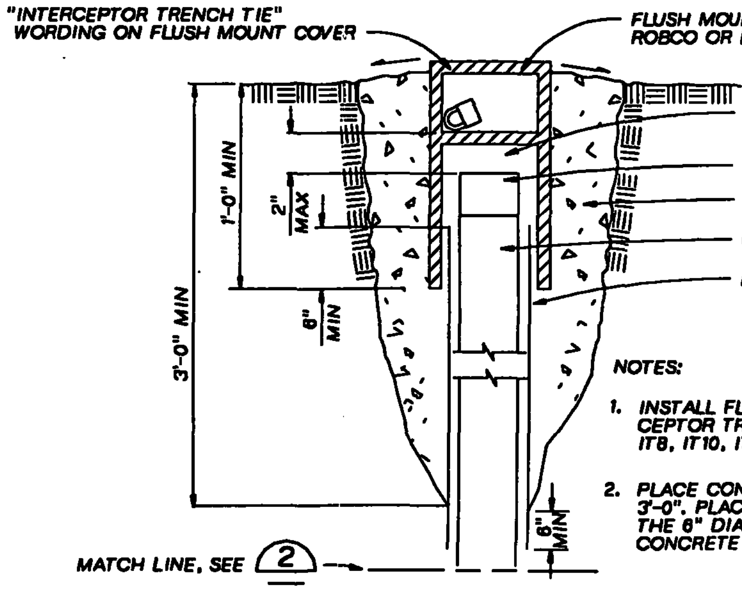
1. EXCAVATION SLOPE GEOMETRY IS THE SUBCONTRACTOR'S RESPONSIBILITY.
2. EXCAVATE THE LANDFILL GAS INTERCEPTOR TRENCH TO A MAXIMUM DEPTH OF 15'-0" BELOW EXISTING GRADE OR TO ELEVATION 645.0, WHICHEVER IS SHALLOWER. TRENCH EXCAVATION SHALL BE TERMINATED IF GROUNDWATER IS ENCOUNTERED.
3. PROVIDE 1'-0" MIN OF COMPACTED TRENCH CLAY FOR THE FULL WIDTH OF THE EXCAVATED LANDFILL GAS INTERCEPTOR TRENCH.
4. GEOTEXTILES SHALL BE EXTENDED A MINIMUM OF 6" UP THE PVC GAS VENT PIPE AS SHOWN.
5. COARSE AGGREGATE SHALL BE A MINIMUM WIDTH OF 2' FOR THE ENTIRE TRENCH DEPTH.

## LANDFILL GAS INTERCEPTOR TRENCH SECTION (B)

NTS 7, 16-23

| TABLE 2 | | | |
|---|---|---|---|
| INTERCEPTOR TRENCH AND VENT LOCATIONS | | | |
| NODE POINT | COORDINATES | | ELEVATIONS |
| | N | E | GAS VENT PIPE INV. |
| IT1 * | 16690.2 | 47723.3 | 654.0 |
| IT2 | 16640.7 | 47577.9 | 656.0 |
| IT3 * | 16546.0 | 47506.3 | 656.5 |
| IT4 | 16395.1 | 47450.4 | 655.5 |
| IT5 * | 16245.7 | 47461.7 | 653.5 |
| IT6 | 16097.7 | 47512.2 | 652.0 |
| IT7 * | 15998.0 | 47604.0 | 652.5 |
| IT8 | 15950.0 | 47691.4 | 653.0 |
| IT9 * | 15901.5 | 47907.5 | 659.0 |
| IT10 | 16047.1 | 47955.7 | 653.5 |
| IT11 * | 16194.5 | 47975.4 | 646.5 |
| IT12 | 16344.9 | 47960.9 | 646.5 |
| IT13 * | 16495.8 | 47950.7 | 648.0 |
| IT14 | 16642.7 | 47842.7 | 653.5 |

* INDICATES PVC GAS VENT LOCATION.
INSTALL (3) AT OTHER LOCATIONS.



NOTES:

1. INSTALL FLUSH MOUNT TIES AT INTERCEPTOR TRENCH NODES IT2, IT4, IT6, IT8, IT10, IT12, AND IT14.
2. PLACE CONCRETE SEAL TO A DEPTH OF 3'-0". PLACE PIPE SLEEVE BETWEEN THE 6" DIA. PVC PIPE AND THE CONCRETE SEAL.

## INTERCEPTOR TRENCH FLUSH TIE IN (3)

NTS

CH2M HILL

DSGN MW PADDOCK JB RUSSELL
DR PT KUTZ
CHK MA SCHMIEGE
APVD JB RUSSELL

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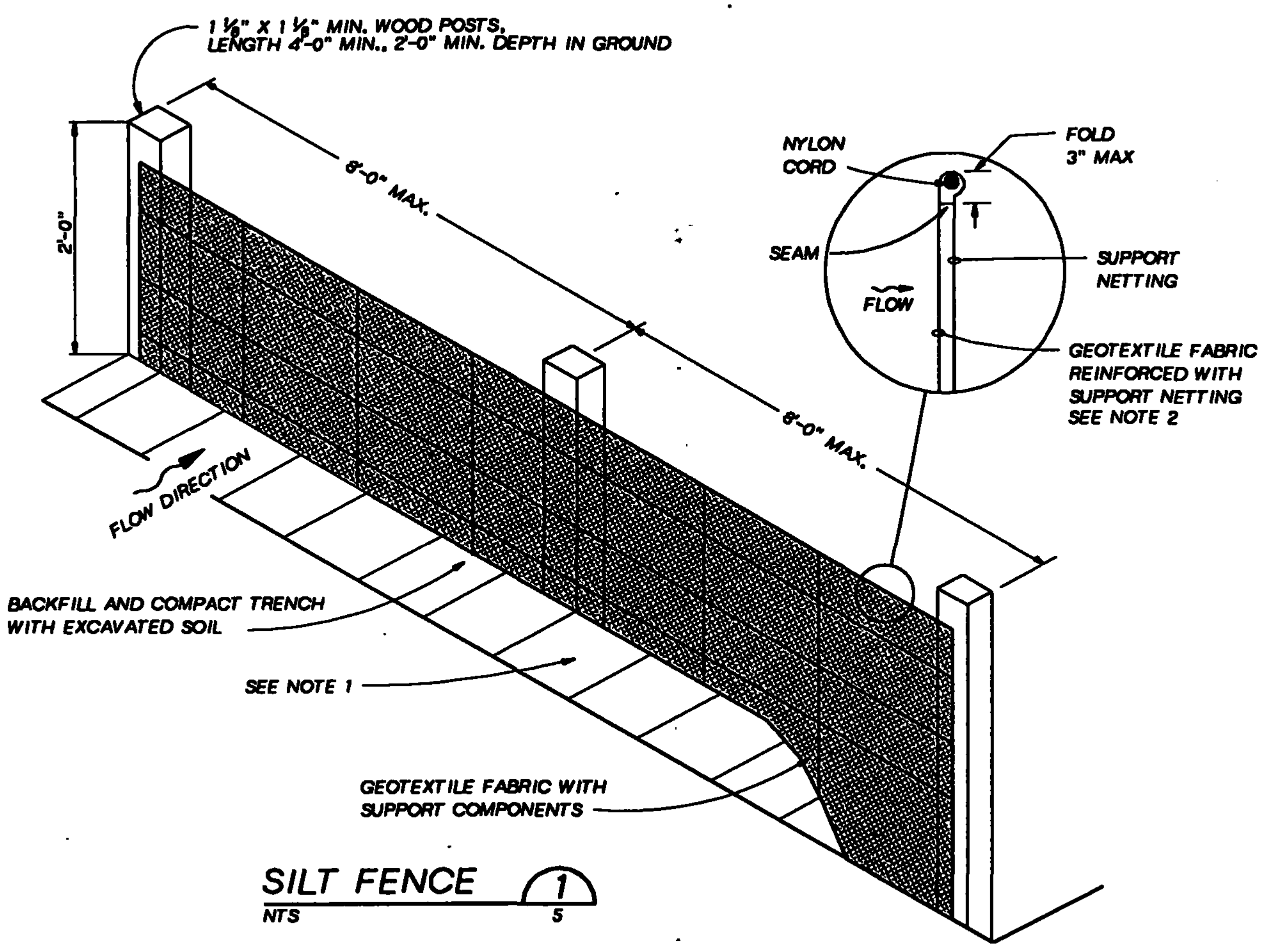
LANDFILL CAP REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

LANDFILL GAS VENT DETAIL
LANDFILL GAS TRENCH DETAILS

SHEET 12
DWG NO. 02-C-11
DATE JUNE 1992
PROJ NO. GLO65602.LC

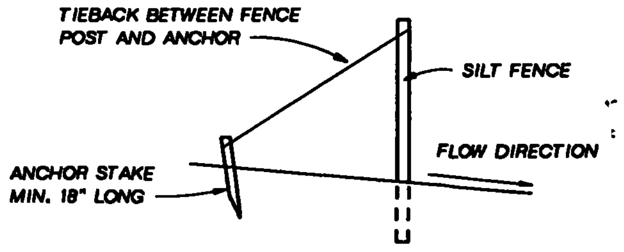


## SILT FENCE 1

NTS 5

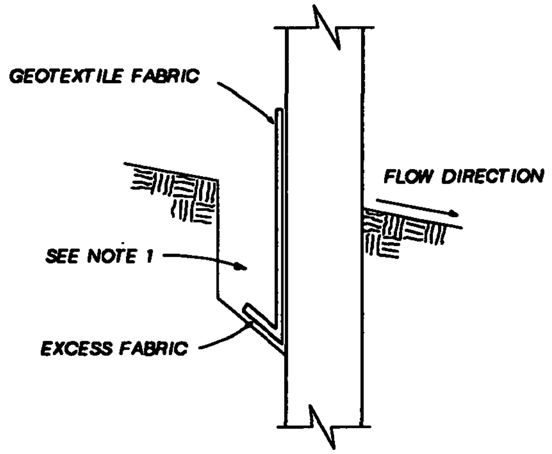
NOTES:

1. EXCAVATE A TRENCH A MINIMUM OF 4" WIDE AND 6" DEEP TO BURY AND ANCHOR THE FABRIC. FOLD MATERIAL TO FIT THE TRENCH AND BACKFILL AND COMPACT WITH EXCAVATED SOIL.
2. GEOTEXTILE FABRIC SHALL BE REINFORCED WITH AN INDUSTRIAL POLYPROPYLENE NETTING WITH A MAXIMUM MESH SPACING OF ¾". A HEAVY NYLON TOP SUPPORT CORD OR EQUIVALENT IS REQUIRED.



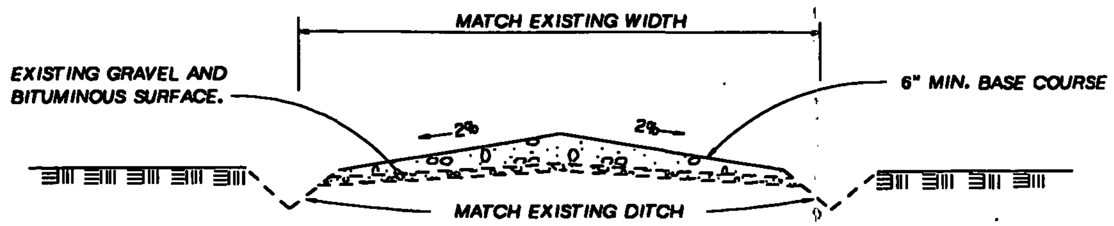
## SILT FENCE TIE BACK DETAIL 2

NTS (WHEN REQUIRED BY CONTRACTOR)



## TRENCH DETAIL 3

NTS

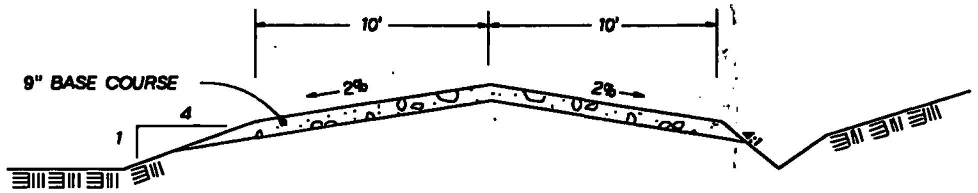


## SPORTSMANS CLUB RD. IMPROVED TYPICAL SECTION 4

NTS 3

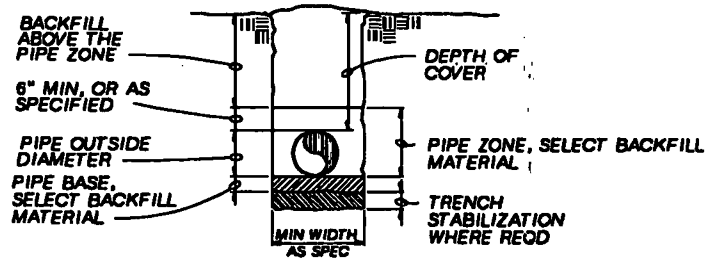
NOTES:

1. MAINTAIN EXISTING DRAINAGE PATTERNS
2. SPORTSMANS CLUB ROAD IMPROVEMENTS SHALL EXTEND FROM THE INTERSECTION OF SPORTSMANS CLUB ROAD AND CTH Z TO THE SITE ACCESS ROAD.



## SITE ACCESS ROAD TYPICAL SECTION 5

NTS 5,16,17,18



## CULVERT DETAIL 6

NTS 5

NOTES:

1. 6" MIN. OF NATIVE SOIL SHALL BE STRIPPED UNDER THE SITE ACCESS ROAD ROUTE PRIOR TO BASE COURSE PLACEMENT.

CH2M HILL

| | | NO. | DATE | REVISION | BY | APVD |
|---|---|---|---|---|---|---|
| DSGN | MW PADDOCK | | | | | |
| DR | PT KUTZ | | | | | |
| CHK | MA SCHMIEGE | | | | | |
| APVD | JB RUSSELL | | | | | |

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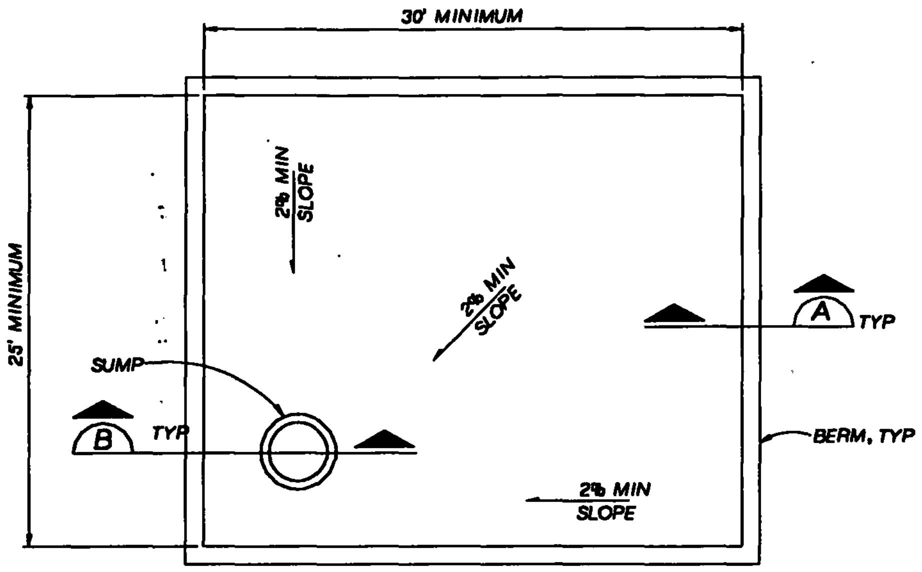
LANDFILL CAP REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

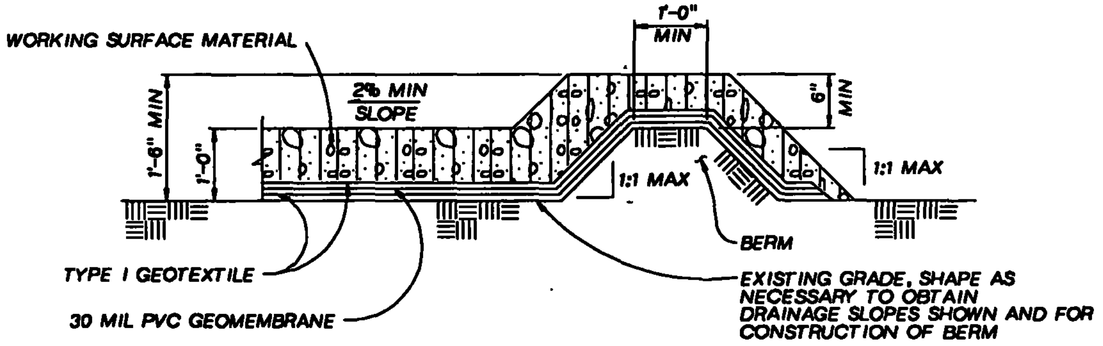
SILT FENCE DETAILS
TYPICAL ACCESS ROAD SECTIONS
CULVERT DETAIL

SHEET 13
DWG NO. 2-C-17
DATE JUNE 1992
PROJ NO. GLO65602.LC

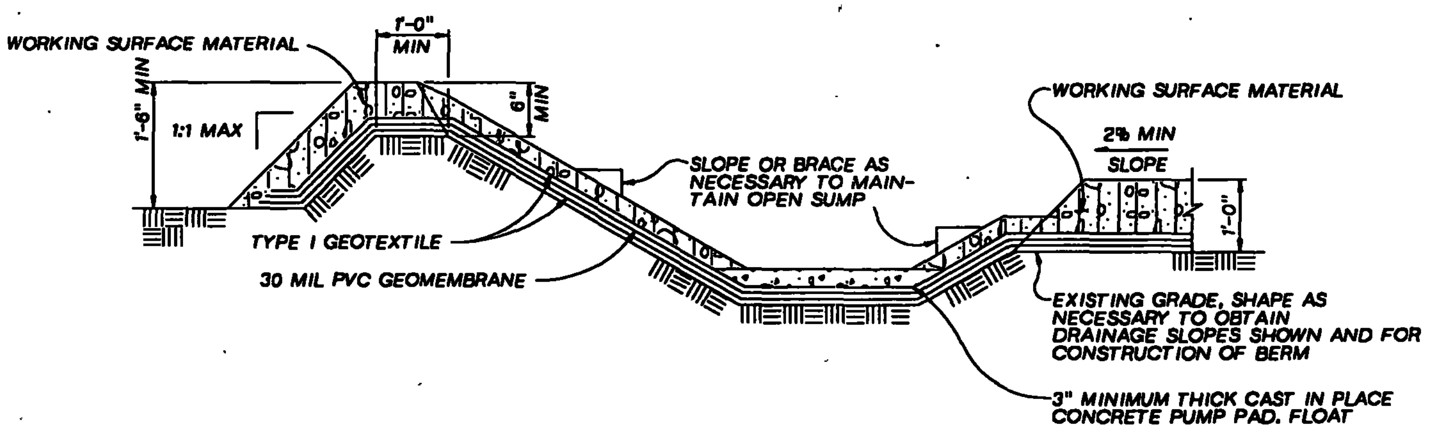


DECONTAMINATION PAD DETAIL (1)
NTS

NOTES:
1. SLOPE AND PREPARE THE SUBGRADE TO DRAIN AS SHOWN.
2. THE 30 MIL PVC GEOMEMBRANE PANEL SHALL BE FACTORY SEAMED AND FABRICATED. THE PANEL SHALL BE LARGE ENOUGH TO CONTINUOUSLY LINE THE DECONTAMINATION PAD.
3. DIMENSIONS SHOWN ARE MINIMUM. CONSTRUCT TO DIMENSIONS REQUIRED TO ALLOW SAFE AND EFFICIENT OPERATION.
4. CONSTRUCT AN ACCESS AND EXIT RAMP TO THE DECONTAMINATION PAD AS REQUIRED. THE ACCESS RAMP SHALL BE CONSTRUCTED OF WORKING SURFACE MATERIAL, 1' MINIMUM THICKNESS.
5. SUMP CAPACITY SHALL BE A MINIMUM OF 30 GALLONS.
6. PROVIDE A 10,000 GALLON MINIMUM HOLDING TANK(S) FOR DECONTAMINATION WATER STORAGE. PROVIDE PUMPS, HOSES, PIPES, AND FITTINGS NECESSARY TO FILL THE HOLDING TANK(S) AND PUMP THE HOLDING TANK(S) CONTENTS. SEE SPECIFICATIONS FOR DECONTAMINATION WATER DISPOSAL REQUIREMENTS.



SECTION (A)
NTS



SECTION (B)
NTS

CH2M HILL

DSGN JB RUSSELL
DR BR LEHMAN PT KUTZ
CHK MA SCHMIEGE
APVD JB RUSSELL

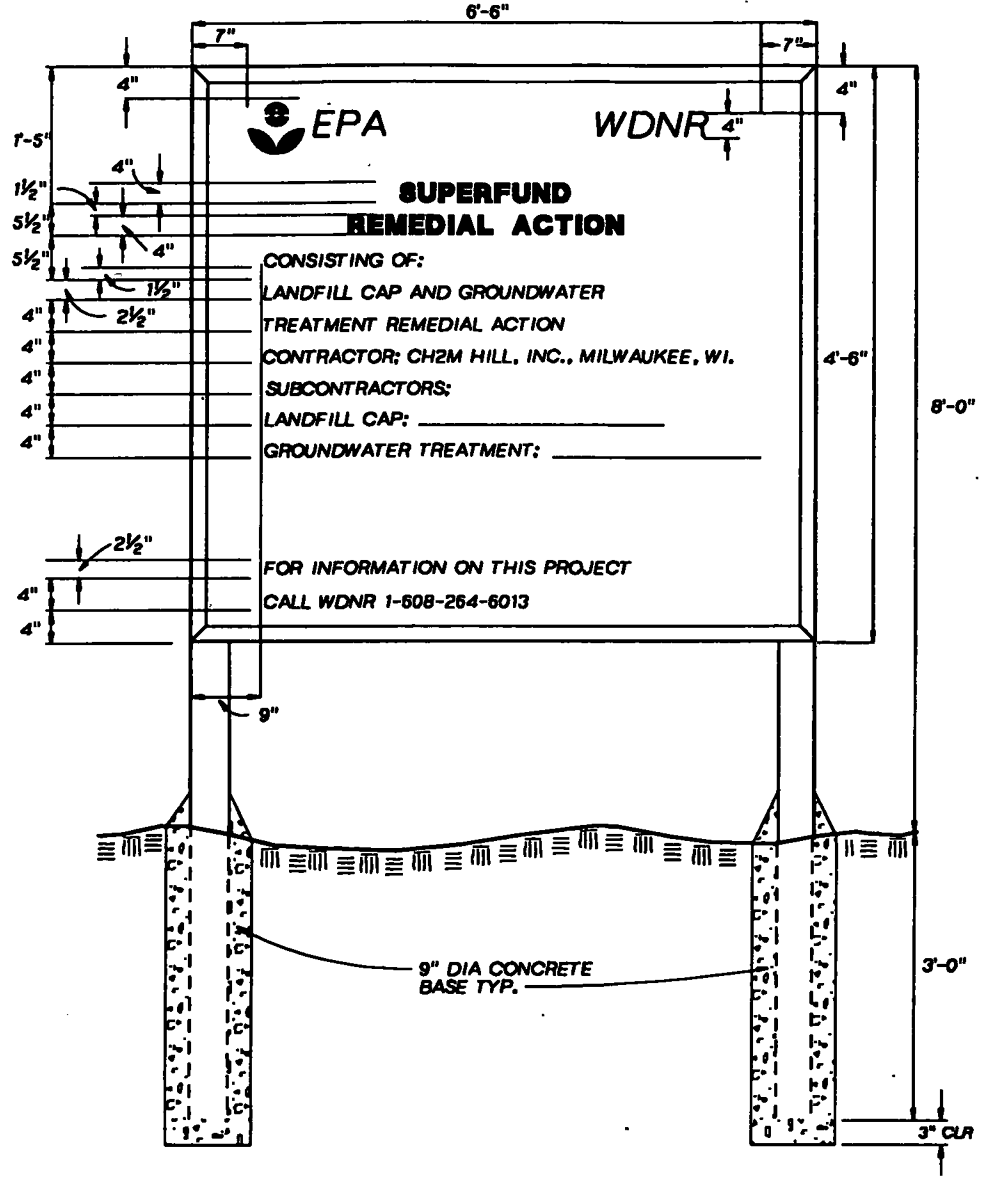
| NO. | DATE | REVISION | BY | APVD |
|---|---|---|---|---|

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

LANDFILL CAP REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

DECONTAMINATION PAD
PLAN AND DETAILS

SHEET 14
DWG NO. 02-C-15
DATE JUNE 1992
PROJ NO. GLO65502.LC

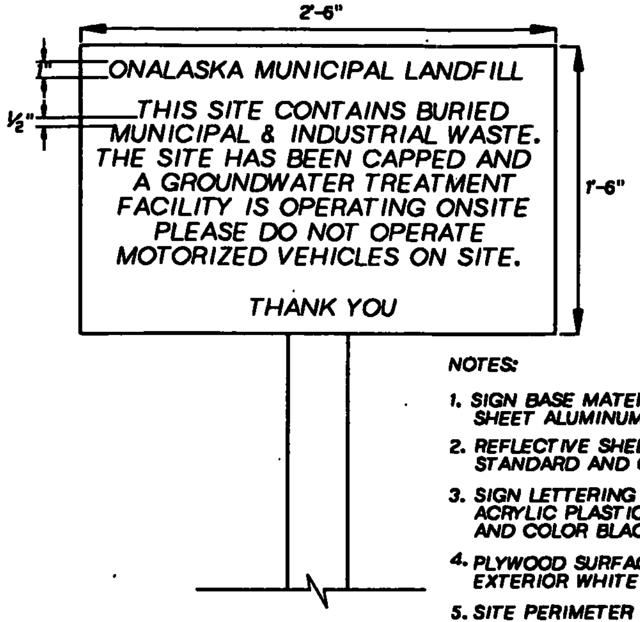


## SITE PROJECT SIGN DETAIL (1)

NTS

NOTES:

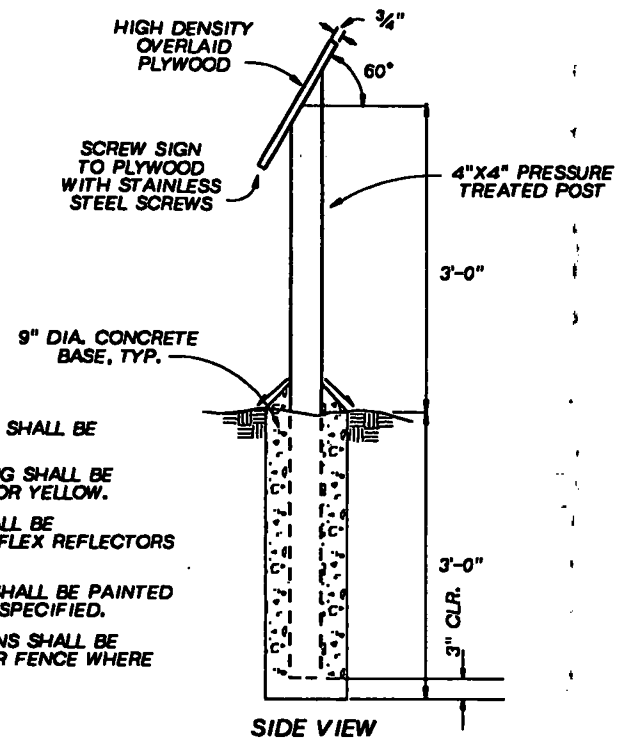
1. 4"X4" PRESSURE TREATED POST, ¾" HIGH DENSITY OVERLAID PLYWOOD.
2. PLYWOOD SURFACE SHALL BE PAINTED EXTERIOR WHITE AS SPECIFIED.
3. ALL LETTERING IS TO BE HELVETICA BOLD OR HELVETICA MEDIUM ITALIC, PAINTED COLOR BLACK
4. U.S. EPA AND WDNR SYMBOLS SHALL CONFORM TO CURRENT SYMBOL STANDARDS.



FRONT VIEW

NOTES:

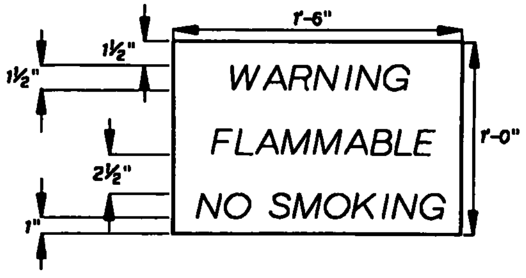
1. SIGN BASE MATERIAL SHALL BE SHEET ALUMINUM.
2. REFLECTIVE SHEETING SHALL BE STANDARD AND COLOR YELLOW.
3. SIGN LETTERING SHALL BE ACRYLIC PLASTIC REFLEX REFLECTORS AND COLOR BLACK.
4. PLYWOOD SURFACE SHALL BE PAINTED EXTERIOR WHITE AS SPECIFIED.
5. SITE PERIMETER SIGNS SHALL BE INSTALLED ON CEDAR FENCE WHERE APPLICABLE.



SIDE VIEW

## SITE PERIMETER SIGN DETAIL (2)

NTS

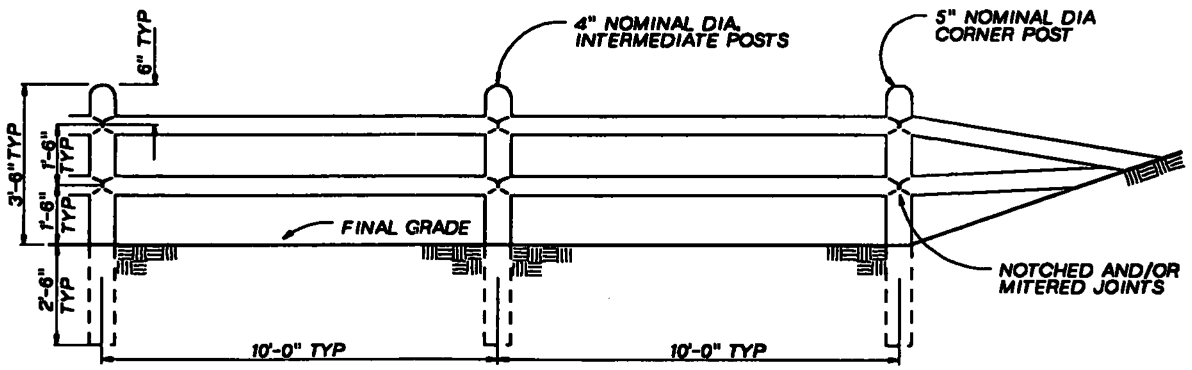


## LANDFILL GAS WARNING SIGN DETAIL (3)

NTS

NOTES:

1. SIGN BASE MATERIAL SHALL BE SHEET ALUMINUM.
2. REFLECTIVE SHEETING SHALL BE STANDARD AND COLOR YELLOW.
3. SIGN LETTERING SHALL BE ACRYLIC PLASTIC REFLEX REFLECTORS AND COLOR BLACK.
4. HANG AND/OR FASTEN SIGN TO PVC GAS VENTS AS APPROVED BY CONTRACTOR.

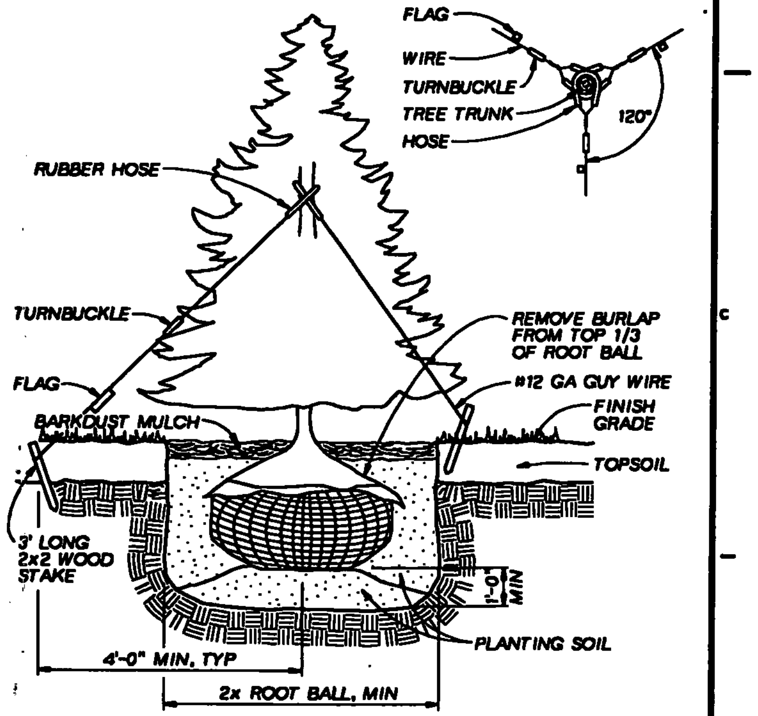


## CEDAR FENCE DETAIL (4)

NTS

NOTES:

1. FENCE POSTS AND RAILS SHALL BE CEDAR
2. FENCE RAILS SHALL TRANSITION UNIFORMLY FROM 3'-6" NOMINAL HEIGHT CORNER POSTS TO THE GROUND SURFACE AT FENCE ENDS.
3. FIELD FABRICATE AND/OR MODIFY CORNER POST JOINTS AS REQUIRED FOR CONSTRUCTING FENCE ALIGNMENT SHOWN ON THE DRAWINGS
4. USE EITHER CIRCULAR POSTS AND RAILS OR SQUARE POSTS AND SPLIT RAILS. DO NOT MIX FENCE TYPES.



## WHITE PINE TREE PLANTING DETAIL (5)

NTS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CH2M HILL | DSGN JB RUSSELL | | | | | | |
| | DR PT KUTZ | | | | | | |
| | CHK IH JOHNSON | | | | | | |
| | APVD JB RUSSELL | NO. | DATE | REVISION | BY | APVD | |

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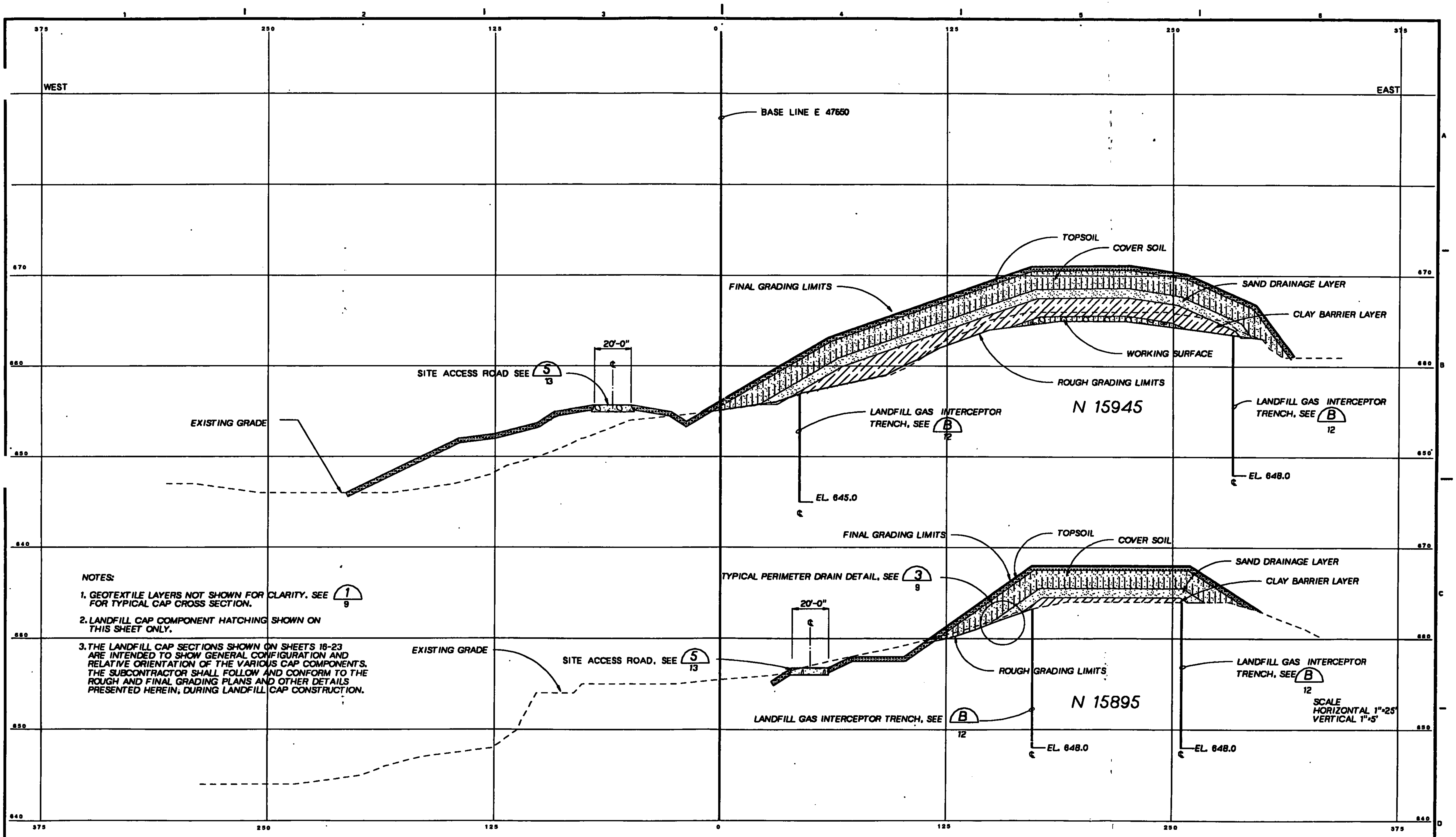
LANDFILL CAP REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

SIGN DETAILS
CEDAR FENCE DETAIL
TREE PLANTING DETAIL

SHEET 15
DWG NO. 02-C-14
DATE JUNE 1992
PROJ NO. GLO65602.LC



NOTES:

1. GEOTEXTILE LAYERS NOT SHOWN FOR CLARITY. SEE 1/9 FOR TYPICAL CAP CROSS SECTION.
2. LANDFILL CAP COMPONENT HATCHING SHOWN ON THIS SHEET ONLY.
3. THE LANDFILL CAP SECTIONS SHOWN ON SHEETS 16-23 ARE INTENDED TO SHOW GENERAL CONFIGURATION AND RELATIVE ORIENTATION OF THE VARIOUS CAP COMPONENTS. THE SUBCONTRACTOR SHALL FOLLOW AND CONFORM TO THE ROUGH AND FINAL GRADING PLANS AND OTHER DETAILS PRESENTED HEREIN; DURING LANDFILL CAP CONSTRUCTION.

CH2M HILL

DSGN MW PADDOCK
DR PA LLANAS
PT KUTZ
CHK MA SCHMIEGE
APVD JB RUSSELL

| NO. | DATE | REVISION | BY | APVD |
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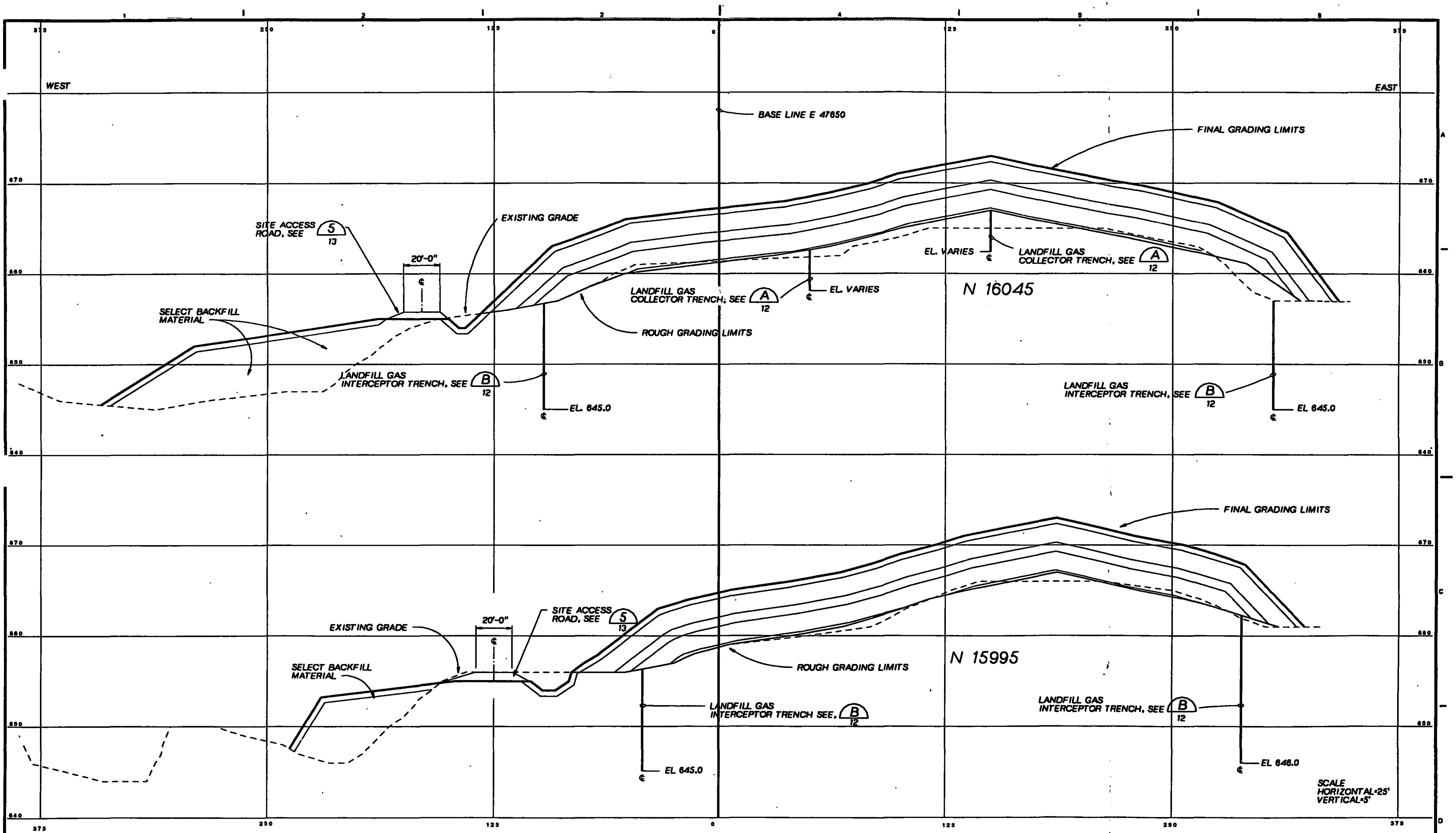
LANDFILL CAP REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

LANDFILL CAP SECTIONS

SHEET 16
DWG NO. 02-C-16
DATE JUNE 1992
PROJ NO. GLO65602.LC



CH2M HILL

| | | | | | | |
|---|---|---|---|---|---|---|
| DSGN MW PADDOCK | | | | | | |
| DR PA LLANAS<br>PT KUTZ | | | | | | |
| CHK MA SCHMIEGE | | | | | | |
| APVD JB RUSSELL | NO. | DATE | REVISION | BY | APVD | |

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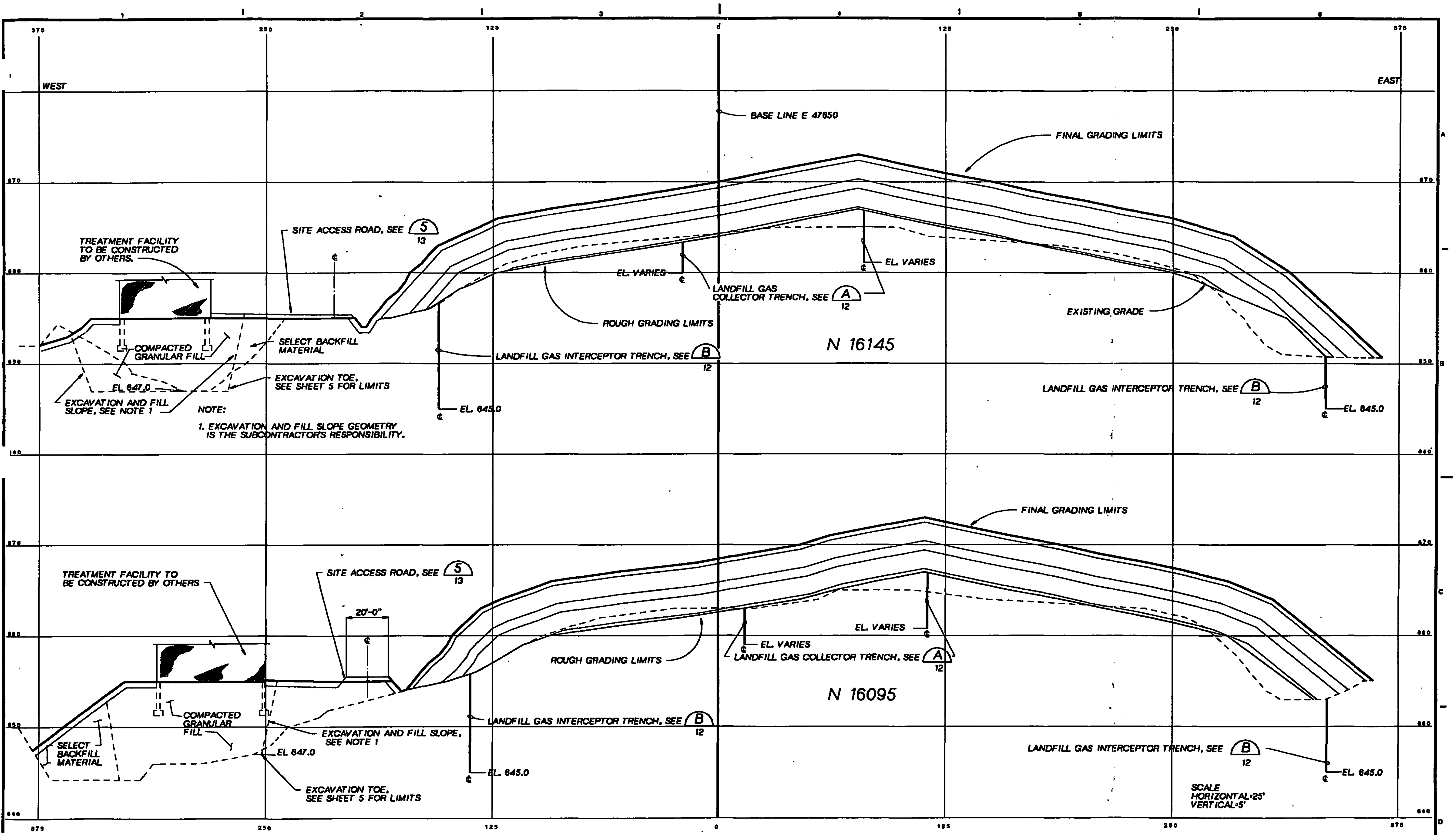
LANDFILL CAP REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

LANDFILL CAP SECTIONS

SHEET 17
DWG NO. 02-C-16
DATE JUNE 1992
PROJ NO. GLO65602.LC



CH2M HILL

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|---|---|---|---|---|---|---|
| DSGN MW PADDOCK | | | | | | |
| DR PA LLANAS<br>PT KUTZ | | | | | | |
| CHK MA SCHMIEGE | | | | | | |
| APVD JB RUSSELL | NO. | DATE | REVISION | BY | APVD | |

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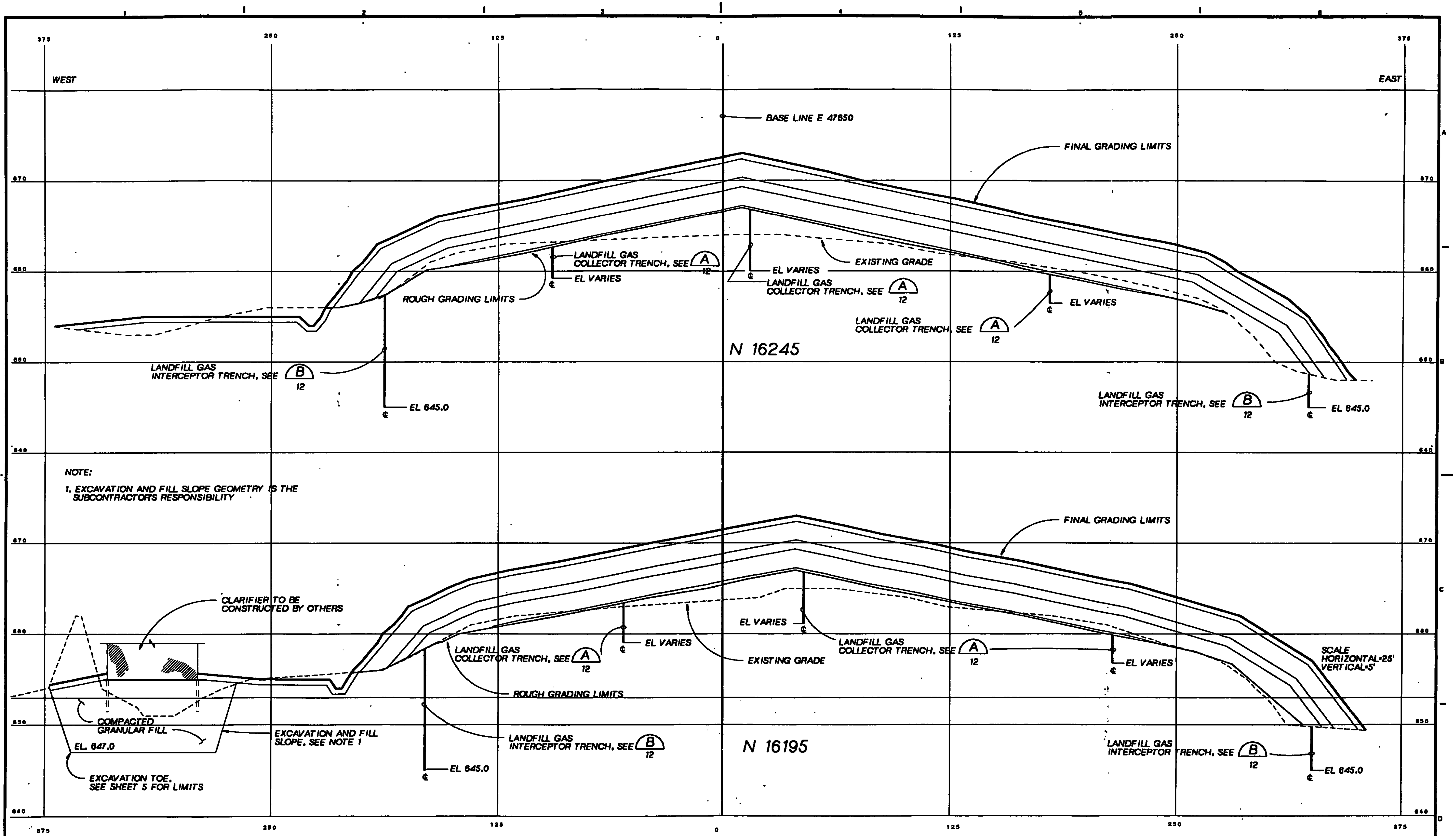
LANDFILL CAP REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

LANDFILL CAP SECTIONS

SHEET 18
DWG NO. 02-C-15
DATE JUNE 1992
PROJ NO. GLO65502.LC



NOTE:

1. EXCAVATION AND FILL SLOPE GEOMETRY IS THE SUBCONTRACTOR'S SUBCONTRACTOR'S RESPONSIBILITY

| | | | | | | |
|---|---|---|---|---|---|---|
| DSGN | MW PADDOCK | | | | | |
| DR | PA LLANAS<br>PT KUTZ | | | | | |
| CHK | MA SCHMIEGE | | | | | |
| APVD | JB RUSSELL | NO. | DATE | REVISION | BY | APVD |

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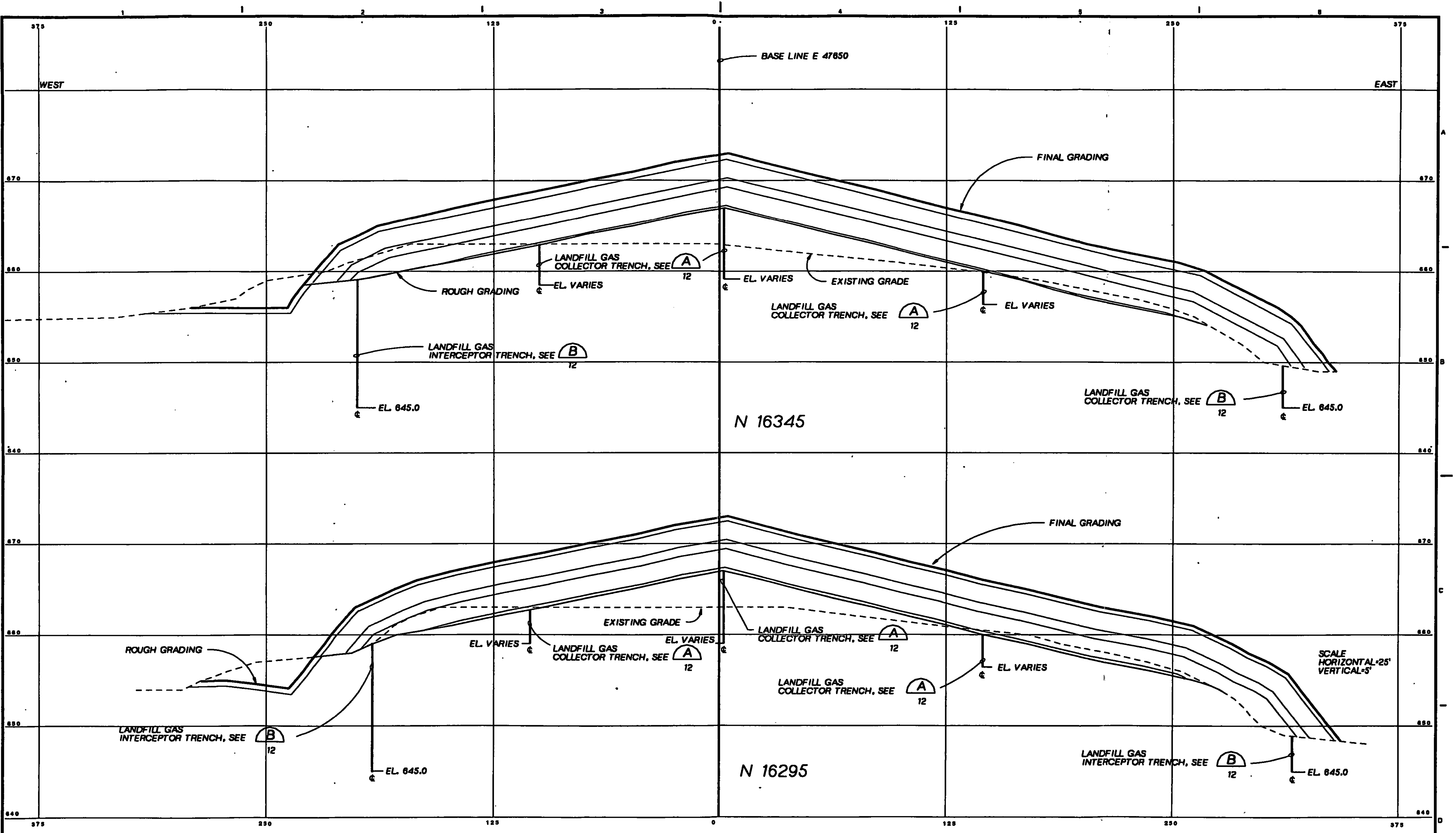
LANDFILL CAP REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

## LANDFILL CAP SECTIONS

SHEET 19
DWG NO. 02-C-16
DATE JUNE 1992
PROJ NO. GLO66602.LC



**CH2M HILL**

DSGN MW PADDOCK
DR PA LLANAS PT KUTZ
CHK MA SCHMIEGE
APVD JB RUSSELL

| NO. | DATE | REVISION | BY | APVD |
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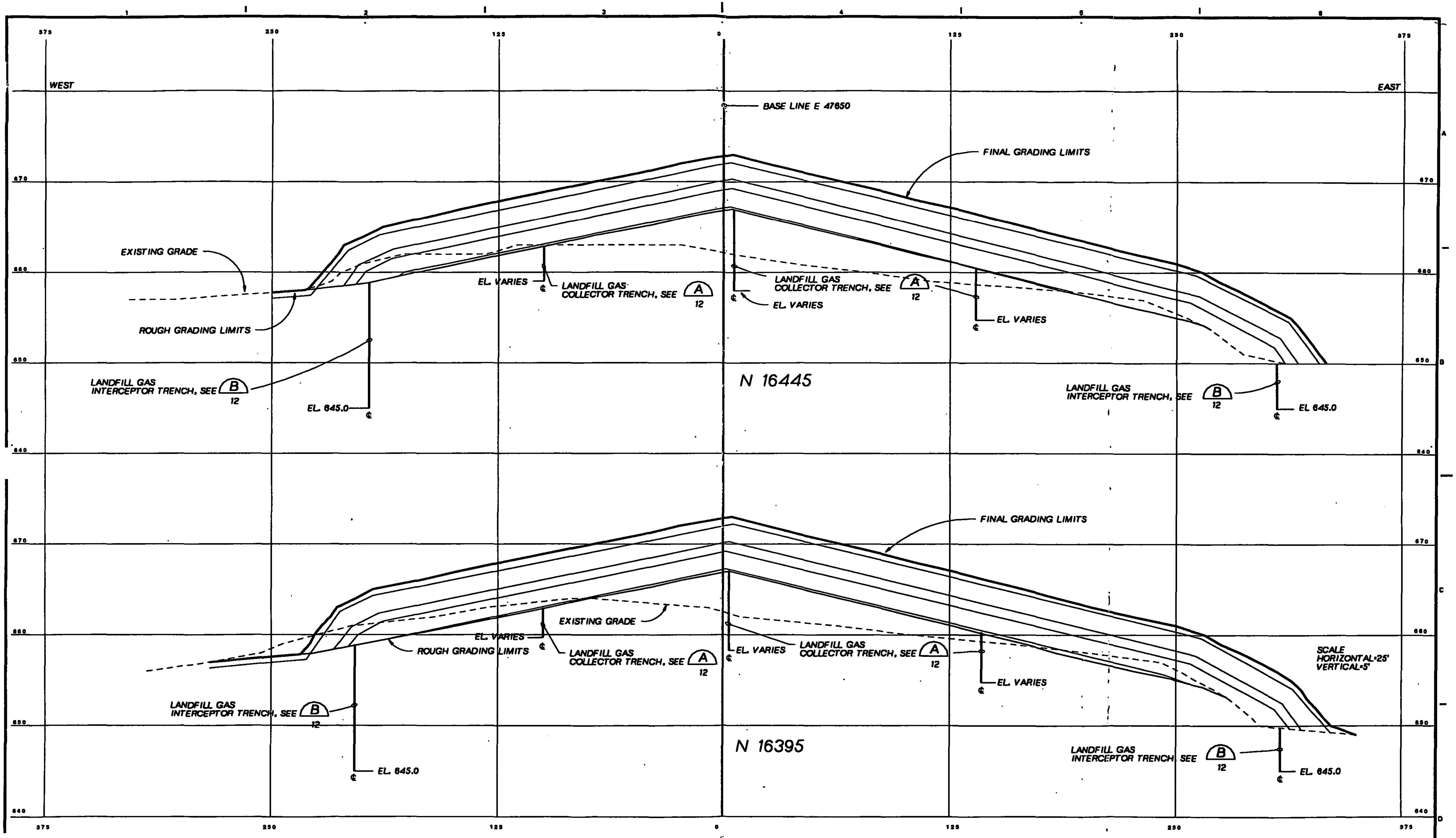
LANDFILL CAP REMEDIAL ACTION
ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

LANDFILL CAP SECTIONS

SHEET 20
DWG NO. 02-C-16
DATE JUNE 1992
PROJ NO. GLO55502.LC



CH2M HILL

| | | | | | | |
|---|---|---|---|---|---|---|
| DSGN MW PADDOCK | | | | | | |
| DR PA LLANAS<br>PT KOTZ | | | | | | |
| CHK MA SCHMIEGE | | | | | | |
| APVD JB RUSSELL | NO. | DATE | REVISION | BY | APVD | |

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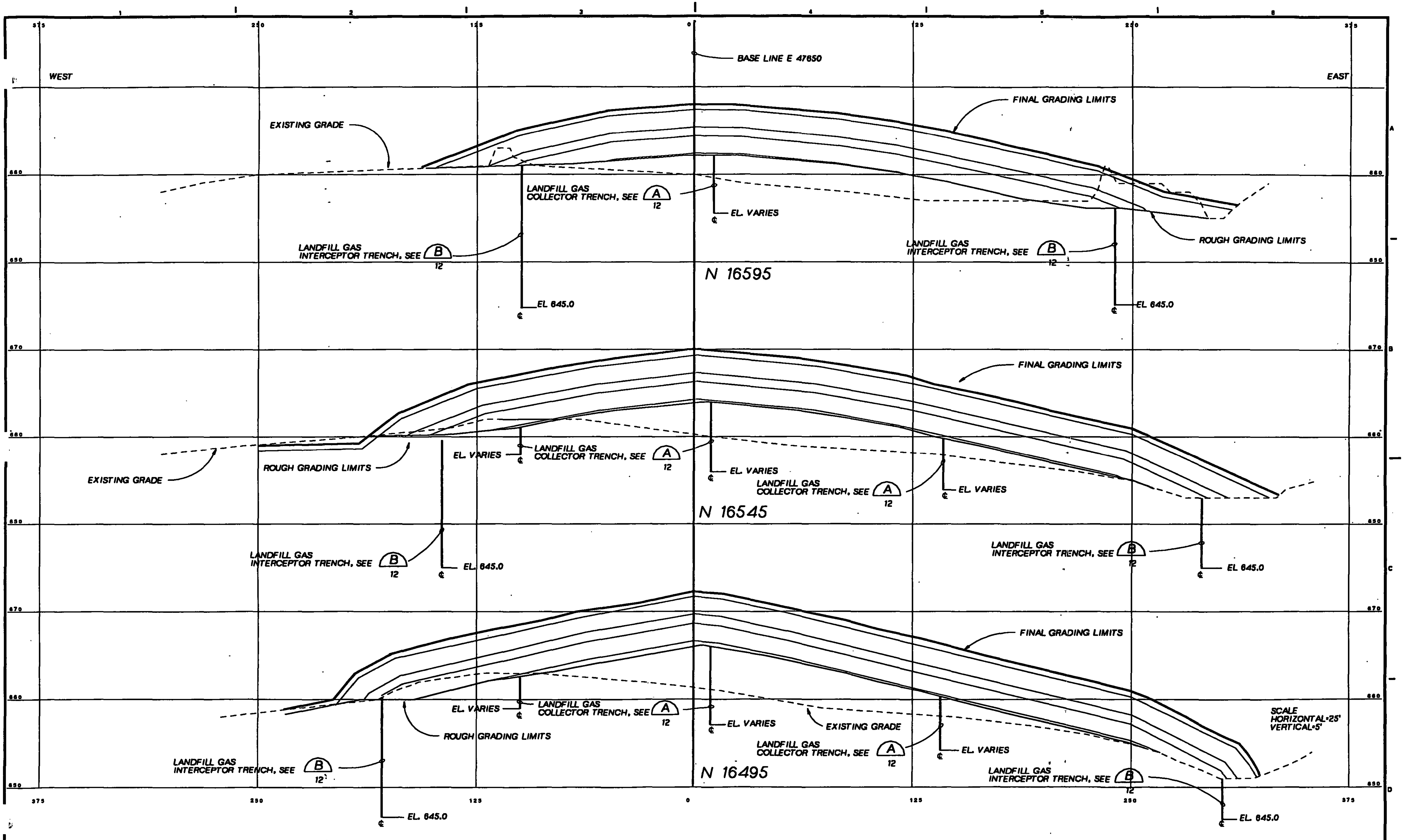
LANDFILL CAP REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

## LANDFILL CAP SECTIONS

SHEET 21
DWG NO. 02-C-16
DATE JUNE 1992
PROJ NO. GLO65602.LC



| | |
|---|---|
| DSGN | MW PADDOCK |
| DR | PA LLANAS<br>PT KUTZ |
| CHK | MA SCHMIEGE |
| APVD | JB RUSSELL |

| NO. | DATE | REVISION | BY | APVD |
|---|---|---|---|---|

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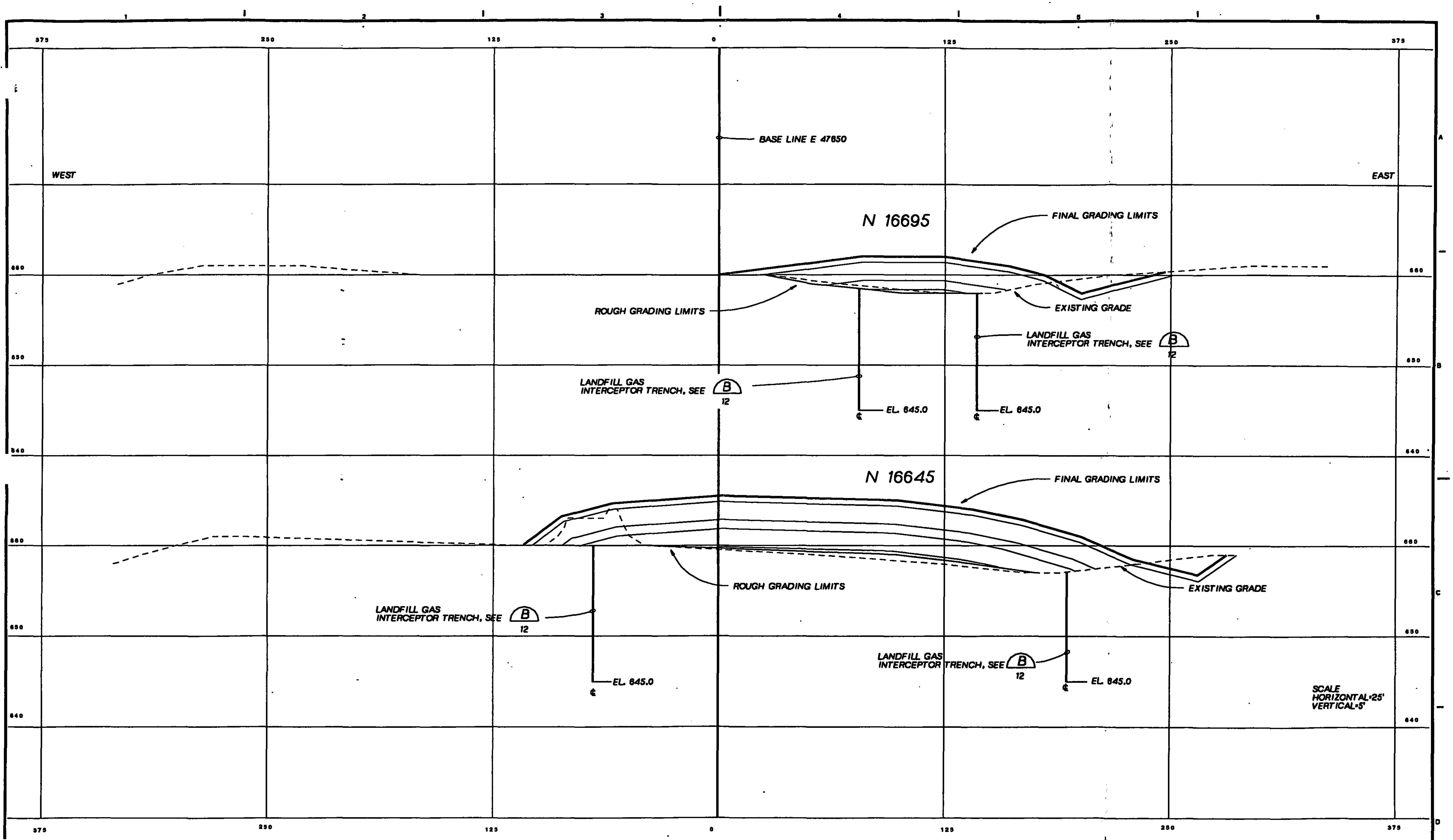
LANDFILL CAP REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

# LANDFILL CAP SECTIONS

SHEET 22
DWG NO. 02-C-16
DATE JUNE 1992
PROJ NO. GLO65602.LC



CH2M HILL

| | | | | | | |
|---|---|---|---|---|---|---|
| DSGN | MW PADDOCK | | | | | |
| DR | PA LLANAS<br>PT KUTZ | | | | | |
| CHK | MA SCHMIEGE | | | | | |
| APVD | JB RUSSELL | NO. | DATE | REVISION | BY | APVD |

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LANDFILL CAP REMEDIAL ACTION

ONALASKA MUNICIPAL LANDFILL SITE
ONALASKA TOWNSHIP, WISCONSIN

LANDFILL CAP SECTIONS

SHEET 23
DWG NO. 02-C-16
DATE JUNE 1992
PROJ NO. GLO65602.LC