

COMMONWEALTH
OF
MASSACHUSETTS

JOHN W. &
KERRY G.
SHAY

DAVID A. &
ELIZABETH
KROON

DONALD B.
& RUTH ANN
JACKSON

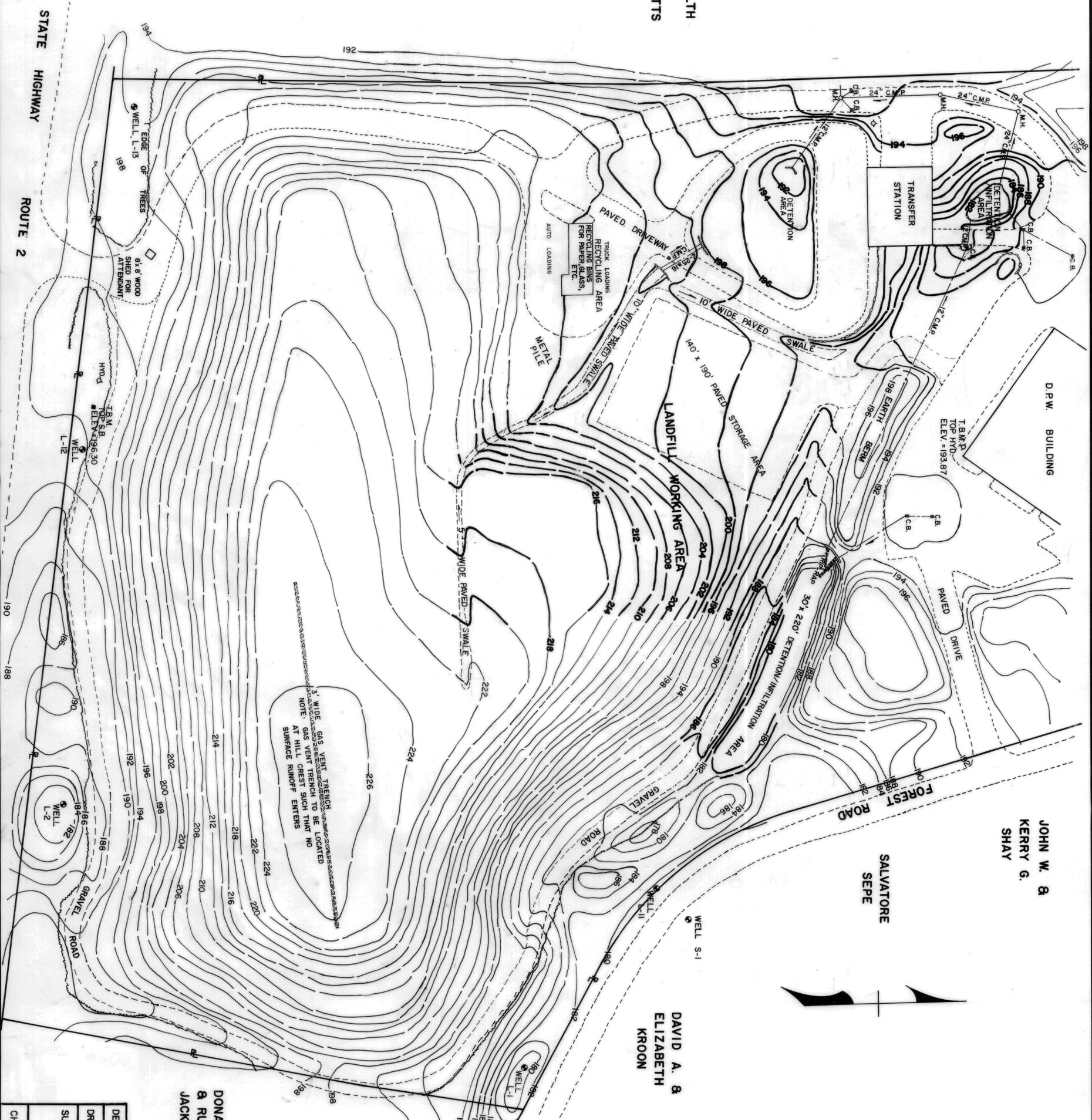
TOWN OF ACTON

NOTES:

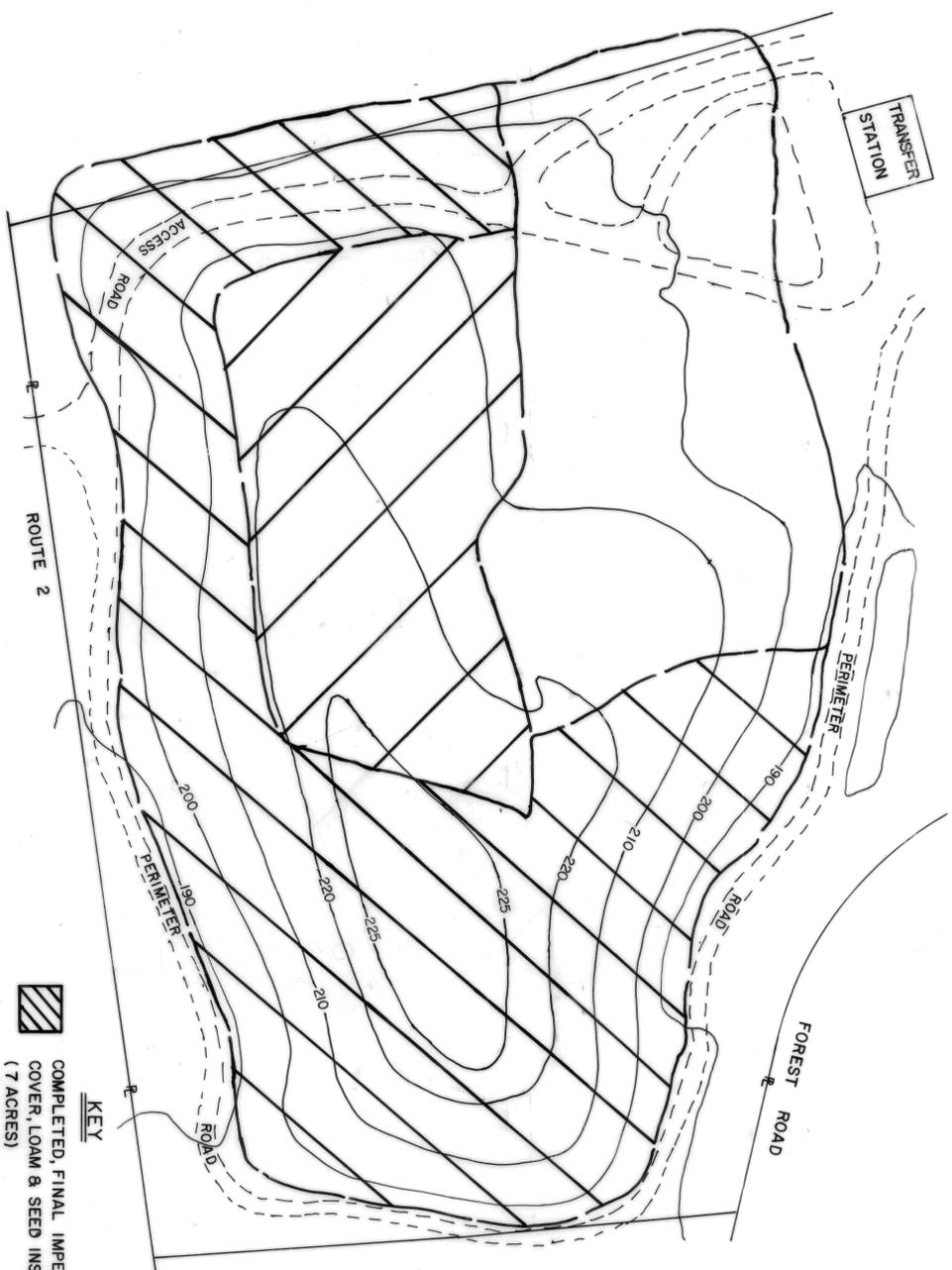
1. PLAN SHOWS FINAL CONTOURS OF FOREST ROAD SANITARY LANDFILL. AREAS SHOWN - 196 - INDICATE EXISTING FINAL CONTOURS. AREAS SHOWN AS - 196 - INDICATE PROPOSED FINAL CONTOURS. EXISTING CONTOURS IN THE PROPOSED AREA ARE NOT SHOWN DUE TO AN ONGOING TRANSFER STATION CONSTRUCTION AND LANDFILL OPERATIONS.
2. MAINTENANCE OF THE SITE WILL BE IN ACCORDANCE WITH "TOWN OF ACTON - FOREST ROAD SANITARY LANDFILL - CLOSURE PLAN - DATED JULY 15, 1985 BY THE ACTON ENGINEERING DEPARTMENT"
3. PAVED STORAGE AREA MAY CHANGE IN SIZE DEPENDING ON THE NEED FOR LANDFILL SPACE. THE SIZE SHOWN IS BASED ON A LANDFILL CLOSURE DATE OF SEPT 1, 1985 WHICH IS THE ESTIMATED DATE THAT THE TOWN WILL BE PREPARED TO TRANSFER ITS WASTE TO THE N.E.S.W. FACILITY.

Eric K. Durling
ERIC K. DURLING, P.E.
DIRECTOR OF PUBLIC WORKS

David F. Abbt
DAVID F. ABBT, P.L.S.
TOWN ENGINEER



DESIGN: E.K.D. & D.K.H.	TOWN OF ACTON ENGINEERING DEPARTMENT
DRAFTING: D.K.H.	FOREST ROAD SANITARY LANDFILL
SURVEY: D.F.A. D.K.H. D.P.R.	CLOSURE PLAN
CHECKED: E.K.D. & D.F.A.	FINAL CONTOUR PLAN
SCALE: 1" = 50'	DATE: JULY 15, 1985



LANDFILL COVER STATUS

AS OF JULY 15, 1985
NOT TO SCALE

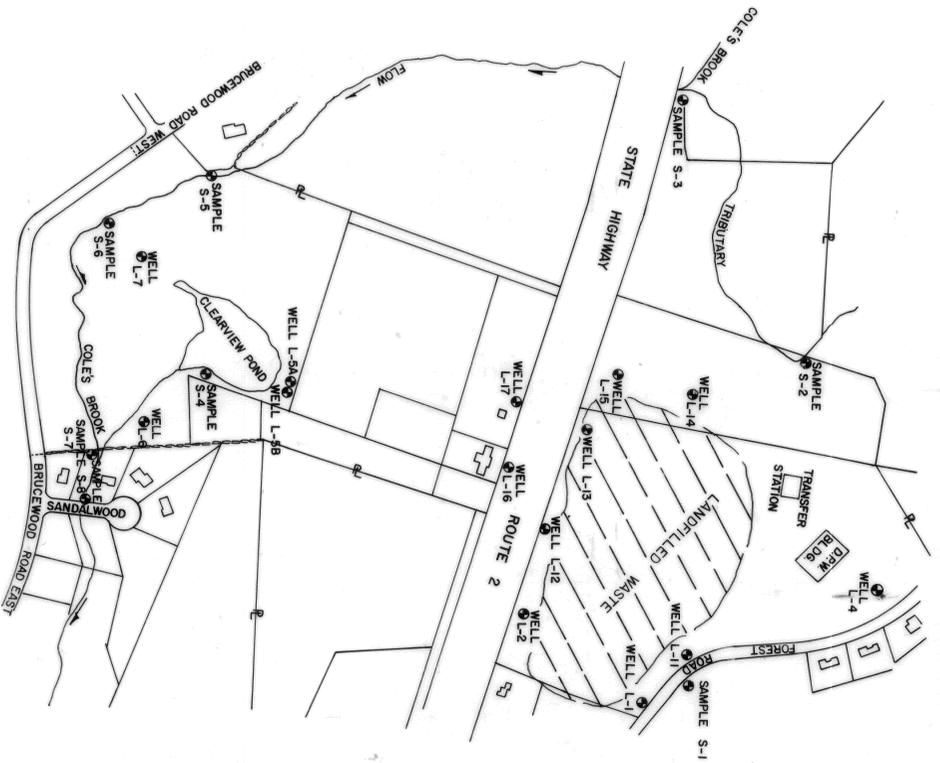
- KEY**
- COMPLETED, FINAL IMPERVIOUS COVER, LOAM & SEED INSTALLED (17 ACRES)
 - FINAL IMPERVIOUS COVER INSTALLED LOAM & SEED TO BE INSTALLED (3 ACRES)
 - DAILY COVER INSTALLED, FINAL COVER, LOAM & SEED TO BE INSTALLED (4 ACRES)

VERTICAL LOCATION OF WELLS & SAMPLES

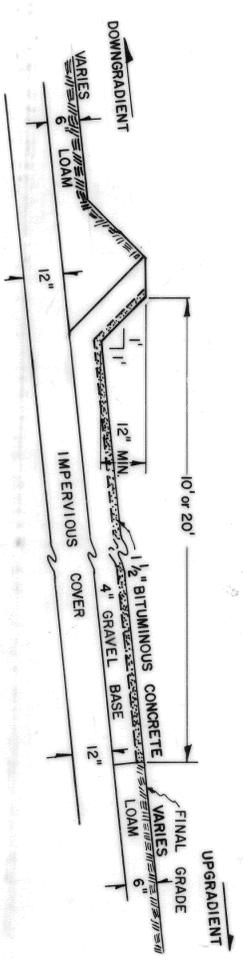
WELL OR SAMPLE NO.	ELEVATION
L-1	178.03
L-2	182.10
L-4	189.26
L-5A	153.36
L-5B	152.60
L-6	147.18
L-7	147.72
L-11	182.48
L-12	197.26
L-13	197.96
L-14	172.71
L-15	171.40
L-16	189.72
L-17	193.78
S-1	174.19
S-2	156.21
S-3	152.04
S-4	148.93
S-5	146.35
S-6	145.78
S-7	145.47
S-8	145.69

NOTES:
ALL ELEVATIONS BASED ON N.G.V.D.
BENCHMARK: GEODETIC SURVEY TRAVERSE DISK 170 C
ELEVATION = 159.34
ELEVATIONS TAKEN TOP LIP OF OUTSIDE CASING
EXCEPT: L-16 TAKEN INSIDE M.H. TOP PLATE WELL
& S-8 TAKEN TOP CULVERT UPSTREAM SIDE

HORIZONTAL LOCATION OF WELLS & SAMPLES

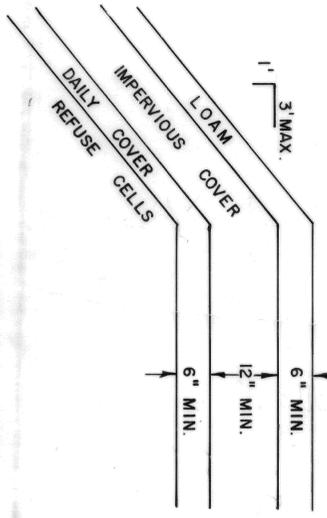


NOTE:
MONITORING WELL LOCATIONS ARE APPROXIMATE



PAVED DRAINAGE SWALE DETAIL

NOT TO SCALE

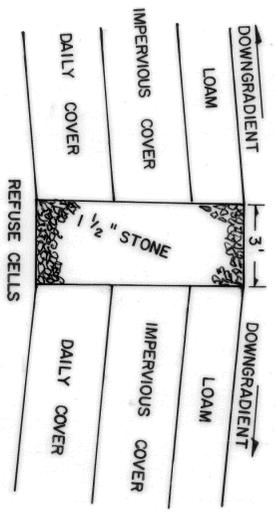


FINAL COVER DETAIL

NOT TO SCALE

Eric K. Durling P.E.
ERIC K. DURLING P.E.
DIRECTOR OF PUBLIC WORKS

David F. Abbt P.L.S.
DAVID F. ABBT P.L.S.
TOWN ENGINEER



GAS VENT TRENCH DETAIL

NOT TO SCALE

DESIGN: E.K.D. & D.K.H.	TOWN OF ACTON ENGINEERING DEPARTMENT
DRAFTING: D.K.H.	FOREST ROAD SANITARY LANDFILL CLOSURE PLAN
SURVEY: D.F.A. D.K.H. D.P.R.	DETAIL PLAN
CHECKED: E.K.D. & D.F.A.	SCALE: AS NOTED
N. B. 45 PGS 31-40 & 43-46	DATE: JULY 15, 1985

GZA
GeoEnvironmental, Inc.

Engineers and
Scientists

July 22, 1999
File No. 14134.50

GZA No. 136

Mr. Robert Bailey
Walsh/O'Connell - A Joint Venture
P.O. Box 130150
Boston, Massachusetts 02113



Re: CA/T Contract C15A3
Vent Building No. 4
Sampling & Testing of Soil

Dear Mr. Bailey:

320 Needham Street
Newton Upper Falls
Massachusetts
02464-1594
617-969-0050
FAX 617-965-7769
<http://www.gza.net>

Attached are the results of laboratory tests performed on a soil sample obtained on 7/12/99 from the bottom of excavation. The sample was taken at approximately column lines 13 and D, at about elevation 65.

Geotechnical and environmental tests were performed in accordance with the requirements of Section 120.020, Art. 3.01.B of the project specifications. Test results are attached along with the procedures used.

In accordance with specification Section 120.020 - Transportation and Disposal of Clay & Till, the material tested is suitable for reuse as capping material at an unlined Massachusetts municipal landfill. As requested, for reference, we have summarized the test results relative to Massachusetts Department of Environmental Protection (DEP) criteria for reuse of soil at municipal landfills (refer to attached Table 1).

Please call me or Bob Palermo with any questions.

Very truly yours,

A Subsidiary of GZA
GeoEnvironmental
Technologies, Inc.

GZA GEOENVIRONMENTAL, INC.

Terese M. Kwiatkowski

Terese M. Kwiatkowski, P.E.
Associate Principal

Attachments

cc: Bob Palermo, GZA
14134.0eu14134-00.sjd\corresp\0en00144.doc

TABLE 1
CA/T C15A3 - VENT BUILDING NO. 4
SUMMARY OF LABORATORY TESTING ON SOIL

TYPE OF TEST (See Note 1)	CRITERIA FOR REUSE AT A MASSACHUSETTS MUNICIPAL LANDFILL (See Note 2)	SAMPLE DATE & APPROX. LOC. 7/12/99 Col: Lines 13 & D, Elev: 65
Atterberg Limits	10% < PI < 40%	PI = 17
Permeability	1×10^{-7} cm/sec (max.)	5.5×10^{-8} cm/sec
Grain Size Analysis:		
% by weight passing No. 200 sieve	40% (min.)	66%
% by weight retained on No. 4 sieve	< 10%	11%
Hydrometer Analysis:		
% by weight that consists of <2um clay-size particles	20% (min.)	30%
Moisture-Content	not specified	$\omega = 16\%$
Moisture-Density	not specified	$\gamma_{\text{max}} = 123 \text{ pcf}, \omega_{\text{opt}} = 13\%$
Unconfined Compressive Strength	not specified	4,688 psf @ 1.9% strain
Total Petroleum Hydrocarbons (TPH)	2,500 mg/kg (max.)	< 10 ug/g (or mg/kg)
Total Arsenic	40 mg/kg (max.)	9.40 mg/kg
Chlorides	not specified	27 mg/l

NOTES:

1. Testing required by specification Section 120.020, Art. 3.01.B.
2. Criteria for allowable contaminant levels of TPH, Total Arsenic and Chlorides based on Massachusetts DEP policy COM-97-001, dated August 15, 1997.
Criteria for all other tests based on DEP Landfill Technical Guidance Manual, Revised May, 1997 for soils used for soil liners.

- B. The Contractor shall obtain samples and perform the following tests on the Clay to be excavated under this Contract, at a frequency of not less than one sample and test per 10,000 cubic yards:

Type of Test	Test Method	
Atterberg Limits	ASTM D423 & D4318	
Lab Permeabilities	USACOE EM 1110-2 1906 App. VII	
Grain Size Analysis	ASTM D422	
Hydrometer Analysis	ASTM D422	
Natural Moisture Content	ASTM D2216	
Moisture-Density Curves	ASTM D1557 Method C	
Unconfined Compressive Strength	ASTM D2166	
Total Petroleum Hydrocarbons (TPH)	EPA Method 418.1/9071	3.03
Total Arsenic (bulk)	EPA Method 1311, 6010/7000	
Chlorides	ASTM D4542	3.04

Lab permeability testing shall be performed at 90 percent modified Proctor and 5 percent above optimum moisture content. Stones shall not be removed from samples before performing grain size analyses, and results shall record the actual percentage of stones retained on the larger screens. A.

- C. The Contractor shall identify the location and elevation from which each Clay sample was obtained, and shall select sample locations evenly distributed across the limits of excavation under this Contract, to ensure that samples are representative of the volume of Clay to be excavated.
- D. The Contractor shall submit all results of Clay testing to the Engineer for review, and shall make all results available to the landfills to which the Contractor proposes to deliver Clay.

3.02 APPROVAL OF REUSE LOCATIONS

- A. Identify all reuse facilities intended for receiving Clay. Reuse facilities in Massachusetts shall be landfills selected by the Contractor from the list of municipal landfills with DEP-approved stockpile plans. Reuse locations outside Massachusetts shall be landfills owned by a public entity (i.e., a municipality, solid waste district, or state agency). B.
- B. Submit to the Engineer, as part of Submittals, the following facility information for each landfill the Contractor intends to use: 3.05
 1. Facility name and address A.
 2. Name, title, address, and telephone number of the contact person
 3. All permits, licenses, letters of approval, and other authorizations to operate that the facility holds pertaining to the receipt and management of Clay. B.
 4. A written confirmation from the facility indicating that the facility is permitted to accept and will accept Clay of the general quality and quantity described in this Section; the hours when the Contractor will be permitted to deliver Clay and operate vehicles and machinery at the site; and the volume of Clay that can be accepted from this Contract on a weekly and total basis. For Massachusetts landfills, the total volume of Clay each facility can accept shall not exceed the amount specified in the facility's DEP-approved stockpile plan; for landfills outside Massachusetts, the total volume each facility can accept shall not exceed 3,000 cubic yards. C.



COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

ARGEO PAUL CELLUCCI
Governor

TRUDY COXE
Secretary
DAVID B. STRUHS
Commissioner

REUSE AND DISPOSAL OF CONTAMINATED SOIL
AT MASSACHUSETTS LANDFILLS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
POLICY # COMM-97-001

(SUPERSEDES POLICY # BWP-94-037)

This Policy provides guidance to the regulated community about the Department of Environmental Protection's requirements, standards, and approvals for testing, tracking, transport, and reuse or disposal of contaminated soil at Massachusetts permitted landfills. This Policy supersedes Department Policy BWP-94-037.

[15 Aug 97]

Date

[Signature on Original]

Edward Kunce
Deputy Commissioner

CONTAMINANT	Reuse Levels (mg/kg)*	
	Lined Landfills	Unlined Landfill
Total Arsenic	40	40
Total Cadmium	80	30
Total Chromium	1,000	1,000
Total Lead	2,000	1,000
Total Mercury	10	10
Total Petroleum Hydrocarbons (TPH)	5,000	2,500
Total PCBs ^b	< 2	< 2
Total SVOCs ^c	100	100
Total VOCs ^d	10	4
Conductivity ^e (umhos/cm)	8,000 umhos/cm	4,000 umhos/cm
Listed or Characteristic Hazardous Waste (TCLP) ^f	NONE	NONE

TABLE I NOTES:

- a The reuse levels are expressed as total levels in mg/kg and apply to reuse of soil as daily cover, intermediate cover, and pre-capping contour material at lined landfills and unlined landfills as described in this Policy.
- b Total concentrations of polychlorinated biphenyls EPA Method 8080.
- c Total concentrations of compounds listed in EPA Method 8270.
- d Total concentration of compounds listed in EPA Method 8260.
- e For soil which may be expected to contain elevated NaCl.
- f TCLP testing shall be performed for metals or organic compounds when the total concentrations in the soil are above the theoretical levels at which the TCLP criteria may be exceeded. For guidance parties shall consult United States Environmental Protection Agency, Memorandum #36, "Notes on RCRA Methods and QA Activities", pp. 19-21, Gail Hanson, January 12, 1993.

[Please note that the methods specified in footnotes d, e, and f indicate the universe of chemicals to be added up in calculating the total concentrations for these classes of contaminants. Section 5.0 of this Policy provides guidance for determining which specific chemicals must be considered chemicals of concern (e.g., contaminants) within the soil. This Policy does not specify the analytical test methods to be used to quantify the specific contaminants. Readers can consult 310 CMR 40.0017 Environmental Sample Collection and Analysis, 310 CMR 30.110 Criteria, Procedures for Determining Which Wastes are to be Regulated as Hazardous Waste or Non-Hazardous Waste and 310 CMR 30.151 Representative Sampling Methods for additional information which may be applicable to the selection of appropriate sampling and analytical methods.]

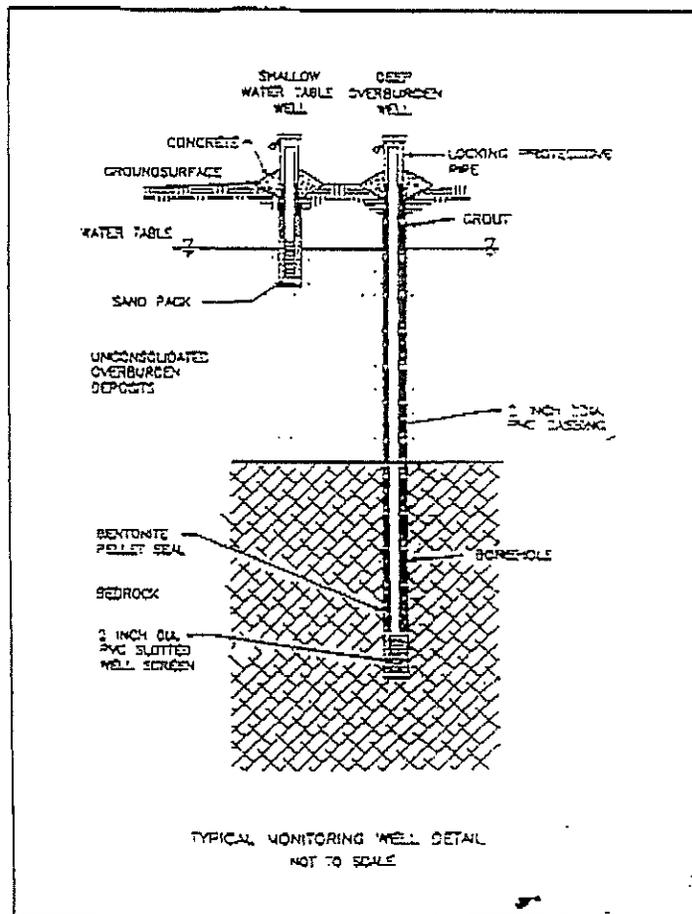


COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

WILLIAM F. WELD
Governor

DAVID B. STRUHS
Commissioner

LANDFILL TECHNICAL GUIDANCE MANUAL



REVISED
MAY, 1997

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
Department of Environmental Protection
Division of Solid Waste Management

must be given to the method of compaction used. The selected compaction method should be one which has no adverse effects on the physical properties of the soil layer.

The soil liner shall be emplaced at optimum moisture content for proper compaction, consistent, and have a uniform thickness across the entire liner. A quality assurance/quality control program (QA/QC) must be developed for the installation of the liner. QA/QC is addressed later in this guidance document.

B. Design Considerations

Soils used for liners should have the properties specified in Table 1-1 to meet the design standards specified in the regulations at 310CMR19.112.

Table 1-1: Properties for Soils Used for Soil Liners

- Maximum hydraulic conductivity of 1.0×10^{-7} cm/sec
 - Minimum of 40% of the soil by weight, should pass a #200 sieve
 - Minimum of 20% of the soil by weight should consist of <2um clay size particles
 - Plasticity index should be 10% or greater, but less than 40%
 - Density should be, at minimum, 95% standard, or 90% Modified Proctor density
 - Maximum clod size should not exceed 1/2 of the lift thickness
 - Maximum rock size should not exceed 3/4 - 1 inch in top 6" of liner and < 3" in lower 18"
 - Coarse fragments < 10% by weight (retained on a #4 sieve)
-

C. Admixtures

An admixture is a combination of native soils and a bentonite-type clayey material which when added to the native soil results in a low permeability material.

Construction of liner systems or portions of liner systems using admixtures should conform to the following:

- Bentonite added to native soils should be powdered to achieve the best mixing possible.
- A pugmill should be used to mix the soil and bentonite.
- A liner constructed of an admixture of bentonite and native soils must have a minimum thickness of 24 inches.

LABORATORY TEST PROCEDURES

CA/T 15A3
BOSTON, MA.
14134.0.

1. The following tests were performed with the noted ASTM test designation:

<u>TEST</u>	<u>ASTM DESIGNATION</u>
Grain Size	D422-63 (See Item 2)
Moisture Content	D2216-90
Moisture Density Relationships	D1557-91
Permeability Test	(see Item 3)
Unconfined Compressive Strength	D2166-85 (see Item 4)
Liquid and Plastic Limits	D4318-84

2. Test Procedures for Combined Sieve and Hydrometer Analysis

When both sieve and hydrometer analyses are required a combined mechanical analysis is performed. This procedure is, in part, similar to ASTM's D421-85 (Dry Preparation of Soil Sample for Particle-Size Analysis and Determination of Soil Constants).

A representative portion of the minus No. 4 material was mixed with 125 mls of 4% dispersing agent and 125 mls of distilled water for a total volume of 250 mls. This solution was soaked for a period of not less than 16 hours. At the end of soaking period, test samples were poured into a mixer, stirred for one minute, decanted into an empty 1000ml graduated cylinder, and filled with distilled water to the required volume. Hydrometer analysis of these samples were performed in the conventional manner. After a period of approx. 24 hours the sample was washed through a # 200 sieve and the fines were removed. Coarser fractions remaining after washing were then oven dried and sieved through a nest of screens (Nos 10, 20, 40, 60, 100 and 200).

3. Test Procedures for Permeability Tests

Test samples were run in general agreement with ASTM Designation D-5084 "Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter". Tests were on reconstituted samples to specified densities approximately equivalent to 92 percent of modified proctor (ASTM D1557-91 Method C) at about 2-3 percent wet of optimum water content.

Reconstituted test specimens were prepared in a manner similar to that described in section 7.3 of the standard. A specified amount of soil at the appropriate water content was weighed in five equal portions. Each portion was tamped by a

means of mechanical tamping foot to a specified height in the mold. The final test samples all had a length to diameter ratio of equal to or greater than one. After 5 layers were compacted the sample was weighed dimensioned and its unit weight verified. After verification of the unit weight, the test sample was placed on a previously de-aired, modified triaxial cell base and porous stone. A membrane was added and the sample sealed at the top and bottom by 'O' rings.

Samples were back pressured under a small effective stress to create complete saturation of the samples. The chamber pressure was then increased such that the desired consolidation effective stress was obtained. This effective consolidation stress was allowed to act approximately 24 hours, or until consolidation was complete. During consolidation phase, readings of volume change versus time were recorded.

After consolidation, the response of the soil samples was checked by increasing the cell pressure and monitoring the pore pressure. Where required, additional back pressure was applied so as to achieve a pore pressure response equal to or greater than 95 percent.

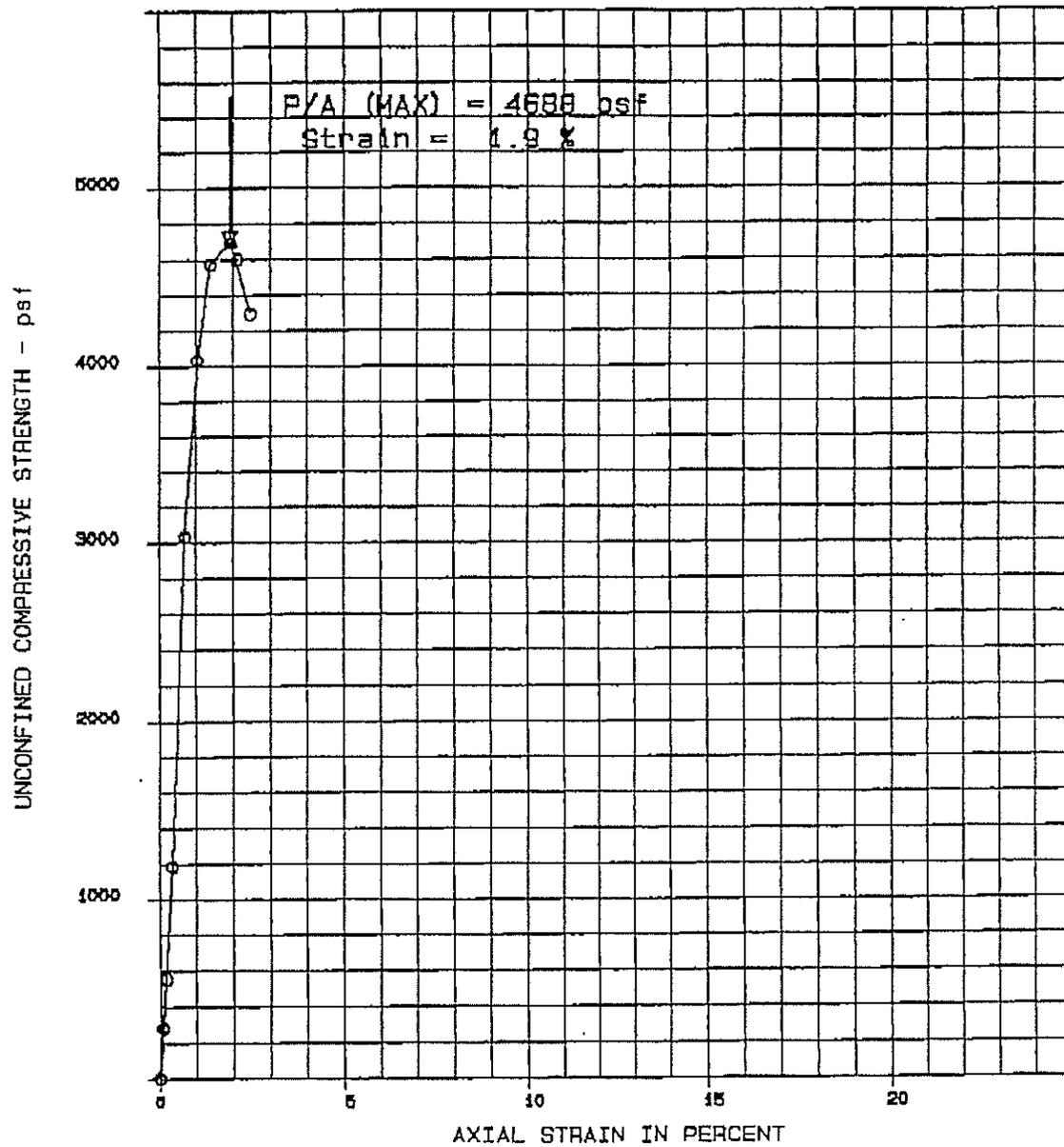
When the desired saturation was achieved, the samples were attached to the permeability apparatus and tested in general agreement with Method C "Test with increasing Tailwater Level". The initial hydraulic gradient for the tests ranged from to . Records of head change vs. time were recorded for the test with the permeability value reported being the average of several consistent values obtained during the latter stages of the test.

4. Test Procedures for Unconfined Compressive Strength of Soils Addenda)

The procedure outlined under ASTM designation D2166-66 was used as a guide during unconfined compression tests. Samples were reconstituted to approximately 92% of maximum compaction and 2-3 percent wet of optimum. Samples were approximately 2.80 inches diameter and 6.00 inches length. Water contents were obtained from adjacent to the test sample, the specimen's height was determined, and its dimensions verified.

The sample was set up on a base platen, fitted with a top cap, and placed in a loading apparatus. The test was run under strain control conditions, loading the sample at a rate of 0.5 percent per minute. The applied load was measured through a proving ring, and recorded at predetermined strain readings.

When failure was reached, the sample was removed from the loading apparatus, the entire weight obtained, and its water content determined.



SKETCH
AT
FAILURE



TEST NO. U16.1

TEST NO.	U16.1
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INITIAL CONDITIONS	INITIAL WATER CONTENT, %	15.1
	INITIAL DRY UNIT WEIGHT, pcf	113.3
	SAMPLE HEIGHT & DIAMETER in.	6.68 2.88

RATE OF STRAIN PERCENT PER MINUTE	0.50
--------------------------------------	------

SOIL DESCRIPTION:	Gray CLAY & SILT
LIGUID LIMIT	34 %
PLASTIC LIMIT	17 %
SPECIFIC GRAVITY	2.70
SAMPLE PREPARATION	

CA/T C15A3
BOSTON, MA.
UNCONFINED COMPRESSION
TESTS

BORING NO.
SAMPLE
DEPTH
TECH.
REVIEWER

EL. 85
MST

TEST SERIES
NO. 16
DATE JULY 88
FILE 14134

FIGURE

GZA GeoEnvironmental, Inc.
320 Needham Street
Newton Upper Falls, MA 02464

ANALYTICAL REPORT

GZA GeoEnvironmental, Inc.
320 Needham Street
Newton Upper Falls, MA 02464

T. Kwiatkowski

Project Name: CA/T 15A3
Project No.: 14134.00

Date Received: 7/12/99
Date Reported: 7/20/99
Work Order No.: 9907-00076

Sample ID: GTL-071299
Sample Date: 7/12/1999

Sample No.: 001

Test Performed	Method	Results	Units	Tech	Analysis Date
TOTAL PETROLEUM HYDROCARBONS	D3328/EPA 8100			MAL	7/13/99
Hydrocarbon Content	D3328/EPA 8100	< 10	ug/g	MAL	7/13/99
Quantitation Limit (total product)	D3328/EPA 8100	10	ug/g-lmt	MAL	7/13/99
Quantitation Limit (individual product)	D3328/EPA 8100	0.50	ug/g-lmt	MAL	7/13/99
Surrogate:	D3328/EPA 8100				
***p-Terphenyl	D3328/EPA 8100	70.1	% R	MAL	7/13/99
Extraction		1.0	DF	MAL	7/13/99
METALS					
Arsenic	EPA 7060	9.40	mg/Kg	AJY	7/15/99
PERCENT SOLID		88.1	%	MJS	7/13/99

GZA GeoEnvironmental, Inc.
ANALYTICAL REPORT

Project Name: CA/T 15A3
Project No.: 14134.00

Work Order No.: 990700076

Organic Data Authorized By: *[Signature]*

Inorganic Data Authorized By: *[Signature]*

% R = % Recovery
DF = Dilution Factor
DO = Diluted Out

Soil data is reported on a dry weight basis unless otherwise specified.

Method 8260: The current version of the method is 8260B.
Method 8021: The current version of the method is 8021B.
Method 8270: The current version of the method is 8270C.

Laboratory Identification Numbers:

MA: MA092 NH: 2028
CT: PH0579 NJ: 59759
NY: 11063 RI: A46

Please note that the laboratory signed copy of the chain of custody record is an integral part of the data report.



Matrix Analytical, Inc.
 106 South Street
 Hopkinton, MA 01748-2295
 1 (800) 362-8749

FINAL REPORT

Client Information

Account:	GZA GeoEnvironmental, Inc.	Project Name:	CAT C15A3 (07/13/1999)
Address:	320 Needham Street	Project Number:	14134.00
	Newton Upper Falls, MA 02164	Project Manager:	T Kwiatkowski
		Sampler Name:	JMM

Sample Information

Lab ID:	91942641-001	Date Sampled:	07/12/99 14:00
Client ID:	GTZ-071299	Date Received:	07/13/99 :0
Matrix:	Soil	Date Reported:	07/19/99

Analytical Parameter	Result	Unit	Detection Limit	Method No.	Analyst	Date Analyzed
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SAMPLE PREPARATION

ASTM Shake Extraction 07/15/99

D3987-Mod.

This method is not intended to simulate site-specific leaching conditions. Rather, the extraction procedure uses the soil sample as the dominant factor in the determination of pH and other inorganic components. The method is performed using a 1:20 ratio of solid to DI water and results are reported on a wet weight basis. The percent moisture has been provided for further calculations.

MISCELLANEOUS TESTING

Chloride	27	mg/l	1	4500-CL-C	jb	07/16/99
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Matrix Analytical, Inc.
106 South Street
Hopkinton, MA 01748-2295
1 (800) 362-8749

F I N A L R E P O R T

Client Information

Account: GZA GeoEnvironmental, Inc.
Address: 320 Needham Street
Newton Upper Falls, MA 02164

Project Name: CA/T C15A3 (07/13/1999)
Project Number: 14134.00
Project Manager: T Kwiatkowski
Sampler Name:

Sample Information

Lab ID: 91942641-002
Client ID: QC Report-Soil
Matrix: Soil

Date Sampled: / / :
Date Received: 07/13/99 : 0
Date Reported: 07/19/99

Analytical Parameter	Result	Unit	Detection Limit	Method No.	Analyst	Date Analyzed

METHOD SUMMARIES

NOTE: Analytical results have been corrected and are reported on a dry weight basis. If required, detection limits can also be corrected to dry weight using the percent moisture data included in this report.

METHOD REFERENCES

1. Test Methods For Evaluating Solid Waste: Physical Chemical Methods. EPA SW 846. Rev. December 1996.
2. Methods For Chemical Analysis of Water and Wastes. EPA 600/4-79-200. Revised March 1983.
3. Standard Methods For Examination of Water and Wastewater. APHA-AWWA-WACP., 18th Edition. 1992.
4. EPA Methods For The Determination of Organic Compounds in Drinking Water.

RECEIVED

September 2, 1999
File No. 14134.50

SEP 02 1999

GZA No. 152

Mr. Paul Praderio
Walsh/O'Connell - A Joint Venture
P.O. Box 130150
Boston, Massachusetts 02113

WALSH/O'CONNELL



Re: CA/T Contract C15A3
Vent Building No. 4
Sampling & Testing of Soil

SPM	_____	JB	_____
GSUP	_____	GC	_____
BB	_____	PP	_____
MA	_____	DG	_____
CR	_____	AN	_____
DL	_____	RJ	_____
BM	_____	KC	_____

320 Needham Street
Newton Upper Falls
Massachusetts
02464-1594
617-969-0050
FAX 617-965-7769
<http://www.gza.net>

Dear Mr. Praderio:

Attached are the results of laboratory tests performed on two soil samples obtained on 8/18/99 from the bottom of excavation. The samples were taken at approximately column lines 5.5 and D, at about elevation 53 and approximately column lines 7.5 and D, at about elevation 58.

Geotechnical and environmental tests were performed in accordance with the requirements of Section 120.020, Art. 3.01.B of the project specifications. Test results are attached along with the procedures used.

In accordance with specification Section 120.020 – Transportation and Disposal of Clay & Till, the material tested is suitable for reuse as capping material at an unlined Massachusetts municipal landfill. As requested, for reference, we have summarized the test results relative to Massachusetts Department of Environmental Protection (DEP) criteria for reuse of soil at municipal landfills (refer to attached Table 1).

Please call me or Bob Palermo with any questions.

Very truly yours,

GZA GEOENVIRONMENTAL, INC.

Terese M. Kwiatkowski

Terese M. Kwiatkowski, P.E.
Associate Principal

Attachments

cc: Bob Palermo, GZA

I:\14134.0eu\14134-00.sjd\corresp\0eu00149.doc

A Subsidiary of GZA
GeoEnvironmental
Technologies, Inc.

ACTON
ENGINEERING DEPT.
RECEIVED

SEP 9 1999

TABLE 1

CA/T C15A3 - VENT BUILDING NO. 4
SUMMARY OF LABORATORY TESTING ON SOIL

TYPE OF TEST (See Note 1)	CRITERIA FOR REUSE AT A MASSACHUSETTS MUNICIPAL LANDFILL (See Note 2)	SAMPLE DATE & APPROX. LOC.		SAMPLE DATE & APPROX. LOC.
		08/18/1999 Col. Lines 5.5 & D, Elev. 53	08/18/1999 Col. Lines 7.5 & D, Elev. 58	
Atterberg Limits	10% < PI < 40%	PI = 22	PI = 16	
Permeability	1×10^{-7} cm/sec (max.)	5.0×10^{-8} cm/sec	2.0×10^{-8} cm/sec	
Grain Size Analysis:				
% by weight passing No. 200 sieve	40% (min.)	100%	86%	
% by weight retained on No. 4 sieve	< 10%	0%	2%	
Hydrometer Analysis:				
% by weight that consists of <2um clay-size particles	20% (min.)	59%	34%	
Moisture-Content	not specified	$\omega = 35\%$	$\omega = 19\%$	
Moisture-Density	not specified	$\gamma_{dmax} = 112.5$ pcf, $\omega_{opt} = 17\%$	$\gamma_{dmax} = 125$ pcf, $\omega_{opt} = 12.5\%$	
Unconfined Compressive Strength	not specified	6,519 psf @ 2.8% strain	5,574 psf @ 5.2% strain	
Total Petroleum Hydrocarbons (TPH)	2,500 mg/kg (max.)	21 ug/g (or mg/kg)	< 10 ug/g (or mg/kg)	
Total Arsenic	40 mg/kg (max.)	< 21.2 mg/kg	< 17.5 mg/kg	
Chlorides	not specified	ND mg/l	ND mg/l	

NOTES:

1. Testing required by specification Section 120.020, Art. 3.01.B.
2. Criteria for allowable contaminant levels of TPH, Total Arsenic and Chlorides based on Massachusetts DEP policy COMM-97-001, dated August 15, 1997.
Criteria for all other tests based on DEP Landfill Technical Guidance Manual, Revised May, 1997 for soils used for soil liners.

SEP

9 1999



- B. The Contractor shall obtain samples and perform the following tests on the Clay to be excavated under this Contract, at a frequency of not less than one sample and test per 10,000 cubic yards:

<u>Type of Test</u>	<u>Test Method</u>	
Atterberg Limits	ASTM D423 & D4318	
Lab Permeabilities	USACOE EM 1110-2 1906 App. VII	
Grain Size Analyses	ASTM D422	
Hydrometer Analyses	ASTM D422	
Natural Moisture Content	ASTM D2216	
Moisture-Density Curves	ASTM D1557 Method C	
Unconfined Compressive Strength	ASTM D2166	
Total Petroleum Hydrocarbons (TPH)	EPA Method 418.1/9071	3.03
Total Arsenic (bulk)	EPA Method 1311, 6010/7000	
Chlorides	ASTM D4542	3.04

Lab permeability testing shall be performed at 90 percent modified Proctor and 5 percent above optimum moisture content. Stones shall not be removed from samples before performing grain size analyses, and results shall record the actual percentage of stones retained on the larger screens.

- C. The Contractor shall identify the location and elevation from which each Clay sample was obtained, and shall select sample locations evenly distributed across the limits of excavation under this Contract, to ensure that samples are representative of the volume of Clay to be excavated.
- D. The Contractor shall submit all results of Clay testing to the Engineer for review, and shall make all results available to the landfills to which the Contractor proposes to deliver Clay.

3.02 APPROVAL OF REUSE LOCATIONS

- A. Identify all reuse facilities intended for receiving Clay. Reuse facilities in Massachusetts shall be landfills selected by the Contractor from the list of municipal landfills with DEP-approved stockpile plans. Reuse locations outside Massachusetts shall be landfills owned by a public entity (i.e., a municipality, solid waste district, or state agency).
- B. Submit to the Engineer, as part of Submittals, the following facility information for each landfill the Contractor intends to use:
1. Facility name and address
 2. Name, title, address, and telephone number of the contact person
 3. All permits, licenses, letters of approval, and other authorizations to operate that the facility holds pertaining to the receipt and management of Clay.
 4. A written confirmation from the facility indicating that the facility is permitted to accept and will accept Clay of the general quality and quantity described in this Section; the hours when the Contractor will be permitted to deliver Clay and operate vehicles and machinery at the site; and the volume of Clay that can be accepted from this Contract on a weekly and total basis. For Massachusetts landfills, the total volume of Clay each facility can accept shall not exceed the amount specified in the facility's DEP-approved stockpile plan; for landfills outside Massachusetts, the total volume each facility can accept shall not exceed 3,000,000 cubic yards.



COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

ARGEO PAUL CELLUCCI
Governor

TRUDY COXE
Secretary

DAVID B. STRUHS
Commissioner

REUSE AND DISPOSAL OF CONTAMINATED SOIL
AT MASSACHUSETTS LANDFILLS
DEPARTMENT OF ENVIRONMENTAL PROTECTION

POLICY # COMM-97-001

(SUPERSEDES POLICY # BWP-94-037)

This Policy provides guidance to the regulated community about the Department of Environmental Protection's requirements, standards, and approvals for testing, tracking, transport, and reuse or disposal of contaminated soil at Massachusetts permitted landfills. This Policy supersedes Department Policy BWP-94-037.

[15 Aug 97]

Date

[Signature on Original]

Edward Kunce
Deputy Commissioner

CONTAMINANT	Reuse Levels (mg/kg) ^a	
	Lined Landfills	Unlined Landfill
Total Arsenic	40	40
Total Cadmium	80	30
Total Chromium	1,000	1,000
Total Lead	2,000	1,000
Total Mercury	10	10
Total Petroleum Hydrocarbons (TPH)	5,000	2,500
Total PCBs ^b	< 2	< 2
Total SVOCs ^c	100	100
Total VOCs ^d	10	4
Conductivity ^e (umhos/cm)	8,000 umhos/cm	4,000 umhos/cm
Listed or Characteristic Hazardous Waste (TCLP) ^f	NONE	NONE

TABLE I NOTES:

- a The reuse levels are expressed as total levels in mg/kg and apply to reuse of soil as daily cover, intermediate cover, and pre-capping contour material at lined landfills and unlined landfills as described in this Policy.
- b Total concentrations of polychlorinated biphenyls EPA Method 8080.
- c Total concentrations of compounds listed in EPA Method 8270.
- d Total concentration of compounds listed in EPA Method 8260.
- e For soil which may be expected to contain elevated NaCl.
- f TCLP testing shall be performed for metals or organic compounds when the total concentrations in the soil are above the theoretical levels at which the TCLP criteria may be exceeded. For guidance parties shall consult United States Environmental Protection Agency, Memorandum #36, "Notes on RCRA Methods and QA Activities", pp. 19-21, Gail Hanson, January 12, 1993.

[Please note that the methods specified in footnotes d, e, and f indicate the universe of chemicals to be added up in calculating the total concentrations for these classes of contaminants. Section 5.0 of this Policy provides guidance for determining which specific chemicals must be considered chemicals of concern (e.g., contaminants) within the soil. This Policy does not specify the analytical test methods to be used to quantify the specific contaminants. Readers can consult 310 CMR 40.0017 Environmental Sample Collection and Analysis, 310 CMR 30.110 Criteria, Procedures for Determining Which Wastes are to be Regulated as Hazardous Waste or Non-Hazardous Waste and 310 CMR 30.151 Representative Sampling Methods for additional information which may be applicable to the selection of appropriate sampling and analytical methods.]

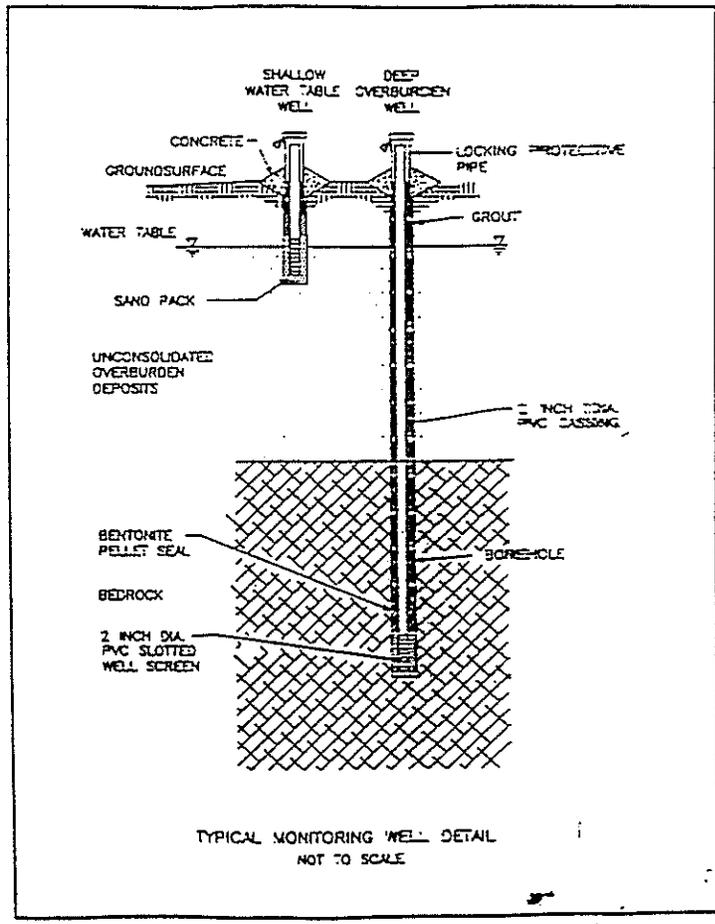


COMMONWEALTH OF MASSACHUSETTS
 EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
 DEPARTMENT OF ENVIRONMENTAL PROTECTION
 ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

WILLIAM F. WELD
 Governor

DAVID B. STRUHS
 Commissioner

LANDFILL TECHNICAL GUIDANCE MANUAL



REVISED
 MAY, 1997

EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
 Department of Environmental Protection
 Division of Solid Waste Management

must be given to the method of compaction used. The selected compaction method should be one which has no adverse effects on the physical properties of the soil layer.

The soil liner shall be emplaced at optimum moisture content for proper compaction, consistent, and have a uniform thickness across the entire liner. A quality assurance/quality control program (QA/QC) must be developed for the installation of the liner. QA/QC is addressed later in this guidance document.

B. Design Considerations

Soils used for liners should have the properties specified in Table 1-1 to meet the design standards specified in the regulations at 310CMR19.112.

Table 1-1: Properties for Soils Used for Soil Liners

- Maximum hydraulic conductivity of 1.0×10^{-7} cm/sec
- Minimum of 40% of the soil by weight, should pass a #200 sieve
- Minimum of 20% of the soil by weight should consist of <2um clay size particles
- Plasticity index should be 10% or greater, but less than 40%
- Density should be, at minimum, 95% standard, or 90% Modified Proctor density
- Maximum clod size should not exceed 1/2 of the lift thickness
- Maximum rock size should not exceed 3/4 - 1 inch in top 6" of liner and < 3" in lower 18"
- Coarse fragments < 10% by weight (retained on a #4 sieve)

C. Admixtures

An admixture is a combination of native soils and a bentonite-type clayey material which when added to the native soil results in a low permeability material.

Construction of liner systems or portions of liner systems using admixtures should conform to the following:

- Bentonite added to native soils should be powdered to achieve the best mixing possible.
- A pugmill should be used to mix the soil and bentonite.
- A liner constructed of an admixture of bentonite and native soils must have a minimum thickness of 24 inches.

LABORATORY TEST PROCEDURES

CA/T 15A3
BOSTON, MA.
14134.0.

1. The following tests were performed with the noted ASTM test designation:

<u>TEST</u>	<u>ASTM DESIGNATION</u>
Grain Size	D422-63 (See Item 2)
Moisture Content	D2216-90
Moisture Density Relationships	D1557-91
Permeability Test	(see Item 3)
Unconfined Compressive Strength	D2166-85 (see Item 4)
Liquid and Plastic Limits	D4318-84

2. Test Procedures for Combined Sieve and Hydrometer Analysis

When both sieve and hydrometer analyses are required a combined mechanical analysis is performed. This procedure is, in part, similar to ASTM's D421-85 (Dry Preparation of Soil Sample for Particle-Size Analysis and Determination of Soil Constants).

A representative portion of the minus No. 4 material was mixed with 125 mls of 4% dispersing agent and 125 mls of distilled water for a total volume of 250 mls. This solution was soaked for a period of not less than 16 hours. At the end of soaking period, test samples were poured into a mixer, stirred for one minute, decanted into an empty 1000ml graduated cylinder, and filled with distilled water to the required volume. Hydrometer analysis of these samples were performed in the conventional manner. After a period of approx. 24 hours the sample was washed through a # 200 sieve and the fines were removed. Coarser fractions remaining after washing were then oven dried and sieved through a nest of screens (Nos 10, 20, 40, 60, 100 and 200).

3. Test Procedures for Permeability Tests

Test samples were run in general agreement with ASTM Designation D-5084 "Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter". Tests were on reconstituted samples to specified densities approximately equivalent to 92 percent of modified proctor (ASTM D1557-91 Method C) at about 4.5 percent wet of optimum water content.

Reconstituted test specimens were prepared in a manner similar to that described in section 7.3 of the standard. A specified amount of soil at the appropriate water content was weighed in five equal portions. Each portion was tamped by a

means of mechanical tamping foot to a specified height in the mold. The final test samples all had a length to diameter ratio of equal to or greater than one. After 5 layers were compacted the sample was weighed dimensioned and its unit weight verified. After verification of the unit weight, the test sample was placed on a previously de-aired, modified triaxial cell base and porous stone. A membrane was added and the sample sealed at the top and bottom by 'O' rings.

Samples were back pressured under a small effective stress to create complete saturation of the samples. The chamber pressure was then increased such that the desired consolidation effective stress was obtained. This effective consolidation stress was allowed to act approximately 24 hours, or until consolidation was complete. During consolidation phase, readings of volume change versus time were recorded.

After consolidation, the response of the soil samples was checked by increasing the cell pressure and monitoring the pore pressure. Where required, additional back pressure was applied so as to achieve a pore pressure response equal to or greater than 95 percent.

When the desired saturation was achieved, the samples were attached to the permeability apparatus and tested in general agreement with Method C "Test with increasing Tailwater Level". The initial hydraulic gradient for the tests ranged from to . Records of head change vs. time were recorded for the test with the permeability value reported being the average of several consistent values obtained during the latter stages of the test.

4. Test Procedures for Unconfined Compressive Strength of Soils Addenda)

The procedure outlined under ASTM designation D2166-66 was used as a guide during unconfined compression tests. Samples were reconstituted to approximately 92% of maximum compaction and 2-3 percent wet of optimum. Samples were approximately 2.80 inches diameter and 6.00 inches length. Water contents were obtained from adjacent to the test sample, the specimen's height was determined, and its dimensions verified.

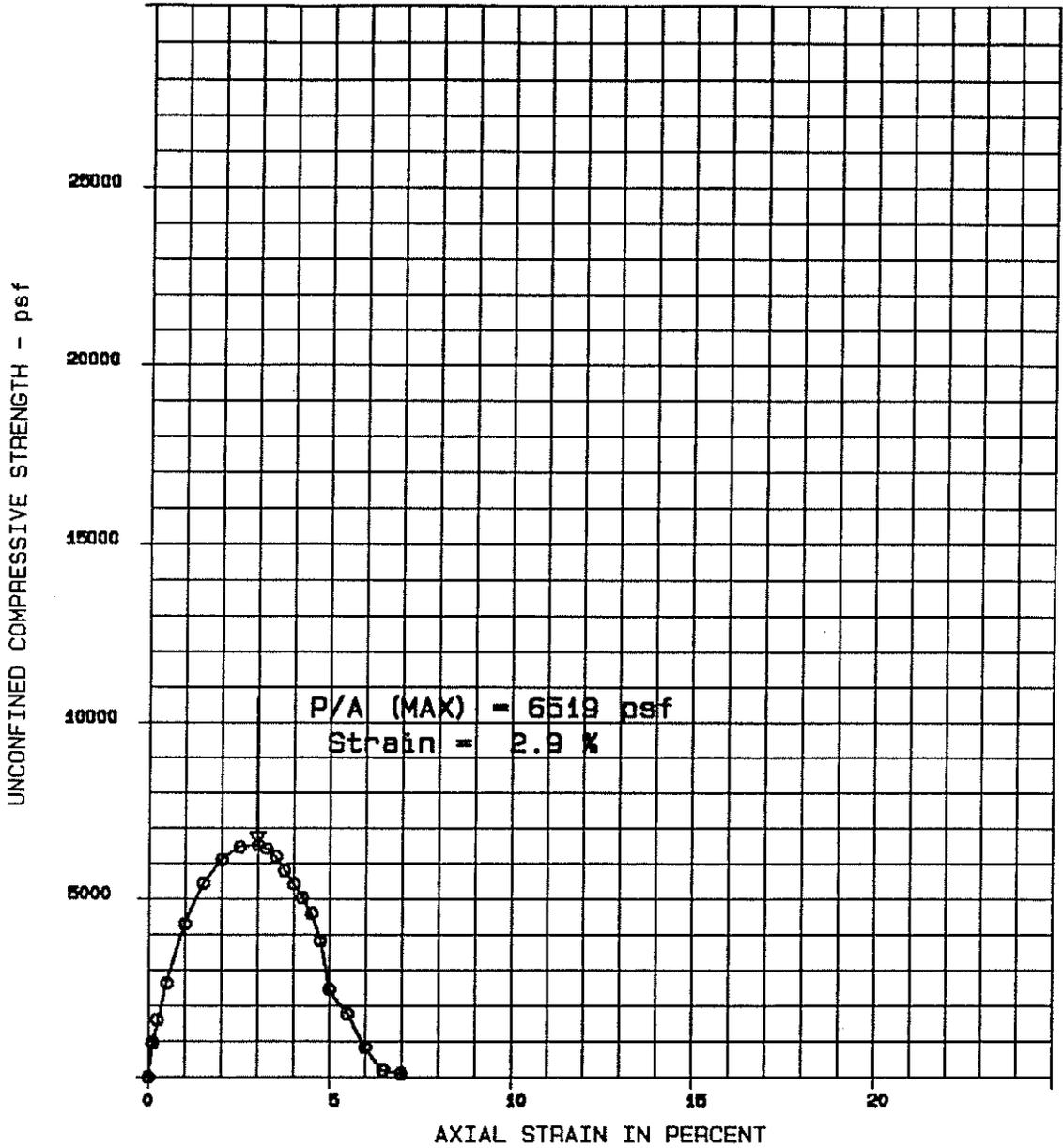
The sample was set up on a base platen, fitted with a top cap, and placed in a loading apparatus. The test was run under strain control conditions, loading the sample at a rate of 0.5 percent per minute. The applied load was measured through a proving ring, and recorded at predetermined strain readings.

When failure was reached, the sample was removed from the loading apparatus, the entire weight obtained, and its water content determined.

SKETCH
AT
FAILURE



TEST NO. U17.1



TEST NO. U17.1

INITIAL CONDITIONS	INITIAL WATER CONTENT, %	18.8
	INITIAL DRY UNIT WEIGHT, pcf	104.0
	SAMPLE HEIGHT & DIAMETER, in.	4.00 2.00

RATE OF STRAIN
PERCENT PER MINUTE 0.50

SOIL DESCRIPTION: Grey Silty CLAY
LIQUID LIMIT 48 % PLASTIC LIMIT 24 % SPECIFIC GRAVITY 2.70
SAMPLE PREPARATION

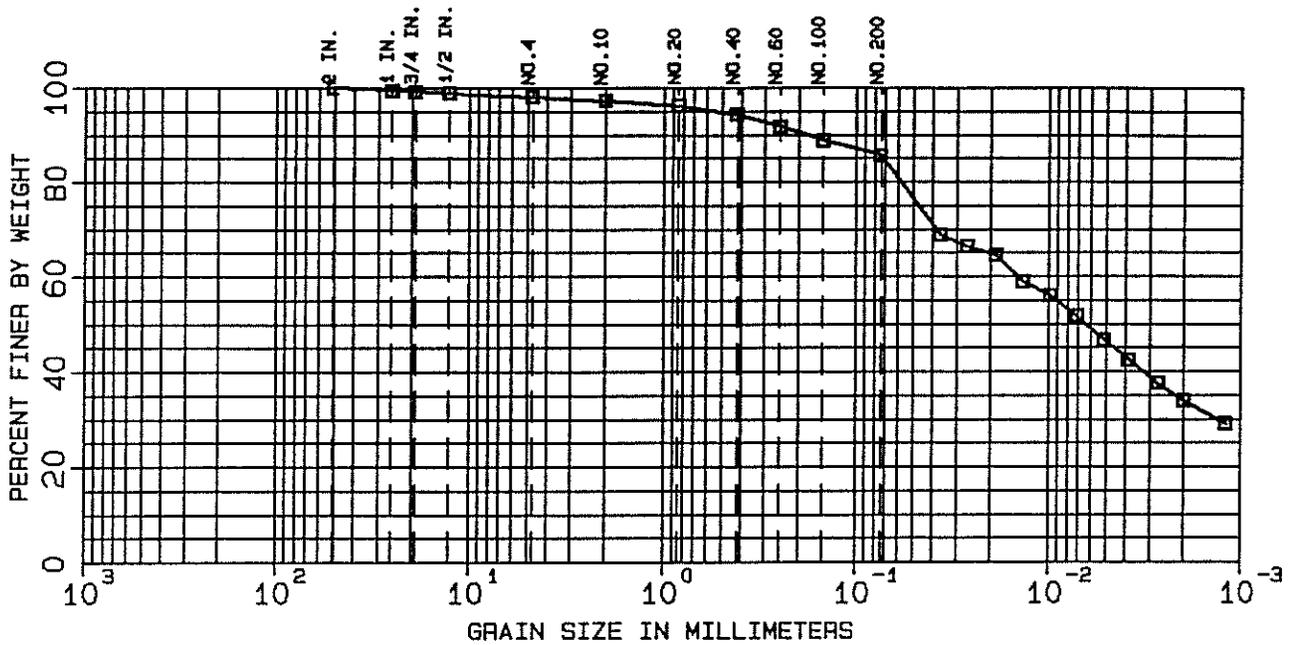
CA/T C15A3 WALSH/O'CONNELL
BOSTON, MA.
UNCONFINED COMPRESSION
TESTS

BORING NO. SAMPLE NO. 5-1 TEST SERIES NO. 17
DEPTH EL. 63 DATE Aug. 88
TECH. HBT
REVIEWER FILE 14134.0

FIGURE

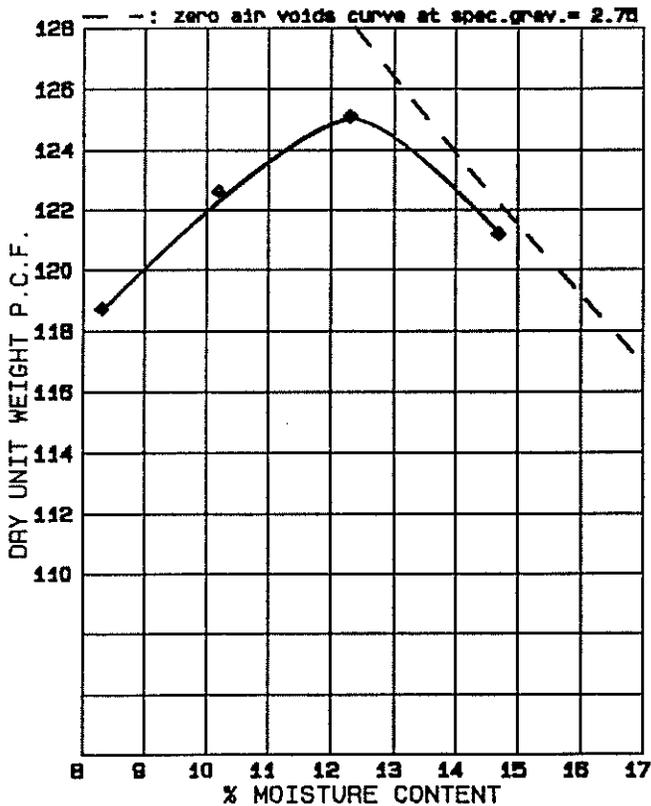
GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

COMPACTION



081899-2
ELEVATION 58

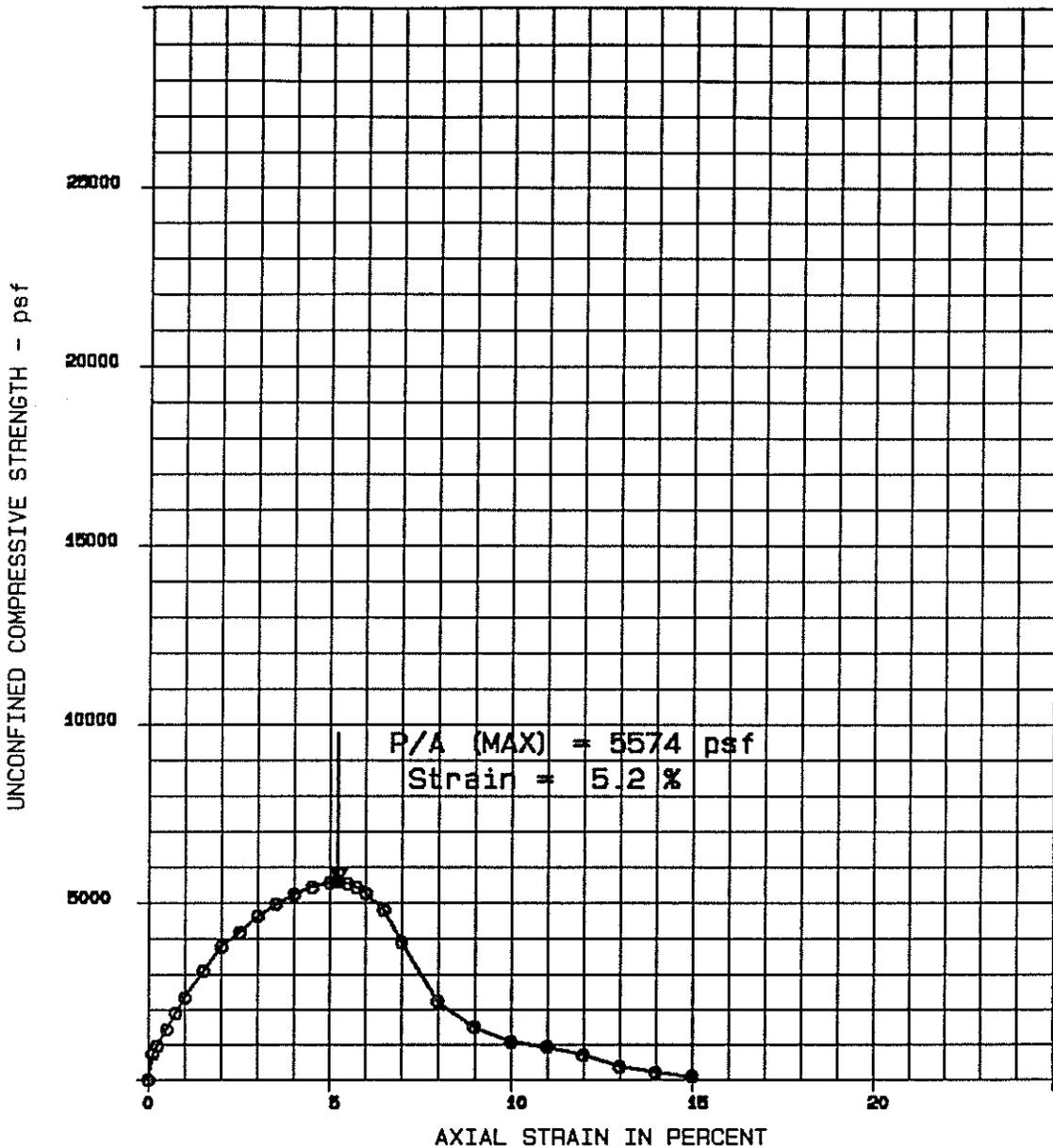
SOIL PROPERTIES		
SOIL DESCRIPTION: Grey CLAY & SILT, trace Silt		
OPT. WATER CONTENT	12.5 %	DRY UNIT WEIGHT
LIQUID LIMIT	%	PLASTIC LIMIT
		SPECIFIC GRAVITY
		125

COMPACTION METHOD		
ASTM TEST	D1557-91	METHOD A
AASHTO TEST		METHOD
MOLD HEIGHT	4.50	MOLD DIA. 4
NO. LAYERS	5	BLOWS/LAYER 25
HAMMER WT.	10 lbs	DROP HEIGHT 18in

CA/T C15A3 WALSH/O'CONNELL BOSTON, MA. COMPACTION-GRADATION TESTS

BORING NO.
SAMPLE
DEPTH EL. 58
TECH. MST
REVIEWER MCM

TEST SERIES
NO. 18
DATE Aug. 99
FILE 14134.0



TEST NO. **U10.1**

INITIAL CONDITIONS	INITIAL WATER CONTENT, %	14.2
	INITIAL DRY UNIT WEIGHT, pcf	115.4
	SAMPLE HEIGHT & DIAMETER, in.	4.00 2.00

RATE OF STRAIN
PERCENT PER MINUTE **0.00**

SOIL DESCRIPTION: **Grey CLAY & SILT**
 LIQUID LIMIT **32 %** PLASTIC LIMIT **16 %** SPECIFIC GRAVITY **2.70**
 SAMPLE PREPARATION

**CA/T C15A3 WALSH/D'CONNELL
 BOSTON, MA.
 UNCONFINED COMPRESSION
 TESTS**

BORING NO. **S-2** TEST SERIES NO. **18**
 SAMPLE DEPTH **EL. 55** DATE **Aug. 60**
 TECH. **NBT** REVIEWER **FILE 14134.0**

FIGURE

GZA GeoEnvironmental, Inc.
320 Needham Street
Newton Upper Falls, MA 02464

ANALYTICAL REPORT

GZA GeoEnvironmental, Inc.
320 Needham Street
Newton Upper Falls, MA 02464

T.Kwiatkowski

Project Name: CA/T 15A3
Project No.: 14134.00

Date Received: 8/18/99
Date Reported: 9/02/99
Work Order No.: 9908-00120

Sample ID: S-1
Sample Date: 8/18/1999

Sample No.: 001

Test Performed	Method	Results	Units	Tech	Analysis Date
TOTAL PETROLEUM HYDROCARBONS	D3328/EPA 8100/8015B			MQS	8/19/99
Hydrocarbon Content	D3328/EPA 8100	21	ug/g	MQS	8/19/99
Quantitation Limit (total product)	D3328/EPA 8100	10	ug/g-lmt	MQS	8/19/99
Quantitation Limit (individual product)	D3328/EPA 8100	0.50	ug/g-lmt	MQS	8/19/99
Surrogate:	D3328/EPA 8100				
***p-Terphenyl	D3328/EPA 8100	105	% R	MQS	8/19/99
Extraction		1	DF	MJS	8/19/99
METALS					
Arsenic	EPA 7060	<21.2	mg/Kg	AJY	9/01/99
PERCENT SOLID		73.1	%	MJS	8/20/99

GZA GeoEnvironmental, Inc.

ANALYTICAL REPORT

Project Name: CA/T 15A3
 Project No.: 14134.00

Work Order No.: 9908-00120

Sample ID: S-2
 Sample Date: 8/18/1999

Sample No.: 002

Test Performed	Method	Results	Units	Tech	Analysis Date
TOTAL PETROLEUM HYDROCARBONS	D3328/EPA 8100/8015B			MQS	8/19/99
Hydrocarbon Content	D3328/EPA 8100	< 10	ug/g	MQS	8/19/99
Quantitation Limit (total product)	D3328/EPA 8100	10	ug/g-lmt	MQS	8/19/99
Quantitation Limit (individual product)	D3328/EPA 8100	0.50	ug/g-lmt	MQS	8/19/99
Surrogate:	D3328/EPA 8100				
***p-Terphenyl	D3328/EPA 8100	99.5	% R	MQS	8/19/99
Extraction		1	DF	MJS	8/19/99
METALS					
Arsenic	EPA 7060	< 17.5	mg/Kg	AJY	9/01/99
PERCENT SOLID		83.0	%	MJS	8/20/99

Organic Data Authorized By: *J. Faubner for KW*Inorganic Data Authorized By: *MJS*

% R = % Recovery
 DF = Dilution Factor
 DO = Diluted Out

Soil data is reported on a dry weight basis unless otherwise specified.

Method 8260: The current version of the method is 8260B.

Method 8021: The current version of the method is 8021B.

Method 8270: The current version of the method is 8270C.

Laboratory Identification Numbers:

MA: MA092 NH: 2028
 CT: PH0579 NJ: 59759
 NY: 11063 RI: A46

Please note that the laboratory signed copy of the chain of custody record is an integral part of the data report.



ANALYTICAL DATA
SUMMARY

Report Date: 08/30/99

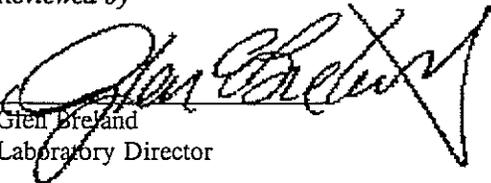
Account: GZA GeoEnvironmental, Inc.
Address: 320 Needham Street
Newton Upper Falls, MA 02164
617-969-0050

Project Manager: T. Kwiatkowski
Project Name: CA/T C15A3 Walsh/O'Connell (08/18)
Project No.: 14134.00

Sample Information:

<u>Laboratory ID</u>	<u>Client/Field ID</u>	<u>Laboratory ID</u>	<u>Client/Field ID</u>
92303152-001	S-1	92303152-003	QC-Report - Soil
92303152-002	S-2		

Reviewed by


Glen Breland
Laboratory Director

Lab Certifications

EPA ID: No. MA059
Massachusetts: No. M-MA059
Maine: Reciprocity
Rhode Island: No. 87
South Carolina: No. 88011

Florida(DEP): QA Plan No. 900437G
Florida(HRS): No. E87290
Connecticut: No. PH0515
New York: ELAP No. 11116
New Hampshire: No. 2041



Matrix Analytical, Inc.
 106 South Street
 Hopkinton, MA 01748-2295
 1 (800) 362-8749

F I N A L R E P O R T

Client Information

Account: GZA GeoEnvironmental, Inc.
 Address: 320 Needham Street
 Newton Upper Falls, MA 02164

Project Name: CA/T C15A3 Walsh/O'Connell (08/18)
 Project Number: 14134.00
 Project Manager: T. Kwiatkowski
 Sampler Name: GZA GeoEnvironmental, Inc.

Sample Information

Lab ID: 92303152-001
 Client ID: S-1
 Matrix: Soil

Date Sampled: 08/18/99 :
 Date Received: 08/18/99 : 0
 Date Reported: 08/30/99

Analytical Parameter	Result	Unit	Detection Limit	Method No.	Analyst	Date Analyzed
----------------------	--------	------	-----------------	------------	---------	---------------

SAMPLE PREPARATION

ASTM Shake Extraction
 Comment:

08/21/99

D3987-Mod.

This method is not intended to simulate site-specific leaching conditions. Rather, the extraction procedure uses the soil sample as the dominant factor in the determination of pH and other inorganic components. The method is performed using a 1:20 ratio of solid to DI water and results are reported on a wet weight basis. The percent moisture has been provided for further calculations.

MISCELLANEOUS TESTING

Chloride	ND	mg/l	1	325.2	ag	08/27/99
Percent Moisture	24.9	Percent			el	08/20/99



Matrix Analytical, Inc.
 106 South Street
 Hopkinton, MA 01748-2295
 1 (800) 362-8749

F I N A L R E P O R T

Client Information

Account: GZA GeoEnvironmental, Inc.
 Address: 320 Needham Street
 Newton Upper Falls, MA 02164

Project Name: CA/T C15A3 Walsh/O'Connell (08/18)
 Project Number: 14134.00
 Project Manager: T. Kwiatkowski
 Sampler Name: GZA GeoEnvironmental, Inc.

Sample Information

Lab ID: 92303152-002
 Client ID: S-2
 Matrix: Soil

Date Sampled: 08/18/99 :
 Date Received: 08/18/99 : 0
 Date Reported: 08/30/99

Analytical Parameter	Result	Unit	Detection Limit	Method No.	Analyst	Date Analyzed
----------------------	--------	------	-----------------	------------	---------	---------------

SAMPLE PREPARATION

ASTM Shake Extraction
 Comment:

08/21/99

D3987-Mod.

This method is not intended to simulate site-specific leaching conditions. Rather, the extraction procedure uses the soil sample as the dominant factor in the determination of pH and other inorganic components. The method is performed using a 1:20 ratio of solid to DI water and results are reported on a wet weight basis. The percent moisture has been provided for further calculations.

MISCELLANEOUS TESTING

Chloride	ND	mg/l	1	325.2	ag	08/27/99
Percent Moisture	19.8	Percent			el	08/20/99



Matrix Analytical, Inc.
 106 South Street
 Hopkinton, MA 01748-2295
 1 (800) 362-8749

F I N A L R E P O R T

Client Information

Account: GZA GeoEnvironmental, Inc.
 Address: 320 Needham Street
 Newton Upper Falls, MA 02164

Project Name: CA/T C15A3 Walsh/O'Connell (08/18)
 Project Number: 14134.00
 Project Manager: T. Kwiatkowski
 Sampler Name:

Sample Information

Lab ID: 92303152-003
 Client ID: QC-Report - Soil
 Matrix: Soil

Date Sampled: / / :
 Date Received: / / : 0
 Date Reported: 08/30/99

Analytical Parameter	Result	Unit	Detection Limit	Method No.	Analyst	Date Analyzed
----------------------	--------	------	-----------------	------------	---------	---------------

METHOD SUMMARIES

NOTE: Analytical results have been corrected and are reported on a dry weight basis. If required, detection limits can also be corrected to dry weight using the percent moisture data included in this report.

METHOD REFERENCES

1. Test Methods For Evaluating Solid Waste: Physical Chemical Methods. EPA SW 846. Rev. December 1996.
2. Methods For Chemical Analysis of Water and Wastes. EPA 600/4-79-200. Revised March 1983.
3. Standard Methods For Examination of Water and Wastewater. APHA-AWWA-WACF., 18th Edition. 1992.
4. EPA Methods For The Determination of Organic Compounds in Drinking Water.

