RFB NO. 317040

CONSTRUCTION DOCUMENTS
PROJECT MANUAL

DANE COUNTY DEPARTMENT OF PUBLIC WORKS,
HIGHWAY AND TRANSPORTATION

PUBLIC WORKS SOLID WASTE DIVISION
1919 ALLIANT ENERGY CENTER WAY
MADISON, WISCONSIN 53713

REQUEST FOR BIDS NO. 317040
PHASE 9 - CELL 2 LINER AND STAGE 4 FINAL COVER CONSTRUCTION
DANE COUNTY NO. 2 (RODEFELD) LANDFILL
7102 U.S. HIGHWAY 12 & 18
MADISON, WISCONSIN

PREPARED BY:
TRC ENVIRONMENTAL CORPORATION
708 HEARTLAND TRAIL, SUITE 3000
MADISON, WISCONSIN

Due Date / Time: **THURSDAY, FEBRUARY 8, 2018 / 2:00 P.M.** Location: **PUBLIC WORKS OFFICE**

Performance / Payment Bond: **100% OF CONTRACT AMOUNT** Bid Deposit: **5% OF BID AMOUNT**

FOR INFORMATION ON THIS REQUEST FOR BIDS, PLEASE CONTACT:

JOHN WELCH, PROJECT MANAGER
TELEPHONE NO.: 608/516-4154
FAX NO.: 608/267-1533
E-MAIL: WELCH@COUNTYOFDANE.COM

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Section

LIST OF DRAWINGS (BOUND SEPARATELY)

Sheet	**These Drawings are for Base Bid**
1	Index/Title Sheet
2	Standard Legend and General Notes
3	Existing Conditions Map

PHASE 9 – CELL 2 LINER DRAWINGS

4	Soil Stockpile Areas
5	Subbase Grades/Groundwater Gradient Control System
6	Base Grades and Leachate Collection System
7	Details – Liner, Gradient Control, and Leachate Collection
8	Details and Engineering Cross Sections 2,201,015E and 381,600N

LANDFILL STAGE 4 FINAL COVER DRAWINGS

9	Final Cover Top of Grading Layer (Bottom of Barrier Layer)
10	Final Cover Subbase Grades (Top of Barrier Layer)
11	Top of Final Cover Grades
12	Details – Final Cover System
13	Details – Final Cover System
14	Details – Final Cover Penetrations
15	Details – Downslope Flumes
16	Erosion Control and Site Restoration Plan
17	Details – Erosion Control

SECTION 00020
INVITATION TO BID

LEGAL NOTICE

INVITATION TO BID

Dane County Public Works, Highway & Transportation Dept., 1919 Alliant Energy Center Way, Madison, WI 53713, will receive sealed Bids until:

2:00 P.M., THURSDAY, FEBRUARY 8, 2018

REQUEST FOR BIDS NO. 317040

PHASE 9, CELL 2 LINER AND STAGE 4 FINAL CAP CONSTRUCTION

DANE COUNTY LANDFILL SITE #2

7102 U.S. HIGHWAY 12 & 18

MADISON, WISCONSIN

Dane County is inviting Bids for construction services for Phase 9, Cell 2 Liner and Stage 4 Final Cap Construction. **Only firms with capabilities, experience & expertise with similar projects should obtain this Request for Bids document & submit Bids.**

Request for Bids document may be obtained after **2:00 p.m. on January 11, 2018** by downloading it from bids-pwht.countyofdane.com. Please call John Welch, Project Manager, at 608/516-4154, or our office at 608/266-4018, for any questions or additional information.

All Bidders must be a registered vendor with Dane County & pay an annual registration fee & must be pre-qualified as a Best Value Contractor before award of Contract. Complete Vendor Registration Form at danepurchasing.com/Account/Login? or obtain one by calling 608/266-4131. Complete Pre-qualification Application for Contractors at countyofdane.com/pwht/BVC_Application.aspx or obtain one by calling 608/266-4029.

A pre-bid site tour will be held January 25, 2018 at 10:00 a.m. at Dane County Landfill Site #2, starting at the Scale House. Bidders are strongly encouraged to attend this optional tour.

PUBLISH: **THURSDAY, JANUARY 11TH AND 18TH, 2018 - WISCONSIN STATE JOURNAL**
THURSDAY, JANUARY 11TH AND 18TH, 2018 - THE DAILY REPORTER

SECTION 00030
BEST VALUE CONTRACTING APPLICATION

DANE COUNTY DEPARTMENT of PUBLIC WORKS, HIGHWAY and TRANSPORTATION

County Executive
Joseph T. Parisi

1919 Alliant Energy Center Way ◆ Madison, Wisconsin 53713
Phone: (608) 266-4018 ◆ FAX: (608) 267-1533

Commissioner / Director
Gerald J. Mandli

BEST VALUE CONTRACTING APPLICATION

CONTRACTORS / LICENSURE APPLICANTS

The Dane County Department of Public Works requires all contractors to be pre-qualified as a best value contractor with the County prior to being awarded a contract. In addition, the County pre-qualifies potential contractors and sub-contractors who wish to work on County contracts. Subcontractors must become pre-qualified ten (10) days prior to commencing work under any Dane County Public Works Contract. Potential subcontractors are urged to become pre-qualified as early as possible. This document shall be completed, properly executed, along with the necessary attachments and additional information that the County requires for the protection and welfare of the public in the performance of a County contract.

Contractors or subcontractors of any tier who attain pre-qualification status will retain that status for a period of two (2) years from the date of qualification. Contractors shall notify the Dane County Department of Public Works, Highway & Transportation within fifteen (15) days of any changes to its business or operations that are relevant to the pre-qualification application. Failure to do so could result in suspension, revocation of the contractor's pre-qualification, debarment from County contracts for up to three (3) years and / or other sanctions available under the law.

No contracts will be awarded for construction work performed on Dane County projects unless the contractor is currently approved as a Wisconsin Trade Trainer or has applied for approval as an Apprenticeship Trade Trainer to the Wisconsin Department of Workforce Development and agrees to an acceptable apprenticeship program. If you are not currently approved as a Wisconsin Trade Trainer, or have not applied for approval as an Apprenticeship Trade Trainer, please contact the Department of Workforce Development - Bureau of Apprenticeship Standards at 608/266-3133 or visit their web site at: dwd.wisconsin.gov/apprenticeship/.

EXEMPTIONS

- Contractors who employ less than five (5) apprenticeable trade workers are not required to pre-qualify.
- Contractors performing work that does not apply to an apprenticeable trade, as outlined in Appendix A.
- The contractor / subcontractor provides sufficient documentation to demonstrate one or more of the following:
    - apprentices are not available in a specific geographic area;
    - the applicable apprenticeship program is unsuitable or unavailable; or
    - there is a documented depression of the local construction market which prevents compliance.

SEC.	PROOF OF RESPONSIBILITY	CHECK IF APPLICABLE
1	Does your firm possesses all technical qualifications and resources, including equipment, personnel and financial resources, necessary to perform the work required for any project or obtain the same through the use of responsible, pre-qualified subcontractors?	Yes: ☐ No: ☐
2	Will your firm possess all valid, effective licenses, registrations or certificates required by federal, state, county, or local law, which are necessary for the type of work to be performed including, but not limited to, those for any type of trade work or specialty work?	Yes: ☐ No: ☐
3	Will your firm meet all bonding requirements as required by applicable law or contract specifications?	Yes: ☐ No: ☐
4	Will your firm meet all insurance requirements as required by applicable law or specifications, including general liability insurance, workers compensation insurance and unemployment insurance requirements?	Yes: ☐ No: ☐
5	Will your firm maintain a substance abuse policy for employees hired for public works contracts that comply with Wis. Stats. Sec. 103.503?	Yes: ☐ No: ☐
6	Does your firm acknowledge that it must pay all craft employees on public works projects the wage rates and benefits required under Section 66.0903 of the Wisconsin Statutes?	Yes: ☐ No: ☐
7	Will your firm fully abide by the equal opportunity and affirmative action requirements of all applicable laws, including County ordinances?	Yes: ☐ No: ☐
8	In the past three (3) years, has your firm had control or has another corporation, partnership or other business entity operating in the construction industry controlled it? If so, please attach a statement explaining the nature of the firm relationship?	Yes: ☐ No: ☐ If Yes, attach details.
9	In the past three (3) years, has your firm had any type of business, contracting or trade license, certification or registration revoked or suspended?	Yes: ☐ No: ☐ If Yes, attach details.
10	In the past three (3) years, has your firm been debarred by any federal, state or local government agency?	Yes: ☐ No: ☐ If Yes, attach details.
11	In the past three (3) years, has your firm defaulted or failed to complete any contract?	Yes: ☐ No: ☐ If Yes, attach details.
12	In the past three (3) years, has your firm committed a willful violation of federal, state or local government safety laws as determined by a final decision of a court or government agency authority.	Yes: ☐ No: ☐ If Yes, attach details.
13	In the past three (3) years, has your firm been in violation of any law relating to your contracting business where the penalty for such violation resulted in the imposition of a penalty greater than $10,000?	Yes: ☐ No: ☐ If Yes, attach details.
14	Is your firm Executive Order 108 precertified with the State of Wisconsin?	Yes: No: ☐
15	Is your firm an active Wisconsin Trade Trainer as determined by the Wisconsin Bureau of Apprenticeship Standards?	Yes: ☐ No: ☐
16	Is your firm exempt from being pre-qualified with Dane County?	Yes: ☐ No: ☐ If Yes, attach reason for exemption.
17	Does your firm acknowledge that in doing work under any County Public Works Contract, it will be required to use as subcontractors only those contractors that are also pre-qualified with the County or become so ten days prior to commencing work?	Yes: ☐ No: ☐
18	Contractor has been in business less than one year?	Yes: ☐ No: ☐
19	Is your firm a first time Contractor requesting a one time exemption, but, intend to comply on all future contracts and are taking steps typical of a "good faith" effort?	Yes: ☐ No: ☐
20	Not applicable. My firm does not intend to work on Best Value Contracts. Note: Best Value Contracting is required to bid on most Public Works Contracts (if unclear, please call Jan Neitzel Knox 608-266-4029).	Yes: ☐ No: ☐

SIGNATURE SECTION

Your firm's Officer, or the individual who would sign a bid and / or contract documents must sign this document.

I do hereby certify that all statements herein contained are true and correct to the best of my knowledge:

____________________________________ ____________________
Signature Date

____
Printed or Typed Name and Title

NAME AND ADDRESS OF CONTRACTOR	
Name of Firm:	
Address:	
City, State, Zip:	
Telephone Number:	
Fax Number:	
E-mail Address:	

REMEMBER!

Return all to forms and attachments, or questions to:

JAN NEITZEL KNOX
EMAIL: NEITZEL-KNOX@COUNTYOFDANE.COM
OFFICE: (608)266-4029, FAX: (608)267-1533

DANE COUNTY DEPARTMENT OF PUBLIC WORKS,
HGHWAY & TRANSPORTATION
1919 ALLIANT ENERGY CENTER WAY
MADISON, WI 53713

APPENDIX A

APPRENTICEABLE TRADES

Bricklayer
Carpenter
Cement Mason (Concrete Finisher)
Cement Mason (Heavy Highway)
Construction Craft Laborer
Data Communications Installer
Electrician
Elevator Mechanic / Technician
Environmental Systems Technician / HVAC Service Technician / HVAC Install & Service
Glazier
Heavy Equipment Operator / Operating Engineer
Insulation Worker (Heat & Frost)
Iron Worker (Assembler, Metal Buildings)
Painter / Decorator
Plasterer
Plumber
Roofer / Waterproofer
Sheet Metal Worker
Sprinkler Fitter
Steamfitter (Service & Refrigeration)
Taper & Finisher
Telecommunications (Voice, Data & Video) Installer / Technician
Tile Setter

SECTION 00100
INSTRUCTIONS TO BIDDERS

INSTRUCTIONS TO BIDDERS

TABLE OF CONTENTS

1. GENERAL

A. Before submitting Bid, bidder shall thoroughly examine all Construction Documents. Successful Bidder shall be required to provide all the Work that is shown on Drawings, set forth in Specifications, or reasonably implied as necessary to complete Contract for this project.

B. Bidder shall visit site to become acquainted with adjacent areas, means of approach to site, conditions of actual site and facilities for delivering, storing, placing, and handling of materials and equipment.

C. Pre-bid meeting is scheduled on January 25, 2018 at 10:00 a.m. at Dane County Landfill Site No. 2, starting at the Scale House. Attendance by all bidders is optional, however bidders and subcontractors are strongly encouraged to attend.

D. Failure to visit site or failure to examine any and all Construction Documents will in no way relieve successful Bidder from necessity of furnishing any necessary materials or equipment, or performing any work, that may be required to complete the Work in accordance with Drawings and Specifications. Neglect of above requirements will not be accepted as reason for delay in the Work or additional compensation.

2. DRAWINGS AND SPECIFICATIONS

A. Drawings and Specifications that form part of this Contract, as stated in Article 1 of General Conditions of Contact, are enumerated in Document Index of these Construction Documents.

B. Complete sets of Drawings and Specifications for all trades will be available to all Bidders, irrespective of category of work to be bid on, in order that all Bidders may be familiar with work of other trades as they affect their bid.

3. INTERPRETATION

A. No verbal explanation or instructions will be given in regard to meaning of Drawings or Specifications before Bid Due Date. Bidders shall bring inadequacies, omissions or conflicts to Owner or Architect / Engineer's attention at least ten (10) calendar days before Bid Due Date. Prompt clarification will be available to all bidders by Addendum.

B. Failure to so request clarification or interpretation of Drawings and Specifications will not relieve successful Bidder of responsibility. Signing of Contract will be considered as implicitly denoting that Contractor has thorough understanding of scope of the Work and comprehension of Construction Documents.

C. Owner will not be responsible for verbal instructions.

4. QUALIFICATIONS OF BIDDER (CONTRACTOR AND SUBCONTRACTOR)

A. Before award of Contract can be approved, Owner shall be satisfied that Bidder involved meets following requirements:

1. Has completed at least one (1) project of at least fifty percent (50%) of size or value of Division of work being bid and type of work completed is similar to that being bid. If greater magnitude of experience is deemed necessary, other than size or value of work, such requirements will be described in appropriate section of Specifications.

2. Maintains permanent place of business.

3. Can be bonded for terms of proposed Contract.

4. Has record of satisfactorily completing past projects. Criteria which will be considered in determining satisfactory completion of projects by bidder will include:

   a. Completed contracts in accordance with drawings and specifications.
   b. Diligently pursued execution of work and completed contracts according to established time schedule unless Owner grants extensions.
   c. Fulfilled guarantee requirements of construction documents.
   d. Is not presently on ineligible list maintained by County's Department of Administration for noncompliance with equal employment opportunities and affirmative action requirements.
   e. Authorized to conduct business in Wisconsin. By submitting Bid, bidder warrants that it has: complied with all necessary requirements to do business in State of Wisconsin; that persons executing contract on its behalf are authorized to do so; and, if corporation, that name and address of bidder's registered agent are as set forth in Contract. Bidder shall notify Owner immediately, in writing, of any change in its registered agent, their address, and bidder's legal status. For partnership, term "registered agent" shall mean general partner.

B. County's Public Works Project Engineer will make such investigations as are deemed necessary to determine ability of bidder to perform the Work, and bidder shall furnish to County's Public Works Project Engineer or designee all such information and data for this purpose as County's Public Works Project Engineer may request. Owner reserves right to reject Bid if evidence submitted by, or investigation of, bidder fails to satisfy Owner that bidder is responsible and qualified to carry out obligations of Contract and to complete the Work contemplated therein.

5. BID GUARANTEE

A. Bank certified check, cashier's check or Bid Bond, payable to County in amount not less than five percent (5%) of maximum bid, shall accompany each Bid as guarantee that if Bid is accepted, Bidder will execute and return proposed Contract and Performance and Payment Bonds within ten (10) business days after being notified of acceptance of Bid. Company issuing bonds must be licensed to do business in Wisconsin.

B. Any bid, which is not accompanied by bid guarantee, will be considered "No Bid" and will not be read at Bid Due Date.

C. If successful Bidder so delivers Contract, Certificate of Insurance, and Performance and Payment Bonds, check will be returned to Bidder. In case Bidder fails to deliver such Contract, insurance, and bond, amount of bid guarantee will be forfeited to County as liquidated damages.

D. All checks tendered as bid guarantee, except those of three (3) lowest qualified, responsible bidders, will be returned to their makers within three (3) business days after Bid Due Date. All such retained checks will be returned immediately upon signing of Contract and Performance and Payment Bonds by successful Bidder.

6. WITHDRAWAL OF BIDS

A. Bids may be withdrawn by written request received from bidder or authorized representative thereof prior to time fixed for Bid Due Date, without prejudice to right of bidder to file new Bid. Withdrawn Bids will be returned unopened. Negligence on part of bidder in preparing their Bid confers no right for withdrawal of Bid after it has been opened.

B. No Bid may be withdrawn for period of sixty (60) calendar days after Bid Due Date.

C. If Bid contains error, omission or mistake, bidder may limit liability to amount of bidder's guarantee by giving written Notice of Intent not to execute Contract to Owner within seventy-two (72) hours of Bid Due Date.

7. CONTRACT FORM

A. Sample copy of contract that successful Bidder will be required to enter into is included in these Construction Documents and bidders are required to familiarize themselves with all conditions contained therein.

8. CONTRACT INTERESTS BY COUNTY PUBLIC OFFICIALS

A. In accordance with Wisconsin Statute 946.13, county official may not bid for or enter into any contract involving receipts or disbursements of more than $15,000.00 in a year, in which they have private pecuniary interest, direct or indirect if at same time they are authorized to take official action with respect to making of this Contract. Any contract entered into in violation of this Statute is void and County incurs no liability thereon. This subsection does not affect application and enforcement of Wisconsin Statute 946.13 by state prosecutors in criminal courts of this state.

9. EMERGING SMALL BUSINESS PROVISIONS

A. **Emerging Small Business Definition.** For purposes of this provision, ESB is defined as:

1. Independent business concern that has been in business minimum of one year;
2. Business located in State of Wisconsin;
3. Business comprised of less than twenty-five (25) employees;
4. Business must not have gross sales in excess of three million dollars ($3,000,000.00) over past three years; and
5. Business does not have history of failing to complete projects.

B. **Emerging Small Business (ESB) Involvement.** Bidder shall make good faith effort to award minimum of ten percent (10%) of the Work to ESBs. Bidder shall submit report to Dane County Contract Compliance Officer within ten (10) business days of Bid Due Date demonstrating such efforts. Good faith efforts means significant contact with ESBs for purposes of soliciting bids from them. Failure to make or demonstrate good faith efforts will be grounds for disqualification.

C. **Emerging Small Business Report.** Emerging Small Business Enterprise Report is to be submitted by Bidder in separate envelope marked "Emerging Small Business Report". This report is due by 2:00 p.m. following specified ten (10) business days after Bid Due Date. Bidder who fails to submit Emerging Small Business Report shall be deemed not responsive.

D. **ESB Goal.** Goal of this project is ten percent (10%) ESB participation. ESB utilizations are shown as percentage of total Bid. If Bidder meets or exceeds specified goal, Bidder is only required to submit Form A - Certification, and Form B - Involvement. Goal shall be met if Bidder qualifies as ESB.

E. **Report Contents.** Following award of Contract, Bidder shall submit copies of executed contracts for all Emerging Small Businesses. Emerging Small Business Report shall consist of these:

1. Form A - Certification;
2. Form B - Involvement;
3. Form C - Contacts;
4. Form D - Certification Statement (if appropriate); and
5. Supportive documentation (i.e., copies of correspondence, telephone logs, copies of advertisements).

F. ESB Listing. Bidders may solicit bids from this ESB listing: pdf.countyofdane.com/commissions/2013-2015_Targeted_Business_Directory.pdf.

G. **ESB Certification.** All contractors, subcontractors and suppliers seeking ESB certification must complete and submit Emerging Small Business Report to Dane County Contract Compliance Program.

H. **Certification Statement.** If ESB firm has not been certified by County as ESB prior to submittal of this Bid, ESB Report cannot be used to fulfill ESB goal for this project unless firm provides "Form D - Certification Statement". Certification statement must be completed and signed by ESB firm.

I. **Questions.** Questions concerning Emerging Small Business provisions shall be directed to:

Dane County Contract Compliance Officer
City-County Building, Room 421
210 Martin Luther King, Jr. Blvd.
Madison, WI 53703
608/266-5623

J. **Substituting ESBs.** In event of any significant changes in subcontract arrangements or if need arises to substitute ESBs, Bidder shall report such proposed changes to Contract Compliance Officer to making any official changes and request authorization to substitute ESB firm. Bidder further agrees to make every possible effort to replace ESB firm with another qualified ESB firm.

K. **Good Faith Efforts.** Good faith efforts can be demonstrated by meeting all of these obligations:

1. Selecting portions of the Work to be performed by ESBs in order to increase likelihood of meeting ESB goal including, where appropriate, breaking down Contract into smaller units to facilitate ESB participation.

2. Advertising in general circulation, trade associations and women / minority focus media concerning subcontracting opportunities.

3. Providing written notices to reasonable number of specific ESBs that their interest in Contract was being solicited in sufficient time to allow ESBs to participate effectively.

4. Following up on initial solicitations of interest by contacting ESBs within five (5) business days prior to Bid Due Date to determine with certainty whether ESB were interested, to allow ESBs to prepare bids.

5. Providing interested ESB with adequate information about Drawings, Specifications and requirements of Contract.

6. Using services of available minority, women and small business organizations and other organizations that provide assistance in recruitment of MBEs / WBEs / ESBs.

7. Negotiating in good faith with interested ESBs, not rejecting ESBs as unqualified without sound reason based on thorough investigation of their capabilities.

8. Submitting required project reports and accompanying documents to County's Contract Compliance Officer within twenty-four (24) hours after Bid Due Date.

L. **Appeals Disqualification of Bid.** Bidder who is disqualified may appeal to Public Works & Transportation Committee and Equal Opportunity Commission.

10. METHOD OF AWARD - RESERVATIONS

A. Following will be basis of award of Contract, providing cost does not exceed amount of funds then estimated by County as available to finance Contract(s):

1. Lowest dollar amount submitted by qualified responsible bidder on Base Bid for all work comprising project, combined with such additive Owner accepted alternates.

2. Owner reserves right to reject all bids or any bid, to waive any informality in any bid, and to accept any bid that will best serve interests of County.

3. Unit Prices and Informational Bids will not be considered in establishing low bidder.

11. SECURITY FOR PERFORMANCE AND PAYMENTS

A. Simultaneous with delivery of signed Contract, Bidder shall be required to furnish Performance and Payment Bonds as specified in Article 29 of General Conditions of Contract, "Contract Security". Surety Company shall be licensed to do business in Wisconsin. Performance and Payment Bonds must be dated same date or subsequent to date of Contract. Performance and Payment Bonds must emulate information in Sample Performance and Payment Bonds in Construction Documents.

B. Provide certified copy of power of attorney from Surety Company showing that agent who signs Bond has power of attorney to sign for Surety Company. Secretary or Assistant Secretary of company must sign this certification, not attorney-in-fact. Certification must bear same or later date as Bond. Power of Attorney must emulate model power of attorney information detailed in Sample Performance and Payment Bonds.

C. If Bidder is partnership or joint venture, State certified list, providing names of individuals constituting partnership or joint venture must be furnished. Contract itself may be signed by one partner of partnership, or one partner of each firm comprising joint venture, but Performance and Payment Bonds must be signed by all partners.

D. If Bidder is corporation, it is necessary that current certified copy of resolution or other official act of directors of corporation be submitted showing that person who signs Contract is authorized to sign contracts for corporation. It is also necessary that corporate seal be affixed to resolution, contract, and performance and payment bonds. If your corporation has no seal, it is required that above documents include statement or notation to effect that corporation has no seal.

12. TAXES

A. Wisconsin Statute 77.54 (9m) allows building materials that become part of local unit government facilities to be exempt from sales & use tax. Vendors & materials suppliers may not charge Bidders sales & use tax on these purchases. This does not include highways, streets or roads. Any other Sales, Consumer, Use & other similar taxes or fees required by law shall be included in Bid.

B. In accordance with Wisconsin Statute 71.80(16)(a), successful nonresident bidder, whether incorporated or not, and not otherwise regularly engaged in business in this state, shall file surety bond with State of Wisconsin Department of Revenue payable to Department of Revenue, to guarantee payment of income taxes, required unemployment compensation contributions, sales and use taxes and income taxes withheld from wages of employees, together with any penalties and interest thereon. Amount of bond shall be three percent (3%) of Contract or subcontract price on all contracts of $50,000 or more.

13. SUBMISSION OF BIDS

A. All Bids shall be submitted on standard Bid Form bound herein and only Bids that are made on this Bid Form will be considered. Entire Bid Form and other supporting documents, if any, shall be removed or copied from Construction Documents, filled out, and submitted in manner specified hereinafter. Submit completed Bid Bond with Bid as well.

B. No bids for any subdivision or any sub-classification of this Work, except as indicated, will be accepted. Any conditional Bid, amendment to Bid Form or appended item thereto, or inclusion of any correspondence, written or printed matter, or details of any nature other than that specifically called for, which would alter any essential provision of Construction Documents, or require consideration of unsolicited material or data in determining award of Contract, will disqualify Bid. Telecommunication alterations to Bid will not be accepted.

C. Bidders must submit single Bid for all the Work.

D. Bid amounts shall be inserted in words and in figures in spaces provided on Bid Form; in case of conflict, written word amounts will govern.

E. Addenda issued after Bid Letting shall become part of Construction Documents. Bidders shall acknowledge receipt of such addenda in appropriate space provided on Bid Form. Bid may be rejected if receipt of any particular addendum applicable to award of Contract has not been acknowledged on Bid Form.

F. Bids shall be signed, placed in envelope, sealed and delivered before due time to place designated in Invitation to Bid, and identified with project name, bid number, location, category of work being bid upon, Bid Due Date, name and address of bidder.

G. Bidder shall be responsible for sealed Bid being delivered to place designated for Bid Due Date on or before date and time specified. Bids received after time of closing will be rejected and returned to bidder unopened.

H. Bid will be considered invalid and will be rejected if bidder has not signed it.

I. Faxed or emailed Bids will not be accepted.

J. Bidder's organization shall submit completed with Bid, Fair Labor Practices Certification form, included in these Construction Documents.

14. SUBCONTRACTOR LISTING

A. Bidders shall be required to submit list of major subcontractors for General Construction, Plumbing, HVAC, and Electrical work proposed for this project to include committed prices for each subcontractor. List shall be placed in separate sealed envelope that must be clearly identified as "Major Subcontractor List", for named project and name of Bidder submitting it. County must receive envelope no later than date by which successful Bidder is required to submit his or her signed Contract, as established in Construction Documents.

15. ALTERNATE BIDS

A. Bidder shall carefully read requests for Alternate Bids, and thoroughly examine Drawings and Specifications to determine extent various changes and conditions will affect Bid.

B. Space is provided in Bid Form for requested Alternate Bids. Failure to submit bid for any requested Alternate Bids may result in rejection of entire Bid.

C. Bidder shall state amount to be added / subtracted to Base Bid for providing alternates, including all incidentals, omissions, additions, and adjustments as may be necessary or required by such changes. If there is no difference in price, Bidder shall state, "No Change".

D. Descriptions of requested Alternate Bids are as set forth in Construction Documents.

16. INFORMATIONAL BIDS

A. Not Applicable.

17. UNIT PRICES

A. Provide unit prices where requested on Bid Form. Unit prices will include all costs for materials, labor, insurance, taxes, overhead and profit necessary to perform specified work. Failure to provide requested unit prices may result in rejection of entire Bid.

B. Owner reserves right to accept or reject any unit prices as given in Bid.

C. Bidder shall refer to Bid Form and applicable specification section to determine basis of unit measure and detailed information related to each unit price item requested.

18. COMMENCEMENT AND COMPLETION

A. Successful Bidder shall commence work when schedule and weather permit, but no later than stated in Bid Form. Contractor shall pursue the Work regularly and continuously at reasonable rate to insure completion of the Work within time stated in Bid.

B. Should it be found impossible to complete the Work on or before time specified for completion, written request may be submitted for extension of time setting forth reasons believed to justify granting of such request. Refer to Article 20 of General Conditions of Contract, titled “Time for Completion”.

19. WORK BY OWNER

A. This work will be accomplished by Owner or will be let under separate contracts and will not be included under this Contract:

1. The borrow source for the Contractor furnished fine grained soil barrier layer will need to be approved by the WDNR (NR 504.075) prior to hauling any material from the site. Owner will collect and analyze samples from borrow site and submit to WDNR for approval. Contractor to provide access to site and dig all test pits as necessary.

2. Native planting topsoil preparation for Stage 4 Final Cover Construction. This will include but not limited to:

   Topsoil sampling and testing

   Soil amendment application (if necessary)

   Native seed procurement and installation

   <u>Please note, erosion control measures are the responsibility of the Contractor (i.e. mulch, mat, sediment logs, etc.).</u>

20. SPECIAL HAZARDS COVERAGE

A. Not Applicable.

FORM A

DANE COUNTY
EMERGING SMALL BUSINESS REPORT - CERTIFICATION

In accordance with General Conditions of Contract, submit this Emerging Small Business Report within ten (10) days after Bid Due Date.

PROJECT NAME: ____

____

BID NO.: ___________________________ BID DUE DATE: ________________________

BIDDER INFORMATION

COMPANY NAME: ____

ADDRESS: ____

____

TELEPHONE NO.: ____

CONTACT PERSON: ____

EMAIL ADDRESS: ____

FORM B

DANE COUNTY
EMERGING SMALL BUSINESS REPORT - INVOLVEMENT

(Copy this Form as necessary to provide complete information)

COMPANY NAME: ____

PROJECT NAME: ____

BID NO.: ______________________ BID DUE DATE: ______________________

ESB NAME: ____

CONTACT PERSON: ____

ADDRESS: ____

____

PHONE NO & EMAIL.: ____

____

Indicate percentage of financial commitment to this ESB: ______% Amount: $______________

ESB NAME: ____

CONTACT PERSON: ____

ADDRESS: ____

____

PHONE NO & EMAIL.: ____

____

Indicate percentage of financial commitment to this ESB: ______% Amount: $______________

FORM C

Page ___ of ___

DANE COUNTY

(Copy this Form as necessary to provide complete information)

EMERGING SMALL BUSINESS REPORT - CONTACTS

COMPANY NAME: ____

PROJECT NAME: ____

BID NO.: ____________________ BID DUE DATE: __________________

	ESB FIRM NAME CONTACTED	DATE	PERSON CONTACTED	DID ESB BID?	ACC-EPT BID?	REASON FOR REJECTION
1)						
2)						
3)						
4)						
5)						
6)						
7)						
8)						

FORM D

DANE COUNTY
EMERGING SMALL BUSINESS REPORT - CERTIFICATION STATEMENT

I, _______________________________________ , _________________________________ of
Name Title

____ certify to best of my knowledge and
Company

belief that this business meets Emerging Small Business definition as indicated in Article 9 and that information contained in this Emerging Small Business Report is true and correct.

____ ___________________________
Bidder's Signature Date

SECTION 00200
INFORMATION AVAILABLE TO BIDDERS

The following documents will be made available for review by bidders at the office of Dane County Solid Waste Division. The following documents contain site information including site geology, soil boring information, site water table/water level information, Phase 9 – Cell 1 Liner Construction (liner adjacent to and north of Phase 9 – Cell 2), Phase 10 – Cell 2 Liner Construction (liner adjacent to and west of Phase 9 – Cell 2):

- Dane Co. Information related to landfill Stage 3 final cover construction performed in 2017.

- Dane County. 2017. Eastern Expansion Phase 10 – Cell 2 Liner Construction Documentation Report, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. September 2017.

- Request for Bids No. 316024. 2016. Eastern Expansion Phase 10 – Cell 2 Liner Construction, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. June 2016.

- Dane County. 2015. Eastern Expansion Phase 10 – Cell 1 Liner Construction Documentation Report, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. November 2015.

- Request for Bids No. 315034. 2015. Eastern Expansion Phase 10 – Cell 1 Liner Construction, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. June 2015.

- Dane County. 2014. Eastern Expansion Phase 9 – Cell 1 Liner Construction Documentation Report, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. December 2014.

- TRC Environmental Corporation. 2014. Addendum No. 1 Eastern Expansion Plan of Operation Report, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin, March 2014.
- TRC Environmental Corporation. 2014. Eastern Expansion Plan of Operation Report, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. March 2014.

- Request for Bids No. 314005. 2014. Eastern Expansion Phase 9 – Cell 1 Liner Construction, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. February 2014.

- TRC Environmental Corporation. 2013. Eastern Expansion Feasibility Report, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. May 24, 2013.

- Rust Environment and Infrastructure. 1993. Plan of Operation Report, Dane County Landfill Expansion Rodefeld Site No. 2, License No. 3018, Dane County, Wisconsin. November 1993.

- SEC Donohue Environment and Infrastructure. 1992. Feasibility Report, Dane County Landfill Expansion Rodefeld Site No. 2, License No. 3018, Dane County, Wisconsin. October 1992.

- RMT, Inc. 1984. Plan of Operation Report, Dane County Landfill Expansion Rodefeld Site No. 2, License No. 3018, Dane County, Wisconsin. February 1984.

- RMT, Inc. 1982. Feasibility Report, Dane County Landfill Expansion Rodefeld Site No. 2, License No. 3018, Dane County, Wisconsin. September 1982.

SECTION 00300
BID FORM (LUMP SUM)

TO: Dane County Department of Public Works – Solid Waste Division
1919 Alliant Energy Center Way
Madison, Wisconsin 53713

FOR: Dane County No. 2 (Rodefeld) Landfill
Phase 9 – Cell 2 Liner and Landfill Stage 4 Final Cover Construction

BID FROM: ____

____

____

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. Bidder accepts all of the terms and conditions of the Advertisement or Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid Security. This Bid will remain subject to acceptance for ninety (90) days after the day of Bid opening. Bidder will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within ten (10) days after the date of Owner's Notice of Award.

3. In the event there is a disagreement related to the volume of soil handled on site for this project, Dane County will have their surveyor verify quantities based on a before and after survey of the ground surface where the soils were removed.

4. In submitting this Bid, Bidder represents, as more fully set forth in the Agreement, that:

(a) Bidder has examined copies of all the Bidding Documents and of the following Addenda receipt of all which is hereby acknowledged: (List addenda by Addendum Number and Date)

Date	Number
____________________	____________________
____________________	____________________
____________________	____________________

(b) Bidder has visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost, progress, performance and furnishing of the Work;

(c) Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress, performance, and furnishing of the Work;

(d) Bidder has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) which have been identified in the Supplementary Conditions. Bidder acknowledges that such reports and drawings are not Contract Documents and may not be complete for Bidder's purpose. Bidder acknowledges that Owner and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bidding Documents with respect to Underground Facilities at or contiguous to the site. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the site or otherwise which may affect cost progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder and safety precautions and programs incident thereto. Bidder does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Contract Documents.

(e) Bidder is aware of the general nature of Work to be performed by Owner and others at the site that relates to Work for which this Bid is submitted as indicated in the Contract Documents.

(f) Bidder has correlated the information known to Bidder, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.

(g) Bidder has given Owner/Engineer written notice of all conflicts, errors, ambiguities or discrepancies that Bidder has discovered in the Contract Documents and the written resolution thereof by Owner/Engineer is acceptable to Bidder, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

(h) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm, or corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

5. Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

Refer to Section 01270 "Schedule of Values and Payment" for description of Work for each bid item identified below.

ITEM	SCHEDULE OF VALUE DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	SCHEDULE OF VALUE PRICE
1	Mobilization	LS	1		
2	Surveying	LS	1		
3	Sediment Control		-----		
	• Sediment Control Fence	LF	4,000		
	• Sediment Control Fence with Erosion Logs	LF	3,000		
	• Stone Weepers at Culvert Outlets	EA	2		
4	Erosion Control and Revegetation Mat	LS	1		
PHASE 9 – CELL 2 LINER CONSTRUCTION					
5	Clear and Grub	LS	1		
6	Subbase Grade Construction		-----		
	• Estimated Cut Volume(1)(2)(3)	CY	25,300		
	• Estimated Fill Volume(1)(2)(3)	CY	670		
7	Groundwater Gradient Control System	LS	1		
8	Select Clay Fill(1) (Owner Furnished Material from Westport Borrow Site)				
	Clay from on-site Stockpiles(1)(2)(3)	CY	8,750		
	Clay from off-site (Westport borrow source)(1)(2)(3)	CY	18,150		
	• Topsoil Stripping and Stockpiling	CY	9,000		
	• Topsoil Placement and Borrow Site Restoration	AC	4		
9	Geomembrane Surface Preparation	LS	1		
10	60 mil Geomembrane (Textured)	SY	20,800		
11	Geotextile Cushion	SY	20,800		
12	Select Aggregate Fill Drainage Layer(1)	CY	6,900		
13	Delineation Berms	LF	317		
14	Perforated HDPE Leachate Pipe	LF	620		
15	Electrical Resistivity Testing Assistance	LS	1		
16	Removal of Existing HDPE Culvert	LS	1		
LANDFILL STAGE 4 – FINAL COVER CONSTRUCTION					
17	General Fill, Fine-Grained Soil and Topsoil Excavation to Subgrade and Prepare Grading Layer for Fine-Grained Soil Barrier Layer Placement(4)(5)	CY	116,900		
18	Waste Excavation and Disposal(4)	CY	7,800		
19	Compacted Fine-Grained Soil Barrier Layer(4) (Owner Furnished Material)	CY	38,000		
20	Compacted Fine-Grained Soil Barrier Layer(4) (Contractor Furnished Material)	CY	18,000		

ITEM	SCHEDULE OF VALUE DESCRIPTION	UNITS	ESTIMATED QUANTITY	UNIT PRICE	SCHEDULE OF VALUE PRICE
21	Geosynthetic Clay Liner (GCL) (Owner Furnished Material)	SY	27,000		
22	Geosynthetic Clay Liner (GCL) (Contractor Furnished Material)	SY	57,750		
23	40 mil LLDPE Textured Geomembrane (Owner Furnished Material)	SY	26,475		
24	40 mil LLDPE Textured Geomembrane (Contractor Furnished Material)	SY	58,275		
25	Geocomposite Drainage Layer (Owner Furnished Material)	SY	30,385		
26	Geocomposite Drainage Layer (Contractor Furnished Material)	SY	54,365		
27	General Fill Rooting Zone Layer(4) (Owner Furnished Material)	CY	70,000		
28	Topsoil Layer(4) (Owner Furnished Material)	CY	14,000		
29	Drainage Layer Toe Drain Collection Pipes	LF	2,117		
30	Diversion Berm Drainage Layer Collection Pipes	LF	2,633		
31	Toe Drain Drainage Layer Discharge Pipes	EA	12		
32	Diversion Berm Drainage Layer Discharge Pipes	EA	13		
33	Permanent Surface Water Diversion Berms	LF	2,633		
34	Temporary Surface Water Diversion Berms	LF	590		
35	Downslope Flume Pipes and Energy Dissipater Structures	EA	2		
36	Geomembrane Boots Around Existing Gas and Leachate Collection System Penetrations Through the Final Cover Geomembrane	LS	1		
			TOTAL:		

Notes:
(1) The quantity is the volume of material needed for liner construction and is based on in-place volume with no consideration for haul loses, shrinkage, or compaction.
(2) The cut and fill volumes are based on a topography map develop from a ground survey performed on December 20, 2017 for the Phase 9 – Cell 2 construction area.
(3) Quantity calculated to the top of existing ground (includes topsoil).
(4) The quantity is the volume of material needed for final cover construction and is based on in-place volume with no consideration for haul loses, shrinkage, or compaction.
(5) The cut volume is based on topography map develop from a ground survey performed on November 16, 2017 for the Stage 4 construction area.

NOTE: WISCONSIN STATUTE 77.54 (9M) ALLOWS FOR NO SALES & USE TAX ON THE PURCHASE OF MATERIALS FOR COUNTY PUBLIC WORKS PROJECTS.

TOTAL LUMP SUM PRICE:

____ ($____________)

(use words)

Note: Contractor is responsible for determining that all costs to complete the Work in accordance with the Contract Documents are included in the TOTAL of the Bid Form and in the TOTAL LUMP SUM PRICE.

(Unit Prices have been computed in accordance with paragraph 10.06 of the General Conditions)

Bidder is required to complete the Estimated Quantities in the Bid Form that are blank based on the bidding documents, review of Information Available to Bidders, site visits and investigations. Refer to Section 01270 (Schedule of Values and Payment) for descriptions of Schedule of Value items.

TOTAL UNIT OF PRICES (BASE BID): ___________________________________ ($____________)
(use words)

6. Bidder will complete the Work for the following add or deduct prices from the lump sum price, if directed by the Owner (refer to Specification Section 01310 Subpart 1.7 (Administrative Provisions) for Alternative descriptions:

LANDFILL STAGE 4 FINAL COVER ALTERNATE BID ITEMS					
ITEM NO.	**ITEM OF WORK**	**ESTIMATED QUANTITY**	**UNITS**	**UNIT PRICE**	**TOTAL ESTIMATED COST**
1A	General Fill Rooting Zone Layer (Contractor Furnished Material)	70,000	CY		
2A	Topsoil Layer (Contractor Furnished Material)	14,000	CY		
3A	Topsoil Layer (From Owners Borrow Source)	5,000	CY		

7. Bidder agrees that the Work will be substantially complete and completed and ready for final payment in accordance with the Contract Documents on or before the dates or within the number of calendar days indicated in the Sample Construction Contract.

- Dane County Public Works Solid Waste Division must have final completion of the Stage 4 Final Cap Construction by September 14, 2018.
  Assuming this Work can be started by April 2, 2018, what dates can you commence and complete this job?

  Commencement Date: ______________ Completion Date: ____________________
  (final, not substantial)

- Dane County Public Works Solid Waste Division must have final completion of the West Port Clay Borrow Site by September 14, 2018.
  Assuming this Work can be started by April 2, 2018, what dates can you commence and complete this job?

  Commencement Date: ______________ Completion Date: ____________________
  (final, not substantial)

- Dane County Public Works Solid Waste Division must have final completion of the Phase 9 – Cell 2 Liner Construction by November 9, 2018.
  Assuming this Work can be started by April 2, 2018, what dates can you commence and complete this job?

  Commencement Date: ______________ Completion Date: ____________________
  (final, not substantial)

8. The following documents are attached to and made a condition of this Bid:

(a) Required 5 Percent Bid Security in the form of ____________________________ (attached as Exhibit A). If Bid Security is in the form of a Bid Bond, the sample Bid Bond provided can be used or another Bid Bond form containing the same information as the sample Bid Bond.

(b) Fair Labor Practices Certification

9. The terms used in this Bid, which are defined in the General Conditions of the Construction Contract included as part of the Contract Documents, have the meanings assigned to them in the General Conditions.

10. Bid submittal:

I have examined and carefully prepared this Bid from the associated Construction Documents and have checked the same in detail before submitting this Bid; that I have full authority to make such statements and submit this Bid in (its) (their) (my) behalf; and that the said statements are true and correct. In signing this Bid, we also certify that we have not, either directly or indirectly, entered into any agreement or participated in any collusion or otherwise taken any action in restraint of free competition; that no attempt has been made to induce any other person or firm to submit or not to submit a Bid; that this Bid has been independently arrived at without collusion with any other bidder, competitor, or potential competitor; that this Bid has not been knowingly disclosed prior to the Bids Due Date to another bidder or competitor; that the above statement is accurate under penalty of perjury.

Bidder: *[Indicate correct name of bidding entity]*

____

By:
[Signature] ______________________________________

[Printed name] ______________________________________
(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.) ______________________________________

Submittal Date: ______________________________________

Address for giving notices:

____

____

____

Telephone Number: ______________________________________

Fax Number: ______________________________________

Contact Name and e-mail address: ______________________________________

____

Bidder's License No.: ______________________________________
(where applicable)

- **THIS PAGE IS FOR BIDDERS' REFERENCE AND NEED NOT BE SUBMITTED WITH BID FORM.**

- **BID CHECK LIST:**

These items **must** be included with Bid:
☐ Bid Form ☐ Bid Bond ☐ Fair Labor Practices Certification

- **BIDDERS SHOULD BE AWARE OF THE FOLLOWING:**

- **DANE COUNTY VENDOR REGISTRATION PROGRAM**

Any person bidding on any County Contract must be registered with the Dane County Purchasing Division & pay an annual registration fee. A Contract will not be awarded to an unregistered vendor. Obtain a *Vendor Registration Form* by calling 608/266-4131 or complete a new form or renewal online at:
www.danepurchasing.com/registration

- **DANE COUNTY BEST VALUE CONTRACTING PRE-QUALIFICATION**

Contractors must be pre-qualified as a Best Value Contractor with the Dane County Public Works Engineering Division before the award of Contract. Obtain a *Best Value Contracting Application* by calling 608/266-4018 or complete one online at:
www.countyofdane.com/pwht/BVC_Application.aspx

- **EQUAL BENEFITS REQUIREMENT**

By submitting a Bid, the Contractor acknowledges that a condition of this Contract is to provide equal benefits as required by Dane County Code of Ordinances Chapter 25.016. Contractor shall provide equal benefits as required by that Ordinance to all required employees during the term of the Contract. Equal Benefits Compliance Payment Certification shall be submitted with final pay request. For more information:
www.danepurchasing.com/partner_benefit.aspx

EXHIBIT A
BID SECURITY

DAMAGES FORM

BID BOND

Any singular reference to Bidder, Surety, Owner, or other party shall be considered plural where applicable.

BIDDER *(Name and Address)*:

SURETY *(Name, and Address of Principal Place of Business)*:

OWNER *(Name and Address)*:

BID
Bid Due Date:
Description *(Project Name— Include Location)*:

BOND
Bond Number:
Date:
Penal sum ______________________________ $ ______________
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER	**SURETY**
______________________ (Seal)	______________________ (Seal)
Bidder's Name and Corporate Seal	Surety's Name and Corporate Seal
By: ______________________	By: ______________________
Signature	Signature (Attach Power of Attorney)
______________________	______________________
Print Name	Print Name
______________________	______________________
Title	Title
Attest: ______________________	Attest: ______________________
Signature	Signature
______________________	______________________
Title	Title

Note: Addresses are to be used for giving any required notice.
Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder any difference between the total amount of Bidder's Bid and the total amount of the Bid of the next lowest, responsible Bidder that submitted a responsive Bid as determined by Owner for the work required by the Contract Documents, provided that:

1.1 If there is no such next Bidder, and Owner does not abandon the Project, then Bidder and Surety shall pay to Owner the penal sum set forth on the face of this Bond, and

1.2 In no event shall Bidder's and Surety's obligation hereunder exceed the penal sum set forth on the face of this Bond.

1.3 Recovery under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.

2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.

3. This obligation shall be null and void if:

3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or

3.2 All Bids are rejected by Owner, or

3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.

6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

EXHIBIT B

FAIR LABOR PRACTICES CERTIFICATION

FAIR LABOR PRACTICES CERTIFICATION

The undersigned, for and on behalf of the BIDDER, APPLICANT or PROPOSER named herein, certifies as follows:

A. That he or she is an officer or duly authorized agent of the above-referenced BIDDER, APPLICANT or PROPOSER, which has a submitted a bid, application or proposal for a contract or agreement with the county of Dane.

B. That BIDDER, APPLICANT or PROPOSER has (check one):

_______ not been found by the National Labor Relations Board ("NLRB") or the Wisconsin Employment Relations Commission ("WERC") to have violated any statute or regulation regarding labor standards or relations in the seven years prior to the signature date of this Certification.

_______ been found by the National Labor Relations Board ("NLRB") or the Wisconsin Employment Relations Commission ("WERC") to have violated any statute or regulation regarding labor standards or relations in the seven years prior to the signature date of this Certification.

____ ____________________
Officer or Authorized Agent Signature Date

____
Printed or Typed Name and Title

____
Printed or Typed Business Name

NOTE: You can find information regarding the violations described above at: www.nlrb.gov and werc.wi.gov.

For reference, Dane County Ordinance 25.11(28)(a) is as follows:
(28) BIDDER RESPONSIBILITY. (a) Any bid, application or proposal for any contract with the county, including public works contracts regulated under chapter 40, shall include a certification indicating whether the bidder has been found by the National Labor Relations Board (NLRB) or the Wisconsin Employment Relations Committee (WERC) to have violated any statute or regulation regarding labor standards or relations within the last seven years. The purchasing manager shall investigate any such finding and make a recommendation to the committee, which shall determine whether the conduct resulting in the finding affects the bidder's responsibility to perform the contract.

If you indicated that the NLRB or WERC have found you to have such a violation, you must include copies of any relevant information regarding such violation with your proposal, bid or application.

Include this completed Certification with your bid, application or proposal.

SECTION 00500
SAMPLE CONSTRUCTION CONTRACT

COUNTY OF DANE

PUBLIC WORKS CONSTRUCTION CONTRACT

Contract No. ____________________ Bid No. 317040

Authority: 2017 RES -__________

THIS CONTRACT, made and entered into as of the date by which authorized representatives of both parties have affixed their signatures, by and between the County of Dane (hereafter referred to as “COUNTY”) and ________________________________ (hereafter, “CONTRACTOR”), and

W I T N E S S E T H :

WHEREAS, COUNTY, whose address is c/o Assistant Public Works Director, 1919 Alliant Energy Center Way, Madison, WI 53713, desires to have CONTRACTOR provide Phase 9, Cell 2 Liner and Stage 4 Final Cap Construction [including Alternate Bid[s] X, Y & Z (if applicable)] (“the Project”); and

WHEREAS, CONTRACTOR, whose address is ____ ____ is able and willing to construct the Project, in accordance with the Construction Documents;

NOW, THEREFORE, in consideration of the above premises and the mutual covenants of the parties hereinafter set forth, the receipt and sufficiency of which is acknowledged by each party for itself, COUNTY and CONTRACTOR do agree as follows:

1. CONTRACTOR agrees to construct, for the price of $______________ the Project and at the CONTRACTOR’S own proper cost and expense to furnish all materials, supplies, machinery, equipment, tools, superintendence labor, insurance, and other accessories and services necessary to complete the Project in accordance with the conditions and prices stated in the Bid Form, General Conditions of Contract, the drawings which include all maps, plats, plans, and other drawings and printed or written explanatory matter thereof, and the specifications therefore as prepared by TRC Environmental Corporation (hereinafter referred to as “the Architect / Engineer”), and as enumerated in the Project Manual Table of Contents, all of which are made a part hereof and collectively evidence and constitute the Contract.

2. COUNTY agrees to pay the CONTRACTOR in current funds for the performance of the Contract subject to additions and deductions, as provided in the General Conditions of Contract, and to make payments on account thereof as provided in Article entitled, “Payments to Contractor” of the General Conditions of Contract.

3. Contract Times

Time of the Essence

A. All time limits for Substantial Completion and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

Contract Times: Dates

B. The Work shall be substantially completed on or before the following dates:

1. September 7, 2018 for Stage 4 Final Cap Construction and Westport Clay Borrow Site; and
2. October 19, 2018 for Phase 9, Cell 2 Liner Construction.

Substantially complete means the following Work shall be completed:

1. Stage 4 Final Cap Construction;
    a. Topsoil placement completed and final grades established,
    b. Erosion control devices installed and maintained, and
    c. Area ready for restoration (Work by Owner).
2. Westport Clay Borrow Site
    a. Final grading completed,
    b. Erosion control devices installed and maintained, and
    c. Site ready for restoration (Work by Owner).
3. Phase 9, Cell 2 Liner Construction
    a. Installation of gradient control system,
    b. Installation of clay and geomembrane liner,
    c. Installation of drainage piping and drainage stone layer, and
    d. Work ready for Electrical Resistivity Test of geomembrane (Geomembrane Leak Location Survey).

C. Work shall be completed and ready for final payment on or before the following dates:

1. September 14, 2018 for Stage 4 Final Cap Construction and Westport Clay Borrow Site; and
2. November 9, 2018 for Phase 9, Cell 2 Liner Construction.

Liquidated Damages

D. Contractor and Owner recognize that time is of the essence as stated above and that Owner will suffer financial and other losses if the Work is not completed within the times specified above, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. Substantial Completion: Contractor shall pay Owner $10,000 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for Substantial Completion until the Work is substantially complete.
2. Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner $5,000 for each day that expires after such time until the Work is completed and ready for final payment.

3. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

4. There shall be no delays or adjustment to the dates for weather delays.

Bonus

E. Contractor and Owner recognize that time is of the essence as stated above and that Owner will suffer financial and other losses if the Work is not completed within the times specified above.

Contractor and Owner further recognize the Owner will realize financial and other benefits if the Work is completed by the time specified for Substantial Completion. Accordingly, Owner and Contractor agree that as a bonus for timely completion, Owner shall pay Contractor $50,000 if the Work is substantially complete by the time specified in Paragraph 3B for Substantial Completion. When determining the final deadline for Bonus payment, there shall be no delays or adjustment to the dates for weather delays.

4. During the term of this Contract, CONTRACTOR agrees to take affirmative action to ensure equal employment opportunities. The CONTRACTOR agrees in accordance with Wisconsin Statute 111.321 and Chapter 19 of the Dane County Code of Ordinances not to discriminate on the basis of age, race, ethnicity, religion, color, gender, disability, marital status, sexual orientation, national origin, cultural differences, ancestry, physical appearance, arrest record or conviction record, military participation or membership in the national guard, state defense force or any other reserve component of the military forces of the United States, or political beliefs. Such equal opportunity shall include, but not be limited to, the following: employment, upgrading, demotion, transfer, recruitment, advertising, layoff, termination, training, rates of pay, and any other form of compensation. CONTRACTOR agrees to post in conspicuous places, available to all employees and applicants for employment, notices setting forth the provisions of this paragraph.

5. CONTRACTOR shall file an Affirmative Action Plan with the Dane County Contract Compliance Officer in accord with Chapter 19 of the Dane County Code of Ordinances. CONTRACTOR must file such plan within fifteen (15) business days of the effective date of this Contract. During the term of this Contract CONTRACTOR shall also provide copies of all announcements of employment opportunities to COUNTY'S Contract Compliance Office, and shall report annually the number of persons, by race, ethnicity, gender, and disability status, which apply for employment and, similarly classified, the number hired and number rejected.

6. During the term of this Contract, all solicitations for employment placed on CONTRACTOR'S behalf shall include a statement to the effect that CONTRACTOR is an "Equal Opportunity Employer".

7. CONTRACTOR agrees to comply with provisions of Chapter 25.13 of the Dane County Code of Ordinances, which pertains to domestic partnership benefits.

8. CONTRACTOR agrees to furnish all information and reports required by COUNTY'S Contract Compliance Officer as the same relate to affirmative action and nondiscrimination, which may include any books, records, or accounts deemed appropriate to determine compliance with Chapter 19, Dane County Code of Ordinances, and the provisions of this Contract.

9. This Contract is intended to be a Contract solely between the parties hereto and for their benefit only. No part of this Contract shall be construed to add to, supplement, amend, abridge or repeal existing rights, benefits or privileges of any third party or parties including, but not limited to, employees of either of the parties.

10. The entire agreement of the parties is contained herein and this Contract supersedes any and all oral agreements and negotiations between the parties relating to the subject matter hereof. The parties expressly agree that the express terms of this Contract shall not be amended in any fashion except in writing, executed by both parties.

11. CONTRACTOR must be pre-qualified as a Best Value Contractor with Dane County Public Works Engineering Division before award of Contract. Subcontractors must be pre-qualified ten (10) business days prior to commencing Work under this Contract.

IN WITNESS WHEREOF, COUNTY and CONTRACTOR, by their respective authorized agents, have caused this Contract and its Schedules to be executed, effective as of the date by which all parties hereto have affixed their respective signatures, as indicated below.

* * * * * * *

FOR CONTRACTOR:

Signature ______________________ Date ______________

Printed or Typed Name and Title ______________________

Signature ______________________ Date ______________

Printed or Typed Name and Title ______________________

NOTE: If CONTRACTOR is a corporation, Secretary should attest. In accordance with IRS Regulations, unincorporated entities are required to provide either their Social Security or Employer Number in order to receive payment for services rendered.

* * * * * * *

This Contract is not valid or effectual for any purpose until approved by the appropriate authority designated below, and no work is authorized until the CONTRACTOR has been given notice to proceed by COUNTY'S Assistant Public Works Director.

FOR COUNTY:

______________________ ______________

Joseph T. Parisi, County Executive Date

______________________ ______________

Scott McDonell, County Clerk Date

SECTION 00700
GENERAL CONDITIONS OF THE CONTRACT

GENERAL CONDITIONS OF CONTRACT

TABLE OF CONTENTS

1. CONSTRUCTION DOCUMENTS

A. Construction Documents, listed in Table of Contents of this Specification volume shall form part of this Contract and provisions of Construction Documents shall be as binding upon parties as if they were fully set forth in Contract itself.

B. These shall also be considered as part of Construction Documents: Addenda, including additions and modifications incorporated in such addenda before execution of Contract; requests for information; construction bulletins; change orders; and written interpretations by Public Works Project Manager that are made after execution of Contract.

C. Construction Documents are complementary, and what is required by one shall be as binding as if required by all. Intent of Construction Documents is to include all labor, materials and equipment necessary for proper execution of the Work.

2. DEFINITIONS

A. These terms as used in this Contract are respectively defined as follows:
   1. All uses of term "County" in Construction Documents shall mean Dane County.
   2. All uses of term "Department" in Construction Documents shall mean Department of Public Works, Highway & Transportation, which is a unit of Dane County government. Department is County agency overseeing Contract with Contractor.
   3. Public Works Project Manager is appointed by and responsible to Department. Public Works Project Manager has authority to act on behalf of Department and will sign change orders, payment requests and other administrative matters related to projects.
   4. Public Works Project Manager is responsible for supervision, administration and management of field operations involved in construction phase of this Work.
   5. Term "Work" includes all labor, equipment and materials necessary to produce project required by Construction Documents.
   6. Term "Substantial Completion" is date when project or specified area of project is certified by Public Works Project Manager that construction is sufficiently completed, in accordance with Construction Documents, and as modified by any subsequent changes agreed to by parties, so that County may occupy project or specified area of project for use for which it was intended subject to permit approval for occupancy.
   7. Contractor is person, firm, or corporation with whom County makes Contract. Though multiple contracts may be involved, Construction Documents treat them throughout as if each were of singular number.

3. ADDITIONAL INSTRUCTIONS AND DRAWINGS

A. Contractor may be furnished additional instructions and detail drawings as necessary to carry out the Work included in Contract. Additional drawings and instructions thus supplied to Contractor will coordinate with Construction Documents and will be so prepared that they can be reasonably interpreted as part thereof. Contractor shall carry out the Work in accordance with additional detail drawings and instructions.

4. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

A. See Division 1, Section 01330 titled "Submittals".

5. CUTTING AND PATCHING

A. Contractor shall be responsible for all cutting, fitting or patching required to complete the Work or to make its parts fit together properly.

B. Contractor shall not damage or endanger portion of the Work or fully or partially completed construction of County or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. Contractor shall not cut or otherwise alter such construction by County or separate contractor except with written consent of County and of such separate contractor; such consent shall not be unreasonably withheld. Contractor shall not withhold unreasonably from County or separate contractor, Contractor's consent to cutting or otherwise altering the Work.

6. CLEANING UP

A. Contractor shall keep premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under Contract. Contractor shall remove from and about the Work waste materials, rubbish, Contractor's tools, construction equipment, machinery, and surplus materials at completion of the Work. Contractor shall maintain streets and sidewalks around the Work site in clean condition. Contractor shall remove all spillage and prevent tracking of spillage arising from performance of the Work, into, out of, and within the Work site. Contractor shall establish regular maintenance program of sweeping, vacuuming and / or hosing to minimize accumulation of dirt and dust upon such areas.

B. If Contractor fails to clean up as directed in Construction Documents, County may do so and shall charge Contractor cost thereof.

C. See additional language in Division 1, Section 01770 titled "Contract Closeout".

7. USE OF SITE

A. Contractor shall provide County and Public Works Project Manager access to the Work under all circumstances.

B. Additional language in Division 1, Section 01310 titled "Administrative Provisions".

8. MATERIALS AND WORKMANSHIP

A. See Division 1, Sections 01450 and 01600 titled "Quality Control" and "Material and Equipment", respectively.

9. CONTRACTOR'S TITLE TO MATERIALS

A. Contractor or any subcontractor shall not purchase materials or supplies for the Work subject to any chattel mortgage or under conditional sale contract or other agreement by which seller retains interest. Contractor warrants that all materials and supplies used in the Work are free from all liens, claims or encumbrances and Contractor has good title to them.

10. "OR EQUAL" CLAUSE

A. Whenever equipment or materials are identified on Drawings or in Specifications by reference to manufacturer's or vendor's name, trade name, catalog number, and other identifying information, it is intended to establish standards; and any equipment or material of other manufacturers and vendors which will perform adequately duties imposed by general design will be considered equally accepted provided equipment or material so proposed is, in opinion of Public Works Project Manager, of equal substance and function. Department shall provide written approval before Contractor may purchase or install it.

B. Equipment or materials of manufacturers, other than those named, may be used only upon following conditions:
   1. That, in opinion of Department, proposed material or equipment item is fully equal or superior (in design, materials, construction, workmanship, performance, finish, etc.) to named item. No compromise in quality level, however small, is acceptable.
   2. That, in substituting materials or equipment, Contractor assumes responsibility for any changes in system or for modifications required in adjacent or related work to accommodate such substitution despite Department's approval, and all costs growing out of approval of "or equal" items shall be responsibility of Contractor. No extra costs resulting from such approval shall become responsibility of Department, or any other separate Contractor.
   3. It shall be understood that use of materials or equipment other than those specified, or approved equal by Department, shall constitute violation of Contract, and that Department shall have right to require removal of such materials or equipment and their replacement with specified materials or equipment at Contractor's expense.
   4. Product and manufacturer named first in Specifications or on information shown on Drawings is basis of selection of manufactured items and equipment, particularly mechanical equipment. In using other than first named products or manufacturers, including those specified as additionally approved or acceptable, Contractor assumes responsibility for any changes in system and for modifications in any work required to accommodate them. Public Works Project Manager's approval of such additionally acceptable products or manufacturers, either in Specifications or in Addendum, does not relieve Contractor from obligation to coordinate such optional products with other Contractors, whose work may be affected by them, and to pay all additional costs resulting from their inclusion into the Work. Contractor's liability shall include payment of any additional services made necessary by or directly connected to such product changes. No extra costs resulting from such changes shall become responsibility of Department or any other separate Contractor.

C. No request for approval of "or equal" materials will be entertained except from Contractor. Identify any request for substitution as substitution on Contractor's letter of transmittal and give reasons for substitution. Department may in its sole discretion allow substitutions of materials.

11. PATENTS AND ROYALTIES

A. If Contractor uses any design, device or material covered by letters, patent or copyright, it is mutually agreed and understood, that, without exception, contract prices shall include all royalties or costs arising from use of such design, device or materials, in any way involved in the Work.

B. Contractor shall indemnify and save harmless County from any and all claims for infringement by reason of use of such patent or copyright in connection with the Work agreed to be performed under this Contract, and shall indemnify County for any cost, expense or damage which it may be obliged to pay by reason of such infringement at any time during prosecution of the Work or after completion of the Work.

12. SURVEYS, PERMITS, REGULATIONS AND TAXES

A. Department will furnish to Contractor all site, topography and property surveys necessary for execution of the Work.

B. Contractor shall procure all permits, licenses and approvals necessary for execution of this Contract.

C. Contractor shall give all notices and comply with all State of Wisconsin, Federal and local laws, codes, rules and regulations relating to performance of the Work, protection of adjacent property, and maintenance of passageways, guard fences or other protective facilities.

D. Refer to Section 12 in Instructions to Bidders for tax language.

E. Contractor shall promptly notify Public Works Project Manager of any variances of Drawings or Specifications with that of any State of Wisconsin, federal or local law, code, rule or regulation. Upon such notification, Public Works Project Manager will require correction of variance to comply with applicable law, code, rule or regulation at no additional cost to Contractor.

F. Work under this Contract shall comply with all applicable State of Wisconsin, Federal and local laws, codes and regulations.

G. Contractor shall pay charges for water, sewer and other utility connections made by municipalities where required by Specifications.

13. CONTRACTOR'S OBLIGATIONS AND SUPERINTENDENCE

A. Contractor shall provide and pay for all materials, labor, tools, equipment, transportation and superintendence necessary to execute, complete and deliver the Work within specified time. Contractor agrees to secure at their own expense all personnel necessary to carry out the Work. Such personnel shall not be deemed County employees nor shall they have or be deemed to have any direct contractual relationship with County.

B. Performance of any work necessary after regular working hours, on Sundays or Legal Holidays shall be without additional expense to County. Performance of any work at site at other than normal working hours must be coordinated with Public Works Project Manager.

C. Contractor shall furnish, erect, maintain and remove such temporary works as may be required.

D. Contractor shall observe, comply with, and be subject to all terms, conditions, requirements and limitations of Construction Documents.

E. At the Work site, Contractor shall give personal superintendence to the Work or shall employ construction superintendent or foreman, experienced in character of work covered by Contract, who shall have full authority to act for Contractor. Understand that such superintendent or foreman shall be acceptable to Department.

F. Remove from project or take other corrective action upon notice from Department for Contractor's employees whose work is considered by Department to be unsatisfactory, careless, incompetent, unskilled or otherwise objectionable.

G. Contractor and subcontractors shall be required to conform to Labor Laws of State of Wisconsin and various acts amendatory and supplementary thereto and to other laws, ordinances and legal requirements applicable to the Work.

H. Presence and observation of the Work by Public Works Project Manager shall not relieve Contractor of any obligations.

14. WEATHER CONDITIONS

A. In event of temporary suspension of work, or during inclement weather, or whenever Public Works Project Manager shall direct, Contractor shall, and shall cause subcontractors to protect carefully all work and materials against damage or injury from weather. If, in opinion of Department, any work or materials that have been damaged or injured due to failure on part of Contractor or any subcontractors so to protect the Work, such materials shall be removed and replaced at expense of Contractor.

15. PROTECTION OF WORK AND PROPERTY

A. Contractor shall at all times safely guard County's property from injury or loss in connection with this Contract. Contractor shall at all times safely guard and protect the Work, and adjacent property, from damage. Contractor shall replace or make good any such damage, loss or injury unless such is caused directly by errors contained in Contract, or by County, or County's duly authorized representative.

B. Contractor may act diligently, without previous instructions from Department, in emergency that threatens loss or injury of property, or safety of life. Contractor shall notify Department immediately thereafter. Promptly submit any claim for compensation by Contractor due to such extra work to Department for approval as provided for in Article 18 herein.

C. Additional language in Division 1, Section 01600 titled "Material and Equipment".

16. INSPECTION AND TESTING OF MATERIALS

A. Authorized representatives and agents of County government shall have access at all times to the Work wherever it is in preparation or progress and Contractor shall provide facilities for such access and for inspection.

B. Should it be considered necessary or advisable at any time before final acceptance of the Work to make examination of work already completed, by removing or tearing out same, Contractor shall upon request, promptly furnish all necessary facilities, labor and materials. If such work is found to be defective in any aspect, due to fault of Contractor or subcontractors thereof, Contractor shall assume all expenses of such examination and of satisfactory reconstruction. Contractor will be reimbursed for such examination and replacement in accordance with Article 18 - A.3., of these General Conditions of Contract if such work is found to meet requirements of Contract.

C. If Specifications, or Public Works Project Manager's instructions require any work to be specially tested or approved, Contractor shall give Public Works Project Manager timely notice of its readiness for testing or inspection. Test all materials and equipment requiring testing in accordance with accepted or specified standards, as applicable. Public Works Project Manager shall recommend laboratory or inspection agency and Department will select and pay for all initial laboratory inspection services. Should retesting be required, due to failure of initial testing, cost of such retesting shall be borne by Contractor.

D. Cost of any testing performed by manufacturers or Contractor for substantiating acceptability of proposed substitution of materials and equipment, or necessary conformance testing in conjunction with manufacturing processes or factory assemblage, shall be borne by Contractor or manufacturer responsible.

17. REPORTS, RECORDS AND DATA

A. Contractor shall submit to Public Works Project Manager such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, invoices, records and other data as either may request concerning work performed or to be performed under this Contract.

18. CHANGES IN THE WORK

A. Make no changes, except in cases of emergency, in the Work covered by approved Construction Documents without having prior written approval of Department. Charges or credits for the Work covered by approved change shall be determined by one of these methods:
   1. Unit bid prices previously approved.
   2. Agreed lump sum based on actual cost of:
      a) Labor, including foremen, and all fringe benefits that are associated with their wages.
      b) Materials entering permanently into the Work.
      c) Ownership or rental cost of construction tools and equipment during time of use on extra work.
      d) Power and consumable supplies for operation of power equipment.
      e) Workmen's Compensation Insurance, Contractor's Public Liability and Property Damage Insurance, and Comprehensive Automobile Liability Insurance.
      f) Social Security and old age and unemployment contributions.
      g) Add to cost under (2), fixed fee to be agreed upon, but not to exceed fifteen percent (15%) of actual cost of work performed with their own labor force. Fee shall be compensation to cover cost of supervision, overhead, bond, profit and any other general expense.
      h) On that portion of the Work under (2) done under subcontract, Contractor may include not over seven and one-half percent (7½%) for supervision, overhead, bond, profit and any other general expense.
      i) Department may require correct amount of costs with supporting vouchers; Contractor shall keep and present in such form as directed.
   3. Cost-plus work, with not-to-exceed dollar limit, based on actual cost of:
      a) Labor, including foremen, and all fringe benefits that are associated with their wages.
      b) Materials entering permanently into the Work.
      c) Ownership or rental cost of construction tools and equipment during time of use on extra work. Rental cost cannot exceed fifty percent (50%) replacement value of rented equipment.
      d) Power and consumable supplies for operation of power equipment.
      e) Workmen's Compensation Insurance, Contractor's Public Liability and Property Damage Insurance, and Comprehensive Automobile Liability Insurance.
      f) Social Security and old age and unemployment contributions.

g) To cost under (3), there shall be added fixed fee to be agreed upon but not to exceed fifteen percent (15%) of actual cost of work performed with their own labor force. Fee shall be compensation to cover cost of supervision, overhead, bond, profit, and any other general expense.

h) On that portion of the Work under (3) done under subcontract, Contractor may include not over seven and one-half percent (7½%) for supervision, overhead, bond, profit, and any other general expense.

i) Contractor shall keep and present, in such form as directed, correct amount of cost together with such supporting vouchers as may be required by Department.

B. If Contractor claims that by any instructions given by Department, by drawings or otherwise, regarding performance of the Work or furnishing of material under Contract, involves extra cost, Contractor shall give Department written notice of cost thereof within two (2) weeks after receipt of such instructions and in any event before proceeding to execute work, unless delay in executing work would endanger life or property.

C. No claim for extra work or cost shall be allowed unless it was done in pursuance of written Change Order from Public Works Project Manager and approved by Department, as previously mentioned, and claim presented with payment request submitted after changed or extra work is completed.

D. Negotiation of cost for change in the Work shall not be cause for Contractor to delay prosecution of the Work if Contractor has been authorized in writing by Public Works Project Manager to proceed.

19. EXTRAS

A. Without invalidating Contract, Department may order extra work or make changes by altering, adding to or deducting from the Work, contract sum being adjusted in accordance with Article 18 herein.

20. TIME FOR COMPLETION

A. Contractor agrees that the Work shall be prosecuted regularly and diligently and complete the Work as stated in Construction Documents.

21. CORRECTION OF WORK

A. All work, all materials whether incorporated in the Work or not, and all processes of manufacture shall at all times and places be subject to inspection of Public Works Project Manager who shall be judge of quality and suitability of the Work, materials, and processes of manufacture for purposes for which they are used. Should they fail to meet Public Works Project Manager's approval they shall be reconstructed, made good, replaced or corrected, by Contractor at Contractor's expense. Immediately remove all rejected material from site.

B. If Contractor defaults or neglects to carry out the Work in accordance with Construction Documents or fails to perform any provision of Contract, Department may, after ten (10) business days' written notice to Contractor and without prejudice to any other remedy County may have, make good such deficiencies. In such case, appropriate Change Order shall be issued deducting from Contractor's payments then or thereafter, cost of correcting such deficiencies, including cost of any additional services made necessary by such default, neglect or failure.

22. SUBSURFACE CONDITIONS FOUND DIFFERENT

A. If Contractor encounters subsurface or latent conditions at site materially differing from those shown on Drawings or indicated in Specifications, Contractor shall immediately give notice to Public Works Project Manager of such conditions before they are disturbed. Public Works Project Manager will thereupon promptly investigate conditions, and if Public Works Project Manager finds that they materially differ from those shown on Drawings or indicated in Specifications, Public Works Project Manager will at once make such changes as necessary, any increase or decrease of cost resulting from such changes to be adjusted in manner provided in above Article 18 entitled “Changes in the Work”.

23. RIGHT OF DEPARTMENT TO TERMINATE CONTRACT

A. In event that any provisions of this Contract are violated by Contractor or by any subcontractors, County may serve written notice upon Contractor and Surety of its intention to terminate Contract, such notice to contain reasons for such intention to terminate Contract, and unless within ten (10) business days after serving of such notice upon Contractor, such violation or delay shall cease and satisfactory arrangement or correction be made, Contract shall, upon expiration of said ten (10) business days, cease and terminate.

B. In event of any such termination, County shall immediately serve notice thereof upon Surety and Contractor, and Surety shall have right to take over and perform Contract subject to County’s approval; provided, however, that if Surety does not commence performance thereof within ten (10) business days from date of mailing to such Surety of notice of termination, County may take over the Work and prosecute same to completion by contract, or by force account, at expense of Contractor; Contractor and Surety shall be liable to County for any excess cost occasioned County thereby, and in such event County may take possession of and utilize in completing the Work, such materials and equipment as may be on the Work site and therefore necessary.

24. CONSTRUCTION SCHEDULE AND PERIODIC ESTIMATES

A. Contractor shall be responsible for Construction Schedule and coordination. Immediately after execution and delivery of Contract and before making first payment, Contractor shall notify all subcontractors to furnish all required information to develop Construction Schedule. Contractor and all subcontractors associated with the Work shall furnish following information from each Division of Specifications:
   1. List of construction activities;
   2. Start, finish and time required for completion of each activity;
   3. Sequential relationships between activities;
   4. Identify all long lead-time items, key events, meetings or activities such as required submittals, fabrication and delivery, procurement of materials, installation and testing;
   5. Weekly definition of extent of work and areas of activity for each trade or Subcontract; and
   6. Other information as determined by Public Works Project Manager.

B. In addition to above requested items, Contractor shall request delivery dates for all County-furnished equipment, materials or labor. This shall include any work handled by Department under separate contracts such as asbestos abatement, air and water balancing, etc. Indicate on Construction Schedule these associated delivery and installation dates.

C. Progress Reporting:

1. Contractor shall update and publish Construction Schedule on monthly basis. Revisions to Schedule shall be by Contractor and made in same detail as original Schedule and accompanied by explanation of reasons for revision; and shall be subject to approval by Department.
2. Failure of Contractor to keep Schedule in updated format shall result in County hiring firm specializing in construction schedule development and deducting those costs associated with updating process from payments due Contractor.
3. Contractor shall show actual percentage of each activity completed, estimated future progress, and anticipated completion time.

D. Responsibility for timely completion requires:
   1. Contractor and subcontractors understand that performance of each is interdependent upon performance of others.
   2. Whenever it becomes apparent from current schedule, that phasing or progress completion dates will not be met, Contractor must take some or all following actions at no additional cost to County:
      a) Increase construction labor in such quantities and crafts as will eliminate backlog of work.
      b) Increase number of working hours per shift, shifts per working day, working days per week, amount of construction equipment, or any combination of foregoing to eliminate backlog of work.
      c) Reschedule work (yet remain in conformance with Drawings and Specifications).
   3. Prior to proceeding with any of above actions, Contractor shall notify Public Works Project Manager.

E. Maintain current Construction Schedule at all times. Revise Construction Schedule in same detail as original and accompany with explanation of reasons for revision. Schedule shall be subject to approval by Public Works Project Manager.

25. PAYMENTS TO CONTRACTOR

A. Contractor shall provide:
   1. Detailed estimate giving complete breakdown of contract price by Specification Division; and
   2. Periodic itemized estimates of work done for purpose of making partial payments thereon.

B. Submit these estimates for approval to Public Works Project Manager. Costs employed in making up any of these schedules are for determining basis of partial payments and not considered as fixing basis for additions to or deductions from Contract price.

C. County will make partial payments to Contractor for value, proportionate to amount of Contract, of all labor and material incorporated in the Work during preceding calendar month upon receipt of Application and Certificate for Payment form from Public Works Project Manager and approval of Department.

D. Contractor shall submit for approval to Public Works Project Manager all Application and Certificate for Payment forms. If requested, Application and Certificate for Payment shall be supported by such additional evidence as may be required, showing Contractor's right to payment claimed.

E. Application and Certificate for Payment for preparatory work and materials delivered and suitably stored at site to be incorporated into the Work at some future period, will be given due consideration. Requesting payment for materials stored off site, may be rejected, however, if deemed essential for reasons of job progress, protection, or other sufficient cause, requests will be considered, conditional upon submission by Contractor of bills of sale, photographs and such other procedures as will adequately protect County's interest such as storage in bonded warehouse with adequate coverage. If there is any error in payment, Contractor is obligated to notify Department immediately, but no longer than ten (10) business days from receipt of payment.

F. Payments by County will be due within forty-five (45) business days after receipt by Department of Application and Certificate for Payment.

G. County will retain five percent (5%) of each Application and Certificate for Payment until final completion and acceptance of all the Work covered by Contract. However, anytime after fifty percent (50%) of the Work has been furnished and installed at site, County will make remaining payments in full if Public Works Project Manager find that progress of the Work corresponds with Construction Schedule. If Public Works Project Manager find that progress of the Work does not correspond with Construction Schedule, County may retain up to ten percent (10%) of each Application and Certificate for Payment for the Work completed.

H. All material and work covered by partial payments made shall become sole property of County, but this provision shall not be construed as relieving Contractor from sole responsibility for care and protection of materials and work upon which payments have been made, or restoration of any damaged work, or as waiver of right of County to require fulfillment of all of terms of Contract.

I. County will make final payment within sixty (60) calendar days after final completion of the Work, and will constitute acceptance thereof. Submit Equal Benefits Compliance Payment Certification with final pay request. Payment may be denied if Certification is not included.

J. County may make payment in full, including retained percentages and less authorized deductions, upon completion and acceptance of each Division where price is stated separately in Contract.

K. Every contractor engaged in performance of any contract for Department of Public Works, Highway & Transportation shall submit to this Department, as requested and with final application for payment for work under said contract, affidavit(s) as required to prove that all debts and claims against this Work are paid in full or otherwise satisfied, and give final evidence of release of all liens against the Work and County. If Wisconsin Prevailing Wage Rate Determination is required for this Work, use "Prime Contractor Affidavit of Compliance with Prevailing Wage Rate Determination" and "Agent or Subcontractor Affidavit of Compliance with Prevailing Wage Rate Determination" (if applicable). If Wisconsin Prevailing Wage Rate Determination is not required for this Work, use "Dane County, Wisconsin Contractor Wage Affidavit". Forms of such affidavits are included in Supplementary Conditions.

26. WITHHOLDING OF PAYMENTS

A. County, after having served written notice on said Contractor, may either pay directly any unpaid bills of which Department has written notice, or withhold from Contractor's unpaid compensation sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged; whereupon, payment to Contractor shall be resumed in accordance with terms of this

Contract, but in no event shall these provisions be construed to impose any obligations upon County to either Contractor or Contractor's Surety.

B. In paying any unpaid bills of Contractor, County shall be deemed agent of Contractor, and any payment so made by County, shall be considered as payment made under Contract by County to Contractor and County shall not be liable to Contractor for any such payment made in good faith.

C. Contractor shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives from all claims growing out of lawful demands of subcontractors, laborers, workers, mechanics, material men, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in performance of this Contract.

D. At Department's request, Contractor shall furnish satisfactory evidence that all obligations of nature designated above have been paid, discharged or waived.

27. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

A. Making of final payment shall constitute waiver of all claims by County except those arising from:
   1. Unsettled lien;
   2. Faulty or defective work appearing after substantial completion;
   3. Failure of the Work to comply with requirements of Construction Documents; or
   4. Terms of any special guarantees required by Construction Documents.

B. Acceptance of final payment shall constitute waiver of all claims by Contractor.

28. PAYMENTS BY CONTRACTOR

A. Contractor shall pay following not later than fifth (5^{th}) business day following each payment received from County:
   1. All transportation and utility services rendered;
   2. All materials, tools, and other expendable equipment that have been delivered at site of the Work to extent of ninety percent (90%) of cost thereof, and balance of cost thereof when said balance is paid to Contractor; and
   3. Each subcontractor, respective amount allowed Contractor because of work performed by subcontractor to extent of subcontractor's interest therein.

29. CONTRACT SECURITY

A. Contractor shall furnish Performance and Payment Bonds in amount at least equal to one hundred percent (100%) of Contract price as security for faithful performance of this Contract and payment of all persons performing labor on project under this Contract and furnishing materials in connection with this Contract.

B. Sample Performance and Payment Bonds that Contractor will be required to execute is bound into these Construction Documents. Before construction Contract is consummated, completed Performance and Payment Bonds must be approved by Department.

30. ASSIGNMENTS

A. Contractor shall not assign whole or any part of this Contract or any moneys due or to become due hereunder without written consent of Department. In case Contractor assigns all or any part of any moneys due or to become due under this Contract, instrument of assignment shall contain clause substantially to effect that it is agreed that right of assignee in and to any moneys due or to become due to Contractor shall be subject to prior claims of all persons, firms and corporations for services rendered or materials supplied for performance of the Work called for in this Contract.

31. MUTUAL RESPONSIBILITY OF CONTRACTORS

A. If, through acts of neglect on part of Contractor or any subcontractor shall suffer loss or damage on the Work, Contractor agrees to settle with such subcontractor by agreement or arbitration if such other subcontractor will so settle. If such subcontractor shall assert any claim against County on account of any damage alleged to have been sustained, Department shall notify Contractor, who shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives against any such claim.

32. SEPARATE CONTRACTS

A. Department may award other contracts for the Work and all Contractors shall fully cooperate with each other and carefully adjust their work to that provided under other contracts as may be directed by Department. No Contractor shall commit or permit any act that will interfere with performance of the Work by any other Contractor.

B. Contractor shall coordinate the Work with those of other Contractors. Cooperation will be required in arrangement for storage of materials and in detailed execution of the Work. Contractor, including subcontractors, shall keep informed of progress and detail work of others and shall notify Department immediately of lack of progress or defective workmanship on part of others. Failure of Contractor to keep informed of the Work progressing on site and failure to give notice of lack of progress or defective workmanship by others shall be construed as acceptance by Contractor of status of the Work as being satisfactory for proper coordination with Contractor’s own work.

33. SUBCONTRACTS

A. Contractor may use services of specialty subcontractors on those parts of the Work that, under normal contracting practices, are performed by specialty subcontractors.

B. Contractor shall not award any work to any subcontractor without prior approval of Department. Qualifications of subcontractors shall be same as qualifications of Contractor. Request for subcontractor approval shall be submitted to Department fifteen (15) business days before start of subcontractor’s work. If subcontractors are changed or added, Contractor shall notify Department in writing.

C. Contractor shall be as fully responsible to County for acts and omissions of subcontractors, and of persons either directly or indirectly employed by them, as Contractor is for acts and omissions of persons directly employed by Contractor.

D. Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind subcontractors to Contractor by terms of General Conditions of Contract and other Construction Documents insofar as applicable to work of subcontractors and to give

Contractor same power as regards terminating any subcontract that Department may exercise over Contractor under any provision of Construction Documents.

E. Nothing contained in this Contract shall create any contractual relation between any subcontractor and County.

F. Contractor shall insert in all subcontracts, Articles 26, 33, 43 and 45, respectively entitled: "Withholding of Payments", "Subcontracts", and "Affirmative Action Provision and Minority / Women / Disadvantaged Business Enterprises", and shall further require all subcontractors to incorporate physically these same Articles in all subcontracts.

34. PUBLIC WORKS PROJECT MANAGER'S AUTHORITY

A. Public Works Project Manager shall:
   1. Administer and ensure compliance with Construction Documents;
   2. Provide responsible on-site observations of construction and have authority to request work and to stop work whenever necessary to insure proper enforcement of Construction Documents;
   3. Convene and chair project meetings and foreman's coordination meetings when necessary to coordinate resolution of conflicts between Contractors, Architects, Engineers, Consultants, and Department; and
   4. Check and inspect material, equipment and installation procedures of all trades for proper workmanship and for compliance with Drawings, Specifications and Shop Drawings, permit no material on project site that is not satisfactory and reject work not in compliance with Construction Documents.

B. Public Works Project Manager shall determine amount, quality, acceptability, and fitness of several kinds of work and materials that are provided under this Contract and shall decide all questions that may arise in relation to said work and construction thereof.

C. Public Works Project Manager shall decide meaning and intent of any portion of Specifications and of any Drawings where they may be found obscure or be in dispute.

D. Public Works Project Manager shall provide responsible observation of construction. Public Works Project Manager has authority to stop the Work whenever such stoppage may be necessary to insure proper execution of Construction Documents.

E. Public Works Project Manager shall be interpreter of conditions of Construction Documents and judge of its performance.

F. Within reasonable time, Public Works Project Manager shall make decisions on all matters relating to progress of the Work or interpretation of Construction Documents.

35. ARCHITECT / ENGINEER'S AUTHORITY

A. Not applicable.

36. STATED ALLOWANCES

A. Stated allowances enumerated in Instructions to Bidders shall cover net cost of materials or equipment, and all applicable taxes. Contractor's cost of delivery and unloading at site, handling costs on site, labor, installation costs, overhead, profit and any other incidental costs shall be included in Contractor's bid, but not as part of cash allowance.

B. Department will solicit at least two (2) bids on materials or equipment for which allowance is stated and select on basis of lowest qualified responsible bid. Contractor will then be instructed to purchase "Allowed Materials". If actual price for purchasing "Allowed Materials", including taxes, is more or less than "Cash Allowance", Contract price shall be adjusted accordingly. Adjustment in Contract price shall not contain any cost items excluded from cash allowance.

37. ESTIMATES OF QUANTITIES

A. Whenever estimated quantities of work to be done and materials to be furnished under this Contract are shown in the Bid Form, they are given for use in comparing bids and right is especially reserved to increase or diminish them as they may be deemed reasonably necessary or desirable by Department to complete the Work included in this Contract, and cost for such increase or diminution shall be adjusted in manner provided for in General Conditions of Contract Article 18 entitled "Changes in the Work".

38. LANDS AND RIGHTS-OF-WAY

A. Prior to start of construction, County shall furnish all land and rights-of-way necessary for carrying out and completion of the Work to be performed under this Contract.

39. GENERAL GUARANTEE

A. Neither final certificate of payment nor any provision in Construction Documents nor partial or entire occupancy of premises by County shall constitute acceptance of work not done in accordance with Construction Documents or relieve Contractor of liability in respect to any expressed warranties or responsibility for faulty materials or workmanship.
   1. In no event shall making of any payment required by Contract constitute or be construed as waiver by County of any breach of covenants of Contract or waiver of any default of Contractor and making of any such payment by County while any such default or breach shall exist shall in no way impair or prejudice right of County with respect to recovery of damages or other remedy as result of such breach or default.

B. Contractor shall remedy and make good all defective workmanship and materials and pay for any damage to other work resulting there from, which appear within period of one (1) year from date of substantial completion, providing such defects are not clearly due to abuse or misuse by County. Department will give notice of observed defects with reasonable promptness.

C. Guarantee on work executed after certified date of substantial completion will begin on date when such work is inspected and approved by Public Works Project Manager.

D. Where guarantees or warrantees are required in sections of Specifications for periods in excess of one (1) year, such longer terms shall apply; however, Contractor's Performance and Payment Bonds shall not apply to any guarantee or warranty period in excess of one (1) year.

40. CONFLICTING CONDITIONS

A. Any provision in any of Construction Documents which may be in conflict or inconsistent with any Articles in these General Conditions of Contract or Supplementary Conditions shall be void to extent of such conflict or inconsistency.

B. In case of ambiguity or conflict between Drawings and Specifications, Specifications shall govern.

C. Printed dimensions shall be followed in preference to measurements by scale. Large-scale drawings take precedence over small-scale drawings. Dimensions on Drawings and details are subject to field measurements of adjacent work.

41. NOTICE AND SERVICE THEREOF

A. Any notice to Contractor from Department relative to any part of this Contract shall be in writing and considered delivered and service thereof completed, when said notice is posted, by certified or registered mail, to Contractor at Contractor's last given address, or delivered in person to said Contractor, or Contractor's authorized representative on the Work.

42. PROTECTION OF LIVES AND HEALTH

A. In order to protect lives and health of Contractor's employees under Contract, Contractor shall comply with all pertinent provisions of Wisconsin Administrative Code, Rules of Department of Commerce, relating to Safety and Health.

B. Contractor alone shall be responsible for safety, efficiency and adequacy of Contractor's tools, equipment and methods, and for any damage that may result from their failure or their improper construction, maintenance or operation.

C. Additional language in Division 1, Section 01016 titled "Health and Safety Considerations".

43. AFFIRMATIVE ACTION PROVISION AND MINORITY / WOMEN / DISADVANTAGED BUSINESS ENTERPRISES

A. Affirmative Action Provisions.
   1. During term of their Contract, Contractor agrees not to discriminate on basis of race, religion, color, sex, handicap, age, sexual preference, marital status, physical appearance, or national origin against any person, whether recipient of services (actual or potential), employee, or applicant for employment. Such equal opportunity shall include but not be limited to following: employment, upgrading, demotion, transfer, recruitment, advertising, layoff, termination, training, rates of pay, and any other form of compensation or level of service(s). Contractor agrees to post in conspicuous places, these affirmative action standards so as to be visible to all employees, service recipients and applicants for this paragraph. Listing of prohibited bases for discrimination shall no be construed to amend in any fashion state or federal law setting forth additional bases and exceptions shall be permitted only to extent allowable in state or federal law.
   2. Contractor is subject to this Article only if Contractor has ten (10) or more employees and receives $10,000.00 or more in annual aggregate contracts with County. Contractor shall file and Affirmative Action Plan with Dane County Contract Compliance Officer in accord with Chapter 19 of Dane County Code of Ordinances. Such plan must be filed within fifteen (15) business days of effective date of this Contract and failure to do so by said date shall constitute ground for immediate termination of Contract by County. Contractor shall also, during term of this Contract, provide copies of all announcements

of employment opportunities to County's Contract Compliance Office, and shall report annually number of persons, by race, sex and handicap status, who apply for employment, and, similarly classified, number hired and number rejected.

3. Contact Dane County Contract Compliance Officer at Dane County Contract Compliance Office, 210 Martin Luther King, Jr. Blvd., Room 421, Madison, WI 53703, 608/266-4114.
4. In all solicitations for employment placed on Contractor's behalf during term of this Contract, Contractor shall include statement to affect Contractor is "Equal Opportunity Employer". Contractor agrees to furnish all information and reports required by County's Contract Compliance Officer as same relate to affirmative action and nondiscrimination, which may include any books, records, or accounts deemed appropriate to determine compliance with Chapter 19, Dane County Code of Ordinances, and provision of this Contract.

B. Minority / Women / Disadvantaged / Emerging Small Business Enterprises.
1. Chapter 19.508 of Dane County Code of Ordinances is official policy of Dane County regarding utilization of, to fullest extent of, Minority Business Enterprises (MBEs), Women Business Enterprises (WBEs) Disadvantage Business Enterprises (DBEs) and Emerging Small Business Enterprises (ESBEs).
2. Contractor may utilize MBEs / WBEs / DBEs / ESBEs as subcontractors or suppliers. List of subcontractors will be required of low bidder as stated in this Contract. List shall indicate which are MBEs / WBEs / DBEs / ESBEs and percentage of subcontract awarded, shown as percentage of total dollar amount of bid.

44. COMPLIANCE WITH FAIR LABOR STANDARDS

A. During term of this Contract, Contractor shall report to County Contract Compliance Officer, within ten (10) business days, any allegations to, or findings by National Labor Relations Board (NLRB) or Wisconsin Employment Relations Commission (WERC) that Contractor has violated statute or regulation regarding labor standards or relations. If investigation by Contract Compliance Officer results in final determination that matter adversely affects Contractor's responsibilities under this Contract, and which recommends termination, suspension or cancellation of this Contract, County may take such action.

B. Contractor may appeal any adverse finding by Contract Compliance Officer as set forth in Dane County Ordinance 25.015(11)(c) through (e).

C. Contractor shall post this statement in prominent place visible to employees: "As condition of receiving and maintaining contract with Dane County, this employer shall comply with federal, state and all other applicable laws prohibiting retaliation or union organizing."

45. DOMESTIC PARTNERSHIP BENEFITS

A. Contractor agrees to provide same economic benefits to all of its employees with domestic partners as it does to employees with spouses, or cash equivalent if such benefit cannot reasonably be provided. Contractor agrees to make available for County inspection Contractor's payroll records relating to employees providing services on or under this Contract or subcontract. If any payroll records of Contractor contain any false, misleading or fraudulent information, or if Contractor fails to comply with provisions of Chapter 25.13, Dane County Ordinances, contract compliance officer may withhold payments on Contract; terminate, cancel or suspend Contract in whole or in part; or, after due process hearing, deny Contractor right to participate in bidding on future County contracts for period of one year after first violation is found and for period of three years after second or subsequent violation is found.

46. USE AND OCCUPANCY PRIOR TO ACCEPTANCE

A. Contractor agrees to use and occupancy of portion or unit of the Work before formal acceptance by Department, provided Department:
   1. Secures written consent of Contractor; except when in opinion of Public Works Project Manager, Contractor is chargeable with unwarranted delay in final cleanup of punch list items or other Contract requirements.
   2. Secures endorsement from insurance carrier and consent of Surety permitting occupancy of building or use of the Work during remaining period of construction, or, secures consent of Surety.
   3. Assumes all costs and maintenance of heat, electricity and water.
   4. Accepts all work completed within that portion or unit of the Work to be occupied, at time of occupancy.

47. MINIMUM WAGES

A. NOT USED.

48. CLAIMS

A. No claim may be made until Department's Assistant Public Works Director has reviewed Public Works Project Manager's decision as provided for in Article 34 of General Conditions of Contract. If any claim remains unresolved after such review by Department's Assistant Public Works Director the claim may be filed under Wisconsin Statute 893.80. Work shall progress during period of any dispute or claim. Unless specifically agreed between parties, venue will be in Dane County, Wisconsin.

49. ANTITRUST AGREEMENT

A. Contractor and County recognize that in actual economic practice, overcharges resulting from antitrust violations are in fact usually borne by County. Therefore, Contractor hereby assigns to County any and all claims for such overcharges as to goods and materials purchased in connection with this Contract, except as to overcharges which result from antitrust violations commencing after price is established under this Contract and any change order thereto.

50. INSURANCE

A. Contractor Carried Insurance:
   1. Contractor shall not commence work under this Contract until Contractor has obtained all insurance required under this Article and has provided evidence of such insurance to Risk Manager, 425 City-County Building, 210 Martin Luther King Jr. Blvd., Madison, WI 53703. Contractor shall not allow any subcontractor to commence work until insurance required of subcontractor has been so obtained and approved. Company providing insurance must be licensed to do business in Wisconsin.
   2. Worker's Compensation Insurance:
      a) Contractor shall procure and shall maintain during life of this Contract, Worker's Compensation Insurance as required by statute for all of Contractor's employees

engaged in work at site of project under this Contract and, in case of any such work sublet, Contractor shall require subcontractor similarly to provide Worker's Compensation Insurance for all of latter's employees to be engaged in such work unless such employees are covered by protection afforded by Contractor's Worker's Compensation Insurance.

  b) If any claim of employees engaged in hazardous work on project under this Contract is not protected under Worker's Compensation Statute, Contractor shall provide and shall cause each subcontractor to provide adequate Employer's Liability Insurance for protection of such of Contractor's employees as are not otherwise protected.

3. Contractor's Public Liability and Property Damage Insurance:
   a) Contractor shall procure and maintain during life of this Contract, Contractor's Public Liability Insurance and Contractor's Property Damage Insurance in amount not less than $1,000,000 bodily injury, including accidental death, to any one person, and subject to same limit for each person, in amount not less than $1,000,000 on account of one accident, and Contractor's Property Damage Insurance in amount not less then $1,000,000 or combined single limit of at least $1,000,000 with excess coverage over and above general liability in amount not less than $5,000,000. Contractor shall add "Dane County" as additional insured for each project.
   b) Contractor's Public Liability and Property Damage Insurance shall include Products, Completed Operation, and Contractual Liability under Insurance Contract. "Contractor shall in all instances save, defend, indemnify and hold harmless County and Architect / Engineer against all claims, demands, liabilities, damages or any other costs which may accrue in prosecution of the Work and that Contractor will save, defend, indemnify and hold harmless County and Architect / Engineer from all damages caused by or as result of Contractor's operations" and each shall be listed as additional insured on Contractor's and sub-contractors' insurance policies.
   c) Obligations of Contractor under Article 50.A.2.b) shall not extend to liability of Architect / Engineer, agents or employees thereof, arising out of:
      1) Preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications; or
      2) Giving of or failure to give directions or instructions by Architect / Engineer, agents or employees thereof provided such giving or failure to give is primary cause of injury or damage.
   d) Contractor shall procure and shall maintain during life of this Contract, Comprehensive Automobile Liability Insurance covering owned, non-owned and hired automobiles for limits of not less than $1,000,000 each accident single limit, bodily injury and property damage combined with excess coverage over and above general liability in amount not less than $5,000,000.
   e) Contractor shall either:
      1) Require each subcontractor to procure and to maintain during life of subcontract, subcontractor's Public Liability Property Damage Insurance, and Comprehensive Automobile Liability Insurance of type and in same amount specified in preceding paragraphs; or
      2) Insure activities of subcontractors in Contractor's own policy.
4. Scope of Insurance and Special Hazards: Insurance required under Article 50.A.2 & 50.A.3. hereof shall provide adequate protection for Contractor and subcontractors, respectively, against damage claims which may arise from operations under this Contract, whether such operation be by insured or by anyone directly or indirectly employed by insured and also against any of special hazards which may be encountered in performance of this Contract as enumerated in Supplementary Conditions.
5. Proof of Carriage of Insurance: Contractor shall furnish Risk Manager with certificates showing type, amount, class of operations covered, effective dates, dates of expiration of policies and "Dane County" listed as additional insured. Such certificates shall also contain (substantially) following statement: "Insurance covered by this certificate will not

be canceled or materially altered, except after ten (10) business days written notice has been received by Risk Manager."

B. Builder's Risk:
   1. County shall provide Builder's Risk insurance coverage for its insurable interests in construction or renovation projects with completed value of $500,000 or less. Therefore, if project completed value is more than $500,000, Contractor shall obtain and maintain in force, at its own expense, Builder's Risk Insurance on all risks for amount equal to full completed value of covered structure or replacement value of alterations or additions. Any deductible shall not exceed $25,000 for each loss. Policy shall include occupancy clause and list Dane County as loss payee.

C. Indemnification / Hold Harmless:
   1. Contractor shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives from and against all claims, damages, losses and expenses including attorneys' fees arising out of or resulting from performance of the Work, provided that any such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, and is caused in whole or in part by any act or omission of Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by part indemnified hereunder.
   2. In any and all claims against Dane County, its boards, commissions, agencies, officers, employees and representatives or by any employee of Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, indemnification obligation under this Contract shall not be limited in any way by any limitation on amount or type of damages, compensation or benefits payable by or for Contractor or any subcontractor under worker's compensation acts, disability benefits or other employee benefit acts.
   3. Obligations of Contractor under this Contract shall not extend to liability of Architect / Engineer, its agents or employees arising out of:
      a) Preparation or approval of maps, drawings, opinion, reports, surveys, change orders, designs or specifications; or
      b) Giving of or failure to give directions or instruction by Architect / Engineer, its agents or employees provided such giving or failure to give is primary cause of injury or damage.
   4. Dane County shall not be liable to Contractor for damages or delays resulting from work by third parties or by injunctions or other restraining orders obtained by third parties.

51. WISCONSIN LAW CONTROLLING

A. It is expressly understood and agreed to by parties hereto that in event of any disagreement or controversy between parties, Wisconsin law shall be controlling.

SECTION 00800
SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the General Conditions of the Contract and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

SC-1 REPORTING AND RESOLVING DISCREPANCIES

If Contractor proceeds with Work that Contractor had actual knowledge or should have known that a conflict, error, or discrepancy in the Contract Documents exists, correction of Work constructed without such notification to Owner/Engineer shall be at Contractor's expense.

SC-2 SUBSURFACE AND PHYSICAL CONDITIONS

In the preparation of the drawings and specification, Designer has relied upon:

A. The following reports of explorations and tests of subsurface conditions at Dane County No. 2 (Rodefeld) Landfill:

1. Dane Co. Information related to landfill Stage 3 final cover construction performed in 2017.
2. Dane County. 2017. Eastern Expansion Phase 10 – Cell 2 Liner Construction Documentation Report, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. September 2017.
3. Request for Bids No. 316024. 2016. Eastern Expansion Phase 10 – Cell 2 Liner Construction, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. June 2016.
4. Dane County. 2015. Eastern Expansion Phase 10 – Cell 1 Liner Construction Documentation Report, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. November 2015.
5. Request for Bids No. 315034. 2015. Eastern Expansion Phase 10 – Cell 1 Liner Construction, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. June 2015.
6. Dane County. 2014. Eastern Expansion Phase 9 – Cell 1 Liner Construction Documentation Report, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. December 2014.
7. TRC Environmental Corporation. 2014. Addendum No. 1 Eastern Expansion Plan of Operation Report, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. March 2014.
8. TRC Environmental Corporation. 2014. Eastern Expansion Plan of Operation Report, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. March 2014.
9. Request for Bids No. 314005. 2014. Eastern Expansion Phase 9 – Cell 1 Construction, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. February 2014.
10. TRC Environmental Corporation. 2013a. Eastern Expansion Feasibility Report, Dane County No. 2 (Rodefeld) Landfill License No. 3018, Dane County, Wisconsin. May 24, 2013. The report contains soil boring logs, grain size analysis, ground water levels, and soil descriptions.
11. SEC Donohue Environment and Infrastructure. 1992. Feasibility Report, Dane County Landfill Expansion Rodefeld Site No. 2, License No. 3018, Dane County, Wisconsin. October 1992.
12. Rust Environment and Infrastructure. 1993. Plan of Operation Report, Dane County Landfill Expansion Rodefeld Site No. 2, License No. 3018, Dane County, Wisconsin. November 1993. The report contains soil boring logs, grain size analysis, ground water levels, and soil descriptions.

13. RMT, Inc. 1982. Feasibility Report, Dane County Landfill Expansion Rodefeld Site No. 2, License No. 3018, Dane County, Wisconsin. September 1982. The report contains soil boring logs, grain size analysis, ground water levels, and soil descriptions.

14. RMT, Inc. 1984. Plan of Operation Report, Dane County Landfill Expansion Rodefeld Site No. 2, License No. 3018, Dane County, Wisconsin. February 1984.

Copies of these reports are available for review at the address of the Owner/Engineer. Contact information for scheduling an appointment for reviewing the information is contained in the Instructions to Bidders.

Owner/Engineer or Designer accepts no responsibility for accuracy of the soil data or water level information. Contractor shall assure itself by personal examination as to subsurface conditions. Borings were used by Designer for design purposes only.

SC-3 OTHER WORK

Select Clay Fill placed in the stockpile and/or hauled from the clay borrow site will be used by Contractor to construct the Select Clay Fill liner. Clay soil laboratory test results from clay samples collected at the Borrow site where the Select Clay Fill will be obtained is included in Appendix B. Contractor will be responsible for finish grading the stockpiles and the Owner will provide the seeding, fertilizing and mulching of the stockpile areas after borrowing from the stockpiles is complete, along with all other areas disturbed during construction and stockpiles that contain excess soil from the Phase 9 – Cell 2 excavated soil.

Owner will conduct required surface water inspection during and after construction until vegetation has established. Contractor is responsible for maintaining and replacing Sediment Control Fence and Logs as required until construction is complete and vegetation has established.

Owner will abandon any necessary existing gas probes and monitoring wells prior to the start of Phase 9 – Cell 2 construction and will replace or extend the existing gas probes and monitoring wells per the Contract Documents.

SC-4 CONSTRUCTION DOCUMENTATION COORDINATE AND ELEVATION TABLES

Attached as Appendices E and F are the Construction Documentation Coordinate and Elevation Tables for the Phase 9 – Cell 2 liner and the landfill Stage 4 final cover to be used by the Contractor to Document as-constructed coordinate and elevations in accordance with the Contract Documents.

SC-5 CONSTRUCTION QUALITY ASSURANCE PLAN

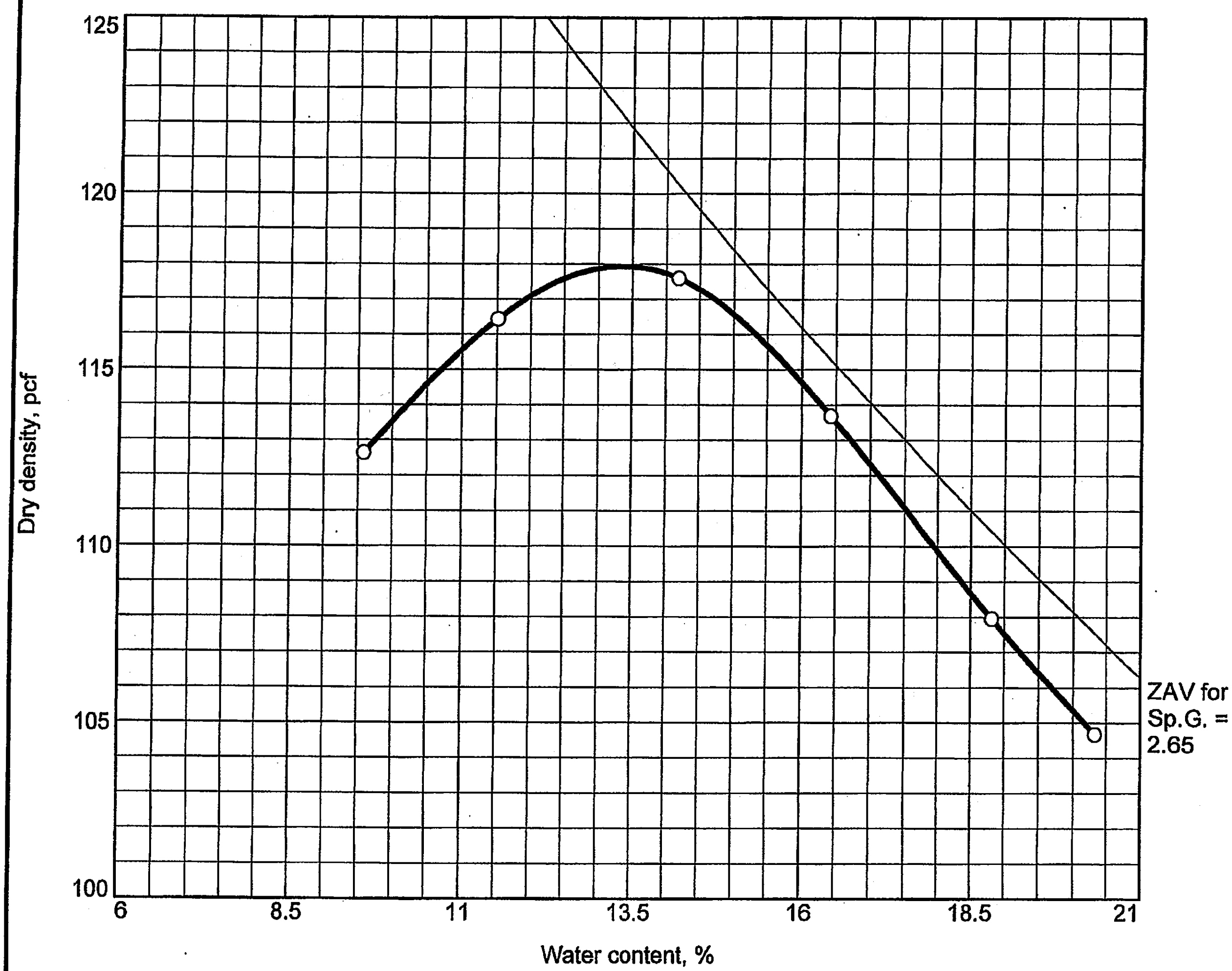
Attached as Appendix D is the Construction Quality Assurance (CQA) Plan for the Eastern Expansion for liner and final cover construction along with a Plan Modification for an alternative final cover for Stage 4 final cover area of the Dane County No. 2 (Rodefeld) Landfill. The CQA Plan was approved in 2014 by the WDNR in a Plan of Operation (POO) permit for the Eastern Expansion. The Plan Modification to the WDNR 1984 approved POO for the existing landfill for the alternative final cover was approved by the WDNR in 2017. The CQA Plan includes pre-construction CQA, construction CQA, and post-construction CQA requirements of the Owner/Engineer and the Contractor. The Plan Modification includes requirements for the fine-grained barrier layer and GCL to be used in the alternative final cover system. The CQA Plan and Plan Modification is provided to assist Bidder's in determining costs associated with coordinating CQA and Plan Modification requirements with the Owner/Engineer to conduct field sampling, field testing, and on-site CQA.

APPENDIX A
LINER CONSTRUCTION CLAY SOIL AND FINAL COVER BARRIER LAYER SOIL
LABORATORY AND FIELD TEST RESULTS

PHASE 10 – CELL 2
LINER CONSTRUCTION
CLAY LABORATORY AND FIELD TEST RESULTS
(CONSTRUCTED IN 2016 – 2017)

BULK SAMPLE AND SHELBY TUBE SAMPLE
LABORATORY TEST RESULTS

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-6(11)	26.6		34	13	0.0	88.2

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.9 pcf Optimum moisture = 13.4 %	Lean clay

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

Date: 08-05-16

○ **Source of Sample:** Clay **Sample Number:** B-1

TRC Environmental Corp.

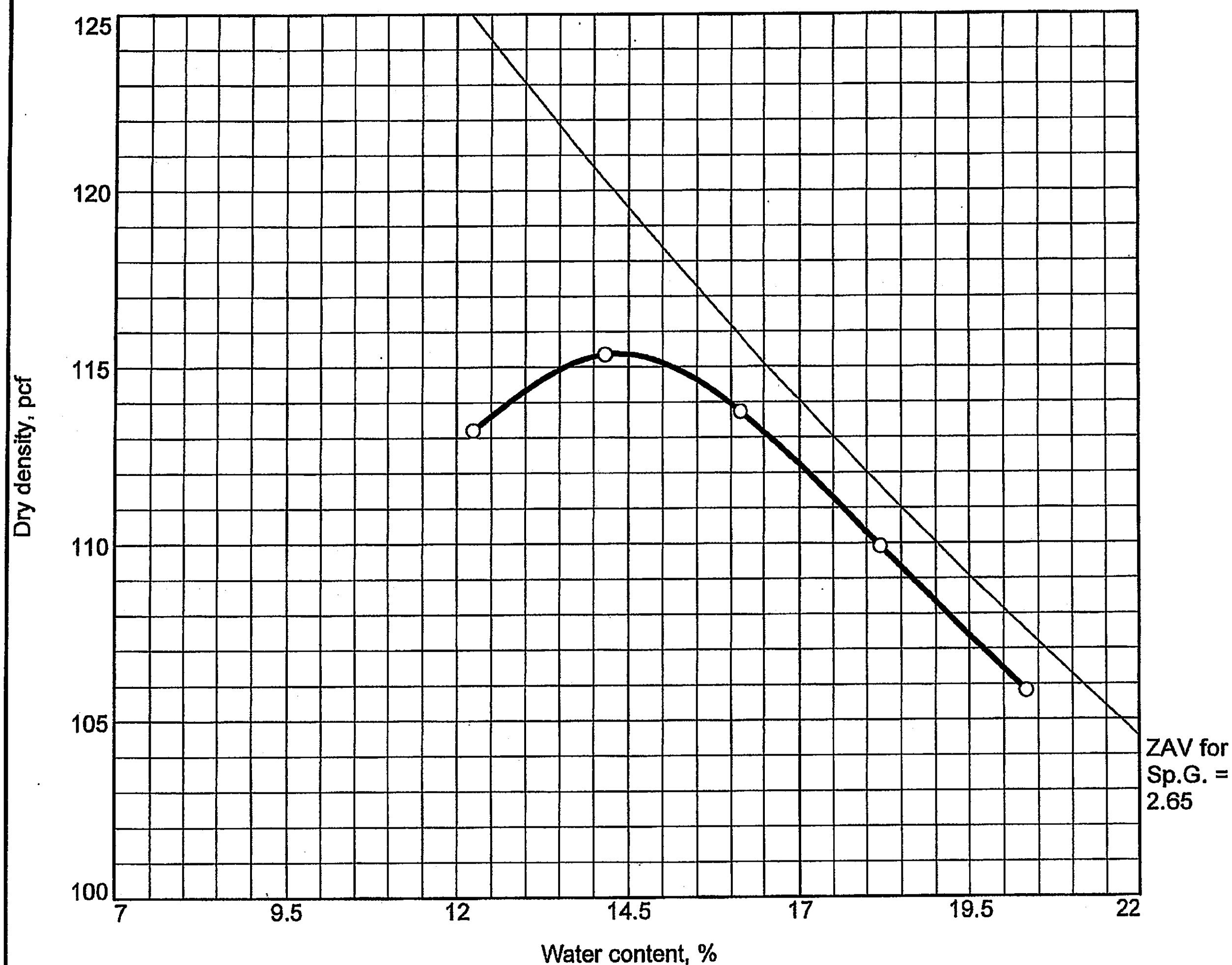
Madison, Wisconsin

Remarks:

Figure

Tested By: JPH **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-6(16)	29.4		38	15	0.0	96.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 115.4 pcf Optimum moisture = 14.3 %	Lean clay

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

Date: 09-15-16

○ **Source of Sample:** Clay Stockpile **Sample Number:** B-2

TRC Environmental Corp.

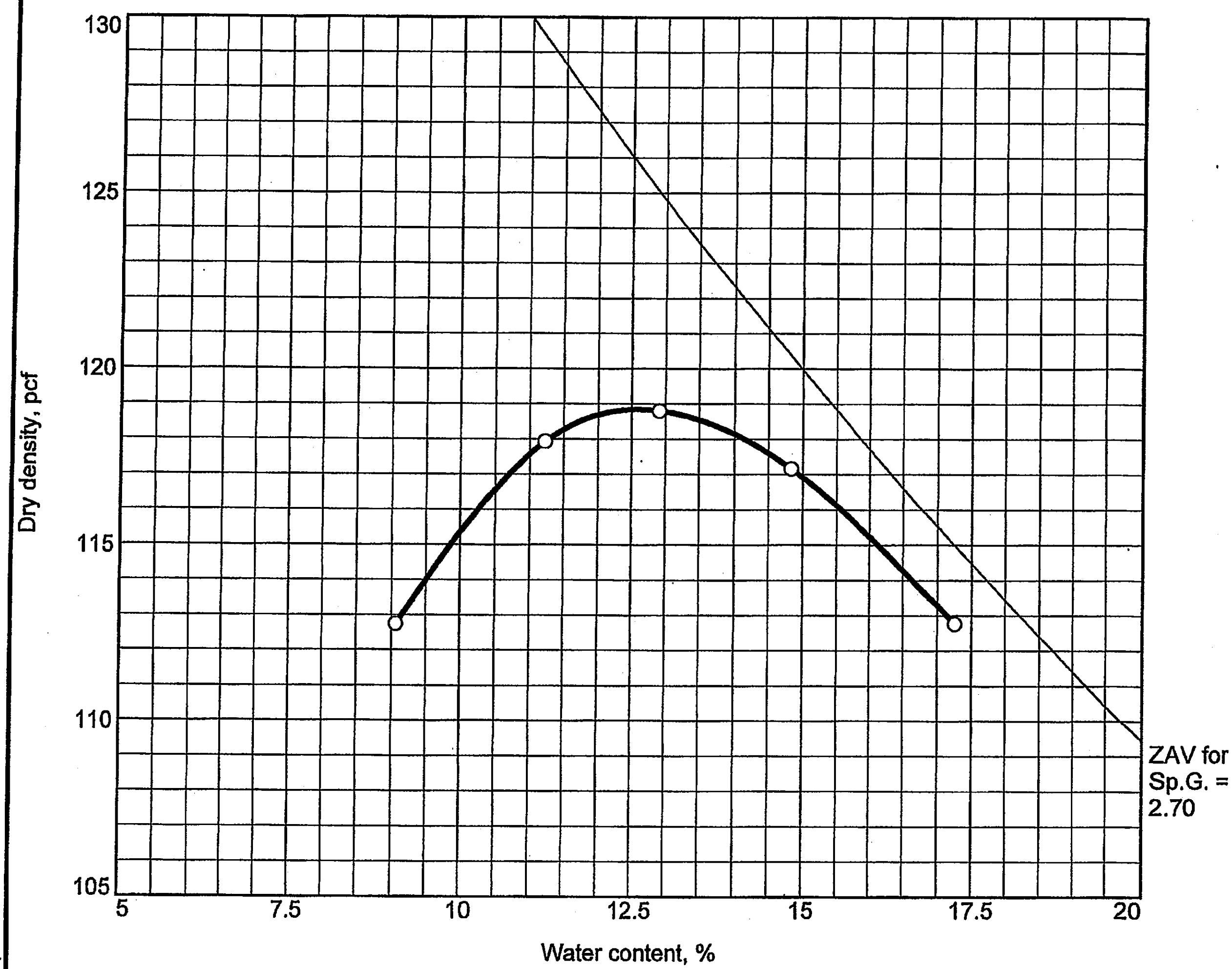
Madison, Wisconsin

Remarks:

Figure

Tested By: MBW **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-6(15)	21.6		38	18	2.5	86.3

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 118.8 pcf Optimum moisture = 12.6 %	Lean clay

Project No. 253325.0000 **Client:** Dane County
Project: Phase 10 - Cell 2 Construction
Date: 09-30-16
○ **Source of Sample:** Clay **Sample Number:** B-3, Lift 1

TRC Environmental Corp.

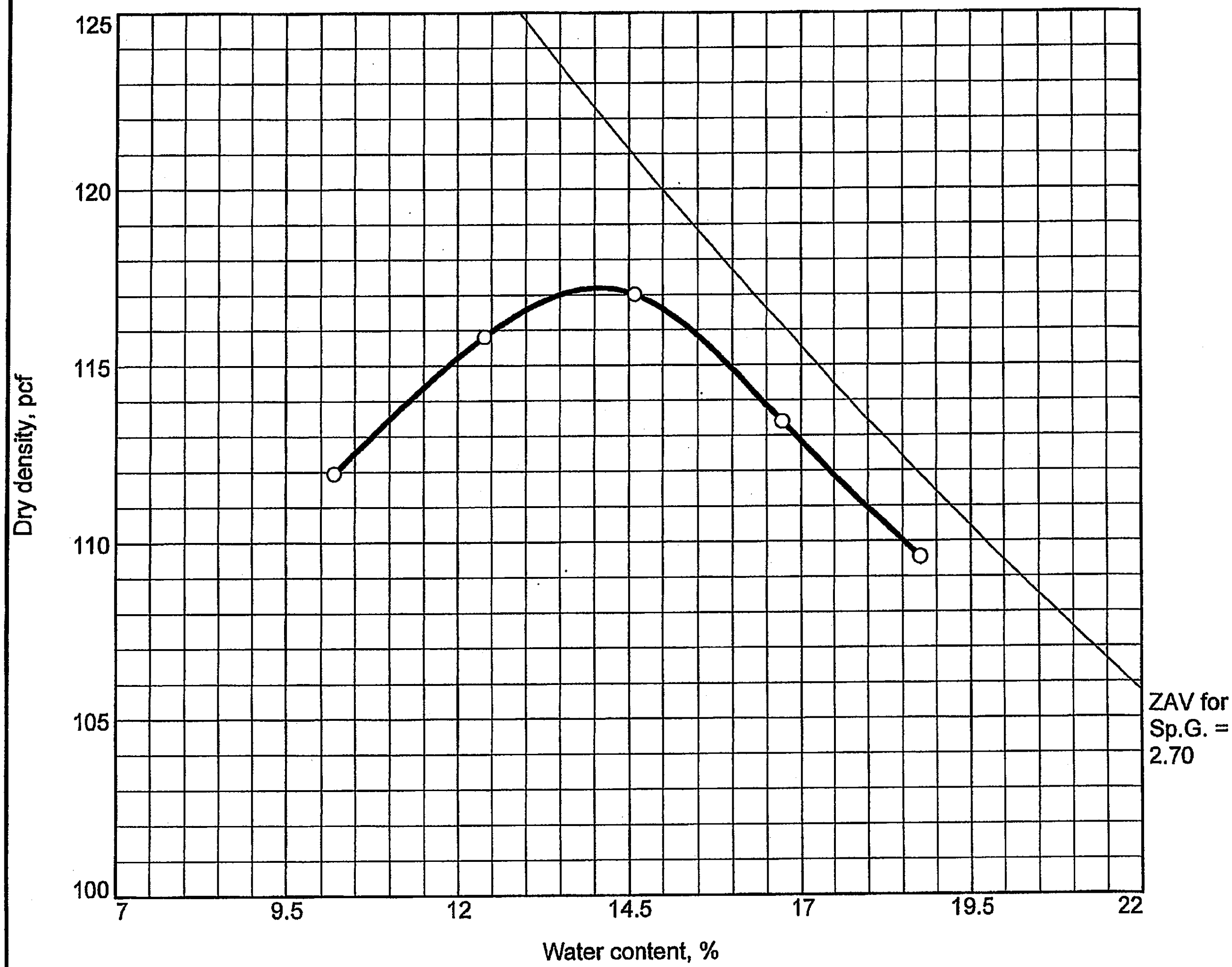
Madison, Wisconsin

Remarks:

Figure

Tested By: MBW **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-6(20)	26.4		39	20	0.1	96.1

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.2 pcf Optimum moisture = 14.1 %	Lean clay

Project No. 253325.0000 **Client:** Dane County
Project: Phase 10 - Cell 2 Construction
Date: 10-05-16
○ **Source of Sample:** Clay **Sample Number:** B-4,381600N,2200800E

TRC Environmental Corp.

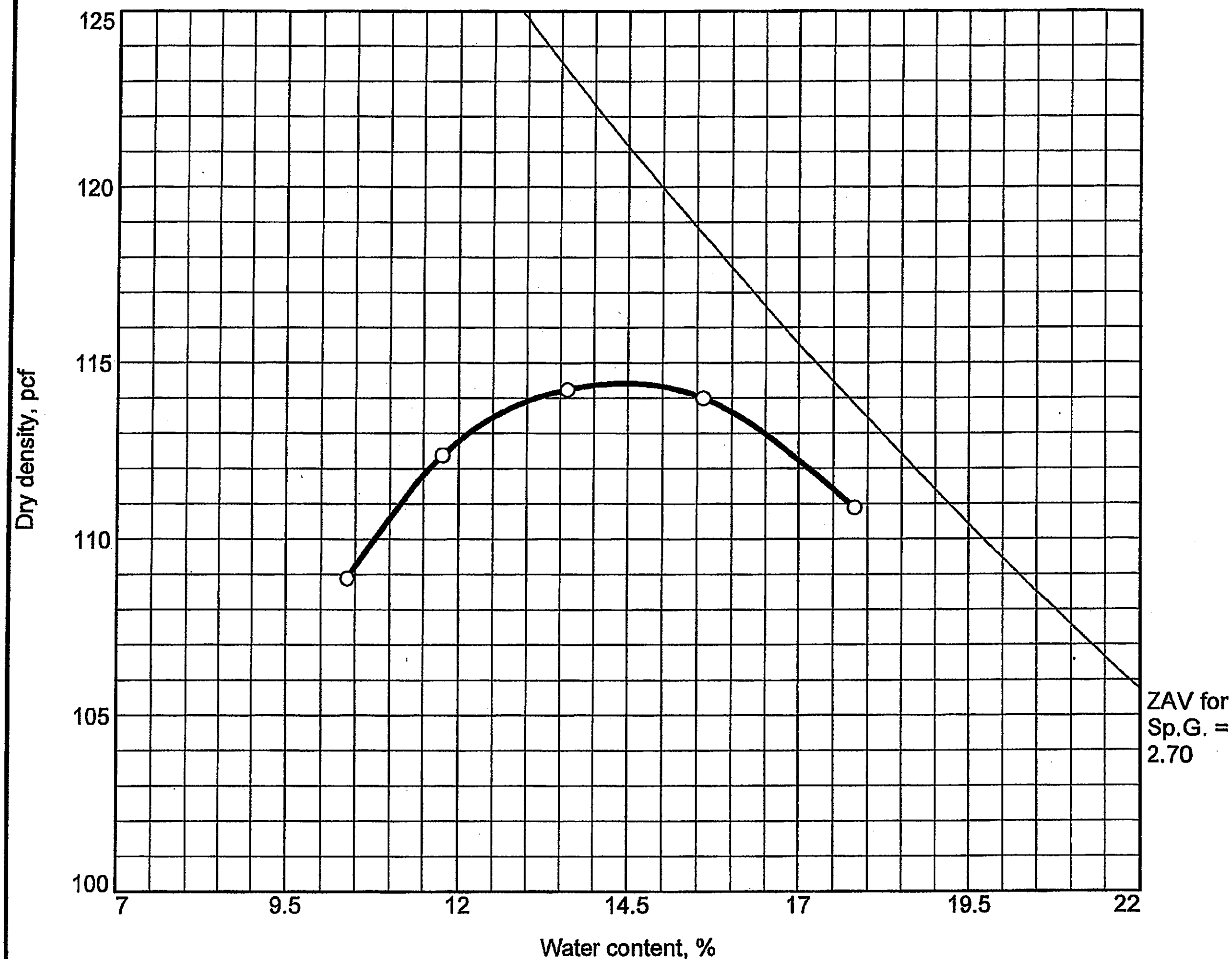
Madison, Wisconsin

Remarks:

Figure

Tested By: MBW / JPH **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-6(18)	26.9		38	18	0.0	95.1

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 114.4 pcf Optimum moisture = 14.4 %	Lean clay

Project No. 253325.0000 **Client:** Dane County
Project: Phase 10 - Cell 2 Construction
Date: 10-27-16
○ **Source of Sample:** Clay **Sample Number:** B-5, Lift 2

TRC Environmental Corp.

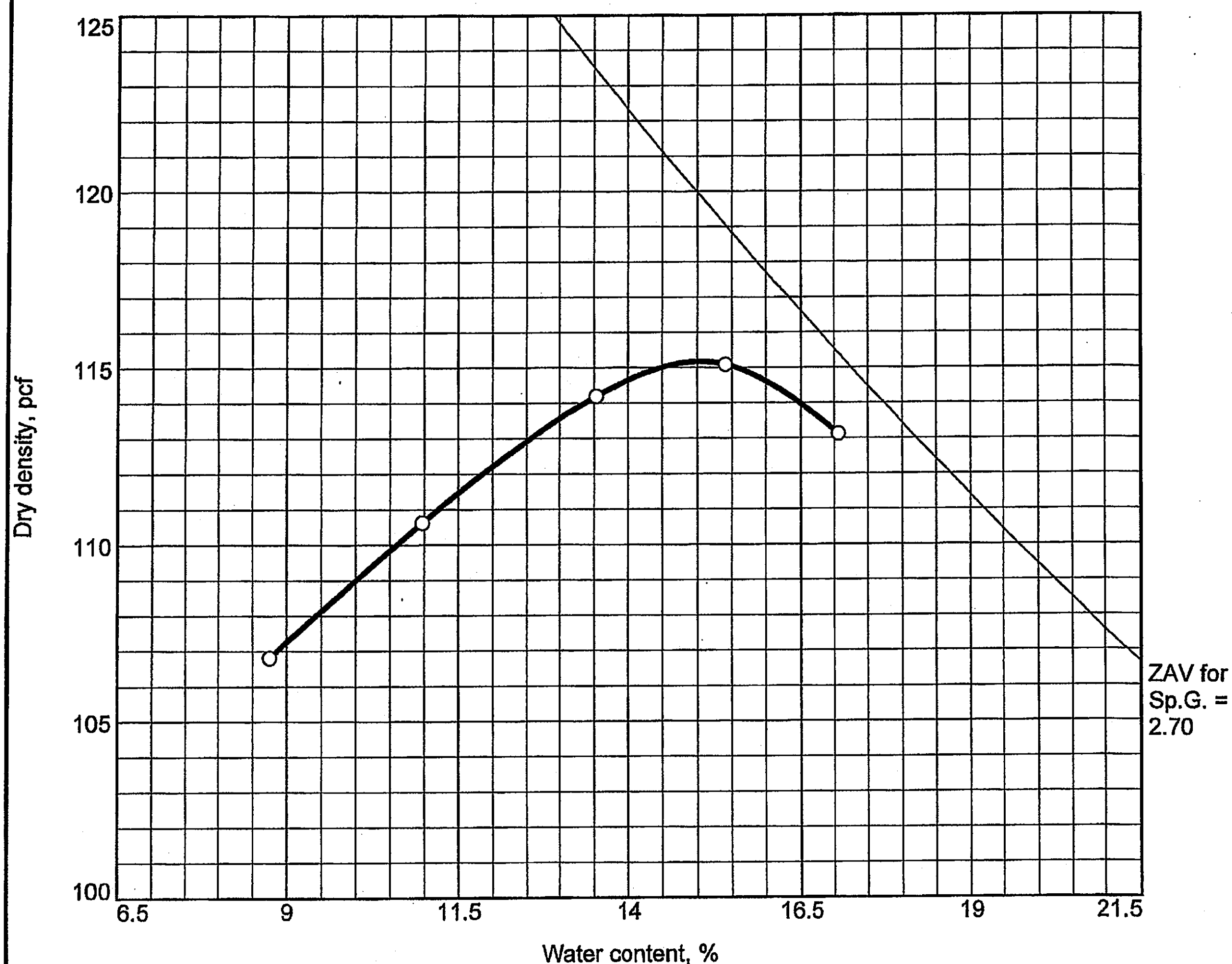
Madison, Wisconsin

Remarks:
381650N, 2200750E

Figure

Tested By: JPH **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-6(19)	28.9		40	19	0.1	95.6

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 115.2 pcf Optimum moisture = 15.0 %	Lean clay

Project No. 253325.0000 **Client:** Dane County
Project: Phase 10 - Cell 2 Construction
Date: 10-28-16
○ **Source of Sample:** Clay **Sample Number:** B-6, Lift 2

TRC Environmental Corp.

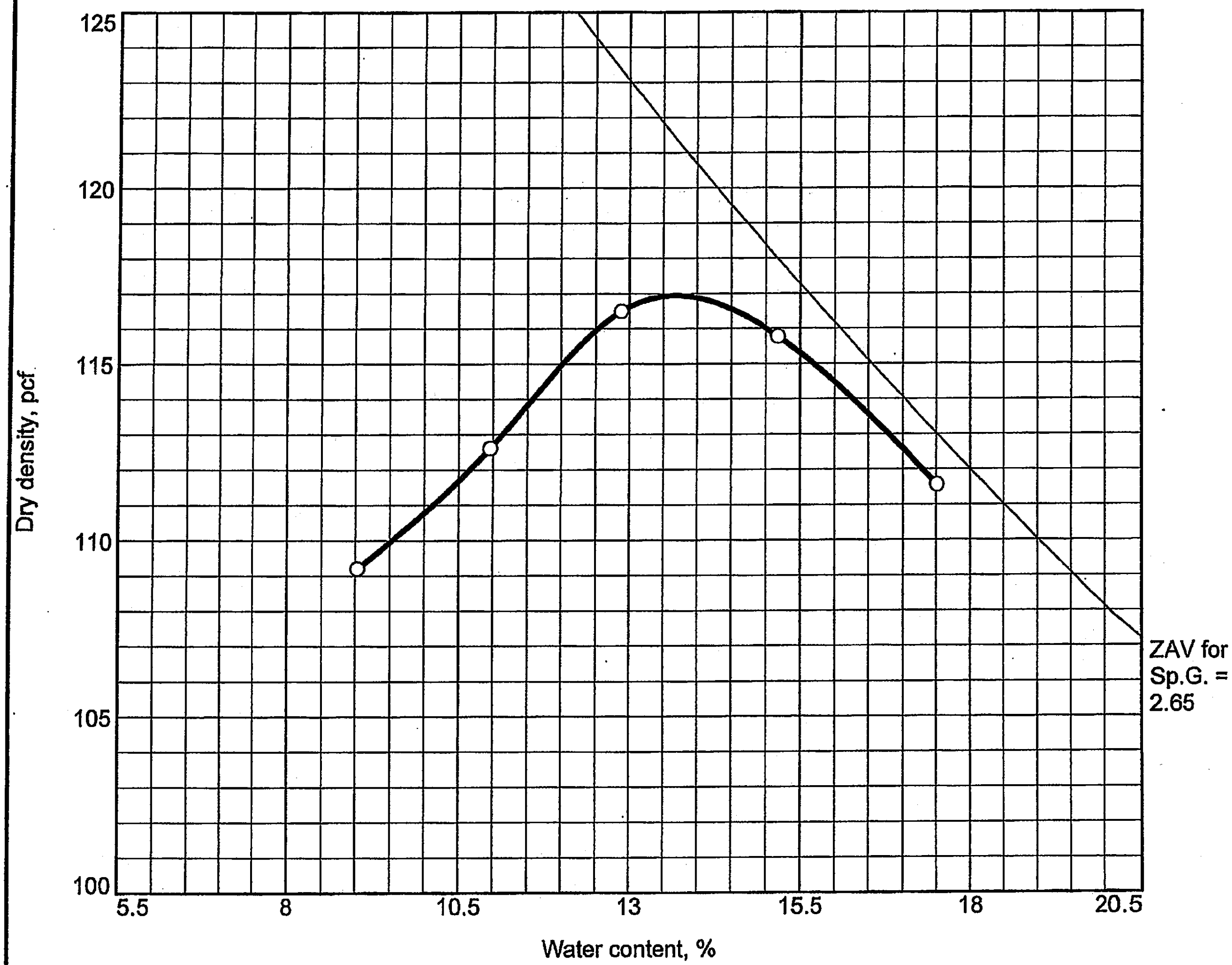
Madison, Wisconsin

Remarks:
381950N, 2200850E

Figure

Tested By: JPH **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-6(14)	28.2		36	14	0.7	93.9

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 116.9 pcf Optimum moisture = 13.7 %	Lean clay

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

Date: 05-16-17

○ **Source of Sample:** Clay **Sample Number:** B-7, Lift 3

TRC Environmental Corp.

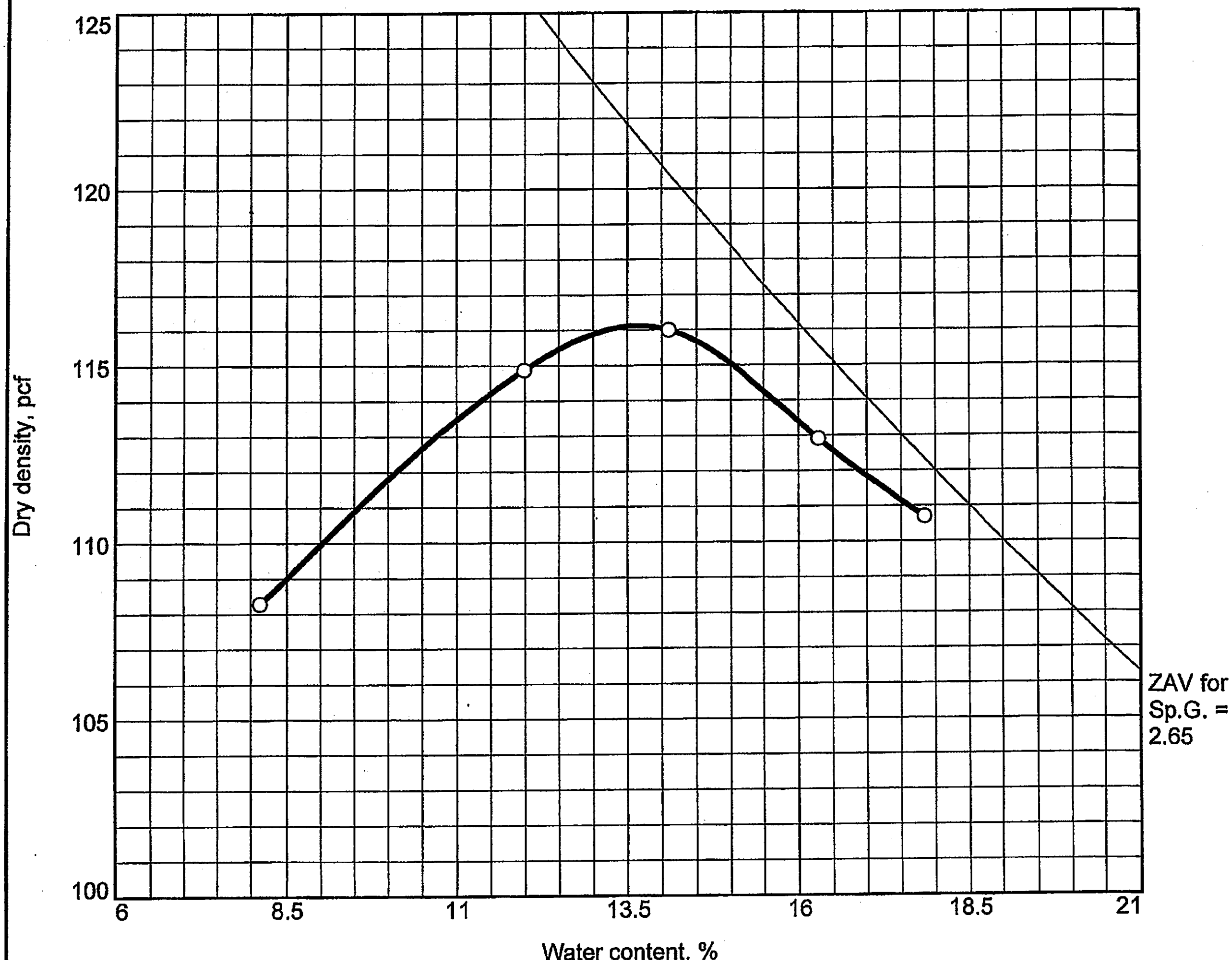
Madison, Wisconsin

Remarks:
381700N
2200700E

Figure

Tested By: JPH **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-6(13)	27.0		35	13	0.0	93.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 116.1 pcf Optimum moisture = 13.7 %	Lean clay

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

Date: 05-17-17

○ **Source of Sample:** Clay **Sample Number:** B-8, Lift 3

Remarks:
381800N
2200900E

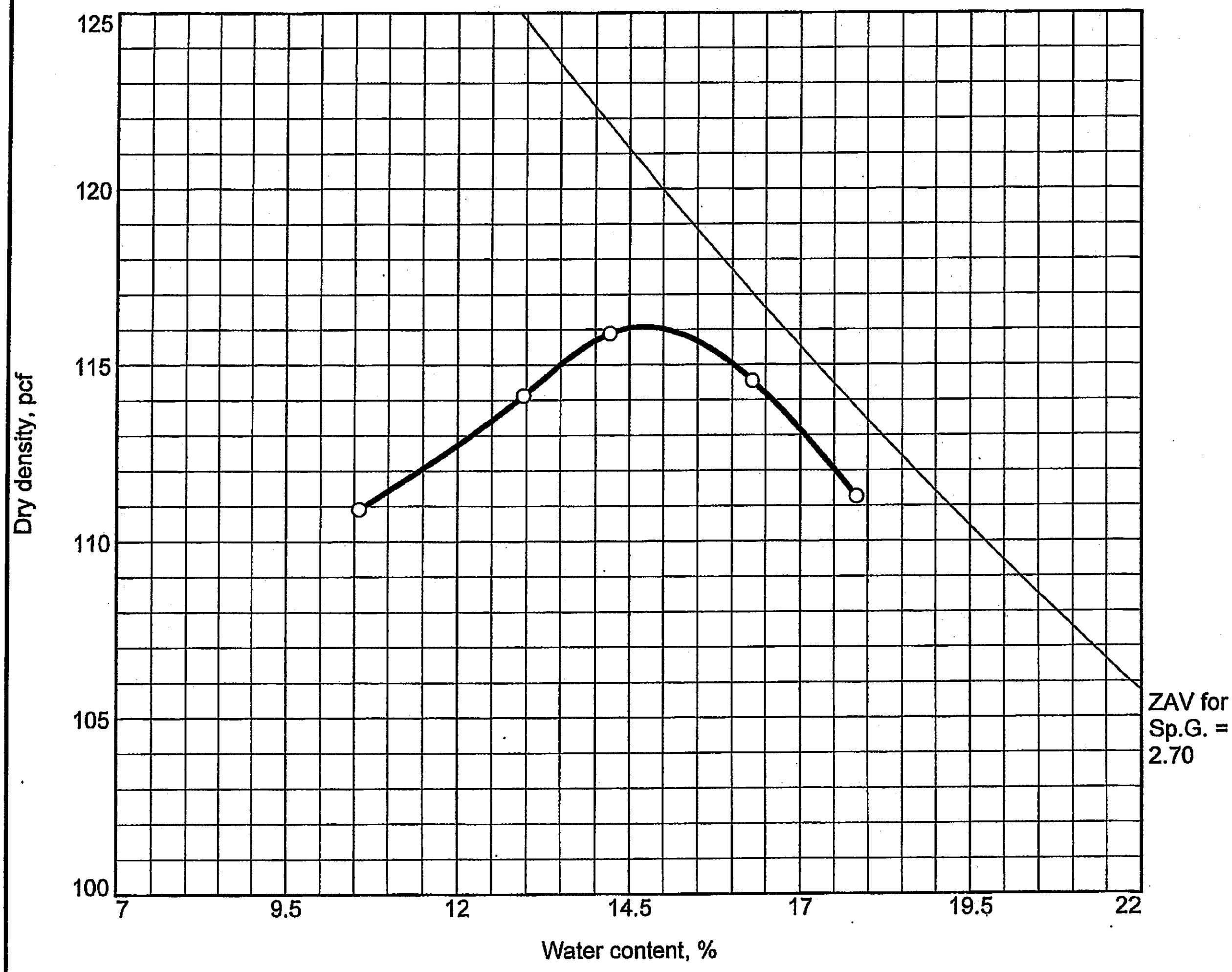
TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: JPH **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-6(12)	26.7		36	12	0.1	93.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 116.1 pcf Optimum moisture = 14.7 %	Lean clay

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

Date: 06-05-17

○ **Source of Sample:** Clay **Sample Number:** B-9, Lift 4

TRC Environmental Corp.

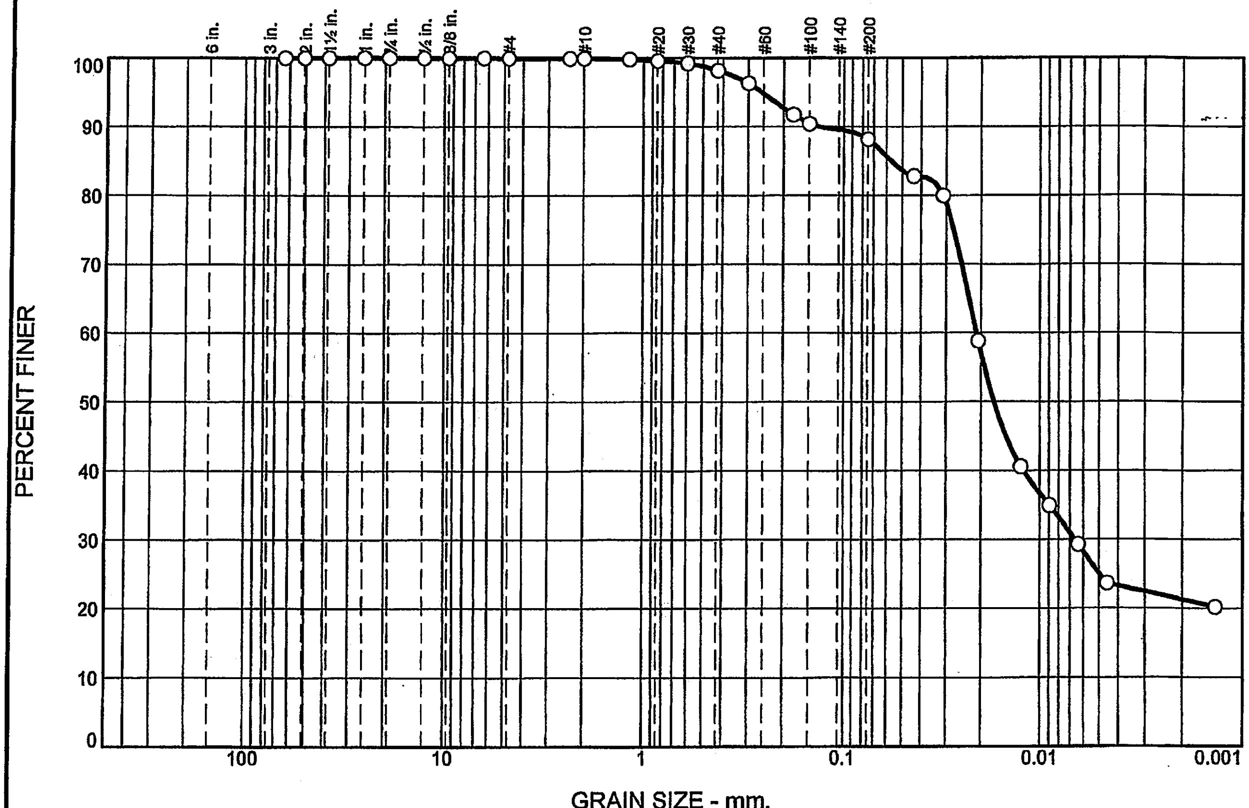
Madison, Wisconsin

Remarks:
381750N
2200700E
Dark Yellowish Brown

Figure

Tested By: JPH **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.8	9.9	63.1	25.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	99.9		
#10	99.9		
#16	99.8		
#20	99.6		
#30	99.2		
#40	98.1		
#50	96.3		
#80	91.7		
#100	90.4		
#200	88.2		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 21 LL= 34 PI= 13

Coefficients

D_{90}= 0.1354 D_{85}= 0.0568 D_{60}= 0.0211
D_{50}= 0.0171 D_{30}= 0.0066 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(11)

Remarks

Source of Sample: Clay
Sample Number: B-1

Date: 08-09-16

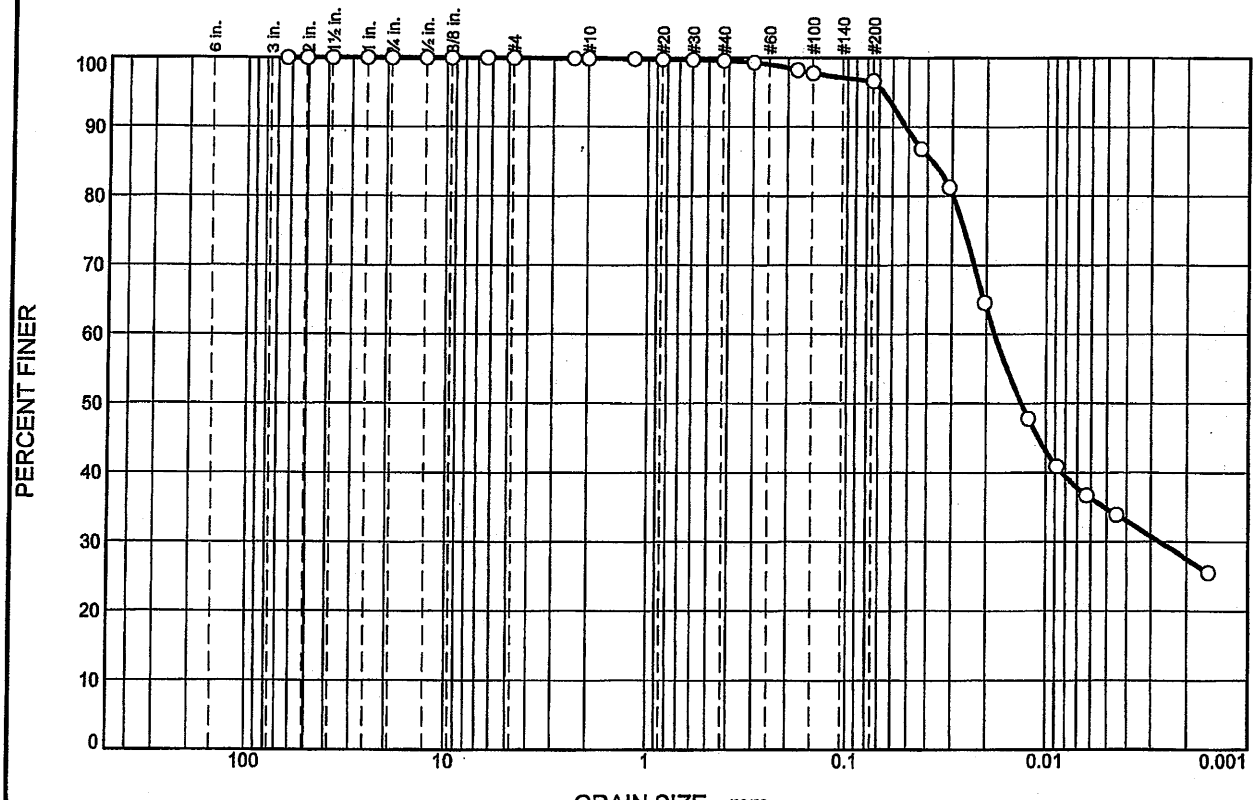
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: JPH **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.3	3.0	61.9	34.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	99.9		
#10	99.9		
#16	99.8		
#20	99.8		
#30	99.7		
#40	99.6		
#50	99.3		
#80	98.2		
#100	97.8		
#200	96.6		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 23 LL= 38 PI= 15

Coefficients

D_{90}= 0.0515 D_{85}= 0.0378 D_{60}= 0.0182
D_{50}= 0.0133 D_{30}= 0.0027 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(16)

Remarks

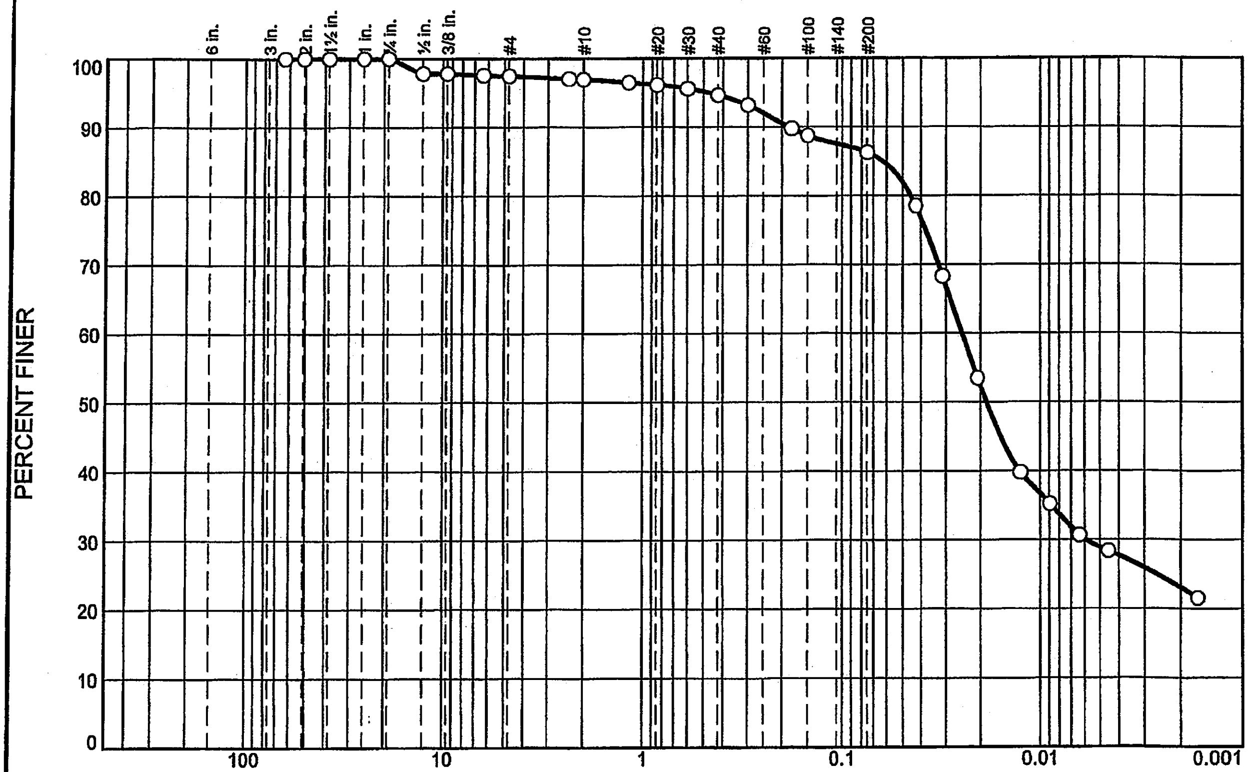
Source of Sample: Clay Stockpile
Sample Number: B-2

Date: 09-15-16

TRC Environmental Corp.	**Client:** Dane County
	Project: Phase 10 - Cell 2 Construction
Madison, Wisconsin	**Project No:** 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.5	0.6	2.3	8.3	57.4	28.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	97.8		
.375	97.8		
.25	97.6		
#4	97.5		
#8	97.0		
#10	96.9		
#16	96.5		
#20	96.1		
#30	95.6		
#40	94.6		
#50	93.2		
#80	89.8		
#100	88.7		
#200	86.3		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 20 LL= 38 PI= 18

Coefficients

D_{90}= 0.1861 D_{85}= 0.0627 D_{60}= 0.0249
D_{50}= 0.0186 D_{30}= 0.0059 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(15)

Remarks

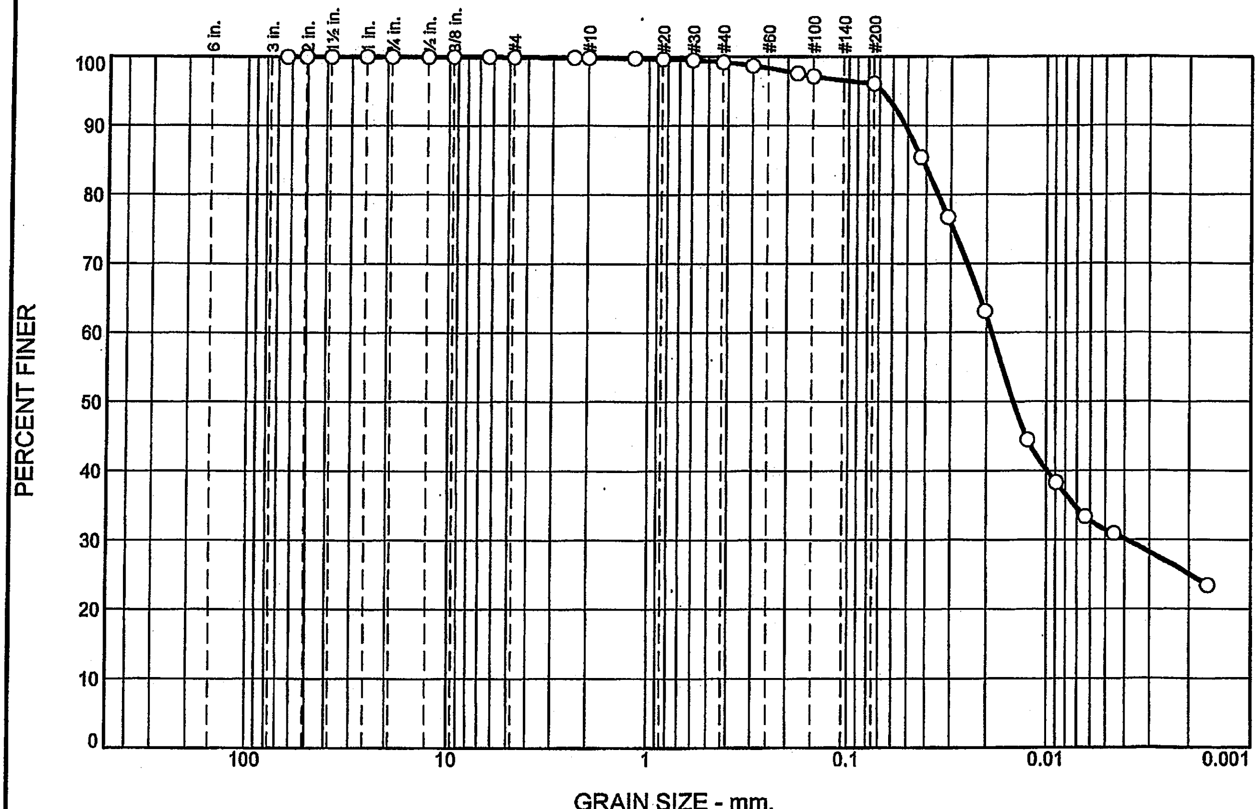
Source of Sample: Clay
Sample Number: B-3, Lift 1

Date: 09-30-16

TRC Environmental Corp. Madison, Wisconsin	**Client:** Dane County **Project:** Phase 10 - Cell 2 Construction **Project No:** 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.0	0.7	3.1	64.7	31.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	99.9		
#8	99.9		
#10	99.9		
#16	99.8		
#20	99.7		
#30	99.5		
#40	99.2		
#50	98.7		
#80	97.5		
#100	97.1		
#200	96.1		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 39 PI= 20

Coefficients

D_{90}= 0.0516 D_{85}= 0.0419 D_{60}= 0.0189
D_{50}= 0.0147 D_{30}= 0.0039 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(20)

Remarks

Source of Sample: Clay
Sample Number: B-4,381600N,2200800E

Date: 10-06-16

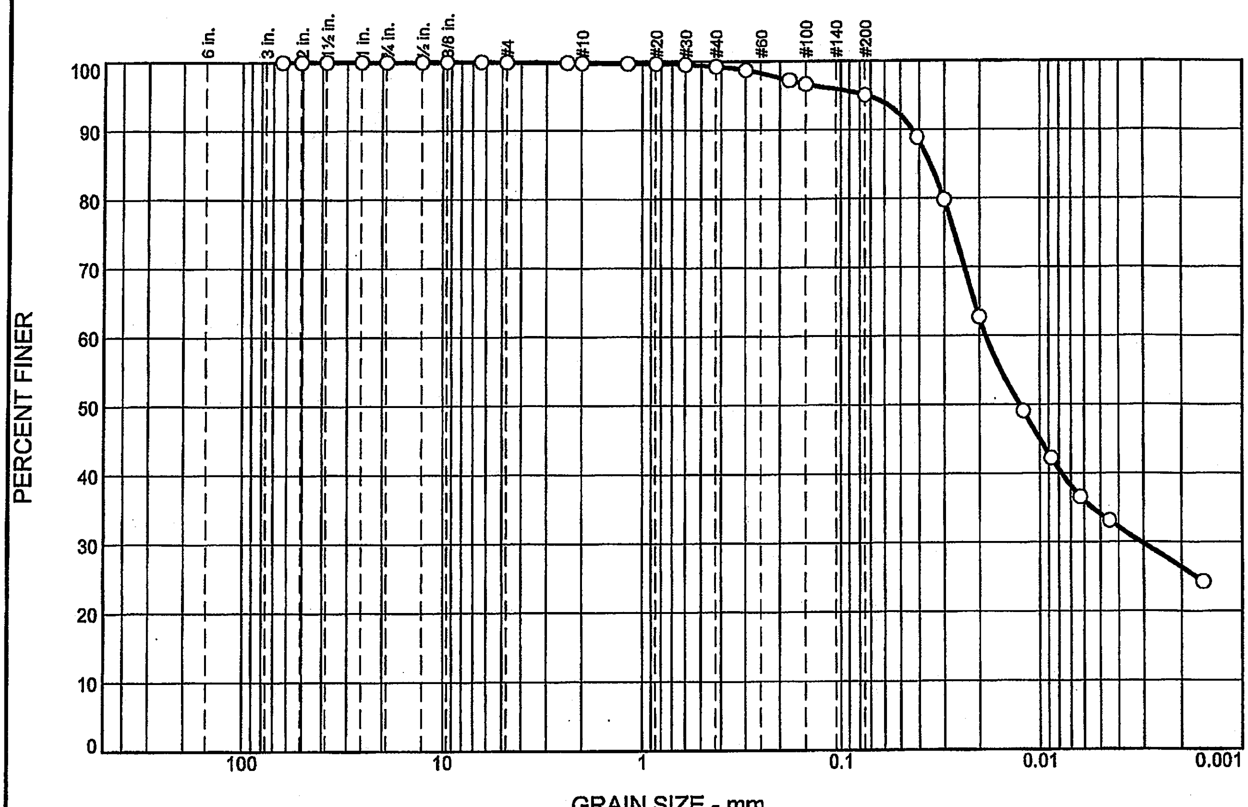
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	0.6	4.1	61.0	34.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	99.9		
#10	99.8		
#16	99.7		
#20	99.7		
#30	99.5		
#40	99.2		
#50	98.7		
#80	97.2		
#100	96.7		
#200	95.1		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 20 LL= 38 PI= 18

Coefficients

D_{90}= 0.0435 D_{85}= 0.0351 D_{60}= 0.0187
D_{50}= 0.0127 D_{30}= 0.0031 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(18)

Remarks

381650N, 2200750E

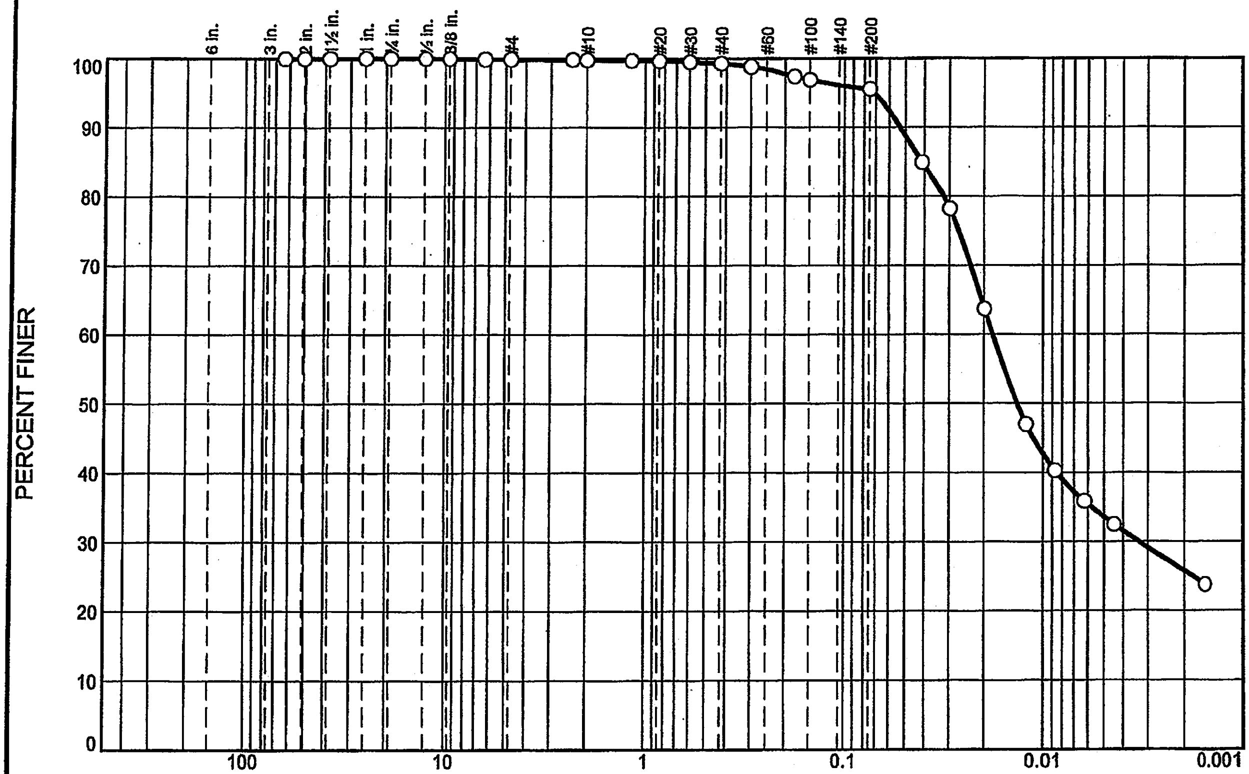
Source of Sample: Clay
Sample Number: B-5, Lift 2

Date: 10-31-16

TRC Environmental Corp. Madison, Wisconsin	**Client:** Dane County **Project:** Phase 10 - Cell 2 Construction **Project No:** 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.1	0.5	3.7	62.0	33.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	99.9		
#4	99.9		
#8	99.8		
#10	99.8		
#16	99.7		
#20	99.6		
#30	99.5		
#40	99.3		
#50	98.8		
#80	97.4		
#100	96.9		
#200	95.6		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 21 LL= 40 PI= 19

Coefficients

D_{90}= 0.0531 D_{85}= 0.0414 D_{60}= 0.0180
D_{50}= 0.0135 D_{30}= 0.0034 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(19)

Remarks

381950N, 2200850E

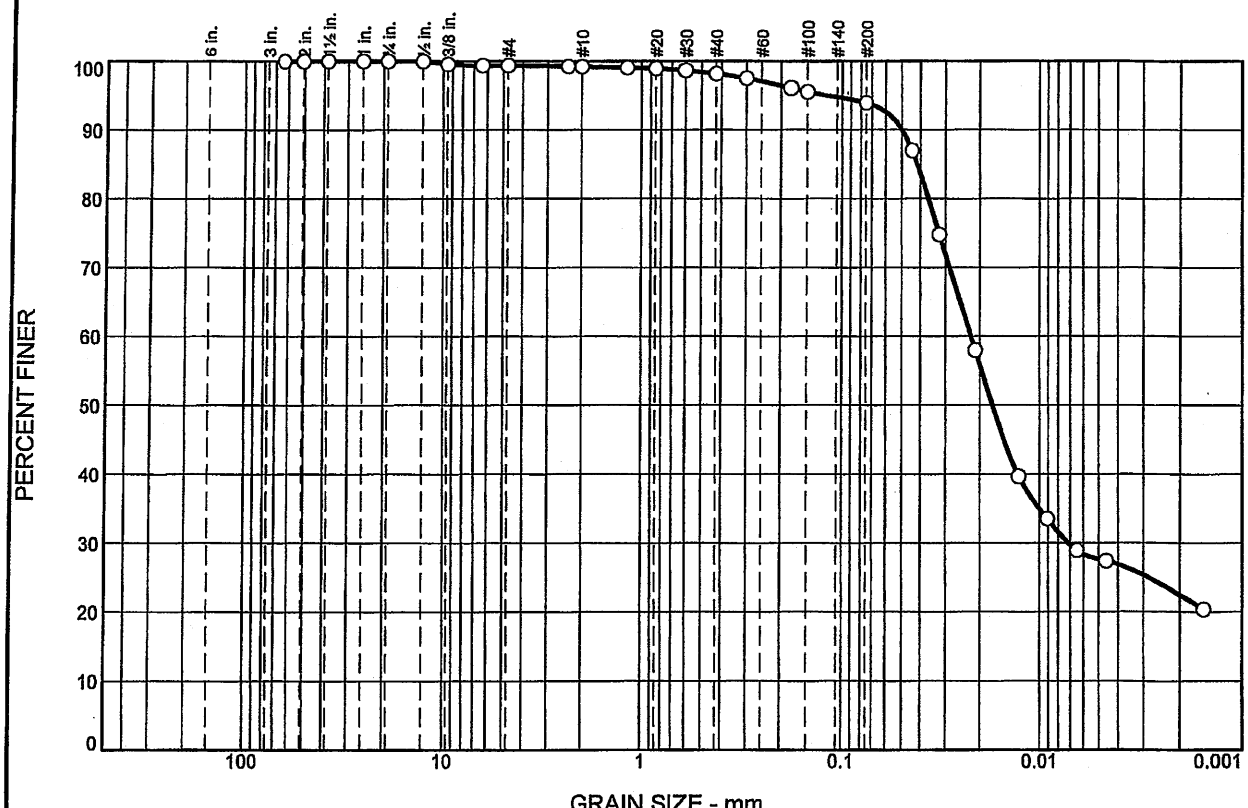
Source of Sample: Clay
Sample Number: B-6, Lift 2

Date: 10-31-16

TRC Environmental Corp. **Madison, Wisconsin**	**Client:** Dane County **Project:** Phase 10 - Cell 2 Construction **Project No:** 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	0.1	1.0	4.3	66.3	27.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	99.5		
.25	99.3		
#4	99.3		
#8	99.2		
#10	99.2		
#16	99.0		
#20	98.9		
#30	98.6		
#40	98.2		
#50	97.5		
#80	96.1		
#100	95.5		
#200	93.9		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 22 LL= 36 PI= 14

Coefficients

D_{90}= 0.0499 D_{85}= 0.0415 D_{60}= 0.0222
D_{50}= 0.0173 D_{30}= 0.0071 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(14)

Remarks

381700N
2200700E

Source of Sample: Clay
Sample Number: B-7, Lift 3

Date: 05-17-17

TRC Environmental Corp.

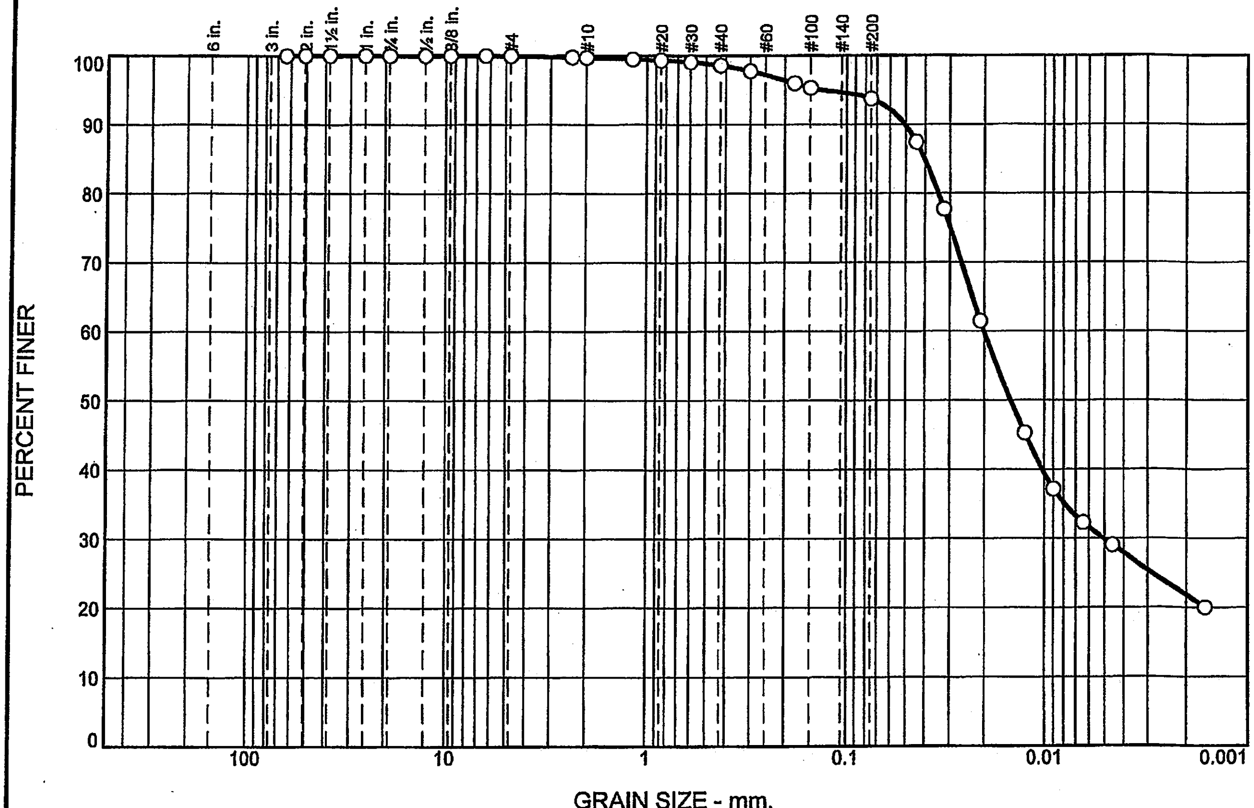
Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction

Project No: 253325.0000 **Figure**

Tested By: JPH **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	1.1	4.9	63.8	29.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	99.8		
#10	99.7		
#16	99.5		
#20	99.3		
#30	99.1		
#40	98.6		
#50	97.8		
#80	96.0		
#100	95.3		
#200	93.7		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 22 LL= 35 PI= 13

Coefficients

D_{90}= 0.0507 D_{85}= 0.0403 D_{60}= 0.0201
D_{50}= 0.0148 D_{30}= 0.0051 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(13)

Remarks

381800N
2200900E

Source of Sample: Clay
Sample Number: B-8, Lift 3

Date: 05-17-17

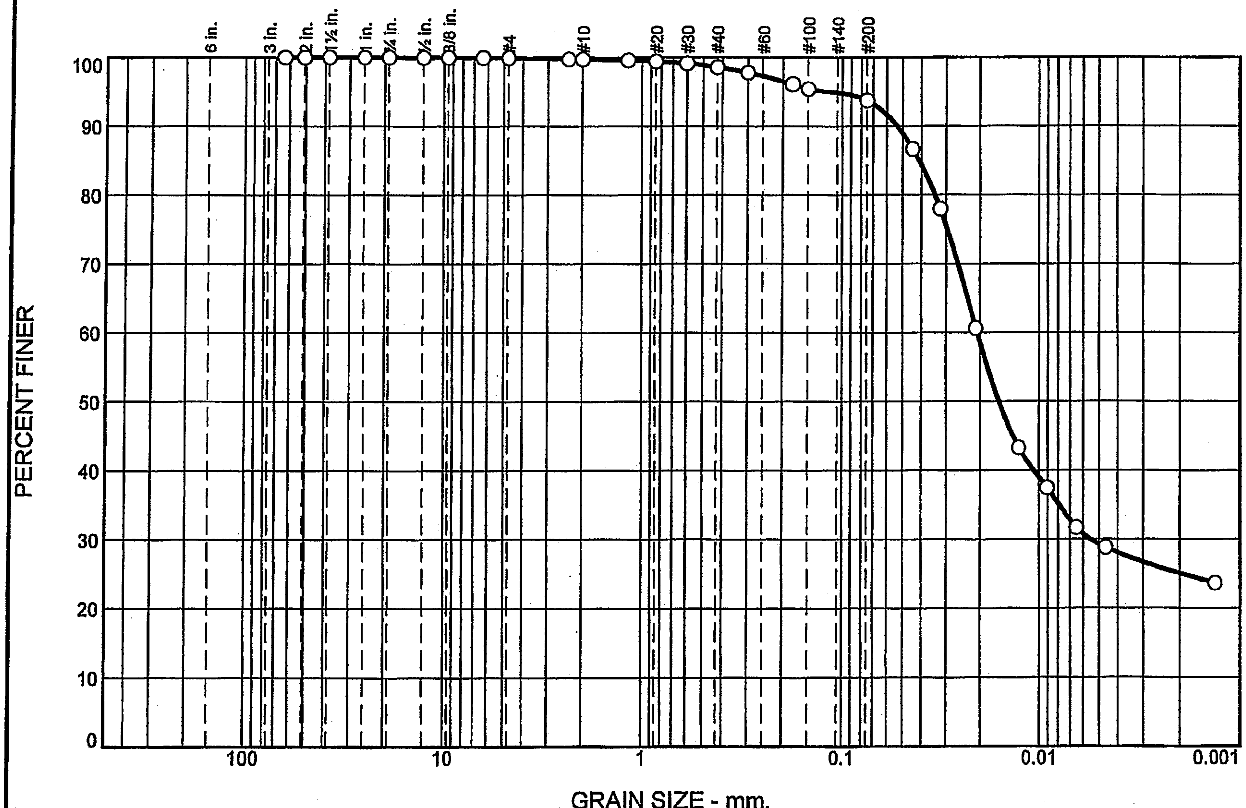
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: JPH **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.2	1.1	4.9	64.4	29.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	99.9		
#4	99.9		
#8	99.7		
#10	99.7		
#16	99.6		
#20	99.4		
#30	99.1		
#40	98.6		
#50	97.8		
#80	96.1		
#100	95.4		
#200	93.7		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 24 LL= 36 PI= 12

Coefficients

D_{90}= 0.0534 D_{85}= 0.0411 D_{60}= 0.0208
D_{50}= 0.0161 D_{30}= 0.0055 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(12)

Remarks

381750N
2200750E

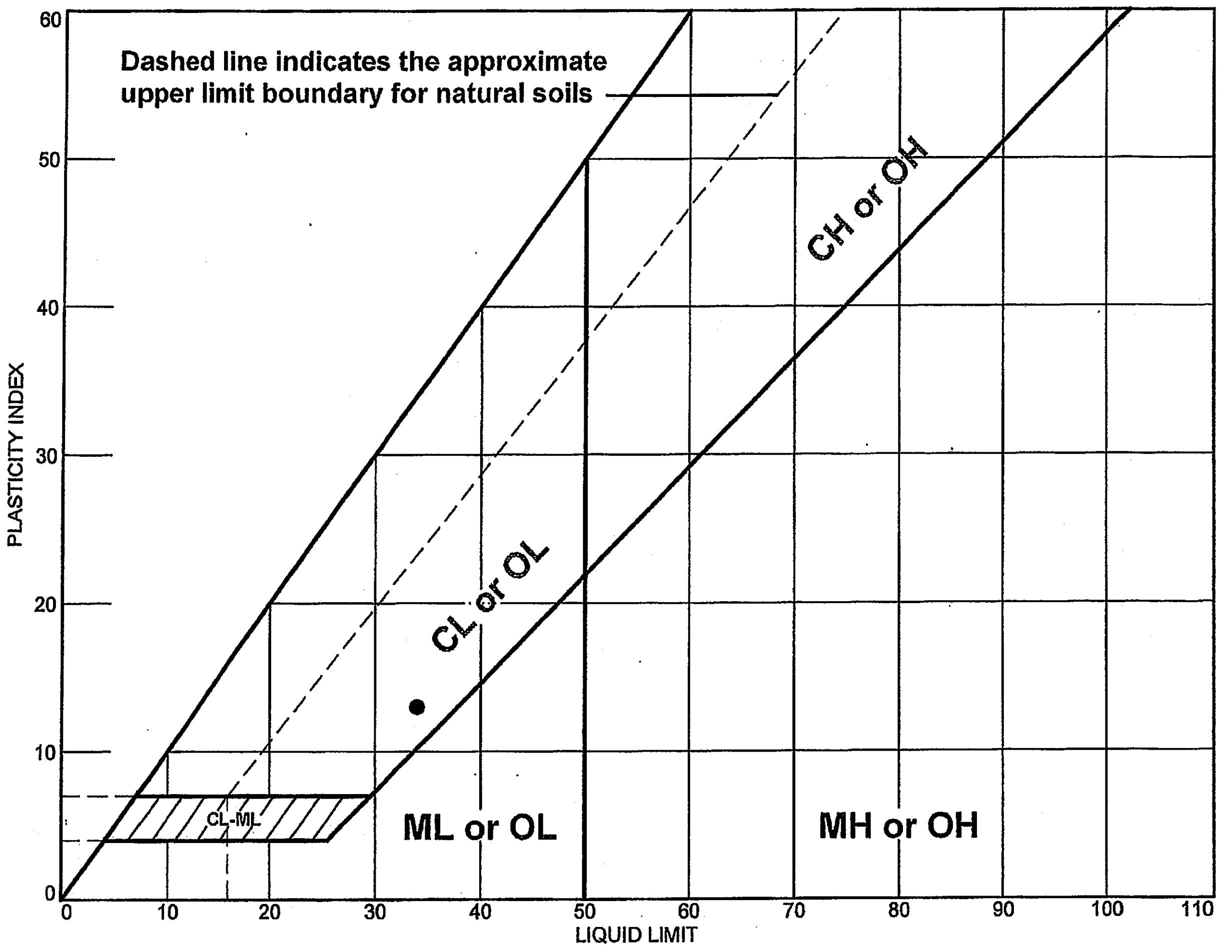
Source of Sample: Clay
Sample Number: B-9, Lift 4

Date: 06-06-17

TRC Environmental Corp. Madison, Wisconsin	**Client:** Dane County **Project:** Phase 10 - Cell 2 Construction **Project No:** 253325.0000 **Figure**

Tested By: JPH **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	34	21	13	98.1	88.2	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** Clay **Sample Number:** B-1

TRC Environmental Corp.

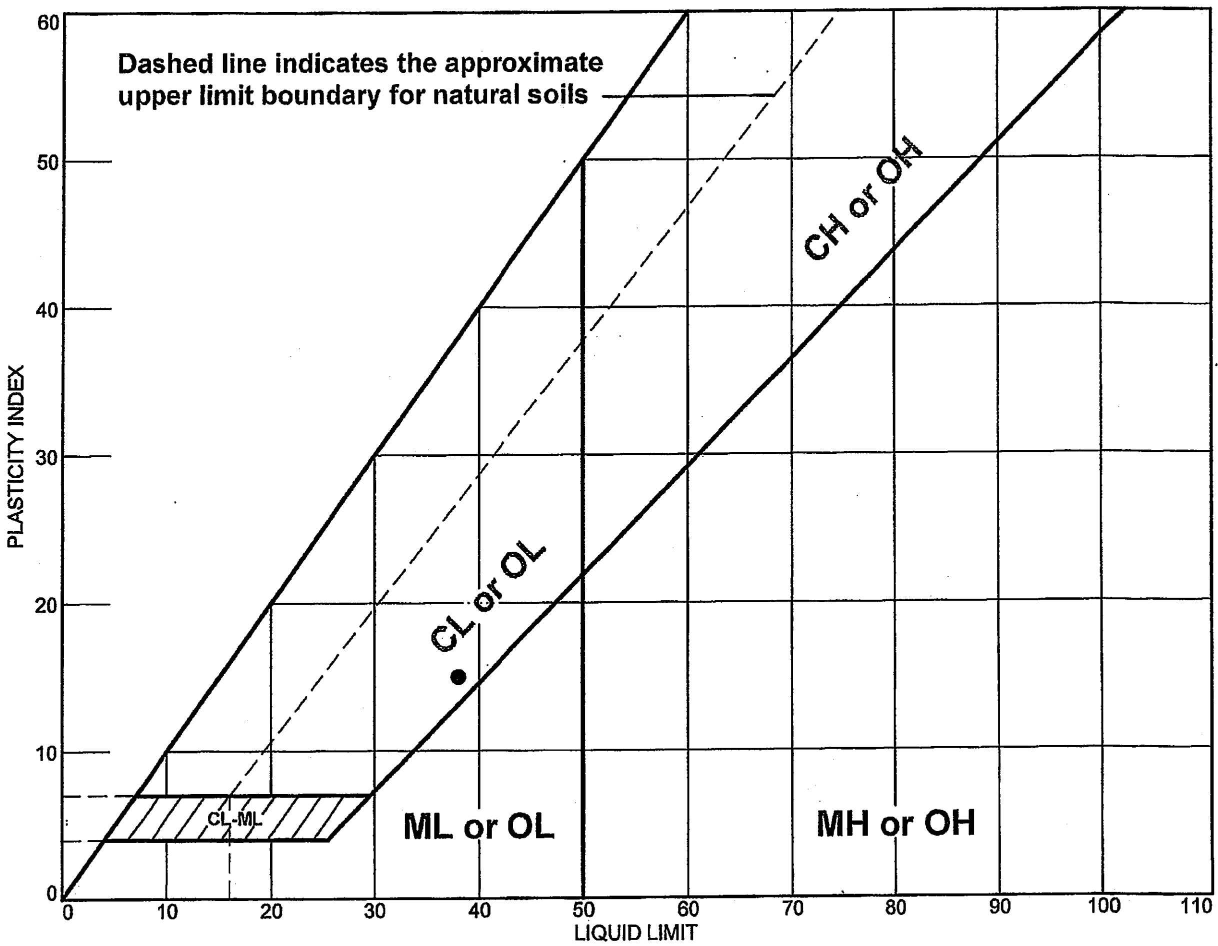
Madison, Wisconsin

Remarks:

Figure

Tested By: JPH **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	38	23	15	99.6	96.6	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** Clay Stockpile **Sample Number:** B-2

Remarks:

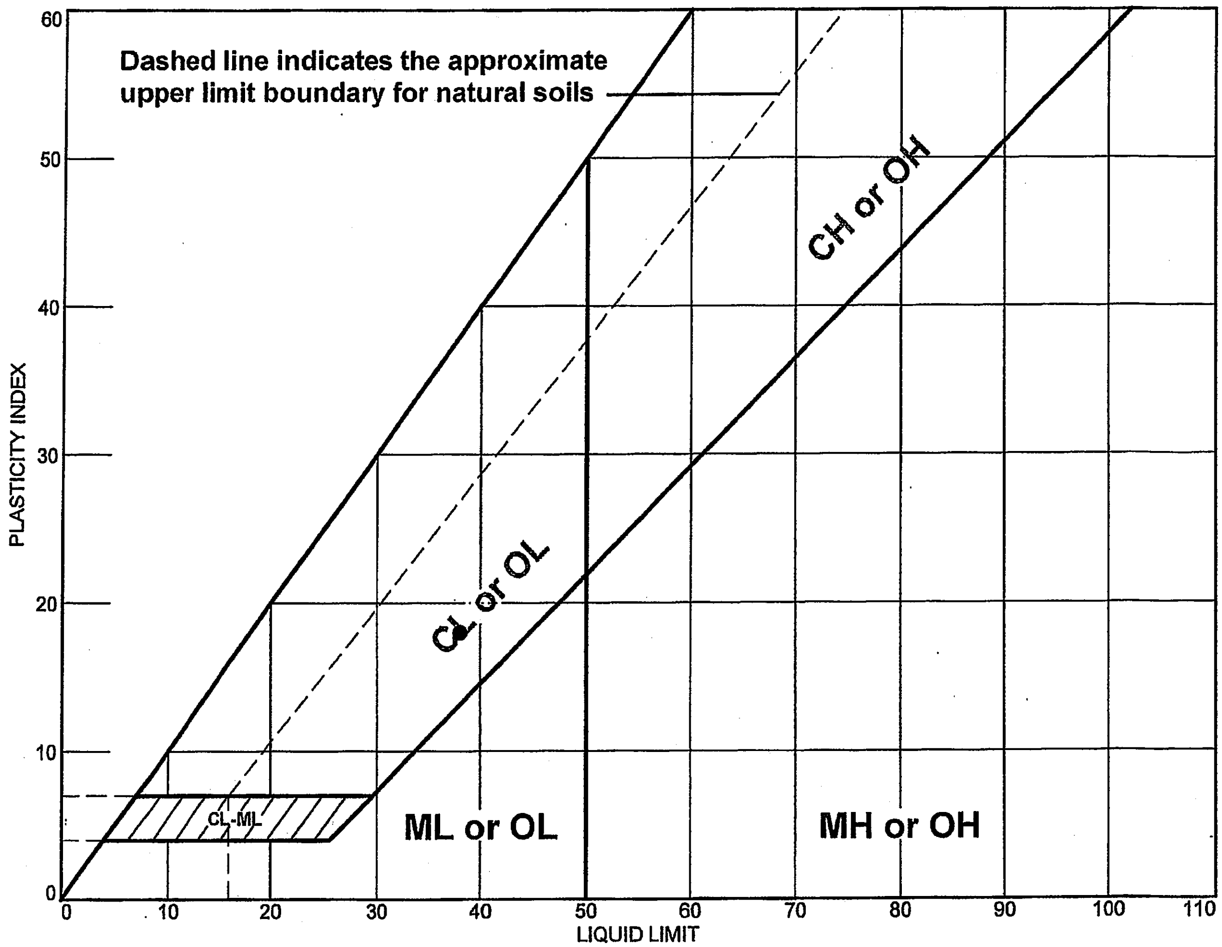
TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: MBW **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	38	20	18	94.6	86.3	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** Clay **Sample Number:** B-3, Lift 1

Remarks:
●381500N, 2200700E

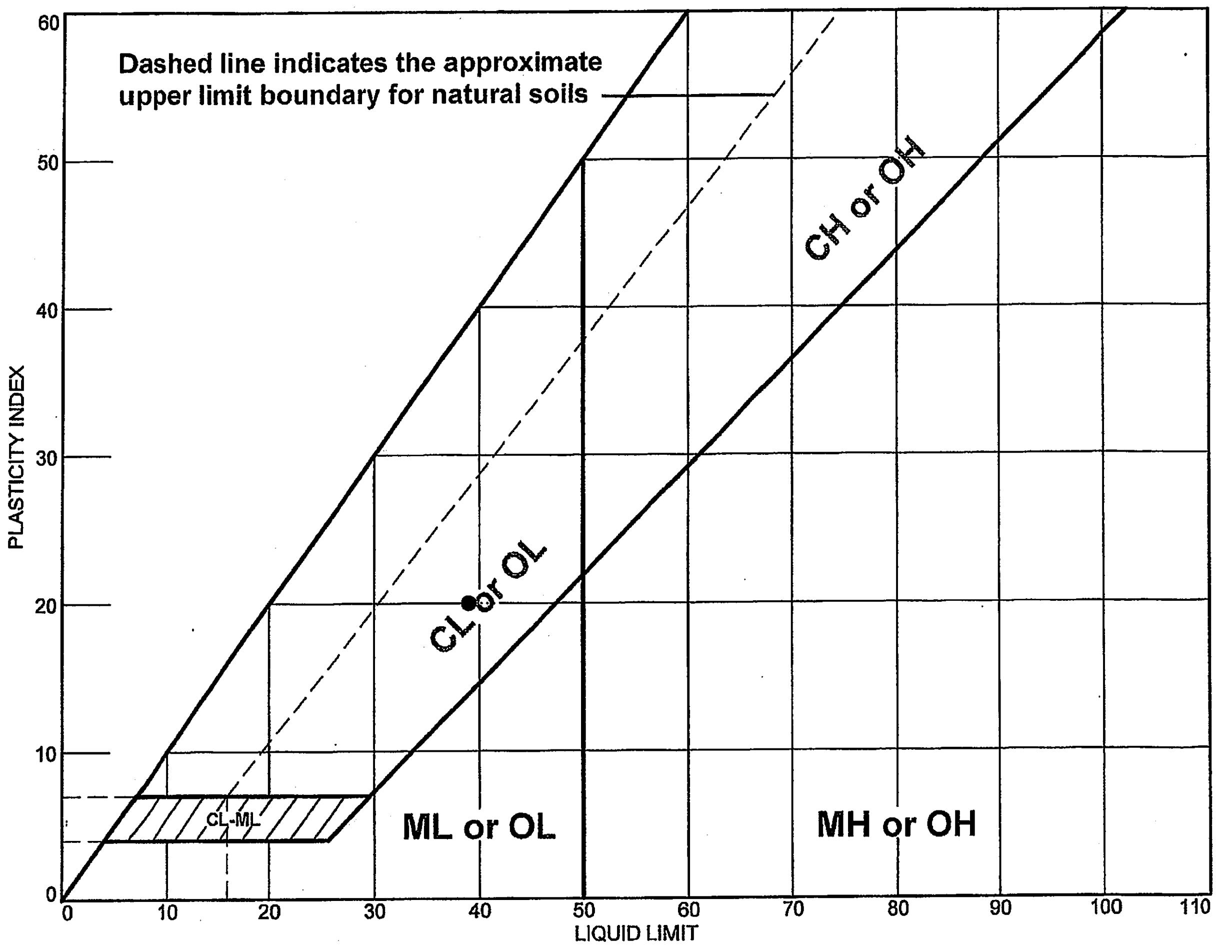
TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: MBW **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	39	19	20	99.2	96.1	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** Clay **Sample Number:** B-4,381600N,2200800E

Remarks:

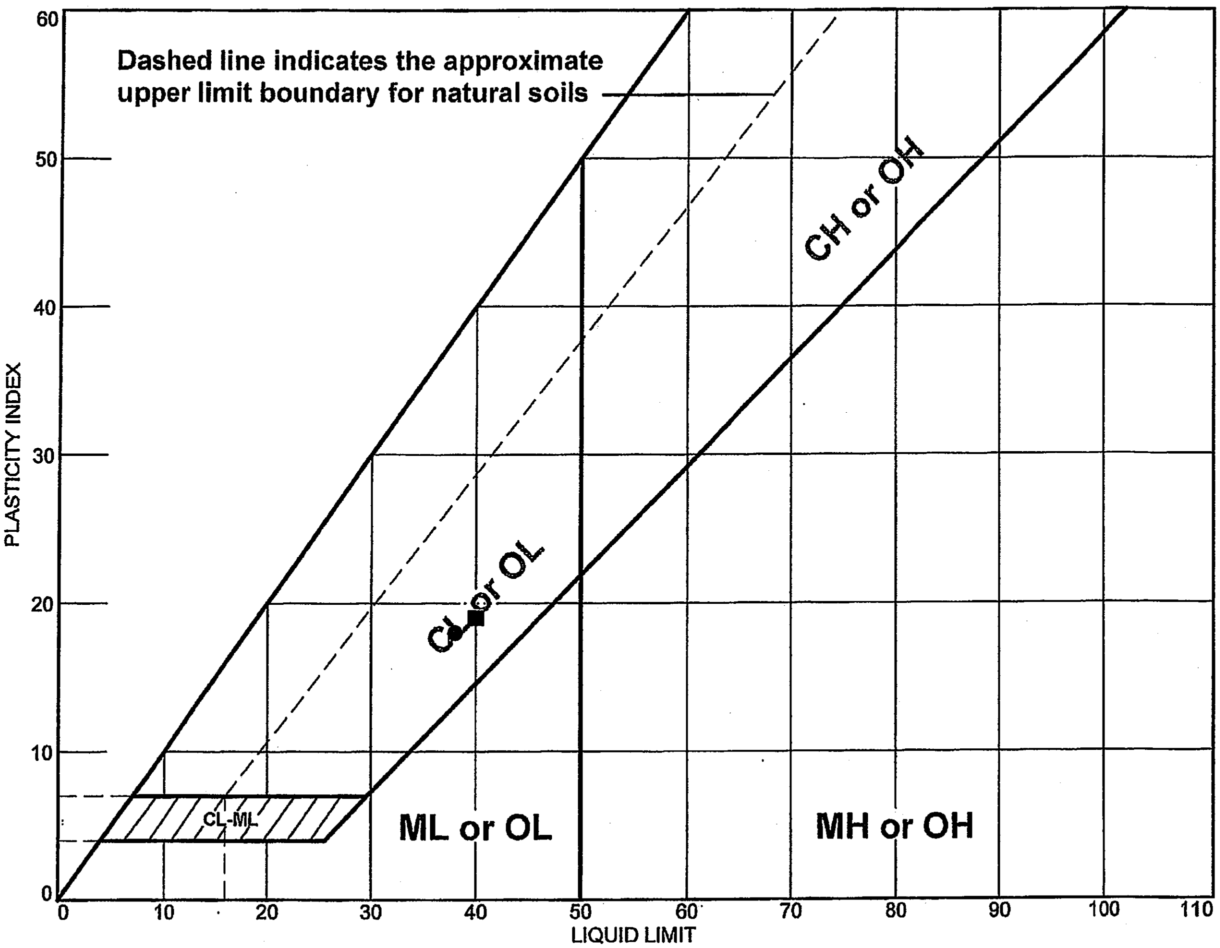
TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: MBW **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	38	20	18	99.2	95.1	CL
■	Lean clay	40	21	19	99.3	95.6	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** Clay **Sample Number:** B-5, Lift 2

■ **Source of Sample:** Clay **Sample Number:** B-6, Lift 2

Remarks:

●381650N, 2200750E

■381950N, 2200850E

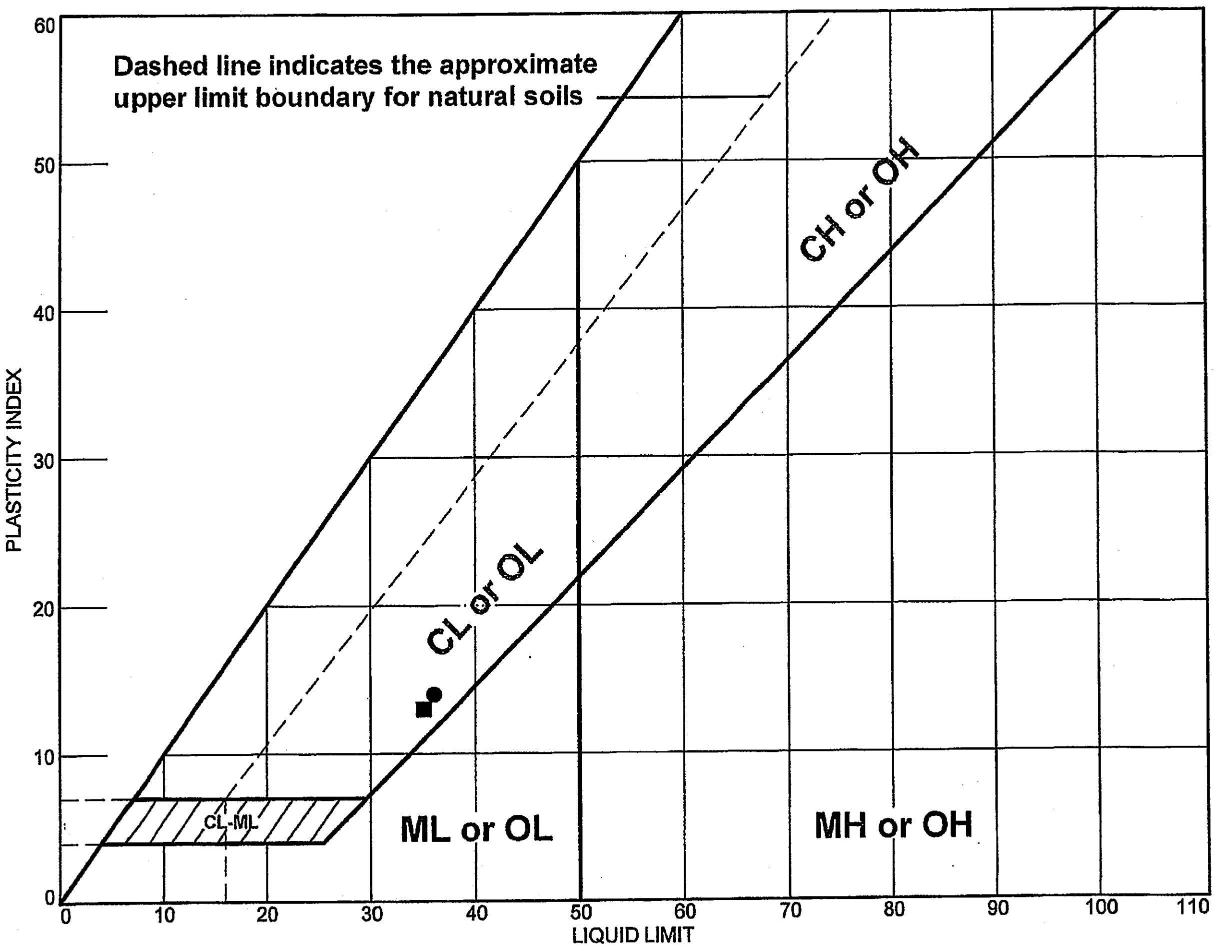
TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: MBW **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	36	22	14	98.2	93.9	CL
■	Lean clay	35	22	13	98.6	93.7	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** Clay **Sample Number:** B-7, Lift 3

■ **Source of Sample:** Clay **Sample Number:** B-8, Lift 3

TRC Environmental Corp.

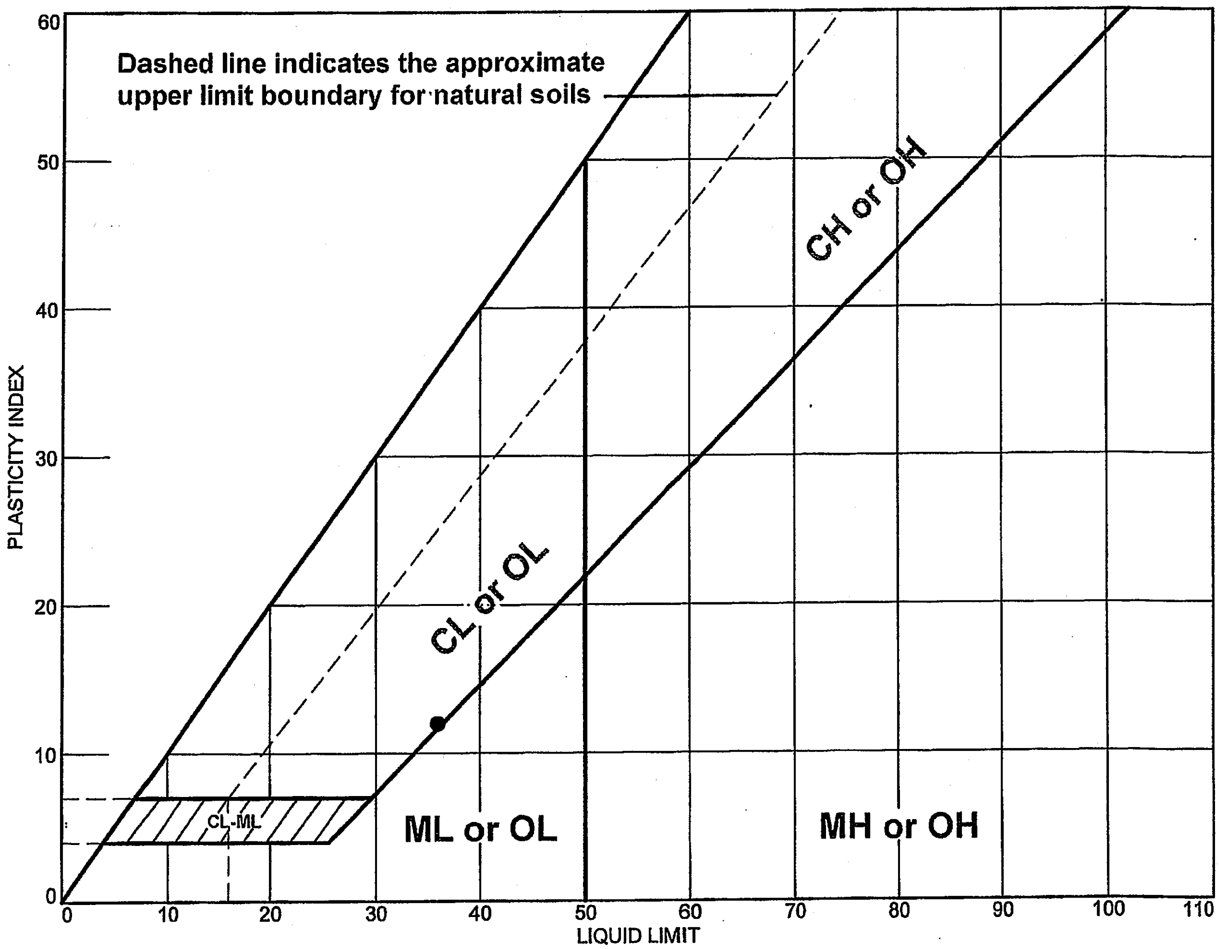
Madison, Wisconsin

Remarks:
●381700N
2200700E
■381800N
2200900E

Figure

Tested By: JPH **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	36	24	12	98.6	93.7	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** Clay **Sample Number:** B-9, Lift 4

Remarks:
● 381750N
2200750E

TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: JPH **Checked By:** JPH

TRC Environmental Corporation

Moisture Content Determination (ASTM D2216)

Project Name: Dane County - Ph. 10 Cell 2			Project #: 253325.0000	
Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)
Clay, B-1	91.21	1105.70	892.50	26.6

TRC Environmental Corporation

Moisture Content Determination (ASTM D2216)

Project Name: Dane County - Ph. 10 Cell 2		Project #: 253325.0000		
Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)
Clay Stockpile, B-2	92.17	1234.10	974.80	29.4

TRC Environmental Corporation

Moisture Content Determination (ASTM D2216)

Project Name: Dane County - Ph. 10 Cell 2		Project #:	253325.0000	
Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)
Clay, B-3, Lift 1, 381,500N, 2,200,700E	90.05	1202.10	1004.90	21.6

TRC Environmental Corporation

Moisture Content Determination (ASTM D2216)

Project Name: Dane County - Ph. 10 Cell 2		Project #: 253325.0000		
Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)
Clay, B-4, 381600N, 2200800E	87.97	1389.30	1117.50	26.4

TRC Environmental Corporation Moisture Content Determination (ASTM D2216)				
Project Name: Dane County - Ph. 10 Cell 2		Project #: 253325.0000		
Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)
Clay, B-5, Lift 2, 381650N, 2200750E	88.41	1193.30	959.10	26.9
Clay, B-6, Lift 2, 381950N, 2200850E	87.08	1211.70	959.80	28.9

TRC Environmental Corporation Moisture Content Determination (ASTM D2216)				
Project Name: Dane County - Ph. 10 Cell 2		Project #: 253325.0000		
Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)
Clay, B-7, Lift 3, 381700N, 2200700E	266.37	1336.60	1101.50	28.2

TRC Environmental Corporation

Moisture Content Determination (ASTM D2216)

Project Name: Dane County - Ph. 10 Cell 2 | Project #: 253325.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)
Clay, B-8, Lift 3, 381800N, 2200900E	265.78	1354.20	1122.80	27.0

TRC Environmental Corporation Moisture Content Determination (ASTM D2216)				
Project Name: Dane County - Ph. 10 Cell 2		Project #: 253325.0000		
Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)
Clay, B-9, Lift 4, 381750N, 2200700E	261.90	1510.90	1247.50	26.7

CLAY LINER AND GENERAL FILL FIELD TEST RESULTS

Table 4

Nuclear Density Test Results - General Fill

Phase 10 - Cell 2 Liner Construction Documentation

Dane County - Rodefeld Landfill

Date	Lift	North	East	Wet Density	Dry Density	Moisture	Moisture %	Compact %	Modified Proctor	Optimum Moisture
Subbase Undercut										
9/29/16	1	381,925	2,200,900	128.1	122.2	5.9	4.8	90.6%	134.9	6.5%
9/29/16	1	381,825	2,200,900	138.1	129.6	8.5	6.6	96.1%	134.9	6.5%
9/29/16	1	381,725	2,200,900	135.5	127.0	8.5	6.7	94.1%	134.9	6.5%
10/1/16	1	381,625	2,200,900	138.6	130.3	8.3	6.4	96.6%	134.9	6.5%
10/3/16	1	381,525	2,200,900	134.3	128.5	5.8	4.5	95.3%	134.9	6.5%
9/29/16	1	381,925	2,200,800	134.7	124.1	10.5	8.5	92.0%	134.9	6.5%
9/29/16	1	381,825	2,200,800	128.4	122.5	5.9	4.8	90.8%	134.9	6.5%
9/29/16	1	381,725	2,200,800	135.6	127.0	8.6	6.8	94.1%	134.9	6.5%
10/1/16	1	381,625	2,200,800	135.1	123.9	11.2	9.1	91.8%	134.9	6.5%
10/3/16	1	381,525	2,200,800	131.5	124.5	7.0	5.6	92.3%	134.9	6.5%
9/30/16	2	381,875	2,200,900	137.6	129.0	8.6	6.7	95.6%	134.9	6.5%
9/30/16	2	381,775	2,200,900	132.8	126.9	5.9	4.7	94.1%	134.9	6.5%
10/1/16	2	381,675	2,200,900	138.7	126.9	11.8	9.3	94.1%	134.9	6.5%
10/4/16	2	381,575	2,200,900	141.0	132.2	8.8	6.7	98.0%	134.9	6.5%
10/4/16	2	381,475	2,200,900	143.0	133.0	10.0	7.5	98.6%	134.9	6.5%
9/30/16	2	381,875	2,200,800	139.0	130.0	9.0	6.9	96.4%	134.9	6.5%
9/30/16	2	381,775	2,200,800	134.3	123.1	11.2	9.1	91.3%	134.9	6.5%
10/1/16	2	381,675	2,200,800	138.1	129.4	8.8	6.8	95.9%	134.9	6.5%
10/4/16	2	381,575	2,200,800	137.8	128.3	9.4	7.4	95.1%	134.9	6.5%
10/4/16	2	381,475	2,200,800	141.2	132.9	8.3	6.2	98.5%	134.9	6.5%
East Perimeter Berm										
6/1/17	1	381,700	2,201,220	140.6	129.3	11.3	8.7	96.3%	134.2	7.2%
6/1/17	1	381,600	2,201,220	138.3	124.5	13.8	11.1	92.8%	134.2	7.2%
6/1/17	1	381,500	2,201,220	138.0	122.8	15.2	12.4	91.5%	134.2	7.2%
6/1/17	1	381,400	2,201,220	137.5	122.2	15.3	12.5	91.1%	134.2	7.2%
6/1/17	1	381,300	2,201,220	139.5	123.4	16.1	13.0	92.0%	134.2	7.2%
6/1/17	2	381,650	2,201,220	137.4	124.2	13.2	10.6	92.5%	134.2	7.2%
6/1/17	2	381,550	2,201,220	137.5	124.1	13.4	10.8	92.5%	134.2	7.2%
6/1/17	2	381,450	2,201,220	137.5	124.0	13.5	10.9	92.4%	134.2	7.2%
6/1/17	2	381,350	2,201,220	135.3	122.2	13.1	10.7	91.1%	134.2	7.2%
6/1/17	2	381,250	2,201,220	136.2	123.3	12.9	10.5	91.9%	134.2	7.2%
6/5/17	3	381,800	2,201,200	140.5	129.4	11.1	8.6	96.4%	134.2	7.2%
6/5/17	3	381,700	2,201,200	137.1	126.1	11.0	8.7	94.0%	134.2	7.2%

Table 4

Nuclear Density Test Results - General Fill

Phase 10 - Cell 2 Liner Construction Documentation

Dane County - Rodefeld Landfill

Date	Lift	North	East	Wet Density	Dry Density	Moisture	Moisture %	Compact %	Modified Proctor	Optimum Moisture
6/5/17	3	381,600	2,201,200	137.2	125.0	12.2	9.8	93.1%	134.2	7.2%
6/5/17	3	381,500	2,201,200	134.0	123.3	10.6	8.6	91.9%	134.2	7.2%
6/5/17	3	381,400	2,201,200	135.6	124.2	11.4	9.2	92.5%	134.2	7.2%
6/5/17	3	381,300	2,201,200	136.2	125.3	10.9	8.7	93.4%	134.2	7.2%
6/5/17	4	381,350	2,201,200	134.8	121.8	13.1	10.7	90.8%	134.2	7.2%
6/5/17	4	381,450	2,201,200	136.9	124.4	12.5	10.0	92.7%	134.2	7.2%
6/5/17	4	381,550	2,201,200	136.9	121.3	15.6	12.8	90.4%	134.2	7.2%
6/5/17	4	381,650	2,201,200	134.6	121.1	13.5	11.2	90.2%	134.2	7.2%
6/5/17	4	381,750	2,201,200	135.1	121.8	13.2	10.9	90.8%	134.2	7.2%
6/5/17	5	381,300	2,201,200	135.9	118.8	17.1	14.4	90.3%	131.6	8.3%
6/5/17	5	381,400	2,201,200	137.6	120.1	17.5	14.6	91.3%	131.6	8.3%
6/5/17	5	381,500	2,201,200	134.4	121.5	13.0	10.7	92.3%	131.6	8.3%
6/5/17	5	381,600	2,201,200	136.3	120.2	16.0	13.3	91.3%	131.6	8.3%
6/5/17	5	381,700	2,201,200	134.4	118.9	15.5	13.0	90.3%	131.6	8.3%
6/6/17	6	381,350	2,201,200	135.7	118.7	17.0	14.3	90.2%	131.6	8.3%
6/6/17	6	381,450	2,201,200	136.4	121.1	15.3	12.6	92.0%	131.6	8.3%
6/6/17	6	381,550	2,201,200	136.2	122.8	13.3	10.9	93.3%	131.6	8.3%
6/6/17	6	381,650	2,201,200	135.2	122.2	13.0	10.6	92.9%	131.6	8.3%

Table 5
Nuclear Density Test Results - Clay Liner
Phase 10 - Cell 2 Liner Construction Documentation
Dane County - Rodefeld Landfill

Date	Lift #	Northing	Easting	Wet Density	Dry Density	Moisture	Moisture %	Compact %	Modified Proctor	Optimum Moisture	Samples
10/20/16	1	381,400	2,200,900	126.2	105.6	20.6	19.5	90.1%	117.2	14.1%	
10/20/16	1	381,500	2,200,900	125.8	105.8	20.0	18.9	90.3%	117.2	14.1%	T-1
10/20/16	1	381,600	2,200,900	126.3	106.0	20.3	19.2	90.4%	117.2	14.1%	
10/20/16	1	381,700	2,200,900	128.7	107.4	21.3	19.9	91.6%	117.2	14.1%	
10/20/16	1	381,800	2,200,900	128.3	108.7	19.6	18.0	92.8%	117.2	14.1%	
10/20/16	1	381,900	2,200,900	128.9	109.9	19.0	17.2	93.8%	117.2	14.1%	T-3
10/20/16	1	381,400	2,200,800	128.6	108.8	19.8	18.2	92.8%	117.2	14.1%	
10/20/16	1	381,500	2,200,800	127.5	108.8	18.7	17.2	92.9%	117.2	14.1%	
10/20/16	1	381,600	2,200,800	125.6	106.2	19.4	18.3	90.6%	117.2	14.1%	B-4
10/20/16	1	381,700	2,200,800	125.8	108.3	17.5	16.1	92.4%	117.2	14.1%	T-2
10/20/16	1	381,800	2,200,800	127.0	107.3	19.7	18.3	91.6%	117.2	14.1%	
10/20/16	1	381,900	2,200,800	128.8	108.9	20.0	18.3	92.9%	117.2	14.1%	
10/21/16	1	381,400	2,200,700	127.7	106.8	20.9	19.6	91.2%	117.2	14.1%	T-4
10/21/16	1	381,500	2,200,700	130.4	111.2	19.2	17.3	94.9%	117.2	14.1%	B-3
10/21/16	1	381,600	2,200,700	129.0	109.8	19.1	17.4	93.7%	117.2	14.1%	
10/21/16	1	381,700	2,200,700	129.4	108.8	20.6	18.9	92.9%	117.2	14.1%	
10/21/16	1	381,800	2,200,700	128.9	108.5	20.4	18.8	92.6%	117.2	14.1%	
10/21/16	1	381,900	2,200,700	125.4	106.7	18.8	17.6	91.0%	117.2	14.1%	
06/09/17	1	381,400	2,200,600	123.7	105.5	18.2	17.2	90.9%	116.1	13.7%	
06/09/17	1	381,500	2,200,600	123.9	105.4	18.4	17.5	90.8%	116.1	13.7%	T-5
06/09/17	1	381,600	2,200,600	126.4	107.1	19.3	18.0	92.2%	116.1	13.7%	
06/09/17	1	381,700	2,200,600	126.0	107.4	18.5	17.3	92.5%	116.1	13.7%	
06/09/17	1	381,800	2,200,600	126.1	107.7	18.4	17.1	92.8%	116.1	13.7%	
06/09/17	1	381,900	2,200,600	127.0	108.5	18.5	17.1	93.4%	116.1	13.7%	
04/25/17	2	381,350	2,200,850	126.1	107.4	18.8	17.5	91.6%	117.2	14.1%	T-6
04/25/17	2	381,450	2,200,850	123.8	106.0	17.8	16.8	90.4%	117.2	14.1%	
05/08/17	2	381,550	2,200,850	127.3	107.9	19.4	17.9	92.1%	117.2	14.1%	
05/08/17	2	381,650	2,200,850	127.8	107.0	20.9	19.5	91.3%	117.2	14.1%	
05/08/17	2	381,750	2,200,850	128.4	106.2	22.2	20.9	90.6%	117.2	14.1%	T-7
05/08/17	2	381,850	2,200,850	127.8	107.4	20.4	19.0	91.7%	117.2	14.1%	
05/10/17	2	381,950	2,200,850	128.2	108.8	19.4	17.8	92.9%	117.2	14.1%	B-6
05/10/17	2	381,350	2,200,750	126.8	106.1	20.7	19.5	90.5%	117.2	14.1%	
05/10/17	2	381,450	2,200,750	127.2	108.2	19.0	17.6	92.3%	117.2	14.1%	
05/10/17	2	381,550	2,200,750	126.0	107.3	18.7	17.4	91.6%	117.2	14.1%	T-8
05/10/17	2	381,650	2,200,750	128.3	108.0	20.2	18.7	92.2%	117.2	14.1%	
05/12/17	2	381,750	2,200,750	127.9	107.6	20.3	18.9	91.8%	117.2	14.1%	B-5
05/12/17	2	381,850	2,200,750	125.2	107.3	17.9	16.6	91.6%	117.2	14.1%	
06/08/17	2	381,950	2,200,750	125.4	107.1	18.3	17.1	91.4%	117.2	14.1%	
06/09/17	2	381,350	2,200,650	123.9	106.1	17.8	16.8	91.4%	116.1	13.7%	
06/09/17	2	381,450	2,200,650	127.7	109.1	18.6	17.1	94.0%	116.1	13.7%	
06/09/17	2	381,550	2,200,650	125.7	107.8	17.9	16.6	92.8%	116.1	13.7%	T-9
06/09/17	2	381,650	2,200,650	124.8	107.1	17.7	16.5	92.3%	116.1	13.7%	
06/09/17	2	381,750	2,200,650	127.8	108.6	19.2	17.7	93.5%	116.1	13.7%	
06/09/17	2	381,850	2,200,650	126.7	108.7	18.0	16.5	93.6%	116.1	13.7%	T-10
06/09/17	2	381,950	2,200,650	125.0	106.1	18.8	17.7	91.4%	116.1	13.7%	
06/10/17	3	381,400	2,200,900	126.8	107.6	19.2	17.8	92.6%	116.1	13.7%	
06/10/17	3	381,500	2,200,900	125.3	105.9	19.4	18.3	91.2%	116.1	13.7%	
06/10/17	3	381,600	2,200,900	124.4	106.1	18.3	17.2	91.4%	116.1	13.7%	
06/10/17	3	381,700	2,200,900	123.7	106.2	17.5	16.5	91.4%	116.1	13.7%	
06/10/17	3	381,800	2,200,900	126.7	107.6	19.1	17.8	92.6%	116.1	13.7%	T-15
06/10/17	3	381,900	2,200,900	125.7	107.3	18.4	17.1	92.4%	116.1	13.7%	B-8
06/06/17	3	381,400	2,200,800	123.3	105.7	17.6	16.7	91.0%	116.1	13.7%	
06/06/17	3	381,500	2,200,800	128.6	110.3	18.3	16.6	95.0%	116.1	13.7%	
06/06/17	3	381,600	2,200,800	126.6	107.8	18.8	17.5	92.9%	116.1	13.7%	T-13

Table 5
Nuclear Density Test Results - Clay Liner
Phase 10 - Cell 2 Liner Construction Documentation
Dane County - Rodefeld Landfill

Date	Lift #	Northing	Easting	Wet Density	Dry Density	Moisture	Moisture %	Compact %	Modified Proctor	Optimum Moisture	Samples
06/06/17	3	381,700	2,200,800	124.4	105.2	19.2	18.2	90.6%	116.1	13.7%	
06/06/17	3	381,800	2,200,800	126.3	108.4	17.9	16.5	93.4%	116.1	13.7%	
06/06/17	3	381,900	2,200,800	127.7	108.2	19.5	18.0	92.3%	117.2	14.1%	
06/01/17	3	381,400	2,200,700	127.6	107.1	20.5	19.1	91.4%	117.2	14.1%	T-11
06/01/17	3	381,500	2,200,700	124.6	107.0	17.6	16.5	91.3%	117.2	14.1%	
06/01/17	3	381,600	2,200,700	127.1	108.1	19.0	17.6	92.2%	117.2	14.1%	
06/01/17	3	381,700	2,200,700	125.6	107.1	18.6	17.3	91.3%	117.2	14.1%	B-7
06/01/17	3	381,800	2,200,700	126.8	108.1	18.7	17.3	92.3%	117.2	14.1%	
06/08/17	3	381,900	2,200,700	126.2	106.0	20.2	19.1	91.3%	116.1	13.7%	
06/06/17	3	381,400	2,200,600	126.0	107.3	18.7	17.4	92.4%	116.1	13.7%	T-12
06/06/17	3	381,500	2,200,600	127.5	109.2	18.3	16.7	94.1%	116.1	13.7%	
06/06/17	3	381,600	2,200,600	126.0	107.1	18.8	17.6	92.3%	116.1	13.7%	
06/06/17	3	381,700	2,200,600	124.5	107.4	17.1	16.0	92.5%	116.1	13.7%	
06/06/17	3	381,800	2,200,600	126.3	108.9	17.3	15.9	93.8%	116.1	13.7%	T-14
06/06/17	3	381,900	2,200,600	124.9	107.4	17.5	16.3	92.5%	116.1	13.7%	
06/10/17	4	381,350	2,200,850	126.2	105.5	20.7	19.6	90.9%	116.1	13.7%	
06/10/17	4	381,450	2,200,850	125.9	107.5	18.4	17.1	92.6%	116.1	13.7%	
06/10/17	4	381,550	2,200,850	125.0	104.6	20.4	19.5	90.1%	116.1	13.7%	T-20
06/10/17	4	381,650	2,200,850	126.8	107.6	19.2	17.8	92.7%	116.1	13.7%	
06/10/17	4	381,750	2,200,850	125.2	106.1	19.0	17.9	91.4%	116.1	13.7%	
06/10/17	4	381,850	2,200,850	126.3	104.6	21.7	20.7	90.1%	116.1	13.7%	
06/10/17	4	381,950	2,200,850	125.4	106.0	19.4	18.3	91.3%	116.1	13.7%	T-19
06/08/17	4	381,350	2,200,750	128.7	107.3	21.3	19.9	92.5%	116.1	13.7%	
06/08/17	4	381,450	2,200,750	123.9	105.7	18.3	17.3	91.0%	116.1	13.7%	T-17
06/08/17	4	381,550	2,200,750	126.0	107.2	18.7	17.5	92.4%	116.1	13.7%	
06/08/17	4	381,650	2,200,750	124.7	105.5	19.2	18.2	90.9%	116.1	13.7%	
06/08/17	4	381,750	2,200,750	123.8	105.0	18.7	17.8	90.5%	116.1	13.7%	B-9 / T-16
06/08/17	4	381,850	2,200,750	124.9	107.3	17.6	16.4	92.4%	116.1	13.7%	
06/08/17	4	381,950	2,200,750	125.7	106.9	18.8	17.6	92.1%	116.1	13.7%	
06/10/17	4	381,350	2,200,650	123.6	106.5	17.1	16.1	91.7%	116.1	13.7%	
06/10/17	4	381,450	2,200,650	125.1	107.1	18.0	16.8	92.3%	116.1	13.7%	
06/10/17	4	381,550	2,200,650	123.2	106.2	17.0	16.0	91.5%	116.1	13.7%	T-18
06/10/17	4	381,650	2,200,650	125.1	107.1	18.0	16.8	92.2%	116.1	13.7%	
06/10/17	4	381,750	2,200,650	126.2	108.2	18.1	16.7	93.2%	116.1	13.7%	
06/10/17	4	381,850	2,200,650	122.8	106.1	16.8	15.8	91.3%	116.1	13.7%	
06/10/17	4	381,950	2,200,650	125.1	107.2	17.9	16.7	92.4%	116.1	13.7%	

Table 6
Nuclear Density Test Results - Clay Liner Transition Area
Phase 10 - Cell 2 Liner Construction Documentation
Dane County - Rodefeld Landfill

Date	Lift #	Northing	Easting	Wet Density	Dry Density	Moisture	Moisture %	Compact %	Modified Proctor	Optimum Moisture
6/12/17	5	381,900	2,200,630	125.3	107.1	18.2	17.0	92.2%	116.1	13.7%
6/12/17	5	381,800	2,200,630	126.0	106.9	19.1	17.9	92.1%	116.1	13.7%
6/12/17	5	381,700	2,200,630	127.1	108.5	18.6	17.2	93.5%	116.1	13.7%
6/12/17	5	381,600	2,200,630	124.1	104.7	19.5	18.6	90.2%	116.1	13.7%
6/12/17	5	381,500	2,200,630	124.9	105.0	19.8	18.9	90.5%	116.1	13.7%
6/12/17	5	381,400	2,200,630	125.5	106.9	18.6	17.4	92.1%	116.1	13.7%
6/13/17	6	381,950	2,200,630	128.0	110.1	17.9	16.3	94.8%	116.1	13.7%
6/13/17	6	381,850	2,200,630	126.9	109.4	17.5	16.0	94.2%	116.1	13.7%
6/13/17	6	381,750	2,200,630	126.5	108.3	18.3	16.9	93.2%	116.1	13.7%
6/13/17	6	381,650	2,200,630	130.0	111.3	18.6	16.7	95.9%	116.1	13.7%
6/13/17	6	381,550	2,200,630	129.1	111.4	17.7	15.9	95.9%	116.1	13.7%
6/13/17	6	381,450	2,200,630	128.9	111.2	17.7	15.9	95.8%	116.1	13.7%
6/13/17	6	381,350	2,200,630	129.7	111.3	18.4	16.6	95.9%	116.1	13.7%
6/13/17	7	381,900	2,200,620	121.8	104.6	17.2	16.5	90.1%	116.1	13.7%
6/13/17	7	381,800	2,200,620	128.1	110.2	17.9	16.2	94.9%	116.1	13.7%
6/13/17	7	381,700	2,200,620	128.5	108.7	19.8	18.3	93.6%	116.1	13.7%
6/13/17	7	381,600	2,200,620	126.1	107.1	19.0	17.7	92.2%	116.1	13.7%
6/13/17	7	381,500	2,200,620	125.2	105.8	19.4	18.3	91.2%	116.1	13.7%
6/13/17	7	381,400	2,200,620	124.6	106.2	18.4	17.4	91.5%	116.1	13.7%
6/15/17	8	381,950	2,200,610	123.4	106.4	17.0	15.9	91.7%	116.1	13.7%
6/15/17	8	381,850	2,200,610	127.0	107.7	19.3	17.9	92.8%	116.1	13.7%
6/15/17	8	381,750	2,200,610	128.8	109.7	19.1	17.4	94.5%	116.1	13.7%
6/15/17	8	381,650	2,200,610	122.7	105.4	17.3	16.4	90.8%	116.1	13.7%
6/15/17	8	381,550	2,200,610	126.2	106.2	20.0	18.9	91.5%	116.1	13.7%
6/15/17	8	381,450	2,200,610	127.0	106.7	20.3	19.0	91.9%	116.1	13.7%
6/15/17	8	381,350	2,200,610	125.4	105.0	20.4	19.4	90.4%	116.1	13.7%
6/15/17	9	381,900	2,200,600	125.9	105.2	20.7	19.7	90.6%	116.1	13.7%
6/15/17	9	381,800	2,200,600	127.0	108.3	18.7	17.3	93.2%	116.1	13.7%
6/15/17	9	381,700	2,200,600	125.9	105.2	20.8	19.7	90.6%	116.1	13.7%
6/15/17	9	381,600	2,200,600	125.5	105.3	20.2	19.2	90.7%	116.1	13.7%
6/15/17	9	381,500	2,200,600	126.4	106.0	20.4	19.2	91.3%	116.1	13.7%
6/15/17	9	381,400	2,200,600	124.5	104.9	19.6	18.6	90.4%	116.1	13.7%
6/15/17	10	381,950	2,200,600	126.8	106.6	20.2	19.0	91.8%	116.1	13.7%
6/15/17	10	381,850	2,200,600	124.1	105.3	18.7	17.8	90.7%	116.1	13.7%
6/15/17	10	381,750	2,200,600	126.2	107.9	18.4	17.0	92.9%	116.1	13.7%
6/15/17	10	381,650	2,200,600	124.5	106.0	18.5	17.5	91.3%	116.1	13.7%
6/15/17	10	381,550	2,200,600	127.3	107.8	19.5	18.1	92.8%	116.1	13.7%
6/15/17	10	381,450	2,200,600	126.0	105.7	20.3	19.2	91.0%	116.1	13.7%
6/15/17	10	381,350	2,200,600	127.0	106.9	20.1	18.8	92.1%	116.1	13.7%
6/15/17	11	381,500	2,200,600	124.1	107.3	16.9	15.7	92.4%	116.1	13.7%
6/15/17	11	381,400	2,200,600	127.1	107.6	19.5	18.1	92.7%	116.1	13.7%

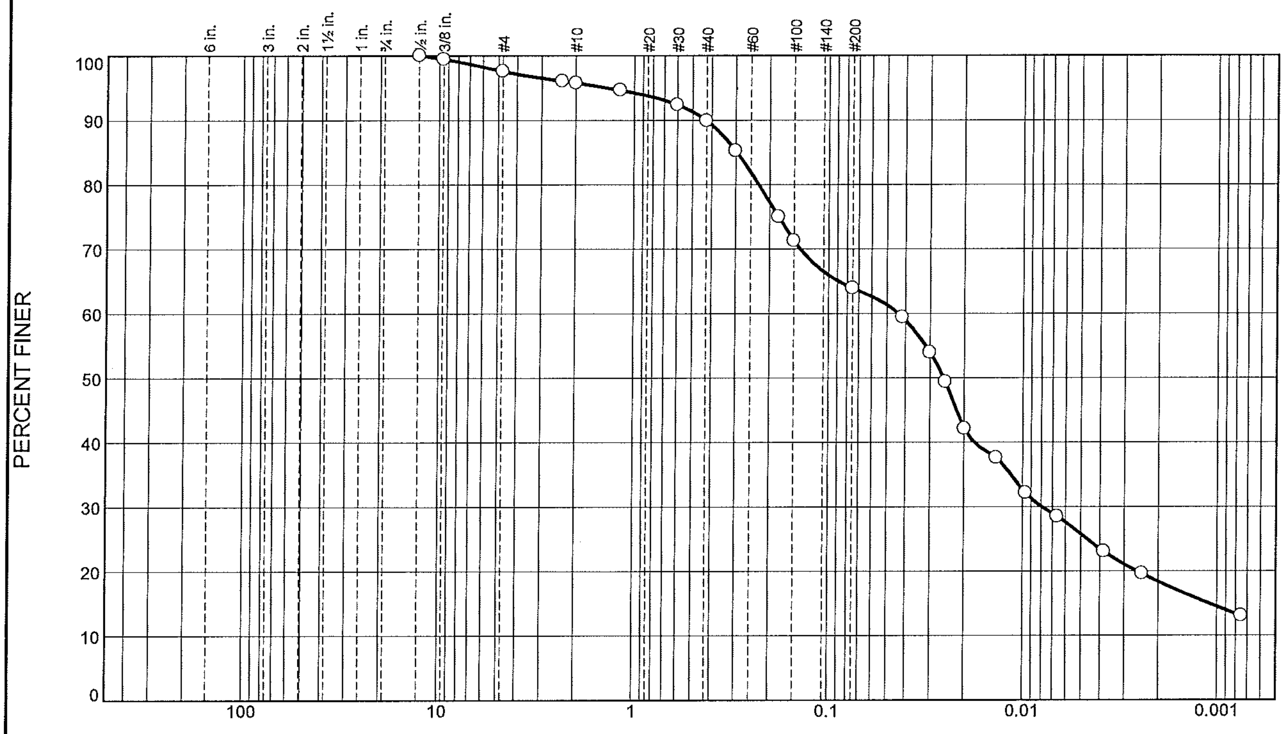
Table 7
Nuclear Density Test Results - Vertical Expansion Area
Phase 10 - Cell 2 Liner Construction Documentation
Dane County - Rodefeld Landfill

Date	Lift	Northing	Easting	Wet Density	Dry Density	Moisture	Moisture %	Compact %	Modified Proctor	Optimum Moisture
5/30/17	1	381,900	2,200,500	125.4	106.0	19.4	18.3	90.4%	117.2	14.1%
5/30/17	1	381,800	2,200,500	127.9	108.5	19.4	17.9	92.6%	117.2	14.1%
5/30/17	1	381,700	2,200,500	128.0	108.7	19.3	17.8	92.7%	117.2	14.1%
5/30/17	1	381,600	2,200,500	127.9	108.7	19.1	17.6	92.7%	117.2	14.1%
5/30/17	1	381,500	2,200,500	129.1	110.6	18.6	16.8	94.4%	117.2	14.1%
5/30/17	1	381,400	2,200,500	125.6	107.2	18.5	17.2	91.4%	117.2	14.1%
6/16/17	1	381,900	2,200,570	130.6	108.8	21.9	20.1	93.7%	116.1	13.7%
6/16/17	1	381,800	2,200,570	127.3	106.8	20.5	19.2	92.1%	116.1	13.7%
6/15/17	1	381,700	2,200,570	128.2	108.4	19.8	18.3	93.3%	116.1	13.7%
6/15/17	1	381,600	2,200,570	129.5	107.9	21.6	20.0	92.9%	116.1	13.7%
6/16/17	1	381,500	2,200,570	129.0	108.1	20.9	19.3	93.1%	116.1	13.7%
6/15/17	1	381,400	2,200,570	128.1	108.2	19.9	18.4	93.2%	116.1	13.7%
6/8/17	2	381,350	2,200,450	127.6	107.2	20.4	19.0	92.3%	116.1	13.7%
6/8/17	2	381,450	2,200,450	127.0	107.7	19.3	17.9	92.8%	116.1	13.7%
6/8/17	2	381,550	2,200,450	127.1	108.0	19.1	17.7	93.0%	116.1	13.7%
6/8/17	2	381,650	2,200,450	126.5	106.0	20.5	19.3	91.3%	116.1	13.7%
6/8/17	2	381,750	2,200,450	127.5	107.9	19.7	18.2	92.9%	116.1	13.7%
6/8/17	2	381,850	2,200,450	127.1	106.7	20.4	19.1	91.9%	116.1	13.7%
6/8/17	2	381,950	2,200,450	126.1	107.4	18.6	17.3	92.5%	116.1	13.7%
6/16/17	2	381,350	2,200,550	124.7	105.5	19.2	18.2	90.9%	116.1	13.7%
6/16/17	2	381,450	2,200,550	128.8	108.0	20.8	19.2	93.1%	116.1	13.7%
6/16/17	2	381,550	2,200,550	126.3	105.6	20.7	19.6	90.9%	116.1	13.7%
6/16/17	2	381,650	2,200,550	126.2	108.3	17.9	16.5	93.3%	116.1	13.7%
6/16/17	2	381,750	2,200,550	126.5	107.5	19.0	17.7	92.6%	116.1	13.7%
6/16/17	2	381,850	2,200,550	126.2	106.0	20.2	19.1	91.3%	116.1	13.7%
6/16/17	2	381,950	2,200,550	131.3	112.6	18.6	16.5	97.0%	116.1	13.7%

PHASE 10 – CELL 1
LINER CONSTRUCTION
CLAY LABORATORY TEST RESULTS
(CONSTRUCTED IN 2015)

CLAY LINER SHELBY TUBE SAMPLE
LABORATORY TEST RESULTS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.4	1.8	5.9	26.0	38.1	25.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2	100.0		
3/8	99.4		
#4	97.6		
#8	96.0		
#10	95.8		
#16	94.6		
#30	92.4		
#40	89.9		
#50	85.2		
#80	75.0		
#100	71.3		
#200	63.9		

* (no specification provided)

Material Description

Brown Lean Clay, Some Sand, Trace Gravel

Atterberg Limits

PL= 20 LL= 36 PI= 16

Coefficients

D_{90}= 0.4292 D_{85}= 0.2966 D_{60}= 0.0436
D_{50}= 0.0255 D_{30}= 0.0080 D_{15}= 0.0011
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(8)

Remarks

Location: 382,100N/2,200,700E
Sample Number: B-1, Lift 1

Date: 9/18/15

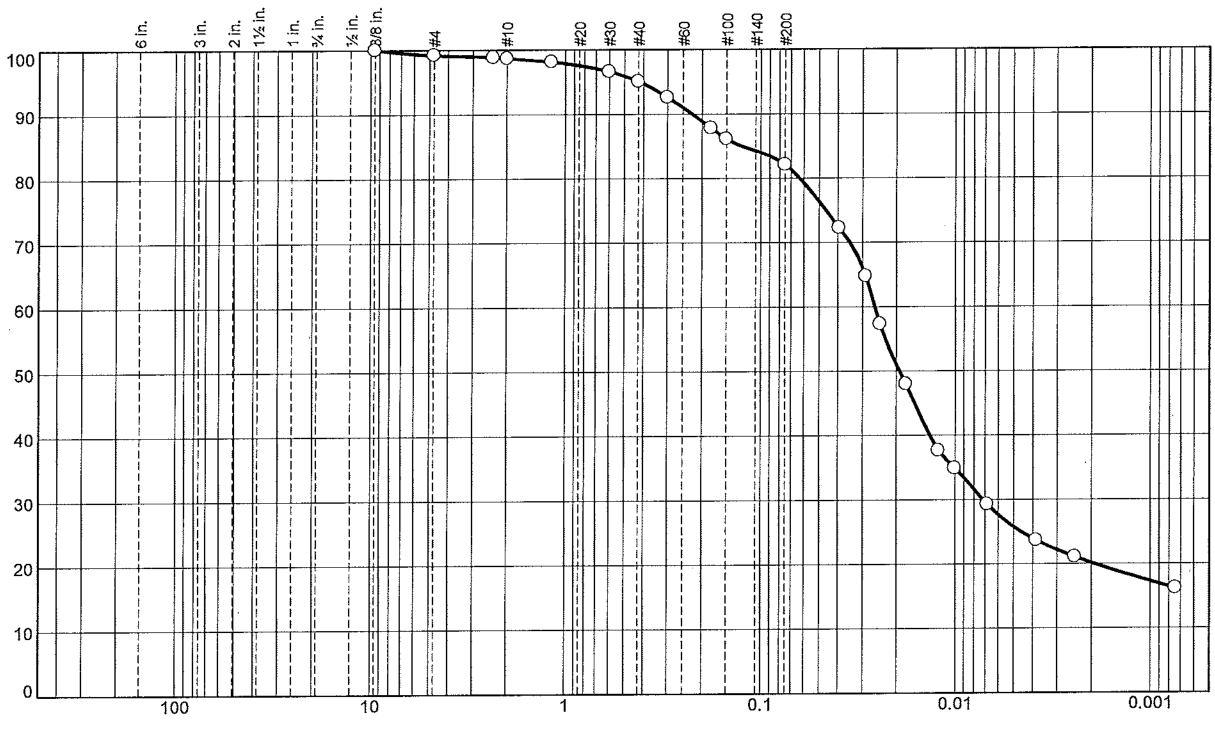
CGC,Inc.

Client: Dane County Public Works
Project: Dane County Landfill

Project No: C15337 **Figure**

Tested By: DRW **Checked By:** DAS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	0.5	3.6	13.0	56.3	25.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.2		
#8	98.8		
#10	98.7		
#16	98.1		
#30	96.6		
#40	95.1		
#50	92.6		
#80	87.8		
#100	86.1		
#200	82.1		

* (no specification provided)

Material Description

Brown Lean Clay, Some Sand, Trace Gravel

Atterberg Limits

PL= 20 LL= 35 PI= 15

Coefficients

D_{90}= 0.2253 D_{85}= 0.1259 D_{60}= 0.0259
D_{50}= 0.0193 D_{30}= 0.0072 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(12)

Remarks

Location: 382,600N/2,200,700E
Sample Number: B-2, Lift 1

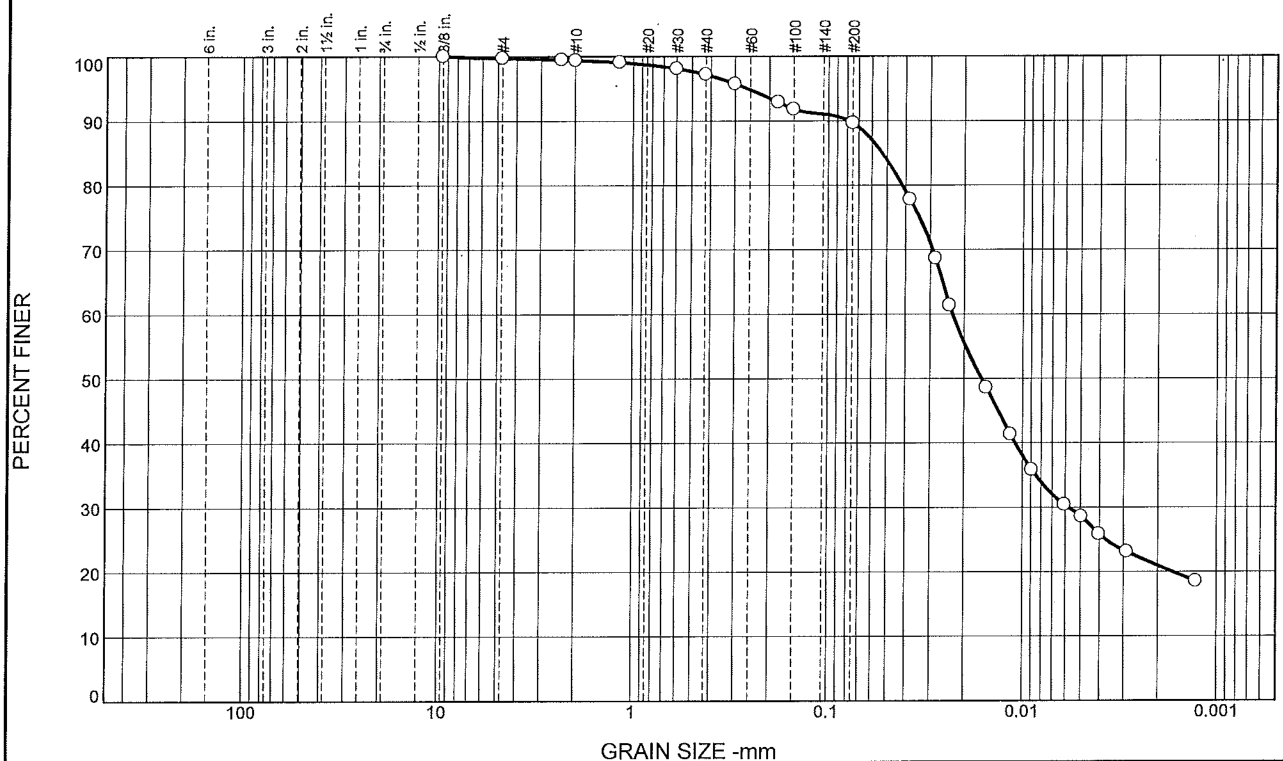
Date: 9/18/15

CGC,Inc.

Client: Dane County Public Works
Project: Dane County Landfill
Project No: C15337 **Figure**

Tested By: DRW **Checked By:** DAS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	0.3	2.2	7.6	61.0	28.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.7		
#8	99.5		
#10	99.4		
#16	99.1		
#30	98.1		
#40	97.2		
#50	95.7		
#80	92.9		
#100	91.8		
#200	89.6		

* (no specification provided)

Material Description

Brown Lean Clay, Little Sand, Trace Gravel

Atterberg Limits

PL= 21 LL= 36 PI= 15

Coefficients

D_{90}= 0.0788 D_{85}= 0.0532 D_{60}= 0.0229
D_{50}= 0.0162 D_{30}= 0.0058 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(14)

Remarks

Location: 382,450N/2,200,650E
Sample Number: B-3, Lift 2

Date: 9/18/15

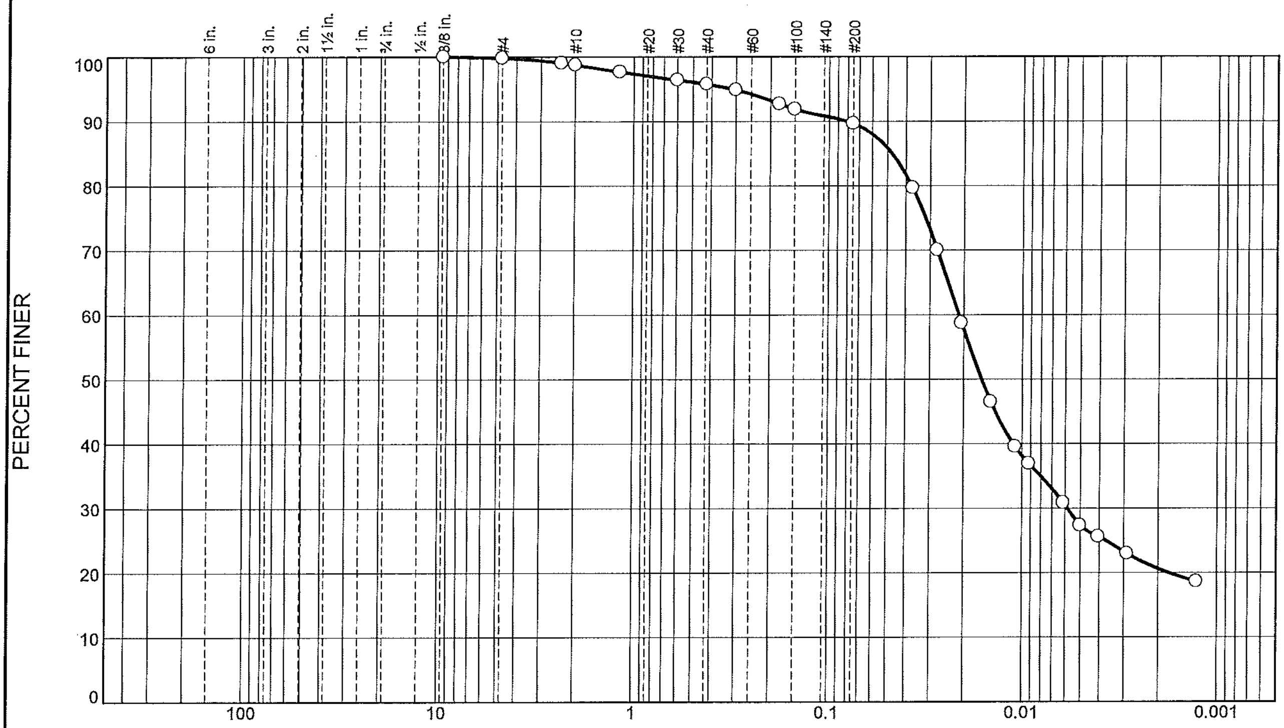
CGC, Inc.

Client: Dane County Public Works
Project: Dane County Landfill

Project No: C15337 **Figure**

Tested By: DRW **Checked By:** DAS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	1.1	3.0	6.1	62.3	27.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.8		
#8	99.0		
#10	98.7		
#16	97.7		
#30	96.4		
#40	95.7		
#50	94.8		
#80	92.7		
#100	91.8		
#200	89.6		

* (no specification provided)

Material Description

Brown Lean Clay, Little Sand, Trace Gravel

Atterberg Limits

PL= 21 LL= 37 PI= 16

Coefficients

D_{90}= 0.0816 D_{85}= 0.0474 D_{60}= 0.0213
D_{50}= 0.0162 D_{30}= 0.0059 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(15)

Remarks

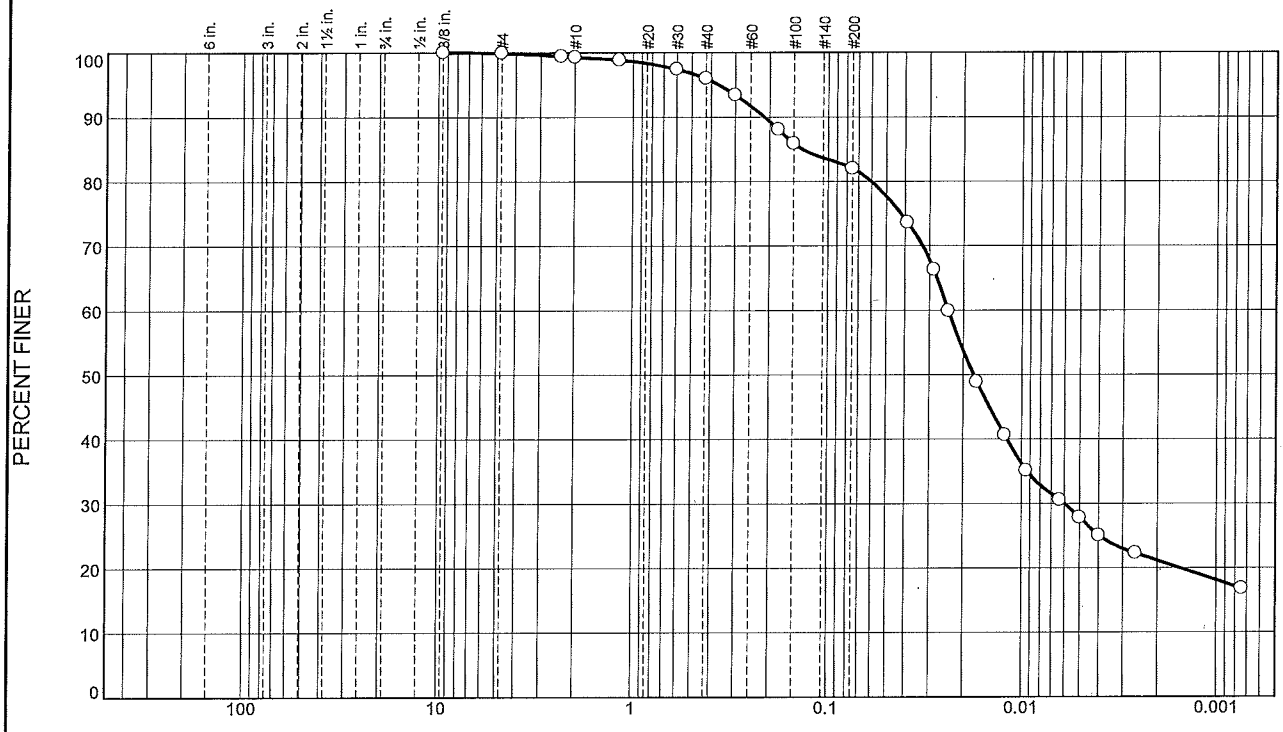
Location: 382,050N/2,200,650E
Sample Number: B-4, Lift 2
Date: 9/18/15

CGC,Inc.

Client: Dane County Public Works
Project: Dane County Landfill
Project No: C15337 **Figure**

Tested By: DRW **Checked By:** DAS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.6	3.3	14.0	54.2	27.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	99.9		
#8	99.4		
#10	99.3		
#16	98.9		
#30	97.4		
#40	96.0		
#50	93.4		
#80	88.0		
#100	85.9		
#200	82.0		

* (no specification provided)

Material Description

Brown Lean Clay, Some Sand, Trace Gravel

Atterberg Limits

PL= 21 LL= 37 PI= 16

Coefficients

D_{90}= 0.2131 D_{85}= 0.1361 D_{60}= 0.0240
D_{50}= 0.0177 D_{30}= 0.0060 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(13)

Remarks

Location: 382,400N/2,200,700E
Sample Number: B-5, Lift 3

Date: 9/18/15

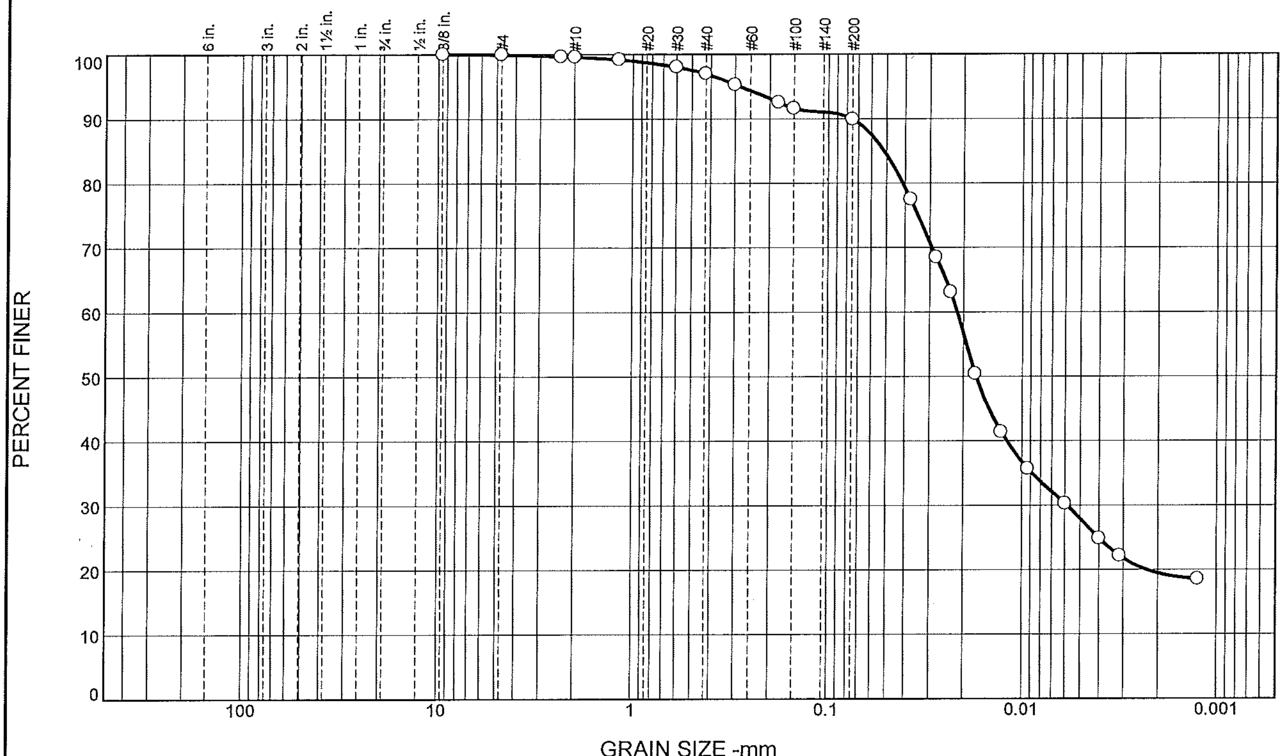
CGC, Inc.

Client: Dane County Public Works
Project: Dane County Landfill

Project No: C15337 **Figure**

Tested By: DRW **Checked By:** DAS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.5	2.5	7.1	62.0	27.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	100.0		
#8	99.6		
#10	99.5		
#16	99.1		
#30	98.0		
#40	97.0		
#50	95.3		
#80	92.5		
#100	91.6		
#200	89.9		

* (no specification provided)

Material Description

Brown Lean Clay, Little Sand

Atterberg Limits

PL= 20 LL= 38 PI= 18

Coefficients

D_{90}= 0.0761 D_{85}= 0.0516 D_{60}= 0.0216
D_{50}= 0.0172 D_{30}= 0.0059 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(16)

Remarks

Location: 382,000N/2,200,800E
Sample Number: B-6, Lift 3

Date: 9/21/15

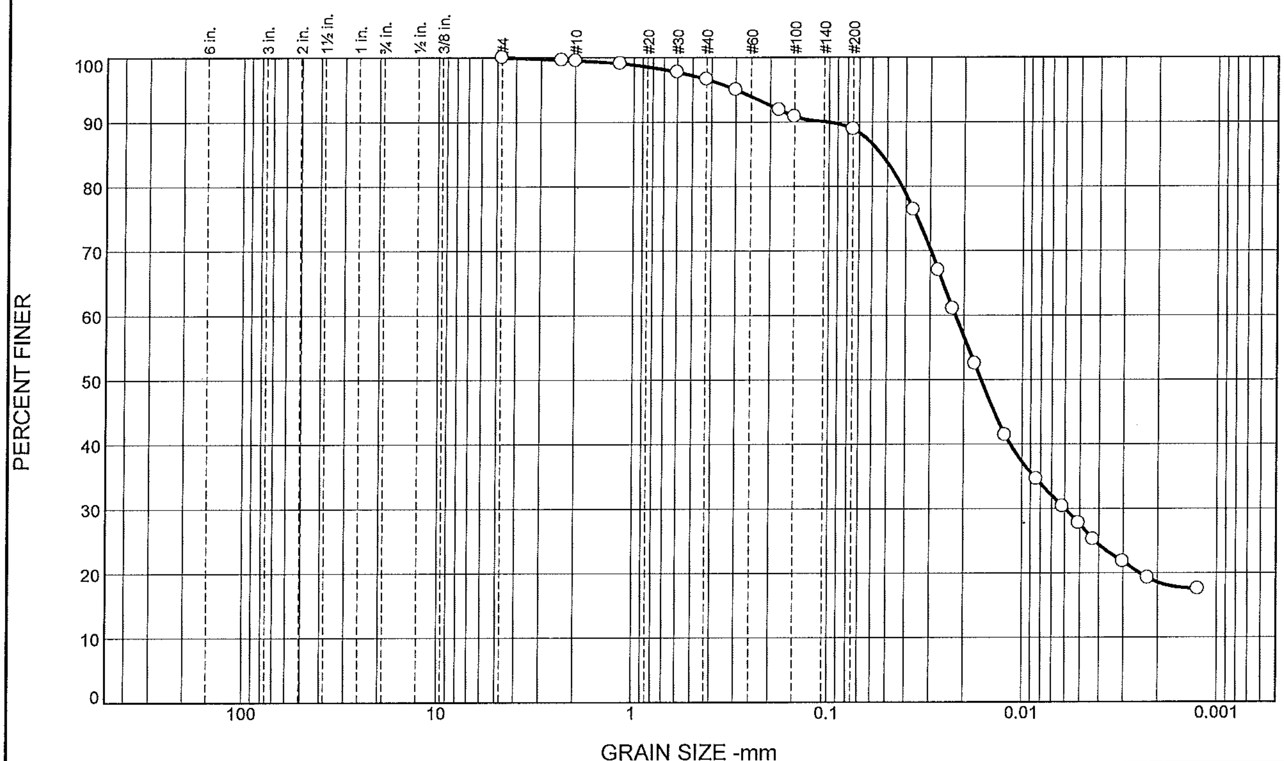
CGC,Inc.

Client: Dane County Public Works
Project: Dane County Landfill

Project No: C15337 **Figure**

Tested By: DRW **Checked By:** DAS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.5	2.9	7.7	61.4	27.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.6		
#10	99.5		
#16	99.1		
#30	97.7		
#40	96.6		
#50	95.0		
#80	91.9		
#100	90.8		
#200	88.9		

* (no specification provided)

Material Description

Brown Lean Clay, Little Sand

Atterberg Limits

PL= 20 LL= 40 PI= 20

Coefficients

D_{90}= 0.1025 D_{85}= 0.0538 D_{60}= 0.0222
D_{50}= 0.0163 D_{30}= 0.0060 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(18)

Remarks

Location: 382,650N/2,200,650E
Sample Number: B-7, Lift 4

Date: 9/21/15

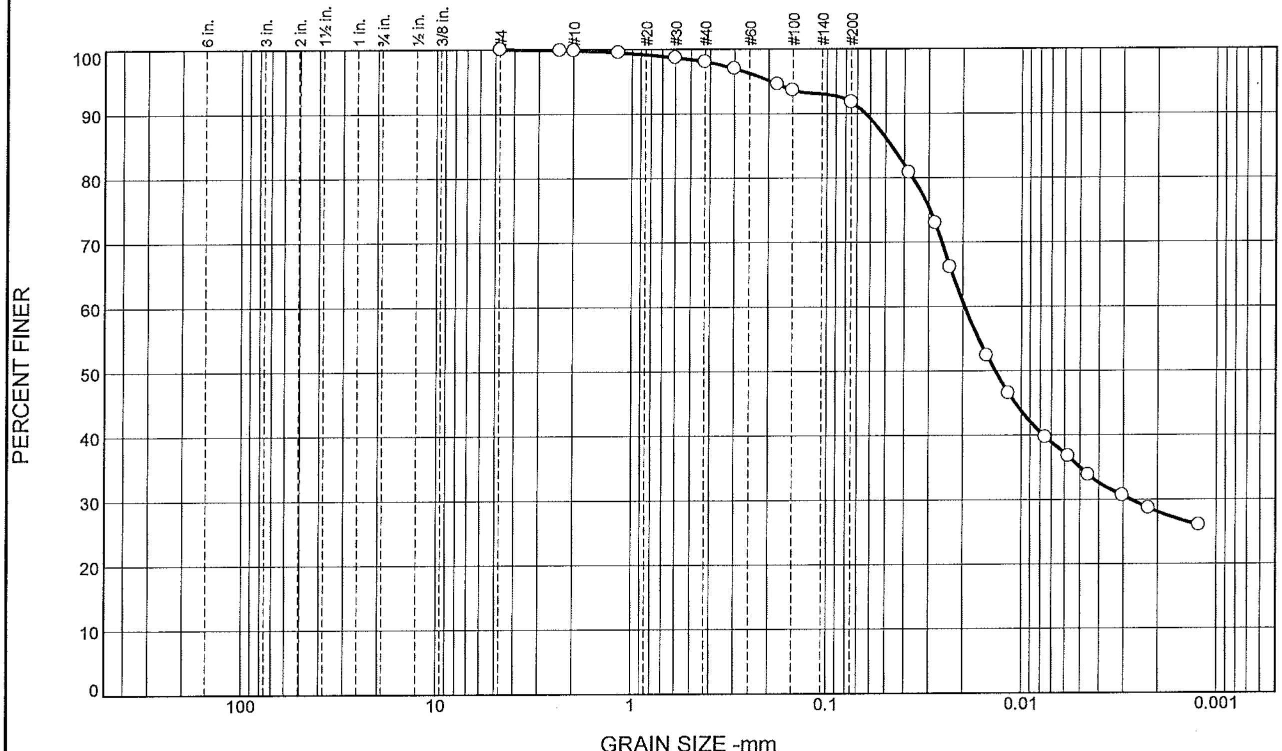
CGC, Inc.

Client: Dane County Public Works
Project: Dane County Landfill

Project No: C15337 **Figure**

Tested By: DRW **Checked By:** DAS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	1.8	6.3	56.7	35.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#10	99.8		
#16	99.5		
#30	98.7		
#40	98.0		
#50	97.0		
#80	94.5		
#100	93.6		
#200	91.7		

* (no specification provided)

Material Description

Brown Lean Clay, Little Sand

Atterberg Limits

PL= 21 LL= 39 PI= 18

Coefficients

D_{90}= 0.0637 D_{85}= 0.0468 D_{60}= 0.0196
D_{50}= 0.0136 D_{30}= 0.0028 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(17)

Remarks

Location: 382,350N/2,200,850E
Sample Number: B-8, Lift 3

Date: 9/21/15

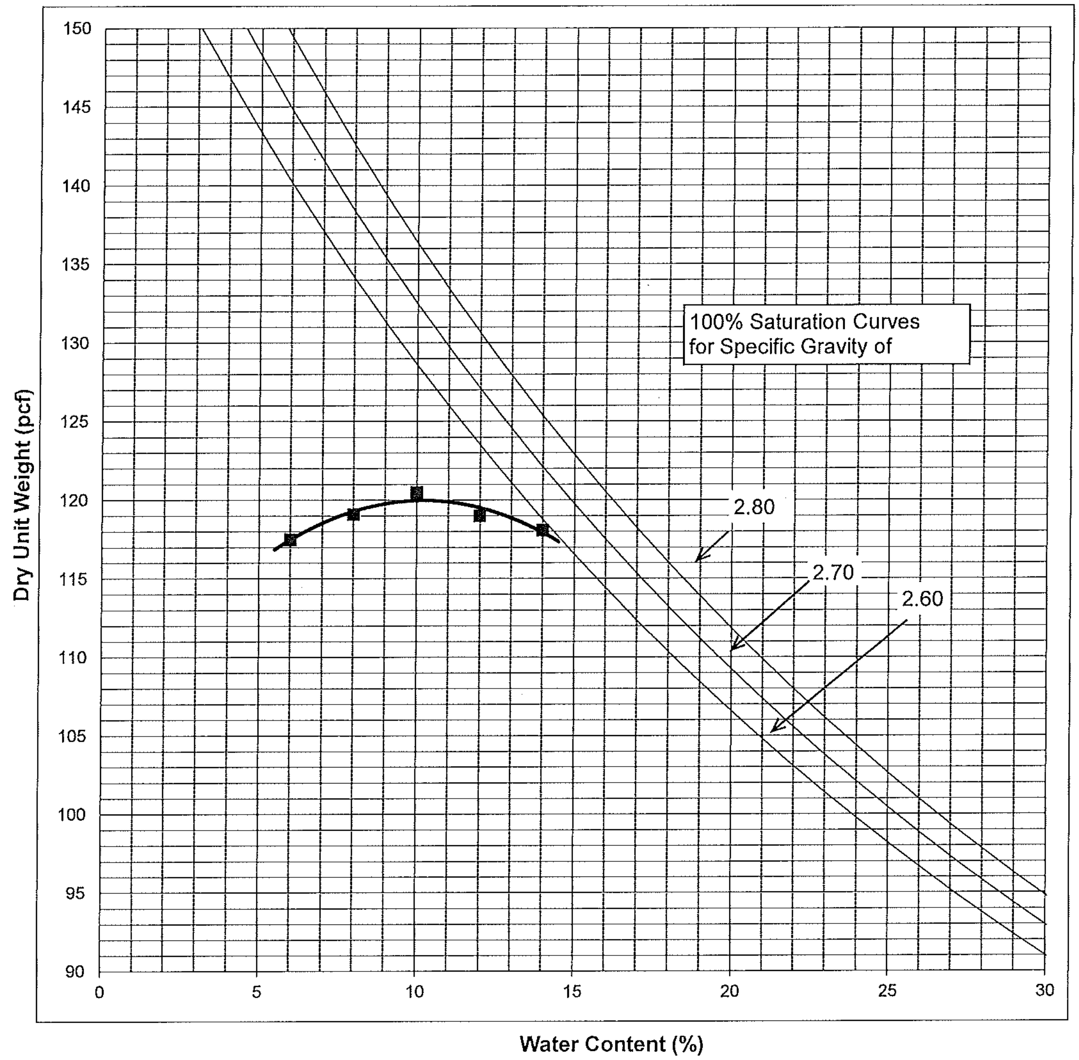
CGC, Inc.

Client: Dane County Public Works
Project: Dane County Landfill

Project No: C15337 **Figure**

Tested By: DRW **Checked By:** DAS

TEST REPORT



Specimen No.		Maximum Dry Unit Weight, pcf		Optimum Water Content, %	
B-1, Lift 1 at 382,100N/2,200,700E		120.5		10.0	
Specimen Description					
Brown Lean Clay, Some Sand, Trace Gravel					
Corrected Maximum Dry Unit Weight, pcf			Corrected Optimum Water Content, %		
see above			see above		
Test Method		Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity
ASTM D1557, Method A		36	20	16	2.7 (est.)
Preparation Method	USCS	% Gravel	% Sand	% Fines	% Oversize
Dry	CL	2.4	33.7	63.9	-

PROJECT: Dane County Landfill

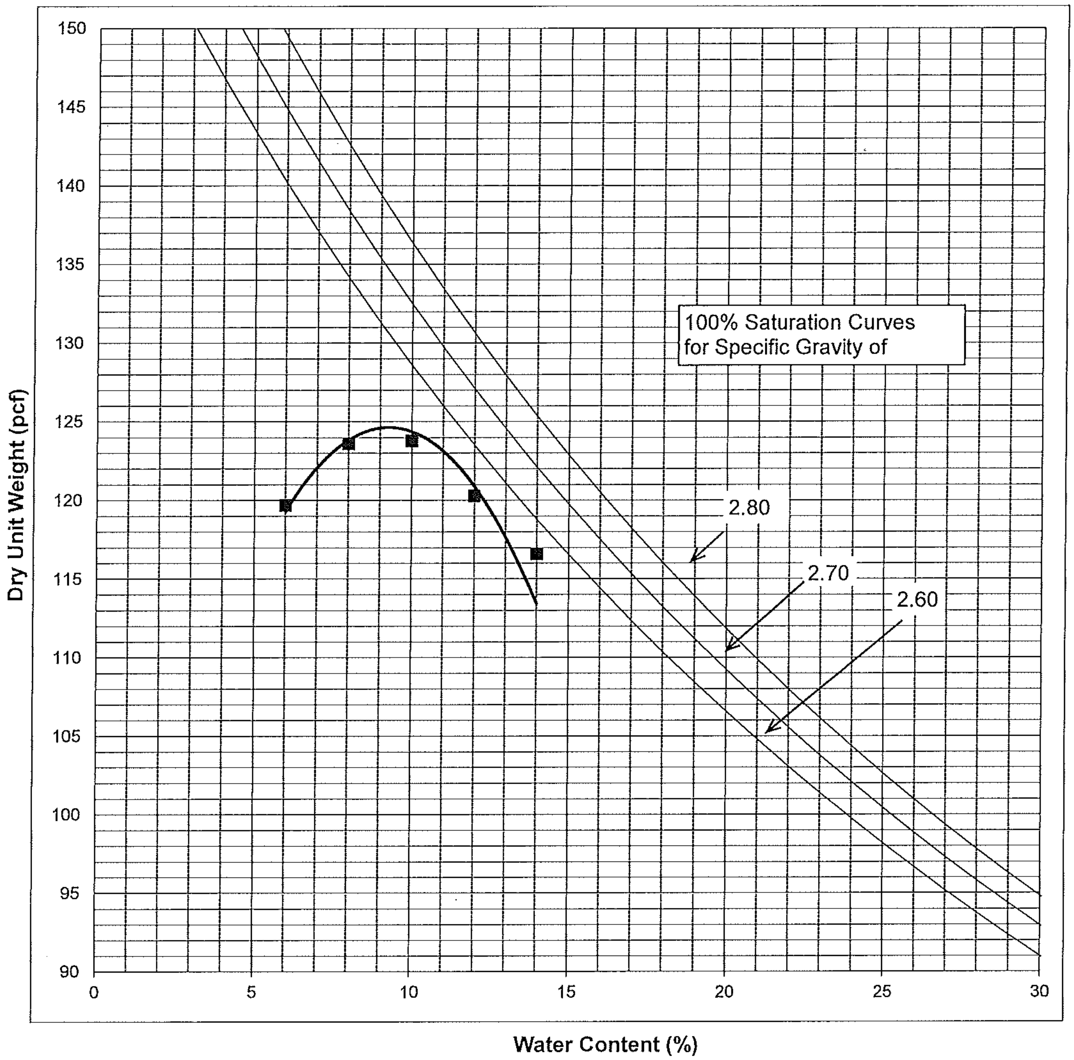
PROJECT NUMBER: C15337

LABORATORY COMPACTION TEST

CGC, Inc.	CHECKED BY: CJR	REVIEWED BY: KJS	18-Sep-15

File:15337.B1.xlsx

TEST REPORT



Specimen No.		Maximum Dry Unit Weight, pcf		Optimum Water Content, %	
B-2, Lift 1 at 382,600N/2,200,700E		125.0		9.0	
Specimen Description					
Brown Lean Clay, Some Sand, Trace Gravel					
Corrected Maximum Dry Unit Weight, pcf		Corrected Optimum Water Content, %			
see above		see above			
Test Method		Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity
ASTM D1557, Method A		35	20	15	2.7 (est.)
Preparation Method	USCS	% Gravel	% Sand	% Fines	% Oversize
Dry	CL	0.8	17.1	82.1	-

PROJECT: Dane County Landfill

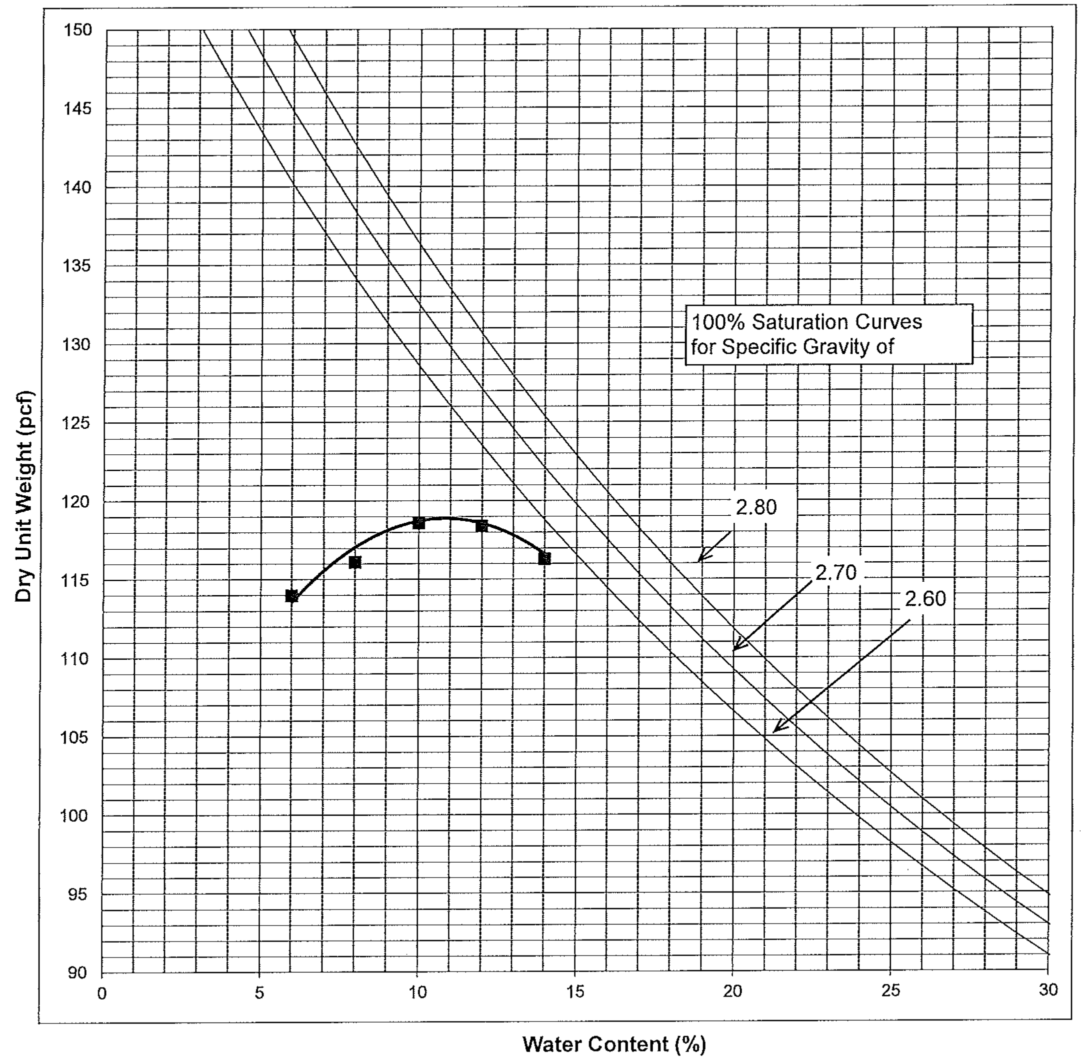
PROJECT NUMBER: C15337

LABORATORY COMPACTION TEST

CGC, Inc. CHECKED BY: CJR REVIEWED BY: KJS 18-Sep-15

File:15337.B2.xlsx

TEST REPORT



Specimen No.		Maximum Dry Unit Weight, pcf		Optimum Water Content, %	
B-3, Lift 1 at 382,450N/2,200,650E		119.0		11.0	
Specimen Description					
Brown Lean Clay, Little Sand, Trace Gravel					
Corrected Maximum Dry Unit Weight, pcf		Corrected Optimum Water Content, %			
see above		see above			
Test Method		Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity
ASTM D1557, Method A		36	21	15	2.7 (est.)
Preparation Method	USCS	% Gravel	% Sand	% Fines	% Oversize
Dry	CL	0.3	10.1	89.6	.

PROJECT: Dane County Landfill

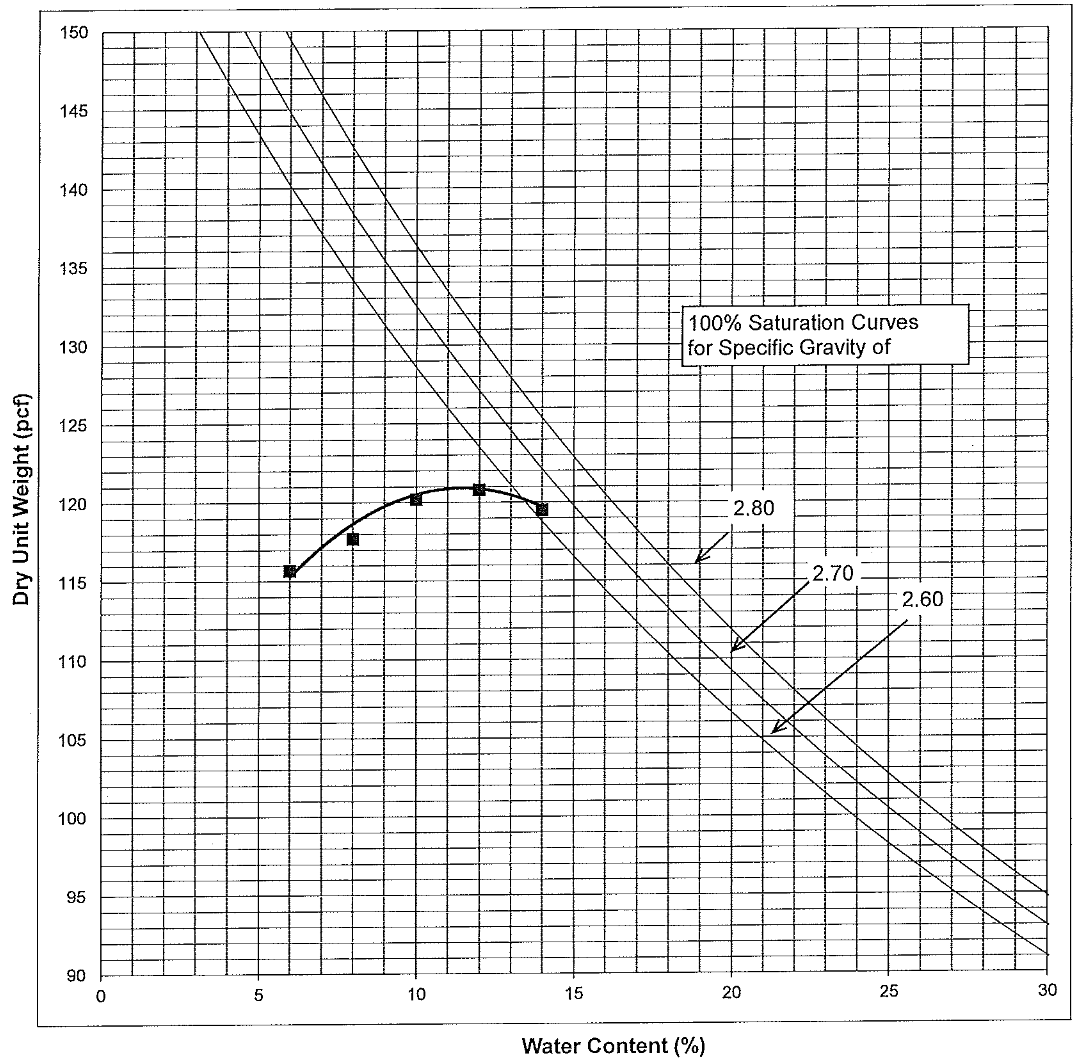
PROJECT NUMBER: C15337

LABORATORY COMPACTION TEST

CGC, Inc.	CHECKED BY: KRP	REVIEWED BY: KJS	18-Sep-15

File:15337.B3.xlsx

TEST REPORT



Specimen No.		Maximum Dry Unit Weight, pcf		Optimum Water Content, %	
B-4, Lift 2 at 382,050N/2,200,650E		121.0		11.5	
Specimen Description					
Brown Lean Clay, Little Sand, Trace Gravel					
Corrected Maximum Dry Unit Weight, pcf			Corrected Optimum Water Content, %		
see above			see above		
Test Method		Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity
ASTM D1557, Method A		37	21	16	2.7 (est.)
Preparation Method	USCS	% Gravel	% Sand	% Fines	% Oversize
Dry	CL	0.2	10.2	89.6	.

PROJECT: Dane County Landfill

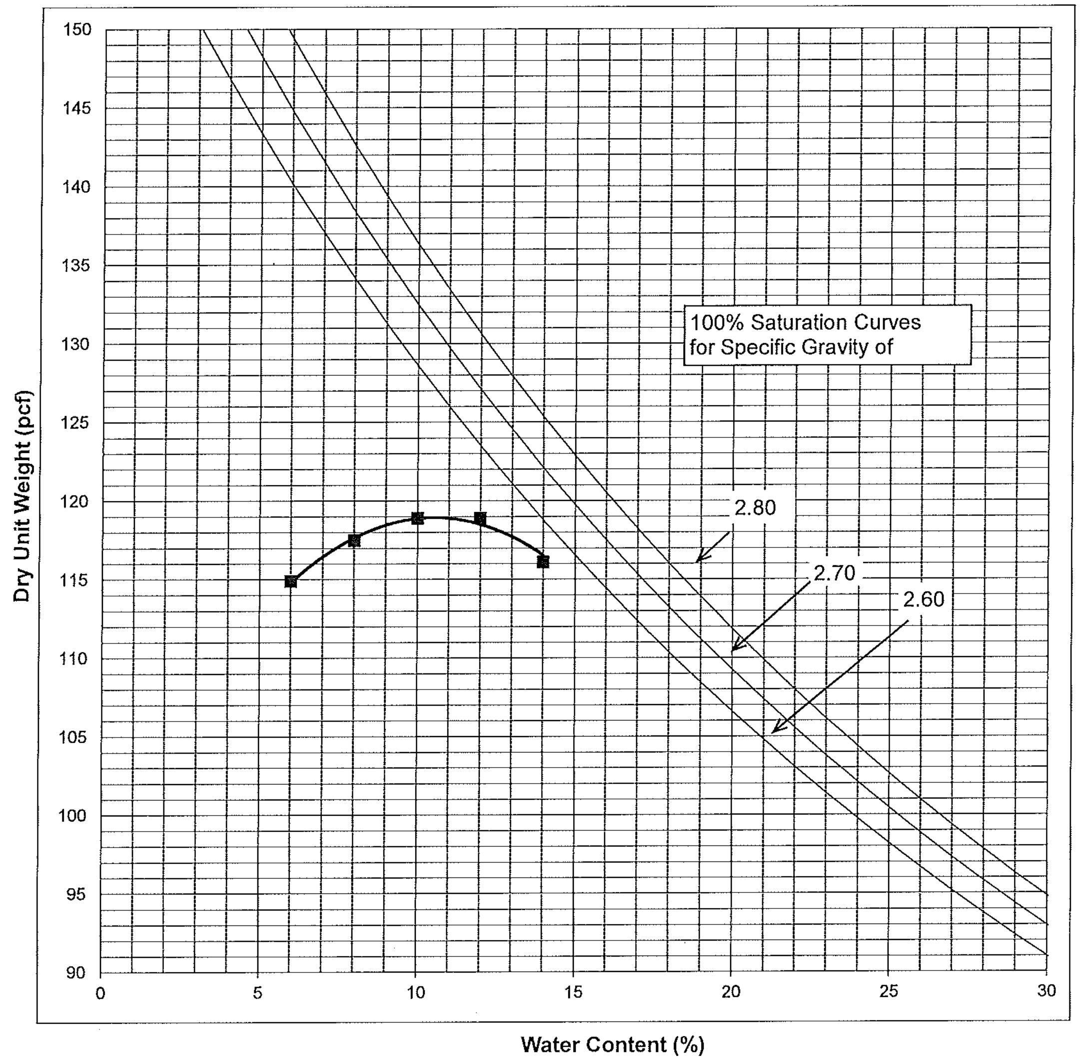
PROJECT NUMBER: C15337

LABORATORY COMPACTION TEST

CGC, Inc.	CHECKED BY: KRP	REVIEWED BY: KJS	18-Sep-15

File:15337.B4.xlsx

TEST REPORT



Specimen No.		Maximum Dry Unit Weight, pcf		Optimum Water Content, %	
B-5, Lift 3 at 382,400N/2,200,700E		119.0		11.0	
Specimen Description					
Brown Lean Clay, Some Sand, Trace Gravel					
Corrected Maximum Dry Unit Weight, pcf			Corrected Optimum Water Content, %		
see above			see above		
Test Method		Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity
ASTM D1557, Method A		37	21	16	2.7 (est.)
Preparation Method	USCS	% Gravel	% Sand	% Fines	% Oversize
Dry	CL	0.1	17.9	82.0	.

PROJECT: Dane County Landfill

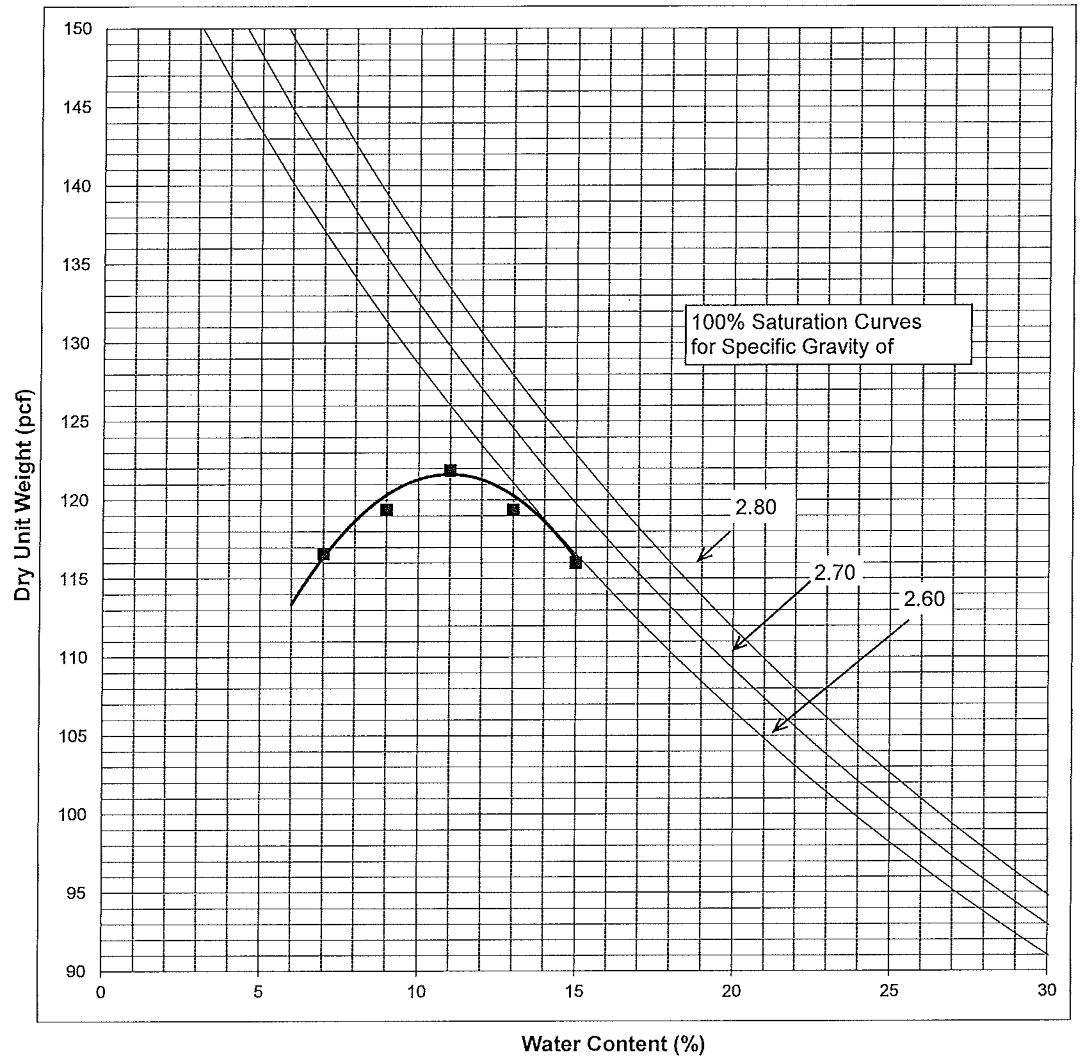
PROJECT NUMBER: C15337

LABORATORY COMPACTION TEST

CGC, Inc. CHECKED BY: CJR REVIEWED BY: KJS 18-Sep-15

File:15337.B5.xlsx

TEST REPORT



Specimen No.		Maximum Dry Unit Weight, pcf		Optimum Water Content, %	
B-6, Lift 3 at 382,000N/2,200,800E		122.0		11.0	
Specimen Description					
Brown Lean Clay, Little Sand					
Corrected Maximum Dry Unit Weight, pcf			Corrected Optimum Water Content, %		
see above			see above		
Test Method		Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity
ASTM D1557, Method A		38	20	18	2.7 (est.)
Preparation Method	USCS	% Gravel	% Sand	% Fines	% Oversize
Dry	CL	0.0	10.1	89.9	.

PROJECT: Dane County Landfill

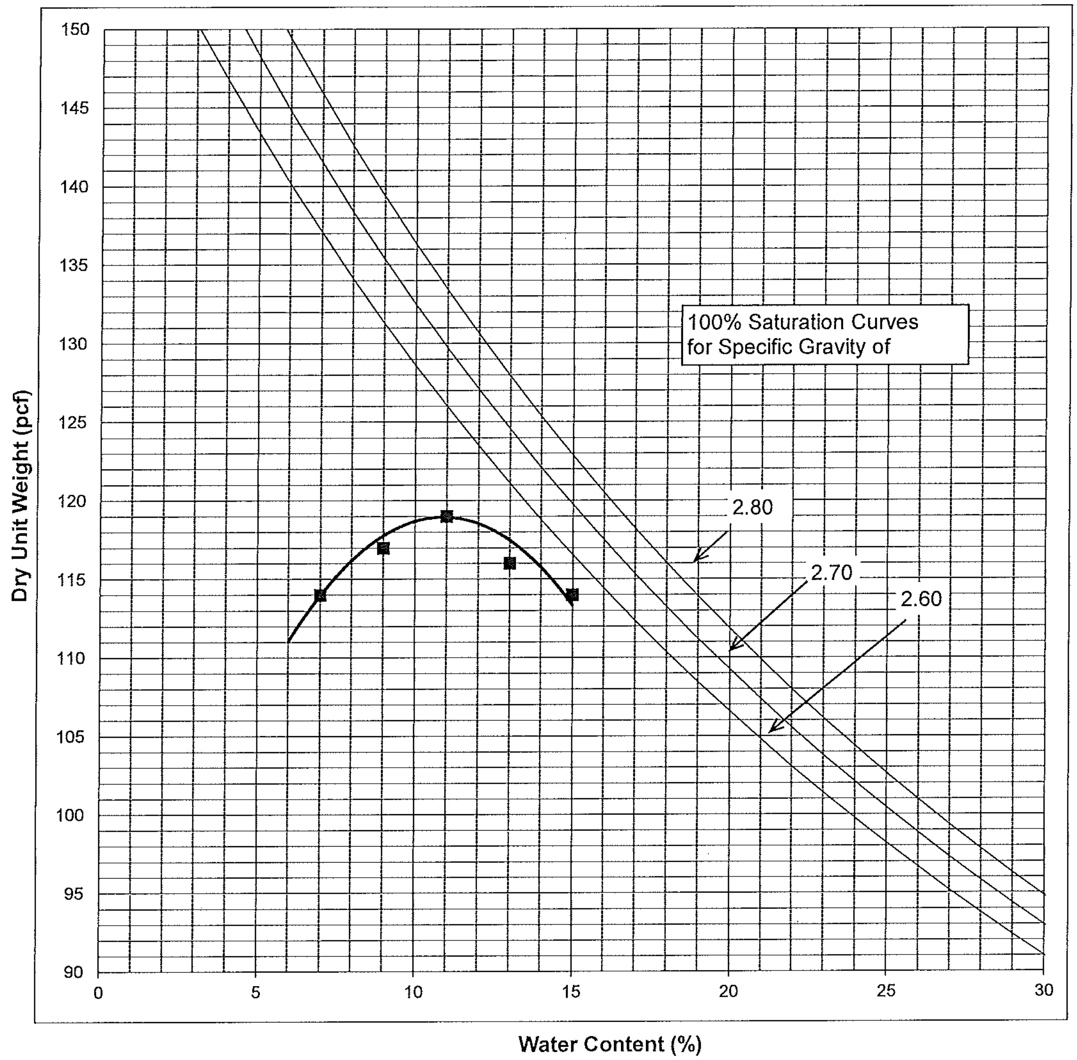
PROJECT NUMBER: C15337

LABORATORY COMPACTION TEST

CGC, Inc. | CHECKED BY: KRP | REVIEWED BY: KJS | 18-Sep-15

File:15337.B6.xlsx

TEST REPORT



Specimen No.	Maximum Dry Unit Weight, pcf	Optimum Water Content, %
B-7, Lift 4 at 382,650N/2,200,650E	119.0	11.0

Specimen Description
Brown Lean Clay, Little Sand

Corrected Maximum Dry Unit Weight, pcf	Corrected Optimum Water Content, %	
see above	see above	

Test Method	Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity
ASTM D1557, Method A	40	20	20	2.7 (est.)

Preparation Method	USCS	% Gravel	% Sand	% Fines	% Oversize
Dry	CL	0.0	11.1	88.9	.

PROJECT: Dane County Landfill

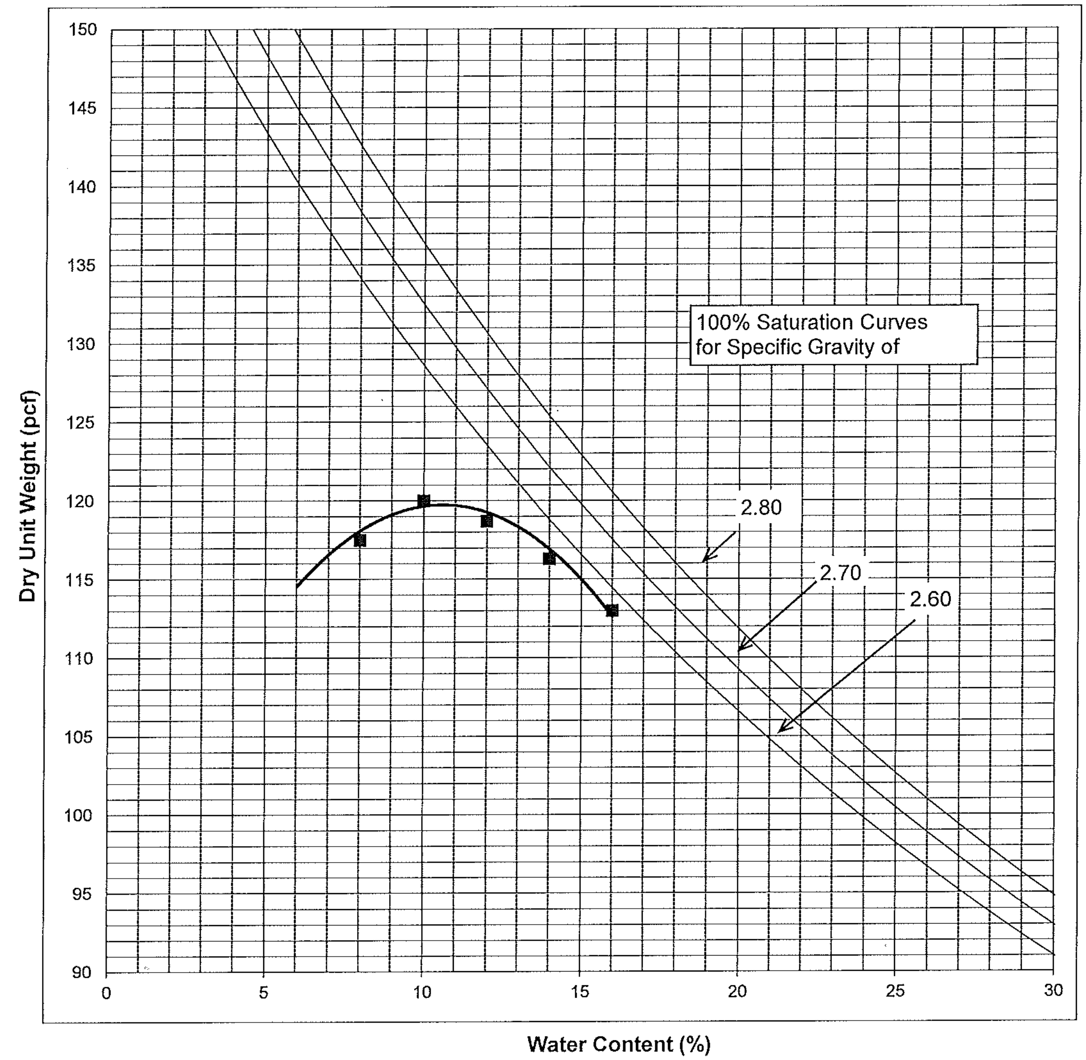
PROJECT NUMBER: C15337

LABORATORY COMPACTION TEST

CGC, Inc.	CHECKED BY: TMK	REVIEWED BY: KJS	18-Sep-15

File:15337.B7.xlsx

TEST REPORT



Specimen No.	Maximum Dry Unit Weight, pcf	Optimum Water Content, %
B-8, Lift 3 at 382,350N/2,200,850E	120.0	10.0

Specimen Description
Brown Lean Clay, Little Sand

Corrected Maximum Dry Unit Weight, pcf	Corrected Optimum Water Content, %	
see above	see above	

Test Method		Liquid Limit	Plastic Limit	Plasticity Index	Specific Gravity
ASTM D1557, Method A		39	21	18	2.7 (est.)
Preparation Method	USCS	% Gravel	% Sand	% Fines	% Oversize
Dry	CL	0.0	8.3	91.7	.

PROJECT: Dane County Landfill

PROJECT NUMBER: C15337

LABORATORY COMPACTION TEST

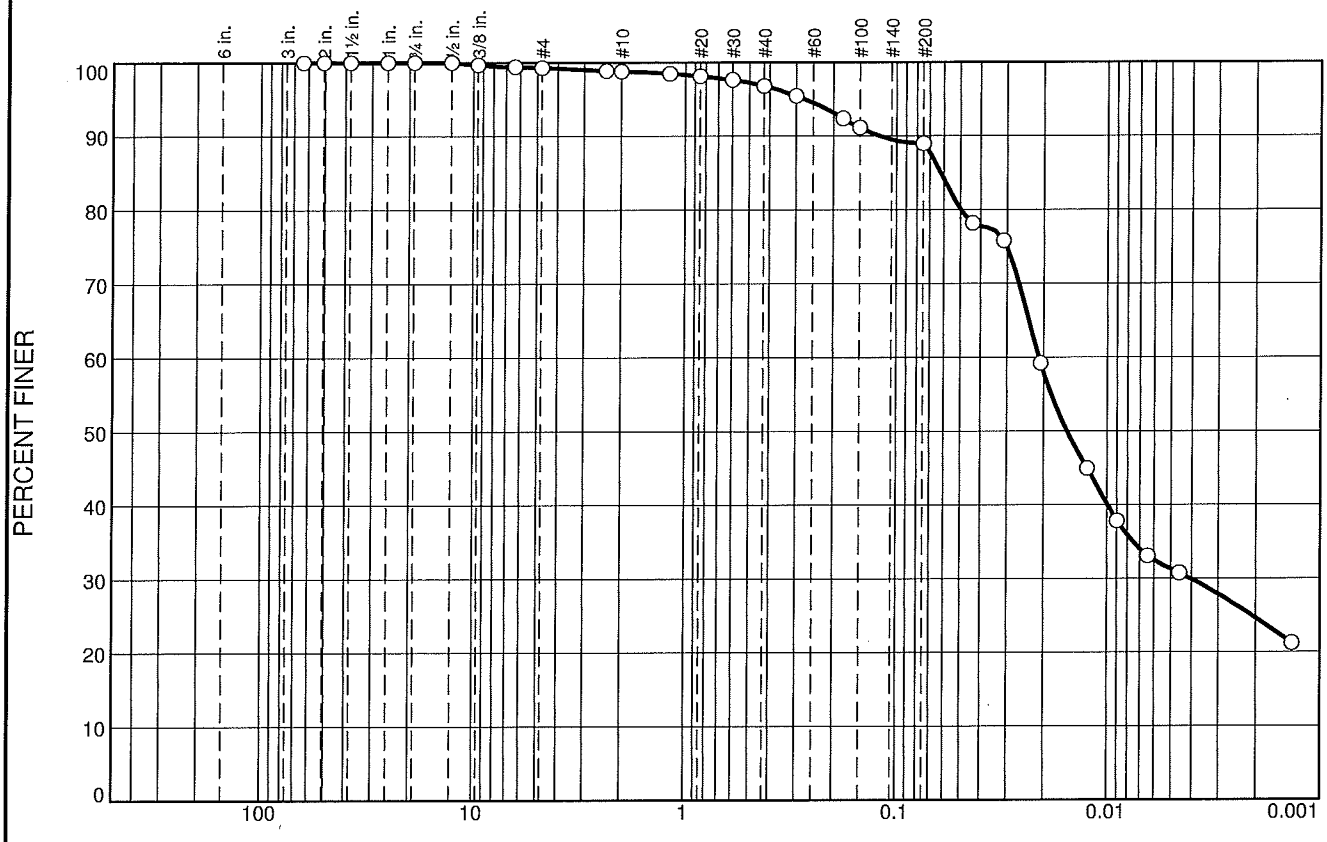
CGC, Inc.	CHECKED BY: TMK	REVIEWED BY: KJS	18-Sep-15

File:15337.B8.xlsx

PHASE 9 – CELL 1
LINER CONSTRUCTION
CLAY LABORATORY TEST RESULTS
(CONSTRUCTED IN 2014)

CLAY LINER BULK SAMPLE AND SHELBY TUBE SAMPLE
LABORATORY TEST RESULTS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	0.5	2.0	7.8	57.7	31.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	99.7		
.25	99.4		
#4	99.3		
#8	98.9		
#10	98.8		
#16	98.5		
#20	98.1		
#30	97.6		
#40	96.8		
#50	95.4		
#80	92.4		
#100	91.1		
#200	89.0		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 22 LL= 37 PI= 15

Coefficients

D_{90}= 0.1207 D_{85}= 0.0620 D_{60}= 0.0211
D_{50}= 0.0155 D_{30}= 0.0041 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(14)

Remarks

Source of Sample: Clay Stockpile
Sample Number: Sample #1

Date: 06-19-14

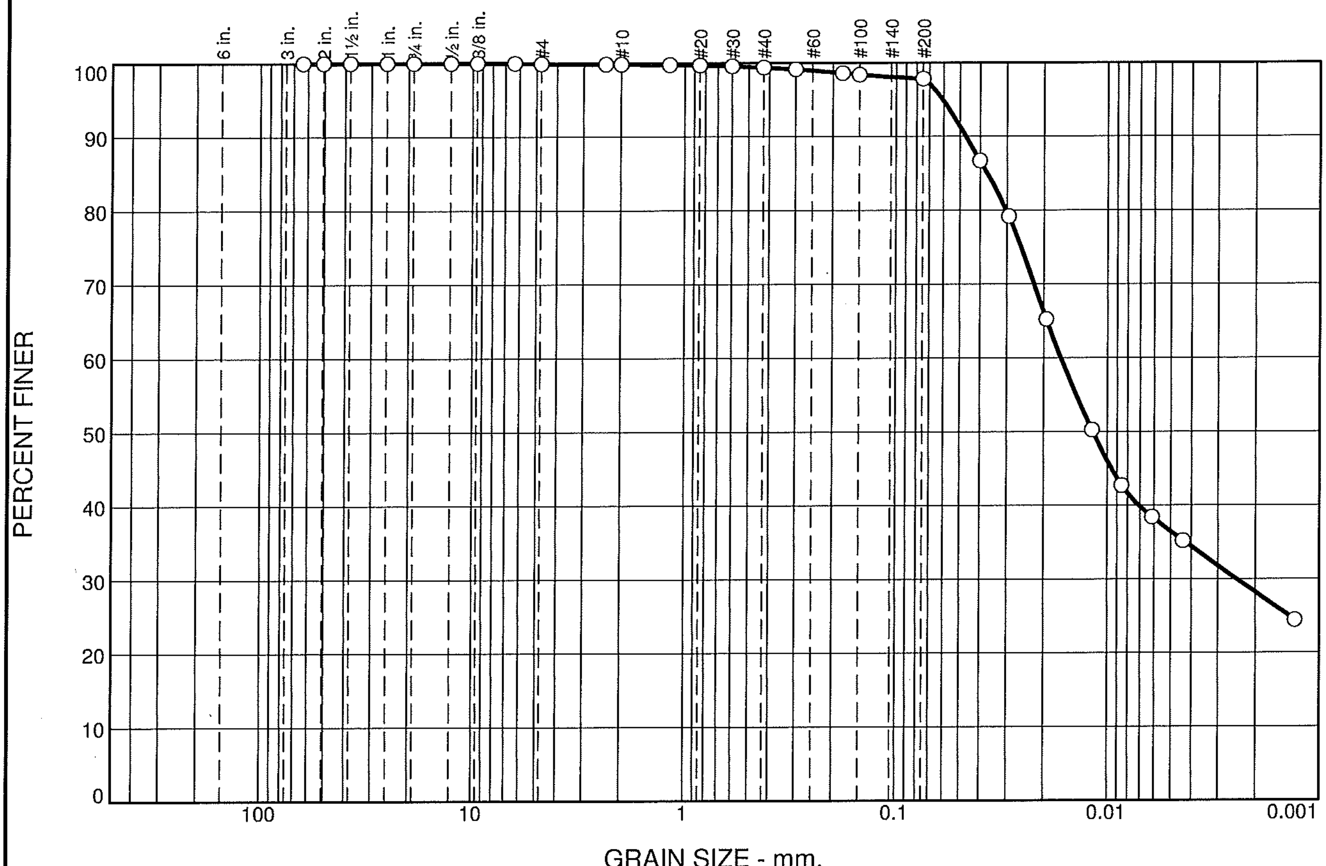
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld

Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.1	0.4	1.6	61.3	36.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	99.9		
#8	99.8		
#10	99.8		
#16	99.8		
#20	99.7		
#30	99.5		
#40	99.4		
#50	99.1		
#80	98.6		
#100	98.4		
#200	97.8		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 23 LL= 43 PI= 20

Coefficients

D_{90}= 0.0469 D_{85}= 0.0372 D_{60}= 0.0166
D_{50}= 0.0117 D_{30}= 0.0025 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(22)

Remarks

Source of Sample: Clay Stockpile
Sample Number: Sample #2

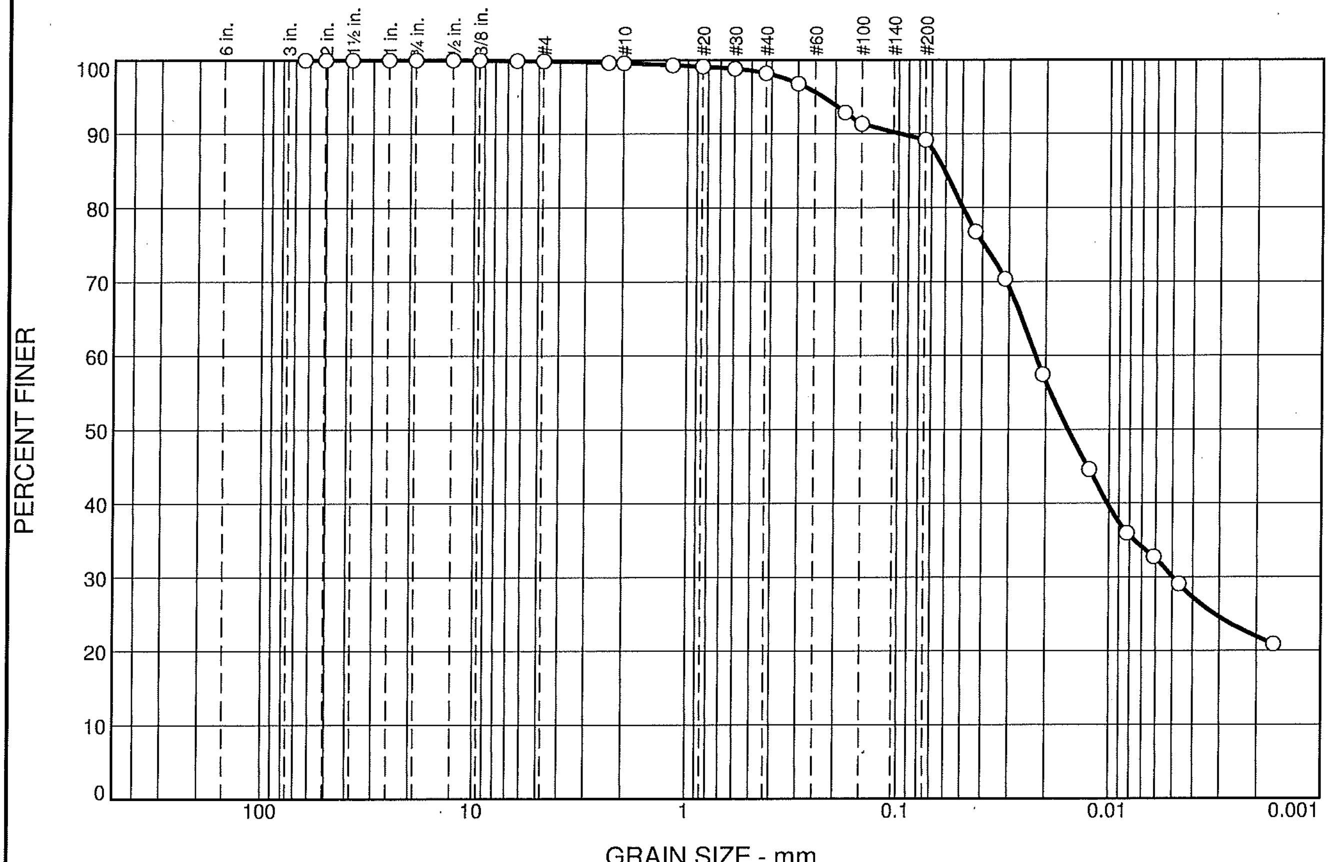
Date: 07-07-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.3	1.4	9.0	59.1	30.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	99.9		
#4	99.9		
#8	99.6		
#10	99.6		
#16	99.3		
#20	99.1		
#30	98.8		
#40	98.2		
#50	96.8		
#80	92.9		
#100	91.3		
#200	89.2		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 21 LL= 40 PI= 19

Coefficients

D_{90}= 0.0979 D_{85}= 0.0605 D_{60}= 0.0224
D_{50}= 0.0157 D_{30}= 0.0050 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(17)

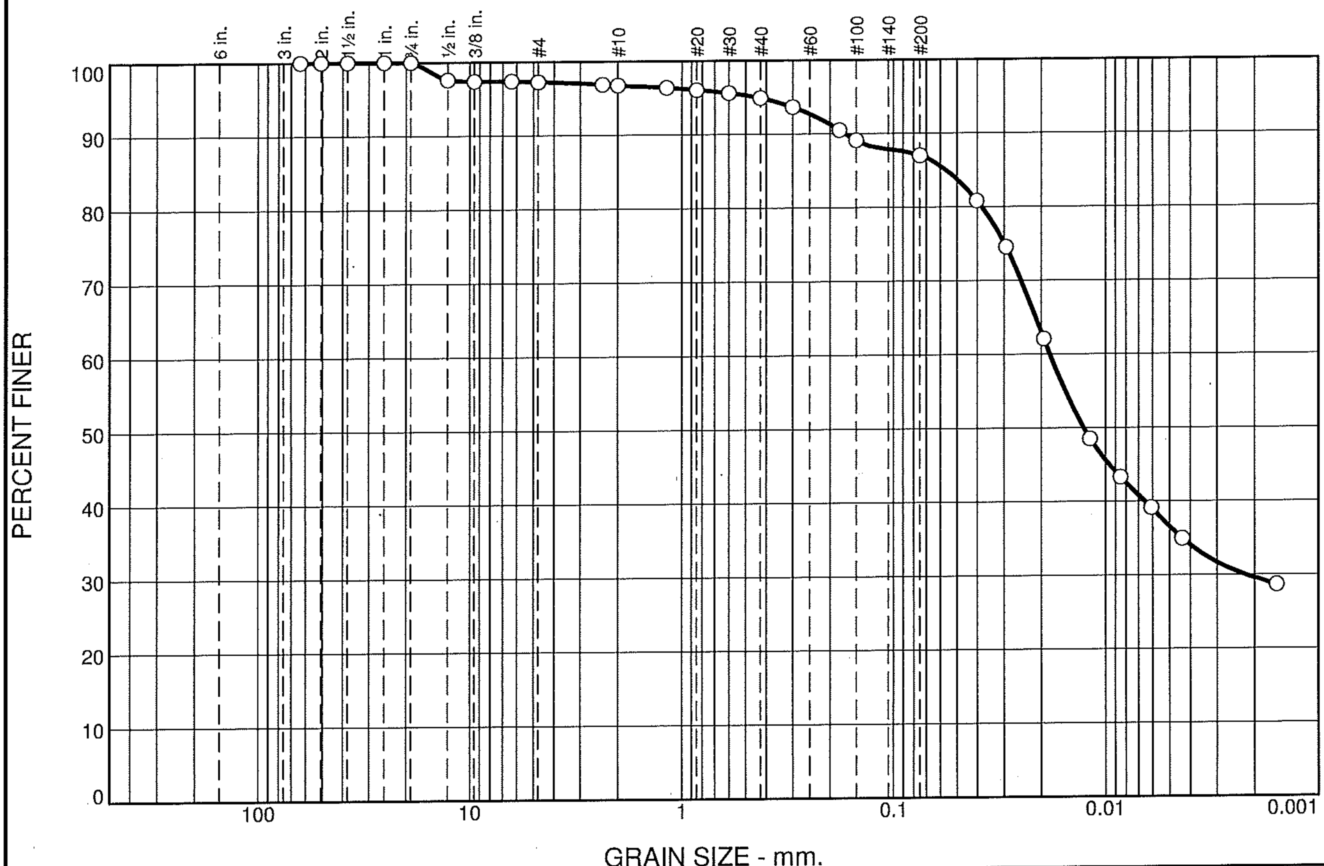
Remarks

Source of Sample: Clay Stockpile
Sample Number: Sample #3

Date: 07-24-14

TRC Environmental Corp.	**Client:** Dane County
	Project: Dane County Rodefeld
Madison, Wisconsin	**Project No:** 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.7	0.5	1.9	7.9	50.4	36.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	97.6		
.375	97.4		
.25	97.4		
#4	97.3		
#8	96.9		
#10	96.8		
#16	96.4		
#20	96.1		
#30	95.6		
#40	94.9		
#50	93.7		
#80	90.5		
#100	89.1		
#200	87.0		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 18 LL= 40 PI= 22

Coefficients

D_{90}= 0.1691 D_{85}= 0.0562 D_{60}= 0.0182
D_{50}= 0.0127 D_{30}= 0.0022 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(19)

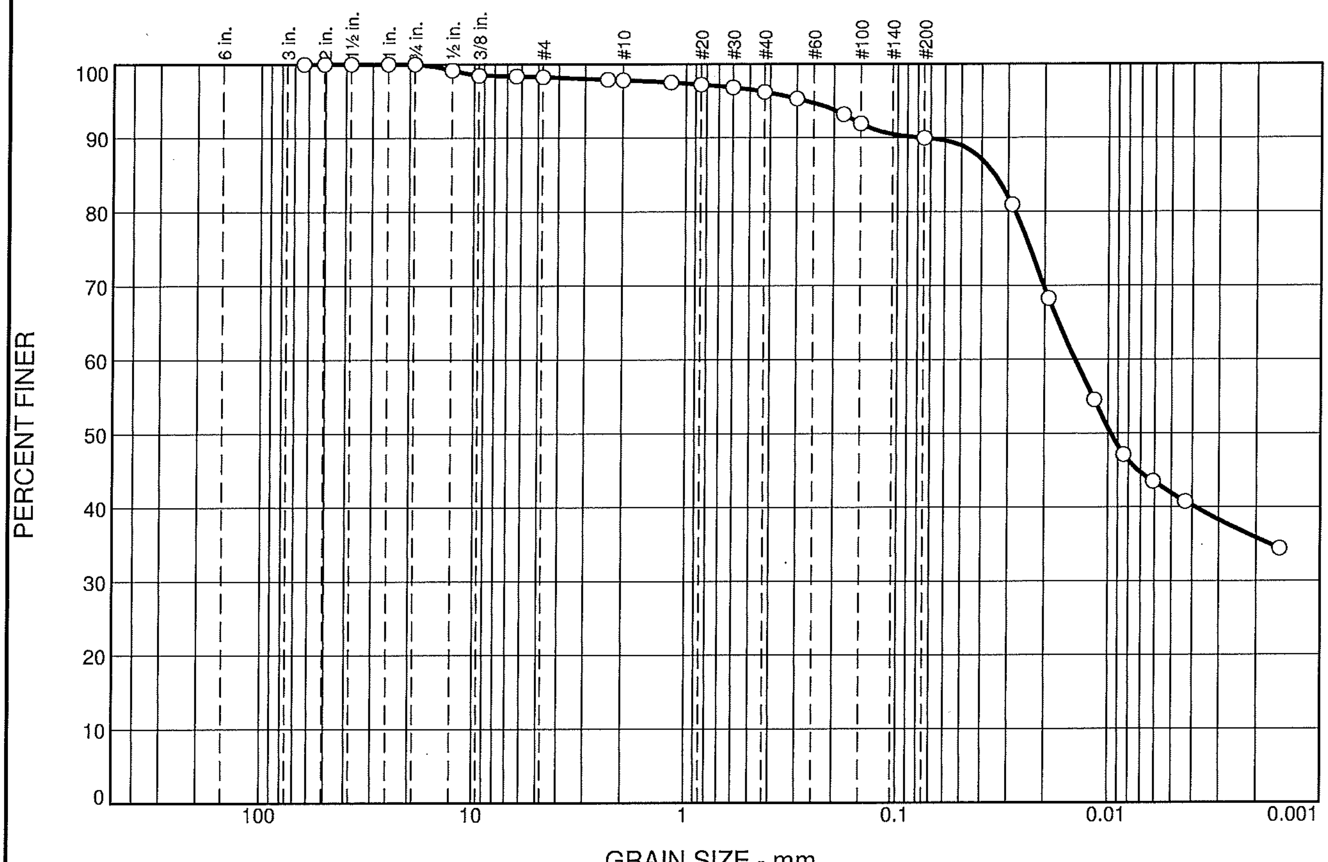
Remarks

Source of Sample: Lift 1 **Depth:** 382,100N/2,201,100E
Sample Number: B-1 **Date:** 08-15-14

TRC Environmental Corp.
Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.7	0.5	1.6	6.2	48.1	41.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	99.2		
.375	98.5		
.25	98.4		
#4	98.3		
#8	97.9		
#10	97.8		
#16	97.5		
#20	97.2		
#30	96.8		
#40	96.2		
#50	95.3		
#80	93.2		
#100	91.9		
#200	90.0		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 18 LL= 40 PI= 22

Coefficients

D_{90}= 0.0772 D_{85}= 0.0347 D_{60}= 0.0144
D_{50}= 0.0097 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(20)

Remarks

Source of Sample: Lift 1 **Depth:** 382,400N/2,201,000E
Sample Number: B-2

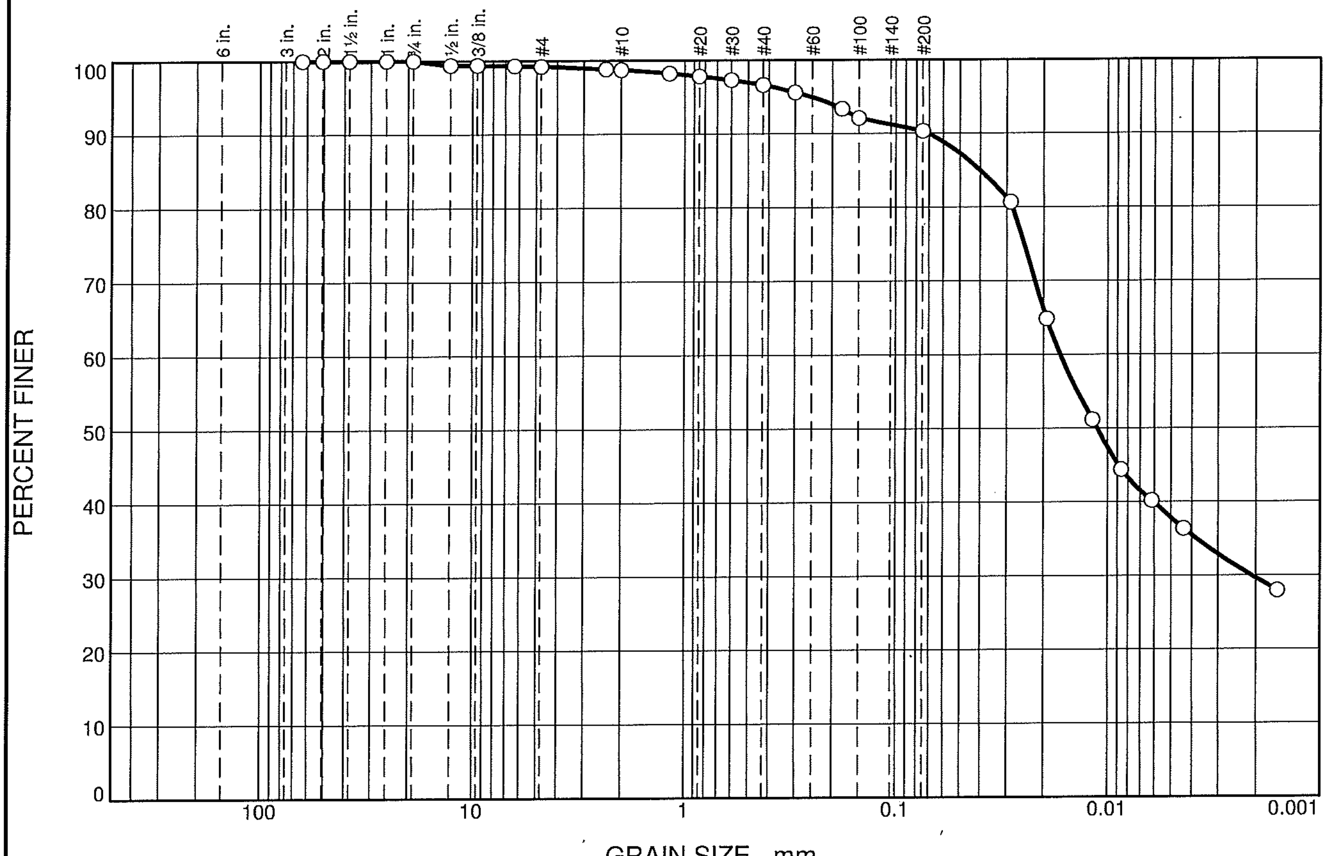
Date: 08-15-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	0.5	2.1	6.2	52.6	37.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	99.4		
.375	99.4		
.25	99.3		
#4	99.2		
#8	98.8		
#10	98.7		
#16	98.2		
#20	97.8		
#30	97.3		
#40	96.6		
#50	95.6		
#80	93.4		
#100	92.1		
#200	90.4		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 41 PI= 22

Coefficients

D_{90}= 0.0707 D_{85}= 0.0401 D_{60}= 0.0167
D_{50}= 0.0112 D_{30}= 0.0021 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(20)

Remarks

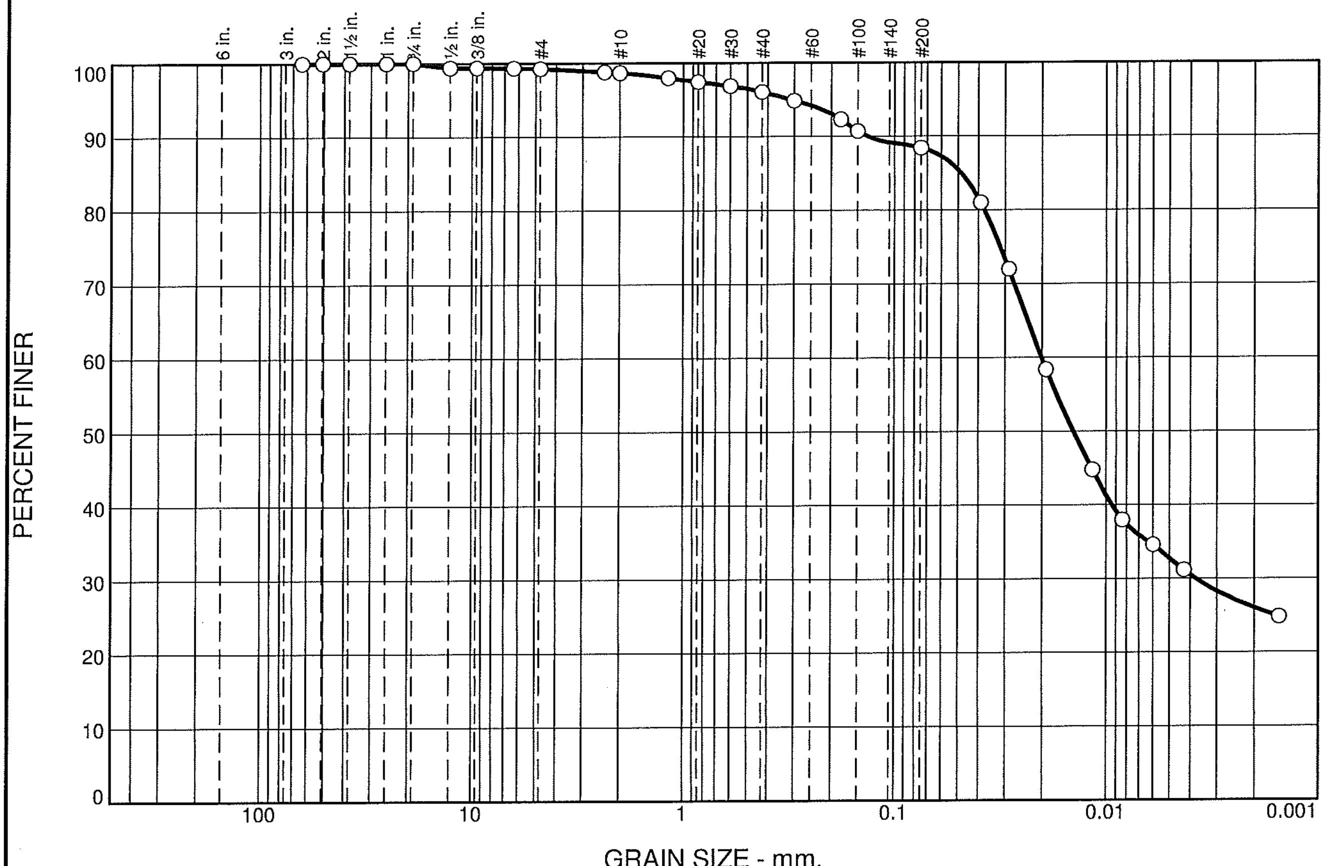
Source of Sample: Lift 1 **Depth:** 382,700N/2,200,900E
Sample Number: B-3 **Date:** 08-15-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	0.5	2.7	7.6	55.6	32.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	99.4		
.375	99.4		
.25	99.3		
#4	99.2		
#8	98.8		
#10	98.7		
#16	98.0		
#20	97.4		
#30	96.9		
#40	96.0		
#50	94.8		
#80	92.3		
#100	90.7		
#200	88.4		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 40 PI= 21

Coefficients

D_{90}= 0.1343 D_{85}= 0.0484 D_{60}= 0.0202
D_{50}= 0.0143 D_{30}= 0.0038 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(19)

Remarks

Source of Sample: Lift 2 **Depth:** 382,350N/2,201,150E
Sample Number: B-4

Date: 09-03-14

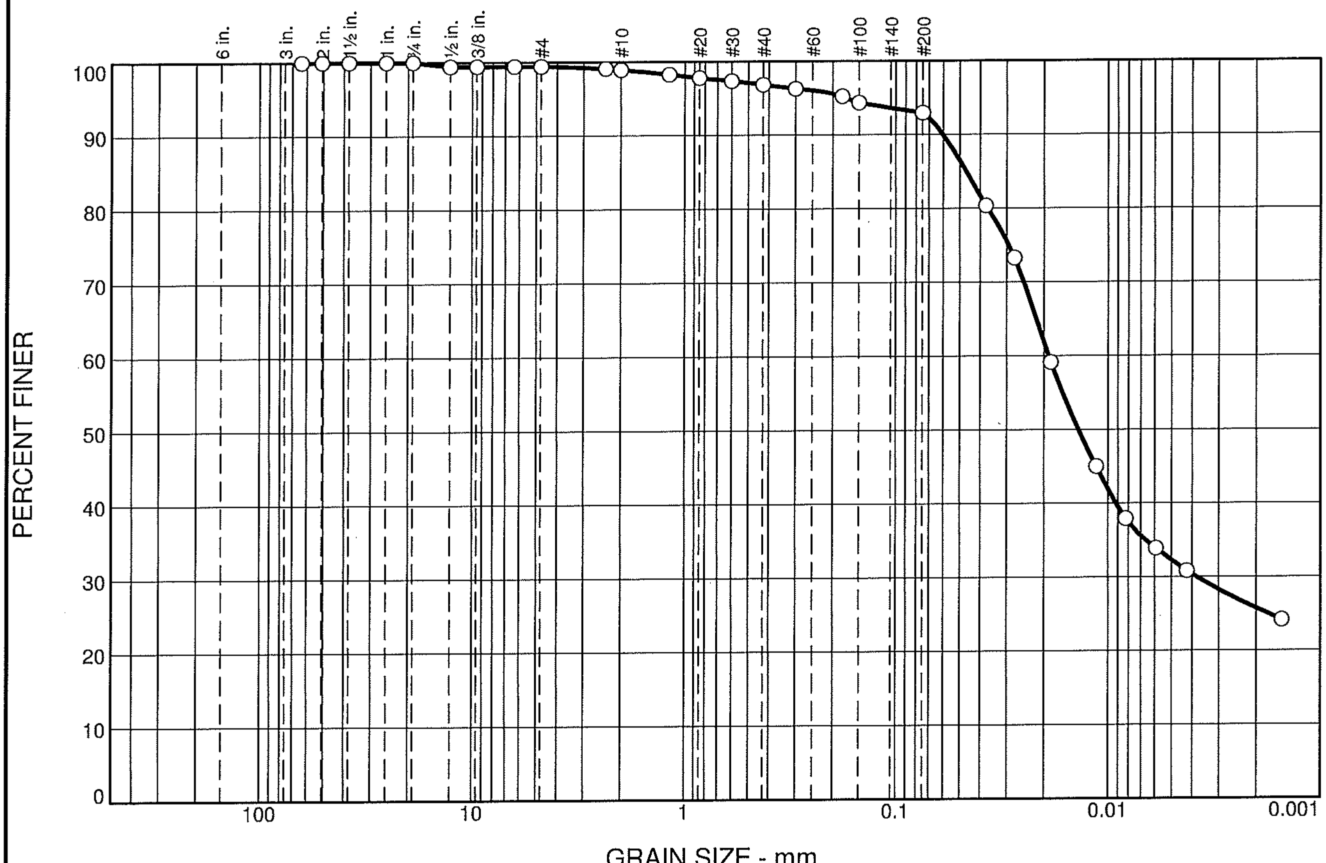
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld

Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	0.5	2.0	3.9	60.7	32.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	99.4		
.375	99.4		
.25	99.4		
#4	99.4		
#8	99.1		
#10	98.9		
#16	98.2		
#20	97.8		
#30	97.3		
#40	96.9		
#50	96.3		
#80	95.2		
#100	94.3		
#200	93.0		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 41 PI= 22

Coefficients

D_{90}= 0.0602 D_{85}= 0.0467 D_{60}= 0.0190
D_{50}= 0.0138 D_{30}= 0.0038 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(21)

Remarks

Source of Sample: Lift 2 **Depth:** 382,750N/2,200,850E
Sample Number: B-5

Date: 09-03-14

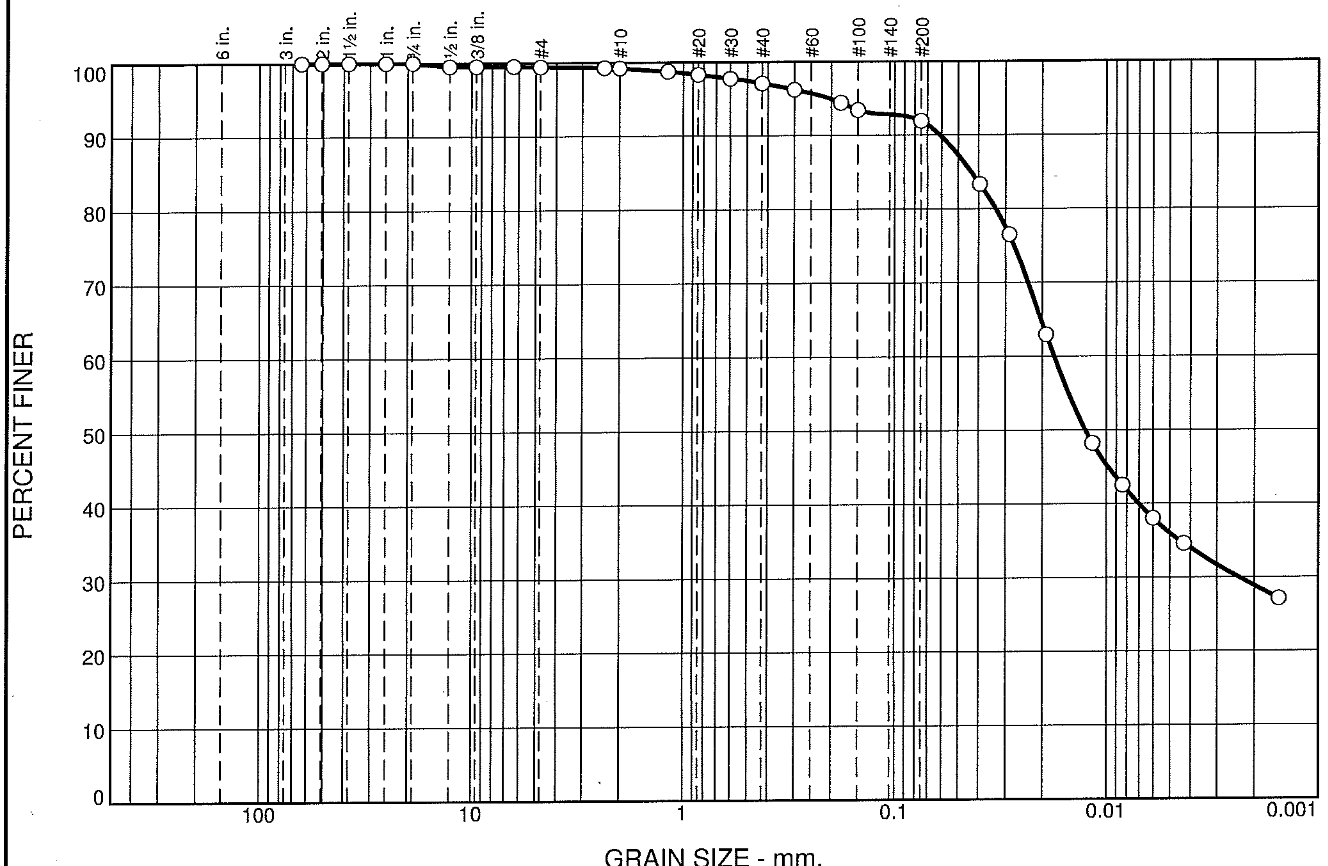
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld

Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	0.2	2.1	5.2	55.9	36.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	99.5		
.375	99.5		
.25	99.5		
#4	99.4		
#8	99.3		
#10	99.2		
#16	98.7		
#20	98.3		
#30	97.8		
#40	97.1		
#50	96.2		
#80	94.4		
#100	93.4		
#200	91.9		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 39 PI= 20

Coefficients

D_{90}= 0.0608 D_{85}= 0.0434 D_{60}= 0.0176
D_{50}= 0.0126 D_{30}= 0.0024 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(19)

Remarks

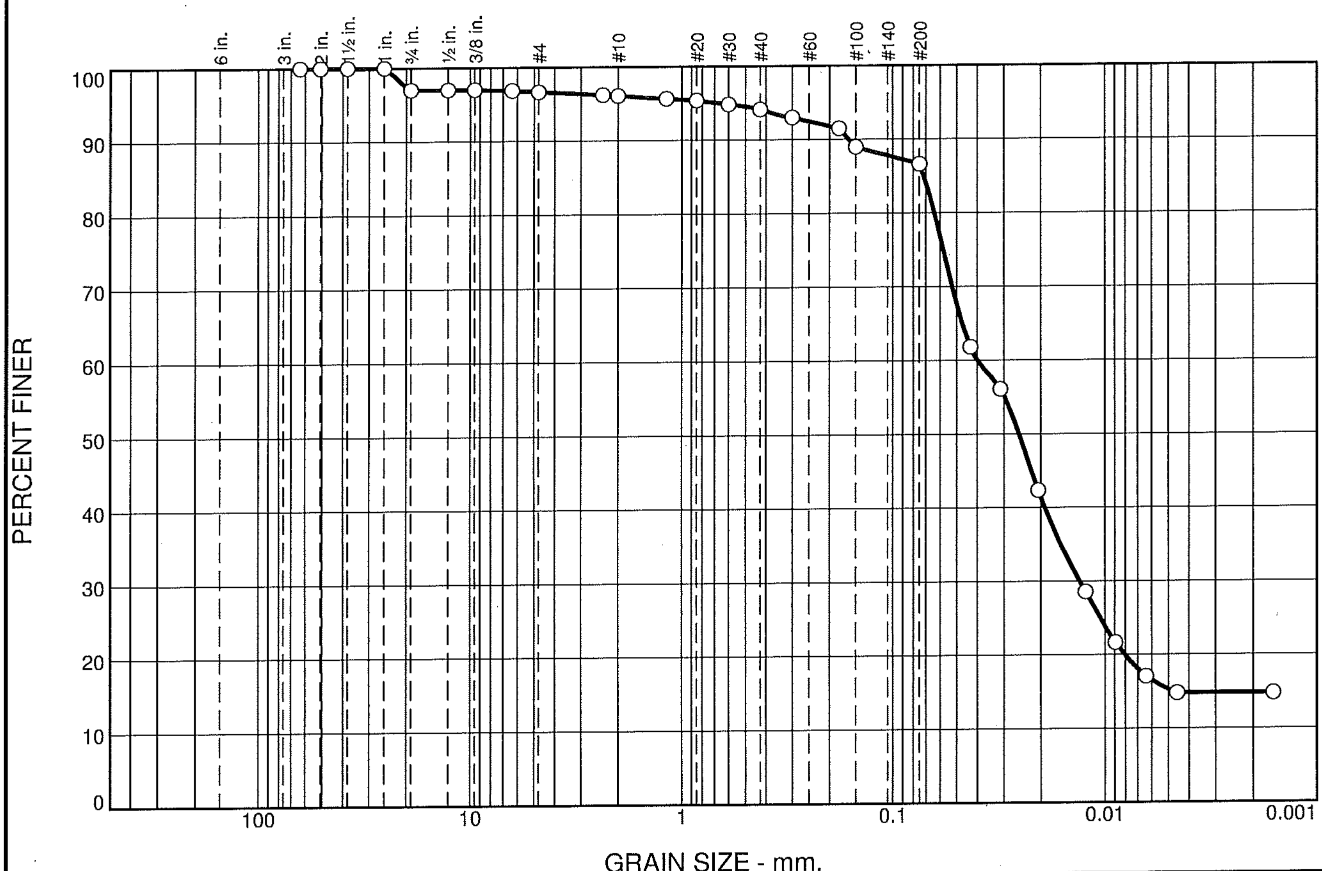
Source of Sample: Lift 2 **Depth:** 382,050N/2,200,950E
Sample Number: B-6 **Date:** 09-03-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.0	0.3	0.6	2.0	7.4	71.4	15.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	97.0		
.5	97.0		
.375	97.0		
.25	96.9		
#4	96.7		
#8	96.2		
#10	96.1		
#16	95.7		
#20	95.4		
#30	94.9		
#40	94.1		
#50	93.0		
#80	91.5		
#100	89.0		
#200	86.7		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 18 LL= 38 PI= 20

Coefficients

D_{90}= 0.1627 D_{85}= 0.0714 D_{60}= 0.0401
D_{50}= 0.0254 D_{30}= 0.0132 D_{15}= 0.0047
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(17)

Remarks

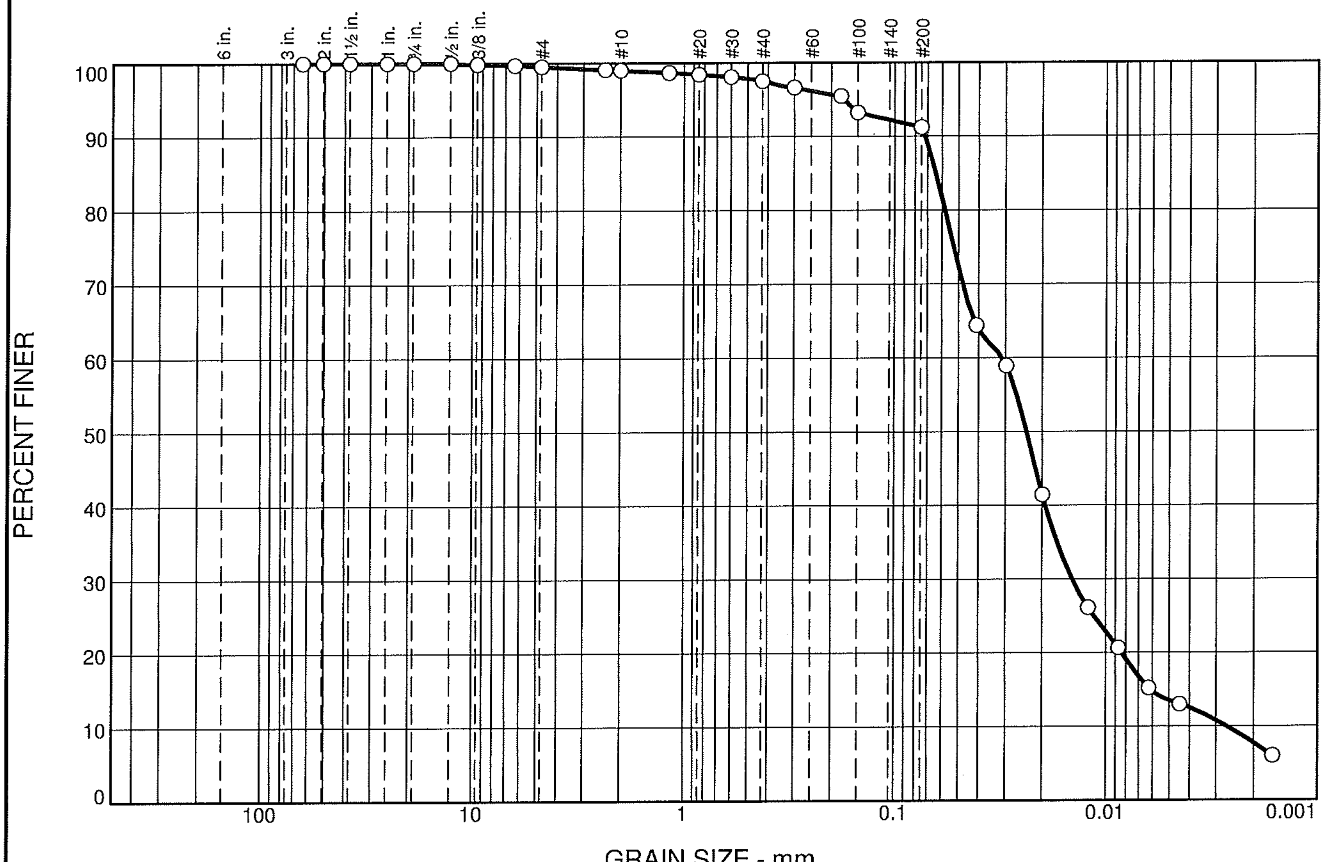
Source of Sample: Lift 3 **Depth:** 382,700N/2,201,100E
Sample Number: B-7 (Standard) **Date:** 9-8-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	0.5	1.5	6.3	77.7	13.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	99.8		
.25	99.7		
#4	99.5		
#8	99.1		
#10	99.0		
#16	98.7		
#20	98.4		
#30	98.1		
#40	97.5		
#50	96.6		
#80	95.5		
#100	93.2		
#200	91.2		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 38 PI= 19

Coefficients

D_{90}= 0.0722 D_{85}= 0.0641 D_{60}= 0.0311
D_{50}= 0.0238 D_{30}= 0.0144 D_{15}= 0.0061
D_{10}= 0.0027 C_u= 11.59 C_c= 2.49

Classification

USCS= CL AASHTO= A-6(17)

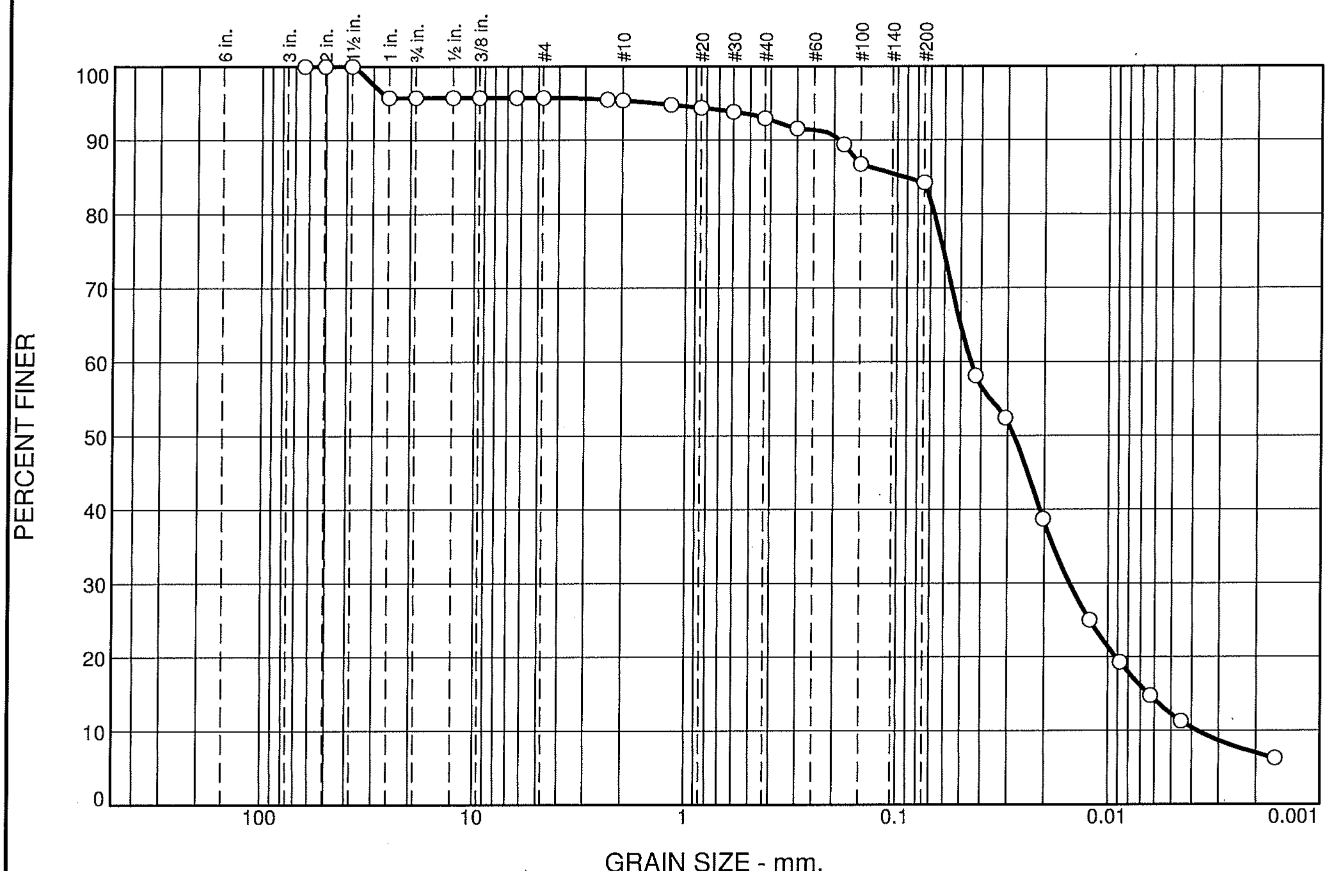
Remarks

Source of Sample: Lift 3 **Depth:** 382,700N/2,200,900E
Sample Number: B-8 (Standard) **Date:** 9-8-14

TRC Environmental Corp.
Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.2	0.0	0.4	2.4	8.8	71.9	12.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	95.8		
.75	95.8		
.5	95.8		
.375	95.8		
.25	95.8		
#4	95.8		
#8	95.5		
#10	95.4		
#16	94.8		
#20	94.4		
#30	93.8		
#40	93.0		
#50	91.6		
#80	89.4		
#100	86.8		
#200	84.2		

* (no specification provided)

Material Description

Lean clay with sand

Atterberg Limits

PL= 17 LL= 38 PI= 21

Coefficients

D_{90}= 0.1882 D_{85}= 0.0924 D_{60}= 0.0449
D_{50}= 0.0279 D_{30}= 0.0152 D_{15}= 0.0064
D_{10}= 0.0038 C_u= 11.92 C_c= 1.37

Classification

USCS= CL AASHTO= A-6(17)

Remarks

Source of Sample: Lift 3 **Depth:** 382,100N/2,200,900E
Sample Number:: B-9 (Modified) **Date:** 9-8-14

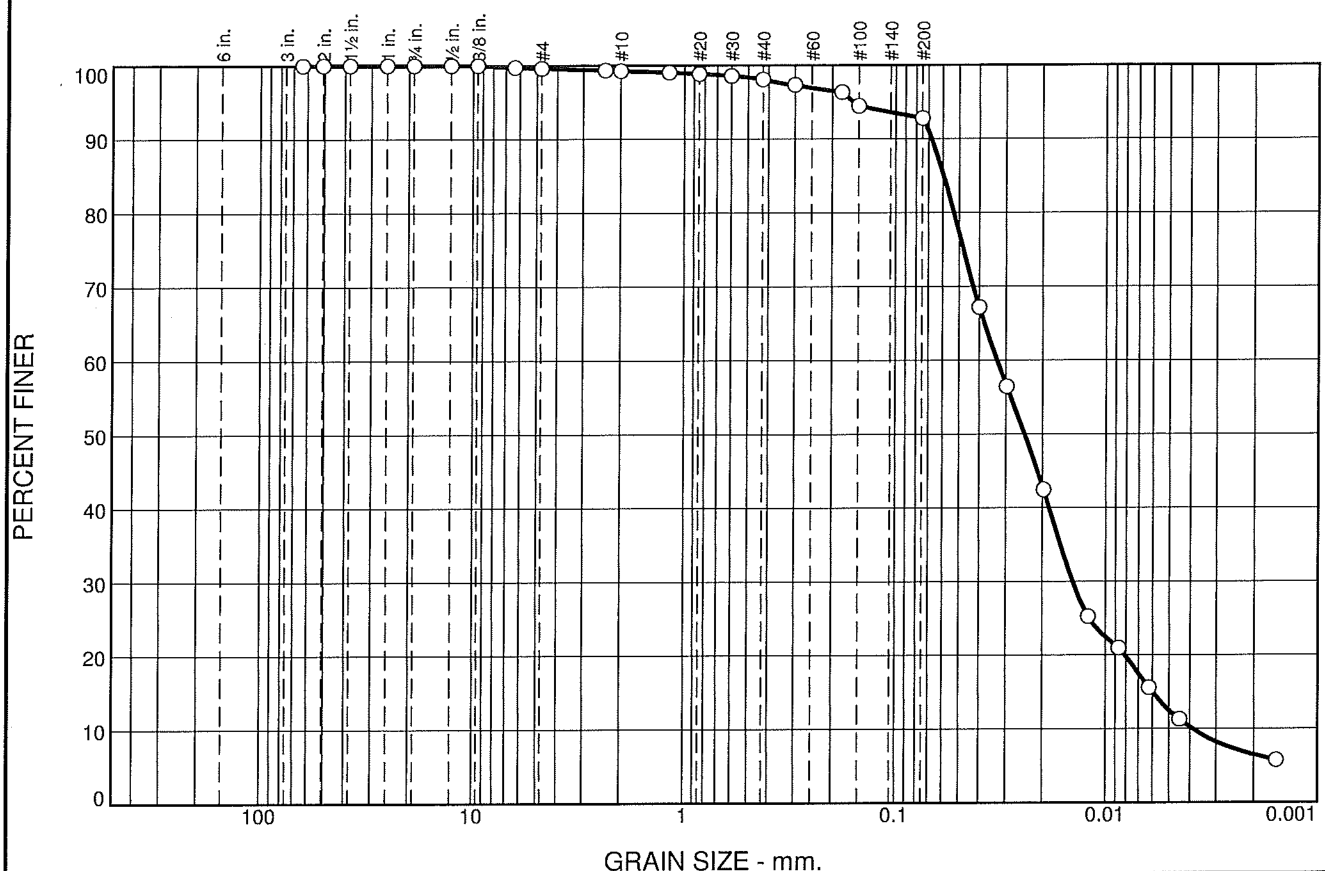
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld

Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.3	1.2	5.3	80.3	12.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.50	100.0		
0.375	100.0		
0.25	99.7		
#4	99.6		
#8	99.3		
#10	99.3		
#16	99.0		
#20	98.8		
#30	98.6		
#40	98.1		
#50	97.3		
#80	96.3		
#100	94.5		
#200	92.8		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 20 LL= 40 PI= 20

Coefficients

D_{90}= 0.0676 D_{85}= 0.0593 D_{60}= 0.0330
D_{50}= 0.0244 D_{30}= 0.0143 D_{15}= 0.0060
D_{10}= 0.0039 C_u= 8.51 C_c= 1.60

Classification

USCS= CL AASHTO= A-6(19)

Remarks

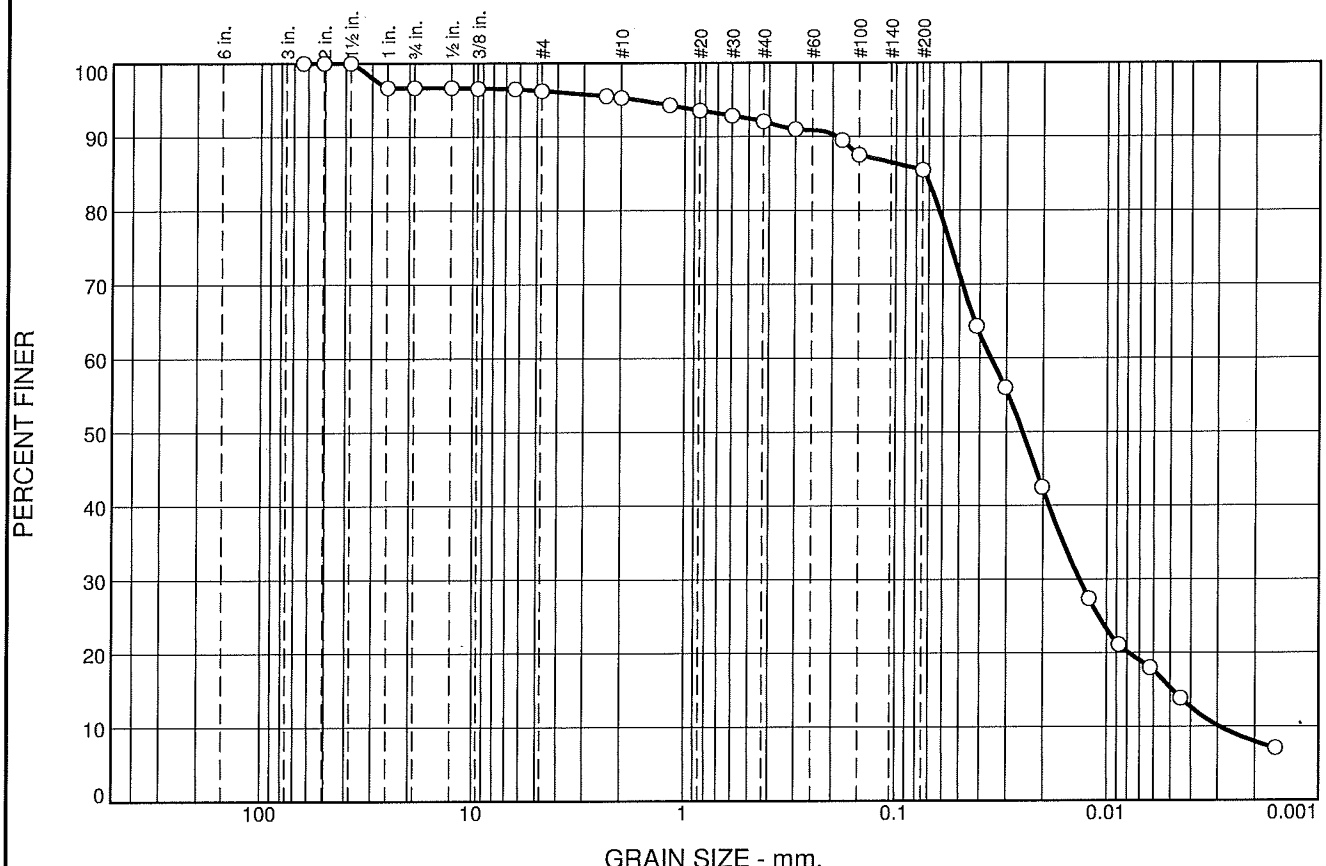
Source of Sample: Lift 4 **Depth:** 382,350N/2,200,950E
Sample Number: B-10 (Modified) **Date:** 9-15-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.3	0.5	0.9	3.3	6.5	70.2	15.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	96.7		
.75	96.7		
.5	96.7		
.375	96.5		
.25	96.5		
#4	96.2		
#8	95.5		
#10	95.3		
#16	94.3		
#20	93.6		
#30	92.9		
#40	92.0		
#50	91.0		
#80	89.5		
#100	87.5		
#200	85.5		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 38 PI= 19

Coefficients

D_{90}= 0.1898 D_{85}= 0.0733 D_{60}= 0.0356
D_{50}= 0.0251 D_{30}= 0.0135 D_{15}= 0.0049
D_{10}= 0.0029 C_u= 12.09 C_c= 1.73

Classification

USCS= CL AASHTO= A-6(16)

Remarks

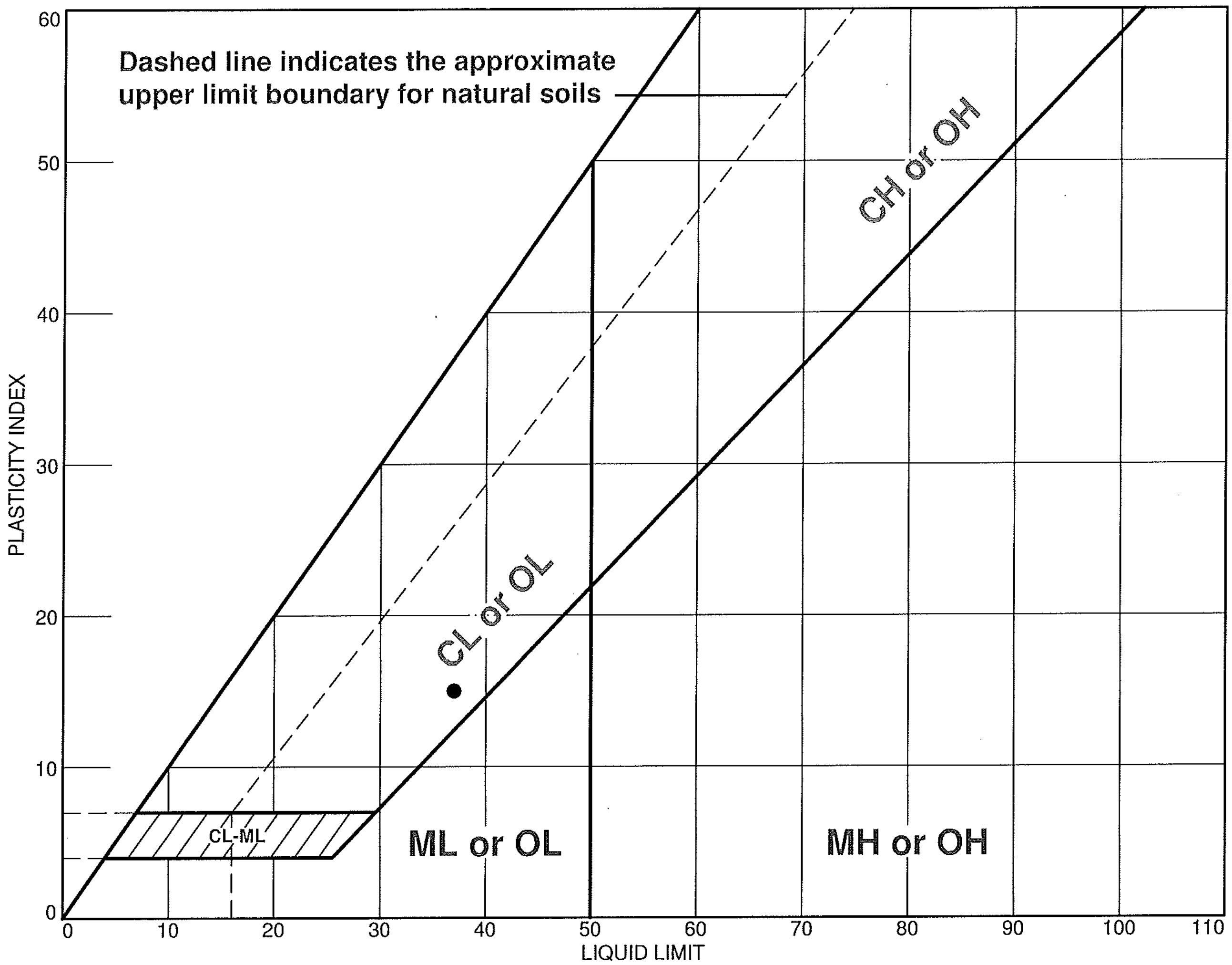
Source of Sample: Lift 4 **Depth:** 382,250N/2,201,050E
Sample Number: B-11 (Modified) **Date:** 9-12-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	37	22	15	96.8	89.0	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source of Sample:** Clay Stockpile **Sample Number:** Sample #1

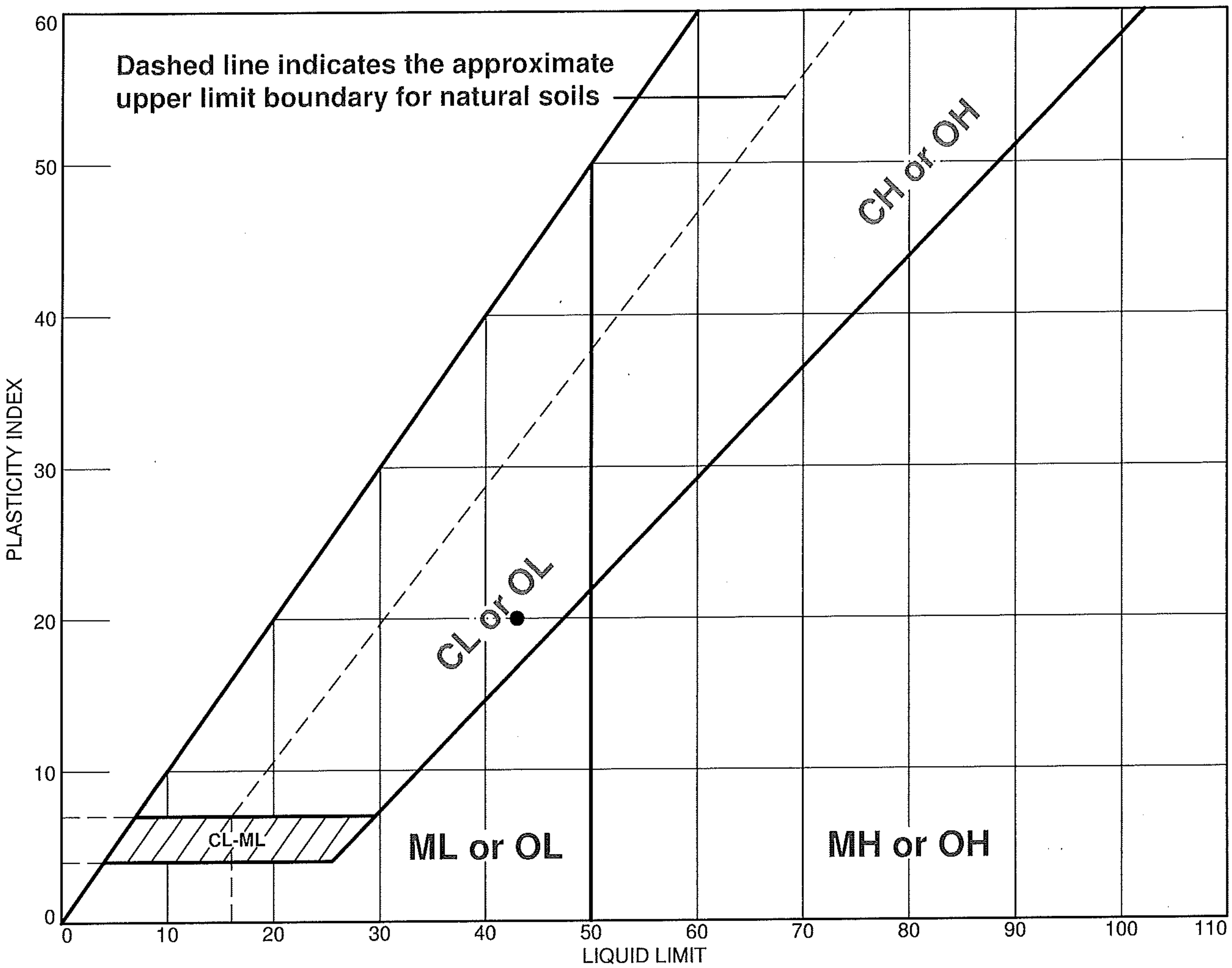
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	43	23	20	99.4	97.8	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source of Sample:** Clay Stockpile **Sample Number:** Sample #2

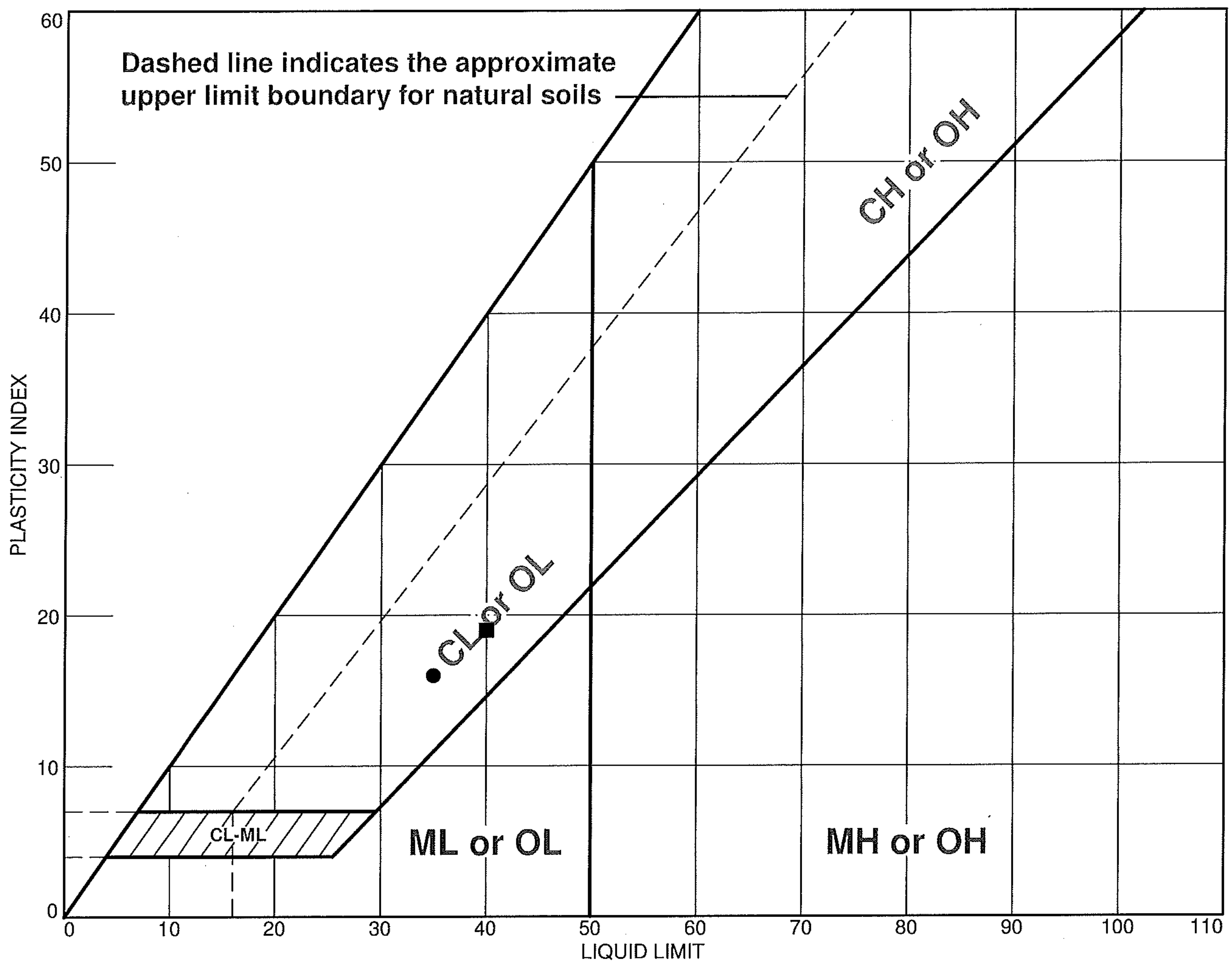
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean clay	35	19	16	90.0	66.6	CL
■	Lean clay	40	21	19	98.2	89.2	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source of Sample:** General Fill **Sample Number:** Stockpile #6

■ **Source of Sample:** Clay Stockpile **Sample Number:** Sample #3

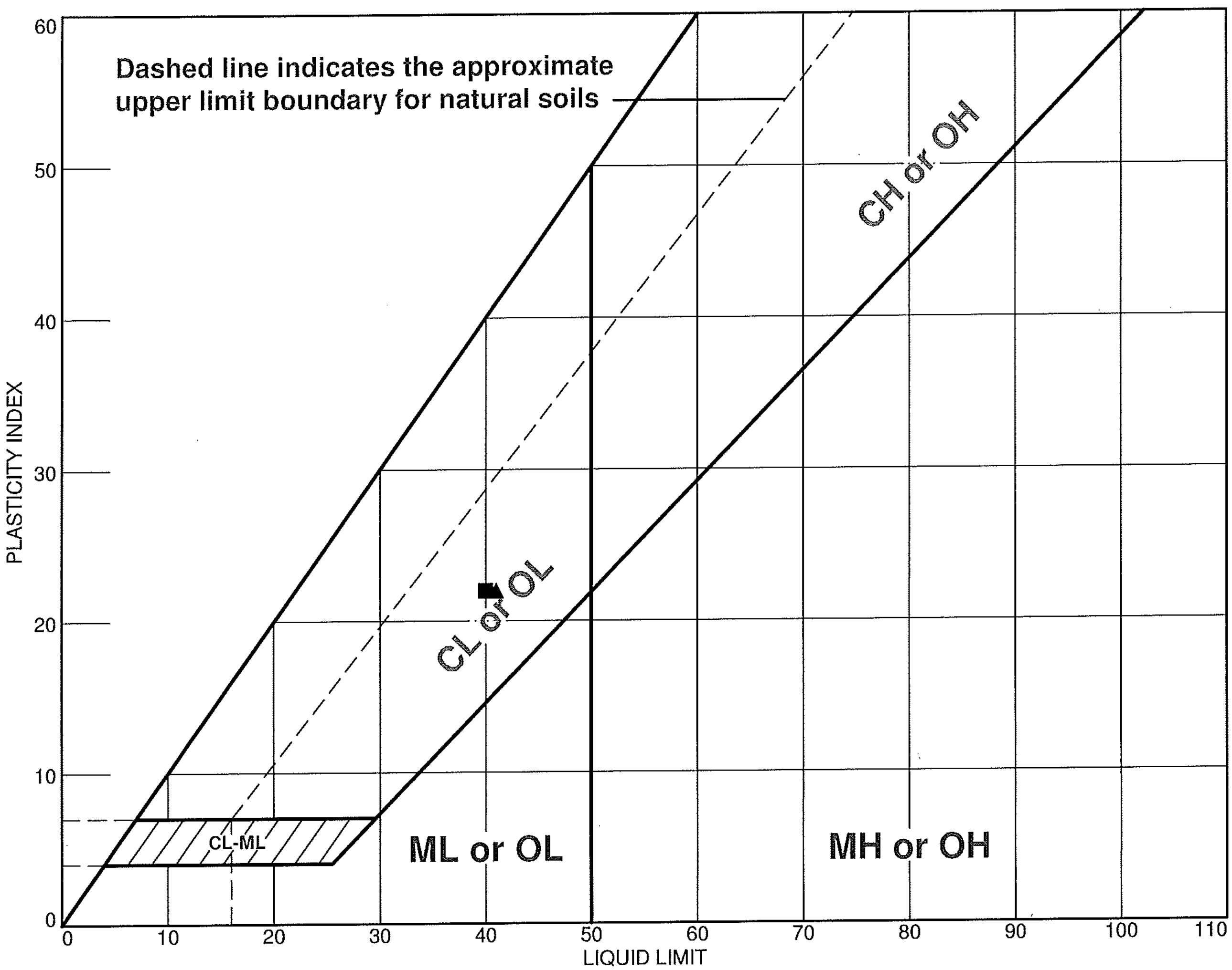
TRC Environmental Corp.

Madison, Wisconsin

Remarks:

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	40	18	22	94.9	87.0	CL
■	Lean clay	40	18	22	96.2	90.0	CL
▲	Lean clay	41	19	22	96.6	90.4	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 1 **Depth:** 382,100N/2,201,100E **Sample No.:** B-1
■ **Source:** Lift 1 **Depth:** 382,400N/2,201,000E **Sample No.:** B-2
▲ **Source:** Lift 1 **Depth:** 382,700N/2,200,900E **Sample No.:** B-3

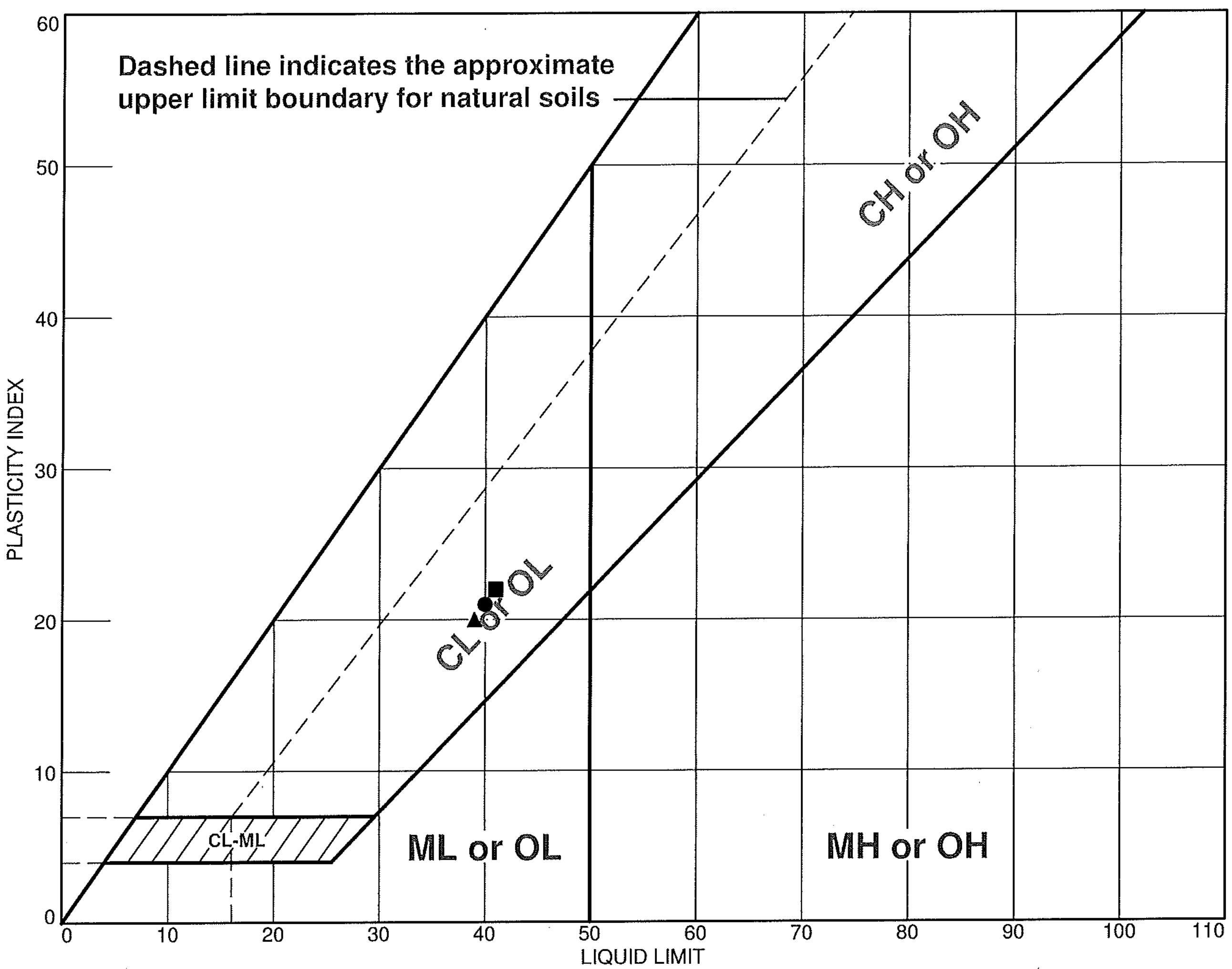
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	40	19	21	96.0	88.4	CL
■	Lean clay	41	19	22	96.9	93.0	CL
▲	Lean clay	39	19	20	97.1	91.9	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 2 **Depth:** 382,350N/2,201,150E **Sample No.:** B-4

■ **Source:** Lift 2 **Depth:** 382,750N/2,200,850E **Sample No.:** B-5

▲ **Source:** Lift 2 **Depth:** 382,050N/2,200,950E **Sample No.:** B-6

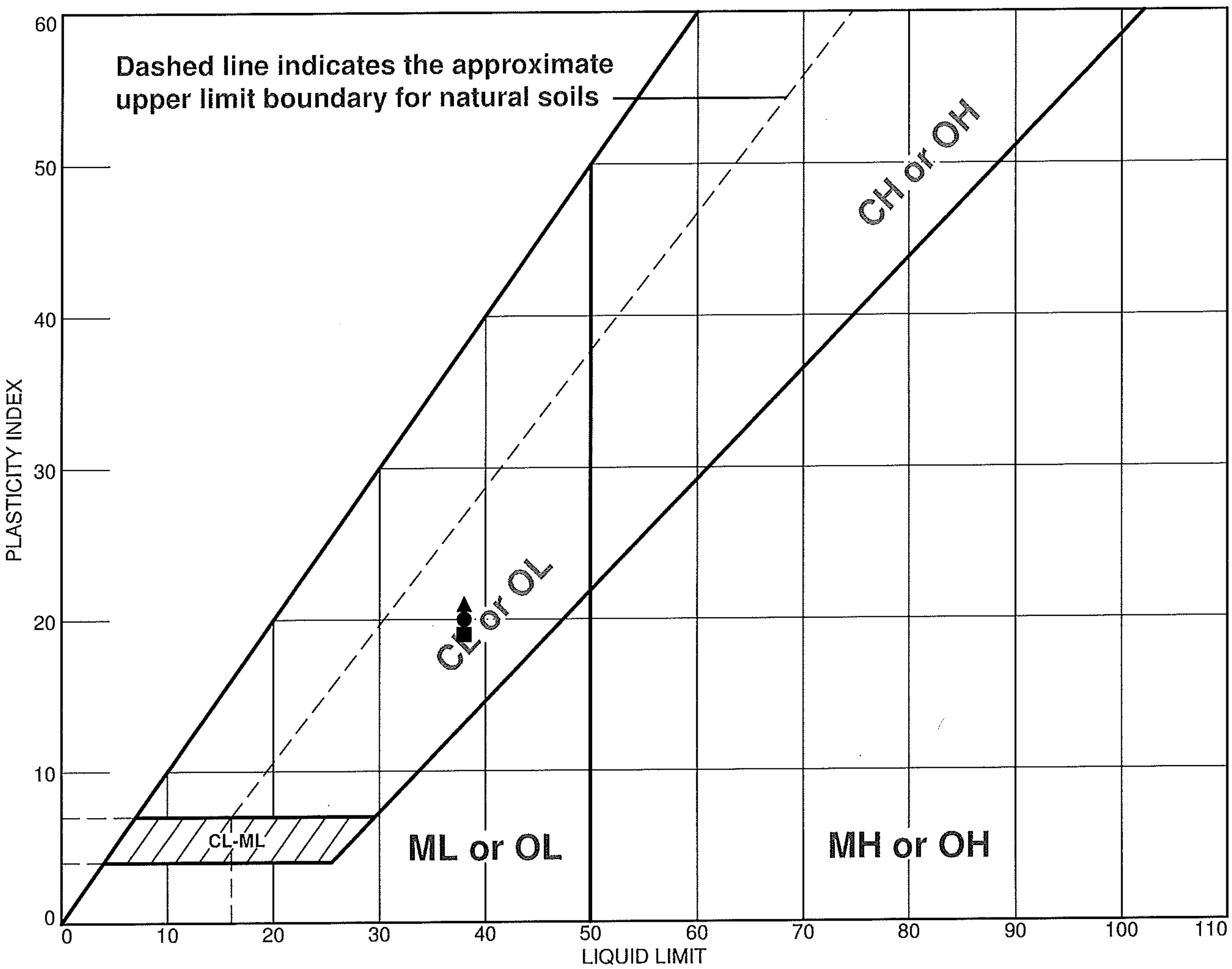
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	38	18	20	94.1	86.7	CL
■	Lean clay	38	19	19	97.5	91.2	CL
▲	Lean clay with sand	38	17	21	93.0	84.2	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 3 **Depth:** 382,700N/2,201,100E **Sample No.:** B-7 (Standard)

■ **Source:** Lift 3 **Depth:** 382,700N/2,200,900E **Sample No.:** B-8 (Standard)

▲ **Source:** Lift 3 **Depth:** 382,100N/2,200,900E **Sample No.:** B-9 (Standard)

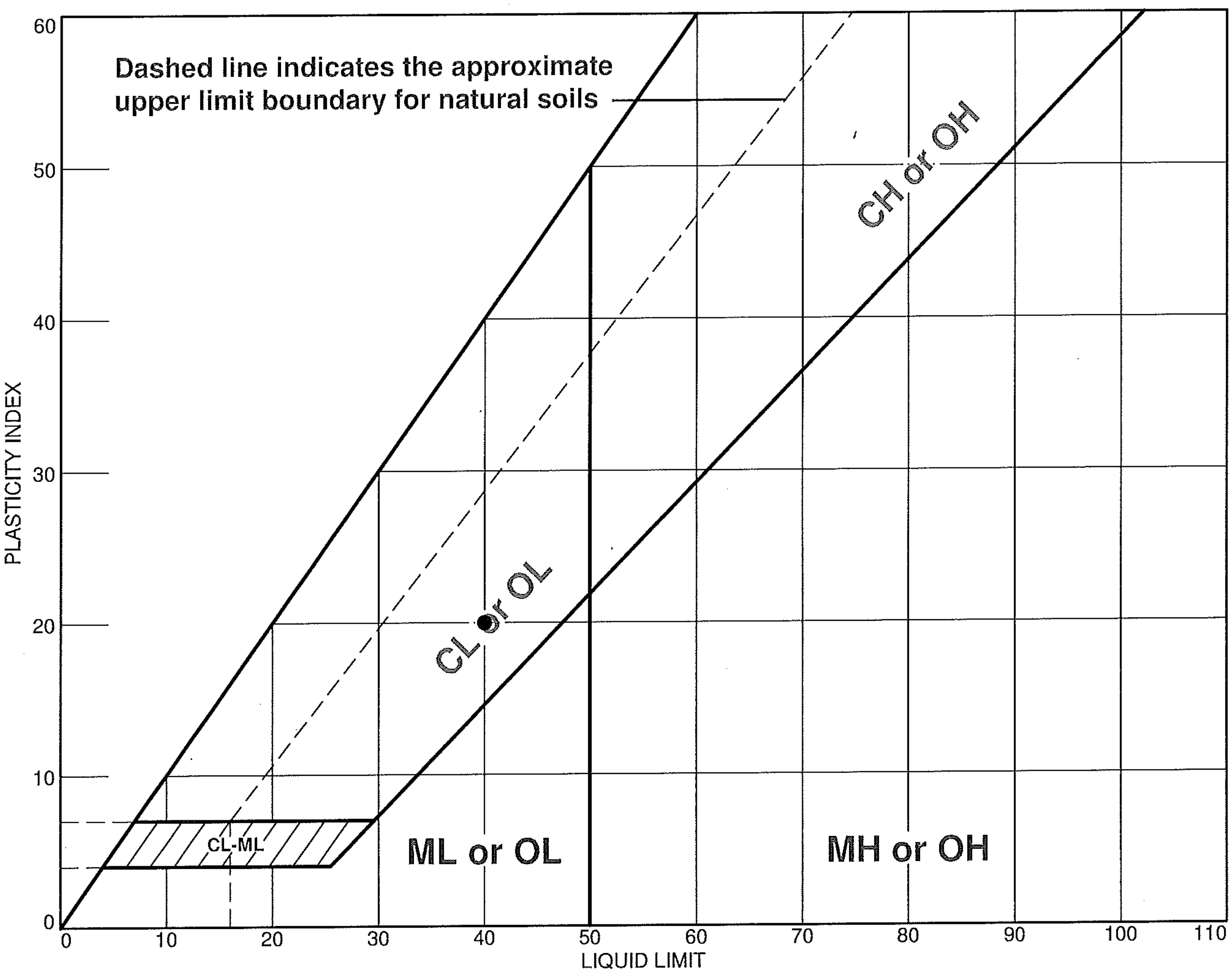
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	40	20	20	98.1	92.8	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 4 **Depth:** 382,350N/2,200,950E **Sample No.:** B-10 (Modified)

Remarks:

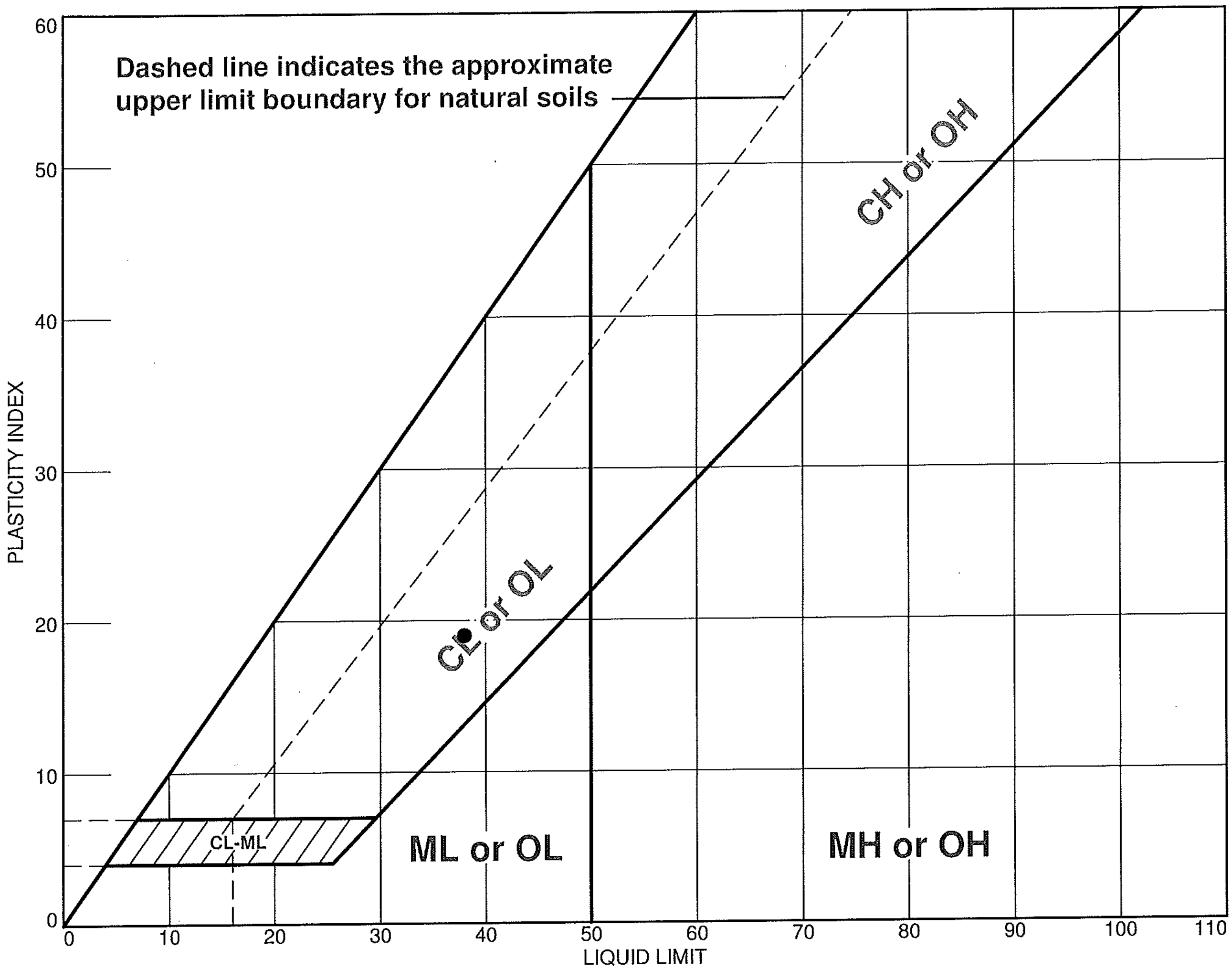
● Brown

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	38	19	19	92.0	85.5	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 4 **Depth:** 382,250N/2,201,050E **Sample No.:** B-11 (Modified)

Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH

QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Clay Stockpile Sample #1	269.15	1374.70	1164.10	23.5						

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH

QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Clay Stockpile, Sample #2	290.90	1410.80	1168.00	27.7						

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH
QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Clay Stockpile, Sample #3	257.06	1693.70	1434.20	22.0						

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH

QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 1, B-1, 382,100N/2,201,100E	268.54	1581.40	1370.60	19.1						
Lift 1, B-2, 382,400N/2,201,000E	255.95	1581.10	1331.90	23.2						
Lift 1, B-3, 382,700N/2,200,900E	258.93	1614.10	1362.30	22.8						

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH

QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 2, B-4, 382,350N/2,201,150E	248.13	1421.50	1205.30	22.6						
Lift 2, B-5, 382,750N/2,200,850E	264.54	1524.80	1271.60	25.1						
Lift 2, B-6, 382,050N/2,200,950E	259.19	1611.90	1364.90	22.3						

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH

QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 3, B-7, 382,700N/2,201,100E	269.23	1088.70	926.60	24.7						
Lift 3, B-8, 382,700N/2,200,900E	261.71	1177.20	995.70	24.7						

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH

QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 3, B-9, 382,100N/2,200,900E	263.70	1081.30	924.20	23.8						

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JNH

QA: JNH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 4, B-10	252.30	992.80	848.00	24.3						
Lift 3, T-17	264.80	1148.40	998.20	20.5	2.87	4.08	264.80	1148.40	127.5	105.9
Lift 3, T-18	264.82	757.10	680.80	18.3	2.87	2.35	264.82	757.10	123.8	104.6
Lift 3, T-19	264.80	1134.30	999.10	18.4	2.87	3.99	264.80	1134.30	128.3	108.4
Lift 3, T-20	267.40	1285.60	1115.70	20.0	2.87	4.62	267.40	1285.60	129.8	108.1
Lift 3, T-21	271.30	1075.60	938.30	20.6	2.87	3.67	271.30	1075.60	129.1	107.0
Lift 3, T-22	266.70	959.60	843.50	20.1	2.86	3.17	266.70	959.60	129.6	107.9
Lift 3, T-23	253.40	1027.60	898.10	20.1	2.86	3.55	253.40	1027.60	129.3	107.7
Lift 3, T-24	267.20	770.70	685.20	20.5	2.86	2.31	267.20	770.70	129.3	107.3

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JNH

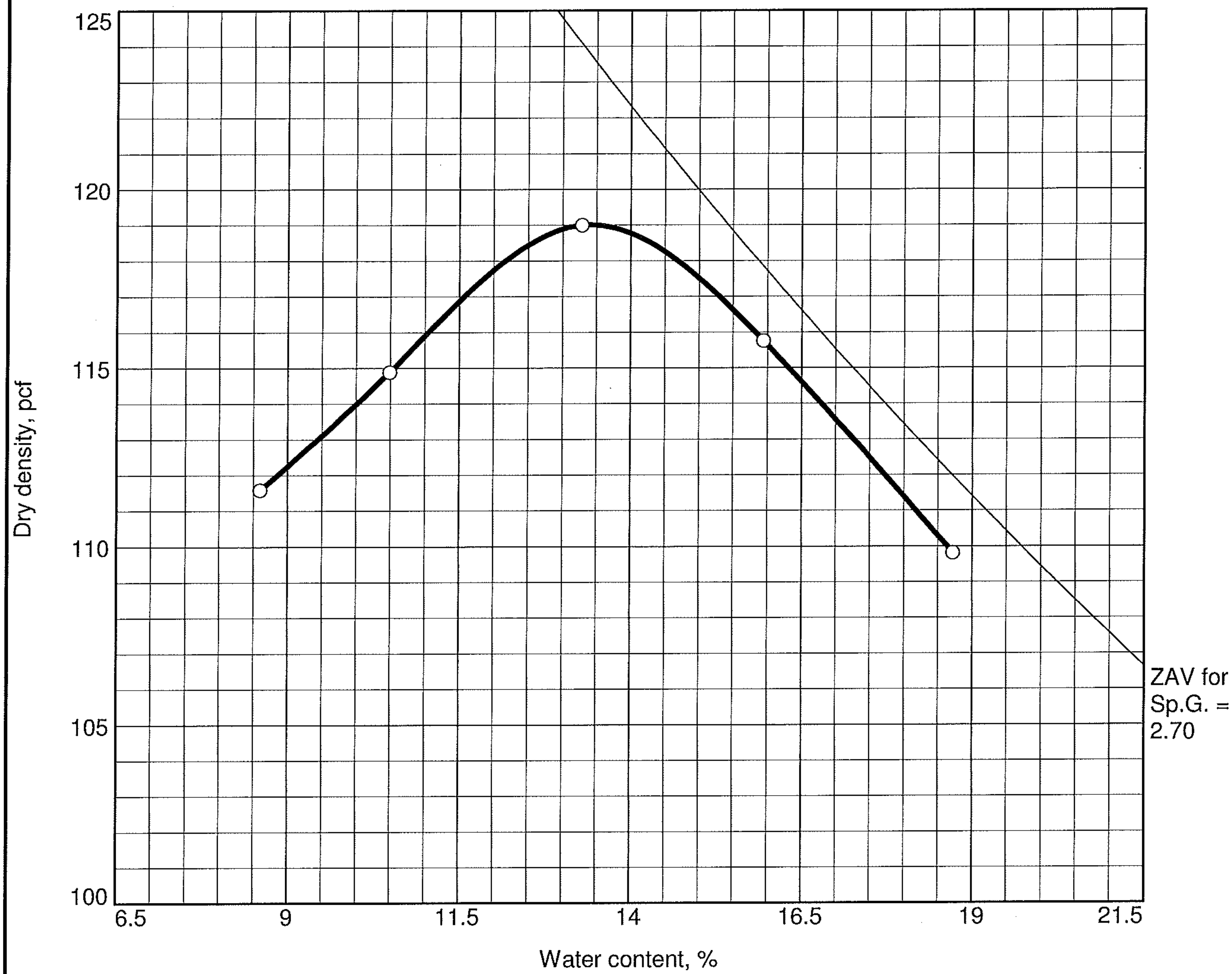
QA: JNH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 4, B-11 382,250N/2,201,050E	240.42	1286.80	1100.20	21.7						

COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 2 in.	% < No.200
	USCS	AASHTO						
	CL	A-6(14)	23.5		37	15	0.0	89.0

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 119.0 pcf Optimum moisture = 13.4 %	Lean clay

Project No. 220142.0000 **Client:** Dane County
Project: Dane County Rodefeld

○ **Source of Sample:** Clay Stockpile **Sample Number:** Sample #1

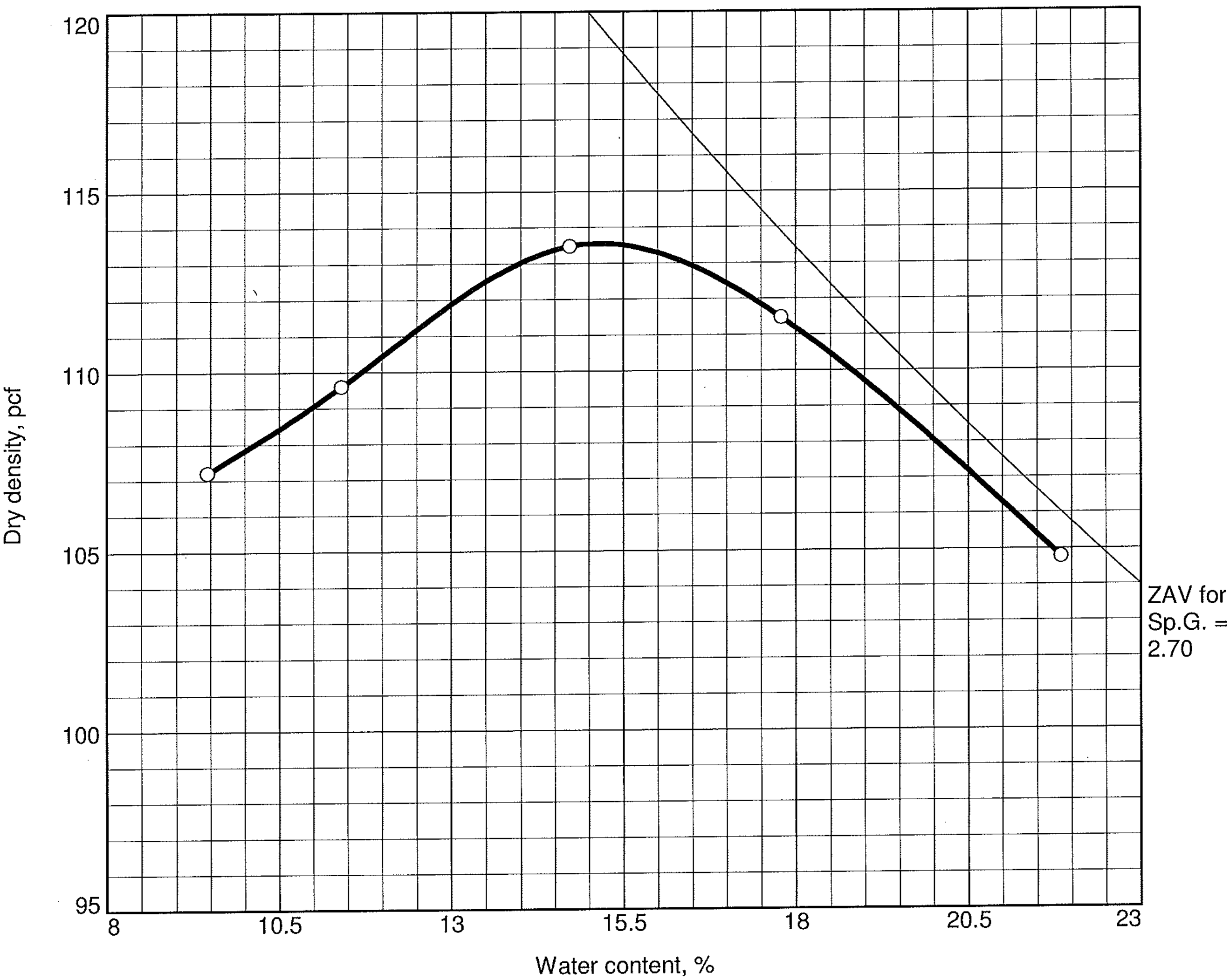
TRC Environmental Corp.

Madison, Wisconsin

Remarks:
Brown to Grayish Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-02 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-7-6(22)	27.7		43	20	0.1	97.8

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 113.5 pcf Optimum moisture = 15.1 %	Lean clay

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

○ **Source of Sample:** Clay Stockpile **Sample Number:** Sample #2

TRC Environmental Corp.

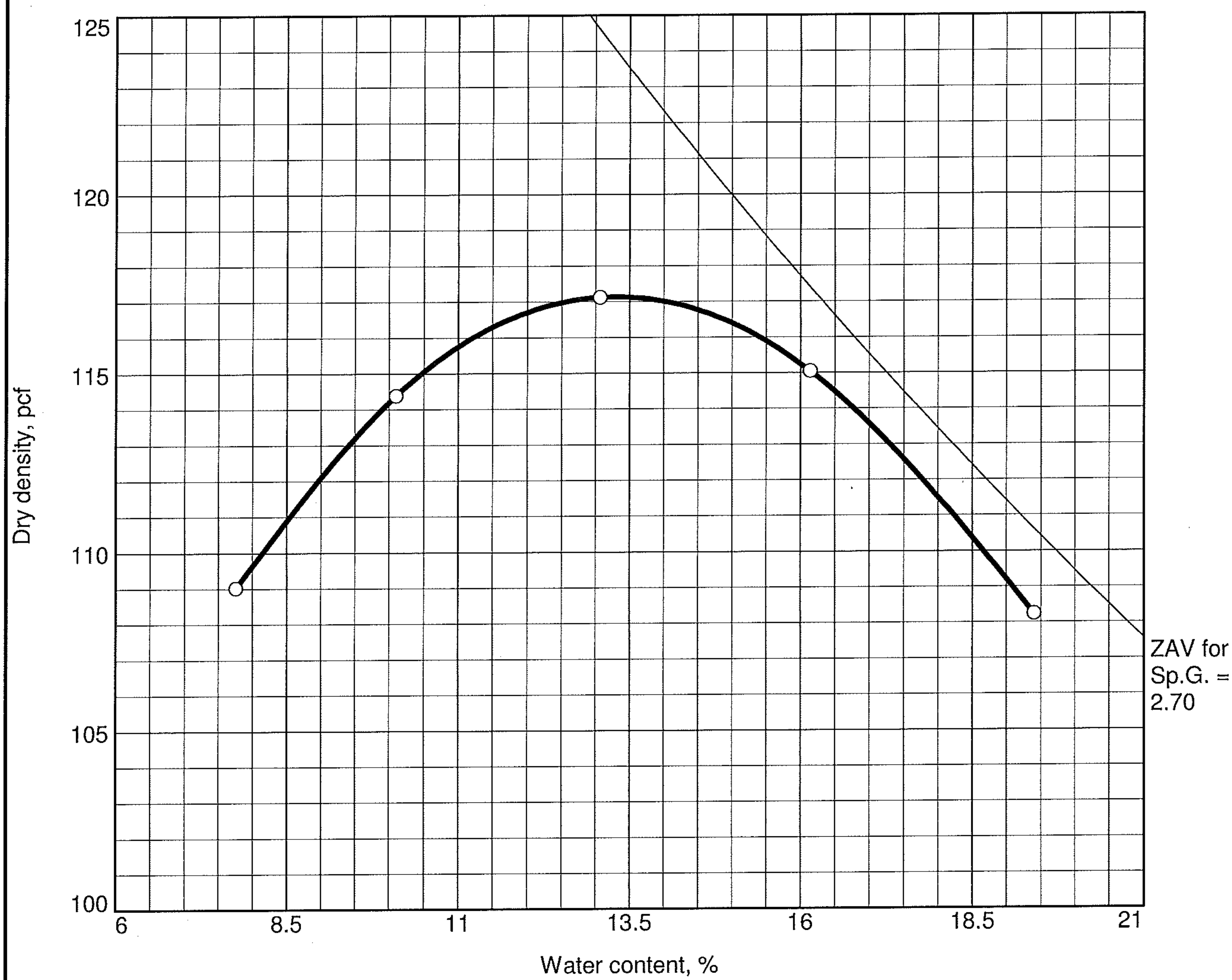
Madison, Wisconsin

Remarks:

Grayish Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-02 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-6(17)	22.0		40	19	0.1	89.2

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.1 pcf Optimum moisture = 13.3 %	Lean clay

Project No. 220142.0000 **Client:** Dane County
Project: Dane County Rodefeld

○ **Source of Sample:** Clay Stockpile **Sample Number:** Sample #3

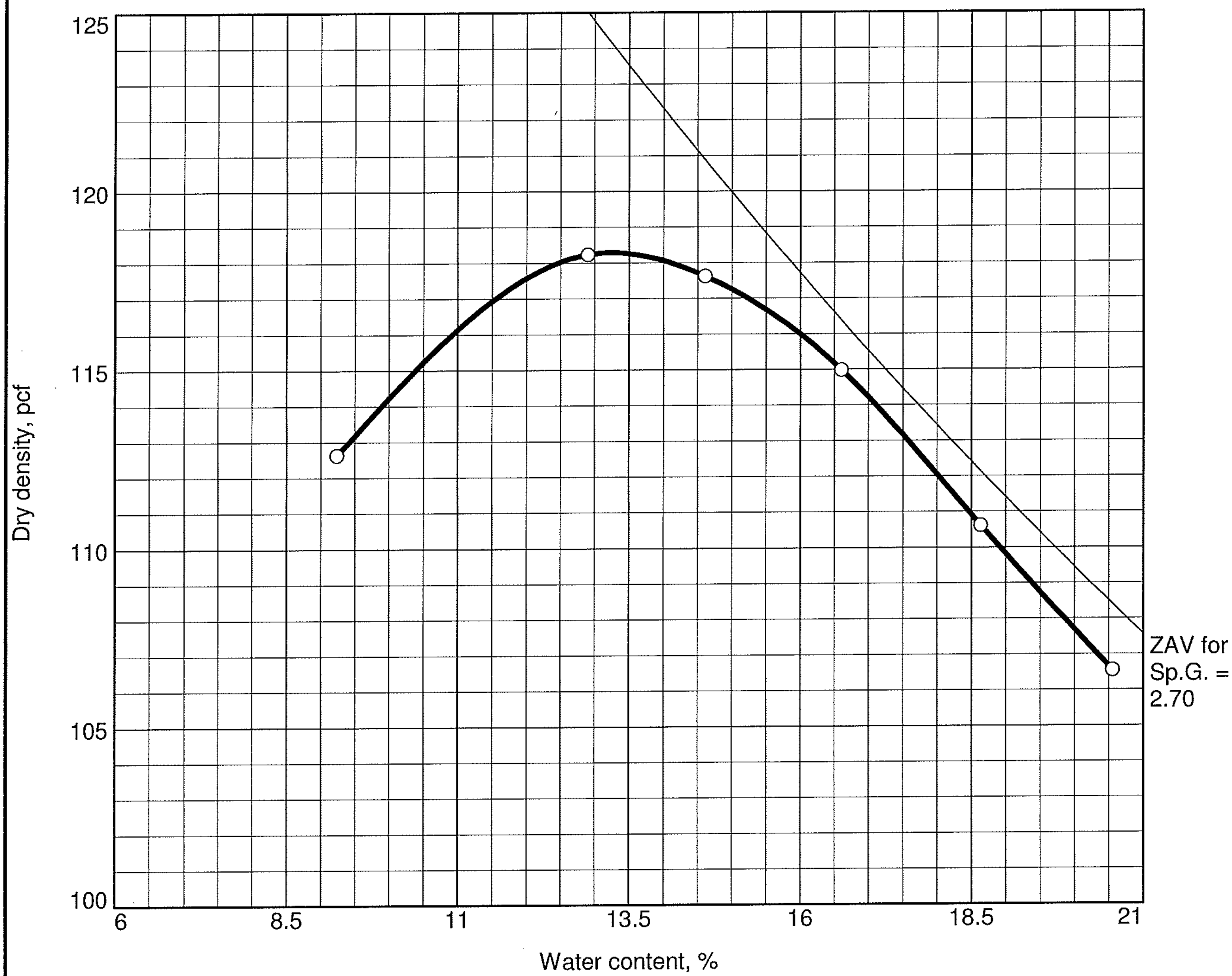
TRC Environmental Corp.

Madison, Wisconsin

Remarks:
Dark Grayish Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-02 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,100N/ 2,201,	CL	A-6(19)	19.1		40	22	2.7	87.0

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 118.3 pcf Optimum moisture = 13.2 %	Lean clay

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

○ **Source of Sample:** Lift 1 **Sample Number:** B-1

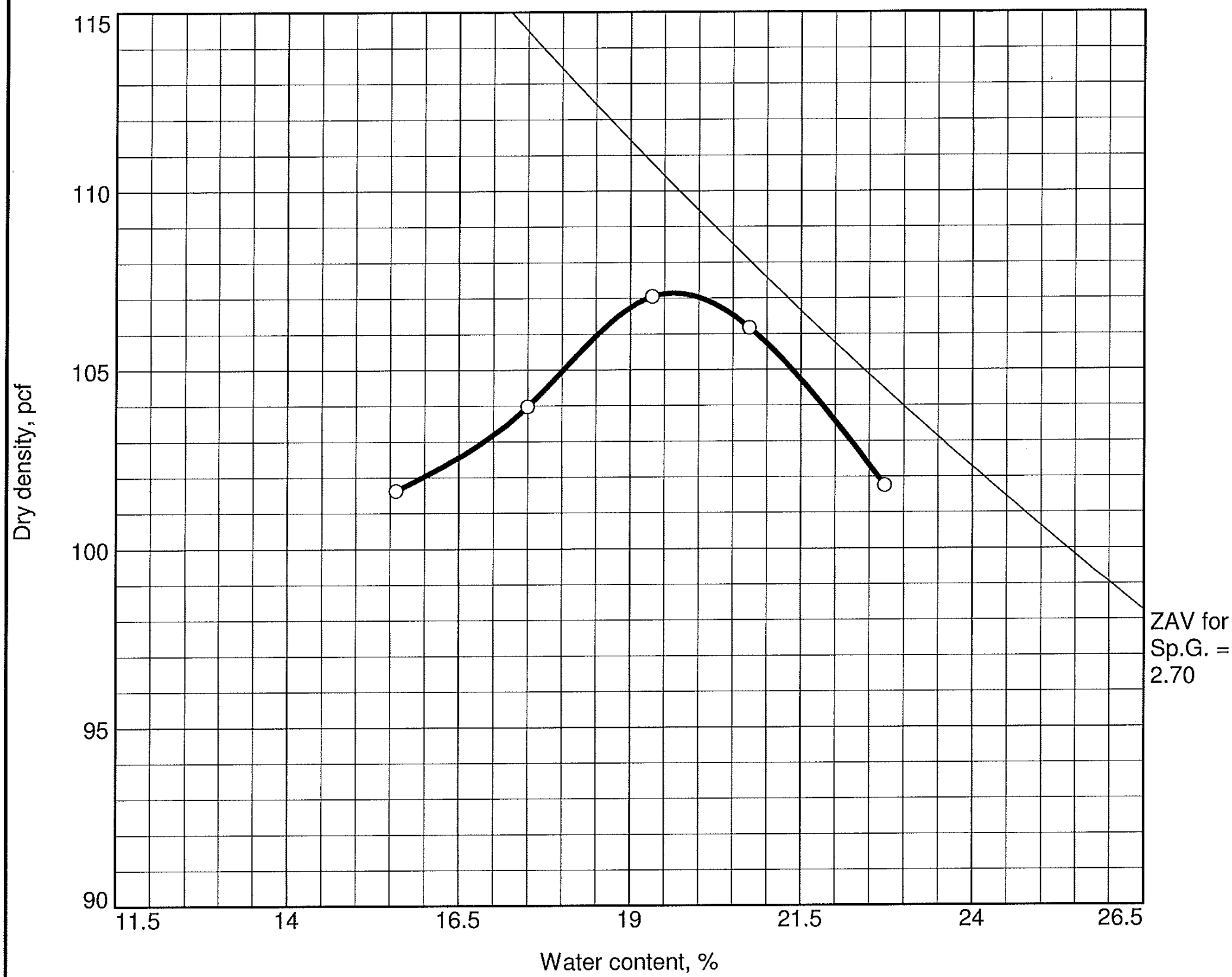
TRC Environmental Corp.

Madison, Wisconsin

Remarks:
382,100N/2,201,100E
Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 698-00a Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,400N/ 2,201,	CL	A-6(20)	23.2		40	22	1.7	90.0

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 107.1 pcf Optimum moisture = 19.6 %	Lean clay

Project No. 220142.0000 **Client:** Dane County
Project: Dane County Rodefeld

o **Source of Sample:** Lift 1 **Sample Number:** B-2

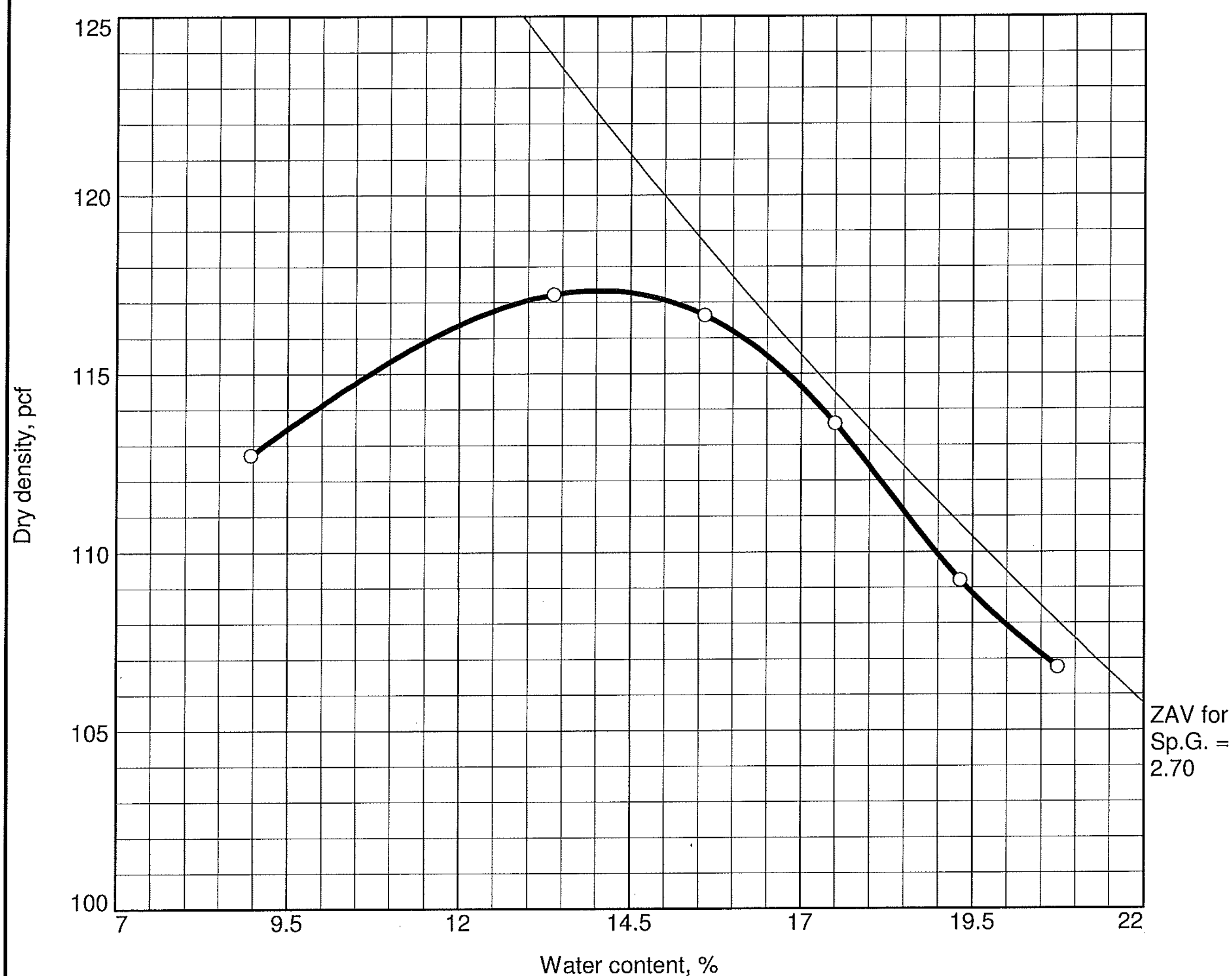
TRC Environmental Corp.

Madison, Wisconsin

Remarks:
382,400N/2,201,000E
Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-02 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,400N/ 2,201,	CL	A-6(20)	23.2		40	22	1.7	90.0

TEST RESULTS

Maximum dry density = 117.3 pcf

Optimum moisture = 14.0 %

MATERIAL DESCRIPTION

Lean clay

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

o **Source of Sample:** Lift 1 **Sample Number:** B-2

Remarks:

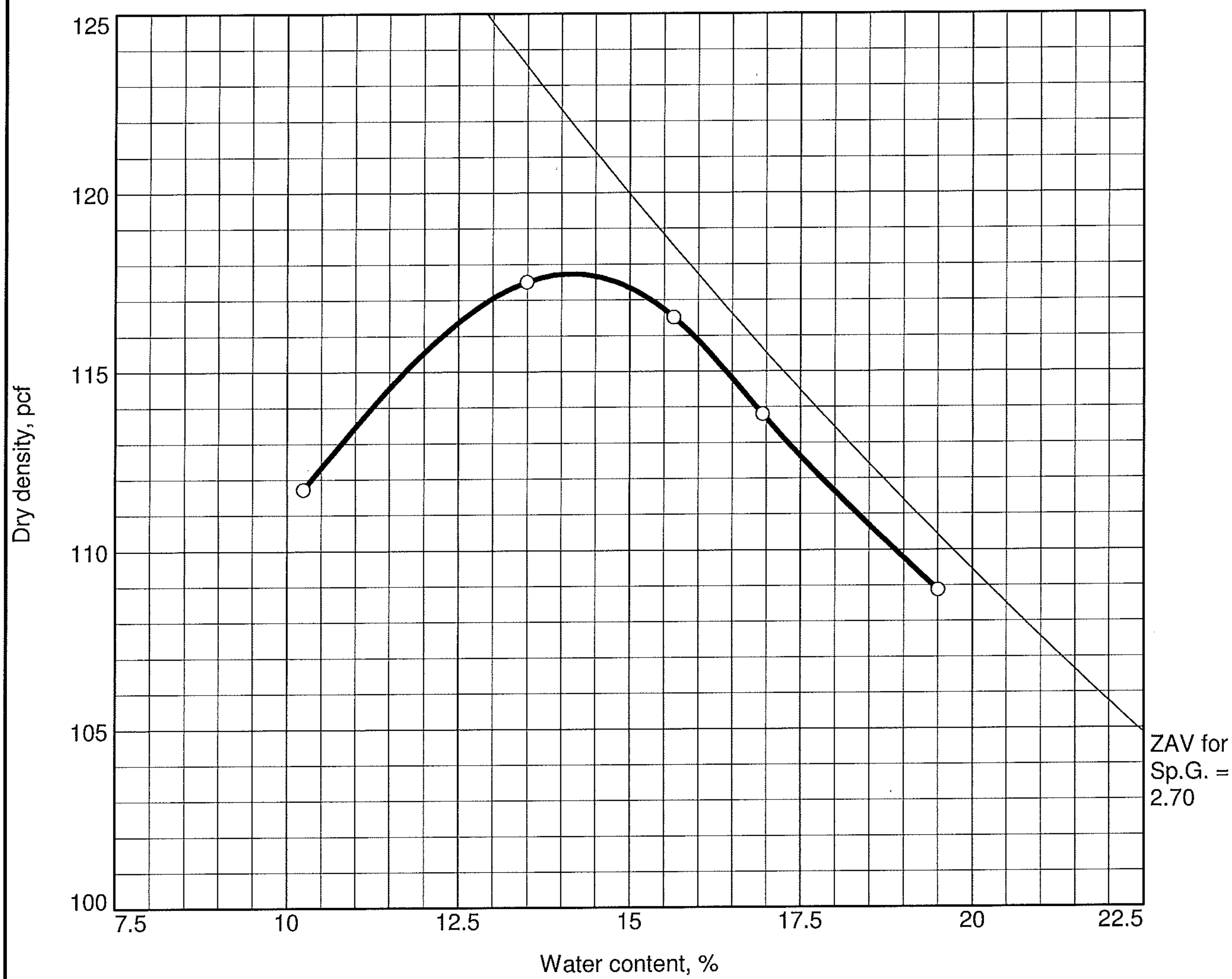
382,400N/2,201,000E
Brown

TRC Environmental Corp.

Madison, Wisconsin

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-02 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,700N/ 2,200,	CL	A-7-6(20)	22.8		41	22	0.8	90.4

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.7 pcf Optimum moisture = 14.1 %	Lean clay

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

○ **Source of Sample:** Lift 1 **Sample Number:** B-3

TRC Environmental Corp.

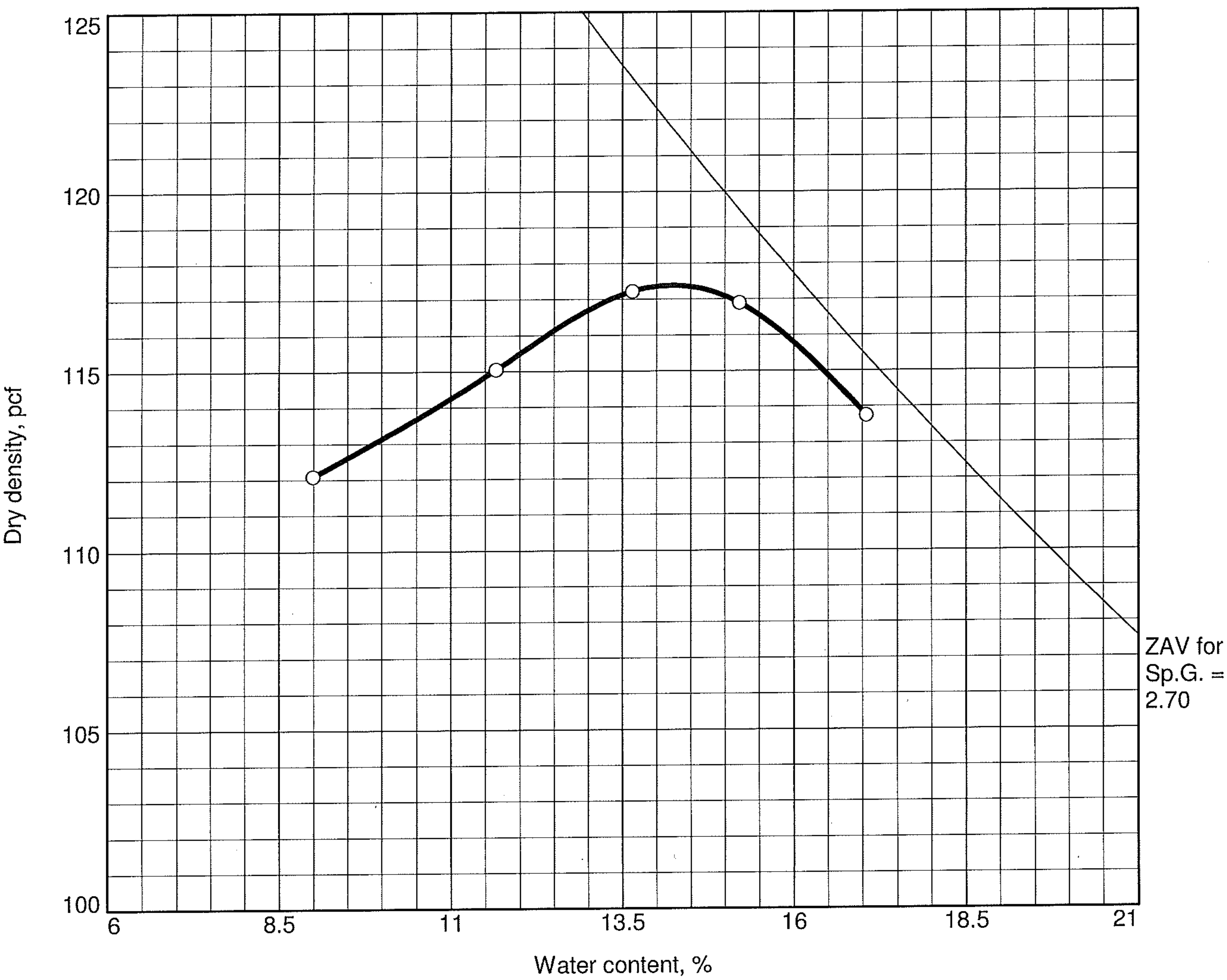
Madison, Wisconsin

Remarks:

382,700N/2,200,900E
Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-02 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,350N/ 2,201,	CL	A-6(19)	22.6		40	21	0.8	88.4

TEST RESULTS

Maximum dry density = 117.4 pcf

Optimum moisture = 14.2 %

MATERIAL DESCRIPTION

Lean clay

Project No. 220142.0000 **Client:** Dane County
Project: Dane County Rodefeld

○ **Source of Sample:** Lift 2 **Sample Number:** B-4

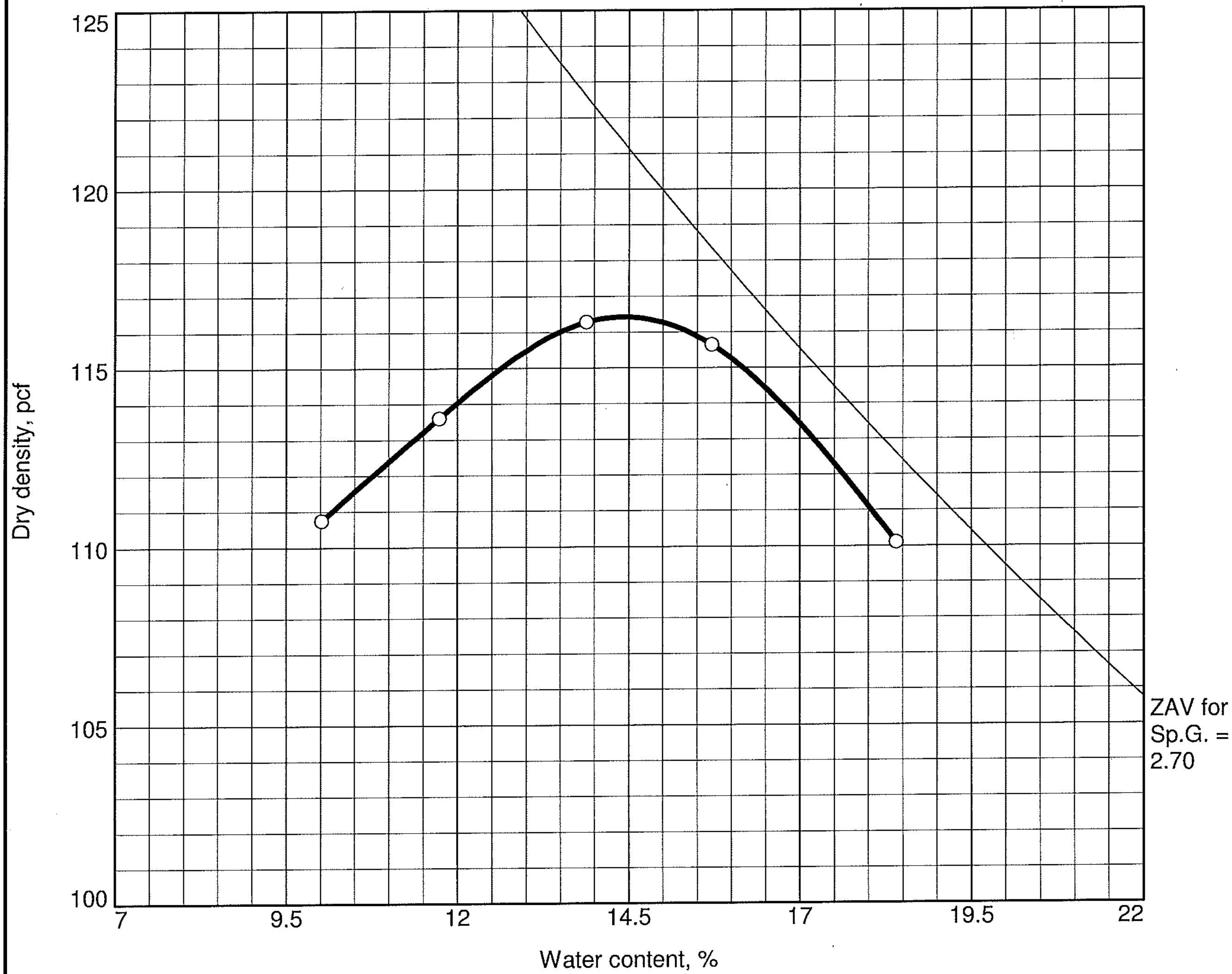
TRC Environmental Corp.

Madison, Wisconsin

Remarks:
Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-02 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,750N/ 2,200,	CL	A-7-6(21)	25.1		41	22	0.6	93.0

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 116.4 pcf Optimum moisture = 14.4 %	Lean clay

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

○ **Source of Sample:** Lift 2 **Sample Number:** B-5

TRC Environmental Corp.

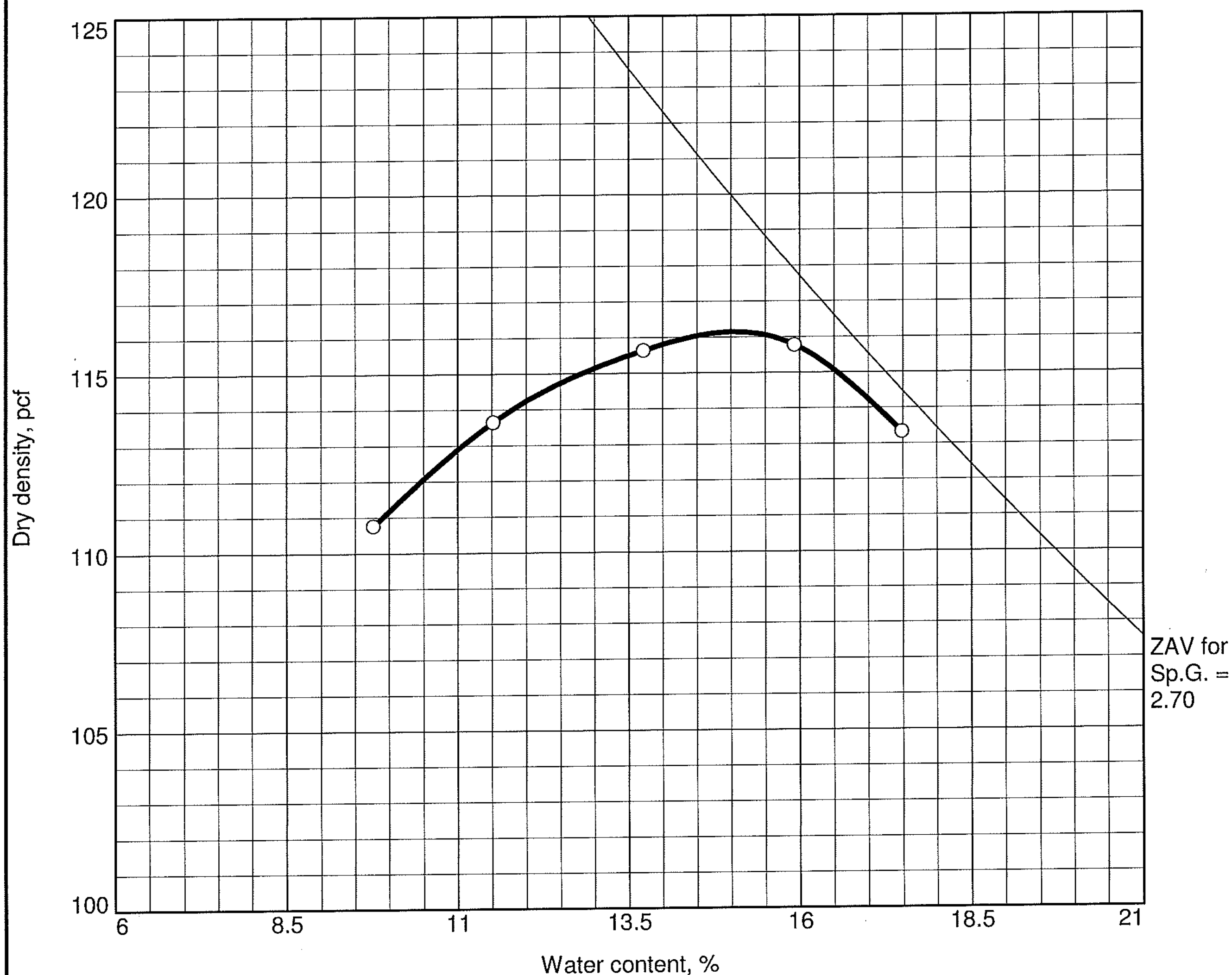
Madison, Wisconsin

Remarks:

Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-02 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,050N/ 2,200,	CL	A-6(19)	22.3		39	20	0.6	91.9

TEST RESULTS

Maximum dry density = 116.1 pcf

Optimum moisture = 15.0 %

MATERIAL DESCRIPTION

Lean clay

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

○ **Source of Sample:** Lift 2 **Sample Number:** B-6

TRC Environmental Corp.

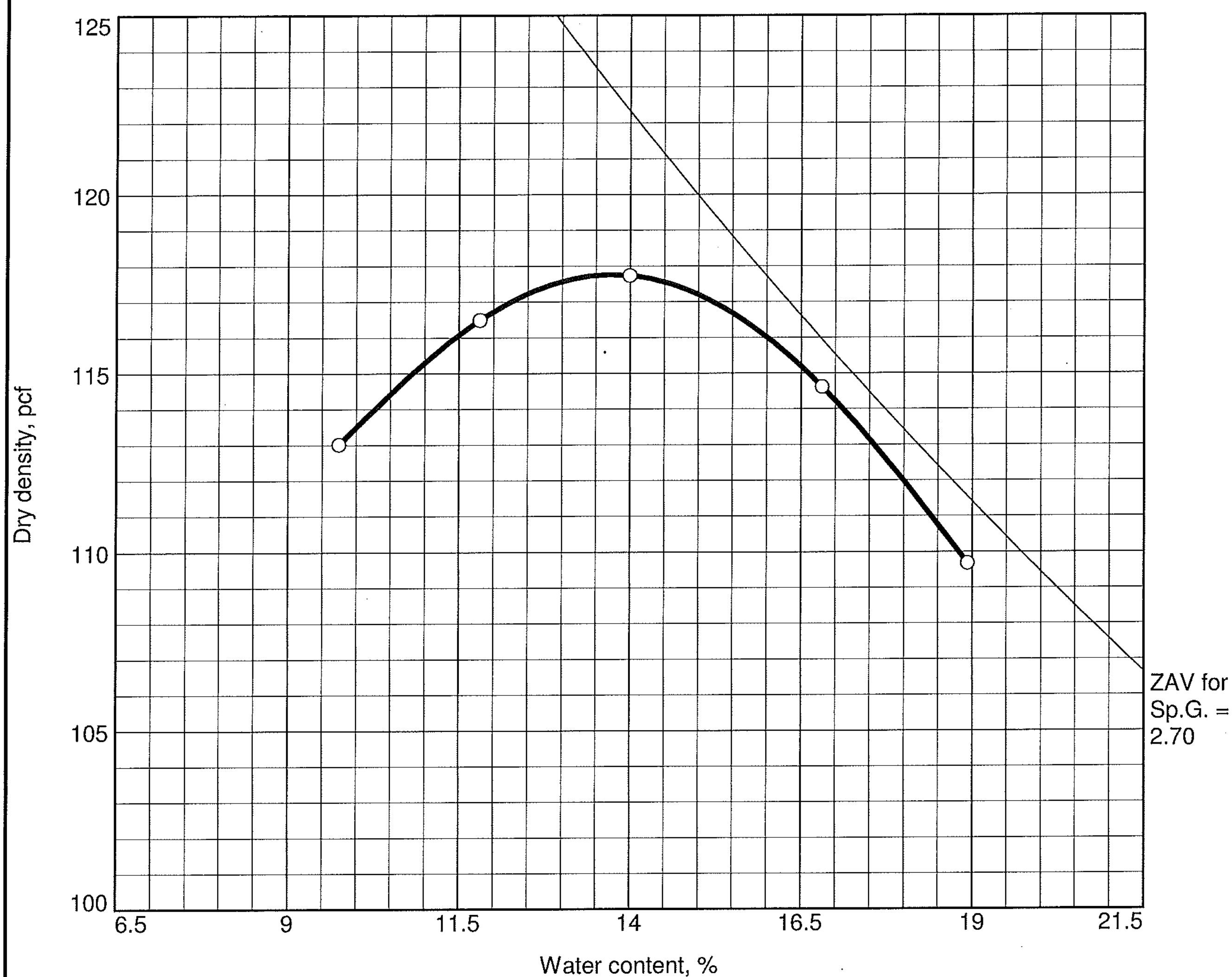
Madison, Wisconsin

Remarks:

Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-02 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,700N/ 2,201,	CL	A-6(17)	24.7		38	20	3.3	86.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.8 pcf Optimum moisture = 13.7 %	Lean clay

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

○ **Source of Sample:** Lift 3 **Sample Number:** B-7 (Modified)

TRC Environmental Corp.

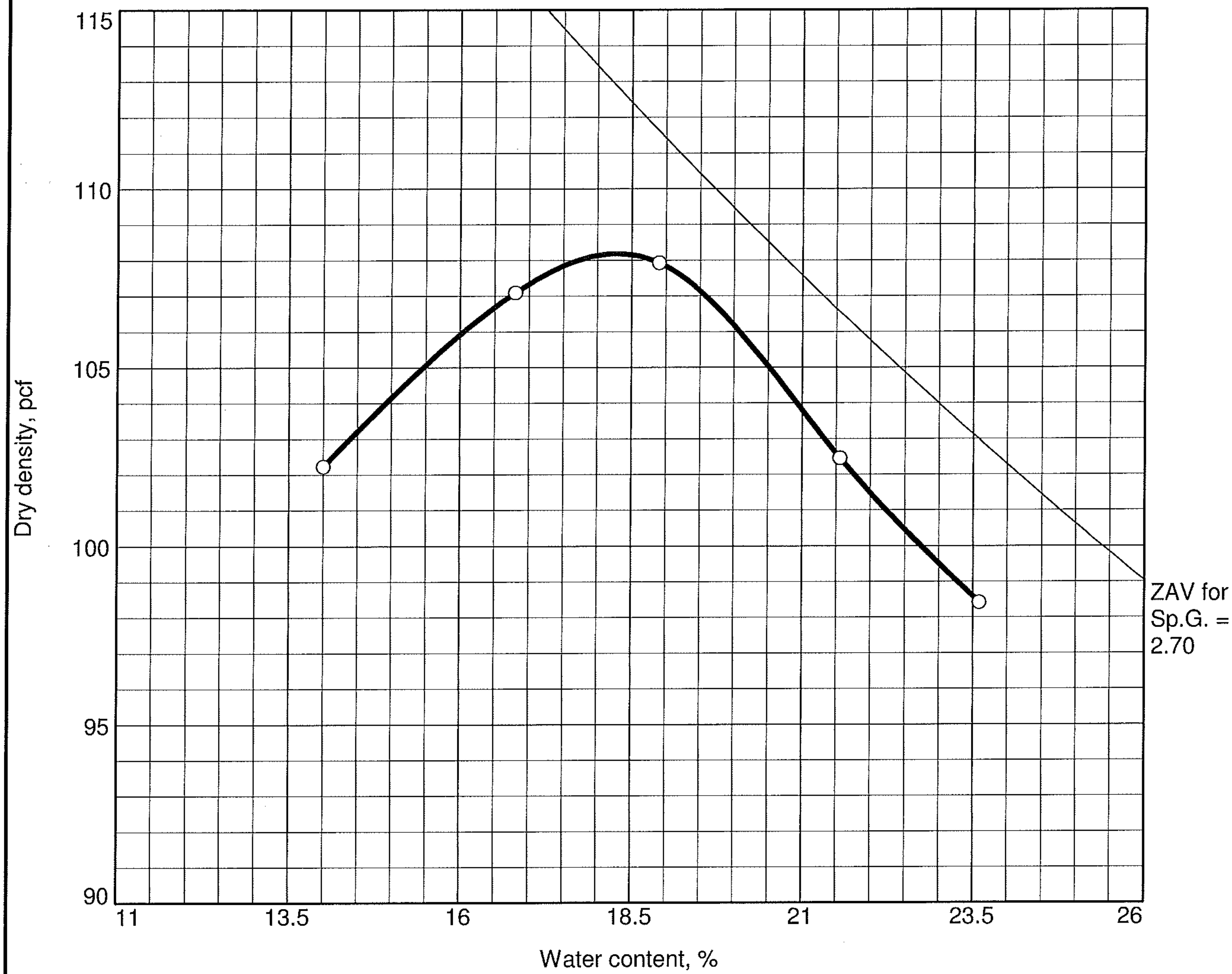
Madison, Wisconsin

Remarks:

Brown to Grayish Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 698-00a Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,700N/ 2,201,	CL	A-6(17)	24.7		38	20	3.3	86.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 108.2 pcf Optimum moisture = 18.3 %	Lean clay

Project No. 220142.0000 **Client:** Dane County
Project: Dane County Rodefeld

○ **Source of Sample:** Lift 3 **Sample Number:** B-7 (Standard)

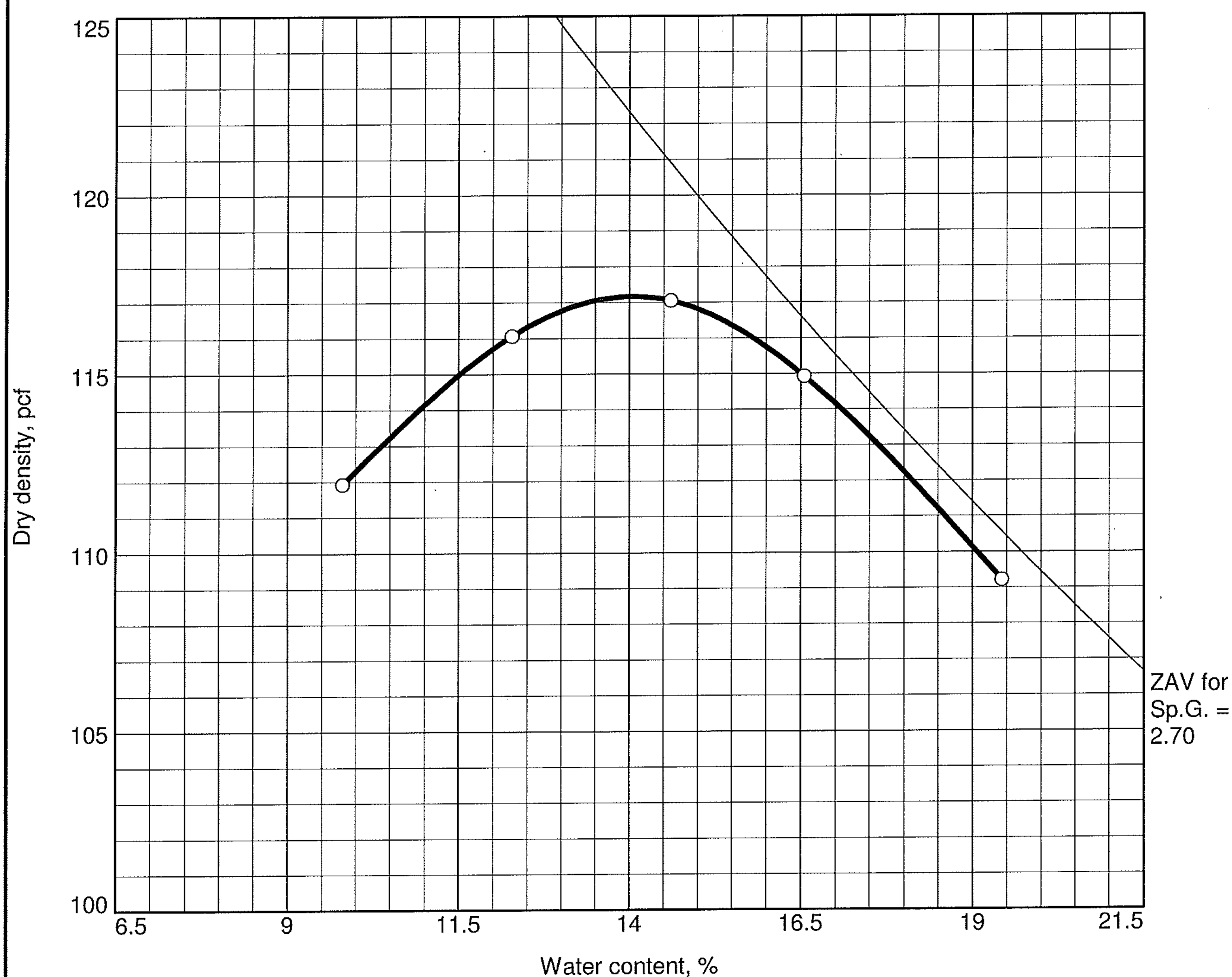
Remarks:
Brown to Grayish Brown

TRC Environmental Corp.

Madison, Wisconsin

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-02 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,700N/ 2,200,	CL		24.7		38	19	0.5	91.2

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.2 pcf Optimum moisture = 14.1 %	Lean clay

Project No. 220142.0000 **Client:** Dane County
Project: Dane County Rodefeld

○ **Source of Sample:** Lift 3 **Sample Number:** B-8 (Modified)

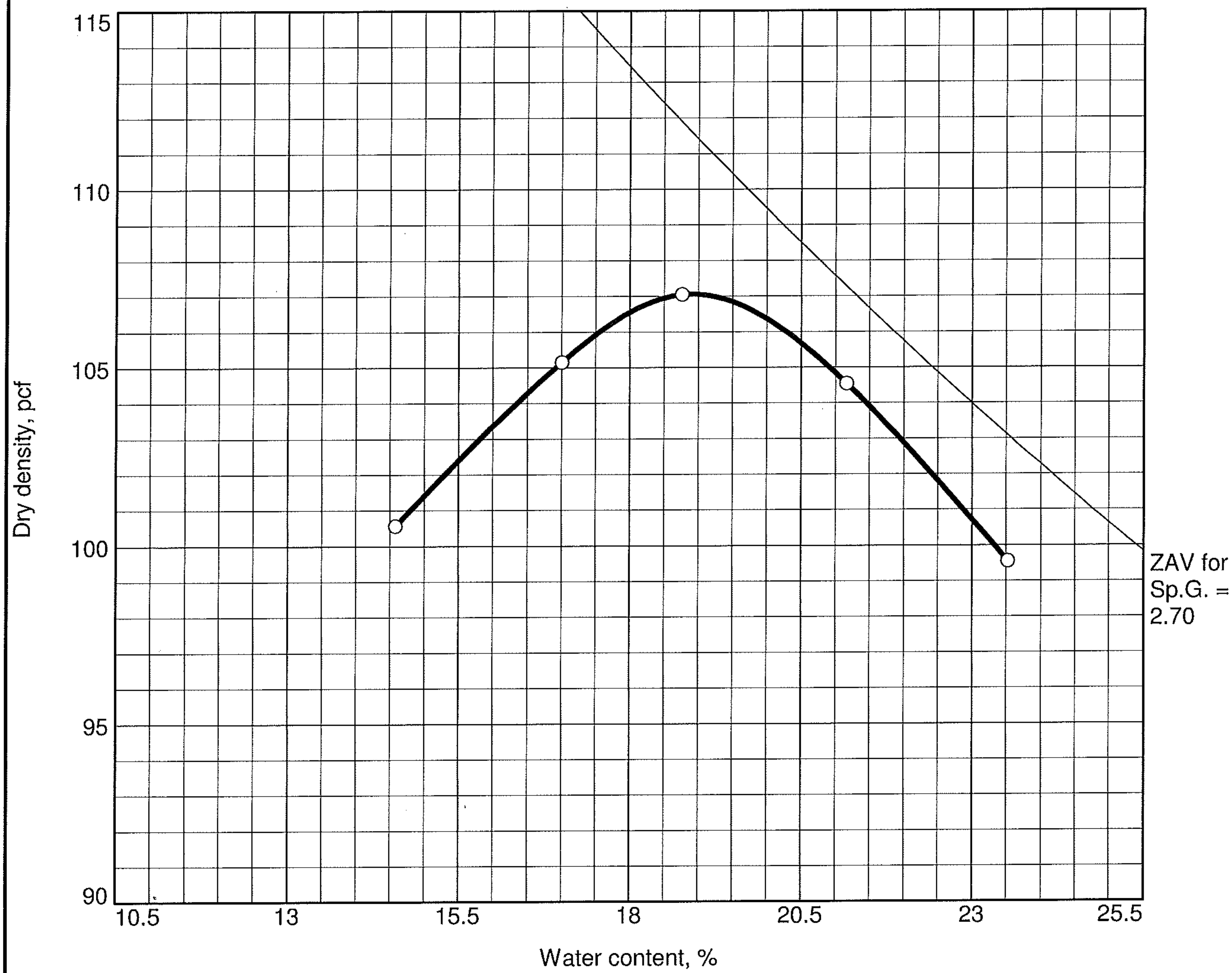
TRC Environmental Corp.

Madison, Wisconsin

Remarks:
Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 698-00a Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,700N/ 2,200,	CL	A-6(17)	24.7		38	19	0.5	91.2

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 107.1 pcf Optimum moisture = 18.9 %	Lean clay

Project No. 220142.0000 **Client:** Dane County
Project: Dane County Rodefeld

○ **Source of Sample:** Lift 3 **Sample Number:** B-8 (Standard)

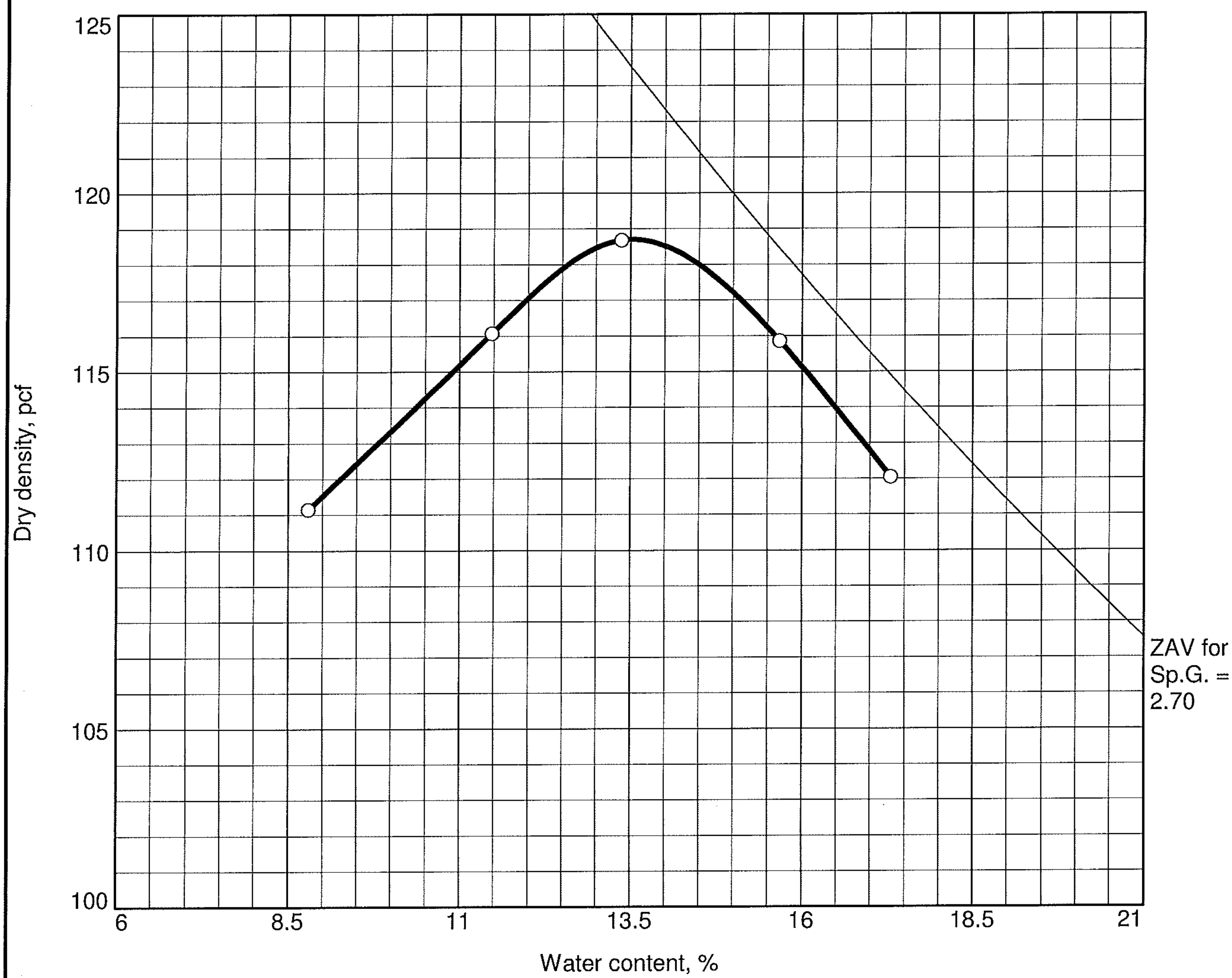
TRC Environmental Corp.

Madison, Wisconsin

Remarks:
Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-02 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,100N/ 2,200,	CL	A-6(17)	23.8		38	21	4.2	84.2

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 118.7 pcf Optimum moisture = 13.5 %	Lean clay with sand

Project No. 220142.0000 **Client:** Dane County
Project: Dane County Rodefeld

○ **Source of Sample:** Lift 3 **Sample Number:** B-9 (Modified)

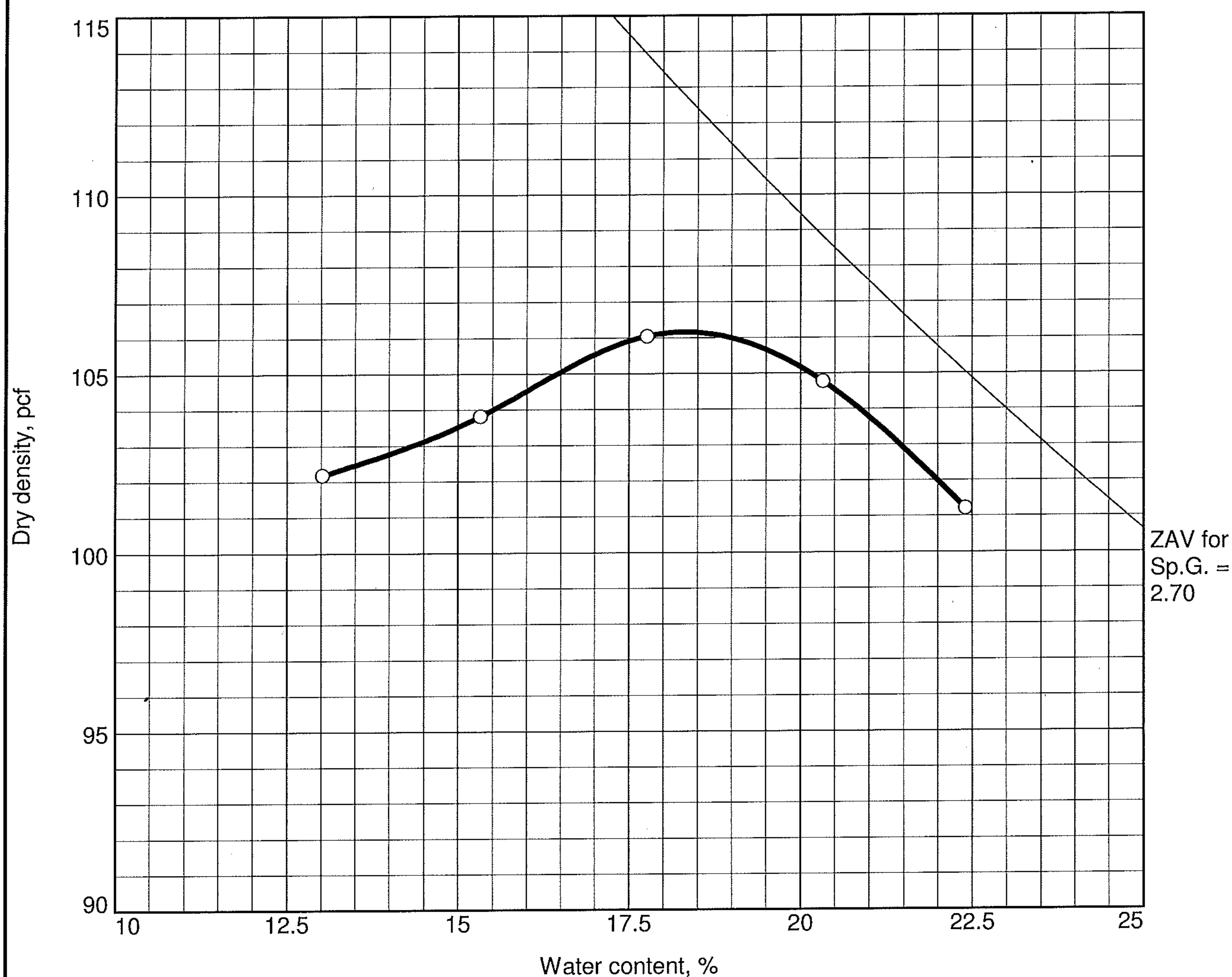
TRC Environmental Corp.

Madison, Wisconsin

Remarks:
Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 698-00a Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,100N/ 2,200,	CL	A-6(17)	23.8		38	21	4.2	84.2

TEST RESULTS

Maximum dry density = 106.2 pcf

Optimum moisture = 18.3 %

MATERIAL DESCRIPTION

Lean clay with sand

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

○ **Source of Sample:** Lift 3 **Sample Number:** B-9 (Standard)

Remarks:

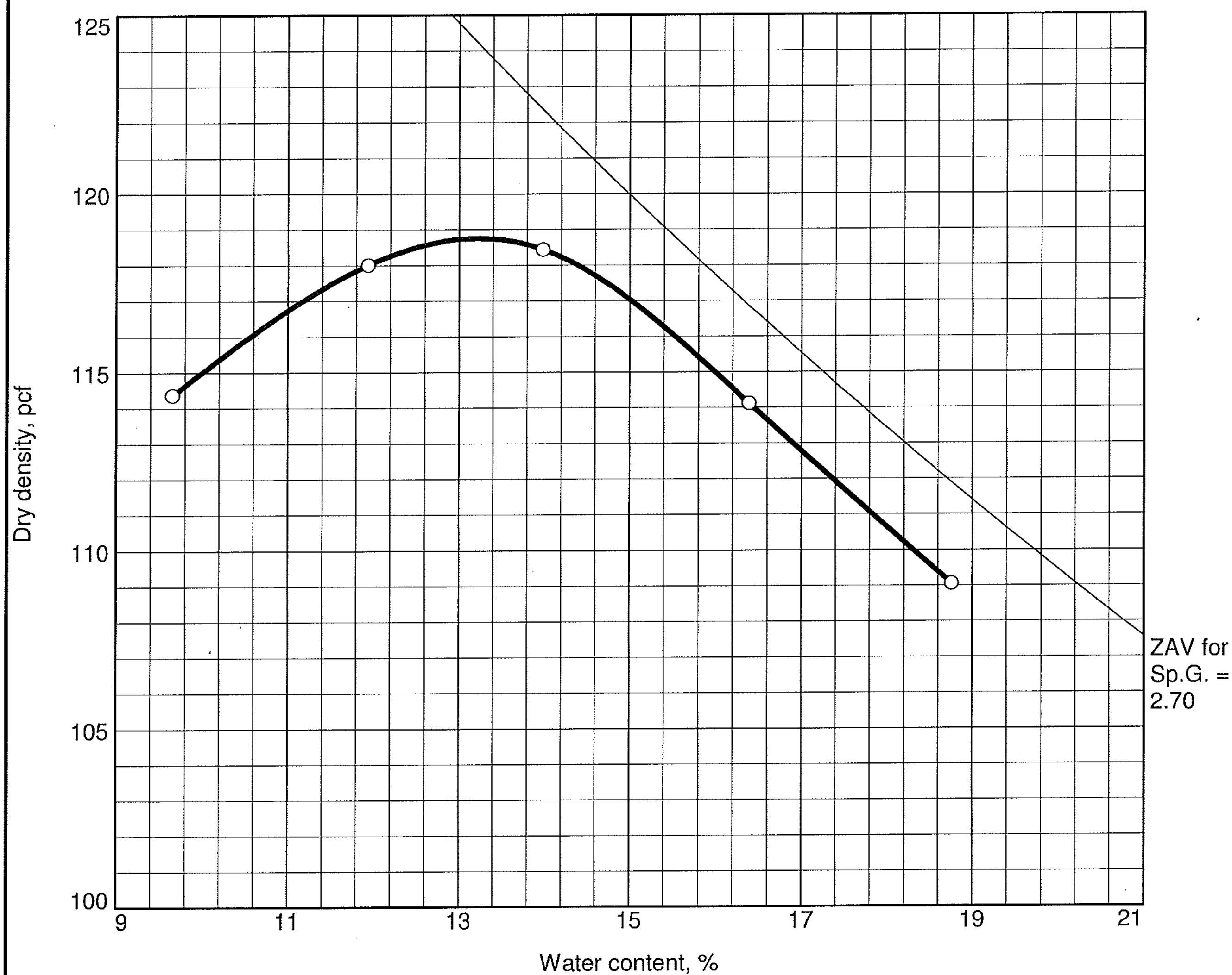
Brown

TRC Environmental Corp.

Madison, Wisconsin

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-02 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,350N/ 2,200,	CL	A-6(19)	24.3		40	20	0.4	92.8

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 118.8 pcf Optimum moisture = 13.2 %	Lean clay

Project No. 220142.0000 **Client:** Dane County
Project: Dane County Rodefeld

○ **Source of Sample:** Lift 4 **Sample Number:** B-10 (Modified)

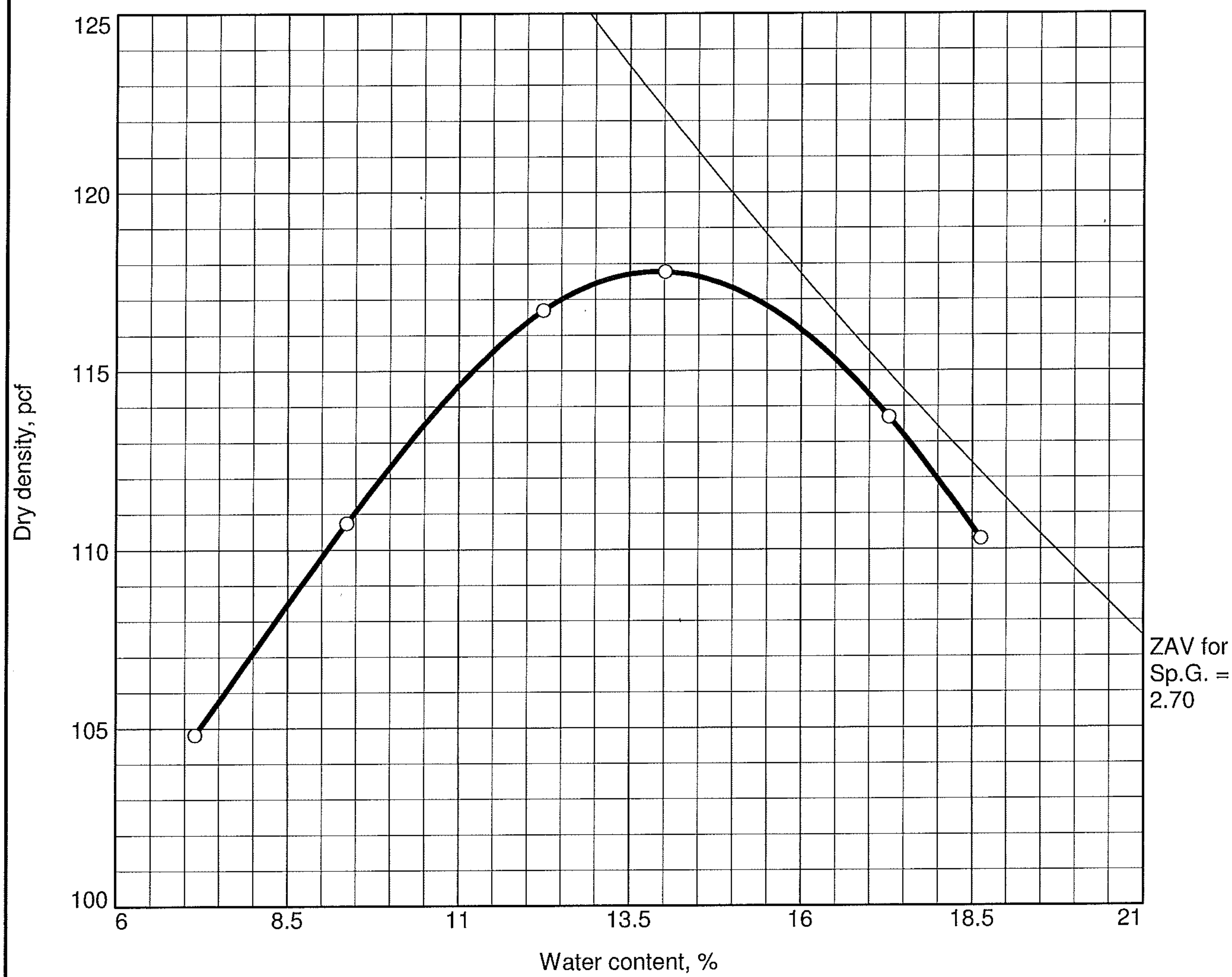
TRC Environmental Corp.

Madison, Wisconsin

Remarks:
Brown

Figure

COMPACTION TEST REPORT



Test specification: ASTM D 1557-02 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
382,250N/ 2,201,	CL	A-6(16)	21.7		38	19	3.8	85.5

TEST RESULTS

Maximum dry density = 117.8 pcf

Optimum moisture = 13.9 %

MATERIAL DESCRIPTION

Lean clay

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

○ **Source of Sample:** Lift 4 **Sample Number:** B-11 (Modified)

Remarks:

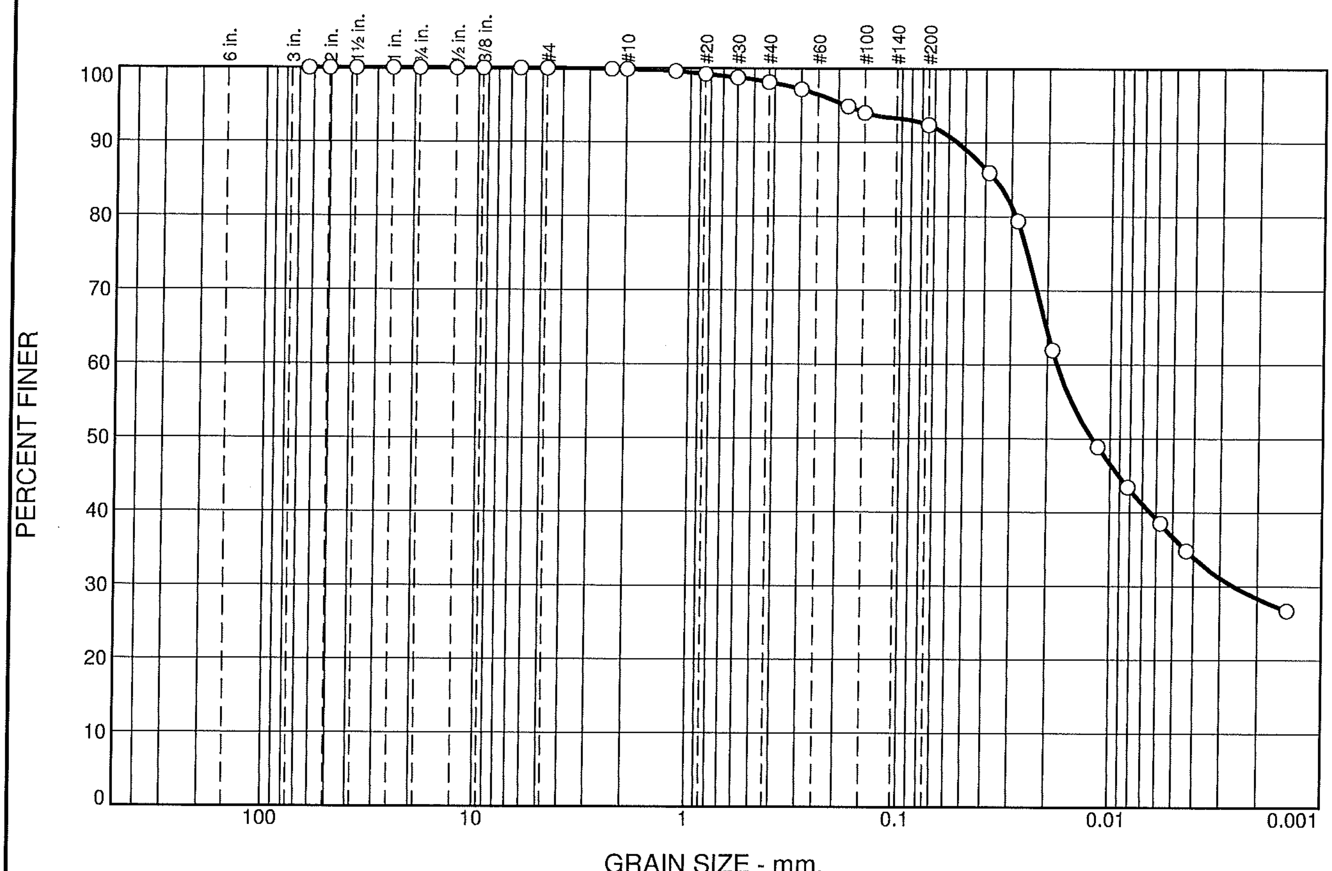
Brown

TRC Environmental Corp.

Madison, Wisconsin

Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.8	5.7	55.7	36.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	99.9		
#10	99.9		
#16	99.6		
#20	99.2		
#30	98.8		
#40	98.1		
#50	97.2		
#80	94.9		
#100	94.0		
#200	92.4		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 18 LL= 36 PI= 18

Coefficients

D_{90}= 0.0545 D_{85}= 0.0359 D_{60}= 0.0180
D_{50}= 0.0122 D_{30}= 0.0026 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(16)

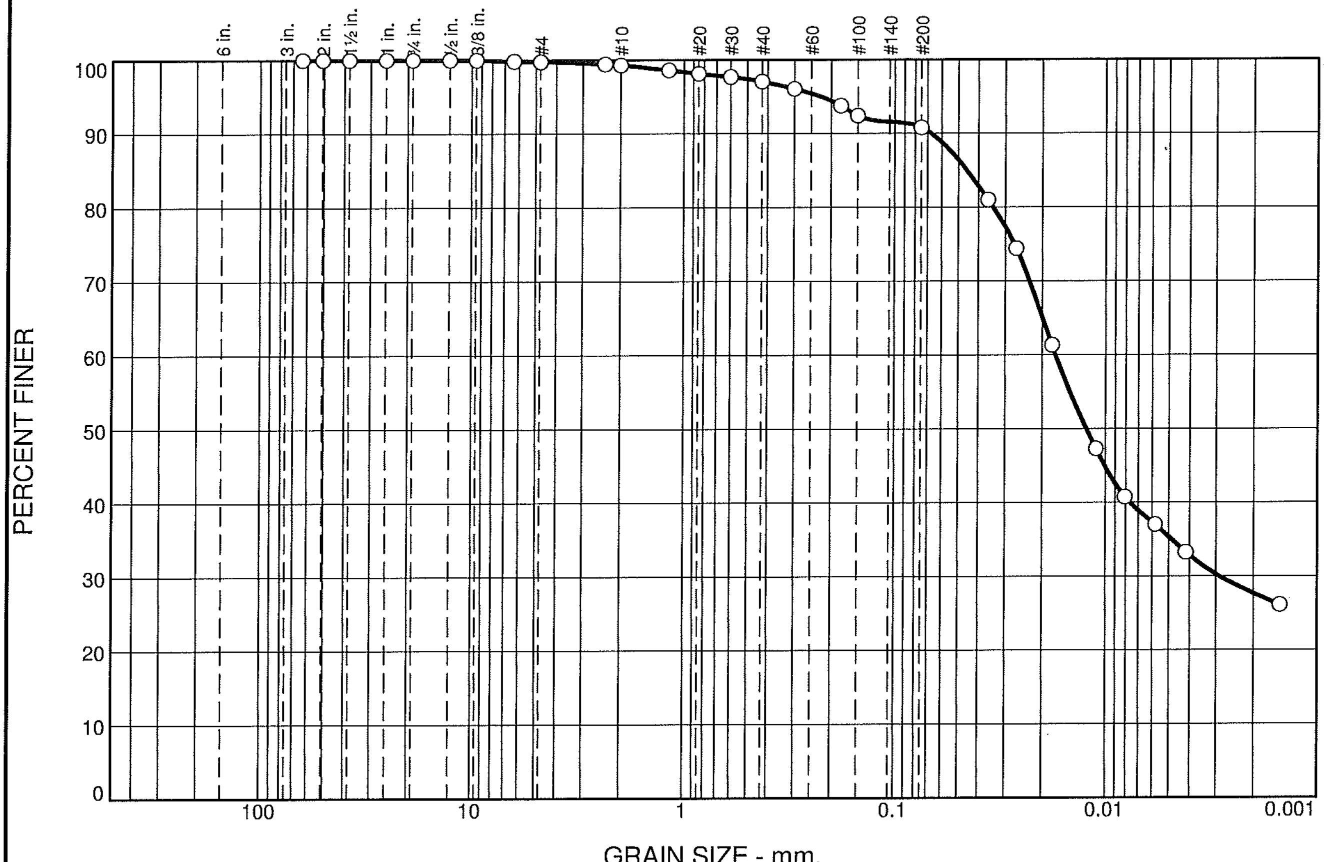
Remarks

Source of Sample: Lift 1 **Depth:** 382,600N/2,201,000E
Sample Number: T-1 **Date:** 08-26-14

TRC Environmental Corp.
Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	0.4	2.3	6.2	55.5	35.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	99.8		
#4	99.7		
#8	99.4		
#10	99.3		
#16	98.6		
#20	98.1		
#30	97.7		
#40	97.0		
#50	96.0		
#80	93.7		
#100	92.4		
#200	90.8		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 18 LL= 37 PI= 19

Coefficients

D_{90}= 0.0672 D_{85}= 0.0456 D_{60}= 0.0173
D_{50}= 0.0124 D_{30}= 0.0029 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(17)

Remarks

Source of Sample: Lift 1 **Depth:** 382,500N/2,200,900E
Sample Number: T-2

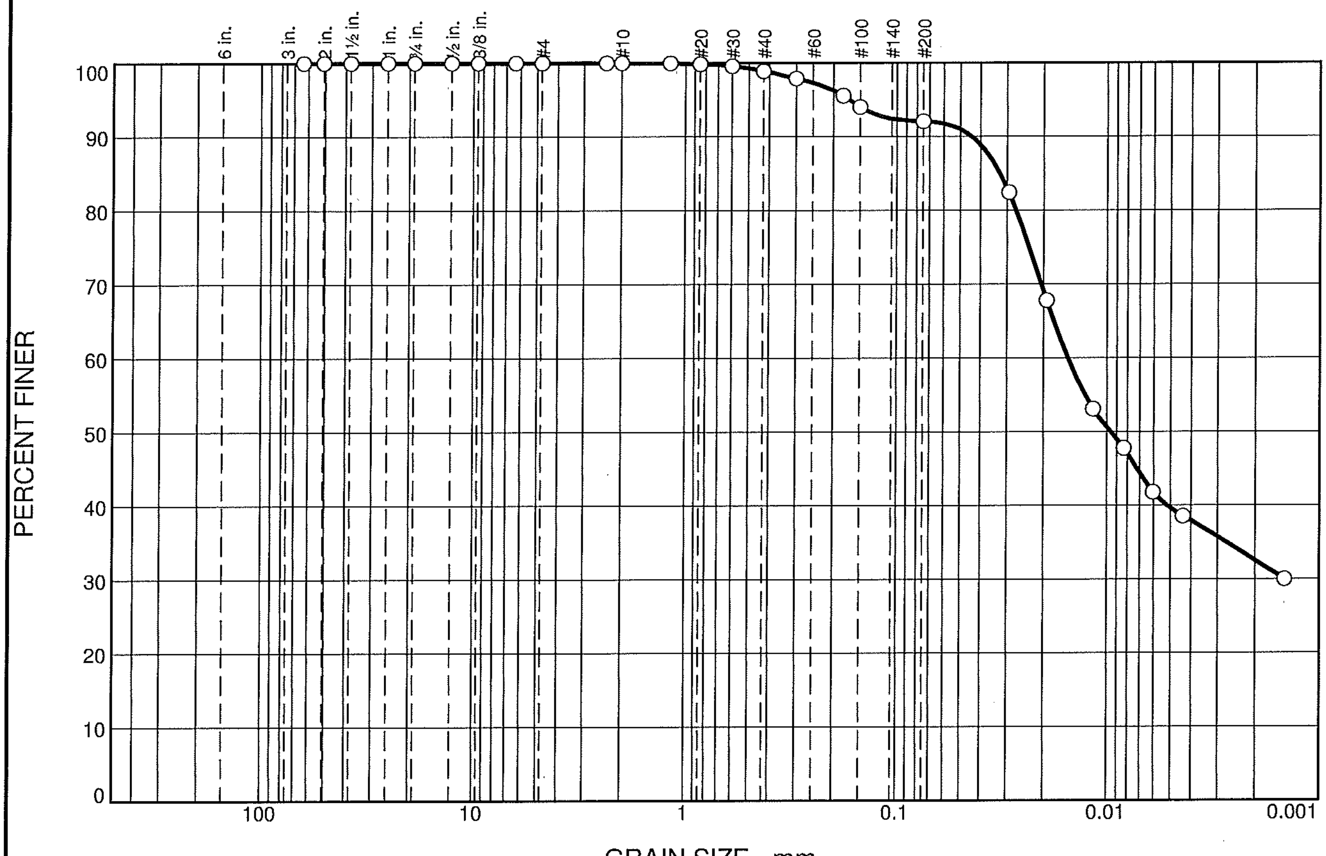
Date: 09-02-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	1.1	6.8	52.5	39.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	100.0		
#10	100.0		
#16	100.0		
#20	99.9		
#30	99.6		
#40	98.9		
#50	97.9		
#80	95.5		
#100	94.0		
#200	92.1		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 18 LL= 37 PI= 19

Coefficients

D_{90}= 0.0441 D_{85}= 0.0324 D_{60}= 0.0153
D_{50}= 0.0096 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(17)

Remarks

Source of Sample: Lift 1 **Depth:** 382,100N/2,201,100E
Sample Number: T-3

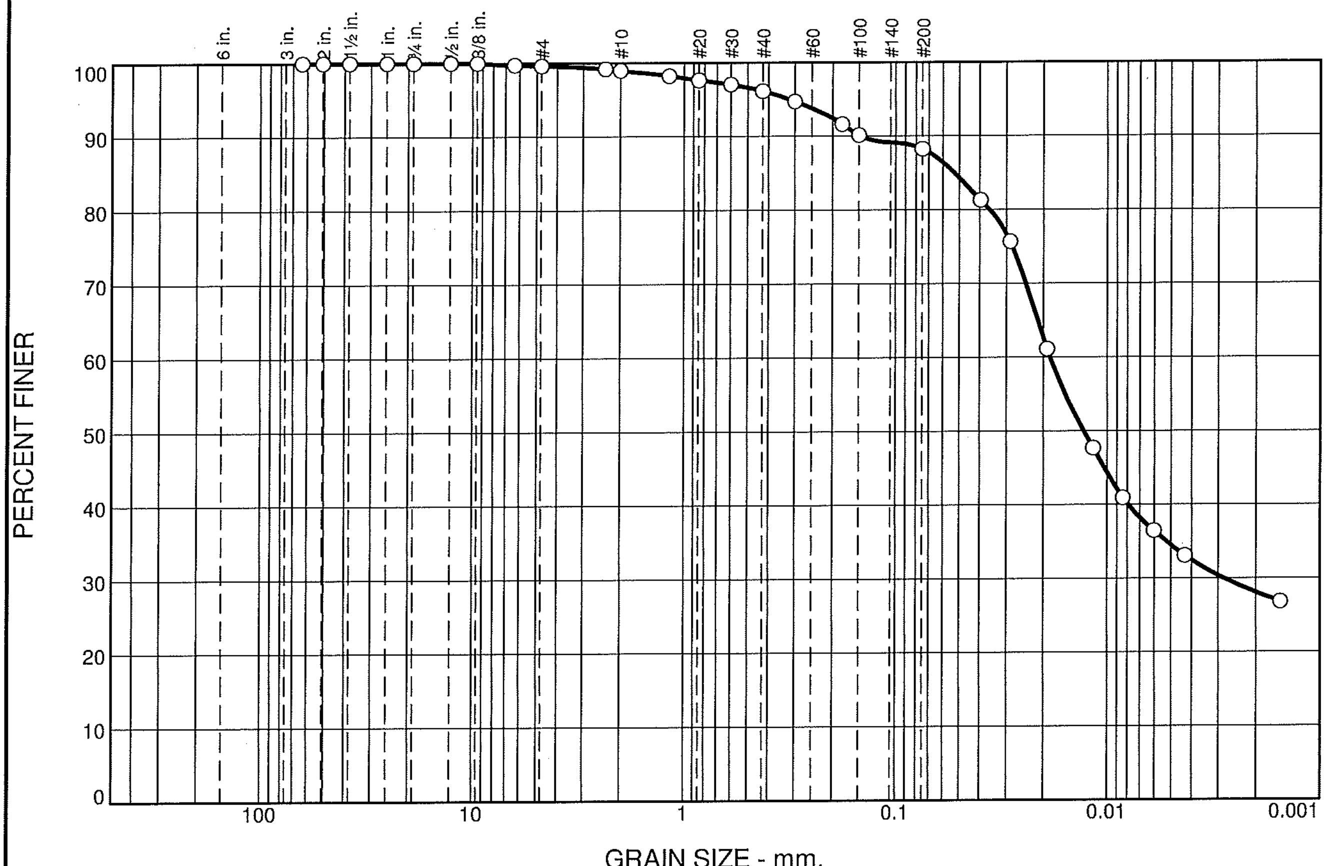
Date: 08-26-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.6	2.9	7.8	53.8	34.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	99.7		
#4	99.6		
#8	99.2		
#10	99.0		
#16	98.2		
#20	97.6		
#30	97.0		
#40	96.1		
#50	94.7		
#80	91.6		
#100	90.1		
#200	88.3		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 18 LL= 39 PI= 21

Coefficients

D_{90}= 0.1469 D_{85}= 0.0529 D_{60}= 0.0186
D_{50}= 0.0129 D_{30}= 0.0028 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(18)

Remarks

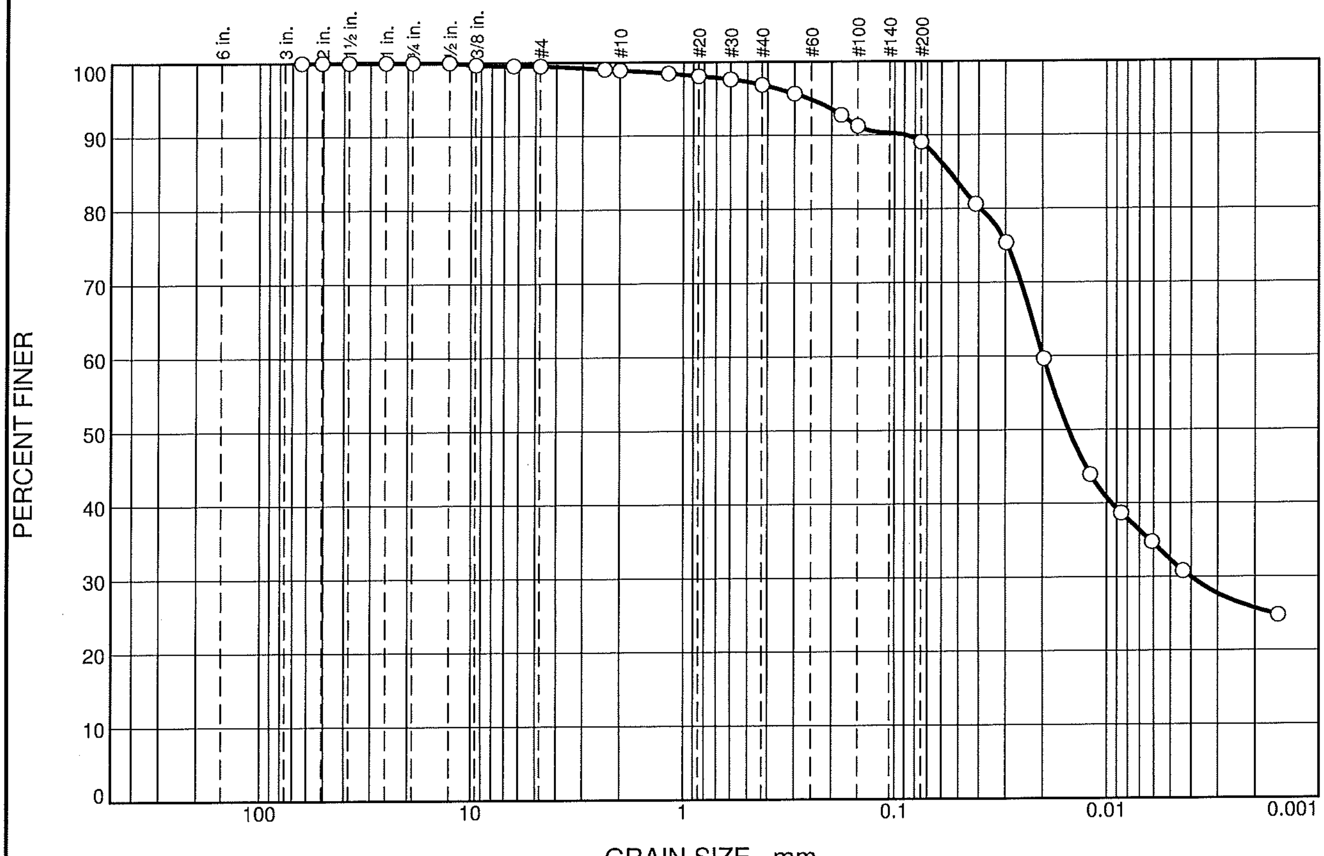
Source of Sample: Lift 1 **Depth:** 382,000N/2,200,900E
Sample Number: T-4 **Date:** 09-03-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	0.6	2.0	7.9	56.7	32.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	99.7		
.25	99.6		
#4	99.5		
#8	99.0		
#10	98.9		
#16	98.5		
#20	98.1		
#30	97.6		
#40	96.9		
#50	95.7		
#80	92.8		
#100	91.2		
#200	89.0		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 38 PI= 19

Coefficients

D_{90}= 0.0890 D_{85}= 0.0552 D_{60}= 0.0199
D_{50}= 0.0151 D_{30}= 0.0040 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(17)

Remarks

Source of Sample: Lift 1 **Depth:** 382,700N/2,201,100E
Sample Number: T-5

Date: 09-03-14

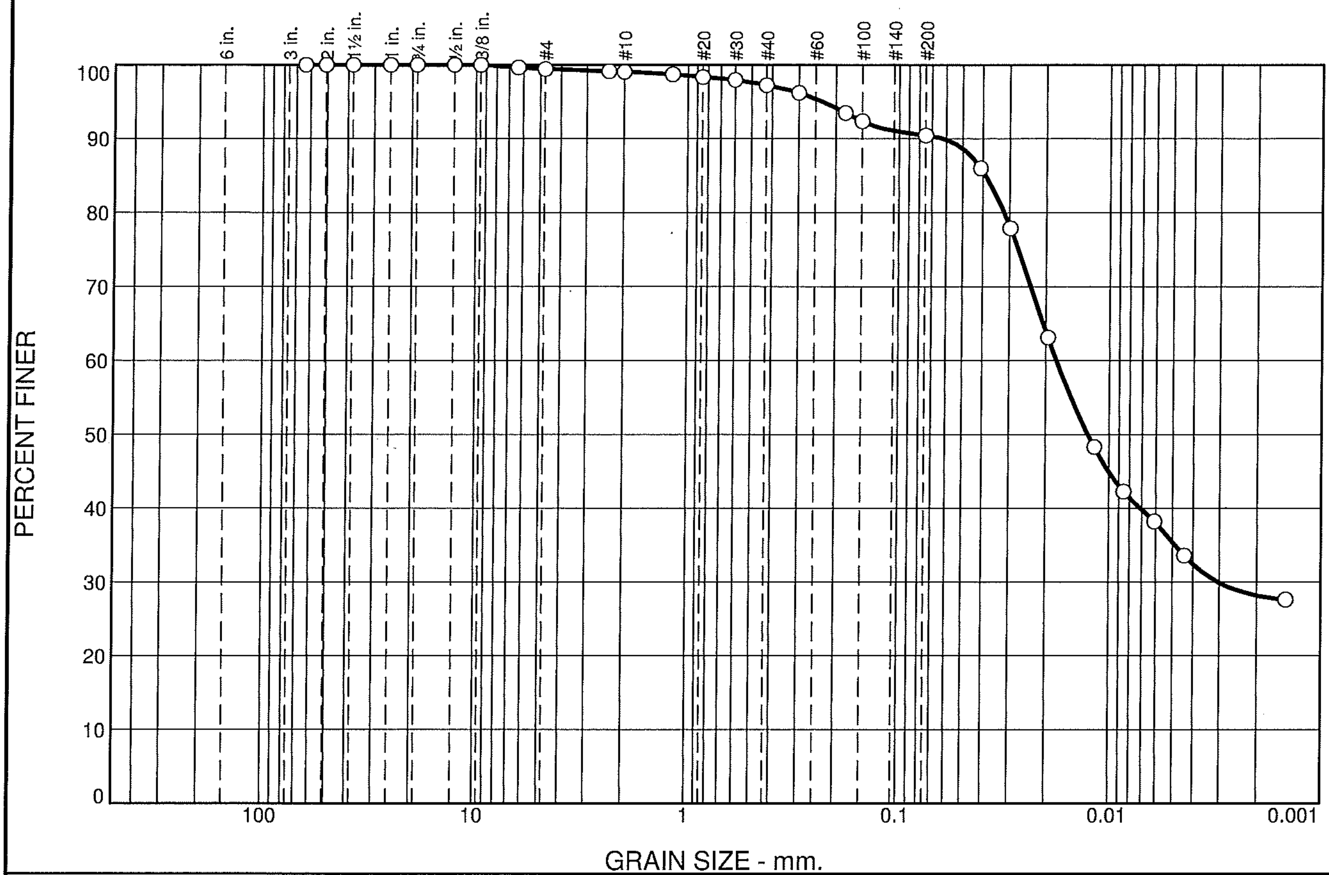
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld

Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	0.3	1.9	6.7	55.1	35.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	99.6		
#4	99.4		
#8	99.1		
#10	99.1		
#16	98.7		
#20	98.4		
#30	98.0		
#40	97.2		
#50	96.2		
#80	93.5		
#100	92.4		
#200	90.5		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 21 LL= 41 PI= 20

Coefficients

D_{90}= 0.0624 D_{85}= 0.0388 D_{60}= 0.0179
D_{50}= 0.0126 D_{30}= 0.0030 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(19)

Remarks

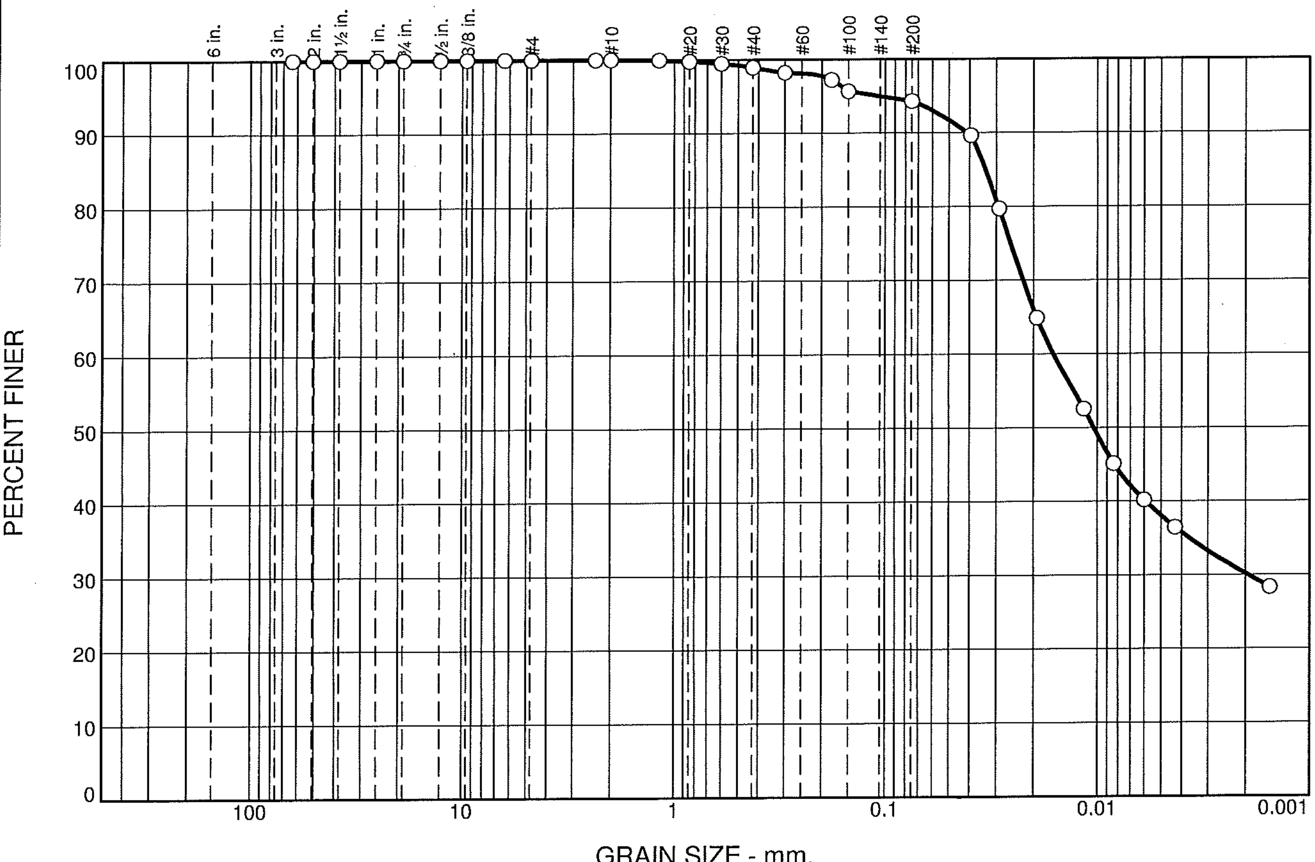
Source of Sample: Lift 1 **Depth:** 382,300N/2,201,100E
Sample Number: T-6 **Date:** 08-26-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	1.1	4.6	56.2	38.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	100.0		
#10	100.0		
#16	99.9		
#20	99.8		
#30	99.4		
#40	98.9		
#50	98.2		
#80	97.2		
#100	95.7		
#200	94.3		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 39 PI= 20

Coefficients

D_{90}= 0.0411 D_{85}= 0.0336 D_{60}= 0.0161
D_{50}= 0.0104 D_{30}= 0.0020 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(19)

Remarks

Source of Sample: Lift 1 **Depth:** 382,800N/2,201,200E
Sample Number: T-7

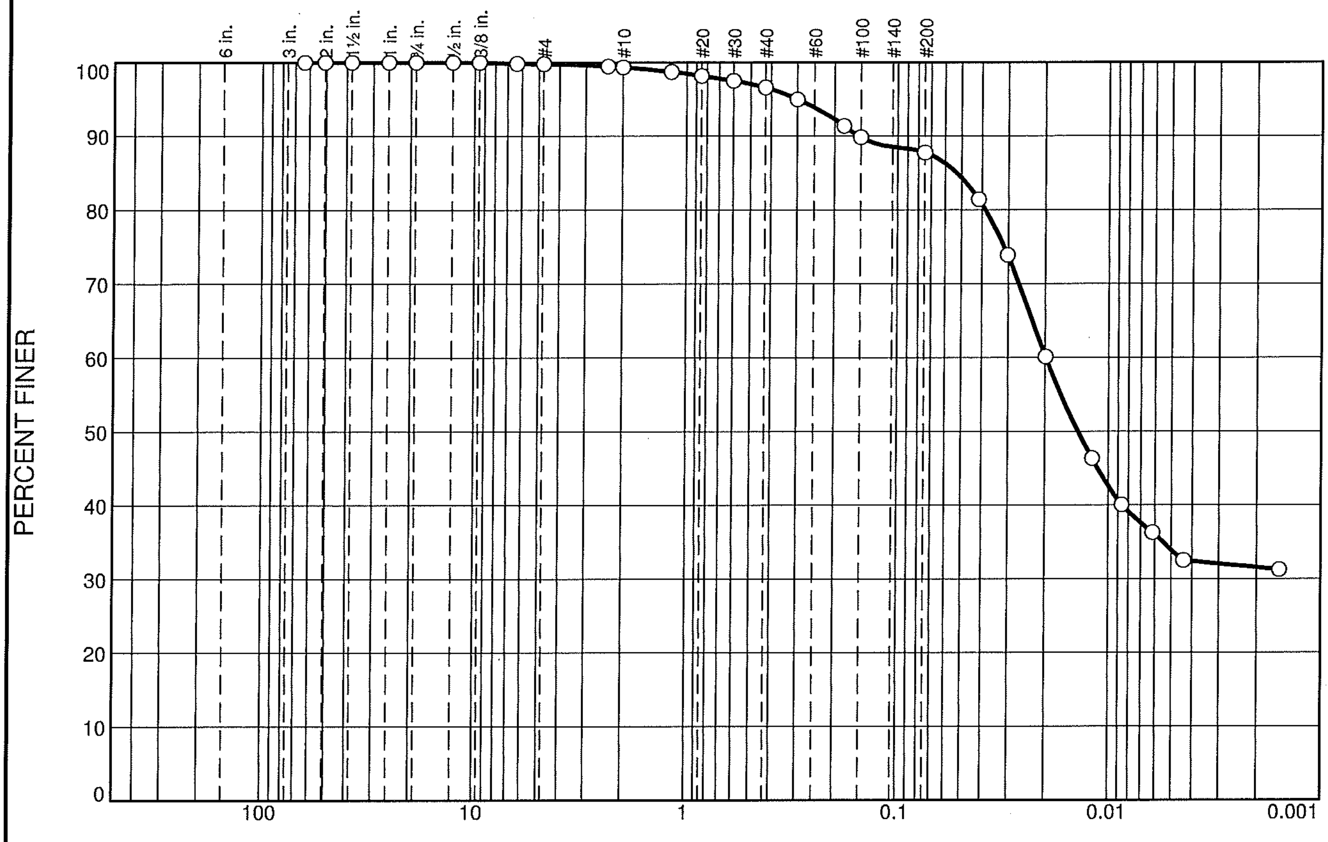
Date: 09-03-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.5	2.7	8.8	53.9	33.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	99.9		
#4	99.8		
#8	99.5		
#10	99.3		
#16	98.7		
#20	98.2		
#30	97.5		
#40	96.6		
#50	95.0		
#80	91.4		
#100	89.8		
#200	87.8		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 39 PI= 20

Coefficients

D_{90}= 0.1535 D_{85}= 0.0528 D_{60}= 0.0198
D_{50}= 0.0140 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(18)

Remarks

Source of Sample: Lift 1 **Depth:** 382,400N/2,201,200E
Sample Number: T-8

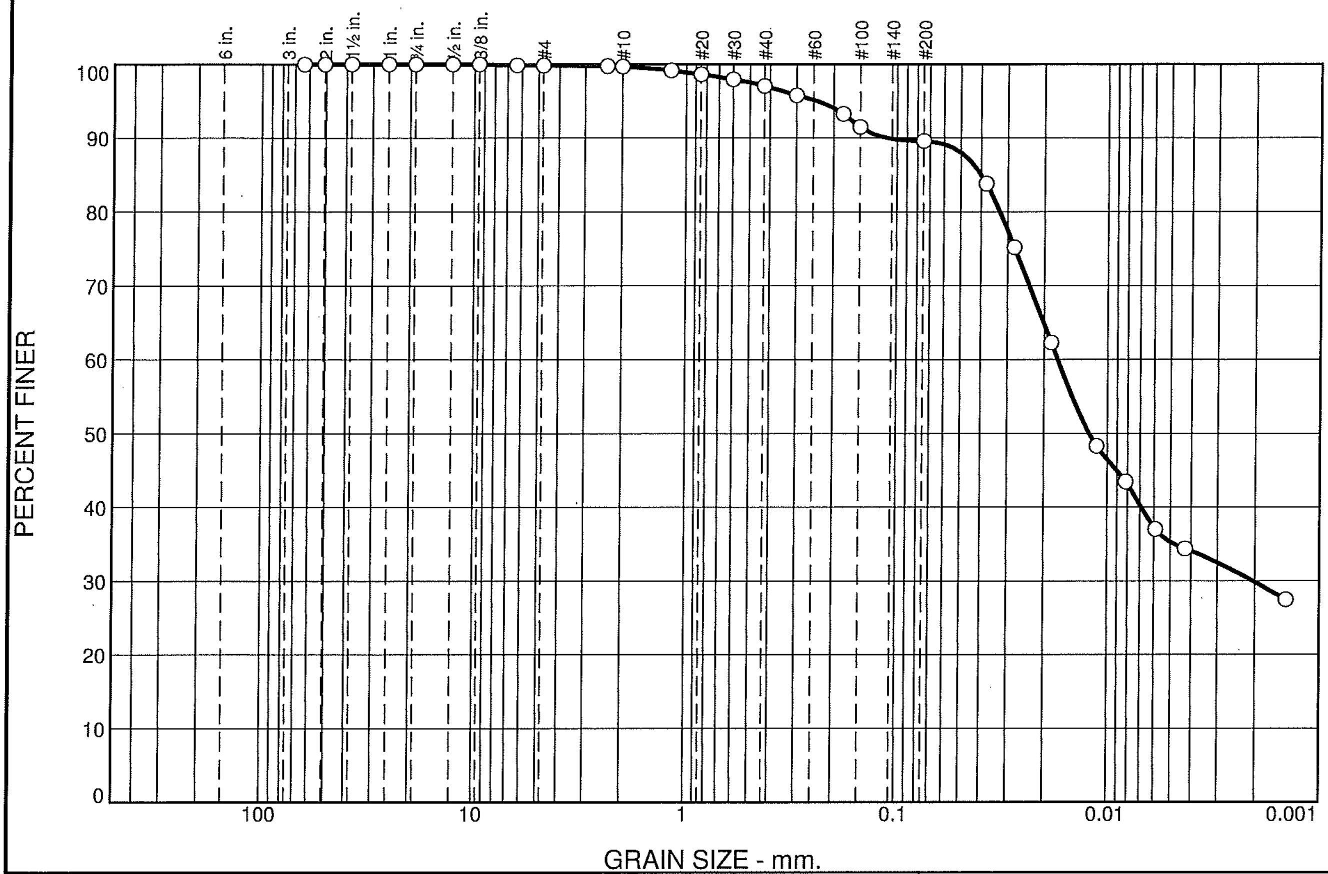
Date: 09-03-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.2	2.6	7.5	54.4	35.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	99.9		
#4	99.9		
#8	99.7		
#10	99.7		
#16	99.2		
#20	98.6		
#30	98.0		
#40	97.1		
#50	95.8		
#80	93.3		
#100	91.5		
#200	89.6		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 18 LL= 39 PI= 21

Coefficients

D_{90}= 0.1124 D_{85}= 0.0401 D_{60}= 0.0173
D_{50}= 0.0122 D_{30}= 0.0020 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(19)

Remarks

Source of Sample: Lift 2
Sample Number: T-9

Date: 08-26-14

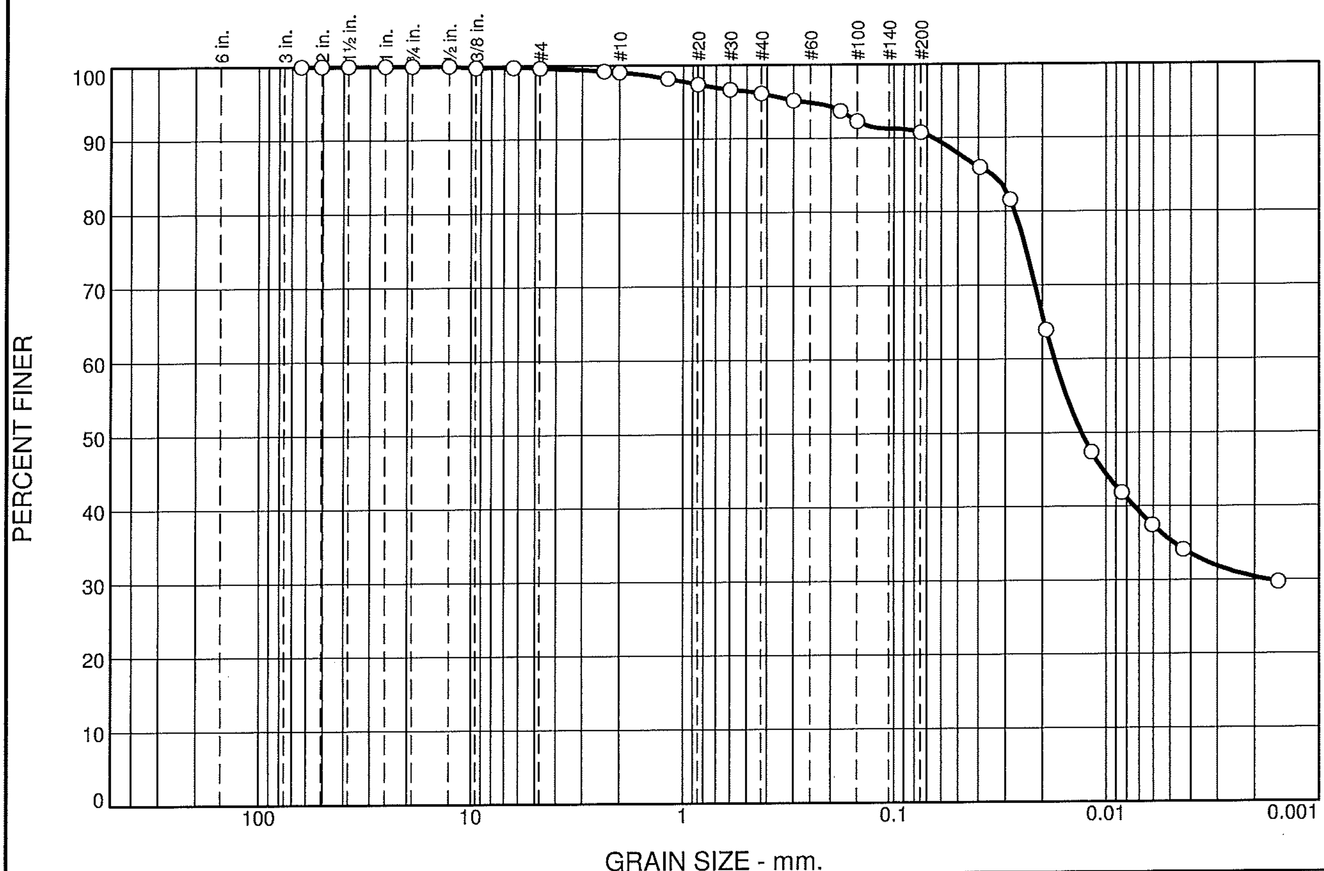
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld

Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.5	3.0	5.3	55.4	35.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	99.8		
.25	99.8		
#4	99.6		
#8	99.2		
#10	99.1		
#16	98.2		
#20	97.4		
#30	96.7		
#40	96.1		
#50	95.1		
#80	93.7		
#100	92.3		
#200	90.8		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 38 PI= 19

Coefficients

D_{90}= 0.0651 D_{85}= 0.0343 D_{60}= 0.0176
D_{50}= 0.0131 D_{30}= 0.0017 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(17)

Remarks

Source of Sample: Lift 2 **Depth:** 382,250N/2,200,850E
Sample Number: T-10

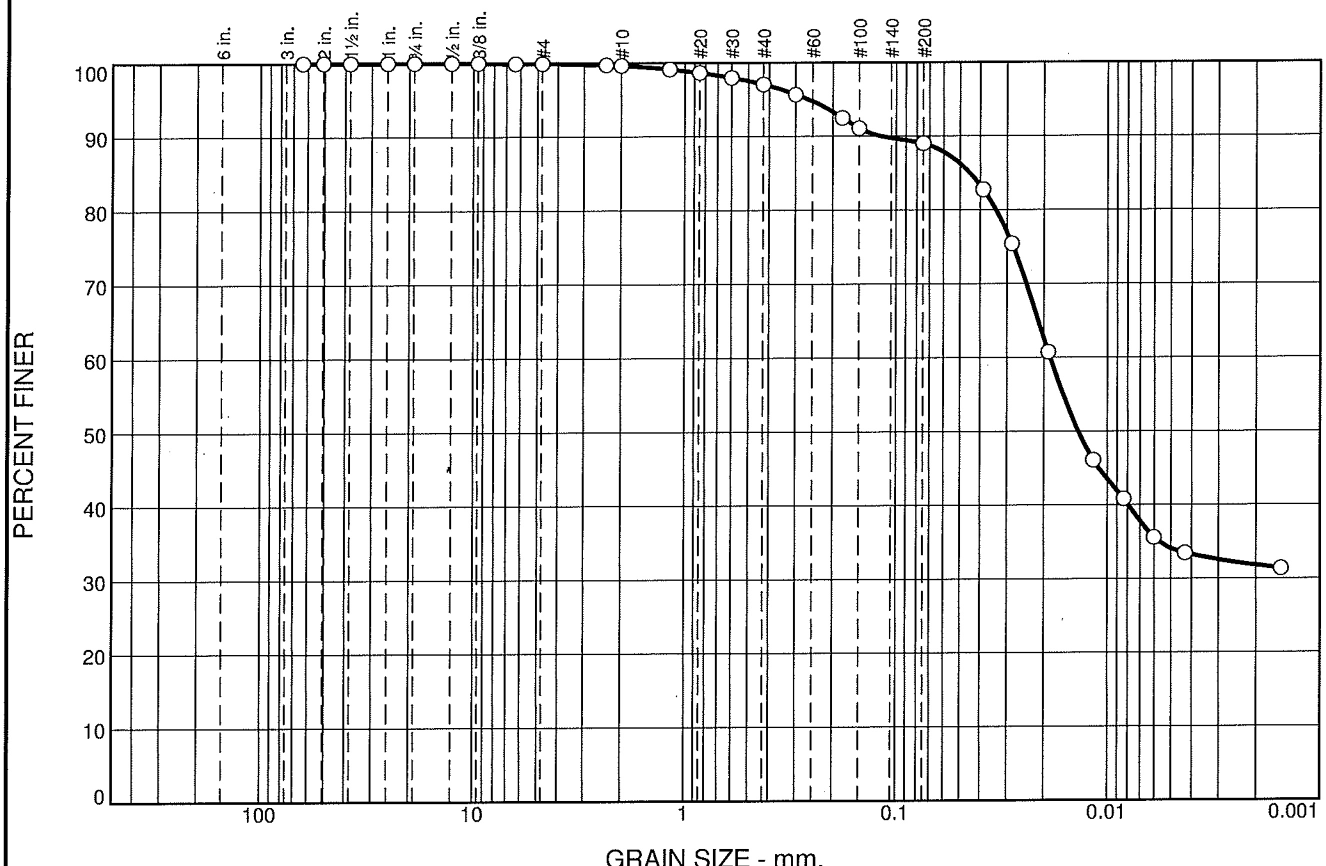
Date: 09-03-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.3	2.6	8.0	54.9	34.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	99.9		
#4	99.9		
#8	99.7		
#10	99.6		
#16	99.1		
#20	98.6		
#30	98.0		
#40	97.0		
#50	95.7		
#80	92.5		
#100	91.1		
#200	89.0		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 39 PI= 20

Coefficients

D_{90}= 0.1177 D_{85}= 0.0449 D_{60}= 0.0187
D_{50}= 0.0137 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(18)

Remarks

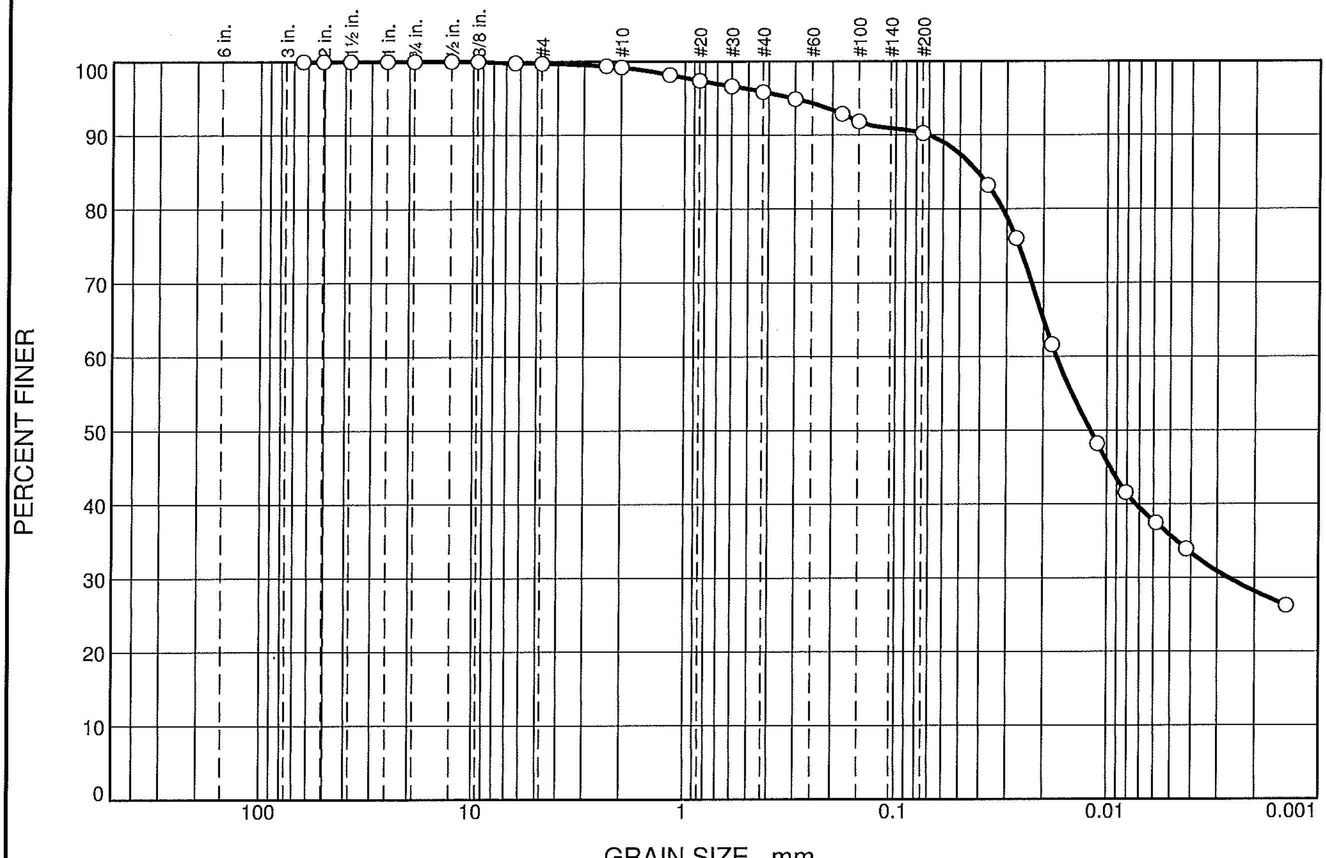
Source of Sample: Lift 2 **Depth:** 382,450N/2,200,950E
Sample Number: T-11 **Date:** 09-03-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	0.5	3.3	5.7	54.4	35.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	99.8		
#4	99.7		
#8	99.4		
#10	99.2		
#16	98.2		
#20	97.4		
#30	96.6		
#40	95.9		
#50	94.9		
#80	92.9		
#100	91.8		
#200	90.2		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 17 LL= 41 PI= 24

Coefficients

D_{90}= 0.0706 D_{85}= 0.0412 D_{60}= 0.0174
D_{50}= 0.0120 D_{30}= 0.0027 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(22)

Remarks

Source of Sample: Lift 2
Sample Number: T-12

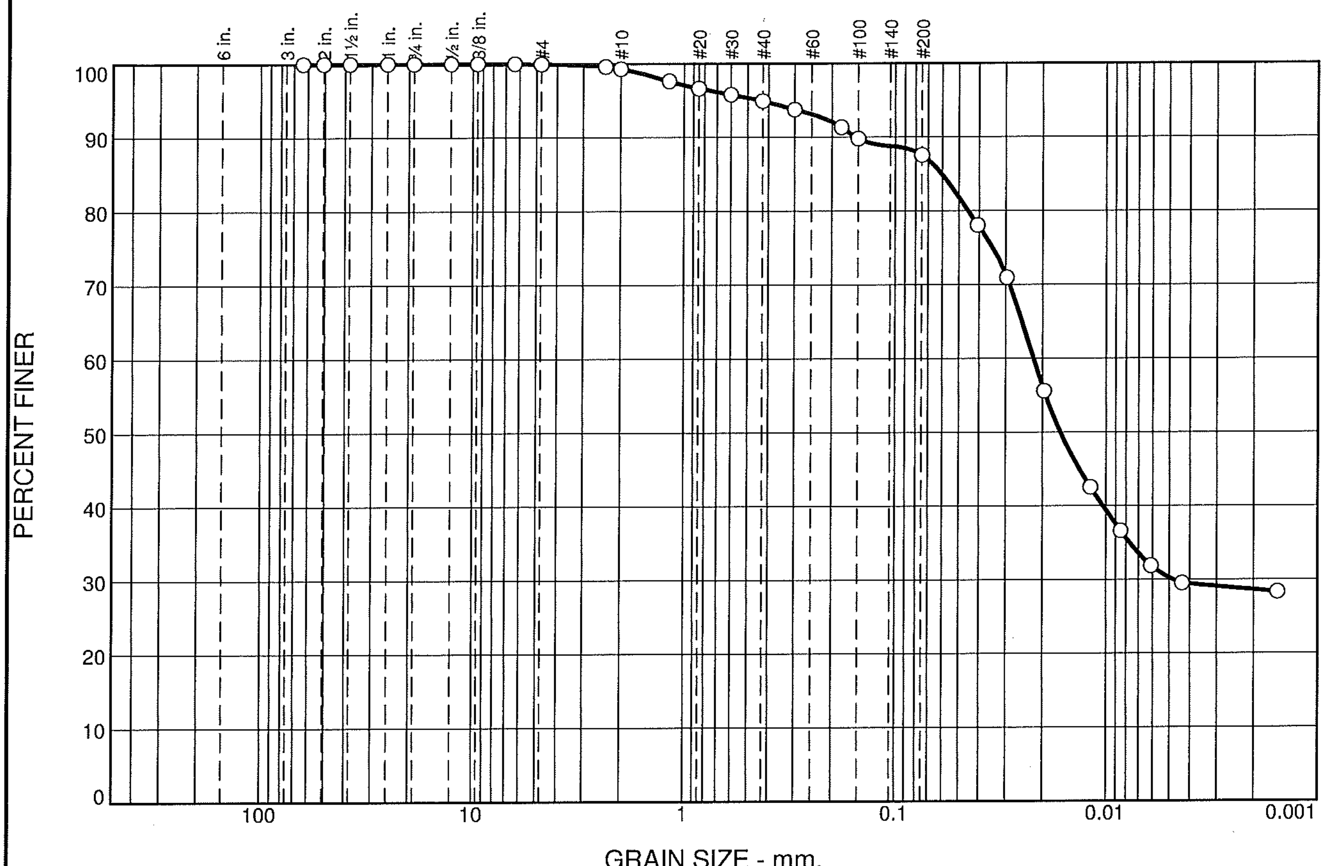
Date: 08-26-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.7	4.4	7.3	57.4	30.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	99.6		
#10	99.3		
#16	97.6		
#20	96.6		
#30	95.8		
#40	94.9		
#50	93.7		
#80	91.3		
#100	89.8		
#200	87.6		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 20 LL= 38 PI= 18

Coefficients

D_{90}= 0.1540 D_{85}= 0.0604 D_{60}= 0.0221
D_{50}= 0.0165 D_{30}= 0.0048 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(16)

Remarks

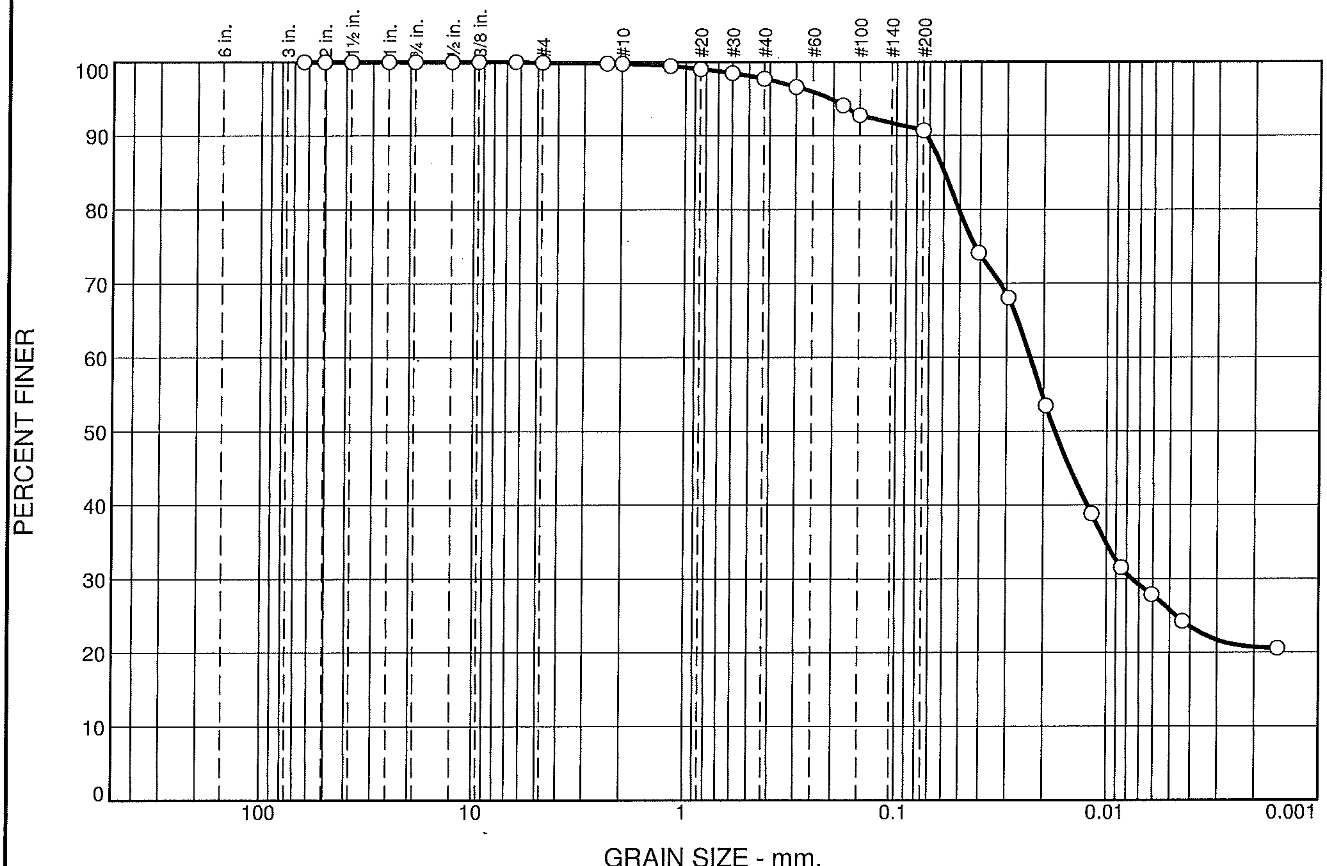
Source of Sample: Lift 2 **Depth:** 382,650N/2,201,050E
Sample Number: T-13 **Date:** 09-03-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.1	2.1	7.0	64.9	25.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	99.9		
#8	99.8		
#10	99.8		
#16	99.4		
#20	99.0		
#30	98.5		
#40	97.7		
#50	96.6		
#80	94.1		
#100	92.8		
#200	90.7		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 18 LL= 40 PI= 22

Coefficients

D_{90}= 0.0721 D_{85}= 0.0594 D_{60}= 0.0232
D_{50}= 0.0177 D_{30}= 0.0076 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(20)

Remarks

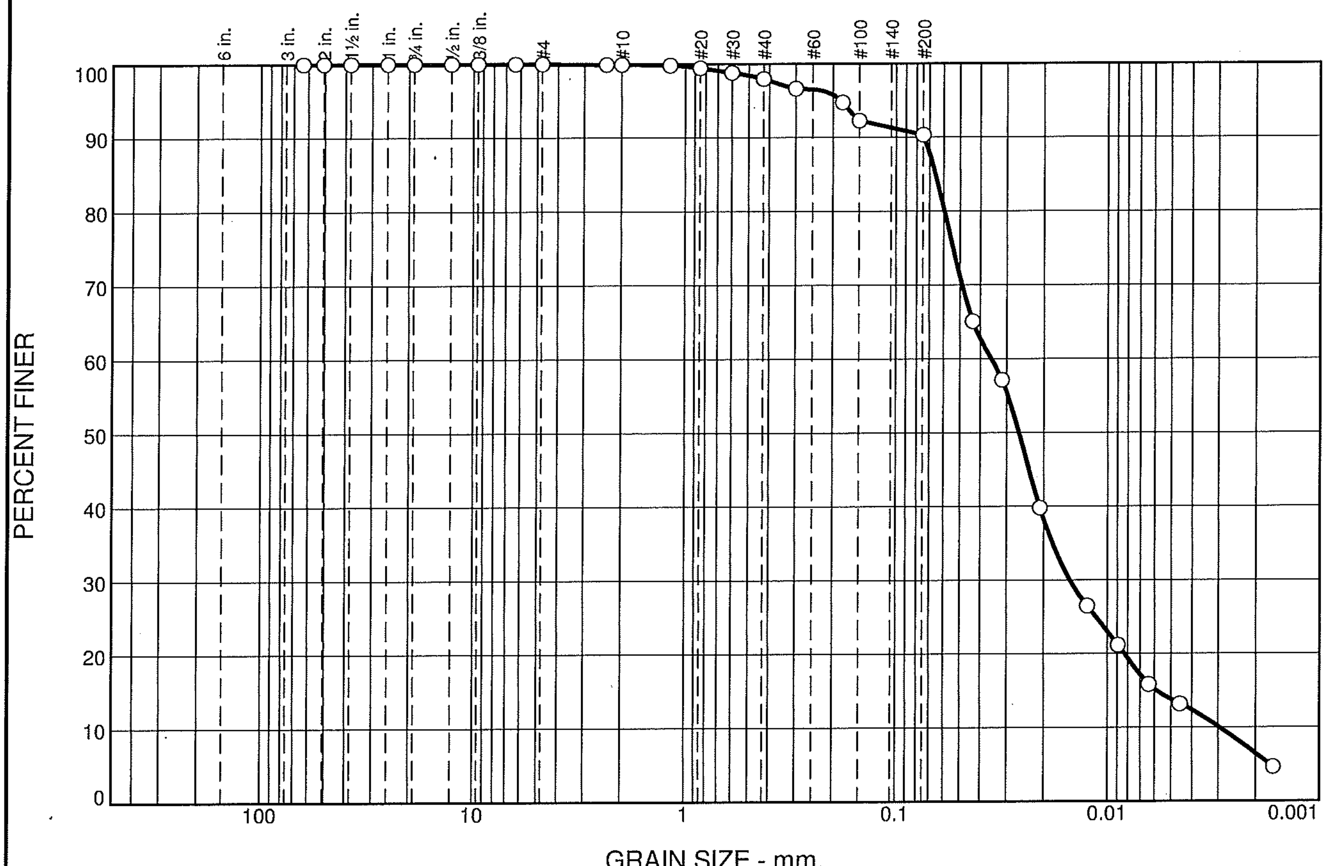
Source of Sample: Lift 2 **Depth:** 382,250N/2,201,050E
Sample Number: T-14 **Date:** 09-03-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.9	7.6	76.6	13.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	99.9		
#10	99.9		
#16	99.8		
#20	99.4		
#30	98.8		
#40	98.0		
#50	96.7		
#80	94.8		
#100	92.3		
#200	90.4		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 38 PI= 19

Coefficients

D_{90}= 0.0741 D_{85}= 0.0654 D_{60}= 0.0354
D_{50}= 0.0262 D_{30}= 0.0150 D_{15}= 0.0059
D_{10}= 0.0030 C_u= 11.99 C_c= 2.15

Classification

USCS= CL AASHTO= A-6(17)

Remarks

Source of Sample: Lift 2 **Depth:** 382,150N/2,201,150E
Sample Number: T-15

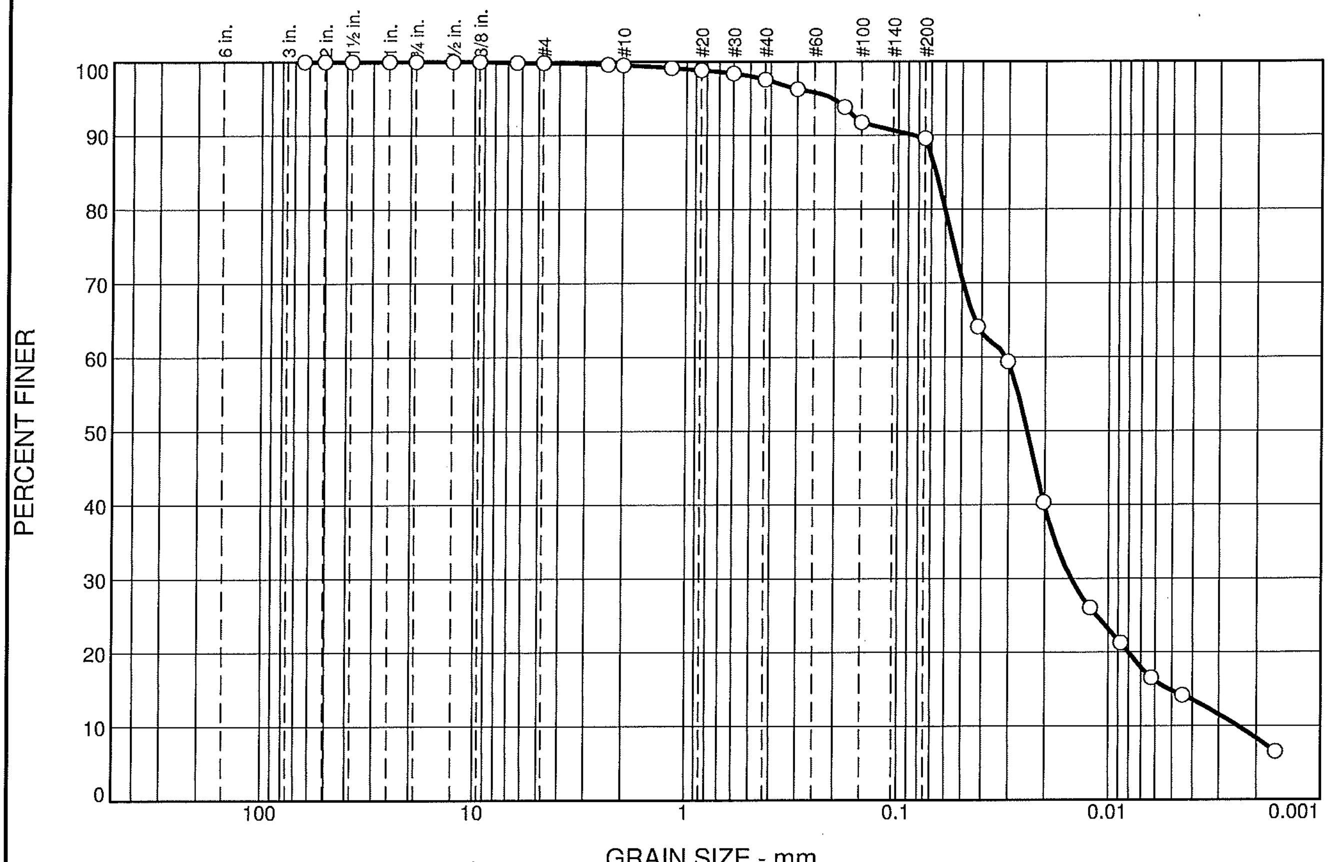
Date: 9-8-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.3	1.9	8.0	74.8	14.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	99.9		
#4	99.8		
#8	99.6		
#10	99.5		
#16	99.1		
#20	98.8		
#30	98.4		
#40	97.6		
#50	96.3		
#80	93.8		
#100	91.8		
#200	89.6		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 38 PI= 19

Coefficients

D_{90}= 0.0855 D_{85}= 0.0665 D_{60}= 0.0310
D_{50}= 0.0243 D_{30}= 0.0150 D_{15}= 0.0052
D_{10}= 0.0025 C_u= 12.63 C_c= 2.97

Classification

USCS= CL AASHTO= A-6(17)

Remarks

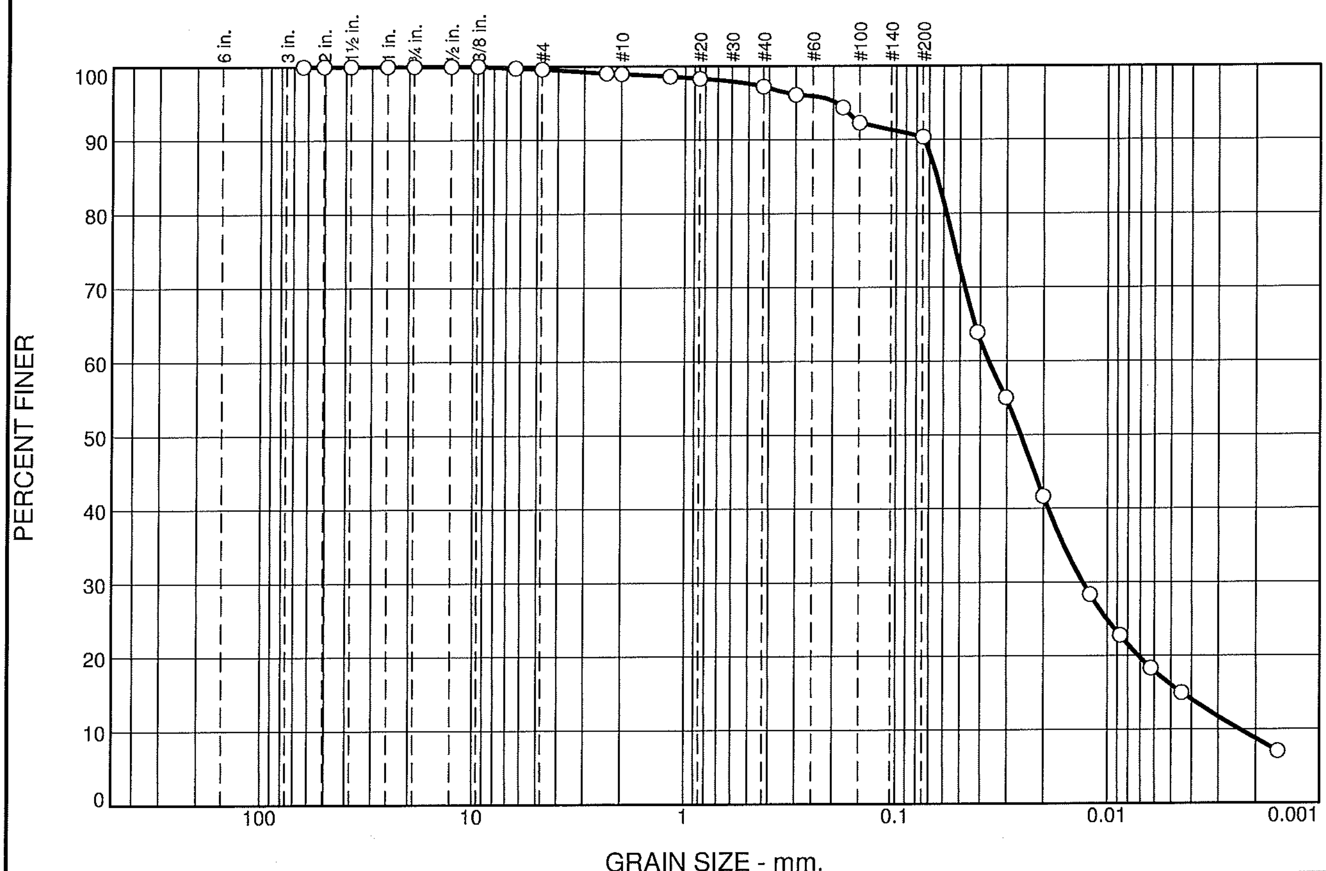
Source of Sample: Lift 2 **Depth:** 382,750N/2,201,150E
Sample Number: T-16 **Date:** 9-8-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.6	1.8	6.8	74.3	16.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1	100.0		
.75	100.0		
.50	100.0		
.375	100.0		
.25	99.7		
#4	99.6		
#8	99.0		
#10	99.0		
#16	98.6		
#20	98.3		
#40	97.2		
#50	96.1		
#80	94.3		
#100	92.3		
#200	90.4		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 21 LL= 37 PI= 16

Coefficients

D_{90}= 0.0740 D_{85}= 0.0645 D_{60}= 0.0366
D_{50}= 0.0257 D_{30}= 0.0131 D_{15}= 0.0045
D_{10}= 0.0024 C_u= 15.42 C_c= 1.97

Classification

USCS= CL AASHTO= A-6(15)

Remarks

Source of Sample: Lift 3 **Depth:** 382,500N/2,201,200E
Sample Number: T-17

Date: 9-15-14

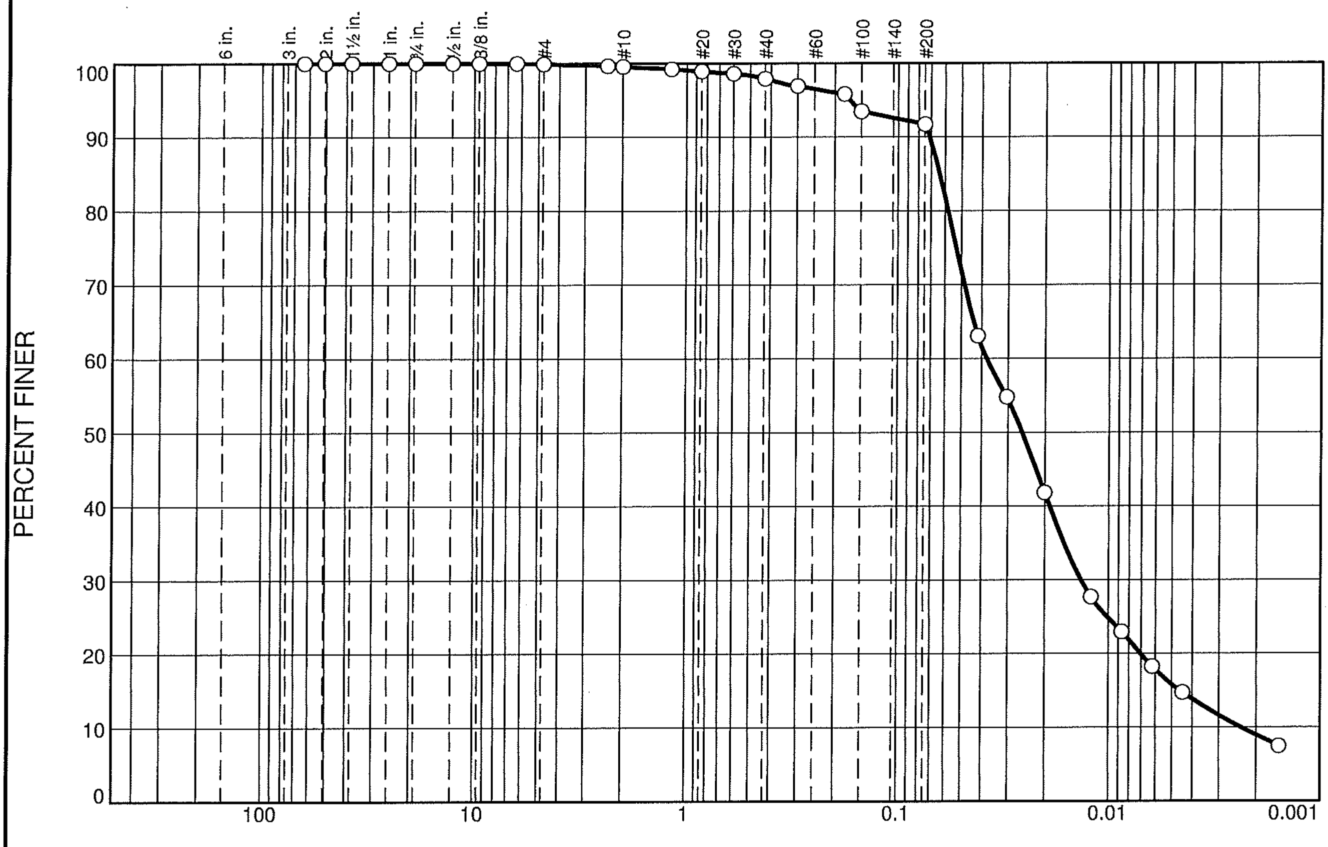
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld

Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.4	1.6	6.2	75.9	15.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.50	100.0		
0.375	100.0		
0.25	100.0		
#4	99.9		
#8	99.6		
#10	99.5		
#16	99.2		
#20	98.9		
#30	98.6		
#40	97.9		
#50	96.9		
#80	95.9		
#100	93.5		
#200	91.7		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 21 LL= 38 PI= 17

Coefficients

D_{90}= 0.0712 D_{85}= 0.0636 D_{60}= 0.0380
D_{50}= 0.0257 D_{30}= 0.0135 D_{15}= 0.0046
D_{10}= 0.0024 C_u= 16.14 C_c= 2.04

Classification

USCS= CL AASHTO= A-6(16)

Remarks

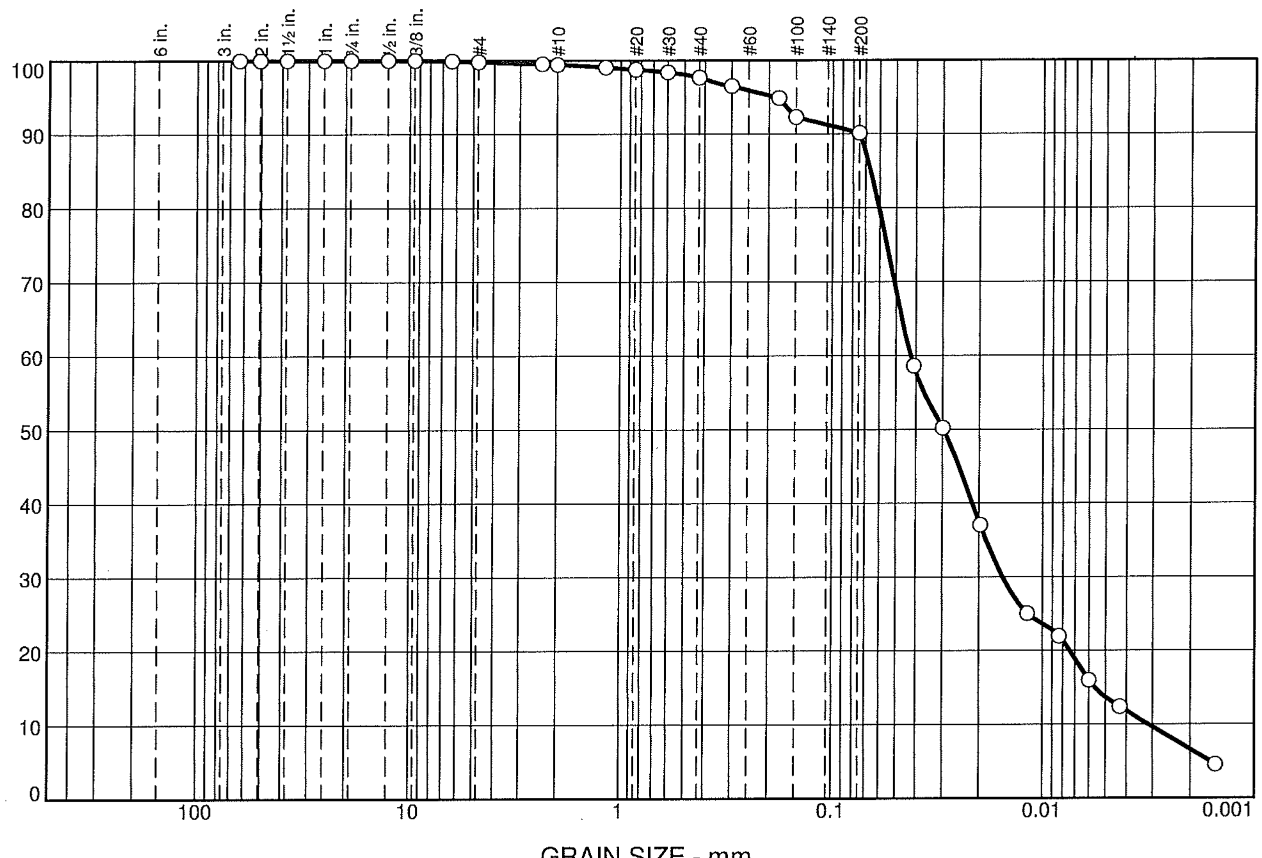
Source of Sample: Lift 3 **Depth:** 382,200N/2,201,000E
Sample Number: T-18 **Date:** 9-12-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.4	1.7	7.5	76.5	13.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.50	100.0		
0.375	100.0		
0.25	99.9		
#4	99.8		
#8	99.5		
#10	99.4		
#16	99.1		
#20	98.8		
#30	98.4		
#40	97.7		
#50	96.5		
#80	94.9		
#100	92.3		
#200	90.2		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 22 LL= 37 PI= 15

Coefficients

D_{90}= 0.0746 D_{85}= 0.0662 D_{60}= 0.0424
D_{50}= 0.0297 D_{30}= 0.0155 D_{15}= 0.0056
D_{10}= 0.0031 C_u= 13.52 C_c= 1.80

Classification

USCS= CL AASHTO= A-6(14)

Remarks

Source of Sample: Lift 3 **Depth:** 382,200N/2,201,000E
Sample Number: T-19

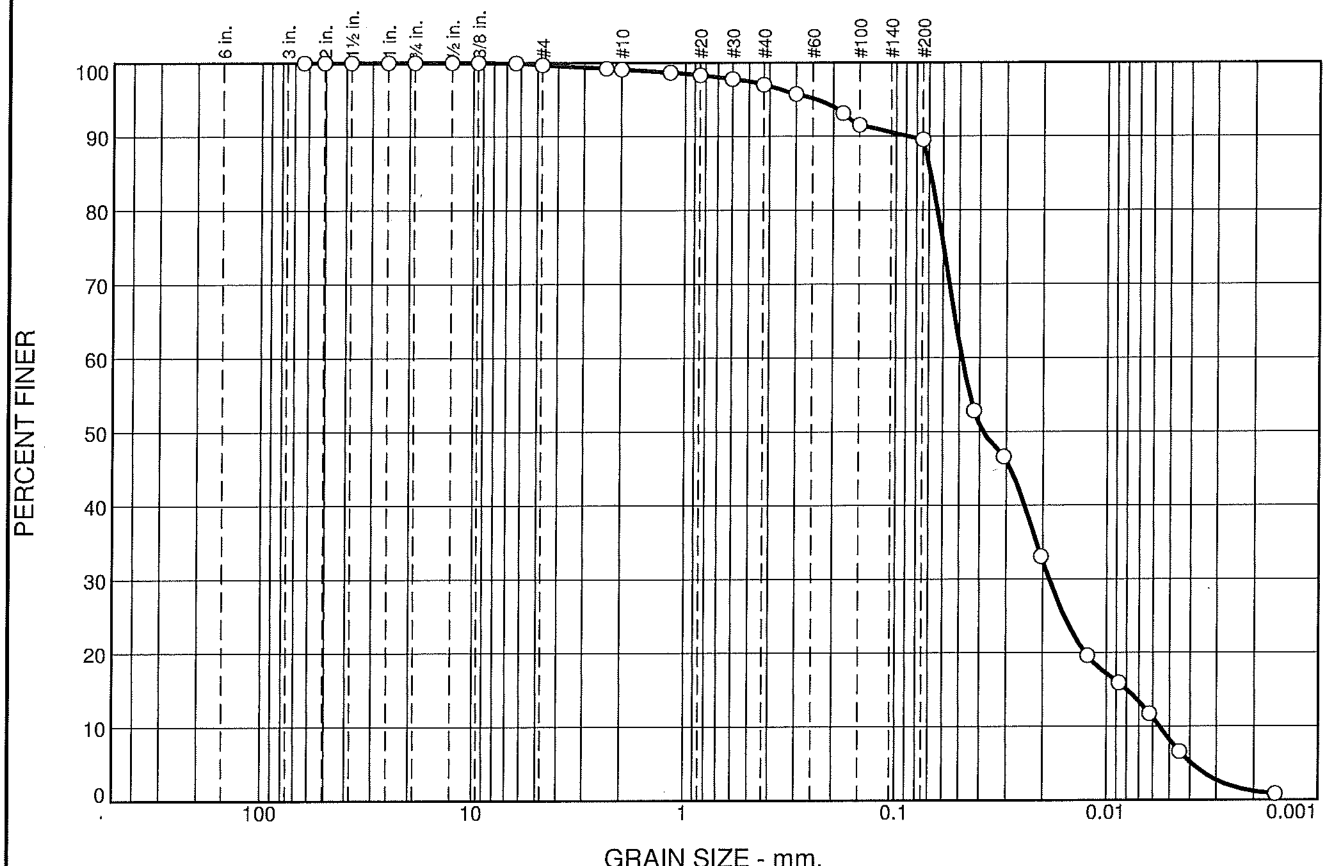
Date: 9-15-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	0.6	2.1	7.5	81.3	8.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.50	100.0		
0.375	100.0		
0.25	100.0		
#4	99.7		
#8	99.2		
#10	99.1		
#16	98.7		
#20	98.3		
#30	97.8		
#40	97.0		
#50	95.7		
#80	93.1		
#100	91.6		
#200	89.5		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 20 LL= 36 PI= 16

Coefficients

D_{90}= 0.0879 D_{85}= 0.0688 D_{60}= 0.0485
D_{50}= 0.0386 D_{30}= 0.0187 D_{15}= 0.0080
D_{10}= 0.0056 C_u= 8.70 C_c= 1.29

Classification

USCS= CL AASHTO= A-6(14)

Remarks

Source of Sample: Lift 3 **Depth:** 382,300N/2,200,900E
Sample Number: T-20

Date: 09-15-14

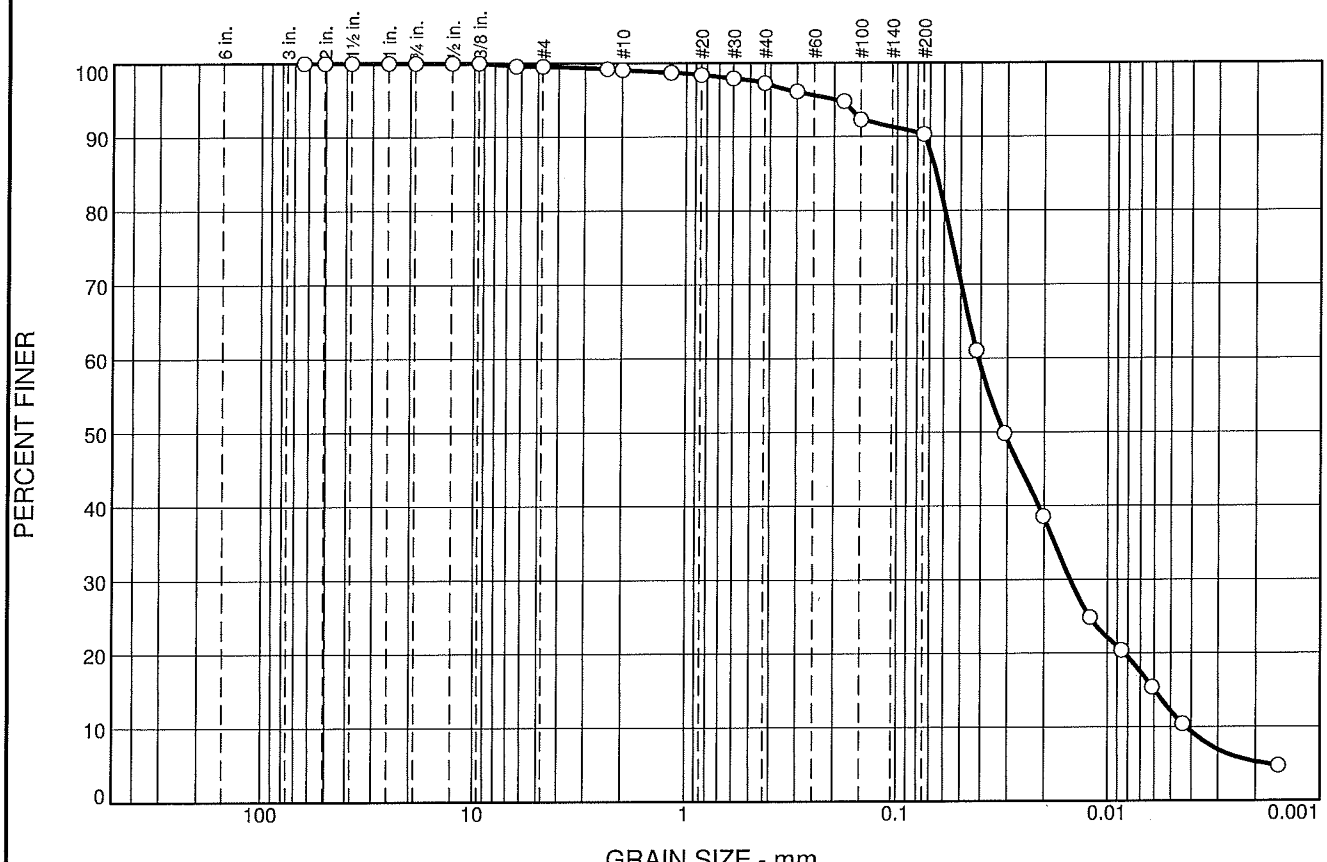
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld

Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	0.4	1.8	6.9	78.2	12.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.50	100.0		
0.375	100.0		
0.25	99.6		
#4	99.5		
#8	99.2		
#10	99.1		
#16	98.7		
#20	98.4		
#30	97.9		
#40	97.3		
#50	96.1		
#80	94.8		
#100	92.3		
#200	90.4		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 17 LL= 43 PI= 26

Coefficients

D_{90}= 0.0741 D_{85}= 0.0652 D_{60}= 0.0412
D_{50}= 0.0311 D_{30}= 0.0150 D_{15}= 0.0060
D_{10}= 0.0042 C_u= 9.69 C_c= 1.29

Classification

USCS= CL AASHTO= A-7-6(24)

Remarks

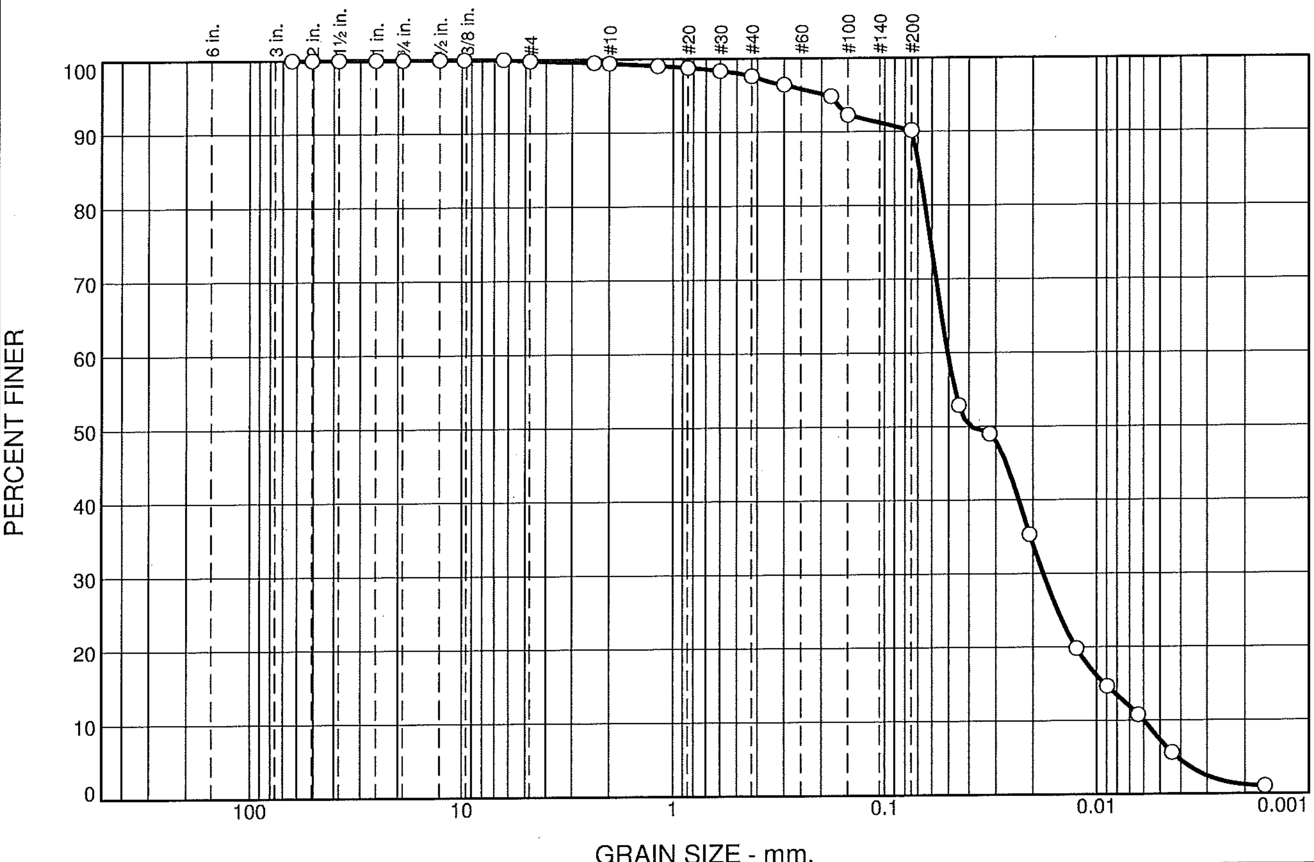
Source of Sample: Lift 3 **Depth:** 382,500N/2,201,000E
Sample Number: T-21 **Date:** 09-15-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	0.4	1.8	7.4	82.8	7.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.50	100.0		
0.385	100.0		
0.25	100.0		
#4	99.8		
#8	99.5		
#10	99.4		
#16	99.1		
#20	98.8		
#30	98.3		
#40	97.6		
#50	96.4		
#80	94.9		
#100	92.3		
#200	90.2		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 38 PI= 19

Coefficients

D_{90}= 0.0748 D_{85}= 0.0690 D_{60}= 0.0506
D_{50}= 0.0394 D_{30}= 0.0179 D_{15}= 0.0092
D_{10}= 0.0060 C_u= 8.44 C_c= 1.06

Classification

USCS= CL AASHTO= A-6(17)

Remarks

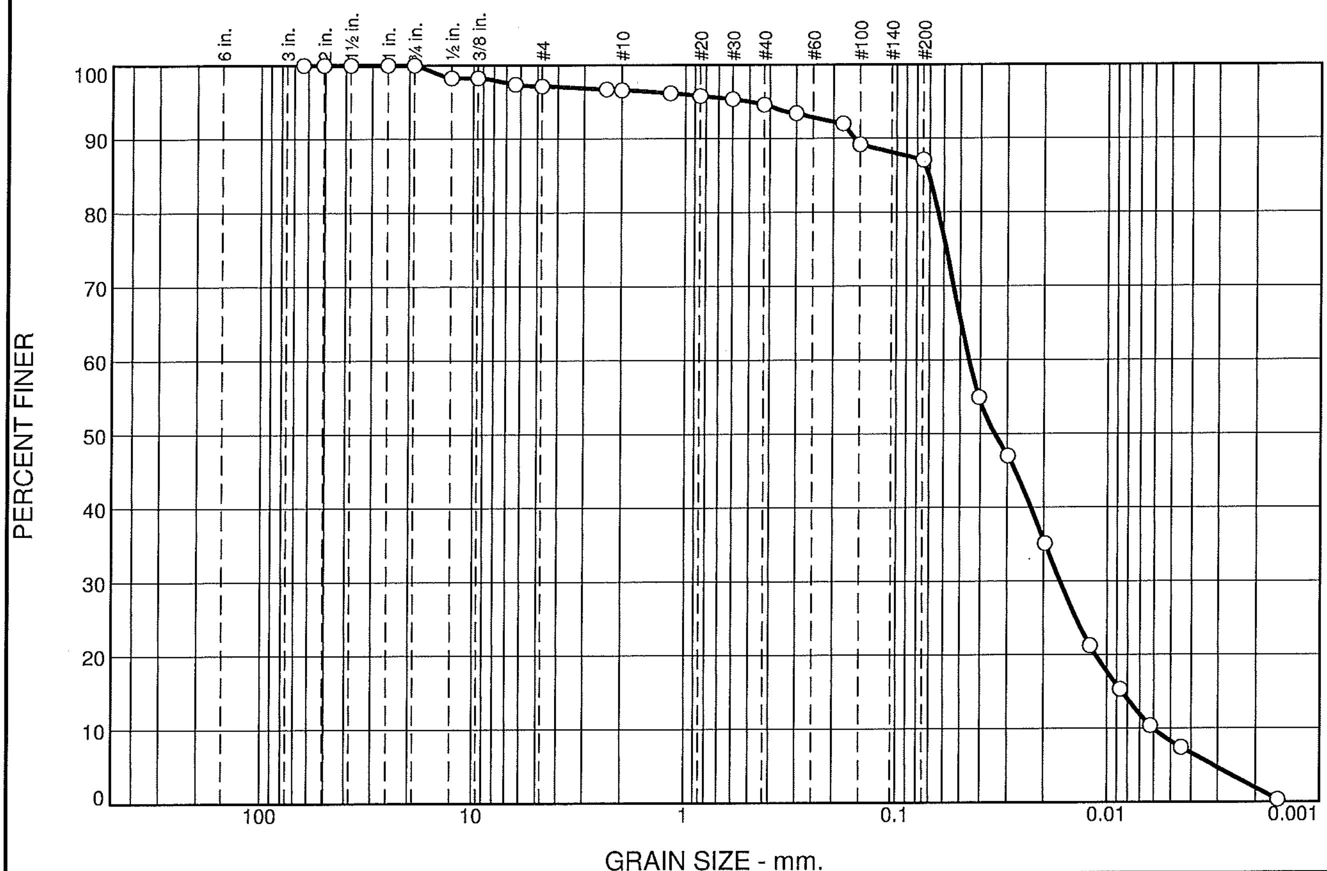
Source of Sample: Lift 3 **Depth:** 382,700N/2,200,900E
Sample Number: T-22
Date: 09-15-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.9	0.5	2.0	7.5	78.8	8.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.50	98.3		
0.375	98.3		
0.25	97.4		
#4	97.1		
#8	96.7		
#10	96.6		
#16	96.2		
#20	95.8		
#30	95.3		
#40	94.6		
#50	93.4		
#80	92.0		
#100	89.2		
#200	87.1		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 18 LL= 38 PI= 20

Coefficients

D_{90}= 0.1594 D_{85}= 0.0708 D_{60}= 0.0453
D_{50}= 0.0343 D_{30}= 0.0168 D_{15}= 0.0085
D_{10}= 0.0060 C_u= 7.52 C_c= 1.03

Classification

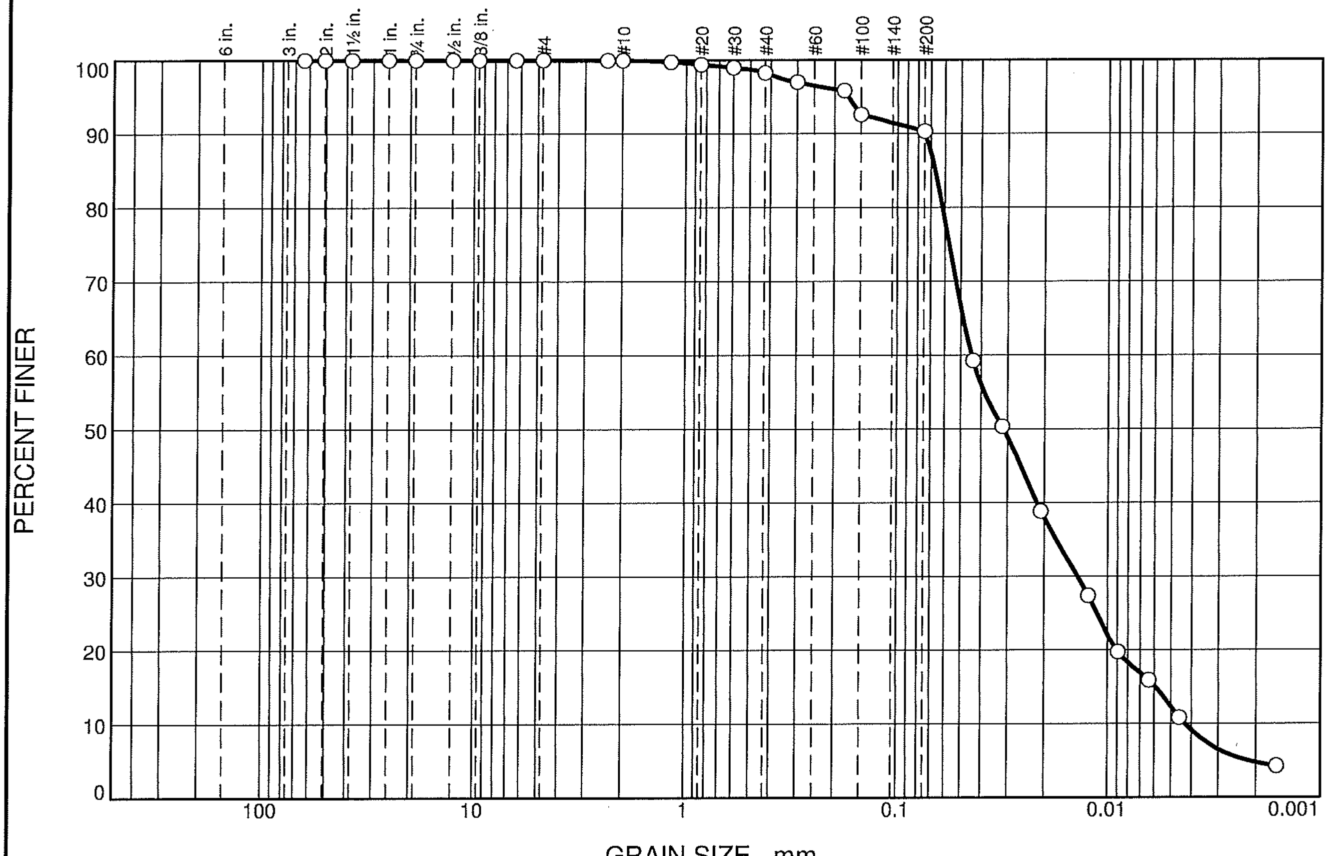
USCS= CL AASHTO= A-6(17)

Remarks

Source of Sample: Lift 3 **Depth:** 382,600N/2,201,100E
Sample Number: T-23 **Date:**

TRC Environmental Corp. Madison, Wisconsin	**Client:** Dane County **Project:** Dane County Rodefeld **Project No:** 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	1.8	7.9	78.0	12.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.50	100.0		
0.375	100.0		
0.25	100.0		
#4	100.0		
#8	100.0		
#10	100.0		
#16	99.7		
#20	99.4		
#30	99.0		
#40	98.2		
#50	97.0		
#80	95.8		
#100	92.6		
#200	90.3		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 18 LL= 38 PI= 20

Coefficients

D_{90}= 0.0743 D_{85}= 0.0668 D_{60}= 0.0444
D_{50}= 0.0313 D_{30}= 0.0139 D_{15}= 0.0059
D_{10}= 0.0043 C_u= 10.35 C_c= 1.01

Classification

USCS= CL AASHTO= A-6(18)

Remarks

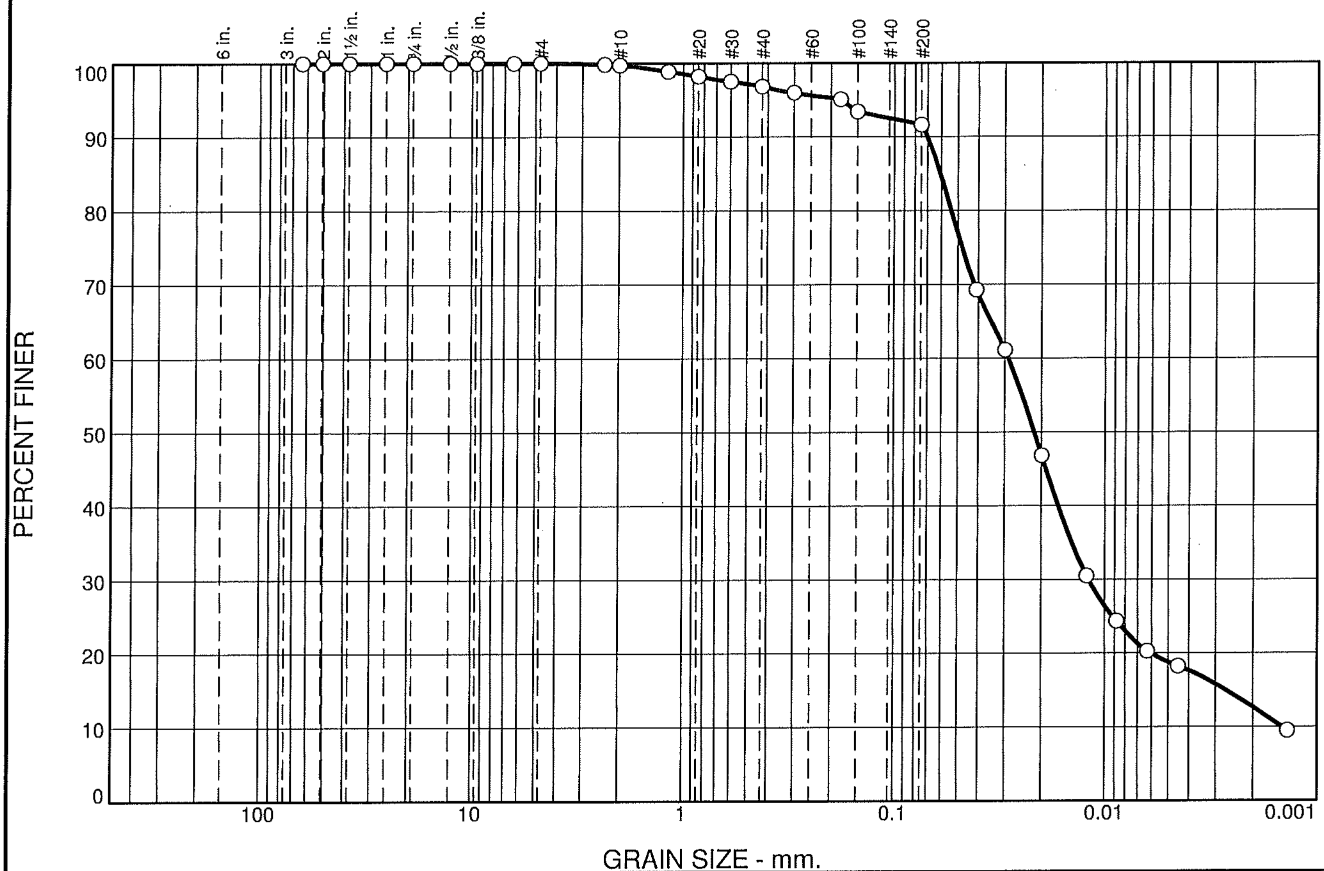
Source of Sample: Lift 3 **Depth:** 382,000N/2,201,100E
Sample Number: T-24 **Date:**

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	2.9	5.1	72.9	18.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	99.8		
#10	99.7		
#16	98.9		
#20	98.2		
#30	97.5		
#40	96.8		
#50	96.0		
#80	95.1		
#100	93.4		
#200	91.7		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 21 LL= 39 PI= 18

Coefficients

D_{90}= 0.0702 D_{85}= 0.0607 D_{60}= 0.0288
D_{50}= 0.0217 D_{30}= 0.0119 D_{15}= 0.0027
D_{10}= 0.0015 C_u= 19.79 C_c= 3.41

Classification

USCS= CL AASHTO= A-6(17)

Remarks

Source of Sample: Lift 4 **Depth:** 382,450N/2,200,950E
Sample Number: T-25

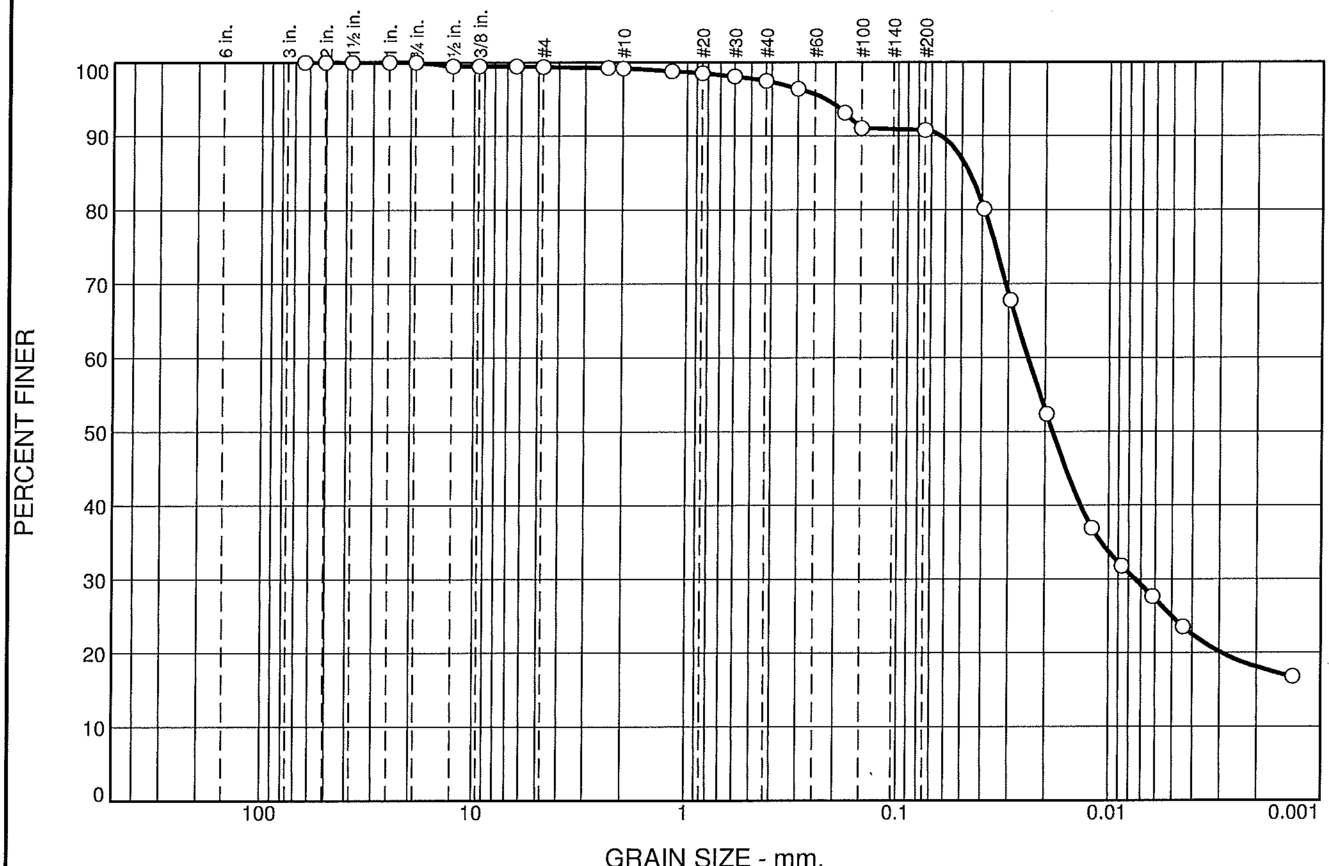
Date: 09-18-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	0.2	1.7	6.7	65.8	25.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	99.5		
.375	99.5		
.25	99.5		
#4	99.4		
#8	99.2		
#10	99.2		
#16	98.8		
#20	98.5		
#30	98.1		
#40	97.5		
#50	96.4		
#80	93.2		
#100	91.0		
#200	90.8		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 20 LL= 38 PI= 18

Coefficients

D_{90}= 0.0627 D_{85}= 0.0460 D_{60}= 0.0242
D_{50}= 0.0184 D_{30}= 0.0075 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(17)

Remarks

Source of Sample: Lift 4 **Depth:** 382,550N/2,200,850E
Sample Number: T-26

Date: 09-18-14

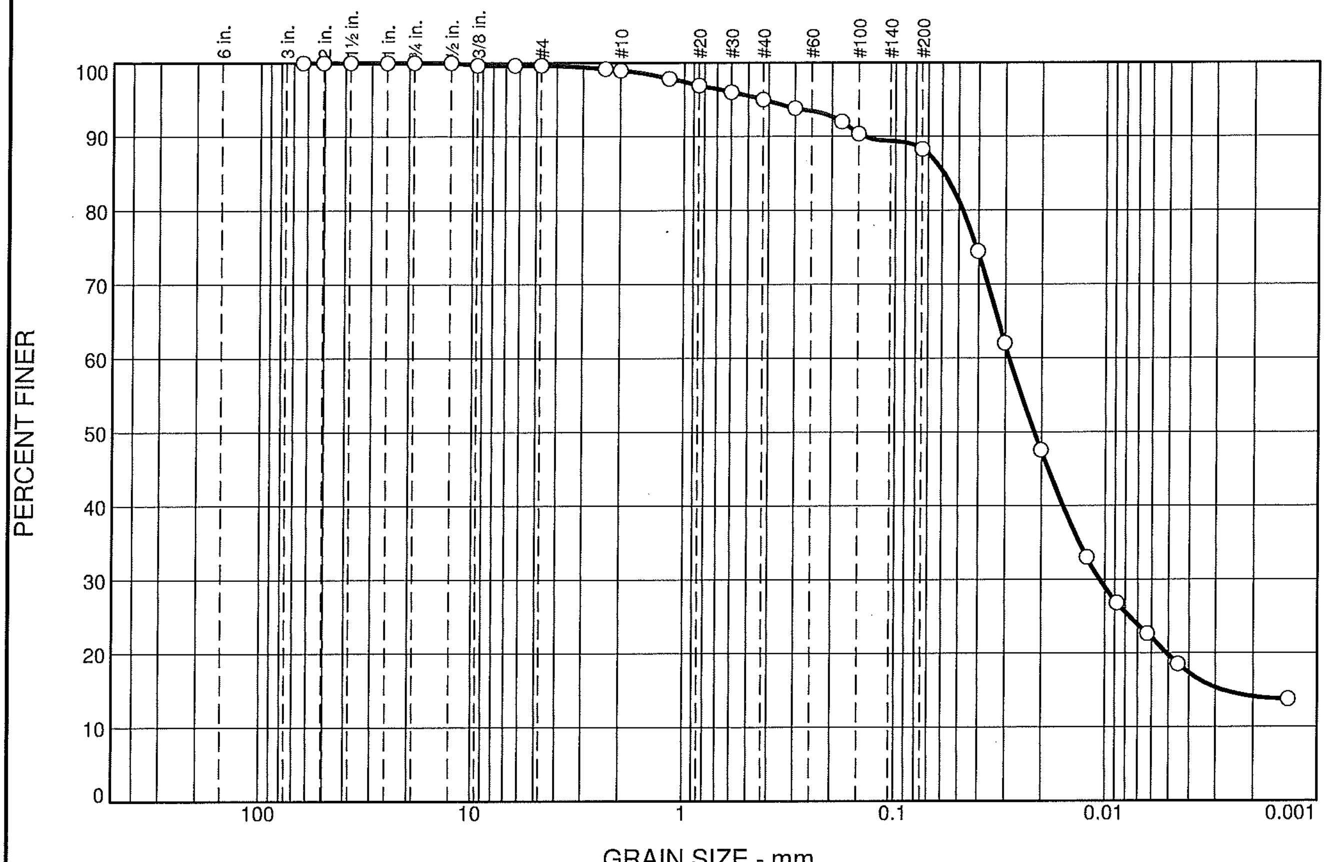
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld

Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	0.6	4.0	6.7	68.5	19.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	99.6		
.25	99.6		
#4	99.6		
#8	99.2		
#10	99.0		
#16	97.9		
#20	96.9		
#30	96.0		
#40	95.0		
#50	93.8		
#80	92.0		
#100	90.4		
#200	88.3		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 21 LL= 39 PI= 18

Coefficients

D_{90}= 0.1405 D_{85}= 0.0587 D_{60}= 0.0287
D_{50}= 0.0217 D_{30}= 0.0106 D_{15}= 0.0028
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(16)

Remarks

Source of Sample: Lift 4 **Depth:** 382,250N/2,200,850E
Sample Number: T-27

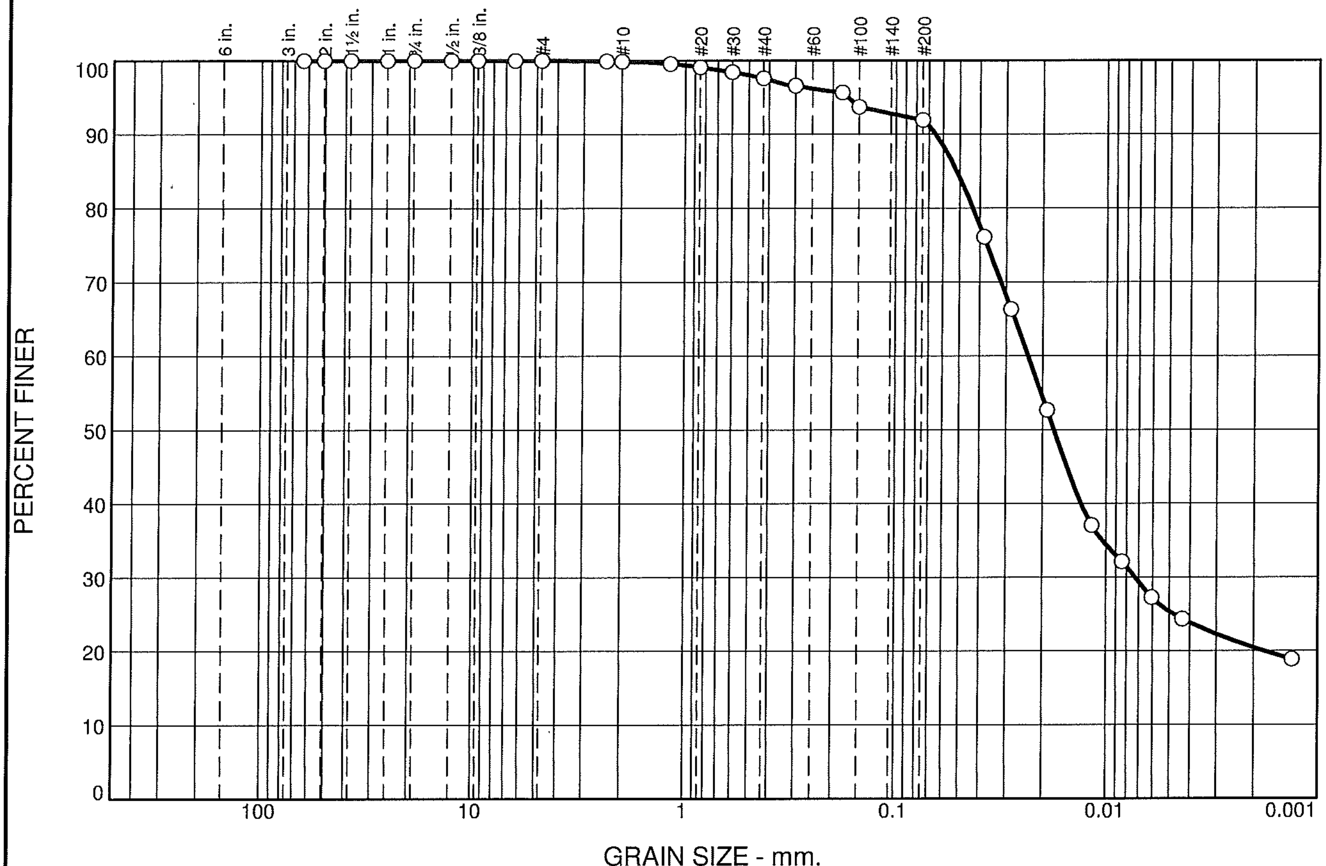
Date: 09-18-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	2.3	5.7	66.6	25.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	99.9		
#10	99.9		
#16	99.6		
#20	99.1		
#30	98.4		
#40	97.6		
#50	96.6		
#80	95.7		
#100	93.7		
#200	91.9		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 40 PI= 21

Coefficients

D_{90}= 0.0650 D_{85}= 0.0517 D_{60}= 0.0235
D_{50}= 0.0177 D_{30}= 0.0073 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(20)

Remarks

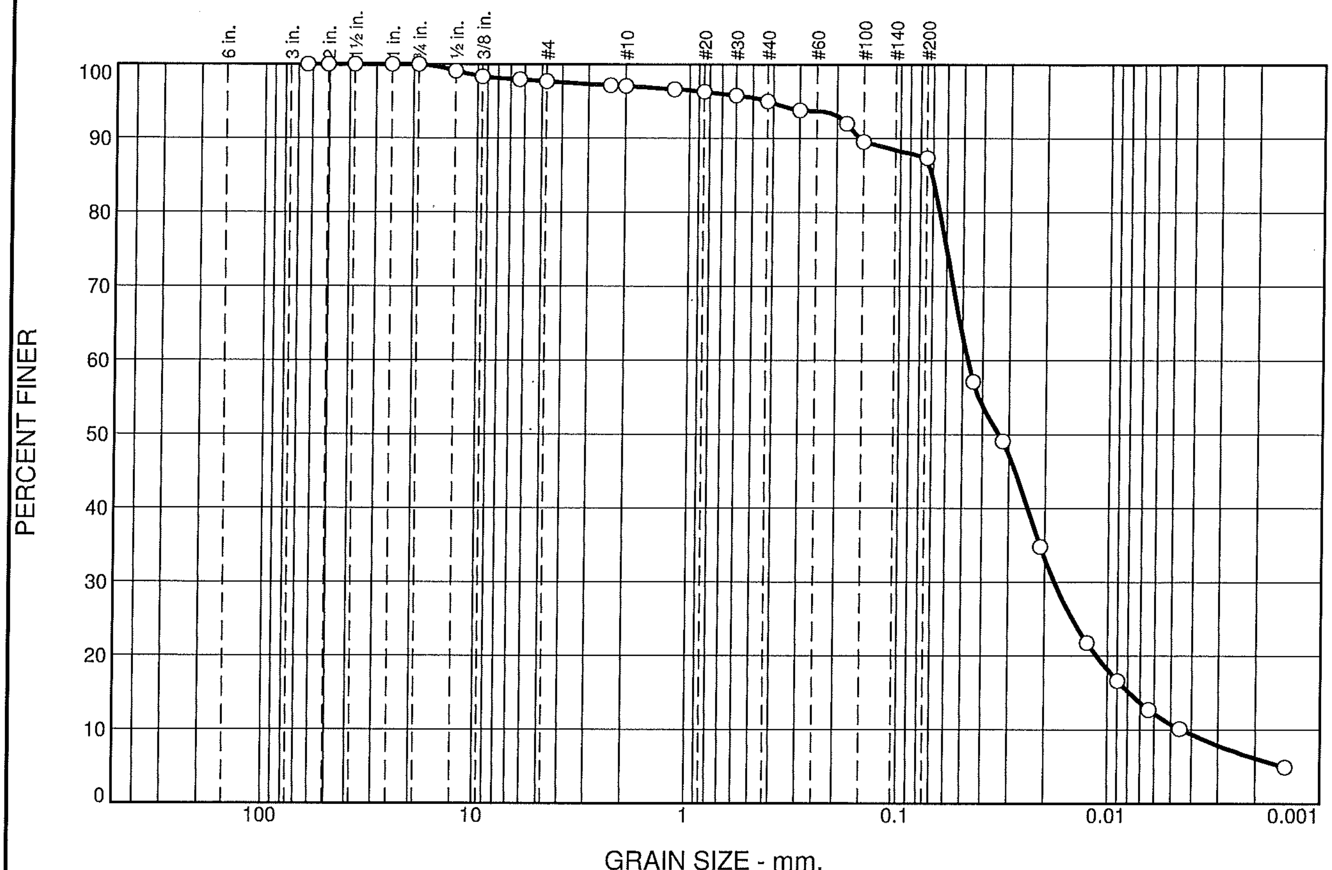
Source of Sample: Lift 4 **Depth:** 382,750N/2,200,950E
Sample Number: T-28 **Date:** 09-18-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.3	0.6	2.1	7.6	76.6	10.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	99.1		
.375	98.3		
.25	98.0		
#4	97.7		
#8	97.2		
#10	97.1		
#16	96.6		
#20	96.3		
#30	95.8		
#40	95.0		
#50	93.8		
#80	92.0		
#100	89.5		
#200	87.4		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 20 LL= 36 PI= 16

Coefficients

D_{90}= 0.1568 D_{85}= 0.0710 D_{60}= 0.0472
D_{50}= 0.0334 D_{30}= 0.0180 D_{15}= 0.0079
D_{10}= 0.0044 C_u= 10.62 C_c= 1.55

Classification

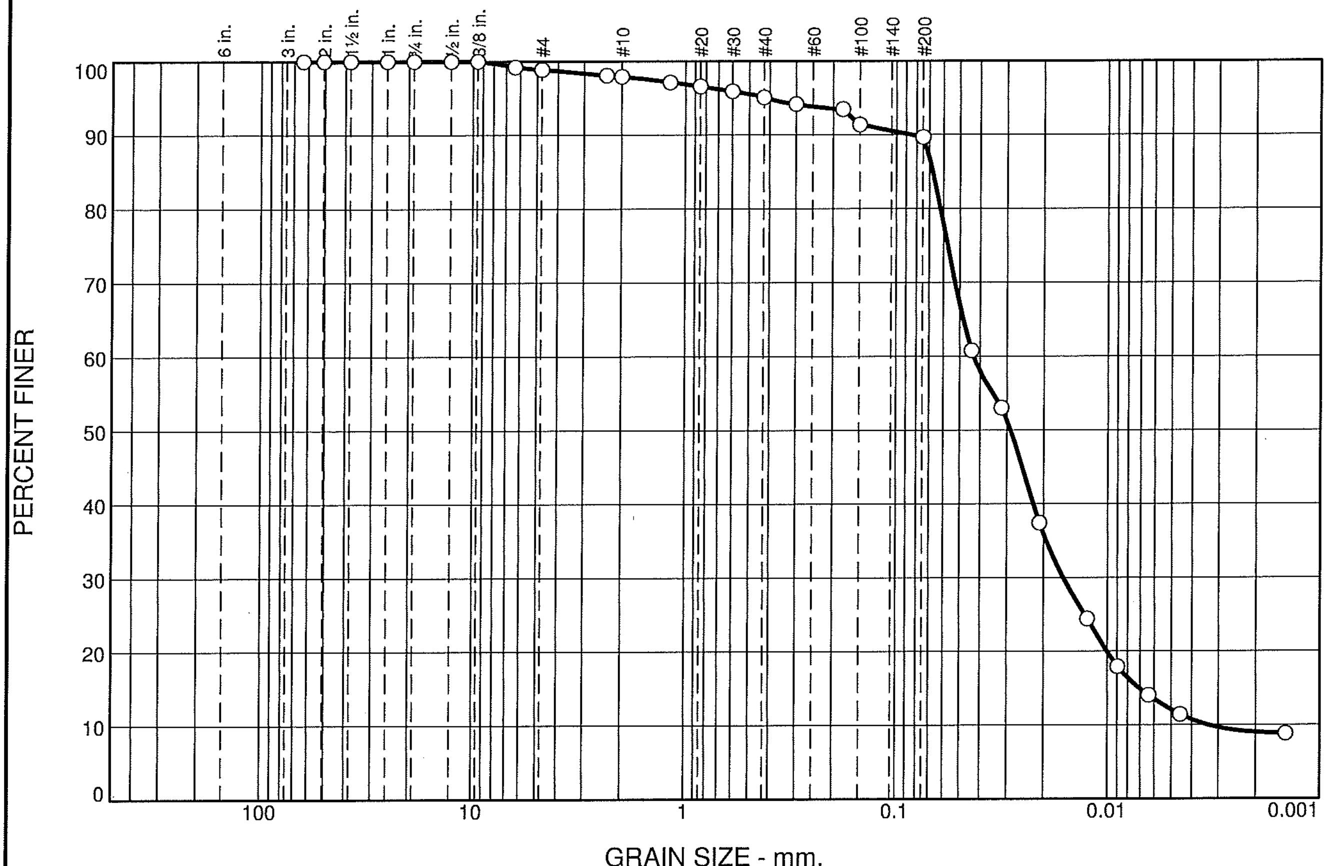
USCS= CL AASHTO= A-6(14)

Remarks

Source of Sample: Lift 4 **Depth:** 382,750N/2,201,150E
Sample Number: T-29 **Date:** 09-24-14

TRC Environmental Corp. Madison, Wisconsin	Client: Dane County Project: Dane County Rodefeld Project No: 220142.0000 Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	1.0	2.8	5.4	77.6	12.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	99.2		
#4	98.9		
#8	98.1		
#10	97.9		
#16	97.1		
#20	96.6		
#30	95.9		
#40	95.1		
#50	94.2		
#80	93.5		
#100	91.4		
#200	89.7		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 20 LL= 37 PI= 17

Coefficients

D_{90}= 0.0851 D_{85}= 0.0675 D_{60}= 0.0430
D_{50}= 0.0288 D_{30}= 0.0162 D_{15}= 0.0071
D_{10}= 0.0033 C_u= 12.87 C_c= 1.82

Classification

USCS= CL AASHTO= A-6(15)

Remarks

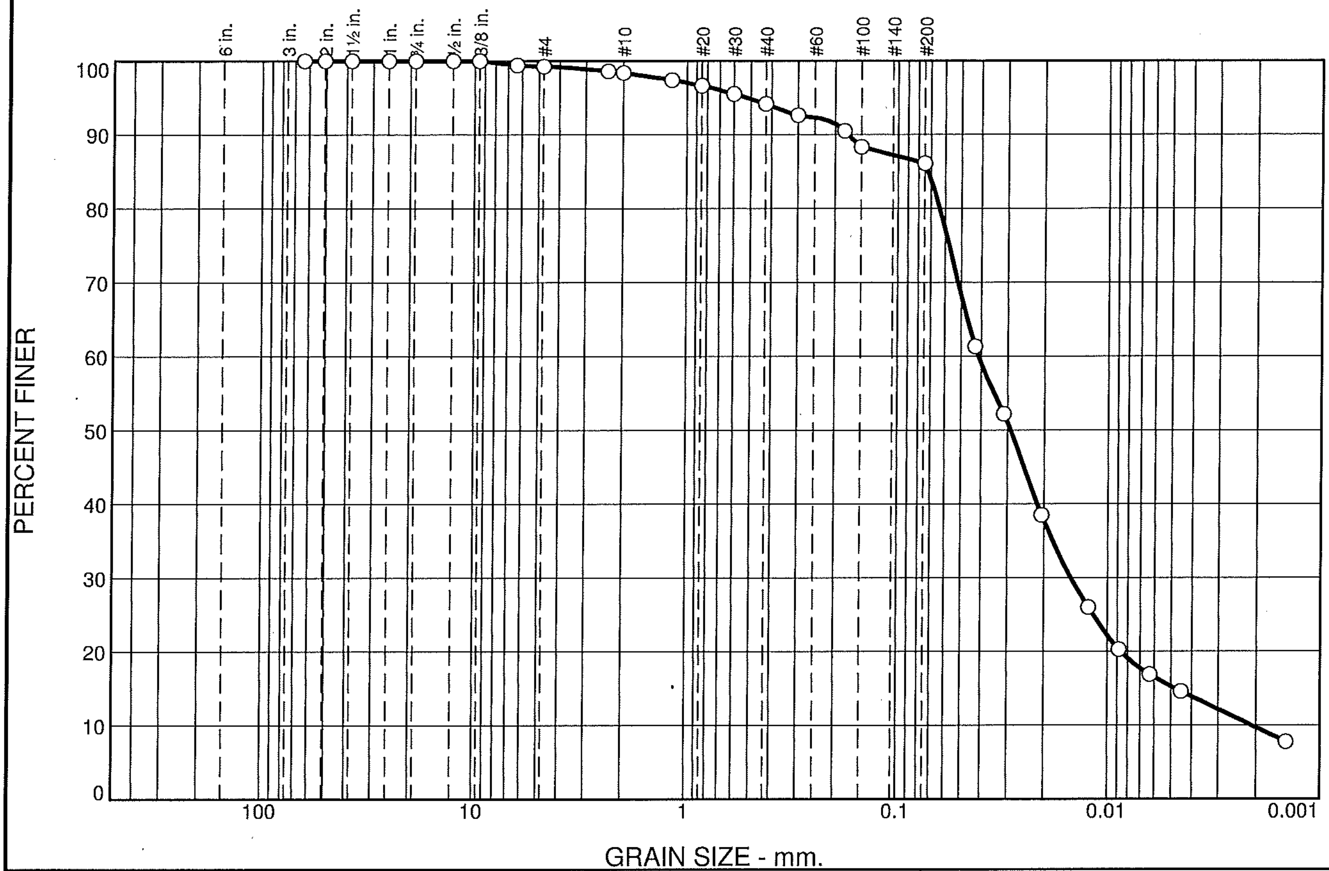
Source of Sample: Lift 4 **Depth:** 382,250N/2,201,150E
Sample Number: T-30 **Date:** 09-24-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	0.9	4.2	8.1	70.8	15.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	99.4		
#4	99.3		
#8	98.6		
#10	98.4		
#16	97.4		
#20	96.6		
#30	95.5		
#40	94.2		
#50	92.6		
#80	90.5		
#100	88.4		
#200	86.1		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 18 LL= 37 PI= 19

Coefficients

D_{90}= 0.1726 D_{85}= 0.0722 D_{60}= 0.0413
D_{50}= 0.0290 D_{30}= 0.0149 D_{15}= 0.0048
D_{10}= 0.0021 C_u= 19.67 C_c= 2.56

Classification

USCS= CL AASHTO= A-6(16)

Remarks

Source of Sample: Lift 4 **Depth:** 382,550N/2,201,050E
Sample Number: T-31

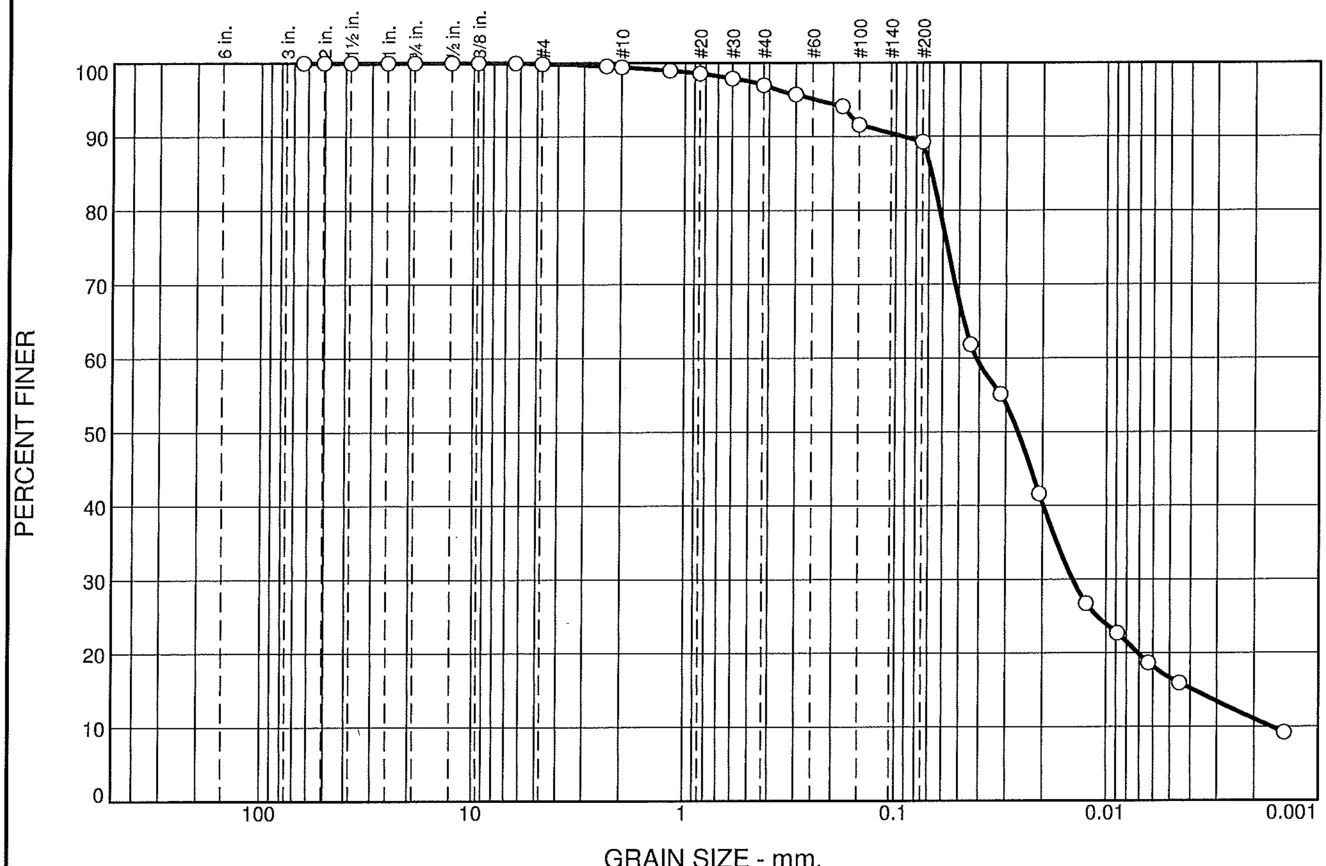
Date: 09-24-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.5	2.4	7.7	72.6	16.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	99.9		
#8	99.5		
#10	99.4		
#16	99.0		
#20	98.5		
#30	97.9		
#40	97.0		
#50	95.7		
#80	94.1		
#100	91.6		
#200	89.3		

* (no specification provided)

Material Description

Lean clay

Atterberg Limits

PL= 19 LL= 37 PI= 18

Coefficients

D_{90}= 0.0929 D_{85}= 0.0678 D_{60}= 0.0415
D_{50}= 0.0263 D_{30}= 0.0144 D_{15}= 0.0039
D_{10}= 0.0017 C_u= 25.02 C_c= 3.02

Classification

USCS= CL AASHTO= A-6(16)

Remarks

Source of Sample: Lift 4 **Depth:** 382,150N/2,201,050E
Sample Number: T-32

Date: 09-24-14

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Dane County Rodefeld
Project No: 220142.0000 **Figure**

TRC Environmental Corporation	QC: JPH
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QA: JPH

Project Name:	Dane County Rodefeld	Cell #:	7
Project #:	220142.0000	USCS Description:	Lean clay
Sample Name:	Lift 1, T-1, 382,600N/2,201,000E	USCS Classification:	CL
Visual Descript:	Lean clay	Average Kv =	1.1E-08 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.82	2.84	Permeant:	Water	
Sample Ht. (in)	2.30	2.30	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	872.80	743.40	Sample Specific Gravity:	2.70	Est.
Tare & Dry (g)	774.80	652.10	Confining Pressure (psi):	100.0	
Tare (g)	267.40	253.69	Burette Diameter (in):	0.250	
Sample Wt. (g)	481.40	489.71	Burette Zero (cm):	100.0	

Moisture (%)	19.3	22.9	Maximum Gradient:	16.4
Wet Density (pcf)	127.7	128.0	Average Gradient:	15.0
Dry Density (pcf)	107.0	104.2	Max. Effect. Stress (psi):	5.9
Saturation (%)	90.5	100.0	Min. Effect. Stress (psi):	4.2
			Ave. Effect. Stress (psi):	4.9

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2014	8	18	4	50.00		0.0	95	95	56.70		2.55		103.20				
2	2014	8	18	5	52.00	3720	20.0	95	95	56.55	-0.15	2.70	0.15	102.40	0.80	-68.4	5.8E-08	
3	2014	8	18	6	45.00	3180	20.0	95	95	56.80	0.25	2.80	0.10	102.30	0.10	0.0	1.4E-08	
4	2014	8	18	8	1.00	4560	20.0	95	95	56.90	0.10	2.90	0.10	102.20	0.10	0.0	1.0E-08	
5	2014	8	18	9	10.00	4140	20.0	95	95	57.15	0.25	3.05	0.15	102.05	0.15	0.0	1.7E-08	
6	2014	8	18	10	39.00	5340	20.0	95	95	57.40	0.25	3.20	0.15	101.90	0.15	0.0	1.3E-08	
7	2014	8	18	13	40.00	10860	23.0	95	95	58.75	1.35	3.50	0.30	101.60	0.30	0.0	1.2E-08	
8	2014	8	19	5	6.00	55560	20.0	95	95	59.80	1.05	4.80	1.30	100.20	1.40	-3.7	1.1E-08	
9	2014	8	20	8	19.00		0.0	95	95	41.30		3.50		102.45				
10	2014	8	20	9	56.00	5820	22.0	95	95	43.35	2.05	3.70	0.20	101.70	0.75	-57.9	3.6E-08	
11	2014	8	20	11	26.00	5400	22.0	95	95	44.40	1.05	3.85	0.15	101.40	0.30	-33.3	1.8E-08	
12	2014	8	20	14	0.00	9240	21.0	95	95	45.70	1.30	4.10	0.25	101.00	0.40	-23.1	1.6E-08	
13	2014	8	20	18	16.00	15360	21.0	95	95	47.60	1.90	4.50	0.40	100.45	0.55	-15.8	1.4E-08	
14	2014	8	21	5	0.00	38640	21.0	95	95	48.90	1.30	5.45	0.95	99.35	1.10	-7.3	1.2E-08	1
15	2014	8	21	9	3.00	14580	22.0	95	95	51.10	2.20	5.80	0.35	99.05	0.30	7.7	1.0E-08	1
16	2014	8	21	13	48.00	17100	23.0	95	95	52.30	1.20	6.20	0.40	98.60	0.45	-5.9	1.1E-08	1
17	2014	8	21	17	53.00	14700	22.0	95	95	53.30	1.00	6.55	0.35	98.25	0.35	0.0	1.1E-08	1
18	2014	8	22	5	34.00	42060	20.0	95	95	54.70	1.40	7.45	0.90	97.25	1.00	-5.3	1.1E-08	1
19	2014	8	22	9	59.00	15900	22.0	95	95	56.10	1.40	7.80	0.35	97.00	0.25	16.7	9.1E-09	1
20	2014	8	22	17	32.00	27180	22.0	95	95	57.30	1.20	8.50	0.70	96.35	0.65	3.7	1.2E-08	1
21	2014	8	25	4	40.00	212880	21.0	95	95	65.00	7.70	12.45	3.95	92.40	3.95	0.0	9.8E-09	1
22																		
23																		
24																		
25																		
26																		

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 1.1E-08 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation	QC: JPH
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QA: JPH

Project Name:	Dane County Rodefeld	Cell #:	8
Project #:	220142.0000	USCS Description:	Lean clay
Sample Name:	Lift 1, T-3, 382,100N/2,201,100E	USCS Classification:	CL
Visual Descript:	Lean clay	Average Kv =	7.6E-09 cm/s

Sample Type: Undisturbed	Initial Values	Final Values		
Sample Dia. (in)	2.83	2.86	Permeant:	Water
Sample Ht. (in)	3.00	3.00	Permeant Specific Gravity:	1.00
Tare & Wet (g)	669.40	905.20	Sample Specific Gravity:	2.70 Est.
Tare & Dry (g)	601.00	786.30	Confining Pressure (psi):	100.0
Tare (g)	264.98	255.95	Burette Diameter (in):	0.250
Sample Wt. (g)	637.20	649.25	Burette Zero (cm):	100.0

Moisture (%)	20.4	22.4	Maximum Gradient:	12.7
Wet Density (pcf)	128.6	128.3	Average Gradient:	12.1
Dry Density (pcf)	106.9	104.8	Max. Effect. Stress (psi):	6.0
Saturation (%)	95.7	100.0	Min. Effect. Stress (psi):	4.2
			Ave. Effect. Stress (psi):	5.0

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2014	8	18	4	51.00		0.0	95	95	54.60		1.20		104.10				
2	2014	8	18	5	53.00	3720	20.0	95	95	54.60	0.00	1.30	0.10	103.35	0.75	-76.5	6.5E-08	
3	2014	8	18	6	46.00	3180	20.0	95	95	54.80	0.20	1.35	0.05	103.30	0.05	0.0	9.0E-09	
4	2014	8	18	8	2.00	4560	20.0	95	95	55.10	0.30	1.45	0.10	103.15	0.15	-20.0	1.6E-08	
5	2014	8	18	9	11.00	4140	20.0	95	95	55.40	0.30	1.55	0.10	103.05	0.10	0.0	1.4E-08	
6	2014	8	18	10	40.00	5340	20.0	95	95	55.75	0.35	1.65	0.10	102.95	0.10	0.0	1.1E-08	
7	2014	8	18	13	41.00	10860	23.0	95	95	57.15	1.40	1.85	0.20	102.80	0.15	14.3	8.6E-09	
8	2014	8	19	5	7.00	55560	20.0	95	95	58.75	1.60	2.65	0.80	102.05	0.75	3.2	8.1E-09	
9	2014	8	20	8	20.00		0.0	95	95	32.00		2.80		102.75				
10	2014	8	20	9	57.00	5820	22.0	95	95	34.85	2.85	2.85	0.05	102.05	0.70	-86.7	3.6E-08	
11	2014	8	20	11	27.00	5400	22.0	95	95	36.40	1.55	2.90	0.05	101.65	0.40	-77.8	2.3E-08	
12	2014	8	20	14	0.00	9180	21.0	95	95	38.30	1.90	2.95	0.05	101.35	0.30	-71.4	1.1E-08	
13	2014	8	20	18	16.00	15360	21.0	95	95	41.00	2.70	3.15	0.20	100.95	0.40	-33.3	1.1E-08	
14	2014	8	21	5	0.00	38640	21.0	95	95	43.60	2.60	3.65	0.50	100.30	0.65	-13.0	8.7E-09	
15	2014	8	21	9	4.00	14640	22.0	95	95	44.90	1.30	3.85	0.20	100.10	0.20	0.0	7.9E-09	1
16	2014	8	21	13	48.00	17040	23.0	95	95	46.30	1.40	4.10	0.25	99.90	0.20	11.1	7.5E-09	1
17	2014	8	21	17	53.00	14700	22.0	95	95	47.30	1.00	4.30	0.20	99.65	0.25	-11.1	8.9E-09	1
18	2014	8	22	5	35.00	42120	20.0	95	95	49.20	1.90	4.75	0.45	99.15	0.50	-5.3	6.9E-09	1
19	2014	8	22	10	0.00	15900	22.0	95	95	50.80	1.60	5.05	0.30	99.05	0.10	50.0	7.4E-09	1
20	2014	8	22	17	33.00	27180	22.0	95	95	52.25	1.45	5.35	0.30	98.60	0.45	-20.0	8.2E-09	1
21	2014	8	25	4	41.00	212880	21.0	95	95	62.35	10.10	7.70	2.35	96.45	2.15	4.4	6.6E-09	1
22																		
23																		
24																		
25																		
26																		

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 7.6E-09 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QC: JPH QA: JPH

Project Name:	Dane County Rodefeld	Cell #:	9
Project #:	220142.0000	USCS Description:	Lean clay
Sample Name:	Lift 1, T-6, 382,300N/2,201,100E	USCS Classification:	CL
Visual Descript:	Lean clay	Average Kv =	2.3E-08 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.83	2.83	Permeant:	Water	
Sample Ht. (in)	3.50	3.50	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	850.40	1000.80	Sample Specific Gravity:	2.70	Est.
Tare & Dry (g)	758.00	865.60	Confining Pressure (psi):	100.0	
Tare (g)	274.48	255.61	Burette Diameter (in):	0.250	
Sample Wt. (g)	733.40	745.19	Burette Zero (cm):	100.0	

	Initial	Final		
Moisture (%)	19.1	22.2	Maximum Gradient:	9.7
Wet Density (pcf)	126.9	128.9	Average Gradient:	8.8
Dry Density (pcf)	106.5	105.5	Max. Effect. Stress (psi):	5.9
Saturation (%)	88.5	100.0	Min. Effect. Stress (psi):	4.1
			Ave. Effect. Stress (psi):	4.7

	Date Yr.	Mo.	Day	Time Hr.	Min.	Run Time (s)	Temp C°**	Pressure (psi) Bot	Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0,1
1	2014	8	19	5	5.00		0.0	95	95	39.65		1.90		103.10				
2	2014	8	19	6	22.00	4620	20.0	95	95	39.80	0.15	2.40	0.50	102.05	1.05	-35.5	1.2E-07	
3	2014	8	19	9	47.00	12300	20.0	95	95	41.40	1.60	3.70	1.30	101.10	0.95	15.6	6.4E-08	
4	2014	8	20	8	20.00		0.0	95	95	48.60		2.55		102.20				
5	2014	8	20	9	57.00	5820	22.0	95	95	52.60	4.00	2.25	-0.30	99.40	2.80	-124.0	1.4E-07	
6	2014	8	20	11	27.00	5400	22.0	95	95	54.70	2.10	2.30	0.05	98.05	1.35	-92.9	8.9E-08	
7	2014	8	20	14	1.00	9240	21.0	95	95	56.80	2.10	2.70	0.40	96.40	1.65	-61.0	7.9E-08	
8	2014	8	20	18	17.00	15360	21.0	95	95	59.30	2.50	3.55	0.85	94.70	1.70	-33.3	6.1E-08	
9	2014	8	21	5	1.00	38640	21.0	95	95	61.80	2.50	5.50	1.95	92.10	2.60	-14.3	4.5E-08	
10	2014	8	21	9	4.00	14580	22.0	95	95	63.00	1.20	6.10	0.60	91.45	0.65	-4.0	3.3E-08	1
11	2014	8	21	13	49.00	17100	23.0	95	95	64.40	1.40	6.70	0.60	90.75	0.70	-7.7	2.9E-08	1
12	2014	8	21	17	54.00	14700	22.0	95	95	65.40	1.00	7.15	0.45	90.30	0.45	0.0	2.4E-08	1
13	2014	8	22	5	35.00	42060	20.0	95	95	66.70	1.30	8.25	1.10	89.20	1.10	0.0	2.2E-08	1
14	2014	8	22	10	0.00	15900	22.0	95	95	68.30	1.60	8.70	0.45	88.80	0.40	5.9	2.2E-08	1
15	2014	8	22	17	33.00	27180	22.0	95	95	69.50	1.20	9.25	0.55	88.20	0.60	-4.3	1.8E-08	1
16	2014	8	25	4	41.00	212880	21.0	95	95	77.15	7.65	12.85	3.60	85.25	2.95	9.9	1.4E-08	1
17																		
18																		
19																		
20																		
21																		
22																		
23																		
24																		
25																		
26																		

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 2.3E-08 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QC: JPH QA: JPH

Project Name:	Dane County Rodefeld	Cell #:	11
Project #:	220142.0000	USCS Description:	Lean clay
Sample Name:	Lift 2, T-9, 382,050N/2,200,950E	USCS Classification:	CL
Visual Descript:	Lean clay	Average Kv =	4.1E-09 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.85	2.85	Permeant:	Water	
Sample Ht. (in)	2.97	2.97	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	358.72	902.20	Sample Specific Gravity:	2.70	Est.
Tare & Dry (g)	340.99	783.80	Confining Pressure (psi):	100.0	
Tare (g)	248.46	266.73	Burette Diameter (in):	0.250	
Sample Wt. (g)	626.50	635.47	Burette Zero (cm):	100.0	

Moisture (%)	19.2	22.9	Maximum Gradient:	12.8
Wet Density (pcf)	126.1	127.9	Average Gradient:	12.7
Dry Density (pcf)	105.9	104.1	Max. Effect. Stress (psi):	6.0
Saturation (%)	87.5	100.0	Min. Effect. Stress (psi):	4.4
			Ave. Effect. Stress (psi):	5.2

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2014	8	20	8	21.00		0.0	95	95	38.80		3.10		103.05				
2	2014	8	20	9	58.00	5820	22.0	95	95	39.90	1.10	4.70	1.60	103.75	-0.70	255.6	4.3E-08	
3	2014	8	20	11	28.00	5400	22.0	95	95	40.75	0.85	5.65	0.95	104.05	-0.30	192.3	3.4E-08	
4	2014	8	20	14	2.00	9240	21.0	95	95	41.95	1.20	6.80	1.15	104.30	-0.25	155.6	2.8E-08	
5	2014	8	20	18	18.00	15360	21.0	95	95	43.90	1.95	8.30	1.50	104.20	0.10	87.5	3.0E-08	
6	2014	8	21	5	3.00	38700	21.0	95	95	47.15	3.25	11.05	2.75	103.50	0.70	59.4	2.7E-08	
7	2014	8	21	9	2.00	14340	22.0	95	95	48.30	1.15	11.95	0.90	103.40	0.10	80.0	2.1E-08	
8	2014	8	21	13	50.00	17280	23.0	95	95	49.85	1.55	12.65	0.70	103.15	0.25	47.4	1.6E-08	
9	2014	8	21	17	55.00	14700	22.0	95	95	51.10	1.25	13.15	0.50	102.90	0.25	33.3	1.6E-08	
10	2014	8	22	5	37.00	42120	20.0	95	95	53.30	2.20	14.55	1.40	102.50	0.40	55.6	1.4E-08	
11	2014	8	22	10	1.00	15840	22.0	95	95	54.80	1.50	15.05	0.50	102.30	0.20	42.9	1.4E-08	
12	2014	8	22	17	34.00	27180	22.0	95	95	56.30	1.50	15.60	0.55	102.20	0.10	69.2	7.6E-09	
13	2014	8	25	13	26.00		0.0	95	95	28.45		2.55		100.90				
14	2014	8	25	14	52.00	5160	22.0	95	95	28.60	0.15	2.70	0.15	100.85	0.05	50.0	1.1E-08	
15	2014	8	26	4	35.00	49380	20.0	95	95	29.70	1.10	3.45	0.75	100.60	0.25	50.0	6.0E-09	
16	2014	8	26	7	30.00	10500	20.0	95	95	29.60	-0.10	3.60	0.15	100.50	0.10	20.0	7.1E-09	
17	2014	8	26	15	27.00	28620	21.0	95	95	30.30	0.70	4.00	0.40	100.35	0.15	45.5	5.6E-09	
18	2014	8	26	18	5.00	9480	21.0	95	95	30.70	0.40	4.05	0.05	100.30	0.05	0.0	3.1E-09	1
19	2014	8	27	4	12.00	36420	20.0	95	95	30.80	0.10	4.45	0.40	100.05	0.25	23.1	5.4E-09	1
20	2014	8	27	8	17.00	14700	20.0	95	95	31.20	0.40	4.55	0.10	100.00	0.05	33.3	3.1E-09	1
21	2014	8	27	11	16.00	10740	22.0	95	95	31.80	0.60	4.65	0.10	99.95	0.05	33.3	4.0E-09	1
22	2014	8	27	16	45.00	19740	22.0	95	95	32.20	0.40	4.75	0.10	99.85	0.10	0.0	2.9E-09	1
23	2014	8	27	18	0.00	4500	22.0	95	95	31.30	-0.90	4.80	0.05	99.80	0.05	0.0	6.5E-09	1
24	2014	8	28	4	37.00	38220	20.0	95	95	32.80	1.50	5.05	0.25	99.55	0.25	0.0	4.0E-09	1
25																		
26																		

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 4.1E-09 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation	QC: JPH
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QA: JPH

Project Name:	Dane County Rodefeld	Cell #:	5
Project #:	220142.0000	USCS Description:	Lean clay
Sample Name:	Lift 2, T-12, 382,650N/2,200,850E	USCS Classification:	CL
Visual Descript:	Lean clay	Average Kv =	1.8E-08 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.85	2.87	Permeant:	Water	
Sample Ht. (in)	2.71	2.73	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	1055.10	860.00	Sample Specific Gravity:	2.71	Est.
Tare & Dry (g)	937.20	755.70	Confining Pressure (psi):	100.0	
Tare (g)	261.28	253.77	Burette Diameter (in):	0.250	
Sample Wt. (g)	592.60	606.23	Burette Zero (cm):	100.0	

Moisture (%)	17.4	20.8	Maximum Gradient:	11.0
Wet Density (pcf)	130.6	130.8	Average Gradient:	9.4
Dry Density (pcf)	111.2	108.3	Max. Effect. Stress (psi):	5.9
Saturation (%)	90.5	100.0	Min. Effect. Stress (psi):	4.5
			Ave. Effect. Stress (psi):	5.0

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2014	8	20	8	22.00		0.0	95	95	40.90		3.15		102.25				
2	2014	8	20	9	58.00	5760	22.0	95	95	40.90	0.00	6.05	2.90	103.35	-1.10	222.2	8.0E-08	
3	2014	8	20	11	28.00	5400	22.0	95	95	40.60	-0.30	7.15	1.10	103.40	-0.05	109.5	5.0E-08	
4	2014	8	20	14	3.00	9300	21.0	95	95	41.60	1.00	8.45	1.30	103.15	0.25	67.7	4.5E-08	
5	2014	8	20	18	19.00	15360	21.0	95	95	42.95	1.35	10.25	1.80	102.35	0.80	38.5	4.7E-08	
6	2014	8	21	5	3.00	38640	21.0	95	95	44.10	1.15	14.40	4.15	100.20	2.15	31.7	4.7E-08	
7	2014	8	21	9	5.00	14520	22.0	95	95	44.00	-0.10	16.10	1.70	99.15	1.05	23.6	5.6E-08	
8	2014	8	21	13	51.00	17160	23.0	95	95	46.40	2.40	17.05	0.95	98.15	1.00	-2.6	3.4E-08	
9	2014	8	21	17	55.00	14640	22.0	95	95	47.45	1.05	17.75	0.70	97.40	0.75	-3.4	3.1E-08	
10	2014	8	22	5	38.00	42180	20.0	95	95	48.20	0.75	20.05	2.30	96.20	1.20	31.4	2.8E-08	
11	2014	8	22	10	1.00	15780	22.0	95	95	49.65	1.45	20.65	0.60	95.60	0.60	0.0	2.5E-08	1
12	2014	8	22	17	35.00	27240	22.0	95	95	50.90	1.25	21.55	0.90	94.75	0.85	2.9	2.2E-08	1
13	2014	8	25	4	45.00	213000	21.0	95	95	58.10	7.20	27.20	5.65	89.90	4.85	7.6	1.9E-08	1
14	2014	8	25	13	27.00	31320	21.0	95	95	58.60	0.50	27.75	0.55	89.25	0.65	-8.3	1.6E-08	1
15	2014	8	25	14	53.00		0.0	95	95	58.90		27.80		89.05				
16	2014	8	26	4	36.00	49380	20.0	95	95	59.20	0.30	28.85	1.05	88.35	0.70	20.0	1.5E-08	1
17	2014	8	26	7	31.00	10500	20.0	95	95	58.90	-0.30	29.10	0.25	88.20	0.15	25.0	1.7E-08	1
18	2014	8	26	15	28.00	28620	21.0	95	95	59.80	0.90	29.50	0.40	87.60	0.60	-20.0	1.5E-08	1
19	2014	8	26	18	5.00	9420	21.0	95	95	60.00	0.20	29.65	0.15	87.45	0.15	0.0	1.4E-08	1
20	2014	8	27	4	12.00	36420	20.0	95	95	59.70	-0.30	30.35	0.70	86.95	0.50	16.7	1.5E-08	1
21																		
22																		
23																		
24																		
25																		
26																		

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 1.8E-08 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation	QC: JPH
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QA: JNH

Project Name:	Dane County Rodefeld	Cell #:	9
Project #:	220142.0000	USCS Description:	Lean Clay
Sample Name:	Lift 2, T-15, 382,150N/2,201,150E	USCS Classification:	Lean Clay
Visual Descript:	VISUAL ONLY	Average Kv =	1.9E-09 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.87	2.88	Permeant:	Water	
Sample Ht. (in)	3.07	3.03	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	866.60	920.30	Sample Specific Gravity:	2.68	Est.
Tare & Dry (g)	761.80	801.40	Confining Pressure (psi):	100.0	
Tare (g)	248.13	254.61	Burette Diameter (in):	0.250	
Sample Wt. (g)	662.30	665.69	Burette Zero (cm):	100.0	

Moisture (%)	20.4	21.7	Maximum Gradient:	56.7
Wet Density (pcf)	127.0	128.5	Average Gradient:	56.1
Dry Density (pcf)	105.5	105.5	Max. Effect. Stress (psi):	10.7
Saturation (%)	93.8	100.0	Min. Effect. Stress (psi):	4.3
			Ave. Effect. Stress (psi):	6.6

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2014	8	29	14	29.00		0.0	95	95	39.35		2.95		102.10				
2	2014	8	29	15	1.00	1920	22.0	95	95	39.85	0.50	3.20	0.25	101.60	0.50	-33.3	1.1E-07	
3	2014	9	2	5	47.00	312360	19.0	95	95	50.75	10.90	7.20	4.00	102.75	-1.15	180.7	2.8E-09	
4	2014	9	2	7	6.00		0.0	95	95	50.90		7.25		102.80				
5	2014	9	2	7	9.00		0.0	95	90	51.40		7.30		102.35				
6	2014	9	2	9	19.00	7800	20.0	95	90	52.60	1.20	7.35	0.05	101.50	0.85	-88.9	7.5E-09	
7	2014	9	2	10	58.00	5940	21.0	95	90	51.10	-1.50	7.40	0.05	101.30	0.20	-60.0	2.7E-09	
8	2014	9	2	13	48.00	10200	22.0	95	90	54.10	3.00	7.45	0.05	101.05	0.25	-66.7	1.8E-09	
9	2014	9	3	5	26.00	56280	20.0	95	90	54.30	0.20	8.15	0.70	99.75	1.30	-30.0	2.3E-09	
10	2014	9	3	12	37.00	25860	24.0	95	90	56.25	1.95	8.65	0.50	99.35	0.40	11.1	2.1E-09	
11	2014	9	3	13	0.00	1380	24.0	95	90	56.20	-0.05	8.70	0.05	99.30	0.05	0.0	4.3E-09	
12	2014	9	3	13	15.00		0.0	95	90	56.20		8.70		99.30				
13	2014	9	3	15	40.00	8700	23.0	95	90	56.70	0.50	8.90	0.20	99.30	0.00	100.0	1.4E-09	
14	2014	9	4	5	37.00	50220	20.0	95	90	56.75	0.05	9.55	0.65	98.20	1.10	-25.7	2.3E-09	
15	2014	9	4	10	54.00	19020	20.5	95	90	57.55	0.80	10.00	0.45	98.00	0.20	38.5	2.3E-09	
16	2014	9	4	12	51.00	7020	22.0	95	90	58.20	0.65	10.10	0.10	97.90	0.10	0.0	1.8E-09	
17	2014	9	4	14	3.00	4320	23.0	95	90	58.55	0.35	10.20	0.10	97.95	-0.05	300.0	7.1E-10	
18	2014	9	4	17	10.00	11220	23.0	95	90	59.20	0.65	10.40	0.20	97.70	0.25	-11.1	2.5E-09	
19	2014	9	5	8	25.00	54900	21.5	95	90	60.15	0.95	11.15	0.75	96.80	0.90	-9.1	1.9E-09	
20	2014	9	5	13	35.00	18600	21.0	95	90	60.25	0.10	11.45	0.30	96.45	0.35	-7.7	2.3E-09	
21	2014	9	5	17	14.00	13140	21.0	95	90	60.00	-0.25	11.65	0.20	96.25	0.20	0.0	2.0E-09	1
22	2014	9	8	5	54.00	218400	20.5	95	90	62.60	2.60	14.90	3.25	93.10	3.15	1.6	2.0E-09	1
23	2014	9	8	10	8.00	15240	22.0	95	90	62.20	-0.40	15.20	0.30	92.90	0.20	20.0	2.1E-09	1
24	2014	9	8	15	43.00	20100	22.0	95	90	62.70	0.50	15.50	0.30	92.60	0.30	0.0	1.9E-09	1
25	2014	9	8	17	25.00	6120	22.0	95	90	62.65	-0.05	15.55	0.05	92.50	0.10	-33.3	1.6E-09	1
26	2014	9	9	7	55.00	52200	20.5	95	90	62.65	0.00	16.30	0.75	91.75	0.75	0.0	1.9E-09	1

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 1.9E-09 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QC: JNH QA: JNH

Project Name:	Dane County Rodefeld	Cell #:	8
Project #:	220142.0000	USCS Description:	Lean clay
Sample Name:	Lift 3, T-18, 382,500N / 2,201,200E	USCS Classification:	CL
Visual Descript:	Lean clay	Average Kv =	8.3E-09 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.85	2.85	Permeant:	Water	
Sample Ht. (in)	2.83	2.84	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	604.70	875.40	Sample Specific Gravity:	2.72	Est.
Tare & Dry (g)	551.30	761.90	Confining Pressure (psi):	100.0	
Tare (g)	266.29	264.48	Burette Diameter (in):	0.250	
Sample Wt. (g)	600.50	610.92	Burette Zero (cm):	100.0	

Moisture (%)	18.7	22.8	Maximum Gradient:	11.4
Wet Density (pcf)	126.7	128.5	Average Gradient:	11.1
Dry Density (pcf)	106.7	104.6	Max. Effect. Stress (psi):	5.9
Saturation (%)	86.6	100.0	Min. Effect. Stress (psi):	4.5
			Ave. Effect. Stress (psi):	5.1

	Date Yr.	Mo.	Day	Time Hr.	Min.	Run Time (s)	Temp C°**	Pressure (psi) Bot	Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0,1
1	2014	9	4	9	52.00		0.0	95	95	39.40		2.50		99.80				
2	2014	9	4	10	51.00	3540	20.5	95	95	39.40	0.00	2.90	0.40	99.10	0.70	-27.3	8.9E-08	
3	2014	9	4	11	50.00	3540	21.0	95	95	39.75	0.35	3.10	0.20	98.80	0.30	-20.0	4.0E-08	
4	2014	9	4	12	54.00	3840	22.0	95	95	40.15	0.40	3.40	0.30	98.65	0.15	33.3	3.2E-08	
5	2014	9	4	14	2.00	4080	23.0	95	95	40.50	0.35	3.60	0.20	98.50	0.15	14.3	2.3E-08	
6	2014	9	4	15	50.00	6480	22.5	95	95	40.80	0.30	3.95	0.35	98.20	0.30	7.7	2.8E-08	
7	2014	9	4	17	9.00	4740	23.0	95	95	41.10	0.30	4.15	0.20	98.00	0.20	0.0	2.3E-08	
8	2014	9	5	8	26.00	55020	21.5	95	95	42.35	1.25	5.85	1.70	96.30	1.70	0.0	1.8E-08	
9	2014	9	5	9	24.00	3480	21.0	95	95	42.40	0.05	5.95	0.10	96.20	0.10	0.0	1.7E-08	
10	2014	9	5	10	26.00	3720	22.0	95	95	42.60	0.20	6.05	0.10	96.15	0.05	33.3	1.2E-08	
11	2014	9	5	11	23.00	3420	22.0	95	95	42.50	-0.10	6.10	0.05	96.05	0.10	-33.3	1.3E-08	
12	2014	9	5	13	33.00	7800	21.0	95	95	42.40	-0.10	6.30	0.20	95.90	0.15	14.3	1.4E-08	
13	2014	9	5	17	13.00	13200	21.0	95	95	42.30	-0.10	6.55	0.25	95.65	0.25	0.0	1.1E-08	
14	2014	9	8	5	53.00	218400	20.5	95	95	44.50	2.20	10.10	3.55	92.70	2.95	9.2	9.6E-09	
15	2014	9	8	7	49.00	6960	20.5	95	95	44.75	0.25	10.15	0.05	92.65	0.05	0.0	4.8E-09	
16	2014	9	8	13	3.00	18840	22.0	95	95	45.35	0.60	10.40	0.25	92.40	0.25	0.0	8.5E-09	1
17	2014	9	8	17	24.00	15660	22.0	95	95	45.50	0.15	10.60	0.20	92.20	0.20	0.0	8.3E-09	1
18	2014	9	9	7	54.00	52200	20.5	95	95	45.60	0.10	11.25	0.65	91.55	0.65	0.0	8.5E-09	1
19	2014	9	9	11	54.00	14400	22.0	95	95	46.55	0.95	11.45	0.20	91.40	0.15	14.3	8.0E-09	1
20	2014	9	9	18	36.00	24120	22.0	95	95	47.35	0.80	11.75	0.30	91.10	0.30	0.0	8.3E-09	1
21	2014	9	10	6	35.00	43140	20.0	95	95	47.90	0.55	12.30	0.55	90.65	0.45	10.0	8.2E-09	1
22																		
23																		
24																		
25																		
26																		

**A zero in this column starts a series of measurements.

*Average Kv for those rows with a 1 in the Ave. column. 8.3E-09 cm/s

(Termination determined by stable Kv and low flow differential.)

***Kv adjusted for temperature.

TRC Environmental Corporation	QC: JNH
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QA: JNH

Project Name:	Dane County Rodefeld	Cell #:	7
Project #:	220142.0000	USCS Description:	Lean clay
Sample Name:	Lift 3, T-21, 382,500N/2,201,000E	USCS Classification:	CL
Visual Descript:	Lean clay	Average Kv =	5.8E-09 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.86	2.87	Permeant:	Water	
Sample Ht. (in)	3.04	3.05	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	533.60	935.90	Sample Specific Gravity:	2.70	Est.
Tare & Dry (g)	488.40	817.80	Confining Pressure (psi):	100.0	
Tare (g)	265.60	261.30	Burette Diameter (in):	0.250	
Sample Wt. (g)	669.50	674.60	Burette Zero (cm):	100.0	

	Initial	Final		
Moisture (%)	20.3	21.2		
Wet Density (pcf)	130.6	129.8		
Dry Density (pcf)	108.6	107.1	Max. Effect. Stress (psi):	8.6
Saturation (%)	99.3	100.0	Min. Effect. Stress (psi):	4.5
			Ave. Effect. Stress (psi):	5.2

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2014	9	4	9	45.00		0.0	95	95	26.40		3.45		99.50				
2	2014	9	4	10	47.00	3720	20.5	95	95	26.35	-0.05	3.50	0.05	98.90	0.60	-84.6	5.4E-08	
3	2014	9	4	11	48.00	3660	21.0	95	95	26.80	0.45	3.75	0.25	98.75	0.15	25.0	3.3E-08	
4	2014	9	4	12	53.00	3900	22.0	95	95	27.20	0.40	4.05	0.30	98.60	0.15	33.3	3.4E-08	
5	2014	9	4	14	0.00	4020	23.0	95	95	27.85	0.65	4.25	0.20	98.50	0.10	33.3	2.2E-08	
6	2014	9	4	15	48.00	6480	22.5	95	95	28.20	0.35	4.55	0.30	98.25	0.25	9.1	2.5E-08	
7	2014	9	4	17	7.00	4740	23.0	95	95	28.70	0.50	4.75	0.20	98.05	0.20	0.0	2.5E-08	
8	2014	9	4	17	55.00	2880	23.0	95	95	29.40	0.70	5.00	0.25	98.85	-0.80	-190.9	-5.6E-08	
9	2014	9	5	8	27.00	52320	21.5	95	95	31.30	1.90	6.40	1.40	96.70	2.15	-21.1	2.1E-08	
10	2014	9	5	9	25.00	3480	21.0	95	95	31.40	0.10	6.50	0.10	96.60	0.10	0.0	1.8E-08	
11	2014	9	5	10	27.00	3720	22.0	95	95	31.75	0.35	6.60	0.10	96.60	0.00	100.0	8.3E-09	
12	2014	9	5	11	22.00	3300	22.0	95	95	31.70	-0.05	6.65	0.05	96.50	0.10	-33.3	1.4E-08	
13	2014	9	5	12	31.00	4140	21.0	95	95	31.70	0.00	6.70	0.05	96.40	0.10	-33.3	1.2E-08	
14	2014	9	5	14	40.00	7740	21.0	95	95	31.90	0.20	6.85	0.15	96.30	0.10	20.0	1.0E-08	
15	2014	9	5	17	11.00	9060	21.0	95	95	31.95	0.05	7.05	0.20	96.15	0.15	14.3	1.2E-08	
16	2014	9	8	5	52.00	218460	20.5	95	95	40.30	8.35	10.35	3.30	93.85	2.30	17.9	8.7E-09	
17	2014	9	8	7	47.00	6900	20.5	95	95	40.70	0.40	10.45	0.10	93.75	0.10	0.0	1.0E-08	
18	2014	9	8	13	2.00	18900	22.0	95	95	42.00	1.30	10.65	0.20	93.65	0.10	33.3	5.3E-09	
19	2014	9	8	17	23.00	15660	22.0	95	95	42.55	0.55	10.80	0.15	93.50	0.15	0.0	6.5E-09	
20	2014	9	9	7	53.00	52200	22.0	95	95	43.60	1.05	11.40	0.60	92.95	0.55	4.3	7.5E-09	
21	2014	9	9	11	53.00	14400	22.0	95	95	44.80	1.20	11.65	0.25	92.90	0.05	66.7	7.2E-09	
22	2014	9	9	18	35.00	24120	22.0	95	95	46.00	1.20	11.80	0.15	92.75	0.15	0.0	4.3E-09	
23	2014	9	10	6	32.00	43020	20.0	95	95	46.90	0.90	12.35	0.55	92.30	0.45	10.0	8.5E-09	
24	2014	9	10	12	14.00	20520	23.0	95	95	48.75	1.85	12.65	0.30	92.15	0.15	33.3	7.5E-09	
25	2014	9	10	14	0.00		0.0	95	92	49.40		12.60		91.90				
26	2014	9	10	15	15.00	4500	22.0	95	92	49.55	0.15	12.70	0.10	91.60	0.30	-50.0	8.6E-09	

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column.

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QC: JNH QA: JNH

Project Name:	Dane County Rodefeld	Cell #:	10
Project #:	220142.0000	USCS Description:	Lean clay
Sample Name:	Lift 3, T-22, 382,700N / 2,200,900E	USCS Classification:	CL
Visual Descript:	Lean clay	Average Kv =	3.0E-09 cm/s

Sample Type: Undisturbed	Initial Values	Final Values		
Sample Dia. (in)	2.86	2.86	Permeant:	Water
Sample Ht. (in)	3.00	3.00	Permeant Specific Gravity:	1.00
Tare & Wet (g)	647.00	919.20	Sample Specific Gravity:	2.70 Est.
Tare & Dry (g)	525.69	797.80	Confining Pressure (psi):	100.0
Tare (g)	0.00	272.11	Burette Diameter (in):	0.250
Sample Wt. (g)	647.00	647.09	Burette Zero (cm):	100.0
Moisture (%)	23.1	23.1		
Wet Density (pcf)	127.4	127.7		
Dry Density (pcf)	103.5	103.8	Max. Effect. Stress (psi):	10.8
Saturation (%)	99.2	100.0	Min. Effect. Stress (psi):	4.2
			Ave. Effect. Stress (psi):	5.0

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2014	9	4	10	0.00		0.0	95	95	40.00		2.50		100.45				
2	2014	9	4	10	53.00	3180	20.0	95	95	41.20	1.20	2.85	0.35	98.70	1.75	-66.7	2.0E-07	
3	2014	9	4	11	53.00	3600	21.0	95	95	42.50	1.30	3.15	0.30	97.80	0.90	-50.0	1.0E-07	
4	2014	9	4	12	52.00	3540	22.0	95	95	43.70	1.20	3.45	0.30	97.05	0.75	-42.9	8.8E-08	
5	2014	9	4	14	5.00	4380	23.0	95	95	45.05	1.35	3.60	0.15	96.30	0.75	-66.7	6.0E-08	
6	2014	9	4	15	52.00	6420	22.5	95	95	46.45	1.40	3.90	0.30	95.45	0.85	-47.8	5.4E-08	
7	2014	9	4	17	11.00	4740	23.0	95	95	47.65	1.20	4.05	0.15	94.90	0.55	-57.1	4.4E-08	
8	2014	9	5	8	24.00	54780	21.5	95	95	52.50	4.85	6.45	2.40	92.25	2.65	-5.0	3.0E-08	
9	2014	9	5	9	22.00	3480	21.0	95	95	52.65	0.15	6.60	0.15	92.15	0.10	20.0	2.4E-08	
10	2014	9	5	10	24.00	3720	22.0	95	95	52.90	0.25	6.70	0.10	92.05	0.10	0.0	1.7E-08	
11	2014	9	5	11	26.00	3720	22.0	95	95	52.95	0.05	6.70	0.00	91.95	0.10	-100.0	8.8E-09	
12	2014	9	5	12	37.00	4260	21.0	95	95	53.05	0.10	6.90	0.20	91.80	0.15	14.3	2.7E-08	
13	2014	9	5	13	36.00	3540	21.0	95	95	53.30	0.25	7.00	0.10	91.75	0.05	33.3	1.4E-08	
14	2014	9	5	14	36.00	3600	21.0	95	95	53.35	0.05	7.10	0.10	91.70	0.05	33.3	1.4E-08	
15	2014	9	5	15	34.00	3480	21.0	95	95	53.40	0.05	7.20	0.10	91.65	0.05	33.3	1.5E-08	
16	2014	9	5	17	15.00	6060	21.0	95	95	53.50	0.10	7.35	0.15	91.50	0.15	0.0	1.7E-08	
17	2014	9	8	5	55.00	218400	20.5	95	95	59.90	6.40	10.25	2.90	89.50	2.00	18.4	8.0E-09	
18	2014	9	8	7	52.00	7020	20.5	95	95	60.20	0.30	10.30	0.05	89.45	0.05	0.0	5.2E-09	
19	2014	9	8	10	10.00	8280	22.0	95	95	60.95	0.75	10.30	0.00	89.35	0.10	-100.0	4.2E-09	
20	2014	9	9	7	56.00	78360	20.5	95	95	63.70	2.75	10.70	0.40	88.90	0.45	-5.9	4.0E-09	
21	2014	9	9	18	38.00	38520	22.0	95	95	64.90	1.20	10.75	0.05	88.50	0.40	-77.8	4.2E-09	
22	2014	9	10	6	37.00	43140	20.0	95	95	65.35	0.45	11.20	0.45	88.55	-0.05	125.0	3.5E-09	
23	2014	9	10	12	14.00		0.0	95	90	28.40		11.25		88.10				
24	2014	9	10	13	53.00	5940	22.5	95	90	29.20	0.80	11.35	0.10	87.40	0.70	-75.0	8.7E-09	
25	2014	9	10	15	17.00	5040	22.0	95	90	29.50	0.30	11.45	0.10	87.10	0.30	-50.0	5.2E-09	
26	2014	9	10	18	8.00	10260	21.0	95	90	29.50	0.00	11.55	0.10	86.70	0.40	-60.0	3.2E-09	

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column.

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation	QC: JNH
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QA: JNH

Project Name:	Dane County Rodefeld	Cell #:	11
Project #:	220142.0000	USCS Description:	Lean clay
Sample Name:	Lift 3, T-23, 382,600N / 2,201,100E	USCS Classification:	CL
Visual Descript:	Lean clay	Average Kv =	3.6E-09 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.87	2.85	Permeant:	Water	
Sample Ht. (in)	3.32	3.31	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	705.40	964.80	Sample Specific Gravity:	2.70	Est.
Tare & Dry (g)	564.77	827.40	Confining Pressure (psi):	100.0	
Tare (g)	0.00	262.63	Burette Diameter (in):	0.250	
Sample Wt. (g)	705.40	702.17	Burette Zero (cm):	100.0	

	Initial	Final		
Moisture (%)	24.9	24.3	Maximum Gradient:	52.5
Wet Density (pcf)	125.1	126.4	Average Gradient:	52.1
Dry Density (pcf)	100.2	101.7	Max. Effect. Stress (psi):	10.6
Saturation (%)	98.6	100.0	Min. Effect. Stress (psi):	4.1
			Ave. Effect. Stress (psi):	6.2

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2014	9	5	8	23.00		0.0	95	95	45.90		5.80		101.45				
2	2014	9	5	9	21.00		0.0	95	95	46.10		2.90		102.30				
3	2014	9	5	10	22.00		0.0	95	95	46.55		2.95		102.45				
4	2014	9	5	11	27.00	3900	22.0	95	95	46.75	0.20	3.00	0.05	102.40	0.05	0.0	7.9E-09	
5	2014	9	5	12	39.00		0.0	95	95	47.05		3.00		102.40				
6	2014	9	5	13	38.00		0.0	95	95	47.40		3.05		102.45				
7	2014	9	5	14	35.00		0.0	95	95	47.50		3.05		103.75				
8	2014	9	5	15	35.00	3600	21.0	95	95	47.75	0.25	3.05	0.00	103.70	0.05	-100.0	4.3E-09	
9	2014	9	5	17	16.00	6060	21.0	95	95	48.05	0.30	3.10	0.05	103.70	0.00	100.0	2.6E-09	
10	2014	9	8	5	56.00	218400	20.5	95	95	56.75	8.70	4.70	1.60	102.60	1.10	18.5	4.0E-09	
11	2014	9	8	7	53.00	7020	20.5	95	95	57.00	0.25	4.75	0.05	102.60	0.00	100.0	2.3E-09	
12	2014	9	8	7	59.00		0.0	95	90	57.25		4.70		102.35				
13	2014	9	8	9	0.00	3660	21.0	95	90	57.90	0.65	4.80	0.10	101.80	0.55	-69.2	1.2E-08	
14	2014	9	8	10	11.00	4260	22.0	95	90	58.75	0.85	4.85	0.05	101.40	0.40	-77.8	7.2E-09	
15	2014	9	8	11	7.00	3360	21.0	95	90	58.95	0.20	4.85	0.00	101.20	0.20	-100.0	4.2E-09	
16	2014	9	8	13	7.00	7200	22.0	95	90	59.90	0.95	4.90	0.05	100.70	0.50	-81.8	5.2E-09	
17	2014	9	8	17	28.00	15660	22.0	95	90	61.10	1.20	5.05	0.15	99.85	0.85	-70.0	4.4E-09	
18	2014	9	9	7	57.00	52140	20.5	95	90	63.35	2.25	6.00	0.95	97.75	2.10	-37.7	4.2E-09	
19	2014	9	9	11	59.00	14520	22.0	95	90	64.60	1.25	6.30	0.30	97.30	0.45	-20.0	3.6E-09	
20	2014	9	9	18	39.00	24000	22.0	95	90	66.98	2.38	6.85	0.55	96.50	0.80	-18.5	3.9E-09	
21	2014	9	10	6	39.00	43200	20.0	95	90	67.10	0.12	7.85	1.00	95.25	1.25	-11.1	3.8E-09	1
22	2014	9	10	12	15.00	20160	22.0	95	90	68.85	1.75	8.35	0.50	94.70	0.55	-4.8	3.7E-09	1
23	2014	9	10	15	18.00	10980	22.0	95	90	69.00	0.15	8.60	0.25	94.45	0.25	0.0	3.2E-09	1
24	2014	9	11	3	46.00	44880	20.0	95	90	69.10	0.10	9.65	1.05	93.25	1.20	-6.7	3.7E-09	1
25	2014	9	11	7	5.00	11940	21.0	95	90	69.40	0.30	9.90	0.25	92.90	0.35	-16.7	3.6E-09	1
26	2014	9	11	10	23.00	11880	20.0	95	90	69.50	0.10	10.15	0.25	92.60	0.30	-9.1	3.4E-09	1

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 3.6E-09 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QC: JPH QA: JPH

Project Name:	Dane County Rodefeld	Cell #:	9
Project #:	220142.0000	USCS Description:	Lean clay
Sample Name:	Lift 4, T-27, 382,250N/2,200,850E	USCS Classification:	CL
Visual Descript:	Lean clay	Average Kv =	2.4E-09 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.87	2.87	Permeant:	Water	
Sample Ht. (in)	2.99	2.99	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	423.51	934.10	Sample Specific Gravity:	2.70	Est.
Tare & Dry (g)	396.11	822.00	Confining Pressure (psi):	100.0	
Tare (g)	256.30	268.95	Burette Diameter (in):	0.250	
Sample Wt. (g)	663.10	665.15	Burette Zero (cm):	100.0	

Moisture (%)	19.6	20.3	Maximum Gradient:	38.9
Wet Density (pcf)	130.6	131.0	Average Gradient:	38.7
Dry Density (pcf)	109.2	108.9	Max. Effect. Stress (psi):	9.0
Saturation (%)	97.5	100.0	Min. Effect. Stress (psi):	4.6
			Ave. Effect. Stress (psi):	6.7

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2014	9	11	3	57.00		0.0	95	95	28.55		3.20		100.70				
2	2014	9	11	4	57.00	3600	21.0	95	95	28.60	0.05	3.30	0.10	100.20	0.50	-66.7	4.8E-08	
3	2014	9	11	10	23.00	19560	20.5	95	95	28.20	-0.40	3.60	0.30	100.05	0.15	33.3	6.9E-09	
4	2014	9	11	12	35.00		0.0	95	95	28.30		3.70		100.05				
5	2014	9	11	12	41.00		0.0	95	92	28.60		3.70		99.90				
6	2014	9	11	14	59.00	8280	21.0	95	92	29.05	0.45	3.80	0.10	99.40	0.50	-66.7	6.6E-09	
7	2014	9	11	19	13.00	15240	21.5	95	92	29.90	0.85	4.05	0.25	99.00	0.40	-23.1	3.9E-09	
8	2014	9	12	8	5.00	46320	20.0	95	92	29.90	0.00	4.75	0.70	98.10	0.90	-12.5	3.3E-09	
9	2014	9	12	13	18.00	18780	20.0	95	92	29.90	0.00	5.05	0.30	97.85	0.25	9.1	2.8E-09	
10	2014	9	12	16	59.00	13260	20.5	95	92	30.25	0.35	5.25	0.20	97.70	0.15	14.3	2.5E-09	
11	2014	9	15	9	8.00	230940	20.5	95	92	30.80	0.55	8.15	2.90	95.10	2.60	5.5	2.3E-09	
12	2014	9	15	10	13.00		0.0	95	92	32.65		8.25		95.05				
13	2014	9	15	11	15.00	3720	22.0	95	92	32.90	0.25	8.40	0.15	95.00	0.05	50.0	5.0E-09	
14	2014	9	15	13	52.00	9420	23.5	95	92	33.20	0.30	8.50	0.10	94.85	0.15	-20.0	2.4E-09	
15	2014	9	15	15	1.00	4140	23.0	95	92	33.20	0.00	8.55	0.05	94.80	0.05	0.0	2.2E-09	
16	2014	9	16	5	58.00	53820	23.0	95	92	33.60	0.40	9.20	0.65	94.10	0.70	-3.7	2.3E-09	
17	2014	9	16	8	2.00	7440	23.0	95	92	33.40	-0.20	9.30	0.10	94.00	0.10	0.0	2.4E-09	
18	2014	9	16	10	0.00	7080	23.0	95	92	33.60	0.20	9.40	0.10	93.90	0.10	0.0	2.6E-09	
19	2014	9	16	12	10.00	7800	23.5	95	92	33.65	0.05	9.55	0.15	93.85	0.05	50.0	2.3E-09	
20	2014	9	16	14	47.00	9420	23.5	95	92	33.70	0.05	9.65	0.10	93.75	0.10	0.0	1.9E-09	1
21	2014	9	16	16	52.00	7500	25.0	95	92	34.45	0.75	9.80	0.15	93.65	0.10	20.0	2.9E-09	1
22	2014	9	16	20	5.00	11580	25.0	95	92	34.50	0.05	10.00	0.20	93.50	0.15	14.3	2.6E-09	1
23	2014	9	17	6	14.00	36540	22.0	95	92	34.10	-0.40	10.35	0.35	93.00	0.50	-17.6	2.2E-09	1
24	2014	9	17	8	1.00	6420	22.5	95	92	34.20	0.10	10.45	0.10	92.90	0.10	0.0	2.9E-09	1
25	2014	9	17	10	34.00	9180	22.0	95	92	34.40	0.20	10.55	0.10	92.80	0.10	0.0	2.0E-09	1
26																		

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 2.4E-09 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QC: JPH QA: JPH

Project Name:	Dane County Rodefeld	Cell #:	8
Project #:	220142.0000	USCS Description:	Lean clay
Sample Name:	Lift 4, T-28, 382,750N/2,200,950E	USCS Classification:	CL
Visual Descript:	Lean clay	Average Kv =	3.3E-09 cm/s

Sample Type: Undisturbed	Initial Values	Final Values			
Sample Dia. (in)	2.86	2.86	Permeant:	Water	
Sample Ht. (in)	2.81	2.80	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	380.65	865.70	Sample Specific Gravity:	2.68	Est.
Tare & Dry (g)	359.27	750.80	Confining Pressure (psi):	100.0	
Tare (g)	258.91	269.58	Burette Diameter (in):	0.250	
Sample Wt. (g)	594.69	596.12	Burette Zero (cm):	100.0	

	Initial	Final		
Moisture (%)	21.3	23.9	Maximum Gradient:	59.9
Wet Density (pcf)	125.5	126.3	Average Gradient:	59.7
Dry Density (pcf)	103.5	101.9	Max. Effect. Stress (psi):	10.8
Saturation (%)	92.8	100.0	Min. Effect. Stress (psi):	4.2
			Ave. Effect. Stress (psi):	6.8

	Date			Time		Run	Temp	Pressure (psi)		Cham	Cham.	Bot	Bot.	Top	Top	Flow	Kv ***	Ave.*
	Yr.	Mo.	Day	Hr.	Min.	Time (s)	C°**	Bot	Top	(cm)	Dif.(cm)	(cm)	Dif.(cm)	(cm)	Dif.(cm)	Dif.(%)	cm/s	0,1
1	2014	9	11	4	5.00		0.0	95	95	32.20		2.10		100.50				
2	2014	9	11	7	0.00	10500	21.0	95	95	33.75	1.55	2.35	0.25	99.50	1.00	-60.0	3.2E-08	
3	2014	9	11	12	34.00	20040	20.0	95	95	35.95	2.20	2.70	0.35	99.30	0.20	27.3	7.7E-09	
4	2014	9	11	19	12.00	23880	21.5	95	95	38.65	2.70	3.10	0.40	99.15	0.15	45.5	6.3E-09	
5	2014	9	12	8	9.00	46620	20.0	95	95	40.95	2.30	3.70	0.60	98.70	0.45	14.3	6.4E-09	
6	2014	9	12	13	17.00	18480	20.0	95	95	41.70	0.75	3.95	0.25	98.55	0.15	25.0	6.2E-09	
7	2014	9	12	16	58.00	13260	20.5	95	95	42.70	1.00	4.10	0.15	98.50	0.05	50.0	4.3E-09	
8	2014	9	12	17	5.00		0.0	95	90	43.05		4.10		98.20				
9	2014	9	12	17	55.00	3000	20.5	95	90	43.90	0.85	4.15	0.05	97.75	0.45	-80.0	1.0E-08	
10	2014	9	15	9	8.00	227580	20.5	95	90	61.65	17.75	10.25	6.10	90.85	6.90	-6.2	3.5E-09	
11	2014	9	15	10	12.00		0.0	95	90	64.80		10.25		90.75				
12	2014	9	15	11	14.00	3720	22.0	95	90	65.45	0.65	10.40	0.15	90.70	0.05	50.0	3.2E-09	
13	2014	9	15	13	52.00	9480	23.5	95	90	66.30	0.85	10.60	0.20	90.30	0.40	-33.3	3.7E-09	
14	2014	9	15	15	0.00	4080	23.0	95	90	66.40	0.10	10.70	0.10	90.20	0.10	0.0	2.9E-09	
15	2014	9	16	5	58.00	53880	23.0	95	90	68.25	1.85	12.20	1.50	88.60	1.60	-3.2	3.4E-09	
16	2014	9	16	8	1.00	7380	23.0	95	90	68.20	-0.05	12.35	0.15	88.35	0.25	-25.0	3.2E-09	
17	2014	9	16	10	0.00	7140	23.0	95	90	68.50	0.30	12.65	0.30	88.20	0.15	33.3	3.7E-09	
18	2014	9	16	12	8.00	7680	23.5	95	90	68.75	0.25	12.85	0.20	88.10	0.10	33.3	2.3E-09	
19	2014	9	16	14	46.00	9480	23.5	95	90	68.80	0.05	13.05	0.20	87.75	0.35	-27.3	3.4E-09	
20	2014	9	16	16	49.00	7380	24.5	95	90	69.75	0.95	13.30	0.25	87.65	0.10	42.9	2.8E-09	
21	2014	9	16	20	3.00	11640	25.0	95	90	70.00	0.25	13.65	0.35	87.30	0.35	0.0	3.4E-09	1
22	2014	9	17	6	13.00	36600	22.0	95	90	69.85	-0.15	14.60	0.95	86.20	1.10	-7.3	3.4E-09	1
23	2014	9	17	8	0.00	6420	22.5	95	90	70.20	0.35	14.75	0.15	86.05	0.15	0.0	2.9E-09	1
24	2014	9	17	10	32.00	9120	22.0	95	90	70.50	0.30	15.05	0.30	85.85	0.20	20.0	3.4E-09	1
25																		
26																		

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 3.3E-09 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation

Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC: JPH
QA: JPH

Project Name:	Dane County Rodefeld	Cell #:	9
Project #:	220142.0000	USCS Description:	Lean clay
Sample Name:	Lift 4, T-30, 382,250N/2,201,150E	USCS Classification:	CL
Visual Descript:	Lean clay	Average Kv =	1.6E-08 cm/s

Sample Type: Undisturbed

	Initial Values	Final Values		
Sample Dia. (in)	2.86	2.86	Permeant:	Water
Sample Ht. (in)	3.26	3.26	Permeant Specific Gravity:	1.00
Tare & Wet (g)	690.60	956.60	Sample Specific Gravity:	2.69 Est.
Tare & Dry (g)	555.31	821.60	Confining Pressure (psi):	100.0
Tare (g)	0.00	266.29	Burette Diameter (in):	0.250
Sample Wt. (g)	690.60	690.31	Burette Zero (cm):	100.0

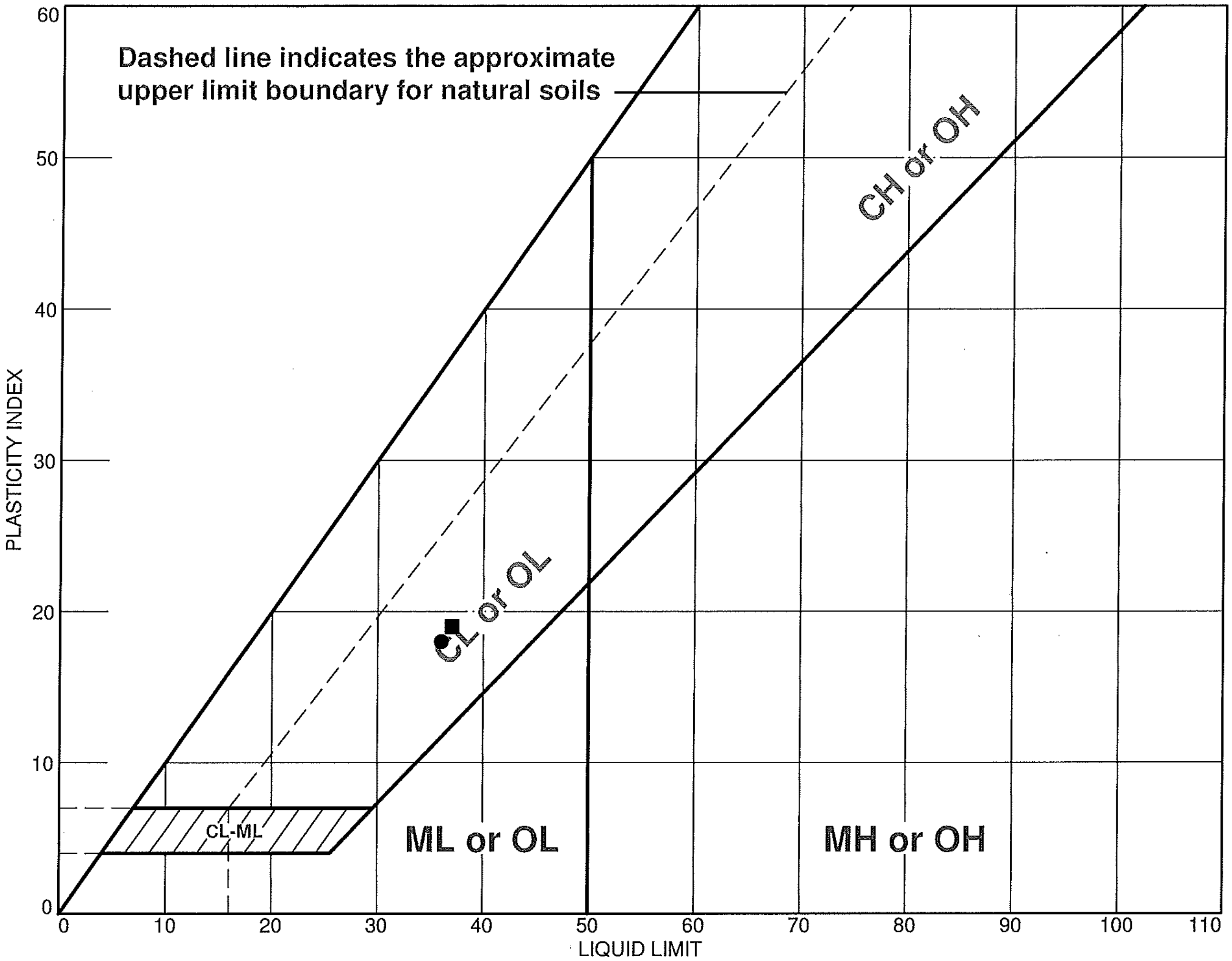
	Initial	Final		
Moisture (%)	24.4	24.3	Maximum Gradient:	10.9
Wet Density (pcf)	126.1	126.2	Average Gradient:	10.7
Dry Density (pcf)	101.4	101.5	Max. Effect. Stress (psi):	5.9
Saturation (%)	99.8	100.0	Min. Effect. Stress (psi):	4.2
			Ave. Effect. Stress (psi):	4.9

	Date Yr.	Mo.	Day	Time Hr.	Min.	Run Time (s)	Temp C°**	Pressure (psi) Bot	Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0,1
1	2014	9	19	9	27.00		0.0	95	95	36.75		3.35		103.20				
2	2014	9	19	9	58.00		0.0	95	95	38.10		3.50		102.60				
3	2014	9	19	11	29.00	5460	23.0	95	95	41.20	3.10	3.60	0.10	102.55	0.05	33.3	8.2E-09	
4	2014	9	19	12	33.00	3840	23.0	95	95	42.40	1.20	3.70	0.10	102.50	0.05	33.3	1.2E-08	
5	2014	9	19	13	23.00	3000	23.0	95	95	43.10	0.70	3.75	0.05	102.45	0.05	0.0	1.0E-08	
6	2014	9	19	14	55.00	5520	23.0	95	95	44.30	1.20	3.85	0.10	102.35	0.10	0.0	1.1E-08	
7	2014	9	22	6	11.00	227760	22.0	95	95	55.30	11.00	5.70	1.85	101.50	0.85	37.0	3.7E-09	
8	2014	9	22	8	12.00	7260	22.0	95	95	55.45	0.15	5.75	0.05	100.95	0.55	-83.3	2.6E-08	
9	2014	9	22	10	27.00	8100	22.5	95	95	55.60	0.15	5.80	0.05	100.90	0.05	0.0	3.9E-09	
10	2014	9	22	12	10.00	6180	22.0	95	95	55.50	-0.10	5.85	0.05	100.85	0.05	0.0	5.1E-09	
11	2014	9	22	12	12.00		0.0	95	95	55.80		5.85		100.60				
12	2014	9	22	14	48.00	9360	22.0	95	95	57.15	1.35	5.90	0.05	99.70	0.90	-89.5	3.3E-08	
13	2014	9	23	6	6.00	55080	22.0	95	95	59.40	2.25	6.85	0.95	97.65	2.05	-36.7	1.8E-08	
14	2014	9	23	7	18.00	4320	24.0	95	95	59.80	0.40	7.00	0.15	97.50	0.15	0.0	2.2E-08	
15	2014	9	23	10	23.00	11100	21.5	95	95	59.40	-0.40	7.15	0.15	97.25	0.25	-25.0	1.2E-08	
16	2014	9	23	13	7.00	9840	22.0	95	95	59.75	0.35	7.40	0.25	97.00	0.25	0.0	1.7E-08	1
17	2014	9	23	17	11.00	14640	23.0	95	95	60.35	0.60	7.70	0.30	96.60	0.40	-14.3	1.6E-08	1
18	2014	9	23	19	27.00	8160	23.5	95	95	60.70	0.35	7.90	0.20	96.40	0.20	0.0	1.6E-08	1
19	2014	9	24	5	49.00	37320	23.0	95	95	61.30	0.60	8.70	0.80	95.35	1.05	-13.5	1.7E-08	1
20																		
21																		
22																		
23																		
24																		
25																		
26																		

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 1.6E-08 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	36	18	18	98.1	92.4	CL
■	Lean clay	37	18	19	98.9	92.1	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 1 **Depth:** 382,600N/2,201,000E **Sample No.:** T-1

■ **Source:** Lift 1 **Depth:** 382,100N/2,201,100E **Sample No.:** T-3

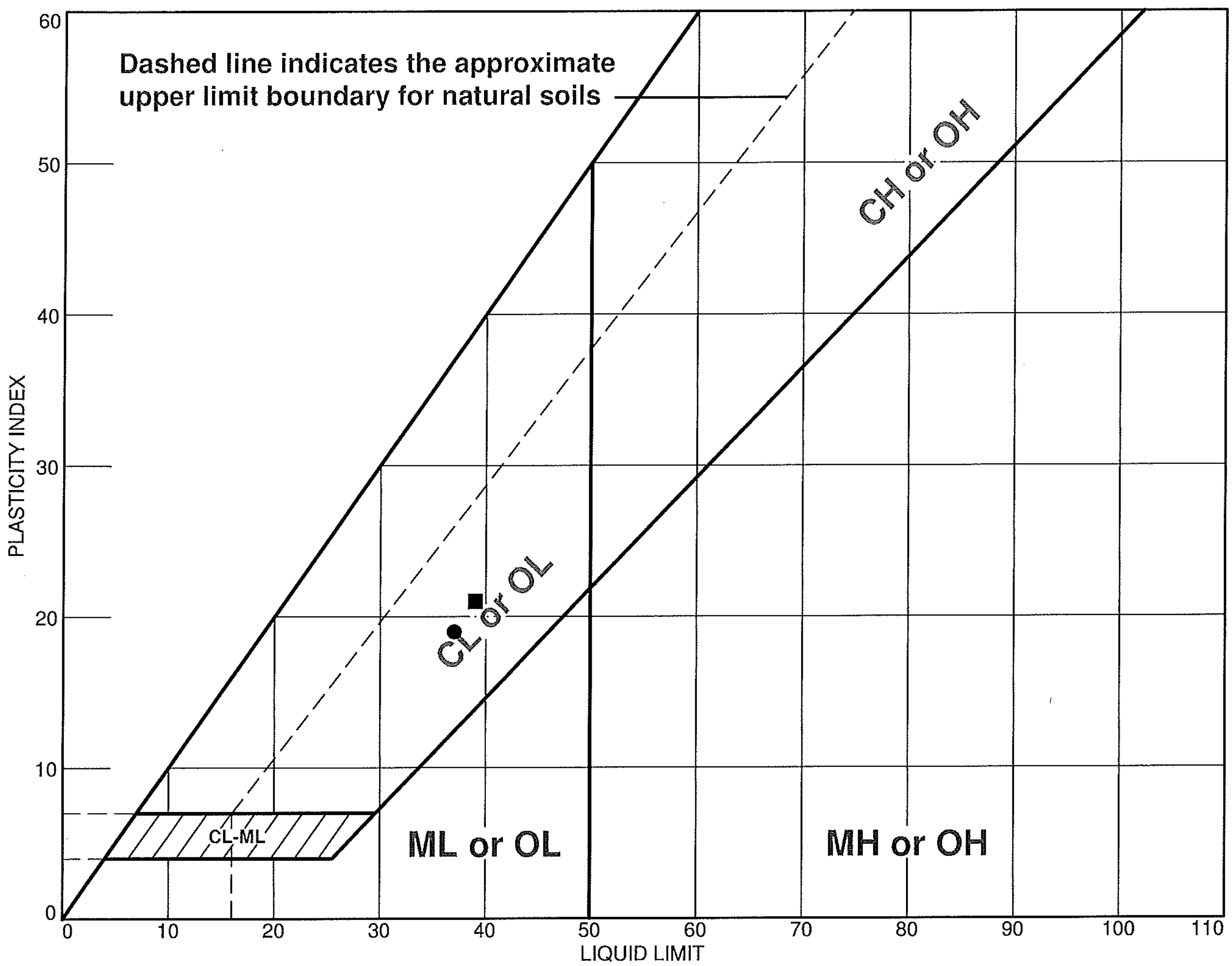
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	37	18	19	97.0	90.8	CL
■	Lean clay	39	18	21	96.1	88.3	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 1 **Depth:** 382,500N/2,200,900E **Sample No.:** T-2

■ **Source:** Lift 1 **Depth:** 382,000N/2,200,900E **Sample No.:** T-4

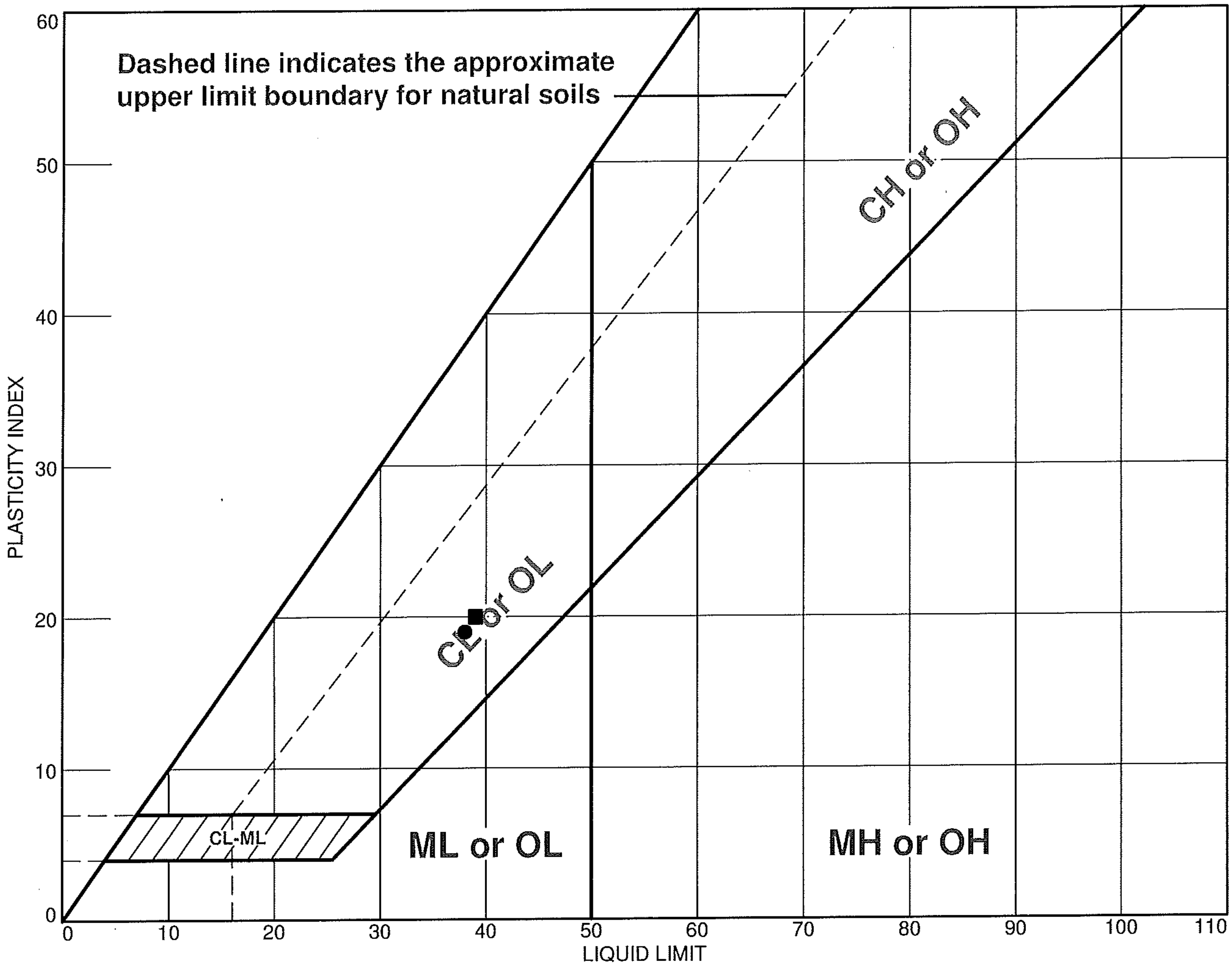
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	38	19	19	96.9	89.0	CL
■	Lean clay	39	19	20	98.9	94.3	CL
▲	Lean clay	39	19	20	96.6	87.8	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 1 **Depth:** 382,700N/2,201,100E **Sample No.:** T-5

■ **Source:** Lift 1 **Depth:** 382,800N/2,201,200E **Sample No.:** T-7

▲ **Source:** Lift 1 **Depth:** 382,400N/2,201,200E **Sample No.:** T-8

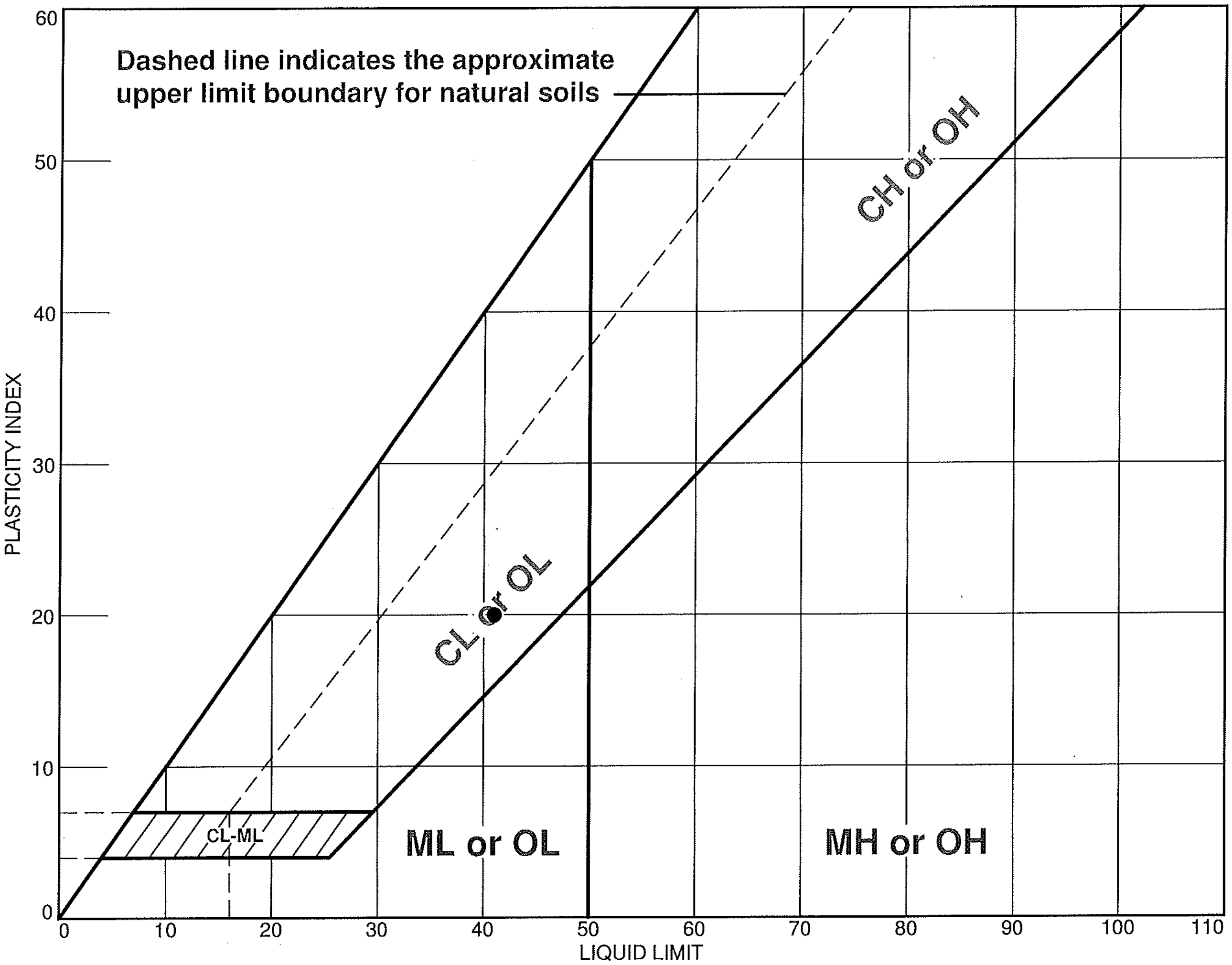
TRC Environmental Corp.

Madison, Wisconsin

Remarks:

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	41	21	20	97.2	90.5	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 1 **Depth:** 382,300N/2,201,100E **Sample No.:** T-6

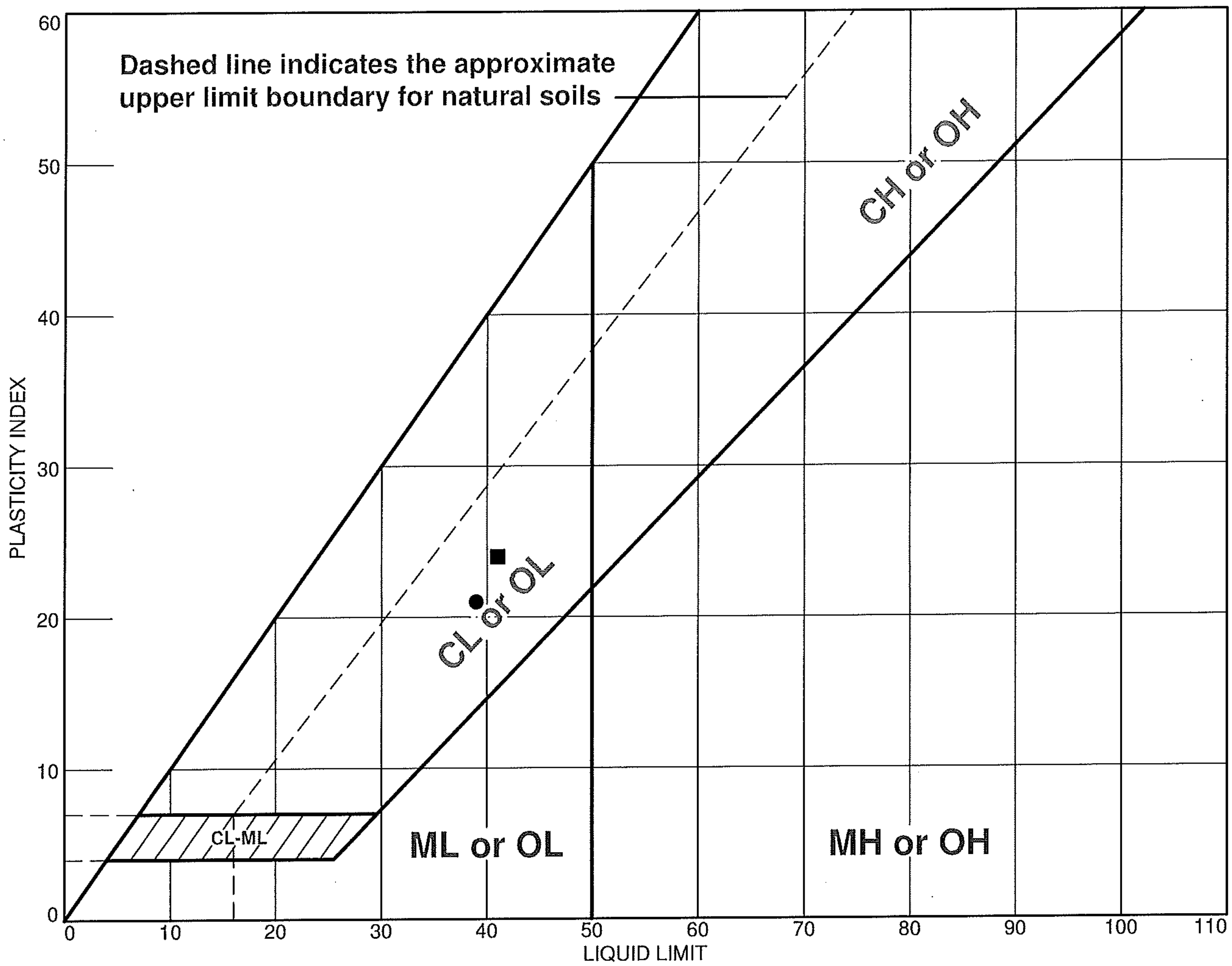
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	39	18	21	97.1	89.6	CL
■	Lean clay	41	17	24	95.9	90.2	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source of Sample:** Lift 2 **Sample Number:** T-9

■ **Source of Sample:** Lift 2 **Sample Number:** T-12

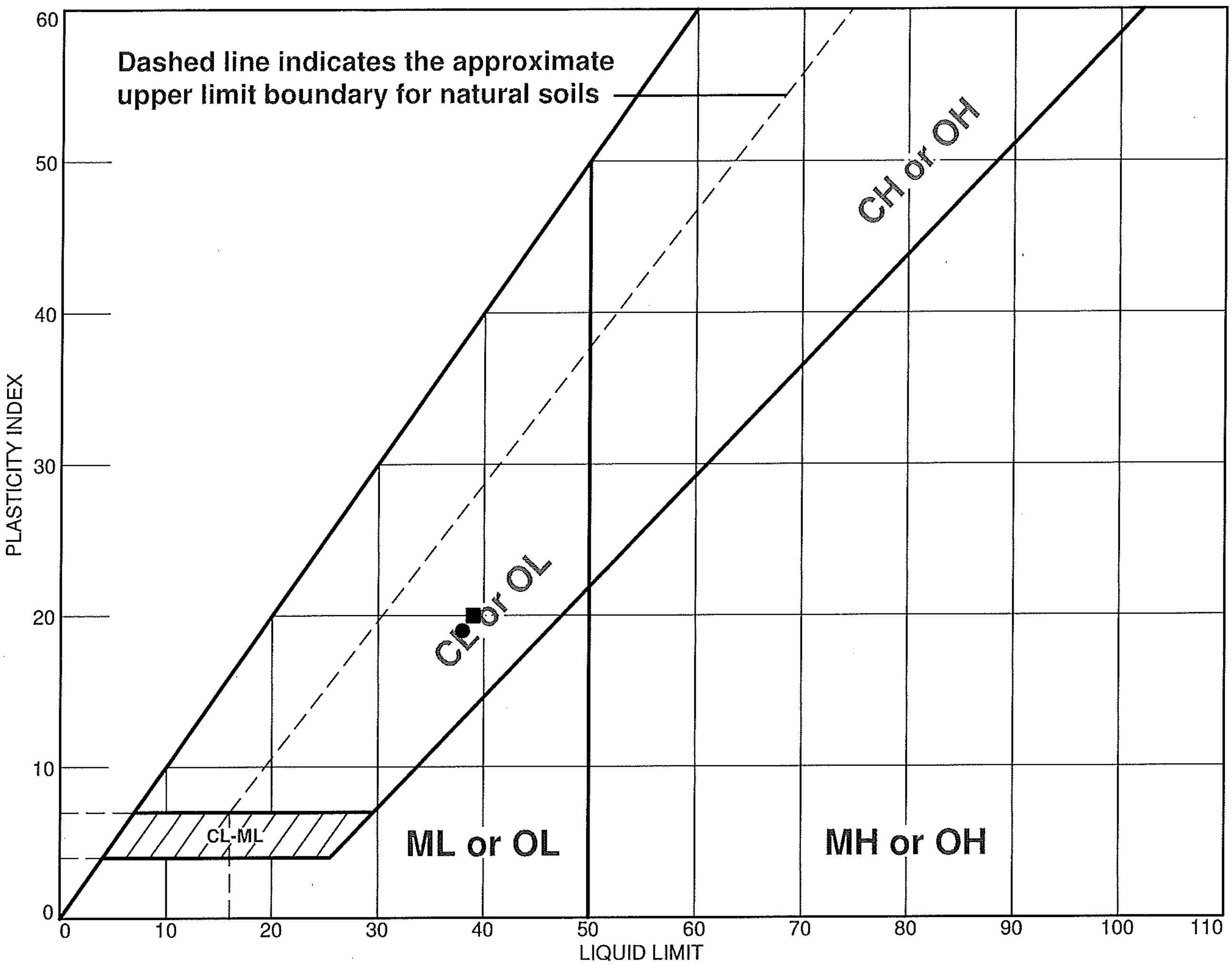
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	38	19	19	96.1	90.8	CL
■	Lean clay	39	19	20	97.0	89.0	CL

Project No. 220142.0000 **Client:** Dane County
Project: Dane County Rodefeld

● **Source:** Lift 2 **Depth:** 382,250N/2,200,850E **Sample No.:** T-10
■ **Source:** Lift 2 **Depth:** 382,450N/2,200,950E **Sample No.:** T-11

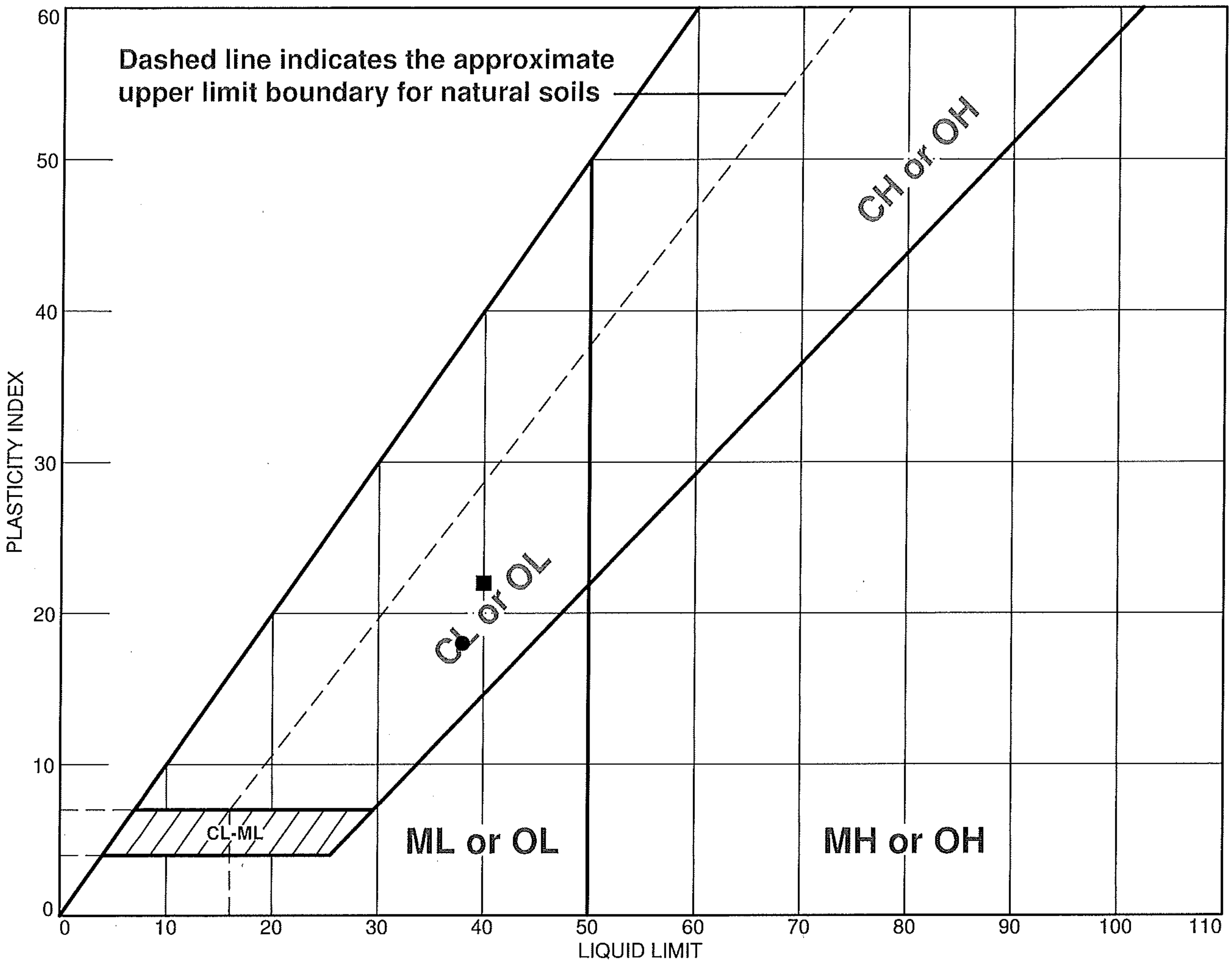
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	38	20	18	94.9	87.6	CL
■	Lean clay	40	18	22	97.7	90.7	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 2 **Depth:** 382,650N/2,201,050E **Sample No.:** T-13

■ **Source:** Lift 2 **Depth:** 382,250N/2,201,050E **Sample No.:** T-14

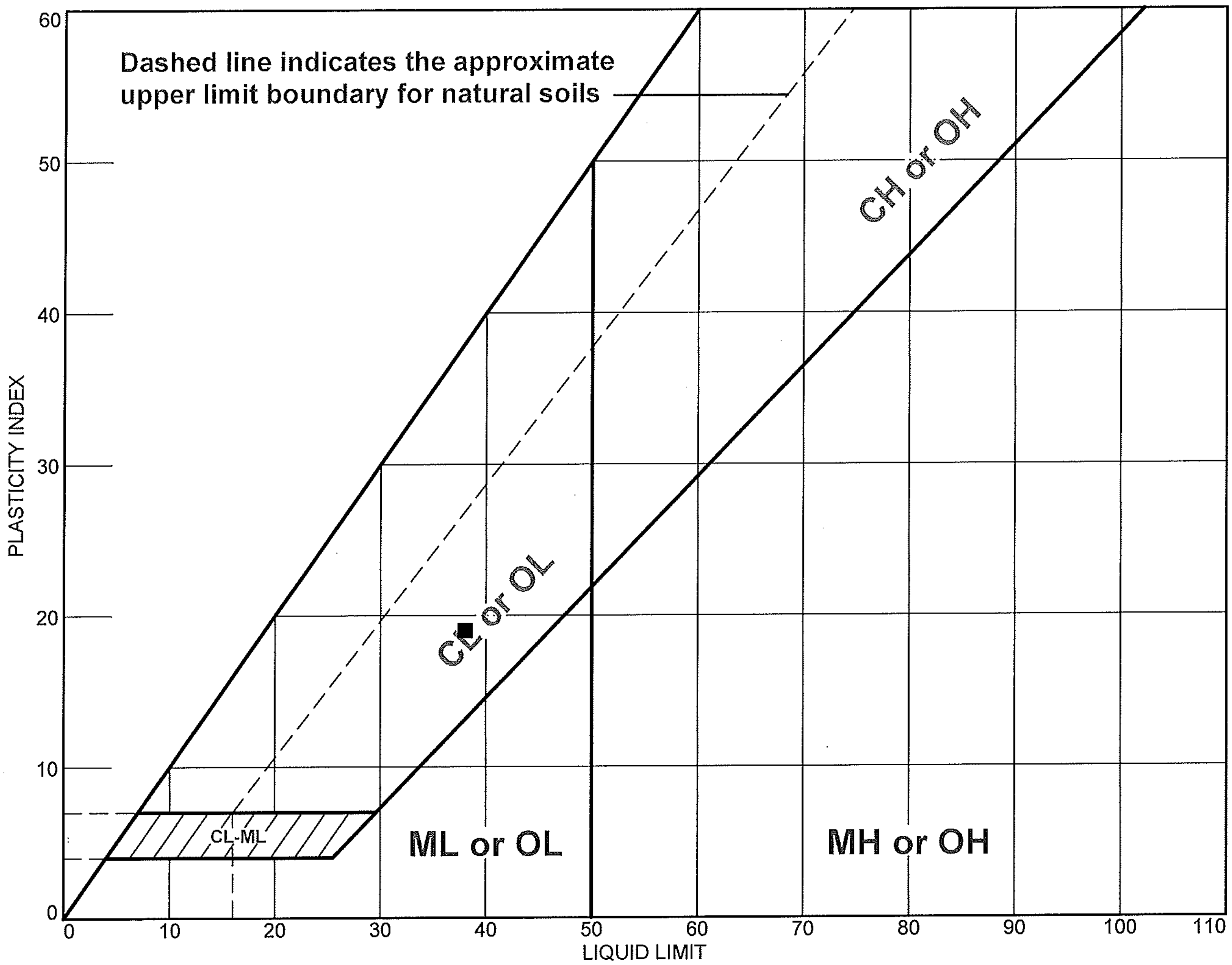
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	38	19	19	98.0	90.4	CL
■	Lean clay	38	19	19	97.6	89.6	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 2 **Depth:** 382,150N/2,201,150E **Sample No.:** T-15

■ **Source:** Lift 2 **Depth:** 382,750N/2,201,150E **Sample No.:** T-16

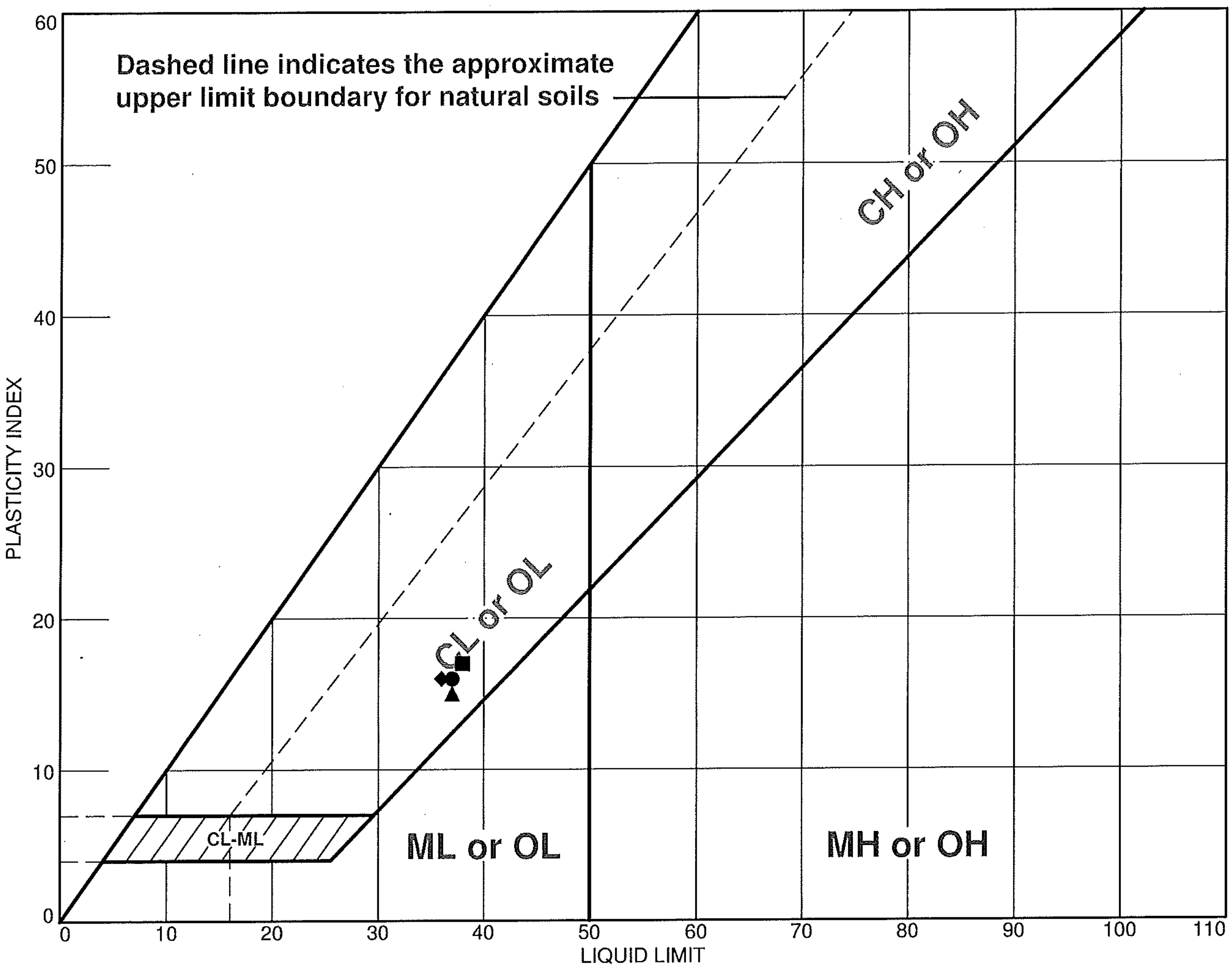
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	37	21	16	97.2	90.4	CL
■	Lean clay	38	21	17	97.9	91.7	CL
▲	Lean clay	37	22	15	97.7	90.2	CL
◆	Lean clay	36	20	16	97.0	89.5	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 3 **Depth:** 382,500N/2,201,200E **Sample No.:** T-17
■ **Source:** Lift 3 **Depth:** 382,200N/2,201,000E **Sample No.:** T-18
▲ **Source:** Lift 3 **Depth:** 382,200N/2,201,000E **Sample No.:** T-19
◆ **Source:** Lift 3 **Depth:** 382,300N/2,200,900E **Sample No.:** T-20

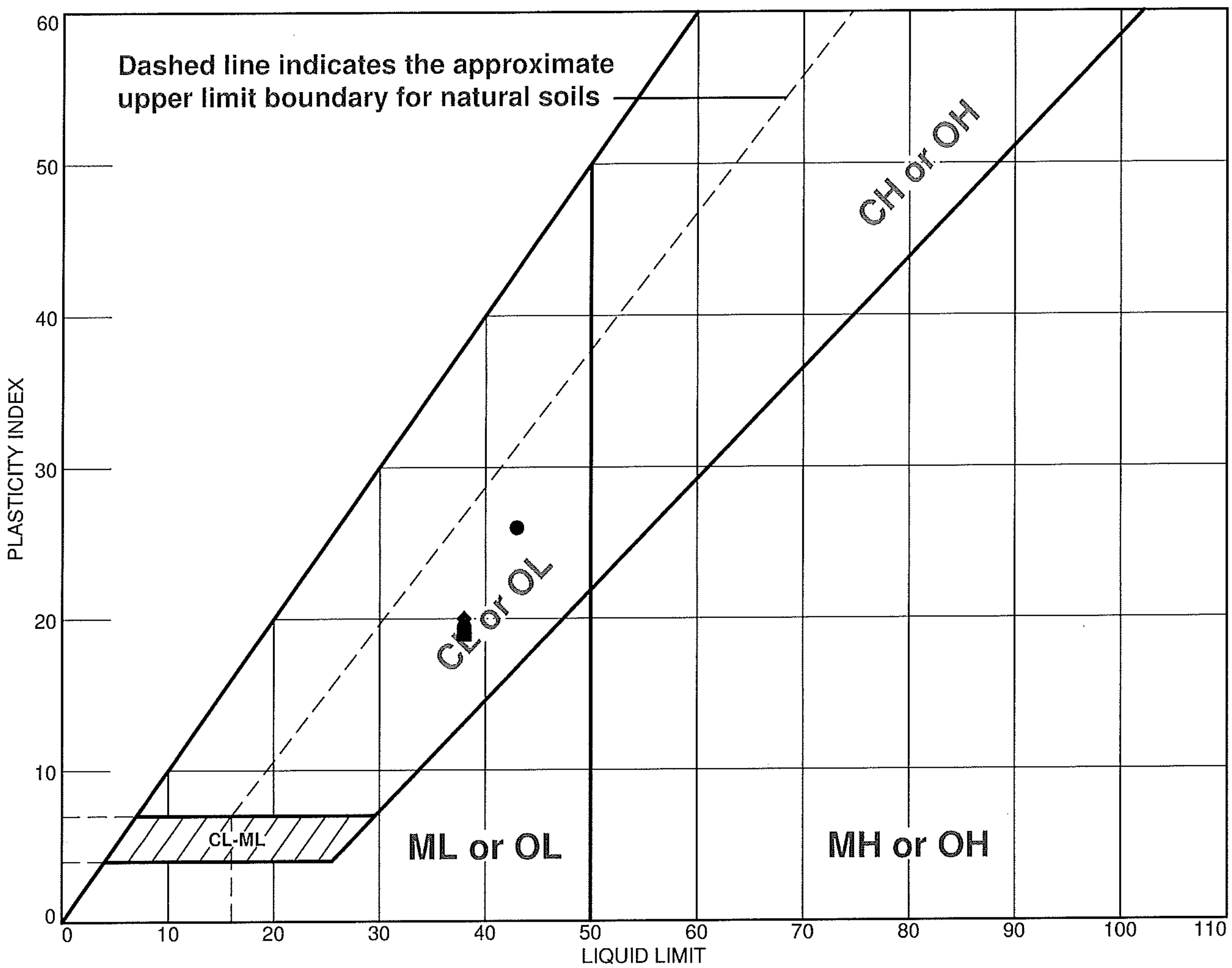
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	43	17	26	97.3	90.4	CL
■	Lean clay	38	19	19	97.6	90.2	CL
▲	Lean clay	38	18	20	94.6	87.1	CL
◆	Lean clay	38	18	20	98.2	90.3	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 3 **Depth:** 382,500N/2,201,000E **Sample No.:** T-21
■ **Source:** Lift 3 **Depth:** 382,700N/2,200,900E **Sample No.:** T-22
▲ **Source:** Lift 3 **Depth:** 382,600N/2,201,100E **Sample No.:** T-23
◆ **Source:** Lift 3 **Depth:** 382,000N/2,201,100E **Sample No.:** T-24

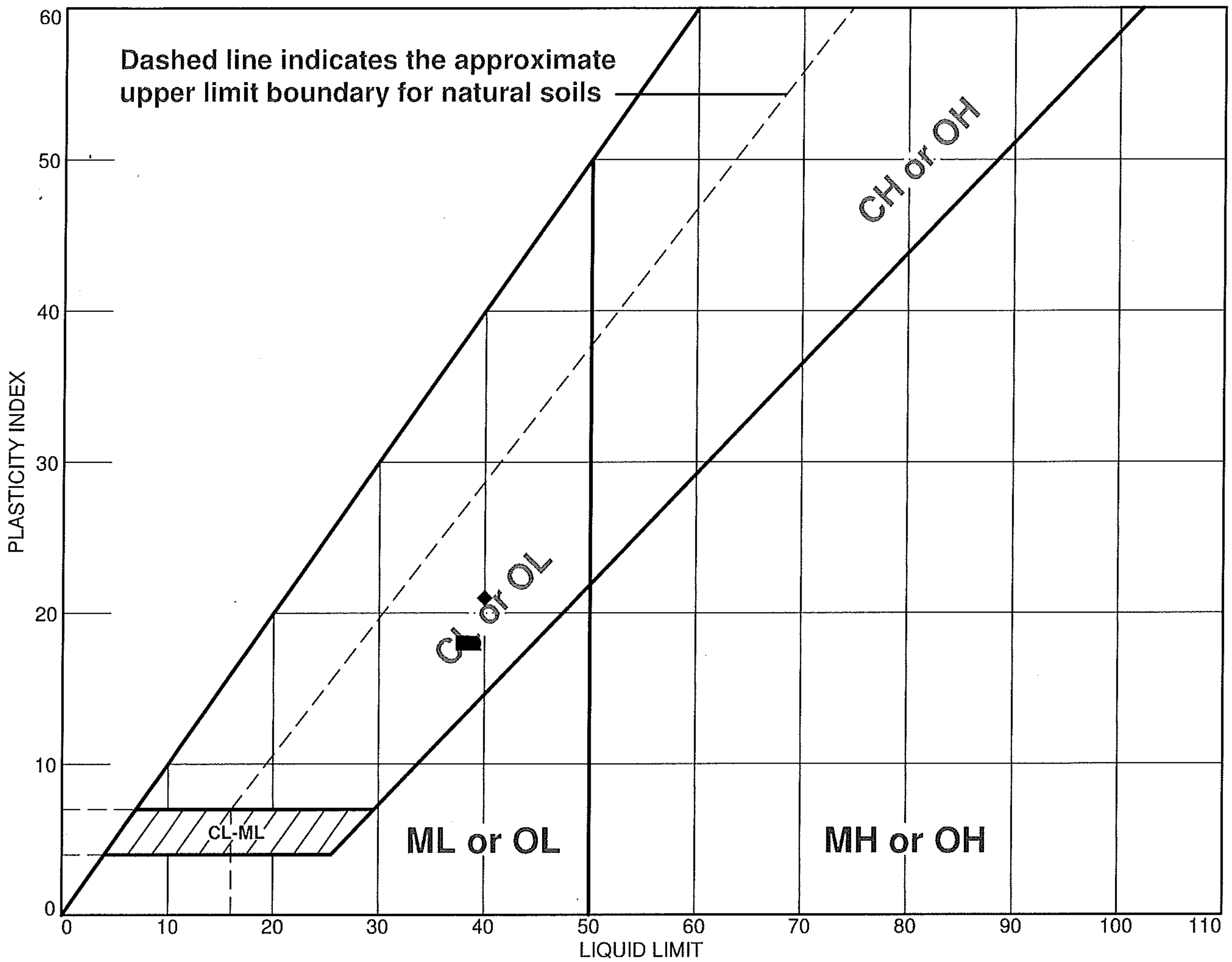
Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	39	21	18	96.8	91.7	CL
■	Lean clay	38	20	18	97.5	90.8	CL
▲	Lean clay	39	21	18	95.0	88.3	CL
◆	Lean clay	40	19	21	97.6	91.9	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 4 **Depth:** 382,450N/2,200,950E **Sample No.:** T-25
■ **Source:** Lift 4 **Depth:** 382,550N/2,200,850E **Sample No.:** T-26
▲ **Source:** Lift 4 **Depth:** 382,250N/2,200,850E **Sample No.:** T-27
◆ **Source:** Lift 4 **Depth:** 382,750N/2,200,950E **Sample No.:** T-28

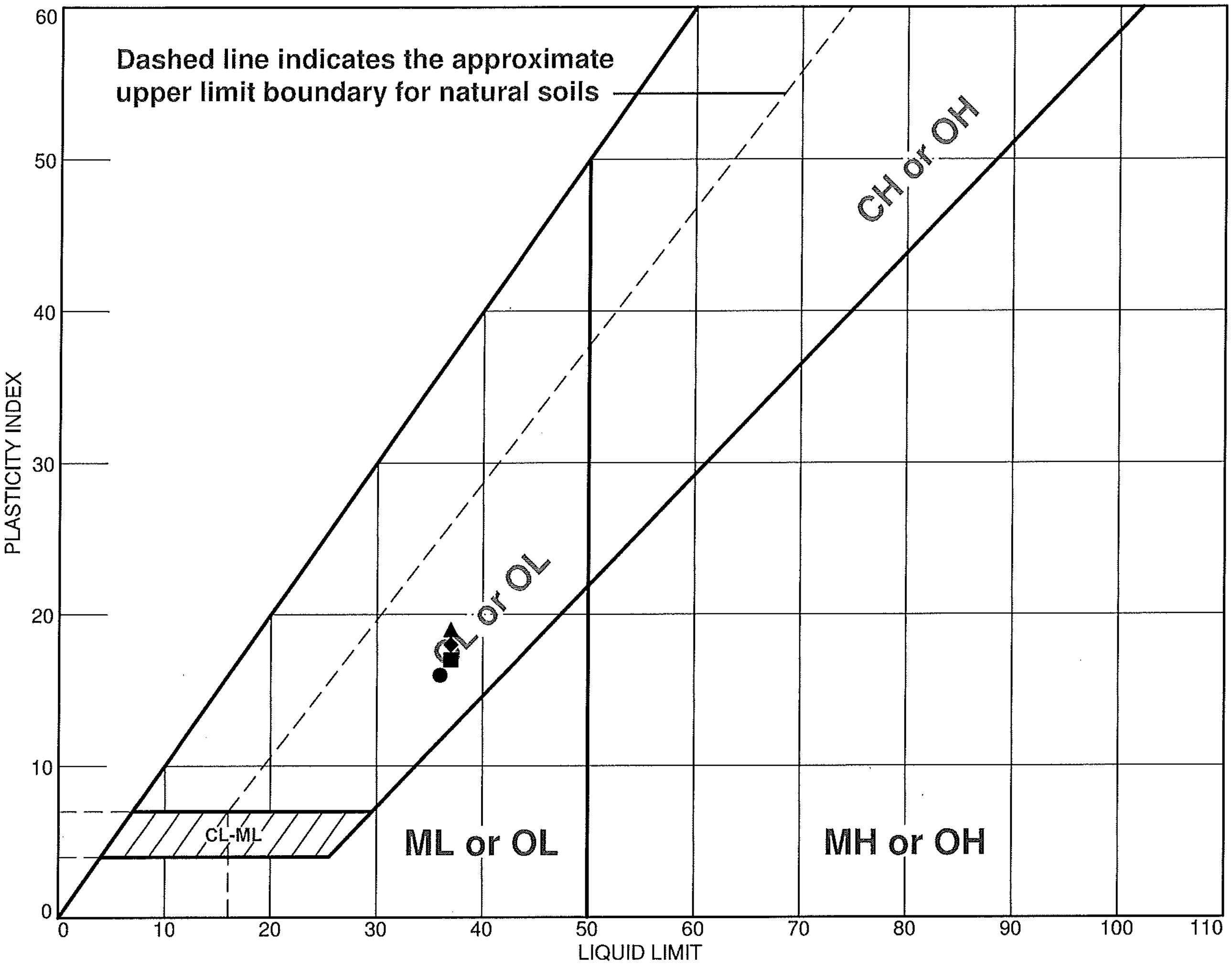
TRC Environmental Corp.

Madison, Wisconsin

Remarks:

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay	36	20	16	95.0	87.4	CL
■	Lean clay	37	20	17	95.1	89.7	CL
▲	Lean clay	37	18	19	94.2	86.1	CL
◆	Lean clay	37	19	18	97.0	89.3	CL

Project No. 220142.0000 **Client:** Dane County

Project: Dane County Rodefeld

● **Source:** Lift 4 **Depth:** 382,750N/2,201,150E **Sample No.:** T-29
■ **Source:** Lift 4 **Depth:** 382,250N/2,201,150E **Sample No.:** T-30
▲ **Source:** Lift 4 **Depth:** 382,550N/2,201,050E **Sample No.:** T-31
◆ **Source:** Lift 4 **Depth:** 382,150N/2,201,050E **Sample No.:** T-32

Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH

QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 1, T-1, 382,600N/2,201,000E	267.40	872.80	774.80	19.3	2.82	2.33	267.40	754.60	127.5	106.9
Lift 1, T-2, 382,500N/2,200,900E	267.80	1543.90	1310.60	22.4	2.85	6.02	267.80	1543.90	126.6	103.4
Lift 1, T-3, 382,100N/2,201,100E	257.30	579.40	536.50	15.4	2.83	1.63	257.30	579.40	119.7	103.7
Lift 1, T-4, 382,000N/2,200,900E	267.20	1549.00	1332.00	20.4	2.85	6.03	267.20	1549.00	126.9	105.5

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH
QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 1, T-5, 382,700N/2,201,100E	266.16	1588.70	1374.50	19.3	2.88	6.03	266.16	1588.70	128.7	107.9
Lift 1, T-6, 382,300N/2,201,100E	264.94	755.00	673.80	19.9	2.83	2.28	264.94	755.00	130.2	108.6
Lift 1, T-7, 382,800N/2,201,200E	270.08	989.80	859.20	22.2	2.87	3.42	270.08	989.80	123.9	101.4
Lift 1, T-8, 382,400N/2,201,200E	280.97	1190.60	1036.00	20.5	2.87	4.24	280.97	1190.60	126.5	105.0

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH

QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 2, T-9, 382,050N/2,200,950E	258.93	1225.10	1086.20	16.8	2.87	4.51	258.93	1225.10	126.2	108.0
Lift 2, T-10, 382,250N/2,200,850E	258.79	1544.90	1325.00	20.6	2.86	6.04	258.79	1544.90	126.3	104.7
Lift 2, T-11, 382,450N/2,200,950E	252.40	1183.50	1028.00	20.0	2.85	4.38	252.40	1183.50	126.9	105.7
Lift 2, T-12, 382,650N/2,200,850E	261.28	1055.10	937.20	17.4	2.85	2.71	0.00	592.60	130.6	111.2

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH

QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 2, T-13, 382,650N/2,201,050E	269.60	1587.30	1375.50	19.2	2.87	6.01	269.60	1587.30	129.1	108.4
Lift 2, T-14, 382,250N/2,201,050E	267.60	1204.50	1052.10	19.4	2.88	4.23	267.60	1204.50	130.0	108.8

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH

QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 2, T-15, 382,150N/2,201,150E	248.13	866.60	761.80	20.4	2.87	3.07	0.00	662.30	127.0	105.5
Lift 2, T-16, 382,750N/2,201,150E	250.32	1310.90	1132.40	20.2	2.87	9.38	0.00	2031.80	127.6	106.1

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JNH
QA: JNH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 4, B-10	252.30	992.80	848.00	24.3						
Lift 3, T-17	264.80	1148.40	998.20	20.5	2.87	4.08	264.80	1148.40	127.5	105.9
Lift 3, T-18	264.82	757.10	680.80	18.3	2.87	2.35	264.82	757.10	123.8	104.6
Lift 3, T-19	264.80	1134.30	999.10	18.4	2.87	3.99	264.80	1134.30	128.3	108.4
Lift 3, T-20	267.40	1285.60	1115.70	20.0	2.87	4.62	267.40	1285.60	129.8	108.1
Lift 3, T-21	271.30	1075.60	938.30	20.6	2.87	3.67	271.30	1075.60	129.1	107.0
Lift 3, T-22	266.70	959.60	843.50	20.1	2.86	3.17	266.70	959.60	129.6	107.9
Lift 3, T-23	253.40	1027.60	898.10	20.1	2.86	3.55	253.40	1027.60	129.3	107.7
Lift 3, T-24	267.20	770.70	685.20	20.5	2.86	2.31	267.20	770.70	129.3	107.3

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH

QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 4, T-25, 382,450N/2,200,950E	291.08	1144.60	996.10	21.1	2.87	3.88	291.08	1144.60	129.5	107.0
Lift 4, T-26, 382,550N/2,200,850E	246.88	1036.60	893.60	22.1	2.86	3.62	246.88	1036.60	129.4	105.9
Lift 4, T-27, 382,250N/2,200,850E	246.00	933.10	820.50	19.6	2.86	3.20	246.00	933.10	127.3	106.5
Lift 4, T-28, 382,750N/2,200,950E	257.27	810.80	717.00	20.4	2.86	2.81	0.00	594.69	125.5	104.2

TRC Environmental Corporation

Moisture Content / Dry Density Determination (ASTM D2216 or D4643)

QC: JPH

QA: JPH

Project Name: Dane County Rodefeld

Project #: 220142.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)	Sample Diameter (in)	Sample Height (in)	Density Tare Wt. (g)	Density Wet Wt. + Tare (g)	Wet Density (pcf)	Dry Density (pcf)
Lift 4, T-29, 382,750N/2,201,150E	257.06	1176.60	1017.90	20.9	2.85	7.00	0.00	1525.50	130.1	107.7
Lift 4, T-30, 382,250N/2,201,150E	265.30	845.30	745.90	20.7	2.85	4.75	0.00	1022.80	128.6	106.6
Lift 4, T-31, 382,550N/2,201,050E	260.18	1272.20	1090.70	21.9	2.85	9.13	0.00	1989.80	130.2	106.9
Lift 4, T-32, 382,150N/2,201,050E	261.28	993.40	877.10	18.9	2.85	6.63	0.00	1415.20	127.6	107.3

STAGE 3 – FINAL COVER CONSTRUCTION
FINE GRAINED SOIL FIELD TEST RESULTS
(CONSTRUCTED IN 2017)

Final Cap Density Test Lift 1

Northing	Easting	% Proctor	Wet Density	Dry Density	Moisture Content	% Moisture	Opt Moisture/PR Value
22+00N	75+00E	90.6	131.9	118.1	13.8	11.7	8.77 / 130.4
21+00N	75+00E	90.3	134.3	117.7	16.6	14.1	8.77 / 130.4
20+00N	75+00E	93.7	137.7	122.2	15.5	12.7	8.77 / 130.4
19+00N	75+00E	92.3	138.5	120.4	18.0	15.0	8.77 / 130.4
18+00N	75+00E	93.0	136.7	121.3	15.5	12.8	8.77 / 130.4
22+00N	76+00E	90.8	133.1	118.4	14.7	12.4	8.77 / 130.4
21+00N	76+00E	92.0	135.7	120.0	15.7	13.1	8.77 / 130.4
20+00N	76+00E	90.9	134.9	118.5	16.4	13.8	8.77 / 130.4
19+00N	76+00E	92.2	133.6	120.2	13.4	11.1	8.77 / 130.4
18+00N	76+00E						8.77 / 130.4
22+00N	77+00E	96.6	134.5	122.6	12.0	9.8	8.77 / 130.4
21+00N	77+00E	92.0	134.4	119.9	14.5	12.1	8.77 / 130.4
20+00N	77+00E	92.3	133.5	120.4	13.1	10.9	8.77 / 130.4
19+00N	77+00E						8.77 / 130.4
18+00N	77+00E						8.77 / 130.4
22+00N	78+00E	93.8	133.0	119.0	14.0	11.8	8.77 / 130.4
21+00N	78+00E	95.1	132.1	120.6	11.5	9.5	8.77 / 130.4
20+00N	78+00E	90.5	130.4	118.1	12.3	10.4	8.77 / 130.4
19+00N	78+00E						8.77 / 130.4
18+00N	78+00E						8.77 / 130.4
22+00N	79+00E	95.0	135.4	120.6	14.8	12.3	8.77 / 130.4
21+00N	79+00E	93.5	129.9	118.5	11.4	9.6	8.77 / 130.4
20+00N	79+00E	94.0	138.6	122.6	16.0	13.1	8.77 / 130.4
19+00N	79+00E						8.77 / 130.4
18+00N	79+00E						8.77 / 130.4
17+00N	79+00E						8.77 / 130.4
							8.77 / 130.4
22+00N	80+00E	93.2	129.8	118.3	11.5	9.7	8.77 / 130.4
21+00N	80+00E	95.7	135.4	121.7	13.7	11.3	8.77 / 130.4
20+00N	80+00E	92.4	136.5	120.5	16.0	13.3	8.77 / 130.4
19+00N	80+00E						8.77 / 130.4
18+00N	80+00E						8.77 / 130.4
17+00N	80+00E						8.77 / 130.4
							8.77 / 130.4
23+00N	81+00E	91.2	132.5	118.9	13.5	11.4	8.77 / 130.4
22+00N	81+00E	96.1	133.6	122.0	11.6	9.5	8.77 / 130.4
21+00N	81+00E	94.5	133.6	120.0	13.6	11.4	8.77 / 130.4
20+00N	81+00E	91.8	134.3	119.7	14.6	12.2	8.77 / 130.4
19+00N	81+00E						8.77 / 130.4
18+00N	81+00E						8.77 / 130.4
17+00N	81+00E						8.77 / 130.4
							8.77 / 130.4
24+00N	82+00E	91.9	132.8	119.8	13.0	10.8	8.77 / 130.4
23+00N	82+00E	92.6	131.0	117.6	13.4	11.4	8.77 / 130.4
22+00N	82+00E	93.3	131.1	118.4	12.7	10.7	8.77 / 130.4
21+00N	82+00E	92.2	129.2	117.0	12.2	10.4	8.77 / 130.4
20+00N	82+00E	90.2	132.1	117.6	14.5	12.3	8.77 / 130.4
19+00N	82+00E						8.77 / 130.4
18+00N	82+00E						8.77 / 130.4
17+00N	82+00E						8.77 / 130.4
							8.77 / 130.4
24+00N	83+00E	91.2	131.3	118.9	12.4	10.5	8.77 / 130.4
23+00N	83+00E	95.0	136.2	123.9	12.3	10.0	8.77 / 130.4
22+00N	83+00E	93.7	137.2	122.1	15.1	12.4	8.77 / 130.4
21+00N	83+00E	95.0	138.9	123.9	15.0	12.1	8.77 / 130.4
20+00N	83+00E	94.2	135.2	122.9	12.3	10.0	8.77 / 130.4
19+00N	83+00E						8.77 / 130.4
18+00N	83+00E						8.77 / 130.4
17+00N	83+00E						8.77 / 130.4
16+00N	83+00E						8.77 / 130.4

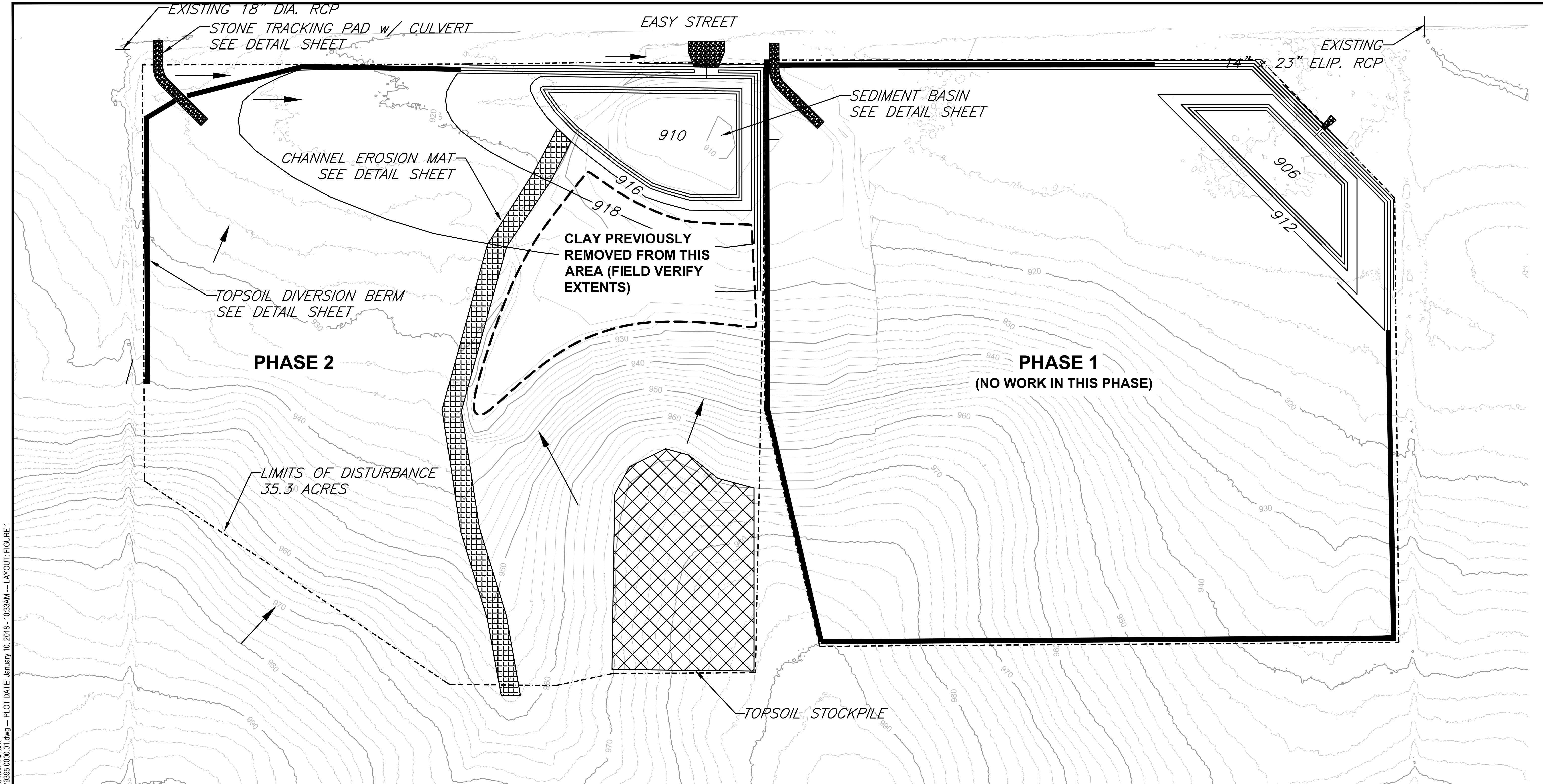
Final Cap Density Test Lift 2							
Northing	Easting	% Proctor	Wet Density	Dry Density	Moisture Content	% Moisture	Opt Moisture/PR Value
22+50N	75+50E	90.4	135.4	117.9	17.8	15.1	8.77 / 130.4
21+50N	75+50E	93.0	134.8	121.3	13.4	11.1	8.77 / 130.4
20+50N	75+50E	93.8	137.3	122.3	14.9	12.2	8.77 / 130.4
19+50N	75+50E	94.7	136.0	123.4	12.5	10.2	8.77 / 130.4
18+50N	75+50E	92.4	133.3	120.5	12.8	10.6	8.77 / 130.4
22+50N	76+50E	93.5	133.9	121.9	12.0	9.8	8.77 / 130.4
21+50N	76+50E	94.9	134.7	123.7	11.0	8.9	8.77 / 130.4
20+50N	76+50E	91.8	132.2	119.7	12.5	10.5	8.77 / 130.4
19+50N	76+50E	91.1	132.9	118.7	14.2	11.9	8.77 / 130.4
18+50N	76+50E						8.77 / 130.4
22+50N	77+50E	95.7	135.8	124.8	11.1	8.9	8.77 / 130.4
21+50N	77+50E	93.0	121.2	134.6	13.4	11.0	8.77 / 130.4
20+50N	77+50E	93.6	122.0	136.7	14.7	12.0	8.77 / 130.4
19+50N	77+50E	93.5	122.0	138.0	16.0	13.1	8.77 / 130.4
18+50N	77+50E						8.77 / 130.4
17+50N	77+50E						8.77 / 130.4
22+50N	78+50E	91.0	132.5	118.7	13.8	11.6	8.77 / 130.4
21+50N	78+50E	93.3	136.1	121.6	14.3	11.9	8.77 / 130.4
20+50N	78+50E	93.0	135.4	121.3	14.1	11.6	8.77 / 130.4
19+50N	78+50E	93.1	134.9	121.4	13.5	11.2	8.77 / 130.4
18+50N	78+50E						8.77 / 130.4
17+50N	78+50E						8.77 / 130.4
22+50N	79+50E	92.6	133.9	120.8	13.2	10.9	8.77 / 130.4
21+50N	79+50E	92.4	131.1	120.5	10.6	8.8	8.77 / 130.4
20+50N	79+50E	91.9	131.7	119.8	11.9	9.8	8.77 / 130.4
19+50N	79+50E	94.0	139.0	122.6	16.4	13.4	8.77 / 130.4
18+50N	79+50E						8.77 / 130.4
17+50N	79+50E						8.77 / 130.4
22+50N	80+50E	90.3	132.3	117.7	14.6	12.4	8.77 / 130.4
21+50N	80+50E	92.2	132.2	120.2	12.0	10.0	8.77 / 130.4
20+50N	80+50E	97.3	138.6	126.9	11.8	9.3	8.77 / 130.4
19+50N	80+50E	93.5	132.9	121.9	11.0	9.0	8.77 / 130.4
18+50N	80+50E						8.77 / 130.4
17+50N	80+50E						8.77 / 130.4
23+50N	81+50E	91.9	130.7	119.9	10.8	9.0	8.77 / 130.4
22+50N	81+50E	90.0	129.7	117.4	11.8	10.0	8.77 / 130.4
21+50N	81+50E	96.7	138.1	126.2	12.0	9.5	8.77 / 130.4
20+50N	81+50E	95.2	135.6	124.1	11.4	9.7	8.77 / 130.4
19+50N	81+50E	91.9	135.8	119.9	15.9	13.3	8.77 / 130.4
18+50N	81+50E						8.77 / 130.4
17+50N	81+50E						8.77 / 130.4
16+50N	81+50E						8.77 / 130.4
23+50N	82+50E	90.8	129.7	118.3	11.3	9.6	8.77 / 130.4
22+50N	82+50E	95.7	136.8	124.7	12.1	9.7	8.77 / 130.4
21+50N	82+50E	92.7	132.8	120.9	12.0	9.9	8.77 / 130.4
20+50N	82+50E	94.9	135.3	123.7	11.6	9.4	8.77 / 130.4
19+50N	82+50E	94.9	136.0	123.7	12.3	9.9	8.77 / 130.4
18+50N	82+50E						8.77 / 130.4
17+50N	82+50E						8.77 / 130.4
16+50N	82+50E						8.77 / 130.4

APPENDIX B
EASY STREET (WESTPORT)
CLAY BORROW INFORMATION

Note to Bidders

The information provided in this Appendix includes site location maps, existing topography, proposed restoration grades, and details for the Westport Borrow Site owned by Dane County Public Works. This data was associated with the Dane County's approved Conditional Use Permit (CUP) for the Westport Borrow Site and is not intended for construction purposes. It is intended to provide the Contractor with sufficient information regarding the location of the borrow site from the Dane County No. 2 (Rodefeld) Landfill and estimated select clay fill thicknesses.

FIGURE 1
EASY STREET EXISTING CONDITIONS 2018 AND
PROPOSED RESTORATION GRADES AFTER CLAY EXCAVATION



NOTES

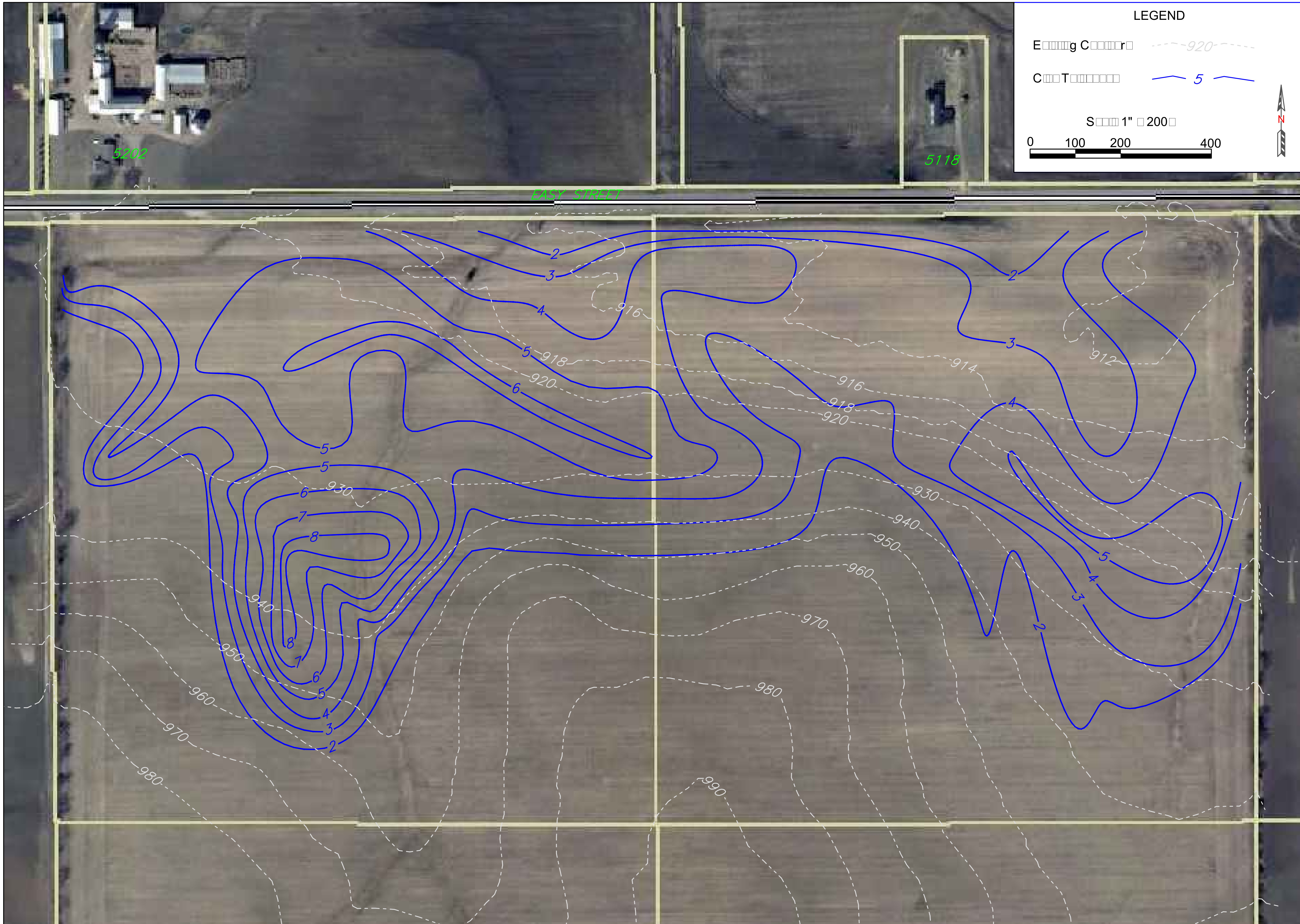
1. CONTRACTOR TO FIELD VERIFY EDGE OF PREVIOUS CLAY REMOVAL AND START EXCAVATION FROM THAT LOCATION.

2. CONTRACTOR SHALL WORK WEST THAN SOUTH FOR CLAY EXCAVATION.

PROJECT:	DANE COUNTY NO. 2 (RODEFELD) LANDFILL PHASE 9 - CELL 2 LINER AND STAGE 4 FINAL COVER CONSTRUCTION DANE COUNTY, WISCONSIN		
TITLE:	WESTPORT CLAY BORROW SITE		
DRAWN BY:	R. NOLDEN	PROJ NO.:	2793950000.0000
CHECKED BY:	D. MARSHALL		FIGURE 1
APPROVED BY:	D. GENTHE		
DATE:	JANUARY 2018		
FILE NO.:			279395.0000.01.dwg

TRC
708 Heartland Trail
Suite 3000
Madison, WI 53717
Phone: 608.826.3600

11x17 --- USER: LStormer --- ATTACHED XREF'S: borrow site final conditions; eg borrow site 2016-11-21 --- ATTACHED IMAGES:
DRAWING NAME: J:\Dane County LF\279395 - P9-C2 Liner Const\0000\ 279395.0000.01.dwg --- PLOT DATE: January 10, 2018 - 10:33AM --- LAYOUT: FIGURE 1
Version: 2017-10-21



DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
CLAY ISOPACH

Design By: MR
Drawn By: MR
Approved By: JV
Bid No: 314002
Date: Jan. 2014
Scale: As shown

File Name:

CLAY LABORATORY TEST RESULTS

Soil Test Summary

Easy Street Clay Borrow Site

	Grid Coordinates			Sample					
Test Pit	East (ft)	South (ft)	Sample #	Depth	Log	Lab Sheet	P200	LL	PI
E1 S1	100	100	1	20" - 36"	Jun-88	K1	99.4	50	28
E1 S1	100	100	2	72" - 84"	Jun-88	K14	94.7	27	10
E3 S1	300	100	1	18" - 30"	Jun-88	K2	100.0	48	26
E3 S1	300	100	2	48" - 60"	Jun-88	K15	98.9	33	14
E5 S1	500	100	1	24" - 36"	Jun-88	K3	100.0	48	27
E5 S1	500	100	2	78" - 84"	Jun-88	K16	97.0	34	13
E7 S1	700	100	1	36" - 48"	Jun-88	K4	98.2	43	22
E7 S1	700	100	2	90" - 100"	Jun-88	K17	97.8	26	7
E9 S1	900	100	1	36" - 48"	Jun-88	K5	99.4	43	24
E9 S1	900	100	2	70" - 80"	Jun-88	K18	88.0	26	9
E11 S1	1100	100	1	30" - 40"	Jun-88	K6	99.4	51	26
E11 S1	1100	100	2	50" - 64"	Jun-88	K19	90.8	40	19
E13 S1	1300	100	1	32" - 45"	Jun-88	K7	99.5	47	28
E13 S1	1300	100	2	60" - 76"	Jun-88	K20	99.2	36	15
E15 S1	1500	100	1	30" - 42"	Jun-88	K8	99.2	50	26
E15 S1	1500	100	2	70" - 80"	Jun-88	K21	97.6	35	15
E17 S1	1700	100	1	30" - 40"	Jun-88	K9	99.5	48	25
E17 S1	1700	100	2	60" - 70"	Jun-88	K22	99.2	39	16
E19 S1	1900	100	1	30" - 40"	Jun-88	K10	97.8	40	20
E19 S1	1900	100	2	50" - 60"	Jun-88	K23	94.3	34	17
E21 S1	2100	100	1	24" - 36"	Jun-88	K11	99.4	47	26
E21 S1	2100	100	2	36" - 48"	Jun-88	K24	92.8	44	25
E23 S1	2300	100	1	30" - 40"	Jun-88	K12	87.4	36	18
E23 S1	2300	100	2	60" - 70"	Jun-88	K25	99.1	49	26
E25 S1	2500	100	1	36" - 48"	Jun-88	K13	98.9	44	23
E25 S1	2500	100	2	80" - 90"	Jun-88	K26	99.0	36	17
E1 S3	100	300	1	24" - 40"	Jun-88	K27	79.8	36	16
E1 S3	100	300	2	24" - 40"	Jun-88	K40	50.2	26	8
E3 S3	300	300	1	30" - 40"	Jun-88	K28	97.7	41	18
E3 S3	300	300	2	70" - 80"	Jun-88	K41	91.4	38	14
E5 S3	500	300	1	30" - 40"	Jun-88	K29	97.4	46	22
E5 S3	500	300	2	70" - 85"	Jun-88	K42	99.2	34	11
E7 S3	700	300	1	40" - 60"	Jun-88	K30	99.6	51	27
E7 S3	700	300	2	70" - 80"	Jun-88	K43	98.7	40	16
E9 S3	900	300	1	30" - 48"	Jun-88	K31	99.6	46	23
E9 S3	900	300	2	72" - 84"	Jun-88	K44	98.2	33	14
E11 S3	1100	300	1	24" - 30"	Jun-88	K32	99.7	50	28
E11 S3	1100	300	2	60" - 72"	Jun-88	K45	98.6	38	14
E13 S3	1300	300	1	24" - 48"	Jun-88	K33	99.1	64	43
E13 S3	1300	300	2	60" - 75"	Jun-88	K46	93.7	39	15
E15 S3	1500	300	1	24" - 36"	Jun-88	K34	99.4	47	23
E15 S3	1500	300	2	36" - 48"	Jun-88	K47	93.8	43	23
E17 S3	1700	300	1	30" - 40"	Jun-88	K35	96.3	45	23
E17 S3	1700	300	2	50" - 60"	Jun-88	K48	97.3	40	17
E19 S3	1900	300	1	32" - 48"	Jun-88	K36	99.6	42	21

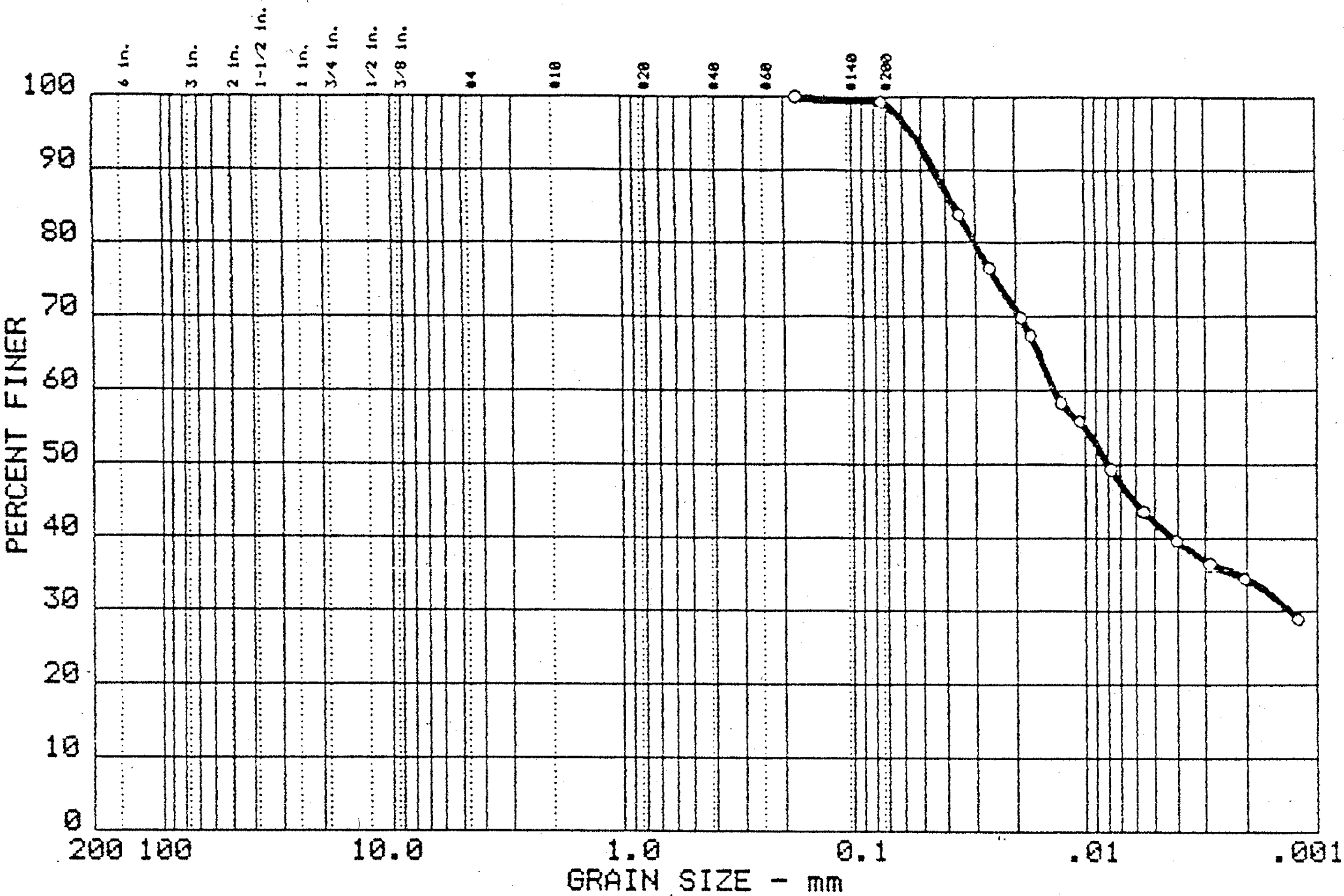
Soil Test Summary
Easy Street Clay Borrow Site

Test Pit	Grid Coordinates East (ft)	South (ft)	Sample #	Sample Depth	Log	Lab Sheet	P200	LL	PI
E19 S3	1900	300	2	60" - 72"	Jun-88	K49	95.4	42	20
E21 S3	2100	300	1	30" - 40"	Jun-88	K37	99.6	32	4
E21 S3	2100	300	2	60" - 72"	Jun-88	K50	97.2	41	17
E23 S3	2300	300	1	30" - 40"	Jun-88	K38	95.0	32	11
E23 S3	2300	300	2	45" - 55"	Jun-88	K51	88.1	40	18
E25 S3	2500	300	1	30" - 40"	Jun-88	K39	92.2	39	25
E25 S3	2500	300	2	60" - 70"	Jun-88	K52	88.0	33	12
E1 S5	100	500	1	18" - 36"	Jun-88	K53	99.5	50	27
E1 S5	100	500	2	45" - 60"	Jun-88	K65	96.9	38	17
E3 S5	300	500	1	15" - 25"	Jun-88	K54	98.2	44	25
E3 S5	300	500	2	20" - 30"	Jun-88	K66	94.3	36	14
E5 S5	500	500	1	20" - 30"	Jun-88	K55	98.9	44	18
E5 S5	500	500	2	50" - 65"	Jun-88	K67	98.2	33	11
E7 S5	700	500	1	36" - 48"	Jun-88	K56	94.4	42	17
E7 S5	700	500	2	66" - 84"	Jun-88	K68	99.4	33	11
E9 S5	900	500	1	36" - 48"	Jun-88	K57	99.0	46	20
E9 S5	900	500	2	50" - 65"	Jun-88	K69	97.5	39	15
E11 S5	1100	500	1	30" - 40"	Jun-88	K58	96.3	45	20
E11 S5	1100	500	2	60" - 78"	Jun-88	K70	97.2	36	12
E13 S5	1300	500	1	24" - 36"	Jun-88	K59	99.5	48	21
E13 S5	1300	500	2	60" - 75"	Jun-88	K71	93.1	37	13
E15 S5	1500	500	1	24" - 36"	Jun-88	K60	96.7	46	18
E15 S5	1500	500	2	60" - 70"	Jun-88	K72	96.7	30	11
E17 S5	1700	500	1	12" - 36"	Jun-88	K61	95.3	42	19
E17 S5	1700	500	2	20" - 30"	Jun-88	K73	99.5	37	16
E19 S5	1900	500	1	24" - 40"	Jun-88	K62	98.8	31	10
E19 S5	1900	500	2	30" - 48"	Jun-88	K74	98.5	36	15
E21 S5	2100	500	1	36" - 48"	Jun-88	K63	98.7	50	23
E21 S5	2100	500	2	60" - 84"	Jun-88	K75	93.5	34	14
E23 S5	2300	500	1	30" - 45"	Jun-88	K64	98.1	39	12
E23 S5	2300	500	2	36" - 54"	Jun-88	K76	84.8	37	16
E25 S5	2500	500	1	30" - 40"	Jun-88	None			
E25 S5	2500	500	2	54" - 74"	Jun-88	None			
E3 S7	300	700	None	None	Jun-88	None			
E5 S7	500	700	1	24" - 36"	Jun-88	K103	99.8	39	16
E5 S7	500	700	2	45" - 60"	Jun-88	K105	99.4	44	20
E7 S7	700	700	1	24" - 40"	Jun-88	K104	99.8	45	21
E7 S7	700	700	2	84" - 96"	Jun-88	K106	99.9	36	15
E9 S7	900	700	None	None	Jun-88	None			
E17 S7	1700	700	None	None	Jun-88	None			
E19 S7	1900	700	None	None	Jun-88	None			
E21 S7	2100	700	1	12" - 24"	Jun-88	K77	98.3	42	18
E21 S7	2100	700	2	24" - 36"	Jun-88	K80	88.3	42	25
E23 S7	2300	700	1	20" - 32"	Jun-88	K78	99.2	48	24
E23 S7	2300	700	2	60" - 72"	Jun-88	K81	95.4	32	13

Soil Test Summary
Easy Street Clay Borrow Site

Test Pit	Grid Coordinates East (ft)	South (ft)	Sample #	Sample Depth	Log	Lab Sheet	P200	LL	PI
E25 S7	2500	700	1	36" - 48"	Jun-88	K79	93.7	49	29
E25 S7	2500	700	2	75" - 90"	Jun-88	K82	97.5	34	14
E5 S9	500	900	1	24" - 36"	Jun-88	K107	99.6	43	17
E5 S9	500	900	2	84" - 120"	Jun-88	K109	99.6	34	12
E7 S9	700	900	1	18" - 30"	Jun-88	K108	88.2	41	18
E7 S9	700	900	2	30" - 48"	Jun-88	K110	84.3	42	19
E17 S9	1700	900	None	None	Jun-88	None			
E19 S9	1900	900	None	None	Jun-88	None			
E21 S9	2100	900	1	12" - 24"	Jun-88	K83	96.6	49	23
E21 S9	2100	900	2	24" - 36"	Jun-88	K86	92.9	41	18
E23 S9	2300	900	1	18" - 30"	Jun-88	K84	99.0	45	20
E23 S9	2300	900	2	50" - 60"	Jun-88	K87	97.2	32	10
E25 S9	2500	900	1	18" - 36"	Jun-88	K85	99.2	49	25
E25 S9	2500	900	2	60" - 84"	Jun-88	K88	96.8	30	8
E7 S11	700	1100	None	None	Jun-88	None			
E19 S11	1900	1100	None	None	Jun-88	None			
E21 S11	2100	1100	1	20" - 30"	Jun-88	K111	98.8	41	26
E21 S11	2100	1100	2	30" - 50"	Jun-88	K113	89.1	33	13
E23 S11	2300	1100	1	12" - 24"	Jun-88	K112	98.3	44	21
E23 S11	2300	1100	2	30" - 45"	Jun-88	K114	92.6	34	10
E25 S11	2500	1100	None	None	Jun-88	None			

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	9	0.0	0.0	0.6	57.2	42.2	CH

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
80	100.0		
200	99.4		

Sample information:
○Fat Clay, trace sand

E1 S1 Sample #1

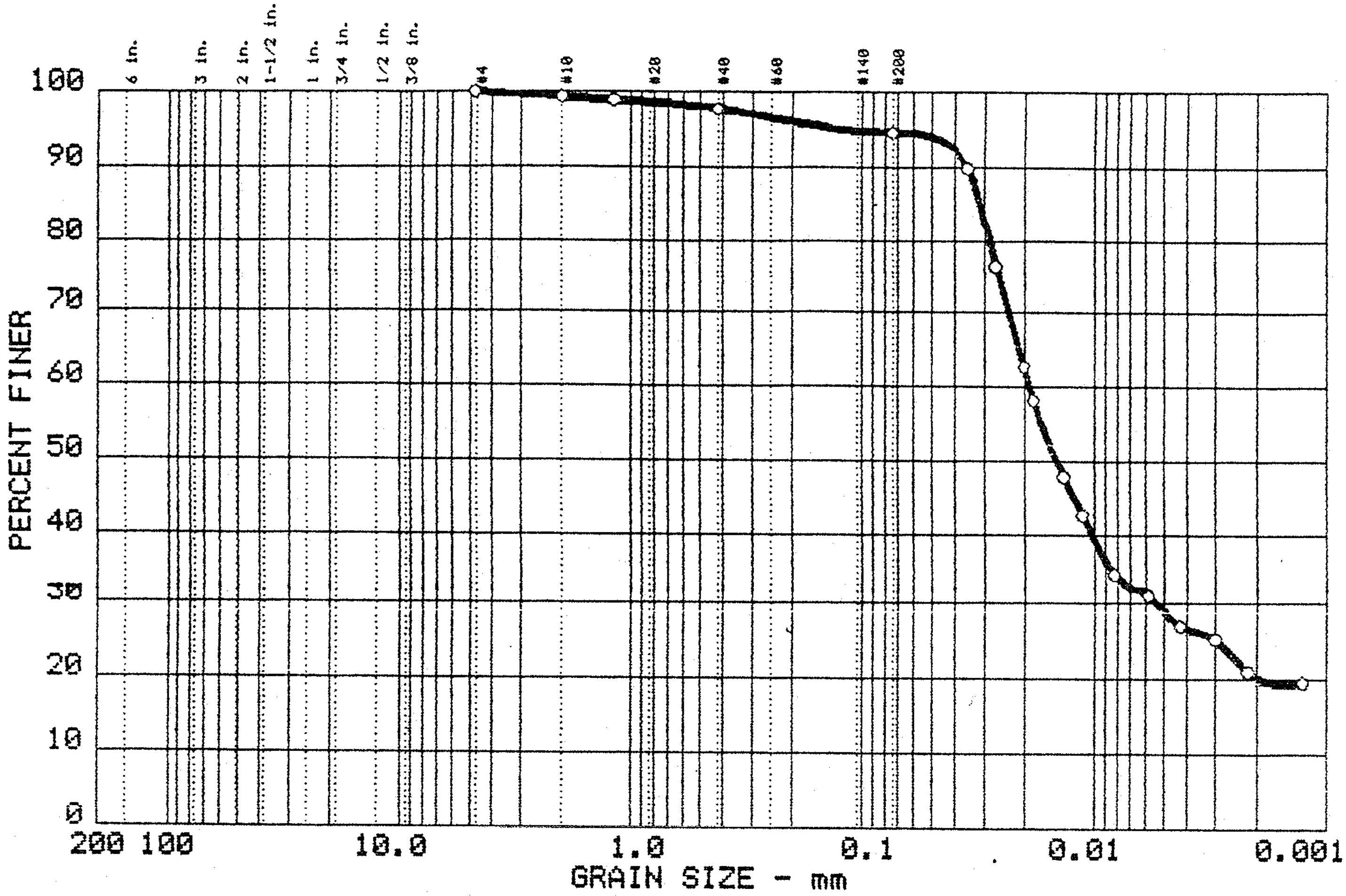
Remarks:
Liquid Limit = 50
Plasticity Index = 28

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 7, 1988 Data Sheet No. K1

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	1	0.0	0.0	5.3	65.7	29.0	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60}	0.01		
D_{30}			
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
4	100.0		
10	99.3		
16	98.9		
40	97.8		
200	94.7		

Sample information:
○ Lean Clay, trace sand

E1 S1 Sample #2

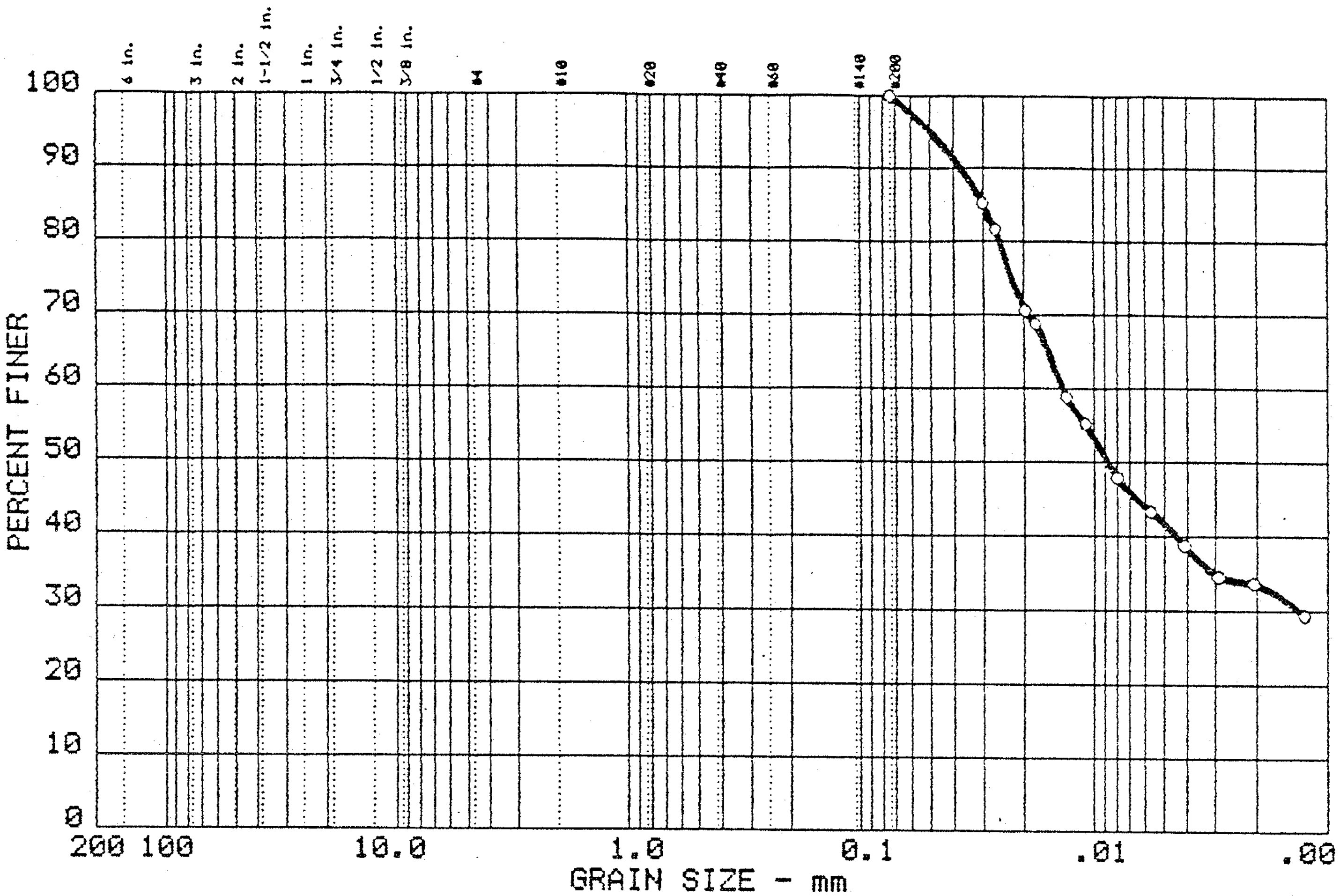
Remarks:
Liquid Limit = 27
Plasticity Index = 10

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K14

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	10	0.0	0.0	0.0	58.3	41.7	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
200	100.0		

Sample information:
○ Lean Clay, trace sand

E3 S1 Sample #1

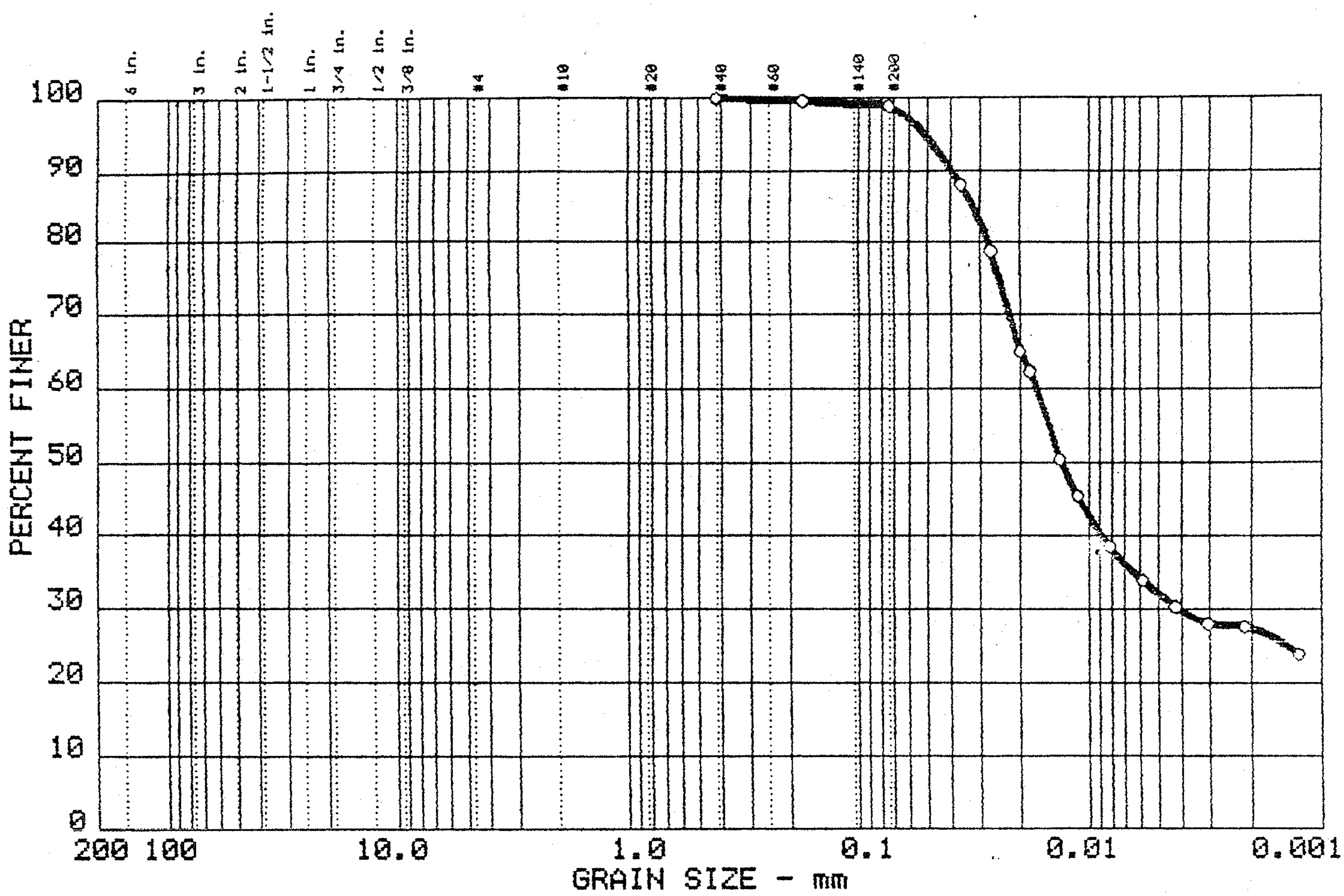
Remarks:
Liquid Limit = 48
Plasticity Index = 26

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 7, 1988 Data Sheet No. K2

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	2	0.0	0.0	1.1	66.8	32.1	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
80	99.7		
200	98.9		

Sample information:
○Lean Clay, trace sand

E3 S1 Sample #2

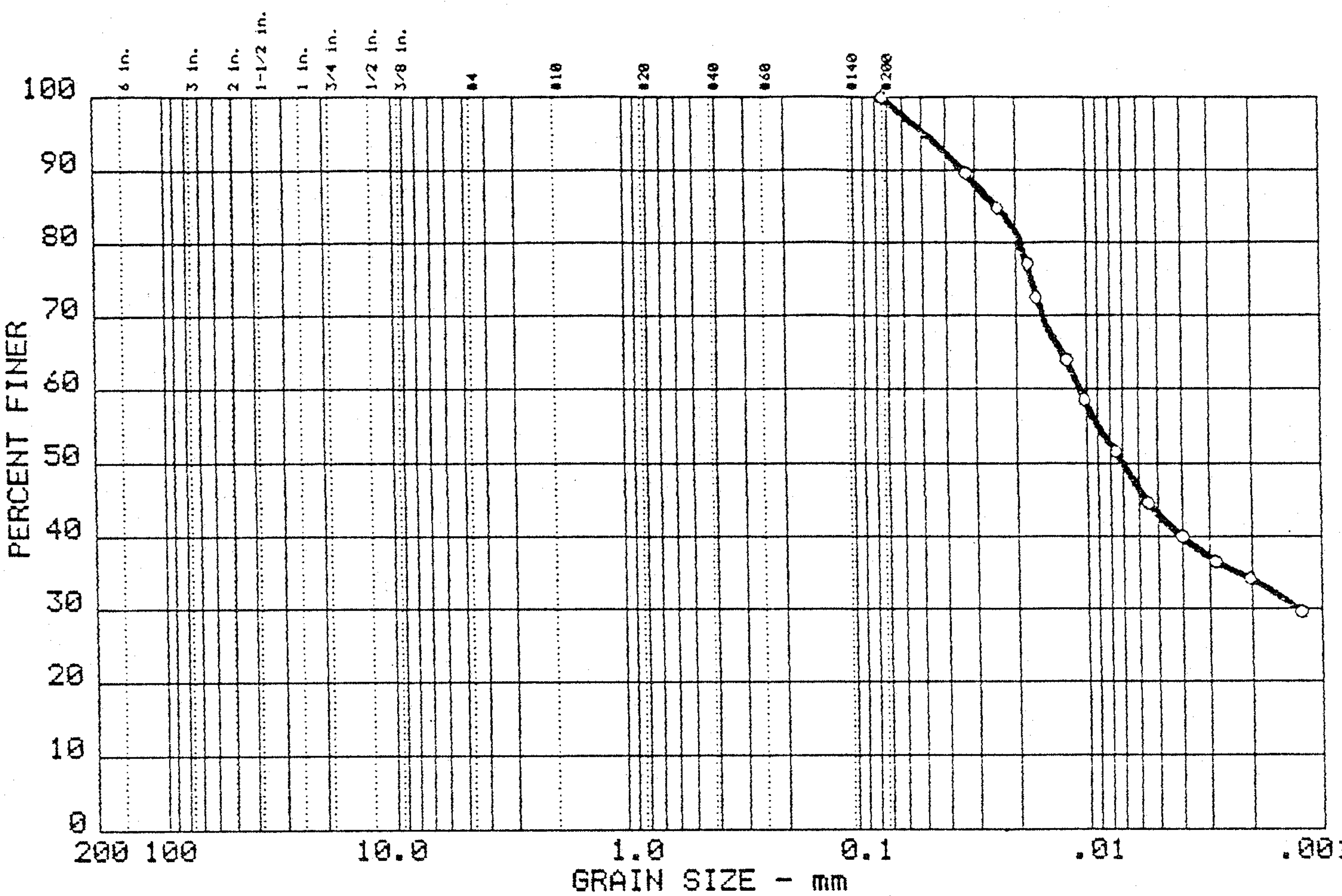
Remarks:
Liquid Limit = 33
Plasticity Index = 14

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K15

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	11	0.0	0.0	0.0	57.0	43.0	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
200	100.0		

Sample information:
○Lean Clay, trace sand

E5 S1 Sample #1

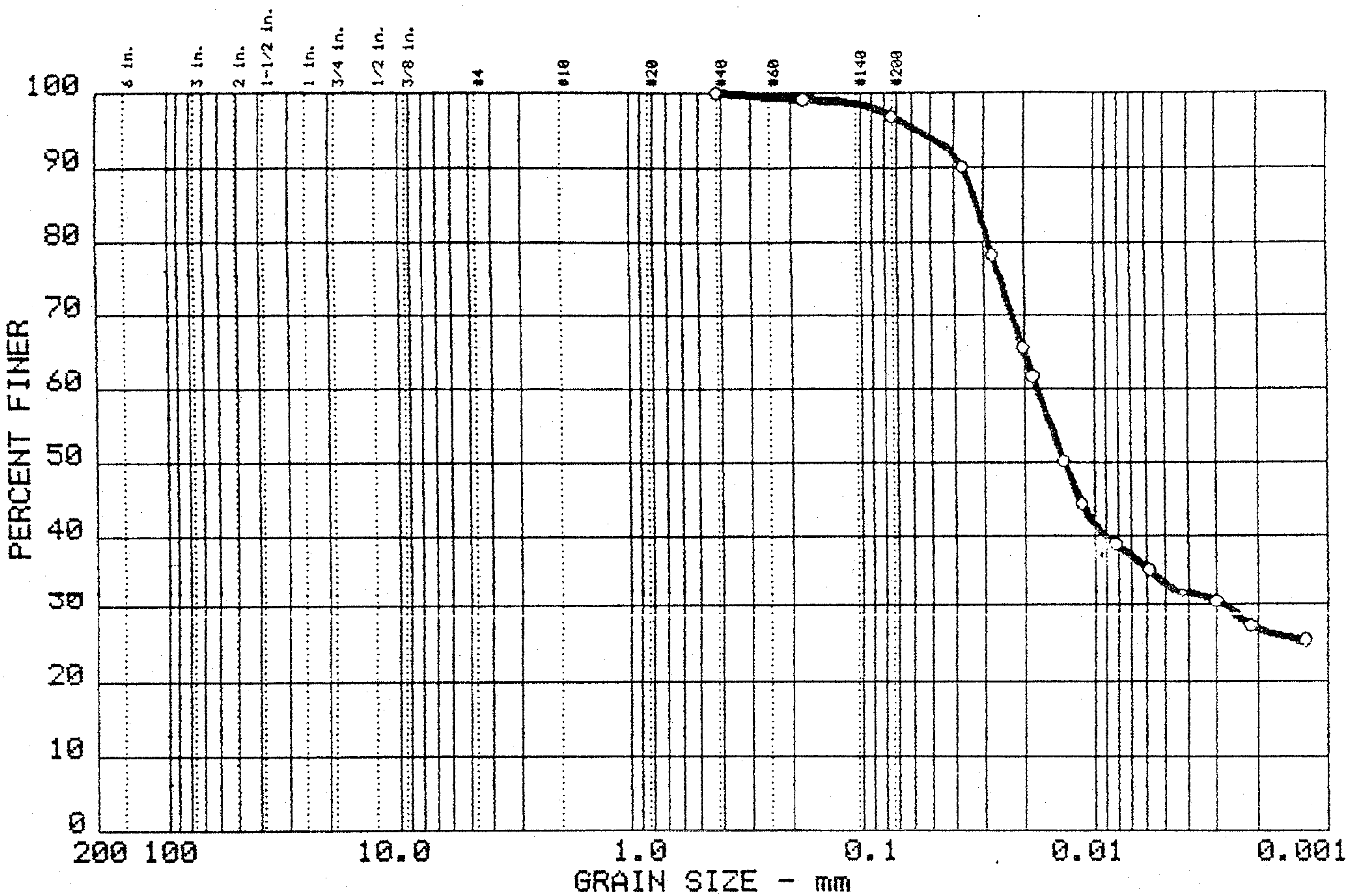
Remarks:
Liquid Limit = 48
Plasticity Index = 27

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 7, 1988 Data Sheet No. K3

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	3	0.0	0.0	3.0	63.4	33.6	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
80	99.2		
200	97.0		

Sample information:
○ Lean Clay, trace sand

E5 S1 Sample #2

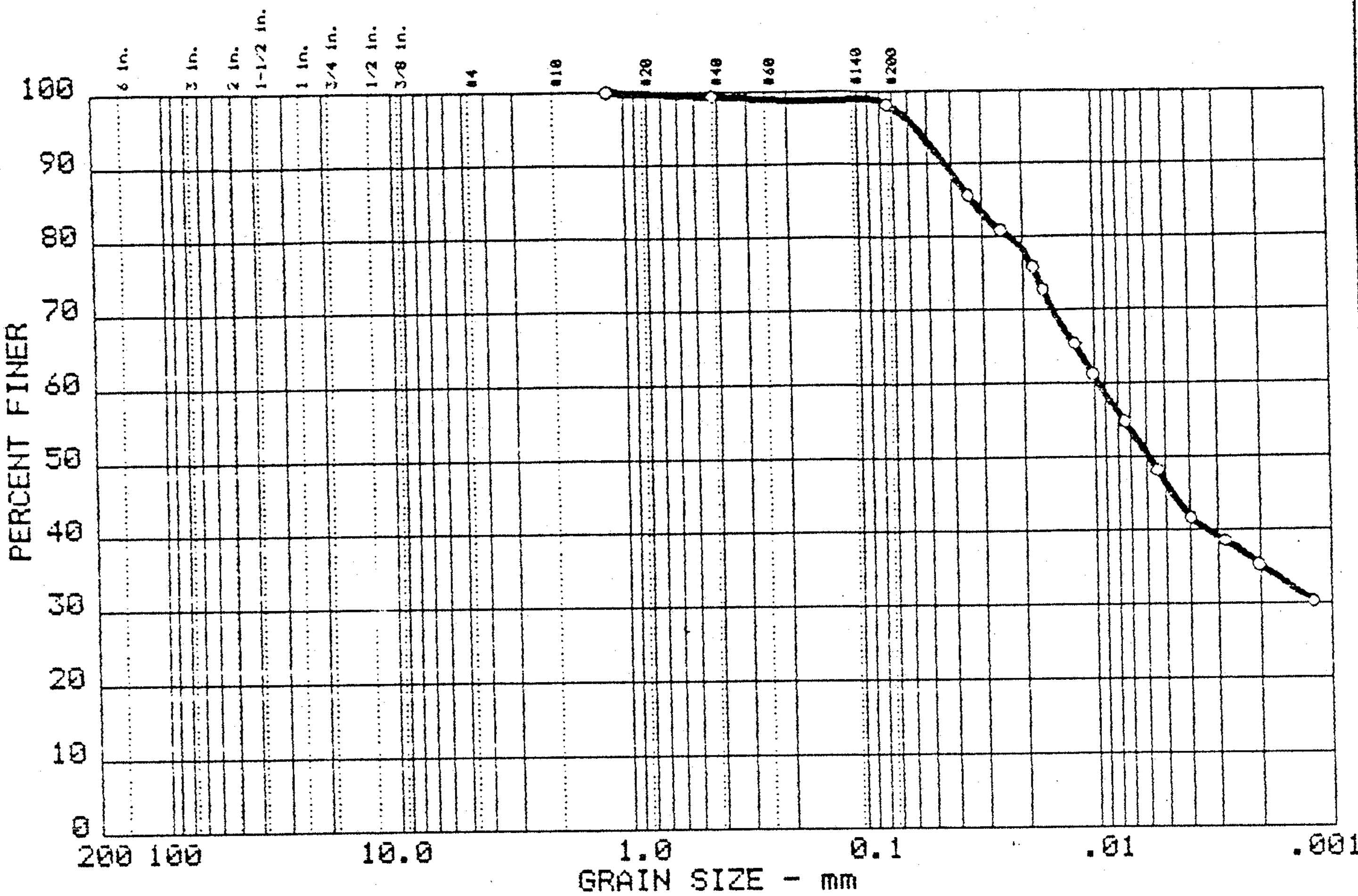
Remarks:
Liquid Limit = 34
Plasticity Index = 13

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K16

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	12	0.0	0.0	1.8	51.7	46.5	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60}			
D_{30}			
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.4		
200	98.2		

Sample information:
○ Lean Clay, trace sand

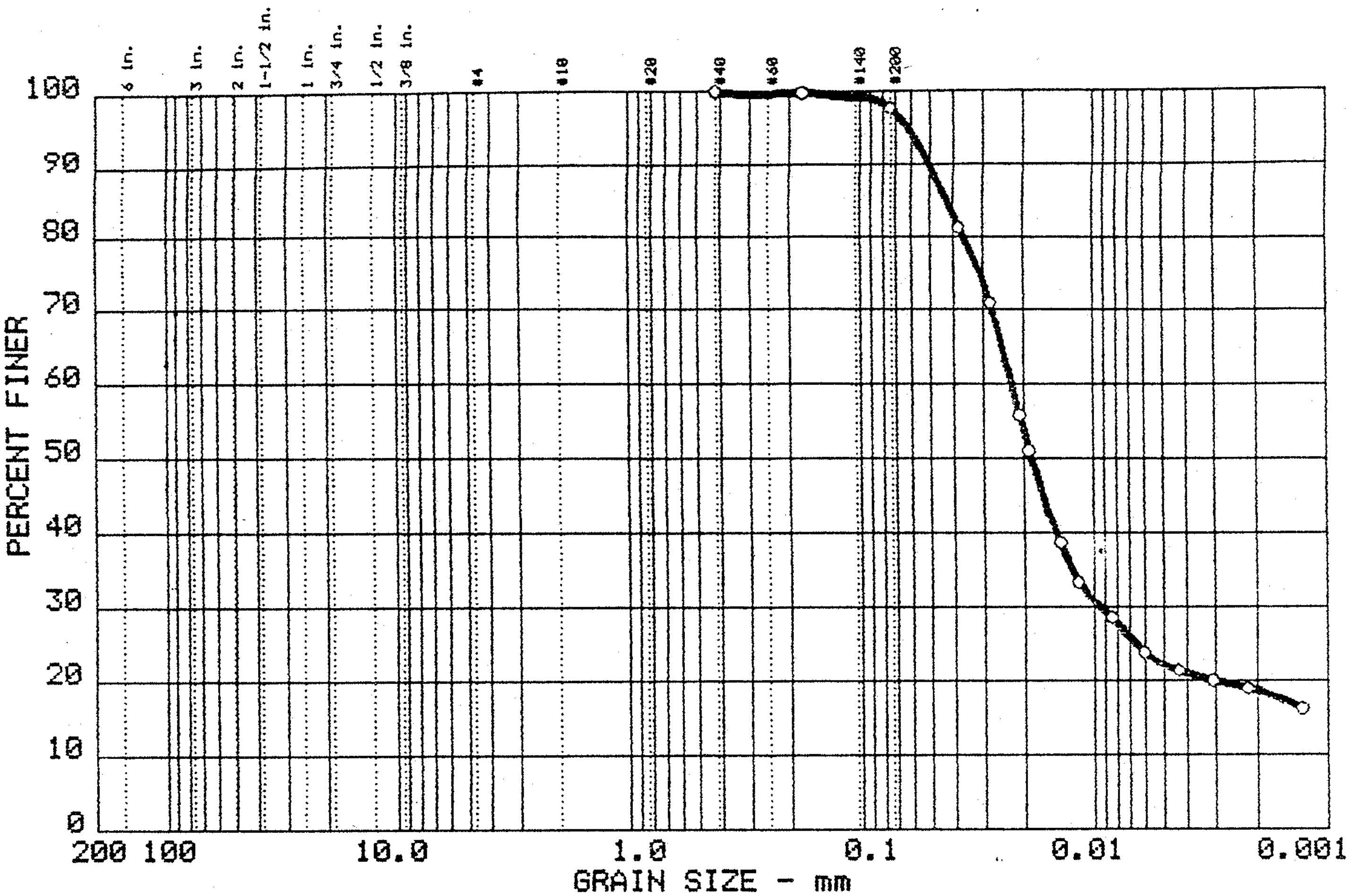
E7 S1 Sample #1

Remarks:
Liquid Limit = 43
Plasticity Index = 22

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill
Date: July 7, 1988 Data Sheet No. K4

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	4	0.0	0.0	2.2	75.7	22.1	CL-ML

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.01		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
80	99.8		
200	97.8		

Sample information:
○ Silty Clay, trace sand

E7 S1 Sample #2

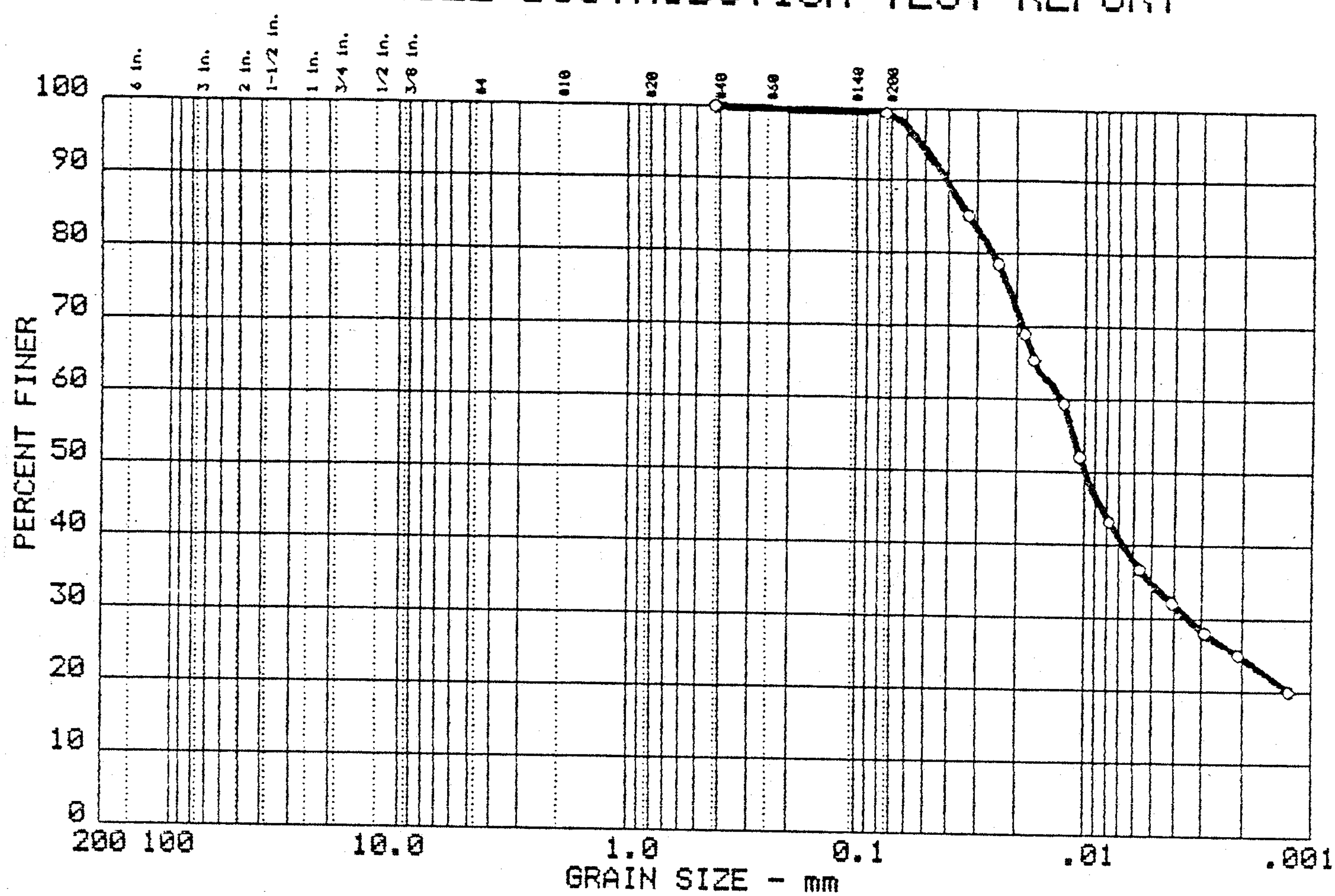
Remarks:
Liquid Limit = 26
Plasticity Index = 7

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K17

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
13	0.0	0.0	0.6	64.7	34.7	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
200	99.4		

Sample information:
○Lean Clay, trace sand

E9 S1 Sample #1

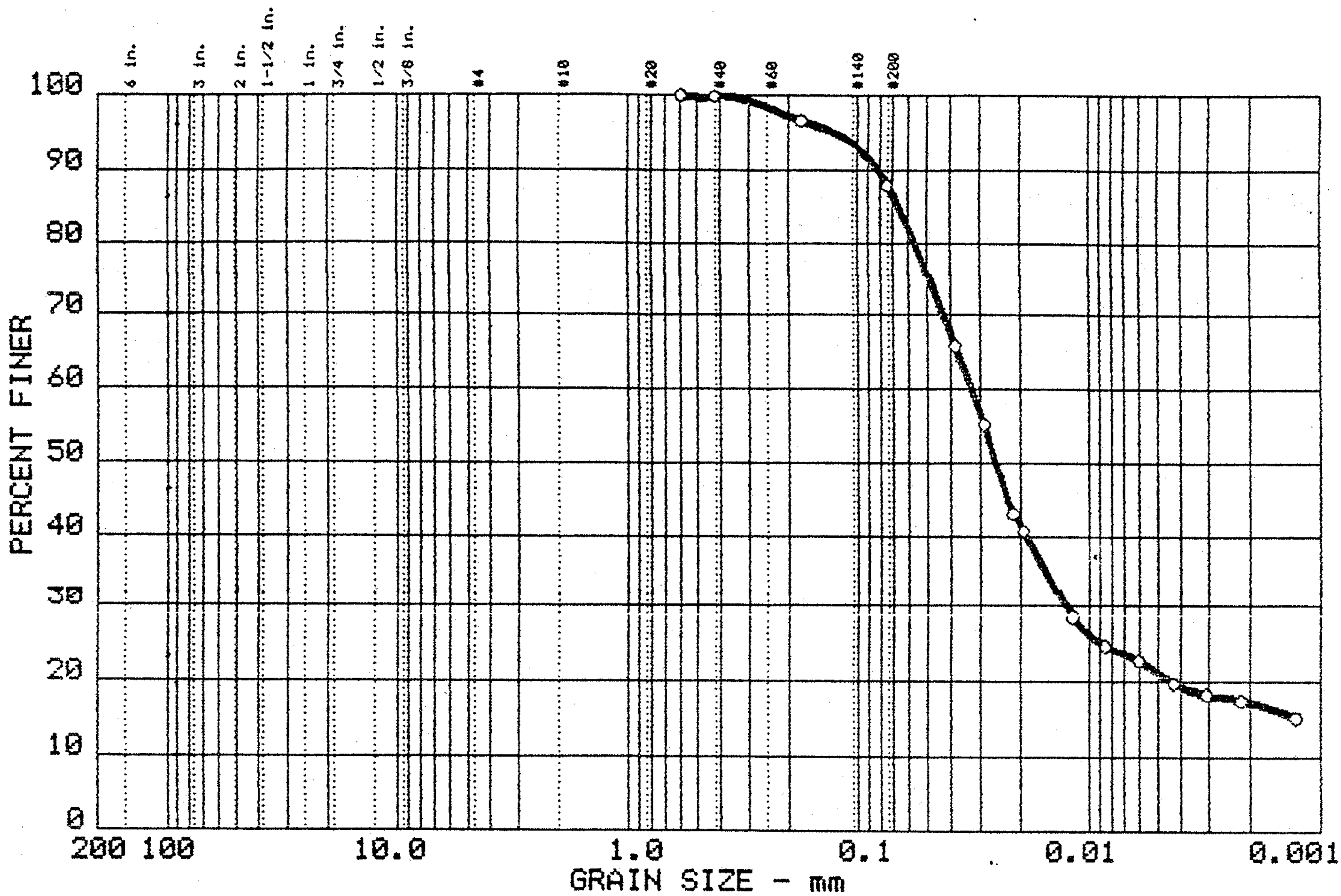
Remarks:
Liquid Limit = 43
Plasticity Index = 24

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 7, 1988   Data Sheet No. K5

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	5	0.0	0.0	12.0	66.8	21.2	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.01		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
30	100.0		
40	99.9		
80	96.6		
200	88.0		

Sample information:
○Lean Clay, some sand

E9 S1 Sample #2

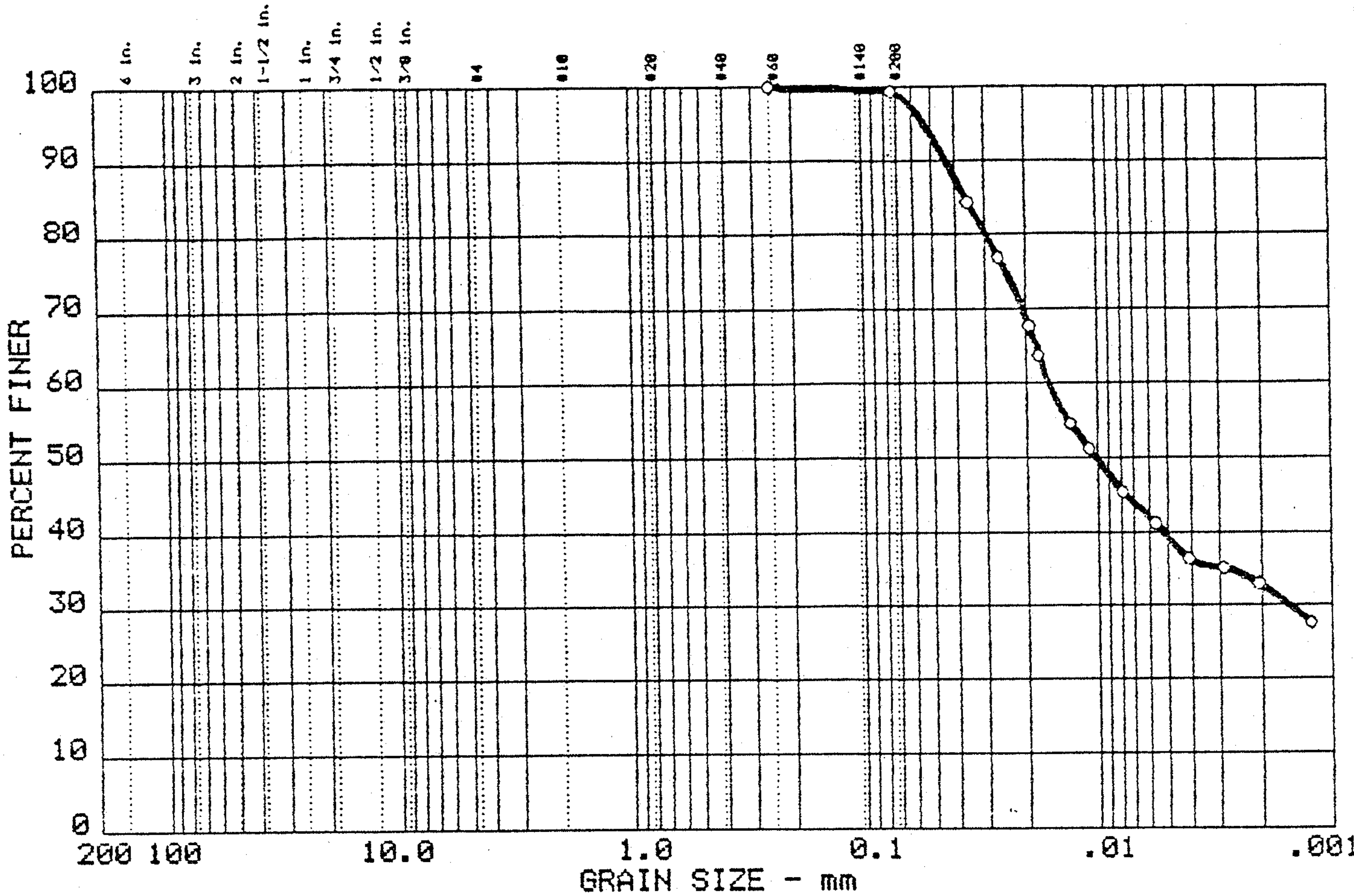
Remarks:
Liquid Limit = 26
Plasticity Index = 9

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K18

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	14	0.0	0.0	0.6	60.2	39.2	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
60	100.0		
200	99.4		

Sample information:
○Fat Clay, trace sand

E11 S1 Sample #1

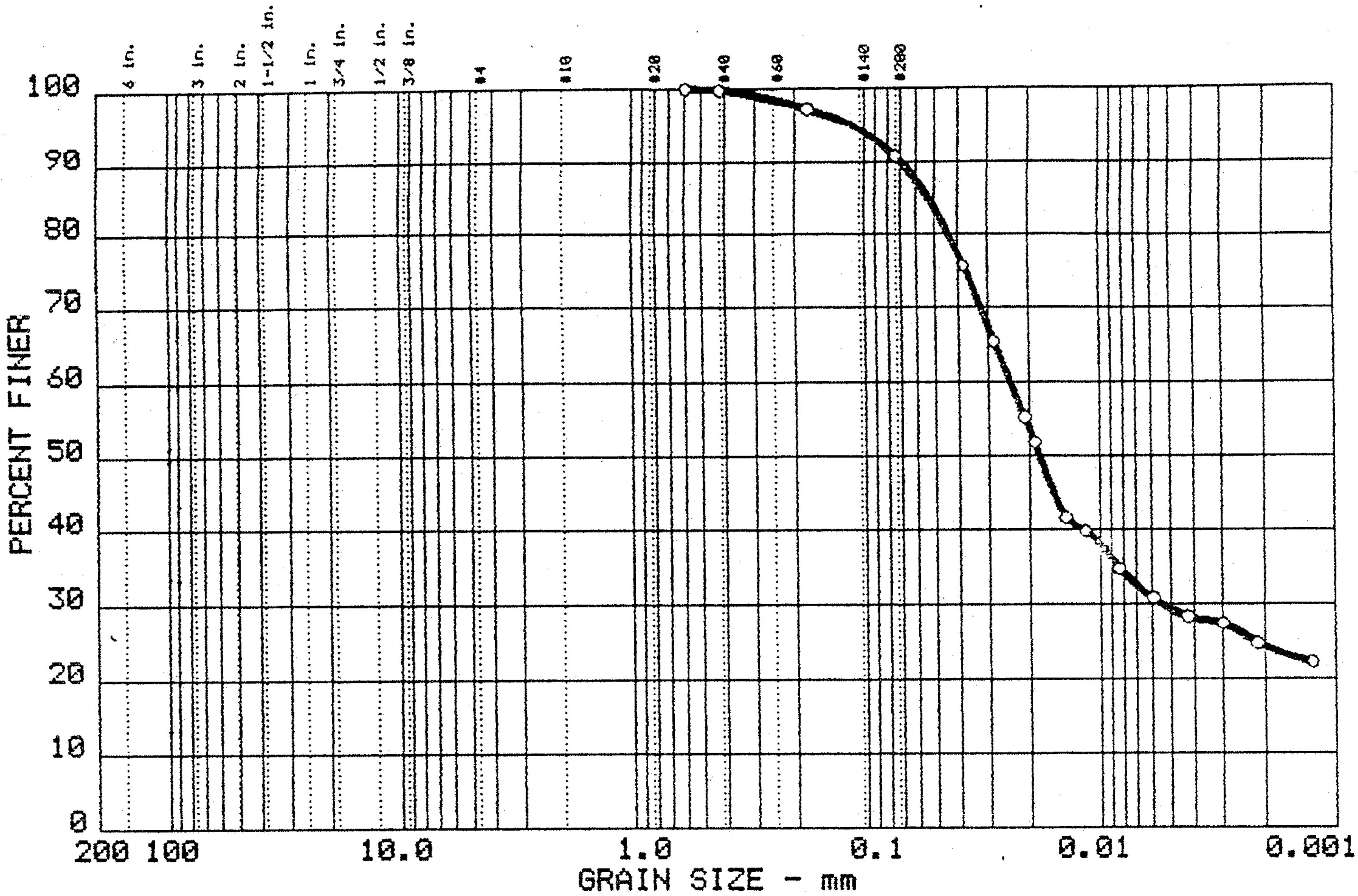
Remarks:
Liquid Limit = 51
Plasticity Index = 26

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 7, 1988 Data Sheet No. K6

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
o	6	0.0	0.0	9.2	61.5	29.3	CL

SIEVE inches size	PERCENT FINER o		
	GRAIN SIZE		
D_{60}	0.01		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER o		
30	100.0		
40	99.9		
80	97.3		
200	90.8		

Sample information:
o Lean Clay, little sand

E11 S1 Sample #2

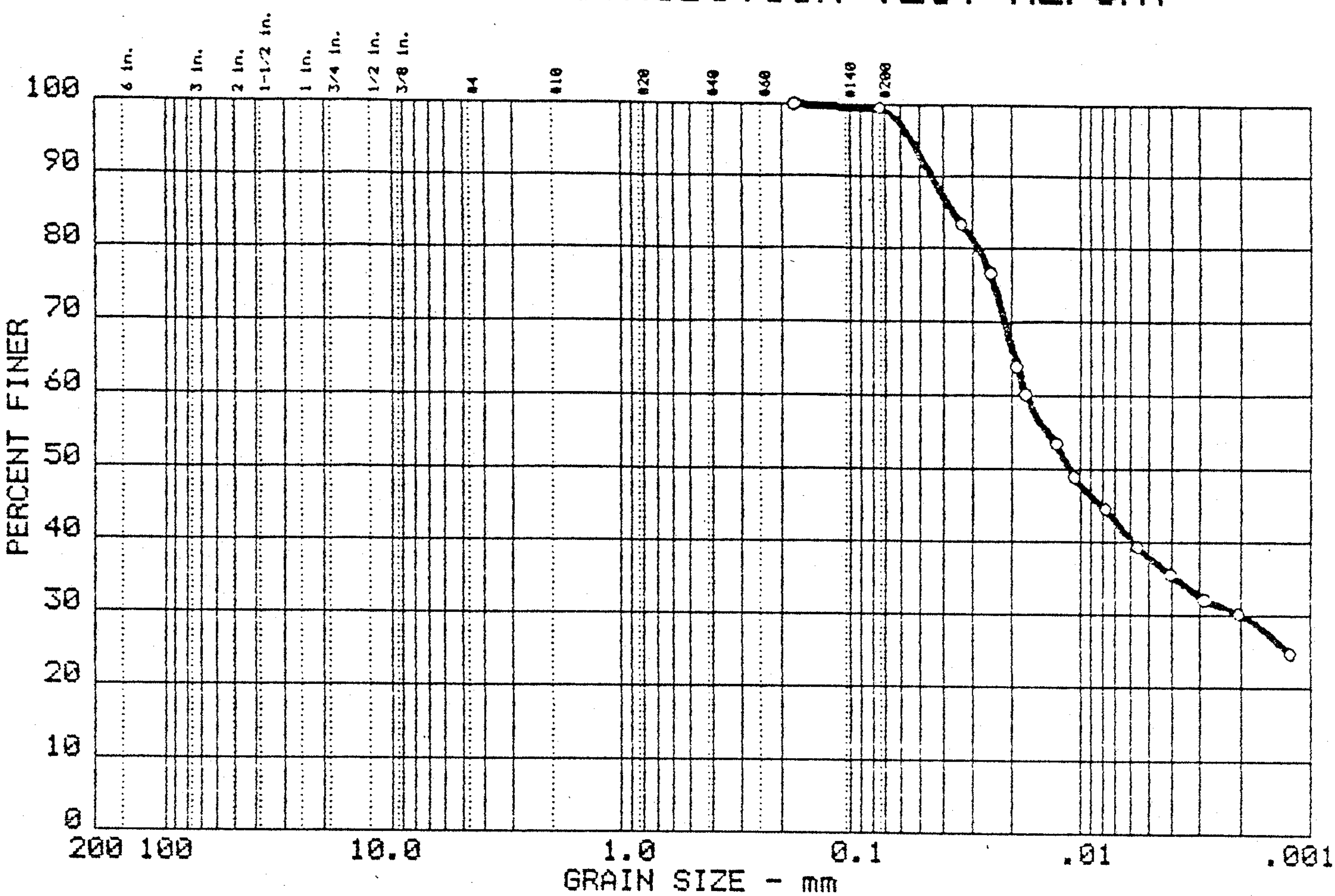
Remarks:
Liquid Limit = 40
Plasticity Index = 19

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K19

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	15	0.0	0.0	0.5	61.7	37.8	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
80	100.0		
200	99.5		

Sample information:
○ Lean Clay, trace sand

E13 S1 Sample #1

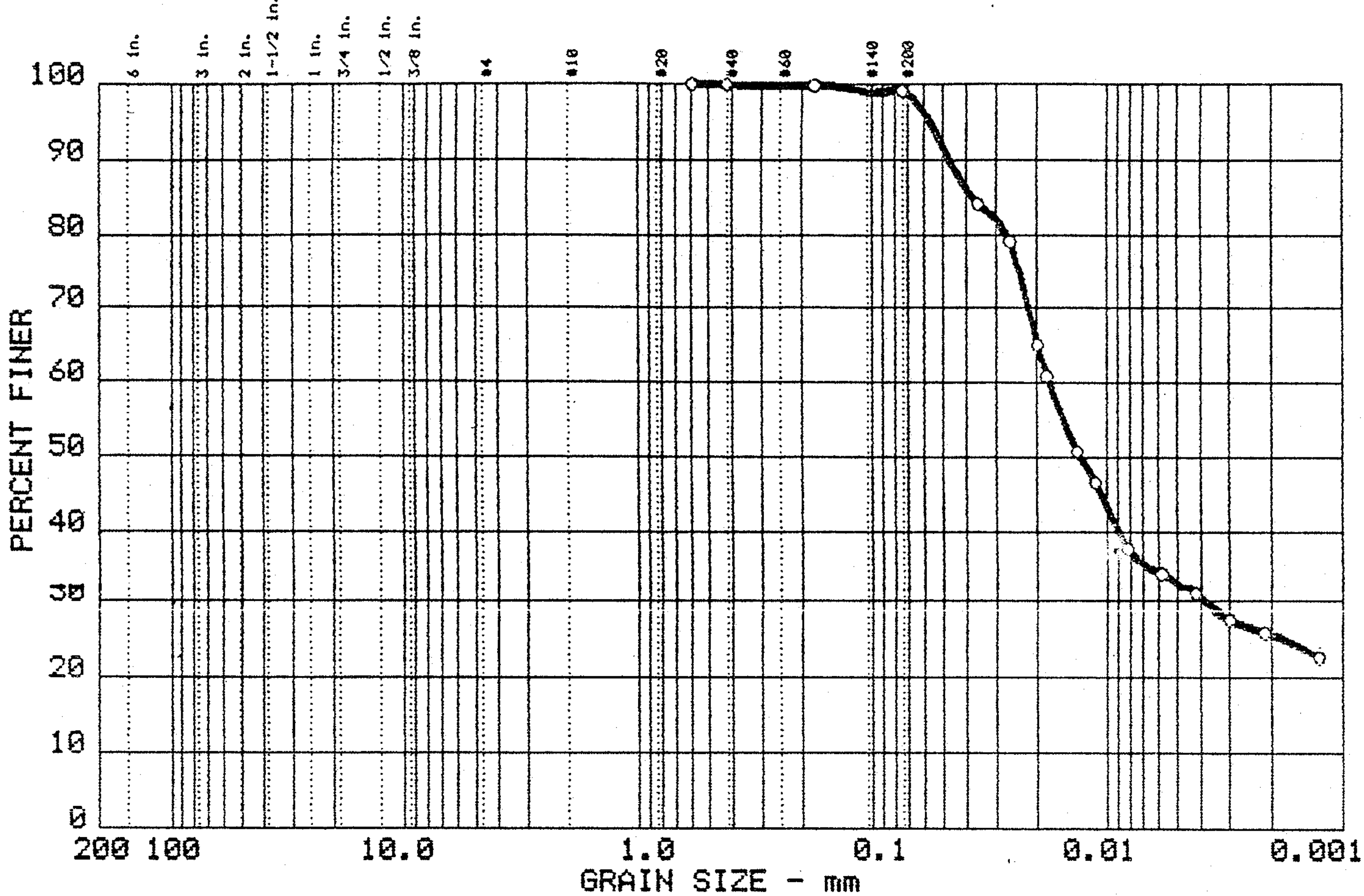
Remarks:
Liquid Limit = 47
Plasticity Index = 28

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 7, 1988 Data Sheet No. K7

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	7	0.0	0.0	0.8	66.2	33.1	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
30	100.0		
40	99.9		
80	99.8		
200	99.2		

Sample information:
○ Lean Clay, trace sand

E13 S1 Sample #2

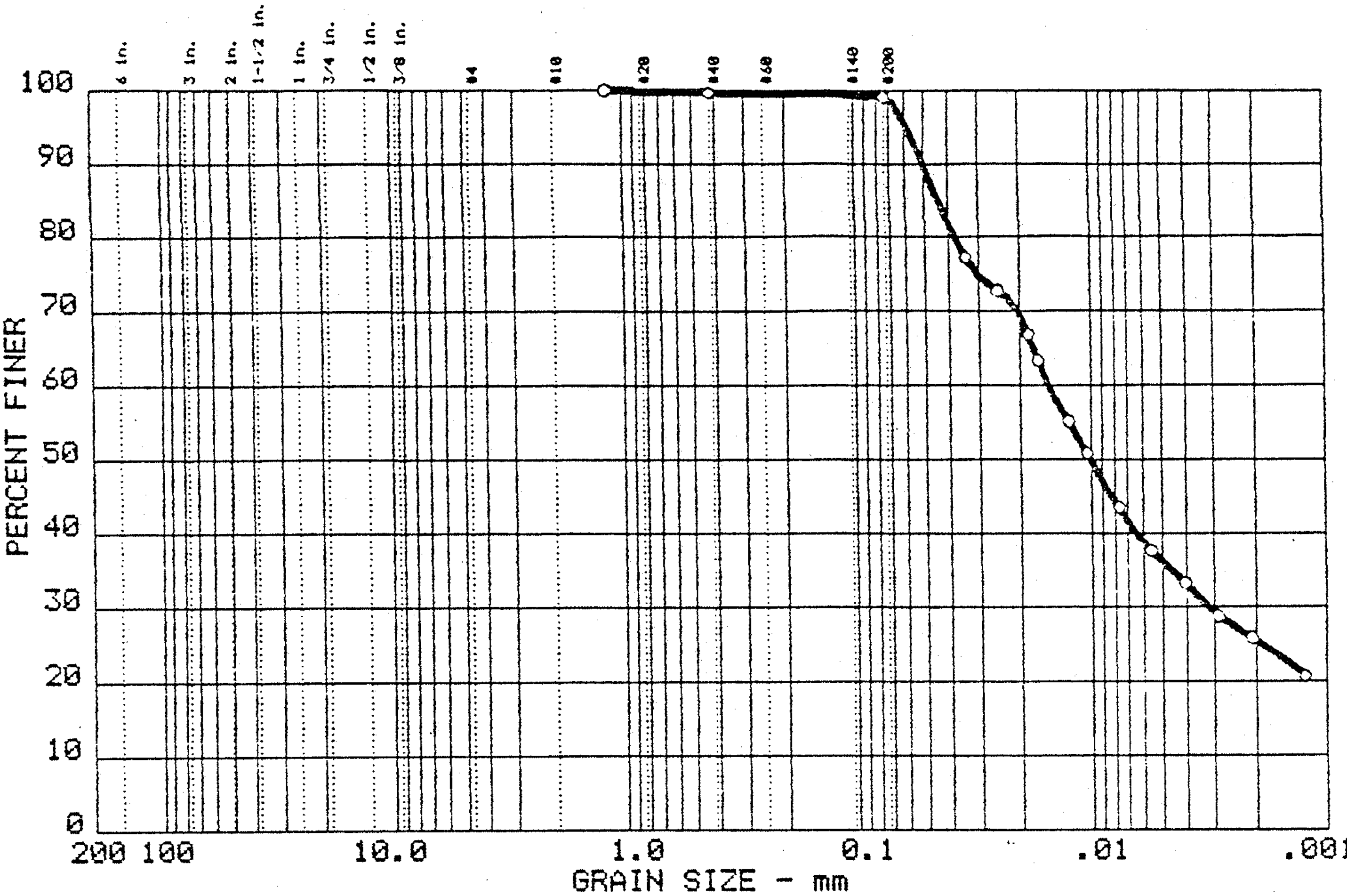
Remarks:
Liquid Limit = 36
Plasticity Index = 15

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K20

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	16	0.0	0.0	0.8	63.1	36.1	CH

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.7		
200	99.2		

Sample information:
○ Fat Clay, trace sand

E15 S1 Sample #1

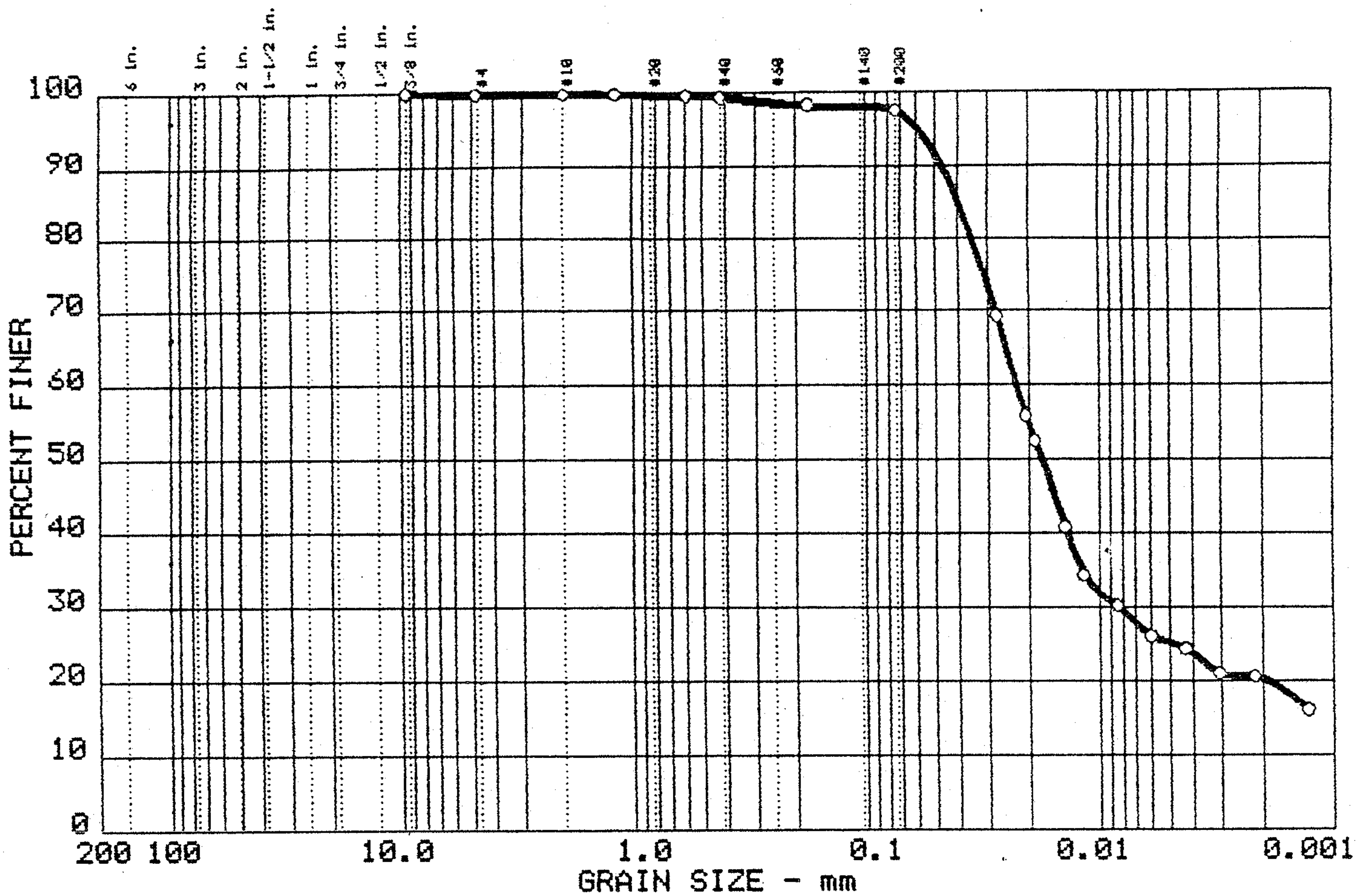
Remarks:
Liquid Limit = 50
Plasticity Index = 26

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 7, 1988 Data Sheet No. K8

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	8	0.0	0.2	2.2	72.5	25.1	CL

SIEVE inches size	PERCENT FINER ○		
0.375	100.0		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.01		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	99.8		
10	99.8		
16	99.7		
30	99.6		
40	99.4		
80	98.3		
200	97.6		

Sample information:
○Lean Clay, trace sand

E15 S1 Sample #2

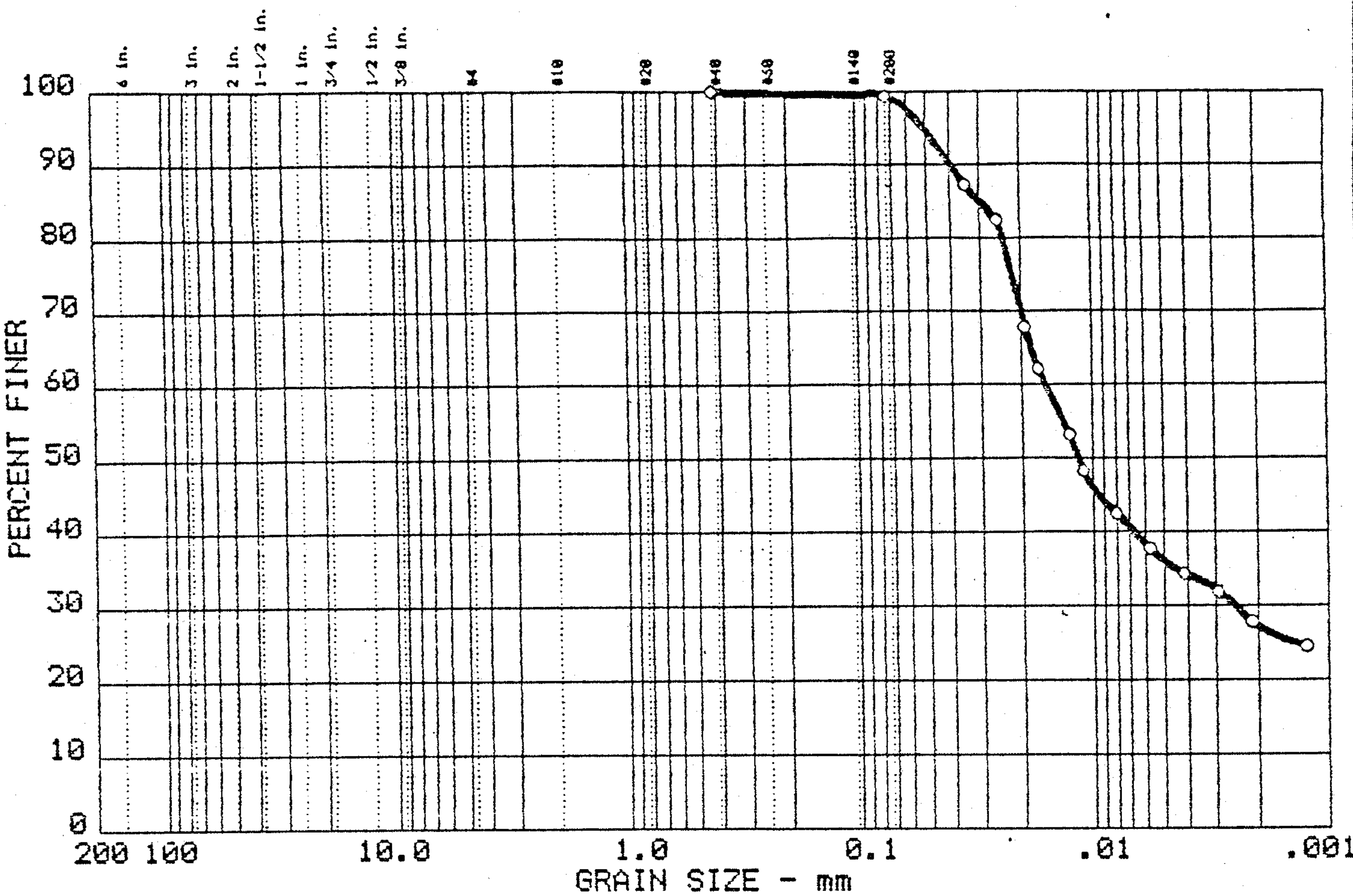
Remarks:
Liquid Limit = 35
Plasticity Index = 15

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K21

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○ 17	0.0	0.0	0.5	63.4	36.0	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
200	99.5		

Sample information:
○ Lean Clay, trace sand

E17 S1 Sample #1

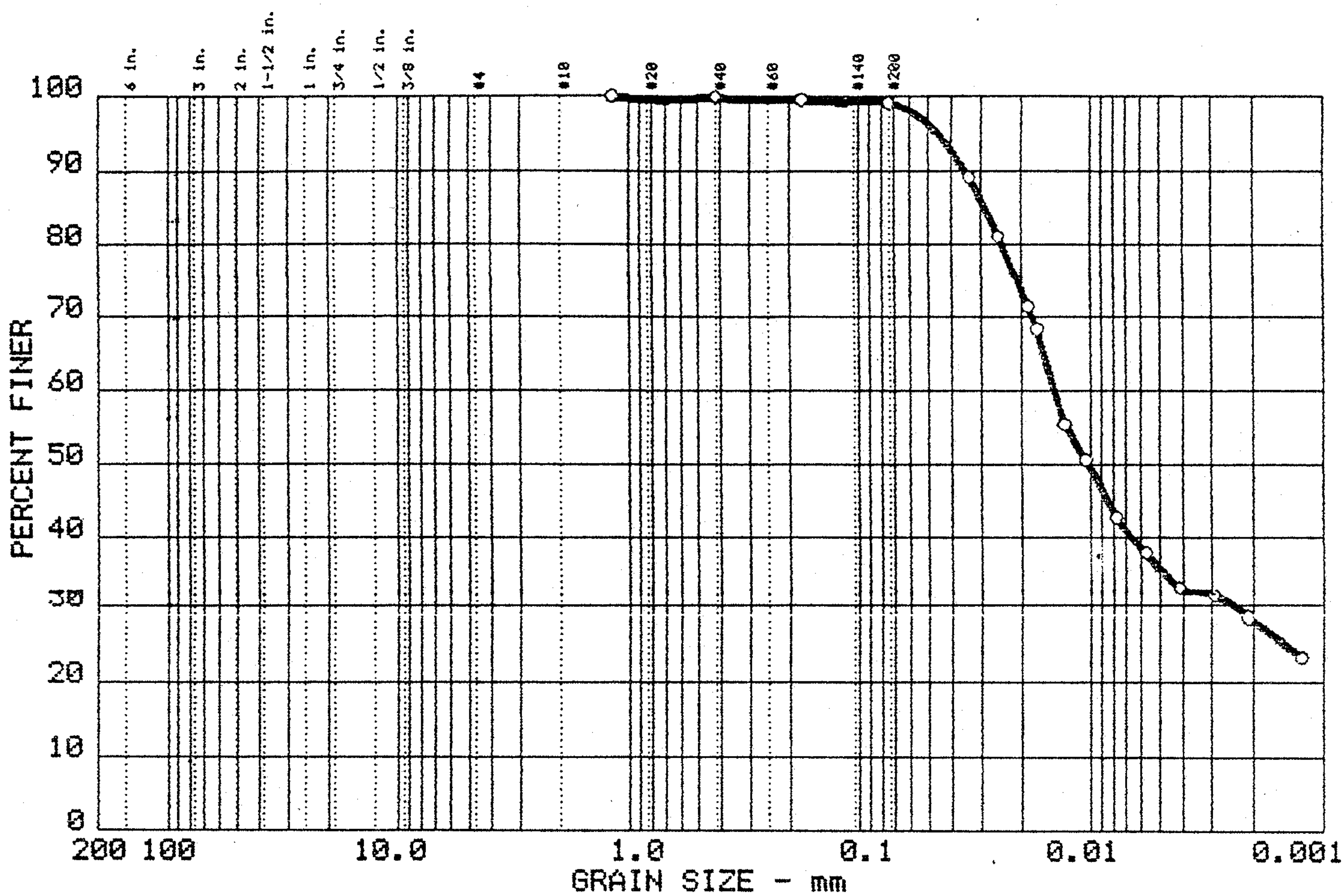
Remarks:
Liquid Limit = 48
Plasticity Index = 25

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 7, 1988 Data Sheet No. K9

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	9	0.0	0.0	0.8	63.5	35.7	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.9		
80	99.6		
200	99.2		

Sample information:
○Lean Clay, trace sand

E17 S1, Sample #2

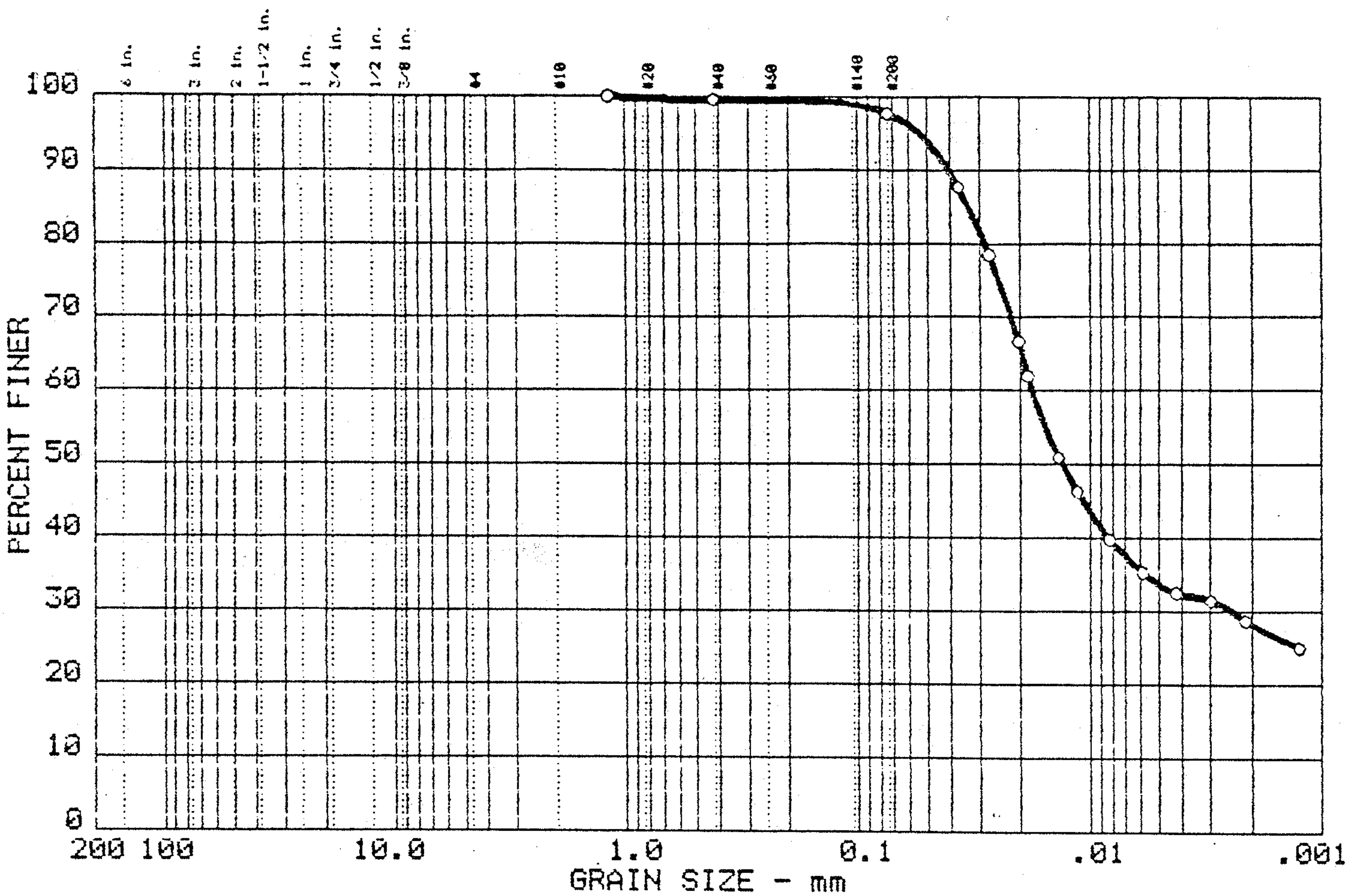
Remarks:
Liquid Limit = 39
Plasticity Index = 16

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K22

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	18	0.0	0.0	2.2	64.2	33.6	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.6		
200	97.8		

Sample information:
○ Lean Clay, trace sand

E19 S1 Sample #1

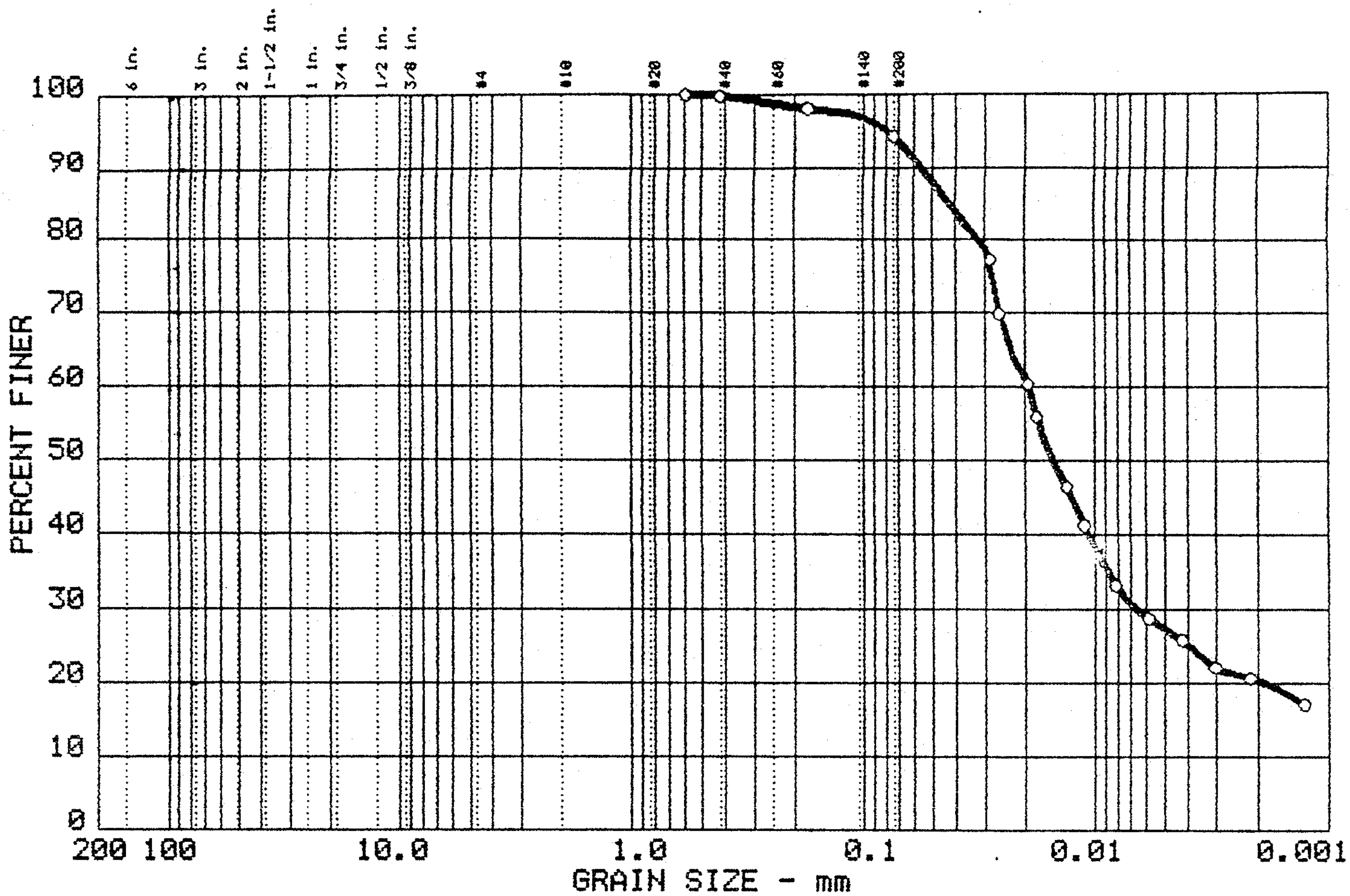
Remarks:
Liquid Limit = 40
Plasticity Index = 20

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 7, 1988 Data Sheet No. K10

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	10	0.0	0.0	5.7	66.9	27.5	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60}	0.01		
D_{30}			
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
30	100.0		
40	99.9		
80	98.2		
200	94.3		

Sample information:
○ Lean Clay, little sand

E19 S1 Sample #2

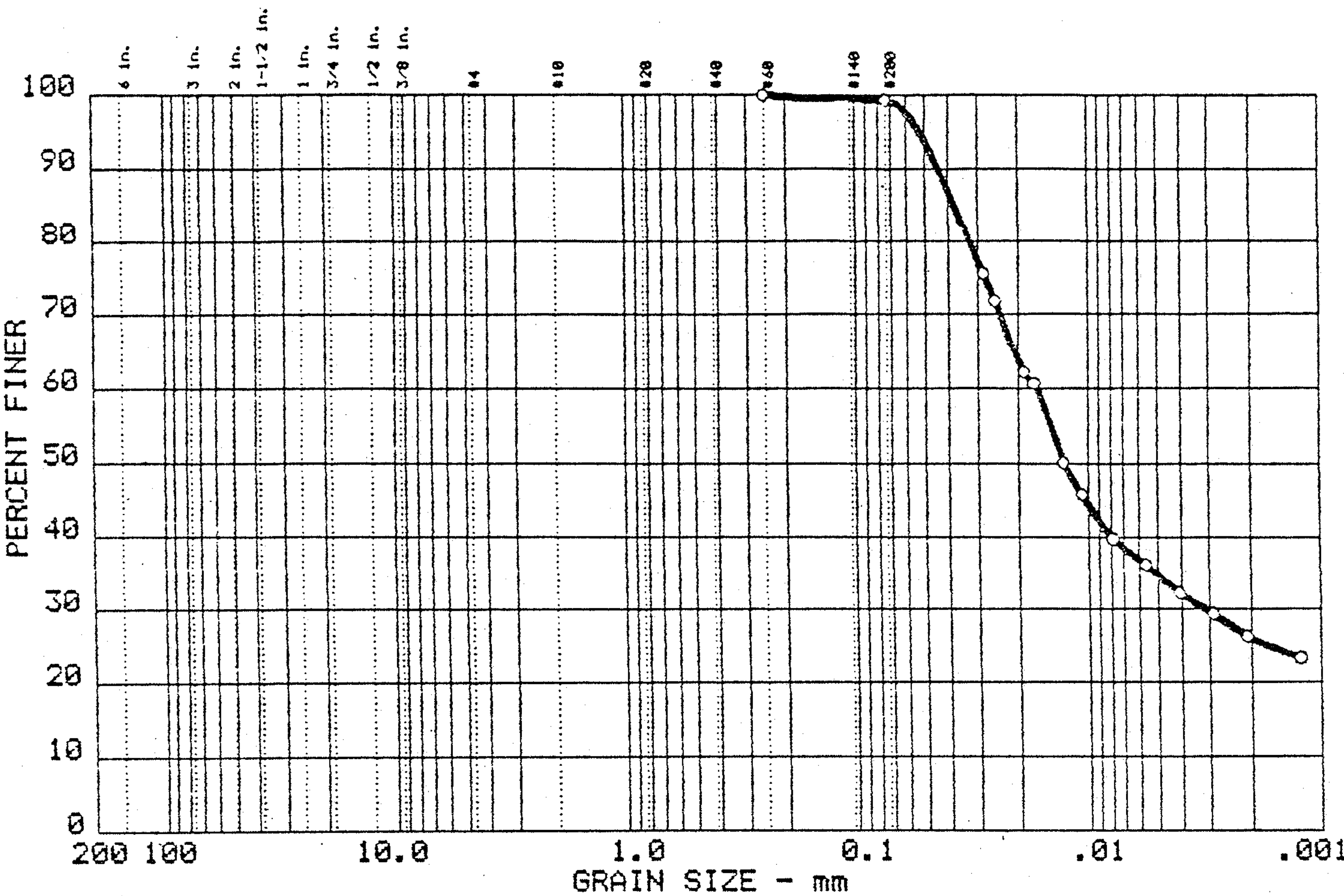
Remarks:
Liquid Limit = 34
Plasticity Index = 17

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K23

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	19	0.0	0.0	0.6	64.7	34.7	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
60	100.0		
200	99.4		

Sample information:
○Lean Clay, trace sand

E21 S1 Sample #1

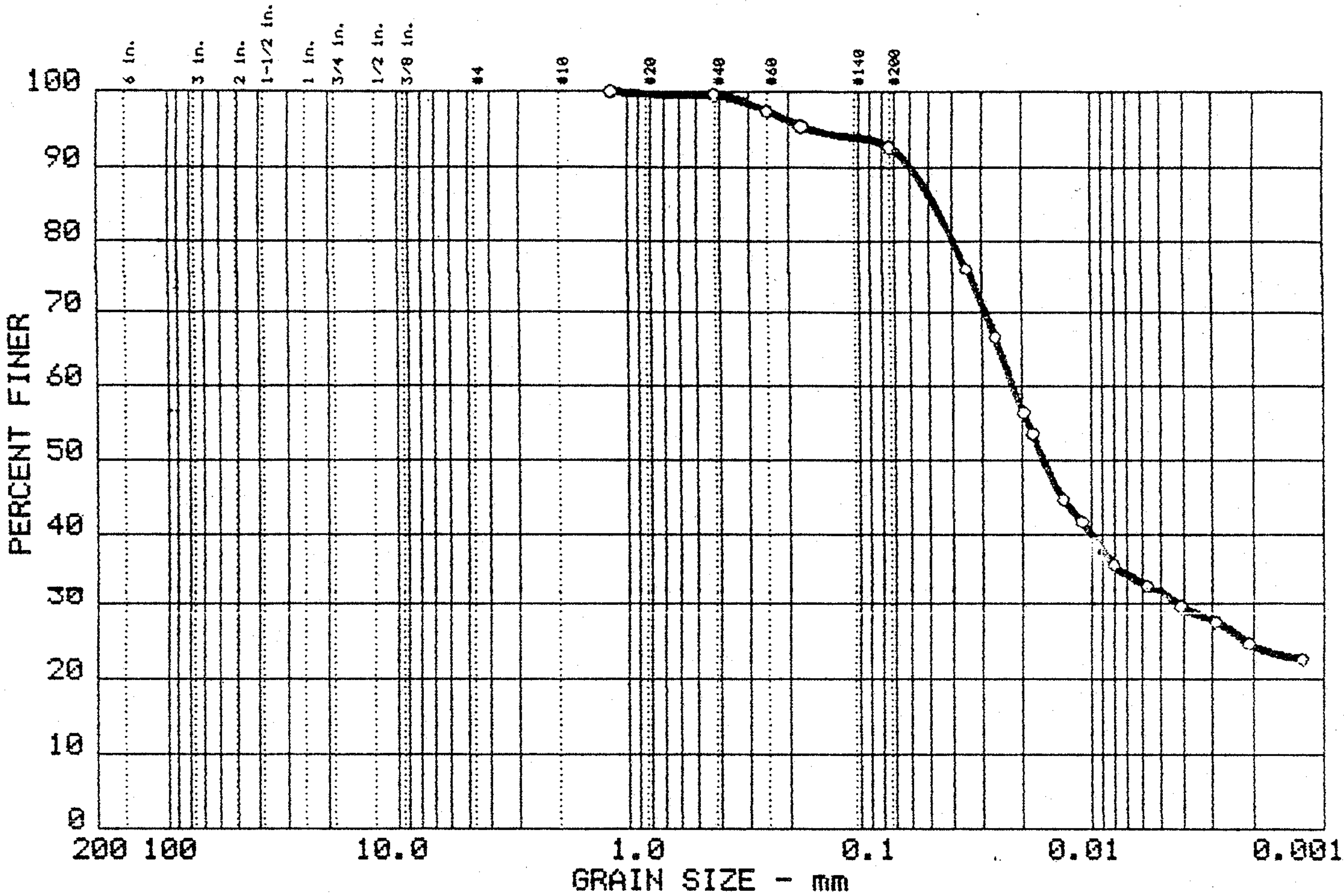
Remarks:
Liquid Limit = 47
Plasticity Index = 26

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 7, 1988 Data Sheet No. K11

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	11	0.0	0.0	7.2	61.1	31.7	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}			
D_{30}	0.00		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.6		
60	97.6		
80	95.5		
200	92.8		

Sample information:
○Lean Clay, little sand

E21 S1 Sample #2

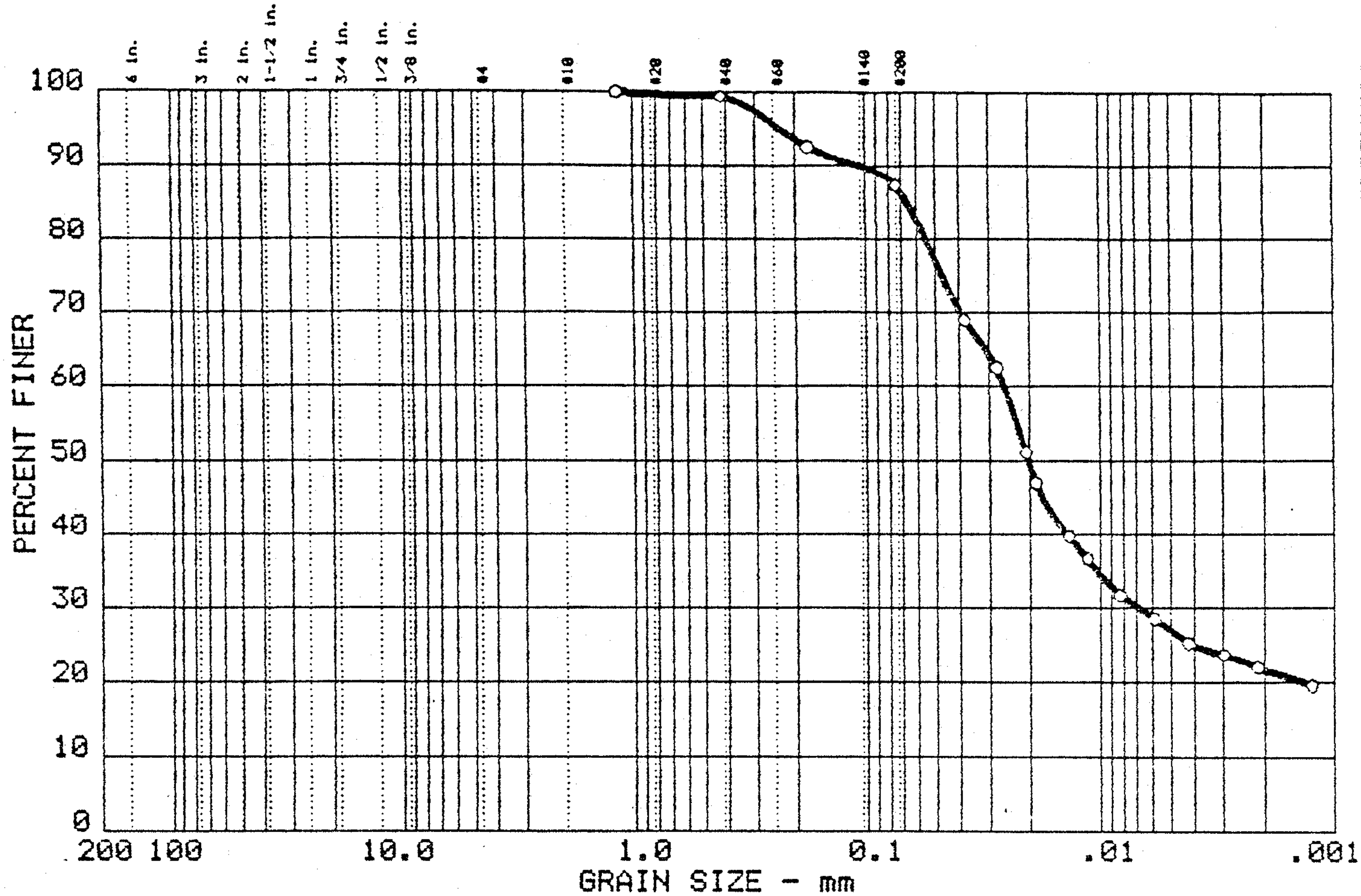
Remarks:
Liquid Limit = 44
Plasticity Index = 25

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K24

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	1	0.0	0.0	12.6	60.6	26.9	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60}			
D_{30}	0.01		
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.5		
80	92.5		
200	87.4		

Sample information:
○ Lean Clay, trace sand

E23 S1 Sample #1

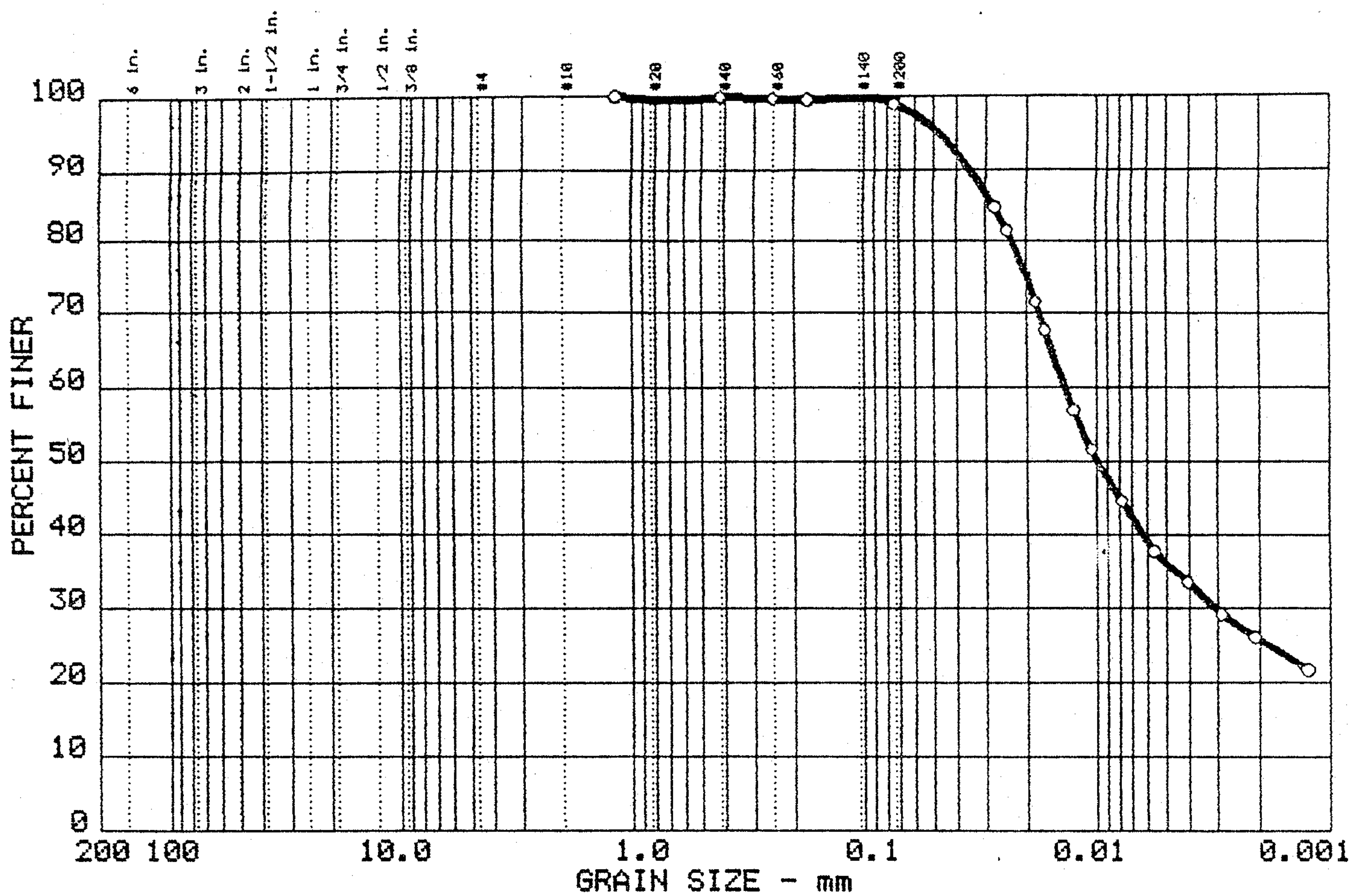
Remarks:
Liquid Limit = 36
Plasticity Index = 18

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 7, 1988 Data Sheet No. K12

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
o	12	0.0	0.0	0.9	63.1	36.0	CL

SIEVE inches size	PERCENT FINER o		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER o		
16	100.0		
40	99.9		
60	99.7		
80	99.6		
200	99.1		

Sample information:
o Lean Clay, trace sand

E23 S1 Sample #2

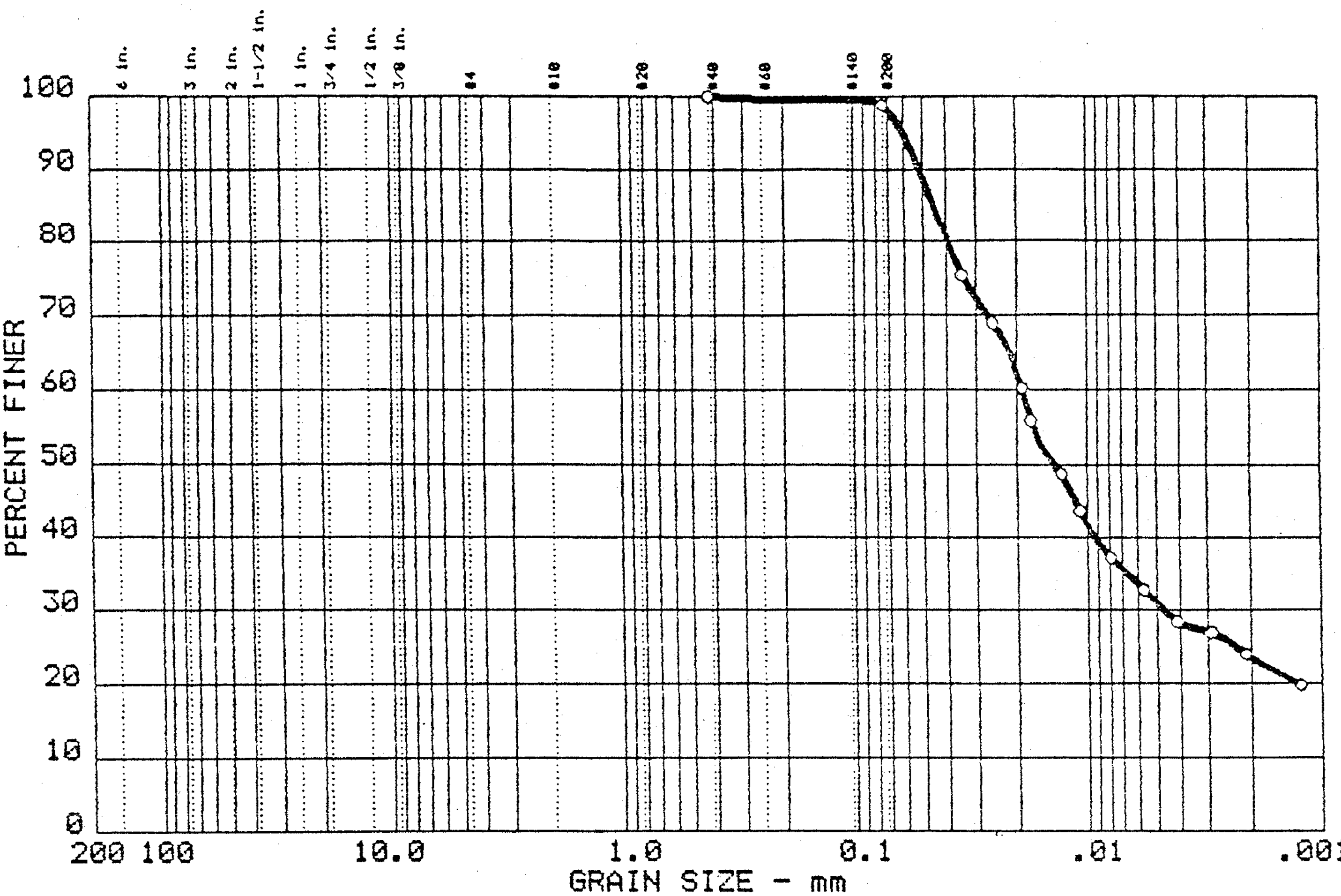
Remarks:
Liquid Limit = 49
Plasticity Index = 26

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K25

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	2	0.0	0.0	1.1	68.0	30.9	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}	0.00		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
200	98.9		

Sample information:
○ Lean Clay, trace sand

E25 S1 Sample #1

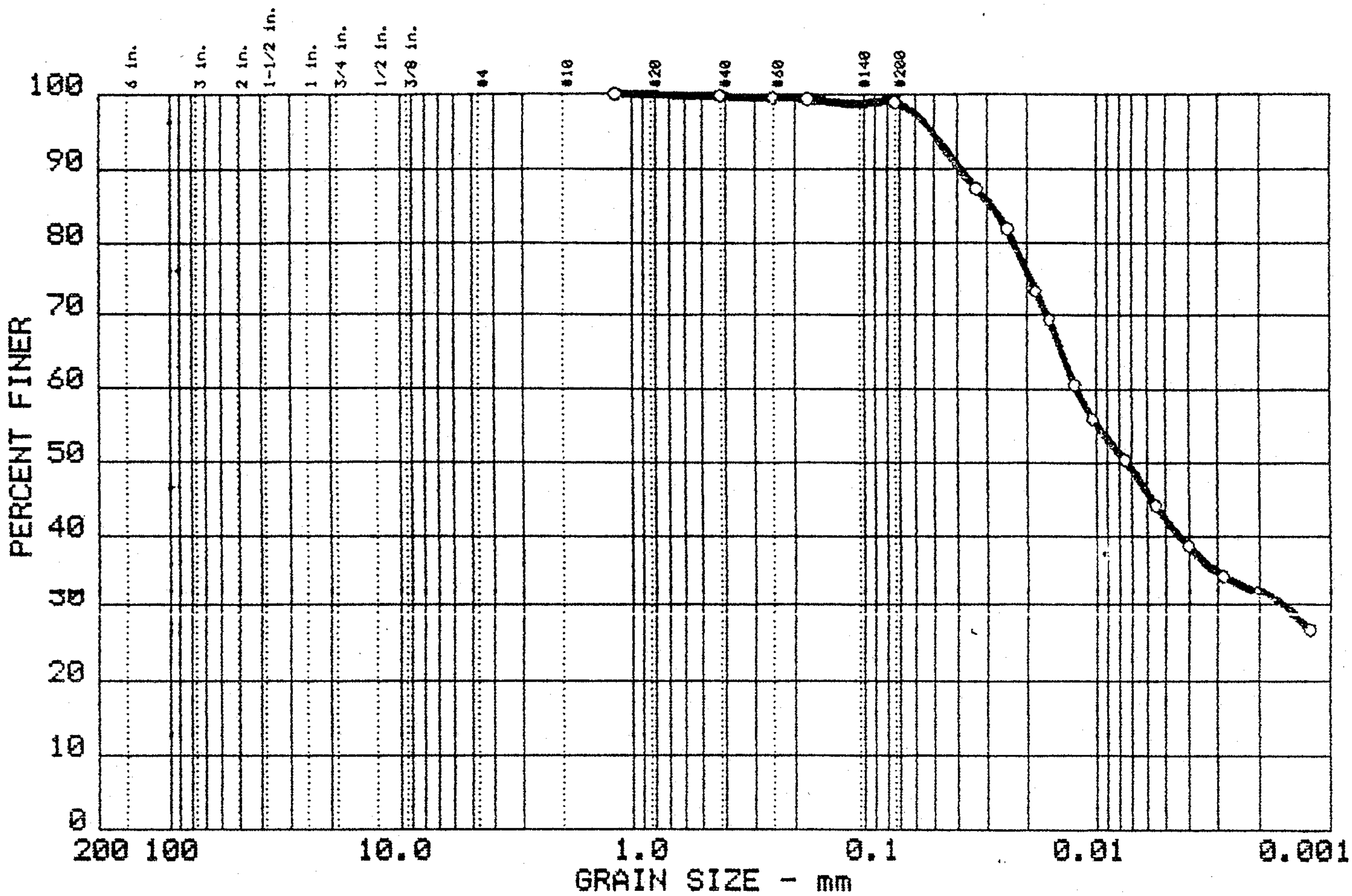
Remarks:
Liquid Limit = 44
Plasticity Index = 23

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 7, 1988 Data Sheet No. K13

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	13	0.0	0.0	1.0	56.7	42.3	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.8		
60	99.5		
80	99.4		
200	99.0		

Sample information:
○ Lean Clay, trace sand

E25 S1 Sample #2

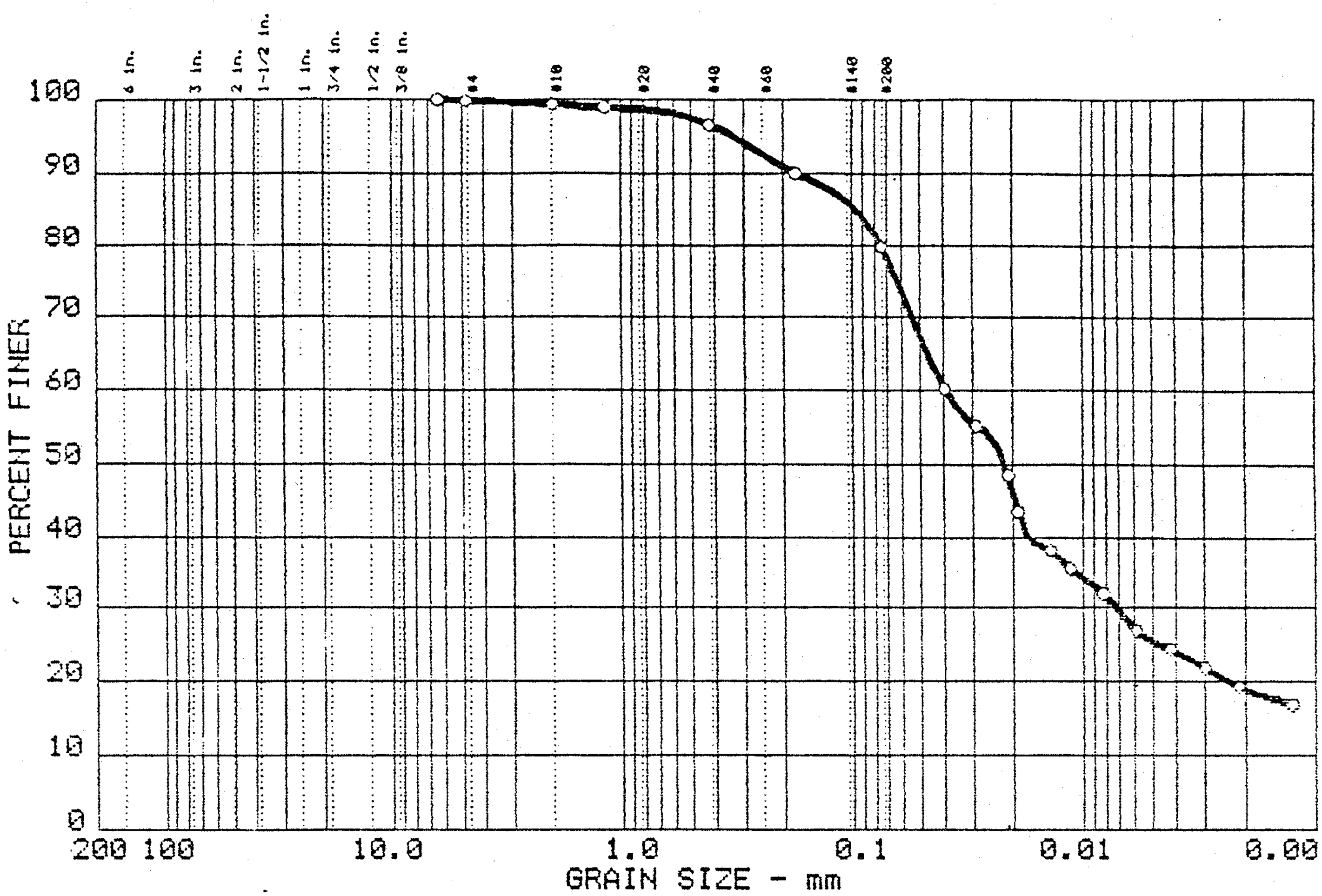
Remarks:
Liquid Limit = 36
Plasticity Index = 17

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K26

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
11	0.0	0.1	20.1	54.4	25.4	CL

SIEVE inches size	PERCENT FINER ○		
0.25	100.0		
	GRAIN SIZE		
D_{60}			
D_{30}	0.01		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
4	99.9		
10	99.3		
16	98.9		
40	96.7		
80	90.0		
200	79.8		

Sample information:
○ Sandy Lean Clay

E1 S3 Sample #1

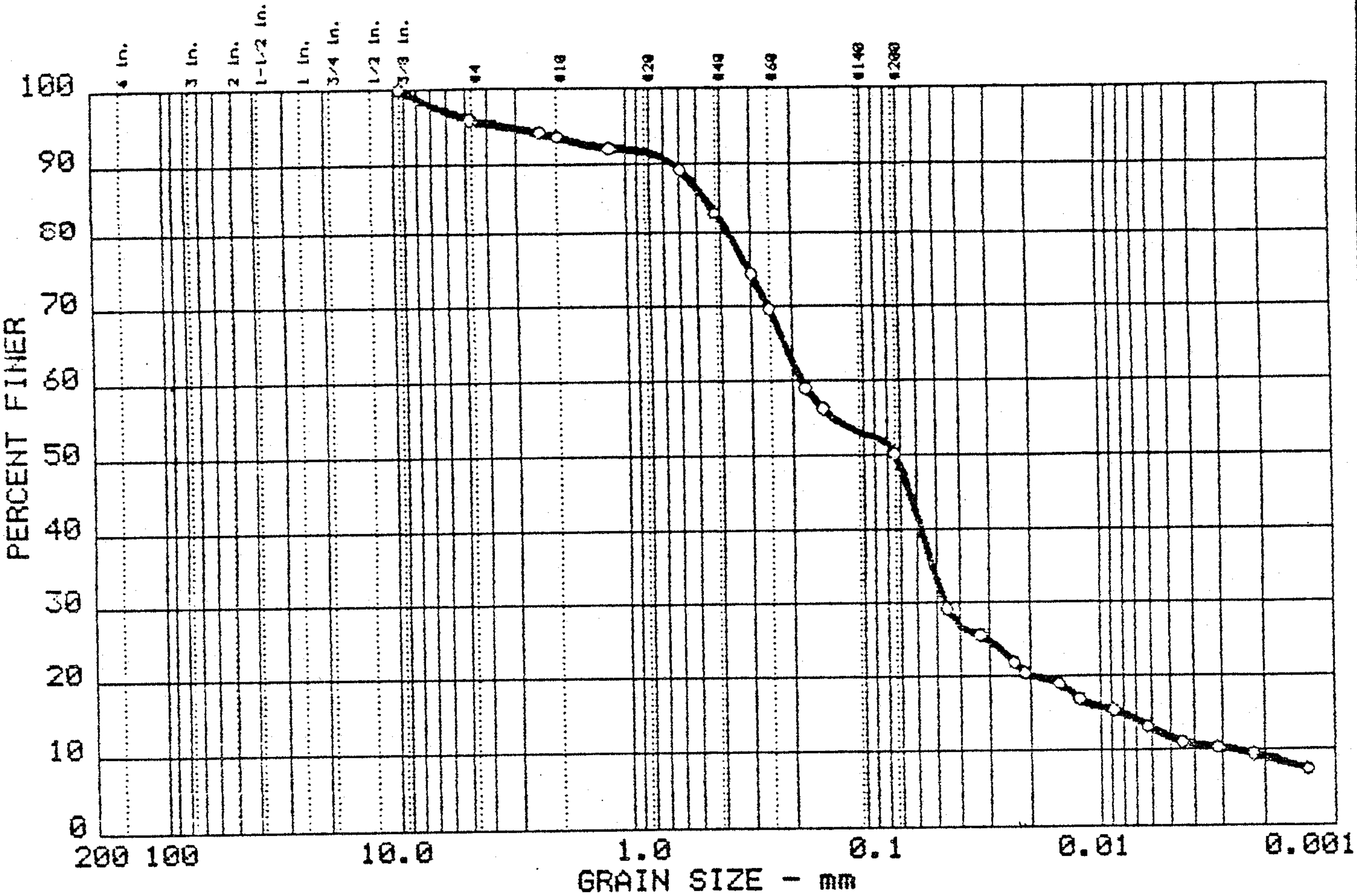
Remarks:
Liquid Limit = 36
Plasticity Index = 16

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K27

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
o	13	0.0	4.0	45.8	38.5	11.7	CL

SIEVE inches size	PERCENT FINER o		
0.375	100.0		
	GRAIN SIZE		
D_{60}	0.18		
D_{30}	0.05		
D_{10}	0.00		
	COEFFICIENTS		
C_c	4.72		
C_u	73.5		

SIEVE number size	PERCENT FINER o		
4	96.0		
8	94.3		
10	93.7		
16	92.2		
30	89.2		
40	82.9		
50	74.4		
60	69.6		
80	59.1		
100	56.3		
200	50.2		

Sample information:
o Sandy Lean Clay, trace gravel
E1 S3 Sample #2

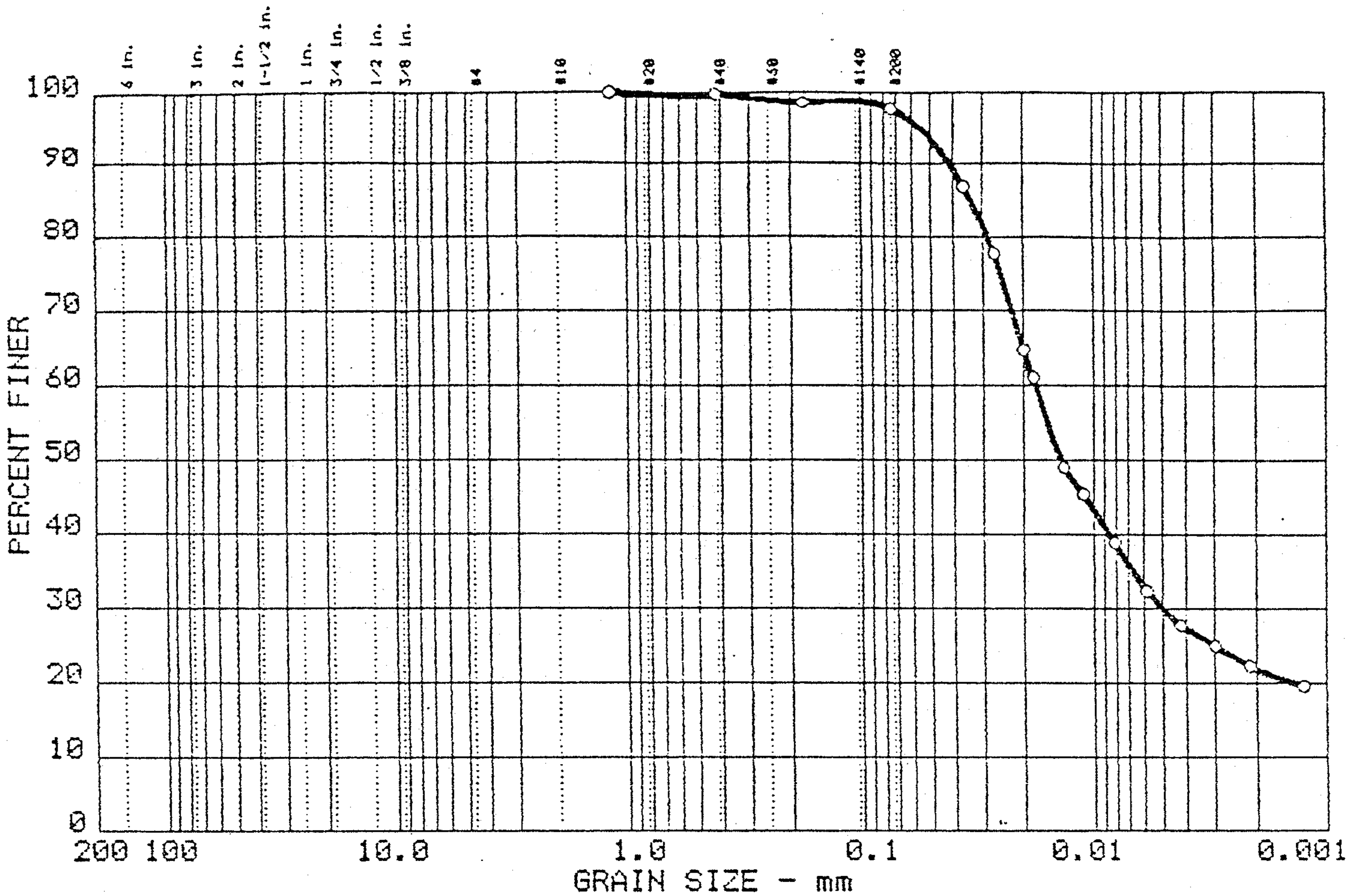
Remarks:
Liquid Limit = 26
Plasticity Index = 8

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 10, 1988 Data Sheet No. K40

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
12	0.0	0.0	2.3	67.7	30.0	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.8		
80	98.5		
200	97.7		

Sample information:
○ Lean Clay, trace sand

E3 S3 Sample #1

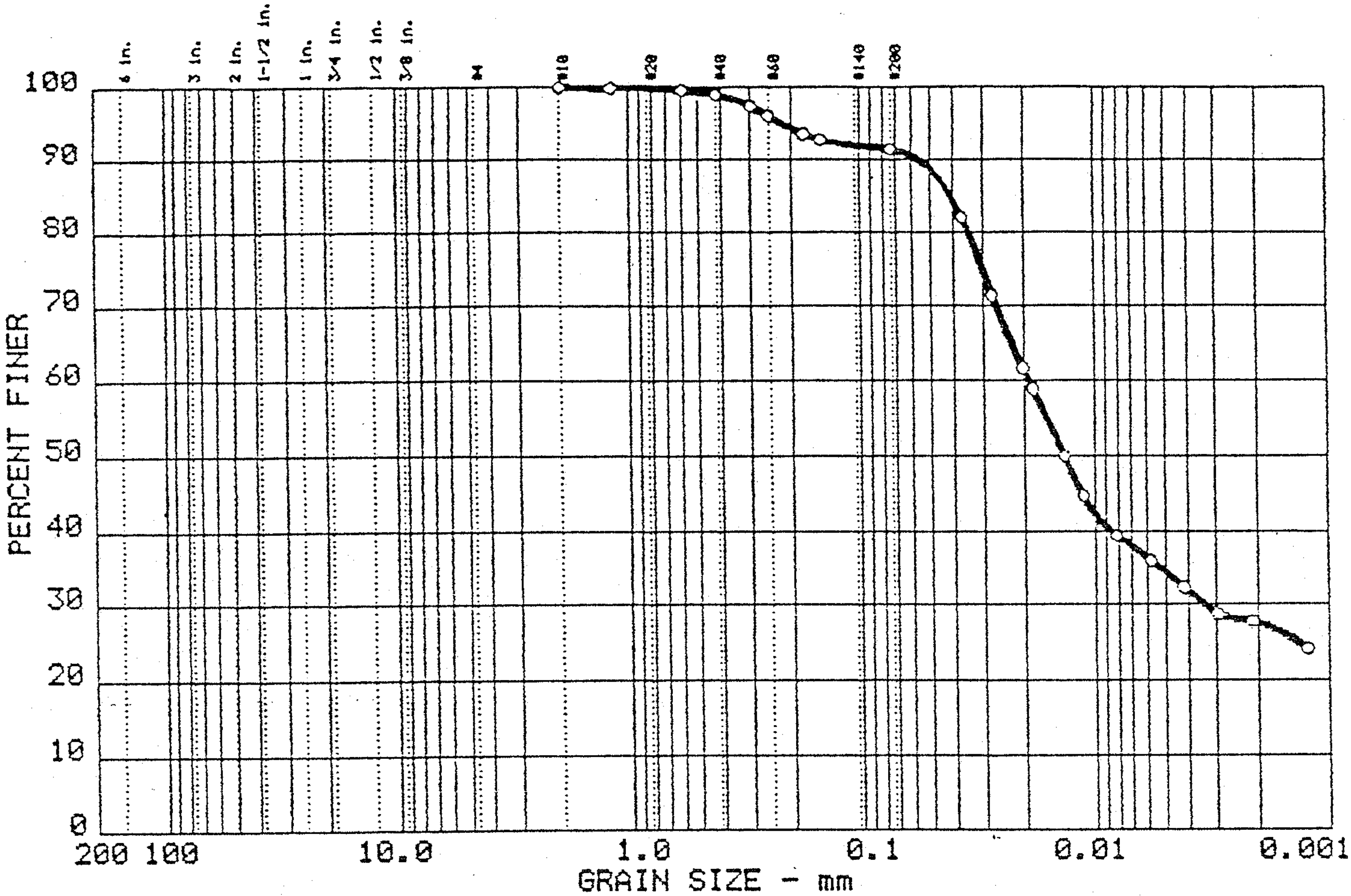
Remarks:
Liquid Limit = 41
Plasticity Index = 18

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K28

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
14	0.0	0.0	8.6	57.1	34.3	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
16	99.9		
30	99.7		
40	98.9		
50	97.4		
60	96.1		
80	93.5		
100	92.8		
200	91.4		

Sample information:
○ Lean Clay, little sand

E3 S3 Sample #2

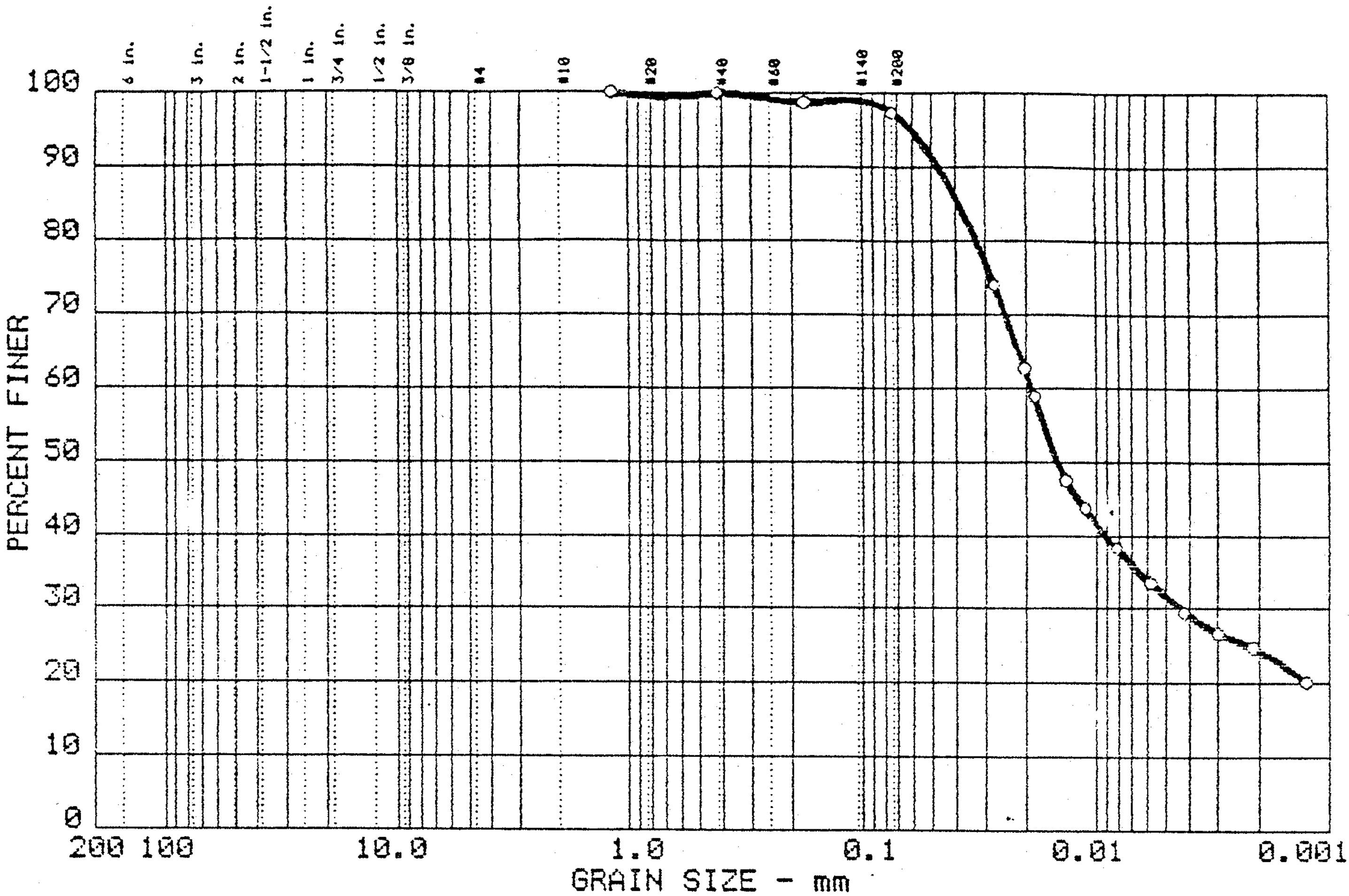
Remarks:
Liquid Limit = 38
Plasticity Index = 14

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 10, 1988 Data Sheet No. K41

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	13	0.0	0.0	2.6	66.0	31.4	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.9		
80	98.8		
200	97.4		

Sample information:
○ Lean Clay, trace sand

E5 S3 Sample #1

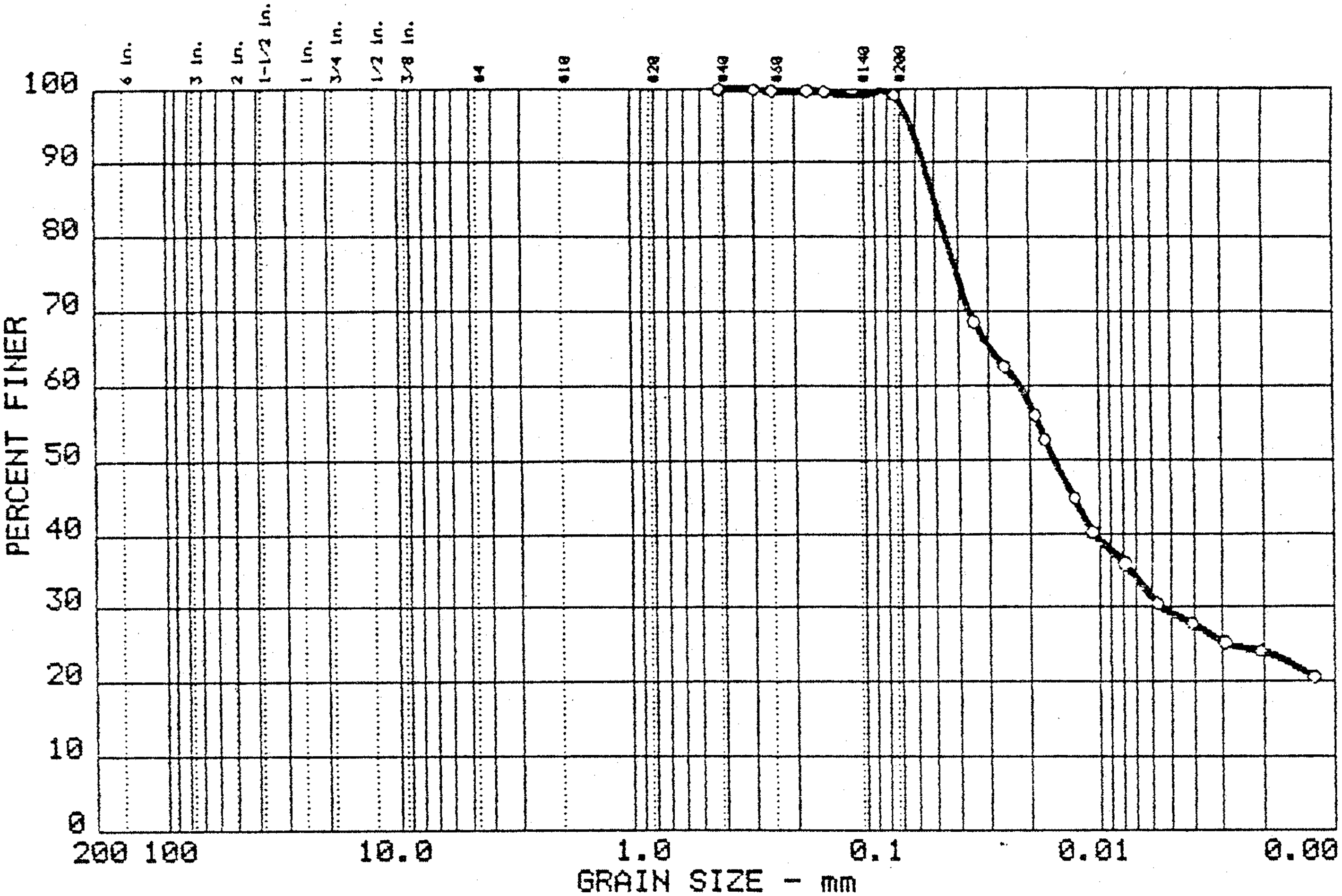
Remarks:
Liquid Limit = 46
Plasticity Index = 22

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988   Data Sheet No. K29

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	15	0.0	0.0	0.8	70.0	29.2	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.01		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
50	99.9		
60	99.9		
80	99.8		
100	99.7		
200	99.2		

Sample information:
○ Lean Clay, trace sand

E5 S3 Sample #2

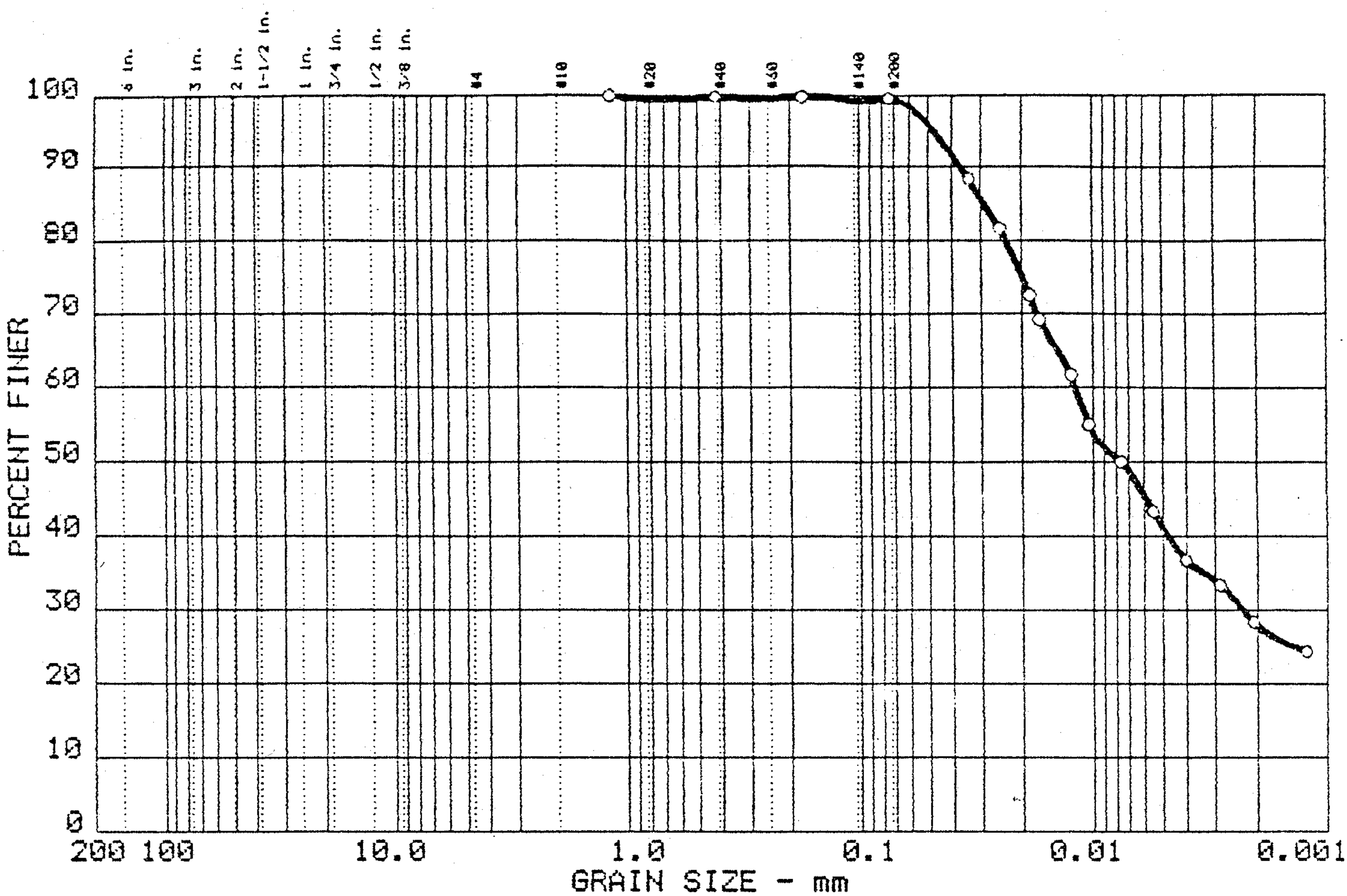
Remarks:
Liquid Limit = 34
Plasticity Index = 11

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 10, 1988 Data Sheet No. K42

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	14	0.0	0.0	0.4	58.6	41.0	CH

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.9		
80	99.9		
200	99.6		

Sample information:
○ Fat Clay

E7 S3 Sample #1

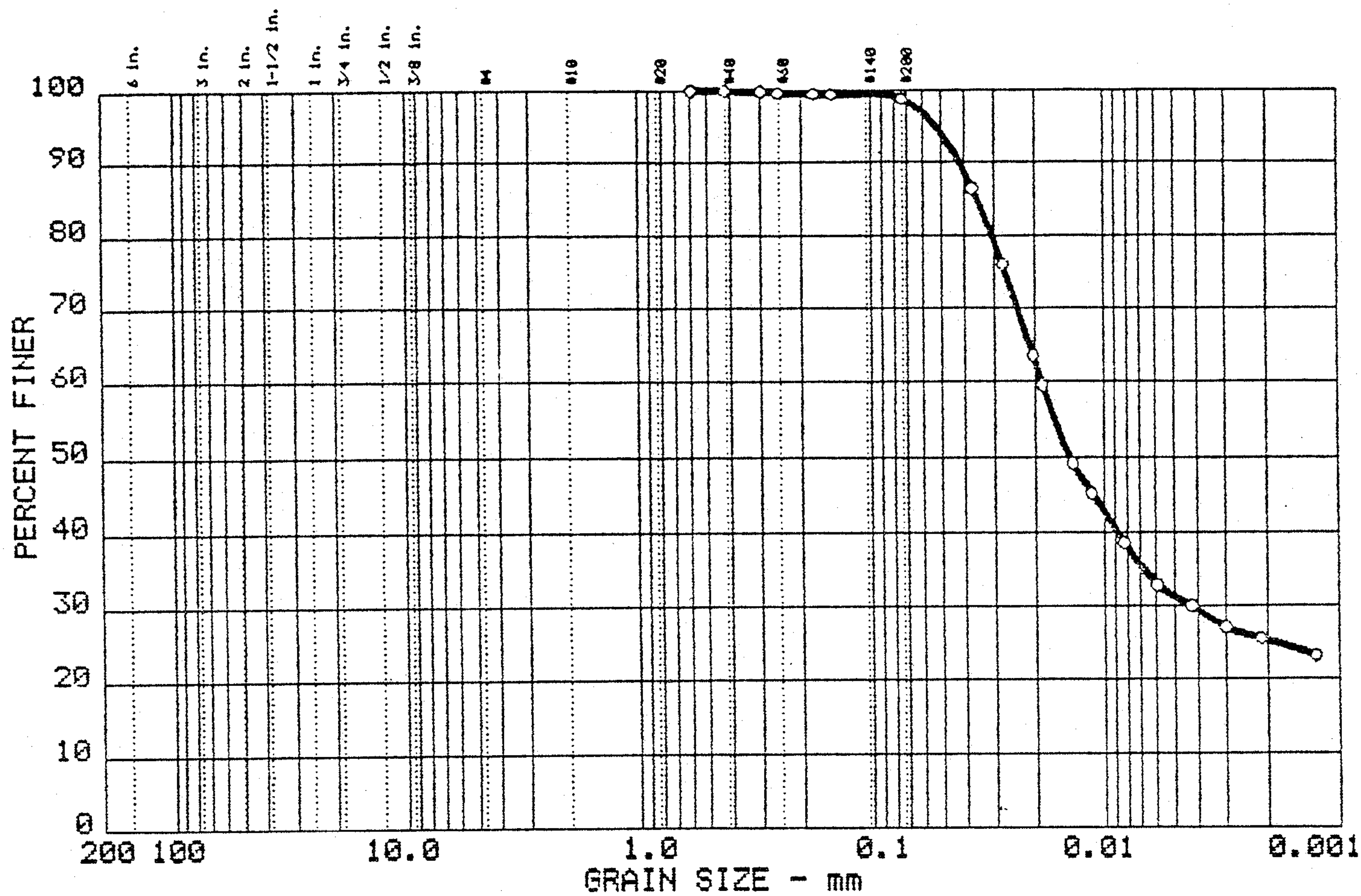
Remarks:
Liquid Limit = 51
Plasticity Index = 27

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1986 Data Sheet No. K30

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
o	16	0.0	0.0	1.3	67.5	31.2	CL

SIEVE inches size	PERCENT FINER o		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER o		
30	100.0		
40	99.9		
50	99.8		
60	99.7		
80	99.5		
100	99.3		
200	98.7		

Sample information:
o Lean Clay, trace sand

E7 S3 Sample #2

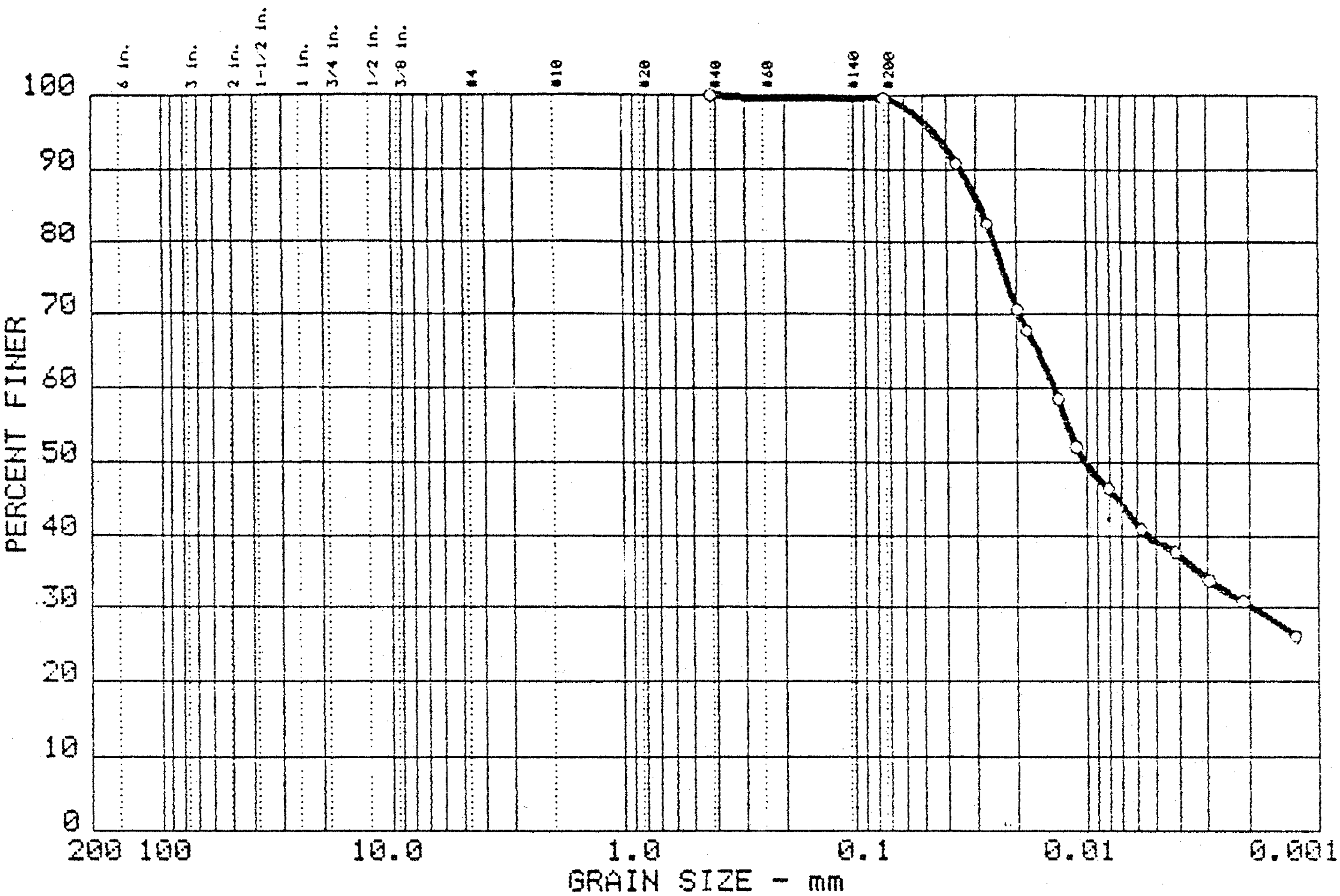
Remarks:
Liquid Limit = 40
Plasticity Index = 16

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 10, 1988 Data Sheet No. K43

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
15	0.0	0.0	0.4	60.4	39.2	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
200	99.6		

Sample information:
○ Lean Clay

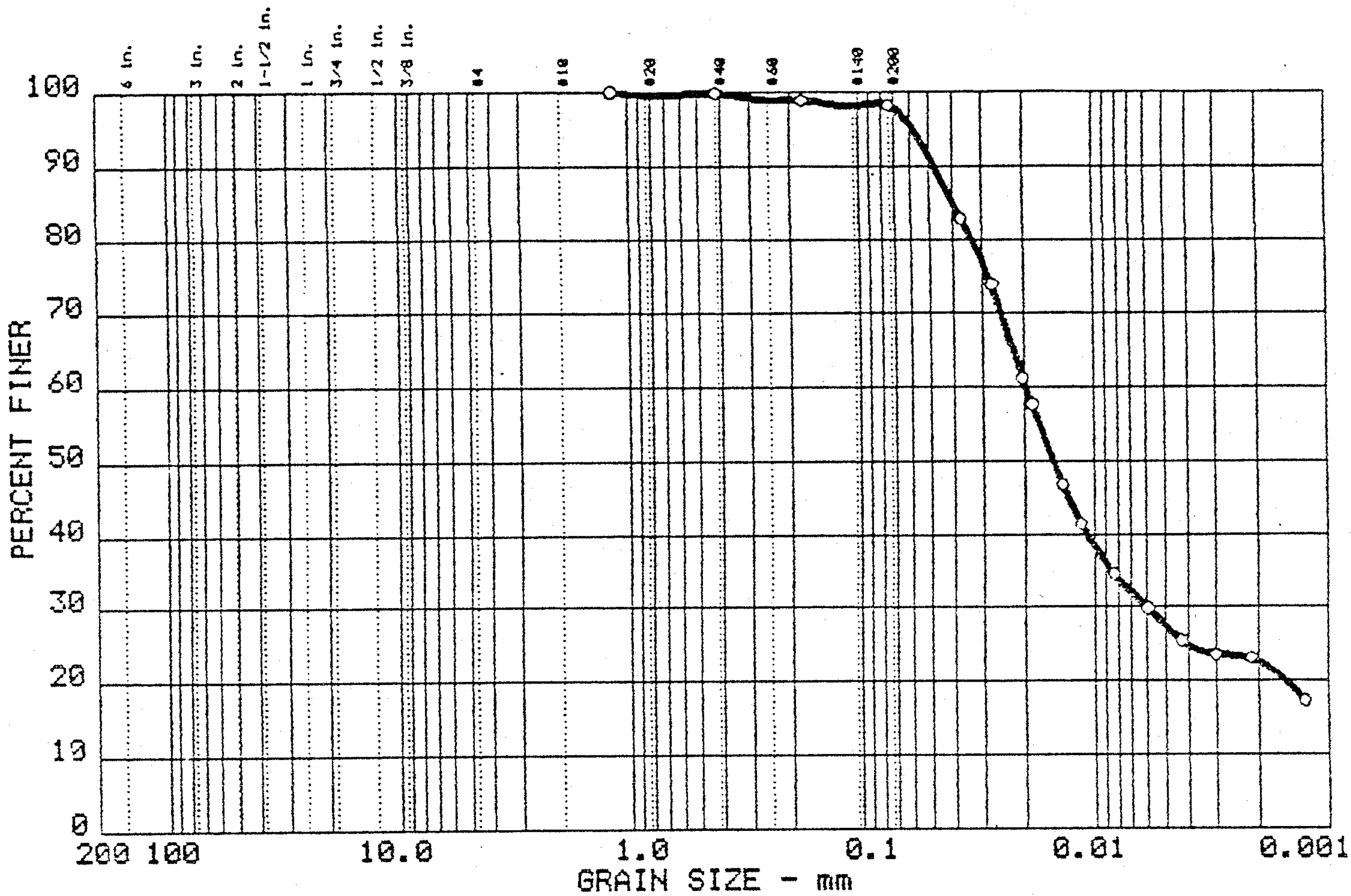
E9 S3 Sample #1

Remarks:
Liquid Limit = 46
Plasticity Index = 23

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill
Date: August 3, 1988 Data Sheet No. K31

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	17	0.0	0.0	1.8	70.8	27.4	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60}	0.01		
D_{30}			
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.8		
80	98.9		
200	98.2		

Sample information:
○Lean Clay, trace sand

E9 S3 Sample #2

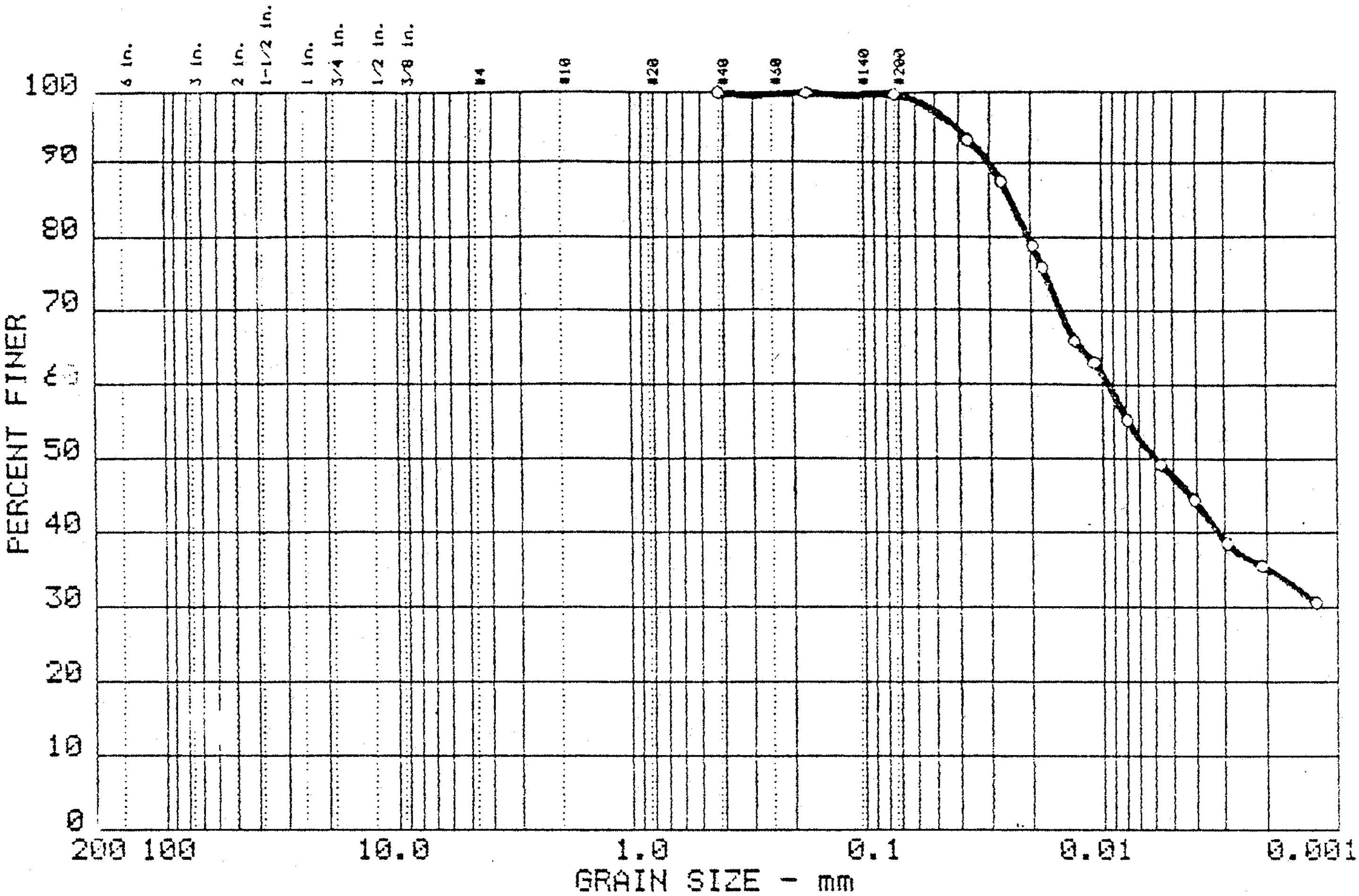
Remarks:
Liquid Limit = 33
Plasticity Index = 14

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 10, 1988 Data Sheet No. K44

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
16	0.0	0.0	0.3	52.2	47.5	MH

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60}			
D_{30}			
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
80	99.9		
200	99.7		

Sample information:
○ Elastic Silt

E11 S3 Sample #1

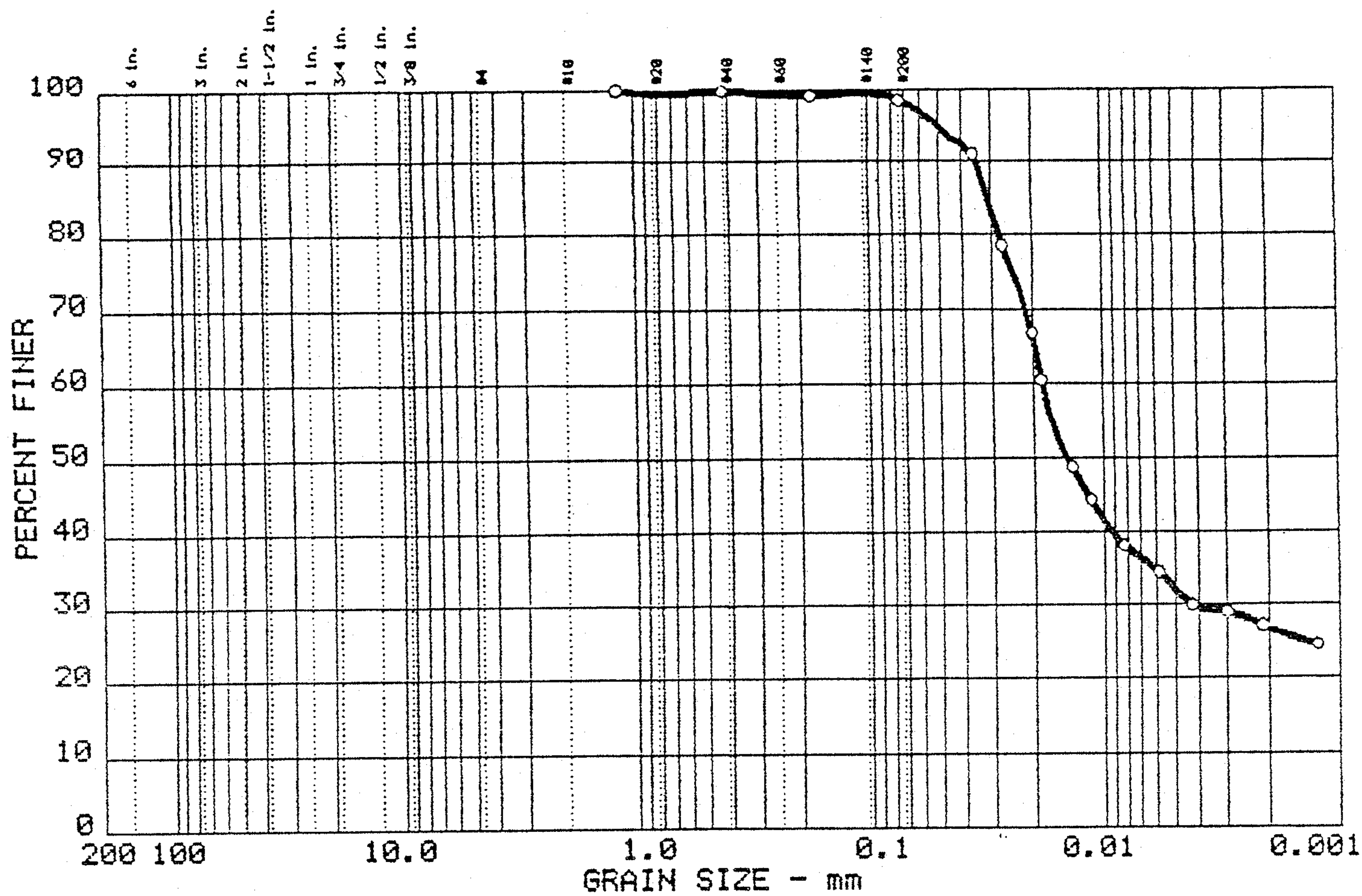
Remarks:
Liquid Limit = 50
Plasticity Index = 28

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K32

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	18	0.0	0.0	1.4	66.6	32.0	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.9		
80	99.2		
200	98.6		

Sample information:
○ Lean Clay, trace sand

E11 S3 Sample #2

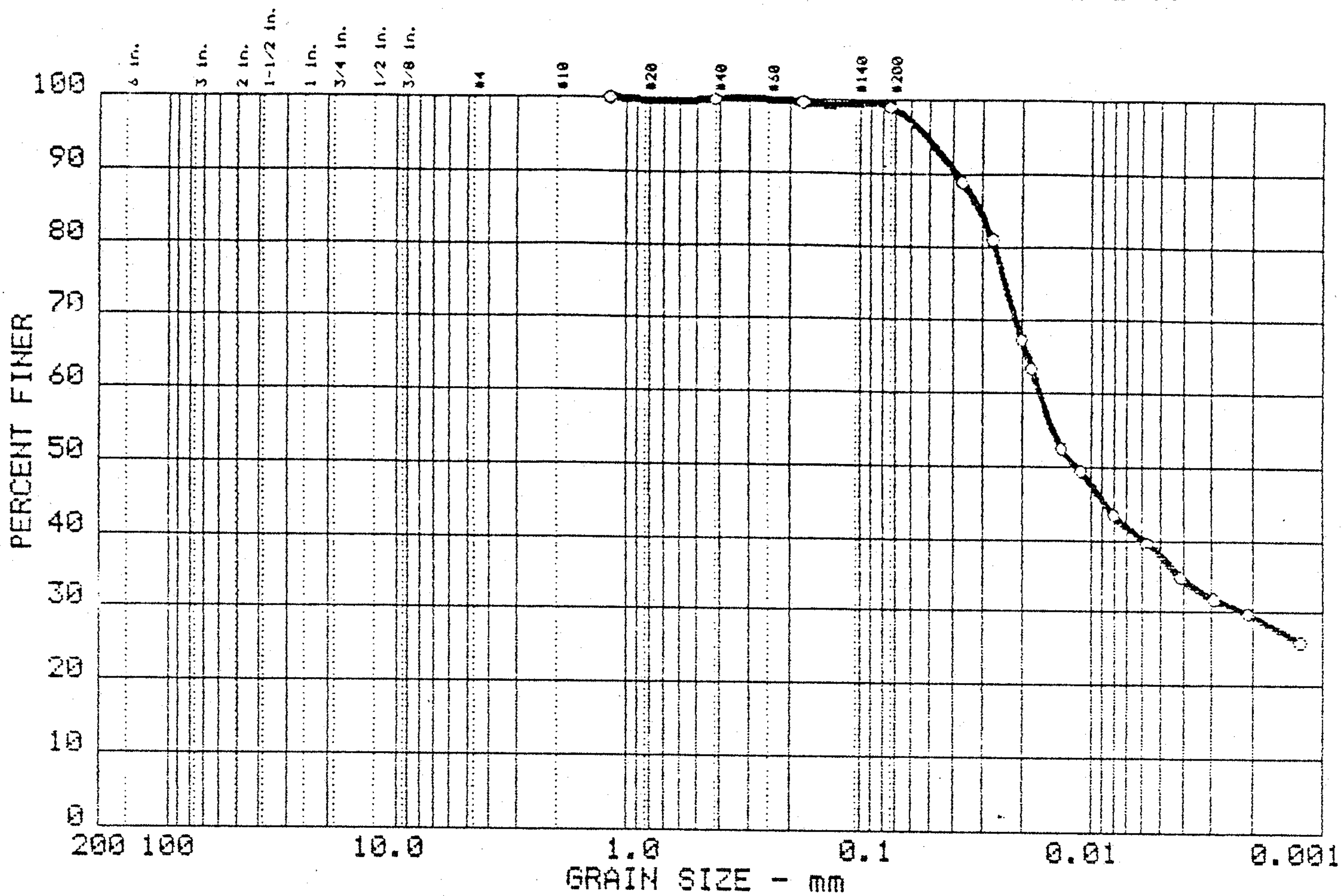
Remarks:
Liquid Limit = 38
Plasticity Index = 14

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 10, 1988 Data Sheet No. K45

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	17	0.0	0.0	0.9	61.5	37.6	CH

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.9		
80	99.6		
200	99.1		

Sample information:
○ Fat Clay, trace sand

E13 S3 Sample #1

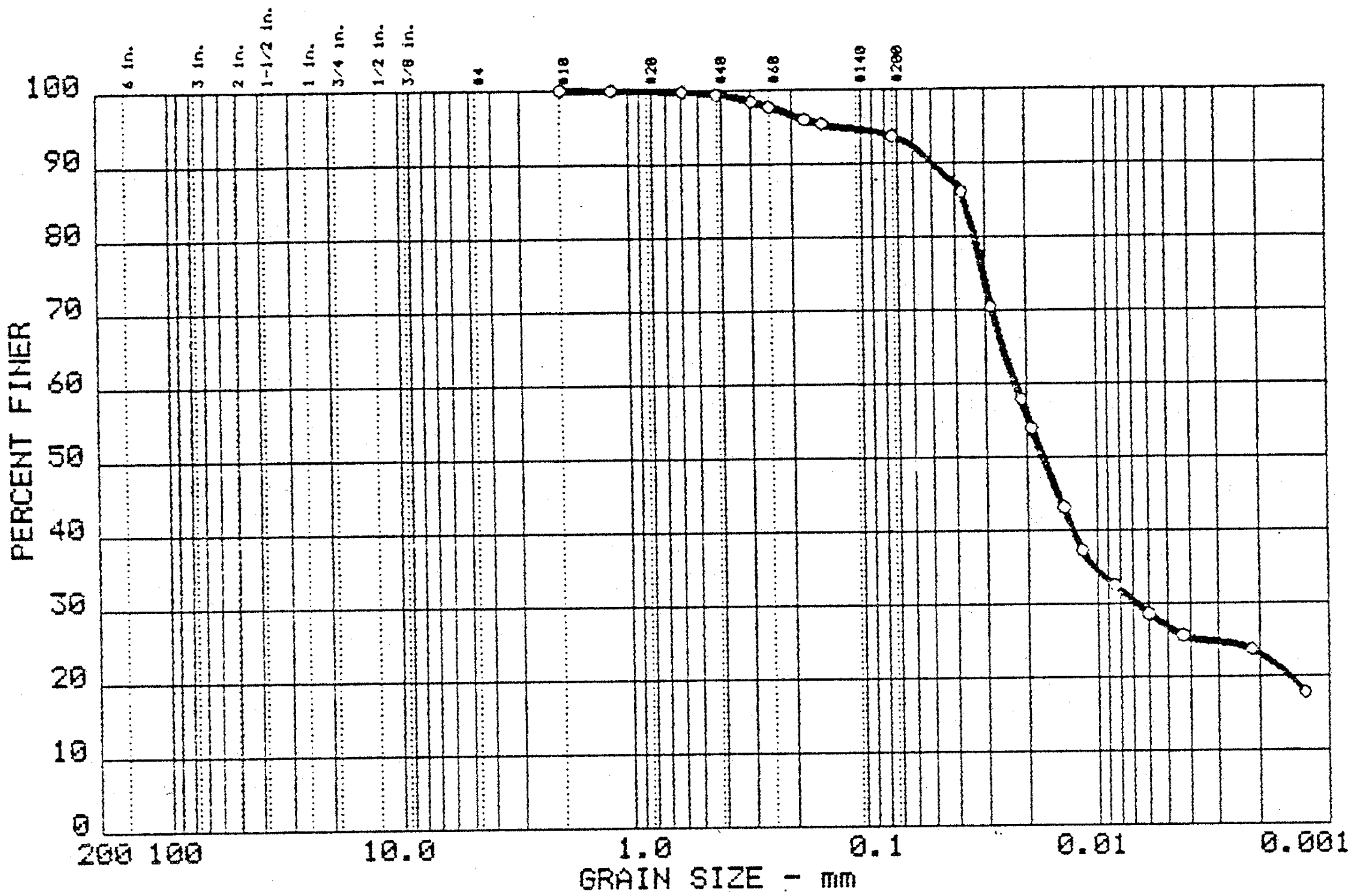
Remarks:
Liquid Limit = 64
Plasticity Index = 43

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K33

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	19	0.0	0.0	6.3	67.0	26.7	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.01		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
16	99.9		
30	99.8		
40	99.4		
50	98.4		
60	97.7		
80	96.0		
100	95.4		
200	93.7		

Sample information:
○Lean Clay, little sand

E13 S3 Sample #2

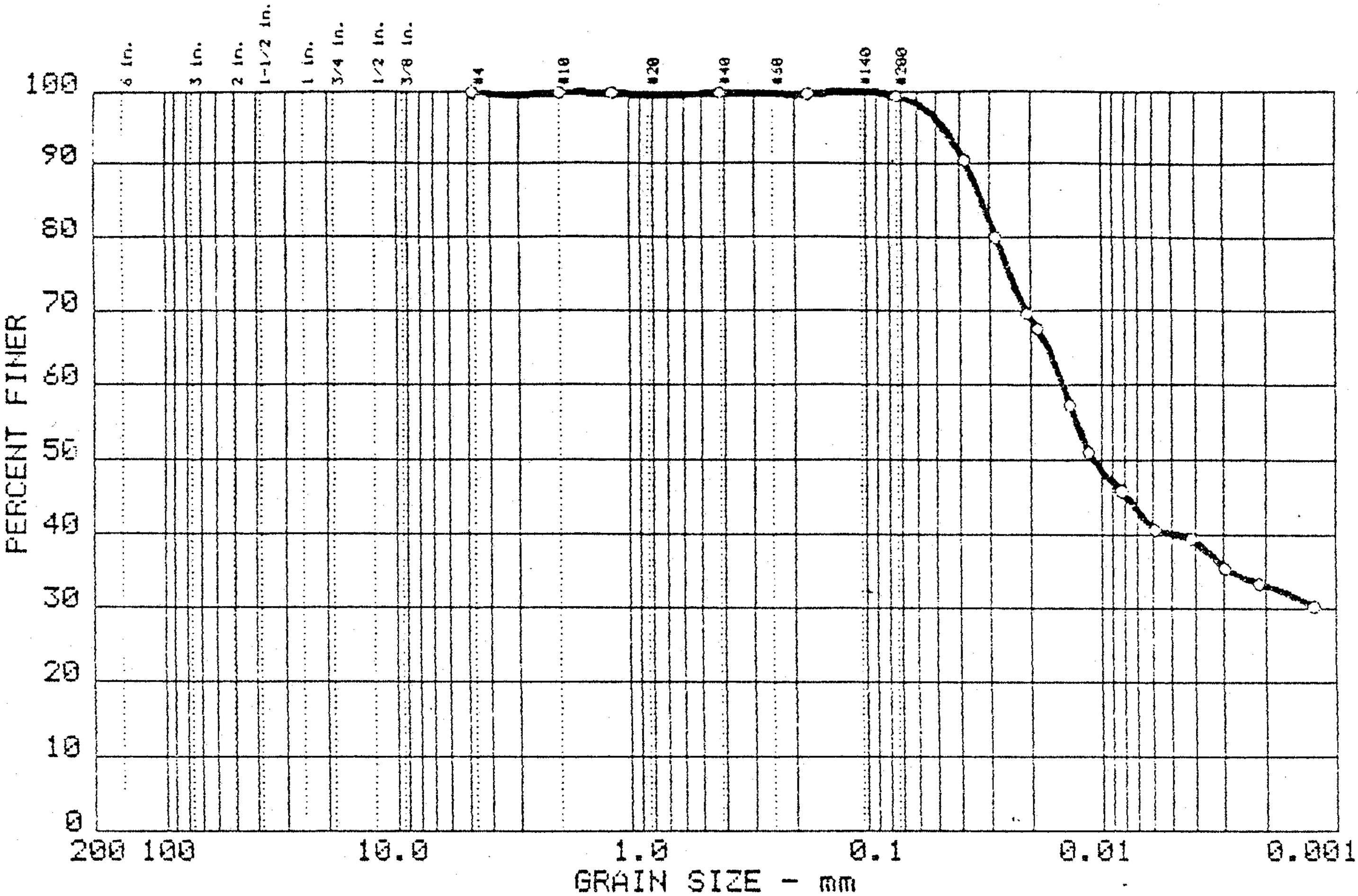
Remarks:
Liquid Limit = 39
Plasticity Index = 15

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 10, 1988 Data Sheet No. K46

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○ 18	0.0	0.0	0.6	59.4	40.0	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}			
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
4	100.0		
10	99.9		
16	99.9		
40	99.9		
80	99.7		
200	99.4		

Sample information:
○Lean Clay

E15 S3 Sample 1

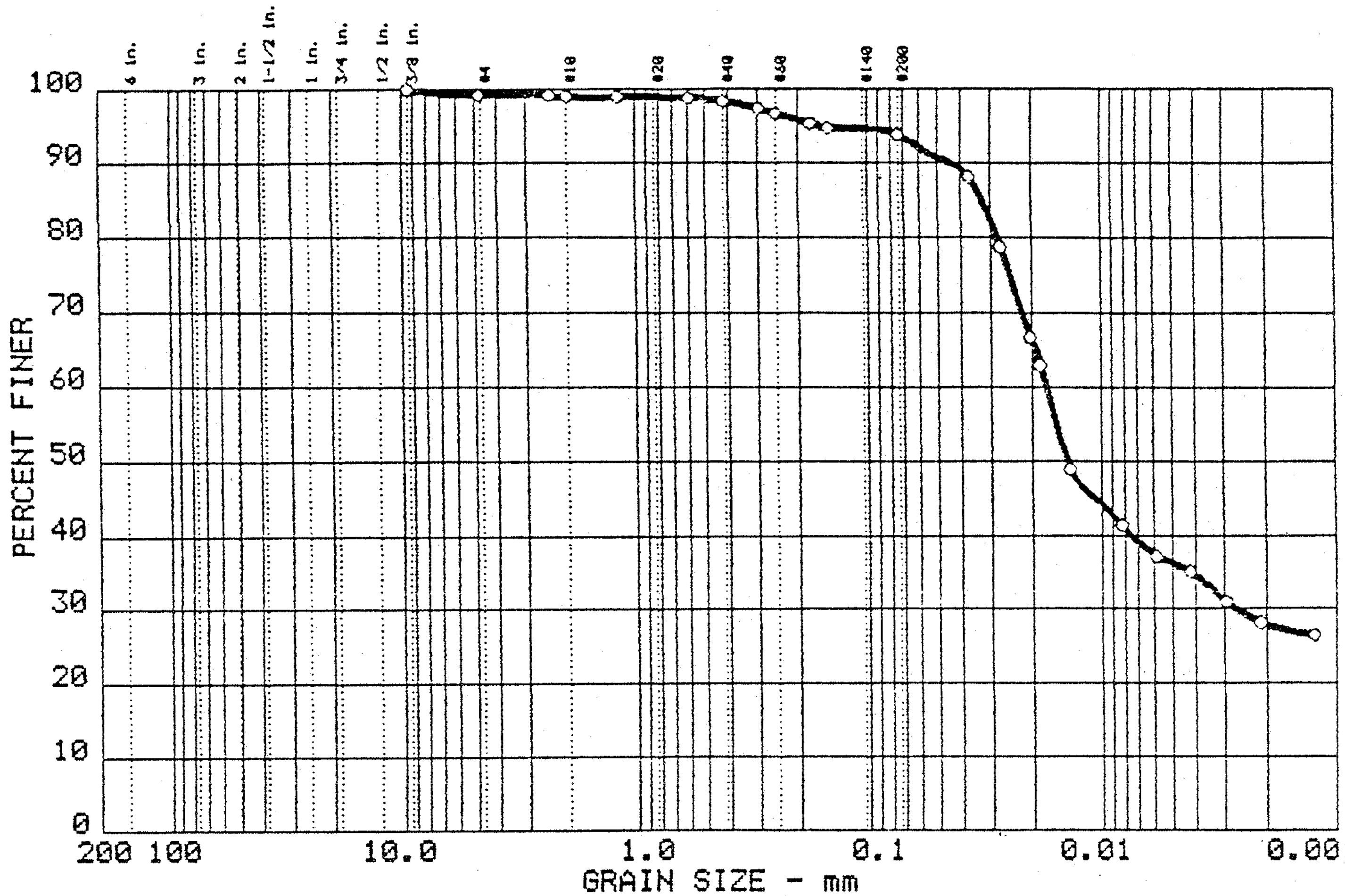
Remarks:
Liquid Limit = 47
Plasticity Index = 23

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K34

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	20	0.0	0.8	5.4	58.0	35.8	CL

SIEVE inches size	PERCENT FINER ○		
0.375	100.0		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	99.2		
8	99.2		
10	99.0		
16	98.9		
30	98.8		
40	98.3		
50	97.3		
60	96.6		
80	95.3		
100	94.7		
200	93.8		

Sample information:
○Lean Clay, little sand

E15 S3 Sample #2

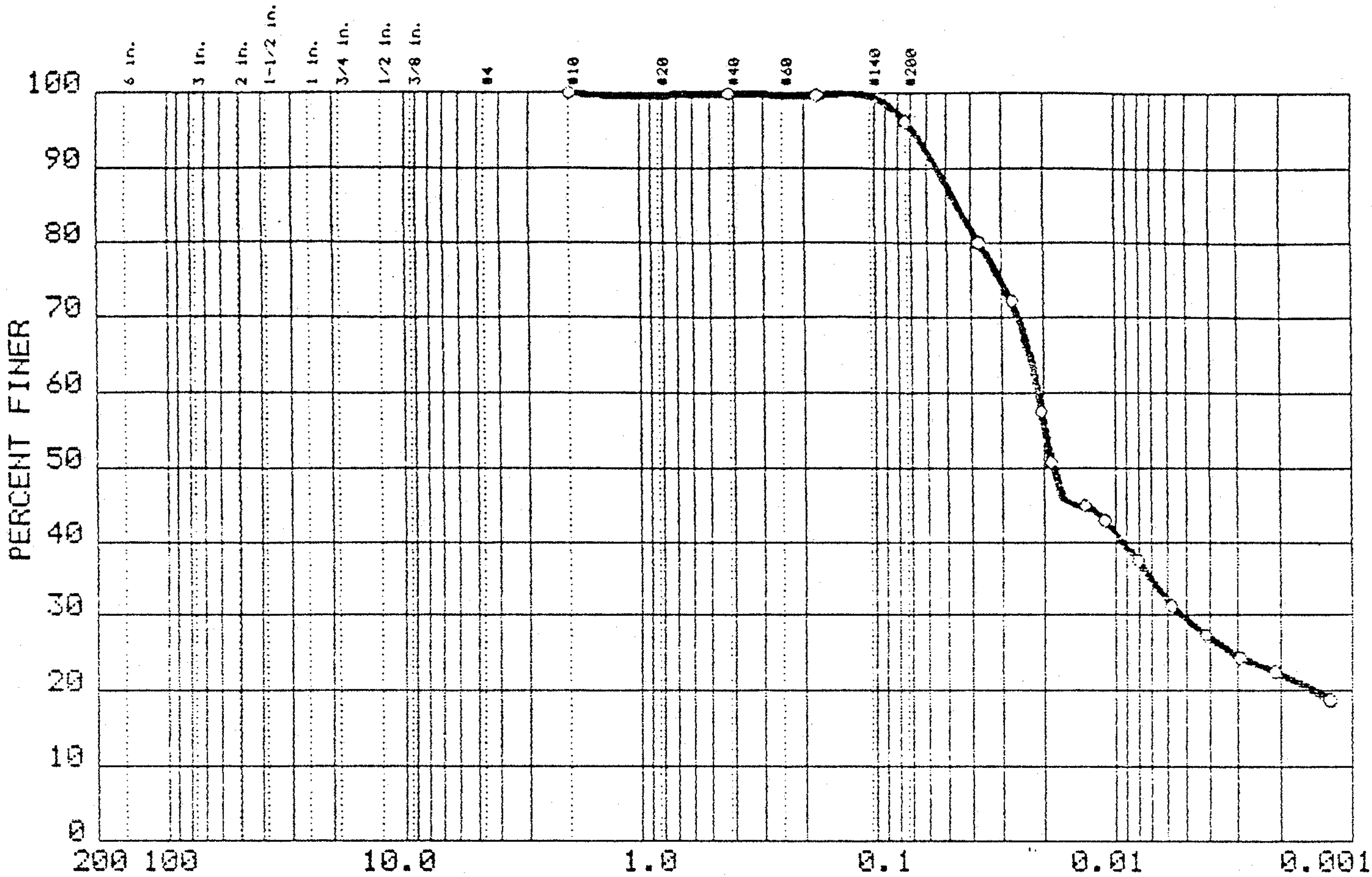
Remarks:
Liquid Limit = 43
Plasticity Index = 23

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 10, 1988 Data Sheet No. K47

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
19	0.0	0.0	3.7	66.9	29.4	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.01		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
40	99.9		
80	99.7		
200	96.3		

Sample information:
○Lean Clay, trace sand

E17 S3 Sample #1

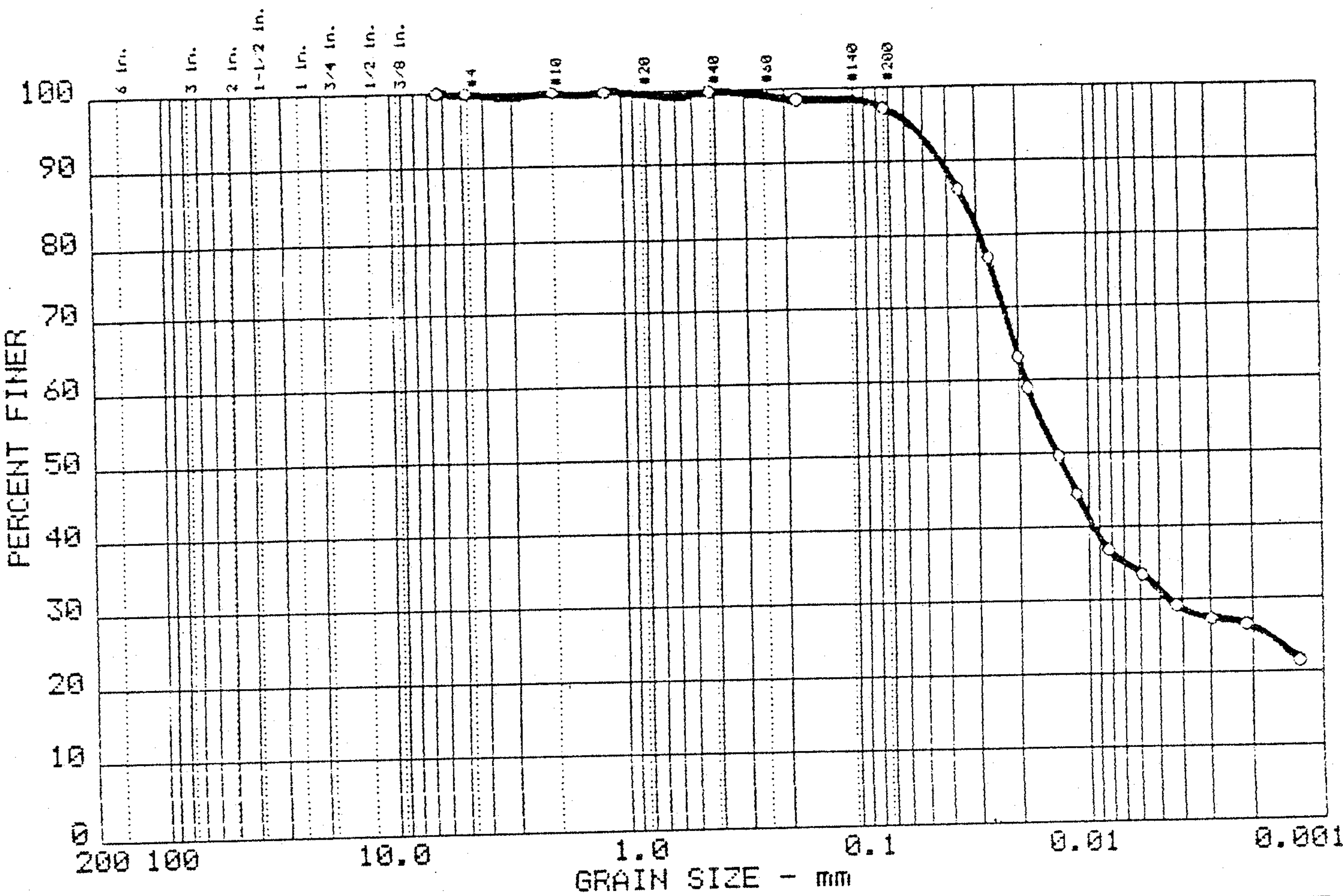
Remarks:
Liquid Limit = 45
Platicity Index = 23

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K35

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	13	0.0	0.1	2.6	66.0	31.3	CL

SIEVE inches size	PERCENT FINER ○		
0.25	100.0		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	99.9		
10	99.9		
16	99.9		
40	99.8		
80	98.6		
200	97.3		

Sample information:
○Lean Clay, trace sand

E17 S3 Sample #2

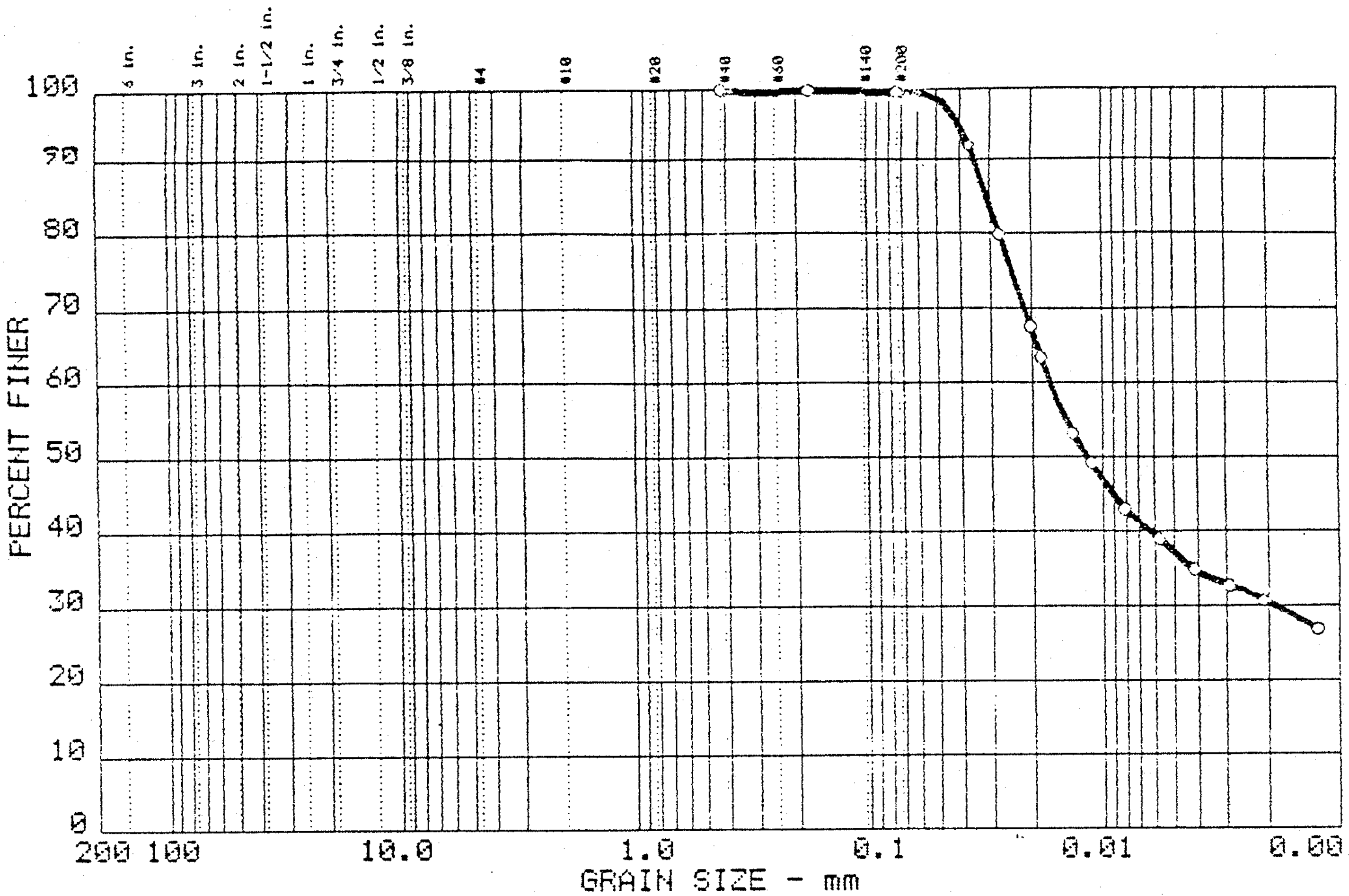
Remarks:
Liquid Limit = 40
Plasticity Index = 17

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K48

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
20	0.0	0.0	0.4	62.6	37.0	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
80	99.9		
200	99.6		

Sample information:
○ Lean Clay

E19 S3 Sample #1

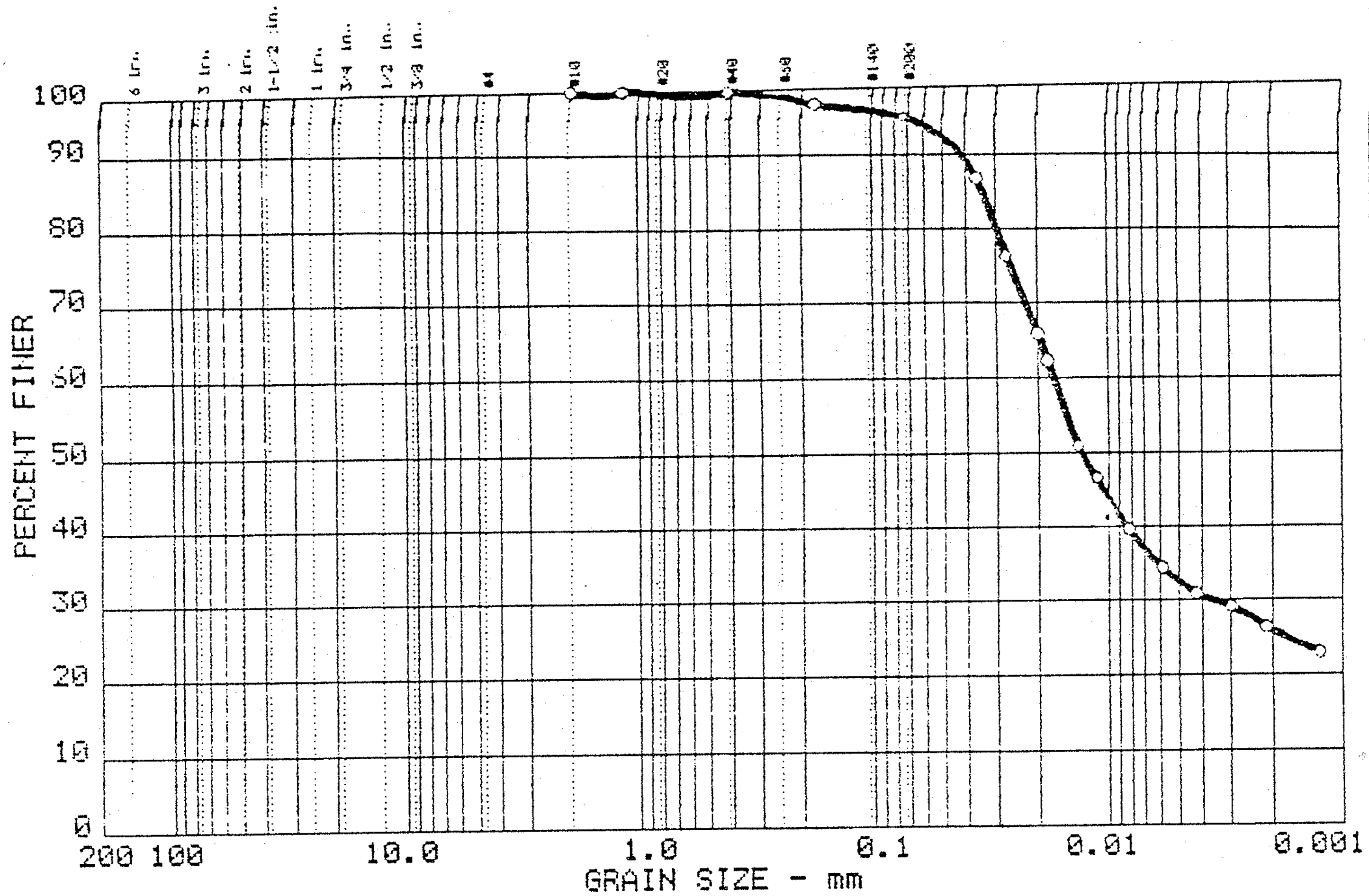
Remarks:
Liquid Limit = 42
Plasticity Index = 21

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K36

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	14	0.0	0.0	4.6	63.0	32.4	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
16	99.9		
40	99.7		
80	97.4		
200	95.4		

Sample information:
○ Lean Clay, trace sand

E19 S3 Sample #2

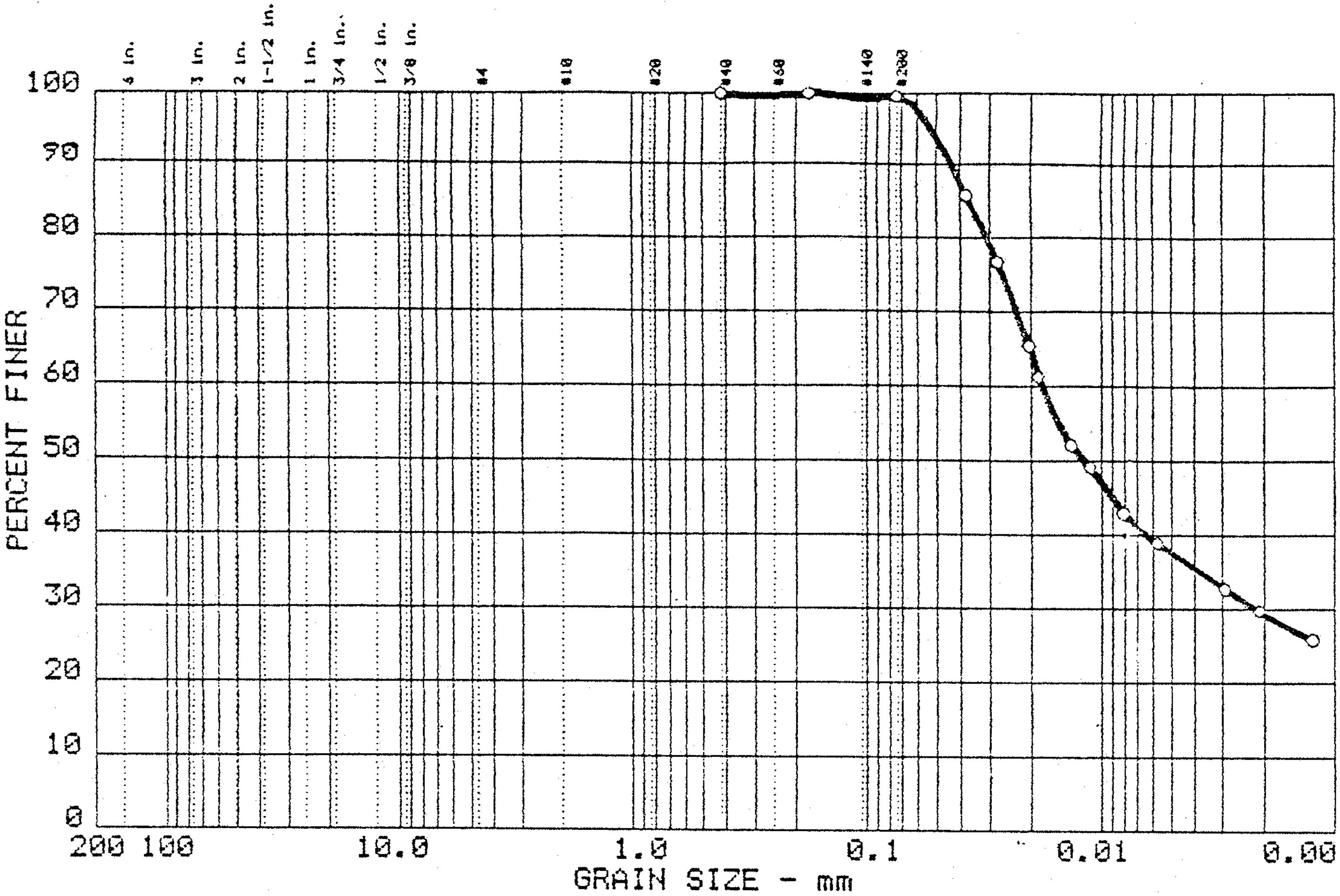
Remarks:
Liquid Limit = 42
Plasticity Index = 20

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K49

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
1	0.0	0.0	0.4	62.1	37.5	ML

SIEVE inches size	PERCENT FINER ○		
GRAIN SIZE			
D_{60} D_{30} D_{10}	0.00		
COEFFICIENTS			
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
80	100.0		
200	99.6		

Sample information:
○ Silt

E21 S3 Sample #1

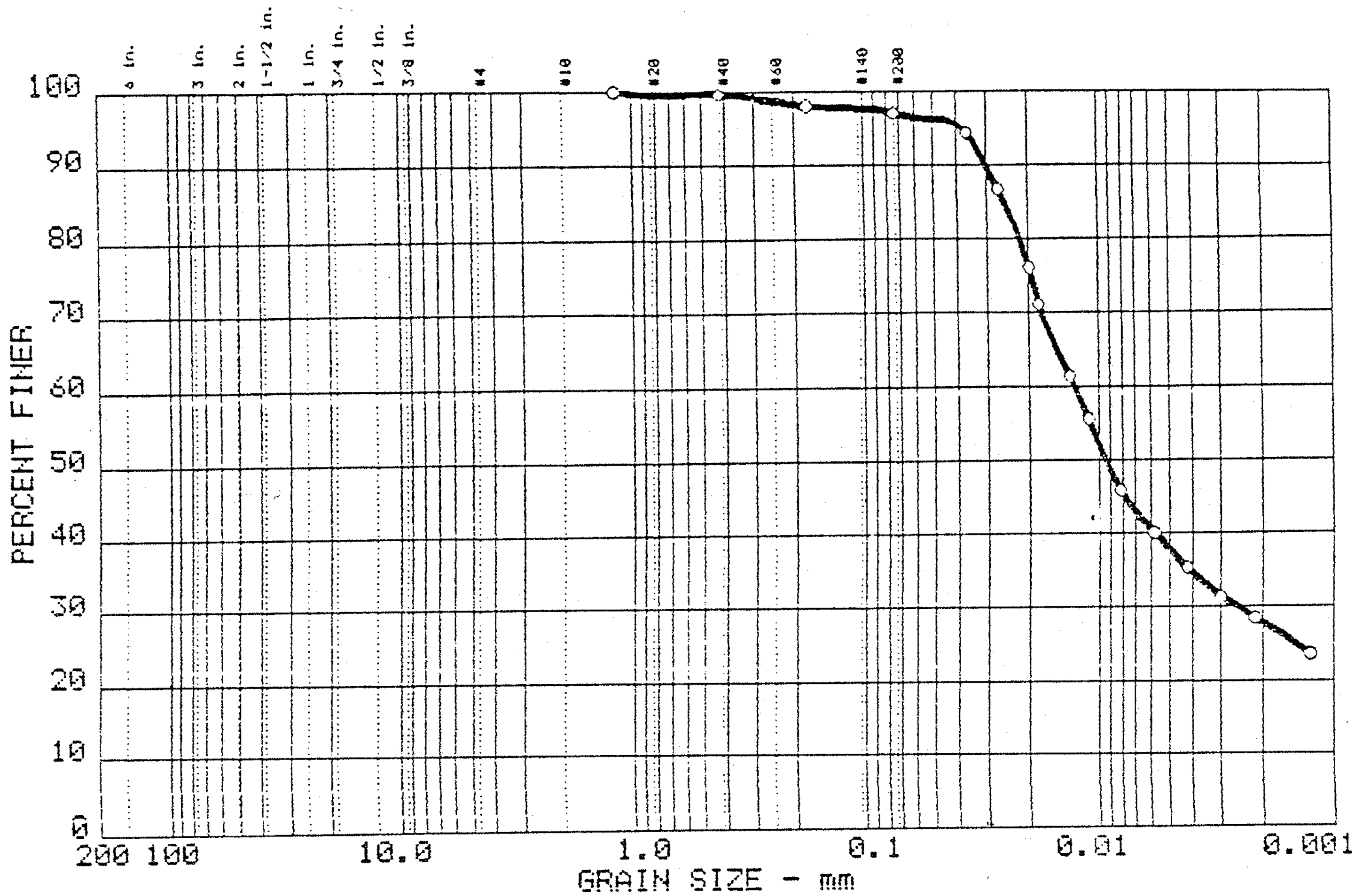
Remarks:
Liquid Limit = 32
Plasticity Index = 4

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K37

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	15	0.0	0.0	2.8	59.5	37.7	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.7		
80	98.2		
200	97.2		

Sample information:
○Lean Clay, trace sand

E21 S3 Sample #2

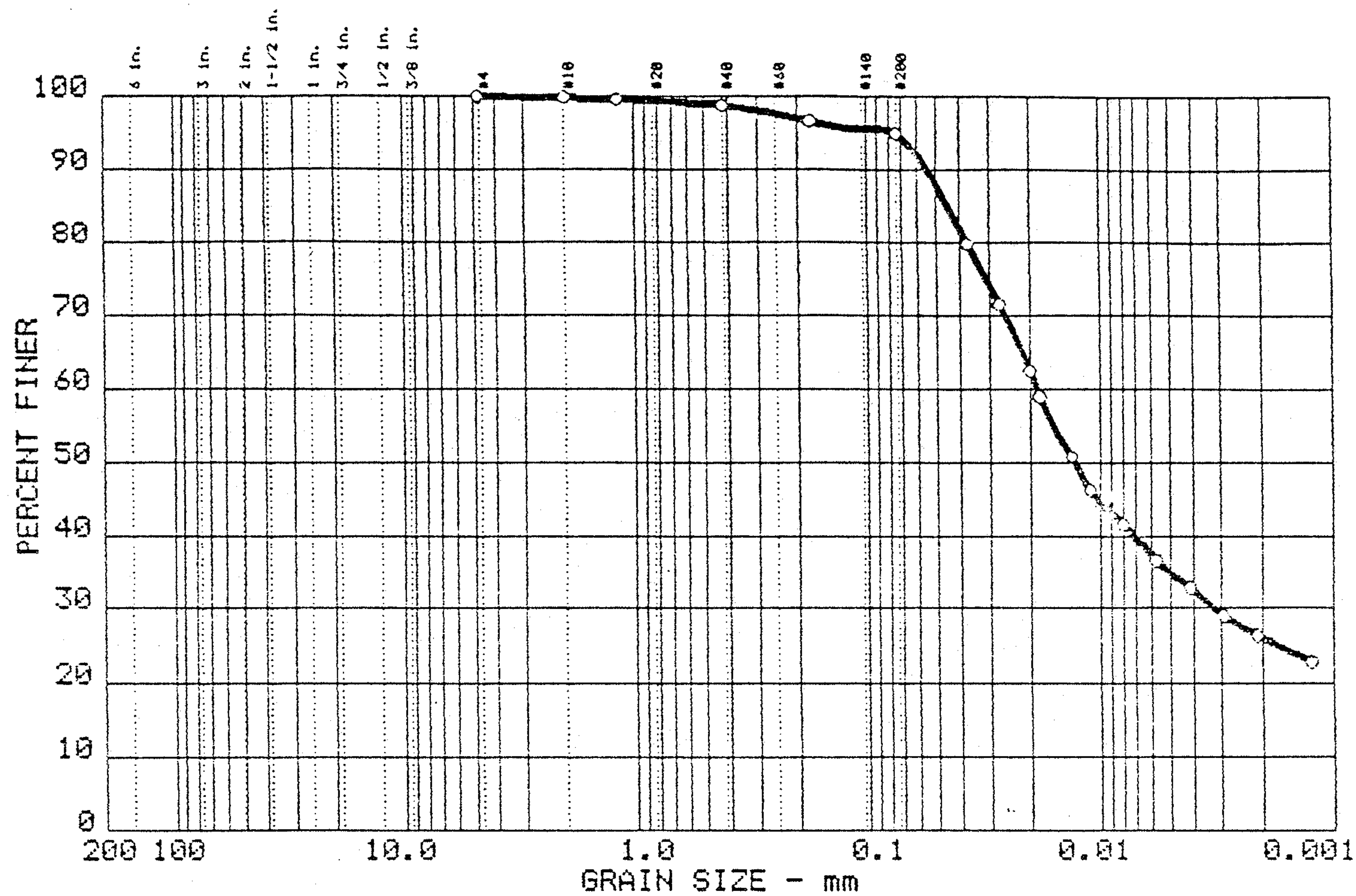
Remarks:
Liquid Limit = 41
Plasticity Index = 17

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K53

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	2	0.0	0.0	5.0	60.4	34.6	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	100.0		
10	99.8		
16	99.5		
40	98.7		
80	96.6		
200	95.0		

Sample information:
○ Lean Clay, little sand

E23 S3 Sample #1

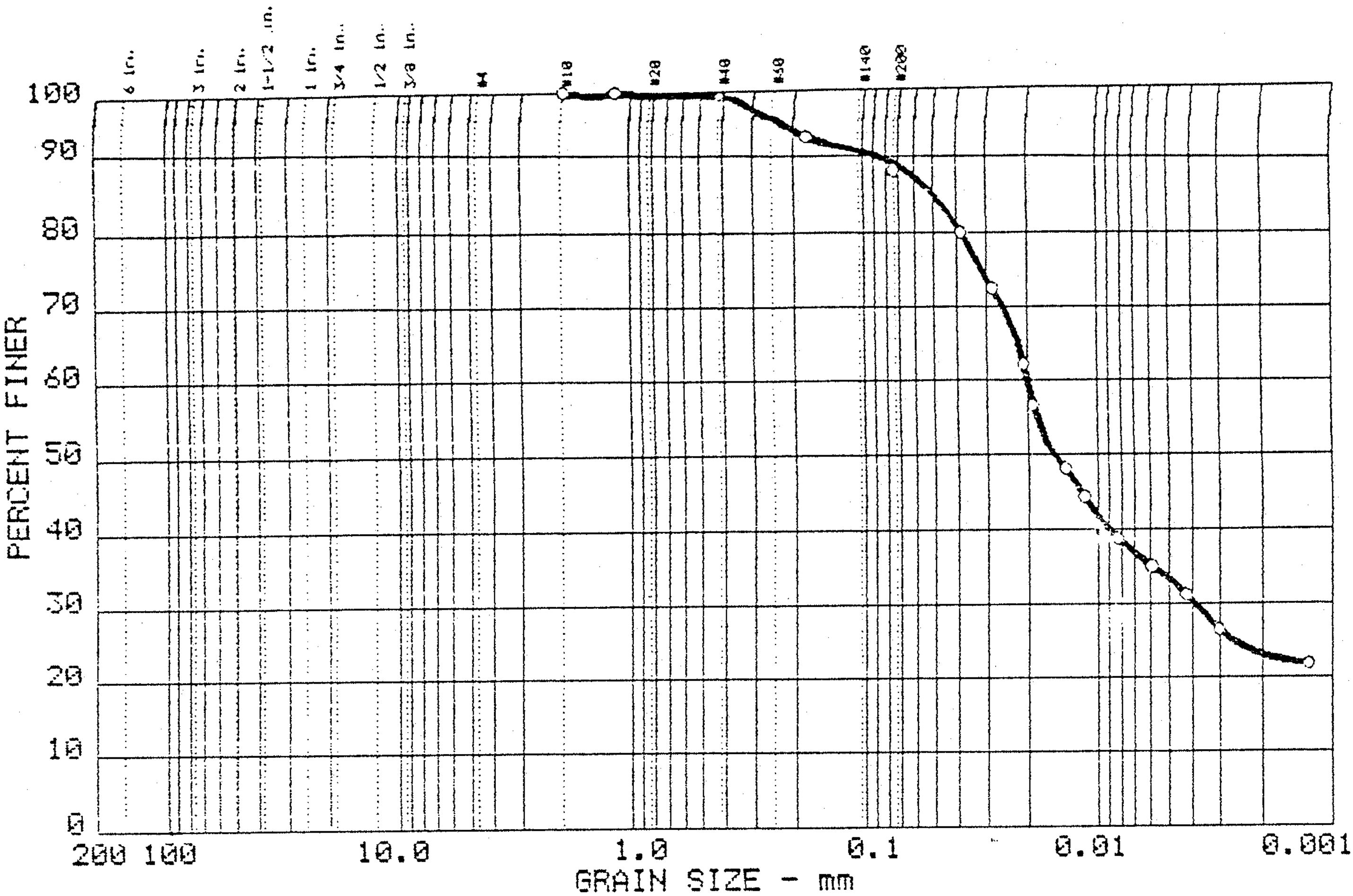
Remarks:
Liquid Limit = 32
Plasticity Index = 11

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988   Data Sheet No. K38

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	16	0.0	0.0	10.9	55.9	33.2	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
16	99.9		
40	99.2		
80	92.7		
200	88.1		

Sample information:
○Lean Clay, little sand

E23 S3 Sample #2

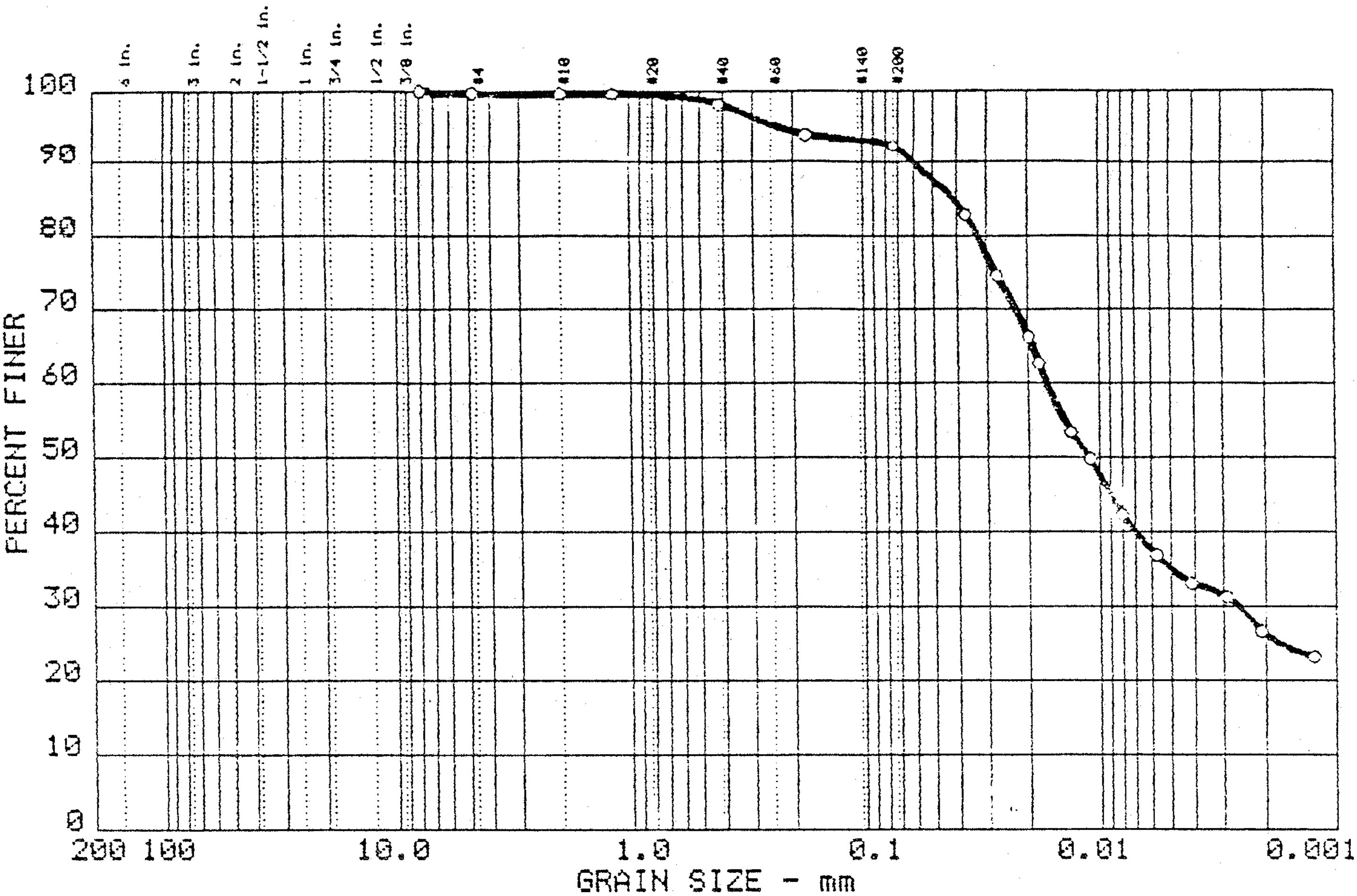
Remarks:
Liquid Limit = 40
Plasticity Index = 18

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K51

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	3	0.0	0.2	7.5	57.2	35.1	CL

SIEVE inches size	PERCENT FINER ○		
0.313	100.0		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	99.8		
10	99.6		
16	99.5		
40	98.2		
80	93.8		
200	92.2		

Sample information:
○Lean Clay, little sand

E25 S3 Sample #1

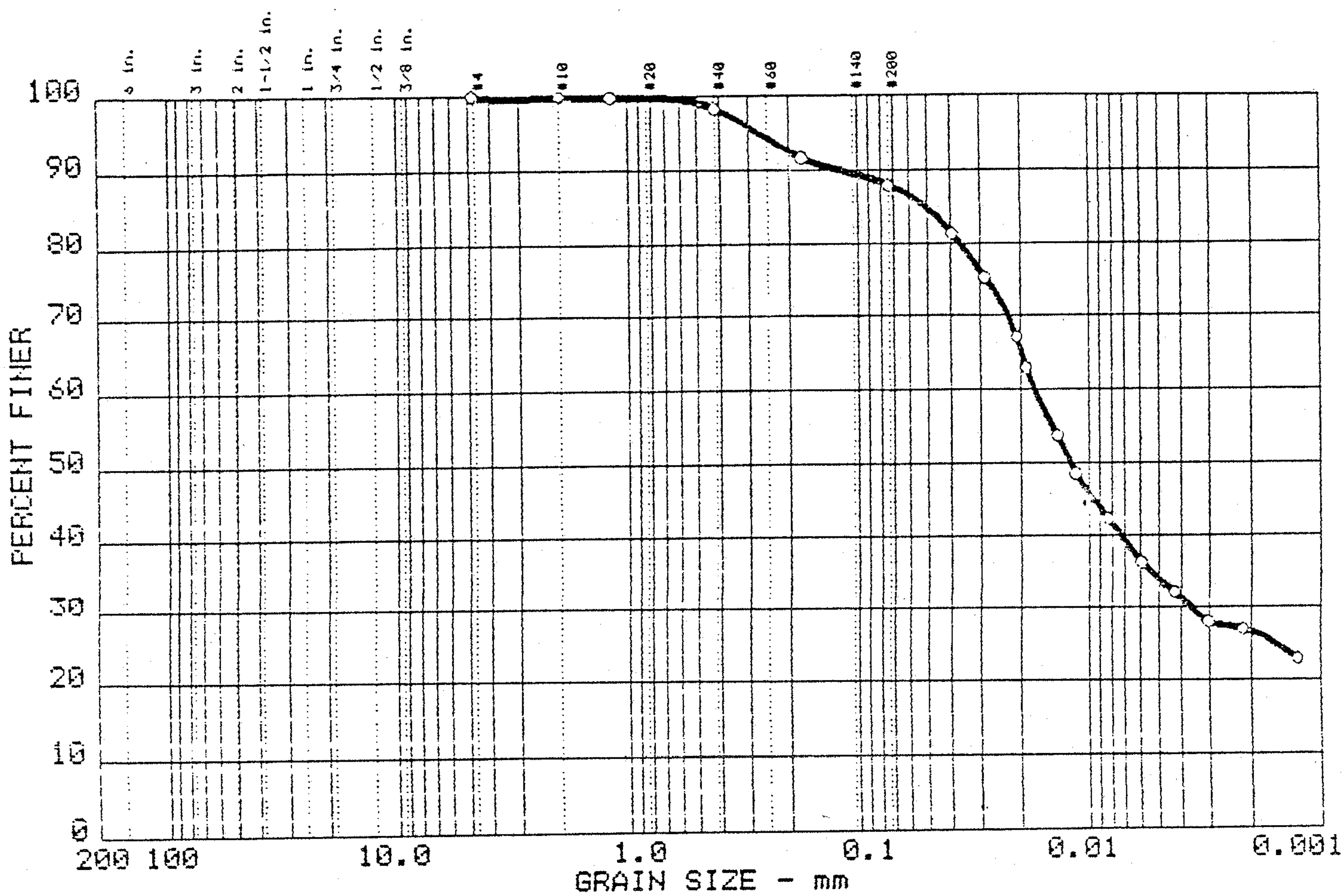
Remarks:
Liquid Limit = 39
Plasticity Index = 25

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K39

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	17	0.0	0.0	12.0	54.0	34.0	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	100.0		
10	99.9		
16	99.8		
40	98.4		
80	91.8		
200	88.0		

Sample information:
○ Lean Clay, little sand

E25 S3 Sample #2

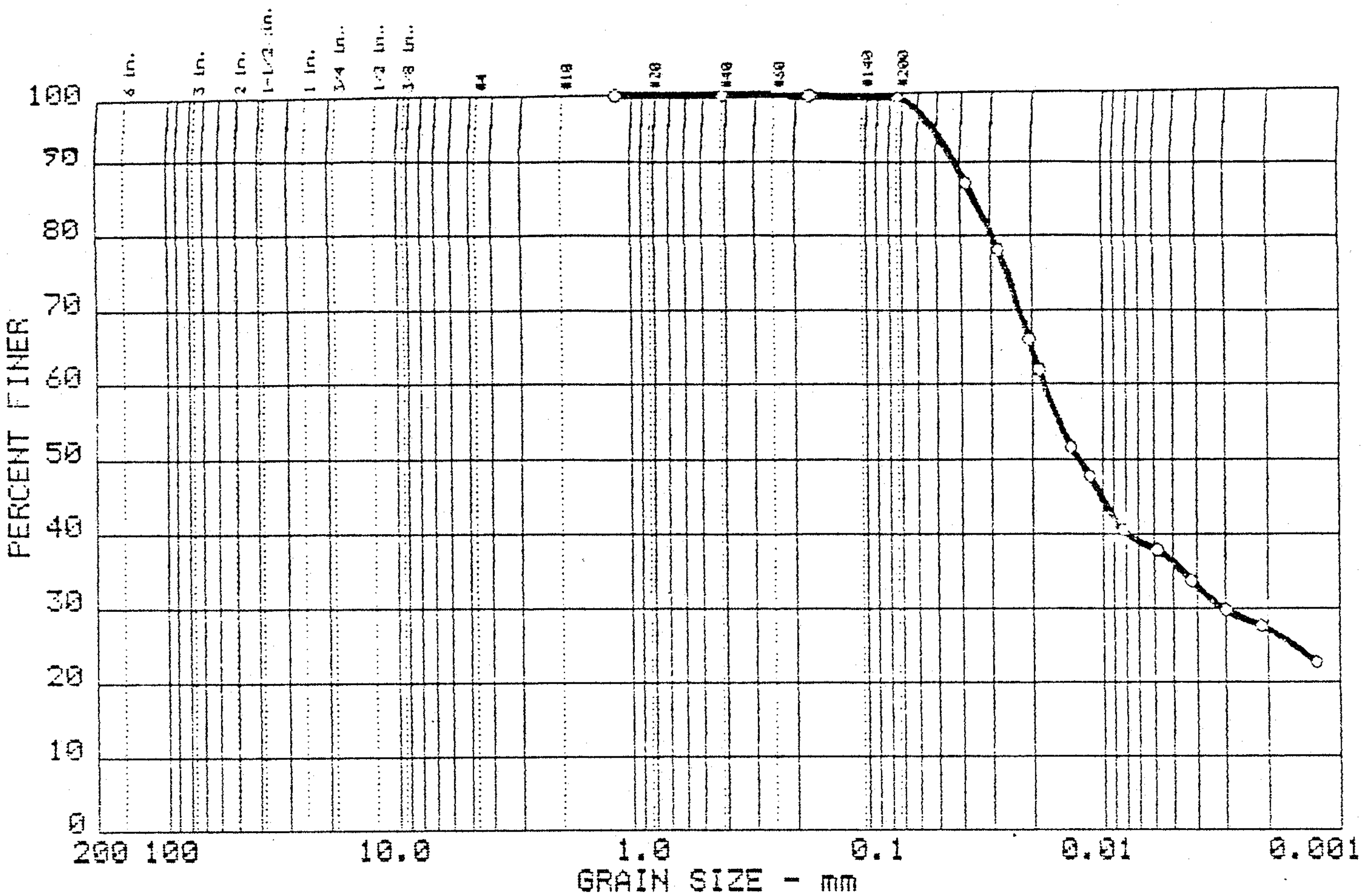
Remarks:
Liquid Limit = 33
Plasticity Index = 12

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K52

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	15	0.0	0.0	0.5	63.2	36.3	CH

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.9		
80	99.8		
200	99.5		

Sample information:
○Fat Clay, trace sand

E1 S5 Sample #1

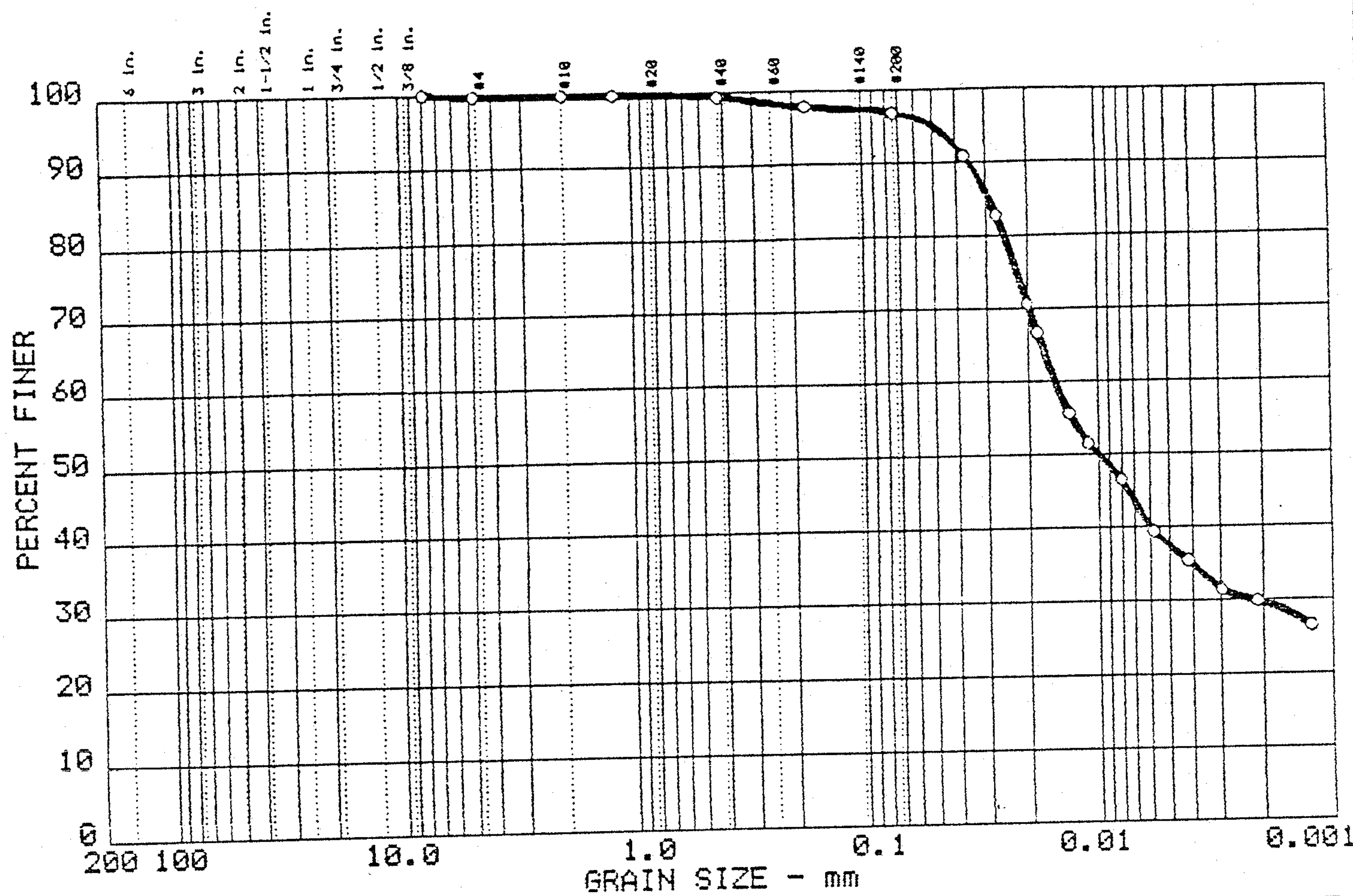
Remarks:
Liquid Limit = 50
Plasticity Index = 27

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K53

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	1	0.0	0.1	2.9	59.6	37.4	CL

SIEVE inches size	PERCENT FINER ○		
0.313	100.0		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	99.9		
10	99.8		
16	99.7		
40	99.4		
80	97.9		
200	96.9		

Sample information:
○Lean Clay, trace sand

E1 S5 Sample #2

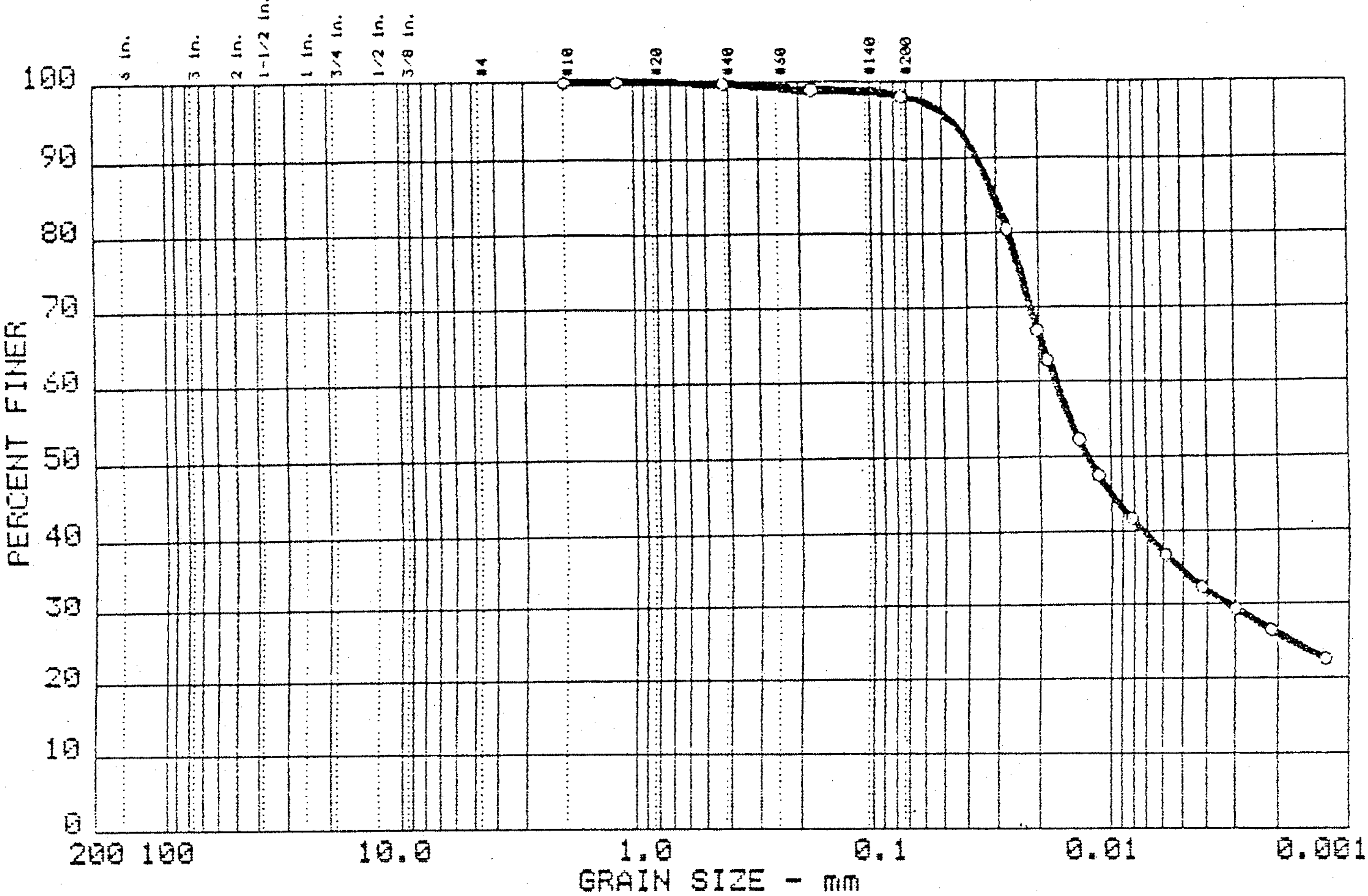
Remarks:
Liquid Limit = 38
Plasticity Index = 17

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K65

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	16	0.0	0.0	1.8	63.7	34.5	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60}	0.00		
D_{30}			
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
16	99.9		
40	99.8		
80	99.0		
200	98.2		

Sample information:
○ Lean Clay, trace sand

E3 S5 Sample #1

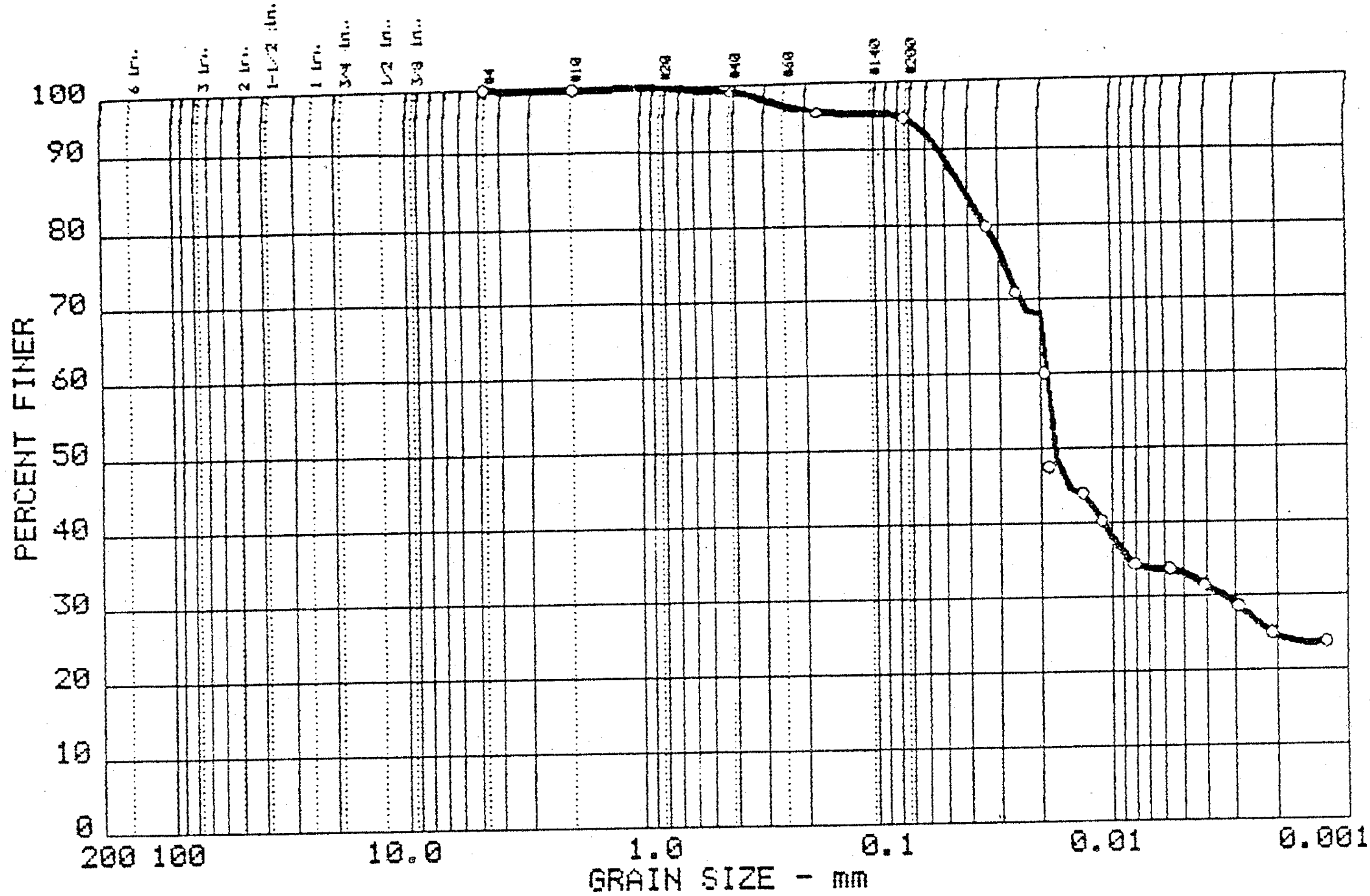
Remarks:
Liquid Limit = 44
Plasticity Index = 25

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K54

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	2	0.0	0.0	5.7	61.1	33.2	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	100.0		
10	99.8		
40	98.7		
80	95.3		
200	94.3		

Sample information:
○Lean Clay, little sand

E3 S5 Sample #2

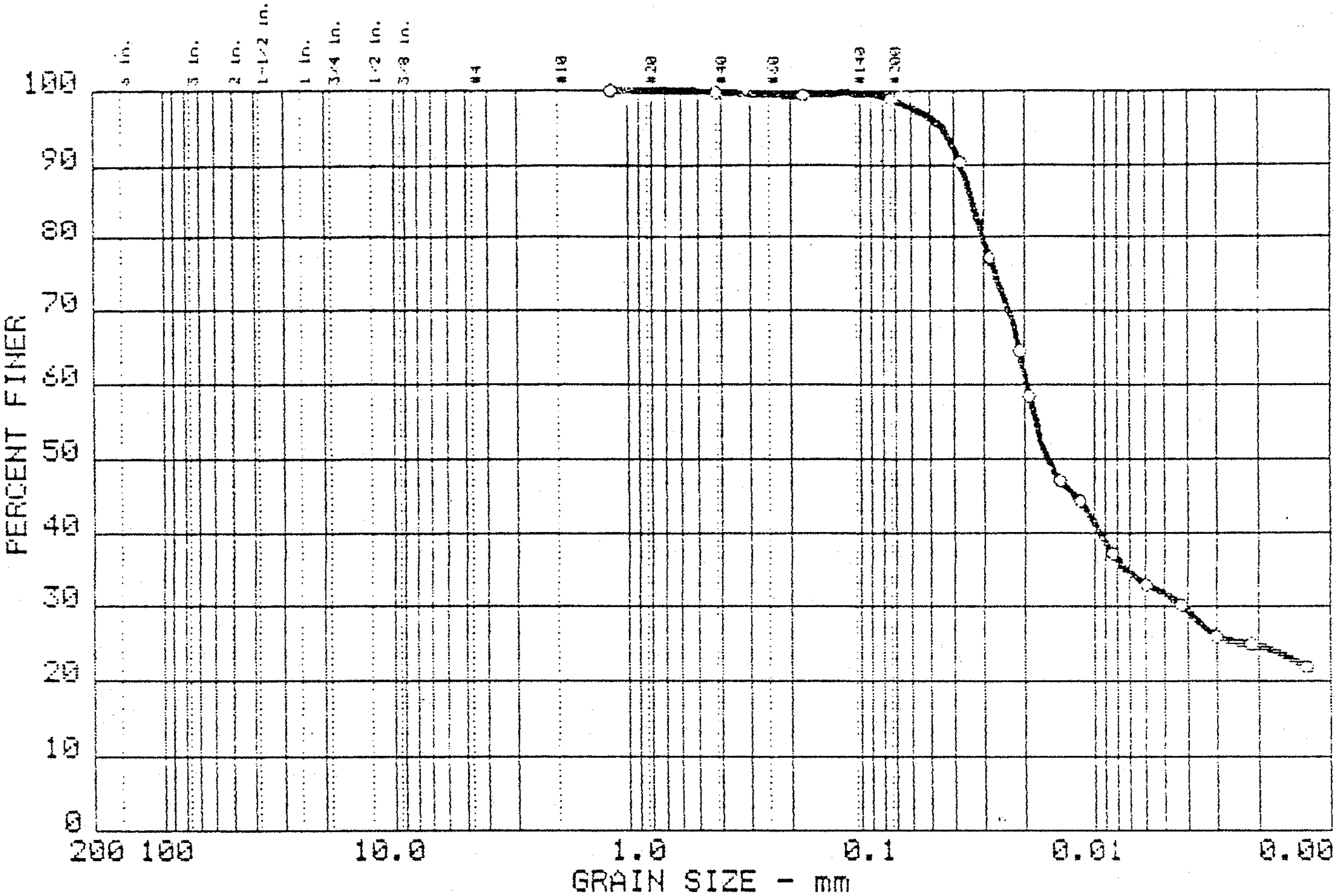
Remarks:
Liquid Limit = 36
Plasticity Index = 14

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K66

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○ 17	0.0	0.0	1.1	67.1	31.8	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.9		
80	99.5		
200	98.9		

Sample information:
○ Lean Clay, trace sand

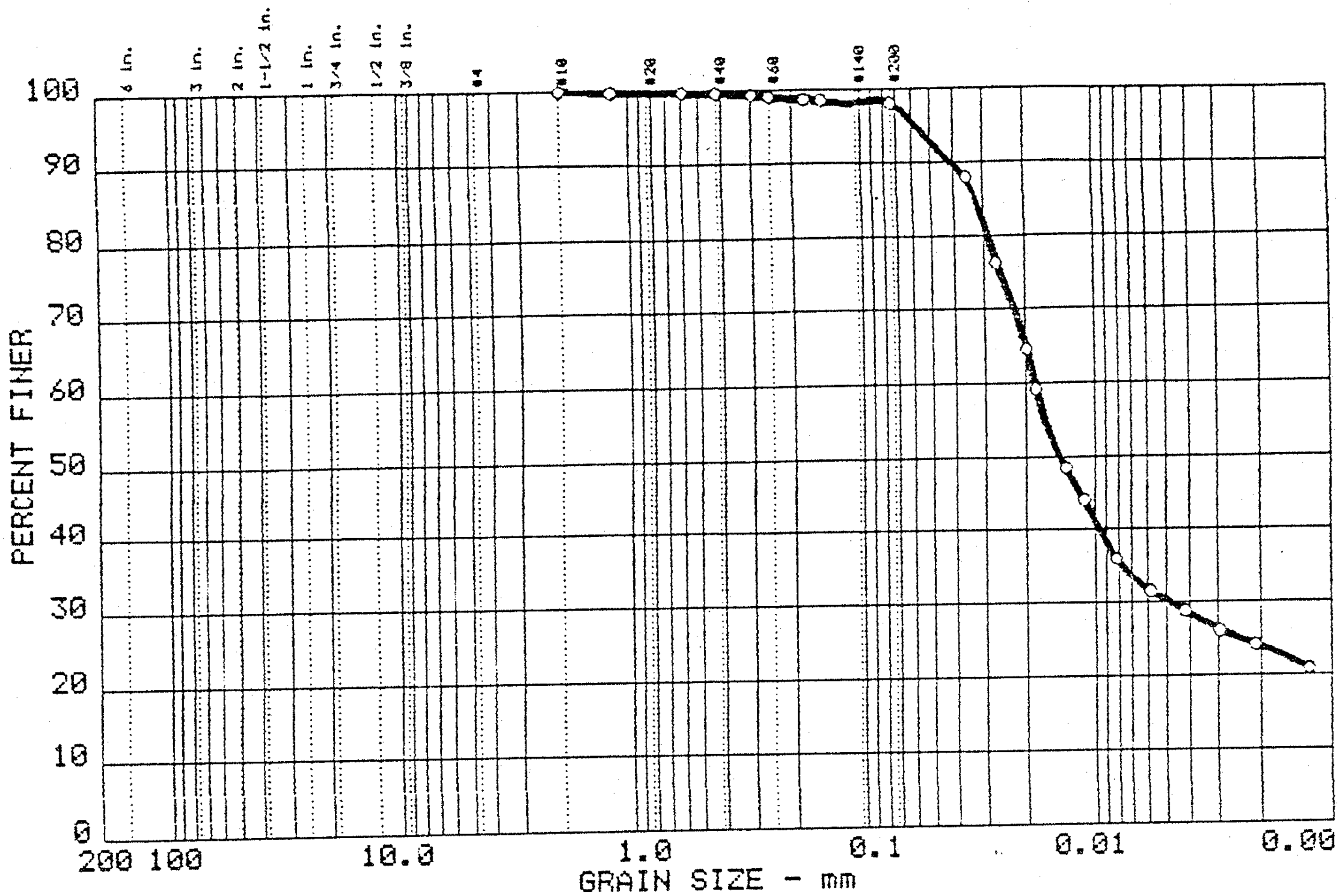
E5 S5 Sample #1

Remarks:
Liquid Limit = 44
Plasticity Index = 18

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill
Date: July 15, 1988 Data Sheet No. K55

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	3	0.0	0.0	1.8	68.0	30.2	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
16	99.9		
30	99.7		
40	99.6		
50	99.3		
60	99.1		
80	98.7		
100	98.5		
200	98.2		

Sample information:
○Lean Clay, trace sand

E5 S5 Sample #2

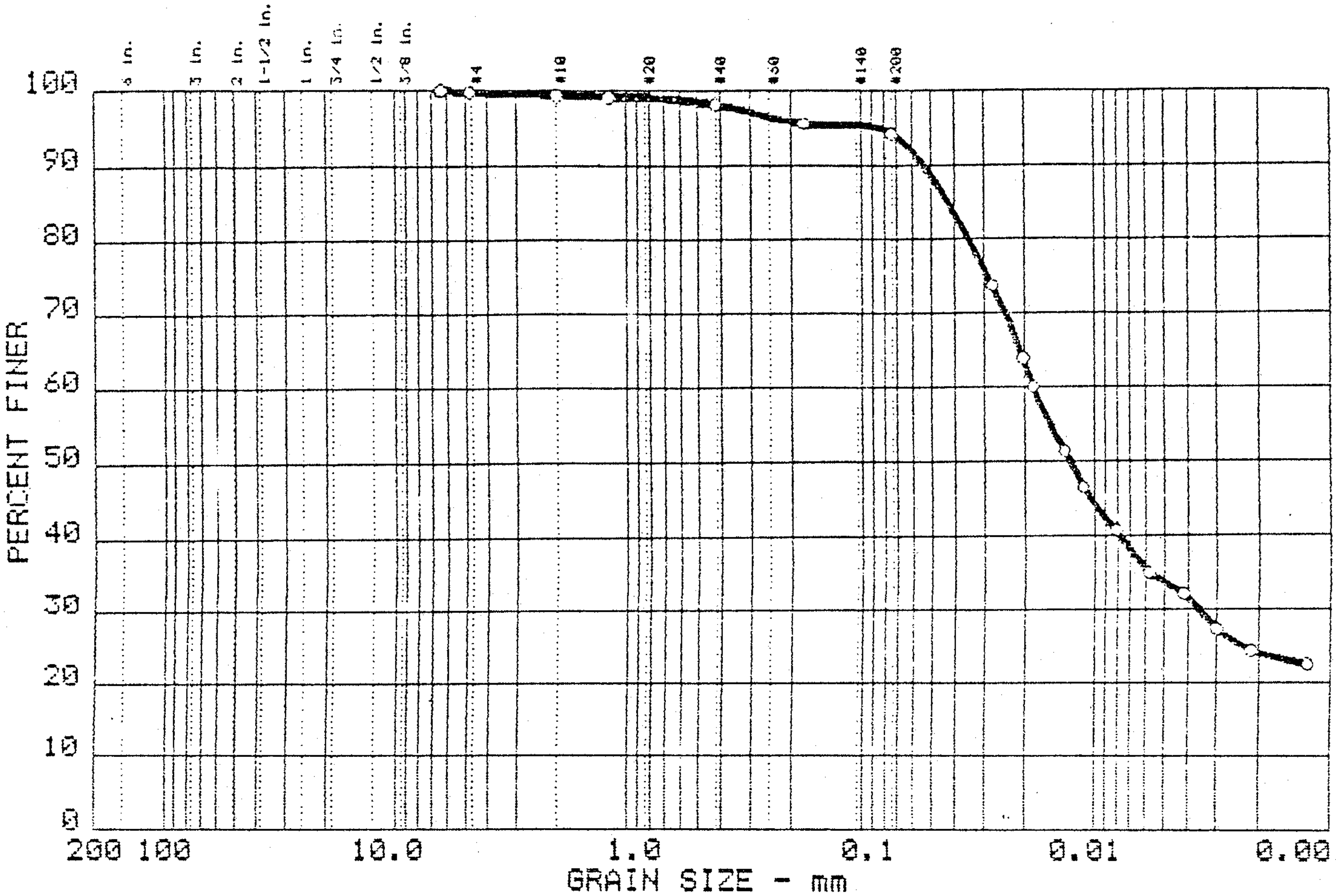
Remarks:
Liquid Limit = 33
Plasticity Index = 11

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K67

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	18	0.0	0.2	5.4	60.9	33.6	CL

SIEVE inches size	PERCENT FINER ○		
0.25	100.0		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	99.8		
10	99.5		
16	99.3		
40	98.3		
80	95.8		
200	94.4		

Sample information:
○ Lean Clay

E7 S5 Sample #1

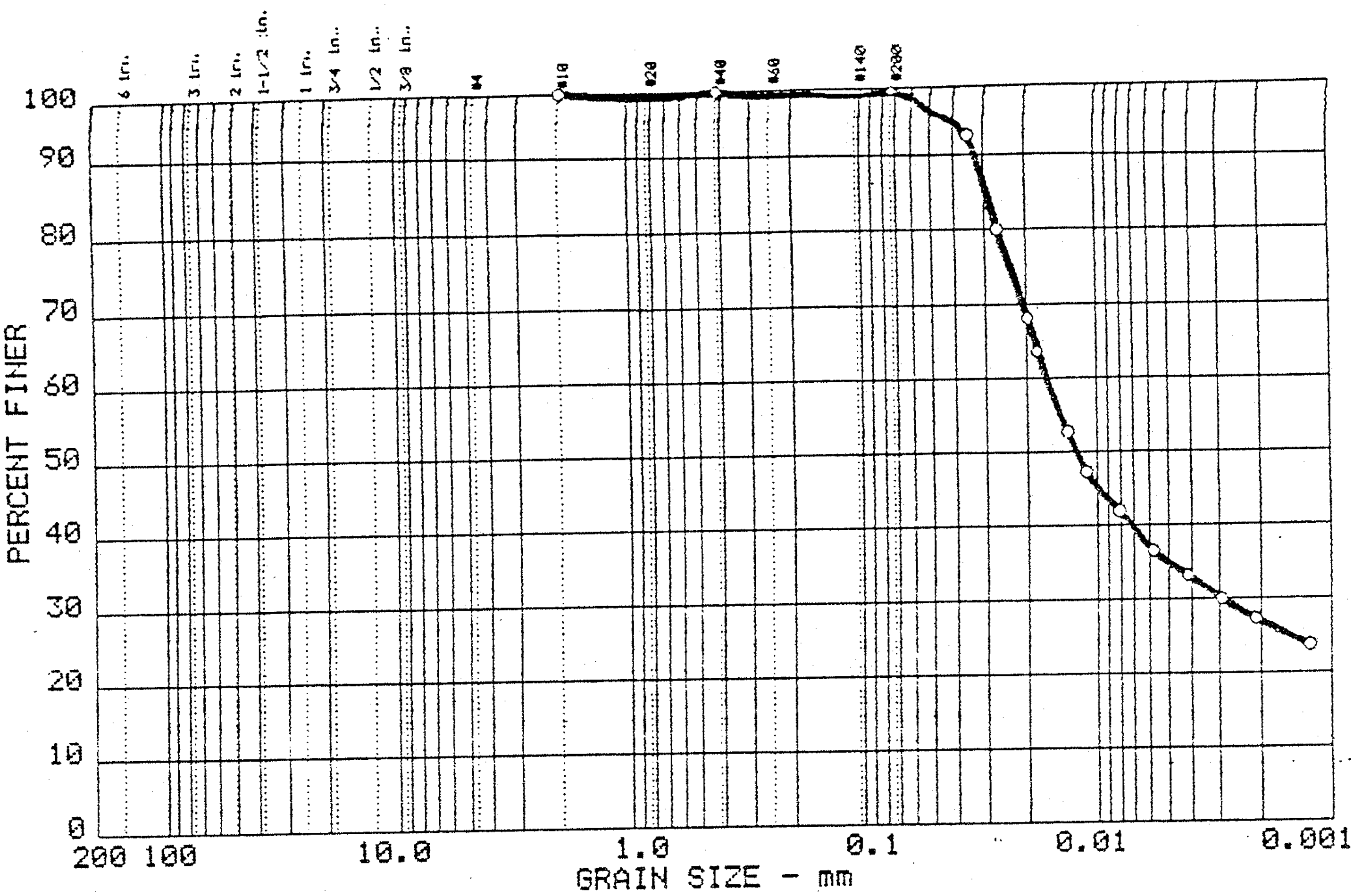
Remarks:
Liquid Limit = 42
Plasticity Index = 17

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K56

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	4	0.0	0.0	0.6	64.5	34.9	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
40	99.9		
200	99.4		

Sample information:
○Lean Clay, trace sand

E7 S5 Sample #2

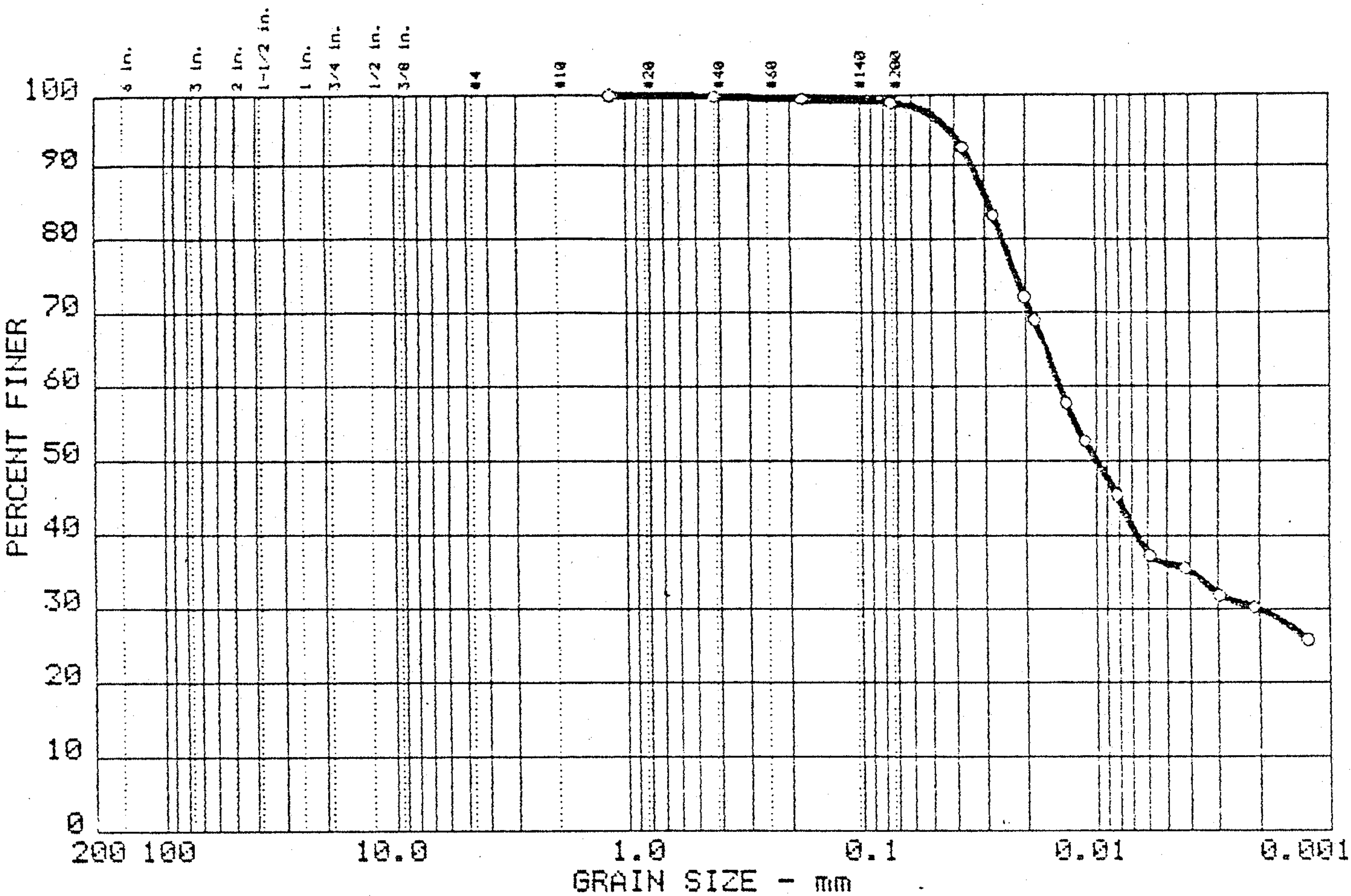
Remarks:
Liquid Limit = 33
Plasticity Index = 11

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988   Data Sheet No. K68

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	19	0.0	0.0	1.0	62.9	36.1	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.9		
80	99.5		
200	99.0		

Sample information:
○Lean Clay, trace sand

E9 S5 Sample #1

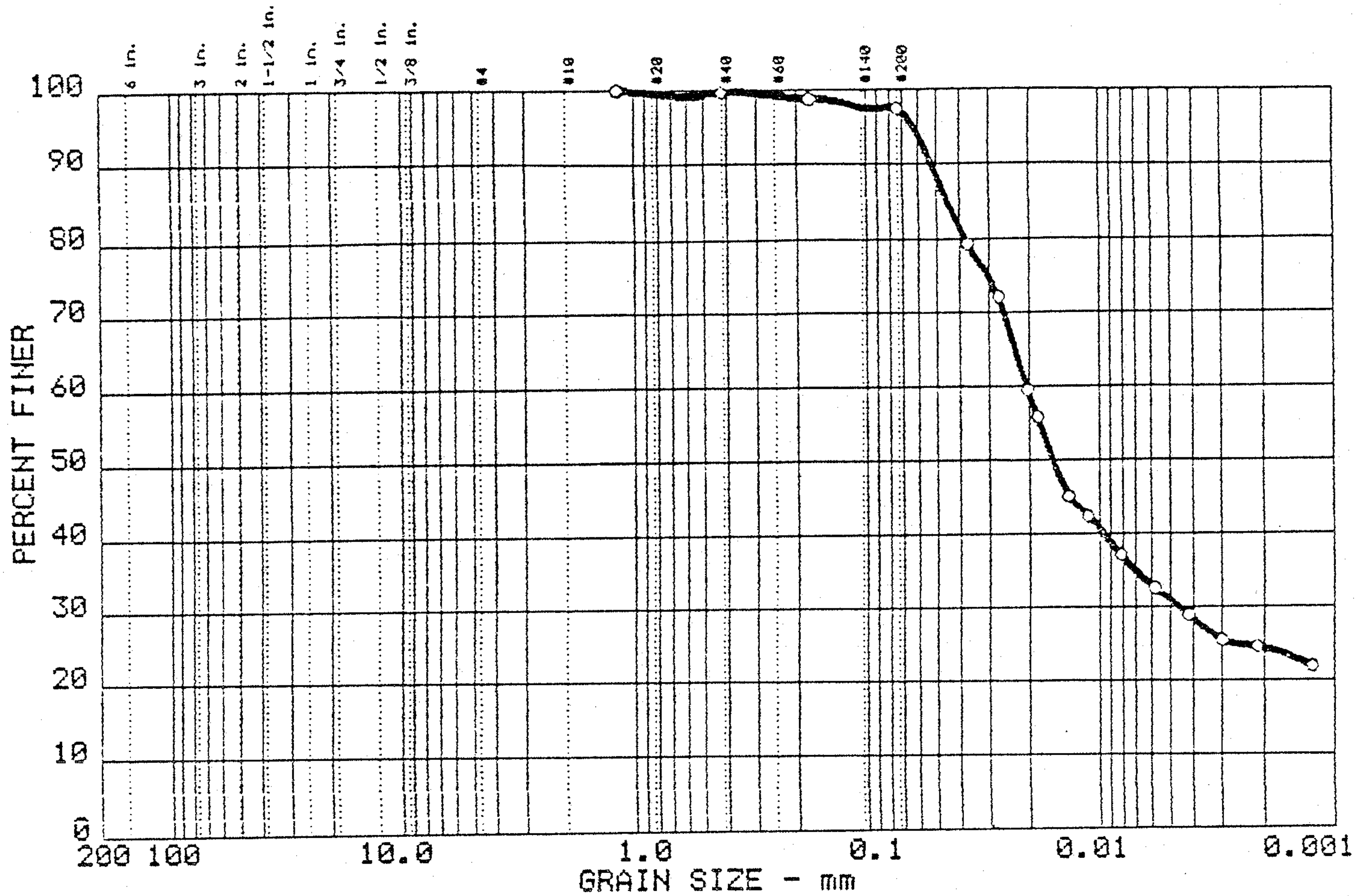
Remarks:
Liquid Limit = 46
Plasticity Index = 20

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K57

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	5	0.0	0.0	2.5	66.6	30.9	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.7		
80	98.8		
200	97.5		

Sample information:
○Lean Clay, trace sand

E9 S5 Sample #2

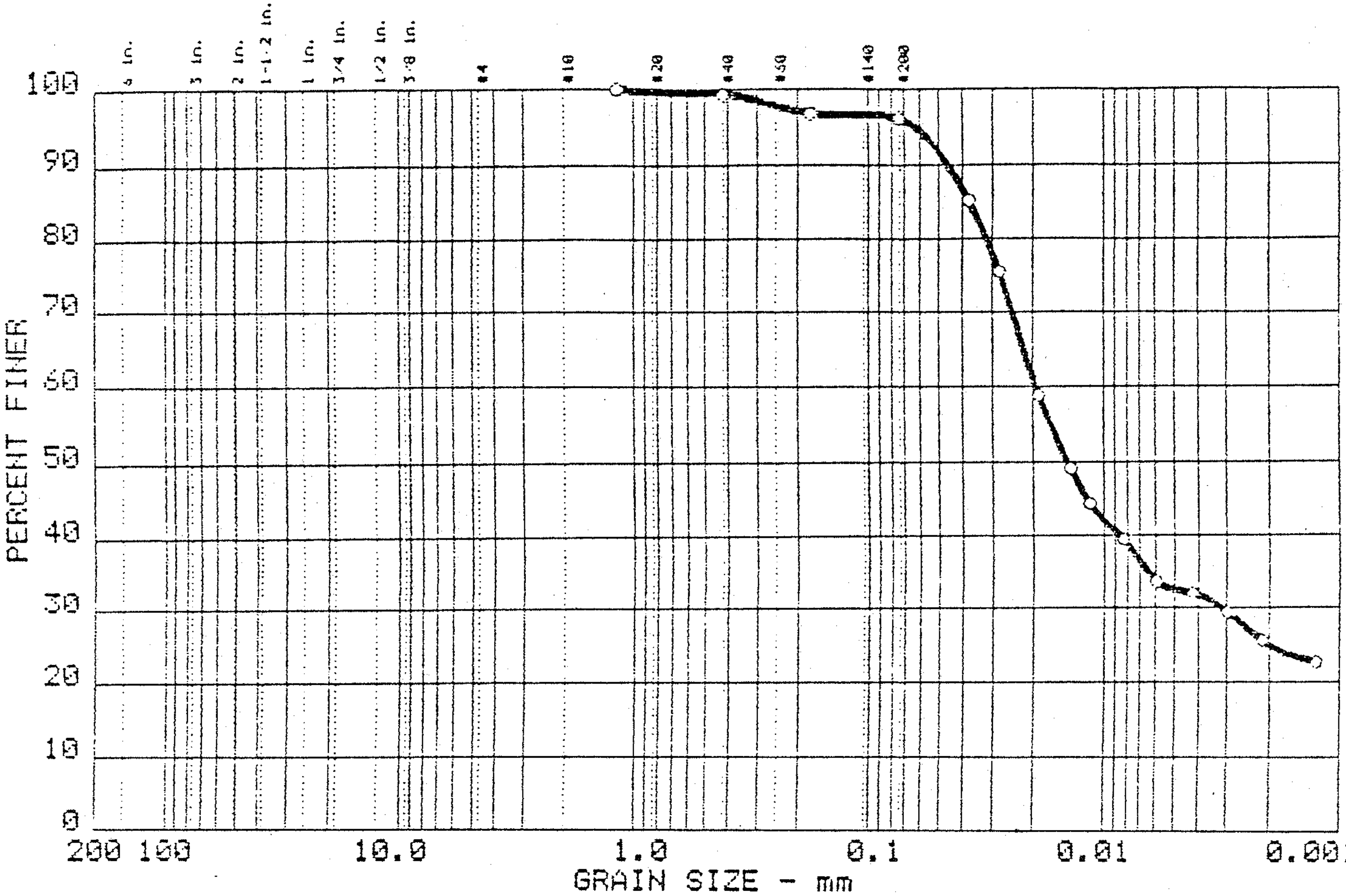
Remarks:
Liquid Limit = 39
Plasticity Index = 15

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988   Data Sheet No. K69

PARTICLE SIZE DISTRIBUTION TEST REPORT



Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○ 20	0.0	0.0	3.7	63.9	32.4	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.5		
80	97.0		
200	96.3		

Sample information:
○ Lean Clay, little sand

E11 S5 Sample #1

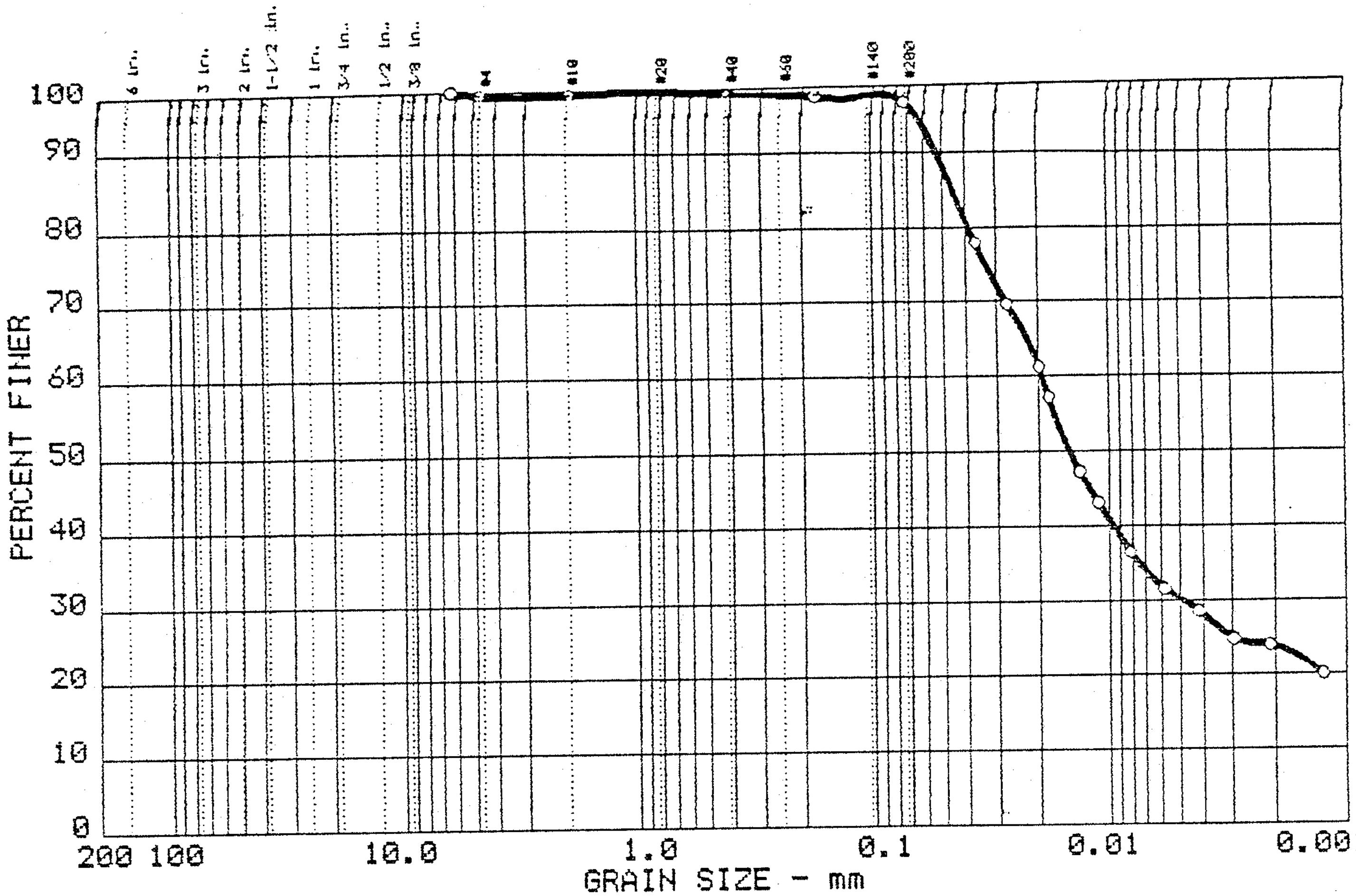
Remarks:
Liquid Limit = 45
Plasticity Index = 20

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K58

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	6	0.0	0.5	2.3	67.0	30.2	CL

SIEVE inches size	PERCENT FINER ○		
0.25	100.0		
	GRAIN SIZE		
D_{60}			
D_{30}	0.00		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
4	99.5		
10	99.5		
40	99.2		
80	98.2		
200	97.2		

Sample information:
○ Lean Clay, trace sand

E11 S5 Sample #2

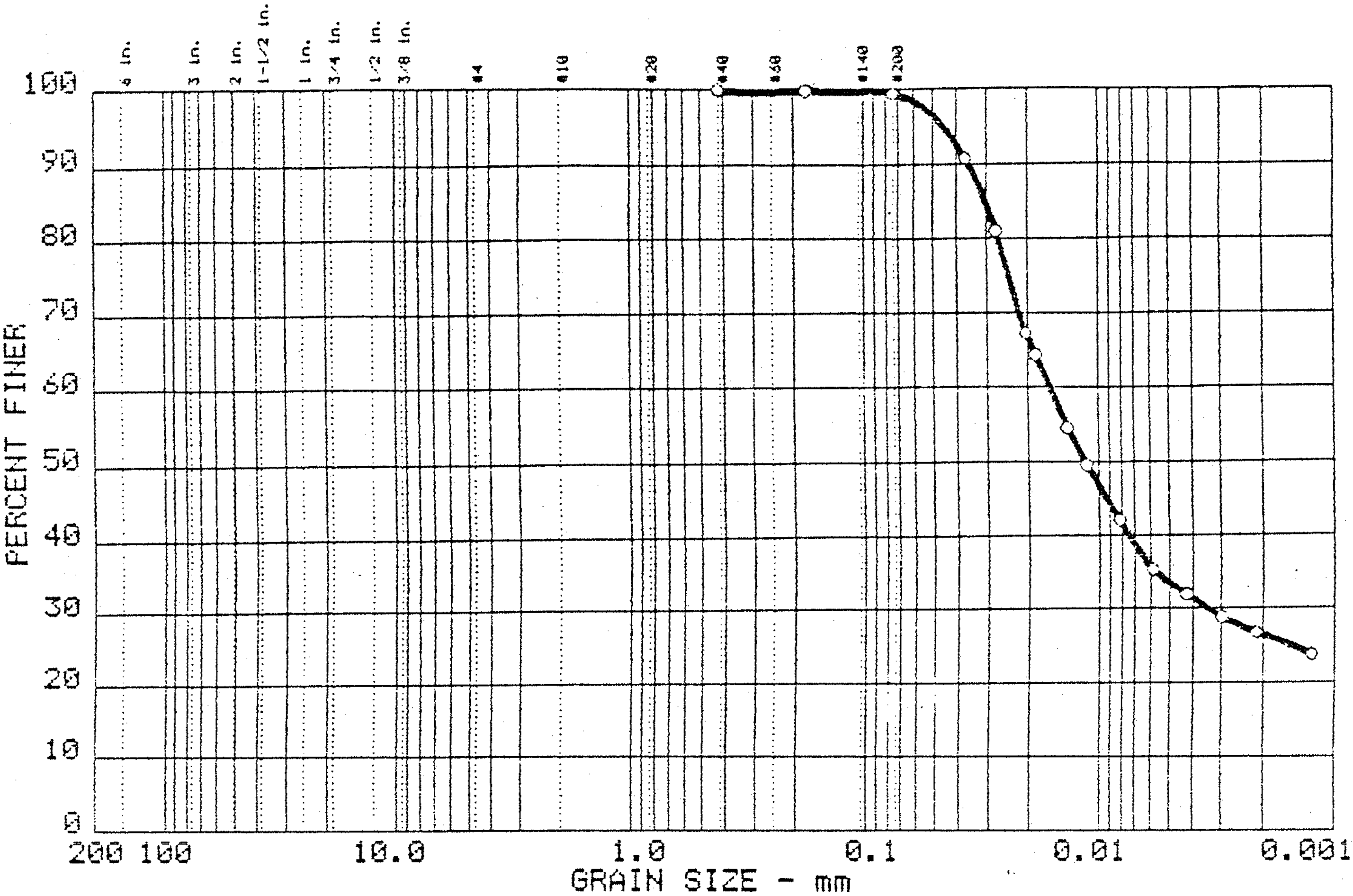
Remarks:
Liquid Limit = 36
Plasticity Index = 12

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K70

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	14	0.0	0.0	0.5	66.1	33.3	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}			
D_{30}	0.00		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
80	99.9		
200	99.5		

Sample information:
○Lean Clay, trace sand

E13 S5 Sample #1

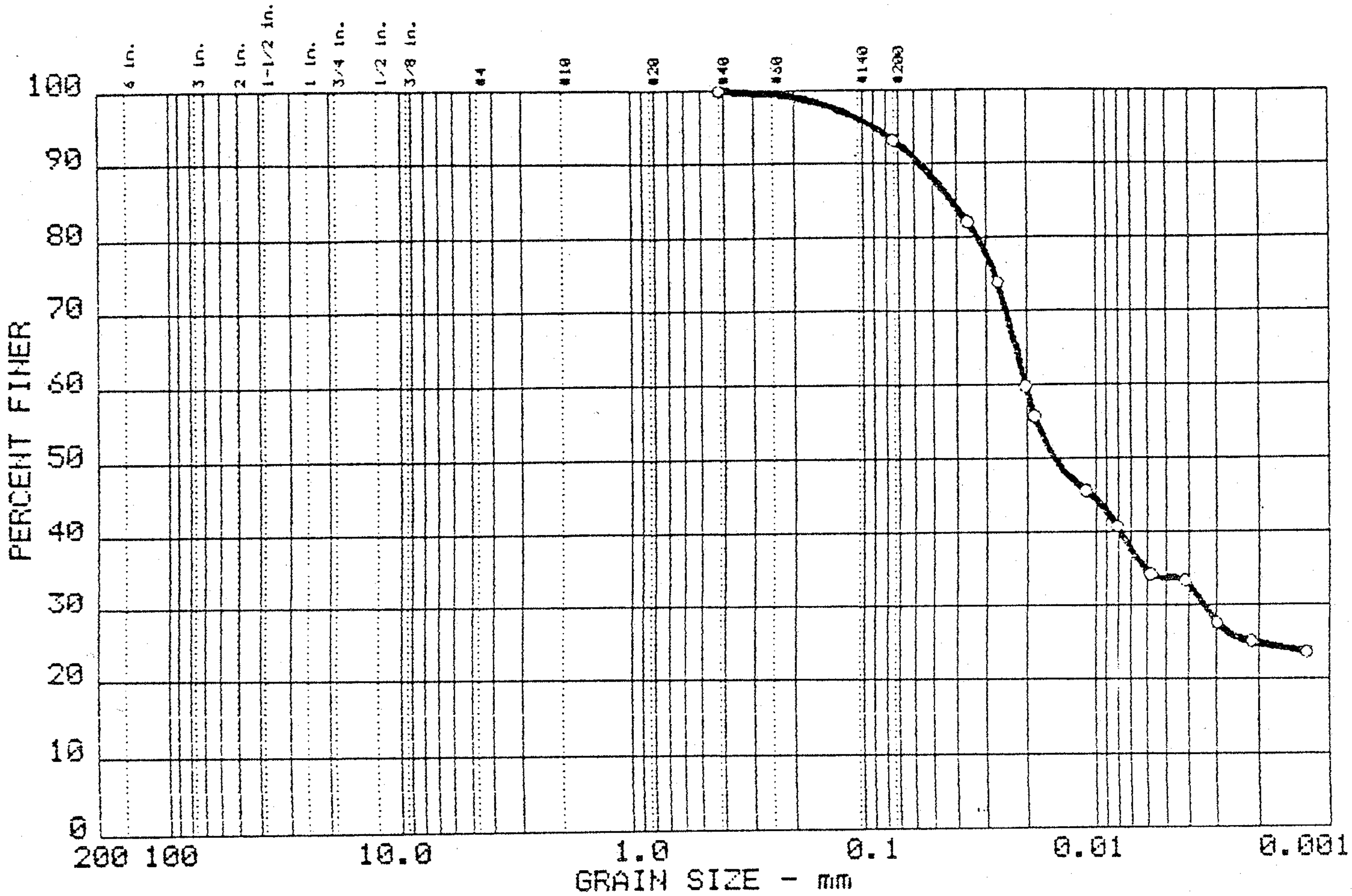
Remarks:
Liquid Limit = 48
Plasticity Index = 21

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: July 15, 1988 Data Sheet No. K59

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	7	0.0	0.0	6.9	59.4	33.7	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60}	0.00		
D_{30}			
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
200	93.1		

Sample information:
○ Lean Clay, little sand

E13 S5 Sample #2

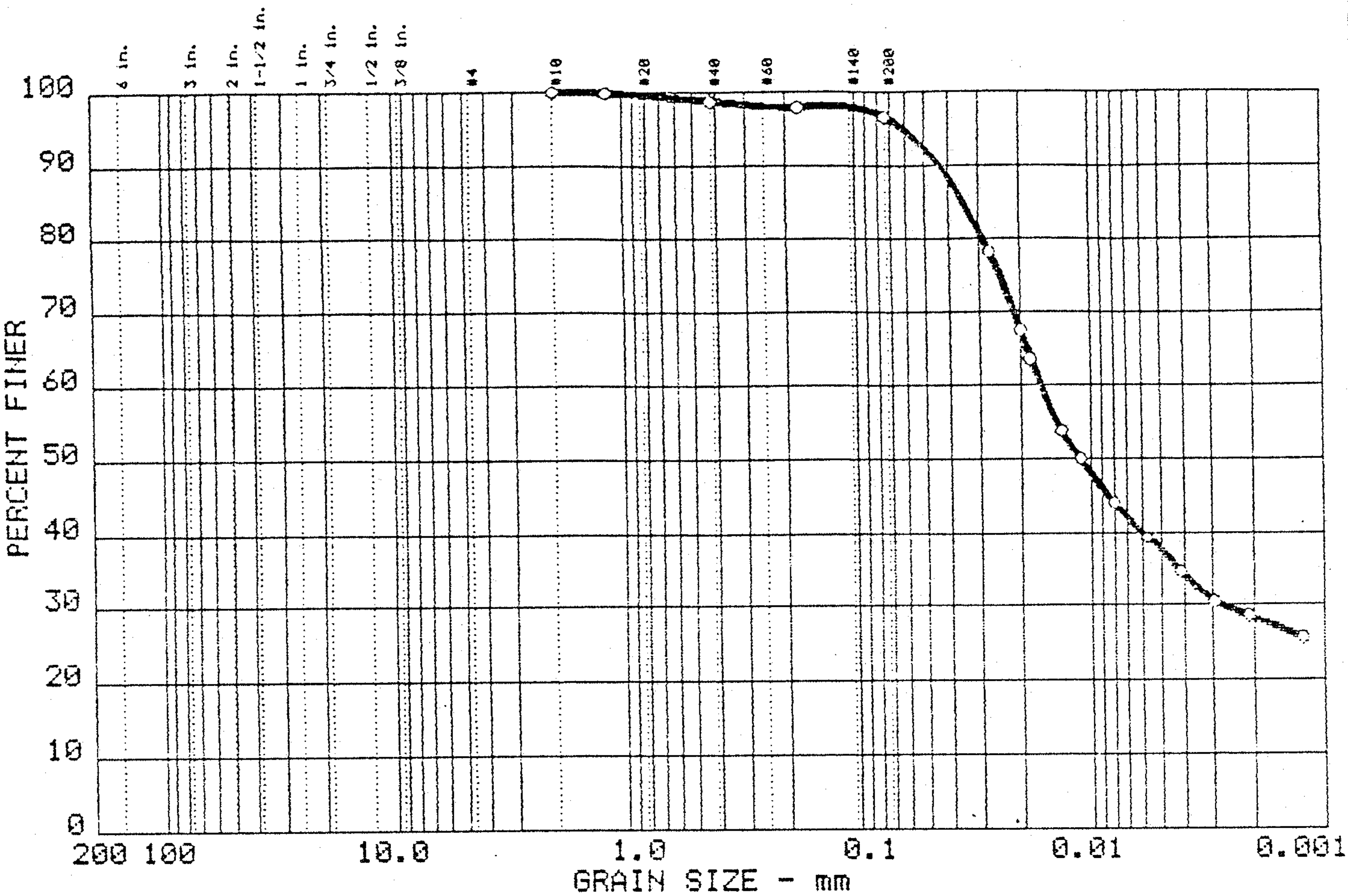
Remarks:
Liquid Limit = 37
Plasticity Index = 13

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K71

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	4	0.0	0.0	3.3	59.5	37.2	ML

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
16	99.9		
40	98.8		
80	98.0		
200	96.7		

Sample information:
○ Silt, little sand

E15 S5 Sample #1

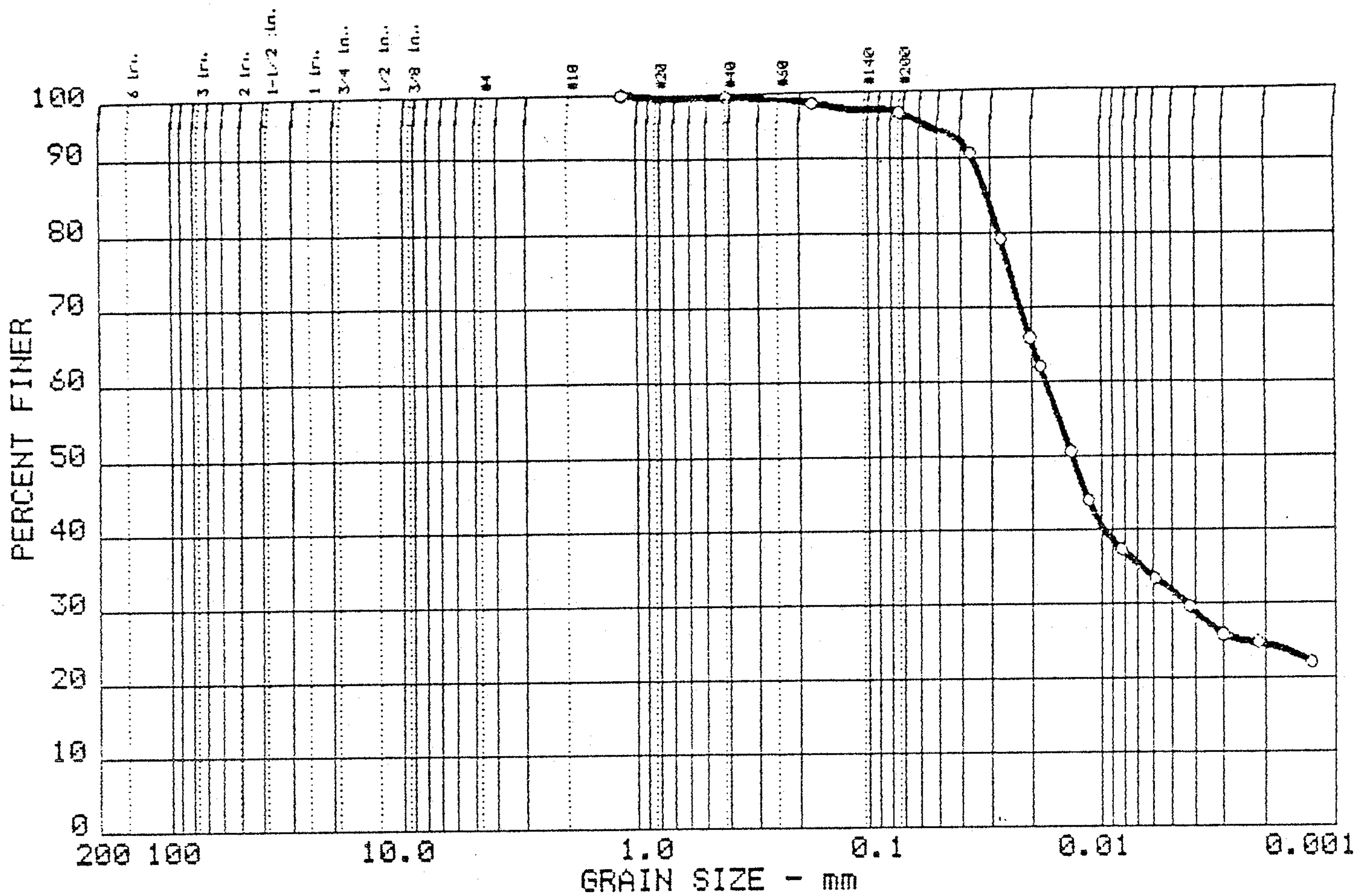
Remarks:
Liquid Limit = 46
Plasticity Index = 18

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K60

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	8	0.0	0.0	3.3	65.1	31.6	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.7		
80	98.0		
200	96.7		

Sample information:
○ Lean Clay, trace sand

E15 S5 Sample #2

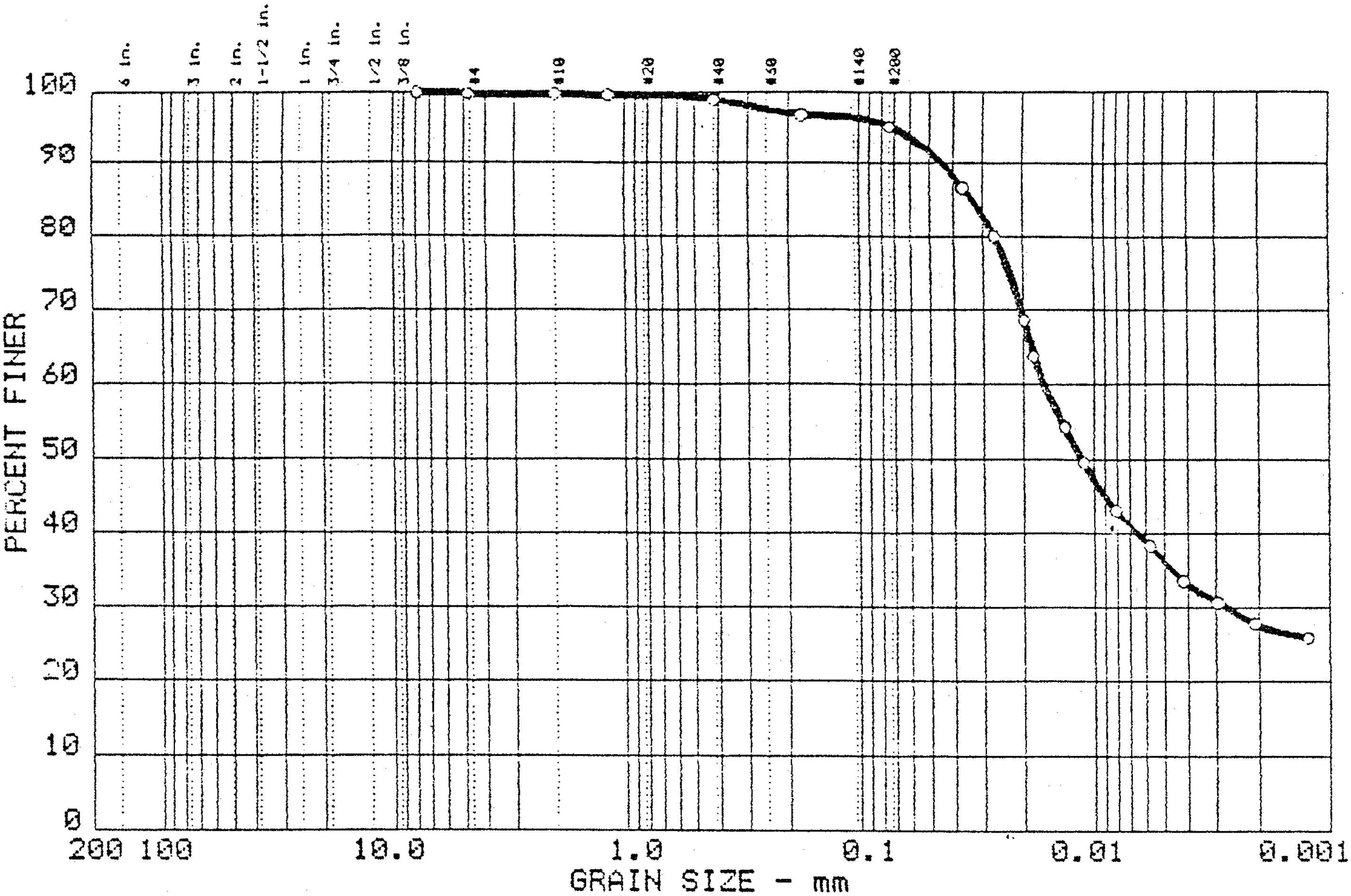
Remarks:
Liquid Limit = 30
Plasticity Index = 11

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K72

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
o	5	0.0	0.1	4.7	59.2	36.0	CL

SIEVE inches size	PERCENT FINER o		
0.313	100.0		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER o		
4	99.9		
10	99.8		
16	99.7		
40	99.0		
80	97.0		
200	95.3		

Sample information:
o Lean Clay, trace sand

E17 S5 Sample #1

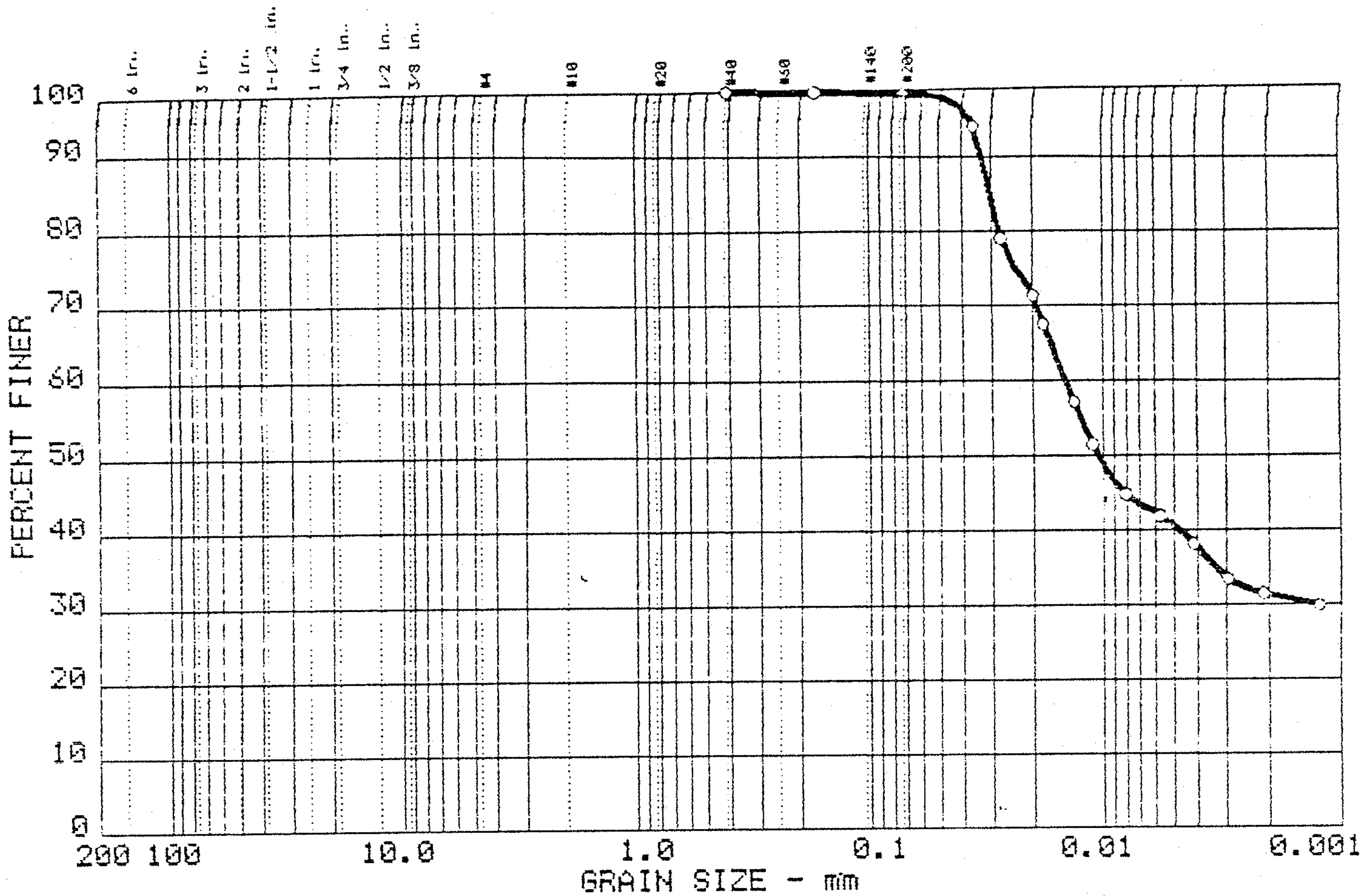
Remarks:
Liquid Limit = 42
Plasticity Index = 19

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K61

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	18	0.0	0.0	0.5	58.8	40.7	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
80	99.8		
200	99.5		

Sample information:
○ Lean Clay

E17 S5 Sample #2

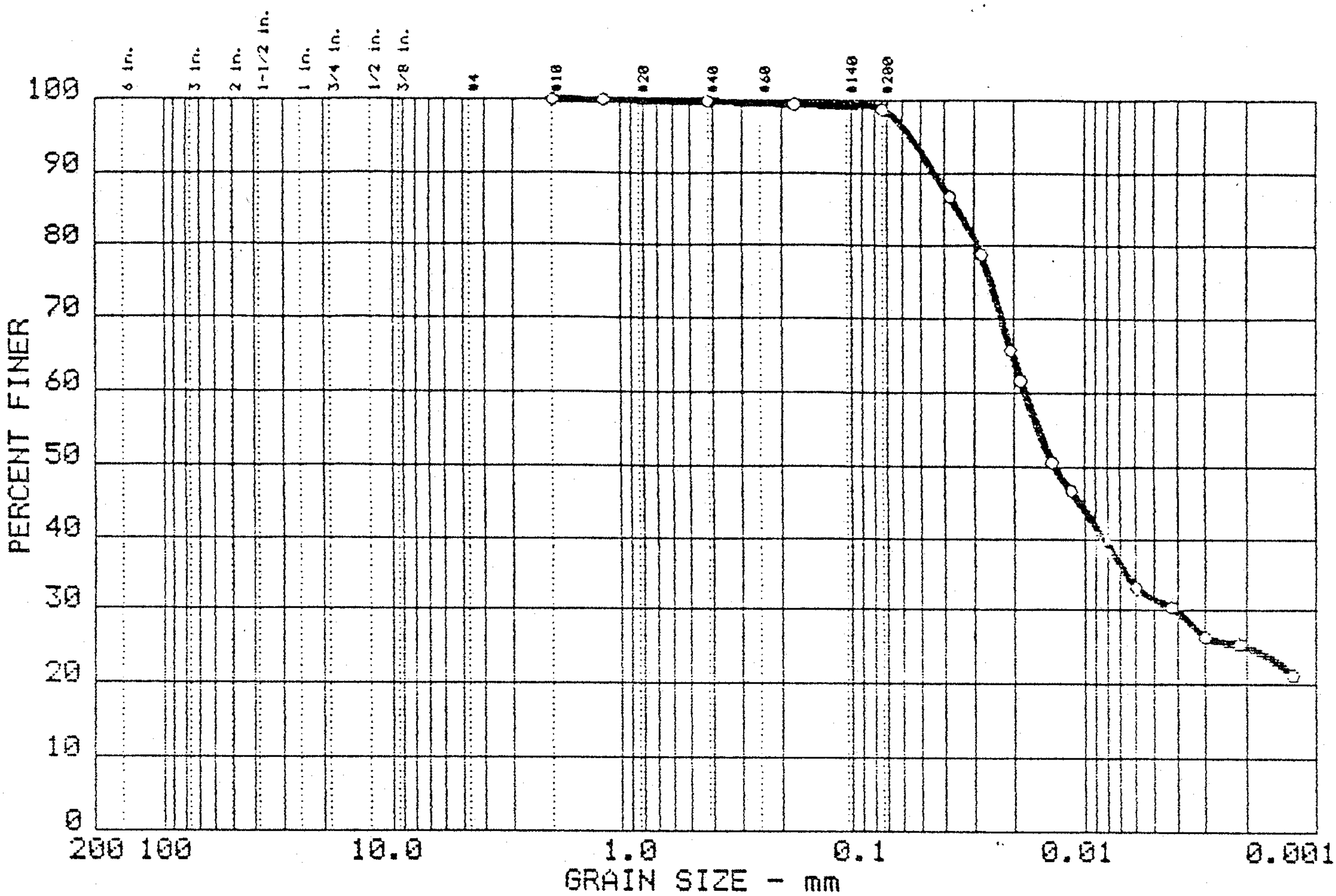
Remarks:
Liquid Limit = 37
Plasticity Index = 16

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K73

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	6	0.0	0.0	1.2	67.3	31.5	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60}			
D_{30}	0.00		
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
16	99.9		
40	99.8		
80	99.4		
200	98.8		

Sample information:
○Lean Clay, trace sand

E19 S5 Sample #1

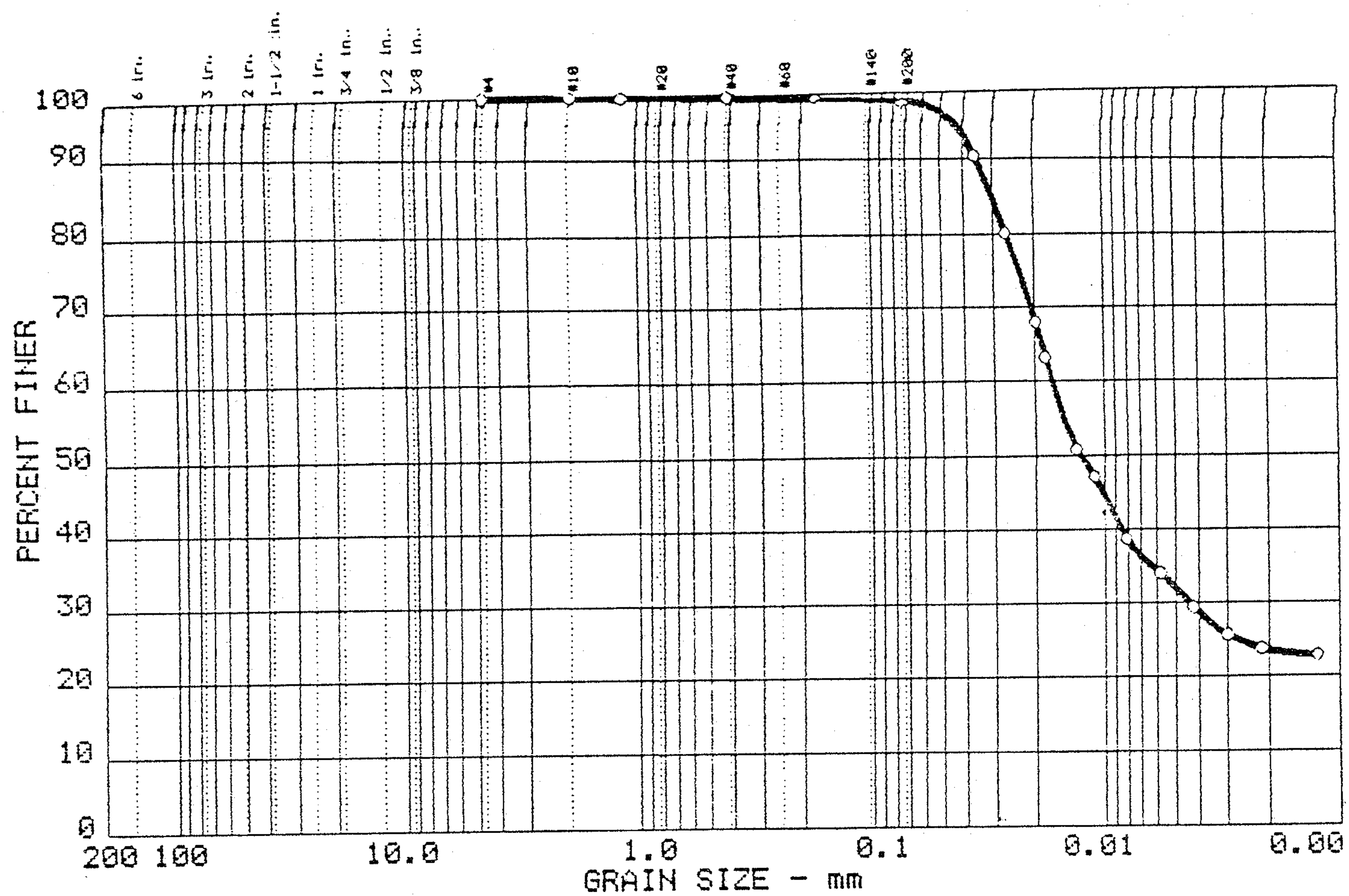
Remarks:
Liquid Limit = 31
Plasticity Index = 10

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K62

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	10	0.0	0.0	1.5	66.5	32.0	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60}	0.00		
D_{30}			
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
4	100.0		
10	99.9		
16	99.9		
40	99.8		
80	99.2		
200	98.5		

Sample information:
○ Lean Clay, trace sand

E19 S5 Sample #2

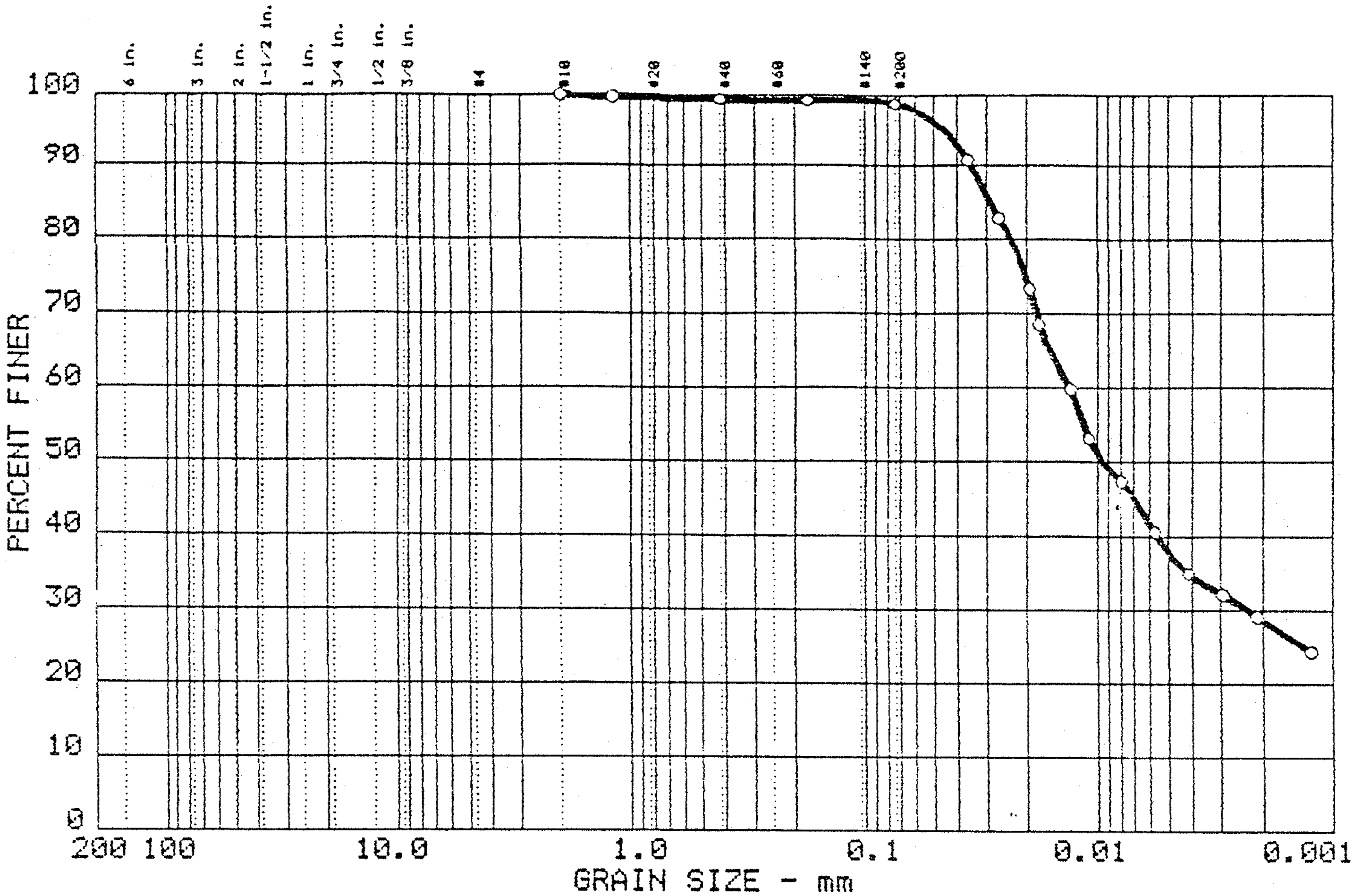
Remarks:
Liquid Limit = 36
Plasticity Index = 15

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K74

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	7	0.0	0.0	1.3	60.8	37.9	CH

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
16	99.9		
40	99.5		
80	99.2		
200	98.7		

Sample information:
○Fat Clay, trace sand

E21 S5 Sample #1

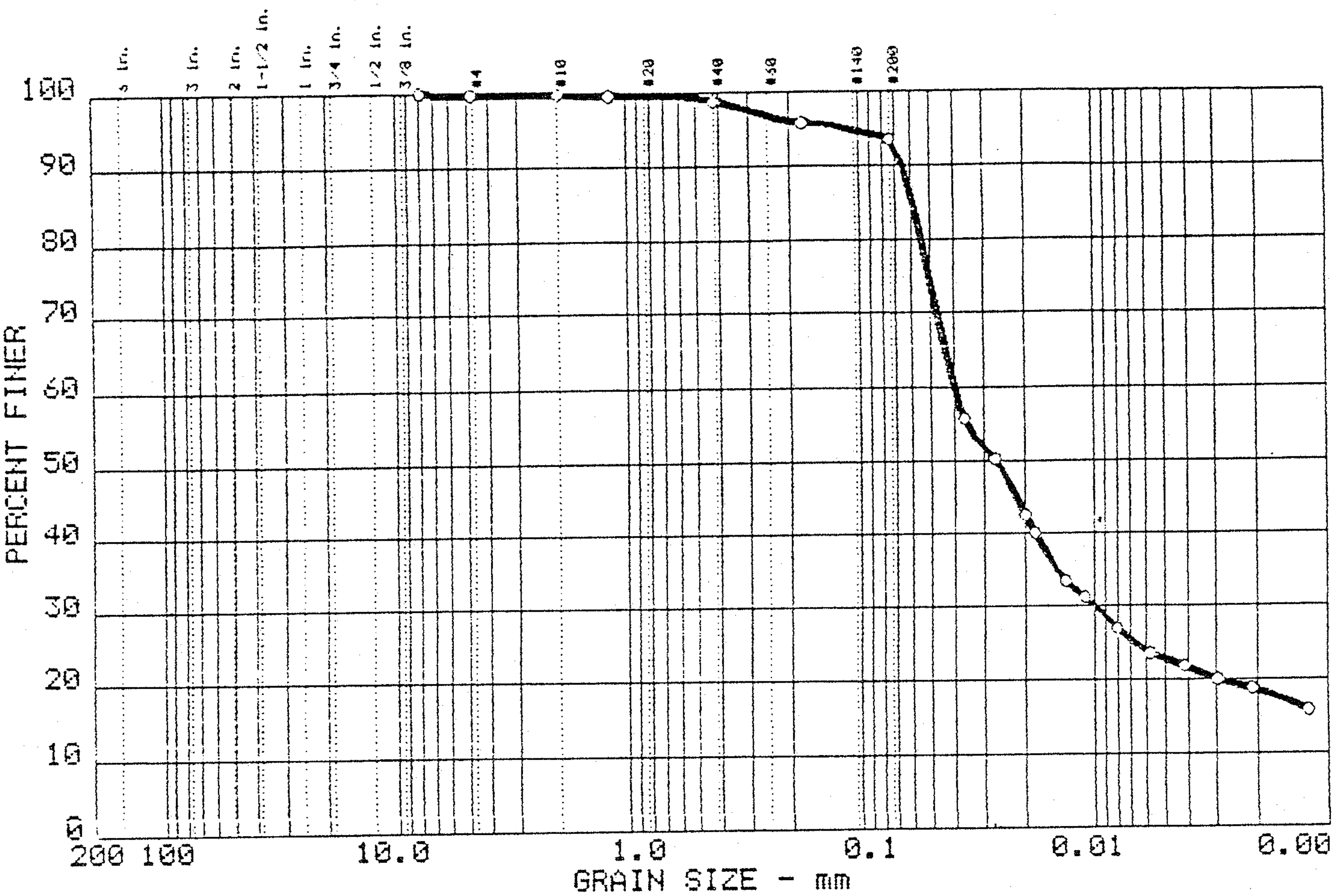
Remarks:
Liquid Limit = 50
Plasticity Index = 23

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K63

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	11	0.0	0.2	6.3	70.7	22.8	CL

SIEVE inches size	PERCENT FINER ○		
0.313	100.0		
	GRAIN SIZE		
D_{60}			
D_{30}	0.01		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
4	99.8		
10	99.7		
16	99.6		
40	98.9		
80	95.9		
200	93.5		

Sample information:
○Lean Clay, some sand

E21 S5 Sample #2

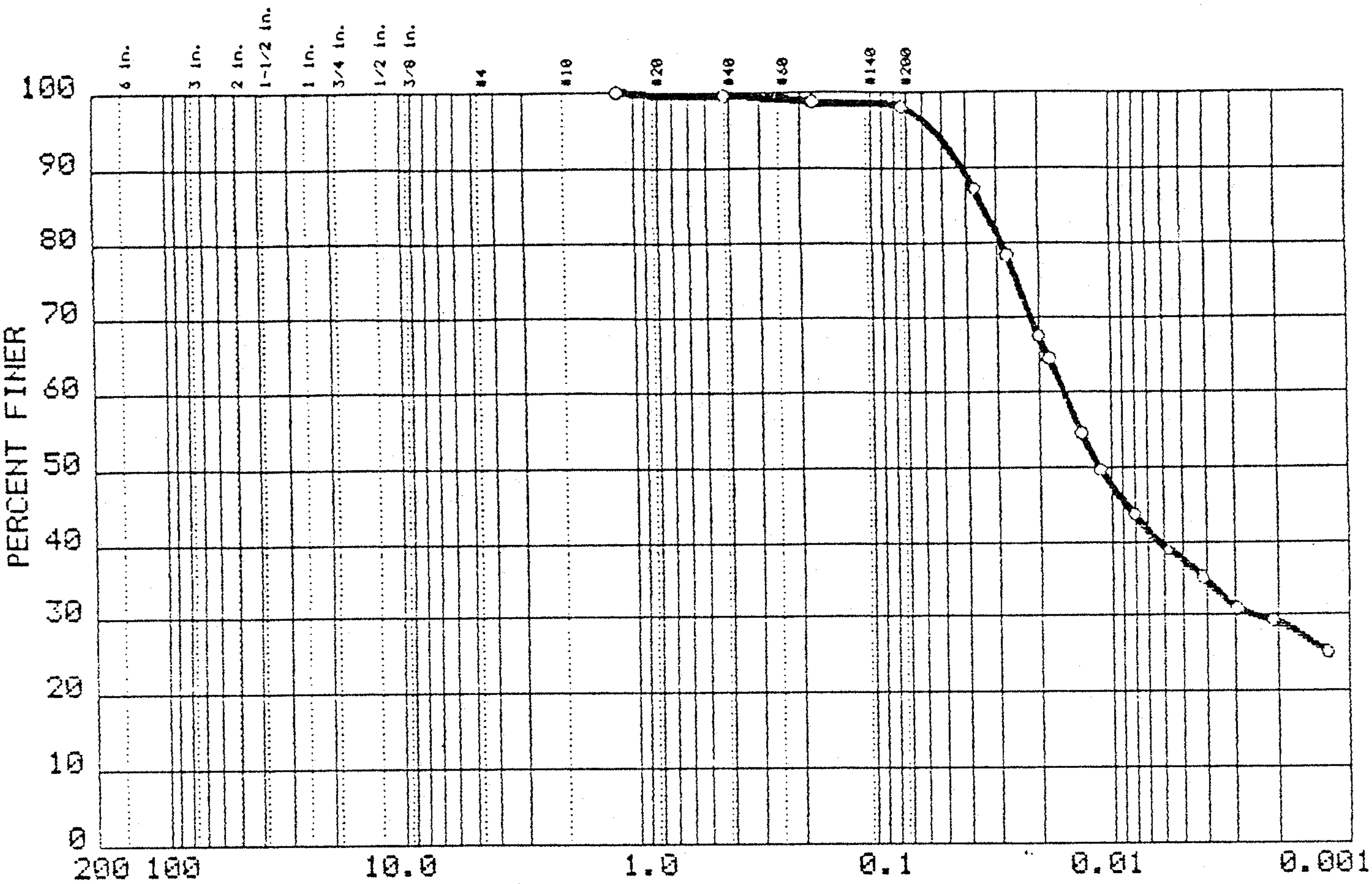
Remarks:
Liquid Limit = 34
Plasticity Index = 14

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K75

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	8	0.0	0.0	1.9	61.0	37.1	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.6		
80	98.8		
200	98.1		

Sample information:
○ Lean Clay, trace sand

E23 S5 Sample #1

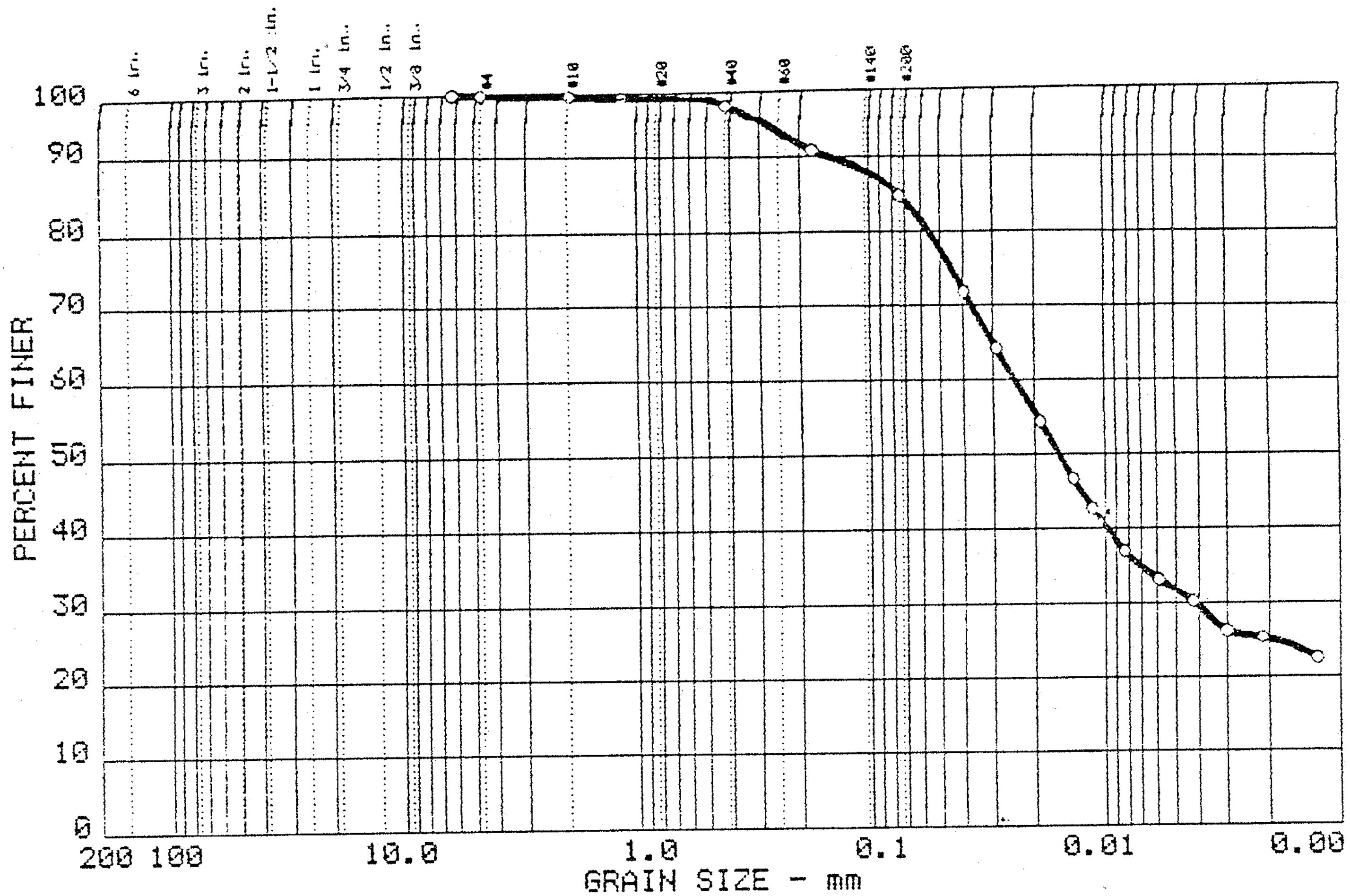
Remarks:
Liquid Limit = 39
Plasticity Index = 12

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 3, 1988 Data Sheet No. K64

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	12	0.0	0.1	15.1	53.1	31.7	CL

SIEVE inches size	PERCENT FINER ○		
0.25	100.0		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	99.9		
10	99.7		
16	99.3		
40	97.6		
80	90.8		
200	84.8		

Sample information:
○ Lean Clay, some sand

E23 S5 Sample #2

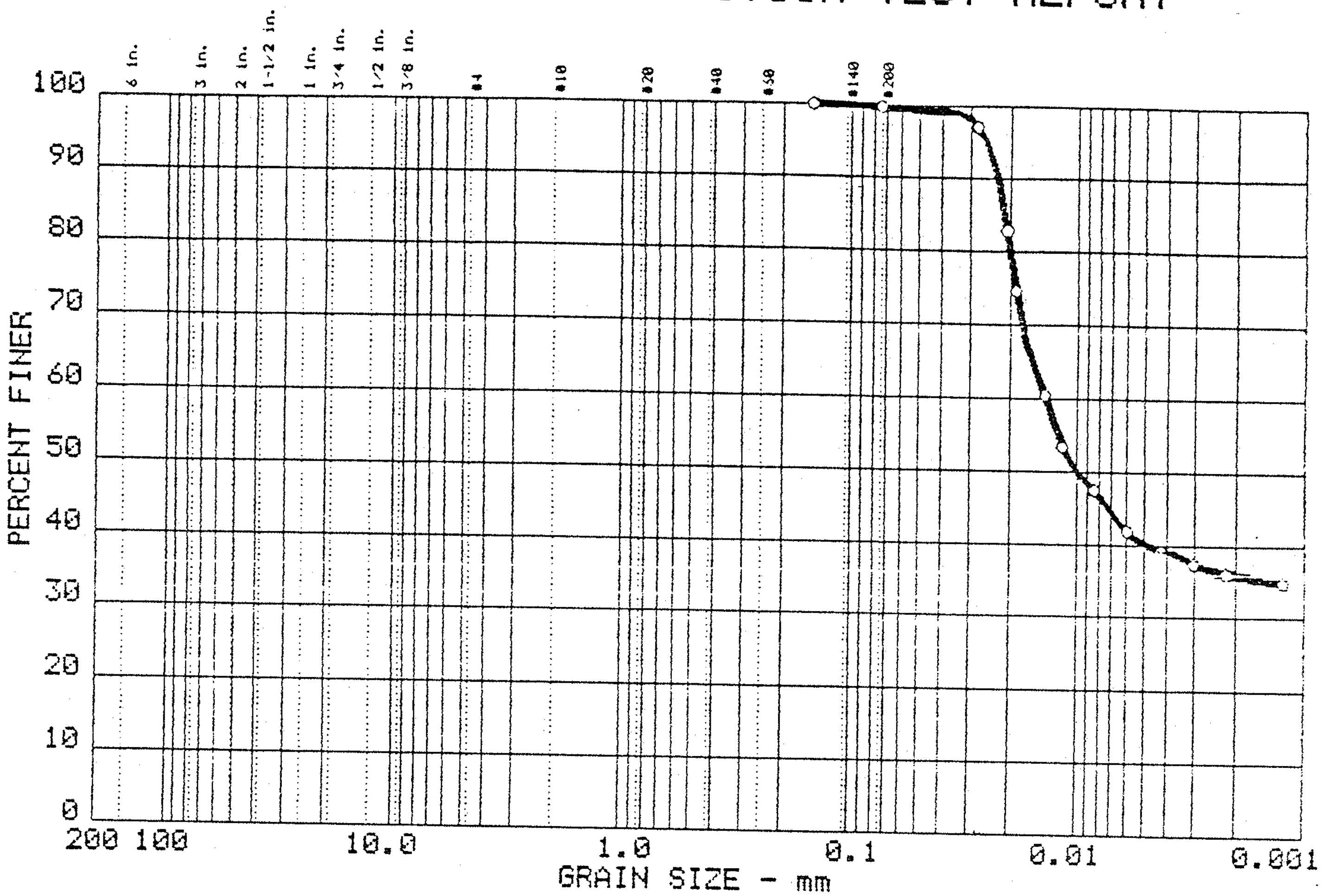
Remarks:
Liquid Limit = 37
Plasticity Index = 16

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 16, 1988 Data Sheet No. K76

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	8	0.0	0.0	0.2	59.6	40.2	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60}			
D_{30}			
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
100	100.0		
200	99.8		

Sample information:
○Lean Clay

E5 S7 Sample #1

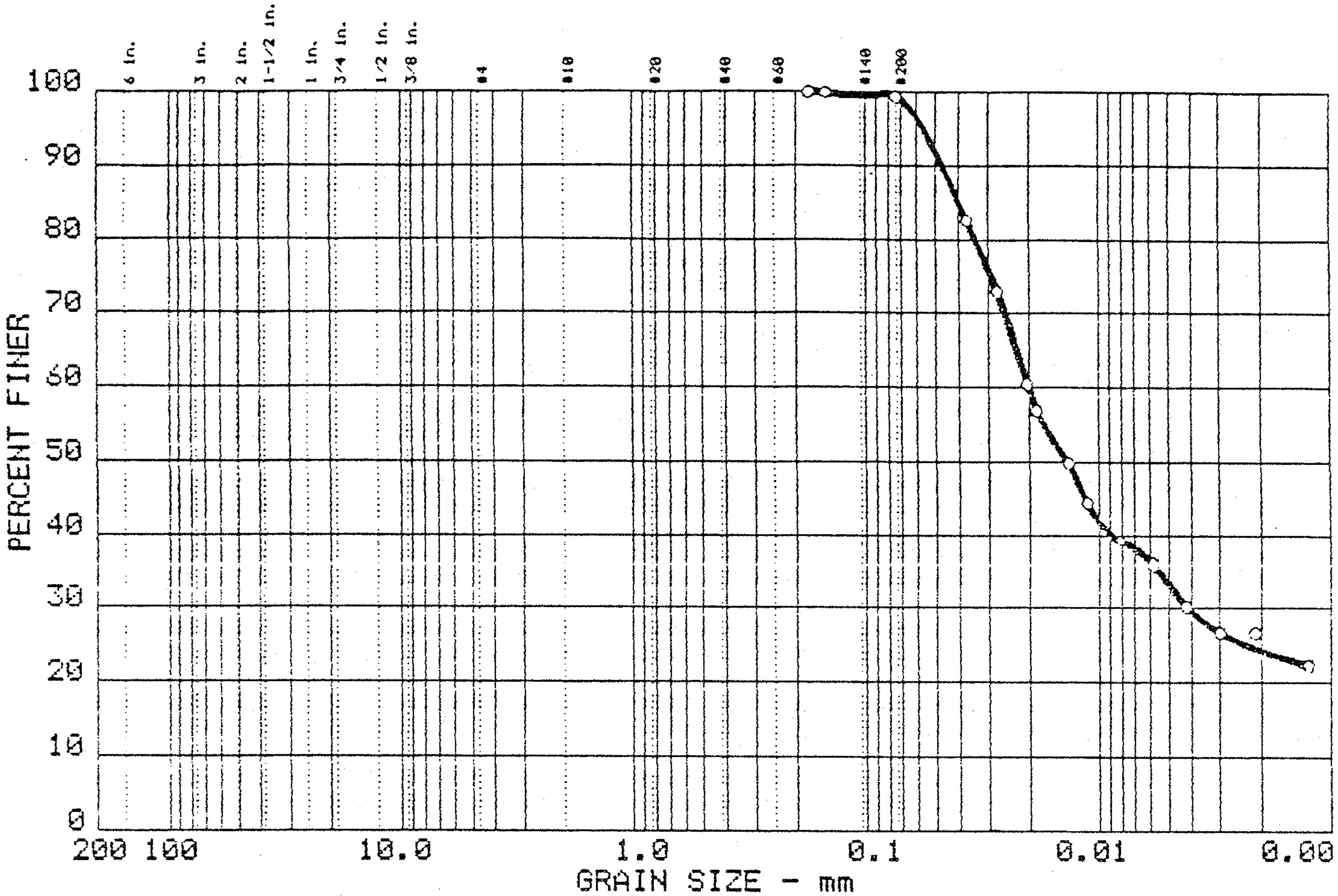
Remarks:
Liquid Limit = 39
Plasticty Index = 16

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 29, 1988 Data Sheet No. K 103

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	10	0.0	0.0	0.6	66.2	33.2	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}			
D_{30}	0.00		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
80	100.0		
100	99.9		
200	99.4		

Sample information:
○Lean Clay

E5 S7 Sample #2

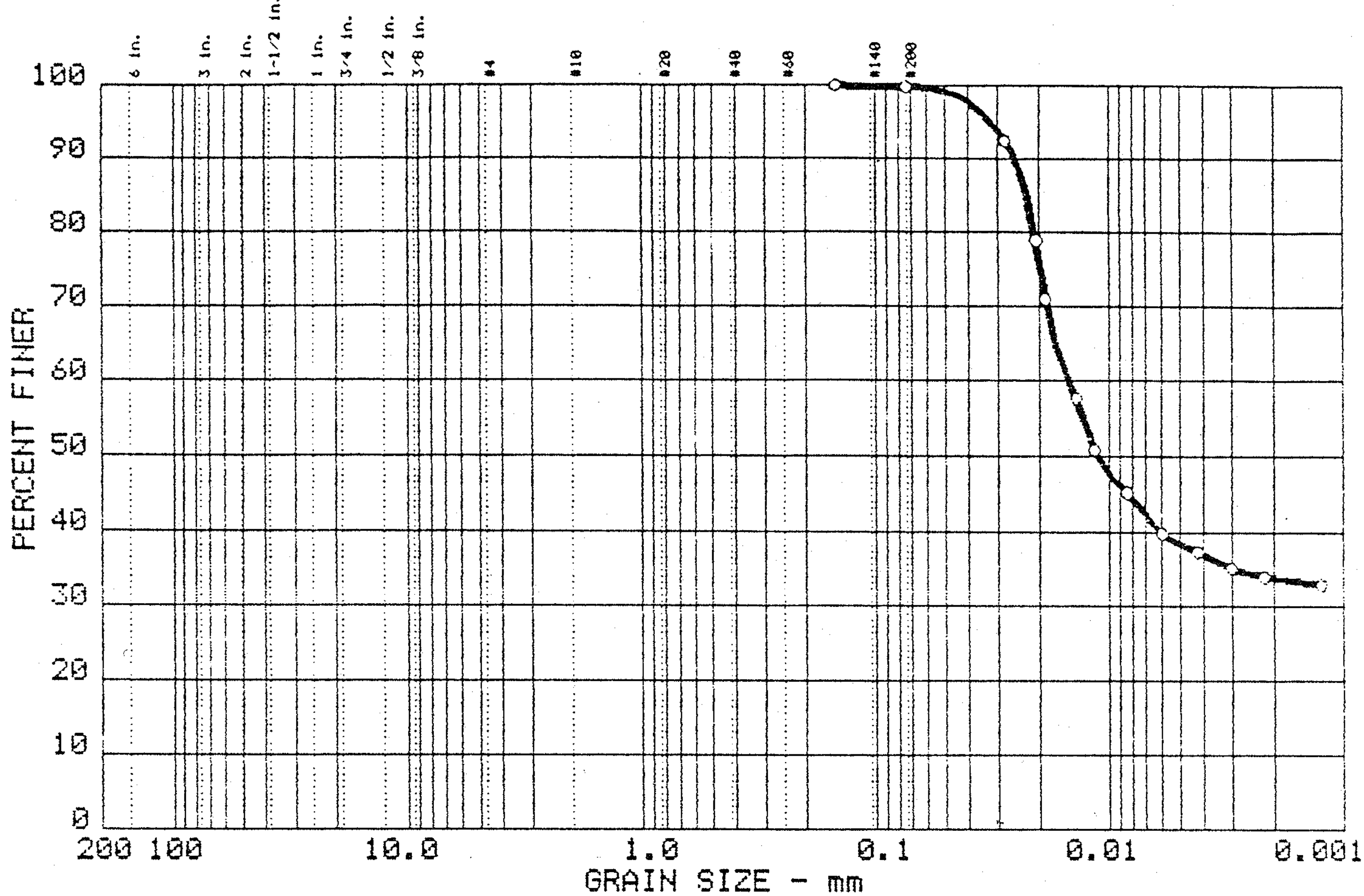
Remarks:
Liquid Limit = 44
Plasticity Index = 20

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 29, 1988 Data Sheet No. K 105

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	9	0.0	0.0	0.2	61.5	38.3	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}			
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
100	100.0		
200	99.8		

Sample information:
○ Lean Clay

E7 S7 Sample #1

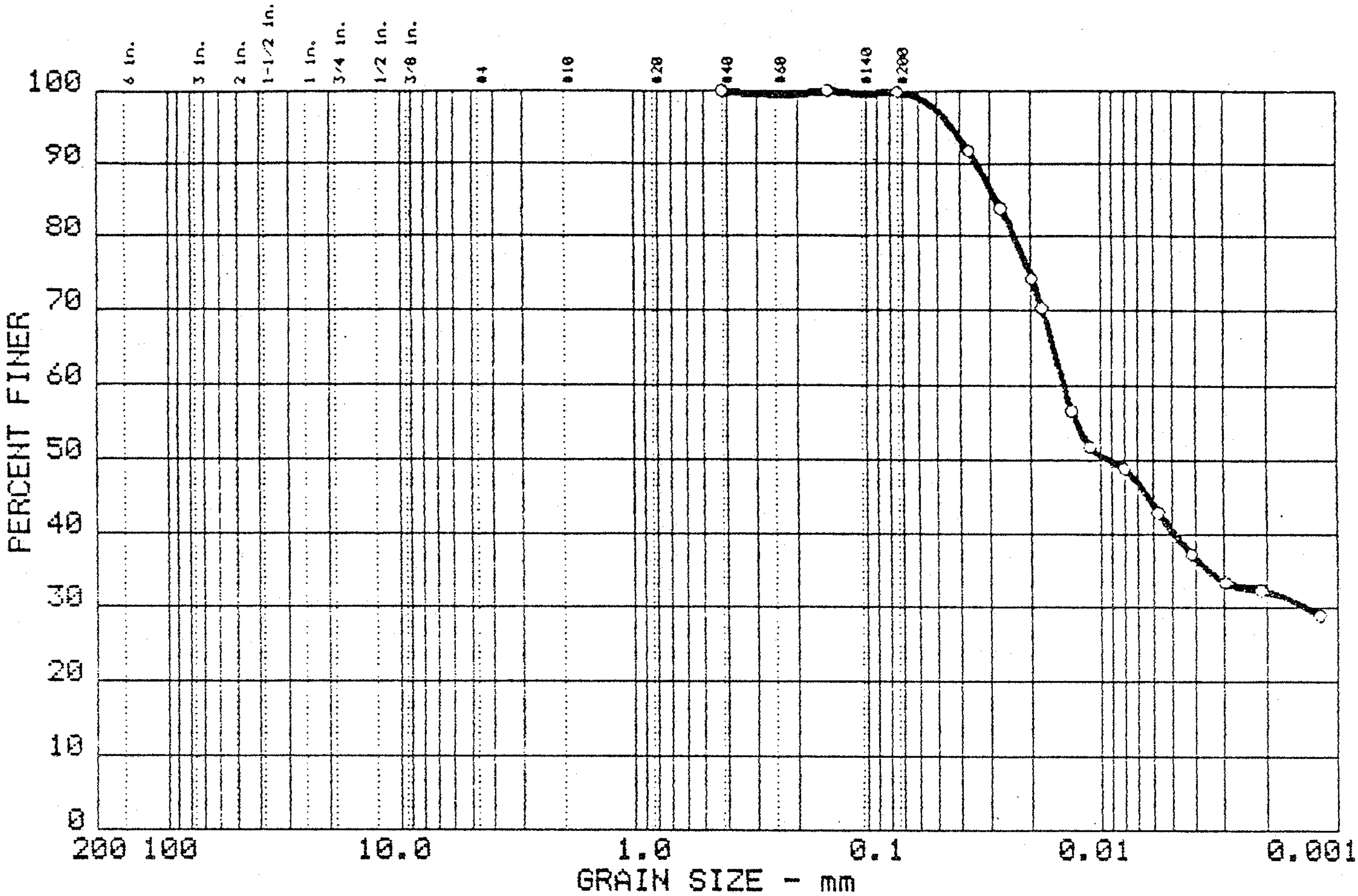
Remarks:
Liquid Limit = 45
Plasticity Index = 21

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 29, 1988 Data Sheet No. K 104

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	11	0.0	0.0	0.1	59.5	40.4	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
100	100.0		
200	99.9		

Sample information:
○ Lean Clay

E7 S7 Sample #2

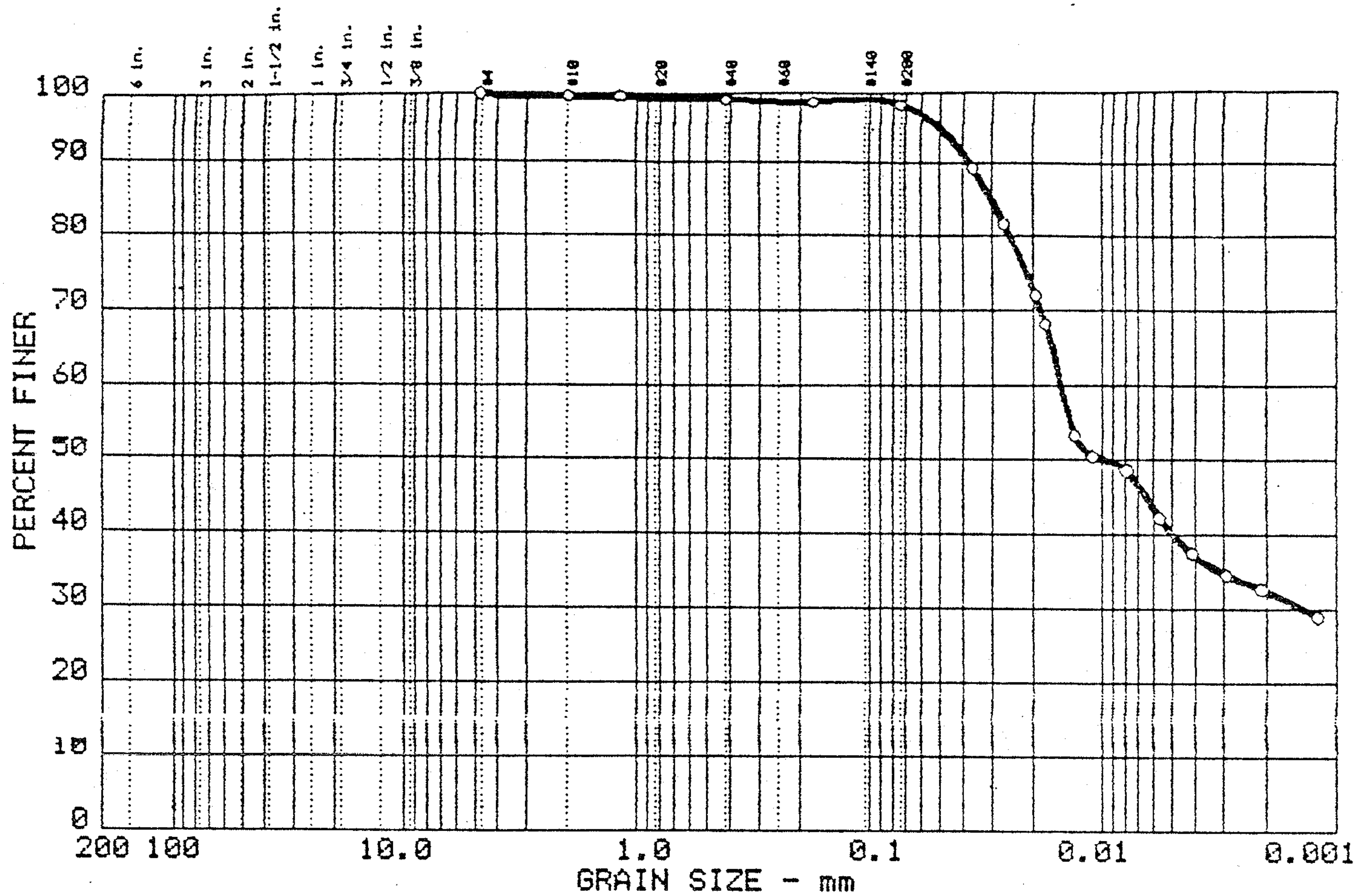
Remarks:
Liquid Limit = 36
Plasticity Index = 15

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 29, 1988 Data Sheet No. K 106

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	17	0.0	0.0	1.7	58.2	40.1	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	100.0		
10	99.7		
16	99.5		
40	99.0		
80	98.7		
200	98.3		

Sample information:
○Lean Clay, trace sand

E21 S7 Sample #1

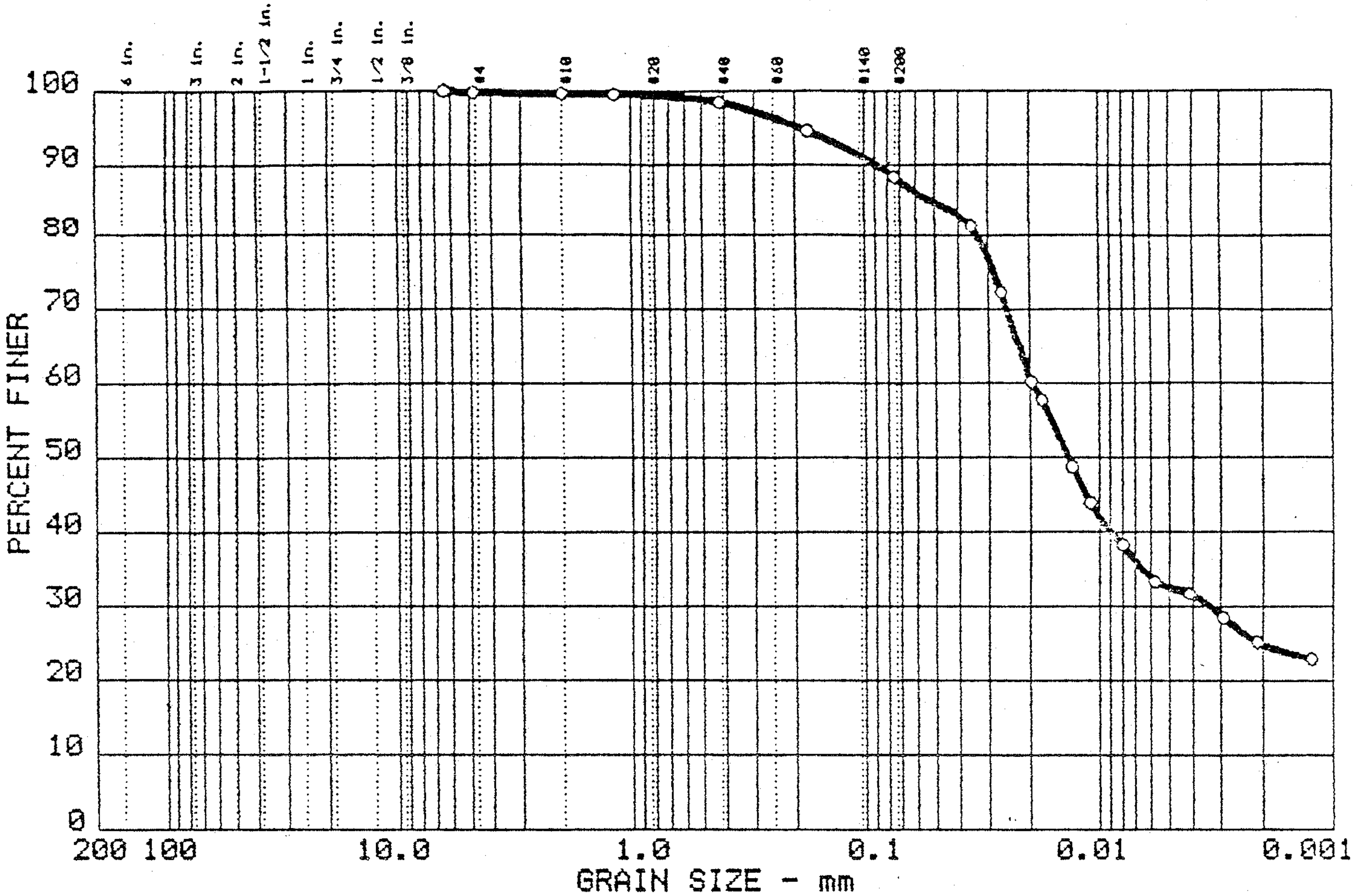
Remarks:
Liquid Limit = 42
Plasticity Index = 18

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 11, 1988 Data Sheet No. K77

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
o	1	0.0	0.2	11.5	55.8	32.5	CL

SIEVE inches size	PERCENT FINER o		
0.25	100.0		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER o		
4	99.8		
10	99.7		
16	99.5		
40	98.5		
80	94.6		
200	88.3		

Sample information:
o Lean Clay, little sand

E21 S7 Sample #2

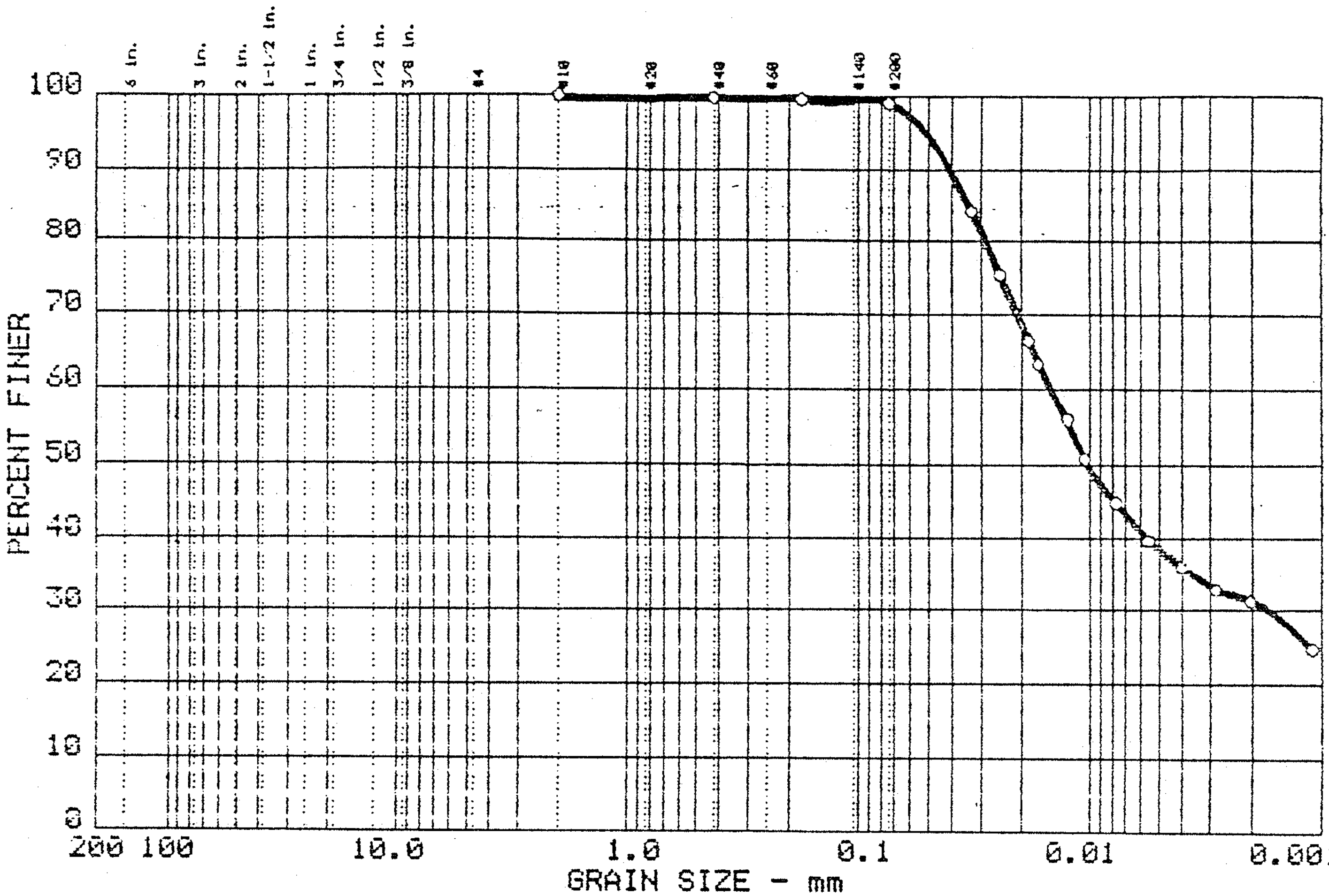
Remarks:
Liquid Limit = 42
Plasticity Index = 25

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 11, 1988 Data Sheet No. K80

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	19	0.0	0.0	0.8	60.9	38.3	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60}	0.00		
D_{30}			
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
40	99.8		
80	99.7		
200	99.2		

Sample information:
○ Lean Clay, trace sand

E23 S7 Sample #1

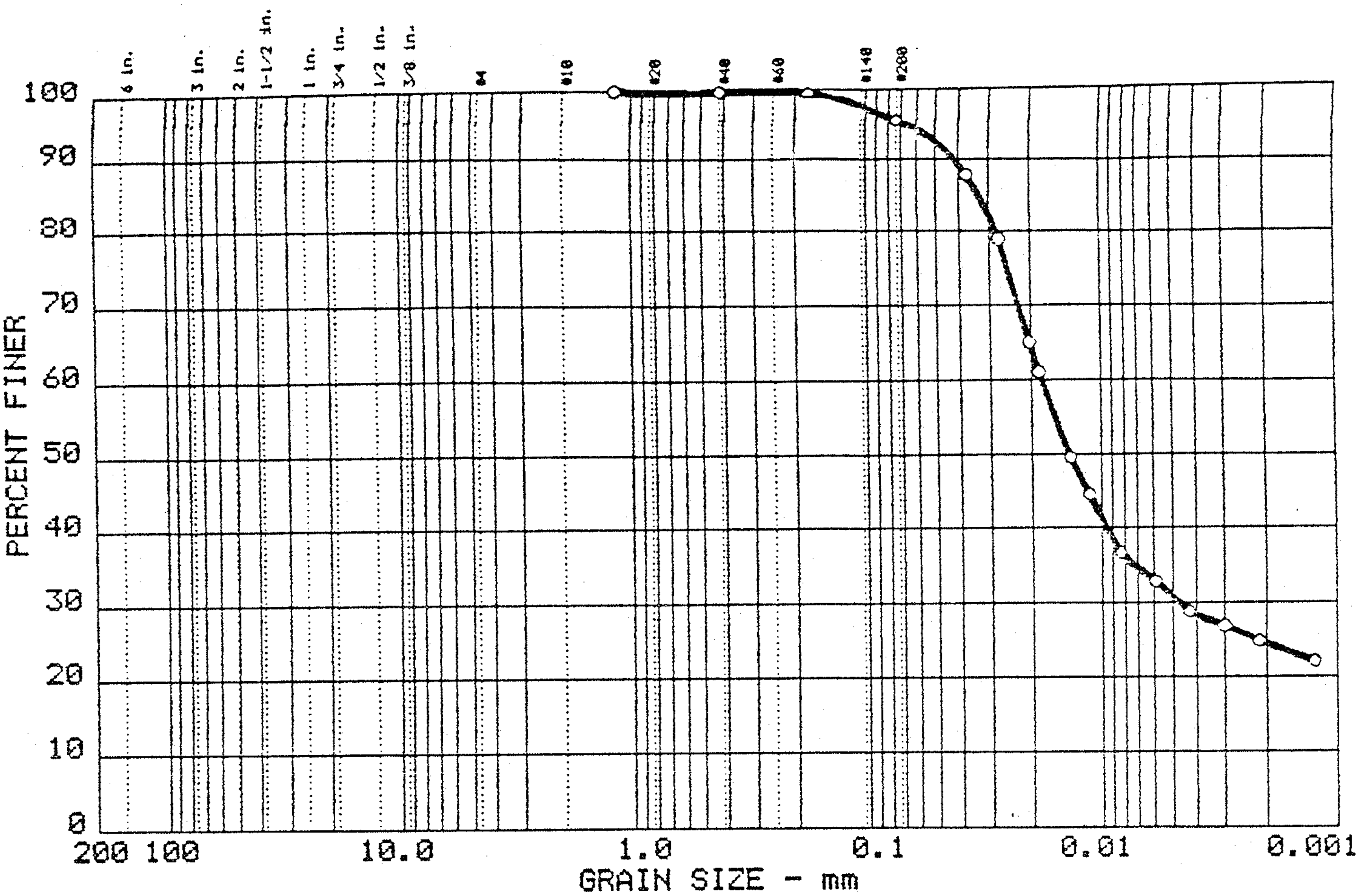
Remarks:
Liquid Limit = 48
Plasticity Index = 24

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 11, 1988 Data Sheet No. K78

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	2	0.0	0.0	4.6	64.7	30.7	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.8		
80	99.5		
200	95.4		

Sample information:
○Lean Clay, trace sand

E23 S7 Sample #2

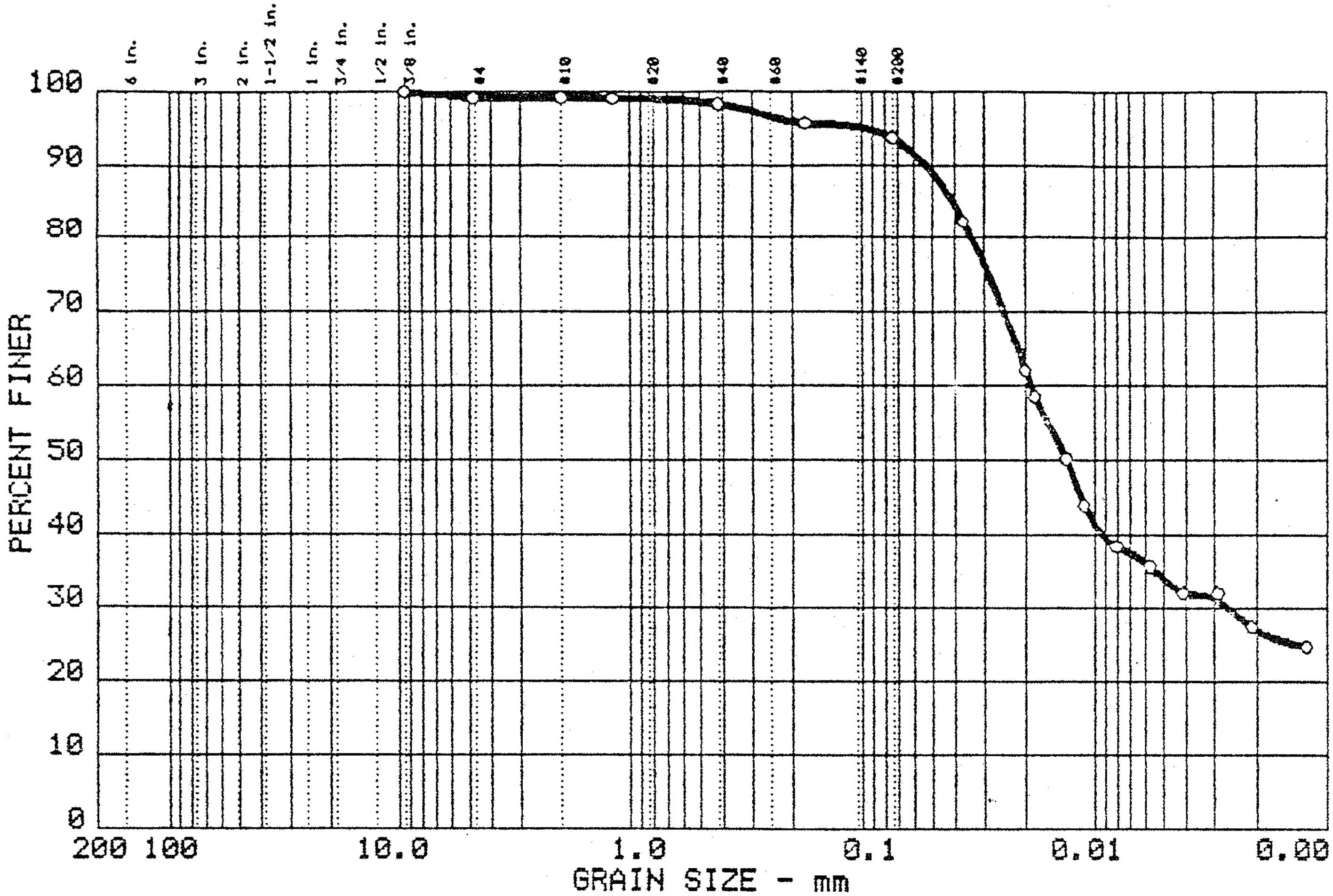
Remarks:
Liquid Limit = 32
Plasticity Idex = 13

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 11, 1988 Data Sheet No. K81

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	20	0.0	0.7	5.5	59.9	33.9	CL

SIEVE inches size	PERCENT FINER ○		
0.375	100.0		

	GRAIN SIZE		
D_{60}	0.00		
D_{30}			
D_{10}			

	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
4	99.3		
10	99.2		
16	99.1		
40	98.4		
80	95.8		
200	93.7		

Sample information:
○ Lean Clay, little sand

E25 S7 Sample #1

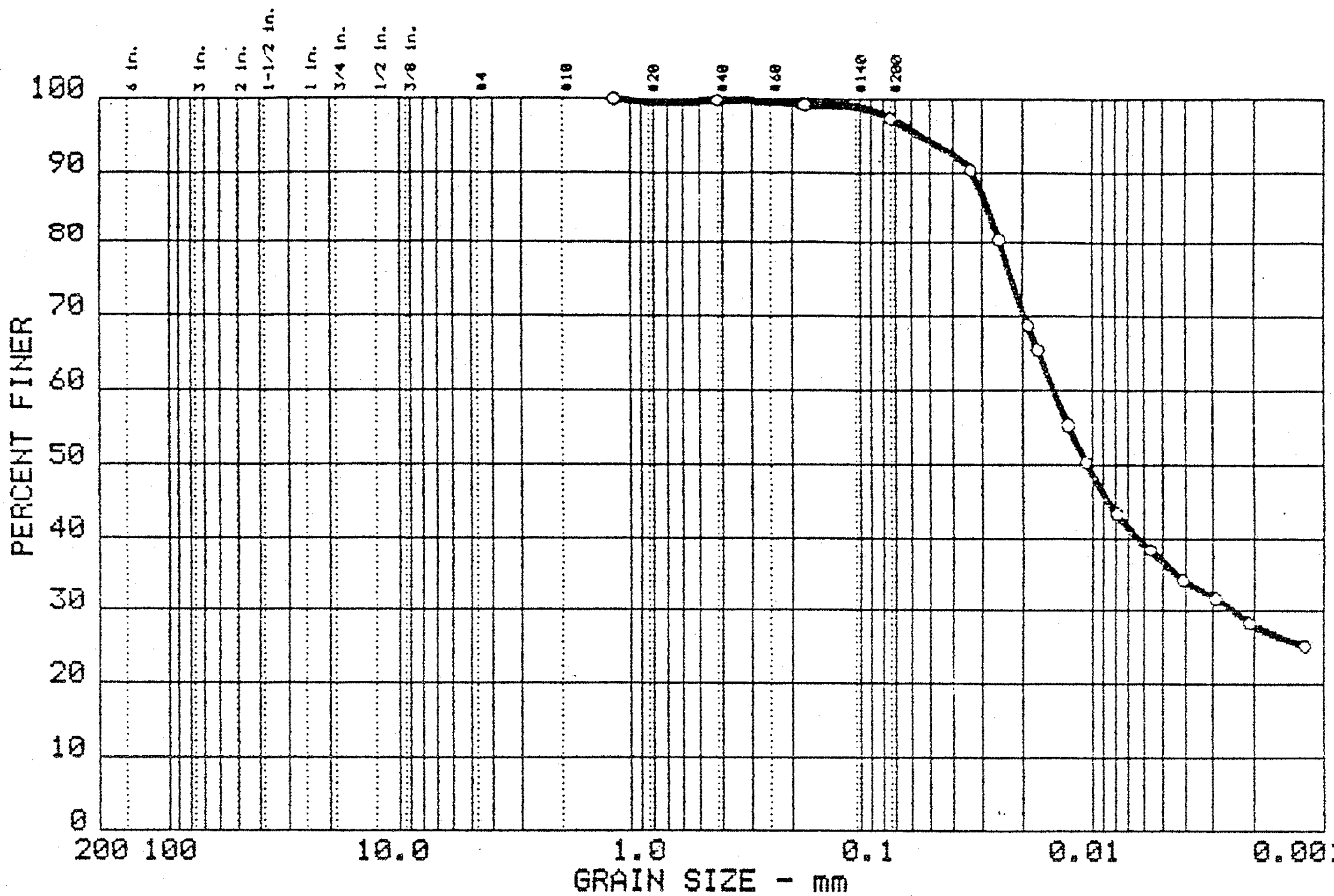
Remarks:
Liquid Limit = 49
Plasticity Index = 29

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 11, 1988 Data Sheet No. K79

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	3	0.0	0.0	2.5	60.8	36.7	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.9		
80	99.3		
200	97.5		

Sample information:
○ Lean Clay, trace sand

E25 S7 Sample #2

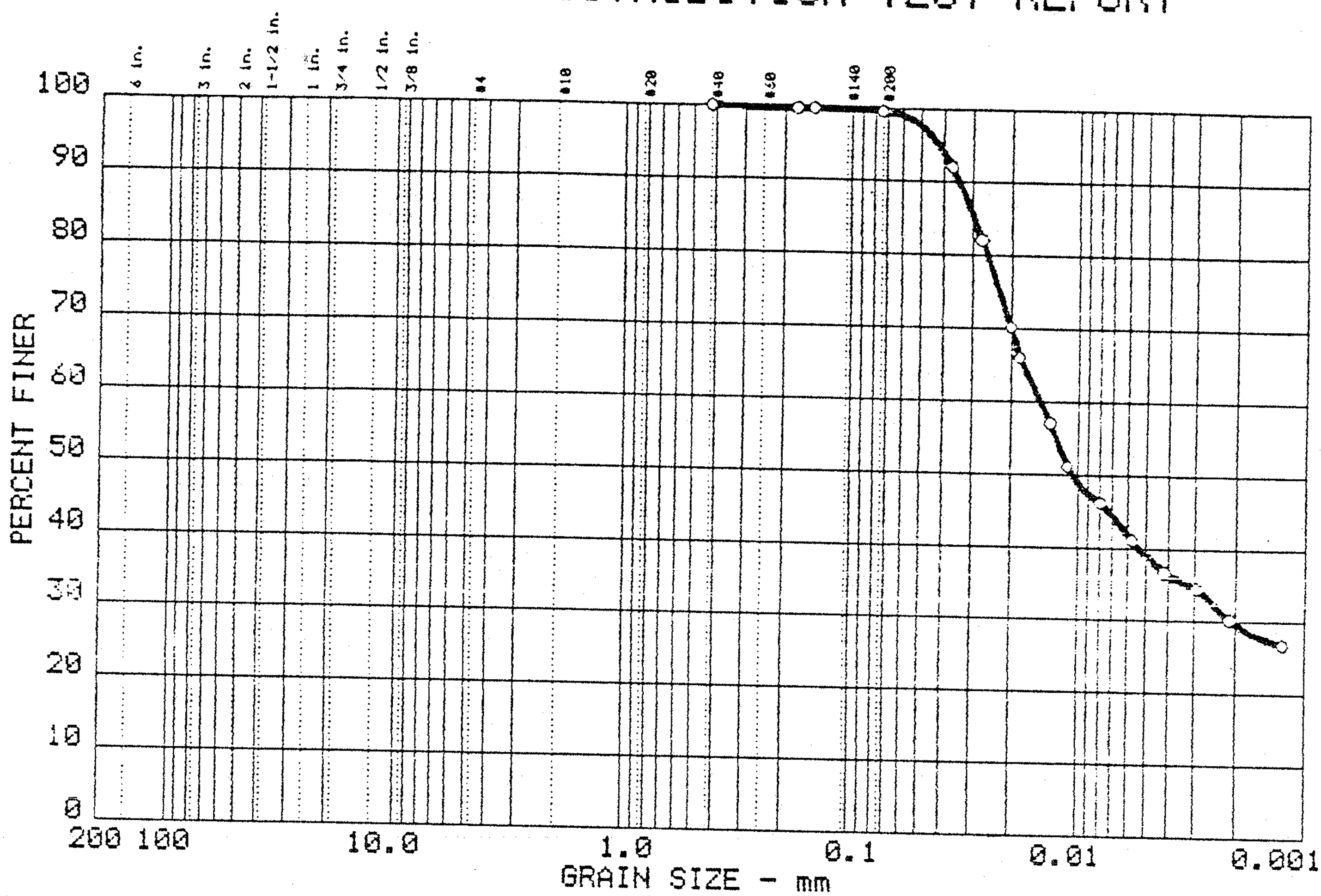
Remarks:
Liquid Limit = 34
Plasticity Index = 14

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 11, 1988 Data Sheet No. K82

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	12	0.0	0.0	0.4	61.0	38.6	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
80	99.8		
100	99.8		
200	99.6		

Sample information:
○Lean Clay

E5 S9 Sample #1

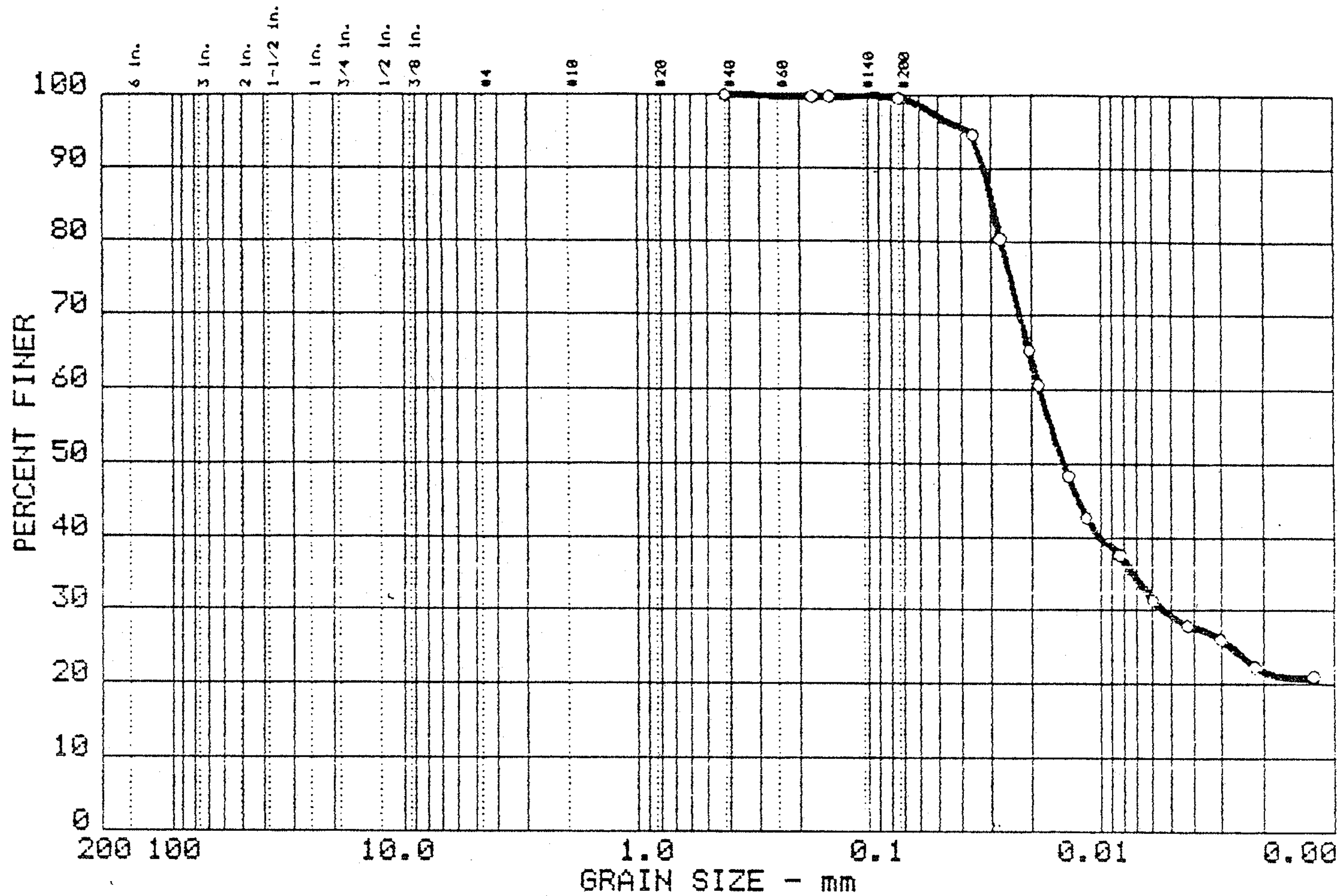
Remarks:
Liquid Limit = 43
Plasticity Index = 17

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 29, 1988 Data Sheet No. K 107

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	14	0.0	0.0	0.4	70.4	29.2	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.01		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
80	99.8		
100	99.8		
200	99.6		

Sample information:
○ Lean Clay,
trace sand
E5 S9 Sample #2

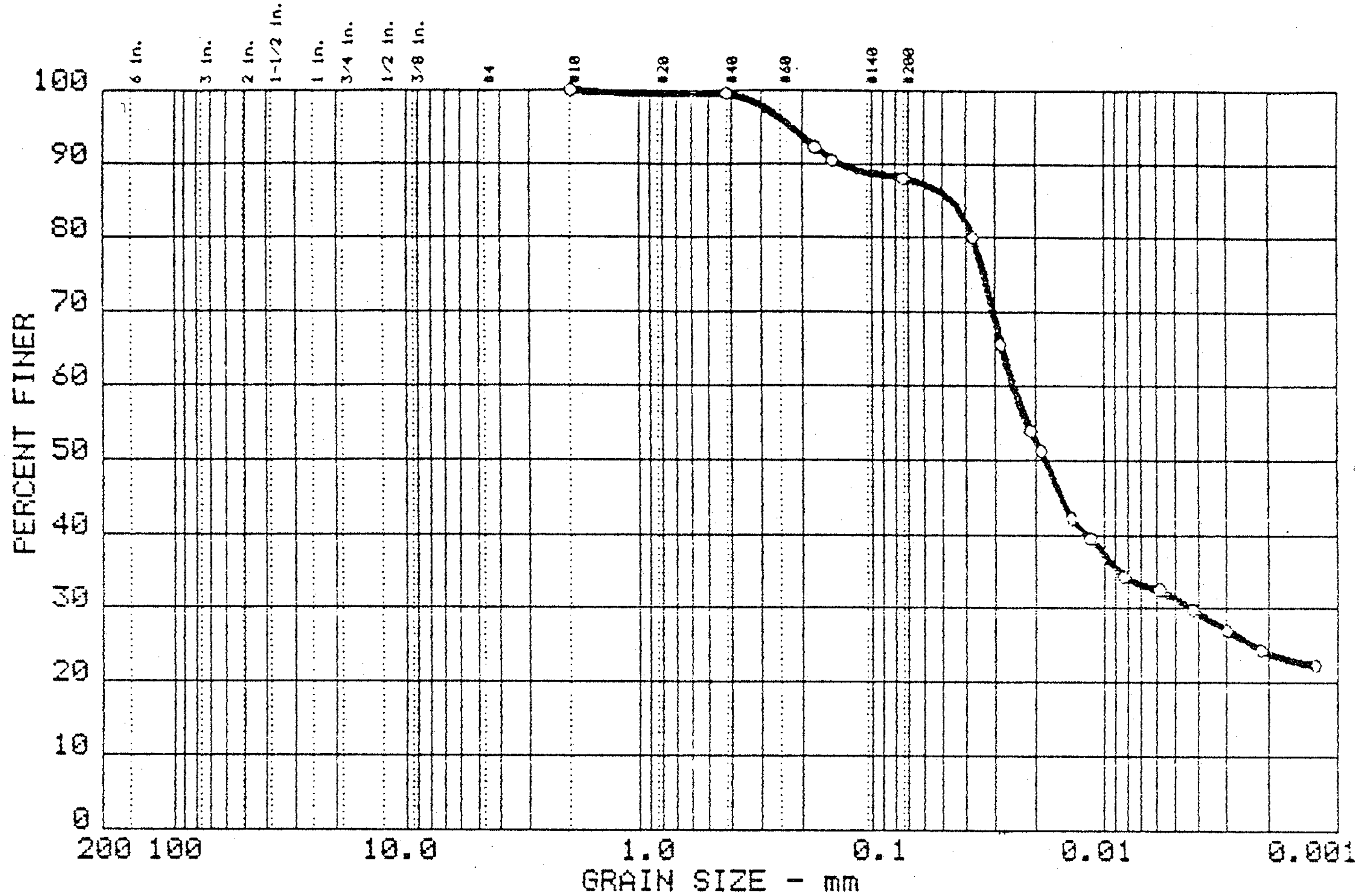
Remarks:
Liquid Limit = 34
Plasticity Index = 12

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 29, 1988 Data Sheet No. K 109

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	13	0.0	0.0	11.8	56.8	31.4	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}			
D_{30}	0.00		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
40	99.6		
80	92.4		
100	90.5		
200	88.2		

Sample information:
○Lean Clay,
little sand
E7 S9 Sample #1

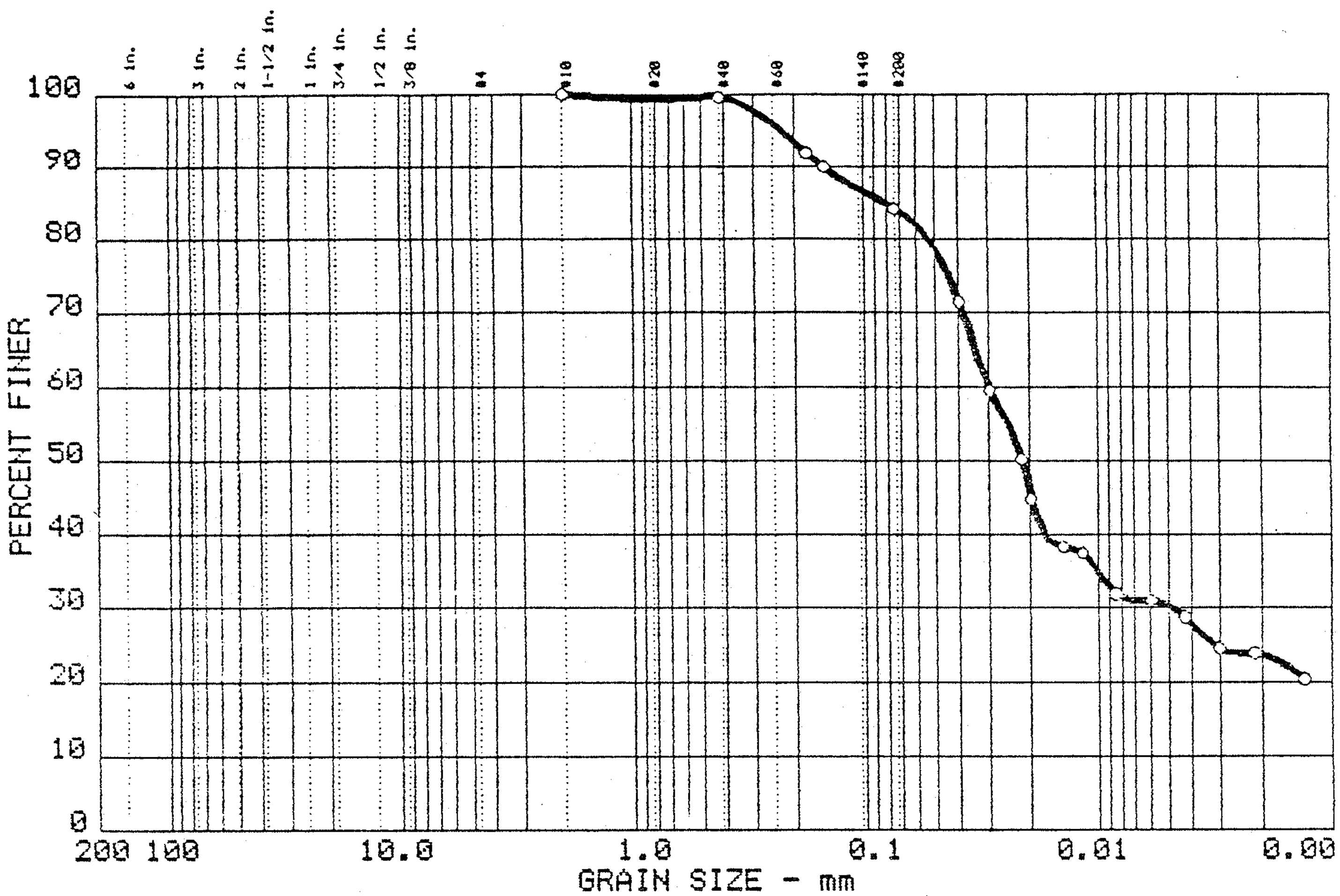
Remarks:
Liquid Limit = 41
Plasticity Index = 18

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 29, 1988 Data Sheet No. K 108

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	15	0.0	0.0	15.7	54.0	30.3	CL

SIEVE inches size	PERCENT FINER ○		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
40	99.7		
80	91.9		
100	89.9		
200	84.3		

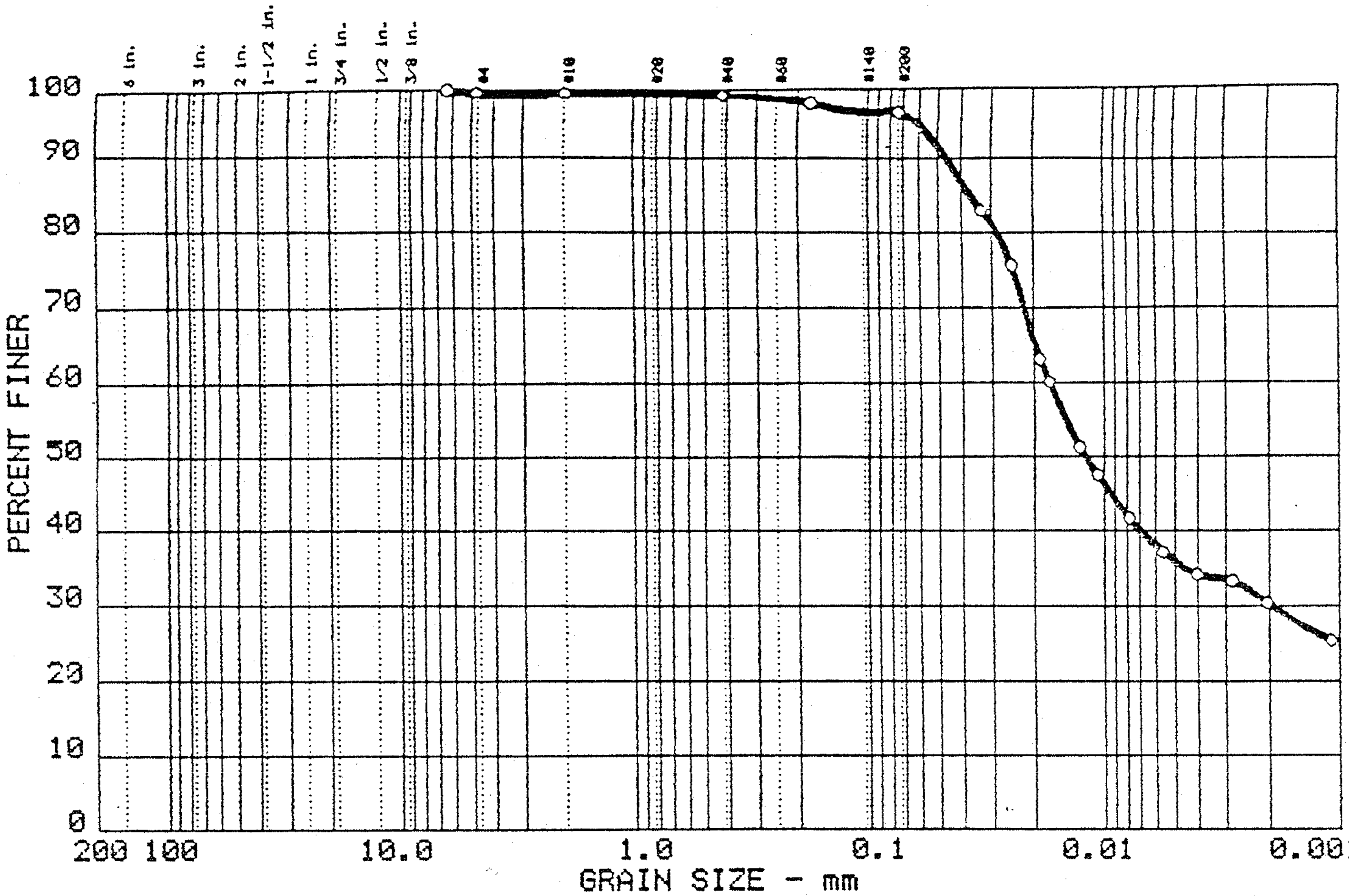
Sample information:
○Lean Clay,
little sand
E7 S9 Sample #2

Remarks:
Liquid Limit = 42
Plasticity Index = 19

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill
Date: August 29, 1988 Data Sheet No. K110

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	4	0.0	0.4	2.9	60.7	36.0	CL

SIEVE inches size	PERCENT FINER ○		
0.25	100.0		

	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		

	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	99.6		
10	99.5		
40	99.2		
80	97.9		
200	96.6		

Sample information:
○ Lean Clay, trace sand

E21 S9 Sample #1

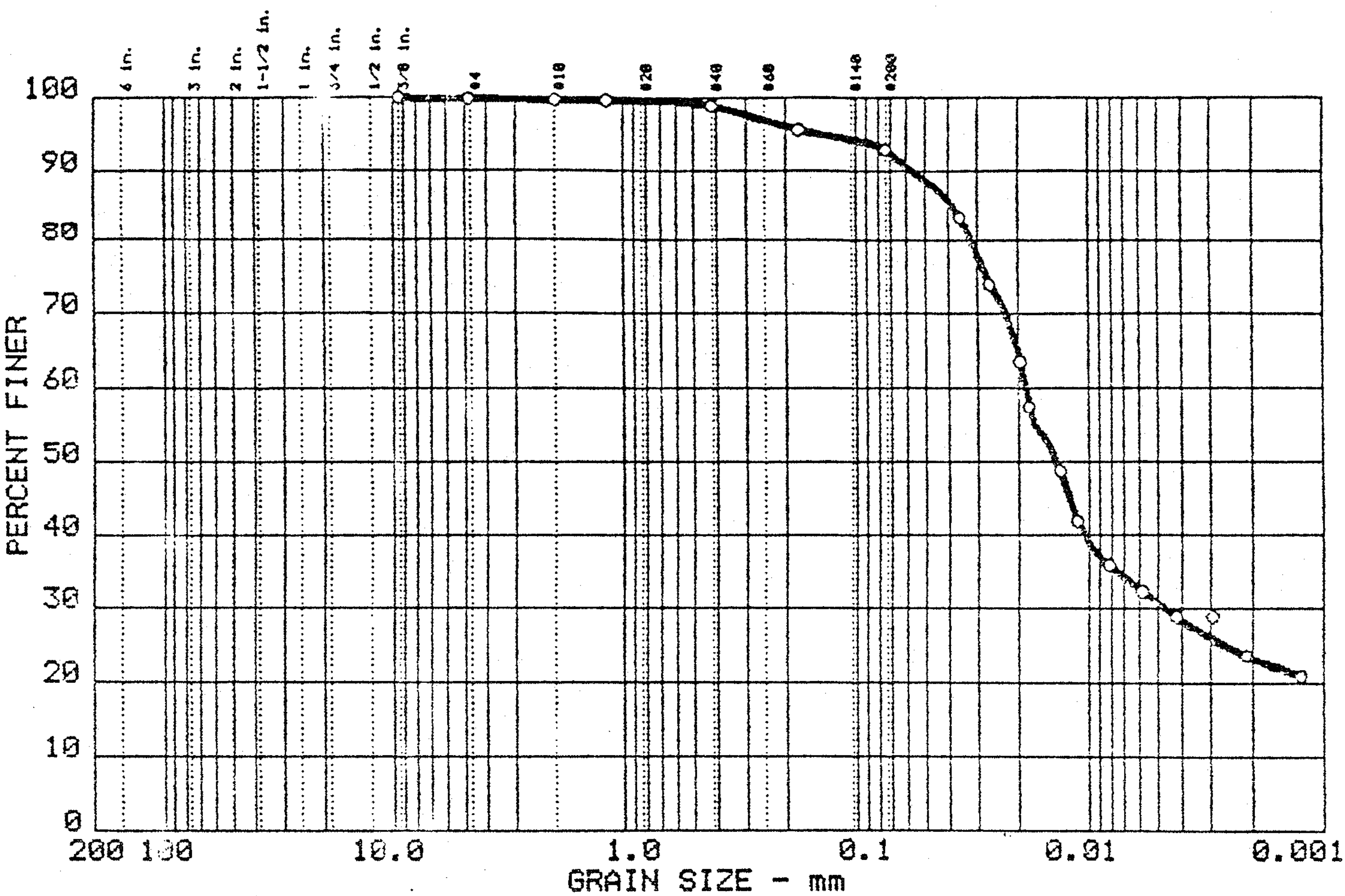
Remarks:
Liquid Limit = 49
Plasticity Index = 23

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 11, 1988 Data Sheet No. K83

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	10	0.0	0.2	6.9	62.2	30.7	CL

SIEVE inches size	PERCENT FINER ○		
0.375	100.0		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	99.8		
10	99.7		
16	99.6		
40	98.9		
80	95.7		
200	92.9		

Sample information:
○Lean Clay, little sand

E21 S9 Sample #2

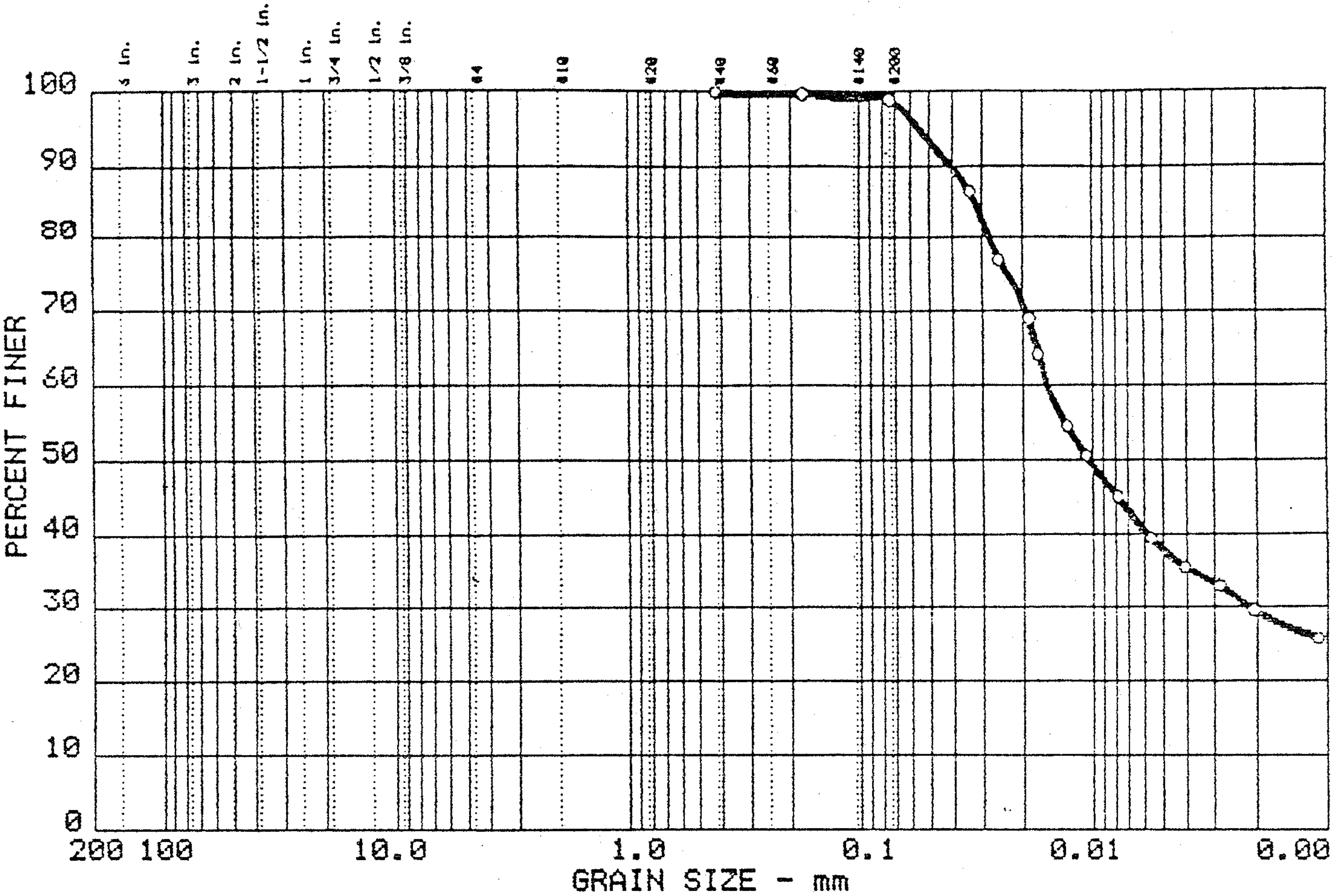
Remarks:
Liquid Limit = 41
Plasticity Index = 18

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 11, 1988 Data Sheet No. K86

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	5	0.0	0.0	1.0	61.4	37.6	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
40	100.0		
80	99.6		
200	99.0		

Sample information:
○Lean Clay, trace sand

E23 S9 Sample #1

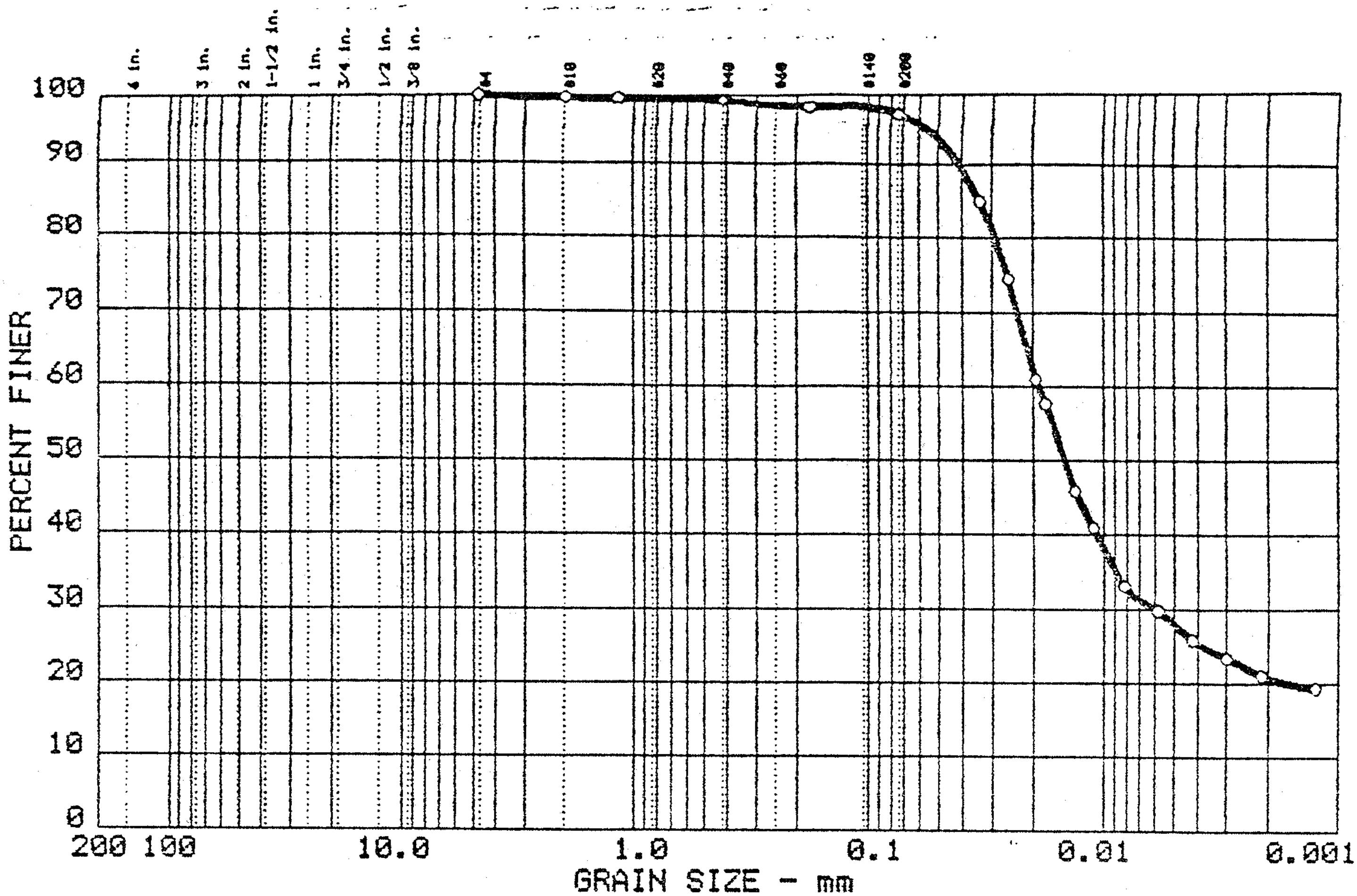
Remarks:
Liquid Limit = 45
Plasticity Index = 20

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 11, 1988 Data Sheet No. K84

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	11	0.0	0.0	2.8	69.2	28.0	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.01		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	100.0		
10	99.7		
16	99.6		
40	99.3		
80	98.2		
200	97.2		

Sample information:
○Lean Clay, trace sand

E23 S9 Sample #2

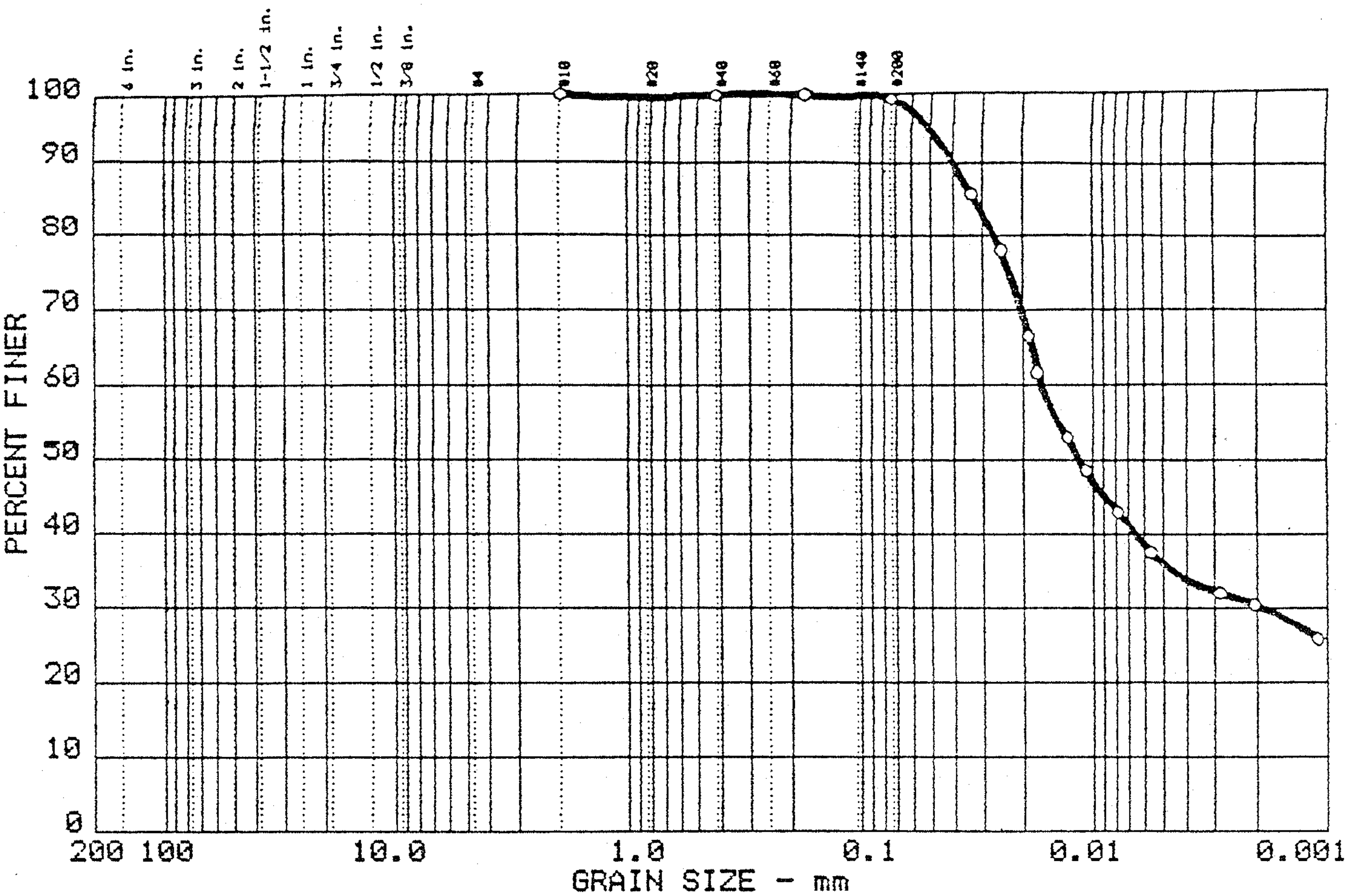
Remarks:
Liquid Limit = 32
Plasticity Index = 10

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 11, 1988 Data Sheet No. K87

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	6	0.0	0.0	0.8	63.3	35.9	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
40	99.9		
80	99.8		
200	99.2		

Sample information:
○ Lean Clay, trace sand

E25 S9 Sample #1

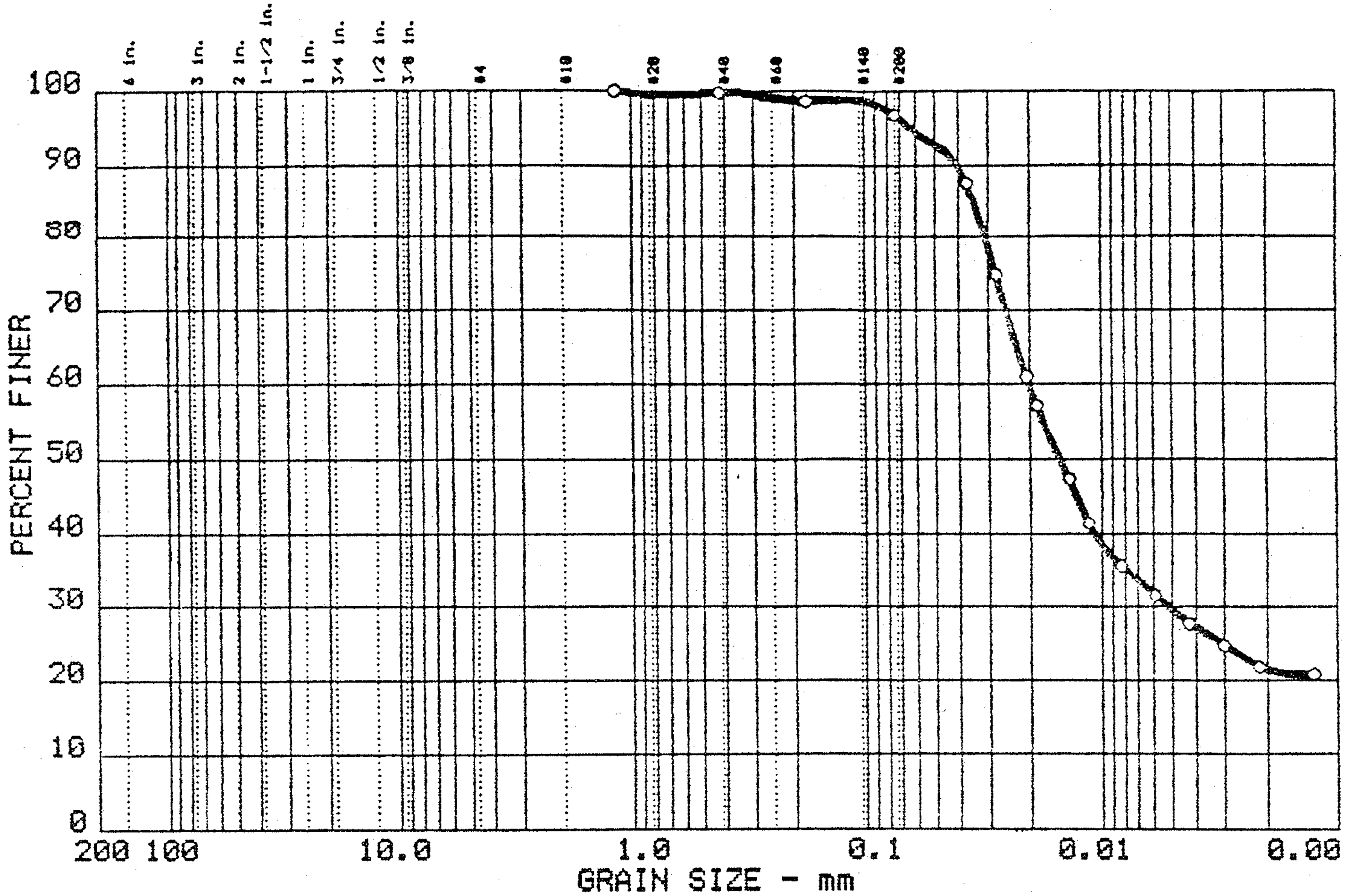
Remarks:
Liquid Limit = 49
Plasticity Index = 25

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 11, 1988 Data Sheet No. K85

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	12	0.0	0.0	3.2	67.2	29.6	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}	0.01		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
40	99.9		
80	98.6		
200	96.8		

Sample information:
○Lean Clay, trace sand

E25 S9 Sample #2

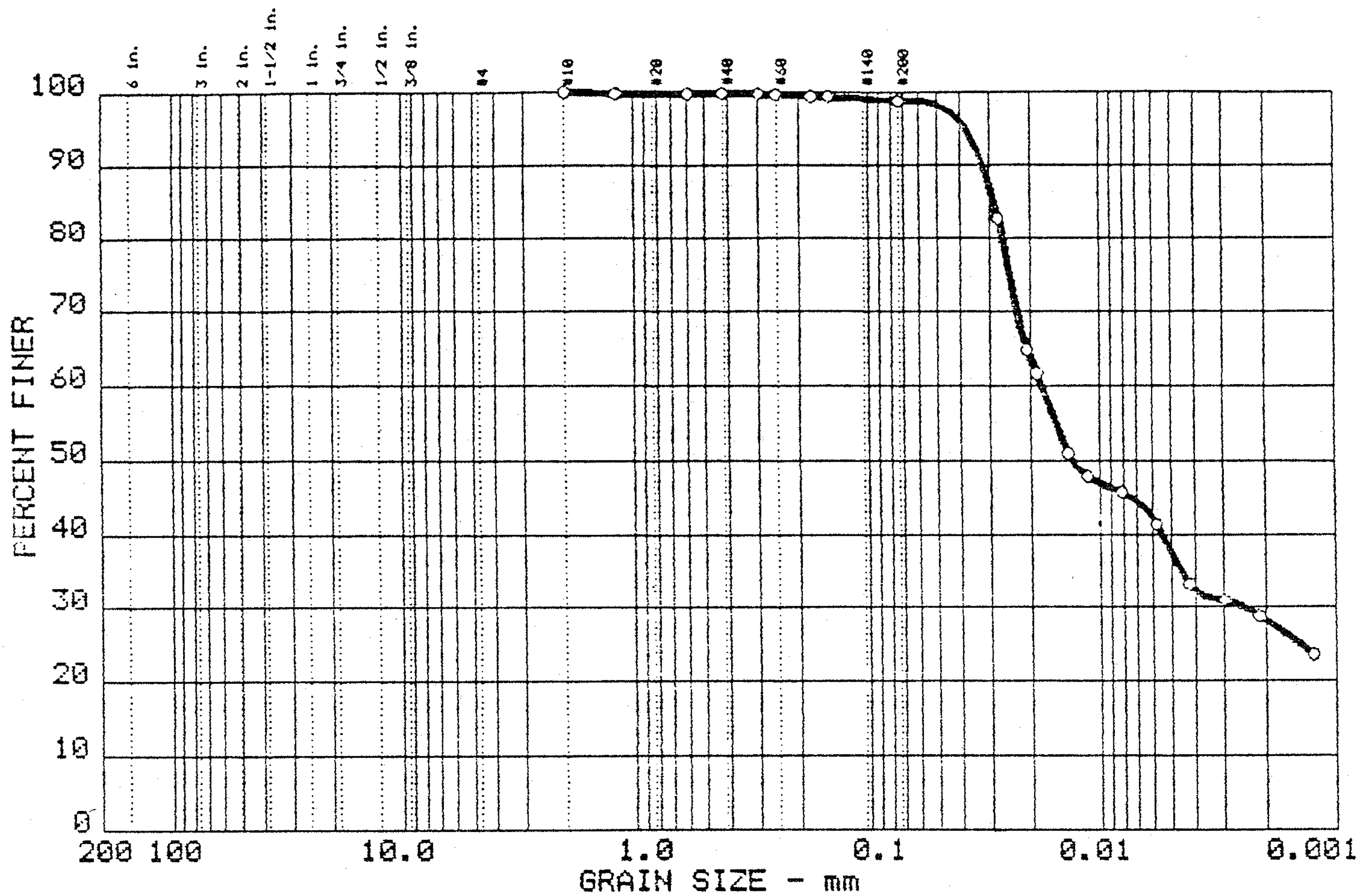
Remarks:
Liquid Limit = 30
Plasticity Index = 8

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 11, 1988 Data Sheet No. K88

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	17	0.0	0.0	1.2	61.4	37.4	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60}	0.00		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
10	100.0		
16	99.9		
30	99.9		
40	99.8		
50	99.7		
60	99.7		
80	99.4		
100	99.4		
200	98.8		

Sample information:
○Lean Clay,
trace sand
E21 S11 Sample #1

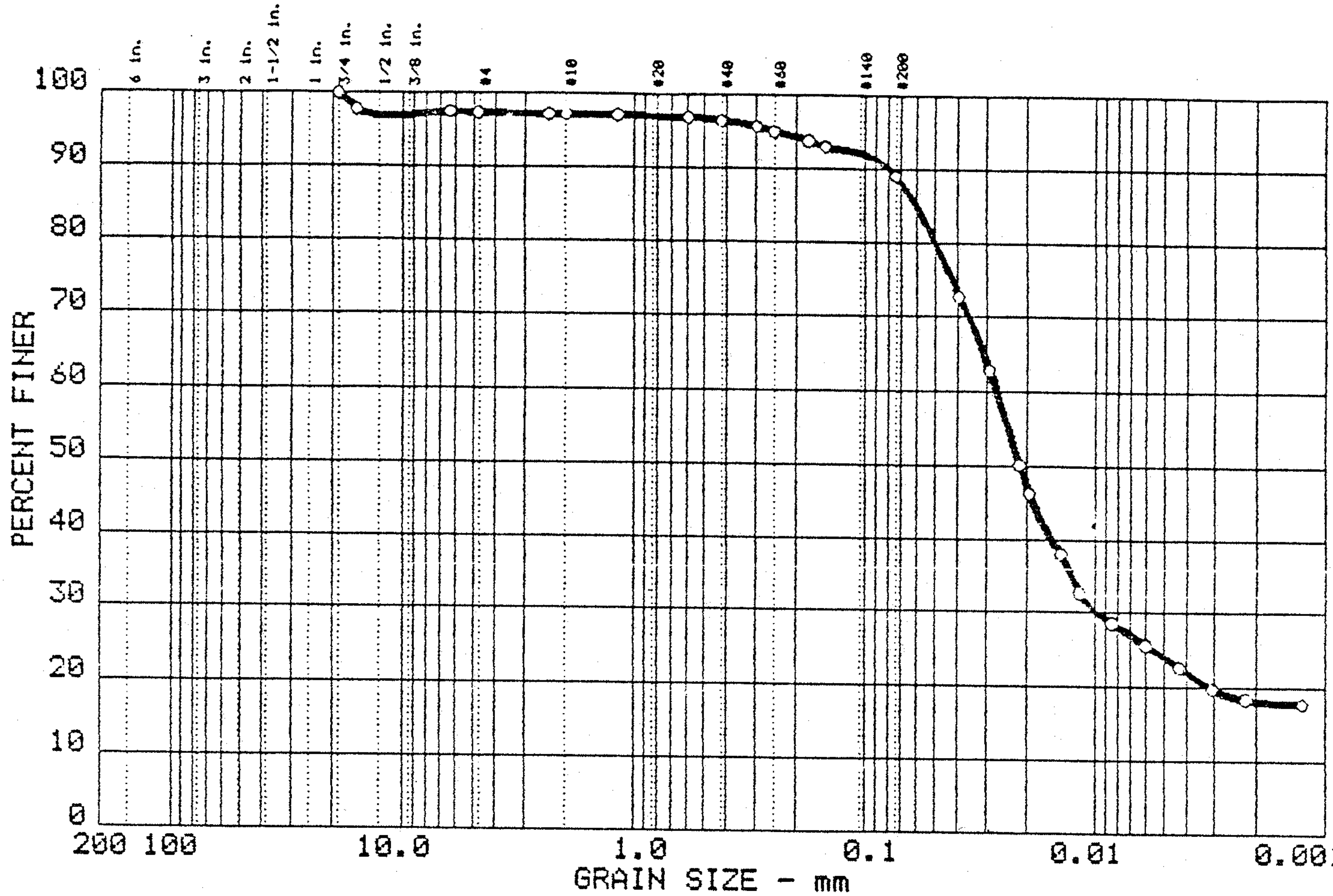
Remarks:
Liquid Limit = 41
Plasticity Index = 26

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 29, 1988 Data Sheet No. K 111

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	18	0.0	2.7	8.2	65.0	24.1	CL

SIEVE inches size	PERCENT FINER ○		
0.75	100.0		
0.625	97.7		
0.25	97.4		
	GRAIN SIZE		
D_{60}			
D_{30}	0.01		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
4	97.3		
8	97.2		
10	97.2		
16	97.1		
30	96.9		
40	96.5		
50	95.7		
60	95.1		
80	93.8		
100	93.0		
200	89.1		

Sample information:
○ Lean Clay, little sand
E21 S11 Sample #2

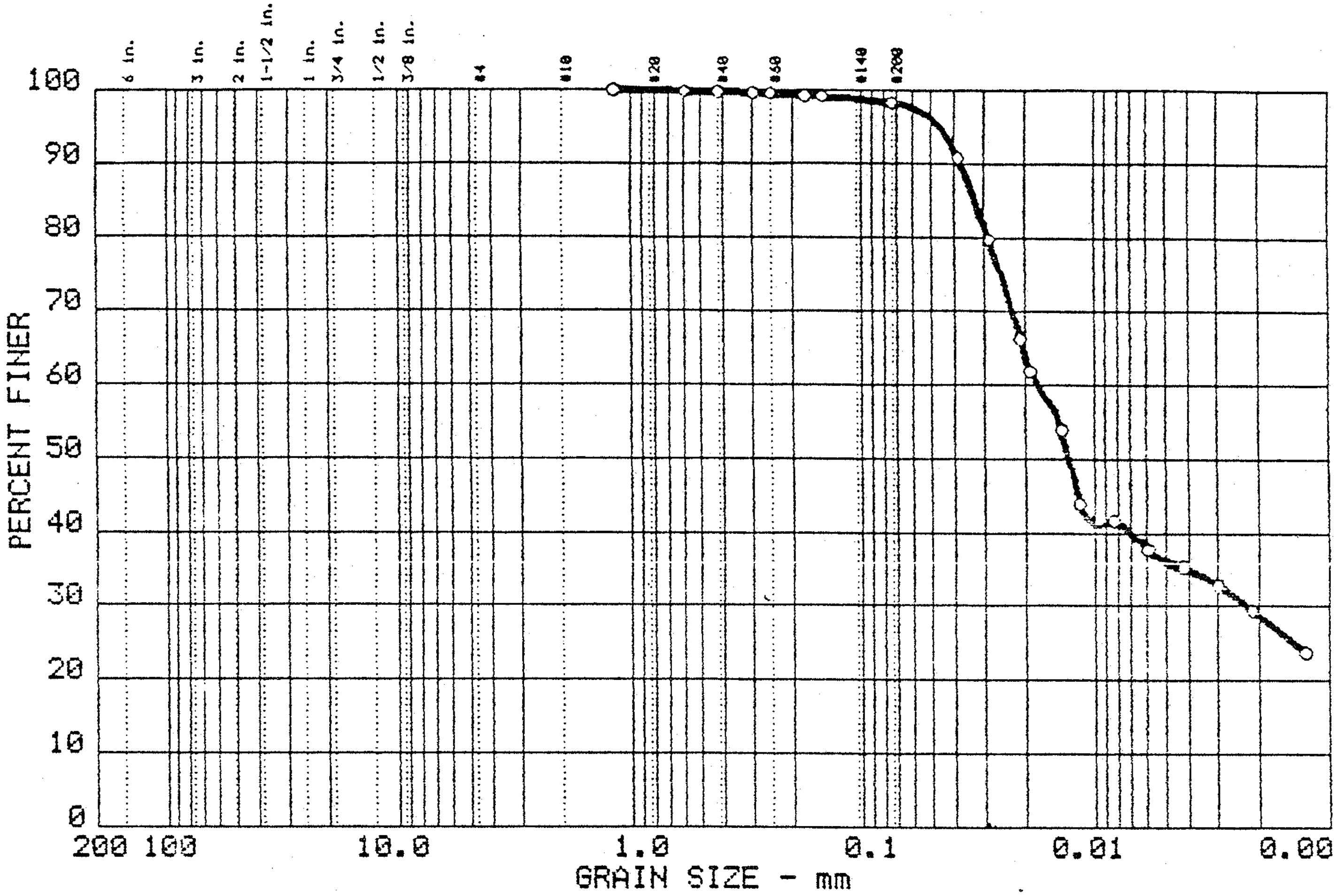
Remarks:
Liquid Limit = 33
Plasticity Index = 13

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 29, 1988 Data Sheet No. K 113

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	16	0.0	0.0	1.7	62.6	35.7	CL

SIEVE inches size	PERCENT FINER ○		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
16	100.0		
30	99.9		
40	99.8		
50	99.7		
60	99.5		
80	99.2		
100	99.1		
200	98.3		

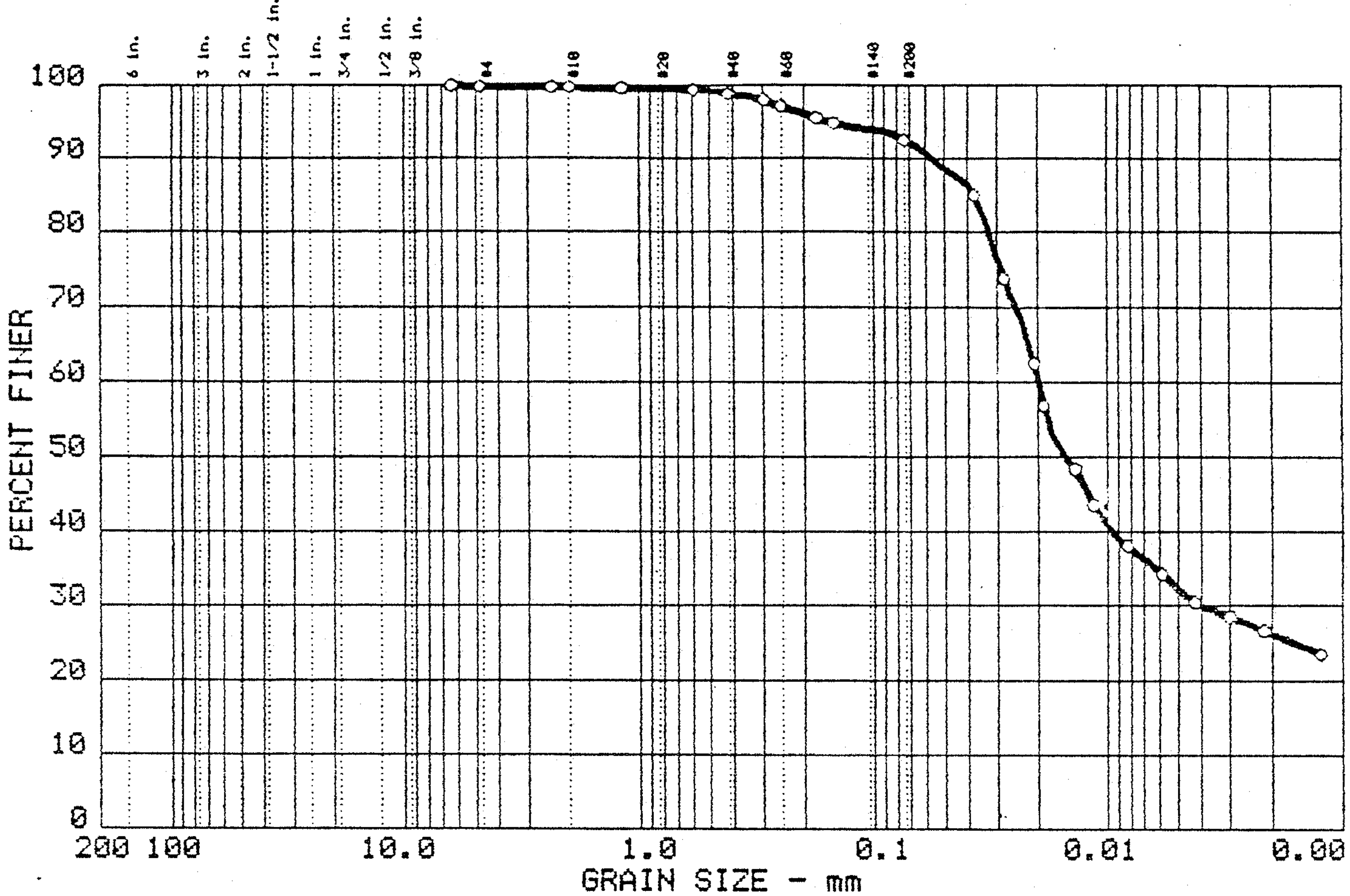
Sample information:
○Lean Clay,
trace sand
E23 S11 Sample #1

Remarks:
Liquid Limit = 44
Plasticity Index = 21

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill
Date: August 29, 1988 Data Sheet No. K 112

PARTICLE SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS
○	19	0.0	0.1	7.3	60.4	32.2	ML

SIEVE inches size	PERCENT FINER ○		
0.25	100.0		
	GRAIN SIZE		
D_{60} D_{30} D_{10}	0.00		
	COEFFICIENTS		
C_c C_u			

SIEVE number size	PERCENT FINER ○		
4	99.9		
8	99.8		
10	99.7		
16	99.6		
30	99.4		
40	98.9		
50	97.9		
60	97.1		
80	95.5		
100	94.8		
200	92.6		

Sample information:
○ Silt, little sand

E23 S11 Sample #2

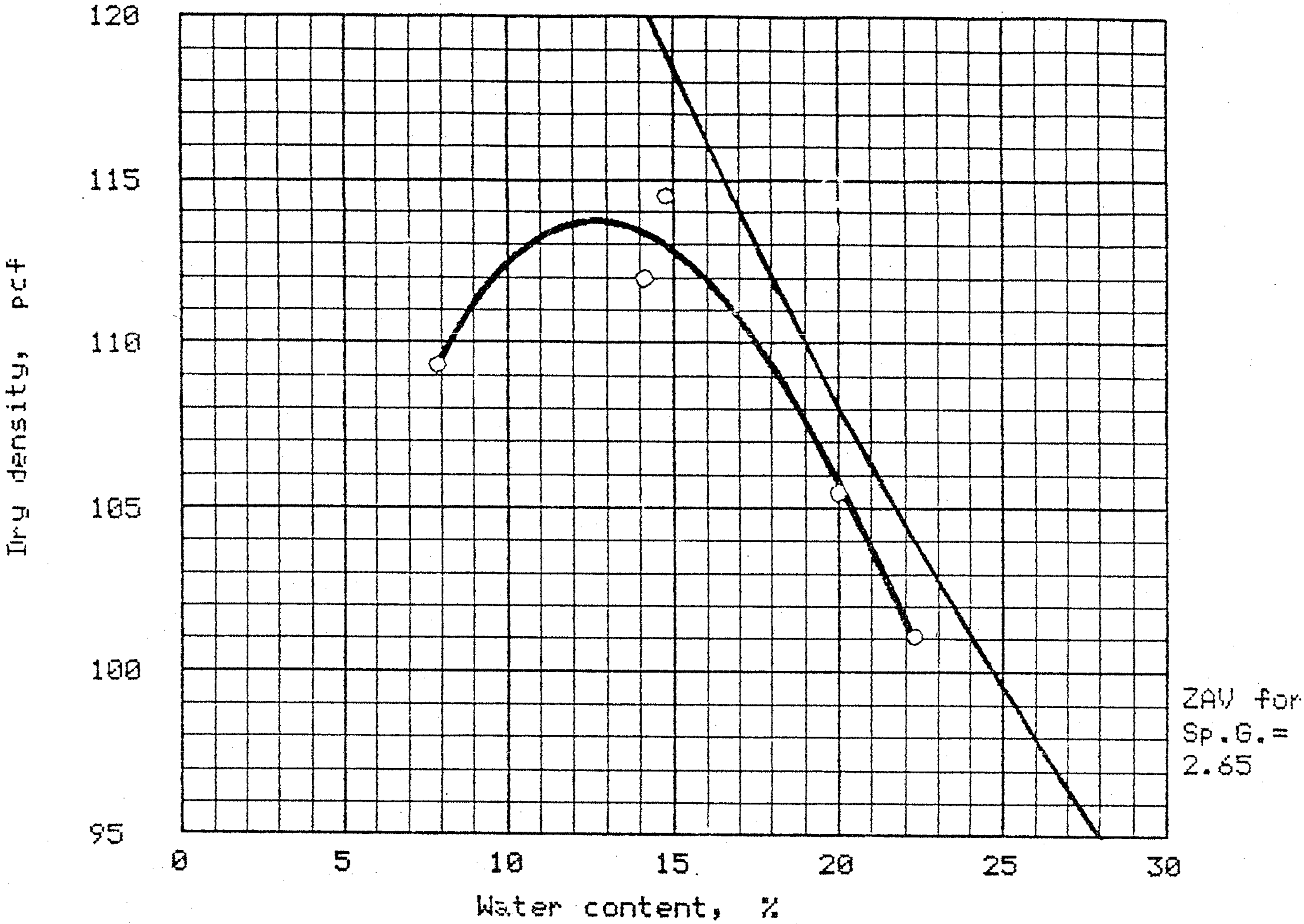
Remarks:
Liquid Limit = 34
Plasticity Index = 10

SOILS & ENGINEERING SERVICES, INC.

Project No.: 8721
Project: Dane County Landfill

Date: August 29, 1988 Data Sheet No. K 114

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	CL			36	16	0.0 %	0.1 %	79.8 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 12.7 % Maximum dry density = 113.7 pcf	Sandy Lean Clay

Project No.: 8721
Project: Dane County Landfill
Location: E1 S3 Sample #1

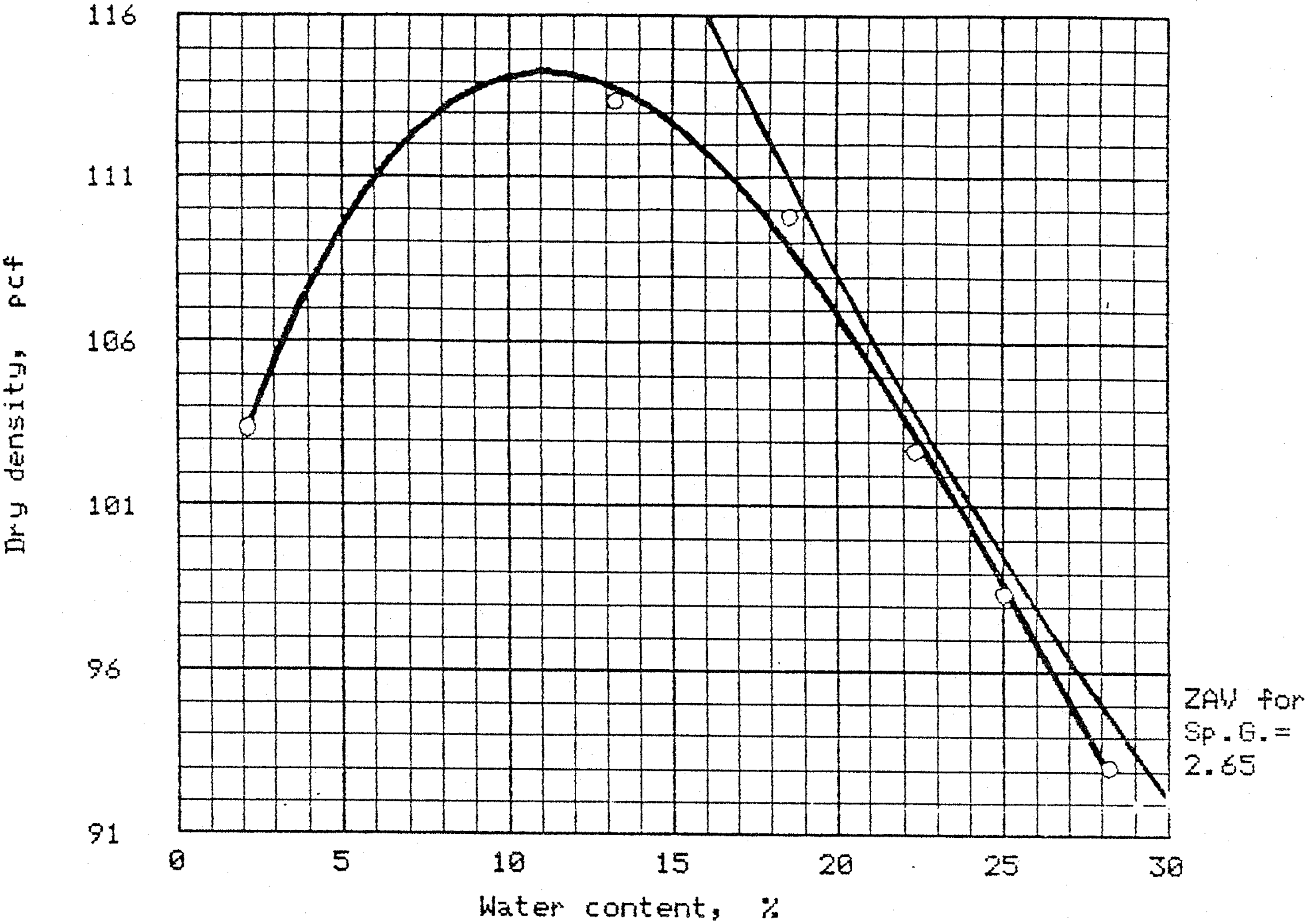
Date: November 1, 1988 ,

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K89

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification		Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	USCS	AASHTO						
	CL			34	11	0.0 %	0.0 %	99.2 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 11.1 % Maximum dry density = 114.3 pcf	Lean Clay, trace sand

Project No.: 8721
Project: Dane County Landfill
Location: E5 S3 Sample #2

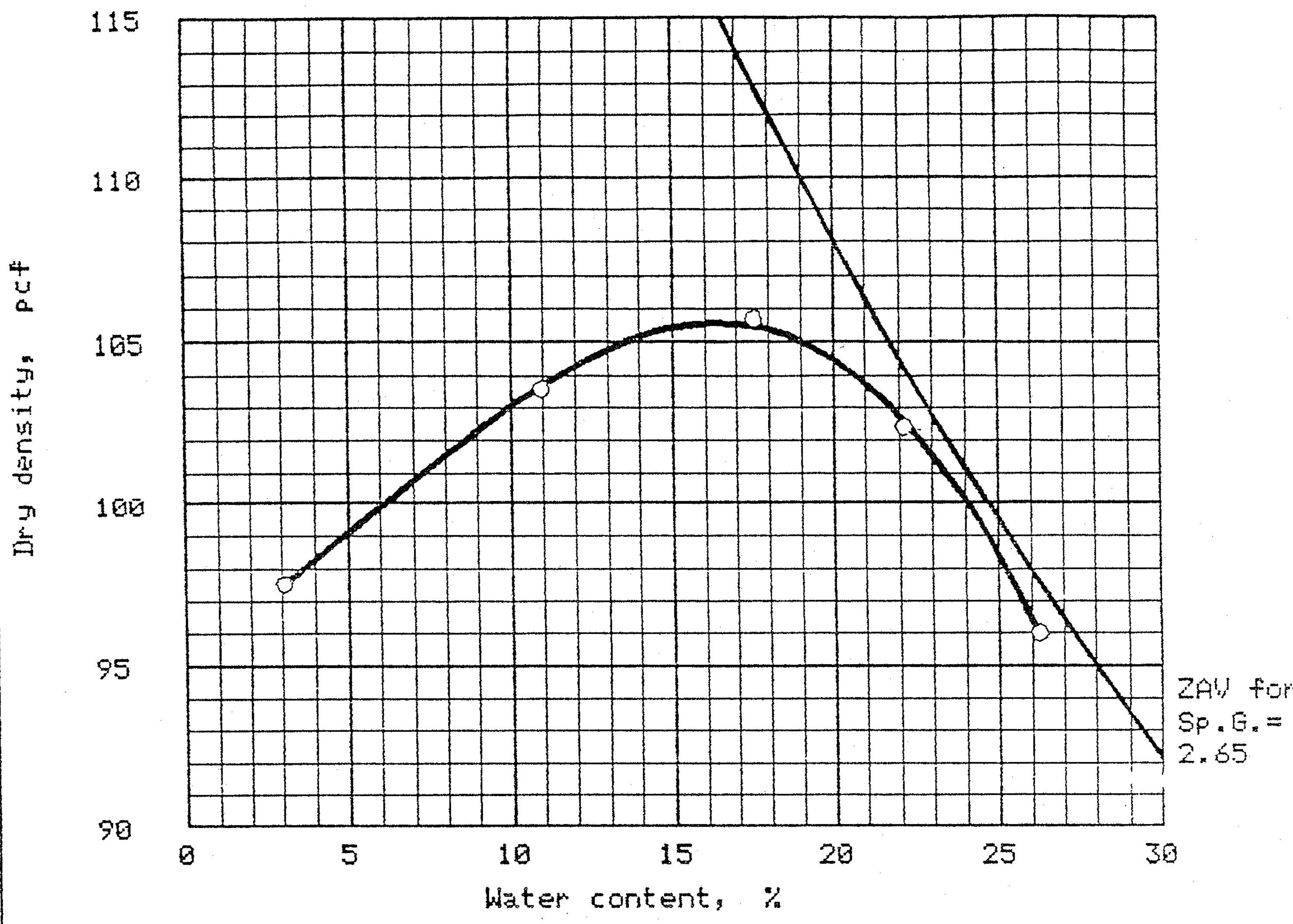
Date: November 1, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K94

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	CH			51	27	0.0 %	0.1 %	99.6 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 16.4 % Maximum dry density = 105.6 pcf	Fat Clay

Project No.: 8721
Project: Dane County Landfill
Location: E7 S3 Sample #1

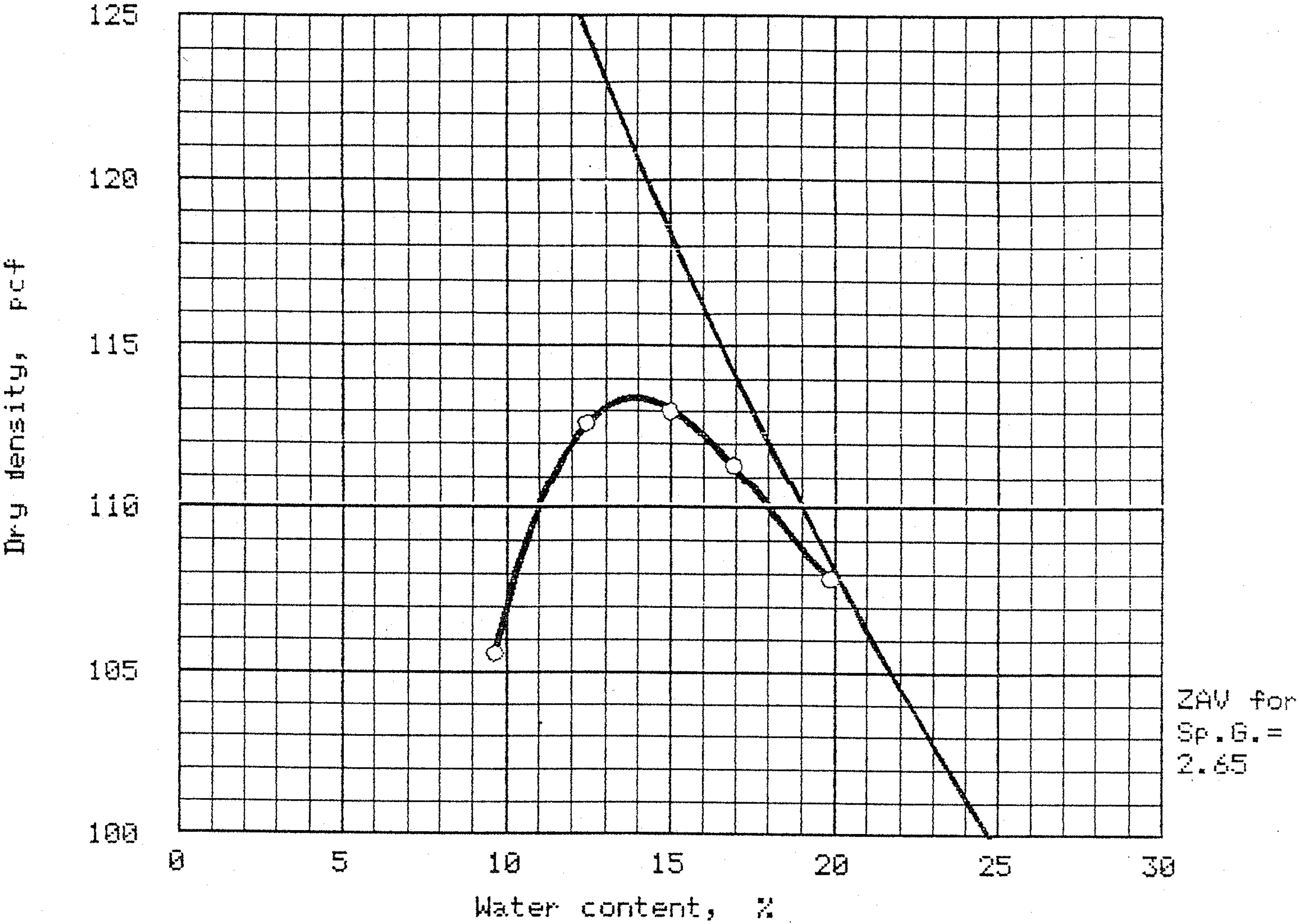
Date: November 1, 1988 ,

SOILS & ENGINEERING
SERVICES, INC.

Remarks:

Figure No. K90

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification		Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	USCS	AASHTO						
	CL			46	23	0.0 %	0.0 %	99.6 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 13.9 % Maximum dry density = 113.4 pcf	Lean Clay

Project No.: 8721
Project: Dane County Landfill
Location: E9 S3 Sample #1

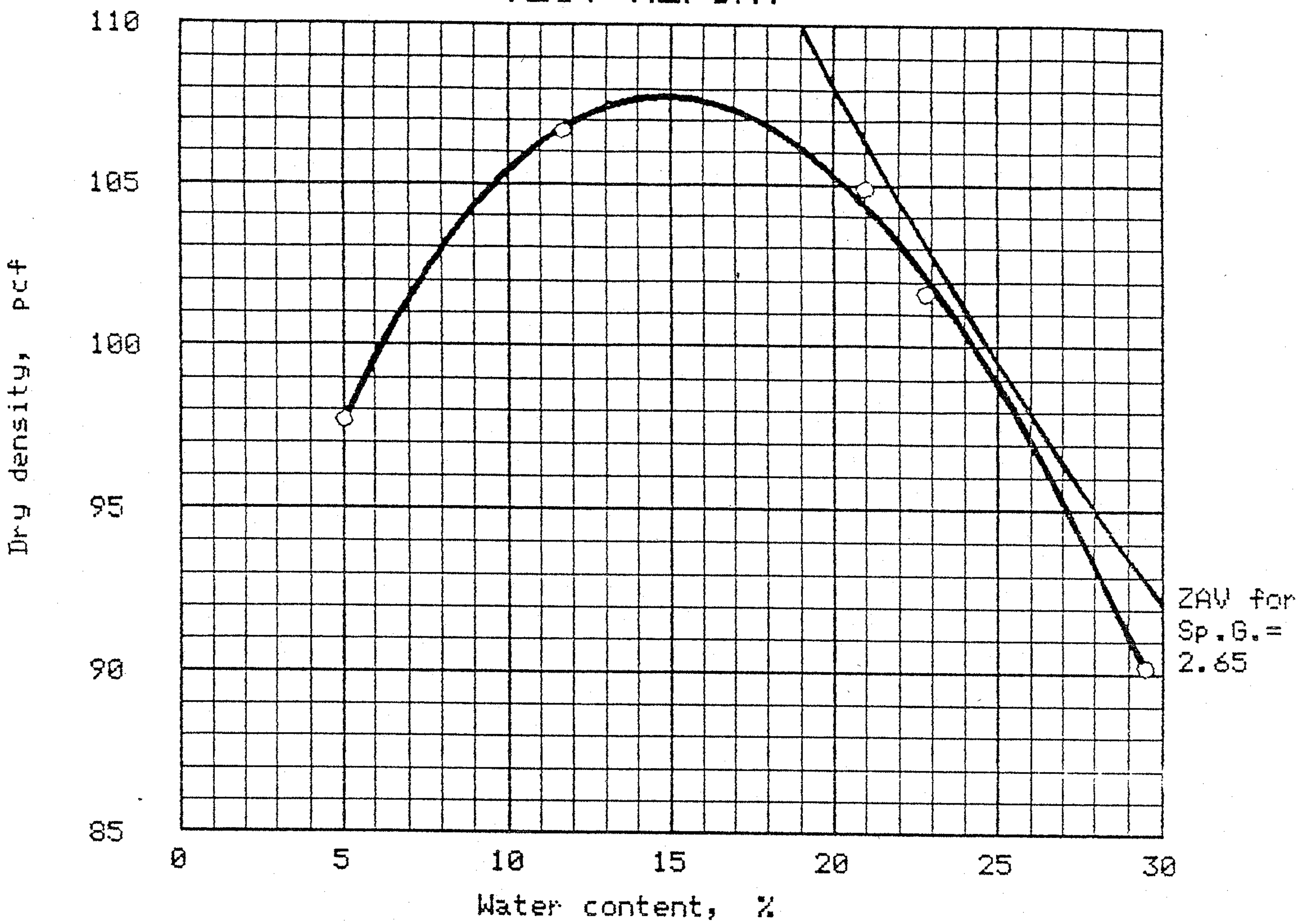
Date: December 5, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K91

OPTIMUM MOISTURE / MAXIMUM DENSITY
TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	MH			50	28	0.0 %	0.0 %	99.7 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 14.8 % Maximum dry density = 107.7 pcf	Elastic Silt

Project No.: 8721
Project: Dane County Landfill
Location: E11 S3 Sample #1

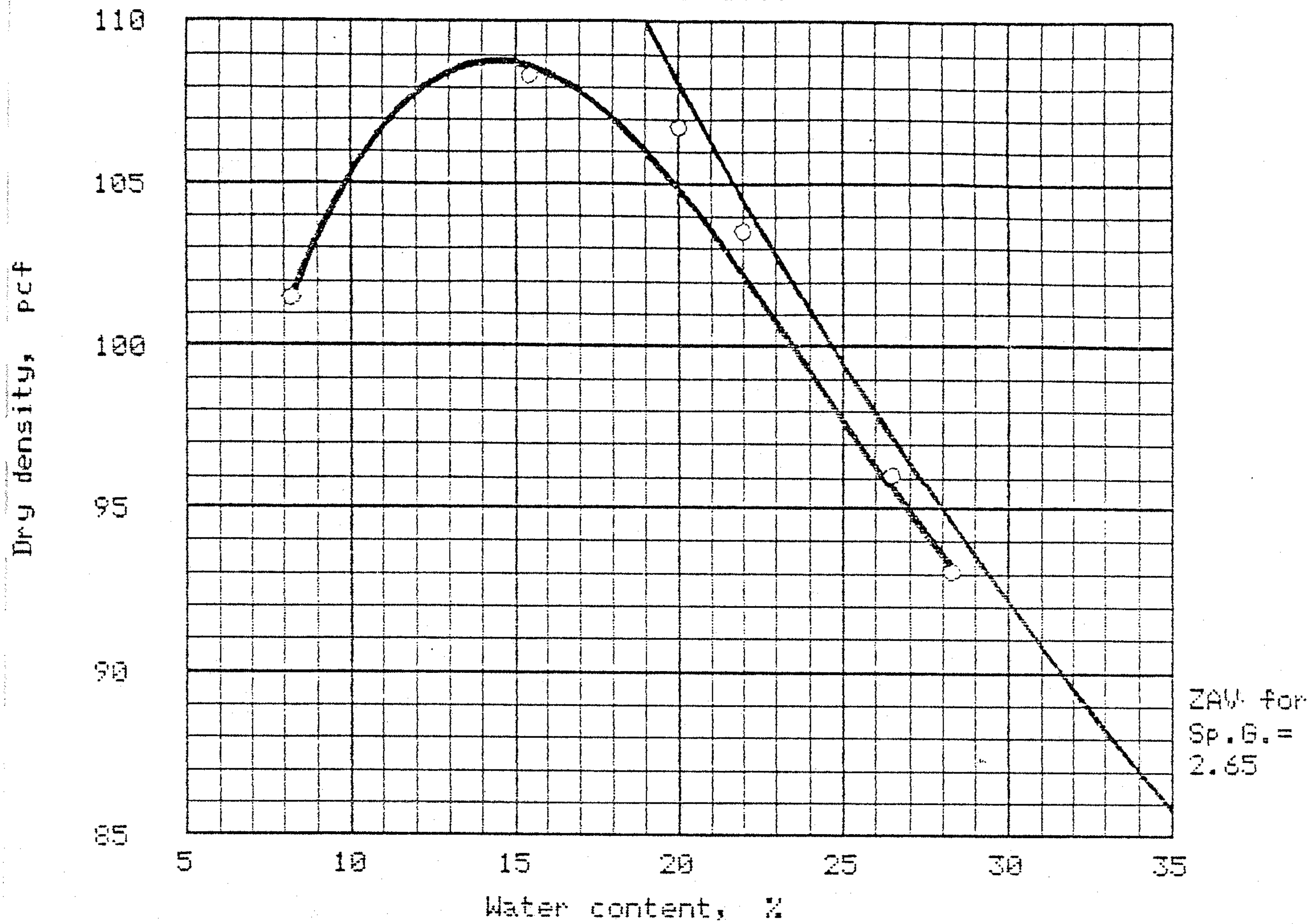
Date: November 1, 1988

SOILS & ENGINEERING
SERVICES, INC.

Remarks:

Figure No. K92

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification		Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	USCS	AASHTO						
	CH			64	43	0.0 %	0.1 %	99.1 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 14.4 % Maximum dry density = 108.8 pcf	Fat Clay, trace sand

Project No.: 8721
Project: Dane County Landfill
Location: E13 S3 Sample #1

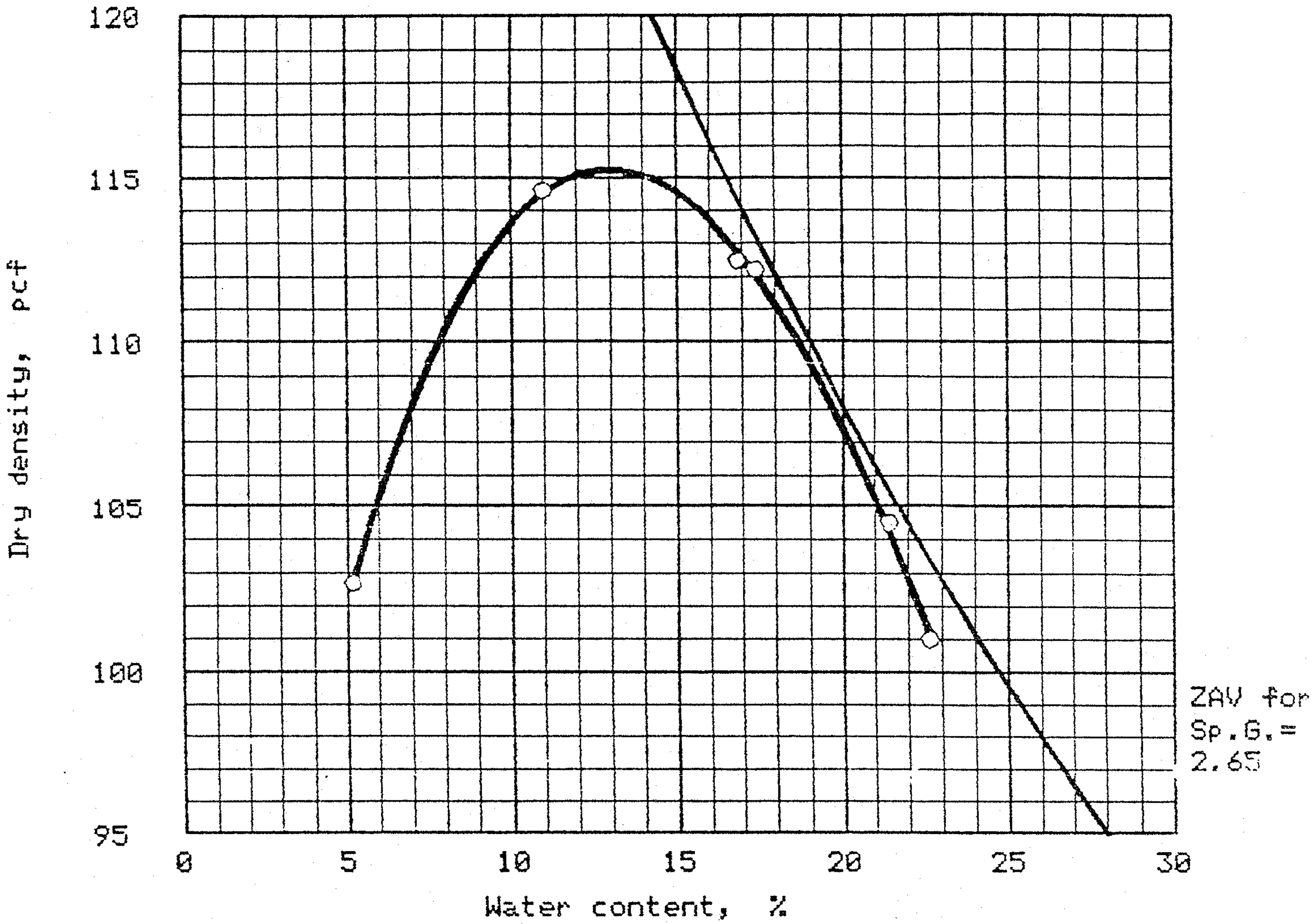
Date: August 4, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K93

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification		Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	USCS	AASHTO						
	CL			38	17	0.0 %	.1 %	96.9 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 13.0 % Maximum dry density = 115.3 pcf	Lean Clay, trace sand

Project No.: 8721
Project: Dane County Landfill
Location: E1 S5 Sample #2

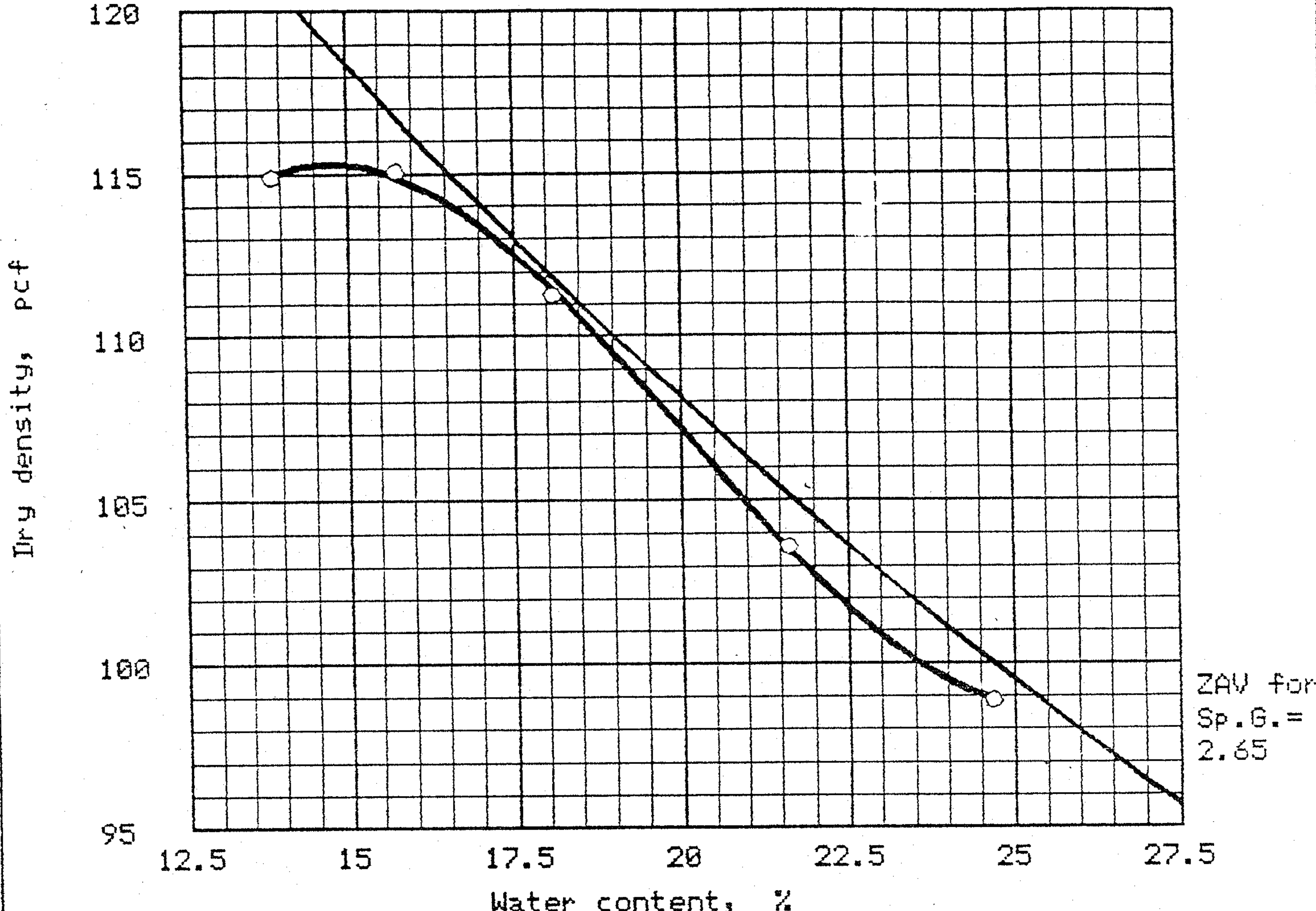
Date: November 1, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K96

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification		Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	USCS	AASHTO						
	CL			33	11	0.0 %	.0 %	98.2 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 14.7 % Maximum dry density = 115.3 pcf	Lean Clay, trace sand

Project No.: 8721
Project: Dane County Landfill
Location: E5 S5 Sample #2

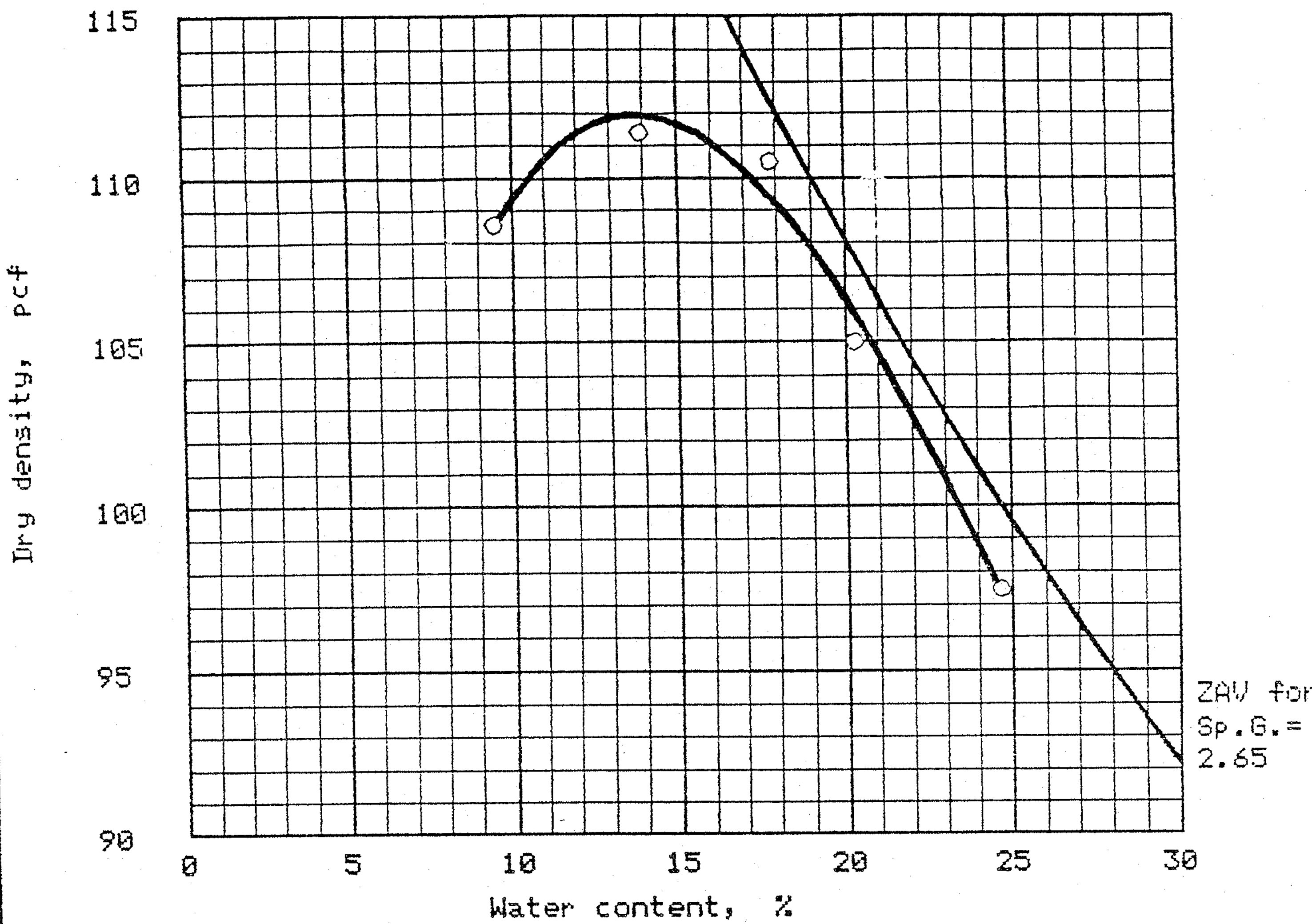
Date: November 1, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K97

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification		Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	USCS	AASHTO						
	CL			39	15	.0 %	.0 %	97.5 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 13.7 % Maximum dry density = 111.9 pcf	Lean Clay, trace sand

Project No.: 8721
Project: Dane County Landfill
Location: E9 S5 Sample #2

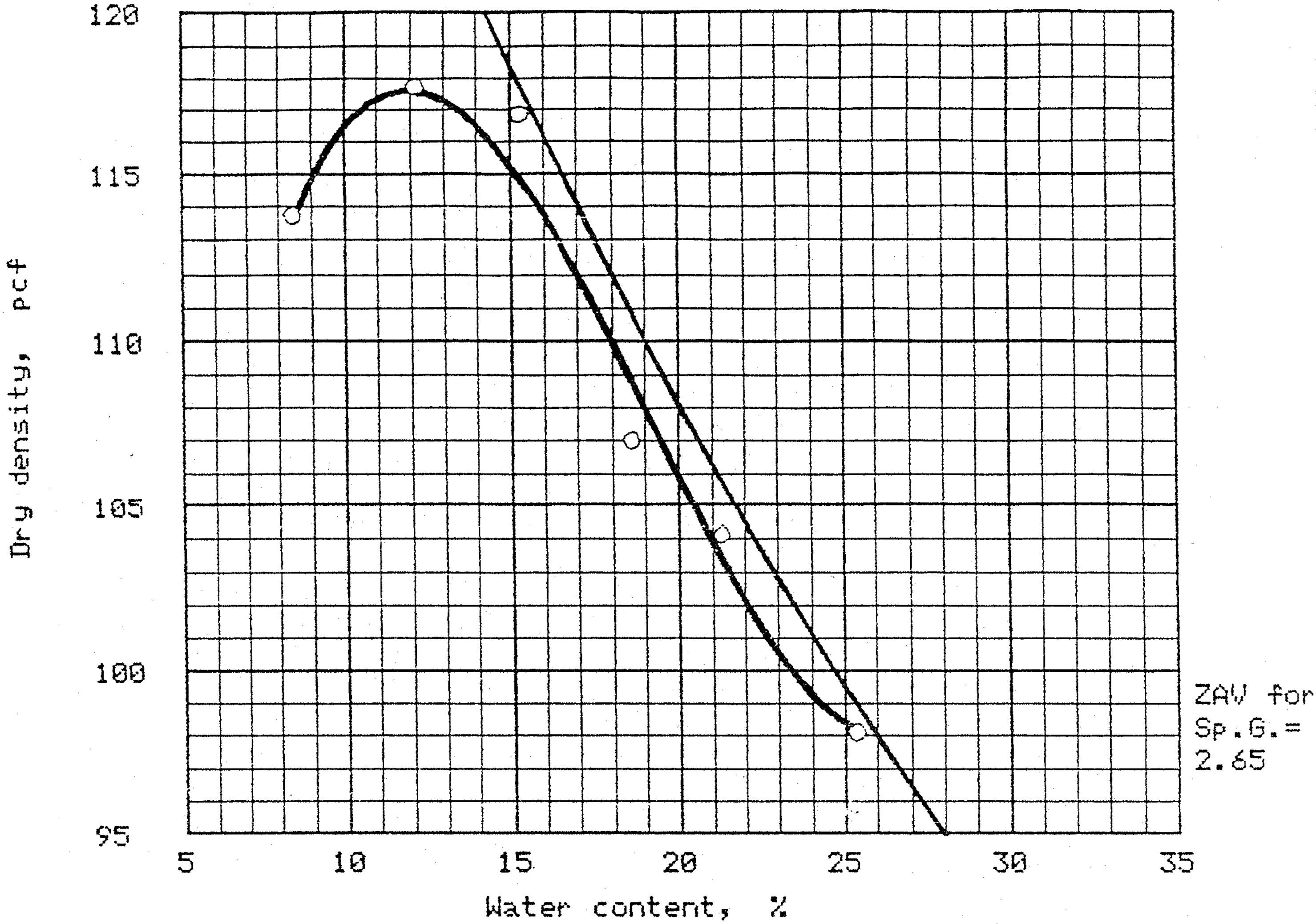
Date: November 1, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K98

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	CL			30	11	.0 %	.0 %	96.7 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 11.9 % Maximum dry density = 117.6 pcf	Lean Clay, trace sand

Project No.: 8721
Project: Dane County Landfill
Location: E15 S5 Sample #2

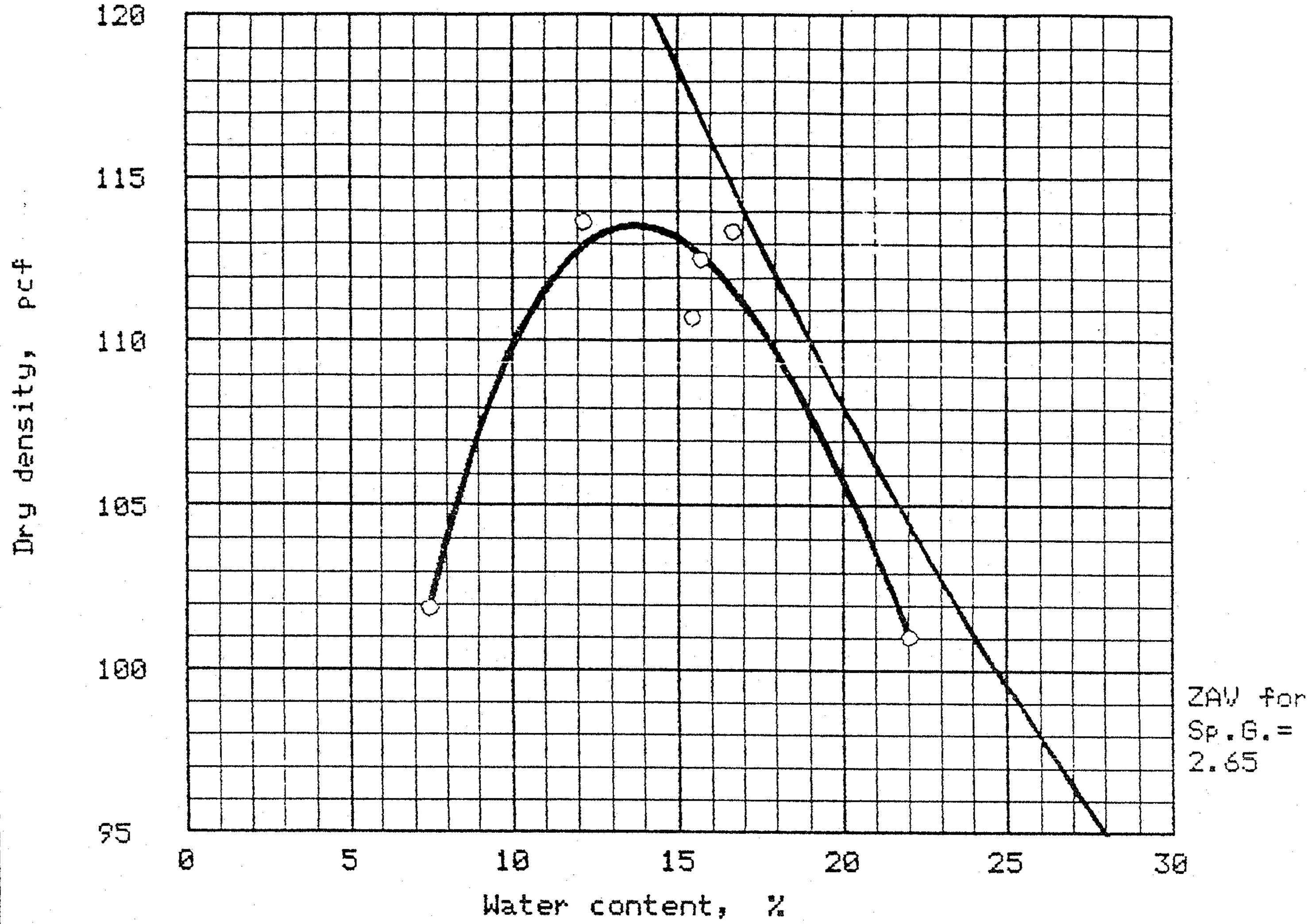
Date: November 1, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K99

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification		Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	USCS	AASHTO						
	CL			42	19	0.0 %	0.1 %	95.3 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 13.7 % Maximum dry density = 113.6 pcf	Lean Clay, trace sand

Project No.: 8721
Project: Dane County Landfill
Location: E17 S5 Sample #1

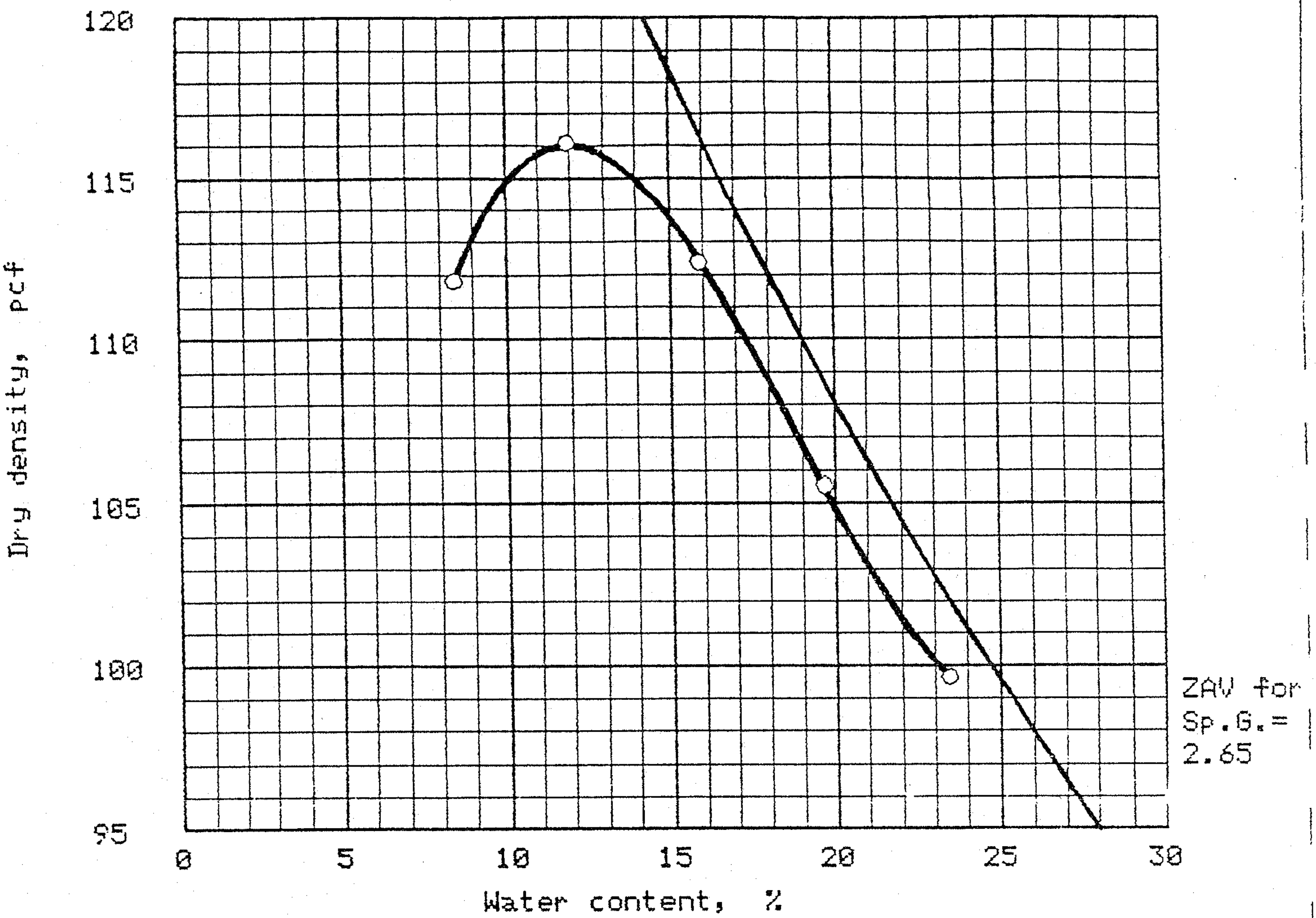
Date: November 1, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K95

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification		Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	USCS	AASHTO						
	CL			36	15	.0 %	.0 %	98.5 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 11.9 % Maximum dry density = 116.0 pcf	Lean Clay, trace sand

Project No.: 8721
Project: Dane County Landfill
Location: E19 S5 Sample #2

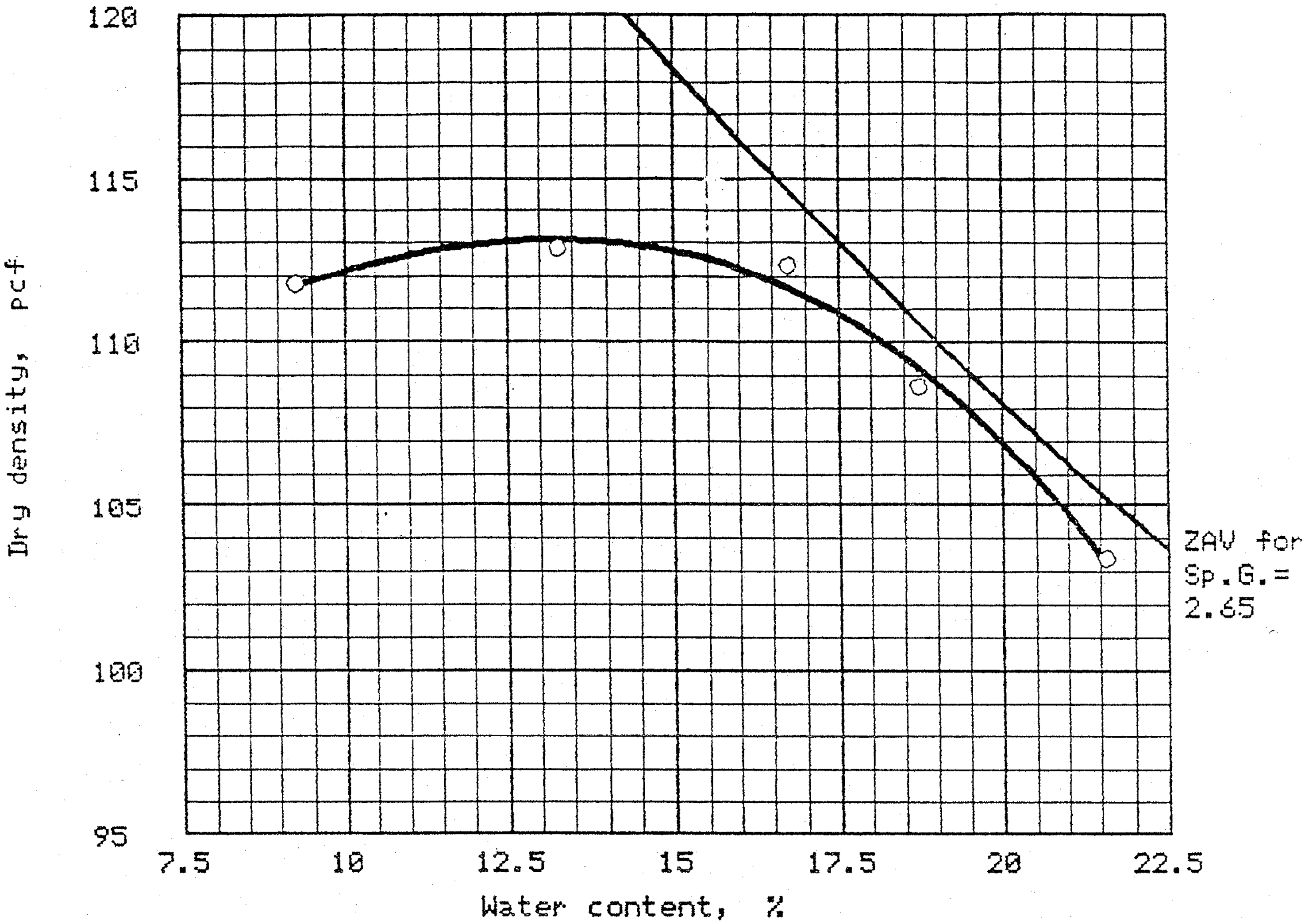
Date: November 1, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K100

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	CL			37	16	.0 %	.1 %	81.7 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 13.3 % Maximum dry density = 113.1 pcf	Lean Clay, some sand

Project No.: 8721
Project: Dane County Landfill
Location: E23 S5 Sample #2

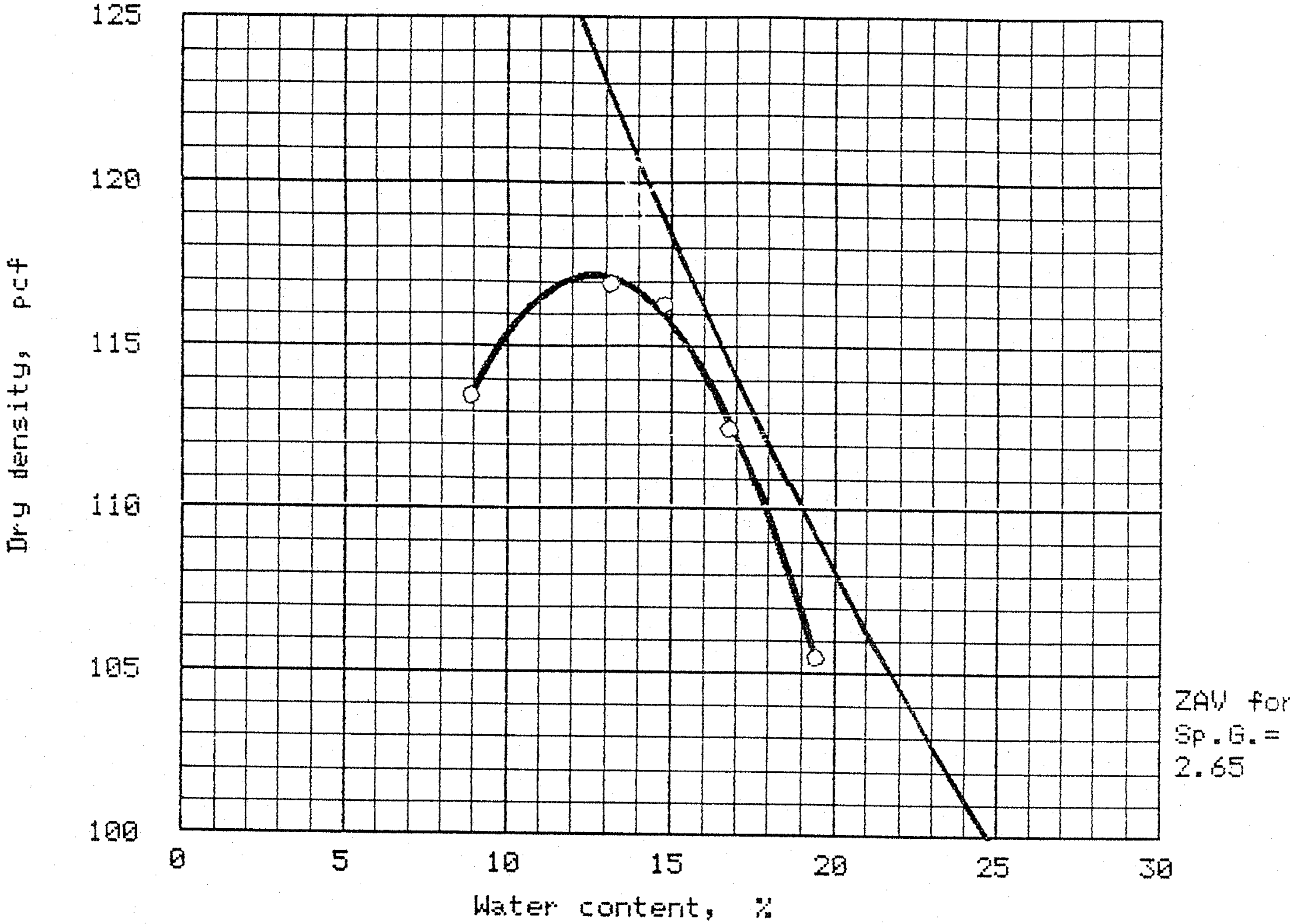
Date: November 1, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K102

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification		Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	USCS	AASHTO						
	CL			45	21	0.0 %	0.0 %	99.8 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 12.6 % Maximum dry density = 117.2 pcf	Lean Clay

Project No.: 8721
Project: Dane County Landfill
Location: E7 S7 Sample #1

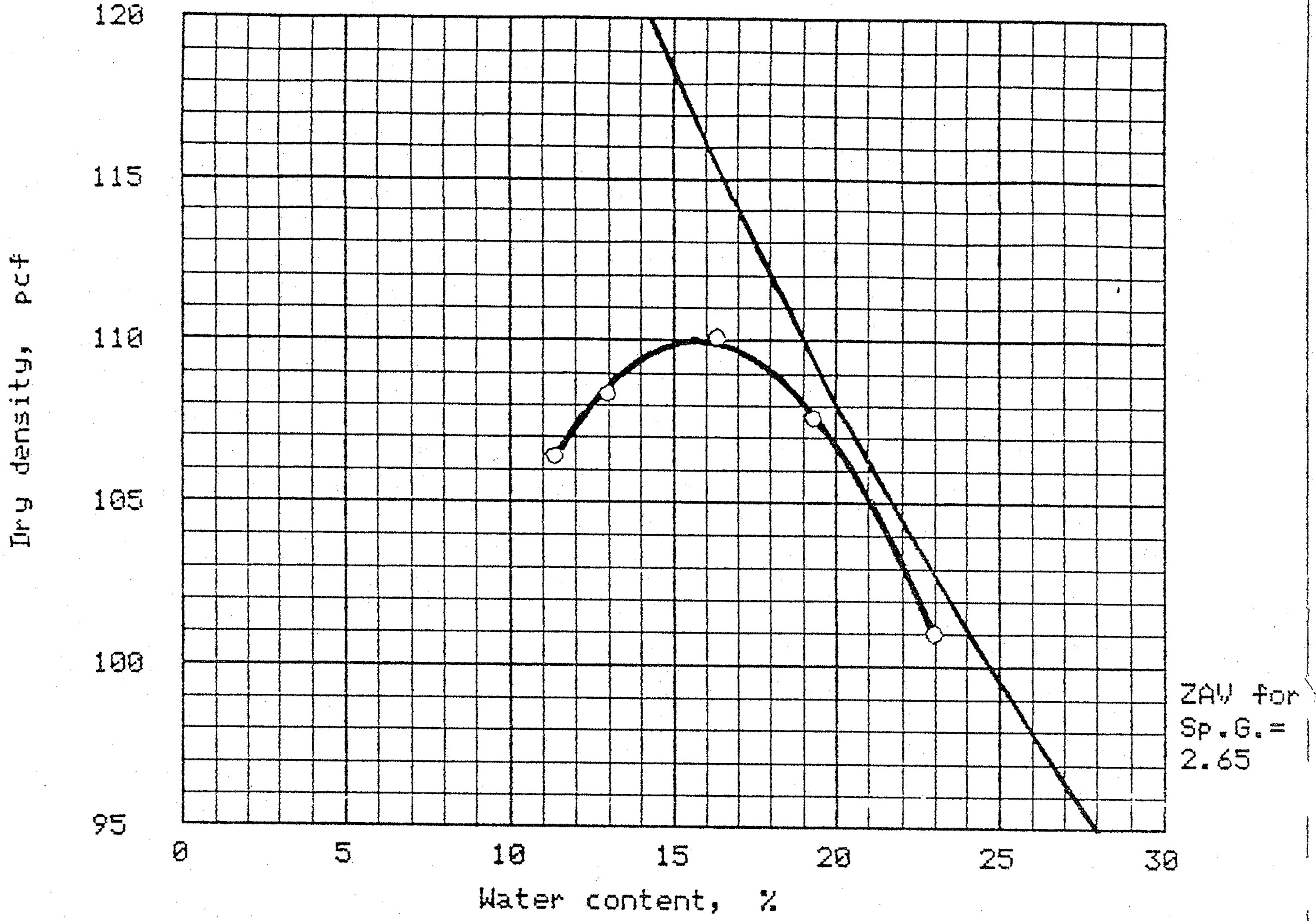
Date: December 5, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K187

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification		Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	USCS	AASHTO						
	CL			33	13	.0 %	2.7 %	89.1 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 15.7 % Maximum dry density = 110.0 pcf	Lean Clay, little sand

Project No.: 8721
Project: Dane County Landfill
Location: E21 S11 Sample #2

Date: November 1, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K188

SOILS & ENGINEERING SERVICES, INC.
CONSULTING CIVIL ENGINEERS
1102 STEWART STREET • MADISON, WISCONSIN 53713 • TELEPHONE: 608 • 274-7600

8721

December 6, 1988

Earl H. Reichel, P.E.
Octavio Tejeda, P.E.

Dane County Department of Public Works
210 Martin Luther King, Jr., Boulevard
Madison, Wisconsin 53709

Attention: Mr. Dennis Sopcich

Subject: Laboratory Testing
Permeability Versus Compaction
Optimum Moisture/Maximum Density Determinations
Clay Samples
Kippley Site

Gentlemen:

We have completed the subject testing on three clay samples acquired from the Kippley Site. The samples were acquired by your personnel and delivered to our office on June 22 and 24, 1988. The sample locations are as follows:

Grid E9 S3 Sample 1
Grid E7 S7 Sample 1
Grid E5 S21 Sample 2

Prior to this report, we determined the soil characteristics and USCS classification for the subject samples. This information was presented in our reports dated August 10, August 31, and September 6, 1988.

The Optimum Moisture/Maximum Density of each sample was determined in accordance with A.S.T.M. D1557. These test results are presented on the enclosed copies of Figures K91, K101, and K187.

The Permeability versus Compaction Curves were developed using the same points from moisture/density curves. The permeability of each point was determined using the falling head method. These test results are presented on the enclosed copies of Figures K91A, K101A, and K187A.

This completed the laboratory testing on the Kippley Site test pit samples.

If you have any questions concerning this work, please contact us.

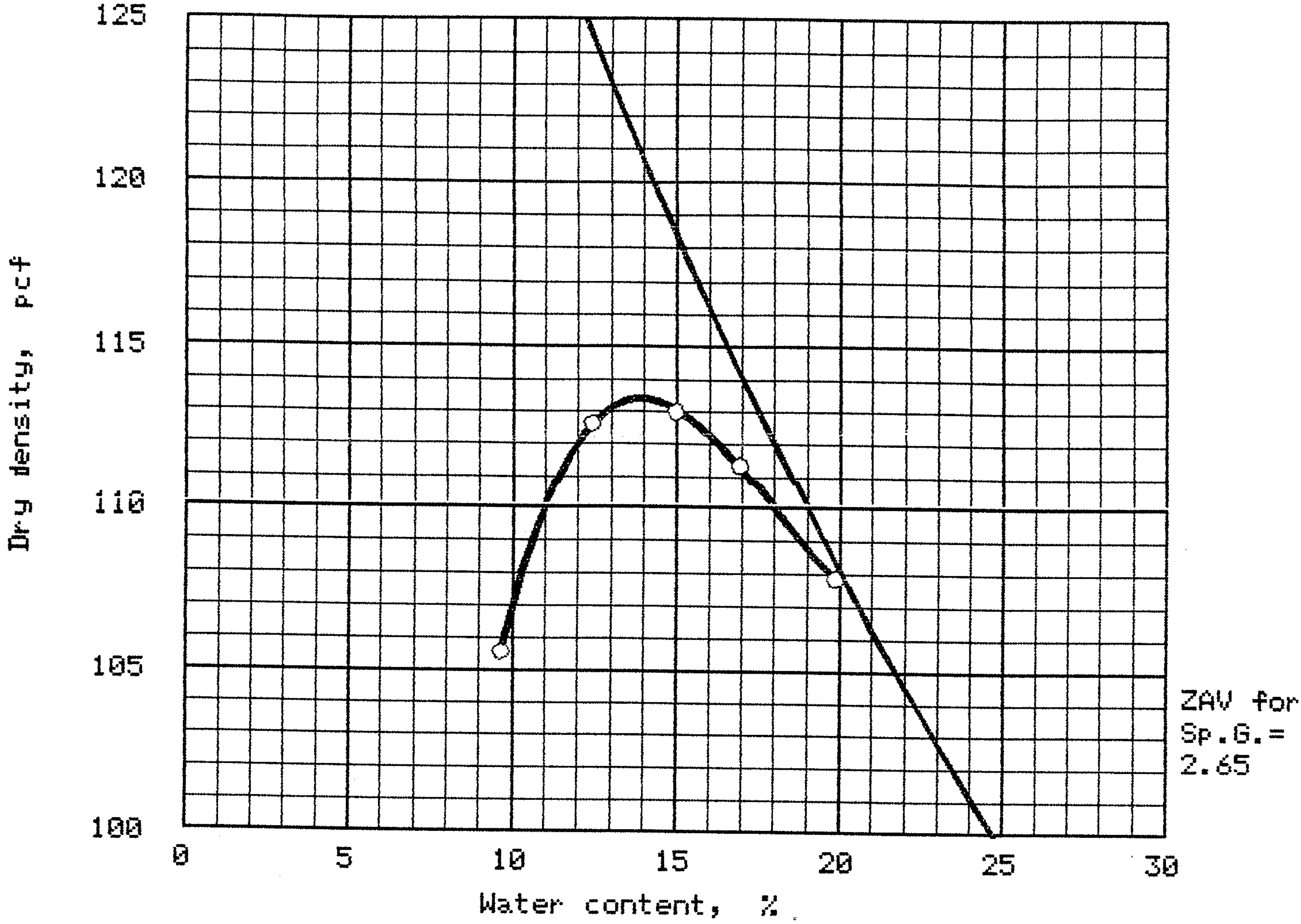
Respectfully submitted,

SOILS & ENGINEERING SERVICES, INC.

Octavio Tejeda, P.E.
OTG:CMB:lt

Enclosures

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification		Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	USCS	AASHTO						
	CL			46	23	0.0 %	0.0 %	99.6 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 13.9 % Maximum dry density = 113.4 pcf	Lean Clay

Project No.: 8721
Project: Dane County Landfill
Location: E9 S3 Sample #1

Date: December 5, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K91

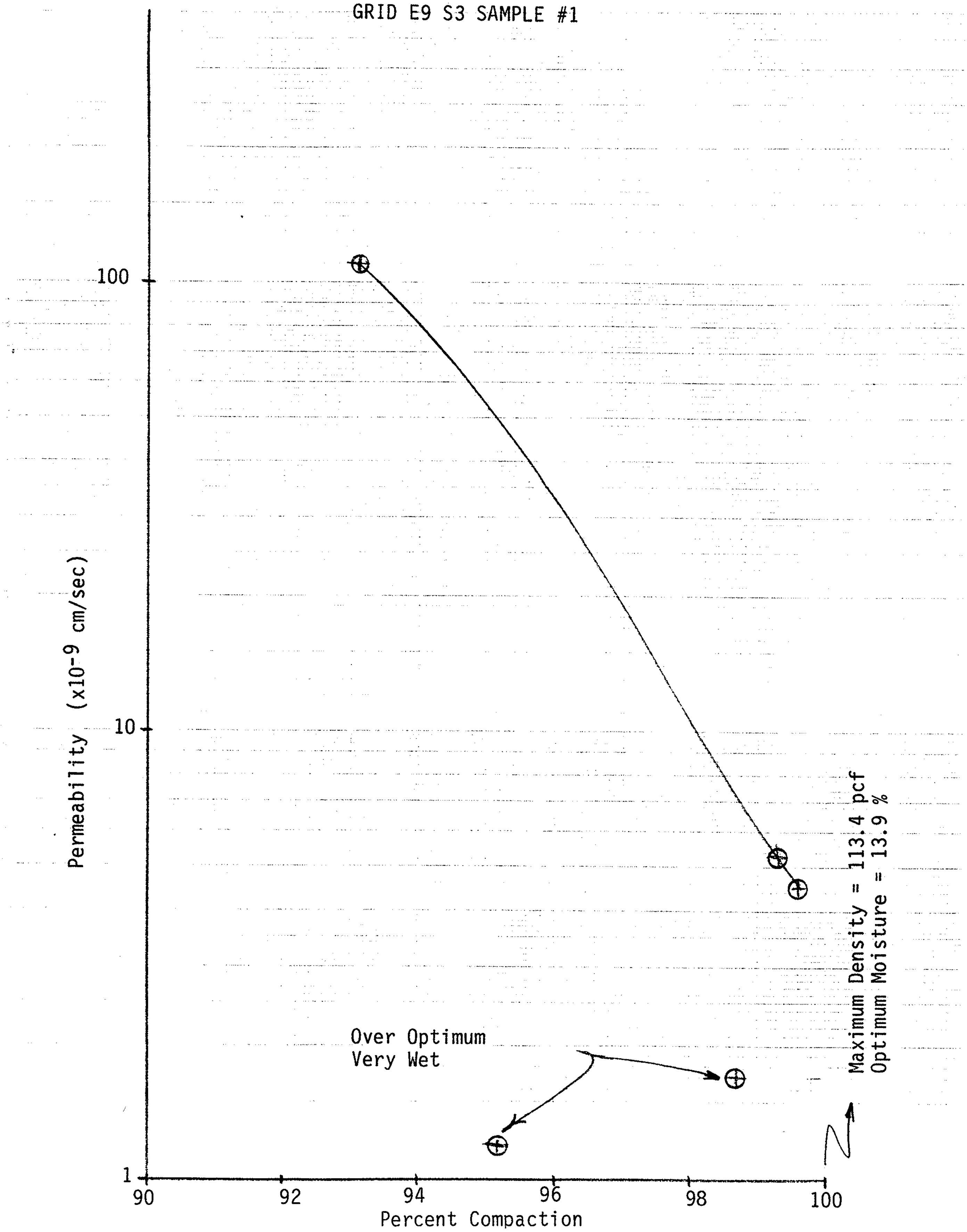
Figure K91A

PLANO PnB

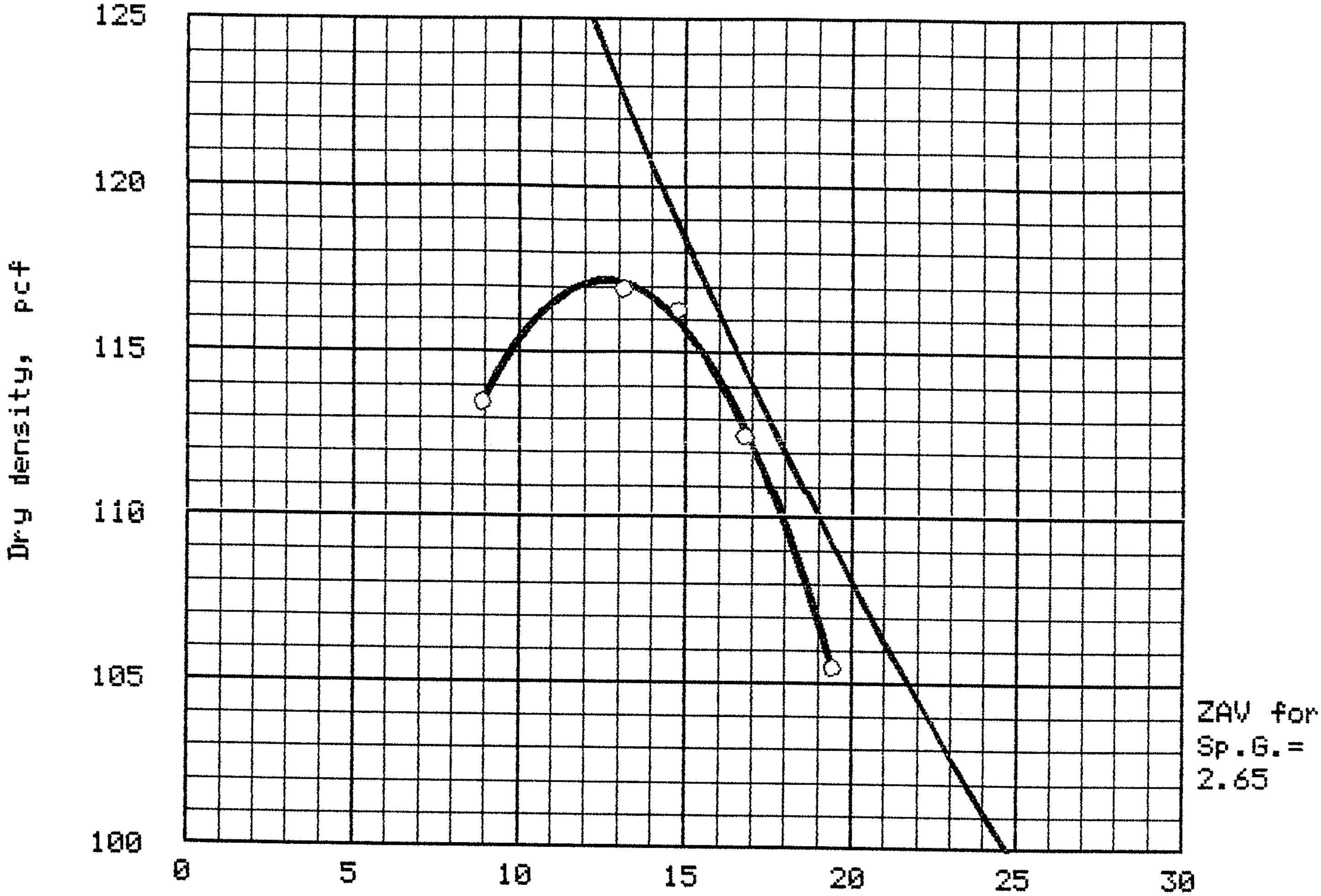
PERMEABILITY VS. COMPACTION

KIPPLEY SITE

GRID E9 S3 SAMPLE #1



OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	CL			45	21	0.0 %	0.0 %	99.8 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 12.6 % Maximum dry density = 117.2 pcf	Lean Clay

Project No.: 8721
Project: Dane County Landfill
Location: E7 S7 Sample #1

Date: December 5, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K187

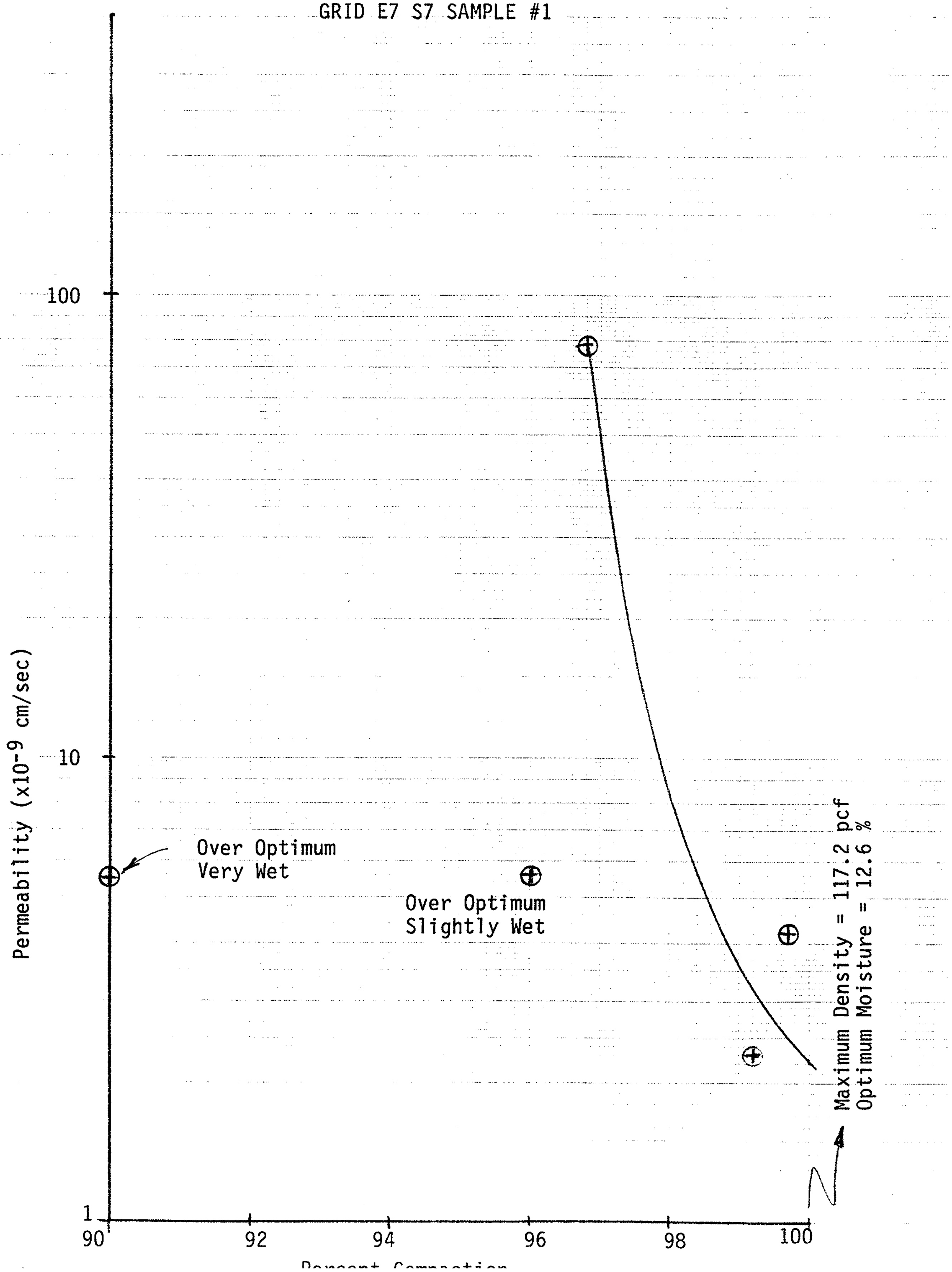
Figure K187A

PLANO PnB

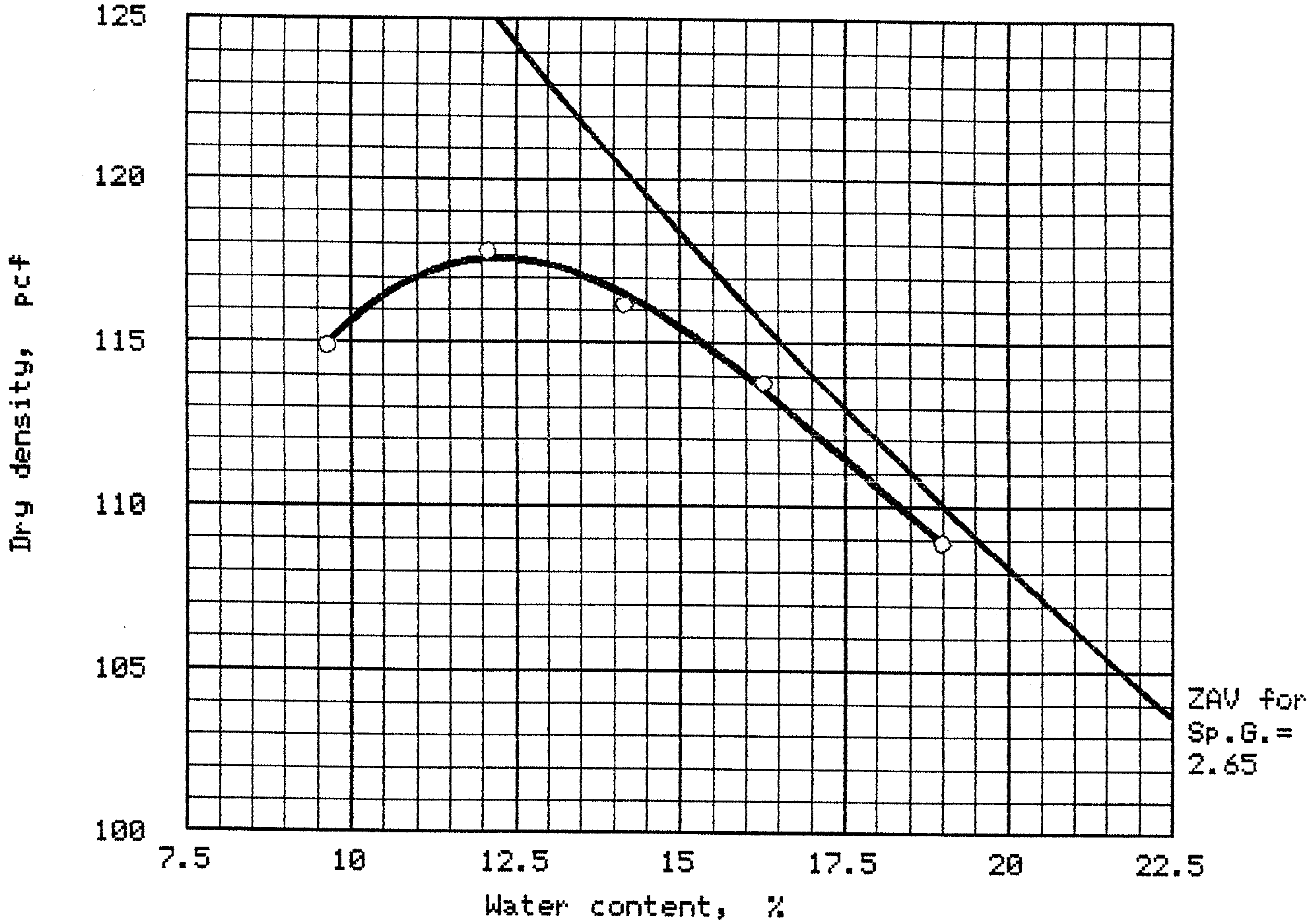
PERMEABILITY VS. COMPACTION

KIPPLEY SITE

GRID E7 S7 SAMPLE #1



OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	CL			41	17	0.0 %	0.0 %	94.6 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 12.2 % Maximum dry density = 117.6 pcf	Lean Clay, little sand

Project No.: 8721
Project: Dane County Landfill
Location: E5 S21 Sample #2

Date: December 5, 1988

SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K101

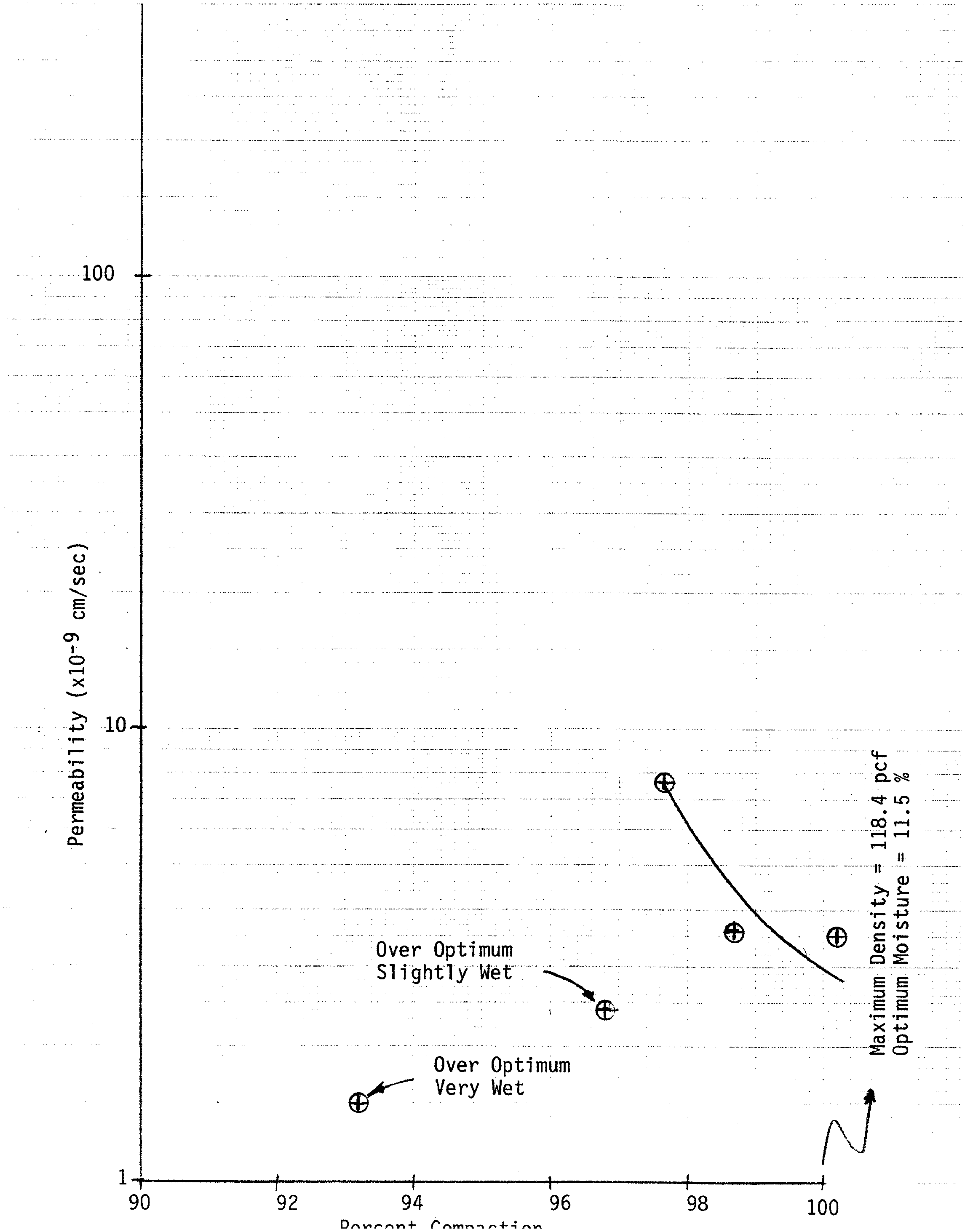
Figure K101A

RINGWOOD RnB

PERMEABILITY VS. COMPACTION

KIPPLEY SITE

GRID E5 S21 SAMPLE #2



SOILS & ENGINEERING SERVICES, INC.
CONSULTING CIVIL ENGINEERS

1102 STEWART STREET • MADISON, WISCONSIN 53713 • TELEPHONE: 608 • 274-7600

Earl H. Reichel, P.E.
Octavio Tejeda, P.E.

8721

November 1, 1988

Dane County Department of Public Works
210 Martin Luther King, Jr., Boulevard
Madison, Wisconsin 53709

Attention: Mr. Dennis Sopcich

Subject: Laboratory Testing
Permeability versus. Compaction
Optimum Moisture/Maximum Density Determinations
Clay Samples
Kippley Site

Gentlemen:

We have completed the subject testing on three clay samples acquired from the Kippley Site. The samples were acquired by your personnel and delivered to our office on June 22 and 24, 1988. The sample locations are as follows:

Grid E3 S21 Sample 2
Grid E19 S23 Sample 1
Grid E23 S19 Sample 1

Prior to this report, we determined the soil characteristics and USCS classification for the subject samples. This information was represented in our reports dated August 31 and September 6, 1988.

The Optimum Moisture/Maximum Density of each sample was determined in accordance with A.S.T.M. D1557. These test results are presented on the enclosed copies of K191, K193, and K196.

The Permeability versus Compaction Curves were developed using the same points from the moisture/density curves. The permeability of each point was determined using the ~~following~~ falling head method. These test results are presented on the enclosed copies of Figures K191A, K193A, and K196A.

If you have any questions concerning this work, please contact us.

Respectfully submitted,

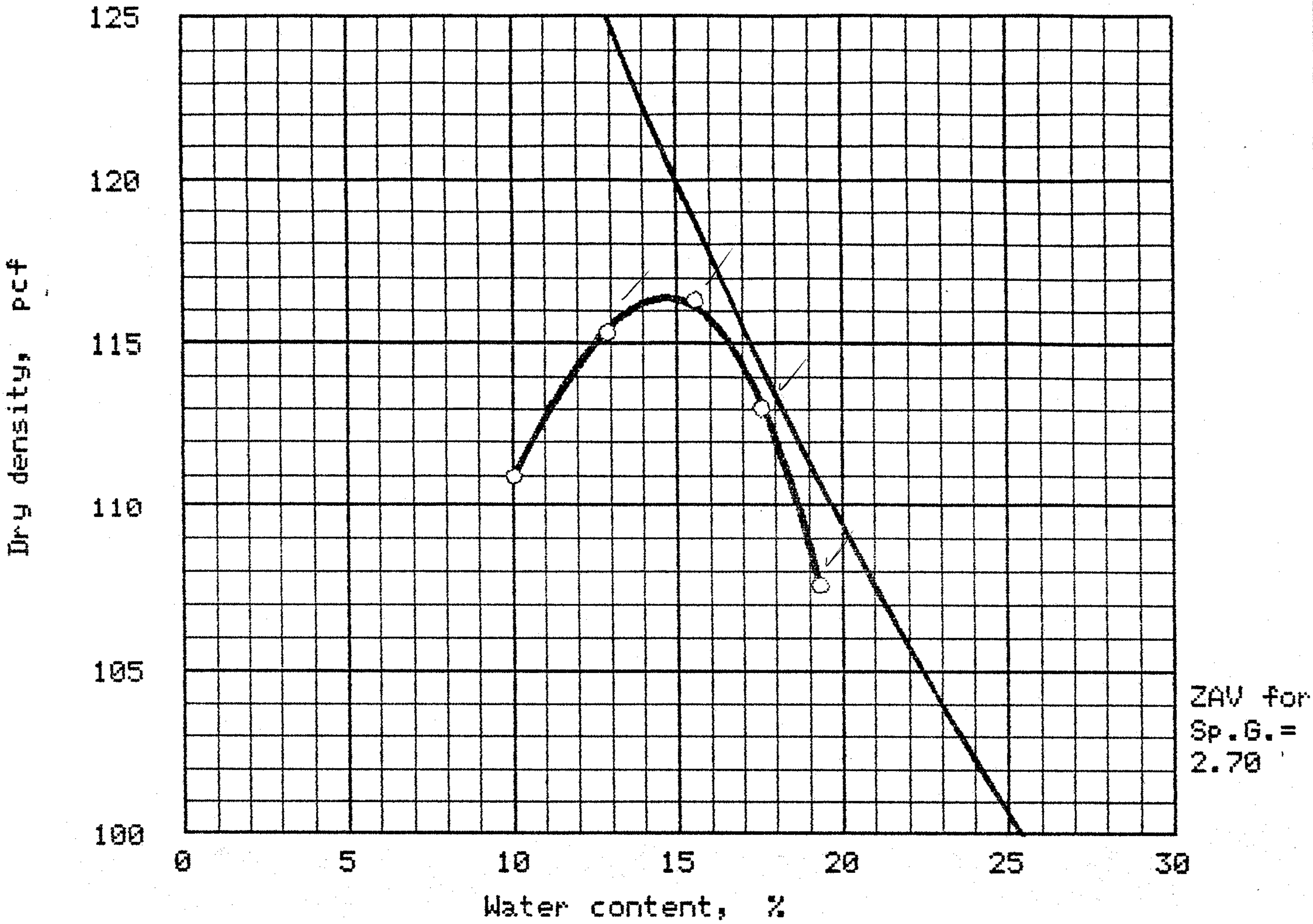
SOILS & ENGINEERING SERVICES, INC.

Octavio Tejeda, P.E.

OTG:CMB:lt

Enclosures

OPTIMUM MOISTURE / MAXIMUM DENSITY TEST REPORT



"Modified" Proctor, ASTM D 1557, Method A

Elev/ Depth	Classification		Nat. Moist.	LL	PI	% R 3/4"	% R No.4	% P No.200
	USCS	AASHTO						
	CL			37	18	0.0 %	0.0 %	93.8 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 14.7 % Maximum dry density = 116.4 pcf	Lean Clay, little sand

Project No.: 8721
Project: Dane County Landfill
Location: E3 S21 Sample #2

Date: September 23, 1988

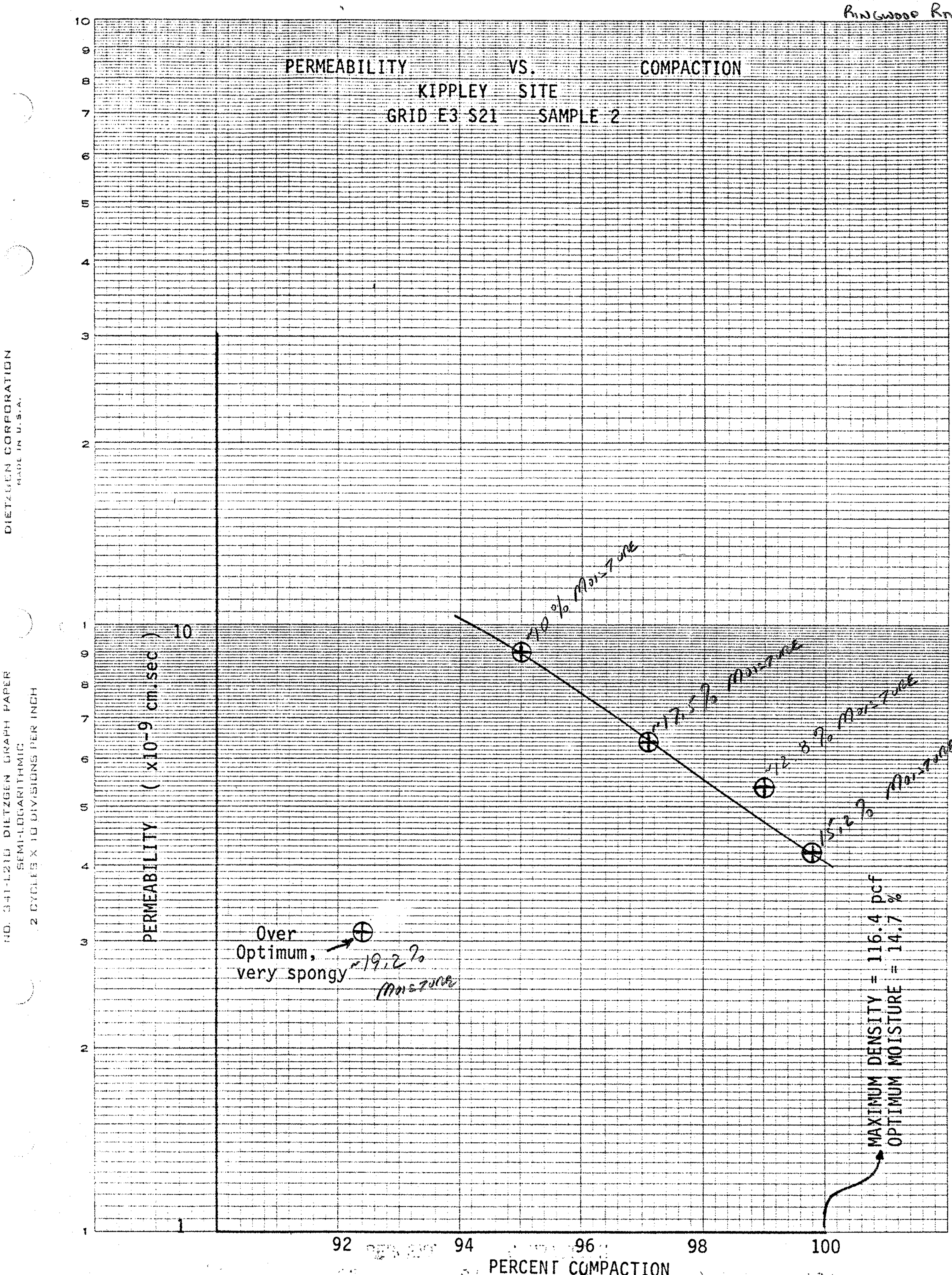
SOILS & ENGINEERING SERVICES, INC.

Remarks:

Figure No. K191

FIGURE NO. K191A

Ringwood RnB



CLAY BORROW SITE FIGURES

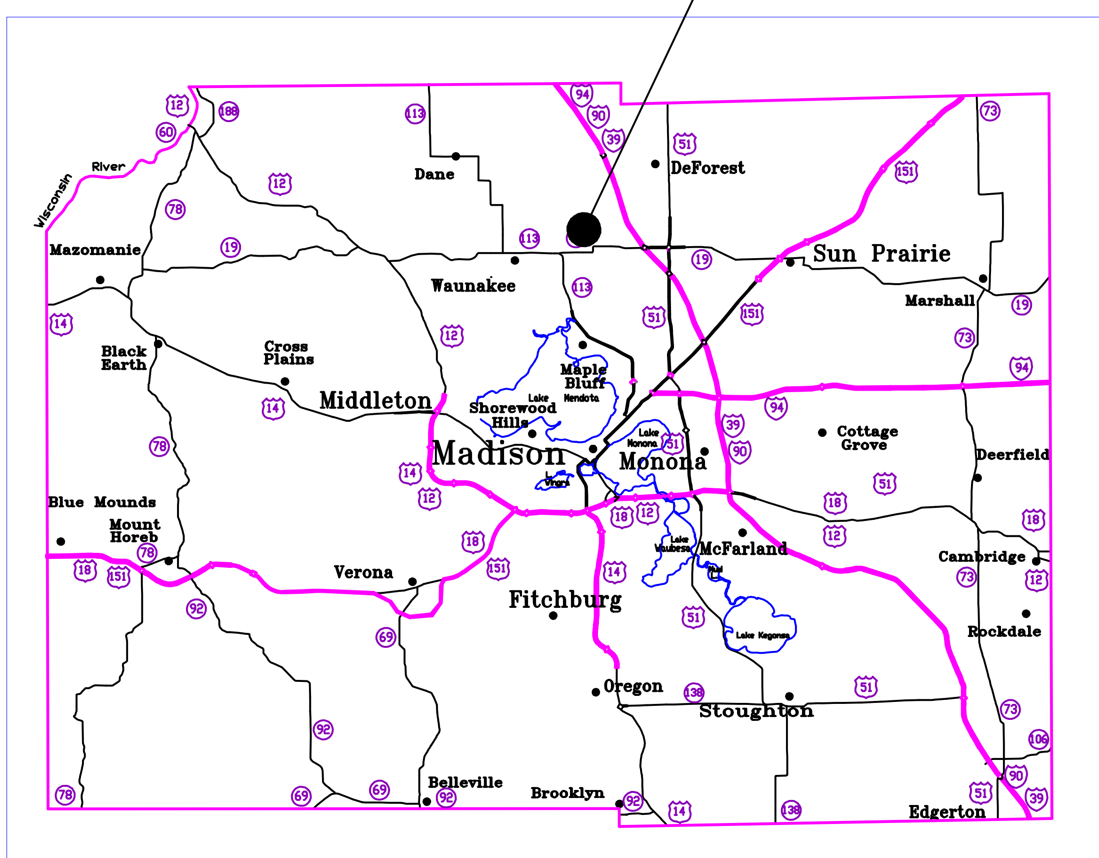
Note to Bidders

The information provided in this Section of the Appendix includes site location maps, existing topography, proposed restoration grades, and details for the Westport Borrow Site owned by Dane County Public Works. This data was associated with the Dane County's approved Conditional Use Permit (CUP) for the Westport Borrow Site and is not intended for construction purposes. It is intended to provide the Contractor with sufficient information regarding the location of the borrow site from the Dane County No. 2 (Rodefeld) Landfill and estimated select clay fill thicknesses.

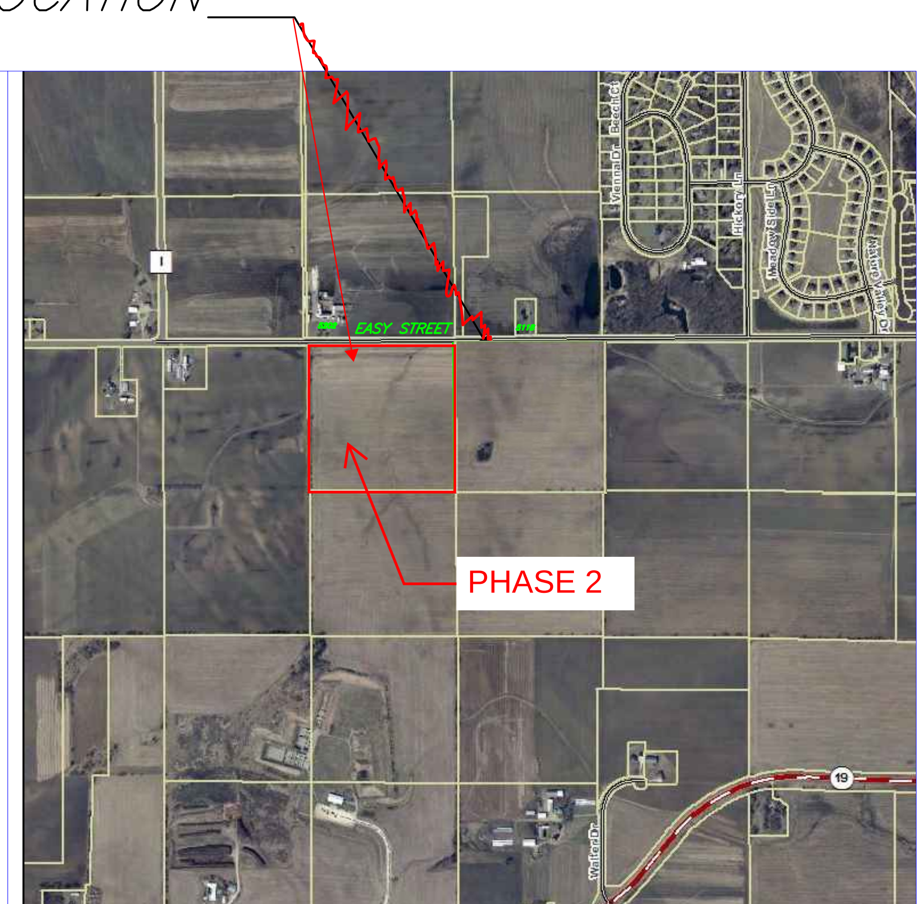
PROJECT NO. 314002
CLAY EXCAVATION AND TRUCKING
EASY STREET CLAY BORROW SITE – PHASE 1

PREPARED BY:
DANE COUNTY PUBLIC WORKS
SOLID WASTE DIVISION
JANUARY 2014

PROJECT LOCATION



DANE COUNTY MAP



LOCATOR MAP

SHEET NUMBER	SHEET TITLE
1	TITLE SHEET
2	GENERAL NOTES
3	TRAFFIC CONTROL
4	HAUL ROUTE
5	EXISTING CONDITIONS
6	CLAY ISOPACH
7	EROSION CONTROL – PHASE 1
8	EROSION CONTROL DETAILS
9	EROSION CONTROL DETAILS
10	RECLAMATION PLAN – PHASE 1

File Name:

EROSION CONTROL NOTES:

1. All erosion and sediment control practices will be installed and maintained in accordance with the following WDNR Technical Standards:

   CHANNEL EROSION MAT (1053)
   CONSTRUCTION SITE DIVERSION (1066)
   DUST CONTROL (1068)
   MULCHING FOR CONSTRUCTION SITES (1058)
   SEEDING (1059)
   STONE TRACKING PAD & TIRE WASHING (1057)
   VEGETATIVE BUFFER FOR CONSTRUCTION SITES (1054)
   SEDIMENT BASIN (1064)
   SILT FENCE (1056)

2. All topsoil stockpiles, diversion berms and vegetated buffer area will be seeded with oats immediately after they are constructed.

3. All erosion and sediment control practices will be inspected at least weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24 hour period.

RESTORATION NOTES:

1. Final reclaimed slopes covered by topsoil will not be steeper than a 3:1 horizontal to vertical incline.

2. Topsoil will be replaced to a minimum depth of 6 inches. Topsoil redistribution will not be performed during or immediately after a precipitation event until the soils have sufficiently dried.

3. Restored areas will be seeded with cereal (winter) rye at a rate of 131 lbs. Pure Live Seed/acre. Seeding will take place no later than October 15th.

4. The grassed waterway will be seeded according to NRCS FOTG Standard 342, Critical Area Planting and Erosion Matted.

CONSTRUCTION SCHEDULE:

Phase 1 (Eastern Parcel)
April 1, 2014 – Strip topsoil / construct erosion control practices
April 21, 2014 – Begin clay extraction
September 15, 2014 – End clay extraction / begin restoration
October 15, 2014 – Complete restoration

Revisions

Approved By: JW
Drawn By: MR
Design By: MR
Scale: As shown
Date: JAN. 2014
Bid No.: 314002

DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
NOTES

Sheet 2 of 10

File Name:

Revisions

Approved By: JW

Drawn By: MR

Design By: MR

Scale: As shown

Date: JAN. 2014

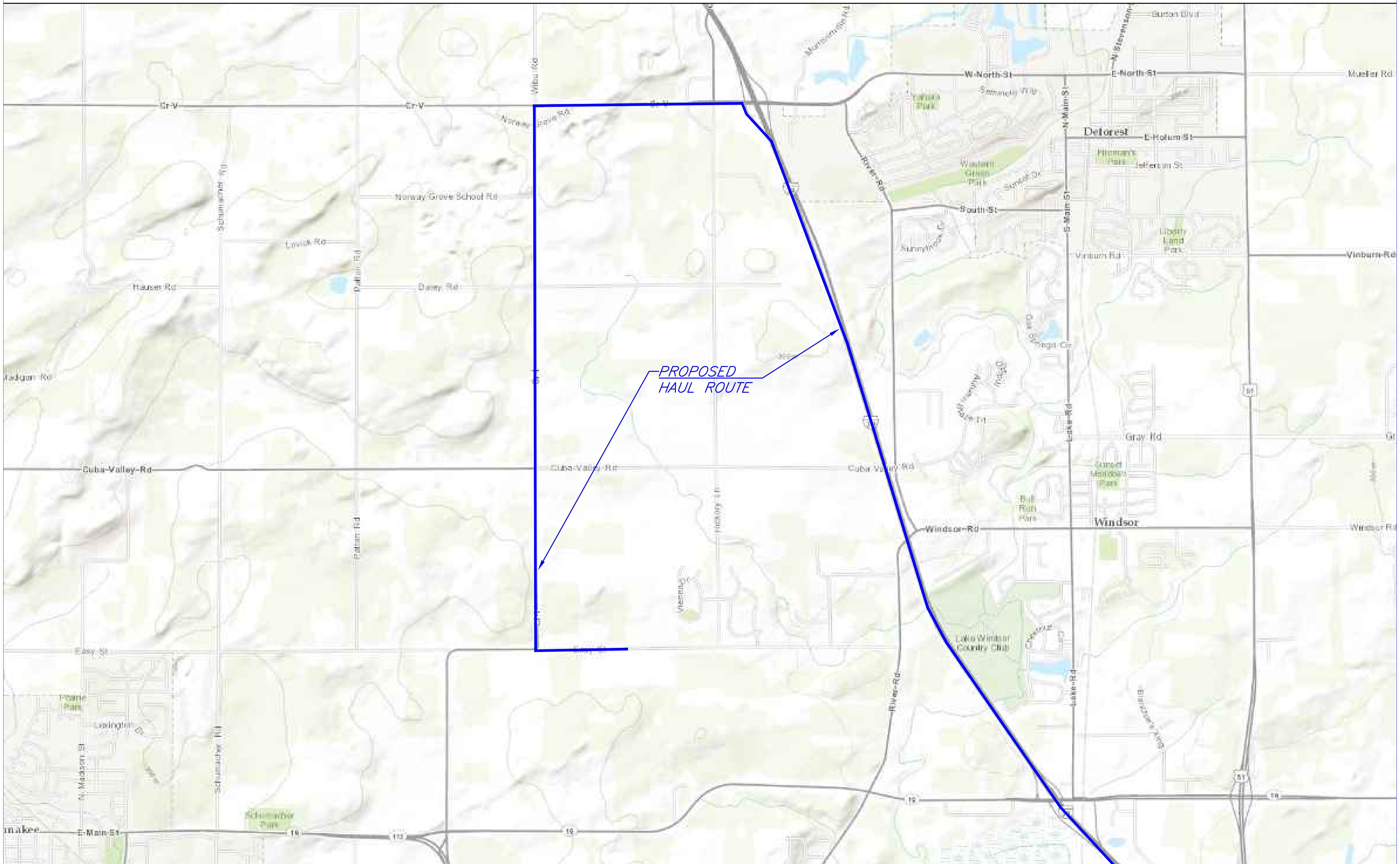
Bid No.: 314002

DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
TRAFFIC CONTROL PLAN

Sheet 3 of 10

File Name:



DEPARTMENT OF PUBLIC WORKS

DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
HAUL ROUTE

Revisions

Design By: MR

Drawn By: MR

Approved By: JV

Bid No: 314002

Date: JAN. 2014

Scale: As shown

Sheet 4 of 10

File Name:

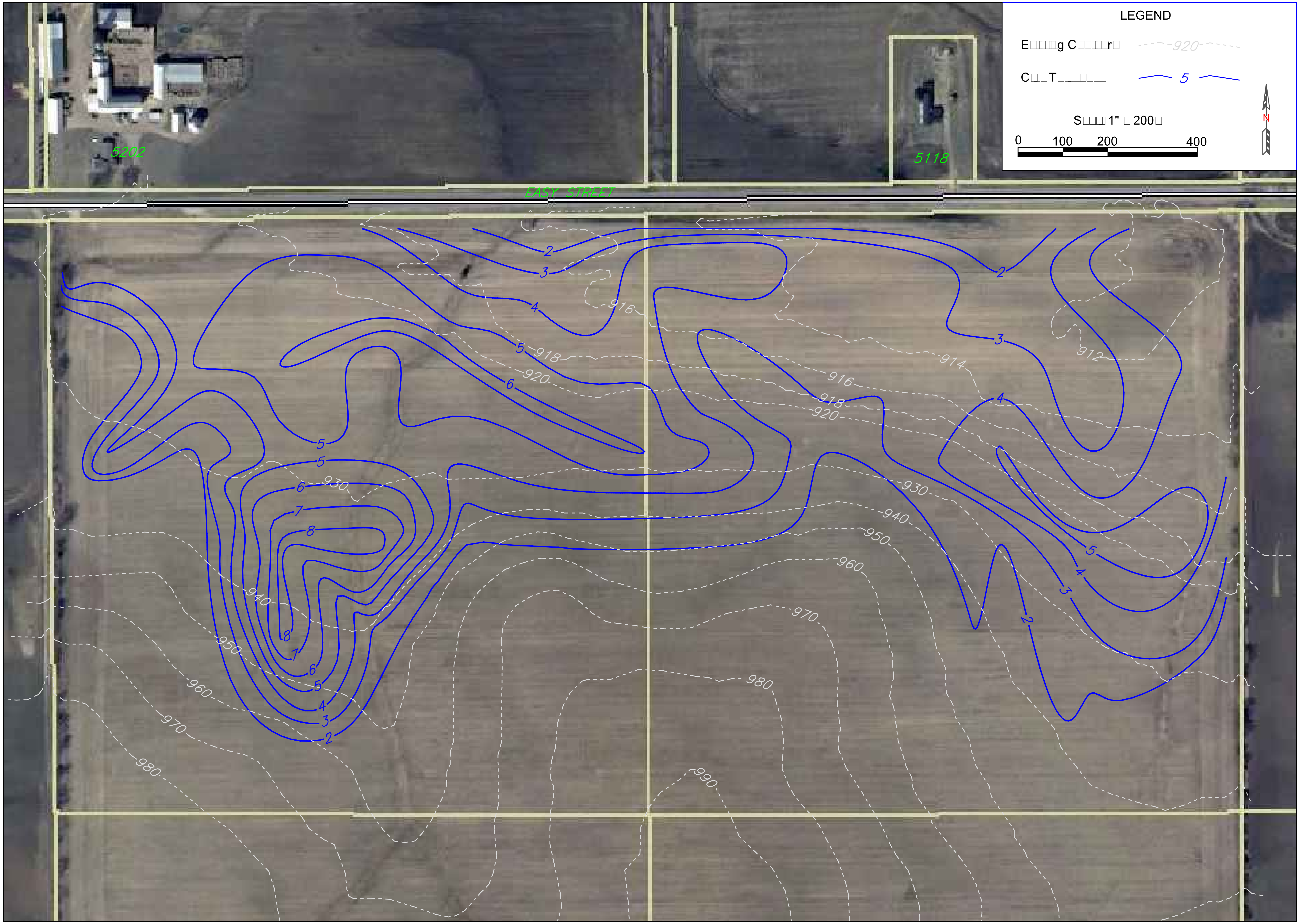
DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
EXISTING CONDITIONS

Approved By: JW
Scale: As shown
Drawn By: MR
Date: Jan. 2014
Design By: MR
Bid No.: 314002

Sheet 5 of 10

File Name:



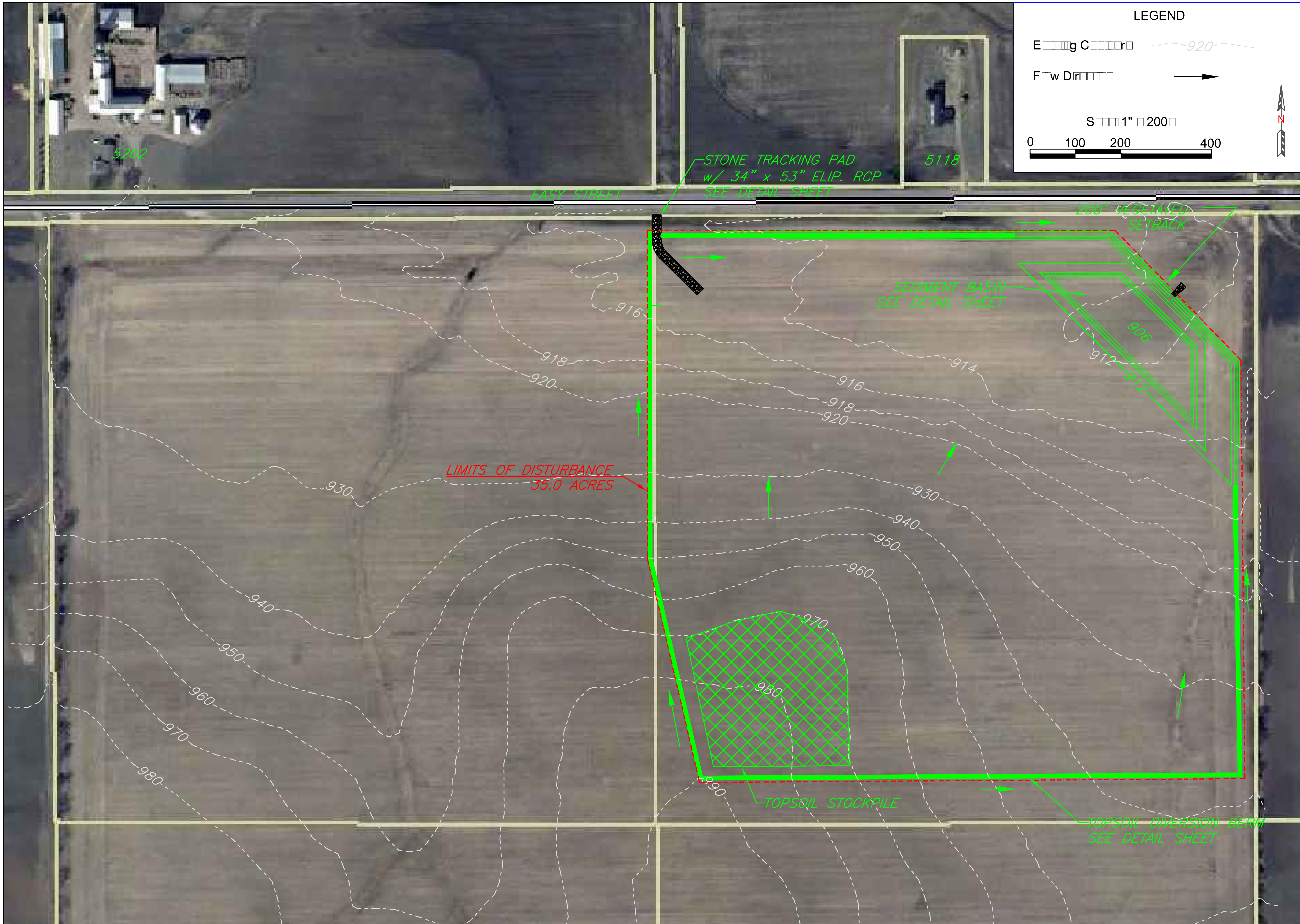
DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
CLAY ISOPACH

Design By: MR
Drawn By: MR
Approved By: JV
Bid No: 314002
Date: Jan. 2014
Scale: As shown

Sheet 6 of 10

File Name:



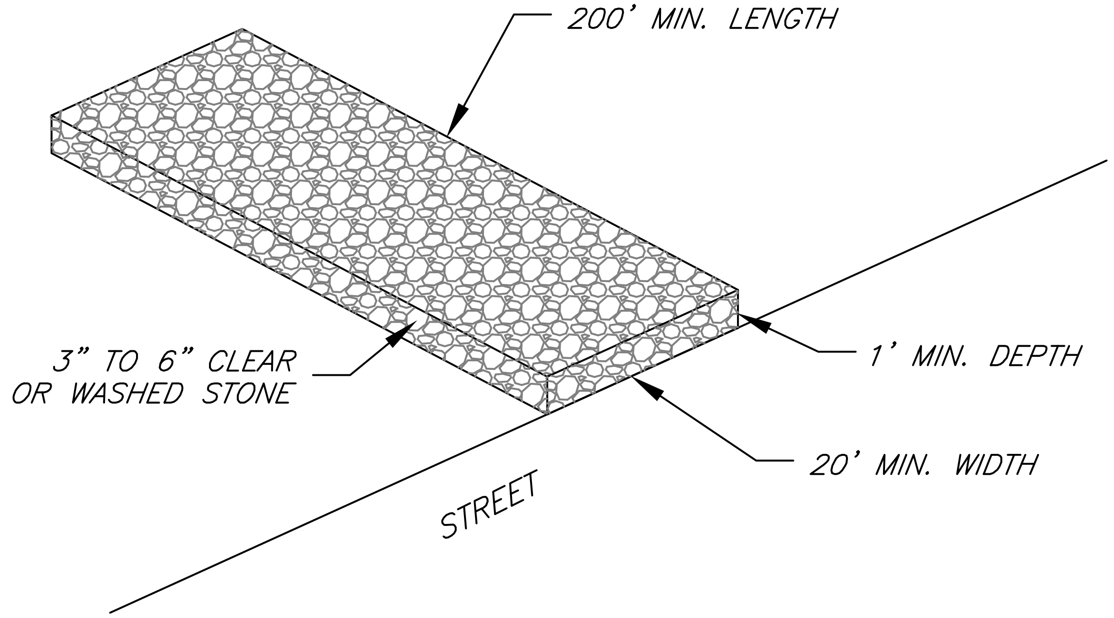
DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
PH. 1 EROSION CONTROL

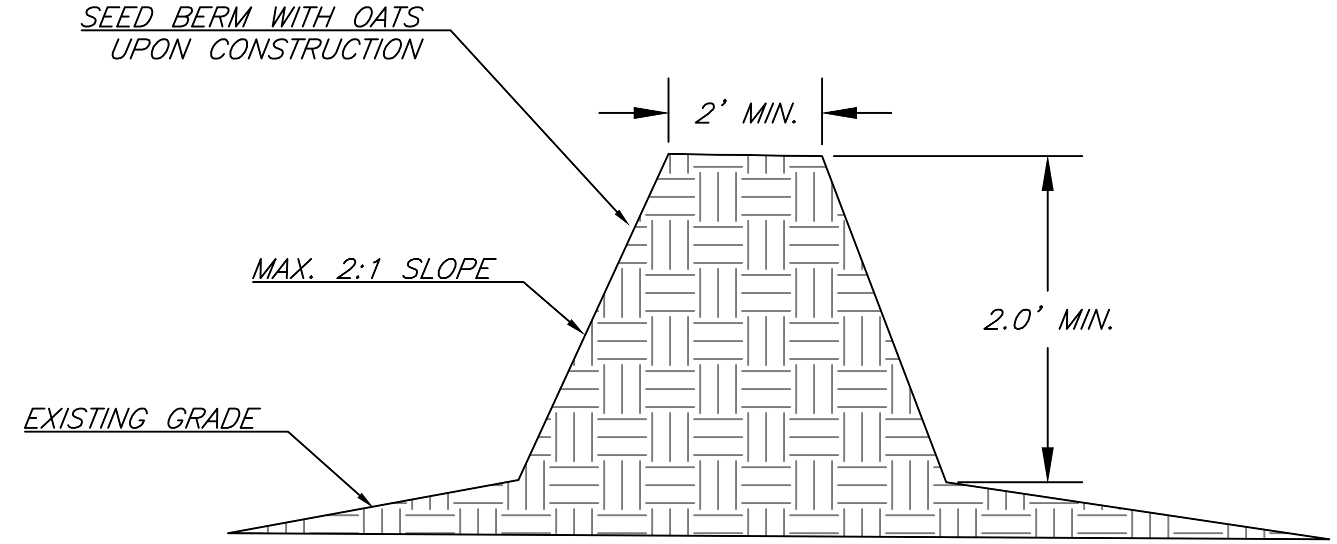
Design By: MR
Drawn By: MR
Approved By: JV
Bid No: 314002
Date: Jan. 2014
Scale: As shown

Sheet 7 of 10

File Name:



STONE TRACKING PAD



DIVERSION BERM CROSS SECTION

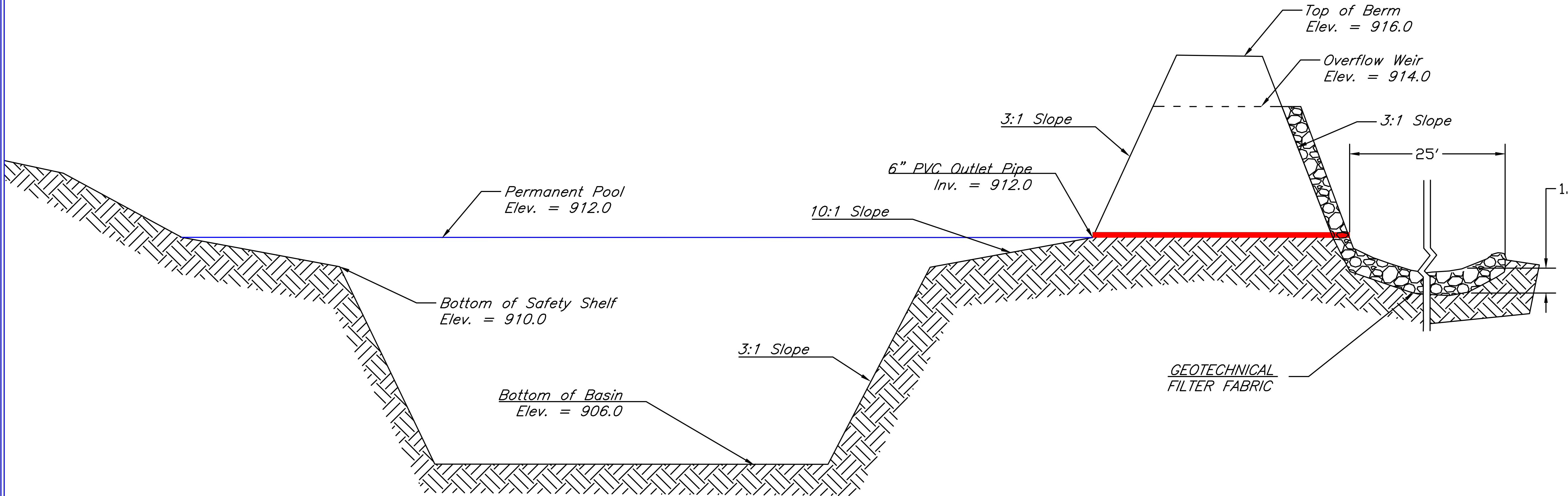
DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
EROSION CONTROL PLAN

Design By: MR
Drawn By: MR
Approved By: JV
Bid No: 314002
Date: Jan. 2014
Scale: As shown

Sheet 8 of 10

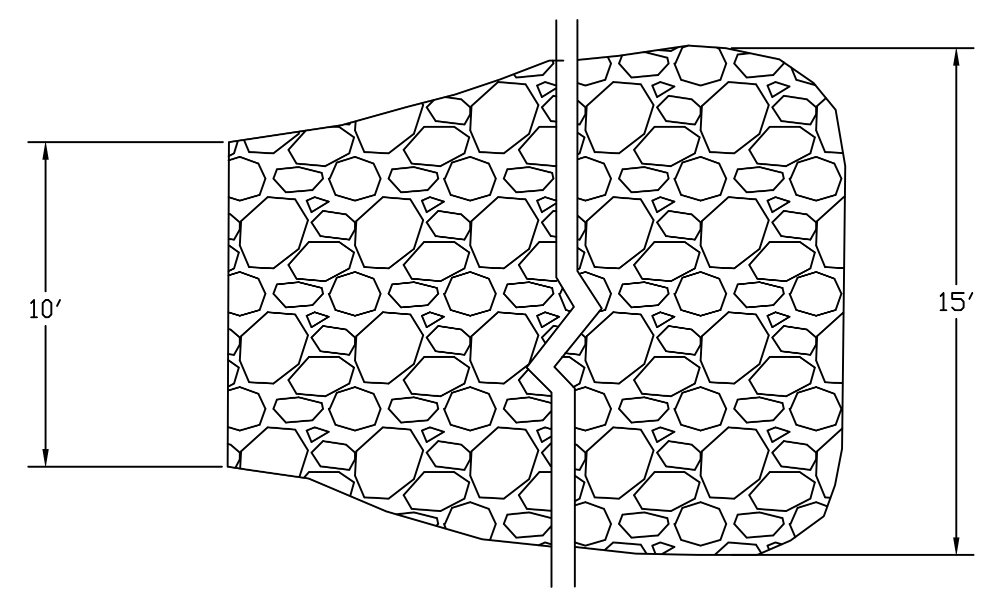
File Name:



PHASE 1 SEDIMENT BASIN CROSS SECTION

Stone Gradation

Percent passing by weight	Size (inches)
100	12 in.
60–85	9 in.
25–50	6 in.
5–20	3 in.
0–5	1.2 in.



Approved By: JV
Scale: As shown
Drawn By: MR
Date: Jan. 2014
Design By: MR
Bid No: 314002

DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
EROSION CONTROL PLAN

Sheet 9
of 10

File Name:

DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
PHASE 1 RECLAMATION

Approved By: JV
Scale: As shown
Drawn By: MR
Date: Jan. 2014
Design By: MR
Bid No: 314002

Sheet 10 of 10

File Name:

Dane County Conditional Use Permit Application

Application Date	C.U.P Number
01/24/2014	DCPCUP-2014-02266
Public Hearing Date	
03/25/2014	

OWNER INFORMATION		AGENT INFORMATION	
OWNER NAME DANE COUNTY	Phone with Area Code	AGENT NAME DANE COUNTY PUBLIC WORKS	Phone with Area Code (608) 266-4990
BILLING ADDRESS (Number, Street) 210 MARTIN LUTHER KING BLVD RM 114		ADDRESS (Number, Street) 1919 ALLIANT ENERGY CENTER WAY	
(City, State, Zip) MADISON, WI 53703-3342		(City, State, Zip) MADISON, WI 53713	
E-MAIL ADDRESS		E-MAIL ADDRESS RUPIPER.MICHAEL@COUNTYOFDANE.COM	

ADDRESS/LOCATION 1		ADDRESS/LOCATION 2		ADDRESS/LOCATION 3	
ADDRESS OR LOCATION OF CUP		ADDRESS OR LOCATION OF CUP		ADDRESS OR LOCATION OF CUP	
SOUTH OF 5202 EASY ST				SOUTH OF 5202 EASY ST	
TOWNSHIP WESTPORT	SECTION 2	TOWNSHIP	SECTION	TOWNSHIP WESTPORT	SECTION 02
PARCEL NUMBERS INVOLVED		PARCEL NUMBERS INVOLVED		PARCEL NUMBERS INVOLVED	
0809-022-8000-4		---		0809-021-8500-0	

CUP DESCRIPTION
MINERAL EXTRACTION

DANE COUNTY CODE OF ORDINANCE SECTION	ACRES
10.123(3)(d)	82.5

DEED RESTRICTION REQUIRED?	Inspectors Initials	SIGNATURE:(Owner or Agent)
☐ Yes ☐ No Applicant Initials________	HJH3	[signature]
		PRINT NAME: John Welch
		DATE: 1/24/14

Form Version 01.00.03

DANE COUNTY PLANNING & DEVELOPMENT

Conditional Use Application

Application Fee: $486 Mineral Extraction: $1136

Zoning Division
Room 116, City-County Building
210 Martin Luther King Jr. Blvd.
Madison, Wisconsin 53703-3342
Phone: (608) 266-4266
Fax: (608) 267-1540

Items required to be submitted with application:

- o **Written Legal Description of Conditional Use Permit boundaries**
- o **Scaled drawing of the property showing existing/proposed buildings, setback requirements, driveway, parking area, outside storage areas, location/type of exterior lighting, any natural features, and proposed signs.**
- o **Scaled map showing neighboring area land uses and zoning districts**
- o **Written operations plan describing the items listed below (additional items needed for mineral extraction sites)**
- o **Written statement on how the proposal meets the 6 standards of a Conditional Use**

Owner	County of Dane	Agent	Mike Rupiper / Public Works
Address	210 Martin Luther King Jr. Blvd.	Address	1919 Alliant Energy Center Way
	Madison, WI 53703		Madison, WI 53713
Phone		Phone	608-266-4990
Email		Email	rupiper.michael@countyofdane.com

Parcel numbers affected: 080902280004 and 080902185000

Town: Westport Section: 2

Property Address: Easy Street

Existing/ Proposed Zoning District : A-1 EX

- o Type of Activity proposed: Clay borrow site (short term non-metallic mineral extraction)
- o Hours of Operation Monday - Friday: 8:00 AM - 4:00 PM
- o Number of employees 3-4 Equipment operators
- o Anticipated customers None
- o Outside storage Construction equipment (backhoe, scrapers, dozer)
- o Outdoor activities Earthwork (excavation and grading)
- o Outdoor lighting None
- o Outside loudspeakers None
- o Proposed signs Traffic control signs as shown on the traffic control plan
- o Trash removal Any trash will be removed from the site daily
- o Six Standards of CUP (see back)

The statements provided are true and provide an accurate depiction of the proposed land use. I authorize that I am the owner or have permission to act on behalf of the owner of the property.

Submitted By: Date: ____________________

John Welch, Solid Waste Manager

Six Standards of a Conditional Use Permit

Provide an explanation on how the proposed land use will meet all six standards.

1. The establishment, maintenance or operation of the conditional use will not be detrimental to or endanger the public health, safety, comfort or general welfare.

   The clay borrow site will be designed and operated in accordance with all applicable regulations for mineral extraction and stormwater management and erosion control.

2. The uses, values and enjoyment of other property in the neighborhood for purposes already permitted shall be in no foreseeable manner substantially impaired or diminished by establishment, maintenance or operation of the conditional use.

   The site will be operated in a nuisance free manner. The hours of operation will be limited to Monday - Friday: 8:00 AM - 4:00 PM. The clay extraction is a short term use.

3. That the establishment of the conditional use will not impede the normal and orderly development and improvement of the surrounding property for uses permitted in the district.

   The surrounding properties are zoned A-1 Exclusive Agriculture, except for 2 rural homes (RH-2 and R-3A) on the north side of Easy Street. The site will be returned to agricultural use after the clay extraction.

4. That adequate utilities, access roads, drainage and other necessary site improvements have been or are being made.

   A stormwater management and erosion control plan has been prepared for the site and submitted to the Dane County Land & Water Resources Department and WDNR for review and approval.

5. Adequate measures have been or will be taken to provide ingress and egress so designed as to minimize traffic congestion in the public streets.

   A traffic control plan has been prepared for the site.

6. That the conditional use shall conform to all applicable regulations of the district in which it is located.

   Non-metallic mineral extraction operations that comply with s. 91.46(6), Wis. Stats., and Dane County Ordinances section 10.191 and Chapter 74 are allowed as a Conditional Use in the A-1 Exclusive Agriculture District.

Dance County

Non-Metallic Mining Reclamation Permit Application

Zoning office use only
Permit #:
Date:

Landowner: County of Dane
Address: 210 Martin Luther King Jr. Blvd.
Madison, WI 53703
Phone:
E-mail:

Agent: Mike Rupiper / Public Works
Address: 1919 Alliant Energy Center Way
Madison, WI 53713
Phone: 608-266-4990
E-mail: rupiper.michael@countyofdane.com

Address of site: Easy Street
(may need to be assigned)

Township: Westport
Parcel #: 080902280004
Parcel #: 080902185000
Parcel #:
Parcel #:

Parcel #:
Parcel #:
Parcel #:
Parcel #:

Type of aggregate: Clay

Total site acreage: 82.5

Plan review fees:
(Less than one acre: NO FEE, 1 to 25 acres: $875.00, 25 to 50 acres: $1,100.00, More than 50 acres: $1,300.00)

Non-conforming: Yes or No

Conditional use permit #:
Effective Date:
Expiration Date:

Erosion control/Stormwater permit #:
Expiration Date:

I hereby request on behalf of the applicant a non-metallic mining permit. I certify, as aduly authorized representative or agent that the operator listed above will comply with the statewide non-metallic mining reclamation standards established in ss. NR 135.05 through NR 135.15, Wis. Adm. Code. The applicant agrees to provide to Dane County an annual fee as established by county ordinance and site access for county officials necessary to evaluate this application and ensure compliance with a permit. Also, financial assurance standards as established in Ch. 74141 od Dane County Code of Ordinances.

Applicant signature:
Date:

If the person applying (submitting the application in-person, at the counter) is not the landowner, a notarized statement authorizing the applicant to act as the landowner's agent must be attached.

Permit received by:
Date:

Permit reviewed by:
Date:

This application must be submitted in person M - F, 8 A.M. - 4 P.M., with two copies of all permit materials to:

Dane County Zoning, 210 Martin Luther King Jr. Blvd. Room 116, Madison, WI

Non-metallic Mining Reclamation Application Checklist

Applicant			Zoning	LCD
Plan Requirement	✓	**Location in Plan** - page number	✓	✓
1. **Site information** - maps of the site including the general location, property boundaries, aerial extent, geologic composition and depth of the deposit, the distribution, thickness and type of soil, the approximate elevation of ground water, the location of surface waters and the existing drainage patterns.		Plan sheets 1 - 5		
2. **Biological resources** - plant communities and wildlife use at and adjacent to the site.		Page 1		
3. **Existing topography** - contour maps of the site at ten foot contour intervals.		Plan sheet 5		
4. **Location of manmade features** - on or near the site.		Plan sheets 1, 3, 4, 5		
5. **Plan view** - (existing mines) showing the location and extent of land previously affected by non-metallic mining.		Not Applicable		
6. **Post-mining land use** - consistent with local land use plans/local zoning.		Page 3		
7. **Under exclusive agricultural zoning?**		Page 1		
8. **Reclamation measures** - description of the proposed reclamation, including methods and procedures to be used and a proposed schedule for the completion of reclamation.		Plan sheets 2, 12, 13 Page 3		
9. **Proposed earthwork and reclamation** - final slope angles, high wall reduction, benching and terracing.		Plan sheets 12, 13		
10. **Methods of topsoil** - topsoil substitute material removal and storage.		Plan sheet 7, 8 Page 3		
11. **Anticipated topography of the reclaimed site.**		Plan sheets 12 & 13		
12. **Plan map that shows surface structures** - after the cessation of mining.		Not Applicable		
13. **Estimated cost of reclamation.**		Not Applicable		
14. **Revegetation plan** - shall include timing and methods of seed bed preparation, rates and kinds of soil amendments, seed application timing, methods and rates, mulching and any other techniques needed to accomplish soil and slope stabilization.		Plan sheet 2, 11		
15. **Standards for revegetation** - may be based on the percent of vegetative cover, productivity, plant density, diversity or other applicable measures.		Plan sheet 2		
16. **Erosion control and stormwater** - chapter 14 requirements.		Permit Applied For		
17. **Description of interim reclamation.**		Not Applicable		
18. **Financial assurance** - $1500/acre.		Not Applicable		

Conditional Use / Mineral Extraction / Reclamation
Permit Application
Proposed Clay Borrow Site
Dane County - Department of Public Works - Solid Waste Division

Legal Description

The proposed clay borrow site includes two parcels (080902280004 and 080902185000), which are owned by Dane County. The legal descriptions of the parcels are SEC 2-8-9 FR NE1/4 NW1/4 and SEC 2-8-9 FR NW1/4 NE1/4. Together the parcels include an area of 82.5 acres.

General Description of the Operation

The proposed operation is a temporary, non-metallic mineral (clay) extraction site. The clay will be used in the construction of the eastern expansion of the Dane County No. 2 (Rodefeld) Landfill located at 7102 USH 12.

Existing Land Use

The property is currently zoned agricultural land (A-1 EX) and is leased by the County to an area farmer for agricultural purposes.

Existing Natural Features

Surface water drainage from the site is to the north toward Easy Street. Runoff then travels east in the roadside ditch on the south side of Easy Street. At the northeast corner of the site the runoff enters a constructed drainageway. The drainageway flows generally east to an unnamed tributary to the Yahara River. There are no mapped wetlands on the site. A mapped wetland area exists to the northeast of the proposed borrow site, on the north side of Easy Street.

Types and Quantities of Materials to be Extracted

Calculations based on test pits and laboratory analysis of the soil at the site indicate that the site contains an estimated 279,000 cubic yards of clay soil that meets WDNR specifications for landfill liner and final cover construction. This estimate is based on the removal of suitable clay within an area of about 45 acres, where it is at least 2 feet thick, down to within 3" of the subsoil.

Proposed Phasing Plan / Schedule

Clay removal is proposed to be conducted in two phases. The first phase will occur in 2014 and includes the eastern parcel. Approximately 35.0 acres of this parcel will be disturbed. An estimated 120,000 cubic yards of clay will be removed from 22.4 acres. This will require an estimated 8,000 truckloads.

Phase 1 (Eastern Parcel)

April 1, 2014 - Strip topsoil / construct erosion control practices
April 21, 2014 – Begin clay extraction
September 15, 2014 – End clay extraction / begin restoration
October 15, 2014 – Complete restoration / reclamation

Alternatively, part of the clay may be removed from Phase 1 during 2014, 2015, 2016, and 2017. In that case the restoration will be phased so that disturbed areas are seeded with temporary cover by October 15th of each year and final reclamation will be completed in 2017.

The second phase will occur in 2020 and includes the western parcel. Approximately 34.7 acres of this parcel will be disturbed. An estimated 160,000 cubic yards of clay will be removed from 22.5 acres. This will require an estimated 10,700 truckloads.

<u>Phase 2 (Western Parcel)</u>
March 30, 2020 - Strip topsoil / construct erosion control practices
April 20, 2020 – Begin clay extraction
September 25, 2020 – End clay extraction / begin restoration
October 15, 2020 – Complete restoration / reclamation

Alternatively, part of the clay may be removed from Phase 2 during 2020, 2024, and 2026. In that case the restoration will be phased so that disturbed areas are seeded with temporary cover by October 15th of each year and final reclamation will be completed in 2026. The years of removal are subject to change based on future waste acceptance rates at the landfill, but it is anticipated that clay excavation will take place no more than 3 years between 2020 and 2026.

<u>Proposed Operating Hours</u>
The proposed hours of operation are 8:00 AM to 4:00 PM, Monday through Friday.

<u>Geologic Composition and Depth to the Mineral Deposit</u>
Based on the test pit field logs, lab test results and the Soil Survey for Dane County, the subsurface profile at the site consists of, in descending order, a variable thickness (9” to 40”) of silt loam topsoil (ML-CL) over mottled brown lean day (CL). The clay soils present at the site overlay either varying thicknesses of brown sandy clay loam (SC) with increased sand content with depth, brown silt soils (ML), or silty sand and sand soils (SM, SP) with trace amounts of cobbles and boulders. The clay stratum is not continuous over the entire area of the site. It ranges in thickness from 1 to 8 feet. The geologic origin of the clay stratum is interpreted as aeolian, or wind deposited materials. The sediments were deposited in this part of Dane County as the glacial ice fronts retreated and exposed newly deposited materials to erosion. The fine-grained material in these glacially derived deposits, primarily silt and clay sized particles, were then picked up by the wind and redeposited as a surficial layer over previous in-place deposits, primarily consisting of poorly graded sand with a variable silt content.

<u>Proposed Transportation Route</u>
The following transportation route will be used to transport clay excavated from the borrow site to the landfill:

Exit the borrow site toward the north and travel west on Easy Street for approximately ½ miles to the junction with County Trunk Highway I. Turn right and travel north on CTH I for approximately 3 miles to the junction with CTH V. Turn right and travel east on CTH V for approximately 1.2 miles to the junction with I-39/90/94. The interstate will then be followed south and east to the junction with USH 12-18 which will be taken east to the landfill. This results in a total haul distance of approximately 24 miles. No route access restrictions are anticipated other than possible weight restrictions in early Spring on Easy Street.

The Dane County Highway and Transportation Division does not recommend the use of CTH I south of Easy Street as a haul route due to the bad intersection with STH 19. A route travelling east on Easy Street to River Road to STH 19 is not recommended to reduce traffic impacts on the residents of the Hickory Meadows and Nature Valley subdivisions in the Town of Vienna.

Equipment to be Used

Scrapers will be used to remove and stockpile the topsoil. The clay soil will be excavated using a tracked backhoe and/or scrapers, and loaded into trucks for transportation to the landfill site. Approximately 80 to 100 truckloads per day will be used to haul the clay from the site.

Site Activities

No blasting, drilling, mining, crushing, screening, washing, asphalt batching, or concrete mixing will be performed on the site. Most likely the equipment will be refueled on site, as needed, by a fuel truck and no fuel will be stored on the site. However, it is possible that a small, probably 500-gallon, fuel tank may be kept on site.

Groundwater Protection

The approximate depth to groundwater is 33 to 38 feet, based on the nearest well construction reports to the property. No excavation will occur below the water table.

Proposed Structures

There are no temporary or permanent structures (e.g., scales, offices) proposed as part of this project.

Special Measures

A water truck will be kept on site and the soil surface will be watered as necessary to control dust. Easy Street will be swept as needed. A stormwater and erosion control plan, traffic control plan, and restoration plan have been prepared for the site. The erosion control plan includes stone tracking pads and sediment basins.

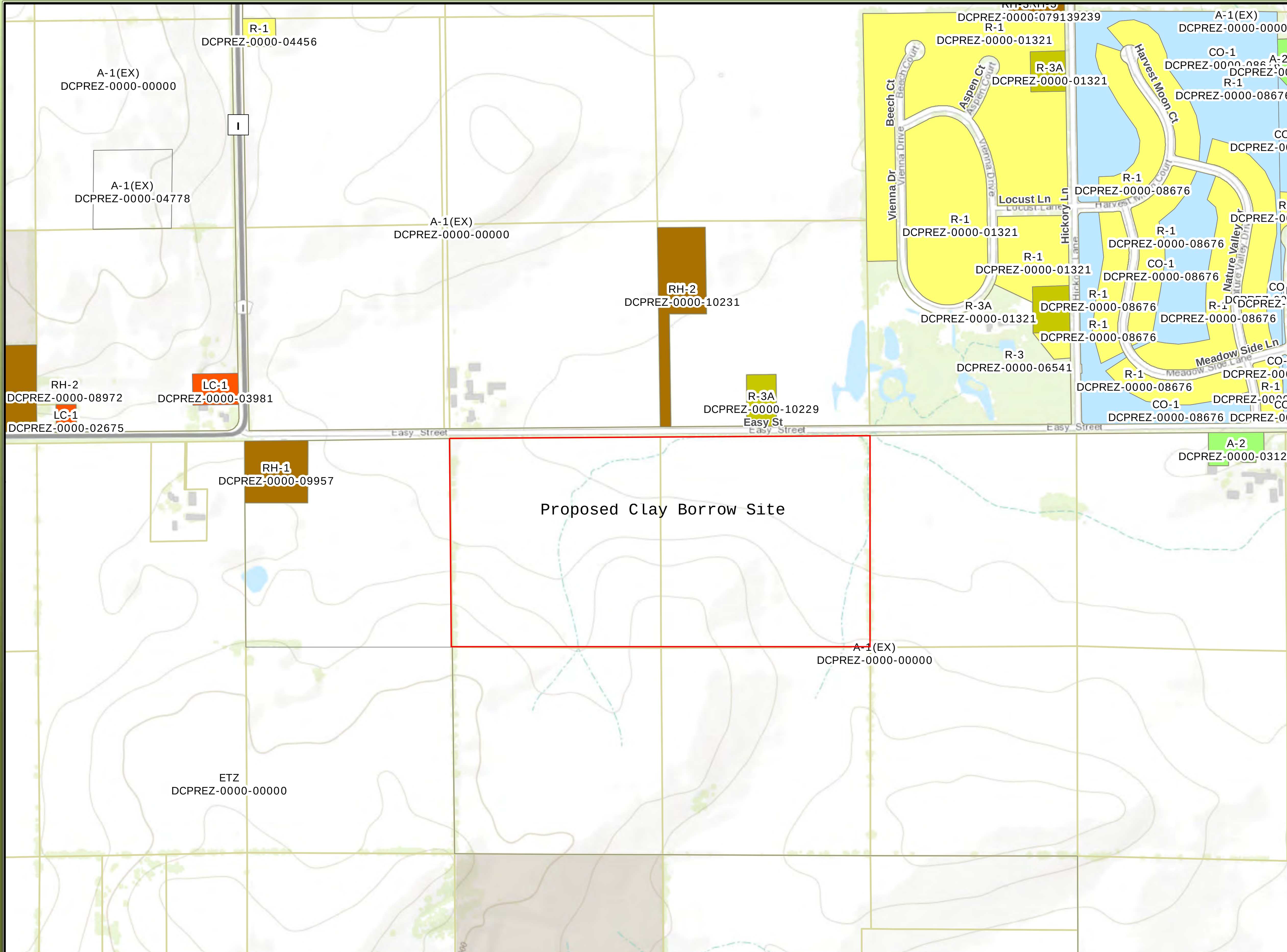
Proposed Use After Reclamation

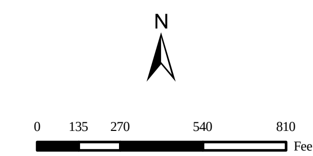
Once the clay removal operations are completed, grades will be established for maintaining permanent surface water drainage. Overall the drainage patterns for the site will remain essentially the same after the site as they are now. Upon completion of the site grading, topsoil will be restored by uniformly spreading a minimum of 6 inches of topsoil over all excavated areas. After the topsoil is spread, the area will be seeded with a cover crop of winter rye and mulched. Post clay removal, the site will be returned to agricultural land use.

Zoning Map

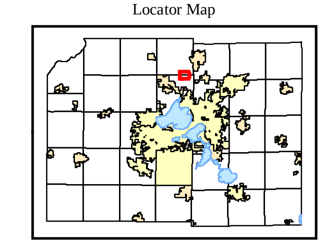
Proposed Clay Borrow Site

November 2013





Locator Map

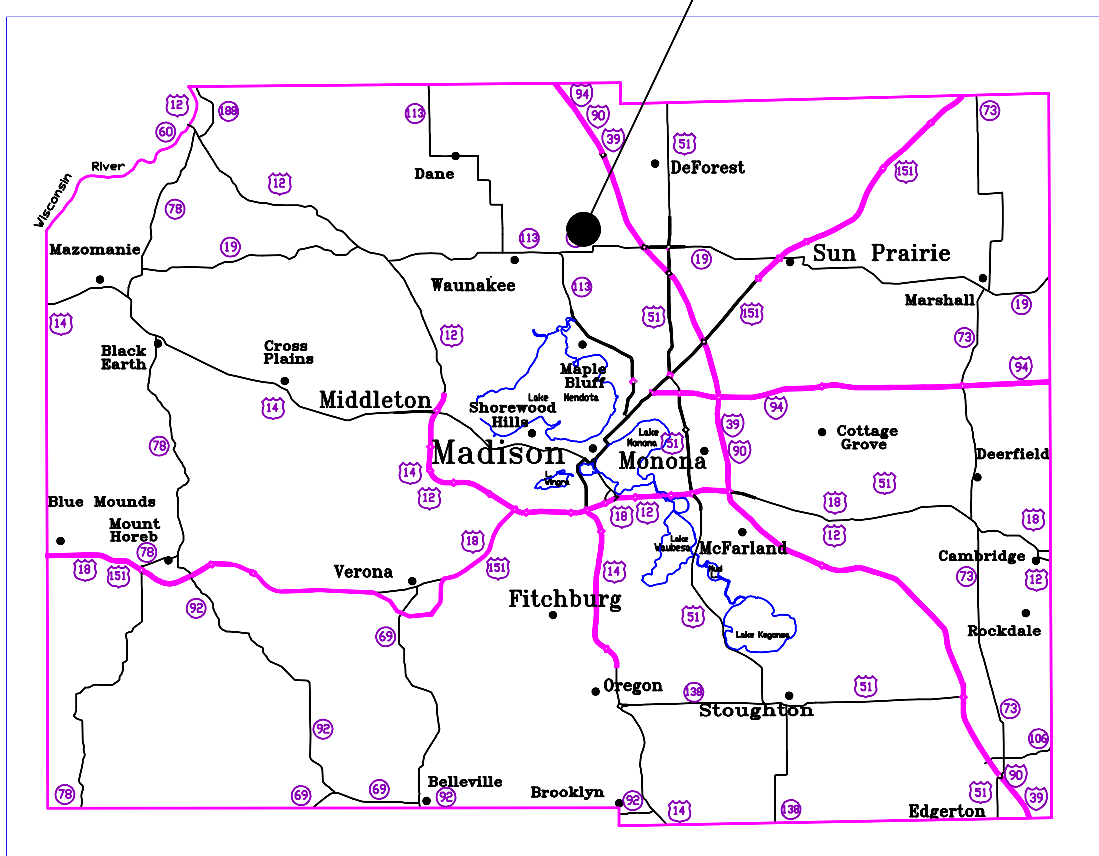


This map was prepared by the Dane County Land Information Office from records and data located in various public offices. Map information is believed to be accurate but is not guaranteed to be without error. Source data used to compile this map is dynamic and in a constant state of maintenance, correction and update. This map does not represent a field survey and is not intended to be used as one. For general cartographic and reference purposes only.

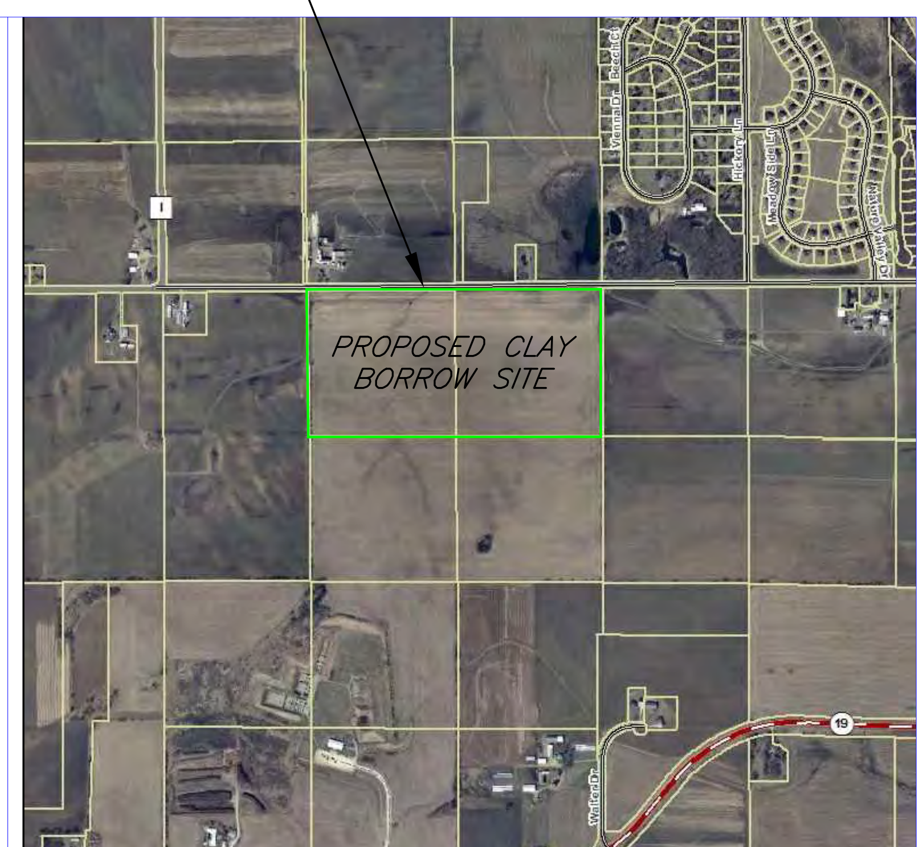
EASY STREET CLAY BORROW SITE
CONDITIONAL USE, NON-METALLIC MINING RECLAMATION and EROSION CONTROL PERMIT APPLICATION

PREPARED BY:
DANE COUNTY PUBLIC WORKS
SOLID WASTE DIVISION
JANUARY 2014

PROJECT LOCATION



DANE COUNTY MAP



LOCATOR MAP

SHEET NUMBER	SHEET TITLE
1	TITLE SHEET
2	GENERAL NOTES
3	TRAFFIC CONTROL
4	HAUL ROUTE
5	EXISTING CONDITIONS
6	CLAY ISOPACH
7	EROSION CONTROL – PHASE 1
8	EROSION CONTROL – PHASE 2
9	EROSION CONTROL DETAILS
10	EROSION CONTROL DETAILS
11	EROSION CONTROL DETAILS
12	RECLAMATION PLAN – PHASE 1
13	RECLAMATION PLAN – PHASE 2

File Name:

EROSION CONTROL NOTES:

1. All erosion and sediment control practices will be installed and maintained in accordance with the following WDNR Technical Standards:

   CHANNEL EROSION MAT (1053)
   CONSTRUCTION SITE DIVERSION (1066)
   DUST CONTROL (1068)
   MULCHING FOR CONSTRUCTION SITES (1058)
   SEEDING (1059)
   STONE TRACKING PAD & TIRE WASHING (1057)
   VEGETATIVE BUFFER FOR CONSTRUCTION SITES (1054)
   SEDIMENT BASIN (1064)
   SILT FENCE (1056)

2. All topsoil stockpiles, diversion berms and vegetated buffer area will be seeded with oats immediately after they are constructed.

3. All erosion and sediment control practices will be inspected at least weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24 hour period.

RESTORATION NOTES:

1. Final reclaimed slopes covered by topsoil will not be steeper than a 3:1 horizontal to vertical incline.

2. Topsoil will be replaced to a minimum depth of 6 inches. Topsoil redistribution will not be performed during or immediately after a precipitation event until the soils have sufficiently dried.

3. Restored areas will be seeded with cereal (winter) rye at a rate of 131 lbs. Pure Live Seed/acre and milched at a rate of 1.5 tons per acre. Mulch shall cover min. 70% of soil surface. Seeding and m,ulching will take place no later than October 15th.

4. The grassed waterway will be seeded according to NRCS FOTG Standard 342, Critical Area Planting and Erosion Matted.

CONSTRUCTION SCHEDULE:

Phase 1 (Eastern Parcel)
April 1, 2014 – Strip topsoil / construct erosion control practices
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Alternatively, part of the clay may be removed from Phase 1 during 2014, 2015, 2016, and 2017. In that case the restoration will be phased so that disturbed areas are seeded with temporary cover by October 15th of each year and final reclamation will be completed in 2017.

Phase 2 (Western Parcel)
March 30, 2020 – Strip topsoil / construct erosion control practices
April 20, 2020 – Begin clay extraction
September 25, 2020 – End clay extraction / begin restoration
October 15, 2020 – Complete restoration

Alternatively, part of the clay may be removed from Phase 2 during 2020, 2024, and 2026. In that case the restoration will be phased so that disturbed areas are seeded with temporary cover by October 15th of each year and final reclamation will be completed in 2026. The years of removal are subject to change based on future waste acceptance rates at the landfill, but it is anticipated that clay excavation will take place no more than 3 years between 2020 and 2026.

Revisions

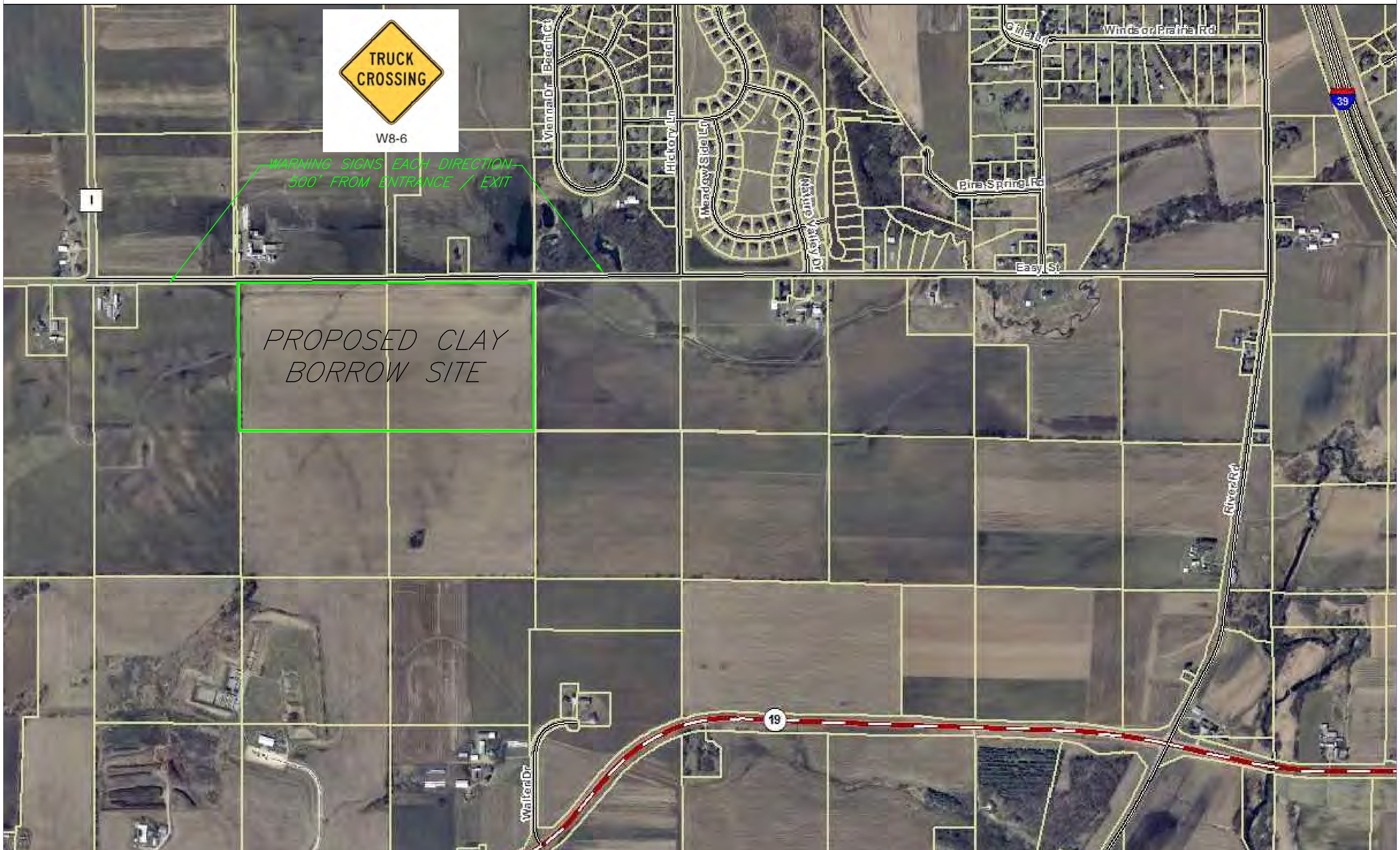
Approved By: JV
Scale: As shown
Drawn By: MR
Date: Jan. 2014
Design By: MR
Bid No:

DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
NOTES

Sheet 2
of 13

File Name:



DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
TRAFFIC CONTROL PLAN

Revisions

Design By: MR
Drawn By: MR
Approved By: JV
Bid No:
Date: Jan. 2014
Scale: As shown

Sheet 3 of 13

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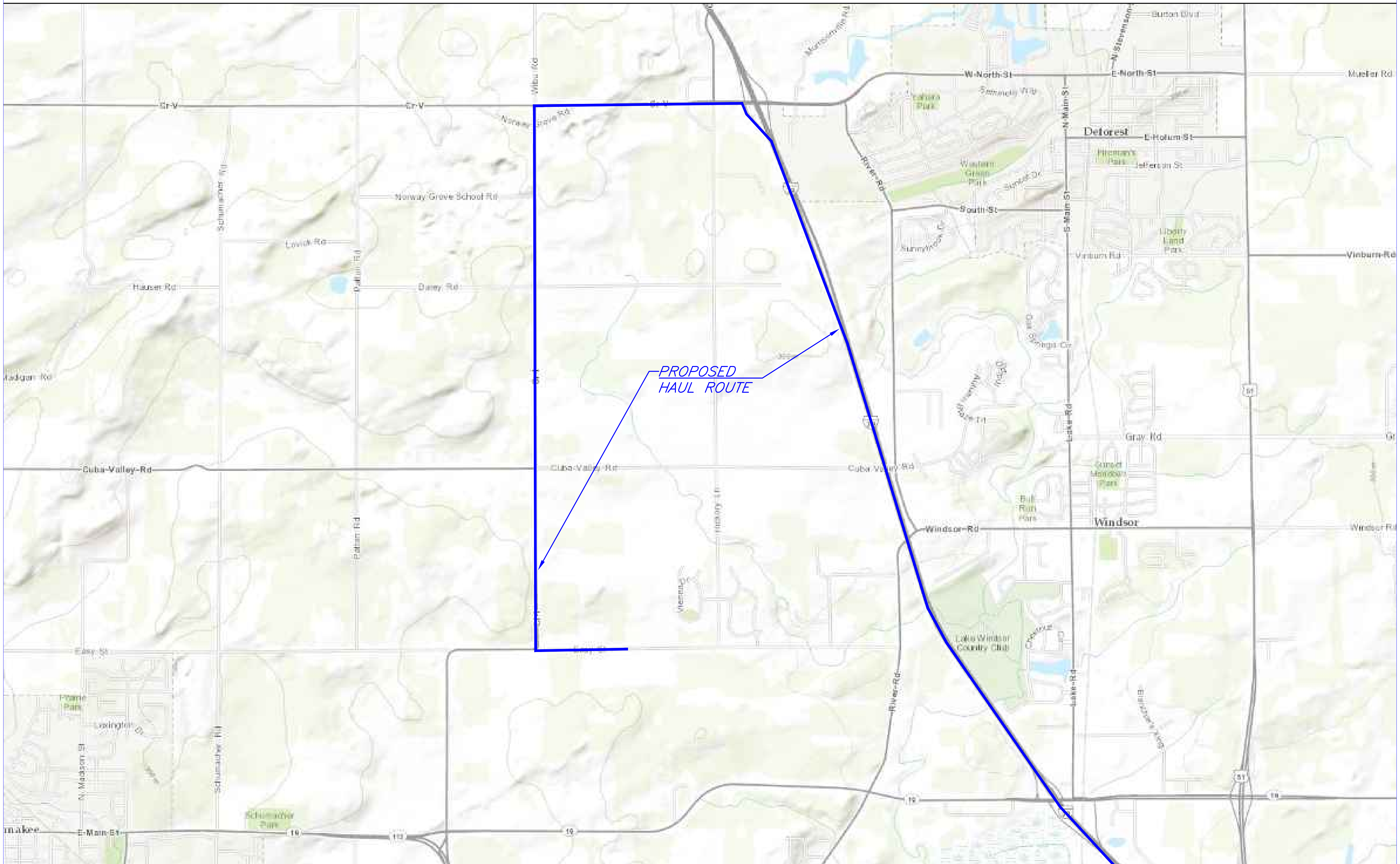


Revisions

Approved By: JV

Drawn By: MR

Design By: MR

Bid No:

Date: Jan. 2014

Scale: As shown

DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
HAUL ROUTE

Sheet 4 of 13

File Name:

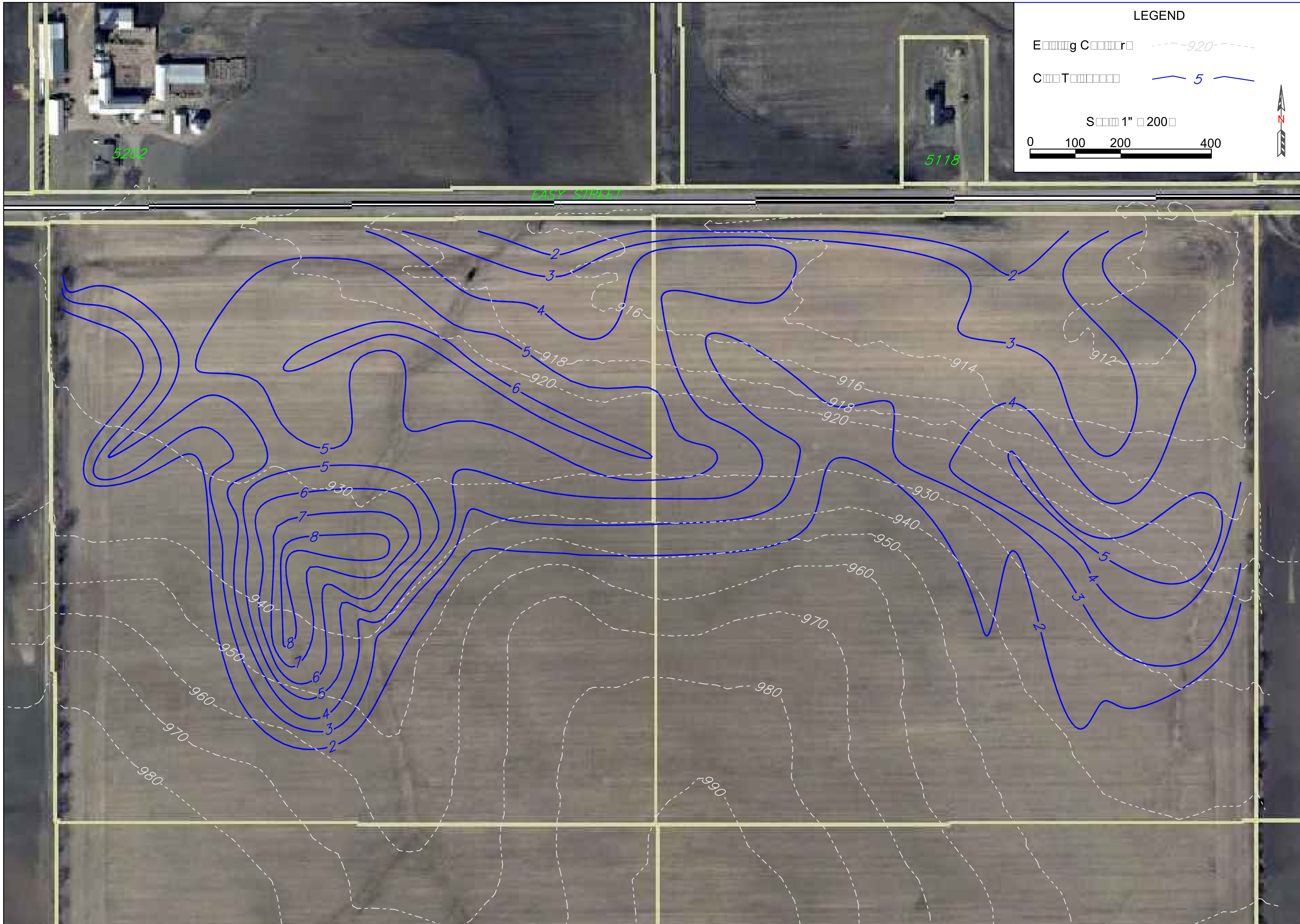
File Name:

DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

Design By: MR
Drawn By: MR
Approved By: JV
Bid No:
Date: Jan. 2014
Scale: As shown

EASY STREET
CLAY BORROW SITE
EXISTING CONDITIONS

Sheet 5 of 13



Design By: MR
Drawn By: MR
Approved By: JV
Bid No:
Date: Jan. 2014
Scale: As shown

DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
CLAY ISOPACH

Sheet 6
of 13

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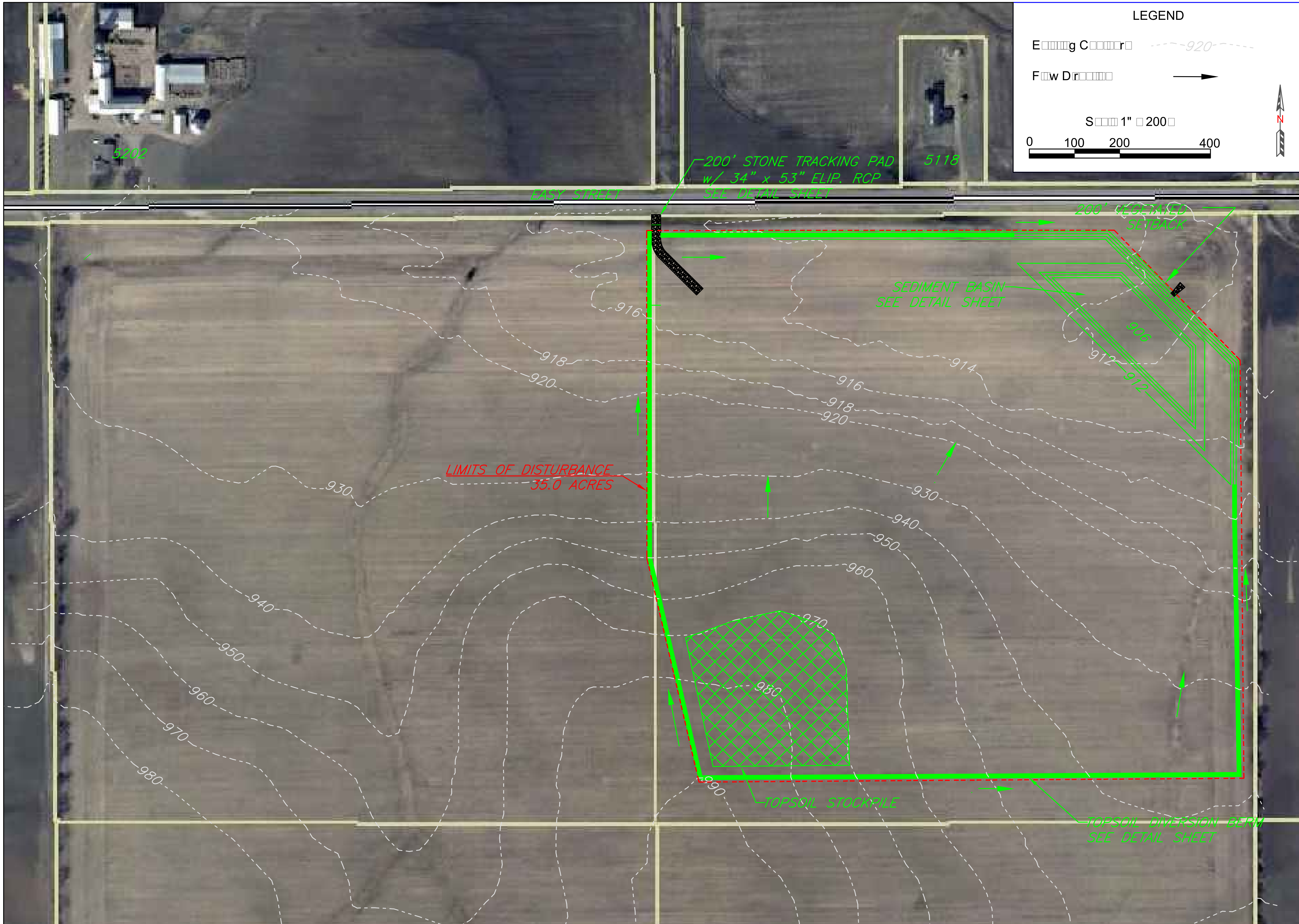


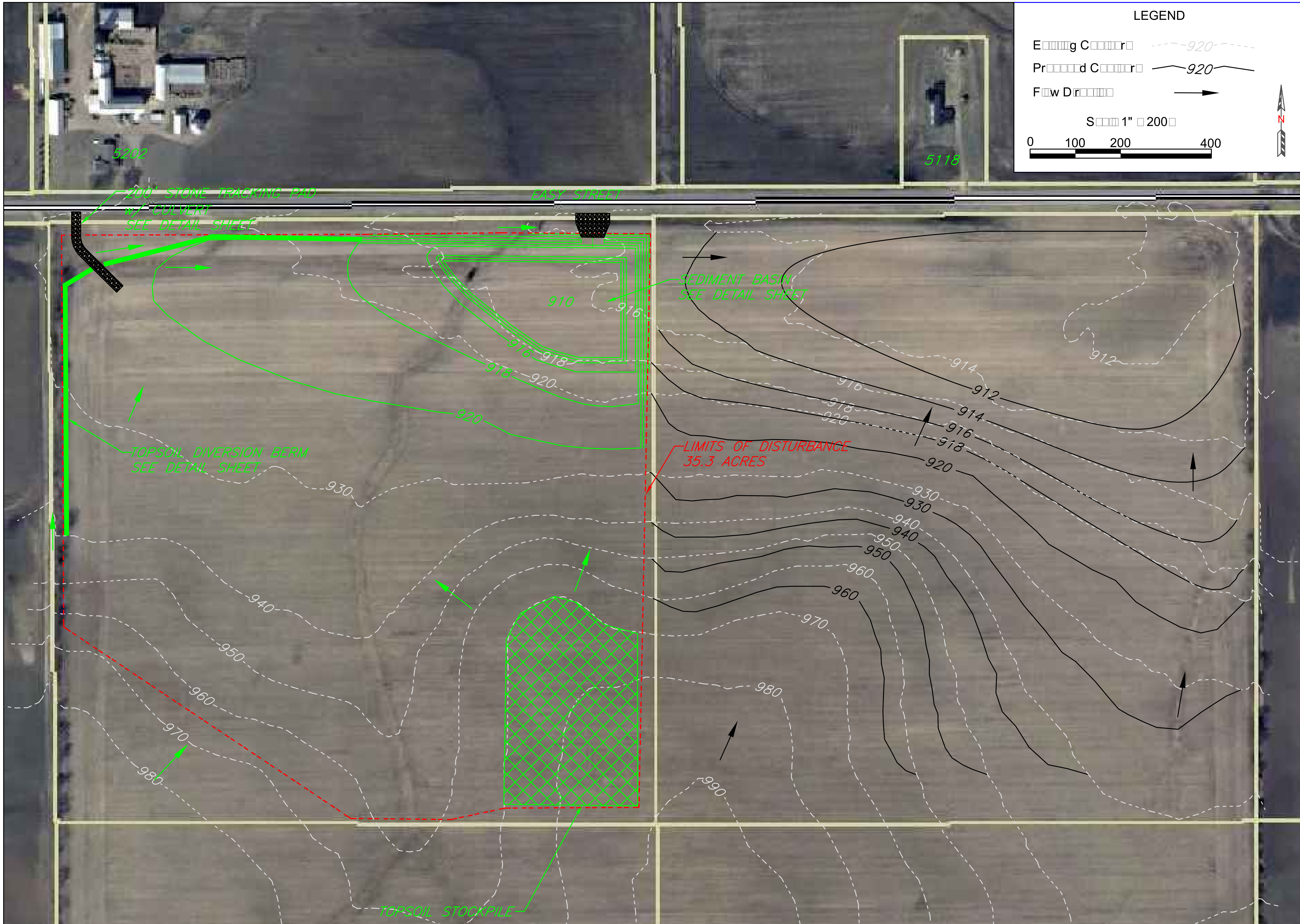
DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
PH. 1 EROSION CONTROL

Design By: MR
Drawn By: MR
Approved By: JV
Bid No:
Date: Jan. 2014
Scale: As shown

Sheet 7 of 13

File Name:



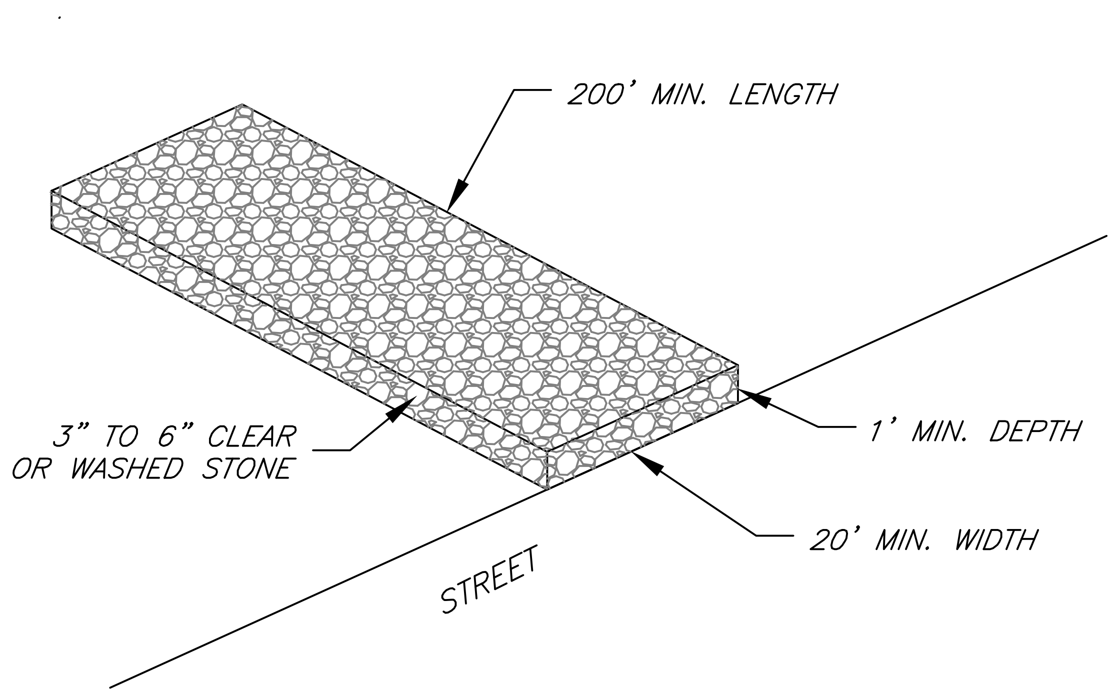
DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
PH. 2 EROSION CONTROL

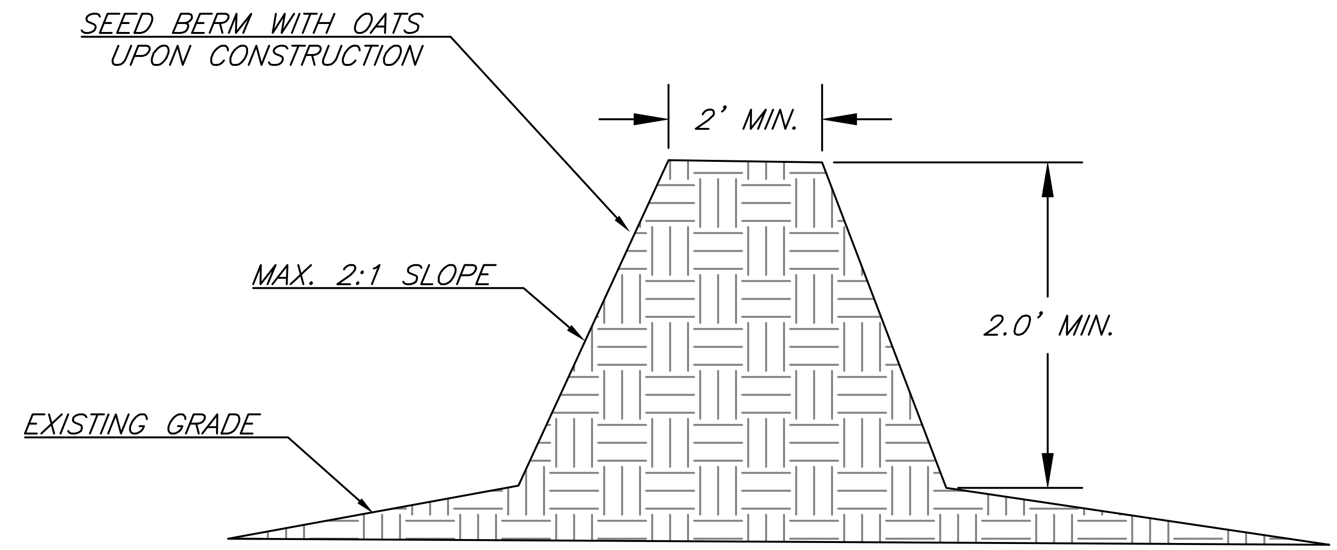
Design By: MR
Drawn By: MR
Approved By: JV
Bid No:
Date: Jan. 2014
Scale: As shown

Sheet 8 of 13

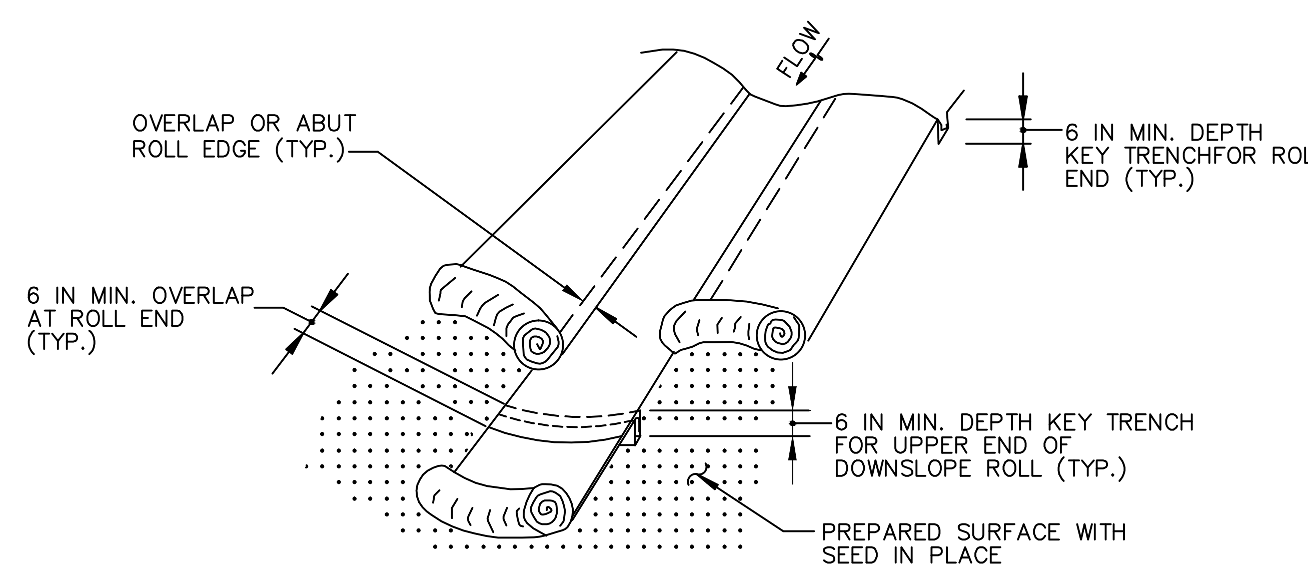
File Name:



STONE TRACKING PAD



DIVERSION BERM CROSS SECTION



CHANNEL EROSION MAT

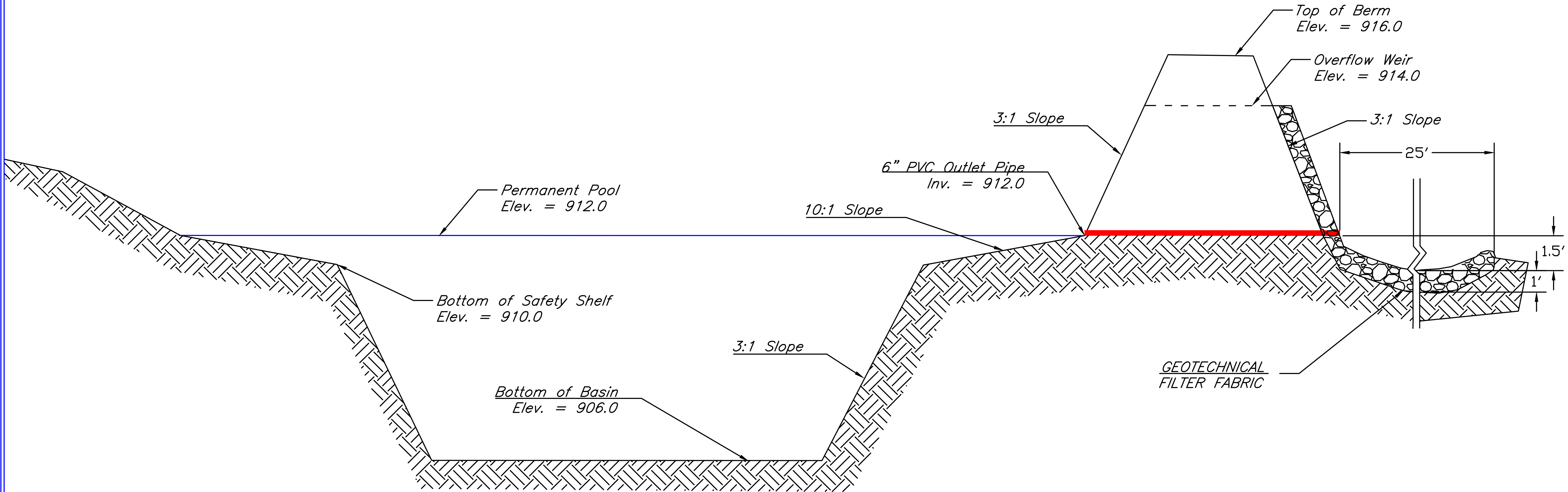
Approved By: JV
Scale: As shown
Drawn By: MR
Date: Jan. 2014
Design By: MR
Bid No:

DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
EROSION CONTROL PLAN

Sheet 9 of 13

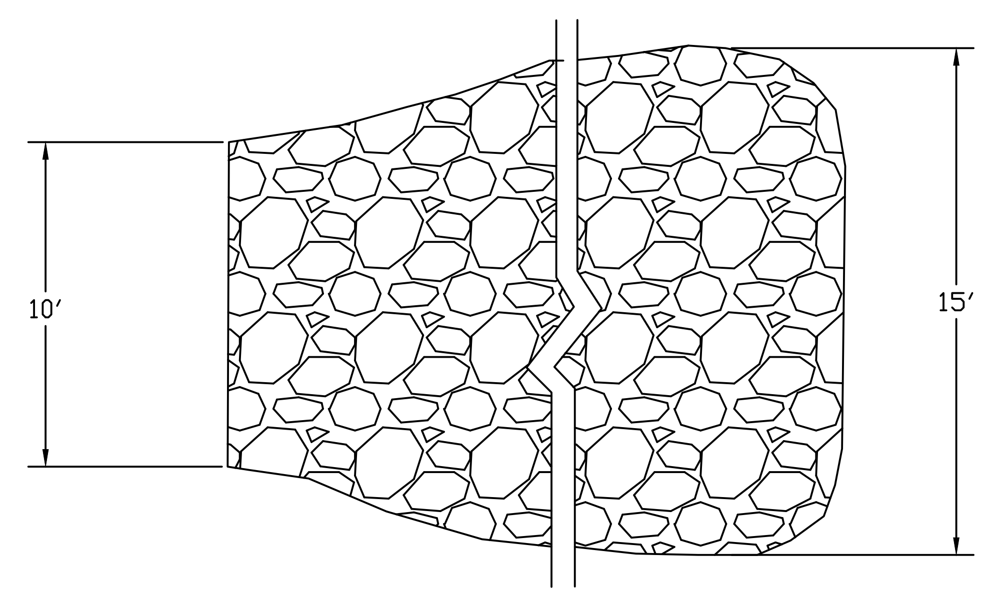
File Name:



PHASE 1 SEDIMENT BASIN CROSS SECTION

Stone Gradation

Percent passing by weight	Size (inches)
100	12 in.
60–85	9 in.
25–50	6 in.
5–20	3 in.
0–5	1.2 in.



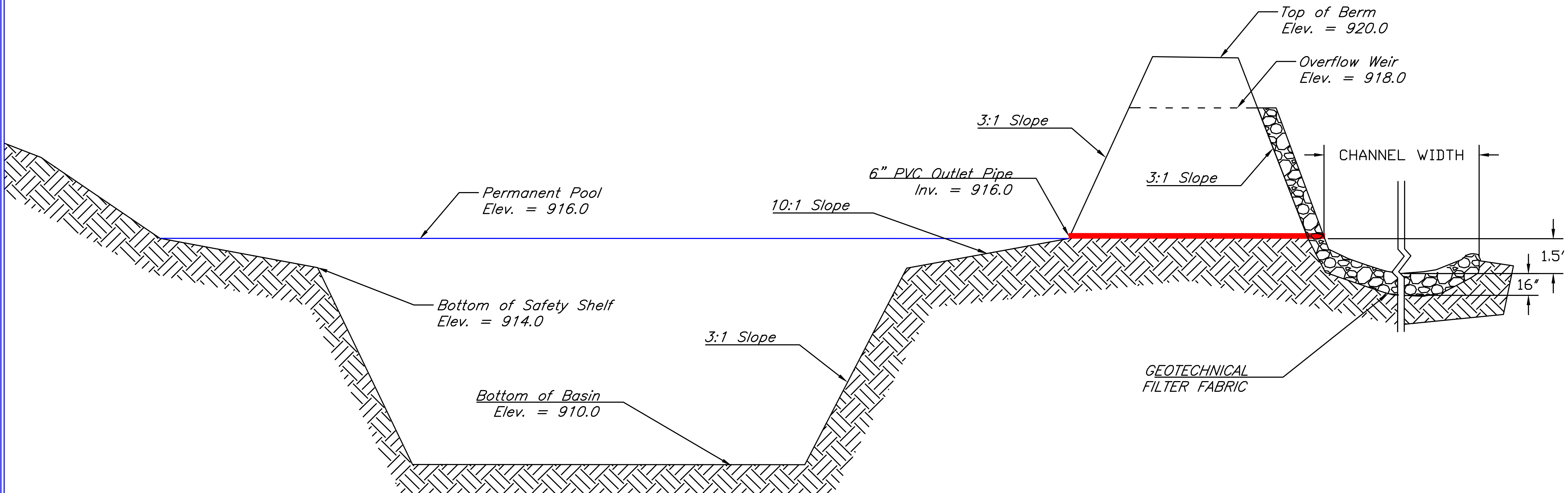
Design By: MR
Drawn By: MR
Approved By: JV
Bid No:
Date: Jan. 2014
Scale: As shown

DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
EROSION CONTROL PLAN

Sheet 10
of 13

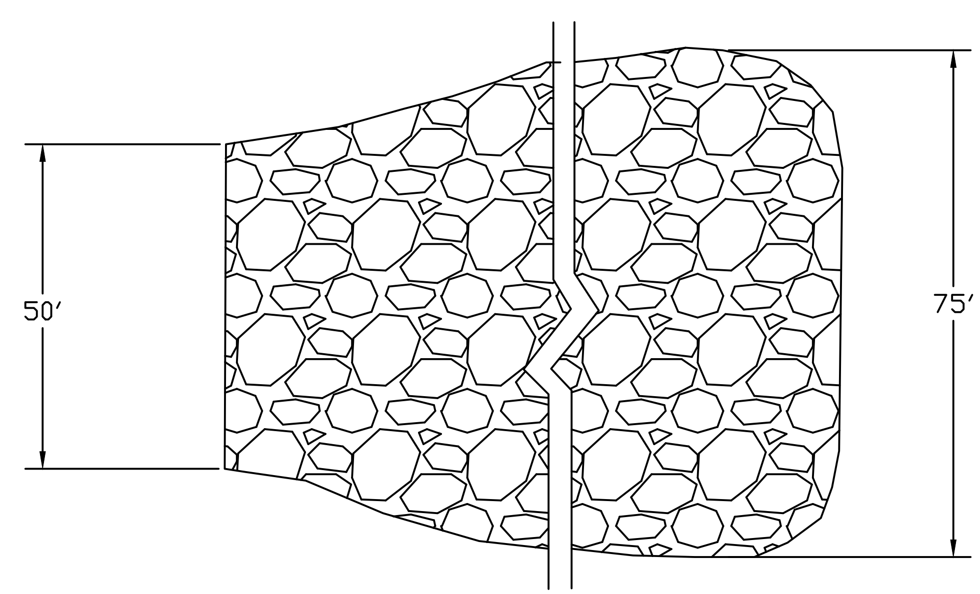
File Name:



PHASE 2 SEDIMENT BASIN CROSS SECTION

Stone Gradation

Percent passing by weight	Size (inches)
100	16 in.
60–85	12 in.
25–50	8 in.
5–20	4 in.
0–5	1.6 in.



Approved By: JV
Drawn By: MR
Design By: MR
Scale: As shown
Date: Jan. 2014
Bid No:

DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
EROSION CONTROL PLAN

File Name:

DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
PHASE 1 RECLAMATION

Approved By: JV
Drawn By: MR
Design By: MR
Scale: As shown
Date: Jan. 2014
Bid No:

Sheet 12 of 13

File Name:

File Name:

DEPARTMENT OF PUBLIC WORKS
DANE COUNTY WISCONSIN

EASY STREET
CLAY BORROW SITE
PHASE 2 RECLAMATION

Design By: MR
Drawn By: MR
Approved By: JV
Bid No:
Date: Jan. 2014
Scale: As shown

Sheet 13 of 13

APPENDIX C
LABORATORY TEST RESULTS FOR FINE GRAINED BARRIER LAYER SOIL IN ON-SITE STOCKPILES

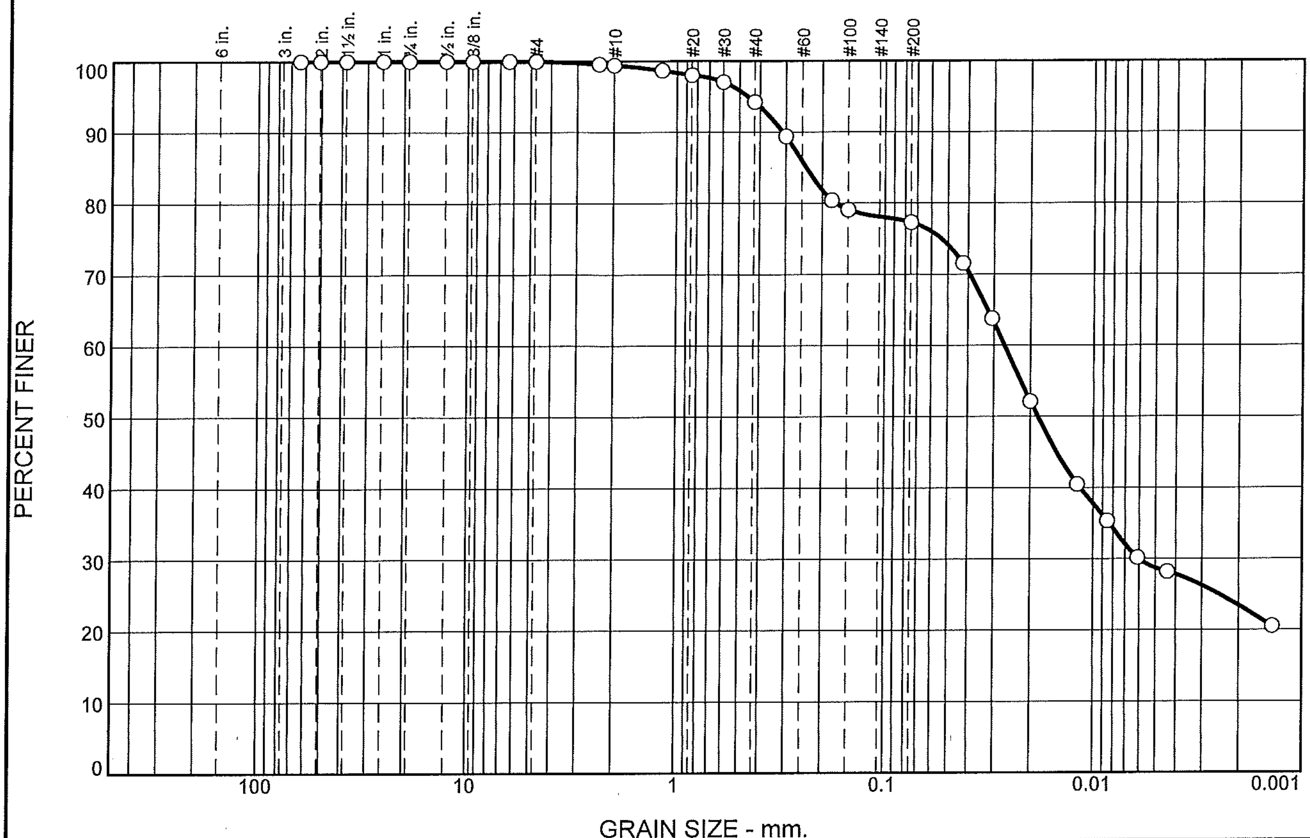
TABLE OF FINE GRAINED BARRIER LAYER LABORATORY TEST RESULTS

Table #1
Fine Grained Barrier Layer Laboratory Results
Dane County Rodefeld Landfill
Madison, Wisconsin

Location	Atterberg Linits			P200	USCS	Modified Proctor		Hycraulic Conductivity (cm/s)
	PL	LL	PI			Maximum Dry Weight lbs/cf	Optimum Moisture %	
Parisi Stockpile								
Sample #1	20	36	16	77.3	CL	124.2	10.5	**5.5×10^{-8}**
Sample #2	19	34	15	72.7	CL			
Sample #3	17	30	13	63	CL			
Sample #4	17	30	13	63.6	CL			
Sample #5	16	23	7	43.7	SC-SM	128.4	8.7	1.6×10^{-8}
Sample #6	17	26	9	54.1	CL			
Sample #7	18	20	2	61.4	ML			
Sample #8	18	28	10	77.3	CL			
Sample #9	17	31	14	58.2	CL	125.2	10.8	8.3×10^{-9}
Fine Grained On-site Material								
FG #1	17	31	14	67.1	CL			
FG #2	15	28	13	52.6	CL			
FG #3	16	27	11	48.2	SC			
FG #4	13	22	9	70	CL			
FG #5	19	33	14	70	CL			
FG #6	15	26	11	53.2	CL			
FG #7	16	30	14	70.7	CL			
FG #8	14	23	9	51.8	CL			
FG #9	16	30	14	62.1	CL			
FG #10	15	27	12	52.5	CL			
FG #11	16	24	8	47.9	SC			
FG #12	17	24	7	46.1	SC-SM			
FG #13	16	24	8	47	SC			
FG #14	19	33	14	75.2	CL			
FG #15	17	26	9	56.7	CL			
FG #16	16	28	12	57.7	CL			
FG #17	15	27	12	48.8	SC			
FG #18	15	24	9	35.8	SC			
FG #19	17	18	1	65.5	ML			
Comp #1-5	16	28	12	64.4	CL	126.8	10.1	
Comp #6-10	18	28	10	56.3	CL	126.2	9.7	
Comp #11-15	17	24	7	53.4	CL-ML	127	9.9	
Comp #16-19	16	23	7	47.9	SC-SM	127.8	9.2	
WDNR Fine Grained Barrier Layer Requirements				>25%	ML, CL, CH, SM, or SC or dual classification of above			

PARISI STOCKPILE LABORATORY TEST RESULTS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.6	5.2	16.9	48.6	28.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#8	99.5		
#10	99.4		
#16	98.7		
#20	98.0		
#30	97.0		
#40	94.2		
#50	89.4		
#80	80.4		
#100	79.1		
#200	77.3		

* (no specification provided)

Material Description

Lean clay with sand

Atterberg Limits

PL= 20 LL= 36 PI= 16

Coefficients

D_{90}= 0.3105 D_{85}= 0.2388 D_{60}= 0.0267
D_{50}= 0.0184 D_{30}= 0.0060 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(11)

Remarks

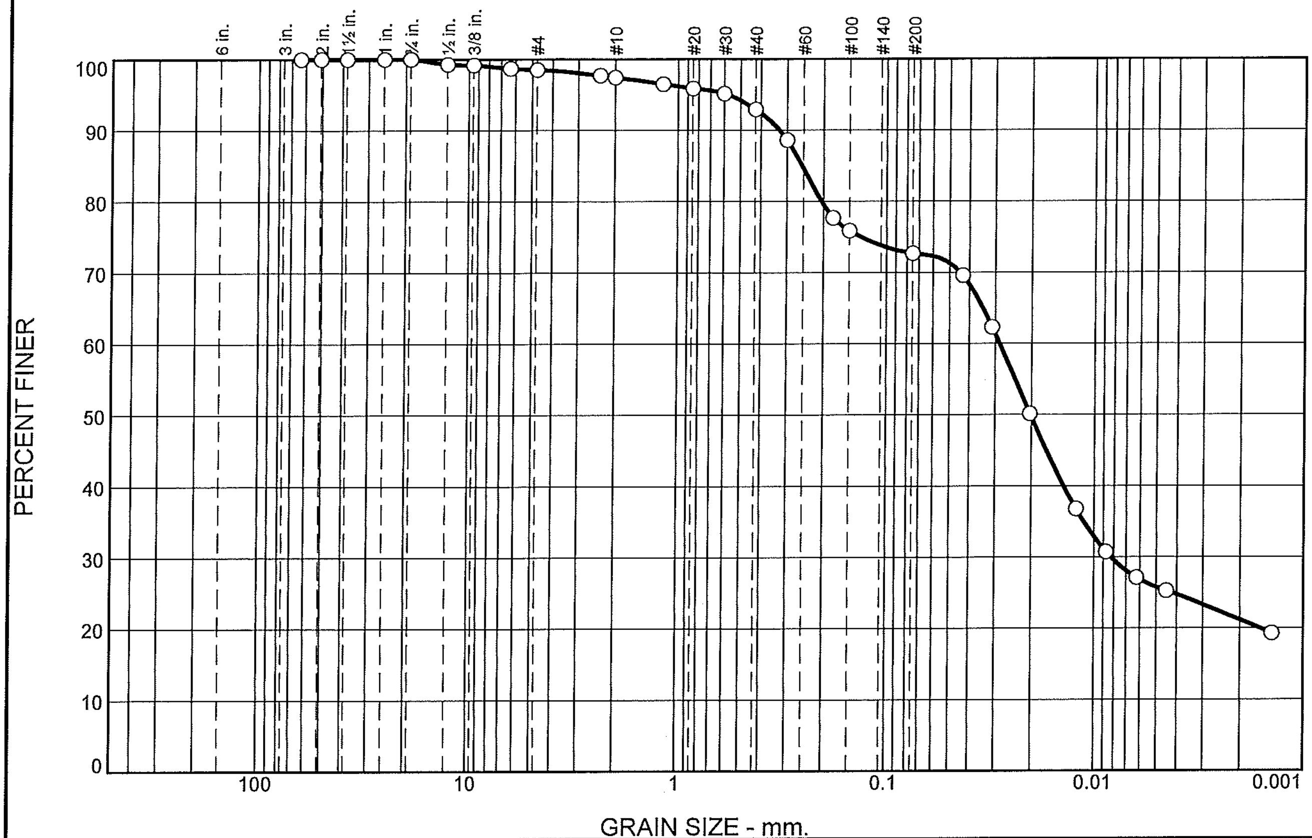
Source of Sample: Parisi Stockpile
Sample Number: Sample #1

Date: 05-06-16

TRC Environmental Corp. Madison, Wisconsin	**Client:** Dane County **Project:** Phase 10 - Cell 2 Construction **Project No:** 253325.0000 **Figure**

Tested By: MBW / JPH **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	1.1	4.5	20.2	46.9	25.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	99.3		
.375	99.2		
.25	98.7		
#4	98.5		
#8	97.7		
#10	97.4		
#16	96.5		
#20	95.9		
#30	95.1		
#40	92.9		
#50	88.6		
#80	77.7		
#100	75.9		
#200	72.7		

* (no specification provided)

Material Description

Lean clay with sand

Atterberg Limits

PL= 19 LL= 34 PI= 15

Coefficients

D_{90}= 0.3261 D_{85}= 0.2541 D_{60}= 0.0286
D_{50}= 0.0203 D_{30}= 0.0083 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(9)

Remarks

Source of Sample: Parisi Stockpile
Sample Number: Sample #2
Date: 05-06-16

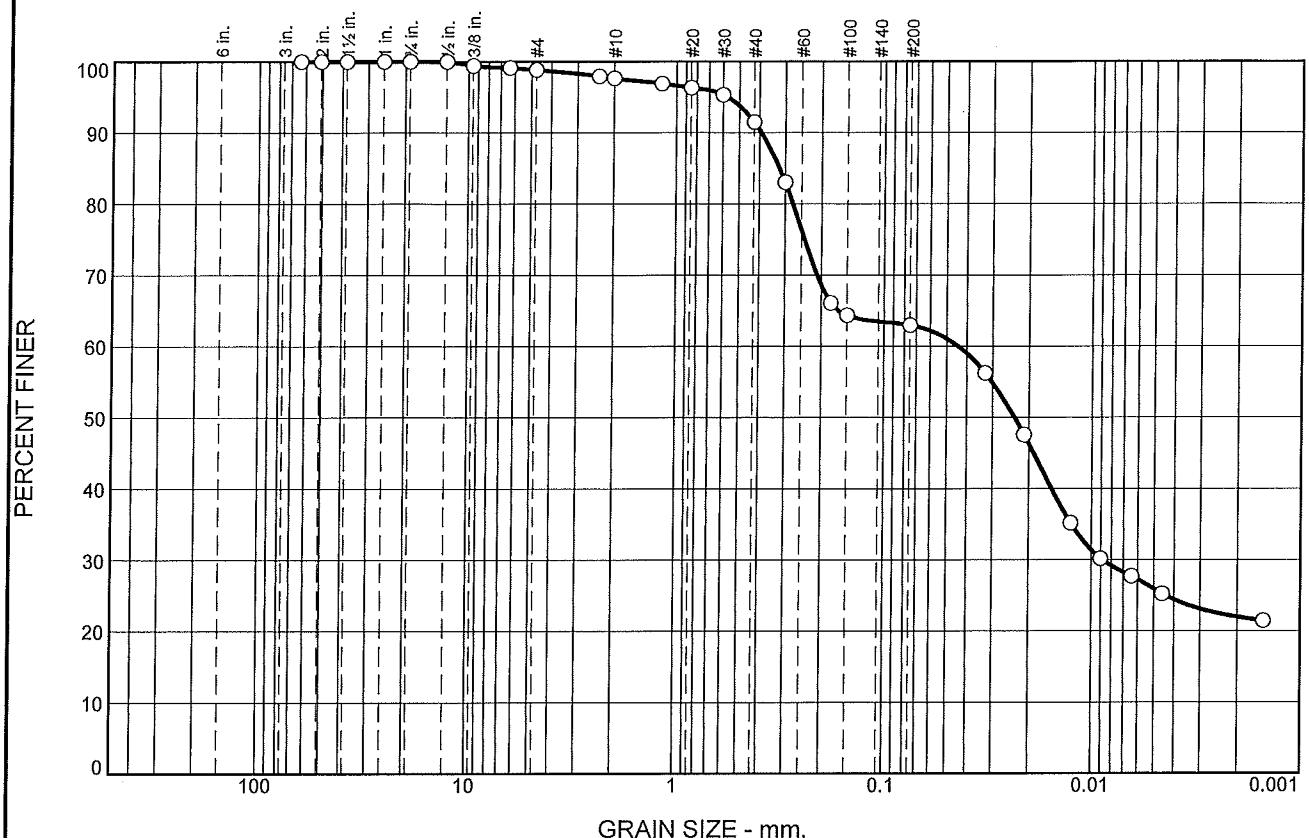
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW / JPH **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.2	1.2	6.1	28.5	37.1	25.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	99.4		
.25	99.1		
#4	98.8		
#8	97.9		
#10	97.6		
#16	96.9		
#20	96.3		
#30	95.3		
#40	91.5		
#50	83.0		
#80	66.1		
#100	64.4		
#200	63.0		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 17 LL= 30 PI= 13

Coefficients

D_{90}= 0.3916 D_{85}= 0.3193 D_{60}= 0.0442
D_{50}= 0.0235 D_{30}= 0.0088 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(6)

Remarks

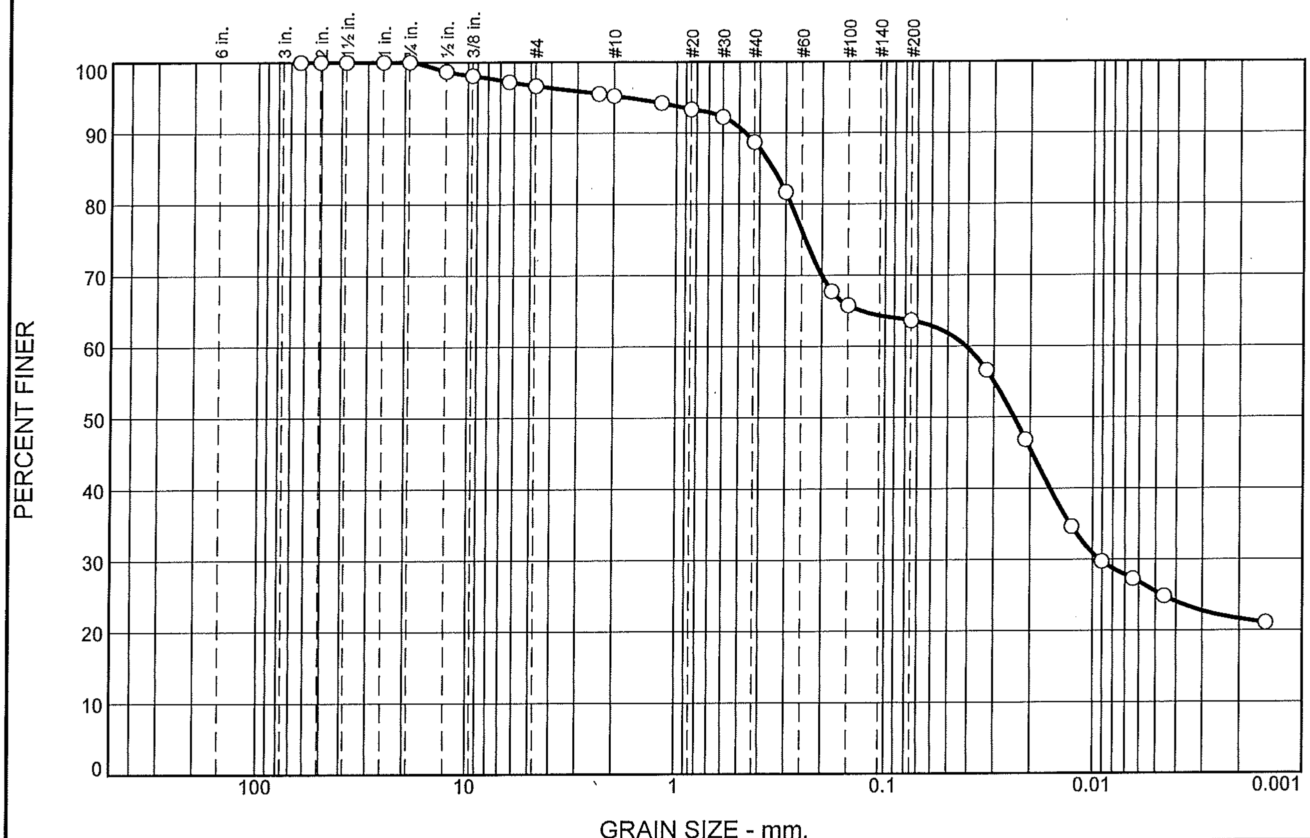
Source of Sample: Parisi Stockpile
Sample Number: Sample #3

Date: 05-10-16

TRC Environmental Corp.	**Client:** Dane County
	Project: Phase 10 - Cell 2 Construction
Madison, Wisconsin	**Project No:** 253325.0000 **Figure**

Tested By: JPH **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.4	1.4	6.5	25.1	42.0	21.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	98.7		
.375	98.1		
.25	97.2		
#4	96.6		
#8	95.5		
#10	95.2		
#16	94.2		
#20	93.3		
#30	92.2		
#40	88.7		
#50	81.7		
#80	67.7		
#100	65.8		
#200	63.6		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 17 LL= 30 PI= 13

Coefficients

D_{90}= 0.4683 D_{85}= 0.3445 D_{60}= 0.0410
D_{50}= 0.0240 D_{30}= 0.0092 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(6)

Remarks

Source of Sample: Parisi Stockpile
Sample Number: Sample #4

Date: 05-10-16

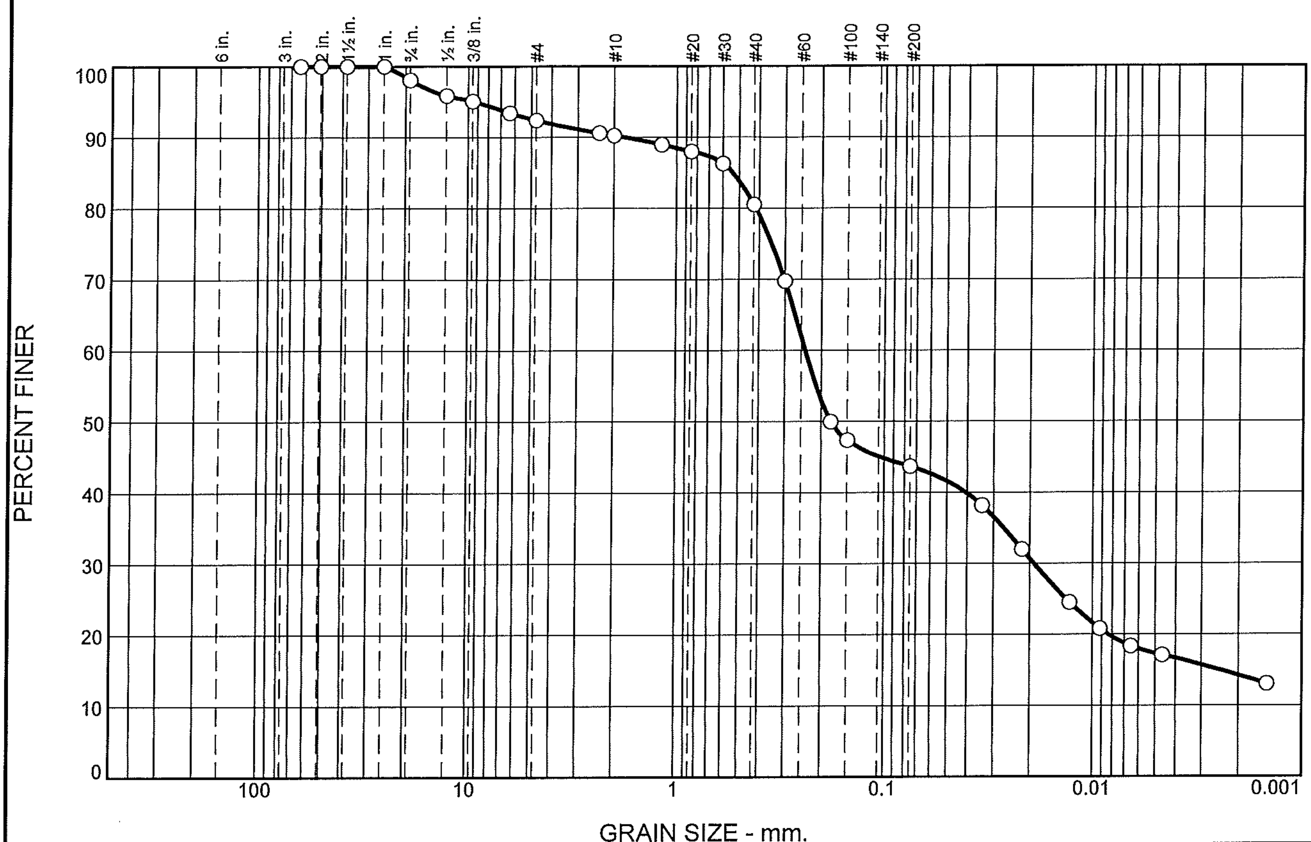
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: JPH **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.0	5.6	2.2	9.7	36.8	26.4	17.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	98.0		
.5	95.8		
.375	95.1		
.25	93.4		
#4	92.4		
#8	90.6		
#10	90.2		
#16	89.0		
#20	88.0		
#30	86.3		
#40	80.5		
#50	69.8		
#80	50.0		
#100	47.4		
#200	43.7		

* (no specification provided)

Material Description

Silty, clayey sand

Atterberg Limits

PL= 16 LL= 23 PI= 7

Coefficients

D_{90}= 1.7907 D_{85}= 0.5393 D_{60}= 0.2390
D_{50}= 0.1802 D_{30}= 0.0192 D_{15}= 0.0025
D_{10}= C_u= C_c=

Classification

USCS= SC-SM AASHTO= A-4(0)

Remarks

Source of Sample: Parisi Stockpile
Sample Number: Sample #5

Date: 05-18-16

TRC Environmental Corp.

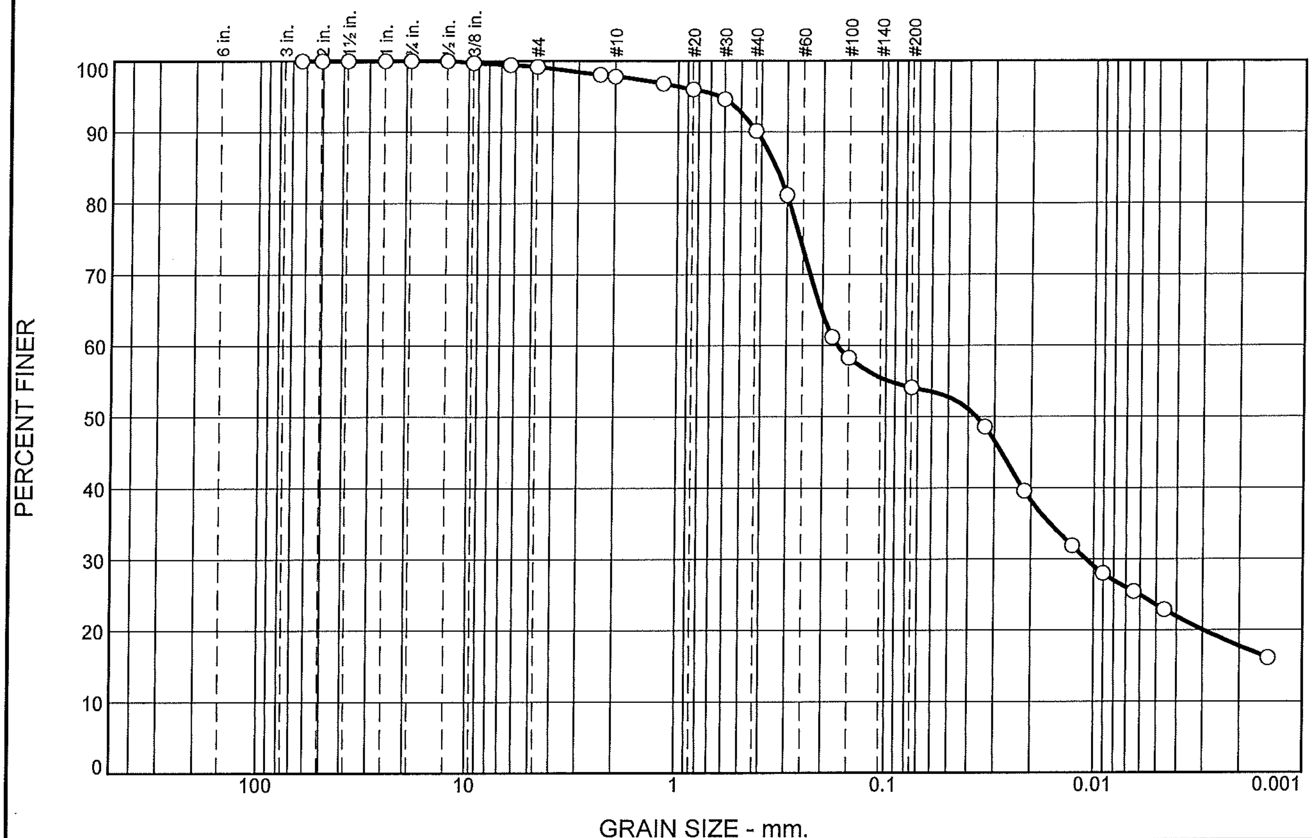
Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction

Project No: 253325.0000 **Figure**

Tested By: JPH **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.8	1.4	7.7	36.0	30.5	23.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	99.7		
.25	99.5		
#4	99.2		
#8	98.0		
#10	97.8		
#16	96.8		
#20	96.0		
#30	94.6		
#40	90.1		
#50	81.2		
#80	61.2		
#100	58.3		
#200	54.1		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 17 LL= 26 PI= 9

Coefficients

D_{90}= 0.4218 D_{85}= 0.3381 D_{60}= 0.1698
D_{50}= 0.0366 D_{30}= 0.0109 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(2)

Remarks

Source of Sample: Parisi Stockpile
Sample Number: Sample #6
Date: 05-18-16

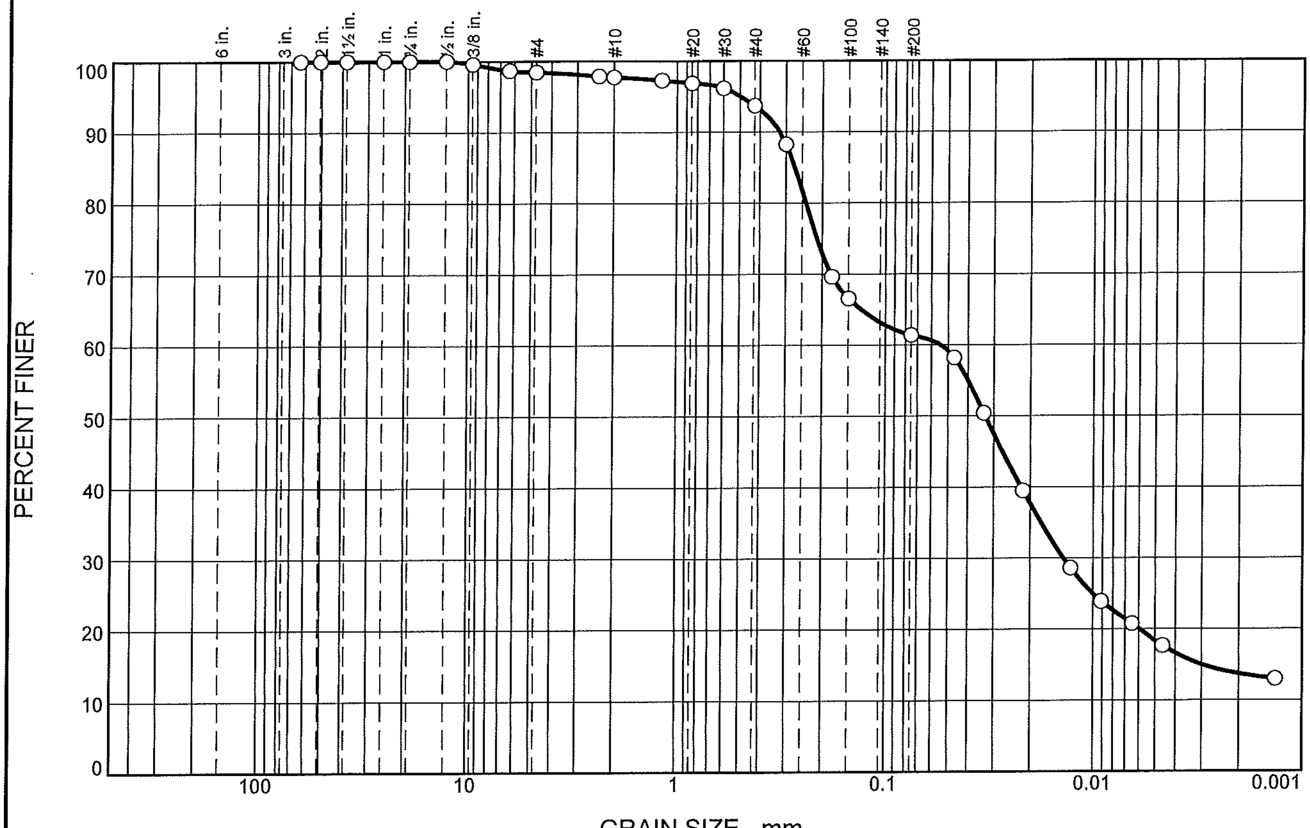
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: JPH **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	0.8	4.0	32.3	43.0	18.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	100.0		
.375	99.6		
.25	98.7		
#4	98.5		
#8	97.9		
#10	97.7		
#16	97.3		
#20	96.9		
#30	96.2		
#40	93.7		
#50	88.3		
#80	69.6		
#100	66.6		
#200	61.4		

* (no specification provided)

Material Description

Sandy silt

Atterberg Limits

PL= 18 LL= 20 PI= 2

Coefficients

D_{90}= 0.3219 D_{85}= 0.2719 D_{60}= 0.0541
D_{50}= 0.0330 D_{30}= 0.0138 D_{15}= 0.0030
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Source of Sample: Parisi Stockpile
Sample Number: Sample #7
Date: 05-20-16

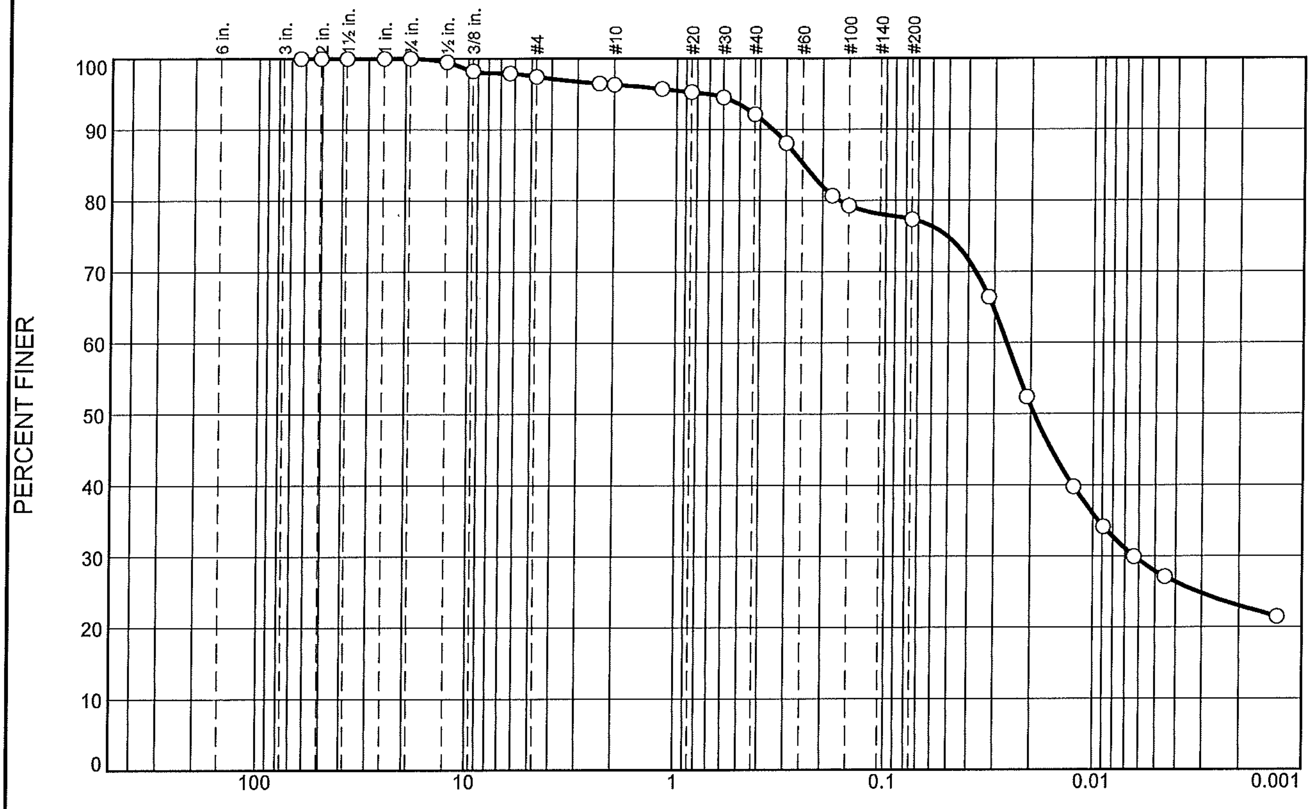
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: JPH **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.6	1.1	4.2	14.8	49.4	27.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	99.5		
.375	98.2		
.25	97.9		
#4	97.4		
#8	96.5		
#10	96.3		
#16	95.7		
#20	95.2		
#30	94.5		
#40	92.1		
#50	88.1		
#80	80.7		
#100	79.3		
#200	77.3		

* (no specification provided)

Material Description

Lean clay with sand

Atterberg Limits

PL= 18 LL= 28 PI= 10

Coefficients

D_{90}= 0.3476 D_{85}= 0.2457 D_{60}= 0.0262
D_{50}= 0.0193 D_{30}= 0.0064 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(6)

Remarks

Source of Sample: Parisi Stockpile
Sample Number: Sample #8

Date: 05-20-16

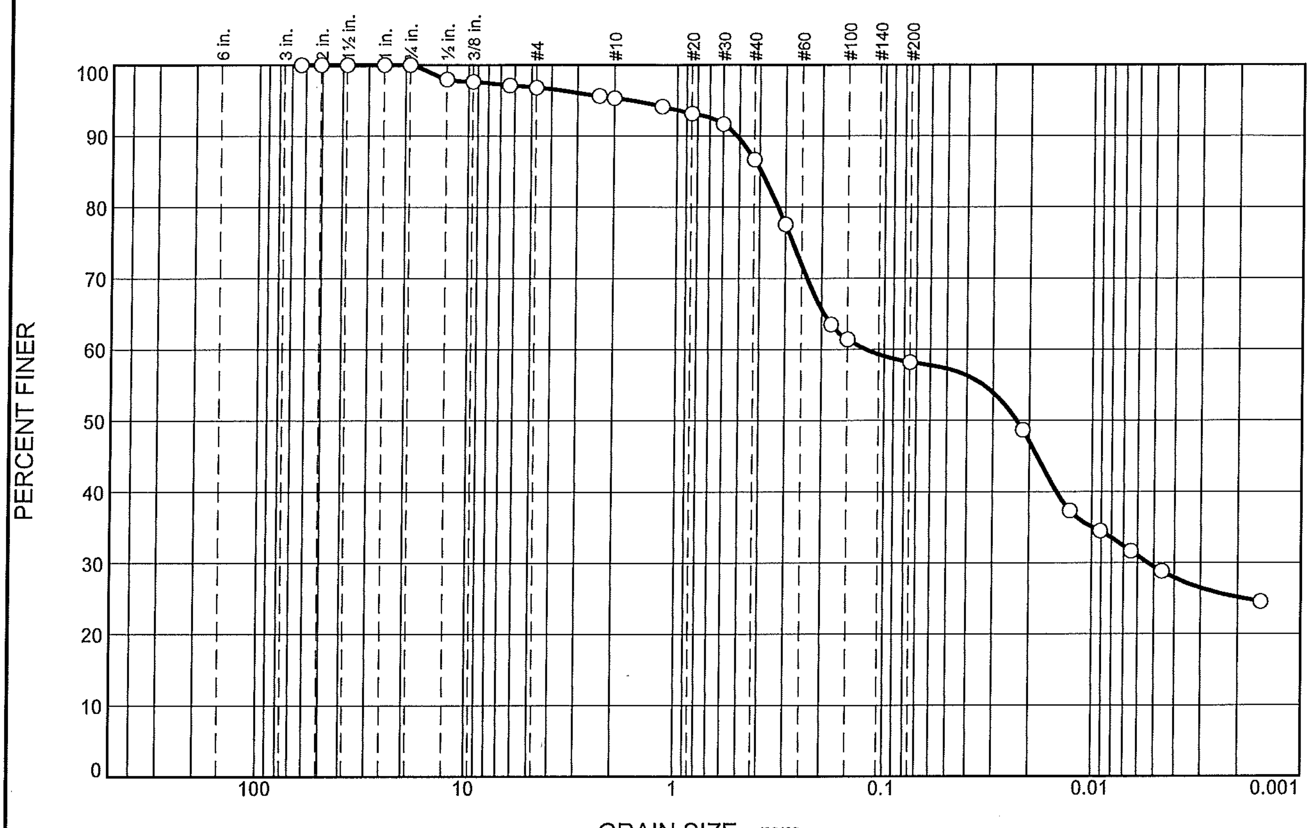
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: JPH **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.2	1.5	8.6	28.5	28.7	29.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	98.0		
.375	97.6		
.25	97.1		
#4	96.8		
#8	95.6		
#10	95.3		
#16	94.2		
#20	93.2		
#30	91.7		
#40	86.7		
#50	77.6		
#80	63.5		
#100	61.4		
#200	58.2		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 17 LL= 31 PI= 14

Coefficients

D_{90}= 0.5155 D_{85}= 0.3940 D_{60}= 0.1222
D_{50}= 0.0231 D_{30}= 0.0053 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(5)

Remarks

Source of Sample: Parisi Stockpile
Sample Number: Sample #9

Date: 05-25-16

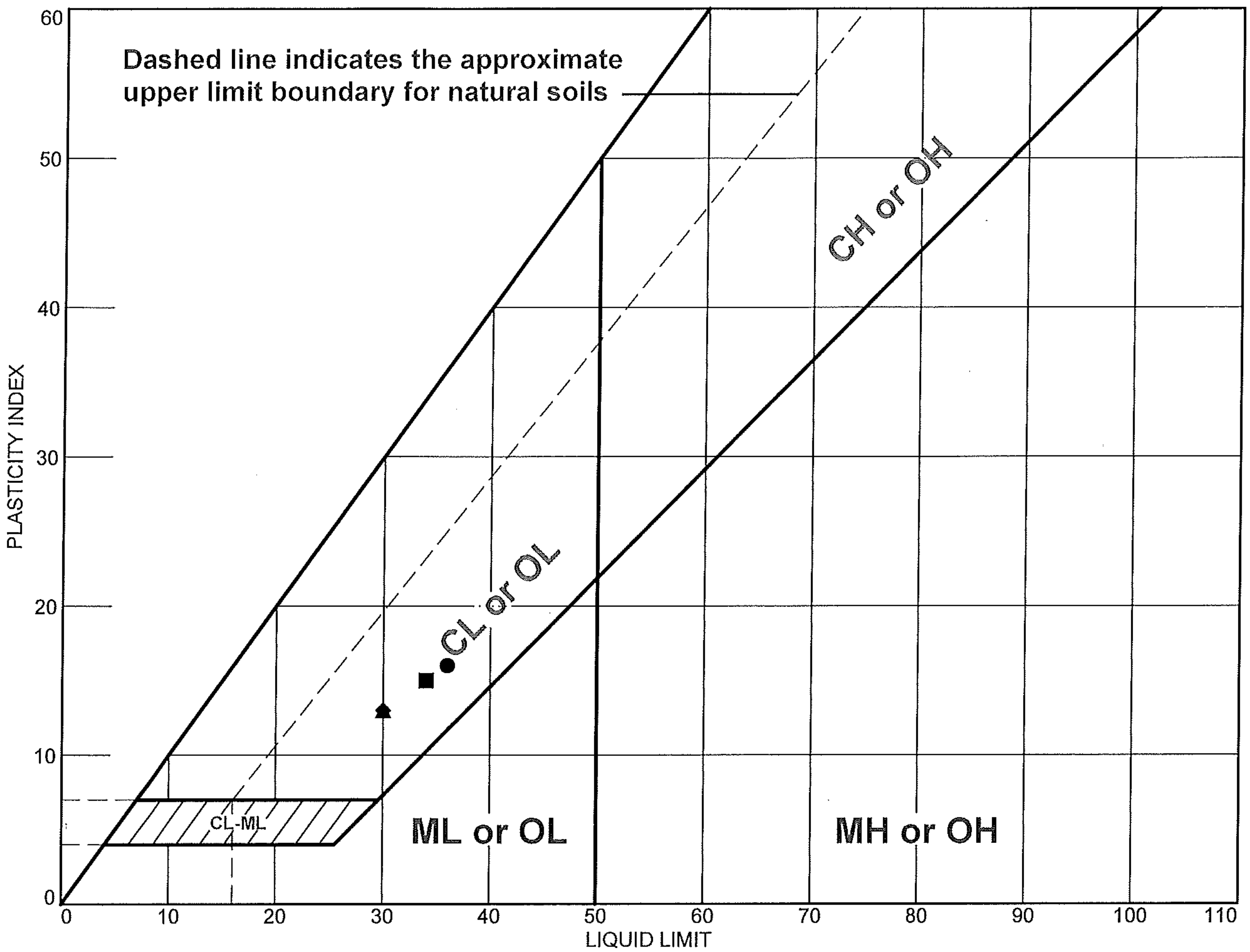
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: JPH **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean clay with sand	36	20	16	94.2	77.3	CL
■	Lean clay with sand	34	19	15	92.9	72.7	CL
▲	Sandy lean clay	30	17	13	91.5	63.0	CL
◆	Sandy lean clay	30	17	13	88.7	63.6	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** Parisi Stockpile **Sample Number:** Sample #1
■ **Source of Sample:** Parisi Stockpile **Sample Number:** Sample #2
▲ **Source of Sample:** Parisi Stockpile **Sample Number:** Sample #3
◆ **Source of Sample:** Parisi Stockpile **Sample Number:** Sample #4

Remarks:

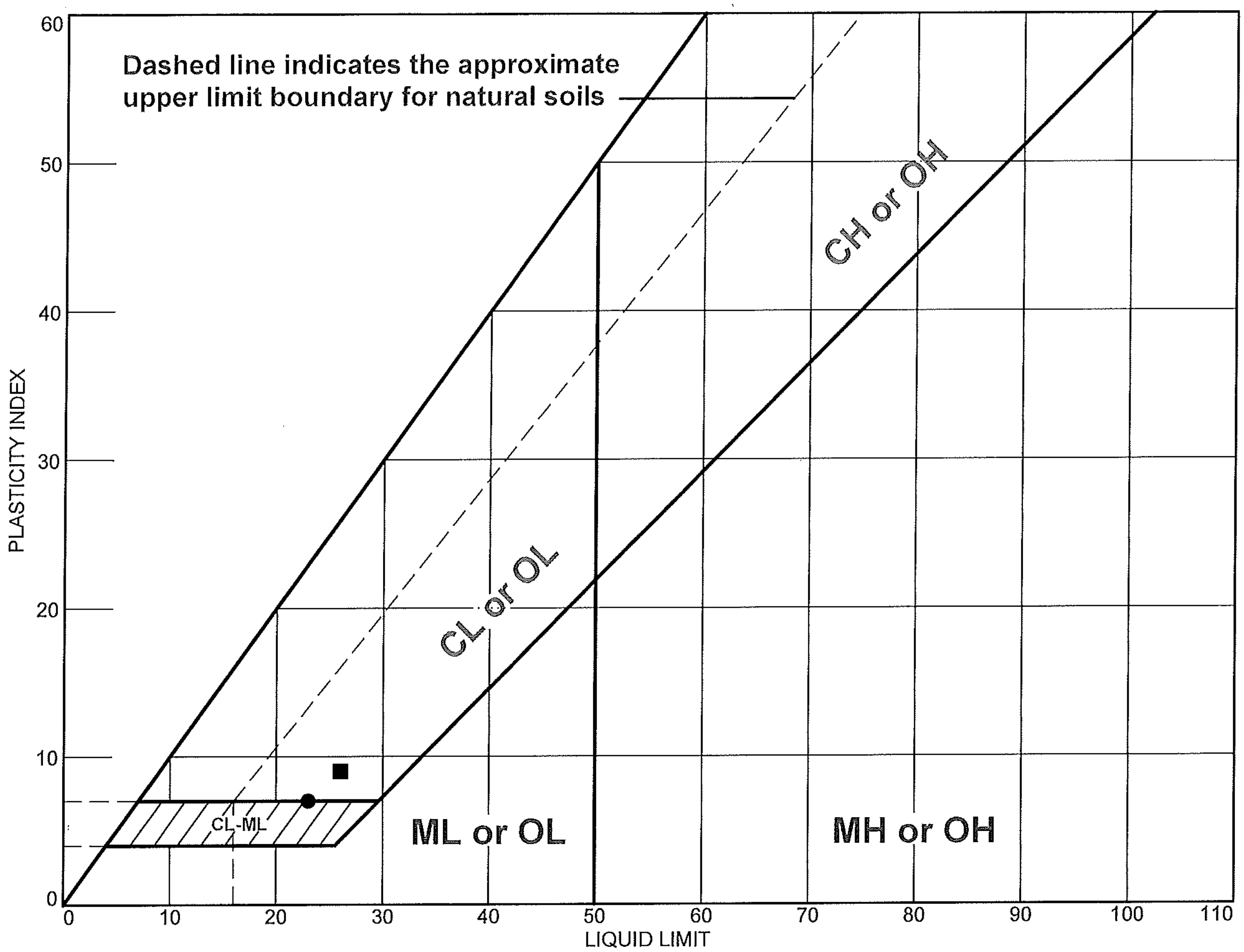
TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: JPH **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty, clayey sand	23	16	7	80.5	43.7	SC-SM
■	Sandy lean clay	26	17	9	90.1	54.1	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** Parisi Stockpile **Sample Number:** Sample #5

■ **Source of Sample:** Parisi Stockpile **Sample Number:** Sample #6

Remarks:

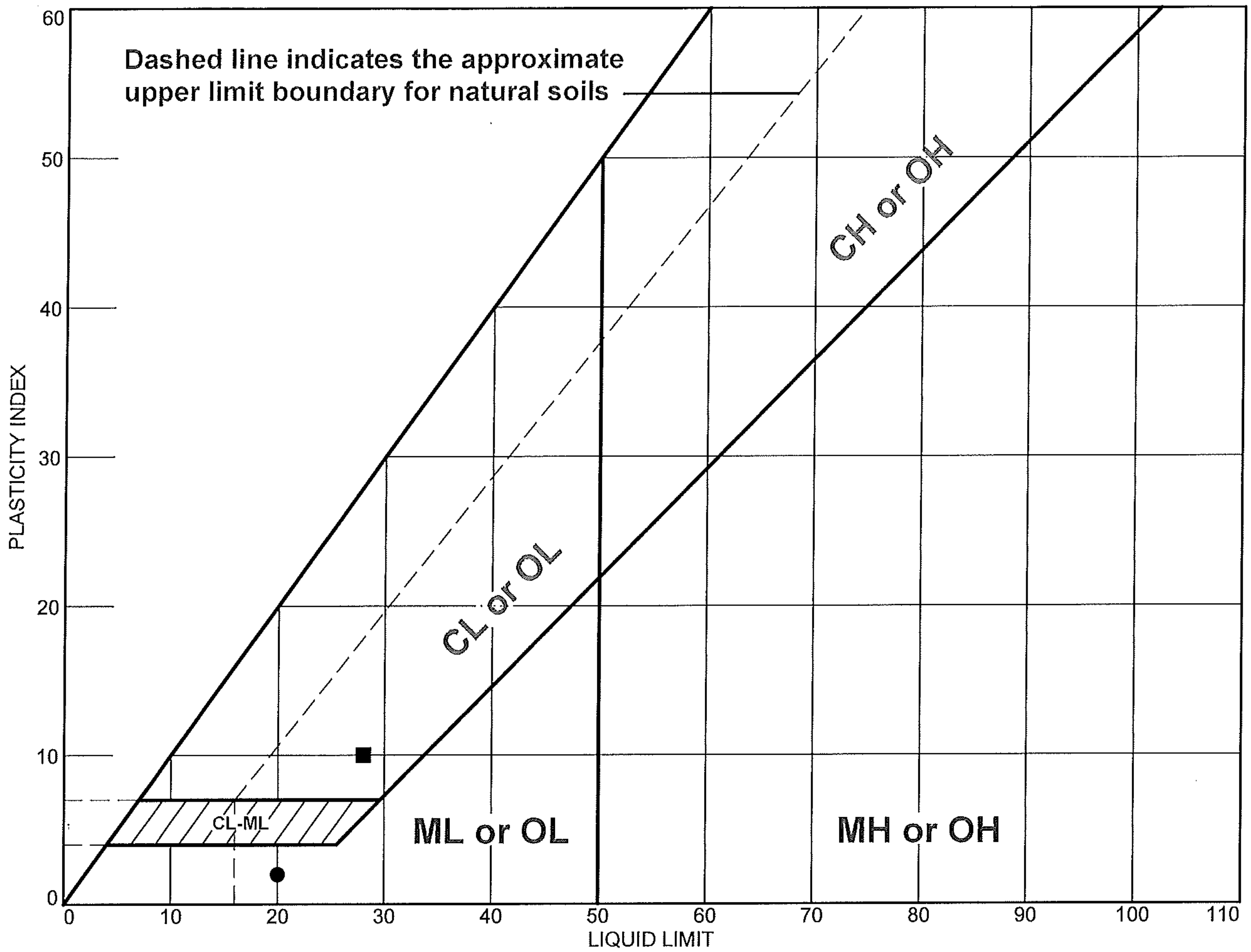
TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: JPH **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy silt	20	18	2	93.7	61.4	ML
■	Lean clay with sand	28	18	10	92.1	77.3	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** Parisi Stockpile **Sample Number:** Sample #7

■ **Source of Sample:** Parisi Stockpile **Sample Number:** Sample #8

Remarks:

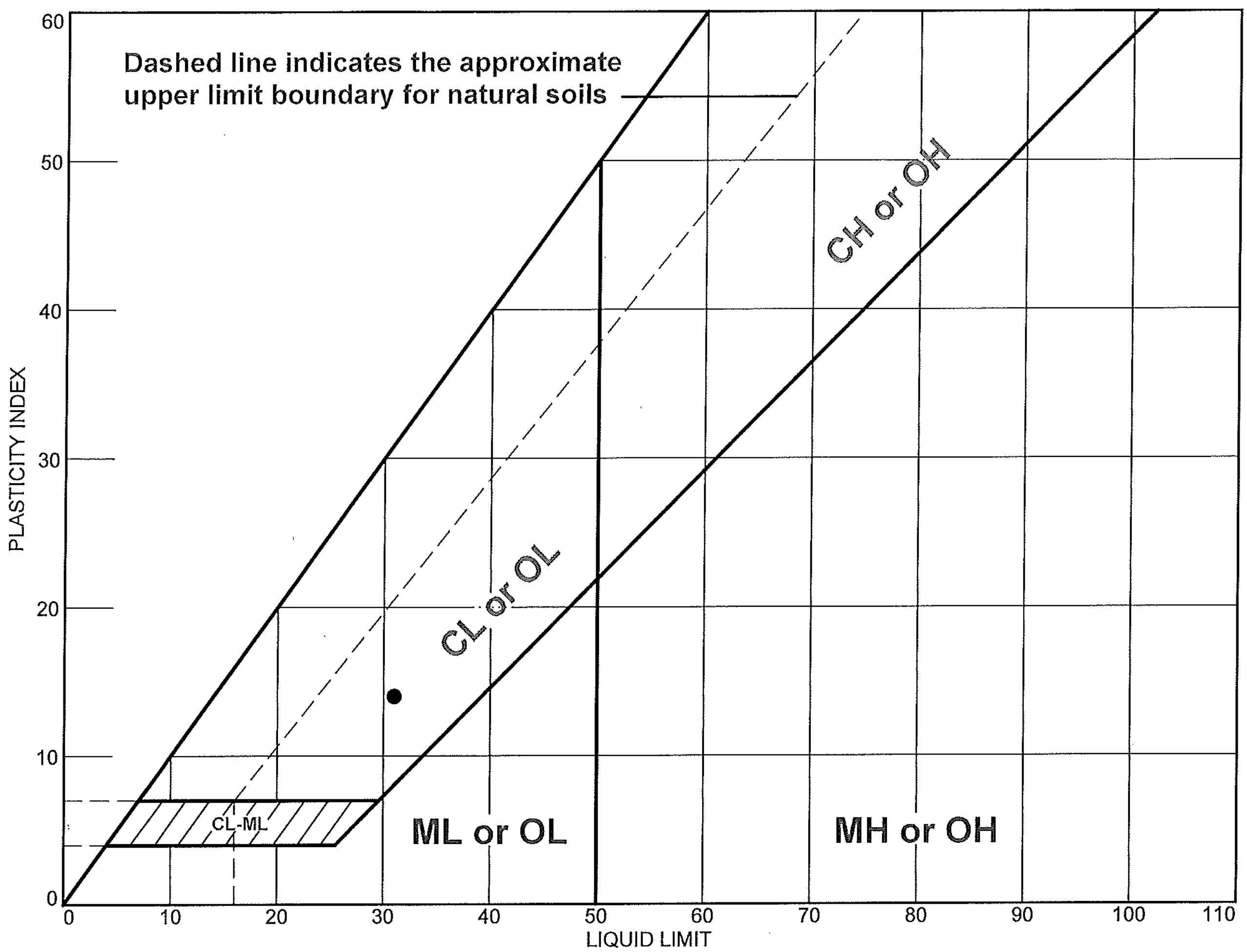
TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: JPH **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean clay	31	17	14	86.7	58.2	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** Parisi Stockpile **Sample Number:** Sample #9

Remarks:

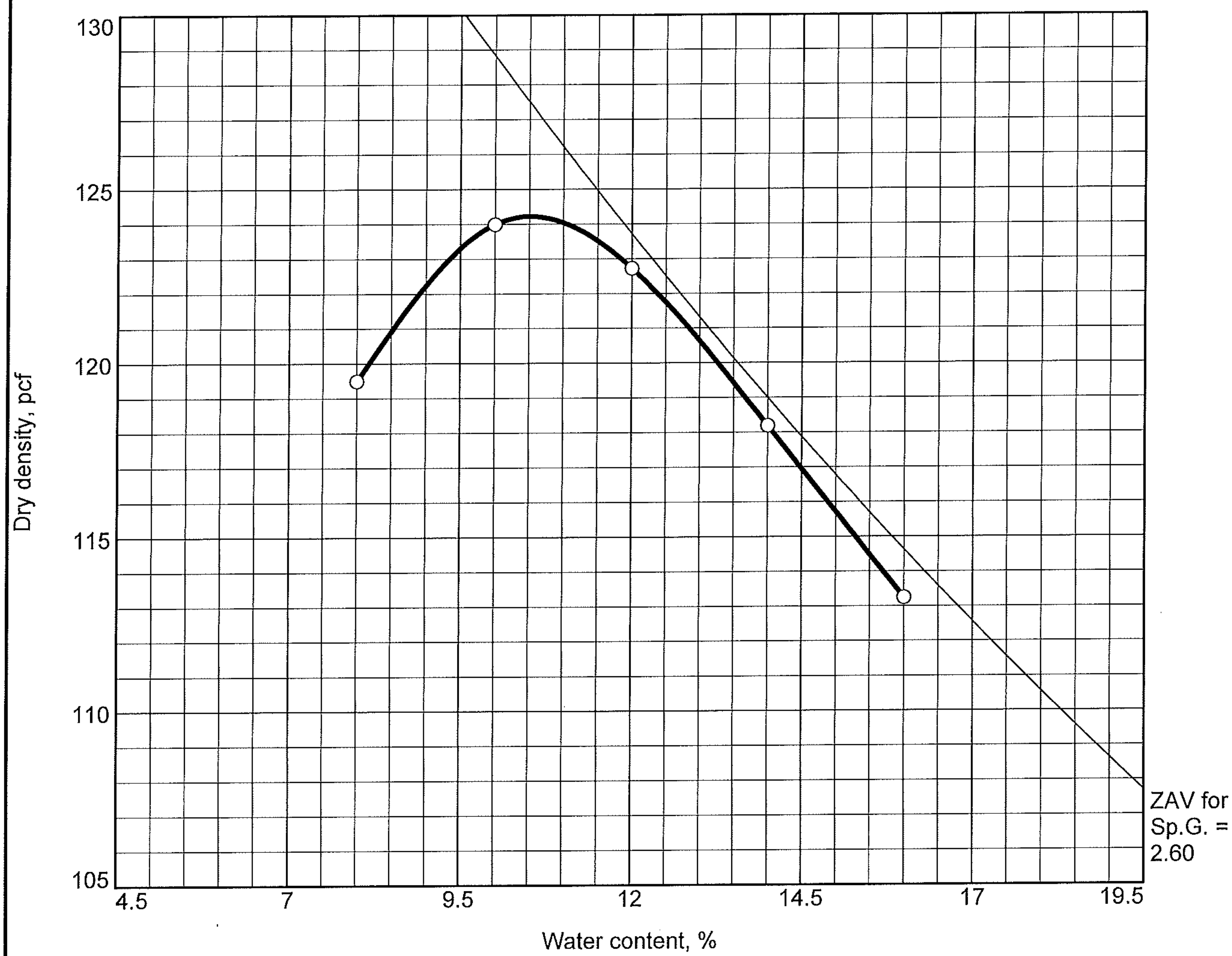
TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: JPH **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Method A Modified

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	CL	A-6(11)	21.7		36	16	0.0	77.3

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 124.2 pcf Optimum moisture = 10.5 %	Lean clay with sand

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

Date: 05-10-16

○ **Source of Sample:** Parisi Stockpile **Sample Number:** Sample #1

TRC Environmental Corp.

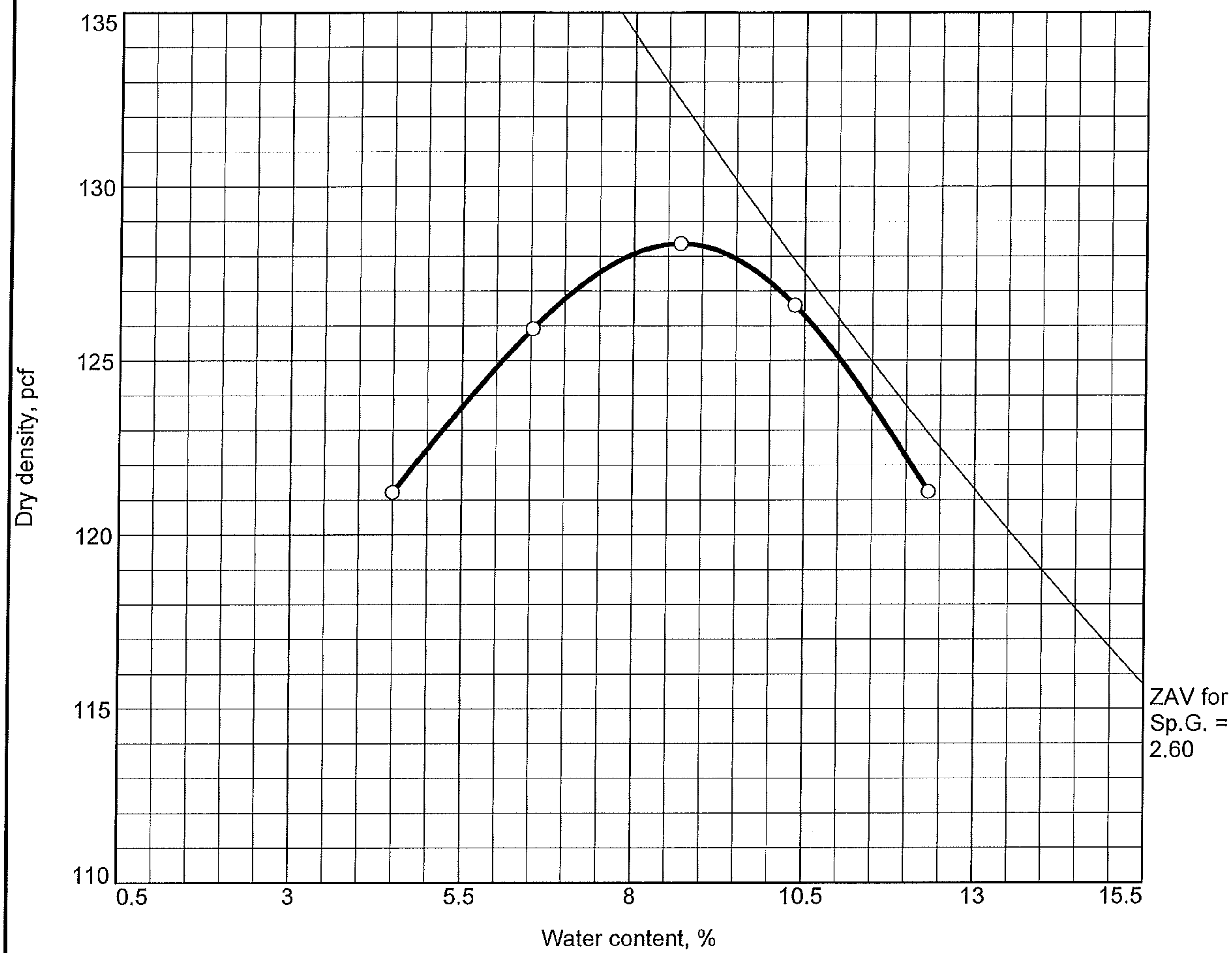
Madison, Wisconsin

Remarks:

Figure

Tested By: JPH **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	SC-SM	A-4(0)	13.9		23	7	7.6	43.7

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 128.4 pcf Optimum moisture = 8.7 %	Silty, clayey sand

Project No. 253325.0000 **Client:** Dane County
Project: Phase 10 - Cell 2 Construction
Date: 05-17-16
○ **Source of Sample:** Parisi Stockpile **Sample Number:** Sample #5

TRC Environmental Corp.

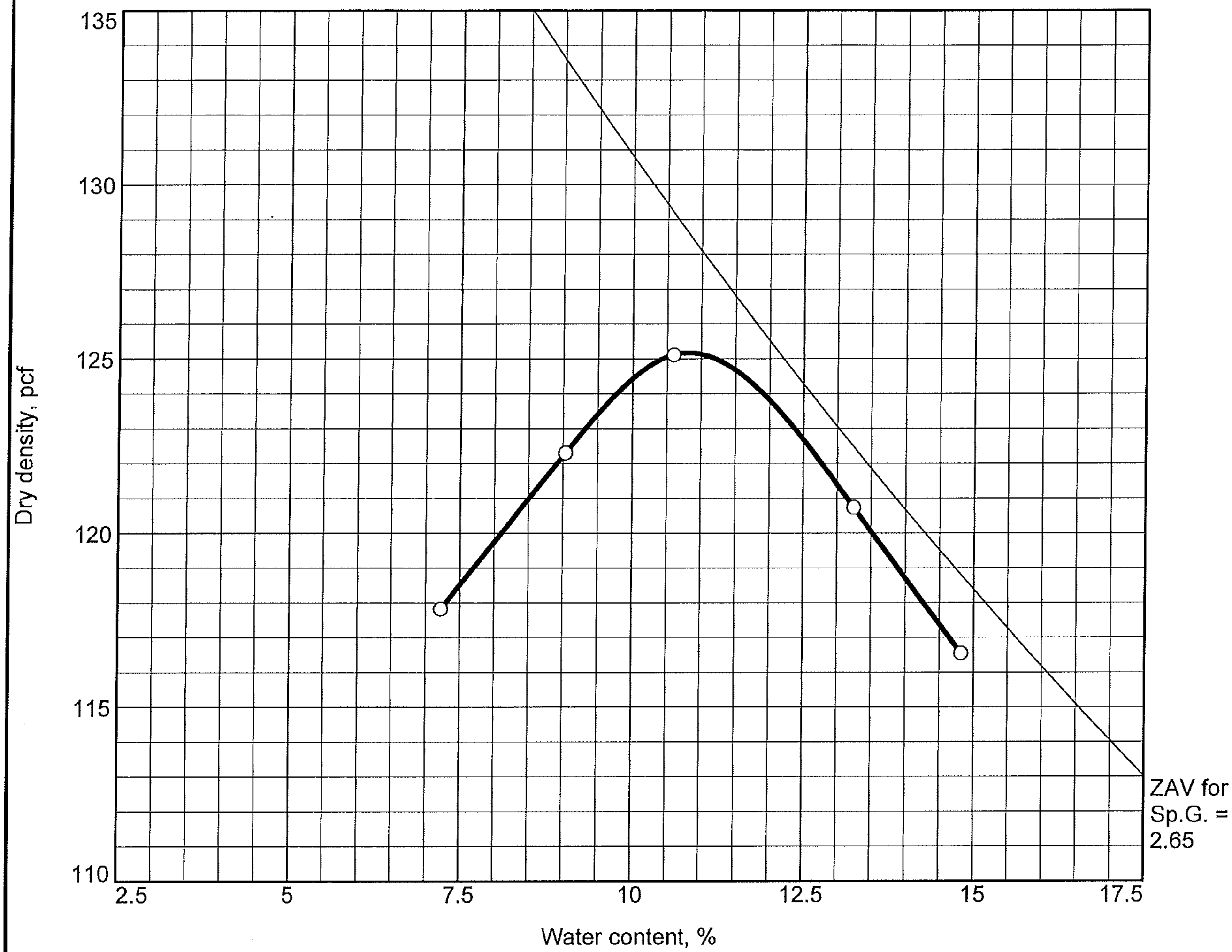
Madison, Wisconsin

Remarks:

Figure

Tested By: MBW **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-6(5)	5.5		31	14	3.2	58.2

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 125.2 pcf Optimum moisture = 10.8 %	Sandy lean clay

Project No. 253325.0000 **Client:** Dane County
Project: Phase 10 - Cell 2 Construction
Date: 05-26-16
○ **Source of Sample:** Parisi Stockpile **Sample Number:** Sample #9

Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: JPH **Checked By:** JPH

TRC Environmental Corporation Moisture Content Determination (ASTM D2216)				
Project Name: Dane County - Ph. 10 Cell 2		Project #: 253325.0000		
Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)
Parisi Stockpile, Sample #1	91.45	1542.60	1283.80	21.7
Parisi Stockpile, Sample #2	89.01	1545.60	1278.80	22.4
Parisi Stockpile, Sample #3	98.49	1591.20	1364.90	17.9
Parisi Stockpile, Sample #4	95.56	1479.60	1262.50	18.6

TRC Environmental Corporation
Moisture Content Determination (ASTM D2216)

Project Name: Dane County - Ph. 10 Cell 2		Project #: 253325.0000		
Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)
Parisi Stockpile, Sample #5	88.96	1636.30	1447.60	13.9
Parisi Stockpile, Sample #6	89.20	1528.70	1300.00	18.9

TRC Environmental Corporation
Moisture Content Determination (ASTM D2216)

Project Name: Dane County - Ph. 10 Cell 2		Project #: 253325.0000		
Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)
Parisi Stockpile, Sample #7	89.06	1736.30	1426.30	23.2
Parisi Stockpile, Sample #8	88.16	1589.00	1335.50	20.3

TRC Environmental Corporation

Moisture Content Determination (ASTM D2216)

Project Name: Dane County - Ph. 10 Cell 2 | Project #: 253325.0000

Sample Location	Moisture Tare Wt. (g)	Moisture Wet Wt. + Tare (g)	Moisture Dry Wt. +Tare (g)	Moisture (%)
Parisi Stockpile, Sample #9	88.96	1643.50	1562.90	5.5

TRC Environmental Corporation

Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)

QC: JPH
QA: JPH

Project Name:	Dane County - Phase 10 cell 2 Construction	Cell #:	8
Project #:	253325.0000	USCS Description:	Lean clay with sand
Sample Name:	Parisi Stockpile Sample #1	USCS Classification:	CL
Visual Descript:	Lean clay with sand	Average Kv =	5.5E-08 cm/s

Sample Type: Remolded	Initial Values	Final Values		
			Maximum Proctor Density:	124.2
			Optimum Moisture Content:	10.5
Sample Dia. (in)	3.00	3.00	Permeant:	Water
Sample Ht. (in)	2.50	2.50	Permeant Specific Gravity:	1.00
Tare & Wet (g)	112.50	711.20	Sample Specific Gravity:	2.79 Est.
Tare & Dry (g)	100.00	606.10	Confining Pressure (psi):	100.0
Tare (g)	0.00	90.20	Burette Diameter (in):	0.250
Sample Wt. (g)	583.59	621.00	Burette Zero (cm):	100.0

	Initial	Final		
% of Proctor Density:	90.0%	89.4%		
% (+/-) of Optimum Moisture Content:	2.0%	9.9%		
Moisture (%)	12.5	20.4		
Wet Density (pcf)	125.8	133.6		
Dry Density (pcf)	111.8	111.0	Max. Effect. Stress (psi):	6.2
Saturation (%)	62.6	100.0	Min. Effect. Stress (psi):	4.7
			Ave. Effect. Stress (psi):	5.3

	Date Yr.	Mo.	Day	Time Hr.	Min.	Run Time (s)	Temp C°**	Pressure (psi) Bot	Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0,1
1	2016	5	11	5	21.00		0.0	95	95	21.20		2.05		102.30				
2	2016	5	11	7	35.00	8040	23.0	95	95	21.20	0.00	6.60	4.55	97.40	4.90	-3.7	2.5E-07	
3	2016	5	11	10	44.00	11340	23.0	95	95	21.60	0.40	11.55	4.95	92.85	4.55	4.2	2.0E-07	
4	2016	5	11	14	10.00	12360	23.0	95	95	21.90	0.30	15.85	4.30	88.85	4.00	3.6	1.8E-07	
5	2016	5	11	17	40.00	12600	23.0	95	95	22.40	0.50	19.65	3.80	85.60	3.25	7.8	1.7E-07	
6	2016	5	11	20	13.00	9180	23.0	95	95	22.65	0.25	22.00	2.35	83.45	2.15	4.4	1.6E-07	
7	2016	5	12	5	34.00	33660	23.0	95	95	22.75	0.10	28.55	6.55	77.40	6.05	4.0	1.4E-07	
8	2016	5	12	8	33.00	10740	23.0	95	95	22.75	0.00	30.25	1.70	75.85	1.55	4.6	1.3E-07	
9	2016	5	12	11	37.00	11040	23.0	95	95	23.25	0.50	31.80	1.55	74.50	1.35	6.9	1.2E-07	
10	2016	5	12	14	37.00	10800	23.0	95	95	23.20	-0.05	33.20	1.40	73.25	1.25	5.7	1.2E-07	
11	2016	5	12	17	39.00	10920	23.0	95	95	23.20	0.00	34.50	1.30	72.05	1.20	4.0	1.2E-07	
12	2016	5	13	5	9.00	41400	25.0	95	95	23.60	0.40	38.60	4.10	68.35	3.70	5.1	1.1E-07	
13	2016	5	13	8	32.00	12180	23.0	95	95	23.70	0.10	39.55	0.95	67.45	0.90	2.7	1.1E-07	
14	2016	5	13	8	33.00		0.0	95	95	23.70		2.55		104.20				
15	2016	5	13	12	6.00	12780	23.0	95	95	23.70	0.00	7.35	4.80	99.10	5.10	-3.0	1.6E-07	
16	2016	5	16	5	8.00	234120	23.0	95	95	24.25	0.55	41.65	34.30	66.55	32.55	2.6	1.1E-07	
17	2016	5	16	5	10.00		0.0	95	95	24.40		2.35		104.30				
18	2016	5	16	8	10.00	10800	23.0	95	95	24.50	0.10	5.10	2.75	101.35	2.95	-3.5	1.1E-07	
19	2016	5	16	11	47.00	13020	23.0	95	95	24.60	0.10	7.80	2.70	98.60	2.75	-0.9	9.2E-08	
20	2016	5	16	14	36.00	10140	23.0	95	95	24.80	0.20	9.75	1.95	96.65	1.95	0.0	8.9E-08	
21	2016	5	16	19	42.00	18360	23.0	95	95	25.40	0.60	13.00	3.25	93.60	3.05	3.2	8.4E-08	
22	2016	5	17	4	56.00	33240	23.0	95	95	25.35	-0.05	18.05	5.05	88.55	5.05	0.0	8.3E-08	
23	2016	5	17	8	19.00	12180	23.0	95	95	25.35	0.00	19.65	1.60	87.00	1.55	1.6	7.7E-08	
24	2016	5	17	14	21.00	21720	23.0	95	95	25.70	0.35	22.35	2.70	84.55	2.45	4.9	7.5E-08	
25	2016	5	17	18	59.00	16680	23.0	95	95	26.05	0.35	24.15	1.80	82.80	1.75	1.4	7.2E-08	
26	2016	5	18	5	0.00	36060	23.0	95	95	25.85	-0.20	27.45	3.30	79.40	3.40	-1.5	6.9E-08	

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column.

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation	QC: JPH
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QA: JPH

Project Name:	Dane County - Phase 10 cell 2 Construction	Cell #:	8
Project #:	253325.0000	USCS Description:	Lean clay with sand
Sample Name:	Parisi Stockpile Sample #1	USCS Classification:	CL
Visual Descript:	Lean clay with sand		

Sample Type: Remolded	Initial Values	Final Values			
			Maximum Proctor Density:	124.2	
			Optimum Moisture Content:	10.5	
Sample Dia. (in)	3.00	3.00	Permeant:	Water	
Sample Ht. (in)	2.50	2.50	Permeant Specific Gravity:	1.00	
Tare & Wet (g)	112.50	711.20	Sample Specific Gravity:	2.79	Est.
Tare & Dry (g)	100.00	606.10	Confining Pressure (psi):	100.0	
Tare (g)	0.00	90.20	Burette Diameter (in):	0.250	
Sample Wt. (g)	583.59	621.00	Burette Zero (cm):	100.0	

	Initial	Final		
% of Proctor Density:	90.0%	89.4%		
% (+/-) of Optimum Moisture Content:	2.0%	9.9%		
Moisture (%)	12.5	20.4	Maximum Gradient:	7.1
Wet Density (pcf)	125.8	133.6	Average Gradient:	6.0
Dry Density (pcf)	111.8	111.0	Max. Effect. Stress (psi):	5.8
Saturation (%)	62.6	100.0	Min. Effect. Stress (psi):	5.0
			Ave. Effect. Stress (psi):	5.4

	Date Yr.	Mo.	Day	Time Hr.	Min.	Run Time (s)	Temp C°**	Pressure (psi) Bot	Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0,1
1	2016	5	18	5	0.00		0.0	95	95	25.85		27.45		79.40				
2	2016	5	18	8	35.00	12900	23.0	95	95	26.00	0.15	28.50	1.05	78.45	0.95	5.0	6.3E-08	
3	2016	5	18	10	54.00	8340	23.0	95	95	25.85	-0.15	29.20	0.70	77.80	0.65	3.7	6.8E-08	
4	2016	5	18	13	23.00	8940	23.0	95	95	26.00	0.15	29.85	0.65	77.15	0.65	0.0	6.2E-08	
5	2016	5	18	17	53.00	16200	23.0	95	95	26.65	0.65	31.05	1.20	76.20	0.95	11.6	5.9E-08	
6	2016	5	19	4	56.00	39780	23.0	95	95	26.65	0.00	33.45	2.40	73.70	2.50	-2.0	5.9E-08	1
7	2016	5	19	8	25.00	12540	23.0	95	95	26.80	0.15	34.15	0.70	73.05	0.65	3.7	5.6E-08	1
8	2016	5	19	11	26.00	10860	23.0	95	95	26.75	-0.05	34.80	0.65	72.55	0.50	13.0	5.7E-08	1
9	2016	5	19	17	35.00	22140	23.0	95	95	27.35	0.60	35.90	1.10	71.60	0.95	7.3	5.2E-08	1
10	2016	5	20	5	31.00	42960	23.0	95	95	27.70	0.35	37.70	1.80	69.70	1.90	-2.7	5.2E-08	1
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		
21																		
22																		
23																		
24																		
25																		
26																		

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 5.5E-08 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

TRC Environmental Corporation	QC: JPH
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QA: JPH

Project Name:	Dane County - Phase 10 cell 2 Construction	Cell #:	6
Project #:	253325.0000	USCS Description:	Silty, clayey sand
Sample Name:	Parisi Stockpile, Sample #5	USCS Classification:	SC-SM
Visual Descript:	Silty, clayey sand	Average Kv =	1.6E-08 cm/s

Sample Type: Remolded	Initial Values	Final Values		
			Maximum Proctor Density:	128.4
			Optimum Moisture Content:	8.7
Sample Dia. (in)	3.00	3.00	Permeant:	Water
Sample Ht. (in)	2.50	2.50	Permeant Specific Gravity:	1.00
Tare & Wet (g)	110.70	705.10	Sample Specific Gravity:	2.56 Est.
Tare & Dry (g)	100.00	625.80	Confining Pressure (psi):	100.0
Tare (g)	0.00	88.59	Burette Diameter (in):	0.250
Sample Wt. (g)	595.30	616.51	Burette Zero (cm):	100.0
% of Proctor Density:	90.3%	90.2%		
% (+/-) of Optimum Moisture Content:	2.0%	6.1%		
Moisture (%)	10.7	14.8	Maximum Gradient:	7.9
Wet Density (pcf)	128.3	132.9	Average Gradient:	7.6
Dry Density (pcf)	115.9	115.8	Max. Effect. Stress (psi):	5.8
Saturation (%)	72.8	100.0	Min. Effect. Stress (psi):	4.1
			Ave. Effect. Stress (psi):	4.6

	Date Yr.	Mo.	Day	Time Hr.	Min.	Run Time (s)	Temp C°**	Pressure (psi) Bot	Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0,1
1	2016	5	18	14	7.00		0.0	95	95	43.30		2.35		102.35				
2	2016	5	18	14	41.00	2040	23.0	95	95	44.00	0.70	2.85	0.50	101.05	1.30	-44.4	1.8E-07	
3	2016	5	18	17	51.00	11400	23.0	95	95	47.40	3.40	5.00	2.15	99.65	1.40	21.1	6.6E-08	
4	2016	5	19	4	55.00	39840	23.0	95	95	54.60	7.20	10.05	5.05	95.70	3.95	12.2	5.1E-08	
5	2016	5	19	8	23.00	12480	23.0	95	95	56.60	2.00	11.15	1.10	94.95	0.75	18.9	3.6E-08	
6	2016	5	19	11	25.00	10920	23.0	95	95	57.85	1.25	11.95	0.80	94.35	0.60	14.3	3.2E-08	
7	2016	5	19	17	34.00	22140	23.0	95	95	61.15	3.30	13.50	1.55	93.25	1.10	17.0	3.0E-08	
8	2016	5	20	5	30.00	42960	23.0	95	95	65.85	4.70	15.80	2.30	91.25	2.00	7.0	2.6E-08	
9	2016	5	20	10	45.00	18900	23.0	95	95	67.80	1.95	16.75	0.95	90.60	0.65	18.7	2.3E-08	
10	2016	5	20	14	52.00	14820	24.0	95	95	69.50	1.70	17.35	0.60	90.10	0.50	9.1	2.0E-08	
11	2016	5	20	18	1.00	11340	24.0	95	95	70.80	1.30	17.85	0.50	89.75	0.35	17.6	2.1E-08	
12	2016	5	23	4	57.00	212160	23.0	95	95	88.00	17.20	24.95	7.10	83.80	5.95	8.8	1.9E-08	
13	2016	5	23	8	6.00	11340	23.0	95	95	88.00	0.00	25.25	0.30	83.50	0.30	0.0	1.9E-08	
14	2016	5	23	11	52.00	13560	23.0	95	95	88.35	0.35	25.60	0.35	83.20	0.30	7.7	1.7E-08	
15	2016	5	23	17	55.00	21780	22.0	95	95	89.20	0.85	26.20	0.60	82.80	0.40	20.0	1.7E-08	
16	2016	5	24	4	57.00	39720	22.0	95	95	90.40	1.20	27.15	0.95	81.85	0.95	0.0	1.8E-08	
17	2016	5	24	14	0.00	32580	22.0	95	95	91.10	0.70	27.90	0.75	81.20	0.65	7.1	1.7E-08	
18	2016	5	24	17	0.00	10800	22.0	95	95	91.50	0.40	28.15	0.25	81.00	0.20	11.1	1.6E-08	
19	2016	5	25	5	13.00	43980	24.0	95	95	92.60	1.10	29.10	0.95	80.10	0.90	2.7	1.6E-08	
20	2016	5	25	8	28.00	11700	22.0	95	95	92.60	0.00	29.30	0.20	79.80	0.30	-20.0	1.8E-08	
21	2016	5	25	12	40.00	15120	21.0	95	95	93.00	0.40	29.70	0.40	79.55	0.25	23.1	1.8E-08	
22	2016	5	25	15	6.00	8760	23.0	95	95	93.60	0.60	29.85	0.15	79.40	0.15	0.0	1.4E-08	1
23	2016	5	25	18	12.00	11160	22.0	95	95	94.00	0.40	30.10	0.25	79.30	0.10	42.9	1.3E-08	1
24	2016	5	26	5	5.00	39180	22.0	95	95	94.40	0.40	30.85	0.75	78.50	0.80	-3.2	1.7E-08	1
25	2016	5	26	9	8.00	14580	22.0	95	95	94.75	0.35	31.15	0.30	78.25	0.25	9.1	1.7E-08	1
26	2016	5	26	13	53.00	17100	22.0	95	95	95.20	0.45	31.45	0.30	77.90	0.35	-7.7	1.7E-08	1

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 1.6E-08 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

PHASE 1 – CELL 2 STOCKPILE LABORATORY TEST RESULTS

TRC Environmental Corporation	QC: JPH
Falling Head, Rising Tailwater Permeability Test (ASTM D5084, Method C)	QA: JPH

Project Name:	Dane County - Phase 10 cell 2 Construction	Cell #:	10
Project #:	253325.0000	USCS Description:	Sandy lean clay
Sample Name:	Parisi Stockpile, Sample #9	USCS Classification:	CL
Visual Descript:	Sandy lean clay	Average Kv =	8.3E-09 cm/s

Sample Type: Remolded	Initial Values	Final Values		
			Maximum Proctor Density:	125.2
			Optimum Moisture Content:	10.8
Sample Dia. (in)	3.00	3.00	Permeant:	Water
Sample Ht. (in)	2.53	2.53	Permeant Specific Gravity:	1.00
Tare & Wet (g)	112.80	877.80	Sample Specific Gravity:	2.66 Est.
Tare & Dry (g)	100.00	782.70	Confining Pressure (psi):	100.0
Tare (g)	0.00	258.95	Burette Diameter (in):	0.250
Sample Wt. (g)	596.00	618.85	Burette Zero (cm):	100.0
% of Proctor Density:	90.1%	89.3%		
% (+/-) of Optimum Moisture Content:	2.0%	7.4%		
Moisture (%)	12.8	18.2	Maximum Gradient:	10.9
Wet Density (pcf)	127.2	132.1	Average Gradient:	10.6
Dry Density (pcf)	112.8	111.8	Max. Effect. Stress (psi):	6.0
Saturation (%)	72.5	100.0	Min. Effect. Stress (psi):	4.6
			Ave. Effect. Stress (psi):	5.1

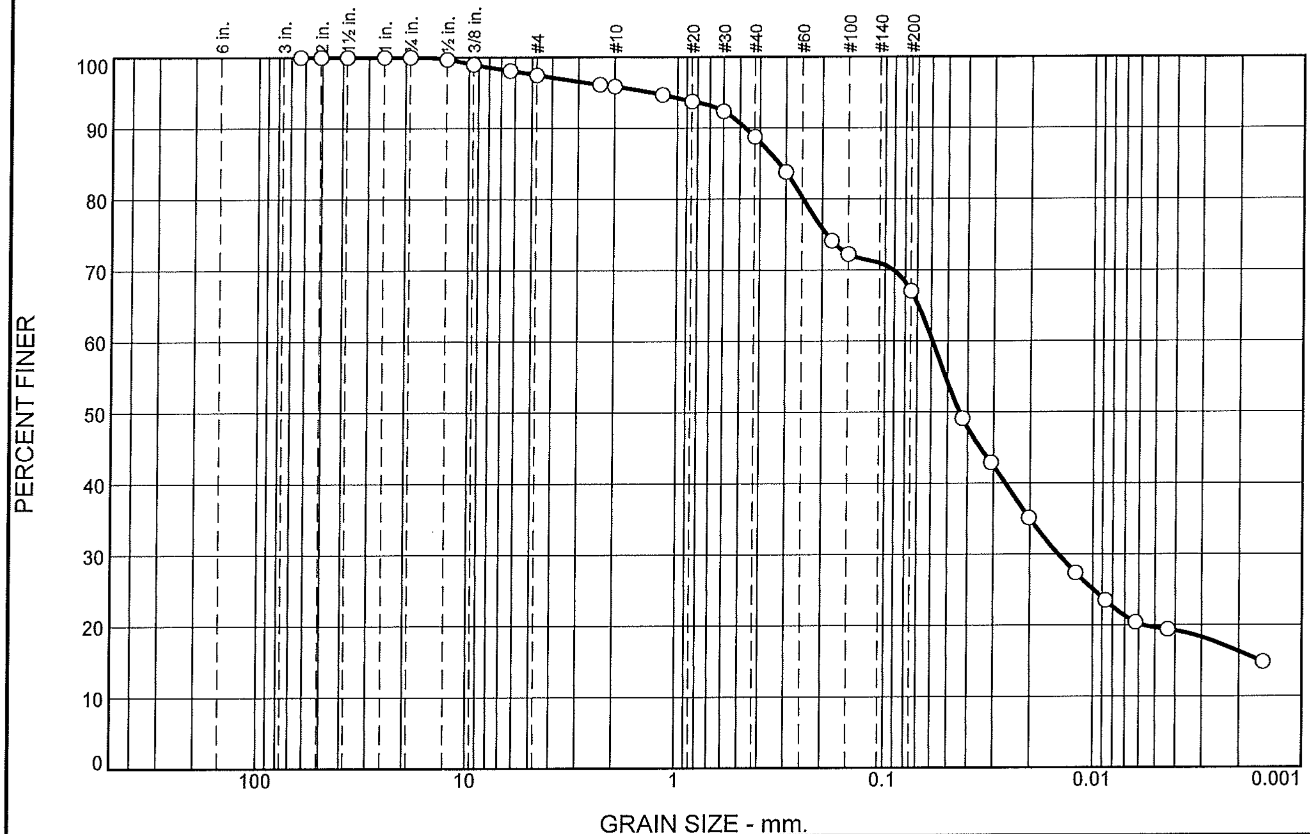
	Date Yr.	Mo.	Day	Time Hr.	Min.	Run Time (s)	Temp C°**	Pressure (psi) Bot	Top	Cham (cm)	Cham. Dif.(cm)	Bot (cm)	Bot. Dif.(cm)	Top (cm)	Top Dif.(cm)	Flow Dif.(%)	Kv *** cm/s	Ave.* 0,1
1	2016	5	26	13	56.00		0.0	95	95	32.00		2.95		102.60				
2	2016	5	26	17	52.00	14160	22.0	95	95	34.10	2.10	4.40	1.45	101.00	1.60	-4.9	4.7E-08	
3	2016	5	27	4	59.00	40020	22.0	95	95	37.30	3.20	7.25	2.85	99.25	1.75	23.9	2.6E-08	
4	2016	5	27	9	53.00	17640	22.0	95	95	38.20	0.90	8.20	0.95	98.60	0.65	18.7	2.1E-08	
5	2016	5	27	13	7.00	11640	22.0	95	95	39.55	1.35	8.75	0.55	98.25	0.35	22.2	1.8E-08	
6	2016	5	31	5	24.00	317820	23.0	95	95	48.30	8.75	17.80	9.05	91.80	6.45	16.8	1.2E-08	
7	2016	5	31	8	47.00	12180	22.0	95	95	48.70	0.40	18.00	0.20	91.60	0.20	0.0	9.4E-09	
8	2016	5	31	13	34.00	17220	22.0	95	95	49.25	0.55	18.30	0.30	91.35	0.25	9.1	9.2E-09	
9	2016	5	31	16	37.00	10980	22.0	95	95	49.45	0.20	18.55	0.25	91.25	0.10	42.9	9.3E-09	
10	2016	5	31	21	16.00	16740	23.0	95	95	49.65	0.20	18.90	0.35	91.00	0.25	16.7	1.0E-08	
11	2016	6	1	4	54.00	27480	22.0	95	95	49.85	0.20	19.35	0.45	90.55	0.45	0.0	9.7E-09	
12	2016	6	1	8	47.00	13980	22.0	95	95	50.20	0.35	19.60	0.25	90.30	0.25	0.0	1.1E-08	
13	2016	6	1	11	49.00		0.0	95	95	50.55		19.80		90.30				
14	2016	6	1	14	49.00	10800	22.0	95	95	51.00	0.45	20.00	0.20	90.15	0.15	14.3	9.8E-09	
15	2016	6	1	16	52.00	7380	22.0	95	95	51.40	0.40	20.30	0.30	90.00	0.15	33.3	1.9E-08	
16	2016	6	2	4	50.00	43080	22.0	95	95	51.70	0.30	20.75	0.45	89.30	0.70	-21.7	8.2E-09	1
17	2016	6	2	8	14.00	12240	22.0	95	95	51.75	0.05	20.95	0.20	89.20	0.10	33.3	7.6E-09	1
18	2016	6	2	11	15.00	10860	22.0	95	95	52.15	0.40	21.15	0.20	89.15	0.05	60.0	7.2E-09	1
19	2016	6	2	14	39.00	12240	22.0	95	95	52.20	0.05	21.30	0.15	88.95	0.20	-14.3	8.9E-09	1
20	2016	6	2	17	1.00	8520	22.0	95	95	52.35	0.15	21.50	0.20	88.90	0.05	60.0	9.2E-09	1
21	2016	6	2	20	32.00	12660	23.0	95	95	52.40	0.05	21.70	0.20	88.80	0.10	33.3	7.3E-09	1
22	2016	6	3	5	3.00	30660	22.0	95	95	52.60	0.20	22.15	0.45	88.30	0.50	-5.3	9.9E-09	1
23																		
24																		
25																		
26																		

**A zero in this column starts a series of measurements. *Average Kv for those rows with a 1 in the Ave. column. 8.3E-09 cm/s

(Termination determined by stable Kv and low flow differential.) ***Kv adjusted for temperature.

Phase 1- Cell 2 Stockpile Laboratory Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.5	1.7	7.1	21.6	47.4	19.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	99.7		
.375	99.0		
.25	98.1		
#4	97.5		
#8	96.1		
#10	95.8		
#16	94.7		
#20	93.8		
#30	92.3		
#40	88.7		
#50	83.8		
#80	74.1		
#100	72.3		
#200	67.1		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 17 LL= 31 PI= 14

Coefficients

D_{90}= 0.4724 D_{85}= 0.3229 D_{60}= 0.0590
D_{50}= 0.0437 D_{30}= 0.0147 D_{15}= 0.0016
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(7)

Remarks

Source of Sample: FG
Sample Number: FG #1

Date: 11-15-16

TRC Environmental Corp.

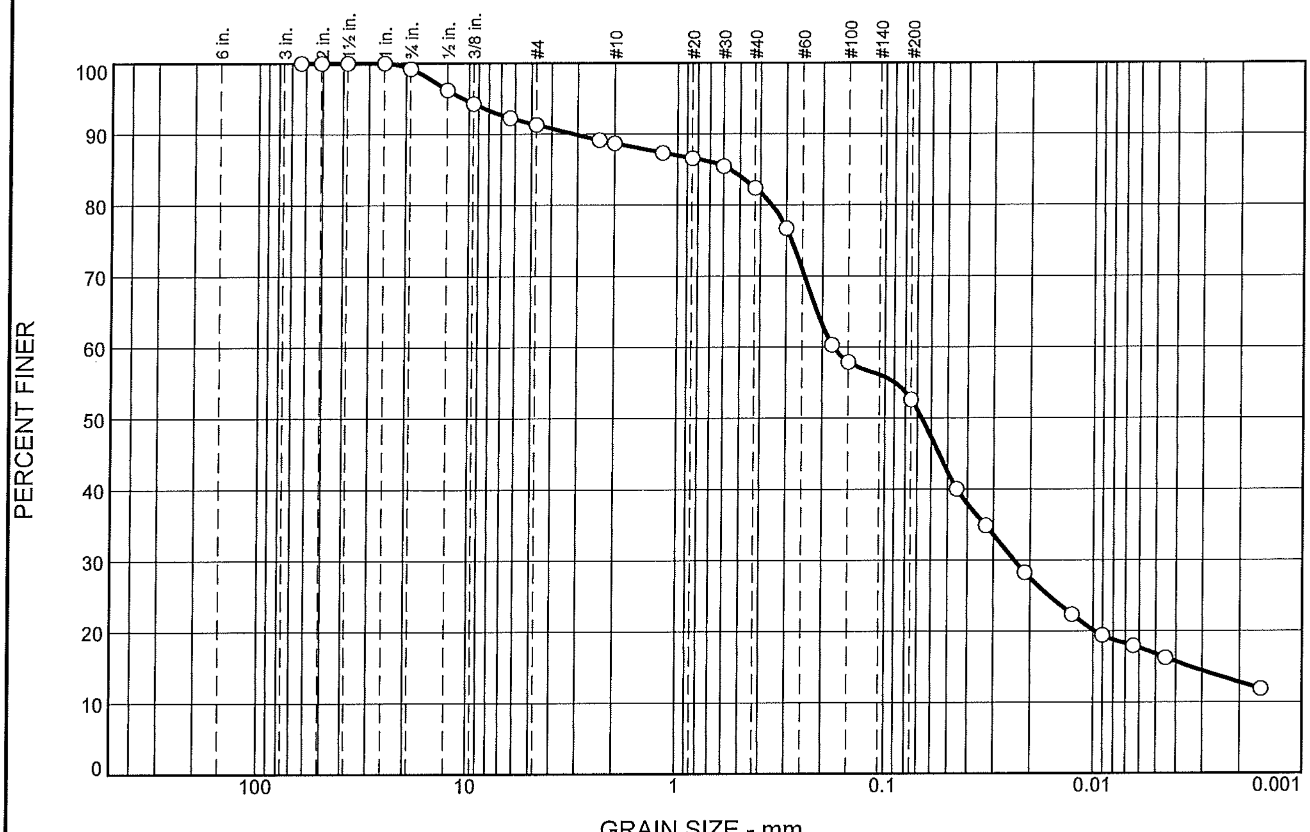
Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction

Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.8	7.9	2.6	6.3	29.8	35.8	16.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	99.2		
.5	96.2		
.375	94.3		
.25	92.3		
#4	91.3		
#8	89.2		
#10	88.7		
#16	87.4		
#20	86.6		
#30	85.4		
#40	82.4		
#50	76.7		
#80	60.3		
#100	57.9		
#200	52.6		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 15 LL= 28 PI= 13

Coefficients

D_{90}= 3.1330 D_{85}= 0.5613 D_{60}= 0.1769
D_{50}= 0.0665 D_{30}= 0.0239 D_{15}= 0.0034
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(4)

Remarks

Source of Sample: FG
Sample Number: FG #2

Date: 11-15-16

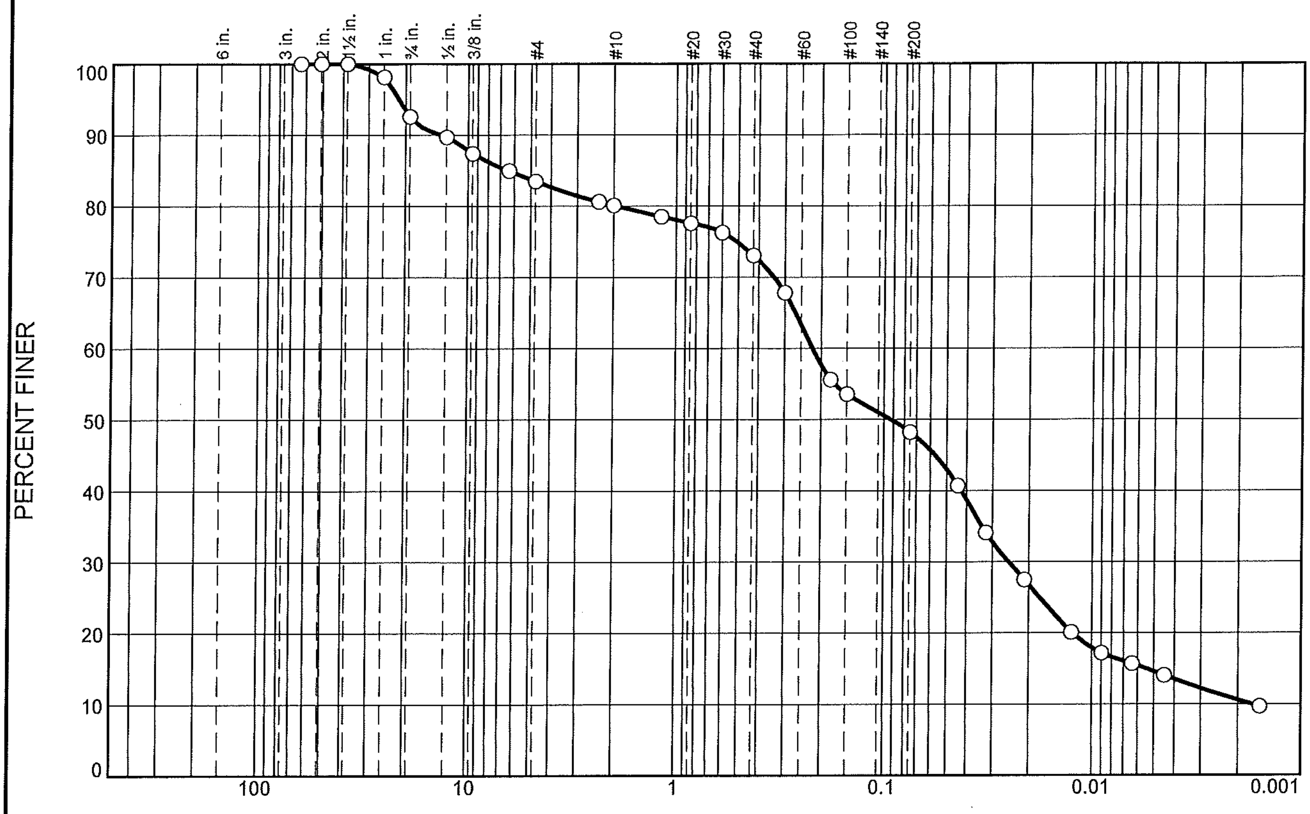
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.4	9.1	3.4	7.1	24.8	33.6	14.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	98.1		
.75	92.6		
.5	89.7		
.375	87.4		
.25	84.9		
#4	83.5		
#8	80.6		
#10	80.1		
#16	78.5		
#20	77.6		
#30	76.3		
#40	73.0		
#50	67.8		
#80	55.6		
#100	53.6		
#200	48.2		

* (no specification provided)

Material Description

Clayey sand with gravel

Atterberg Limits

PL= 16 LL= 27 PI= 11

Coefficients

D_{90}= 13.4491 D_{85}= 6.4238 D_{60}= 0.2206
D_{50}= 0.0925 D_{30}= 0.0251 D_{15}= 0.0054
D_{10}= 0.0017 C_u= 128.64 C_c= 1.67

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Source of Sample: FG
Sample Number: FG #3

Date: 11-15-16

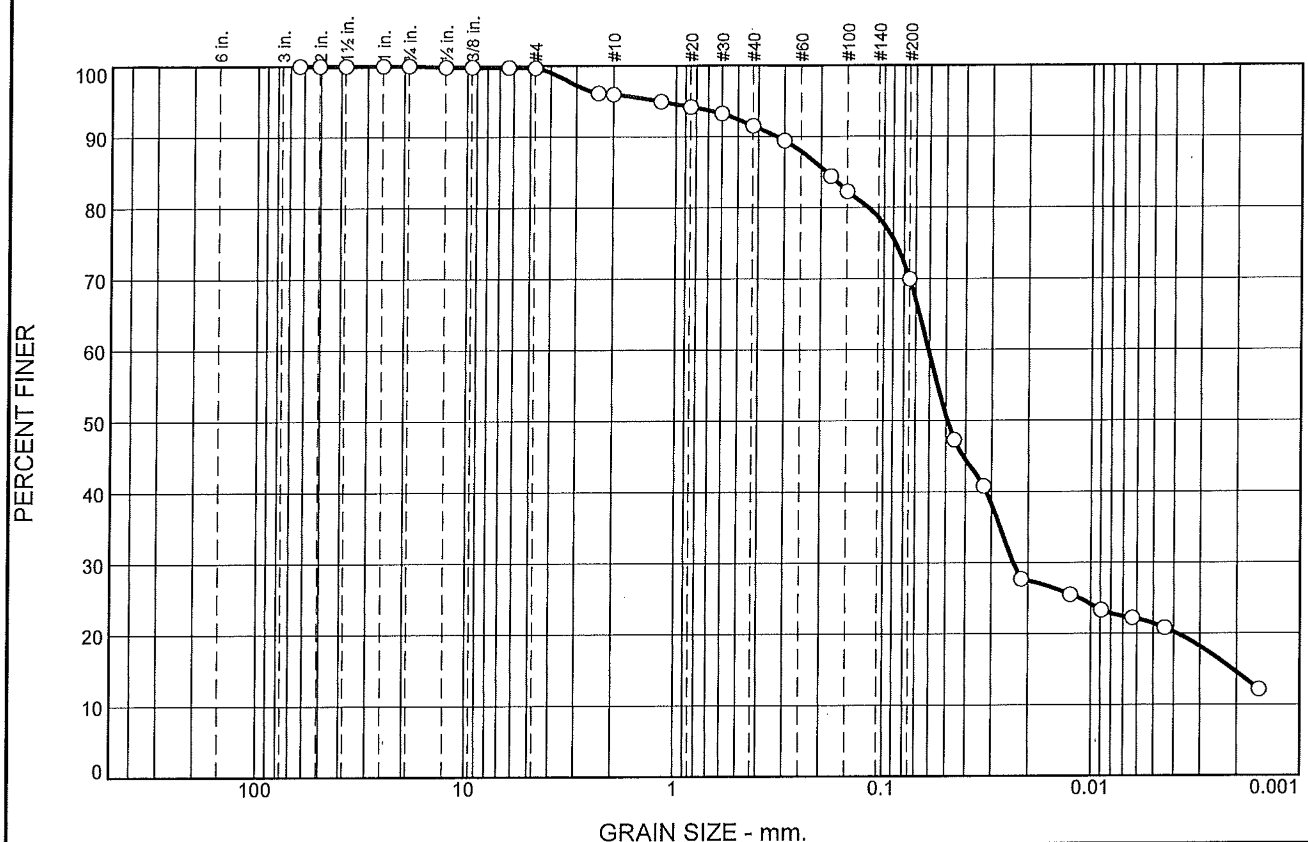
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	3.8	4.4	21.5	48.6	21.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	99.8		
.375	99.8		
.25	99.7		
#4	99.7		
#8	96.1		
#10	95.9		
#16	94.9		
#20	94.2		
#30	93.2		
#40	91.5		
#50	89.4		
#80	84.4		
#100	82.3		
#200	70.0		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 13 LL= 22 PI= 9

Coefficients

D_{90}= 0.3263 D_{85}= 0.1888 D_{60}= 0.0607
D_{50}= 0.0490 D_{30}= 0.0235 D_{15}= 0.0021
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(3)

Remarks

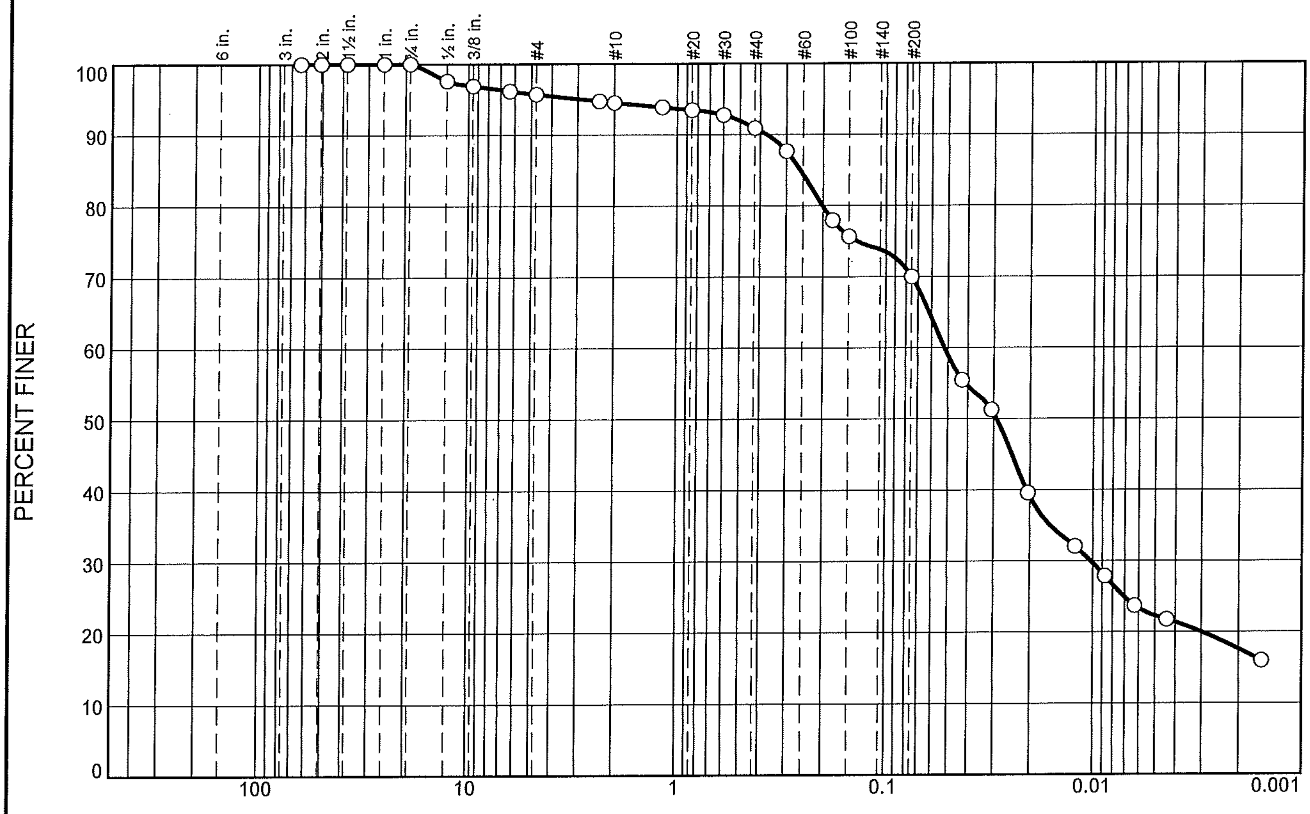
Source of Sample: FG
Sample Number: FG #4

Date: 11-15-16

TRC Environmental Corp. Madison, Wisconsin	**Client:** Dane County **Project:** Phase 10 - Cell 2 Construction **Project No:** 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.3	1.2	3.6	20.9	47.7	22.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	97.6		
.375	96.9		
.25	96.2		
#4	95.7		
#8	94.7		
#10	94.5		
#16	93.9		
#20	93.5		
#30	92.8		
#40	90.9		
#50	87.7		
#80	78.0		
#100	75.7		
#200	70.0		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 19 LL= 33 PI= 14

Coefficients

D_{90}= 0.3727 D_{85}= 0.2576 D_{60}= 0.0519
D_{50}= 0.0290 D_{30}= 0.0102 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(8)

Remarks

Source of Sample: FG
Sample Number: FG #5

Date: 11-15-16

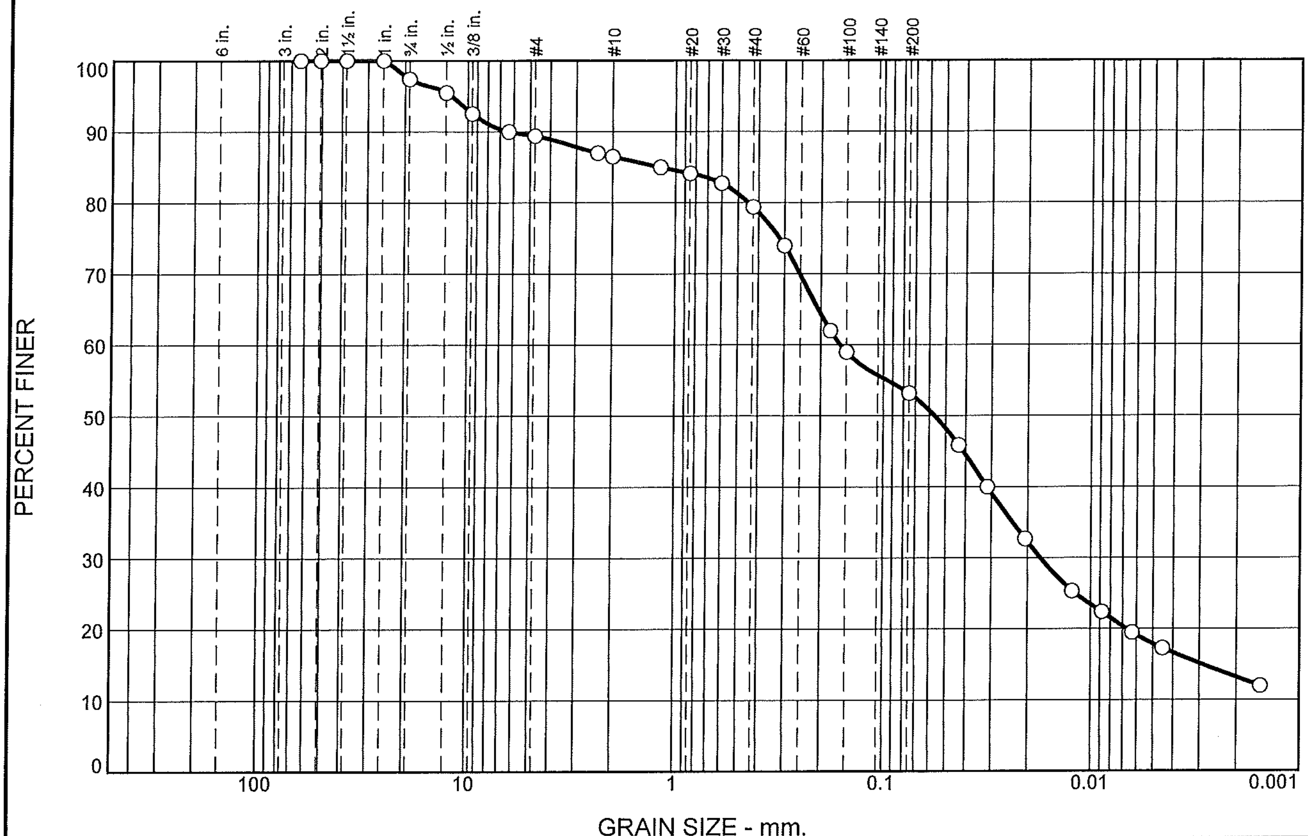
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.6	8.0	2.9	7.1	26.2	35.3	17.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	97.4		
.5	95.5		
.375	92.5		
.25	90.0		
#4	89.4		
#8	87.0		
#10	86.5		
#16	85.0		
#20	84.1		
#30	82.7		
#40	79.4		
#50	73.9		
#80	62.0		
#100	59.0		
#200	53.2		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 15 LL= 26 PI= 11

Coefficients

D_{90}= 6.3846 D_{85}= 1.1841 D_{60}= 0.1610
D_{50}= 0.0565 D_{30}= 0.0174 D_{15}= 0.0029
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(3)

Remarks

Source of Sample: FG
Sample Number: FG #6

Date: 11-11-16

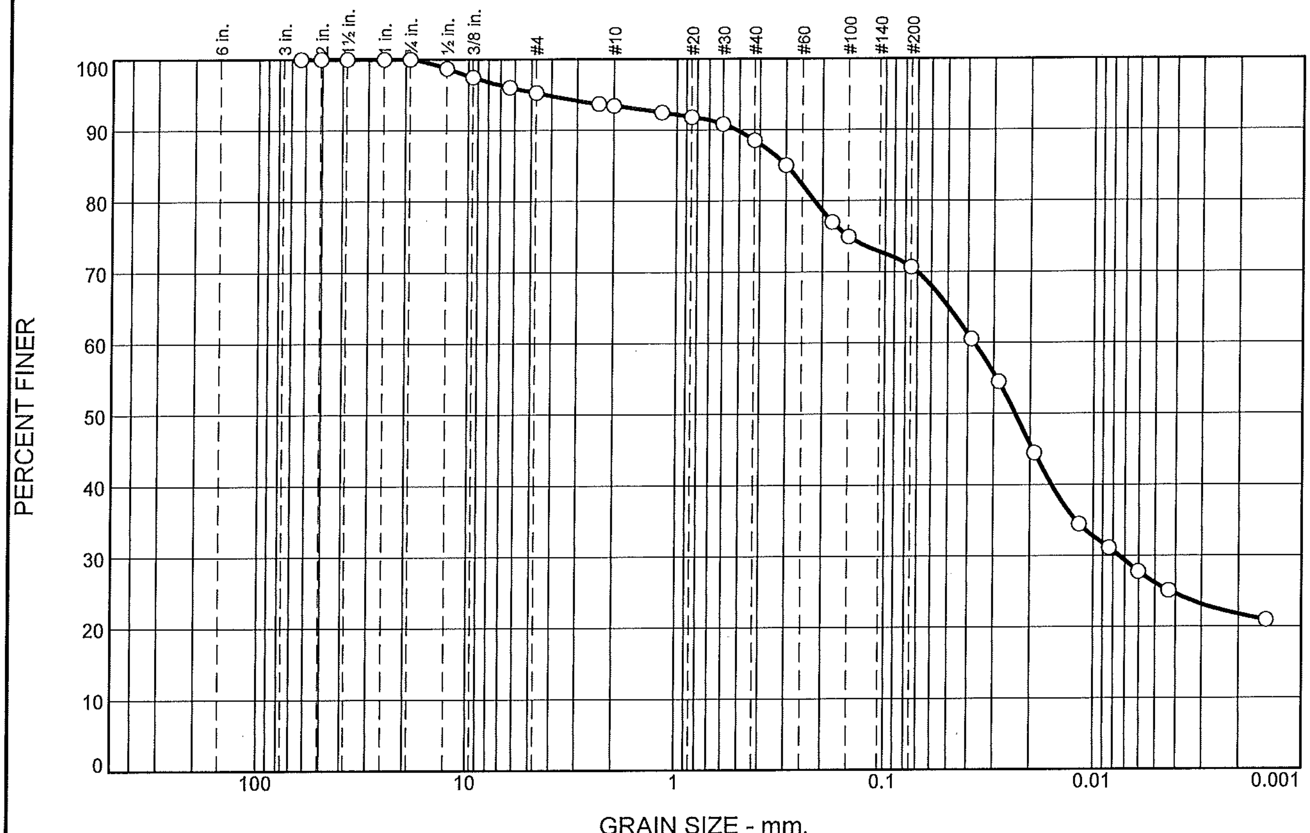
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.8	1.8	4.9	17.8	44.5	26.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	98.7		
.375	97.5		
.25	96.0		
#4	95.2		
#8	93.7		
#10	93.4		
#16	92.5		
#20	91.8		
#30	90.8		
#40	88.5		
#50	85.0		
#80	77.0		
#100	75.0		
#200	70.7		

* (no specification provided)

Material Description

Lean clay with sand

Atterberg Limits

PL= 16 LL= 30 PI= 14

Coefficients

D_{90}= 0.5187 D_{85}= 0.2996 D_{60}= 0.0374
D_{50}= 0.0236 D_{30}= 0.0075 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(8)

Remarks

Source of Sample: FG
Sample Number: FG #7

Date: 11-11-16

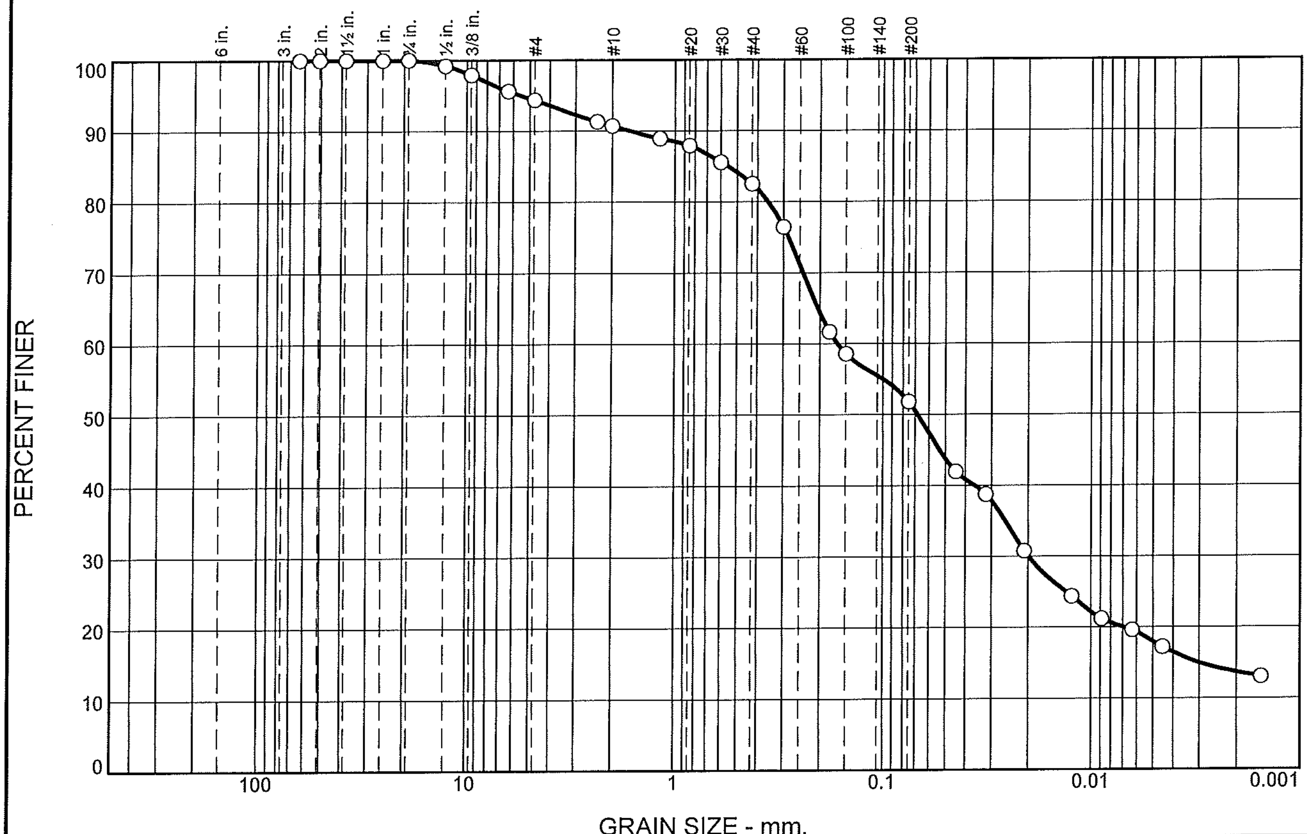
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.6	3.7	8.2	30.7	33.8	18.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	99.2		
.375	97.9		
.25	95.6		
#4	94.4		
#8	91.3		
#10	90.7		
#16	88.9		
#20	87.9		
#30	85.6		
#40	82.5		
#50	76.5		
#80	61.6		
#100	58.6		
#200	51.8		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 14 LL= 23 PI= 9

Coefficients

D_{90}= 1.6419 D_{85}= 0.5560 D_{60}= 0.1654
D_{50}= 0.0679 D_{30}= 0.0200 D_{15}= 0.0030
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(2)

Remarks

Source of Sample: FG
Sample Number: FG #8

Date: 11-11-16

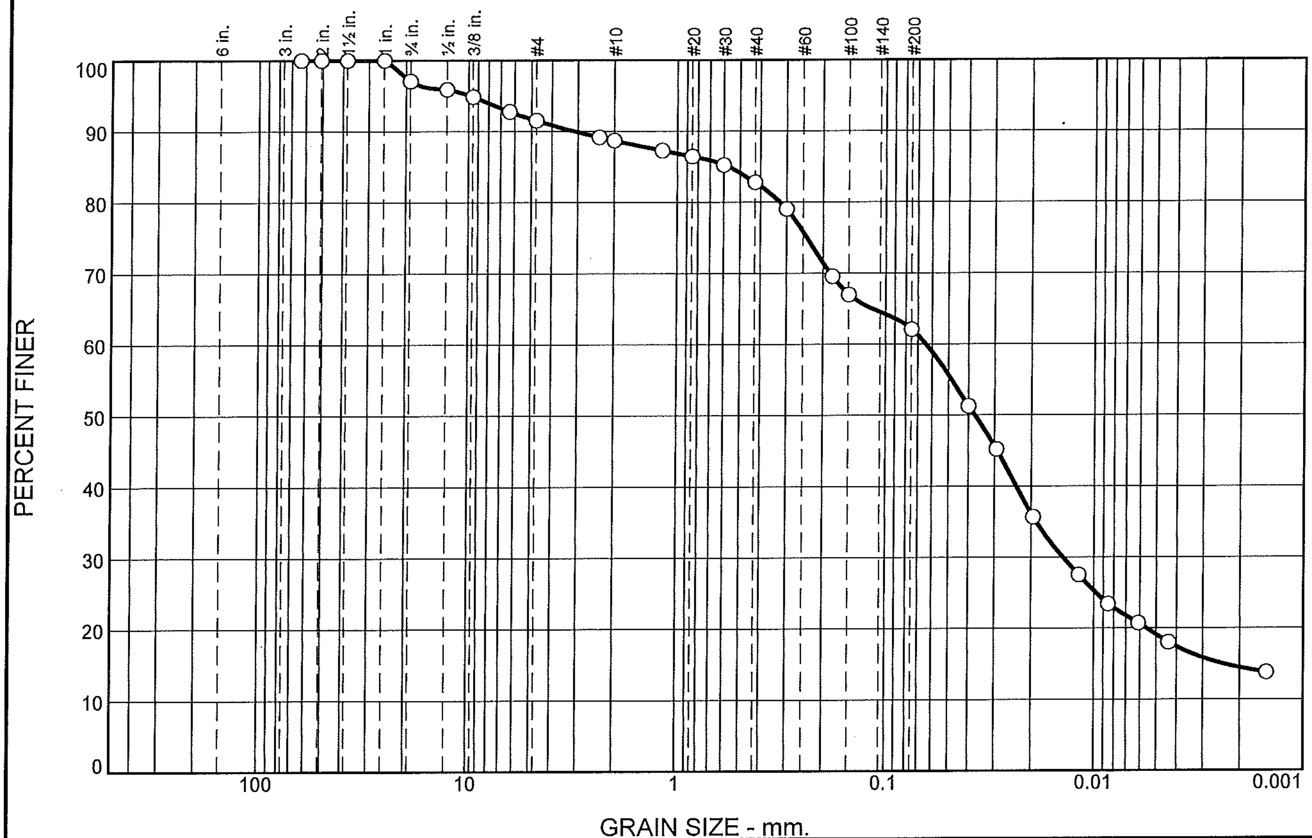
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.0	5.5	2.8	5.9	20.7	43.0	19.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	97.0		
.5	95.9		
.375	94.8		
.25	92.8		
#4	91.5		
#8	89.2		
#10	88.7		
#16	87.3		
#20	86.4		
#30	85.3		
#40	82.8		
#50	79.0		
#80	69.5		
#100	67.0		
#200	62.1		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 16 LL= 30 PI= 14

Coefficients

D_{90}= 3.1196 D_{85}= 0.5723 D_{60}= 0.0640
D_{50}= 0.0373 D_{30}= 0.0141 D_{15}= 0.0024
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(6)

Remarks

Source of Sample: FG
Sample Number: FG #9

Date: 11-14-16

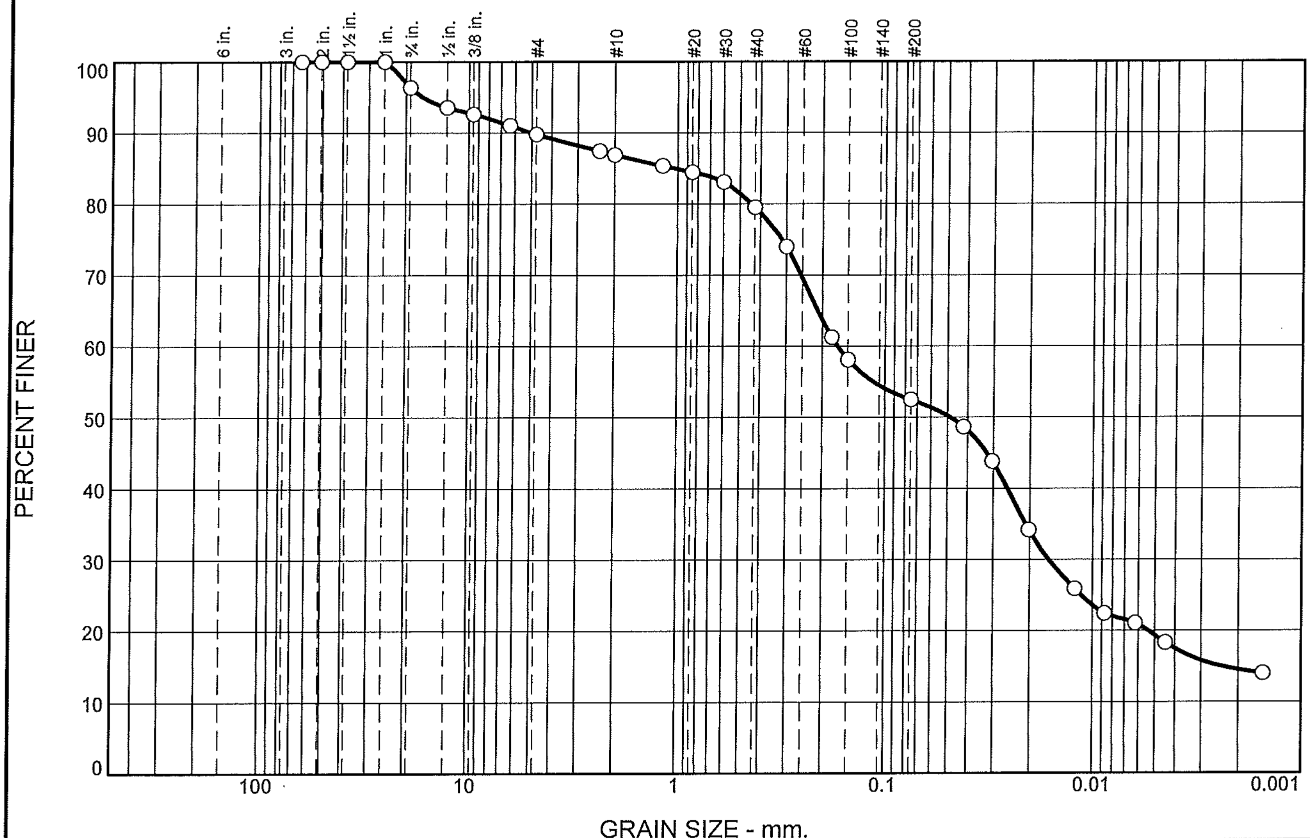
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.6	6.6	2.9	7.4	27.0	33.1	19.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	96.4		
.5	93.5		
.375	92.6		
.25	91.0		
#4	89.8		
#8	87.4		
#10	86.9		
#16	85.4		
#20	84.5		
#30	83.1		
#40	79.5		
#50	74.0		
#80	61.3		
#100	58.1		
#200	52.5		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 15 LL= 27 PI= 12

Coefficients

D_{90}= 5.0096 D_{85}= 1.0330 D_{60}= 0.1687
D_{50}= 0.0484 D_{30}= 0.0162 D_{15}= 0.0024
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(3)

Remarks

Source of Sample: FG
Sample Number: FG #10

Date: 11-14-16

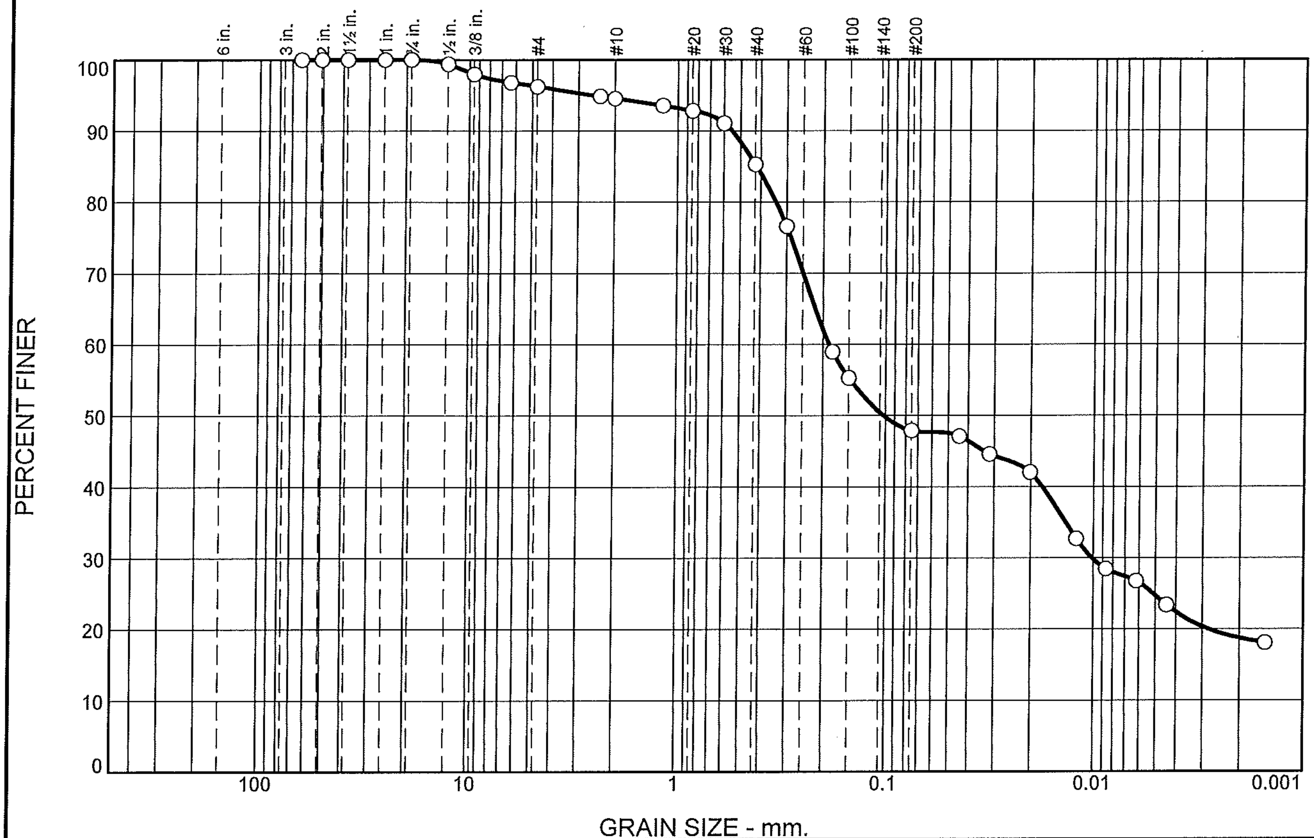
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.8	1.6	9.3	37.4	23.2	24.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	99.4		
.375	98.0		
.25	96.8		
#4	96.2		
#8	94.8		
#10	94.6		
#16	93.5		
#20	92.8		
#30	91.1		
#40	85.3		
#50	76.6		
#80	59.0		
#100	55.3		
#200	47.9		

* (no specification provided)

Material Description

Clayey sand

Atterberg Limits

PL= 16 LL= 24 PI= 8

Coefficients

D_{90}= 0.5508 D_{85}= 0.4188 D_{60}= 0.1871
D_{50}= 0.1021 D_{30}= 0.0101 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-4(1)

Remarks

Source of Sample: FG
Sample Number: FG #11

Date: 11-14-16

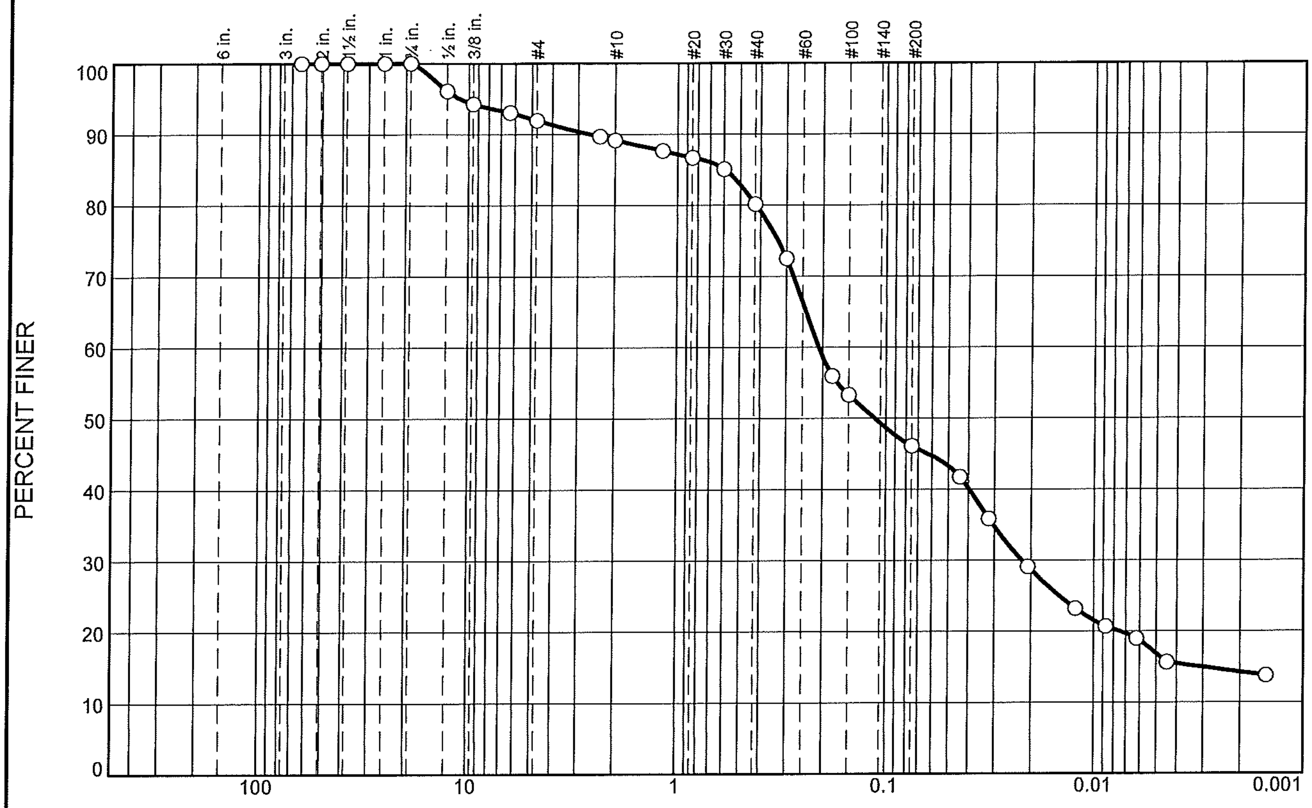
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.1	2.7	9.1	34.0	29.3	16.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	96.1		
.375	94.3		
.25	93.1		
#4	91.9		
#8	89.7		
#10	89.2		
#16	87.7		
#20	86.7		
#30	85.1		
#40	80.1		
#50	72.5		
#80	56.0		
#100	53.3		
#200	46.1		

* (no specification provided)

Material Description

Silty, clayey sand

Atterberg Limits

PL= 17 LL= 24 PI= 7

Coefficients

D_{90}= 2.6340 D_{85}= 0.5953 D_{60}= 0.2091
D_{50}= 0.1129 D_{30}= 0.0222 D_{15}= 0.0031
D_{10}= C_u= C_c=

Classification

USCS= SC-SM AASHTO= A-4(0)

Remarks

Source of Sample: FG
Sample Number: FG #12

Date: 11-14-16

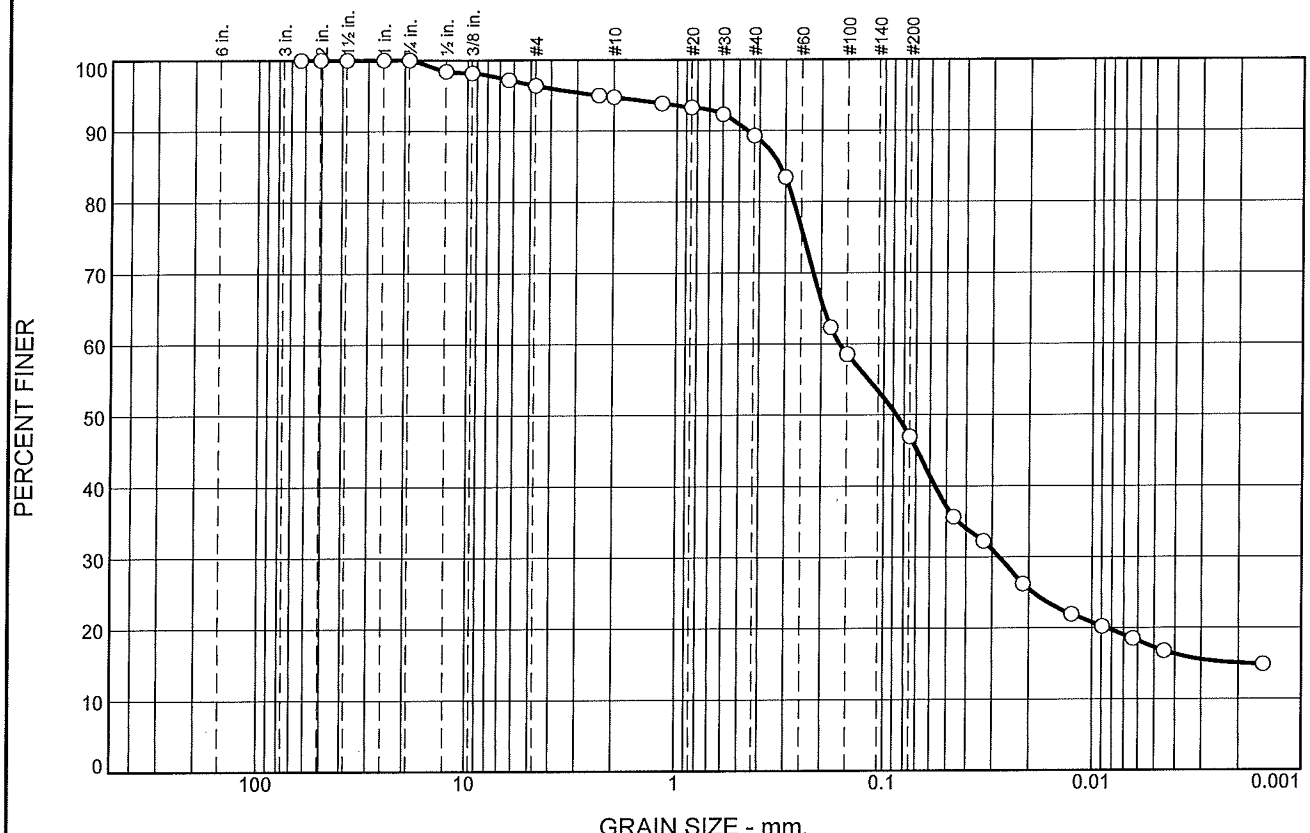
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.6	1.6	5.5	42.3	29.7	17.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	98.4		
.375	98.2		
.25	97.2		
#4	96.4		
#8	95.0		
#10	94.8		
#16	93.9		
#20	93.3		
#30	92.3		
#40	89.3		
#50	83.5		
#80	62.3		
#100	58.6		
#200	47.0		

* (no specification provided)

Material Description

Clayey sand

Atterberg Limits

PL= 16 LL= 24 PI= 8

Coefficients

D_{90}= 0.4578 D_{85}= 0.3168 D_{60}= 0.1631
D_{50}= 0.0868 D_{30}= 0.0277 D_{15}= 0.0019
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-4(1)

Remarks

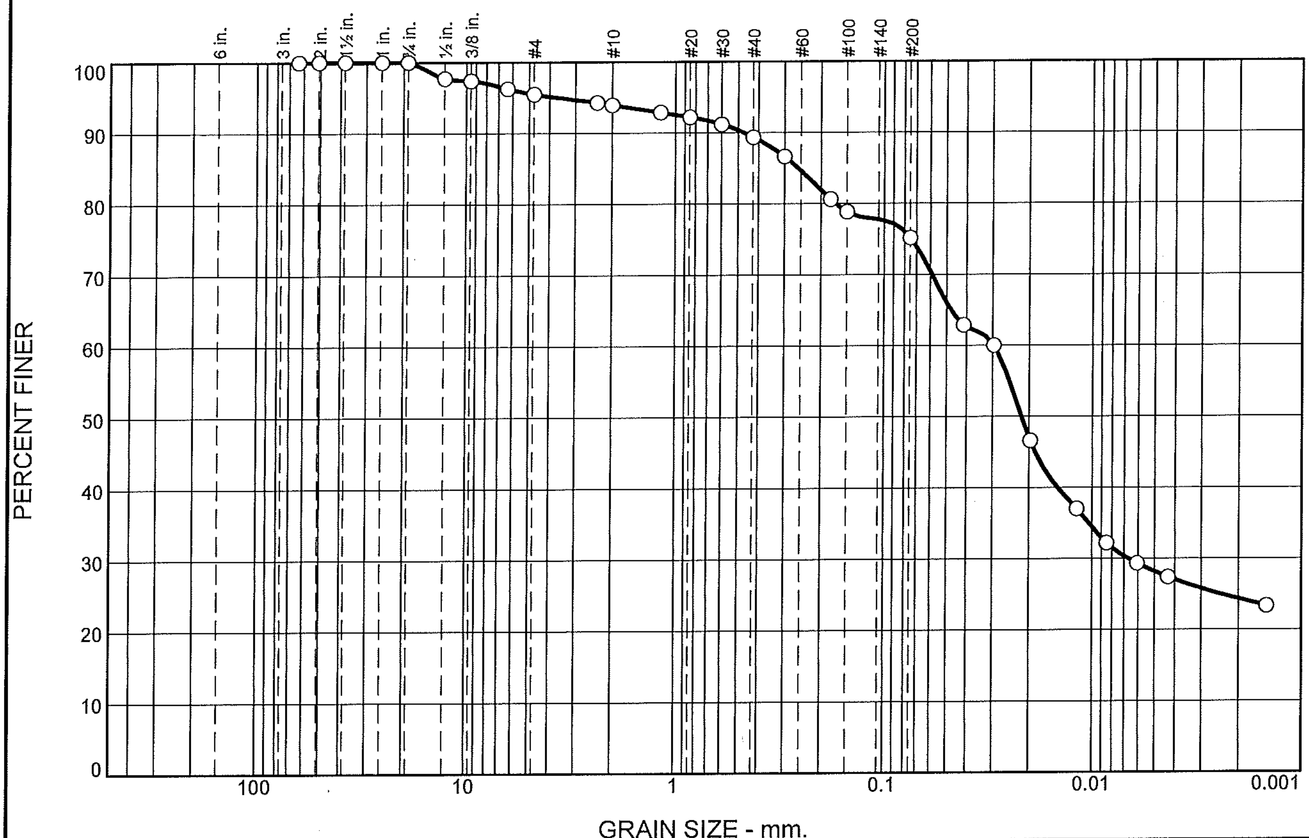
Source of Sample: FG
Sample Number: FG #13

Date: 11-14-16

TRC Environmental Corp.	**Client:** Dane County
	Project: Phase 10 - Cell 2 Construction
Madison, Wisconsin	**Project No:** 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.5	1.6	4.6	14.1	47.0	28.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	97.7		
.375	97.4		
.25	96.2		
#4	95.5		
#8	94.3		
#10	93.9		
#16	92.9		
#20	92.2		
#30	91.2		
#40	89.3		
#50	86.6		
#80	80.6		
#100	78.8		
#200	75.2		

* (no specification provided)

Material Description

Lean clay with sand

Atterberg Limits

PL= 19 LL= 33 PI= 14

Coefficients

D_{90}= 0.4734 D_{85}= 0.2578 D_{60}= 0.0296
D_{50}= 0.0218 D_{30}= 0.0067 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(9)

Remarks

Source of Sample: FG
Sample Number: FG #14

Date: 11-14-16

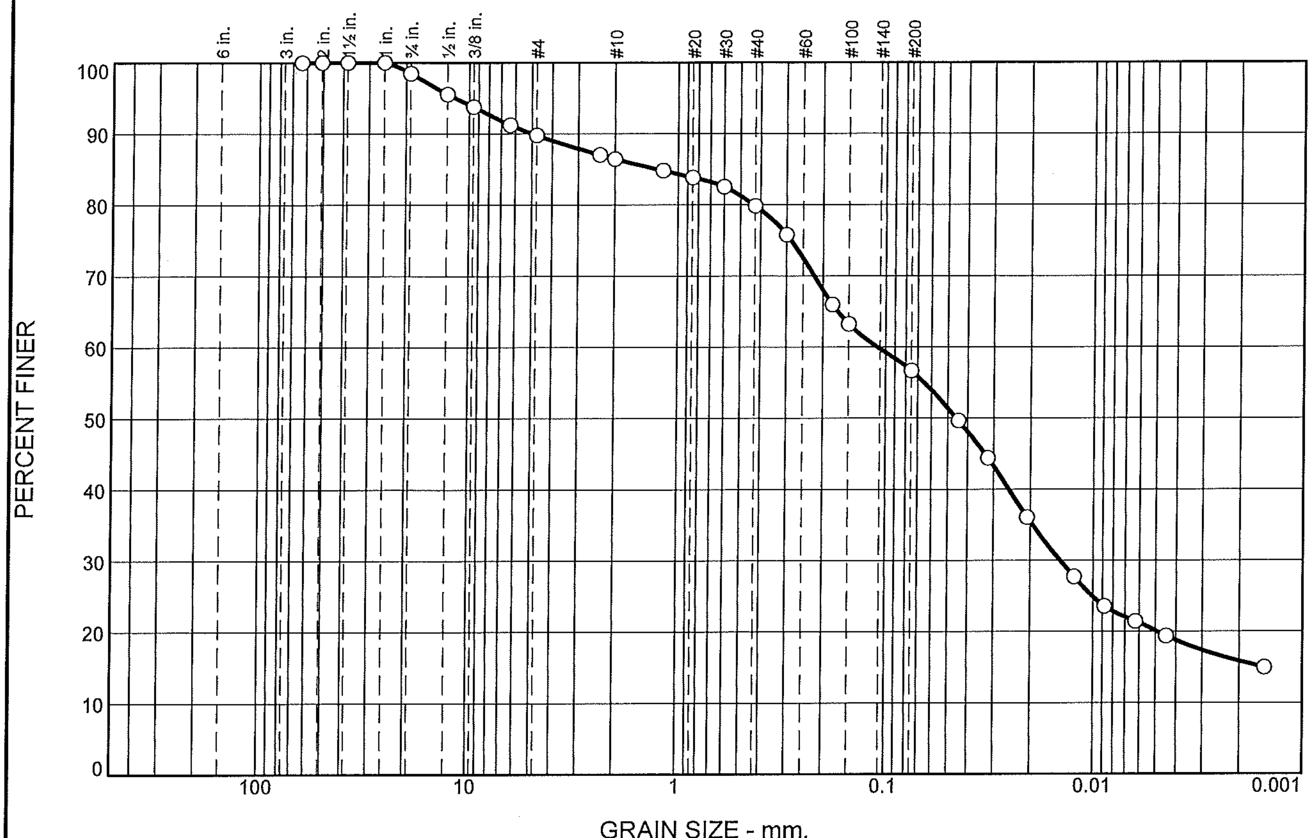
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.5	8.7	3.3	6.7	23.1	36.6	20.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	98.5		
.5	95.5		
.375	93.8		
.25	91.2		
#4	89.8		
#8	87.0		
#10	86.5		
#16	84.8		
#20	83.8		
#30	82.5		
#40	79.8		
#50	75.8		
#80	66.0		
#100	63.2		
#200	56.7		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 17 LL= 26 PI= 9

Coefficients

D_{90}= 4.9855 D_{85}= 1.2577 D_{60}= 0.1094
D_{50}= 0.0455 D_{30}= 0.0144 D_{15}= 0.0015
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(2)

Remarks

Source of Sample: FG
Sample Number: FG #15

Date: 11-14-16

TRC Environmental Corp.

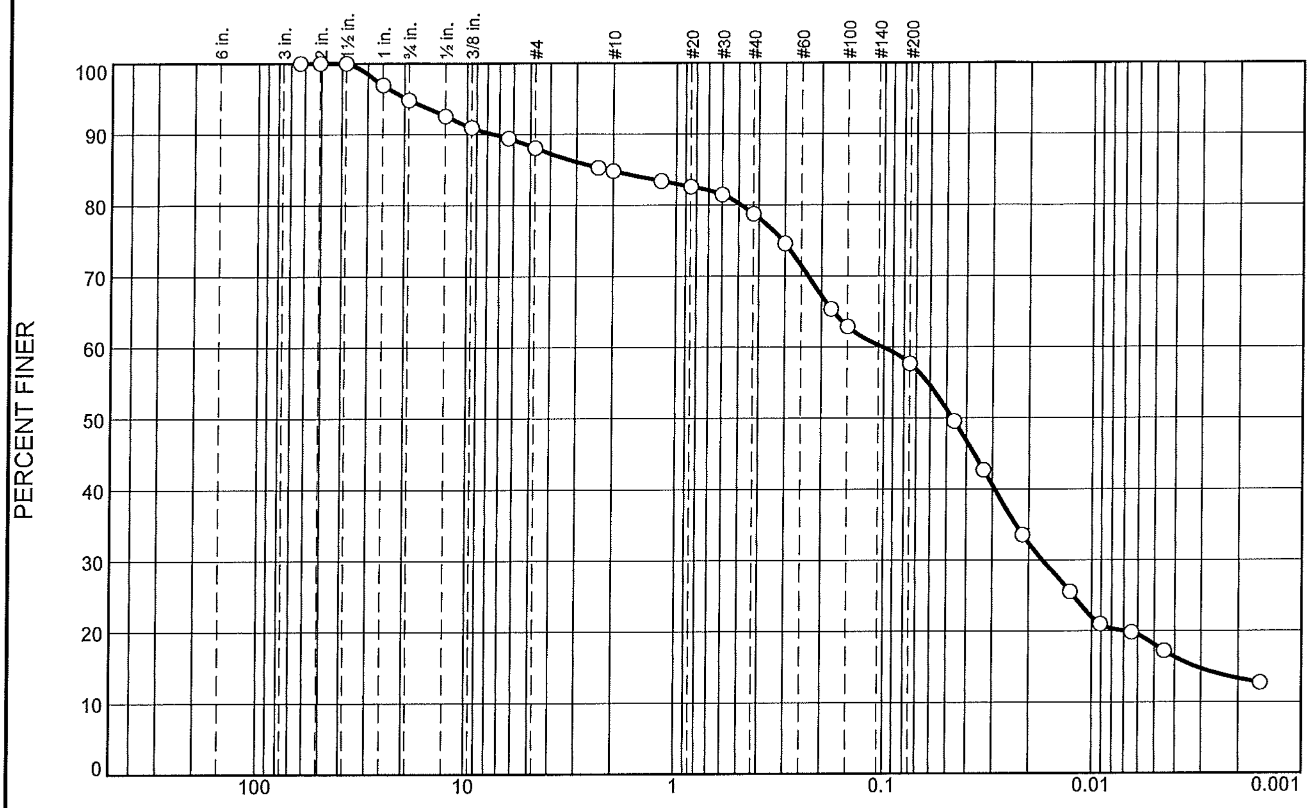
Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction

Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.2	6.7	3.3	6.0	21.1	39.6	18.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	96.9		
.75	94.8		
.5	92.6		
.375	90.9		
.25	89.4		
#4	88.1		
#8	85.3		
#10	84.8		
#16	83.4		
#20	82.6		
#30	81.5		
#40	78.8		
#50	74.6		
#80	65.4		
#100	62.9		
#200	57.7		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 16 LL= 28 PI= 12

Coefficients

D_{90}= 7.4721 D_{85}= 2.1351 D_{60}= 0.1011
D_{50}= 0.0469 D_{30}= 0.0172 D_{15}= 0.0032
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(4)

Remarks

Source of Sample: FG
Sample Number: FG #16

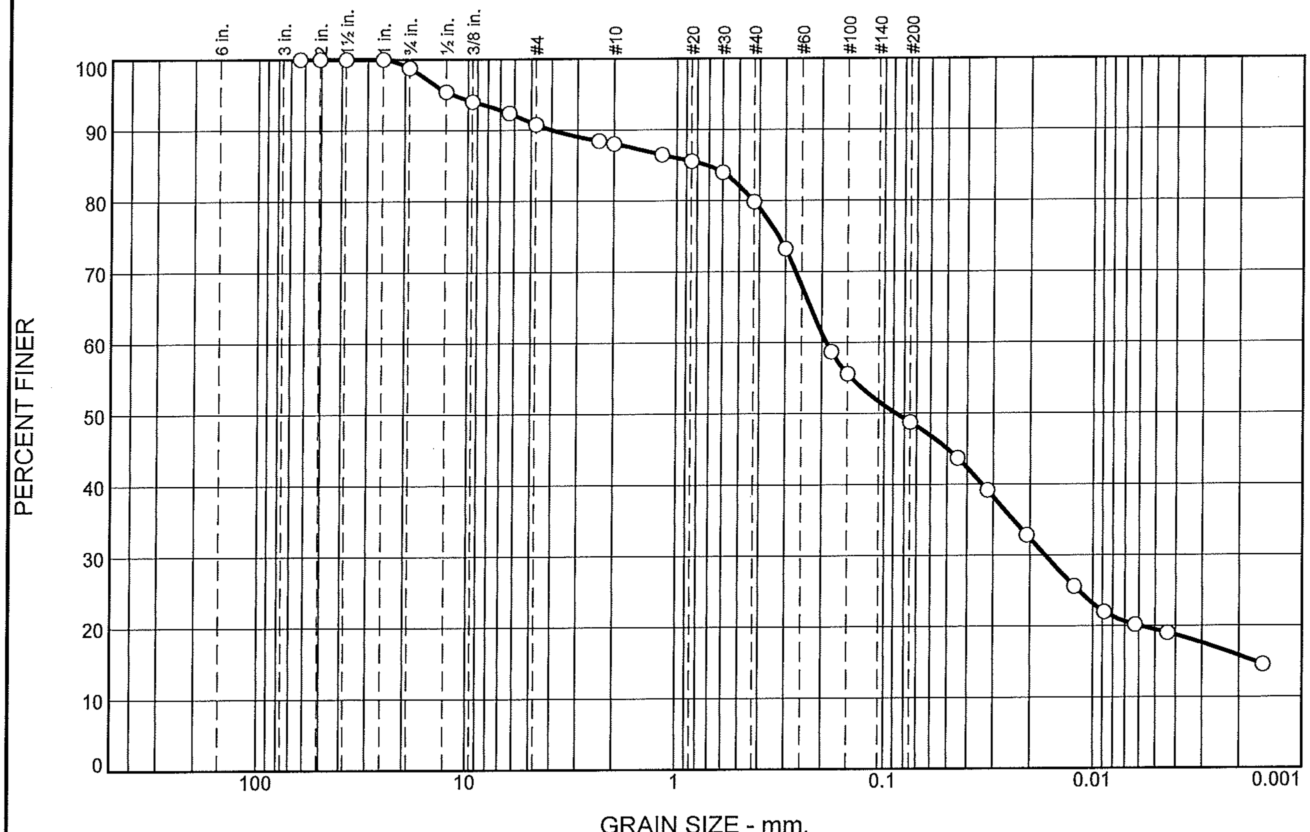
Date: 11-15-16

TRC Environmental Corp.
Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.3	7.9	2.8	8.2	31.0	29.3	19.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	98.7		
.5	95.4		
.375	94.0		
.25	92.4		
#4	90.8		
#8	88.4		
#10	88.0		
#16	86.5		
#20	85.5		
#30	84.0		
#40	79.8		
#50	73.2		
#80	58.7		
#100	55.6		
#200	48.8		

* (no specification provided)

Material Description

Clayey sand

Atterberg Limits

PL= 15 LL= 27 PI= 12

Coefficients

D_{90}= 4.0181 D_{85}= 0.7166 D_{60}= 0.1904
D_{50}= 0.0874 D_{30}= 0.0170 D_{15}= 0.0017
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(3)

Remarks

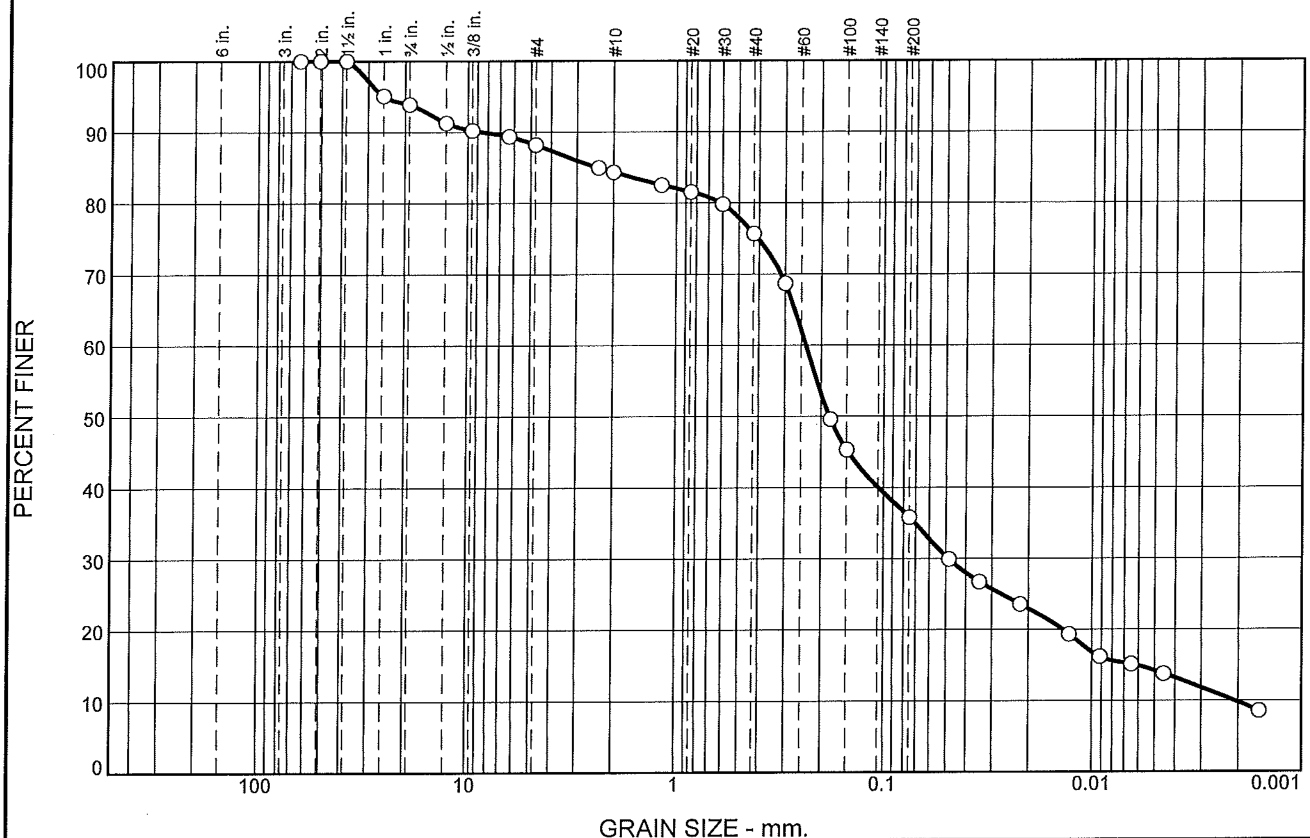
Source of Sample: FG
Sample Number: FG #17

Date: 11-15-16

TRC Environmental Corp.	**Client:** Dane County
	Project: Phase 10 - Cell 2 Construction
Madison, Wisconsin	**Project No:** 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.1	5.7	3.9	8.6	39.9	21.6	14.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	95.1		
.75	93.9		
.5	91.3		
.375	90.2		
.25	89.4		
#4	88.2		
#8	84.9		
#10	84.3		
#16	82.6		
#20	81.6		
#30	79.8		
#40	75.7		
#50	68.7		
#80	49.6		
#100	45.3		
#200	35.8		

* (no specification provided)

Material Description

Clayey sand

Atterberg Limits

PL= 15 LL= 24 PI= 9

Coefficients

D_{90}= 8.5470 D_{85}= 2.3933 D_{60}= 0.2375
D_{50}= 0.1823 D_{30}= 0.0486 D_{15}= 0.0062
D_{10}= 0.0021 C_u= 113.56 C_c= 4.75

Classification

USCS= SC AASHTO= A-4(0)

Remarks

Source of Sample: FG
Sample Number: FG #18

Date: 11-15-16

TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction

Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report

% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.3	4.0	2.6	5.8	20.8	40.1	25.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	98.7		
.5	97.4		
.375	96.8		
.25	95.7		
#4	94.7		
#8	92.5		
#10	92.1		
#16	90.8		
#20	90.0		
#30	88.9		
#40	86.3		
#50	82.2		
#80	73.2		
#100	70.9		
#200	65.5		

* (no specification provided)

Material Description

Sandy silt

Atterberg Limits

PL= 17 LL= 18 PI= 1

Coefficients

D_{90}= 0.8546 D_{85}= 0.3729 D_{60}= 0.0519
D_{50}= 0.0291 D_{30}= 0.0100 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

Source of Sample: FG
Sample Number: FG #19

Date: 11-15-16

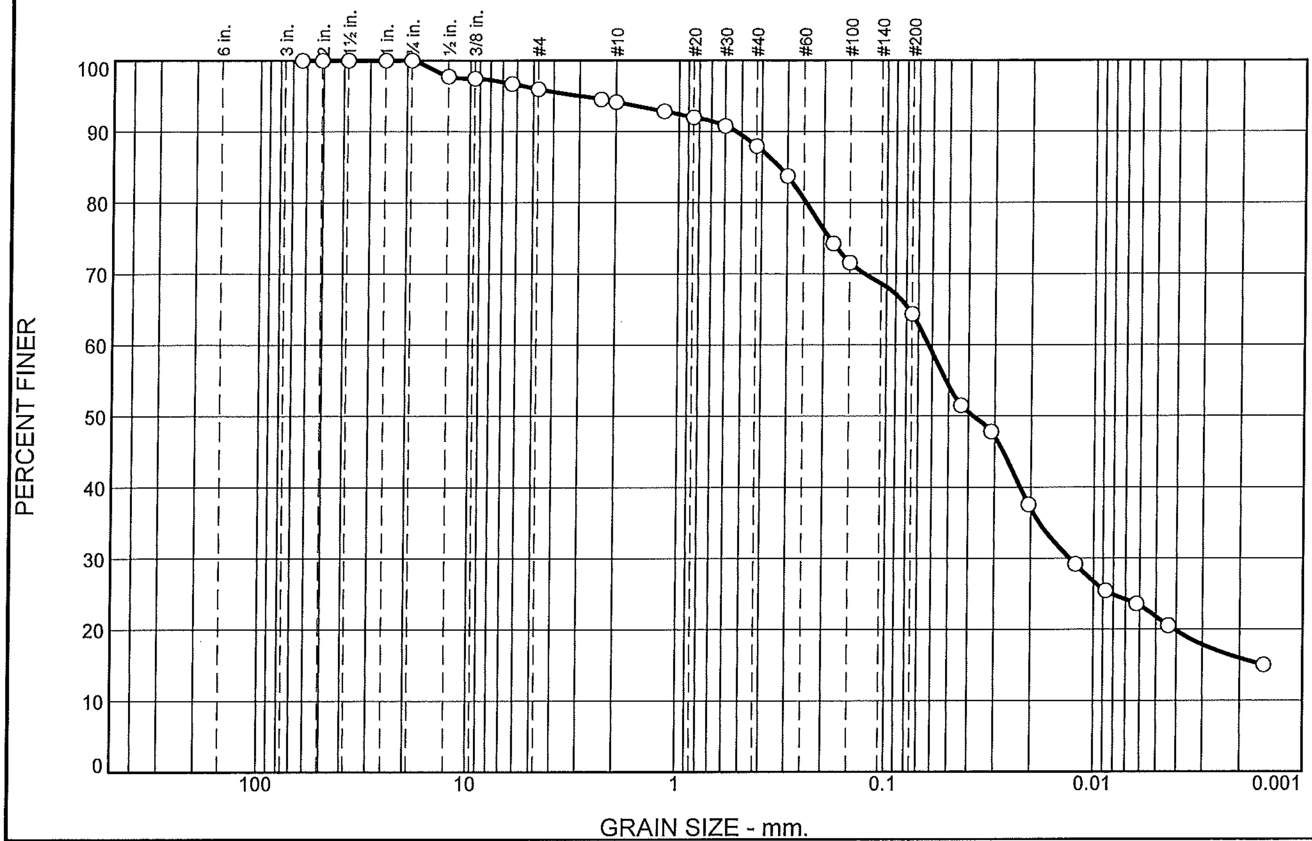
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.1	1.8	6.2	23.5	42.6	21.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	97.7		
.375	97.5		
.25	96.7		
#4	95.9		
#8	94.5		
#10	94.1		
#16	92.8		
#20	92.0		
#30	90.8		
#40	87.9		
#50	83.7		
#80	74.3		
#100	71.6		
#200	64.4		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 16 LL= 28 PI= 12

Coefficients

D_{90}= 0.5339 D_{85}= 0.3274 D_{60}= 0.0624
D_{50}= 0.0380 D_{30}= 0.0130 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(5)

Remarks

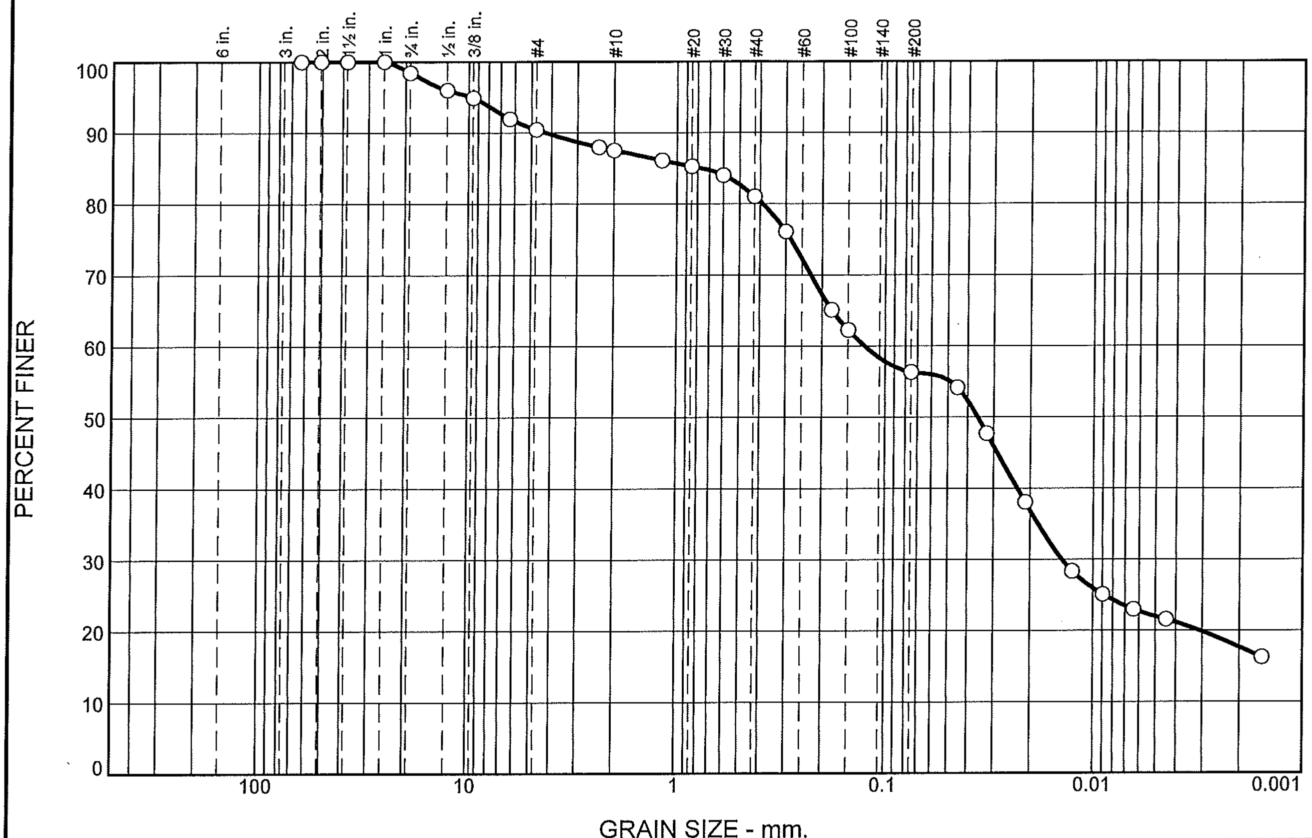
Source of Sample: FG
Sample Number: Composite #1 - #5

Date: 11-15-16

TRC Environmental Corp. Madison, Wisconsin	**Client:** Dane County **Project:** Phase 10 - Cell 2 Construction **Project No:** 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.6	8.0	2.9	6.5	24.7	34.3	22.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	98.4		
.5	96.0		
.375	94.9		
.25	91.9		
#4	90.4		
#8	88.0		
#10	87.5		
#16	86.1		
#20	85.3		
#30	84.0		
#40	81.0		
#50	76.1		
#80	65.1		
#100	62.2		
#200	56.3		

* (no specification provided)

Material Description

Sandy lean clay

Atterberg Limits

PL= 18 LL= 28 PI= 10

Coefficients

D_{90}= 4.2675 D_{85}= 0.7662 D_{60}= 0.1255
D_{50}= 0.0359 D_{30}= 0.0141 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(3)

Remarks

Source of Sample: FG
Sample Number: Composite #6 - #10

Date: 11-15-16

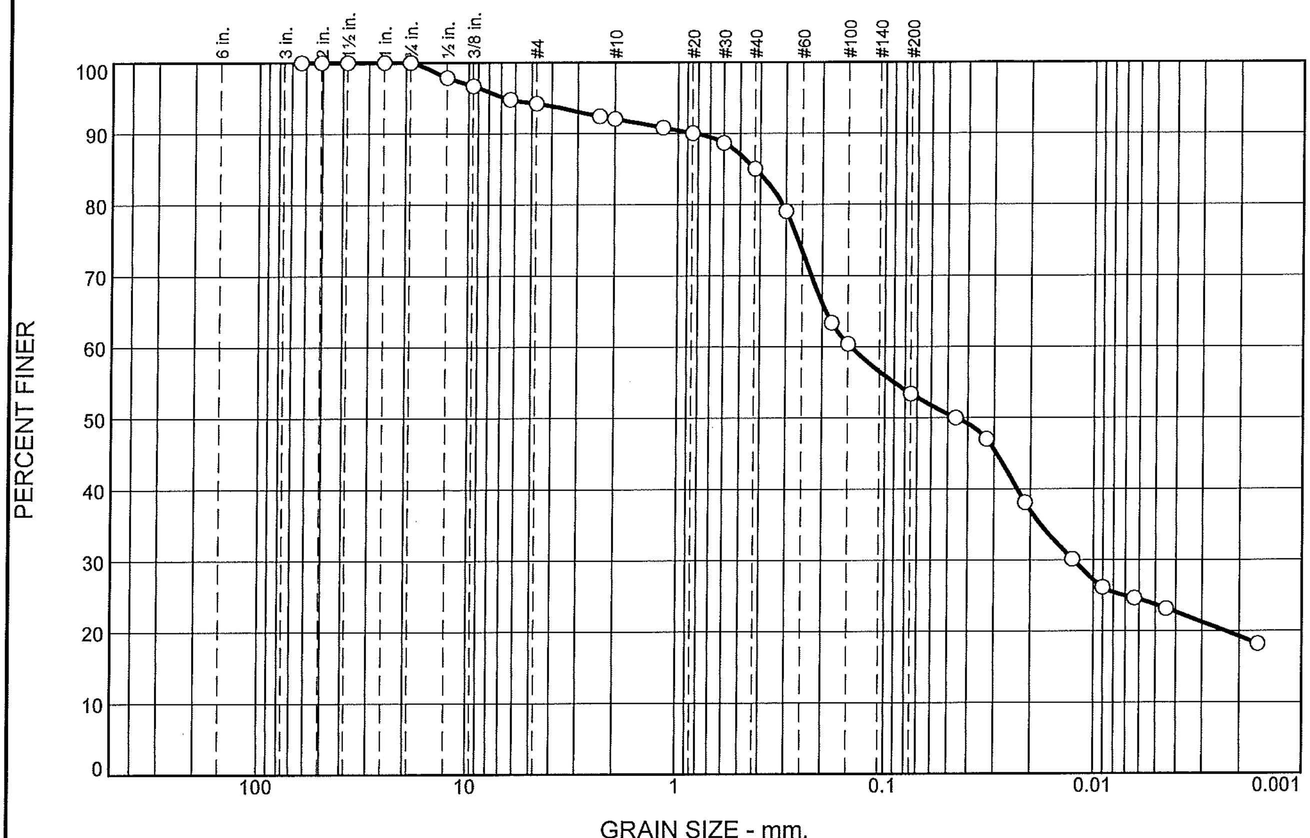
TRC Environmental Corp.

Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction
Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.8	2.2	7.0	31.6	29.7	23.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	100.0		
.5	97.9		
.375	96.7		
.25	94.8		
#4	94.2		
#8	92.4		
#10	92.0		
#16	90.8		
#20	90.0		
#30	88.7		
#40	85.0		
#50	79.1		
#80	63.4		
#100	60.4		
#200	53.4		

* (no specification provided)

Material Description

Sandy silty clay

Atterberg Limits

PL= 17 LL= 24 PI= 7

Coefficients

D_{90}= 0.8425 D_{85}= 0.4241 D_{60}= 0.1450
D_{50}= 0.0456 D_{30}= 0.0125 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL-ML AASHTO= A-4(1)

Remarks

Source of Sample: FG
Sample Number: Composite #11 - #15

Date: 11-11-16

TRC Environmental Corp.

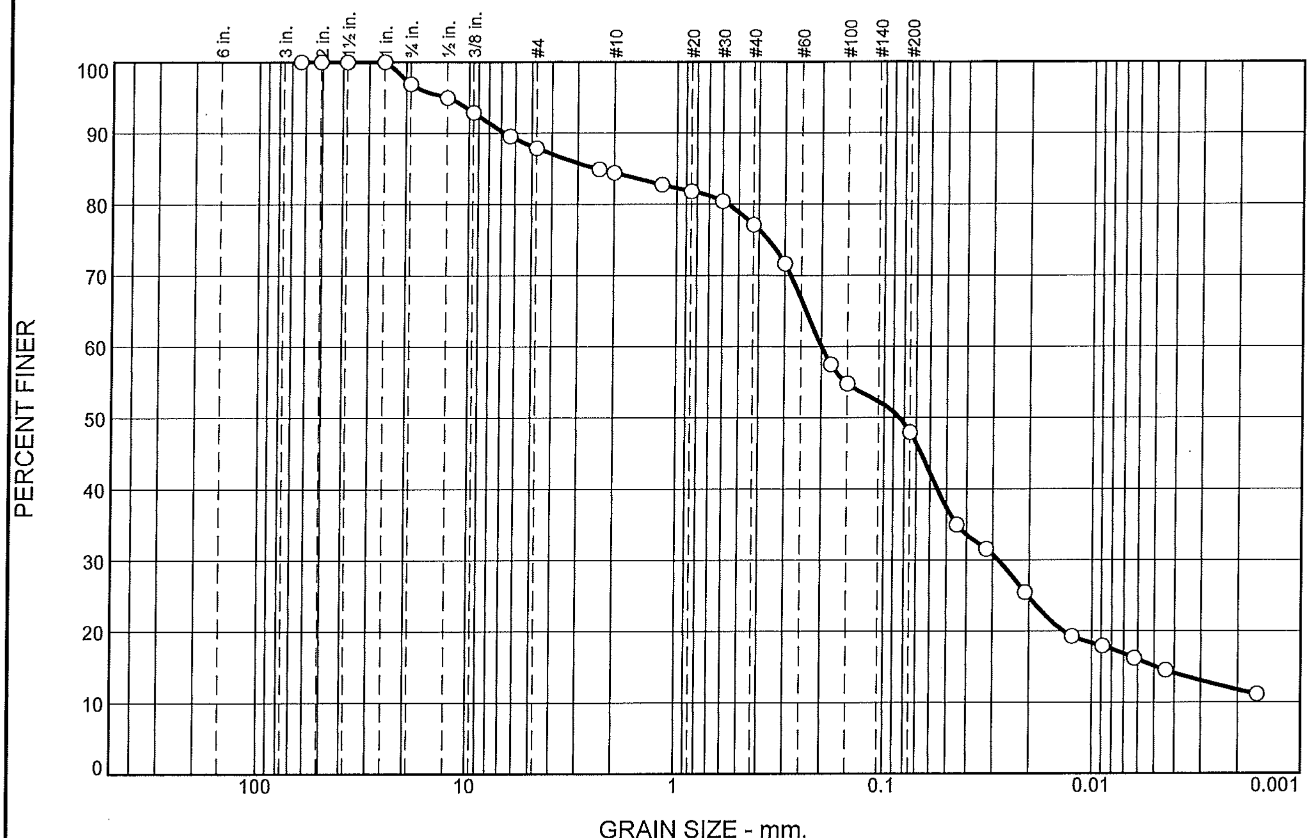
Madison, Wisconsin

Client: Dane County
Project: Phase 10 - Cell 2 Construction

Project No: 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.1	9.0	3.5	7.3	29.2	32.8	15.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
2.5	100.0		
2.0	100.0		
1.5	100.0		
1.0	100.0		
.75	96.9		
.5	95.0		
.375	92.9		
.25	89.5		
#4	87.9		
#8	84.9		
#10	84.4		
#16	82.8		
#20	81.8		
#30	80.4		
#40	77.1		
#50	71.6		
#80	57.5		
#100	54.8		
#200	47.9		

* (no specification provided)

Material Description

Silty, clayey sand

Atterberg Limits

PL= 16 LL= 23 PI= 7

Coefficients

D_{90}= 6.7637 D_{85}= 2.4241 D_{60}= 0.2001
D_{50}= 0.0845 D_{30}= 0.0282 D_{15}= 0.0049
D_{10}= C_u= C_c=

Classification

USCS= SC-SM AASHTO= A-4(1)

Remarks

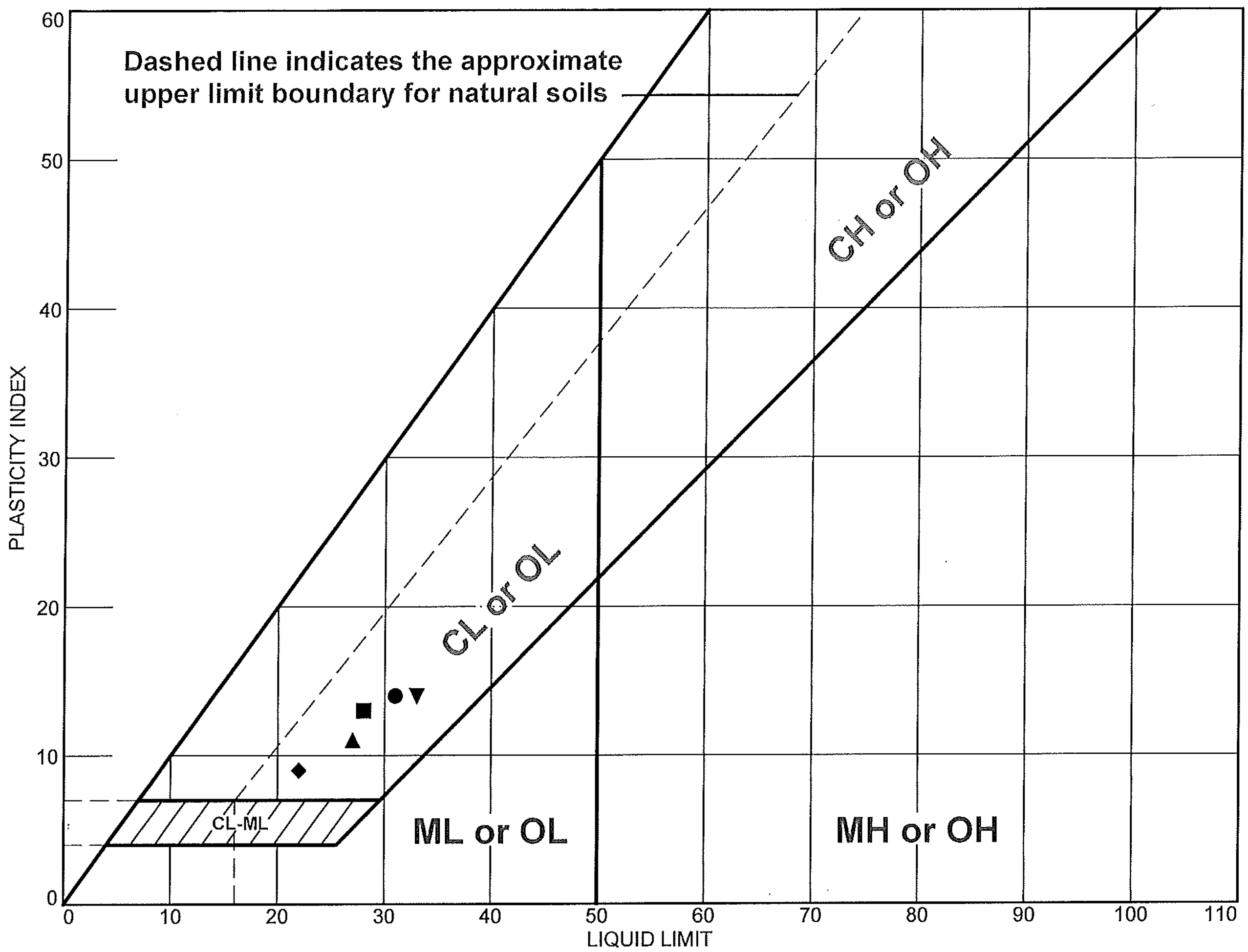
Source of Sample: FG
Sample Number: Composite #16 - #19

Date: 11-11-16

TRC Environmental Corp. **Madison, Wisconsin**	**Client:** Dane County **Project:** Phase 10 - Cell 2 Construction **Project No:** 253325.0000 **Figure**

Tested By: MBW **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean clay	31	17	14	88.7	67.1	CL
■	Sandy lean clay	28	15	13	82.4	52.6	CL
▲	Clayey sand with gravel	27	16	11	73.0	48.2	SC
◆	Sandy lean clay	22	13	9	91.5	70.0	CL
▼	Sandy lean clay	33	19	14	90.9	70.0	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** FG **Sample Number:** FG #1
■ **Source of Sample:** FG **Sample Number:** FG #2
▲ **Source of Sample:** FG **Sample Number:** FG #3
◆ **Source of Sample:** FG **Sample Number:** FG #4
▼ **Source of Sample:** FG **Sample Number:** FG #5

Remarks:

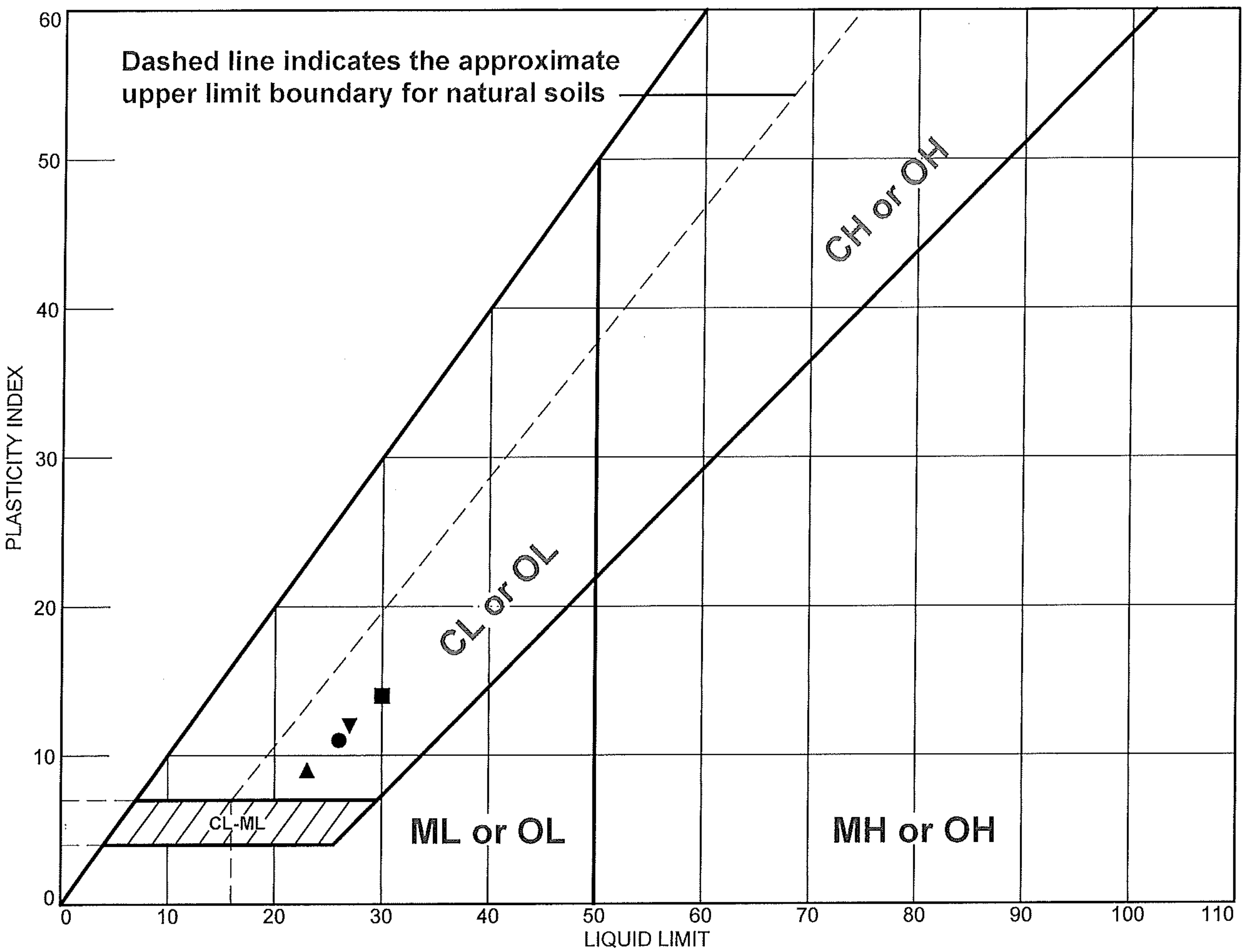
TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: MBW **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean clay	26	15	11	79.4	53.2	CL
■	Lean clay with sand	30	16	14	88.5	70.7	CL
▲	Sandy lean clay	23	14	9	82.5	51.8	CL
◆	Sandy lean clay	30	16	14	82.8	62.1	CL
▼	Sandy lean clay	27	15	12	79.5	52.5	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** FG **Sample Number:** FG #6
■ **Source of Sample:** FG **Sample Number:** FG #7
▲ **Source of Sample:** FG **Sample Number:** FG #8
◆ **Source of Sample:** FG **Sample Number:** FG #9
▼ **Source of Sample:** FG **Sample Number:** FG #10

Remarks:

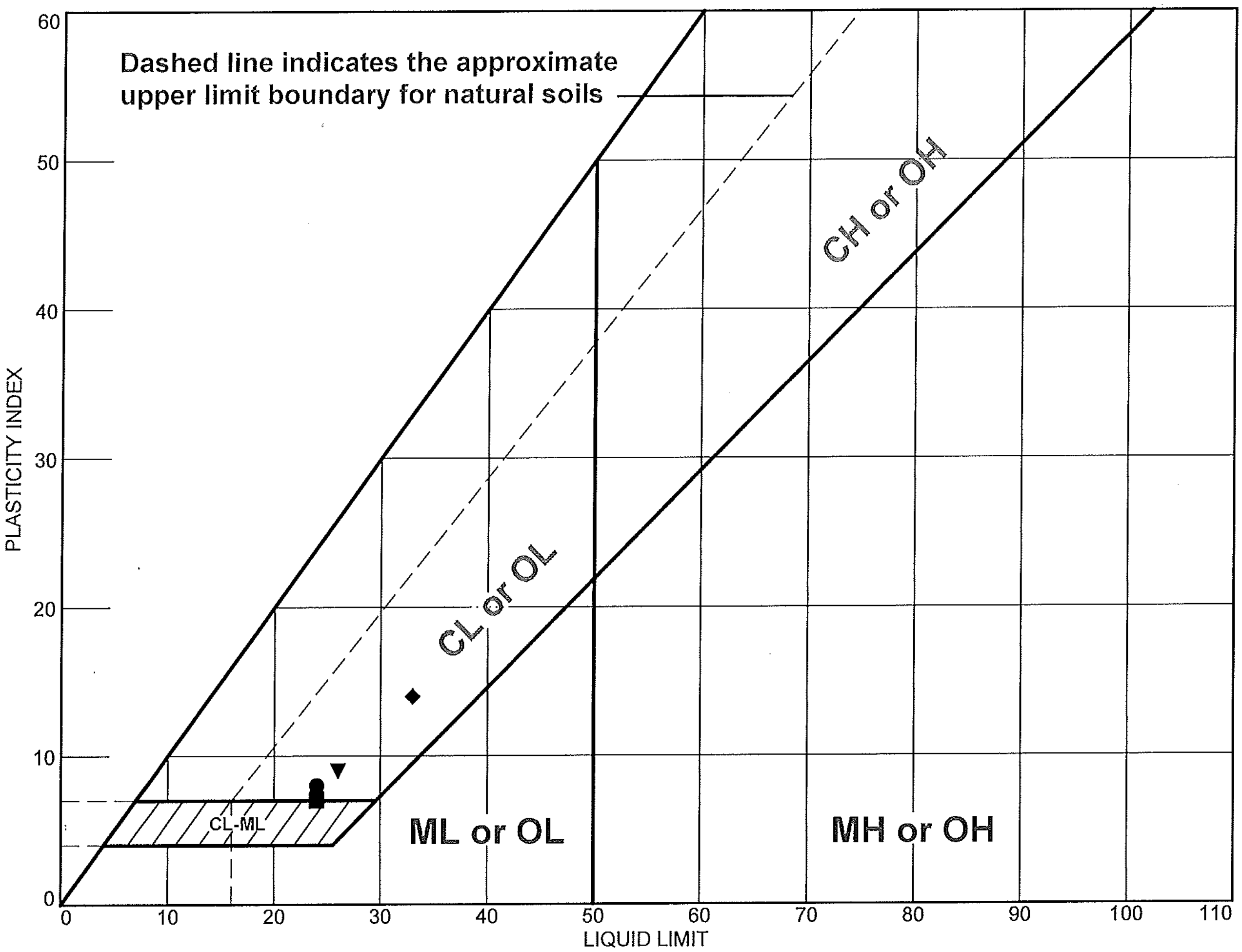
TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: MBW **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey sand	24	16	8	85.3	47.9	SC
■	Silty, clayey sand	24	17	7	80.1	46.1	SC-SM
▲	Clayey sand	24	16	8	89.3	47.0	SC
◆	Lean clay with sand	33	19	14	89.3	75.2	CL
▼	Sandy lean clay	26	17	9	79.8	56.7	CL

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** FG **Sample Number:** FG #11
■ **Source of Sample:** FG **Sample Number:** FG #12
▲ **Source of Sample:** FG **Sample Number:** FG #13
◆ **Source of Sample:** FG **Sample Number:** FG #14
▼ **Source of Sample:** FG **Sample Number:** FG #15

Remarks:

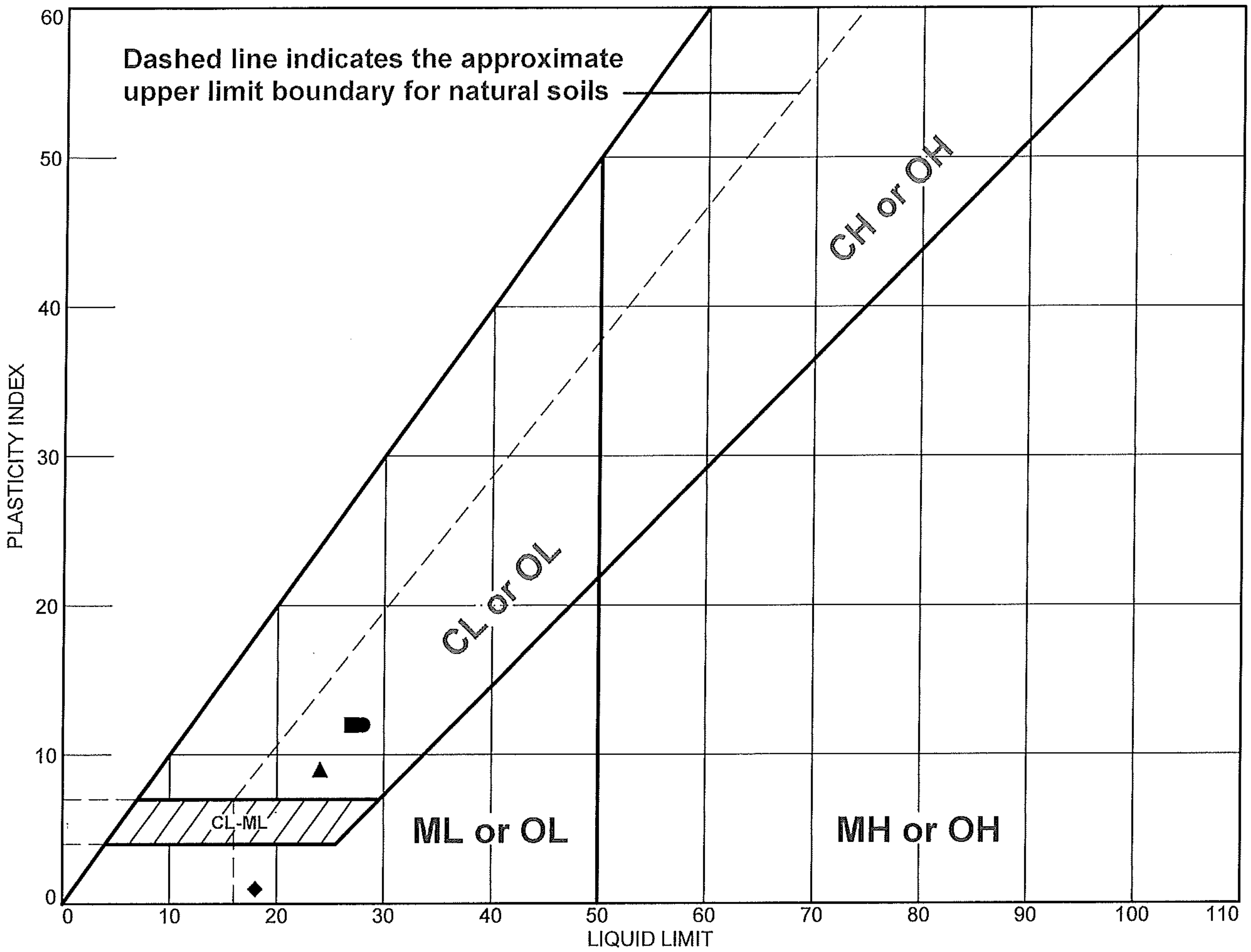
TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: JPH **Checked By:** MBW

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean clay	28	16	12	78.8	57.7	CL
■	Clayey sand	27	15	12	79.8	48.8	SC
▲	Clayey sand	24	15	9	75.7	35.8	SC
◆	Sandy silt	18	17	1	86.3	65.5	ML

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** FG **Sample Number:** FG #16
■ **Source of Sample:** FG **Sample Number:** FG #17
▲ **Source of Sample:** FG **Sample Number:** FG #18
◆ **Source of Sample:** FG **Sample Number:** FG #19

Remarks:

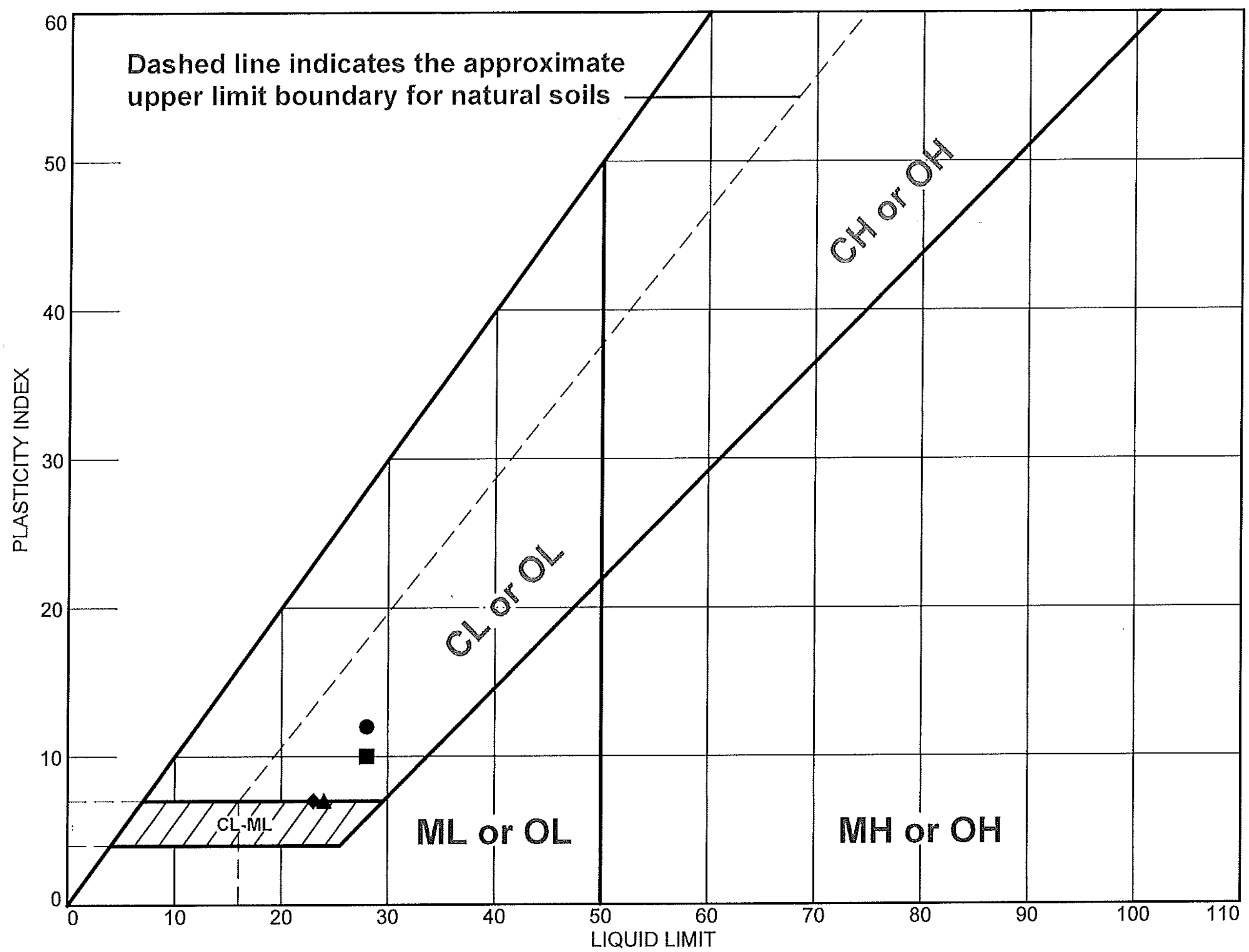
TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: MBW **Checked By:** JPH

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean clay	28	16	12	87.9	64.4	CL
■	Sandy lean clay	28	18	10	81.0	56.3	CL
▲	Sandy silty clay	24	17	7	85.0	53.4	CL-ML
◆	Silty, clayey sand	23	16	7	77.1	47.9	SC-SM

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

● **Source of Sample:** FG **Sample Number:** Composite #1 - #5
■ **Source of Sample:** FG **Sample Number:** Composite #6 - #10
▲ **Source of Sample:** FG **Sample Number:** Composite #11 - #15
◆ **Source of Sample:** FG **Sample Number:** Composite #16 - #19

TRC Environmental Corp.

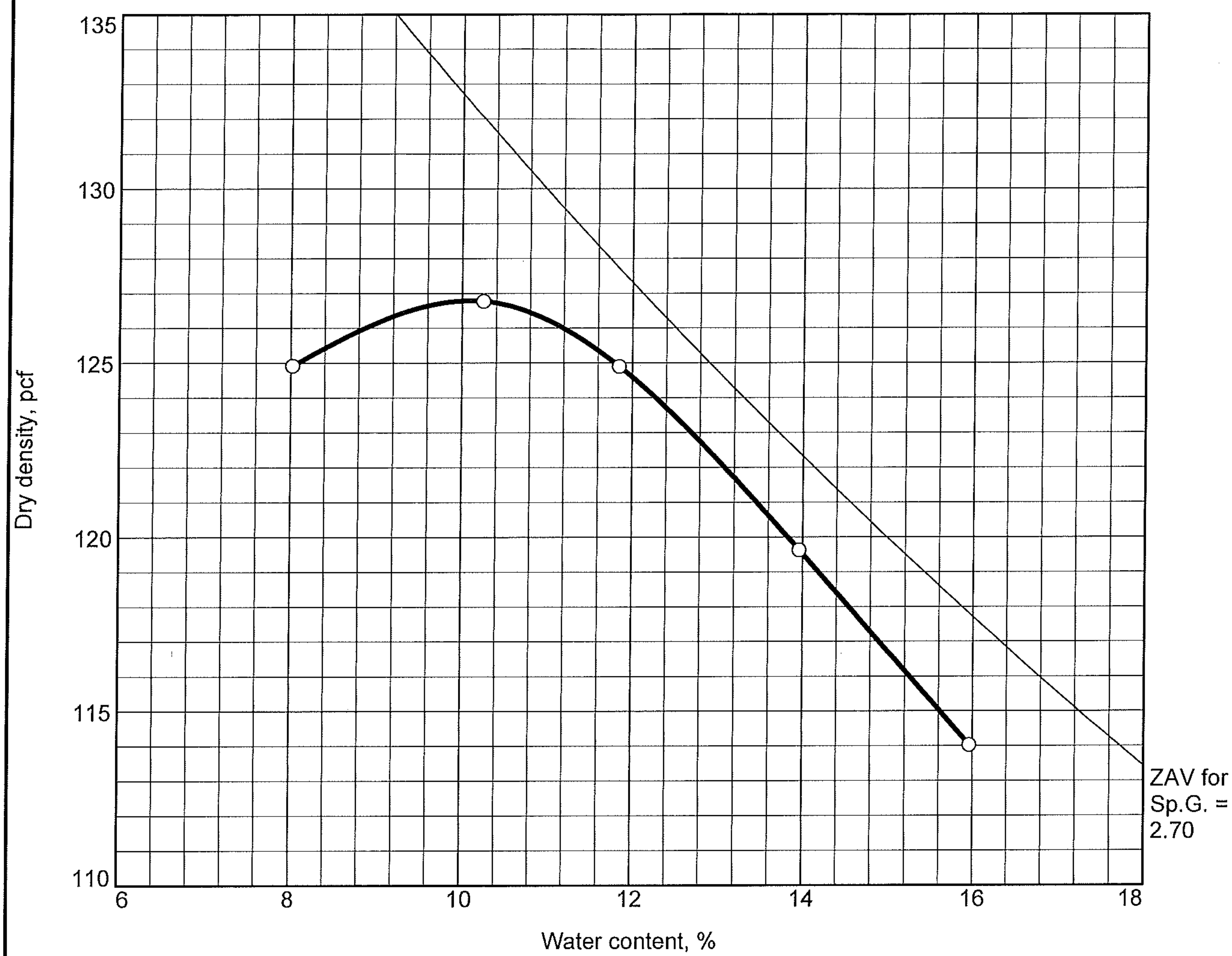
Madison, Wisconsin

Remarks:

Figure

Tested By: JPH **Checked By:** MBW

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-6(5)			28	12	4.1	64.4

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 126.8 pcf Optimum moisture = 10.1 %	Sandy lean clay

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

Date: 10-04-16

○ **Source of Sample:** FG **Sample Number:** Composite #1 - #5

TRC Environmental Corp.

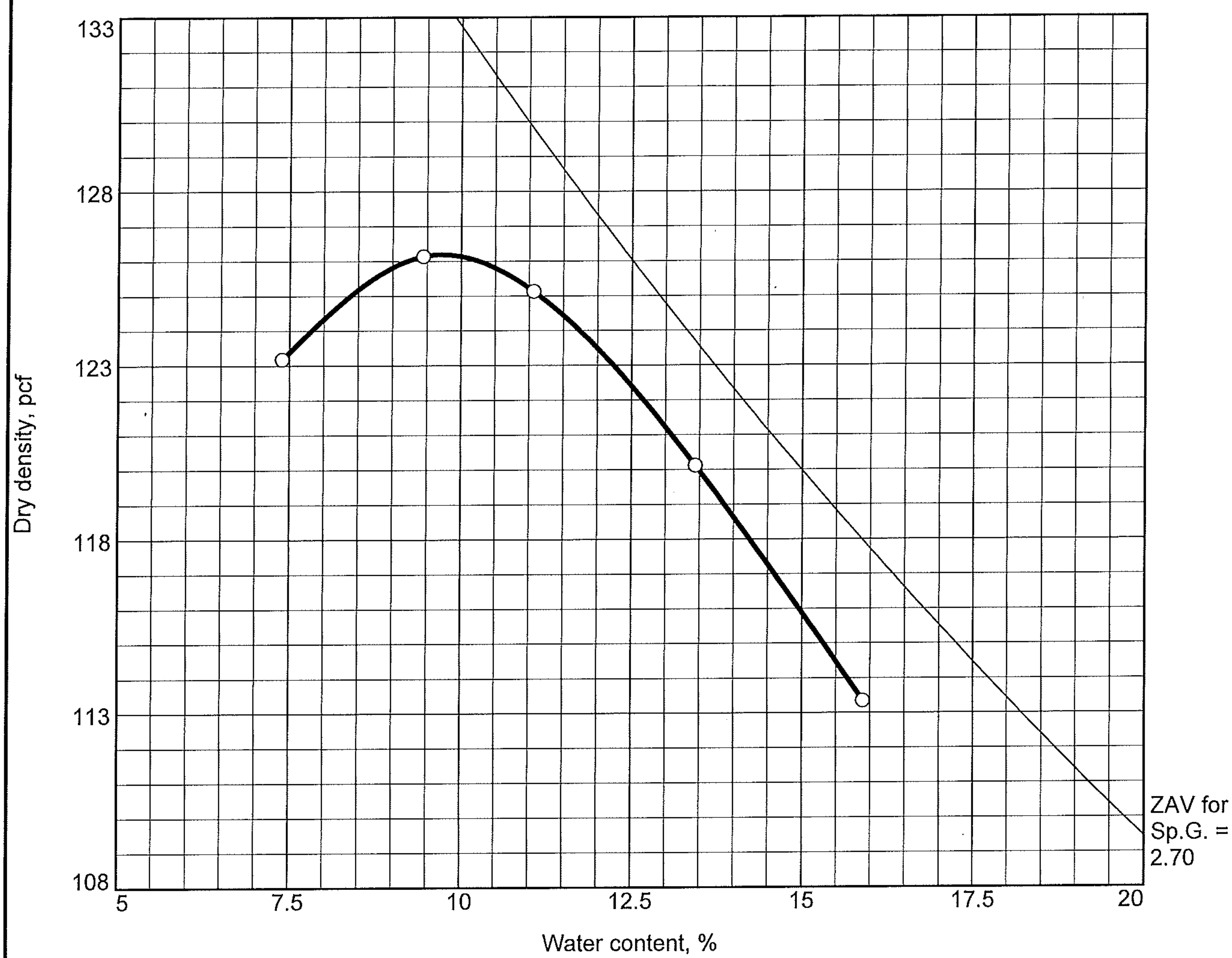
Madison, Wisconsin

Remarks:

Figure

Tested By: MBW **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL	A-4(3)			28	10	9.6	56.3

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 126.2 pcf Optimum moisture = 9.7 %	Sandy lean clay

Project No. 253325.0000 **Client:** Dane County

Project: Phase 10 - Cell 2 Construction

Date: 10-05-16

○ **Source of Sample:** FG **Sample Number:** Composite #6 - #10

TRC Environmental Corp.

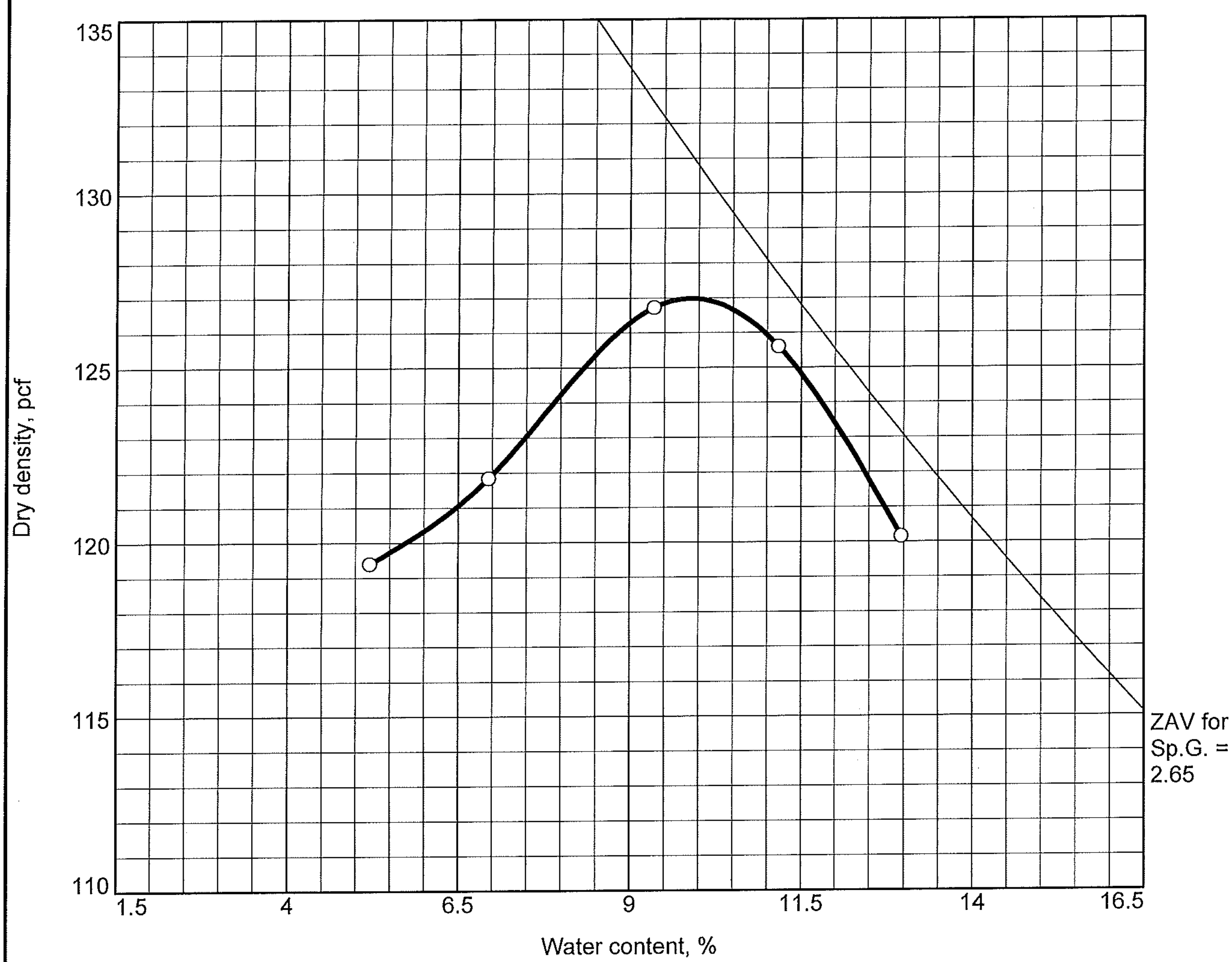
Madison, Wisconsin

Remarks:

Figure

Tested By: MBW **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	CL-ML	A-4(1)			24	7	5.8	53.4

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 127.0 pcf Optimum moisture = 9.9 %	Sandy silty clay

Project No. 253325.0000 **Client:** Dane County
Project: Phase 10 - Cell 2 Construction
Date: 10-05-16
○ **Source of Sample:** FG **Sample Number:** Composite #11 - #15

TRC Environmental Corp.

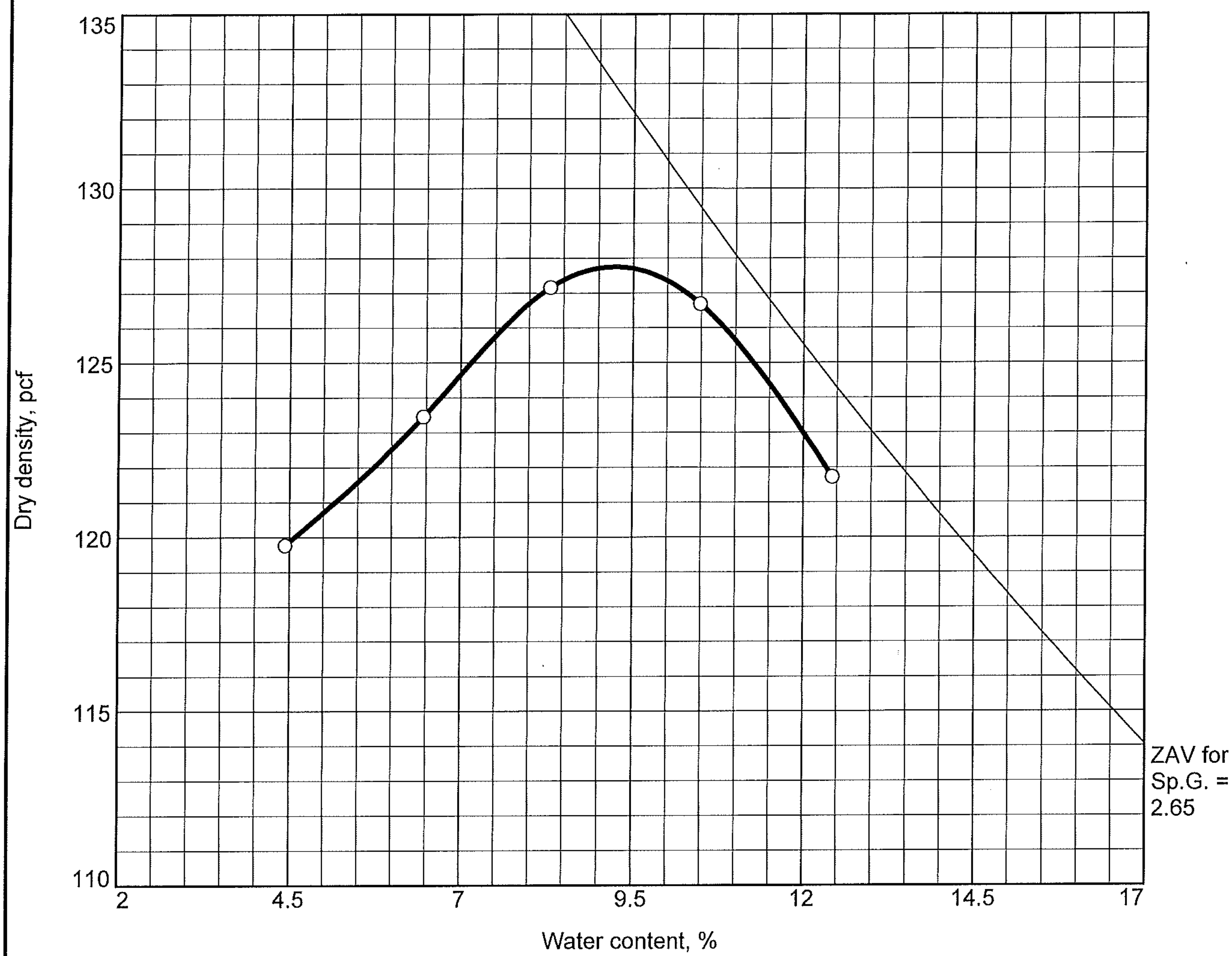
Madison, Wisconsin

Remarks:

Figure

Tested By: MBW **Checked By:** JPH

COMPACTION TEST REPORT



Test specification: ASTM D 1557-12 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	SC-SM	A-4(1)			23	7	12.1	47.9

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 127.8 pcf Optimum moisture = 9.2 %	Silty, clayey sand

Project No. 253325.0000 **Client:** Dane County
Project: Phase 10 - Cell 2 Construction
Date: 10-06-16
○ **Source of Sample:** FG **Sample Number:** Composite #16 - #19

Remarks:

TRC Environmental Corp.

Madison, Wisconsin

Figure

Tested By: MBW **Checked By:** JPH

APPENDIX D
CONSTRUCTION QUALITY ASSURANCE PLAN
AND PLAN MODIFICATION

CONSTRUCTION CQA PLAN

Construction Quality Assurance Plan (CQA)

Dane County No. 2 (Rodefeld) Landfill – Eastern Expansion
Madison, Wisconsin

March 2014

Table of Contents

List of Tables

Section 1
Introduction

1.1 Project Background

This CQA Plan has been prepared for, and is included in, the Plan of Operation submittal for the Eastern Expansion (Expansion). This CQA Plan is intended to be a "working" document, in other words, one that is updated to reflect changes in specific materials, installation practices, industry standards, or tests and testing methods as the site develops.

1.2 Purpose and Scope

The purpose of this CQA Plan is to address the quality assurance procedures and requirements for the construction at the Expansion, including all earthen materials (clay, sand, aggregate, general soil, and topsoil) and synthetic materials (geomembrane, geotextile, geosynthetic clay liner (GCL) and piping).

This CQA Plan provides procedures that will ensure that all of the landfill components are constructed in a manner that will maximize their performance requirements and that will safeguard components from damage during construction. The CQA Plan is intended to outline procedures for constructing, testing, and documenting the landfill composite liner and cover in accordance with the design criteria and regulatory requirements.

The scope of this Plan includes general CQA requirements in regard to the roles, responsibilities, and qualifications of the parties involved; the preconstruction activities; and the general inspection and documentation procedures. Specifically, this Plan establishes requirements for construction procedures and observation, field and laboratory testing frequencies and methods, and acceptance criteria for each component of the composite liner and cover. Testing and acceptance criteria are based on Chapter NR 500, Wisconsin Administrative Code (WAC), requirements where applicable. Geosynthetics testing and acceptance criteria are based on the Geosynthetic Research Institute (GRI) Standards, American Society for Testing and Materials (ASTM) and on current acceptable industry standards and practice.

The CQA Plan addresses the construction of the following systems within the landfill facility:

- Composite liner
- Leachate collection system (LCS)
- Leachate transfer system (from landfill cells to sanitary sewer)

- Composite final cover
- Landfill gas extraction system
- Surface water management system
- Access and maintenance roads

The following sources were used in the development of this Plan:

- EPA Technical Guidance Document, EPA/530-SW-86-031, titled "Construction Quality Assurance for Hazardous Waste Land Disposal Facilities"
- EPA Technical Guidance Document, EPA/530-SW-86-007, titled "Design, Construction, and Evaluation of Clay Liners For Hazardous Waste Facilities"
- Geosynthetic Research Institute, "GRI Test Method GCL 3," revision 2 – 07/26/10
- Geosynthetic Research Institute, "GRI Test Method GM 10," revision 3 – 02/20/06
- Geosynthetic Research Institute, "GRI Test Method GM 13," revision 11 –12/14/12
- Geosynthetic Research Institute, "GRI Test Method GM 17," revision 8 – 12/14/12
- Geosynthetic Research Institute, "GRI Test Method GM 19," revision 6 – 10/03/11
- American Society of Testing and Materials, *Annual Book of ASTM Standards*.
- Chapter NR 500, Wisconsin Administrative Code

1.3 Quality Assurance and Quality Control

Quality assurance and quality control are defined as follows:

- ***Quality assurance*** - A planned and systematic pattern of all means and actions designed to provide adequate confidence that materials or services meet contractual and regulatory requirements. This is typically performed to assure the purchaser, owner, and/or regulatory agencies that delivered materials or services are of desired quality.
- ***Quality control*** - Those actions that provide a means to measure and regulate the characteristics of a material or service to meet contractual and regulatory requirements. This typically is performed by, or for, the provider of materials or services as a control mechanism on the quality of the provider's efforts.

In the context of this manual, the terms are further defined as follows:

- ***Quality assurance*** refers to the means and actions employed by the CQA Officer to ensure conformity of the systems' installation with the CQA Plan and the construction plans and specifications. Quality assurance is primarily provided by an independent third party (consultant or laboratory) under the oversight of the CQA Officer.

- ***Quality control*** refers to those actions taken by the Manufacturer, Fabricator, or Contractor/Installer to provide materials and workmanship that meet the requirements of the CQA Plan and the construction plans and specifications. Some testing efforts required by this CQA Plan may serve as both quality control and quality assurance measures.

1.4 General Testing Requirements

This CQA Plan includes references to test procedures of the American Society for Testing and Materials (ASTM) and the Geosynthetics Research Institute (GRI). Test procedure references are always to the latest approved version up to the date of this document, unless specifically stated otherwise in this document.

Tests will be performed in strict accordance with the referenced test procedure and the description included in this Plan, unless indicated otherwise. Deviations to test procedures called out in this Plan must be approved, in writing, by the CQA Officer prior to commencement of any work.

Section 2
CQA Roles, Responsibilities, and Qualifications

2.1 CQA Officer

The CQA Officer will supervise and be responsible for all observation, testing, and related construction documentation as described in this CQA Plan. The CQA Officer will be responsible for preparing the documentation, construction acceptance, or certification report to certify substantial compliance with appropriate sections of Chapter NR 500, WAC. The CQA Officer will be a Professional Engineer registered in the State of Wisconsin.

The CQA Officer may delegate daily observation and documentation, testing, and sampling duties to a qualified technician or engineer with experience in the assigned aspect of construction who will serve as the Resident Project Representative (RPR). Although these duties may be delegated, the CQA Officer will retain the responsibility for these activities.

2.2 Resident Project Representative (RPR)

The RPR will carry out daily observation, testing, and sampling duties under the direct supervision of the CQA Officer. The RPR will be a qualified technician or engineer with experience in the assigned aspect of construction. The RPR will observe and document construction and installation procedures. The RPR will prepare daily summary reports and will routinely transmit these to the CQA Officer. The RPR will immediately notify the CQA Officer of problems or deviations from the CQA Plan or the construction plans and specifications. Reporting, documentation, and resolution of problems and deficiencies will be carried out as described in Section 4. The RPR will not have authority to approve design or specification changes without the consent of the CQA Officer.

2.3 Soil Testing Laboratory

The Soil Testing Laboratory retained will be experienced in landfill construction soil testing, the American Society of Testing and Materials Standards (ASTM), and other applicable standards. The selected laboratory will be required to be responsive to the project needs by providing test results within reasonable time frames. This will include providing verbal communication on the status of ongoing tests and immediate communication of test results as needed to facilitate ongoing construction. Such information may include hydraulic conductivity test data, maximum dry density and optimum moisture content values, and borrow source characterization data. Final laboratory reports will be checked and approved by the soil testing laboratory and submitted to the CQA Officer.

2.4 Geosynthetics Testing Laboratory/Laboratories

The Geosynthetics Testing Laboratory/Laboratories will have experience in testing geosynthetics in accordance with standards developed by ASTM and the Geosynthetics Research Institute (GRI), and other applicable test standards. The selected laboratory/laboratories will be required to be responsive to the project needs by providing test results within reasonable time frames. Final laboratory reports will be certified by the geosynthetics testing laboratory/laboratories and will be submitted to the CQA Officer.

2.5 Construction Contractor

The Construction Contractor's role will be to furnish earthwork, construction, and piping installation, and to provide overall construction responsibility for the completion of the landfill facility. The Construction Contractor will be experienced in solid waste landfill construction, knowledgeable about clay liner construction techniques, and familiar with geosynthetic installations. The term “Contractor” is used interchangeably with “Construction Contractor” in this Plan.

2.6 Geosynthetics Installer

The Geosynthetics Installer is the company hired by the Construction Contractor or Owner to install the geosynthetic components referenced in this manual and to perform the nondestructive seam testing of the geomembranes as required by this Plan. The term "Installer" is used throughout this Plan when reference is made to the tasks and responsibilities of a Geosynthetics Installer.

The Installer will be trained and qualified to install the various geosynthetic components covered by this Plan. The Installer of the geomembranes will be approved and/or licensed by the Manufacturer.

Prior to confirmation of any contractual agreements, the Installer of the geosynthetics will provide the CQA Officer and/or Owner with the following written information, which must be approved by the CQA Officer and/or the Owner:

- Corporate background and information.
- Installation capabilities, including the following:
  - Information on equipment and personnel
  - Resumes of personnel
  - Daily anticipated production
  - Quality control manual for installation

- A list of at least 10 completed facilities, totaling a minimum of 2,000,000 square feet for which the Installer has completed the installation of polyethylene geomembrane. For each installation, the following information will be provided:
  - Name and purpose of facility, its location, and date of installation
  - Name of owner, project manager, designer, manufacturer, and fabricator (if any)
  - Thickness and type of polyethylene geomembrane and the surface area of the installed geomembrane

The Installer will provide a copy of the field tensiometer certification, indicating the date in which the tensiometer was calibrated prior to the start of any seaming operations. The Installer is responsible for delays caused to the project until tensiometer certification is delivered to the RPR.

Tensiometers used in the state of Wisconsin are required to be calibrated within 3 months prior to the start of geomembrane installation. The Installer is responsible for meeting this requirement, and must supply a copy of the certification at the time of mobilization to the job site.

All personnel performing geomembrane seaming operations will be qualified by experience or by successfully passing seaming tests for the seaming methods to be used. At least one seamer will have experience in seaming a minimum of 2,000,000 square feet of polyethylene geomembrane using the same type of seaming apparatus in use at the site. The most experienced seamer, the "master seamer," will provide direct supervision, as required, over less experienced seamers. No field seaming will take place without an experienced seamer (meeting the seaming criteria stated above) being present.

The Installer will provide the CQA Officer with a list of proposed seaming and testing personnel, and their professional records, prior to installation of the geosynthetics. This document will be reviewed by the CQA Officer and the Owner. Any proposed seaming personnel deemed insufficiently experienced will not be accepted by the CQA Officer and/or the Owner.

The Installer will designate one representative as the Superintendent, who will represent the Installer at all site meetings and who will be responsible for acting as the Installer's spokesperson on-site. This Superintendent will be prequalified for this role on the basis of experience, management ability, and authority.

Section 3
Preconstruction Activities

3.1 Preconstruction Meeting

Prior to commencement of each phase of liner or final cover construction at the landfill facility, a preconstruction meeting will be held. This meeting will include the parties involved in the earth work construction, including the CQA Officer or designated representative, the RPR, the Construction Contractor, and the Owner.

The purpose of this meeting is to begin the planning and coordination of construction tasks; to identify potential problems that might cause difficulties and delays in construction; to properly interpret the design intent by the Contractor(s); and to present the CQA Plan to all of the parties involved. It is important that the rules regarding testing, repairs, etc., be known and accepted by each party to this Plan.

Specific topics considered for this meeting include the following:

- Review critical design details of the project, including the plans and specifications.
- Review measures for surface water runoff and runon diversion control, including sump locations, siltation control, and pumping requirements.
- Make appropriate modifications to the Construction Quality Assurance Plan, and develop project-specific addendums (if necessary).
- Review the responsibilities of each party.
- Review lines of authority and communication.
- Review methods for documenting and reporting, and for distributing documents and reports.
- Review requirements of the soil testing laboratory regarding sample sizes, methods of collection, and shipment. Also, review turn times for sample data and their implications on the construction schedule, pending receipt of acceptance data.
- Review the number and locations of the tests required for soil components.
- Review precautions to be taken to maximize bonding between lifts of compacted clay.
- Review the method for splicing segments of the compacted clay liner/cover.
- Review precautions to be taken to minimize desiccation cracking of clay surfaces.

- Review methods of clay layer surface preparation and approval prior to geosynthetics placement.
- Review the time schedule for all operations.
- Observe where the site survey benchmarks are located, and review methods for maintaining vertical and horizontal control.
- Review permit documentation requirements.
- Review the survey documentation tables and plans that identify the locations where survey documentation information is required.
- Conduct a site walk-around to review material storage locations and general conditions relative to construction.
- Set up a time and place for regular construction progress meetings.

The CQA Officer and/or the Owner will document this meeting, and minutes may be distributed to all parties involved in the construction project.

3.2 Preinstallation Submittal

A preinstallation report will be prepared for each phase of construction of the composite liner and each phase of the composite final cover. The preinstallation report will be submitted to the WDNR no later than 15 days prior to the preinstallation meeting (refer to Subsection 3.3). The preinstallation report will include the information required under s. NR 516.04(5), including the following items:

- Any revisions and detail diagrams incorporating all changes between the owner, installer, and the quality assurance contractor.
- Identification of the manufacturer of the geosynthetics used in construction, manufacturer qualifications, technical specifications for each item, and results of the manufacturer's quality control tests for products supplied to the project.
- Results of a shear test conducted, in accordance with ASTM D5321 on the soils and geosynthetic materials selected for use in construction of the liner and the final cover.
- A Quality Control Plan which provides all information specified in s. NR 514.07(1)(i), as well as the identification of the installation contractor, contractor qualifications, and on-site supervisory staff.
- A Quality Assurance Plan which provides all information specified in s. NR 514.07(1)(j), as well as identification of the professional engineer and qualified technician who will be providing quality assurance and a summary of their qualifications and related work experience.

3.3 Preinstallation Meeting

Prior to commencement of the installation of the geomembrane component for each phase of construction of the composite liner and final cover, a preinstallation meeting will be held in accordance with s. NR 516.04(4). This meeting will include the parties involved in the construction, including the appropriate WDNR district and central staff, the CQA Officer or designated representative, the RPR, the Construction Contractor, the Geosynthetic Installer, and the Owner.

The purpose of this meeting is to begin the planning and coordination of geosynthetic installation tasks, identify potential problems that might cause difficulties and delays in construction, to properly interpret the design intent, and to present the CQA Plan to all of the parties involved. It is important that the requirements regarding testing, seaming, repairs, etc., be known and accepted by each party to this Plan.

Specific topics considered for this meeting include the following:

- Review the proposed panel layouts and critical design details involving geosynthetic installation.
- Review measures for surface water controls and pumping requirements.
- Clarify or confirm design changes.
- Confirm acceptability of selected geosynthetic materials.
- Clarify construction concepts or practices required by the approved plans and preinstallation submittal.
- Review the responsibilities of each party.
- Review lines of authority and communication.
- Review methods for documenting and reporting, and for distributing documents and reports.
- Review requirements of geosynthetics testing laboratory regarding sample size, method of collection, and shipment. Also review turn times for sample data and their implications on the construction schedule, pending receipt of acceptance data.
- Review the number and locations of the tests required for geosynthetic components.
- Review methods of clay layer surface preparation and approval prior to geosynthetics placement.
- Establish rules for writing on the geosynthetic (*i.e.*, who is authorized to write, what can be written, and in which color), and outline procedures for packaging and storing archive samples.

- Review geosynthetics panel and seam layout diagrams and numbering systems.
- Establish procedures for use of the geomembrane welding apparatus, if applicable.
- Finalize field cutout sample sizes.
- Review geosynthetic repair procedures.
- Establish procedures for the deployment of materials over prepared sub-grade and installed geosynthetics emphasizing protection of the geosynthetics. Specific discussion will address deployment of select granular or aggregate fill drainage materials on the sidewalls.
- Review the construction schedule.
- Review survey requirements

The CQA Officer and/or the Owner will document this meeting, and minutes may be distributed to all parties involved in the construction project.

Section 4
General Construction Observation and Documentation

This section describes general documentation procedures to be implemented, including the use of forms, the identification and resolution of problems or deficiencies, and photographic documentation.

4.1 Progress Meetings

Progress meetings will be held regularly at the work area. At a minimum, meetings will be attended by field supervisory and CQA personnel. The purposes of the meetings are as follows:

- Review the work activity since the last progress meeting.
- Discuss the Contractor's and Installer's personnel and equipment assignments.
- Review the work schedule.
- Discuss possible problems.
- Review any new test data.
- Review data documentation requirements.

The meetings will be documented by a person designated at the beginning of the meeting, and minutes will be transmitted to all appropriate parties involved in the construction project.

4.2 Daily Reports

A daily summary report will be prepared by the CQA Officer, or the RPR under direct supervision of the CQA Officer, for each day of activity and will include the following information:

- Date, project name, location, report preparer's name, and the names of representatives on-site performing CQA under the supervision of the CQA Officer
- Time work starts and ends each construction work day, along with the duration and reason for work stoppages (*i.e.*, weather delay, equipment shortage, labor shortage, unanticipated conditions encountered, etc.)
- Data on weather conditions, including temperature, wind speed and direction, cloud cover, and precipitation

- Construction contractor's work force, equipment in use, and materials delivered to or removed from the job site
- Chronological description of work in progress, including locations and type of work performed
- A description of materials used and references or results of testing and documentation
- Discussion of problems/deficiencies identified and corrective actions taken as described in Subsection 4.4 (Problem/Deficiency Identification and Corrective Action)
- Identification/List of laboratory samples collected, marked, and delivered to laboratories, or clear reference to the document containing such information
- Subgrade acceptance reports submitted by the geosynthetic installer

Field data sheets containing the following information, as necessary, will be prepared daily by each representative:

- Test or sample location and elevation or lift number
- Type of documentation (*i.e.*, field moisture/density test, etc.)
- Procedures used
- Test data (*i.e.*, Proctor value, etc.)
- Results

4.3 Forms, Checklists, and Data Sheets

Additional forms may be developed during the course of the project to provide specific needs, such as GCL or geomembrane CQA documentation, or simply to improve the efficiency of data collection.

4.4 Problem/Deficiency Identification and Corrective Action

Problem and/or deficiency identification and corrective action will be documented in the daily report when a construction material or activity is observed or tested that does not meet the requirements set forth in this Plan. Problem and/or deficiency identification and corrective action documentation may include the following information:

- A description of the problem or deficiency, including reference to supplemental data or observations responsible for determining the problem or deficiency.
- The location of the problem or deficiency, including how and when the problem or deficiency was discovered, and an estimate of how long the problem or deficiency has existed.

- An opinion as to the probable cause of the problem or deficiency.
- A recommended corrective action for resolving the problem or deficiency. If the corrective action has already been implemented, then the observations and documentation to show that the problem or deficiency has been resolved should be included. If the problem or deficiency has not been resolved by the end of the day upon which it was discovered, then the report will clearly state that it is an unresolved problem or deficiency. Subsequent daily reports will indicate the status of problems or deficiencies until they are resolved.

If the problem or deficiency has not been resolved, then the CQA Officer and the RPR will discuss the necessary corrective actions. The CQA Officer will work with the Owner and Construction Contractor to implement actions as necessary to resolve the problem or deficiency. A description of such problems or deficiencies and corrective actions implemented will be provided in the Construction Documentation Report.

The CQA Officer, working with the Owner and Construction Contractor, will determine if the problem or deficiency is an indication of a situation that might require changes to the plans and specifications and/or the CQA Plan. Revisions to the plans or specifications or the CQA Plan must be approved by the CQA Officer and the site Owner and may require consultation with the WDNR.

4.5 Photographic Documentation

Photographs will be taken to document observations, problems, deficiencies, corrective actions, and work in progress. Photographs will be in print format or digital and will be filed in chronological order in a permanent protective file or electronic file by the CQA Officer or the RPR.

The following information may be documented in a log book for each photograph:

- Date and time
- Information regarding the orientation of the photograph itself for proper viewing (*i.e.*, looking south)
- Description of the subject matter
- Unique identifying number for reference in reports

4.6 Surveying

Documentation surveying requirements for each composite liner or cover component are described in their respective report sections. Required surveying will be performed by personnel experienced in construction surveying. Surveys will be based on survey control points previously established at the site. Elevations will be based on mean sea level (M.S.L.) datum, and coordinates will be based on the site-specific horizontal control. The location of field tests and samples will be recorded. Generally, these locations can be determined by reference to nearby construction stakes or markings. However, if such convenient reference is not readily available, the CQA Officer or the designated RPR will be responsible for providing or requesting survey control.

Section 5
Compacted Select Clay Fill

5.1 General

This section includes the quality assurance requirements for placement, backfilling, and compaction of select clay fill. Compacted select clay fill will be used in the following manner:

- Constructing the landfill liner
- Constructing the final cover unless replaced by a GCL overlying a minimum 2-feet-thick soil barrier layer

Field tests and soil sample types will be recorded in the daily construction reports (see Subsection 4.2) including locations (by coordinates or survey point reference number) and elevation or lift number of field tests and laboratory sample points.

5.2 Procedures and Observation

The RPR will observe compacted select clay fill construction activities and will document relevant observations to support certification of the following requirements:

- The RPR will confirm the subbase is acceptable and ready for select clay fill placement prior to placement of select clay fill over the subbase. Procedures for determining subbase acceptance are discussed in Subsection 6.2.
- The RPR will confirm the uniformity of the excavated soil to be used as select clay fill. Soil placement will be monitored for segregation and removal of unsuitable material and for changes in soil type, color, texture, and moisture content.
- The Construction Contractor will segregate and/or remove unsuitable materials such as granular soil, silty or sandy clay not meeting acceptance criteria, boulders, cobbles, organic material, and other deleterious material.
- The RPR will observe clay placement and will measure field densities and moisture contents, using methods described in Subsection 5.3 (Sampling Requirements and Acceptance Criteria), to document that the compacted clay liner and cover are in substantial conformance with the placement specifications and that soil placement has been conducted in a manner to achieve a uniform, homogeneous clay mass.
- Voids created by nuclear density gauge (NDG) probes or as the result of Shelby tube samples will be backfilled with granular bentonite.

- Areas of unacceptable permeability, density, or moisture content, as defined by Subsection 5.3 (Sampling Requirements and Acceptance Criteria), will be documented by the RPR. Corrective action will consist of moisture-conditioning of the soil and/or additional compactive effort as necessary. Methods for moisture-conditioning soil are described below. Following corrective actions, such areas will be retested.
- If necessary, surfaces of liner or cover to receive successive lifts of clay will be moisture-conditioned either by scarification and addition of water where desiccated, or by discing and air drying where saturated to promote effective bonding of lifts. Following scarification, water will be applied with a spray bar applicator or equivalent method to achieve uniform distribution.
- Clay placement will be performed in a manner to achieve continuous and complete keying together of clay liner and cover construction areas. Stepped joints will be utilized to connect lateral segments of clay liner construction, as shown on the construction plan details.
- No frozen soil will be used for select clay fill liner or cover construction. Frozen soil in the compaction work area will be removed or allowed to thaw prior to compaction.
- Stones and other penetrating objects 2 inches or larger and stones with sharp edges or points protruding from the surface of the final lift of compacted select clay fill will be removed to avoid puncturing the geomembrane. The RPR will observe the liner or cover during this process and will document the removal of stones and other objects by the Contractor. Voids made by the removal of stones will be filled with clay soil or bentonite, and the entire liner surface will be rolled with a smooth-drum compactor.
- Preconstruction planning will be undertaken to sequence construction activities to minimize the length of time any completed clay surface will be exposed prior to receiving protective cover. Protective cover will be provided by the installation of the geomembrane.

5.3 Sampling Requirements and Acceptance Criteria

Field and laboratory sampling frequencies are based on the area or volume of material placed, as specified in s. NR 516.07. This section describes the required analyses, methods, sample frequencies, and acceptance limits. The RPR will perform field tests and will collect soil samples for laboratory analysis.

5.3.1 Field Testing

The following field testing methods will be used by the RPR during construction:

PARAMETER	METHOD
Moisture content	ASTM D3017
Soil density	ASTM D2922 Method B

Field density and moisture content tests will be performed on a 100-foot grid pattern for each 1-foot thickness of compacted select clay fill placed. The testing pattern will be offset on alternate lifts. In confined areas where compaction equipment is hindered or hand compaction is necessary, a minimum of two field density and moisture content tests will be performed for each 1-foot thickness of clay placed.

Field Testing Acceptance Criteria

Acceptance criteria for field density will require soil compaction to a minimum of 90 percent of the Modified Proctor (ASTM D1557) maximum dry density, or a minimum of 95 percent of the Standard Proctor (ASTM D698) maximum dry density. Moisture content requirements will be at least 2 percent wet of optimum if using the Modified Proctor, and at least wet of optimum if using the Standard Proctor, in accordance with s. NR 504.06(2)(f)(3). The acceptable range will be based on Proctor moisture-density relationships and compaction versus permeability relationships.

5.3.2 Laboratory Testing

Routine laboratory testing of the clay liner soil will be performed on samples from the clay borrow area and on the in-place clay soil samples collected by the RPR. Samples for determining in-place properties will be collected by pushing Shelby tubes. Soil characteristics will be determined from representative samples and from Shelby tube samples.

Undisturbed Sample Analysis

One undisturbed sample will be taken for each acre or less for every 1-foot thickness of clay placed and will be submitted to the Soil Testing Laboratory.

The following analyses will be performed on all undisturbed samples obtained:

PARAMETER	TEST METHOD
Moisture content and dry density	ASTM D2216
Atterberg limits	ASTM D4318
Grain-size analysis	ASTM D422[a]

Notes:
[a] Distribution is to be reported through 0.002 mm particle size.

One of every three undisturbed samples will also be analyzed for hydraulic conductivity as follows:

PARAMETER	TEST METHOD
Hydraulic conductivity	ASTM D5084 or SW 846 EPA Method 9100

Representative Sample Analysis

Representative (grab) samples will be obtained on the basis of three criteria. First, an initial sample will be obtained from the clay borrow source (if not used in construction of a prior phase) and analyzed prior to construction. This will confirm soil characteristics and provide an initial maximum dry density and optimum moisture content for field moisture/density testing. Second, routine samples will be obtained for every 5,000 cubic yards placed. Third, in the event that changes in physical appearance or soil characteristics are observed, a sample will be obtained and analyzed. The maximum dry density and optimum moisture content values used for compaction testing may be adjusted during the course of liner and cover construction based on the results of the above sampling.

The following laboratory analyses will be performed on all representative samples obtained:

PARAMETER	TEST METHOD
Moisture-density relationship using Modified/Standard Proctor compaction	ASTM D1557 [a, b]/ ASTM D698 [a, b]
Atterberg limits	ASTM D4318
Grain-size analysis	ASTM D422[c]

Notes:
(a) Five-point Proctor analysis required for first and second sampling criteria.
(b) A one-point Proctor analysis may be utilized for representative samples collected for the third sampling criterion (apparent changes in soil quality) to verify applicability of previously analyzed moisture-density relationships. If the result does not verify applicability, then a five-point analysis will be performed in accordance with the first sampling criterion.
(c) Distribution is to be reported through the 0.002 mm particle size.

Laboratory Testing Acceptance Criteria

The following acceptance criteria will apply to the compacted select clay fill.

- A minimum 50 percent by weight that passes the 200 sieve
- A saturated hydraulic conductivity of 1×10^{-7} cm/s or less, when compacted to required moisture contents and densities based on the modified Proctor method, standard Proctor method, or a line of optimums method approved by the WDNR.
- An average liquid limit of 25 or greater, with no values less than 20
- An average plasticity index of 12 or greater, with no values less than 10

5.4 Thickness Documentation

The bottom and top of the clay liner portion of the composite liner will be surveyed on a 50-foot grid pattern (same location for the top and bottom of the clay liner) and at other key location (breaks in slope, toe of slopes, top of slopes, limit of liner construction, etc.) to determine that minimum as-constructed clay liner thicknesses were achieved.

The bottom of the final cover select clay fill layer will be surveyed on a maximum 100-foot grid pattern (maximum 50-foot grid pattern if the final cover construction is less than 4 acres) and at key locations for final cover. Final cover clay layer as-constructed thickness will be determined by the use of auger borings on a maximum 100-foot grid pattern (maximum 50-foot grid pattern if the final cover construction is less than 4 acres) or using another method approved by the CQA Officer.

In the alignment for leachate collection lines, bottom and top of the clay liner elevation of the trench will be surveyed at maximum 25-foot intervals (maximum 50-foot intervals if a total station, laser equipment, or survey quality global positioning system equipment is used). The clay liner and cover thicknesses will be determined at surveyed locations or cover auger locations and reported in a tabular fashion. The minimum acceptable liner/cover thickness will be as indicated on the Plan of Operations drawings and details.

Section 6
General Soil

6.1 General

This section includes the quality assurance requirements for placement, compaction, and grading of general soil (i.e., general fill). General soil may be any inorganic soil. General soil will be used in the construction of the following landfill components:

- Subbase preparation
- Final cover
- Access roads
- Landfill perimeter berms

All field tests, soil sample types, and survey measurements will be recorded as record construction data, including locations (by coordinates) and elevations or lifts of field tests and laboratory sample points.

6.2 Procedures and Observation

The RPR will observe general soil placement activities and will document relevant observations to support certification of the following requirements:

- The RPR will periodically observe loads of general fill for general conformance to material specifications and may randomly sample loads. The RPR will perform routine conformance sampling as defined in Subsection 6.3.2.
- No frozen soil will be used for backfilling. Any frozen soil in the compaction work area will be removed.
- Loose lift thickness for general soil compaction will not exceed 18 inches.
- General soil used as structural fill (*i.e.*, subbase preparation, perimeter landfill berms and roads) will be compacted to a minimum of 90 percent or 95 percent of the maximum dry density as determined by the Modified or Standard Proctor test, respectively.
- Unacceptable compaction density, as defined above, will be reported to the CQA Officer by the RPR. Corrective action will consist of moisture-conditioning of the soil and/or additional compactive effort as necessary.

- The RPR will confirm the subbase is acceptable and ready for select clay fill placement prior to placement of select clay fill over the subbase. The RPR will notify the Engineer of any soft appearing areas of the subbase during subbase development and prior to select clay fill placement.

Field densities using methods described in Subsection 6.3.1 will be measured to document that the in-place soil is in substantial conformance with the required density.

6.3 Sampling Requirements and Acceptance Criteria

Testing is required for general soil used as structural fill (recompacted soil used in subgrade and berm construction). No field or laboratory testing of general soil will be required for placement in the final cover. Sampling and testing of structural fill will be conducted in accordance with NR 516.07(1m)

6.3.1 Field Testing

The following field testing method will be used by the RPR during construction:

PARAMETER	TEST METHOD
Moisture content	ASTM D3017
Soil density	ASTM D2922 Method B

Field density and moisture content tests will be performed on a 100-foot grid pattern as much as reasonably possible for each 1-foot thickness of compacted structural fill placed or at a minimum frequency of one test per 370 cubic yards of structural fill placed. The testing pattern will be offset on alternate lifts as much as reasonably possible. In confined areas where compaction equipment is hindered or hand compaction is necessary, a minimum of two field density and moisture content tests will be performed for each 1-foot thickness of structural fill placed.

Field Testing Acceptance Criteria

Acceptance criteria for field density will require soil compaction to a minimum of 90 percent of the Modified Proctor (ASTM D1557) maximum dry density, or a minimum of 95 percent of the Standard Proctor (ASTM D698) maximum dry density.

6.3.2 Laboratory Testing

Routine laboratory testing of the structural fill will be performed on representative samples collected from the general fill borrow area and/or general fill stockpiles. Soil characteristics will be determined from representative samples.

Representative Sample Analysis

Representative (grab) samples of the structural fill will be obtained at a minimum frequency of one sample for every 5,000 cubic yards placed and a sample will be collected in the event that changes in physical appearance or soil characteristics are observed. The maximum dry density values used for compaction testing may be adjusted during the course construction based on the results of the above sampling.

The following laboratory analyses will be performed on all representative samples obtained:

PARAMETER	TEST METHOD
Moisture-density relationship using Modified or Standard Proctor compaction	ASTM D1557 [(a)]/ ASTM D698 [(a)]
Atterberg limits[(c)]	ASTM D4318
Grain-size analysis	ASTM D422[(b)]

Notes:

(a) A one-point Proctor analysis may be utilized for representative samples collected for the third sampling criterion (apparent changes in soil quality) to verify applicability of previously analyzed moisture-density relationships. If the result does not verify applicability, then a five-point analysis will be performed in accordance with the first sampling criterion.

(b) Distribution is to be reported through the 0.002 mm particle size.

(c) Atterberg limits are only applicable when the sample is fine grain soil.

Laboratory Testing Acceptance Criteria

There are no laboratory acceptance criteria for general fill.

6.4 Thickness Documentation

Top of subbase grades will be documented on an approximate 50-foot grid, and at other key locations, such as breaks in grade, toes of slope, mid-points, and tops of slopes. In the alignment for leachate collection undercuts, the bottom of trench undercut elevations will be surveyed at maximum 25-foot intervals (maximum 50-foot intervals if total station, laser equipment, or survey grade global positioning system equipment is used). The allowable tolerance in subbase elevation will be -0.1 foot or as allowed by the CQA Officer.

The top of the grading layer elevations in the final cover will be surveyed on an approximate 100-foot grid pattern (50-foot grid pattern on final cover areas less than 4 acres), and at other key locations, such as breaks in grade and toe of slopes. The top of grading layer elevations will be at or below the approved design grades prior to final cover construction.

The rooting zone thickness of the final cover will be measured on an approximate 100-foot grid (50-foot on final cover areas less than 4 acres), and at other key locations, such as breaks in grade and toes of slopes.

In addition to survey measurements for elevation, measurements for horizontal location will also be performed using previously established horizontal control to document the boundaries and alignment of the general soil placement.

Section 7
Granular Fill

7.1 General

Granular fill includes select granular fill and select aggregate fill. Select granular fill is used as gradient control system drainage layer material and select aggregate fill is used as gradient control trench collection pipe bedding/trench drainage material, leachate collection drainage layer material, leachate collection pipe bedding material, and as pipe bedding in the final cover drain outlets for the geosynthetic drainage layer and perimeter toe drains. The leachate collection pipe bedding material refers to the gravel to be used for structural support of the leachate collection pipes. Limestone and dolomite stone will not be used in the leachate collection system unless no other suitable material is reasonably available. Select aggregate fill used in the leachate collection system above geomembrane should be rounded to subangular.

7.2 Procedures and Observation

The RPR will observe granular soil placement activities and will document relevant observations to support certification of the following requirements:

- The RPR will periodically observe loads of granular soil for general conformance to material specifications and may randomly sample loads. The RPR will perform routine conformance sampling as defined in Subsection 7.3.
- No trucks or heavy equipment will travel directly on the liner or final cover geomembrane. Only low-ground pressure tracked equipment (< 5 psi) may operate above the geomembrane when there is a minimum 12-inch–thick layer of select aggregate fill or soil is in-place between the tracks of the equipment and the geomembrane. A minimum of 2 feet of material will be required to be placed over the geomembrane prior to operating other tracked and flotation tire–equipped vehicles. Rubber-tired equipment may not travel above the geomembrane unless a minimum of 3 feet of material is in-place over the geomembrane. Procedures for deployment of pipe, select aggregate fill, geocomposite drainage layers and geotextiles overlying geomembranes will be planned at the preconstruction meeting. Special requirements for geomembrane protection and equipment necessary to deploy materials must be approved by the CQA Officer.
- Care will be exercised during placement of granular soil to prevent undue damage to pipes, geomembrane, and geotextiles. Stone will not be dropped from a height greater than 3 feet above the pipe trench or sump.
- A geotextile cushion will be placed between the geomembrane and the drainage layer, and the pipe bedding material in accordance with Section 11.

- A minimum of 4 inches of pipe bedding material will be placed under leachate collection pipes prior to pipe placement, and a minimum of 1.5 feet of bedding material will be placed over the top of the leachate collection pipes.
- If granular soil is stockpiled on-site prior to use, measures will be taken to minimize contamination by fines such as wind-blown particles and surface soil during loading operations.

7.3 Sampling Requirements and Acceptance Criteria

Field sampling and laboratory testing frequencies are based on proportionate sampling of construction areas or volumes of material placed as specified by s. NR 516.07. This section describes the required analyses, methods, sampling frequencies, and acceptance limits. The RPR will collect soil samples for laboratory analysis.

7.3.1 Field Testing

No field testing will be required for select granular fill, select aggregate fill, or pipe bedding material soil. However, as stated in Subsection 7.2 above, the RPR will perform a visual inspection of this soil for conformance to material specifications and may randomly sample deliveries.

7.3.2 Laboratory Testing

Representative (grab) samples will be obtained from the proposed select granular fill, select aggregate fill, and pipe bedding material sources prior to delivery of the material. The source sampling frequency will be dependent on the apparent uniformity of the source and must be approved by the CQA Officer.

Grab samples of granular material placed will be collected and analyzed as follows:

SOIL TYPE	FREQUENCY	PARAMETER	TEST METHOD
Select aggregate fill pipe bedding material (leachate collection pipes and groundwater collection pipes)	1/1,000 LF of pipe or a minimum of 3 samples[(a)]	Grain size	ASTM D422[(b)]
Select aggregate fill (in sumps)	1/500 CY	Grain size	ASTM D422[(b)]
Select aggregate fill (leachate collection drainage layer)	1/5,000 CY or a minimum of 2 samples[(c)]	Grain size	ASTM D422 [(b)]
Select granular fill (gradient control drainage layer)	1/1,000 CY or a minimum of 4 samples[(e)]	Grain size	ASTM D422 [(b)]

SOIL TYPE	FREQUENCY	PARAMETER	TEST METHOD
Select granular fill (gradient control drainage layer)	1/2,500 CY or a minimum of 2 samples[c]	Hydraulic conductivity	ASTM D2434
Select aggregate fill pipe bedding material (final cover toe drains)	1/1,000 CY	Grain size	ASTM D422 [b]
Pipe bedding material (solid-wall pipe associated with the transfer of leachate and groundwater)	1/1,000 LF of pipe or a minimum of 3 samples [a]	Grain size	ASTM D422[d]

Notes:
[a] For construction projects with a combined pipe trench of less than 3,000 linear feet, a minimum of three samples will be tested.
[b] Testing is required only to the #200 sieve.
[c] For lesser volumes, a minimum of two samples will be tested.
[d] Testing is required to the #4 sieve.
[e] For lesser volumes, a minimum of four samples will be tested.

Laboratory Testing Acceptance Criteria

Select aggregate fill utilized in the leachate collection system (leachate collection pipe bedding and leachate drainage layer material) will have a uniformity coefficient of less than 4, will contain no more than 5 percent by weight passing the #4 sieve, will have a maximum particle diameter of 1 ½ inches, and have a minimum hydraulic conductivity of 1 cm/s at the anticipated field density. Limestone and dolomite stone will not be used in the leachate collection system unless no other suitable material is reasonably available. Select aggregate fill used in the leachate collection system above geomembrane should be rounded to subangular.

Select granular fill used in the gradient control drainage layer will have a remolded hydraulic conductivity of 1×10^{-3} cm/s or greater at the anticipated field density

Select aggregate fill pipe bedding material used in the final cover toe drains and in the gradient control trench will have a remolded hydraulic conductivity of 1×10^{-2} cm/s or greater at the anticipated field density.

7.4 Thickness Documentation

The finished elevation of the select granular or aggregate fill drainage layer portion of the leachate and gradient control systems will be surveyed on a 50-foot grid, which coincides with the grid used for the final clay liner and cover surface, respectively, to verify its thickness. The minimum acceptable drainage layer thickness will be 12 inches. Pipe bedding placed along collection pipe alignments will be surveyed for elevation prior to pipe placement and following pipe backfilling at 25-foot intervals to document the thickness of gravel placed below pipe inverts and above the top of pipe. The minimum acceptable stone thickness will be 4 inches below and 18 inches above the leachate collection piping.

Section 8
Soil Barrier Layer

8.1 General

This section includes the quality assurance requirements for placing, backfilling, and compacting the barrier layer soil in the final cover system. The 24-inch–thick soil barrier layer will consist of fine-grained soil.

8.2 Subgrade Preparation

The Contractor will be responsible for the preparation of the subgrade of the barrier layer. Subgrade preparation may include top-of-waste regrading, grading layer placement, or top of grading layer regrading, at the discretion of the Owner.

The subgrade will consist of a minimum 6-inch–thick soil grading layer placed on top of the waste. The soil grading layer will consist of general fill material obtained from on-site or off-site and will typically be installed as a normal part of landfill operations (see Section 6). If topsoil material was used as part of the grading layer placed during normal landfill operations, the Contractor will remove and salvage the temporary topsoil layer. The CQA Officer or RPR will inspect the subgrade, upon completion of the grading layer work and will verify, at a minimum, the following:

- A qualified land surveyor has verified lines and grades as described in Subsection 6.4.
- The grading layer soil meets the depth criteria in the project specifications.

The RPR will indicate to the Contractor any observed locations that are not adequate for the placement of the barrier layer during final cover construction. The Contractor will repair defects in the subgrade soil such that the properties of the repaired areas meet the minimum subgrade requirements.

8.3 Procedures and Observations

The RPR will observe and document barrier layer construction activities to support certification of the following requirements:

- The RPR will confirm the uniformity of the barrier layer soil and will monitor for segregation and removal of unsuitable material and for changes in soil type, color, texture, and moisture content. The Contractor will segregate and/or remove unsuitable materials, such as soil not meeting acceptance criteria, boulders, cobbles, and organic material.

- The RPR will observe the barrier layer placement and will measure field densities and moisture contents (see Subsection 8.4), to document that the barrier layer is in substantial conformance with the specifications and that soil placement has been conducted in a manner to achieve a uniform, homogeneous mass.
- The RPR will backfill with granular bentonite, or a bentonite-soil mixture, voids created by nuclear density gauge probes.
- The RPR will document areas of unacceptable density or moisture content, as defined by Subsection 8.4. The Contractor will perform corrective action that will consist of the moisture-conditioning of the soil and/or additional compactive effort, as necessary. The RPR will retest the area, following corrective actions.
- The Contractor will place each lift of barrier layer material in approximate 1-foot lifts.
- The RPR will verify that compaction equipment has a minimum static weight of 30,000 pounds or has a minimum static weight 15,000 pounds that is capable of vibrating to produce a minimum dynamic compaction force of 30,000 pounds.
- The RPR will verify that compaction equipment used to compact the barrier layer has compaction feet a minimum of 6 inches long.
- The Contractor will not use frozen soil in the barrier layer and will remove frozen soil from the compaction work area.
- The Contractor will remove stones and other penetrating objects 1 inch or larger protruding from the surface of the final lift of the barrier layer to avoid puncturing the overlying geosynthetics. The RPR will document the removal of the stones and other objects. The Contractor will fill with barrier layer soil or bentonite any voids made by the removal of stones, and the entire cover surface will be rolled with a smooth-drum compactor.
- Preconstruction planning will be undertaken to sequence construction activities to minimize the length of time a completed barrier layer surface will be exposed prior to receiving protective cover. Protective cover will be provided by the installation of the GCL and subsequently the geomembrane.

8.4 Sampling Requirements and Acceptance Criteria

This section describes the required analyses, methods, sample frequencies, and acceptance limits of the barrier layer. The RPR will collect soil samples for laboratory analysis. The RPR will record the field sample locations in the daily construction reports or field data sheets as record construction data, including locations and lift locations of the laboratory sample points.

8.4.1 Field Testing

The RPR will use the following field-testing methods during construction of the barrier layer:

PARAMETER	TEST METHOD
Moisture content	ASTM D3017
Field density	ASTM D2922 Method B

Moisture content and field density tests will be performed in accordance with NR 516.07(2m)(b)(1) using a nuclear density gauge on a 100-foot grid pattern for each 1-foot thickness of barrier layer soil placed. The testing grid pattern will be offset on each subsequent layer of tests. In confined areas where compaction equipment is hindered or hand compaction is necessary, a minimum of two field density and moisture content tests will be performed for each 1-foot thickness of barrier layer soil placed.

8.4.2 Field Testing Acceptance Criteria

Acceptance criteria for field density will require soil compaction to a minimum of 90 percent of the Modified Proctor (ASTM D1557) maximum dry density or to a minimum of 95 percent of the Standard Proctor (ASTM D698) maximum dry density and at a moisture content wet of optimum moisture content.

8.4.3 Laboratory Testing

Routine laboratory testing of the barrier layer soil will be performed on samples from the borrow area or on-site stockpile (representative). Soil characteristics will be determined from the representative samples.

Representative Sample Analysis

Representative (grab) samples will be obtained on the basis of three criteria. First, an initial sample will be obtained from the borrow source (if not used in construction of a prior phase) and analyzed prior to construction. This will confirm soil characteristics and provide an initial maximum dry density and optimum moisture content for field moisture/density testing. Second, routine samples will be obtained for every 5,000 cubic yards placed. Third, in the event that changes in physical appearance or soil characteristics are observed, a sample will be obtained and analyzed. The maximum dry density and optimum moisture content values used for compaction testing may be adjusted during the course of cover construction based on the results of the above sampling.

The following laboratory analyses will be performed on the representative samples obtained:

PARAMETER	TEST METHOD
Moisture-density relationship using Modified or Standard Proctor compaction	ASTM D1557 (1, 2)/ ASTM D698 (1, 2)
Atterberg limits	ASTM D4318
Grain-size analysis	ASTM D422(3)

Notes:
(1) Five-point Proctor analysis required, except as described in Note 2, below.
(2) One-point Proctor analysis may be utilized for representative samples collected for apparent changes in soil quality to verify applicability of previously analyzed moisture-density relationships. If the result does not verify applicability, then a five-point analysis will be performed in accordance with the first sampling criteria.
(3) Distribution is to be reported through the 0.002-mm particle size.

8.4.4 Laboratory Testing Acceptance Criteria

The following acceptance criteria will apply to the barrier layer.

- The upper 1 foot of the barrier layer will have a maximum particle diameter of 2 inches and the lower 1 foot of the barrier layer will have a maximum particle diameter of 4 inches.
- Fine grained-soil or well graded sandy soil with fines meeting the USCS soil types ML, CL, CH, SM, or SC, or dual-symbol classifications composed of those soil types, with at least 25 percent by weight passing the #200 sieve.

8.5 Thickness Documentation

The bottom of the final cover barrier layer (top of grading layer) will be surveyed on a maximum 100-foot grid pattern (maximum 50-foot grid pattern if the final cover construction is less than 4 acres) and at key locations on the final cover. Key locations include breaks in grade, top of slopes, and limits of final cover construction. The barrier layer thickness will be determined at top of grading layer surveyed locations and reported in a tabular fashion in the Construction Documentation Report. The minimum acceptable barrier layer thickness will be 2 feet.

Section 9
Topsoil

9.1 General

This section includes the quality assurance requirements for the excavation and placement of the topsoil and for the fertilization, seeding, mulching, and watering of the topsoil layer for vegetation. Topsoil is the final layer of soil material installed on the final cover, along the outside slopes of the perimeter berms, along the ditches, and on other perimeter areas. Topsoil will be obtained from existing on-site stockpile and from soil excavated by the clearing of the landfill footprint and associated disturbed perimeter areas or will be hauled in from an off-site borrow source.

9.2 Procedures and Observation

Work covered by this section will be performed in accordance with the construction plans and specifications. The RPR will observe topsoil placement activities and will document relevant observations to support certification of the following requirements:

- The RPR will confirm the source and uniformity of topsoil used. Soil excavation and placement will be monitored for minimization of inorganic soil not compatible for establishment of vegetation.
- Prior to seeding, the topsoil will be worked to prepare a suitable seedbed.
- Fertilizing, seeding, and mulching will be performed in a timely manner.

9.3 Sampling Requirements and Acceptance Criteria

The topsoil will be suitable for the establishment and long-term maintenance of the selected vegetation seed mix with appropriate fertilization. At the CQA Officer's discretion, samples may be collected for laboratory testing.

9.4 Thickness Documentation

The thickness of topsoil placement on the final cover will be documented on a 100-foot grid by surveying or by hand shoveling or auguring and measuring the observed thickness of topsoil.

Section 10
Geomembrane

10.1 General

This section of the CQA Plan applies to the high-density polyethylene (HDPE) geomembrane used in the landfill composite liner and the linear low density polyethylene (LLDPE) geomembrane used in the composite final cover. The geomembrane used in the liner system of the landfill will be 60-mil HDPE (textured and smooth) on the horizontal expansion areas and 40-mil HDPE textured on the vertical expansion areas. The geomembrane in the final cover will be 40- mil LLDPE (textured).

The geomembrane will be supplied to the site in factory rolls. <u>No factory seams will be used to prepare larger panels of geomembrane for delivery to the site.</u>

This section is divided into five major subheadings, which cover general information, and the CQA requirements for pre-installation, installation, field seaming, and post-installation. These terms pre-installation, installation, field seaming, and post–installation are applicable only to the geomembrane installation and to not apply to the overall construction of the landfill facility.

10.2 Pre-Installation

This section describes the quality control measures that are applicable to the polyethylene (PE) resin manufacturers, geomembrane manufactures, and finished geomembrane roll delivery to the site prior to installation.

The geomembrane must be fabricated from polyethylene resin and be virgin material with no more than 10 percent rework by weight. Rework material must be of the same formulation as the parent material. No post-consumer resin allowed.

10.2.1 Manufacturing

Material Specifications

The following list specifies the required geomembrane materials for liner and final cover construction:

- Horizontal expansion base liner sideslopes (3H:1V): 60-mil HDPE-textured
- Horizontal expansion base liner: 60-mil HDPE-smooth (textured optional)

- Vertical expansion base liner: 40-mil HDPE-textured
- Final cover: 40-mil LLDPE-textured

Quality Control Requirements

Prior to the delivery of any geomembrane rolls to the site, the Geomembrane Manufacturer will provide the Owner and the CQA Officer with the following information:

- The resin supplier, location of supplier's production plant(s), and resin brand name and product number
- Any results of tests conducted by the Geomembrane Manufacturer and/or the Resin Manufacturer's testing laboratories to document the quality of the resin used in fabricating the geomembrane
- The Quality Control Plan that the Geomembrane Manufacturer will be using for the geomembrane being supplied

Every roll of geomembrane for delivery to the site must be manufactured and inspected in accordance with the Geomembrane Manufacturer according to the following requirements:

- First quality polyethylene resin must be used.
- The geomembrane must contain no more than a maximum of 1 percent by weight of additives, fillers, or extenders, excluding carbon black.
- Carbon black for ultraviolet protection shall be added during manufacturing of the geomembrane.
- The geomembrane must be free of holes, blisters, undispersed raw materials, or any other sign of contamination by foreign matter.

The Geomembrane Manufacturer will routinely perform specific gravity (ASTM 0792, method B or ASTM D1505) and melt index (ASTM D1238) tests on the raw resin to document the quality of the HDPE and LLDPE resin used to manufacture the geomembrane rolls assigned to this project. The maximum specific gravity allowed for the HDPE and LLDPE raw resin is 0.932 and 0.926, respectively. The maximum melt index for both the HDPE and LLDPE raw resins is 1.0 grams/10 minutes.

Manufacturer's Certification

The Geomembrane Manufacturer will test the geomembrane produced for the site according to the test method and frequencies listed in Tables 10-1, 10-2, and 10-3 or in accordance with the most current version of GM13 and GM17. The Geomembrane Manufacturer will provided certification, based on tests performed by either the Geomembrane Manufacturer's laboratory or another outside laboratory contracted by the Geomembrane Manufacturer, that the geomembrane supplied under this Plan will meet the specifications presented in Tables 10-1, 10-2, and 10-3. Additionally, the Manufacturer will provide certification that the Manufacturer's Quality Control Plan was fully implemented for the geomembrane material supplied under this Plan. The Manufacturer will provide documentation to verify results of the Manufacturer's Quality Control Plan implementation if requested by the CQA Officer.

10.2.2 Delivery, Handling, and Storage of Geomembrane Rolls

The geomembrane will be protected during shipment from excessive heat or cold, puncture, cutting, or other damaging or deleterious conditions. The geomembrane rolls will be stored on-site in a designated area and will be protected from long-term ultraviolet exposure prior to actual installation.

- Each geomembrane roll will be marked by the Geomembrane Manufacturer with the following information (on a durable gummed label, or equivalent, on inside of core):
  - Name of Manufacturer
  - Product type and identification number (if any)
  - Roll length and width
  - Nominal product thickness
  - Roll number
  - Batch or lot number
  - Date of manufacture

Table 10-1
High Density Polyethylene (HDPE) Geomembrane – Smooth Test Frequency and Acceptance Criteria

PROPERTIES	TEST METHOD	TEST VALUE (60 mils)	TESTING FREQUENCY
Thickness (min. average) ▪ Lowest individual of 10 values	D5199	Nom. -10%	Per roll
Density mg/L (minimum)	D1505/D792	0.940 g/cc	200,000 lb
Tensile Properties (min. average)[1] ▪ Yield strength ▪ Break strength ▪ Yield elongation ▪ Break elongation	D6693 Type IV	 126 lb/in. 228 lb/in. 12% 700%	20,000 lb
Tear Resistance (min. average)	D1004	42 lb	45,000 lb
Puncture Resistance (min. average)	D4833	108 lb	45,000 lb
Stress Crack Resistance[2]	D5397 (App.)	300 hr.	per GRI-GM10
Carbon Black Content (range)	D4218[3]	2.0–3.0%	20,000 lb
Carbon Black Dispersion	D5596	Note [4]	45,000 lb
Oxidative Induction Time (OIT) (min. average)[5] ▪ Standard OIT —or— ▪ High Pressure OIT	 D3895 D5885	 100 min. 400 min.	 200,000 lb
Oven Aging at 85°C[5][6] ▪ Standard OIT (min. average) - % retained after 90 days —or— ▪ High Pressure OIT (min. average) - % retained after 90 days	D5721 D3895 D5885	 55% 80%	Per each formulation
UV Resistance[7] ▪ Standard OIT (min. average) —or— ▪ High Pressure OIT (min. average) - % retained after 1,600 hours[9]	D7238 D3895 D5885	 N.R.[8] 50%	Per each formulation

Notes:
(1) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.
– Yield elongation is calculated using a gauge length of 1.3 inches.
– Break elongation is calculated using a gauge length of 2.0 inches.
(2) The yield stress used to calculate the applied load for the SP-NCTL test should be the manufacturer's mean value via MQC testing.
(3) Other methods such as D1603 (tube furnace) or D63 TGA) are acceptable if an appropriate correlation to D4218 (muffle furnace) can be established.
(4) Carbon black dispersion (only near spherical agglomerates) for 10 different views:
– Nine in Categories 1 or 2, and 1 in Category 3.
(5) The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.
(6) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90-day response.
(7) The condition of the test should be 20-hour UV cycle at 75°C, followed by 4-hour condensation at 60°C.
(8) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
(9) UV resistance is based on percent retained value of the original HP-OIT value.

Table 10-2
High Density Polyethylene (HDPE) Geomembrane – Textured Test Frequency and Acceptance Criteria

PROPERTIES	TEST METHOD	TEST VALUE (40 mils	TEST VALUE (60 mils)	TESTING FREQUENCY
Thickness (min. average) ▪ Lowest individual for 8 out of 10 values ▪ Lowest individual for any of the 10 values	D5994	Nom. (-5%) 10% 15%	Nom. (-5%) 10% 15%	Per roll
Asperity Height (min. average)(1)	D7466	10 mil.	10 mil.	Every second roll(2)
Density (min. average)	D1505/D 792	0.940 g/cc	0.940 g/cc	200,000 lb
Tensile Properties (min. average)(3) ▪ Yield strength ▪ Break strength ▪ Yield elongation ▪ Break elongation	D6693 Type IV	 84 lb/in. 60 lb/in. 12% 100%	 126 lb/in. 90 lb/in. 12% 100%	20,000 lb
Tear Resistance (min. average)	D1004	28 lb	42 lb	45,000 lb
Puncture Resistance (min. average)	D4833	60 lb	90 lb	45,000 lb
Stress Crack Resistance(4)	D5397 (App.)	300 hr.	300 hr.	per GRI-GM10
Carbon Black Content (range)	D4218(5)	2.0–3.0%	2.0–3.0%	20,000 lb
Carbon Black Dispersion	D5596	Note (6)	Note (6)	45,000 lb
Oxidative Induction Time (OIT) (min. average)(7) ▪ Standard OIT —or— ▪ High Pressure OIT	 D3895 D5885	 100 min. 400 min.	 100 min. 400 min.	 200,000 lb
Oven Aging at 85°C(7)(8) ▪ Standard OIT (min. average) - % retained after 90 days —or— ▪ High Pressure OIT (min. average) - % retained after 90 days	D5721 D3895 D5885	 55% 80%	 55% 80%	Per each formulation
UV Resistance(9) ▪ Standard OIT (min. average) —or— ▪ High Pressure OIT (min. average) - % retained after 1,600 hours(11)	D7238 D3895 D5885	 N.R.(10) 50%	 N.R.(10) 50%	Per each formulation

Notes:
(1) Of 10 readings, 8 out of 10 must be ≥ 7 mils, and lowest individual reading must be ≥ 5 mils. Also see Note 6.
(2) Alternate the measurement side for double-sided textured sheet.
(3) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.
– Yield elongation is calculated using a gauge length of 1.3 inches.
– Break elongation is calculated using a gauge length of 2.0 inches.
(4) P-NCTL test is not appropriate for testing geomembranes with textured or irregular rough surfaces. Test should be conducted on smooth edges of textured rolls or on smooth sheets made from the same formulation as being used for the textured sheet materials. The yield stress used to calculate the applied load for the SP-NCTL test should be the manufacturer's mean value via MQC testing.
(5) Other methods such as D1603 (tube furnace) or D63 TGA) are acceptable if an appropriate correlation to D4218 (muffle furnace) can be established.
(6) Carbon black dispersion (only near spherical agglomerates) for 10 different views:
– Nine in Categories 1 or 2, and 1 in Category 3.
(7) The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.
(8) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90-day response.
(9) The condition of the test should be 20-hour UV cycle at 75°C, followed by 4-hour condensation at 60°C.
(10) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
(11) UV resistance is based on percent retained value of the original HP-OIT value.

Table 10-3
Linear Low Density Polyethylene (LLDPE) Geomembrane – Textured
Test Frequency and Acceptance Criteria

PROPERTIES	TEST METHOD	TEST VALUE (40 mils)	TESTING FREQUENCY (minimum)
Thickness mils (min. average) ▪ Lowest individual for 8 out of 10 values ▪ Lowest individual for any of the 10 values	D5994	nom. (-5%) -10% -15%	Per roll
Asperity Height mils (min. average)[(1)]	D7466	10	Every 2nd roll[(2)]
Density g/ml (max.)	D1505/D792	0.939	200,000 lb
Tensile Properties (min. average)[(3)] ▪ Break strength - lb/in ▪ Break elongation - %	D6693 Type IV	 60 250	20,000 lb
2% Modulus - lb/in (max.)	D5323	2,400	Per formulation
Tear Resistance - lb (min. average)	D1004	22	45,000 lb
Puncture Resistance - lb (min. average)	D4833	44	45,000 lb
Axi-Symmetric Break Resistance Strain - % (min.)	D5617	30	Per formulation
Carbon Black Content - %	D4218[(4)]	2.0-3.0	45,000 lb
Carbon Black Dispersion	D5596	Note [(5)]	45,000 lb
Oxidative Induction Time (OIT) (min. average)[(6)] ▪ Standard OIT —or— ▪ High Pressure OIT	 D3895 D5885	 100 400	 200,000 lb
Oven Aging at 85°C[(7)] ▪ Standard OIT (min. average) - % retained after 90 days —or— ▪ High Pressure OIT (min. average) - % retained after 90 days	D5721 D3895 D5885	 35 60	Per formulation
UV Resistance[(8)] ▪ Standard OIT (min. average) —or— ▪ High Pressure OIT (min. average) - % retained after 1,600 hours[(10)]	 D3895 D5885	 N.R. [(9)] 35	Per formulation

Notes:
(1) Of 10 readings, 8 out of 10 must be ≥ 7 mils, and lowest individual reading must be ≥ 5 mils; also see Note 9.
(2) Alternate the measurement side for double-sided textured sheet.
(3) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.
– Break elongation is calculated using a gauge length of 2.0 inches at 2.0 in/min.
(4) Other methods such as D1603 (tube furnace) or D63 TGA) are acceptable if an appropriate correlation to D4218 (muffle furnace) can be established.
(5) Carbon black dispersion (only near spherical agglomerates) for 10 different views:
– Nine in Categories 1 or 2, and 1 in Category 3.
(6) The manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.
(7) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90-day response.
(8) The condition of the test should be 20-hour UV cycle at 75°C, followed by 4-hour condensation at 60°C.
(9) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
(10) UV resistance is based on percent retained value regardless of the original HP-OIT value.

When cores are required for preparing geomembrane for shipment, the manufacturer will use cores with sufficient crushing strength to prevent collapse or other damage while in use.

The following practices will be used as a minimum in receiving and storing geomembrane rolls in the designated storage area at the job site:

- While unloading or transferring the geomembrane rolls from one location to another, care will be taken to prevent damage to the geomembrane itself. The preferred method involves using a spreader-bar, straps, and a loader. Rolls will not be dragged.
- Geomembrane rolls will be stored in a manner so as to ensure that they are adequately protected from the following:
    - Equipment damage
    - Strong oxidizing chemicals, acids, or bases
    - Flames, including welding sparks
    - Temperature in excess of 160° Fahrenheit
    - Dust and dirt

The RPR will observe and document, throughout the pre-installation, installation, and post-installation periods that the Installer provided adequate handling equipment for moving geomembrane rolls and that the equipment and the handling methods used do not pose unnecessary risk of damage. The Installer is responsible for the means and methods to implement the work.

The Installer will be responsible for ensuring that all material installed meets specifications (i.e., that the roll marking label information indicates required specifications and properly represents materials). The RPR will maintain a log of geomembrane roll deliveries. The log will contain the roll numbers, the date of delivery, and the batch (lot) numbers.

10.3 Installation

This section includes discussion of geomembrane roll testing requirements, earthwork required for geomembrane placement, placement of the geomembrane, defects and repairs of geomembrane, and requirements applicable to other materials in contact with the geomembrane. Subsection 10.4 describes the installation and testing requirements for geomembrane seams.

All parties involved in the installation of the geomembranes will be familiar with geomembrane and will focus on protecting the geomembrane from damage during construction activities.

10.3.1 Testing Requirements

This subsection describes the test methods, including sampling procedures and frequencies, and the role of the geosynthetics testing laboratory in testing the geomembrane roll samples. Subsection 10.2.1, under Quality Control Requirements, describes the test methods that are performed on an infrequent basis to demonstrate the uniformity of resin used to fabricate geomembrane shipped to the job site. Seam testing is described in Subsection 10.4.4 and 10.4.5.

Test Methods

A representative of the geosynthetics testing laboratory at the Geomembrane Manufacturer's plant may collect geomembrane roll samples. Conformance samples will be collected at a rate one sample per 100,000 square feet (or per requirements of NR516.07(2)(a) of geomembrane produced for delivery to the site. At least one sample will also be obtained for each geomembrane production batch. Samples for thickness testing or measurements will be collected on every roll for delivery to the site. The Installer should not ship to, or receive at, the site geomembrane from more than two production batches in any single shipment without the prior written approval of the CQA Officer and the Owner.

Samples collected will be of a size determined by the geosynthetics testing laboratory. The laboratory technician will indicate the machine direction on the sample.

Tables 10-1, 10-2, and 10-3 list some of the tests and the test methods that may be performed on HDPE and LLDPE geomembrane roll samples. At a minimum, the minimum number of tests required by NR516.07(2)(a) or approved by the WDNR will be conducted on the samples. The specifications and methods used in evaluating the results are discussed below under Procedures for Determining Geomembrane Roll Test Failures. Unless specified otherwise, sample specimens will be prepared in accordance with the referenced test method. The results for tear resistance and each of the tensile property tests will be reported for both the machine and cross direction if these tests are conducted.

Role of Testing Laboratory

The geosynthetics testing laboratory will be responsible for performing the tests on samples submitted to them as described above under Test Methods or as determined by the CQA Officer. The results of the tests performed will be reported to the CQA Officer, the RPR, and the Owner.

Retesting of geomembrane rolls for quality assurance purposes because of failure to meet any or all of the acceptance specifications listed in Tables 10-1, 10-2, and 10-3 can only be authorized by the CQA Officer.

The Geomembrane Manufacturer and/or Installer may perform their own tests according to the methods and procedures defined in Tables 10-1, 10-2, and 10-3; however, the results will only be applicable to their own quality control needs. The results will not be substituted for the quality assurance testing describe herein.

Procedures for Determining Geomembrane Roll Test Failures

Tables 10-1, 10-2, and 10-3 list the acceptance specifications for HDPE and LLDPE geomembranes of various thicknesses. The HDPE geomembrane values listed in the acceptance specifications of Tables 10-1 and 10-2 is from GRI Test Method GM 13. Table 10-3 was developed from GRI Test Method GM 17 for LLDPE geomembranes. The most current version of GM 13 and GM 17 will supersede the acceptance specifications in the tables. Acceptance specifications apply to both textured and smooth geomembranes. For those tests where results are reported for both machine and cross direction, each result will be compared to the listed specification to determine acceptance.

The following procedure will be used for interpreting results:

- If the test values meet the stated specification in Tables 10-1, 10-2, and 10-3, then the roll and the lot will be accepted for use at the job site. If the sample represents all rolls from an entire shipment, then the entire shipment will also be considered accepted.
- If the result does not meet the specifications, then the roll and the batch may be retested using specimens either from the original roll sample or from another sample collected by the geosynthetics laboratory technician or the RPR. For retesting, two additional tests will be performed for the failed test procedure. (Each additional test will consist of multiple-specimen tests if multiple specimens are called for in the test procedure). If both of the retests are acceptable, then the roll and batch will be considered

to have passed this particular acceptance test; if either of the two additional tests fail, then the roll and batch will be considered unsuitable without further recourse. The CQA Officer and the Owner may obtain samples from other rolls in the batch. On the basis of testing these samples, the CQA Officer and the Owner may choose to accept a portion of the batch while rejecting the remainder.

If retesting does not result in passing test results as defined in the preceding paragraph, or if there is any other nonconformity with the material specifications, then the Installer will withdraw the rolls from use in the project at the Installer's sole risk, and expense. The Installer will be responsible at his/her sole risk, cost, and expense for removing this geomembrane from the site and replacing it with acceptable geomembrane.

10.3.2 Earthwork

The Construction Contractor will be responsible for preparing the supporting soil according to the plans and specifications. For each day of installation of the geomembrane, the Installer, the Contractor, and the RPR will observe the surface and certify that the surface is acceptable for installations. The installer will prepare and sign a subgrade acceptance form for each day of geomembrane deployment.

The soil surface will also be evaluated during geomembrane installation for any areas softened by precipitation or cracked due to desiccation. The Construction Contractor will rework areas determined to be unacceptable until acceptable.

10.3.3 Placement

Location and Panel Layout Drawing

A panel layout drawing for the geomembrane installation covered by this Plan will be prepared by the Installer prior to the installation and submitted to the CQA Officer and the Owner, showing the proposed location and orientation of geomembrane panels to be installed in relation to slope, collection trenches, anchor trench, and phase boundaries. The panel layout drawing will be submitted to the State Regulatory Agency prior to the preconstruction meeting required by NR516.04(4). The Owner and the CQA Officer will review the proposed panel layout drawing and document that it is consistent with accepted practice and the construction plans and specifications.

Installation Techniques

Geomembrane panels will be installed by placing one at a time, and each panel will be seamed by the end of the day on which it was placed.

The RPR will document that the condition of the supporting soil has not changed detrimentally during installation. The RPR will notify the Installer and the Construction Contractor of any damage done (i.e., rutting by equipment used to deploy geomembrane) to the supporting soil prior to panel seaming.

It is the responsibility of the Installer to remove the deployed panel to allow the Construction Contractor to repair the supporting soil. The RPR will observe and document the repair of the supporting soil. The RPR will inform the Installer that the method of deployment will be observed during further deployment, and if damage to supporting soil continues, deployment will be stopped and an alternative means of deployment is to be developed. The RPR will document these events and conversations in the daily report.

The Installer will take the following precautions while installing the geomembrane:

- Ensure that the equipment used does not damage the geomembrane by the way it is handled, by excessive heat, by leakage of hydrocarbons, or by other means.
- Ensure that personnel working on the geomembrane do not smoke, wear damaging clothing, or engage in other activities that could damage the geomembrane.
- Ensure that the method used to deploy the geomembrane does not cause scratches or crimps in the geomembrane.
- Ensure that the method used to deploy the rolls minimizes wrinkles.
- Ensure that the geomembrane is adequately loaded to prevent wind uplift.
- Minimize the amount of direct contact with the geomembrane, by limiting the number of personnel that are allowed on the geomembrane once QC and CQA are completed.
- Ensure that only approved equipment is allowed on the surface of the geomembrane (i.e., generators, test equipment). The use of motorized ATV vehicles is not permitted without approval from the CQA Officer.

Weather Conditions

Geomembrane will not be placed in areas of ponded water, during precipitation events, or in the presence of excess winds. The Installer must receive written approval to deploy geomembrane in temperature below 32°F.

Damages

The RPR will examine each panel for damage after placement and will determine which panels, or panel portions, should be rejected, or accepted. Damaged panels or portions that have been rejected will be marked, removed, and recorded by the RPR.

10.3.4 Defects and Repairs

This section applies to all defects and repairs resulting from examinations, tests, or visual observations performed on the geomembrane material itself and on the seams.

Identification

All seamed and nonseamed areas of the geomembrane will be examined and documented by the RPR for identification of defects, holes, blisters, undispersed raw material, and any signs of contamination by any foreign matter. Because light reflected by the geomembrane helps to detect defects, the surface of the geomembrane will be clean at the time of examination. The RPR will complete a final examination of the geomembrane in areas in which both the Installer and the RPR have completed their QC and CQA, respectively. The RPR and the Installer will perform a final examination over the entire geomembrane at the completion of the project. The Installer and/or the Construction Contractor will clean any area that is insufficiently clean to complete the final examination.

Evaluation

Each suspect area identified will be nondestructively tested using the vacuum box test method, an air test, or the spark test method. The RPR will approve the proper test method for each suspect location.

Repair Procedures

Any portion of the geomembrane exhibiting a flaw or failing a destructive or nondestructive test will be repaired. Several procedures exist for the repair of these areas. The procedures available include the following:

- Patching is used to repair large holes, tears, undispersed raw materials, and contamination by foreign matter.
- Grinding and rewelding are used to repair small sections of extruded seams.
- Spot welding or seaming is used to repair small tears; pinholes; or other minor, localized flaws.
- Capping is used to repair large lengths of failed seams.
- Topping is used to repair areas of inadequate seams that have an exposed edge.
- Other procedures may be used at the recommendation of the Installer if agreed upon by the CQA Officer and the RPR.

The repair procedures, materials, and techniques will be approved in advance of the specific repair by the CQA Officer, the RPR, and the Installer. At a minimum, the following provisions will be satisfied:

- Patches or caps will extend at least 6 inches beyond the edge of the defect, and all corners of patches will be rounded with a radius of at least 3 inches.
- The type of geomembrane (i.e., smooth or textured) used for repairs will be approved by the RPR prior to completing repairs.

Examination of Repairs

Each repair will be numbered and logged by the RPR. Each repair will be nondestructively tested according to Subsection 10.4.4. Repairs that pass the above testing will be considered to be adequate, except that large caps may be of sufficient extent to require destructive seam sampling and testing, at the discretion of the RPR, according to the provisions of Subsection 10.4.5.

Failed tests indicate that the repair was inadequate, and the repair will be redone and retested until a passing result is obtained. The RPR will document that all repairs have been subjected to nondestructive testing and will record the number of each repair, the date, and the test outcome.

Large Wrinkles

When seaming of the geomembrane is completed, the RPR will examine the geomembrane for wrinkles and determine which wrinkles should be cut out and reseamed by the Installer. The wrinkle repair will be done in accordance with the equipment and procedures described in Subsection 10.4.2 and 10.4.3, respectively, and it will be nondestructively tested using the vacuum box test method described in Subsection 10.4.4.

10.3.5 Material in Contact With Geomembranes – Anchor Trench System and Backfilling

The Construction Contractor will excavate the anchor trench for the geomembrane, unless otherwise specified, to the lines and grades shown on the plans and specifications. The trench will use a "U" configuration. No more than the amount of trench required for the geomembrane to be anchored in 1 day will be excavated to minimize the desiccation potential of the anchor trench soil unless moisture content is maintained. The anchor trench will be adequately drained to prevent ponding or softening of the adjacent soil while the trench is open.

The anchor trench will be backfilled and compacted by the Contractor. Care will be taken when backfilling the trenches to prevent any damage to the geomembrane or other geosynthetics that may also be placed in the trench prior to backfilling.

The RPR will observe the backfilling and compacting operations and will advise the Contractor of the adequacy of the soil installation. The RPR will also advise the CQA Officer and the Owner of any problems.

10.4 Field Seaming

This section covers the quality assurance procedures on seams used to join the rolls of geomembrane into a continuous layer. The installation of each of the geomembranes at the landfill facility will include 100 percent nondestructive testing of all field seams for joining adjacent rolls of geomembranes to document that no openings or gaps exist between geomembrane sheets. In addition, destructive testing will be performed at a routine interval for determining the strength and mode of failure of field seams in both the shear and peel modes.

The allowable field seam methods, equipment, personnel qualifications, and destructive and nondestructive testing methods are described in this section.

10.4.1 Panel/Seam Layout

No horizontal seams will be allowed on slopes greater than 5 horizontal to 1 vertical except at the location that the 40-mil and 60-mil geomembranes are seamed together in the vertical expansion areas. In corners and at other odd-shaped geometric intersections, the number of horizontal seams will be minimized. A seam numbering system comparable and compatible with panel numbering system will be agreed upon at the preconstruction meeting (Subsection 3.3).

10.4.2 Seaming Equipment

The approved methods for field seaming panels and repairs are the dual hot wedge (fusion-type) seam method and the extrusion fillet weld process. Dual hot wedge seaming method will be used on linear seams (production seams). Corners, butt seams, tie-ins, and long repairs will be dual hot wedge seamed. The extrusion fillet or dual hot wedge welding will be used for other repairs and patches (nonproduction). No other processes can be used without prior written authorization from the CQA Officer and the Owner. Only equipment that has been specifically approved by make and model will be used.

Dual Hot Wedge Process

The Installer will meet the following requirements regarding the use, availability, and cleaning of the equipment to be used at the job site:

- An automated self-propelled type of apparatus will be used.
- The welding apparatus will be equipped to continuously monitor applicable temperatures.
- One spare operable seaming device will be maintained on-site at all times.
- Equipment used for seaming will not damage the geomembrane.
- The geomembrane will be protected in areas of heavy traffic to prevent damage discussed in Subsection 10.3.3.
- For cross seams, the intersecting dual hot wedge seam will be patched using the extrusion fillet process described below.
- The electric generator for the equipment will be placed on a smooth base in such a way that no damage occurs to the geomembrane. Similarly, a smooth insulating plate or fabric will be placed beneath the hot equipment after use.

The Installer will keep records for each seamer performing dual hot wedge seaming, including welding machine I.D. number, ambient temperature, and machine operating temperatures. These data will be recorded at intervals as agreed upon at the preconstruction meeting.

Extrusion Fillet Process

The Installer will meet the following requirements regarding the use, availability, and cleaning of the extrusion welding equipment to be used at the job site:

- The welding equipment will be equipped to continuously monitor temperature at the nozzle.
- One spare seaming device will be maintained on-site at all times.
- Equipment used for seaming will not damage the geomembrane.
- The geomembrane will be protected in areas of heavy traffic to prevent damage.
- The extruder will be cleaned and purged prior to beginning seaming, and at any time seaming operations are stopped, until all heat-degraded extrudate has been removed from the barrel.
- The electric generator for the equipment will be placed on a smooth base in such a way that no damage occurs to the geomembrane. Similarly, a smooth insulating plate or fabric will be placed beneath the hot equipment after use.
- Grinding geomembrane surfaces for welding preparation will not be performed more than 1 hour prior to seaming.
- Welding rod shall be kept clean and be of the correct type for the specific material being welded.

The Installer and, if applicable the Geomembrane Manufacturer will provide documentation to the CQA Officer regarding the quality of the extrudate used in the welding apparatus. At a minimum, the extrudate will be compatible with the base liner material and will contain the same grade and quality of polyethylene resins as used in the base material.

The Installer will keep records for each seamer performing extrusion weld seaming, including welding machine I.D. number, and ambient temperature. These data will be recorded at intervals as agreed upon at the preconstruction meeting.

10.4.3 Initial Requirements

Personnel Qualifications

All personnel performing seaming operations will be qualified by experience and by successfully passing seaming tests for the type of seaming equipment to be used. At least one seamer will have experience in seaming a minimum of 1,000,000 square feet of polyethylene geomembrane using the same type of seaming apparatus to be used at the landfill facility. The most experienced seamer, the "master seamer," will have direct supervisory responsibility at the job site.

The Installer will provide a list of proposed seaming personnel and their experience records to the CQA Officer and the RPR for their review and approval.

Weather Conditions

The weather conditions under which geomembrane seaming can be performed are as follows:

- Unless otherwise authorized in writing by the CQA Officer, no seaming will be attempted or performed at an ambient temperature below 32°F (0°C) or above 104°F (40°C).
- Between ambient temperatures of 32°F (0°C) and 50°F (10°C), seaming will be performed only if the geomembrane is preheated by either sun or a hot air device, provided there is no excessive ambient cooling resulting from high winds.
- Above 50°F (10°C), no preheating of the geomembrane will be required.
- Geomembrane will be dry and protected from wind.
- Seaming will not be performed during any precipitation event unless the Installer erects satisfactory shelter to protect the geomembrane areas for seaming from water and/or moisture.
- Seaming will not be performed in areas where ponded water has collected below the surface of the geomembrane.

If the Installer wishes to use methods that may allow seaming at ambient temperatures below 32°F or above 104°F, the Installer will demonstrate and certify that the methods and techniques used to perform the seaming produce seams that are entirely equivalent to seams produced at temperatures above

50°F and below 104°F, and that the overall quality of the geomembrane is not adversely affected.

The RPR will document the following:

- Ambient temperature at which seaming is performed.
- Any precipitation events that occurred at the site, including the time of such occurrences, the intensity, and the amount of the event.

The RPR will inform the CQA Officer and the Owner if any of the weather conditions are not being fulfilled. The CQA Officer will stop or postpone the geomembrane seaming when weather conditions are unacceptable.

Overlapping and Temporary Bond

The Installer will be responsible for ensuring that the following requirements are met:

- Panels of geomembrane will have a finished overlap of a minimum of 3 inches for extrusion welding and 4 inches for fusion welding; but, in any event, sufficient overlap will be provided to allow peel tests to be performed on the seam.
- No solvents or adhesives will be used on the geomembrane unless the CQA Officer and the Owner have approved the product in writing. Approval can only be obtained by submitting samples and data sheets to the CQA Officer and the Owner for evaluation.
- Procedures used to temporally bond adjacent geomembrane panels must not damage the geomembrane; in particular, the temperature of the hot air at the nozzle of any spot welding apparatus will be controlled such that the geomembrane is protected at all times against potential damage.

Trial Seams

Trial seams will be made on fragments of geomembrane to document that seaming conditions are adequate. Trial seams will be performed on the surface the geomembrane will be deployed on (i.e., top of compacted clay liner, top of GCL). Such trial seams will be made at the beginning of each seaming period, following work interruptions, at changes in weather, and at least once every 5 hours of seaming activities, for each seaming apparatus used that day with additional test run following work interruptions, weather changes, changes in machine settings for temperature or speed or as directed by the CQA officer or RPR. Each seamer is required to complete a trial seam prior to seaming. Trial seams are to be run using the materials for which the seaming will be used (i.e., smooth to smooth, smooth to textured, textured to textured). At a minimum, one trial seam per welding machine will be made at the start of each day by each seaming technician performing welding that day.

The trial seams will be examined by the Installer and the RPR for squeeze-out, foot pressure applied by the seaming equipment, and general appearance, and will be tested using a field tensiometer. If the seam fails any of these examinations, it will be repeated. If the second trial seam fails these examinations, the welding apparatus and seamer are not allowed to seam until the Installer can demonstrate the cause of the failure. Once the Installer has made the necessary corrections to the welding equipment, the seamer and the apparatus are required to pass two trial seams prior to beginning seaming. The RPR will document the reason for the failure and all subsequent trial seams.

The trial seam samples will be at least 3 feet long by 1 foot wide after seaming, with the seam centered lengthwise. Seam overlap will be as indicated above under Overlapping and Temporary Bond. Trial seams shall be welded under the same conditions as production seaming is to take place.

Five adjoining specimens, each 1 inch wide, will be cut from each end of the trial seam sample by the Installer. The specimens will be tested by the Installer in shear (5 field shear) and peel (5 field peel [inner and outer seams for dual hot wedge]), respectively, using a field tensiometer.

The remainder of the trial seam sample will be identified and marked by the RPR as follows:

- The sample will be assigned a number and marked as to the welding apparatus used and the seamer's name.
- The date, time, applicable welding equipment operating temperatures, and ambient temperature at the time of seaming will be noted.
- Whether the sample passes or fails will be recorded.

The RPR will observe trial seam procedures, and record them on the field log forms. The sample itself will be cut into three pieces, one for the Owner's record, one to be retained by the RPR, and one to be made available to the Installer.

The RPR may randomly select trial seam samples for destructive testing by the geosynthetics testing laboratory according to the test procedures described in Subsection 10.4.5. The frequency for trial seam laboratory testing will be at the discretion of the RPR and the CQA Officer.

If a trial seam sample fails a destructive test performed by the geosynthetics testing laboratory, according to the acceptance criteria stated in Subsection 10.4.5, then a destructive test seam sample(s) will be taken from each of the seams completed by the seamer during the shift related to the failed trial seam test. These samples will be forwarded by the RPR to the geosynthetics testing laboratory and, if any of them fails the tests, then the procedures described in Subsection 10.4.5 will apply. The conditions of this paragraph will be considered met if a destructive seam test sample, collected and tested according to the provisions under Location and Sampling Frequency and Sampling Procedure of Subsection 10.4.5, has already been taken and has passed.

Seam Preparation

The Installer will ensure that the following conditions for each of the geomembrane installations covered by this Plan are met:

- Prior to seaming, the seam area is clean and free of moisture, dust, dirt, debris of any kind, and foreign material.
- If seam overlap grinding is required, then the grinding process will be completed according to the Geomembrane Manufacturer's instructions within 1 hour of the seaming operation, and in a way that will not damage the geomembrane or cause excessive striation of the geomembrane surface.
- Seams will be aligned so as to minimize the number of wrinkles and "fishmouths."

General Seaming Procedures

Unless otherwise specified, the general seaming procedures to be used by the Installer for each of the geomembrane installations covered by this Plan, and observed by the RPR, will be as follows:

- A firm subbase will be provided to achieve proper support for seaming.
- Fishmouths or wrinkles at the seam overlaps will be cut along the ridge of the wrinkle in order to achieve a flat overlap. The cut fishmouths or wrinkles will be seamed, and any portion where the overlap is inadequate

will then be patched with the same geomembrane (including thickness) extending a minimum of 6 inches beyond the cut in all directions.

- If seaming operations are to be conducted at night, adequate illumination will be provided.

10.4.4 Nondestructive Testing

Each field seam will be nondestructively tested over its full length using one of the methods described in this section. The purpose of nondestructive testing is to determine the continuity of the seams. Nondestructive testing, at this stage of development, does not provide any information on the strength of seams. Seam strengths will be determined by destructive testing methods that are described in Subsection 10.4.5. Failure of any of the nondestructive or destructive tests will require the repair of the failed section according to the procedures contained in Subsection 10.3.4.

Nondestructive testing as described in this section will be performed on seams for every geomembrane installation covered by this Plan. The recommended test methods for conducting the nondestructive seam testing are the air pressure test for dual hot wedge seams and the vacuum box test for extrusion fillet welds. These two nondestructive testing methods are described below.

The RPR will perform the following documentation tasks:

- Observe nondestructive seam testing, and examine seams for squeeze-out, foot pressure, and general appearance. Failure of these criteria will be considered as failure of the seam, and repair or reconstruction will be required.
- Document location, date, test unit number, name of tester, and outcome of all testing.
- Inform the Installer and CQA Officer of any required repairs.
- Document that appropriate repairs are made and that the repairs are retested nondestructively with passing results.

Air Pressure Testing

The following test procedures are applicable only to dual hot wedge seams. The equipment for performing the test should meet the following minimum requirements:

- An air compressor or hand pump equipped with a pressure gauge and regulator capable of producing and sustaining a pressure between 25 and 30 psig and mounted on a cushion to protect the geomembrane surface

- Fittings, rubber hose, valves, etc., to operate the equipment, and a sharp hollow needle or other approved pressure feed device

Air pressure testing will be performed according to the following procedure:

1. Seal both ends of the seam to be tested.
2. Insert a needle or other approved pressure feed device into the airspace at one end of the dual hot wedge seam.
3. Energize the air compressor or hand pump to a pressure of 25-30 psig. Close the valve, and monitor the pressure in the seam airspace for approximately 7 minutes.
4. Record the pressure in the seam at the end of 2 minutes and again at the end of 7 minutes.
5. If the pressure difference between the 2-minute and 7-minute readings exceeds 2 psi for 60 mil or 3 psi for 40 mil HDPE and LLDPE, or if the pressure does not stabilize within the 7-minute period, one more 5-minute pressure-monitoring interval is allowed.
6. If the pressure loss over both 5-minute intervals exceeds 2 psi for 60 mil HDPE or 3 psi for 40 mil HDPE and LLDPE, or if the pressure does not stabilize, then the seam fails the test.
7. If the pressure loss over either 5-minute interval does not exceed 2 psi for 60 mil HDPE or 3 psi for 40 mil HDPE and LLDPE, then the seam may be deemed by the Installer to have passed the test.
8. The Installer must verify that the air channel tested was not obstructed by noting a release of air pressure at the end of the tested seam interval opposite the pressure gauge.

For any seam interval that fails the air pressure nondestructive test, additional nondestructive testing or visual inspection will be used to identify, if possible, the faulty area of the seam. The faulty area will be repaired and retested. If the faulty area cannot be identified, then the entire seam will be repaired and retested.

Vacuum Box Test

Vacuum box testing is to be used on those seams made by the extrusion fillet process, to locate the defects identified from air pressure testing, or to evaluate suspect seam and nonseam areas as discussed in Subsection 10.3.4.

Vacuum box testing equipment must meet the following minimum standards:

- A five-sided vacuum box with an open bottom, a clear viewing panel on top and a pliable gasket attached to the bottom
- A pump assembly equipped with pressure controller and pipe connections capable of achieving a vacuum of 10 inches of water.
- A vacuum gauge on the tank with an operating range from 0 to 26 inches of vacuum, and a vacuum gauge on the vacuum box with an operating range from 0 to 10 inches of water vacuum

The following procedure will be used in performing the vacuum box test:

1. Clean the seams to be tested so that they are relatively free from soil or foreign objects that might prohibit a good seal from being formed between the vacuum chamber and the geomembrane.
2. Energize the vacuum pump, and reduce the tank pressure to approximately 5 to 10 inches of water vacuum.
3. Wet a strip of geomembrane approximately twice the size of the vacuum box with the soapy solution.
4. Place and center the vacuum box with the gasket in contact with the geomembrane surface over the wetted area of the seam.
5. Applying a normal force to the top of the vacuum box, close the bleed valve, and open the vacuum valve. Check to make certain that a tight seal is created between the geomembrane and the vacuum box. A minimum vacuum of 5 inches will be used for testing with the maximum allowable testing pressure never exceeding 10 inches of vacuum.
6. With the vacuum drawn, use the viewing panel to examine the geomembrane seam for bubbles resulting from the flow of air through the seam. Continue this examination for not less than 5 seconds.
7. Remove the vacuum box by first closing the vacuum valve and then opening the bleed valve. Proceed to Step 8 if bubbles appear in Step 6. If no bubbles appear in Step 6, then proceed directly to Step 9.
8. If bubbles appear through the geomembrane, mark the defective area for repair according to the provisions of Subsection 10.3.4. All repairs will be tested until nondestructive results are passing.
9. Move the vacuum box along the seam to be tested, overlapping the previously tested area by no less than 3 inches.

10.4.5 Destructive Seam Testing

Destructive seam testing will be performed on the geomembrane seams covered by this Plan. Destructive seam testing is performed to determine the strength of the seam in both shear and peel failure modes. Destructive seam testing will be performed within 48 hours of sampling either in an on-site laboratory by personnel under the direction of the CQA Officer or at the geosynthetics testing laboratory.

Location and Sampling Frequency

The RPR will select locations where seam samples will be cut out for the destructive testing. The RPR will mark the locations and record on the seam sample the assigned sample number, seam number, welder ID, machine number, and date welded. Test locations will be determined during seaming at the RPR's discretion. Suspicion of excess crystallinity, contamination, offset welds, or any other potential causes of an imperfect seam may prompt selection of such locations. The Installer will not be informed in advance of any location where seam samples will be taken.

The minimum frequency of sample collection on the liner system geomembrane will be one test location for every 1,000 linear feet of fusion seam length. Note: leak testing is required on the liner system. The minimum frequency of sample collection on the final cover geomembrane, where leak location testing will not be performed, will be one test location every 500 linear feet of fusion seam length.

Sample Procedure

Samples will be cut under the direction of the RPR as the seaming progresses. For each sample location, the following information will be documented:

- Assigned sample number and reason for collecting the sample (e.g., as part of statistical testing program, suspicious seam, etc.)
- Seam number
- Welder ID
- Machine #
- Date Welded
- Sample location on layout drawing

- For the peel test, which geomembrane is the top and which is the bottom with respect to seams performed using dual hot wedge (fusion) weld techniques

Specimens for qualitative field testing will be taken prior to the removal of the laboratory sample. Samples for field tensiometer testing will be 1 inch wide by 8 inches long, with the seam centered parallel to the width. A total of 10 samples will be collected for field testing. Five samples will be tested in peel (inner and outer seams for dual hot wedge samples) and five samples will be tested in shear. If all 10 samples pass the field tensiometer test described below under Field Test Methods, then the sample for laboratory testing will be taken according to the procedure described below.

The sample for laboratory testing will be located between samples used for field-testing. The destructive sample will be 12 inches wide by a minimum 42 inches long with the seam centered lengthwise. The sample will be cut by the Installer into three parts and distributed as follows:

- A sample 12 inches by 14 inches will be kept by the Installer for testing.
- A sample 12 inches by 12 inches will be given to the Owner for record storage.
- A sample 12 inches by 16 inches will be transmitted to the geosynthetics testing laboratory or on-site testing laboratory by the RPR.

The Installer in accordance with the repair procedures described in Subsection 10.3.4 will immediately repair all holes cut into the geomembrane resulting from destructive seam sampling. The repaired area will be nondestructively tested in accordance with the requirements of Subsection 10.4.4.

End-of-Seam Sampling

In addition to the 42-inch sample cut for laboratory testing, an additional sample will be cut from at least one end of each fusion seam weld greater than 100 feet in length for field-testing as described below. The end-of seam sample will consist of a minimum of two 1 inch wide samples, often referred to as bones. A minimum of one bone will be field tested in shear mode and a minimum of one bone will be field tested in peel mode (inner and outer seam).

Field Test Methods

The 1-inch–wide samples described above under Sampling Procedure, as well as the end-of-seam samples described above under End-of-Seam Sampling, will be field-tested in both peel mode and shear mode. Testing will be performed using a field tensiometer or equivalent device. Seam testing acceptance criteria for the field testing of the destructive samples and end of seam samples is contained in Tables 10-4 or 10-5. If the samples fail the field tensiometer test, then the repair procedures of Subsection 10.3.4 for the holes left by the cutout samples, and the seam reconstruction procedures for the repair of the defective seam, discussed later in this subsection, will be implemented.

Laboratory Test Methods

Laboratory testing of the destructive seam samples will be performed by the geosynthetics testing laboratory or on-site testing laboratory under the direction of the CQA Officer. All destructive seam tests, whether performed on trial seam samples (as described above) or on samples cut out from production seams, will be performed in general accordance with the methodology of ASTM D6392, which stipulates that at least five specimens will be tested in shear and five in peel. All specimens will be cut as 1-inch–wide strips.

The following tests will be performed on each seam sample submitted for laboratory testing:

- Shear and peel maximum tension is the maximum load per unit width of a 1-inch–wide specimen expressed in pounds per inch of width in both the shear and peel mode, according to ASTM D6392.
- Shear elongation at break is the extension at break expressed as a percentage of the initial distance between the edge of the fused track and the nearer grip. This distance should be the same on both sides of the seam and is usually 2 inches.
- Peel seam separation estimates the length of seam bond separation expressed as a percentage of the original bond length.

Also, for both the seam shear and peel tension tests, an indication will be given for each specimen tested that defines the locus of the failure.

For shear tests, the following values will be reported for each specimen tested:

- Maximum tension in pounds per inch

- Elongation at break indicating at what percentage the specimen failed (up to a tested maximum of 50%)
- The locus of failure

Table 10-4
40-mil and 60-mil HDPE Geomembrane Seam Acceptance Criteria

PROPERTY	TEST METHOD	UNITS	TYPE OF CRITERION	ACCEPTANCE VALUES	
				40-mil [(1)]	60-mil [(1)]
Shear strength [(2)]	ASTM D6392	ppi	Minimum	80	120
Shear elongation [(2)]	--	%	Minimum	50	50
Peel strength [(3),(4)] Fusion	ASTM D6392	ppi	Minimum	60	91
Peel strength [(3),(4)] Extrusion	ASTM D6392	ppi	Minimum	52	78
Peel separation [(5),(6)]	--	%	Maximum	25	25

Notes:
(1) Values apply for both textured and smooth HDPE geomembranes.
(2) Five out of the five test specimens must meet these requirements. In addition, failure type must be film-tear (FTB) for all five specimens.
(3) Four of the five specimens must meet these requirements. The fifth specimen shall achieve 90 percent of the listed peel strength.
(4) Failure type must be film-tear bond (FTB) for five out of the five specimens.
(5) Maximum Acceptance Value for five out of the five test specimens.
(6) The following are unacceptable break codes:
- Hot wedge: AD and AD-Brk >25%
- Extrusion fillet: AD1, AD2 and AD-WLD (unless strength is achieved)

Table 10-5
40-mil LLDPE Geomembrane Seam Acceptance Criteria

PROPERTY	TEST METHOD	UNITS	TYPE OF CRITERION	ACCEPTANCE VALUES	
				NON-TEXTURED	TEXTURED (1)
Shear strength (2)	ASTM D6392	ppi	Minimum	60	60
Shear elongation (2)	--	%	Minimum	50	50
Peel strength (3),(4) Fusion	ASTM D6392	ppi	Minimum	50	50
Peel strength (3),(4) Extrusion	ASTM D6392	ppi	Minimum	44	44
Peel separation (5),(6)	--	%	Maximum	25	25

Notes:
(1) If the lengthwise edges of the textured geomembrane panels are nontextured, then the nontextured specifications shall apply for testing of seams made along these edges.
(2) Five out of the five test specimens must meet these requirements. In addition, failure type must be film-tear (FTB) for all five specimens.
(3) Four of the five specimens must meet these requirements. The fifth specimen shall achieve 90 percent of the listed peel strength.
(4) Failure type must be film-tear bond (FTB) for five out of the five specimens.
(5) Maximum Acceptance Value for five out of the five test specimens.
(6) The following are unacceptable break codes:
- Hot wedge: AD and AD-Brk >25%
- Extrusion fillet: AD1, AD2 and AD-WLD (unless strength is achieved)

For peel tests, the following values will be reported for each specimen tested:

- Maximum tension in pounds per inch
- Seam separation expressed as percent of original seam bond length
- Locus of failure

For each set of five specimens, the mean will be calculated and reported for the shear maximum tension and the peel maximum tension.

Role of Testing Laboratory

The geosynthetics testing laboratory or on-site testing laboratory will be responsible for performing the tests on samples submitted to them as described above. The results of tests performed will be reported to the Owner, the CQA Officer, and the RPR. Retesting of seams because of failure to meet any or all of the specifications listed below can only be authorized by the CQA Officer and the Owner.

The Geomembrane Manufacturer and/or the Installer may perform their own quality control testing in accordance with the methods and procedures defined above under Laboratory Test Methods; however, the results, if substantially different from those obtained by the geosynthetics testing laboratory or on-site laboratory, may only be used to request a retesting by the geosynthetics testing laboratory or on-site testing laboratory. All quality assurance test results from the geosynthetics testing laboratory or on-site laboratory govern over any test results from the Geomembrane Manufacturer or the Installer. Only the CQA Officer and the Owner are authorized to approve a retesting request.

Procedures for Determining Destructive Seam Test Failures

The procedures described in this section apply to the destructive testing procedures defined above under Field Test Methods and Laboratory Test Methods. Procedures for repairing failed seams are given in Subsection 10.3.4 of this Plan.

The results from the shear and peel tests for the HDPE geomembranes will be evaluated against the criteria tabulated in Table 10-4; and the LLDPE geomembrane will be evaluated against the criteria presented in Table 10-5.

All of the tabular criteria for each respective geomembrane type must be met for a given seam to be considered acceptable.

The Installer has the following two options in determining the repair boundary whenever a seam has failed either the field tensiometer testing or the laboratory destructive testing:

1. The seam can be reconstructed between any two previously tested and passed destructive seam test locations.
2. The Installer can trace the welding path to an intermediate location (at a 10-foot minimum from the point of the failed test in each direction) and request that the field tensiometer tests be performed at these intermediate locations. If the field tensiometer sample results are acceptable, then the seam sample will be sent to the geosynthetics testing laboratory. If either sample fails, then the process will be repeated until acceptable destructive seam tests have been performed in both directions away from the original failed sample location. All retesting of seams according to this procedure will use the sampling methodology described earlier in this Plan under Sampling Procedure.

   The tracing of a failed seam test will continue until the seaming path boundaries are located, tracking will continue into the previous day's work if needed and into the next day's welding as well.

Seams reconstructed due to a failing destructive seam sample that are in excess of 150 feet long will be destructed tested, and any additional samples taken from the reconstructed zone must pass destructive seam testing.

The RPR will be responsible for documenting all actions, including test results submitted by the geosynthetics testing laboratory, taken in conjunction with seam testing. The RPR will also be responsible for keeping the CQA Officer informed on seam testing results and seaming progress.

The RPR will be responsible for documenting all actions, including test results submitted by the geosynthetics test laboratory, taken in conjunction with seam testing. The RPR will also be responsible for keeping the CQA Officer informed of the seam testing results and the seaming process.

10.5 Post-Installation

Each component covered by this Plan will be examined by the RPR. Any defects, whether due to failed seams, pinholes, or other penetrations, will be repaired.

Placement of the geotextile cushion and select aggregate fill drainage layer will proceed as soon as practicable following the RPR's testing and acceptance of completed geomembrane areas.

The geotextile cushion and drainage layer will provide ultraviolet protection, thermal insulation, and protection form physical damage.

Low-ground pressure tracked equipment (<5 psi) will be used to place the drainage layer material over the geomembrane. A minimum of 1 foot of cover material is required between the geomembrane and the low-ground pressure equipment. A minimum of 2 feet of cover soil is required between the geomembrane and all other tracked or floatation wheeled equipment. A minimum of 3 feet of cover soil is required between the geomembrane and all rubber-tired vehicles.

10.6 Leak Location Testing

Leak location testing (electrical resistivity testing or other approved method) of the installed geomembrane in the liner system will be completed by or observed by the CQA Officer, RPR, or a qualified technician. Leak location testing will be conducted after the leachate collection layer has been placed on the base grades and lower half of the sideslopes. Documentation of the testing method, including a description of the procedures and photographic documentation will be included in the construction documentation report. The documentation report will also include documentation of all defects and repairs including testing data for geomembrane sheet and welding and photographic documentation of the defects prior to and after repairs.

Section 11
Geotextile

11.1 General

This section of the CQA Plan applies to nonwoven geotextile used throughout the landfill facility. Geotextile will be installed in the following systems of the landfill facility:

- Leachate collection system
- Leachate collection sumps
- Liner system

Geotextile may also be used within roadways and spillways for reinforcement. Specifications for the reinforced geotextile will be included with the project plans and specifications for each construction project.

This section is further divided into three major subheadings, which cover the quality assurance requirements for pre-installation (which includes Geotextile Manufacturers), installation, and post-installation (which includes the final examination of the geotextiles prior to placing the appropriate material above the geotextile). The terms pre-installation, installation, and post-installation are applicable only to the geotextile and do not apply to the overall construction of the landfill facility.

11.2 Pre-Installation

11.2.1 Manufacturing

The geotextile will be supplied to the site in factory rolls. Prior to the delivery of any geotextile rolls, the Geotextile Manufacturer will provide the CQA Officer and the Owner with the manufacturer's Quality Control Plan used for the production of the geotextile.

Every roll of geotextile for delivery to the site will be manufactured and inspected by the Geotextile Manufacturer, according to the following requirements:

– The geotextile must contain no needles used for punching.

– The geotextile must be free of holes and any other sign of contamination by foreign matter.

The Geotextile Manufacturer will provide certification, based on tests performed in accordance with the methods listed in Table 11-1 that the geotextile supplied under this Plan will meet the material specifications listed in Table 11-2. These tests may be performed by the Geotextile Manufacturer's laboratory or a laboratory contracted by the Manufacturer. Additionally, the Geotextile Manufacturer will provide certification that the Manufacturer's Quality Control Plan was fully implemented for the geotextile materials supplied under this plan and that the geotextile delivered to the site does not contain needles. The Geotextile Manufacturer will provide documentation to verify the results of the Manufacturer's CQA Plan implementation required by the CQA Officer and the Owner.

The geotextile rolls will be tested and evaluated prior to acceptance. The CQA Officer may perform/require additional testing (i.e., conformance testing) as required by detailed specifications or as required in the judgment of the CQA Officer to verify that the geotextile meets the specifications.

11.2.2 Delivery, Handling, and Storage of Geotextile Rolls

Each geotextile roll to be used at the landfill facility will be marked by the Geotextile Manufacturer with the following information and in the following manner:

When fabric is rolled on a core, each roll will be identified with a durable gummed label, or an equivalent, on the inside of the core and on the outside of the protective wrapping for the roll.

- Each roll label will contain the following information at a minimum:
  - Name of manufacturer
  - Style and type number
  - Roll length and width
  - Batch (or lot) number
  - Nominal product thickness
  - Date of manufacture
  - Roll number

Table 11-1
Geotextile Tests and Test Methods

PROPERTY	TEST METHOD
Grab tensile strength[(1) (2)]	ASTM D4632
Grab elongation[(1) (2)]	ASTM D4632
Puncture strength[(1) (2)]	ASTM D4833
Trapezoidal tear[(1) (2)]	ASTM D4533
Apparent opening size[(1)]	ASTM D4751
Permittivity[(1)]	ASTM D4491
Water flow rate[(1)]	ASTM D4491
UV resistance[(3)]	ASTM D4355

Notes:
(1) Testing is required for geotextile filter.
(2) Testing is required for geotextile cushion.
(3) Testing is required only if the geotextile is to be uncovered for more than 30 days.

Table 11-2
Geotextile Tests, Test Methods, and Acceptance Criteria

PROPERTY[(1)(2)]	TEST METHOD	UNITS	VALUE	6 OZ. [(3)]	8 OZ. [(3)]	10 OZ. [(3)]	12 OZ. [(3)]	16 OZ. [(3)]
Grab tensile strength	ASTM D4632	lb	MARV	160	205	250	300	380
Grab elongation	ASTM D4632	%	MARV	50	50	50	50	50
Puncture strength	ASTM D4833	lb	MARV	85	110	150	175	240
Trapezoidal tear	ASTM D4533	lb	MARV	60	85	100	115	150
Apparent opening size	ASTM D4751	Sieve	MARV	70	80	100	100	100
Permittivity	ASTM D4491	Sec^{-1}	MARV	1.4	1.2	1.0	0.7	0.5
Water flow rate	ASTM D4491	gpm/ft^2	MARV	110	95	75	50	45
UV resistance	ASTM D4355	% Retained @ 500 hrs	Typical[(2)]	70	70	70	70	70

Notes:

1. Values are based on discussions with acceptable manufacturers and represent production values at the time this document was prepared.
2. Values reported in weaker principal direction. All values listed are Minimum Average Roll Values (MARV) except UV resistance. UV resistance is a typical value.
3. Ounce values indicate MARV's in ounce per square yard as determined in accordance with test method ASTM D5261.

The Geotextile Manufacturer will use the following guidelines in packaging, wrapping, and preparing all geotextile rolls for shipment:

- When cores are required, those that have a crushing strength sufficient to avoid collapse or other damage while in use will be used.
- Each roll will be covered with a wrapping material that will protect the geotextile from damage due to shipment, water, sunlight, or contaminants.

The following practices will be used as minimum in receiving and storing geotextile rolls in the designated storage area at the job site:

- While unloading or transferring the geotextile rolls from one location to another, care will be taken to prevent damage to the wrapping or the geotextile itself. If practicable, the Installer/Contractor may use forklift trucks fitted with poles that can be inserted into the cores of rolls. The poles will be at least two-thirds the length of the rolls, to prevent breaking the cores and possibly damaging the geotextile. Rolls will not be dragged.
- The geotextile rolls will be stored in such a manner so as to ensure that they are adequately protected from the following:
  - Precipitation
  - Ultraviolet radiation, including sunlight
  - Strong oxidizing chemicals, acids or bases
  - Flames, including welding sparks
  - Temperatures in excess of 160° Fahrenheit
  - Soiling

The RPR will observe and document, throughout the pre-installation, installation, and post-installation periods, that the Installer provides adequate handling equipment used for moving geotextile rolls and that the equipment and handling methods used do not pose unnecessary risk of damage. The Installer/Contractor is responsible for the means and methods to implement the work.

- The Installer will responsible for ensuring that all materials installed meet specifications. The RPR will maintain a log of the geotextile rolls delivered. The following information, at a minimum, will be recorded on the log for each shipment received at the job site:
  - Date of delivery at the job site
  - For each roll of geotextile, the roll number and the batch (lot) number

11.3 Installation

This section describes the quality assurance requirements applicable to the installation, observation, and documentation of geotextile.

11.3.1 Placement

The Installer will install all geotextile in such a manner so as to ensure that it is not damaged and that it complies with the following requirements:

- On sideslopes, the geotextile will be securely anchored and then rolled down the slope in such a manner so as to continually keep the geotextile in tension.
- In the presence of wind, all geotextile will be secured by suitable methods. The temporary securing material will be left in place until replaced with cover material, if applicable.
- In-place geotextile will be cut with special care to protect other materials from damage that could be caused by the cutting of the geotextile.
- The Installer will take the necessary precautions to prevent damage to any underlying layers during placement of the geotextile.
- During placement of the geotextile, care will be taken not to entrap in the geotextile any stones, excessive dust, or moisture that could damage the geotextile or the underlying geosynthetics, or that could clog drains or filters.
- A visual examination of the geotextile will be carried out over the entire surface after the installation by the Installer to ensure that no potentially harmful objects, such as needles, are present.
- The edges of the geomembrane between phases will be protected with a geotextile wrap and/or an overlying protective material until the edges are spliced together with the liner system of the adjacent phase.

11.3.2 Seams and overlaps

- Geotextile placed as geotextile cushion (to protect the geomembrane liner from the drainage layer material and drainage layer material placement) will be continuously sewn, heat-bonded or seamed using another method approved by the CQA Officer. Geotextile will be overlapped 6 inches prior to seaming. The sewing method and stitch type will be per the Manufacturer's recommendation, but must be approved by the CQA Officer and the Owner. Overlapping of geotextile without sewing may be acceptable for certain applications (*i.e.*, seams under riprap, access roads) with approval from the CQA Officer.

- No horizontal seams will be allowed on slopes steeper than 5 horizontal to 1 vertical (i.e., seams will be along, not across, the slopes), except as part of a geotextile repair.
- Sewing will be performed with thread made from the same base material as the geotextile, or suitable equivalent.
- The Installer will pay particular attention to seams to ensure that materials are not inadvertently trapped beneath the geotextile.

The RPR will be responsible for observing and documenting that the above provisions are performed by the Installer in an acceptable manner.

11.4 Post-Installation

11.4.1 Final Examination

The RPR will perform a final geotextile examination after the installation of each geotextile layer has been completed. The objectives of the final examination are as follows:

- To examine for the presence of holes, tears, or other deterioration
- To examine for excessive tension due to stretching of the fabric during installation
- To examine for the presence of foreign objects (i.e., stones, soil clods) beneath the geotextile

If there will be an extended time delay between completion of the geotextile and the start of the installation of any other cover, then the Installer will make provisions by temporarily securing the geotextile using suitable methods to protect it from wind uplift. The RPR will document in the daily report the placement of the temporary securing methods used.

11.4.2 Placement of Soil Materials

The Construction Contractor will place all soil materials located on top of a geotextile in such a manner so as to minimize the following:

- Damage to the geosynthetics
- Slippage of the geotextile on underlying layers
- Excessive tensile stresses imposed on the geotextile

Section 12
Geosynthetic Clay Liner

12.1 Introduction

This section is divided into three major subheadings, which cover the quality assurance requirements for preinstallation (includes the GCL manufacturer), installation, and post-installation (includes the final examination of GCL prior to the placement of the geomembrane). The terms preinstallation, installation, and post-installation are applicable only to the GCL installation and do not apply to the overall construction of the landfill facility.

12.2 Preinstallation

Preinstallation activities are designed to help ensure that a high-quality product is being manufactured and that it is properly delivered, handled, and stored to maintain its quality.

12.2.1 Manufacturer's Quality Control Plan (MQCP)

The manufacturer of each component of the GCL and the GCL itself will have a Manufacturer's Quality Control Plan (MQCP) to ensure that their product meets all of the stated minimum properties. These manufacturers include the Bentonite Supplier, the Geotextile Manufacturer, and the GCL Manufacturer.

Bentonite Supplier

The Bentonite Supplier will have a MQCP that will be adhered to in the manufacturing process. This plan will include the following information:

- Documentation that the bentonite is sodium bentonite
- Testing that demonstrates that the bentonite meets specified gradation requirements
- Testing that demonstrates that the bentonite meets specified index test requirements
- Testing that demonstrates that the bentonite has not been treated with synthetic chemicals or polymers

Geotextile Manufacturer

The Geotextile Manufacturer will have a MQCP that will be adhered to in their manufacturing process. This plan will include the following provisions:

- Testing that demonstrates that the product is made of specified polymers
- Testing that demonstrates that the product meets certain minimum average roll values (for geotextiles)

GCL Manufacturer

The GCL manufacturer will have a MQCP that describes the procedures for accomplishing quality in the final product. At a minimum, the tests shown in Table 12-1 shall be performed by the Manufacturer.

This MQCP will also dictate the following requirements:

- Overlap alignment lines are to be marked on the edges.
- Completed rolls are to be securely wrapped in plastic.
- Completed rolls are to be stored indoors, and provisions are to be in place to prevent rolls from being stacked too high, to ensure that they are kept dry, and to prevent damage during handling.
- Quality control certificates are to be provided.

12.2.2 Materials

The GCL will be needle-punched reinforced composite GCL consisting of a layer of pure sodium bentonite clay encapsulated between two geotextiles, and will comply with all of the manufacturing processes and physical/chemical criteria listed in this Section.

The bentonite clay utilized in the manufacture of the GCL, as well as any accessory bentonite clay (*i.e.*, Volclay® granular sodium bentonite or approved equivalent) provided for seaming and detail work, will meet the manufacturer's minimum requirements, as specified in the MQCP.

The geotextile components of the GCL, and the geosynthetic clay liner itself, will meet the minimum requirements of the respective MQCPs.

12.2.3 GCL Delivery, Handling, and Storage

The GCL panels will be supplied to the site in factory-produced rolls, which are of standard factory roll dimensions.

Table 12-1
GCL Material Tests, Test Methods, and Acceptance Criteria

	PROPERTY	TEST METHOD[1]	UNITS	VALUE
Bentonite properties	Swell Index Moisture Content Fluid loss	ASTM D5890 ASTM D4643 ASTM D5891	ml/2 g min % ml	24 (min) 12 (max) 18 (max)[3]
Geotextile (as received)	Non-woven (mass per unit area)	ASTM D5261	oz/yd^2	5.9 (MARV)
	Woven (mass per unit area)	ASTM D5261	oz/yd^2	3.0 (MARV)
Physical GCL properties	Bentonite mass per unit area[1] @ 0% moisture	ASTM D5993	lb/ft^2	0.75 (MARV)
	Tensile Strength[2]	ASTM D6768	lb/in	30 (MARV)
	Peel Strength	ASTM D6496	lb/in	3.5 (MARV)
	Hydraulic Conductivity[3]	ASTM D5887	cm/sec	5 x 10^{-9} (max)
	Index Flux[4]	ASTM D5887	m^3/m^2/sec	1 x 10^{-8} (max)
	Internal Shear Strength[4]	ASTM D6243	psf	500 (typical)

Notes:
(1) At 0% moisture content
(2) Tested in machine and cross direction
(3) Deaired, deionized water @ 5 psi maximum effective confining stress and 2 psi head pressure
(4) Typical peak value for specimen hydrated for 24 hours and sheared under a 200 psf normal stress

Each roll of GCL supplied to the site will be labeled with the following information:

- Name and date of manufacturer
- Product type and identification number (if any)
- Roll number
- Lot (batch) number

The GCL Manufacturer will ensure that the crushing strength of all GCL roll cores will be sufficient to avoid collapse or other damage while in use.

The rolls of GCL will be carefully unloaded by the Contractor upon arrival at the site. At a minimum, the following practices will be followed in receiving and storing GCL rolls in the covered storage area at the job site:

- While unloading or transferring the GCL rolls from one location to another, prevent damage to the GCL.
- For standard rolls, a steel support pipe will be inserted through the cardboard roll core. The slings or lifting chains will be attached at one end to the support pipe and at the other end to the bucket of a front-end loader or lifting device. A spreader bar will be used to support and spread the slings. The bar and support pipe must be long enough to prevent damage to the edges of the GCL during hoisting.
- Alternatively, fork lift trucks can be modified to lift the rolls with a steel bar, securely attached to the fork lift and inserted into the roll core. At no time will the rolls be lifted by sliding the forks under the roll.
- The rolls of GCL will be stored in their original, unopened, wrapped cover in a clean, dry area. The material will be stored off the ground on pallets or by other suitable techniques that provide continuous support over the entire length of the roll. It will be covered with a heavy, protective tarpaulin or stored beneath a roof. Care will be used to protect the GCL from the following:
    - Precipitation
    - Ultraviolet radiation, including sunlight
    - Strong oxidizing chemicals, acids or bases
    - Flames, including welding sparks
    - Temperatures in excess of 160°F

The RPR will be responsible throughout the preinstallation, installation, and post-installation periods, for observing and documenting that the Installer provides adequate handling equipment used for moving GCL rolls and that the equipment and handling methods used do not pose any risk of damage.

The RPR will be responsible for making certain that the name of the manufacturer, the type, and the thickness of each roll (as noted on the roll marking label described above) are correct. The RPR will also maintain a log of GCL roll deliveries. The following information, at a minimum, will be recorded on the log for each shipment received at the job site:

- Date of receipt of delivery at job site
- For each GCL roll, the following information will be noted:
  - Roll number
  - Batch (lot) number

12.2.4 Submittals

Submittals will be made prior to installation of the GCL concerning the GCL manufacturer/production information and the GCL installer information.

The GCL Manufacturer/Production Information will include the following:

- Corporate background and information
- Manufacturer's Quality Control Plan (MQCP) for bentonite, geotextile, and GCL manufacturers
- Project reference list consisting of the principal details of at least 10 projects totaling at least 8 million square feet of GCL installation, if required by the RPR or CQA Officer
- Results of tests conducted by the Bentonite Supplier and Geotextile Supplier to document the quality of the materials used to manufacture the GCL rolls assigned to the project
- Copy of quality control certificates, signed by a responsible entity of the Manufacturer. Each quality control certificate will include roll identification numbers, and the results of quality control tests (refer to Subsection 12.2.1 above for minimum testing requirements)
- Manufacturer's written certification that the GCL meets the project specifications, that the GCL has been continuously inspected and found to be needle-free, that the bentonite will not shift during transportation or installation, and that the bentonite and geotextile materials meet the Manufacturer's specifications

GCL Installer information will include the following:

- Corporate background information
- Project reference list consisting of the principal details of at least five projects totaling at least 1 million square feet, if required by the RPR or CQA Officer
- List of personnel performing field operations, along with pertinent experience information, if required by the RPR or CQA Officer

The proposed panel layout diagram identifying placement of the GCL panels and seams, as well as any variances or additional details that deviate from the engineering drawings will also be submitted prior to installation. The layout will be drawn to scale, will include information such as dimensions and details, and will be adequate for use as a construction plan.

12.3 Installation

The following installation procedures are designed to ensure the effectiveness of the GCL in meeting its design requirements and to simplify the deployment procedures. These procedures are to be followed by the Installer, unless the Installer proposes alternative procedures in writing and the CQA Officer approves them in writing prior to installation.

12.3.1 Testing Requirements

This subsection describes the test methods, including sampling procedures and frequencies, and the role of the Geosynthetic Testing Laboratory in testing the GCL roll samples. Unless specified otherwise, all sampling procedures will be performed in accordance with the referenced test method defined in this section.

GCL roll samples will be collected by the Contractor at the discretion of, and under the direction of, the RPR, at a rate specified by the RPR.

Samples will be 3 feet long by the full width of the roll and will not include the first 3 feet of any roll.

Table 12-1 lists the tests and the test methods that may be performed on GCL roll samples. The specifications and methods used in evaluating the results are discussed later in this subsection. At a minimum, the testing required by NR516.07(2m)(a) will be conducted on the GCL.

Role of Testing Laboratory

The Geosynthetic Testing Laboratory will be responsible for performing the tests on samples submitted to them. The results of tests performed will be reported to the RPR and CQA Officer.

Retesting of GCL rolls for quality assurance purposes, because of failure to meet any or all of the acceptance specifications in this section, can only be authorized by the CQA Officer.

The GCL Manufacturer and/or Installer may perform their own tests according to the methods and procedures defined in Table 12-1; however, the results will only be applicable to their own quality control needs. These results will not be substituted for the quality assurance testing described herein.

Procedure For Determining GCL Roll Test Failures

Table 12-1 lists the specifications that are applicable to the GCL. For any referenced test method that requires the testing of multiple specimens, the criteria in Table 12-1 will be met based on the average results of the multiple specimen tests.

The following procedure will be used for interpreting the results relative to acceptance or rejection of rolls, lots, and shipments of GCL to the site:

1. If the test values meet the stated specifications, then the roll and batch will be accepted for use at the job site. If the sample represents all rolls from an entire shipment, then the entire shipment will also be considered accepted.
2. If the results do not meet the specification, then the roll and the batch will be retested at the Contractor's expense using specimens either from the original roll sample or from another sample collected by the RPR. For retesting, two additional tests will be performed for the failed test procedure. (Each additional test will consist of multiple specimen tests if multiple specimens are called for in the failed test procedure.) If both of the retests are acceptable, then the roll and batch will be considered as having passed this particular acceptance test; if either of the two additional tests fail, then the roll and batch will be considered as being unsuitable without further recourse. The RPR may obtain samples from other rolls in the batch. On the basis of testing these samples, the CQA Officer may choose to accept a portion of the batch while rejecting the remainder.

3. If retesting does not result in passing test results as defined in the preceding paragraph, or if there is any other nonconformity with the material specifications, then the Contractor will withdraw the rolls from use in the project at Contractor's sole risk, cost, and expense. Once withdrawn, the same rolls will not be resubmitted for use. Expenses for removing this GCL from the site and replacing it with acceptable GCL will be the sole risk and responsibility of Contractor.

12.3.2 Required Equipment

The following installation equipment is required on-site:

- Front end loader, crane, or other similar equipment. The selected piece of equipment will not cause damage to the subgrade, such as rutting. The Installer will verify in the presence of the RPR that the selected piece of equipment does not damage the subgrade
- A spreader bar to prevent slings from damaging the ends of the rolls.
- Several steel pipes to be inserted into the roll's core for lifting.
- Wooden pallets for aboveground storage of the GCL rolls.
- Heavy waterproof tarps for protecting all GCL rolls.
- Sandbags for securing the GCL during installation and for securing the tarps.
- Adhesive or tape for securing patches.
- Granular bentonite for seams and patches, and for securing around penetrations and structures as shown on the drawings.

12.3.3 Surface/Subgrade Preparation

GCL liner installation will not begin until a proper subbase has been prepared to accept the bentonite liner. Base material will be fine-grained soil free from angular rocks, roots, grass, and vegetation. Foreign materials and protrusions will be removed, and all cracks and voids will be filled; the surface will be made smooth and uniformly sloping. Unless otherwise required by the contract specifications and drawings, the prepared surface will be free from excessive moisture, loose earth, rocks or clay clods larger than 2 inches in diameter, rubble, and other foreign matter. The subgrade will be uniformly compacted to a minimum of 90 percent Modified Proctor density (ASTM D1557), to ensure against localized settlement and rutting under wheel loads and will be smoothed with a smooth drum or vibratory roller.

The surface on which the liner is to be placed will be maintained in a firm, clean, and smooth condition, free of standing water, during liner installation.

12.3.4 Deployment

As each roll is moved from the storage area, the labels will be removed by the Installer or RPR for storage in the project file.

The rolls of GCL will be brought to the area to be lined with a front-end loader, and support pipe will be set up such that the roll of liner is fully supported across its length. A spreader bar or similar device will be used to prevent the lifting chains or slings from damaging the edges. Dragging of the GCL liner will be minimized.

The Contractor will ensure, and the RPR will verify, that the following criteria are being met:

- The equipment used does not damage the GCL by handling, excessive heat, leakage of hydrocarbons, or by other means.
- The prepared surface underlying the GCL has not deteriorated since previous acceptance, and it is still acceptable at the time of GCL placement.
- Personnel working on the GCL do not smoke, wear damaging clothing, or engage in other activities that could damage the GCL.
- The method used to unroll the GCL does not cause damage to the GCL, and/or the subgrade.
- The method used to place the rolls minimizes wrinkles (especially wrinkles between adjacent panels).

GCL must not be placed during precipitation events, in the presence of excessive moisture, in any area of ponded water, or during excessive winds. The GCL must be dry when installed and must be dry when covered.

The proper side of the GCL, as per the manufacturer's recommendation, will face upward (unless otherwise dictated by project requirements). The liner will be placed over the prepared surface such that material handling will be minimized.

The GCL panels will be placed in a manner that ensures sufficient overlap as described in Subsection 12.3.5. Horizontal seams will not occur on slopes steeper than 7H:1V.

The cover material (i.e., geomembrane) will be placed over the bentonite liner during the same day as the placement of the GCL. Only those GCL rolls that can be covered that same day will be unpacked and placed in position.

When wind conditions could affect installation, the GCL liner installation will be started at the upwind side of the project and will proceed downwind. The leading edge of the liner will be secured at all times with sandbags or other means sufficient to hold it down during high winds.

The GCL will be installed in a relaxed condition and will be free of tension or stress upon completion of the installation. Stretching of the liner to fit will not be allowed. Deployed rolls (panels) will be straightened by the installation personnel to smooth out creases or irregularities.

The RPR will visually inspect the geotextile's quality, the bentonite uniformity, and the degree of hydration, if any, of the GCL. Any areas in need of repair will be marked.

12.3.5 Seaming

Once the first panel has been deployed, adjoining panels will be laid with a 6-inch minimum overlap on longitudinal seams, and 20 inches on the panel end seams, depending on project specifications. Six-inch overlap lines will be marked on the liner to assist in obtaining the proper overlap. All dirt, gravel, or other debris will be removed from the overlap area of the GCL.

Seam overlaps, whenever possible, will be placed such that the direction of flow is from the top panel to the underlying panel to form a shingle effect.

If the GCL requires a granular bentonite seam, then the overlapping panel edge will be pulled back and granular Volclay® (or approved equivalent) sodium bentonite will be poured continuously along all seams and lap areas from the panel edge to the 6-inch lapline, at a minimum application rate of ¼ pound per linear foot or as recommended by the manufacturer.

12.3.6 Patches/Repairs

Irregular shapes, cuts, or tears in the installed GCL will be covered with sufficient liner to provide a 12-inch overlap in all directions beyond the damaged area. A layer of granular bentonite will be placed in the overlap zone in accordance with the Manufacturer's recommendations. An epoxy-based adhesive, or other approved method, will be used to secure the patch during backfill operations. Alternatively, the patch can be placed underneath the defective liner.

12.3.7 Penetration Seals

The GCL will be sealed around penetrations, pipes, and structures in accordance with the recommendations of the GCL Manufacturer.

Pipe penetrations will incorporate a collar of GCL wrapped around the pipe and securely fastened. A bentonite or mastic grout will be placed around the corners for additional protection.

An additional GCL skirt placed over the bentonite grout is also recommended to provide a third level of protection and to prevent the bentonite grout from being displaced.

If the seal requires granular bentonite, then a 1- to 2-inch cut will be excavated around the circumference of the pipe, into the subgrade at least 12 inches out from the pipe. Volclay® sodium bentonite (or approved equivalent) will then be packed around the pipe in the subgrade excavation and on adjacent areas so that the pipe is surrounded with granular bentonite.

The GCL panel will then be placed over the pipe by penetrating the GCL with slits in a "pie" configuration where the pipe is to protrude in a manner that will create a snug fit between the GCL and the pipe.

More sodium bentonite will then be spread around the cut edges of the GCL against the pipe and over adjacent areas.

To complete the pipe penetration seal, a collar of GCL will be cut in a manner similar to that made on the main panel and will be fit around the pipe, with additional Volclay® sodium bentonite (or approved equivalent) being applied into any gaps that may remain.

12.3.8 Covering GCL

Only the amount of GCL that can be inspected, repaired, and covered with geomembrane in the same day will be installed. The GCL must be covered with geomembrane or alternative temporary cover the same day on which it is installed.

Geosynthetics

When covering the GCL, precautions will be taken to prevent damage to the GCL by restricting heavy equipment traffic. If a textured geomembrane is to be placed over the GCL, the RPR may require a slip sheet (such as 20-mil smooth HDPE) will be placed over the GCL to allow the textured geomembrane to slide into its proper position. The slip sheet will be removed after the geomembrane is in place.

The following requirements apply to soil placement over the GCLs:

- Equipment used for placing the soil must not be driven directly on the GCL.
- A minimum thickness of 1 foot of soil is specified between a light dozer (*i.e.*, maximum contact pressure of 5 lb/sq. inch) and the GCL.
- A minimum thickness of 3 feet of soil is specified between rubber-tired vehicles and the GCL.

Any leading edge or panels of GCL left unprotected must be covered with a heavy, waterproofing tarp that is secured and protected with sandbags or other ballast.

12.3.9 Submittals

The following will be submitted during installation:

- Daily records/logs prepared by the Installer documenting work performed, personnel involved, general working conditions, and any problems encountered or expected on the project. These records will be submitted on a weekly basis.
- Copy of daily subgrade acceptance forms by the Installer.
- Quality control documentation.

12.4 Post-installation

12.4.1 Final Examination

The RPR will perform a final GCL examination after portions of installation have been completed. The RPR will examine the GCL for the following:

- Tears or defects
- Proper overlaps

If any portion of the GCL requires repairs based on the above examination, it will be repaired in accordance with the procedures in Subsection 12.3.6.

12.4.2 Submittals

The following will be submitted after installation is complete:

- Installation certification prepared by the Installer certifying that the GCL was installed in substantial accordance with the specifications and the CQA Plan.
- An as-build panel layout diagram prepared by the Installer identifying the placement of panels and seams. The numbering sequence will be as agreed upon between the RPR and the Installer prior to commencing installation.
- A copy of the Warranty obtained from the Manufacturer/Installer.

Section 13
Piping

13.1 General

This section includes quality assurance requirements for piping used throughout the facility. Piping will be used in the construction of the following items:

- Leachate collection system
- Leachate conveyance system
- Gradient control system
- Gas extraction system
- Final cover toe drain collection and discharge piping

This section is further divided into three major subheadings, which cover the quality assurance requirements for the pre-installation (includes Piping Manufacturers and Fabricators), installation, and post-installation (includes the final observation and documentation of piping installations). The terms pre-installation, installation, and post-installation are applicable only to the piping installation and do not apply to the overall construction.

Individual pipe sizes and standard dimension ratios (SDRs) to be used for each individual pipe installation are not detailed in this section; the construction plans and specifications will be used for the determination of correct size and wall thickness.

13.2 Pre-Installation

13.2.1 Manufacturing

High-Density Polyethylene Material Specifications

High-density polyethylene (HDPE) pipe must be made from extra high molecular weight (EHMW) polyethylene (PE) resin, and the manufactured piping must be classified as Type III, Class C, Category 5, Grade P34 material according to ASTM D1248 and have a cell classification of 345464C as defined by ASTM D3350.

Polyvinyl Chloride Material Specifications

All polyvinyl chloride (PVC) pipe fittings must be PVC molded fittings. Extruded fittings may not be used unless specifically approved in writing by the CQA Officer.

Fabricator

The Piping Fabricator will be responsible for perforating the pipe delivered by the Piping Manufacturer according to the plans and specifications.

13.2.2 Delivery, Handling, and Storage of Piping

Pipe will be protected during shipment from excessive heat or cold, puncture, or other damaging or deleterious conditions. The pipe will be stored on-site in a manner suitable to protect it from long-term ultraviolet exposure prior to actual installation.

The RPR will be responsible throughout the pre-construction, construction, and post-construction periods for observing and documenting that the Contractor provides adequate handling equipment for moving pipe and that the equipment and handling methods used do not pose any risk of damage.

The RPR will maintain a log of pipe deliveries throughout the installation. The pipe size and type at a minimum will be recorded on the log for each shipment received at the job site.

13.3 Installation

13.3.1 Connections

HDPE Pipe

Unless approved otherwise by the CQA Officer, HDPE pipe connections will be made by the butt fusion procedure. The following procedure will be used regarding butt fusion seams:

- Seams will be made at the Manufacturer's recommended temperature for fusing pipe and fittings.
- For pipe diameter sizes 4 inches (nominal) and larger, seams will be made using the hydraulic fusion machines. For pipe diameters of less than 4 inches, manual fusion equipment can be used.

- Care will be taken to make certain that adequate pressures are used for fusing pipes and that sufficient cooling periods are allowed prior to testing, bending, or backfilling of pipe sections.

PVC Pipe

Unless approved otherwise by the CQA Officer, all PVC pipe connections will be made according to the Standard Practice for Making Solvent-Cemented Joints with Polyvinyl chloride (PVC) Pipe and Fittings, ASTM D2855. Particular care will be taken regarding required set and cure times for solvent-cemented joints, which vary for ambient temperature conditions. Joints will not be subjected to stresses by moving or backfilling prior to the specified set times, ASTM D2855. Only original quality solvent cement may be used since expired shelf life and deteriorated cements may cause inadequate connections.

13.3.2 Placement

Pipe placement will be done in accordance with the following procedure and requirements:

- Piping will be bedded and backfilled according to the plans and specifications.
- Piping placement will not be performed in the presence of excessive moisture.
- The prepared surface underlying the piping will not show evidence of deterioration since previous acceptance and must be acceptable prior to piping placement.
- The method used to place the piping will not cause damage to the piping and will not disturb the supporting backfill.
- The pipe bedding material will be shovel-sliced, or compacted to the spring line of the pipe to ensure proper bedding.
- Observations and measurements will be made to ensure that the pipes are of the specified size and dimension ratio, manufactured of the specified material, and that pipe perforations are sized and spaced as specified.
- All piping will be located as noted in the plans and specifications. Locations, grades, and size requirements are specified on the details of the plan set. Observations and surveying measurements will be made to ensure that the pipes are placed at the specified locations and grades and in the specified configuration. Deviations from the plans and specifications will be brought to the attention of the CQA Officer for evaluation of the necessity of corrective action.

13.3.3 Damage

The RPR will examine each pipe after placement for damage. The RPR will advise the CQA Officer as to which pipes will be rejected, repaired, or accepted. Damaged pipes or portions of pipes that have been rejected will be marked and removed from the installation area and documented by the RPR.

13.4 Post-Installation

Leachate collection pipes will be cleaned with a water jet cleanout device with a maximum pressure of 10,000 pounds per square inch after collection pipe and leachate drainage layer installation is complete. The pipes will be cleaned by jetting from each cleanout access point to the toe of the opposite sideslope. Any pipes that do not appear to be free flowing will be immediately reported to the CQA Officer, and corrective action will be taken.

A video camera inspection will be conducted on all leachate collection pipes after initial pipe cleaning activities described above. The video camera inspection will extend a minimum of 300 feet onto the base grades of each leachate collection pipe.

A summary report will be submitted after the pipe cleaning and video camera inspection. The report will summarize any specialty equipment used in collection pipe cleaning, blockages or difficulties in cleaning pipes, and how blockages were removed or pipe damage repaired. Recording tape or disk of the video camera inspection will be included with the summary report.

Solid-wall leachate transfer pipe (single- and double-walled) outside the limits of waste and all gas transfer pipe will be water pressure–tested to document that the piping system is water-tight. The line will be filled with clean water to remove all air and pressurized to a target value of 30 pounds/square inch (gauge pressure). The valve on the pressurizing unit will be closed, and the system will be pressure monitored for a minimum of 3 hours. The water pressure test is acceptable if the pressure remains within 5 percent of the target value for 1 hour once the target pressure is reached. The RPR will observe and document that this operation is carried out and that the pipes are water-tight. If pipes are found to not be water-tight, the pipes will be repaired and repressurized until passing values are achieved.

Pipe invert elevations will be documented every 25 linear feet by survey or every 50 feet if a total station, GPS, or laser equipment is used, as well as at key points, including changes in grade, intersections, and end points.

Section 14
Geocomposite

14.1 General

This section covers the quality assurance requirements for pre-installation, installation, and post-installation. The terms pre-installation, installation, and post-installation are applicable only to the geocomposite and to not apply to the overall construction of the landfill facility.

14.2 Pre-Installation

14.2.1 Manufacturing

The geotextile portion of the geocomposite will be composed of a nonwoven, needle-punched, polyester or polypropylene geotextile. The Installer will ensure that the geotextile portion of the geocomposite has a minimum average roll value as listed in Table 14-1.

The geonet portion of the geocomposite must be fabricated for HDPE resin, and fabricated geonet must be classified as Type III, Class C, and Category 4 or 5, as defined by ASTM D1248. The geonet will be manufactured by extruding two sets of strands to form a three-dimensional structure to provide planar flow. The Installer will ensure that the geonet portion of the geocomposite has minimum average roll values listed in Table 14-2.

The geocomposite will be manufactured by heat-bonding the geotextile to the geonet on both sides. The bond between the geotextile and the geonet must have minimum peel strength of 1 lb/inch (ASTM D413).

The geocomposite will be supplied to the site in factory rolls. Prior to the delivery of any geocomposite rolls, the Geocomposite Manufacturer will provide the CQA Officer and the Owner with the manufacturer's Quality Control Plan used for the production of the geocomposite.

Table 14-1
Geotextile Specifications

PROPERTY	TEST	UNITS	CRITERION	4 OZ VALUE	6 OZ VALUE	8 OZ VALUE	10 OZ VALUE	12 OZ VALUE	16 OZ VALUE
Apparent opening size	ASTM D4751	Sieve	Maximum	70	70	80	100	100	100
Grab strength	ASTM D4632	lb	Minimum	120	170	220	260	320	390
Grab strength elongation	ASTM D4632	Percent	Minimum	50	50	50	50	50	50
Trapezoidal tear	ASTM D4533	lb	Minimum	50	70	95	100	125	150
Puncture strength	ASTM D4833	lb	Minimum	60	90	120	165	190	240
Permittivity	ASTM D4491	Sec^{-1}	Minimum	1.50	1.50	1.50	1.20	0.80	0.70
Permittivity	ASTM D4491	cm/s	Minimum	0.22	0.30	0.30	0.30	0.29	0.27

Table 14-2
Geonet Specifications

PROPERTY	TEST	UNITS	CRITERION	VALUE	VALUE	VALUE	VALUE
Thickness	ASTM D5199	Mils	Range	200	250	275	300
Density	ASTM D1505	g/cm^3	Minimum	0.94	0.94	0.94	0.94
Carbon black content	ASTM D1603 modified	Percent	Range	2.0	2.0	2.0	2.0

The Geocomposite Manufacturer will provide certification, based on tests performed in accordance with the methods listed in Table 14-1 that the geotextile supplied under this Plan will meet the material specifications listed in Table 14-1 and that the geonet supplied under this Plan will meet the material specifications in Table 14-2. These tests may be performed by the Geotextile or Geonet Manufacturer's laboratory or a laboratory contracted by the Manufacturer. Additionally, the Geocomposite Manufacturer will provide certification that the Manufacturer's Quality Control Plan was fully implemented for the geotextile materials supplied under this plan and that the geocomposite delivered to the site does not contain needles. The Geocomposite Manufacturer will provide documentation to verify the results of the Manufacturer's CQA Plan implementation required by the CQA Officer and the Owner.

The geocomposite rolls may be tested and evaluated prior to acceptance. The CQA Officer may perform/require additional testing (i.e., conformance testing) as required by detailed specifications or as required in the judgment of the CQA Officer to verify that the geocomposite meets the specifications.

14.2.2 Delivery, Handling, and Storage of Geocomposite Rolls

Each geocomposite roll, for use at the landfill facility, will be marked by the Geocomposite Manufacturer with the following information and in the following manner:

- When fabric is rolled on a core, each roll will be identified with a durable gummed label, or an equivalent, on the inside of the core and on the outside of the protective wrapping for the roll.
- Each roll label will contain the following information, at a minimum:
    - Name of manufacturer
    - Style and type number
    - Roll length and width
    - Batch (or lot) number, if applicable
    - Date of manufacture
    - Roll number

The geocomposite Manufacturer will use the following guidelines in packing, wrapping, and preparing all geocomposite rolls for shipment:

- When cores are required, those that have a crushing strength sufficient to avoid collapse or other damage while in use will be used.
- Each roll will be covered with a wrapping material that will protect the geotextile from damage due to shipment, water, sunlight, or contaminants.

At a minimum, the following practices will be followed in receiving and storing geocomposite rolls in the covered storage area at the job site:

- While unloading or transferring the geocomposite rolls from one location to another, care will be taken to prevent damage to the geocomposite. If practicable, forklift trucks fitted with poles that can be inserted into the cores of the rolls will be used. The poles will be at least two-thirds the length of the rolls to avoid breaking the cores and possibly damaging the geocomposite. Rolls will not be dragged. For geocomposite rolls shipped with manufacturer's straps, these straps can be used to unload or transport geocomposite rolls.
- The geocomposite rolls will be stored in a manner so as to ensure that they are adequately covered to protect the geocomposite from the following:
  - Precipitation
  - Ultraviolet radiation
  - Strong oxidizing chemicals, acids or bases
  - Flames, including welding sparks
  - Temperature in excess of 160°F

The RPR will be responsible throughout the pre-installation, installation, and the post-installation periods for observing and documenting that the Installer provides adequate handling equipment used for moving geocomposite rolls and that the equipment used does not damage the geocomposite rolls.

The RPR will maintain a log of geocomposite roll deliveries. The following information, at a minimum, will be recorded on the log for each shipment received at the job site.

- Date of delivery at the job site.
- For each geocomposite roll, the following information:
  - Roll number
  - Batch (lot) number, if applicable

14.3 Installation

14.3.1 Placement

The Installer will install all geocomposite in such a manner so as to ensure that it is not damaged in any way, and in a manner that complies with the following:

- The geocomposite will be securely anchored, as shown on the design drawings and specifications, and then rolled downslope in such a manner so as to continually keep the geocomposite in tension. If needed, the geocomposite will be positioned by hand after being unrolled to minimize wrinkles. Horizontal placement of the geocomposite on sideslopes will not be allowed.
- In the presence of wind, all geocomposite will be secured by suitable means. The temporary weighted material will be left in place until replaced with cover material as shown on the design drawings and specifications.
- Cutting will be done according to manufacturer's recommendations.
- The Installer will take the necessary precautions to prevent damage to any underlying layers during placement of the geocomposite.
- During placement of geocomposite, care will be taken not to entrap any stones, excessive dust, or moisture that could clog the drainage system, and/or stones that could damage the adjacent geomembrane.
- The geocomposite will not be welded or tack-welded to the geomembrane.

The RPR will observe and document that the Installer performs each of the above steps. Any noncompliance with the above requirements will be recorded and reported by the RPR.

14.3.2 Overlaps and Joining

The following requirements will be used with regard to the overlapping and joining of geocomposite rolls:

- The geotextile portion of the geocomposite will be overlapped 4 to 6 inches, and the upper geotextile will be sewn or fusion welded. The geonet portion will be overlapped a minimum of 2 inches, and will be secured with plastic ties.
- Tying will be performed with pull ties. Ties will be white or brightly colored plastic for easy identification. Ties will be placed 3 feet to 5 feet on center along the edges, and 12 inches on center on the ends of the rolls. Metallic devices will not be used under any circumstances.

- No horizontal joints or overlaps will be allowed on slopes greater than 3 horizontal to 1 vertical, except as part of a patch.
- The Installer will pay particular attention to the overlapped areas to ensure that no earthen or foreign materials could be inadvertently trapped beneath the geocomposite.

The RPR will observe and document that the Installer performs each of the above steps. Any noncompliance with the above requirements will be reported by the RPR to the CQA Officer and the Owner.

14.3.3 Repairs

Any tears or other defects in the geocomposite will be repaired by placing a patch with minimum overlaps described in Subsection 14.3.2. The patch will be secured to the original geocomposite by tying every 6 inches. If the tear or other defect width is more than 50 percent of the roll width, the damaged area will be cut out and replaced with new geocomposite. Tying will be as indicated in Subsection 14.3.2.

The RPR will examine and document that the repair of any geocomposite is performed according to the above procedure.

14.4 Post-Installation

14.4.1 Final Acceptance

The RPR will perform a final geocomposite examination after installation has been completed. The objectives of this step are as follows:

- To examine for presence of tears or defects
- To examine overlaps to make certain that they are in conformance with the requirements of Subsection 14.3.2

If any portion of the geocomposite requires repairs due the above examination, they will then be performed according to the procedures in Subsection 14.3.3.

If there will be an extended delay between completion of the geocomposite and the start of the installation of any overlaying cover, the Installer will make provisions, by placing temporary securing means, to protect the geocomposite from wind uplift.

14.4.2 Placement of Soil Materials

The Contractor will place all soil materials located on top of the geocomposite in such a manner so as to minimize the following:

- Damage to the geocomposite
- Slippage of the geocomposite on underlying layers
- Excessive tensile stresses imposed on the geocomposite

PLAN MODIFICATION

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
3911 Fish Hatchery Road
Fitchburg WI 53711-5397

Scott Walker, Governor
Cathy Stepp, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

WISCONSIN
DEPT. OF NATURAL RESOURCES

April 18, 2017

John Welch
Solid Waste Manager
Dane County Landfill
1919 Alliant Energy Center Way
Madison, WI 53713

FID # 113127300
SW Approvals

Subject: Plan of Operation Approval Modifications, Dane County Landfill No. 2 (Rodefeld), License #3018

Dear Mr. Welch:

The requested modifications to your plan of operation for a proposed alternative final cover design and for the use of on-site stockpiled materials as the fine grained soil barrier layer in the final cover for the Dane County Landfill #2 have been reviewed and approved. Please include the attached approval in the written operating record for the landfill as specified in s. NR 506.17, Wis. Adm. Code.

Alternative Final Cover Design

The proposed alternative final cover design modification includes the option of replacing the currently approved final cover design for the area of the site not covered by the August 13, 2014 plan of operation approval with an alternative design. The currently approved final cover consists of the following (top to bottom):

6 inches of topsoil
24 inches of rooting zone
Geocomposite drainage system
40-mil HDPE textured geomembrane
2 feet of compacted clay
6 to 12 inches of intermediate cover/grading layer soils

The proposed geosynthetic clay liner (GCL) final cover option would allow the clay layer to be replaced with a GCL and a soil barrier layer. This final cover option would consist of the following (top to bottom):

6 inches of topsoil
30 inches of rooting zone
Geocomposite drainage system
40-mil LLDPE geomembrane liner
Geosynthetic clay liner (GCL)
2 feet of compacted soil barrier layer
6 to 12 inches of intermediate cover/grading layer soils

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The compacted soil barrier layer will consist of 2 feet of compacted soil classified according to the Unified Soil Classification System (USCS) as ML, CH, CL, SM, SC, or a dual classification of these soils, with at least 25% by weight passing the P200 sieve size. Soil will be placed in compacted lifts no greater than 1 foot and compacted using footed compaction equipment with feet at least 6 inches long. Soil will be compacted to a minimum of 95% of the standard Proctor or 90% of the modified Proctor maximum dry density at a moisture content at or wet of optimum. The upper one foot of the soil barrier layer will have a maximum particle size of 2 inches or less and the lower one foot of the soil barrier layer shall have a maximum particle size of 4 inches or less. The surface of the top lift shall be graded or compacted to be smooth and firm. The prepared surface of the soil barrier layer will be free of vegetation, stones, sharp-edged rocks, soil clods, or other deleterious material protruding from the surface that could damage the GCL. Any objects larger than 1/2 inch shall be removed from the soil barrier layer surface.

After acceptance of the soil barrier layer, the GCL will be installed in a relaxed condition. The GCL will be covered with the geomembrane on the same day it is installed to prevent excessive hydration or desiccation. The GCL may not be installed in standing water or during rain. The GCL will be stored and handled in accordance with ASTM D5888.

A preconstruction report per s. NR 514.07(1)(k), Wis. Adm. Code, will be submitted prior to the installation of the geomembrane and GCL. This report will present information about the GCL selected for the project, the manufacturer and installer of the GCL, and the CQA Plan and QA Contractor. The preconstruction report will include information from physical stability testing, and describe the methods and equipment to be used in installing the GCL and associated cover system components. A planned GCL panel layout diagram will be included in the report. Per NR 516.04(5)(c), Wis. Adm. Code, a shear test will be required to determine the interface friction angle between the soil barrier layer material, GCL, and geomembrane to be used in each construction segment.

Soil Barrier Layer Capping Material

The proposed modification to use on-site stockpiled materials as the fine grained soil barrier layer in the final cover includes material from Parisi Construction and Phase 10-Cell 2 construction. The modification also requests an alternative sampling plan for future sources of soil barrier layer material such as removed final cover general fill soils in the Phase 10-Cell 3 and Phase 11 areas, and soils excavated for horizontal expansion in Phase 9-Cell 2, Phase 11, and phase 12 areas.

The Parisi Construction stockpile has approximately 12,000 cubic yards of material. Nine samples were collected and analyzed for Atterberg Limits, grain size, and USCS classification. Three samples were tested for Modified Proctor and hydraulic conductivity. The test results show that this material is classified as CL, ML and SC-SM and with at least 25% passing the P200 sieve size.

The Phase 10- Cell 2 construction stockpile has approximately 40,000 cubic yards of material. Nineteen samples were collected and analyzed for Atterberg Limits, grain size, and USCS classification. Four samples were tested for Modified Proctor. The test results show that this material is classified as CL, ML, SC, CL-ML and SC-SM and with at least 25% passing the P200 sieve size.

Future sources of soil barrier layer material will, at a minimum, be sampled every 2,000-2,500 cubic yards. All samples will be tested for grain size, Atterberg Limits, and USCS classification. Proctor testing will be performed, at a minimum, on one of every four samples. If the material s are variable in nature, additional testing will be performed to adequately characterized each material. Material testing results will be forwarded to the Department prior to use for final cover construction.

If you have any questions regarding this letter, please contact Ann Bekta at (608)743-4845 or ann.bekta@wisconsin.gov.

Sincerely,

Cynthia Moore
Waste and Materials Management Supervisor
South Central Region

c: Ann Bekta – Janesville
Adam Hogan – SCR

BEFORE THE
STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

PLAN OF OPERATION APPROVAL MODIFICATION
FOR THE
DANE COUNTY LANDFILL NO. 2 (RODEFELD) (#3018)

FINDINGS OF FACT

1. Dane County ("County") owns and operates the Dane County Landfill No. 2 (Rodefeld), a solid waste disposal facility located in the N1/2 of Section 25, T7N, R10E, City of Madison, Dane County, Wisconsin.

2. Conditional plan of operation approvals were issued by the Department for the facility on August 14, 1984, March 14, 1994 and August 13, 2014.

3. On February 23, 2017, Dane County submitted a request to the Department for modifications to the plan of operation approval. The correct review fee of $1,650 was received by the Department on March 27, 2017.

4. On March 27, 2017, Dane County submitted a request to the Department for modifications to the plan of operation approval. The correct review fee of $1,650 was received by the Department on April 6, 2017.

5. The information submitted in connection with the modification request includes:

   a. A February 20, 2017 letter entitled "Plan Modification for Final Cover System Design and Construction, Dane County Landfill Site No. 2 Rodefeld that was received by the Department on February 23, 2017.

   b. A March 23, 2017, letter entitled "Plan Modification – Soil Barrier Layer Capping Material, Dane County Landfill Site No. 2 Rodefeld that was received by the Department on March 27, 2017.

   c. An April 7, 2017, Dane County addendum letter for the February 23, 2017 and March 27, 2017 plan modifications. The addendum contained a registered professional engineer certification, clarified the type of geomembrane, and provided a sampling frequency for the soil barrier layer material.

6. Additional documents considered in connection with the modification request include the following:

   a. The Department's August 13, 2014 plan of operation approval.

   b. The Department's March 14, 1994 plan of operation approval.

   c. The Department files for the Dane County Landfill (License #3018).

7. The special conditions set forth below are needed to assure that the facility will not pose a substantial hazard to public health or welfare.

CONCLUSIONS OF LAW

1. The Department has authority under s. 289.30(6), Stats., to modify a plan of operation approval if the modification would not inhibit compliance with the applicable portions of chs. NR 500-538, Wis. Adm. Code.

2. The Department has authority to approve a modification to the plan of operation with special conditions if the conditions are needed to ensure compliance with the applicable portions of chs. NR 500-538, Wis. Adm. Code.

3. The conditions of this approval are needed to ensure compliance with chs. NR 500-538, Wis. Adm. Code.

4. In accordance with the foregoing, the Department has authority under s. 289, Stats., to issue the following conditional plan of operation approval modification.

PLAN OF OPERATION APPROVAL MODIFICATION

The Department hereby approves the proposed modifications to the plan of operation for the Dane County Landfill #2, subject to chs. NR 500 through NR 538, Wis. Adm. and the following:

1. The geosynthetic clay layer and the soil barrier layer shall meet the material and construction specification in NR 504.07(4)(a), and NR 516.07(2m), NR Wis. Adm. Code.

2. The Department's waste management engineer assigned to this project shall be informed a minimum of one week prior to each of the construction events listed below, in order to allow a Department representative to observe the work. A fee shall be paid to the Department for each required inspection in accordance with s. NR 520.04(5), Wis. Adm. Code. The inspection fees shall be paid at the time the construction documentation review fee is submitted to the Department.

    a. Placement and compaction of the soil barrier layer below the GCL.

    b. Placement of the GCL.

    c. Placement of the geomembrane over GCL.

This approval is based on the information available to the Department as of the date of approval. If additional information, project changes or other circumstances indicate a possible need to modify this approval, the Department may ask you to provide further information relating to this activity. Likewise, the Department accepts proposals to modify approvals, as provided for in state statutes and administrative codes.

NOTICE OF APPEAL RIGHTS

If you believe that you have a right to challenge this decision, you should know that Wisconsin statutes and administrative rules establish time periods within which requests to review Department decisions must be filed.

For judicial review of a decision pursuant to sections 227.52 and 227.53, Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for judicial review shall name the Department of Natural Resources as the respondent.

Dated: April 18, 2017

DEPARTMENT OF NATURAL RESOURCES
For the Secretary

Cynthia Moore

Cynthia Moore
Waste & Materials Management Supervisor
South Central Region

Cynthia Moore for Ann Bekta

Ann M. Bekta, P.E.
Waste Management Engineer
South Central Region

APPENDIX E
PHASE 9 – CELL 2 LINER CONSTRUCTION
DOCUMENTATION COORDINATE AND ELEVATION TABLES

Table 1
Gradient Control System
Phase 9 - Cell 2 Construction
Dane County No. 2 (Rodefeld) Landfill

POINT NO.	PIPE LOCATION		GRADIENT CONTROL COLLECTION LINE TRENCH ELEVATION			PIPE INVERT ELEVATION			COMMENTS
	NORTHING	EASTING	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	
429	381,955.6	2,201,015.0	865.76	865.72	0.0	866.10	866.07	0.0	Blind Flange End of Existing Pipe
1443	381,920.0	2,201,015.0	865.90			866.29			Spot elevation along pipe
1444	381,870.0	2,201,015.0	866.09			866.48			Spot elevation along pipe
1445	381,820.0	2,201,015.0	866.29			866.68			Spot elevation along pipe
1446	381,770.0	2,201,015.0	866.48			866.87			Spot elevation along pipe
1447	381,720.0	2,201,015.0	866.68			867.07			Spot elevation along pipe
1448	381,670.0	2,201,015.0	866.87			867.26			Spot elevation along pipe
1449	381,620.0	2,201,015.0	867.07			867.46			Spot elevation along pipe
1450	381,570.0	2,201,015.0	867.26			867.65			Spot elevation along pipe
1451	381,520.0	2,201,015.0	867.46			867.85			Spot elevation along pipe
1452	381,470.0	2,201,015.0	867.65			868.04			Spot elevation along pipe
1453	381,420.0	2,201,015.0	867.85			868.24			Spot elevation along pipe
1454	381,370.0	2,201,015.0	868.04			868.43			Spot elevation along pipe
1455	381,331.2	2,201,015.0	868.20			868.58			Blind Flange End of Pipe

Notes:

1. Refer to Plan Sheet 5 of the construction drawings for locations of coordinate points.

Checked: S. Sellner, 01/02/2018
Approved: D. Marshall, 01/02/2018

Table 2
Clay Liner Grades
Phase 9 - Cell 2 Construction
Dane County No. 2 (Rodefeld) Landfill

POINT NO.	DESIGN LOCATION NORTHING	DESIGN LOCATION EASTING	BOTTOM OF GRADIENT LAYER DESIGN ELEVATION DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	SUBBASE DESIGN ELEVATION DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	BASE GRADE DESIGN ELEVATION DESIGN (ft)	ACTUAL (ft)	DELTA	CLAY LINER THICKNESS DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	GRANULAR DRAINAGE LAYER LAYER ELEVATION DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	GRANULAR DRAINAGE LAYER THICKNESS DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	COMMENTS
TOLERANCE RANGE					+0.00 -0.10			+0.00 -0.10			+0.10 -0.00			+0.10 -0.00			+0.10 -0.00			+0.10 -0.00	
LOCATION OF EXISTING LINER IN PHASE 9 - CELL 1 FOR TIE-IN OF THE LINER FOR PHASE 9 - CELL 2																					
406	381,967.4	2,200,915.0	NA	NA	NA	NA	874.26	NA	NA	878.34	NA	NA	4.08	NA	879.34			1.00			Limits of 4' Clay Liner
407	381,967.4	2,200,965.0	NA	NA	NA	NA	873.23	NA	NA	877.34	NA	NA	4.11	NA	878.34			1.00			Limits of 4' Clay Liner
408	381,967.4	2,200,990.0	NA	871.80	NA	NA	872.81	NA	NA	876.90	NA	NA	4.09	NA	877.90			1.00			Limits of 4' Clay Liner
409	381,967.4	2,201,004.8	NA	871.47	NA	NA	872.49	NA	NA	876.54	NA	NA	4.05	NA	877.54			1.00			Limits of 4' Clay Liner
410	381,967.4	2,201,015.0	NA	869.88	NA	NA	870.83	NA	NA	874.83	NA	NA	4.00	NA	875.83			1.00			Limits of 4' Clay Liner
411	381,967.4	2,201,025.2	NA	871.41	NA	NA	872.50	NA	NA	876.54	NA	NA	4.04	NA	877.54			1.00			Limits of 4' Clay Liner
412	381,967.4	2,201,040.0	NA	871.72	NA	NA	872.73	NA	NA	876.91	NA	NA	4.18	NA	877.91			1.00			Limits of 4' Clay Liner
413	381,967.4	2,201,070.0	NA	NA	NA	NA	873.33	NA	NA	877.43	NA	NA	4.10	NA	878.43			1.00			Limits of 4' Clay Liner
414	381,967.4	2,201,106.3	NA	NA	NA	NA	874.15	NA	NA	878.20	NA	NA	4.05	NA	879.20			1.00			Limits of 4' Clay Liner
415	381,967.4	2,201,120.0	NA	NA	NA	NA	878.59	NA	NA	882.69	NA	NA	4.10	NA	883.69			1.00			Limits of 4' Clay Liner
416	381,967.4	2,201,170.0	NA	NA	NA	NA	895.21	NA	NA	899.31	NA	NA	4.10	NA	900.31			1.00			Limits of 4' Clay Liner
417	381,967.4	2,201,201.7	NA	NA	NA	NA	905.82	NA	NA	909.88	NA	NA	4.06	NA	910.88			1.00			Limits of 4' Clay Liner
418	381,967.4	2,201,213.7	NA	NA	NA	NA	909.78	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Limits of Clay Fill Placement
LOCATION OF EXISTING LINER IN PHASE 10 - CELL 2 FOR TIE-IN OF THE LINER FOR PHASE 9 - CELL 2																					
1115	381,318.8	2,200,925.0	NA	NA	NA	NA	879.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Limits of Clay Fill Placement
1116	381,331.2	2,200,925.0	NA	NA	NA	NA	879.13	NA	NA	883.28	NA	NA	4.15	NA	884.28			1.00			
1117	381,370.0	2,200,925.0	NA	NA	NA	NA	878.84	NA	NA	882.93	NA	NA	4.09	NA	883.93			1.00			Limits of 4' Clay Liner
1118	381,420.0	2,200,925.0	NA	NA	NA	NA	878.42	NA	NA	882.52	NA	NA	4.10	NA	883.52			1.00			
1119	381,470.0	2,200,925.0	NA	NA	NA	NA	878.03	NA	NA	882.13	NA	NA	4.11	NA	883.13			1.00			
1120	381,520.0	2,200,925.0	NA	NA	NA	NA	877.65	NA	NA	881.74	NA	NA	4.08	NA	882.74			1.00			
1121	381,570.0	2,200,925.0	NA	NA	NA	NA	877.27	NA	NA	881.34	NA	NA	4.08	NA	882.34			1.00			
1122	381,620.0	2,200,925.0	NA	NA	NA	NA	876.83	NA	NA	880.93	NA	NA	4.10	NA	881.93			1.00			
1123	381,670.0	2,200,925.0	NA	NA	NA	NA	876.44	NA	NA	880.52	NA	NA	4.08	NA	881.52			1.00			
1124	381,720.0	2,200,925.0	NA	NA	NA	NA	876.02	NA	NA	880.12	NA	NA	4.11	NA	881.12			1.00			
1125	381,770.0	2,200,925.0	NA	NA	NA	NA	875.64	NA	NA	879.71	NA	NA	4.07	NA	880.71			1.00			
1126	381,820.0	2,200,925.0	NA	NA	NA	NA	875.25	NA	NA	879.31	NA	NA	4.06	NA	880.31			1.00			
1127	381,870.0	2,200,925.0	NA	NA	NA	NA	874.82	NA	NA	879.32	NA	NA	4.10	NA	880.32			1.00			
1128	381,920.0	2,200,925.0	NA	NA	NA	NA	874.42	NA	NA	879.53	NA	NA	4.11	NA	880.53			1.00			
PHASE 9 - CELL 2 LINER CONSTRUCTION COORDINATES AND ELEVATIONS																					
419	381,963.0	2,201,015.0	NA	NA	NA	870.86			874.86						877.36						Spot Elevation
420	381,961.6	2,201,106.3	NA	NA	NA	874.20			878.20						879.20						Spot Elevation
421	381,961.6	2,201,120.0	NA	NA	NA	878.75			882.75						883.75						Spot Elevation
422	381,961.6	2,201,170.0	NA	NA	NA	895.42			899.42						900.42						Spot Elevation
423	381,961.6	2,201,201.7	NA	NA	NA	906.00			910.00						911.00						Spot Elevation
424	381,961.6	2,201,213.7	NA	NA	NA	910.00			914.00						915.00						Spot Elevation
427	381,955.6	2,200,915.0	NA	NA	NA	874.41			878.41						879.41						Spot Elevation
428	381,955.6	2,200,965.0	NA	NA	NA	873.42			877.42						878.42						Spot Elevation
429	381,955.6	2,201,015.0	NA	NA	NA	870.92			874.92						877.42						Spot Elevation
430	381,955.6	2,201,070.0	NA	NA	NA	873.52			877.52						878.52						Spot Elevation
431	381,955.6	2,201,106.6	NA	NA	NA	874.25			878.25						879.25						Spot Elevation
432	381,955.6	2,201,120.0	NA	NA	NA	878.68			882.68						883.68						Spot Elevation
433	381,955.6	2,201,170.0	NA	NA	NA	895.35			899.35						900.35						Spot Elevation
434	381,955.6	2,201,213.7	NA	NA	NA	909.93			913.93						914.93						Spot Elevation
1101	381,920.0	2,200,937.8	NA	NA	NA	874.25			878.25						879.25						Spot Elevation
1102	381,870.0	2,200,937.8	NA	NA	NA	874.65			878.65						879.65						Spot Elevation
1103	381,820.0	2,200,937.8	NA	NA	NA	875.05			879.05						880.05						Spot Elevation
1104	381,770.0	2,200,937.8	NA	NA	NA	875.45			879.45						880.45						Spot Elevation
1105	381,720.0	2,200,937.8	NA	NA	NA	875.85			879.85						880.85						Spot Elevation
1106	381,670.0	2,200,937.8	NA	NA	NA	876.25			880.25						881.25						Spot Elevation
1107	381,620.0	2,200,937.8	NA	NA	NA	876.65			880.65						881.65						Spot Elevation
1108	381,570.0	2,200,937.8	NA	NA	NA	877.05			881.05						882.05						Spot Elevation
1109	381,520.0	2,200,937.8	NA	NA	NA	877.45			881.45						882.45						Spot Elevation
1110	381,470.0	2,200,937.8	NA	NA	NA	877.85			881.85						882.85						Spot Elevation
1111	381,420.0	2,200,937.8	NA	NA	NA	878.25			882.25						883.25						Spot Elevation
1112	381,370.0	2,200,937.8	NA	NA	NA	878.65			882.65						883.65						Spot Elevation
1113	381,319.5	2,200,937.8	NA	NA	NA	878.86			882.86						883.86						Spot Elevation
1114	381,318.8	2,200,937.8	NA	NA	NA	878.85			882.85						883.85						Spot Elevation
1401	381,920.0	2,200,965.0	NA	NA	NA	873.71			877.71						878.71						Spot Elevation
1402	381,870.0	2,200,965.0	NA	NA	NA	874.11			878.11						879.11						Spot Elevation

Table 2
Clay Liner Grades
Phase 9 - Cell 2 Construction
Dane County No. 2 (Rodefeld) Landfill

POINT NO.	DESIGN LOCATION		BOTTOM OF GRADIENT LAYER DESIGN ELEVATION			SUBBASE DESIGN ELEVATION			BASE GRADE DESIGN ELEVATION			CLAY LINER THICKNESS			GRANULAR DRAINAGE LAYER LAYER ELEVATION			GRANULAR DRAINAGE LAYER THICKNESS			COMMENTS
	NORTHING	EASTING	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	
TOLERANCE RANGE					+0.00 -0.10			+0.00 -0.10			+0.10 -0.00			+0.10 -0.00			+0.10 -0.00			+0.10 -0.00	
1403	381,820.0	2,200,965.0	NA	NA	NA	874.51			878.51						879.51						Spot Elevation
1404	381,770.0	2,200,965.0	NA	NA	NA	874.91			878.91						879.91						Spot Elevation
1405	381,720.0	2,200,965.0	NA	NA	NA	875.31			879.31						880.31						Spot Elevation
1406	381,670.0	2,200,965.0	NA	NA	NA	875.71			879.71						880.71						Spot Elevation
1407	381,620.0	2,200,965.0	NA	NA	NA	876.11			880.11						881.11						Spot Elevation
1408	381,570.0	2,200,965.0	NA	NA	NA	876.51			880.51						881.51						Spot Elevation
1409	381,520.0	2,200,965.0	NA	NA	NA	876.91			880.91						881.91						Spot Elevation
1410	381,470.0	2,200,965.0	NA	NA	NA	877.31			881.31						882.31						Spot Elevation
1411	381,420.0	2,200,965.0	NA	NA	NA	877.71			881.71						882.71						Spot Elevation
1412	381,370.0	2,200,965.0	NA	NA	NA	878.11			882.11						883.11						Spot Elevation
1413	381,331.2	2,200,965.0	NA	NA	NA	878.42			882.42						883.42						Spot Elevation
1414	381,318.8	2,200,965.0	NA	NA	NA	878.30			882.30						883.30						Spot Elevation, end of liner subbase
1415	381,920.0	2,200,990.0	NA	NA	NA	873.21			877.21						878.21						Spot Elevation along edge of pipe trench
1416	381,870.0	2,200,990.0	NA	NA	NA	873.61			877.61						878.61						Spot Elevation along edge of pipe trench
1417	381,820.0	2,200,990.0	NA	NA	NA	874.01			878.01						879.01						Spot Elevation along edge of pipe trench
1418	381,770.0	2,200,990.0	NA	NA	NA	874.41			878.41						879.41						Spot Elevation along edge of pipe trench
1419	381,720.0	2,200,990.0	NA	NA	NA	874.81			878.81						879.81						Spot Elevation along edge of pipe trench
1420	381,670.0	2,200,990.0	NA	NA	NA	875.21			879.21						880.21						Spot Elevation along edge of pipe trench
1421	381,620.0	2,200,990.0	NA	NA	NA	875.61			879.61						880.61						Spot Elevation along edge of pipe trench
1422	381,570.0	2,200,990.0	NA	NA	NA	876.01			880.01						881.01						Spot Elevation along edge of pipe trench
1423	381,520.0	2,200,990.0	NA	NA	NA	876.41			880.41						881.41						Spot Elevation along edge of pipe trench
1424	381,470.0	2,200,990.0	NA	NA	NA	876.81			880.81						881.81						Spot Elevation along edge of pipe trench
1425	381,420.0	2,200,990.0	NA	NA	NA	877.21			881.21						882.21						Spot Elevation along edge of pipe trench
1426	381,370.0	2,200,990.0	NA	NA	NA	877.61			881.61						882.61						Spot Elevation along edge of pipe trench
1427	381,331.2	2,200,990.0	NA	NA	NA	877.92			881.92						882.92						Spot Elevation along edge of pipe trench
1428	381,318.8	2,200,990.0	NA	NA	NA	877.80			881.80						882.80						Spot Elevation, end of liner subbase
1429	381,920.0	2,201,004.8	NA	NA	NA	872.91			876.91						877.91						Spot Elevation
1430	381,870.0	2,201,004.8	NA	NA	NA	873.31			877.31						878.31						Spot Elevation
1431	381,820.0	2,201,004.8	NA	NA	NA	873.71			877.71						878.71						Spot Elevation
1432	381,770.0	2,201,004.8	NA	NA	NA	874.11			878.11						879.11						Spot Elevation
1433	381,720.0	2,201,004.8	NA	NA	NA	874.51			878.51						879.51						Spot Elevation
1434	381,670.0	2,201,004.8	NA	NA	NA	874.91			878.91						879.91						Spot Elevation
1435	381,620.0	2,201,004.8	NA	NA	NA	875.31			879.31						880.31						Spot Elevation
1436	381,570.0	2,201,004.8	NA	NA	NA	875.71			879.71						880.71						Spot Elevation
1437	381,520.0	2,201,004.8	NA	NA	NA	876.11			880.11						881.11						Spot Elevation
1438	381,470.0	2,201,004.8	NA	NA	NA	876.51			880.51						881.51						Spot Elevation
1439	381,420.0	2,201,004.8	NA	NA	NA	876.91			880.91						881.91						Spot Elevation
1440	381,370.0	2,201,004.8	NA	NA	NA	877.31			881.31						882.31						Spot Elevation
1441	381,331.2	2,201,004.8	NA	NA	NA	877.62			881.62						882.62						Spot Elevation
1442	381,318.8	2,201,004.8	NA	NA	NA	877.51			881.51						882.51						Spot Elevation, end of liner subbase
1443	381,920.0	2,201,015.0	865.51			871.21			875.21						877.71						Spot Elevation
1444	381,870.0	2,201,015.0	865.71			871.61			875.61						878.11						Spot Elevation
1445	381,820.0	2,201,015.0	865.90			872.01			876.01						878.51						Spot Elevation
1446	381,770.0	2,201,015.0	866.10			872.41			876.41						878.91						Spot Elevation
1447	381,720.0	2,201,015.0	866.29			872.80			876.80						879.30						Spot Elevation
1448	381,670.0	2,201,015.0	866.49			873.20			877.20						879.70						Spot Elevation
1449	381,620.0	2,201,015.0	866.68			873.60			877.60						880.10						Spot Elevation
1450	381,570.0	2,201,015.0	866.88			874.00			878.00						880.50						Spot Elevation
1451	381,520.0	2,201,015.0	867.07			874.40			878.40						880.90						Spot Elevation
1452	381,470.0	2,201,015.0	867.27			874.80			878.80						881.30						Spot Elevation
1453	381,420.0	2,201,015.0	867.46			875.20			879.20						881.70						Spot Elevation
1454	381,370.0	2,201,015.0	867.66			875.60			879.60						882.10						Spot Elevation
1455	381,331.2	2,201,015.0	867.81			875.92			879.92						882.42						Spot Elevation
1456	381,318.8	2,201,015.0	NA	NA	NA	875.80			879.80						880.80						Spot Elevation, end of liner subbase
1457	381,331.2	2,201,025.2	NA	NA	NA	877.62			881.62						882.62						Spot Elevation
1458	381,318.8	2,201,025.2	NA	NA	NA	877.51			881.51						882.51						Spot Elevation, end of liner subbase
1459	381,420.0	2,201,025.2	NA	NA	NA	876.91			880.91						881.91						Spot Elevation
1460	381,370.0	2,201,025.2	NA	NA	NA	877.31			881.31						882.31						Spot Elevation
1461	381,520.0	2,201,025.2	NA	NA	NA	876.11			880.11						881.11						Spot Elevation
1462	381,470.0	2,201,025.2	NA	NA	NA	876.51			880.51						881.51						Spot Elevation

Table 2
Clay Liner Grades
Phase 9 - Cell 2 Construction
Dane County No. 2 (Rodefeld) Landfill

POINT NO.	DESIGN LOCATION NORTHING	DESIGN LOCATION EASTING	BOTTOM OF GRADIENT LAYER DESIGN ELEVATION DESIGN (ft)	BOTTOM OF GRADIENT LAYER ACTUAL (ft)	BOTTOM OF GRADIENT LAYER DELTA (ft)	SUBBASE DESIGN ELEVATION DESIGN (ft)	SUBBASE ACTUAL (ft)	SUBBASE DELTA (ft)	BASE GRADE DESIGN ELEVATION DESIGN (ft)	BASE GRADE ACTUAL (ft)	BASE GRADE DELTA (ft)	CLAY LINER THICKNESS DESIGN (ft)	CLAY LINER ACTUAL (ft)	CLAY LINER DELTA (ft)	GRANULAR DRAINAGE LAYER ELEVATION DESIGN (ft)	GRANULAR DRAINAGE LAYER ELEVATION ACTUAL (ft)	GRANULAR DRAINAGE LAYER ELEVATION DELTA (ft)	GRANULAR DRAINAGE LAYER THICKNESS DESIGN (ft)	GRANULAR DRAINAGE LAYER THICKNESS ACTUAL (ft)	GRANULAR DRAINAGE LAYER THICKNESS DELTA (ft)	COMMENTS
TOLERANCE RANGE					+0.00 -0.10			+0.00 -0.10			+0.10 -0.00			+0.10 -0.00			+0.10 -0.00			+0.10 -0.00	
1463	381,670.0	2,201,025.2	NA	NA	NA	874.91			878.91						879.91						Spot Elevation
1464	381,620.0	2,201,025.2	NA	NA	NA	875.31			879.31						880.31						Spot Elevation
1465	381,570.0	2,201,025.2	NA	NA	NA	875.71			879.71						880.71						Spot Elevation
1466	381,770.0	2,201,025.2	NA	NA	NA	874.11			878.11						879.11						Spot Elevation
1467	381,720.0	2,201,025.2	NA	NA	NA	874.51			878.51						879.51						Spot Elevation
1468	381,870.0	2,201,025.2	NA	NA	NA	873.31			877.31						878.31						Spot Elevation
1469	381,820.0	2,201,025.2	NA	NA	NA	873.71			877.71						878.71						Spot Elevation
1470	381,920.0	2,201,025.2	NA	NA	NA	872.91			876.91						877.91						Spot Elevation
1471	381,920.0	2,201,040.0	NA	NA	NA	873.21			877.21						878.21						Spot Elevation along edge of pipe trench
1472	381,870.0	2,201,040.0	NA	NA	NA	873.61			877.61						878.61						Spot Elevation along edge of pipe trench
1473	381,820.0	2,201,040.0	NA	NA	NA	874.01			878.01						879.01						Spot Elevation along edge of pipe trench
1474	381,770.0	2,201,040.0	NA	NA	NA	874.41			878.41						879.41						Spot Elevation along edge of pipe trench
1475	381,720.0	2,201,040.0	NA	NA	NA	874.80			878.80						879.80						Spot Elevation along edge of pipe trench
1476	381,670.0	2,201,040.0	NA	NA	NA	875.20			879.20						880.20						Spot Elevation along edge of pipe trench
1477	381,620.0	2,201,040.0	NA	NA	NA	875.60			879.60						880.60						Spot Elevation along edge of pipe trench
1478	381,570.0	2,201,040.0	NA	NA	NA	876.00			880.00						881.00						Spot Elevation along edge of pipe trench
1479	381,520.0	2,201,040.0	NA	NA	NA	876.40			880.40						881.40						Spot Elevation along edge of pipe trench
1480	381,470.0	2,201,040.0	NA	NA	NA	876.80			880.80						881.80						Spot Elevation along edge of pipe trench
1481	381,420.0	2,201,040.0	NA	NA	NA	877.21			881.21						882.21						Spot Elevation along edge of pipe trench
1482	381,370.0	2,201,040.0	NA	NA	NA	877.61			881.61						882.61						Spot Elevation along edge of pipe trench
1483	381,331.2	2,201,040.0	NA	NA	NA	877.92			881.92						882.92						Spot Elevation along edge of pipe trench
1484	381,318.8	2,201,040.0	NA	NA	NA	877.80			881.80						882.80						Spot Elevation, end of liner subbase
1485	381,920.0	2,201,070.0	NA	NA	NA	873.81			877.81						878.81						Spot Elevation
1486	381,870.0	2,201,070.0	NA	NA	NA	874.20			878.20						879.20						Spot Elevation
1487	381,820.0	2,201,070.0	NA	NA	NA	874.60			878.60						879.60						Spot Elevation
1488	381,770.0	2,201,070.0	NA	NA	NA	875.00			879.00						880.00						Spot Elevation
1489	381,720.0	2,201,070.0	NA	NA	NA	875.40			879.40						880.40						Spot Elevation
1490	381,670.0	2,201,070.0	NA	NA	NA	875.80			879.80						880.80						Spot Elevation
1491	381,620.0	2,201,070.0	NA	NA	NA	876.20			880.20						881.20						Spot Elevation
1492	381,570.0	2,201,070.0	NA	NA	NA	876.60			880.60						881.60						Spot Elevation
1493	381,520.0	2,201,070.0	NA	NA	NA	877.00			881.00						882.00						Spot Elevation
1494	381,470.0	2,201,070.0	NA	NA	NA	877.40			881.40						882.40						Spot Elevation
1495	381,420.0	2,201,070.0	NA	NA	NA	877.80			881.80						882.80						Spot Elevation
1496	381,370.0	2,201,070.0	NA	NA	NA	878.20			882.20						883.20						Spot Elevation
1497	381,331.2	2,201,070.0	NA	NA	NA	878.52			882.52						883.52						Spot Elevation
1498	381,318.8	2,201,070.0	NA	NA	NA	878.40			882.40						883.40						Spot Elevation, end of liner subbase
1499	381,920.0	2,201,109.0	NA	NA	NA	874.58			878.58						879.58						Spot Elevation, toe of berm slope
1500	381,870.0	2,201,112.2	NA	NA	NA	875.05			879.05						880.05						Spot Elevation, toe of berm slope
1501	381,820.0	2,201,115.4	NA	NA	NA	875.51			879.51						880.51						Spot Elevation, toe of berm slope
1502	381,770.0	2,201,118.6	NA	NA	NA	875.98			879.98						880.98						Spot Elevation, toe of berm slope
1503	381,920.0	2,201,120.0	NA	NA	NA	878.25			882.25						883.25						Spot Elevation
1504	381,870.0	2,201,120.0	NA	NA	NA	877.65			881.65						882.65						Spot Elevation
1505	381,820.0	2,201,120.0	NA	NA	NA	877.05			881.05						882.05						Spot Elevation
1506	381,770.0	2,201,120.0	NA	NA	NA	876.44			880.44						881.44						Spot Elevation
1507	381,720.0	2,201,120.0	NA	NA	NA	876.40			880.40						881.40						Spot Elevation
1508	381,670.0	2,201,120.0	NA	NA	NA	876.80			880.80						881.80						Spot Elevation
1509	381,620.0	2,201,120.0	NA	NA	NA	877.20			881.20						882.20						Spot Elevation
1510	381,570.0	2,201,120.0	NA	NA	NA	877.60			881.60						882.60						Spot Elevation
1511	381,520.0	2,201,120.0	NA	NA	NA	878.00			882.00						883.00						Spot Elevation
1512	381,470.0	2,201,120.0	NA	NA	NA	878.40			882.40						883.40						Spot Elevation
1513	381,420.0	2,201,120.0	NA	NA	NA	878.80			882.80						883.80						Spot Elevation
1514	381,370.0	2,201,120.0	NA	NA	NA	879.20			883.20						884.20						Spot Elevation
1515	381,331.2	2,201,120.0	NA	NA	NA	879.52			883.52						884.52						Spot Elevation
1516	381,318.8	2,201,120.0	NA	NA	NA	879.40			883.40						884.40						Spot Elevation, end of liner subbase
1517	381,720.0	2,201,121.8	NA	NA	NA	876.44			880.44						881.44						Spot Elevation, toe of berm slope
1518	381,670.0	2,201,125.0	NA	NA	NA	876.90			880.90						881.90						Spot Elevation, toe of berm slope
1519	381,620.0	2,201,128.2	NA	NA	NA	877.37			881.37						882.37						Spot Elevation, toe of berm slope
1520	381,570.0	2,201,131.4	NA	NA	NA	877.83			881.83						882.83						Spot Elevation, toe of berm slope
1521	381,520.0	2,201,134.6	NA	NA	NA	878.30			882.30						883.30						Spot Elevation, toe of berm slope
1522	381,470.0	2,201,137.8	NA	NA	NA	878.76			882.76						883.76						Spot Elevation, toe of berm slope

Table 2
Clay Liner Grades
Phase 9 - Cell 2 Construction
Dane County No. 2 (Rodefeld) Landfill

POINT NO.	DESIGN LOCATION		BOTTOM OF GRADIENT LAYER DESIGN ELEVATION			SUBBASE DESIGN ELEVATION			BASE GRADE DESIGN ELEVATION			CLAY LINER THICKNESS			GRANULAR DRAINAGE LAYER LAYER ELEVATION			GRANULAR DRAINAGE LAYER THICKNESS			
	NORTHING	EASTING	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	
TOLERANCE RANGE					+0.00 -0.10			+0.00 -0.10			+0.10 -0.00			+0.10 -0.00			+0.10 -0.00			+0.10 -0.00	COMMENTS
1523	381,420.0	2,201,141.0	NA	NA	NA	879.22			883.22						884.22						Spot Elevation, toe of berm slope
1524	381,370.0	2,201,144.2	NA	NA	NA	879.69			883.69						884.69						Spot Elevation, toe of berm slope
1525	381,331.2	2,201,146.7	NA	NA	NA	880.05			884.05						885.05						Spot Elevation, toe of berm slope
1526	381,318.8	2,201,146.8	NA	NA	NA	879.94			883.94						884.94						Spot Elevation, end of liner subbase
1527	381,920.0	2,201,170.0	NA	NA	NA	894.92			898.92						899.92						Spot Elevation
1528	381,870.0	2,201,170.0	NA	NA	NA	894.32			898.32						899.32						Spot Elevation
1529	381,820.0	2,201,170.0	NA	NA	NA	893.71			897.71						898.71						Spot Elevation
1530	381,770.0	2,201,170.0	NA	NA	NA	893.11			897.11						898.11						Spot Elevation
1531	381,720.0	2,201,170.0	NA	NA	NA	892.51			896.51						897.51						Spot Elevation
1532	381,670.0	2,201,170.0	NA	NA	NA	891.91			895.91						896.91						Spot Elevation
1533	381,620.0	2,201,170.0	NA	NA	NA	891.30			895.30						896.30						Spot Elevation
1534	381,570.0	2,201,170.0	NA	NA	NA	890.70			894.70						895.70						Spot Elevation
1535	381,520.0	2,201,170.0	NA	NA	NA	890.10			894.10						895.10						Spot Elevation
1536	381,470.0	2,201,170.0	NA	NA	NA	889.50			893.50						894.50						Spot Elevation
1537	381,420.0	2,201,170.0	NA	NA	NA	888.89			892.89						893.89						Spot Elevation
1538	381,370.0	2,201,170.0	NA	NA	NA	888.29			892.29						893.29						Spot Elevation
1539	381,331.2	2,201,170.0	NA	NA	NA	887.82			891.82						892.82						Spot Elevation
1540	381,318.8	2,201,170.0	NA	NA	NA	887.68			891.68						892.68						Spot Elevation, end of liner subbase
1541	381,920.0	2,201,201.7	NA	NA	NA	905.50			909.50						910.50						Spot Elevation
1542	381,870.0	2,201,201.7	NA	NA	NA	904.90			908.90						909.90						Spot Elevation
1543	381,820.0	2,201,201.7	NA	NA	NA	904.30			908.30						909.30						Spot Elevation
1544	381,770.0	2,201,201.8	NA	NA	NA	903.70			907.70						908.70						Spot Elevation
1545	381,720.0	2,201,201.8	NA	NA	NA	903.09			907.09						908.09						Spot Elevation
1546	381,670.0	2,201,201.8	NA	NA	NA	902.49			906.49						907.49						Spot Elevation
1547	381,620.0	2,201,201.8	NA	NA	NA	901.89			905.89						906.89						Spot Elevation
1548	381,570.0	2,201,201.8	NA	NA	NA	901.29			905.29						906.29						Spot Elevation
1549	381,520.0	2,201,201.8	NA	NA	NA	900.69			904.69						905.69						Spot Elevation
1550	381,470.0	2,201,201.8	NA	NA	NA	900.09			904.09						905.09						Spot Elevation
1551	381,420.0	2,201,201.8	NA	NA	NA	899.48			903.48						904.48						Spot Elevation
1552	381,370.0	2,201,201.8	NA	NA	NA	898.88			902.88						903.88						Spot Elevation
1553	381,331.2	2,201,201.8	NA	NA	NA	898.42			902.42						903.42						Spot Elevation
1554	381,920.0	2,201,213.8	NA	NA	NA	909.50			913.50						914.50						Spot Elevation, subbase at top inside edge of berm
1555	381,870.0	2,201,213.8	NA	NA	NA	908.90			912.90						913.90						Spot Elevation, subbase at top inside edge of berm
1556	381,820.0	2,201,213.8	NA	NA	NA	908.30			912.30						913.30						Spot Elevation, subbase at top inside edge of berm
1557	381,770.0	2,201,213.8	NA	NA	NA	907.69			911.69						912.69						Spot Elevation, subbase at top inside edge of berm
1558	381,720.0	2,201,213.8	NA	NA	NA	907.09			911.09						912.09						Spot Elevation, subbase at top inside edge of berm
1559	381,670.0	2,201,213.8	NA	NA	NA	906.49			910.49						911.49						Spot Elevation, subbase at top inside edge of berm
1560	381,620.0	2,201,213.8	NA	NA	NA	905.89			909.89						910.89						Spot Elevation, subbase at top inside edge of berm
1561	381,570.0	2,201,213.8	NA	NA	NA	905.29			909.29						910.29						Spot Elevation, subbase at top inside edge of berm
1562	381,520.0	2,201,213.8	NA	NA	NA	904.69			908.69						909.69						Spot Elevation, subbase at top inside edge of berm
1563	381,470.0	2,201,213.8	NA	NA	NA	904.08			908.08						909.08						Spot Elevation, subbase at top inside edge of berm
1564	381,420.0	2,201,213.8	NA	NA	NA	903.48			907.48						908.48						Spot Elevation, subbase at top inside edge of berm
1565	381,370.0	2,201,213.8	NA	NA	NA	902.88			906.88						907.88						Spot Elevation, subbase at top inside edge of berm
1566	381,331.2	2,201,213.8	NA	NA	NA	902.41			906.41						907.41						Spot Elevation, subbase at top inside edge of berm
1567	381,318.8	2,201,213.8	NA	NA	NA	902.26			906.26						907.26						Spot Elevation, end of liner subbase

Notes:
1. Refer to Plan Sheet 5 of the construction drawings for locations of coordinate points.

By: S. Sellner, 12/13/2017
Checked: A. Sampson, 01/02/2018
Approved:

Table 3
Leachate Collection Pipe Grades
Phase 9 - Cell 2 Construction
Dane County No. 2 (Rodefeld) Landfill

POINT NO.	PIPE LOCATION NORTHING	EASTING	LEACHATE PIPE INVERT ELEVATION DESIGN (ft)	ACTUAL (ft)	DELTA (ft)	COMMENTS
536	381,997.2	2,201,015.0	875.09	875.38	0.29	I.E. of Existing Leachate Collection Pipe Blind Flange
600	381,975.0	2,201,015.0	875.16			I.E. Leachate Collection Pipe
601	381,950.0	2,201,015.0	875.36			I.E. Leachate Collection Pipe
602	381,925.0	2,201,015.0	875.56			I.E. Leachate Collection Pipe
603	381,900.0	2,201,015.0	875.76			I.E. Leachate Collection Pipe
604	381,875.0	2,201,015.0	875.96			I.E. Leachate Collection Pipe
605	381,850.0	2,201,015.0	876.16			I.E. Leachate Collection Pipe
606	381,825.0	2,201,015.0	876.36			I.E. Leachate Collection Pipe
607	381,800.0	2,201,015.0	876.56			I.E. Leachate Collection Pipe
608	381,775.0	2,201,015.0	876.76			I.E. Leachate Collection Pipe
609	381,750.0	2,201,015.0	876.96			I.E. Leachate Collection Pipe
610	381,725.0	2,201,015.0	877.16			I.E. Leachate Collection Pipe
611	381,700.0	2,201,015.0	877.36			I.E. Leachate Collection Pipe
612	381,675.0	2,201,015.0	877.56			I.E. Leachate Collection Pipe
613	381,650.0	2,201,015.0	877.76			I.E. Leachate Collection Pipe
614	381,625.0	2,201,015.0	877.96			I.E. Leachate Collection Pipe
615	381,600.0	2,201,015.0	878.16			I.E. Leachate Collection Pipe
616	381,575.0	2,201,015.0	878.36			I.E. Leachate Collection Pipe
617	381,550.0	2,201,015.0	878.56			I.E. Leachate Collection Pipe
618	381,525.0	2,201,015.0	878.76			I.E. Leachate Collection Pipe
619	381,500.0	2,201,015.0	878.96			I.E. Leachate Collection Pipe
620	381,475.0	2,201,015.0	879.16			I.E. Leachate Collection Pipe
621	381,450.0	2,201,015.0	879.36			I.E. Leachate Collection Pipe
622	381,425.0	2,201,015.0	879.56			I.E. Leachate Collection Pipe
623	381,400.0	2,201,015.0	879.76			I.E. Leachate Collection Pipe
624	381,375.0	2,201,015.0	879.96			I.E. Leachate Collection Pipe
625	381,350.0	2,201,015.0	880.16			I.E. of Proposed Leachate Collection Pipe Blind Flange

Notes:
1. Refer to Plan Sheet 6 of the construction drawings for locations of coordinate points.

Checked: S. Sellner, 01/02/2018
Approved: D. Marshall, 01/02/2018

APPENDIX F
LANDFILL STAGE 4 – FINAL COVER CONSTRUCTION
DOCUMENTATION COORDINATE AND ELEVATION TABLES

Table 1
Summary of Coordinates
Stage 4 Final Cover
Dane County No. 2 (Rodefeld) Landfill

ORIGINAL ID NO.	COORDINATES NORTHING	COORDINATES EASTING	TOP OF WASTE DESIGN (ft)	TOP OF WASTE ACTUAL (ft)	TOP OF FINE-GRAINED BARRIER LAYER DESIGN (ft)	TOP OF FINE-GRAINED BARRIER LAYER ACTUAL (ft)	BARRIER LAYER (2' min.) THICK. (ft)	TOP OF GENERAL FILL ROOTING ZONE LAYER DESIGN (ft)	TOP OF GENERAL FILL ROOTING ZONE LAYER ACTUAL (ft)	GENERAL FILL (2.5' min.) THICK. (ft)	TOP OF TOPSOIL LAYER (Final Cover) DESIGN (ft)	TOP OF TOPSOIL LAYER (Final Cover) ACTUAL (ft)	TOPSOIL LAYER (0.5' min.) THICK. (ft)	COMMENTS
LOCATION OF EXISTING FINAL COVER - TIE-IN OF THE STAGE 3 CONSTRUCTION														
3427	381950.03	2198320.03												**POINTS DOCUMENTED AS PART OF THE STAGE 3 FINAL COVER CONSTRUCTION EVENT**
3428	381929.15	2198320.02												
3429	381999.96	2198320.00												
3430	382100.06	2198320.01												
3431	382200.02	2198320.01												
3432	382300.02	2198319.98												
3433	382399.96	2198320.03												
3434	382439.29	2198319.95												
3462	381795.00	2197493.95												
3463	381815.87	2197514.67												
3464	381850.97	2197557.70												
3465	381875.85	2197593.82												
3466	381900.99	2197632.18												
3467	381920.83	2197653.01												
3468	381927.10	2197660.80												
3469	381925.30	2197682.83												
3470	381922.46	2197723.15												
3473	381920.64	2197769.36												
3474	381918.25	2197819.03												
3477	381917.56	2197875.73												
3478	381916.96	2197940.35												
3481	381916.48	2198003.33												
3482	381919.59	2198066.75												
3485	381922.45	2198125.10												
3486	381924.68	2198178.19												
3489	381926.69	2198237.73												
3490	381927.77	2198282.59												
STAGE 4 FINAL COVER CONSTRUCTION COORDINATES AND ELEVATIONS														
15	381800.00	2197500.00	894.36		896.36			898.86			899.36			Grid Location
16	381767.78	2197600.00	892.83		894.83			897.33			897.83			Grid Location
17	381800.00	2197600.00	900.63		902.63			905.13			905.63			Grid Location
18	381871.77	2197600.00	918.01		920.01			922.51			923.01			Grid Location
39	381900.00	2197700.00	931.03		933.03			935.53			936.03			Grid Location
40	381800.00	2197700.00	906.82		908.82			911.32			911.82			Grid Location
41	381742.22	2197700.00	892.83		894.83			897.33			897.83			Grid Location
42	381716.67	2197800.00	892.83		894.83			897.33			897.83			Grid Location
43	381800.00	2197800.00	913.04		915.04			917.54			918.04			Grid Location
44	381900.00	2197800.00	937.27		939.27			941.77			942.27			Grid Location
45	381911.27	2197800.00	940.00		942.00			944.50			945.00			Grid Location
57	381900.00	2197900.00	943.60		945.60			948.10			948.60			Grid Location
58	381885.53	2197900.00	940.00		942.00			944.50			945.00			Grid Location

Table 1
Summary of Coordinates
Stage 4 Final Cover
Dane County No. 2 (Rodefeld) Landfill

ORIGINAL ID NO.	COORDINATES NORTHING	EASTING	TOP OF WASTE DESIGN (ft)	ACTUAL (ft)	TOP OF FINE-GRAINED BARRIER LAYER DESIGN (ft)	ACTUAL (ft)	BARRIER LAYER (2' min.) THICK. (ft)	TOP OF GENERAL FILL ROOTING ZONE LAYER DESIGN (ft)	ACTUAL (ft)	GENERAL FILL (2.5' min.) THICK. (ft)	TOP OF TOPSOIL LAYER (Final Cover) DESIGN (ft)	ACTUAL (ft)	TOPSOIL LAYER (0.5' min.) THICK. (ft)	COMMENTS
59	381800.00	2197900.00	919.27		921.27			923.77			924.27			Grid Location
60	381700.00	2197900.00	895.03		897.03			899.53			900.03			Grid Location
61	381691.11	2197900.00	892.88		894.88			897.38			897.88			Grid Location
62	381665.55	2198000.00	893.32		895.32			897.82			898.32			Grid Location
63	381700.00	2198000.00	901.62		903.62			906.12			906.62			Grid Location
64	381800.00	2198000.00	925.71		927.71			930.21			930.71			Grid Location
65	381859.31	2198000.00	940.00		942.00			944.50			945.00			Grid Location
66	381900.00	2198000.00	949.99		951.99			954.49			954.99			Grid Location
83	381914.84	2198100.00	959.93		961.93			964.43			964.93			Grid Location
84	381900.00	2198100.00	956.48		958.48			960.98			961.48			Grid Location
85	381831.61	2198100.00	940.00		942.00			944.50			945.00			Grid Location
86	381800.00	2198100.00	932.38		934.38			936.88			937.38			Grid Location
87	381700.00	2198100.00	908.29		910.29			912.79			913.29			Grid Location
88	381639.99	2198100.00	893.83		895.83			898.33			898.83			Grid Location
89	381614.43	2198200.00	894.35		896.35			898.85			899.35			Grid Location
90	381700.00	2198200.00	914.97		916.97			919.47			919.97			Grid Location
91	381800.00	2198200.00	939.06		941.06			943.56			944.06			Grid Location
92	381886.92	2198200.00	960.00		962.00			964.50			965.00			Grid Location
113	381900.00	2198300.00	969.82		971.82			974.32			974.82			Grid Location
114	381776.21	2198300.00	940.00		942.00			944.50			945.00			Grid Location
115	381700.00	2198300.00	921.64		923.64			926.14			926.64			Grid Location
116	381600.00	2198300.00	897.55		899.55			902.05			902.55			Grid Location
117	381588.87	2198300.00	894.87		896.87			899.37			899.87			Grid Location
118	381563.32	2198400.00	895.38		897.38			899.88			900.38			Grid Location
119	381600.00	2198400.00	904.22		906.22			908.72			909.22			Grid Location
120	381700.00	2198400.00	928.31		930.31			932.81			933.31			Grid Location
121	381800.00	2198400.00	952.41		954.41			956.91			957.41			Grid Location
122	381900.00	2198400.00	976.50		978.50			981.00			981.50			Grid Location
123	381957.29	2198400.00	990.00		992.00			994.50			995.00			Grid Location
124	382000.00	2198400.00	991.16		993.16			995.66			996.16			Grid Location
125	382045.53	2198400.00	990.00		992.00			994.50			995.00			Grid Location
126	382100.00	2198400.00	977.44		979.44			981.94			982.44			Grid Location
127	382200.00	2198400.00	952.53		954.53			957.03			957.53			Grid Location
128	382300.00	2198400.00	927.62		929.62			932.12			932.62			Grid Location
129	382400.00	2198400.00	902.71		904.71			907.21			907.71			Grid Location
130	382444.67	2198400.00	891.58		893.58			896.08			896.58			Grid Location
131	382451.12	2198500.00	892.08		894.08			896.58			897.08			Grid Location
132	382400.00	2198500.00	904.82		906.82			909.32			909.82			Grid Location
133	382300.00	2198500.00	929.73		931.73			934.23			934.73			Grid Location
134	382200.00	2198500.00	954.64		956.64			959.14			959.64			Grid Location
135	382138.34	2198500.00	970.00		972.00			974.50			975.00			Grid Location
136	382100.00	2198500.00	979.55		981.55			984.05			984.55			Grid Location
137	382000.00	2198500.00	995.55		997.55			1000.05			1000.55			Grid Location
138	381900.00	2198500.00	983.17		985.17			987.67			988.17			Grid Location

Table 1
Summary of Coordinates
Stage 4 Final Cover
Dane County No. 2 (Rodefeld) Landfill

ORIGINAL ID NO.	COORDINATES NORTHING	COORDINATES EASTING	TOP OF WASTE DESIGN (ft)	TOP OF WASTE ACTUAL (ft)	TOP OF FINE-GRAINED BARRIER LAYER DESIGN (ft)	TOP OF FINE-GRAINED BARRIER LAYER ACTUAL (ft)	BARRIER LAYER (2' min.) THICK. (ft)	TOP OF GENERAL FILL ROOTING ZONE LAYER DESIGN (ft)	TOP OF GENERAL FILL ROOTING ZONE LAYER ACTUAL (ft)	GENERAL FILL (2.5' min.) THICK. (ft)	TOP OF TOPSOIL LAYER (Final Cover) DESIGN (ft)	TOP OF TOPSOIL LAYER (Final Cover) ACTUAL (ft)	TOPSOIL LAYER (0.5' min.) THICK. (ft)	COMMENTS
139	381800.00	2198500.00	959.08		961.08			963.58			964.08			Grid Location
140	381700.00	2198500.00	934.99		936.99			939.49			939.99			Grid Location
141	381600.00	2198500.00	910.89		912.89			915.39			915.89			Grid Location
142	381537.76	2198500.00	895.90		897.90			900.40			900.90			Grid Location
143	381512.20	2198600.00	896.41		898.41			900.91			901.41			Grid Location
144	381600.00	2198600.00	917.57		919.57			922.07			922.57			Grid Location
145	381700.00	2198600.00	941.66		943.66			946.16			946.66			Grid Location
146	381800.00	2198600.00	965.75		967.75			970.25			970.75			Grid Location
147	381900.00	2198600.00	989.85		991.85			994.35			994.85			Grid Location
148	381975.00	2198600.00	999.60		1001.60			1004.10			1004.60			Grid Location
149	382000.00	2198600.00	997.98		999.98			1002.48			1002.98			Grid Location
150	382066.52	2198600.00	990.00		992.00			994.50			995.00			Grid Location
151	382100.00	2198600.00	981.66		983.66			986.16			986.66			Grid Location
152	382200.00	2198600.00	956.75		958.75			961.25			961.75			Grid Location
153	382300.00	2198600.00	931.84		933.84			936.34			936.84			Grid Location
154	382400.00	2198600.00	906.93		908.93			911.43			911.93			Grid Location
155	382457.57	2198600.00	892.59		894.59			897.09			897.59			Grid Location
156	382464.02	2198700.00	893.09		895.09			897.59			898.09			Grid Location
157	382400.00	2198700.00	909.03		911.03			913.53			914.03			Grid Location
158	382300.00	2198700.00	933.94		935.94			938.44			938.94			Grid Location
159	382200.00	2198700.00	958.86		960.86			963.36			963.86			Grid Location
160	382100.00	2198700.00	983.77		985.77			988.27			988.77			Grid Location
161	382058.90	2198700.00	994.00		996.00			998.50			999.00			Grid Location
162	382000.00	2198700.00	997.82		999.82			1002.32			1002.82			Grid Location
163	381973.04	2198700.00	999.60		1001.60			1004.10			1004.60			Grid Location
164	381900.00	2198700.00	994.85		996.85			999.35			999.85			Grid Location
165	381890.56	2198700.00	994.24		996.24			998.74			999.24			Grid Location
166	381800.00	2198700.00	972.43		974.43			976.93			977.43			Grid Location
167	381700.00	2198700.00	948.33		950.33			952.83			953.33			Grid Location
168	381600.00	2198700.00	924.24		926.24			928.74			929.24			Grid Location
169	381500.00	2198700.00	900.15		902.15			904.65			905.15			Grid Location
170	381486.64	2198700.00	896.93		898.93			901.43			901.93			Grid Location
171	381461.08	2198800.00	897.44		899.44			901.94			902.44			Grid Location
172	381500.00	2198800.00	906.82		908.82			911.32			911.82			Grid Location
173	381600.00	2198800.00	930.91		932.91			935.41			935.91			Grid Location
174	381700.00	2198800.00	955.01		957.01			959.51			960.01			Grid Location
175	381800.00	2198800.00	979.10		981.10			983.60			984.10			Grid Location
176	381854.76	2198800.00	992.29		994.29			996.79			997.29			Grid Location
177	381900.00	2198800.00	995.20		997.20			999.70			1000.20			Grid Location
178	381965.20	2198800.00	999.60		1001.60			1004.10			1004.60			Grid Location
179	382000.00	2198800.00	997.25		999.25			1001.75			1002.25			Grid Location
180	382073.58	2198799.28	992.44		994.44			996.94			997.44			Grid Location
181	382100.00	2198800.00	985.87		987.87			990.37			990.87			Grid Location
182	382200.00	2198800.00	960.96		962.96			965.46			965.96			Grid Location

Table 1
Summary of Coordinates
Stage 4 Final Cover
Dane County No. 2 (Rodefeld) Landfill

ORIGINAL ID NO.	COORDINATES NORTHING	EASTING	TOP OF WASTE DESIGN (ft)	ACTUAL (ft)	TOP OF FINE-GRAINED BARRIER LAYER DESIGN (ft)	ACTUAL (ft)	BARRIER LAYER (2' min.) THICK. (ft)	TOP OF GENERAL FILL ROOTING ZONE LAYER DESIGN (ft)	ACTUAL (ft)	GENERAL FILL (2.5' min.) THICK. (ft)	TOP OF TOPSOIL LAYER (Final Cover) DESIGN (ft)	ACTUAL (ft)	TOPSOIL LAYER (0.5' min.) THICK. (ft)	COMMENTS
183	382300.00	2198800.00	936.05		938.05			940.55			941.05			Grid Location
184	382400.00	2198800.00	911.14		913.14			915.64			916.14			Grid Location
185	382470.46	2198800.00	893.59		895.59			898.09			898.59			Grid Location
186	382476.90	2198899.74	894.09		896.09			898.59			899.09			Grid Location
187	382400.00	2198900.00	913.08		915.08			917.58			918.08			Grid Location
188	382300.00	2198900.00	937.87		939.87			942.37			942.87			Grid Location
189	382200.00	2198900.00	962.96		964.96			967.46			967.96			Grid Location
190	382100.00	2198900.00	987.98		989.98			992.48			992.98			Grid Location
191	382088.49	2198900.00	990.85		992.85			995.35			995.85			Grid Location
192	382000.00	2198900.00	996.73		998.73			1001.23			1001.73			Grid Location
193	381957.35	2198900.00	999.60		1001.60			1004.10			1004.60			Grid Location
194	381900.00	2198900.00	995.73		997.73			1000.23			1000.73			Grid Location
195	381818.85	2198900.00	990.33		992.33			994.83			995.33			Grid Location
196	381800.00	2198900.00	985.79		987.79			990.29			990.79			Grid Location
197	381700.00	2198900.00	961.82		963.82			966.32			966.82			Grid Location
198	381600.00	2198900.00	937.88		939.88			942.38			942.88			Grid Location
199	381500.00	2198900.00	913.91		915.91			918.41			918.91			Grid Location
200	381437.51	2198900.00	898.49		900.49			902.99			903.49			Grid Location
486	381432.06	2198919.95	894.02		896.02			898.52			899.02			End of Composite Final Cover Construction
487	381500.00	2198919.95	910.87		912.87			915.37			915.87			End of Composite Final Cover Construction
488	381600.00	2198919.95	934.89		936.89			939.39			939.89			End of Composite Final Cover Construction
489	381700.00	2198919.95	958.92		960.92			963.42			963.92			End of Composite Final Cover Construction
490	381800.00	2198919.95	982.78		984.78			987.28			987.78			End of Composite Final Cover Construction
491	381810.71	2198919.95	985.23		987.23			989.73			990.23			End of Composite Final Cover Construction
492	381900.00	2198919.95	991.61		993.61			996.11			996.61			End of Composite Final Cover Construction
493	381955.79	2198919.95	994.91		996.91			999.41			999.91			End of Composite Final Cover Construction
494	382000.00	2198919.95	992.41		994.41			996.91			997.41			End of Composite Final Cover Construction
495	382091.31	2198919.95	986.04		988.04			990.54			991.04			End of Composite Final Cover Construction
496	382100.00	2198919.95	983.90		985.90			988.40			988.90			End of Composite Final Cover Construction
497	382200.00	2198919.95	958.83		960.83			963.33			963.83			End of Composite Final Cover Construction
498	382300.00	2198919.95	933.72		935.72			938.22			938.72			End of Composite Final Cover Construction
499	382400.00	2198919.95	908.95		910.95			913.45			913.95			End of Composite Final Cover Construction
500	382478.20	2198919.95	888.98		890.98			893.48			893.98			End of Composite Final Cover Construction
501	381429.58	2198928.95	893.81		895.81			898.31			898.81			End of Geosynthetic Liner System
502	381500.00	2198928.95	911.54		913.54			916.04			916.54			End of Geosynthetic Liner System
503	381600.00	2198928.95	935.54		937.54			940.04			940.54			End of Geosynthetic Liner System
504	381700.00	2198928.95	959.57		961.57			964.07			964.57			End of Geosynthetic Liner System
505	381800.00	2198928.95	983.48		985.48			987.98			988.48			End of Geosynthetic Liner System
506	381807.04	2198928.95	984.79		986.79			989.29			989.79			End of Geosynthetic Liner System
507	381900.00	2198928.95	991.66		993.66			996.16			996.66			End of Geosynthetic Liner System
508	381955.08	2198928.95	994.44		996.44			998.94			999.44			End of Geosynthetic Liner System
509	382000.00	2198928.95	992.37		994.37			996.87			997.37			End of Geosynthetic Liner System
510	382092.59	2198928.95	985.90		987.90			990.40			990.90			End of Geosynthetic Liner System
511	382100.00	2198928.95	984.09		986.09			988.59			989.09			End of Geosynthetic Liner System

Table 1
Summary of Coordinates
Stage 4 Final Cover
Dane County No. 2 (Rodefeld) Landfill

ORIGINAL ID NO.	COORDINATES NORTHING	COORDINATES EASTING	TOP OF WASTE DESIGN (ft)	TOP OF WASTE ACTUAL (ft)	TOP OF FINE-GRAINED BARRIER LAYER DESIGN (ft)	TOP OF FINE-GRAINED BARRIER LAYER ACTUAL (ft)	BARRIER LAYER (2' min.) THICK. (ft)	TOP OF GENERAL FILL ROOTING ZONE LAYER DESIGN (ft)	TOP OF GENERAL FILL ROOTING ZONE LAYER ACTUAL (ft)	GENERAL FILL (2.5' min.) THICK. (ft)	TOP OF TOPSOIL LAYER (Final Cover) DESIGN (ft)	TOP OF TOPSOIL LAYER (Final Cover) ACTUAL (ft)	TOPSOIL LAYER (0.5' min.) THICK. (ft)	COMMENTS
512	382200.00	2198928.95	959.00		961.00			963.50			964.00			End of Geosynthetic Liner System
513	382300.00	2198928.95	933.89		935.89			938.39			938.89			End of Geosynthetic Liner System
514	382400.00	2198928.95	909.10		911.10			913.60			914.10			End of Geosynthetic Liner System
515	382478.78	2198928.95	889.27		891.27			893.77			894.27			End of Geosynthetic Liner System
516	381428.90	2198931.70	893.87		895.87			898.37			898.87			End of Fine-Grained Barrier Layer
517	381500.00	2198931.95	911.74		913.74			916.24			916.74			End of Fine-Grained Barrier Layer
518	381700.00	2198931.95	959.79		961.79			964.29			964.79			End of Fine-Grained Barrier Layer
519	381600.00	2198931.95	935.76		937.76			940.26			940.76			End of Fine-Grained Barrier Layer
520	381800.00	2198931.95	983.71		985.71			988.21			988.71			End of Fine-Grained Barrier Layer
521	381805.81	2198931.95	984.65		986.65			989.15			989.65			End of Fine-Grained Barrier Layer
522	381900.00	2198931.95	991.67		993.67			996.17			996.67			End of Fine-Grained Barrier Layer
523	381954.85	2198931.95	994.21		996.21			998.71			999.21			End of Fine-Grained Barrier Layer
524	382000.00	2198931.95	992.35		994.35			996.85			997.35			End of Fine-Grained Barrier Layer
525	382093.01	2198931.95	985.86		987.86			990.36			990.86			End of Fine-Grained Barrier Layer
526	382100.00	2198931.95	984.15		986.15			988.65			989.15			End of Fine-Grained Barrier Layer
527	382200.00	2198931.95	959.05		961.05			963.55			964.05			End of Fine-Grained Barrier Layer
528	382300.00	2198931.95	933.94		935.94			938.44			938.94			End of Fine-Grained Barrier Layer
529	382400.00	2198931.95	909.15		911.15			913.65			914.15			End of Fine-Grained Barrier Layer
530	382478.97	2198931.95	889.39		891.39			893.89			894.39			End of Fine-Grained Barrier Layer

Notes:
(1) Refer to Plan Sheet 9 of the construction drawings for locations of coordinate points.

Prepared By: S. Sellner, 12/22/2017
Checked By:

Table 2
Toe Drain Pipe Grades
Stage 4 Final Cover Construction
Dane County No. 2 (Rodefeld Landfill)

POINT NO.	PIPE LOCATION[1] NORTHING	EASTING	DESIGN TOP OF PIPE ELEVATION ACTUAL (ft)	COMMENTS
701	381417.9	2198927.7		Discharge Pipe Tee Low Point
702	381442.9	2198830.9		Collection Pipe High Point
703	381468.0	2198734.0		Discharge Pipe Tee Low Point
704	381493.0	2198637.2		Collection Pipe High Point
705	381518.0	2198540.4		Discharge Pipe Tee Low Point
706	381543.0	2198443.6		Collection Pipe High Point
707	381568.1	2198346.8		Discharge Pipe Tee Low Point
708	381593.1	2198250.0		Collection Pipe High Point
709	381618.1	2198153.1		Discharge Pipe Tee Low Point
710	381642.8	2198056.2		Collection Pipe High Point
711	381667.0	2197959.2		Discharge Pipe Tee Low Point
712	381691.5	2197862.2		Collection Pipe High Point
713	381716.2	2197765.4		Discharge Pipe Tee Low Point
714	381741.0	2197668.5		Collection Pipe High Point
715	381765.8	2197571.6		Discharge Pipe Tee Low Point
716	381792.4	2197478.7		Collection Pipe High Point
717	382447.8	2198313.0		Discharge Pipe Tee Low Point
718	382454.5	2198412.8		Collection Pipe High Point
719	382461.3	2198512.6		Discharge Pipe Tee Low Point
720	382468.1	2198612.3		Collection Pipe High Point
721	382474.8	2198712.1		Discharge Pipe Tee Low Point
722	382481.6	2198811.9		Collection Pipe High Point
723	382488.4	2198911.6		Discharge Pipe Tee Low Point
724	382489.6	2198928.9		Collection Pipe High Point

Notes:
(1) Refer to Plan Sheet 10 of the construction drawings for locations of coordinate points.

Created by: S. Sellner, 12/21/2017
Checked by: A. Sampson, 01/02/2018

SECTION 00900
SAMPLE FORMS

1. Notice of Award (EJCDC C-510, 2013 edition)
2. Notice to Proceed (Dane County standard form)
3. Change Order (Dane County standard form)
4. Application for Payment (EJCDC C-620, 2013 edition) or AIA
5. Performance Bond
6. Payment Bond
7. Certificate of Substantial Completion (EJCDC C-625, 2013 Edition)
8. Equal Benefits Compliance Payment Certification

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

NOTICE OF AWARD

Date of Issuance:

Owner: Owner's Contract No.:

Engineer: Engineer's Project No.:

Project: Contract Name:

Bidder:

Bidder's Address:

TO BIDDER:

You are notified that Owner has accepted your Bid dated [________________________________] for the above Contract, and that you are the Successful Bidder and are awarded a Contract for:

____ .

[describe Work, alternates, or sections of Work awarded]

The Contract Price of the awarded Contract is: $_______ *[note if subject to unit prices, or cost-plus]*

[ ] unexecuted counterparts of the Agreement accompany this Notice of Award, and one copy of the Contract Documents accompanies this Notice of Award, or has been transmitted or made available to Bidder electronically. *[revise if multiple copies accompany the Notice of Award]*

☐ a set of the Drawings will be delivered separately from the other Contract Documents.

You must comply with the following conditions precedent within 15 days of the date of receipt of this Notice of Award:

1. Deliver to Owner [____]counterparts of the Agreement, fully executed by Bidder.
2. Deliver with the executed Agreement(s) the Contract security *[e.g., performance and payment bonds]* and insurance documentation as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any):

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner:

Authorized Signature

By:

Title:

Copy: Engineer

DANE COUNTY DEPT. OF
PUBLIC WORKS, HIGHWAY &
TRANSPORTATION

1919 Alliant Energy Center Way
Madison, Wisconsin 53713
Office: 608/266-4018 ◊ Fax: 608/267-1533
Public Works Engineering Division
Public Works Solid Waste Division

NOTICE TO PROCEED

TO: [Contact Name]
[Contractor / Consultant Co. Name]

DATE: [Issue Date], 201[X]

ADDRESS: [XXXXX]
[City / Town], WI [53XXX]

OFFICE: 608/[XXX-XXXX] **MOBILE:** 608/[XXX-XXXX] **EMAIL:** [XXX@XXXX]

PURCHASE ORDER NO.: [PO No.]

OWNER'S BID NO.: 317040
OWNER'S CONTRACT NO.: [Contract No.]

PROJECT: Phase 9, Cell 2 Liner and Stage 4 Final Cap Construction
Dane County Landfill Site No. 2

You are notified that[, under terms of the [Agreement, Contract],] you are to start performing your obligations on [Start Date], 201[X] with completion by [End Date], 201[X].

These obligations include all items as detailed in:
1. Dane County Request for Bids (RFB) No. 317040 for above Project, due date [Date], 201[X];
2. Dane County Ordinance Chapter 25.13, which pertains to domestic partnership benefits;
3. RFB [Addendum, Addenda] dated [Add'm 1 Date], 201[X], [Add'm 2 Date], 201[X], [etc.];
4. Contractor's Bid Form, dated [Date], 20[XX]; and
5. Public Works Contract.

Agreed upon Contract price for Base Bid is------------------------------------ $[XX,XXX].00
Agreed upon Contract price for Alternate Bid No. [X] is--------------------- $[XX,XXX].00
Agreed upon Contract price for Alternate Bid No. [X] is--------------------- $[XX,XXX].00
Agreed upon Total Contract price is -- $[XX,XXX].00
These prices may vary up or down since they are unit prices.

Before you may start any Work at site:
1. Sign this "Notice To Proceed" and return it to Public Works Project Manager;
2. Submit Certificate of Insurance with "Dane County" listed as additional insured;
3. Submit completed 100% Performance / Payment Bond;
4. Have submittals on all equipment / materials approved by Public Works Project Manager;

Public Works Project Manager is John Welch, 608/516-4154.

Site work shall include following:
1. [Item X];
2. [Item Y];
3. [Item Z];
4. Participate in punchlist development, review & completion; and
5. Site must be cleaned of any material produced as a result of the Work being done.

In addition, you must comply with these requirements:

1. Maintain Dane County insurance requirements;
2. [Attend pre-construction meeting on [Day] [Meeting Date], 201[X] at [Time] on site];
3. [Submit construction schedule];
4. [Submit list of subcontractors];
5. [Submit breakdown of costs according to division on pay request form];
6. Submit all billing to Public Works Project Manager at address on top of this form; and
7. Submit Equal Benefits Compliance Payment Certification Form with final payment application.

OWNER - DANE COUNTY		**CONTRACTOR**	
By: ______________________		By: ______________________	
[PW PM's Name]		(Authorized Signature)	
Project Manager	[Signing Date], 201[X]		
Title	Date	Title	Date

1919 Alliant Energy Center Way
Madison, Wisconsin 53713
Office: 608/266-4018 ◊ Fax: 608/267-1533
Public Works Engineering Division
Public Works Solid Waste Division

DANE COUNTY DEPT. OF PUBLIC WORKS, HIGHWAY & TRANSPORTATION

CONTRACT CHANGE ORDER

TO: Public Works & Transportation Committee

C.O. NO: [XXX]
DATE: [Issue Date], 201[X]

REFERENCE: Bid No.: 317040
P.O. No.: [201XXXXX]
PROJECT: Phase 9, Cell 2 Liner and Stage 4 Final Cap Construction
CONTRACTOR: [Contractor Co. Name]
DESCRIPTION:

1. Reference: [N/A, RFI#, CB#, ASI#, COP#]
2. Requested By: [Owner, Contractor, A/E, Other]
3. Proposed Change: [Text description – can be as long or short as necessary]
4. Reason for Change: [Text description – can be as long or short as necessary]
5. **TOTAL [ADD / DEDUCT] TO CONTRACT:** **$[0.00]**

Document not valid unless signed by the Owner, Architect (if applicable) and Contractor

The original Contract amount was .... $[0.00]
Net change by previously authorized Change Orders .... $[0.00]
The Contract amount prior to this Change Order was .... $[0.00]
The Contract amount will be [increased, decreased, unchanged] by this Change Order in the amount of .. $[0.00]
The new Contract amount including this Change Order will be .... $[0.00]
The Completion Date will be [increased, decreased, unchanged] by .... [0] days
The date of Substantial Completion as of the date of this Change Order therefore is .... [Date]

Approvals:

Public Works & Transportation Committee	Controller's Division
Contractor	Architect / Engineer (A/E)
Purchasing Division	Public Works, Highway & Transportation (PWHT)

Final Copy Distribution: Contractor ____ Purchasing ____ Department ____ A/E ____ PWHT ____

Contractor's Application for Payment No.

	Application Period:	Application Date:
To (Owner):	From (Contractor):	Via (Engineer):
Project:	Contract:	
Owner's Contract No.:	Contractor's Project No.:	Engineer's Project No.:

Application For Payment

Change Order Summary

Approved Change Orders		
Number	Additions	Deductions
TOTALS		
NET CHANGE BY CHANGE ORDERS		

1. ORIGINAL CONTRACT PRICE.. $ ______

2. Net change by Change Orders... $ ______

3. Current Contract Price (Line 1 ± 2).. $ ______

4. TOTAL COMPLETED AND STORED TO DATE
(Column F total on Progress Estimates)... $ ______

5. RETAINAGE:
a. X ______ Work Completed.......... $ ______
b. X ______ Stored Material............ $ ______
c. Total Retainage (Line 5.a + Line 5.b)............................. $ ______

6. AMOUNT ELIGIBLE TO DATE (Line 4 - Line 5.c)............................ $ ______

7. LESS PREVIOUS PAYMENTS (Line 6 from prior Application)........ $ ______

8. AMOUNT DUE THIS APPLICATION.. $ ______

9. BALANCE TO FINISH, PLUS RETAINAGE
(Column G total on Progress Estimates + Line 5.c above)...................... $ ______

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:
(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;
(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all Liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such Liens, security interest, or encumbrances); and
(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor Signature

By:	Date:

Payment of: $ ______
(Line 8 or other - attach explanation of the other amount)

is recommended by: ______ ______
(Engineer) (Date)

Payment of: $ ______
(Line 8 or other - attach explanation of the other amount)

is approved by: ______ ______
(Owner) (Date)

Approved by: ______ ______
Funding or Financing Entity (if applicable) (Date)

Progress Estimate - Lump Sum Work

Contractor's Application

For (Contract):	Application Number:
Application Period:	Application Date:

			Work Completed		E	F		G
A		B	C	D	Materials Presently Stored (not in C or D)	Total Completed and Stored to Date (C + D + E)	% (F / B)	Balance to Finish (B - F)
Specification Section No.	Description	Scheduled Value ($)	From Previous Application (C+D)	This Period				
	Totals							

Stored Material Summary

Contractor's Application

For (Contract):	Application Number:
Application Period:	Application Date:

A		B	C		D		E	Subtotal Amount Completed and Stored to Date (D + E)	F		G
Bid Item No.	Supplier Invoice No.	Submittal No. (with Specification Section No.)	Storage Location	Description of Materials or Equipment Stored	Stored Previously		Amount Stored this Month ($)		Incorporated in Work		Materials Remaining in Storage ($) (D + E - F)
					Date Placed into Storage (Month/Year)	Amount ($)			Date (Month/ Year)	Amount ($)	
				Totals							

EJCDC
ENGINEERS JOINT CONTRACT
DOCUMENTS COMMITTEE

PERFORMANCE BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT
Effective Date of the Agreement:
Amount:
Description *(name and location)*:

BOND
Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☐ See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

____ *(seal)*
Contractor's Name and Corporate Seal

By: ____
Signature

____
Print Name

____
Title

Attest:____
Signature

____
Title

SURETY

____ *(seal)*
Surety's Name and Corporate Seal

By:____
Signature *(attach power of attorney)*

____
Print Name

____
Title

Attest:____
Signature

____
Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than

the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

PAYMENT BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:
Amount:
Description *(name and location)*:

BOND

Bond Number:
Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:
Amount:
Modifications to this Bond Form: ☐ None ☐ See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

______________________________ *(seal)*
Contractor's Name and Corporate Seal

By: ______________________________
Signature

____
Print Name

____
Title

Attest: ______________________________
Signature

____
Title

SURETY

______________________________ *(seal)*
Surety's Name and Corporate Seal

By: ______________________________
Signature *(attach power of attorney)*

____
Print Name

____
Title

Attest: ______________________________
Signature

____
Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.

4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.

5. The Surety's obligations to a Claimant under this Bond shall arise after the following:

   5.1 Claimants who do not have a direct contract with the Contractor,

      5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and

      5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).

   5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).

6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.

7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

   7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

   7.2 Pay or arrange for payment of any undisputed amounts.

   7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.

11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. **Definitions**

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;
7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default**: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

EJCDC
ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	Owner's Contract No.:
Contractor:	Contractor's Project No.:
Engineer:	Engineer's Project No.:
Project:	Contract Name:

This [preliminary] [final] Certificate of Substantial Completion applies to:

☐ All Work ☐ The following specified portions of the Work:

____

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 15.03.D of the General Conditions.]*

Amendments to Owner's responsibilities: ☐ None
☐ As follows

Amendments to Contractor's responsibilities: ☐ None
☐ As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract.

EXECUTED BY ENGINEER:	RECEIVED:	RECEIVED:
By: ____________	By: ____________	By: ____________
(Authorized signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: ____________	Title: ____________	Title: ____________
Date: ____________	Date: ____________	Date: ____________

EQUAL BENEFITS COMPLIANCE PAYMENT CERTIFICATION FORM

PURPOSE

25.016(8) of the Dane County Ordinance requires that each contractor receiving payment for contracted services must certify that he or she has complied fully with the requirements of Chapter 25.016 “Equal Benefits Requirement” of the Dane County Ordinances. Such certification must be submitted prior to the final payment on the contract.

This form should be included with a copy of the final contract invoice forwarded to your contract representative at Dane County.

CERTIFICATION

I, ____ certify that
Printed or Typed Name and Title

____
Printed or Typed Name of Contractor

has complied fully with the requirements of Chapter 25.016 of the Dane County Ordinances “Equal Benefits Requirements”.

Signed ____

Date _______________________________________

For questions on this form, please contact Chuck Hicklin at 608-266-4109 or your contract representative at Dane County.

DIVISION 1

Table of Contents

SECTION 01016
HEALTH AND SAFETY CONSIDERATIONS

PART 1. GENERAL

1.1 RESPONSIBILITY FOR HEALTH AND SAFETY

A. CONTRACTOR shall be solely and completely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the WORK. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent injury or loss to, all CONTRACTOR's and SUBCONTRACTOR's employees on the Site.

B. CONTRACTOR is expected to comply with all applicable OSHA regulations. CONTRACTOR's Health and Safety Plan does not supersede or in any way relieve CONTRACTOR of obligations under any applicable OSHA regulations including 29 CFR 1926: Occupational Health and Safety Standards for Construction.

C. CONTRACTOR shall be solely responsible for developing, providing, and implementing an appropriate Health and Safety program, including monitoring, equipment, plans in event of problems, incidents, and/or emergencies, and other related items as needed.

D. CONTRACTOR shall submit, for informational purposes only, one copy of site Health and Safety Plans to OWNER within 14 calendar days after Notice to Proceed.

1.2 EXCAVATION SAFETY

A. CONTRACTOR shall maintain a temporary barrier around open excavations at all times to restrict personnel access.

1.3 HEALTH AND SAFETY PROGRAM

A. CONTRACTOR shall develop, provide, and implement a Health and Safety Program in accordance with all applicable OSHA regulations, 29 CFR 1926 and any other applicable federal, state, or local agency regulations or requirements. Landfill gas and municipal solid waste leachate are present at the site. Landfill gas contains flammable gases and volatile organic compounds (VOCs) as well as other compounds. Address landfill gas and municipal solid waste leachate in CONTRACTOR's Health and Safety Program.

B. If OWNER/ENGINEER observes any of CONTRACTOR's employees or Subcontractors engaging in an unsafe act or procedure that may result in serious injury or death to the person performing the act/procedure, or to any other person, OWNER/ENGINEER shall have the right, but not the duty, to stop the WORK until the condition is corrected.

C. CONTRACTOR shall be held responsible for any increased costs that result from this WORK stoppage.

D. The cost of complying with this Section shall be included in the prices bid in the bid schedule for other items of WORK.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01270
SCHEDULE OF VALUES AND PAYMENT

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Procedures for schedule of value payment.

B. Schedule of value prices.

1.2 PROCEDURES

A. Lump Sum Bid is full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete all WORK of the contract documents.

B. OWNER will pay CONTRACTOR for the percentage of WORK completed on the basis of each schedule of value item.

1.3 SCHEDULE OF VALUE ITEMS FOR LUMP SUM BID

A. Description of WORK Items described below will form the basis for determining a schedule of values for determining progress payments for the lump sum price for Phase 9 – Cell 2 Liner and the Stage 4 Final Cover Construction.

ITEM 1 MOBILIZATION

Mobilization schedule of value item includes, but is not limited to, the WORK and operations necessary for the transportation of equipment, training and movement of personnel to the project site, and for all other WORK and operations which must be performed before beginning WORK at the project site. WORK also includes, providing field office trailers (if necessary by CONTRACTOR), equipment trailers, location of underground utilities, development of appropriate health and safety plans, site security procedures, obtaining required construction related permits with the exception of the erosion control permit which OWNER will provide, bonds and insurance, and administrative costs. Fifty percent of this item will be paid as demobilization at the end of the project.

ITEM 2 SURVEYING

Surveying schedule of value item includes, but is not limited to, performing all survey layout and survey documentation required to complete the WORK required under this contract. This item of includes, global positioning system (GPS) setup of base stations and equipment, construction layout staking, and documenting as constructed coordinates and elevations required to complete the Thickness and Elevation Information in the construction documentation coordinate and elevations Tables 1 through 3 in Appendix E for the Phase 9 – Cell 2 liner, and Tables 1 and 2 in Appendix F for the landfill Stage 4 Final Cover in the Supplementary Conditions Section of this project manual. CONTRACTOR survey requirements are further outlined in Section 01720 (Field Engineering) of this project manual.

For the Phase 9 – Cell 2 liner, the construction documentation coordinate and elevation tables provide the Groundwater Gradient Control System and liner design coordinates and elevations on a maximum 50 foot grid pattern and at slope break lines, Groundwater

Gradient Control System perforated and nonperforated piping at 50 feet intervals, and leachate collection pipe design elevations at maximum 25 feet intervals.

For the landfill Stage 4 Final Cover, the construction documentation coordinates and elevation tables provide the coordinates and elevations on a maximum 100 foot grid pattern and at slope break lines, and the drainage layer collection and discharge pipes on 50 foot intervals. This item of also includes, surveying the location of every as constructed geomembrane panel corner and the middle of every repair, location/elevation of surface water diversion berm flow lines, top of pipe elevation/location of perimeter drainage system piping, and downslope flumes/energy dissipater structures. Stakes, lath, paint or other materials used for locating and maintaining the locations will be furnished by CONTRACTOR.

Note that GPS enabled/guided equipment is required to be used for finish grading the subbase of the Select Clay Fill liner for Phase 9 – Cell 2 for maintaining maximum clay lift thickness during Select Clay Fill placement, finish grading the base grades (top of Select Clay Fill liner), for finish grading outside the limits of composite liner construction, and for placing Select Aggregate Fill over the geomembrane liner to monitor that minimum specified cover soil thickness are maintained for the various equipment traversing over the geomembrane liner. GPS enabled/guided equipment is also required to be used for finish grading the subbase of the Compacted Barrier Layer for the landfill Stage 4 Final Cover and for the soil layer thicknesses identified in the construction documentation tables

ITEM 3 SEDIMENT CONTROL

<u>SEDIMENT CONTROL FENCE</u> – Sediment Control Fence schedule of value item includes, but is not limited to, furnishing and installing Silt Fence in accordance with Specification Section 02374 in this project manual, local codes, and ordinances. This item of includes, maintaining silt fence during construction. Silt fence locations are shown on Plan Sheet 17 in the engineering plans.

<u>SEDIMENT CONTROL WITH EROSION LOGS</u> – Sediment Control with Erosion Logs schedule of value item includes, but is not limited to, furnishing and installing erosion control logs in accordance with Specification Section 02375 in this project manual, local codes, and ordinances. This item includes, maintaining erosion control logs during construction. Erosion control logs location are shown on Plan Sheet 17 in the engineering drawings.

<u>STONE WEEPERS at CULVERT OUTLETS</u> – Stone Weepers for Culverts schedule of value item includes, but is not limited to, furnishing and installing the stone and geotextile in accordance with the detail and in the location shown on the drawings. This item includes, maintaining the weepers during construction and removing following completion of construction.

ITEM 4 EROSION CONTROL AND REVEGETATION MAT

Erosion Control and Revegetation Mat (ECRM) schedule of value item includes, but is not limited to, furnish and installing ECRM and appurtenances on diversion berms, and all disturbed areas with 3H:1V or greater slopes in accordance with the Drawings and Specifications. This item includes, trenching, anchoring, and staking or pinning the ECRM in accordance with MANUFACTURER's instructions.

PHASE 9 – CELL 2 LINER CONSTRUCTION

ITEM 5 CLEAR AND GRUB

OWNER will provide clearing and grubbing within the limits of construction prior to start of Phase 9 – Cell 2 construction. CONTRACTOR shall protect trees, brush, and shrubs outside and directly adjacent to the limit of construction boundary so visual screening to the construction activities and landfill operations is provided.

ITEM 6 SUBBASE GRADE CONSTRUCTION

Subbase Grade Construction schedule of value item includes, but is not limited to, excavating, and placing fill to establish subbase grades, fine grading the subbase grades prior to placement of Select Clay Fill as shown on the Drawings. This item also includes, controlling and removing surface water and groundwater, and stabilizing areas to allow construction of the subbase in accordance with the Drawings and Specifications.

Subbase grades within the limits of composite liner will be documented on a maximum 50 foot grid, and at changes of slopes. Coordinate locations of the subbase to be documented are contained on the construction documentation coordinate and elevations tables provided in Appendix E of the Supplementary Conditions of this project manual. The documentation point locations numbers indicated on the tables are shown on Plan Sheet 5. The as constructed subbase elevations at the documentation locations within the limits of the Select Clay Fill placement are required to be at or below (-0.1 feet below) design subbase grades. Stockpile excess Topsoil and General Fill in the excess soil stockpile areas shown on Plan Sheet 4.

The designer has estimated the quantity of cut to be approximately 25,300 cubic yards, and quantity of fill to be approximately 670 cubic yards resulting in excess Topsoil and General Fill to be stockpiled. Note that these estimated quantities are based on in place cut and fill quantities comparing the existing topographic map shown on Plan Sheet 3 and the subbase grades shown on Plan Sheet 5 and do not account for stripped Topsoil, shrink, swell, or material loss and these estimated quantities are not guaranteed. A descriptions on the sources used to develop the existing topography map is provided in Note 1 of Plan Sheet 2. Bidder is responsible for determining actual quantities and determining how the quantities affect the lump sum price. Also, not included in the estimated quantities, are the cuts and fills required for constructing the Groundwater Gradient Control System trenches and drainage layer.

ITEM 7 GROUNDWATER GRADIENT CONTROL SYSTEM

Groundwater Gradient Control System schedule of value item includes, but is not limited to, miscellaneous excavation, grading, trenching and backfilling; furnishing and installing Select Aggregate Fill, perforated HDPE pipe, connecting to the existing transfer pipe, geotextile wrap, Select Granular Fill drainage layer and pipe bedding. This item also includes, controlling and removing surface water and groundwater, and stabilizing areas to allow construction of the Groundwater Gradient Control System in accordance with the Drawings and Specification.

ITEM 8 SELECT CLAY FILL (OWNER FURNISHED MATERIAL – FROM WESTPORT BORROW SITE)

Select Clay Fill schedule of value item includes, but is not limited to, excavating, loading and hauling from OWNER on site and off site Select Clay Fill borrow sources, placing, scarifying, moisture conditioning, compacting and constructing to the grades and minimum thickness shown on the Drawings (refer to prior liner construction project using clay from the Easy Street (Westport) borrow source in Appendix A and the Easy Street borrow site information provided in Appendix B). WORK also includes proof rolling the subbase surface prior to placing the first lift of Select Clay Fill, and coordinating with and assisting OWNER/ENGINEER as necessary to allow OWNER/ENGINEER to conduct required in field density testing and collecting undisturbed Shelby tube samples for laboratory testing. Select Clay Fill field and laboratory testing will be provided by OWNER, but CONTRACTOR will remove and replace Select Clay Fill with failing test results at no additional cost to OWNER.

Top of Select Clay Fill grades will be documented on a maximum 50 foot grid, and at changes of slopes (at the same location as the subbase grades). Coordinate locations of the Select Clay Fill to be documented are contained in the construction documentation coordinate and elevations tables provided in Appendix E of the Supplementary Conditions of this project manual. The documentation point locations numbers indicated on the tables are shown on Plan Sheet 5. The as constructed elevations at the documentation locations are required to be at or above the design base grades and at or above the minimum design Select Clay Fill liner thicknesses shown on Table 2. CONTRACTOR will be responsible for maintaining uniform slopes to comply with the Drawings and Specifications and to control/pump surface water from the Select Clay Fill clay liner area. Double handling of Select Clay Fill is incidental to this bid item.

OWNER has an approved Conditional Use Permit and will obtain the necessary erosion control permits for the Easy Street Borrow Site. WORK related to OWNER's off site borrow source include:

- Follow requirements and procedures identified in OWNER's approved Conditional Use Permit.

- Furnishing materials and installing erosion control features per OWNER's erosion control plan.

- Stripping of Topsoil/General Fill overburden (estimated to be approximately 18 inches thick) from the Selected Clay Fill borrow area and stockpiling on site.

- Excavating, loading, hauling Select Clay Fill to the landfill, unloading and placing in the Phase 9 – Cell 2 liner area during liner construction. Volumes shall be verified by OWNER's survey before Topsoil stripping, and before/after Select Clay Fill excavation.

- Any hauled Select Clay Fill that is in excess of Select Clay Fill needed for Phase 9 – Cell 2 construction shall be stockpiled at the landfill site in a Select Clay Fill stockpile location to be identified by OWNER.

- Restore the borrow area by placing General Fill from the stockpile in areas where Select Clay Fill was excavated and grading to provide proper drainage to an existing sedimentation basin.

- Using Topsoil from the on site stockpile and placing over the area disturbed by Select Clay Fill excavation.

- Contractor is responsible for other permits outside OWNER's approved Conditional Use Permit necessary for excavating and hauling Select Clay Fill from the borrow site to the landfill.

The Dane County has estimated the quantity Select Clay Fill available in on site stockpile is approximately 8,650 cubic yards (refer to Plan Sheet 4 for stockpile location), the remaining volume of Select Clay Fill needed for liner construction will come from OWNER off site (Westport) Select Clay Fill borrow source. Note that these estimated quantities are based on in place fill quantities.

ITEM 9 GEOMEMBRANE SURFACE PREPARATION

Geomembrane Surface Preparation schedule of value item includes, but is not limited to, fine grading and smooth drum rolling the top of Select Clay Fill surface, so that it is free of irregularities, protrusions, loose soil, and abrupt changes in grade. This item includes, removing stones, waste materials, grade stakes, and other debris that may be damaging to the geomembrane, and filling all depressions and large cracks with tamped Select Clay Fill or bentonite. This item also includes, maintaining the surface and moisture content of the Select Clay Fill layer until geomembrane installation is complete including fixing ruts in the Select Clay Fill during geomembrane installation.

ITEM 10 60 MIL HDPE GEOMEMBRANE (TEXTURED)

Geomembrane schedule of value item includes, but is not limited to, furnishing, unloading shipments, storing, deploying, and installing textured 60 mil HDPE Geomembrane liner material above the Select Clay Fill in accordance with the Drawings and Specifications. This item also includes, performing specified testing, documentation, and repairs of the geomembrane panels and seams. This item includes, excavating and backfilling anchor trenches, repairs required to remove rolled up stones/debris from under the geomembrane. This item includes, patching holes found in the liner during the electrical resistivity testing survey after the leachate drainage layer and leachate piping is installed over the geomembrane. The rain flap in the Delineation Berms shall be included in the schedule of value for Item 13 (Delineation Berms).

Area measurements will be based on in place true area measurements (adjusted for slopes). In place measurements will not account for overlaps or waste material. geomembrane extending beyond the anchor trench will not be paid for (refer to Detail 5 on Plan Sheet 7). Areas will be determined in the field by survey.

ITEM 11 GEOTEXTILE CUSHION

Geotextile Cushion schedule of value item includes, but is not limited to, furnishing and installing the 12 oz Geotextile Cushion above the geomembrane of the composite liner as shown on the Drawings.

ITEM 12 SELECT AGGREGATE FILL DRAINAGE LAYER

Select Aggregate Fill Drainage Layer schedule of values item includes, but is not limited to, furnishing and installing Select Aggregate Fill on the composite liner system to a minimum thickness of 1.0 feet to comply with the Drawings and Specifications. This item includes using GPS enabled equipment or other method to control stone thickness ensuring that a minimum thickness of Select Aggregate Fill is maintained between tracked and wheeled equipment as specified in the Specifications. This item should not include, the additional Select Aggregate Fill placed as bedding material for the Perforated HDPE Leachate Pipe or Select Aggregate Fill placed in the Delineations Berms. Additional Select Aggregate Fill described above should be accounted in the appropriate other schedule of value items.

ITEM 13 DELINEATION BERMS

Delineation Berms schedule of value item includes, but is not limited to, furnishing and installing geomembrane rain flap, protection for the primary geomembrane liner future tie in area, and appurtenances to construct the Delineation Berms in accordance with the Drawings and Specifications. For this Item, performing specified testing, documentation, and repairs of the geomembrane panels and seams, is covered under schedule of valve Item 10 (60 mil geomembrane). This item also includes, furnishing, installing, and grading the additional Select Aggregate Fill above the 1 foot thick Select Aggregate Fill Drainage Layer included in schedule of value Item 12.

ITEM 14 PERFORATED HDPE LEACHATE PIPE

Perforated HDPE Leachate Pipe schedule of value item includes, but is not limited to, furnishing, fusing, and installing, Perforated HDPE Leachate Pipes, pipe fittings, and appurtenances in accordance with the Drawings and Specifications. This item also includes, furnishing and installing the additional Select Aggregate Fill over the pipe above and beyond the 1 foot thick Select Aggregate Fill Drainage Layer included in schedule of value Item 12.

ITEM 15 ELECTRICAL RESISTIVITY TESTING ASSISTANCE

Electrical Resistivity Testing Assistance schedule of value item includes, but not limited to, providing assistance to OWNER/ENGINEER while OWNER/ENGINEER performs the geomembrane leak location survey as discussed in Section 02320, Subsection 3.5. This item includes, providing a source of AC power (110 VAC, 5 A), two supervised laborers with equipment, a water truck, water, and truck driver. WORK also includes, remove standing water and uncovering, exposing, and repairing any leaks found in the geomembrane. The leak location survey will be completed in less than 3 consecutive 10 hour days. Contractor must coordinate sequence of other WORK with the schedule for electrical resistivity testing.

ITEM 16 REMOVAL OF HDPE CULVERT

Removal of HDPE Culvert schedule of value item includes, but is not limited to, excavating an existing 12 inch diameter, 60 foot long, HDPE Culvert in the northwestern corner of Phase 9 – Cell 2 and disposing in an on site location designated by OWNER (refer to Plan Sheet 5).

LANDFILL STAGE 4 FINAL COVER CONSTRUCTION

ITEM 17 GENERAL FILL, FINE GRAINED SOIL AND TOPSOIL EXCAVATION TO SUBGRADE AND PREPARE GRADING LAYER FOR GCL PLACEMENT

General Fill, Fine Grained Soil and Topsoil Excavation to Subgrade and Prepare Grading Layer for GCL Placement schedule of value item includes, but is not limited to, excavating materials, to establish subbase grades, fine grading the subbase grades prior to placement of Fine Grained Soil Barrier Layer as shown on the Drawings (refer to Plan Sheet 4 for location of existing Fine Grained Soil). OWNER anticipates that Waste Excavation and Disposal will be necessary to achieve design subbase grades so a separate line item for Waste Excavation and Disposal is provided in Item 18. This item also includes, segregating General Fill from Fine Grained Soil by placing in separate stockpiles, or placing Fine Grained Soil directly in the final cover (if areas are ready to receive the Fine Grained Soil), controlling and removing surface water, and stabilizing areas to allow construction of the subbase in accordance with the Drawings and Specifications.

Subbase grades within the limits of the final cover area will be documented on a maximum 100 foot grid, and at changes of slopes. Coordinate locations of the subbase to be documented are contained on the construction documentation coordinate and elevations tables provided in Appendix F of the Supplementary Conditions of this project manual. The documentation point locations numbers indicated on the tables are shown on Plan Sheet 9. The as constructed subbase elevations at the documentation locations within the limits of Barrier Layer placement are required to be at or below (-0.1 feet below) design subbase grades.

The OWNER has estimated the quantity of cut to be approximately 116,900. Note that this estimated quantity is based on in place cut and fill quantities comparing the existing topographic map shown on Plan Sheet 3 and the subbase grades shown on Plan Sheet 9 minus the estimated depth of waste (refer to Item 18) and do not account for shrink, swell, or material loss and these estimated quantities are not guaranteed. A descriptions on the sources used to develop the existing topography map is provided in Note 1 of Plan Sheet 2. Bidder is responsible for determining actual quantities and determining how the quantities affect the lump sum price.

ITEM 18 WASTE EXCAVATION AND DISPOSAL

Waste Excavation and Disposal schedule of value item includes, but is not limited to, after excavation of Topsoil, General Fill and Fine Grained Soil, Excavating Waste to the design subbase grades and disposing at the eastern end of the landfill (Eastern Expansion Area) in area(s) designated by OWNER, fine grading the subbase grades prior to placement of Fine Grained Barrier Layer Soil as shown on the Drawings. THE CONTRACTOR IS REQUIRED TO CONTACT THE OWNER PRIOR TO RELOCATING WASTE FOR DISPOSAL. This item also includes, controlling and removing surface water, and stabilizing areas to allow construction of the subbase in accordance with the Drawings and Specifications.

Subbase grades within the limits of the final cover area will be documented on a maximum 100 foot grid, and at changes of slopes. Coordinate locations of the subbase to be documented are contained on the construction documentation coordinate and elevations tables provided in Appendix F of the Supplementary Conditions of this project manual. The documentation point locations numbers indicated on the tables are shown on Plan Sheet 9. The as constructed subbase elevations at the documentation locations within the limits of barrier layer placement are required to be at or below (-0.1 feet below) design subbase grades.

The OWNER has estimated the quantity of Waste Excavation be approximately 7,800 cubic yards. Note that this estimated quantity is based on in place quantities and based a test pit investigation performed by OWNER to identify the top of waste and compared to the subbase grades shown on Plan Sheet 9. This estimated quantity is not guaranteed. The actual volume of Waste Excavation and Disposal will be based on surveying the top of waste following removal of over burden soils and comparing to design subbase grades.

Note: CONTRACTOR cannot use paved access road along northern side of the landfill for hauling waste to the Eastern Expansion for disposal.

ITEM 19 COMPACTED FINE GRAINED SOIL BARRIER LAYER (OWNER FURNISHED MATERIAL)

Compacted Fine Grained Soil Barrier Layer schedule of value item includes, but is not limited to, excavating, loading, and hauling Fine Grained soil from OWNER'S on site stockpile (Parisi stockpile) and from the northern slope of the Stage 4 Final Cover area (area shown on Plan Sheet 4), placing and constructing the barrier layer to the grades shown on the Drawings and in accordance with the Specifications. Refer to laboratory test results for OWNER furnished Fine Grained Soil provided in Appendix C). A minimum 2.0 foot thick thickness is required, with an allowable tolerance of -0.2/0.0 foot. WORK also includes, proof rolling the subbase surface prior to placing the GCL. The minimum thickness of the Fine Grained Barrier Layer will be field verified by on site measurements.

Top of Compacted Fine Grained Soil Barrier Layer grades will be documented on a maximum 100 foot grid, and at changes of slopes (at the same location as the subbase grades). Coordinate locations of the Compacted Fine Grained Barrier Soil Layer to be documented are contained in the construction documentation coordinate and elevation tables provided in Appendix F of the Supplementary Conditions of this project manual. The documentation point locations numbers indicated in the tables are shown on Plan Sheet 9. Area measurement will be based on in place planimetric area (not adjusted for slopes) based on surveyed limits of the Compacted Fine Grained Barrier Soil Layer placement limits. Double handling of soil is incidental to this bid item.

OWNER has estimated the on site fine grained soil to be approximately 38,000 cubic yards. Note that this estimated quantity is based on in place volume and these estimated quantities are not guaranteed. The actual volume of fine grained soil excavation will be based on survey performed during construction for the top and bottom of existing fine grained soil removed.

ITEM 20 COMPACTED FINE GRAINED SOIL BARRIER LAYER (CONTRACTOR FURNISHED MATERIAL)

Compacted Fine Grained Soil Barrier Layer schedule of value item includes, but is not limited to, furnishing, excavating, loading, and hauling fine grained soil from CONTRACTOR'S off site borrow source, placing and constructing the barrier layer to the grades shown on the Drawings and in accordance with the Specifications. A minimum 2.0 foot thick thickness is required, with an allowable tolerance of 0.2/0.0 foot. WORK also includes, proof rolling the subbase surface prior to placing the GCL. The minimum thickness of the Compacted Fine Grained Barrier Soil Layer will be field verified by on site measurements.

Prior to hauling Fine Grained Soil to the landfill, the CONTRACTOR's proposed Fine Grained Soil borrow source must be approve by the WDNR and meet the requirements of NR 504.075. OWNER will collect and analyze soil samples collected from the CONTRACTOR's borrow source and will send the required submittals to the WDNR for approval. CONTRACTOR shall provide the laborers and equipment necessary to assist the OWNER in collecting samples needed for testing.

Top of Compacted Fine Grained Barrier Soil Layer grades will be documented on a maximum 100 foot grid, and at changes of slopes (at the same location as the subbase grades). Coordinate locations of the Compacted Fine Grained Barrier Soil Layer to be documented are contained in the construction documentation coordinate and elevation tables provided in Appendix F of the Supplementary Conditions of this project manual. The documentation point locations numbers indicated in the tables are shown on Plan Sheet 9. Area measurement will be based on in place planimetric area (not adjusted for slopes) based on surveyed limits of the Compacted Fine Grained Barrier Soil Layer placement limits. Double handling of soil is incidental to this bid item.

ITEM 21 GEOSYNTHETIC CLAY LINER (GCL) (OWNER FURNISHED MATERIAL)

Geosynthetic Clay Liner (GCL) schedule of value item includes, but is not limited to, installing OWNER furnished GCL in accordance with the Drawings and Specifications, Section 02075 and CQA Plan in Appendix D of the Supplementary Conditions Tab in this project manual. The location of OWNER furnished GCL is provided on Plan Sheet 4.

This item of WORK also includes, providing a panel layout plan and other submittals identified in the Specifications, protection of the GCL, providing completed subgrade acceptance forms, transporting and deploying the GCL, seaming the GCL (including seaming to CONTRACTOR furnished GCL), protecting the GCL prior to and after covering, geomembrane, geocomposite, General Fill (rooting zone layer), and incidentals required for the installation and protection of the GCL. WORK also includes, salvaging plywood/posts, cleaning the existing GCL cover for connection to the new GCL cover in accordance with the Drawings and Specifications.

This item of WORK also includes, installing GCL in the trench for the Drainage Layer Toe Drain Collection Pipes in accordance with the Drawings and Specifications. Excavation and installation of the Drainage Layer Toe Drain Collection Pipes is included in Bid Item 29.

OWNER has estimated the on site OWNER furnished GCL to be 108 rolls (15’ wide x 150’ long) for 27,000 square yards.

Area measurements will be based on in place true areas (adjusted for slopes) based on surveyed limits of the installed GCL. In place measurements will not account for overlaps or waste material. GCL extending beyond the Drainage Layer Toe Drain Collection Pipe trench will not be paid for (refer to Detail 4 on Plan Sheet 13).

ITEM 22 GEOSYNTHETIC CLAY LINER (GCL) (CONTRACTOR FURNISHED MATERIAL)

Geosynthetic Clay Liner (GCL) schedule of value item includes, but is not limited to, furnishing and installing the GCL in accordance with the Drawings and Specifications, Section 02075 and CQA Plan in Appendix D of the Supplementary Conditions tab in this project manual.

This item of WORK also includes, providing a panel layout plan and other submittals identified in the Specifications, unloading GCL shipments, on site storage and protection of the GCL, providing completed subgrade acceptance forms, transporting and deploying the GCL, seaming the GCL (including seaming to OWNER furnished GCL), protecting the GCL prior to and after covering, geomembrane, geocomposite, General Fill (rooting zone layer), and incidentals required for the installation and protection of the GCL. WORK also includes, salvaging plywood/posts, cleaning the existing GCL cover for connection to the new GCL cover in accordance with the Drawings and Specifications.

This item of WORK also includes, installing GCL in the trench for the Drainage Layer Toe Drain Collection Pipes in accordance with the Drawings and Specifications. Excavation and installation of the Drainage Layer Toe Drain Collection Pipes is included in Bid Item 29.

Area measurements will be based on in place true areas (adjusted for slopes) based on surveyed limits of the installed GCL. In place measurements will not account for overlaps or waste material. GCL extending beyond the Drainage Layer Toe Drain Collection Pipe trench will not be paid for (refer to Detail 4 on Plan Sheet 13).

ITEM 23 40 MIL LLDPE TEXTURED GEOMEMBRANE (OWNER FURNISHED MATERIAL)

40 mil LLDPE Textured Geomembrane schedule of value item includes, but is not limited to, storing, and installing OWNER furnished geomembrane cover material above the GCL, and performing the specified testing and repairs of the geomembrane panels and seams. Pipe boots for penetrations through the geomembrane are cover under Item 36.

This item of WORK also includes, providing a panel layout plan and other submittals identified in the Specifications, cleaning the existing geomembrane cover for connection to the new geomembrane cover, seaming the geomembrane (including seaming to CONTRACTOR furnished Geomembrane), protecting the geomembrane prior to and after covering with geocomposite and General Fill, and other incidentals required for the installation of the geomembrane, in accordance with the Drawings and Specifications.

This item of WORK also includes, installing 40 mil LLDPE Textured Geomembrane in the trench for the Drainage Layer Toe Drain Collection Pipes in accordance with the Drawings and Specifications. Excavation and installation of the Drainage Layer Toe Drain Collection Pipes is included in Bid Item 29.

OWNER has estimated the on site OWNER furnished 40 mil LLDPE textured geomembrane to be 14 rolls (23’ wide x 740’ long) for 26,475 square yards.

Area measurements will be based on in place true area measurements (adjusted for slopes). In place measurements will not account for overlaps or waste material. geomembrane extending beyond the Drainage Layer Toe Drain Collection Pipe trench will not be paid for (refer to Detail 4 on Plan Sheet 13).

ITEM 24 40 MIL LLDPE TEXTURED GEOMEMBRANE (CONTRACTOR FURNISHED MATERIAL)

40 mil LLDPE Textured Geomembrane schedule of value item includes, but is not limited to, furnishing, unloading shipments, storing, and installing the geomembrane cover material above the GCL, and performing the specified testing and repairs of the geomembrane panels and seams. Pipe boots for penetrations through the geomembrane are cover under Item 36.

This item of WORK also includes, providing a panel layout plan and other submittals identified in the Specifications, cleaning the existing geomembrane cover for connection to the new geomembrane cover, seaming the geomembrane (including seaming to OWNER furnished geomembrane), protecting the geomembrane prior to and after covering with geocomposite and General Fill, and other incidentals required for the installation of the geomembrane, in accordance with the Drawings and Specifications.

This item of WORK also includes, installing 40 mil LLDPE Textured Geomembrane in the trench for the Drainage Layer Toe Drain Collection Pipes in accordance with the Drawings and Specifications. Excavation and installation of the Drainage Layer Toe Drain Collection Pipes is included in Bid Item 29.

Area measurements will be based on in place true area measurements (adjusted for slopes). In place measurements will not account for overlaps or waste material. geomembrane extending beyond the Drainage Layer Toe Drain Collection Pipe trench will not be paid for (refer to Detail 4 on Plan Sheet 13).

ITEM 25 GEOCOMPOSITE DRAINAGE LAYER (OWNER FURNISHED MATERIAL)

Geocomposite Drainage Layer schedule of value item includes, but is not limited to, installing OWNER furnished geocomposite above the geomembrane, in accordance with the Drawings and Specifications. Repairs to geomembrane damaged during placement of the geocomposite Drainage Layer will be paid for by CONTRACTOR, with no expense to OWNER.

This item of WORK also includes, providing a panel layout plan and other submittals identified in the Specifications, protection of the geocomposite, deploying the geocomposite, seaming the geocomposite (including seaming to CONTRACTOR furnished geocomposite), protecting the geocomposite prior to and after covering, General Fill (rooting zone layer), and other incidentals required for the installation and protection of the geocomposite.

This item of WORK also includes, installing geocomposite in the trench for the Drainage Layer Toe Drain Collection Pipes in accordance with the Drawings and Specifications. Excavation and installation of the Drainage Layer Toe Drain Collection Pipes is included in Bid Item 29.

OWNER has estimated the on site OWNER furnished geocomposite drainage layer to be 82 rolls (14.5’ wide x 230’ long) for 30,385 square yards.

Area measurements will be based on in place true areas (adjusted for slopes) based on surveyed limits of the installed geocomposite. In place measurements will not account for overlaps or waste material. geocomposite extending beyond the Drainage Layer Toe Drain Collection Pipe trench will not be paid for (refer to Detail 4 on Plan Sheet 14).

ITEM 26 GEOCOMPOSITE DRAINAGE LAYER (CONTRACTOR FURNISHED MATERIAL)

Geocomposite Drainage Layer schedule of value item includes, but is not limited to, furnishing, unloading shipments, storing, and installing the geocomposite above the geomembrane, in accordance with the Drawings and Specifications. Repairs to geomembrane damaged during placement of the geocomposite Drainage Layer will be paid for by CONTRACTOR, with no expense to OWNER.

This item of WORK also includes, providing a panel layout plan and other submittals identified in the Specifications, protection of the geocomposite, deploying the geocomposite, seaming the geocomposite (including seaming to OWNER furnished geocomposite), protecting the geocomposite prior to and after covering, General Fill (rooting zone layer), and other incidentals required for the installation and protection of the geocomposite.

This item of WORK also includes, installing geocomposite in the trench for the Drainage Layer Toe Drain Collection Pipes in accordance with the Drawings and Specifications. Excavation and installation of the Drainage Layer Toe Drain Collection Pipes is included in Bid Item 29.

Area measurements will be based on in place true areas (adjusted for slopes) based on surveyed limits of the installed geocomposite. In place measurements will not account for overlaps or waste material. Geocomposite extending beyond the Drainage Layer Toe Drain Collection Pipe trench will not be paid for (refer to Detail 4 on Plan Sheet 14).

ITEM 27 GENERAL FILL ROOTING ZONE LAYER (OWNER FURNISHED MATERIAL)

General Fill Rooting Zone Layer schedule of value item includes, but is not limited to, excavating General Fill from OWNER's on site soil stockpile areas identified on Plan Sheet 4 (includes General Fill stockpiled from excavation of General Fill over the Stage 4 Final Cover area, refer to Item 17), loading, hauling, placing, and grading the General Fill layer in accordance with the Drawings and Specifications, and CQA Plan. A minimum 2.5 foot thick thickness is required, with an allowable tolerance of 0.0/+0.20 foot. The minimum thickness of the General Fill Rooting Zone Layer will be field verified by on site measurements.

Top of General Fill Rooting Zone Layer grades will be documented on a maximum 100 foot grid, and at changes of slopes (at the same location as the subbase and barrier layer grades). Coordinate locations of the General Fill Rooting Zone Layer to be documented are contained in the construction documentation coordinate and elevation tables provided in Appendix F of the Supplementary Conditions of this project manual. The documentation point locations numbers indicated in the tables are shown on Plan Sheet 9.

Area measurement will be based on in place planimetric area (not adjusted for slopes) based on surveyed limits of the General Fill placement limits. Double handling of General Fill is incidental to this bid item.

ITEM 28 TOPSOIL LAYER (OWNER FURNISHED MATERIAL)

Topsoil Layer schedule of value item includes, but is not limited to, hauling, placing, and grading topsoil from OWNER's on site stockpiles (refer to Sheet 4) in accordance with the Drawings and Specifications. A minimum 0.5 foot thick thickness is required, with an allowable tolerance of 0.0/+0.10 foot. The minimum thickness of the topsoil will be field verified by on site measurements at the point locations on Table 1 in Appendix F of the Supplementary Conditions of this project manual. Double handling of Topsoil is incidental to this bid item.

ITEM 29 DRAINAGE LAYER TOE DRAIN COLLECTION PIPES

Drainage Layer Toe Drain Collection Pipes schedule of value item includes, but is not limited to, trenching, furnishing and installing 4 inch diameter perforated corrugate Polyethylene pipe with smooth interior [Advanced Drainage System (ADS N-12) pipe or equal], miscellaneous fittings and appurtenances required for pipe installation, bedding with Select Aggregate Fill, and wrapping with geotextile filter, as shown on the Drawings. Measurement to be verified in the field.

ITEM 30 DIVERSION BERM DRAINAGE LAYER COLLECTION PIPES

Diversion Berm Drainage Layer Collection Pipes schedule of value item includes, but is not limited to, furnishing and installing 4 inch diameter perforated corrugate Polyethylene pipe with smooth interior [Advanced Drainage System (ADS N-12) pipe or equal], miscellaneous fittings and appurtenances required for pipe installation, bedding with

Select Aggregate Fill, and wrapping with geocomposite drainage layer material, as shown on the Drawings. Measurement to be verified in the field.

ITEM 31 TOE DRAIN DRAINAGE LAYER DISCHARGE PIPES

Toe Drain Drainage Layer Discharge Pipes schedule of value item includes, but is not limited to, trenching, furnishing and installing 4 inch diameter nonperforated corrugate Polyethylene pipe with smooth interior [Advanced Drainage System (ADS N-12) pipe or equal], miscellaneous fittings and appurtenances required for pipe installation, backfilling, and placing a select aggregate fill apron around the daylight end of pipe, as shown on the Drawings. Measurements to be verified in the field.

ITEM 32 DIVERSION BERM DRAINAGE LAYER DISCHARGE PIPES

Diversion Berm Discharge Layer Discharge Pipes schedule of value item includes, but is not limited to, trenching, furnishing and installing 4 inch diameter nonperforated corrugate Polyethylene pipe with smooth interior [Advanced Drainage System (ADS N-12) pipe or equal], miscellaneous fittings and appurtenances required for pipe installation, backfilling, and placing a select aggregate fill apron around the daylight end of pipe, as shown on the Drawings. Measurements to be verified in the field.

ITEM 33 PERMANENT SURFACE WATER DIVERSION BERMS

Permanent Surface Water Diversion Berms schedule of value item includes, but is not limited to, loading, hauling, placing, fine grading, and incidentals required to construct the general fill diversion berm (Detail 2 on Plan Sheet 12) in accordance with the plans and Specifications. In place length will be measured in the field. Double handling of General Fill is considered incidental to the bid item.

ITEM 34 TEMPORARY SURFACE WATER DIVERSION BERMS

Temporary Surface Water Diversion Berms schedule of value item includes, but is not limited to, loading, hauling, placing, fine grading, and incidentals required to construct the Topsoil Temporary Diversion Berms (Detail 6 on Plan Sheet 12) in accordance with the plans and Specifications. In place length will be measured in the field.

ITEM 35 DOWNSLOPE FLUME PIPES AND ENERGY DISSIPATER STRUCTURES

Downslope Flumes Pipes and Energy Dissipater Structures schedule of value item includes, but is not limited to, furnishing and installing water tight Advanced Drainage System (ADS) N12 corrugated polyethylene pipe (smooth wall interior), inlet aprons, riprap inlets and outlets (including geomembrane and geotextile), fittings, other miscellaneous appurtenances required for construction the flume and dissipater, in accordance with the Drawings and Specifications

ITEM 36 GEOMEMBRANE BOOTS AROUND EXISTING GAS AND LEACHATE COLLECTION SYSTEM PENETRATIONS THROUGH THE FINAL COVER GEOMEMBRANE

Geomembrane Boots Around Existing Gas and Leachate Collection System Penetrations Through the final cover geomembrane schedule of value item includes, but is not limited to, furnishing, and installing 40 mil LLDPE Textured Geomembrane pipe boots around gas and leachate collection features that penetrate the geomembrane liner as indicated on the Drawings and Specifications. This item of WORK also includes constructing a Geomembrane Apron around two leachate collection vaults as shown on Detail 3 on Plan Sheet 8. For this

Item, performing specified testing, documentation, and repairs of the geomembrane panels and seams, is covered under schedule of value Items 21 and 22 (geomembrane).

B. Description of work for Alternate Bid Items described below will form the basis for determining a schedule of values for determining progress payments for the lump sum price for the Stage 4 Final Cover 2 Construction.

ITEM 1A GENERAL FILL ROOTING ZONE LAYER (CONTRACTOR FUNISHED MATERIAL)

General Fill Rooting Zone Layer schedule of value item includes, but is not limited to, furnishing, loading, hauling, placing, and grading the General Fill layer in accordance with the Drawings and Specifications, and CQA Plan. A minimum 2.5 foot thick thickness is required, with an allowable tolerance of 0.0/+0.20 foot. The minimum thickness of the General Fill Rooting Zone Layer will be field verified by on site measurements.

Top of General Fill Rooting Zone Layer grades will be documented on a maximum 100 foot grid, and at changes of slopes (at the same location as the subbase and barrier layer grades). Coordinate locations of the Rooting Zone Layer to be documented are contained in the construction documentation coordinate and elevation tables provided in Appendix F of the Supplementary Conditions of this project manual. The documentation point locations numbers indicated in the tables are shown on Plan Sheet 9.

Area measurement will be based on in place planimetric area (not adjusted for slopes) based on surveyed limits of the General Fill placement limits. Double handling of General Fill is incidental to this bid item.

ITEM 2A TOPSOIL LAYER (CONTRACTOR FURNISHED MATERIAL)

Topsoil Layer schedule of value item includes, but is not limited to, furnishing, loading, hauling, placing, and grading topsoil in accordance with the Drawings and Specifications. A minimum 0.5 foot thick thickness is required, with an allowable tolerance of 0.0/+0.10 foot. The minimum thickness of the topsoil will be field verified by on site measurements at the point locations on Table 1 in Appendix F of the Supplementary Conditions of this project manual. Double handling of Topsoil is incidental to this bid item.

ITEM 3A TOPSOIL LAYER (CONTRACTOR FURNISHED MATERIAL)

Topsoil Layer schedule of value item includes, but is not limited to, excavating, loading, and hauling, from the OWNER’s Easy Street (Westport) borrow source, placing, and grading topsoil in accordance with the Drawings and Specifications. A minimum 0.5 foot thick thickness is required, with an allowable tolerance of 0.0/+0.10 foot. The minimum thickness of the topsoil will be field verified by on site measurements at the point locations on Table 1 in Appendix F of the Supplementary Conditions of this project manual. Double handling of Topsoil is incidental to this bid item.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01310
ADMINISTRATIVE PROVISIONS

PART 1. GENERAL

1.1 SECTION INCLUDES

A. WORK Covered by Contract Documents.

B. Contract Method.

C. WORK Sequence.

D. CONTRACTOR Use of Premises and OWNER Occupancy.

E. OWNER Furnished Products.

F. Alternates.

G. Applications for Payment.

H. Coordination.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. CONTRACTOR shall complete all WORK as specified or indicated in the Contract Documents. The WORK is generally described as follows:

- Furnishing, installing and maintaining temporary and permanent erosion controls throughout Phase 9 – Cell 2 liner and Stage 4 Final Cover construction.

- Excavating, loading, hauling, placing Fine Grained soil, Select Clay Fill, General Fill, Topsoil from OWNER's borrow source to the landfill for liner and final cover construction.

- Stripping available Topsoil.

- Excavating, filling, and grading to achieve design grades shown on the Drawings.

- Stockpiling excess fill at the stockpile locations shown on the Drawings.

- Placing Topsoil in disturbed areas.

- Constructing a Groundwater Gradient Control System including trenching, collection piping, pipe bedding, and 50 feet wide drainage layer.

- Constructing a minimum 4 foot thick Select Clay Fill clay liner using Select Clay Fill clay from OWNER off site borrow source.

- Constructing a final cover over the landfill Stage 4 area.

- Furnishing and installing a 60 mil HDPE Textured Geomembrane liner component of the composite liner for the Phase 9 – Cell 2 Expansion Area.

- Furnishing and installing a 12 ounce nonwoven geotextile cushion and 6 ounce nonwoven geotextile filter.
- Furnishing and installing a minimum 1 foot thick aggregate leachate collection drainage blanket.
- Furnishing and installing Perforated HDPE Leachate Collection Pipes.
- Constructing cell Delineation Berms and temporary geomembrane flaps.
- Assisting OWNER/ENGINEER in conducting a leak location survey on the liner geomembrane
- Furnishing and installing a 40 mil LLDPE Textured Geomembrane liner component for the final cover of the Landfill Stage 4 Final Cover Area.
- Furnishing and installing toe drain collection and discharge pipes in the final cover system.
- Installing Erosion Control and Revegetation Mat (ECRM).
- Furnishing and Constructing Access Roads and Stone Tracking Pads.

B. The limits of construction line shown on the Drawings designates the limit of the construction area. Storage of materials and equipment and staging of WORK is to be within this area unless other areas are approved by OWNER/ENGINEER.

1.3 CONTRACT METHOD WORK

A. Construct the WORK under a Lump Sum Contract.

B. Compensation is full payment for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the WORK.

1.4 WORK SEQUENCE

A. Construct the WORK in stages to accommodate OWNER’s landfill operations and to accommodate the resistivity testing requirements during the construction period; coordinate construction schedule and operations with OWNER. Erosion controls must be installed prior to performing any WORK task that will require erosion controls.

1.5 CONTRACTOR USE OF PREMISES AND OWNER OCCUPANCY

A. Limit use of premises to WORK and construction operations; allow for OWNER’s operations.

B. Coordinate use of premises under direction of OWNER. Cooperate with OWNER to minimize conflict and to facilitate OWNER’s operations.

C. Limit access to site from the entrance located off of State Highway 12 and 18 or the site entrance located off of County Rd AB.

D. Keep landfill gate closed and locked during times the landfill operations are closed.

1.6 OWNER FURNISHED PRODUCTS

A. Products furnished by OWNER:

- Geomembrane
- Geocomposite Drainage Layer
- Select Clay Fill
- Fine Grained Soil
- General Fill
- Topsoil

1.7 ALTERNATES

A. Alternates quoted on Bid Form will be exercised based on the condition of the Fine Grained Soil Barrier Layer for the final cover meeting WDNR requirements.

B. OWNER will consider bids for the following items:

1. Construction of the final cover using Fine Grained Soil furnished by Bidder.

C. Coordinate and modify WORK affected by accepted alternates as required to complete the WORK.

D. Schedule of Alternates:

1. Cubic Yard for furnishing, loading and hauling of Fine Grained Soil from Bidder's Contractor's off site borrow source to the landfill

2. Other Alternatives Proposed by the Bidder: Alternative(s) proposed should include any earthwork or any other WORK that OWNER may be able to do to obtain a deduct from the lump sum price such as purchase materials, haul and direct place Select Clay Fill, Fine Grained Soil, General Fill, and Topsoil to the landfill, etc. Alternates proposed by the BIDDER should be submitted with the bids and be detailed and easily measured for deducting from the lump sum price.

1.8 APPLICATIONS FOR PAYMENT

A. Submit three copies of each application under procedures of Section 01330.

B. Content and Format: Sample form for Application for Payment contained in this project manual or other spreadsheet approved by OWNER.

1.9 COORDINATION

A. Coordinate and integrate elements of WORK of the various Sections of Specifications to ensure efficient and orderly sequence of installation with provisions for accommodating items installed later.

B. Verify that characteristics of elements of interrelated operating equipment are compatible; coordinate WORK of various Specification sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

C. Coordinate space requirements and installation of mechanical WORK which are indicated diagrammatically on Drawings. Follow routing shown for pipes as closely as practicable. Use spaces efficiently for maximum accessibility to other installations, for maintenance, and for repairs.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01314
PROJECT MEETINGS

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Preconstruction conferences.

B. Progress meetings.

1.2 PRECONSTRUCTION AND PREINSTALLATION CONFERENCES

A. OWNER/ENGINEER will administer Preconstruction Conference prior to the start of construction to discuss schedules, procedures, submittals, payments, staging areas, and establish a working understanding among parties.

B. OWNER/ENGINEER will administer Preinstallation Conference prior to start of Fine Grained Soil and Select Clay Fill installations for the Liner construction to discuss installation requirements, schedules, procedures, submittals, staging areas, and establish a working understanding among parties.

C. OWNER/ENGINEER will administer Preinstallation Conference prior to the start of Geosynthetic installations to discuss installation requirements, schedules, procedures, submittals, staging areas, and establish a working understanding among parties and meet the requirements of NR 516.04(4). At a minimum OWNER, CONTRACTOR, appropriate DNR staff, geosynthetics INSTALLER, Construction Quality Assurance (CQA) personnel, and OWNER/ENGINEER will attend the Preinstallation Conference(s).

1.3 PROGRESS MEETINGS

A. OWNER/ENGINEER will schedule and administer Project meetings throughout progress of the WORK at maximum weekly intervals.

B. OWNER/ENGINEER will arrange meetings, prepare agenda, and preside at meetings.

C. Attendance: Job Superintendent, major subcontractors and suppliers, OWNER/ENGINEER as appropriate to topics on the agenda for each meeting.

D. Suggested Agenda: Review WORK progress, status of construction schedule and adjustments thereto, equipment and material, delivery schedules, submittals, adherence to quality standards, pending changes and substitutions, coordination, and other items affecting the progress of WORK.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01330
SUBMITTALS

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Procedures.

B. Construction Progress Schedules.

C. Schedule of Values.

D. Shop Drawings.

E. Product Data.

F. MANUFACTURER's Instructions.

G. Samples.

H. CONTRACTOR Review.

1.2 PROCEDURES

A. Deliver submittals to OWNER/ENGINEER.

B. Identify Project, CONTRACTOR, Subcontractor, and Major Supplier; identify pertinent Drawing sheet and detail number, and Specification Section number, as appropriate. Identify deviations from Contract Documents.

C. Comply with construction schedule for submittals related to WORK progress. Coordinate submittal of related items.

D. After OWNER/ENGINEER reviews submittal, revise and resubmit as required; identify changes made since previous submittal.

E. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

1.3 CONSTRUCTION PROGRESS SCHEDULE

A. Refer to Section 23 in the General Conditions (Construction Schedule and Periodic Estimates) for submitting and revising the construction schedule.

B. Show detailed sequence for Select Clay Fill placement upon request of OWNER/ENGINEER. Sequence Select Clay Fill placement to maximize time between lifts to allow for soils testing and documentation, minimize splices, and to meet regulatory requirements.

1.4 SHOP DRAWINGS

A. Submit the number of opaque reproductions which CONTRACTOR requires, plus two copies which will be retained by OWNER/ENGINEER or submit a printable electronic copy.

B. Present in a clear and thorough manner. Title each drawing with Project name; identify each element of Drawings by reference to sheet number and detail of Contract Documents.

C. Identify field dimensions; show relationship to adjacent or critical features of WORK or products.

1.5 PRODUCT DATA

A. Mark each copy to identify applicable product, models, options, and other data; supplement MANUFACTURER's standard data to provide information unique to the WORK.

B. Submit the number of copies which CONTRACTOR requires plus two copies which will be retained by OWNER/ ENGINEER or submit a printable electronic copy.

1.6 MANUFACTURER'S INSTRUCTIONS

A. When required by an individual Specification Section, submit MANUFACTURER's printed instructions for delivery, storage, assembly, installation, start up, adjusting, and finishing, in quantities specified for product data.

1.7 SAMPLES

A. Provide field samples as required by individual Specifications Sections. Install sample complete and finished. Acceptable samples in place may be retained in the completed WORK.

B. Submit samples to illustrate functional characteristics of the product, with integral parts and attachment devices. Coordinate submittal of different categories for interfacing WORK.

C. Include identification on each sample, giving full information.

D. Submit number specified in respective Specification Section; one will be retained by OWNER/ENGINEER. Reviewed samples which may be used in the WORK are indicated in the Specification Section.

1.8 CONTRACTOR REVIEW

A. Review submittals prior to transmittal; determine and verify field measurements, field construction criteria, MANUFACTURER's catalog numbers, and conformance of submittal with requirements.

B. Coordinate submittals with requirements of WORK and of Contract Documents.

C. Sign or initial each sheet of shop drawings and product data, and each sample label to certify compliance with requirements of Contract Documents. Notify OWNER/ENGINEER in writing at time of submittal of any deviations from requirements of Contract Documents.

D. Do not fabricate products or begin WORK which requires submittals until return of submittal with OWNER/ENGINEER's acceptance.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01410
REGULATORY REQUIREMENTS

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Description.

B. Permits.

C. Taxes.

1.2 DESCRIPTION

A. Give all notices; observe and comply with all laws, rules, regulations and ordinances applicable to the WORK.

B. Notify area utility companies before beginning WORK, in accordance with state and local regulations.

1.3 PERMITS

A. OWNER will obtain all required erosion control permits. OWNER shall maintain all conditions of the erosion control permits such as conducting required inspections and record keeping. CONTRACTOR will be responsible for maintenance and any corrective actions necessary (as directed by OWNER) of all erosion control Best Management Practices (BMP’s)

B. Obtain all other construction permits (if any) and licenses necessary for the prosecution of the WORK, which are applicable at the time of CONTRACTOR's Bid.

C. OWNER will assist CONTRACTOR, when necessary, in obtaining such permits and licenses.

1.4 TAXES

A. Pay all sales, consumer, use and other similar taxes required to be paid in accordance with the law of the place where the WORK is to be performed. Refer to Tax paragraph in the Instructions to Bidders section of this project manual.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01420
REFERENCE STANDARDS

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Applicability of Reference Standards.

B. Provision of Reference Standards at site.

1.2 QUALITY ASSURANCE

A. Comply with requirements of the standard for products or workmanship specified by association, trade, or federal standards, except when more rigid requirements are specified or are required by applicable codes.

B. Except when a specific date is specified, the date of the standard is that in effect as of the Bid date, or date of OWNER/CONTRACTOR Agreement when there are no bids.

C. When required by individual Specifications Section, obtain copy of standard. Maintain copy at job site during submittals, planning, and progress of the specific WORK, until Substantial Completion.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01450
QUALITY CONTROL

PART 1. GENERAL

1.1 SECTION INCLUDES

A. General Quality Control.

B. Workmanship.

C. MANUFACTURER's Instructions.

D. MANUFACTURER's Certificates.

E. Mockups.

F. MANUFACTURER's Field Services.

1.2 GENERAL QUALITY CONTROL

A. Maintain quality control over suppliers, MANUFACTURERS, products, services, site conditions, and workmanship to produce WORK of specified quality.

1.3 WORKMANSHIP

A. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.

B. Perform WORK by persons qualified to produce workmanship of specified quality.

C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and cracking.

1.4 MANUFACTURER'S INSTRUCTIONS

A. Comply with instructions in full detail, including each step in sequence. Should instructions conflict with Contract Documents, request clarification from OWNER/ENGINEER before proceeding.

1.5 MANUFACTURER'S CERTIFICATES

A. When required by individual Specifications Section, submit MANUFACTURER's certificate, in duplicate, that products meet or exceed specified requirements.

1.6 MANUFACTURER'S FIELD SERVICES

A. When specified in respective Specification Sections, require Supplier or MANUFACTURER to provide qualified personnel to observe field conditions, conditions of surfaces and installation, quality of workmanship, startup of equipment, test, adjust and balance equipment, as applicable, and to make appropriate recommendations.

B. MANUFACTURER's Representative shall submit written report to OWNER/ENGINEER listing observations and recommendations.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01452
TESTING LABORATORY SERVICES

PART 1. GENERAL

1.1 SECTION INCLUDES

A. References.

B. Selection and Payment.

C. Quality Assurance.

D. CONTRACTOR Submittals.

E. Laboratory Responsibilities.

F. Laboratory Reports.

G. Limits on Testing Laboratory Authority.

H. CONTRACTOR Responsibilities.

I. Soils Testing.

1.2 REFERENCES

A. ANSI/ASTM D3740 – Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

B. ANSI/ASTM E329 – Specification for Agencies Engaged in Testing and/or Inspection of Materials Used in Construction.

C. ASTM D422 – Test Method for Particle Size Analysis of Soils: Sieve Analysis and Hydrometer.

D. ASTM D698 – Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort: Standard Proctor.

E. ASTM D1140 – Test Method for Amount of Material in Soils Finer than the No. 200 Sieve: P200 Content.

F. ASTM D1556 – Test Method for Density and Unit Weight of Soil In Place by the Sand Cone Method: Sand Cone Density Test.

G. ASTM D1557 – Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort: Modified Proctor.

H. ASTM D2216 – Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock: Natural Moisture Content.

I. ASTM D2434 – Test Method for Permeability of Granular Soils (Constant Head).

J. ASTM D2487 – Classification of Soils for Engineering Purposes (Unified Soil Classification System).

K. ASTM D2922 – Test Methods for Density of Soil and Soil Aggregate In Place by Nuclear Methods (Shallow Depth): Nuclear Density Test.

L. ASTM D2937 – Test Method for Density of Soil In Place by the Drive Cylinder Method.

M. ASTM D3017 – Test Method for Water Content of Soil and Rock In Place by Nuclear Methods (Shallow Depth): Nuclear Moisture Content.

N. ASTM D4318 – Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils: Atterberg limits.

O. ASTM C136 – Test Method for Sieve Analysis of Fine and Coarse Aggregates.

P. ASTM D4643 – Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method.

Q. ASTM D5084 – Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.

1.3 SELECTION AND PAYMENT

A. OWNER will employ and pay for services of an independent testing laboratory to perform specified inspection and testing.

B. Employment of testing laboratory shall in no way relieve CONTRACTOR of obligation to perform WORK in accordance with requirements of Contract Documents.

1.4 LABORATORY RESPONSIBILITIES

A. Test samples of materials submitted by OWNER/ENGINEER or CONTRACTOR.

B. Provide qualified personnel at site after due notice; cooperate with OWNER/ENGINEER and CONTRACTOR in performance of services.

C. Perform specified inspection, sampling and testing of products in accordance with specified standards.

D. Promptly notify OWNER/ENGINEER and CONTRACTOR of observed irregularities or nonconformance of WORK or products.

1.5 LABORATORY REPORTS

A. After each inspection and test, promptly submit two copies of laboratory report to OWNER/ENGINEER and to CONTRACTOR.

1.6 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke, alter, or enlarge on the requirements of Contract Documents.

B. Laboratory may not approve or accept any portion of the WORK.

C. Laboratory may not assume any duties of CONTRACTOR.

D. Laboratory has no authority to stop WORK.

1.7 CONTRACTOR RESPONSIBILITIES

A. Deliver submittal samples required by individual Specification sections to OWNER/ENGINEER. OWNER/ENGINEER will deliver samples to the laboratory.

B. Cooperate with laboratory personnel, and provide access to WORK.

C. Provide incidental labor and facilities to provide access to WORK to be tested, assist OWNER/ENGINEER to obtain and handle samples at the site or at the source of products to be tested, to facilitate tests and inspections, and for storage and curing of test samples.

D. Notify OWNER/ENGINEER of operations requiring inspection and testing services 24 hours before services are needed.

E. If tests indicate WORK does not meet specified requirements, remove WORK, replace, and retest until compliance is achieved at no cost to OWNER.

1.8 SOILS TESTING

A. OWNER/ENGINEER will determine the moisture density relation and maximum dry density by the Modified Proctor test.

B. OWNER/ENGINEER may perform additional Proctor tests whenever material changes are detected.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01520
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Electricity, Lighting.

B. Water.

C. Sanitary Facilities.

D. Barriers.

E. Protection of WORK.

F. Security.

G. Cleaning During Construction.

H. Field Offices and Sheds.

I. Removal.

1.2 ELECTRICITY, LIGHTING

A. Provide generators for heating requirements. Connect to existing service; provide branch wiring and distribution boxes located to allow service and lighting by means of construction type power cords. Take measures to conserve energy. OWNER will pay for normal electrical use related to the expansion, but will not pay for utility/fuel costs associated with temporary heat.

1.3 WATER

A. Provide water for construction operations.

B. A water line and hydrants are available at the west end of the site for water trucks. Water is not available on the east end of the site except for a small well located in the park.

1.4 SANITARY FACILITIES

A. Provide and maintain enclosed, portable, self contained sanitary facilities.

1.5 BARRIERS

A. Provide as required for OWNER's use of site, to prevent public entry to construction areas and to protect existing facilities and adjacent properties from damage.

1.6 PROTECTION OF WORK

A. Provide temporary protection for WORK in progress and items installed.

B. Control traffic in construction area to minimize damage to completed WORK.

1.7 SECURITY

A. Provide security program and facilities to protect WORK, existing facilities, and OWNER's operations from unauthorized entry, vandalism and theft. Coordinate with OWNER's security program.

1.8 CLEANING DURING CONSTRUCTION

A. Control accumulation of waste materials and rubbish; periodically dispose of off site.

B. Maintain site in a clean and orderly condition.

C. Clean interior plant areas at the end of each day's WORK; control dust and other contaminants during operations.

1.9 REMOVAL

A. Remove temporary materials, equipment, services, and construction prior to final inspection.

B. Restore existing facilities used during construction to specified, or to original, condition.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01570
TEMPORARY CONTROLS

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Dust Control.

B. Erosion and Sediment Control.

C. Noise Control.

D. Pollution Control.

1.2 DUST CONTROL

A. Execute WORK by methods to minimize raising dust from construction operations.

B. Provide positive means to prevent air borne dust from dispersing into atmosphere.

C. Do not use oils, bitumens, or chlorides for dust control.

D. Conduct dust control in accordance with WDNR Conservation Practice Standard No. 1068 – Dust Control on Construction Sites.

1.3 EROSION AND SEDIMENT CONTROL

A. Use Best Management Practices (BMP) to minimize erosion and sediment transport.

B. Minimize amount of bare soil exposed at one time.

C. Plan and execute construction to control surface drainage from cuts and fills, and from borrow and waste disposal areas. Prevent erosion and sedimentation.

D. Keep duration of exposure of construction materials before final finishing or cover as short as practical.

E. Conduct operations to avoid washing or deposition of materials into waterways or off site.

F. Do not track or spill mud, clay, gravel, or other materials onto adjacent streets or off site. Clean off inadvertent tracking and spills immediately. If dirt tracked onto adjacent streets is not cleaned within 24 hours, OWNER will have clean up done and bill CONTRACTOR.

G. Periodically inspect earthwork for evidence of erosion and sedimentation; promptly apply corrective measures. OWNER will conduct weekly inspections during construction and within 24 hours of rain events of 0.5 inches or greater and notify CONTRACTOR when corrective measures are required.

1.4 NOISE CONTROL

A. Limit the operation of heavy equipment and machinery to the hours of 7:00 a.m. to 7:00 p.m. Monday through Friday and 8:00 a.m. to 11:00 a.m. on Saturday.

B. Comply with City of Madison Ordinance 24.08. If CONTRACTOR plans to WORK additional hours from 7:00 a.m. through 7:00 p.m. on Saturday and 10:00 a.m. – 7:00 p.m. on Sunday, it must be stated on the submitted Bid Form. Coordinate additional hours with OWNER/ENGINEER during construction.

1.5 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances and pollutants produced by construction operations.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01574
TEMPORARY WATER CONTROL

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Control of surface water and ground water during construction.

1.2 WATER CONTROL

A. Rough grade site to prevent standing water and to direct surface water drainage away from WORK area.

B. Pump/dewater groundwater as necessary to allow for construction of the Groundwater Gradient Control System and subbase. Conduct dewatering in accordance with WDNR Conservation Practice Standard No. 1061 Dewatering.

C. Maintain or relocate existing ditches and spillways.

D. Do not stockpile material such that it restricts surface drainage.

E. If it is necessary to interrupt existing surface water drainage, provide and maintain temporary piping or ditching until permanent drainage is provided.

F. Maintain excavations and trenches free of water. Provide and operate pumping equipment of a capacity to control water flow out of excavations and trenches.

G. Provide piping to handle discharge to prevent erosion or deposit of silt. Remove equipment when no longer needed for temporary water control.

H. Provide and operate pumping equipment of a capacity to control water flow out of temporary pumping basin.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01600
MATERIAL AND EQUIPMENT

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Products.

B. Transportation and Handling.

C. Storage and Protection.

D. Disposal.

E. Product Options.

F. Products List.

G. Substitutions.

H. Systems Demonstration.

1.2 PRODUCTS

A. Products include material, equipment, and systems. Products may also include existing materials or components required for reuse.

B. Do not use materials and equipment removed from existing structure or system, except as specifically required, or allowed by Contract Documents.

C. Comply with Specifications and referenced standards as minimum requirements.

D. Provide components of the same MANUFACTURER, for interchangeable components.

1.3 TRANSPORTATION AND HANDLING

A. Transport products by methods which prevent product damage; deliver in undamaged, dry condition in MANUFACTURER's unopened containers or packing.

B. Provide equipment and personnel to handle products by methods which prevent soiling or damage.

C. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

1.4 STORAGE AND PROTECTION

A. Store products in accordance with MANUFACTURER's instructions, with seals and labels intact and legible. Store sensitive products in weather tight enclosures; maintain within temperature and humidity ranges required by MANUFACTURER's instructions.

B. For exterior storage of fabricated products, place on sloped supports above ground. Cover products subject to deterioration with impervious sheet covering; provide ventilation to prevent condensation.

C. Store loose granular materials on solid surfaces in a well drained area; prevent mixing with foreign matter.

D. Arrange storage to provide access for inspection. Periodically inspect to ensure products are undamaged, and are maintained under required conditions.

1.5 DISPOSAL

A. Submit to OWNER/ENGINEER the disposal site location for excess materials which may not be disposed on site before beginning WORK.

B. Dispose of excess materials off site in an appropriate manner.

1.6 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description only: Any product meeting those standards may be used.

B. Products Specified by naming one or more MANUFACTURERS with a Provision for Substitutions: Submit a request for substitution for any MANUFACTURER not specifically named.

C. Products Specified by Naming Several MANUFACTURERS: Products of named MANUFACTURERS meeting Specifications: No options, no substitutions allowed.

D. Products Specified by Naming Only One MANUFACTURER: No options, no substitutions allowed.

1.7 PRODUCTS LIST

A. Within 15 days after Notice to Proceed, submit complete list of major products proposed for use, with name of MANUFACTURER, trade name, and model number of each product.

1.8 SUBSTITUTIONS

A. OWNER/ENGINEER will consider CONTRACTOR's request for substitutions only within 15 days after Notice to Proceed. Subsequently, substitutions will be considered only when a product becomes unavailable through no fault of CONTRACTOR.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

C. Request constitutes a representation that CONTRACTOR:

1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.

2. Will provide the same warranty for substitution as for the specified product.

3. Will coordinate installation and make other changes which may be required for WORK to be complete in all respects.

4. Waives claims for additional costs which may subsequently become apparent.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require substantial revision of Contract Documents.

E. OWNER/ENGINEER will determine acceptability of proposed substitution, and will notify CONTRACTOR of acceptance or rejection in writing within a reasonable time.

F. Only one request for substitution will be considered for each product. When substitution is not accepted, provide specified product.

1.9 SYSTEMS DEMONSTRATION

A. Prior to final walk through demonstrate operation of each system to OWNER/ENGINEER.

B. Instruct OWNER's personnel in operation, adjustment, and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01720
FIELD ENGINEERING

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Submittals.

B. Quality Assurance.

C. Surveying and Field Engineering Services.

D. CONTRACTOR Survey Requirements.

1.2 SUBMITTALS

A. On request, submit data demonstrating qualifications of persons providing services.

B. On request, submit documentation verifying accuracy of survey WORK.

C. Maintain complete, accurate log of control and survey WORK as it progresses. Submit Record Documents under provisions of Section 01770.

1.3 QUALITY ASSURANCE

A. Use skilled persons, trained and experienced in the necessary tasks and techniques, for the proper performance of this WORK.

B. Verify locations of survey control points prior to starting WORK. Promptly notify OWNER/ENGINEER of any discrepancies discovered.

1.4 PROTECTION

A. Locate and protect control points before starting WORK.

B. Preserve permanent reference points during progress of WORK.

C. Do not change or relocate reference points or lines without specific approval from OWNER/ENGINEER.

D. Promptly inform OWNER/ENGINEER when a reference point is lost or destroyed, or requires relocation.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

3.1 SURVEYING AND FIELD ENGINEERING SERVICES

A. OWNER/ENGINEER has identified permanent benchmarks and control points on Plan Sheets 2 and 3. Permanent benchmarks that fall within the limits of construction will be relocated by OWNER.

B. CONTRACTOR's surveyor will provide all necessary as constructed survey information required to complete the construction documentation coordinate and elevation tables (provided in Appendices E and F of the Supplementary Conditions) to OWNER/ENGINEER. Verify that all as constructed survey data submitted to OWNER/ENGINEER indicates that the minimum design thickness were achieved at every survey point location shown on the construction documentation coordinate and elevation tables. Locations identified by OWNER/ENGINEER as not meeting minimum design thickness requirements will be repaired and resurveyed by CONTRACTOR. As constructed survey data that CONTRACTOR's surveyor will provide to OWNER/ENGINEER is identified below.

3.2 CONTRACTOR SURVEY REQUIREMENTS

A. Establish and maintain lines and levels.

B. Locate, layout WORK, and document as constructed WORK by total Station or GPS instrumentation and similar appropriate means.

C. Periodically verify layouts.

D. Provide all necessary survey data required by OWNER/ENGINEER to complete an as constructed geomembrane panel layout and GCL diagrams for showing all seam and repair locations. At a minimum, every panel corner and every repair will be surveyed.

E. Provide as constructed coordinate locations and invert elevations for the leachate pipes at maximum 25 foot intervals and gradient control pipes at 50 foot intervals to OWNER/ENGINEER. Refer to Tables 1, 2 and 3 for the liner system in Appendix E of the Supplementary Conditions.

F. Provide as constructed coordinate locations and invert elevations for the final cover toe and diversion berm drainage layer collection and discharge pipes at maximum 50 foot intervals to OWNER/ENGINEER. Refer to Tables 1 and 2 for the final cover in Appendix F of the Supplementary Conditions.

G. Provide a registered land surveyor or qualified surveyor to provide as constructed survey data to OWNER/ENGINEER for completion of the construction documentation coordinate and elevation tables provided in Appendix E and F of the Supplementary Conditions as follows:

<u>Liner Construction:</u>

1. Groundwater Gradient Control Collection/transfer Pipe invert elevations and bottom of trench elevations at maximum 50 foot intervals and at critical locations (tolerances within $\underline{+}$ 0.05 feet unless approved otherwise by OWNER/ENGINEER). Refer to liner Table 1 in Appendix E of the Supplementary Conditions.

2. Bottom and top elevations of the Groundwater Gradient Control Select Granular fill drainage layer on a maximum 50 foot grid and at critical locations (minimum drainage layer design thickness of 1.0 feet is required). Refer to liner Table 2 Appendix E of the Supplementary Conditions.

3. Subbase (bottom of Select Clay Fill liner) and base (top of Select Clay Fill liner) elevations on a maximum 50 foot grid and at critical locations (minimum Select Clay Fill liner design thicknesses are required). Refer to liner Table 2 in Appendix E of the Supplementary Conditions.

4. Perforated HDPE Leachate Pipe invert elevations at maximum 25 foot intervals and at critical locations (tolerances within $\pm$ 0.05 feet unless approved otherwise by OWNER/ENGINEER). Refer to liner Table 3 in Appendix E of the Supplementary Conditions.

5. Top of Select Aggregate Fill leachate drainage layer on a maximum 50 foot grid and at critical locations (minimum drainage layer design thicknesses are required). Refer to liner Table 2 in Appendix E of the Supplementary Conditions.

Final Cover:

6. Drainage Layer Collection/transfer Pipe invert elevations at maximum 50 foot intervals along the perforated pipe and at both ends of the nonperforated discharge pipes (tolerances within $\pm$ 0.1 feet unless approved otherwise by OWNER/ENGINEER). Refer to final cover Table 2 in Appendix F of the Supplementary Conditions.

7. Bottom and top elevations of the Fine Grained Soil Barrier Layer on a maximum 100 foot grid and at critical locations (minimum barrier layer design thickness of 2.0 feet is required). Refer to final cover Table 1 Appendix F of the Supplementary Conditions.

8. Top and bottom of Rooting Zone layer elevations on a maximum 100 foot grid and at critical locations (minimum Rooting Zone layer design thickness of 2.5 feet are required). Refer to final cover Table 1 in Appendix F of the Supplementary Conditions.

9. Top of Topsoil layer on a maximum 100 foot grid and at critical locations (minimum Topsoil layer design thickness of 0.5 feet are required). Refer to Table 1 in Appendix F of the Supplementary Conditions.

END OF SECTION

SECTION 01760
MONITORING WELL PROTECTION

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Protection

B. Adjustment

C. Repair

1.2 PROTECTION

A. Preserve and protect existing monitoring wells from damage.

B. Protect well casing and boring from infiltration of surface water, other water, soil, and any foreign materials.

C. Use hand equipment when excavating, filling, or conducting other operations around monitoring wells.

D. Notify OWNER/ENGINEER of necessary alterations or damage to monitoring wells.

1.3 ADJUSTMENT

A. All well adjustments or installations will be performed by an environmental well drilling firm who is approved by OWNER.

1.4 REPAIR

A. Wells damaged by CONTRACTOR'S operations will be repaired by a licensed well driller, as approved by OWNER and at no additional cost to OWNER.

B. OWNER/ENGINEER will observe the repaired well to determine if further repair or replacement is needed. Repair and replacement shall be done at no expense to OWNER.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

SECTION 01770
CONTRACT CLOSEOUT

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Closeout Procedures.

B. Final Cleaning.

C. Project Record Documents.

D. Operation and Maintenance Data.

E. Warranties and Bonds.

F. Spare Parts and Maintenance Materials.

1.2 CLOSEOUT PROCEDURES

A. Comply with procedures stated in General Conditions of the Contract for issuance of Certificate of Substantial Completion.

B. In addition to submittals required by Conditions of the Contract, provide submittals required by governing authorities, and submit a final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due.

1.3 FINAL CLEANING

A. Execute prior to final walk through.

B. Clean installed equipment and fixtures.

C. Clean drainage and collection systems.

1.4 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following project record documents; record actual revisions of the WORK:

1. Contract Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other Modifications to the contract.

5. Reviewed shop drawings, product data, and samples.

B. Store project record documents separately from construction documents.

C. Keep documents current; do not permanently conceal any WORK until required information has been recorded.

D. At contract closeout, submit documents with transmittal letter containing date, Project title, CONTRACTOR's name and address, list of documents, and signature of CONTRACTOR.

1.5 WARRANTIES AND BONDS

A. Provide duplicate, notarized copies when specified in specific Section. Execute CONTRACTOR's submittals and assemble documents executed by subcontractors, suppliers, and MANUFACTURERS. Provide table of contents and assemble in binder with durable plastic cover.

B. Submit material before final application for payment. For equipment put into use with OWNER's permission during construction, submit within ten days after first operation.

1.6 SPARE PARTS AND MAINTENANCE MANUALS

A. Provide products, spare parts, and maintenance materials in quantities specified in each section, in addition to that used for construction of WORK.

B. Coordinate with OWNER/ENGINEER; deliver to site before final payment.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

NOT USED.

END OF SECTION

DIVISION 2

SECTION 02070
HIGH DENSITY POLYETHYLENE (HDPE) TEXTURED GEOMEMBRANE

PART 1. GENERAL

1.1 WORK INCLUDES

A. Providing High Density Polyethylene (HDPE) Textured Geomembrane in accordance with the Drawings and these Specifications, including, but not limited to, excavation and backfilling of anchor trench, deployment of geomembrane, seaming, repairs, testing, and necessary and incidental items required to complete the WORK.

1.2 REFERENCE STANDARDS

A. ASTM D792 – Specific Gravity (Relative Density) and Density of Plastics by Displacement.

B. ASTM D1004 – Test Method for Initial Tear Resistance of Plastic Film and Sheeting.

C. ASTM D1238 – Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.

D. ASTM D1248 – Specification for Polyethylene Plastics Molding and Extrusion Materials.

E. ASTM D1505 – Test Method for Density of Plastics by the Density Gradient Technique.

F. ASTM D1603 – Test Method for Carbon Black in Olefin Plastics.

G. ASTM D3895 – Test Method for Oxidative Induction Time of Polyolefins by Thermal Analysis.

H. ASTM D4218 – Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle Furnace Technique.

I. ASTM D4437 – Standard Test Methods for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.

J. ASTM D4833 – Tech Method for Index Puncture Resistance Geotextiles, Geomembrane, and Related Products.

K. ASTM D5199 – Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.

L. ASTM D5321 – Standard Test Method for Determining the Shear Strength of Soil Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear.

M. ASTM D5397 – Procedure to Perform a Single-Point Notched Constant Load Test - (SP-NCTL) Test.

N. ASTM D5596 –Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.

O. ASTM D5721 – Practice for Air-Oven Aging of Polyolefin Geomembranes.

P. ASTM D5885 – Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High Pressure Differential Scanning Calorimetry.

Q. ASTM D5994 – Test Method for Measuring the Core Thickness of Textured Geomembranes.

R. ASTM D6392 –Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.

S. ASTM D6693 – Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polyethylene Geomembranes.

T. GRI GM6 – Standard Practice for Pressurized Air Channel Test for Dual Seamed Geomembranes.

U. GRI GM12 – Measurement of Asperity Height of Textured Geomembrane Using a Depth Gauge.

V. GRI GM13 – Test Properties, Testing Frequency, and Recommended Warrant for High Density Polyethylene (HDPE) Smooth and Textured Geomembrane.

W. Construction Quality Assurance (CQA) Plan

1.3 DEFINITIONS

A. INSTALLER – CONTRACTOR or organization hired by CONTRACTOR responsible for field handling, transporting, storing, deploying, seaming, and testing of the geomembrane seams (and if applicable, other geosynthetic components).

B. MANUFACTURER – Company hired by CONTRACTOR to furnish geomembrane.

C. Resin Supplier – Company selected by the MANUFACTURER to furnish polyethylene resin used to manufacture the geomembrane.

D. Geomembrane – A relatively impermeable thin sheet of polyethylene used as a barrier liner or cover to prevent liquid or vapor migration into or from liquid or solid storage facilities.

E. Textured Geomembrane – Geomembrane with roughened, high friction surfaces created by co-extrusion, extrusion coating, or spray coating.

F. Installation Field Crew – Individuals employed by INSTALLER to deploy geomembrane panels and perform field screening, nondestructive testing, and other critical operations.

G. Fusion Weld – A bond between two polyethylene geomembrane surfaces achieved by fusing both polyethylene surfaces into a homogeneous bond using a power driven apparatus capable of heating and compressing the overlapped portions of the geomembrane sheets at a specified rate of speed.

H. Extrusion Weld – A bond between two polyethylene materials achieved by extruding a bead of molten polyethylene over leading edge of the seam between upper and lower sheet, or rigid polyethylene piping or plating, using a hand held apparatus.

I. ENGINEER – Official representative of OWNER. ENGINEER or designated Construction Quality Control Officer (CQA Officer) is responsible for observing and documenting that activities related to quality assurance of the construction conform to the Drawings and Specifications.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. MANUFACTURER: At least 5 years of continuous experience in manufacturing HDPE geomembrane and have produced 10,000,000 square feet (minimum) of HDPE geomembrane and installed at least 8,000,000 square feet.

2. INSTALLER:

a. At least 5 years of continuous experience in installing polyethylene geomembranes and have installed a total of 10,000,000 square feet (minimum) of polyethylene geomembrane for at least 10 completed facilities.

b. Personnel performing seaming operations: Qualified by experience or by successfully passing seaming tests. At least one seamer to have experience in seaming 5,000,000 square feet (minimum) of polyethylene geomembrane using the same type of seaming apparatus to be used on this project. The most experienced seamer, called the "master seamer," to provide direct supervision, as required, over less experienced seamers.

B. Quality Assurance Program: MANUFACTURER/INSTALLER agree to participate in and conform to Quality Assurance Program as outlined in this Specification and Construction Quality Assurance Plan.

1.5 SUBMITTALS

Items A through E shall be submitted no later than 30 days prior to start of geomembrane installation or 15 days prior to delivery of first geomembrane shipment, whichever is sooner.

A. Raw Materials:

1. Resin supplier name, production plant(s) location(s), and the resin brand name and product number.

2. Copy of quality control certificates issued by HDPE resin suppliers.

3. HDPE resin production date(s).

4. Results of tests conducted by MANUFACTURER and resin supplier. Results shall conform to requirements in Part 2.2(A).

5. Statement by MANUFACTURER certifying that no recycled polymer and no more than 10% rework of the same type of material is added to resin during geomembrane manufacturing.

B. MANUFACTURER's Certification: MANUFACTURER shall certify that supplied geomembrane meets Specifications of GRI GM13.

C. Geomembrane MANUFACTURER/Production Information:

1. Corporate background information.

2. Manufacturing Quality Control (MQC) Plan.

3. List of geomembrane roll numbers proposed for the project and associated batch each roll was produced.

4. Quality control certificates for geomembrane rolls and welding rod indicating compliance with requirements of Part 2.

D. Geomembrane INSTALLER's Information:

OWNER has preapproved the following geomembrane INSTALLERS, which bidding contractors shall obtain bids for the Phase 9 – Cell 2 liner system construction. Bidders can submit request for an alternate INSTALLER with approval from OWNER prior to submitting their bid to OWNER.

GEO-SYNTHETICS, INC.
2401 Pewaukee Rd., Waukesha, WI 53188
Contact: Mark H. Downs – VP of Construction Services Sales
Telephone: (605)428-4353
Fax: (605)428-4393
Cell phone: (262)366-5570
e-mail: markd@geo-synthetics.com
Website: www.geo-synthetics.com

TEXAS ENVIRONMENTAL PLASTICS, LTD
29089 Robinson Rd., Conroe, TX 77385
Contacts: Bob Natz – Sales
E-mail: nantz@tepinc.net
Russell Wells – Fabrication/Distribution Manager
E-mail: rwells@tepinc.net
Candice Caldwall
E-mail: ccaldwell@brawler.com
Telephone: (281)821-7320
Fax: (281)821-7138
Website: www.tepinc.net

COMANCO ENVIRONMENTAL CORPORATION
4301 Sterling Commerce Drive, Plant City, FL 33566
Contact: Christine Thomas – Sr. Estimating/Operations Administrator
Telephone: (813)988-8829
Cell phone: (813)498-8526
Fax: (813)988-8953
E-mail: cthomas@comanco.com
Website: www.comanco.com

1. Corporate background information.

2. Construction Quality Control (CQC) Plan.

3. A list of at least 10 completed facilities, totaling 10,000,000 square feet minimum for which INSTALLER has completed installing polyethylene geomembrane. Include facility name, location, installation date, geomembrane type, and quantity installed.

4. List of field crew personnel, along with pertinent project experience information.

E. Installation panel layout diagram identifying placement of geomembrane panels and seams and variances or additional details that deviate from engineering drawings. Following approval, to change the layout without permission from OWNER/ENGINEER.

F. Submittals during installation:

1. Daily records/logs prepared by INSTALLER documenting the WORK performed (i.e., productivity), personnel involved, general working conditions, and any problems encountered or anticipated on the project.

2. Subgrade acceptance forms prepared by INSTALLER for each day geomembrane was deployed.

3. Quality control documentation (i.e., trial seam tests, destructive tests, nondestructive tests).

4. Field tensiometer calibration certificate. Latest calibration within 3 months the start of geomembrane installation.

5. Geomembrane INSTALLER to provide OWNER with estimated number of days to complete the WORK.

G. Submittals after completion of installation:

1. Geomembrane installation certification stating the geomembrane was installed in accordance with the contract documents.

2. As built panel layout diagram.

3. Warranty from MANUFACTURER/INSTALLER

1.6 DELIVERY, STORAGE, AND HANDLING

A. Shipping: Ship geomembrane liner rolled onto cores that allow for easy handling and deployment.

B. Transportation: Unload and handle geomembrane rolls by appropriate means to prevent damage.

C. On Site Storage: Provide on site storage location for geomembrane material with level base that protects the geomembrane from punctures, abrasions, and excessive dirt and moisture.

D. On Site Handling: Use appropriate handling equipment when moving geomembrane rolls. Instructions for moving shall be given by MANUFACTURER.

1.7 WARRANTIES

A. MANUFACTURER/INSTALLER shall provide written 2 year warranties from date of substantial completion. Warranties shall address quality of material and workmanship.

PART 2. PRODUCTS

2.1 MANUFACTURERS

A. HDPE Geomembranes

Agru America, Inc.
500 Garrison Road
Georgetown, SC 29440
1-800-321-1379

Poly-Flex, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051
1-888-765-9359

GSE, Environmental, Inc.
19103 Gundle Road
Houston, TX 77073
1-800-435-2008

B. Substitutions: Submit request to OWNER/ENGINEER with complete supporting technical information under provisions of Section 01600.

2.2 MATERIALS

A. Polyethylene Geomembrane Resin

1.	Specific Gravity/Density	ASTM D792, Method B or ASTM D1505	0.932 minimum
2.	Melt Index	ASTM D1238 (190°C & 2.16 kg)	1.0 g/10 minute maximum

3. Resin: Virgin material with no more than 10 percent rework (by weight). Rework material to be of the same formulation as parent material. No post consumer resin allowed.

B. HDPE Geomembrane

1. Manufactured from top quality resin.

2. No more than 1 percent (by weight) of additives, fillers, or extenders, excluding carbon black.

3. Free of holes and shall have no undispersed raw materials, striations, scratches, or blemishes on geomembrane surface.

4. Carbon black for ultraviolet protection, added during the manufacture of the geomembrane.

5. Uniform textured appearance.

C. Fabrication

1. Supply geomembrane in factory produced rolls. <u>No factory seams may be used to prepare larger geomembrane panels for delivery to the site.</u>

2. Label each geomembrane roll with the following information:

- Name of MANUFACTURER.
- Product type and identification number (if any).
- Nominal product thickness.
- Roll number.
- Roll dimensions.

2.3 ACCEPTANCE TESTING REQUIREMENTS

Evaluate and test geomembrane rolls prior to acceptance. OWNER/ENGINEER or a designated, independent geosynthetics laboratory may perform additional testing (i.e., conformance testing and direct shear testing) to verify that HDPE geomembrane meets the Specifications and project requirements. Testing requirements are detailed in following subsections:

A. MANUFACTURER's Quality Control Testing

Perform tests on HDPE geomembrane at frequencies given in Table 02070-1 prior to shipping.

Submit test results to OWNER/ENGINEER prior to shipping geomembrane rolls. Submit single point constant tensile load test results to OWNER/ENGINEER within 14 days of shipping. OWNER/ENGINEER will evaluate test results as discussed in Subsection 2.3(C).

B. Conformance Test Samples

Conformance samples will be obtained by OWNER/ENGINEER at a minimum rate of one sample per 100,000 square feet of geomembrane delivered or to be delivered to the site. At least one conformance sample will be obtained from geomembrane rolls representing each resin production batch. Samples may also be collected from each roll and tested for thickness. Samples will genrerally be collected at the manufacturing plant prior to shipment to the site by a laboratory technician affileated the geosynthetic testing laboratory.

Samples collected on site: Conformance samples will be 3 feet long by the full width of the roll and not the first 3 feet of any roll or of the size required by the geosynthetic testing Laboratory. Geomembrane thickness samples will be of the size required by the geosynthetic testing laboratory. Table 02070-1 list conformance tests and test methods that may be performed on geomembrane roll samples. At a minimum, the conformance testing required by Wisconsin Administrative Code NR 516.07(2)(a) will be conducted by OWNER/ENGINEER. OWNER/ENGINEER will perform testing through use of a recognized testing laboratory. OWNER/ENGINEER will evaluate test results as discussed in Subsection 2.3(C).

MANUFACTURER shall not ship geomembrane rolls to the site until Manufacture test results have been evaluated by OWNER/ENGINEER and accepted for shipment.

OWNER will bear the cost for conformance testing. The cost for retesting samples required due to failing test results shall be paid by CONTRACTOR.

Table 02070-1
High Density Polyethylene (HDPE) Geomembrane

PROPERTIES	TEST METHOD	TEST VALUE (60 mils)	TESTING FREQUENCY
Thickness (min. average) ▪ Lowest individual for 8 out of 10 values ▪ Lowest individual for any of the 10 values	D5994	Nom. (-5%) 10% 15%	Per roll
Asperity Height (min. average)[1]	D7466	16 mil.	Every second roll[2]
Density (min. average)	D1505/D 792	0.940 g/cc	200,000 lb
Tensile Properties (min. average)[3] ▪ Yield strength ▪ Break strength ▪ Yield elongation ▪ Break elongation	D6693 Type IV	 126 lb/in. 90 lb/in. 12% 100%	20,000 lb
Tear Resistance (min. average)	D1004	42 lb	45,000 lb
Puncture Resistance (min. average)	D4833	90 lb	45,000 lb
Stress Crack Resistance[4]	D5397 (App.)	500 hr.	per GRI-GM10
Carbon Black Content (range)	D4218[5]	2.0–3.0%	20,000 lb
Carbon Black Dispersion	D5596	Note [6]	45,000 lb
Oxidative Induction Time (OIT) (min. average)[7] ▪ Standard OIT —or— ▪ High Pressure OIT	 D3895 D5885	 100 min. 400 min.	 200,000 lb
Oven Aging at 85°C[7][8] ▪ Standard OIT (min. average) - % retained after 90 days —or— ▪ High Pressure OIT (min. average) - % retained after 90 days	D5721 D3895 D5885	 55% 80%	Per each formulation
UV Resistance[9] ▪ Standard OIT (min. average) —or— ▪ High Pressure OIT (min. average) - % retained after 1,600 hours[11]	D7238 D3895 D5885	 N.R.[10] 50%	Per each formulation

Notes:

(1) Of 10 readings, 8 out of 10 must be ≥ 7 mils, and lowest individual reading must be ≥ 5 mils. Also see Note 6.

(2) Alternate the measurement side for double sided textured sheet.

(3) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.

— Yield elongation is calculated using a gauge length of 1.3 inches.

— Break elongation is calculated using a gauge length of 2.0 inches.

(4) P-NCTL test is not appropriate for testing geomembranes with textured or irregular rough surfaces. Test should be conducted on smooth edges of textured rolls or on smooth sheets made from the same formulation as being used for the textured sheet materials. The yield stress used to calculate the applied load for the SP-NCTL test should be manufacturer's mean value via MQC testing.

(5) Other methods such as D1603 (tube furnace) or D6370 (TGA) are acceptable if an appropriate correlation to D4218 (muffle furnace) can be established.

(6) Carbon black dispersion (only near spherical agglomerates) for 10 different views:

— Nine in Categories 1 or 2, and 1 in Category 3.

(7) Manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.

(8) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.

(9) The condition of the test should be 20 hour UV cycle at 75°C, followed by 4 hour condensation at 60°C.

(10) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.

(11) UV resistance is based on percent retained value of the original HP-OIT value.

C. Procedures for Determining Geomembrane Roll Test Failures

Table 02070-1 lists the acceptance Specifications. For tests results reported in both machine and cross direction, compare results from each direction to listed Specifications to determine acceptance. For test methods requiring multiple specimens, criteria in Table 02070-1 must be met based on average results of multiple specimen tests. Use the following procedures for interpreting results:

1. If the test result values meet stated Specifications, then roll and batch, and entire shipment, if applicable, will be accepted based on conformance testing; and

2. If test results do not meet Specifications, then roll and batch must be retested at CONTRACTOR's expense using specimens from the original roll sample or from another sample collected by OWNER/ENGINEER or third party geosynthetic laboratory. For retesting, perform two additional tests for a failed test procedure.

   If both retest values meet Specifications, then roll and batch will be accepted based on conformance testing; if one additional test fails, then roll and batch must be rejected without further recourse. OWNER/ENGINEER may obtain samples from other rolls in batch. On the basis of testing these samples, OWNER/ENGINEER may choose to accept a portion of batch while rejecting the remainder.

   If retesting does not result in passing these results as defined above, or if there is any other nonconformity with the material Specifications, then geomembrane rolls must be withdrawn from the site. Do not resubmit these same rolls for use. Remove rejected geomembrane from the site and replace with acceptable geomembrane.

D. Direct Shear Testing and Stability Analysis

Identify the proposed geomembrane MANUFACTURER (and 12 oz. geotextile cushion MANUFACTURER) a minimum of 4 weeks prior to the start of geomembrane installation to allow OWNER/ENGINEER to conduct direct shear testing on the selected geomembrane material.

OWNER/ENGINEER will collect geomembrane samples (and 12 oz. geotextile cushion) for direct shear testing at MANUFACTURER's plant as directed by OWNER/ENGINEER. OWNER/ENGINEER will collect samples of on site soil/material for direct shear testing. OWNER/ENGINEER will perform the required testing through the use of a recognized geosynthetic testing laboratory. OWNER will bear the cost for direct shear testing.

OWNER/ENGINEER will perform slope stability calculations using the direct shear test results on materials proposed for construction. OWNER/ENGINEER will determine if the proposed geomembrane will be acceptable or unacceptable based on the evaluation of the stability analysis.

PART 3. EXECUTION

3.1 EARTHWORK PREPARATION

A. Prepare foundation and complete subgrade surface that will support geomembrane. Excavate, backfill, and compact the anchor trenches to dimensions and at locations shown on Drawings.

B. Prior to geomembrane deployment, visually examine subgrade surface to confirm suitability for deployment of geomembrane thereon. Verify that subgrade is firm, smooth, and uniform; and free of excessive moisture, abrupt changes in grade, cracking, protruding stones, that could damage the geomembrane and clay clods (greater than ½ inch), vegetation, and other deleterious debris. Refinish subgrade surface found to be unsuitable for deployment of the geomembrane. Provide OWNER/ENGINEER with written acceptance of the subgrade surface over which panels are to be deployed for each day of panel deployment.

C. Deploy geomembrane over prepared and acceptable subgrade surface as soon as practicable after the subgrade has been completed and is suitable for deployment of geomembrane.

3.2 INSTALLATION - PANEL DEPLOYMENT

A. Install geomembrane according to approved layout drawing. Notify OWNER/ENGINEER of revisions or modifications to approved plan prior to installing the geomembrane. Upon placement, identify each panel by roll number, and panel number, and date deployed.

B. Do not place geomembrane during precipitation, in areas of ponded water, or during excessive winds. OWNER/ENGINEER may order the suspension of WORK during such conditions.

C. Maintain documentation of above conditions in the daily installation records, and provide such documentation to OWNER/ENGINEER. Inform OWNER/ENGINEER if above conditions are not met.

D. Verify the following:

1. Equipment does not damage geomembrane.

2. Prepared surface underlying geomembrane has not deteriorated since previous acceptance, and is still acceptable at time of geomembrane placement.

3. Personnel working on geomembrane do not smoke, wear damaging footwear or clothing, or engage in activities that could damage the Geomembrane.

4. Methods and equipment used to unroll and seam the geomembrane do not cause scratches, crimps, or gouges in the geomembrane.

5. Method used to place the rolls minimizes wrinkles (especially wrinkles between adjacent panels).

6. Adequate temporary loading or anchoring (continuously placed, if necessary) does not damage geomembrane.

7. No vehicular traffic operates directly over geomembrane, except for balloon tire all terrain vehicles (ATVs) when approved by OWNER/ENGINEER.

Immediately notify OWNER/ENGINEER if these conditions are, or have been, violated, and take immediate steps to mitigate any damage.

E. Examine each roll for damage after placement and prior to seaming. Inform OWNER/ENGINEER as to which rolls, or portions of rolls, should be rejected or repaired. Mark and remove from site damaged rolls or portions of rolls that have been rejected, at no risk, or expense to OWNER. Notify OWNER/ENGINEER when such removal occurs.

3.3 INSTALLATION - FIELD SEAMS

A. Seam Layout:

1. Orient seams parallel to the line of maximum slope. Do not orient seams across slopes steeper than 5:1 (horizontal to vertical). Minimize the number of seams in corners, at other odd shaped geometric intersections, in leachate collection trenches, and in leachate collection sump.

2. Do not locate any horizontal seams on slopes steeper than 5:1 (horizontal to vertical).

3. Slope panels must extend a minimum of 5 feet beyond the grade break onto the flat base area.

4. Use a seam numbering system comparable to, and compatible with, the geomembrane panel numbering system.

5. No longitudinal seams will be allowed in any leachate collection pipe trenches unless prior authorization is obtained by OWNER/ENGINEER.

B. Seaming Processes/Equipment

1. Use the approved processes for field seaming (welding), which are extrusion welds and dual hot wedge fusion welds. Other processes require written authorization from OWNER/ENGINEER. Dual hot fusion weld all linear seam. Dual fusion weld corners, butt seams, and long repairs where possible.

2. Comply with the following requirements regarding use, availability, and cleaning of <u>extrusion welding</u> equipment:

a. Equip welding apparatus with operational thermocouples to continuously monitor temperature in barrel and at nozzle.

b. Clean and purge extruder prior to beginning seaming until heat degraded extrudate has been removed from the barrel.

c. Check vital mechanical components, i.e., Teflon shoes, brushes, and thermostats, daily.

d. Place electric generator for equipment on a smooth base such that no damage occurs to the geomembrane.

e. Place a smooth insulating plate or fabric beneath hot equipment after usage to protect geomembrane.

3. Comply with the following requirements regarding use, availability, and cleaning of <u>dual hot wedge fusion welding</u> equipment:

a. Equip welding apparatus to continuously monitor applicable temperatures. Verify and document temperatures daily.

b. Ground edge of cross seams to a smooth incline (top and bottom) prior to welding. Patch cross seams after welding.

c. Place electric generator for equipment on a smooth base such that no damage occurs to the geomembrane.

d. Place a smooth insulating plate or fabric beneath hot equipment after usage to protect geomembrane.

C. Seaming Requirements/Procedures

1. Perform geomembrane seaming under the following weather conditions only:

a. Ambient temperature at least 32°F (0°C) but no higher than 104°F (40°C), unless authorized in writing by OWNER/ENGINEER. Measure temperatures 1 to 2 feet above the geomembrane surface using a conventional mercury thermometer.

b. Dry geomembrane.

c. No ponded water has collected above or below the surface of the geomembrane.

2. For seaming at ambient temperatures below 32°F or above 104°F, demonstrate to OWNER/ENGINEER that the methods and techniques used to perform the seaming produce seams that are entirely equivalent to seams produced at temperatures above 32°F and below 104°F, and that the overall quality of the geomembrane is not adversely affected. OWNER/ENGINEER may, at his/her sole discretion, deny approval for use of proposed technique regardless of demonstration results.

3. For overlapping and temporary bonding, use the following procedures:

a. Provide sufficient overlap between geomembrane panels to perform extrusion or fusion welding, in accordance with MANUFACTURER’s recommendation, and allow peel tests to be performed on the seam. Cap seam if there is insufficient overlap.

b. Do not use solvents or adhesives on geomembranes unless the product has been approved in writing by OWNER/ENGINEER based upon samples and data sheets submitted to OWNER/ENGINEER for testing and evaluation.

c. Do not use procedures to temporarily bond adjacent geomembrane rolls that will damage the geomembrane; in particular, control the nozzle temperature of the spot welding apparatus to protect the geomembrane from potential damage. Keep spot welding to a minimum. Spot welding is subject to weather restrictions listed above. Perform spot welding only by approved seaming personnel pursuant to Subsection 1.4 of this Specification.

4. Make trial seams on nondeployed geomembrane seams at the beginning of each seaming period and at least once every 5 hours during continuous operation with each welding machine by each seaming technical performing geomembrane welding with that machine. Make trial seams under the same conditions as actual seams. Trial seams are also required for welding equipment for which the power supply has been interrupted. Seaming personnel must make at least one

satisfactory trial seam each day to demonstrate satisfactory abilities. Satisfactory trial seams must pass the inspection and testing described below.

a. Ensure that trial seam samples are at least 3 feet long by 1 foot wide after seaming, with the seam centered along its length.

b. Inspect trial seams for proper squeeze out, footprint pressure, and general appearance. If general appearance is acceptable, then cut five specimens, 1 inch in width, from each end of the trial seam sample. Give remainder of trial seam to OWNER/ENGINEER.

c. Subject five specimens to a shear test and five specimens to a peel test (dual fusion welds shall be tested for peel on both sides of the air channel). If test specimens exhibit a film tear bond and meet acceptance Specifications listed in Subsection 3.5 Table 02070-2, then the trial seam is satisfactory.

d. If the trial seam fails the field test or inspection, make a second trial seam (either with or without adjustments in the seaming techniques), and inspect and test it. If no inspection or test on the second trial seam fails, then the trial seam is satisfactory. If the second trial seam fails, then adjust the seaming apparatus or seaming technique as necessary until two consecutive, satisfactory trial seams are obtained.

5. Seam Preparation:

a. Ensure that the seam area is clean and free of moisture, dust, dirt, debris, and foreign material prior to seaming.

b. Align seams so as to minimize the number of wrinkles and "fishmouths."

6. General Seaming Procedures:

a. Use dual hot wedge fusion welding for all linear seams.

b. Use dual fusion welding for corner seams, butt seams, and long repairs where possible.

c. Extend welded seam to the end of geomembrane panels placed in anchor trenches to minimize the potential for tear propagation along the seam.

d. Whenever possible, start field seaming from top of slope down, to minimize the development of wrinkles. Use hot air only when making tack welds; no double sided tape, glue, or other method is permitted.

e. Ensure that the completed liner does not exhibit "bridging" or "trampolining" when protective cover or other materials are placed over geomembrane.

f. “Walk out” fishmouths or wrinkles at seam overlaps if possible, or cut along ridge of wrinkle in order to achieve a flat overlap, and then weld along overlap and patch each end.

g. Provide adequate illumination when seaming operations are to be conducted at night.

h. When restarting an extrusion seam, grind end of existing extrusion bead, and start new seam with less than a 2 inch overlap of existing bead.

3.4 NONDESTRUCTIVE TESTING

A. Nondestructively test each field seam over its full length using one of the methods described in this section. Perform nondestructive testing concurrently with seaming and do not await completion of the project's seaming. Air pressure testing is only applicable to dual hot wedge fusion seams.

B. Vacuum Box Testing

1. Vacuum box testing equipment:

a. Vacuum box with open bottom, clear viewing panel on top, and pliable gasket attached to the bottom.

b. Vacuum pump assembly equipped with pressure controller and pipe connections capable of achieving a vacuum of 2 psig.

c. Vacuum gauge on vacuum box with an operating range of vacuum pressures from 0 to 5 psig.

d. Soapy solution compatible with the geomembrane and conductive to the formation of bubbles with a means to apply.

2. Vacuum box test procedures:

a. Ensure that seams are clean and relatively free from soil or foreign objects.

b. Wet seam approximately twice the length of the vacuum box with a soapy solution.

c. Center vacuum box with gasket in contact with the geomembrane surface over the wetted area of the seam.

d. Apply normal force to the top of the vacuum box, Energize vacuum pump, and create a vacuum in vacuum box of 2 to 10 psig. (Ensure that a tight seal is created between the geomembrane and vacuum box.)

e. Examine the geomembrane seam through the viewing panel for bubbles for a period of not less than 10 seconds.

f. Remove the vacuum box after removing or bleeding vacuum from the vacuum box. Proceed to step g if bubbles appeared in step e. If no bubbles appeared in step e, move vacuum box over the next adjoining area with a minimum 3 inch overlap, and repeat the process.

g. If bubbles appeared through the geomembrane, then mark the defective area with an appropriate device for repair according to the provisions of Subsection 3.6(C).

C. Air Pressure Testing

1. Air pressure testing equipment:

   a. Air compressor with pressure gauge and regulator capable of producing and sustaining a pressure between 25 and 30 psig.

   b. Fittings, rubber hose, valves, etc., to operate the equipment and a sharp hollow needle, or other pressure feed device, if approved by OWNER/ENGINEER.

2. Air pressure testing procedures:

   a. Seal both ends of the seam to be tested.

   b. Insert needle into air channel of dual hot wedge seam.

   c. Inflate airspace with compressor to a pressure of approximately 30 psig, close valve, and monitor pressure in the air channel for approximately 7 minutes.

   d. Record pressure at the end of 2 minutes and again at the end of 7 minutes.

   e. If the pressure difference between the 2 minute and the 7 minute readings exceeds 2 psi, or if the pressure does not stabilize within the 2 minute period, one more 5 minute pressure monitoring interval will be allowed.

   f. If the pressure loss over both 5 minute intervals exceeds 2 psig or if the pressure does not stabilize, then the seam fails the test.

   g. If the pressure loss over either 5 minute interval does not exceed 2 psig, then the seam may be deemed by INSTALLER to have passed the test.

   h. Cut the end of the tested seam interval opposite the pressure gauge to verify that air channel tested was not obstructed by noting a release of air pressure.

3. For seam intervals failing the air pressure nondestructive test, perform additional nondestructive testing or visual inspection to identify, if possible, the faulty area of the seam. Repair and retest the faulty area. If the faulty area cannot be identified, then repair and retest the entire seam.

D. Nondestructive Seam Test Failures

Repair seams failing nondestructive testing according to Subsection 3.6(C) and subsequently nondestructively retest according to Subsection 3.4.

3.5 DESTRUCTIVE TESTING

OWNER/ENGINEER will have the seam samples laboratory tested at OWNER's expense. INSTALLER to perform field destructive seam testing.

A. Location and Sampling Frequency

1. OWNER/ENGINEER will select locations where laboratory seam samples shall be cut by INSTALLER for destructive testing.

2. Collect laboratory destructive samples at a frequency of not less than one per every 1000 linear feet of seam length. OWNER/ENGINEER may direct that additional samples be cut.

3. Collect and test field end of seam destructive samples from at least one end of each fusion welded seam 100 feet or greater in length using a calibrated field tensiometer according to ASTM D4437. Field test a minimum of one sample specimen each in peel and shear. Results will be evaluated against the criteria presented in Subsection 3.5(E).

B. Sampling Procedure

1. For each sample location, OWNER/ENGINEER will:

a. Assign a sample number and mark accordingly.

b. Record sample location on layout drawing.

c. Record pertinent information, including date, time, number of seaming unit, and name of seamer.

2. Ensure that destructive samples are at least 12 inches wide (at least 5 inches on each side of the seam) by 42 inches long. Cut samples into three parts, and distribute as follows:

a. Cut and retain a 12 inch by 14 inch portion. Perform field testing on this sample as described in Subsection 3.5(C).

b. Cut a 12 inch by 12 inch portion and give it to OWNER/ENGINEER for record storage.

c. Give the remaining 16 inch by 12 inch portion, to OWNER/ENGINEER for testing as described in Subsection 3.5(D).

3. Repair holes cut into the geomembrane resulting from destructive seam sampling in accordance with Subsection 3.6(C). Nondestructively test repair area in accordance with Subsection 3.4(B).

C. Field Testing

1. Field test a minimum of five 1 inch wide samples for peel, and field test a minimum of five 1 inch wide samples for shear. Use a field tensionmeter run at a cross head speed of 2 inches per minute that has been calibrated within 3 months of the start of geomembrane installation.

2. Record quantitative and qualitative test results, and evaluate against acceptance Specifications listed in Table 02070-2.

3. Implement the procedures of Subsection 3.5(E) if any sample fails the field tensiometer test.

D. Laboratory Testing

1. Test destructive seam samples in general accordance with the methodology of ASTM D4437. Perform peel testing for dual hot wedge fusion welds on both inside and outside tracks.

2. Perform the following tests on each destructive seam sample:

   a. Shear strength, expressed in pounds per inch width (ppi), when tested in general accordance with ASTM D4437.

   b. Peel strength, expressed in pounds per inch width (ppi), recorded during the peel test in general accordance with ASTM D4437.

3. Ensure that the shear test gauge length is 2 inches between each edge of the seam and the adjacent grip. Maintain crosshead speed of 2 inches per minute. Monitor load and cross head displacement during the test.

4. Ensure that peel test grips are no closer than 1 inch to the edge of the seam unless material is insufficient to allow insertion at this setting. Maintain cross head speed of 2 inches per minute.

5. Report the following values, along with mean and standard deviation where appropriate for each specimen tested in shear:

   a. Maximum tension in pounds per square inch.

   b. Elongation at break (up to a tested maximum of 100 percent).

   c. The locus of failure.

6. Report the following values, along with mean and standard deviation where appropriate for each specimen tested in peel:

   a. Maximum tension in pounds per square inch.

   b. Seam separation (expressed as percent of original seam area).

   c. Locus of failure.

7. Retesting of seams, because of failure to meet any or all of the Specifications, may be performed at the sole discretion of OWNER/ENGINEER.

Table 02070-2
60-mil HDPE Geomembrane Acceptance Specifications

PROPERTY	ASTM TEST METHOD	UNITS	MINIMUM AVERAGE VALUE
Shear Strength(2)	D4437	ppi	120
Shear Elongation(2)(6)	--	percent	50
Peel Strength(3),(4) - Fusion	D4437	ppi	91
Peel Strength(3),(4) - Extrusion	D4437	ppi	78
Peel Separation(5)	--	percent	25

Notes:

(1) If the lengthwise edges of the textured geomembrane panels are nontextured, then the nontextured specifications shall apply for the testing of seams made along these edges. For textured to nontextured seams, use the textured specifications.

(2) Five out of the five test specimens shall meet these requirements. In addition, failure type must be film tear bond (FTB) for all five specimens.

(3) Four out of the five specimens shall meet the three requirements. The fifth specimen shall achieve 80 percent of the listed peel strength.

(4) Failure type shall be film tear bond (FTB) for five out of five test specimens.

(5) Maximum Acceptance Value for five out of five test specimens. The locus of break patterns of the different seaming methods in shear and peel, the following are unacceptable break codes per their description in ASTM D6392 (in this regard, SIP is an acceptable break code):

- Hot Wedge: AD and AD-BrK >25%.
- Extrusion Fillet: AD1, AD2, and AD-WLD (unless strength is achieved).

(6) Elongation measurements shall be omitted for field testing.

E. Destructive Seam Test Failure

1. Evaluate results from the shear and peel tests against the criteria tabulated in Table 02070-2. Meet Table 02070-2 criteria for the seam to be considered acceptable.

2. Determine the repair boundary whenever a seam has failed the destructive testing following one of two options:

a. Reconstruct the seam path between any two previously tested and passed field and laboratory destructive sample locations; or

b. Trace the welding path to an intermediate location at least 10 feet from the point of the failed test in each direction, and obtain destructive test samples at these intermediate locations. If the destructive tests on these samples are acceptable, then reconstruct the seam between these intermediate locations. If either sample fails, then repeat the process until an acceptable seam test has been performed on both sides of the original failed sample. If a passing sample is not found on one (or both) sides of the original failed sample, then extend the seam repair to the end(s) of the seam. Continue to track the failing seam path, as necessary, and as appropriate, past the end(s) and onto the prior seams and following the seams made with the same welding equipment. For the retesting of seams, according to this procedure, use the sampling methodology described in Subsection 3.5(B). Continue tracking the seam path until passing field and laboratory destruction sample locations are found at both ends of the seam path, even if seaming occurred by the machine days prior or days after welding the failing destruct seam. An additional sample taken from the reconstructed zone must pass destructive seam testing, if destructive sample failure(s) causes the reconstruction and the length of the reconstructed seam is greater than 150 feet.

3.6 DEFECTS AND REPAIRS

A. Examine seam and nonseam areas of the geomembrane to identify defects, holes, blisters, undispersed raw materials, and signs of contamination by foreign matter. Clean the surface of the geomembrane at the time of examination. Groom and wash geomembrane surface if the amount of dust or mud inhibits examination. Provide a water truck, an operator, and water and hoses as reasonably necessary to assist in such washing.

B. Evaluation

1. Mark each location requiring repair due to failure of the nondestructive test, observations, examinations, or destructive tests.

2. Do not cover locations that have been repaired or replaced until these locations are examined by OWNER/ENGINEER and testing results indicate passing values.

C. Repair or replace portions of the geomembrane exhibiting a flaw, or failing a destructive or nondestructive test. Several procedures exist for the repair of these areas, as follows:

1. Patching—for repair of large holes, tears, undispersed raw materials, contamination by foreign matter, holes resulting from destructive sampling, and locations where the seam overlap is insufficient.

2. Spot welding or seaming—for repair of small tears, pinholes, or other minor, localized flaws.

3. Capping—for repair of large lengths of failed seams.

4. Removal and replacement—used to replace nonconforming or damaged panels or portions thereof.

5. Additional procedures if agreed upon by OWNER/ENGINEER.

D. Extend patches and caps at least 6 inches beyond the edge of the defect. Round the corners of patches and caps. In addition, satisfy the following provisions:

1. Abrade surfaces of the geomembrane to be repaired no more than 1 hour prior to the repair if extrusion welding techniques are used.

2. Ensure that geomembrane surfaces are clean and dry at the time of repair.

3. OWNER/ENGINEER must approve repair procedures, equipment, materials, and techniques prior to the repair.

E. Log the repair date, time, welder number, and the name of welder operator for each repair. Nondestructively test each repair. Passing tests indicate adequate repair. Large caps may be of sufficient extent to require destructive test sampling at the discretion of OWNER/ENGINEER.

F. If failing nondestructive tests indicate inadequate repair, reconstruct repair and retest until a passing result is obtained.

G. Cut and seam wrinkles that are higher than they are wide or may adversely affect the long term integrity of the geomembrane, hinder subsequent construction of the overlying layers, or impede drainage off the geomembrane after it is covered by soil. Perform seaming in accordance with the equipment and procedures described in Subsections 3.3(B) and 3.3(C), respectively, and subject to the test provisions of Subsections 3.4 (nondestructive testing) and 3.5 (destructive testing).

3.7 MATERIAL IN CONTACT WITH GEOMEMBRANES

A. Pipe Penetrations and Appurtenances - Verify that the following requirements are met:

1. Nondestructively test seaming performed on and pipe penetrations, and other appurtenances according to one of the following methods: (1) vacuum box method as discussed in Section 3.4; (2) spark testing according to MANUFACTURER's recommended procedures; or (3) factory testing, along with certification, of prefabricated seams (i.e., pipe boots).

2. The geomembrane has not been visibly damaged while making connection to leachate collection sump and appurtenances.

3. Installation of the geomembrane in the area of the pipe penetrations and connections of the geomembrane to these structures and appurtenances have been made according to the approved engineering plans and shop drawings.

B. Soil/Select Aggregate Fill - Requirements for the placement of soil are described in Section 02320. Apply the following general criteria for WORK on Geomembranes:

1. Do not place soil on the geomembrane at an ambient temperature below 32°F, (0°C) nor above 104°F (40°C), unless otherwise specified.

2. Do not drive equipment used for placing the soil directly on the geomembrane.

3. A minimum thickness of 1 foot of soil is specified between a low ground pressure dozer (maximum contact pressure of 5 psi) and the geomembrane.

4. A minimum thickness of 2.0 feet of soil is specified between for other tracked vehicles and flotation tire–equipped vehicles.

5. A minimum thickness of 3.0 feet of soil is specified between rubber tired vehicles and the geomembrane, including areas of heavy traffic.

6. On slopes steeper than 6:1, place overlying soil from bottom to top.

3.8 LEAK LOCATION TESTING

A. OWNER/ENGINEER will conduct a leak location survey on the geomembrane liner after the placement of the leachate drainage layer and leachate piping on the composite liner per NR 516.07(2)(d).

B. Refer to Specification Section 02320 Subpart 3.4 for CONTRACTOR requirements for assisting OWNER/ENGINEER in conducting a Leak Location Survey on the geomembrane liner.

END OF SECTION

SECTION 02072
LINEAR LOW DENSITY POLYETHYLENE (LLDPE) TEXTURED GEOMEMBRANE

PART 1. GENERAL

1.1 WORK INCLUDES

A. Install Linear Low Density Polyethylene (LLDPE) Textured Geomembrane in accordance with the Drawings and these Specifications, including, but not limited to, excavation and backfilling of anchor trench, deployment of geomembrane, seaming, repairs, testing, and necessary and incidental items required to complete the WORK. OWNER and CONTRACTOR furnished material (refer to Section 01270 Schedule of Value and Payments)

1.2 REFERENCE STANDARDS

A. ASTM D792 – Specific Gravity (Relative Density) and Density of Plastics by Displacement.

B. ASTM D1004 – Test Method for Initial Tear Resistance of Plastic Film and Sheeting.

C. ASTM D1238 – Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer.

D. ASTM D1248 – Specification for Polyethylene Plastics Molding and Extrusion Materials.

E. ASTM D1505 – Test Method for Density of Plastics by the Density Gradient Technique.

F. ASTM D1603 – Test Method for Carbon Black in Olefin Plastics.

G. ASTM D3895 – Test Method for Oxidative Induction Time of Polyolefins by Thermal Analysis.

H. ASTM D4218 – Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle Furnace Technique.

I. ASTM D4437 – Standard Test Methods for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.

J. ASTM D4833 – Tech Method for Index Puncture Resistance Geotextiles, Geomembrane, and Related Products.

K. ASTM D5199 – Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.

L. ASTM D5323 – Practice for Determination of 2% Secant Modulus for Polyethylene Geomembrane.

M. ASTM D5596 – Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.

N. ASTM D5617 – Test Method for Multi Axial Tension Test for Geosynthetics.

O. ASTM D5721 – Practice for Air-Oven Aging of Polyolefin Geomembranes.

P. ASTM D5885 – Test Method for Oxidative Induction Time of Polyolefin Geosynthetics by High Pressure Differential Scanning Calorimetry.

Q. ASTM D5994 – Test Method for Measuring the Core Thickness of Textured Geomembranes.

R. ASTM D6392 – Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.

S. ASTM D6693 – Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polyethylene Geomembranes.

T. GRI GM6 – Standard Practice for Pressurized Air Channel Test for Dual Seamed Geomembranes.

U. GRI GM12 – Measurement of Asperity Height of Textured Geomembrane Using a Depth Gauge.

V. GRI GM17 – Test Properties and Testing Frequency for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembrane.

W. Construction Quality Assurance (CQA) Plan

1.3 DEFINITIONS

A. INSTALLER - CONTRACTOR or organization hired by CONTRACTOR to install the Geomembrane (and if applicable, other geosynthetic components).

B. MANUFACTURER - Company hired by CONTRACTOR to furnish geomembrane.

C. Resin Supplier - Company selected by the MANUFACTURER to furnish polyethylene resin used to manufacture the geomembrane.

D. Geomembrane - A relatively impermeable thin sheet of polyethylene used as a barrier liner or cover to prevent liquid or vapor migration into or from liquid or solid storage facilities.

E. Textured Geomembrane - Geomembrane with roughened, high friction surfaces created by co-extrusion, extrusion coating, or spray coating.

F. Installation Field Crew - Individuals employed by installer to deploy geomembrane panels and perform field screening, nondestructive testing, and other critical operations.

G. Fusion Weld - A bond between two polyethylene geomembrane surfaces achieved by fusing both polyethylene surfaces into a homogeneous bond using a power driven apparatus capable of heating and compressing the overlapped portions of the geomembrane sheets at a specified rate of speed.

H. Extrusion Weld - A bond between two polyethylene materials achieved by extruding a bead of molten polyethylene over leading edge of the seam between upper and lower sheet, or rigid polyethylene piping or plating, using a hand held apparatus.

I. ENGINEER - Official representative of OWNER. ENGINEER or designated Construction Quality Control Officer (CQA Officer) is responsible for observing and documenting that activities related to quality assurance of the construction conform to the Drawings and Specifications.

1.4 QUALITY ASSURANCE

A. Qualifications:

1. MANUFACTURER: At least 5 years of continuous experience in manufacturing LLDPE geomembrane and have produced 10,000,000 square feet (minimum) of LLDPE geomembrane and installed at least 8,000,000 square feet.

2. INSTALLER:

    a. At least 5 years of continuous experience in installing polyethylene geomembranes and have installed a minimum of 10,000,000 square feet (minimum) of polyethylene geomembrane for at least 10 completed facilities.

    b. Personnel performing seaming operations: Qualified by experience or by successfully passing seaming tests. At least one seamer to have experience in seaming 5,000,000 square feet (minimum) of polyethylene geomembrane using the same type of seaming apparatus to be used on this project. The most experienced seamer, called the "master seamer," to provide direct supervision, as required, over less experienced seamers. MANUFACTURER/INSTALLER agree to participate in and conform with Quality Assurance Program as outlined in this Specification and Construction Quality Assurance Plan.

1.5 SUBMITTALS

Items A through E shall be submitted no later than 45 days prior to start of geomembrane installation or 15 days prior to delivery of first geomembrane shipment, whichever is sooner.

A. Raw Materials:

1. Resin supplier name, production plant(s) location(s), and the resin brand name and product number.

2. Copy of quality control certificates issued by LLDPE resin suppliers.

3. LLDPE resin production date(s).

4. Results of tests conducted by MANUFACTURER and resin supplier. Results shall conform with requirements in Part 2.2(A).

5. Statement by MANUFACTURER certifying that no recycled polymer and no more than 10% rework of the same type of material is added to resin during geomembrane manufacturing.

B. MANUFACTURER's Certification: MANUFACTURER shall certify that supplied geomembrane meets MANUFACTURER's minimum Specifications.

C. Geomembrane MANUFACTURER/Production Information:

1. Corporate background information.

2. Manufacturing Quality Control (MQC) Plan.

3. List of geomembrane roll numbers proposed for the project and associated batch each roll was produced.

4. Quality control certificates for geomembrane rolls and welding rod indicating compliance with requirements of Part 2.

D. Geomembrane INSTALLER's Information:

1. Corporate background information.

2. Construction Quality Control (CQC) Plan.

3. A list of at least 10 completed facilities, totaling 10,000,000 square feet minimum for which INSTALLER has completed installing polyethylene geomembrane. Include facility name, location, installation date, geomembrane type, and quantity installed.

4. List of field crew personnel, along with pertinent project experience information.

E. Installation panel layout diagram identifying placement of geomembrane panels and seams and variances or additional details that deviate from engineering drawings. Following approval, do not change the layout without permission from OWNER/ENGINEER.

F. Submittals during installation:

1. Daily records/logs prepared by INSTALLER documenting the WORK performed (i.e., productivity), personnel involved, general working conditions, and any problems encountered or anticipated on the project.

2. Subgrade acceptance forms prepared by INSTALLER for each day geomembrane was deployed.

3. Quality control documentation (i.e., trial seam tests, destructive tests, nondestructive tests).

4. Field tensiometer calibration certificate. Latest calibration within 3 months of the start of geomembrane installation.

G. Submittals after completion of installation:

1. Geomembrane installation certification stating the geomembrane was installed in accordance with the contract documents.

2. As built panel layout diagram.

3. Warranty from MANUFACTURER/INSTALLER

1.6 DELIVERY, STORAGE, AND HANDLING

A. Shipping: Ship geomembrane liner rolled onto cores that allow for easy handling and deployment.

B. Transportation: Unload and handle geomembrane rolls by appropriate means to prevent damage.

C. On Site Storage: Provide on site storage location for geomembrane material with level base that protects the geomembrane from punctures, abrasions, and excessive dirt and moisture.

D. On Site Handling: Use appropriate handling equipment when moving geomembrane rolls. Instructions for moving shall be given by MANUFACTURER.

1.7 WARRANTIES

A. MANUFACTURER/INSTALLER shall provide written 2 year warranties from date of substantial completion. Warranties shall address quality of material and workmanship.

PART 2. PRODUCTS

2.1 MANUFACTURERS

A. LLDPE Geomembranes

Agru/America, Inc.
500 Garrison Road
Georgetown, SC 29440
1-800-321-1379

Poly-Flex, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051
1-888-765-9359

GSE, Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073
1-800-435-2008

B. Substitutions: Submit request to OWNER/ENGINEER and OWNER with complete supporting technical information under provisions of Section 01600.

2.2 MATERIALS

A. Polyethylene Geomembrane Resin

1.	Specific Gravity/Density	ASTM D792, Method B or ASTM D1505	0.926 maximum
2.	Melt Index	ASTM D1238 (190°C & 2.16 kg)	1.0 g/10 minute maximum

3. Resin: Virgin material with no more than 10 percent rework (by weight). Rework material to be of the same formulation as parent material. No post consumer resin allowed.

B. LLDPE Geomembrane

1. Manufactured from top quality resin.
2. No more than 1 percent (by weight) of additives, fillers, or extenders, excluding carbon black.
3. Free of holes and shall have no undispersed raw materials, striations, scratches, or blemishes on geomembrane surface.
4. Carbon black for ultraviolet protection, added during the manufacture of geomembrane.
5. Uniform textured appearance.

C. Fabrication

1. Supply geomembrane in factory produced rolls. <u>No factory seams may be used to prepare larger geomembrane panels for delivery to the site.</u>

2. Label each geomembrane roll with the following information:

   - Name of MANUFACTURER.
   - Product type and identification number (if any).
   - Nominal product thickness.
   - Roll number and dimensions.

2.3 ACCEPTANCE TESTING REQUIREMENTS

Evaluate and test geomembrane rolls prior to acceptance. OWNER/ENGINEER or a designated, independent geosynthetics laboratory may perform additional testing (i.e., conformance testing and direct shear testing) to verify that LLDPE geomembrane meets the Specifications and project requirements. Testing requirements are detailed in following subsections:

A. MANUFACTURER's Quality Control Testing

Perform tests on LLDPE geomembrane at frequencies given in Table 02072-1 prior to shipping.

Submit test results to OWNER/ENGINEER prior to shipping geomembrane rolls. OWNER/ENGINEER will evaluate test results as discussed in Subsection 2.3(C).

B. Conformance Test Samples

At least one sample shall also be Conformance samples will be obtained by OWNER/ENGINEER at a minimum rate of one sample per 100,000 square feet of geomembrane delivered or to be delivered to the site. At least one conformance sample will be obtained from geomembrane rolls representing each resin production batch. Samples may also be collected from each roll and tested for thickness. Samples will genrerally be collected at the manufacturing plant prior to shipment to the site by a laboratory technician affileated the geosynthetic testing laboratory.

Samples collected on site: Conformance samples will be 3 feet long by the full width of the roll and not the first 3 feet of any roll or of the size required by the geosynthetic testing Laboratory. Geomembrane thickness samples will be of the size required by the geosynthetic testing laboratory. Table 02072-1 list conformance tests and test methods that may be performed on geomembrane roll samples. At a minimum, the conformance testing required by Wisconsin Administrative Code NR 516.07(2)(a) will be conducted by OWNER/ENGINEER. OWNER/ENGINEER will perform testing through use of a recognized testing laboratory. OWNER/ENGINEER will evaluate test results as discussed in Subsection 2.3(C).

MANUFACTURER shall not ship geomembrane rolls to the site until test results have been evaluated by OWNER/ENGINEER and accepted for shipment.

Owner will bear the cost for conformance testing. The cost for retesting samples required due to failing test results shall be paid by Contractor.

Table 02072-1
Linear Low Density Polyethylene (LLDPE) Geomembrane - Textured

PROPERTIES	TEST METHOD	TEST VALUE (40 mils)	TESTING FREQUENCY (minimum)
Thickness mils (min. average) ▪ Lowest individual for 8 out of 10 values ▪ Lowest individual for any of the 10 values	D5994	nom. (-5%) -10% -15%	Per roll
Asperity Height mils (min. average)	D7466	16	Every 2nd roll[1]
Density g/ml (max.)	D1505/D792	0.939	200,000 lb
Tensile Properties (min. average)[2] ▪ Break strength - lb/in ▪ Break elongation - %	D6693 Type IV	 60 250	20,000 lb
2% Modulus - lb/in (max.)	D5323	2,400	Per formulation
Tear Resistance - lb (min. average)	D1004	22	45,000 lb
Puncture Resistance - lb (min. average)	D4833	44	45,000 lb
Axi-Symmetric Break Resistance Strain - % (min.)	D5617	30	Per formulation
Carbon Black Content - %	D4218[3]	2.0-3.0	45,000 lb
Carbon Black Dispersion	D5596	Note [4]	45,000 lb
Oxidative Induction Time (OIT) (min. average)[5] ▪ Standard OIT —or— ▪ High Pressure OIT	 D3895 D5885	 100 400	 200,000 lb
Oven Aging at 85°C[6] ▪ Standard OIT (min. average) - % retained after 90 days —or— ▪ High Pressure OIT (min. average) - % retained after 90 days	D5721 D3895 D5885	 35 60	Per formulation
UV Resistance[7] ▪ Standard OIT (min. average) —or— ▪ High Pressure OIT (min. average) - % retained after 1,600 hours[9]	D7238 D3895 D5885	 N.R. [8] 35	Per formulation

Notes:
(1) Alternate the measurement side for double sided textured sheet.
(2) Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction.
— Break elongation is calculated using a gauge length of 2.0 inches at 2.0 in/min.
(3) Other methods such as D1603 (tube furnace) or D6370 (TGA) are acceptable if an appropriate correlation to D4218 (muffle furnace) can be established.
(4) Carbon black dispersion (only near spherical agglomerates) for 10 different views:
— Nine in Categories 1 or 2, and 1 in Category 3.
(5) Manufacturer has the option to select either one of the OIT methods listed to evaluate the antioxidant content in the geomembrane.
(6) It is also recommended to evaluate samples at 30 and 60 days to compare with the 90 day response.
(7) The condition of the test should be 20 hour UV cycle at 75°C, followed by 4 hour condensation at 60°C.
(8) Not recommended since the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.
(9) UV resistance is based on percent retained value regardless of the original HP-OIT value.

C. Procedures for Determining Geomembrane Roll Test Failures

Table 02072-1 lists the acceptance Specifications. For tests results reported in both machine and cross direction, compare results from each direction to listed Specifications to determine acceptance. For test methods requiring multiple specimens, criteria in Table 02072-1 must be met based on average results of multiple specimen tests. Use the following procedures for interpreting results:

1. If the test result values meet stated Specifications, then roll and batch, and entire shipment, if applicable, will be accepted based on conformance testing; and

2. If test results do not meet Specifications, then roll and batch must be retested at Contractor's expense using specimens from the original roll sample or from another sample collected by Owner/Engineer or third party geosynthetics laboratory. For retesting, perform two additional tests for a failed test procedure.

   If both retest values meet Specifications, then roll and batch will be accepted based on conformance testing; if one additional test fails, then roll and batch must be rejected without further recourse. OWNER/ENGINEER may obtain samples from other rolls in batch. On the basis of testing these samples, OWNER/ENGINEER may choose to accept a portion of batch while rejecting the remainder.

   If retesting does not result in passing test results as defined above, or if there is any other nonconformity with the material Specifications, then geomembrane rolls must be withdrawn from the site. Do not resubmit these same rolls for use. Remove rejected geomembrane from the site and replace with acceptable geomembrane.

D. Direct Shear Testing and Stability Analysis

Identify the proposed geomembrane MANUFACTURER a minimum of 4 weeks prior to the start of geomembrane installation to allow OWNER/ENGINEER to conduct direct shear testing on the selected geomembrane material.

Collect geomembrane samples for direct shear testing at MANUFACTURER's plant as directed by ENGINEER. Collect samples of on site soil/material for direct shear testing as directed by OWNER/ENGINEER will perform the required testing through the use of a recognized geosynthetic testing laboratory. OWNER will bear the cost for direct shear testing.

ENGINEER will perform slope stability calculations using the direct shear test results on materials proposed for construction. ENGINEER will determine if the proposed geomembrane will be acceptable or unacceptable based on the evaluation of the stability analysis.

PART 3. EXECUTION

3.1 EARTHWORK PREPARATION

A. Prepare foundation and complete subgrade surface that will support geomembrane. Excavate, backfill, and compact the anchor trenches to dimensions and at locations shown on Drawings.

B. Prior to geomembrane deployment, visually examine subgrade surface to confirm suitability for deployment of geomembrane thereon. Verify that subgrade is firm, smooth, and uniform; and free of excessive moisture, abrupt changes in grade, cracking, protruding stones and clay clods (greater than 1/2 inch), vegetation, and other deleterious debris. Refinish subgrade surface found to be unsuitable for deployment of the geomembrane. Provide OWNER/ENGINEER with written acceptance of the subgrade surface over which panels are to be deployed for each day of panel deployment.

C. Deploy geomembrane over prepared and acceptable subgrade surface as soon as practicable after the subgrade has been completed and is suitable for deployment of geomembrane.

3.2 INSTALLATION - PANEL DEPLOYMENT

A. Install geomembrane according to approved layout drawing. Notify OWNER/ENGINEER of revisions or modifications to approved plan prior to installing the geomembrane. Upon placement, identify each panel by roll number, panel number, and date deployed.

B. Do not place geomembrane during precipitation, in areas of ponded water, or during excessive winds. OWNER/ENGINEER may order the suspension of WORK during such conditions.

C. Maintain documentation of above conditions in the daily installation records, and provide such documentation to OWNER/ENGINEER. Inform OWNER/ENGINEER if above conditions are not met.

D. Verify the following:

1. Equipment does not damage geomembrane.

2. Prepared surface underlying geomembrane has not deteriorated since previous acceptance, and is still acceptable at time of geomembrane placement.

3. Personnel working on geomembrane do not smoke, wear damaging footwear or clothing, or engage in activities that could damage the geomembrane.

4. Methods and equipment used to unroll and seam the geomembrane do not cause scratches, crimps, or gouges in the geomembrane.

5. Method used to place the rolls minimizes wrinkles (especially wrinkles between adjacent panels).

6. Adequate temporary loading or anchoring (continuously placed, if necessary) does not damage geomembrane.

7. No vehicular traffic, including all terrain vehicles (ATVs), operates directly on the geomembrane.

Immediately notify OWNER/ENGINEER if these conditions are, or have been, violated, and take immediate steps to mitigate any damage.

E. Examine each roll for damage after placement and prior to seaming. Inform OWNER/ENGINEER as to which rolls, or portions of rolls, should be rejected or repaired. Mark and remove from site damaged rolls or portions of rolls that have been rejected, at no risk, or expense to OWNER. Notify OWNER/ENGINEER when such removal occurs.

3.3 INSTALLATION - FIELD SEAMS

A. Seam Layout:

1. For slopes in excess of 10 percent, geomembrane panels shall be installed such that the seams run perpendicular to the contour lines of the slope to the extent possible. Minimize the number of seams in corners and at other odd shaped geometric intersections.

2. Do not locate any horizontal butt seams on slopes steeper than 5:1 (horizontal to vertical).

3. Use a seam numbering system comparable to, and compatible with, the geomembrane panel numbering system.

B. Seaming Processes/Equipment

1. Use the approved processes for field seaming (welding), which are extrusion welds and dual hot wedge fusion welds. Other processes require written authorization from OWNER/ENGINEER. Dual hot fusion weld all linear seams. Fusion weld corners, butt seams, and long repairs where possible.

2. Comply with the following requirements regarding use, availability, and cleaning of extrusion welding equipment:

a. Equip welding apparatus with operational thermocouples to continuously monitor temperature in barrel and at nozzle.

b. Clean and purge the extruder prior to beginning seaming until heat degraded extrudate has been removed from the barrel.

c. Check vital mechanical components, i.e. teflon shoes, brushes, and thermostats, daily.

d. Place electric generator for equipment on a smooth base such that no damage occurs to the geomembrane.

e. Place a smooth insulating plate or fabric beneath hot equipment after usage to protect geomembrane.

3. Comply with the following requirements regarding use, availability, and cleaning of dual hot wedge fusion welding equipment:

a. Equip welding apparatus to continuously monitor applicable temperatures. Verify and document temperatures daily.

b. Ground edge of cross seams to a smooth incline (top and bottom) prior to welding. Patch cross seams after welding.

c. Place electric generator for equipment on a smooth base such that no damage occurs to the geomembrane.

d. Place a smooth insulating plate or fabric beneath hot equipment after usage to protect geomembrane.

C. Seaming Requirements/Procedures

1. Perform geomembrane seaming under the following weather conditions only:

   a. Ambient temperatures of at least 32°F (0°C), but no higher than 104°F (40°C) unless authorized in writing by OWNER/ENGINEER. Measure temperatures 1 to 2 feet above the geomembrane surface using a conventional mercury thermometer.

   b. Dry geomembrane.

   c. No ponded water has collected above or below the surface of the geomembrane.

2. For seaming at ambient temperatures below 32°F or above 104°F, demonstrate to OWNER/ENGINEER that the methods and techniques used to perform the seaming produce seams that are entirely equivalent to seams produced at temperatures above 32°F and below 104°F, and that the overall quality of the geomembrane is not adversely affected. OWNER/ENGINEER may, at his/her sole discretion, deny approval for use of proposed technique regardless of demonstration results.

3. For overlapping and temporary bonding, use the following procedures:

   a. Provide sufficient overlap between geomembrane panels to perform extrusion or fusion welding, in accordance with MANUFACTURER's recommendation, and allow peel tests to be performed on the seam. Cap seam if there is insufficient overlap.

   b. Do not use solvents or adhesives on geomembranes unless the product has been approved in writing by OWNER/ENGINEER based upon samples and data sheets submitted to OWNER/ENGINEER for testing and evaluation.

   c. Do not use procedures to temporarily bond adjacent geomembrane rolls that will damage the geomembrane; in particular, control the nozzle temperature of the spot welding apparatus to protect the geomembrane from potential damage. Keep spot welding to a minimum. Spot welding is subject to weather restrictions listed above. Perform spot welding only by approved seaming personnel pursuant to Subsection 1.4 of this Specification.

4. Make trial seams on nondeployed geomembrane seams at the beginning of each seaming period and at least once every 5 hours during continuous operation with each welding machine by each seaming technician performing geomembrane welding with that machine. Make trial seams under the same conditions as actual seams. Trial seams are also required for welding equipment for which the power supply has been interrupted. Seaming personnel must make at least one satisfactory trial seam each day to demonstrate satisfactory abilities. Satisfactory trial seams must pass the inspection and testing described below.

   a. Ensure that the trial seam samples are at least 3 feet long by 1 foot wide after seaming, with the seam centered along its length.

b. Inspect trial seams for proper squeeze out, footprint pressure, and general appearance. If general appearance is acceptable, then cut specimens, 1 inch in width, from each end of the trial seam sample. Give remainder of trial seam to OWNER/ENGINEER.

c. Subject five specimens to a shear test and five specimens to a peel test (fusion welds shall be tested for peel on both sides of the air channel). If test specimens exhibit a film tear bond and meet acceptance Specifications listed in Subsection 3.5 Table 02072-2, then the trial seam is satisfactory.

d. If trial seam fails the field test or inspection, make a second trial seam (either with or without adjustments in the seaming techniques), and inspect and test it. If no inspection or test on the second trial seam fails, then the trial seam is satisfactory. If the second trial seam fails, then adjust the seaming apparatus or seaming technique as necessary until two consecutive, satisfactory trial seams are obtained.

5. Seam Preparation:

a. Ensure that the seam area is clean and free of moisture, dust, dirt, debris, and foreign material prior to seaming.

b. Align seams so as to minimize the number of wrinkles and "fishmouths."

c. If seam overlap grinding is required, complete grinding process according to MANUFACTURER's instructions within one (1) hour of seaming operation. Do not damage geomembrane or cause excessive striation on geomembrane surface when grinding.

6. General Seaming Procedures:

a. Use dual hot wedge fusion welding for linear seams.

b. Use fusion welding for corner seams, butt seams, and long repairs where possible.

c. Extend welded seam to the end of geomembrane panels placed in anchor trenches to minimize the potential for tear propagation along the seam.

d. Whenever possible, start field seaming from top of slope down, to minimize the development of wrinkles. Use hot air only when making tack welds; no double sided tape, glue, or other method is permitted.

e. Ensure that the completed liner does not exhibit "bridging" or "trampolining" when protective cover or other materials are placed over geomembrane.

f. “Walk out” fishmouths or wrinkles at seam overlaps if possible, or cut along ridge of wrinkle in order to achieve a flat overlap, and then weld along overlap and patch each end.

g. Provide adequate illumination when seaming operations are to be conducted at night.

h. When restarting an extrusion seam, grind end of existing extrusion bead, and start new seam with less than a 2 inch overlap of existing bead.

3.4 NONDESTRUCTIVE TESTING

A. Nondestructively test each field seam over its full length using one of the methods described in this section. Perform nondestructive testing to concurrently with seaming and do not await completion of the project's seaming. Air pressure testing is only applicable to dual hot wedge fusion seams. Conduct vacuum box testing on dual wedge fusion seams with the airspace between the tracks open to the atmosphere at one or both ends of the seam.

B. Vacuum Box Testing

1. Vacuum box testing equipment:

   a. Vacuum box with open bottom, clear viewing panel on top, and pliable gasket attached to the bottom.

   b. Vacuum pump assembly equipped with pressure controller and pipe connections capable of achieving a vacuum of 2 psig.

   c. Vacuum gauge on vacuum box with an operating range of vacuum pressures from 0 to 5 psig.

   d. Soapy solution compatible with the geomembrane and conductive to the formation of bubbles with a means to apply.

2. Vacuum box test procedures:

   a. Ensure that seams are clean and relatively free from soil or foreign objects.

   b. Wet seam approximately twice the length of the vacuum box with a soapy solution.

   c. Center vacuum box with gasket in contact with the geomembrane surface over the wetted area of the seam.

   d. Apply normal force to the top of the vacuum box, Energize vacuum pump, and create a vacuum in vacuum box of 2 to 10 psig. (Ensure that a tight seal is created between the geomembrane and vacuum box.)

   e. Examine the geomembrane seam through the viewing panel for bubbles for a period of not less than 10 seconds.

   f. Remove the vacuum box after removing or bleeding vacuum from the vacuum box. Proceed to step g if bubbles appeared in step e. If no bubbles appeared in step e, move vacuum box over the next adjoining area with a minimum 3 inch overlap, and repeat the process.

   g. If bubbles appeared through the geomembrane, then mark the defective area with an appropriate device for repair according to the provisions of Subsection 3.6(C).

C. Air Pressure Testing

1. Air pressure testing equipment:

a. Air compressor with pressure gauge and regulator capable of producing and sustaining a pressure between 25 and 30 psig.

b. Fittings, rubber hose, valves, etc., to operate the equipment and a sharp hollow needle, or other pressure feed device, if approved by OWNER/ENGINEER.

2. Air pressure testing procedures:

a. Seal both ends of the seam to be tested.

b. Insert needle into air channel of dual hot wedge seam.

c. Inflate airspace with compressor to a pressure of approximately 30 psig, close valve, and monitor pressure in the air channel for approximately 7 minutes.

d. Record pressure at the end of 2 minutes and again at the end of 7 minutes.

e. If the pressure difference between the 2 minute and the 7 minute readings exceeds 4 psi, or if the pressure does not stabilize within the 2 minute period, one more 5 minute pressure monitoring interval will be allowed.

f. If the pressure loss over both 5 minute intervals exceeds 4 psig or if the pressure does not stabilize, then the seam fails the test.

g. If the pressure loss over either 5 minute interval does not exceed 4 psig, then the seam may be deemed by INSTALLER to have passed the test.

h. Cut the end of the tested seam interval opposite the pressure gauge to verify that air channel tested was not obstructed by noting a release of air pressure.

3. For seam intervals failing the air pressure nondestructive test, perform additional nondestructive testing or visual inspection to identify, if possible, the faulty area of the seam. Repair and retest the faulty area. If the faulty area cannot be identified, then repair and retest the entire seam.

D. Nondestructive Seam Test Failures

Repair seams failing nondestructive testing according to Subsection 3.6(C) and subsequently nondestructively retest according to Subsection 3.4.

3.5 DESTRUCTIVE TESTING

OWNER/ENGINEER, under agreement with OWNER, will contract to have the seam samples laboratory tested at OWNER's expense. INSTALLER to perform field destructive seam testing.

A. Location and Sampling Frequency

1. OWNER/ENGINEER will select locations where laboratory seam samples shall be cut by INSTALLER for destructive testing.

2. Collect laboratory destructive samples at a frequency of not less than one per every 500 linear feet of seam length. OWNER/ENGINEER may direct that additional samples be cut.

B. Collect and test field end of seam destructive samples from at least one end of each fusion welded seam 100 feet or greater in length using a calibrated field tensiometer according to ASTM D4437. Field test a minimum of one sample specimen each in peel and shear. Results will be evaluated against the criteria presented in Subsection 3.5(E).

1. For each sample location, OWNER/ENGINEER will:

a. Assign a sample number and mark accordingly.

b. Record sample location on layout drawing.

c. Record pertinent information, including date, time, number of seaming unit, and name of seamer.

2. Ensure that destructive samples are at least 12 inches wide (at least 5 inches on each side of the seam) by 42 inches long. Cut samples into three parts, and distribute as follows:

a. Cut and retain a 12 inch by 12 inch portion. Perform field testing on this sample as described in Subsection 3.5(C).

b. Cut a 12 inch by 12 inch portion and give it to OWNER/ENGINEER for record storage.

c. Give the remaining 18 inch by 12 inch portion, to OWNER/ENGINEER for testing as described in Subsection 3.5(D).

3. Repair holes cut into the geomembrane resulting from destructive seam sampling in accordance with Subsection 3.6(C). Nondestructively test repair area in accordance with Subsection 3.4(B).

C. Field Testing

1. Field test a minimum of five 1 inch–wide samples for peel, and field test a minimum of five 1 inch wide samples for shear. Use a field tensiometer run at a cross head speed of 20 inches per minute that has been calibrated within 3 months of the start of geomembrane installation.

2. Record quantitative and qualitative test results, and evaluate against acceptance Specifications listed in Table 02072-2.

3. Implement the procedures of Subsection 3.5(E) if any sample fails the field tensiometer test.

Table 02072-2
40-mil LLDPE Geomembrane Acceptance Specifications

PROPERTY	TEST METHOD	UNITS	MINIMUM AVERAGE VALUE NON-TEXTURED	MINIMUM AVERAGE VALUE TEXTURED[(1)]
Shear Strength[(2)]	ASTM D4437	ppi	60	
Shear Elongation[(2)(6)]	--	percent	50	
Peel Strength[(3),(4)] - Fusion	ASTM D4437	ppi	50	
Peel Strength[(3),(4)] - Extrusion	ASTM D4437	ppi	44	
Peel Separation[(5)]	--	percent	25	

Notes:

(1) If the lengthwise edges of the textured geomembrane panels are nontextured, then the nontextured specifications shall apply for the testing of seams made along these edges. For textured to nontextured seams, use the textured specifications.

(2) Five out of the five test specimens shall meet these requirements. In addition, failure type must be film tear bond (FTB) for all five specimens.

(3) Four out of the five specimens shall meet the three requirements. The fifth specimen shall achieve 80 percent of the listed peel strength.

(4) Failure type shall be film tear bond (FTB) for five out of five test specimens.

(5) Maximum Acceptance Value for five out of five test specimens. The locus of break patterns of the different seaming methods in shear and peel, the following are unacceptable break codes per their description in ASTM D6392 (in this regard, SIP is an acceptable break code):

— Hot Wedge: AD and AD-BrK >25%.

— Extrusion Fillet: AD1, AD2, and AD-WLD (unless strength is achieved).

(6) Elongation measurements shall be omitted for field testing.

D. Laboratory Testing

1. Test destructive seam samples in general accordance with the methodology of ASTM D4437. Perform peel testing for dual hot wedge fusion welds on both inside and outside tracks.

2. Perform the following tests on each destructive seam sample:

    a. Shear strength, expressed in pounds per inch width (ppi), when tested in general accordance with ASTM D4437.

    b. Peel strength, expressed in pounds per inch width (ppi), recorded during the peel test in general accordance with ASTM D4437.

3. Ensure that the shear test gauge length is 2 inches between each edge of the seam and the adjacent grip. Maintain crosshead speed of 20 inches per minute. Monitor load and cross head displacement during the test.

4. Ensure that peel test grips are no closer than 1 inch to the edge of the seam unless material is insufficient to allow insertion at this setting. Maintain cross head speed of 20 inches per minute.

5. Report the following values, along with mean and standard deviation where appropriate for each specimen tested in shear:

    a. Maximum tension in pounds per square inch.

    b. Elongation at break (up to a tested maximum of 100 percent).

    c. The locus of failure.

6. Report the following values, along with mean and standard deviation where appropriate for each specimen tested in peel:

    a. Maximum tension in pounds per square inch.

    b. Seam separation (expressed as percent of original seam area).

    c. Locus of failure.

7. Retesting of seams, because of failure to meet any or all of the Specifications, may be performed at the sole discretion of OWNER/ENGINEER.

E. Destructive Seam Test Failure

1. Evaluate results from the shear and peel tests against the criteria tabulated in Table 02072-2. Meet Table 02072-2 criteria for the seam to be considered acceptable.

2. Determine the repair boundary whenever a seam has failed the destructive testing following one of two options:

    a. Reconstruct the seam path between any two previously tested and passed field and laboratory destructive sample locations; or

b. Trace the welding path to an intermediate location at least 10 feet from the point of the failed test in each direction, and obtain destructive test samples at these intermediate locations. If the destructive tests on these samples are acceptable, then reconstruct the seam between these intermediate locations. If either sample fails, then repeat the process until an acceptable seam test has been performed on both sides of the original failed sample. If a passing sample is not found on one (or both) sides of the original failed sample, then extend the seam repair to the end(s) of the seam. Continue to track the failing seam path, as necessary, and as appropriate, past the end(s) and onto the prior seams and following the seams made with the same welding equipment. For the retesting of seams, according to this procedure, use the sampling methodology described in Subsection 3.5(B). Continue tracking the seam path until passing field and laboratory destruction sample locations are found at both ends of the seam path, even if seaming occurred by the machine days prior or days after welding the failing destruct seam.

c. An additional sample taken from the reconstructed zone must pass destructive seam teasing, if destructive sample failure(s) causes the reconstruction and the length of the reconstructed seam is greater than 150 feet.

3.6 DEFECTS AND REPAIRS

A. Examine seam and nonseam areas of the geomembrane to identify defects, holes, blisters, undispersed raw materials, and signs of contamination by foreign matter. Clean surface of the geomembrane at the time of examination. Groom and wash geomembrane surface if the amount of dust or mud inhibits examination. Provide a water truck, an operator, and water and hoses as reasonably necessary to assist in such washing.

B. Evaluation

1. Mark each location requiring repair due to failure of the nondestructive test, observations, examinations, or destructive tests.

2. Do not cover locations that have been repaired or replaced until these locations are examined by OWNER/ENGINEER and testing results indicate passing values.

C. Repair or replace portions of the geomembrane exhibiting a flaw, or failing a destructive or nondestructive test. Several procedures exist for the repair of these areas, as follows:

1. Patching—for repair of large holes, tears, undispersed raw materials, contamination by foreign matter, holes resulting from destructive sampling, and locations where the seam overlap is insufficient.

2. Spot welding or seaming—for repair of small tears, pinholes, or other minor, localized flaws.

3. Capping—for repair of large lengths of failed seams.

4. Removal and replacement—used to replace nonconforming or damaged panels or portions thereof.

5. Additional procedures if agreed upon by OWNER/ENGINEER.

D. Extend patches and caps at least 6 inches beyond the edge of the defect. Round the corners of patches and caps. In addition, satisfy the following provisions:

1. Abrade surfaces of the geomembrane to be repaired no more than 1 hour prior to the repair if extrusion welding techniques are used.

2. Ensure that geomembrane surfaces are clean and dry at the time of repair.

3. OWNER/ENGINEER must approve repair procedures, equipment, materials, and techniques prior to the repair.

E. Log the repair date, time, welder number, and the name of welder operator for each repair. Nondestructively test each repair. Passing tests indicate adequate repair. Large caps may be of sufficient extent to require destructive test sampling at the discretion of OWNER/ENGINEER.

F. If failing nondestructive tests indicate inadequate repair, reconstruct repair and retest until a passing result is obtained.

G. Cut and seam wrinkles that are higher than they are wide or may adversely affect the long term integrity of the geomembrane, hinder subsequent construction of the overlying layers, or impede drainage off the geomembrane after it is covered by soil. Perform seaming in accordance with the equipment and procedures described in Subsections 3.3(B) and 3.3(C), respectively, and subject to the test provisions of Subsections 3.4 (nondestructive testing) and 3.5 (destructive testing).

3.7 MATERIAL IN CONTACT WITH GEOMEMBRANES

A. Pipe Penetrations and Appurtenances - Verify that the following requirements are met:

1. Nondestructively test seaming performed on and pipe penetrations, and other appurtenances according to one of the following methods: (1) vacuum box method as discussed in Section 3.4; (2) spark testing according to MANUFACTURER's recommended procedures; (3) factory testing, along with certification, of prefabricated seams (i.e., pipe boots.

2. The geomembrane has not been visibly damaged while making connection to sumps and appurtenances.

3. Installation of the geomembrane in the area of the pipe penetrations and connections of the geomembrane to these structures and appurtenances have been made according to the approved engineering plans and shop drawings.

B. Soil - Requirements for the placement of soil are described in Section 02230. Apply the following general criteria for WORK on geomembranes:

1. Do not place soil on the geomembrane at an ambient temperature below 32^{o}, (0°C) nor above 104^{o}C, unless otherwise specified.

2. Do not drive equipment used for placing the soil directly on the geomembrane.

3. A minimum thickness of 1 foot of soil is specified between a low ground pressure dozer (maximum contact pressure of 5 psi) and the geomembrane.

4. A minimum thickness of 2.0 feet of soil is specified between other tracked vehicles and flotation tire equipped vehicles.

5. A minimum thickness of 3.0 feet of soil is specified between rubber tired vehicles and the geomembrane, including areas of heavy traffic.

6. On slopes steeper than 6:1, place overlying soil from bottom to top.

C. Geocomposite/Geotextile/GCL - Requirements for installation of the Geocomposite/ Geotextile/GCL are described in Section 02078.

END OF SECTION

SECTION 02075
GEOSYNTHETIC CLAY LINER

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Install Geosynthetic Clay Liner (GCL) in accordance with the Drawings and the Specifications, including, but not limited to, excavating and backfilling anchor trench, GCL panel layout, seaming, patching, testing, and all necessary and incidental items required to complete the WORK. OWNER and CONTRACTOR furnished material (refer to Section 01270 Schedule of Value and Payments)

1.2 REFERENCE STANDARDS

A. GRI GCL3 – Test Methods, Required properties, and Testing Frequencies of Geosynthetic Clay Liners (GCLs)

B. GRI GCL2 – Permeability of Geosynthetic Clay Liners.

C. ASTM D5321 – Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.

D. ASTM D5887 – Test Method for Measurement of Index Flux through Geosynthetic Clay Liner Specimens using Flexible Wall Permeameter.

E. ASTM D5888 – Practice for Storage and Handling of Geosynthetic Clay Liners.

F. ASTM D5890 – Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners.

G. ASTM D5891 – Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners.

H. ASTM D5993 – Test Method for Measuring the Mass per Unit Area of Geosynthetic Clay Liners.

I. ASTM D6102 – Standard Guide for Installation of Geosynthetic Clay Liners

J. ASTM D6141 – Standard Guide for Screening Clay Portion of Geosynthetic Clay Liner (GCL) for Chemical Compatibility to Liquids.

K. ASTM D6243 – Standard Test Method for Determining the Internal and Interface Shear Resistance of Geosynthetic Clay Liner by the Direct Shear Method.

L. ASTM D6496 – Standard Test Method for Determining Average Bonding Peel Strength Between Top and Bottom Layers of Needle Punched Geosynthetic Clay Liners

M. ASTM D6768 – Standard Test Method for Tensile Strength of Geosynthetic Clay Liners

N. ASTM E946 – Standard Test Method for Water Absorption of Bentonite by Porous Plate Method.

O. Construction quality Assurance Plan

1.3 DEFINITIONS

A. INSTALLER - Organization hired by CONTRACTOR to install the GCL (and if applicable other geosynthetic components).

B. MANUFACTURER - Company hired by CONTRACTOR to provide the GCL.

C. OWNER/ENGINEER - Official representative of OWNER. OWNER/ENGINEER or designated Construction Quality Assurance Officer (CQA Officer) will be responsible for observing and documenting that activities related to the quality assurance of the construction conform to the Drawings and Specifications.

D. Installation field crew - Group of individuals employed by INSTALLER to coordinate deployment of GCL panels, and to perform field seaming and other critical operations.

E. Geosynthetic Clay Liner – Factory manufactured hydraulic barriers typically consisting of bentonite clay or other very low permeability clay materials, supported by geotextiles and/or geomembranes, which are held together by needling, stitching, and/or chemical adhesives.

1.4 QUALITY ASSURANCE

A. Qualifications

1. MANUFACTURER shall have at least 3 years of continuous experience in the manufacturing of GCLs and shall have produced a minimum of 10,000,000 square feet of needle punched GCL with at least 8,000,000 square feet installed.

2. INSTALLER shall have at least 5 years of continuous experience in the installation of GCLs and shall have installed a minimum of 1,000,000 square feet of GCL for at least 5 completed facilities, or must provide to OWNER/ENGINEER satisfactory evidence, through similar experience in the installation of other types of geosynthetics, that the GCL will be installed in a competent, professional manner.

B. MANUFACTURER's Quality Control Plan (MQCP) - The MANUFACTURER of each component of the GCL and the GCL itself shall have an established MQCP to ensure that their product meets all of the stated minimum properties.

1.5 MANUFACTURERS' QUALITY CONTROL PLANS (MQCP)

A. Bentonite Supplier

1. The bentonite supplier shall have a MQCP that is adhered to in the bentonite manufacturing process. This plan shall include, at a minimum, the following provisions:

a. Testing or procedures to verify that the bentonite is sodium bentonite.

b. Testing or procedures to verify that the bentonite meets specified gradation requirements.

c. Testing or procedures to verify that the bentonite meets specified index test requirements.

d. Testing or procedures to verify that the bentonite has not been treated with synthetic chemicals or polymers.

B. Geotextile Supplier

1. The geotextile supplier shall have a MQCP that is adhered to in the geotextile manufacturing process. This plan shall include, at a minimum, the following provisions:

   a. Certification that the material is made of specified polymeric material.

   b. Certification that the material meets certain minimum average roll values.

C. GCL MANUFACTURER

1. MANUFACTURER shall have a MQCP that describes the procedures for accomplishing quality in the final product. At a minimum, the tests shown in Table 02075 shall be performed by MANUFACTURER (or an independent laboratory hired by MANUFACTURER). Minimum testing frequency will be conducted at the testing frequencies provided in Tables 1(a) and 1 (b) in GRI GCL 3.

2. The MQCP shall also dictate that

   a. overlap alignment lines are to be marked along the roll edges;

   b. completed rolls are to be securely wrapped in plastic;

   c. completed rolls are to be stored indoors, and provisions are to be in place to prevent rolls from being stacked too high, damaged during handling, and from becoming wet;

   d. Quality Control certificates shall be provided for each GCL roll.

1.6 SUBMITTALS

A. Submittals prior to shipment and installation

1. GCL MANUFACTURER/Production Information:

   a. Corporate background information.

   b. MQCPs for bentonite, geotextile, and GCL MANUFACTURERS.

   c. Project reference list consisting of the principal details of at least 10 projects totaling at least 10 million square feet of GCL installation.

   d. Test results conducted by the bentonite supplier and geotextile supplier to document the quality of the materials used to manufacture the GCL rolls assigned to this project.

   e. Copy of quality control certificates, signed by a responsible entity of MANUFACTURER. Each quality control certificate shall include roll identification numbers, and the results of quality control tests.

   f. MANUFACTURER'S written certification that the GCL meets the project Specifications, that the GCL has continuously been inspected and found to be needle free, and that the bentonite will not shift during transportation or installation.

Table 02075
GCL Material Tests, Test Methods, and Acceptance Specifications

	PROPERTY	TEST METHOD(1)	UNITS	VALUE
Bentonite properties	Free swell	ASTM D5890	ml/2 g min	24 (min)
	Moisture Content	ASTM D4643	%	12 (max)(3)
	Fluid loss	ASTM D5891	ml	18 (max)
Geotextile (as received)	Nonwoven (mass per unit area)	ASTM D5261	oz/yd^2	5.9 (MARV)
	Woven (mas per unit area)	ASTM D5261	oz/yd^2	3.0 (MARV)
Physical GCL properties	Bentonite mass per unit area	ASTM D5993	lb/ft(2)	0.75 (MARV)
	Woven (mas per unit area)			
	Tensile Strength(2)	ASTM D6768	lb/in	0.30 (MARV)
	Peel Strength	ASTM D6496	lb/in	0.35 (MARV)
	Hydraulic Conductivity(3)	ASTM D5887	cm/sec	5×10^{-9} (max)
	Index Flux(4)	ASTM D5887	$m^3/m^2/sec$	1×10^{-8} (max)
	Internal Shear Strength(4)	ASTM D6243	psf	500 (typical)

Notes:

(1) At 0% moisture content

(2) Tested in machine and cross direction

(3) Deaired, deionized water @ 5 psi maximum effective confining stress and 2 psi head pressure

(4) Typical peak value for specimen hydrated for 24 hours and sheared under a 200 psf normal stress

2. GCL INSTALLER Information:

   a. Corporate background information.

   b. Project reference list consisting of the principal details of at least 10 projects totaling at least 1 million square feet.

   c. List of personnel performing field operations, along with pertinent experience information.

3. Proposed panel layout diagram identifying placement of GCL panels and seams, as well as any variance or additional details that deviate from engineering Drawings. Layout shall be drawn to scale and shall be adequate for use as a construction plan and shall include information such as dimensions and details.

4. Installation schedule as part of construction progress schedule.

B. Submittals during installation:

   1. Daily records/logs prepared by INSTALLER documenting WORK performed, personnel involved, general working conditions, and any problems encountered or anticipated on the project, to be submitted at a minimum, on a weekly basis.

   2. Copy of subgrade acceptance forms by INSTALLER.

   3. Quality control documentation.

C. Submittals after completion of installation:

   1. Installation Certification certifying that the GCL was installed in accordance with the Drawings and Specifications and the CQA Plan.

   2. As built panel layout diagram identifying the placement of panels and seams. The numbering sequence shall be agreed upon between OWNER/ENGINEER and INSTALLER prior to commencing installation.

   3. Copy of warranty obtained from MANUFACTURER/INSTALLER.

1.7 DELIVERY, STORAGE, AND HANDLING

The MANUFACTURER assumes responsibility for initial loading the GCL. Shipping will be the responsibility of the party paying the freight. Unloading, on site handling and storage of the GCL are the responsibility of CONTRACTOR, INSTALLER or other designated party.

A. Delivery: Deliver all GCL rolls to the job site at least 3 weeks prior to installation to allow for conformance testing.

B. Transportation:

   1. Inspect each roll as it is unloaded to identify if the packaging has been damaged. Rolls with damaged packaging shall be marked and set aside for further inspection. Repair packaging before being placed in storage.

2. The party responsible for unloading the GCL should contact the MANUFACTURER prior to shipment to ascertain the appropriateness of the proposed unloading methods and equipment.

C. On Site Storage:

1. Storage of the GCL rolls shall be the responsibility of INSTALLER. A dedicated storage area shall be selected at the job site that is away from high traffic areas and is level, dry and well drained.

2. Protect from direct sunlight, moisture, and heat.

3. Use wooden pallets for aboveground storage of the GCL rolls.

4. Use heavy waterproof tarps for protecting all GCL rolls and accessory bentonite.

5. Rolls should be stacked at a height no higher than that at which the lifting apparatus can be safely handled (typically no higher than four). Stacks or tiers of rolls should be situated in a manner that prevents sliding or rolling by “choking” the bottom layer of rolls. Rolls shall not be stacked on uneven or discontinuous surfaces in order to prevent bending, deformation, damage to the GCL or cause difficulty inserting the core pipe.

6. The integrity and legibility of the label shall be preserved during storage.

D. On Site Handling:

1. Use appropriate handling equipment when moving rolls of GCL from one place to another. Provide instructions for moving.

2. Use a fork lift, front end loader, crane, or other similar equipment. The selected piece of equipment shall not be used in a manner that will cause damage to the subgrade, such as rutting. Verify in the presence of OWNER/ENGINEER that the selected piece of equipment does not damage the subgrade.

3. Use a spreader bar to prevent slings from damaging the ends of the rolls.

   Insert a pipe, in accordance with MANUFACTURER's recommendations, into the core of the roll for lifting.

1.8 WARRANTY

A. Provide written 5 year warranty from date of substantial completion. Warranty shall address quality of material and workmanship.

PART 2. PRODUCTS

2.1 MANUFACTURERS

A. Geosynthetic Clay Liners:

Colloid Environmental Technologies Company (CETCO)
1500 West Shure Drive
Arlington Heights, IL 60004
1-800-527-9948

GSE Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073
800-435-2008

B. Substitutions: Submit request to OWNER/ENGINEER and OWNER with complete supporting technical information under provisions of Section 01600.

2.2 MATERIALS

A. The GCL shall meet the material Specifications as shown in Table 02075 and the minimum requirements of the MQCP.

B. The GCL shall consist of a layer of pure sodium bentonite encapsulated between a woven and nonwoven and shall comply with all of the manufacturing processes and physical/chemical criteria listed in this Section.

C. The bentonite utilized in the manufacture of the GCL, as well as any accessory bentonite provided for seaming and detail WORK, shall meet MANUFACTURER's minimum requirements, as specified in the MQCP.

D. The geotextile components of the GCL shall meet the minimum requirements of the MQCP.

E. Fabrication

1. GCL panels shall be supplied to the site in factory produced rolls. MANUFACTURER shall supply GCL panels to the job site in standard factory roll dimensions.

2. Each roll of GCL supplied to the site shall be labeled with the following information:

a. Name of MANUFACTURER

b. Product type and identification number (if any)

c. Lot (Batch) number

d. Date of manufacture

e. Roll number and dimensions

2.3 ACCEPTANCE TESTING REQUIREMENTS

The GCL rolls shall be tested and evaluated prior to acceptance. In general, testing of the GCL shall be conducted by MANUFACTURER. OWNER/ENGINEER or a designated, independent geosynthetics laboratory may perform additional testing (i.e., conformance testing), as required by these detailed Specifications or as required in the judgment of OWNER/ENGINEER to verify that the GCL meets the Specifications. Testing requirements are detailed in the following subsections:

A. MANUFACTURER's Quality Control Testing

MANUFACTURER is required to submit a Manufacturing Quality Control Plan, as discussed in Section 1.5. Test results shall be submitted to OWNER/ENGINEER prior to shipping the rolls. OWNER/ENGINEER shall evaluate the results as discussed in Section 2.3(D).

B. Conformance Test Samples

Samples shall be collected by CONTRACTOR under the direction of OWNER/ENGINEER at a rate of one sample per 100,000 square feet of GCL delivered to the site. Hydraulic conductivity test samples shall be collected at a rate of one sample per 750,000 square feet of GCL delivered to the site. At least one sample shall also be obtained from each GCL production batch in each shipment. Samples shall be at least 3 feet long by the full width of the roll and shall not include the first 3 feet of any roll.

Table 02075 lists the conformance tests and the test methods that may be performed on GCL roll samples. The Specifications and methods used in evaluating the conformance test results are discussed in Section 2.3(D).

C. Role of Testing Laboratories

CONTRACTOR shall be responsible for acquiring the samples described in Section 2.3(B) and for providing the samples to OWNER/ENGINEER. OWNER/ENGINEER shall perform the required testing through the use of a recognized testing laboratory. OWNER shall bear the cost for this conformance testing. Any costs for retesting of samples required due to test results not meeting the acceptance Specification criteria shall be paid by CONTRACTOR.

D. Procedures for Determining GCL Roll Test Failures

Table 02075 lists the acceptance Specifications. For any referenced test method that requires the testing of multiple specimens, the criteria in Table 02075 shall be met based on the average results of the multiple specimen tests. The following procedure shall be used for interpreting results:

1. If the test result value meets the stated Specification, then the roll, the batch, and, if applicable, the entire shipment shall be considered to have passed this particular acceptance test.

2. If the result does not meet the Specification, then the roll and the batch shall be retested at CONTRACTOR's expense using specimens either from the original roll sample or from another sample collected by OWNER/ENGINEER. For retesting, two additional tests shall be performed for the failed test procedure. (Each additional test shall consist of multiple specimen tests if multiple specimens are called for in the failed test procedure.) If both of the retests are

acceptable, then the roll and batch shall be considered to have passed this particular acceptance test; if either of the two additional tests fail, then the roll and batch shall be considered unsuitable without further recourse. OWNER/ENGINEER may obtain samples from other rolls in the batch. On the basis of testing these samples, OWNER/ENGINEER may choose to accept a portion of the batch while rejecting the remainder.

If retesting does not result in passing test results as defined in the preceding paragraph, or if there is any other nonconformity with the material Specifications, then CONTRACTOR shall withdraw the rolls from use in the project at CONTRACTOR's sole risk, cost, and expense. Once withdrawn, the same rolls shall not be resubmitted for use. Cost and expense for removing this GCL from the site and replacing it with acceptable GCL shall be the sole risk and responsibility of CONTRACTOR.

E. Steep Slopes

For projects where GCL is to be placed on steep slopes direct shear testing (ASTM D6243) is required.

CONTRACTOR shall identify the proposed GCL MANUFACTURER a minimum of 4 weeks prior to the start of GCL installation to allow OWNER/ENGINEER to conduct direct shear testing on selected GCL material.

GCL samples for direct shear testing will be collected at the MANUFACTURER's plant as directed by OWNER/ENGINEER. OWNER/ENGINEER shall perform the required testing through the use of a recognized Geosynthetic testing laboratory.

F. Chemical Compatibility

In linear applications, it may be necessary to determine the ability of the clay portion of a geosynthetic clay liner to resist change due to exposure to liquids, ASTM D 6141 should be followed.

G. Direct Shear Testing and Stability Analysis

Identify the proposed GCL MANUFACTURER a minimum of 4 weeks prior to the start of GCL installation to allow OWNER/ENGINEER to conduct direct shear testing on the selected GCL material.

Collect GCL samples for direct shear testing at MANUFACTURER's plant as directed by ENGINEER. Collect samples of on site soil/material for direct shear testing as directed by OWNER/ENGINEER will perform the required testing through the use of a recognized geosynthetic testing laboratory. OWNER will bear the cost for direct shear testing.

ENGINEER will perform slope stability calculations using the direct shear test results on materials proposed for construction. ENGINEER will determine if the proposed GCL will be acceptable or unacceptable based on the evaluation of the stability analysis.

PART 3. EXECUTION

3.1 SUBGRADE PREPARATION

A. Prepare the foundation and complete the subgrade surface that will support the GCL. Excavate and backfill anchor trenches as shown on the Drawings.

B. Prior to the deployment of the GCL, visually inspect the receiving subgrade surface to confirm that it is suitable for GCL deployment. The inspection shall verify that the subgrade is firm, smooth, and uniform; and that it is free of excessive moisture, abrupt changes in grade, cracks larger than one quarter inch in width, large (greater than 0.5 inch) stones and clay clods, excessive rutting (greater than 1 inch), protrusions extending more than 0.5 inch, vegetation, and all other deleterious debris. If the subgrade surface is found to be unsuitable for the GCL deployment, refinish the surface. Rolling the subgrade with a smooth drum compactor is recommended. For each day of deployment, provide OWNER/ENGINEER with written acceptance of the subgrade surface over which the panels will be deployed.

C. Deploy GCL over the subgrade surface as soon as practicable after the subgrade has been completed and deemed suitable for deployment.

3.2 INSTALLATION - PANEL DEPLOYMENT

A. Supply a panel layout drawing for approval by OWNER/ENGINEER prior to construction. Install the GCL according to the layout drawing as approved. Notify OWNER/ENGINEER of any revisions or modifications of the approved plan prior to installing the GCL in the area of the revision. Immediately upon placement, document the panel placement locations and identify each panel by roll number.

B. Do not place GCL during precipitation, in the presence of excessive moisture, in any area of ponded water, or during excessive winds. OWNER/ENGINEER may order the suspension of WORK during such conditions. Failure to do so shall not be construed to relieve INSTALLER of the responsibility to meet this Specification and properly perform the WORK, or the responsibility for personnel safety.

C. Place GCL over prepared surface to minimize material handling. Place proper side of GCL upward per MANUFACTURER's recommendation or as specified by OWNER/ENGINEER per direct shear testing.

D. Maintain construction progress documentation in the daily installation records, and provide such documentation to OWNER/ENGINEER. The documentation shall verify that the above conditions are fulfilled. Inform OWNER/ENGINEER if any of the above conditions are not met.

E. Use sandbags to temporarily secure the GCL panels prior to placement of the overlying material. Cover material shall be placed over the GCL on the same day the GCL was deployed. Only install as much GCL that can be covered at the end of the day. No GCL shall be left exposed overnight. If the GCL is hydrated when no confining stress is present, it may be necessary to remove and replace the hydrated material.

F. Verify the following:

1. The equipment used does not damage the GCL by handling, excessive heat, leakage of hydrocarbons, or by other means.

2. The prepared surface underlying the GCL has not deteriorated since previous acceptance, and that it is still acceptable at the time of GCL placement.

3. Personnel working on the GCL do not smoke, wear damaging clothing, or engage in other activities that could damage the GCL.

4. The method used to unroll the GCL does not cause damage to the GCL, and/or the subgrade.

5. The method used to place the rolls minimizes wrinkles (especially wrinkles between adjacent panels).

   Immediately notify OWNER/ENGINEER if any of these conditions are being, or have been, violated, and take immediate steps to mitigate any damage.

6. Examine each roll for damage after placement and prior to seaming. Inform OWNER/ENGINEER as to which rolls, or portions of rolls, should be rejected or repaired. Mark and remove from the site damaged rolls or portions of rolls that have been rejected, at no risk, cost, or expense to OWNER. Notify OWNER/ENGINEER when such removal occurs.

G. GCL rolls should not be released on the slope and allowed to unroll freely by gravity.

H. Do not deploy when GCL is frozen.

I. If the GCL is prematurely hydrated than 30% moisture, INSTALLER shall notify the QA/QC technician and project engineer for a site specific determination as to whether the material is acceptable or if alternative measures must be taken to ensure the quality of the design.

3.3 INSTALLATION - PANEL SEAMING

A. Provide 6 inch to 9 inch overlap at longitudinal seam locations, and a minimum 24 inch overlap at the panel end seams. Use the line(s) printed on the panels to assist in obtaining this overlap. Adjust the edges of the GCL panels to smooth out any wrinkles, creases, or "fishmouths" to maximize contact with the underlying panel. Overlap seams such that the direction of flow is from the top panel to the underlying panel, to form a shingle effect.

B. After the overlying panel is placed, pull back its edge to expose the overlap zone. Remove any soil or debris present in the overlap zone or entrapped in the GCL or its individual components. Place a layer of granular bentonite in the overlap zone as per MANUFACTURER's recommendations (minimum application rate of one quarter pound per linear foot).

C. Place granular bentonite or MASTIC grout around penetrations and structures as shown on the Drawings.

3.4 DEFECTS AND REPAIRS

A. Examine and document all seam and non seam areas of the GCL for identification of defects, holes, and any signs of contamination by any foreign matter. The surface of the GCL shall be clean at the time of examination.

B. Do not proceed with WORK with any materials that will cover locations that have been repaired or replaced until these locations are examined by OWNER/ENGINEER.

C. Identify and repair any damage in the form of cuts or tears in the GCL by cutting a patch from unused GCL and placing it over the damaged area. Clear all dirt and debris from the damaged area. Extend the patch a minimum of 12 inches in all directions beyond the damaged area. Place a layer of granular bentonite in the overlap zone in accordance with MANUFACTURER's recommendations. It may be necessary to use an epoxy based adhesive or alternative method of securing the patch as approved by OWNER/ENGINEER to keep the patch in position during backfill operations.

D. Include documentation of defects and repairs in daily records/logs.

3.5 MATERIAL IN CONTACT WITH GEOSYNTHETIC CLAY LINER / COVER PLACEMENT

A. Geosynthetics - When covering the GCL with a geomembrane or other geosynthetic, take precautions to prevent damage to the GCL by restricting heavy equipment traffic. If a textured geomembrane is to be placed over the GCL, place a slip sheet (such as 20 mil smooth HDPE) over the GCL to allow the textured geomembrane to slide into its proper position. Remove slip sheet after geomembrane is in place.

B. Soil - Requirements for placement of soil are described in Section 02230. Apply the following general criteria for WORK on GCLs:

1. Do not drive equipment used for placing the soil directly on the GCL.

2. A minimum thickness of 1 foot of soil is specified between a light dozer (i.e., maximum contact pressure of 8 lb/sq. inch) and the GCL.

3. A minimum thickness of 2 feet of soil is specified between rubber tired vehicles and the GCL and frequently trafficked areas or roadways.

4. Care should be taken to avoid damaging the GCL by making sharp turns or pivots with equipment as well as sudden starts or stops.

C. Compaction – To prevent damage to the GCL, the initial lift(s) of soil cover shall not be compacted in excess of 85 percent Modified Proctor density or as specified by OWNER/ENGINEER.

D. When cover GCL on slope areas, cover soil should be pushed up slope to minimize tension on the GCL. Soil cover should be placed in a manner that prevents the soil from entering GCL overlap zones.

E. Waterproof Sheet - Protect the leading edge of the GCL panels left uncovered at the end of the working day with a waterproof sheet that is adequately secured with sandbags or other ballast.

END OF SECTION

SECTION 02076
GEOTEXTILES

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Furnish all labor, materials, tools, supervision, transportation, and installation equipment necessary for the installation of geotextiles, as specified herein, and as shown on the Drawings, and in accordance with the Construction Quality Assurance (CQA) Plan.

1.2 REFERENCES

A. ASTM D3786 – Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabric - Diaphragm Bursting Strength Tester Method.

B. ASTM D4491 – Standard Test Method for Water Permeability of Geotextiles by Permittivity.

C. ASTM D4533 – Standard Test Method for Trapezoid Tearing Strength of Geotextiles.

D. ASTM D4595 – Standard Test Method for Tensile Properties of Geotextiles by the Wide Width Strip Method.

E. ASTM D4632 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

F. ASTM D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile.

G. ASTM D4833 – Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.

H. ASTM D5261 – Standard Test Method for Measuring Mass Per Unit Area of Geotextiles.

1.3 QUALITY ASSURANCE

A. Responsibilities and Qualifications:

1. Provide and accept and retain full responsibility for all services of a Geotextile MANUFACTURER and INSTALLER who meet the following qualifications.

- MANUFACTURER: Shall be responsible for the production and delivery of geotextile rolls and shall be a well established firm with more than 2 years' experience in the manufacture of geotextiles. Shall submit a statement listing certified minimum average roll values of the proposed geotextile and the tests used to determine those properties.

- INSTALLER: Shall be responsible for field handling, storing, deploying, seaming or connecting, anchoring, and other site aspects of the geotextiles. Shall be trained and qualified to install geotextiles.

B. Quality Assurance Program: Agree to participate in, and conform to, all items and requirements of the quality assurance program as outlined in this Specification and in the Construction Quality Assurance (CQA) Plan.

1.4 SUBMITTALS

A. Submit the following information no later than 15 days prior to delivery of first shipment.

1. A copy of the quality control certificate for each roll of nonwoven geotextile proposed for delivery to the site. The quality control certificate shall include lot, batch, or roll numbers and identification.

2. The results of the quality control tests. The results shall include sampling frequencies and test methods used.

B. MANUFACTURER's Certification

On the basis of the results of the tests performed by either the MANUFACTURER’s laboratory or another outside laboratory with which MANUFACTURER has contracted at its sole cost and expense, MANUFACTURER shall provide a written certification that the supplied geotextile meets the requirements outlined in this Specification and that the nonwoven geotextile supplied to the site is needle free.

1.5 DELIVERY, STORAGE AND HANDLING

A. Unload and handle geotextiles so as to cause no damage.

B. Protect geotextiles from sunlight, moisture, mud, dirt, and dust, excessive heat or cold, puncture, or other damaging conditions.

C. Handle with care so as not to rupture or puncture geotextiles.

PART 2. PRODUCTS

2.1 MATERIALS

A. 12 oz. Geotextile Cushion (Geotextile Cushion), and geotextile filter used to envelope the Select Aggregate Fill in the Groundwater Gradient Control System trench shall consist of nonwoven polyester or polypropylene. Nonwoven fabric may be needle punched, heat bonded, resin bonded, or combinations thereof.

B. Unless otherwise noted on the Drawings, furnish materials with Minimum Average Roll Values (MARV) that meet or exceed the criteria specified in Tables 02076-1 and 02076-2. Provide test results for these procedures, as well as certification that the materials' properties meet or exceed the specified values.

C. Minimum Average Role Value (MARV) shall be based on MANUFACTURER's data and shall be calculated as the mean value of the property of interest plus or minus two standard deviations, as appropriate. Where material proprieties vary among the machine and cross machine directions, the MARV shall apply to the direction providing the lowest value when a minimum value is specified or the highest value when a maximum value is specified.

D. Woven Geotextile used in the construction of the all weather Access Road will be Mirafi 500x (or equal) woven geotextile.

Table 02076-1
Geotextile (Filter)

PROPERTIES AND REQUIREMENTS	QUALIFIER	UNITS	SPECIFIED VALUES[1]	TEST METHOD
Polymer composition	Minimum	Percent	95 percent polypropylene or polyester by weight	
Mass per unit area	Minimum	Ounce/sq. yd.	6	ASTM D5261
Permittivity	Minimum	1/s	1.4	ASTM D4491
Apparent opening size (AOS)	Maximum	Sieve	70	ASTM D4751
Grab strength[2]	Minimum	lb	160	ASTM D4632
Grab elongation[2]	Minimum	Percent	50	ASTM D4632
Tear strength[2]	Minimum	lb	60	ASTM D4533
Puncture strength	Minimum	lb	85	ASTM D4833
Water flow rate	Minimum	gpm/ft^2	110	ASTM D4491

Notes:

(1) All values represent minimum average roll values (i.e., all rolls in a lot shall meet or exceed the values in this table).

(2) Minimum value measured in machine and cross machine direction.

Table 02076-2
12 oz. Geotextile Cushion (Geotextile Cushion)

PROPERTIES AND REQUIREMENTS	QUALIFIER	UNITS	SPECIFIED VALUES[1]	TEST METHOD
Type	--	--	Nonwoven	--
Polymer composition	Minimum	Percent	95 percent polypropylene or polyester by weight	
Mass per unit area	Minimum	oz/yd^2	12	ASTM D5261
Grab strength[2]	Minimum	lb	300	ASTM D4632
Tear strength[2]	Minimum	lb	115	ASTM D4533
Puncture strength	Minimum	lb	175	ASTM D4833
Grab elongation	Minimum	Percent	50	ASTM D4632

Notes:

(1) All values represent minimum average roll values (i.e., all rolls in a lot shall meet or exceed the values in this table).

(2) Minimum value measured in machine and cross machine direction.

2.2 ACCEPTANCE TESTING REQUIREMENTS

A. General Requirements: Geotextile rolls will be tested and evaluated prior to acceptance. In general, testing of the geotextile will be conducted by MANUFACTURER. OWNER/ENGINEER or a designated, independent geosynthetics laboratory may perform additional testing (i.e., conformance testing) as determined necessary by OWNER/ENGINEER to verify that the geotextile meets the Specifications.

B. Manufacturing Quality Control

1. Sampling and testing of the geotextile material will be conducted by MANUFACTURER to demonstrate that the material conforms to the requirements in Part 2.1 of this Section. Submit test results in accordance with the submittal requirement of Part 1.4 of this Section and the CQA Plan.

2. Sampling shall, in general, be performed on sacrificial portions of the material, such that repair of the material is not required.

3. Samples that do not meet the specified properties shall result in rejection of the applicable rolls.

4. At MANUFACTURER's discretion and expense, additional testing of individual rolls may be performed to more closely identify the noncomplying rolls and/or to qualify individual rolls.

PART 3. EXECUTION

3.1 PREPARATION

A. Grade the area smooth; and remove all stones, roots, sticks, or other foreign material that would interfere with the geotextile being completely in contact with the soil prior to placing the geotextile.

3.2 HANDLING AND PLACEMENT

A. Handle all geotextiles in such a manner as to ensure they are not damaged in any way.

B. Take any necessary precautions to prevent damage to underlying layers during placement of the geotextile. After deployment of the geotextile, the geotextile shall not be left exposed for a period in excess of 30 days unless a longer exposure period is approved by OWNER/ENGINEER, based on a formal demonstration by MANUFACTURER that the geotextile is stabilized against U.V. degradation for the proposed period of exposure.

C. Take care not to entrap stones, bones, trash or debris between the Geotextile Cushion and the geomembrane during Geotextile Cushion placement. Remove all debris from the geomembrane surface prior to placing the Geotextile Cushion over the geomembrane.

D. Secure all geotextiles with sandbags, or equivalent. Such sandbags shall be installed during placement and shall remain until overlying protective soil cover or other components of the liner system are in place. Sandbag shall not be left in place without prior approval from OWNER/ENGINEER except for those placed over sheets of plywood along the Delineation Berms to protect the geosynthetics as shown on the drawings.

E. Examine the entire geotextile surface after installation to ensure that no potentially harmful foreign objects are present. Remove any such foreign objects, and replace any damaged geotextile in accordance with Subsection 3.4.

F. Place all soil and geosynthetic materials on top of a geotextile as shown on the Drawings, in such a manner as to ensure that

1. the geotextile and underlying materials are not damaged;

2. minimum slippage occurs between the geotextile and underlying layers; and

3. excess stresses are not produced in the geotextile.

3.3 SEAMS AND OVERLAPS

A. Continuously sew or fusion weld 12 oz. Geotextile Cushion (i.e., spot sewing or fusion welding is not allowed) install above the geomembrane liner. Seaming method must be approved by OWNER/ENGINEER. Overlap geotextiles a minimum of 6 inches prior to seaming or 4 inches prior to fusion welding. No horizontal seams shall be allowed on slopes steeper than 5 horizontal to 1 vertical (i.e., seams shall be along, not across, the slopes) unless preapproved by OWNER/ENGINEER.

B. For all sewing, use polymeric thread, with chemical resistance properties equal to or exceeding those of the geotextile.

C. Geotextile and Geotextile Cushion used in the Groundwater Gradient Control System and under riprap can be seamed by sewing, fusion welding, or overlapping a minimum of 1 foot.

3.4 REPAIR

A. Repair any holes or tears in the geotextile as follows:

1. On slopes steeper than 5 horizontal to 1 vertical, double seam a patch made from the same geotextile into place (with each seam 0.5 inch apart and no closer than 2 inches from any edge). Should any tear exceed 10 percent of the width of the roll, remove that roll from the slope and replace it with new material.

2. On slopes flatter than or equal to 5 horizontal to one vertical, spot seam a patch made from the same geotextile in place with a minimum of a 1 foot overlap in all directions.

B. Take care to remove any soil or other material that may have penetrated the torn geotextiles.

END OF SECTION

SECTION 02078
DRAINAGE GEOCOMPOSITE

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Furnish all labor, materials tools, supervision, transportation, and installation equipment necessary for the installation of geocomposite, as specified herein, and as shown on the Drawings, and in accordance with the Construction Quality Assurance [CQA] Plan. OWNER and CONTRACTOR furnished material (refer to Section 01270 Schedule of Value and Payments)

1.2 Reference Standards

A. ASTM D413 – Standard Test Methods for Rubber Property - Adhesion to Flexible Substate.

B. ASTM D751 – Method of Testing Coated Fabrics.

C. ASTM D792 – Test Method for Density and Specific Gravity (Relative Density) of Plastics by Displacement.

D. ASTM D1238 – Standard Test Method for Flow Rates of Thermoplastic by Extrusion Plastometer.

E. ASTM D1248 – Standard Specifications for Polyethylene Plastic Molding and Extrusion Materials.

F. ASTM 1505 – Test Method for Density of Plastics by the Density Gradient Technique.

G. ASTM D1603 – Test Method for Carbon Black in Olefin Plastics.

H. ASTM D1777 – Standard Method for Thickness of Textile Materials.

I. ASTM D3776 – Test Method for Mass for Unit Area (Weight) of Woven Fabric.

J. ASTM D3786 – Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics - Diaphragm Bursting Strength Tester Method.

K. ASTM D4355 – Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).

L. ASTM D4491 – Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

M. ASTM D4595 – Standard Test Method for Tensile Properties of Geotextiles by the Wide Width Strip.

N. ASTM D4533 – Standard Test Method for Trapezoidal Tearing Strength of Geotextiles.

O. ASTM D4632 – Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.

P. ASTM 4716 – Standard Test Method for Determining the (In place) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

Q. ASTM D4751 – Standard Test Method for Determining Apparent Opening Size of a Geotextile.

R. ASTM D4833 – Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembrane, and Related Products.

S. ASTM D4873 – Standard Guide for Identification, Storage, and Handling of Geotextiles.

T. ASTM D5199 – Standard Test Method for Measuring Nominal Thickness for Geotextiles and Geomembranes.

U. ASTM F904 – Standard Test Method for Comparison of Bond Strength of Ply Adhesion of Similar Laminates Made From Flexible Materials.

1.3 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. CONTRACTOR: Provide, accept, and retain full responsibility for all services of a Geonet MANUFACTURER and INSTALLER who meet the following qualifications:

- MANUFACTURER: Provide references to ENGINEER indicating at least 3 years of continuous experience in the manufacturing of geocomposite and have produced a minimum of 6,000,000 square feet of geocomposite with at least 5,000,000 square feet installed. Submit a MANUFACTURER Quality control plan (MQCP) as described in Subsection 1.4. Submit a statement to ENGINEER indicating production capacity available and projected dates for delivery.

- INSTALLER: Provide references to ENGINEER indicating at least 5 years of continuous experience in the installation of geocomposite and have installed a minimum of 1,000,000 square feet of geocomposite for at least 10 completed facilities, or must provide to ENGINEER satisfactory evidence, through similar experience in the installation of other types of geosynthetics, that the geocomposite will be installed in a competent, professional manner.

- Be responsible for field handling, storing, deploying, seaming, and joining, temporary restraining (against wind), anchoring systems, and other site aspects or the geocomposite drainage layer.

- If four or less installation field crews are on site, at least one crew member shall be certified by the National Institute for Certification in Engineering Technologies (NICET) for Level [III] geosynthetics. If five or more installation field crews are on site, then two crew members must be NICET certified for Level I, in addition to the Level [III] certification.

B. Quality Assurance Program: Agree to participate in, and conform with, all items and requirements of the quality assurance program as outlined in this Specification (and in the Construction Quality Assurance CQA Plan.) Installation of the geocomposite shall be monitored and all activities outlined in the CQA plan shall be accounted for in the installation schedule.

C. Quality Assurance:

1. Geocomposite shall be free of defects, rips, holes, and flaws.

2. It shall be manufactured in widths and lengths that will permit installation of geocomposite with as few laps as possible.

3. During shipment and storage, geocomposite shall be wrapped in relatively impermeable and opaque protective covers.

4. Geocomposite shall be marked with MANUFACTURER's name, product identification, lot number, roll number, and roll dimensions.

5. If any special handling is required, it shall be so marked on the geocomposite itself.

1.4 MANUFACTURERS' QUALITY CONTROL PLANS (MQCP)

A. Geonet MANUFACTURER - The Geonet MANUFACTURER shall have a MQCP that describe the procedures for accomplishing quality in the final product. MANUFACTURER shall sample and test the geonet and at a minimum, the test will demonstrate that the materials conform to the requirements shown in Table 02078 (test shall be performed by MANUFACTURER or an independent laboratory hired by MANUFACTURER).

B. Geotextile Supplier - The geotextile supplier shall have a MQCP that describes the products for accomplishing quality in the final product. The MANUFACTURER shall sample and test the geotextile and at a minimum, the test will demonstrate that the materials conform to the requirements shown in Table 02078 (test shall be performed by MANUFACTURER or independent laboratory hired by MANUFACTURER). This plan shall include the following provisions:

1. Certification that the material is made of specified polymeric material

2. Certification that the material meets certain minimum average roll values

C. Geocomposite MANUFACTURER

1. Have a MQCP that describes the procedures for accomplishing quality in the final product. At a minimum, the tests shown in Table 02078 shall be performed by MANUFACTURER (or an independent laboratory hired by MANUFACTURER).

2. The geocomposite shall be manufactured with quality control procedures that meet or exceed generally accepted industry standards.

3. The MQCP shall also dictate that

a. completed rolls are to be securely wrapped in plastic;

b. completed rolls are to be stored indoors, and provisions are to be in place to prevent rolls from being stacked too high, damaged during handling, and from becoming wet; and

c. Quality Control certificates shall be provided for each geocomposite roll.

Table 02078
Geocomposite Test and Acceptance Specifications

PROPERTY	UNITS	VALUE	TEST	CRITERION
Geotextile Properties				
Mass Per Unit Area	oz/yd^2	6	ASTM D5261	Minimum
Apparent opening size	US sieve	70	ASTM D4751	Maximum
Grab strength	lb	170	ASTM D4632	Minimum
Grab strength elongation	percent	50	ASTM D4632	Minimum
Trapezoidal tear	lb	65	ASTM D4533	Minimum
Puncture strength	lb	90	ASTM D4833	Minimum
Permittivity	sec^1	1.5	ASTM D4491	Minimum
Geonet Properties				
Thickness	mils	200	ASTM D5199	Minimum
Density	g/cc	0.94	ASTM D1505/792 Method B	Minimum
Metal flow index	g/10 min	1.0	ASTM D1238	Range
Carbon black content	percent	2-3	ASTM D1603/D4218	Range
Wide width tensile strength	lbs/in	40	ASTM D5035/D7179	Minimum
Transmissivity	m^2/sec	2x10^{-3}	ASTM D4716	Minimum
Geocomposite Properties				
Transmissivity	m^2/sec	2x10^{-4}	ASTM D4716	Minimum
Ply Adhesion	lb/in	1.0	ASTM D7005	Minimum

NOTES:

The geocomposite shall be manufactured by heat bonding the geotextile to the geonet on both sides. No burn through geotextiles nor glue or adhesive shall be permitted.

The transmissivity (ASTM D4716) of the geocomposite shall measure using a gradient of 0.1, and tested between two steel plates under a load of 2,000 psf for 15 minutes.

1.5 SUBMITTALS

A. Submittals to ENGINEER prior to shipment and installation

1. Geocomposite MANUFACTURER/Production Information:

   a. Corporate background information.

   b. MQCPs for geotextile/geonet MANUFACTURER.

   c. Project reference list consisting of the principal details of at least 10 projects totaling at least 5 million square feet of geocomposite installation.

   d. Test results conducted by the geotextile/geonet supplier to document the quality of the materials used to manufacture the geocomposite rolls assigned to this project.

   e. Certification that no reclaimed polymer is added to the resin during MANUFACTURER of the geocomposite drainage layers to be used in this project.

   f. Copy of quality control certificates for suppliers of the geotextile and geonet material used, and a quality control certificate issued by the resin supplier for the geonet including production dates of the resin, signed by a responsible entity of these MANUFACTURER. Each quality control certificate shall include product identification numbers, lot number, roll number, and the results of quality control tests, including descriptions of the test methods used.

   g. Geocomposite MANUFACTURER's written certification that the geocomposite meets the project Specifications, that the geocomposite has continuously been inspected and found to be needle free. A quality control certification for each shift's production, signed by responsible parties employed by the MANUFACTURER, and notarized. The certificate shall include roll numbers, sampling procedures; and results of quality control test, including method of test used.

2. GEOCOMPOSITE INSTALLER Information:

   a. Corporate background information

   b. Project reference list consisting of the principal details of at least 10 projects totaling at least 1 million square feet

   c. List of personnel performing field operations, along with pertinent experience information and NICET certificates

   d. Submit written documentation to OWNER that the geocomposite has been installed according to the design Drawings and Specifications and that in place materials meet generally accepted standards of practice.

B. Submittals during installation:

1. Daily records/logs prepared by CONTRACTOR documenting work performed, personnel involved, general working conditions, and any problems encountered or anticipated on the project, to be submitted at a minimum, on a weekly basis

2. Quality control documentation

C. Submittals after completion of installation:

1. Installation Certification certifying that the geocomposite was installed in accordance with the Drawings and Specifications and the CQA Plan.

2. Copy of warranty obtained from MANUFACTURER/INSTALLER.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Transportation of geocomposite is the responsibility of MANUFACTURER, who shall be liable for all damages to geocomposite/geonet prior to and during transportation to site.

B. Transportation: Unload and handle geocomposite rolls by appropriate means as recommended by MANUFACTURER so as to cause no damage. Inspect each roll as it is unloaded to identify if the packaging has been damaged. Rolls with damaged packaging shall be marked and set aside for further inspection. Repair packaging before being placed in storage.

C. On Site Storage: Provide storage for the geocomposite at the site as recommended by MANUFACTURER. The geocomposite at a minimum shall be stored off the ground. Protect from direct sunlight, moisture, mud, dirt, debris, and excessive heat or cold.

D. On Site Handling:

1. Use appropriate handling equipment when moving rolls of geocomposite from one place to another. Provide instructions for moving.

2. Handling, storage, and care of geocomposite on site is the responsibility of INSTALLER prior to, during, and after geocomposite installation. OWNER shall provide adequate storage space on site. CONTRACTOR shall be liable for all damages to geocomposite incurred prior to final acceptance of installation by OWNER, except for those due to negligent actions on part of OWNER.

1.7 WARRANTY

A. Provide written 2 year warranty from date of substantial completion. Warranty shall address quality of material and workmanship.

PART 2. PRODUCTS

2.1 MANUFACTURERS

A. Drainage Composite:

Tenax Corporation
4800 East Monument Street
Baltimore, MD 21205
800-874-7437

Fluid Systems
1245 Corporate Blvd., Suite 300
Aurora, IL 60504
800-346-9107

National Seal Company
1245 Corporate Blvd., Suite 300
Aurora, IL 60504
800-323-3820

GSE
19103 Gundle Road
Houston, TX 77073
800-435-2008

B. Substitutions: Submit request to ENGINEER and OWNER with complete supporting technical information under provisions of Section 01600.

2.2 MATERIALS

A. The geocomposite shall meet the material Specifications as shown in Table 02078 and the minimum requirements of the MQCP.

B. Geotextile: The geotextile portion of the geocomposite is to be comprised of polyester or polypropylene. Provide a nonwoven needle punched geotextile for the geocomposite having the minimum average roll values given in Table 02078.

C. Geonet: Provide products for the geonet portion of the geocomposite to be comprised of HDPE. The geonet shall be manufactured by extruding two sets of stands to form a three dimensional structure to provide planer flow and shall meet the minimum average roll values given in Table 02078.

D. Fabrication:

1. Geocomposite panels shall be supplied to the site in factory produced rolls. MANUFACTURER shall supply geocomposite panels to the job site in standard factory roll dimensions.

2. Each roll of geocomposite supplied to the site shall be labeled with the following information:

a. Name of MANUFACTURER
b. Product type and identification number (if any)
c. Lot (Batch) number

d. Date of manufacture
e. Roll number and dimensions

3. The geocomposite shall retain their structure during handling, placement, and long term service.

4. Be capable of withstanding outdoor exposure for a minimum of 60 days with no measurable deterioration.

5. Be chemically inert when immersed in the leachate from a typical sanitary landfill.

2.3 Acceptance Testing Requirements

A. The geocomposite rolls shall be tested and evaluated prior to acceptance. In general, testing of the geocomposite shall be conducted by MANUFACTURER and a manufacturing quality control plan (MQCP), as discussed in Section 1.4, with test results shall be submitted to ENGINEER prior to shipping rolls. ENGINEER or a designated, independent geosynthetics laboratory may perform additional testing (i.e., conformance testing), as required by these detailed Specifications (see Table 02078) or as required in the judgment of ENGINEER to document that the geocomposite meets the Specifications.

B. Conformance Testing:

1. Any geocomposite sample that does not comply with this Specification shall result in rejection of the roll from which the sample was obtained. Replace any rejected rolls at no additional cost to OWNER.

2. If a geocomposite sample fails to meet the quality control requirements of this Specification, CONTRACTOR shall require that the geocomposite MANUFACTURER sample and test each roll manufactured in the same lot or batch, or at the same time, as the failing roll. Sampling and testing of rolls shall continue until a pattern of acceptable test results is established.

3. Additional sample testing may be performed, at the geocomposite MANUFACTURER's discretion and expense, to more closely identify any noncomplying rolls and/or to quality individual rolls.

4. Sampling shall, in general, be performed on sacrificial portions of the material such that repair of the materials is not required. The geocomposite MANUFACTURER shall sample and test the geocomposite to demonstrate that its properties conform to the values specified in Table 02078.

5. The geocomposite MANUFACTURER shall comply with the certification and submittal requirements of the CQA Plan.

C. Direct Shear Testing and Stability Analysis

Identify the proposed geocomposite MANUFACTURER a minimum of 4 weeks prior to the start of geocomposite installation to allow OWNER/ENGINEER to conduct direct shear testing on the selected geocomposite material.

Collect geocomposite samples for direct shear testing at MANUFACTURER’s plant as directed by ENGINEER. Collect samples of on site soil/material for direct shear testing as directed by OWNER/ENGINEER will perform the required testing through the use of a recognized geosynthetic testing laboratory. OWNER will bear the cost for direct shear testing.

ENGINEER will perform slope stability calculations using the direct shear test results on materials proposed for construction. ENGINEER will determine if the proposed geomembrane will be acceptable or unacceptable based on the evaluation of the stability analysis.

PART 3. EXECUTION

3.1 Subgrade Preparation, geocomposite Placement and Handling

A. Prepare the foundation and complete the subgrade surface that will support the geocomposite. Excavate and backfill anchor trenches as shown on the Drawings.

B. On slopes, anchor geocomposite at the top as shown on the drawings and then roll down the slope in such a manner as to continually keep the geonet in tension.

C. Prior to the deployment of the geocomposite, visually inspect the receiving subgrade surface to confirm that it is suitable for geocomposite deployment. The inspection shall document that the subgrade is firm, smooth, and uniform; and that it is free of stones and clay clods, vegetation, and all other deleterious debris. If the subgrade surface is found to be unsuitable for the geocomposite deployment, refinish the surface. For each day of deployment, provide ENGINEER with written acceptance of the subgrade surface over which the panels will be deployed.

D. Take any necessary precautions to prevent damage to underlying layers during placement of the geonet.

E. Handle all geocomposite in such a manner as to ensure it is not damaged in any way.

F. If necessary, the geocomposite shall be positioned by hand after being unrolled to minimize wrinkles.

G. In the presence of wind, geocomposite shall be weighted with sandbags or equivalent. Such sandbags shall be installed during placement and shall remain until replaced with cover material.

H. During placement, care shall be taken not to entrap any stones, excessive dust, or moisture that could cause clogging of the drainage system and/or stones that could damage the geomembrane (if used with geocomposite).

I. Geocomposite shall be cut using MANUFACTURER's recommended procedures. If in place, special care must be taken to protect any geomembrane (if used with geocomposite) from damage which could be caused by cutting of geocomposites.

J. Examination of geocomposite over entire surface, after installation, shall be conducted to ensure that no potentially harmful foreign objectives, such as needles, are present. Any foreign objectives encountered shall be removed by CONTRACTOR, or geocomposite shall be replaced.

K. Geocomposite shall not be welded or tack welded to the underlying geomembrane liner.

L. The geocomposite placed on the sideslopes shall be placed with no horizontal seams along the slope. The geocomposite panels shall extend a minimum of 5 feet beyond the toe of slope as shown on the Drawings.

M. The geonet portion of the geocomposite shall be overlapped approximately 4 inches. The geonet shall be joined by colored plastic ties every 5 feet along the roll length and at panel ends.

N. Place the material located on top of geocomposite in such a manner as to ensure:

1. No damage of geocomposite

2. Minimal slippage of geocomposite on underlying layers.

3. No excess tensile stresses in geocomposite.

O. Unless otherwise specified by ENGINEER, all equipment operating on soil material overlying the geocomposite shall comply with the following:

Maximum Allowable Equipment Ground Pressure (psi)	Thickness of Overlying Compacted Fill (in.)
< 5	12
<10	18
<20	24
>20	36

P. Deploy geocomposite over the subgrade surface as soon as practicable after the subgrade has been completed and deemed suitable for deployment.

3.2 Installation - Panel Deployment

A. Prior to beginning geocomposite installation, INSTALLER shall become thoroughly familiar with all portions of the work related to the geocomposite installation and the CQA Plan.

B. Prior to beginning geocomposite installation, INSTALLER shall inspect and document that all work is complete to the point where the installation of geocomposite may properly commence without any adverse impacts.

C. If CONTRACTOR has any concerns regarding the site preparation done prior to the installation, INSTALLER shall notify ENGINEER in writing within 48 hours of his site inspection. Failure to inform ENGINEER in writing prior to installation of the geocomposite will construed as CONTRACTOR's acceptance of the site as ready for geocomposite installation.

D. Install the geocomposite according to the drawings as approved. Notify ENGINEER of any revisions or modifications of the approved plan prior to installing the geocomposite in the area of the revision.

E. Maintain construction progress documentation in the daily installation records, and provide such documentation to ENGINEER.

F. Use sandbags to temporarily secure the geocomposite panels prior to placement of the overlying material.

G. Document the following:

1. The equipment used does not damage the geocomposite by handling.

2. The prepared surface underlying the geocomposite has not deteriorated since previous acceptance, and that it is still acceptable at the time of geocomposite placement.

3. Personnel working on the geocomposite do wear damaging clothing, or engage in other activities that could damage the geocomposite.

4. The method used to unroll the geocomposite does not cause damage to the geocomposite, and/or the subgrade.

5. The method used to place the rolls minimizes wrinkles (especially wrinkles between adjacent panels).

Immediately notify ENGINEER if any of these conditions are being, or have been, violated, and take immediate steps to mitigate any damage.

H. Examine each roll for damage after placement and prior to connecting to adjacent panels. Inform ENGINEER as to which rolls, or portions of rolls, should be rejected or repaired. Mark and remove from the site damaged rolls or portions of rolls that have been rejected, at no risk, cost, or expense to OWNER. Notify ENGINEER when such removal occurs.

3.3 Installation - Panel Seaming

A. The geocomposite panels shall have no horizontal seams on slopes steeper than 10 percent. On slope steeper than 10 percent, continuous rolls shall be installed.

B. On slopes steeper than 10 percent the geocomposite geotextile shall be continuously sewn. The geotextile must be over lapped a minimum of 3 inches.

C. Adjust the edges of the geocomposite panels to smooth out any wrinkles, creases, or "fishmouths" to maximize contact with the underlying panel.

D. The geonet portion of the geocomposite panels shall overlap a minimum of 4 inches and fastening shall be with plastic fasteners or polymer braid. Fastening devices shall be white or yellow for easy inspection.

E. Fastening of the geonet portion of the geocomposite shall lb every 5 feet along the slope, every 12 inches across the slope (see note A), every 6 inches in the anchor trench and every 6 feet on horizontal surfaces.

3.4 Defects and Repairs

A. Examine and document geocomposite for identification of damage, defects, holes, and any signs of contamination by any foreign matter. The surface of the geocomposite shall be clean at the time of examination.

B. Do not proceed with work with any materials that will cover locations that have been repaired or replaced until these locations are examined by ENGINEER.

C. Identify and repair any damage in the geocomposite by cutting a patch from unused geocomposite and placing it over the damaged area. Clear all dirt and debris from the damaged area. Extend the patch a minimum of 12 inches in all directions beyond the damaged area. Repair geonet portion of the geocomposite by securing the patch with connecting devices in accordance with Subsection 3.3(C) a minimum of 6 inches around the entire patch. Repair the geotextile portion of the geocomposite by thermally bonding the patch in place with a minimum of 12 inches overlap in all direction.

D. Include documentation of defects and repairs in daily records/logs.

END OF SECTION

SECTION 02222
REMOVAL OF MISCELLANEOUS STRUCTURES

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Removal one existing approximately 60 foot long, 12 inch diameter, HDPE pipe for disposal by OWNER.

B. Existing Monitoring wells or Gas probes in area of construction activities for Phase 9 – Cell 2 will be abandoned and replaced or extended by OWNER prior to beginning of the Phase 9 – Cell 2 liner construction.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

3.1 PREPARATION

A. Protect existing structures such as manholes, vaults, pavement, culvert pipe, gas probes, monitoring wells, and piping which are not to be removed or disturbed.

B. Mark location of disconnected utilities (if any). Identify utilities and indicate capping locations on Project Record Drawings.

3.2 EXECUTION

A. Remove structures and appurtenances in an orderly and careful manner. Leave site in clean condition.

B. Except where noted otherwise, immediately remove demolished material from site.

C. Remove materials to be reinstalled or retained in manner to prevent damage.

D. Remove for storage/disposal by OWNER one existing HDPE culvert. Location of culvert is shown on the drawings.

E. Do not burn or bury material on site without approval of OWNER/ENGINEER.

F. Backfill excavated areas and open holes caused as a result of removal. Use soil specified in Section 02320 - Fill.

G. Rough grade and compact areas affected by removal to maintain site grades and contours.

END OF SECTION

SECTION 02232
CLEARING AND GRUBBING

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Clearing, stripping, grubbing, removing, and disposing of plant life, including dead and decayed matter, that exists within the limits of construction areas and which are not specifically designated to remain.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

3.1 CLEARING AND GRUBBING

A. CONTRACTOR will provide all Clearing and Grubbing prior to the start of Phase 9 – Cell 2 construction.

B. CONTRACTOR will remove stumps, roots, shrubs, brush and logs to a minimum depth of 2 feet below ground surface.

3.2 DISPOSAL

A. CONTRACTOR will dispose, chip, or salvage Cleared and Grubbed materials prior to the start of Phase 9 – Cell 2 construction.

3.3 PROTECTION OF EXISTING TREES AND VEGETATION

A. Preserve and protect trees not cleared and grubbed by OWNER and intended to remain for landfill screening. Do not remove any trees, shrubs, or brush without prior approval from OWNER.

END OF SECTION

SECTION 02315
EXCAVATION

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Stripping Topsoil to the extent possible and stockpiling on site. Finish grading of stockpiles that will remain after Phase 9 – Cell 2 and Stage 4 Final Cover construction.

B. Digging, moving, and stockpiling of materials including finish grading to the extent and elevations shown on the Drawings.

C. Constructing perimeter diversion berms and drainage ditches.

D. Measurement based on the length of berms and ditches.

PART 2. PRODUCTS

NOT USED.

PART 3. EXECUTION

3.1 PREPARATION

A. Remove ice and snow before excavation.

B. Identify required construction survey control lines and datum.

3.2 EXCAVATION

A. Grade perimeter of excavation to prevent surface water drainage into excavation.

B. Notify OWNER/ENGINEER of unexpected subsurface conditions and discontinue affected WORK in area until notified to resume WORK.

C. Stockpile excess excavated General Fill (refer to Section 02320) and Topsoil (refer to Section 02911) in excess soil stockpile areas designated on the Drawings. Grade to provide positive drainage. CONTRACTOR will install Sediment Control Fence around the stockpiles prior to beginning of construction for Phase 9 – Cell 2 and the Stage 4 Final Cover as indicated on the Drawings. Place a minimum 4 inches of Topsoil over the General Fill stockpile.

D. Use suitable excavated material as General Fill in accordance with Section 02320

3.3 FINISHING

A. Blend slopes with existing landscape features, at the intersection of cuts and fills; provide gradual slope between new and existing construction.

B. Finish to elevations shown within 0.10 foot tolerance. Use GPS enabled equipment to finish grade areas outside the limits of composite liner and Stage 4 Final Cover construction.

3.4 FIELD QUALITY CONTROL

A. Identify materials within the excavation areas which will meet the required Specifications for Topsoil (Section 02911) and General Fill Section 02320). Excavate and place unsuitable soils encountered during excavation in a stockpile within the limits of construction in an area identified by OWNER/ENGINEER.

3.5 PROTECTION

A. Notify all area utility companies prior to commencing WORK in accordance with state and local regulations.

B. Locate, identify, and protect existing utilities from damage.

C. Protect bench marks, survey monuments, monitoring wells, existing structures, fences and gates, sidewalks, paving, and curbs from damage by excavation equipment and vehicular traffic.

D. Protect excavations by shoring, bracing, sheet piling, or other methods required to prevent cave in or loose soil from falling into excavation.

E. Underpin adjacent structures which may be damaged by excavation WORK, including service utilities and piping.

F. Do not remove or disturb any materials outside the limits of construction.

G. Keep excavations free from water by pumping or constructing diversion berms and/or ditches to divert water.

H. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.

END OF SECTION

SECTION 02316
EXCAVATION UNDERCUT

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Removing and disposing of unsuitable subgrade soils encountered in the Groundwater Gradient Control subgrade and in the Select Clay Fill subgrade.

B. Backfilling and compacting undercut area.

PART 2. PRODUCTS

2.1 MATERIALS

A. Backfill: General Fill in accordance with Section 02320.

PART 3. EXECUTION

3.1 INSPECTION

A. OWNER/ENGINEER will monitor and measure the Excavation Undercut.

B. No compensation will be made for Excavation Undercut not monitored by OWNER/ENGINEER.

3.2 PERFORMANCE

A. Excavate and backfill the Undercut in compliance with Section 02317 (Trenching, Backfilling and Compacting).

B. Compact the backfill material to at least 90 percent of the maximum dry density as determined by the Modified Proctor (ASTM D1557) or 95 percent of the maximum dry density as determined by the Standard Proctor (ASTM D698).

3.3 DISPOSAL

A. Excavate and stockpile unsuitable soils in an area within the limits of construction as directed by OWNER/ENGINEER.

3.4 FIELD QUALITY CONTROL

A. Proof roll the subbase grades using a partially loaded haul truck or equipment approved by OWNER/ENGINEER prior to placing Select Clay Fill in the clay liner. Conduct subbase proof rolling in the presence and observation of OWNER/ENGINEER. OWNER/ENGINEER will determine locations and extents of the subbase, if any, requiring undercutting and backfilling.

B. OWNER/ENGINEER will perform the same number of tests specified for General Fill material under Section 02320.

END OF SECTION

SECTION 02317
TRENCHING, BACKFILLING, AND COMPACTING

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Excavating trenches, backfilling, and compacting for installation of piped utilities.

B. Dewatering, protection and maintenance of trench, support of existing structures, sheeting and shoring, hauling and disposal of excess excavated materials and fill.

1.2 REFERENCES

A. OSHA 29 CFR Part 1926, Occupational Safety and Health Standards - Excavations.

PART 2. PRODUCTS

2.1 BACKFILL MATERIALS

A. Backfill: Select Fill complying with Section 02320 to the minimum thicknesses and extents indicated the drawings.

2.2 BEDDING MATERIALS

A. For pipes greater than 10 inches in diameter:

Bedding material to the thickness and extent as indicated on the drawings. Use Select Granular Fill in accordance with Section 02320 if not identified on the drawings.

B. For all pipes less than 10 inches in diameter:

Bedding material to the thickness and extent as indicated on the drawings. Use Select Granular Fill in accordance with Section 02320 if not identified on the drawings.

PART 3. EXECUTION

3.1 PREPARATION AND RESTORATION

A. Remove sod, Topsoil, and other surface treatment and restore to original condition or better upon completion of the WORK.

3.2 PROTECTION

A. Comply with OSHA 29 CFR Part 1926, Occupational Safety and Health Standards - Excavations

B. Protect excavations by shoring, bracing, sheet piling, or other methods required to prevent cave in or loose soil from falling into excavation.

C. Place excavated and other material 2 feet minimum back from edge of trench excavation.

D. Minimum trench excavation slope to be in compliance with OSHA 29 CFR Part 1926. Terrace trench where necessary to provide a stable trench.

E. Underpin adjacent structures which may be damaged by excavation WORK, including utilities and piping.

F. Notify OWNER/ENGINEER immediately of unexpected subsurface conditions.

G. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.

3.3 TRENCHING

A. Excavate to the design alignment and grade. Elevations of pipes subject to revisions as necessary to fit field conditions. Revise alignment and grades only with the approval of OWNER/ENGINEER.

B. Dewater groundwater as necessary to allow installation and construction of the Groundwater Gradient Control System.

C. No adjustment in compensation will be made for grade adjustments unless preapproved by OWNER/ENGINEER.

D. Maximum trench width at pipe level to be outside pipe diameter plus 24 inches unless indicated on the drawings.

E. Remove water which may accumulate in trench, and construct ditches, flumes, and dams to direct water away from excavation.

F. OWNER/ENGINEER may limit the amount of open trench where field conditions or plant operations require.

G. OWNER/ENGINEER may order additional excavation in areas where unsuitable soil conditions are encountered.

H. Promptly stockpile excess excavation on site at the stockpile locations shown on the Drawings.

3.4 UTILITY TEST HOLES

A. Where potential utility conflicts are anticipated, uncover utility lines well in advance of trench excavation.

B. Determine grade of the utility line. OWNER/ENGINEER will advise the Utility Company of the adjustment required.

C. Backfill and restore disturbed area to original condition or better.

3.5 BEDDING

A. Minimum bedding requirements: Install pipe bedding to the minimum thicknesses below and above the pipe in accordance with the drawings. Install bedding material from 6 inches below pipe to 12 inches above pipe if not indicated on the Drawings.

B. Minimum depth of pipe embedment in bedding: One third outside pipe diameter.

C. Mechanically compact bedding under pipe hunches.

3.6 BACKFILLING

A. Backfill immediately following completion of pipe installation.

B. Take necessary precautions with backfill and construction operations to protect completed utility system from damage.

C. Backfill with care around structures and cleanouts.

D. Backfill to the original ground elevation unless shown otherwise on Drawings.

3.7 COMPACTING

A. Compact backfills outside the compacted Select Clay Fill liner area to at least 90 percent or 95 percent of the maximum dry density as determined by the Modified Proctor or Standard Proctor, respectively.

3.8 FIELD QUALITY CONTROL

A. Allow access for OWNER/ENGINEER to perform backfill compaction testing and collection of pipe bedding samples. Coordinate compaction testing and the collection of pipe bedding material sampling with OWNER/ENGINEER.

B. OWNER/ENGINEER will collect and test pipe bedding samples from the perforated and nonperforated HDPE leachate pipe, Groundwater Gradient Control System collection pipe, and solid wall Groundwater Gradient Control System transfer pipe at the minimum frequencies required by NR 516.07(4).

C. OWNER/ENGINEER will perform backfill compaction at the minimum frequencies required by NR 516.07(1m).

D. Backfill to within 0.10 feet of grades shown.

END OF SECTION

SECTION 02320
FILL

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Loading, hauling, placing, and compacting General Fill materials for the Phase 9 – Cell 2 Liner and for the Stager 4 Final Cover rooting zone layer in accordance with the lines, grades, thicknesses, and typical sections shown on the Drawings. OWNER and CONTRACTOR furnished material (refer to Section 01270 Schedule of Value and Payments)

B. Loading, hauling, placing, moisture conditioning, and compacting Select Clay Fill for the Phase 9 – Cell 2 Liner from the on site stockpile and OWNER off site borrow source in accordance with the lines, grades, thicknesses, and typical sections shown on the Drawings.

C. Providing fill materials for pipe bedding, Groundwater Gradient Control System collection layer, the leachate collection layer, and the final cover drainage layer collection/discharge pipes in accordance with the lines, grades, thicknesses, and typical sections shown on the Drawings.

D. Loading, hauling, placing and compacting Fine Grained Soil (Barrier Layer) from on site stockpile in accordance with the lines, grades and thicknesses and typical sections shown on the Drawings. OWNER and CONTRACTOR furnished material (refer to Section 01270 Schedule of Value and Payments)

1.2 REFERENCES

A. AASHTO Designation T96 – Percentage of Wear, Los Angeles abrasion test.

B. AASHTO Designation T104 – Sodium Sulfate soundness test, 5 cycles.

C. ASTM C136 – Test Method for Sieve Analysis of Fine and Coarse Aggregates.

D. ASTM D422 – Test Method for Particle Size Analysis of Soils.

E. ASTM D698 – Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort: Standard Proctor.

F. ASTM D1140 – Standard Test Method for Amount of Material in Soils Finer than the No. 200 Sieve.

G. ASTM D1556 – Test Method for Density and Unit Weight of Soil In Place by the Sand Cone Method.

H. ASTM D1557 – Standard Test Method for Laboratory Compaction Characteristic of Soil Using Modified Effort: Modified Proctor.

I. ASTM D2216 – Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.

J. ASTM D2434 – Standard Test Method for Permeability of Granular Soils (Constant Head).

K. ASTM D2487 – Classification of Soils for Engineering Purposes (Unified Soil Classification System).

L. ASTM D2922 – Test Methods for Density of Soil and Soil Aggregate In Place by Nuclear Methods (Shallow Depth).

M. ASTM D2937 – Standard Test Method for Density of Soil In Place by the Drive Cylinder Method.

N. ASTM D3017 – Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

O. ASTM D4318 – Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

P. ASTM D4643 – Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method.

Q. ASTM D5084 – Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Material Using a Flexible Wall Permeameter.

1.3 SUBMITTALS

A. Submit sequence of Select Clay Fill placement with project schedule under provisions of Section 01330.

B. Submit material testing documentation and samples of Select Granular Fill and Select Aggregate Fill with the project schedule as described in Part 3 of this Specification.

C. Submit sequence of final cover placement with project schedule under provisions of Section 01330.

D. Submit material testing documentation and samples of Fine Grained Barrier Layer Soil with the project schedule as described in Part 3 of this Specification.

PART 2. PRODUCTS

2.1 GENERAL FILL

A. On site and from OWNERS off site borrow source materials free from organic matter and refuse, masonry, metal, sharp objects, boulders, snow, and ice.

B. From CONTRACTOR furnished borrow source materials free from organic matter and refuse, masonry, metal, sharp objects, boulders, snow, and ice.

C. No solid material larger than 6 inches in its largest dimension.

2.2 SELECT GRANULAR FILL

A. Provide Select Granular Fill meeting all the requirements in this subpart.

B. Durable sand or gravelly material rounded, subrounded, or subangular with a USCS Classification of SP for sand material (ASTM D2487).

C. A minimum hydraulic conductivity of 1 x 10^{-3} cm/sec at the dry density and moisture content achieved during placement (ASTM D2434).

D. A maximum of 5 percent by weight passing the #200 sieve (ASTM D422)

2.3 SELECT AGGREGATE FILL (USED IN THE GROUNDWATER GRADIENT CONTROL SYSTEM)

A. Provide Select Aggregate Fill meeting all the requirements in this subpart.

B. Durable gravel material rounded or subangular with a USCS Classification of GP (ASTM D2487).

C. Grain Size: 100 percent by weight passing the 1.5 inch sieve, a maximum of 80 percent by weight passing the ¾ inch sieve, a maximum of 50 percent by weight passing the 3/8 inch sieve, and a maximum of 5 percent by weight passing the #4 sieve (ASTM D422)

D. A minimum hydraulic conductivity of 1 x 10^{-2} cm/sec at the dry density and moisture content achieved during placement (ASTM D2434).

E. A Uniformity Coefficient of less than 4 (ASTM D422).

2.4 SELECT AGGREGATE FILL (USED IN THE PHASE 9 – CELL 2 LEACHATE COLLECTION SYSTEM AND THE STAGE 4 FINAL COVER TOE DRAIN AND DIVERSION BERM DRAIN COLLECTION SYSTEM.)

A. Provide Select Aggregate Fill meeting all the requirements in this subpart.

B. Durable gravel material rounded or subangular with a USCS Classification of GP (ASTM D2487).

C. Non calcareous origin without OWNER/ENGINEER approval.

D. Phase 9 – Cell 2 Grain Size: 100 percent by weight passing the 1.5 inch sieve, a maximum of 80 percent by weight passing the ¾ inch sieve, a maximum of 50 percent by weight passing the 3/8 inch sieve, and a maximum of 5 percent by weight passing the #8 sieve (ASTM D422).

E. Stage 4 Final Cover Grain Size: 100 percent by weight passing the 1 inch sieve, a 80-100 percent by weight passing the ¾ inch sieve, a 10-70 percent by weight passing the ½ inch sieve, and a maximum of 5 percent by weight passing the #4 sieve (ASTM D422).

F. Phase 9 – Cell 2, a minimum hydraulic conductivity of 1 cm/sec at the dry density and moisture content achieved during placement (ASTM D2434).

G. A Uniformity Coefficient of less than 4 (ASTM D422).

2.5 SELECT CLAY FILL (PHASE 9 – CELL 2)

A. Select Clay Fill will be furnished by OWNER and either stockpiled on site in area designated on the Drawings or hauled in by contractor constructing the liner depending agreement between CONTRACTOR and OWNER.

B. Materials classified as CL, ML, CH, or MH or as a combination according to the Unified Soil Classification System.

C. Maximum clump size of 8 inches and capable of being broken down with normal construction equipment to a size of 2 to 3 inches prior to compaction.

D. Fifty percent or more of the soil particles by weight pass the Number 200 sieve.

E. Average Liquid Limit (LL) greater than or equal to 25 with no values less than 20.

F. Average Plasticity Index (PI) greater than or equal to 12 with no values less than 10.

G. Maximum hydraulic conductivity of 1×10^{-7} cm/sec at a dry density of 90 percent Modified Proctor maximum dry density or at a dry density of 95 percent Standard Proctor maximum dry density.

2.6 FINE GRAINED SOIL (STAGE 4 FINAL COVER)

A. Fine Grained Soil be furnished by OWNER and stockpiled on site in area designated on the Drawings. Fined Grained Soil furnished by CONTRACTOR.

B. Maximum clump size of 4 inches and capable of being broken down with normal construction equipment to a size of 2 inches prior to compaction.

C. The upper one foot of the soil barrier layer will have a maximum particle size of 2 inches or less and the lower one foot of the oil barrier layer shall have a maximum particle size of 4 inches or less.

D. Fine grained soil or well graded sandy soil with fines, with a maximum particle diameter less than one inch and meeting the criteria of USCS soil types ML, CL, CH, SM or SC or dual symbol.

E. Twenty five percent or more of the soil particles by weight pass the Number 200 sieve.

F. Soil furnished by CONTRACTOR from off site borrow sources will, at a minimum, be sampled every 2,000-2,500 cubic yards. All samples will be tested for grain size, Atterberg limits, and USCS classification. Proctor testing will be performed, at a minimum, on one of every four samples. If the material are variable in nature, additional testing will be performed to adequately characterize each material.

PART 3. EXECUTION

3.1 STOCKPILE

A. Stockpile excess General Fill on site at locations indicated on Drawings.

B. Stockpile Fill in sufficient quantities to meet project schedule and requirements.

C. Maintain stockpiles during construction. Grade stockpiles to provide positive drainage to prevent erosion or deterioration of materials. Provide erosion control around stockpile.

D. Regrade and restore stockpile areas, after borrow excavation is complete from the stockpile.

3.2 PREPARATION AND RESTORATION

A. Remove ice and snow before placing Fill. Do not place Fill on frozen subgrade.

B. Cut out soft areas of unsuitable subgrade.

C. Phase 9 – Cell 2, Proof roll subgrade before placing Select Granular Fill and Select Clay fill per Section 02316 using partially loaded haul truck.

D. Phase 9 – Cell 2, Cut out soft areas of unsuitable subgrade (refer to Section 02316).

E. Phase 9 – Cell 2, OWNER/ENGINEER will observe and accept surface conditions prior to placement of Select Granular fill and Select Clay Fill.

F. Stage 4 Final Cover, the surface of the top lift shall be graded or compacted to be smooth and firm. The prepared surface of the soil barrier layer will be free of vegetation, stones, sharp edged rocks, soil clods, or other deleterious material protruding from the surface that could damage the GCL. Any objects larger than ½ inch shall be removed from the soil barrier layer surface.

3.3 PLACEMENT AND COMPACTION OF FINE GRAINED SOIL

A. Place and spread Select Low Permeability Soil in lift thicknesses as required to obtain the specified levels of compaction. Maximum lift thicknesses of 12 inches after compaction will not be exceeded.

B. Compact material to a minimum of 95 percent of the Standard Proctor or 90 percent of Modified Proctor test maximum dry density at a moisture content at or wet of optimum.

C. Compact Fine Grained Soil using penetrating foot–type compaction equipment having feet protrusion at least 6 inch long. Compaction equipment utilized to compact Fine Grained Soil shall have a minimum static weight of 30,000 pounds.

D. Scarify Fine Grained Soil to a minimum depth of 2 inches between lifts when previous lift has dried out or been smooth drum rolled. Add water as required to maintain specified moisture content.

E. Remove and replace Fine Grained Soil that does not meet specified material compaction requirements at no additional cost to OWNER.

F. Place additional lifts of Fine Grained Soil as soon as practical after compaction and completion of testing by OWNER/ENGINEER to avoid drying and desiccation of preceding Fine Grained Soil lift.

3.4 PLACEMENT AND COMPACTION OF GENERAL FILL

A. Maintain proper moisture content to achieve standard compaction as specified in Subpart 3.7 of this Section.

B. Place and spread General Fill in lift thicknesses as required to obtain the specified levels of compaction. Maximum lift thicknesses of 1 foot after compaction will not be exceeded.

3.5 PLACEMENT OF SELECT GRANULAR FILL

A. Do not compact Select Granular Fill. Place loosely and avoid excessive traffic compaction.

B. Remove and replace Select Granular Fill which does not meet specified material testing requirements at no additional cost to OWNER.

3.6 PLACEMENT AND COMPACTION OF SELECT AGGREGATE FILL

A. Do not compact Select Aggregate Fill. Place loosely and avoid excessive traffic compaction. Refer to Specification Section 02070 Subpart 3.7 for Specifications for placement of soil/drainage material over geomembrane.

B. Remove and replace Select Aggregate Fill which does not meet specified material testing requirements at no additional cost to OWNER.

C. CONTRACTOR to provide assistance during the geomembrane Leak Location Survey for the Phase 9 – Cell 2 liner that includes the following:

- Provide a source of AC power (110 VAC, 5 A);
- Provide two supervised laborers with equipment to help lay out the survey string lines and to wet the survey area if the drainage material is dry. If the cover material located on top of the primary liner is dry, water must be sprayed onto the cover material to provide additional surface moisture;
- Provide a water truck, water, and driver if required. For best results, the survey should be conducted with the Geotextile Cushion wet, either through rainfall or by manually wetting the geotextile;
- Provide electrical isolation at the edges of the survey area. Electrical isolation is achieved by leaving a strip of 2 to 5 feet of bare liner exposed around the perimeter of the landfill cell;
- Remove standing water, if any, in the drainage layer on top of the geomembrane; and
- Uncovering, exposing, and repairing any leaks found in the geomembrane
- INSTALLER will be on site during the geomembrane leak location survey to repair holes found in the geomembrane to allow the repaired geomembrane area to be retested for holes after the repair is complete.

3.7 PLACEMENT AND COMPACTION OF SELECT CLAY FILL

A. Maintain proper moisture content to achieve specified compaction and hydraulic conductivity.

B. Provide Select Clay Fill in lift thicknesses as required to obtain the specified levels of compaction. Do not exceed maximum lift thicknesses of 6 inches after compaction.

C. Compact Select Clay Fill in accordance with the following Special Compaction:

- Maintain moisture content of at least 2 percent above the optimum value as determined by the Modified Proctor test. Maintain a moisture content higher than 2 percent above optimum moisture content as determined by the Modified Proctor test or higher moisture content if needed to achieve the maximum specified hydraulic conductivity of 1×10^{-7} cm/sec.
- Compact material to a dry density of at least 90 percent of the maximum dry density, as determined by the Modified Proctor test.

- Compact Select Clay Fill using penetrating foot–type compaction equipment having feet protrusion greater in length than the loose lift thickness of clay being placed prior to compaction. Compaction equipment utilized to compact Select Clay Fill shall have a minimum static weight of 30,000 pounds.

- Scarify Select Clay Fill to a minimum depth of 2 inches between lifts when previous lift has dried out or been smooth drum rolled. Add water as required to maintain specified moisture content

- Remove and replace Select Clay Fill that does not meet specified material compaction or hydraulic conductivity testing requirements at no additional cost to OWNER.

- Place additional lifts of Select Clay Fill as soon as practical after compaction and completion of clay testing by OWNER/ENGINEER avoid drying and desiccation of Select Clay Fill proceeding lift.

- Scarify Select Clay Fill to a minimum depth of 2 inches between lifts when previous lift has dried out or been smooth drum rolled to protect from desiccation rain events. Add water as required to maintain specified moisture content.

D. Top surface of the layer of Select Clay Fill will be rolled smooth to facilitate placement of the geomembrane. Protruding rocks (larger than ½ inch diameter), sticks, and other foreign objects that could damage the geomembrane will be removed and replaced with Select Clay Fill.

3.8 STANDARD COMPACTION

A. Provide each layer of fill to the degree that no further appreciable consolidation is evidence under the action of the compaction equipment. OWNER/ENGINEER will require the compaction of the material to a dry density of 90 percent or 95 percent of the maximum dry density as determined by the Modified Proctor or the Standard Proctor test, respectively.

B. Provide each layer of General Fill to the degree that no further appreciable consolidation is evidence under the action of the compaction equipment.

C. Required compaction will be attained for each layer before any material for the succeeding layer is placed.

3.9 TRENCH BACKFILLING

A. Backfill immediately following completion of pipe installation and documentation required by OWNER/ENGINEER.

B. Take necessary precautions with backfill and construction operations to protect completed utility system from damage.

C. Backfill with care around structures and cleanouts.

D. Backfill to the original ground elevation unless shown otherwise on Drawings.

3.10 FIELD QUALITY CONTROL OF SELECT GRANULAR FILL

A. Top and bottom of Select Granular Fill in the Groundwater Gradient Control System drainage layer will be surveyed by CONTRACTOR as specified in Specification Section 01720 (Field Engineering).

B. OWNER/ENGINEER will collect samples and perform the following tests under provisions of Section 01452:

Select Granular Fill

1. One sieve analysis (ASTM D422) (minimum of four samples will be tested) to the #200 sieve for every 1,000 cubic yards of Select Granular Fill placed as Groundwater Gradient Control System drainage layer material.

2. One constant head hydraulic conductivity (ASTM D2434) (minimum of two samples will be tested) for every 2,500 cubic yards of Select Granular Fill placed as Groundwater Gradient Control System drainage layer material.

3. One sieve analysis (ASTM D422) (minimum of three samples will be tested) to the #4 sieve for every 1,000 linear feet of Select Granular Fill solid wall leachate transfer pipe bedding material placed.

3.11 FIELD QUALITY CONTROL SELECT AGGREGATE FILL

A. Top and bottom of Select Aggregate Fill leachate collection drainage layer will be surveyed by CONTRACTOR as specified in Specification Section 01720 (Field Engineering) on a 50 foot grid pattern to verify minimum thicknesses are achieved.

B. OWNER/ENGINEER will collect samples and perform the following tests under provisions of Section 01452.

Select Aggregate Fill

1. One sieve analysis (ASTM D422) (minimum of three samples) to the #200 sieve for every 1,000 linear feet of Groundwater Gradient Control System collection pipe bedding material placed.

2. One sieve analysis (ASTM D422) (minimum of two samples) to the #200 sieve for every 5,000 cubic yards of Select Aggregate Fill placed as leachate drainage layer material.

3. One constant head hydraulic conductivity (ASTM D2434) of Select Aggregate Fill placed as leachate drainage layer material.

4. One sieve analysis (ASTM D422) (minimum of three samples) to the #200 sieve for every 1,000 linear feet of Select Aggregate Fill leachate collection pipe bedding material placed.

5. One constant head hydraulic conductivity (ASTM D2434) of Select Aggregate Fill placed as leachate collection pipe bedding material.

3.12 FIELD QUALITY CONTROL OF GENERAL FILL PLACED FOR SUBGRADE

A. OWNER/ENGINEER will collect samples and perform the following tests under provisions of Section 01452:

General Fill for Subgrade

1. Continuous in field moisture (ASTM D3017) and density (ASTM D2922) tests on maximum 100 foot grid on each 12 inch compacted thickness.

2. A Modified Proctor (ASTM D1557) or Standard Proctor (ASTM D698), sieve analysis and hydrometer (ASTM D422), and Atterberg limits (ASTM D4318) for every 5,000 cubic yards placed, or when visual observations indicate that change has occurred in the material.

3.13 FIELD QUALITY CONTROL OF SELECT CLAY FILL

A. Top and bottom of the Select Clay Fill liner will be surveyed by CONTRACTOR as specified in Specification Section 01720 (Field Engineering) on a 50 foot grid pattern and critical locations to verify minimum thicknesses are achieved.

B. OWNER/ENGINEER will collect samples and perform the following tests under provisions of Section 01452:

1. Representative samples will be collected from the Select Clay Fill stockpiled at a minimum frequency of one sample for every 5,000 cubic yards placed, or when visual observations indicate that change has occurred in the material. Each representative sample collected will be tested for Modified Proctor (ASTM D1557) or Standard Proctor (ASTM D698), USCS classification (ASTM D2487), sieve analysis and hydrometer (ASTM D422), and Atterberg limits (ASTM D4318).

2. Continuous in field moisture (ASTM D3017) and density (ASTM D2922) tests on approximate 100 foot grid on each 12 inch compacted thickness.

3. Undisturbed Shelby tube samples will be collected from the in place compacted Select Clay Fill liner at a minimum frequency of one sample for each acre foot thickness of Select Clay Fill placed. Each undisturbed sample from the liner will analyzed for USCS Classification (ASTM D2487), sieve analysis and hydrometer (ASTM D422), Atterberg limits (ASTM D4318), and moisture/density content (ASTM D4643). Every third undisturbed Shelby tube samples sample collected from the Select Clay Fill liner will analyzed for hydraulic conductivity (ASTM D5084).

END OF SECTION

SECTION 02372
RIPRAP

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Furnishing and placing riprap in accordance with the locations and thicknesses shown on the Drawings.

PART 2. PRODUCTS

2.1 MATERIALS

A. Durable field or quarry stone that is sound, hard, dense, resistant to action of air and water, and free from seams, cracks, or other structural defects.

B. D_{50} = 8” Stone pieces meeting the following size requirements:

Size	% Passing by Weight
16”	100
12”	60-85
8”	25-50
4”	5-20
2”	0-5

C. D_{50} = 4” Stone pieces meeting the following size requirements:

Size	% Passing by Weight
8”	100
6”	60-85
4”	25-50
2”	5-20
1”	0-5

PART 3. EXECUTION

3.1 PREPARATION

A. Excavate to the lines and grades required for placement of the riprap to the thickness indicated on the Drawings.

B. Place 12 oz. Geotextile Cushion over areas to receive riprap in accordance with Section 02076 and the Drawings.

3.2 PLACEMENT

A. Minimum thickness of riprap layer is as shown on the Drawings measured perpendicular to the slope.

B. Place riprap to the limits shown on the Drawings and to within a 3 inch tolerance for thickness.

C. Place riprap with care so no damage is done to 12 oz. Geotextile Cushion. Do not drop riprap from a height greater than 12 inches.

D. Place riprap from the base of the slope upward. Place smaller sized stones to fill voids between the larger sized stones.

END OF SECTION

SECTION 02374
SEDIMENT CONTROL FENCE

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Installing, maintaining, and replacing damaged CONTRACTOR installed Sediment Control Fence. Maintaining and replacing damaged installed Sediment Control Fence.

1.2 REFERENCES

A. WDNR Conservation Practice Standard No. 1056 – Silt Fence.

PART 2. PRODUCTS

2.1 MATERIALS

A. Wood Supports as indicated on the drawings

1. Fill length of the silt fence shall be supported by air or kiln dried posts of hickory or oak.

2. Silt fence fabric shall be stapled to the upslope side of the post.

B. Maximum post spacing for nonwoven silt fabric as indicated on the drawings.

C. Silt fence shall have a support cord in location as indicated on the drawings.

D. Geotextile Fabric: woven or nonwoven polyester, polypropylene, stabilized nylon, polyethylene or Polyvinylidene chloride.

E. Geotextile fabric shall have the following MARV values:

1. Minimum grab tensile strength (ASTM D 4632) in machine and cross machine direction – 120 lbs. and 100 lbs, respectively.

2. Maximum apparent opening size (ASTM D4751) – No. 30 sieve size

3. Maximum permittivity (ASTM D4491) – 0.05 sec^{-1}

4. Minimum ultraviolet stability percent of strength retained after 500 hours of exposure (ASTM D4355) – 70%

PART 3. EXECUTION

3.1 INSTALLATION OF DAMAGED SILT FENCE

A. Install hardwood posts 2 feet below grade, at maximum spacing as indicated on the drawings.

B. Anchor bottom 6 inches of fence netting below grade to create a continuous toe-in structure along fence installation.

END OF SECTION

SECTION 02375
SEDIMENT CONTROL EROSION LOGS

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Installing, maintaining, and replacing damaged CONTRACTOR installed Sediment Control Erosion Logs. Maintaining and replacing damaged installed Sediment Control Erosion Logs.

1.2 REFERENCES

A. WDNR Conservation Practice Standard No. 1071 – Interim Manufactured Perimeter Control and Slope Interruption Products

PART 2. PRODUCTS

2.1 MATERIALS

A. Curlex 20 inch Sediment Logs.

Type I (20 inch nominal diameter) logs filled with Great Lakes Aspen Excelsior fibers encased in an outside open weave containment fabric. Fibers shall be curled with soft, interlocking barbs to form a strong, organic filtration matrix. A minimum of 80 percent of the fibers shall be 16 cm (6 inch) or greater in length. Fibers shall be evenly disturbed throughout the diameter and length of the Sediment Log. Fibers shall be naturally seed free. Excelsior color shall be standard Aspen (natural). Netting at each end of the log shall be secured to assure fiber containment.

PART 3. EXECUTION

3.1 INSTALLATION OF DAMAGED EROSION LOGS

A. Logs placed on disturbed ground shall be entrenched a minimum of 2 inches to ensure continuous ground contact.

B. Logs placed on vegetated ground may be installed without entrenchment. All gaps and ruts creating and undercutting situation shall be filled with soil or log type product filter media.

C. Logs placed on frozen ground does not require entrenchment. Product installed on frozen ground shall be assessed for effectiveness upon ground thaw and staked or replaced as needed.

D. Overlap – minimum of 24 inches or as required by the MANUFACTURER if more restrictive. Overlap should be shingled in the direction of flow as shown on the drawings.

E. Support – stake or anchor as needed to maintain constant ground contact along the entire length of product at all times and to prevent lateral movement and/or flotation. Staking or anchoring shall be performed per MANUFACTURER's recommendations.

F. Stacking – logs shall not be stacked individually on top of one another. Logs may be staked in a "pyramid" manner (i.e., one on top of two).

G. Maximum Spacing – space logs in direction of slope shall not exceed the maximum slope lengths for the appropriate slope as specified in Table 2 of the WDNR Conservation Practice Standard No. 1071.

H. Install Logs prior to disturbing the upslope area and/or when changes in disturbed slope or slope length require the installation of additional product.

END OF SECTION

SECTION 02376
EROSION CONTROL MATERIAL

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Providing and installing Erosion Control and Revegetation Mat (ECRM) in all flat bottom, in all V-notch ditches and seeded 3:1 or greater slopes.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. D 570 – Standard Test Methods for Water Absorption of Plastics.

2. D 5199 – Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.

3. D 1907 –Test Method for Yarn Number by Skein Method.

4. D 2256 – Test Method for Breaking Strength and Elongation of Yarn by Single Strand Method.

5. D 3786 – Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics.

6. D 4354 – Practice for Sampling of Geosynthetics for Testing.

7. D 4355 – Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).

8. D 4439 – Terminology for Geotextiles.

9. D 4595 – Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

10. D 4632 – Test Method for Grab Breaking Load and Elongation of Geotextiles.

11. D 4759 – Practice for Determining the Specification Conformance of Geosynthetics.

12. D 4873 – Guide for Identification, Storage, and Handling of Geotextiles.

13. D 5035 – Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Force).

14. D 5261 – Test Method for Measuring Mass Per Unit Area of Geotextiles.

B. Federal Test Method of America (FTMA) CCC-5-191B - Smolder Resistance of Textile Materials.

C. Geosynthetic Accreditation Institute (GAI) - Laboratory Accreditation Program (LAP).

D. International Standards Organization (ISO) 9002 - Quality System Certification.

E. Light Projection Analysis - Lumite Test Method for Measuring Light Projection Through Fabric.

F. WDNR Conservation Practice Standards

1. No. 1053 – Channel Erosion Mat

2. No. 1052 – Nonchannel Erosion Mat

1.3 DELIVERY, STORAGE, AND HANDLING

A. Attach durable label to product, indicating MANUFACTURER, product name or style number, roll and lot number, and roll dimensions.

B. Deliver, store, and handle rolls in manner to prevent damage.

C. After unloading, inspect rolls for defects and damage.

D. Store rolls off ground, protected from precipitation, ultraviolet radiation, strong chemicals, sparks and flames, temperatures in excess of 71 degrees C (160 degrees F) and other environmental conditions that could cause damage to geosynthetic.

E. Prevent damage to wrappings and geosynthetic.

PART 2. PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. ECRM – Various. Approved Class I, Type A and Type B erosion mats in WDOT Product Acceptability List (PAL).

2.2 MATERIALS

A. Erosion Control and Revegetation Mat (ECRM) for ditches < 4% grade.

1. Class I, Type B ECRM as approved in WDOT Product Acceptability List (PAL), current edition.

B. Erosion Control Revegetative Mat for seeded 3:1 slopes or greater.

1. Class I, Type A ECRM as approved in WisDOT Product Acceptability List (PAL), current edition

2.3 ACCESSORIES

A. Ground Anchoring Devices:

1. U-shaped wire staples, metal pins, or triangular wooden stakes.

2. Wire staples: Minimum 8 gauge.

3. Metal pins: Steel, minimum 0.20 inch in diameter with 1.5 inch steel washer.

4. Wooden stakes: triangular wooden survey stakes with minimum 1.6 inch head.

5. Length: 8 to 18 inches; sufficient ground penetration to resist pullout. Use longer anchors for loose soils.

2.4 QUALITY CONTROL

A. Manufacturing Quality Control: MANUFACTURER shall certify that supplied erosion control materials meets MANUFACTURER's minimum Specifications.

B. Conformance Testing: OWNER/ENGINEER, or a designated, independent laboratory, may perform additional testing (i.e., conformance testing) to verify the erosion control material meets the Specifications.

PART 3. EXECUTION

3.1 PREPARATION

A. Grade areas to be treated with erosion control material, or as directed by OWNER/ENGINEER.

B. Remove large rocks, soil clods, vegetation, and other sharp objects that could keep erosion control material from intimate contact with subgrade.

C. Prepare seedbed by loosening 2 to 3 inches of soil above final grade.

D. Construct anchor trenches per MANUFACTURER written procedures.

E. Install ground anchoring devices and at the locations and frequency per MANUFACTURER recommendations.

3.2 INSTALLATION

A. Install erosion control material at elevation and alignment indicated, and in accordance with MANUFACTURER written procedures.

END OF SECTION

SECTION 02618
HDPE PIPING, BELOW GRADE

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Providing High Density Polyethylene (HDPE) pipe, fittings and appurtenances for gradient control and leachate collection as indicated on the Drawings.

1.2 REFERENCES

A. ASTM D1248 – HDPE weight resin for pipe and fittings.

B. ASTM D2513 – Industrial molded fittings for high density polyethylene (HDPE) pipes.

C. ASTM D3261 – Butt fittings for high density polyethylene (HDPE) pipes.

D. ASTM D2683 – Socket fittings for high density polyethylene (HDPE) pipes.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Protect pipe from the sun, and provide ventilation.

B. Deliver and store valves in shipping containers with labeling in place.

C. Comply with requirements of Section 01600 - Material and Equipment

1.4 SUBMITTALS

A. Submit product data under provisions of Section 01330.

B. Provide data on pipe materials, pipe fittings, valves, and accessories.

PART 2. PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Pipe:

1. Spirolite Corporation
4094 Blue Ridge Industrial Parkway
Norcross, GA 30071

2. Plexco
3240 N. Mannheim Road
Franklin Park, IL 60131

3. Poly Pipe Industries, Inc.
Drawer HH
Gainesville, TX 76240

4. Phillips Driscopipe, Inc.
2929 North Central Expressway
Richardson, TX 75083

B. Substitutions: Under provisions of Section 01600.

2.2 MATERIALS

A. HDPE Piping: As shown on the Drawings. Only new and undamaged materials shall be used.

B. HDPE piping and fittings shall be made from high density, extra high molecular weight material with a broad range of molecular weight distribution designed as PE 3408 with an ASTM D3350 cell classification number of 345464C or 355464C.

C. Joints: Heat fusion process according to MANUFACTURER's Specifications.

D. Perforations: As shown on the Drawings.

E. Valves: As shown on the Drawings.

PART 3. EXECUTION

3.1 INSPECTION

A. Inspect pipe, fittings, and other appurtenances before installation to verify quality of material.

B. Bends to be prefabricated.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs.

B. Remove dirt and foreign material, inside and outside, from pipe and fitting materials before assembly.

C. Make straight field cuts without chipping or cracking pipe.

3.3 BEDDING

A. Excavate pipe trench to lines and grades indicated. Hand trim excavation for placement of pipe to elevations and depths indicated.

B. Place bedding material at trench bottom under provisions of Section 02317.

3.4 INSTALLATION - PIPE

A. Make heat fusion joints in accordance with MANUFACTURER's Specifications.

B. Install pipe and fittings to the line and grade specified on the Drawings.

C. Provide continuous, smooth invert.

D. The maximum allowable tolerance for leachate collection pipe grade is 0.08 feet.

E. Install bedding, backfill, and cover material over pipe as designated in Drawings.

3.5 FIELD QUALITY CONTROL

A. OWNER/ENGINEER to observe prior to backfilling.

B. When fusing joints and fittings, follow MANUFACTURER's recommendations and procedures for heat joining pipes and fittings.

C. Clean all Phase 9 – Cell 2 leachate collection pipe after completing installation of the Select Aggregate Fill drainage layer. Clean collection pipe with a water jet device with a maximum pressure of 10,000 pounds per square inch. Clean the leachate collection pipe the full length with water jet cleaning device cleaning from each cleanout access point. Provide OWNER/ENGINEER with a written statement or letter from the company cleaning the leachate collection pipe indicating the total length of the pipe segment, direction and cleanout access point from which the pipe was cleaned, the length that the pipe was cleaned, any difficulties encountered during the cleaning of the pipe segment, and any relevant observations.

D. Conduct a video camera inspection on entire length of Phase 9 – Cell 2 leachate collection pipe after initial pipe cleaning activities required by paragraph (C.) above. Provide OWNER/ENGINEER with 2 copies of the video. The videos will identify the cleanout access location, direction of videoing, and location of the camera in feet from the access point.

END OF SECTION

SECTION 02911
TOPSOIL

PART 1. GENERAL

1.1 SECTION INCLUDES

A. Strip available Topsoil from excavation area and soil stockpile areas and stockpile at a locations shown on the drawings. Move Topsoil from on site stockpiles and place over finished graded areas to be seeded. Do not place Topsoil to be stockpiled on Select Clay Fill or General Fill stockpiles.

PART 2. PRODUCTS

2.1 MATERIALS

A. Friable, fertile, loamy soil containing an amount of organic matter normal to the region, capable of sustaining healthy plant life.

B. Free from refuse, subsoils, materials toxic to plant growth, and foreign objects.

PART 3. EXECUTION

3.1 PREPARATION

A. Remove vegetation, foreign materials, unsatisfactory or contaminated soils, obstructions, and matter harmful to plant growth from ground surface before placement.

B. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

C. Scarify subsoil to a depth of 3 inches where Topsoil is to be placed. Repeat cultivation in areas where equipment used for hauling and spreading Topsoil has compacted subsoil.

3.2 PLACEMENT

A. Place Topsoil to a uniform depth of 4 inches or as indicated on the drawings.

B. Finish grade to within 0.10 foot of elevations shown on Drawings.

C. Break down clods and lumps.

END OF SECTION