Application for Risk Based Disposal of PCB-Containing Dredged Sediments at Indiana Harbor and Canal

Submitted pursuant to 40 CFR Section 761.61

Submitted to:

U.S. Environmental Protection Agency
Region 5
77 W. Jackson Boulevard
Chicago, Illinois 60604

and

Indiana Department of Environmental Management
100 N. Senate Avenue
Indianapolis, Indiana 46204

Prepared by:

U.S. Army Corps of Engineers
Chicago District
Hydraulics and Environmental Engineering Section
231 S. LaSalle St, Suite 1500
Chicago, Illinois 60604

March 2014
updated figures December 2016

Reference 26
Slurry Wall 1 CDR

Part 4 of 4

Appendix F

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 7-29-03	TRANSMITTAL NO. 02260-24

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: x THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR x FIO ☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
6	Bentonite Certificate (PreConstruction Material Approval)	Bentonite Certificates	6	1.5		F	X	

REMARKS

The certificate for the PreConstruction Material approval is dated July 8, 2002 and is for unused, surplus material relocated from a previous GeoCon project. 16.5 Tons of this material is planned for use at this project site. The values for this material meet API Spec 13-A Section 4 requirements.

The Contract Specifications and associated Table 3 Bentonite Powder requirements are for API Spec 13-A Section 5. USACE Specific Comment C Transmittal 02260-20, Item 4, Preconstruction Chemical Compatability Test Report, provided acceptance of the use of bentonite that satisfies the API Spec 13-A Section 4 as long as the soil bentonite backfill material complies with the permeability and other requirements of the contract.

The constituents and requirements between Section 5 and 4 are different due to differing test procedures (copies of API Spec 13-A Section 4 and 5 are attached). The constituent and requirements are summarized below:

	Section 5 & per Specification	Section 4 bentonite
YP/PV Ratio	1.5 max	3 max
Plastic Viscosity	>10	N/A
Filtrate Loss	<12.5 cubic cm (dispersed)	<15.0 cubic cm
Moisture Content	<10%	<10%
Viscosity Dial Reading at 600 rpm	N/A	>30
Residue >75 micormeter	N/A	4% weight, maximum

This variation requests the use of Section 4 test parameters and values.

Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise

NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 7/8/2002

SOLD TO:	SHIP TO:
GEO CON MCCOOK PROJECT 7601 LAGRANGE AVE WILLOW SPRING 60480	SAME

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
7/8/02	ROGERS & SONS 9113	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	48
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.6
> 75 micron (wt. %)	4.0 max.	1.4

Test or Property	API Spec	Result
Moisture (wt. %)	12.5 max.	7.0
Y.P. / P.V. Ratio	3.0 max.	1.43

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4456.

Sign: Joe Cheatham Date: 7/8/02

Approved by: Plant Manager

LabanaCert.doc (4/22/97)

Rev E (9/99)

HGV 4740

JUL 23 2003 4:48PM FEDERAL NO.3455 P. 1

Specification for Drilling-Fluid Materials

API SPECIFICATION 13A (SPEC 13A)
FIFTEENTH EDITION, MAY 1, 1993

American Petroleum Institute
1220 L Street, Northwest
Washington, DC 20005

Issued by
AMERICAN PETROLEUM INSTITUTE
Production Department

FOR INFORMATION CONCERNING TECHNICAL CONTENTS OF THIS PUBLICATION CONTACT THE API PRODUCTION DEPARTMENT, 1201 MAIN STREET, SUITE 2335, DALLAS, TX 75202-3994 — (214) 748-3841
SEE BACK COVER FOR INFORMATION CONCERNING HOW TO OBTAIN ADDITIONAL COPIES OF THIS PUBLICATION.

Users of this publication should become completely familiar with its scope and content, including any provisions it may have regarding marking of manufactured products. This publication is intended to supplement rather than replace individual professional judgment.

OFFICIAL PUBLICATION

REG. U.S. PATENT OFFICE

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SECTION 4
BENTONITE

4.1 Description

a. Drilling grade bentonite is a naturally occurring clay containing the clay mineral smectite. It may also contain accessory minerals such as quartz, mica, feldspar, and calcite.

b. Drilling grade bentonite shall be deemed to meet this specification if a composite sample representing no more than one day's production conforms to the physical requirements of Table 4.1, represents the product produced, and is controlled by the manufacturer.

TABLE 4.1
BENTONITE PHYSICAL REQUIREMENTS

Requirement	Specification
Suspension Properties	
Viscometer Dial Reading at 600 rpm	30, minimum
Yield Point/Plastic Viscosity Ratio	3, maximum
Filtrate Volume	15.0 cm^3, maximum
Residue greater than 75 micrometers	4.0 wt. percent, maximum
Moisture	10.0 wt. percent, maximum

SUSPENSION PROPERTIES

4.2 Equipment

a. Thermometer: 32-220 ±1°F (0-105 ±0.5°C)

b. Balance: precision of ±0.01 g

c. Mixer (e.g., Multimixer Model 9B with 9B29X impellers or equivalent as shown in Fig. 2.1): Each spindle will be fitted with a single sine-wave impeller approximately one inch (25mm) in diameter mounted flush side up.

d. Container: approximate dimensions — 7 inches (180 mm) deep, 3-13/16 inch (97 mm) ID top, 2-3/4 inch (70 mm) ID bottom (e.g., Hamilton Beach mixer cup No. M110-D, or equivalent)

e. Spatula

f. Motor-Driven Direct Indicating Viscometer: as referenced in API RP 13B-1, 1st edition, June, 1990, Par. 2.4

g. Filter press: as referenced in API RP 13B-1, 1st edition, June, 1990, section 3.2

h. Graduated cylinder (TD): 500 ±5 cm^3

i. Deionized or distilled water

j. Container: about 500-cm^3 with lid

k. Timer: two interval, mechanical or electrical, precision of ±0.1 minute

l. Graduated cylinder (TC): 10 ±0.1 cm^3

4.3 Procedure—600 rpm Reading, Plastic Viscosity, Yield Point

a. Prepare a suspension of the bentonite. Add 22.5 ±0.01 g of clay (as received) to 350 ±5 cm^3 of deionized water while stirring on the mixer.

b. After stirring five ±0.5 minutes, remove the container from mixer and scrape its sides with the spatula to dislodge any bentonite adhering to container walls. Be sure all bentonite clinging to the spatula is incorporated into the suspension.

c. Replace the container on the mixer and continue to stir. The container may need to be removed from the mixer and the sides scraped to dislodge any clay clinging to container walls after another 5 and 10 minutes. Total stirring time shall equal 20 ±1 minutes.

d. Age the bentonite suspension up to 16 hours in a sealed or covered container at room temperature. Record storage temperature and storage duration.

e. After aging bentonite suspension, shake well and then pour the suspension into the mixer container. Stir the suspension on the mixer for 5 ±0.5 minutes.

f. Pour the suspension into the viscometer cup provided with the direct indicating viscometer. The dial readings at 600 and 300 rpm rotor speed settings of the viscometer shall be recorded when a constant value for each rpm is reached. Readings shall be taken at a suspension test temperature of 77 ±2°F (25 ±1°C).

4.4 Calculation — Plastic Viscosity and Yield Point

Plastic Viscosity, cP =
[600 rpm reading] - [300 rpm reading] (a)

Yield Point, lb/100 ft^2 =
[300 rpm reading] - Plastic Viscosity (b)

Yield Point/Plastic viscosity ratio =
Yield point [Eq. 4.4(b)] ÷
Plastic viscosity [Eq. 4.4(a)] (c)

Record calculated values for plastic viscosity, yield point, and yield point/plastic viscosity ratio.

4.5 Procedure — Filtrate Volume

a. Recombine all of the suspension as prepared and tested in Par. 4.3 and stir in container for 1 ±0.5 minute on the mixer. Adjust suspension temperature to 77 ±2°F (25 ±1°C).

b. Pour the suspension into filter press cell. Before adding suspension, be sure each part of the filter cell is dry and that all gaskets are not disturbed or worn. Pour the mud to within about 1/2 inch (13 mm) of the top of

the cell. Complete assembly of the filter press cell. Place filter cell in frame and close reliefvalve. Place a container under the drain tube.

c. Set one timer for 7.5 ±0.1 minutes and the second timer for 30 ±0.1 minutes. Start both timers and adjust pressure on cell at 100 ±5 psi (690 ±35 kPa). Both of these steps shall be completed in less than 15 seconds. Pressure shall be supplied by compressed air, nitrogen, or helium.

d. At 7.5 ±0.1 minutes on the first timer remove the container and any adhering liquid on the drain tube and discard. Place the dry 10-cm³ graduated cylinder under the drain tube and continue collecting filtrate to the end of the second timer set at 30 minutes. Remove the graduated cylinder and record the volume of filtrate collected.

4.6 Calculation — Filtrate Volume

Calculate the filtrate volume of the clay suspension as:

$$\text{Filtrate vol., cm}^3 = 2 \times V_c \qquad \text{(u)}$$

where: V_c = volume filtrate collected between 7.5 and 30 minutes

Record calculated filtrate volume.

RESIDUE GREATER THAN 75 MICROMETERS

4.7 Equipment

a. Oven: regulated to 220 ±5°F (105 ±3°C)

b. Sodium hexametaphosphate (CAS #10124-56-8)

c. Balance: precision of ±0.01 g

d. Mixer (e.g., Multimixer Model 9B with 9B29X impellers or equivalent as shown in Fig. 2.1): Each spindle will be fitted with a single sine-wave impeller approximately one inch (25mm) in diameter mounted flush side up.

e. Container: approximate dimensions — 7 inches (180 mm) deep, 3-13/16 inch (97 mm) ID top, 2-3/4 inch (70 mm) ID bottom (e.g., Hamilton Beach mixer cup No. M120-D, or equivalent)

f. Spatula

g. A 75-micrometer sieve conforming* to the requirements of ASTM E11 Standard Specifications for Wire-Cloth Sieves for Testing Purposes, latest edition. Approximate dimensions are 3 in. (78mm) diameter, and 2.5 in. (69mm) from top of frame to wire cloth.

*NOTE: *Supplier's verification that sieve conforms to ASTM E11 is satisfactory evidence of compliance.*

h. Spray nozzle 1/4 TT body (Spraying Systems Company, No. TG 6.5 tip with 1/4 TT body or equivalent) attached to water line with 90 degree elbow as shown in Fig. 2.2

i. Water pressure regulator capable of regulation to 10 ±1 psi (69 ±7 kPa)

j. Evaporating dish

k. Wash bottle

4.8 Procedure

a. Weigh 10 ±0.01 g of bentonite.

b. Add the weighed bentonite sample to approximately 950 cm³ of water containing about 0.2 g of sodium hexametaphosphate while stirring on the mixer.

c. Stir suspension on the mixer for 30 ±1 minutes.

d. Transfer the sample to the sieve. Use the wash bottle to remove all material from the container to the sieve. Wash the material on the sieve with water controlled to 10 ±1 psi (69 ±7 kPa) from the spray nozzle for two minutes ±15 seconds. While washing, hold the tip of the spray nozzle approximately in the plane of the top of sieve — move the spray of water repeatedly over the sample.

e. Wash the residue from the sieve into a tared evaporating dish and decant excess clear water.

f. Dry the residue in the oven to a constant weight. Record residue weight and total drying time.

4.9 Calculation

$$\text{Residue, wt. \% greater than 75 micrometers} = 100\frac{\text{(Weight residue, g)}}{\text{(Weight sample, g)}} - C_c^{*}$$

*where: C_c = calibration correction (Par. 12.5)

Record calculated value.

MOISTURE

4.10 Equipment

a. Oven: regulated to 220 ±5°F (105 ±3°C)

b. Balance: precision of ±0.01 g

c. Evaporating dish

d. Spatula

e. Desiccator with calcium sulfate (CAS #7778-18-9) desiccant, or equivalent

4.11 Procedure

a. Weigh 10 ±0.01 g of bentonite sample into a tared evaporating dish.

b. Dry sample in the oven to a constant weight. Record total drying time.

c. Cool to room temperature in desiccator.

d. Reweigh the evaporating dish containing the dry bentonite. Record weight.

4.12 Calculation

$$M = 100\,\frac{(W_1 - W_2)}{W_1} \qquad \text{(a)}$$

where: M = moisture, wt. percent

W_1 = original sample weight, g

W_2 = dry sample weight, g

Record calculated value.

SECTION 5
NONTREATED BENTONITE

5.1 Description

a. Drilling grade nontreated bentonite is dried and ground, but not chemically-treated clay, composed principally of the mineral smectite. It may also contain accessory minerals such as quartz, mica, feldspar, and calcite.

b. Drilling grade nontreated bentonite shall be deemed to meet this specification if a composite sample representing no more than one day's production conforms to the physical requirements of Table 5.1, represents the product produced, and is controlled by the manufacturer.

TABLE 5.1
NONTREATED BENTONITE
PHYSICAL REQUIREMENT

Requirement	Specification
Suspension Properties	
Yield Point/Plastic Viscosity Ratio	1.5, maximum
Dispersed Plastic Viscosity	10 cP, minimum
Dispersed Filtrate Volume	12.5 cm^3, maximum

SUSPENSION PROPERTIES

5.2 Equipment

a. Balance: precision of 0.01 g

b. Mixer (e.g., Multimixer Model 9B with 9B29X impellers or equivalent as shown in Fig. 2.1): Each spindle will be fitted with a single sine-wave impeller approximately one inch (25mm) in diameter mounted flush side up.

c. Container: approximate dimensions — 7 inches (180 mm) deep, 3-13/16 inch (97 mm) ID top, 2-3/4 inch (70 mm) ID bottom (e.g., Hamilton Beach mixer cup No. M110-D, or equivalent)

d. Motor-Driven Direct Indicating Viscometer: as referenced in API RP 13B-1, 1st edition, June, 1990, Par. 2.4

e. Filter press: as referenced in API RP 13B-1, 1st edition, June 1, 1990, Par. 3.2

f. Spatula

g. Thermometer: 32-220 ±1°F (0-105 ±0.5°C)

h. Deionized or distilled water

i. Graduated cylinder (TD): 500 ±5 cm^3

j. Container about 500 cm^3 with lid

k. Syringe or pipette: 5 ±0.01 cm^3

l. Sodium hexametaphosphate (CAS #10124-56-8) solution: 10 ±0.5% by wt

m. Timer: two interval, mechanical or electrical, precision of 0.1 minute

n. Graduated cylinder (TC): 10 ±0.01 cm^3

5.3 Procedure — Yield Point/Plastic Viscosity Ratio

a. Prepare a suspension of nontreated bentonite. Add 26 ±0.01 g of clay (as received) to 350 ±5 cm^3 deionized water while stirring on the mixer.

b. After stirring 5 ±0.5 minutes, remove the container from mixer and scrape its sides with the spatula to dislodge any bentonite adhering to container walls. Be sure all bentonite clinging to the spatula is incorporated into the suspension.

c. Replace the container on the mixer and continue to stir. The container may need to be removed from the mixer and the sides scraped to dislodge any clay clinging to container walls after another 5 and 10 minutes. Total stirring time shall equal 20 ±1 minutes.

d. Age the bentonite suspension up to 16 hours in a sealed container at room temperature. Record storage temperature and storage duration.

e. After aging bentonite suspension, shake well and then pour the suspension into the mixer container. Stir the suspension on the mixer for 5 ±0.5 minutes.

f. Pour the suspension into the viscometer cup provided with the direct indicating viscometer. The dial readings at 600 and 300 rpm rotor speed settings of the viscometer shall be recorded when a constant value for each rpm is reached. Readings shall be taken at a suspension test temperature of 77 ±2°F (25 ±1°C).

5.4 Calculation — Plastic Viscosity and Yield Point

Plastic Viscosity, cP =
[600 rpm reading] -[300 rpm reading] (a)

Yield Point, lb/100 ft^2 = (b)
[300 rpm reading] - Plastic Viscosity

Yield Point/Plastic viscosity ratio =
Yield point [Eq. 5.4(b)] ÷
Plastic viscosity [Eq. 5.4(a)] (c)

Record calculated values for plastic viscosity, yield point, and yield point/plastic viscosity ratio.

5.5 Procedure — Dispersed Plastic Viscosity

a. Recombine all of the bentonite suspension as prepared and tested in Par. 5.3 and stir in container for 1 ±0.5 minute on the mixer

b. Add 5 ±0.1 cm^3 of a 10% solution of sodium hexameta-phosphate to the suspension and stir for 3 ±0.5 minutes on the mixer.

c. Pour the suspension into the viscometer cup provided with the direct indicating viscometer. The dial readings at 600 and 300 rpm rotor speed settings of the viscometer shall be recorded when a constant value for each rpm is reached. Readings shall be taken at a suspension test temperature of 77 ±2°F (25 ±1°C).

d. Calculate and record the dispersed plastic viscosity as per Par. 5.4a.

5.6 Procedure — Dispersed Filtrate Volume

a. Recombine all of the suspension as prepared and tested in Par. 5.5 and stir in container for 1 ±0.5 minute on the mixer. Adjust suspension temperature to 77 ±2°F (25 ±1°C).

b. Pour the suspension into filter press cell. Before adding the suspension, be sure each part of the filter cell is dry and that all gaskets are not distorted or worn. Pour the suspension to within about 1/2 inch (13 mm) of the top of the cell. Complete assembly of the filter press cell. Place filter cell in frame and close relief valve. Place a container under the drain tube.

c. Set one timer for 7.5 ±0.1 minutes and the second timer for 30 ±0.1 minutes. Start both timers and adjust pressure on cell at 100 ±5 psi (690 ±35 kPa). Both of these steps shall be completed in less than 15 seconds. Pressure shall be supplied by compressed air, nitrogen, or helium.

d. At 7.5 ±0.1 minutes on the first timer remove the container and any adhering liquid on the drain tube and discard. Place dry 10-cm^3 graduated cylinder under the drain tube and continue collecting filtrate to the end of the second timer set at 30 minutes. Remove the graduated cylinder and record the volume of filtrate collected.

5.7 Calculation — Dispersed Filtrate Volume

Calculate the dispersed filtrate volume of the clay suspension as:

$$\text{Filtrate vol., } cm^3 = 2 \times V_e \qquad (a)$$

where: V_e = volume filtrate collected between 7.5 and 30 minutes

Record calculated filtrate volume.

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 080503

TRANSMITTAL NO. 02260-31

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd.
Griffith, IN 46319 219/923-1763

FROM: J. A. Wentz, PE, EQM
1800 Carillon Blvd.
Cincinnati, Ohio 45240
800/229-7495

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*

PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility
Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
138	Bentonite Certificate 072903 Delivery D&E Transport 100# Bags	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

DATE

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 7/29/2003

HCN 5587

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD COPERATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
7/29/03	D&E TRANSPORTATION	GREYBULL	FED GEL 90

100#

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	56
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.4
> 75 micron (wt. %)	4.0 max.	2.6

Test or Property	API Spec	Result
Moisture (wt. %)	12.5 max.	8.2
Y.P. / P.V. Ratio	3.0 max.	1.29

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Joe Chatham 7/29/03

Signed Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)

Rev E (9/03)

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 080503	TRANSMITTAL NO. 02260-30

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
137	Bentonite Certificate 072903 Delivery Highball 176 Bulk Bags	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

GP-1

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 7/28/2003

SOLD TO:	SHIP TO:
GEO-CON INC 4075 MONROEVILLE BLVD COPERATE I BUILDING2 SWEET 400 MONROEVILLE PA 15146	GEO-CON E CHICAGO IN 46312 HCIV 5586

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
7/28/03	HI BALL 176	GREYBULL	FED GEL 90

12 bulk bags

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result	Test or Property	API Spec	Result
Viscosity	30 min	38	Moisture (wt. %)	12.5 max	8.5
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max	0.71
Yield Point (# / 100 ft2)	N/A				
Filtrate Volume (cm3)	15.0 max	12.8			
> 75 micron (wt. %)	4.0 max	2.5			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Joe Chiatko 7/29/03
Signed Date

Approved by: Plant Manager

LabaraCert.doc (4/22/97)
Rev E (9/99)

Received by
Eric Bom

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 080603	TRANSMITTAL NO. 02260-39

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
142	Bentomte Certificate 080603 Amhof 144 100# Bags	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

GP-101

39

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 8/5/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD COPERATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HC1V005591	GEO-CON E CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
8-4-03	AMHOP 144	GREYBULL	FED JEL 90

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result	Test or Property	API Spec	Result
Viscosity	30 min.	41	Moisture (wt. %)	12.5 max.	7.7
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max.	0.73
Yield Point (# / 100 ft2)	N/A				
Filtrate Volume (cm3)	15.0 max.	12.8			
> 75 micron (wt. %)	4.0 max.	2.0			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-783-4496.

100# Bags

Signed 8/6/03 Date

Approved by Plant Manager

LabanaCert.doc (4/22/97)
Rev E (8/99)

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 080603

TRANSMITTAL NO. 02260-~~41~~ 42

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd.
Griffith, IN 46319 219/923-1763

FROM: J. A. Wentz, PE, EQM
1800 Carillon Blvd.
Cincinnati, Ohio 45240
800/229-7495

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*

PROJECT TITLE AND LOCATION: IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
144	Bentonite Certificate 080603 Diamond H 15 4000# Bulk Bags	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

GP-101

42

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 7/29/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD COPERATE 1 BUILDING2 SUITE400 MONROEVILLE PA 15146	GEO-CON E. CHICAGO IN 46312
SALES ORDER NO.: HCIV005593	

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
8-4-03	DIAMOND H 15	GREYBULL	FED JEL 90

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result	Test or Property	API Spec	Result
Viscosity	30 min.	56	Moisture (wt. %)	12.5 max.	8.2
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max.	1.29
Yield Point (# / 100 ft2)	N/A				
Filtrate Volume (cm3)	15.0 max.	12.4			
> 75 micron (wt. %)	4.0 max.	2.6			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4436.

12 bulk bags

Signed 8/4/03 Date

Approved by: Plant Manager

LabanoCert.doc (4/22/97)
Rev E (9/99)

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 080603

TRANSMITTAL NO. 02260-41

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd.
Griffith, IN 46319 219/923-1763

FROM: J. A. Wentz, PE, EQM
1800 Carillon Blvd.
Cincinnati, Ohio 45240
800/229-7495

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*

PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
143	Bentonite Certificate 080603 Hi Ball 850 4000# Bulk Bags	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

DATE

GP-101

41

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 7/31/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD COPERATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV005592	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
8-4-03	HI BALL 850	GREYBULL	Fed Del 90

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result	Test or Property	API Spec	Result
Viscosity	30 min.	52	Moisture (wt. %)	12.5 max.	7.1
Plastic Viscosity (cP)	N/A		Y.P./P.V. Ratio	3.0 max.	1.46
Yield Point (#/100 ft2)	N/A				
Filtrate Volume (cm3)	15.0 max.	12.6			
> 75 micron (wt. %)	4.0 max.	2.1			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4498.

12 bulk bags

Signed 8/4/03 Date

Approved by: Plant Manager

LabansCert.doc (4/22/97)
Rev E (9/99)

GP-101

273

MI SWACO LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 1/16/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1800 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV008282	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
4-20-04	MONT TRANS #2	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result	Test or Property	API Spec.	Result
Viscosity	30 min.	40	Moisture (wt. %)	N/A	8.1
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max.	1.33
Yield Point (# / 100 ft2)	N/A				
Filtrate Volume (cm3)	15.0 max.	13.8			
> 75 micron (wt. %)	4.0 max.	1.8			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Signed 4/21/04 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Rec'd 043004

GP-101

274

MI SWACO LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 1/16/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1800 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV006298	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
4-20-04	QUALITY #	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	40
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.8
> 76 micron (wt. %)	4.0 max.	1.8

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	8.1
Y.P. / P.V. Ratio	3.0 max.	1.33

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4488.

Signed 4/21/04 Date

Approved by: Plant Manager

LabansCert.doc (4/22/97)
Rev E (9/99)

Rec'd 043004

MI SWACO

LABORATORY ANALYSIS CERTIFICATION

275

GREYBULL PLANT

DATE TESTED 4/19/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1800 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV006294	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
4-20-04	MONT TRANS #2606	GREYBULL	GSL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	43
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.4
> 75 micron (wt. %)	4.0 max.	2.1

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	7.9
Y.P. / P.V. Ratio	3.0 max.	1.07

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Signed 4/21/04 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Rec'd 043004

GP-101

276

MI SWACO LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 4/19/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1600 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV005295	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
4-20-04	MONT TRANS #4	GREYBULL	OBL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	43
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.4
> 75 micron (wt. %)	4.0 max.	2.1

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	7.9
Y.P. / P.V. Ratio	3.0 max.	1.07

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4498.

Signed Date 4/21/04

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Recd 043004

GP-101

277

MI SWACO LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 4/19/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1900 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV006296	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
4-20-04	DOUBLE ARROW #1	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result	Test or Property	API Spec.	Result
Viscosity	30 min.	43	Moisture (wt. %)	N/A	7.9
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max.	1.07
Yield Point (# / 100 ft2)	N/A				
Filtrate Volume (cm3)	15.0 max.	13.4			
> 75 micron (wt. %)	4.0 max.	2.1			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Signed 4/21/04 Date

Approved by: Plant Manager

LebaneCert.doc (4/22/97)
Rev E (9/99)

Rcd 043004

GP-101

278

MI SWACO LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 4/19/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1800 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV006297	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
4-20-04	QUALITY #10	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	43
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.4
> 75 micron (wt. %)	4.0 max.	2.1

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	7.9
Y.P. / P.V. Ratio	3.0 max.	1.07

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Signed 4/21/04 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Rec'd 043004

GP-101

MI SWACO LABORATORY ANALYSIS CERTIFICATION

279

GREYBULL PLANT

DATE TESTED 4/21/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1800 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV606288	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
4-21-04	FLEETWOOD #250	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	75
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.0
> 75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	9.6
Y.P. / P.V. Ratio	3.0 max.	2.17

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4466.

Signed 4/22/04 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (8/99)

Rec'd 043004

280

MI SWACO

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 2/13/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1800 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV005298	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
4-22-04	FOWLER #D4	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	47
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	11.4
> 75 micron (wt. %)	4.0 max.	1.6

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	8.6
Y.P. / P.V. Ratio	3.0 max.	1.13

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4498.

Signed 4/23/04 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (6/99)

Rec'd 050404

GP-101

281

MI SWACO LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 4/22/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1800 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV006300	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
4-23-04	QUALITY #42	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	82
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.8
> 75 micron (wt. %)	4.0 max.	1.7

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	7.8
Y.P. / P.V. Ratio	3.0 max.	2.10

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Signed 4/26/04 Date

LabanaCert.doc (4/22/97)

Approved by: Plant Manager

Rev E (9/99)

Rec'd 050404

282

MI SWACO

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 4/20/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1800 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV008301	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
4-23-04	QUALITY #27	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	38
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.0
> 75 micron (wt. %)	4.0 max.	2.0

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	6.4
Y.P. / P.V. Ratio	3.0 max.	0.71

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Signed 4/26/04 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (8/98)

Rec'd 050404

GP-101

283

MI SWACO LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 4/21/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1800 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV006302	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
4-23-04	QUALITY #60	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	75
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.0
> 75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	9.6
Y.P. / P.V. Ratio	3.0 max.	2.17

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 12A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4498.

Signed 4/26/04 Date

LabanaCert.doc (4/22/97)

Approved by: Plant Manager

Rev E (8/99)

Rec'd 050404

GP-101

284

MI SWACO LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 4/21/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1800 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV006303	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
4-23-04	ARROW #9721	GREYBULL	OEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	75
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.0
> 75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	9.6
Y.P. / P.V. Ratio	3.0 max.	2.17

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Signed 4/26/04 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Recd 05 04 04

GP-101

285

MI SWACO LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 4/22/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1800 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV006304	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
4-23-04	ARROW #7108	GREYBULL	GBL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	32
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.8
> 75 micron (wt. %)	4.0 max.	1.7

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	7.8
Y.P. / P.V. Ratio	3.0 max.	2.10

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4400.

Signed [signature] Date 4/26/04

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Rec'd 050404

GP-101

286

MI SWACO

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 1/29/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1800 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER #: HCIV008328	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
5-4-04	C & D #6	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	39
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	18.0 max	13.4
> 75 micron (wt. %)	4.0 max.	2.0

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	8.9
Y.P. / P.V. Ratio	3.0 max.	1.00

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-766-4486.

Signed 5/7/04 Date

Approved by Plant Manager

LabanaCert.doc (4/22/97)
Rev E (6/98)

Rec'd 05 0604

MI SWACO

LABORATORY ANALYSIS CERTIFICATION

GP-101

287

GREYBULL PLANT

DATE TESTED 5/3/2004

SOLD TO:	SHIP TO:
ENVIRONMENTAL QUALITY MANAGEMENT INC 1800 CARILLON BOULEVARD CINCINNATI OH 45240 USA SALES ORDER # HCIV006329	ENVIRONMENTAL QUALITY 150890400 3500 INDIANAPOLIS BLVD EAST CHICAGO IN 46312 USA

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
5-5-04	ARROW #950	GREYBULL	GBL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	48
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.0
> 75 micron (wt. %)	4.0 max.	1.0

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	8.9
Y.P. / P.V. Ratio	3.0 max.	1.00

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4426.

Signed 5/7/04 Date

Approved by: Plant Manager

LabansCert.doc (4/22/97)
Rev E (8/99)

Rec'd 05 07 04

Appendix G

CONTRACTOR QUALITY CONTROL PLAN

INDIANA HARBOR AND CANAL CUTOFF WALL

Prepared for:

U.S. Army Corps of Engineers
Chicago District
Calumet Area Office
906 Griffith Boulevard
Griffith, Indiana 46319

Contract No. DACW27-02-C-0003

Specification Section 01451
Contractor Quality Control

Submittal No. 01451-1.2

Prepared by:

Environmental Quality Management, Inc.
1800 Carillon Boulevard
Cincinnati, Ohio 45240

July 3, 2002

CONTRACTOR QUALITY CONTROL PLAN

Contract No. DACW27-02-C-0003

Submittal No. 01451-1.2

I certify that this submittal has been reviewed in detail and is correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

_____

Edward Wise Date

Noted Exceptions:

None that have not been addressed by USACE.

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SECTION 1

INTRODUCTION

1.1 Purpose

The purpose of this construction project is to install a soil-bentonite slurry trench cutoff wall around the perimeter of the project site located at 3500 Indianapolis Boulevard, East Chicago, Indiana, referred to as the Energy Cooperative, Incorporated (ECI) property. To accomplish this objective, surface and subsurface obstructions along the alignment of the slurry trench cutoff wall must be removed and other environmental controls implemented.

This Contractor Quality Control (CQC) Plan describes the personnel, procedures, control, instructions, tests, records, and forms to be used for all features of work. This plan was written in conformance with specification *Section 01451, Contractor Quality Control* of Contract No. DACW27-02-C-0003. This is the Indiana Harbor & Canal Confined Disposal Facility Subsurface Investigation and Cutoff Wall, Construction Solicitation and Specifications (Construction Specifications).

1.2 Organization

This plan contains seven sections. Section 2 provides background information on the ECI property, including a description of the site location and information describing the manufacturing that has taken place on the property. Section 3 describes the CQC organization for this project, its authority and responsibilities, and its commitment to follow a three-phase CQC Plan. Section 4 summarizes the approach for scheduling, reviewing, certifying, and managing submittals including subcontractors, off-site fabricators, suppliers, and purchasing agents. Section 5 presents the control, verification, and acceptance procedures for CQC. Section 6 describes the three-phase control program and the procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation. This section provides the procedures for tracking construction deficiencies from

identification through acceptable corrective action. Section 7 includes a list of the definable features of work.

SECTION 2

SITE LOCATION AND DESCRIPTION

2.1 Site Location

The Energy Cooperative Incorporated (ECI) property is located in Lake County Indiana (northwest Indiana), 20 miles southeast of downtown Chicago, Illinois and 1.5 miles northwest of the City of East Chicago, Indiana. A location map is provided as Figure 1. The overall size of the property is approximately 160 acres. The project site is bordered by the Lake George Canal to the south, Indianapolis Boulevard to the east, Cline Avenue to the north, and the Amoco Oil Company Refinery to the west. A railroad track owned by CSX Railroad runs parallel to the entire length of the west property line. A portion of these railroad tracks also diverges and bisects the property into a northern and a southern zone. The size of the northern zone is approximately 50 acres, and the southern zone is approximately 110 acres. The northern zone is connected to the southern zone via a right of way that crosses the bisecting railroad track near the eastern edge of the property.

2.2 Site Description

The ECI property was the location of a petroleum products refinery from 1918 to 1981. Peak production was approximately 140,000 barrels per day. The project parcel, termed the main refinery, contained the principal production area and also included storage, a marine loading area, rail loading areas, insecticide manufacturing, truck docking facilities, and an American Petroleum Institute (API) separator. The refinery operations included the production of mineral spirits, propane, leaded and unleaded gasoline, fuel oil, kerosene, asphalt and asphalt products, liquefied petroleum gas, grease, lubricating oils, paraffin wax, phenols, and sulfur. Between 1940 and 1958, pyrethrum extract consisting of dried heads of certain varieties of

chrysanthemums was filtered on site. The filtered extract was combined with kerosene and used as an insecticide base to produce insecticide. The maximum annual production of insecticide base occurred in 1944 when 49,359 barrels were produced. This accounted for 0.26 percent of the total plant throughput.

Former owners of the project site include Sinclair from 1918 to 1968, Atlantic Richfield Company (ARCO) from 1968 to 1976, and ECI from 1976 to 1981. Figure 2 shows the layout of the project site during ECI's ownership in 1977 while it operated as a refinery. In 1981, ECI filed for bankruptcy, and in the late 1980s, all buildings and aboveground structures were razed in response to a court order. Several inches of clean topsoil were graded to cover the site. In 1989, the City of East Chicago became the owner of the site as payment for back taxes owed by ECI.

The site has open Resource Conservation and Recovery Act (RCRA) status because the court-approved closure of the facility was not comparable to a RCRA-approved closure. In addition, the site requires RCRA corrective action because soil and groundwater on site were contaminated from past industrial activities.

SECTION 3

CQC ORGANIZATION AND RESPONSIBILITY

3.1 Quality Control Organization

The Construction Specifications require a CQCSM (CQC Site Manager) and an Assistant CQCSM. Under normal circumstances only one of these individuals would be performing work for this project at a given time. Due to the complex nature of the project, EQ has proposed to divide the responsibilities of the CQCSM into office and field components. The CQC Office Coordinator would oversee the tasks of the CQCSM related to office tasks such as plan preparation, data validation, etc. The field component of the CQC function would be performed by the CQCSM. The overall responsibility for the CQCSM function specified in the Construction Specifications would remain with the CQCSM. Dividing the responsibilities of the CQCSM in this fashion would enable the field CQCSM to have more time for field required tasks.

In most respects the CQC Office Coordinator will function as a subordinate to the CQCSM. Technically, this may not be a deviation from the Construction Specifications. However, EQ feels this is a significant topic, and merits USACE consideration. We are therefore presenting it as a Deviation from the Construction Specifications.

Figure 3 shows the CQC organization for the Indiana Harbor cutoff wall project. The CQC staff will implement the three-phase control system (Preparatory, Initial, and Follow-up) specified in Section 01451 Part 3.5 of the Construction Specifications.

3.2 CQC Staff

The project organization is presented in Figure 3. Resumes for key CQC personnel are presented in Appendix A. The following subsections present the name, qualifications, duties, responsibilities, and authorities of each person assigned a CQC function.

3.2.1 CQCSM

The CQCSM for this project will be Mr. Ed Wise. Mr. Wise has 19 years of relevant experience with focused experience on projects relating to hazardous wastes, TSCA, CERCKAm wastewater, air, and OSHA. He successfully completed the CQC Management Training Class offered by the Corps of Engineers in 2002. As the CQCSM, Mr. Wise will be responsible for ensuring that the project is performed in accordance with the Construction Specifications and associated work plans. He will have the authority to adequately perform the function of the CQCSM, including the authority to stop work that is not in compliance with the Construction Specifications.

3.2.2 Assistant CQCSM

The Assistant CQCSM for this project will be Mr. Eric Bowman. Mr. Bowman is a degreed geologist with 18 years of relevant experience. He successfully completed the CQC Management Training Class offered by the Corps of Engineers in 1999. The certification for this class is valid for five years. As the Assistant CQCSM, Mr. Bowman will be responsible for ensuring that the project is performed in accordance with the Construction Specifications and associated work plans in the event that the CQCSM is unavailable on site. He will have the authority to adequately perform the function of the CQCSM, including the authority to stop work that is not in compliance with the Construction Specifications.

3.2.3 CQC Office Coordinator

The CQC Office Coordinator for this project will be Mr. Fred Hall. Mr. Hall is a degreed engineer with 27 years of relevant experience. He successfully completed the CQC Management Training Class offered by the Corps of Engineers in 1999. The certification for this class is valid for five years. As the CQC Office Coordinator, Mr. Hall will be responsible for ensuring that the work plans and QA/QC elements related to of-site analytical data are in accordance with the Construction Specifications.

3.2.4 Cutoff Wall CQC Specialist

The Cutoff Wall CQC Specialist has not been identified to date. EQ will submit a proposed Cutoff Wall CQC Specialist no later than 30 days prior to installation of the cutoff wall test section and will not begin work on this task prior to receipt of approval from USACE.

3.2.5 Site Manager/Project Superintendent

Mr. Jeff Beck will serve as the Site Manager/Project Superintendent. Mr Beck has a Bachelors Degree in Education and 24 years of relevant project experience. He will have the overall responsibility for ensuring that the project is completed on schedule and in conformance with the Construction Specifications.

3.2.6 Specialized Support Personnel

Specialized EQ personnel will be assigned, when required, to assist the CQCSM in the following areas: civil (John Wentz), geotechnical (Colleen Lear), materials technician (Neil Morstadt), environmental (John Miller), and submittals processing (Randy Staehling).

3.3 Letter to the CQC System Manager

A copy of the letter to the CQC System Manager, signed by an authorized official of EQ, is contained in Appendix B. This letter describes the responsibilities and designates sufficient authorities to perform the functions of the CQCSM and authorizes the CQCSM to stop work that is not in compliance with the contract.

SECTION 4

SUBMITTAL PROCEDURES

4.1 Submittal Register

EQ will make submittals in accordance with the requirements of Specification Section 01330. ENG Form 4288 (Appendix C) will be used to track submittals. The Government has completed the initial entries in the Submittal Register, but additional submittals will be required. This form will be maintained in accordance with Specification Section 01330, Section 3.2. All submittals will be entered into the submittal registry including those from subcontractors, off-site fabricators, suppliers, and purchasing agents. The approved submittal register will be used to control submittals throughout the life of the contract and will become the scheduling document. The submittal register and the progress schedule will be coordinated.

The submittal register ENG Form 4288 is in Microsoft Excel format and will be updated as needed to ensure that it is current as submittals are made or returned. The register will allow EQ to ensure that submittals are properly scheduled to allow for CQCSM and CO review and approval prior to ordering and/or performing.

As required by Section 1330, all submittals will be checked and approved by the CQCSM prior to submittal to the CO.

4.2 Transmittals

All submittals will be stamped, signed, and dated; any deviations will be clearly identified. The transmittal form (ENG Form 4025) will accompany all submittals. For any submittals that include proposed deviations, the column "variation" of the transmittal form will be checked. Eight paper copies of all submittals will be submitted to the CO. Upon completion of review of submittals requiring government approval, the submittals will be identified as having received approval. Six copies of the submittal will be retained by the CO, and two copies of the submittal will be returned to EQ. After approval, EQ will provide to the CO the approved

submittal in the appropriate electronic format within 5 calendar days. The appropriate electronic formats are Microsoft Excel for data tables, PDF format for Quality Assurance/Quality Control (QA/QC) or other documentation, and Microstation .DGN format for electronic drawings. Other types of documentation will be submitted in the formats contained in Section 1330.

SECTION 5

CONTROL, VERIFICATION, AND ACCEPTANCE TESTING PROCEDURES

This section presents the control, verification, and acceptance testing procedures for each specific test. All activities will be performed in accordance with the plans and specifications. The applicable quality control tests will be performed, documented, and submitted with the Daily CQC Management Report. Table 1 presents a summary of tests required under the Construction Specifications. This table includes the test name, specification paragraph requiring the test, feature of work to be tested, test frequency, and person responsible for each test.

Environmental Chemical Corporation (now owned by SIMALABS) will perform the analyses for the air and waste samples. A copy of validation letter for the USACE's Hazardous, Toxic and Radioactive Waste Program is included in Appendix D. Great Lakes Soil & Environmental Consultants, Inc. (333 Shore Drive, Burr Ridge, Illinois) will complete the geotechnical analysis of soil, bentonite slurry, and soil bentonite backfill samples and the permeability testing. The Great Lakes laboratory has been certified by the Corps to complete the tests required but the qualification was valid through December 2, 2001. This laboratory has agreed to work with the Corps to complete re-certification as soon as possible. A letter from Great Lakes Soil & Environmental Consultants and an EQ memo describing the current status of re – certification are included in Appendix D.

A General Sampling Checklist for sample collection supplies and activities is included in Appendix C. More detailed sample-specific checklists for the QC testing activities are presented in the appropriate section(s) below.

5.1 Drilling, Sampling, and Testing of Borings

The drilling, sampling, and testing of borings will determine the type, nature, and characteristics of subsurface materials, including the extent and conditions of the various materials as they exist to the depths and at the locations specified in Section 02210. The borings and laboratory testing will be completed at least 7 days prior to the start of chemical compatibility testing.

5.1.1 Soil Properties

Split spoon samples will be collected until at least 5 feet of continuous silty clay has been sampled. The following tests will be performed while carrying out the activities within Section 02210:

Testing of Boring Samples

Subject	Standard	Type Of Test	Minimum Frequency	Specified Value
Soil Particle Size	ASTM D 422	Hydrometer Sieve Analysis	3 per boring 3 per boring	Determine soil properties
Atterberg Limits of Soils Passing No. 40 mesh sieve	ASTM D 4318	Liquid Limit Plastic Limit Plasticity Index	3 per boring	Determine properties of soils passing No. 40 mesh sieve
Soil pH	ASTM D 4972	pH	1 per boring	Determine soil properties
Soil Penetration	ASTM D 1586	Drive hammer blow in blows per 6 in.	Continuous when driving sample spoons	Determine soil properties

The CQCSM will verify that these samples are being collected in accordance with the procedures presented in Section 02210 and the Pre-Installation Boring Plan. The previous day's activities will be reported in the Daily Construction Quality Control Management Reports along with any results received.

5.1.2 Boring Depth, Alignment, and Backfill

EQ will use drive sample boring techniques to characterize site conditions on 200-foot centers until a minimum of 5 feet of continuous silty clay is penetrated at each boring location. Prior to boring, EQ will use geophysical surveying methods to detect any subsurface obstruction. A dual-frequency line locator will be used for the geophysical survey. See the *Site Survey and Investigation Plan* for additional detail and the cut sheets for this device.

If the proposed boring location cannot be "cleared," the boring location will be relocated with the approval of the USACE. The initial maximum offset will be 25 feet. To the extent possible, offset locations will be as close as possible to the centerline. After the boring has been completed, the location will be surveyed for vertical and lateral position by an Indiana licensed surveyor. The elevation of the ground surface at each borehole location will be determined within an accuracy of ± 0.1 foot, and the horizontal location of each borehole will be determined within an accuracy of ±1 foot as specified. The surveying will be made relative to the State Plane system, and the coordinates of the boring will be determined relative to the station and offset relative to the centerline of the proposed slurry wall.

Boreholes will be backfilled with bentonite chips or slurry to within 2 feet of ground surface. The remaining 2 feet of the borehole will be backfilled with local soil that will be compacted by tamping. The CQCSM will observe the backfilling of the boreholes to ensure that the procedures detailed in the Drilling, Sampling, and Testing of Borings plan are followed.

5.1.3 Quality Control Review and Reporting

The EQ field geologist/engineer will keep an accurate boring log as described in Section 02210. The CQCSM will review the previous day's boring logs and sample results and inspect the sample jars, storage boxes, and labels daily to ensure that all required information is recorded and that the storage boxes are not subjected to rough handling or damaging environmental conditions. Information of the number of borings drilled and other pertinent information will be presented in the daily QC report.

Hard copy (eight copies) of the boring logs, including the results of the laboratory testing, will be submitted to the Corps in batches of 10 borings, as soon as 10 borings have been drilled, with an ENG FORM 4025. Each set of borings will be a new item number on the submittal

register. After all borings have been completed, PDF file(s) of all of the logs will be submitted on CD-ROMS, with ENG 4025.

5.2 Dewatering Process and Oil Boom Systems

Two systems will be designed and installed to capture and dispose of free product encountered during the contract work. The dewatering process system will process water and free oil removed during the excavation work or other activities that result in the pumping of groundwater. The oil boom system, located in the Lake George Branch of the Indiana Harbor Canal, will control seepage of free oil from the project site into the canal.

5.2.1 Dewatering Process

The dewatering system will consist of piping, supports, fittings, equipment, pumps, tanks, and accessories needed to process all liquid collected during the inspection trench dewatering activities and the test section pump test. The process will have sufficient storage to include capacity to store the separated free product without constraining the dewatering activities. This includes sufficient time to arrange for off-site disposal in accordance with the plan for Storage, Transportation, and Disposal of Hazardous Materials and Free Product Waste (Section 02120).

The CQCSM will review the design capacity of the dewatering system and estimates of water and free product generation from inspection trench dewatering activities and the test section pump test. All pipes and valves will be inspected prior to and periodically during construction to ensure that each piece of pipe and the valve bear the appropriate ASTM designation and markings to identify the manufacturer, size, pressure rating, body disc, and seat material. The unit will be designed to include sufficient storage capacity to store the separated free product without constraining dewatering activities and to allow sufficient time to arrange for off-site disposal.

The CQCSM will inspect the dewatering system weekly and review the daily log daily for leaks, groundwater flow, and levels of free product in the free product storage tank. Any problems will be reported at once to the EQ On-site Manager and included in the daily CQC Management Report.

5.2.2 Oil Boom Systems

An oil boom system will be installed to contain and collect free product and to prevent the movement of free product into the Lake George Branch of the Indiana Harbor Canal. The oil boom system will be made up of an inner boom that is a disposable oil absorbent type boom and an outer "permanent" containment boom. The oil boom system will operate as a static system and will be inspected weekly to identify any leaks through the outer containment boom. The inspection will also identify the need to remove free product or the need to replace an absorbent boom due to saturation. It will also monitor the oil/water separator and free product tanks for leaks and spills. The details of the design, installation, and maintenance of the oil boom system are contained in the Oil Boom Installation, Operation, and Management Plan.

The first task to be performed will be the initial background monitoring. Subsequent to the completion of this task, the following tasks can be performed prior to installation of the Oil Boom:

- Install the decontamination pad.
- Construct access roads.
- Install temporary facilities/offices/project signs.
- Install site security service shed and equipment.
- Clearing and grubbing.
- Place aggregate in the tarry site surface depressions.
- Install oil-water separator pad and spent oil boom containment area.
- Install the railroad underpass conduit.
- Well decommissioning.
- Drill and sample soil borings.

The CQCSM will verify that the oil boom system is completely installed and operating prior to performing any other earth-disturbing activities. He will also inspect the system weekly and review the operating log daily during site operations. The CQCSM will also inspect the inventory of absorbent products and oil booms weekly to verify that sufficient replacement booms and absorbent materials are available for proper operation and maintenance of the system as described in the Oil Boom Installation, Operation, and Management Plan.

5.3 Oil/Water Separator Process Equipment

The oil/water separator (OWS) system will include the oil/water separator unit, unit housing, solids management, maintenance drainage system, and all related equipment as detailed in Section 11500 of the specification. As part of the dewatering process system, the OWS will be used to process the liquid (groundwater and free oil) from the dewatering system, pump test section, and oil boom system. Several intermittent wastewater streams may also be processed in the system including the contents of underground storage tanks, petroleum-piping abandonments, and water resulting from cleaning of materials and equipment. The water used for the OWS Performance Verification Test (PVT) will also be processed through the equipment. Decontamination fluids containing detergents or other cleaning agents will not be processed through the system.

The CQCSM will review the design of the OWS system to ensure that the design is in compliance with the other requirements of Section 11500 as well as any CO-approved variances. This review will also ensure that the OWS can accommodate uncontrolled surges of water, oil, or oil/water mixture ranging from zero flow up to 100 percent of maximum hydraulic throughput capacity.

The OWS unit will be tested by the manufacturer prior to shipment and will be tested on site prior to operation (Performance Verification Test or PVT). The CQCSM will review the test schedule to verify that the CO has been supplied with the test procedures, the CO has given EQ written approval of the test procedures, and that the CO is notified at least 21 days prior to the manufacturer's test. Prior to on-site PVT testing, the CQCSM will verify that the CO has approved the test plan and given written permission before proceeding.

All pipes and valves will be inspected periodically during installation of the OWS system to ensure that each piece of pipe and valves bear the appropriate ASTM designation and markings to identify the manufacturer, size, pressure rating, body disc, and seat material. The valves will also bear a securely attached tag with the manufacturer's name, valve model number, and valve identification permanently displayed and marked in accordance with MSS SP-25.

The CQCSM will verify that the CO has been given the results (original copies) of the PVT at the conclusion of each phase of testing. EQ will not proceed with the installation of the system equipment, hardware, and software until the CO approves the test results.

Leakage tests will be conducted for at least 2 hours with the piping being subjected to at least 200 psig pressure. The pressure must be maintained within 5 psi of the specified leakage test pressure (200 psig) after the piping has been filled with the test liquid and all air is expelled. The CQCSM will review the results of all leak tests. If any pressure test discloses leakage greater that that allowed, the CQCSM will verify that the leaks are located and repaired until the leakage is within the specified allowance.

During OWS system operation, the CQCSM will inspect the OWS system weekly and review the daily log daily for leaks or other operating problems. The OWS system will be shut down during the winter months. The CQCSM will also inspect the spare parts inventory prior to startup and weekly to verify that there are spare parts for each different item of material and equipment specified that is recommended by the manufacturer to be replaced any time up to one year of service. Any problems will be reported at once to the EQ Site Manager and included in the daily CQC Management Report.

5.4 Survey Obstruction Investigation, Inspection, and Removal

The survey investigation, inspection, and obstruction removal are performed to locate, identify, inspect, and remove all subsurface obstructions or buried structures that will prevent installation of the cutoff wall. The obstructions include petroleum pipelines, sanitary and storm sewers, manholes, power lines and conduits, outfall drainage structures, underground storage tanks (USTs) and their connected piping, concrete slabs, concrete foundations, building construction debris from razing of previous on-site facilities, dock wall steel sheet and H-piles, and railroad ties/tracks. The investigation includes inspection trenching and dewatering along the cutoff wall alignment to a depth of 15 feet. The obstruction removal work includes plugging, capping, and closure of all open pipes and conduits upon removal of the obstruction. All obstruction investigation, inspection trenching, and removal work will be completed prior to the start of the cutoff wall installation.

The excavation will consist of removal of material for the inspection trench for a minimum width of 30 inches, maximum width of 5 feet, and to a depth of 15 feet. The CQCSM will observe trenching operations and review the field notes daily as well as the previous day's

survey investigations. The CQCSM will verify daily that the field verification, location, horizontal, and vertical control surveys meet the standards and specifications of USACE Third Order Class II accuracy as defined in EM 1110-1-1004 "Deformation Monitoring and Control Surveying," Chapter 5.

All pipes and tiles will be plugged, capped, and/or closed to eliminate the possible loss of slurry during cutoff wall construction. For pipes 12 inches in diameter and less, mechanical plugs will be used. For pipes over 12 inches in diameter, the opening will be sealed with concrete for at least one pipe diameter. Fluids drained from these pipes (e.g., oils, fuels) will be passed through the OWS if appropriate. Any disposal of these substances will meet the requirements of Section 01410: Environmental Protection and Section 02120: Storage, Transportation, and Disposal of Hazardous Material and Free Product Wastes. The CQCSM will review the daily field notes and review the plugging of pipes and tiles prior to their plugging to verify that proper plugging procedures are being used for a given pipe diameter. The CQCSM will also review the quantities of materials removed from the pipes and other material disposed off site to verify that disposal of these materials meets the requirements of Sections 01410 and 02120.

Only satisfactory material as defined in Section 02215 will be used as backfill for the inspection trench. This includes on-site soils containing petroleum contaminants, but does not include materials containing organic matter, frozen materials, and building/construction debris from razing of previous on-site facilities. Any excavated material not satisfactory for backfill will be placed in the debris stockpile area. The CQCSM will inspect the trenching operations daily to verify that these procedures are being followed in accordance with Section 02215. All debris in the stockpile area will be weighed and reported daily in the daily CQC report. No inspection trenching work will be performed until the Excavation, Handling, and Obstruction Removal Work Plan is approved.

EQ will prepare and maintain "as-built" drawings, which will show all obstructions, piping, debris, and other items encountered during the work. These will show location, material type, dimensions, pipe diameters, depths, pipe invert elevation, lengths, type of plug installed, relocations, and all other information that adequately describes obstruction features, closure, and

corrective activities for removal. The CQCSM will review these as-built drawings daily and verify that these drawings are kept up-to-date.

The CQCSM will maintain records for all construction operations performed as well as report the previous day's activities in the daily CQC report. These records will include the following:

1. Permits and licenses
2. Observance of safety regulations
3. Stripping
4. Excavation
5. Trenching
6. Control and field verification surveys
7. Drainage
8. Filling and backfilling
9. Materials and obstruction disposition and closure.

5.5 Soil-Bentonite Slurry Trench Cutoff Wall

5.5.1 Bentonite Slurry

Bentonite slurry used for trench excavation will be tested in accordance with Table 2. The water for slurry preparation will be acquired from a municipal water hydrant located near the site. Test results will be recorded on the Daily Quality Control Report. A Bentonite Slurry Sampling Checklist form specific to testing the initial and in-trench bentonite slurry is included in Appendix C.

5.5.2 Trench Width, Depth, Continuity, and Alignment

The width of the slurry wall will be verified by measuring the width of the bucket. Continuity will be visually and mechanically observed by completely passing the excavator bucket from the workpad surface to the trench bottom depth along the length of each cut.

The depth of the slurry wall will be measured and recorded every 10 feet along the cutoff wall centerline. Slurry wall trench depths are measured using a weighted tape. The depth profile of the open trench and the backfill slopes will be recorded and plotted daily on the project drawings. This drawing(s) will be kept available on site in the field trailer to allow for

verification of trench stability and backfill placement. The trench alignment and offset control points will be surveyed prior to construction activities. More detailed survey markers with station locations will be measured from these surveyed points at 20-foot intervals along the cutoff wall centerline.

5.5.3 Excavated Soils

Excavated soils will be placed to the side of the trench for either backfill mixing or disposal. These soils will be visually inspected to determine when the excavator has encountered the silty clay 'key' material. The depth of the top of silty clay will be recorded along with the total trench depth. These measurements will be performed to ensure that the minimum key depth of 3 feet into the silty clay layer is maintained. The depths will be recorded on the Daily Slurry Wall Quality Control Form (Appendix C) along with daily profiles of the backfill slope. One set of backfill material tests will be performed for every 100 lineal feet of cutoff wall during the production cutoff wall and at least once every day as listed in Table 2. For the test section, the testing will be performed for every 20 lineal feet of wall. A Backfill Material Sampling Checklist specific to testing the backfill material is included in Appendix C.

5.5.4 Soil-Bentonite Backfill

No mixing or placing of backfill will be allowed when the air temperature is below 20°F. If dry bentonite is used, the amount will be measured by counting the number of pre-weighed bags. Two soil-bentonite samples will be collected every shift. The slump test results, minus 200 sieve (fines content), and backfill density (at least 15 pcf greater than the trench slurry density) results will be recorded on the daily quality control report. The results required for all of these tests will be developed during the site-specific mix design. A Soil-Bentonite Backfill Sampling Checklist is presented in Appendix C.

5.5.5 Laboratory Quality Control Testing

Sampling and testing will be performed just prior to placing soil-bentonite backfill material in the trench. Slump cone tests will be done at the rate of 1 per 100 lineal feet of wall and at least once every day. The density of the soil-bentonite backfill material will be calculated

using a 4-inch cylindrical mold as described in Paragraph 6 of ASTM D 698. Soil-bentonite backfill material will be placed in the mold and rodded 10 times. Additional soil-bentonite backfill will then be added to fill the mold. The weight and volume of the molded soil-bentonite backfill will then be used to determine the density. Density will be determined at a rate of 1 per 100 lineal feet of wall and at least once every day. Particle-size analysis (ASTM D 422) and Atterberg Limits (ASTM D 4318) tests will be performed every 100 lineal feet of wall and at least once every day, except for the test section where the tests will be performed every 20 lineal feet of wall.

For the production cutoff wall, one permeability test will be performed every 25 lineal feet of wall using the API fixed-ring device for the filter press (API RP 13B-1). For every 100 lineal feet of wall, there will be one test on a duplicate sample using a flexible wall permeameter (ASTM D 5084). For the test section, API tests and a flexible wall test on a duplicate sample will be performed for every 20 lineal feet of wall. For both the test section and production cutoff walls, a minimum of one API and one flexible wall permeability test will be performed each day plus one API and one flexible wall permeability test will be performed on a sample taken from each of the cutoff corners. Test methods and procedures will be submitted and approved prior to use. The permeability tests will use the water for mixing during construction as permeate. Flexible wall permeability tests will be performed at an effective confining pressure of 0.5 tsf. For the flexible wall test, the hydraulic gradient should not exceed the maximum value recommended in the ASTM D 5084.

The flexible wall permeameter results will be the basis for acceptance of the soil-bentonite backfill. The permeability determined at the conclusion of the flexible wall test on the samples obtained from the test section and production walls will be no more than 1.0×10^{-7} cm/sec. Area(s) of the test section or production walls that fail to meet the permeability requirement will be removed to the location of the nearest passing test and replaced.

5.5.6 On-Site QC Testing Equipment

The following equipment will be utilized for on-site quality control testing:

- Mud balance for density testing
- Slump cone for slump testing

- Marsh funnel for slurry viscosity measurement
- Sounding cable for trench depth measurement
- Filtrate loss cell.

5.6 Laboratory

To ensure that the data provided for waste characterization meets project data quality objectives, a laboratory meeting USACE validation requirements will be used. The laboratory performing analysis will be Simalabs International, formerly Environmental Chemical Corporation (ECC). A copy of the laboratory's current letter of validation is presented in Appendix D. A letter from ECC to the USACE explaining the acquisition of ECC by Simalabs is also included in Appendix D. The laboratory is located in Cincinnati, Ohio. Alternate laboratories may be used with the approval of the USACE.

5.7 Duplicate Samples

EQ will perform specified or required tests to verify that control measures are adequate to provide a product that conforms to contract requirements. EQ will furnish to the Government duplicate samples of test specimens for possible testing by the Government, for a minimum of 5 percent of the QC tests, or as directed by the Government. Testing will include operation and/or acceptance tests when specified. EQ will procure the services of a Corps of Engineers approved testing laboratory, or establish an approved testing laboratory at the project site. EQ will perform the following activities, and record and provide the following data:

- Verify that testing procedures comply with contract requirements.
- Verify that facilities and testing equipment are available and comply with testing standards.
- Check test instrument calibration data against certified standards.
- Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
- Record results of all tests taken, both passing and failing tests, on the CQC report for the date taken. The specification paragraph reference, the location where tests were taken, and the sequential control number identifying the test will be given. If approved by the CO, actual

test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an off-site or commercial test facility will be provided directly to the CO.

SECTION 6

TRACKING PROCEDURES

After all required plans/documents/materials are approved/accepted, at least three phases of control will be conducted by the CQCSM for each definable feature of work: Preparatory Phase, Initial Phase, and Follow-up Control Phase. The USACE will be notified at least 48 hours in advance of beginning both the preparatory and initial control phases. Whenever one of the control phase meetings occur, a set of meeting minutes will be prepared by the CQCSM and attached to the Daily CQC Management Report.

During the First Preparatory Phase meeting between EQ and the government, a schedule of the work tasks requiring phase meetings will be agreed upon. This schedule will then be used to document the progress of work including the three phases of control (preparatory, initial, and follow-up) for each work task. The schedule will be updated as required and will be posted on the wall of the contractor's field trailer. A current copy of the schedule will be submitted along with the Daily CQC Management Report and Phase meeting minutes when these meetings occur.

6.1 Preparatory Phase

The preparatory phase will be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase will include:

- A review of each paragraph of applicable specifications, reference codes, and standards. A copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field will be made available by EQ at the Preparatory Inspection. These copies will be maintained in the field and available for use by USACE personnel until final acceptance of the work.
- A review of the applicable contract drawings.

- A check to ensure that all materials and/or equipment have been tested, submitted, and approved.
- Review of provisions that have been made to provide required control inspection and testing.
- Examination of the work area to ensure that all required preliminary work has been completed and is in compliance with the contract.
- A physical examination of required materials, equipment, and sample work to ensure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- A review of the appropriate activity hazard analysis to ensure safety requirements are met.
- Discussion of procedures for controlling the quality of the work, including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work will be included.
- A check to ensure that the portion of the plan for the work to be performed has been accepted by the CO.
- Discussion of the initial control phase.
- Completion of Preparatory Phase Checklist (Appendix C).

6.2 Initial Phase

The initial phase will be accomplished at the beginning of a definable feature of work. The following will be accomplished:

- Check work to ensure that it is in full compliance with contract requirements. Review preparatory meeting minutes.
- Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.
- Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
- Resolve all differences.

- Check safety to include compliance with and upgrading of the safety plan and the activity hazard analysis. Review the activity analysis with each worker.

- The initial phase will be repeated for each new crew to work on site, or any time acceptable specified quality standards are not being met.

- Completion of Initial Inspection Checklist (Appendix C).

6.3 Follow-up Phase

Daily checks will be performed to ensure that control activities, including control testing, are providing continued compliance with contract requirements until completion of the particular feature of work. The checks will be made a matter of record in the CQC documentation. Final follow-up checks will be conducted, and all deficiencies corrected prior to the start of additional features of work that may be affected by the deficient work. EQ will not build upon nor conceal non-conforming work.

6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases will be conducted on the same definable features of work if:

- The quality of on-going work is unacceptable.
- There are changes in the applicable CQC staff, on-site production supervision, or work crew.
- Work on a definable feature is resumed after a substantial period of inactivity.
- Other problems develop.

6.5 Deficiency Procedure

This section establishes procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.

Daily checks will be performed to ensure that control activities are providing continued compliance with contractual requirements and will be recorded on the daily CQC Management Report (Appendix C). Final follow-up checks will be conducted at the completion of each work

item and prior to start of additional phases that may be affected by any deficiencies in previous work.

A deficiency-tracking list will be developed and a deficiency number associated with each problem (starting with Deficiency No. 1). This list will be posted in the on-site field trailer and will include the following items at a minimum: number, description, initial date, corrective action, final date corrected. A copy of this form will be submitted along with the Daily CQC Management Report on any dates that a deficiency has occurred or been corrected.

6.6 Reporting Procedures

The Daily Quality Control Management Report will be completed daily. Additional reporting forms will be submitted (as needed) as attachments to this document to document quality control.

This project requires subsurface investigation and obstruction removal in order to construct the soil-bentonite slurry trench cutoff wall. This CQC program includes, but is not limited to:

- Drilling, sampling, and testing of borings prior to production cutoff wall installation
- Survey investigation, inspection, and obstruction removal
- Decommissioning wells
- Oil/water separator process equipment
- Slurry and backfill testing
- Procedures to check depth and excavated materials.

Test results, abnormalities, excavation, obstruction removal, backfill profiles, and OWS operation and sampling procedures will be recorded on the daily quality control reports. The daily forms will be completed early the following morning for signature of the USACE's on-site representative. Updated and current copies of all CQC documents will be available at the site trailer for review or inspection at all times.

SECTION 7

DEFINABLE WORK FEATURES

This section presents a list of definable features of work. The following features of work will be completed as part of this project:

1) Air Monitoring – EQ will provide all equipment and perform perimeter air monitoring during all field activities. This includes 14 days of pre-construction air monitoring to gather background air concentrations of particulate, volatile organic compounds (VOC), benzene, and PCBs. A meteorological data gathering system will be installed to collect and store meteorological data during construction activities. The construction activities consist of clearing and grubbing, inspection trench construction, cutoff wall test section installation, and cutoff wall construction. During these construction activities, air monitoring will be performed at three locations downwind and adjacent to the work zone and at one background location.

2) Mobilization – Mobilization involves the setup of temporary site facilities, mobilization of personnel to the site, and the transportation of equipment to the site. Prior to beginning any excavation activity, the following tasks will be performed:

   - Mark the work area limits.
   - Install temporary erosion and sedimentation control devices including berms, dikes, drains, silt fences, sedimentation basins, grassing, and mulching.
   - Install diversion ditches, benches, and berms to retard and control runoff.

3) Erosion Control – Install temporary gravel construction entrance/exit pad, perimeter dike constructed of HDPE pipe and an impervious liner, earthen dikes around stock pile areas, and silt fencing. Initiate program to control fugitive dust emissions. These measures will control water run-off and run-on, channel storm water into the Lake George Canal, and protect the Canal from sediment-laden runoff.

4) Security Fence – Replace defective sections of the perimeter fence, and relocate the entrance gate to provide clearance for cutoff wall. Change single double-leaf entrance gate configuration to a pair of double-leaf gates. Install fencing around additional areas within the main perimeter to provide supplemental security around areas such as the USACE office trailer, air monitoring stations, and others as believed appropriate by the site manager.

5) Install Security Shed – A security shed will be installed at the main entrance and provide a licensed, unarmed security guard continuously throughout active construction periods. Install watchman's clocks at key locations to verify rounds are being made in a timely fashion.

6) Install and Furnish Field Offices – Provide temporary field offices for the USACE, EQ, and EQ's subcontractors. Furnish offices with desks, communications equipment, copiers, fax machines, and other supplies according to specification. Provide additional trailers to store light equipment and supplies.

7) Install Support Facilities - Install sanitary facilities, potable water, electricity, telephones, waste disposal receptacles for contaminated and uncontaminated construction materials, and a "lay-down" area for construction materials and signs. An equipment cleaning station will be constructed. The system of existing access roads on site will be expanded as necessary. New roads will be constructed of crushed aggregate with a similar design as the existing roads.

8) Install Project and Safety Signs – EQ will erect one project sign, one safety sign, and four safety warning signs. These signs will be maintained throughout the duration of the project.

9) Clearing and Grubbing – Clearing and grubbing activities will be performed on site as required.

10) Oil Boom System Installation and Maintenance – Install oil boom system to contain free product seeping into the canal and absorbent products to remove free product that may build up behind the oil boom.

11) Storage, Transportation, and Disposal of Hazardous Material and Free Product Waste – Perform sampling, chain-of-custody, analytical, labeling, storage, inspection, training, and other procedures designed to ensure the management of these materials in accordance with applicable regulations. Provide containers for temporary storage of any water streams produced prior to the installation of the OWS system.

12) Site Survey Investigation - Provide site surveying to establish controls, lay out centerline of the observation trench/cutoff wall, and establish locations for soil borings, existing wells, the air monitoring stations, observation wells, and on-site structures for as-built drawings.

13) Placing Aggregate in Tar-Filled Site Surface Depressions – Provide surficial cover of rip rap over tar-filled surface depressions.

14) Decommissioning Wells – Decommission existing wells and any wells installed as part of the cutoff wall test section.

15) Drilling, sampling, and testing of borings – Complete drilling, sampling, and testing of borings to determine the type, nature, and characteristics of subsurface materials.

16) Dewatering Process – Install all piping, supports, fittings, equipment, pumps, tanks, and accessories needed to process all liquid collected during the inspection trench dewatering activities.

17) OWS process equipment – Install OWS with solids collection chamber. The separator will be comprised of a tank with an inlet compartment, an oil separation compartment, a solids collection chamber, and an outlet compartment.

18) Survey investigation and inspection – Perform all operations necessary for subsurface investigations, inspection trenching, and dewatering within a maximum of 5 feet on both sides of the cutoff wall centerline alignment.

19) Obstruction removal – Remove all subsurface obstructions or buried structures that will prevent installation of the cutoff wall within a maximum of 5 feet on both sides of the cutoff wall centerline alignment. These obstructions are likely to include petroleum pipelines, gas lines, electric conduit/power lines, storm sewers, field tiles, manholes, sanitary sewers, underground storage tanks, concrete foundations and reinforced concrete slabs, abandoned dock wall piles, abandoned drainage and settling basin structures, and building and construction debris from previous on-site facilities.

20) Soil-bentonite slurry wall test section – A test section of the soil-bentonite slurry wall will be installed using the same design and work plan elements proposed for the permanent cutoff wall. The test section will not be part of the production cutoff wall. A pumping well will be centered in the test section. Observation wells will also be installed. The test section will be monitored for at least a continuous 7-day period to ensure that the cutoff wall will pass performance criteria.

21) Soil-bentonite slurry wall installation – A soil-bentonite slurry wall will be installed having a minimum width of 30 inches and an in-situ permeability of no more than 1.0×10^{-7} cm/sec.

22) Demobilization – Demobilization involves the dismantling and removal of all construction equipment and temporary support facilities, including haul roads, work areas, structures, stockpiles of excess waste materials, and construction debris. Any areas used for storage or other use will be restored to original or better condition.

FIGURES

TABLES

APPENDIX A

RESUMES OF CQC PERSONNEL

APPENDIX B

LETTER TO THE CQC SYSTEM MANAGER

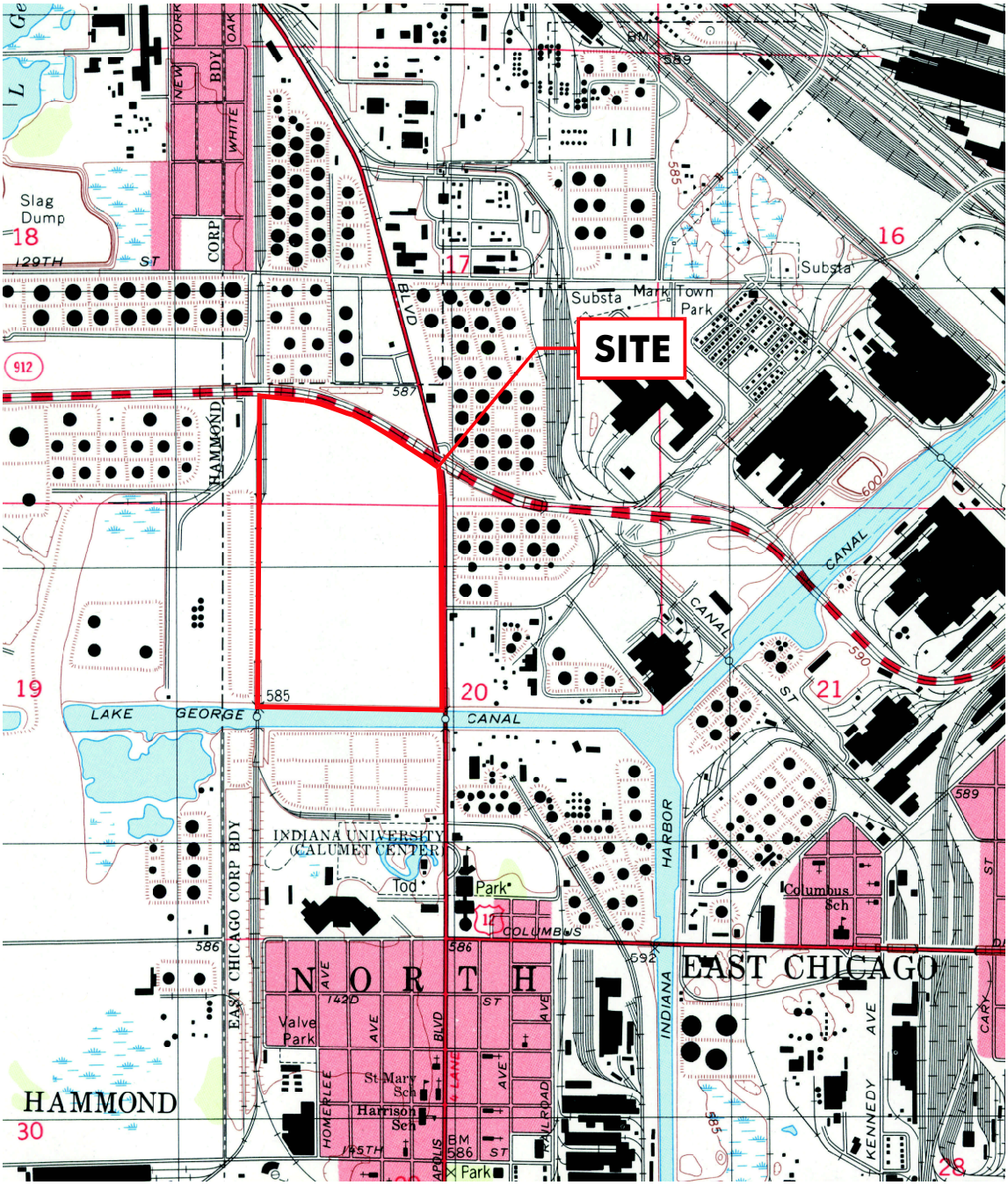
APPENDIX C

FORMS

APPENDIX D

LABORATORY CERTIFICATION

Figures



Scale 1:24000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

QUADRANGLE LOCATION

N

Reference:
IN Harbor & Canal CDF
Subsurface Investigation & Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312
Contract No. DACW 27-02-C-0003

Date: March 2002

BASE MAP SOURCE:
USGS 7 1/2 minute topographic quadrangle map. Whiting, Indiana 1998.

Environmental Quality Management, Inc.
1800 Carillon Boulevard
Cincinnati, Ohio 45240
Phone: (513) 825-7500
Fax: (513) 825-7495

DRAWN	SRL	3/12/02
CHECKED	JAW	3/12/02
APPROVED	FDH	3/12/02
SCALE: 1:24000		

Site Location Map

Indiana Harbor & Canal CFD,
Subsurface Investigation and Cutoff Wall

ORIGINAL SIZE	PROJECT NO.	DWG NO.	REV
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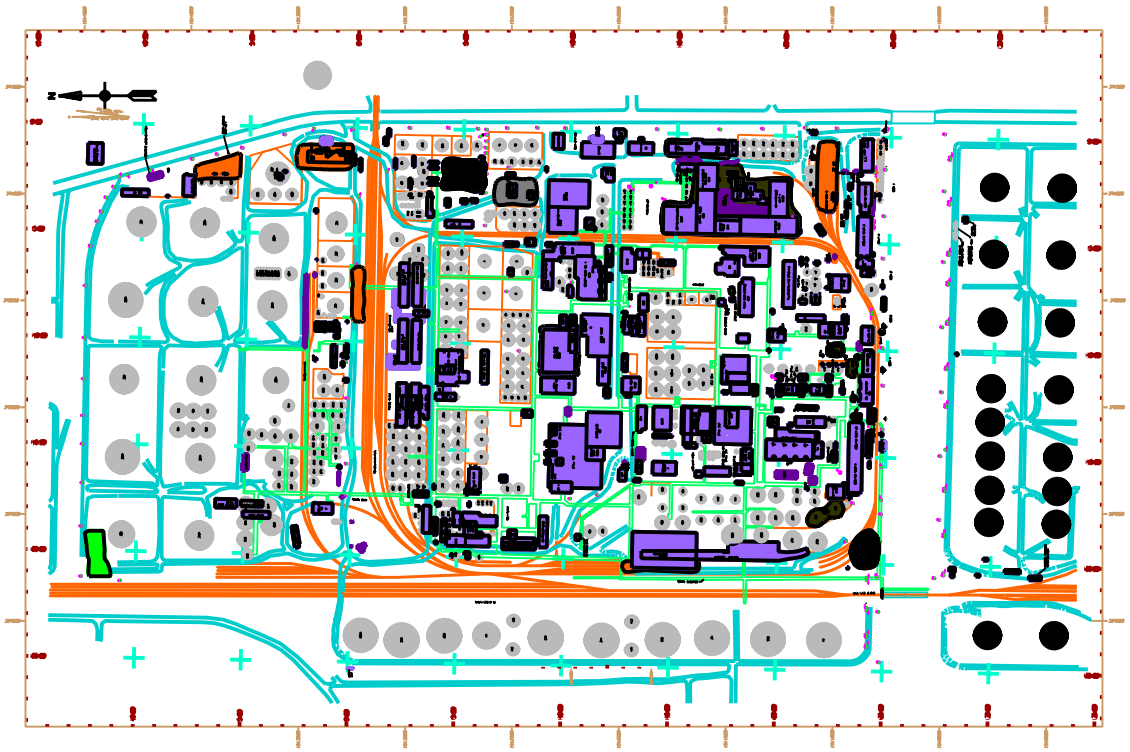

0 100' 300' 800'
50' 200' 400'

REV	DESCRIPTION	DATE	APPROVED

REVISIONS

ENVIRONMENTAL QUALITY MANAGEMENT, INC.
1800 CARILLON BLVD.
CINCINNATI, OHIO 45240
P (513)825-7500
F (513)825-7495

DRAWN	D. TOHO	3/11/02
CHECKED	J. HEWITZ	3/12/02
APPROVED	F. HALL	3/13/02
SCALE: AS NOTED		

INDIANA HARBOR CDF
ECI SITE PLAN
1977

SIZE	PROJECT NO.	DWG NO.	REV
B	030205	FIGURE 2	0

[Unlicensed] ...\Figure 2 - Site Plan.dgn 08/09/2005 02:56:07 PM

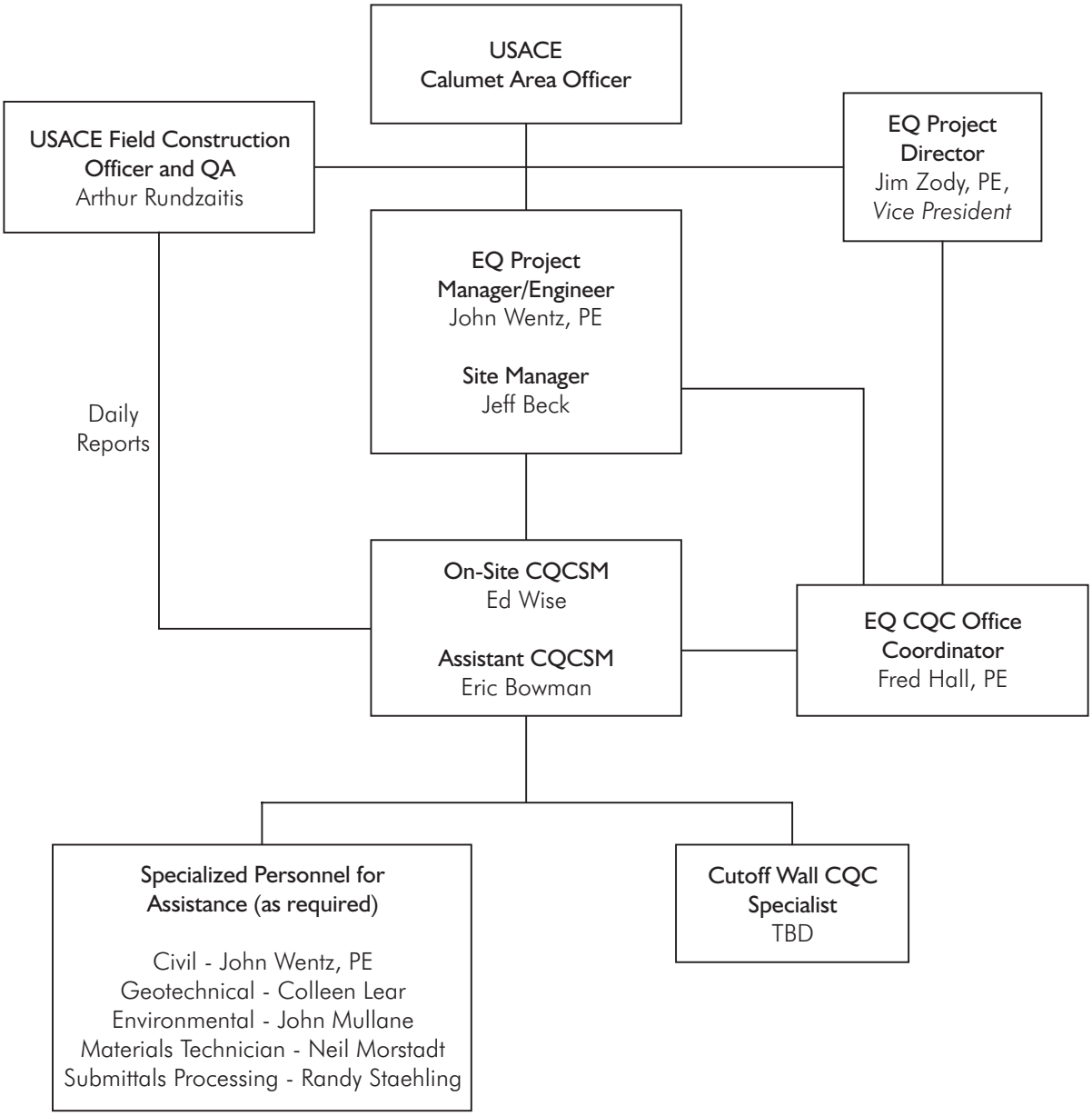

Figure 3. CQC Organizational Chart

Tables

TABLE 1. SUMMARY OF TESTS REQUIRED UNDER ALL SECTIONS OF THE CONSTRUCTION SPECIFICATIONS

Feature of Work / Test	Method	Specification Paragraph	Task	Feature of Work	Testing Frequency	Responsible Personnel
1) Air Monitoring						
Aromatic Hydrocarbons	NIOSH 1501	01410 par. 3.1.8.2 01410 par. 3.1.8.7	Construction Emissions Air Monitoring Low-volume benzene monitoring	Air Monitoring	<u>Pre-construction phase:</u> one sample per day for 14 consecutive days <u>Initial evaluation phase:</u> a. beginning of earthwork requires four samples per day for 14 consecutive days b. Beginning of inspection trench Construction requires four samples per day for 14 consecutive days c. Cut-off wall test section Requires four Samples per day for 14 consecutive days d. Beginning of Cut-off wall construction Requires four samples per day for 14 consecutive days <u>Verification phase:</u> a. During earthwork requires four samples Taken twice per week b. During inspection trench construction requires four samples taken twice per week c. During cut-off wall construction requires four samples taken twice per week	Air Monitoring Operator

TABLE 1. SUMMARY OF TESTS REQUIRED UNDER ALL SECTIONS OF THE CONSTRUCTION SPECIFICATIONS

Feature of Work / Test	Method	Specification Paragraph	Task	Feature of Work	Testing Frequency	Responsible Personnel
Polychlorobiphenyls	NIOSH 5503	01410 par. 3.1.8.2 01410 par. 3.1.8.7	Construction Emissions Air Monitoring Low-volume PCB monitoring	Air Monitoring	<u>Pre-construction phase:</u> one sample per day for 14 consecutive days <u>Initial evaluation phase:</u> e. beginning of earthwork requires four samples per day for 14 consecutive days f. Beginning of inspection trench Construction requires four samples per day for 14 consecutive days g. Cut-off wall test section Requires four Samples per day for 14 consecutive days h. Beginning of Cut-off wall construction Requires four samples per day for 14 consecutive days <u>Verification phase:</u> d. During earthwork requires four samples Taken twice per week e. During inspection trench construction requires four samples taken twice per week During cut-off wall construction requires four samples taken twice per week	Air Monitoring Operator
Real-time Volatile Monitoring	PID, FID, OVA, or other approved field unit	01410 par. 3.1.8.2 01410 par. 3.1.8.7	Construction Emissions Air Monitoring	Air Monitoring	During construction activities real-time measurements will be taken once at the beginning of each work shift, every two hours thereafter and once at the end of each work shift	Air Monitoring Operator
Real-time Particulate Monitoring	Field approved particulate monitor	01410 par. 3.1.8.2 01410 par. 3.1.8.7	Construction Emissions Air Monitoring	Air Monitoring	During construction activities real-time measurements will be taken once at the beginning of each work shift, every two hours thereafter and once at the end of each work shift	Air Monitoring Operator

TABLE 1. SUMMARY OF TESTS REQUIRED UNDER ALL SECTIONS OF THE CONSTRUCTION SPECIFICATIONS

Feature of Work / Test	Method	Specification Paragraph	Task	Feature of Work	Testing Frequency	Responsible Personnel
3) Erosion Control						
Grab Breaking Load & Elongation of Geotextiles	ASTM D 4632	01356 par. 2.1.1	Filter fabric requirements for silt fencing	Erosion Control	Mill Certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric	Site Manager
Trapezoid Tearing Strength of Geotextiles	ASTM D 4533	01356 par. 2.1.1	Filter fabric requirements for silt fencing	Erosion Control	Mill Certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric	Site Manager
Water Permeability of Geotextiles by Permittivity	ASTM D 4491	01356 par. 2.1.1	Filter fabric requirements for silt fencing	Erosion Control	Mill Certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric	Site Manager
Determining Apparent Opening Size of a Geotextile	ASTM D 4751	01356 par. 2.1.1	Filter fabric requirements for silt fencing	Erosion Control	Mill Certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric	Site Manager
11) Storage, Transportation, and Disposal of Hazardous Material and Free Product Waste						
TCLP Volatiles	EPA 1311/8260	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
TCLP Semivolatiles	EPA 1311/8270	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
TCLP Pesticides	EPA 1311/8081	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
TCLP Herbicides	EPA 1311/8151	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
TCLP Metals	EPA 1311/6010/7470	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
PCB's	EPA 8082	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
Total Phenols	EPA 9065/9066	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
Total Halogens	EPA 9076	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
Flashpoint	EPA 1010/1020	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
Reactivity (Cyanide & Sulfide)	EPA SW846 7.3	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
pH	EPA 9045	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector

TABLE 1. SUMMARY OF TESTS REQUIRED UNDER ALL SECTIONS OF THE CONSTRUCTION SPECIFICATIONS

Feature of Work / Test	Method	Specification Paragraph	Task	Feature of Work	Testing Frequency	Responsible Personnel
Specific Gravity	EPA SM2710F	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
Btu	ASTM D 2015	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
% Solids	EPA 5030	02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
% Water		02120 par. 1.3.1.1 02120 par. 3.2.1	Manifesting and Disposal Samples Sampling of Waste Materials	Storage, Transportation and Disposal of Wastes	As required for acceptance into TSDF As required for acceptance into TSDF	Environmental Sample Collector Environmental Sample Collector
Drilling, Sampling, and Testing of Borings						
Particle-Size Analysis of Soils	ASTM D 422	02210 par. 1.1 02210 SD-18 02210 par. 3.3	Drilling, Sampling, & Testing of Borings Records Soil Sampling & Testing	Drilling, Sampling, & Testing of Borings Drilling, Sampling, & Testing of Borings	Every 200' along the alignment of the trench cutoff wall every 2.5' to a depth of 25'. The boring will be terminated once a minimum of 5 feet of continuous silty clay has been sampled.	Field GeoTech Field GeoTech Field GeoTech
Penetration Test & Split-Barrel Sampling of Soils	ASTM D 1586	02210 par. 3.3	Soil Sampling and Testing	Drilling, Sampling, & Testing of Borings	Three particle-size analysis including both hydrometer and sieve analyses	Field GeoTech
Classification of soils For engineering purposes	ASTM D 2487	02210 par. 1.3 02210 par. 1.3.2	System Description Unsatisfactory Materials	Drilling, Sampling, & Testing of Borings		
Description and Identification of Soils (Visual-Manual Procedure)	ASTM D 2488	02210 par. 3.6 sub. i	Classification by depths of the materials sampled	Drilling, Sampling, & Testing of Borings	Description shall be made immediately after the samples are retrieved	
pH	ASTM D4972	02210 par. 3.3	Soil Sampling and Testing	Drilling, Sampling, & Testing of Borings	The pH from one sample of the fill from each boring shall be determined.	
Liquid Limit, Plastic Limit, and Plasticity Index of Soils	ASTM D 4318	02210 par. 3.3	Soil Sampling and Testing	Drilling, Sampling, & Testing of Borings	three Atterberg limits (ASTM D 4318 on the portion of the sample passing the No. 40 sieve) shall be performed on representative samples from each boring drilled	

TABLE 1. SUMMARY OF TESTS REQUIRED UNDER ALL SECTIONS OF THE CONSTRUCTION SPECIFICATIONS

Feature of Work / Test	Method	Specification Paragraph	Task	Feature of Work	Testing Frequency	Responsible Personnel
Survey Investigation and Inspection						
Laboratory Compaction Characteristics of Soil Using Standard Effort	ASTM D 698	02215 par. 3.2.1	Excavation General Requirements – Backfill requirements	Survey Investigation and Inspection	For any inspection trenches or excavations that are wider than the cutoff wall, the trench or excavation shall be backfilled and compacted. The backfill shall be placed in lifts with a maximum loose thickness of 8 inches, and shall be compacted to 95 percent of maximum dry density. One test shall be performed for every 2000 cubic yards of backfill placed. Areas that fail shall be immediately recompacted and tested.	Field GeoTech
Density & Unit Weight of Soil by Sand Cone Method	ASTM D 1556	02215 par. 3.2.1	Excavation General Requirements – Backfill requirements	Survey Investigation and Inspection	One test per 500 sq. ft. per lift, or once per lift if less than 500 sq. ft.	Field GeoTech
Density & Unit Weight of Soil in place by the Rubber Balloon Method	ASTM D 2167	02215 par. 3.2.1	Excavation General Requirements– Backfill requirements	Survey Investigation and Inspection	One test per 500 sq. ft. per lift, or once per lift if less than 500 sq. ft.	Field GeoTech
Density & Unit Weight of Soil by Nuclear Methods	ASTM D 2922	02215 par. 3.2.1	Excavation General Requirements– Backfill requirements	Survey Investigation and Inspection	One test per 500 sq. ft. per lift, or once per lift if less than 500 sq. ft. If used, a minimum of 1 in 10 tests must use ASTM D 1556 or ASTM D 2167	Field GeoTech
Obstruction Removal						
TCLP Volatiles	EPA 1311/8260	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
TCLP Semivolatiles	EPA 1311/8270	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
TCLP Pesticides	EPA 1311/8081	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
TCLP Herbicides	EPA 1311/8151	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
TCLP Metals	EPA 1311/6010/7470	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
PCB's	EPA 8082	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
Total Phenols	EPA 9065/9066	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
Total Halogens	EPA 9076	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector

TABLE 1. SUMMARY OF TESTS REQUIRED UNDER ALL SECTIONS OF THE CONSTRUCTION SPECIFICATIONS

Feature of Work / Test	Method	Specification Paragraph	Task	Feature of Work	Testing Frequency	Responsible Personnel
Flashpoint	EPA 1010/1020	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
Reactivity (Cyanide & Sulfide)	EPA SW846 7.3	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
pH	EPA 9045	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
Specific Gravity	EPA SM2710F	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
Btu	ASTM D 2015	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
% Solids	EPA 5030	02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
% Water		02115 par. 3.2	Sampling Tank Contents	Obstruction Removal	As required for acceptance into TSDF	Environmental Sample Collector
Combustible Vapor Monitoring	Explosimeter (O_2, LEL Meter)	02115 par. 3.4.2	Purging and inerting tanks or piping	Obstruction Removal	Continuous during purging /inerting operations	Site Safety and Health Officer
Oxygen level monitoring Method	Oxygen, LEL Meter	02115 par. 3.4.2	Purging and inerting tanks or piping	Obstruction Removal	Continuous during purging /inerting operations	Site Safety and Health Officer
20) Soil-Bentonite Slurry Wall Test Section and 21) Soil-Bentonite Slurry Wall Installation						
Dissolved Solids	EPA 160.3	02260 par2.4.2	Testing of water	Soil-Bentonite Slurry Trench Cutoff Wall	One test per specified requirement in Table 3 02260	Cutoff Wall CQC Specialist
Particle-Size Analysis of Soils	ASTM D 422	02260 SD-09 par. c	Reports	Soil-Bentonite Slurry Trench Cutoff Wall		Cutoff Wall CQC Specialist
		02260 par. 2.4.5	QC Bentonite Backfill Material	Soil-Bentonite Slurry Trench Cutoff Wall	One test per 100 lineal feet of wall and at least once each day for production wall, and one test per 20 lineal feet of test section	Cutoff Wall CQC Specialist
		02260 par. 3.2	Test Section	Soil-Bentonite Slurry Trench Cutoff Wall	Six particle-size analyses including both hydrometer and sieve analyses	Cutoff Wall CQC Specialist
		02260 par. 3.4.12	Soil Bentonite Slurry Cutoff Wall Cap	Soil-Bentonite Slurry Trench Cutoff Wall	Each placement of cap material	Cutoff Wall CQC Specialist
Thin-Walled Tube Geotechnical Sampling of Soils	ASTM D 1587	02260 par 3.2	Test Section	Soil-Bentonite Slurry Trench Cutoff Wall	The soil-bentonite backfill material shall be sampled continuously using a hydraulic piston sampler to collect undisturbed, 3-inch diameter Shelby tubes from the top of the wall until a minimum of two (2) feet of the natural silty clay is penetrated.	Cutoff Wall CQC Specialist
Classification of soils For engineering purposes	ASTM D 2487	02260 par. 2.1.3	Backfill Material	Soil-Bentonite Slurry Trench Cutoff Wall		Cutoff Wall CQC Specialist

TABLE 1. SUMMARY OF TESTS REQUIRED UNDER ALL SECTIONS OF THE CONSTRUCTION SPECIFICATIONS

Feature of Work / Test	Method	Specification Paragraph	Task	Feature of Work	Testing Frequency	Responsible Personnel
Liquid Limit, Plastic Limit, and Plasticity Index of Soils	ASTM D 4318	02260 par 2.4.5	QC Soil Bentonite Backfill Material	Soil-Bentonite Slurry Trench Cutoff Wall	One test per 100 lineal feet of wall and at least once each date and one test per 20 lineal feet of test section	Cutoff Wall CQC Specialist
		02260 par. 3.2	Test Section	Soil-Bentonite Slurry Trench Cutoff Wall	six Atterberg limits on the portion of the sample passing the No. 200 sieve shall be performed on sand samples from each boring drilled.	Cutoff Wall CQC Specialist
Laboratory Compaction Characteristics of Soil Using Standard Effort	ASTM D 698	02260 par. 3.4.12	Soil Bentonite Slurry Cutoff Wall Cap	Soil-Bentonite Slurry Trench Cutoff Wall	One test per source of cap soil	Cutoff Wall CQC Specialist
Volatiles (including BTEX, methylene chloride, acetone)	EPA 8260B	02260 SD-09 par. b	Chemical Analysis of Test Solutions.	Soil-Bentonite Slurry Trench Cutoff Wall	One test per each of three solutions for compatibility testing	Cutoff Wall CQC Specialist
Semi-volatiles Method	EPA 8270C	02260 SD-09 par. b	Chemical Analysis of Test Solutions	Soil-Bentonite Slurry Trench Cutoff Wall	One test per each of three solutions for compatibility testing	Cutoff Wall CQC Specialist
Phenolics (including phenol)	EPA 420.2	02260 SD-09 par. b	Chemical Analysis of Test Solutions	Soil-Bentonite Slurry Trench Cutoff Wall	One test per each of three solutions for compatibility testing	Cutoff Wall CQC Specialist
Total Petroleum Hydrocarbons (gasoline &diesel range)	EPA 8015M	02260 SD-09 par. b	Chemical Analysis of Test Solutions	Soil-Bentonite Slurry Trench Cutoff Wall	One test per each of three solutions for compatibility testing	Cutoff Wall CQC Specialist
Total Calcium Method	EPA 6010B	02260 SD-09 par. b	Chemical Analysis of Test Solutions	Soil-Bentonite Slurry Trench Cutoff Wall	One test per each of three solutions for compatibility testing	Cutoff Wall CQC Specialist
Total Magnesium	EPA 6010B	02260 SD-09 par. b	Chemical Analysis of Test Solutions	Soil-Bentonite Slurry Trench Cutoff Wall	One test per each of three solutions for compatibility testing	Cutoff Wall CQC Specialist
Total Dissolved Solids	EPA 160.3	02260 SD-09 par. b	Chemical Analysis of Test Solutions	Soil-Bentonite Slurry Trench Cutoff Wall	One test per each of three solutions for compatibility testing	Cutoff Wall CQC Specialist
Density, Viscosity, pH	API RP 13B-1	02260 SD-09 par. c	Compatibility testing of bentonite slurry	Soil-Bentonite Slurry Trench Cutoff Wall	Four tests of bentonite slurry to be used for cutoff wall construction	Cutoff Wall CQC Specialist
		02260 par. 2.4.4	Testing of Initial Bentonite Slurry	Soil-Bentonite Slurry Trench Cutoff Wall	Prior to placing in the trench and a minimum of two times each day per mixing plant	Cutoff Wall CQC Specialist
		02260 par. 2.4.4	Testing of In-Trench Bentonite Slurry	Soil-Bentonite Slurry Trench Cutoff Wall	Slurry in the trench will be sampled twice a day minimum at two depths, once at the beginning of the day and once at the end of the day.	Cutoff Wall CQC Specialist

TABLE 1. SUMMARY OF TESTS REQUIRED UNDER ALL SECTIONS OF THE CONSTRUCTION SPECIFICATIONS

Feature of Work / Test	Method	Specification Paragraph	Task	Feature of Work	Testing Frequency	Responsible Personnel
Filtrate Loss Test	API RP 13B-1	02260 SD-09 par. d	Compatibility testing of bentonite slurry	Soil-Bentonite Slurry Trench Cutoff Wall	Using each of three test solutions for slurry to be used for cutoff wall construction	Cutoff Wall CQC Specialist
		02260 par. 2.4.4	Testing of Initial Bentonite Slurry	Soil-Bentonite Slurry Trench Cutoff Wall	Prior to placing in the trench and a minimum of two times each day per mixing plant	Cutoff Wall CQC Specialist
		02260 par. 2.4.4	Testing of In-Trench Bentonite Slurry	Soil-Bentonite Slurry Trench Cutoff Wall	Slurry in the trench will be sampled twice a day minimum at two depths, once at the beginning of the day and once at the end of the day.	Cutoff Wall CQC Specialist
		02260 par. 2.4.1	Bentonite specification	Soil-Bentonite Slurry Trench Cutoff Wall	Bentonite manufacturer test results for each load with a certificate of compliance	Cutoff Wall CQC Specialist
Flexible Wall Permeability Method	ASTM D 5084	02260 SD-09 par. e	Short-Term Permeability Test	Soil-Bentonite Slurry Trench Cutoff Wall	Four tests per backfill material sample	Cutoff Wall CQC Specialist
		02260 par. 2.4.5	QC Soil Bentonite Backfill Material		For every 100 lineal feet of wall, there shall be one test on a duplicate sample. For the test section, a duplicate sample shall be tested for every 20 lineal feet of wall	Cutoff Wall CQC Specialist
Flexible Wall Permeability	ASTM D 5084 Method A	02260 SD-09 par. f	Long-term Compatibility Test	Soil-Bentonite Slurry Trench Cutoff Wall	Three tests per backfill material mix two additional tests using the test solutions as permeates.	Cutoff Wall CQC Specialist
YP/PV Ratio, Plastic Viscosity	API Spec 13A	02260 par. 2.4.1	Bentonite specification	Soil-Bentonite Slurry Trench Cutoff Wall	Bentonite manufacturer test results for each load with a certificate of compliance	Cutoff Wall CQC Specialist
Moisture Content	ASTM D 2216	02260 par. 2.4.1	Bentonite specification	Soil-Bentonite Slurry Trench Cutoff Wall	Bentonite manufacturer test results for each load with a certificate of compliance	Cutoff Wall CQC Specialist
pH, Hardness	API RP 13B-1	02260 par. 2.4.2	Water source analysis	Soil-Bentonite Slurry Trench Cutoff Wall	One test per water source used for slurry	Cutoff Wall CQC Specialist
Dissolved Solids	EPA 600/4-79/020 Method 160.3	02260 par. 2.4.2	Water source analysis	Soil-Bentonite Slurry Trench Cutoff Wall	One test per water source used for slurry	Cutoff Wall CQC Specialist
Sand Content	API RP 13B-1	02260 par. 2.4.4	In-trench bentonite slurry	Soil-Bentonite Slurry Trench Cutoff Wall	Slurry in the trench will be sampled twice a day minimum at two depths, once at the beginning of the day and once at the end of the day.	Cutoff Wall CQC Specialist
Grain Size	ASTM D 422	02260 par. 2.4.3	QC Backfill material	Soil-Bentonite Slurry Trench Cutoff Wall	One set of backfill material tests per 100 lineal feet of production cutoff wall and every 20 lineal feet from the test section.	Cutoff Wall CQC Specialist

TABLE 1. SUMMARY OF TESTS REQUIRED UNDER ALL SECTIONS OF THE CONSTRUCTION SPECIFICATIONS

Feature of Work / Test	Method	Specification Paragraph	Task	Feature of Work	Testing Frequency	Responsible Personnel
Atterberg limits	ASTM D 4318	02260 par. 2.4.3	QC Backfill material	Soil-Bentonite Slurry Trench Cutoff Wall	One set of backfill material tests per 100 lineal feet of production cutoff wall and every 20 lineal feet from the test section.	Cutoff Wall CQC Specialist
Moisture Content	ASTM D 2216	02260 par. 2.4.3	QC Backfill material	Soil-Bentonite Slurry Trench Cutoff Wall	One set of backfill material tests per 100 lineal feet of production cutoff wall and every 20 lineal feet from the test section.	Cutoff Wall CQC Specialist
Slump Cone	ASTM C 143	02260 par. 2.4.5	Soil Bentonite Backfill Material	Soil-Bentonite Slurry Trench Cutoff Wall	One test per 100 lineal feet of wall and at least once every day	Cutoff Wall CQC Specialist

TABLE 2. BENTONITE QA/QC TESTING FOR CUTOFF WALL

Subject	Standard	Type of Test	Minimum Frequency	Specified Value
Bentonite Powder	API Spec 13A API Spec 13A API Spec 13A API Spec 13A ASTM D 2216	Certificate of compliance YP/PV Ratio Plastic Viscosity Filtrate Loss Moisture	1 per truck load	Sodium cation montmorillonite 1.5 maximum > 10 < 12.5 < 10%
Water	API RP 13B-1 API RP 13B-1 EPA Method 160.3	pH Hardness Dissolved Solids	1 per water source	6 to 8 < 100 ppm < 500 ppm
Bentonite Slurry at the Mixer	API RP 13B-1	Viscosity Filtrate loss Density pH	2 / shift 2 / shift 2 / shift 2 / shift	40 seconds min <20 cm^3 ≥ 64 pcf $6.5 \leq pH \leq 10$
Bentonite Slurry in the Trench	API RP 13B-1	Viscosity Density pH Filtrate loss Sand content	2 depths, 2/shift 2 depths, 2/shift 2 depths, 2/shift 2 depths, 2/shift 2 depths, 2/shift	MFV 40 to 90 seconds Between 64 and 85 pcf. At least 15 pcf less than soil-bentonite backfill density. 6.5 to 10 <25 cm^3 20% max
Backfill Material	ASTM D 422 ASTM D 4318 ASTM D 2216	Grain Size Atterberg limits Moisture content	Every 100 ft of cutoff wall, at least 1/day (Production wall). Every 20 ft of wall for test section.	100% < 3 in. Implementation Plan (IP) For record
Soil-Bentonite Backfill Material	ASTM D 422 ASTM D 4318 ASTM C 143 ASTM D 698 Mix Spec API RP 13B-1 & ASTM D 5084	Grain Size Atterberg limits Slump Cone Density Bentonite Content Permeability	Same as Backfill Same as Backfill Same as Backfill Same as Backfill 1/mix, min. 1/day	Per IP Per IP Per IP For record >4% <= 1.0×10^{-7} cm/s

APPENDIX A

RESUMES FOR CQC PERSONNEL

U.S. ARMY CORPS OF ENGINEERS

PROFESSIONAL DEVELOPMENT SUPPORT CENTER
HUNTSVILLE, ALABAMA

CERTIFICATE

Ed Wise

has completed the Corps of Engineers Training Course

CONSTRUCTION QUALITY MANAGEMENT FOR CONTRACTORS

(STATE OF FLORIDA, Construction Industry Licensing Board COURSE # 004F0384-1B)
(12 CEHs of 16 CEH requirement, 1 CEH for Business Practices (site safety, workman's comp., financing CEHs not included)
(STATE OF FLORIDA, Board of Architecture and Interior Design COURSE # AR.04.579 - 17 Hours - Level of Instruction - Advanced)

is awarded continuing education credits as
*indicated for **16** hours of organized instruction*

Certified Provider #199309
1.3 CEUs

Registered Provider #I009
39 LUs

Registered Provider
13 PDHs

Given at West Palm Beach, FL By Jacksonville District June 19 & 20, 2002
Location Instructional District Date

Joseph Tavares
Joseph Tavares
Facilitator
CESAJ-CO-CQ (904) 232-3446

Gary F. Graham
Chief, USACE Professional Development Support Center

THIS CERTIFICATE EXPIRES FIVE YEARS FROM DATE OF ISSUE

Education

B.S. Chemical Engineering, Michigan Technological University, May 1980
MBA, Northern Kentucky University, In Progress

Active Registration: USACE Construction Quality Mmgt. for Contractors, 2002

Areas of Specialization

- Hazardous and PCB Waste Characterization and Remediation
- Superfund RI/FS, RD, and RA
- Water and Wastewater Treatability, Treatment System Design, Troubleshooting, for Industrial, Emergency, and Remedial Activities
- Hazardous Waste and Wastewater Permitting
- Due Diligence and Compliance
- Contingency Planning: SPCC, SWP3, TOMP, BMP
- Innovative Treatment Technology Development for Hazardous Waste and Waste Water

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Professional Experience

Mr. Wise is a Chemical Engineer with 19 years of environmental engineering experience. His technical experience is focused at projects relating to hazardous waste, TCSA, CERCLA, wastewater, air, and OSHA. This included remediation, permitting, compliance, QA/QC, and general management issues. He has extensive experience in site characterization and remediation, multifaceted compliance audits, pre-acquisition due diligence audits, and agency/attorney/public interaction for permitting and regulatory interpretation projects. He has performed the QA/QC manager function for numerous projects. This included data validation, ensuring compliance with contract and regulatory provisions, and trouble shooting for areas of non-compliance. He has also served as corporate health and safety officer ensuring all employees were OSHA certified and compliant, and developed corporate and project specific health and safety plans.

Mr. Wise has performed numerous site characterization and remediation projects. The constituents of concern have included; Polychlorinated Biphenyl's (PCB's), heavy metals, Polynuclear Aromatic Hydocarbons (PAH's), halogenated solvents, non-halogenated solvents, dioxin/dibenzofurans, low-level radioactive/mixed waste, biohazardous waste and others. These projects were performed at a wide variety of industrial and governmental sites. These include interstate natural gas pipeline, refinery, petro-chemical, integrated steel, military (base and major contractors), and a wide variety of manufacturing firms.

He has extensive experience with the interstate natural gas pipeline industry and has performed a projects at over 80 different compressor stations and 20 metering and reduction sites. These projects have included development and implementation of site characterization work plans (including surface and sub-surface soils, groundwater, as well as permeable and impermeable surfaces), QA/QC protocol, remedial alternative review, development of remedial action plans, oversite of remediation (including verification sampling), and agency/attorney interaction. Constituents of concern included PCBs, mercury, chromium, arsenic, lead, petroleum hydrocarbons, non-halogenated solvents, and others. He has also performed wastewater characterization, treatment system design, installation, operation, and trouble shooting resulting in the installation of 11 wastewater treatment plants. In addition, Mr. Wise has also prepared over 75 SPCC plans for stations located throughout the eastern U.S. He is intimately familiar with typical operations and procedures associated with the industry.

Mr. Wise has extensive experience in wastewater characterization and treatment system design. This includes a variety of physical/chemical and biological treatment systems. The constituents of concern have included PCB's, total suspended solids, heavy metals, oil and grease, pH, biological oxygen demand, phenolics, cyanide, organic nitrogen compounds, and a wide variety of organic compounds. This included systems ranging from 10 to 5,000 gpm. Mr. Wise was responsible for developing analytical programs (including QA/QC) for characterization, interpretation of data, review of appropriate treatment systems (including treatability studies), design and equipment specification, contractor selection, system fabrication/installation, start-up, operator training, and de-bugging. He has also performed numerous projects related to upgrades or expansion of existing systems.

Mr. Wise also has extensive experience in due diligence or pre-acquisition auditing. This has involved well over 100 transactions and included (Phase I, Phase II, agency negotiation, remediation, etc.). The projects were very diverse and ranged in size from vacant tracts of land through a $6.0 Billion transaction of a major chemical corporation. Applicable industries included, integrated steel facilities, chemical corporations, automotive salvage yards, clothing dry cleaners, equipment manufacturers, gasoline stations, and many others.

Mr. Wise has performed numerous multi-discipline compliance audits covering a wide variety of environmental, fire protection, and health and safety issues. He developed site specific audit checklists, conducted/supervised audits, prepared reports, and consulted with clients on prioritizing action items. Industries that were audited include specialty chemical manufacturer's, integrated steel mills, cement kilns, precious metal foundries, and a diverse assortment of manufacturing facilities.

Mr. Wise also has performed work on over 15 CERCLA (Superfund sites). This has included review of the hazard ranking system analysis of sites, remedial investigation, feasibility studies, review and negotiation of records of decision, remedial design, and

remedial action. The sites included a relatively small site affected with PCBs from a transformer salvage operation, several abandoned creosote and pentachlorphenol wood treating sites, a formed heavy metal reclamation site, and several former commercial industrial waste disposal sites.

Mr. Wise has performed projects in 29 different states throughout the continental U.S. In addition to federal regulations, he is familiar with a wide variety of state and local regulations. He has performed or assisted with agency negotiations with a wide variety of federal, state and local agencies. This includes projects relating to site characterization/remediation (RCRA, TSCA and CERCLA), permitting, and regulatory compliance matters. He has extensive experience in assisting attorneys and has provided expert witness testimony.

Mr. Wise also developed a process for rendering a hazardous waste scrubber sludge non-hazardous by the fixation of lead and cadmium. This included identification and development of an innovation phosphate fixation technology. Mr. Wise evaluated the process system, obtained representative samples, performed treatability studies, and reviewed the analytical data. He then performed a conceptual and detailed design (including equipment specification) and supervised the installation and start-up. The capital cost of this project was $70,000 and resulted in an annual cost savings of about $1.0 Million.

Mr. Wise also has extensive experience in performing economic evaluations on various remedial and treatment options. This included cost estimating for the various options (capital and operating), performing risk analysis, and economic analysis. These economic analysis have included net present value, return on investment, effective rate of return, and others. These studies have enabled management to make sound economic decisions relating to environmental matters.

Selected Publications

RCRA Surface Impoundment Options for Creosote and Pentachlorophenol Wood Treating Facilities - Edward D. Wise, presented at the 1986 American Wood Preservers Association Meeting, Philadelphia, PA.

Total Recycle of Flue Gas Scrubber Water From a Steelmaking Process - Edward D. Wise and Carl Batliner, presented at the 1984 National Water Pollution Control Federation Symposium, New Orleans, LA.

Application of Armco's Phosphate Fixation Technology on Open Hearth Wet Scrubber Sludge - Edward D. Wise and Carl Batliner, presented at the 1983 joint U.S. EPA - American Iron and Steel Institute Symposium, Chicago, IL.

U.S. ARMY CORPS OF ENGINEERS

PROFESSIONAL DEVELOPMENT SUPPORT CENTER
HUNTSVILLE, ALABAMA

ABC
ASSOCIATED BUILDERS AND CONTRACTORS, INC.

CERTIFICATE

Fred D. Hall

has completed the Corps of Engineers Training Course

CONSTRUCTION QUALITY MANAGEMENT FOR CONTRACTORS

*is awarded continuing education credits as indicated for **16** hours of organized instruction*

CERTIFIED INTERNATIONAL ASSOCIATION FOR CONTINUING EDUCATION AND TRAINING IACET PROVIDER
Certified Provider #199309
1.3 CEUs

CONTINUING EDUCATION AIA
Registered Provider #I009
39 LUs

PE
Registered Provider
13 PDHs

Given at *Louisville, KY* By *CELRL-CD* *29 & 30 Mar 1999*
Location Instructional District Date

Charles W. Hartsfield III, P.E.
Facilitator

Gary F. Anderson
Chief, USACE Professional Development Support Center

THIS CERTIFICATE EXPIRES FIVE YEARS FROM DATE OF ISSUE

Name and Title: Fred D. Hall, Senior Project Manager

Assignment On This Project: Contractor Quality Control System Manager

Name of Firm: Environmental Quality Management, Inc. (EQ)

Number of Years: ***With This Firm:*** 9 ***With Other Firms:*** 18

Education: M.B.A. / 1982 / Finance
B.S. / 1971 /

Active Registration: USACE Construction Quality Mmgt. for Contractors, 1999
Professional Engineer, AL (#21892), IN(#8802242), IL (#062-51912), KS (#14089), KY (#15658), NC (#20074), OH (#E-48582), PA (#PE-046147-R), TN (#00101798), and VA (#016927).

Mr. Hall has 27 years of experience in solid/ hazardous waste management, QA/QC, process analysis, and air pollution control. Directed coordination of equipment construction; remediation technology/process assessment, testing and evaluation; process sampling and analysis. Managed 87 studies involving development and evaluation of hazardous waste treatment/disposal strategies. Monitored projects to verify that each definable work element was completed according to the contract and plans and specifications. He has completed the Corps *Construction Quality Management for Contractors* course given by the Louisville District.

He is responsible for projects involving certification and quality control of hazardous waste treatment/ disposal strategies and cleanup and closure activities. Responsible for development of project approach, schedule, costs, and management structure including CQC.

Specific Experience:

Certifying Engineer, (1997-1998) Landfill Closure
Ref: Mike Tracy, Town of Fort Sheridan Operating Company; (847) 266-84570

Managed QC activities during closure of landfills 3 and 4 at Fort Sheridan, IL to assure that remediation steps and procedures in approved closure plan were followed. Relied on frequent discussions with onsite personnel, data and reports from the site manager, and direct observation for quality control and to certify the project goals were met and to ensure that QC requirements were achieved.

Quality Control and Certifying Engineer (1972-1999) Safety-Kleen Corporation
Ref: Steve Fleming, Safety-Kleen Corp.; (513) 956-2172

Reviewed closure plans for completeness; monitored closure activities for compliance with closure plan and for quality control; and certified closure as specified in closure plans. Observed and certified closure activities at tank removal sites, drum and bulk hazardous waste storage areas, and return and fill stations.

Certifying Engineer, (1995-1996) Hazardous Waste Landfill Closure
Monitored and certified closure activities at hazardous waste landfill in Williamsburg, Ohio. Reviewed closure plans for completeness, and monitored closure activities for compliance with closure plan and quality control objectives. Involved design and installation of clay cap, drum storage, tank removals, and soil contamination.

Certifying Engineer, (1995) Closure of RCRA Sites
Monitored and certified cleanup and closure activities 20 RCRA sites at Letterkenny Army Depot. Included hazardous waste storage areas, chrome plating sump cleanup, and fire training areas. Quality control activities included evaluation of cleanup plans and procedures, tracking submittals, and review and evaluation of sampling sites and analytical results to determine that sites were cleaned to pollutant concentrations specified as "clean" in closure plans.

Quality Control and Certifying Engineer, (1992 - Present) Various Industrial Clients
Prepared and certified Spill Prevention, Control, and Countermeasure (SPCC) and Storm Water Pollution Prevention plans for clients including a solvent reclaimer, chemical blending facility, refinery tank farm, detergent manufacturer, automobile manufacturer, and metal fabrication and coating facility. Reviewed closure plans for completeness, monitored closure activities for compliance with closure plan, and for quality control and certified closure as specified in closure plans. Observed and certified closure activities at tank removal sites, drum and bulk hazardous waste storage areas, and return and fill stations at solvent reclaimer.

Name and Title Eric Bowman, Sr. Project Manager

Assignment On This Project: Assistant Contractor Quality Control System Manager

Name of Firm: Environmental Quality Management, Inc. (EQ)

Number of Years: ***With This Firm:*** 5 ***With Other Firms:*** 13

Education: B.S. / 1984 / Geology

Active Registration: CHMM 7161, 1984
OSHA 40-Hr, 1987; Refresher, 2001; Supervisor, 1989
Confined Space, 1991; HM 181, 1994
USACE CQM, 1999

Mr. Bowman is a Certified Hazardous Materials Manager and an approved U.S. EPA Response Manager in Region 5 with 18 years of hazardous waste management experience. His responsibilities include project scope development, field crew supervision, work plan and report preparation, site safety and corporate policy enforcement and project cost and schedule compliance. He has directed projects involving soil removal, facility decontamination and demolition, utility identification and plugging and capping, containment system construction, treatment system installation, operation and maintenance, and storage tank management. He has completed several projects at abandoned refineries.

He has managed the cleanup of chlorinated solvents, PCBs, heavy metals, reactive chemicals, corrosives, flammables, and explosives. He oversees waste profiling, manifest development and disposal of multiple waste streams. He routinely interfaces with U.S. EPA and various state regulators on approaches, permit issues, treatment options, and cleanup operations. He has completed the Corps *Construction Quality Management for Contractors* course given by the Louisville District.

He has directed all planning, negotiation, budget and schedule, technical approach determination and client interface for 45 remedial actions ranging in value from $4K to $5.5M. He has prepared required plans and managed subcontractor procurement.

He has managed groundwater investigations, contamination definition, sampling and design, installation and O&M of soil vapor extraction and groundwater pump and treat systems. Conducted UST removals and supervised plating facility closures.

Specific Experience:
Project Manager, (9/01-Present) Pipeline Closure/Removal, Indiana Shipping Canal Site
Ref: Betty Lavis, U.S. EPA Region 5; (312) 886-7183

Managing the closure/removal of 5 pipeline segments that cross the Lake George Shipping Canal at the ECI property located in East Chicago, Indiana. The project involves closing in-place and/or removing 5 pipelines that cross through the Lake George Shipping Canal that were former conveyance lines for the former refinery located at this site. Four of the lines are 12 inches in diameter, and the remaining line is 8 inches in diameter. The contents of the lines are unknown at the on-set of the project. EQ will locate the line by tracing 100 feet back from the canal on both sides, excavate to expose them, install cold taps on the lines to drain them, evacuate their contents, and plug the sections up gradient from the canal with expandable plugs. EQ will focus on the pipeline segments that cross through the canal. These segments will be evacuated of contents, cleaned with a line jetter, recovered with rinse water, and camera inspected to determine integrity status. The customer will determine final closure requirements after determining the soundness of the pipelines. The pipelines will be either closed in place by filling void space with a concrete grout, or complete removal from the shipping channel. Complete removal will require further investigation to determine removal method. A marine diver will inspect the pipeline runs to determine their construction configuration, which is unknown at this time. The pipelines may be isolated by cofferdams and removed with conventional excavation equipment after dewatering, or removed in whole or in section with diver assistance by one or more cranes positioned at each bank. Mr. Bowman is responsible for determining work approaches and preparation of work plan, implementing administrative and engineering controls to perform work safely, as well as identification and procurement of resources.

Project Manager, (4/2000-9,2000; 3/2001-10/2001) Water and Contaminated Sediment Remediation; Pine River, MI
Ref: Stephanie Ball, U.S. EPA Region 5; (312) 353-2315

The Velsicol Chemical Corporation (Velsicol), located on the banks of the Pine River in St. Louis, MI, was a former manufacturer of the pesticides and herbicides 1,1,1-trichloro 2,2-bis (p-chlorophenyl) ethane (DDT), polybrominated biphenyls (PBB), and hexabromobenzene (HBB). The site also operated as a refinery. In the late 1980s, the entire manufacturing facility was razed and provided a RCRA protective cap. The 52-acre site was enclosed with a bentonite slurry wall and provided groundwater recovery wells. The objective of the remediation effort performed by EQ is to isolate the hot spots, remove the contaminated sediment for offsite treatment and disposal, and keep the remediated area isolated from the river. Installed a silt curtain and sheet piling coffer dam around the areas of concern. The isolated area is being dewatered and the remaining sediment mixed with stabilizing material. To support the operations, upgrades included structural overpasses over the existing slurry wall to prevent damage from heavy construction traffic, a soil staging pad which also provides for equipment decontamination, and a 2,000-gallon-per-minute wastewater plant to treat the water removed from the isolated area prior to return to the Pine River. The wastewater treatment system includes two 1,000-gpm dissolved air flotation units, 40-micron particulate and oil absorbent filters, 5-micron auto-backwashing particulate filters, activated carbon filters for organics removal, and 0.5-micron post-filtration filters.

As Project Manger his responsibilities include managing site personnel, plant operations, and on-site laboratory. This includes scheduling of personnel, completing various weekly and monthly reports for corporate, MDEQ, and U.S. EPA. Responsible for training of site operators, trouble shooting and repairing system deficiencies, and coordinating with project engineer. Ensures that the plant is operated and maintained 24 hours a day, seven days per week.

Project Manager, (9/2000-3/2001) Mahoningside Power Plant Remediation, Warren, OH
Ref: Mark Durno, U.S. EPA Region 5; (440) 250-1743

Managed removal at a former power plant on the bank of the Mahoning River. PCBs were identified in an oil slick from rising groundwater in the basement. EQ took over water treatment plant operations and upgraded the system to meet discharge requirements to the City's sewer system. This was necessary because the basement floor was below the groundwater table. The water treatment system was upgraded from 20-30 gallons per minute to 180 gallons per minute. An extent of contamination investigation was conducted to determine impact on soil/bedrock and groundwater. PCB removal extended below the water table to achieve cleanup levels established by EPA. This required constant dewatering and water treatment to facilitate contamination removal. Operations included cleaning sediment from pits, sump and underground pipelines; pumped water, vacuumed sediments and pressure cleaned pipelines; constructed treatment vessel enclosure; solidified material in rolloffs; excavated 3 test pits in basement floor; graded service road; installed road plates over pits, sumps and trenches prior to drilling; hard plumbed the treatment system and installed chlorinator units to induce iron precipitation to improve performance; performed 24 soil/rock borings; removed 700 tons of soils and backfilled; dredged the Mahoning River below the outfall; installed 448 tons of rock and backfilled pits and sumps; coordinated disposal of PCB sediment and 1,610 tons of PCB waste.

Project Manager, (8/99-3/2000) Pipeline Demolition, AK Steel Corporation
Ref: Alan Alvarez, AK Steel; (513) 425-3623

Directed removal of 35,000 feet of aboveground and underground coke oven gas lines; cleaned lines; pressure pumped and filled with grout; overviewed subcontractors; developed work plan, safety plan; managed budget and schedule; client interface. The demolition subcontractor addressed approximately 16,500 feet of above ground pipeline, and the excavation contractor addressed 18,500 feet of pipeline. The above ground work focused on removing pipeline from 3-inches to 24-inches in diameter at both operational and non-operational areas of the plant. Prior to any underground work taking place, an excavation permit had to be obtained form the plant's energy department who was responsible for electrical, water, communication, steam, industrial gas lines, and sewer. When obstacles prevented removal, lines were mechanically cleaned by pulling scrappers through isolated line segments and recovering residue for disposal and filling the void space with cement grout material. It was the Project Manager's job to identify and mark

pipeline segments scheduled for closure from a set of construction drawings provided by AK Steel.

Project Manager, (3/98-10/98) Demolition and Oil Cleanup; Crystal Refinery
Ref: Betty Lavis, U.S. EPA Region 5; (312) 886-7183

Managed waste removal, asbestos abatement and demolition of refinery/tank farm across 30 acres; excavated and solidified 17,000 tons of soils; treated 4 million gallons of water; installed groundwater treatment system; demolished 250 ABTs; removed 350,000 gallons of sludge; recycled 1,500 tons scrap. The OPA scope of work covered activities that specifically addressed the cleanup of oil and protection of the body of water called Fish Creek that bordered the site to the west. The CERCLA scope of work addressed the removal of hazardous waste, asbestos abatement, and demolition of the refinery and tank farm. The OPA project consisted of sampling over 180 tanks, deploying and maintaining 350 feet of sorbent boom over a period of 6 months, vacuuming over 50,000 feet of gravel roadway to facilitate waste removal from the site, and disposal of over 110,000 gallons of oily water, disposal of 8,782 tons of tank bottom sludge. Designed, procured, and installed a free product recovery system that consisted of 9 interceptor trenches and 2 purge wells equipped with float activated electric submersible pumps that are tied to settling tanks where product is skimmed and pumped into an adjacent product tank and water is pumped through a water treatment system.

Name and Title: Julia A. Fields, Corporate QA/QC Manager

Assignment On This Project:

Name of Firm: Environmental Quality Management, Inc. (EQ)

Number of Years: ***With This Firm:*** 6 ***With Other Firms:*** 15

Education: M.S. / 1986 / Physical Chemistry
B.S. / 1981 / Chemistry

21 years of experience in QA/QC oversight of environmental programs, including 12 years of experience with Air Force programs. QA/QC Manager on EQ's AFCEE Remedial Action Contract at Rickenbacker ANGB, preparing contract QPP and project-specific SAPs to assure data quality objectives meet AFCEE requirements. QA Officer on EQ's worldwide AFIERA contract, reviewing plans, design documents, and technical reports produced by analyzers and scientists ensuring completeness, accuracy and conformance to specifications and standards.

Specific Experience:

Program QA Manager, AFIERA OEHA Contract
Provides program-wide QA/QC management in support of project activities, including QAPP preparation, data review and validation, document review, and project auditing.

Program QA Manager, AFCEE Full Service Remedial Action Contract, Rickenbacker ANGB, OH
Provides QA/QC management for remedial construction task orders in support of Base Realignment and Closure activities. Includes plan preparation, document review, project auditing, subcontractor auditing, and data review and validation.

Program Manager, USEPA Regional Collection and Analysis Contract
Region 7 contract to provide remedial investigation and enforcement compliance assurance testing and QA/QC for water, air, waste, sediment, and biota.

Team Leader, Sediments Characterization
USEPA Superfund Demonstration Project to remediate PCB-contaminated river sediments. Conducted feasibility study to determine optimum treatment remedy. Designed and managed onsite analytical laboratory for characterization of dredged PCB- and pesticide-contaminated sediments and treatment system effluent.

Chief Chemist and Quality Assurance Coordinator, USEPA Emergency and Rapid Response Services Contracts
Provides technical chemistry support for sites deemed to pose an imminent threat to human health and the environment. Services include development and implementation of hazardous materials characterization testing at 50 sites, development and implementation of analytical testing requirements, and consultation with EPA officials regarding handling of unknown/hazardous materials. Developed a data quality program that included auditing of

subcontract laboratories, resulting in data acceptance rates improving from 25% to 97% over a 9-month period. Developed and implemented quality assurance programs that were rated as "outstanding" and "proactive" by respective government clients.

Program Manager, Innovative Technology Research, USEPA
Investigating pollution technologies for handling, treatment, and disposal of hazardous materials and wastes. Projects included state-of-the-art assessments of lead-based paint stabilization, demonstration of the Lasagna® Process for remediation of TCE-contaminated soil, co-metabolic bioventing for biodegradation of chlorinated solvents in soil, an impact assessment of contaminated sediment dredging on estuary ecology, stabilization and solidification of lead- and mercury-contaminated wastes, assessment of chromium fumes during welding operations, and preparation of the USEPA Phytoremediation Handbook.

Principal Scientist, Disposal Methods for In-Field Heated Meals
*En*vironmental study of disposal methods for reactive magnesium chemical heaters for the US Army Soldier Systems Command. Determined disposal methods for military bases to achieve environmental compliance within the US as well as disposal in accordance with European Union and German regulations.

Principal Scientist, Advanced Military Engineering Emission Reductions Program
USAF technology transfer of the emissions reductions program. Prepared support documents and training materials for proper installation/operation of emissions reduction equipment at WPAFB.

Manager of Research/Analytical Testing Laboratories
For 10 years, managed up to 16 scientists and operating budgets up to $1.25 million.

Project Manager, Industrial Projects
Developed and optimized manufacturing process for minimization of solid and hazardous waste. Oversaw bench and pilot scale studies and led full manufacturing implementation of new and optimized processes. Developed and implemented an optimized process resulting in $150,000 annual savings in disposal costs of waste water containing heavy metals. Managed research and analytical testing laboratories for 10 years, with staffs of 4 to 16 scientists. Determined facilities and equipment capabilities and investments and maintained operating budgets up to $1.25 million. As Environmental, Health, and Safety (EHS) Coordinator in Advanced Military Engineering at General Electric Aircraft Engines, determined EHS requirements for contract proposals and laboratory and pilot test facilities.

APPENDIX B

LETTER TO THE CQC SYSTEM MANAGER

June 10, 2002

Mr. Edward D. Wise
Conractor Quality Control System Manager
1800 Carillon Boulevard
Cincinnati, Ohio 45240

RE: Quality Control System Manager Responsibility and Authority
Indiana Harbor and Canal Cutoff Wall Project
DACW27-D2-C-0003

Dear Mr. Wise:

This is a Letter of Direction to you outlining your duties and responsibilities as our Quality Control System Manager on the above referenced project.

You will be responsible for preparing and maintaining the Submittal Register Form 4288 for the duration of the project. You are required to check all shop drawings for accurate dimensions and to ensure compliance to applicable specifications and drawings as to the quality of materials being proposed for this project. This also applies to all subcontractors, offsite fabricators, and suppliers.

You will make, on a continuing basis, sufficient daily follow-ups to ensure that all workmanship and materials in the construction of this project are in conformance with the specifications and drawings.

You will be responsible for all testing as required by the specifications. Qualified individuals onsite will perform the tests and the results will be supplied to you for your review and approval as outlined in the Site CQC plan.

You will be present during all testing and coordinate all such tests as required in accordance with the specifications and the Corps of Engineers Representative.

The quality control system will include three phases of control and tests: Preparatory Phase, Initial Phase, and Follow-up Phase. You are directed to Section 01451, paragraph 3.5, for specific instructions outlining these control phases. All control phases and tests shall be recorded daily on the Quality Control Report and submitted to the Government Representative on the following workday covered by the report. All test results shall be submitted in triplicate copies.

You are directed to review, in their entirety, the Indiana Harbor CQC Plan as well as the Project Specifications, Amendments and Drawings. If there is an item not understood, you are to consult your Quality Control Support Team.

You are hereby authorized to stop work that is not in compliance with the Contract.

Sincerely,

ENVIRONMENTAL QUALITY MANAGEMENT, INC.

James G. Zody, P.E.
Project Director for Indiana Harbor and Canal CDF Project
Vice President

JGZ:alc

cc: EQ Project Manager
USACE

APPENDIX C

FORMS

FORM 1

DAILY CONSTRUCTION QUALITY CONTROL MANAGEMENT REPORTS

DATE _____ REPORT NO. _____

CONTRACTOR: Environmental Quality Management CONTRACT NO. DACW27-02-C-0003_

PROJECT NAME: Indiana Harbor CDF __LOCATION East Chicago, IN

WEATHER: TYPE___ TEMP.MAX___MIN___RAIN FALL___GAGE READING__

EMPLOYEES: SUPV__ SKILLED__ LABORERS__ LENGTH OF SHIFT__HR__

_____

NAME (PRIME OR SUBCONTRACTOR) AND AREA OF RESPONSIBILITY
WORK RESPONSIBILITY:

a. _____
b. _____
c. _____
d. _____
e. _____

_____

WORK PERFORMED TODAY: LOCATION, DESCRIPTION, QUANTITY AND RESPONSIBILITY BY LETTER REFERENCE (Relate to item on the Progress Chart or CPM)

_____

INSPECTION: (Description of Inspection and Location. Include off-site Materials and Equipment Inspection)

a. PREPARATORY PHASE:

b. INITIAL PHASE:

c. FOLLOW-UP PHASE:

_____

RESULTS OF INSPECTION (Include Findings, Deficiencies Observed And Corrective Action)

FORM 1 (continued)

DAILY CONSTRUCTION QUALITY CONTROL MANAGEMENT REPORT (CONTINUED)

RESULTS OF INSPECTION (CONTINUED)

TEST PERFORMED: Type, Location, Results Including Failure & Remedial Action (Attach copy of test report or notation when it will furnished)

WORK ITEMS BEHIND SCHEDULE: Reason, Effect on Progress Schedule and Action Taken.

JOB SAFETY: (Report conditions, Deficiencies, Corrective Action & Results)

REMARKS: List Attachment and Other Management Actions Taken To Assure Quality Construction.

IF INSPECTION & RESULTS ARE NOT LISTED THEN IT IS ASSUMED THAT QUALITY CONTROL IS NOT BEING IMPLEMENTED.

The above report is complete and correct and all material, equipment, work performed, and test conducted are in strict compliance with the terms of the contract except as noted.

CONTRACTOR'S APPROVED REPRESENTATIVE SIGNATURE

PREPARATORY PHASE CHECKLIST

Contract No.:_____ Date Preparatory Held:_____
Title:_____ Spec Section 01410_____
_____ Drawing No.(a): _____

Definable Feature of Work:_____
_____

A. PERSONNEL PRESENT

NAME	POSITION	COMPANY
1._____	_____	_____
2._____	_____	_____
3._____	_____	_____
4._____	_____	_____
5._____	_____	_____
6._____	_____	_____
7._____	_____	_____
8. _____	_____	_____
9. _____	_____	_____

(List additional personnel on reverse side)

B. DRAWINGS AND SPECS:

I. Has each spec paragraph, contract drawing, and shop drawing been studied: YES____ NO____
II. Do all parties have up-to-date drawings and specifications: YES___ NO____

C. SHOP DRAWINGS INVOLVED:

Transmittal Descr.	Trans.#	Action Code
1. None_____	_____	_____
2._____	_____	_____
3._____	_____	_____

D. MATERIALS:

I. Are all materials on hand? YES___ NO___

II. Have all materials been checked for contract compliance against approved shop drawings: YES___ NO___

III. Items not on hand or not in accordance with transmittals (If not on hand, check during initial phase)

1._____

2. _____

3. _____

4. _____

E. Test required in accordance with contract requirements:
Test/Paragraph Frequency

1. _____ _____

2. _____ _____

3. _____ _____

4. _____ _____

5. _____ _____

F. ACCIDENT PREVENTION: Has Hazard Analysis been completed?
YES _____ NO____ If yes, attach a copy,
if no, explain _____

_____

_____

_____

_____

_____

_____

G. EQUIPMENT REQUIRING OPERATIONAL CHECK:

1. _____

2. _____

3. _____

4. _____

H. WORKMANSHIP: Have procedures for accomplishing work been reviewed with CQC Rep & other appropriate people? YES____ NO____

I. PREVIOUS WORK: Has all preliminary work been accomplished in accordance with contract requirements and is this feature of work ready to start? YES_____ NO____ None Required

Explain any problems: _____

_____

_____

_____

_____

J. OTHER COMMENTS: _____

_____

_____

_____

_____

_____

CONTRACTOR QC REPRESENTATIVE

Note: CQC = Contractor Quality Control

FORM 3

INITIAL INSPECTION CHECKLIST

CONTRACT NO.: _____ DATE: _____

Description and Location of Work Inspected: _____

_____ Spec. Sec. _____

REFERENCE CONTRACT DRAWINGS: _____

A. PERSONNEL PRESENT

	NAME	POSITION	COMPANY
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9.	_____	_____	_____
10.	_____	_____	_____

B. MATERIALS BEING USED ARE IN STRICT COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS: YES____ NO____

IF NOT EXPLAIN _____

_____

_____

FORM 3 (continued)

C. PROCEDURE AND/OR WORK METHODS WITNESSED ARE IN STRICT COMPLIANCE WITH THE REQUIREMENTS OF THE CONTRACT SPECIFICATIONS: YES____ NO____

IF NOT, EXPLAIN: _____

_____

_____

_____

D. WORKMANSHIP IS ACCEPTABLE: YES____ NO____ STATE AREAS WHERE IMPROVEMENT IS NEEDED: _____

_____

_____

E. SAFETY VIOLATIONS AND CORRECTIVE ACTION TAKEN: _____

_____

_____

_____

_____

CONTRACTOR QC REPRESENTATIVE

General Sampling Checklist
Indiana Harbor CDF Project
Environmental Quality Management

	Reviewed sampling operation procedures and objectives
	List of sample points and parameters of interest
	Coordinate and make advance notifications to all necessary or involved parties
	Prepare list of equipment, materials, and supplies necessary to accomplish the sampling objectives
Accumulating appropriate supplies	
	Sample containers and sample preservatives
	Sample labels
	Chain of custody (COC)
	Custody Seals and tamper evident seals
	Sample log
	Shipping documentation
	Packaging materials (bubble wrap and tape)
	Sampling equipment (i.e., hand auger, shovel, scoop, etc.)
	Decontamination supplies
	Appropriate PPE
Site Activities	
	Setting up sample storage and equipment/personnel decon area
	Identify waste collection and storage needs (i.e., decon water)
	Locating and marking sample points
	Decontaminate field sampling equipment
	Collecting, preserving, labeling, packing all samples
	Confirm all samples have been taken (including all laboratory QA/QC samples)
	Decontaminate field sampling equipment
	Complete COC, sample log, and other field documentation necessary
	Package all samples into appropriate shipping container
	Coordinate shipment of samples (lab courier, commercial courier, etc.)
	Coordinate storage and disposal of all waste materials (i.e., decon water, ppe, etc)
	Notify site CQC Officer of any variances from procedures
	Submit all necessary paperwork to appropriate personnel (as identified in the appropriate site plans)

Backfill Material Sampling Checklist
Indiana Harbor CDF Project
Environmental Quality Management

Date _____ Location (coordinates or station) _____

Cutoff Wall: Production Test Section (Circle one)

Lineal Feet of Wall since Last Test _____ ft (at least one test every 100 ft for production wall or at least once per day)
(At least one test every 20 ft for test section)

Note: Collect duplicate samples for possible testing by the USACE every 20 samples (5%)

	Visual – Backfill material free of debris, brush, organic or frozen material
	Wide mouth sample jars, 500 ml and scoop
	Distilled water for decontaminating scoop between samples
	Sample labels
	Indelible ink pen (waterproof ink)
	Chain of custody (COC)
	Custody Seals and tamper evident seals
	Field log updated
	At least two sample jars filled – Sufficient sample for at least 200 grams passing the No. 40 sieve (<425 µm)
	Sampling instrument decontaminated between samples
	Seal jars to avoid drying prior to testing
Equipment for Field Determination of Properties	
	Screens (3-inch, No. 4, No. 40, No. 200) and sieve shaker
	Use wet preparation method for <425 µm for Atterberg limit tests
	Mechanical liquid limit device
	Balance
	Oven for moisture content

Notes:

Bentonite Slurry Sampling Checklist
Indiana Harbor CDF Project
Environmental Quality Management

Date _____ Location (coordinates or station) _____

Cutoff Wall: Production Test Section (Circle one)

Time of Sample Collection _____
(Collect at least two samples per shift: near the beginning and end of each day, at two depths; approximately 2 ft below the slurry surface and approximately 2 ft above the bottom of the trench)

Note: Collect duplicate samples for possible testing by the USACE every 20 samples (5%)

	Wide mouth sample jars, 500 ml and slurry sampler
	Distilled water for decontaminating slurry sampler between samples
	Sample labels
	Indelible ink pen (waterproof ink)
	Chain of custody (COC)
	Custody Seals and tamper evident seals
	Field log updated
	At least two sample jars filled – Sufficient sample for viscosity, filtrate loss, density, and pH tests
	Sampling instrument decontaminated between samples
	Seal jars to avoid drying prior to testing
Equipment for Field Determination of Properties	
	Marsh funnel sets
	Standard filter press
	Mud balances (direct reading of density)
	Balance
	Direct-indicating viscometer
	pH meter

Notes:

Soil-Bentonite Backfill Sampling Checklist
Indiana Harbor CDF Project
Environmental Quality Management

Date _____ Location (coordinates or station) _____

Cutoff Wall: Production Test Section (Circle one)

Lineal Feet of Wall since Last Test _____ ft (at least one test every 100 ft for production wall or at least once per day)
(For Bentonite content, at least one sample per mix, minimum one sample per day)
(At least one test every 20 ft for test section)

Note: Collect duplicate samples for possible testing by the USACE every 20 samples (5%)

	Visual – Backfill material free of debris, brush, organic or frozen material
	Wide mouth sample jars, 500 ml and scoop
	Distilled water for decontaminating scoop between samples
	Sample labels
	Indelible ink pen (waterproof ink)
	Chain of custody (COC)
	Custody Seals and tamper evident seals
	Field log updated
	At least three sample jars filled – Sufficient sample for at least 200 grams passing the No. 40 sieve (<425 µm), slump determination, density, and permeability
	Review mixing specification and field records to confirm that bentonite content is less than 4%
	Sampling instrument decontaminated between samples
	Seal jars to avoid drying prior to testing
Equipment for Field Determination of Properties	
	Screens (3-inch, No. 4, No. 40, No. 200) and sieve shaker
	Use wet preparation method for <425 µm for Atterberg limit tests
	Mechanical liquid limit device
	Balance
	Mold and rod for slump test
	Mud balances
	4 inch cylindrical mold
	Modified API filter press for onsite permeability test

Notes:

APPENDIX D

LABORATORY CERTIFICATION

Environmental Quality Management, Inc.
Memorandum

To:	John Wentz	**Date:**	June 11, 2002
From:	Bill Thompson	**File:**	Indiana Harbor
Subject:	Geotechnical Laboratory	**Copies:**	Fred Hall

In response to the June 10, 2002 e-mail from Mr. Doug Anderson, USACE Project Manager for the Indiana Harbor Project, EQ is planning to use Great Lakes Soil & Environmental Consultants, Inc. (333 Shore Drive, Burr Ridge Illinois) to complete the geotechnical analysis of soil samples collected during installation of pre-construction soil borings.

Attached is a copy of a May 23, 2000 letter from the Corps to Great Lakes demonstrating that the lab has been certified by the Corps to complete the tests required. You will note that the qualification was valid through December 2, 2001. Dr. Sanjeev Bandi, Principal Engineer, has indicated to me that he spoke with Mr. Kent Smith of the Corps' Construction Branch prior to submitting a bid on this project to verify the re-certification process. According to Dr. Bandi, Mr. Kent indicated that re-certification should not be a problem. However, Dr. Bandi informed me the Corps' re-certification of geotechnical labs had been suspended during early 2002 because of a Corps re-organization.

Dr. Bandi indicated that the re-qualification process is on-going and that the Corps' inspection is tentatively scheduled for July or August. Dr. Bandi indicated that the lab is currently conducting geotechnical testing for the Corps. Great Lakes appears to be on track to obtain the necessary Corps certification for this effort.

Mr. Anderson suggested that we obtain the list of Validated Laboratories from the Corps' web page. The appropriate pages for Illinois and Indiana are attached. You will note that there are 10 labs listed in Illinois and Indiana and that the certification of six of these labs will end before completion of EQ's efforts. As indicated by Mr. Anderson, re-certification can take up to several months to complete, thus it does not appear appropriate to consider any lab whose certification ends in calendar year 2002. Of the remaining four labs, the only one in Illinois is not certified to complete Atterberg Limits (ASTM D 4318) testing required and the three labs in Indiana are not close enough to the site to allow the timely delivery of the samples from the site to the lab.

In my opinion, Great Lakes is as viable as any other lab to complete the required analyses. I believe that we should request that the Corps expedite certification of the lab.

Great Lakes
Soil & Environmental Consultants, Inc.

333 Shore Drive
Burr Ridge, IL 60521
Ph· (630) 321-0944
Fax: (630) 321-0945
www.greatlakessoil.com

Engineering, soil and material testing

6/17/02

Mr. William E. Thompson
Environmental Quality Management, Inc.
1800 Carillon Boulevard
Cincinnati, OH 45240

Dear Mr. Thompson:

As requested by you this morning, this letter is to confirm that Great Lakes Soil & Environmental Consultants (GLSEC) has enrolled with AASHTO Materials Reference Laboratory (AMRL) and Cement Concrete Reference Laboratory (CCRL) for Proficiency Sample Program (PSP) and onsite assessment. The onsite assessment and PSP will enable GLSEC to obtain accreditation in the areas of soils, concrete, aggregate and asphalt laboratory testing. So far GLSEC has completed the soils, aggregate and concrete PSPs. We are currently working on the asphalt PSP.

GLSEC has already requested Army Corps of Engineers (Corps) for revalidation of its laboratory. GLSEC has been in contact with Mr. Kent Smith of the Chicago District office in connection with its efforts obtaining Corps certification. As the AASHTO assessments are to take place in a short while from now, GLSEC will submit the required documentation to the Corps for a desk audit.

Enclosed are letters from AMRL and CCRL confirming our request for laboratory assessment. If you have any questions or need additional information, please feel free to call me at (630) 321-0944.

Thank you.

Very truly yours,
Great Lakes Soil & Environmental Consultants, Inc.

Sanjeev Bandi, Ph.D., P.E.
Principal Engineer

Encl.

UNITED STATES DEPARTMENT OF COMMERCE
National Institute of Standards and Technology
Gaithersburg, Maryland 20899-

CCRL - NIST
100 Bureau Dr. Stop 8622
Gaithersburg, MD 20899-8622
Telephone No. (301) 975-6704
Fax No. (301) 330-1956

March 5, 2002

Sanjeev Bandi, Ph.D , P E.
Vice President
Great Lakes Soil & Environmental Consult
333 Shore Drive Street
Burr Ridge, Illinois 60527

Subject: Inspection of Laboratories

Dear Dr. Bandi:

The Cement and Concrete Reference Laboratory is pleased to acknowledge your recent request for inspection of your testing facilities during our Thirty-first Inspection Tour.

The inspection will be made at the earliest possible date compatible with the established tour sequence. In accordance with our usual procedure, each participating laboratory will receive approximately four weeks' advance notice of the anticipated date of the inspector's arrival.

For your information, we are enclosing a copy of the current listing of commercial concrete testing laboratories that have had their testing facilities inspected by the CCRL.

This letter serves only as an acknowledgment that you have requested an inspection of your laboratory by the CCRL. It does not constitute a proof of inspection since you have the option to cancel your request prior to the inspection of your laboratory by the CCRL.

Your interest in our inspection work is much appreciated.

Very truly yours,

James H. Pielert

James H. Pielert, P.E.
Manager, Cement and Concrete Reference Laboratory
Building Materials Division
Center for Building Technology

Enclosure

LIP F20

NIST

AMRL AASHTO Materials Reference Laboratory

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY • 100 BUREAU DRIVE, STOP 8623 • BUILDING 202, ROOM 211 • GAITHERSBURG, MD 20899-8623
• phone: 301.975.5450 • fax: 301.975.8208 • e-mail: amrl@nist.gov • web site: http://www.nist.gov/amrl •

May 3, 2002

Mr. Sanjeev Bandi
Laboratory Director
Great Lakes Soil & Environmental Consultants, Inc.
333 Shore Drive
Burr Ridge, Illinois 60527

Dear Mr. Bandi:

The AASHTO Materials Reference Laboratory plans to have C. Ivann Harnish and Michael McGough visit your laboratory located in Burr Ridge, Illinois on July 1, 2002 to conduct an on-site assessment.

Mr. Harnish and Mr. McGough will be prepared to assess your laboratory's hot mix asphalt test facilities and to conduct a quality system evaluation based on AASHTO Standard Practice R18. The scope of the assessment may include any of the test methods indicated in the enclosure to this letter. It is suggested that the enclosure to this letter be referred to laboratory personnel prior to the arrival of the assessors.

You will be advised if circumstances require a substantial change in the assessment date indicated above.

Sincerely,

for David A. Savage
Laboratory Assessment Supervisor

Enclosures

DAS: bd

AMRL AASHTO Materials Reference Laboratory

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY • 100 BUREAU DRIVE, STOP 8623 • BUILDING 202, ROOM 211 • GAITHERSBURG, MD 20899-8623
• phone: 301.975.5450 • fax: 301.975.8208 • e-mail: amrl@nist.gov • web site: http://www.nist.gov/amrl •

November 12, 2001

Mr. Sanjeev Bandi
Laboratory Director
Great Lakes Soil & Environmental Consultants, Inc.
333 Shore Drive
Burr Ridge, Illinois 60527

Dear Mr. Bandi:

We have received your request for accreditation in the hot mix asphalt, aggregate and soil area. We have arranged for a bituminous laboratory assessor and a soil and aggregate laboratory assessor to make separate visits to your laboratory at the earliest possible dates compatible with our established tour sequences. You will receive approximately three weeks advance notice of each assessor's anticipated arrival date.

This letter serves only as an acknowledgement that you have requested an on-site assessment. It does not indicate proof of an assessment since you have the option of cancelling prior to the assessor's visit to your laboratory.

We appreciate your interest in our program and look forward to visiting your laboratory.

Sincerely,

PASpellerberg

Peter A. Spellerberg, Assistant Manager
AASHTO Materials Reference Laboratory

PAS: bd

The American Industrial Hygiene Association

is proud to acknowledge that

Environmental Chemical Corporation

Cincinnati, OH

has fulfilled the requirements for and has been formally recognized by AIHA and is technically competent to perform the analyses listed in the following

SCOPE OF ACCREDITATION

INDUSTRIAL HYGIENE
Originally Accredited: 04/01/88

_X_ Metals
___Asbestos PCM
_X_ Organic Solvents
___Silica
___Asbestos PLM
___Diffusive Samples

ENVIRONMENTAL LEAD

___Paint Chips
___Dust Wipes
___Air
___Soil

ENVIRONMENTAL MICROBIOLOGY

___Bacteria
___Fungi

The above named laboratory agrees to perform all analyses listed above in the scope of accreditation according to applicable policy requirements and acknowledges that continued accreditation is dependent on successful participation in the appropriate proficiency testing programs. This laboratory may be contacted to verify the current scope of accreditation, proficiency testing performance and accreditation status. Accreditation by AIHA is not a guarantee of the validity of the data generated by the laboratory.

Laboratory # 100924
Certificate # 364

Accreditation Expires: 04/01/03

Colleen Becker
Colleen Becker
Chair, Analytical Accreditation Board

James R. Thornton
James R. Thornton, CIH, CSP
President, AIHA

ECC
ENVIRONMENTAL CHEMICAL CORPORATION

Feb 13, 2002

American Industrial Hygiene Association
ATTN: Kim E. Banks
2700 Prosperity Ave.
Fairfax, VA 22301

SIMALABS International and Environmental Chemical Corporation are pleased to announce that an agreement has been reached for SIMALABS International to acquire Environmental Chemical Corporation's (ECC) Cincinnati Laboratory.

This transaction has been conducted in such a way as to allow for uninterrupted service to our clients and the contiguous adherence to all applicable State and Federal regulations. Moreover, this transfer of ownership has been performed in accordance with all applicable certification requirements.

SIMALABS will continue to provide the same excellent service and quality data on which the Cincinnati lab's reputation has been built. Most importantly, SIMALABS is committed to the policies and procedures upon which the Cincinnati laboratory's quality system was established.

This letter also notifies you of a change in key personnel. Mr. Bradden Bigelow, ECC Cincinnati's current Quality Assurance Manager will be retained as ECC's Corporate Quality Assurance Manager and will be replaced locally by Ms. Gina Luna, an established ECC employee in the QC office. Through oversight of the SIMALABS Corporate QA Director, Mr. Jeffrey Loewe, Ms. Luna will continue to ensure the implementation of the ECC quality systems. Following this transition period, Mr. Bigelow will be relocating to the Denver area and will continue to be available to consult with SIMALABS in the future.

Ms. Violet Fanning and Mr. Jim Burns will continue to serve as the Technical Directors for the Cincinnati Laboratory with oversight from the SIMALABS Vice President of Operations, Mr. Robert Crookston.

This is a very exciting time for us. Please feel assured that the quality and service you have come to expect from Environmental Chemical Corporation will not be lost as a result of this acquisition and we look forward to providing all of our clients with even more services. For additional information please contact Mr. Jeffrey Loewe or Mr. Robert Crookston at 219-769-8378.

Sincerely,

Jeffrey M. Loewe
SIMALABS International
Corporate QA Director

Bradden Bigelow
Environmental Chemical Corporation
Corporate QA Manager

6954 Cornell Road
Suite 300
Cincinnati, OH
45242
TEL: (513) 489-2001
FAX: (513) 489-2223

ECC

ENVIRONMENTAL CHEMICAL CORPORATION

Feb 13, 2002

United States Army Corps of Engineers
HTRW CX
ATTN: Dr. Joesph Solsky
12565 West Center Road
Omaha, NE 68144-3369

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Sincerely,

Jeffrey M. Loewe
SIMALABS International
Corporate QA Director

Bradden Bigelow
Environmental Chemical Corporation
Corporate QA Manager

6954 Cornell Road
Suite 300
Cincinnati, OH
45242

TEL: (513) 489-2001
FAX: (513) 489-2223

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
HTRW CENTER OF EXPERTISE
12565 WEST CENTER ROAD
OMAHA, NEBRASKA 68144-3869

REPLY TO
ATTENTION OF:

October 31, 2001

Hazardous, Toxic and Radioactive Waste
Center of Expertise

Environmental Chemical Corporation
ATTN: Bradden Bigelow
6954 Cornell Road
Cincinnati, OH 45242

Gentlemen:

This correspondence addresses the recent evaluation of Environmental Chemical Corporation of Cincinnati, OH by the U.S. Army Corps of Engineers (USACE) for chemical analysis in support of the USACE Hazardous, Toxic and Radioactive Waste Program.

Your laboratory is now validated for the parameters listed below:

METHOD	PARAMETERS	MATRIX(1)
8021B	Aromatic Volatile Organics - BTEX	Water(2)
8021B	Aromatic Volatile Organics - BTEX	Solids
8330	Explosives	Water(2)
8330	Explosives	Solids(2)
8081A	Organochlorine Pesticides	Water(2)
8081A	Organochlorine Pesticides	Solids
8082	Polychlorinated Biphenyls	Water(2)
8082	Polychlorinated Biphenyls	Solids(2)
8270C	Semivolatile Organics	Water(2)
8270C	Semivolatile Organics	Solids(2)
6010B/7000A	TAL Metals(3)	Water(2)
6010B/7000A	TAL Metals(3)	Solids(2)
Mod 8015	TPH - DRO/GRO(4)	Water
Mod 8015	TPH - DRO/GRO(4)	Solids
8260B	Volatile Organics	Water(2)
8260B	Volatile Organics	Solids

Remarks:

1) 'Solids' includes soils, sediments, and solid waste.

2) The laboratory has successfully analyzed a performance evaluation sample for this method/matrix.

3) TAL Metals: Aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.

4) Approval for this parameter is based on review of SOPs only.

Enclosed for your information is a copy of the Laboratory Inspection and Evaluation Report. Your laboratory has responded to the deficiencies as noted in the report. Please refer to Section 6 of this report for any additional responses required.

Based on the successful analysis of the performance evaluation samples, the results of the laboratory inspection, and your Corrective Action Report, your laboratory will be validated for sample analysis by the methods listed above. The period of validation is 24 months and expires on October 19, 2003.

The USACE reserves the right to conduct additional laboratory inspections or to suspend validation status for any or all of the listed parameters if deemed necessary. It should be noted that your laboratory may not subcontract USACE analytical work to any other laboratory location without the approval of this office. This laboratory validation does not guarantee the delivery of any analytical samples from a USACE Contracting Officer Representative.

Any questions or comments can be directed to Joseph Solsky at (402) 697-2573. General questions regarding laboratory validation may be directed to the Laboratory Validation Coordinator at (402) 697-2574.

Sincerely,

Marcia C. Davies

Marcia C. Davies, Ph.D.
Director, USACE Hazardous,
Toxic and Radioactive Waste
Center of Expertise

Enclosure

Appendix H

ENVIRONMENTAL QUALITY MANAGEMENT, INC.
1800 Carillon Boulevard
Cincinnati, Ohio 45240
(513) 825-7500
fax (513) 825-7495
www.eqm.com

November 11, 2004

Mr. Douglas M. Anderson, P.E.
Contracting Officer's Representative
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd
Griffith, IN 46319

Re: Contract No. DACW27-02-C-0003
Indiana Harbor & Canal Confined Disposal Facility
Subsurface Investigation and Cutoff Wall
Soil-Bentonite Slurry Wall QC Data, Section 02260

Dear Doug,

This letter is provided as confirmation of the change in code status from "G-Other" to acceptable for the following Soil-Bentonite Slurry Wall QC Data Submittals.

- 02260-55.1 through 02260-59.1
- 02260-61.1
- 02260-63.1 through 02260-70.1
- 02260-76.1
- 02260-79 through 02260-83
- 02260-85
- 02260-87
- 02260-88

The USACE letter C-0116 dated October 8, 2004 supports this change in code status. A copy of this letter is attached for reference.

Sincerely,

ENVIRONMENTAL QUALITY NMANAGEMENT, INC.

John A. Wentz, P.E.
Sr. Project Manager

Cc: Project File

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 NORTH CANAL STREET
CHICAGO, IL 60606-7206

REPLY TO
ATTENTION OF

October 8, 2004

Technical Services Division
Calumet Area Office

C-0116

SUBJECT: Contract No. DACW27-02-C-0003
Indiana Harbor & Canal Confined Disposal Facility
Subsurface Investigation and Cutoff Wall
Cutoff Wall Backfill QC Data Submittals

Mr. John A. Wentz, P.E.
Environmental Quality Management, Inc.
1800 Carillon Boulevard
Cincinnati, OH 45240

Dear Mr. Wentz:

Please reference submittals 02260-55.1 through 02260-59.1, 02260-61.1, 02260-63.1 through 02260-70.1, 02260-76.1, 02260-79 through 02260-83, 02260-85, 02260-87, and 02260-88. These submittals contained data pertaining to the compliance of the cutoff wall with Contract specifications. The Government assigned each of these submittals an action code of "G - Other." The Government comments on the submittals indicated that the Corps of Engineers and the Contractor were investigating the impact of the potential non-compliance of the data contained in the submittals, if any, upon the quality of construction of the cutoff wall. The comments further stated that the Corps of Engineers would address the cutoff wall quality control data submittals in separate correspondence after the investigations were completed. This letter addresses the referenced quality control data submittals.

As you know, Environmental Quality Management, Inc. (EQ) replaced portions of the cutoff wall in response to the data covered by the submittals. Subsequent quality control data collected from the replaced cutoff wall sections indicate that the final cutoff wall construction is in compliance with Contract requirements. Thus, this letter documents that the cutoff wall is acceptable.

If you have any questions, please feel free to call me at (219) 923-1763.

Sincerely,

Douglas M. Anderson, P.E.
Contracting Officer's
Representative

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7/29/2003 JOB NAME: East Chicago JOB NUMBER: P01048

WEATHER: sunny 80's RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
0+10	2	79	18	16	48	9
0+10	25	80	22	14	49	9.5
0+10	2	80	20	18.5	47	9.5
0+10	37	80.5	20	19	43	9.5

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
	none			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
	none					

COMMENTS

Lead in trench and first out complete today no backfill mixed today

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

PH CALIBRATIONS PERFORMED TODAY?	
BALANCE CALIBRATIONS PERFORMED TODAY?	
FUNNEL CALIBRATIONS PERFORMED TODAY?	

GEO-CON: **OWNER:**

Laboratory Derived Results

SOIL-BENTONITE BACKFILL

SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY
inches		%		API

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7/29/2003 JOB NAME: E. Chicago JOB NUMBER: P01048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	PH
Military	lb/ft3	seconds	cm3	S.U.
8:55	65	42	12.5	7.5
14:21	66	43	13.5	9

FUNNEL CALIBRATIONS PERFORMED TODAY?	
pH METER CALIBRATIONS PERFORMED TODAY?	
BALANCE CALIBRATIONS PERFORMED TODAY?	

GEO-CON: _____ **OWNER:** _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7/29/2003 JOB NAME: E. Chicago JOB NUMBER: P01048

WEATHER: RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
0+10	35	39					L 0		3
0+10	35	39					L 10		10.5
0+20	35	39					L 20		22
							L 30		29.5
							0+00		39
							0+10		39
							0+20		39

SF TODAY NA

SF TO DATE NA

COMMENTS

ist day of excavation-no backfill mixed or placed

GEO-CON: **OWNER:**

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 073003	TRANSMITTAL NO. 02260-25

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
9	072903 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

7-29-03 JOB NAME: E. CHICAGO JOB NUMBER: P01048

WEATHER: SUNNY 80'S RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
0+10	2	79	18	16	48	9
2+10	25	80	22	14	49	9.5
2+10	2	80	20	18.5	47	9.5
2+10	37	80.5	20	19	43	9.5

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
	NONE			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
	NONE					

COMMENTS

LEAD-IN TRENCH AND FIRST CUT COMPLETE TODAY. NO BACKFILL MIXED TODAY.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

PH CALIBRATIONS PERFORMED TODAY?	
BALANCE CALIBRATIONS PERFORMED TODAY?	
FUNNEL CALIBRATIONS PERFORMED TODAY?	

GEO-CON: OWNER:

Received by Eric Bow

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7-29-03 JOB NAME: E. CHICAGO JOB NUMBER: P01098

WEATHER: SUNNY 80'S RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
0+00	35	39					L 0		3
0+10	35	39					L 10		10.5
0+20	35	39					L 20		22
							L 30		29.5
							0+00		39
							0+10		39
							0+20		39

SF TODAY N/A

SF TO DATE N/A

COMMENTS 1ST DAY OF EXCAVATION - NO BACKFILL MIXED OR PLACED

GEO-CON: OWNER:

Received by Eric Bow

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7-29-03 JOB NAME: E. CHICAGO JOB NUMBER: P01048

SLURRY BATCH PLANT

TIME Military	DENSITY lb/ft3	VISCOSITY seconds	FILTRATE LOSS cm3	PH S.U.
08:55	65	42	12.5	7.5
14:21	66	43	13.5	9

FUNNEL CALIBRATIONS PERFORMED TODAY?	
pH METER CALIBRATIONS PERFORMED TODAY?	
BALANCE CALIBRATIONS PERFORMED TODAY?	

GEO-CON: OWNER:

Received by Eric Ryan

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7/30/2003 JOB NAME: E. Chicago JOB NUMBER: P01-048

WEATHER: Sunny 80s RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
0+20	3	72	6	17.5	40	8
0+20	36	77	18	18.5	43	9
0+30	3	74.5	13.5	23	42	9
0+40	35	72	7	16.5	40	9

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
0+00 (NW)				
0+20 (NWE20)				
0+40 (NWE40)				

samples taken & will be sent to the lab for analysis on 7/31/03
backfill soil & soil bentonite backfill for the 3 stations

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

backfill mixed & placed today slump 3.5"

DRY BENTONITE ADDITION		
	TONS	%
TODAY	18	6
TO DATE	18	6
BORROW %	CY	3001.34

PH CALIBRATIONS PERFORMED TODAY?	NA	yes
BALANCE CALIBRATIONS PERFORMED TODAY?	NA	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	NA	yes

GEO-CON: **OWNER:**

Laboratory Derived Results

SOIL-BENTONITE BACKFILL

SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY
inches		%		API

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7/30/2003 JOB NAME: E. Chicago JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	PH	
Military	lb/ft3	seconds	cm3	S.U.	
7:44	66	55	13	7	Note: batch adjusted & retested before sent to trench
14:30		39			
14:50	65	44	12.5	7	
15:30		44			

FUNNEL CALIBRATIONS PERFORMED TODAY?	NA
pH METER CALIBRATIONS PERFORMED TODAY?	NA
BALANCE CALIBRATIONS PERFORMED TODAY?	NA

GEO-CON: _____ **OWNER:** _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7/30/2003 JOB NAME: E. Chicago JOB NUMBER: P01-048

WEATHER: sunny 80s RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
NWE 30	35	39				43"	NWS L-0	3	top out
NWE 40	36	40	39.5	10	395	44"	NWS L-1	10.5	9.5
NWE 50	35.5	38.5				47"	NWS L-2	21.5	20
NE	36	39	39.25	5	196.25	NA	NWS L-3	29.5	24.5
NWE 60	36	39				50"	NW	39	26.5
			39	5	195		NWE 10	39	28
							NWE 20	39	31
							NWE 30		30.5
							NWE 40		33
							NWE 50		35.5
							NE		36.5
							NWE 60		38.5

SF TODAY 786.25
SF TO DATE 2053.75

COMMENTS

backfill mixed & placed today

GEO-CON: **OWNER:**

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 080503	TRANSMITTAL NO. 02260-26

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)*	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8)	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION (See instruction no. 6)	FOR CE USE CODE
				SPEC. PARA NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.
10	073003 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7-30-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: SUNNY 80's RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
0+20	3	72	6	17.5	40	8
0+20	36	79	18	18.5	43	9
0+30	3	74.5	13.5	23	42	9
0+40	35	72	7	16.5	40	9

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
0+00	~~(NWE 10)~~ ADH	(NW)		
0+20	(NWE 20)			
0+40	(NWE 40)			

SAMPLES TAKEN & WILL BE SENT TO THE LAB FOR ANALYSIS ON 7-31-03 (BACKFILL SOIL & SOIL BENTONITE BACKFILL FOR THE 3 STATIONS)

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

BACKFILL MIXED & PLACED TODAY SLUMP 3.5"

DRY BENTONITE ADDITION		
	TONS	%
TODAY	18	6
TO DATE	18	6
BORROW %	CY	3001.34

PH CALIBRATIONS PERFORMED TODAY?	N/A	✓
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A	✓
FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A	✓

GEO-CON: [signature] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7-30-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	PH
Military	lb/ft3	seconds	cm3	S.U.
07:44	66	55	13	7
14:30		39		
14:50	65	44	12.5	7
15:30		44		

NOTE - BATCH ADJUSTED & RETESTED. SLURRY SENT TO TRENCH

FUNNEL CALIBRATIONS PERFORMED TODAY?	NA
pH METER CALIBRATIONS PERFORMED TODAY?	NA
BALANCE CALIBRATIONS PERFORMED TODAY?	NA

GEO-CON: [signature] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7-30-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: SUNNY 80's RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
NWE 30	35	39	39.5	10	395	43"	NWS L-0	3	TOP OUT
NWE 40	36	40				44"	NWS L-1	10.5	9.5
NWE 50	35.5	38.5	39.25	5	196.25	47"	NWS L-2	21.5	20
NE	36	39	39	5	195	N/A	NWS L-3	29.5	24.5
NWE 60	36	39				50"	NW	39	26.5
							NWE 10	39	28
							NWE 20	39	31
							NWE 30		30.5
							NWE 40		33
							NWE 50		35.5
							NE		36.5
							NWE 60		38.5

SF TODAY 786.25

SF TO DATE 2053.75

COMMENTS

BACKFILL MIXED & PLACED TODAY

GEO-CON: [signature] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7/31/2003 JOB NAME: E. Chicago JOB NUMBER: P01-048

WEATHER: sunny 80s RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
0+50	3	71	4.5	15	45	8
0+50	30	73.5	7	18	42	8
NES 30	2	73	4	28	38	9
NES 30	32	81	2.5	27	40	9

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
0+60 (NWE)				
0+80 (NES20)				
1+00 (NES40)				

samples taken & sent to the lab for analysis w/7/30/03 samples

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

backfill mixed and placed today slump 2"

DRY BENTONITE ADDITION		
	TONS	%
TODAY	3	6
TO DATE	21	6
BORROW %	CY	2924.04

PH CALIBRATIONS PERFORMED TODAY?	NA
BALANCE CALIBRATIONS PERFORMED TODAY?	NA
FUNNEL CALIBRATIONS PERFORMED TODAY?	NA

GEO-CON: **OWNER:**

Laboratory Derived Results

SOIL-BENTONITE BACKFILL

SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY
inches		%		API

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7/31/2003 JOB NAME: E. Chicago JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	PH	hoe down didn't allow a 4th visc
Military	lb/ft3	seconds	cm3	S.U.	
9:10	65.5	42	21	7	
11:55	65	42			
14:42	65.5	41	18.5	7	

FUNNEL CALIBRATIONS PERFORMED TODAY?	NA
pH METER CALIBRATIONS PERFORMED TODAY?	NA
BALANCE CALIBRATIONS PERFORMED TODAY?	NA

GEO-CON: _____ **OWNER:** _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7/31/2003 JOB NAME: E. Chicago JOB NUMBER: P01-048

WEATHER: sunny 80s RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
NES 10	35.7	39				39"	NWS L-0	top out	top out
NES 20	35.8	39.2	39.1	10	391	46"	NWS L-1	6	top out
NES 30	35.7	39.4				47"	NWS L-2	17.5	12
NES 40	36	39.1	39.3	10	393	44"	NWS L-3	23	18
NES 50	NOT	COMPLETED				52"	NW	29	20
SE	NOT	COMPLETED	39.25			49"	NWE 10	30	22
							NWE 20	31	23
							NWE 30	32.5	26
							NWE 40	33	27
							NWE 50	33	29
							NE	34	31
							NWE 60	36.5	31.5
							NES 10		38
							NES 20		39
							NES 30		39
							NES 40		39
							NES 50		29
							SE		28

SF TODAY 784

SF TO DATE 2837.75

COMMENTS

GEO-CON: **OWNER:**

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 080503	TRANSMITTAL NO. 02260-27

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312		CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See Instruction no. 6) h.	FOR CE USE CODE i.
11	073103 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7-31-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: SUNNY 80'S RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
0+50	3	71	4.5	15	45	8
0+50	30	73.5	7	18	42	8
NES 30	2	73.0	4	28	38	9
NES 30	32	81.0	2.5	27	40	9

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
0+60	(NWE)			
0+80	(NES 70)			
1+00	(NES 40)			

SAMPLES TAKEN & SENT TO THE LAB FOR ANALYSIS w/ 7-30-03 SAMPLES

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

BACKFILL MIXED & PLACED TODAY SLUMP 2"

DRY BENTONITE ADDITION		
	TONS	%
TODAY	3	6
TO DATE	21	6
BORROW %	CY	[illegible]

PH CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A
FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: [signature] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7-31-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME Military	DENSITY lb/ft3	VISCOSITY seconds	FILTRATE LOSS cm3	PH S.U.	
9:10	65.5	42	21	7	HOT DOWN DIGGING THROW A 4TH VISC (CEA-CON SOIL)
11:55	65	42			
14:42	65.5	41	18.5	7	

FUNNEL CALIBRATIONS PERFORMED TODAY?	NA
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: [signature] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 7-31-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: SUNNY 80's RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
NES 10	35.7	39.0	39.1	10	391	39"	NWS L-0	TOP OUT	TOP OUT
NES 20	35.8	39.2				46"	NWS L-1	6	TOP OUT
NES 30	35.7	39.4	39.3	10	393	47"	NWS L-2	17.5	12
NES 40	36.0	39.1	39.25			44"	NWS L-3	23.0	18
NES 50	NOT	COMPLETED				52"	NW	29.0	20
SE	NOT	COMPLETED				49"	NWE 10	30.0	22
							NWE 20	31.0	23
							NWE 30	32.5	26
							NWE 40	33.0	27
							NWE 50	33.0	29
							NE	34.0	31
							NWE 60	36.5	31.5
							NES 10		38
							NES 20		39
							NES 30		39
							NES 40		39
							NES 50		29
							SE		28

SF TODAY 784

SF TO DATE 2837.75

COMMENTS

GEO-CON: [signature] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/1/2003 JOB NAME: E. Chicago JOB NUMBER: P01-048

WEATHER: mostly sunny 80s passing thunderstorms RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
NES 40	3	74	2	19	42	9
NES 40	36	77.5	4	24	42	9
SE	3	77.5	2	21	42	9
SE	27	78.5	2.5	24	40	9

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
SE	sample picked up by lab on 8/1/03 for analysis			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
NWE	2					
NES 20		samples taken & picked up by lab on 8/1/03 for analysis				
NES 40						
SE						

COMMENTS

performed density testing for the following soil bentonite backfill samples which were omitted from the daily reports:

NWE 20; 107 PCF 7/30/03

NE; 110.5 PCF 7/31/03

NES 40; 109.4 PCF 8/1/03

DRY BENTONITE ADDITION		
	TONS	%
TODAY	NA	NA
TO DATE	21	6
BORROW %	CY	5523

PH CALIBRATIONS PERFORMED TODAY?	NA
BALANCE CALIBRATIONS PERFORMED TODAY?	NA
FUNNEL CALIBRATIONS PERFORMED TODAY?	NA

GEO-CON: **OWNER:**

Laboratory Derived Results

SOIL-BENTONITE BACKFILL

SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY
inches		%		API

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/1/2003 JOB NAME: E. Chicago JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	PH
Military	lb/ft3	seconds	cm3	S.U.
8:30	66	55	17	7
10:45	65.5	49	18.5	7
13:40	65.5	37		
16:20	65	55		
Batch at 13:40 was held in mixer & not pumped until corrected parameters				
A thicker slurry was mixed today to adjust the trench slurry from 7/31/03 (end of day)				

FUNNEL CALIBRATIONS PERFORMED TODAY?	NA
pH METER CALIBRATIONS PERFORMED TODAY?	NA
BALANCE CALIBRATIONS PERFORMED TODAY?	NA

GEO-CON: _____ **OWNER:** _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/1/2003 JOB NAME: E. Chicago JOB NUMBER: P01-048

WEATHER: mostly sunny 80s passing thunder showers RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
NES 50	35.4	39				52"	NWS L-1	top out	top out
SE	35.4	39.2	39.1	10	391	NA	NWS L-2	12	top out
SEW 10	35.2	38.9				62"	NWS L-3	17.5	5
SEW 20	35	39	39.05	10	390.5	56"	NW	21	11.2
SEW 30	not completed						NWE 10	22.5	17
			38.95	10	389.5		NWE 20	24	18.4
							NWE 30	25	20
							NWE 40	26	21.1
							NWE 50	28	22.8
							NE	29.5	25
							NWE 60	31	25.4
							NES 10	37	30.2
							NES 20	37.5	32.5
							NES 30	38.5	34
							NES 40	39	35.9
							NES 50	28	38.2
							SE	26.5	39.2
							SEW 10		38.9
							SEW 20		39.1
							SEW 30		28.5

SF TODAY 1171
SF TO DATE 4008.75

COMMENTS

GEO-CON: **OWNER:**

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 080503

TRANSMITTAL NO. 02260-28

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd.
Griffith, IN 46319 219/923-1763

FROM: J. A. Wentz, PE, EQM
1800 Carillon Blvd.
Cincinnati, Ohio 45240
800/229-7495

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*

PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility
Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
17	080103 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

DATE

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8-1-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	PH
Military	lb/ft3	seconds	cm3	S.U.
8:30	66	55	17	7
10:45	65.5	49	18.5	7
13:40	65.5	37		
16:20	65	55		
BATCH AT	13:40 WAS	HELD IN	MIXER & NOT	
PUMPED	UNTIL CORRECTED	PARAMETERS.		
A THICKER	SLURRY WAS	MIXED TODAY	TO ADJUST	THE
TRENCH	SLURRY FROM	7-31-03:	(END OF DAY)	

FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: Cinda D. Hardel OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

8-1-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: MOSTLY SUNNY 80's PASSING THUNDER SHOWERS RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
NES 40	3	74	2	19	42	9
NES 40	36	77.5	4	24	42	9
SE	3	77.5	2	21	42	9
SE	27	78.5	2.5	24	40	9

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
SE	SAMPLE PICKED UP BY LAB ON 8-1-03 FOR ANALYSIS			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084
NWE	2	SAMPLES TAKEN & PICKED UP BY LAB ON 8-1-03 FOR ANALYSIS				
NES 20						
NES 40						
SE						

COMMENTS

PERFORMED DENSITY TESTING FOR THE FOLLOWING SOIL BENTONITE BACKFILL SAMPLES WHICH WERE OMITTED FROM THE DAILY REPORTS:

NWE 20 : 107 PCF 7-30-03
NE : 110.5 PCF 7-31-03
NES40 : 109.4 PCF 8-1-03

DRY BENTONITE ADDITION	TONS	%
TODAY	N/A	N/A
TO DATE	21	6
BORROW %	CY	5523.0

PH CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A
FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: [signature] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8-1-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: MOSTLY SUNNY 80's PASSING THUNDER SHOWERS RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
NES 50	35.4	39	39.1	10	391	52"	NWS L-1	TOP OUT	TOP OUT
SE	35.4	39.2				N/A	NWS L-2	12	TOP OUT
SEW 10	35.2	38.9	39.05	10	390.5	62"	NWS L-3	17.5	5
SEW 20	35	39	38.95	10	389.5	56"	NW	21	11.2
SEW 30	NOT	COMPLETED					NWE 10	22.5	17
							NWE 20	24	18.4
							NWE 30	25	20
							NWE 40	26	21.1
							NWE 50	28	22.8
							NE	29.5	25.0
							NWE 60	31	25.4
							NES 10	37	30.2
							NES 20	37.5	32.5
							NES 30	38.5	34
							NES 40	39	35.9
							NES 50	28	38.2
							SE	26.5	39.2
							SEW 10		38.9
							SEW 20		39.1
							SEW 30		28.5

SF TODAY 1171.0

SF TO DATE 4008.75

COMMENTS

GEO-CON: Aaron D. Hardt OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/2/2003 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: sunny 80s RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
SEW 30	3	77.5	4	26	44	8
SEW 30	30	80.5	5	27	44	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
SEW 20	Collected sample today for Monday 8/4/03 pickup by lab.			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
SEW 20	2.5	Collected sample today for Monday 8/4/03 pickup by lab.				

COMMENTS

Backfill mixed and placed today

Production stopped @ noon - blown hose on excavator

Fresh slurry pumped to maintain trench level over the weekend (Sunday)

DRY BENTONITE ADDITION		
	TONS	%
TODAY	NA	NA
TO DATE	21	6
BORROW %	CY	

PH CALIBRATIONS PERFORMED TODAY?	NA
BALANCE CALIBRATIONS PERFORMED TODAY?	NA
FUNNEL CALIBRATIONS PERFORMED TODAY?	NA

GEO-CON: **OWNER:**

Laboratory Derived Results

SOIL-BENTONITE BACKFILL

SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY
inches		%		API

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/2/2003 JOB NAME: E. Chicago JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	PH
Military	lb/ft3	seconds	cm3	S.U.
8:10	65	52	17.5	7
10:40	64.5	42	21	7

FUNNEL CALIBRATIONS PERFORMED TODAY?	NA
pH METER CALIBRATIONS PERFORMED TODAY?	NA
BALANCE CALIBRATIONS PERFORMED TODAY?	NA

GEO-CON: _____ **OWNER:** _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/2/2003 JOB NAME: E. Chicago JOB NUMBER: P01-048

WEATHER: Sunny 80's RIG NUMBER: NA

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
SEW 30	35.3	39.1				49	NWS 10	topout	39.2
NWS 10	35.8	39.2	39.15	10	391.5	43	NWS 20	topout	26.9
NWS 20	Not	Completed					NWS 30	6	10.5
NWS 30	Not	Completed					NW	11	39
							NWE 10	16.2	37.2
							NWE 20	18.6	33.1
							NWE 30	20.1	27.8
							NWE 40	21.2	24.2
							NWE 50	21.9	22
							NE	24.4	20 to 10 lip 11 topout
							NWE 60	25	21.2
							NES 10	31.4	22.4
							NES 20	32.5	24.6
							NES 30	33.6	26.3
							NES 40	34.8	27.8
							NES 50	37.2	29.7
							SE	39	32.4
							SEW 10	38.5	34.9
							SEW 20	39	38.4
							SEW 30	28	39.1
							SEW 40		25.5

SF TODAY 391.5

SF TO DATE 4400.25

COMMENTS

GEO-CON: **OWNER:**

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 080503

TRANSMITTAL NO. 02260-29

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd.
Griffith, IN 46319 219/923-1763

FROM: J. A. Wentz, PE, EQM
1800 Carillon Blvd.
Cincinnati, Ohio 45240
800/229-7495

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*

PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility
Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
19	080203 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

DATE

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

8-2-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: SUNNY 80'S RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
SEW 30	3	77.5	4	26	44	8
SEW 30	30	80.5	5	27	44	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
SEW 20	COLLECTED SAMPLE TODAY FOR MONDAY 8-4-03 PICKUP BY LAB			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084
SEW 20	2.5	COLLECTED SAMPLE TODAY FOR MONDAY 8-4-03 PICKUP BY LAB				

COMMENTS

BACKFILL MIXED & PLACED TODAY
PRODUCTION STOPPED @ NOON - BLOWN HOSE ON EXCAVATOR
FRESH SLURRY PUMPED TO MAINTAIN TRENCH LEVEL OVER THE WEEKEND (SUNDAY)

DRY BENTONITE ADDITION		
	TONS	%
TODAY	N/A	N/A
TO DATE	21	6
BORROW %	CY	

PH CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A
FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: [signature] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8-2-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	PH
Military	lb/ft3	seconds	cm3	S.U.
8:10	65	52	17.5	7
10:40	64.5	42	21	7

FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: [signature] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8-2-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: SUNNY 80's RIG NUMBER: N/A

EXCAVATION

STATION	DEPTH TOP KEY	DEPTH BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH
SEW 30	35.3	39.1	39.15	10	391.5	49"
NWS 10	35.8	39.2				43"
NWS 20	NOT	COMPLETED				
NWS 30	NOT	COMPLETED				

BACKFILL SLOPE

STATION	START OF SHIFT	END OF SHIFT
NWS 10	TOPOUT	39.2
NWS 20	TOPOUT	26.9
NWS 30	16'	10.5
NW	11	39
NWE 10	16.2	37.2
NWE 20	18.6	33.1
NWE 30	20.1	27.8
NWE 40	21.2	24.2
NWE 50	21.9	22
NE	24.4	20←10'→LIE 11'→TOPOUT
NWE 60	25.0	21.2
NES 10	31.4	22.4
NES 20	32.5	24.6
NES 30	33.6	26.3
NES 40	34.8	27.8
NES 50	37.2	29.7
SE	39.0	32.4
SEW 10	38.5	34.9
SEW 20	39.0	38.4
SEW 30	28.0	39.1
SEW 40		25.5

SF TODAY 391.5

SF TO DATE 4400.25

COMMENTS

SW CORNER UNCUT TO PROVIDE SAFETY & STABILITY FOR THE EXCAVATOR. FINISH CUTS IN BOTH DIRECTIONS

GEO-CON: [signature] OWNER:

Geo-Con

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 7.30.03
Weather: Sunny

Job Number: P01048
Job Name: E. Chicago

Trench Excavated Sta. 0+00 (+5' N.W.) to 0+63 (N.E. +5') = 63' L.F.

Length: 63' * Depth: 39' =Square Feet 2457

Square feet: 2457. * Width: 2.5' =Total Cubic Feet 6142.5

Cubic feet: 6142.5 * Dry Unit Weight: 5835375 (95) /2000= 291.77 Tons of Soil

Tons of Soil: 291.77 * 0.06 = Unit Addition Rate 17.50

Unit Rate: 4000 * Specified Rate: 6% =Bentonite Required 8.75

Via Mixer = N/A Tons of Bentonite

Via Backfill = 17.50 Tons of Bentonite

Total Tons of Bentonite Used = 17.50

Comments:

GEO-CON Signature/Date

OWNER: Signature/Date

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/4/03 JOB NAME: E. Chicago JOB NUMBER: P01-048

WEATHER: 70's partly cloudy breezy north wind RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
SEW40	3	77.5	3	24.5	44	9
SEW40	30	84	9.5	27	50	9
NWS40	3	82.5	5.5	25.5	45	9
NWS40	36	81	5	27	45	9

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
SEW40	SAMPLES COLLECTED & PICKED UP BY THE LAB TODAY SENT			
	SEW 20 SAMPLE ALSO			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
SEW 40	5	COLLECTED SAMPLE TODAY & PICKED UP BY THE LAB TODAY SENT SEW 20 SAMPLE ALSO				

COMMENTS

IN TRENCH SLURRY FILTRATE TESTS OUT OF SPEC CORRECTIVE MEASURES ARE BEING TAKEN

DRY BENTONITE ADDITION		
	TONS	%
TODAY	16	6
TO DATE	37	6
BORROW %	CY	4373.49

PH CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A
FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: **OWNER:**

Laboratory Derived Results

SOIL-BENTONITE BACKFILL

SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY
inches		%		API

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/4/2003 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	PH
Military	lb/ft3	seconds	cm3	S.U.
10:37	65.5	58	12.5	7
13:30	65	60	15	7
15:30	65.5	47		
4TH VISC NOT TAKEN DUE TO PLACEMENT OF BACKFILL TO MAINTAIN				
SLURRY LEVEL. NEARING THE END OF THE EXCAVATION				

FUNNEL CALIBRATIONS PERFORMED TODAY?	NA
pH METER CALIBRATIONS PERFORMED TODAY?	NA
BALANCE CALIBRATIONS PERFORMED TODAY?	NA

GEO-CON: _____ **OWNER:** _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/4/2003 JOB NAME: E. CHICAGO JOB NUMBER: p01-048

WEATHER: 70'S PARTLY CLOUDY BREEZY NORTH WIN RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
SEW40	35	39.2				44"	NWS 10	38.3	36.6
SEW 50	NOT	COMPLETED	39.2	10	392	NA	NWS 20	26.4	39.2
SW	NOT	COMPLETED				NA	NWS 30	11	39.1
NWS 20	35.3	39.4	NA	NA	NA	47"	NWS 40	NA	39
NWS 30	35.1	39.1				42"	NWS 50	NA	39.2
NWS 40	34.8	39	39.05	10	392.5	49"	NW	38.4	34.2
NWS 50	NOT	COMPLETED					NWE 10	36.8	29.4
							NWE 20	34	23
							NWE 30	27.9	17.8
							NWE 40	24.9	13.2
							NWE 50	22.4	9.4
							NE	20.2	6.2
							NWE 60	21.1	8.4
							NES 10	21.8	12.3
							NES 20	23.1	15.3
							NES 30	25	19.7
							NES 40	27.2	22.4
							NES 50	29.4	25.1
							SE	32	26
							SEW 10	35.1	28.9
							SEW 20	38.2	32.8

#

SF TODAY 1175

SF TO DATE 5575.25

#

COMMENTS

BACKFILL SOIL MIXED WITH DRY BENTONITE TODAY (8 BAGS)

GEO-CON: **OWNER:**

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 080603	TRANSMITTAL NO. 02260-34

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
21	080403 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

8-4-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: 70's PARTLY CLOUDY BREEZY NORTH WIND RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
SEW 40	3	77.5	3	24.5	44	9
SEW 40	30	84	9.5	27	50	9
NWS 40	3	82.5	5.5	25.5	45	9
NWS 40	36	81	5	27	45	9

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
SEW 40	SAMPLES COLLECTED & PICKED UP BY THE LAB TODAY			
	SENT SEW 20 SAMPLE ALSO			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
SEW 40	5	COLLECTED SAMPLE TODAY &		PICKED UP BY THE LAB TODAY		
		SENT SEW 20	SAMPLE ALSO.			

COMMENTS

IN TRENCH SLURRY FILTRATE TESTS OUT OF SPEC. CORRECTIVE MEASURES ARE BEING TAKEN.

DRY BENTONITE ADDITION		
	TONS	%
TODAY	16	6
TO DATE	37	6
BORROW %	CY	4373.49

PH CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A
FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8-4-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME Military	DENSITY lb/ft3	VISCOSITY seconds	FILTRATE LOSS cm3	PH S.U.
10:37	65.5	58	12.5	7
13:30	65	60	15	7
15:30	65.5	47		
4TH VISC. NOT TAKEN DUE TO PLACEMENT OF BACKFILL TO MAINTAIN SLURRY LEVEL. NEARING THE END OF THE EXCAVATION.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: Carson D. Handel OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8-4-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: 70's PARTLY CLOUDY BREEZY NORTH WIND RIG NUMBER: _____

EXCAVATION

STATION	DEPTH TOP KEY	DEPTH BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH
SEW 40	35	39.2	39.2	10	392	44"
SEW 50	NOT	COMPLETED				N/A
SW	NOT	COMPLETED	N/A	N/A	N/A	N/A
NWS 20	35.3	39.4	39.25	10	392.5	47"
NWS 30	35.1	39.1				42"
NWS 40	34.8	39	39.05	10	390.5	49"
NWS 50	NOT	COMPLETED				

BACKFILL SLOPE

STATION	START OF SHIFT	END OF SHIFT
NWS 10	38.3	36.6
NWS 20	26.4	39.2
NWS 30	11	39.1
NWS 40	N/A	39
NWS 50	N/A	39.2
NW	38.4	34.2
NWE 10	36.8	29.4
NWE 20	34	23
NWE 30	27.9	17.8
NWE 40	24.9	13.2
NWE 50	22.4	9.4
NE	20.2 4-12' 10-TOP	6.2 4-4' LS-TOP
NWE 60	21.1	8.4
NES 10	21.8	12.3
NES 20	23.1	15.3
NES 30	25	19.7
NES 40	27.2	22.4
NES 50	29.4	25.1
SE	32	26
SEW 10	35.1	28.9
SEW 20	38.2	32.8
SEW 30	39	36.3
SEW 40	25.1	39
SEW 50	N/A	29.4
SW	N/A	23.2

SF TODAY 1175

SF TO DATE 5575.25

COMMENTS

BACKFILL SOIL MIXED WITH DRY BENTONITE TODAY (8 BAGS)

GEO-CON: Chan D. Handel OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/5/2003 JOB NAME: E. Chicago JOB NUMBER: P01-048

WEATHER: mix clouds & sun e wind RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
SW	3	89	12	29	54	9
SW	36	85.5	10	32	55	9

TRENCH SLURRY IS BEING DISPLACED BY SOIL BENTONITE BACKFILL AS THE EXCAVATION IS COMPLETED

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
NWS 20	SAMPLES COLLECTED & WILL BE PICKED UP BY THE LAB TODAY			
NWS 40				
SW				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
NWS 20	4	SAMPLES COLLECTED & WILL BE PICKED UP BY THE LAB TODAY				

Laboratory Derived Results

SOIL-BENTONITE BACKFILL

SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY
inches		%		API

COMMENTS

BACKFILL SOIL WAS MIXED WITH DRY BENTONITE TODAY (5 BAGS) & PLACED IN THE TRENCH
THE THREE REMAINING BAGS WIL BE MIXED UPON ARRIVAL IN THE REMAINING MIXING AREA
DENSITY TESTING WAS PERFORMED ON THE FOLLOWING SOIL BENTONITE BACKFILL SAMPLES
WHICH WERE OMITTED FROM THE DAILY REPORTS

DRY BENTONITE ADDITION		
	TONS	%
TODAY	10	6
TO DATE	47	6
BORROW %	CY	

NES 20= 119.5 PCF 8-1-03	PH CALIBRATIONS PERFORMED TODAY?	NA
SEW 20= 117.5 PCF 8-2-03	BALANCE CALIBRATIONS PERFORMED TODAY?	NA
SW = 106.5 PCF 8-5-03	FUNNEL CALIBRATIONS PERFORMED TODAY?	NA

GEO-CON: **OWNER:**

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/5/2003 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	PH
Military	lb/ft3	seconds	cm3	S.U.
LURRY MIXED TODAY. SOIL BENTONITE BACKFILL IS DISPLACING SLURRY IN TH				

FUNNEL CALIBRATIONS PERFORMED TODAY?	NA
pH METER CALIBRATIONS PERFORMED TODAY?	NA
BALANCE CALIBRATIONS PERFORMED TODAY?	NA

GEO-CON: _____ **OWNER:** _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/5/2003 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: MIX SUN 7 COUDS 70'S NO PRECIP RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
NWS 50	34.9	39				49"	NWS 10	35.8	16.5
SW	35	39.4	36.95	10	369.5	NA	NWS 20	37.9	20.4
SEW 50	35	39.1				52"	NWS 30	38.4	24.2
			39.25	10	392.5		NWS 40	39	27.7
							NWS 50	39.2	30
							NW	33.8	11.7
							NWE 10	28.8	8.7
							NWE 20	23.3	7.5
							NWE 30	18.4	5.4
							NWE 40	13.9	TOP OUT
							NWE 50	10.1	TOP OUT
							NE	7.2	TOP OUT
							NWE 60	8.8	TOP OUT
							NES 10	12.7	TOP OUT
							NES 20	16	4
							NES 30	20.1	7.3
							NES 40	23	9.8
							NES 50	25.9	11.1
							SE	27.4	13
							SEW 10	32.1	16.2
							SEW 20	33.1	19.5

SF TODAY 762
SF TO DATE 6337.25

COMMENTS

EXCAVATION COMPLETED TODAY

GEO-CON: **OWNER:**

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 080603	TRANSMITTAL NO. 02260-35

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
22	080503 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

8-5-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: MIX CLOUDS & SUN E WIND RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
SW	3	89	12	29	54	9
SW	36	85.5	10	32	55	9

TRENCH SLURRY IS BEING DISPLACED BY SOIL BENTONITE BACKFILL AS THE EXCAVATION IS COMPLETED.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
NWS 20	SAMPLES COLLECTED & WILL BE PICKED UP BY THE LAB TODAY			
NWS 40				
SW				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICAT
	inches		%		API	TAKEN FOR D508
NWS 20	4	SAMPLES COLLECTED & WILL BE PICKED UP BY THE LAB TODAY				
SW	4					

COMMENTS

BACKFILL SOIL WAS MIXED WITH DRY BENTONITE TODAY (5 BAGS) & PLACED IN THE TRENCH. THE THREE REMAINING BAGS WILL BE MIXED UPON ARRIVAL IN THE REMAINING MIXING AREA.

DENSITY TESTING WAS PERFORMED ON THE FOLLOWING SOIL BENTONITE BACKFILL SAMPLES WHICH WERE OMITTED FROM THE DAILY REPORTS:

NES 20 : 119.5 pcf 8-1-03
SEW 20 : 117.5 pcf 8-2-03
SW : 106.5 pcf 8-5-03

DRY BENTONITE ADDITION		
	TONS	%
TODAY	10	6
TO DATE	47	6
BORROW %	CY	3209.

PH CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A
FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: [signature] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8-5-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	PH
Military	lb/ft3	seconds	cm3	S.U.
NO NEW SLURRY MIXED TODAY. SOIL BENTONITE BACKFILL IS DISPLACING SLURRY IN THE TRENCH.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: [signature] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8-5-03 JOB NAME: E.CHICAGO JOB NUMBER: P01-048

WEATHER: MIX SUN & CLOUDS 70'S NO PRECIP. RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
NWS 50	34.9	39.0	36.95	10	369.5	49"	NWS 10	35.8	16.5
SW	35.0	39.4				N/A	NWS 20	37.9	20.4
SEW 50	35.0	39.1	39.25	10	392.5	52"	NWS 30	38.4	24.2
							NWS 40	39.0	27.7
							NWS 50	39.2	30.0
							NW	33.8	11.7
							NWE 10	28.8	8.7
							NWE 20	23.3	7.5
							NWE 30	18.4	5.4
							NWE 40	13.9	TOP OUT
							NWE 50	10.1	TOP OUT
							NE	7.2 4-3.5' 20-TOP 80'	TOP OUT
							NWE 60	8.8	TOP OUT
							NES 10	12.7	TOP OUT
							NES 20	16	4.0
							NES 30	20.1	7.3
							NES 40	23	9.8
							NES 50	25.9	11.1
							SE	27.4	13.0
							SEW 10	32.1	16.2
							SEW 20	33.1	19.5
							SEW 30	36.6	22.7
							SEW 40	39.1	25.5
							SEW 50	29.1	28.4
							SW	23.5	

SF TODAY 762
SF TO DATE 6337.25

COMMENTS

EXCAVATION COMPLETED TODAY.

GEO-CON: [signature] OWNER:

Geo-Con

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 8.5.03
Weather: Sunny

Job Number: P01048
Job Name: E. Chicago

Trench Excavated Sta. S.E. 0+00 to S.W. 0+55.8 = 55.8 L.F.

Length: 55.8 * Depth: 39 =Square Feet 2176.2

Square feet: 2176.2 * Width: 2.5 =Total Cubic Feet 5440.5

Cubic feet: 5440.5 * Dry Unit Weight: 516847.5 /2000= 258.42 Tons of Soil

Tons of Soil: 258.42 * 0.06 = Unit Addition Rate 15.51

Unit Rate: 4000 * Specified Rate: 6% =Bentonite Required 7.76

Via Mixer = N/A Tons of Bentonite

Via Backfill = 15.51 Tons of Bentonite

Total Tons of Bentonite Used = 15.51

Comments:

GEO-CON [signature] Signature/Date

OWNER: Signature/Date

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/6/2003 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: MOSTLY SUNNY 70-80 RIG NUMBER:

SLURRY

WITHIN TRENCH						
STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
NO TESTING PERFORMED-BACKFILL BEING PLACED TO TOPOUT FOR THE LENGTH OF THE TRENCH.						

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
BACKFILL SOIL SAMPLES WERE TAKEN YESTERDAY 8/5/03				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
NWS 40	4	SAMPLES COLLECTED & WILL BE PICKED UP BY THE LAB TODAY				
SE	6					
SEW 40	SENSITY FOR 8/4/03 122 PCF					

COMMENTS

11-4000# BAGS DRY BENTONITE ADDED & MIXED FOR SOIL BENTONITE BACKFILL TODAY (3 BAGS SOUTH BED) 8 BAGS WEST BED) TRENCH COMPLETELY TOPPED OUT WITH BACKFILL TODAY

MISSED 1-4000# BAG WHICH WAS ADDED ON FRIDAY 8/1/03. ERROR ON 7/31. REPORT SHOWED 3 TONS (1.5 BAGS) ACTUALLY WAS 2 TONS (1 BAG).

DRY BENTONITE ADDITION		
	TONS	%
TODAY	22	6
TO DATE	70	6
BORROW %	CY	3209.62

PH CALIBRATIONS PERFORMED TODAY?	NA
BALANCE CALIBRATIONS PERFORMED TODAY?	NA
FUNNEL CALIBRATIONS PERFORMED TODAY?	NA

GEO-CON: **OWNER:**

Laboratory Derived Results

SOIL-BENTONITE BACKFILL

SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY
inches		%		API

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/6/2003 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	PH
Military	lb/ft3	seconds	cm3	S.U.
NO NEW SLURRY MIXED TODAY. SOIL BENTONITE BACKFILL TOPPED OUT THE LENGTH OF THE TRENCH				

FUNNEL CALIBRATIONS PERFORMED TODAY?	NA
pH METER CALIBRATIONS PERFORMED TODAY?	NA
BALANCE CALIBRATIONS PERFORMED TODAY?	NA

GEO-CON: _____ **OWNER:** _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8/6/2003 JOB NAME: E CHICAGO JOB NUMBER: P01-048

WEATHER: MOSTLY SUNNY 70-80 RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
XCAVATION COMPLETED ON 8/5/0							NWS 10	16.2	TOP OUT
							NWS 20	21	
							NWS 30	24.7	
							NWS 40	27.3	
							NWS 50	29.8	
							NW	11.9	
							NWE 10	9.1	
							NWE 20	7.5	
							NWE 30	5.4	
							NWE 40	TOP OUT	
							NWE 50	TOP OUT	
							NE	TOP OUT	
							NWE 60	TOP OUT	
							NES 10	TOP OUT	
							NES 20	3.8	
							NES 30	7.5	
							NES 40	10	
							NES 50	11.4	
							SE	13.6	
							SEW 10	16.3	
							SEW 20	19.6	

SF TODAY NA
SF TO DATE 6337.25

COMMENTS

11 BAGS DRY BENTONITE MIXED (8 WEST BED) (3 SOUTH BED) 4000# BAGS.
THE TRENCH WAS TOPPED OUT COMPLETELY WITH BACKFILL TODAY.

GEO-CON: **OWNER:**

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 080703	TRANSMITTAL NO. 02260-40

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
23	080603 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

8-6-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: MOSTLY SUNNY 70's - 80's RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.
NO TESTING PERFORMED - BACKFILL BEING PLACED TO TOPOUT FOR THE LENGTH OF THE TRENCH.						

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
BACKFILL SOIL SAMPLES WERE TAKEN YESTERDAY 8-5-03				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
NWS 40	4	SAMPLES COLLECTED & WILL BE PICKED UP BY THE LAB				TODAY
SE	6					
SEW 40 - DENSITY FOR 8-4-03 SAMPLE : 122 pcf						

COMMENTS

11 - 4000# BAGS DRY BENTONITE ADDED & MIXED FOR SOIL BENTONITE BACKFILL TODAY (3 BAGS SOUTH BED) (8 BAGS WEST BED).
TRENCH COMPLETELY TOPPED OUT WITH BACKFILL TODAY

MISSED 1 - 4000# BAG WHICH WAS ADDED ON FRIDAY 8-1-03.
ERROR ON 7-31-03 REPORT SHOWED 3 TONS (1.5 BAGS) ACTUALLY WAS 2 TONS (1 BAG).

DRY BENTONITE ADDITION		
	TONS	%
TODAY	22	6
TO DATE	7069	6
BORROW %	CY	3209.62
BORROW FROM YESTERDAY 8-6-03		

PH CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A
FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: [signature] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8-6-03 JOB NAME: E.CHICAGO JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	PH
Military	lb/ft3	seconds	cm3	S.U.
NO NEW SLURRY MIXED TODAY. SOIL BENTONITE				
BACKFILL TOPPED OUT THE LENGTH OF THE TRENCH				

FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: [illegible] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 8-6-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: MOSTLY SUNNY 70's - 80's RIG NUMBER:

EXCAVATION

STATION	DEPTH TOP KEY	DEPTH BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH
EXCAVATION COMPLETED ON			8-5-03			

BACKFILL SLOPE

STATION	START OF SHIFT	END OF SHIFT
NWS 10	16.2	TOP OUT
NWS 20	21.0	
NWS 30	24.7	
NWS 40	27.3	
NWS 50	29.8	
NW	11.9	
NWE 10	9.1	
NWE 20	7.5	
NWE 30	5.4	
NWE 40	TOP OUT	
NWE 50	TOP OUT	
NE (L1 L2 L3)	TOP OUT	
NWE 60	TOP OUT	
NES 10	TOP OUT	
NES 20	3.8	
NES 30	7.5	
NES 40	10.0	
NES 50	11.4	
SE	13.6	
SEW 10	16.3	
SEW 20	19.6	
SEW 30	21.9	
SEW 40	25.2	
SEW 50	28.1	
SW	22.6	

SF TODAY N/A

SF TO DATE 6337.25

COMMENTS

11 BAGS DRY BENTONITE MIXED (8 WEST BED) (3 SOUTH BED) 4000# BAGS.
THE TRENCH WAS TOPPED OUT COMPLETELY WITH BACKFILL TODAY.

GEO-CON: [signature] OWNER:

Geo-Con

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 8·6·03
Weather: Sunny

Job Number: P01048
Job Name: E. Chicago

Trench Excavated Sta. NW 0+00 to S.W. 0+56.6 = 56.6 L.F.

Length: 56.6 * Depth: 39 =Square Feet 2207.4

Square feet: 2207.4 * Width: 25 =Total Cubic Feet 5518.5

Cubic feet: 5518.5 * Dry Unit Weight: 524257.5 /2000= 262.13 Tons of Soil

Tons of Soil: 262.13 * 0.06% = Unit Addition Rate 15.73

Unit Rate: 15.73 * Specified Rate: 06% =Bentonite Required 7.865

Via Mixer = N/A Tons of Bentonite

Via Backfill = 15.73 Tons of Bentonite

Total Tons of Bentonite Used = 15.73

Comments:

GEO-CON Carmen D. Handel
Signature/Date

OWNER:
Signature/Date

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 081103	TRANSMITTAL NO. 02260-43

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)*	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
24	080703 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

8-7-03 JOB NAME: E. CHICAGO JOB NUMBER: P01-048

WEATHER: SUNNY, BREEZY 70's - 80's RIG NUMBER: N/A

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	PH
	feet	lb/ft3	%	cm3	seconds	S.U.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

AD 8-7-03

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICAT
	inches		%		API	TAKEN FOR D508

COMMENTS

DENSITIES ON THE MUD BALANCE WERE RECORDED TODAY FOR THE FOLLOWING STATIONS:

NWS 40 : 111 pcf

SE : 108.5 pcf

SEE ATTACHED SHEETS (2) WITH ALL API QUICK PERM RESULTS

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

PH CALIBRATIONS PERFORMED TODAY?	
BALANCE CALIBRATIONS PERFORMED TODAY?	
FUNNEL CALIBRATIONS PERFORMED TODAY?	

GEO-CON: [signature] OWNER:

Geo-Con

API QUICK PERMEABILITY TEST

Job: E. CHICAGO

Sta: SEW 20, NES 20, SW, SEW 40, NWE 20, NES 40, NW, NWE 60, NE, NWS 20, NWE 40, NWS 40, SE

Technician: [signature]

Sample Area: A= $A = \pi r^2$ $\pi (3.85)^2 = 46.56$ cm^2

Sample Height: L= 6.5cm, 6.5, 6.2, 6.7, 6.7, 6.7, 6.7, 6.7, 6.5, 7, 6.7, 7 cm

	Date	Time	Δ T (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	Q Δ (cc)	K = (ΔQ/Δt) * (1/X) (cm/sec)
SEW 20	8-5-03	12:12 – 16:12	240	10	108.212	559261.1228	—	114.5	8.50×10^{-7}
NES 20	8-5-03	12:12 – 16:12			108.212	559261.1228		119.5	8.86×10^{-7}
SW	8-5-03	12:12 – 16:12			113.44	586322.145		138	9.80×10^{-7}
SEW 40	8-6-03	9:48 – 13:48			104.98	542566.761		104	7.97×10^{-7}
NWE 20	8-6-03	9:48 – 13:48			104.98	542566.761		77.5	5.94×10^{-7}
NES 40	8-6-03	9:48 – 13:48			104.98	542566.761		107.5	8.24×10^{-7}
NW	8-6-03	10:25 – 14:25			104.98	542566.761		105	8.05×10^{-7}
NWE 60	8-6-03	14:46 – 18:46			104.98	542566.761		108.5	8.30×10^{-7}
NWS 20	8-6-03	14:46 – 18:46			108.212	559261.1229		96	7.12×10^{-7}
NWE 40	8-6-03	14:46 – 18:46			100.483	519313.8999		107	8.56×10^{-7}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

API QUICK PERMEABILITY TEST

Job: E. CHICAGO Sta: NWS 40, SE Technician: [signature]

Sample Area: A= $A = \pi r^2$ $\pi (3.85)^2 = 46.56$ cm^2 Sample Height: L= 6.7, 7 cm

	Date	Time	Δ T (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	Q Δ (cc)	K = (ΔQ/Δt) * (1/X) (cm/sec)
NWS 40	8-7-03	6:57 – 10:57	240	10	104.98	542566.761	—	41	3.14×10^{-7}
SE	8-7-03	6:57 – 10:57	240	10	100.483	519313.8999	—	78.5	6.28×10^{-7}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

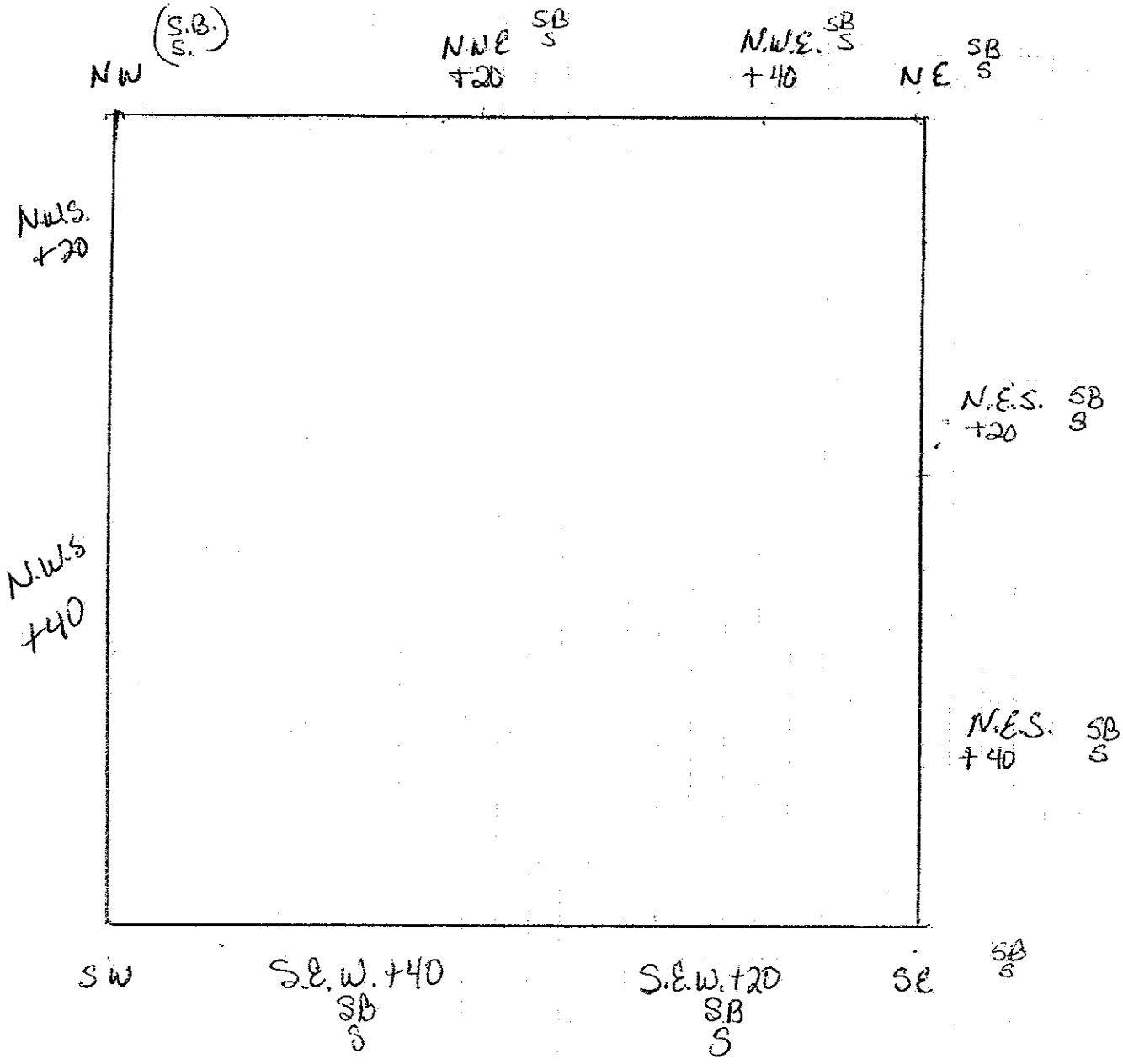
By: _____ Date: _____ Subject: E. CHICAGO Sheet _____ of _____

Chkd. by: _____ Date: _____ P01-048 Job No.: _____

TEST SECTION

N

Sample Locations



Geo-Con

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 111703

TRANSMITTAL NO. 02260-53

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE Chicago Dist., Calumet Area Office
606 Griffith Blvd
Griffith, IN 46319 219/923 1763

FROM: J. A. Wentz, PE, EOM
1600 Carlton Blvd.
Cincinnati, Ohio 45240
800/229-7405

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260

PROJECT TITLE AND LOCATION: N Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐ GOV'T APPROVAL

ITEM NO a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
28	111003 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

RECEIVED
CALUMET AREA OFFICE
CHICAGO DISTRICT
NOV 18 2003

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY
Douglas M. Anderson

DATE 11/18/2003

ENG FORM 4025-R, MAR 96 (ER 415-1-10) EDITION OF SEP 93 IS OBSOLETE SHEET 1 OF 1

DOUGLAS M. ANDERSON, P.E.
Contracting Officer's Representative

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE 11/18/2003	TRANSMITTAL NO. 02260-53
PROJECT TITLE IHC CDF Subsurface Invest. & Cutoff Wall	CONTRACT NO. DACW27-02-C-0003 NA	PAGE 1 of 1
LOCATION Indiana Harbor & Canal CDF, East Chicago, IN		

Item	Description	Variation	QA Code
28	111003 Daily Slurry Wall QC Data	No	F

SECTION III - GOVERNMENT REVIEW REMARKS

Item No.28
Action Code ; "F- Receipt Acknowledged" - See Following Government Remarks- Resubmission Not Required.

1. Starting Station is 106+50 not as noted at Station 106+70.
2. It is noted for no Slurry Soil Backfill placed this date.
3. Receipt of Transmittal does not relieve the contractor from complying with all of the requirements of the contract plans and specifications

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 111703	TRANSMITTAL NO. 02260-53

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE. X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312		CHECK ONE. THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
28	111003 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/10/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, 27-51 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
106+70	2.00	66.00	0.80	14.50	45.00	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						

COMMENTS

Filter cake was 2mm for shallow sample at 106+70. Only one sample was taken today due to problems in the morning (late start, clogged HDPE line) and in the afternoon (broken pump, could not pump slurry to the trench).

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

.O-CON: Suzanne E. Sepio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/10/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
9:10	65.00	43.00	13.00	8
**No sample was taken in the afternoon due to the pump breaking down.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	yes
pH METER CALIBRATIONS PERFORMED TODAY?	yes
BALANCE CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/10/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, 27-51 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
NO SOUNDINGS WERE TAKEN			0.0	10.0	0.0		NO BACKFILL TODAY		
TODAY DUE TO THE PROBLEMS									
AT THE BATCH PLANT CAUSING			0.0	10.0	0.0				
NO CUT TO BE COMPLETED.									
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				

SF TODAY

SF TO DATE

COMMENTS

Morning work consisted of moving the excavator to the southwest corner (STA 106+76) and finalizing preparations for start of installation of the slurry wall. Slurry mixing began at 9:00. Excavation began but no slurry. Line was clogged. Blew the line and tried pumping again. Started excavation. Pump broke down at the batch plant in the afternoon (~16:00). Excavation stopped.

GEO-CON: Suzanne C Lepio OWNER:

DAILY QC TESTS

DATE 11/10/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	9:10	43	> 40 sec	65	> 64 pcf	8	6.5 - 10	13	< 20 cm^3	2
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
13:25	106+70	2'	45	40 - 90 sec	66	64 - 95 pcf	8	6.5 - 10	14.5	< 25 cm^3	2	0.8	MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET TEST PERMEABILITY EVERY 25 LINEAR FEET COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 111703

TRANSMITTAL NO. 02260-54

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd
Griffith, IN 46319 219/923-1763

FROM: J. A. Wentz, PE, EQM
1600 Carillon Blvd.
Cincinnati, Ohio 45240
800/229-7495

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260

PROJECT TITLE AND LOCATION: IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 6) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See Instruction no. 6) h.	FOR CE USE CODE i.
29	111103 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

RECEIVED
NOV 18 2003
CALUMET AREA OFFICE
CHICAGO DISTRICT

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

DATE

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE 11/18/2003	TRANSMITTAL NO 02260-54
PROJECT TITLE IHC CDF Subsurface Invest. & Cutoff Wall	CONTRACT NO. DACW27-02-C-0003 NA	PAGE 1 of 1
LOCATION Indiana Harbor & Canal CDF, East Chicago, IN		

Item	Description	Variation	QA Code
29	111103 Daily Slurry Wall QC Data	No	F

SECTION III - GOVERNMENT REVIEW REMARKS

Item No.29
Action Code ; "F- Receipt Acknowledged" - See Following Government Remarks- Resubmission Not Required.

1. Starting Station is 106+50 not as noted at Station 106+76.
2. It is noted for no Slurry Soil Backfill placed this date.
3. Receipt of Transmittal does not relieve the contractor from complying with all of the requirements of the contract plans and specifications.

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 111703

TRANSMITTAL NO. 02260-54

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd.
Griffith, IN 46319 219/923-1763

FROM J. A. Wentz, PE, EQM
1800 Carillon Blvd.
Cincinnati, Ohio 45240
800/229-7495

CONTRACT NO
DACW27-02-C-0003

CHECK ONE
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260

PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility
Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐GOV'T APPROVAL

ITEM NO a	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO (See Instruction no. 8) c.	NO OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
29	111103 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

DATE

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/11/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly Cloudy, 49 - 60 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
N/A						

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						

COMMENTS

No slurry testing from the test or the batch plant today. Pump replacement arrived onsite at 11:55. Set up and tried to pump slurry at 13:51. Pump did not work. Spent the rest of the day taking the pump off the batch plant and finishing the clearing and grubbing.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A
FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A

.O-CON: Suzanne E. Sepe OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/11/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
N/A				
**No slurry was mixed today because the replacement pump that arrived onsite did not work.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: Suzanne E. Sepro OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/11/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly Cloudy, 49 - 60 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
NO SOUNDINGS WERE TAKEN			0.0	10.0	0.0		NO BACKFILL TODAY		
TODAY DUE TO THE PROBLEMS			0.0	10.0	0.0				
WITH THE PUMP. NO SLURRY			0.0	10.0	0.0				
MIXING. NO EXCAVATION.			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				

SF TODAY 0.00

SF TO DATE 0.00

COMMENTS

Morning work consisted of moving the excavator to the southwest corner (STA 106+76) and finalizing preparations for start of installation of the slurry wall. Slurry mixing began at 9:00. Excavation began but no slurry. Line was clogged. Blew the line and tried pumping again. Started excavation. Pump broke down at the batch plant in the afternoon (~16:00). Excavation stopped.

GEO-CON: Suzanne E. Sepa OWNER:

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read instructions on the reverse side prior to initiating this form)*	DATE 111703	TRANSMITTAL NO. 02260-55

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS ***(This section will be initiated by the contractor)***

TO: T.A. Deis, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, BCM 1800 Carlton Blvd. Cincinnati, Ohio 45240 800/229-7485	CONTRACT NO. DACW27-02-C-0003	CHECK ONE X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE. THIS TRANSMITTAL IS FOR X FIO ☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
30	111203 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

RECEIVED
NOV 18 2003
CALUMET AREA OFFICE
CHICAGO DISTRICT

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE 11/18/2003	TRANSMITTAL NO 02260-55
PROJECT TITLE IHC CDF Subsurface Invest. & Cutoff Wall	CONTRACT NO. DACW27-02-C-0003 NA	PAGE 1 of 1
LOCATION Indiana Harbor & Canal CDF, East Chicago, IN		

Item	Description	Variation	QA Code
30	111203 Daily Slurry Wall QC Data	No	F

SECTION III - GOVERNMENT REVIEW REMARKS

Item No.30
Action Code ; "F- Receipt Acknowledged" - See Following Government Remarks- Resubmission Not Required.

1. Bentonite Slurry at the plant PM. is at the lowest acceptance range "64 pcf"
2. It is noted for no Slurry Soil Backfill placed this date.
3. Receipt of Transmittal does not relieve the contractor from complying with all of the requirements of the contract plans and specifications.

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 111703	TRANSMITTAL NO. 02260-55

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE. X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312		CHECK ONE. THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO a	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f	FOR CONTRACTOR USE CODE g	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
30	111203 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/12/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, Windy, 50-62 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
106+50	5.00	69.50	4.50	13.00	53.00	8
**						

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						

COMMENTS

Filter cake was 2mm for shallow sample at 106+50. Only one sample was taken today due to the 2nd replacement pump not arriving onsite until ~12:00. Pump had some problems (kept wanting to shut off) and the fuel filter had to be replaced. Running well now.

**No deep sample of trench slurry from Station 106+50 due to the fact that the bottom 2' of the lead-in trench was not reached until the very end of the shift and the QC techs were already sent home. This will be tested 1st thing tomorrow.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A
FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/12/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
12:55	65.00	42.00	18.00	8
15:42	64.00	51.00	18.00	8
16:58	-	41.00	-	-

**No sample was taken in the morning due to the replacement pump didn't get onsite until ~12:00.

FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: Suzanne E. Sepro OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/12/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, Windy, 50-62 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
NO CUT WAS COMPLETED.			0.0	10.0	0.0		NO BACKFILL TODAY		
THESE COLUMNS WILL BE FILLED									
IN ONCE CUT IS COMPLETE.			0.0	10.0	0.0				
SOUNDINGS FOR DEPTH ONLY.			0.0	10.0	0.0				
106+50	25.6								
106+40	35.1		0.0	10.0	0.0				
106+30	35.6								
106+20	34.1		0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				

SF TODAY 0.00

SF TO DATE 0.00

COMMENTS

No excavation or mixing of slurry in the morning due to the 2nd replacement pump not arriving onsite until ~12:00.

Slurry mixing began at 12:45. Pump went down. Had to replace fuel filter. Excavation restarted once mixing began.

Started and finished the lead-in trench.

STATION	KEY
106+50	DID NOT REACH
106+40	34.1'
106+30	34.0'
106+20	DID NOT REACH

GEO-CON: Suzanne E Sepic OWNER:

DAILY QC STS

DATE 11/12/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	12:55	42	> 40 sec	65	> 64 pcf	8	6.5 - 10	18	< 20 cm^3	1.5
PM	15:42	51	> 40 sec	64	> 64 pcf	8	6.5 - 10	18	< 20 cm^3	2

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	16:58	41	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM, 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—		MAX 30%
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—		MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
13:30	106+50	5	53	40 - 90 sec	69.5	64 - 95 pcf	8	6.5 - 10	13	< 25 cm^3	2	4.5	MAX 30%
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET TEST PERMEABILITY EVERY 25 LINEAR FEET COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read instructions on the reverse side prior to initiating this form)

DATE 111703

TRANSMITTAL NO. 02260-56

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd.
Griffith, IN 46319 219/923-1763

FROM: J. A. Wentz, PE, EQM
1800 Carillon Blvd
Cincinnati, Ohio 45240
800/229-7495

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO *(Cover only one section with each transmittal)* 2260

PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See Instruction no. 6) h.	FOR CE USE CODE i.
31	111303 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

RECEIVED
NOV 18 2003
CALUMET AREA OFFICE
CHICAGO DISTRICT

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

DATE

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE 11/18/2003	TRANSMITTAL NO. 02260-56
PROJECT TITLE IHC CDF Subsurface Invest. & Cutoff Wall	CONTRACT NO DACW27-02-C-0003 NA	PAGE 1 of 1
LOCATION Indiana Harbor & Canal CDF, East Chicago, IN		

Item	Description	Variation	QA Code
31	111303 Daily Slurry Wall QC Data	No	F

SECTION III - GOVERNMENT REVIEW REMARKS

Item No.31
Action Code ; "F- Receipt Acknowledged" - See Following Government Remarks- Resubmission Not Required.

1. It noted "Bentonite Slurry At the Trench" Sand Content of 28%. Inspection of testing equipment (sand content flask) is only calibrated/marked to 20%. Review testing equipment for proper testing parameters/rang.
2. It is noted for no Slurry Soil Backfill placed this date.
3. Receipt of Transmittal does not relieve the contractor from complying with all of the requirements of the contract plans and specifications.

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 111703	TRANSMITTAL NO. 02260-56

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO	FROM	CONTRACT NO.	CHECK ONE
T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	DACW27-02-C-0003	X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312		CHECK ONE THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO (See Instruction no. 8) c.	NO OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC PARA NO e.	DRAWING SHEET NO. f	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
31	111303 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

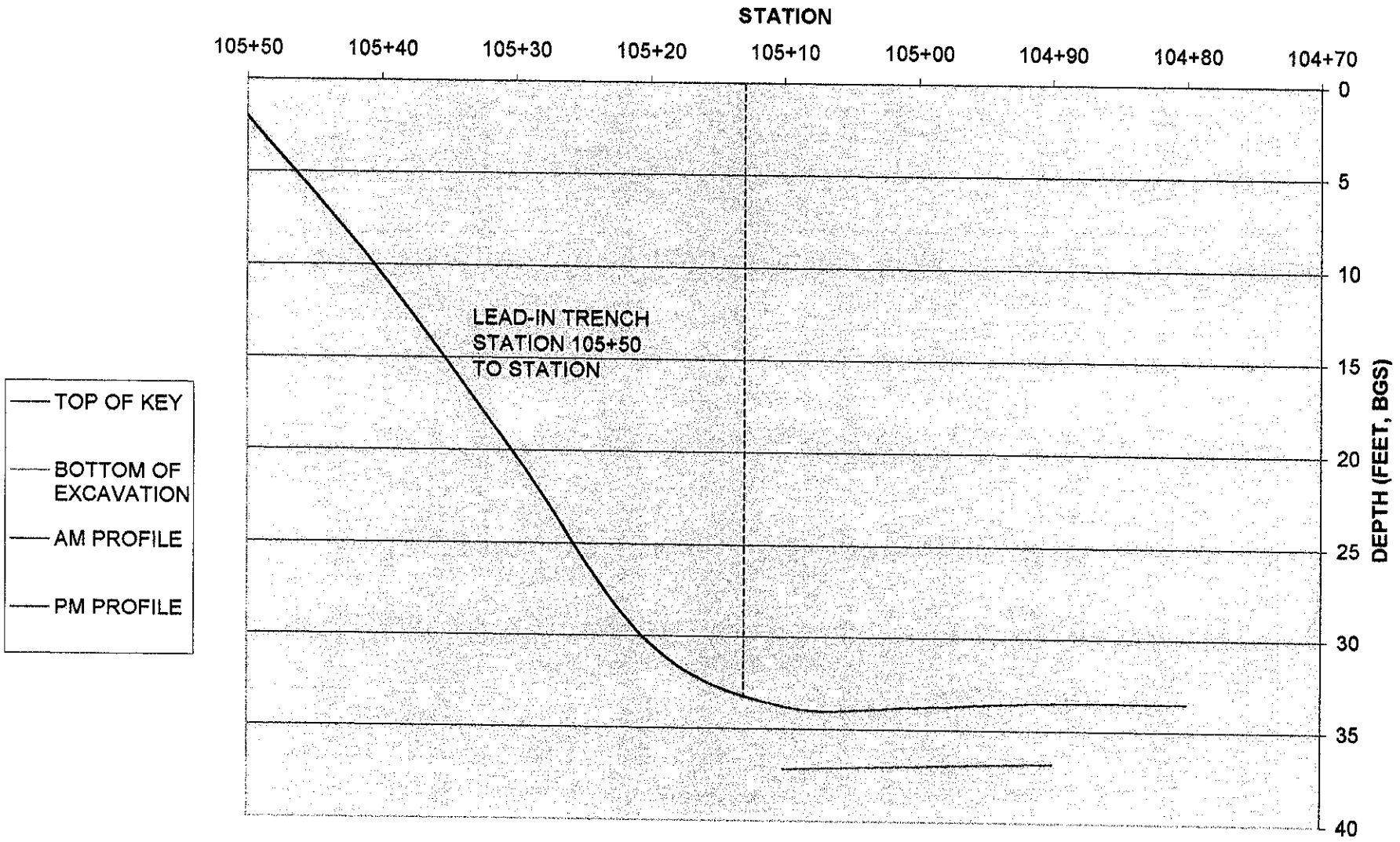
I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

AS-BUILT PROFILE



Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/13/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny, Windy, 21-35 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
106+50	23.00	75.00	19.00	16.50	43.00	8
105+40	2.00	84.50	28.00	17.50	71.00	8
**						

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						

COMMENTS

Filter cake was 2mm for both samples. At 10:30, production was stopped due to a pipe obstruction being discovered 20' deep at Station 106+12. Meeting was held between Geo-Con, EQ, and USACE to discuss options. It was decided that the completed 106+50 and 30' cut be abandoned. The trench would move the start to Station 105+50. Station 106+50 to 105+20 would be re-excavated at a later date. Only one trench slurry sample taken from each location due to obstruction being encountered. Will get deep sample at 105+40 tomorrow, once depth is reached.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A
FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A

.O-CON: Suzanne E. Sepio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/13/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:30	65.00	45.00	18.50	8
14:30	-	44.00	-	-
15:00	65.00	41.00	15.50	8

**2nd morning viscosity sample was not done due to obstruction being encountered and production being stopped from 10:30 to 12:01. Pump broke down again at 15:05. No more slurry was made today.

FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: Suzanne E Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/13/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny, Windy, 21-35 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
106+50	33.7	38.1					NO BACKFILL TODAY		
			38.4	10.0	383.5				
106+40	34.1	38.6							
			39.4	10.0	394.0				
106+30	34.0	40.2							
			40.2	10.0	401.5				
106+20	34.5	40.1							
SF	1179.0			SF	1179.0				
AT 10:30, EXCAVATION WAS STOPPED BECAUSE A 12" PIPE OBSTRUCTION WAS FOUND AT STATION 106+12, ~22' DEEP. TRENCH START WAS MOVED TO STATION 105+50 AT 12:01. LEAD-IN IS 105+50 TO 105+13.									
105+50	2.0	LEAD-IN							
105+40	10.5	LEAD-IN							
105+30	20.3	LEAD-IN							
105+20	30.4	LEAD-IN							
105+10	33.8	37.2							
105+00	33.8	37.0							
			37.1	10.0	371.0				
104+90	33.5	36.8							
			36.9	10.0	369.0				
104+80	33.5	NOT @ BOTTOM							

SF TODAY 740.00
SF TO DATE 740.00

**SF TODAY ONLY INCLUDES THE SF FROM THE NEW START @ 105+50.

COMMENTS

Morning profile: 106+50 @ 25.4', 106+40 @ 35', 106+30 @ 35.5', and 106+20 @ 33.7'. Excavation was halted at 10:30 due to a pipe obstruction 20' deep at Station 106+12. Decided to abandon this start of the slurry wall and move start to Station 105+50. Station 106+50 to Station 105+20 will be re-excavated once the pipe obstruction has been removed.

GEO-CON: Suzanne C. Sepic OWNER:

DAILY QC TESTS

DATE 11/13/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	7:30	45	> 40 sec	65	> 64 pcf	8	6.5 - 10	185	< 20 cm^3	15
PM	15:00	41	> 40 sec	65	> 64 pcf	8	6.5 - 10	155	< 20 cm^3	15

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	14:30	44	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:30	106+50	23	43	40 - 90 sec	75	64 - 95 pcf	8	6.5 - 10	165	< 25 cm^3	2	19	MAX 30%
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:00	105+40	2	71	40 - 90 sec	84.5	64 - 95 pcf	8	6.5 - 10	175	< 25 cm^3	2	28	MAX 30%
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET TEST PERMEABILITY EVERY 25 LINEAR FEET COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 111703

TRANSMITTAL NO. 02260-57

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd
Griffith, IN 46319 219/923-1763

FROM: J.A. Wertz, PE, EQM
1800 Carillon Blvd.
Cincinnati, Ohio 45240
600/229-7455

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260

PROJECT TITLE AND LOCATION: IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 6) c.	NO OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See Instruction no. 6) h.	FOR CE USE CODE i.
32	111403 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

RECEIVED
NOV 18 2003
CALUMET AREA OFFICE
CHICAGO DISTRICT

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

DATE

ENG FORM 4025-R, MAR 95 (ER 415-1-10) EDITION OF SEP 93 IS OBSOLETE. SHEET 1 OF 1

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE	DATE 11/18/2003	TRANSMITTAL NO. 02260-57
PROJECT TITLE IHC CDF Subsurface Invest. & Cutoff Wall	CONTRACT NO. DACW27-02-C-0003 NA	PAGE 1 of 1
LOCATION Indiana Harbor & Canal CDF, East Chicago, IN		

Item	Description	Variation	QA Code
32	111403 Daily Slurry Wall QC Data	No	F

SECTION III - GOVERNMENT REVIEW REMARKS

Item No.32
Action Code ; "F- Receipt Acknowledged" - See Following Government Remarks- Resubmission Not Required.

1. It noted "Bentonite Slurry At the Trench" Sand Content of 29%,25%. Inspection of testing equipment (sand content flask) is only calibrated/marked to 20%. Review testing equipment for proper testing parameters/rang.
2. It is noted for no Slurry Soil Backfill placed this date.
3. Receipt of Transmittal does not relieve the contractor from complying with all of the requirements of the contract plans and specifications.

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 111703

TRANSMITTAL NO. 02260-57

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd.
Griffith, IN 46319 219/923-1763

FROM: J. A. Wentz, PE, EQM
1800 Carillon Blvd.
Cincinnati, Ohio 45240
800/229-7495

CONTRACT NO
DACW27-02-C-0003

CHECK ONE.
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260

PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility
Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE. THIS TRANSMITTAL IS FOR
X FIO
☐GOV'T APPROVAL

ITEM NO. a	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC PARA NO e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
32	111403 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/14/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 33 - 42 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
105+40	8.50	94.00	29.00	17.50	89.00	8
105+00	35.00	92.00	25.00	20.00	64.00	8
103+50	2.00	64.50	1.00	14.00	41.00	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						

COMMENTS

Filter cake was 4mm, 5mm, and 3mm respectively. There was no excavation in the morning because the 3rd replacement pump did not arrive onsite until mid morning and the batch plant operators were not allowed to work with their respirators on until they had a fit test.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A
FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A

O-CON: Suzanne C. Sepe OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/14/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
16:08	65.00	45.00	9.50	8
17:04	64.50	42.00	12.50	8

**Morning viscosity samples were not taken due to the pump not arriving until mid-morning and the batch plant operators having to get a fit test on their respirators.

FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/14/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 33 - 42 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
104+80	33.5	38.4	37.6	10.0	376.0		NO BACKFILL TODAY		
SF LEAD-IN (105+50 TO 105+20)									
	SF	**470.0**							
SF (105+10 TO 104+80)									
	SF	**1454.0**							
EXCAVATION HAD TO MOVE									
AGAIN BECAUSE ANOTHER									
PIPE OBSTRUCTION WAS									
DISCOVERED IN THE CUT FROM									
STATION 104+70 TO 104+30.									
THE FOLLOWING SOUNDINGS									
ARE DEPTH ONLY. NO KEY.									
*04+00	0.0	LEAD-IN							
.03+90	11.4	LEAD-IN							
103+80	17.3	LEAD-IN							
103+70	14.7	LEAD-IN							
103+60	11.8								
103+50	9.5								

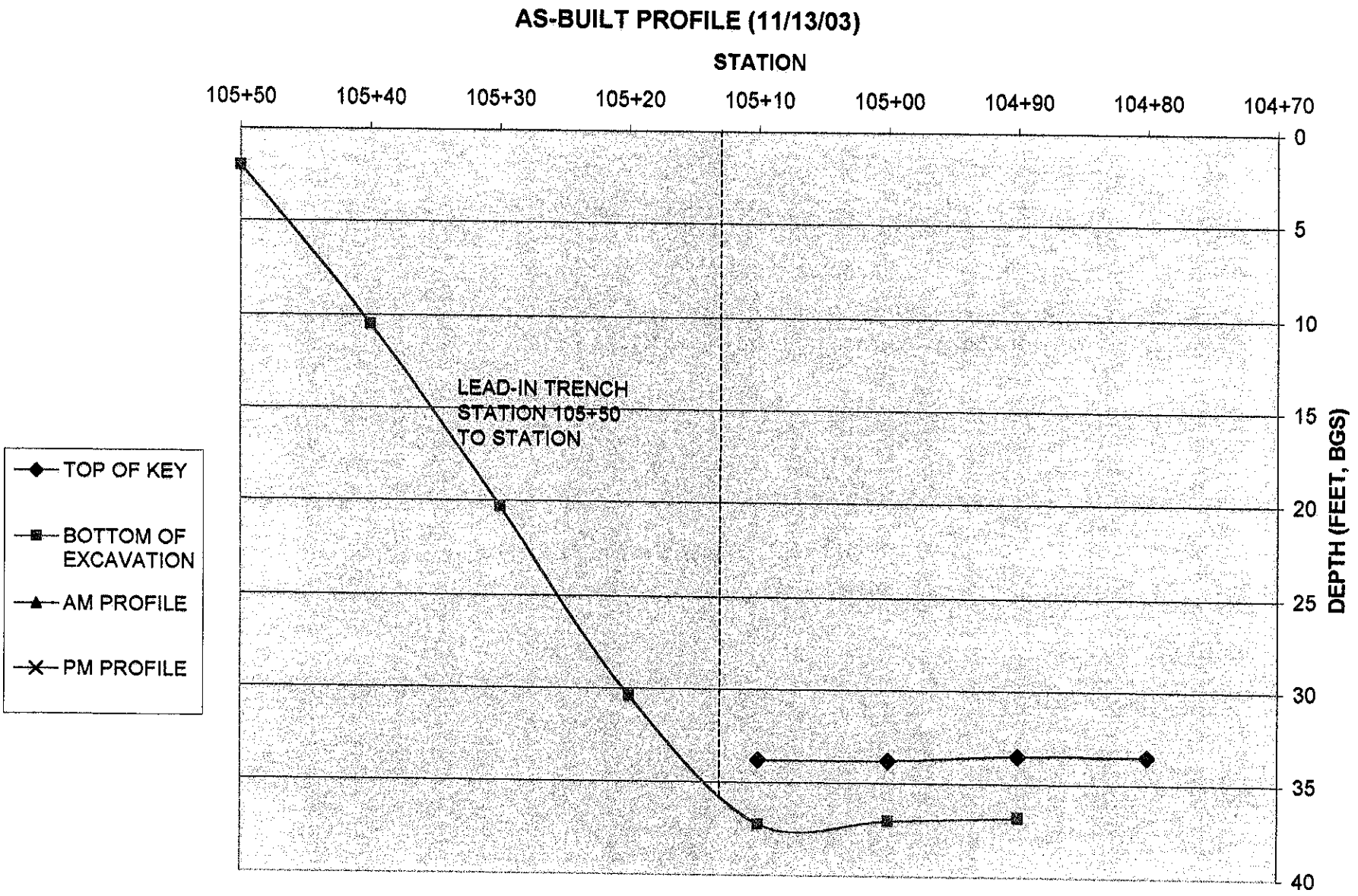
SF TODAY 376.00

SF TO DATE 1454.00 **SF TO DATE INCLUDES SF FROM 105+10 TO 104+80

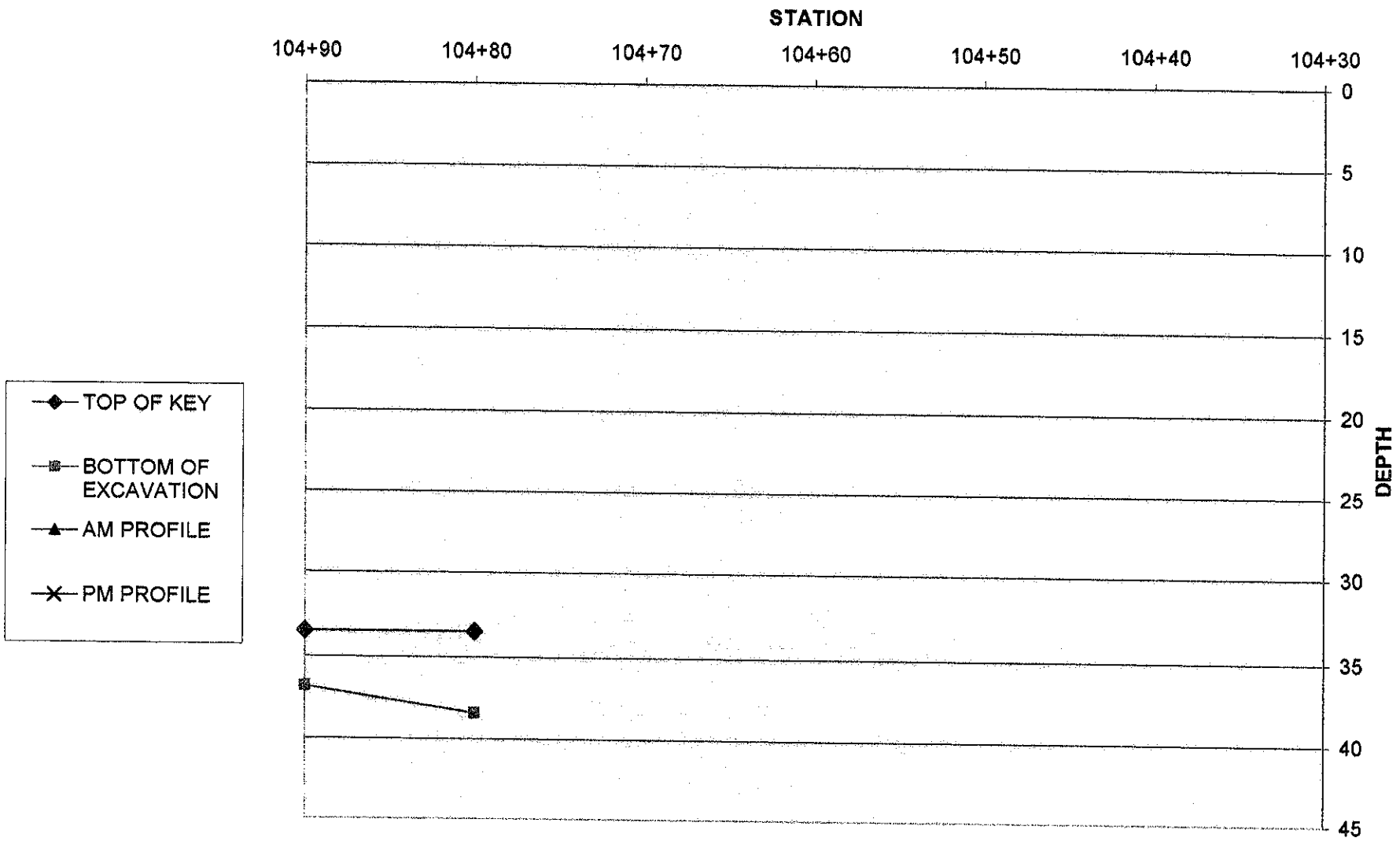
COMMENTS

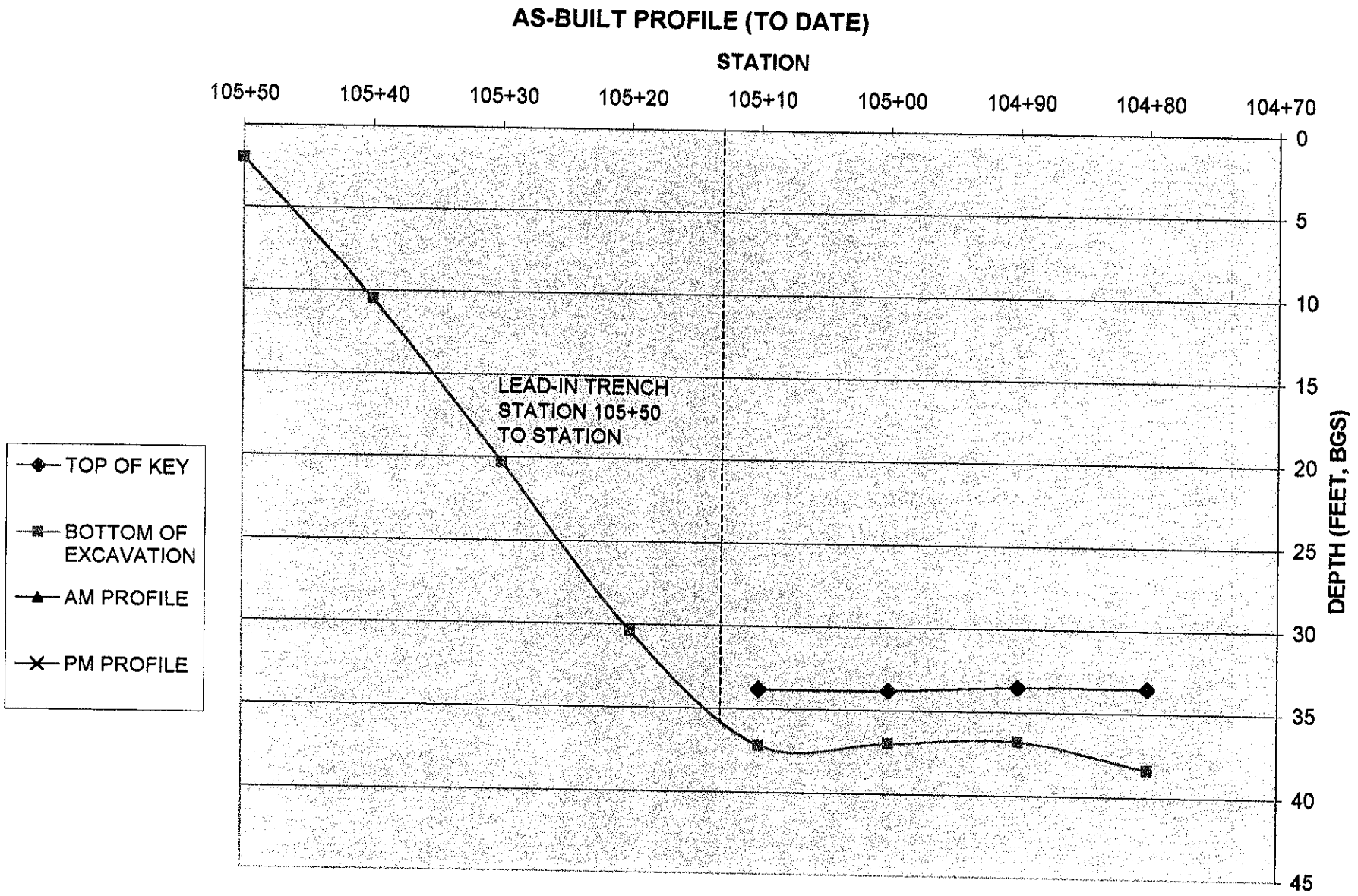
Morning profile: 105+50 @ 2', 105+40 @ 10.4', 104+30 @ 20.5', 105+20 @ 30.6', 105+10 @ 36.9, 105+00 @ 37.1, 104+90 @ 36.8, and 104+80 @ 36.7'. No excavation occurred in the morning due to the batch plant being shut down due to the 3rd replacement pump not arriving to mid-morning and the requirement that the batch plant operators be fit tested before they could work in their respirators. See above for discussion of 2nd move of start.

GEO-CON: Suzanne E Sepic OWNER:


AS-BUILT PROFILE (11/13/03)
STATION
105+50
105+40
105+30
105+20
105+10
105+00
104+90
104+80
104+70
0
5
10
15
20
25
30
35
40
DEPTH (FEET, BGS)
LEAD-IN TRENCH
STATION 105+50
TO STATION
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE (11/14/03)




AS-BUILT PROFILE (TO DATE)
STATION
105+50
105+40
105+30
105+20
105+10
105+00
104+90
104+80
104+70
0
5
10
15
20
25
30
35
40
45
DEPTH (FEET, BGS)
LEAD-IN TRENCH
STATION 105+50
TO STATION
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 11/14/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
~~AM~~ PM	16:08	45	> 40 sec	65	> 64 pcf	8	6.5 - 10	9.5	< 20 cm^3	1.5
PM	17:04	42	> 40 sec	64.5	> 64 pcf	8	6.5 - 10	12.5	< 20 cm^3	2

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:36	105+40	8.5	89	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	17.5	< 25 cm^3	4	29	MAX 30%
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:45	105+00	35	64	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	5	25	MAX 30%
17:20	103+50	2	41	40 - 90 sec	64.5	64 - 95 pcf	8	6.5 - 10	14	< 25 cm^3	3	1	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET TEST PERMEABILITY EVERY 25 LINEAR FEET COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read instructions on the reverse side prior to initiating this form)

DATE 111703

TRANSMITTAL NO. 02260-58

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd.
Griffith, IN 46319 219/923-1783

FROM: J.A. Wentz, PE, BCM
1800 Carillon Blvd.
Cincinnati, Ohio 45240
800/229-7495

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260

PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See instruction no. 6) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
33	111503 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

RECEIVED
NOV 18 2003
CALUMET AREA OFFICE
CHICAGO DISTRICT

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*

NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY

DATE

ENG FORM 4025-R, MAR 86 (ER 415-1-10) EDITION OF SEP 83 IS OBSOLETE. SHEET 1 OF 1

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE		DATE 11/18/2003	TRANSMITTAL NO. 02260-58
PROJECT TITLE	IHC CDF Subsurface Invest. & Cutoff Wall	CONTRACT NO. DACW27-02-C-0003 NA	PAGE 1 of 1
LOCATION	Indiana Harbor & Canal CDF, East Chicago, IN		

Item	*Description*	*Variation*	*QA Code*
33	111503 Daily Slurry Wall QC Data	No	F

SECTION III - GOVERNMENT REVIEW REMARKS

Item No.33
Action Code ; "F- Receipt Acknowledged" - See Following Government Remarks- Resubmission Not Required.

1. It is noted for no Slurry Soil Backfill placed this date.
2. Receipt of Transmittal does not relieve the contractor from complying with all of the requirements of the contract plans and specifications.

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 111703	TRANSMITTAL NO. 02260-58

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO DACW27-02-C-0003	CHECK ONE. X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312		CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
33	111503 Daily Slurry Wall QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise

NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/15/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 39 - 54 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
103+50	16.00	71.50	11.00	23.00	43.00	8
103+50	34.50	85.50	14.00	21.00	49.00	8
103+00	2.00	69.00	6.00	15.00	40.00	8
103+00	35.00	75.50	20.00	21.00	47.00	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						

COMMENTS

Filter cake was 2mm, 1.5mm, 5mm, and 4mm respectively.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A
FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: Suzanne C. Sipo OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/15/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:45	65.00	46.00	20.00	8
12:43	-	42.00	-	-
15:01	65.00	41.00	13.50	8
16:42	-	41.00	-	-

FUNNEL CALIBRATIONS PERFORMED TODAY?	N/A
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	N/A

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/15/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 39 - 54 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
104+00	LEAD-IN	0.0					NO BACKFILL TODAY		
			5.5	10.0	55.0				
103+90	LEAD-IN	11.0							
			15.0	10.0	150.0				
103+80	LEAD-IN	19.0							
			24.1	10.0	241.0				
103+70	LEAD-IN	29.2							
			33.3	10.0	332.5				
103+60	32.8	37.3							
			37.3	10.0	373.0				
103+50	33.4	37.3							
			37.4	10.0	373.5				
103+40	33.5	37.4							
			37.3	10.0	373.0				
103+30	32.9	37.2							
			37.5	10.0	375.0				
103+20	32.8	37.8							
			37.3	10.0	373.0				
103+10	33.2	36.7							
			37.3	10.0	372.5				
103+00	33.5	37.1							
			36.9	10.0	369.0				
102+90	32.9	36.5							
			36.8	10.0	368.0				
102+80	32.6	35.9							
			36.2	10.0	362.0				

SF TODAY 3744.50

SF TO DATE 6847.50 **SF TO DATE INCLUDES SF TODAY, 1179 SF FROM 106+50 TO 106+20 & 1924 SF FROM 105+50 TO 104+80

COMMENTS

Morning profile: 104+00 @ 0', 103+90 @ 10', 103+80 @ 18.5', 103+70 @ 17', 103+60 @ 14.7, 103+50 @ 12.4', and 103+40 @ 2.

GEO-CON: Suzanne E. Sepic OWNER:

DAILY QC TESTS **DATE** 11/15/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	7:45	46	> 40 sec	65	> 64 pcf	8	6.5 - 10	20	< 20 cm^3	2
PM	15:01	41	> 40 sec	65	> 64 pcf	8	6.5 - 10	13.5	< 20 cm^3	2

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	12:43	42	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	16:42	41	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
7:35	103+50	16	43	40 - 90 sec	71.5	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	2	11	MAX 30%
11:22	103+50	34.5	49	40 - 90 sec	85.5	64 - 95 pcf	8	6.5 - 10	21	< 25 cm^3	1.5	14	MAX 30%

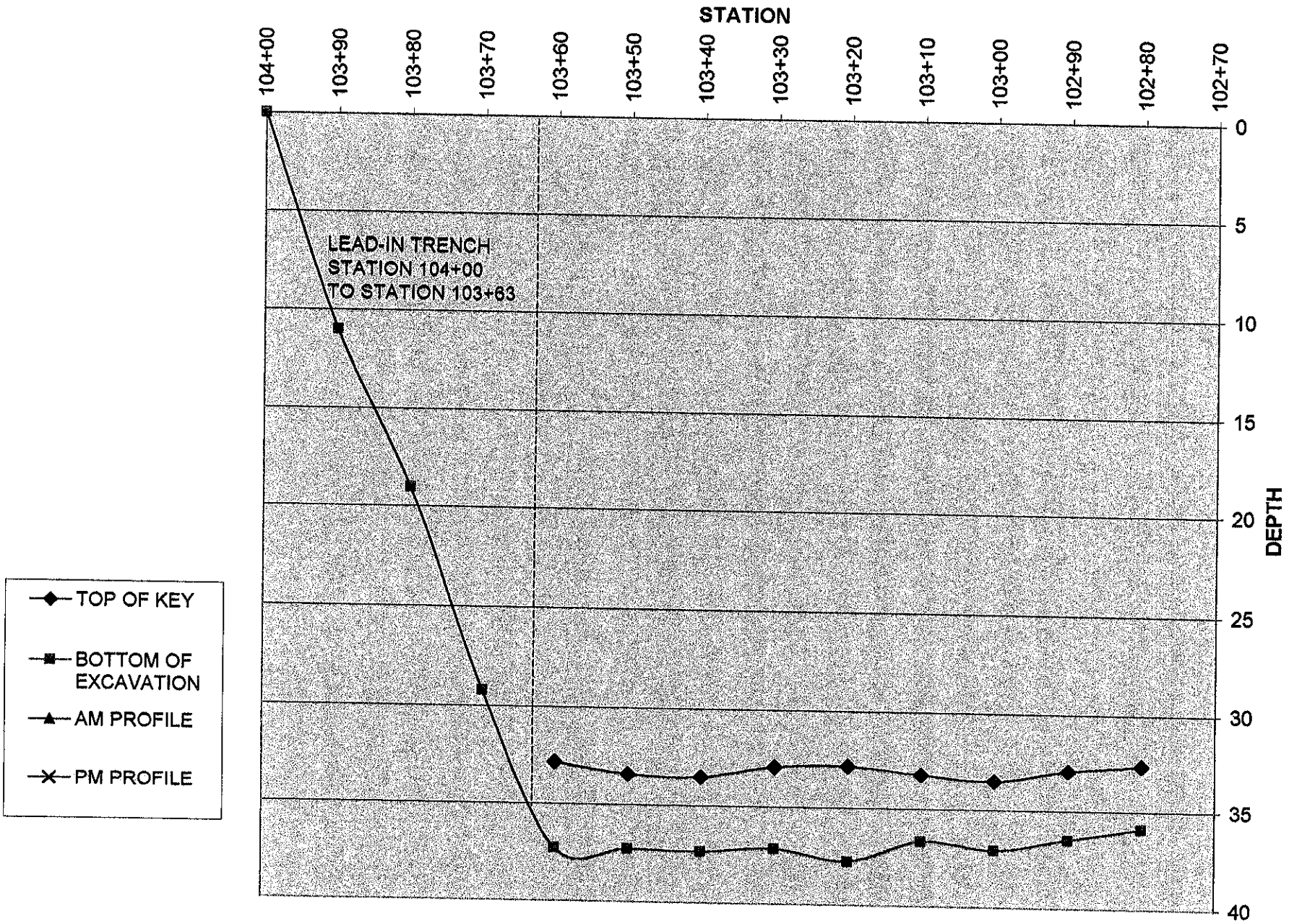
PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
13:31	103+00	2	40	40 - 90 sec	69	64 - 95 pcf	8	6.5 - 10	15	< 25 cm^3	5	6	MAX 30%
15:25	103+00	35	47	40 - 90 sec	75.5	64 - 95 pcf	8	6.5 - 10	21	< 25 cm^3	4	20	MAX 30%

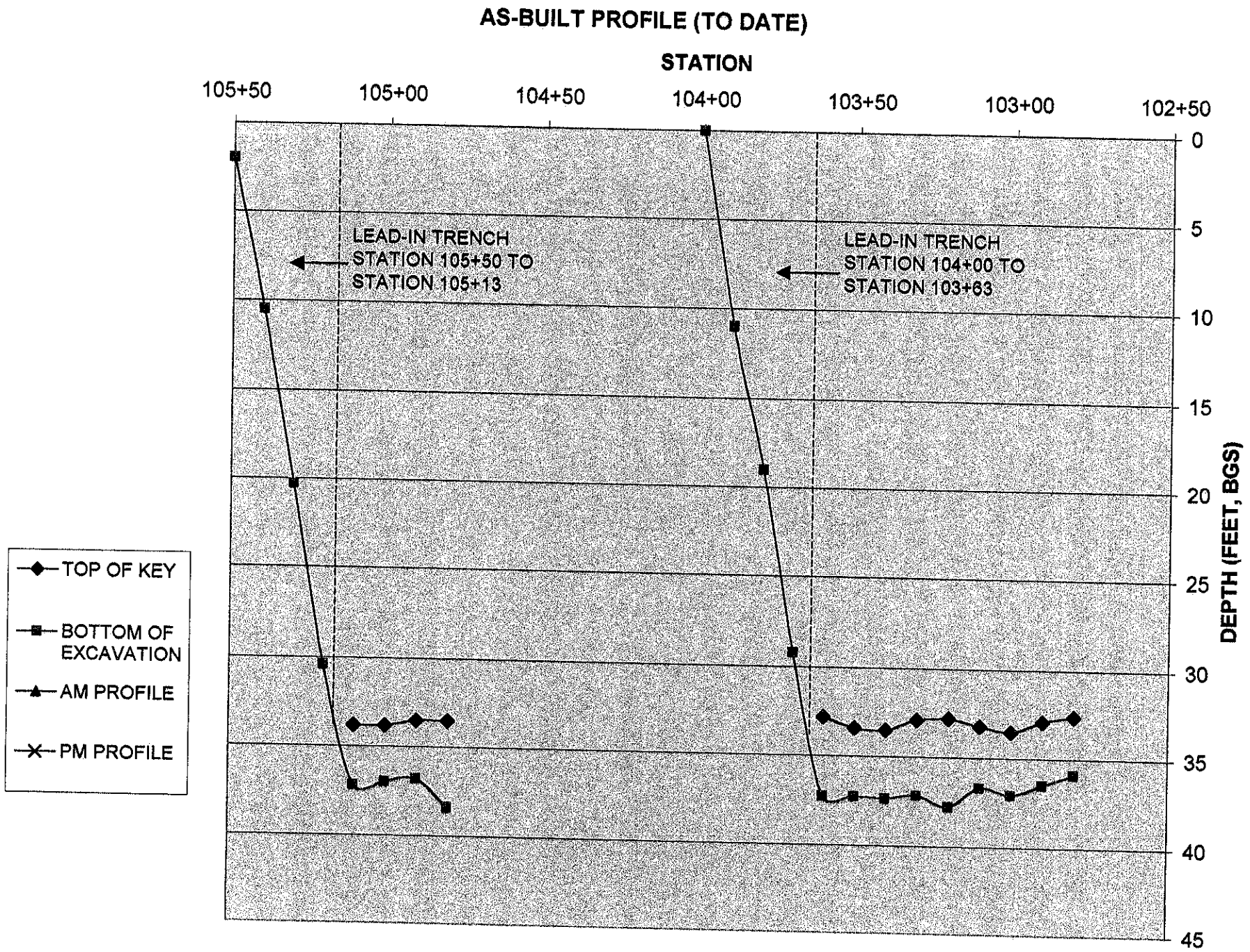
SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB

AS-BUILT PROFILE (11/15/03)




AS-BUILT PROFILE (TO DATE)
STATION
105+50
105+00
104+50
104+00
103+50
103+00
102+50
0
5
10
15
20
25
30
35
40
45
DEPTH (FEET, BGS)
LEAD-IN TRENCH
STATION 105+50 TO
STATION 105+13
LEAD-IN TRENCH
STATION 104+00 TO
STATION 103+63
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 01/15/04	TRANSMITTAL NO. 02260-61.1

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL X THIS IS A RESUBMITTAL OF TRANSMITTAL 02260-61
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
150	111703 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.
Items 151, 152, 153,154, & 155 were also provided under original transmittal 02260-61. These items were coded "F" and there fore are not attached to this retransmittal of data.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Fred Hall Fred Hall 1/15/04
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

CONTRACTOR RESPONSE TO GOVERNMENT REVIEW REMARKS

Indian Harbor Canal Confined Disposal Facility
Subsurface Investigation& Cutoff Wall

Contract No. DACW27-02-C-0003

Response to Government Comments on the following:

Item No.:	Submittal No.:	Description:	Date:
150	02260-61	111703 Daily GeoCon QC Data	December 5, 2003

Response to Government Comments Provided As:

Item No.:	Submittal No.:	Description:	Date:
150	02260-61.1	111703 Daily GeoCon QC Data	January 14, 2004

Action Code: FX – Code. Receipt acknowledged, does not comply as noted with contract requirements. Resubmission of Item No. 150 is required. See comments below.

Response:
Geo-Con has revised the 111703 Daily GeoCon QC Data to reflect USACE comments and is hereby resubmitting the entire document.

COMMENTS ON MAIN BODY AND GENERAL COMMENTS:

Comment:

1. Ensure that the daily cutoff wall QC data submittals include all laboratory data for all samples taken that day. Include Atterburg limits, grain size, moisture content, and permeability data. There are no moisture content test results. There are no grain size or Atterburg limits test results for the soil-bentonite backfill samples. Also, the "date tested" of the permeability test data sheets for samples SB-001 and SB-002 is shown as 9/24/03. Please correct date and resubmit.

Response:

All laboratory data for all samples taken this day are now included as part of the Daily Geo-Con QC Data Report. Samples on the COCs that were collected on differing dates, have the result reported with the date sampled. Moisture content results are located on a separate form from the Atterburg limits and grain size report. The "date tested" of the permeability test data sheets for samples SB-001 and SB-002 now show the correct date instead of 9/24/03, although sample SB-002 was not collected on this date (it was collected 11/19/03).

Comment:

2. Include calculations demonstrating that 6% dry bentonite is being added by including the "Soil-Bentonite Backfill Quality Control" form included in the approved Transmittal No. 02260-16.1; Soil-Bentonite Slurry Trench Cutoff Wall Implementation Plan. (The form is in the Appendix C of the Standard Operating Procedures included in Appendix E of the Implementation Plan.) Ensure that the width of the cutoff wall shown on the "Daily Soil Bentonite Slurry Wall Quality Control Form" and used in the percent-dry-bentonite calculations is based on field measurements of the slurry trench width.

Response:

Calculations demonstrating that 6% dry bentonite is being added while mixing the soil-bentonite backfill are located on the "Soil-Bentonite Backfill Quality Control" form and included as part of the Geo-Con Daily QC Data Report. Actual field measured trench widths are shown on the "Daily Soil Bentonite Slurry Wall Quality Control Form and the field measured widths (average) are used in the percent-dry-bentonite calculations.

Comment:

3. Reference Section 02260, paragraph 3.5.1, which requires elevations to be recorded. Include on the forms the elevations of the items listed in 02260, paragraph 3.5.1.5. Note that there are areas of cut and fill present along the cutoff wall alignment and that there is an apparent absence of vertical survey control in determining the elevations of the referenced items. The use of the disturbed "original ground surface elevation" as zero ("0") will not be representative of actual final depth/elevations for record drawings.

Response:

A separate elevation spreadsheet form including all the elevations of the items listed in 02260, paragraph 3.5.1.5, is now included as part of the Geo-Con Daily QC Data Report. Due to the fact that no clay cap has been placed yet, there is no column for elevation of clay cap and the elevation of the top of the trench platform/work platform is the same as the elevation of the top of the soil-bentonite cutoff wall. Elevations for the top of trench platform/ground surface (elev.) column that Geo-Con is using for the reference of zero ("0") are taken in the following manner: Excavation is made to the top of clay (this is determined once the trench hand and excavator operator observe clay in the excavator's bucket). On the required 10' intervals, the trench hand stands on the outside edge of the trench and a depth measurement for top of clay is obtained. Once the excavator has completed the cut to full depth, the trench hand returns to the same point on the outside edge, where he stands to drop the weighted tape again into the trench to get the bottom of the trench depth. Geo-Con representative sets up the level at a stationary location, shoots a known elevation reference point (i.e. DLZ established hub or monitoring well) to use as the H.I. (height of the instrument), and

then shoots the rod at each station where the depth measurements were obtained. This is the point identified as top of trench platform/ground surface (elev.) on the elevation spreadsheet.

Upon installation of the clay cap, the elevation of the top of the slurry wall will be surveyed at three points (centerline, left edge, right edge) per station. This will also apply to the elevation of the top of the clay cap. When surveying the elevation of the top of trench platform/elevation of the top of the soil-bentonite slurry wall, established survey hubs are being used as reference points.

Comment:

4. Ensure that the filtrate loss of the slurry meets the Contract requirements.

Response:

Filtrate loss of the slurry on this report meets the Contract requirements.

Comment:

5. Note that the sand content of the "Bentonite Slurry at the Trench" exceeds 20%, yet the testing equipment (i.e., the sand content flask) is only calibrated/marked to 20%. Ensure that the testing equipment is suitable for the ranges encountered and is capable of producing reliable data.

Response:

On this report, sand content does not exceed 20%. But, for clarification, in the onsite lab, there are 4 sand content flasks. Once the sand in the "Bentonite Slurry at the Trench" exceeded 20%, a second flask was used. The excess sand over 20% was poured into the second flask and was measured and added to the 20% in the first flask. When the USACE QA representative from Patrick Engineering arrived onsite, he calibrated one flask to measure up to 30% sand (by pouring 10% sand from flask #2 into flask #1 and marking lines).

Comment:

6. It is noted with reference to Spec. Section 02260/3.4.12, "Clay Cap", that no clay cap material has been placed to date.

Response:

Clay cap will be placed at a later date as the soil-bentonite slurry wall nears completion or after it is completed.

Comment:

7. Reference the CQC requirements in Section 02260, paragraph 2.4, paragraph 3.4.4, paragraph 3.4.6, paragraph 3.4.9, paragraph 3.4.11, paragraph 3.5, paragraph 3.5.1.5, and paragraph 3.5.2.2.

Response:

Comment noted.

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)

Phone: (724) 366-9311 Airbill No: N/A

Date Shipped: 19-Nov-03

Carrier: DIRECT--LAB PICKUP

Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD, BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL

PROJECT NO: P01-048

P.O.# 78406

Relinquished by: (Signature) Suzanne E Sepic

Received By: Atul Kumar

Date / 11/19/03
Time: 9:00

Relinquished by: (Signature)

Received By:

Date /
Time:

Relinquished by: (Signature)

Received at lab by:

Date /
Time:

Relinquished from lab by: (Signature)

Received By:

Date /
Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-001	SOIL ONLY BACKFILL	106+50	11/12/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-002	SOIL ONLY BACKFILL	105+00	11/13/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-003	SOIL ONLY BACKFILL	104+00	11/14/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-004	SOIL ONLY BACKFILL	103+00	11/15/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-005	SOIL ONLY BACKFILL	102+00	11/17/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ SB-001	SB BACKFILL**	104+00	11/17/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE
SANJEEV--TO RESOLVE ANY PAYMENT ISSUES, IF YOU COULD GET ME A WEEKLY INVOICE BY EACH FRIDAY AFTERNOON FOR ALL THE TESTING THAT HAS BEEN/WILL BE PERFORMED FOR THAT WEEK, I CAN HAVE A CHECK CUT BY THURSDAY OF THE FOLLOWING WEEK. (I.E. INVOICE GEO-CON FOR THE WORK DONE 11/15/03 TO 11/21/03, GIVE ME THE INVOICE BY 11/21/03 AFTERNOON, AND I CAN HAVE A CHECK SENT TO THE SITE ON 11/27/03 (IF IT WASN'T THANKSGIVING) OR MAILED DIRECTLY TO YOU THAT DAY.)

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/17/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Morning fog, Partly cloudy, 50 -58 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
102+70	2.00	72.00	9.00	19.00	40.00	8
102+70	32.00	79.00	13.00	21.00	43.00	8
101+60	2.00	79.50	12.00	**	43.00	8
101+60	33.00	81.50	17.00	**	48.00	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
106+50	LAB SAMPLE COLLECTED 11/12/03			
105+00	LAB SAMPLE COLLECTED 11/13/03			
104+00	LAB SAMPLE COLLECTED 11/14/03			
103+00	LAB SAMPLE COLLECTED 11/15/03			
102+00	LAB SAMPLE COLLECTED 11/17/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
104+00	2.50	Sample to lab	Sample to lab	Sample to lab	2.56×10^{-7}	yes
103+75	3.00	N/A	N/A	N/A	2.17×10^{-7}	N/A
103+50	3.00	N/A	N/A	N/A	1.00×10^{-7}	N/A

COMMENTS

Filter cake was 3mm, and 2mm respectively. The filtrate test for the shallow and the deep sample of slurry from the trench was not run due to the fact that all of the filter press cylinders were occupied by quick perms and could not be completed before the QC tech had to leave for the day. Received 5 truckloads of bentonite.

Unit Weight: 104+00: 110.5 pcf
103+75: 106.5 pcf
103+50: 116.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/17/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:35	65.00	60.00	13.50	8
11:00	-	49.00	-	-
14:00	-	40.00	-	-
15:00	65.00	41.00	**	8

**Slurry sample taken from the batch plant at 15:00 did not have a filtrate test performed on it in the afternoon due to the fact that all cylinders on the filter press unit were occupied by quick perms and could not be completed by the time the QC tech had to leave the site for the day.

FUNNEL CALIBRATIONS PERFORMED TODAY?	yes
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/17/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Morning fog, Partly cloudy, 50 -58 degre RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
102+70	32.8	36.5	36.2	10.0	362.0	5.4	104+00	0.0	1.0
102+60	32.7	36.3	36.4	10.0	364.0	5.3	103+90	11.1	11.0
102+50	33.1	36.2	36.3	10.0	362.5	5.1	103+80	20.3	20.2
102+40	33.0	36.8	36.5	10.0	365.0	5.4	103+70	30.3	28.1
102+30	32.9	37.1	37.0	10.0	369.5	5.1	103+60	36.8	28.4
102+20	32.8	36.9	37.0	10.0	370.0	5.1	103+50	36.7	28.6
102+10	32.9	36.6	36.8	10.0	367.5	5.3	103+40	36.9	28.9
102+00	33.1	36.5	36.6	10.0	365.5	5.3	103+30	37.2	29.8
101+90	33.1	36.5	36.5	10.0	365.0	5.3	103+20	37.4	29.9
101+80	32.8	36.4	36.5	10.0	364.5	5.4	103+10	36.5	30.1
101+70	32.7	36.7	36.6	10.0	365.5	5.6	103+00	36.6	30.2
101+60	32.7	36.7	36.7	10.0	367.0	5.3	102+90	36.4	32.2
101+50	32.9	36.4	36.6	10.0	365.5	5.2	102+80	36.3	33.4
101+40	LEAD-IN	30.3	33.4	10.0	333.5	5.3	102+70		33.8
101+30	LEAD-IN	21.4	25.9	10.0	258.5	5.1	102+60		34.2
101+20	LEAD-IN	10.4	15.9	10.0	159.0	5.2	102+50		36.2
101+10	LEAD-IN	2.0	6.2	10.0	62.0	5.0	102+40		36.8
							102+30		37.1
							102+20		36.9
							102+10		36.6
							102+00		36.5
							101+90		36.5
							101+80		36.4
							101+70		36.7
							101+60		36.7
							101+50		36.4
							101+40		30.6
							101+30		21.2
							101+20		10.4
							101+10		2.0

SF TODAY 5566.50

SF TO DATE 12414.00

COMMENTS

Start of shift profile had no backfill placed yet.

GEO-CON: Suzanne C. Sepic OWNER:

DAILY QC TESTS

DATE 11/17/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	7:35	60	> 40 sec	65	> 64 pcf	8	6.5 - 10	13.5	< 20 cm^3	1.5
PM	15:00	41	> 40 sec	65	> 64 pcf	8	6.5 - 10	**	< 20 cm^3	**

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	11:00	49	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	14:00	40	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

** The filtrate tests could not be run on the PM slurry samples (batch plant and trench) due to the fact that all of the filter press cylinders were occupied by quick perms.

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
7:25	102+70	2'	40	40 - 90 sec	72	64 - 95 pcf	8	6.5 - 10	19	< 25 cm^3	3	9	MAX 30%
7:25	102+70	32'	43	40 - 90 sec	79	64 - 95 pcf	8	6.5 - 10	21	< 25 cm^3	2	13	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
14:00	101+60	2'	43	40 - 90 sec	79.5	64 - 95 pcf	8	6.5 - 10	**	< 25 cm^3	**	12	MAX 30%
14:00	101+60	33'	48	40 - 90 sec	81.5	64 - 95 pcf	8	6.5 - 10	**	< 25 cm^3	**	17	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY. (cm/sec)	Require
104+00	2.5	2" to 6"	110.5	+15 pcf over trench slurry	2.56×10^{-7}	1.0×10^{-7} cm/sec
103+75	3	2" to 6"	106.5	+15 pcf over trench slurry	2.17×10^{-7}	1.0×10^{-7} cm/sec
103+50	3	2" to 6"	116	+15 pcf over trench slurry	1.00×10^{-7}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 104+00, 103+75, 103+50

Technician: MM ✓BY SES

Sample Area: A= $A = \pi r^2$ $\pi(3.85)^2 = 46.56$ cm²

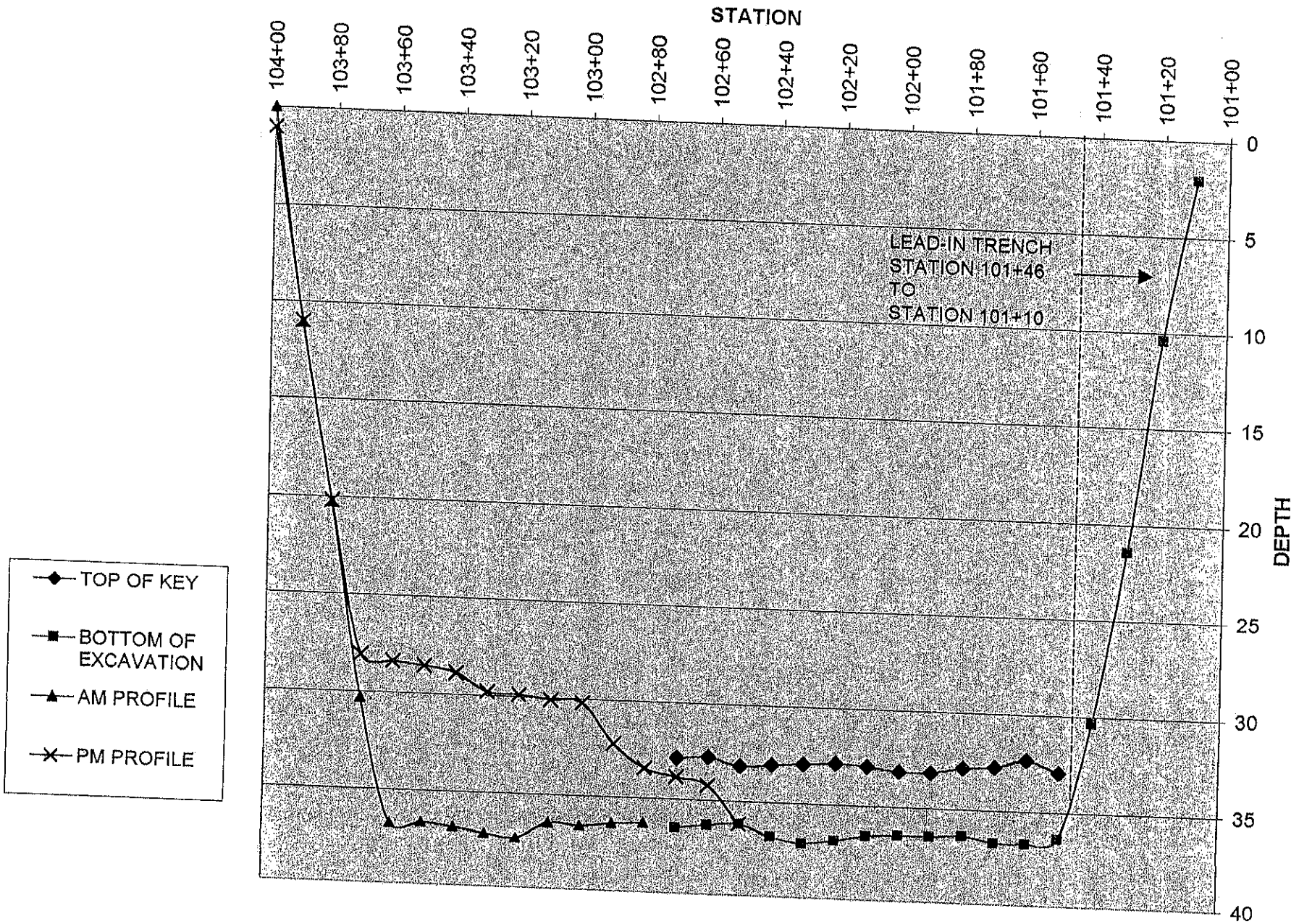
Sample Height: L= 7.0, 7.0, 7.0 respectively cm

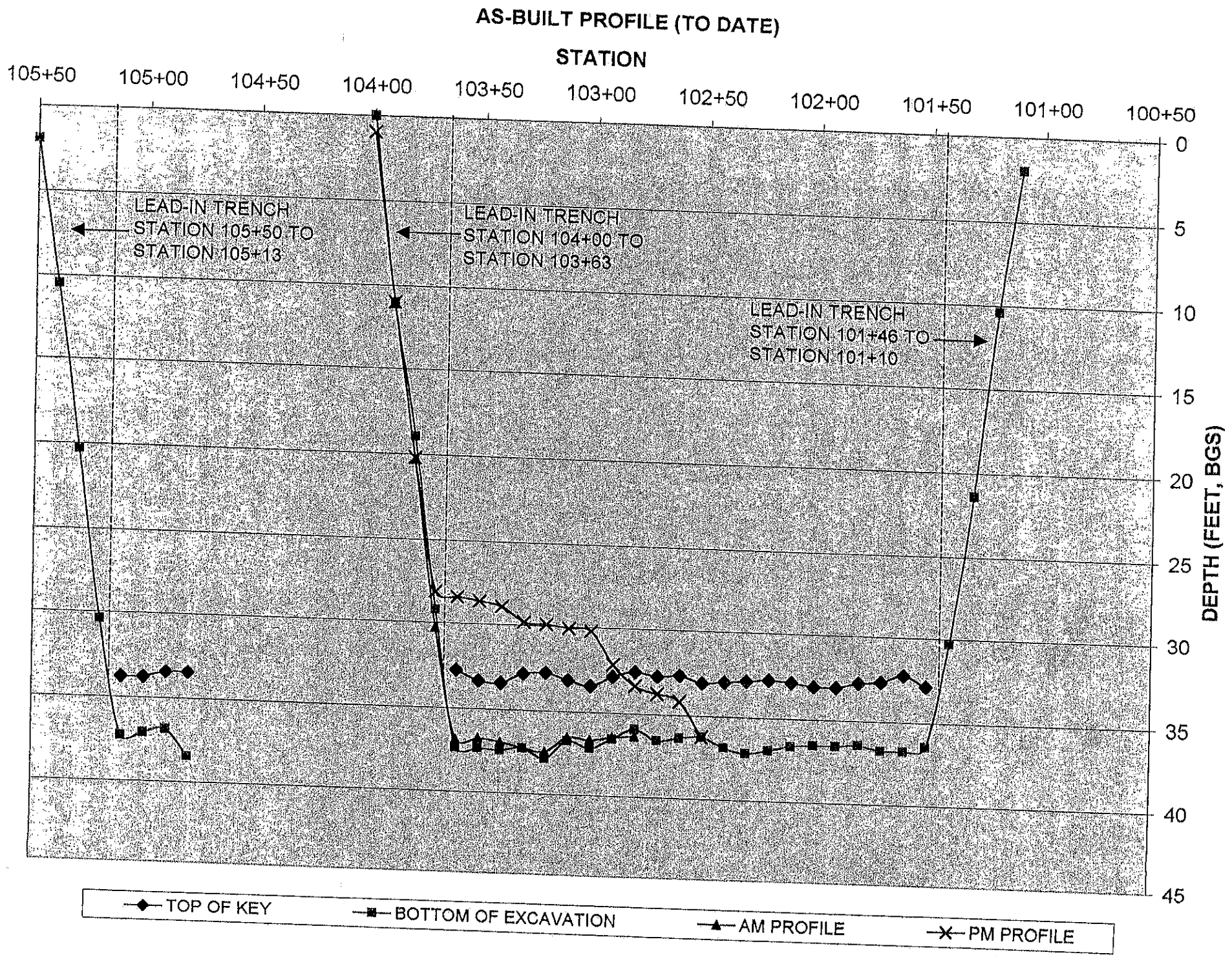
	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)
104+00	11/17/03	12:05 - 16:05	240	10	100.483	519312.2213	–	32	2.56×10^{-7}
103+75	11/17/03	12:05 - 16:05	240	10	100.483	519312.2213	–	27	2.17×10^{-7}
103+50	11/17/03	12:05 - 16:05	240	10	100.483	519312.2213	–	12.5	1.00×10^{-7}

I= $\frac{P\ (psi)}{0.014217\ L\ (cm)}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

AS-BUILT PROFILE (11/17/03)




AS-BUILT PROFILE (TO DATE)
STATION
105+50
105+00
104+50
104+00
103+50
103+00
102+50
102+00
101+50
101+00
100+50
0
5
10
15
20
25
30
35
40
45
DEPTH (FEET, BGS)
LEAD-IN TRENCH
STATION 105+50 TO
STATION 105+13
LEAD-IN TRENCH
STATION 104+00 TO
STATION 103+63
LEAD-IN TRENCH
STATION 101+46 TO
STATION 101+10
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

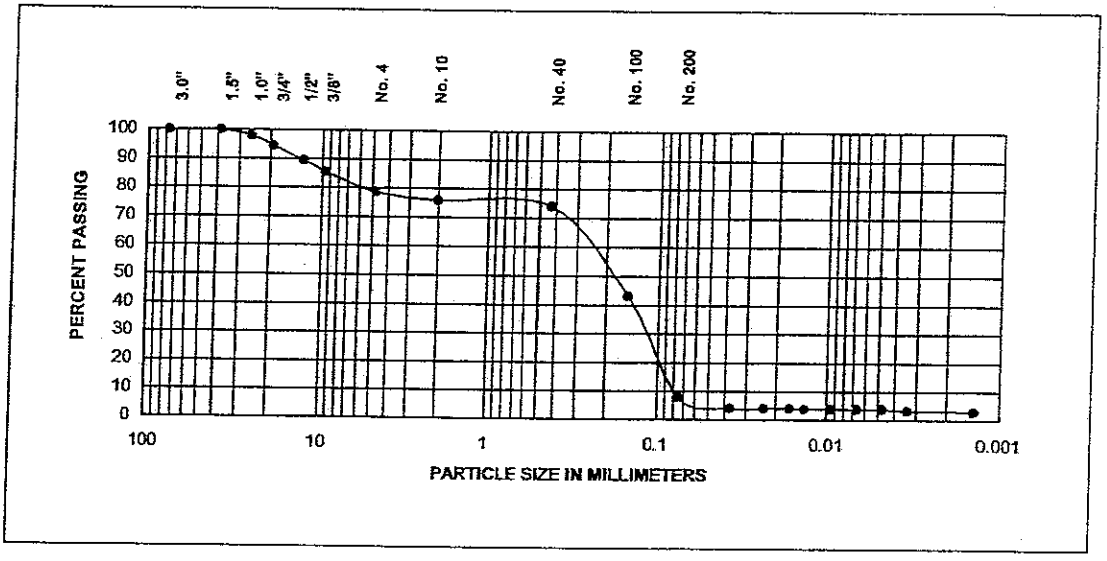
11/17/03

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
102+70	587.1	586.8	32.8	554.0	36.5	550.3	3.6	5.4
102+60	587.1	586.6	32.7	553.9	36.3	550.3	3.5	5.3
102+50	587.1	586.8	33.1	553.7	36.2	550.6	3.4	5.1
102+40	587.1	587.1	33.0	554.1	36.8	550.3	3.6	5.4
102+30	587.2	587.0	32.9	554.1	37.1	549.9	3.4	5.1
102+20	587.2	587.1	32.8	554.3	36.9	550.2	3.4	5.1
102+10	587.2	587.2	32.9	554.3	36.6	550.6	3.5	5.3
102+00	587.2	587.1	33.1	554.0	36.5	550.6	3.5	5.3
101+90	587.3	587.3	33.1	554.2	36.5	550.8	3.5	5.3
101+80	587.3	587.4	32.8	554.6	36.4	551.0	3.6	5.4
101+70	587.3	587.3	32.7	554.6	36.7	550.6	3.7	5.6
101+60	587.3	587.7	32.7	555.0	36.7	551.0	3.7	5.6
101+50	587.4	587.8	32.9	554.9	36.4	551.4	3.7	5.6
101+40	587.4	587.8	LEAD-IN		30.3	557.5	3.5	5.3
101+30	587.4	587.8	LEAD-IN		21.4	566.4	3.5	5.3
101+20	587.4	587.8	LEAD-IN		10.4	577.4	3.6	5.4
101+10	587.4	587.8	LEAD-IN		2.0	585.8	3.5	5.3

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-005	**Date Tested**	11/23/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	11/19/2003
Sample Location	102+00 (SW)
Sample Description	Gray Silty Sand with Clay, gravel & foul smell (Soil Only Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	21.4	70.5	4.0	4.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.26	0.12	0.08	3.4	0.65

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.0
3/4"	94.5
1/2"	89.6
3/8"	85.5
No. 4	78.6
No. 10	75.9
No. 40	74.1
No. 100	43.1
No. 200	8.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

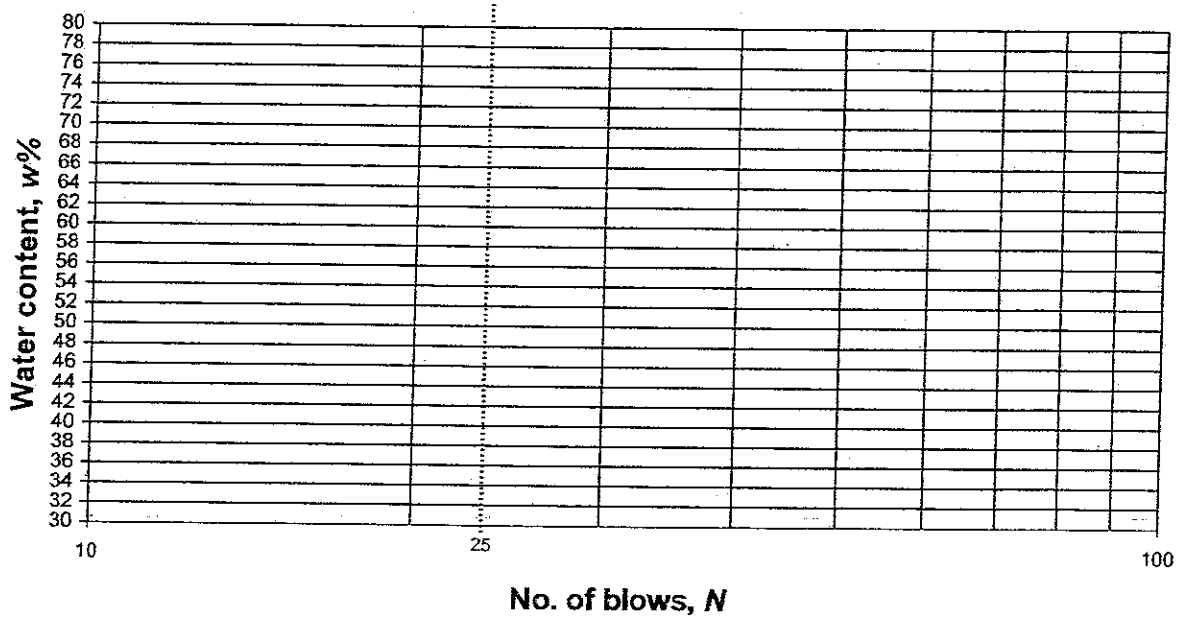
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-005	**Date Tested**	11/21/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	11/19/2003
Sample Location	102+00 (SW)
Sample Description	Gray Silty Sand with Clay, gravel & foul smell (Soil Only Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	1	Date	11/20/2003	Sheet	1
				Date of weighing	11/20 &11/21/03	Tested by	NP

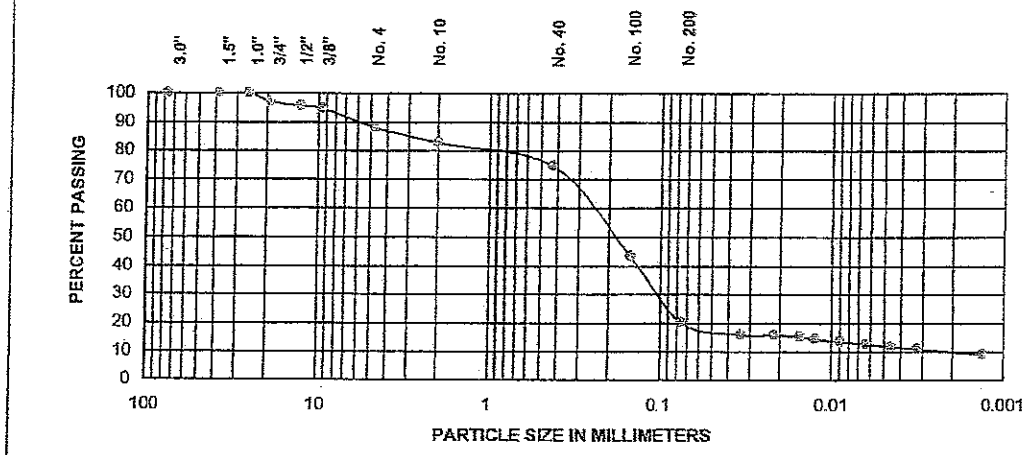
Boring No.	-	-	-	-	-	-
Sample No.	BF-001	BF-002	BF-003	BF-004	BF-005	BF-006
Location	106+50 (SW)	105+00 (SW)	104+00 (SW)	103+00 (SW)	102+00 (SW)	101+00 (SW)
Tin No.	18C	4C	11C	72A	7C	76A
Tin + Wet Soil	157.16	194.69	175.01	165.96	167.49	160.53
Tin + Dry Soil	135.06	150.98	129.65	135.46	145.64	130.15
Wt. of Tin	31.26	30.82	31.17	30.36	31.13	30.56
Wt. of Dry Soil	103.8	120.2	98.5	105.1	114.5	99.6
Wt. of Water	22.1	43.7	45.4	30.5	21.9	30.4
Moisture, %	21.3	36.4	46.1	29.0	19.1	30.5
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	BF-007	BF-008				
Location	106+00 (SW)	100+00 (SW)				
Tin No.	35C	176A				
Tin + Wet Soil	162.09	169.09				
Tin + Dry Soil	135.06	139.69				
Wt. of Tin	31.38	30.76				
Wt. of Dry Soil	103.7	108.9				
Wt. of Water	27.0	29.4				
Moisture, %	26.1	27.0				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-001	**Date Tested**	11/23/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	11/19/2003
Sample Location	104+00 (SW)
Sample Description	Gray Silty Clayey Sand with tr. Gravel & foul smell (S B Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.8	68.2	7.9	12.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	97.1
1/2"	95.6
3/8"	94.7
No. 4	88.2
No. 10	82.8
No. 40	74.8
No. 100	43.3
No. 200	20.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
38	20	18

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

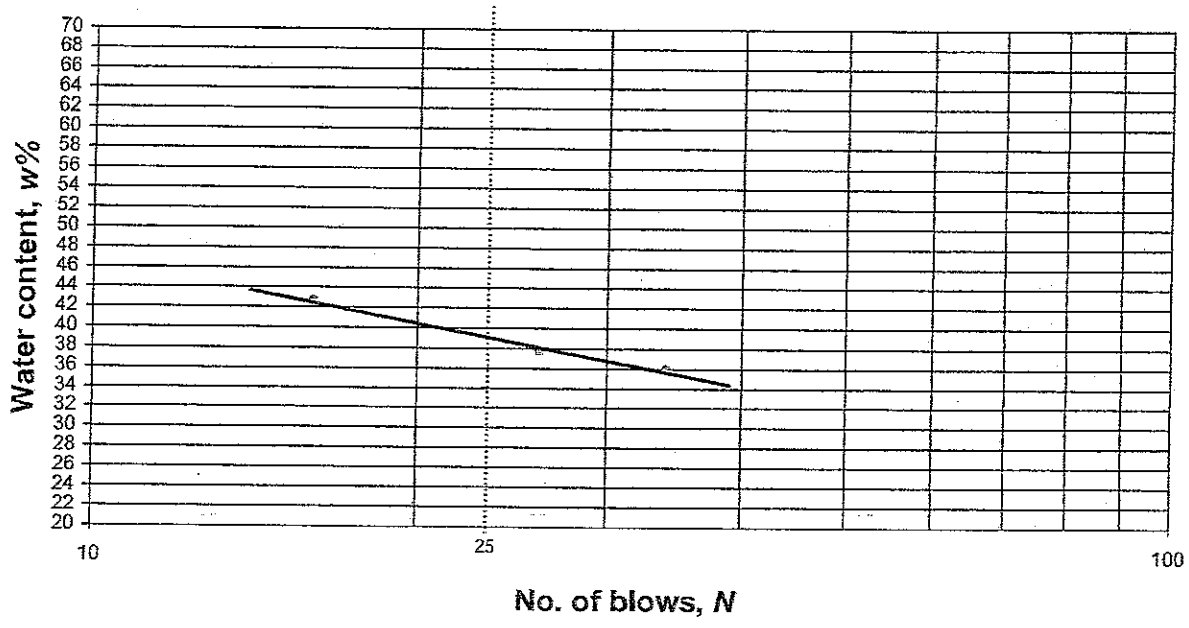
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-001	**Date Tested**	11/21/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	11/19/2003
Sample Location	104+00 (SW)
Sample Description	Gray Silty Clayey Sand with tr. Gravel & foul smell (S B Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	38	Plastic Limit, PL	20	Plasticity Index, PI	18

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	11/24/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-001	Date Recd.	11/19/03	**Location**	104+00 (SW)		
Sample Description	Gray Silty Clayey Sand with tr. Gravel & foul smell (S B Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.33	cm	Volume, V:	217.0	cu cm
Mass of Sample:	415.7	g	**Moisture Content:**	**28.3**	%
			Wet Density	**119.5**	pcf
			Dry Density	**93.2**	pcf

Final

Diameter:	6.85	cm	Area, A:	36.9	sq cm
Height, L:	4.88	cm	Volume, V:	179.8	cu cm
Mass of Sample:	362.00	g	**Moisture Content:**	**25.6**	%
			Wet Density	**125.6**	pcf
			Dry Density	**100.0**	pcf
			Deg of Saturation	**98.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	23.8	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
11/24/2003	9:30 AM	0	0	3.18	6.09		20.0	---
11/24/2003	10:30 AM	3600	3600	3.32	5.97	1.2	20.0	2.99E-08
11/24/2003	11:40 AM	4200	7800	3.50	5.82	1.2	20.0	3.25E-08
11/24/2003	12:30 PM	3000	10800	3.61	5.73	1.2	20.0	2.76E-08
11/24/2003	2:00 PM	5400	16200	3.81	5.57	1.3	20.0	2.77E-08

Average Permeability = **2.9E-08** **cm/sec**

Remarks:

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 120603

TRANSMITTAL NO. 02260-62

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd.
Griffith, IN 46319 219/923-1763

FROM: J. A. Wentz PE, EQM
1800 Carillon Blvd.
Cincinnati, Ohio 45240
800/229-7465

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260

PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See Instruction no. 6) h.	FOR CE USE CODE i.
156	111803 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025. This submittal contains the GeoCon Field QC data, Off-site Great Lakes analytical data, and any bentonite certifications for this date.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/18/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Rain, all day; 54 - 61 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
N/A						

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						

COMMENTS

No work today. Cancelled on account of weather forecast of rain and storms all day.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/18/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
N/A				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/18/03

JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL

JOB NUMBER: P01-048

WEATHER: Rain, all day; 54 - 61 degrees

RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A									

SF TODAY 0.00

SF TO DATE 12414.00

COMMENTS

No work today because of rain.

GEO-CON: Suzanne C. Sepic

OWNER:

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 01/15/04	TRANSMITTAL NO. 02260-63.1

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1600 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL X THIS IS A RESUBMITTAL OF TRANSMITTAL 02260-63
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
157	111903 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Fred Hall Fred Hall 1/15/04
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

CONTRACTOR RESPONSE TO GOVERNMENT REVIEW REMARKS

Indian Harbor Canal Confined Disposal Facility
Subsurface Investigation& Cutoff Wall

Contract No. DACW27-02-C-0003

Response to Government Comments on the following:

Item No.:	Submittal No.:	Description:	Date:
157	02260-63	111903 Daily GeoCon QC Data	December 6, 2003

Response to Government Comments Provided As:

Item No.:	Submittal No.:	Description:	Date:
157	02260-63.1	111903 Daily GeoCon QC Data	January 14, 2004

Action Code: FX – Code. Receipt acknowledged, does not comply as noted with contract requirements. Resubmission is required. See comments below.

Response:
Geo-Con has revised the 111903 Daily GeoCon QC Data to reflect USACE comments and is hereby resubmitting the entire document.

COMMENTS ON MAIN BODY AND GENERAL COMMENTS:

Comment:

1. Ensure that the daily cutoff wall QC data submittals include all laboratory data for all samples taken that day. Include Atterburg limits, grain size, moisture content, and permeability data. Why is the permeability report for SB-009 the only one included? Is the sample I.D. a typographical error on this lab sheet?

Response:

All laboratory data for all samples taken this day are now included as part of the Daily GeoCon QC Data Report. Only Samples BF-006 and SB-002 should be included for this date. SB-009 was not collected/sampled until 11/25/03.

Comment:

2. Include calculations demonstrating that 6% dry bentonite is being added by including the "Soil-Bentonite Backfill Quality Control" form included in the approved Transmittal No. 02260-16.1; Soil-Bentonite Slurry Trench Cutoff Wall Implementation Plan. (The form is in the Appendix C of the Standard Operating Procedures included in Appendix E of the Implementation Plan.) Ensure

that the width of the cutoff wall shown on the "Daily Soil Bentonite Slurry Wall Quality Control Form" and used in the percent-dry-bentonite calculations is based on field measurements of the slurry trench width.

Response:

Calculations demonstrating that 6% dry bentonite is being added while mixing the soil-bentonite backfill are located on the "Soil-Bentonite Backfill Quality Control" form and included as part of the GeoCon Daily QC Data Report. Actual field measured trench widths are shown on the "Daily Soil Bentonite Slurry Wall Quality Control Form and the field measured widths (average) are used in the percent-dry-bentonite calculations.

Comment:

3. Reference Section 02260, paragraph 3.5.1, which requires elevations to be recorded. Include on the forms the elevations of the items listed in 02260, paragraph 3.5.1.5.

Response:

A separate elevation spreadsheet form including all the elevations of the items listed in 02260, paragraph 3.5.1.5, is now included as part of the Geo-Con Daily QC Data Report.

Comment:

4. Ensure that the filtrate loss of the slurry meets the Contract requirements.

Response:

Filtrate loss of the slurry on this report meets the Contract requirements.

Comment:

5. Reference Section 02260, paragraph 3.4.4 – Slurry Placement and Maintenance. If the density or sand content of the slurry in the trench does not conform to the standards specified in Table 3, the excess solids shall be removed from the slurry using approved methods or the slurry shall be replaced with fresh slurry. Conditioning of the slurry may require recirculation through a shake screen or the addition of approved additives. Also, the slurry shall not be diluted by surface water.

Response:

For this report, all trench slurry conforms to the standards specified in Table 3 of the Soil-Bentonite Slurry Trench Cutoff Wall Implementation Plan. Slurry is not being diluted by surface water in this particular area of excavation.

Comment:

6. Note that the sand content of the "Bentonite Slurry at the Trench" exceeds 20%, yet the testing equipment (i.e., the sand content flask) is only calibrated/marked to 20%. Ensure that the testing equipment is suitable for the ranges encountered and is capable of producing reliable data.

Response:

On this report, sand content only exceeds 20% for one test (21%). In the onsite lab, there are 4 sand content flasks. Once the sand in the "Bentonite Slurry at the Trench" exceeded 20%, a second flask was used. The excess sand over 20% was poured into the second flask and was measured and added to the 20% in the first flask. When the USACE QA representative from Patrick Engineering arrived onsite, he calibrated one flask to measure up to 30% sand (by pouring 10% sand from flask #2 into flask #1 and marking lines).

Comment:

7. It is noted with reference to Spec. Section 02260/3.4.12, "Clay Cap", that no clay cap material has been placed to date.

Response:

Clay cap will be placed at a later date as the soil-bentonite slurry wall nears completion or after it is completed.

GEO-CON

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)

Phone: (724) 366-9311

Date Shipped: 20-Nov-03

Airbill No: N/A

Carrier: DIRECT--LAB PICKUP

Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL

PROJECT NO: P01-048

P.O.# 78406

Relinquished by: (Signature) Suzanne C Sepic

Received By: Atul Kumar

Date / Time: 11/20/03

Relinquished by: (Signature)

Received By:

Date / Time:

Relinquished by: (Signature)

Received at lab by:

Date / Time:

Relinquished from lab by: (Signature)

Received By:

Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
SB-002	SB BACKFILL**	102+00	11/19/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
BF-006	SOIL ONLY BACKFILL	101+00	11/19/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/19/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Sunny; 37 - 58 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
104+10	2.00	73.50	9.00	19.00	40.00	8
104+10	34.00	84.00	19.50	23.00	46.00	8
104+40	32.00	83.50	21.00	18.50	52.00	8
104+40	2.00	84.00	17.00	21.00	45.00	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
101+00	LAB SAMPLE COLLECTED 11/19/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
101+50	3.00	N/A	N/A	N/A	9.03×10^{-8}	N/A
101+75	3.00	N/A	N/A	N/A	1.34×10^{-7}	N/A
102+00	3.00	Sample to lab	Sample to lab	Sample to lab	1.30×10^{-7}	yes

COMMENTS

Filter cake was .3mm, .4mm, .5mm, and .6mm respectively.

Unit Weight: 101+50: 102.0 pcf
101+75: 105.5 pcf
102+00: 110.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepo OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/19/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
11:50	64.50	46.00	16.50	8
13:03	-	43.00	-	-
14:59	65.50	41.00	14.00	8

**Batch plant operations were halted at 15:00 today. Slurry was to the top of the trench. The level in the trench was kept high by backfilling operations for the rest of the shift.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/19/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Sunny; 37 - 58 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
103+50	32.4	36.3	36.9	10.0	368.5	3.5	104+00	1.0	SEE
103+60	32.4	36.7	36.5	10.0	365.0	3.4	103+90	11.1	PAGE
103+70	32.3	36.7	36.7	10.0	367.0	3.4	103+80	20.3	FOUR
103+80	32.5	36.3	36.5	10.0	365.0	3.4	103+70	28.2	FOR
103+90	32.4	36.3	36.3	10.0	363.0	3.3	103+60	28.2	END
104+00	32.5	36.8	36.6	10.0	365.5	3.3	103+50	28.3	OF
104+10	32.6	36.3	36.6	10.0	365.5	3.3	103+40	28.8	SHIFT
104+20	32.7	36.6	36.5	10.0	364.5	3.3	103+30	29.7	PROFILE
104+30	32.6	36.6	36.6	10.0	366.0	3.3	103+20	29.7	DUE
104+40	32.6	36.3	36.5	10.0	364.5	3.3	103+10	30.1	TO
							103+00	30.1	THE
							102+90	32.1	FACT
							102+80	33.2	THAT
							102+70	33.6	DIGGING
							102+60	34.0	CHANGED
							102+50	36.2	DIRECTION
							102+40	36.6	FROM
							102+30	37.2	SOUTH
							102+20	36.9	TO
							102+10	36.7	NORTH
							102+00	36.4	TO
							101+90	36.5	NORTH
							101+80	36.4	TO
							101+70	36.6	SOUTH
							101+60	36.7	
							101+50	36.5	
							101+40	30.5	
							101+30	21.3	
				SF TODAY	3654.50		101+20	10.4	
				SF TO DATE	16068.50		101+10	2.0	

COMMENTS

PM Profile is on page 4 due to the fact that excavation changed directions from south to north to north to south. This is to excavate the stations that were skipped due to pipe obstructions.

At 9:45, at Station 104+00, the excavator was tracked onto crane matts and digging started from Station 103+50 towards the south end of the wall (Station 106+50).

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/19/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Sunny; 37 - 58 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
							101+10		TOP OUT
							101+20		5.0
							101+30		10.2
							101+40		11.0
							101+50		13.1
							101+60		15.0
							101+70		16.1
							101+80		18.6
							101+90		20.9
							102+00		21.5
							102+10		22.2
							102+20		22.8
							102+30		23.0
							102+40		23.0
							102+50		23.0
							102+60		25.5
							102+70		28.5
							102+80		28.6
							102+90		28.6
							103+00		28.9
							103+10		28.7
							103+20		28.9
							103+30		36.3
							103+40		36.6
							103+50		36.3
							103+60		36.7
							103+70		36.7
							103+80		36.3
							103+90		36.3
							104+00		36.8
							104+10		36.3
							104+20		36.6
							104+30		36.6
							104+40		36.3

SF TODAY

SF TO DATE

COMMENTS

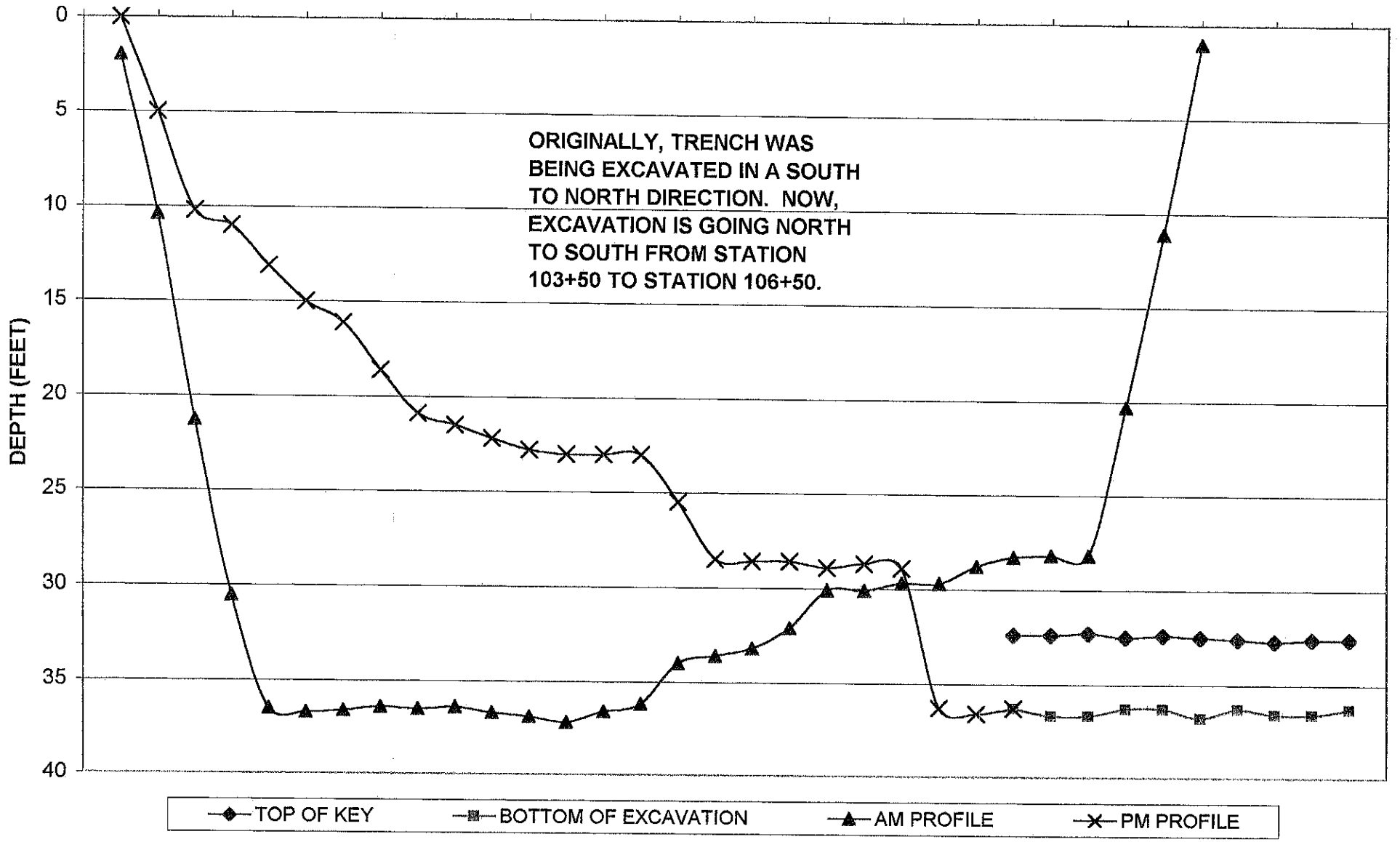
PM Profile is on page 4 due to the fact that excavation changed directions from south to north to north to south. This is to excavate the stations that were skipped due to pipe obstructions.

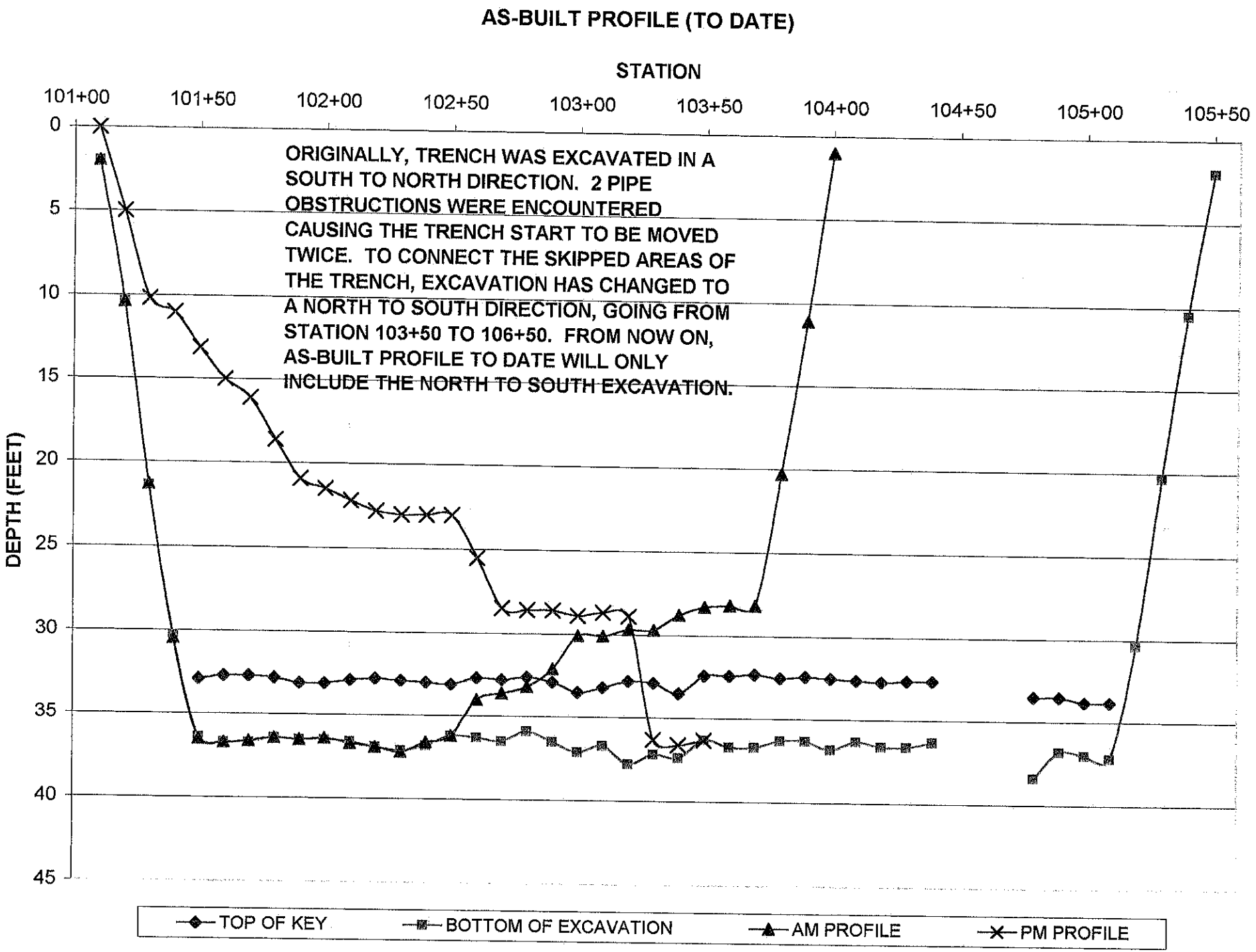
At 9:45, at Station 104+00, the excavator was tracked onto crane matts and digging started from Station 103+50 towards the south end of the wall (Station 106+50).

GEO-CON Suzanne E. Sepic OWNER:

AS-BUILT PROFILE (11/19/03)

STATION




AS-BUILT PROFILE (TO DATE)
STATION
101+00
101+50
102+00
102+50
103+00
103+50
104+00
104+50
105+00
105+50
DEPTH (FEET)
0
5
10
15
20
25
30
35
40
45
ORIGINALLY, TRENCH WAS EXCAVATED IN A SOUTH TO NORTH DIRECTION. 2 PIPE OBSTRUCTIONS WERE ENCOUNTERED CAUSING THE TRENCH START TO BE MOVED TWICE. TO CONNECT THE SKIPPED AREAS OF THE TRENCH, EXCAVATION HAS CHANGED TO A NORTH TO SOUTH DIRECTION, GOING FROM STATION 103+50 TO 106+50. FROM NOW ON, AS-BUILT PROFILE TO DATE WILL ONLY INCLUDE THE NORTH TO SOUTH EXCAVATION.
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 11/19/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	11:50	46	> 40 sec	64.5	> 64 pcf	8	6.5 - 10	16.5	< 20 cm^3	0.15
PM	14:59	41	> 40 sec	65.5	> 64 pcf	8	6.5 - 10	14	< 20 cm^3	0.15

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	13:03	43	> 40 sec							
PM	—	—	> 40 sec							

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
13:10	104+10	2	40	40 - 90 sec	73.5	64 - 95 pcf	8	6.5 - 10	19	< 25 cm^3	0.3	9	MAX 30%
13:10	104+10	34	46	40 - 90 sec	84	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	0.4	19.5	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
16:11	104+40	32	52	40 - 90 sec	83.5	64 - 95 pcf	8	6.5 - 10	18.5	< 25 cm^3	.5	21	MAX 30%
16:11	104+40	2'	45	40 - 90 sec	84	64 - 95 pcf	8	6.5 - 10	21	< 25 cm^3	.6	17	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
101+50	3	2" to 6"	102	+15 pcf over trench slurry	9.03×10^{-8}	1.0×10^{-7} cm/sec
101+75	3	2" to 6"	105.5	+15 pcf over trench slurry	1.34×10^{-7}	1.0×10^{-7} cm/sec
102+00	3	2" to 6"	110	+15 pcf over trench slurry	1.30×10^{-7}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
						1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 101+50, 101+75, 102+00

Technician: MM ✓BY SES

Sample Area: A= $\pi(3.85)^2$ = 46.56 cm^2 ($A=\pi r^2$)

Sample Height: L= 7.5cm, 6.5cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)
101+50	11/19/03	14:30-18:30	240	10	93.7844	484692.7847 ~~510533.5847~~	–	10.5	9.03×10^{-8}
101+75	11/19/03	14:30-18:30	240	10	108.2128	559261.0644	–	18.0	1.34×10^{-7}
102+00	11/19/03	14:30-18:30	240	10	108.2128	559261.0644	–	17.5	1.30×10^{-7}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$

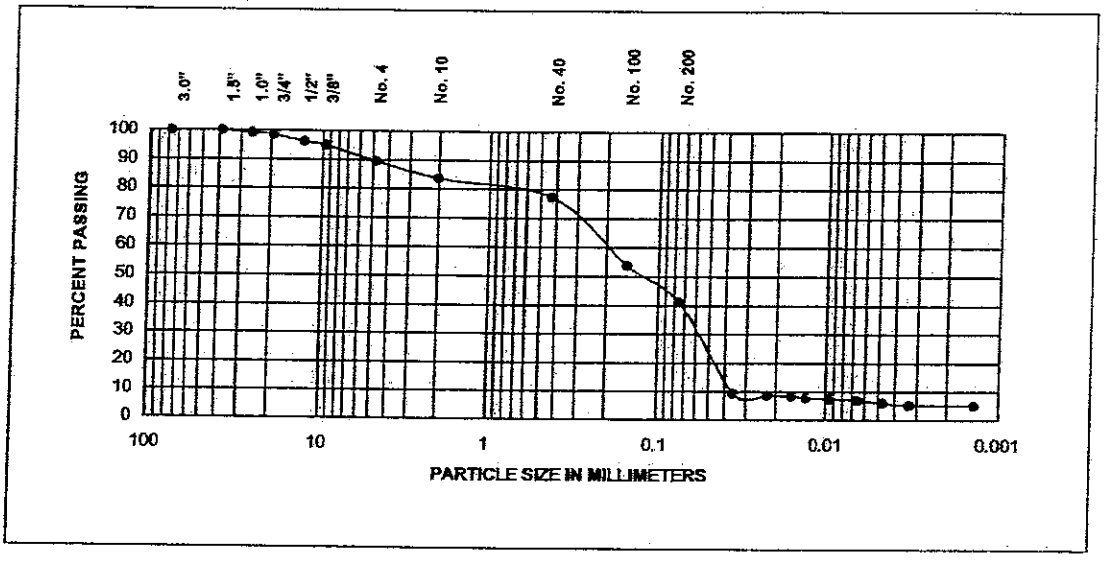
R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
104+40	586.5	586.5	32.6	553.9	36.3	550.2	3.3	5.0
104+30	586.6	586.6	32.6	554.0	36.6	550.0	3.3	5.0
104+20	586.6	586.5	32.7	553.8	36.6	549.9	3.3	5.0
104+10	586.7	586.2	32.6	553.6	36.3	549.9	3.3	5.0
104+00	586.7	586.3	32.5	553.8	36.8	549.5	3.3	5.0
103+90	586.7	586.5	32.4	554.1	36.3	550.2	3.3	5.0
103+80	586.7	586.6	32.5	554.1	36.3	550.3	3.4	5.1
103+70	586.8	586.5	32.3	554.2	36.7	549.8	3.4	5.1
103+60	586.8	586.5	32.4	554.1	36.7	549.8	3.4	5.1
103+50	586.8	586.4	32.4	554.0	36.3	550.1	3.5	5.3

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-006	**Date Tested**	11/24/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	11/20/2003
Sample Location	101+00 (SW)
Sample Description	Gray Silty Sand, tr. Gravel & foul smell (Soil Only Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	10.5	48.4	34.6	6.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	99.3
3/4"	98.6
1/2"	96.3
3/8"	95.0
No. 4	89.5
No. 10	83.7
No. 40	77.4
No. 100	53.8
No. 200	41.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SM
Soil Description:	Silty sand
System:	USCS

Remarks:

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

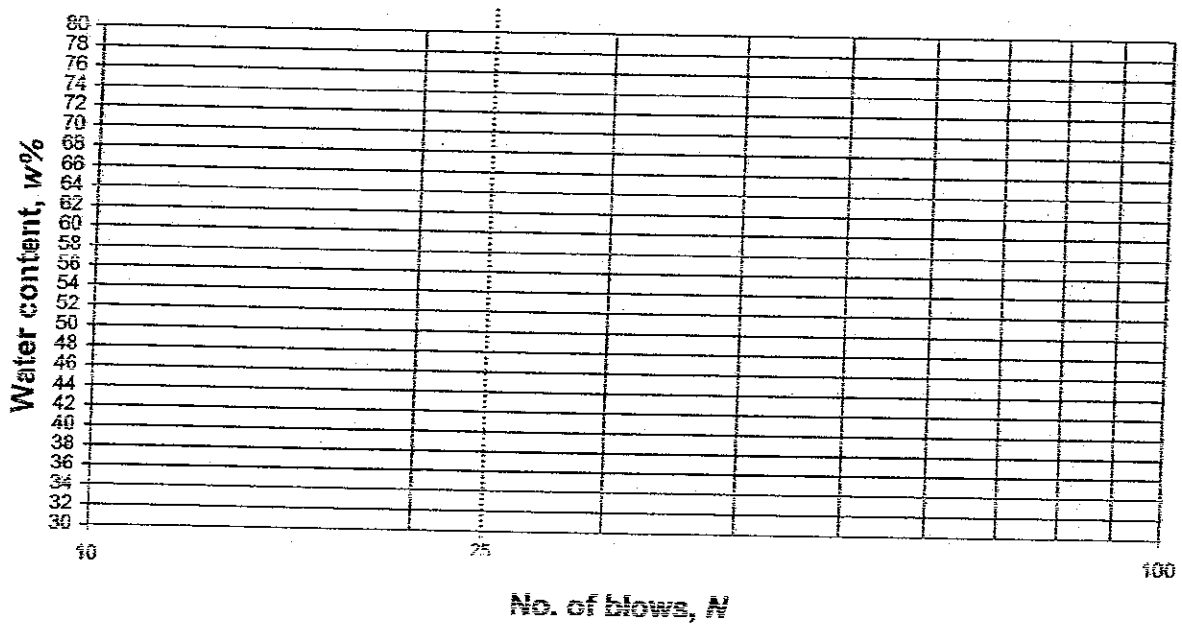
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-006	**Date Tested**	11/22/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	11/20/2003
Sample Location	101+00 (SW)
Sample Description	Gray Silty Sand, tr. Gravel & foul smell (Soil Only Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	Plastic Limit, PL	NP	Plasticity Index, PI	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	1	Date	11/20/2003	Sheet	1
				Date of weighing	11/20 &11/21/03	Tested by	NP

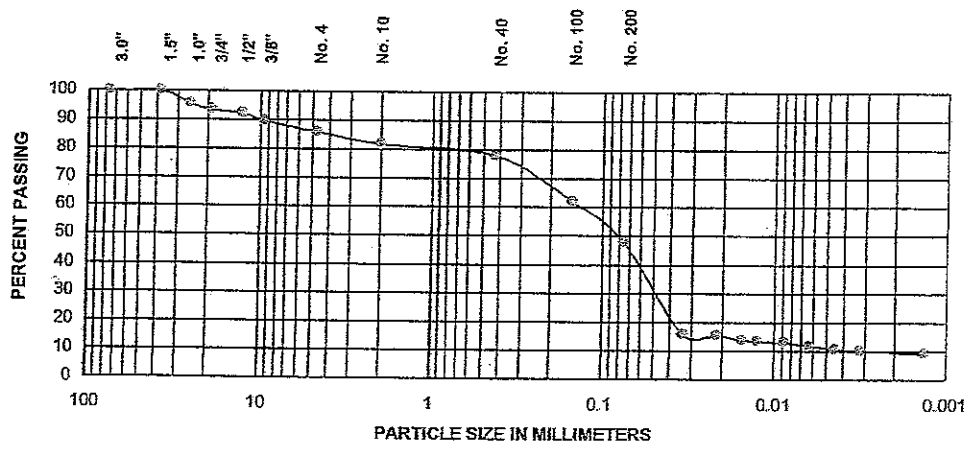
Boring No.	-	-	-	-	-	-
Sample No.	BF-001	BF-002	BF-003	BF-004	BF-005	BF-006
Location	106+50 (SW)	105+00 (SW)	104+00 (SW)	103+00 (SW)	102+00 (SW)	101+00 (SW)
Tin No.	18C	4C	11C	72A	7C	76A
Tin + Wet Soil	157.16	194.69	175.01	165.96	167.49	160.53
Tin + Dry Soil	135.06	150.98	129.65	135.46	145.64	130.15
Wt. of Tin	31.26	30.82	31.17	30.36	31.13	30.56
Wt. of Dry Soil	103.8	120.2	98.5	105.1	114.5	99.6
Wt. of Water	22.1	43.7	45.4	30.5	21.9	30.4
Moisture, %	21.3	36.4	46.1	29.0	19.1	30.5
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	BF-007	BF-008				
Location	106+00 (SW)	100+00 (SW)				
Tin No.	35C	176A				
Tin + Wet Soil	162.09	169.09				
Tin + Dry Soil	135.06	139.69				
Wt. of Tin	31.38	30.76				
Wt. of Dry Soil	103.7	108.9				
Wt. of Water	27.0	29.4				
Moisture, %	26.1	27.0				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-002	**Date Tested**	11/24/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	11/20/2003
Sample Location	102+00 (SW)
Sample Description	Gray Clayey Sand, tr. Gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	14.1	38.1	36.7	11.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	95.5
3/4"	93.4
1/2"	92.2
3/8"	89.7
No. 4	85.9
No. 10	81.9
No. 40	78.0
No. 100	62.1
No. 200	47.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
33	20	13

Soil Classification:	SC
Soil Description:	Clayey sand
System:	USCS

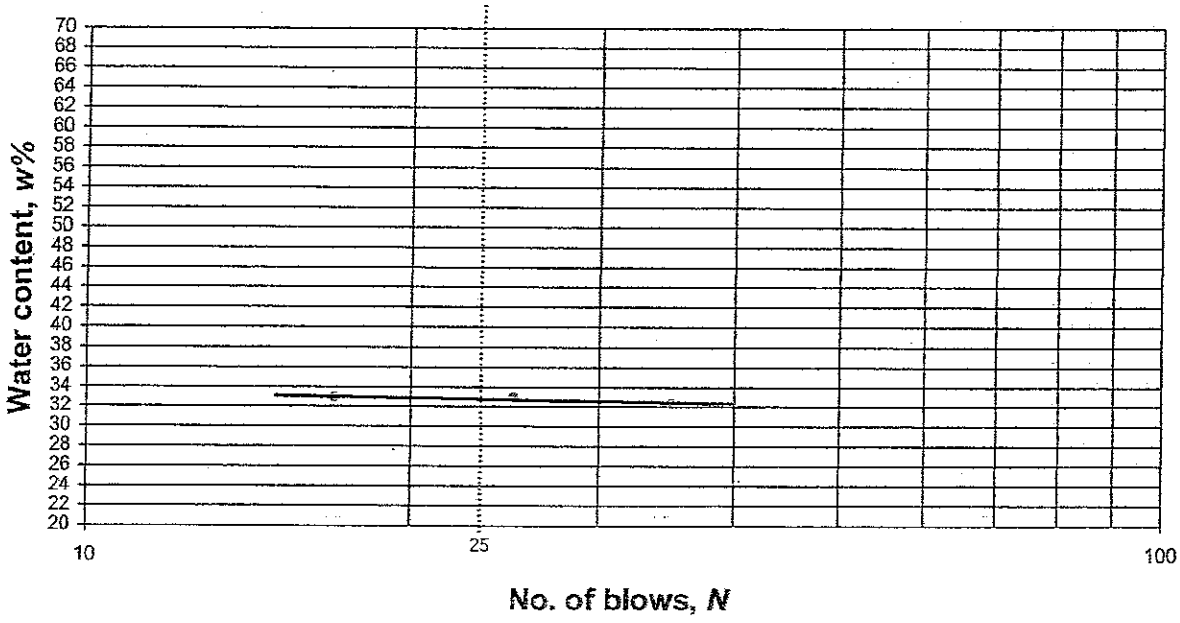
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-002	**Date Tested**	11/22/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	11/20/2003
Sample Location	102+00 (SW)
Sample Description	Gray Clayey Sand, tr. Gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	33	Plastic Limit, PL	20	Plasticity Index, PI	13

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	11/24/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-002	Date Recd.	11/20/03	**Location**	102+00 (SW)		
Sample Description	Gray Clayey Sand, tr Gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.09	cm	Volume, V:	207.2	cu cm
Mass of Sample:	403.1	g	**Moisture Content:**	**28.5**	**%**
			Wet Density	**121.4**	**pcf**
			Dry Density	**94.5**	**pcf**

Final

Diameter:	7.05	cm	Area, A:	39.0	sq cm
Height, L:	4.78	cm	Volume, V:	186.6	cu cm
Mass of Sample:	377.50	g	**Moisture Content:**	**24.3**	**%**
			Wet Density	**126.2**	**pcf**
			Dry Density	**101.6**	**pcf**
			Deg of Saturation	**96.9**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	24.9	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
11/24/2003	9:30 AM	0	0	2.97	6.08		20.0	---
11/24/2003	10:30 AM	3600	3600	3.10	5.97	1.2	20.0	2.59E-08
11/24/2003	11:40 AM	4200	7800	3.25	5.80	0.9	20.0	3.47E-08
11/24/2003	12:30 PM	3000	10800	3.37	5.70	1.2	20.0	2.90E-08
11/24/2003	2:00 PM	5400	16200	3.57	5.53	1.2	20.0	2.78E-08

Average Permeability = **2.9E-08** **cm/sec**

Remarks:

Revised

LABORATORY ANALYSIS/ CERTIFICATION

P.O. Box 832 Greybull, Wyoming 02426
307-765-4496

Date Tested: 11/21/2003

SOLD TO:	*SHIP TO:*
GEO-CON East Chicago, Indiana	SAME

SHIP DATE	RAILCAR OR TRUCK NUMBER	PLANT OF ORIGIN	PRODUCT
11/17/2003	Tausan 57	Greybull	Federal Gel 90

Note: Our data for the above shipment shows the following test results:

Test or Property	API Spec.	Result
Viscosity	30 min.	35
Plastic Viscosity (cP)	N/A	
Yield Point (# /100ft^2)	N/A	
Filtrate Volume (cm^3)	15.0 max.	13.2
>75 micron (wt. %)	4.0 max.	2.3

Test or Property	API Spec.	Result
Moisture (wt %)	10.0 max.	7.3
Y.P. / P.V. Ratio	3.0 max.	1.5

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13-A; Section 4 for "Drilling Grade Bentonite". Should you have any questions or require additional information please let us know 1-307-765-4496.

ORDER NUMBERS : HCIV 5957

TRUCK SHIP DATE : 11/17/2003

Marie Williams 11/24/03

Signed Date

Arrived onsite 11/19/03

2000 # Bulk Bags

Revised

LABORATORY ANALYSIS/ CERTIFICATION

P.O. Box 832 Greybull, Wyoming 02426
307-765-4496

Date Tested: 11/21/2003

SOLD TO:	*SHIP TO:*
GEO-CON East Chicago, Indiana	SAME

SHIP DATE	RAILCAR OR TRUCK NUMBER	PLANT OF ORIGIN	PRODUCT
11/17/2003	Quality 64	Greybull	Federal Gel 90

Note: Our data for the above shipment shows the following test results:

Test or Property	API Spec.	Result
Viscosity	30 min.	35
Plastic Viscosity (cP)	N/A	
Yield Point (# /100ft^2)	N/A	
Filtrate Volume (cm^3)	15.0 max.	13.2
>75 micron (wt. %)	4.0 max.	2.3

Test or Property	API Spec.	Result
Moisture (wt %)	10.0 max.	7.3
Y.P. / P.V. Ratio	3.0 max.	1.5

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13-A; Section 4 for "Drilling Grade Bentonite". Should you have any questions or require additional information please let us know 1-307-765-4496.

ORDER NUMBERS : HCIV 5959

TRUCK SHIP DATE : 11/17/2003

Maxine Williams 11/24/03

Signed Date

rived onsite 11/19/03
OO# Bulk Reas

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 4/1/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV005932	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
11-17-03	TARIN TRUCKING #7	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result	Test or Property	API Spec	Result
Viscosity	30 min.	48	Moisture (wt. %)	N/A	8.4
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max.	1.69
Yield Point (# / 100 ft2)	N/A				
Filtrate Volume (cm3)	15.0 max.	13.8			
> 75 micron (wt. %)	4.0 max.	2.2			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4498.

Signed 11/18/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Arrived 11/19/03

100# Bags

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 01/15/04	TRANSMITTAL NO. 02260-64.1

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL X THIS IS A RESUBMITTAL OF TRANSMITTAL 02260-64
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
158	112003 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Fred Hall Fred W. Hall 1/15/04
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

CONTRACTOR RESPONSE TO GOVERNMENT REVIEW REMARKS

Indian Harbor Canal Confined Disposal Facility
Subsurface Investigation& Cutoff Wall

Contract No. DACW27-02-C-0003

Response to Government Comments on the following:

Item No.:	Submittal No.:	Description:	Date:
158	02260-64	112003 Daily GeoCon QC Data	December 6, 2003

Response to Government Comments Provided As:

Item No.:	Submittal No.:	Description:	Date:
158	02260-64.1	112003 Daily GeoCon QC Data	January 14, 2004

Action Code: FX – Code. Receipt acknowledged, does not comply as noted with contract requirements. Resubmission is required. See comments below.

Response:
Geo-Con has revised the 112003 Daily GeoCon QC Data to reflect USACE comments and is hereby resubmitting the entire document.

COMMENTS ON MAIN BODY AND GENERAL COMMENTS:

Comment:

1. Include calculations demonstrating that 6% dry bentonite is being added by including the "Soil-Bentonite Backfill Quality Control" form included in the approved Transmittal No. 02260-16.1; Soil-Bentonite Slurry Trench Cutoff Wall Implementation Plan. (The form is in the Appendix C of the Standard Operating Procedures included in Appendix E of the Implementation Plan.) Ensure that the width of the cutoff wall shown on the "Daily Soil Bentonite Slurry Wall Quality Control Form" and used in the percent-dry-bentonite calculations is based on field measurements of the slurry trench width.

Response:

Calculations demonstrating that 6% dry bentonite is being added while mixing the soil-bentonite backfill are located on the "Soil-Bentonite Backfill Quality Control" form and included as part of the Geo-Con Daily QC Data Report. Actual field measured trench widths are shown on the "Daily Soil Bentonite Slurry Wall Quality Control Form and the field measured widths (average) are used in the percent-dry-bentonite calculations.

Comment:

2. Reference Section 02260, paragraph 3.5.1, which requires elevations to be recorded. Include on the forms the elevations of the items listed in 02260, paragraph 3.5.1.5.

Response:

A separate elevation spreadsheet form including all the elevations of the items listed in 02260, paragraph 3.5.1.5, is now included as part of the Geo-Con Daily QC Data Report.

Comment:

3. Ensure that the filtrate loss of the slurry meets the Contract requirements.

Response:

Filtrate loss of the slurry on this report meets the Contract requirements.

Comment:

4. Note that the sand content of the "Bentonite Slurry at the Trench" exceeds 20%, yet the testing equipment (i.e., the sand content flask) is only calibrated/marked to 20%. Ensure that the testing equipment is suitable for the ranges encountered and is capable of producing reliable data.

Response:

In the onsite lab, there are 4 sand content flasks. Once the sand in the "Bentonite Slurry at the Trench" exceeded 20%, a second flask was used. The excess sand over 20% was poured into the second flask and was measured and added to the 20% in the first flask. When the USACE QA representative from Patrick Engineering arrived onsite, he calibrated one flask to measure up to 30% sand (by pouring 10% sand from flask #2 into flask #1 and marking lines).

Comment:

5. It is noted with reference to Spec. Section 02260/3.4.12, "Clay Cap", that no clay cap material has been placed to date.

Response:

Clay cap will be placed at a later date as the soil-bentonite slurry wall nears completion or after it is completed.

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)

Phone: (724) 366-9311

Airbill No: N/A

Date Shipped: 21-Nov-03

Carrier: DIRECT--LAB PICKUP

Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944

Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL

PROJECT NO: P01-048

P.O.# 78406

Relinquished by: (Signature) Suzanne C. Sepic

Received By: Atul Kumar

Date / 11/21/03
Time: 7:35

Relinquished by: (Signature)

Received By:

Date /
Time:

Relinquished by: (Signature)

Received at lab by:

Date /
Time:

Relinquished from lab by: (Signature)

Received By:

Date /
Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
SB-003	SB BACKFILL**	101+50	11/20/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-004	SB BACKFILL**	103+00	11/20/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/20/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Sunny; 41 - 64 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
104+50	2.00	79.00	21.00	20.50	49.00	8
104+50	34.00	82.50	25.00	23.00	51.00	8
105+10	34.00	84.50	23.00	23.50	47.00	8
105+10	2.00	85.50	20.00	22.00	73.00	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A	THE AREA WE ARE EXCAVATING IN WAS ALREADY SAMPLED.			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
101+10	3.00	N/A	N/A	N/A	2.93×10^{-7}	N/A
101+25	3.00	N/A	N/A	N/A	3.54×10^{-7}	N/A
101+50	3.00	Sample to lab	Sample to lab	Sample to lab	5.86×10^{-7}	yes
102+25	3.00	N/A	N/A	N/A	4.09×10^{-7}	N/A
102+50	3.00	N/A	N/A	N/A	1.55×10^{-7}	N/A
102+75	3.00	N/A	N/A	N/A	2.20×10^{-7}	N/A
103+00	3.00	Sample to lab	Sample to lab	Sample to lab	tomorrow	yes

COMMENTS

Filter cake was .5mm, .5mm, .5mm, and .5mm respectively.

Unit Weight: 101+10: 101.0 pcf
101+25: 103.5 pcf
101+50: 102.0 pcf
102+25: 110.0 pcf
102+50: 106.5 pcf
102+75: 107.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/20/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
N/A				

**No slurry was mixed at the batch plant today. Slurry level in the trench was kept high by backfilling operations.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/20/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Sunny; 41 - 64 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
							104+10		27.8
							104+20		28.1
							104+30		29.9
							104+40		32.2
							104+50		35.1
							104+60		35.8
							104+70		36.6
							104+80		36.5
							104+90		36.8
							105+00		36.4
							105+10		36.7
							105+20		26.8
							105+30		22.0

SF TODAY

SF TO DATE

COMMENTS

PM Profile continued from Page 3.

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/20/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Sunny; 41 - 64 degrees RIG NUMBER:

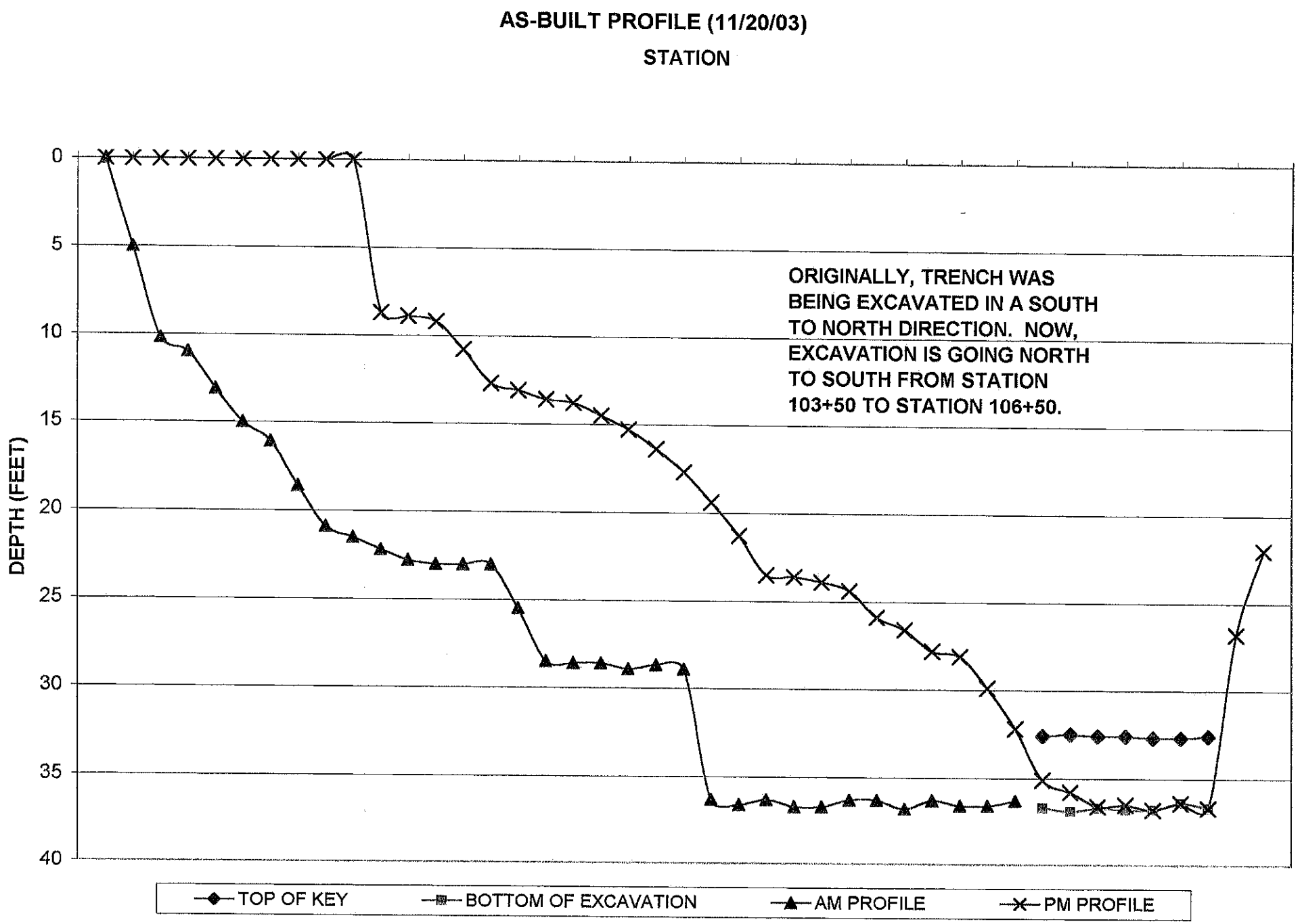
EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
104+50	32.6	36.7	36.5	10.0	365.0	3.2	101+10	OUT	TOP OUT
104+60	32.5	36.9	36.8	10.0	368.0	3.3	101+20	5.0	TOP OUT
104+70	32.6	36.7	36.8	10.0	368.0	3.4	101+30	10.2	TOP OUT
104+80	32.6	36.8	36.8	10.0	367.5	3.4	101+40	11.0	TOP OUT
104+90	32.7	36.8	36.8	10.0	368.0	3.5	101+50	13.1	TOP OUT
105+00	32.7	36.4	36.6	10.0	366.0	3.5	101+60	15.0	TOP OUT
105+10	32.6	36.7	36.6	10.0	365.5	3.6	101+70	16.1	TOP OUT
							101+80	18.6	TOP OUT
							101+90	20.9	TOP OUT
							102+00	21.5	TOP OUT
							102+10	22.2	8.7
							102+20	22.8	8.9
							102+30	23.0	9.2
							102+40	23.0	10.8
							102+50	23.0	12.7
							102+60	25.5	13.1
							102+70	28.5	13.6
							102+80	28.6	13.8
							102+90	28.6	14.5
							103+00	28.9	15.3
							103+10	28.7	16.4
							103+20	28.9	17.7
							103+30	36.3	19.4
							103+40	36.6	21.3
							103+50	36.3	23.5
							103+60	36.7	23.6
							103+70	36.7	23.9
							103+80	36.3	24.4
			SF TODAY		2568.00		103+90	36.3	25.9
			SF TO DATE		18636.50		104+00	36.8	26.6

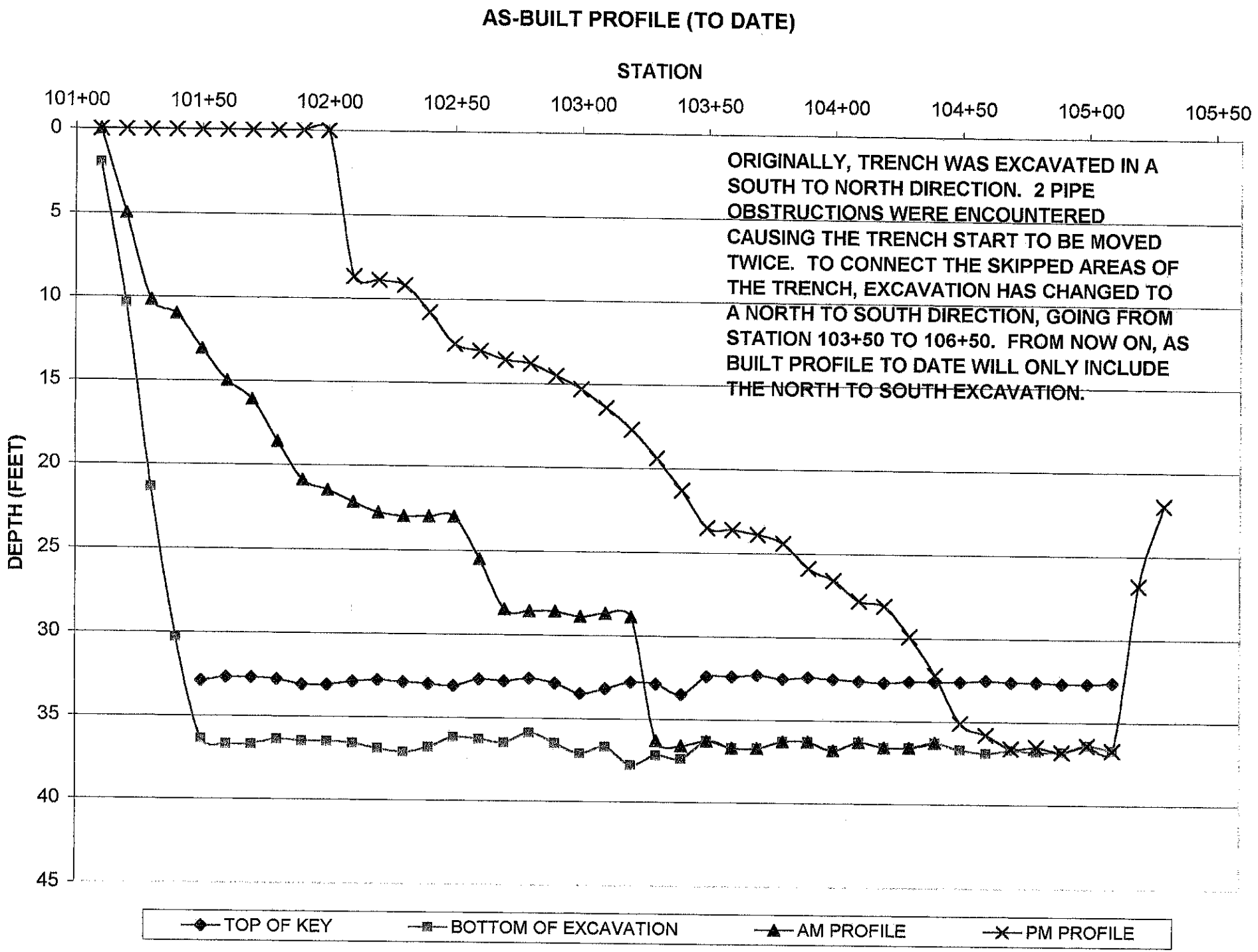
COMMENTS (CON'T ON PAGE 4)

PM Profile is continued on page 4.

At 7:45, we were excavating at Station 104+77 (pipe). When excavating this cut, another pipe was discovered at Station 104+55, approximately 25.8' deep. At 14:30, at Station 104+87, the 2nd pipe of the day was discovered.

GEO-CON: Suzanne E. Sepic OWNER:


AS-BUILT PROFILE (11/20/03)
STATION
DEPTH (FEET)
0
5
10
15
20
25
30
35
40
ORIGINALLY, TRENCH WAS BEING EXCAVATED IN A SOUTH TO NORTH DIRECTION. NOW, EXCAVATION IS GOING NORTH TO SOUTH FROM STATION 103+50 TO STATION 106+50.
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE (TO DATE)
STATION
101+00
101+50
102+00
102+50
103+00
103+50
104+00
104+50
105+00
105+50
DEPTH (FEET)
0
5
10
15
20
25
30
35
40
45
ORIGINALLY, TRENCH WAS EXCAVATED IN A SOUTH TO NORTH DIRECTION. 2 PIPE OBSTRUCTIONS WERE ENCOUNTERED CAUSING THE TRENCH START TO BE MOVED TWICE. TO CONNECT THE SKIPPED AREAS OF THE TRENCH, EXCAVATION HAS CHANGED TO A NORTH TO SOUTH DIRECTION, GOING FROM STATION 103+50 TO 106+50. FROM NOW ON, AS BUILT PROFILE TO DATE WILL ONLY INCLUDE THE NORTH TO SOUTH EXCAVATION.
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 11/20/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	—	—	> 40 sec	—	> 64 pcf	—	6.5 - 10	—	< 20 cm^3	—
PM	—	—	> 40 sec	—	> 64 pcf	—	6.5 - 10	—	< 20 cm^3	—

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	—	—	> 40 sec							
PM	—	—	> 40 sec							

No slurry mixed at the Batch Plant today. Slurry level in the trench Kept up by backfilling Operations.

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
13:20	104+50	2'	49	40 - 90 sec	79	64 - 95 pcf	8	6.5 - 10	20.5	< 25 cm^3	.5	21	MAX 30%
13:20	104+50	34'	51	40 - 90 sec	82.5	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	.5	25	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
16:50	105+10	34'	47	40 - 90 sec	84.5	64 - 95 pcf	8	6.5 - 10	23.5	< 25 cm^3	.5	23	MAX 30%
16:50	105+10	2'	73	40 - 90 sec	85.5	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	.5	20	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
101+10	3	2" to 6"	101.0	+15 pcf over trench slurry	2.93×10^{-7}	1.0×10^{-7} cm/sec
101+25	3	2" to 6"	103.5	+15 pcf over trench slurry	3.54×10^{-7}	1.0×10^{-7} cm/sec
101+50	3	2" to 6"	102.0	+15 pcf over trench slurry	5.86×10^{-7}	1.0×10^{-7} cm/sec
102+~~00~~ 25	3	2" to 6"	110.0	+15 pcf over trench slurry	4.09×10^{-7}	1.0×10^{-7} cm/sec
102+~~50~~ 50	3	2" to 6"	106.5	+15 pcf over trench slurry	1.55×10^{-7}	1.0×10^{-7} cm/sec
102+75	3		107.0		2.20×10^{-7}	

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 101+10, 101+25, 101+50, 102+25, 102+50, 102+75

Technician: MM ✓BY SES

Sample Area: A= $\pi(3.85)^2$ = 46.56 cm² ($A=\pi r^2$)

Sample Height: L= 7.0cm, 6.5cm, 7.0cm, 6.1cm, 7.5cm, 6.3cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ correlation factor x(1/14.65)
101+10	11/20/03	9:16-13:16	240	10	100.4833	519313.7717	—	36.5	2.93×10^{-7}	2.00×10^{-8}
101+25	11/20/03	9:16-13:16	240	10	108.2128	559261.0214	—	47.5	3.54×10^{-7}	2.42×10^{-8}
101+50	11/20/03	9:16-13:16	240	10	100.4833	519313.7717	—	73.0	5.86×10^{-7}	4.00×10^{-8}
102+25	11/20/03	14:35-18:35	240	10	115.3087	595933.8110	—	58.5	4.09×10^{-7}	2.79×10^{-8}
102+50	11/20/03	14:35-18:35	240	10	93.7844	484692.7847	—	18.0	1.55×10^{-7}	1.06×10^{-8}
102+75	11/20/03	14:35-18:35	240	10	111.6481	577015.2445	—	30.5	2.20×10^{-7}	1.50×10^{-8}

I= P (psi) / 0.014217 L (cm)

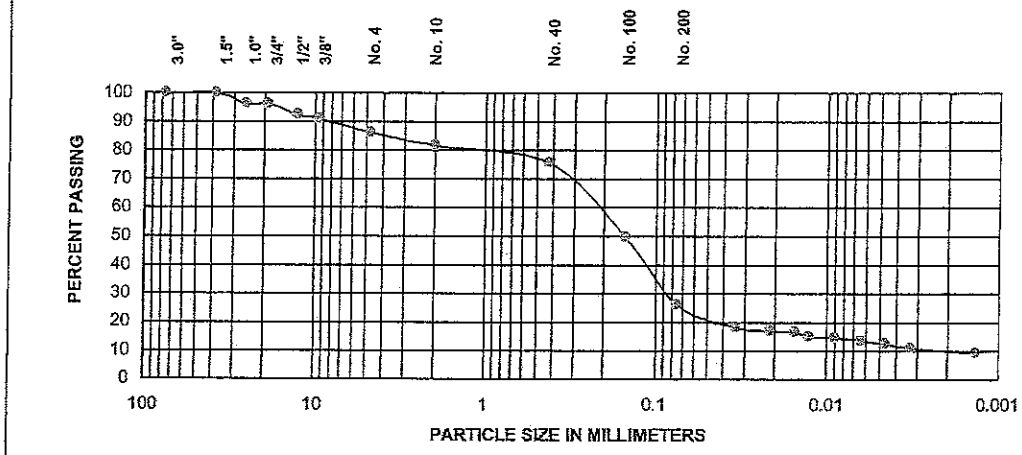
R= Quick Test / Triaxial Test = 1.85

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
105+10	586.2	586.3	32.6	553.7	36.7	549.6	3.6	5.4
105+00	586.2	586.3	32.7	553.6	36.4	549.9	3.5	5.3
104+90	586.3	586.3	32.7	553.6	36.8	549.5	3.5	5.3
104+80	586.3	586.3	32.6	553.7	36.8	549.5	3.4	5.1
104+70	586.4	586.3	32.6	553.7	36.7	549.6	3.4	5.1
104+60	586.4	586.5	32.5	554.0	36.9	549.6	3.3	5.0
104+50	586.5	586.5	32.6	553.9	36.7	549.8	3.2	4.8

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-003	**Date Tested**	11/25/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	11/21/2003
Sample Location	101+50 (SW)
Sample Description	Gray Clayey Sand, tr. Gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	13.9	60.1	13.0	13.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	96.2
3/4"	96.2
1/2"	92.5
3/8"	91.0
No. 4	86.1
No. 10	81.7
No. 40	75.7
No. 100	49.7
No. 200	26.1

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
29	19	10

Soil Classification:	SC
Soil Description:	Clayey sand
System:	USCS

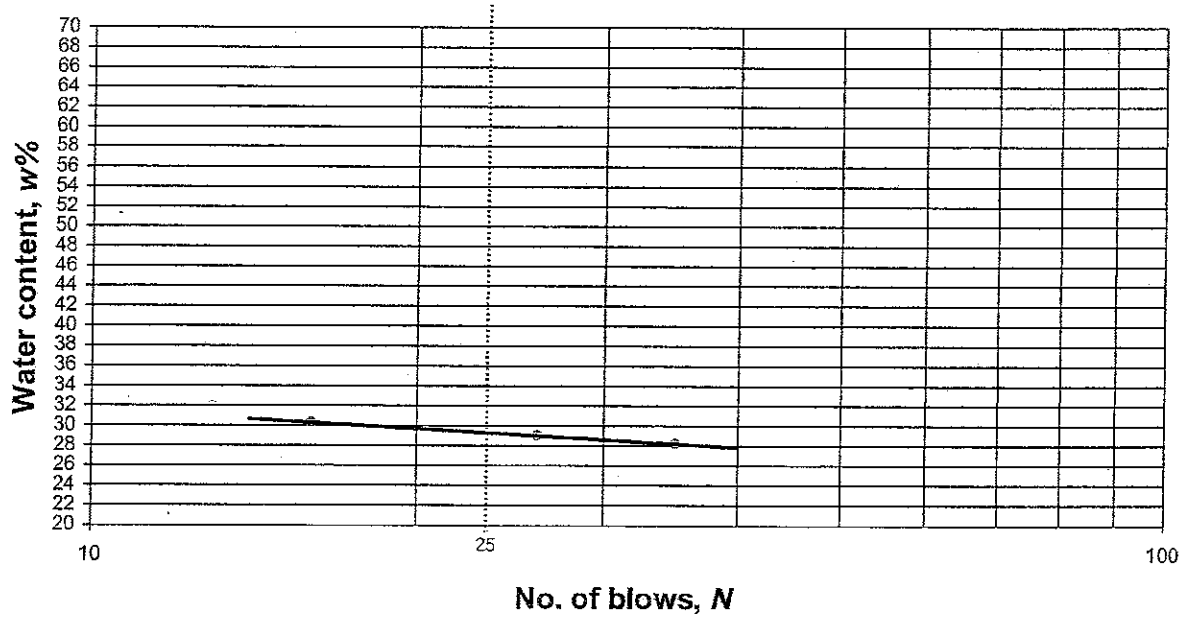
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-003	**Date Tested**	11/28/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	11/21/2003
Sample Location	101+50 (SW)
Sample Description	Gray Clayey Sand, tr. Gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	29	**Plastic Limit, PL**	19	**Plasticity Index, PI**	10

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	11/26/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-003	Date Recd.	11/21/03	**Location**	101+50 (SW)		
Sample Description	Gray Silty Clayey Sand, tr. Gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.70	cm	Volume, V:	232.1	cu cm
Mass of Sample:	416.4	g	**Moisture Content:**	**27.0**	**%**
			Wet Density	**112.0**	**pcf**
			Dry Density	**88.2**	**pcf**

Final

Diameter:	7.13	cm	Area, A:	39.9	sq cm
Height, L:	4.95	cm	Volume, V:	197.6	cu cm
Mass of Sample:	372.50	g	**Moisture Content:**	**31.3**	**%**
			Wet Density	**117.6**	**pcf**
			Dry Density	**89.6**	**pcf**
			Deg of Saturation	**94.0**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	22.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
11/26/2003	9:00 AM	0	0	3.02	6.00		20.0	—
11/26/2003	10:00 AM	3600	3600	3.28	5.77	1.1	20.0	6.13E-08
11/26/2003	11:00 AM	3600	7200	3.53	5.54	1.1	20.0	6.28E-08
11/26/2003	12:00 PM	3600	10800	3.78	5.32	1.1	20.0	6.15E-08
11/26/2003	1:00 PM	3600	14400	4.00	5.10	1.0	20.0	6.30E-08
11/26/2003								

Average Permeability = **6.2E-08** cm/sec

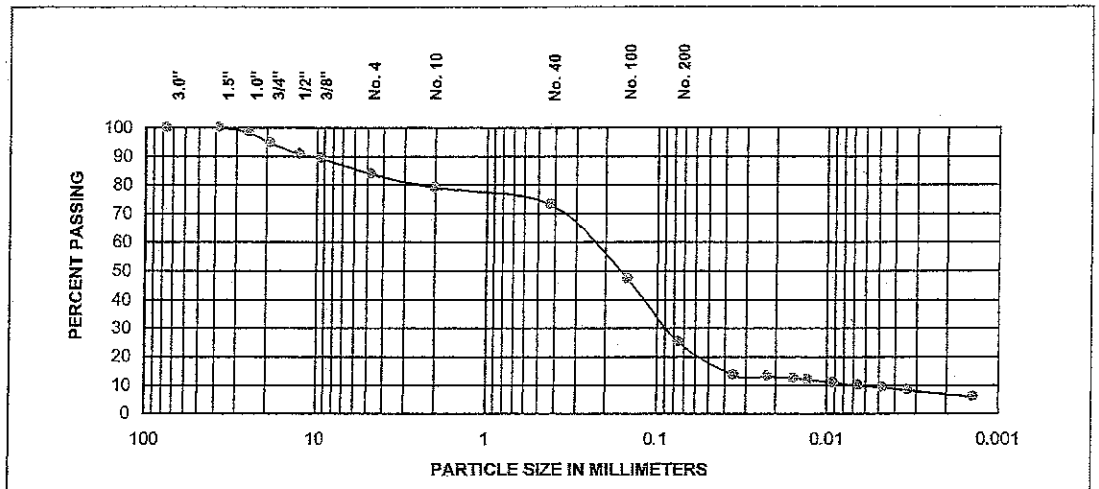
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-004	**Date Tested**	11/25/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	11/21/2003
Sample Location	103+00 (SW)
Sample Description	Gray Silty Clayey Sand with Gravel (Soil Bentonite Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	16.1	58.7	15.8	9.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**	**Liquid Limit, L_L**	**Plastic Limit, PL**	**Plasticity Index, PI**
3.0"	100.0	30	19	11
1.5"	100.0			
1.0"	98.5			
3/4"	94.7			
1/2"	90.7			
3/8"	89.3			
No. 4	83.9			
No. 10	79.2			
No. 40	73.1			
No. 100	47.2			
No. 200	25.2			

Soil Classification:	SC
Soil Description:	Clayey sand with gravel
System:	USCS

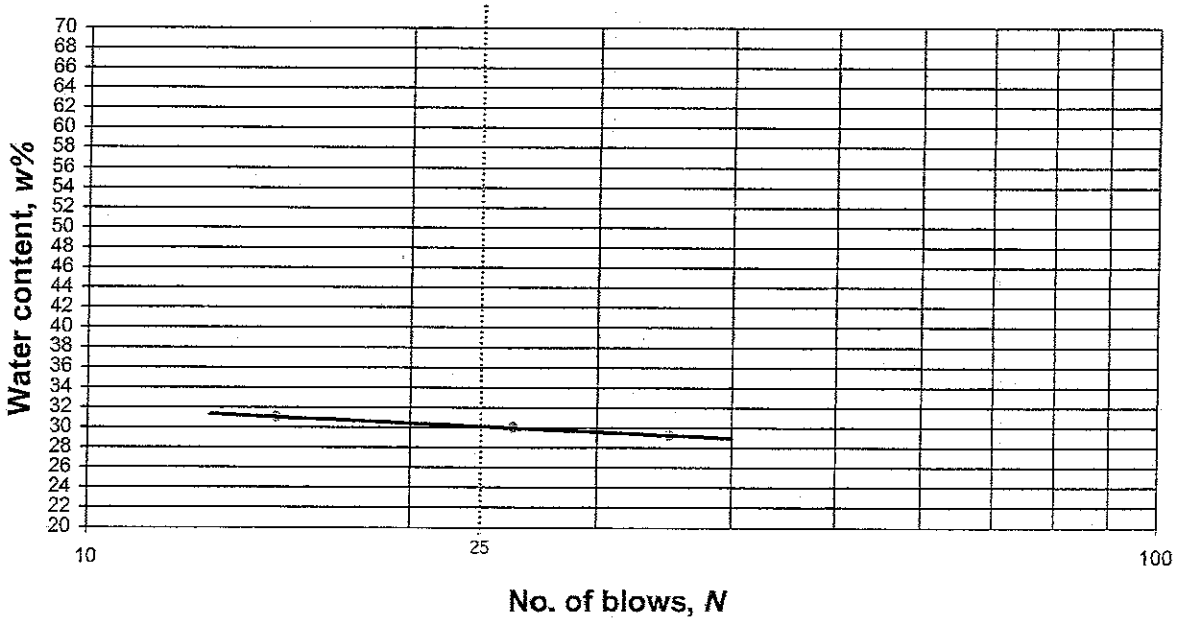
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-004	**Date Tested**	11/28/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	11/21/2003
Sample Location	103+00 (SW)
Sample Description	Gray Silty Clayey Sand with Gravel (Soil Bentonite Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**30**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**11**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	11/26/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-004	Date Recd.	11/21/03	**Location**	103+00 (SW)		
Sample Description	Gray Clayey Sand with Gravel (Soil Bentonite Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	4.96	cm	Volume, V:	201.9	cu cm
Mass of Sample:	371.8	g	**Moisture Content:**	**26.8**	**%**
			Wet Density	**114.9**	**pcf**
			Dry Density	**90.6**	**pcf**

Final

Diameter:	7.06	cm	Area, A:	39.1	sq cm
Height, L:	4.55	cm	Volume, V:	178.1	cu cm
Mass of Sample:	362.90	g	**Moisture Content:**	**24.1**	**%**
			Wet Density	**127.1**	**pcf**
			Dry Density	**102.4**	**pcf**
			Deg of Saturation	***98.2***	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	25.5	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
11/26/2003	9:00 AM	0	0	2.72	6.19		20.0	—
11/26/2003	10:00 AM	3600	3600	3.02	5.92	1.1	20.0	6.13E-08
11/26/2003	11:00 AM	3600	7200	3.31	5.64	1.0	20.0	6.54E-08
11/26/2003	12:00 PM	3600	10800	3.63	5.38	1.2	20.0	6.24E-08
11/26/2003	1:00 PM	3600	14400	3.94	5.10	1.1	20.0	6.92E-08
11/26/2003								

Average Permeability = **6.5E-08** **cm/sec**

Remarks:

Quality, Service & Commitment

Revised

LABORATORY ANALYSIS/ CERTIFICATION

P.O. Box 832 Greybull, Wyoming 02426
307-765-4496

Date Tested: 11/21/2003

SOLD TO:	*SHIP TO:*
GEO-CON East Chicago, Indiana	SAME

SHIP DATE	RAILCAR OR TRUCK NUMBER	PLANT OF ORIGIN	PRODUCT
11/17/2003	Tarin 18	Greybull	Federal Gel 90

Note: Our data for the above shipment shows the following test results:

Test or Property	API Spec.	Result
Viscosity	30 min.	35
Plastic Viscosity (cP)	N/A	
Yield Point (# /100ft^2)	N/A	
Filtrate Volume (cm^3)	15.0 max.	13.2
>75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec.	Result
Moisture (wt %)	10.0 max.	8.3
Y.P. / P.V. Ratio	3.0 max.	1.5

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13-A; Section 4 for "Drilling Grade Bentonite". Should you have any questions or require additional information please let us know 1-307-765-4496.

ORDER NUMBERS : HCIV 5955

TRUCK SHIP DATE : 11/17/2003

Marcu Wilkins 11/24/03

Signed Date

Arrived onsite 11/20/03

2000 # Bulk Bags

Revised

LABORATORY ANALYSIS/ CERTIFICATION

Date Tested: 11/21/2003

P.O. Box 832 Greybull, Wyoming 02426
307-765-4496

SOLD TO:	*SHIP TO:*
GEO-CON East Chicago, Indiana	SAME

SHIP DATE	RAILCAR OR TRUCK NUMBER	PLANT OF ORIGIN	PRODUCT
11/17/2003	Tarin 14	Greybull	Federal Gel 90

Note: Our data for the above shipment shows the following test results:

Test or Property	API Spec.	Result
Viscosity	30 min.	35
Plastic Viscosity (cP)	N/A	
Yield Point (# /100ft^2)	N/A	
Filtrate Volume (cm^3)	15.0 max.	13.2
>75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec.	Result
Moisture (wt %)	10.0 max.	8.3
Y.P. / P.V. Ratio	3.0 max.	1.5

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13-A; Section 4 for "Drilling Grade Bentonite". Should you have any questions or require additional information please let us know 1-307-765-4496.

ORDER NUMBERS : HCIV 5956

TRUCK SHIP DATE : 11/17/2003

Marcie Williams 11/24/03

Signed Date

Arrived onsite 11/20/03

2000 # Bulk Bags

Revised

LABORATORY ANALYSIS/ CERTIFICATION

P.O. Box 332 Greybull, Wyoming 02426
307-765-4496

Date Tested: 11/21/2003

SOLD TO:	SHIP TO:
GEO-CON East Chicago, Indiana	SAME

SHIP DATE	RAILCAR OR TRUCK NUMBER	PLANT OF ORIGIN	PRODUCT
11/17/2003	Nolan 22	Greybull	Federal Gel 90

Note: Our data for the above shipment shows the following test results:

Test or Property	API Spec.	Result
Viscosity	30 min.	35
Plastic Viscosity (cP)	N/A	
Yield Point (# /100ft^2)	N/A	
Filtrate Volume (cm^3)	15.0 max.	13.2
>75 micron (wt. %)	4.0 max.	2.3

Test or Property	API Spec.	Result
Moisture (wt %)	10.0 max.	7.3
Y.P. / P.V. Ratio	3.0 max.	1.5

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13-A; Section 4 for "Drilling Grade Bentonite". Should you have any questions or require additional information please let us know 1-307-765-4496.

ORDER NUMBERS : HCIV 5958

TRUCK SHIP DATE : 11/17/2003

Marcia Williams 11/24/03

Signed Date

Arrived onsite 11/20/03

2000# Bulk Bags

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 01/15/04	TRANSMITTAL NO. 02260-65.1

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL X THIS IS A RESUBMITTAL OF TRANSMITTAL 02260-65
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
159	112103 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Fred Hall 1/15/04
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

CONTRACTOR RESPONSE TO GOVERNMENT REVIEW REMARKS

Indian Harbor Canal Confined Disposal Facility
Subsurface Investigation& Cutoff Wall

Contract No. DACW27-02-C-0003

Response to Government Comments on the following:

Item No.:	Submittal No.:	Description:	Date:
159	02260-65	112103 Daily GeoCon QC Data	December 6, 2003

Response to Government Comments Provided As:

Item No.:	Submittal No.:	Description:	Date:
159	02260-65.1	112103 Daily GeoCon QC Data	January 14, 2004

Action Code: FX – Code. Receipt acknowledged, does not comply as noted with contract requirements. Resubmission is required. See comments below.

Response:
Geo-Con has revised the 112103 Daily GeoCon QC Data to reflect USACE comments and is hereby resubmitting the entire document.

COMMENTS ON MAIN BODY AND GENERAL COMMENTS:

Comment:

1. Include calculations demonstrating that 6% dry bentonite is being added by including the "Soil-Bentonite Backfill Quality Control" form included in the approved Transmittal No. 02260-16.1; Soil-Bentonite Slurry Trench Cutoff Wall Implementation Plan. (The form is in the Appendix C of the Standard Operating Procedures included in Appendix E of the Implementation Plan.) Ensure that the width of the cutoff wall shown on the "Daily Soil Bentonite Slurry Wall Quality Control Form" and used in the percent-dry-bentonite calculations is based on field measurements of the slurry trench width.

Response:

Calculations demonstrating that 6% dry bentonite is being added while mixing the soil-bentonite backfill are located on the "Soil-Bentonite Backfill Quality Control" form and included as part of the Geo-Con Daily QC Data Report. Actual field measured trench widths are shown on the "Daily Soil Bentonite Slurry Wall Quality Control Form and the field measured widths (average) are used in the percent-dry-bentonite calculations.

Comment:

2. Reference Section 02260, paragraph 3.5.1, which requires elevations to be recorded. Include on the forms the elevations of the items listed in 02260, paragraph 3.5.1.5.

Response:

A separate elevation spreadsheet form including all the elevations of the items listed in 02260, paragraph 3.5.1.5, is now included as part of the Geo-Con Daily QC Data Report.

Comment:

3. Ensure that the filtrate loss of the slurry meets the Contract requirements.

Response:

Filtrate loss of the slurry on this report meets the Contract requirements.

Comment:

4. Note that the sand content of the "Bentonite Slurry at the Trench" exceeds 20%, yet the testing equipment (i.e., the sand content flask) is only calibrated/marked to 20%. Ensure that the testing equipment is suitable for the ranges encountered and is capable of producing reliable data.

Response:

In the onsite lab, there are 4 sand content flasks. Once the sand in the "Bentonite Slurry at the Trench" exceeded 20%, a second flask was used. The excess sand over 20% was poured into the second flask and was measured and added to the 20% in the first flask. When the USACE QA representative from Patrick Engineering arrived onsite, he calibrated one flask to measure up to 30% sand (by pouring 10% sand from flask #2 into flask #1 and marking lines).

Comment:

5. It is noted with reference to Spec. Section 02260/3.4.12, "Clay Cap", that no clay cap material has been placed to date.

Response:

Clay cap will be placed at a later date as the soil-bentonite slurry wall nears completion or after it is completed.

Comment:

6. Reference the CQC requirements in Section 02260, paragraph 2.4, paragraph 3.4.4, paragraph 3.4.6, paragraph 3.4.9, paragraph 3.4.11, paragraph 3.5, paragraph 3.5.1.5, and paragraph 3.5.2.2.

Response:

Comment noted.

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 25-Nov-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P.O.# 78406

Relinquished by: (Signature)	Received By: Atul Kumar	Date / 11/25/03 Time: 9:20
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
SB-005	SB BACKFILL**	104+00	11/21/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-006	SB BACKFILL**	106+00	11/22/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-007	SB BACKFILL**	106+00	11/24/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-008	SB BACKFILL**	102+00	11/24/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
BF-007	SOIL ONLY	106+00	11/22/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-008	SOIL ONLY	100+00	11/24/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/21/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 39 - 59 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
105+50	2.00	87.50	21.00	21.00	46.00	8
105+50	35.00	90.50	23.00	22.00	59.00	8
106+00	35.00	89.50	23.00	20.00	48.00	8
106+00	2.00	88.50	18.00	18.00	43.00	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A	THE AREA WE ARE EXCAVATING IN WAS ALREADY SAMPLED.			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
103+00	3.00	Sample to lab 11/20	Sample to lab 11/20	Sample to lab 11/20	2.93×10^{-7}	yes
103+25	3.00	N/A	N/A	N/A	3.54×10^{-7}	N/A
103+50	3.00	N/A	N/A	N/A	5.86×10^{-7}	N/A
103+75	3.00	N/A	N/A	N/A	4.09×10^{-7}	N/A
104+00	3.00	Sample to lab	Sample to lab	Sample to lab	1.55×10^{-7}	yes
104+25	3.00	N/A	N/A	N/A	2.20×10^{-7}	N/A

COMMENTS

Filter cake was 1.0mm, 1.3mm, 1.0mm and .7mm respectively.

Unit Weight: 103+00: 109.5 pcf
103+25: 110.0 pcf
103+50: 107.0 pcf
103+75: 105.5 pcf
104+00: 107.0 pcf
104+25: 112.0 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/21/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
8:35	64.50	40.00	18.00	8
15:20	66.00	43.00	8.00	8

**Only a few batches of slurry were mixed at the batch plant today. Only tested once in the morning and once in afternoon because of that.

Filter cakes were .5mm and . 2mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/21/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 39 - 59 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
105+20	34.0	37.2	37.0	10.0	369.5	3.6	101+10	OUT	TOP OUT
105+30	34.1	37.3	37.3	10.0	372.5	3.7	101+20	OUT	TOP OUT
105+40	34.3	37.5	37.4	10.0	374.0	3.7	101+30	OUT	TOP OUT
105+50	34.3	37.4	37.5	10.0	374.5	3.7	101+40	OUT	TOP OUT
105+60	34.3	37.6	37.5	10.0	375.0	3.6	101+50	OUT	TOP OUT
105+70	34.4	37.7	37.7	10.0	376.5	3.7	101+60	OUT	TOP OUT
105+80	34.4	37.8	37.8	10.0	377.5	3.8	101+70	OUT	TOP OUT
105+90	34.5	37.9	37.9	10.0	378.5	3.9	101+80	OUT	TOP OUT
106+00	34.6	37.9	37.9	10.0	379.0	3.9	101+90	OUT	TOP OUT
106+10	34.2	37.5	37.7	10.0	377.0	3.9	102+00	OUT	TOP OUT
							102+10	8.7	TOP OUT
							102+20	8.9	TOP OUT
							102+30	9.2	TOP OUT
							102+40	10.8	TOP OUT
							102+50	12.7	TOP OUT
							102+60	13.1	TOP OUT
							102+70	13.6	TOP OUT
							102+80	13.8	TOP OUT
							102+90	14.5	TOP OUT
							103+00	15.3	6.3
							103+10	16.4	10.6
							103+20	17.7	12.2
							103+30	19.4	14.7
							103+40	21.3	15.6
							103+50	23.5	16.3
							103+60	23.6	17.9
							103+70	23.9	19.2
							103+80	24.4	20.3
							103+90	25.9	21.2
							104+00	26.6	22.1

SF TODAY 3754.00

SF TO DATE 22390.50

COMMENTS

(CON'T ON PAGE 4)

PM Profile is continued on page 4.

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/21/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 39 - 59 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
							104+10	27.8	23.2
							104+20	28.1	24.1
							104+30	29.9	24.9
							104+40	32.2	25.3
							104+50	35.1	25.7
							104+60	35.8	27.5
							104+70	36.6	29.4
							104+80	36.5	30.7
							104+90	36.8	31.9
							105+00	36.4	32.4
							105+10	36.7	33.2
							105+20	26.8	34.1
							105+30	22.0	34.8
							105+40		35.8
							105+50		36.6
							105+60		37.6
							105+70		37.8
							105+80		37.7
							105+90		37.8
							106+00		37.9
							106+10		37.5

SF TODAY

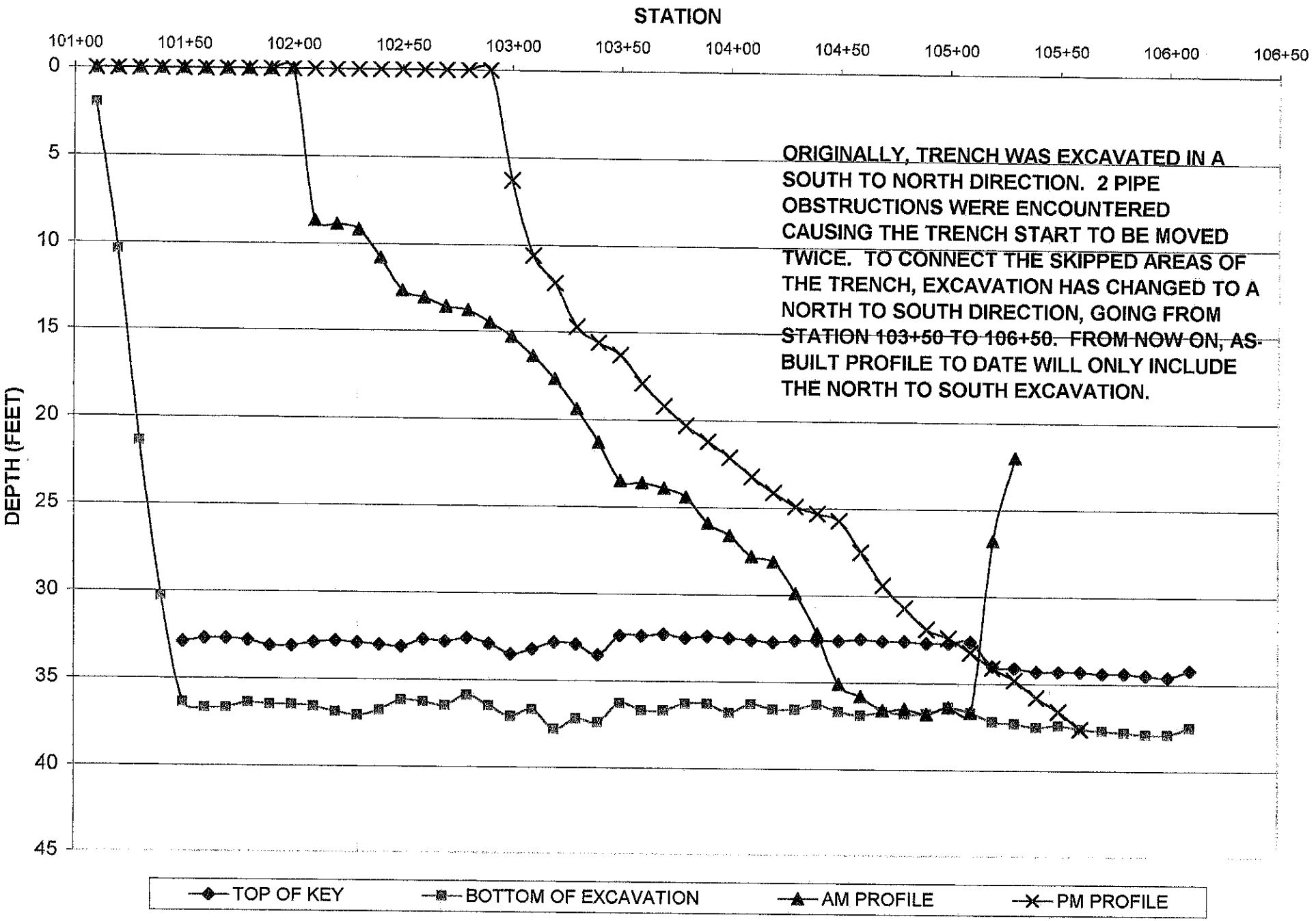
SF TO DATE

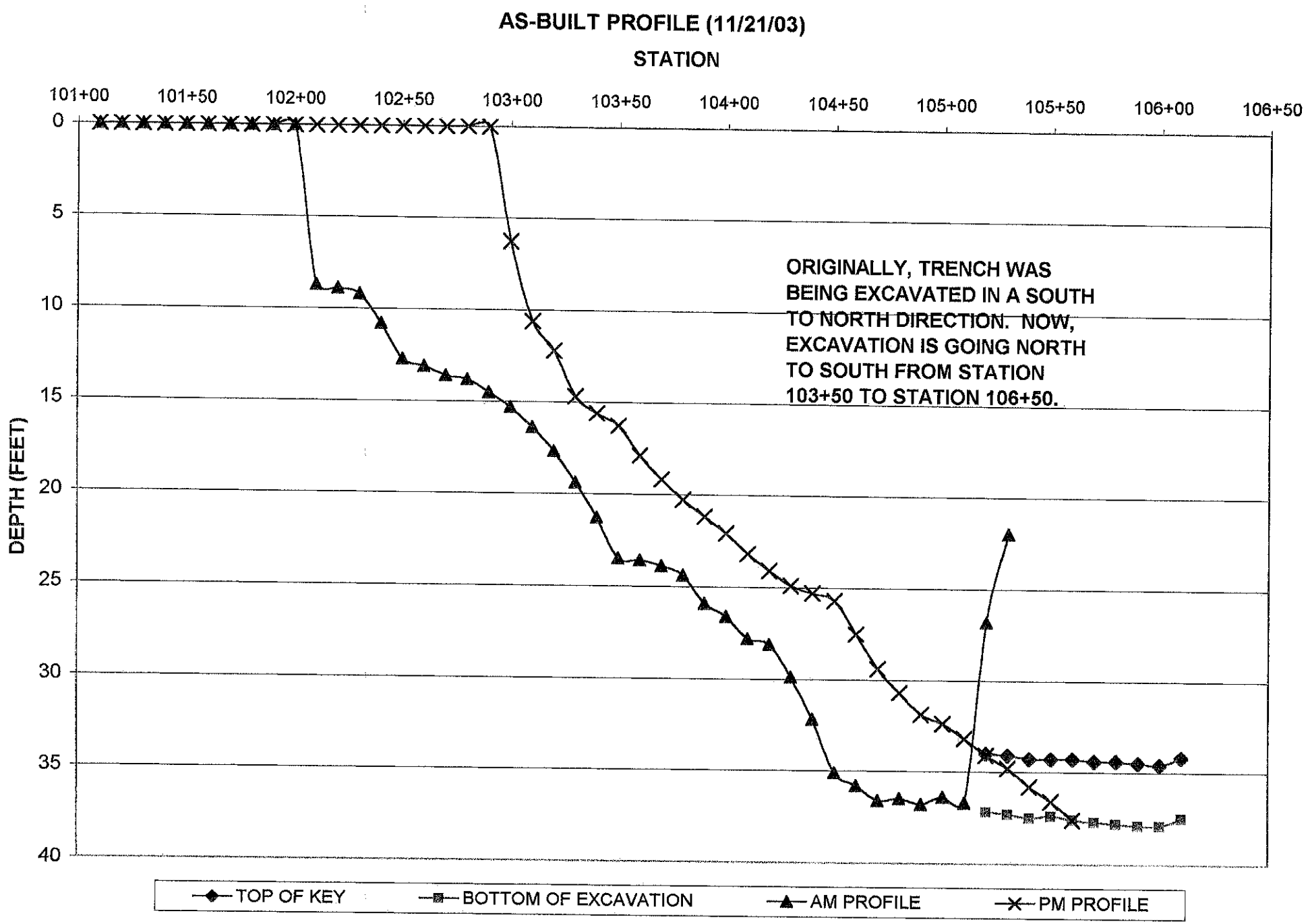
COMMENTS

PM Profile continued from Page 3.

GEO-CON: Jimmie C. Lopez OWNER:

AS-BUILT PROFILE (TO DATE)




AS-BUILT PROFILE (11/21/03)
STATION
101+00
101+50
102+00
102+50
103+00
103+50
104+00
104+50
105+00
105+50
106+00
106+50
DEPTH (FEET)
0
5
10
15
20
25
30
35
40
ORIGINALLY, TRENCH WAS BEING EXCAVATED IN A SOUTH TO NORTH DIRECTION. NOW, EXCAVATION IS GOING NORTH TO SOUTH FROM STATION 103+50 TO STATION 106+50.
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 11/21/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	8:35	40	> 40 sec	64.5	> 64 pcf	8	6.5 - 10	18.0	< 20 cm^3	.5
PM	15:20	43	> 40 sec	66	> 64 pcf	8	6.5 - 10	8.0	< 20 cm^3	.2

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
10:00	105+50	2'	46	40 - 90 sec	87.5	64 - 95 pcf	8	6.5 - 10	21	< 25 cm^3	1.0	21	MAX 30%
10:00	105+50	35'	59	40 - 90 sec	90.5	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	1.3	23	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
16:30	106+00	35	48	40 - 90 sec	89.5	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	1.0	23	MAX 30%
16:30	106+00	2	43	40 - 90 sec	88.5	64 - 95 pcf	8	6.5 - 10	18	< 25 cm^3	.7	18	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
103+00	3	2" to 6"	109.5	+15 pcf over trench slurry	1.25×10^{-7}	1.0×10^{-7} cm/sec
103+25	3	2" to 6"	110.0	+15 pcf over trench slurry	1.24×10^{-7}	1.0×10^{-7} cm/sec
103+50	3	2" to 6"	107.0	+15 pcf over trench slurry	1.97×10^{-7}	1.0×10^{-7} cm/sec
103+75	3	2" to 6"	105.5	+15 pcf over trench slurry	5.99×10^{-8}	1.0×10^{-7} cm/sec
104+00	3	2" to 6"	107.0	+15 pcf over trench slurry	1.09×10^{-7}	1.0×10^{-7} cm/sec
104+25	3		112.0		4.42×10^{-8}	

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 103+00, 103+25, 103+50, 103+75, 104+00, 104+25

Technician: MM √BY SES

Sample Area: A= $\pi(3.85)^2 = 46.56$ cm² ($A = \pi r^2$)

Sample Height: L= 7.5cm, 6.0cm, 6.0cm; 7.0cm, 7.0cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	with C.F. of 1/14.65
103+00	11/21/03	11:45-15:45	240	10	93.7844	484692.7847	—	14.5	1.25×10^{-7}	8.53×10^{-9}
103+25	11/21/03	11:45-15:45	240	10	117.2305	605865.9809	—	18.0	1.24×10^{-7}	8.46×10^{-9}
103+50	11/21/03	11:45-15:45	240	10	100.4833	519313.7717	—	24.5	1.97×10^{-7}	1.34×10^{-8}
103+75	11/21/03	17:38-5:58	740	10	100.4833	519313.7717	—	23.0	5.99×10^{-8}	4.09×10^{-9}
104+00	11/21/03	17:38-5:58	740	10	100.4833	519313.7717	—	42.0	1.09×10^{-7}	7.44×10^{-9}
104+25	11/21/03	17:38-5:58	740	10	100.4833	519313.7717	—	17.0	4.42×10^{-8}	3.02×10^{-9}

$I = \frac{P\ (psi)}{0.014217\ L\ (cm)}$

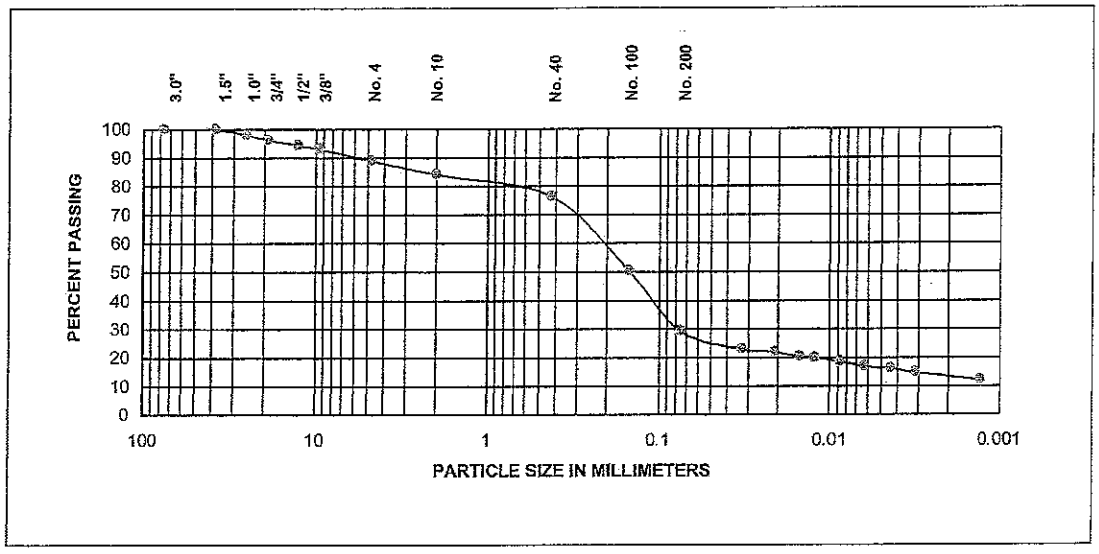
$R = \frac{\text{Quick Test}}{\text{Triaxial Test}} = 1.85$

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
106+10	585.6	586.2	34.2	552.0	37.5	548.7	3.9	5.9
106+00	585.6	586.2	34.6	551.6	37.9	548.3	3.9	5.9
105+90	585.7	586.3	34.5	551.8	37.9	548.4	3.9	5.9
105+80	585.7	586.3	34.4	551.9	37.8	548.5	3.8	5.7
105+70	585.8	586.4	34.4	552.0	37.7	548.7	3.7	5.6
105+60	585.8	586.3	34.3	552.0	37.6	548.7	3.6	5.4
105+50	585.9	586.4	34.3	552.1	37.4	549.0	3.7	5.6
105+40	585.9	586.2	34.3	551.9	37.5	548.7	3.7	5.6
105+30	586.0	586.3	34.1	552.2	37.3	549.0	3.7	5.6
105+20	586.1	586.2	34.0	552.2	37.2	549.0	3.6	5.4

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-005	**Date Tested**	12/2/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	11/25/2003
Sample Location	104+00 (SW)
Sample Description	Gray Clayey Sand, tr. Gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.2	59.5	12.8	16.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.0
3/4"	96.2
1/2"	94.4
3/8"	93.1
No. 4	88.8
No. 10	84.2
No. 40	76.5
No. 100	50.3
No. 200	29.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
45	19	26

Soil Classification:	SC
Soil Description:	Clayey sand
System:	USCS

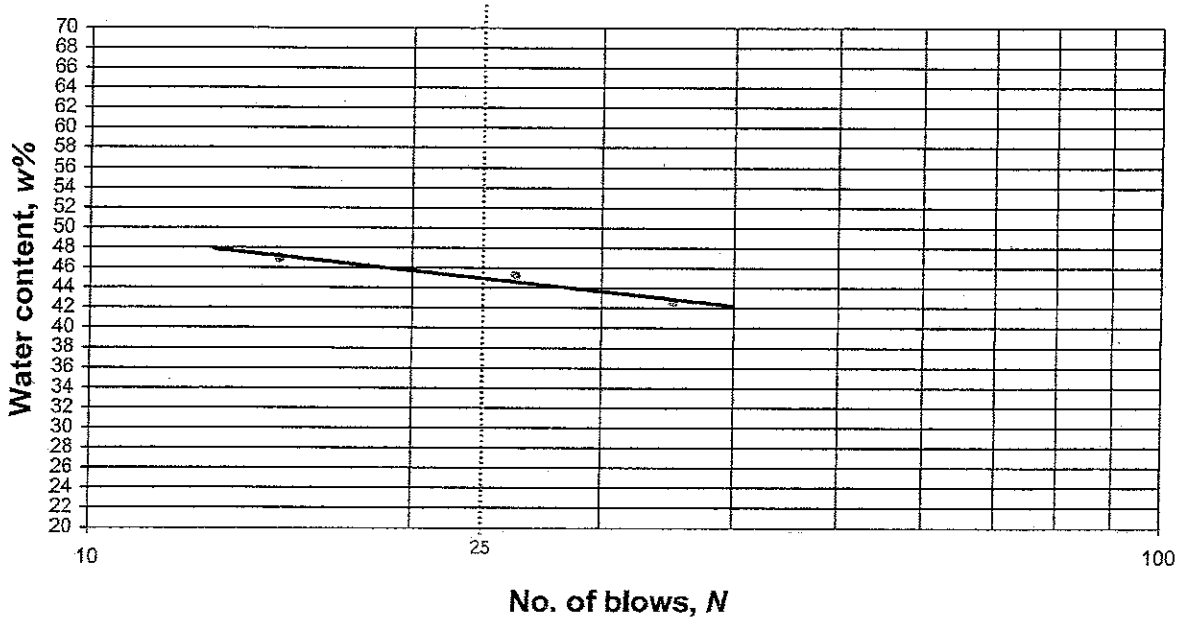
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-005	**Date Tested**	11/30/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	11/25/2003
Sample Location	104+00 (SW)
Sample Description	Gray Clayey Sand, tr. Gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**45**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**26**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	11/28/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-005	Date Recd.	11/25/03	**Location**	104+00 (SW)		
Sample Description	Gray Clayey Sand, tr Gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.07	cm	Volume, V:	206.4	cu cm
Mass of Sample:	370.3	g	**Moisture Content:**	32.5	%
			Wet Density	111.9	pcf
			Dry Density	84.5	pcf

Final

Diameter:	7.03	cm	Area, A:	38.8	sq cm
Height, L:	4.74	cm	Volume, V:	184.0	cu cm
Mass of Sample:	357.98	g	**Moisture Content:**	28.4	%
			Wet Density	121.4	pcf
			Dry Density	94.5	pcf
			Deg of Saturation	95.9	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	25.0	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
11/28/2003	10:00 AM	0	0	3.17	5.80		20.0	---
11/28/2003	11:00 AM	3600	3600	3.23	5.75	1.2	20.0	1.20E-08
11/28/2003	12:00 PM	3600	7200	3.29	5.70	1.2	20.0	1.20E-08
11/28/2003	1:00 PM	3600	10800	3.32	5.67	1.0	20.0	7.24E-09
11/28/2003	2:00 PM	3600	14400	3.35	5.64	1.0	20.0	7.26E-09

Average Permeability = **9.6E-09** cm/sec

Remarks:

Quality, Service & Commitment

161

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/18/2003

SOLD TO:	SHIP TO:
GEO-CON INC 4013 MONROEVILLE BLVD CORPORATE 1 BUILDING SUITE 400 MONROEVILLE PA 15146	GEO-CON S. CHICAGO IN 46312
SALES ORDER NO.: HOT004553	

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
11-19-03	MONT TRANS #12	GREYBULL	GEL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	40
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.8
> 75 micron (wt. %)	4.0 max.	3.6

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.8
Y.P. / P.V. Ratio	3.0 max.	1.33

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4892.

Signature Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (6/99)

Arrived 11/21/03

100# Bags

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 01/15/04	TRANSMITTAL NO. 02260-66.1

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL X THIS IS A RESUBMITTAL OF TRANSMITTAL 02260-66
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
160	112203 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Fred Hall 1/15/04
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

CONTRACTOR RESPONSE TO GOVERNMENT REVIEW REMARKS

Indian Harbor Canal Confined Disposal Facility
Subsurface Investigation& Cutoff Wall

Contract No. DACW27-02-C-0003

Response to Government Comments on the following:

Item No.:	Submittal No.:	Description:	Date:
160	02260-66	112203 Daily GeoCon QC Data	December 6, 2003

Response to Government Comments Provided As:

Item No.:	Submittal No.:	Description:	Date:
160	02260-66.1	112203 Daily GeoCon QC Data	January 14, 2004

Action Code: FX – Code. Receipt acknowledged, does not comply as noted with contract requirements. Resubmission is required. See comments below.

Response:
Geo-Con has revised the 112203 Daily GeoCon QC Data to reflect USACE comments and is hereby resubmitting the entire document.

COMMENTS ON MAIN BODY AND GENERAL COMMENTS:

Comment:

1. Ensure that the daily cutoff wall QC data submittals include all laboratory data for all samples taken that day. Include Atterburg limits, grain size, moisture content, and permeability data. When were the soil-bentonite backfill samples taken at Sta. 106+00 and 102+00? When was the soil-bentonite backfill material placed in the trench at Station 106+00?

Response:

All laboratory data for all samples taken this day are now included as part of the Daily GeoCon QC Data Report. The first soil-bentonite backfill sample taken at Sta. 102+00 was on 11/19/03 (sent to the lab). This material was placed prior to all of the jumping around caused by discovering the underground pipes in this section of the wall. A soil-bentonite backfill sample was taken at Sta. 106+00 on 11/23/03. Due to an afternoon rainstorm that shut down operations per EQ, the backfill mixed in this area was not placed in the trench. This area was remixed on 11/24/03. Since this sample was not placed in the trench and was remixed the following day, the sample was archived and noted that it would not be sent to the lab unless otherwise directed (see comments on Page 1 of 4 of 112303 Daily GeoCon QC Data Report). The soil-bentonite backfill samples taken at Sta. 106+00 and 102+00 were collected on 11/24/03 (sent to the lab). Soil-bentonite backfill placement

at Sta. 106+00 was started on 11/23/03 (2' rise from AM profile to PM profile) and was at top out on 11/26/03. Sample reports are provided in the daily data submittal for the day the sample was collected.

Comment:

2. Include calculations demonstrating that 6% dry bentonite is being added by including the "Soil-Bentonite Backfill Quality Control" form included in the approved Transmittal No. 02260-16.1; Soil-Bentonite Slurry Trench Cutoff Wall Implementation Plan. (The form is in the Appendix C of the Standard Operating Procedures included in Appendix E of the Implementation Plan.) Ensure that the width of the cutoff wall shown on the "Daily Soil Bentonite Slurry Wall Quality Control Form" and used in the percent-dry-bentonite calculations is based on field measurements of the slurry trench width.

Response:

Calculations demonstrating that 6% dry bentonite is being added while mixing the soil-bentonite backfill are located on the "Soil-Bentonite Backfill Quality Control" form and included as part of the Geo-Con Daily QC Data Report. Actual field measured trench widths are shown on the "Daily Soil Bentonite Slurry Wall Quality Control Form and the field measured widths (average) are used in the percent-dry-bentonite calculations.

Comment:

3. Reference Section 02260, paragraph 3.5.1, which requires elevations to be recorded. Include on the forms the elevations of the items listed in 02260, paragraph 3.5.1.5.

Response:

A separate elevation spreadsheet form including all the elevations of the items listed in 02260, paragraph 3.5.1.5, is now included as part of the Geo-Con Daily QC Data Report.

Comment:

4. Ensure that the filtrate loss of the slurry meets the Contract requirements.

Response:

Filtrate loss of the slurry on this report meets the Contract requirements.

Comment:

5. Note that the sand content of the "Bentonite Slurry at the Trench" exceeds 20%, yet the testing equipment (i.e., the sand content flask) is only calibrated/marked to 20%. Ensure that the testing equipment is suitable for the ranges encountered and is capable of producing reliable data.

Response:

In the onsite lab, there are 4 sand content flasks. Once the sand in the "Bentonite Slurry at the Trench" exceeded 20%, a second flask was used. The excess sand over 20% was poured into the second flask and was measured and added to the 20% in the first flask. When the USACE QA representative from Patrick Engineering arrived onsite, he calibrated one flask to measure up to 30% sand (by pouring 10% sand from flask #2 into flask #1 and marking lines).

Comment:

6. It is noted with reference to Spec. Section 02260/3.4.12, "Clay Cap", that no clay cap material has been placed to date.

Response:

Clay cap will be placed at a later date as the soil-bentonite slurry wall nears completion or after it is completed.

Comment:

7. Reference the CQC requirements in Section 02260, paragraph 2.4, paragraph 3.4.4, paragraph 3.4.6, paragraph 3.4.9, paragraph 3.4.11, paragraph 3.5, paragraph 3.5.1.5, and paragraph 3.5.2.2.

Response:

Comment noted.

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 25-Nov-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P.O.# 78406

Relinquished by: (Signature) | Received By: Atul Kumar | Date / Time: 11/25/03 9:30

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
SB-005	SB BACKFILL**	104+00	11/21/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-006	SB BACKFILL**	105+00	11/22/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-007	SB BACKFILL**	106+00	11/24/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-008	SB BACKFILL**	102+00	11/24/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
BF-007	SOIL ONLY	106+00	11/22/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-008	SOIL ONLY	100+00	11/24/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/22/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 50 - 58 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
106+10	36.00	92.00	24.00	19.50	64.00	8
106+10	2.00	92.00	24.00	16.50	70.00	8
101+80	2.00	79.00	12.00	17.50	45.00	8
101+80	17.50	84.00	18.50	18.00	66.00	8
101+40	35.00	89.50	15.00	24.50	47.00	8
101+40	2.00	79.00	16.00	21.50	44.00	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
106+00	LAB SAMPLE COLLECTED 11/22/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
104+50	3.00	N/A	N/A	N/A	1.52×10^{-7}	N/A
104+75	3.00	N/A	N/A	N/A	1.28×10^{-7}	N/A
105+00	3.00	Sample to lab	Sample to lab	Sample to lab	1.36×10^{-7}	yes
105+25	3.00	N/A	N/A	N/A	3.74×10^{-8}	N/A
105+50	3.00	N/A	N/A	N/A	5.44×10^{-8}	N/A
105+75	3.00	N/A	N/A	N/A	3.23×10^{-8}	N/A

COMMENTS

Filter cake was 1.3mm, .5mm, .2mm, .3mm, .3mm, and .2mm respectively.

Unit Weight: 104+50: 118.5 pcf
104+75: 120.0 pcf
105+00: 112.0 pcf
105+25: 116.5 pcf
105+50: 120.0 pcf
105+75: 114.0 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/22/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
8:15	65.00	50.00	15.00	8
11:05	-	51.00	-	-
16:50	66.00	40.00	18.00	8

**Only a few batches of slurry were mixed at the batch plant today. 2nd PM test on viscosity was not done because of this.

Filter cakes were .2mm and . 2mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/22/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 50 - 58 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
106+12	34.5	39.7	38.6	2.0	77.2	3.8	102+90	OUT	TOP OUT
106+20	34.5	40.1	39.9	8.0	319.2	3.7	103+00	6.3	TOP OUT
106+30	34.0	40.2	40.2	10.0	401.5	3.7	103+10	10.6	TOP OUT
106+40	34.1	38.6	39.4	10.0	394.0	3.6	103+20	12.2	TOP OUT
106+50	33.7	38.1	38.4	10.0	383.5	3.6	103+30	14.7	TOP OUT
	SF	1575.4					103+40	15.6	TOP OUT
SF (N TO S DIG)		23965.9					103+50	16.3	TOP OUT
102+00	LEAD-IN	0.0					103+60	17.9	TOP OUT
101+90	LEAD-IN	10.1	5.1	10.0	50.5	3.5	103+70	19.2	TOP OUT
101+80	LEAD-IN	20.7	15.4	10.0	154.0	3.5	103+80	20.3	TOP OUT
101+70	LEAD-IN	30.9	25.8	10.0	258.0	3.6	103+90	21.2	TOP OUT
101+60	33.0	37.2	34.1	10.0	340.5	3.7	104+00	22.1	TOP OUT
101+50	32.9	37.4	37.3	10.0	373.0	3.7	104+10	23.2	TOP OUT
101+40	33.6	37.6	37.5	10.0	375.0	3.7	104+20	24.1	TOP OUT
101+30	33.6	37.7	37.7	10.0	376.5	3.6	104+30	24.9	TOP OUT
101+20	33.6	37.7	37.7	10.0	377.0	3.6	104+40	25.3	TOP OUT
101+10	33.7	37.9	37.8	10.0	378.0	3.7	104+50	25.7	TOP OUT
							104+60	27.5	1.9
							104+70	29.4	3.4
							104+80	30.7	5.1
							104+90	31.9	7.3
							105+00	32.4	9.1
							105+10	33.2	10.2
							105+20	34.1	12.1
							105+30	34.8	14.7
							105+40	35.8	16.3
							105+50	36.6	18.2
							105+60	37.6	20.7
							105+70	37.8	22.7
							105+80	37.7	24.4

SF TODAY 4257.90

SF TO DATE 26648.40

(CON'T ON PAGE 4)

COMMENTS

PM Profile is continued on page 4.

At 9:20, we were at Station 106+12. The pipe was found and cleaned at 23' deep.

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/22/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 50 - 58 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
							105+90	37.8	26.1
							106+00	37.9	27.6
							106+10	37.5	29.1
							106+20		31.3
							106+30		33.8
							106+40		35.1
							106+50		36.5

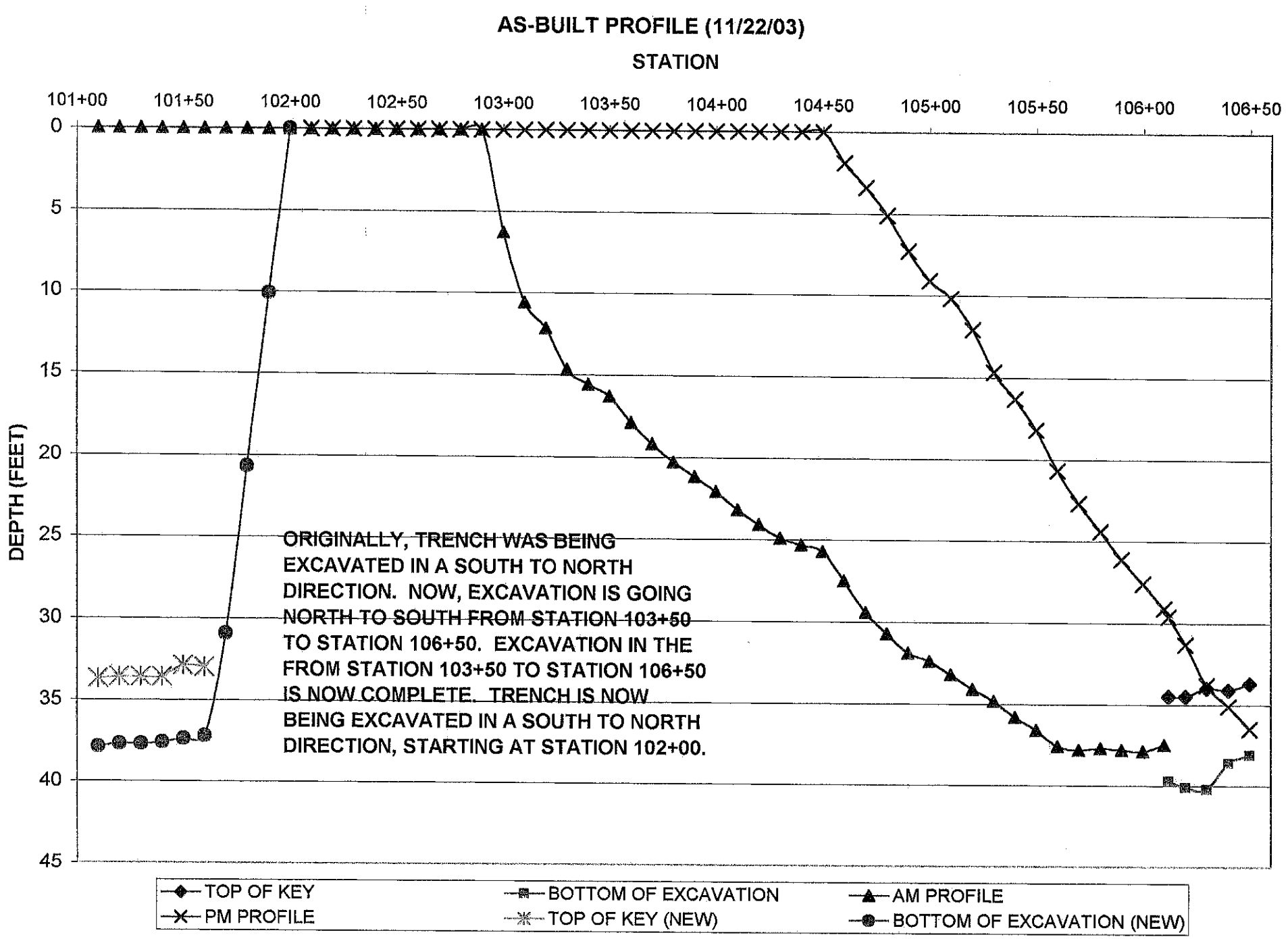
SF TODAY

SF TO DATE

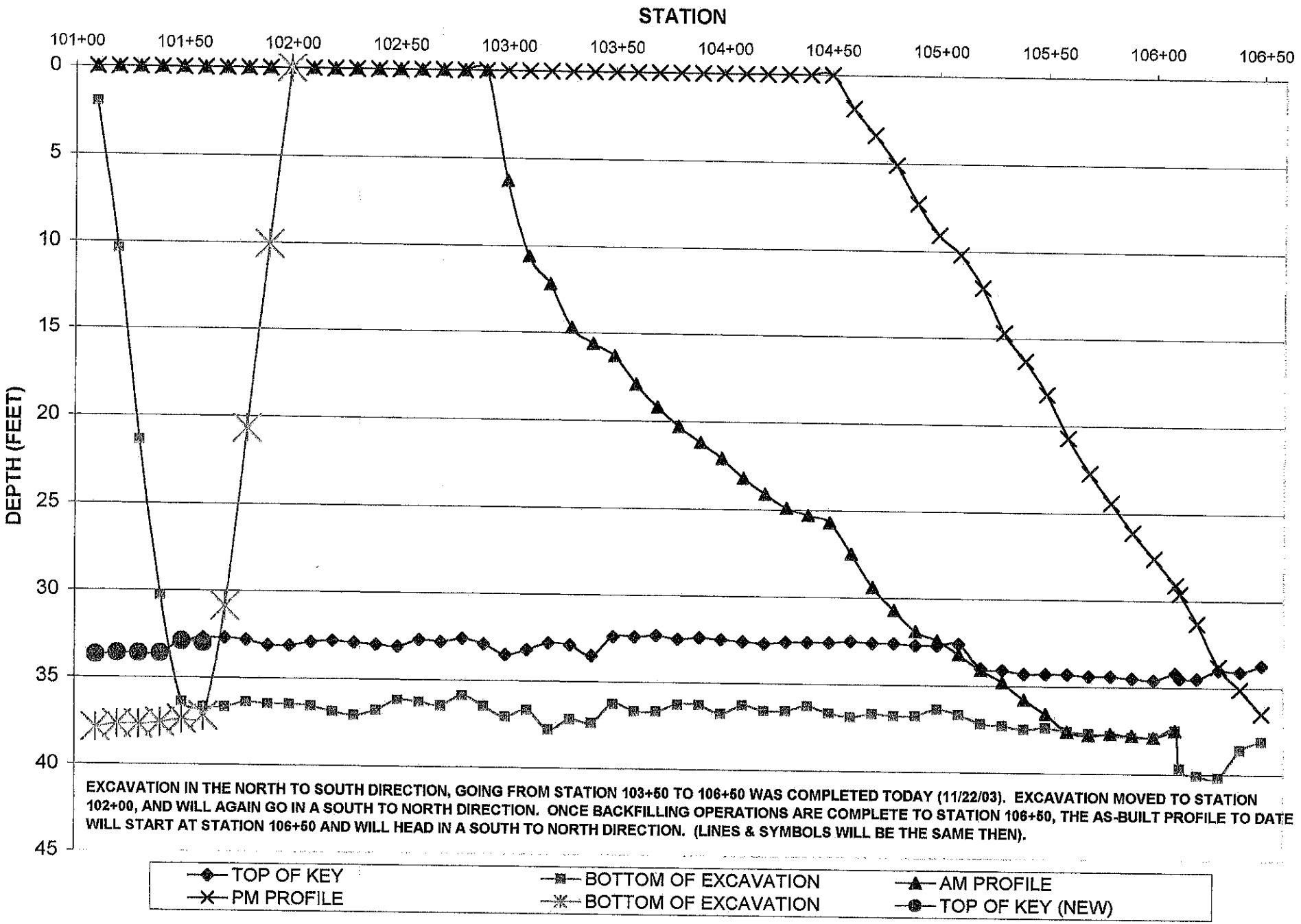
COMMENTS

PM Profile continued from Page 3.

GEO-CON: Suzanne C. Sepic OWNER:


AS-BUILT PROFILE (11/22/03)
STATION
101+00
101+50
102+00
102+50
103+00
103+50
104+00
104+50
105+00
105+50
106+00
106+50
DEPTH (FEET)
0
5
10
15
20
25
30
35
40
45
ORIGINALLY, TRENCH WAS BEING EXCAVATED IN A SOUTH TO NORTH DIRECTION. NOW, EXCAVATION IS GOING NORTH TO SOUTH FROM STATION 103+50 TO STATION 106+50. EXCAVATION IN THE FROM STATION 103+50 TO STATION 106+50 IS NOW COMPLETE. TRENCH IS NOW BEING EXCAVATED IN A SOUTH TO NORTH DIRECTION, STARTING AT STATION 102+00.
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE
TOP OF KEY (NEW)
BOTTOM OF EXCAVATION (NEW)

AS-BUILT PROFILE (TO DATE)



EXCAVATION IN THE NORTH TO SOUTH DIRECTION, GOING FROM STATION 103+50 TO 106+50 WAS COMPLETED TODAY (11/22/03). EXCAVATION MOVED TO STATION 102+00, AND WILL AGAIN GO IN A SOUTH TO NORTH DIRECTION. ONCE BACKFILLING OPERATIONS ARE COMPLETE TO STATION 106+50, THE AS-BUILT PROFILE TO DATE WILL START AT STATION 106+50 AND WILL HEAD IN A SOUTH TO NORTH DIRECTION. (LINES & SYMBOLS WILL BE THE SAME THEN).

DAILY QC TESTS

DATE 11/22/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	8:15	50	> 40 sec	65	> 64 pcf	8	6.5 - 10	15.0	< 20 cm^3	.2
PM	16:50	40	> 40 sec	66	> 64 pcf	8	6.5 - 10	18.0	< 20 cm^3	.2

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	11:05	51	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
8:00	106+10	36	64	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	19.5	< 25 cm^3	1.3	24	MAX 30%
8:00	106+10	2	70	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	16.5	< 25 cm^3	.5	24	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
11:10	101+80	2	45	40 - 90 sec	79	64 - 95 pcf	8	6.5 - 10	17.5	< 25 cm^3	.2	12	MAX 30%
11:10	101+80	17.5	66	40 - 90 sec	84	64 - 95 pcf	8	6.5 - 10	18	< 25 cm^3	.3	18.5	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	Quick PERMEABILITY (cm/sec)	Require
104+50	3	2" to 6"	118.5	+15 pcf over trench slurry	1.52×10^{-7}	1.0×10^{-7} cm/sec
104+75	3	2" to 6"	120.0	+15 pcf over trench slurry	1.28×10^{-7}	1.0×10^{-7} cm/sec
105+00	3	2" to 6"	112.0	+15 pcf over trench slurry	1.36×10^{-7}	1.0×10^{-7} cm/sec
105+25	3	2" to 6"	116.5	+15 pcf over trench slurry	3.74×10^{-8}	1.0×10^{-7} cm/sec
105+50	3	2" to 6"	120.0	+15 pcf over trench slurry	5.44×10^{-8}	1.0×10^{-7} cm/sec
105+75	3		114.0		3.23×10^{-8}	

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS

DATE 11/22/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
16:15	101+40	35	47	40 - 90 sec	89.5	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	.3	15	MAX 30%
16:15	101+40	2	44	40 - 90 sec	79	64 - 95 pcf	8	6.5 - 10	21.5	< 25 cm^3	.2	16	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 104+50, 104+75, 105+00, 105+25, 105+50, 105+75

Technician: MM / BY SES

Sample Area: A= $A = \pi r^2$ $\pi (3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 7.0cm, 7.0cm, 7.0cm, 7.5cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/c.f (1/14.65)
104+50	11/22/03	12:45 - 16:45	240	10	100.4833	519313.7717	—	19	1.52×10^{-7}	1.04×10^{-8}
104+75	11/22/03	12:45 - 16:45	240	10	100.4833	519313.7717	—	16	1.28×10^{-7}	8.74×10^{-9}
105+00	11/22/03	12:45 - 16:45	240	10	100.4833	519313.7717	—	17	1.36×10^{-7}	9.28×10^{-9}
105+25	11/22/03	17:50 - 5:50	720	10	100.4833	519313.7717	—	14	3.74×10^{-8}	2.55×10^{-9}
105+50	11/22/03	17:50 - 5:50	720	10	93.7844	484692.7847	—	19	5.44×10^{-8}	3.71×10^{-9}
105+75	11/22/03	17:50 - 5:50	720	10	108.2128	559261.0644	—	13	3.23×10^{-8}	2.20×10^{-9}

I= P (psi) / 0.014217 L (cm)

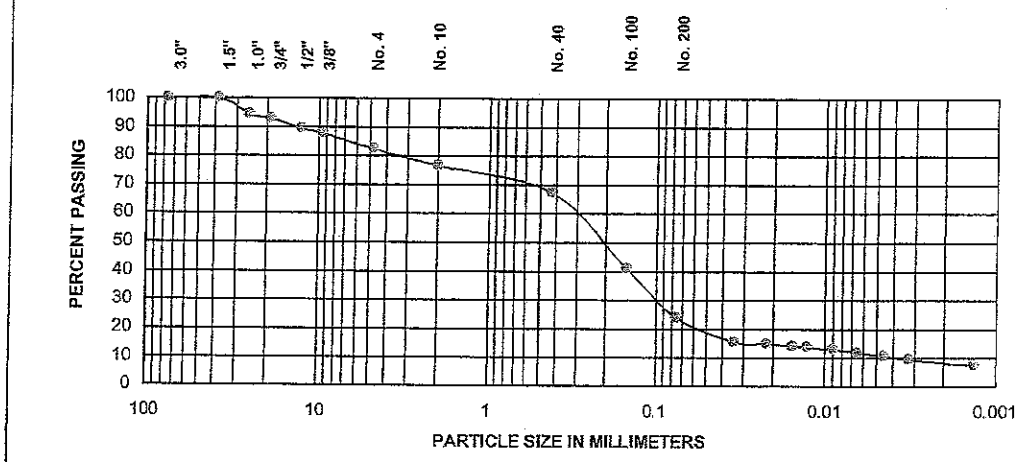
R= Quick Test / Triaxial Test = 1.85

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
106+50	585.4	586.1	33.7	552.4	38.1	548.0	3.6	5.4
106+40	585.4	586.2	34.1	552.1	38.6	547.6	3.6	5.4
106+30	585.5	586.2	34.0	552.2	40.2	546.0	3.7	5.6
106+20	585.5	586.2	34.5	551.7	40.1	546.1	3.7	5.6
106+12	585.5	586.2	34.5	551.7	39.7	546.5	3.8	5.7
101+60	587.3	587.3	33.0	554.3	37.2	550.1	3.7	5.6
101+50	587.4	587.3	32.9	554.4	37.4	549.9	3.7	5.6
101+40	587.4	587.5	33.6	553.9	37.6	549.9	3.7	5.6
101+30	587.4	587.7	33.6	554.1	37.7	550.0	3.6	5.4
101+20	587.4	587.6	33.6	554.0	37.7	549.9	3.6	5.4
101+10	587.4	587.7	33.7	554.0	37.9	549.8	3.7	5.6

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-007	**Date Tested**	12/2/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	11/25/2003
Sample Location	106+00 (SW)
Sample Description	Gray Silty Sand with Gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	17.6	58.7	12.6	11.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	94.5
3/4"	92.9
1/2"	89.5
3/8"	88.0
No. 4	82.4
No. 10	76.7
No. 40	67.4
No. 100	41.0
No. 200	23.7

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
31	20	11

Soil Classification:	SM
Soil Description:	Silty sand with gravel
System:	USCS

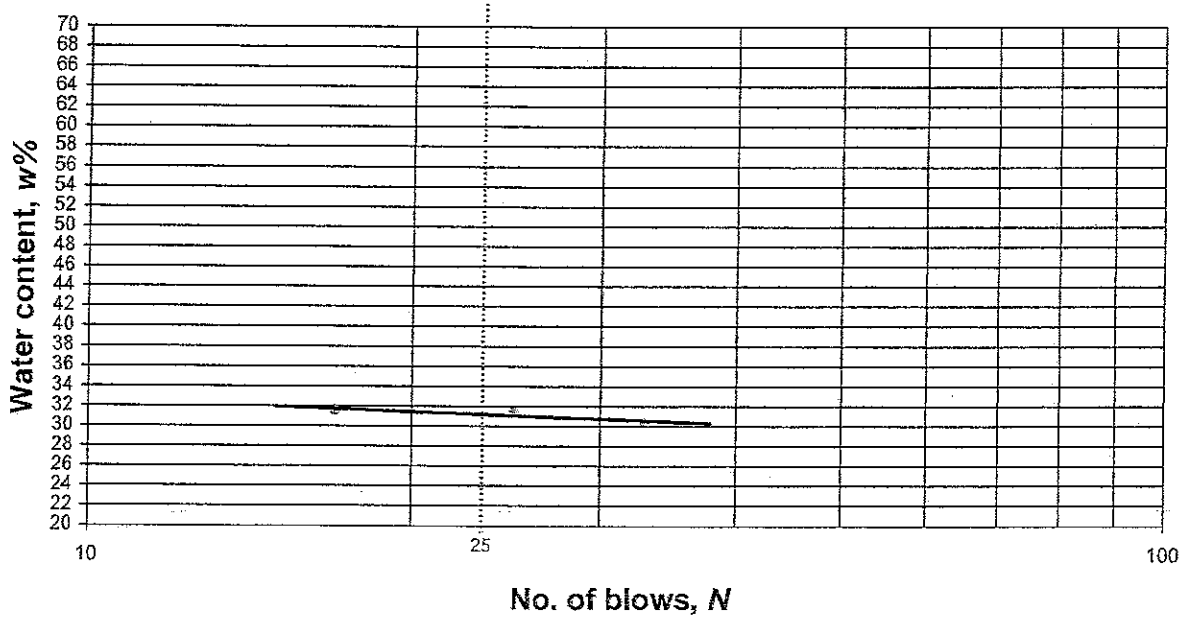
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-007	**Date Tested**	11/30/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	11/25/2003
Sample Location	106+00 (SW)
Sample Description	Gray Silty Sand with Gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	31	**Plastic Limit, PL**	20	**Plasticity Index, PI**	11

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	1	Date	11/20/2003	Sheet	1
				Date of weighing	11/20 &11/21/03	Tested by	NP

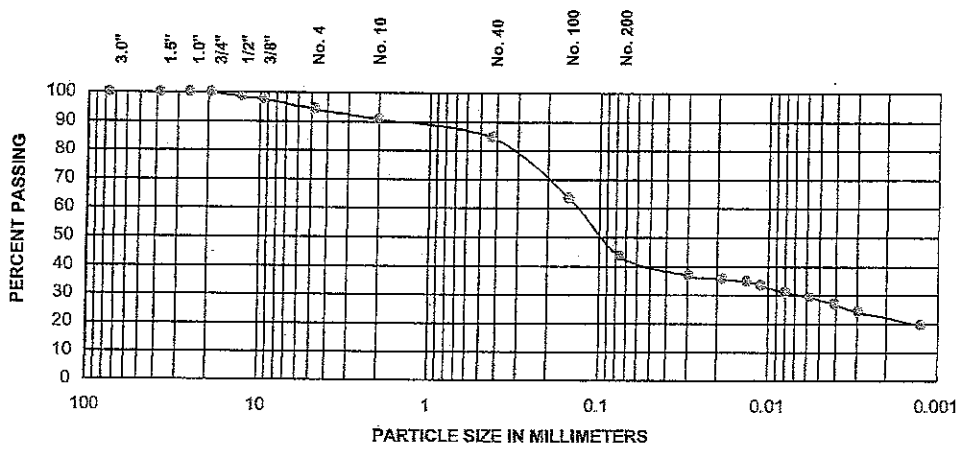
Boring No.	-	-	-	-	-	-
Sample No.	BF-001	BF-002	BF-003	BF-004	BF-005	BF-006
Location	106+50 (SW)	105+00 (SW)	104+00 (SW)	103+00 (SW)	102+00 (SW)	101+00 (SW)
Tin No.	18C	4C	11C	72A	7C	76A
Tin + Wet Soil	157.16	194.69	175.01	165.96	167.49	160.53
Tin + Dry Soil	135.06	150.98	129.65	135.46	145.64	130.15
Wt. of Tin	31.26	30.82	31.17	30.36	31.13	30.56
Wt. of Dry Soil	103.8	120.2	98.5	105.1	114.5	99.6
Wt. of Water	22.1	43.7	45.4	30.5	21.9	30.4
Moisture, %	21.3	36.4	46.1	29.0	19.1	30.5
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	BF-007	BF-008				
Location	106+00 (SW)	100+00 (SW)				
Tin No.	35C	176A				
Tin + Wet Soil	162.09	169.09				
Tin + Dry Soil	135.06	139.69				
Wt. of Tin	31.38	30.76				
Wt. of Dry Soil	103.7	108.9				
Wt. of Water	27.0	29.4				
Moisture, %	26.1	27.0				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-006	**Date Tested**	12/2/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	11/25/2003
Sample Location	105+00 (SW)
Sample Description	Gray Clayey Sand, tr. Gravel (S.B. Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	5.7	50.8	15.3	28.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	98.5
3/8"	97.7
No. 4	94.3
No. 10	90.9
No. 40	84.6
No. 100	63.6
No. 200	43.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
37	15	22

Soil Classification:	SC
Soil Description:	Clayey sand
System:	USCS

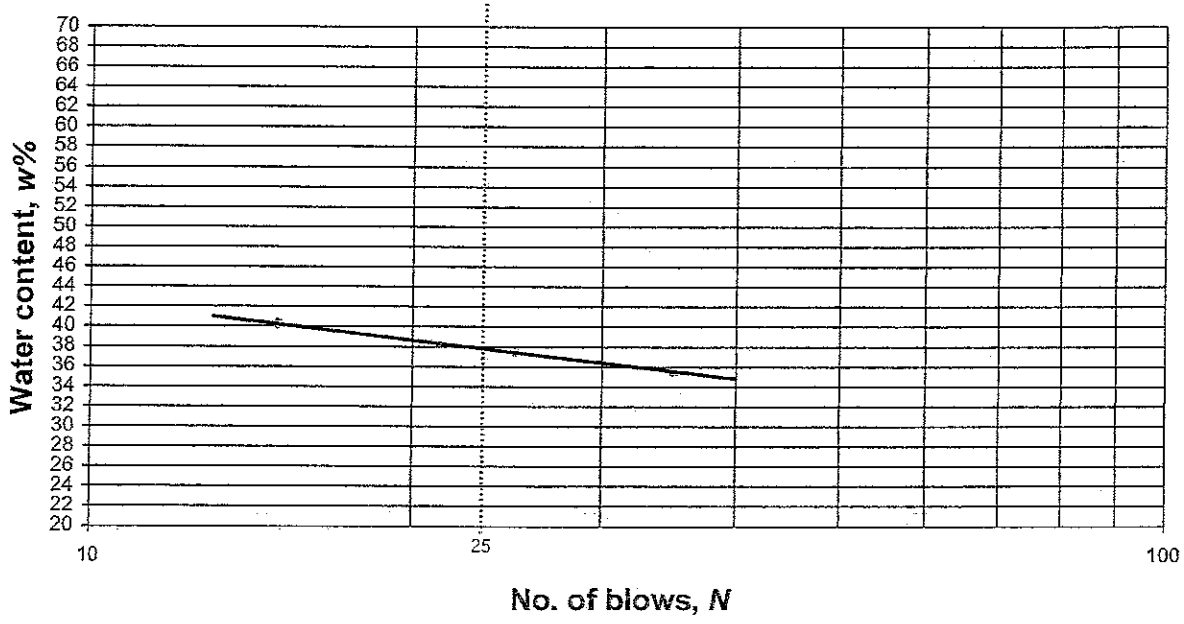
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-006	**Date Tested**	11/30/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	11/25/2003
Sample Location	105+00 (SW)
Sample Description	Gray Clayey Sand, tr. Gravel (S.B. Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	37	Plastic Limit, PL	15	Plasticity Index, PI	22

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	11/28/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-006	Date Recd.	11/25/03	**Location**	105+00 (SW)		
Sample Description	Gray Clayey Sand, tr of Gravel (S.B. Backfill)						

Specimen Data

Initial

Diameter	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.19	cm	Volume, V:	211.3	cu cm
Mass of Sample:	402.0	g	**Moisture Content:**	28.1	%
			Wet Density	118.7	pcf
			Dry Density	92.7	pcf

Final

Diameter	6.93	cm	Area, A:	37.7	sq cm
Height, L:	4.84	cm	Volume, V:	182.6	cu cm
Mass of Sample:	382.10	g	**Moisture Content:**	19.9	%
			Wet Density	130.6	pcf
			Dry Density	108.9	pcf
			Deg of Saturation	95.2	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	24.4	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
		0	0					—
11/28/2003	10:00 AM	—	—	3.02	5.74	—	20.0	—
11/28/2003	11:00 AM	3600	3600	3.09	5.68	1.2	20.0	1.46E-08
11/28/2003	12:00 PM	3600	7200	3.16	5.62	1.2	20.0	1.47E-08
11/28/2003	1:00 PM	3600	10800	3.23	5.56	1.2	20.0	1.48E-08
11/28/2003	2:00 PM	3600	14400	3.30	5.50	1.2	20.0	1.49E-08

Average Permeability = **1.5E-08** cm/sec

Remarks:

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 01/15/04	TRANSMITTAL NO. 02260-67.1

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz, PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7495	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL X THIS IS A RESUBMITTAL OF TRANSMITTAL 02260-67
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐ GOV'T APPROVAL

ITEM NO.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)*	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8)	NO. OF COPIES	CONTRACT REFERENCE DOCUMENT		FOR CONTRACTOR USE CODE	VARIATION (See instruction no. 6)	FOR CE USE CODE
				SPEC. PARA NO.	DRAWING SHEET NO.			
a.	b.	c.	d.	e.	f.	g.	h.	i.
161	112303 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Fred Hall 1/15/04
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

CONTRACTOR RESPONSE TO GOVERNMENT REVIEW REMARKS

Indian Harbor Canal Confined Disposal Facility
Subsurface Investigation& Cutoff Wall

Contract No. DACW27-02-C-0003

Response to Government Comments on the following:

Item No.:	Submittal No.:	Description:	Date:
161	02260-67	112303 Daily GeoCon QC Data	December 6, 2003

Response to Government Comments Provided As:

Item No.:	Submittal No.:	Description:	Date:
161	02260-65.1	112303 Daily GeoCon QC Data	January 14, 2004

Action Code: FX – Code. Receipt acknowledged, does not comply as noted with contract requirements. Resubmission is required. See comments below.

Response:
Geo-Con has revised the 112303 Daily GeoCon QC Data to reflect USACE comments and is hereby resubmitting the entire document.

COMMENTS ON MAIN BODY AND GENERAL COMMENTS:

Comment:

1. Ensure that the daily cutoff wall QC data submittals include all laboratory data for all samples taken that day. Include Atterburg limits, grain size, moisture content, and permeability data. It is not clear when the soil-bentonite backfill was placed at Sta. 106+00 and when the corresponding soil-bentonite sample was collected for laboratory testing. See the comments on Transmittal No. 02260-66.

Response:

All laboratory data for all samples taken this day are now included as part of the Daily GeoCon QC Data Report. A soil-bentonite backfill sample was taken at Sta. 106+00 on 11/23/03. Due to an afternoon rainstorm that shut down operations per EQ, the backfill mixed in this area was not placed in the trench. This area was remixed on 11/24/03. Since this sample was not placed in the trench and was remixed the following day, the sample was archived and noted that it would not be sent to the lab unless otherwise directed (see comments on Page 1 of 4 of 112303 Daily GeoCon QC Data Report). The soil-bentonite backfill samples taken at Sta. 106+00 and 102+00 were collected on 11/24/03 (sent to the lab). Soil-bentonite backfill placement at Sta. 106+00 was started on 11/23/03

(2' rise from AM profile to PM profile) and was at top out on 11/26/03. Sample reports are provided in the daily data submittal for the day the sample was collected.

Comment:

2. Include calculations demonstrating that 6% dry bentonite is being added by including the "Soil-Bentonite Backfill Quality Control" form included in the approved Transmittal No. 02260-16.1; Soil-Bentonite Slurry Trench Cutoff Wall Implementation Plan. (The form is in the Appendix C of the Standard Operating Procedures included in Appendix E of the Implementation Plan.) Ensure that the width of the cutoff wall shown on the "Daily Soil Bentonite Slurry Wall Quality Control Form" and used in the percent-dry-bentonite calculations is based on field measurements of the slurry trench width.

Response:

Calculations demonstrating that 6% dry bentonite is being added while mixing the soil-bentonite backfill are located on the "Soil-Bentonite Backfill Quality Control" form and included as part of the Geo-Con Daily QC Data Report. Actual field measured trench widths are shown on the "Daily Soil Bentonite Slurry Wall Quality Control Form and the field measured widths (average) are used in the percent-dry-bentonite calculations.

Comment:

3. Reference Section 02260, paragraph 3.5.1, which requires elevations to be recorded. Include on the forms the elevations of the items listed in 02260, paragraph 3.5.1.5.

Response:

A separate elevation spreadsheet form including all the elevations of the items listed in 02260, paragraph 3.5.1.5, is now included as part of the Geo-Con Daily QC Data Report.

Comment:

4. Ensure that the filtrate loss of the slurry meets the Contract requirements.

Response:

Filtrate loss of the slurry on this report meets the Contract requirements.

Comment:

5. It is noted with reference to Spec. Section 02260/3.4.12, "Clay Cap", that no clay cap material has been placed to date.

Response:

Clay cap will be placed at a later date as the soil-bentonite slurry wall nears completion or after it is completed.

Comment:

6. Reference the CQC requirements in Section 02260, paragraph 2.4, paragraph 3.4.4, paragraph 3.4.6, paragraph 3.4.9, paragraph 3.4.11, paragraph 3.5, paragraph 3.5.1.5, and paragraph 3.5.2.2.

Response:

Comment noted.

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/23/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy, rain, sometime pouring; 62 - 70 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
101+50	2.00	78.50	11.00	25.00	41.00	8
101+50	35.00	78.00	13.00	24.50	40.00	8

No afternoon sample was collected. Site operations were shut down at 13:30 per EQ due to the rain storm. Jobsite was shut down for the rest of the day since the forecast showed no signs of clearing up.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A	AREA WE ARE EXCAVATING IN WAS ALREADY SAMPLED.			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
106+00	3.00	Sample collected	Sample collected	Sample collected	1.31×10^{-7}	yes**
106+25	3.00	N/A	N/A	N/A	1.40×10^{-7}	N/A
106+50	3.00	N/A	N/A	N/A	1.38×10^{-7}	N/A

**Sample was collected at Station 106+00. Because of the afternoon rainstorm that shut down operations per EQ, none of the backfill was placed in the trench. This sample will not be sent to the lab unless otherwise directed. Area will be remixed and resampled tomorrow. Quick perms will also be run again.

COMMENTS

Filter cake was .2mm, and .5mm respectively.

Unit Weight: 106+00: 111.0 pcf
106+25: 116.0 pcf
106+50: 123.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/23/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:40	66.50	42.00	12.50	8
11:52	-	46.00	-	-

**No afternoon tests were performed because site operations were shut down at 13:30 per EQ, due to the rain storm.

Filter cake was .3mm.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/23/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy, rain, sometime pouring; 62 - 70 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
101+00	33.9	37.6	37.8	10.0	377.5	3.7	104+50	OUT	TOP OUT
100+90	31.9	36.5	37.1	10.0	370.5	3.7	104+60	1.9	1.9
100+80	29.6	35.9	36.2	10.0	362.0	3.7	104+70	3.4	3.4
100+70	29.6	33.6	34.8	10.0	347.5	3.6	104+80	5.1	5.1
100+60	29.9	33.2	33.4	10.0	334.0	3.5	104+90	7.3	7.3
100+50	30.1	33.1	33.2	10.0	331.5	3.5	105+00	9.1	9.1
100+40	30.3	34.8	34.0	10.0	339.5	3.5	105+10	10.2	10.1
							105+20	12.1	12.0
							105+30	14.7	14.1
							105+40	16.3	15.4
							105+50	18.2	16.9
							105+60	20.7	18.4
							105+70	22.7	20.8
							105+80	24.4	22.3
							105+90	26.1	23.6
							106+00	27.6	25.2
							106+10	29.1	26.9
							106+20	31.3	28.4
							106+30	33.8	29.7
							106+40	35.1	31.2
							106+50	36.5	32.0
							102+00	OUT	TOP OUT
							101+90	10.1	7.1
							101+80	20.7	15.5
							101+70	30.9	23.4
							101+60	37.2	24.9
							101+50	37.4	25.6
				SF TODAY	2462.50		101+40	37.6	25.9
				SF TO DATE	29110.90		101+30	37.7	26.6

COMMENTS

(CON'T ON PAGE 4)

PM Profile is continued on page 4.

Site operations were shut down at 13:30 per EQ due to the rain storm that occurred. Work was stopped for the rest of the day because the forecast showed no signs of the rain letting up.

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/23/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy, rain, sometime pouring; RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
							101+20	37.7	27.5
							101+10	37.9	28.8
							101+00	22.7	30.7
							100+90		31.6
							100+80		32.2
							100+70		33.6
							100+60		33.2
							100+50		33.1
							100+40		34.8

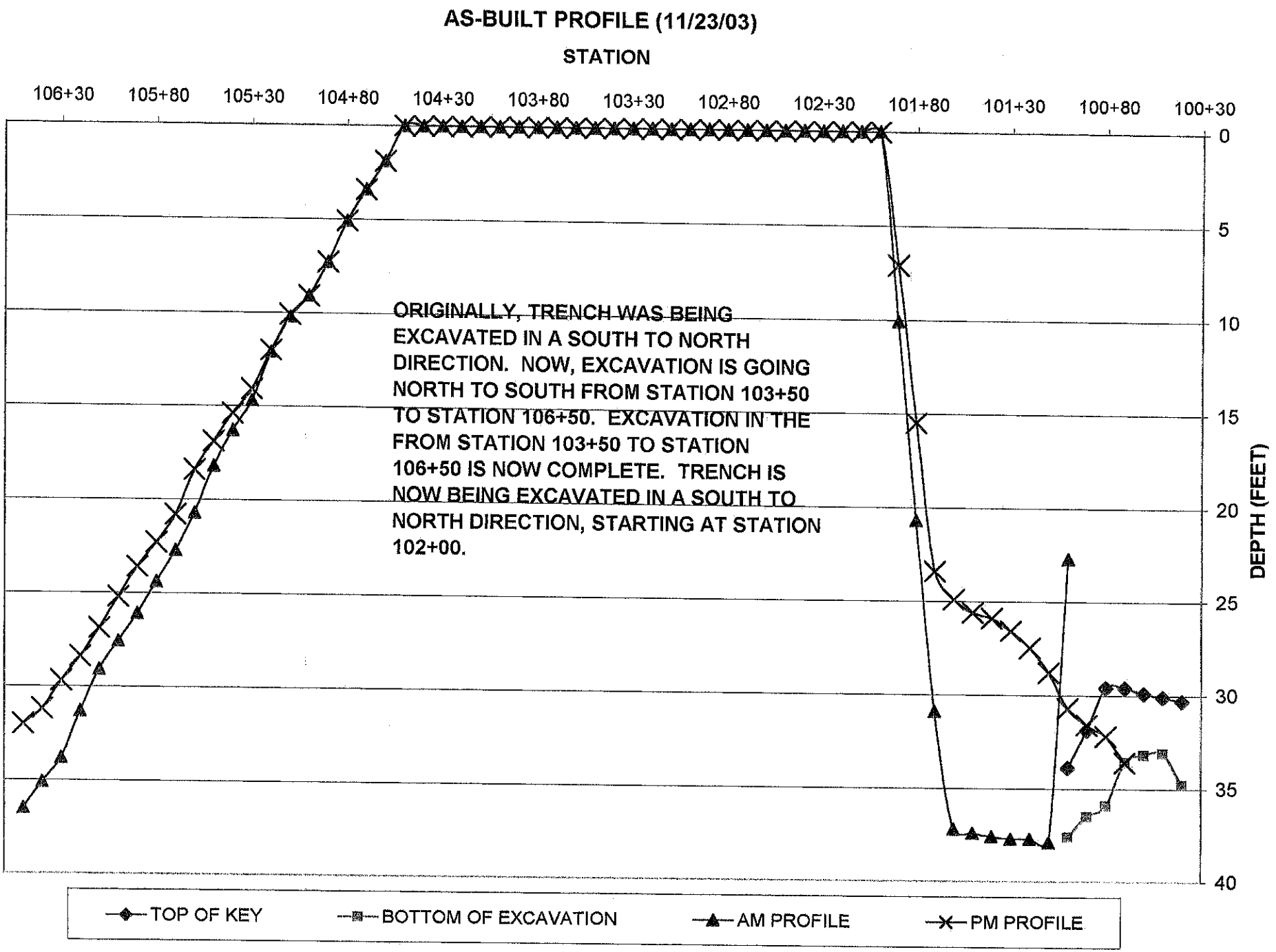
SF TODAY

SF TO DATE

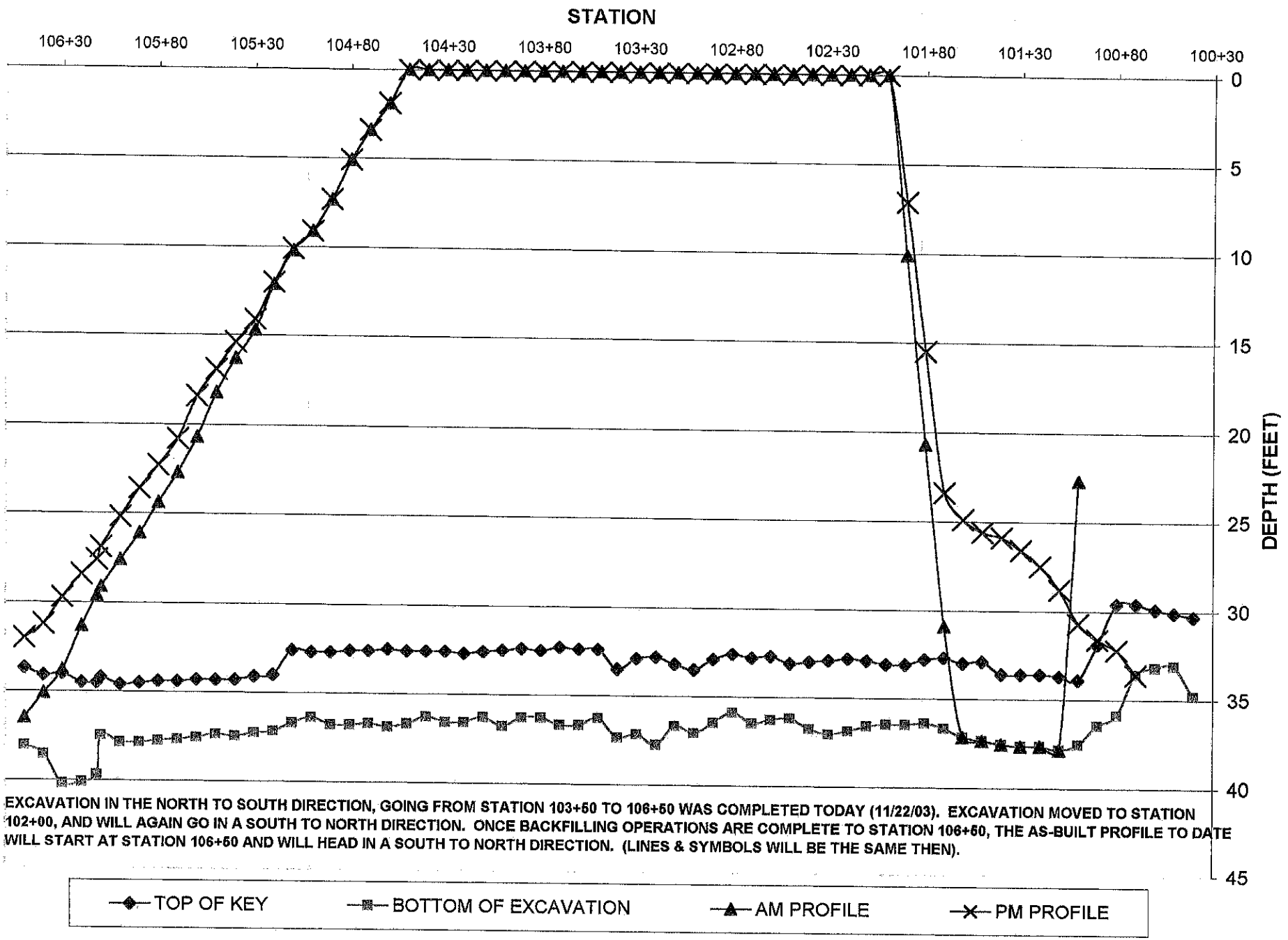
COMMENTS

PM Profile continued from Page 3.

GEO-CON: Suzanne E. Sepac OWNER:


AS-BUILT PROFILE (11/23/03)
STATION
106+30
105+80
105+30
104+80
104+30
103+80
103+30
102+80
102+30
101+80
101+30
100+80
100+30
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
ORIGINALLY, TRENCH WAS BEING EXCAVATED IN A SOUTH TO NORTH DIRECTION. NOW, EXCAVATION IS GOING NORTH TO SOUTH FROM STATION 103+50 TO STATION 106+50. EXCAVATION IN THE FROM STATION 103+50 TO STATION 106+50 IS NOW COMPLETE. TRENCH IS NOW BEING EXCAVATED IN A SOUTH TO NORTH DIRECTION, STARTING AT STATION 102+00.
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE (TO DATE)



EXCAVATION IN THE NORTH TO SOUTH DIRECTION, GOING FROM STATION 103+50 TO 106+50 WAS COMPLETED TODAY (11/22/03). EXCAVATION MOVED TO STATION 102+00, AND WILL AGAIN GO IN A SOUTH TO NORTH DIRECTION. ONCE BACKFILLING OPERATIONS ARE COMPLETE TO STATION 106+50, THE AS-BUILT PROFILE TO DATE WILL START AT STATION 106+50 AND WILL HEAD IN A SOUTH TO NORTH DIRECTION. (LINES & SYMBOLS WILL BE THE SAME THEN).

DAILY QC TESTS

DATE 11/23/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	7:40	42	> 40 sec	66.5	> 64 pcf	8	6.5 - 10	12.5	< 20 cm^3	.3
PM	—	—	> 40 sec	—	> 64 pcf	—	6.5 - 10	—	< 20 cm^3	—

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	11:52	46	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

SITE OPERATIONS WERE SHUT DOWN AT 13:30 PER EQ DUE TO RAIN. NO AFTERNOON TESTS

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
7:30	101+50	2	41	40 - 90 sec	78.5	64 - 95 pcf	8	6.5 - 10	25	< 25 cm^3	.2	11	MAX 30%
7:30	101+50	35	40	40 - 90 sec	78	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	.5	13	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
106+00	3	2" to 6"	111.0	+15 pcf over trench slurry	1.31×10^{-7}	1.0×10^{-7} cm/sec
106+25	3	2" to 6"	116.0	+15 pcf over trench slurry	1.40×10^{-7}	1.0×10^{-7} cm/sec
106+50	3	2" to 6"	123.0	+15 pcf over trench slurry	1.38×10^{-7}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 106+00, 106+25, 106+50

Technician: MM ✓BY SES

Sample Area: A= $A = \pi r^2$ $\pi(3.85)^2 = 46.56$ cm^2

Sample Height: L= 6.0cm, 7.0cm, 6.7cm cm

Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/ c f (1/14.65)
11/23/03	9:50-13:50	240	10	117.2305	605865.9809	—	19.0	1.31×10^{-7}	8.94×10^{-9}
11/23/03	9:50-13:50	240	10	100.4833	519313.7717	—	17.5	1.40×10^{-7}	9.55×10^{-9}
11/23/03	9:50-13:50	240	10	104.9826	542566.8740	—	18.0	1.38×10^{-7}	9.42×10^{-9}
	NO OTHER SAMPLES WERE RUN. SITE OPERATIONS WERE SHUT								
	DOWN BY EQ AT 13:30 DUE TO THE POURING RAIN AND NO SIGN								
	OF IT LETTING UP.								

I= $\frac{P\ (psi)}{0.014217\ L\ (cm)}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
101+00	587.4	587.8	33.9	553.9	37.6	550.2	3.7	5.6
100+90	587.5	587.6	31.9	555.7	36.5	551.1	3.7	5.6
100+80	587.5	587.6	29.6	558.0	35.9	551.7	3.7	5.6
100+70	587.5	587.5	29.6	557.9	33.6	553.9	3.6	5.4
100+60	587.5	587.4	29.9	557.5	33.2	554.2	3.5	5.3
100+50	587.6	587.3	30.1	557.2	33.1	554.2	3.5	5.3
100+40	587.6	587.3	30.3	557.0	34.8	552.5	3.5	5.3

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 120603

TRANSMITTAL NO. 02260-68

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd.
Griffith, IN 46319 219/923-1763

FROM: J. A. Wentz PE, EQM
1800 Carillon Blvd.
Cincinnati, Ohio 45240
800/229-7495

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260

PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility
Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
162	112403 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025. This submittal contains the GeoCon Field QC data, Off-site Great Lakes analytical data, and any bentonite certifications for this date.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/24/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, snow showers, windy; 21 - 30 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
100+30	2.00	74.00	4.00	23.00	40.00	8
100+30	35.00	86.00	20.00	23.50	42.00	8
99+50	2.00	93.50	26.00	24.00	47.00	8
99+50	31.00	95.00	29.00	24.00	47.00	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
100+00	LAB SAMPLE COLLECTED 11/24/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
106+00	3.00	Sample collected	Sample collected	Sample collected	$1.16x10^{-7}$	yes
106+25	3.00	N/A	N/A	N/A	$1.46x10^{-7}$	N/A
106+50	3.00	N/A	N/A	N/A	$1.08x10^{-7}$	N/A
102+00	3.00	Sample collected	Sample collected	Sample collected	$1.79x10^{-7}$	yes
101+75	3.00	N/A	N/A	N/A	$8.60x10^{-8}$	N/A
101+50	3.00	N/A	N/A	N/A	$8.82x10^{-8}$	N/A

COMMENTS

Filter cake was .4mm, .8mm, 1.0mm, and 1.5mm respectively.

Unit Weight: 106+00: 111.0 pcf
106+25: 120.5 pcf
106+50: 115.5 pcf
102+00: 117.5 pcf
101+75: 113.0 pcf
101+50: 120.5 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/24/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
8:42	-	41.00	-	-
10:40	66.00	51.00	15.00	8
15:45	66.00	69.00	16.50	8
16:49	-	65.00	-	-

Filter cake was .2mm and .7mm.

FUNNEL CALIBRATIONS PERFORMED TODAY?	yes
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/24/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, snow showers, windy; 21 - 30 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
100+30	30.1	33.3	34.1	10.0	341.0	2.5	104+50	OUT	TOP OUT
100+20	30.2	33.3	33.3	10.0	333.0	2.5	104+60	1.9	TOP OUT
100+10	30.2	33.4	33.4	10.0	333.5	2.5	104+70	3.4	TOP OUT
100+00	30.1	33.5	33.5	10.0	334.5	2.5	104+80	5.1	TOP OUT
99+90	30.0	33.6	33.6	10.0	335.5	2.5	104+90	7.3	TOP OUT
99+80	30.2	33.6	33.6	10.0	336.0	2.5	105+00	9.1	TOP OUT
99+70	30.3	33.7	33.7	10.0	336.5	2.5	105+10	10.1	5.1
99+60	30.2	33.7	33.7	10.0	337.0	2.5	105+20	12.0	7.2
99+50	30.3	33.9	33.8	10.0	338.0	2.5	105+30	14.1	8.1
99+40	30.2	33.9	33.9	10.0	339.0	2.5	105+40	15.4	9.6
99+30	30.3	34.2	34.1	10.0	340.5	2.5	105+50	16.9	12.1
99+20	30.4	34.2	34.2	10.0	342.0	2.5	105+60	18.4	13.7
							105+70	20.8	15.3
							105+80	22.3	16.8
							105+90	23.6	17.2
							106+00	25.2	18.7
							106+10	26.9	20.3
							106+20	28.4	21.9
							106+30	29.7	23.5
							106+40	31.2	25.0
							106+50	32.0	26.6
							102+00	OUT	TOP OUT
							101+90	7.1	5.0
							101+80	15.5	9.1
							101+70	23.4	12.3
							101+60	24.9	13.2
							101+50	25.6	15.4
				SF TODAY	4046.50		101+40	25.9	15.5
				SF TO DATE	33157.40		101+30	26.6	16.4

COMMENTS

(CON'T ON PAGE 4)

PM Profile is continued on page 4.

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/24/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, snow showers, windy; 21 - RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
							101+20	27.5	17.6
							101+10	28.8	19.3
							101+00	30.7	19.9
							100+90	31.6	21.1
							100+80	32.2	23.2
							100+70	33.6	24.1
							100+60	33.2	24.9
							100+50	33.1	26.4
							100+40	34.8	27.4
							100+30		28.0
							100+20		28.7
							100+10		29.4
							100+00		30.0
							99+90		33.3
							99+80		33.4
							99+70		33.6
							99+60		33.9
							99+50		34.0
							99+40		33.9
							99+30		34.2
							99+20		34.2

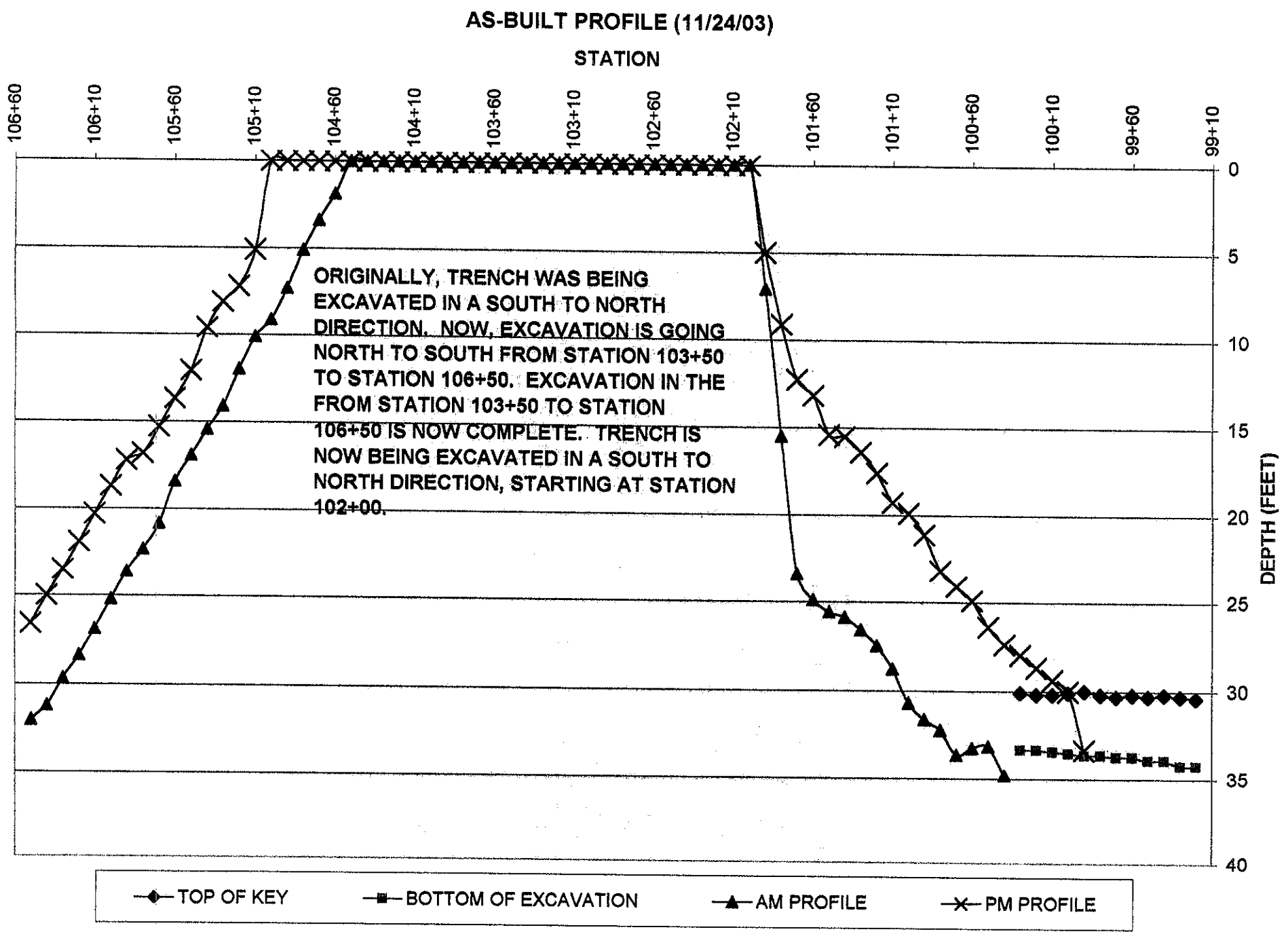
SF TODAY

SF TO DATE

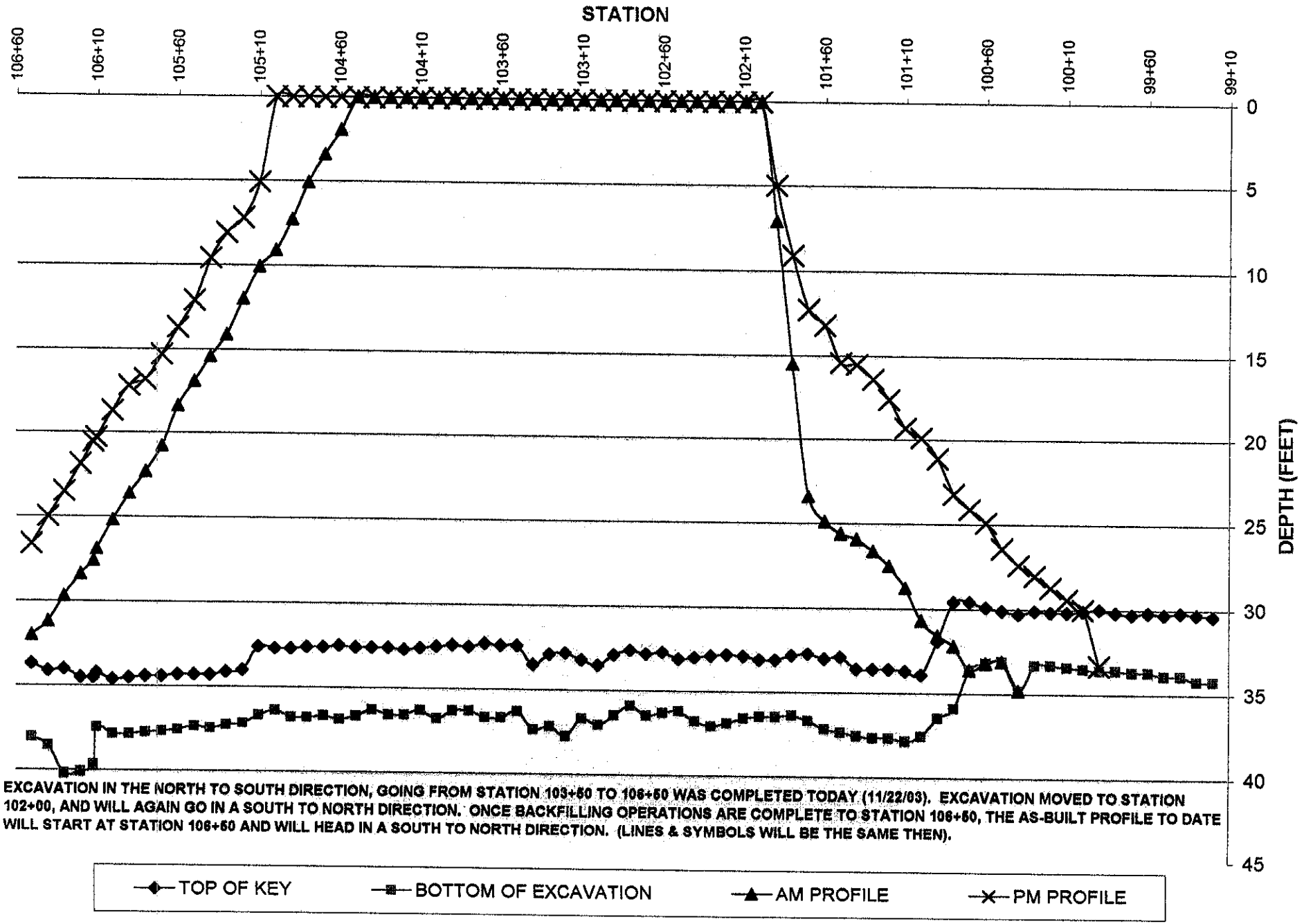
COMMENTS

PM Profile continued from Page 3.

GEO-CON: Suzanne E. Sepic OWNER:


AS-BUILT PROFILE (11/24/03)
STATION
106+60
106+10
105+60
105+10
104+60
104+10
103+60
103+10
102+60
102+10
101+60
101+10
100+60
100+10
99+60
99+10
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
ORIGINALLY, TRENCH WAS BEING EXCAVATED IN A SOUTH TO NORTH DIRECTION. NOW, EXCAVATION IS GOING NORTH TO SOUTH FROM STATION 103+50 TO STATION 106+50. EXCAVATION IN THE FROM STATION 103+50 TO STATION 106+50 IS NOW COMPLETE. TRENCH IS NOW BEING EXCAVATED IN A SOUTH TO NORTH DIRECTION, STARTING AT STATION 102+00.
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE (TO DATE)



EXCAVATION IN THE NORTH TO SOUTH DIRECTION, GOING FROM STATION 103+60 TO 106+60 WAS COMPLETED TODAY (11/22/03). EXCAVATION MOVED TO STATION 102+00, AND WILL AGAIN GO IN A SOUTH TO NORTH DIRECTION. ONCE BACKFILLING OPERATIONS ARE COMPLETE TO STATION 106+60, THE AS-BUILT PROFILE TO DATE WILL START AT STATION 106+60 AND WILL HEAD IN A SOUTH TO NORTH DIRECTION. (LINES & SYMBOLS WILL BE THE SAME THEN).

DAILY QC TESTS **DATE** 11/24/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:40	51	> 40 sec	66	> 64 pcf	8	6.5 - 10	15	< 20 cm^3	.2
PM	15:45	69	> 40 sec	66	> 64 pcf	8	6.5 - 10	16.5	< 20 cm^3	.7

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	8:42	41	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	16:49	65	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:55	100+30	2	40	40 - 90 sec	74	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	.4	4	MAX 30%
7:55	100+30	35	42	40 - 90 sec	86	64 - 95 pcf	8	6.5 - 10	23.5	< 25 cm^3	.8	20	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
17:09	99+20	2	47	40 - 90 sec	93.5	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.0	26	MAX 30%
17:09	99+20	31	47	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.5	29	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
106+00	3	2" to 6"	111	+15 pcf over trench slurry		1.0 x 10^{-7} cm/sec
106+25	3	2" to 6"	120.5	+15 pcf over trench slurry		1.0 x 10^{-7} cm/sec
106+50	3	2" to 6"	115.5	+15 pcf over trench slurry		1.0 x 10^{-7} cm/sec
102+00	3	2" to 6"	117.5	+15 pcf over trench slurry		1.0 x 10^{-7} cm/sec
101+75	3	2" to 6"	113	+15 pcf over trench slurry		1.0 x 10^{-7} cm/sec
101+50	3		120.5			

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 102+00, 101+75, 101+50 / 106+00, 106+25, 106+50

Technician: MM / BY SES

Sample Area: A= $A=\pi r^2$ $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 7.5cm, 7.0cm / 6.5 cm, 7.5cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ c.f (1/14.65)
102+00	11/24/03	8:57-12:57	240	10	100.4833	519313.7717	—	14.5	1.16×10^{-7}	7.92×10^{-9}
101+75	11/24/03	8:57-12:57	240	10	93.7844	484692.7847	—	17	1.46×10^{-7}	9.96×10^{-9}
101+50	11/24/03	8:57-12:57	240	10	100.4833	519313.7717	—	13.5	1.08×10^{-7}	7.37×10^{-9}
106+00	11/24/03	13:40-17:40	240	10	108.2128	559261.0644	—	24	1.79×10^{-7}	1.22×10^{-8}
106+25	11/24/03	13:40-17:40	240	10	93.7844	484692.7847	—	10	8.60×10^{-8}	5.87×10^{-9}
106+50	11/24/03	13:40-17:40	240	10	100.4833	519313.7717	—	11	8.82×10^{-8}	6.02×10^{-9}

I= $\frac{P\ (psi)}{0.014217\ L\ (cm)}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/1/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-010	Date Recd.	11/26/03	**Location**	100+00 (SB Backfill)		
Sample Description	Gray Clayey Sand, tr. Gravel (S.B. Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	7.76	cm	Volume, V:	315.9	cu cm
Mass of Sample:	565.0	g	**Moisture Content:**	**26.8**	**%**
			Wet Density	**111.6**	**pcf**
			Dry Density	**88.0**	**pcf**

Final

Diameter:	6.95	cm	Area, A:	37.9	sq cm
Height, L:	7.12	cm	Volume, V:	270.1	cu cm
Mass of Sample:	537.10	g	**Moisture Content:**	**26.5**	**%**
			Wet Density	**124.1**	**pcf**
			Dry Density	**98.1**	**pcf**
			Deg of Saturation	**97.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	16.3	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/1/2003	9:15 AM	0	0	2.93	5.86		20.0	—
12/1/2003	10:15 AM	3600	3600	3.02	5.75	0.8	20.0	3.98E-08
12/1/2003	11:15 AM	3600	7200	3.10	5.67	1.0	20.0	2.92E-08
12/1/2003	12:15 PM	3600	10800	3.20	5.59	1.3	20.0	2.94E-08
12/1/2003	1:15 PM	3600	14400	3.28	5.50	0.9	20.0	3.34E-08

Average Permeability = **3.3E-08** cm/sec

Remarks:

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MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2740	Report No.	1	Date	11/20/2003	Sheet	1
				Date of weighing	11/20 &11/21/03	Tested by	NP

Boring No.	-	-	-	-	-	-
Sample No.	**BF-001**	**BF-002**	**BF-003**	**BF-004**	**BF-005**	**BF-006**
Location	106+50 (SW)	105+00 (SW)	104+00 (SW)	103+00 (SW)	102+00 (SW)	101+00 (SW)
Tin No.	18C	4C	11C	72A	7C	76A
Tin + Wet Soil	157.16	194.69	175.01	165.96	167.40	160.53
Tin + Dry Soil	133.06	150.98	129.65	135.46	145.64	130.15
Wt. of Tin	31.26	30.82	31.17	30.36	31.13	30.56
Wt. of Dry Soil	103.8	120.2	98.5	105.1	114.5	99.6
Wt. of Water	**22.1**	**43.7**	**45.4**	**30.5**	**21.9**	**30.4**
Moisture, %	21.3	36.4	46.1	29.0	19.1	30.5
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	**BF-007**	**BF-008**				
Location	100+00 (SW)	100+00 (SW)				
Tin No.	35C	176A				
Tin + Wet Soil	**162.09**	**169.09**				
Tin + Dry Soil	135.95	139.59				
Wt. of Tin	**31.38**	**30.76**				
Wt. of Dry Soil	103.7	108.8				
Wt. of Water	**27.0**	**29.4**				
Moisture, %	26.1	27.0				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc
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MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2740	Report No.	2	Date	11/25/2003	Sheet	1
				Date of weighing	11/26/2003	Tested by	NP

Boring No.	-	-	-	-	-	-
Sample No.	**BF-007**	**BF-008**				
Location	106+00 (SW)	100+00 (SW)				
Tin No.	35C	176A				
Tin + Wet Soil	162.00	169.00				
Tin + Dry Soil	135.06	139.69				
Wt. of Tin	31.38	30.76				
Wt. of Dry Soil	103.7	108.9				
Wt. of Water	**27.0**	**29.4**				
Moisture, %	26.1	27.0				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

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MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	1	Date	11/20/2003	Sheet	1
				Date of weighing	11/20 &11/21/03	Tested by	NP

Boring No.	-	-	-	-	-	-
Sample No.	BF-001	BF-002	BF-003	BF-004	BF-005	BF-006
Location	106+50 (SW)	105+00 (SW)	104+00 (SW)	103+00 (SW)	102+00 (SW)	101+00 (SW)
Tin No.	18C	4C	11C	72A	7C	76A
Tin + Wet Soil	157.16	194.69	175.01	165.96	167.49	160.53
Tin + Dry Soil	135.06	150.98	129.65	135.46	145.64	130.15
Wt. of Tin	31.26	30.82	31.17	30.36	31.13	30.56
Wt. of Dry Soil	103.8	120.2	98.5	105.1	114.5	99.6
Wt. of Water	22.1	43.7	45.4	30.5	21.9	30.4
Moisture, %	21.3	36.4	46.1	29.0	19.1	30.5
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	BF-007	BF-008				
Location	106+00 (SW)	100+00 (SW)				
Tin No.	35C	176A				
Tin + Wet Soil	162.09	169.09				
Tin + Dry Soil	135.06	139.69				
Wt. of Tin	31.38	30.76				
Wt. of Dry Soil	103.7	108.9				
Wt. of Water	27.0	29.4				
Moisture, %	26.1	27.0				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc
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MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	2	Date	11/25/2003	Sheet	1
				Date of weighing	11/26/2003	Tested by	NP

Boring No.	-	-	-	-	-	-
Sample No.	BF-007	BF-008				
Location	106+00 (SW)	100+00 (SW)				
Tin No.	35C	176A				
Tin + Wet Soil	162.09	169.09				
Tin + Dry Soil	135.06	139.69				
Wt. of Tin	31.38	30.76				
Wt. of Dry Soil	103.7	108.9				
Wt. of Water	27.0	29.4				
Moisture, %	26.1	27.0				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

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MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	3	Date	11/26/2003	Sheet	1
				Date of weighing	11/27/2003	Tested by	NP

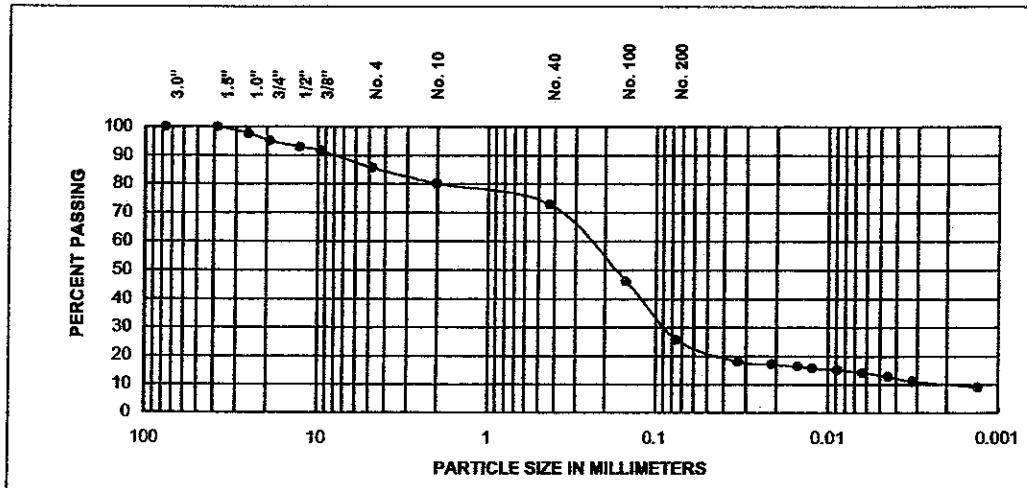
Boring No.	-	-	-	-	-	-
Sample No.	BF-009	BF-010				
Location	101+00 (SW)	98+00 (SW)				
Tin No.	7C	66A				
Tin + Wet Soil	132.06	149.36				
Tin + Dry Soil	109.09	125.36				
Wt. of Tin	31.44	30.47				
Wt. of Dry Soil	77.7	94.9				
Wt. of Water	23.0	24.0				
Moisture, %	29.6	25.3				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-010	**Date Tested**	12/3/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	11/26/2003
Sample Location	100+00 (SB Backfill)
Sample Description	Gray Clayey Sand, tr. Gravel (S.B. Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	14.3	60.0	12.3	13.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.6
3/4"	95.1
1/2"	92.9
3/8"	91.7
No. 4	85.7
No. 10	80.3
No. 40	72.8
No. 100	46.1
No. 200	25.7

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
36	19	17

Soil Classification:	SC
Soil Description:	Clayey sand
System:	USCS

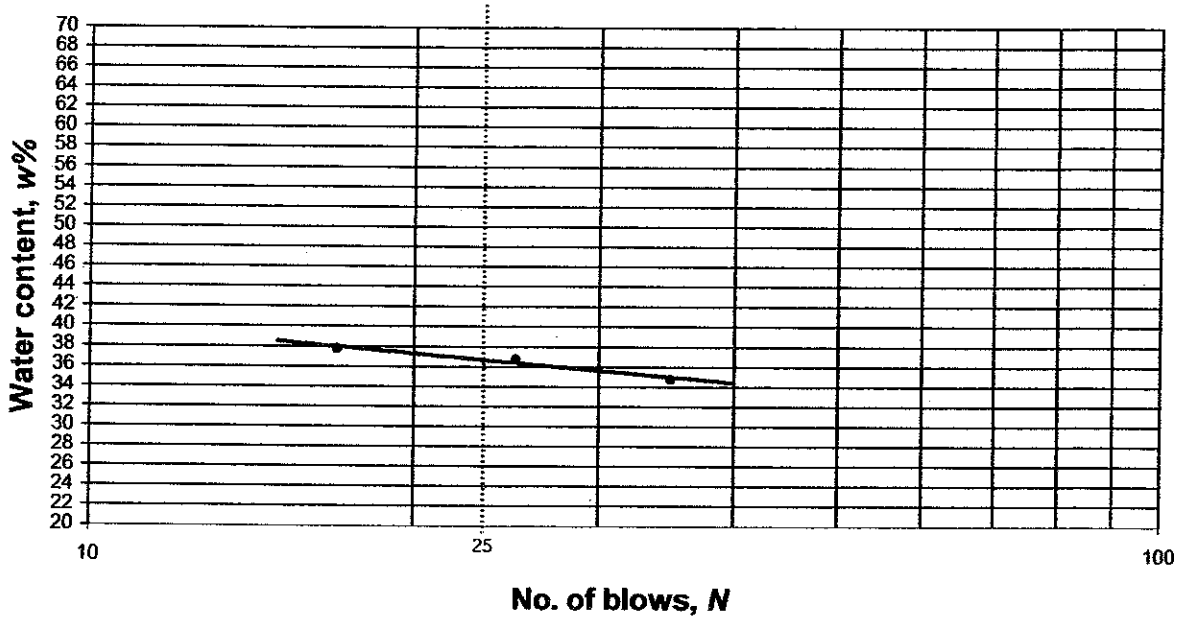
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-010	**Date Tested**	12/2/2003	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	11/26/2003
Sample Location	100+00 (SB Backfill)
Sample Description	Gray Clayey Sand, tr. Gravel (S.B. Backfill)

LIQUID LIMIT DETERMINATION



Results

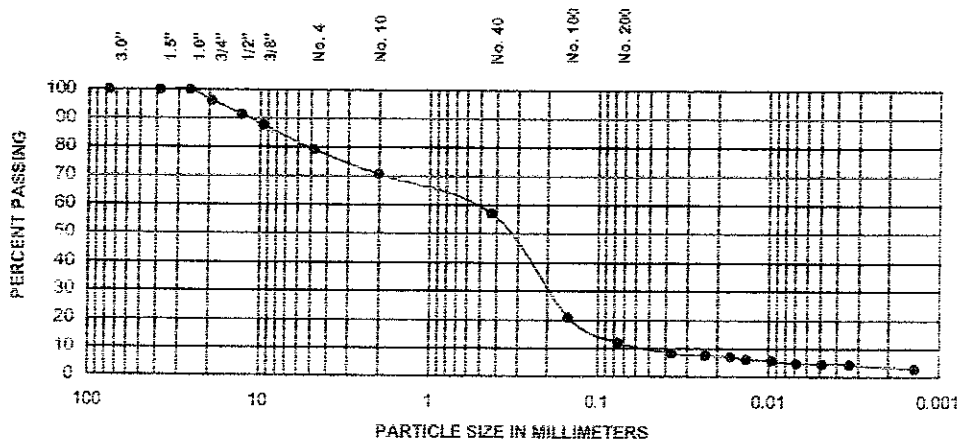
Liquid Limit, LL	**36**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**17**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-008	**Date Tested**	12/2/2003	**Tested by**	MA
						Qc by	NP

Date Sample Received:	11/25/2003
Sample Location	100+00 (SW)
Sample Description	Gray Silty, Clayey Sand with Gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	21.0	67.0	7.4	4.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	96.2
1/2"	91.5
3/8"	87.6
No. 4	79.0
No. 10	70.6
No. 40	57.1
No. 100	20.7
No. 200	12.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

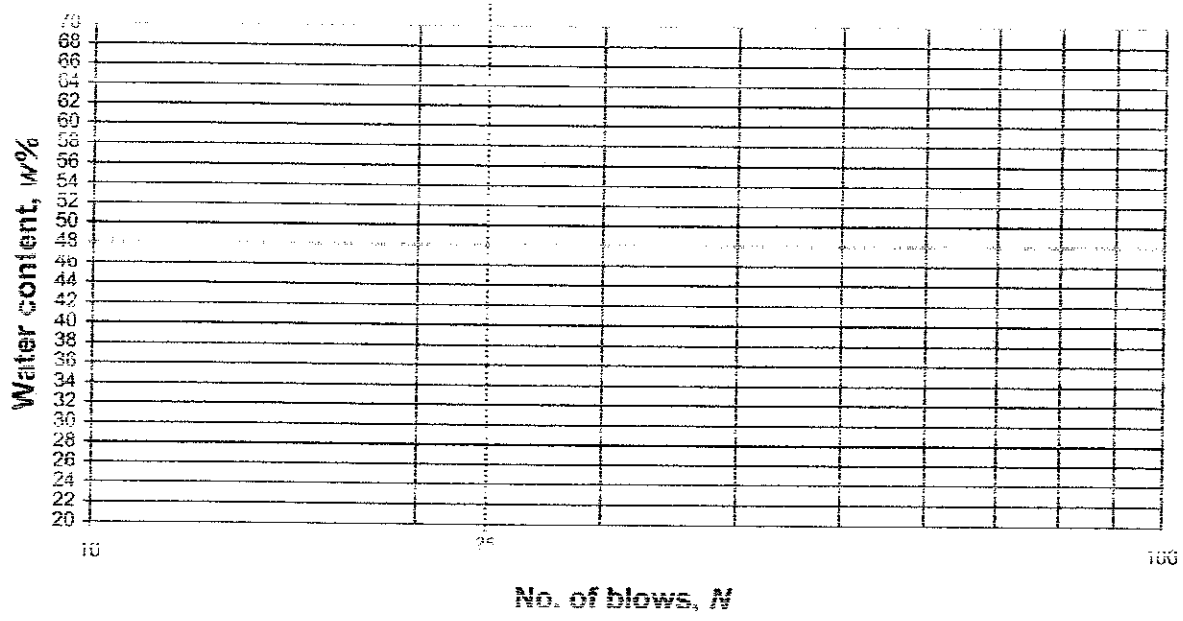
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No	2746	Sample #	BF-009	Date Tested	11/30/2003	Tested By	KM
						Qc By	NP

Date Sample Recd.	11/25/2003
Sample Location	100+00 (SW)
Sample Description	Gray Silty, Clayey Sand with Gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	Plastic Limit, PL	NP	Plasticity Index, PI	NP

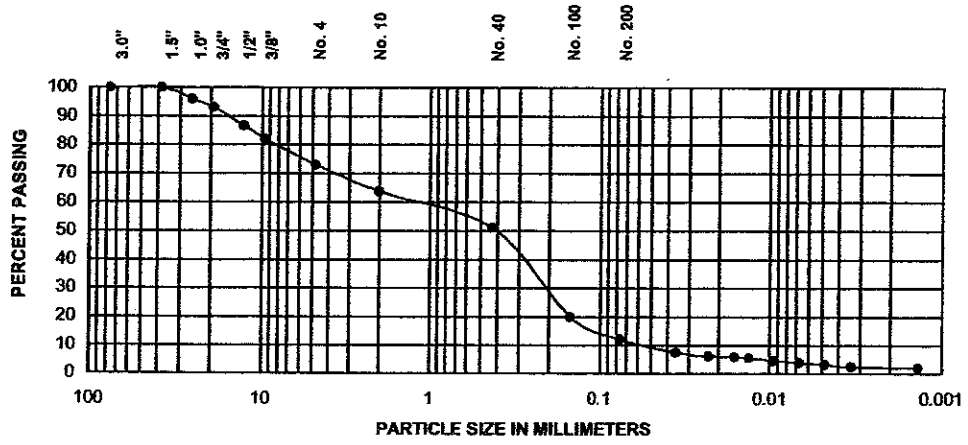
Remarks

NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-009	**Date Tested**	12/3/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	11/26/2003
Sample Location	~~101+00~~ (SW) 99+00
Sample Description	Gray Silty, Clayey Sand with Gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	27.1	60.8	8.7	3.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	96.0
3/4"	93.2
1/2"	86.7
3/8"	82.0
No. 4	72.9
No. 10	63.9
No. 40	51.1
No. 100	19.9
No. 200	12.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

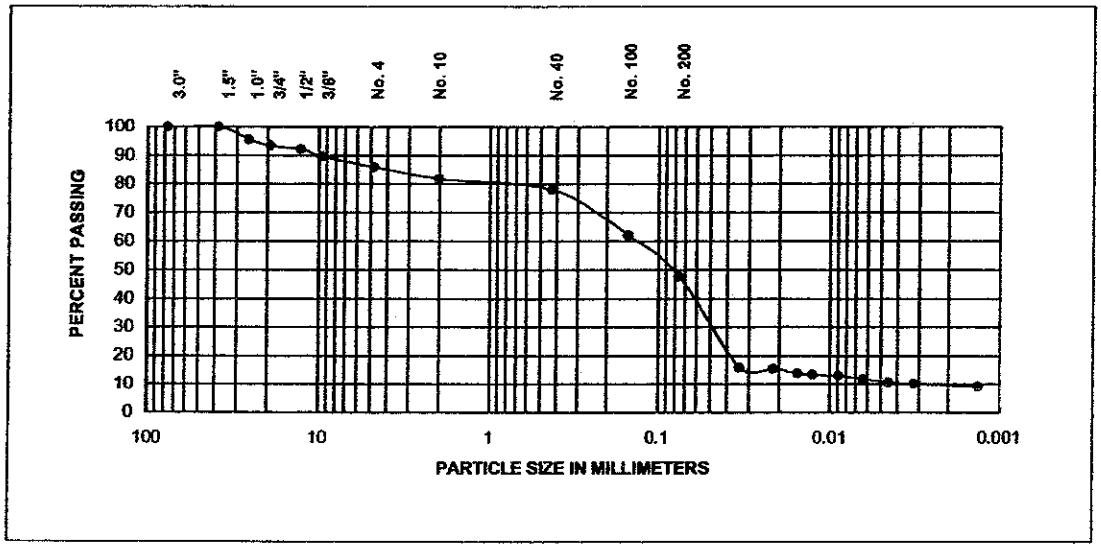
Remarks:

NP: Non-plastic soil

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-002	**Date Tested**	11/24/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	11/20/2003
Sample Location	102+00 (SW)
Sample Description	Gray Clayey Sand, tr. Gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	14.1	38.1	36.7	11.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	95.5
3/4"	93.4
1/2"	92.2
3/8"	89.7
No. 4	85.9
No. 10	81.9
No. 40	78.0
No. 100	62.1
No. 200	47.8

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
33	20	13

Soil Classification:	SC
Soil Description:	Clayey sand
System:	USCS

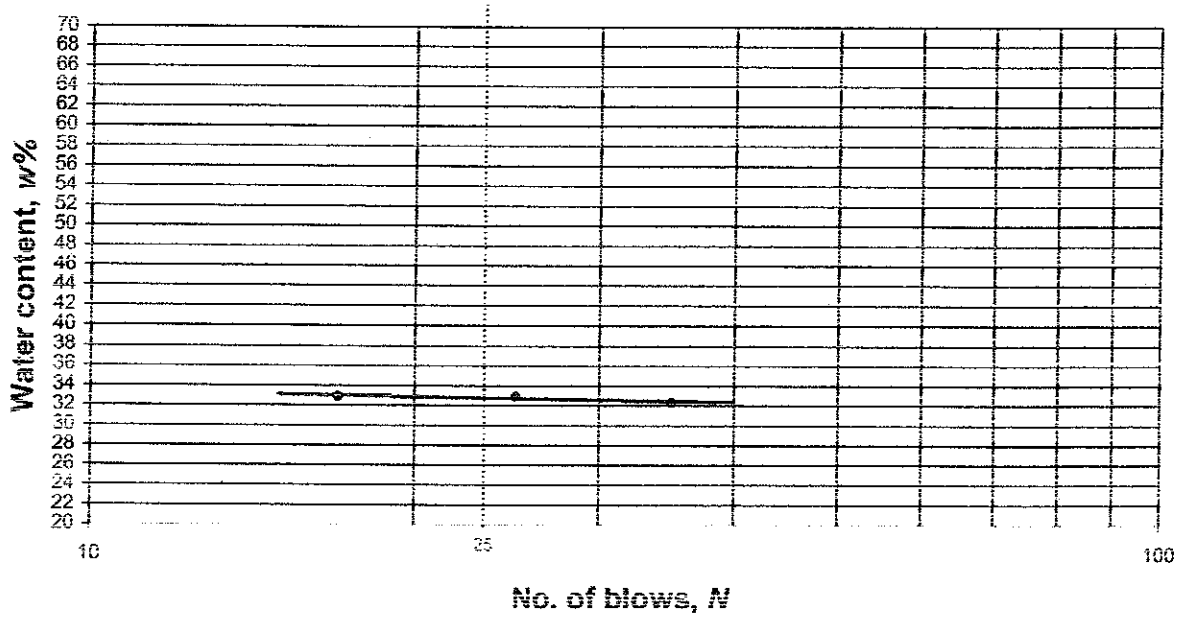
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-002	**Date Tested**	11/22/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	11/20/2003
Sample Location	102+00 (SW)
Sample Description	Gray Clayey Sand, tr. Gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

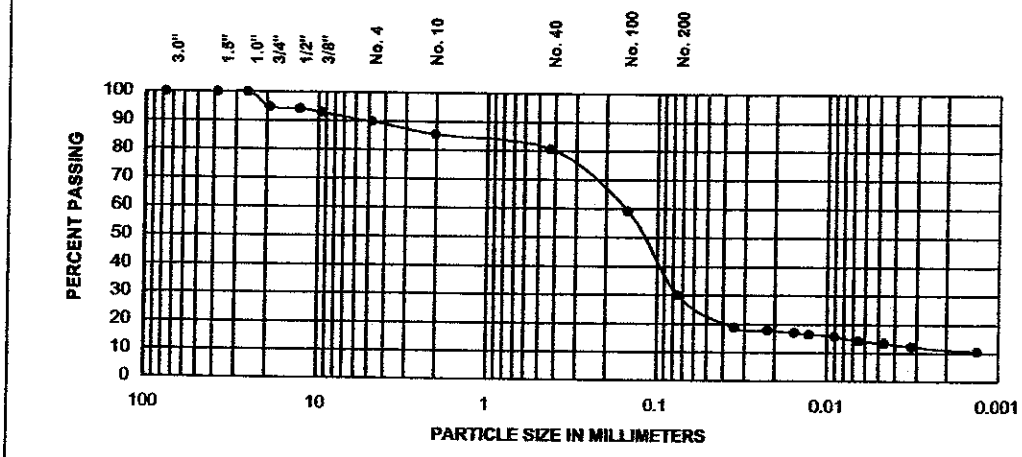
Liquid Limit, LL	33	Plastic Limit, PL	20	Plasticity Index, PI	13

Remarks

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	Sample #	SB-008	Date Tested	12/2/2003	Tested by	MT
						Qc by	NP

Date Sample Received:	11/25/2003
Sample Location	102+00 (SW)
Sample Description	Gray Clayey Sand, tr. Gravel (S.B Backfill)



			Fines	
% + 3"	% Gravel	% Sand	% Silt	% Clay
0.0	10.1	59.9	16.3	13.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	94.8
1/2"	94.2
3/8"	92.9
No. 4	89.9
No. 10	85.6
No. 40	80.6
No. 100	59.2
No. 200	30.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
30	17	13

Soil Classification:	SC
Soil Description:	Clayey sand
System:	USCS

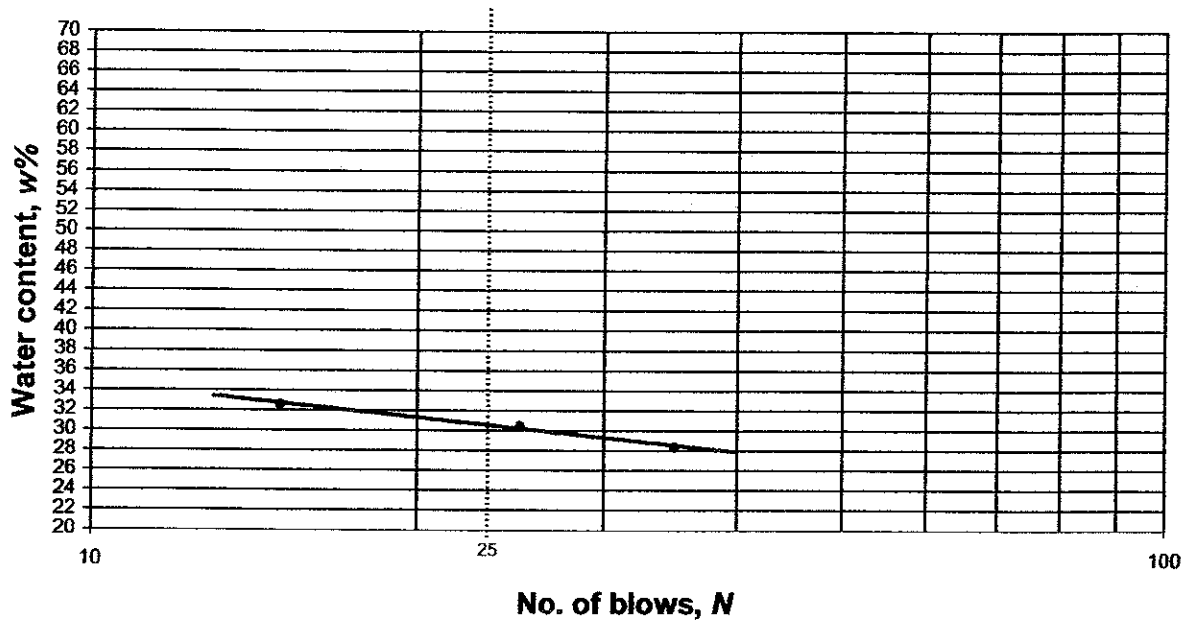
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-008	**Date Tested**	11/30/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	11/25/2003
Sample Location	102+00 (SW)
Sample Description	Gray Clayey Sand, tr. Gravel (S.B Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**30**	**Plastic Limit, PL**	**17**	**Plasticity Index, PI**	**13**

Remarks

ISP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/21/2003

SOLD TO:	SHIP TO:
GEO-CON INC 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV005934	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
11-21-03	KLEINSCHMIDT #40	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	45
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.6
> 75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	7.0
Y.P. / P.V. Ratio	3.0 max.	1.21

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Signed 11/24/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/23/97)
Rev E (8/99)

Arrived onsite 11/24/03
100# Bags

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/21/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCTV905936	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
11-21-03	ATS 14900	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	45
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.6
> 75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	7.0
Y.P. / P.V. Ratio	3.0 max.	1.21

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Signed 11/24/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/98)

Arrived onsite 11/24/03
100# Bags

LABORATORY ANALYSIS/ CERTIFICATION

P.O. Box 832 Greybull, Wyoming 02426
307-765-4496

Date Tested: 11/21/2003

SOLD TO:	SHIP TO:
GEO-CON East Chicago, Indiana	SAME

SHIP DATE	RAILCAR OR TRUCK NUMBER	PLANT OF ORIGIN	PRODUCT
11/21/2003	Southwest Express 252	Greybull	Federal Gel 90

Note: Our data for the above shipment shows the following test results:

Test or Property	API Spec.	Result
Viscosity	30 min.	36
Plastic Viscosity (cP)	N/A	
Yield Point (#/100ft²)	N/A	
Filtrate Volume (cm³)	15.0 max.	13.0
>75 micron (wt. %)	4.0 max.	3.0

Test or Property	API Spec.	Result
Moisture (wt %)	10.0 max.	9.5
Y.P. / P.V. Ratio	3.0 max.	1.0

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13-A; Section 4 for "Drilling Grade Bentonite". Should you have any questions or require additional information please let us know 1-307-765-4496.

ORDER NUMBERS : HCIV 5962

TRUCK SHIP DATE : 11/21/2003

Marcie Williams 12/1/03

Signed Date

11/24/03
2000# Jumbo Socks

LABORATORY ANALYSIS/ CERTIFICATION

P.O. Box 832 Greybull, Wyoming 02426
307-765-4496

Date Tested: 11/21/2003

SOLD TO:	SHIP TO:
GEO-CON East Chicago, Indiana	SAME

SHIP DATE	RAILCAR OR TRUCK NUMBER	PLANT OF ORIGIN	PRODUCT
11/21/2003	Joe Owens 19	Greybull	Federal Gel 90

Note. Our data for the above shipment shows the following test results:

Test or Property	API Spec.	Result
Viscosity	30 min.	37
Plastic Viscosity (cP)	N/A	
Yield Point (#/100ft^2)	N/A	
Filtrate Volume (cm^3)	15.0 max	12.8
>75 micron (wt. %)	4.0 max.	3.2

Test or Property	API Spec.	Result
Moisture (wt %)	10.0 max.	9.7
Y.P. / P.V. Ratio	3.0 max.	1.36

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13-A; Section 4 for "Drilling Grade Bentonite" Should you have any questions or require additional information please let us know 1-307-765-4496.

ORDER NUMBERS : HCIV 5963

TRUCK SHIP DATE : 11/21/2003

Marci Williams 12/1/03

Signed Date

11/24/03

2000# Jumbo Sacks

LABORATORY ANALYSIS/ CERTIFICATION

P.O. Box 832 Greybull, Wyoming 82426
307-765-4496

Date Tested: 11/21/2003

SOLD TO:	SHIP TO:
GEO-CON East Chicago, Indiana	SAME

SHIP DATE	RAILCAR OR TRUCK NUMBER	PLANT OF ORIGIN	PRODUCT
11/21/2003	Quality 66	Greybull	Federal Gel 90

Note: Our data for the above shipment shows the following test results:

Test or Property	API Spec.	Result	Test or Property	API Spec.	Result
Viscosity	30 min.	54	Moisture (wt %)	10.0 max.	8.3
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max.	1.86
Yield Point (# /100ft²)	N/A				
Filtrate Volume (cm³)	15.0 max.	12.4			
>75 micron (wt. %)	4.0 max.	3.2			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13-A; Section 4 for "Drilling Grade Bentonite". Should you have any questions or require additional information please let us know 1-307-765-4496.

ORDER NUMBERS : HCIV 5965

TRUCK SHIP DATE : 11/21/2003

Marcie Williams 12/1/03

Signed Date

11/24/03

2000# Jumbo Sacks

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 120603	TRANSMITTAL NO. 02260-69

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7465	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312		CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
163	112503 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025. This submittal contains the GeoCon Field QC data, Off-site Great Lakes analytical data, and any bentonite certifications for this date.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/25/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, windy; 29 - 40 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
99+10	32.00	93.50	23.00	24.00	50.00	8
99+10	2.00	86.50	20.00	22.50	45.00	8
98+50	2.00	88.00	22.00	24.00	55.00	8
98+50	32.00	95.00	20.00	24.50	55.00	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
99+00	LAB SAMPLE COLLECTED 11/25/03			
98+00	LAB SAMPLE COLLECTED 11/25/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
101+25	3.00	N/A	N/A	N/A	2.06×10^{-7}	N/A
101+00	3.00	Sample collected	Sample collected	Sample collected	1.07×10^{-7}	yes
100+75	3.00	N/A	N/A	N/A	1.44×10^{-7}	N/A
100+50	3.00	N/A	N/A	N/A	1.27×10^{-7}	N/A
100+25	3.00	N/A	N/A	N/A	1.84×10^{-7}	N/A
100+00	3.00	Sample collected	Sample collected	Sample collected	1.28×10^{-7}	yes

COMMENTS

Filter cake was 1.6mm, .6mm, 1.0mm, and 1.5mm respectively.

Unit Weight: 101+25: 111.0 pcf
101+00: 112.0 pcf
100+75: 114.5 pcf
100+50: 117.5 pcf
100+25: 110.0 pcf
100+00: 120.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/25/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
13:15	65.50	45.00	14.00	8
14:24	65.00	44.00	15.50	8
No AM slurry samples. No slurry mixing this AM.				
Filter cake was .2mm and .2mm.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepa OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/25/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, windy; 29 - 40 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
99+10	31.0	33.9	34.1	10.0	340.5	2.5	105+00	OUT	TOP OUT
99+00	31.1	34.0	34.0	10.0	339.5	2.5	105+10	5.0	TOP OUT
98+90	31.2	34.1	34.1	10.0	340.5	2.5	105+20	7.0	TOP OUT
98+80	31.1	34.1	34.1	10.0	341.0	2.5	105+30	8.0	TOP OUT
98+70	31.2	34.3	34.2	10.0	342.0	2.5	105+40	9.5	TOP OUT
98+60	31.3	34.3	34.3	10.0	343.0	2.5	105+50	11.9	TOP OUT
98+50	31.3	34.3	34.3	10.0	343.0	2.5	105+60	13.5	TOP OUT
98+40	31.0	34.6	34.5	10.0	344.5	2.5	105+70	15.1	TOP OUT
98+30	30.8	33.9	34.3	10.0	342.5	2.5	105+80	16.6	3.1
98+20	31.2	34.8	34.4	10.0	343.5	2.5	105+90	17.1	5.8
98+10	31.1	35.1	35.0	10.0	349.5	2.5	106+00	18.5	7.7
							106+10	20.1	10.1
							106+20	21.8	12.6
							106+30	23.3	15.3
							106+40	24.9	16.9
							106+50	26.5	18.3
							102+00	OUT	TOP OUT
							101+90	5.0	TOP OUT
							101+80	9.1	TOP OUT
							101+70	12.4	1.1
							101+60	13.1	2.4
							101+50	15.6	3.1
							101+40	15.6	3.9
							101+30	16.4	4.6
							101+20	17.8	5.9
							101+10	19.2	7.1
							101+00	19.7	8.7
				SF TODAY	3769.50		100+90	21.0	10.4
				SF TO DATE	36926.90		100+80	23.3	11.6

COMMENTS

(CON'T ON PAGE 4)

PM Profile is continued on page 4.

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/25/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, windy; 29 - 40 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
							100+70	24.1	12.4
							100+60	25.0	14.1
							100+50	26.6	15.4
							100+40	27.5	17.0
							100+30	28.0	18.3
							100+20	28.8	19.4
							100+10	29.6	20.9
							100+00	30.0	23.1
							99+90	33.3	23.8
							99+80	33.6	24.5
							99+70	33.6	25.3
							99+60	33.9	26.6
							99+50	34.0	27.4
							99+40	34.0	28.8
							99+30	34.4	29.7
							99+20	34.2	30.9
							99+10		32.4
							99+00		33.1
							98+90		34.1
							98+80		34.1
							98+70		34.3
							98+60		34.3
							98+50		34.3
							98+40		34.6
							98+30		33.9
							98+20		34.8
							98+10		35.1

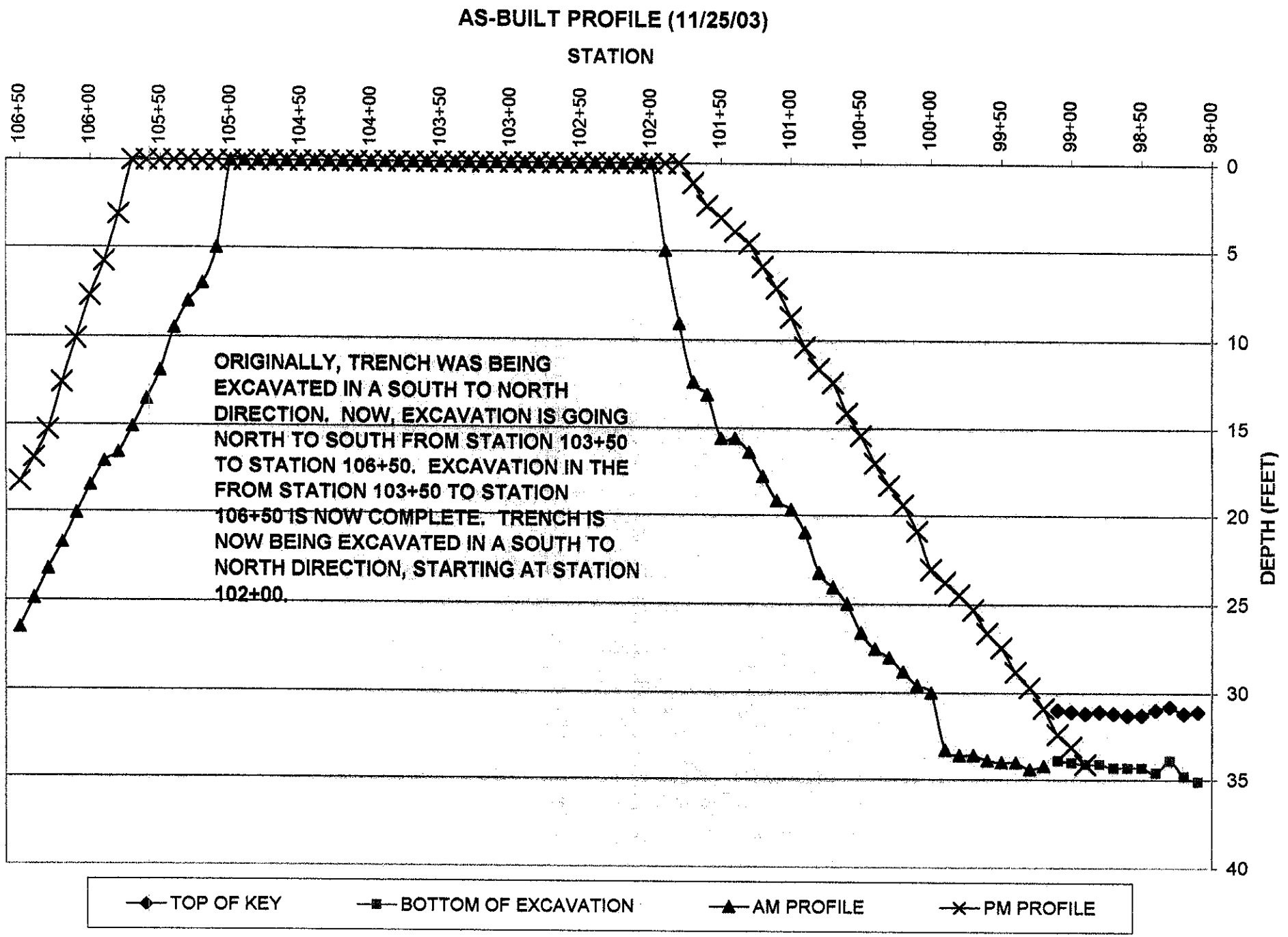
SF TODAY

SF TO DATE

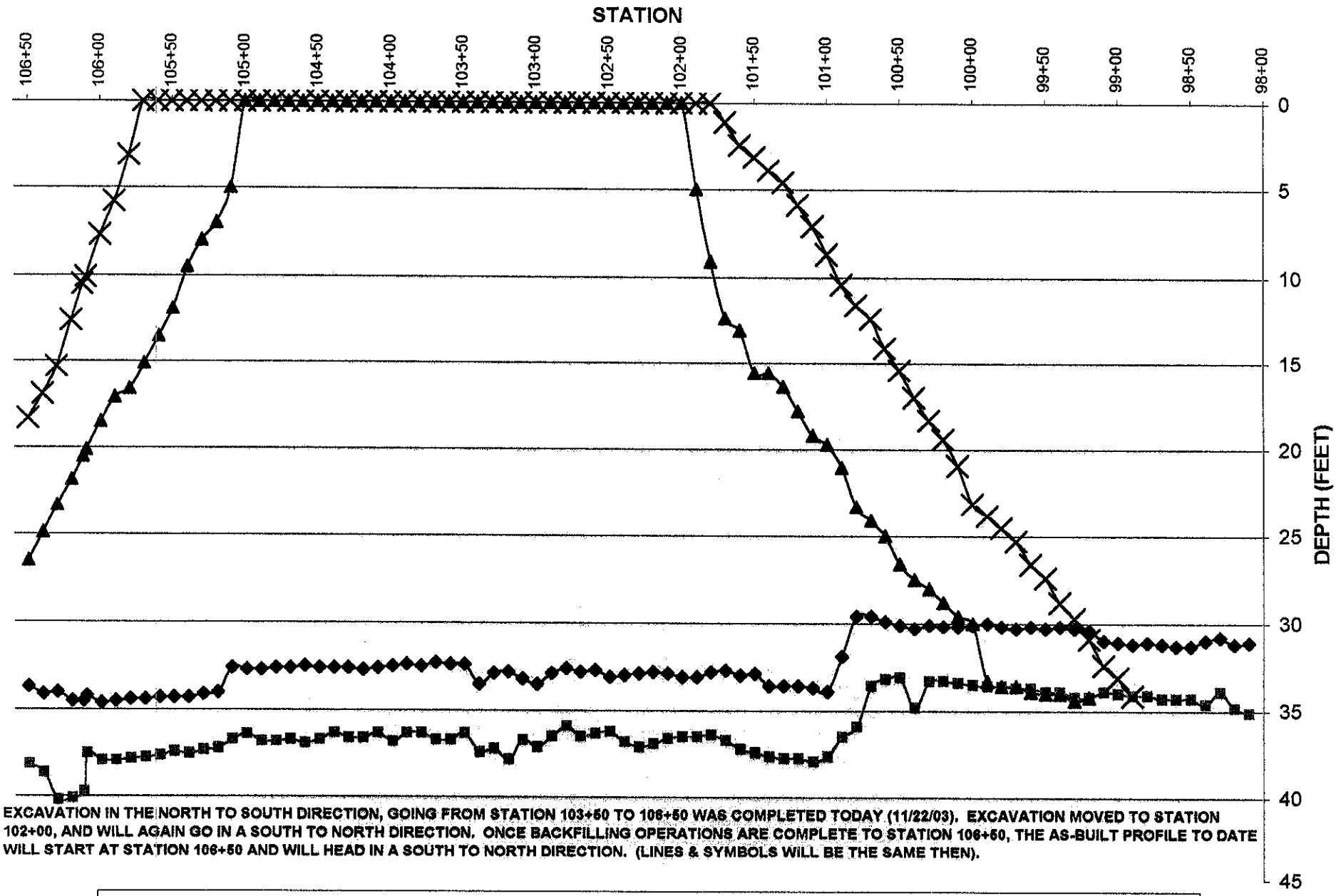
COMMENTS

PM Profile continued from Page 3.

GEO-CON: Suzanne E. Sepio OWNER:


AS-BUILT PROFILE (11/25/03)
STATION
106+50
106+00
105+50
105+00
104+50
104+00
103+50
103+00
102+50
102+00
101+50
101+00
100+50
100+00
99+50
99+00
98+50
98+00
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
ORIGINALLY, TRENCH WAS BEING EXCAVATED IN A SOUTH TO NORTH DIRECTION. NOW, EXCAVATION IS GOING NORTH TO SOUTH FROM STATION 103+50 TO STATION 106+50. EXCAVATION IN THE FROM STATION 103+50 TO STATION 106+50 IS NOW COMPLETE. TRENCH IS NOW BEING EXCAVATED IN A SOUTH TO NORTH DIRECTION, STARTING AT STATION 102+00.
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE (TO DATE)



EXCAVATION IN THE NORTH TO SOUTH DIRECTION, GOING FROM STATION 103+50 TO 106+50 WAS COMPLETED TODAY (11/22/03). EXCAVATION MOVED TO STATION 102+00, AND WILL AGAIN GO IN A SOUTH TO NORTH DIRECTION. ONCE BACKFILLING OPERATIONS ARE COMPLETE TO STATION 106+50, THE AS-BUILT PROFILE TO DATE WILL START AT STATION 106+50 AND WILL HEAD IN A SOUTH TO NORTH DIRECTION. (LINES & SYMBOLS WILL BE THE SAME THEN).

DAILY QC TESTS

DATE 11/25/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
PM ~~AM~~	13:15	45	> 40 sec	65.5	> 64 pcf	8	6.5 - 10	14.0	< 20 cm^3	.2
PM	14:24	44	> 40 sec	65	> 64 pcf	8	6.5 - 10	15.5	< 20 cm^3	.2

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
~~PM~~	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
7 30	99+10	32	50	40 - 90 sec	93.5	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.6	23	MAX 30%
7 30	99+10	2	45	40 - 90 sec	86.5	64 - 95 pcf	8	6.5 - 10	28.5	< 25 cm^3	.6	20	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
16:00	98+50	2	55	40 - 90 sec	88	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.0	22	MAX 30%
16:00	98+50	32	55	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	1.8	20	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
101+25	3	2" to 6"	111.0	+15 pcf over trench slurry		1.0×10^{-7} cm/sec
101+00	3	2" to 6"	112.0	+15 pcf over trench slurry		1.0×10^{-7} cm/sec
100+75	3	2" to 6"	114.5	+15 pcf over trench slurry		1.0×10^{-7} cm/sec
100+50	3	2" to 6"	117.5	+15 pcf over trench slurry		1.0×10^{-7} cm/sec
100+25	3	2" to 6"	110.0	+15 pcf over trench slurry		1.0×10^{-7} cm/sec
100+00	3		120.0			

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 101+25, 101+00, 100+75, 100+50, 100+25, 100+00

Technician: MM ✓SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.5, 7.5, 7.0 6.5, 7.0, 7.0 cm

Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ c.f. (1/14.65)
11/25/03	9:05-13:05	240	10	93.7844	484692.7847	–	24	2.06×10^{-7}	1.41×10^{-8}
11/25/03	9:05-13:05	240	10	93.7844	484692.7847	–	12.5	1.07×10^{-7}	7.30×10^{-9}
11/25/03	9:05-13:05	240	10	100.4833	519313.7717	–	18.0	1.44×10^{-7}	9.83×10^{-9}
11/25/03	18:00-6.00	720	10	108.2128	559261.0644	–	51	1.27×10^{-7}	8.67×10^{-9}
11/25/03	18:00-6.00	720	10	100.4833	519313.7717	–	69	1.84×10^{-7}	1.26×10^{-8}
11/25/03	18:00-6.00	720	10	100.4833	519313.7717	–	48	1.28×10^{-7}	8.74×10^{-9}

I= P (psi) / 0.014217 L (cm)

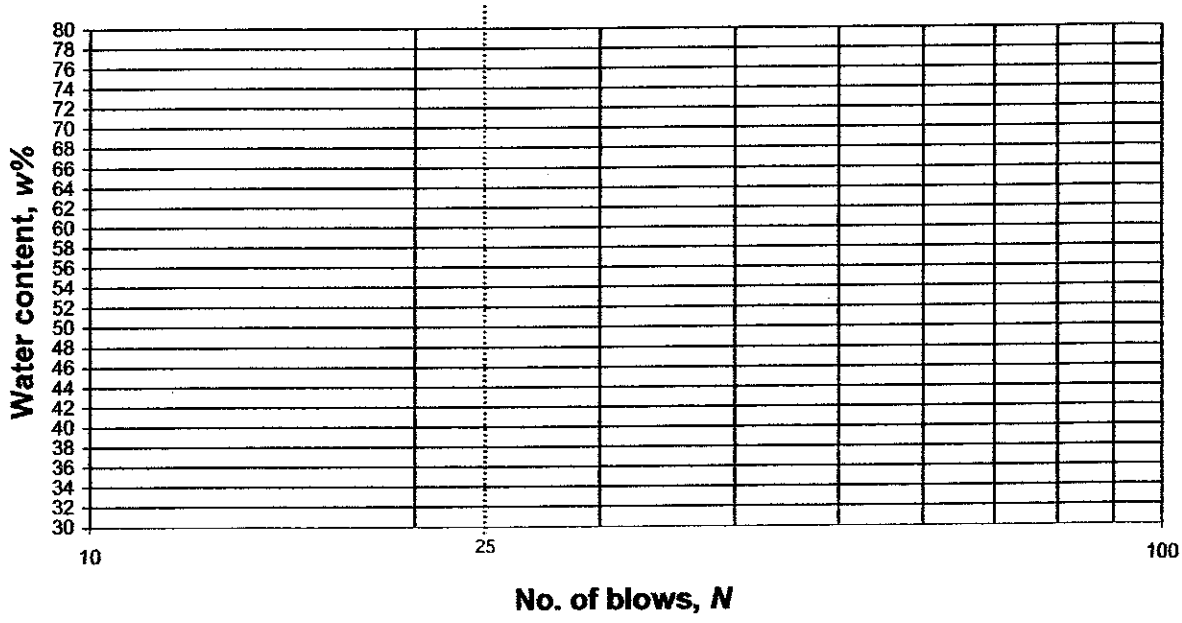
R= Quick Test / Triaxial Test = 1.85

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-009	**Date Tested**	12/2/2003	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	11/26/2003
Sample Location	~~101+00~~ (SW) 99+00
Sample Description	Gray Silty, Clayey Sand with Gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

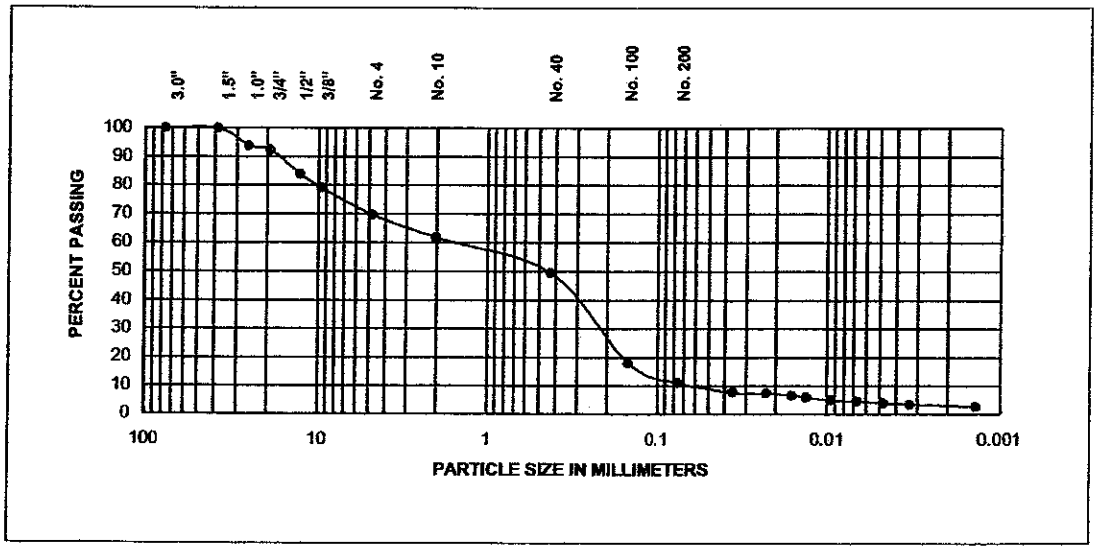
Remarks

NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-010	**Date Tested**	12/3/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	11/26/2003
Sample Location	98 + 00 (SW)
Sample Description	Gray Poorly Graded Sand with Clay andGravel (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	30.3	58.6	6.9	4.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.58	0.22	0.06	26.6	0.53

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	93.7
3/4"	92.2
1/2"	83.8
3/8"	79.0
No. 4	69.7
No. 10	61.9
No. 40	49.4
No. 100	18.0
No. 200	11.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

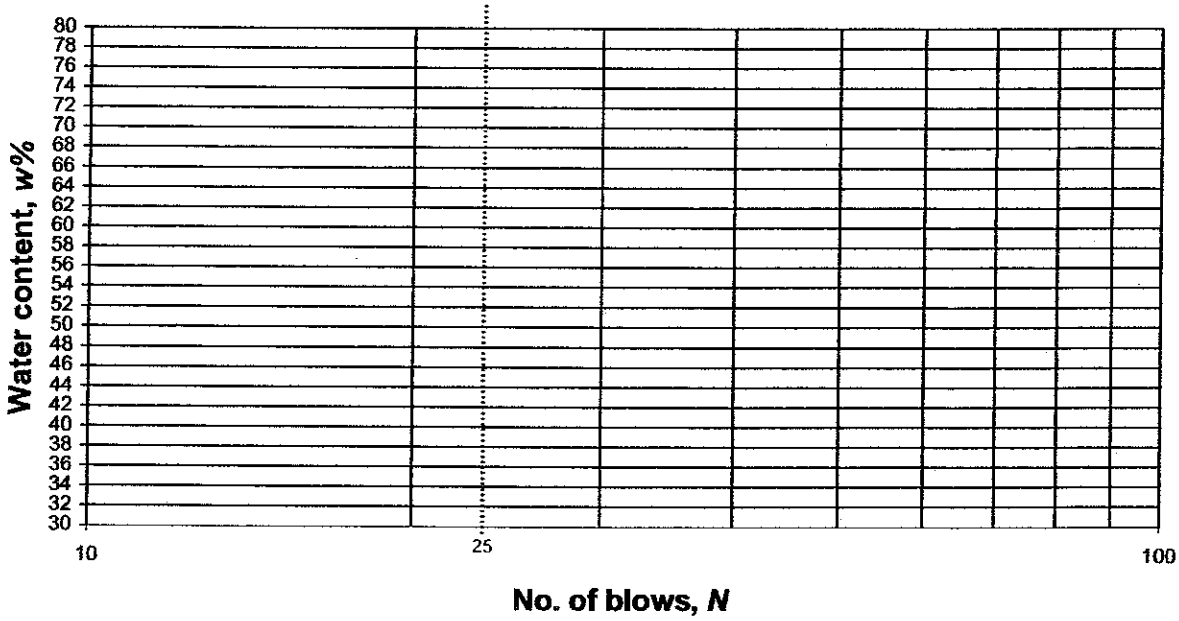
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-010	**Date Tested**	12/2/2003	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	11/26/2003
Sample Location	98 + 00 (SW)
Sample Description	Gray Poorly Graded Sand with Clay and Gravel (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2740	Report No.	1	Date	11/20/2003	Sheet	1
				Date of weighing	11/20 &11/21/03	Tested by	NP

Boring No.	-	-	-	-	-	-
Sample No.	**BF-001**	**BF-002**	**BF-003**	**BF-004**	**BF-005**	**BF-006**
Location	106+50 (SW)	105+00 (SW)	104+00 (SW)	103+00 (SW)	102+00 (SW)	101+00 (SW)
Tin No.	18C	4C	11C	72A	7C	76A
Tin + Wet Soil	157.16	194.69	175.01	165.06	167.49	160.53
Tin + Dry Soil	135.06	150.98	129.65	135.46	145.04	130.15
Wt. of Tin	31.26	30.92	31.17	30.36	31.13	30.56
Wt. of Dry Soil	103.8	120.2	98.5	105.1	114.5	99.6
Wt. of Water	22.1	43.7	45.4	30.5	21.9	30.4
Moisture, %	21.3	36.4	46.1	29.0	19.1	30.5
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	**BF-007**	**BF-008**				
Location	100+00 (SW)	100+00 (SW)				
Tin No.	35C	176A				
Tin + Wet Soil	162.09	169.09				
Tin + Dry Soil	135.06	139.69				
Wt. of Tin	31.35	30.76				
Wt. of Dry Soil	103.7	108.9				
Wt. of Water	27.0	29.4				
Moisture, %	26.1	27.0				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2740	Report No.	2	Date	11/25/2003	Sheet	1
				Date of weighing	11/26/2003	Tested by	NP

Boring No.	-	-	-	-	-	-
Sample No.	**BF-007**	**BF-008**				
Location	106+00 (SW)	100+00 (SW)				
Tin No.	35C	176A				
Tin + Wet Soil	162.00	169.00				
Tin + Dry Soil	135.06	139.69				
Wt. of Tin	31.38	30.76				
Wt. of Dry Soil	103.7	108.9				
Wt. of Water	**27.0**	**29.4**				
Moisture, %	26.1	27.0				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	1	Date	11/20/2003	Sheet	1
				Date of weighing	11/20 &11/21/03	Tested by	NP

Boring No.	-	-	-	-	-	-
Sample No.	BF-001	BF-002	BF-003	BF-004	BF-005	BF-006
Location	106+50 (SW)	105+00 (SW)	104+00 (SW)	103+00 (SW)	102+00 (SW)	101+00 (SW)
Tin No.	18C	4C	11C	72A	7C	76A
Tin + Wet Soil	157.16	194.69	175.01	165.96	167.49	160.53
Tin + Dry Soil	135.06	150.98	129.65	135.46	145.64	130.15
Wt. of Tin	31.26	30.82	31.17	30.36	31.13	30.56
Wt. of Dry Soil	103.8	120.2	98.5	105.1	114.5	99.6
Wt. of Water	22.1	43.7	45.4	30.5	21.9	30.4
Moisture, %	21.3	36.4	46.1	29.0	19.1	30.5
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	BF-007	BF-008				
Location	106+00 (SW)	100+00 (SW)				
Tin No.	35C	176A				
Tin + Wet Soil	162.09	169.09				
Tin + Dry Soil	135.06	139.69				
Wt. of Tin	31.38	30.76				
Wt. of Dry Soil	103.7	108.9				
Wt. of Water	27.0	29.4				
Moisture, %	26.1	27.0				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	2	Date	11/25/2003	Sheet	1
				Date of weighing	11/26/2003	Tested by	NP

Boring No.	-	-	-	-	-	-
Sample No.	BF-007	BF-008				
Location	106+00 (SW)	100+00 (SW)				
Tin No.	35C	176A				
Tin + Wet Soil	162.09	169.09				
Tin + Dry Soil	135.06	139.69				
Wt. of Tin	31.38	30.76				
Wt. of Dry Soil	103.7	108.9				
Wt. of Water	27.0	29.4				
Moisture, %	26.1	27.0				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	3	Date	11/26/2003	Sheet	1
				Date of weighing	11/27/2003	Tested by	NP

Boring No.	-	-	-	-	-	-
Sample No.	BF-009	BF-010				
Location	101+00 (SW)	98+00 (SW)				
Tin No.	7C	66A				
Tin + Wet Soil	132.06	149.36				
Tin + Dry Soil	109.09	125.36				
Wt. of Tin	31.44	30.47				
Wt. of Dry Soil	77.7	94.9				
Wt. of Water	23.0	24.0				
Moisture, %	29.6	25.3				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/21/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV005935	GEO-CON E CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
11-20-03	BURGERS 100	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	45
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.6
> 75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	7.0
Y.P. / P.V. Ratio	3.0 max.	1.21

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Signed 11/21/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (8/99)

Arrived 11/25/03

100# Bags

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 120603	TRANSMITTAL NO. 02260-70

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz PE, EQM 1600 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7465	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312		CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
164	112603 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025. This submittal contains the GeoCon Field QC data, Off-site Great Lakes analytical data, and any bentonite certifications for this date.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/26/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, breezy; 27 - 43 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
98+70	2.00	93.50	23.00	24.00	50.00	8
98+70	32.00	86.50	20.00	22.50	45.00	8

**No new slurry was added to the trench today. No excavation today. Backfilled all day to close up the trench as far as possible for the Thanksgiving break. Test from trench was to check if properties were still good. Therefore, no afternoon test was necessary.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
100+25	3.50	N/A	N/A	N/A	1.82×10^{-7}	N/A
100+00	3.50	Sample collected 11/25/03	Sample collected 11/25/03		1.17×10^{-7}	Sample collected 11/25/03
99+75	3.50	N/A	N/A	N/A	2.02×10^{-7}	N/A
99+50	3.00	N/A	N/A	N/A	1.48×10^{-7}	N/A
99+25	3.00	N/A	N/A	N/A	1.33×10^{-7}	N/A
99+00	3.00	Sample collected	Sample collected	Sample collected	1.09×10^{-7}	yes

COMMENTS

Filter cake was 1.0mm and 1.5mm respectively.

Unit Weight: 100+25: 114.5 pcf
100+00: 119.0 pcf
99+75: 111.5 pcf
99+50: 118.0 pcf
99+25: 110.0 pcf
99+00: 120.5 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/26/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
N/A				
No slurry mixed today.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/26/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, breezy; 27 - 43 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A							105+00	OUT	TOP OUT
							105+10	OUT	TOP OUT
							105+20	OUT	TOP OUT
							105+30	OUT	TOP OUT
							105+40	OUT	TOP OUT
							105+50	OUT	TOP OUT
							105+60	OUT	TOP OUT
							105+70	OUT	TOP OUT
							105+80	3.1	TOP OUT
							105+90	5.8	TOP OUT
							106+00	7.7	TOP OUT
							106+10	10.1	TOP OUT
							106+20	12.6	TOP OUT
							106+30	15.3	TOP OUT
							106+40	16.9	TOP OUT
							106+50	18.3	TOP OUT
							101+80	OUT	TOP OUT
							101+70	1.1	TOP OUT
							101+60	2.3	TOP OUT
							101+50	3.0	TOP OUT
							101+40	3.7	TOP OUT
							101+30	4.6	TOP OUT
							101+20	5.8	TOP OUT
							101+10	7.0	TOP OUT
							101+00	8.6	TOP OUT
							100+90	10.4	TOP OUT
							100+80	11.6	TOP OUT
				SF TODAY	0.00		100+70	12.4	TOP OUT
				SF TO DATE	36926.90		100+60	14.1	TOP OUT

COMMENTS

(CON'T ON PAGE 4)

PM Profile is continued on page 4.

No excavation today. Backfill only to try and close up/top off trench.

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/26/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, breezy; 27 - 43 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
							100+50	15.3	1.9
							100+40	17.0	4.0
							100+30	18.2	4.8
							100+20	19.3	5.2
							100+10	20.9	5.6
							100+00	23.0	5.6
							99+90	23.9	5.8
							99+80	24.6	6.3
							99+70	25.3	7.3
							99+60	26.6	7.7
							99+50	27.5	8.1
							99+40	28.9	9.9
							99+30	29.8	11.2
							99+20	31.0	11.9
							99+10	32.4	11.9
							99+00	33.2	12.2
							98+90	34.1	13.2
							98+80		14.8
							98+70		15.1
							98+60		15.7
							98+50		17.1
							98+40		17.7
							98+30		20.1
							98+20		21.1
							98+10		13.1

SF TODAY

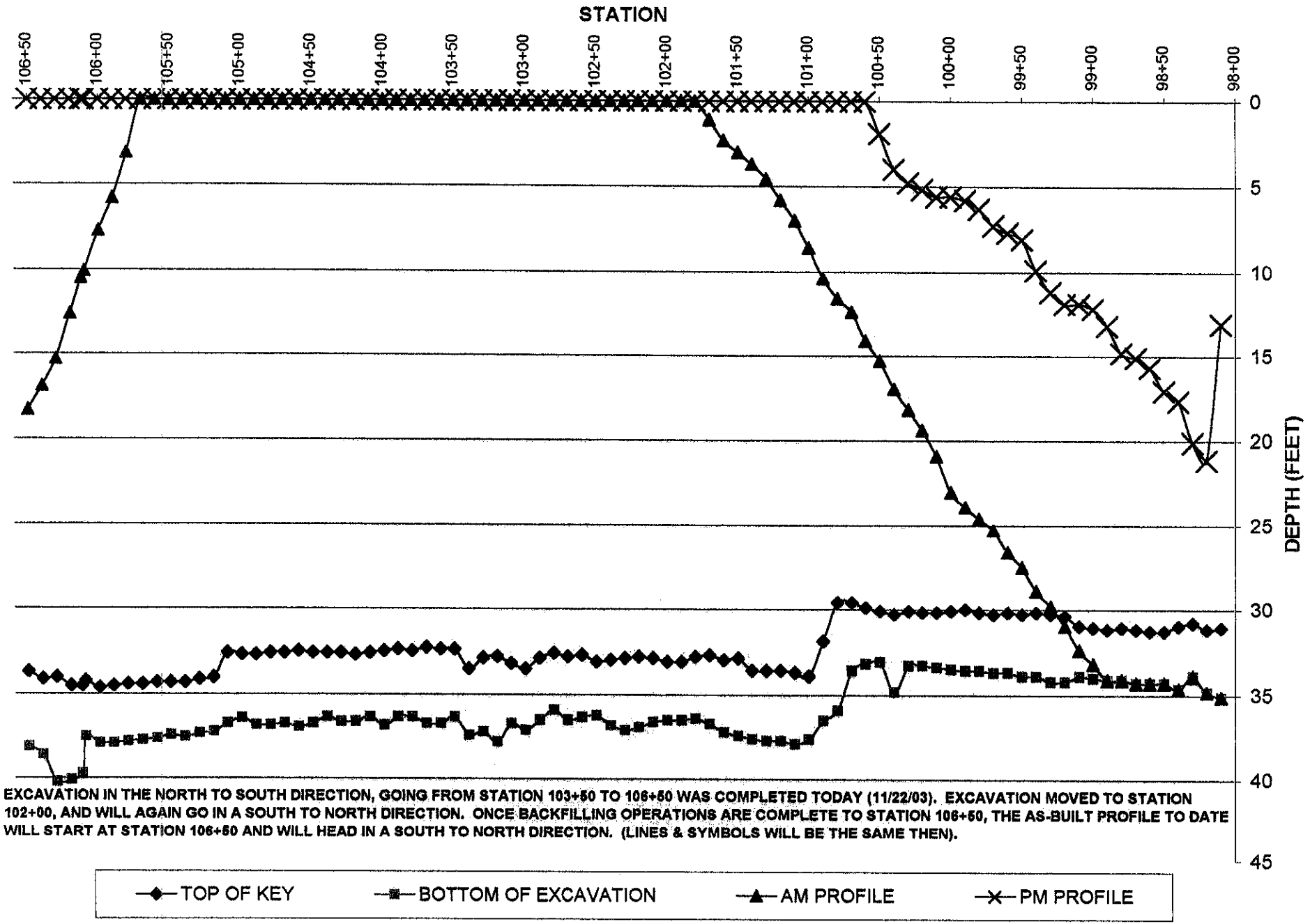
SF TO DATE

COMMENTS

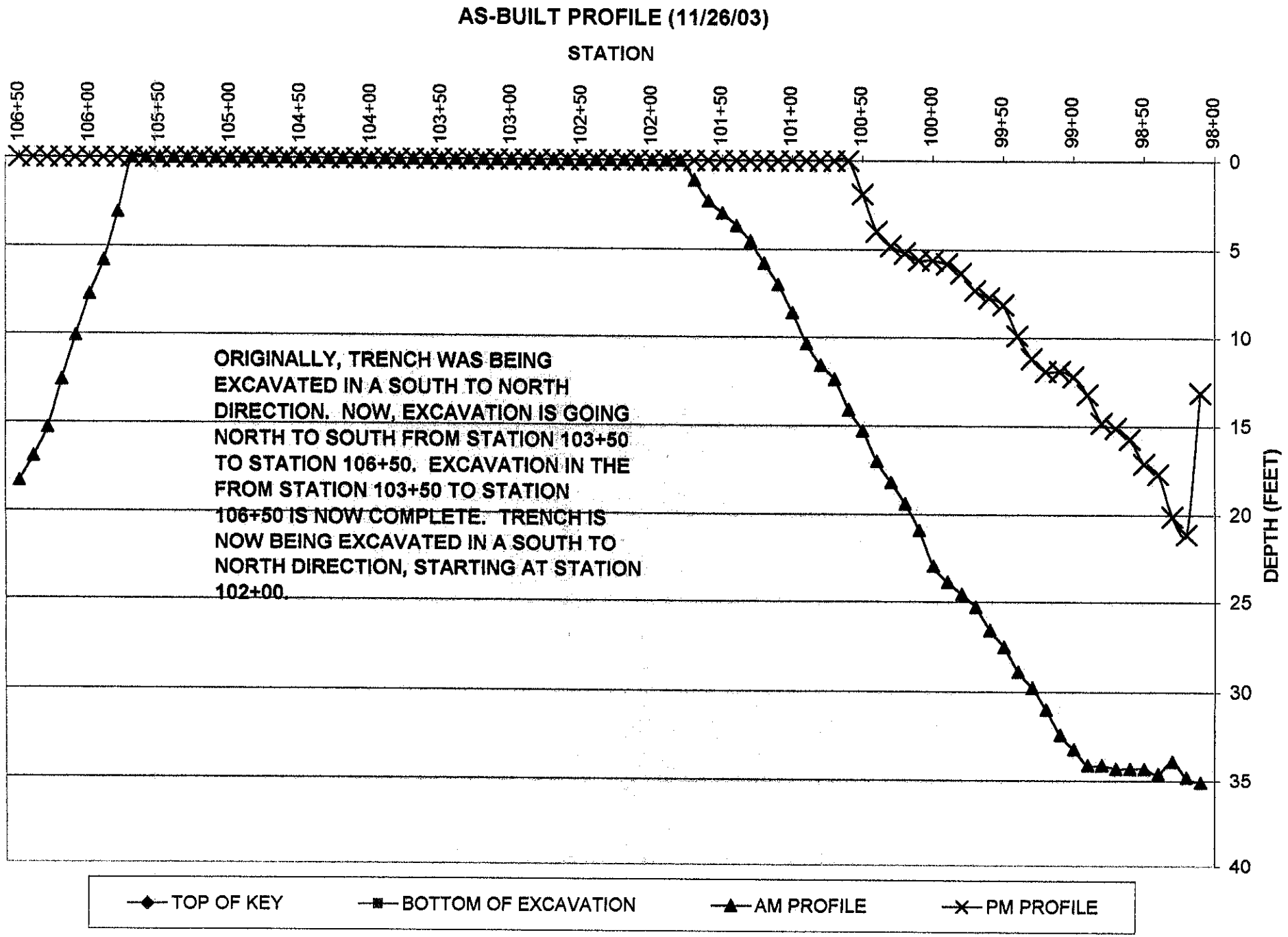
PM Profile continued from Page 3.

GEO-CON: Suzanne E. Sipio OWNER:

AS-BUILT PROFILE (TO DATE)



EXCAVATION IN THE NORTH TO SOUTH DIRECTION, GOING FROM STATION 103+50 TO 106+50 WAS COMPLETED TODAY (11/22/03). EXCAVATION MOVED TO STATION 102+00, AND WILL AGAIN GO IN A SOUTH TO NORTH DIRECTION. ONCE BACKFILLING OPERATIONS ARE COMPLETE TO STATION 106+50, THE AS-BUILT PROFILE TO DATE WILL START AT STATION 106+50 AND WILL HEAD IN A SOUTH TO NORTH DIRECTION. (LINES & SYMBOLS WILL BE THE SAME THEN).


AS-BUILT PROFILE (11/26/03)
STATION
106+50
106+00
105+50
105+00
104+50
104+00
103+50
103+00
102+50
102+00
101+50
101+00
100+50
100+00
99+50
99+00
98+50
98+00
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
ORIGINALLY, TRENCH WAS BEING EXCAVATED IN A SOUTH TO NORTH DIRECTION. NOW, EXCAVATION IS GOING NORTH TO SOUTH FROM STATION 103+50 TO STATION 106+50. EXCAVATION IN THE FROM STATION 103+50 TO STATION 106+50 IS NOW COMPLETE. TRENCH IS NOW BEING EXCAVATED IN A SOUTH TO NORTH DIRECTION, STARTING AT STATION 102+00.
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

GP-109

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/14/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING 2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV005921	GEO-CON 8 CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
11-24-03	MONT TRANS 24	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	37
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	15.2
> 75 micron (wt. %)	4.0 max.	2.2

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.0
Y.P. / P.V. Ratio	3.0 max.	1.47

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4495.

Signed 11/25/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (6/99)

11/26/03
~~[illegible]~~
2000# Jumbo Sacks

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 120603

TRANSMITTAL NO. 02260-71

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd.
Griffith, IN 46319 219/923-1763

FROM: J. A. Wentz PE, EQM
1800 Carillon Blvd.
Cincinnati, Ohio 45240
800/229-7465

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260

PROJECT TITLE AND LOCATION IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 8) h.	FOR CE USE CODE i.
165	112703 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025. This submittal contains the GeoCon Field QC data, Off-site Great Lakes analytical data, and any bentonite certifications for this date.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/27/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: N/A RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
N/A						

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						

COMMENTS

No work onsite today. Thanksgiving break.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/27/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
N/A				
No work onsite today. Thanksgiving break.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/27/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: N/A RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A									

SF TODAY 0.00

SF TO DATE 36926.90

COMMENTS (CON'T ON PAGE 4)

No work onsite today. Thanksgiving break.

GEO-CON: Suzanne E. Sepic OWNER:

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE
(Read Instructions on the reverse side prior to initiating this form)

DATE 120603

TRANSMITTAL NO. 02260-72

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer
USACE, Chicago Dist., Calumet Area Office
906 Griffith Blvd.
Griffith, IN 46319 219/923-1763

FROM: J. A. Wentz PE, EQM
1800 Carillon Blvd.
Cincinnati, Ohio 45240
800/229-7455

CONTRACT NO. DACW27-02-C-0003

CHECK ONE:
X THIS IS A NEW TRANSMITTAL
☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260

PROJECT TITLE AND LOCATION: IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall
3500 Indianapolis Boulevard
East Chicago, IN 46312

CHECK ONE: THIS TRANSMITTAL IS FOR
X FIO
☐GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
166	112803 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025. This submittal contains the GeoCon Field QC data, Off-site Great Lakes analytical data, and any bentonite certifications for this date.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/28/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: N/A RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
N/A						

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						

COMMENTS

No work onsite today. Thanksgiving break.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/28/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
N/A				
No work onsite today. Thanksgiving break.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Stepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/28/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: N/A RIG NUMBER:

EXCAVATION							BACKFILL		
STATION	DEPTH						SLOPE		
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A									

SF TODAY	0.00
SF TO DATE	36926.90

COMMENTS (CON'T ON PAGE 4)

No work onsite today. Thanksgiving break.

GEO-CON: Suzanne C. Sepe OWNER:

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 120603	TRANSMITTAL NO. 02260-73

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz PE, EQM 1800 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7465	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT: SPEC. PARA NO. e.	CONTRACT REFERENCE DOCUMENT: DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
167	112903 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025. This submittal contains the GeoCon Field QC data, Off-site Great Lakes analytical data, and any bentonite certifications for this date.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/29/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: N/A RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
N/A						

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						

COMMENTS

No work onsite today. Thanksgiving break.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/29/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
N/A				
No work onsite today. Thanksgiving break.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/29/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: N/A RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A									

SF TODAY 0.00

SF TO DATE 36926.90

COMMENTS (CON'T ON PAGE 4)

No work onsite today. Thanksgiving break.

GEO-CON: Suzanne E. Sepic OWNER:

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE *(Read Instructions on the reverse side prior to initiating this form)*	DATE 120603	TRANSMITTAL NO. 02260-74

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS *(This section will be initiated by the contractor)*

TO: T.A. Deja, Area Engineer USACE, Chicago Dist., Calumet Area Office 906 Griffith Blvd. Griffith, IN 46319 219/923-1763	FROM: J. A. Wentz PE, EQM 1600 Carillon Blvd. Cincinnati, Ohio 45240 800/229-7455	CONTRACT NO. DACW27-02-C-0003	CHECK ONE: X THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____
SPECIFICATION SEC. NO. *(Cover only one section with each transmittal)* 2260	PROJECT TITLE AND LOCATION	IN Harbor & Canal, Confined Space Disposal Facility Subsurface Investigation and Cutoff Wall 3500 Indianapolis Boulevard East Chicago, IN 46312	CHECK ONE: THIS TRANSMITTAL IS FOR X FIO ☐ GOV'T APPROVAL

ITEM NO. a.	DESCRIPTION OF ITEM SUBMITTED *(Type size, model number/etc.)* b.	MFG OR CONTR. CAT., CURVE DRAWING OR BROCHURE NO. (See Instruction no. 8) c.	NO. OF COPIES d.	CONTRACT REFERENCE DOCUMENT SPEC. PARA NO. e.	DRAWING SHEET NO. f.	FOR CONTRACTOR USE CODE g.	VARIATION (See instruction no. 6) h.	FOR CE USE CODE i.
168	113003 Daily GeoCon QC Data	Data	6	2260-1.5		F		

REMARKS
Return of submitted data is not required. Please return 3 executed copies of ENG form 4025. This submittal contains the GeoCon Field QC data, Off-site Great Lakes analytical data, and any bentonite certifications for this date.

I certify that the above submitted items have been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

Ed Wise
NAME AND SIGNATURE OF CONTRACTOR

SECTION II – APPROVAL ACTION

ENCLOSURES RETURNED *(List By Item No.)*	NAME, TITLE AND SIGNATURE OF APPROVING AUTHORITY	DATE

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/30/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: N/A RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
N/A						

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						

COMMENTS

No work onsite today. Thanksgiving break.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/30/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
N/A				
No work onsite today. Thanksgiving break.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sipe OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 11/30/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: N/A RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A									

SF TODAY 0.00

SF TO DATE 36926.90

COMMENTS (CON'T ON PAGE 4)

No work onsite today. Thanksgiving break.

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/01/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 24 - 39 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
97+90	2.00	85.00	19.00	19.50	74.00	8
97+90	33.00	89.50	22.00	21.50	85.00	8
97+50	2.00	91.50	20.00	18.00	69.00	8
97+50	33.00	94.00	25.00	21.00	81.00	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
98+00	LAB SAMPLE COLLECTED 11/25/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
99+25	3.00	N/A	N/A	N/A	1.49×10^{-7}	N/A
99+00	3.00	Sample collected	Sample collected	Sample collected	3.69×10^{-7}	yes
98+75	3.00	N/A	N/A	N/A	2.01×10^{-7}	N/A
98+50	3.00	N/A	N/A	N/A	2.01×10^{-7}	N/A
98+25	3.00	N/A	N/A	N/A	1.26×10^{-7}	N/A
98+00	3.00	Sample collected	Sample collected	Sample collected	1.39×10^{-7}	yes

COMMENTS

Filter cake was .8mm, 1.5mm, 1.0mm and 1.5mm respectively.

Unit Weight: 99+25: 119.5 pcf
99+00: 121.0 pcf
98+75: 116.0 pcf
98+50: 112.0 pcf
98+25: 115.0 pcf
98+00: 120.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/01/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
N/A				
No slurry mixed today.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	yes
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/01/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 24 - 39 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
98+10	31.1	35.2	35.0	10.0	350.0	3.9	100+60	0.0	0.0
98+00	31.2	35.3	35.3	10.0	352.5	3.8	100+50	2.1	0.0
97+90	31.2	35.1	35.2	10.0	352.0	3.8	100+40	4.1	0.0
97+80	31.3	35.3	35.2	10.0	352.0	3.8	100+30	4.8	0.0
97+70	31.3	35.4	35.4	10.0	353.5	3.7	100+20	5.3	0.0
97+60	31.0	35.4	35.4	10.0	354.0	3.6	100+10	5.7	0.0
97+50	31.1	35.3	35.4	10.0	353.5	3.7	100+00	5.8	0.0
97+40	31.1	35.2	35.3	10.0	352.5	3.7	99+90	5.8	0.0
97+30	31.2	35.1	35.2	10.0	351.5	3.7	99+80	6.4	0.0
97+20	31.3	35.0	35.1	10.0	350.5	3.7	99+70	7.3	0.0
97+10	31.3	34.9	35.0	10.0	349.5	3.8	99+60	7.7	0.0
							99+50	8.0	0.0
							99+40	9.8	0.0
							99+30	11.0	0.0
							99+20	11.6	0.0
							99+10	11.9	0.0
							99+00	12.3	0.0
							98+90	13.3	0.0
							98+80	14.9	0.0
							98+70	15.0	0.0
							98+60	15.5	0.0
							98+50	17.2	0.0
							98+40	17.8	0.0
							98+30	20.0	0.0
							98+20	21.3	0.0
							98+10	13.0	0.0
							98+00		0.0
							97+90		0.0
				SF TODAY	3871.50		97+80		0.0
				SF TO DATE	40798.40		97+70		0.0

COMMENTS

(CON'T ON PAGE 4)

PM Profile is continued on page 4.

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/01/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 24 - 39 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
							98+60		2.6
							98+50		5.1
							98+40		8.1
							98+30		10.2
							98+20		13.1
							98+10		16.2
							98+00		18.3
							97+90		21.4
							97+80		23.5
							97+70		25.6
							97+60		28.1
							97+50		30.2
							97+40		31.9
							97+30		33.3
							97+20		34.4
							97+10		35.1

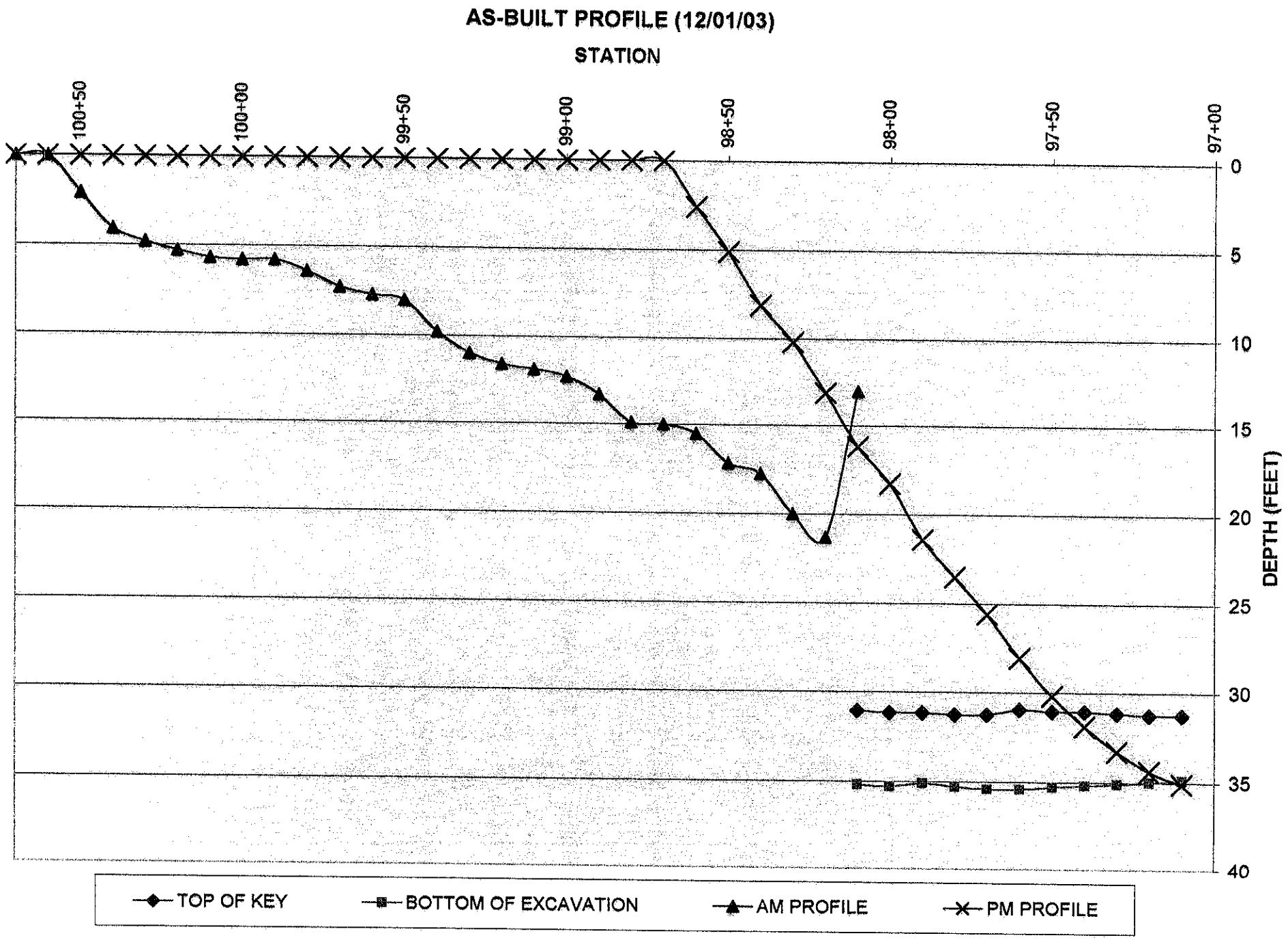
SF TODAY

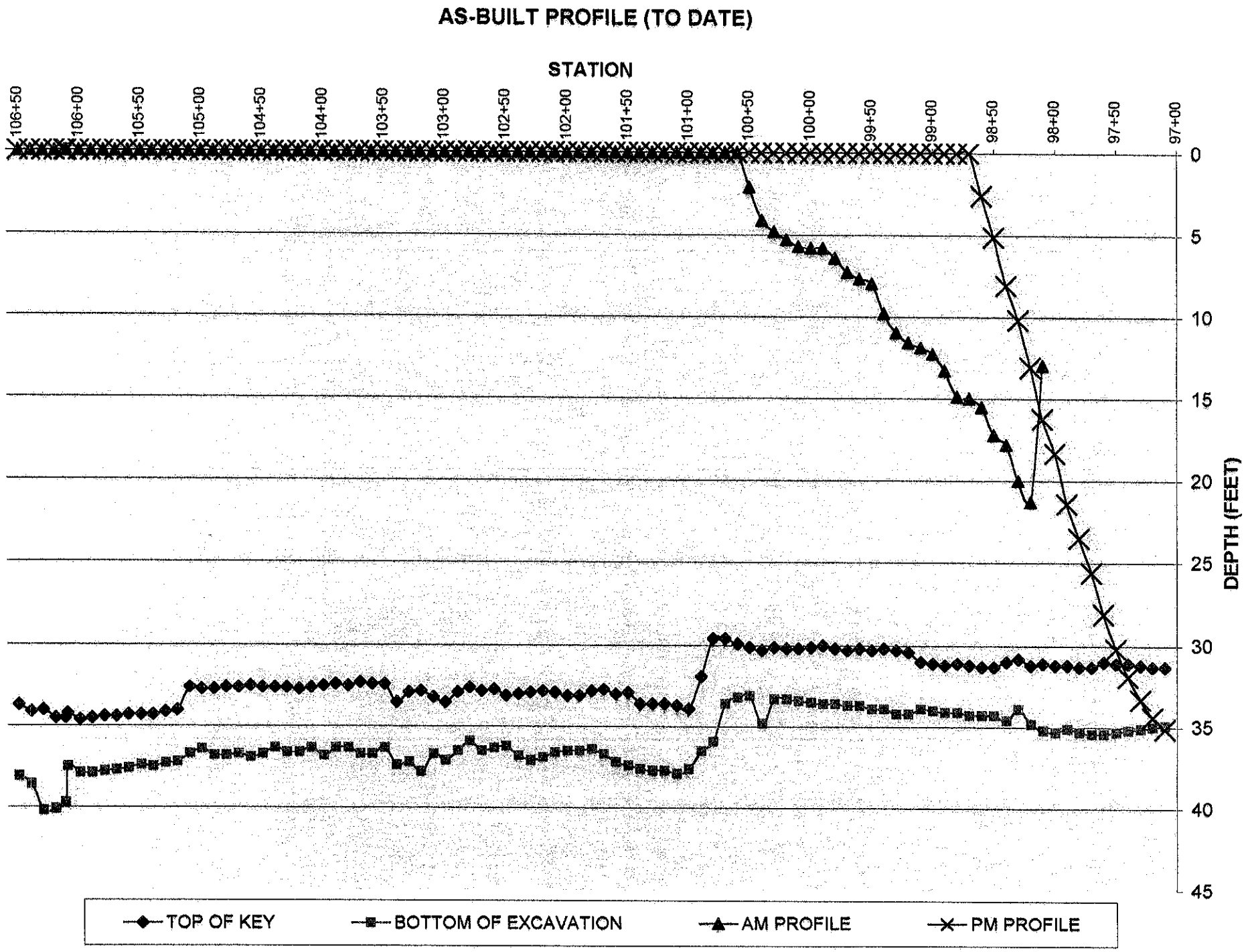
SF TO DATE

COMMENTS

PM Profile continued from Page 3.

GEO-CON: Suzanne C. Sepic OWNER:


AS-BUILT PROFILE (12/01/03)
STATION
100+50
100+00
99+50
99+00
98+50
98+00
97+50
97+00
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE (TO DATE)
STATION
106+50
106+00
105+50
105+00
104+50
104+00
103+50
103+00
102+50
102+00
101+50
101+00
100+50
100+00
99+50
99+00
98+50
98+00
97+50
97+00
0
5
10
15
20
25
30
35
40
45
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/01/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	~~11:14~~	—	> 40 sec	—	> 64 pcf	—	6.5 - 10	—	< 20 cm^3	—
PM	—	—	> 40 sec	—	> 64 pcf	—	6.5 - 10	—	< 20 cm^3	—

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
11.14	97+90	2	74	40 - 90 sec	85	64 - 95 pcf	8	6.5 - 10	19.5	< 25 cm^3	.8	19	MAX 30%
11.14	97+90	33	85	40 - 90 sec	89.5	64 - 95 pcf	8	6.5 - 10	21.5	< 25 cm^3	1.5	22	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:30	97+50	2	69	40 - 90 sec	91.5	64 - 95 pcf	8	6.5 - 10	18	< 25 cm^3	1.0	20	MAX 30%
15 30	97+50	33	81	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	21	< 25 cm^3	1.5	25	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
99+25	3	2" to 6"	119.5	+15 pcf over trench slurry	1.49×10^{-7}	1.0×10^{-7} cm/sec
99+00	3	2" to 6"	121.0	+15 pcf over trench slurry	3.69×10^{-7}	1.0×10^{-7} cm/sec
98+75	3	2" to 6"	116.0	+15 pcf over trench slurry	2.01×10^{-7}	1.0×10^{-7} cm/sec
98+50	3	2" to 6"	112.0	+15 pcf over trench slurry	2.01×10^{-7}	1.0×10^{-7} cm/sec
98+25	3	2" to 6"	115.0	+15 pcf over trench slurry	1.26×10^{-7}	1.0×10^{-7} cm/sec
98+00	3		120.0		1.39×10^{-7}	

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 99+25, 99+00, 98+75, 98+50, 98+25, 98+00

Technician: MM/RF / BY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.5cm, 7.0cm, 7.0cm 7.0cm, 7.5cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/ conv. factor (1/14.65)
99+25	12/01/03	9:35-13:35	240	10	108.2128	559261.0644	—	20	1.49×10^{-7}	1.02×10^{-8}
99+00	12/01/03	9:35-13:35	240	10	100.4833	519313.7717	—	46	3.69×10^{-7}	2.52×10^{-8}
98+75	12/01/03	9:35-13:35	240	10	100.4833	519313.7717	—	25	2.01×10^{-7}	1.37×10^{-8}
98+50	12/01/03	17:45-5:45	720	10	100.4833	519313.7717	—	75	2.01×10^{-7}	1.37×10^{-8}
98+25	12/01/03	17:45-5:45	720	10	93.7844	484692.7847	—	44	1.26×10^{-7}	8.60×10^{-9}
98+00	12/01/03	17:45-5:45	720	10	100.4833	519313.7717	—	52	1.39×10^{-7}	9.49×10^{-9}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 11/26/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	—	—	> 40 sec	—	> 64 pcf	—	6.5 - 10	—	< 20 cm^3	—
PM	—	—	> 40 sec	—	> 64 pcf	—	6.5 - 10	—	< 20 cm^3	—

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)
AM	—	—	> 40 sec							
PM	—	—	> 40 sec							

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
10:26	98+70	2	50	40 - 90 sec	93.5	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.0	23	MAX 30%
10:26	98+70	32	45	40 - 90 sec	86.5	64 - 95 pcf	8	6.5 - 10	22.5	< 25 cm^3	1.5	20	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (cm)	SAND CONTENT (%)	Require
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
100+25	3.5	2" to 6"	114.5	+15 pcf over trench slurry	1.82×10^{-7}	1.0×10^{-7} cm/sec
100+00	3.5	2" to 6"	119.0	+15 pcf over trench slurry	1.17×10^{-7}	1.0×10^{-7} cm/sec
99+75	3.5	2" to 6"	111.5	+15 pcf over trench slurry	2.02×10^{-7}	1.0×10^{-7} cm/sec
99+50	3	2" to 6"	118.0	+15 pcf over trench slurry	1.48×10^{-7}	1.0×10^{-7} cm/sec
99+25	3	2" to 6"	110.0	+15 pcf over trench slurry	1.33×10^{-7}	1.0×10^{-7} cm/sec
99+00	3		120.5		1.09×10^{-7}	

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 100+25, 100+00, 99+75 / 99+50, 99+25, 99+00

Technician: MM ✓ By SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.5cm, 6.5cm, 7.0cm / 7.0cm, 7.0cm, 7.0cm cm

Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/ c f (1/14.65)
11/26/03	6:15 - 10:15	240	10	108.2128	559261.0644	—	24.5	1.82×10^{-7}	1.24×10^{-8}
11/26/03	6:15 - 10:15	240	10	108.2128 ~~100.483~~	559261.0644	—	16	1.17×10^{-7}	7.98×10^{-9}
11/26/03	6.15 - 10:15	240	10	100.4833	519313.7717	—	25	2.02×10^{-7}	1.38×10^{-8}
11/26/03	11:00 - 15:00	240	10	100.4833	519313.7717	—	18.5	1.48×10^{-7}	1.01×10^{-8}
11/26/03	11:00 - 15:00	240	10	100.4833	519313.7717	—	16.5	1.33×10^{-7}	9.08×10^{-9}
11/26/03	11:00 - 15.00	240	10	100.4833	519313.7717	—	13.5	1.09×10^{-7}	7.44×10^{-9}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 3-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P.O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-011	SOIL ONLY	97+00	12/2/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-011	SB BACKFILL**	99+00	11/26/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-012	SB BACKFILL**	99+00	12/1/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-013	SB BACKFILL**	98+00	12/1/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-014	SB BACKFILL**	97+00	12/2/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

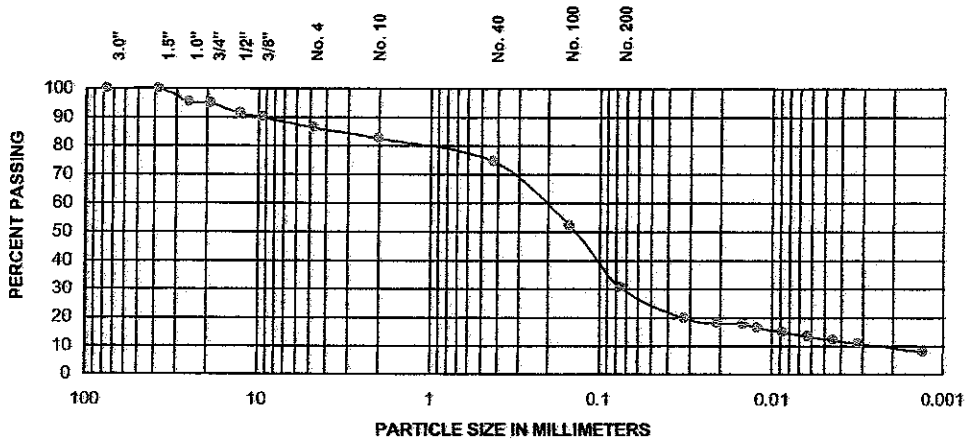
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-012	**Date Tested**	12/6/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/3/2003
Sample Location	99+00 (SW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	13.6	55.8	17.9	12.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	95.4
3/4"	94.9
1/2"	91.4
3/8"	90.1
No. 4	86.4
No. 10	82.6
No. 40	74.6
No. 100	52.2
No. 200	30.6

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
31	17	14

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

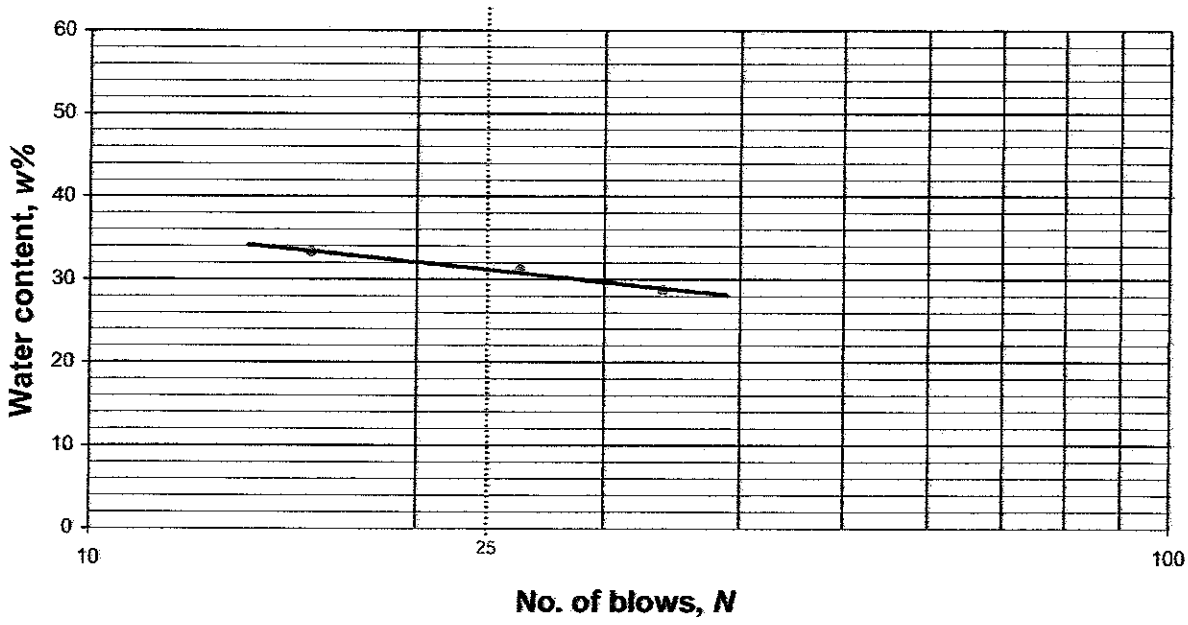
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-012	**Date Tested**	12/5/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/3/2003
Sample Location	99+00 (SW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**31**	**Plastic Limit, PL**	**17**	**Plasticity Index, PI**	**14**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/5/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-012	Date Recd.	12/3/03	**Location**	99+00 (SW)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.28	cm	Volume, V:	215.0	cu cm
Mass of Sample:	386.1	g	**Moisture Content:**	**24.6**	**%**
			Wet Density	**112.1**	**pcf**
			Dry Density	**90.0**	**pcf**

Final

Diameter:	6.95	cm	Area, A:	37.9	sq cm
Height, L:	4.72	cm	Volume, V:	179.1	cu cm
Mass of Sample:	370.80	g	**Moisture Content:**	**22.3**	**%**
			Wet Density	**129.2**	**pcf**
			Dry Density	**105.7**	**pcf**
			Deg of Saturation	**98.2**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	24.0	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/5/2003	9:45 AM	0	0	3.21	5.81		20.0	---
12/5/2003	10:45 AM	3600	3600	3.51	5.57	1.3	20.0	6.05E-08
12/5/2003	11:45 AM	3600	7200	3.73	5.32	0.9	20.0	6.46E-08
12/5/2003	1:30 PM	6300	13500	4.17	4.90	1.0	20.0	6.41E-08
12/5/2003	2:30 PM	3600	17100	4.35	4.69	0.9	20.0	5.80E-08

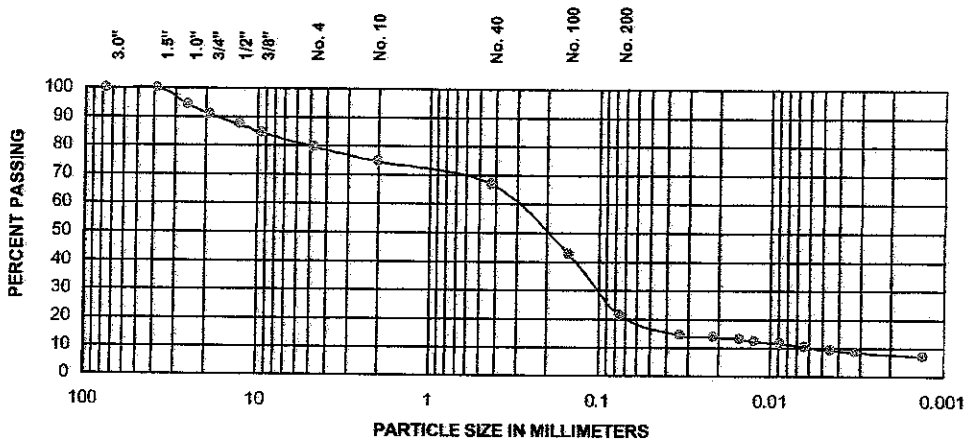
Average Permeability = **6.2E-08** cm/sec

Remarks:

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-013	**Date Tested**	12/10/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/3/2003
Sample Location	98+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	20.4	58.2	11.6	9.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	94.3
3/4"	90.9
1/2"	87.4
3/8"	84.5
No. 4	79.6
No. 10	74.7
No. 40	66.9
No. 100	42.7
No. 200	21.4

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
29	19	10

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

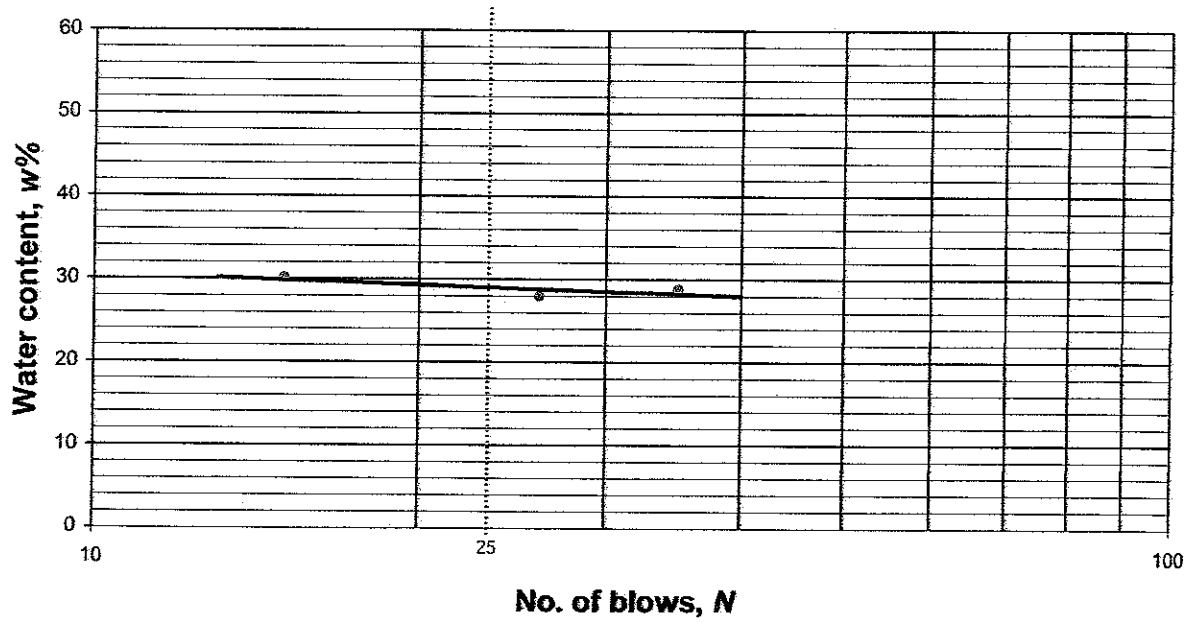
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-013	**Date Tested**	12/5/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/3/2003
Sample Location	98+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**29**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**10**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/5/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-013	Date Recd. 12/3/03	**Location**	98+00 (SW)			
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.30	cm	Volume, V:	215.8	cu cm
Mass of Sample:	393.8	g	**Moisture Content:**	**28.1**	**%**
			Wet Density	**113.9**	**pcf**
			Dry Density	**88.9**	**pcf**

Final

Diameter:	6.98	cm	Area, A:	38.3	sq cm
Height, L:	4.89	cm	Volume, V:	187.1	cu cm
Mass of Sample:	384.20	g	**Moisture Content:**	**23.2**	**%**
			Wet Density	**128.1**	**pcf**
			Dry Density	**104.0**	**pcf**
			Deg of Saturation	**98.2**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	23.9	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/5/2003	9:45 AM	0	0	4.27	5.78		20.0	---
12/5/2003	10:45 AM	3600	3600	4.64	5.48	1.2	20.0	8.04E-08
12/5/2003	11:45 AM	3600	7200	4.90	5.19	0.9	20.0	8.03E-08
12/5/2003	1:30 PM	6300	13500	5.40	4.69	1.0	20.0	8.25E-08
12/5/2003	2:30 PM	3600	17100	5.61	4.44	0.8	20.0	7.53E-08

Average Permeability = **8.0E-08** cm/sec

Remarks:

Quality, Service & Commitment

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/21/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV005993	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
11-24-03	MIDDELSON #6	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	45
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.6
> 75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	7.0
Y.P. / P.V. Ratio	3.0 max.	1.21

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4490.

Signed 11/25/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

12/01/03

4000# Jumbo Sacks

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/21/2003

SOLD TO:	SHIP TO:
GEO-CON INC 4075 MONROEVILLE BLVD CORPORATE I BUILDING SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV005922	GEO-CON E CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
11-24-03	BULL MTN EXP 02	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result	Test or Property	API Spec	Result
Viscosity	30 min.	45	Moisture (wt. %)	N/A	7.0
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max.	1.21
Yield Point (# / 100 ft2)	N/A				
Filtrate Volume (cm3)	15.0 max.	12.6			
> 75 micron (wt. %)	4.0 max.	1.5			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4185.

Signed 11/25/03 Date

Approved by: Plant Manager

LaBenoCert.doc (4/22/97)
Rev E (9/99)

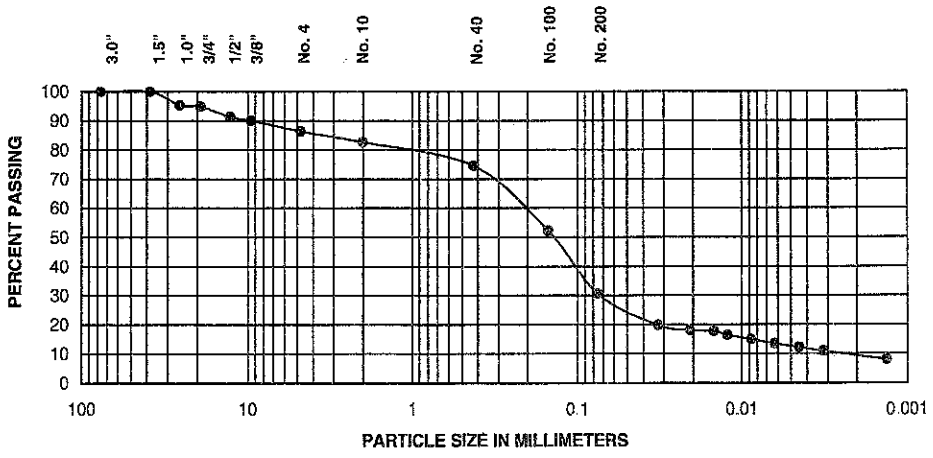
12/01/03

4000# ~~50~~ Jumbo Sacks

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-012	**Date Tested**	12/6/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/3/2003
Sample Location	99+00 (SW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	13.6	55.8	17.9	12.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	95.4
3/4"	94.9
1/2"	91.4
3/8"	90.1
No. 4	86.4
No. 10	82.6
No. 40	74.6
No. 100	52.2
No. 200	30.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
31	17	14

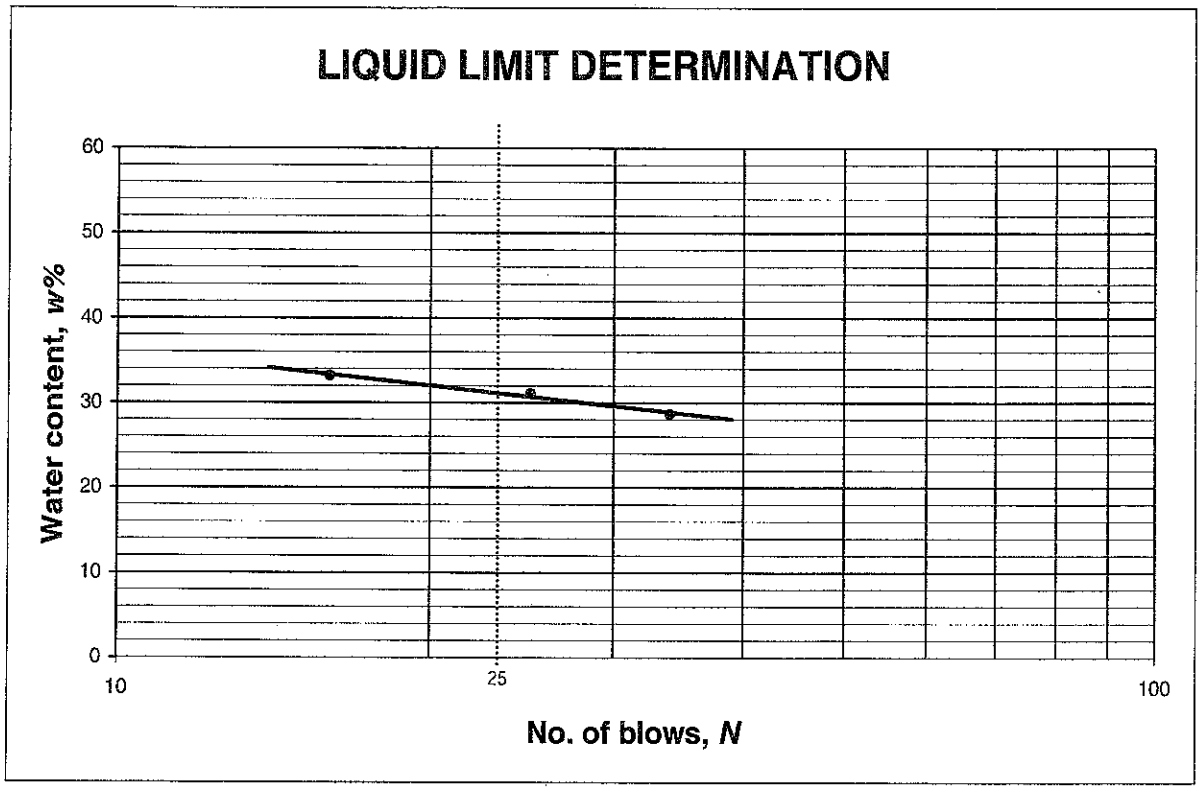
Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-012	**Date Tested**	12/5/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/3/2003
Sample Location	99+00 (SW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



Results

Liquid Limit, LL	31	**Plastic Limit, PL**	17	**Plasticity Index, PI**	14

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/5/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-012	Date Recd.	12/3/03	**Location**	99+00 (SW)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.28	cm	Volume, V:	215.0	cu cm
Mass of Sample:	386.1	g	**Moisture Content:**	**24.6**	**%**
			Wet Density	**112.1**	**pcf**
			Dry Density	**90.0**	**pcf**

Final

Diameter:	6.95	cm	Area, A:	37.9	sq cm
Height, L:	4.72	cm	Volume, V:	179.1	cu cm
Mass of Sample:	370.80	g	**Moisture Content:**	**22.3**	**%**
			Wet Density	**129.2**	**pcf**
			Dry Density	**105.7**	**pcf**
			Deg of Saturation	**98.2**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	24.0	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/5/2003	9:45 AM	0	0	3.21	5.81		20.0	---
12/5/2003	10:45 AM	3600	3600	3.51	5.57	1.3	20.0	6.05E-08
12/5/2003	11:45 AM	3600	7200	3.73	5.32	0.9	20.0	6.46E-08
12/5/2003	1:30 PM	6300	13500	4.17	4.90	1.0	20.0	6.41E-08
12/5/2003	2:30 PM	3600	17100	4.35	4.69	0.9	20.0	5.80E-08

Average Permeability = **6.2E-08** **cm/sec**

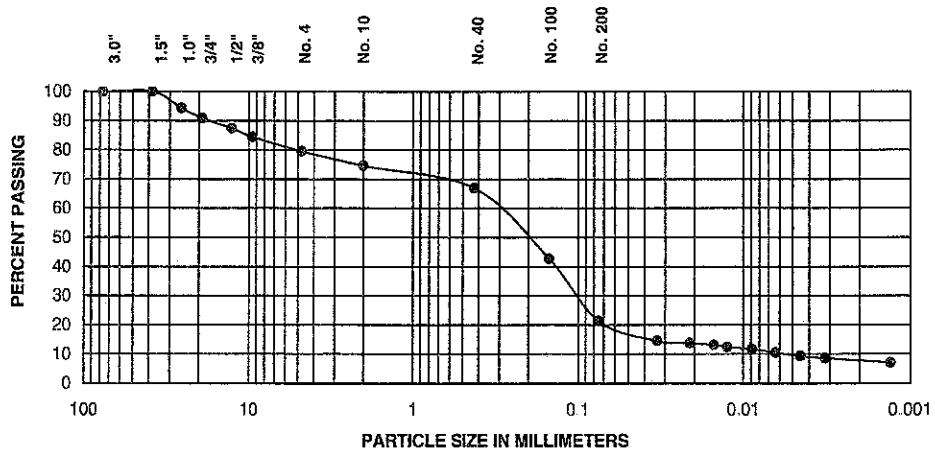
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-013	**Date Tested**	12/10/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/3/2003
Sample Location	98+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	20.4	58.2	11.6	9.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	94.3
3/4"	90.9
1/2"	87.4
3/8"	84.5
No. 4	79.6
No. 10	74.7
No. 40	66.9
No. 100	42.7
No. 200	21.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
29	19	10

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

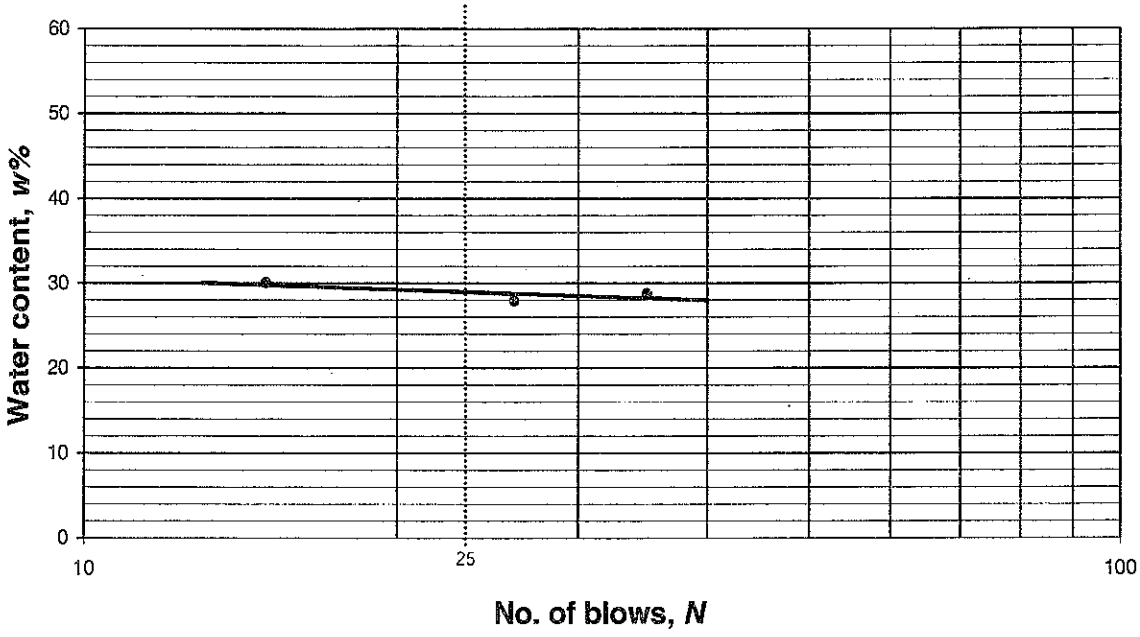
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-013	**Date Tested**	12/5/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/3/2003
Sample Location	98+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	29	**Plastic Limit, PL**	19	**Plasticity Index, PI**	10

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/5/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-013	Date Recd.	12/3/03	**Location**	98+00 (SW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.30	cm	Volume, V:	215.8	cu cm
Mass of Sample:	393.8	g	**Moisture Content:**	**28.1**	%
			Wet Density	**113.9**	**pcf**
			Dry Density	**88.9**	**pcf**

Final

Diameter:	6.98	cm	Area, A:	38.3	sq cm
Height, L:	4.89	cm	Volume, V:	187.1	cu cm
Mass of Sample:	384.20	g	**Moisture Content:**	**23.2**	%
			Wet Density	**128.1**	**pcf**
			Dry Density	**104.0**	**pcf**
			Deg of Saturation	**98.2**	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	76.8 psi
Gradient:	23.9

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/5/2003	9:45 AM	0	0	4.27	5.78		20.0	--
12/5/2003	10:45 AM	3600	3600	4.64	5.48	1.2	20.0	8.04E-08
12/5/2003	11:45 AM	3600	7200	4.90	5.19	0.9	20.0	8.03E-08
12/5/2003	1:30 PM	6300	13500	5.40	4.69	1.0	20.0	8.25E-08
12/5/2003	2:30 PM	3600	17100	5.61	4.44	0.8	20.0	7.53E-08

Average Permeability = **8.0E-08** cm/sec

Remarks:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/02/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 28 - 38 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
97+00	2.00	88.00	21.00	23.00	69.00	8
97+00	33.00	95.00	21.00	24.50	83.00	8
96+50	2.00	85.00	20.00	21.50	42.00	8
96+50	35.00	93.50	21.00	24.00	43.00	8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
97+00	LAB SAMPLE COLLECTED 12/02/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
98+25	3.00	N/A	N/A	N/A	5.30×10^{-7}	N/A
98+00	3.00	Sample collected 12/01/03	Sample collected 12/01/03		1.79×10^{-7}	Sample collected 12/01/03
97+75	3.00	N/A	N/A	N/A	1.98×10^{-7}	N/A
97+50	3.00	N/A	N/A	N/A	1.27×10^{-7}	N/A
97+25	3.00	N/A	N/A	N/A	8.48×10^{-8}	N/A
97+00	3.00	Sample collected	Sample collected	Sample collected	1.36×10^{-7}	yes

COMMENTS

Filter cake was .6mm, .6mm, .5mm and 1.0mm respectively.

Unit Weight: 98+25: 114.0 pcf
98+00: 114.0 pcf
97+75: 118.5 pcf
97+50: 110.5 pcf
97+25: 115.0 pcf
97+00: 113.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/02/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
8:25	66.00	51.00	14.00	8
10:58	-	40.00	-	-
13:04	-	43.00	-	-
16:00	67.50	40.00	17.00	8
Filter cake was .3mm and .3mm, respectively.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/02/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 28 - 38 degrees RIG NUMBER:

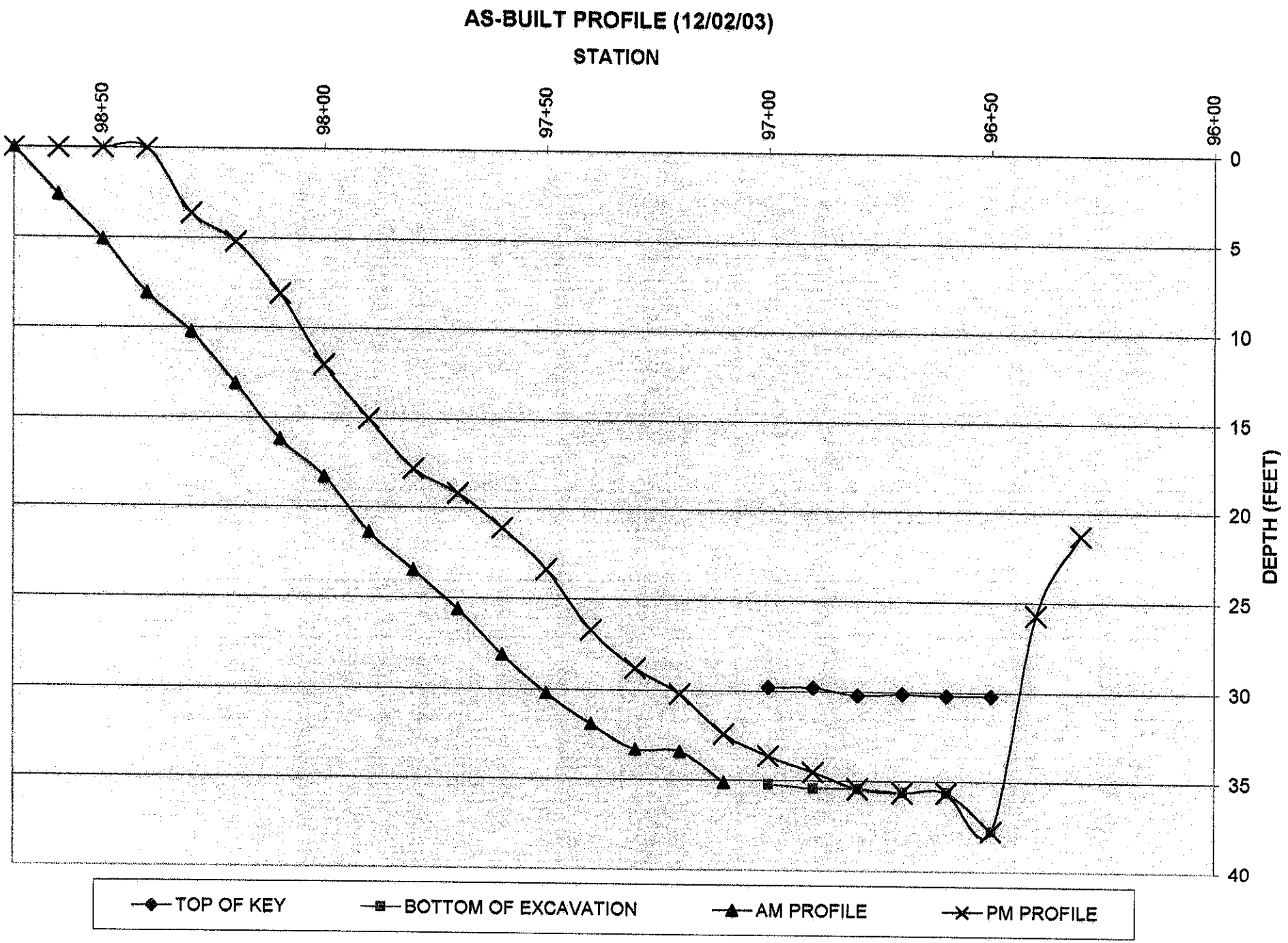
EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
97+00	29.8	35.2	35.1	10.0	350.5	4.1	98+70	OUT	TOP OUT
96+90	29.8	35.4	35.3	10.0	353.0	4.1	98+60	2.6	TOP OUT
96+80	30.2	35.4	35.4	10.0	354.0	4.1	98+50	5.1	TOP OUT
96+70	30.1	35.6	35.5	10.0	355.0	4.0	98+40	8.1	TOP OUT
96+60	30.2	35.6	35.6	10.0	356.0	4.0	98+30	10.2	3.6
96+50	30.2	37.7	36.7	10.0	366.5	4.0	98+20	13.1	5.2
							98+10	16.2	8.1
							98+00	18.3	12.0
							97+90	21.4	15.0
							97+80	2.5	17.8
							97+70	25.6	19.2
							97+60	28.1	21.1
							97+50	30.2	23.4
							97+40	31.9	26.7
							97+30	33.3	28.8
							97+20	34.4	30.2
							97+10	35.1	32.4
							97+00		33.6
							96+90		34.5
							96+80		35.4
							96+70		35.6
							96+60		35.6
							96+50		37.7
							96+40		25.7
							96+30		21.3

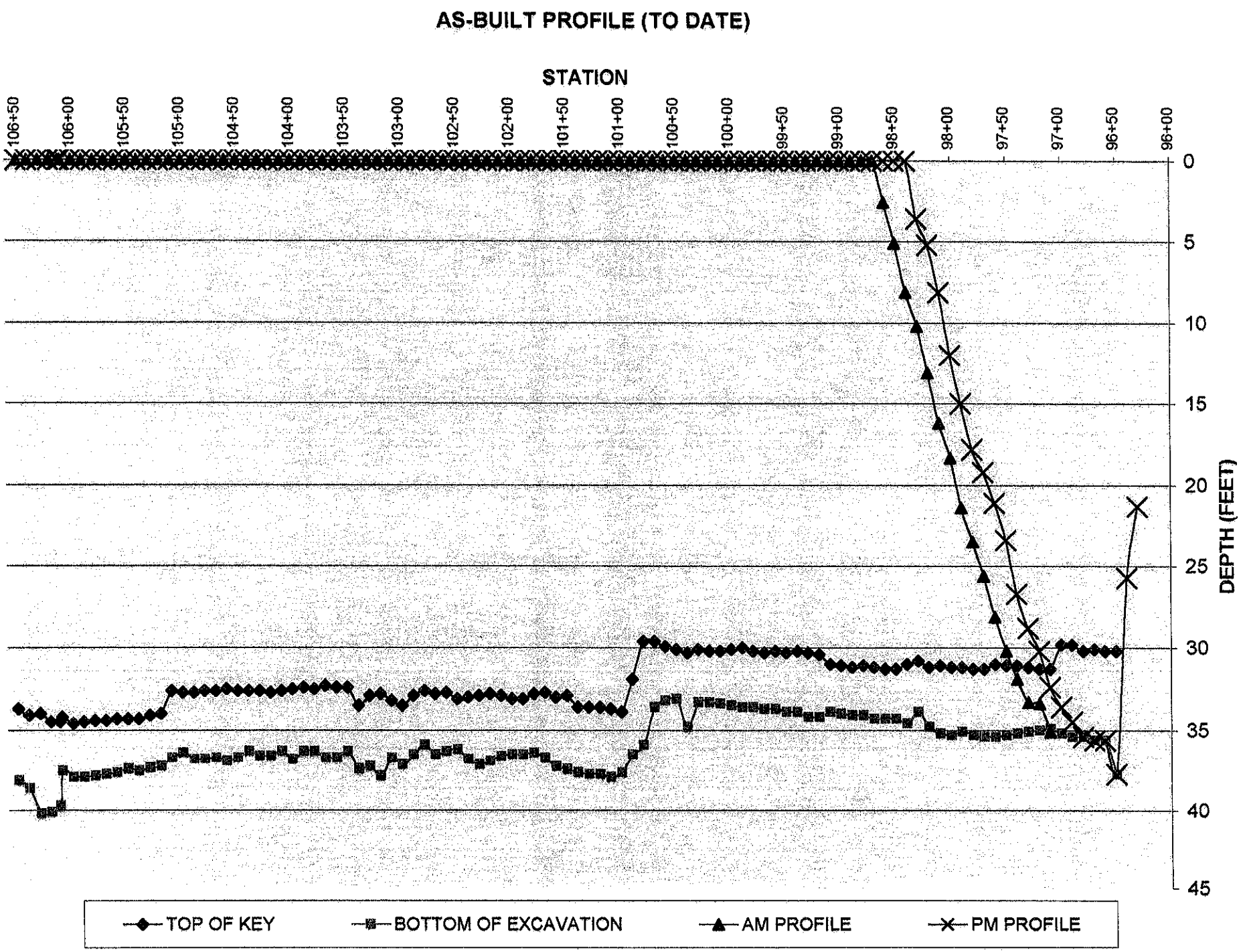
SF TODAY 2135.00

SF TO DATE 42933.40

COMMENTS

GEO-CON: Suzanne E. Sepic OWNER:


AS-BUILT PROFILE (12/02/03)
STATION
98+50
98+00
97+50
97+00
96+50
96+00
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE (TO DATE)
STATION
106+50
106+00
105+50
105+00
104+50
104+00
103+50
103+00
102+50
102+00
101+50
101+00
100+50
100+00
99+50
99+00
98+50
98+00
97+50
97+00
96+50
96+00
0
5
10
15
20
25
30
35
40
45
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/02/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	8:25	51	> 40 sec	66	> 64 pcf	8	6.5 - 10	14	< 20 cm^3	.3
PM	16:00	40	> 40 sec	67.5	> 64 pcf	8	6.5 - 10	17	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:58	40	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	13:04	43	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:00	97+00	2	69	40 - 90 sec	88	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	.6	21	MAX 30%
9:00	97+00	33	83	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	.6	21	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:45	96+50	2	42	40 - 90 sec	85	64 - 95 pcf	8	6.5 - 10	21.5	< 25 cm^3	.5	20	MAX 30%
15:45	96+50	35	43	40 - 90 sec	93.5	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.0	21	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
98+25	3	2" to 6"	114	+15 pcf over trench slurry	5.30×10^{-7}	1.0×10^{-7} cm/sec
98+00	3	2" to 6"	114	+15 pcf over trench slurry	1.79×10^{-7}	1.0×10^{-7} cm/sec
98+75	3	2" to 6"	118.5	+15 pcf over trench slurry	1.98×10^{-7}	1.0×10^{-7} cm/sec
97+50	3	2" to 6"	110.5	+15 pcf over trench slurry	1.27×10^{-7}	1.0×10^{-7} cm/sec
97+25	3	2" to 6"	115	+15 pcf over trench slurry	8.48×10^{-8}	1.0×10^{-7} cm/sec
97+00	3		113		1.36×10^{-7}	

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 98+25, 98+00, 97+75, 97+50, 97+25, 97+00

Technician: MM/RF ✓BY SES

Sample Area: A= πr^2 $(\pi)(3.85)^2$ = 46.56 cm²

Sample Height: L= 7.0, 6.5, 7.5, 7.4, 7.4, 7.0 cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/ conv. factor (1/14.65)
98+25	12/02/03	12:15-16:15	240	10	100.4833	519313.7717	–	66	5.30×10^{-7}	3.62×10^{-8}
98+00	12/02/03	12:15-16:15	240	10	108.2128	559261.0644	–	24	1.79×10^{-7}	1.22×10^{-8}
97+75	12/02/03	12:15-16.15	240	10	93.7844	484692.7847	–	23	1.98×10^{-7}	1.35×10^{-8}
97+50	12/02/03	17:48-5.48	720	10	95.0518	491242.9107	–	45	1.27×10^{-7}	8.67×10^{-9}
97+25	12/02/03	17:48-5:48	720	10	95.0518	491242.9107	–	30	8.48×10^{-8}	5.79×10^{-9}
97+00	12/02/03	17:48-5:48	720	10	100.4833	519313.7717	–	51	1.36×10^{-7}	9.28×10^{-9}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 3-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P.O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-011	SOIL ONLY	97+00	12/2/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-011	SB BACKFILL**	99+00	11/26/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-012	SB BACKFILL**	99+00	12/1/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-013	SB BACKFILL**	98+00	12/1/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-014	SB BACKFILL**	97+00	12/2/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

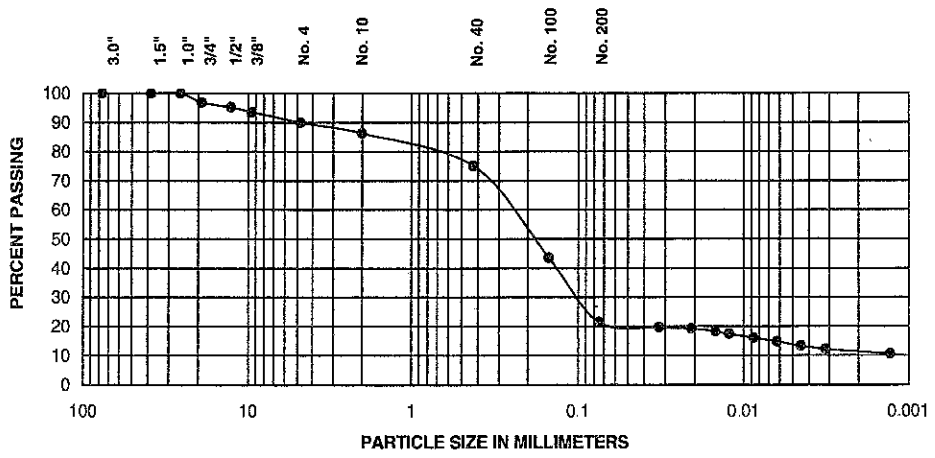
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-014	**Date Tested**	12/8/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/3/2003
Sample Location	97+00 (SW)
Sample Description	Gray silty, clayey sand with tr. of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	10.1	68.5	7.5	13.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	96.9
1/2"	95.2
3/8"	93.5
No. 4	89.9
No. 10	86.3
No. 40	75.0
No. 100	43.5
No. 200	21.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
30	19	11

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

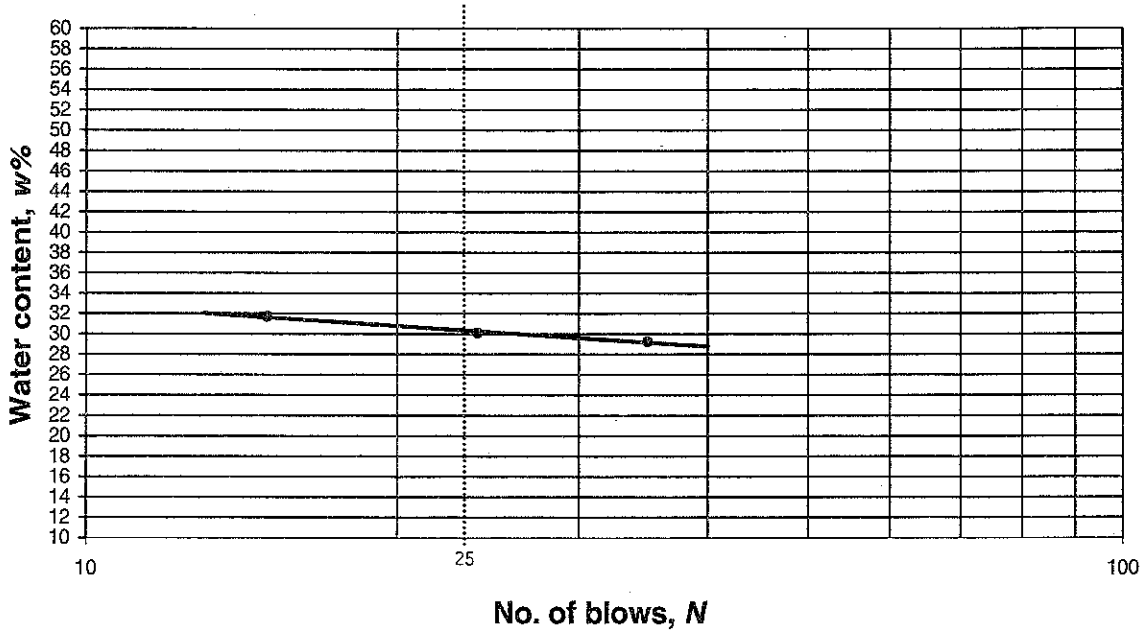
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn : Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-014	**Date Tested**	12/8/2003	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	12/3/2003
Sample Location	97+00 (SW)
Sample Description	Gray silty, clayey sand with tr. of gr. (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**30**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**11**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/8/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-014	Date Recd.	12/3/03	**Location**	97+00 (SW)		
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.45	cm	Volume, V:	221.9	cu cm
Mass of Sample:	418.4	g	**Moisture Content:**	**29.7**	%
			Wet Density	**117.7**	**pcf**
			Dry Density	**90.7**	**pcf**

Final

Diameter:	7.00	cm	Area, A:	38.5	sq cm
Height, L:	4.99	cm	Volume, V:	192.0	cu cm
Mass of Sample:	389.70	g	**Moisture Content:**	**24.0**	%
			Wet Density	**126.6**	**pcf**
			Dry Density	**102.1**	**pcf**
			Deg of Saturation	**97.0**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	23.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/8/2003	9:00 AM	0	0	2.95	5.81		20.0	---
12/8/2003	10:00 AM	3600	3600	3.03	5.71	0.8	20.0	2.55E-08
12/8/2003	11:00 AM	3600	7200	3.10	5.64	1.0	20.0	1.80E-08
12/8/2003	12:00 PM	3600	10800	3.18	5.57	1.1	20.0	1.81E-08
12/8/2003	1:45 PM	6300	17100	3.34	5.40	0.9	20.0	2.54E-08

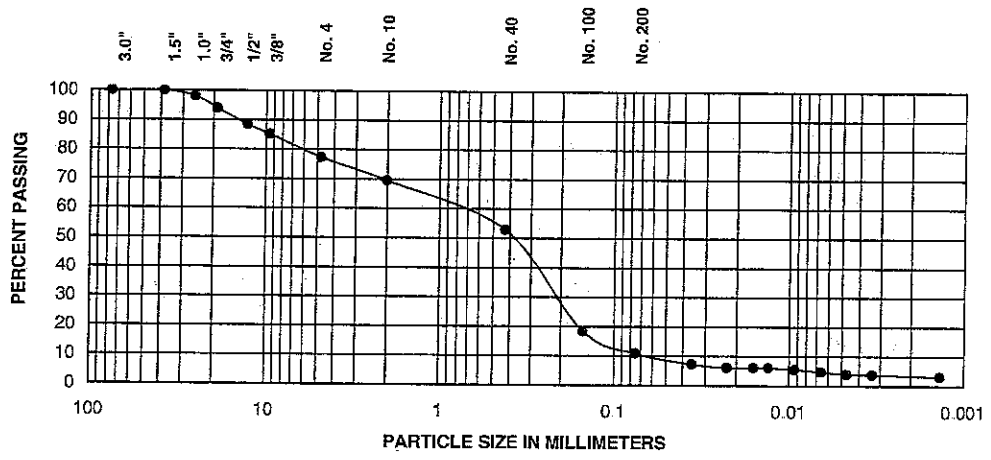
Average Permeability = **2.2E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-011	**Date Tested**	12/10/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/3/2003
Sample Location	97+00 (SW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	22.6	66.5	6.7	4.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.82	0.21	0.06	13.1	0.88

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.1
3/4"	94.0
1/2"	88.4
3/8"	85.2
No. 4	77.4
No. 10	69.5
No. 40	53.0
No. 100	18.4
No. 200	10.9

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

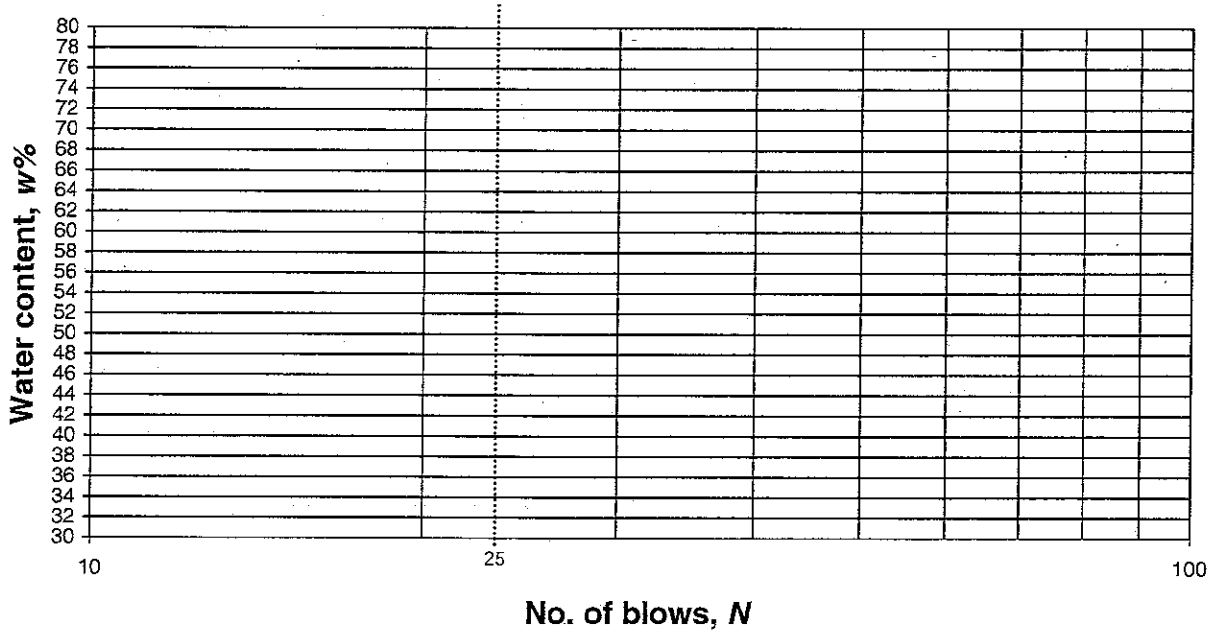
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-011	**Date Tested**	12/8/2003	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	12/3/2003
Sample Location	97+00 (SW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	4	Date	12/3/2003	Sheet	1
				Date of weighing	12/4/2003	Tested by	NP

Boring No.	-					
Sample No.	**BF-011**					
Location	**97 + 00 (SW)**					
Tin No.	**12C**					
Tin + Wet Soil	**147.09**					
Tin + Dry Soil	**135.36**					
Wt. of Tin	**30.66**					
Wt. of Dry Soil	**104.7**					
Wt. of Water	**11.7**					
Moisture, %	**11.2**					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/03/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 27 - 39 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH	
	feet	lb/ft^3	%	cm^3	seconds	S.U.	
96+30	2.00	93.00	11.00	23.00	48.00	8	SW TRENCH
96+30	32.00	93.50	22.00	23.00	52.00	8	
95+90	2.00	90.00	11.00	23.50	43.00	8	
95+90	32.00	92.00	20.00	24.00	44.00	8	
78+50	12.00	79.00	6.00	22.00	46.00	8	NW TRENCH
78+10	2.00	72.00	10.00	19.00	41.00	8	
78+10	18.00	74.00	10.00	23.00	48.00	8	

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	
	%		%		
96+00	LAB SAMPLE COLLECTED 12/03/03				SW TRENCH
78+50	LAB SAMPLE COLLECTED 12/03/03				NW TRENCH

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
98+00	3.00	Sample collected 12/01/03	Sample collected 12/01/03		5.42×10^{-7}	Sample collected 12/01/03
97+75	3.00	N/A	N/A	N/A	1.20×10^{-7}	N/A
97+50	3.00	Sample collected	Sample collected	Sample collected	1.29×10^{-7}	yes
97+25	3.00	N/A	N/A	N/A	1.31×10^{-7}	N/A
97+00	3.00	Sample collected 12/02/03	Sample collected 12/02/03		1.76×10^{-7}	Sample collected 12/02/03
96+75	3.00	N/A	N/A	N/A	1.58×10^{-7}	N/A

COMMENTS

Filter cake was .8mm, 1.0mm, 1.2mm, 1.3mm, .4mm, .4mm and .5mm respectively.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

Unit Weight:
- 98+00: 117.5 pcf
- 97+75: 120.0 pcf
- 97+50: 118.0 pcf
- 97+25: 110.5 pcf
- 97+00: 111.0 pcf
- 96+75: 115.0 pcf

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E Sepio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/03/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
9:34	65.50	65.00	9.00	8
12:02	-	41.00	-	-
14:58	-	46.00	-	-
16:48	65.00	53.00	11.50	8

Filter cake was .3mm and .3mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/03/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 27 - 39 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
96+40	30.6	34.8	36.3	10.0	362.5	4.0	98+40	OUT	TOP OUT
96+30	30.7	34.5	34.7	10.0	346.5	4.0	98+30	3.6	TOP OUT
96+20	30.7	34.4	34.5	10.0	344.5	4.0	98+20	5.2	TOP OUT
96+10	30.6	34.2	34.3	10.0	343.0	3.9	98+10	8.1	TOP OUT
96+00	30.6	34.2	34.2	10.0	342.0	3.9	98+00	12.0	2.3
95+90	30.5	34.2	34.2	10.0	342.0	3.9	97+90	15.0	9.2
95+80	30.5	34.6	34.4	10.0	344.0	3.9	97+80	17.8	16.1
							97+70	19.2	23.3
							97+60	21.1	23.9
							97+50	23.4	24.5
							97+40	26.7	25.1
							97+30	28.8	26.0
							97+20	30.2	27.0
							97+10	32.4	27.7
							97+00	33.6	28.3
							96+90	34.5	29.1
							96+80	35.4	30.2
							96+70	35.6	31.4
							96+60	35.6	32.3
							96+50	37.7	32.9
							96+40	25.7	33.6
							96+30	21.3	34.5
							96+20		34.4
							96+10		34.2
							96+00		34.2
							95+90		34.2
							95+80		34.6
							95+70		25.0

SF TODAY 2424.50

SF TO DATE 45357.90

COMMENTS (CON'T ON PAGE 4)

NW trench profiles are continued on page 4.

Excavator on the SW trench blew a couple of hoses. Lost a couple of hours of production replacing them.

Original excavator on the SW trench moved to the NW trench to begin excavation here. Began digging around 13:00.

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/03/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 27 - 39 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A							78+60		START
							78+50		20.0
							78+40		20.0
							78+30		20.0
							78+20		20.0
							78+10		20.0
							78+00		12.0

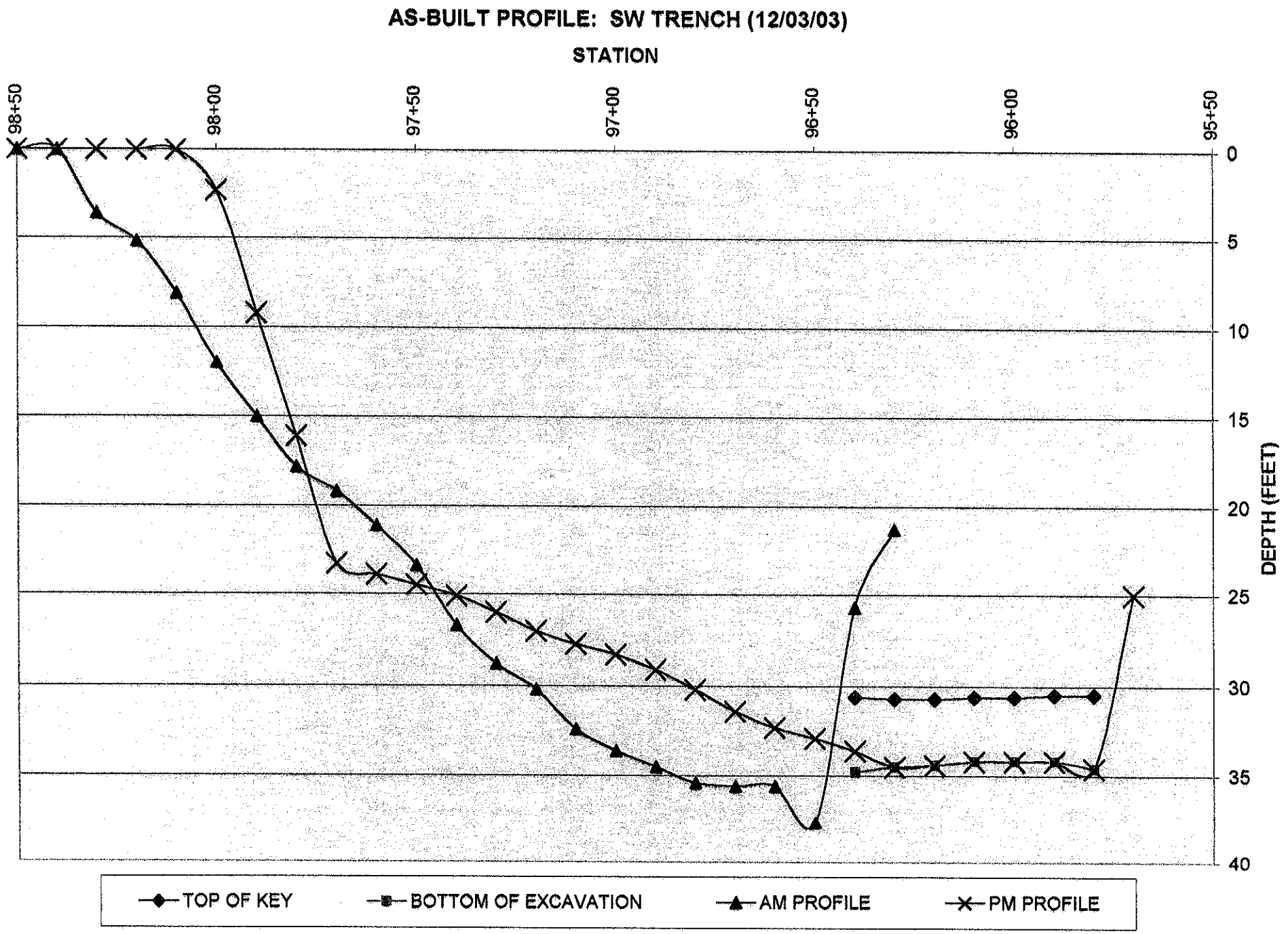
SF TODAY

SF TO DATE

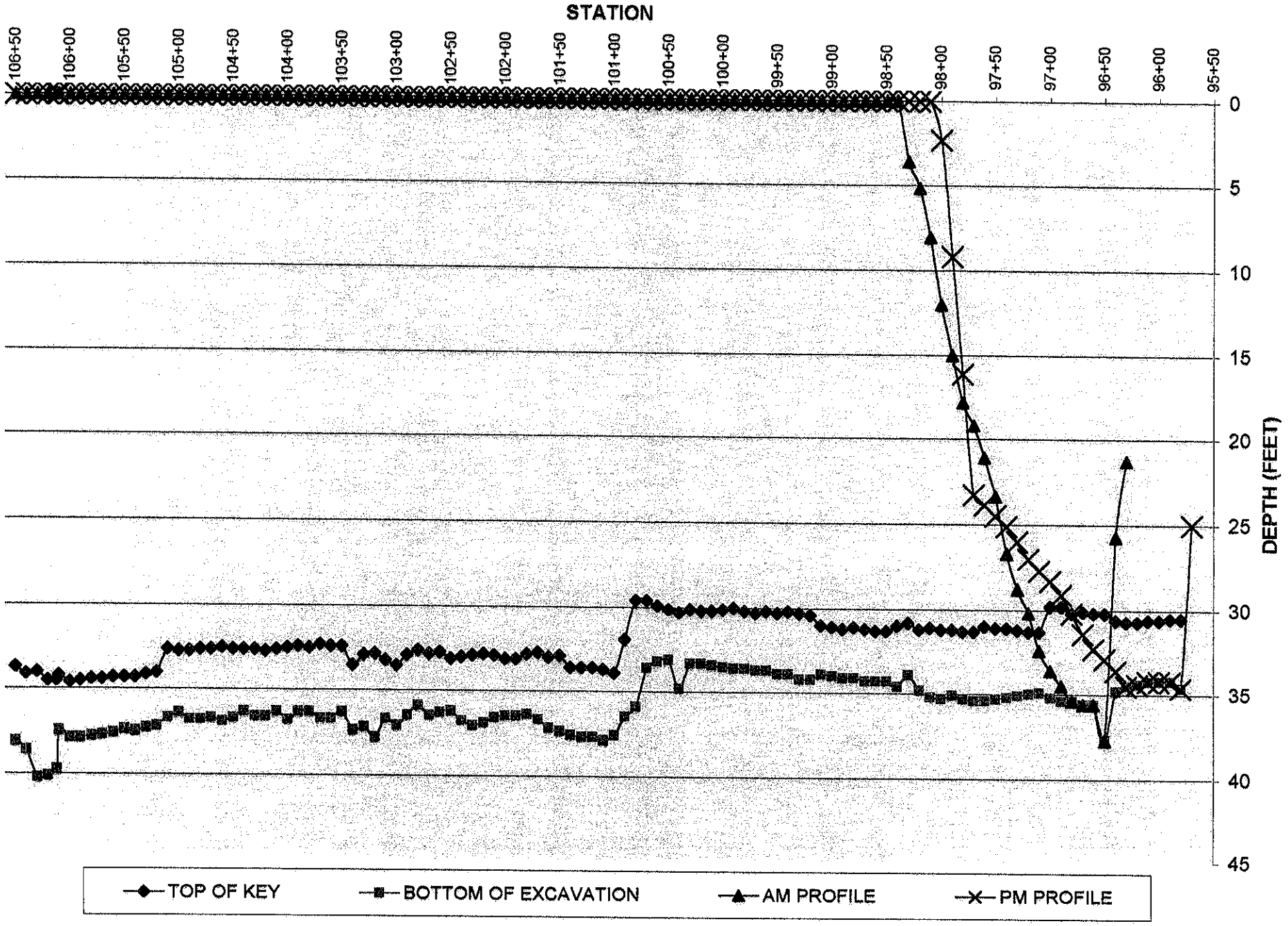
COMMENTS

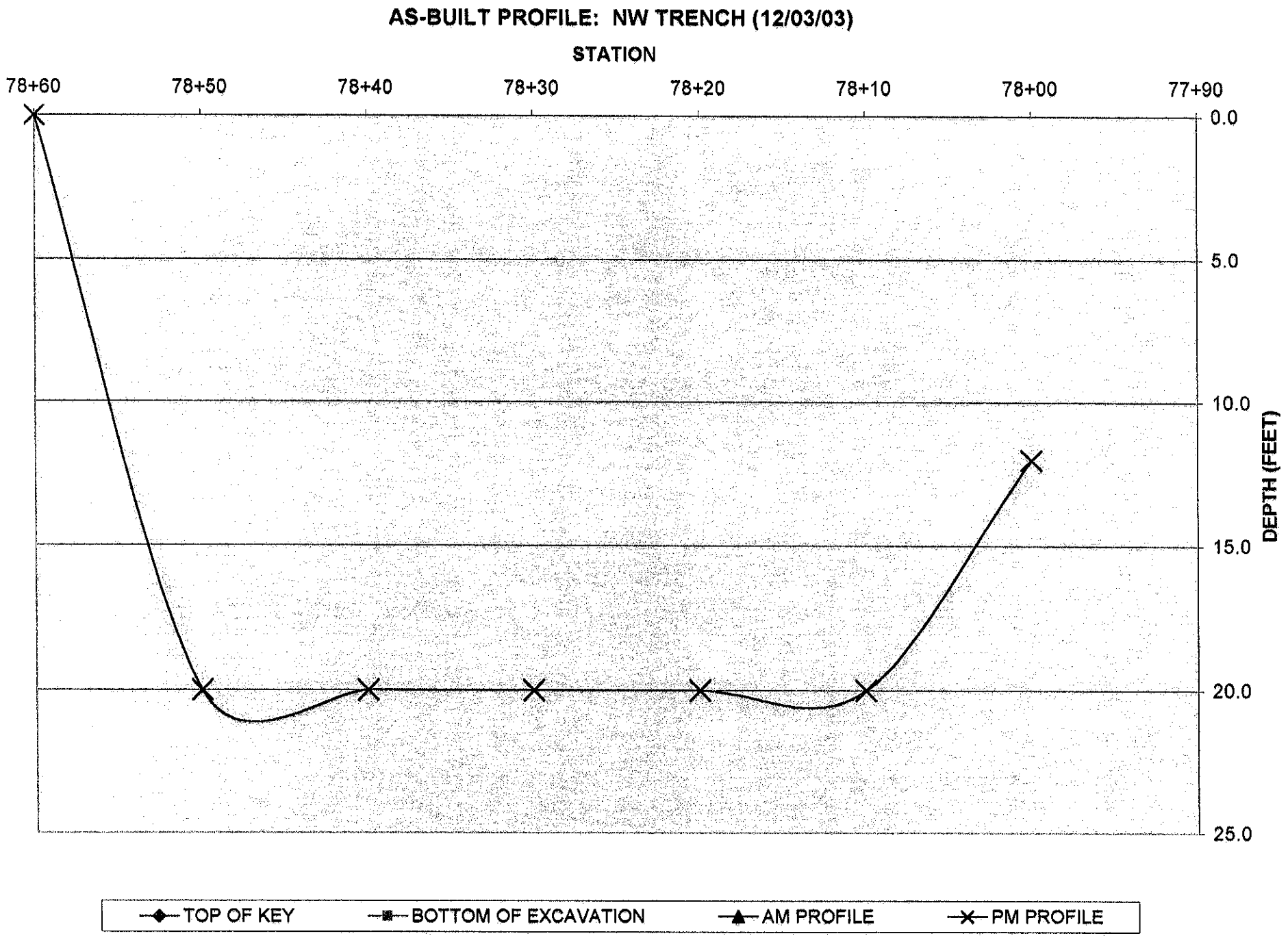
NW Trench

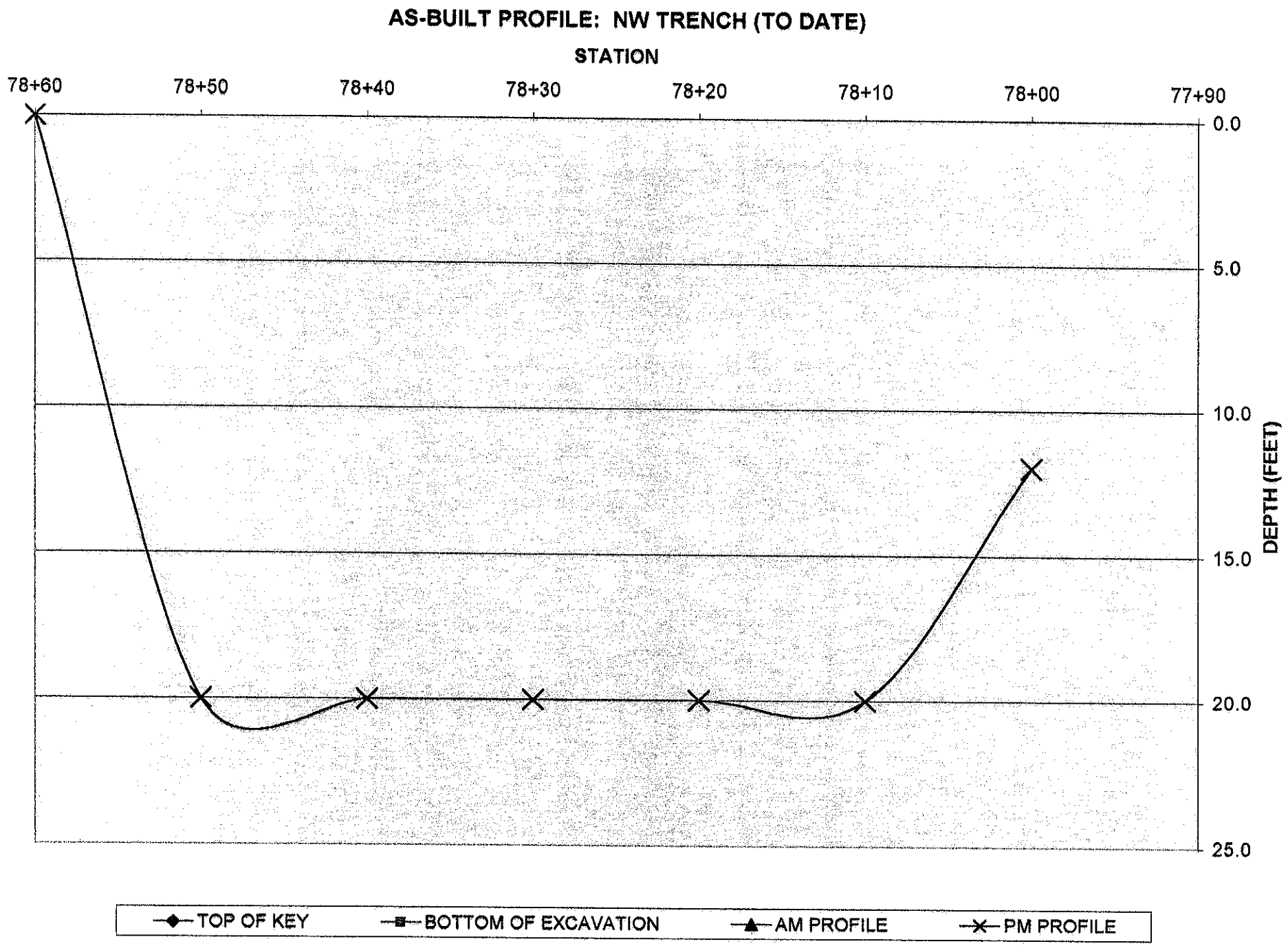
GEO-CON: Suzanne E. Sepic OWNER:


AS-BUILT PROFILE: SW TRENCH (12/03/03)
STATION
98+50
98+00
97+50
97+00
96+50
96+00
95+50
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: SW TRENCH (TO DATE)




AS-BUILT PROFILE: NW TRENCH (12/03/03)
STATION
78+60
78+50
78+40
78+30
78+20
78+10
78+00
77+90
0.0
5.0
10.0
15.0
20.0
25.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
78+60
78+50
78+40
78+30
78+20
78+10
78+00
77+90
0.0
5.0
10.0
15.0
20.0
25.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/03/03

SW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9:34	65	> 40 sec	65.5	> 64 pcf	8	6.5 - 10	9	< 20 cm^3	.3
PM	16:48	53	> 40 sec	65	> 64 pcf	8	6.5 - 10	11.5	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	12:02	41	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	14:58	46	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:15	96+30	2	48	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	.8	11	MAX 30%
9:15	96+30	32	52	40 - 90 sec	93.5	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	1.0	22	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:32	95+90	2	43	40 - 90 sec	90	64 - 95 pcf	8	6.5 - 10	23.5	< 25 cm^3	1.2	11	MAX 30%
16:32	95+90	32	44	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.3	20	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
98+00	3	2" to 6"	117.5	+15 pcf over trench slurry	5.42×10^{-7}	1.0×10^{-7} cm/sec
97+75	3	2" to 6"	120.0	+15 pcf over trench slurry	1.20×10^{-7}	1.0×10^{-7} cm/sec
97+50	3	2" to 6"	118.0	+15 pcf over trench slurry	1.29×10^{-7}	1.0×10^{-7} cm/sec
97+25	3	2" to 6"	110.5	+15 pcf over trench slurry	1.31×10^{-7}	1.0×10^{-7} cm/sec
97+00	3	2" to 6"	111.0	+15 pcf over trench slurry	1.76×10^{-7}	1.0×10^{-7} cm/sec
96+75	3		115.0		1.58×10^{-7}	

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS

DATE 12/03/03

Page 2 of 2

NW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

SW TRENCH AS SAME SLURRY PROPERTIES

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
—	LEAD-IN	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%
14:59	78+50	12	46	40 - 90 sec	79	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	.4	6	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:25	78+10	2	41	40 - 90 sec	72	64 - 95 pcf	8	6.5 - 10	19	< 25 cm^3	.4	10	MAX 30%
16.25	78+10	18	48	40 - 90 sec	74	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	.5	10	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

NO BACKFILLING OPERATIONS

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 98+00, 97+75, 97+50, 97+25, 97+00, 96+75

Technician: MM / BY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.5cm, 7.5cm, 6.5cm, 7.0cm, 7.0cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. factor (1/14.65)
98+00	12/03/03	10:48-14:48	240	10	93.7844	484692.7847	–	63	5.42×10^{-7}	3.70×10^{-8}
97+75	12/03/03	10:48-14:48	240	10	93.7844	484692.7847	–	14	1.20×10^{-7}	8.19×10^{-9}
97+50	12/03/03	10:48-14:48	240	10	108.2128	559261.0644	–	15	1.29×10^{-7}	8.80×10^{-9}
97+25	12/03/03	18:09-6:09	720	10	100.4833	519313.7717	–	49	1.31×10^{-7}	8.94×10^{-9}
97+00	12/03/03	18:09-6:09	720	10	100.4833	519313.7717	–	66	1.76×10^{-7}	1.20×10^{-8}
96+75	12/03/03	18:09-6:09	720	10	100.4833	519313.7717	–	59	1.58×10^{-7}	1.08×10^{-8}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 4-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-012	SOIL ONLY	96+00	12/3/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-013	SOIL ONLY	78+50	12/3/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-015	SB BACKFILL**	97+50	12/3/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/22/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV005039	GEO-CON E CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-1-03	HI BALL #184	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result	Test or Property	API Spec	Result
Viscosity	30 min.	30	Moisture (wt. %)	N/A	8.1
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max.	1.33
Yield Point (# / 100 ft2)	N/A				
Filtrate Volume (cm3)	15.0 max.	12.8			
> 75 micron (wt. %)	4.0 max.	1.9			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4456.

Signed 12/4/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Arrived onsite 12/03/03

100# Bags

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/1/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCTV006002	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-1-03	HI BALL 186	GREYBULL	GBL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	50
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.4
> 75 micron (wt. %)	4.0 max.	1.8

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	9.0
Y.P. / P.V. Ratio	3.0 max.	1.85

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-753-4495.

Signed 12/4/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

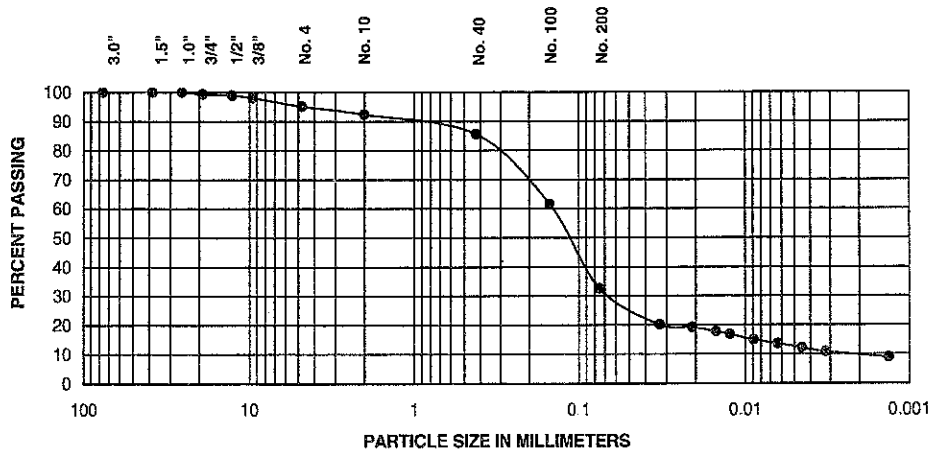
Arrived onsite 12/03/03

4000 # Jumbo Sacks

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-015	**Date Tested**	12/10/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/4/2003
Sample Location	97+50 (SW)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	4.8	62.6	19.9	12.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.4
1/2"	98.9
3/8"	98.1
No. 4	95.2
No. 10	92.3
No. 40	85.7
No. 100	61.5
No. 200	32.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
26	17	9

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

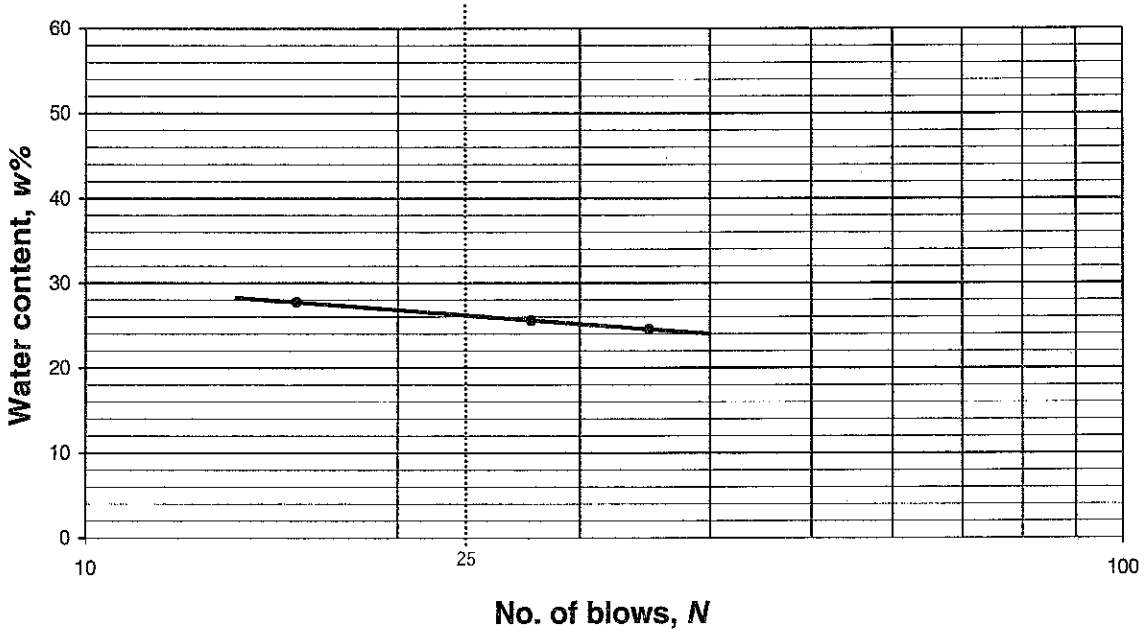
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-015	**Date Tested**	12/5/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/4/2003
Sample Location	97+50 (SW)
Sample Description	Gray silty, clayey sand with tr of gr. (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**26**	**Plastic Limit, PL**	**17**	**Plasticity Index, PI**	**9**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/8/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-015	Date Recd.	12/4/03	**Location**	97+50 (SW)		
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)						

Specimen Data

Initial

Diameter:	7.21	cm	Area, A:	40.8	sq cm
Height, L:	5.27	cm	Volume, V:	215.2	cu cm
Mass of Sample:	418.1	g	**Moisture Content:**	**27.4**	**%**
			Wet Density	**121.3**	**pcf**
			Dry Density	**95.2**	**pcf**

Final

Diameter:	6.92	cm	Area, A:	37.6	sq cm
Height, L:	5.09	cm	Volume, V:	191.4	cu cm
Mass of Sample:	386.70	g	**Moisture Content:**	**24.7**	**%**
			Wet Density	**126.0**	**pcf**
			Dry Density	**101.1**	**pcf**
			Deg of Saturation	**97.4**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	24.0	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/8/2003	9:00 AM	0	0	2.96	5.89		20.0	---
12/8/2003	10:00 AM	3600	3600	3.14	5.69	0.9	20.0	4.92E-08
12/8/2003	11:00 AM	3600	7200	3.30	5.52	0.9	20.0	4.25E-08
12/8/2003	12:00 PM	3600	10800	3.47	5.38	1.2	20.0	3.56E-08
12/8/2003	1:45 PM	6300	17100	3.83	5.05	1.1	20.0	4.91E-08

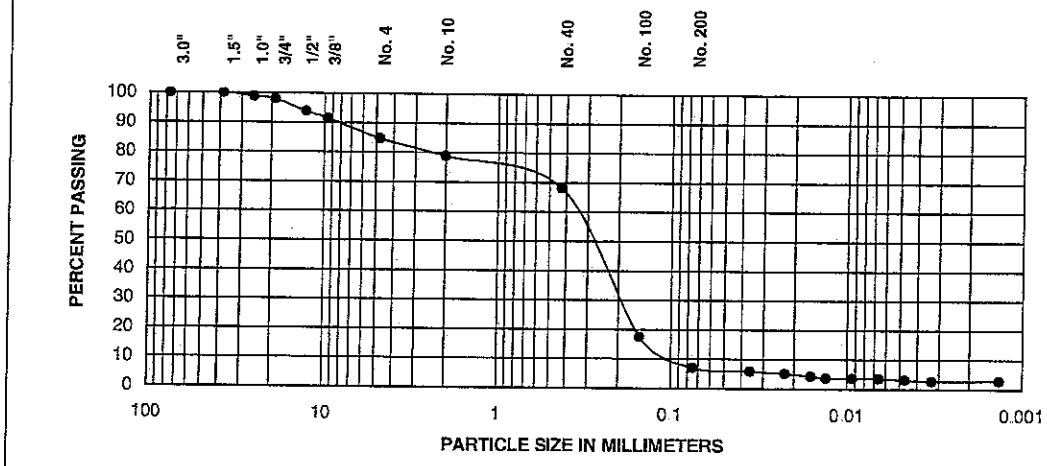
Average Permeability = **4.4E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-012	**Date Tested**	12/10/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/4/2003
Sample Location	96+00 (SW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



% + 3"	% Gravel	% Sand	Fines	
			% Silt	% Clay
0.0	15.3	77.6	3.8	3.3

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.36	0.19	0.09	4.0	1.15

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.8
3/4"	98.0
1/2"	93.8
3/8"	91.6
No. 4	84.7
No. 10	78.9
No. 40	68.2
No. 100	17.6
No. 200	7.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

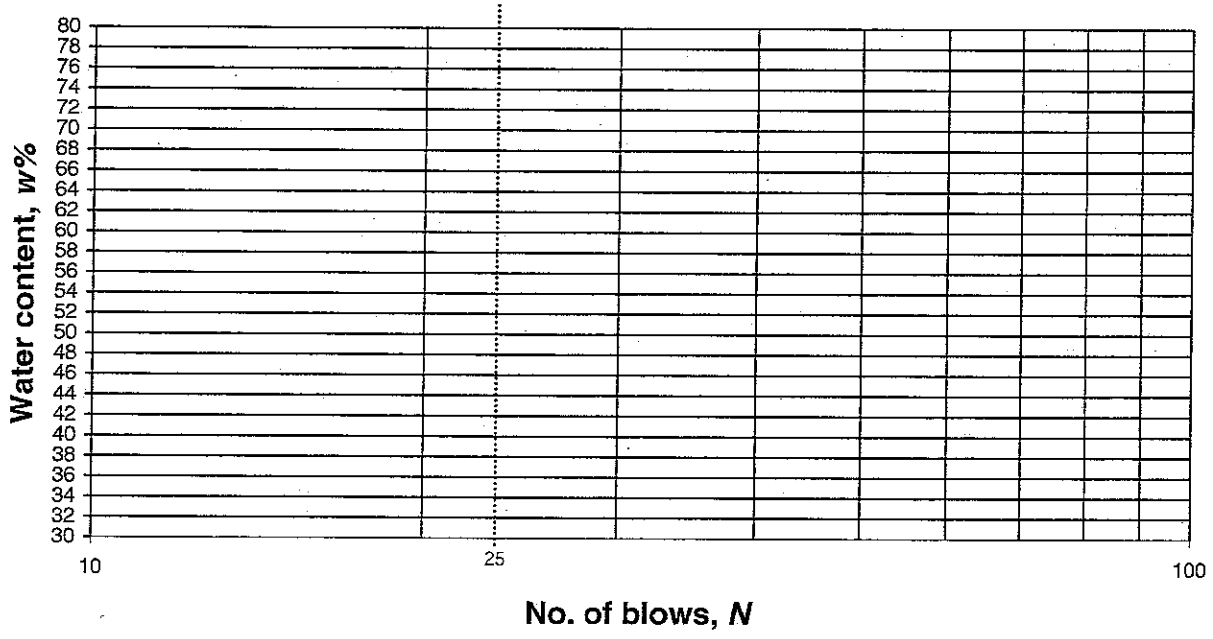
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-012	**Date Tested**	12/8/2003	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	12/4/2003
Sample Location	96+00 (SW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	5	Date	12/4/2003	Sheet	1
				Date of weighing	12/5/2003	Tested by	NP

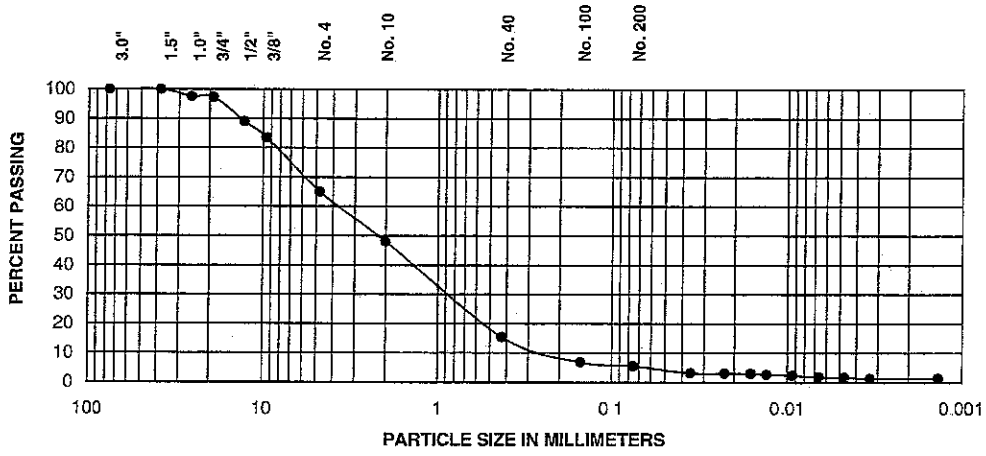
Boring No.	-	-				
Sample No.	BF-012	BF-013				
Location	96 + 00 (SW)	78 + 50 (NW)				
Tin No.	67A	12C				
Tin + Wet Soil	138.98	157.84				
Tin + Dry Soil	125.61	131.9				
Wt. of Tin	30.66	30.97				
Wt. of Dry Soil	95.0	100.9				
Wt. of Water	13.4	25.9				
Moisture, %	14.1	25.7				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-013	**Date Tested**	12/10/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/4/2003
Sample Location	78+50 (NW)
Sample Description	Gray poorly graded sand with silty clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	35.0	59.5	3.8	1.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	3.67	0.85	0.22	16.8	0.89

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.6
3/4"	97.2
1/2"	89.0
3/8"	83.4
No. 4	65.0
No. 10	48.1
No. 40	15.5
No. 100	6.9
No. 200	5.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

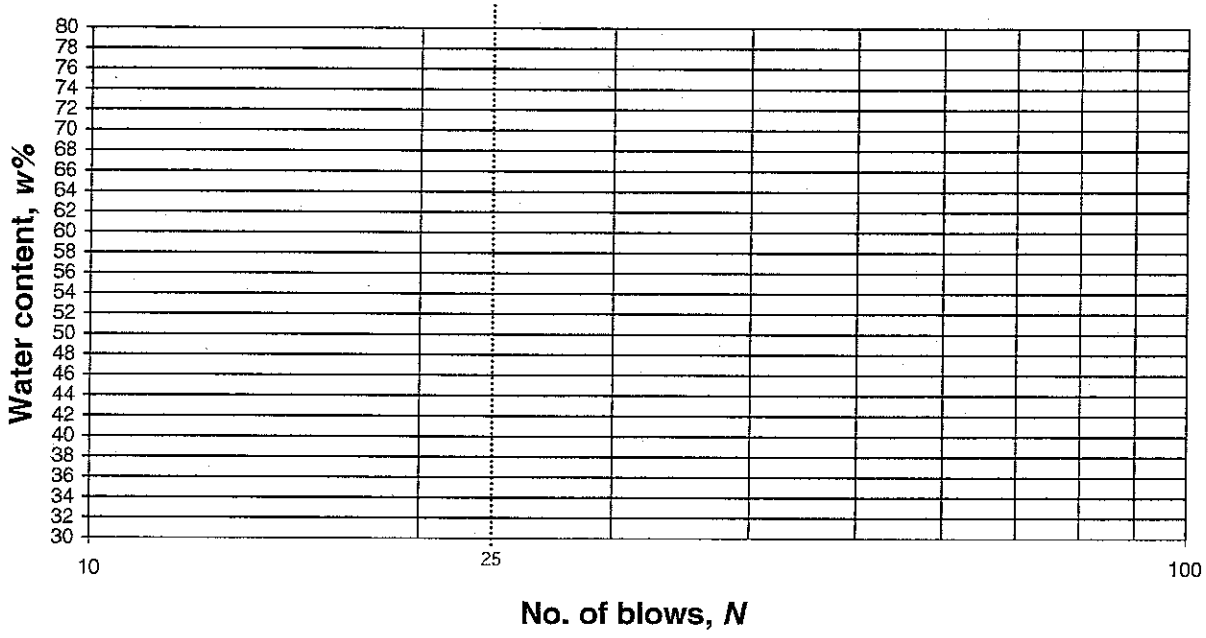
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-013	**Date Tested**	12/8/2003	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	12/4/2003
Sample Location	78+50 (NW)
Sample Description	Graypoorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	5	Date	12/4/2003	Sheet	1
				Date of weighing	12/5/2003	Tested by	NP

Boring No.	-	-				
Sample No.	BF-012	BF-013				
Location	96 + 00 (SW)	78 + 50 (NW)				
Tin No.	67A	12C				
Tin + Wet Soil	138.98	157.84				
Tin + Dry Soil	125.61	131.9				
Wt. of Tin	30.66	30.97				
Wt. of Dry Soil	95.0	100.9				
Wt. of Water	13.4	25.9				
Moisture, %	14.1	25.7				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/04/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, Drizzle; 27 - 39 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH	
	feet	lb/ft^3	%	cm^3	seconds	S.U.	
95+60	2.00	94.00	8.00	23.50	50.00	8	SW TRENCH
95+60	32.00	95.50	9.00	24.00	51.00	8	
95+00	2.00	91.00	8.00	24.00	51.00	8	
95+00	31.00	94.00	10.00	24.50	54.00	8	
78+30	2.00	70.00	6.00	21.00	41.00	8	NW TRENCH
78+30	25.00	74.00	7.00	22.50	43.00	8	
78+20	2.00	71.00	7.00	21.50	40.00	8	
78+20	33.00	77.00	7.00	22.00	41.00	8	

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	
	%		%		
95+00	LAB SAMPLE COLLECTED 12/04/03				SW TRENCH
	NO SAMPLE COLLECTED FROM THE NW TRENCH. SAME CUT				NW TRENCH

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
97+00	3.00	Sample collected 12/02/03	Sample collected 12/02/03		1.36×10^{-7}	Sample collected 12/02/03
96+75	3.00	N/A	N/A	N/A	1.04×10^{-7}	N/A
96+50	3.00	N/A	N/A	N/A	1.29×10^{-7}	N/A
96+25	3.00	N/A	N/A	N/A	1.02×10^{-7}	N/A
96+00	3.00	Sample collected	Sample collected	Sample collected	1.09×10^{-7}	yes
95+75	3.00	N/A	N/A	N/A	1.06×10^{-7}	N/A

COMMENTS

Filter cake: 2.0mm, 2.8mm, 1.9mm, 2.3mm, .4mm, .5mm, .4mm and .5mm respectively.

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

Unit Weight:
- 97+00: 123.0 pcf
- 96+75: 119.5 pcf
- 96+50: 114.0 pcf
- 96+25: 115.5 pcf
- 96+00: 119.0 pcf
- 95+75: 116.5 pcf

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepac OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/04/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
9:03	67.50	73.00	11.50	8
13:06	-	45.00	-	-
16:14	65.50	63.00	10.00	8

Filter cake was .3mm and .3mm, respectively. No 2nd check of viscosity in AM due to pipe clogging.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepac OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/04/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, Drizzle; 27 - 39 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
95+70	30.6	33.9	34.3	10.0	342.5	3.9	98+10	OUT	TOP OUT
95+60	30.6	33.9	33.9	10.0	339.0	4.0	98+00	2.3	TOP OUT
95+50	30.5	34.0	34.0	10.0	339.5	4.0	97+90	9.2	TOP OUT
95+40	30.5	34.0	34.0	10.0	340.0	4.0	97+80	16.1	TOP OUT
95+30	30.2	33.8	33.9	10.0	339.0	3.9	97+70	23.3	TOP OUT
95+20	30.0	33.7	33.8	10.0	337.5	3.9	97+60	23.9	TOP OUT
95+10	29.7	35.2	34.5	10.0	344.5	3.8	97+50	24.5	TOP OUT
95+00	28.6	35.7	35.5	10.0	354.5	3.8	97+40	25.1	TOP OUT
94+90	29.0	35.4	35.6	10.0	355.5	3.9	97+30	26.0	TOP OUT
94+80	28.8	35.8	35.6	10.0	356.0	3.9	97+20	27.0	TOP OUT
							97+10	27.7	TOP OUT
							97+00	28.3	4.0
							96+90	29.1	7.5
							96+80	30.2	11.0
							96+70	31.4	14.0
							96+60	32.3	17.0
							96+50	32.9	18.5
							96+40	33.6	20.0
							96+30	34.5	21.0
							96+20	34.4	22.0
							96+10	34.2	22.8
							96+00	34.2	23.4
							95+90	34.2	25.1
							95+80	34.6	26.6
							95+70	25.0	28.3
							95+60		30.0
							95+50		31.1
							95+40		32.3
				SF TODAY	3448.00		95+30		33.0
				SF TO DATE	48805.90		95+20		33.7

COMMENTS

(CON'T ON PAGE 4)

SW trench profiles are continued on page 4.

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/04/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, Drizzle; 27 - 39 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A							95+10		35.2
							95+00		35.7
							94+90		35.4
							94+80		35.8
							94+70		24.7
							94+60		7.6

SF TODAY 0.00

SF TO DATE 45357.90

COMMENTS

(CON'T FROM PAGE 3)

NW trench profiles are on page 5.

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/04/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, Drizzle; 27 - 39 degrees RIG NUMBER:

EXCAVATION

STATION	DEPTH: TOP KEY	DEPTH: BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH
78+50	31.7	35.2				
			35.1	10.0	351.0	10.0
78+40	31.8	35.0				
			35.1	10.0	350.5	10.4
78+30	31.9	35.1				
			35.2	10.0	351.5	11.1
78+20	31.8	35.2				

SF TODAY 1053.00

SF TO DATE 1053.00

BACKFILL SLOPE

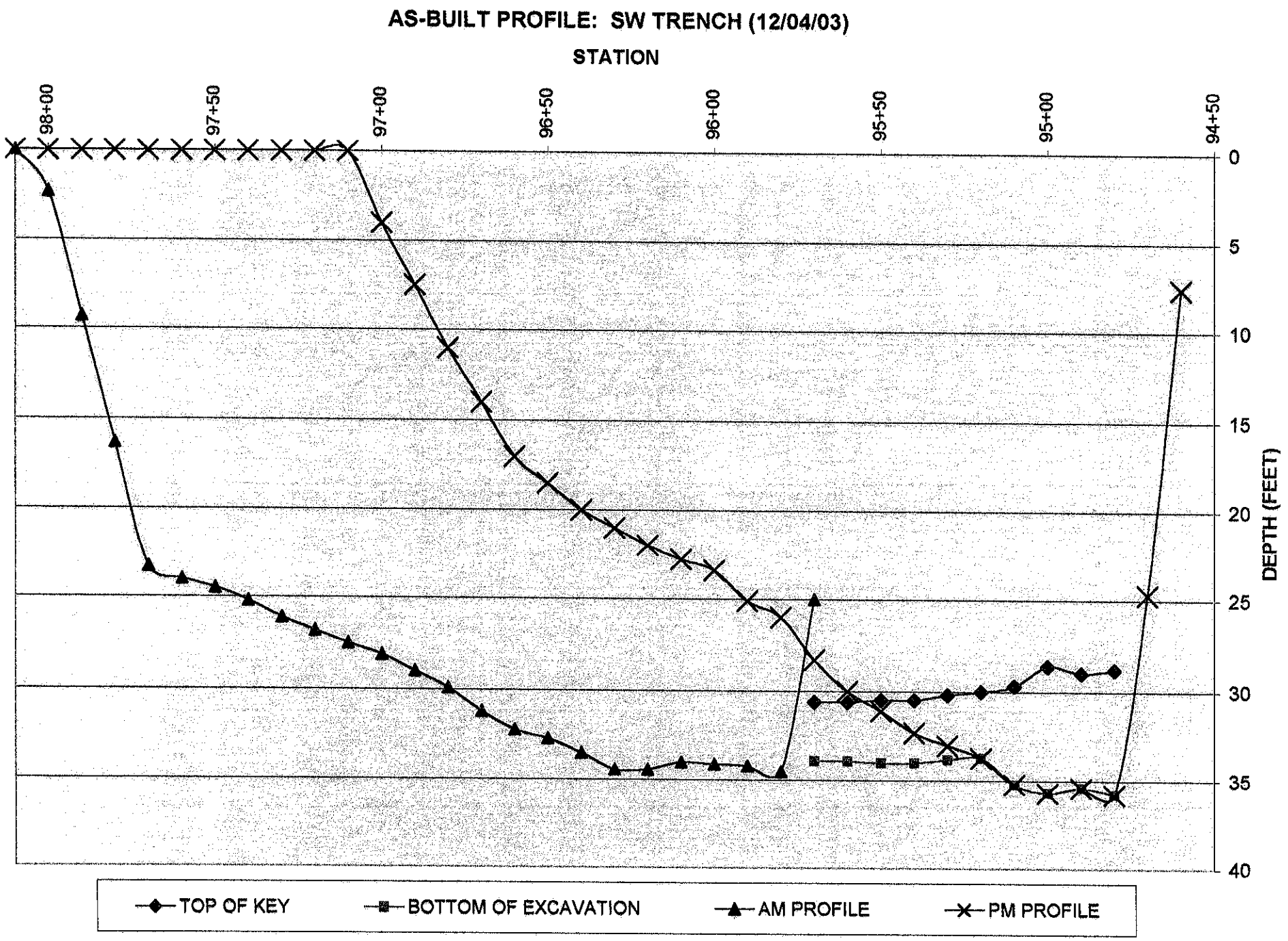
STATION	START OF SHIFT	END OF SHIFT
78+60	START	START
78+50	20.0	35.3
78+40	20.0	34.9
78+30	20.0	35.0
78+20	20.0	35.0
78+10	20.0	25.5
78+00	12.0	

COMMENTS

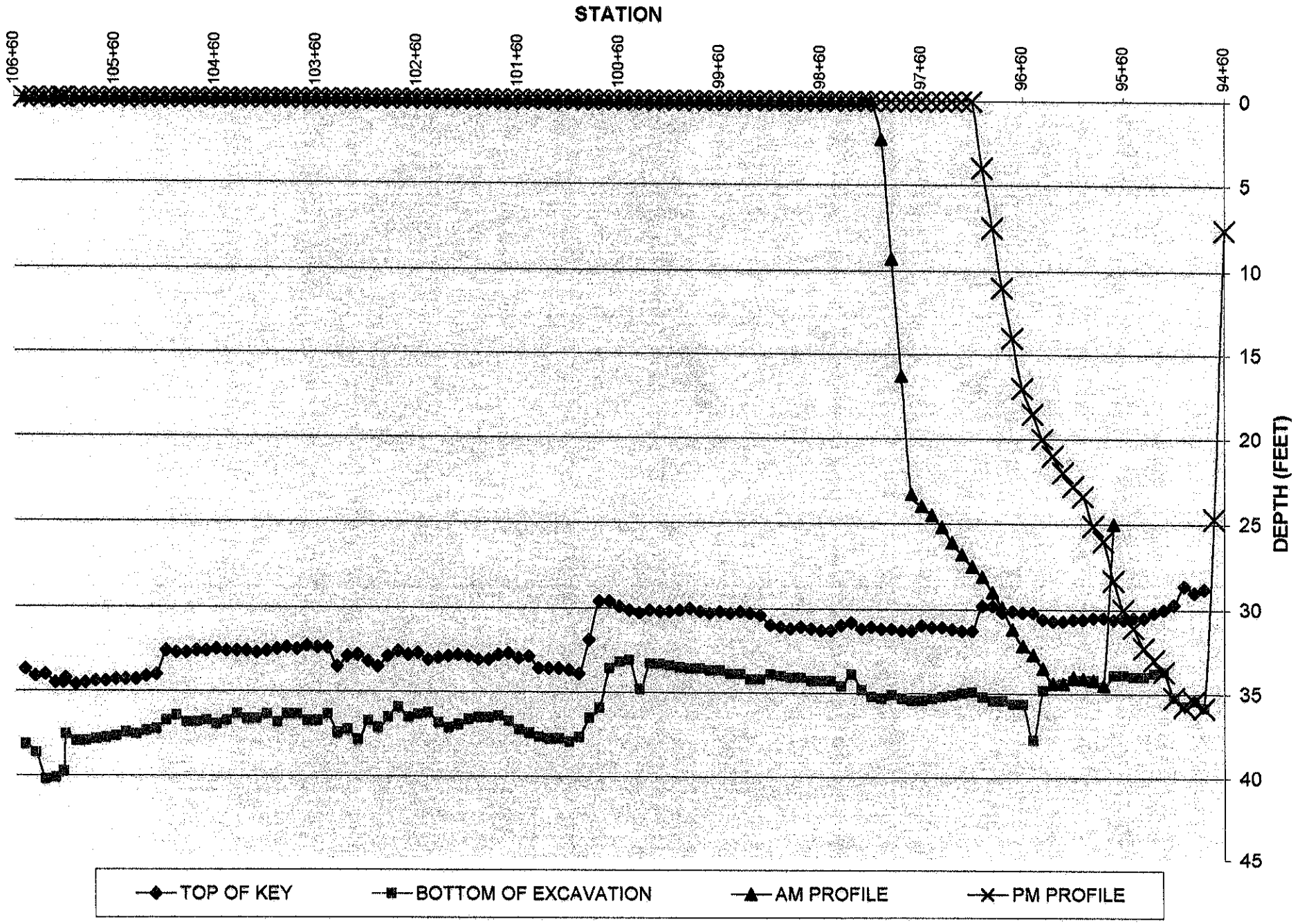
NW Trench

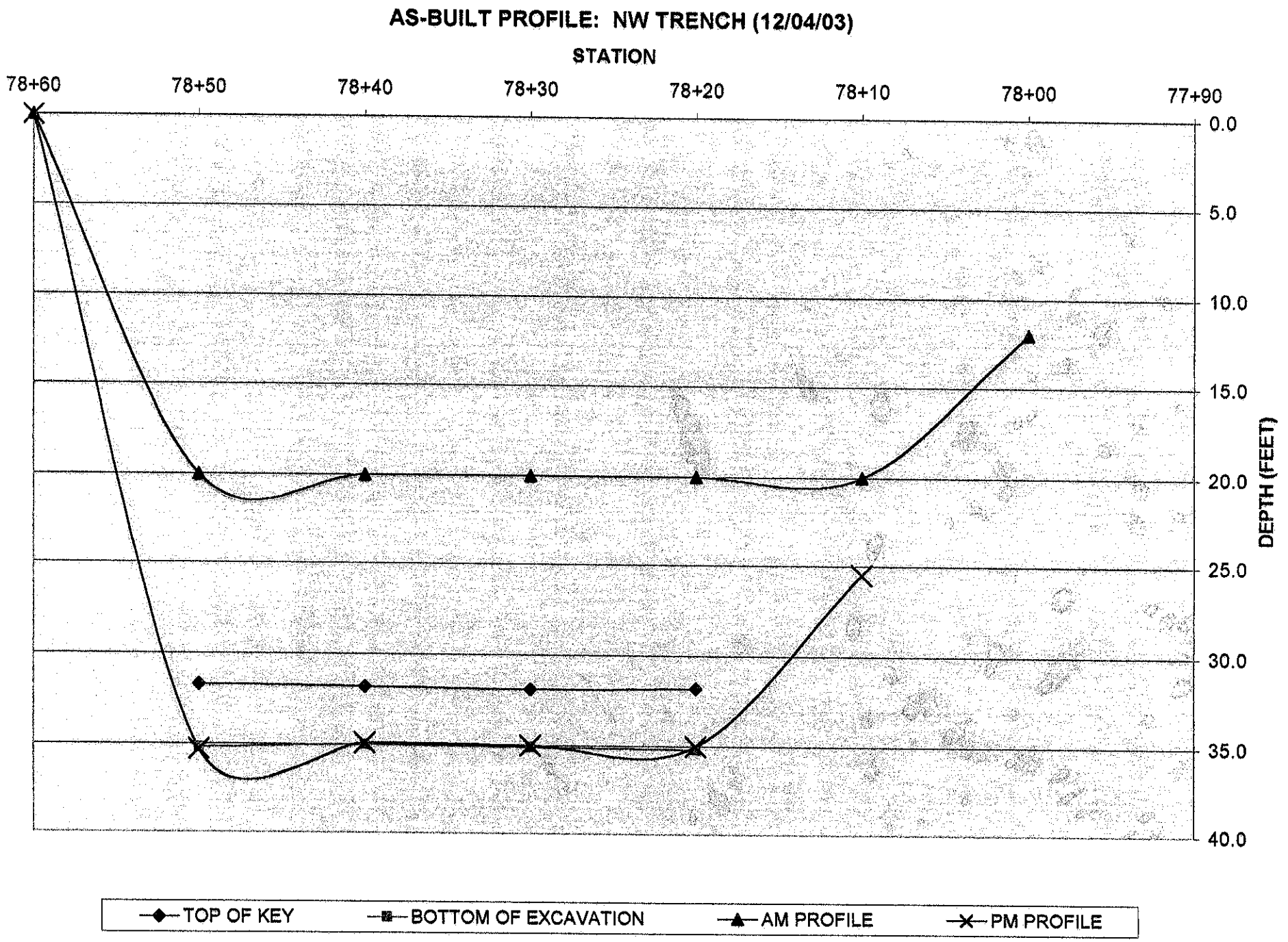
Slurry line had a blockage in it. Spent most of the day trying to remove it. Therefore, production was slow because the slurry level in the trench could not be kept up.

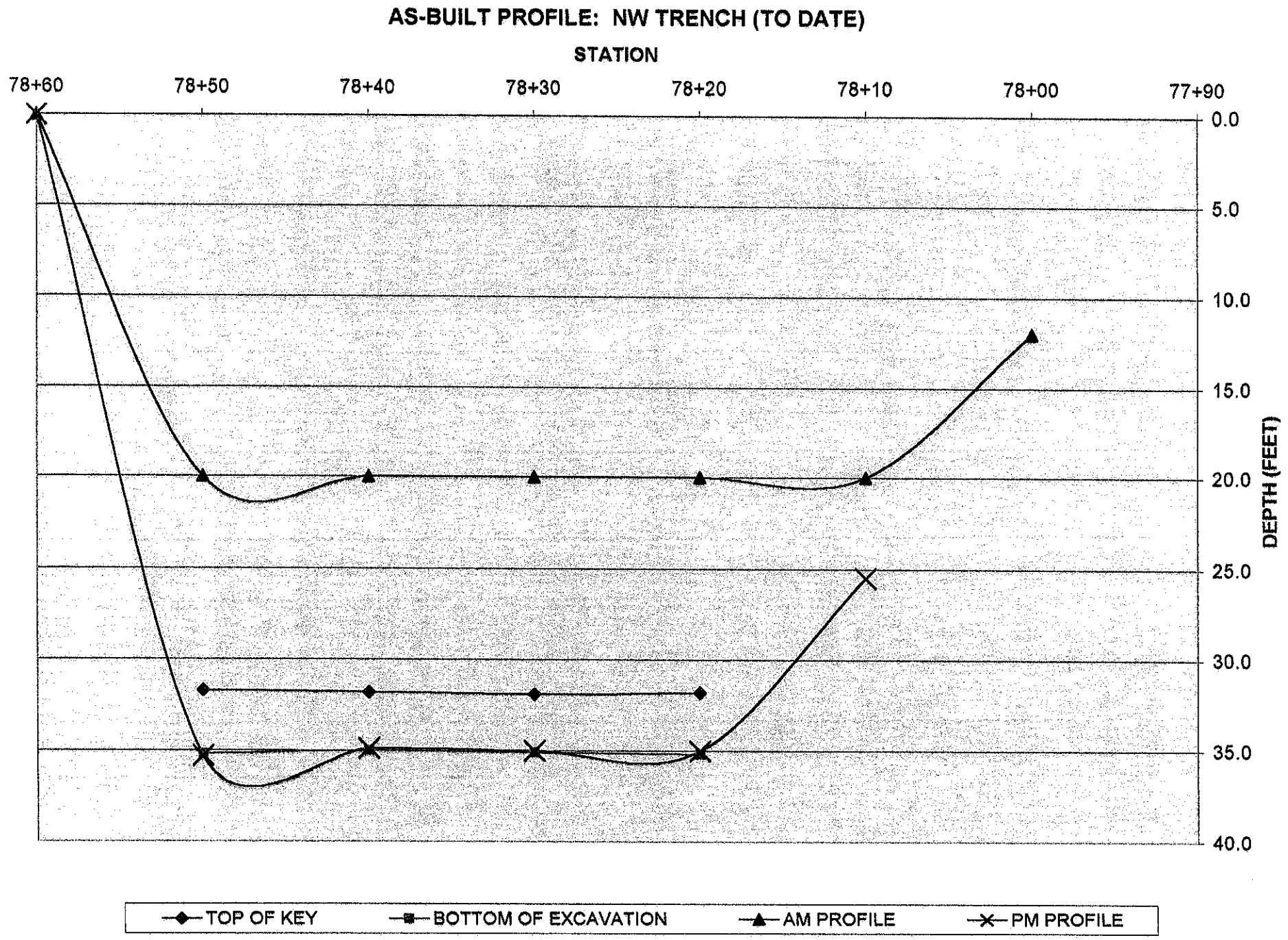
GEO-CON: Suzanne C. Sepc OWNER:


AS-BUILT PROFILE: SW TRENCH (12/04/03)
STATION
98+00
97+50
97+00
96+50
96+00
95+50
95+00
94+50
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: SW TRENCH (TO DATE)




AS-BUILT PROFILE: NW TRENCH (12/04/03)
STATION
78+60
78+50
78+40
78+30
78+20
78+10
78+00
77+90
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
78+60
78+50
78+40
78+30
78+20
78+10
78+00
77+90
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS **DATE** 12/04/03

SW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9:03	73	> 40 sec	67.5	> 64 pcf	8	6.5 - 10	11.5	< 20 cm^3	.3
PM	16:14	63	> 40 sec	65.5	> 64 pcf	8	6.5 - 10	10	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	13:06	45	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:23	95+60	2	50	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	23.5	< 25 cm^3	2.0	8	MAX 30%
9:23	95+60	32	51	40 - 90 sec	95.5	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	2.8	9	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:42	95+00	2	51	40 - 90 sec	91	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.9	8	MAX 30%
16:42	95+00	31	54	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	2.3	10	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
97+00	3	2" to 6"	123.0	+15 pcf over trench slurry	1.36×10^{-7}	1.0×10^{-7} cm/sec
96+75	3	2" to 6"	119.5	+15 pcf over trench slurry	1.04×10^{-7}	1.0×10^{-7} cm/sec
96+50	3	2" to 6"	114.0	+15 pcf over trench slurry	1.29×10^{-7}	1.0×10^{-7} cm/sec
96+25	3	2" to 6"	115.5	+15 pcf over trench slurry	1.02×10^{-7}	1.0×10^{-7} cm/sec
96+00	3	2" to 6"	119.0	+15 pcf over trench slurry	1.09×10^{-7}	1.0×10^{-7} cm/sec
95+75	3		116.5		1.06×10^{-7}	

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS

DATE 12/04/03

NW/Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

GW Trench

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

same as

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:15	78+30	2	41	40 - 90 sec	70	64 - 95 pcf	8	6.5 - 10	21	< 25 cm^3	.4	6	MAX 30%
9:15	78+30	25	43	40 - 90 sec	74	64 - 95 pcf	8	6.5 - 10	22.5	< 25 cm^3	5	7	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
17:09	78+20	2	40	40 - 90 sec	71	64 - 95 pcf	8	6.5 - 10	21.5	< 25 cm^3	.4	7	MAX 30%
17:09	78+20	33	41	40 - 90 sec	77	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	.5	7	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

N/A

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 97+00, 96+75, 96+50 / 96+25, 96+00, 95+75

Technician: MM ✓BY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0 cm, 7.0 cm, 7.5 cm / 7.0 cm, 6.5 cm, 6.5 cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ conv. factor (1/14.66)
97+00	12/04/03	12:25 - 16:25	240	10	100.4833	519313.7717	—	17	1.36×10^{-7}	9.28×10^{-9}
96+75	12/04/03	12:25 - 16:25	240	10	100.4833	519313.7717	—	13	1.04×10^{-7}	7.09×10^{-9}
96+50	12/04/03	12:25 - 16:25	240	10	93.7844	484692.7847	—	15	1.29×10^{-7}	8.81×10^{-9}
96+25	12/04/03	17:58 - 5:58	720	10	100.4833	519313.7717	—	38	1.02×10^{-7}	6.96×10^{-9}
96+00	12/04/03	17:58 - 5:58	720	10	108.2128	559261.0644	—	44	1.09×10^{-7}	7.44×10^{-9}
95+75	12/04/03	17:58 - 5:58	720	10	108.2128	559261.0644	—	42.5	1.06×10^{-7}	7.24×10^{-9}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 5-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-014	SOIL ONLY	95+00	12/4/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-016	SB BACKFILL**	96+00	12/4/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/22/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: DCIV006011	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-2-03	MONT TRANS BM32	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	50
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.8
> 75 micron (wt. %)	4.0 max.	3.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.1
Y.P. / P.V. Ratio	3.0 max.	1.33

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4494.

Bal J 12/4/03
Signed Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (8/99)

Arrived onsite 12/04/03
100# Bags

GP-401

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/2/2003

SOLD TO:	SHIP TO:
GEO-CON INC 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV006012	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-2-03	MONT TRANS 101	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	46
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	14.2
> 75 micron (wt. %)	4.0 max.	1.8

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.3
Y.P. / P.V. Ratio	3.0 max.	1.29

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-763-4486.

Signed 12/4/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev 2 (2/99)

Arrived 12/04/03

100# Bags

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/26/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV006001	GEO-CON E CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-2-03	BIERI 307	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	52
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.2
> 75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.2
Y.P. / P.V. Ratio	3.0 max.	1.71

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4458.

Signed 12/4/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Arrived onsite 12/04/03
4000# Jumbo Bags

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/26/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV005999	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-2-03	BULL MTN EXP 03	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	52
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.2
> 75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.2
Y.P. / P.V. Ratio	3.0 max.	1.71

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4428.

Signed 12/4/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/98)

Arrived 12/04/03
4000# Jumbo Bags

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/22/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV066010	GEO-CON E CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-2-03	MONT TRANS 2	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	50
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.8
> 75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.1
Y.P. / P.V. Ratio	3.0 max.	1.33

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4486.

Signed 12/4/03 Date

Approved by: Plant Manager

LabandCert.doc (4/22/97)
Rev E (8/99)

Arrived 12/04/03
100# Bags

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/26/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCDV006000	GEO-CON E CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-1-03	QUALITY#25	GREYBULL	GBL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result	Test or Property	API Spec	Result
Viscosity	30 min.	32	Moisture (wt. %)	N/A	8.2
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max.	1.71
Yield Point (# / 100 ft2)	N/A				
Filtrate Volume (cm3)	15.0 max.	13.2			
> 75 micron (wt. %)	4.0 max.	1.9			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4488.

Signed 12/4/03 Date

Approved by: Plant Manager

LabensCert.doc (4/23/97)
Rev E (9/99)

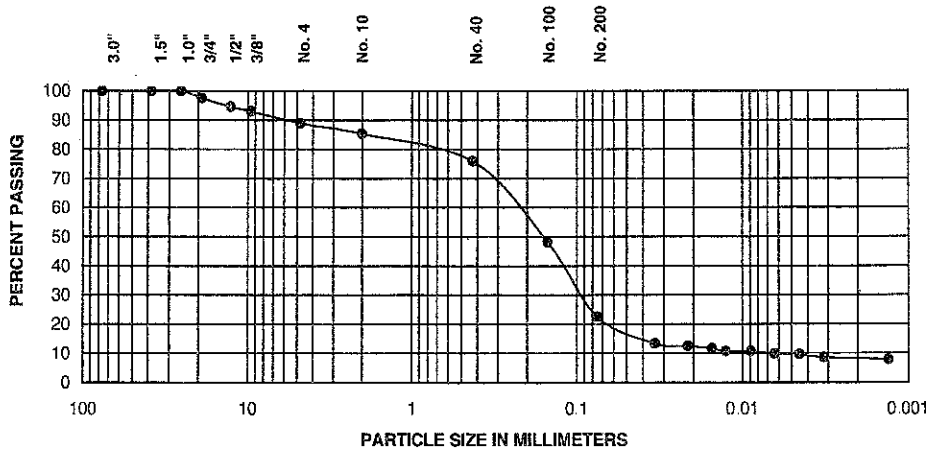
Arrived 12/04/03

4000# Jumbo Bags

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-016	**Date Tested**	12/10/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/5/2003
Sample Location	96+00 (SW)
Sample Description	Gray silty clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.1	66.3	12.8	9.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	97.5
1/2"	94.6
3/8"	93.1
No. 4	88.9
No. 10	85.3
No. 40	75.9
No. 100	48.0
No. 200	22.6

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
27	21	6

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

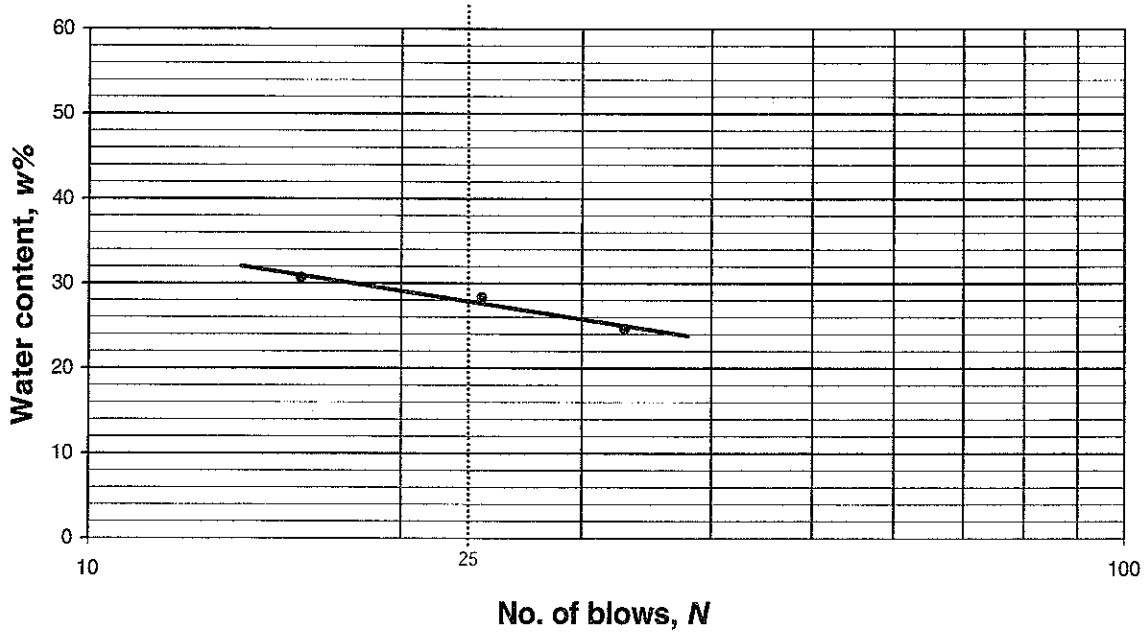
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-016	**Date Tested**	12/8/2003	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	12/5/2003
Sample Location	96+00 (SW)
Sample Description	Gray silty clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	27	**Plastic Limit, PL**	21	**Plasticity Index, PI**	6

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/8/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-016	Date Recd.	12/5/03	**Location**	96+00 (SW)		
Sample Description	Gray silty clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.37	cm	Volume, V:	218.6	cu cm
Mass of Sample:	417.9	g	**Moisture Content:**	**25.6**	%
			Wet Density	**119.3**	**pcf**
			Dry Density	**95.0**	**pcf**

Final

Diameter:	6.98	cm	Area, A:	38.3	sq cm
Height, L:	5.18	cm	Volume, V:	198.2	cu cm
Mass of Sample:	404.90	g	**Moisture Content:**	**23.9**	%
			Wet Density	**127.5**	**pcf**
			Dry Density	**102.9**	**pcf**
			Deg of Saturation	**98.4**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	23.6	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/8/2003	9:00 AM	0	0	3.04	5.94		20.0	---
12/8/2003	10:00 AM	3600	3600	3.11	5.85	0.8	20.0	2.25E-08
12/8/2003	11:00 AM	3600	7200	3.21	5.77	1.3	20.0	2.02E-08
12/8/2003	12:00 PM	3600	10800	3.28	5.71	1.2	20.0	1.53E-08
12/8/2003	1:45 PM	6300	17100	3.44	5.57	1.1	20.0	2.05E-08

Average Permeability = **2.0E-08** **cm/sec**

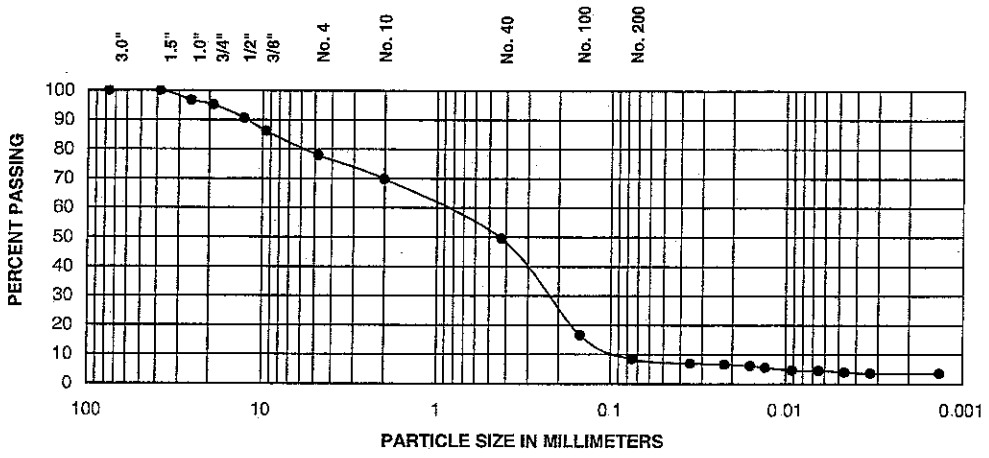
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-014	**Date Tested**	12/10/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/5/2003
Sample Location	95+00 (SW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	22.0	69.5	4.4	4.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.95	0.23	0.09	11.1	0.65

Sieve Size	**Percent Passing**	**Liquid Limit, L_L**	**Plastic Limit, PL**	**Plasticity Index, PI**
3.0"	100.0	NP	NP	NP
1.5"	100.0			
1.0"	96.7			
3/4"	95.2			
1/2"	90.5			
3/8"	86.2			
No. 4	78.0			
No. 10	69.9			
No. 40	49.5			
No. 100	16.5			
No. 200	8.5			

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

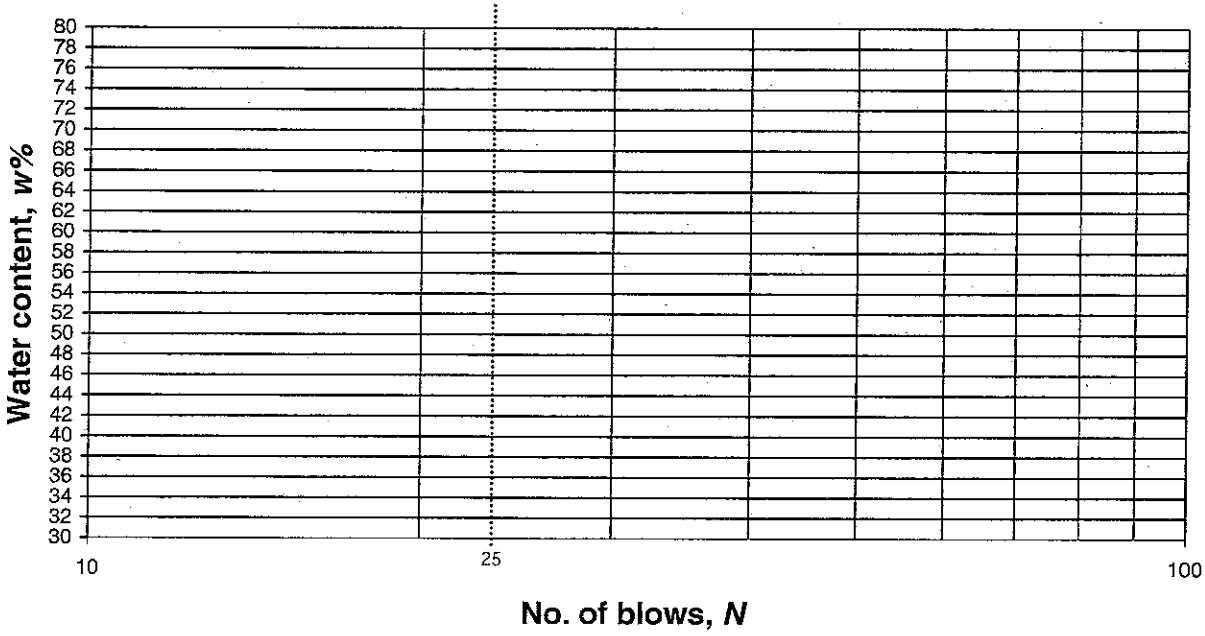
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-014	**Date Tested**	12/8/2003	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	12/5/2003
Sample Location	95+00 (SW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	6	Date	12/5/2003	Sheet	1
				Date of weighing	12/6/2003	Tested by	NP

Boring No.	-					
Sample No.	BF-014					
Location	95 + 00 (SW)					
Tin No.	8C					
Tin + Wet Soil	168.74					
Tin + Dry Soil	151					
Wt. of Tin	30.89					
Wt. of Dry Soil	120.1					
Wt. of Water	17.7					
Moisture, %	14.8					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/05/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy, Rain, Windy; 31 - 39 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH	
	feet	lb/ft^3	%	cm^3	seconds	S.U.	
94+50	2.00	83.00	2.00	25.00	40.00	8	SW TRENCH
94+50	31.00	94.50	6.00	24.50	44.00	8	
78+30	2.00	70.00	4.00	24.00	40.00	8	NW TRENCH
78+30	33.00	72.50	7.00	23.00	41.00	8	
78+50	2.00	75.00	5.00	22.50	41.00	8	
78+50	33.00	80.00	9.00	23.50	43.00	8	

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	
	%		%		
78+00	LAB SAMPLE COLLECTED 12/05/03				NW TRENCH

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
95+75	4.00	N/A	N/A	N/A	1.56×10^{-7}	N/A
95+50	4.00	N/A	N/A	N/A	7.22×10^{-8}	N/A
95+25	4.00	N/A	N/A	N/A	2.53×10^{-7}	N/A
95+00	3.00	Sample collected	Sample collected	Sample collected	3.74×10^{-8}	yes
78+50	3.00	Sample collected	Sample collected	Sample collected	8.88×10^{-8}	yes
78+25	3.00	N/A	N/A	N/A	6.15×10^{-8}	N/A

COMMENTS

Filter cake: 2.5mm, 1.5mm, 1.0mm, 1.2mm, .5mm and .7mm respectively.

Unit Weight:	95+75:	116.0 pcf
	95+50:	114.0 pcf
	95+25:	119.0 pcf
	95+00:	114.0 pcf
	78+50:	120.0 pcf
	78+25:	109.0 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Stepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/05/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
8:56	65.00	44.00	13.00	8
11:09	-	45.00	-	-
14:20	-	57.00	-	-
17:14	66.00	62.00	12.00	8

Filter cake was .3mm and .3mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sipio OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/05/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy, Rain, Windy; 31 - 39 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
94+70	29.7	33.2	34.5	10.0	345.0	3.7	97+10	OUT	TOP OUT
94+60	29.8	32.9	33.1	10.0	330.5	3.7	97+00	4.0	TOP OUT
94+50	29.8	33.5	33.2	10.0	332.0	3.7	96+90	7.5	TOP OUT
94+40	29.9	33.7	33.6	10.0	336.0	3.7	96+80	11.0	TOP OUT
							96+70	14.0	TOP OUT
							96+60	17.0	4.0
							96+50	18.5	7.8
							96+40	20.0	11.6
							96+30	21.0	15.2
							96+20	22.0	18.1
							96+10	22.8	19.7
							96+00	23.4	21.0
							95+90	25.1	22.4
							95+80	26.6	23.9
							95+70	28.3	25.1
							95+60	30.0	26.6
							95+50	31.1	27.9
							95+40	32.3	28.7
							95+30	33.0	29.0
							95+20	33.7	30.9
							95+10	35.2	32.9
							95+00	35.7	32.4
							94+90	35.4	33.0
							94+80	35.8	33.4
							94+70	24.7	33.2
							94+60	7.6	32.9
							94+50		33.5
							94+40		33.7
				SF TODAY	1343.50		94+30		24.6
				SF TO DATE	50149.40		94+20		4.7

COMMENTS

PM slurry sample could not be taken today due to the crowd cylinder blowing on the 375 excavator. No excavation in the PM because of this.

GEO-CON: Suzanne E. Sept OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/05/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy, Rain, Windy; 31 - 39 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
START	LEAD-IN	0.0					START		0.0
78+90	LEAD-IN	2.0	1.0	5.0	5.0	3.5	79+90		5.1
78+80	LEAD-IN	5.0	3.5	5.0	17.5	4.9	78+80		12.2
78+70	LEAD-IN	15.2	10.1	10.0	101.0	6.0	78+70		17.5
78+60	LEAD-IN	25.6	20.4	10.0	204.0	8.0	78+60	START	21.4
78+50	**31.7**	**35.2**	30.4	10.0	304.0	8.0	78+50	35.2	21.4
78+40	**31.8**	**35.0**					78+40	34.8	23.5
78+30	**31.9**	**35.1**					78+30	21.7	25.3
78+20	**31.8**	**35.2**					78+20	21.7	28.6
78+10	31.1	34.2	34.7	10.0	347.0	12.6	78+10		32.3
78+00	31.0	34.0	34.1	10.0	341.0	13.3	78+00		33.8
77+90	31.0	34.0	34.0	10.0	340.0	14.0	77+90		34.2
77+80	31.1	34.1	34.1	10.0	340.5	14.5	77+80		34.1
77+70	31.1	34.2	34.2	10.0	341.5	15.1	77+70		34.2
77+60	31.2	34.6	34.4	10.0	344.0	15.5	77+60		34.2
77+50	31.2	34.5	34.6	10.0	345.5	15.8	77+50		34.3

SF TODAY 3031.00

SF TO DATE 4084.00

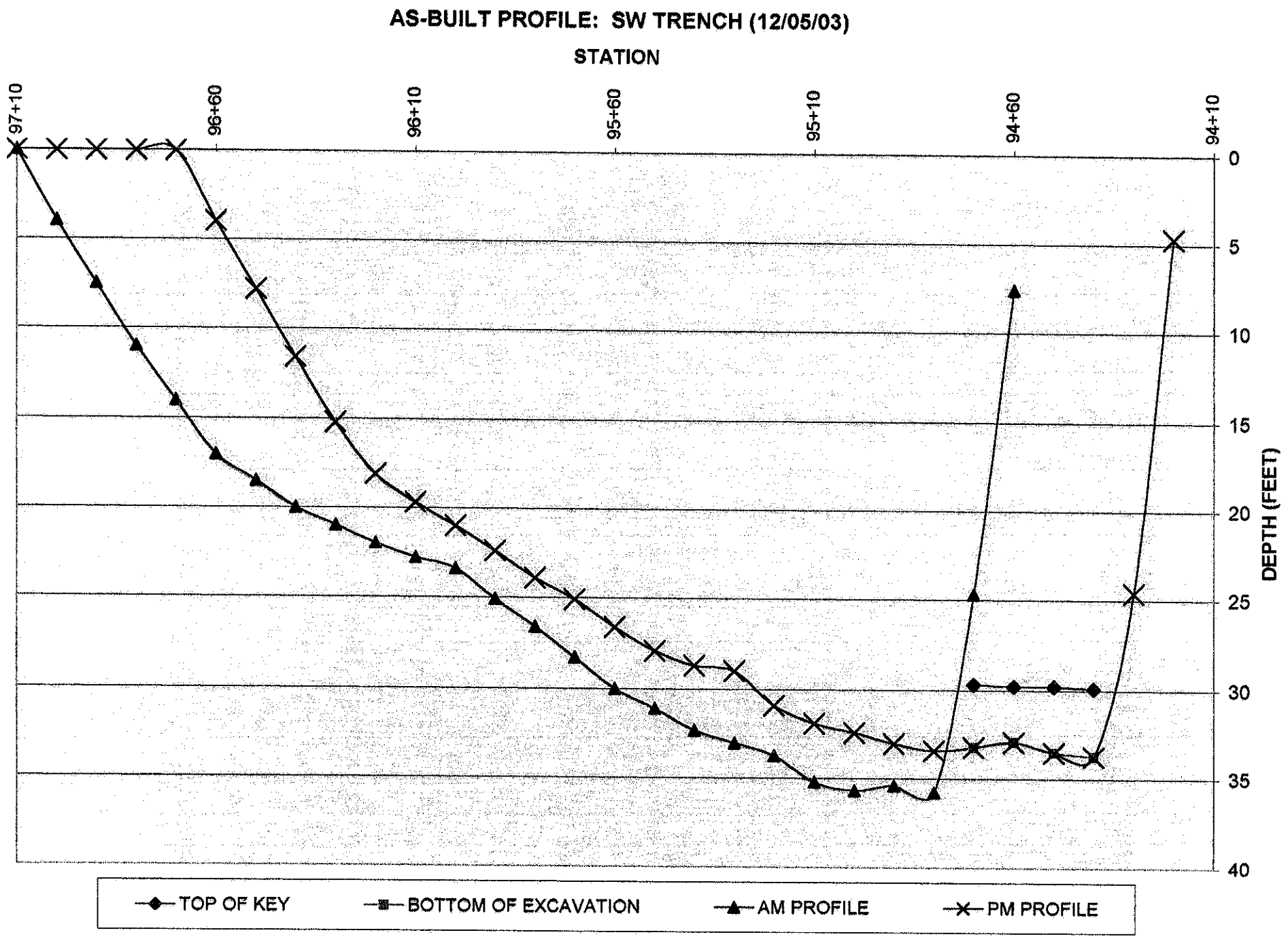
COMMENTS

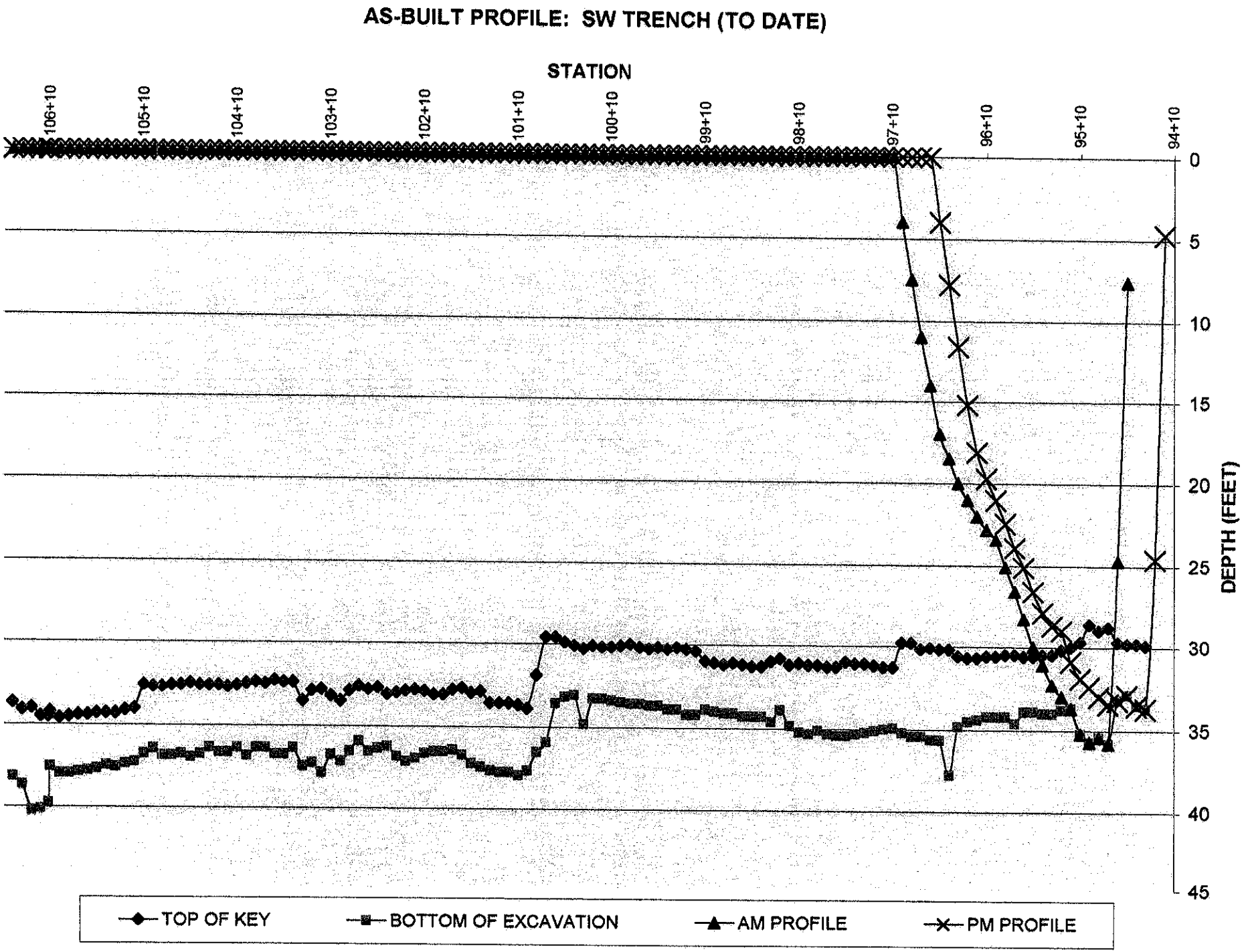
NW Trench. LEAD-IN TRENCH IS PERPENDICULAR TO THE SLURRY WALL ALIGNMENT.

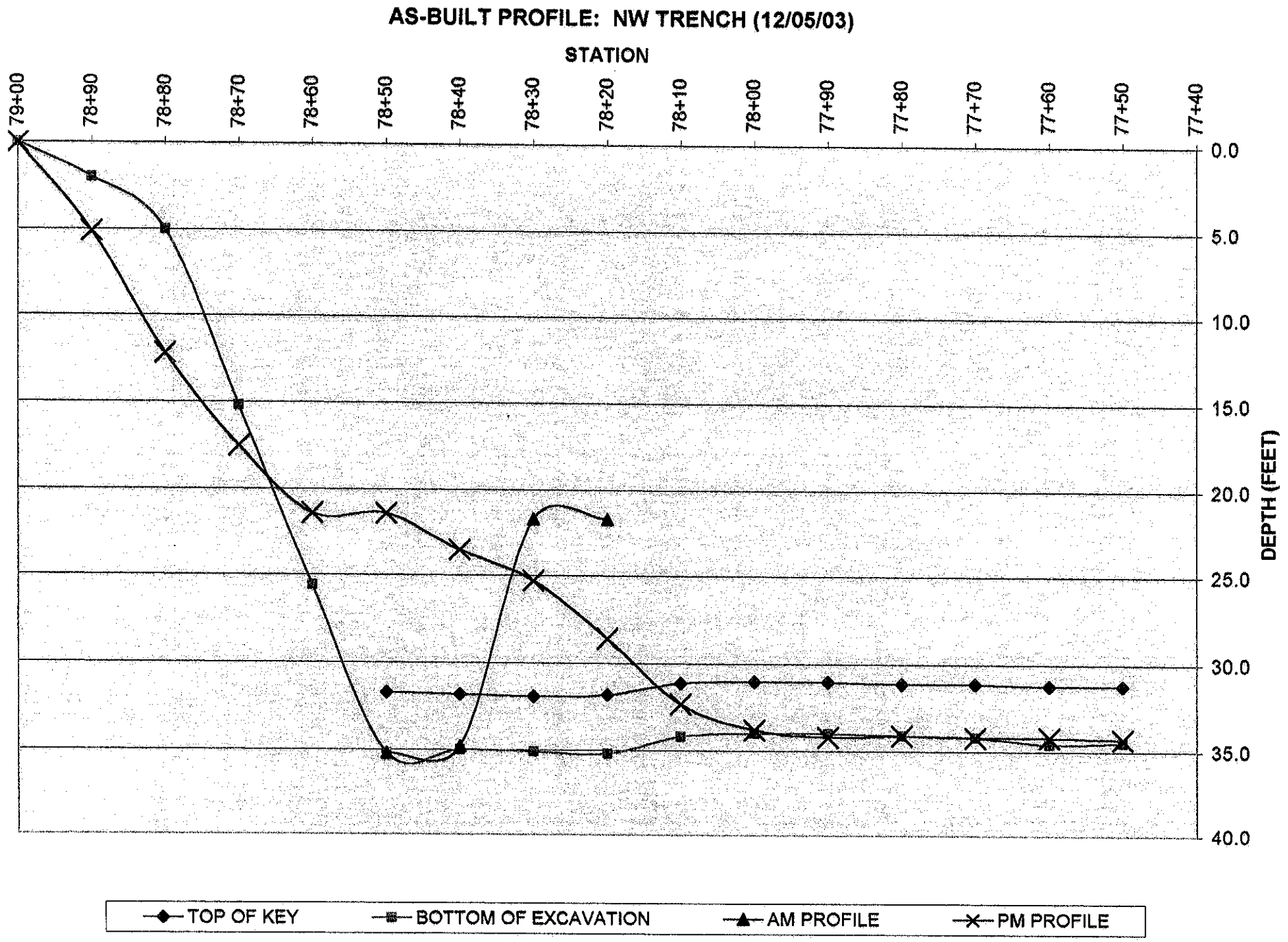
**AM Profile shows a cave-in from Station 78+30 to 78+20. Morning work consisted of placing mats, walking excavator on the mats, and cleaning out this area.

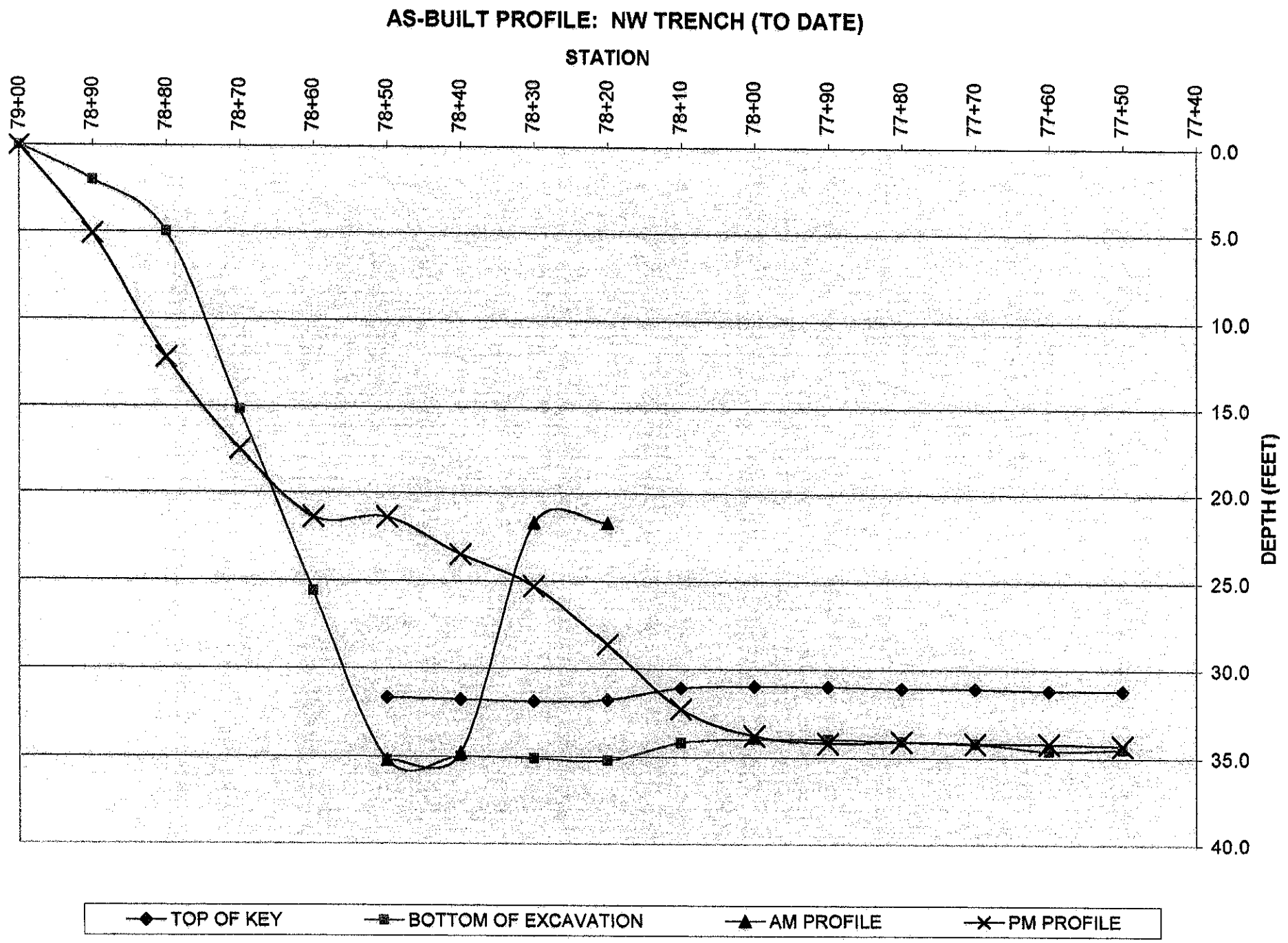
BOLD STATIONS ON THE SF SECTION WERE CLEANED OUT PER ABOVE. SF WAS OBTAINED 12/04/03.

GEO-CON: Suzanne E. Sepio OWNER:


AS-BUILT PROFILE: SW TRENCH (12/05/03)
STATION
97+10
96+60
96+10
95+60
95+10
94+60
94+10
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SW TRENCH (TO DATE)
STATION
106+10
105+10
104+10
103+10
102+10
101+10
100+10
99+10
98+10
97+10
96+10
95+10
94+10
DEPTH (FEET)
0
5
10
15
20
25
30
35
40
45
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (12/05/03)
STATION
79+00
78+90
78+80
78+70
78+60
78+50
78+40
78+30
78+20
78+10
78+00
77+90
77+80
77+70
77+60
77+50
77+40
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
79+00
78+90
78+80
78+70
78+60
78+50
78+40
78+30
78+20
78+10
78+00
77+90
77+80
77+70
77+60
77+50
77+40
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/05/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	8:56	44	> 40 sec	65	> 64 pcf	8	6.5 - 10	13	< 20 cm^3	.3
PM	17:14	62	> 40 sec	66	> 64 pcf	8	6.5 - 10	12	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	11:09	45	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	14:20	57	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

SW Trench

No PM Sample from trench due to the Crowd cylinder blowing on the excavator

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:29	94+50	2	40	40 - 90 sec	83	64 - 95 pcf	8	6.5 - 10	25	< 25 cm^3	2.5	2	MAX 30%
8:29	94+50	31	44	40 - 90 sec	94.5	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	1.5	6	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
95+75	4	2" to 6"	116	+15 pcf over trench slurry	1.56×10^{-7}	1.0×10^{-7} cm/sec
95+50	4	2" to 6"	114	+15 pcf over trench slurry	7.22×10^{-8}	1.0×10^{-7} cm/sec
95+25	4	2" to 6"	119	+15 pcf over trench slurry	2.53×10^{-7}	1.0×10^{-7} cm/sec
95+00	3	2" to 6"	114	+15 pcf over trench slurry	3.74×10^{-8}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS **DATE** 12/05/03

NW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

~~Bonnie Southwest (SW) Trench~~

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:59	78+30	2	40	40 - 90 sec	70	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.0	4	MAX 30%
8:59	78+30	33	41	40 - 90 sec	72.5	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	1.2	7	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
17:05	78+50	2	41	40 - 90 sec	75	64 - 95 pcf	8	6.5 - 10	22.5	< 25 cm^3	.5	5	MAX 30%
17:05	78+50	33	43	40 - 90 sec	80	64 - 95 pcf	8	6.5 - 10	23.5	< 25 cm^3	.7	9	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
78+50	3	2" to 6"	120	+15 pcf over trench slurry	8.88×10^{-8}	1.0×10^{-7} cm/sec
78+25	3	2" to 6"	109	+15 pcf over trench slurry	6.15×10^{-8}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 95+75, 95+50, 95+25, 95+00, 78+50, 78+25

Technician: MM / BY SES

Sample Area: A= πr^2 $\pi(3.85)^2$ = 46.56 cm²

Sample Height: L= 7.0, 7.0, 6.5, 7.0, 7.5, 7.0 cm

BW	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. face (1/14.65)
95+75	12/05/03	12:05-16:05	240	10	100.4833	519313.7717	–	19.5	1.56×10^{-7}	1.06×10^{-8}
95+50	12/05/03	12:05-16:05	240	10	100.4833	519313.7717	–	9	7.22×10^{-8}	4.93×10^{-9}
95+25	12/05/03	12:05-16:05	240	10	108.2128	559261.0644	–	34	2.53×10^{-7}	1.73×10^{-8}
95+00	12/05/03	18:09-6.09	720	10	100.4833	519313.7717	–	14	3.74×10^{-8}	2.55×10^{-9}
BW 78+50	12/05/03	18:09-6.09	720	10	93.7844	484692.7844	–	31	8.88×10^{-8}	6.06×10^{-9}
78+25	12/05/03	18:09-6.09	720	10	100.4833	519313.7717	–	23	6.15×10^{-8}	4.20×10^{-9}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 8-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P.O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-016	SOIL ONLY	77+00	12/6/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-017	SOIL ONLY	94+00	12/6/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-018	SOIL ONLY	76+00	12/7/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ SB-017	SB BACKFILL**	78+50	12/5/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ SB-018	SB BACKFILL**	95+00	12/5/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-019	SB BACKFILL**	78+00	12/6/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-020	SB BACKFILL**	95+50	12/6/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-021	SB BACKFILL**	77+00	12/7/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-022	SB BACKFILL**	94+50	12/7/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 9-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL	SEND RESULTS TO:
333 SHORE DRIVE	Clients Name: SUE SEPIC
BURR RIDGE, IL 60527	Company: GEO-CON, INC.
Phone: (630) 321-0944	Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Attention: SANJEEV BANDI	Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL PROJECT NO: P01-048 P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-015	SOIL ONLY	78+00	12/5/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-019	SOIL ONLY	93+00	12/8/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-020	SOIL ONLY	75+00	12/8/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-023	SB BACKFILL**	94+00	12/8/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-024	SB BACKFILL**	76+00	12/8/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

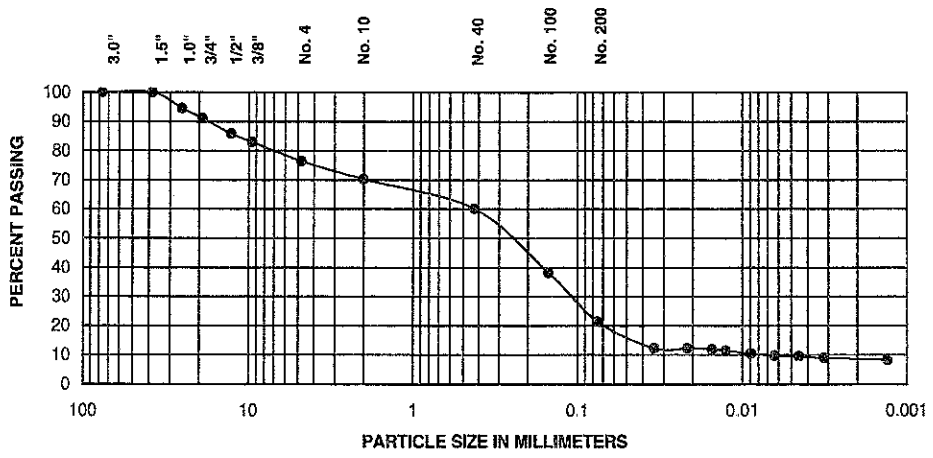
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-017	**Date Tested**	12/17/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/8/2003
Sample Location	78+50 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	23.6	55.0	11.9	9.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	94.5
3/4"	91.1
1/2"	85.9
3/8"	82.9
No. 4	76.4
No. 10	70.3
No. 40	60.1
No. 100	38.1
No. 200	21.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
41	18	23

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

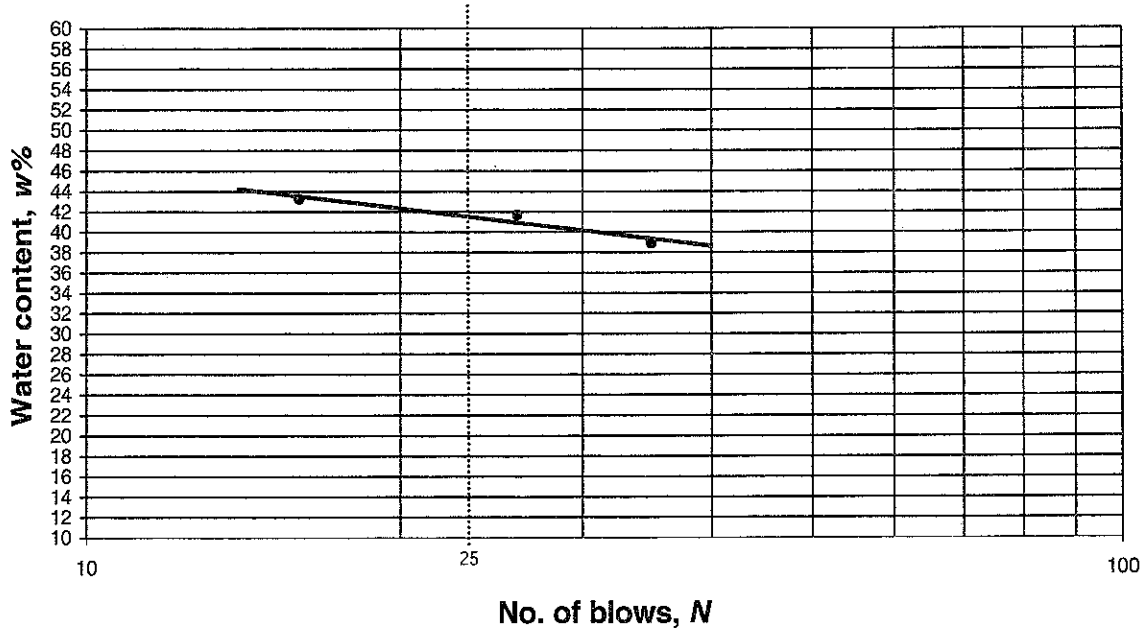
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-017	**Date Tested**	12/11/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/8/2003
Sample Location	78+50 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	41	**Plastic Limit, PL**	18	**Plasticity Index, PI**	23

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/11/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-017	Date Recd.	12/8/03	**Location**	78+50 (SW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.45	cm	Volume, V:	221.9	cu cm
Mass of Sample:	414.7	g	**Moisture Content:**	**23.2**	%
			Wet Density	116.6	**pcf**
			Dry Density	94.7	**pcf**

Final

Diameter:	6.95	cm	Area, A:	37.9	sq cm
Height, L:	5.21	cm	Volume, V:	197.7	cu cm
Mass of Sample:	398.30	g	**Moisture Content:**	**23.9**	%
			Wet Density	125.7	**pcf**
			Dry Density	101.5	**pcf**
			Deg of Saturation	95.1	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	23.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/11/2003	9:00 AM	0	0	3.26	5.93		20.0	---
12/11/2003	9:45 AM	2700	2700	3.34	5.86	1.1	20.0	2.40E-08
12/11/2003	10:30 AM	2700	5400	3.41	5.80	1.2	20.0	2.07E-08
12/11/2003	11:15 AM	2700	8100	3.48	5.74	1.2	20.0	2.08E-08
12/11/2003	12:00 PM	2700	10800	3.54	5.69	1.2	20.0	1.74E-08

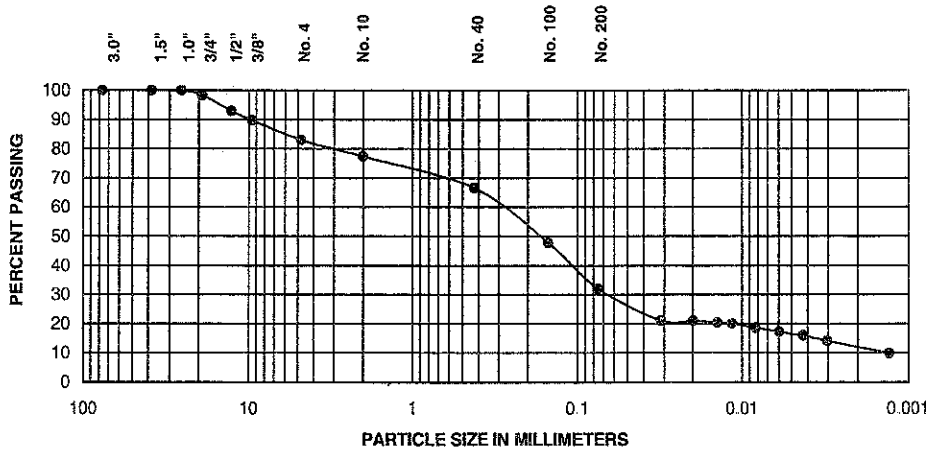
Average Permeability = **2.1E-08** **cm/sec**

Remarks:

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-018	**Date Tested**	12/13/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/8/2003
Sample Location	95+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	17.0	50.9	15.4	16.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.3
1/2"	92.9
3/8"	89.7
No. 4	83.0
No. 10	77.4
No. 40	66.6
No. 100	47.7
No. 200	32.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
31	16	15

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

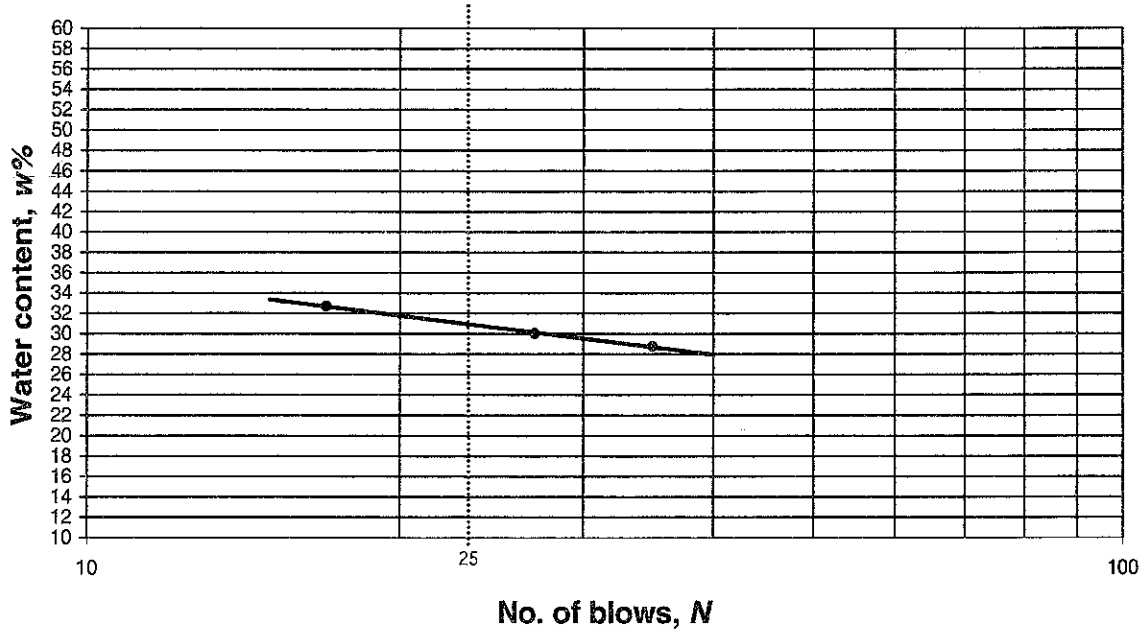
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-018	**Date Tested**	12/11/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/8/2003
Sample Location	95+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	31	**Plastic Limit, PL**	16	**Plasticity Index, PI**	15

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/11/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-018	Date Recd.	12/8/03	**Location**	95+00 (SW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.49	cm	Volume, V:	223.5	cu cm
Mass of Sample:	411.8	g	**Moisture Content:**	**21.6**	**%**
			Wet Density	**115.0**	**pcf**
			Dry Density	**94.6**	**pcf**

Final

Diameter:	6.92	cm	Area, A:	37.6	sq cm
Height, L:	4.93	cm	Volume, V:	185.4	cu cm
Mass of Sample:	396.30	g	**Moisture Content:**	**19.3**	**%**
			Wet Density	**133.4**	**pcf**
			Dry Density	**111.8**	**pcf**
			Deg of Saturation	**99.2**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	23.1	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/11/2003	9:00 AM	0	0	3.18	5.89		20.0	---
12/11/2003	9:45 AM	2700	2700	3.34	5.76	1.2	20.0	4.49E-08
12/11/2003	10:30 AM	2700	5400	3.47	5.65	1.2	20.0	3.85E-08
12/11/2003	11:15 AM	2700	8100	3.60	5.53	1.1	20.0	4.25E-08
12/11/2003	12:00 PM	2700	10800	3.71	5.44	1.2	20.0	3.22E-08

Average Permeability = **4.0E-08** **cm/sec**

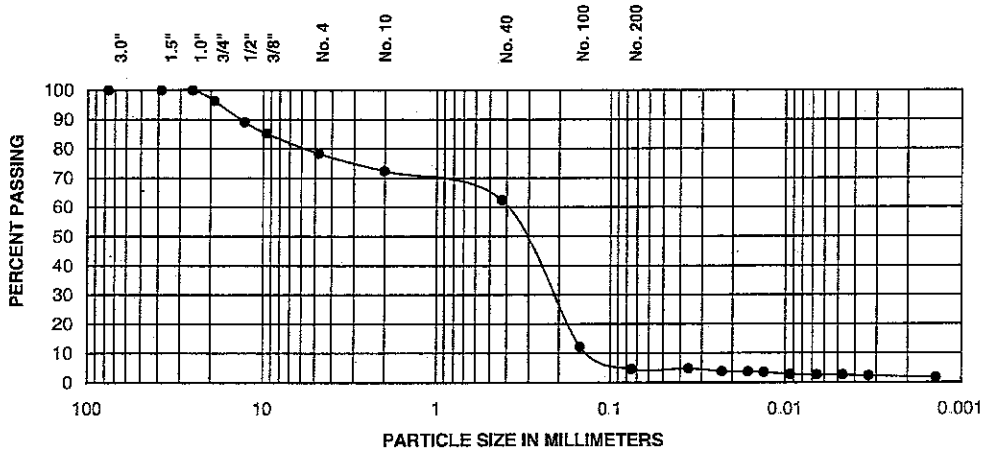
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-015	**Date Tested**	12/15/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/9/2003
Sample Location	78+00 (NW)
Sample Description	Gray poorly graded sand with gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	21.7	73.8	2.1	2.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.40	0.22	0.12	3.3	0.95

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	96.4
1/2"	89.2
3/8"	85.2
No. 4	78.3
No. 10	72.3
No. 40	62.4
No. 100	12.1
No. 200	4.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP
Soil Description:	Poorly graded sand with gravel
System:	USCS

Remarks:

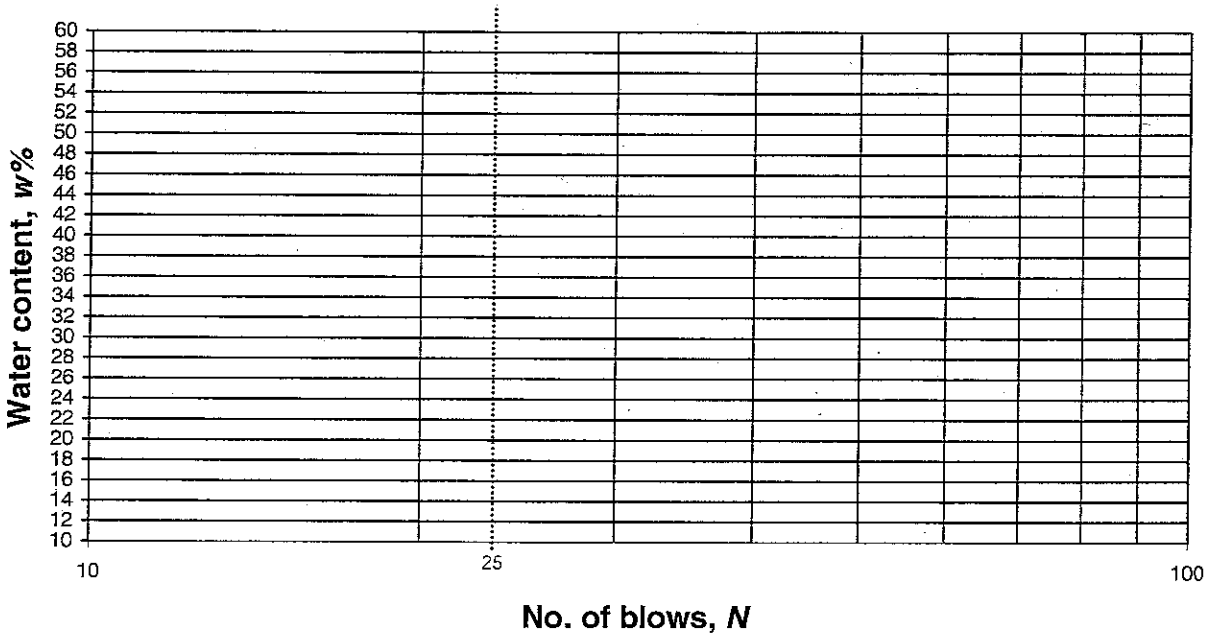
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-015	**Date Tested**	12/11/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/9/2003
Sample Location	78+00 (NW)
Sample Description	Gray poorly graded sand with gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	7	Date	12/10/2003	Sheet	1
				Date of weighing	12/11/2003	Tested by	NP

Boring No.	-	-	-			
Sample No.	BF-015	BF-019	BF-020			
Location	78 + 00 (NW)	93 + 00 (SW)	75 + 00 (NW)			
Tin No.	42C	35C	2C			
Tin + Wet Soil	165.77	205.66	192.87			
Tin + Dry Soil	144.81	187.16	167.23			
Wt. of Tin	30.89	31.9	31.18			
Wt. of Dry Soil	113.9	155.3	136.1			
Wt. of Water	21.0	18.5	25.6			
Moisture, %	18.4	11.9	18.8			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/06/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 33 - 41 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH	
	feet	lb/ft^3	%	cm^3	seconds	S.U.	
94+60	2.00	81.00	2.00	24.50	40.00	8	SW TRENCH
94+60	31.00	87.00	8.00	20.00	51.00	8	
94+00	2.00	97.00	8.00	23.00	42.00	8	
94+00	29.00	100.00	8.00	24.00	46.00	8	
77+50	2.00	81.00	3.00	24.50	40.00	8	NW TRENCH
77+50	32.00	92.00	7.00	24.50	43.00	8	
76+60	2.00	82.50	4.00	22.00	41.00	8	
76+60	30.00	90.50	7.00	22.50	44.00	8	

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	
	%		%		
77+00	LAB SAMPLE COLLECTED 12/06/03				NW TRENCH
94+00	LAB SAMPLE COLLECTED 12/06/03				SW TRENCH

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
96+00	4.00	N/A	N/A	N/A	1.26×10^{-7}	N/A
95+75	4.00	N/A	N/A	N/A	1.47×10^{-7}	N/A
95+50	4.00	Sample collected	Sample collected	Sample collected	1.42×10^{-7}	yes
78+50	3.00	N/A	N/A	N/A	2.46×10^{-7}	N/A
78+25	3.00	N/A	N/A	N/A	4.09×10^{-7}	N/A
78+00	3.00	Sample collected	Sample collected	Sample collected	5.34×10^{-7}	yes

COMMENTS

Filter cake: 1.0mm, 2.5mm, 2.5mm, 2.7mm, 1.0mm, 2.0mm, .5mm and 1.0mm respectively.

Unit Weight: 96+00: 114.0 pcf		
95+75: 117.0 pcf		
95+50: 110.0 pcf		
78+50: 108.0 pcf		
78+25: 107.5 pcf		
78+00: 109.0 pcf		

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/06/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:24	65.50	42.00	12.50	8
10:56	-	51.00	-	-
14:09	-	48.00	-	-
16:32	66.50	54.00	11.50	8

Filter cake was .2mm and .3mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/06/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 33 - 41 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
94+30	30.1	33.3	33.5	10.0	335.0	3.8	96+70	OUT	TOP OUT
94+20	30.0	33.2	33.3	10.0	332.5	3.9	96+60	4.2	TOP OUT
94+10	29.7	33.0	33.1	10.0	331.0	3.9	96+50	7.9	TOP OUT
94+00	29.8	32.9	33.0	10.0	329.5	3.9	96+40	11.7	TOP OUT
93+90	29.6	32.7	32.8	10.0	328.0	3.9	96+30	15.3	TOP OUT
							96+20	18.3	TOP OUT
							96+10	19.8	TOP OUT
							96+00	21.2	TOP OUT
							95+90	22.4	3.9
							95+80	23.9	7.2
							95+70	25.2	10.1
							95+60	26.5	12.6
							95+50	27.8	14.4
							95+40	28.6	16.1
							95+30	29.0	18.0
							95+20	30.8	21.3
							95+10	31.7	24.2
							95+00	32.3	24.5
							94+90	33.0	25.4
							94+80	33.4	26.4
							94+70	33.1	27.1
							94+60	32.9	28.8
							94+50	33.5	29.4
							94+40	33.7	30.9
							94+30	24.5	31.0
							94+20	4.8	33.2
							94+10		33.0
							94+00		32.9
							93+90		32.7

SF TODAY 1656.00

SF TO DATE 51805.40

COMMENTS

Now digging the SW trench with the CAT 320 excavator until the 375 is fixed.

GEO-CON: Suzanne E. Sepio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/06/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 33 - 41 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
77+40	31.8	34.9	34.7	10.0	347.0	15.4	START	0.0	OUT
77+30	31.8	35.0	35.0	10.0	349.5	15.5	79+90	5.2	OUT
77+20	31.8	35.0	35.0	10.0	350.0	15.5	78+80	12.2	OUT
77+10	31.9	35.0	35.0	10.0	350.0	16.0	78+70	17.3	OUT
77+00	31.9	35.1	35.1	10.0	350.5	16.0	78+60	21.5	OUT
76+90	32.0	35.1	35.1	10.0	351.0	16.0	78+50	21.3	OUT
76+80	32.0	35.3	35.2	10.0	352.0	16.0	78+40	23.6	OUT
76+70	32.1	35.5	35.4	10.0	354.0	16.0	78+30	25.1	4.0
76+60	32.1	35.3	35.4	10.0	354.0	16.0	78+20	28.4	6.3
76+50	32.0	35.2	35.3	10.0	352.5	16.0	78+10	32.2	9.1
							78+00	33.7	11.2
							77+90	34.1	13.4
							77+80	34.2	16.2
							77+70	34.2	19.9
							77+60	34.3	23.1
							77+50	34.3	25.9
							77+40		28.2
							77+30		30.9
							77+20		31.8
							77+10		33.2
							77+00		34.2
							76+90		34.9
							76+80		35.5
							76+70		35.0
							76+60		35.3
							76+50		35.3

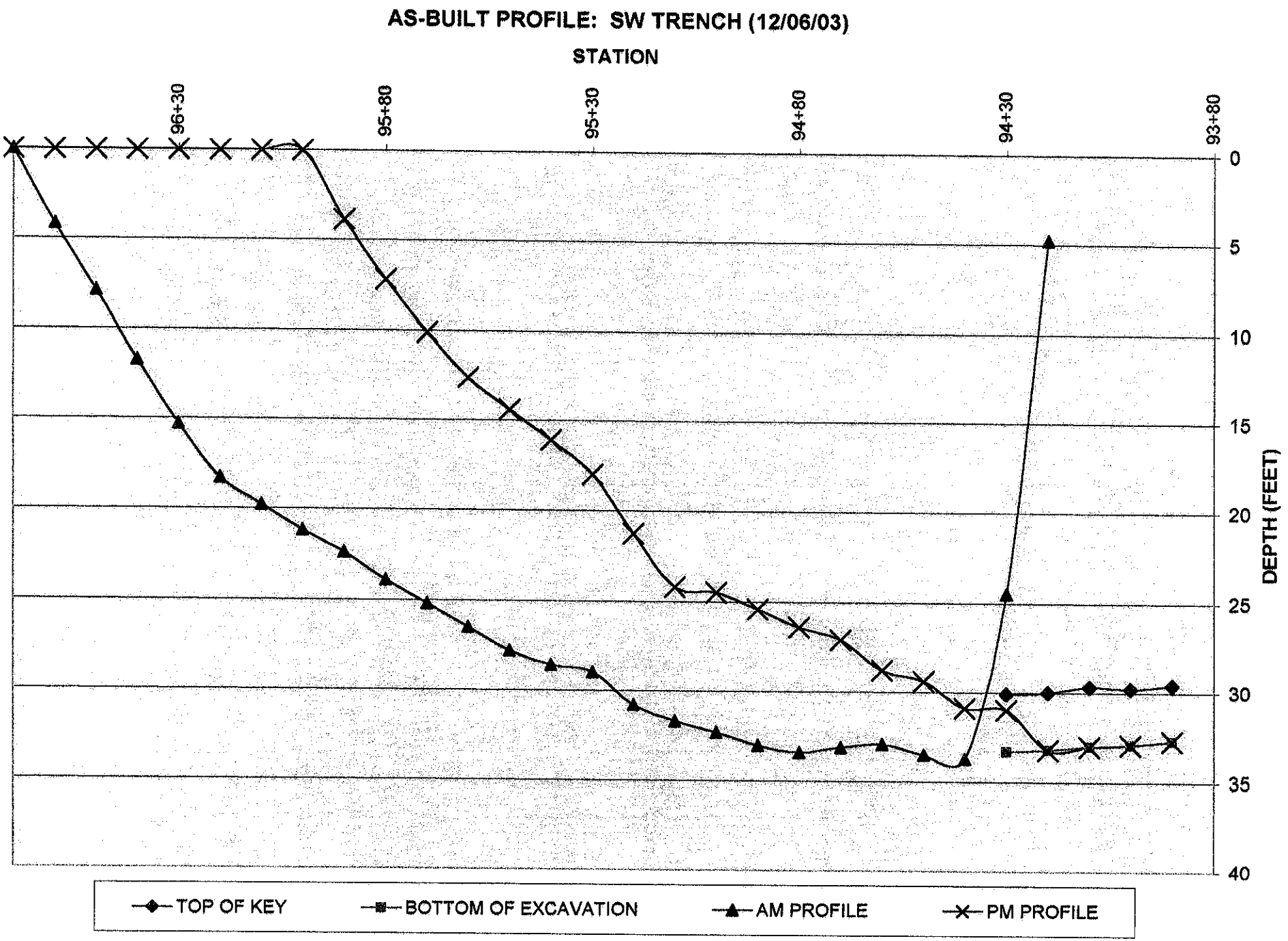
SF TODAY 3510.50

SF TO DATE 7594.50

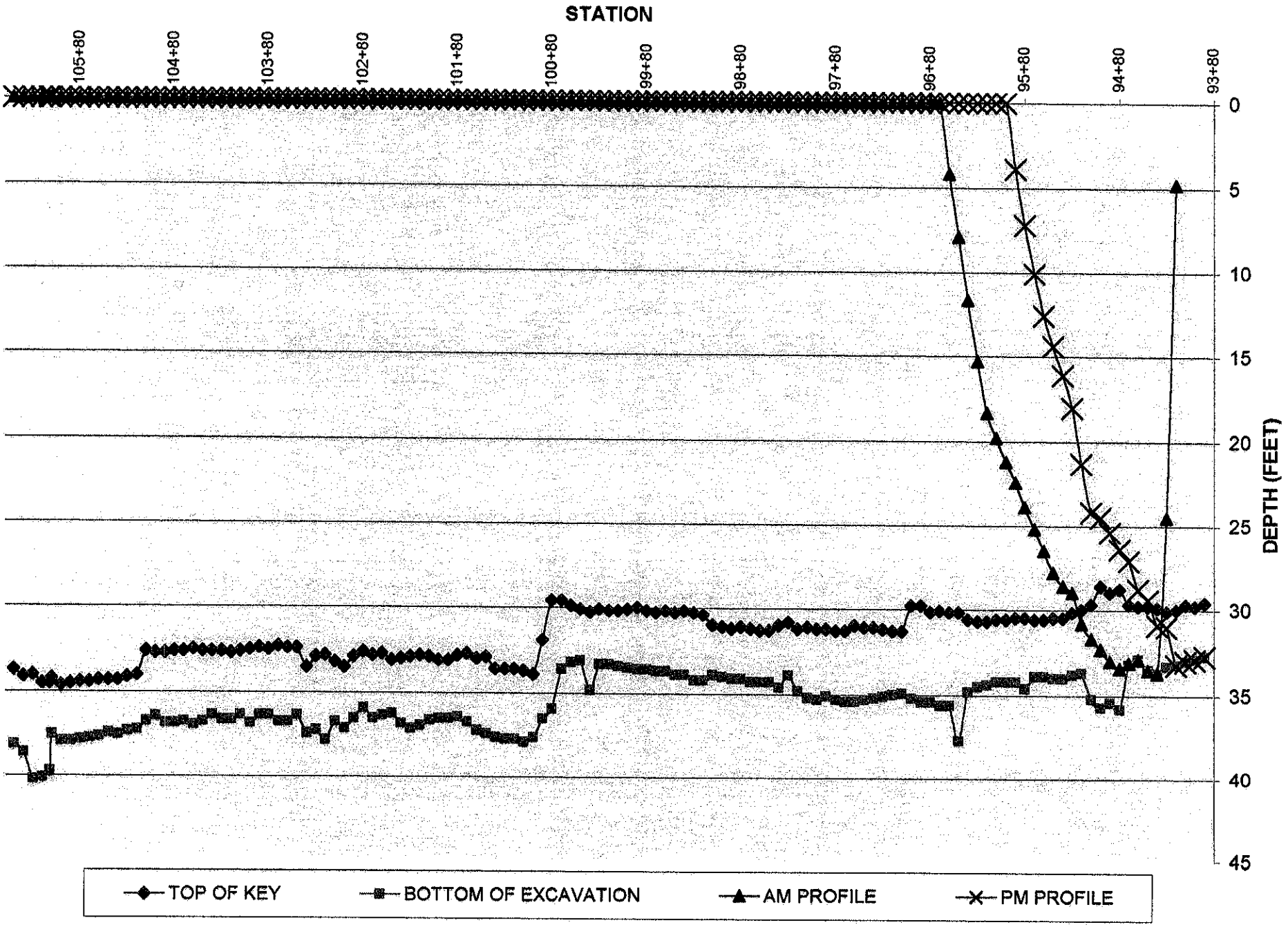
COMMENTS

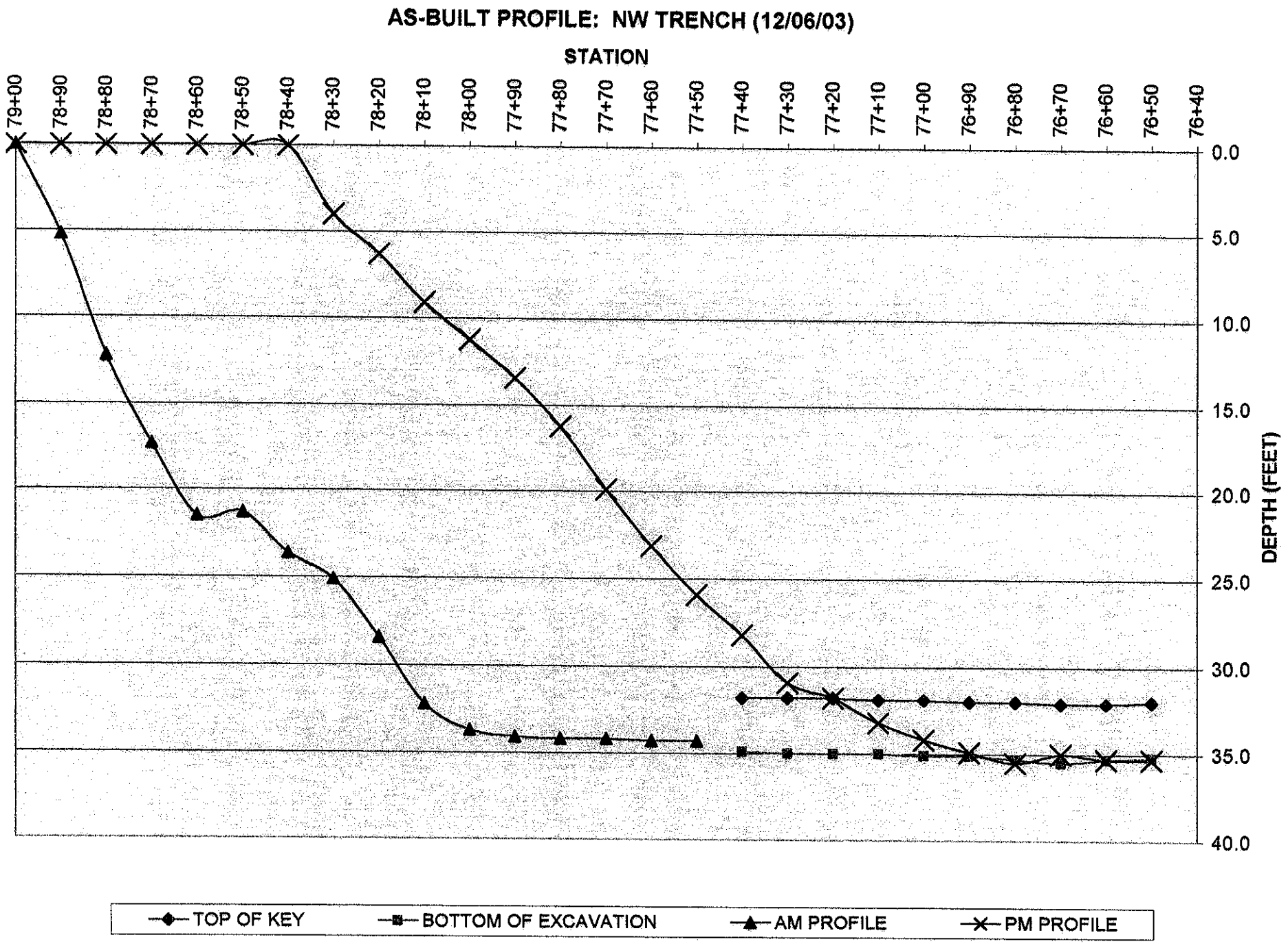
NW Trench

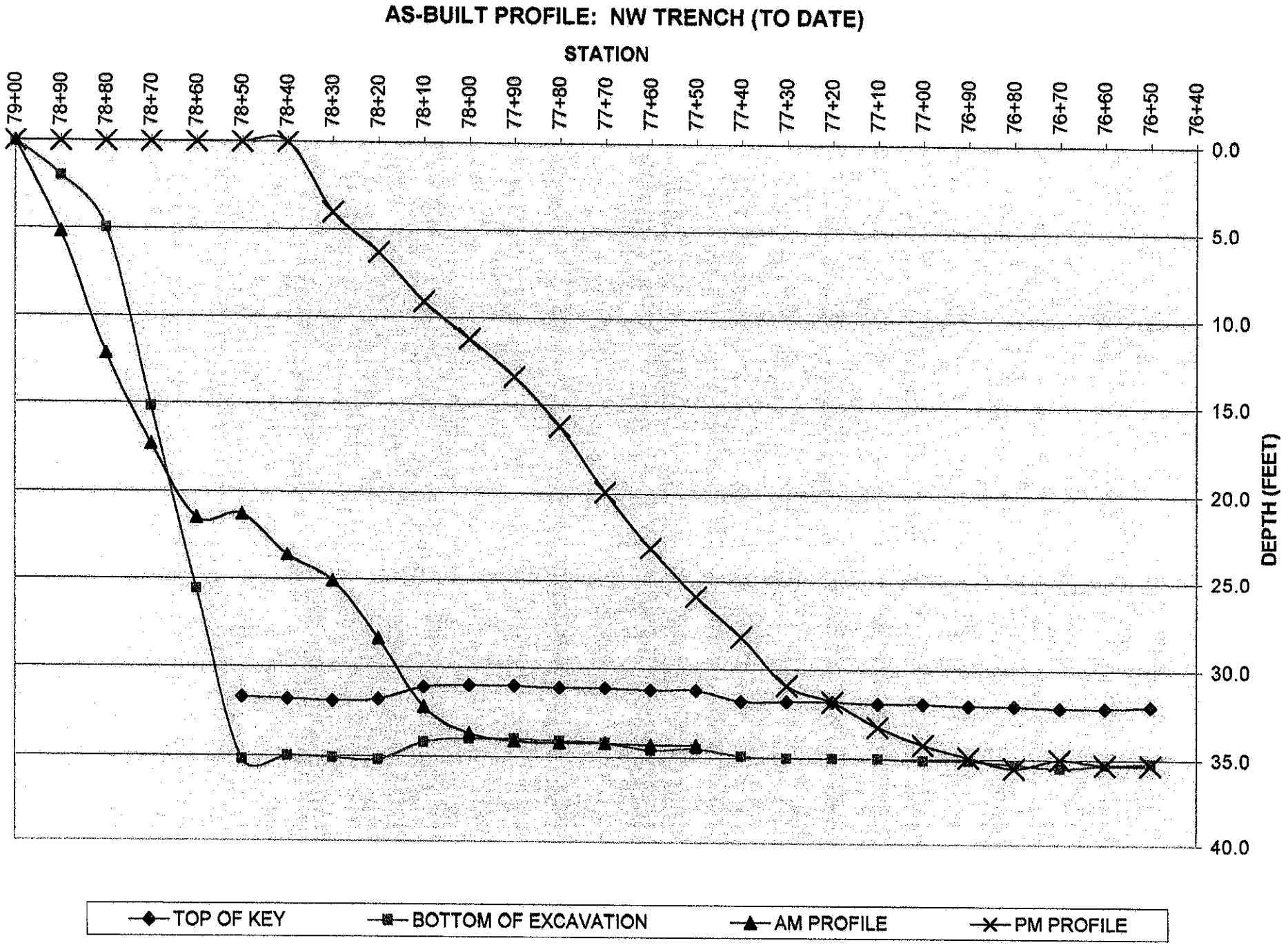
GEO-CON: Suzanne C. Sepic OWNER:


AS-BUILT PROFILE: SW TRENCH (12/06/03)
STATION
96+30
95+80
95+30
94+80
94+30
93+80
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: SW TRENCH (TO DATE)




AS-BUILT PROFILE: NW TRENCH (12/06/03)
STATION
79+00
78+90
78+80
78+70
78+60
78+50
78+40
78+30
78+20
78+10
78+00
77+90
77+80
77+70
77+60
77+50
77+40
77+30
77+20
77+10
77+00
76+90
76+80
76+70
76+60
76+50
76+40
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
79+00
78+90
78+80
78+70
78+60
78+50
78+40
78+30
78+20
78+10
78+00
77+90
77+80
77+70
77+60
77+50
77+40
77+30
77+20
77+10
77+00
76+90
76+80
76+70
76+60
76+50
76+40
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/06/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	7:24	42	> 40 sec	65.5	> 64 pcf	8	6.5 - 10	12.5	< 20 cm^3	.2
PM	16:32	54	> 40 sec	66.5	> 64 pcf	8	6.5 - 10	11.5	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:56	51	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	14:09	48	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

SW Trench

* All SB Backfill quick perms were run prior to PM slurry sample. Therefore use AM weights

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:00	94+60	2	40	40 - 90 sec	81	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	1.0	2	MAX 30%
9:00	94+60	31	51	40 - 90 sec	87	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	2.5	8	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:15	94+00	2	42	40 - 90 sec	97	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	2.5	8	MAX 30%
15:15	94+00	29	46	40 - 90 sec	100	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	2.7	8	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
96+00	4	2" to 6"	114	+15 pcf over trench slurry	1.26×10^{-7}	1.0×10^{-7} cm/sec
95+75	4	2" to 6"	117	+15 pcf over trench slurry	1.47×10^{-7}	1.0×10^{-7} cm/sec
95+50	4	2" to 6"	110	+15 pcf over trench slurry	1.42×10^{-7}	1.0×10^{-7} cm/sec
95+25	4	2" to 6"	107	+15 pcf over trench slurry	* see quick perm	1.0×10^{-7} cm/sec
95+00	4	2" to 6"	104	+15 pcf over trench slurry	* see quick perm	1.0×10^{-7} cm/sec
94+75	4	2" to 6"	102	+15 pcf over trench slurry	* see quick perm	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS **DATE** 12/06/03

NW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:35	76+50	2	40	40 - 90 sec	81.0	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	1.0	3	MAX 30%
7:35	77+50	32	43	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	2.0	7	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:00	76+60	2	41	40 - 90 sec	82.5	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	.5	4	MAX 30%
15:00	76+60	30	44	40 - 90 sec	90.5	64 - 95 pcf	8	6.5 - 10	22.5	< 25 cm^3	1.0	7	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
78+50	3	2" to 6"	108.0	+15 pcf over trench slurry	2.46×10^{-7}	1.0×10^{-7} cm/sec
78+25	3	2" to 6"	107.5	+15 pcf over trench slurry	4.09×10^{-7}	1.0×10^{-7} cm/sec
78+00	3	2" to 6"	109	+15 pcf over trench slurry	5.34×10^{-7}	1.0×10^{-7} cm/sec
77+75	3	2" to 6"	115	+15 pcf over trench slurry	* see quick perm	1.0×10^{-7} cm/sec
77+50	3	2" to 6"	118	+15 pcf over trench slurry	* see quick perm	1.0×10^{-7} cm/sec
77+25	3	2" to 6"	113.5	+15 pcf over trench slurry	* see quick perm	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 78+50, 78+25, 78+00 / 96+00, 95+75, 95+50

Technician: MM ✓ BY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.5, 7.0, 7.0 / 7.0, 6.0, 7.0 cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. factor (1/14.65)
NW 78+50	12/06/03	10:00-14:00	240	10	108.2128	559261.0647	—	33	2.46×10^{-7}	1.68×10^{-8}
78+25	12/06/03	10:00-14:00	240	10	100.4833	519313.7717	—	51	4.09×10^{-7}	2.79×10^{-8}
78+00	12/06/03	10:00-14:00	240	10	100.4833	519313.7717	—	66.5	5.34×10^{-7}	3.64×10^{-8}
SW 96+00	12/06/03	18:00-6.00	720	10	100.4833	519313.7717	—	47	1.26×10^{-7}	8.60×10^{-9}
95+75	12/06/03	18:00-6.00	720	10	117.2305	605865.9809	—	64	~~1.48×10^{-7}~~ 1.47×10^{-7}	1.00×10^{-8}
95+50	12/06/03	18:00-6.00	720	10	100.4833	519313.7717	—	53	1.42×10^{-7}	9.69×10^{-9}

I= P (psi) / 0.014217 L (cm) R= Quick Test / Triaxial Test = 1.85

* SB Backfill samples were collected for quick perms at Stations 95+25, 95+00, 94+75, 77+75, 77+50 & 77+25. Quick perms were not run today on these samples because time ran out on the shift. Tomorrow, they will be run, once the regulator & hose come in for the new 6-cylinder filter press unit.

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 8-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P.O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-016	SOIL ONLY	77+00	12/6/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-017	SOIL ONLY	94+00	12/6/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-018	SOIL ONLY	76+00	12/7/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-017	SB BACKFILL**	78+50	12/5/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-018	SB BACKFILL**	95+00	12/5/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-019	SB BACKFILL**	78+00	12/6/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-020	SB BACKFILL**	95+50	12/6/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-021	SB BACKFILL**	77+00	12/7/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-022	SB BACKFILL**	94+50	12/7/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

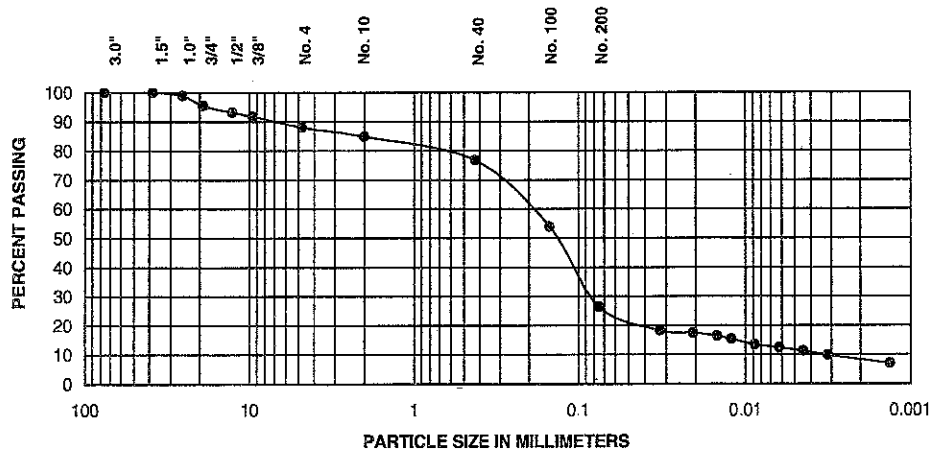
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-019	**Date Tested**	12/13/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/8/2003
Sample Location	78 + 00 (NW)
Sample Description	Gray silty, clayey sand with tr. of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.9	61.6	14.9	11.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	98.9
3/4"	95.5
1/2"	93.2
3/8"	91.7
No. 4	88.1
No. 10	84.9
No. 40	76.8
No. 100	53.9
No. 200	26.5

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
28	20	8

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

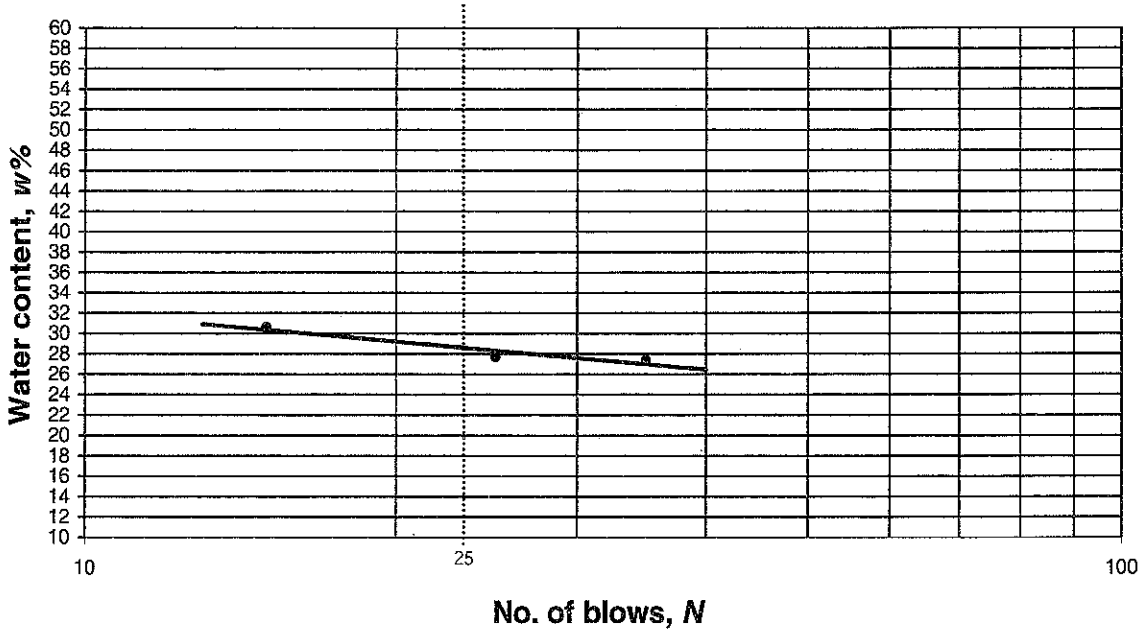
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.· Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-019	**Date Tested**	12/11/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/8/2003
Sample Location	78 + 00 (NW)
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**28**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**8**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/12/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-019	Date Recd.	12/8/03	**Location**	78 + 00 (NW)		
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.29	cm	Volume, V:	215.4	cu cm
Mass of Sample:	420.5	g	**Moisture Content:**	**29.2**	%
			Wet Density	**121.8**	**pcf**
			Dry Density	**94.3**	**pcf**

Final

Diameter:	6.97	cm	Area, A:	38.2	sq cm
Height, L:	5.14	cm	Volume, V:	196.1	cu cm
Mass of Sample:	388.80	g	**Moisture Content:**	**25.0**	%
			Wet Density	**123.7**	**pcf**
			Dry Density	**98.9**	**pcf**
			Deg of Saturation	**93.7**	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	76.8 psi
Gradient:	23.9

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/12/2003	9:30 AM	0	0	3.28	5.75		20.0	---
12/12/2003	10:30 AM	3600	3600	3.54	5.48	1.0	20.0	6.86E-08
12/12/2003	11:30 AM	3600	7200	3.80	5.17	0.8	20.0	8.09E-08
12/12/2003	12:30 PM	3600	10800	4.06	4.96	1.2	20.0	5.63E-08
12/12/2003	1:30 PM	3600	14400	4.30	4.76	1.2	20.0	5.49E-08

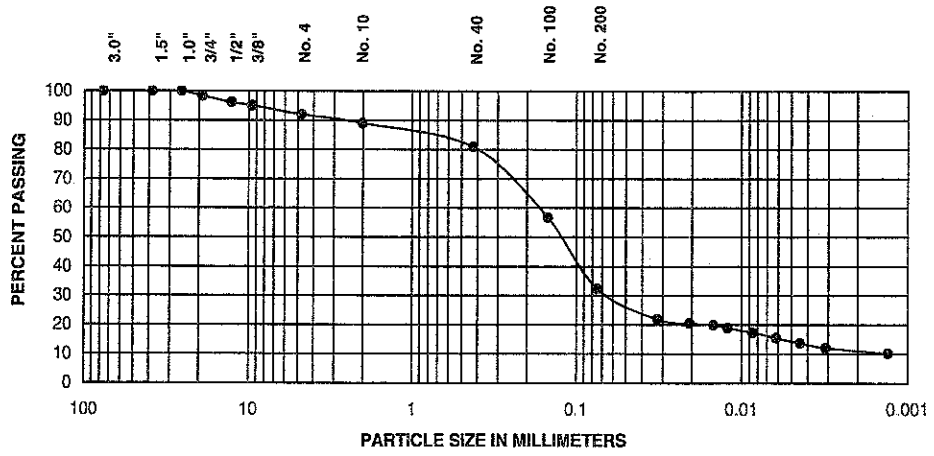
Average Permeability = **6.5E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-020	**Date Tested**	12/16/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/8/2003
Sample Location	95+50 (SW)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	7.9	59.8	17.8	14.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.4
1/2"	96.2
3/8"	95.0
No. 4	92.1
No. 10	89.0
No. 40	80.9
No. 100	56.7
No. 200	32.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
32	20	12

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

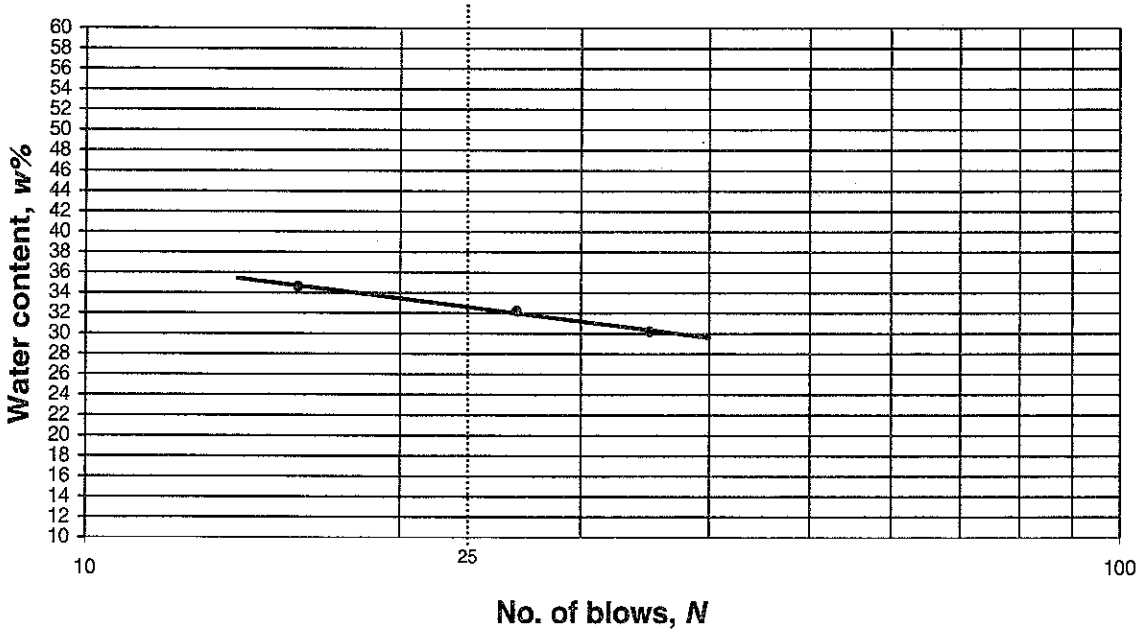
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-020	**Date Tested**	12/12/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/8/2003
Sample Location	95+50 (SW)
Sample Description	Gray silty, clayey sand with tr of gr. (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**32**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**12**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/11/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-020	Date Recd.	12/8/03	**Location**	95+50 (SW)		
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.34	cm	Volume, V:	217.4	cu cm
Mass of Sample:	394.7	g	**Moisture Content:**	**31.6**	%
			Wet Density	**113.3**	**pcf**
			Dry Density	**86.1**	**pcf**

Final

Diameter:	6.87	cm	Area, A:	37.1	sq cm
Height, L:	4.85	cm	Volume, V:	179.8	cu cm
Mass of Sample:	375.50	g	**Moisture Content:**	**21.5**	%
			Wet Density	**130.3**	**pcf**
			Dry Density	**107.2**	**pcf**
			Deg of Saturation	**98.7**	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	76.8 psi
Gradient:	23.7

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/11/2003	9:00 AM	0	0	3.03	5.84		20.0	---
12/11/2003	9:45 AM	2700	2700	3.14	5.73	1.0	20.0	3.67E-08
12/11/2003	10:30 AM	2700	5400	3.23	5.65	1.1	20.0	2.69E-08
12/11/2003	11:15 AM	2700	8100	3.32	5.54	0.8	20.0	3.74E-08
12/11/2003	12:00 PM	2700	10800	3.40	5.47	1.1	20.0	2.40E-08

Average Permeability = **3.1E-08** **cm/sec**

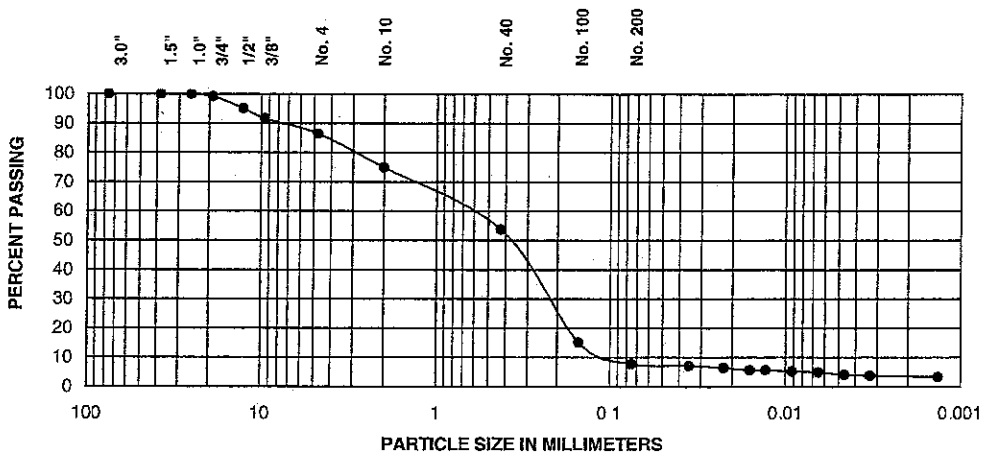
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-016	**Date Tested**	12/12/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/8/2003
Sample Location	77+00 (NW)
Sample Description	Gray poorly graded sand with silty clay, tr. of gr. & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	13.5	78.6	3.4	4.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.67	0.22	0.09	7.3	0.81

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.2
1/2"	95.2
3/8"	91.7
No. 4	86.5
No. 10	75.0
No. 40	53.8
No. 100	15.1
No. 200	7.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay
System:	USCS

Remarks:

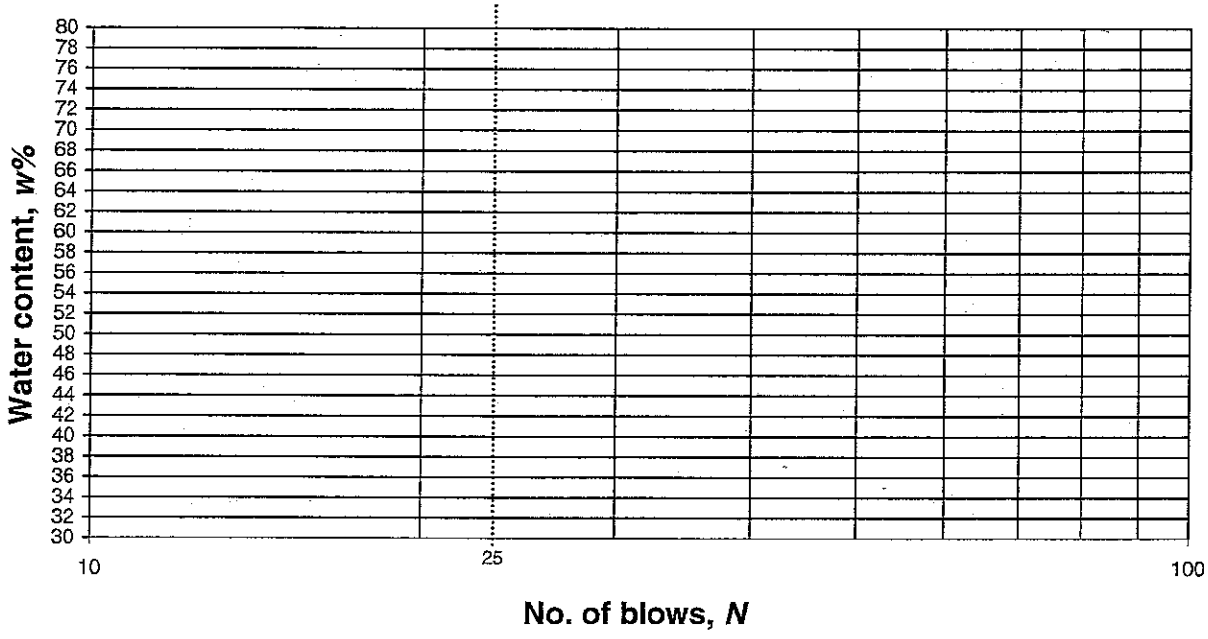
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-016	**Date Tested**	12/11/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/8/2003
Sample Location	77+00 (NW)
Sample Description	Gray poorly graded sand with silty clay, tr of gr. & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	8	Date	12/8/2003	Sheet	1
				Date of weighing	12/9/2003	Tested by	NP

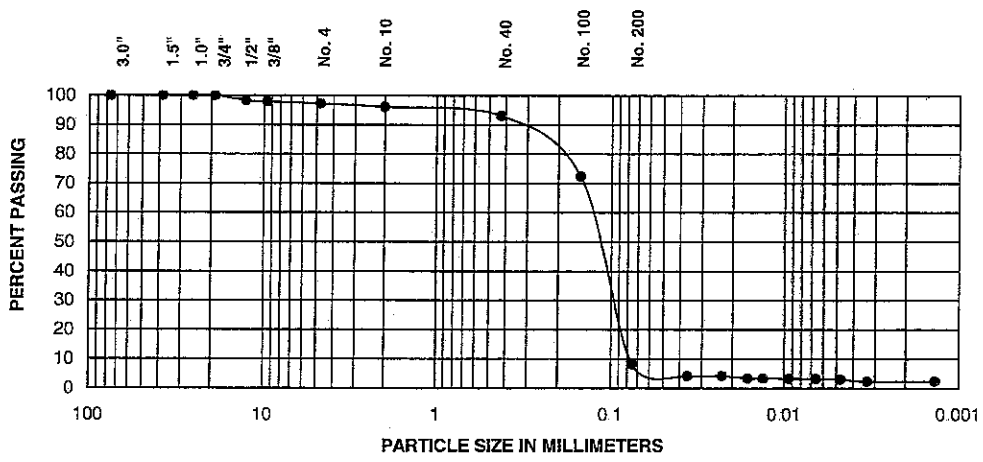
Boring No.	-	-	-			
Sample No.	BF-016	BF-017	BF-018			
Location	77 + 00 (NW)	94 + 00 (SW)	76 + 00 (NW)			
Tin No.	53A	1C	80A			
Tin + Wet Soil	143.2	156.69	204.41			
Tin + Dry Soil	122.88	132.29	164.37			
Wt. of Tin	30.63	30.69	30.37			
Wt. of Dry Soil	92.3	101.6	134.0			
Wt. of Water	20.3	24.4	40.0			
Moisture, %	22.0	24.0	29.9			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-017	**Date Tested**	12/12/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/8/2003
Sample Location	94+00 (SW)
Sample Description	Gray poorly graded sand with silty clay, tr.of gr. & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	2.7	89.1	5.1	3.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.13	0.09	0.08	1.7	0.90

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	98.4
3/8"	97.8
No. 4	97.3
No. 10	96.1
No. 40	93.2
No. 100	72.4
No. 200	8.2

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay
System:	USCS

Remarks:

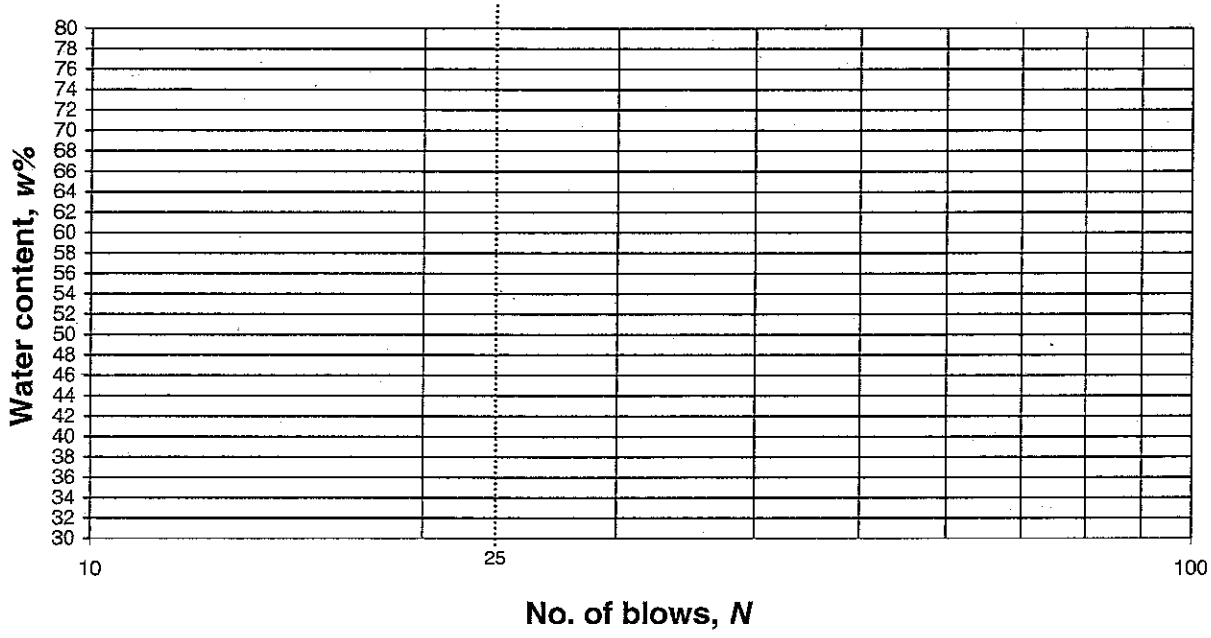
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-017	**Date Tested**	12/11/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/8/2003
Sample Location	94+00 (SW)
Sample Description	Gray poorly graded sand with silty clay, tr of gr & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	8	Date	12/8/2003	Sheet	1
				Date of weighing	12/9/2003	Tested by	NP

Boring No.	-	-	-			
Sample No.	BF-016	BF-017	BF-018			
Location	77 + 00 (NW)	94 + 00 (SW)	76 + 00 (NW)			
Tin No.	53A	1C	80A			
Tin + Wet Soil	143.2	156.69	204.41			
Tin + Dry Soil	122.88	132.29	164.37			
Wt. of Tin	30.63	30.69	30.37			
Wt. of Dry Soil	92.3	101.6	134.0			
Wt. of Water	20.3	24.4	40.0			
Moisture, %	22.0	24.0	29.9			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/07/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 35 - 42 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH	
	feet	lb/ft^3	%	cm^3	seconds	S.U.	
93+90	2.00	90.00	2.00	21.50	40.00	8	SW TRENCH
93+90	30.00	94.00	8.00	19.00	42.00	8	
93+50	2.00	91.00	4.00	20.00	43.00	8	
93+50	29.00	93.50	6.00	17.00	46.00	8	
76+50	2.00	80.00	3.00	17.00	40.00	8	NW TRENCH
76+50	33.00	90.50	5.00	12.00	43.00	8	
76+00	2.00	84.00	2.00	15.00	41.00	8	
76+00	33.00	91.00	7.00	13.00	42.00	8	

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	
	%		%		
76+00	LAB SAMPLE COLLECTED 12/07/03				NW TRENCH

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
95+25	**4.00**	**N/A**	**N/A**	**N/A**	**1.97×10^{-7}**	**N/A**
95+00	**4.00**	**N/A**	**N/A**	**N/A**	**2.83×10^{-7}**	**N/A**
94+75	**4.00**	**N/A**	**N/A**	**N/A**	**2.16×10^{-7}**	**N/A**
77+75	**3.00**	**N/A**	**N/A**	**N/A**	**1.56×10^{-7}**	**N/A**
77+50	**3.00**	**N/A**	**N/A**	**N/A**	**2.49×10^{-7}**	**N/A**
77+25	**3.00**	**N/A**	**N/A**	**N/A**	**3.21×10^{-7}**	**N/A**
94+75	4.00	N/A	N/A	N/A	1.26×10^{-7}	N/A
94+50	4.00	Sample collected	Sample collected	Sample collected	1.58×10^{-7}	yes
94+25	4.00	N/A	N/A	N/A	1.92×10^{-7}	N/A
77+50	3.00	N/A	N/A	N/A	1.71×10^{-7}	N/A
77+25	3.00	N/A	N/A	N/A	1.53×10^{-7}	N/A
77+00	3.00	Sample collected	Sample collected	Sample collected	1.06×10^{-7}	yes
76+75	3.00	N/A	N/A	N/A	2.30×10^{-7}	N/A
76+50	3.00	N/A	N/A	N/A	1.30×10^{-7}	N/A

COMMENTS **COULD NOT DO MORE QUICK PERMS TODAY DUE TO MOVING THE ONSITE LAB (~4 HOURS)**

Filter cake: 2.5mm, 1.5mm, 1.0mm, 1.2mm, .5mm and .7mm respectively.

BOLD SAMPLES FOR QUICK PERMS COLLECTED 12/06/03.

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

Unit Weight:	95+25: 107.0 pcf	77+50: 114.5 pcf	
	95+00: 104.0 pcf	77+25: 110.0 pcf	
	94+75: 102.0 pcf	77+00: 117.0 pcf	
	77+75: 115.0 pcf	76+75: 118.5 pcf	
	77+50: 118.0 pcf	76+50: 115.0 pcf	
	77+25: 113.5 pcf		
	94+75: 110.0 pcf	pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
	94+50: 109.0 pcf	BALANCE CALIBRATIONS PERFORMED TODAY?	no
	94+25: 116.0 pcf	FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Susanne C. Sepo OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/07/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
8:15	66.00	41.00	12.00	8
11:25	-	44.00	-	-
13:54	-	43.00	-	-
17:02	66.00	48.00	12.00	8

Filter cake was .2mm and .3mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/07/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 35 - 42 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
93+80	29.7	32.8	32.8	10.0	327.5	3.8	96+00	OUT	TOP OUT
93+70	29.6	32.7	32.8	10.0	327.5	3.8	95+90	3.7	TOP OUT
93+60	29.5	32.7	32.7	10.0	327.0	3.7	95+80	7.1	TOP OUT
93+50	29.3	32.5	32.6	10.0	326.0	3.8	95+70	10.3	TOP OUT
93+40	29.3	32.4	32.5	10.0	324.5	3.8	95+60	12.7	2.5
							95+50	14.5	3.8
							95+40	16.2	5.0
							95+30	18.3	6.4
							95+20	21.4	7.9
							95+10	24.3	8.4
							95+00	24.6	9.9
							94+90	25.7	11.0
							94+80	26.5	13.5
							94+70	27.0	15.1
							94+60	28.7	17.5
							94+50	29.6	19.8
							94+40	30.9	21.0
							94+30	31.0	23.4
							94+20	33.2	25.7
							94+10	33.0	27.2
							94+00	32.9	29.8
							93+90	32.7	30.4
							93+80		31.0
							93+70		32.7
							93+60		32.7
							93+50		32.5
							93+40		32.4

SF TODAY 1632.50

SF TO DATE 53437.90

COMMENTS

Now digging the SW trench with the CAT 320 excavator until the 375 is fixed.

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/07/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

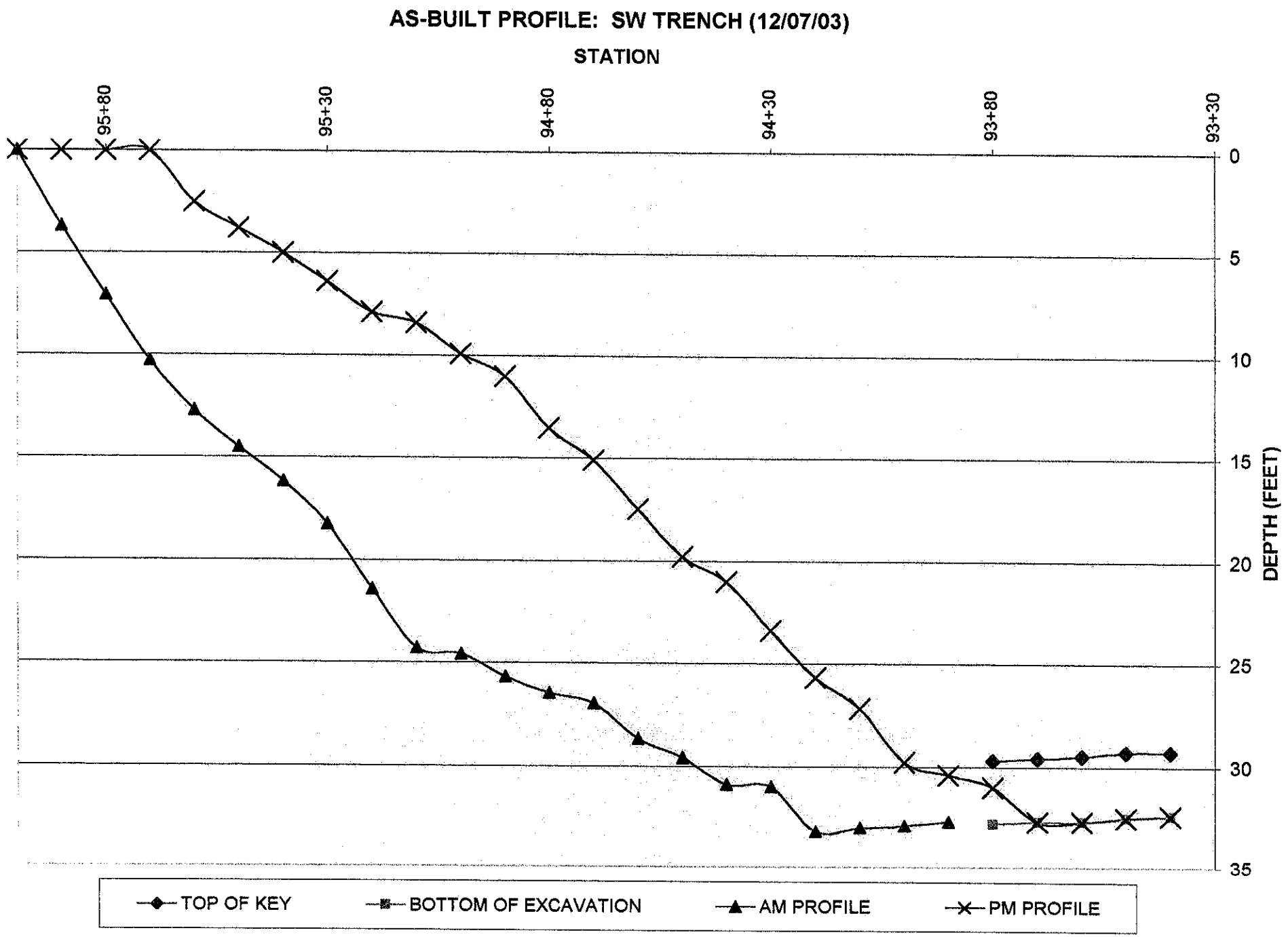
WEATHER: Partly cloudy; 35 - 42 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
76+40	31.2	35.5	35.4	10.0	353.5	16.0	78+40	OUT	OUT
76+30	31.5	35.5	35.5	10.0	355.0	16.0	78+30	4.0	OUT
76+20	31.5	35.6	35.6	10.0	355.5	16.0	78+20	6.1	OUT
76+10	31.6	35.6	35.6	10.0	356.0	16.0	78+10	8.9	OUT
76+00	31.6	35.5	35.6	10.0	355.5	16.0	78+00	11.0	OUT
75+90	31.7	35.4	35.5	10.0	354.5	16.0	77+90	13.2	OUT
75+80	31.7	35.4	35.4	10.0	354.0	16.0	77+80	16.3	OUT
75+70	31.7	35.5	35.5	10.0	354.5	16.0	77+70	20.0	OUT
75+60	31.8	35.2	35.4	10.0	353.5	16.0	77+60	23.1	OUT
75+50	32.0	35.2	35.2	10.0	352.0	16.0	77+50	25.9	OUT
							77+40	28.3	OUT
							77+30	31.0	OUT
							77+20	31.9	OUT
							77+10	33.2	OUT
							77+00	34.2	OUT
							76+90	34.9	OUT
							76+80	35.5	OUT
							76+70	35.0	OUT
							76+60	35.3	3.5
							76+50	35.3	7.7
							76+40		11.8
							76+30		15.2
							76+20		19.4
							76+10		22.6
							76+00		25.7
							75+90		28.9
							75+80		32.0
							75+70		35.4
							75+60		35.1
							75+50		35.1
				SF TODAY	3544.00		75+40		22.0
				SF TO DATE	11138.50		75+30		12.0

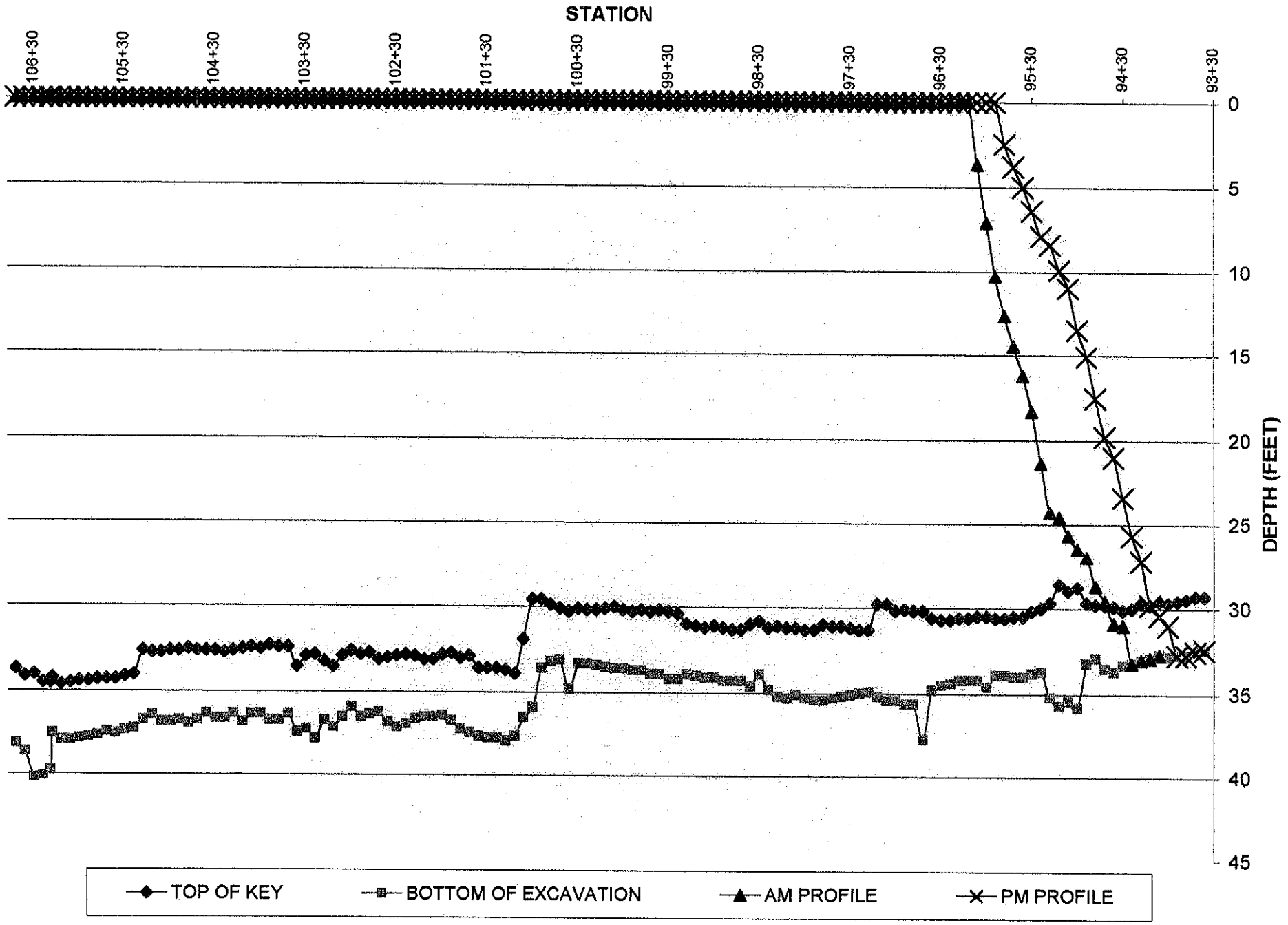
COMMENTS

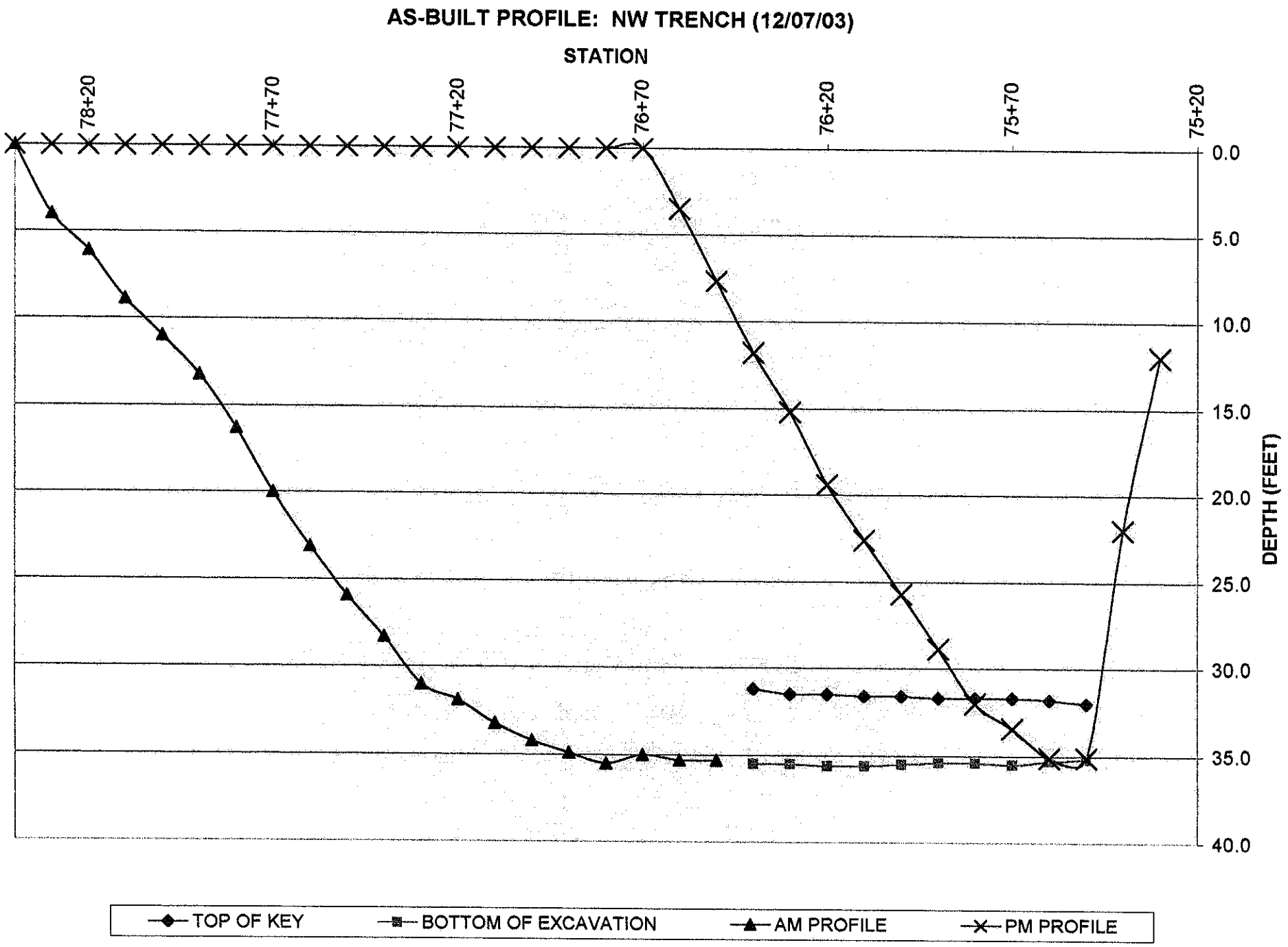
NW Trench

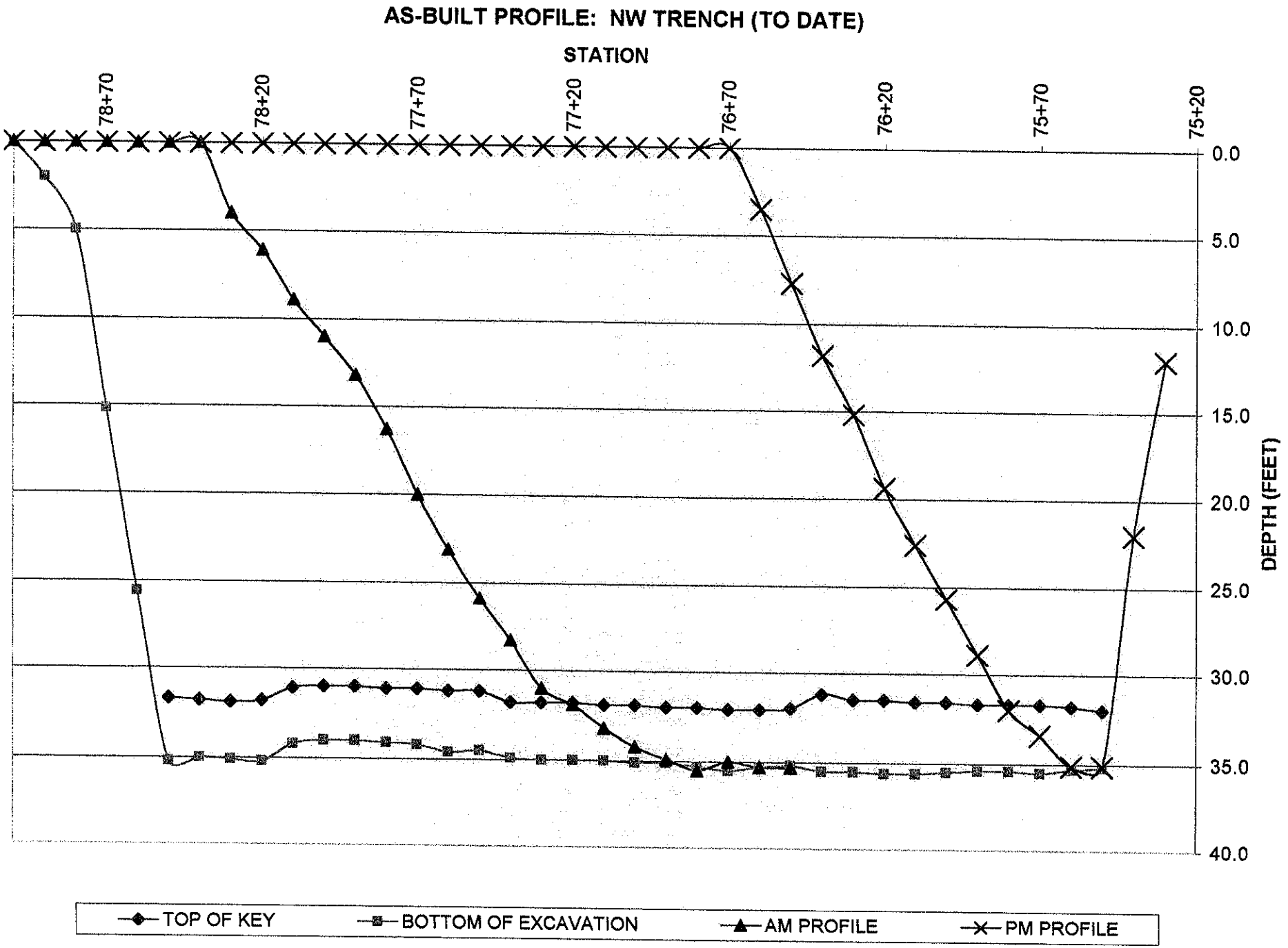
GEO-CON: Suzanne C. Sepic OWNER:


AS-BUILT PROFILE: SW TRENCH (12/07/03)
STATION
95+80
95+30
94+80
94+30
93+80
93+30
0
5
10
15
20
25
30
35
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: SW TRENCH (TO DATE)




AS-BUILT PROFILE: NW TRENCH (12/07/03)
STATION
78+20
77+70
77+20
76+70
76+20
75+70
75+20
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
78+70
78+20
77+70
77+20
76+70
76+20
75+70
75+20
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/07/03

SW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	8:15	41	> 40 sec	66	> 64 pcf	8	6.5 - 10	12	< 20 cm^3	.2
PM	17:02	48	> 40 sec	66	> 64 pcf	8	6.5 - 10	12	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	11:25	44	> 40 sec							
PM	13:54	43	> 40 sec							

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:15	93+90	2	40	40 - 90 sec	90	64 - 95 pcf	8	6.5 - 10	21.5	< 25 cm^3	2.5	2	MAX 30%
8:15	93+90	30	42	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	19	< 25 cm^3	1.5	8	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:45	93+50	2	43	40 - 90 sec	91	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	1.0	4	MAX 30%
15:45	93+50	29	46	40 - 90 sec	93.5	64 - 95 pcf	8	6.5 - 10	17	< 25 cm^3	1.2	6	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
94+75	4	2" to 6"	110	+15 pcf over trench slurry	1.26×10^{-7}	1.0×10^{-7} cm/sec
94+50	4	2" to 6"	109	+15 pcf over trench slurry	1.58×10^{-7}	1.0×10^{-7} cm/sec
94+25	4	2" to 6"	116	+15 pcf over trench slurry	1.92×10^{-7}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS

DATE 12/07/03

NW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec	[redacted]						
PM			> 40 sec							

Sub trench

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:42	76+50	2	40	40 - 90 sec	80	64 - 95 pcf	8	6.5 - 10	17	< 25 cm^3	.5	3	MAX 30%
8:42	76+50	33	43	40 - 90 sec	90.5	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	.7	5	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:00	76+00	2	41	40 - 90 sec	84	64 - 95 pcf	8	6.5 - 10	15	< 25 cm^3	.8	2	MAX 30%
16:00	76+00	33	42	40 - 90 sec	91	64 - 95 pcf	8	6.5 - 10	13	< 25 cm^3	1.1	7	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
77+50	3	2" to 6"	114.5	+15 pcf over trench slurry	1.71×10^{-7}	1.0×10^{-7} cm/sec
77+25	3	2" to 6"	110	+15 pcf over trench slurry	1.53×10^{-7}	1.0×10^{-7} cm/sec
77+00	3	2" to 6"	117	+15 pcf over trench slurry	1.06×10^{-7}	1.0×10^{-7} cm/sec
76+75	3	2" to 6"	118.5	+15 pcf over trench slurry	2.30×10^{-7}	1.0×10^{-7} cm/sec
76+50	3	2" to 6"	115	+15 pcf over trench slurry	1.30×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

APR-04-2001 00:56 EQM 2193977285 P.12/13

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 94+75, 94+50, 94+25, 77+50, 77+25, 77+00, 76+75, 76+50

Technician: MM VBY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.5, 7.0, 7.0, 6.5 6.5, 7.5, 7.0, 7.0 cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x I/X (cm/sec)	w/cons. (1/14)
SW 94+75	12/07/03	18:00-6:00	720	10	93.7844	484692.7847	—	44	1.26×10^{-7}	8.60x1
94+50	12/07/03	18:00-6:00	720	10	100.4833	519313.7717	—	59	1.58×10^{-7}	1.08x1
94+25	12/07/03	18:00-6:00	720	10	100.4833	519313.7717	—	72	1.92×10^{-7}	1.31x
NW 77+50	12/07/03	18:00-6:00	720	10	108.2128	559261.0644	—	69	1.71×10^{-7}	1.17x1
77+25	12/07/03	18:00-6:00	720	10	108.2128	559261.0644	—	61.5	1.53×10^{-7}	1.04x
77+00	12/07/03	18:00-6:00	720	10	93.7844	484692.7847	—	37	1.06×10^{-7}	7.24x1
76+75	12/07/03	18:00-6:00	720	10	100.4833	519313.7717	—	86	2.30×10^{-7}	1.57x
76+50	12/07/03	18:00-6:00	720	10	100.4833	519313.7717	—	48.5	1.30×10^{-7}	8.87x

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 8-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P.O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-016	SOIL ONLY	77+00	12/6/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-017	SOIL ONLY	94+00	12/6/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-018	SOIL ONLY	76+00	12/7/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-017	SB BACKFILL**	78+50	12/5/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-018	SB BACKFILL**	95+00	12/5/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-019	SB BACKFILL**	78+00	12/6/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-020	SB BACKFILL**	95+50	12/6/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ SB-021	SB BACKFILL**	77+00	12/7/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ SB-022	SB BACKFILL**	94+50	12/7/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

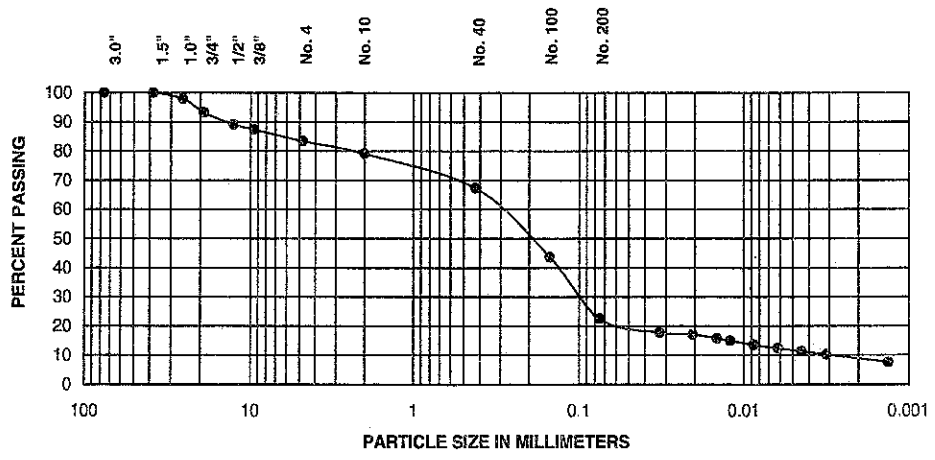
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-021	**Date Tested**	12/13/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/8/2003
Sample Location	77+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	% Gravel	% Sand	% Silt	% Clay
0.0	16.6	60.9	10.9	11.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.9
3/4"	93.2
1/2"	89.1
3/8"	87.4
No. 4	83.4
No. 10	79.2
No. 40	67.3
No. 100	43.6
No. 200	22.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
28	20	8

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

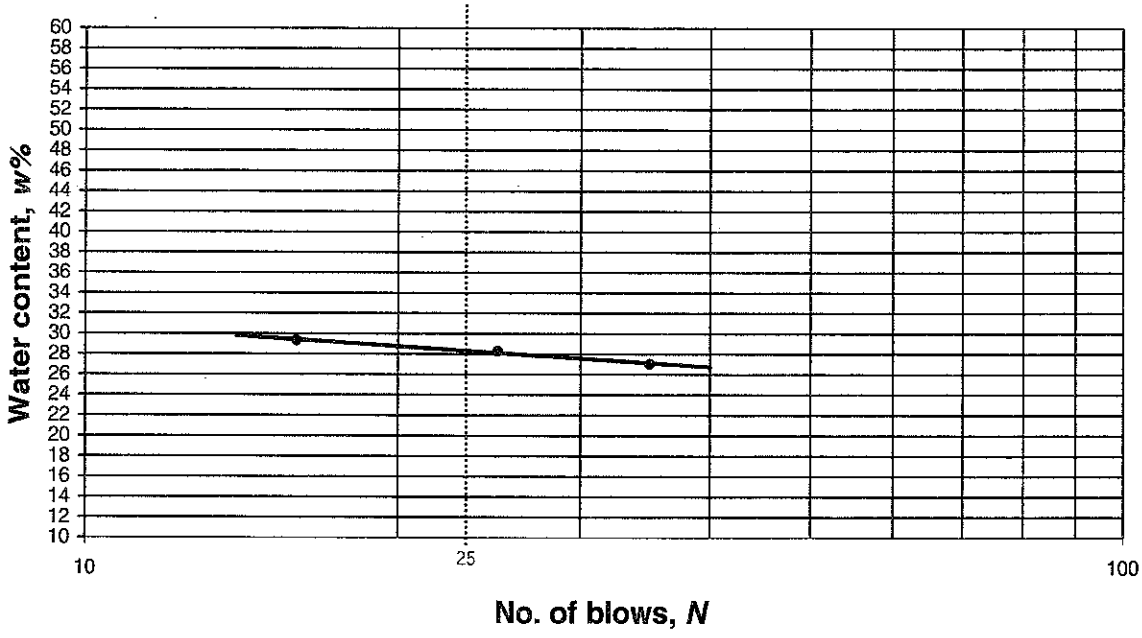
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn: Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-021	**Date Tested**	12/12/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/8/2003
Sample Location	77+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**28**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**8**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/11/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-021	Date Recd.	12/8/03	**Location**	77+00 (NW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.98	cm	Volume, V:	243.5	cu cm
Mass of Sample:	440.1	g	**Moisture Content:**	**19.7**	%
			Wet Density	**112.8**	**pcf**
			Dry Density	**94.2**	**pcf**

Final

Diameter:	7.03	cm	Area, A:	38.8	sq cm
Height, L:	5.20	cm	Volume, V:	201.8	cu cm
Mass of Sample:	422.30	g	**Moisture Content:**	**21.2**	%
			Wet Density	**130.6**	**pcf**
			Dry Density	**107.7**	**pcf**
			Deg of Saturation	**93.4**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/11/2003	9:00 AM	0	0	3.65	5.83		20.0	---
12/11/2003	9:45 AM	2700	2700	3.82	5.69	1.2	20.0	5.41E-08
12/11/2003	10:30 AM	2700	5400	3.98	5.56	1.2	20.0	5.10E-08
12/11/2003	11:15 AM	2700	8100	4.17	5.40	1.2	20.0	6.38E-08
12/11/2003	12:00 PM	2700	10800	4.30	5.29	1.2	20.0	4.45E-08

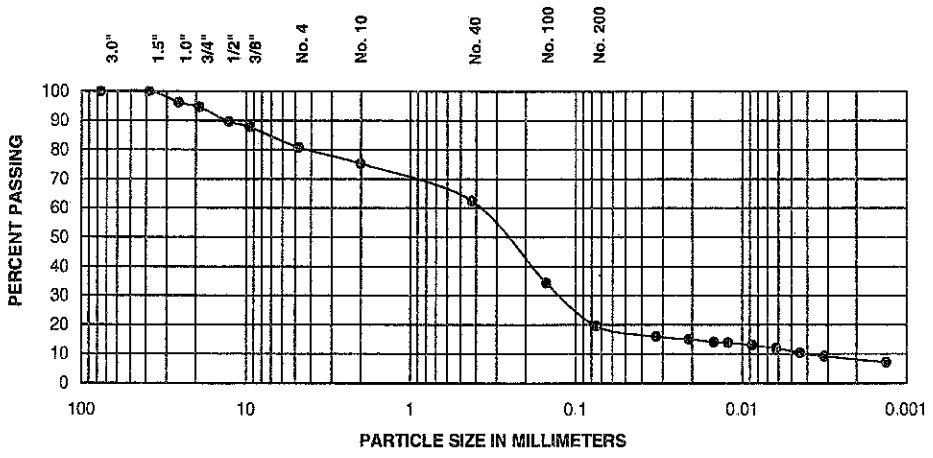
Average Permeability = **5.3E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-022	**Date Tested**	12/15/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/8/2003
Sample Location	94+50 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	19.2	61.1	8.6	11.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	96.2
3/4"	94.6
1/2"	89.7
3/8"	87.7
No. 4	80.8
No. 10	75.2
No. 40	62.5
No. 100	34.3
No. 200	19.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
29	21	8

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

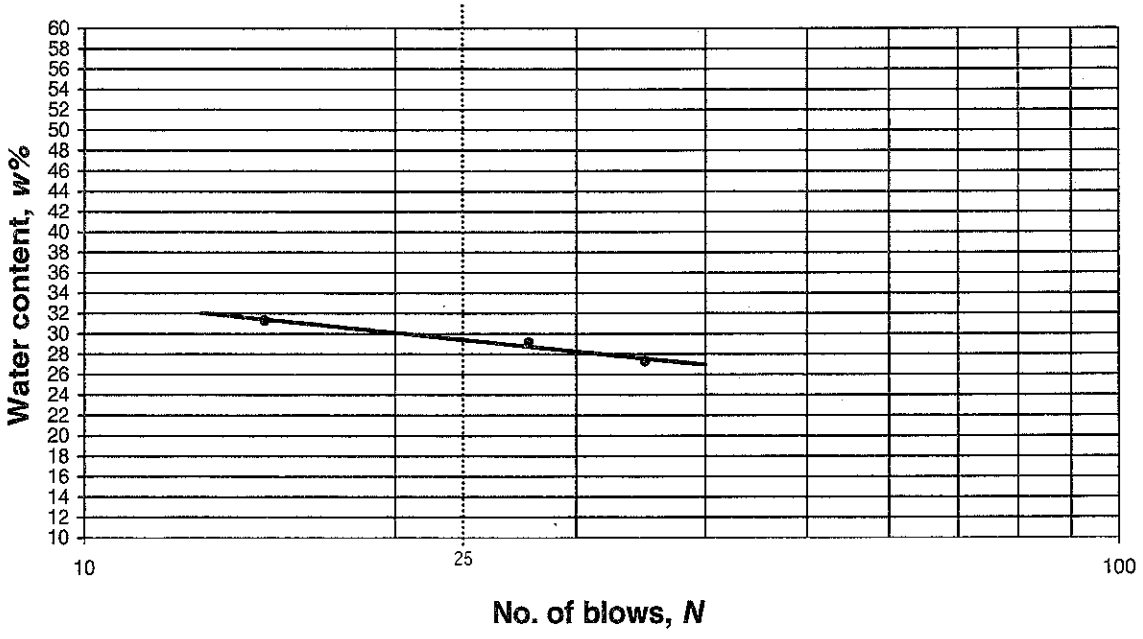
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-022	**Date Tested**	12/11/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/8/2003
Sample Location	94+50 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	29	**Plastic Limit, PL**	21	**Plasticity Index, PI**	8

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/12/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-022	Date Recd.	12/8/03	**Location**	94+50 (SW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.70	cm	Volume, V:	232.1	cu cm
Mass of Sample:	440.6	g	**Moisture Content:**	**25.9**	%
			Wet Density	**118.5**	**pcf**
			Dry Density	**94.1**	**pcf**

Final

Diameter:	6.80	cm	Area, A:	36.3	sq cm
Height, L:	5.12	cm	Volume, V:	185.9	cu cm
Mass of Sample:	416.90	g	**Moisture Content:**	**14.4**	%
			Wet Density	**139.9**	**pcf**
			Dry Density	**122.3**	**pcf**
			Deg of Saturation	**98.1**	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	76.8 psi
Gradient:	22.2

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/12/2003	9:30 AM	0	0	3.04	5.88		20.0	---
12/12/2003	10:30 AM	3600	3600	3.22	5.67	0.9	20.0	5.63E-08
12/12/2003	11:30 AM	3600	7200	3.42	5.41	0.8	20.0	7.11E-08
12/12/2003	12:30 PM	3600	10800	3.64	5.19	1.0	20.0	6.15E-08
12/12/2003	1:30 PM	3600	14400	3.83	5.03	1.2	20.0	4.57E-08

Average Permeability = **5.9E-08** cm/sec

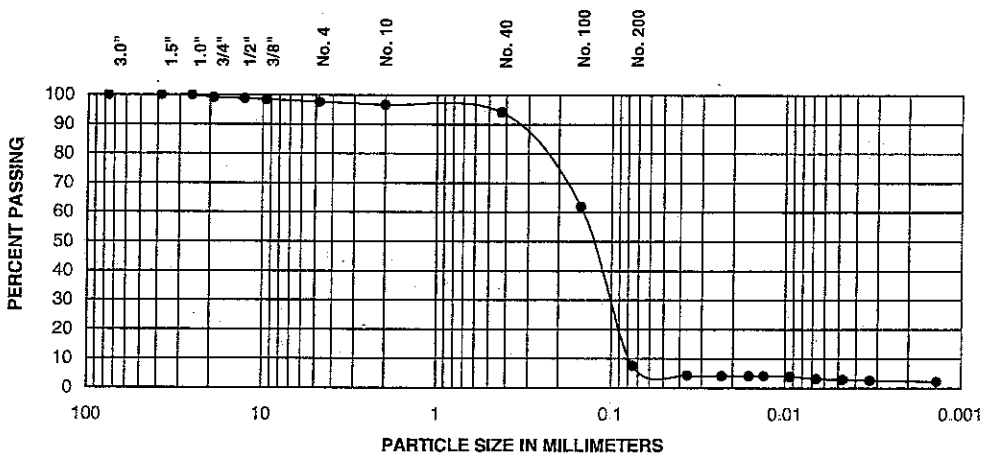
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-018	**Date Tested**	12/15/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/8/2003
Sample Location	76+00 (NW)
Sample Description	Gray poorly graded sand with silty clay, tr.of gr. & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	2.3	90.0	4.7	3.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.15	0.10	0.08	1.9	0.88

Sieve Size	**Percent Passing**	**Liquid Limit, L_L**	**Plastic Limit, PL**	**Plasticity Index, PI**
3.0"	100.0	NP	NP	NP
1.5"	100.0			
1.0"	100.0			
3/4"	99.1			
1/2"	98.8			
3/8"	98.4			
No. 4	97.7			
No. 10	96.7			
No. 40	94.2			
No. 100	61.9			
No. 200	7.6			

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay
System:	USCS

Remarks:

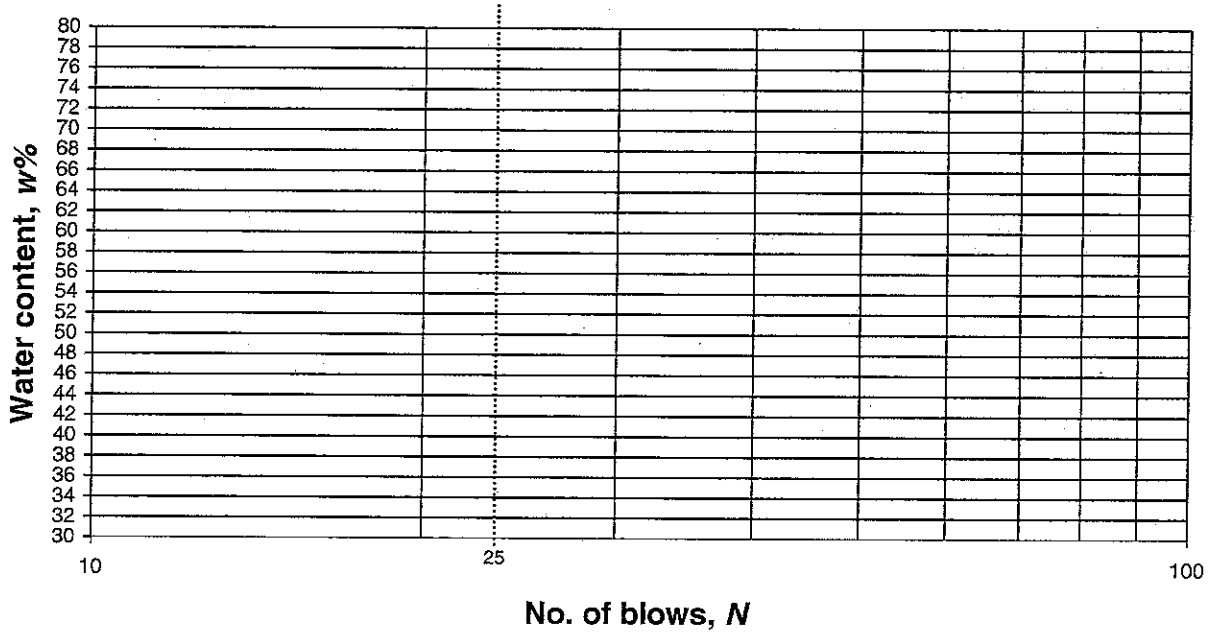
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn : Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-018	**Date Tested**	12/11/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/8/2003
Sample Location	76+00 (NW)
Sample Description	Gray poorly graded sand with silty clay, tr.of gr. & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	8	Date	12/8/2003	Sheet	1
				Date of weighing	12/9/2003	Tested by	NP

Boring No.	-	-	-			
Sample No.	BF-016	BF-017	BF-018			
Location	77 + 00 (NW)	94 + 00 (SW)	76 + 00 (NW)			
Tin No.	53A	1C	80A			
Tin + Wet Soil	143.2	156.69	204.41			
Tin + Dry Soil	122.88	132.29	164.37			
Wt. of Tin	30.63	30.69	30.37			
Wt. of Dry Soil	92.3	101.6	134.0			
Wt. of Water	20.3	24.4	40.0			
Moisture, %	22.0	24.0	29.9			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/08/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 37 - 44 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH	
	feet	lb/ft^3	%	cm^3	seconds	S.U.	
93+40	2.00	87.00	4.00	22.00	40.00	8	SW TRENCH
93+40	30.00	89.00	8.50	24.00	43.00	8	
93+00	2.00	97.00	5.00	19.00	42.00	8	
93+00	30.00	98.00	9.00	20.00	43.00	8	
75+60	2.00	79.50	2.00	21.50	40.00	8	NW TRENCH
75+60	33.00	83.50	8.00	23.00	42.00	8	
74+30	2.00	88.00	3.00	16.50	40.00	8	
74+30	33.00	90.00	10.00	19.00	45.00	8	

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	
	%		%		
93+00	LAB SAMPLE COLLECTED 12/08/03				SW TRENCH
75+00	LAB SAMPLE COLLECTED 12/08/03				NW TRENCH

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
94+75	3.00	N/A	N/A	N/A	2.01×10^{-7}	N/A
94+50	3.00	N/A	N/A	N/A	1.81×10^{-7}	N/A
94+25	3.00	N/A	N/A	N/A	1.86×10^{-7}	N/A
94+00	3.00	Sample collected	Sample collected	Sample collected	1.63×10^{-7}	yes
93+75	3.00	N/A	N/A	N/A	1.40×10^{-7}	N/A
76+50	3.00	N/A	N/A	N/A	1.44×10^{-7}	N/A
76+25	3.00	N/A	N/A	N/A	1.24×10^{-7}	N/A
76+00	3.00	Sample collected	Sample collected	Sample collected	5.46×10^{-8}	yes
75+75	3.00	N/A	N/A	N/A	1.32×10^{-7}	N/A
75+50	3.00	N/A	N/A	N/A	1.82×10^{-7}	N/A

COMMENTS

Filter cake: 1.0mm, 1.6mm, 1.0mm, 1.5mm, .9mm, 1.4mm, 1.5mm and 1.7mm respectively.

Unit Weight:	94+75:	117.0 pcf	75+50:	115.5 pcf	
	94+50:	115.0 pcf			
	94+25:	115.0 pcf			
	94+00:	118.5 pcf			
	93+75:	120.0 pcf			
	76+50:	110.5 pcf			
	76+25:	108.5 pcf			
	76+00:	112.5 pcf			
	75+75:	117.0 pcf			

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/08/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
9:15	64.00	59.00	18.00	8
11:30	-	53.00	-	-
14:40	65.50	48.00	14.50	8
16:49	-	47.00	-	-

Filter cake was .3mm and .3mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	yes
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/08/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 37 - 44 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
93+30	29.3	32.9	32.7	10.0	326.5	3.8	95+70	OUT	TOP OUT
93+20	29.0	32.7	32.8	10.0	328.0	3.9	95+60	2.8	TOP OUT
93+10	29.0	32.3	32.5	10.0	325.0	4.0	95+50	3.9	TOP OUT
93+00	29.2	32.2	32.3	10.0	322.5	4.0	95+40	5.2	TOP OUT
92+90	29.1	32.5	32.4	10.0	323.5	4.0	95+30	6.7	2.1
							95+20	8.0	5.4
							95+10	8.7	8.2
							95+00	9.9	11.6
							94+90	11.3	12.2
							94+80	13.6	15.8
							94+70	15.2	17.7
							94+60	17.6	19.2
							94+50	19.7	21.0
							94+40	21.0	21.8
							94+30	23.2	22.2
							94+20	25.6	23.4
							94+10	27.0	24.2
							94+00	29.5	25.6
							93+90	30.2	26.9
							93+80	30.9	27.2
							93+70	32.6	28.8
							93+60	32.7	29.7
							93+50	32.5	31.2
							93+40	32.4	32.4
							93+30		32.9
							93+20		32.7
							93+10		32.3
							93+00		32.2
			SF TODAY		1625.50		92+90		32.5
			SF TO DATE		55063.40				

COMMENTS

Now digging the SW trench with the CAT 320 excavator until the 375 is fixed.

Encountered a pipe at Station 93+10 at 11:15 a.m. It was approximately 29' down. Passed the pipe at 16:00.

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/08/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

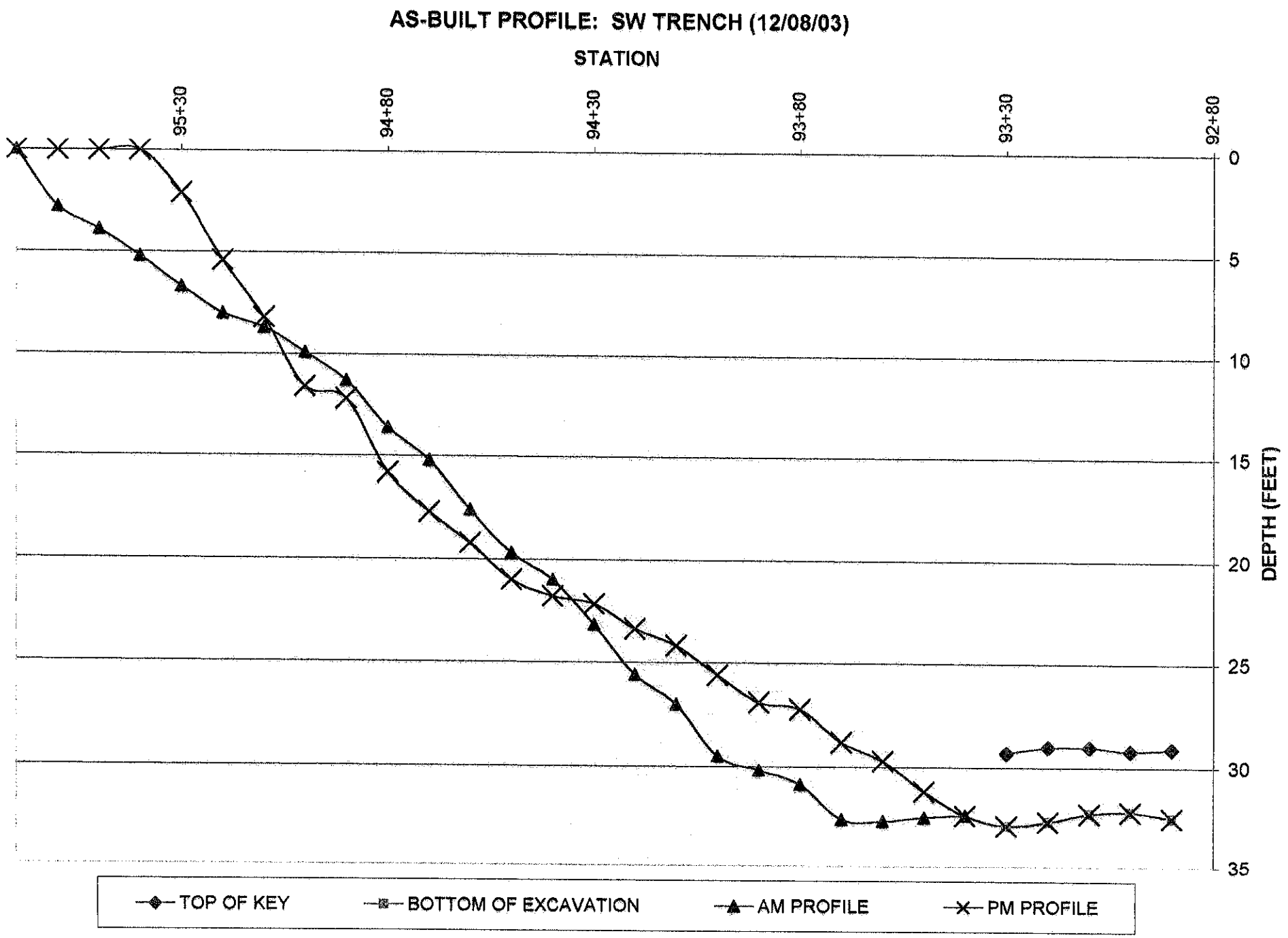
WEATHER: Partly cloudy; 37 - 44 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
75+40	31.9	35.2	35.2	10.0	352.0	16.0	76+70	OUT	OUT
75+30	31.9	35.3	35.3	10.0	352.5	16.2	76+60	3.6	OUT
75+20	32.0	35.4	35.4	10.0	353.5	16.4	76+50	7.5	2.1
75+10	32.0	35.3	35.4	10.0	353.5	16.5	76+40	11.6	4.6
75+00	31.9	35.2	35.3	10.0	352.5	16.7	76+30	15.1	6.5
74+90	31.8	35.1	35.2	10.0	351.5	16.8	76+20	19.4	8.4
74+80	32.0	35.1	35.1	10.0	351.0	16.8	76+10	22.6	10.3
74+70	32.0	35.2	35.2	10.0	351.5	16.9	76+00	25.7	12.2
74+60	32.0	35.2	35.2	10.0	352.0	17.0	75+90	29.0	14.6
74+50	31.9	35.2	35.2	10.0	352.0	17.2	75+80	32.0	17.6
74+40	31.9	35.4	35.3	10.0	353.0	17.5	75+70	35.3	20.0
74+30	31.9	35.1	35.3	10.0	352.5	17.3	75+60	35.1	22.9
74+20	32.0	35.1	35.1	10.0	351.0	17.1	75+50	35.1	24.5
							75+40	22.3	26.2
							75+30	12.1	28.0
							75+20		30.4
							75+10		32.2
							75+00		35.2
							74+90		35.1
							74+80		35.2
							74+70		35.1
							74+60		35.2
							74+50		35.2
							74+40		35.4
							74+30		35.1
							74+20		35.1
				SF TODAY	4578.50				
				SF TO DATE	15717.00				

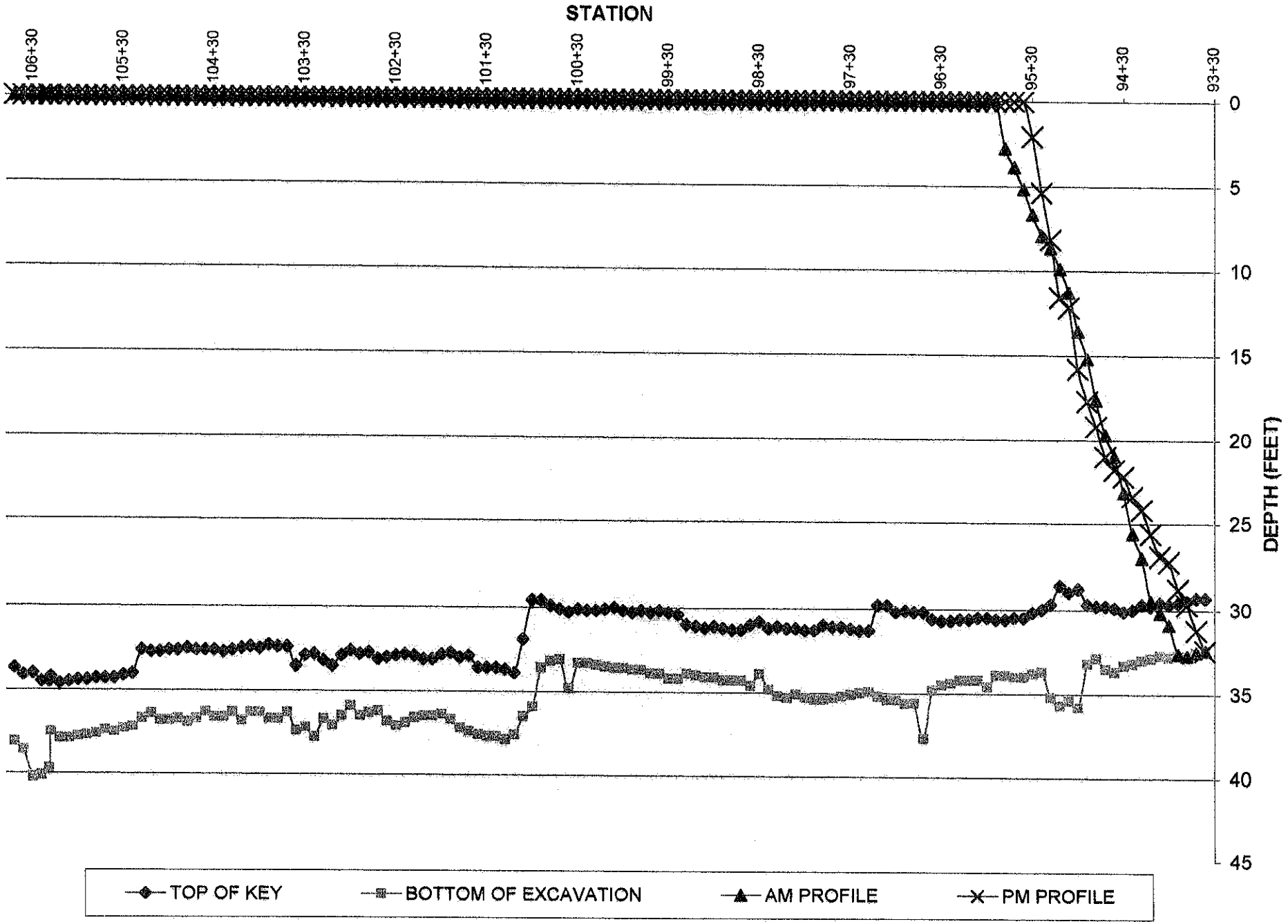
COMMENTS

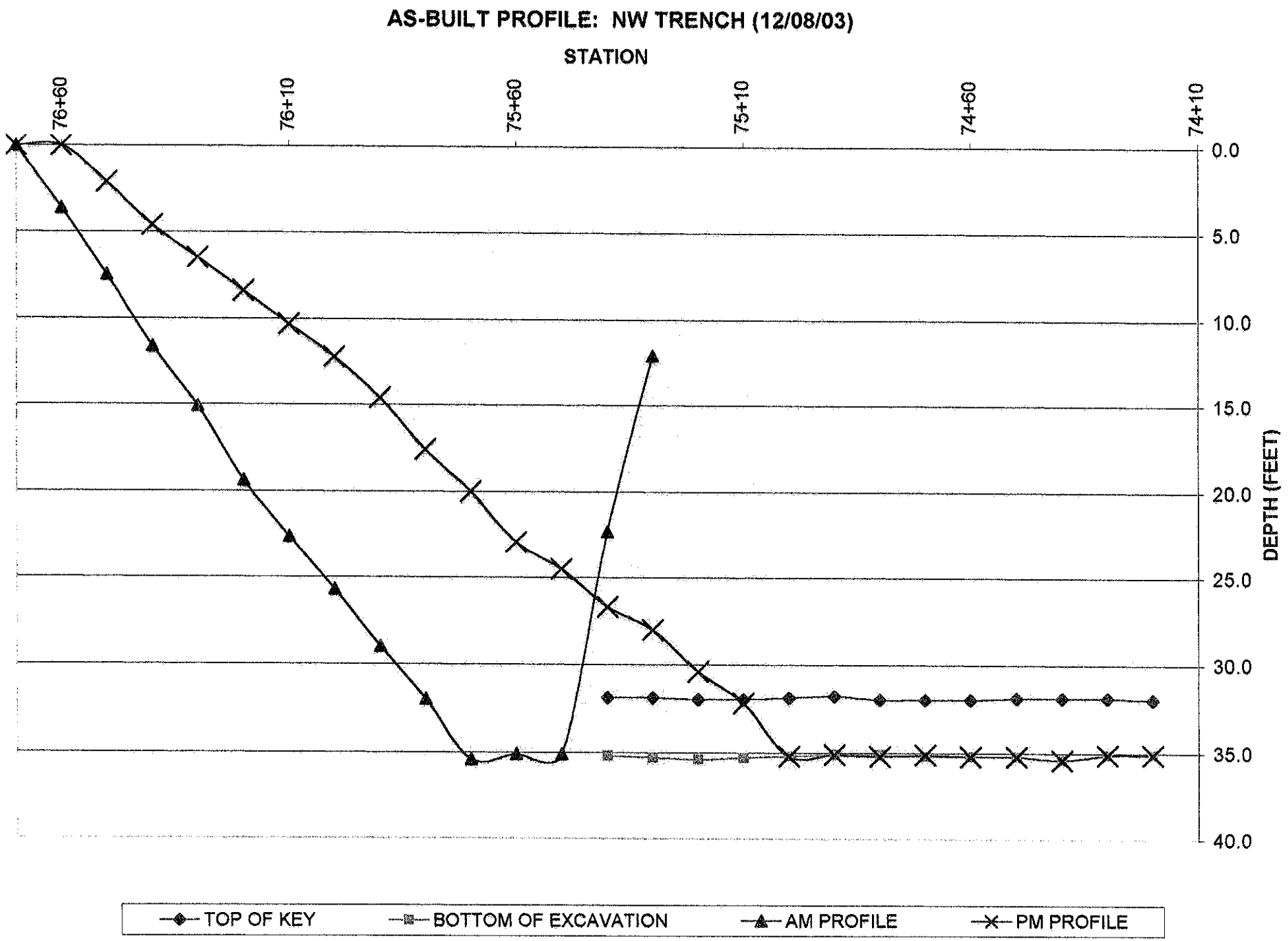
NW Trench

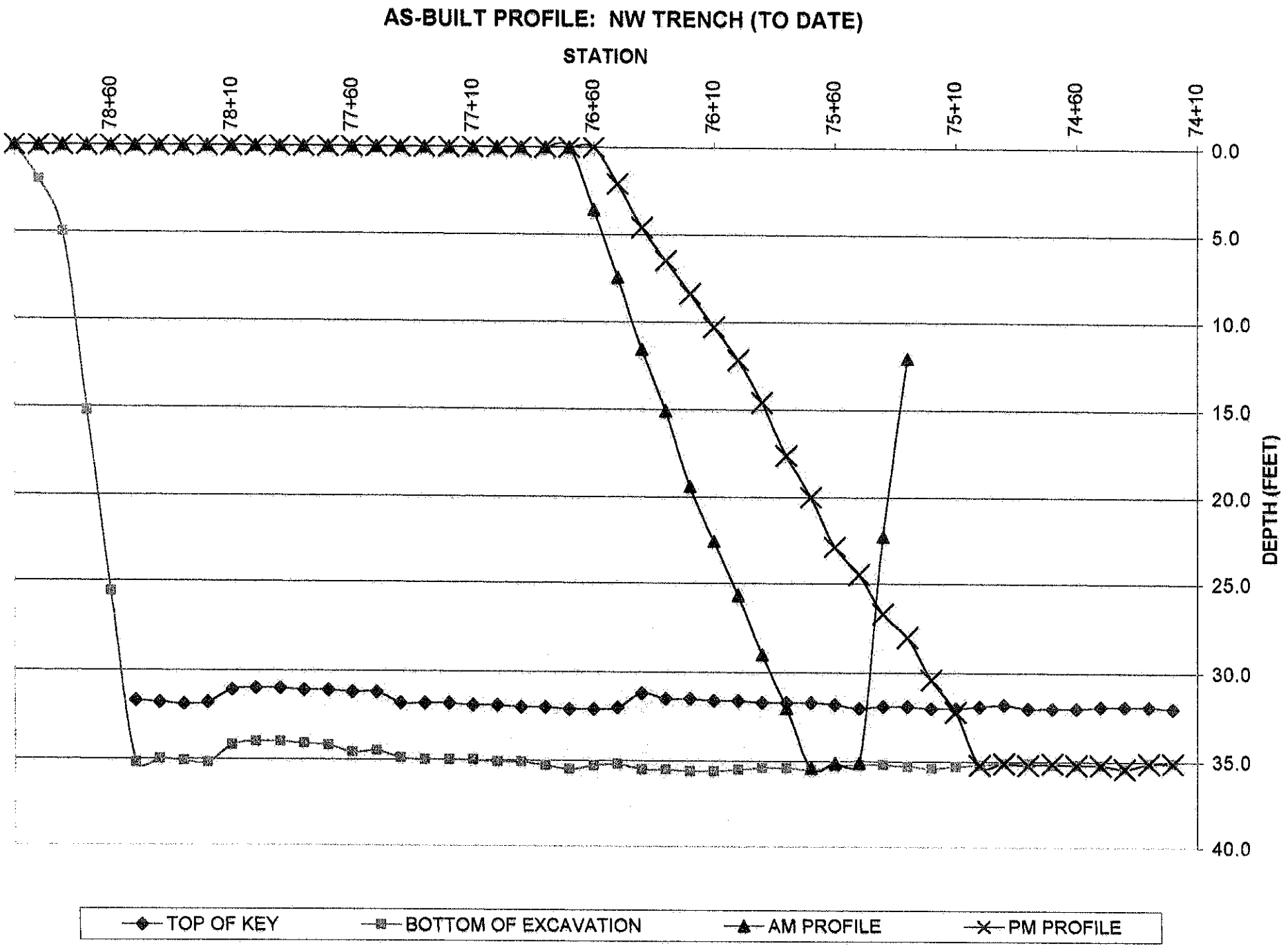
GEO-CON: Suzanne C. Sepic OWNER:


AS-BUILT PROFILE: SW TRENCH (12/08/03)
STATION
95+30
94+80
94+30
93+80
93+30
92+80
0
5
10
15
20
25
30
35
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: SW TRENCH (TO DATE)




AS-BUILT PROFILE: NW TRENCH (12/08/03)
STATION
76+60
76+10
75+60
75+10
74+60
74+10
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
78+60
78+10
77+60
77+10
76+60
76+10
75+60
75+10
74+60
74+10
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/08/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9.15	59	> 40 sec	64	> 64 pcf	8	6.5 - 10	18	< 20 cm^3	.3
PM	14:40	48	> 40 sec	65.5	> 64 pcf	8	6.5 - 10	14.5	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	11 30	53	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	16:49	47	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

SW Trench

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:15	93+40	2	40	40 - 90 sec	87	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	1.0	4	MAX 30%
9:15	93+40	30	43	40 - 90 sec	89	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.6	8.5	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
17:00	93+00	2	42	40 - 90 sec	97	64 - 95 pcf	8	6.5 - 10	19	< 25 cm^3	1.0	5	MAX 30%
17:00	93+00	30	43	40 - 90 sec	98	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	1.5	9	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
94+75	3	2" to 6"	117	+15 pcf over trench slurry		1.0×10^{-7} cm/sec
94+50	3	2" to 6"	115	+15 pcf over trench slurry		1.0×10^{-7} cm/sec
94+25	3	2" to 6"	115	+15 pcf over trench slurry		1.0×10^{-7} cm/sec
94+00	3	2" to 6"	118.5	+15 pcf over trench slurry		1.0×10^{-7} cm/sec
93+75	3	2" to 6"	120	+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS **DATE** 12/08/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NW Trench

Damaged NW Trench

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:30	75+60	2	40	40 - 90 sec	79.5	64 - 95 pcf	8	6.5 - 10	21.5	< 25 cm^3	.9	2	MAX 30%
8:30	75+60	33	42	40 - 90 sec	83.5	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	1.4	8	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:30	74+30	2	40	40 - 90 sec	88	64 - 95 pcf	8	6.5 - 10	16.5	< 25 cm^3	1.5	3	MAX 30%
16:30	74+30	33	45	40 - 90 sec	90	64 - 95 pcf	8	6.5 - 10	19	< 25 cm^3	1.7	10	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
76+50	3	2" to 6"	110.5	+15 pcf over trench slurry		1.0×10^{-7} cm/sec
76+25	3	2" to 6"	108.5	+15 pcf over trench slurry		1.0×10^{-7} cm/sec
76+00	3	2" to 6"	112.5	+15 pcf over trench slurry		1.0×10^{-7} cm/sec
75+75	3	2" to 6"	117	+15 pcf over trench slurry		1.0×10^{-7} cm/sec
75+50	3	2" to 6"	115.5	+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 94+75, 94+50, 94+25, 94+00 93+75

Technician: MM/RF VBY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0, 7.0, 6.5, 7.0, 7.5 cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/ conv. Sector (1/14.65)
94+75	12/08/03	12:03-16.03	240	10	100.4833	519313.7717	—	25	2.01×10^{-7}	1.37×10^{-7}
94+50	12/08/03	12:03-16.03	240	10	100.4833	519313.7717	—	22.5	1.81×10^{-7}	1.24×10^{-7}
94+25	12/08/03	12:03-16.03	240	10	108.2128	559261.0644	—	25	1.86×10^{-7}	1.27×10^{-8}
94+00	12/08/03	18:21-6.21	720	10	100.4833	519313.7717	—	61	1.63×10^{-7}	1.11×10^{-8}
93+75	12/08/03	18:21-6:21	720	10	93.7844	484682.7847	—	49	1.40×10^{-7}	9.56×10^{-9}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

NW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 76+50, 76+25, 76+00, 75+75, 75+50

Technician: MM/RF ✓BY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0, 7.0, 6.5, 6.5, 7.0 cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv factor (1/14.65)
76+50	12/08/03	12:03 16:03	240	10	100.4833	519313.7717	—	18	1.44×10^{-7}	9.83×10^{-9}
76+25	12/08/03	12:03 16:03	240	10	100.4833	519313.7717	—	15.5	1.24×10^{-7}	8.46×10^{-9}
76+00	12/08/03	18:21 6:21	720	10	108.2128	559261.0644	—	22	5.46×10^{-8}	3.73×10^{-9}
75+75	12/08/03	18:21 6:21	720	10	108.2128	559261.0644	—	53	1.32×10^{-7}	9.01×10^{-9}
75+50	12/08/03	18:21 6:21	720	10	100.4833	519313.7717	—	70	1.82×10^{-7}	1.24×10^{-8}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 9-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P.O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-015	SOIL ONLY	78+00	12/5/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-019	SOIL ONLY	93+00	12/8/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-020	SOIL ONLY	75+00	12/8/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ SB-023	SB BACKFILL**	94+00	12/8/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ SB-024	SB BACKFILL**	76+00	12/8/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 9-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P.O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-015	SOIL ONLY	78+00	12/5/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-019	SOIL ONLY	93+00	12/8/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-020	SOIL ONLY	75+00	12/8/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ SB-023	SB BACKFILL**	94+00	12/8/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ SB-024	SB BACKFILL**	76+00	12/8/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

OP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/4/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV006006	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-4-03	HALVERSON 19*	GREYBULL	925

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	48
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft.)	N/A	
Filtrate Volume (cm3)	15.0 max.	14.4
> 75 microns (wt. %)	4.0 max.	0.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	7.5
Y.P. / P.V. Ratio	3.0 max.	1.69

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4400.

Signed 12/5/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Arrived onsite 12/08/03

4000# Jumbo Bags

GP-102

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/4/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV006004	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-5-03	HT BALL 190	GREYBULL	GEL

Note: (Test data for this above shipment is [illegible] following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	48
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	16.4
> 75 microns (wt. %)	4.0 max.	0.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	7.5
Y.P. / P.V. Ratio	3.0 max.	1.49

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4498.

Signed 12/8/03 Date

Approved by: Plant Manager

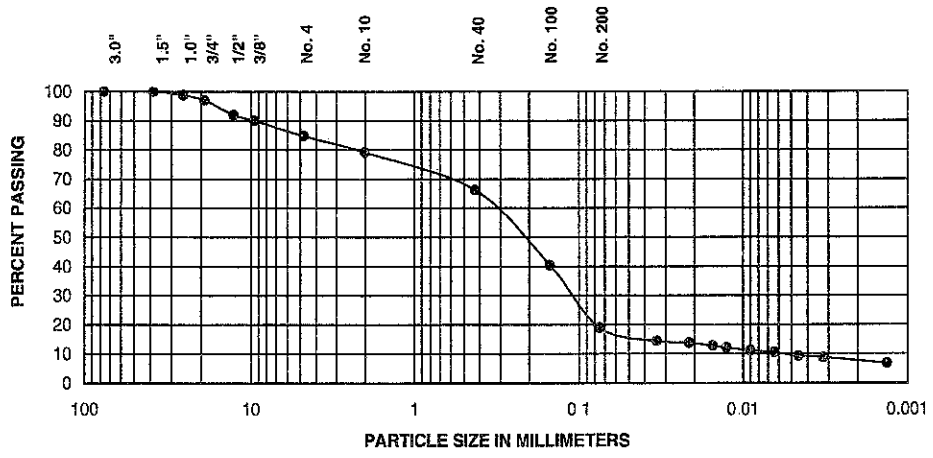
LabcertCert.doc (4/22/97)
Rev E (7/99)

Arrived onsite
12/08/03
4000# Sumbos

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-023	**Date Tested**	12/16/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/9/2003
Sample Location	94+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	15.2	65.9	9.3	9.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.7
3/4"	97.1
1/2"	92.0
3/8"	90.1
No. 4	84.8
No. 10	79.2
No. 40	66.1
No. 100	40.4
No. 200	18.9

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
31	22	9

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

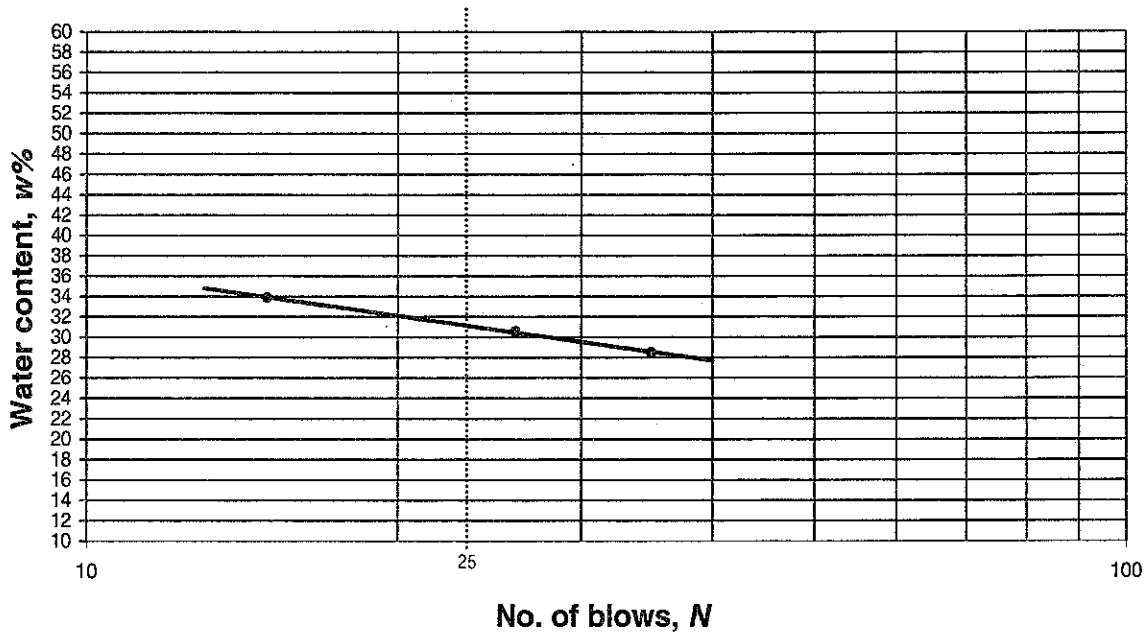
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.· Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-023	**Date Tested**	12/12/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/9/2003
Sample Location	94+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	31	**Plastic Limit, PL**	22	**Plasticity Index, PI**	9

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/11/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-023	Date Recd.	12/9/03	**Location**	94+00 (SW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.86	cm	Volume, V:	279.3	cu cm
Mass of Sample:	533.2	g	**Moisture Content:**	**25.4**	%
			Wet Density	**119.1**	**pcf**
			Dry Density	**95.0**	**pcf**

Final

Diameter:	6.85	cm	Area, A:	36.9	sq cm
Height, L:	6.46	cm	Volume, V:	238.1	cu cm
Mass of Sample:	516.20	g	**Moisture Content:**	**17.5**	%
			Wet Density	**135.3**	**pcf**
			Dry Density	**115.2**	**pcf**
			Deg of Saturation	**98.1**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	18.5	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/11/2003	9:45 AM	0	0	3.07	5.93		20.0	---
12/11/2003	10:30 AM	2700	2700	3.20	5.76	0.8	20.0	7.28E-08
12/11/2003	11:15 AM	2700	5400	3.37	5.60	1.1	20.0	6.96E-08
12/11/2003	12:00 PM	2700	8100	3.51	5.48	1.2	20.0	5.30E-08
12/11/2003	12:45 PM	2700	10800	3.66	5.35	1.2	20.0	5.82E-08

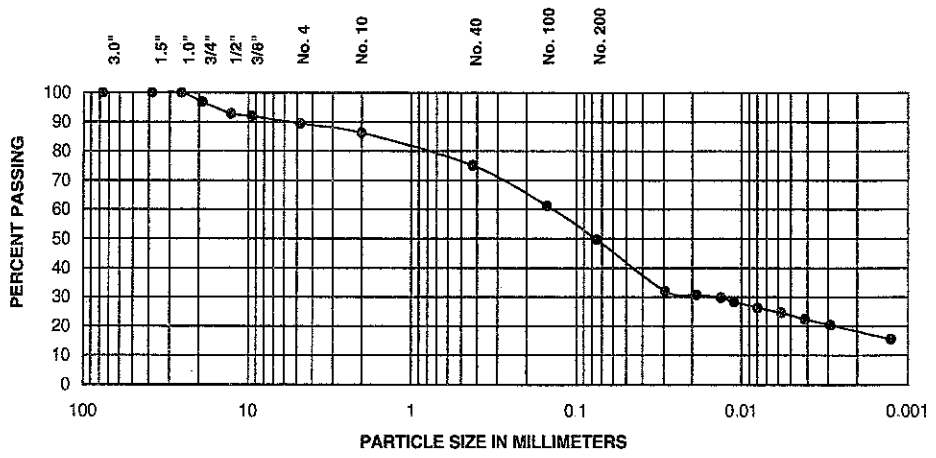
Average Permeability = **6.3E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-024	**Date Tested**	12/17/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/9/2003
Sample Location	76 + 00 (NW)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	10.5	39.8	26.1	23.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	96.9
1/2"	92.8
3/8"	91.9
No. 4	89.5
No. 10	86.2
No. 40	75.2
No. 100	61.2
No. 200	49.7

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
31	15	16

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

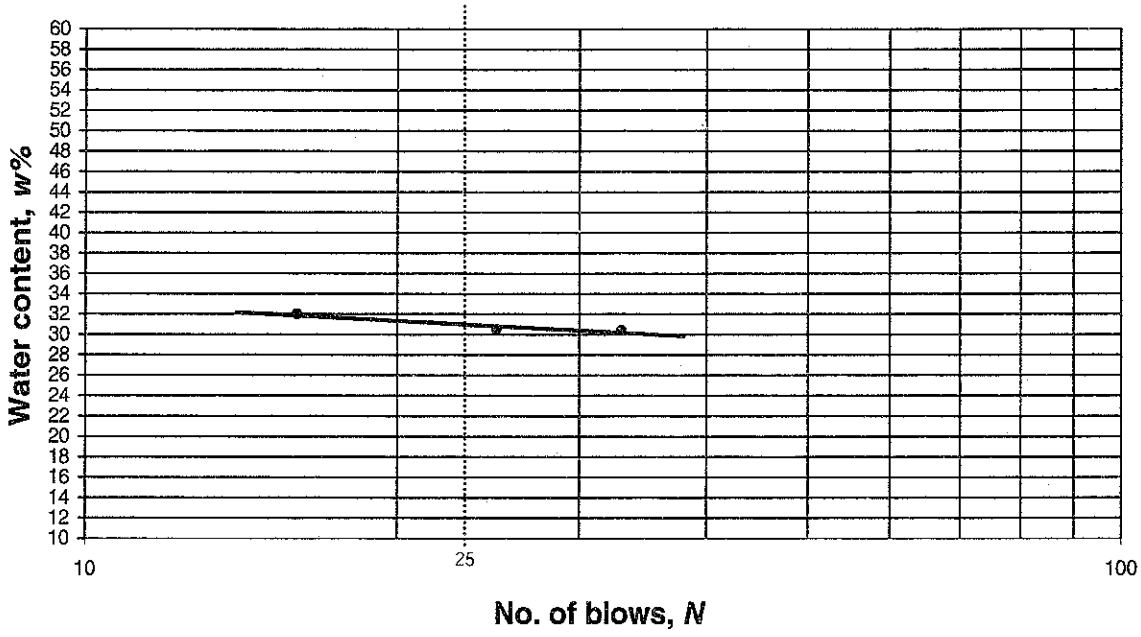
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-024	**Date Tested**	12/12/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/9/2003
Sample Location	76 + 00 (NW)
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	31	**Plastic Limit, PL**	15	**Plasticity Index, PI**	16

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/15/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-024	Date Recd.	12/9/03	**Location**	76 + 00 (NW)		
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.22	cm	Volume, V:	253.2	cu cm
Mass of Sample:	467.0	g	**Moisture Content:**	**26.7**	%
			Wet Density	**115.1**	**pcf**
			Dry Density	**90.9**	**pcf**

Final

Diameter:	6.89	cm	Area, A:	37.3	sq cm
Height, L:	5.73	cm	Volume, V:	213.6	cu cm
Mass of Sample:	452.50	g	**Moisture Content:**	**19.9**	%
			Wet Density	**132.2**	**pcf**
			Dry Density	**110.2**	**pcf**
			Deg of Saturation	**98.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	20.4	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/15/2003	9:15 AM	0	0	3.14	5.98		20.0	---
12/15/2003	10:00 AM	2700	2700	3.22	5.91	1.1	20.0	2.71E-08
12/15/2003	10:45 AM	2700	5400	3.30	5.84	1.1	20.0	2.73E-08
12/15/2003	11:30 AM	2700	8100	3.41	5.75	1.2	20.0	3.54E-08
12/15/2003	12:15 PM	2700	10800	3.50	5.67	1.1	20.0	3.18E-08

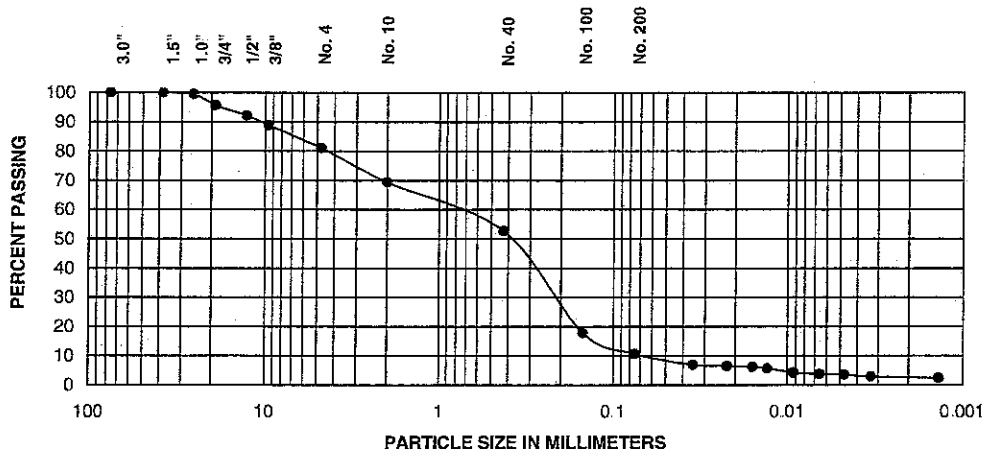
Average Permeability = **3.0E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-019	**Date Tested**	12/15/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/9/2003
Sample Location	93+00 (SW)
Sample Description	Gray poorly graded sand with silty clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	19.0	70.4	7.2	3.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.83	0.22	0.07	12.7	0.85

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	99.5
3/4"	95.6
1/2"	92.1
3/8"	88.9
No. 4	81.0
No. 10	69.4
No. 40	52.8
No. 100	17.8
No. 200	10.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

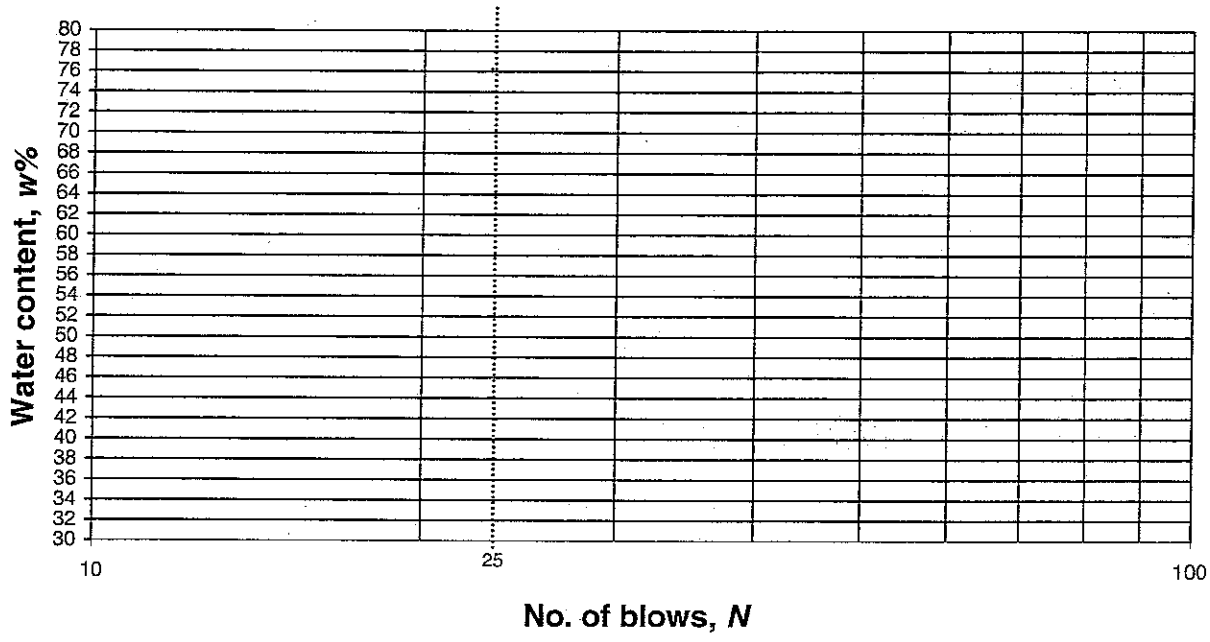
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-019	**Date Tested**	12/11/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/9/2003
Sample Location	93+00 (SW)
Sample Description	Gray poorly graded sand with silty clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	7	Date	12/10/2003	Sheet	1
				Date of weighing	12/11/2003	Tested by	NP

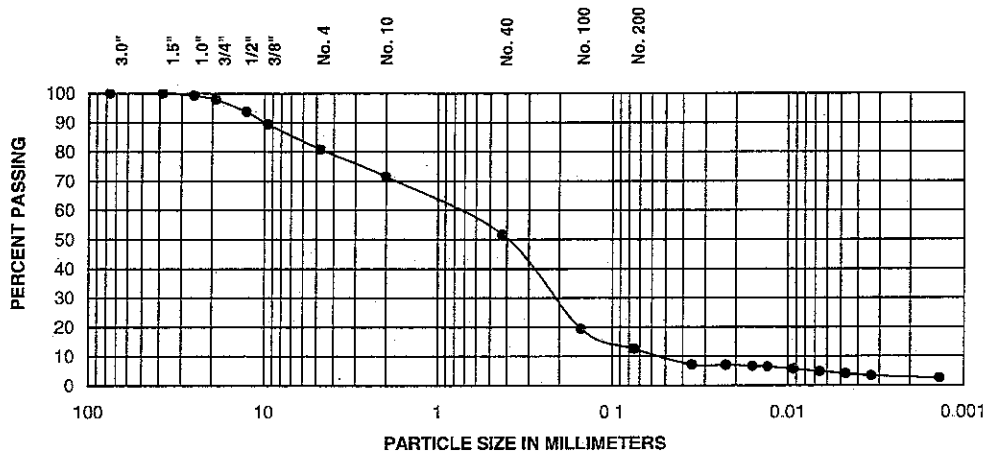
Boring No.	-	-	-			
Sample No.	BF-015	BF-019	BF-020			
Location	78 + 00 (NW)	93 + 00 (SW)	75 + 00 (NW)			
Tin No.	42C	35C	2C			
Tin + Wet Soil	165.77	205.66	192.87			
Tin + Dry Soil	144.81	187.16	167.23			
Wt. of Tin	30.89	31.9	31.18			
Wt. of Dry Soil	113.9	155.3	136.1			
Wt. of Water	21.0	18.5	25.6			
Moisture, %	18.4	11.9	18.8			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-020	**Date Tested**	12/16/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/9/2003
Sample Location	STA 75+00 (NW)
Sample Description	Gray silty, clayey sand with gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	19.1	68.4	8.2	4.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	99.2
3/4"	97.9
1/2"	93.7
3/8"	89.4
No. 4	80.9
No. 10	71.6
No. 40	51.8
No. 100	19.5
No. 200	12.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

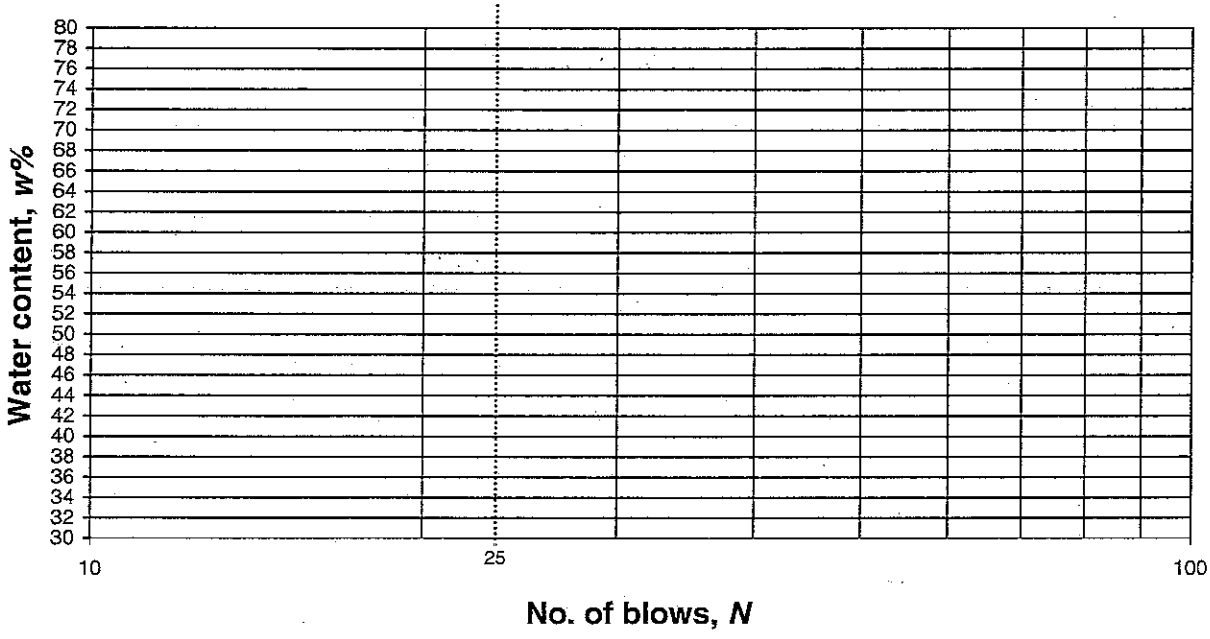
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-020	**Date Tested**	12/11/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/9/2003
Sample Location	STA 75+00 (NW)
Sample Description	Gray silty, clayey sand with gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	7	Date	12/10/2003	Sheet	1
				Date of weighing	12/11/2003	Tested by	NP

Boring No.	-	-	-			
Sample No.	BF-015	BF-019	BF-020			
Location	78 + 00 (NW)	93 + 00 (SW)	75 + 00 (NW)			
Tin No.	42C	35C	2C			
Tin + Wet Soil	165.77	205.66	192.87			
Tin + Dry Soil	144.81	187.16	167.23			
Wt. of Tin	30.89	31.9	31.18			
Wt. of Dry Soil	113.9	155.3	136.1			
Wt. of Water	21.0	18.5	25.6			
Moisture, %	18.4	11.9	18.8			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/09/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Overcast, foggy, misty, PM rain; 38 - 46 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH	
	feet	lb/ft^3	%	cm^3	seconds	S.U.	
92+90	2.00	83.00	6.00	22.00	40.00	8	SW TRENCH
92+90	30.00	87.00	11.00	23.00	42.00	8	
92+40	2.00	78.00	7.00	24.00	40.00	8	
92+40	30.00	90.00	13.00	24.50	43.00	8	
74+20	2.00	74.00	4.00	19.00	41.00	8	NW TRENCH
74+20	33.00	83.00	7.00	20.50	43.00	8	
73+30	2.00	76.00	4.00	22.00	40.00	8	
73+30	32.00	84.50	8.00	24.00	42.00	8	

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	
	%		%		
74+00	LAB SAMPLE COLLECTED 12/09/03				NW TRENCH
					NW TRENCH

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
94+75	2.00	N/A	N/A	N/A	1.46×10^{-7}	N/A
94+50	2.00	N/A	N/A	N/A	1.82×10^{-7}	N/A
94+25	2.00	N/A	N/A	N/A	1.24×10^{-7}	N/A
94+00	3.00	N/A	N/A	N/A	1.34×10^{-7}	N/A
93+75	3.00	N/A	N/A	N/A	7.45×10^{-8}	N/A
93+50	3.00	Sample collected	Sample collected	Sample collected	8.60×10^{-8}	yes
76+25	3.00	N/A	N/A	N/A	1.35×10^{-7}	N/A
76+00	4.00	N/A	N/A	N/A	1.54×10^{-7}	N/A
75+75	4.00	N/A	N/A	N/A	8.56×10^{-8}	N/A
75+50	4.00	N/A	N/A	N/A	1.09×10^{-7}	N/A
75+25	3.00	N/A	N/A	N/A	1.32×10^{-7}	N/A
75+00	3.00	Sample collected	Sample collected	Sample collected	1.02×10^{-7}	yes

COMMENTS

Filter cake: 1.0mm, 1.4mm, 1.2mm, 1.6mm, 1.0mm, 1.5mm, 1.5mm and 1.5mm respectively.

Unit Weight:				
94+75:	117.0 pcf	75+50:	115.5 pcf	
94+50:	119.0 pcf	75+25:	113.5 pcf	
94+25:	116.5 pcf	75+00:	118.5 pcf	
94+00:	118.5 pcf			
93+75:	114.0 pcf			
93+50:	111.5 pcf			
76+25:	108.5 pcf			
76+00:	116.5 pcf			
75+75:	114.0 pcf			

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Susanne C Sipe OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/09/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
16:30	64.50	58.00	12.00	8
Filter cake was .2mm. No slurry mixing until 16:30. Morning work consisted of erecting decon area.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/09/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Overcast, foggy, misty, PM rain; 38 - 46 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
92+80	29.3	32.3	32.4	10.0	324.0	4.0	95+40	OUT	TOP OUT
92+70	29.2	32.5	32.4	10.0	324.0	4.0	95+30	2.3	TOP OUT
92+60	29.4	33.0	32.8	10.0	327.5	4.0	95+20	5.7	TOP OUT
92+50	29.2	33.1	33.1	10.0	330.5	4.0	95+10	8.4	TOP OUT
92+40	29.3	32.9	33.0	10.0	330.0	4.0	95+00	11.7	TOP OUT
92+30	29.5	32.8	32.9	10.0	328.5	3.9	94+90	12.4	TOP OUT
							94+80	15.9	TOP OUT
							94+70	17.8	TOP OUT
							94+60	19.4	2.1
							94+50	21.2	5.4
							94+40	21.9	7.3
							94+30	22.3	10.1
							94+20	23.4	12.6
							94+10	24.1	15.2
							94+00	25.6	17.7
							93+90	26.8	19.3
							93+80	27.0	21.1
							93+70	28.6	21.9
							93+60	29.5	22.4
							93+50	31.0	23.1
							93+40	32.0	24.5
							93+30	32.9	24.9
							93+20	32.7	25.3
							93+10	32.3	27.5
							93+00	32.2	28.9
							92+90	32.2	29.8
							92+80		30.7
							92+70		31.2
							92+60		33.0
							92+50		33.1
				SF TODAY	1964.50		92+40		32.9
				SF TO DATE	57027.90		92+30		32.8

COMMENTS

Now digging the SW trench with the CAT 320 excavator until the 375 is fixed.

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/09/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Overcast, foggy, misty, PM rain; 38 - 46 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
74+10	32.0	35.2	35.2	10.0	351.5	16.5	76+60	OUT	OUT
74+00	31.9	35.3	35.3	10.0	352.5	16.3	76+50	2.1	OUT
73+90	31.9	35.3	35.3	10.0	353.0	16.7	76+40	4.5	OUT
73+80	31.8	35.4	35.4	10.0	353.5	16.9	76+30	6.4	OUT
73+70	31.9	35.3	35.4	10.0	353.5	17.2	76+20	8.3	OUT
73+60	31.9	35.3	35.3	10.0	353.0	17.5	76+10	10.3	OUT
73+50	32.0	35.4	35.4	10.0	353.5	17.9	76+00	12.2	OUT
73+40	32.0	35.4	35.4	10.0	354.0	18.0	75+90	14.6	OUT
73+30	31.9	35.3	35.4	10.0	353.5	18.3	75+80	17.6	OUT
73+20	32.0	35.3	35.3	10.0	353.0	18.2	75+70	20.0	OUT
73+10	31.9	35.2	35.3	10.0	352.5	18.7	75+60	22.9	OUT
							75+50	24.5	OUT
							75+40	26.2	OUT
							75+30	28.0	3.5
							75+20	30.4	7.3
							75+10	32.2	10.0
							75+00	35.2	11.6
							74+90	35.1	13.1
							74+80	35.2	14.3
							74+70	35.1	16.1
							74+60	35.2	18.0
							74+50	35.2	21.2
							74+40	35.4	22.7
							74+30	35.1	24.5
							74+20	35.1	25.0
							74+10		25.5
							74+00		27.0
							73+90		28.1
							73+80		29.3
							73+70		32.2
			SF TODAY		3883.50		73+60		33.0
			SF TO DATE		19600.50		73+50		34.6

COMMENTS

NW Trench (Profile continued on Page 4)

GEO-CON: Suzanne E. Sepio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/09/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Overcast, foggy, misty, PM rain; 38 - 46 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A							73+40		35.2
							73+30		35.2
							73+20		35.1
							73+10		35.1

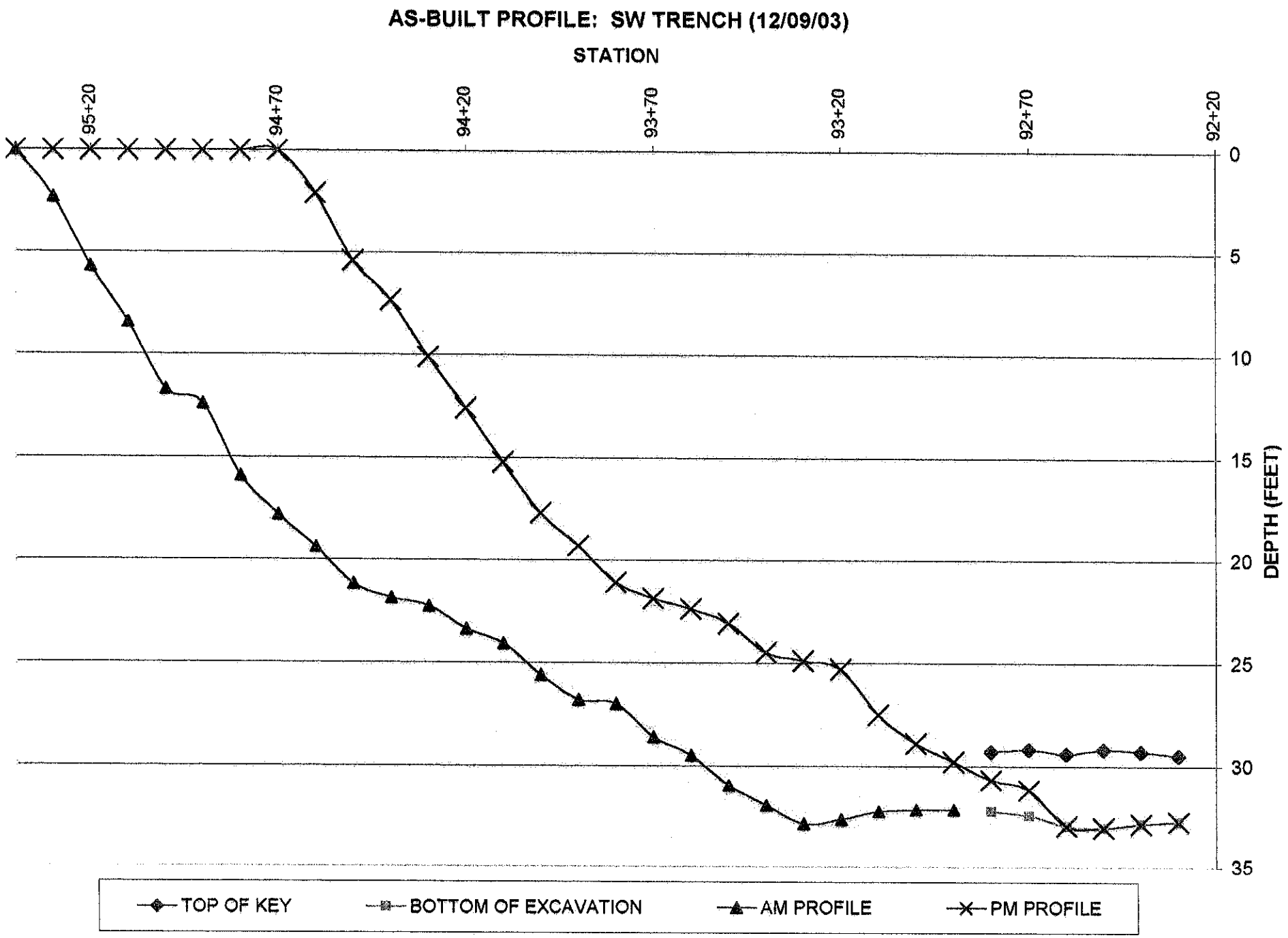
SF TODAY

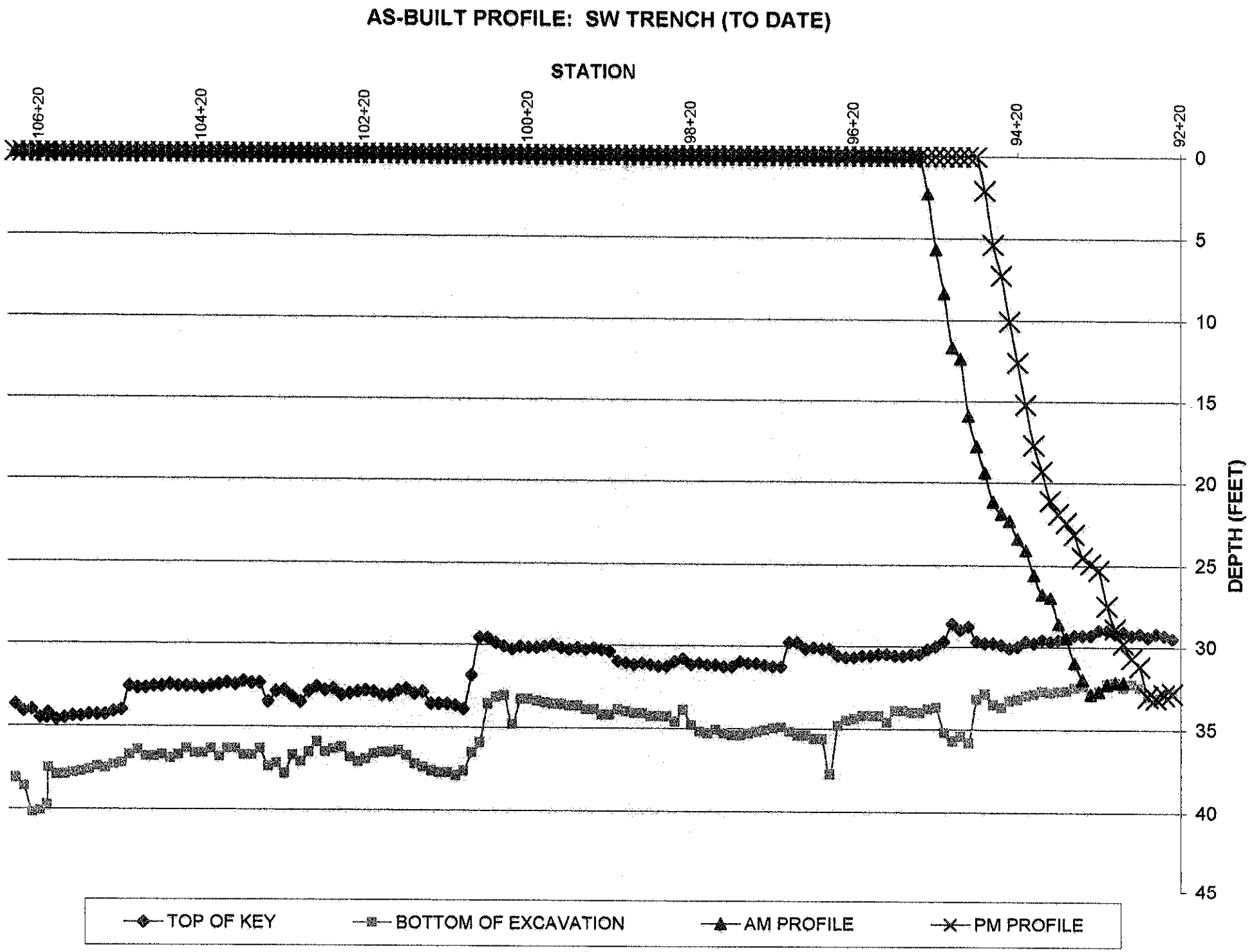
SF TO DATE

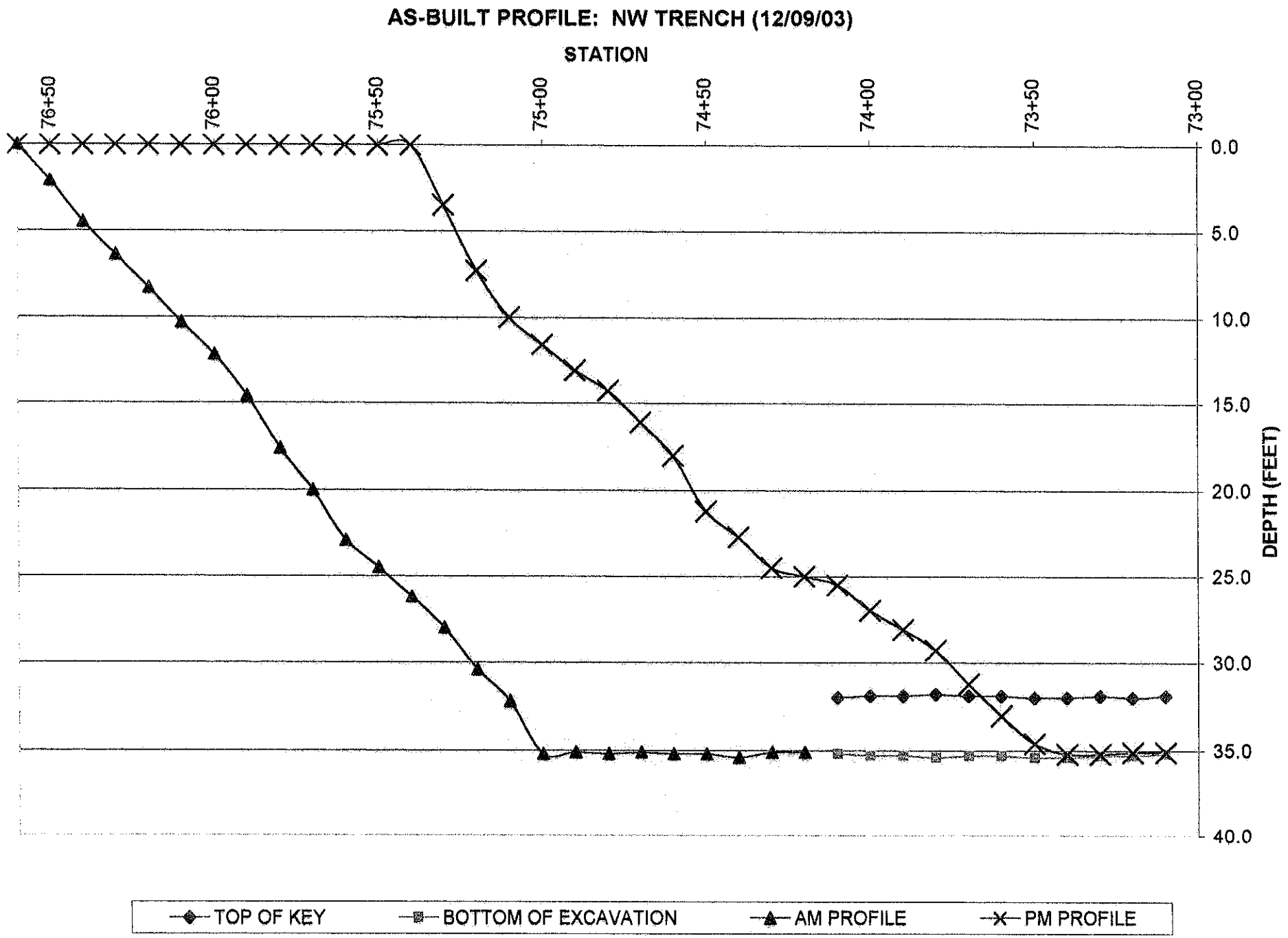
COMMENTS

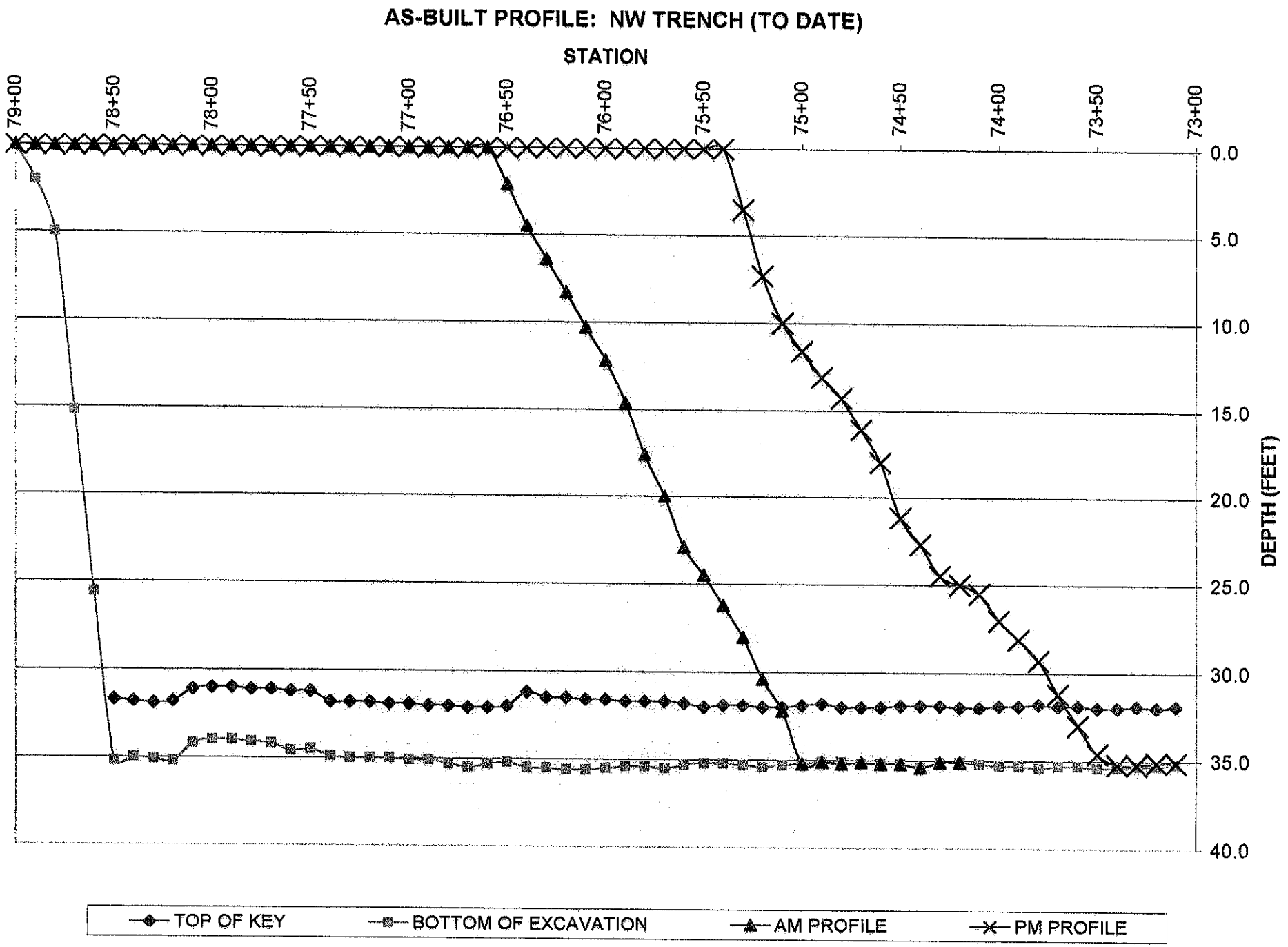
NW Trench (con't from page 4)

GEO-CON: Suzanne E. Sepic OWNER:


AS-BUILT PROFILE: SW TRENCH (12/09/03)
STATION
95+20
94+70
94+20
93+70
93+20
92+70
92+20
0
5
10
15
20
25
30
35
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SW TRENCH (TO DATE)
STATION
106+20
104+20
102+20
100+20
98+20
96+20
94+20
92+20
DEPTH (FEET)
0
5
10
15
20
25
30
35
40
45
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (12/09/03)
STATION
76+50
76+00
75+50
75+00
74+50
74+00
73+50
73+00
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
79+00
78+50
78+00
77+50
77+00
76+50
76+00
75+50
75+00
74+50
74+00
73+50
73+00
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 10-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL	SEND RESULTS TO:
333 SHORE DRIVE	Clients Name: SUE SEPIC
BURR RIDGE, IL 60527	Company: GEO-CON, INC.
Phone: (630) 321-0944	Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Attention: SANJEEV BANDI	Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL PROJECT NO: P01-048 P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-021	SOIL ONLY	74+00	12/9/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-025	SB BACKFILL**	75+00	12/9/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-026	SB BACKFILL**	93+50	12/9/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/5/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV006003	GEO-CON E CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-4-0[illegible]	QUALITY 24	GREYBULL	GEL

Note: Certificate for the above shipment of over the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	50
Plastic Viscosity (cP)	N/A	
Yield Point (#/100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	14.2
> 75 micron (wt. %)	4.0 max.	1.5

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.0
Y.P. / P.V. Ratio	3.0 max.	1.67

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4404.

Signed 12/8/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Arrived onsite 12/09/03

4000# Jumbos

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 11/21/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HGIV006005	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
[illegible]	[illegible]	GREYBULL	GBL

Below are data for the above shipment which meet the following test criteria.

Test or Property	API Spec	Result
Viscosity	30 min.	35
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.6
> 75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	7.0
Y.P. / P.V. (ratio)	3.0 max.	1.21

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-800-798-4488.

Signed 12/8/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/98)

Arrived onsite 12/09/03

4000# Jumbos

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/8/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE I BUILDING SUITE 400 MONROEVILLE PA 15146	GEO-CON E. CHICAGO IN 46312
SALES ORDER NO.: HOIV006032	

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-5-03	QUALITY 5	GREYBULL	GEL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	60
Plastic Viscosity (cP)	N/A	
Yield Point (#/100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max	13.8
> 75 micron (wt. %)	4.0 max	0.7

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	8.5
Y.P. / P.V. Ratio	3.0 max	1.75

This certifies that the product shipped to the location as stated meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let me know 1-307-765-4336.

Signed 12/8/03 Date

Approved by: Plant Manager

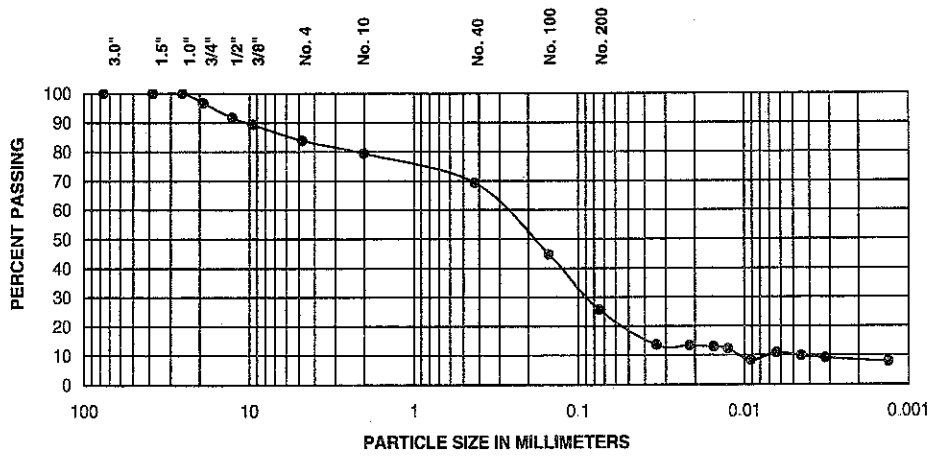
LabanaCert.doc (4/22/97)
Rev E (9/99)

Arrived onsite 12/09/03
100# Bags

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-025	**Date Tested**	12/16/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/10/2003
Sample Location	75+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	16.2	58.2	15.9	9.7

	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
For coarse-grained soils with <12% Fines					

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	96.8
1/2"	91.7
3/8"	89.3
No. 4	83.8
No. 10	79.4
No. 40	69.3
No. 100	44.8
No. 200	25.7

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
27	19	8

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

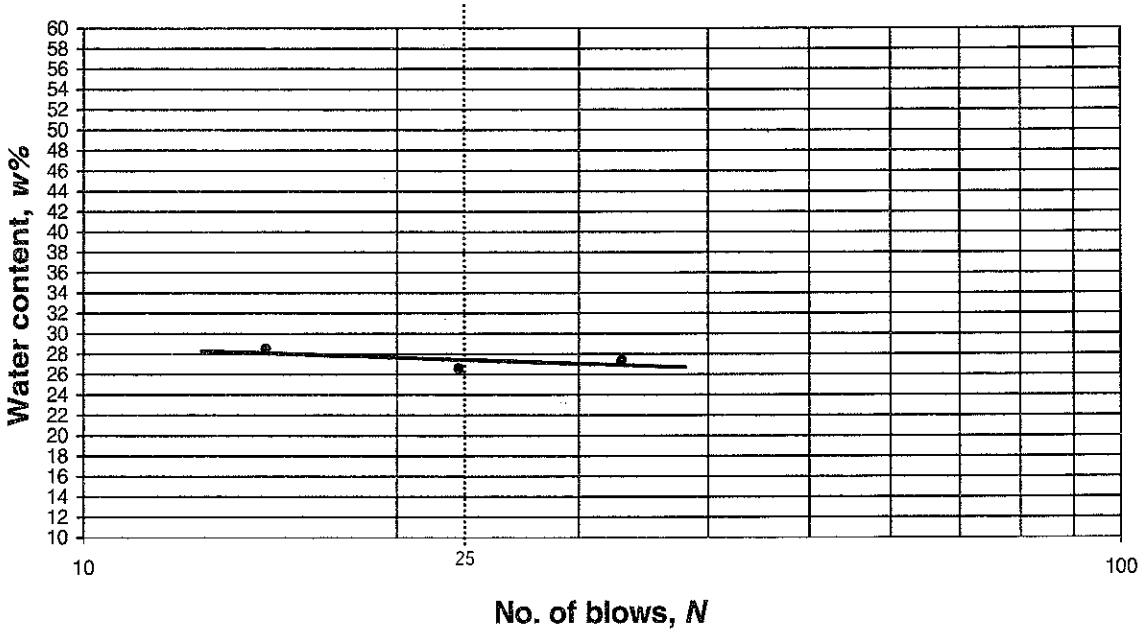
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-025	**Date Tested**	12/16/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/10/2003
Sample Location	75+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**27**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**8**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/15/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-025	Date Recd.	12/10/03	**Location**	75+00 (NW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.71	cm	Volume, V:	273.2	cu cm
Mass of Sample:	518.2	g	**Moisture Content:**	**25.8**	%
			Wet Density	**118.4**	**pcf**
			Dry Density	**94.1**	**pcf**

Final

Diameter:	6.96	cm	Area, A:	38.0	sq cm
Height, L:	6.16	cm	Volume, V:	234.4	cu cm
Mass of Sample:	498.90	g	**Moisture Content:**	**19.1**	%
			Wet Density	**132.8**	**pcf**
			Dry Density	**111.5**	**pcf**
			Deg of Saturation	**97.6**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	18.9	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/15/2003	9:15 AM	0	0	3.18	5.85		20.0	---
12/15/2003	10:00 AM	2700	2700	3.45	5.63	1.2	20.0	9.35E-08
12/15/2003	10:45 AM	2700	5400	3.71	5.42	1.2	20.0	9.14E-08
12/15/2003	11:30 AM	2700	8100	3.95	5.22	1.2	20.0	8.90E-08
12/15/2003	12:15 PM	2700	10800	4.18	5.03	1.2	20.0	8.65E-08

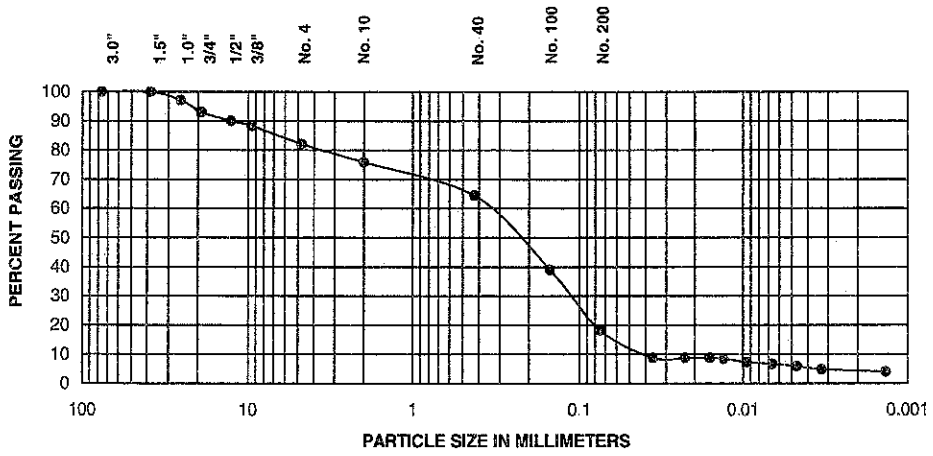
Average Permeability = **9.0E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-026	**Date Tested**	12/18/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/10/2003
Sample Location	93+50 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	17.8	63.9	12.2	6.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.1
3/4"	93.0
1/2"	90.0
3/8"	88.4
No. 4	82.2
No. 10	75.9
No. 40	64.5
No. 100	39.1
No. 200	18.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
31	20	11

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

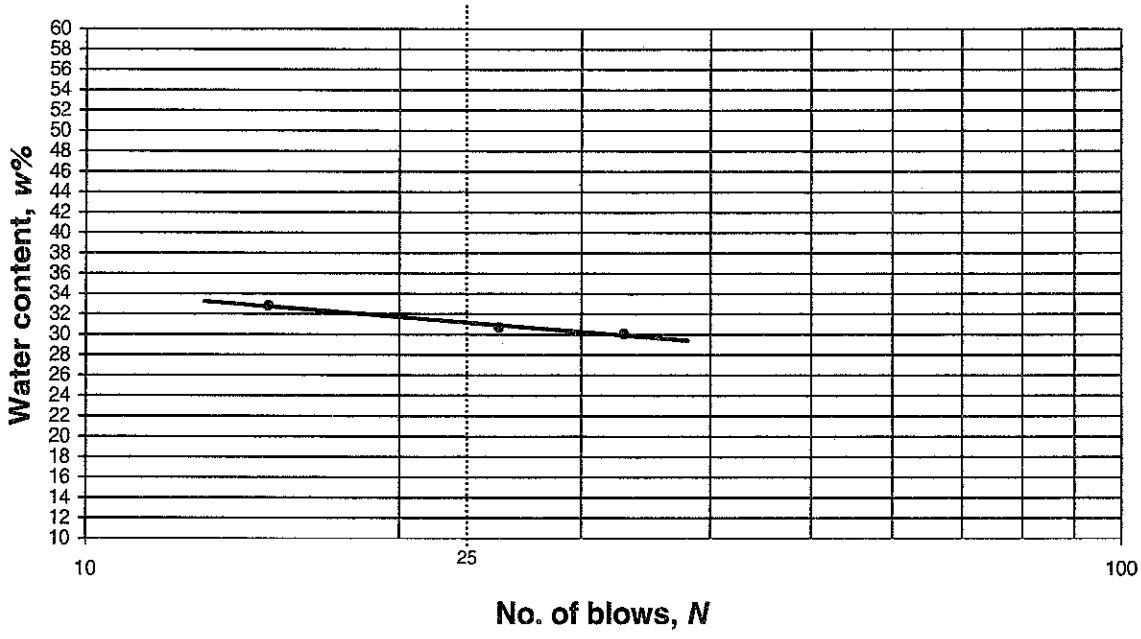
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-026	**Date Tested**	12/16/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/10/2003
Sample Location	93+50 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**31**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**11**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/15/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-026	Date Recd.	12/10/03	**Location**	93+50 (SW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.56	cm	Volume, V:	267.1	cu cm
Mass of Sample:	500.8	g	**Moisture Content:**	**26.7**	%
			Wet Density	**117.0**	**pcf**
			Dry Density	**92.3**	**pcf**

Final

Diameter:	6.98	cm	Area, A:	38.3	sq cm
Height, L:	6.12	cm	Volume, V:	234.2	cu cm
Mass of Sample:	483.10	g	**Moisture Content:**	**23.3**	%
			Wet Density	**128.7**	**pcf**
			Dry Density	**104.4**	**pcf**
			Deg of Saturation	**99.6**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	19.3	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/15/2003	9:15 AM	0	0	3.26	5.88		20.0	---
12/15/2003	10:00 AM	2700	2700	3.38	5.78	1.2	20.0	4.14E-08
12/15/2003	10:45 AM	2700	5400	3.53	5.65	1.2	20.0	5.44E-08
12/15/2003	11:30 AM	2700	8100	3.63	5.57	1.3	20.0	3.39E-08
12/15/2003	12:15 PM	2700	10800	3.76	5.46	1.2	20.0	4.71E-08

Average Permeability = **4.4E-08** **cm/sec**

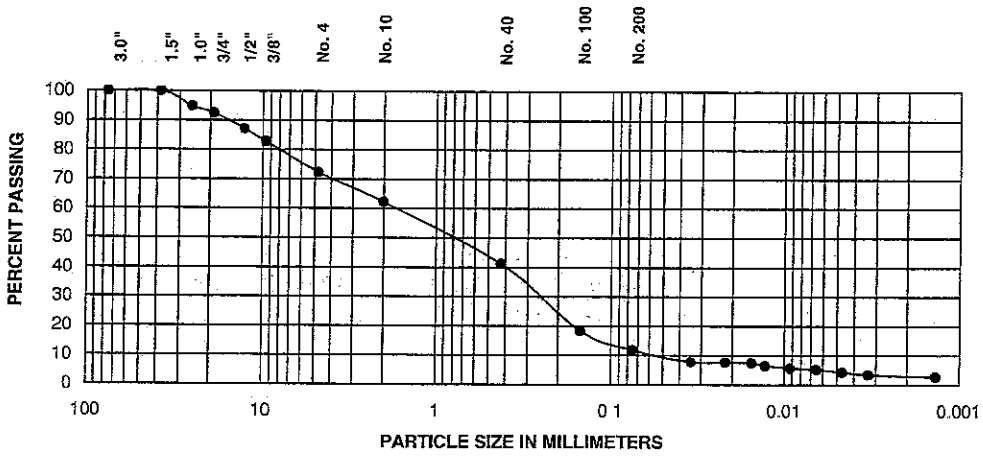
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-021	**Date Tested**	12/7/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/10/2003
Sample Location	74+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	27.7	60.4	7.3	4.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.70	0.25	0.05	32.5	0.74

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	94.9
3/4"	92.5
1/2"	87.1
3/8"	82.8
No. 4	72.3
No. 10	62.2
No. 40	41.2
No. 100	18.4
No. 200	11.9

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

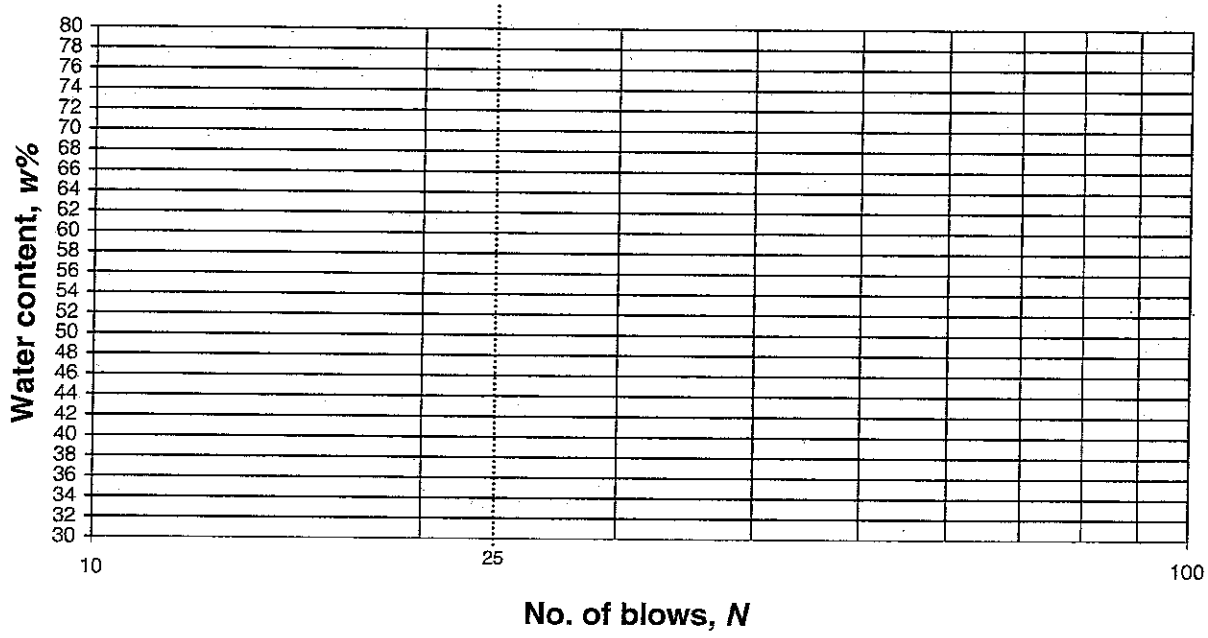
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-021	**Date Tested**	12/16/2003	**Tested By**	KC
						Qc By	SB

Date Sample Recd.	12/10/2003
Sample Location	74+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	9	Date	12/10/2003	Sheet	1
				Date of weighing	12/11/2003	Tested by	NP

Boring No.	-	-	-			
Sample No.	BF-021	BF-022	BF-023			
Location	74 + 00 (NW)	92 + 00 (SW)	73 + 00 (NW)			
Tin No.	18C	98A	85A			
Tin + Wet Soil	157.3	155.18	158.64			
Tin + Dry Soil	130.9	127.25	129.65			
Wt. of Tin	31.26	30.74	30.08			
Wt. of Dry Soil	99.6	96.5	99.6			
Wt. of Water	26.4	27.9	29.0			
Moisture, %	26.5	28.9	29.1			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/10/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy, AM rain; 34 - 53 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH	
	feet	lb/ft^3	%	cm^3	seconds	S.U.	
92+30	2.00	74.00	12.00	24.50	42.00	8	SW TRENCH
92+30	30.00	84.00	12.00	24.00	44.00	8	
92+00	2.00	75.00	20.00	24.00	43.00	8	
92+00	31.00	94.00	23.00	24.50	46.00	8	
73+10	2.00	67.00	10.00	21.00	40.00	8	NW TRENCH
73+10	33.00	71.50	13.00	22.00	41.00	8	
72+60	2.00	68.00	11.00	21.50	40.00	8	
72+60	33.00	72.00	14.00	23.00	41.00	8	

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	
	%		%		
92+00	LAB SAMPLE COLLECTED 12/10/03				SW TRENCH
73+00	LAB SAMPLE COLLECTED 12/10/03				NW TRENCH

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
94+25	2.00	N/A	N/A	N/A	1.03×10^{-7}	N/A
94+00	2.00	N/A	N/A	N/A	1.56×10^{-7}	N/A
93+75	2.00	N/A	N/A	N/A	1.20×10^{-7}	N/A
93+50	3.00	N/A	N/A	N/A	4.81×10^{-8}	N/A
93+25	3.00	N/A	N/A	N/A	8.25×10^{-8}	N/A
93+00	3.00	Sample collected	Sample collected	Sample collected	1.02×10^{-7}	yes
75+00	3.00	N/A	N/A	N/A	1.72×10^{-7}	N/A
74+75	4.00	N/A	N/A	N/A	1.53×10^{-7}	N/A
74+50	4.00	N/A	N/A	N/A	1.93×10^{-7}	N/A
74+25	4.00	N/A	N/A	N/A	1.35×10^{-7}	N/A
74+00	3.00	Sample collected	Sample collected	Sample collected	1.74×10^{-7}	N/A
73+75	3.00	N/A	N/A	N/A	1.92×10^{-7}	N/A

COMMENTS

Filter cake: .5mm, 1.0mm, .5mm, 1.0mm, 1.0mm, 1.0mm, 1.2mm and 1.3mm respectively.

Unit Weight:				
94+25:	120.0 pcf	74+25:	109.0 pcf	
94+00:	110.0 pcf	74+00:	110.5 pcf	
93+75:	119.0 pcf	73+75:	114.0 pcf	
93+50:	112.0 pcf			
93+25:	110.0 pcf			
93+00:	112.0 pcf			
75+00:	117.0 pcf			
74+75:	111.0 pcf			
74+50:	121.0 pcf			

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/10/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
8:56	64.00	41.00	20.00	8
10:14	-	45.00	-	-
16:27	65.00	44.00	16.00	8
Filter cake was .5mm and .3mm, respectively.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/10/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy, AM rain; 37 - 55 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
92+20	29.5	32.9	32.9	10.0	328.5	3.9	94+70	OUT	TOP OUT
92+10	29.6	33.0	33.0	10.0	329.5	3.9	94+60	2.3	TOP OUT
92+00	29.9	33.2	33.1	10.0	331.0	3.9	94+50	5.5	TOP OUT
							94+40	7.4	TOP OUT
							94+30	10.3	TOP OUT
							94+20	12.7	TOP OUT
							94+10	15.4	2.8
							94+00	17.9	5.7
							93+90	19.4	9.2
							93+80	21.2	12.1
							93+70	21.9	14.7
							93+60	22.4	17.0
							93+50	23.0	19.3
							93+40	24.4	21.1
							93+30	24.7	22.5
							93+20	25.2	23.2
							93+10	27.3	24.7
							93+00	28.8	25.8
							92+90	29.5	26.3
							92+80	30.5	27.7
							92+70	31.1	28.6
							92+60	33.0	29.2
							92+50	33.1	30.8
							92+40	32.9	31.2
							92+30	32.8	32.8
							92+20		32.9
							92+10		33.0
							92+00		33.2

SF TODAY 989.00

SF TO DATE 58016.90

COMMENTS

Now digging the SW trench with the CAT 320 excavator until the 375 is fixed.

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/10/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

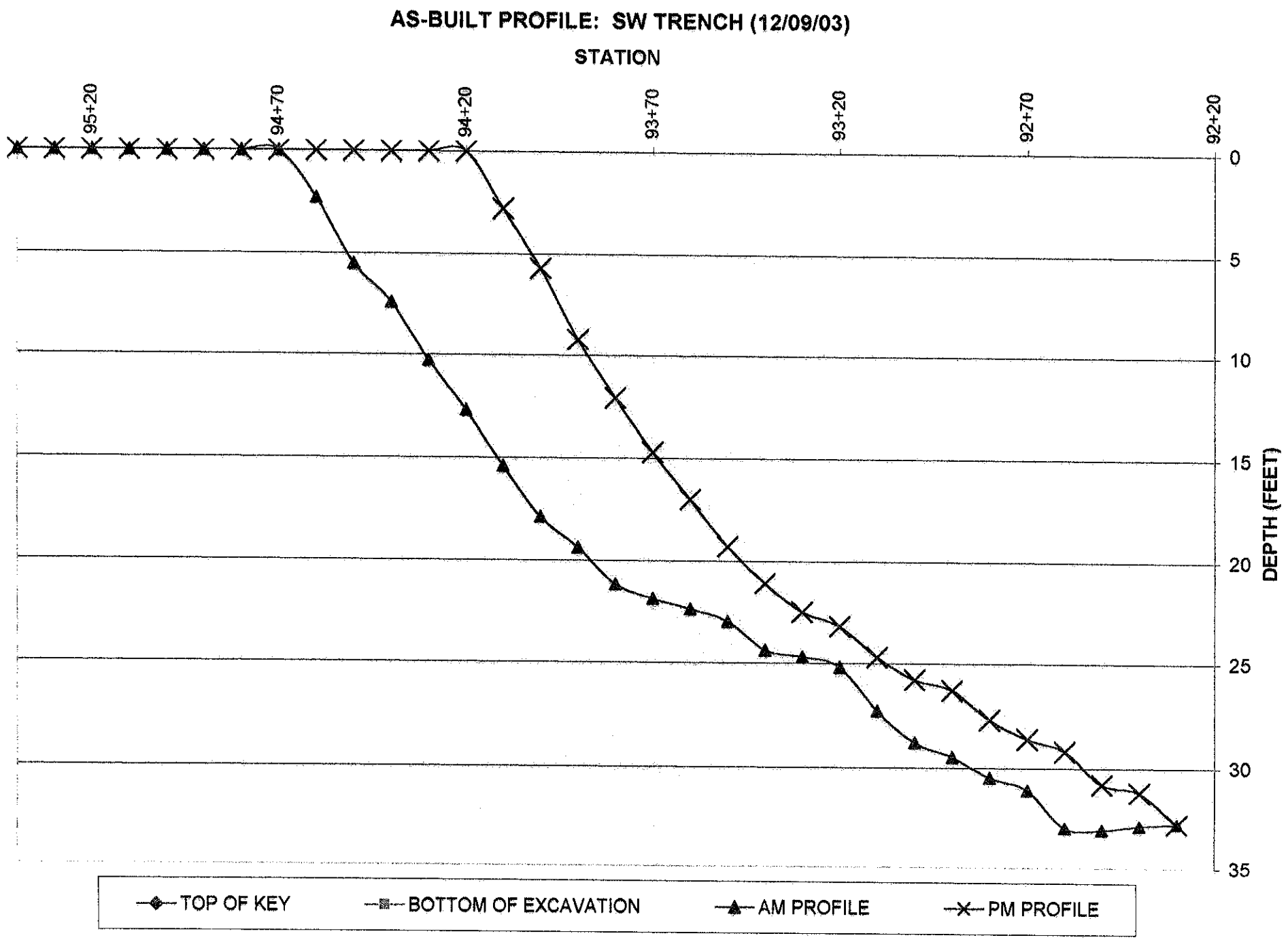
WEATHER: Mostly cloudy, AM rain; 37 - 55 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
73+00	31.9	35.2	35.2	10.0	352.0	20.1	75+40	OUT	OUT
72+90	31.9	35.5	35.4	10.0	353.5	20.0	75+30	3.7	OUT
72+80	32.0	35.2	35.4	10.0	353.5	20.2	75+20	7.1	OUT
72+70	32.0	35.3	35.3	10.0	352.5	20.3	75+10	9.9	OUT
72+60	32.1	35.3	35.3	10.0	353.0	20.4	75+00	11.7	OUT
72+50	32.1	NO BOTTOM					74+90	12.0	OUT
							74+80	14.4	OUT
							74+70	16.1	3.0
							74+60	18.1	5.1
							74+50	21.2	7.3
							74+40	22.9	8.5
							74+30	24.4	11.1
							74+20	25.1	12.2
							74+10	25.6	13.3
							74+00	27.0	14.6
							73+90	28.1	15.5
							73+80	29.2	17.3
							73+70	31.4	18.2
							73+60	32.9	21.4
							73+50	34.8	23.6
							73+40	35.2	25.1
							73+30	35.2	27.4
							73+20	35.1	30.7
							73+10	25.1	33.2
							73+00		35.2
							72+90		35.5
							72+80		35.2
							72+70		35.2
							72+60		35.3
							72+50		32.6
			SF TODAY		1764.50		72+40		25.3
			SF TO DATE		21365.00		72+30		21.4
							72+20		12.3

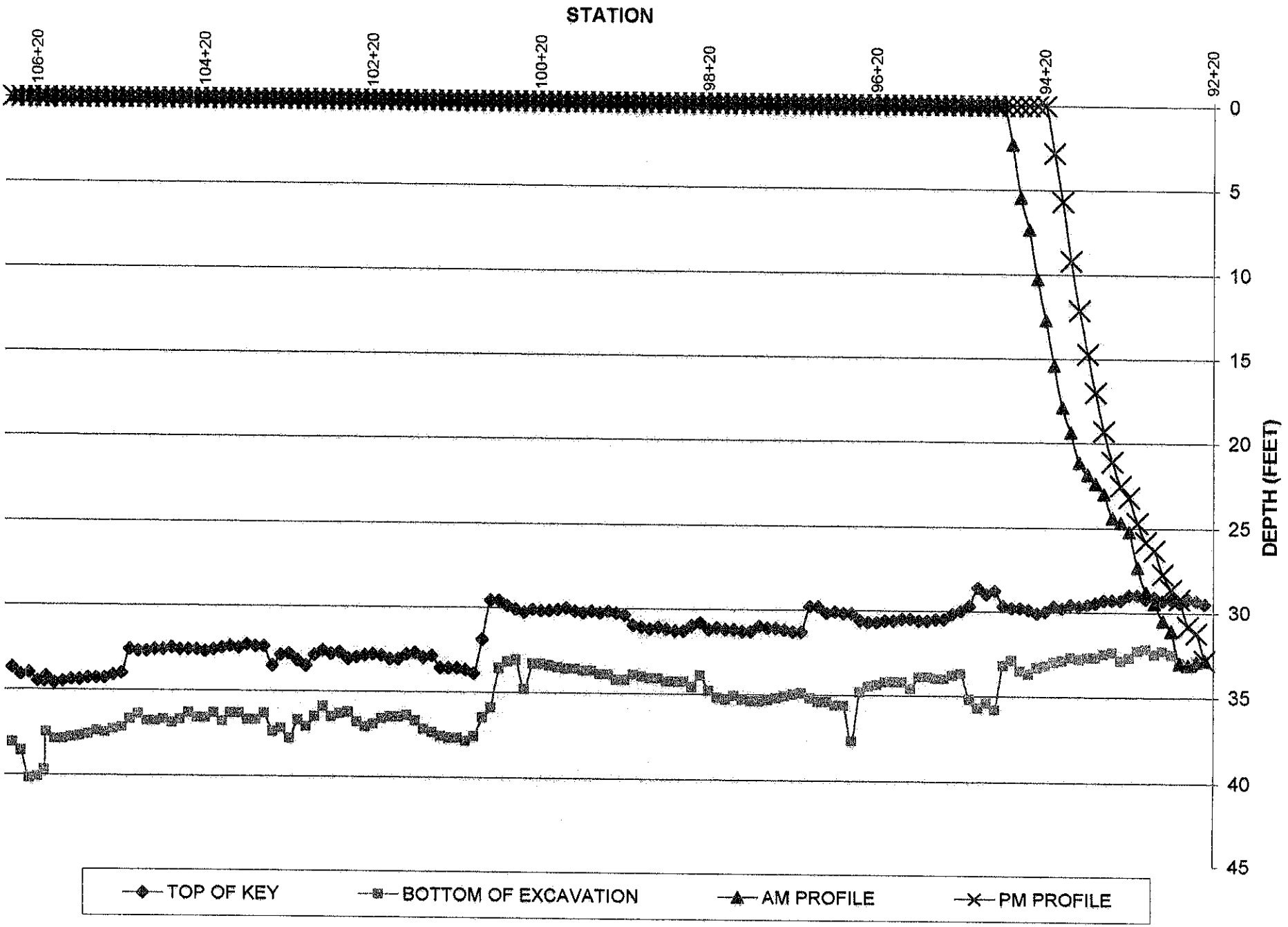
COMMENTS

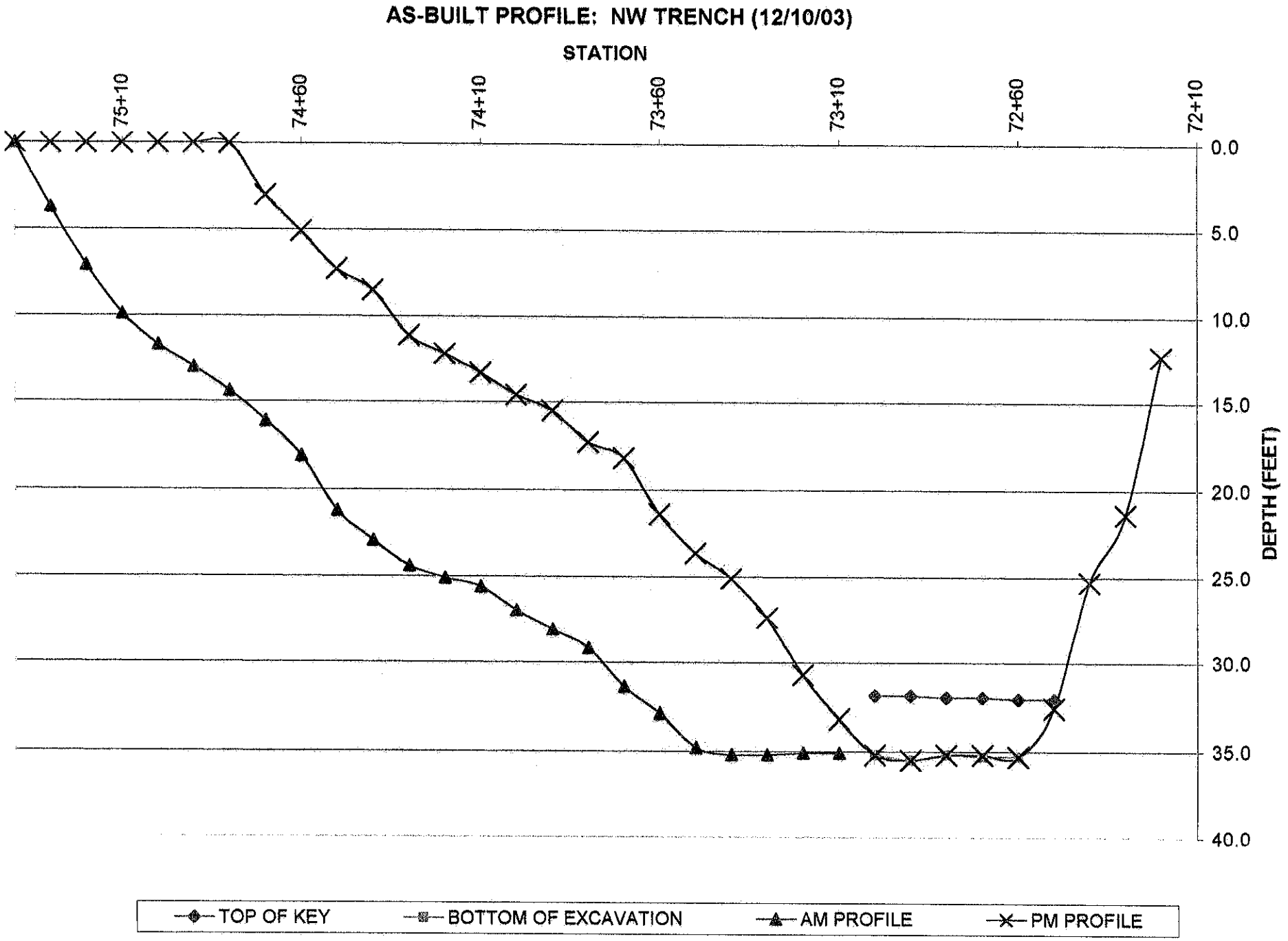
NW Trench

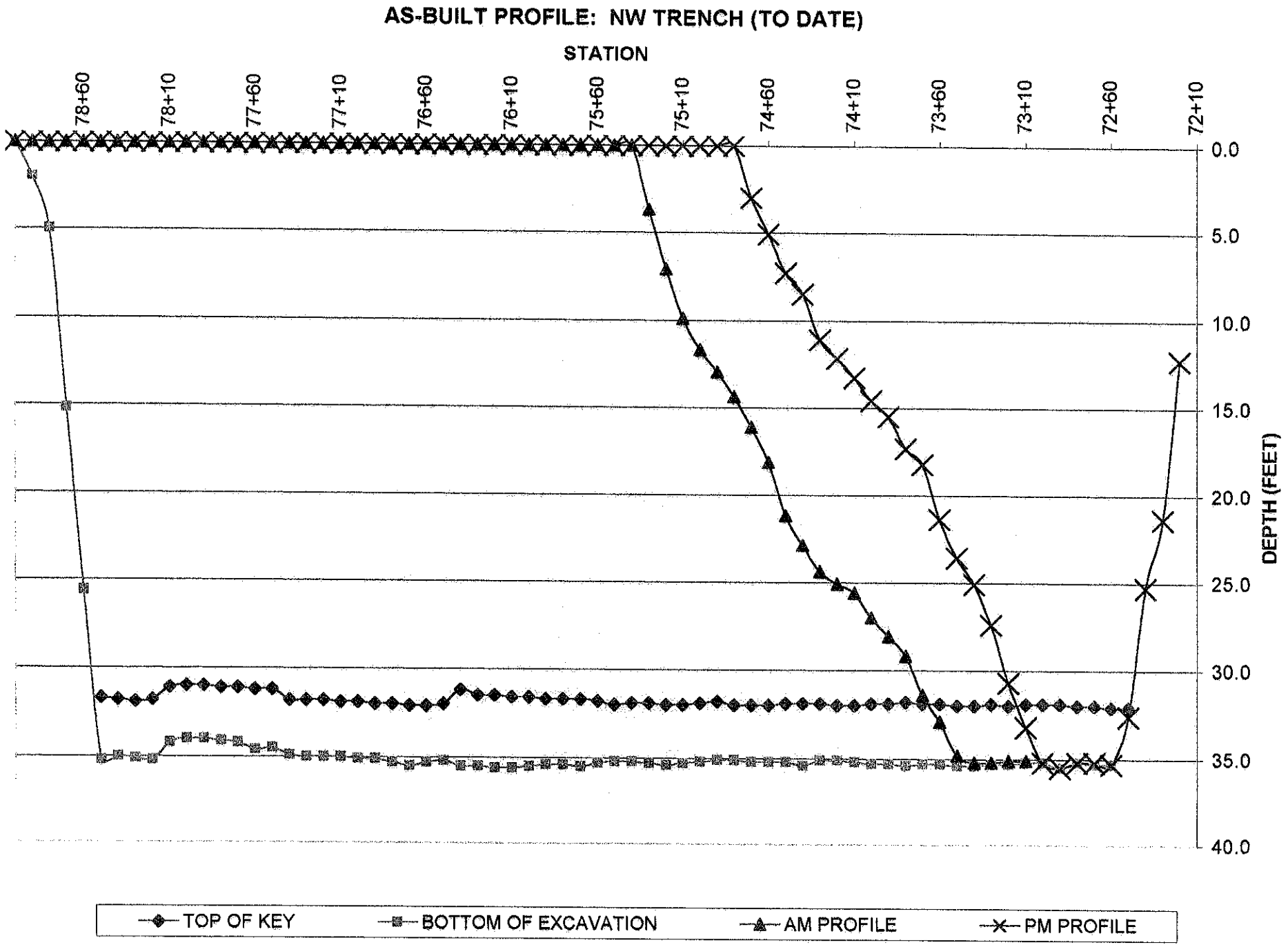
GEO-CON: Suzanne E. Sepic OWNER:


AS-BUILT PROFILE: SW TRENCH (12/09/03)
STATION
95+20
94+70
94+20
93+70
93+20
92+70
92+20
0
5
10
15
20
25
30
35
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: SW TRENCH (TO DATE)




AS-BUILT PROFILE: NW TRENCH (12/10/03)
STATION
75+10
74+60
74+10
73+60
73+10
72+60
72+10
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
78+60
78+10
77+60
77+10
76+60
76+10
75+60
75+10
74+60
74+10
73+60
73+10
72+60
72+10
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS **DATE** 12/10/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	8:56	41	> 40 sec	64	> 64 pcf	8	6.5 - 10	20	< 20 cm^3	.5
PM	16:27	45	> 40 sec	65	> 64 pcf	8	6.5 - 10	16	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:14	44	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

SW Trench

Only a few batches of slurry mixed in the PM

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:10	92+30	2	42	40 - 90 sec	74	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	.5	12	MAX 30%
9:10	92+30	30	44	40 - 90 sec	84	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.0	12	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:58	92+00	2	43	40 - 90 sec	75	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	.5	20	MAX 30%
16:58	92+00	31	46	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	1.0	23	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
94+25	3	2" to 6"	120	+15 pcf over trench slurry	1.03×10^{-7}	1.0×10^{-7} cm/sec
94+00	3	2" to 6"	110	+15 pcf over trench slurry	1.56×10^{-7}	1.0×10^{-7} cm/sec
93+75	3	2" to 6"	119	+15 pcf over trench slurry	1.20×10^{-7}	1.0×10^{-7} cm/sec
93+50	3	2" to 6"	112	+15 pcf over trench slurry	4.81×10^{-8}	1.0×10^{-7} cm/sec
93+25	3	2" to 6"	110	+15 pcf over trench slurry	8.25×10^{-8}	1.0×10^{-7} cm/sec
93+00	3	2" to 6"	112	+15 pcf over trench slurry	1.02×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 94+25, 94+00, 93+75, 93+50, 93+25, 93+00

Technician: RF/MM ✓BY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.0, 6.5, 7.5, 7.0, 6.0, 6.5 cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. factor (1/14.65)
94+25	12/10/03	12:35-16:35	240	10	117.2305	605865.9809	—	15	1.03×10^{-7}	7.03×10^{-9}
94+00	12/10/03	12:35-16:35	240	10	108.2128	559261.0644	—	21	1.56×10^{-7}	1.06×10^{-8}
93+75	12/10/03	12:35-16:35	240	10	93.7844	484692.7847	—	14	1.20×10^{-7}	8.19×10^{-9}
93+50	12/10/03	18:00-6.00	720	10	100.4833	519313.7717	—	18	4.81×10^{-8}	3.28×10^{-9}
93+25	12/10/03	18:00-6.00	720	10	117.2305	605865.9809	—	36	8.25×10^{-8}	5.63×10^{-9}
93+00	12/10/03	18:00-6.00	720	10	108.2128	559261.0644	—	41	1.02×10^{-7}	6.96×10^{-9}

$I = \frac{P\ (psi)}{0.014217\ L\ (cm)}$ $R = \frac{\text{Quick Test}}{\text{Triaxial Test}} = 1.85$

DAILY QC TESTS

DATE 12/10/03

NW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

Trench

Demo

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:35	73+10	2	40	40 - 90 sec	67	64 - 95 pcf	8	6.5 - 10	21	< 25 cm^3	1.0	10	MAX 30%
9:35	73+10	33	41	40 - 90 sec	71.5	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	1.0	13	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
17:00	72+60	2	40	40 - 90 sec	68	64 - 95 pcf	8	6.5 - 10	21.5	< 25 cm^3	1.2	11	MAX 30%
17:00	72+60	33	41	40 - 90 sec	72	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	1.3	14	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
75+00	4	2" to 6"	117	+15 pcf over trench slurry	1.72×10^{-7}	1.0×10^{-7} cm/sec
74+75	4	2" to 6"	111	+15 pcf over trench slurry	1.53×10^{-7}	1.0×10^{-7} cm/sec
74+50	4	2" to 6"	121	+15 pcf over trench slurry	1.93×10^{-7}	1.0×10^{-7} cm/sec
74+25	3	2" to 6"	109	+15 pcf over trench slurry	1.35×10^{-7}	1.0×10^{-7} cm/sec
74+00	3	2" to 6"	110.5	+15 pcf over trench slurry	1.74×10^{-7}	1.0×10^{-7} cm/sec
73+75	3	2" to 6"	114	+15 pcf over trench slurry	1.92×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NW trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 75+00 74+75 74+50 / 74+25 74+00 73+75

Technician: RF/MM VBY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.0 6.5 7.5 / 6.0 7.0 6.0 cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv fac (1/14.6)
75+00	12/10/03	12:35 - 16:35	240	10	117.2305	605865.9809	—	25	1.72×10^{-7}	1.17×10^{-8}
74+75	12/10/03	12:35 - 16:35	240	10	108.2128	559201.0644	—	20.5	1.53×10^{-7}	1.04×10^{-8}
74+50	12/10/03	12:35 16:35	240	10	93.7844	484682.7847	—	22.5	1.93×10^{-7}	1.32×10^{-8}
74+25	12/10/03	18:00 - 6:00	720	10	117.2305	605865.9809	—	59	1.35×10^{-7}	9.22×10^{-9}
74+00	12/10/03	18:00 - 6:00	720	10	100.4833	519313.7717	—	65	1.74×10^{-7}	1.19×10^{-8}
73+75	12/10/03	18:00 - 6:00	720	10	117.2305	605865.9809	—	84	1.92×10^{-7}	1.31×10^{-8}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 12/09/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	—	—	> 40 sec	—	> 64 pcf	—	6.5 - 10	—	< 20 cm^3	—
PM	16:30	58	> 40 sec	64.5	> 64 pcf	8	6.5 - 10	12	< 20 cm^3	.2

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

SW Trench

No AM slurry mixing. Begin mixing at 16:30

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:15	92+90	2	40	40 - 90 sec	83	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	1.0	6	MAX 30%
8:15	92+90	30	42	40 - 90 sec	87	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	1.4	11	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:14	92+40	2	40	40 - 90 sec	78	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.2	7	MAX 30%
16:14	92+40	30	43	40 - 90 sec	90	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	1.6	13	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
94+75	2	2" to 6"	117	+15 pcf over trench slurry	1.46×10^{-7}	1.0×10^{-7} cm/sec
94+50	2	2" to 6"	119	+15 pcf over trench slurry	1.82×10^{-7}	1.0×10^{-7} cm/sec
94+25	2	2" to 6"	116.5	+15 pcf over trench slurry	1.24×10^{-7}	1.0×10^{-7} cm/sec
94+00	3	2" to 6"	118.5	+15 pcf over trench slurry	1.34×10^{-7}	1.0×10^{-7} cm/sec
93+75	3	2" to 6"	114	+15 pcf over trench slurry	7.45×10^{-8}	1.0×10^{-7} cm/sec
93+50	3		111.5		8.60×10^{-8}	

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SW Trench

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 94+75, 94+50, 94+25, 94+00, 93+75, 93+50

Technician: RF/MM ✓BY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.7, 6.5, 7.0 / 6.0, 6.5, 6.0 cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/ΔT x I/X (cm/sec)	w/ compaction factor (1/14.065)
94+75	12/09/03	11:50 / 15:50	240	10	104.9826	542568.8740	—	19	1.46×10^{-7}	9.96×10^{-9}
94+50	12/09/03	11:50 / 15:50	240	10	108.2128	559261.0644	—	24.5	1.82×10^{-7}	1.24×10^{-8}
94+25	12/09/03	11:50 / 15:50	240	10	100.4833	519313.7717	—	15.5	1.24×10^{-7}	8.64×10^{-9}
94+00	12/09/03	18:37 / 6:37	720	10	117.2305	605865.9809	—	58.5	1.34×10^{-7}	9.15×10^{-9}
93+75	12/09/03	18:37 / 6:37	720	10	108.2128	559261.0644	—	30	7.45×10^{-8}	5.08×10^{-9}
93+50	12/09/03	18:37 / 6:37	720	10	117.2305	605865.9809	—	37.5	8.60×10^{-8}	5.87×10^{-9}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

DAILY QC TESTS

DATE 12/109/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NW Trench

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

SW trench

same as

NOTE TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:58	74+20	2	41	40 - 90 sec	74	64 - 95 pcf	8	6.5 - 10	19	< 25 cm^3	1.0	4	MAX 30%
7:58	74+20	33	43	40 - 90 sec	83	64 - 95 pcf	8	6.5 - 10	20.5	< 25 cm^3	1.5	7	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
17:03	73+30	2	40	40 - 90 sec	76	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	1.5	4	MAX 30%
17:03	73+30	32	42	40 - 90 sec	84.5	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.5	8	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
76+25	3	2" to 6"	108.5	+15 pcf over trench slurry	1.35×10^{-7}	1.0×10^{-7} cm/sec
76+00	4	2" to 6"	116.5	+15 pcf over trench slurry	1.54×10^{-7}	1.0×10^{-7} cm/sec
75+75	4	2" to 6"	114	+15 pcf over trench slurry	8.56×10^{-8}	1.0×10^{-7} cm/sec
75+50	4	2" to 6"	115.5	+15 pcf over trench slurry	1.09×10^{-7}	1.0×10^{-7} cm/sec
75+25	3	2" to 6"	113.5	+15 pcf over trench slurry	1.32×10^{-7}	1.0×10^{-7} cm/sec
75+00	3		118.5		1.02×10^{-7}	

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NW Trench

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 76+25, 76+00 75+75 75+50, 75+25, 75+00

Technician: RF/MM vor SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.5, 6.5, 6.5 7.5 7.0, 6.5 cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/ΔT x 1/X (cm/sec)	w/conv. fract. (1/14.69)
76+25	12/09/03	11:50 - 15:50	240	10	93.7844	494692.7847	—	16	1.35×10^{-7}	9.21×10^{-9}
76+00	12/09/03	11:50 - 15:50	240	10	104.9826	542568140	—	20	1.54×10^{-7}	1.05×10^{-8}
75+75	12/09/03	11:50 - 15:50	240	10	108.2128	559261.0644	—	11.5	8.56×10^{-8}	5.84×10
75+50	12/09/03	18:37 - 6:37	720	10	93.7844	494692.7847	—	39	1.09×10^{-7}	7.44×10^{-9}
75+25	12/09/03	18:37 - 6:37	720	10	100.4833	519313.7717	—	49.5	1.32×10^{-7}	9.01×10^{-9}
75+00	12/09/03	18:37 - 6:37	720	10	108.2128	559261.0644	—	41	1.02×10^{-7}	6.96×10^{-9}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 11-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO: P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By: Atul Kumar	Date / Time: 12/11/03
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-022	SOIL ONLY	92+00	12/10/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-023	SOIL ONLY	73+00	12/10/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-027	SB BACKFILL**	74+00	12/10/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-028	SB BACKFILL**	93+00	12/10/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold - Site

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/9/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV005926	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-8-03	MONT TRANS #843	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	60
Plastic Viscosity (cP)	N/A	
Yield Point (#/ 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.8
> 75 micron (wt. %)	4.0 max.	1.7

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.5
Y.P. / P.V. Ratio	3.0 max.	1.75

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Signed 12/9/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Arrived onsite 12/10/03

4000 # Bags

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/8/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV006007	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-3-03	ARROW 4054	GREYBULL	GEL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	65
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.2
> 75 micron (wt. %)	4.0 max.	1.7

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.5
Y.P. / P.V. Ratio	3.0 max.	1.73

This certifies that the product shipped to the location as stated above meets the requirements of API Specification 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-287-765-4636.

Signed 12/4/03 Date

Approved by: Plant Manager

LibraryGeo.doc (4/22/97)
Rev E (9/99)

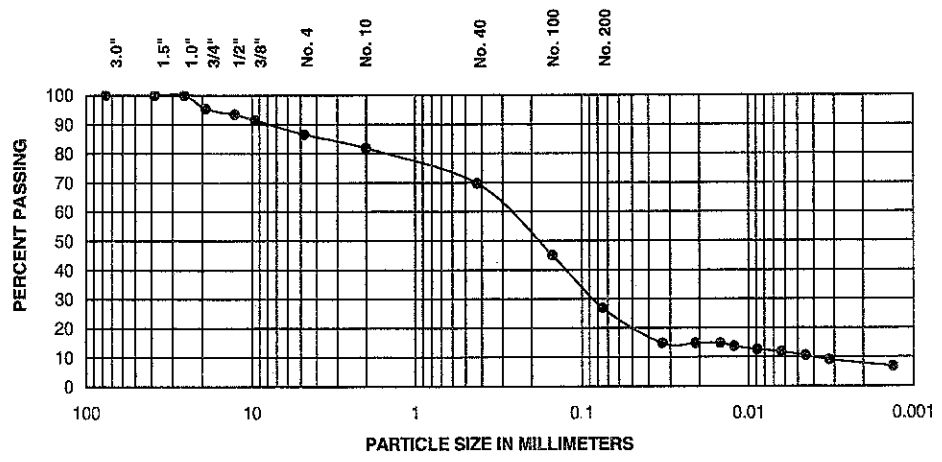
Arrived onsite 12/10/03

4000# Jumbo

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-027	**Date Tested**	12/16/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/11/2003
Sample Location	74+00 (NW)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	13.5	59.7	15.8	11.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	95.4
1/2"	93.4
3/8"	91.4
No. 4	86.5
No. 10	81.8
No. 40	69.7
No. 100	45.0
No. 200	26.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
28	20	8

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

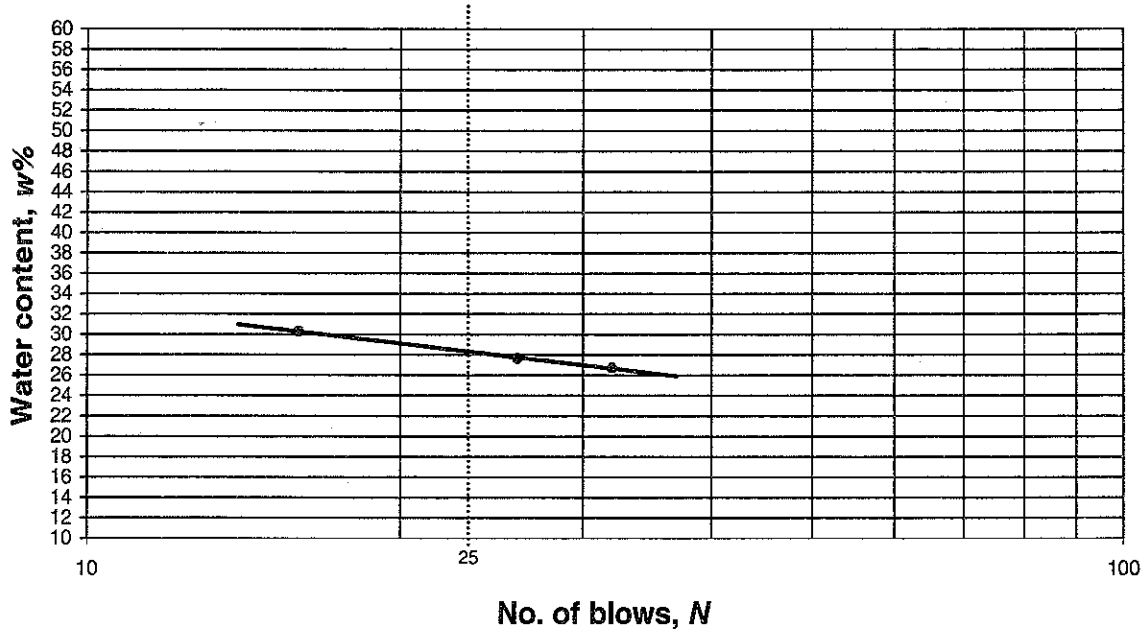
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-027	**Date Tested**	12/16/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/11/2003
Sample Location	74+00 (NW)
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	28	**Plastic Limit, PL**	20	**Plasticity Index, PI**	8

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/15/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-027	Date Recd.	12/11/03	**Location**	74+00 (NW)		
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.26	cm	Volume, V:	254.9	cu cm
Mass of Sample:	453.8	g	**Moisture Content:**	**26.0**	%
			Wet Density	**111.1**	**pcf**
			Dry Density	**88.2**	**pcf**

Final

Diameter:	7.02	cm	Area, A:	38.7	sq cm
Height, L:	4.88	cm	Volume, V:	188.9	cu cm
Mass of Sample:	392.20	g	**Moisture Content:**	**22.1**	%
			Wet Density	**129.6**	**pcf**
			Dry Density	**106.1**	**pcf**
			Deg of Saturation	**98.5**	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	76.8 psi
Gradient:	20.2

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/15/2003	9:15 AM	0	0	3.26	5.94		20.0	---
12/15/2003	10:00 AM	2700	2700	3.33	5.88	1.2	20.0	2.36E-08
12/15/2003	10:45 AM	2700	5400	3.41	5.81	1.1	20.0	2.77E-08
12/15/2003	11:30 AM	2700	8100	3.52	5.72	1.2	20.0	3.59E-08
12/15/2003	12:15 PM	2700	10800	3.61	5.64	1.1	20.0	3.22E-08

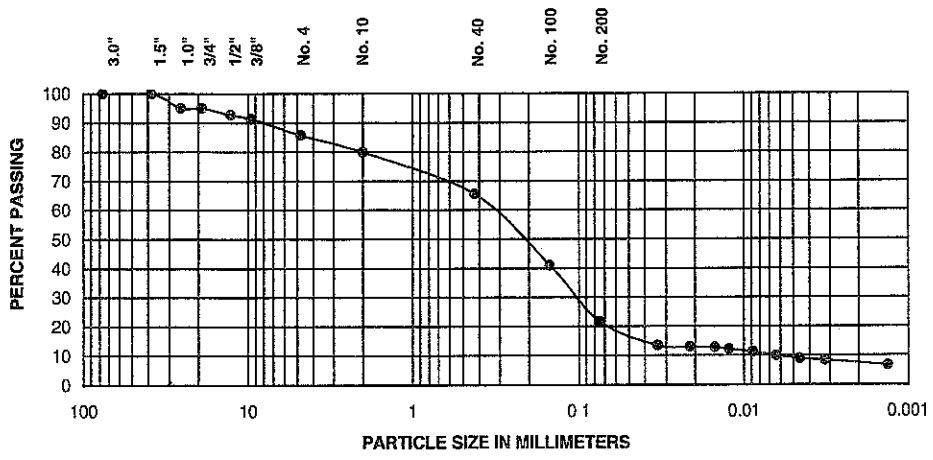
Average Permeability = **3.0E-08** cm/sec

Remarks:

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-028	**Date Tested**	12/17/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/11/2003
Sample Location	93+00 (SW)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	14.3	63.9	12.5	9.3

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	95.0
3/4"	95.0
1/2"	92.7
3/8"	91.3
No. 4	85.7
No. 10	79.9
No. 40	65.6
No. 100	41.1
No. 200	21.8

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
37	24	13

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

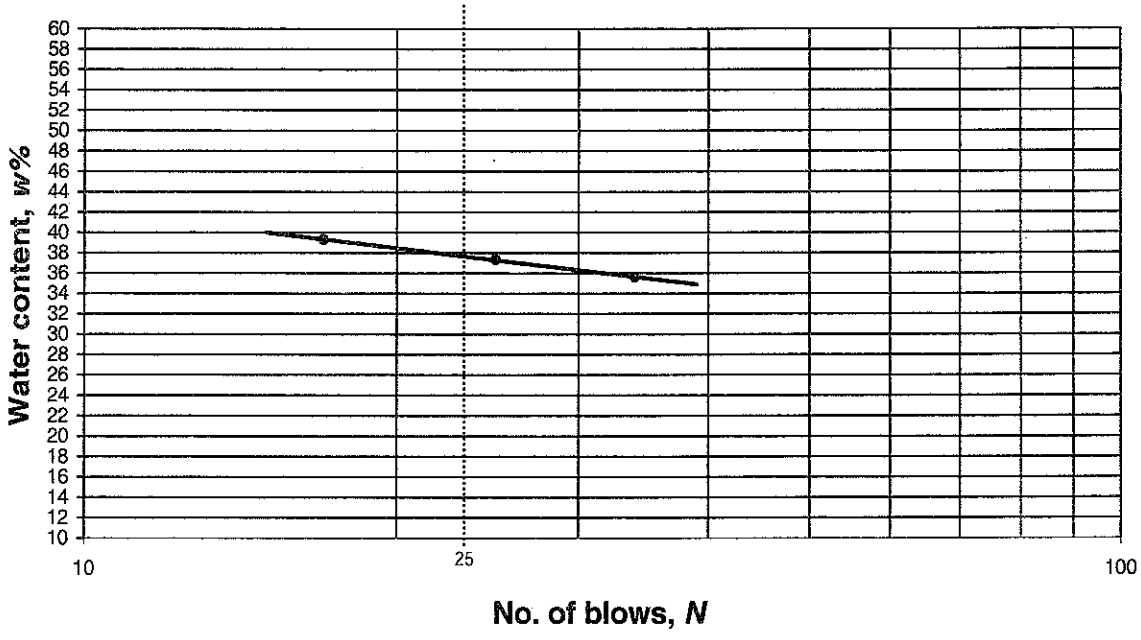
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-028	**Date Tested**	12/16/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/11/2003
Sample Location	93+00 (SW)
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**37**	**Plastic Limit, PL**	**24**	**Plasticity Index, PI**	**13**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/16/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-028	Date Recd.	12/11/03	**Location**	93+00 (SW)		
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.47	cm	Volume, V:	222.7	cu cm
Mass of Sample:	415.0	g	**Moisture Content:**	**29.7**	%
			Wet Density	**116.3**	**pcf**
			Dry Density	**89.7**	**pcf**

Final

Diameter:	7.04	cm	Area, A:	38.9	sq cm
Height, L:	5.12	cm	Volume, V:	199.3	cu cm
Mass of Sample:	399.50	g	**Moisture Content:**	**25.1**	%
			Wet Density	**125.1**	**pcf**
			Dry Density	**100.0**	**pcf**
			Deg of Saturation	**96.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	23.1	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/16/2003	7:00 AM	0	0	3.01	6.14	.	20.0	---
12/16/2003	7:45 AM	2700	2700	3.06	6.09	1.0	20.0	1.68E-08
12/16/2003	8:30 AM	2700	5400	3.10	6.05	1.0	20.0	1.35E-08
12/16/2003	9:15 AM	2700	8100	3.15	6.00	1.0	20.0	1.69E-08
12/16/2003	10:00 AM	2700	10800	3.19	5.96	1.0	20.0	1.36E-08

Average Permeability = **1.5E-08** cm/sec

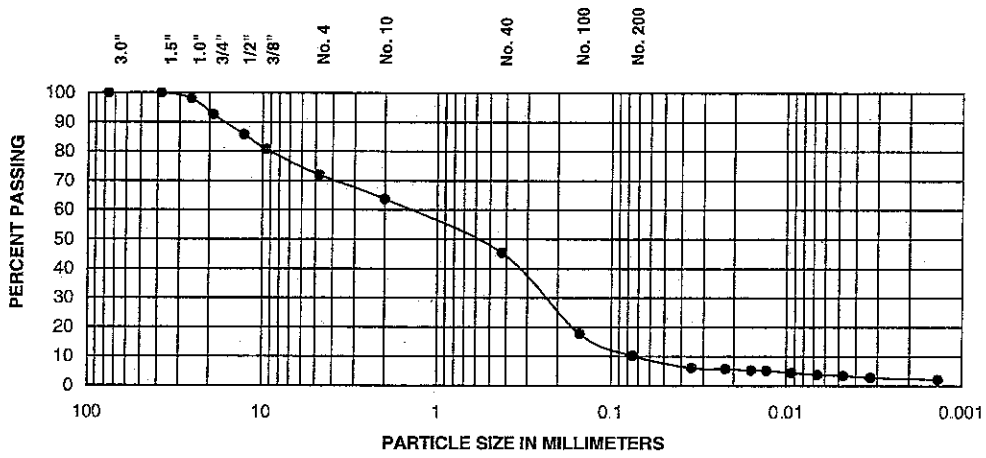
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-022	**Date Tested**	12/17/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/11/2003
Sample Location	92+00 (SW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	% Gravel	% Sand	% Silt	% Clay
0.0	28.1	61.6	6.8	3.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.45	0.24	0.07	20.5	0.55

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.1
3/4"	92.7
1/2"	85.8
3/8"	80.8
No. 4	71.9
No. 10	63.8
No. 40	45.4
No. 100	17.7
No. 200	10.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

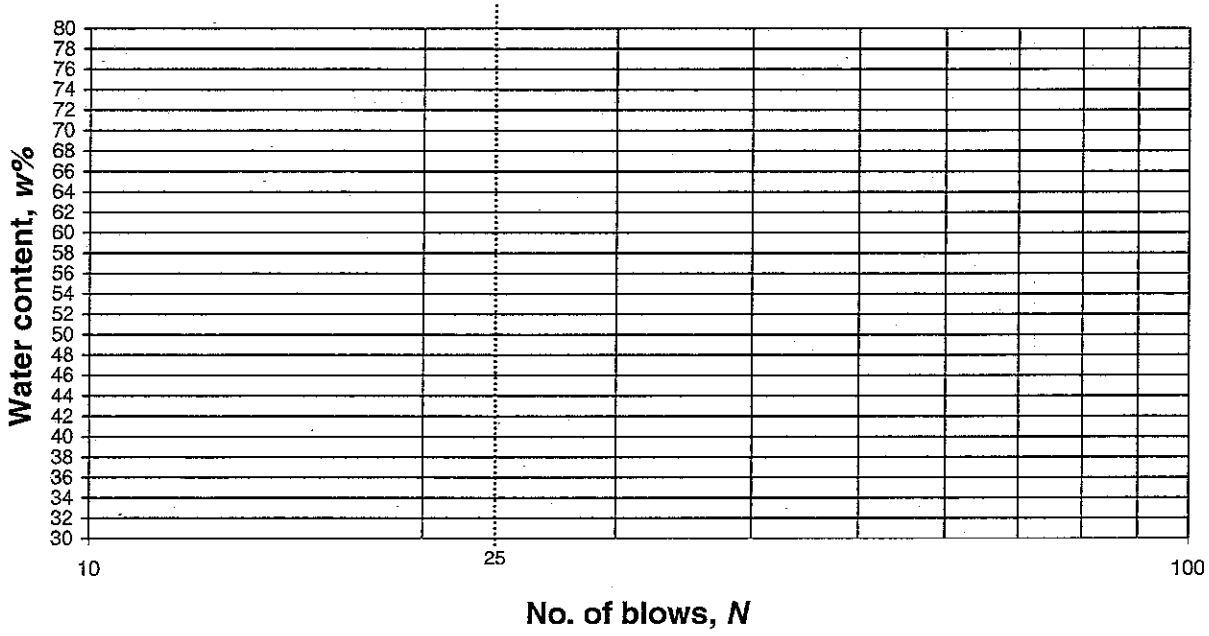
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-022	**Date Tested**	12/17/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/11/2003
Sample Location	92+00 (SW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	9	Date	12/10/2003	Sheet	1
				Date of weighing	12/11/2003	Tested by	NP

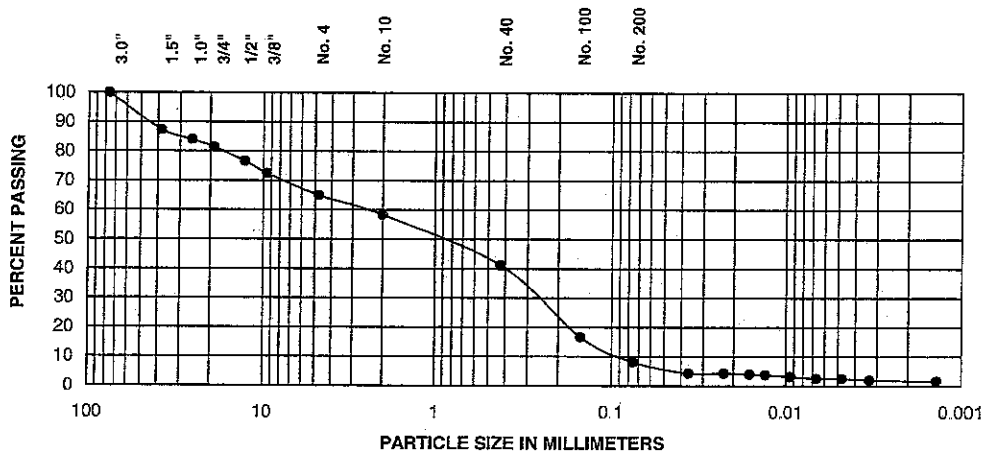
Boring No.	-	-	-			
Sample No.	BF-021	BF-022	BF-023			
Location	74 + 00 (NW)	92 + 00 (SW)	73 + 00 (NW)			
Tin No.	18C	98A	85A			
Tin + Wet Soil	157.3	155.18	158.64			
Tin + Dry Soil	130.9	127.25	129.65			
Wt. of Tin	31.26	30.74	30.08			
Wt. of Dry Soil	99.6	96.5	99.6			
Wt. of Water	26.4	27.9	29.0			
Moisture, %	26.5	28.9	29.1			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-023	**Date Tested**	12/17/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/11/2003
Sample Location	73+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	35.0	56.8	5.6	2.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	2.48	0.26	0.09	28.5	0.32

Sieve Size	Percent Passing
3.0"	100.0
1.5"	87.4
1.0"	84.0
3/4"	81.4
1/2"	76.6
3/8"	72.5
No. 4	65.0
No. 10	58.3
No. 40	41.2
No. 100	16.7
No. 200	8.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

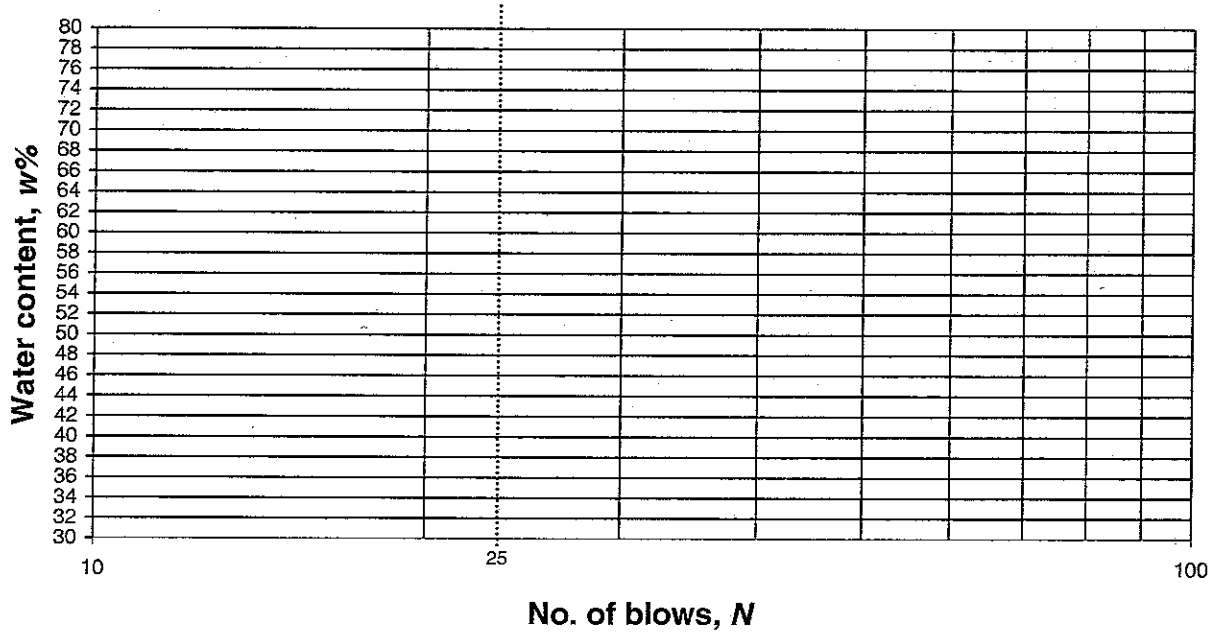
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-023	**Date Tested**	12/17/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/11/2003
Sample Location	73+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	9	Date	12/10/2003	Sheet	1
				Date of weighing	12/11/2003	Tested by	NP

Boring No.	-	-	-			
Sample No.	BF-021	BF-022	BF-023			
Location	74 + 00 (NW)	92 + 00 (SW)	73 + 00 (NW)			
Tin No.	18C	98A	85A			
Tin + Wet Soil	157.3	155.18	158.64			
Tin + Dry Soil	130.9	127.25	129.65			
Wt. of Tin	31.26	30.74	30.08			
Wt. of Dry Soil	99.6	96.5	99.6			
Wt. of Water	26.4	27.9	29.0			
Moisture, %	26.5	28.9	29.1			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/11/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 22 - 30 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH	
	feet	lb/ft^3	%	cm^3	seconds	S.U.	
92+00	2.00	84.00	25.00	24.00	40.00	8	SW TRENCH
92+00	31.00	85.00	26.00	24.00	41.00	8	
91+00	2.00	94.00	28.00	23.50	48.00	8	
91+00	32.00	95.00	28.00	24.00	49.00	8	
72+50	2.00	70.00	19.00	24.50	40.00	8	NW TRENCH
72+50	33.00	74.50	21.00	24.50	40.00	8	
72+30	2.00	71.00	20.00	24.50	40.00	8	
72+30	33.00	75.00	21.00	25.00	40.00	8	

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	
	%		%		
91+00	LAB SAMPLE COLLECTED 12/11/03				SW TRENCH
72+00	LAB SAMPLE COLLECTED 12/11/03				NW TRENCH

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
93+50	3.00	N/A	N/A	N/A	5.22×10^{-8}	N/A
93+25	3.00	N/A	N/A	N/A	1.71×10^{-7}	N/A
93+00	3.00	Sample collected	Sample collected	Sample collected	5.62×10^{-8}	yes
92+75	3.00	N/A	N/A	N/A	8.94×10^{-8}	N/A
92+50	3.00	N/A	N/A	N/A	1.24×10^{-7}	N/A
92+25	3.00	N/A	N/A	N/A	2.00×10^{-7}	N/A
92+00	3.00	Sample collected	Sample collected	Sample collected	1.71×10^{-7}	yes
91+75	3.00	N/A	N/A	N/A	1.52×10^{-7}	N/A
74+50	3.00	N/A	N/A	N/A	2.31×10^{-7}	N/A
74+25	3.00	N/A	N/A	N/A	1.49×10^{-7}	N/A
74+00	3.00	N/A	N/A	N/A	2.17×10^{-7}	N/A
73+75	3.00	N/A	N/A	N/A	2.89×10^{-7}	N/A
73+50	3.00	N/A	N/A	N/A	2.52×10^{-7}	N/A
73+25	3.00	N/A	N/A	N/A	2.18×10^{-7}	N/A
73+00	3.00	Sample collected	Sample collected	Sample collected	2.27×10^{-7}	yes

COMMENTS

Filter cake: 1.0mm, 1.0mm, 2.0mm, 2.5mm, 1.0mm, 1.0mm, 1.0mm and 1.1mm respectively.

Soil sample from 72+00 was actually from 72+50. See page 4.

Unit Weight:

93+50:	116.0 pcf	74+00:	112.0 pcf
93+25:	115.5 pcf	73+75:	112.0 pcf
93+00:	111.0 pcf	73+50:	118.0 pcf
92+75:	120.5 pcf	73+25:	117.5 pcf
92+50:	114.5 pcf	73+00:	111.0 pcf
92+25:	112.0 pcf	91+75:	117.5 pcf
92+00:	116.0 pcf		
74+50:	110.0 pcf		
74+25:	115.5 pcf		

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepo OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/11/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
N/A				
No fresh slurry mixed today at the batch plant.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E Sepo OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/11/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 22 - 30 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
91+90	29.9	33.3	33.3	10.0	332.5	3.9	94+20	OUT	TOP OUT
91+80	30.2	33.6	33.5	10.0	334.5	3.9	94+10	3.0	TOP OUT
91+70	30.3	33.8	33.7	10.0	337.0	3.9	94+00	6.1	TOP OUT
91+60	30.4	33.9	33.9	10.0	338.5	3.8	93+90	9.4	TOP OUT
91+50	30.8	34.1	34.0	10.0	340.0	3.8	93+80	12.3	TOP OUT
91+40	30.7	34.5	34.3	10.0	343.0	3.8	93+70	14.8	TOP OUT
91+30	31.0	34.8	34.7	10.0	346.5	3.8	93+60	17.1	TOP OUT
91+20	31.3	35.0	34.9	10.0	349.0	3.7	93+50	19.5	TOP OUT
91+10	31.0	34.7	34.9	10.0	348.5	3.7	93+40	21.2	TOP OUT
91+00	30.7	34.5	34.6	10.0	346.0	3.6	93+30	22.5	TOP OUT
90+90	30.5	34.1	34.3	10.0	343.0	3.6	93+20	23.3	TOP OUT
							93+10	24.7	TOP OUT
							93+00	25.8	TOP OUT
							92+90	26.3	TOP OUT
							92+80	27.5	TOP OUT
							92+70	28.5	TOP OUT
							92+60	29.0	3.4
							92+50	30.4	6.5
							92+40	31.0	8.2
							92+30	32.8	10.7
							92+20	32.9	13.4
							92+10	33.0	16.2
							92+00	33.2	19.7
							91+90		21.5
							91+80		23.3
							91+70		26.9
							91+60		29.1
							91+50		31.6
							91+40		32.2
							91+30		33.7
							91+20		35.0
							91+10		34.7
							91+00		34.5
							90+90		34.1

SF TODAY 3758.50

SF TO DATE 61775.40

COMMENTS

Now digging the SW trench with the CAT 320 excavator until the 375 is fixed.

GEO-CON Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/11/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 22 - 30 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
72+50	32.1	35.6	35.5	10.0	354.5	20.5	74+80	OUT	OUT
72+40	31.9	35.5	35.6	10.0	355.5	21.0	74+70	3.3	OUT
72+30	31.9	35.4	35.5	10.0	354.5	21.5	74+60	5.4	OUT
							74+50	7.5	OUT
							74+40	8.6	OUT
							74+30	11.4	OUT
							74+20	12.5	OUT
							74+10	13.5	OUT
							74+00	14.8	OUT
							73+90	15.9	1.5
							73+80	17.6	4.5
							73+70	18.8	6.3
							73+60	21.7	8.9
							73+50	23.8	9.2
							73+40	25.2	9.9
							73+30	27.5	10.3
							73+20	30.8	11.0
							73+10	33.4	12.8
							73+00	35.4	13.9
							72+90	35.1	15.9
							72+80	35.1	19.2
							72+70	35.3	23.8
							72+60	32.6	26.5
							72+50	25.3	31.1
							72+40	21.3	34.6
							72+30	12.1	35.4
							71+60		21.4
							71+50		12.3
							71+40		8.5

SF TODAY 1064.50

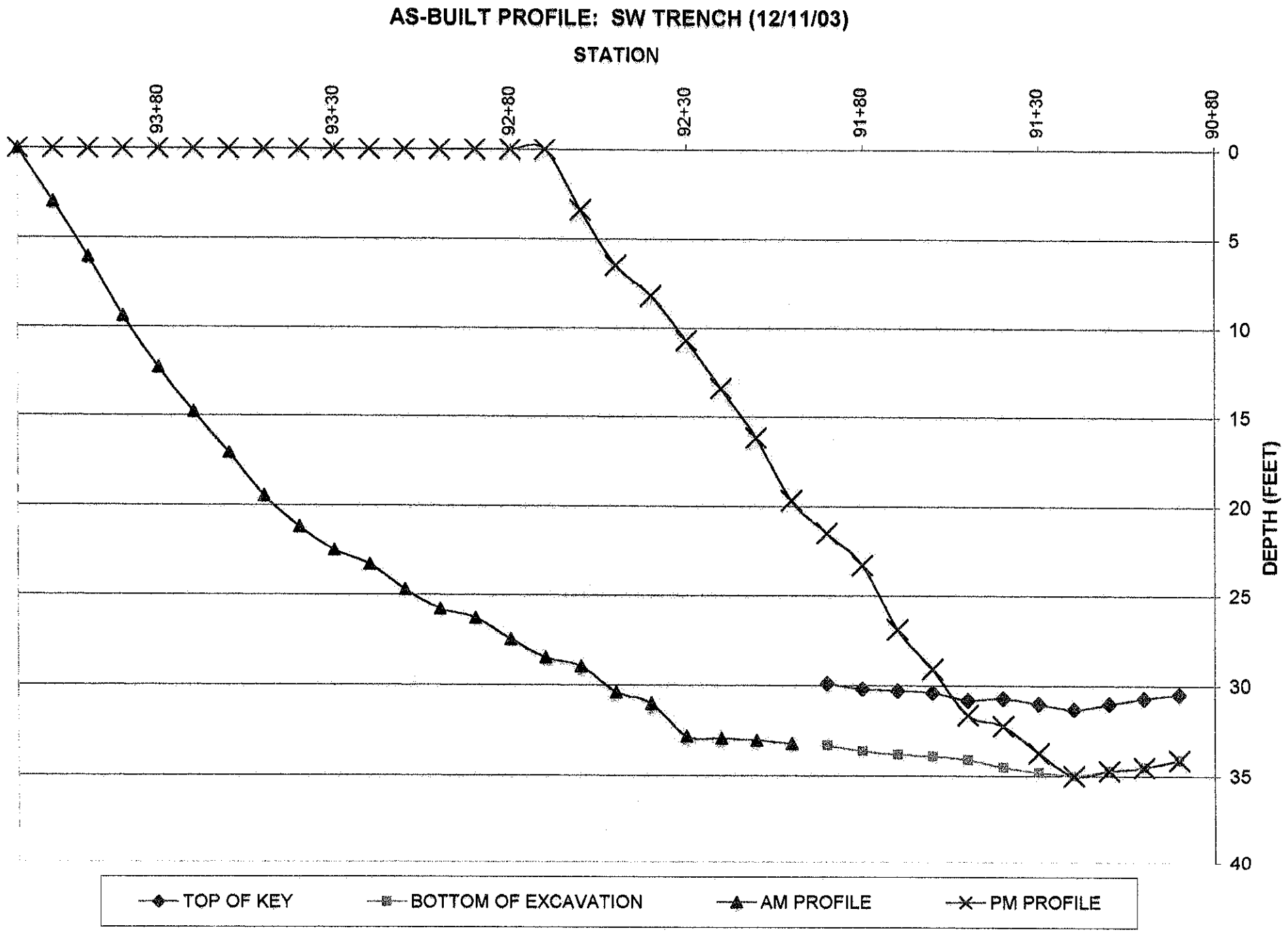
SF TO DATE 22429.50

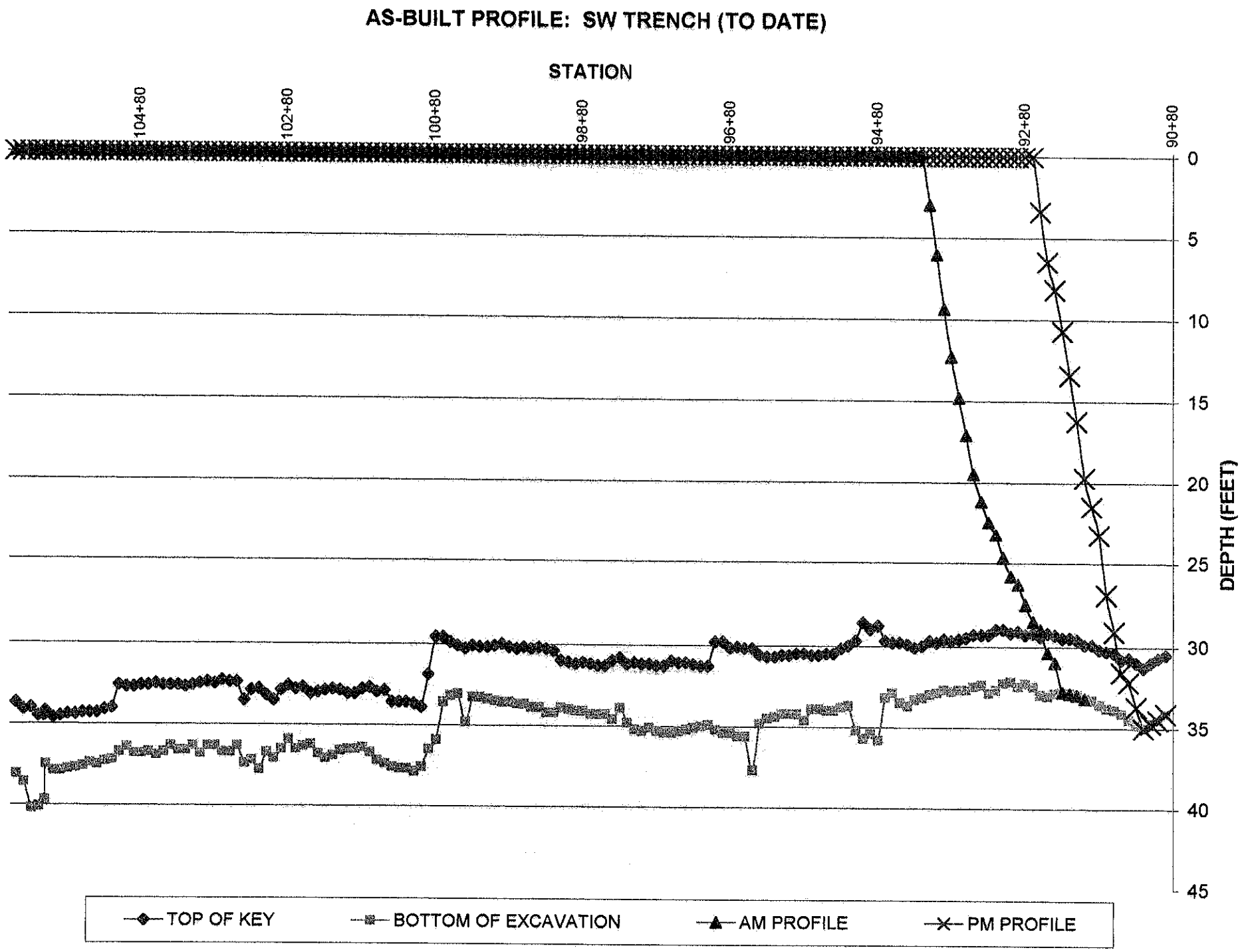
COMMENTS

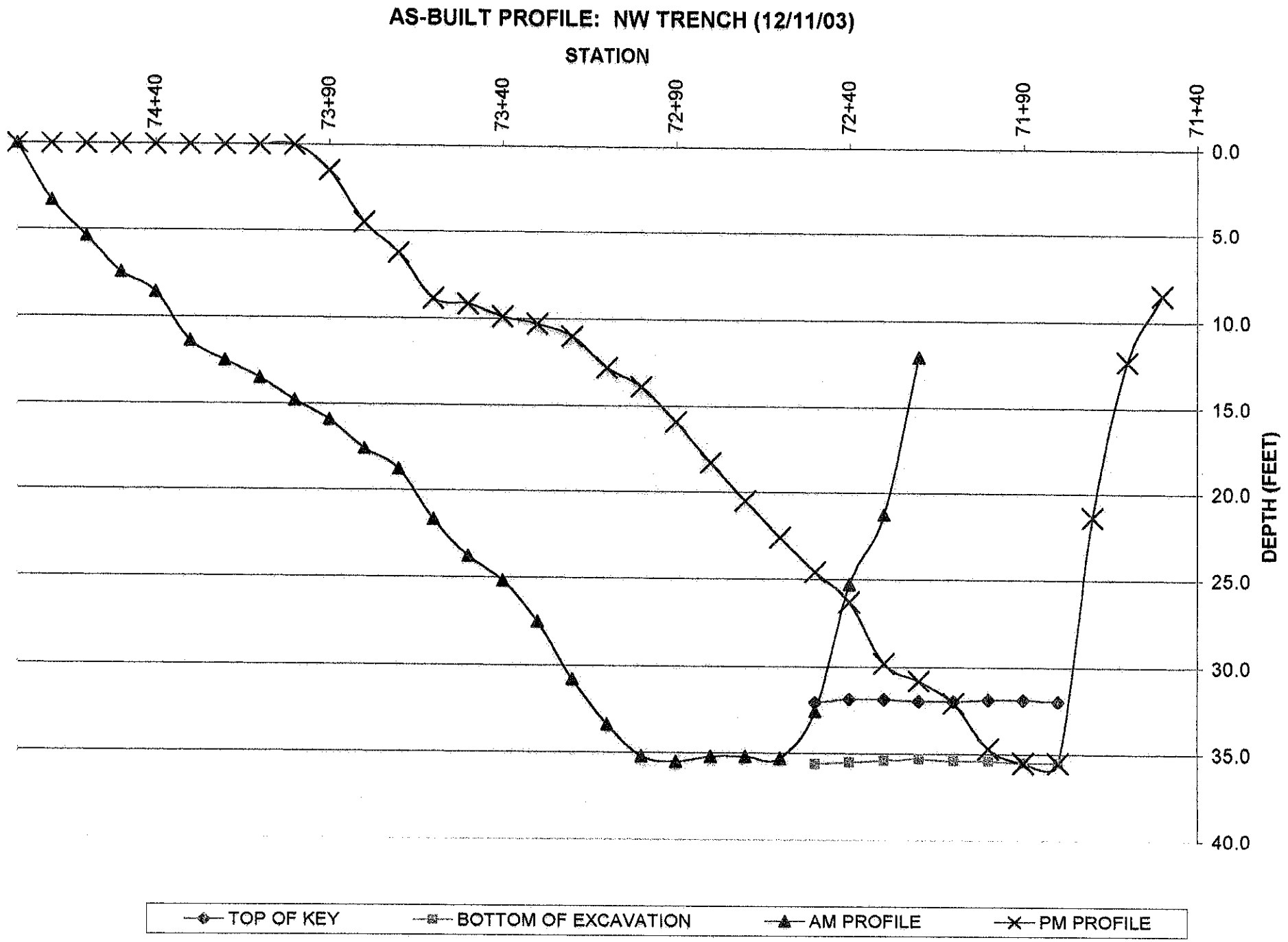
NW Trench

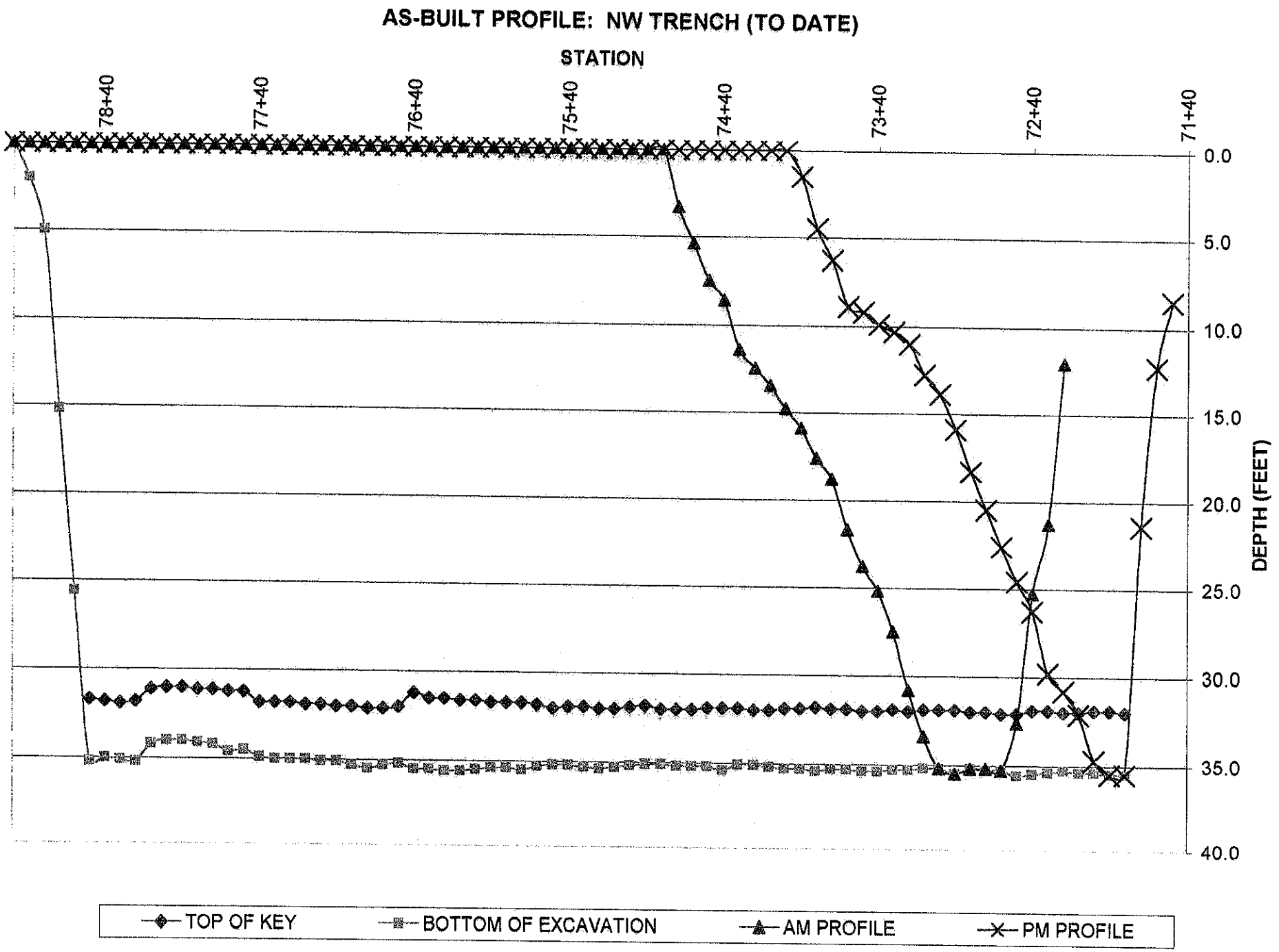
Due to realignment of the slurry wall by DLZ, Station 72+23 and Station 71+63 are in the same location. Therefore, stationing will go 72+40, 72+30, 71+60, 71+50...

GEO-CON: Suzanne E. Sepic OWNER:


AS-BUILT PROFILE: SW TRENCH (12/11/03)
STATION
93+80
93+30
92+80
92+30
91+80
91+30
90+80
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SW TRENCH (TO DATE)
STATION
104+80
102+80
100+80
98+80
96+80
94+80
92+80
90+80
0
5
10
15
20
25
30
35
40
45
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (12/11/03)
STATION
74+40
73+90
73+40
72+90
72+40
71+90
71+40
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
78+40
77+40
76+40
75+40
74+40
73+40
72+40
71+40
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/11/03

SW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

No bentonite slurry mixing today

Station	Slump	Unit Wt.	Perm
91+75	3"	117.5	1.52×10^{-7}

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:46	92+00	2	40	40 - 90 sec	84	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.0	25	MAX 30%
8:46	92+00	31	41	40 - 90 sec	85	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.0	26	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:29	91+00	2	48	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	23.5	< 25 cm^3	2.0	28	MAX 30%
16:29	91+00	32	49	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	2.5	28	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
93+50	3	2" to 6"	116	+15 pcf over trench slurry	5.22×10^{-8}	1.0×10^{-7} cm/sec
93+25	3	2" to 6"	118	+15 pcf over trench slurry	1.71×10^{-7}	1.0×10^{-7} cm/sec
93+00	3	2" to 6"	111	+15 pcf over trench slurry	5.62×10^{-8}	1.0×10^{-7} cm/sec
92+75	3	2" to 6"	120.5	+15 pcf over trench slurry	8.94×10^{-8}	1.0×10^{-7} cm/sec
92+50	3	2" to 6"	114.5	+15 pcf over trench slurry	1.24×10^{-7}	1.0×10^{-7} cm/sec
92+25	3	2" to 6"	112	+15 pcf over trench slurry	2.00×10^{-7}	1.0×10^{-7} cm/sec
92+00	3	2" to 6"	116	+15 pcf over trench slurry	1.71×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 93+50, 93+25, 93+00, 92+75, 92+50, 92+25, 92+00, 91+75

Technician: RF/MM ✓BY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.0cm, 6.0cm, 7.0cm, 6.5cm, 6.5cm, 7.0cm, 6.5cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	
93+50	12/11/03	9:18-13:18	240	10	108.2128	559261.0644	—	7	5.22×10^{-8}	3.56×10^{-7}
93+25	12/11/03	9:18-13:18	240	10	108.2128	559261.0644	—	23	1.71×10^{-7}	1.17×10^{-8}
93+00	12/11/03	9:18-13:18	240	10	100.4833	519313.7717	—	7	5.62×10^{-8}	3.84×10^{-7}
92+75	12/11/03	14:02-18:02	240	10	117.2305	605865.9809	—	13	8.94×10^{-8}	6.10×10^{-7}
92+50	12/11/03	14:02-18:02	240	10	117.2305	605865.9809	—	18	1.24×10^{-7}	8.46×10^{-8}
92+25	12/11/03	14:02-18:02	240	10	100.4833	519313.7717	—	25	2.00×10^{-7}	1.36×10^{-8}
92+00	12/11/03	18:15-6:15	720	10	108.2128	559261.0644	—	69	1.71×10^{-7}	1.17×10^{-8}
91+75	12/11/03	18:15-6:15	720	10	100.4833	519313.7717	—	57	1.52×10^{-7}	1.04×10^{-8}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

DAILY QC TESTS

DATE 12/11/03

NW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

No measurement today of fresh slurry

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:30	72+50	2	40	40 - 90 sec	70	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	1.0	19	MAX 30%
8:30	72+50	33	40	40 - 90 sec	74.5	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	1.0	21	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
17:00	71+80	2	40	40 - 90 sec	71	64 - 95 pcf	8	6.5 - 10	24.5	< 25 cm^3	1.0	20	MAX 30%
17:00	71+80	33	40	40 - 90 sec	75	64 - 95 pcf	8	6.5 - 10	25	< 25 cm^3	1.1	21	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
74+50	3	2" to 6"	110	+15 pcf over trench slurry	2.31×10^{-7}	1.0×10^{-7} cm/sec
74+25	3	2" to 6"	115.5	+15 pcf over trench slurry	1.49×10^{-7}	1.0×10^{-7} cm/sec
74+00	3	2" to 6"	112	+15 pcf over trench slurry	2.17×10^{-7}	1.0×10^{-7} cm/sec
73+75	3	2" to 6"	112	+15 pcf over trench slurry	2.89×10^{-7}	1.0×10^{-7} cm/sec
73+50	3	2" to 6"	118	+15 pcf over trench slurry	2.52×10^{-7}	1.0×10^{-7} cm/sec
73+25	3	2" to 6"	117.5	+15 pcf over trench slurry	2.18×10^{-7}	1.0×10^{-7} cm/sec
73+00	3	2" to 6"	111	+15 pcf over trench slurry	2.27×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 74+50, 74+25, 74+00, 73+75, 73+50, 73+25, 73+00

Technician: RF/MM ✓ SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.0, 5.5, 6.0, 6.5, 6.5, 6.5, 6.0 cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ conv. facto. (1/14.65)
74+50	12/11/03	14:02-18:02	240	10	108.2128	559261.0644	–	31	2.31×10^{-7}	1.58×10^{-8}
74+25	12/11/03	14:02-18:02	240	10	108.2128	559261.0644	–	20	1.49×10^{-7}	1.02×10^{-8}
74+00	12/11/03	14:02-18:02	240	10	117.2305	605865.9809	–	31.5	2.17×10^{-7}	1.48×10^{-8}
73+75	12/11/03	18:15-6:15	720	10	117.2305	605865.9809	–	126	2.89×10^{-7}	1.97×10^{-8}
73+50	12/11/03	18:15-6:15	720	10	127.8879	660945.1283	–	120	2.52×10^{-7}	1.72×10^{-8}
73+25	12/11/03	18:15-6:15	720	10	117.2305	605865.9809	–	95	2.18×10^{-7}	1.49×10^{-8}
73+00	12/11/03	18:15-6:15	720	10	108.2128	559261.0644	–	91.5	2.27×10^{-7}	1.55×10^{-8}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 12-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO: P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By: Atul Kumar	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-024	SOIL ONLY	81+00	12/11/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-025	SOIL ONLY	72+00	12/11/2003		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-029	SB BACKFILL	78+00	12/11/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-030	SB BACKFILL	93+00	12/11/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-031	SB BACKFILL	92+00	12/11/2003		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept File Gold - Site

GP-101

P.O. Box 2842, Fo...

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/8/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV006013	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
[illegible]	[illegible]	GREYBULL	GEL

[illegible] data for the above shipment shows the following test results.

Test or Property	API Spec.	Result	Test or Property	API Spec.	Result
Viscosity	30 min.	50	Moisture (wt. %)	N/A	8.5
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max.	1.75
Yield Point (#/100 ft2)	N/A				
Filtrate Volume (cm3)	15.0 max.	13.8			
> 75 micron (wt. %)	4.0 max.	1.7			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4436.

Signed 12/9/03 Date

Approved by: Plant Manager

Laboratory.doc (10/22/97, Rev 0 10/98)

Arrived onsite 12/11/03

160# Bags

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/8/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV005008	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-8-03	ARROW 1040	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	41
Plastic Viscosity (cP)	N/A	
Yield Point (#/100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max	13.2
> 75 micron (wt. %)	4.0 max	1.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.1
Y.P. / P.V. Ratio	3.0 max	1.15

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4495.

Signed 12/8/03 Date

Approved by: Plant Manager

LaboratoryCert.doc (4/22/97)
Rev E (8.03)

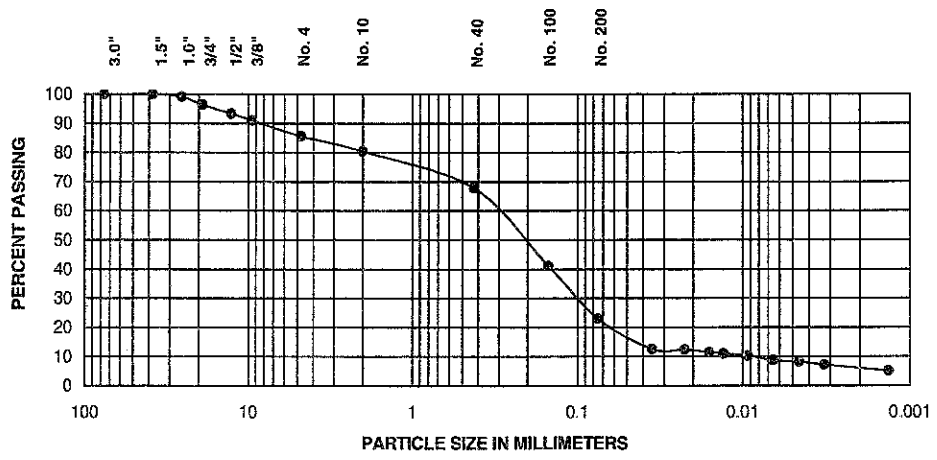
Arrived onsite 12/11/03

40004 Jumbo Bags

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-029	**Date Tested**	12/17/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/12/2003
Sample Location	73+00 (NW)
Sample Description	Gray silty, clayey sand with tr. of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	14.4	62.6	14.6	8.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	99.1
3/4"	96.4
1/2"	93.3
3/8"	91.0
No. 4	85.6
No. 10	80.4
No. 40	67.9
No. 100	41.2
No. 200	23.1

Liquid Limit, L_L	Plastic Limit, P_L	Plasticity Index, PI
28	19	9

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

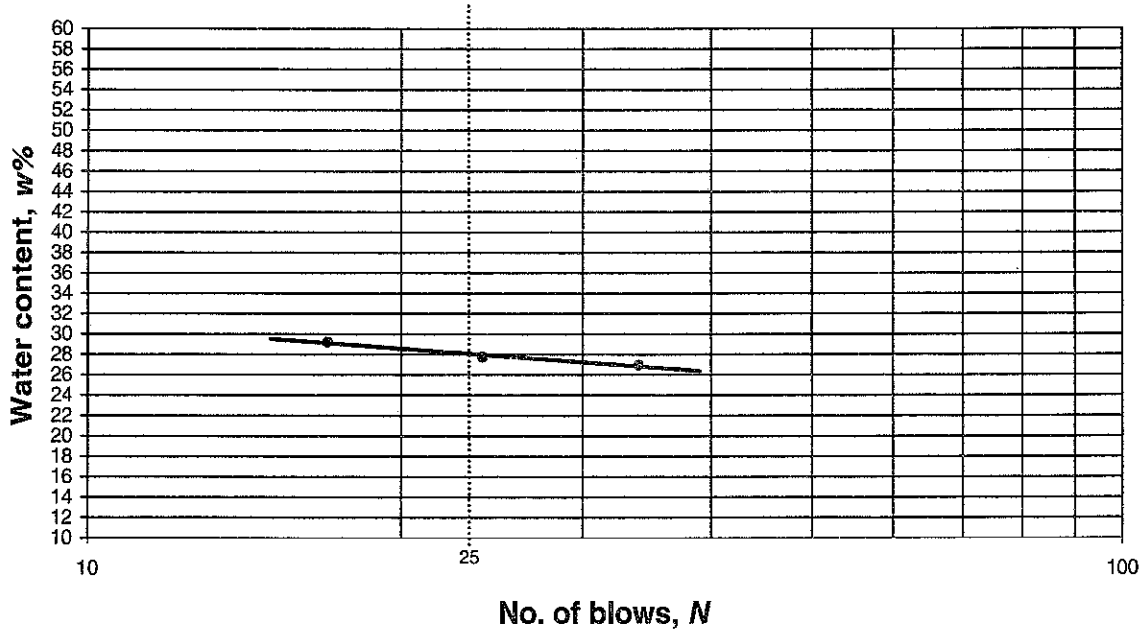
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-029	**Date Tested**	12/17/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/12/2003
Sample Location	73+00 (NW)
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	28	**Plastic Limit, PL**	19	**Plasticity Index, PI**	9

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/15/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-029	Date Recd.	12/12/03	**Location**	73+00 (NW)		
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.55	cm	Volume, V:	226.0	cu cm
Mass of Sample:	420.7	g	**Moisture Content:**	**24.9**	%
			Wet Density	**116.2**	**pcf**
			Dry Density	**93.0**	**pcf**

Final

Diameter:	7.00	cm	Area, A:	38.5	sq cm
Height, L:	5.03	cm	Volume, V:	193.6	cu cm
Mass of Sample:	403.70	g	**Moisture Content:**	**21.8**	%
			Wet Density	**130.1**	**pcf**
			Dry Density	**106.9**	**pcf**
			Deg of Saturation	**98.8**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	22.8	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/15/2003	9:15 AM	0	0	3.63	6.04		20.0	---
12/15/2003	10:00 AM	2700	2700	3.90	5.81	1.2	20.0	8.19E-08
12/15/2003	10:45 AM	2700	5400	4.19	5.57	1.2	20.0	8.77E-08
12/15/2003	11:30 AM	2700	8100	4.50	5.29	1.1	20.0	1.05E-07
12/15/2003	12:15 PM	2700	10800	4.83	5.02	1.2	20.0	1.05E-07

Average Permeability = **9.5E-08** cm/sec

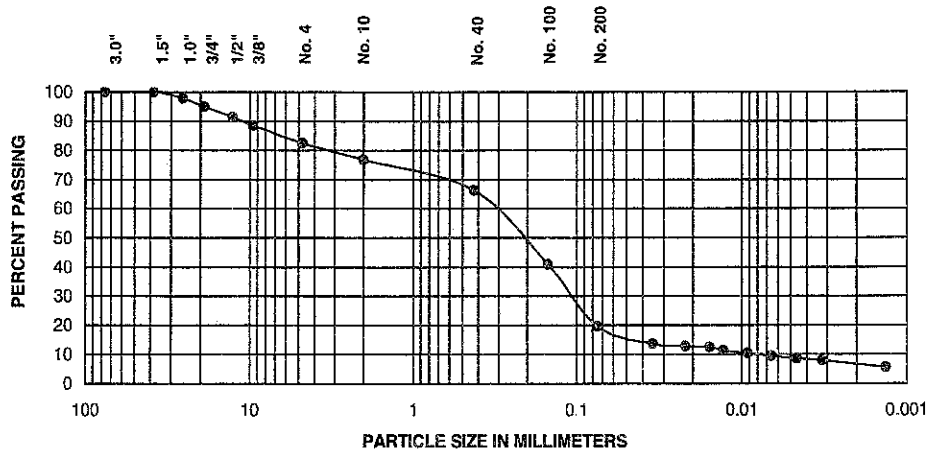
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-030	**Date Tested**	12/17/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/12/2003
Sample Location	93+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	17.5	62.9	10.8	8.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.9
3/4"	95.0
1/2"	91.4
3/8"	88.5
No. 4	82.5
No. 10	76.8
No. 40	66.4
No. 100	40.9
No. 200	19.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
31	24	7

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

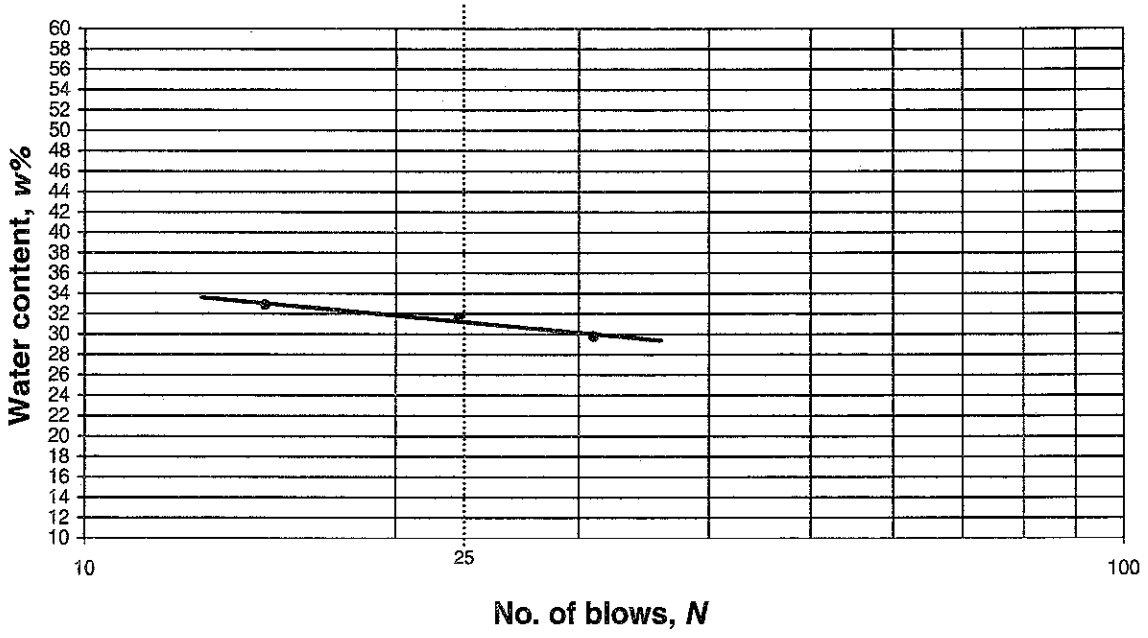
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-030	**Date Tested**	12/17/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/12/2003
Sample Location	93+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	31	**Plastic Limit, PL**	24	**Plasticity Index, PI**	7

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/16/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-030	Date Recd.	12/12/03	**Location**	93+00 (SW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.39	cm	Volume, V:	219.5	cu cm
Mass of Sample:	404.5	g	**Moisture Content:**	**24.6**	%
			Wet Density	**115.0**	**pcf**
			Dry Density	**92.3**	**pcf**

Final

Diameter:	7.06	cm	Area, A:	39.1	sq cm
Height, L:	4.95	cm	Volume, V:	193.8	cu cm
Mass of Sample:	395.00	g	**Moisture Content:**	**23.4**	%
			Wet Density	**127.2**	**pcf**
			Dry Density	**103.1**	**pcf**
			Deg of Saturation	**96.8**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	23.5	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/16/2003	7:00 AM	0	0	3.10	6.01		20.0	---
12/16/2003	7:45 AM	2700	2700	3.42	5.75	1.2	20.0	8.79E-08
12/16/2003	8:30 AM	2700	5400	3.70	5.50	1.1	20.0	8.69E-08
12/16/2003	9:15 AM	2700	8100	3.96	5.26	1.1	20.0	8.56E-08
12/16/2003	10:00 AM	2700	10800	4.20	5.03	1.0	20.0	8.41E-08

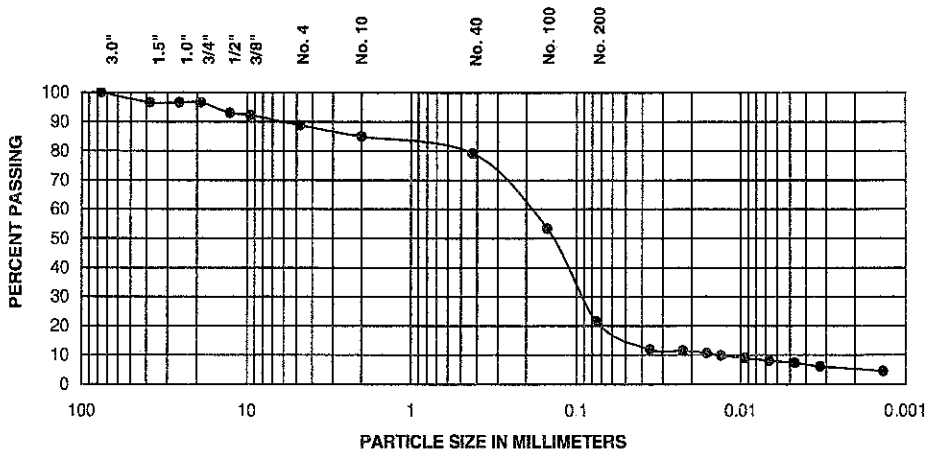
Average Permeability = **8.6E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-031	**Date Tested**	12/17/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/12/2003
Sample Location	92+00 (SW)
Sample Description	Gray silty, clayey sand with tr. of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.2	67.3	14.0	7.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	96.7
1.0"	96.7
3/4"	96.7
1/2"	93.0
3/8"	92.3
No. 4	88.8
No. 10	85.0
No. 40	79.1
No. 100	53.4
No. 200	21.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
32	21	11

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

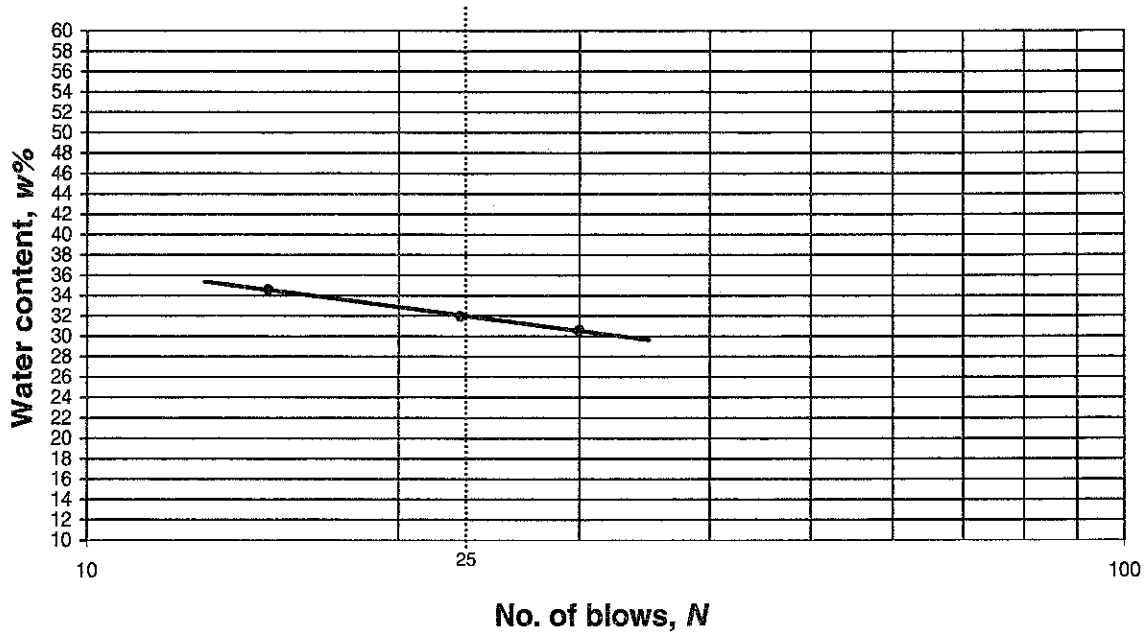
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-031	**Date Tested**	12/16/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/12/2003
Sample Location	92+00 (SW)
Sample Description	Gray silty, clayey sand with tr. of gr. (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**32**	**Plastic Limit, PL**	**21**	**Plasticity Index, PI**	**11**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/15/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-031	Date Recd.	12/12/03	**Location**	92+00 (SW)		
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.28	cm	Volume, V:	215.0	cu cm
Mass of Sample:	398.1	g	**Moisture Content:**	**25.4**	**%**
			Wet Density	**115.6**	**pcf**
			Dry Density	**92.2**	**pcf**

Final

Diameter:	7.05	cm	Area, A:	39.0	sq cm
Height, L:	4.78	cm	Volume, V:	186.6	cu cm
Mass of Sample:	388.50	g	**Moisture Content:**	**21.7**	**%**
			Wet Density	**129.9**	**pcf**
			Dry Density	**106.7**	**pcf**
			Deg of Saturation	**98.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	24.0	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/15/2003	9:15 AM	0	0	3.15	5.90		20.0	---
12/15/2003	10:00 AM	2700	2700	3.29	5.79	1.3	20.0	3.64E-08
12/15/2003	10:45 AM	2700	5400	3.41	5.69	1.2	20.0	3.35E-08
12/15/2003	11:30 AM	2700	8100	3.56	5.56	1.2	20.0	4.41E-08
12/15/2003	12:15 PM	2700	10800	3.70	5.43	1.1	20.0	4.47E-08

Average Permeability = **4.0E-08** cm/sec

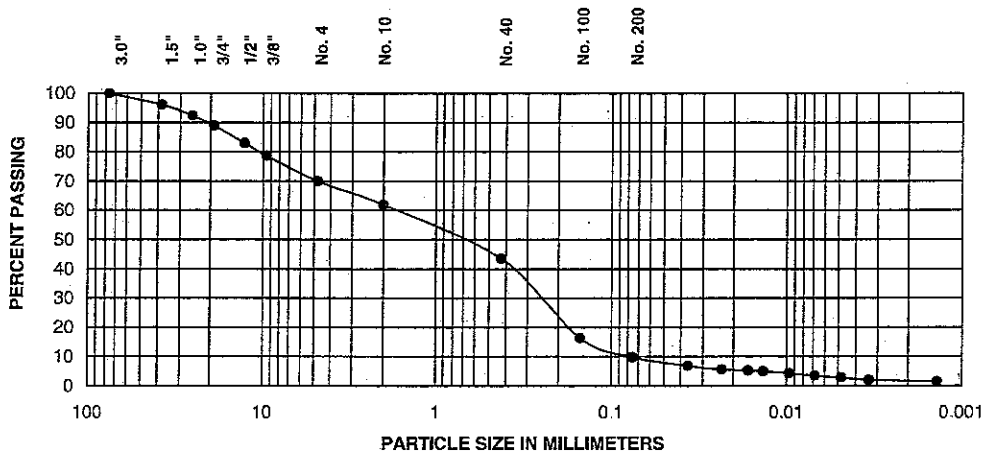
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-024	**Date Tested**	12/17/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/12/2003
Sample Location	91+00 (SW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	30.0	60.2	6.8	3.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.70	0.25	0.08	22.1	0.49

Sieve Size	Percent Passing
3.0"	100.0
1.5"	96.1
1.0"	92.4
3/4"	89.0
1/2"	83.0
3/8"	78.7
No. 4	70.0
No. 10	62.0
No. 40	43.5
No. 100	16.3
No. 200	9.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

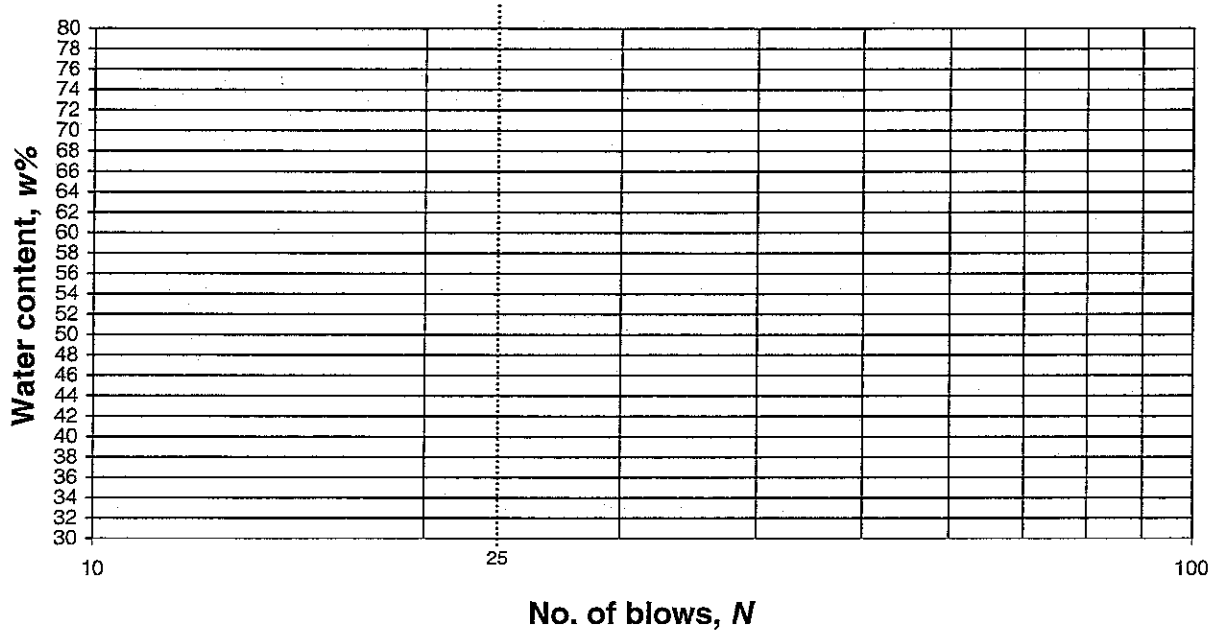
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-024	**Date Tested**	12/17/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/12/2003
Sample Location	91+00 (SW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	10	Date	12/12/2003	Sheet	1
				Date of weighing	12/13/2003	Tested by	NP

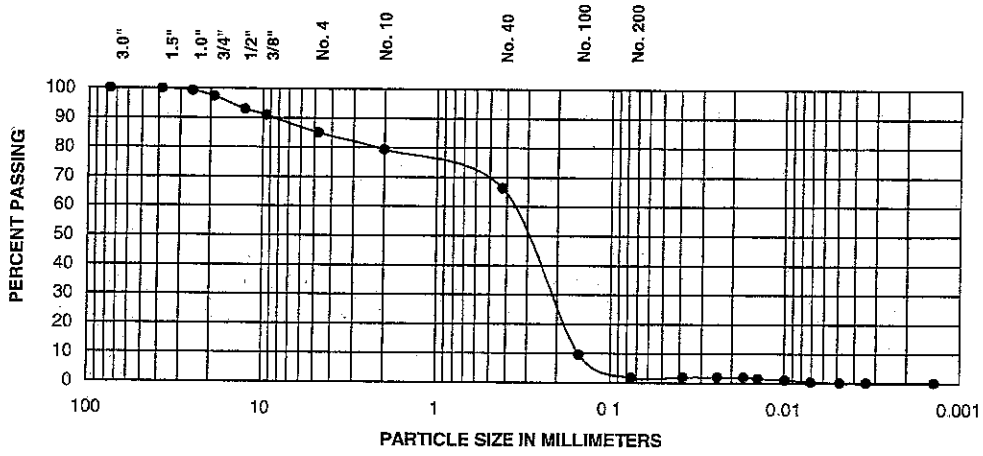
Boring No.	-	-				
Sample No.	BF-024	BF-025				
Location	91 + 00 (SW)	72 + 00 (NW)				
Tin No.	1C	8C				
Tin + Wet Soil	178.53	222.53				
Tin + Dry Soil	157.99	188.52				
Wt. of Tin	30.86	30.96				
Wt. of Dry Soil	127.1	157.6				
Wt. of Water	20.5	34.0				
Moisture, %	16.2	21.6				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-025	**Date Tested**	12/17/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/12/2003
Sample Location	72+00 (NW)
Sample Description	Gray poorly graded sand with tr.of gr. & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	15.0	83.2	1.6	0.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.38	0.22	0.15	2.5	0.83

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	99.3
3/4"	97.4
1/2"	93.0
3/8"	91.0
No. 4	85.0
No. 10	79.4
No. 40	66.4
No. 100	9.6
No. 200	1.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP
Soil Description:	Poorly graded sand
System:	USCS

Remarks:

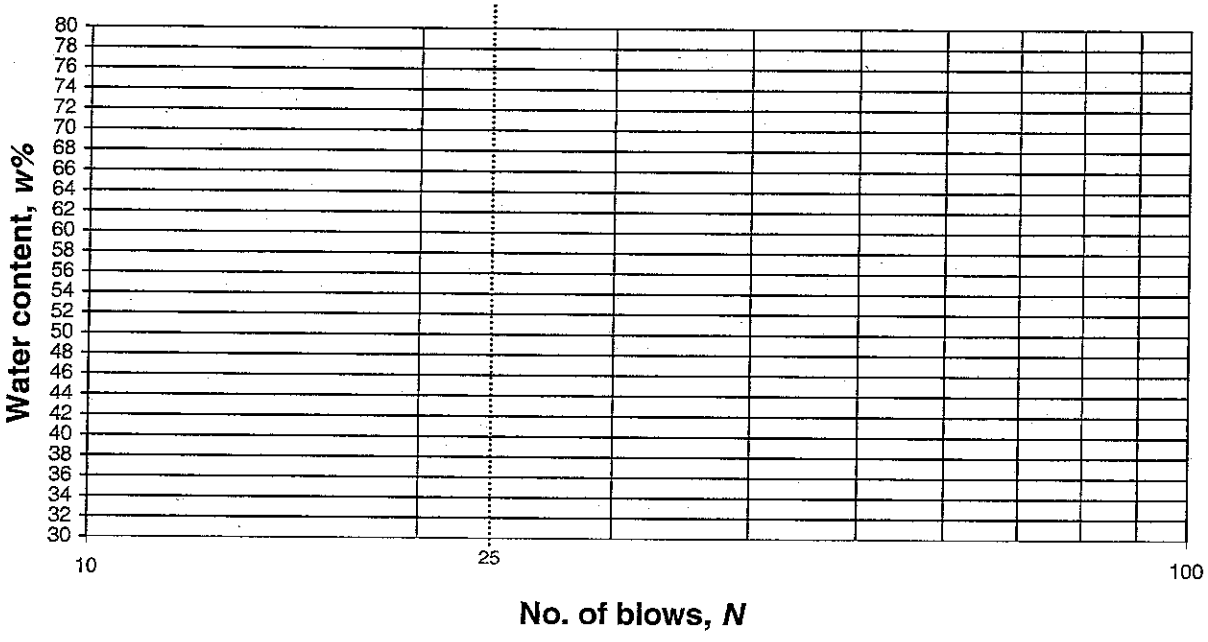
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-025	**Date Tested**	12/17/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/12/2003
Sample Location	72+00 (NW)
Sample Description	Gray poorly graded sand with tr of gr. & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	10	Date	12/12/2003	Sheet	1
				Date of weighing	12/13/2003	Tested by	NP

Boring No.	-	-				
Sample No.	BF-024	BF-025				
Location	91 + 00 (SW)	72 + 00 (NW)				
Tin No.	1C	8C				
Tin + Wet Soil	178.53	222.53				
Tin + Dry Soil	157.99	188.52				
Wt. of Tin	30.86	30.96				
Wt. of Dry Soil	127.1	157.6				
Wt. of Water	20.5	34.0				
Moisture, %	16.2	21.6				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/12/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Sunny; 14 - 25 degrees RIG NUMBER: _____

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH	
	feet	lb/ft^3	%	cm^3	seconds	S.U.	
90+80	2.00	94.00	28.00	67.00	49.00	8	SW TRENCH
90+80	32.00	93.00	29.00	68.00	49.00	8	
90+00	2.00	94.50	29.00	80.50	54.00	8	
90+00	31.00	96.00	33.00	89.00	60.00	8	
71+80	2.00	71.00	-	-	29.00	-	NW TRENCH
71+80	33.00	74.50	-	-	30.00	-	**DID NOT RUN
70+90	2.00	73.00	-	-	30.00	-	OTHER TESTS
70+90	33.00	75.00	-	-	32.00	-	SINCE VISC. FAILED

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	
	%		%		
90+00	LAB SAMPLE COLLECTED 12/12/03				SW TRENCH
71+00	LAB SAMPLE COLLECTED 12/12/03				NW TRENCH

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
92+50	3.00	N/A	N/A	N/A	1.95×10^{-7}	N/A
92+25	3.00	N/A	N/A	N/A	5.29×10^{-7}	N/A
92+00	3.00	N/A	N/A	N/A	1.52×10^{-7}	N/A
91+75	3.00	Sample collected	Sample collected	Sample collected	1.02×10^{-7}	yes
91+50	3.00	N/A	N/A	N/A	1.22×10^{-7}	N/A
91+25	3.00	N/A	N/A	N/A	1.18×10^{-7}	N/A
91+00	3.00	Sample collected	Sample collected	Sample collected	1.36×10^{-7}	yes
73+75	3.00	N/A	N/A	N/A	1.44×10^{-7}	N/A
73+50	3.00	N/A	N/A	N/A	1.99×10^{-7}	N/A
73+25	3.00	N/A	N/A	N/A	1.58×10^{-7}	N/A
73+00	3.00	Sample collected	Sample collected	Sample collected	1.14×10^{-7}	yes
72+75	3.00	N/A	N/A	N/A	1.39×10^{-7}	N/A
72+50	3.00	N/A	N/A	N/A	1.90×10^{-7}	N/A
72+25	3.00	N/A	N/A	N/A	1.66×10^{-7}	N/A
72+00	3.00	Sample collected	Sample collected	Sample collected	1.60×10^{-7}	yes

COMMENTS

Filter cake: 2.0mm, 3.5mm, 2.5mm, 3.4mm, respectively. Did not run remaining tests on slurry in NW trench once viscosity failed. **See page 2 for more comments.**

Unit Weight:			
92+50:	107.0 pcf**	73+25:	119.0 pcf
92+25:	111.0 pcf	73+00:	120.0 pcf
92+00:	117.0 pcf	72+75:	114.0 pcf
91+75:	114.0 pcf	72+50:	111.0 pcf
91+50:	112.0 pcf	72+25:	117.0 pcf
91+25:	116.0 pcf	72+00:	116.5 pcf
91+00:	118.5 pcf		
73+75:	116.0 pcf		
73+50:	119.0 pcf		

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

**THIS BATCH OF SB BACKFILL WAS TESTED USING AM UNIT WT.

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Marianne C. Bosco OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/12/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
9:35	64.00	51.00	16.50	8
12:13	-	42.00	-	-
13:00	64.00	44.00	19.00	8
17:09	-	45.00	-	-

Filter cake is .6mm and .6mm, respectively.

COMMENTS ON NW TRENCH SLURRY:

Slurry in the NW trench is not meeting the specification for viscosity. Because of all of the water (standing, surface, etc.) in that area going into the trench, it is causing the slurry to lose the properties it is leaving the batch plant with. Yesterday, we backfilled heavily to close the trench up as much as possible. Then we started bailing out the bad slurry while simultaneously pumping in fresh slurry. Properties went up slightly from AM to PM. We will continue to do all we can to bring the properties back within specs. Geo-Con feels that once we get out of this area, slurry properties in the trench will go back to within specifications.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/12/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Sunny; 14 - 25 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
90+80	30.3	34.2	34.2	10.0	341.5	3.6	92+70	OUT	TOP OUT
90+70	30.1	34.0	34.1	10.0	341.0	3.6	92+60	3.6	TOP OUT
90+60	29.7	33.6	33.8	10.0	338.0	3.7	92+50	6.7	TOP OUT
90+50	29.8	33.5	33.6	10.0	335.5	3.7	92+40	8.3	TOP OUT
90+40	29.5	33.2	33.4	10.0	333.5	3.7	92+30	10.9	TOP OUT
90+30	29.6	33.1	33.2	10.0	331.5	3.7	92+20	13.5	TOP OUT
90+20	29.4	33.3	33.2	10.0	332.0	3.7	92+10	16.4	TOP OUT
90+10	29.3	33.5	33.4	10.0	334.0	3.8	92+00	19.8	TOP OUT
90+00	29.4	33.4	33.5	10.0	334.5	3.8	91+90	21.5	TOP OUT
							91+80	23.2	TOP OUT
							91+70	26.7	TOP OUT
							91+60	29.0	TOP OUT
							91+50	31.5	TOP OUT
							91+40	32.0	4.7
							91+30	33.5	7.8
							91+20	35.0	11.2
							91+10	34.7	14.6
							91+00	34.5	16.2
							90+90	34.1	19.3
							90+80		21.6
							90+70		23.8
							90+60		26.4
							90+50		29.9
							90+40		31.5
							90+30		32.1
							90+20		33.3
							90+10		33.5
							90+00		33.4

SF TODAY 3021.50

SF TO DATE 64796.90

COMMENTS

SW Trench

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/12/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Sunny; 14 - 25 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
71+60	31.8	35.5	35.5	10.0	355.0	21.8	74+00	OUT	OUT
71+50	31.9	35.4	35.5	10.0	354.5	22.0	73+90	1.9	OUT
71+40	32.0	35.3	35.4	10.0	353.5	22.5	73+80	4.8	OUT
71+30	32.0	35.3	35.3	10.0	353.0	23.4	73+70	6.7	OUT
71+20	31.9	35.4	35.4	10.0	353.5	24.7	73+60	9.1	OUT
71+10	31.9	35.4	35.4	10.0	354.0	25.6	73+50	9.7	OUT
71+00	32.0	35.3	35.4	10.0	353.5	26.1	73+40	10.1	OUT
70+90	32.0	35.2	35.3	10.0	352.5	28.0	73+30	10.7	OUT
70+80	32.0	35.2	35.2	10.0	352.0	27.3	73+20	11.4	OUT
70+70	32.0	35.2	35.2	10.0	352.0	26.6	73+10	13.1	OUT
70+60	31.9	35.2	35.2	10.0	352.0	25.5	73+00	14.2	OUT
70+50	31.9	35.1	35.2	10.0	351.5	24.9	72+90	16.3	1.0
							72+80	19.3	3.0
							72+70	24.0	6.0
							72+60	26.6	9.0
							72+50	31.2	11.1
							72+40	34.6	11.7
							72+30	35.4	13.6
							71+60	21.3	16.0
							71+50	12.2	20.0
							71+40	8.6	25.0
							71+30		30.0
							71+20		32.7
							71+10		34.3
							71+00		35.1
							70+90		35.1
							70+80		35.2
							70+70		35.2
							70+60		35.2
							70+50		35.1

SF TODAY 4237.00

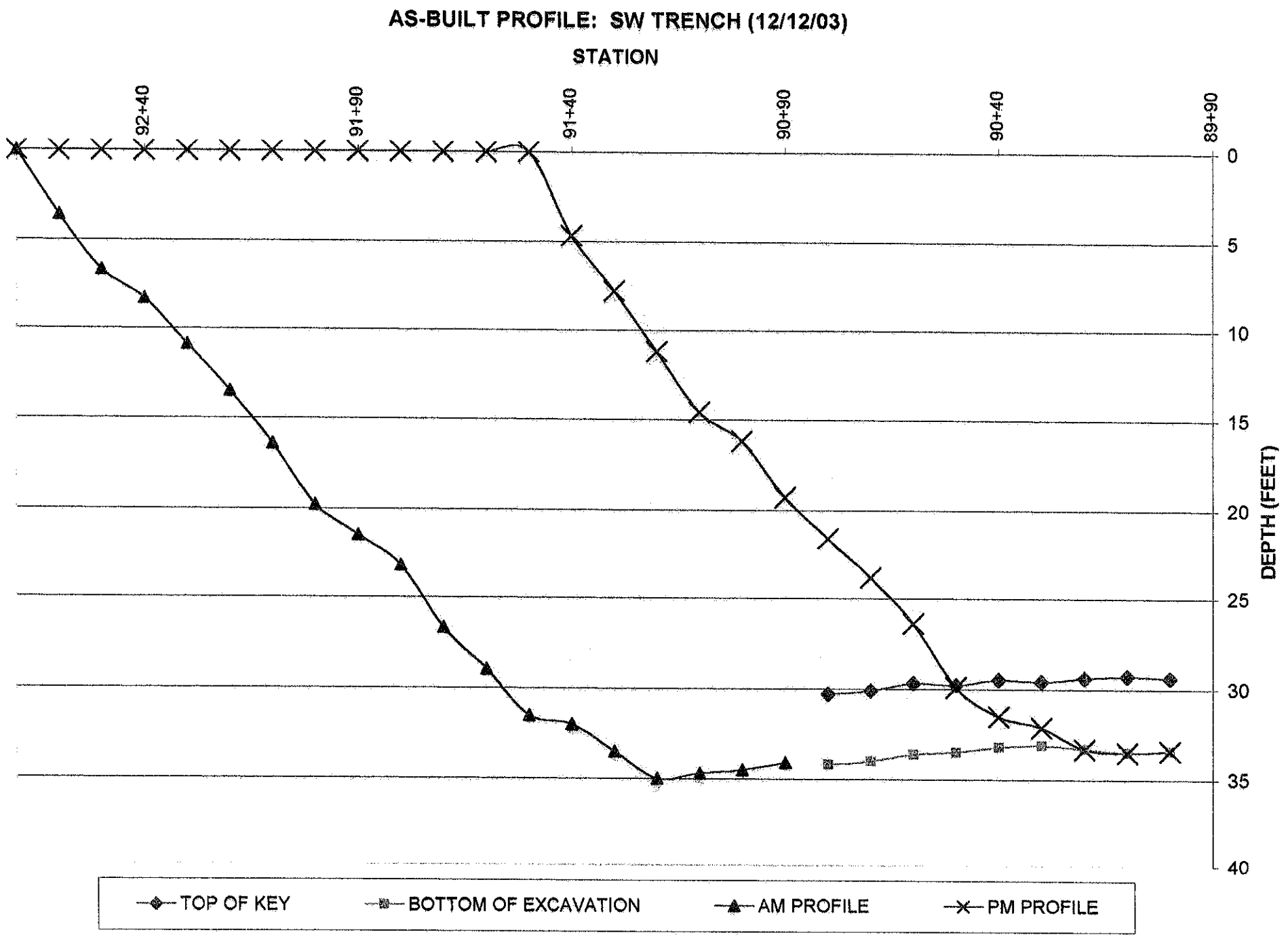
SF TO DATE 26666.50

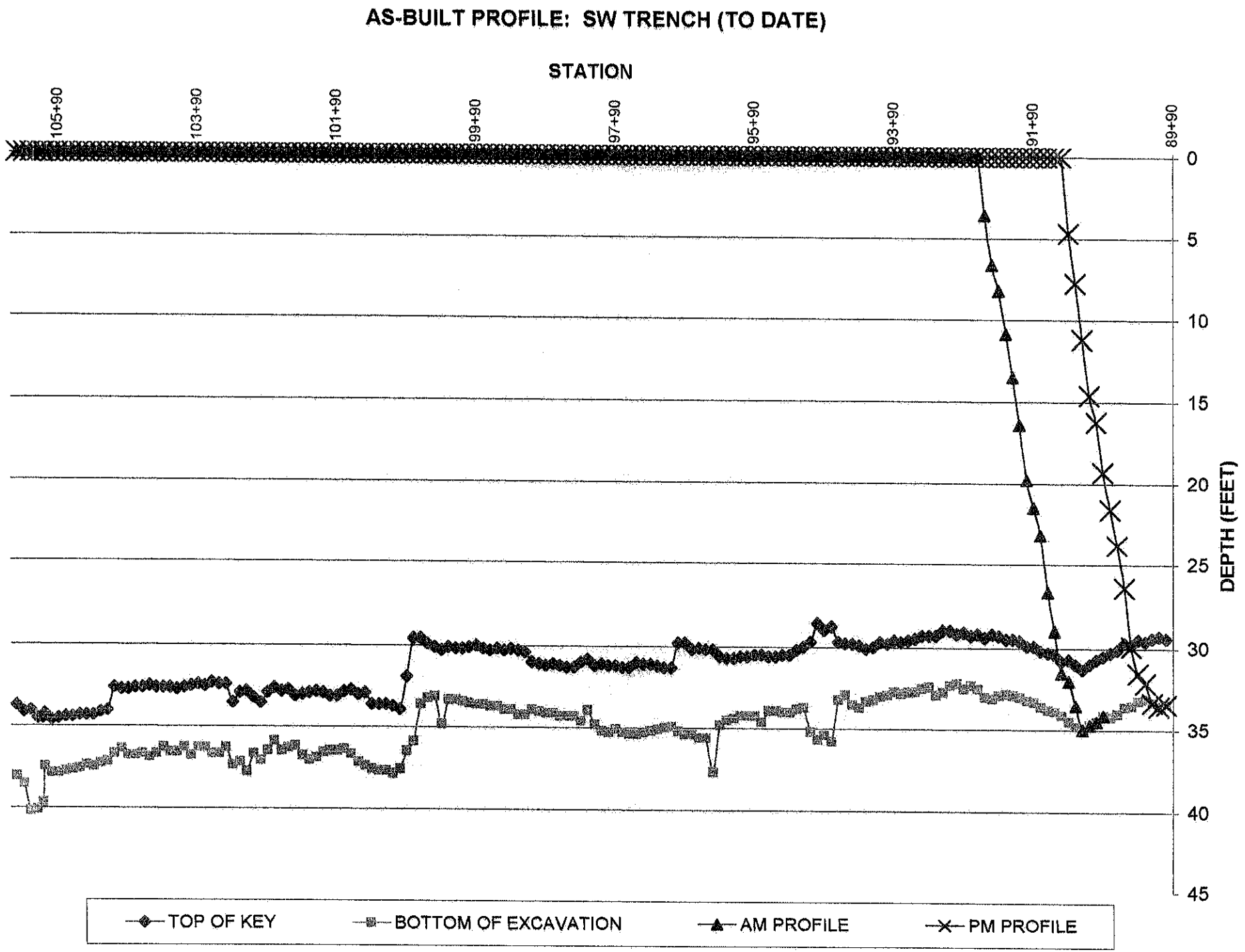
COMMENTS

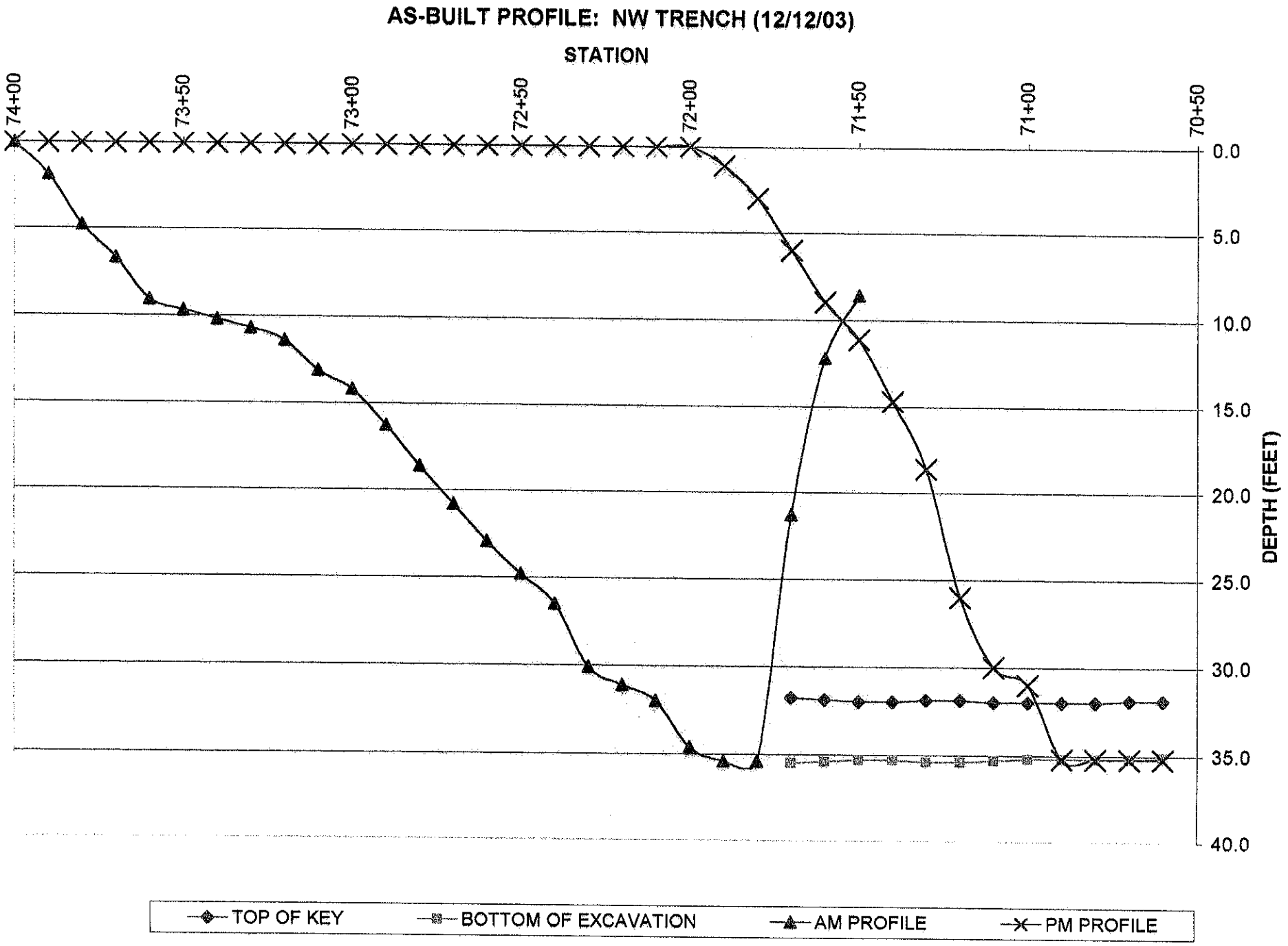
NW Trench

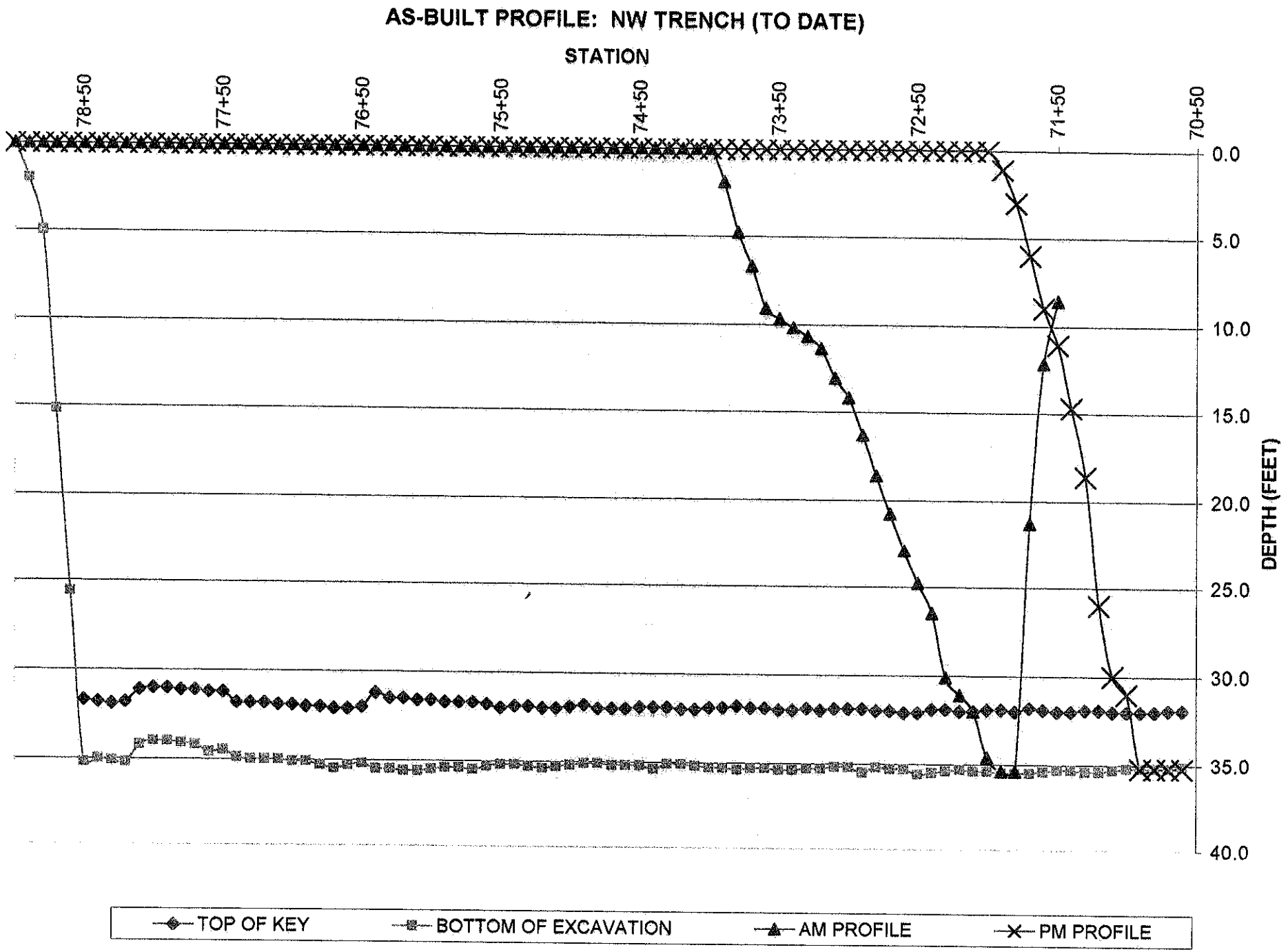
Due to realignment of the slurry wall by DLZ, Station 72+23 and Station 71+63 are in the same location. Therefore, stationing will go 72+40, 72+30, 71+60, 71+50...

GEO-CON: Suzanne C. Sepic OWNER:


AS-BUILT PROFILE: SW TRENCH (12/12/03)
STATION
92+40
91+90
91+40
90+90
90+40
89+90
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SW TRENCH (TO DATE)
STATION
105+90
103+90
101+90
99+90
97+90
95+90
93+90
91+90
89+90
0
5
10
15
20
25
30
35
40
45
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (12/12/03)
STATION
74+00
73+50
73+00
72+50
72+00
71+50
71+00
70+50
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
78+50
77+50
76+50
75+50
74+50
73+50
72+50
71+50
70+50
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/12/03

SW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9:35	51	> 40 sec	64	> 64 pcf	8	6.5 - 10	16.5	< 20 cm^3	.6
PM	13:00	44	> 40 sec	64	> 64 pcf	8	6.5 - 10	19	< 20 cm^3	.6

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	12:13	42	> 40 sec	[redacted]						
PM	17:09	45	> 40 sec							

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:46	90+80	2	49	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	67	< 25 cm^3	2.0	28	MAX 30%
7:46	90+80	32	49	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	68	< 25 cm^3	3.5	29	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:58	90+00	2	54	40 - 90 sec	94.5	64 - 95 pcf	8	6.5 - 10	80.5	< 25 cm^3	2.5	29	MAX 30%
18:58	90+00	31	60	40 - 90 sec	96	64 - 95 pcf	8	6.5 - 10	89	< 25 cm^3	3.4	33	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
92+50	3	2" to 6"	107	+15 pcf over trench slurry	1.95×10^{-7}	1.0×10^{-7} cm/sec
92+25	3	2" to 6"	111	+15 pcf over trench slurry	5.29×10^{-7}	1.0×10^{-7} cm/sec
92+00	3	2" to 6"	117	+15 pcf over trench slurry	1.52×10^{-7}	1.0×10^{-7} cm/sec
91+75	3	2" to 6"	114	+15 pcf over trench slurry	1.02×10^{-7}	1.0×10^{-7} cm/sec
91+50	3	2" to 6"	112	+15 pcf over trench slurry	1.22×10^{-7}	1.0×10^{-7} cm/sec
91+25	3	2" to 6"	116	+15 pcf over trench slurry	1.18×10^{-7}	1.0×10^{-7} cm/sec
91+00	3	2" to 6"	118.5	+15 pcf over trench slurry	1.36×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS

DATE 12/12/03

NW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec	[redacted]						
PM			> 40 sec							

Damaged trench

71+25 Slump 3" Unit wt. 116.5pcf Perm 1.60×10^{-7} cm

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

* DID NOT RUN OTHER TESTS SINCE VISC. FAILED.

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:20	71+60	2	29	40 - 90 sec	71	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%
8:20	71+60	33	30	40 - 90 sec	74.5	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:15	70+90	2	30	40 - 90 sec	73	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%
16:15	70+90	33	32	40 - 90 sec	75	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
73+75	3	2" to 6"	116	+15 pcf over trench slurry	1.44×10^{-7}	1.0×10^{-7} cm/sec
73+50	3	2" to 6"	119	+15 pcf over trench slurry	1.99×10^{-7}	1.0×10^{-7} cm/sec
73+25	3	2" to 6"	119	+15 pcf over trench slurry	1.58×10^{-7}	1.0×10^{-7} cm/sec
73+00	3	2" to 6"	120	+15 pcf over trench slurry	1.14×10^{-7}	1.0×10^{-7} cm/sec
72+75	3	2" to 6"	114	+15 pcf over trench slurry	1.39×10^{-7}	1.0×10^{-7} cm/sec
72+50	3	2" to 6"	111	+15 pcf over trench slurry	1.90×10^{-7}	1.0×10^{-7} cm/sec
71+50	3	2" to 6"	117	+15 pcf over trench slurry	1.66×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SW Trench

API QUICK PERMEABILITY TEST

92+50, 92+25, 92+00,

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 91+75 91+50 91+25, 91+00

Technician: RF/MM ✓ BY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0 cm 6.5cm, 7.0cm, 6.5cm (5.5cm, 6.5cm, 7.0cm) cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	[illegible]
92+50	12/12/03	14:00-18:00	240	10	127.8879	460945.1213	—	31	1.95×10^{-7}	1.33×10^{-7}
92+25	12/12/03	14:00-18:00	240	10	108.2128	559261.0644	—	71	5.29×10^{-7}	3.61×10^{-7}
92+00	12/12/03	14:00-18:00	240	10	100.4833	51933.7717	—	19	1.52×10^{-7}	1.04×10^{-7}
91+75	12/12/03	18:29-6:29	720	10	100.4833	519313.7717	—	38	1.02×10^{-7}	6.96×10^{-7}
91+50	12/12/03	18:29-6:29	720	10	108.2128	559261.0644	—	49	1.22×10^{-7}	8.33×10^{-7}
91+25	12/12/03	18:29-6:29	720	10	100.4833	519313.7717	—	44	1.18×10^{-7}	8.05×10^{-7}
91+00	12/12/03	18:29-6:29	720	10	108.2128	559261.0644	—	55	1.36×10^{-7}	9.28×10^{-7}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

NW Trench

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 73+75, 73+50, 73+25, 73+00, 72+75, 72+50, 72+25, 72+00

Technician: RF/MM / BY SES

Sample Area: A= πr^2 $\pi(3.85)^2$ = 46.56 cm^2

Sample Height: L= 6.5 cm, 7.0 cm, 7.0 cm, 7.0 cm, 6.5 cm, 7.0 cm, 7.0 cm, 6.0 cm, 6.0 cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/correction factor (114.6%)
73+75	12/12/03	14:00-18:00	240	10	100.4833	519313.7717	—	18	1.44×10^{-7}	9.83×10^{-8}
73+50	12/12/03	14:00-18:00	240	10	117.2305	605865.9809	—	29	1.99×10^{-7}	1.36×10
73+25	12/12/03	14:00-18:00	240	10	117.2305	605865.9809	—	23	1.58×10^{-7}	1.08×10^{-7}
73+00	12/12/03	18:29-6:29	720	10	108.2128	559261.0644	—	46	1.14×10^{-7}	7.78×10^{-8}
72+75	12/12/03	18:29-6:29	720	10	100.4833	519313.7717	—	52	1.39×10^{-7}	9.49×10^{-8}
72+50	12/12/03	18:29-6:29	720	10	100.4833	519313.7717	—	71	1.90×10^{-7}	1.30×10^{-7}
72+25	12/12/03	18:29-6:29	720	10	108.2128	(559261.0644) 559261.0644	—	67	1.66×10^{-7}	1.13×10^{-7}
72+00	12/12/03	18:29-6:29	720	10	100.4833	519313.7717	—	60	1.60×10^{-7}	1.09×10^{-7}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 15-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO: P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-026	SOIL ONLY	90+00	12/12/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-027	SOIL ONLY	71+00	12/12/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-032	SB BACKFILL**	91+75	12/12/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-033	SB BACKFILL**	73+00	12/12/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-034	SB BACKFILL**	91+00	12/12/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-035	SB BACKFILL**	72+00	12/12/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
BF-028	SOIL ONLY	89+00	12/13/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-029	SOIL ONLY	70+00	12/13/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-036	SB BACKFILL**	90+00	12/13/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-037	SB BACKFILL**	71+00	12/13/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/9/2003

SOLD TO:	SHIP TO:
GEO-CON INC 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCTV000022	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-9-03	FOWLER D4	GREYBULL	GEL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	65
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	14.6
> 75 micron (wt. %)	4.0 max	1.1

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.1
Y.P. / P.V. Ratio	3.0 max.	3.13

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4495.

Signed 12/16/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/07)
Rev E (9/99)

Received 12/12/03
4000 # BAGS

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/10/2003

SOLD TO:	SHIP TO:
GEO-CON INC 4975 MONROEVILLE BLVD CORPORATE 1 BUILDING STE 400 MONROEVILLE PA 15146 SALES ORDER NO. HCIV005023	GEO CON E CHICAGO IN 46313

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-9-03	YATES 001	GREYBULL	OBL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	52
Plastic Viscosity (cP)	N/A	
Yield Point (@ 120 °F)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.6
> 75 micron (wt. %)	< 5.0 max.	1.4

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	9.0
Y.P./P.V. Ratio	3.0 max.	2.43

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4458.

Signed 12/16/03 Date

Approved by: Plant Manager

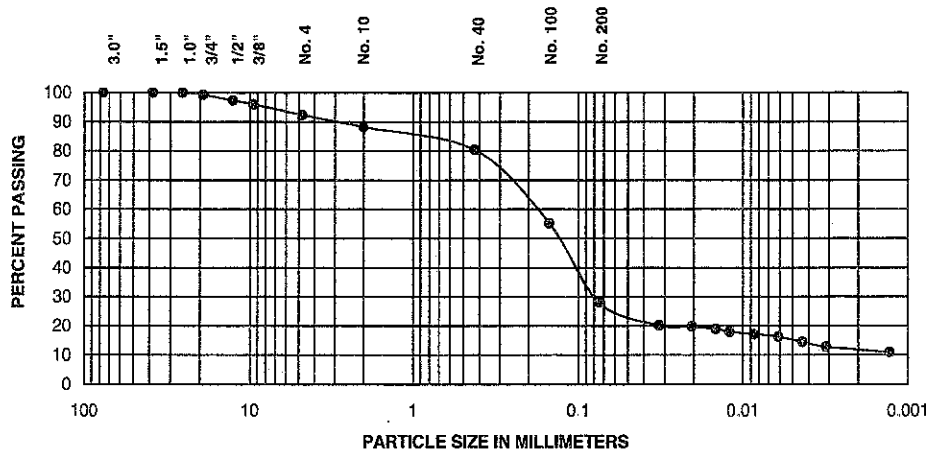
LabanalCert.doc (4/22/07)
Rev E (9/99)

Rcvd 12/12/03
4000# BAGS

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-032	**Date Tested**	12/19/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/15/2003
Sample Location	91+75 (SW)
Sample Description	Gray silty, clayey sand with tr. of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	7.6	64.2	12.8	15.3

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.3
1/2"	97.4
3/8"	96.0
No. 4	92.4
No. 10	88.2
No. 40	80.4
No. 100	55.1
No. 200	28.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
32	22	10

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

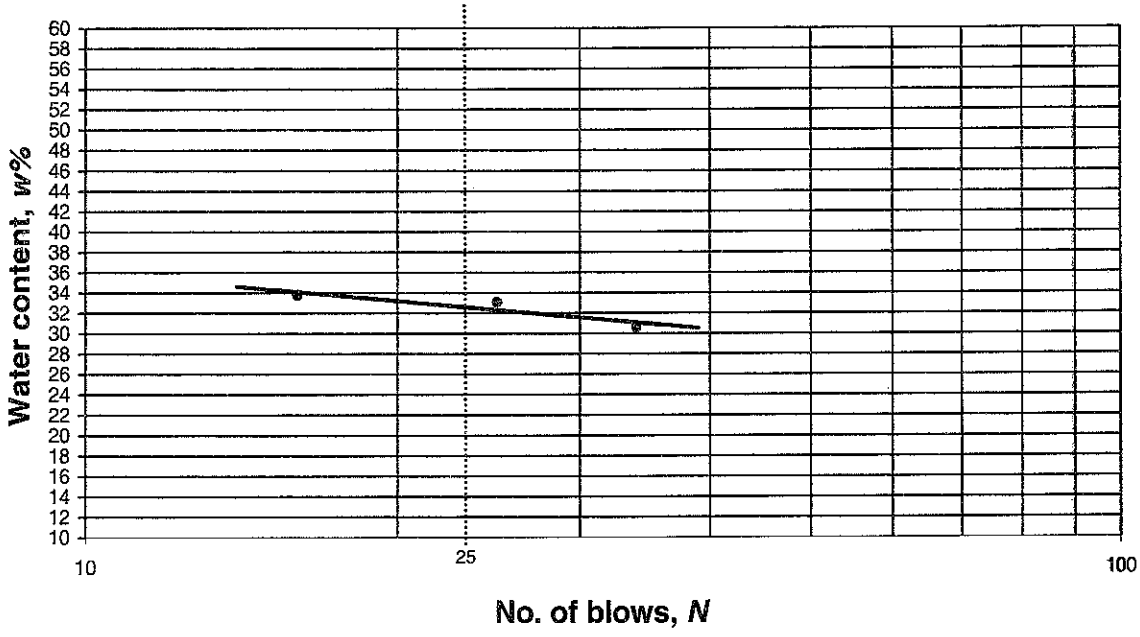
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-032	**Date Tested**	12/17/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/15/2003
Sample Location	91+75 (SW)
Sample Description	Gray silty, clayey sand with tr. of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**32**	**Plastic Limit, PL**	**22**	**Plasticity Index, PI**	**10**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/18/2003	**Tested by:**	MT	**QC by:**	NP
Sample ID:	SB-032	Date Recd.	12/15/03	**Location**	91+75 (SW)		
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.45	cm	Volume, V:	221.9	cu cm
Mass of Sample:	414.4	g	**Moisture Content:**	**25.5**	%
			Wet Density	**116.5**	**pcf**
			Dry Density	**92.9**	**pcf**

Final

Diameter:	6.97	cm	Area, A:	38.2	sq cm
Height, L:	5.06	cm	Volume, V:	193.1	cu cm
Mass of Sample:	398.40	g	**Moisture Content:**	**22.7**	%
			Wet Density	**128.8**	**pcf**
			Dry Density	**104.9**	**pcf**
			Deg of Saturation	**98.4**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	23.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/28/2003	10:00 AM	0	0	3.41	5.94		20.0	---
12/28/2003	10:45 AM	2700	2700	3.45	5.90	1.0	20.0	1.38E-08
12/28/2003	11:30 AM	2700	5400	3.50	5.86	1.2	20.0	1.38E-08
12/28/2003	12:30 PM	3600	9000	3.55	5.82	1.2	20.0	1.04E-08
12/28/2003	1:30 PM	3600	12600	3.59	5.78	1.0	20.0	1.05E-08

Average Permeability = **1.2E-08** cm/sec

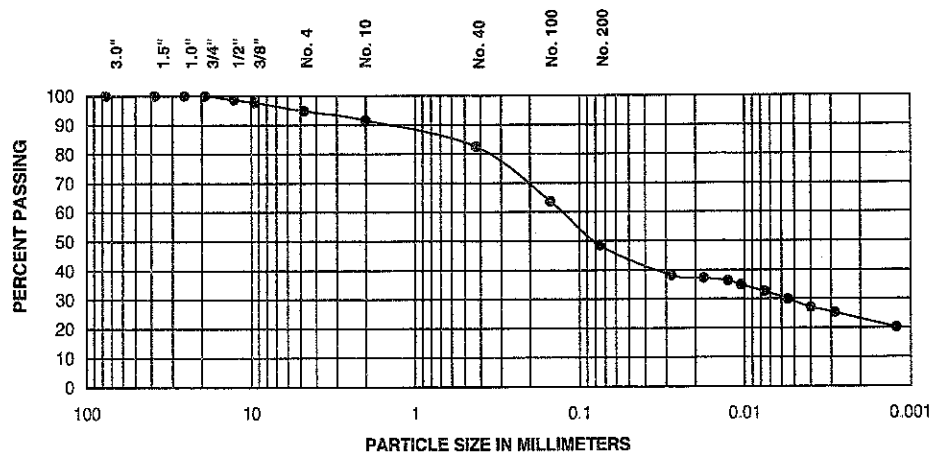
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-033	**Date Tested**	12/21/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/15/2003
Sample Location	73+00 (SW)
Sample Description	Gray silty, clayey sand with tr. of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	5.1	46.3	19.6	28.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	98.7
3/8"	97.7
No. 4	94.9
No. 10	91.7
No. 40	82.5
No. 100	63.6
No. 200	48.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
28	14	14

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

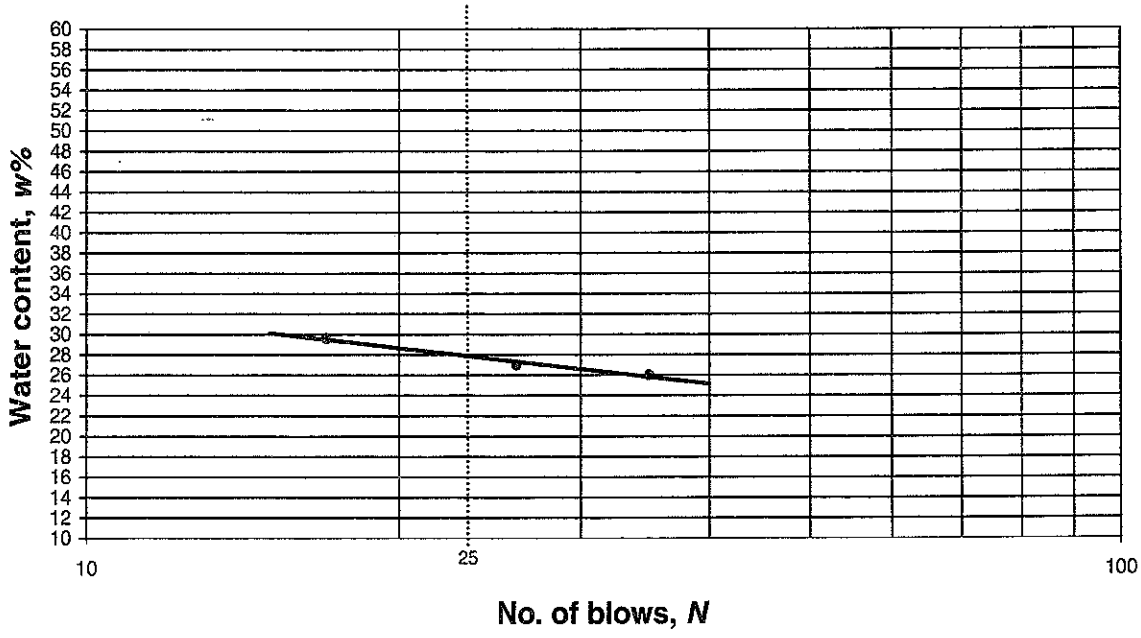
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-033	**Date Tested**	12/18/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/15/2003
Sample Location	73+00 (SW)
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**28**	**Plastic Limit, PL**	**14**	**Plasticity Index, PI**	**14**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/18/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-033	Date Recd.	12/15/03	**Location**	73+00 (SW)		
Sample Description	Gray silty, clayey sand with tr. of gr. (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	4.97	cm	Volume, V:	202.4	cu cm
Mass of Sample:	354.9	g	**Moisture Content:**	23.9	%
			Wet Density	109.4	**pcf**
			Dry Density	88.4	**pcf**

Final

Diameter:	6.97	cm	Area, A:	38.2	sq cm
Height, L:	4.38	cm	Volume, V:	167.1	cu cm
Mass of Sample:	347.60	g	**Moisture Content:**	22.2	%
			Wet Density	129.8	**pcf**
			Dry Density	106.2	**pcf**
			Deg of Saturation	99.1	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	76.8 psi
Gradient:	25.5

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/18/2003	10:00 AM	0	0	3.05	5.97		20.0	---
12/18/2003	10:45 AM	2700	2700	3.14	5.89	1.1	20.0	2.47E-08
12/18/2003	11:32 AM	2820	5520	3.23	5.81	1.1	20.0	2.38E-08
12/18/2003	12:30 PM	3480	9000	3.32	5.73	1.1	20.0	1.95E-08
12/18/2003	1:30 PM	3600	12600	3.40	5.66	1.1	20.0	1.66E-08

Average Permeability = **2.1E-08** cm/sec

Remarks:

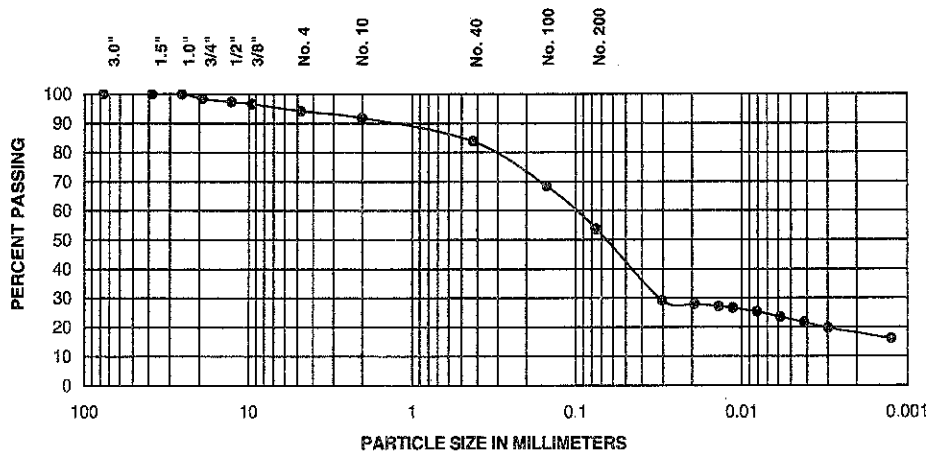
Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)

333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-034	**Date Tested**	12/21/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/15/2003
Sample Location	91+00 (SW)
Sample Description	Gray sandy lean clay with tr. of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	5.8	40.5	31.0	22.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.4
1/2"	97.3
3/8"	96.6
No. 4	94.2
No. 10	91.8
No. 40	83.8
No. 100	68.4
No. 200	53.7

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
31	16	15

Soil Classification:	CL
Soil Description:	Sandy lean clay
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

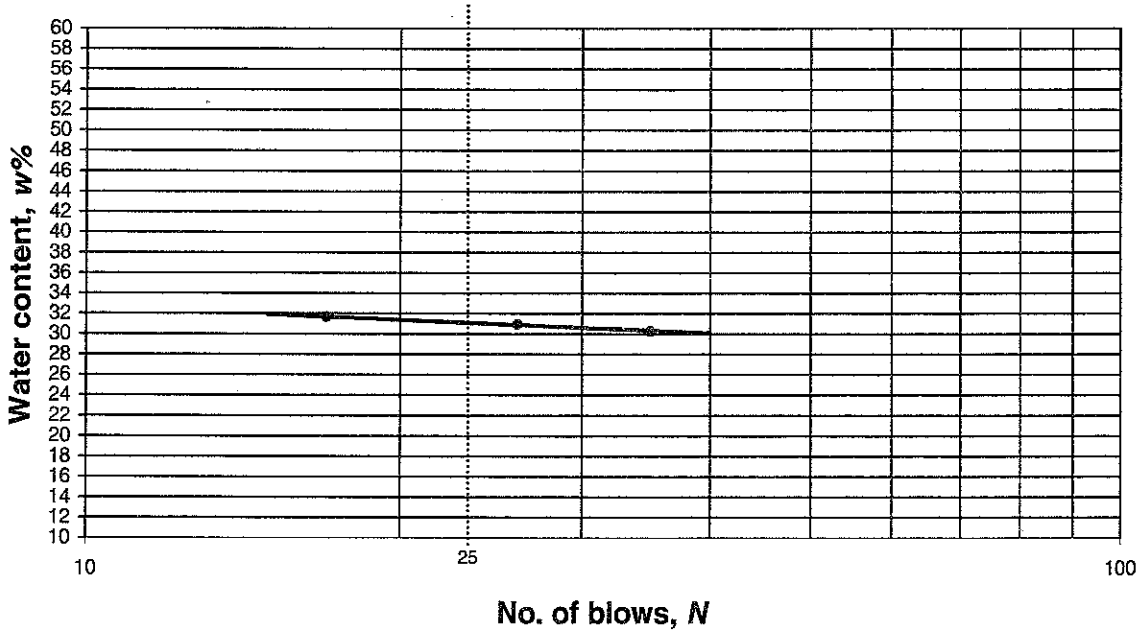
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-034	**Date Tested**	12/18/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/15/2003
Sample Location	91+00 (SW)
Sample Description	Gray sandy lean clay with tr. of gr. (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**31**	**Plastic Limit, PL**	**16**	**Plasticity Index, PI**	**15**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/18/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-034	Date Recd.	12/15/03	**Location**	91+00 (SW)		
Sample Description	Gray sandy lean clay with tr of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.06	cm	Volume, V:	206.0	cu cm
Mass of Sample:	387.3	g	**Moisture Content:**	**25.5**	%
			Wet Density	**117.3**	**pcf**
			Dry Density	**93.5**	**pcf**

Final

Diameter:	6.99	cm	Area, A:	38.4	sq cm
Height, L:	4.63	cm	Volume, V:	177.7	cu cm
Mass of Sample:	374.50	g	**Moisture Content:**	**20.8**	%
			Wet Density	**131.5**	**pcf**
			Dry Density	**108.9**	**pcf**
			Deg of Saturation	**99.3**	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	76.8 psi
Gradient:	25.0

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/18/2003	10:00 AM	0	0	3.09	5.96		20.0	---
12/18/2003	10:45 AM	2700	2700	3.17	5.89	1.1	20.0	2.20E-08
12/18/2003	11:30 AM	2700	5400	3.25	5.82	1.1	20.0	2.22E-08
12/18/2003	12:30 PM	3600	9000	3.32	5.76	1.2	20.0	1.44E-08
12/18/2003	1:30 PM	3600	12600	3.40	5.69	1.1	20.0	1.69E-08

Average Permeability = **1.9E-08** **cm/sec**

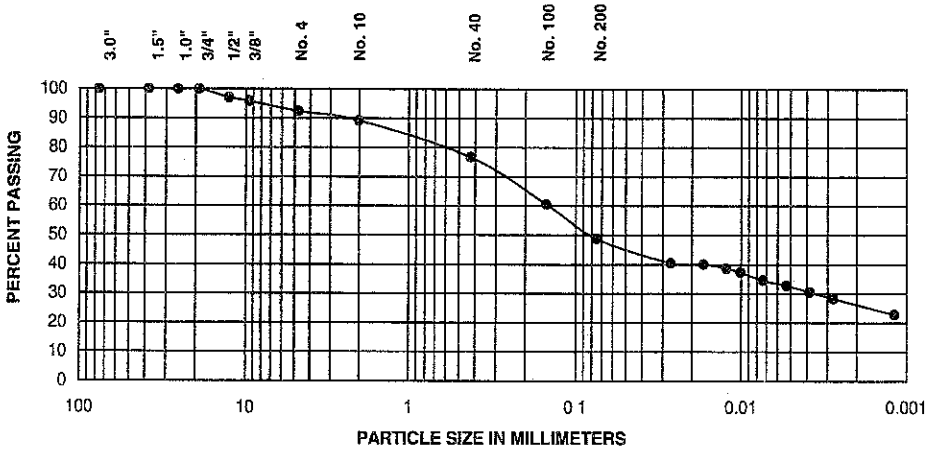
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-035	**Date Tested**	12/21/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/15/2003
Sample Location	72+00 (NW)
Sample Description	Gray silty, clayey sand with tr. of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	7.6	43.6	16.8	32.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	97.0
3/8"	95.8
No. 4	92.4
No. 10	89.2
No. 40	76.7
No. 100	60.5
No. 200	48.9

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
32	28	4

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

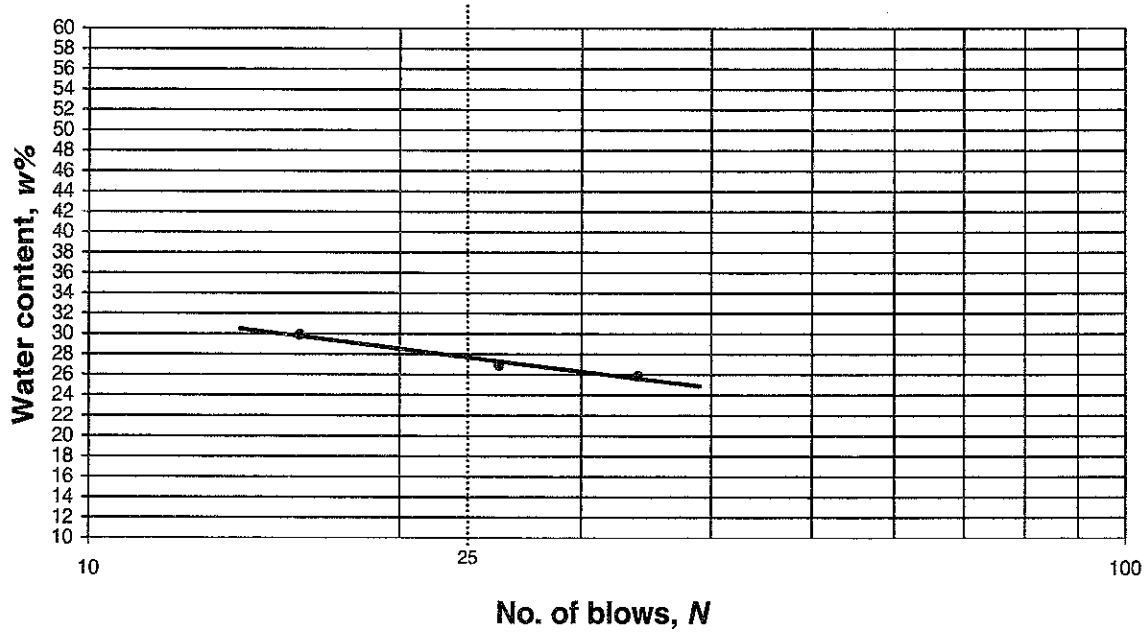
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-035	**Date Tested**	12/18/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/15/2003
Sample Location	72+00 (NW)
Sample Description	Gray silty, clayey sand with tr of gr. (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	27	**Plastic Limit, PL**	19	**Plasticity Index, PI**	8

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/18/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-035	Date Recd.	12/15/03	**Location**	72+00 (NW)		
Sample Description	Gray silty, clayey sand with tr. of gr. (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.98	cm	Volume, V:	243.5	cu cm
Mass of Sample:	466.0	g	**Moisture Content:**	**25.7**	**%**
			Wet Density	**119.4**	**pcf**
			Dry Density	**95.0**	**pcf**

Final

Diameter:	7.00	cm	Area, A:	38.5	sq cm
Height, L:	5.51	cm	Volume, V:	212.0	cu cm
Mass of Sample:	448.20	g	**Moisture Content:**	**20.2**	**%**
			Wet Density	**131.9**	**pcf**
			Dry Density	**109.7**	**pcf**
			Deg of Saturation	**98.6**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/18/2003	10:00 AM	0	0	3.03	5.97		20.0	---
12/18/2003	10:45 AM	2700	2700	3.21	5.82	1.2	20.0	5.59E-08
12/18/2003	11:30 AM	2700	5400	3.36	5.67	1.0	20.0	5.67E-08
12/18/2003	12:30 PM	3600	9000	3.57	5.50	1.2	20.0	4.90E-08
12/18/2003	1:30 PM	3600	12600	3.74	5.35	1.1	20.0	4.40E-08

Average Permeability = **5.1E-08** cm/sec

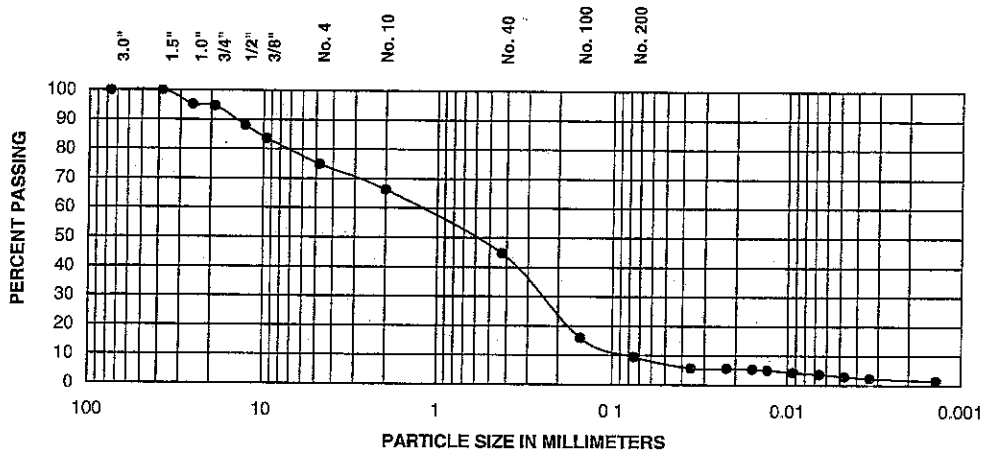
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-026	**Date Tested**	12/21/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/15/2003
Sample Location	90+00 (SW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	25.1	65.4	6.3	3.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.28	0.25	0.08	16.1	0.62

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	95.2
3/4"	94.7
1/2"	88.1
3/8"	83.6
No. 4	74.9
No. 10	66.3
No. 40	44.7
No. 100	16.0
No. 200	9.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

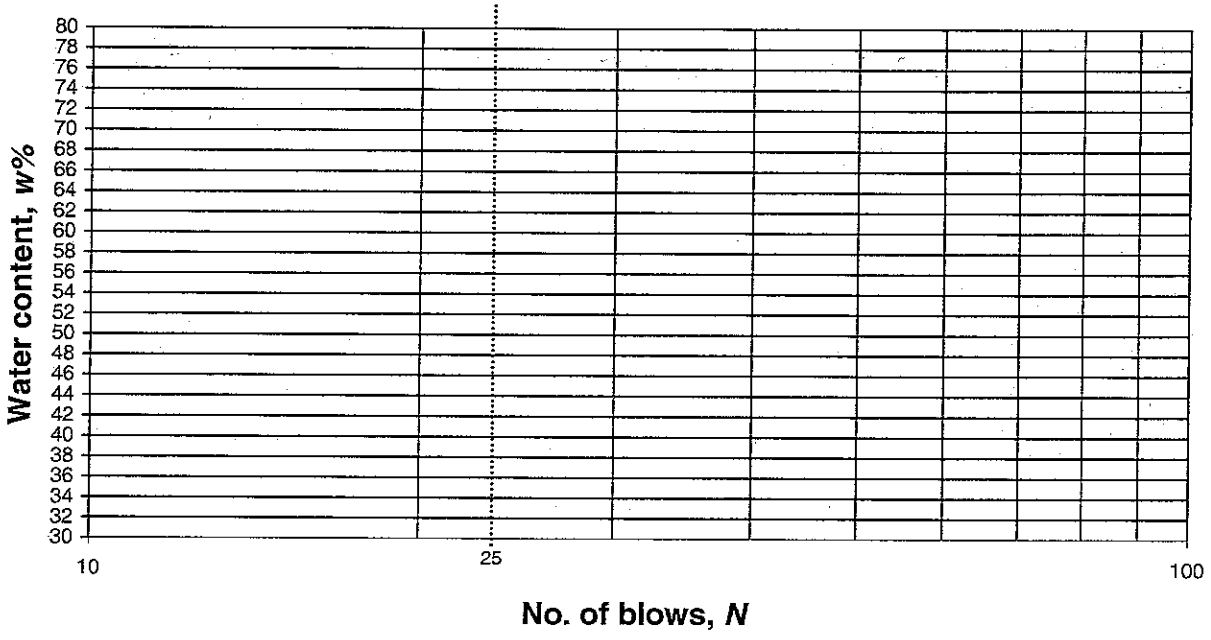
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-026	**Date Tested**	12/18/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/15/2003
Sample Location	90+00 (SW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	11	Date	12/15/2003	Sheet	1
				Date of weighing	12/16/2003	Tested by	NP

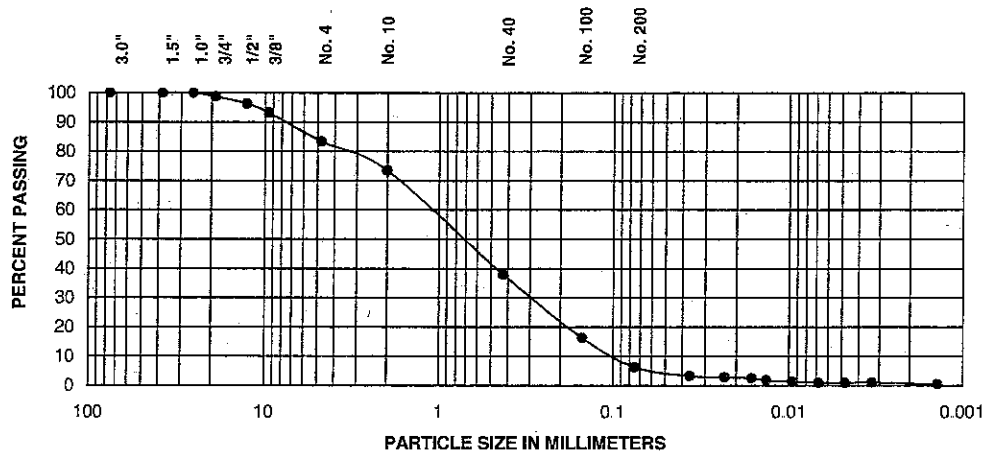
Boring No.	-	-	-	-		
Sample No.	BF-026	BF-027	BF-028	BF-029		
Location	90 + 00 (SW)	71 + 00 (NW)	89 + 00 (SW)	70 + 00 (NW)		
Tin No.	36C	42C	44C	46C		
Tin + Wet Soil	151.15	179.33	131.03	177.48		
Tin + Dry Soil	133.94	142.44	118.16	151.27		
Wt. of Tin	31.48	30.94	31.31	31.42		
Wt. of Dry Soil	102.5	111.5	86.9	119.9		
Wt. of Water	17.2	36.9	12.9	26.2		
Moisture, %	16.8	33.1	14.8	21.9		
Penetrometer	-	-	-	-		
Qu (tsf)	-	-	-	-		
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-027	**Date Tested**	12/23/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/15/2003
Sample Location	71+00 (NW)
Sample Description	Gray poorly graded sand with silt, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	16.6	77.1	5.4	0.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.11	0.29	0.10	11.5	0.78

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.8
1/2"	96.3
3/8"	93.2
No. 4	83.4
No. 10	73.5
No. 40	38.0
No. 100	16.2
No. 200	6.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SM
Soil Description:	Poorly graded sand with silt and gravel
System:	USCS

Remarks:

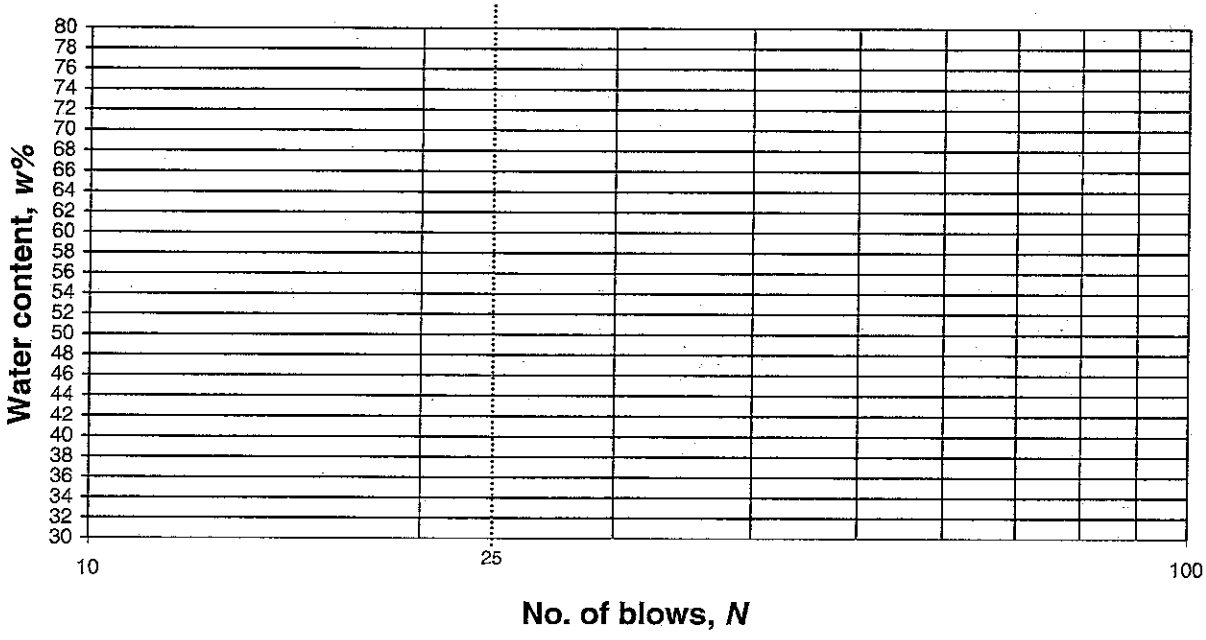
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-027	**Date Tested**	12/18/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/15/2003
Sample Location	71+00 (NW)
Sample Description	Gray poorly graded sand with silt, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	11	Date	12/15/2003	Sheet	1
				Date of weighing	12/16/2003	Tested by	NP

Boring No.	-	-	-	-		
Sample No.	BF-026	BF-027	BF-028	BF-029		
Location	90 + 00 (SW)	71 + 00 (NW)	89 + 00 (SW)	70 + 00 (NW)		
Tin No.	36C	42C	44C	46C		
Tin + Wet Soil	151.15	179.33	131.03	177.48		
Tin + Dry Soil	133.94	142.44	118.16	151.27		
Wt. of Tin	31.48	30.94	31.31	31.42		
Wt. of Dry Soil	102.5	111.5	86.9	119.9		
Wt. of Water	17.2	36.9	12.9	26.2		
Moisture, %	16.8	33.1	14.8	21.9		
Penetrometer	-	-	-	-		
Qu (tsf)	-	-	-	-		
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/13/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 14 - 28 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH	
	feet	lb/ft^3	%	cm^3	seconds	S.U.	
90+00	2.00	90.00	29.00	31.00	62.00	8	SW TRENCH
90+00	31.00	95.00	30.00	35.50	74.00	8	
89+10	2.00	94.00	28.00	69.00	54.00	8	
89+10	31.00	97.00	30.00	62.00	74.00	8	
70+50	2.00	70.00	5.00	68.00	29.00	8	NW TRENCH
70+50	33.00	85.00	5.00	74.00	30.00	8	
69+70	2.00	64.00	5.00	73.00	31.00	8	
69+70	33.00	67.00	5.00	85.00	34.00	8	

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	
	%		%		
89+00	LAB SAMPLE COLLECTED 12/13/03				SW TRENCH
70+00	LAB SAMPLE COLLECTED 12/13/03				NW TRENCH

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
91+25	3.00	N/A	N/A	N/A	1.48×10^{-7}	N/A
91+00	3.00	N/A	N/A	N/A	1.44×10^{-7}	N/A
90+75	3.00	N/A	N/A	N/A	2.41×10^{-7}	N/A
90+50	3.00	N/A	N/A	N/A	1.82×10^{-7}	N/A
90+25	3.00	N/A	N/A	N/A	1.44×10^{-7}	N/A
90+00	3.00	Sample collected	Sample collected	Sample collected	1.56×10^{-7}	yes
72+75	3.00	N/A	N/A	N/A	1.44×10^{-7}	N/A
72+50	3.00	N/A	N/A	N/A	1.56×10^{-7}	N/A
72+25	3.00	N/A	N/A	N/A	1.12×10^{-7}	N/A
71+50	3.00	N/A	N/A	N/A	9.28×10^{-8}	N/A
71+25	3.00	N/A	N/A	N/A	1.36×10^{-7}	N/A
71+00	3.00	Sample collected	Sample collected	Sample collected	1.45×10^{-7}	yes

COMMENTS

Filter cake: 2.0mm, 3.5mm, 2.5mm, 3.4mm, 1.0mm, 1.0mm, 1.0mm, and 1.0mm respectively.

See page 2 for more comments on failing slurry in NW trench.

Unit Weight:

91+25:	121.0 pcf	71+50:	113.5 pcf
91+00:	118.0 pcf	71+25:	118.0 pcf
90+75:	122.0 pcf	71+00:	114.5 pcf
90+50:	117.5 pcf		
90+25:	119.0 pcf		
90+00:	120.5 pcf		
72+75:	119.0 pcf		
72+50:	115.0 pcf		
72+25:	114.0 pcf		

DRY BENTONITE ADDITION

	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C Sipic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/13/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:15	64.00	51.00	20.00	8
10:00	-	40.00	-	-
12:55	-	46.00	-	-
15:00	67.00	54.00	18.00	8

Filter cake is .6mm and .6mm, respectively.

COMMENTS ON NW TRENCH SLURRY:

Slurry in the NW trench is still not meeting the specification for viscosity. Because of all of the water (standing, surface, etc.) in that area going into the trench, it is causing the slurry to lose the properties it is leaving the batch plant with. We continued to backfill heavily to close the trench up as much as possible and continued bailing out the bad slurry while simultaneously pumping in fresh slurry. Properties went up slightly from AM to PM. We will continue to do all we can to bring the properties back within specs. Geo-Con feels that once we get out of this area, slurry properties in the trench will go back to within specifications.

SW trench filtrate high too. Try to fix with fresh slurry. This filtrate cm^3 is quite typical for trench slurry.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/13/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 14 - 28 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
89+90	29.5	33.3	33.4	10.0	333.5	3.8	91+50	OUT	TOP OUT
89+80	29.7	33.5	33.4	10.0	334.0	3.7	91+40	4.9	TOP OUT
89+70	29.6	33.4	33.5	10.0	334.5	3.7	91+30	7.9	TOP OUT
89+60	29.8	33.5	33.5	10.0	334.5	3.7	91+20	11.4	TOP OUT
89+50	29.8	33.6	33.6	10.0	335.5	3.6	91+10	14.7	TOP OUT
89+40	29.9	33.7	33.7	10.0	336.5	3.6	91+00	16.3	TOP OUT
89+30	30.1	33.5	33.6	10.0	336.0	3.6	90+90	19.5	TOP OUT
89+20	30.2	34.0	33.8	10.0	337.5	3.6	90+80	21.7	TOP OUT
89+10	30.0	33.8	33.9	10.0	339.0	3.7	90+70	23.8	TOP OUT
89+00	30.1	33.6	33.7	10.0	337.0	3.7	90+60	26.3	TOP OUT
							90+50	29.7	TOP OUT
							90+40	31.2	TOP OUT
							90+30	32.0	TOP OUT
							90+20	32.3	TOP OUT
							90+10	33.5	3.2
							90+00	33.4	7.8
							89+90		11.7
							89+80		14.4
							89+70		18.0
							89+60		21.7
							89+50		24.9
							89+40		28.7
							89+30		31.3
							89+20		34.0
							89+10		33.8
							89+00		33.6

SF TODAY 3358.00

SF TO DATE 68154.90

COMMENTS

SW Trench

GEO-CON: Suzanne E. Sipio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/13/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 14 - 28 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
70+40	32.0	35.2	35.2	10.0	351.5	24.5	73+00	OUT	OUT
70+30	32.0	35.3	35.3	10.0	352.5	23.6	72+90	1.2	OUT
70+20	32.0	35.3	35.3	10.0	353.0	22.7	72+80	3.3	OUT
70+10	32.0	35.4	35.4	10.0	353.5	21.4	72+70	6.2	OUT
							72+60	9.2	OUT
							72+50	11.3	OUT
							72+40	11.7	OUT
EXCAVATION OF THE NW CORNER WITH 5' OVERLAPS IN EACH DIRECTION. DOES NOT COUNT FOR SQUARE FOOTAGE.							72+30	13.6	OUT
							71+60	16.1	OUT
							71+50	20.1	OUT
70+06	32.0	35.5					71+40	25.2	OUT
70+06+05N	32.0	35.4					71+30	30.3	OUT
70+06+05W	32.0	35.5					71+20	32.8	OUT
							71+10	34.5	OUT
							71+00	35.3	2.3
							70+90	35.1	4.5
							70+80	35.2	6.1
							70+70	35.2	7.5
							70+60	35.2	11.0
							70+50	35.1	13.4
							70+40		15.1
							70+30		18.1
							70+20		20.1
							70+10		25.2
							70+06		25.0
							70+06+05N		25.0
							70+06+05W		25.0

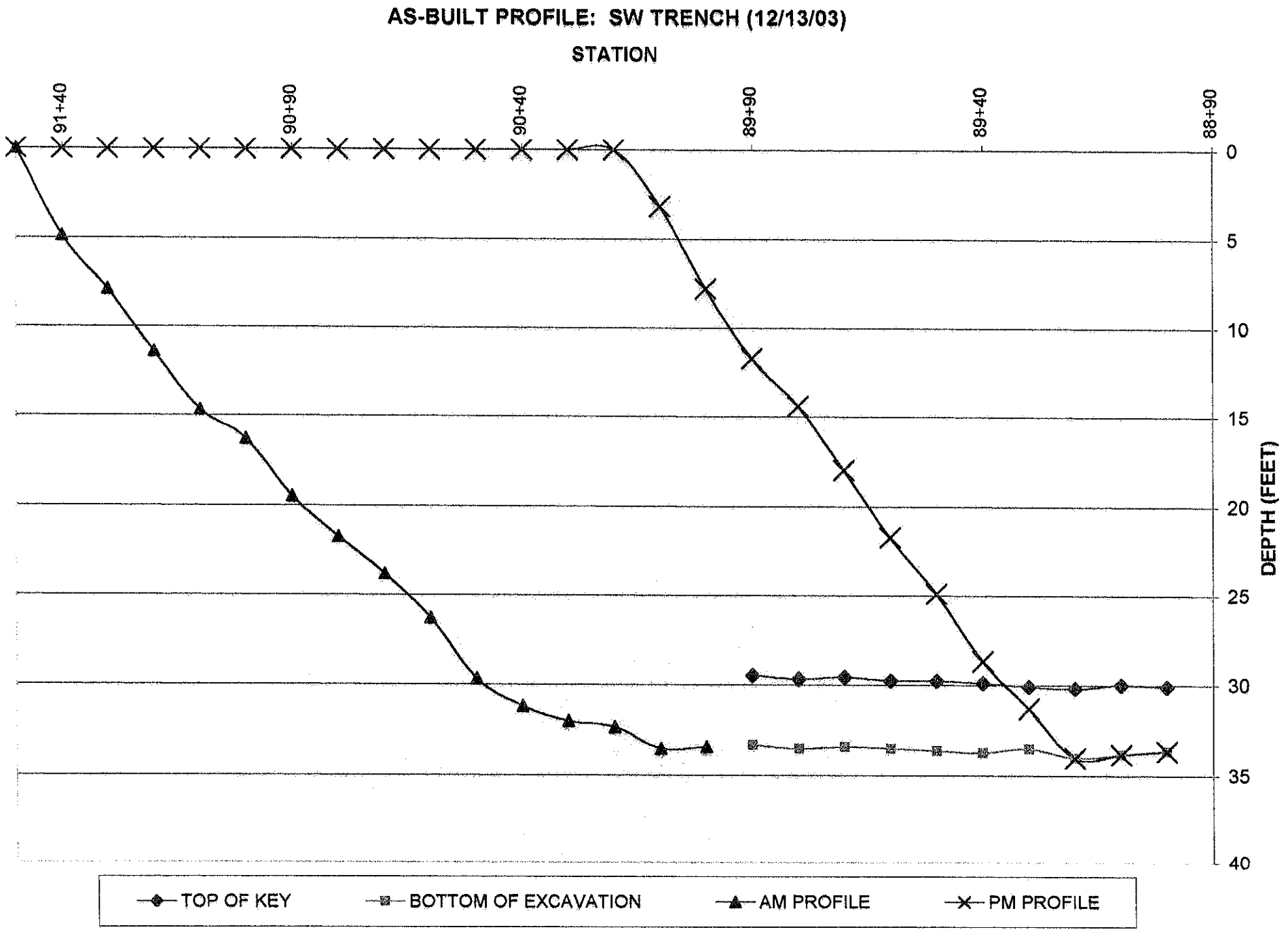
SF TODAY 1410.50

SF TO DATE 28077.00

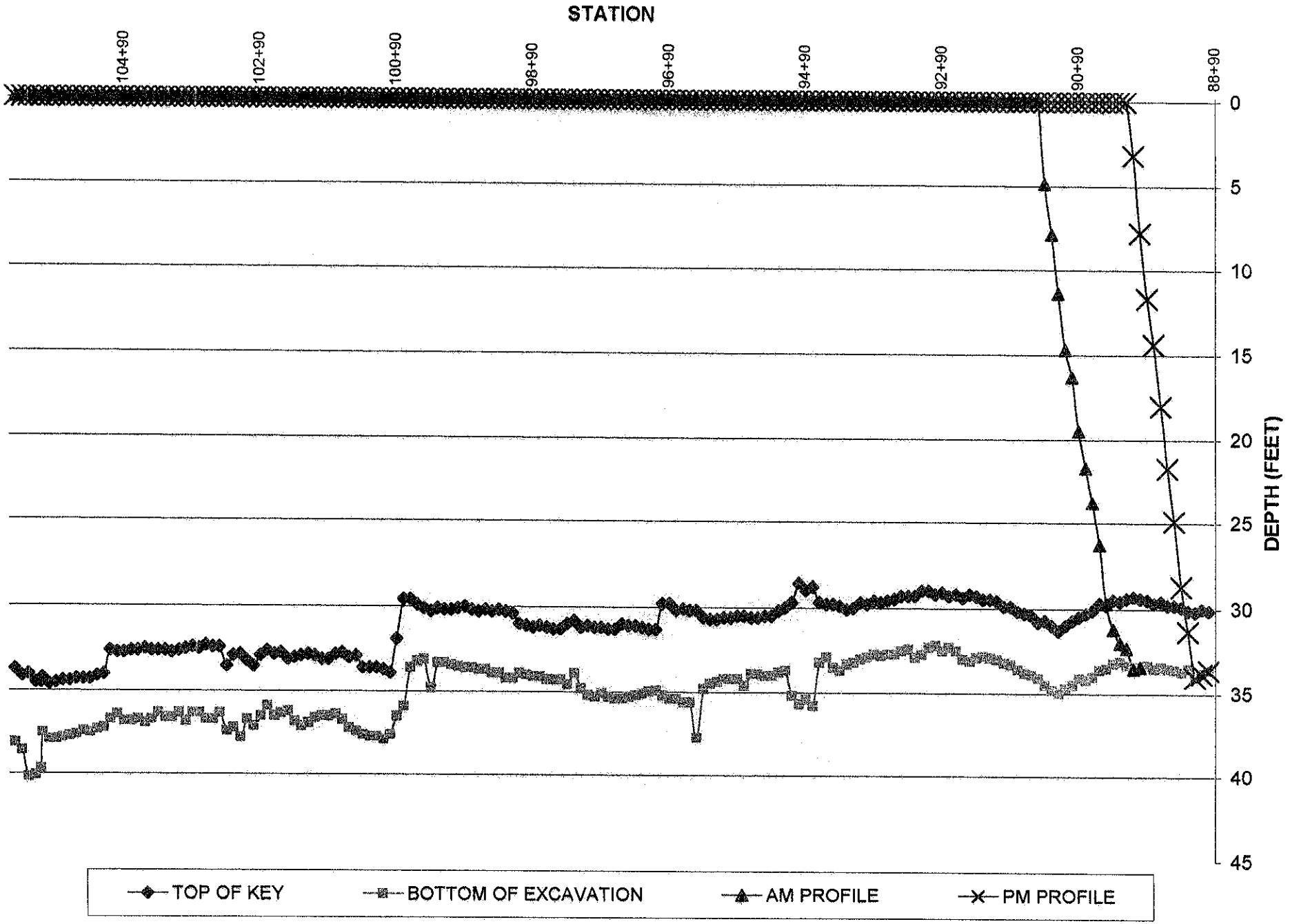
COMMENTS

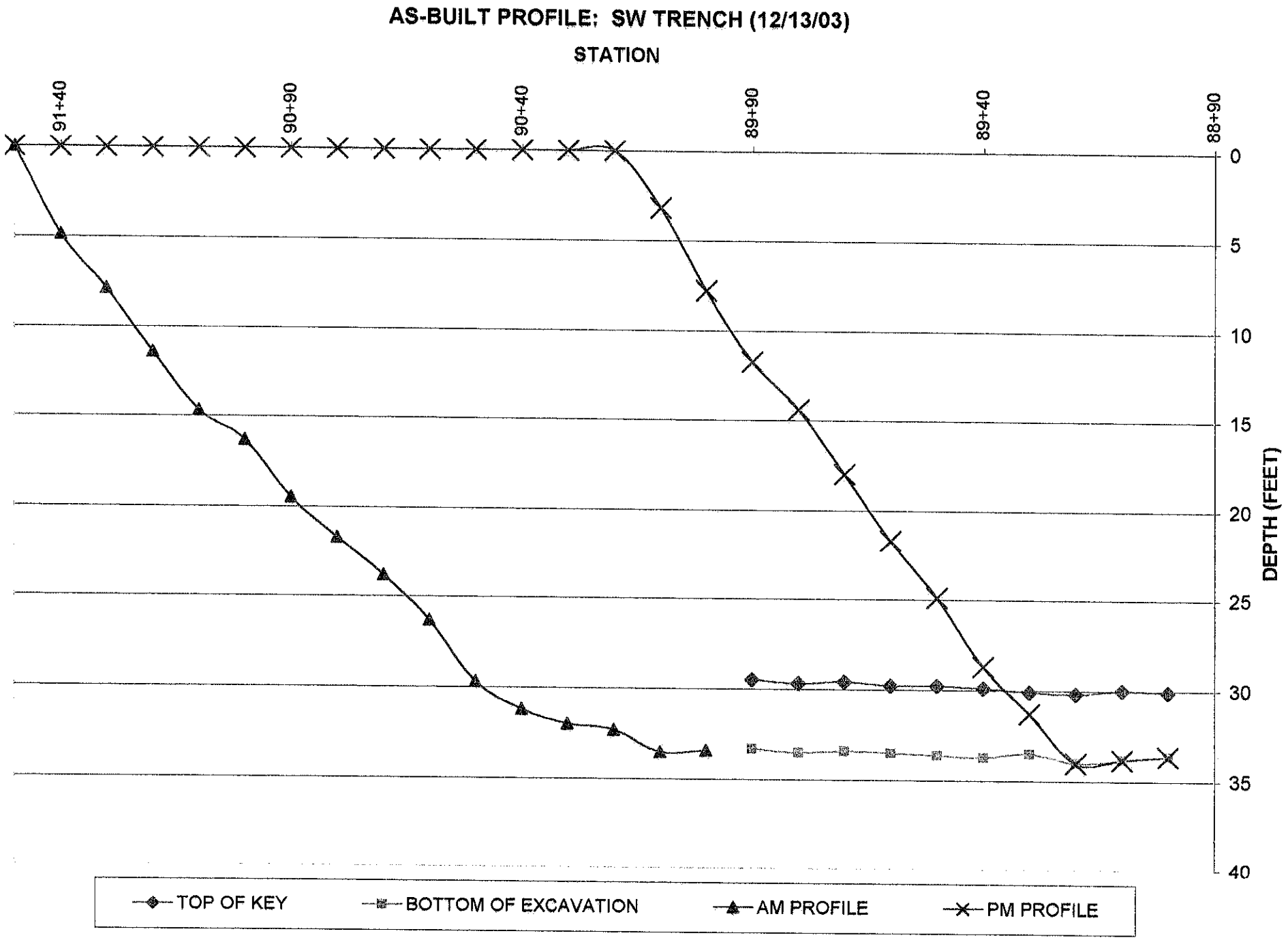
NW Trench

GEO-CON: Suzanne E. Sepic OWNER:

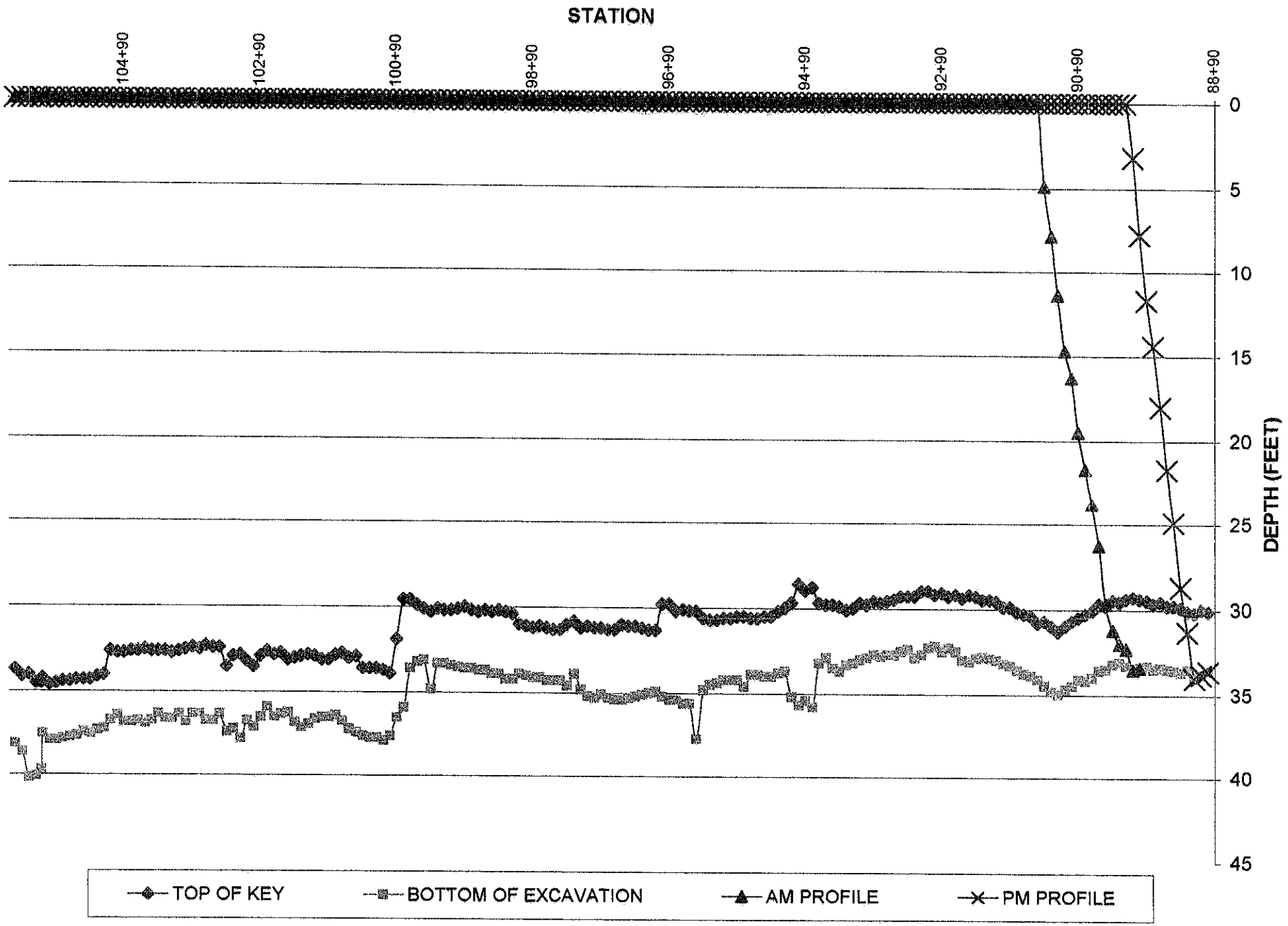

AS-BUILT PROFILE: SW TRENCH (12/13/03)
STATION
91+40
90+90
90+40
89+90
89+40
88+90
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

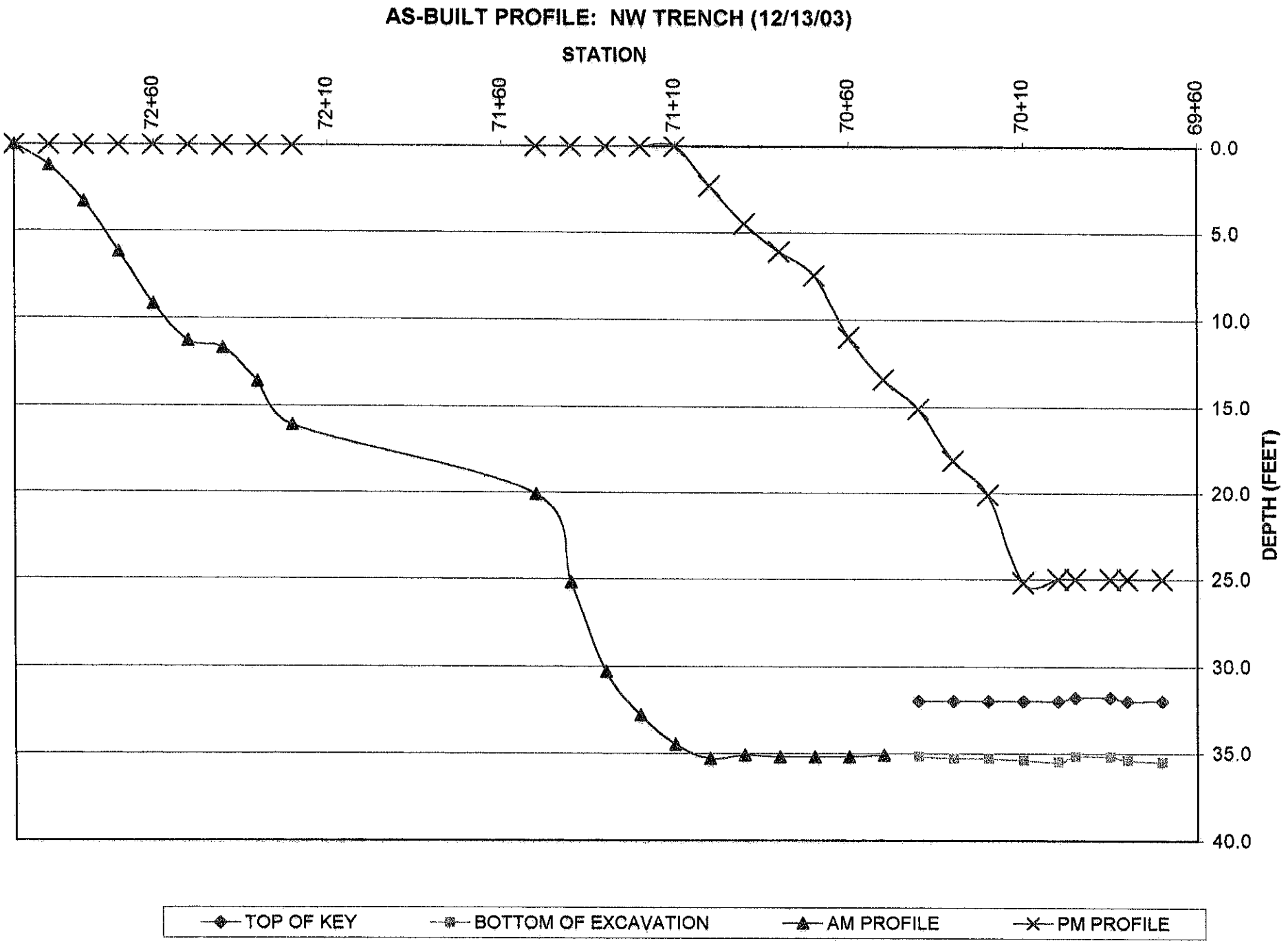
AS-BUILT PROFILE: SW TRENCH (TO DATE)

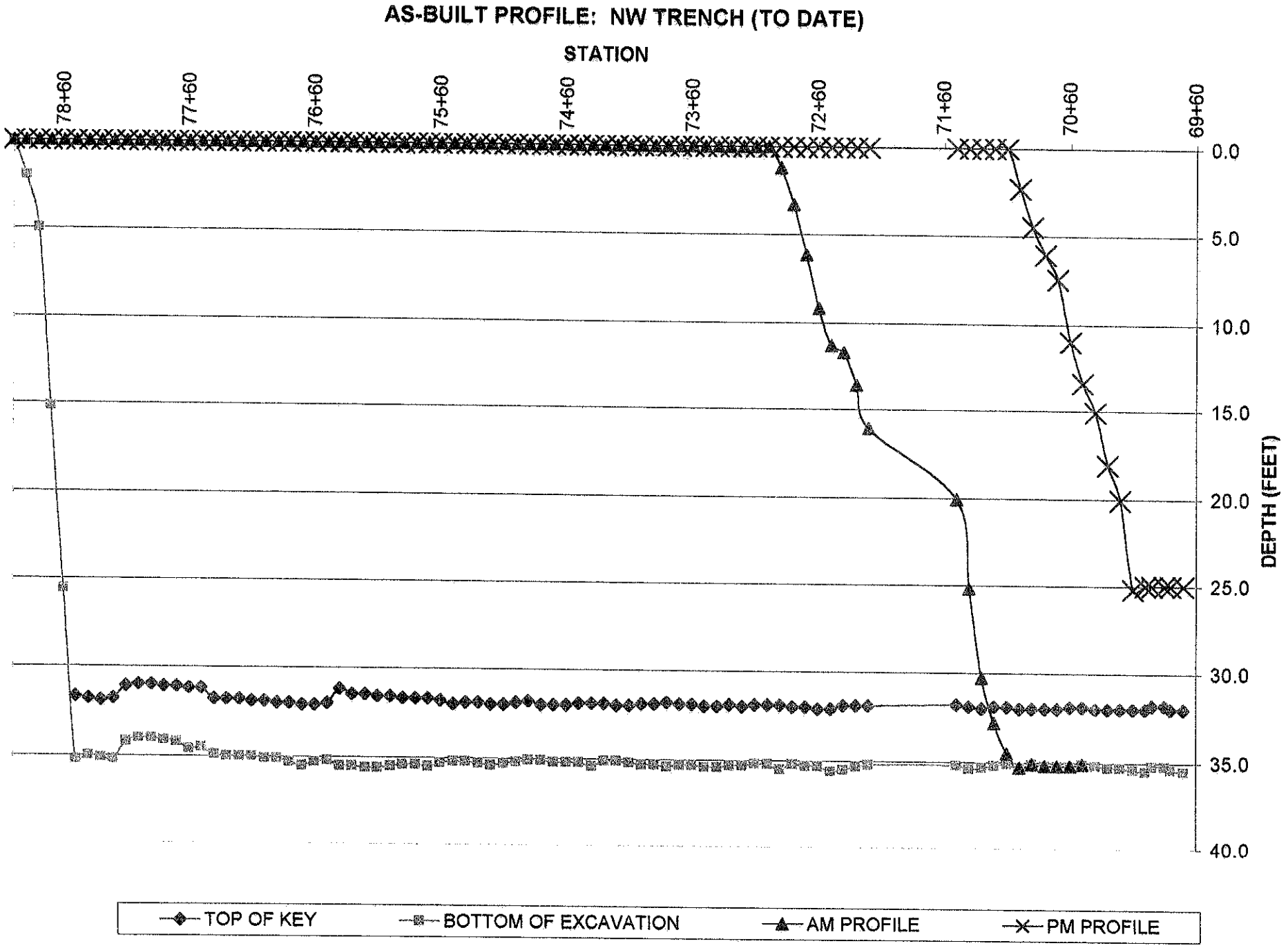



AS-BUILT PROFILE: SW TRENCH (12/13/03)
STATION
91+40
90+90
90+40
89+90
89+40
88+90
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: SW TRENCH (TO DATE)




AS-BUILT PROFILE: NW TRENCH (12/13/03)
STATION
72+60
72+10
71+60
71+10
70+60
70+10
69+60
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
78+60
77+60
76+60
75+60
74+60
73+60
72+60
71+60
70+60
69+60
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/13/03

SW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	7:15	51	> 40 sec	64	> 64 pcf	8	6.5 - 10	20	< 20 cm^3	.6
PM	15:00	54	> 40 sec	67	> 64 pcf	8	6.5 - 10	18	< 20 cm^3	.6

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:00	40	> 40 sec							
PM	12:55	46	> 40 sec							

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:00	90+00	2	62	40 - 90 sec	90	64 - 95 pcf	8	6.5 - 10	31	< 25 cm^3	2.0	29	MAX 30%
8:00	90+00	31	74	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	35.5	< 25 cm^3	3.5	30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:30	89+10	2	54	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	69	< 25 cm^3	2.5	28	MAX 30%
16:30	89+10	31	74	40 - 90 sec	97	64 - 95 pcf	8	6.5 - 10	62	< 25 cm^3	3.4	30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
91+25	3	2" to 6"	121	+15 pcf over trench slurry	1.48×10^{-7}	1.0×10^{-7} cm/sec
91+00	3	2" to 6"	118	+15 pcf over trench slurry	1.44×10^{-7}	1.0×10^{-7} cm/sec
90+75	3	2" to 6"	122	+15 pcf over trench slurry	2.41×10^{-7}	1.0×10^{-7} cm/sec
90+50	3	2" to 6"	117.5	+15 pcf over trench slurry	1.82×10^{-7}	1.0×10^{-7} cm/sec
90+25	3	2" to 6"	119	+15 pcf over trench slurry	1.44×10^{-7}	1.0×10^{-7} cm/sec
90+00	3	2" to 6"	120.5	+15 pcf over trench slurry	1.56×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS

DATE 12/13/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec	[redacted]						
PM			> 40 sec							

SW trench

DAMM

NW Trench

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:15	70+50	2	29	40 - 90 sec	70	64 - 95 pcf	8	6.5 - 10	68	< 25 cm^3	1.0	5	MAX 30%
8:15	70+50	33	30	40 - 90 sec	85	64 - 95 pcf	8	6.5 - 10	74	< 25 cm^3	1.0	5	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:00	69+70	2	31	40 - 90 sec	64	64 - 95 pcf	8	6.5 - 10	73	< 25 cm^3	1.0	5	MAX 30%
16:00	69+70	33	34	40 - 90 sec	67	64 - 95 pcf	8	6.5 - 10	85	< 25 cm^3	1.0	5	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
72+75	3	2" to 6"	119	+15 pcf over trench slurry	1.44×10^{-7}	1.0×10^{-7} cm/sec
72+00	3	2" to 6"	115	+15 pcf over trench slurry	1.56×10^{-7}	1.0×10^{-7} cm/sec
71+75	3	2" to 6"	114	+15 pcf over trench slurry	1.12×10^{-7}	1.0×10^{-7} cm/sec
71+50	3	2" to 6"	112.5	+15 pcf over trench slurry	9.28×10^{-8}	1.0×10^{-7} cm/sec
71+25	3	2" to 6"	118	+15 pcf over trench slurry	1.36×10^{-7}	1.0×10^{-7} cm/sec
71+00	3	2" to 6"	114.5	+15 pcf over trench slurry	1.45×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 91+25, 91+00, 90+75, 90+50, 90+25, 90+00

Technician: RF/MM ✓ SES

Sample Area: A= πr^2 $\pi(3.85)^2$ = 46.56 cm^2

Sample Height: L= 6.5, 6.0, 7.0, 7.0, 7.0, 7.0 cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. fctr (1/19.65)
91+25	12/13/03	8:35-12:35	240	10	117.2305	605865.9809	—	21.5	1.48×10^{-7}	1.01×10^{-8}
91+00	12/13/03	8:35-12:35	240	10	117.2305	605865.9809	—	21	1.44×10^{-7}	9.83×10^{-9}
90+75	12/13/03	8:35-12:35	240	10	100.4833	519313.7717	—	30	2.41×10^{-7}	1.64×10
90+50	12/13/03	12:52-16:52	240	10	108.2128	559261.0044	—	24.5	1.82×10^{-7}	1.24×10^{-8}
90+25	12/13/03	12:52-16:52	240	10	100.4833	519313.7717	—	18	1.44×10^{-7}	9.83×10^{-9}
90+00	12/13/03	12:52-16:52	240	10	100.4833	519313.7717	—	19.5	1.56×10^{-7}	1.06×10^{-8}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

NW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 72+75, 72+50, 72+25 / 71+50, 71+25, 71+00

Technician: MM/RF /BY SES

Sample Area: A= πr^2 $\pi (3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0, 6.5, 6.5, / 6.0, 7.0, 6.5 cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/conv Factor (1/14.60)
72+75	12/13/03	8:35-12:35	240	10	100.4833	519313.7717	—	18	1.44×10^{-7}	9.83×10^{-7}
72+50	12/13/03	8:35-12:35	240	10	108.2128	559261.0644	—	21	1.56×10^{-7}	1.06×10^{-6}
72+25	12/13/03	8:35-12:35	240	10	108.2128	559261.0644	—	15	1.12×10^{-7}	7.61×10^{-7}
71+50	12/13/03	12:52-16.52	240	10	117.2305	605865.9809	—	13.5	9.28×10^{-8}	6.33×10^{-8}
71+25	12/13/03	12:52-16.52	240	10	100.4833	519313.7717	—	17	1.36×10^{-7}	9.28×10^{-7}
71+00	12/13/03	12:52-16.52	240	10	108.2128	559261.0644	—	19.5	1.45×10^{-7}	9.90×10^{-7}

I= $\frac{P \text{ (psi)}}{0.014217 \text{ L (cm)}}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 15-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-026	SOIL ONLY	90+00	12/12/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-027	SOIL ONLY	71+00	12/12/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-032	SB BACKFILL**	91+75	12/12/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-033	SB BACKFILL**	73+00	12/12/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-034	SB BACKFILL**	91+00	12/12/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-035	SB BACKFILL**	72+00	12/12/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ BF-028	SOIL ONLY	89+00	12/13/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-029	SOIL ONLY	70+00	12/13/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ SB-036	SB BACKFILL**	90+00	12/13/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ SB-037	SB BACKFILL**	71+00	12/13/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

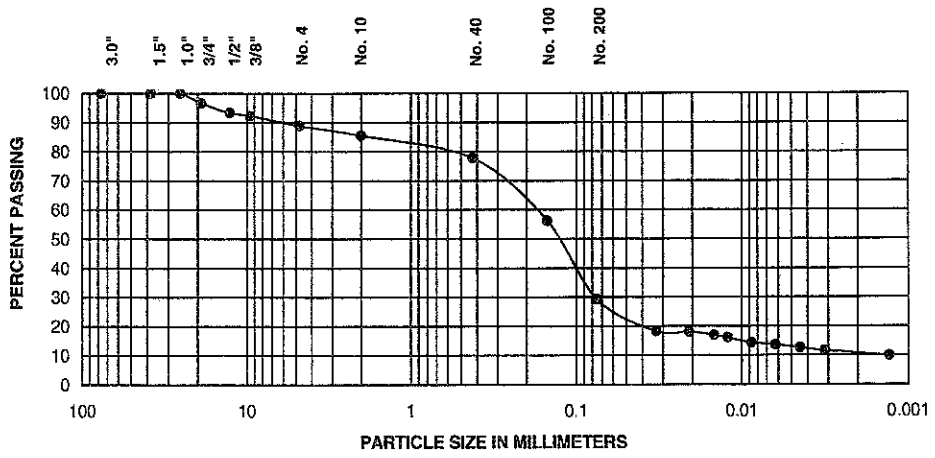
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-036	**Date Tested**	12/21/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/15/2003
Sample Location	90+00 (SW)
Sample Description	Gray silty, clayey sand with tr. of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.1	59.6	16.4	12.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	96.6
1/2"	93.4
3/8"	92.3
No. 4	88.9
No. 10	85.5
No. 40	77.8
No. 100	56.2
No. 200	29.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
33	28	5

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

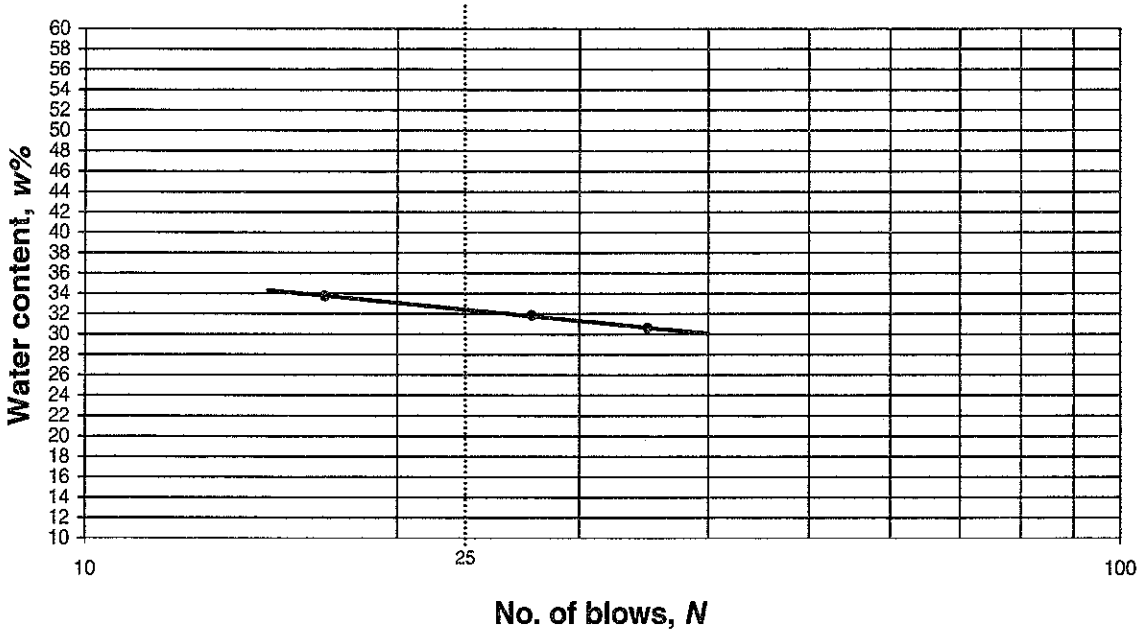
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-036	**Date Tested**	12/18/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/15/2003
Sample Location	90+00 (SW)
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**32**	**Plastic Limit, PL**	**28**	**Plasticity Index, PI**	**4**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/18/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-036	Date Recd.	12/15/03	**Location**	90+00 (SW)		
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.74	cm	Volume, V:	274.4	cu cm
Mass of Sample:	527.6	g	**Moisture Content:**	**24.7**	%
			Wet Density	**120.0**	**pcf**
			Dry Density	**96.2**	**pcf**

Final

Diameter:	6.93	cm	Area, A:	37.7	sq cm
Height, L:	6.13	cm	Volume, V:	231.2	cu cm
Mass of Sample:	487.10	g	**Moisture Content:**	**20.6**	%
			Wet Density	**131.5**	**pcf**
			Dry Density	**109.0**	**pcf**
			Deg of Saturation	**98.5**	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	76.8 psi
Gradient:	18.8

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/18/2003	10:00 AM	0	0	3.18	5.96		20.0	---
12/18/2003	10:45 AM	2700	2700	3.26	5.89	1.1	20.0	2.95E-08
12/18/2003	11:30 AM	2700	5400	3.36	5.81	1.3	20.0	3.40E-08
12/18/2003	12:30 PM	3600	9000	3.47	5.72	1.2	20.0	2.89E-08
12/18/2003	1:30 PM	3600	12600	3.58	5.63	1.2	20.0	2.92E-08

Average Permeability = **3.0E-08** cm/sec

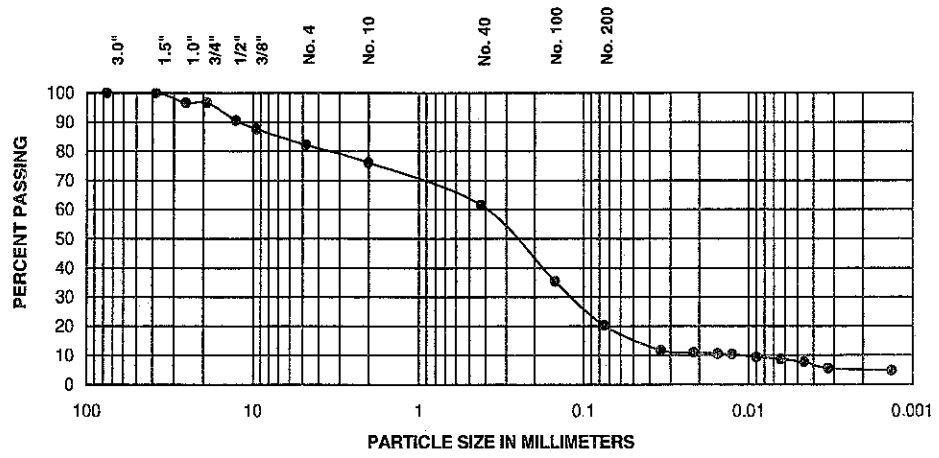
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-037	**Date Tested**	12/21/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/15/2003
Sample Location	71+00
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	17.9	61.9	12.2	8.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	96.6
3/4"	96.6
1/2"	90.6
3/8"	87.7
No. 4	82.1
No. 10	76.1
No. 40	61.5
No. 100	35.4
No. 200	20.2

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
29	19	10

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

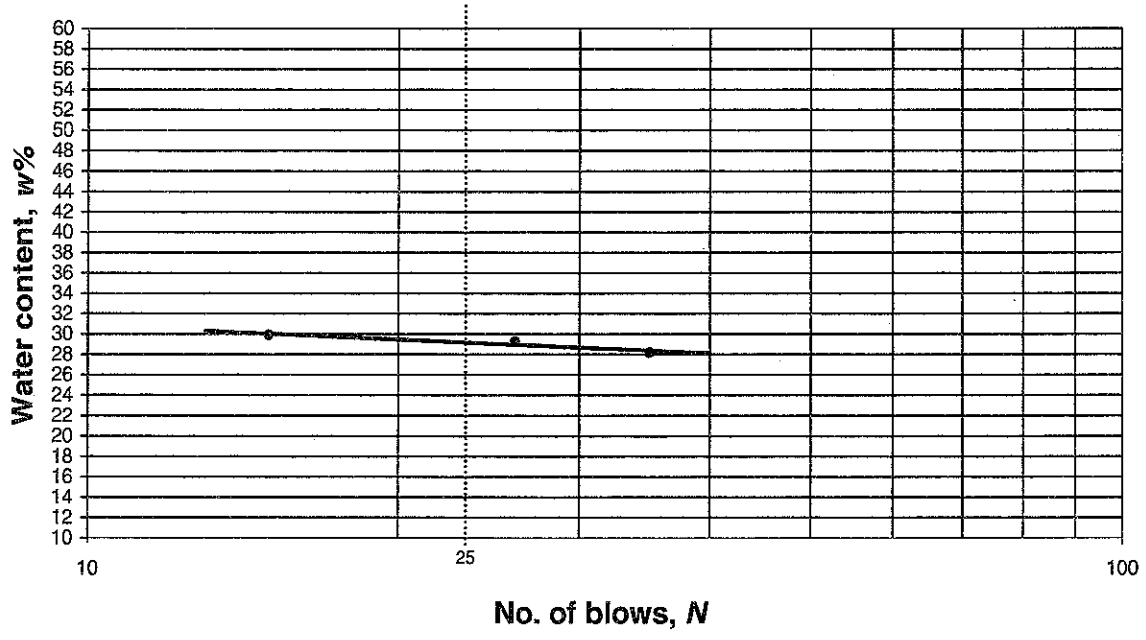
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-037	**Date Tested**	12/18/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/15/2003
Sample Location	71+00
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	29	**Plastic Limit, PL**	19	**Plasticity Index, PI**	10

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/19/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-037	Date Recd.	12/15/03	**Location**	71+00		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.61	cm	Volume, V:	269.1	cu cm
Mass of Sample:	538.0	g	**Moisture Content:**	**24.5**	%
			Wet Density	**124.7**	**pcf**
			Dry Density	**100.2**	**pcf**

Final

Diameter:	6.85	cm	Area, A:	36.9	sq cm
Height, L:	6.37	cm	Volume, V:	234.8	cu cm
Mass of Sample:	513.20	g	**Moisture Content:**	**16.3**	%
			Wet Density	**136.4**	**pcf**
			Dry Density	**117.3**	**pcf**
			Deg of Saturation	**97.0**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	19.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/19/2003	9:15 AM	0	0	3.16	5.85		20.0	---
12/19/2003	10:00 AM	2700	2700	3.22	5.78	0.9	20.0	2.90E-08
12/19/2003	10:45 AM	2700	5400	3.30	5.71	1.1	20.0	2.92E-08
12/19/2003	11:30 AM	2700	8100	3.35	5.66	1.0	20.0	2.10E-08
12/19/2003	12:15 PM	2700	10800	3.41	5.61	1.2	20.0	2.11E-08

Average Permeability = **2.5E-08** cm/sec

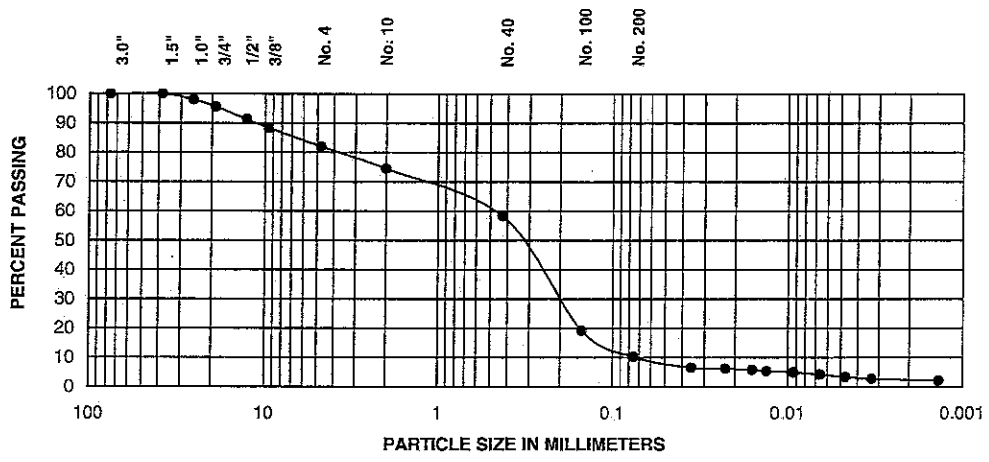
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-028	**Date Tested**	12/15/2003	**Tested by**	NP
						Qc by	SB

Date Sample Received:	12/15/2003
Sample Location	89+00 (SW)
Sample Description	Gray well graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	17.9	71.8	6.6	3.7

	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
For coarse-grained soils with <12% Fines	0.50	0.20	0.07	7.1	1.14

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.0
3/4"	95.6
1/2"	91.4
3/8"	88.4
No. 4	82.1
No. 10	74.6
No. 40	58.3
No. 100	19.1
No. 200	10.3

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
NP	NP	NP

Soil Classification:	SW-SC
Soil Description:	Well-graded sand with clay and gravel
System:	USCS

Remarks:

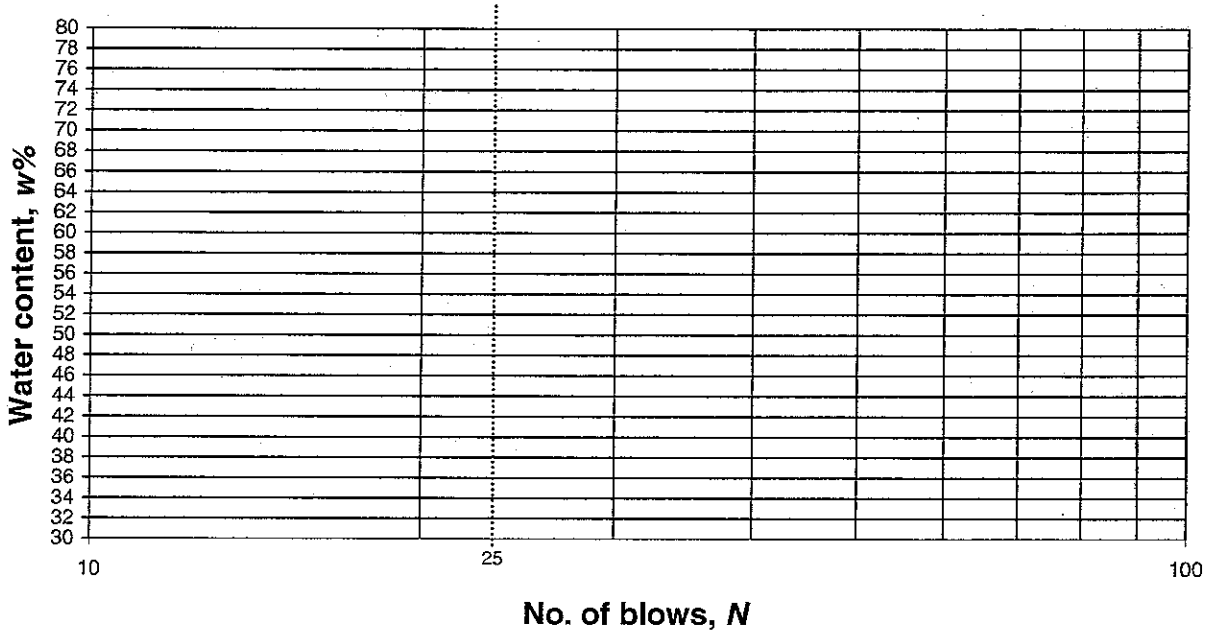
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-028	**Date Tested**	12/18/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/15/2003
Sample Location	89+00 (SW)
Sample Description	Gray well graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	11	Date	12/15/2003	Sheet	1
				Date of weighing	12/16/2003	Tested by	NP

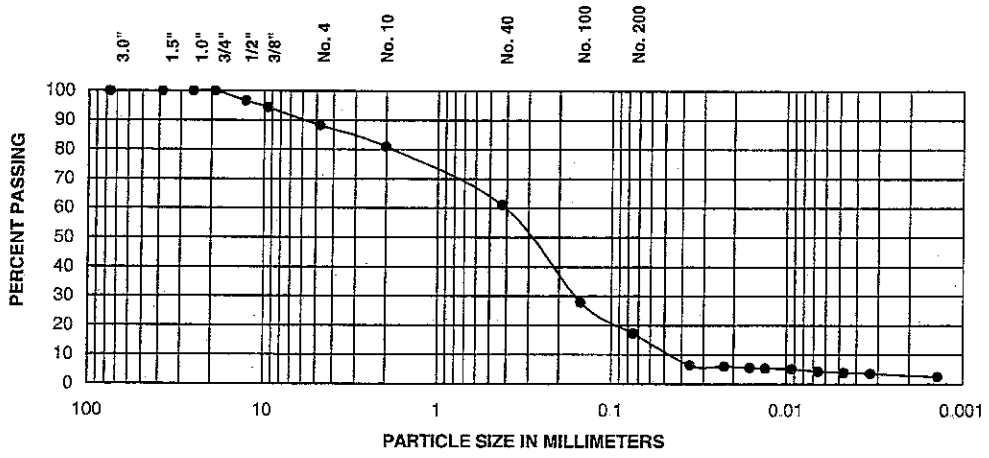
Boring No.	-	-	-	-		
Sample No.	BF-026	BF-027	BF-028	BF-029		
Location	90 + 00 (SW)	71 + 00 (NW)	89 + 00 (SW)	70 + 00 (NW)		
Tin No.	36C	42C	44C	46C		
Tin + Wet Soil	151.15	179.33	131.03	177.48		
Tin + Dry Soil	133.94	142.44	118.16	151.27		
Wt. of Tin	31.48	30.94	31.31	31.42		
Wt. of Dry Soil	102.5	111.5	86.9	119.9		
Wt. of Water	17.2	36.9	12.9	26.2		
Moisture, %	16.8	33.1	14.8	21.9		
Penetrometer	-	-	-	-		
Qu (tsf)	-	-	-	-		
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0946	

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-029	**Date Tested**	12/19/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/15/2003
Sample Location	70+00 (NW)
Sample Description	Gray silty,clayey sand with tr. of gr. & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.8	70.9	13.2	4.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	96.6
3/8"	94.4
No. 4	88.2
No. 10	80.9
No. 40	61.2
No. 100	27.9
No. 200	17.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945

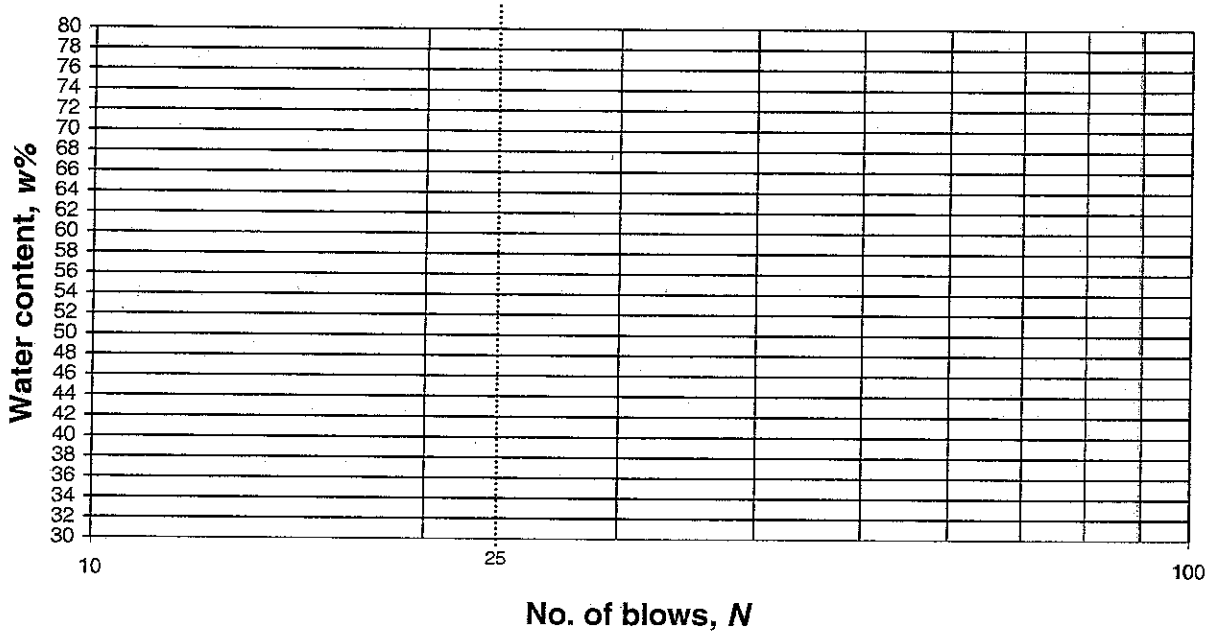
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-029	**Date Tested**	12/18/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/15/2003
Sample Location	70+00 (NW)
Sample Description	Gray silty,clayey sand with tr of gr. & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	11	Date	12/15/2003	Sheet	1
				Date of weighing	12/16/2003	Tested by	NP

Boring No.	-	-	-	-		
Sample No.	BF-026	BF-027	BF-028	BF-029		
Location	90 + 00 (SW)	71 + 00 (NW)	89 + 00 (SW)	70 + 00 (NW)		
Tin No.	36C	42C	44C	46C		
Tin + Wet Soil	151.15	179.33	131.03	177.48		
Tin + Dry Soil	133.94	142.44	118.16	151.27		
Wt. of Tin	31.48	30.94	31.31	31.42		
Wt. of Dry Soil	102.5	111.5	86.9	119.9		
Wt. of Water	17.2	36.9	12.9	26.2		
Moisture, %	16.8	33.1	14.8	21.9		
Penetrometer	-	-	-	-		
Qu (tsf)	-	-	-	-		
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/15/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, windy; 25 - 37 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH	
	feet	lb/ft^3	%	cm^3	seconds	S.U.	
89+00	2.00	95.00	29.00	23.50	58.00	8	SW TRENCH
89+00	31.00	95.00	30.00	33.50	64.00	8	
88+10	2.00	92.00	30.00	82.00	52.00	8	
88+10	31.00	95.00	30.00	91.00	56.00	8	
69+80	2.00	75.00	16.00	33.50	34.00	8	NW TRENCH
69+80	33.00	76.00	16.00	45.00	35.00	8	
68+90	2.00	94.00	18.00	87.00	38.00	8	
68+90	32.00	105.00	20.00	95.00	42.00	8	

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	
	%		%		
88+00	LAB SAMPLE COLLECTED 12/14/03				SW TRENCH
69+00	LAB SAMPLE COLLECTED 12/14/03				NW TRENCH

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
90+00	3.00	N/A	N/A	N/A	1.68×10^{-7}	N/A
89+75	3.00	N/A	N/A	N/A	2.89×10^{-7}	N/A
89+50	3.00	N/A	N/A	N/A	3.37×10^{-7}	N/A
89+25	3.00	N/A	N/A	N/A	1.17×10^{-7}	N/A
89+00	3.00	Sample collected	Sample collected	Sample collected	1.71×10^{-7}	yes
88+75	3.00	N/A	N/A	N/A	1.74×10^{-7}	N/A
71+00	3.00	N/A	N/A	N/A	4.13×10^{-8}	N/A
70+75	3.00	N/A	N/A	N/A	7.56×10^{-8}	N/A
70+50	3.00	N/A	N/A	N/A	1.04×10^{-7}	N/A
70+25	4.00	N/A	N/A	N/A	1.98×10^{-7}	N/A
70+00	4.00	Sample collected	Sample collected	Sample collected	1.12×10^{-7}	yes
69+75	4.00	N/A	N/A	N/A	1.04×10^{-7}	N/A

COMMENTS

Filter cake: 3.0mm, 3.5mm, 3.0mm, 3.5mm, 1.0mm, 1.5mm, 1.5mm, and 3.0mm respectively.

See page 2 for more comments on failing slurry in SW and NW trenches.

Unit Weight: 90+00: 133.0 pcf 70+25: 124.0 pcf
89+75: 132.0 pcf 70+00: 125.0 pcf
89+50: 130.0 pcf 69+75: 123.0 pcf
89+25: 121.0 pcf
89+00: 122.0 pcf
88+75: 124.0 pcf
71+00: 125.0 pcf
70+75: 127.0 pcf
70+50: 121.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Lipic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/15/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:30	64.00	50.00	15.00	8
9:00	-	45.00	-	-
14:00	64.00	56.00	20.00	8
15:30	-	47.00	-	-

Filter cake is .5mm and .5mm, respectively.

COMMENTS ON NW TRENCH SLURRY:

Slurry in the NW trench is still not meeting the specification for viscosity. Because of all of the water (standing, surface, etc.) in that area going into the trench, it is causing the slurry to lose the properties it is leaving the batch plant with. We continued to backfill heavily to close the trench up as much as possible and continued bailing out the bad slurry while simultaneously pumping in fresh slurry. Properties went up slightly from AM to PM, and the deep passed in the PM. We will continue to do all we can to bring the properties back within specs. Geo-Con feels that once we get out of this area, slurry properties in the trench will go back to within specifications.

NW and SW trench filtrate high too. Try to fix with fresh slurry
This filtrate cm^3 is quite typical for trench slurry

FUNNEL CALIBRATIONS PERFORMED TODAY?	yes
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/15/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, windy; 25 - 37 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
88+90	29.8	33.8	33.7	10.0	337.0	3.7	90+20	OUT	TOP OUT
88+80	29.7	33.5	33.7	10.0	336.5	3.6	90+10	3.5	TOP OUT
88+70	29.5	33.6	33.6	10.0	335.5	3.5	90+00	7.9	TOP OUT
88+60	29.3	33.4	33.5	10.0	335.0	3.6	89+90	11.9	TOP OUT
88+50	29.2	33.5	33.5	10.0	334.5	3.5	89+80	14.5	TOP OUT
88+40	29.1	33.3	33.4	10.0	334.0	3.5	89+70	18.2	TOP OUT
88+30	29.2	33.2	33.3	10.0	332.5	3.4	89+60	21.9	TOP OUT
88+20	29.1	33.2	33.2	10.0	332.0	3.3	89+50	24.8	TOP OUT
88+10	29.1	33.0	33.1	10.0	331.0	3.4	89+40	28.5	TOP OUT
88+00	29.0	33.4	33.2	10.0	332.0	3.4	89+30	31.0	TOP OUT
87+90	29.0	33.1	33.3	10.0	332.5	3.4	89+20	33.7	TOP OUT
							89+10	33.8	TOP OUT
							89+00	33.6	TOP OUT
							88+90		TOP OUT
							88+80		TOP OUT
							88+70		TOP OUT
							88+60		TOP OUT
							88+50		15.0
							88+40		24.0
							88+30		24.0
							88+20		24.0
							88+10		28.0
							88+00		29.0
							87+90		33.0

SF TODAY 3672.50

SF TO DATE 71827.40

COMMENTS

SW Trench

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/15/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, windy; 25 - 37 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
70+00	31.8	35.4	35.5	10.0	354.5	20.1	71+10	OUT	OUT
69+90	31.9	35.5	35.5	10.0	354.5	21.3	71+00	2.6	OUT
69+80	31.9	35.5	35.5	10.0	355.0	22.9	70+90	4.8	OUT
69+70	32.0	35.4	35.5	10.0	354.5	24.0	70+80	6.4	OUT
69+60	31.9	35.4	35.4	10.0	354.0	24.9	70+70	7.7	OUT
69+50	31.6	35.0	35.2	10.0	352.0	25.5	70+60	11.2	OUT
69+40	31.6	35.0	35.0	10.0	350.0	26.6	70+50	13.6	OUT
69+30	31.4	35.0	35.0	10.0	350.0	26.5	70+40	15.2	OUT
69+20	31.5	34.7	34.9	10.0	348.5	26.5	70+30	18.3	3.1
69+10	31.3	34.5	34.6	10.0	346.0	26.6	70+20	20.4	6.0
69+00	30.7	34.5	34.5	10.0	345.0	27.0	70+10	25.5	9.3
68+90	30.5	34.7	34.6	10.0	346.0	27.2	70+06	25.2	13.0
68+80	30.5	34.6	34.7	10.0	346.5	25.8	70+06+05N	25.2	13.0
68+70	30.9	34.5	34.6	10.0	345.5	23.5	70+06+05W	25.1	13.2
68+60	31.4	34.7	34.6	10.0	346.0	21.2	70+06	25.2	13.0
68+50	31.6	34.9	34.8	10.0	348.0	19.6	70+00		14.1
							69+90		16.2
							69+80		18.4
							69+70		21.1
							69+60		23.1
							69+50		26.3
							69+40		28.9
							69+30		30.6
							69+20		32.4
							69+10		34.1
							69+00		34.5
							68+90		34.7
							68+80		34.6
							68+70		34.5
							68+60		34.7
							68+50		34.9

SF TODAY 5596.00

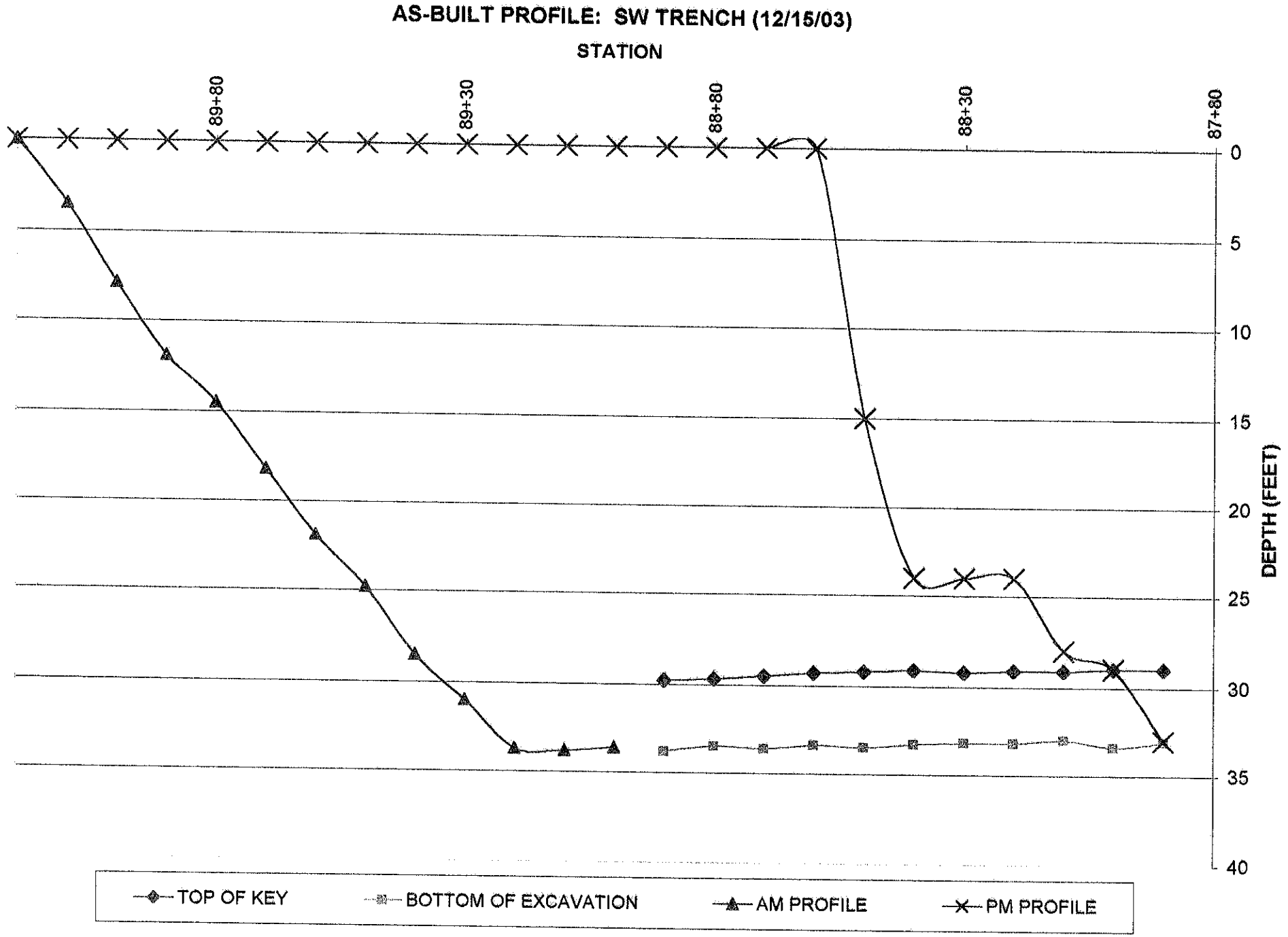
SF TO DATE 33673.00

COMMENTS

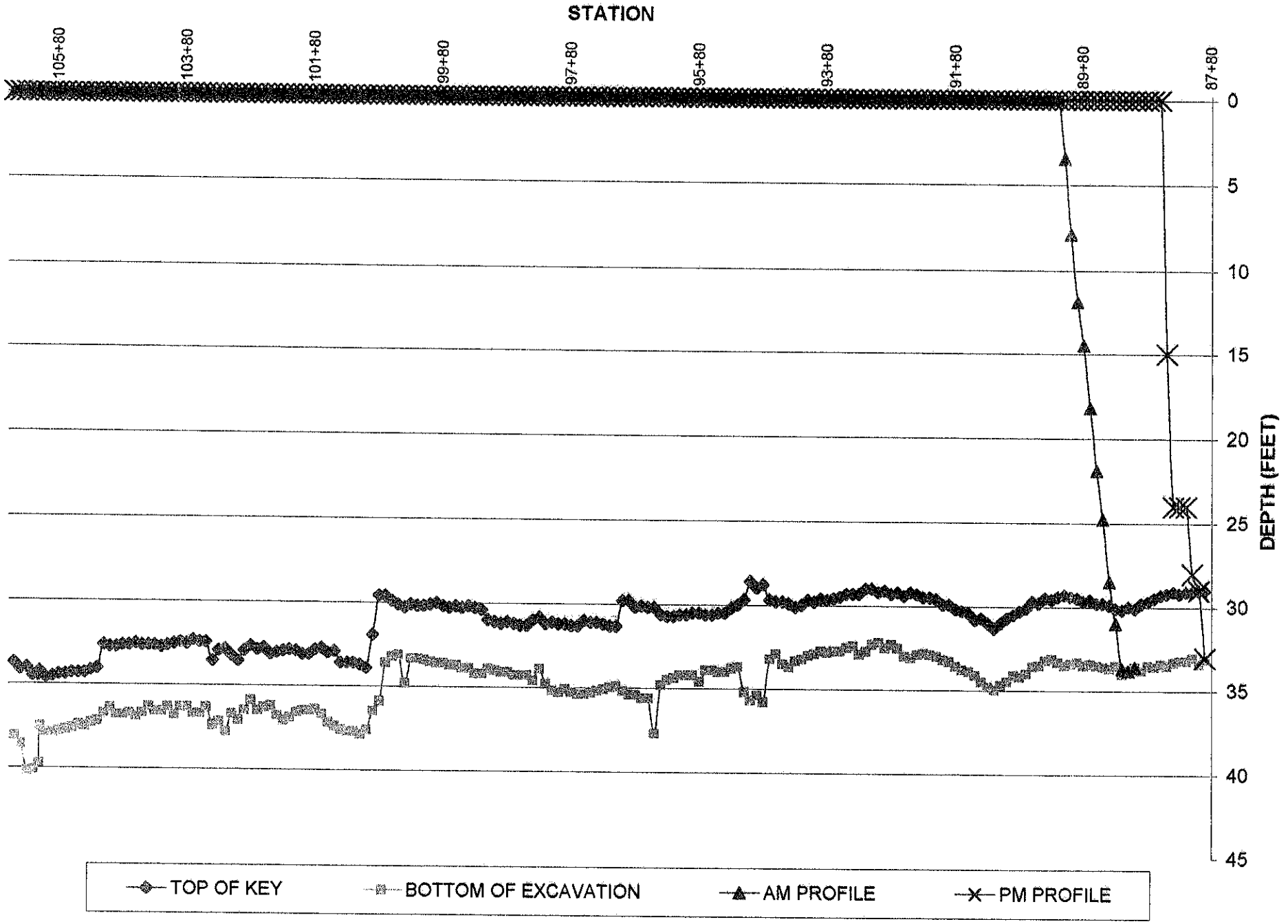
NW Trench

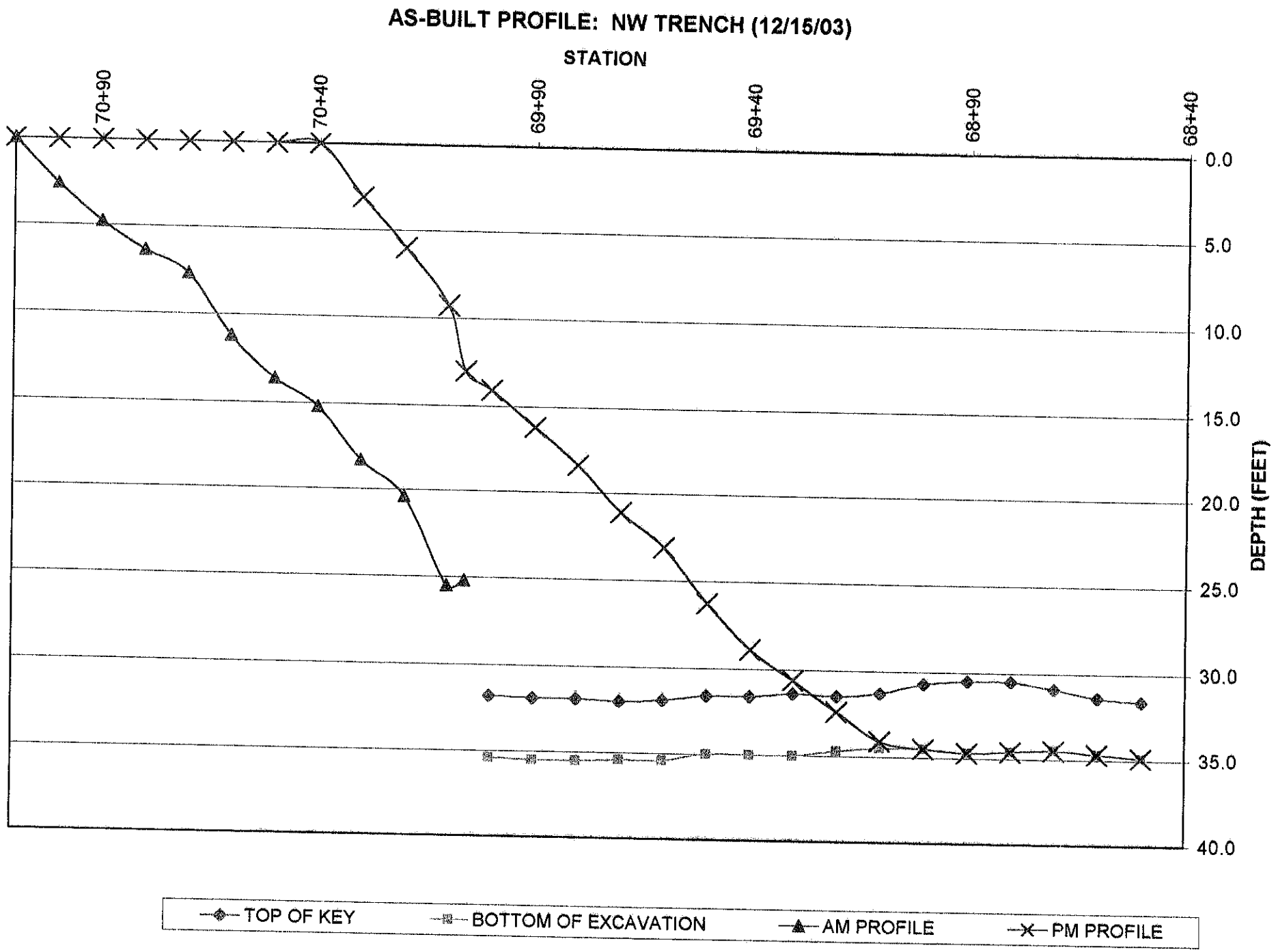
Cleaned out corner first thing this morning.

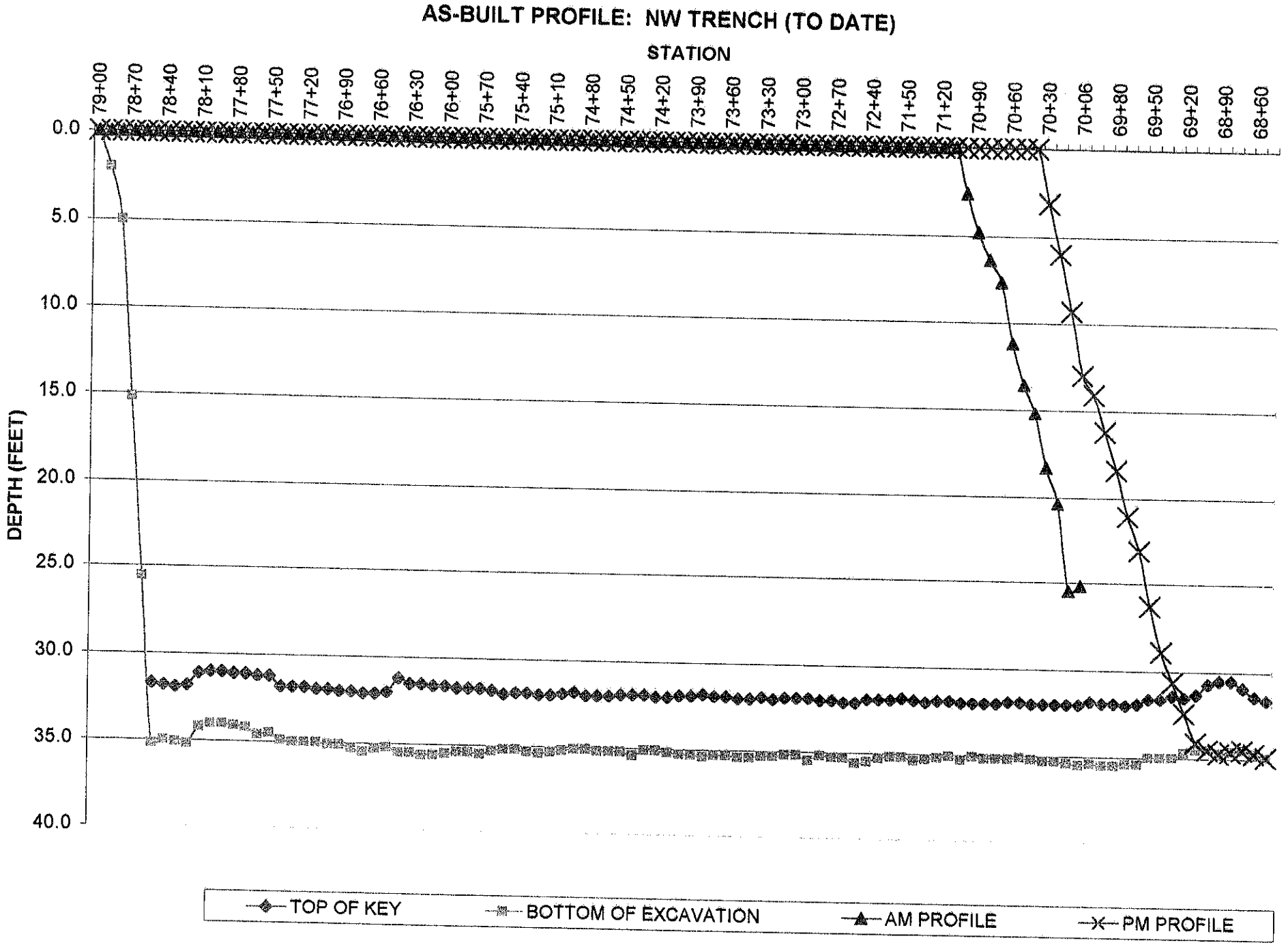
GEO-CON: Suzanne E. Sepe OWNER:


AS-BUILT PROFILE: SW TRENCH (12/15/03)
STATION
89+80
89+30
88+80
88+30
87+80
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: SW TRENCH (TO DATE)




AS-BUILT PROFILE: NW TRENCH (12/15/03)
STATION
70+90
70+40
69+90
69+40
68+90
68+40
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
79+00
78+70
78+40
78+10
77+80
77+50
77+20
76+90
76+60
76+30
76+00
75+70
75+40
75+10
74+80
74+50
74+20
73+90
73+60
73+30
73+00
72+70
72+40
71+50
71+20
70+90
70+60
70+30
70+06
69+80
69+50
69+20
68+90
68+60
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/15/03

SW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	7:30	50	> 40 sec	64	> 64 pcf	8	6.5 - 10	15	< 20 cm^3	.5
PM	14:00	56	> 40 sec	64	> 64 pcf	8	6.5 - 10	20	< 20 cm^3	.5

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9:00	45	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	15:30	47	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:00	89+00	2	58	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	23.5	< 25 cm^3	3	29	MAX 30%
8:00	89+00	31	64	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	33.5	< 25 cm^3	3.5	30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:00	88+10	2	52	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	82	< 25 cm^3	3	30	MAX 30%
15:00	88+10	31	56	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	91	< 25 cm^3	3.5	30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
90+00	3	2" to 6"	133	+15 pcf over trench slurry	1.68×10^{-7}	1.0×10^{-7} cm/sec
89+75	3	2" to 6"	132	+15 pcf over trench slurry	2.89×10^{-7}	1.0×10^{-7} cm/sec
89+50	3	2" to 6"	130	+15 pcf over trench slurry	3.37×10^{-7}	1.0×10^{-7} cm/sec
89+25	3	2" to 6"	121	+15 pcf over trench slurry	1.17×10^{-7}	1.0×10^{-7} cm/sec
89+00	3	2" to 6"	122	+15 pcf over trench slurry	1.71×10^{-7}	1.0×10^{-7} cm/sec
88+75	3	2" to 6"	124	+15 pcf over trench slurry	1.74×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 90+00, 89+75, 89+50, 89+25, 89+00, 88+75

Technician: RF/MM ✓ SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 7.0cm, 7.0cm; 6.5cm, 7.0cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ conv. factor (1/14.65)
90+00	12/15/03	13:45-17:45	240	10	100.4833	519313.7717	—	21	1.68×10^{-7}	1.15×10^{-8}
89+75	12/15/03	13:45-17:45	240	10	100.4833	519313.7717	—	36	2.89×10^{-7}	1.97×10^{-8}
89+50	12/15/03	13:45-17:45	240	10	100.4833	519313.7717	—	42	3.37×10^{-7}	2.30×10^{-8}
89+25	12/15/03	18:03-6.03	720	10	108.2128	559261.0644	—	47	1.17×10^{-7}	7.99×10^{-9}
89+00	12/15/03	18.03-6.03	720	10	100.4833	519313.7717	—	64	1.71×10^{-7}	1.17×10^{-8}
88+75	12/15/03	18.03-6.03	720	10	100.4833	519313.7717	—	65	1.74×10^{-7}	1.19×10^{-8}

I= $\frac{P\ (psi)}{0.014217\ L\ (cm)}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 12/15/03

NW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
10:00	69+80	2	34	40 - 90 sec	75	64 - 95 pcf	8	6.5 - 10	33.5	< 25 cm^3	1	16	MAX 30%
10:00	69+80	33	35	40 - 90 sec	76	64 - 95 pcf	8	6.5 - 10	45	< 25 cm^3	1.5	16	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
14:30	68+90	2	38	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	87	< 25 cm^3	1.5	18	MAX 30%
14:30	68+90	32	42	40 - 90 sec	105	64 - 95 pcf	8	6.5 - 10	95	< 25 cm^3	3	20	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
71+00	3	2" to 6"	125	+15 pcf over trench slurry	4.13×10^{-8}	1.0×10^{-7} cm/sec
70+75	3	2" to 6"	127	+15 pcf over trench slurry	7.56×10^{-8}	1.0×10^{-7} cm/sec
70+50	3	2" to 6"	121	+15 pcf over trench slurry	1.04×10^{-7}	1.0×10^{-7} cm/sec
70+25	4	2" to 6"	124	+15 pcf over trench slurry	1.98×10^{-7}	1.0×10^{-7} cm/sec
70+00	4	2" to 6"	125	+15 pcf over trench slurry	1.12×10^{-7}	1.0×10^{-7} cm/sec
69+75	4	2" to 6"	123	+15 pcf over trench slurry	1.04×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 71+00, 70+75, 70+50, 70+25, 70+00, 69+75

Technician: RF/MM w/ SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.0cm, 6.0cm, 7.0cm, 7.0cm, 6.5cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ coin fact (1/14.6)
71+00	12/15/03	13:45-17:45	240	10	117.2305	605865.9809	—	6	4.13×10^{-8}	2.82×10^{-9}
70+75	12/15/03	13:45-17:45	240	10	117.2305	605865.9809	—	11	7.56×10^{-8}	5.16×10^{-9}
70+50	12/15/03	13:45-17:45	240	10	100.4833	519313.7717	—	13	1.04×10^{-7}	7.10×10^{-9}
70+25	12/15/03	18:03-6.03	720	10	100.4833	519313.7717	—	74	1.98×10^{-7}	1.35×10^{-8}
70+00	12/15/03	18:03-6.03	720	10	108.2128	559261064.4	—	45	1.12×10^{-7}	7.64×10
69+75	12/15/03	18:03 6.03	720	10	100.4833	519313.7717	—	39	1.04×10^{-7}	7.10×10^{-9}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 16-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P.O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-030	SOIL ONLY	88+00	12/15/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-031	SOIL ONLY	69+00	12/15/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-038	SB BACKFILL**	89+00	12/15/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-039	SB BACKFILL**	70+00	12/15/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/10/2003

SOLD TO:	SHIP TO:
GEO-CON INC 4075 MONROEVILLE BLVD CORPORATE I BUILDING 2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO. HCIV006033	GEO-CON E CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12/16/03	ARROW 6-12	GREYBULL	GEL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result	Test or Property	API Spec.	Result
Viscosity	30 min.	62	Moisture (wt. %)	N/A	9.0
Plastic Viscosity (cP)	N/A		Y P / P. V. Ratio	3.0 max.	2.43
Yield Point (# / 100 ft2)	N/A				
Filtrate Volume (cm3)	15.0 max.	13.8			
> 75 micron (wt. %)	4.0 max.	1.6			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4400.

Signed 12/16/03 Date

Plant Manager

LabCertGrd.doc (4/2/07)
Rev E (9/06)

Rcvd 12/15/03
100 # bags

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/8/2003

SOLD TO:	SHIP TO:
GEO-CON INC 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV006034	GEO-CON E CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
[illegible]-03	MONT TRANS #4	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec.	Result
Viscosity	30 min.	60
Plastic Viscosity (cP)	N/A	
Yield Point (#/ 100 ft2)	N/A	
Filtrate Volume (cmS)	15.0 max.	13.8
>75 micron (wt. %)	4.0 max.	1.7

Test or Property	API Spec.	Result
Moisture (wt. %)	N/A	8.3
Y.P. / P.V. Ratio	3.0 max.	1.75

This certifies that the product shipped to the customer as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4845.

Signed 12/9/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Arrived 12/15/03
100# BAGS.

LABORATORY ANALYSIS/ CERTIFICATION

P.O. Box 832 Greybull, Wyoming 02426
307-765-4496

Date Tested: 12/12/2003

SOLD TO:	SHIP TO:
GEO-CON East Chicago, Indiana	SAME

SHIP DATE	RAILCAR OR TRUCK NUMBER	PLANT OF ORIGIN	PRODUCT
12/10/2003	FG Trucking 30	Wyoben	Federal Gel 90

Note: Our data for the above shipment shows the following test results:

Test or Property	API Spec.	Result
Viscosity	30 min.	47
Plastic Viscosity (cP)	N/A	
Yield Point (# /100ft^2)	N/A	
Filtrate Volume (cm^3)	15.0 max.	12.4
>75 micron (wt. %)	4.0 max.	3.7

Test or Property	API Spec.	Result
Moisture (wt %)	10.0 max.	8.2
Y.P. / P.V. Ratio	3.0 max.	1.92

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13-A; Section 4 for "Drilling Grade Bentonite". Should you have any questions or require additional information please let us know 1-307-765-4496.

ORDER NUMBERS : HCIV 6047

TRUCK SHIP DATE : 12/10/2003

Diane Williams 12/15/03

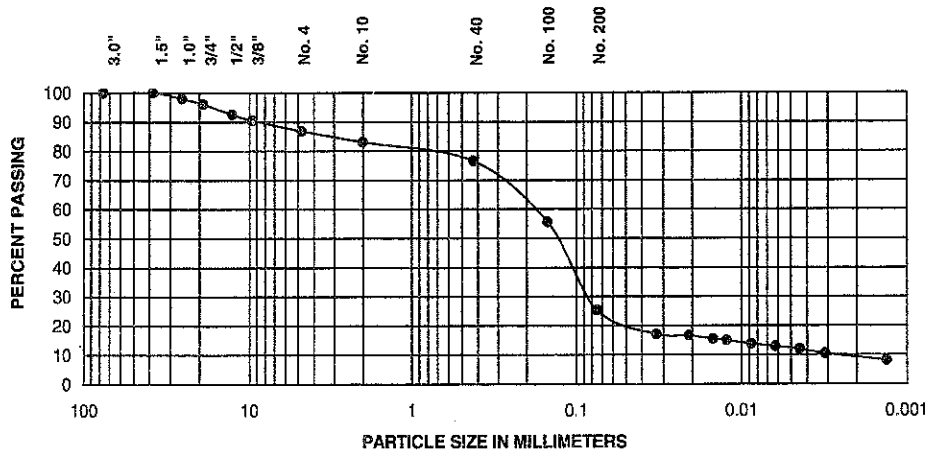
Signed Date

Rcvd. 12/15/03
2000# BAGS

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-038	**Date Tested**	12/21/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/16/2003
Sample Location	89+00 (SW)
Sample Description	Gray silty, clayey sand with tr. of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	13.1	61.4	13.1	12.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.0
3/4"	96.1
1/2"	92.6
3/8"	90.5
No. 4	86.9
No. 10	83.1
No. 40	76.6
No. 100	55.6
No. 200	25.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
31	20	11

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

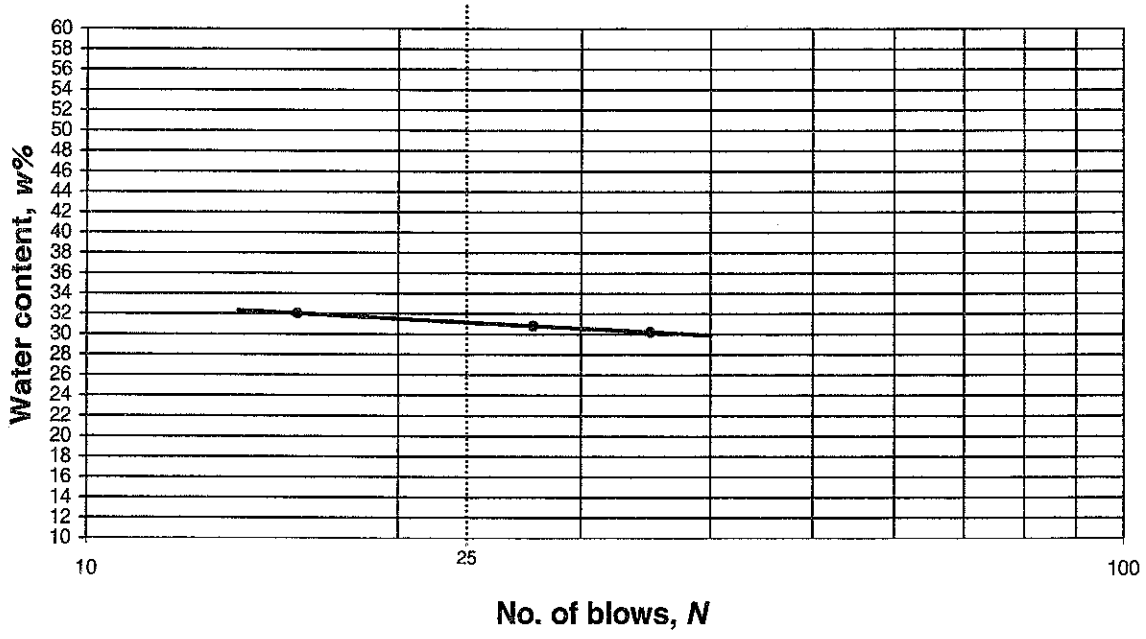
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-038	**Date Tested**	12/18/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/16/2003
Sample Location	89+00 (SW)
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**31**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**11**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/19/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-038	Date Recd.	12/16/03	**Location**	89+00 (SW)		
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.40	cm	Volume, V:	260.6	cu cm
Mass of Sample:	493.6	g	**Moisture Content:**	**25.4**	%
			Wet Density	**118.2**	**pcf**
			Dry Density	**94.3**	**pcf**

Final

Diameter:	6.86	cm	Area, A:	37.0	sq cm
Height, L:	5.77	cm	Volume, V:	213.3	cu cm
Mass of Sample:	479.60	g	**Moisture Content:**	**14.3**	%
			Wet Density	**140.3**	**pcf**
			Dry Density	**122.7**	**pcf**
			Deg of Saturation	**99.0**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	19.8	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/19/2003	9:15 AM	0	0	3.25	5.86		20.0	---
12/19/2003	10:00 AM	2700	2700	3.33	5.76	0.8	20.0	4.03E-08
12/19/2003	10:45 AM	2700	5400	3.42	5.67	1.0	20.0	3.66E-08
12/19/2003	11:30 AM	2700	8100	3.48	5.60	0.9	20.0	2.87E-08
12/19/2003	12:15 PM	2700	10800	3.55	5.53	1.0	20.0	2.89E-08

Average Permeability = **3.4E-08** **cm/sec**

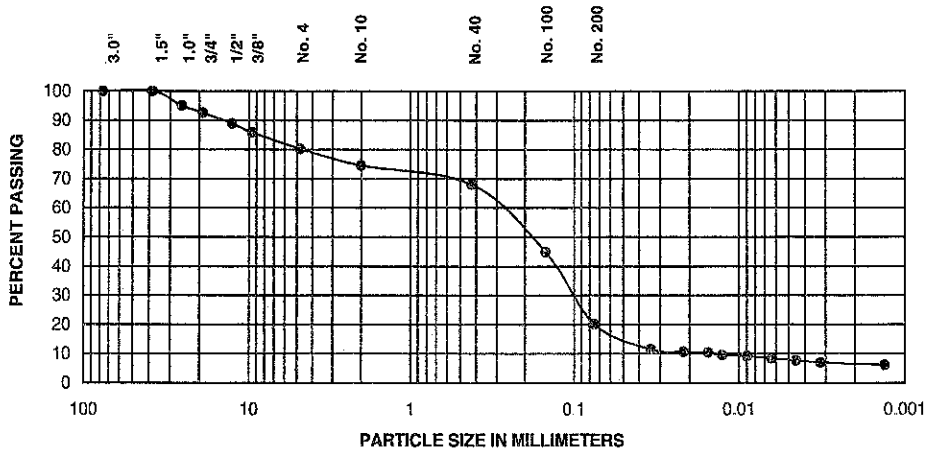
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-039	**Date Tested**	12/22/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/16/2003
Sample Location	70+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	19.8	60.0	12.2	8.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	95.1
3/4"	92.6
1/2"	88.9
3/8"	85.8
No. 4	80.2
No. 10	74.7
No. 40	68.1
No. 100	44.9
No. 200	20.2

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
29	20	9

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

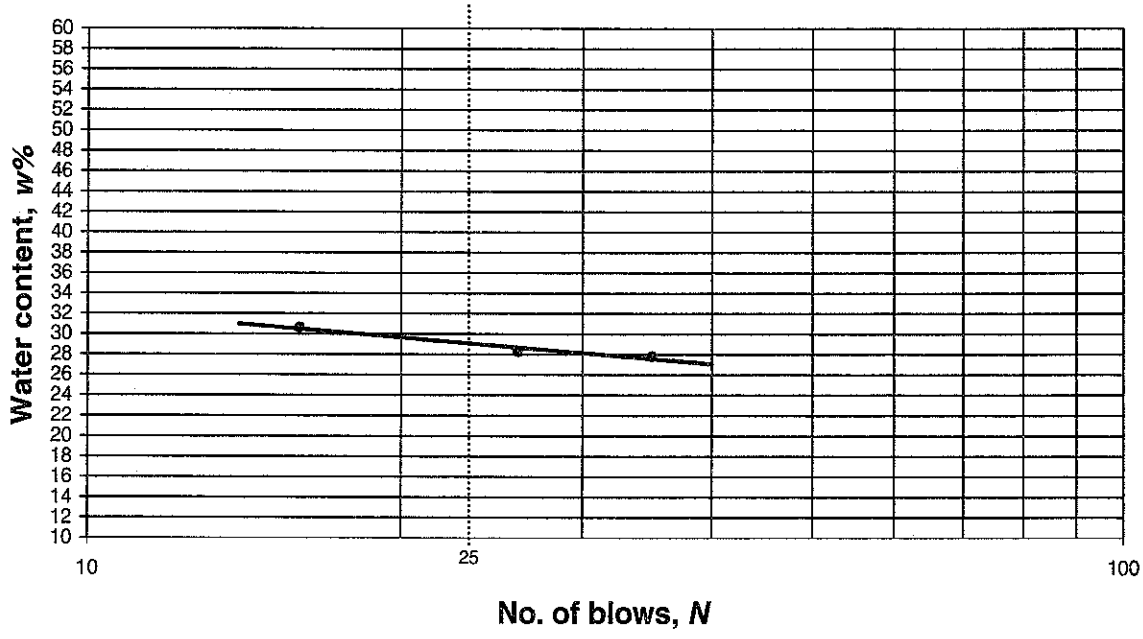
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-039	**Date Tested**	12/19/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/16/2003
Sample Location	70+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**29**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**9**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/19/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-039	Date Recd.	12/16/03	**Location**	70+00 (NW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.72	cm	Volume, V:	232.9	cu cm
Mass of Sample:	439.3	g	**Moisture Content:**	**25.6**	%
			Wet Density	**117.7**	**pcf**
			Dry Density	**93.7**	**pcf**

Final

Diameter:	6.87	cm	Area, A:	37.1	sq cm
Height, L:	4.92	cm	Volume, V:	182.4	cu cm
Mass of Sample:	410.60	g	**Moisture Content:**	**14.2**	%
			Wet Density	**140.5**	**pcf**
			Dry Density	**123.0**	**pcf**
			Deg of Saturation	**98.9**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	22.1	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/19/2003	9:15 AM	0	0	3.00	5.80		20.0	---
12/19/2003	10:00 AM	2700	2700	3.09	5.69	0.8	20.0	3.93E-08
12/19/2003	10:45 AM	2700	5400	3.17	5.59	0.8	20.0	3.61E-08
12/19/2003	11:30 AM	2700	8100	3.23	5.51	0.8	20.0	2.91E-08
12/19/2003	12:15 PM	2700	10800	3.29	5.43	0.8	20.0	2.93E-08

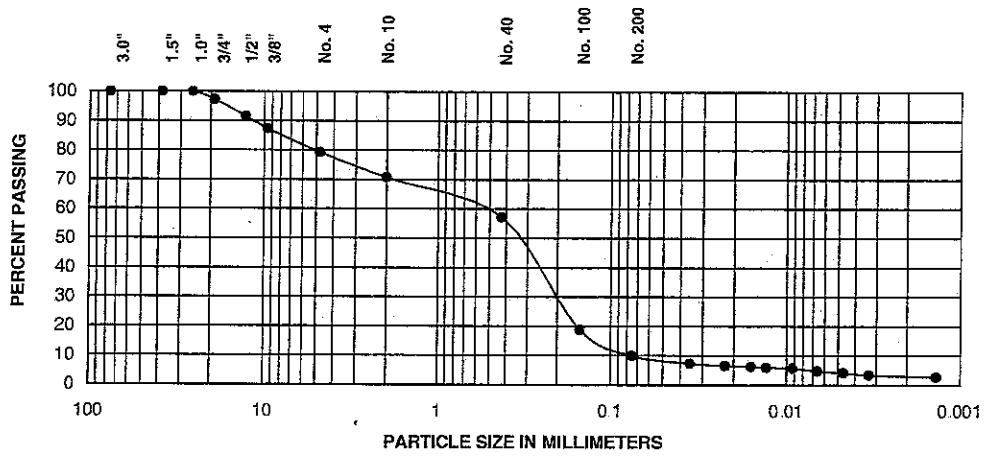
Average Permeability = **3.3E-08** cm/sec

Remarks:

	Great Lakes Soil & Environmental Consultants, inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-030	**Date Tested**	12/22/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/16/2003
Sample Location	88+00 (SW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	20.7	69.4	5.5	4.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.59	0.20	0.08	7.8	0.93

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	97.2
1/2"	91.6
3/8"	87.3
No. 4	79.3
No. 10	70.7
No. 40	57.2
No. 100	18.9
No. 200	9.9

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

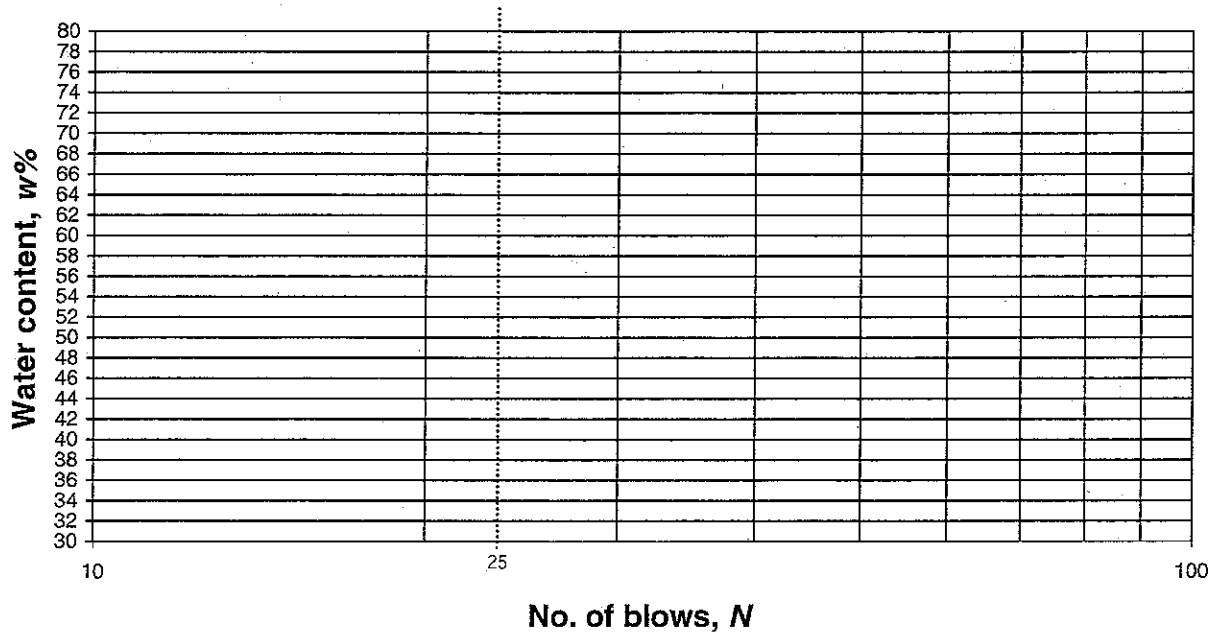
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.· Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-030	**Date Tested**	12/22/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/16/2003
Sample Location	88+00 (SW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	13	Date	12/16/2003	Sheet	1
				Date of weighing	12/17/2003	Tested by	ON

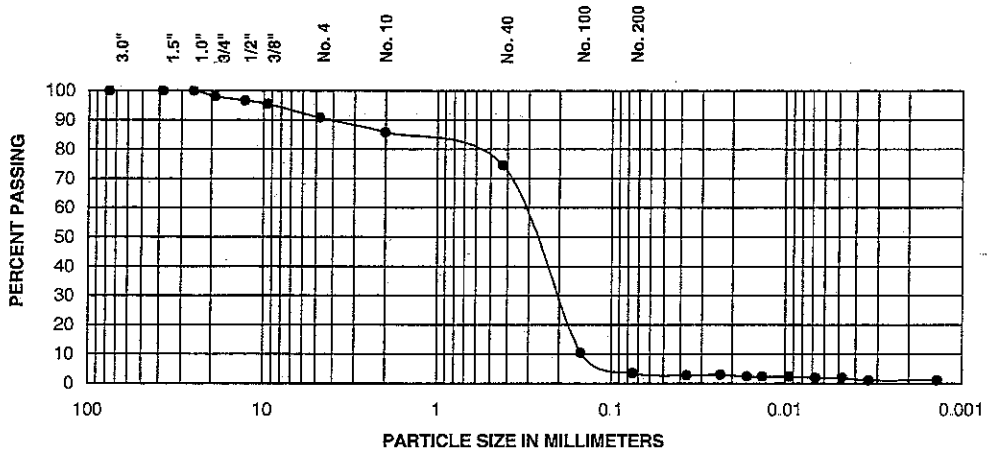
Boring No.	-	-				
Sample No.	BF-030	BF-031				
Location	88 + 00 (SW)	69 + 00 (NW)				
Tin No.	71A	2C				
Tin + Wet Soil	154.04	159.48				
Tin + Dry Soil	139.99	139.24				
Wt. of Tin	30.49	31.01				
Wt. of Dry Soil	109.5	108.2				
Wt. of Water	14.1	20.2				
Moisture, %	12.8	18.7				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-031	**Date Tested**	12/22/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/16/2003
Sample Location	69+00 (NW)
Sample Description	Gray poorly graded sand with tr.of gr.& foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	9.2	87.4	1.5	1.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.34	0.21	0.14	2.3	0.88

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.1
1/2"	96.6
3/8"	95.4
No. 4	90.8
No. 10	85.8
No. 40	74.5
No. 100	10.4
No. 200	3.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP
Soil Description:	Poorly graded sand
System:	USCS

Remarks:

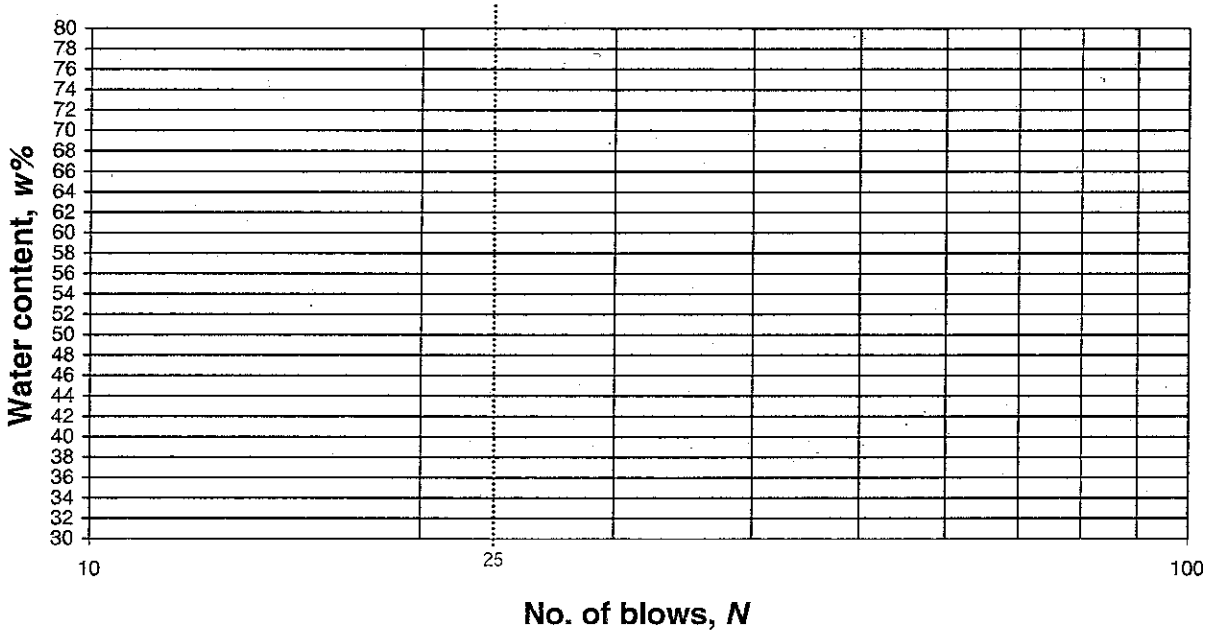
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-031	**Date Tested**	12/22/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/16/2003
Sample Location	69+00 (NW)
Sample Description	Gray poorly graded sand with tr of gr & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	13	Date	12/16/2003	Sheet	1
				Date of weighing	12/17/2003	Tested by	ON

Boring No.	-	-				
Sample No.	BF-030	BF-031				
Location	88 + 00 (SW)	69 + 00 (NW)				
Tin No.	71A	2C				
Tin + Wet Soil	154.04	159.48				
Tin + Dry Soil	139.99	139.24				
Wt. of Tin	30.49	31.01				
Wt. of Dry Soil	109.5	108.2				
Wt. of Water	14.1	20.2				
Moisture, %	12.8	18.7				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/16/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, windy; 26 - 43 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH	
	feet	lb/ft^3	%	cm^3	seconds	S.U.	
87+80	2.00	91.00	30.00	86.50	56.00	8	SW TRENCH
87+80	32.00	94.50	30.00	86.50	65.00	8	
86+90	2.00	93.00	20.00	45.00	81.00	8	
86+90	31.00	97.50	20.00	55.00	84.00	8	
68+50	2.00	89.00	10.00	69.00	35.00	8	NW TRENCH
68+50	32.00	92.00	11.00	72.50	40.00	8	
67+40	2.00	92.00	8.00	80.00	40.00	8	
67+40	34.00	94.50	10.00	86.00	42.00	8	

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	
	%		%		
87+00	LAB SAMPLE COLLECTED 12/16/03				SW TRENCH
68+00	LAB SAMPLE COLLECTED 12/16/03				NW TRENCH

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
88+50	3.00	N/A	N/A	N/A	2.83×10^{-7}	N/A
88+25	3.00	N/A	N/A	N/A	1.99×10^{-7}	N/A
88+00	3.00	Sample collected	Sample collected	Sample collected	1.04×10^{-7}	yes
87+75	3.00	N/A	N/A	N/A	6.15×10^{-8}	N/A
87+50	3.00	N/A	N/A	N/A	1.26×10^{-7}	N/A
87+25	3.00	N/A	N/A	N/A	1.23×10^{-7}	N/A
70+25	3.00	N/A	N/A	N/A	3.29×10^{-7}	N/A
70+00	3.00	N/A	N/A	N/A	2.33×10^{-7}	N/A
69+75	3.00	N/A	N/A	N/A	1.49×10^{-7}	N/A
69+50	4.00	Sample collected	Sample collected	Sample collected	9.74×10^{-8}	yes
69+25	4.00	N/A	N/A	N/A	1.02×10^{-7}	N/A
69+00	4.00	N/A	N/A	N/A	1.58×10^{-7}	N/A

COMMENTS

Filter cake: 5.0mm, 5.5mm, 3.5mm, 3.5mm, 2.0mm, 2.5mm, 3.0mm, and 3.0mm respectively.

See page 2 for more comments on failing slurry in SW and NW trenches.

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

Unit Weight:				
	88+50:	121.0 pcf	69+50:	123.5 pcf
	88+25:	123.5 pcf	69+25:	122.0 pcf
	88+00:	119.5 pcf	69+00:	120.0 pcf
	87+75:	120.0 pcf		
	87+50:	117.0 pcf		
	87+25:	124.0 pcf		
	70+25:	118.5 pcf		
	70+00:	115.0 pcf		
	69+75:	121.5 pcf		

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/16/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
9:00	64.00	40.00	9.00	8
11:30	-	44.00	-	-
14:30	-	42.00	-	-
15:30	64.50	41.00	10.50	8

Filter cake is .5mm and .5mm, respectively.

COMMENTS ON NW TRENCH SLURRY:

Slurry in the NW trench is did not meet the specification for viscosity in the morning for the shallow sample. Geo-Con believes this is due to the overnight rain. Fresh slurry was pumped to this trench and the viscosity passed in the afternoon sample. We continued to backfill heavily to close the trench up as much as possible and continued pumping in fresh slurry. Filtrates in the NW and SW trenches are still failing. Filtrate results like this are typical for trench slurry. We will continue to do all we can to bring the properties back within specs.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/16/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, windy; 26 - 43 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
87+80	29.2	34.0	33.6	10.0	335.5	3.5	88+60	OUT	TOP OUT
87+70	29.1	33.2	33.6	10.0	336.0	3.5	88+50	16.5	TOP OUT
87+60	29.3	33.0	33.1	10.0	331.0	3.4	88+40	18.2	TOP OUT
87+50	29.3	33.3	33.2	10.0	331.5	3.2	88+30	19.7	TOP OUT
87+40	29.1	33.1	33.2	10.0	332.0	3.4	88+20	21.5	TOP OUT
87+30	29.0	33.0	33.1	10.0	330.5	3.3	88+10	24.2	TOP OUT
87+20	29.2	32.8	32.9	10.0	329.0	3.1	88+00	26.3	TOP OUT
87+10	29.2	33.0	32.9	10.0	329.0	3.0	87+90	28.4	TOP OUT
87+00	29.0	32.9	33.0	10.0	329.5	3.0	87+80	30.0	TOP OUT
86+90	29.1	33.3	33.1	10.0	331.0	3.1	87+70		TOP OUT
							87+60		TOP OUT
							87+50		TOP OUT
							87+40		TOP OUT
							87+30		TOP OUT
							87+20		TOP OUT
							87+10		1.0
							87+00		2.0
							86+90		3.0

SF TODAY 3315.00

SF TO DATE 75142.40

COMMENTS

SW Trench

SW Trench excavation is complete. Tomorrow, we will finish backfilling.

GEO-CON: Suzanne E Lepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/16/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, windy; 26 - 43 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
68+40	32.8	36.0	35.5	10.0	354.5	14.9	70+40	OUT	OUT
68+30	32.9	36.1	36.1	10.0	360.5	13.6	70+30	3.4	OUT
68+20	33.0	36.2	36.2	10.0	361.5	12.2	70+20	6.3	OUT
68+10	32.9	36.2	36.2	10.0	362.0	11.6	70+10	9.5	OUT
68+00	33.0	36.4	36.3	10.0	363.0	10.7	70+00	13.2	OUT
67+90	33.0	36.4	36.4	10.0	364.0	10.1	70+00+5N	13.2	OUT
67+80	33.0	36.5	36.5	10.0	364.5	10.0	70+00+5W	13.5	OUT
67+70	32.9	36.5	36.5	10.0	365.0	9.9	70+00	13.2	OUT
67+60	33.0	36.4	36.5	10.0	364.5	9.4	69+90	16.5	OUT
67+50	32.8	36.3	36.4	10.0	363.5	9.0	69+80	18.7	OUT
67+40	32.8	36.2	36.3	10.0	362.5	8.6	69+70	21.2	OUT
67+30	32.9	36.0	36.1	10.0	361.0	8.5	69+60	23.2	OUT
							69+50	26.5	OUT
							69+40	30.0	OUT
							69+30	30.5	3.2
							69+20	32.5	6.4
							69+10	34.6	9.4
							69+00	34.5	11.7
							68+90	34.7	13.8
							68+80	34.6	15.4
							68+70	34.5	17.6
							68+60	34.6	19.1
							68+50	34.8	21.4
							68+40		23.1
							68+30		24.2
							68+20		25.9
							68+10		27.1
							68+00		29.7
							67+90		32.1
							67+80		34.2
							67+70		36.5
							67+60		36.4
							67+50		36.3
							67+40		36.2
							67+30		36.0

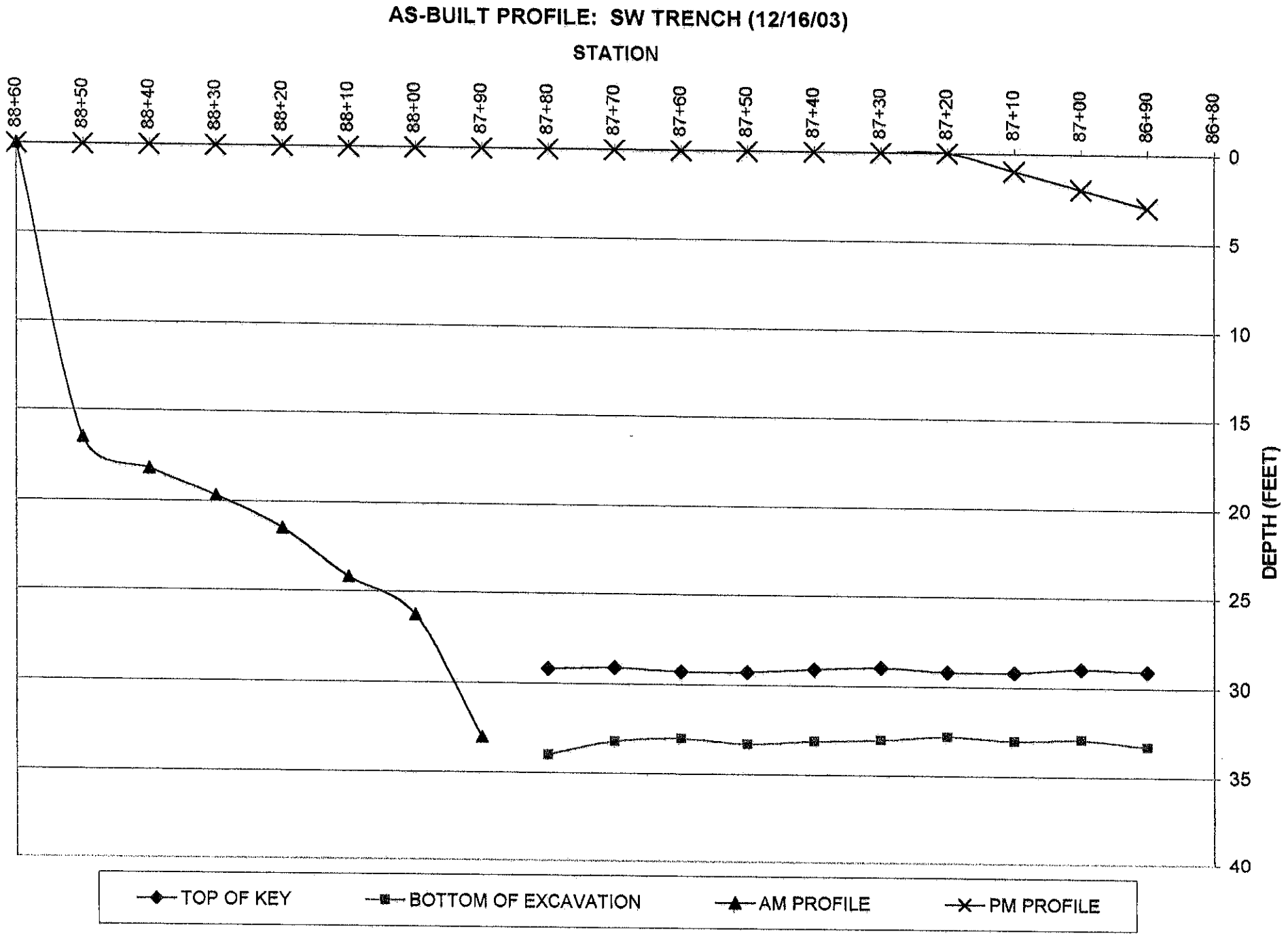
SF TODAY 4346.50

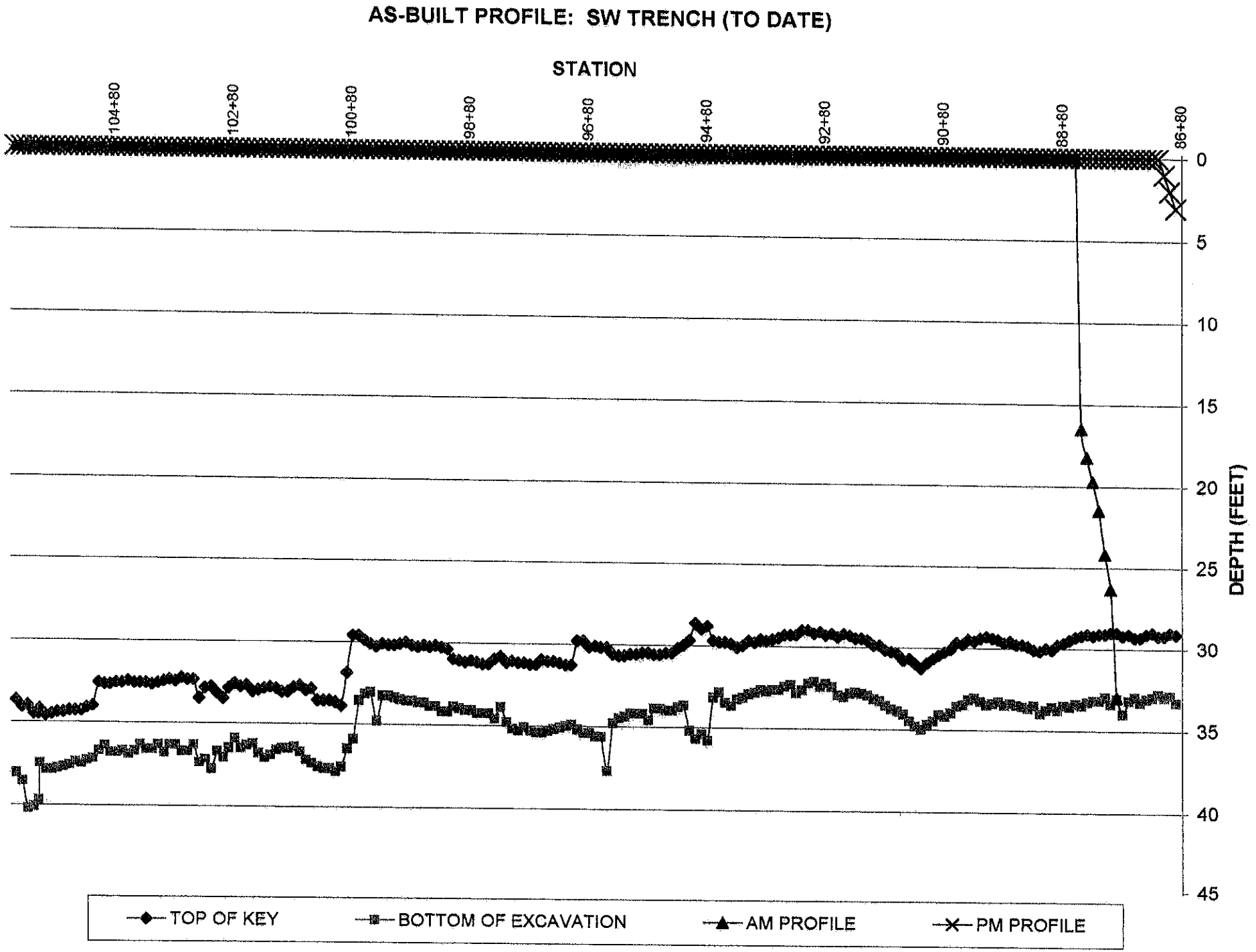
SF TO DATE 38019.50

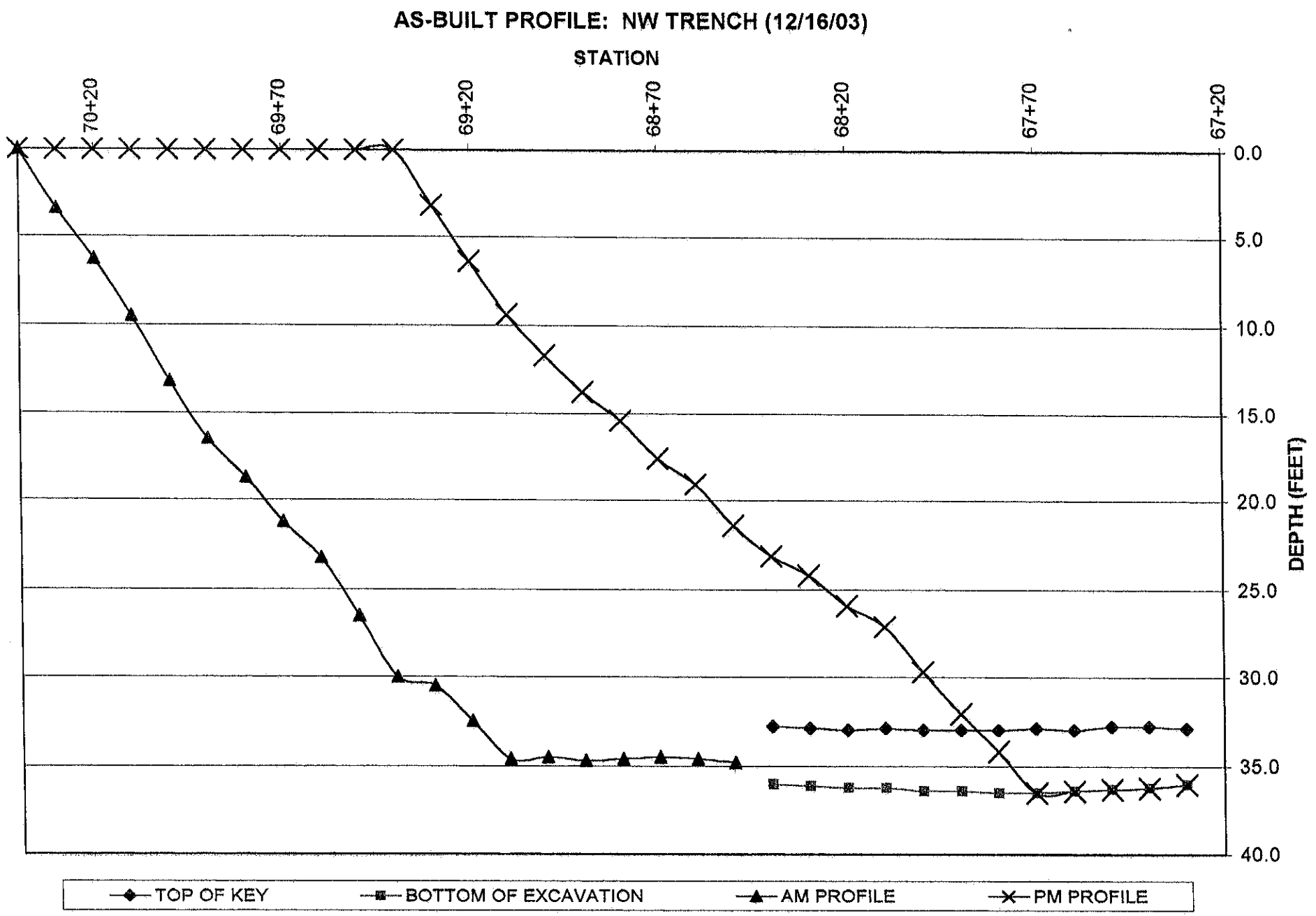
COMMENTS

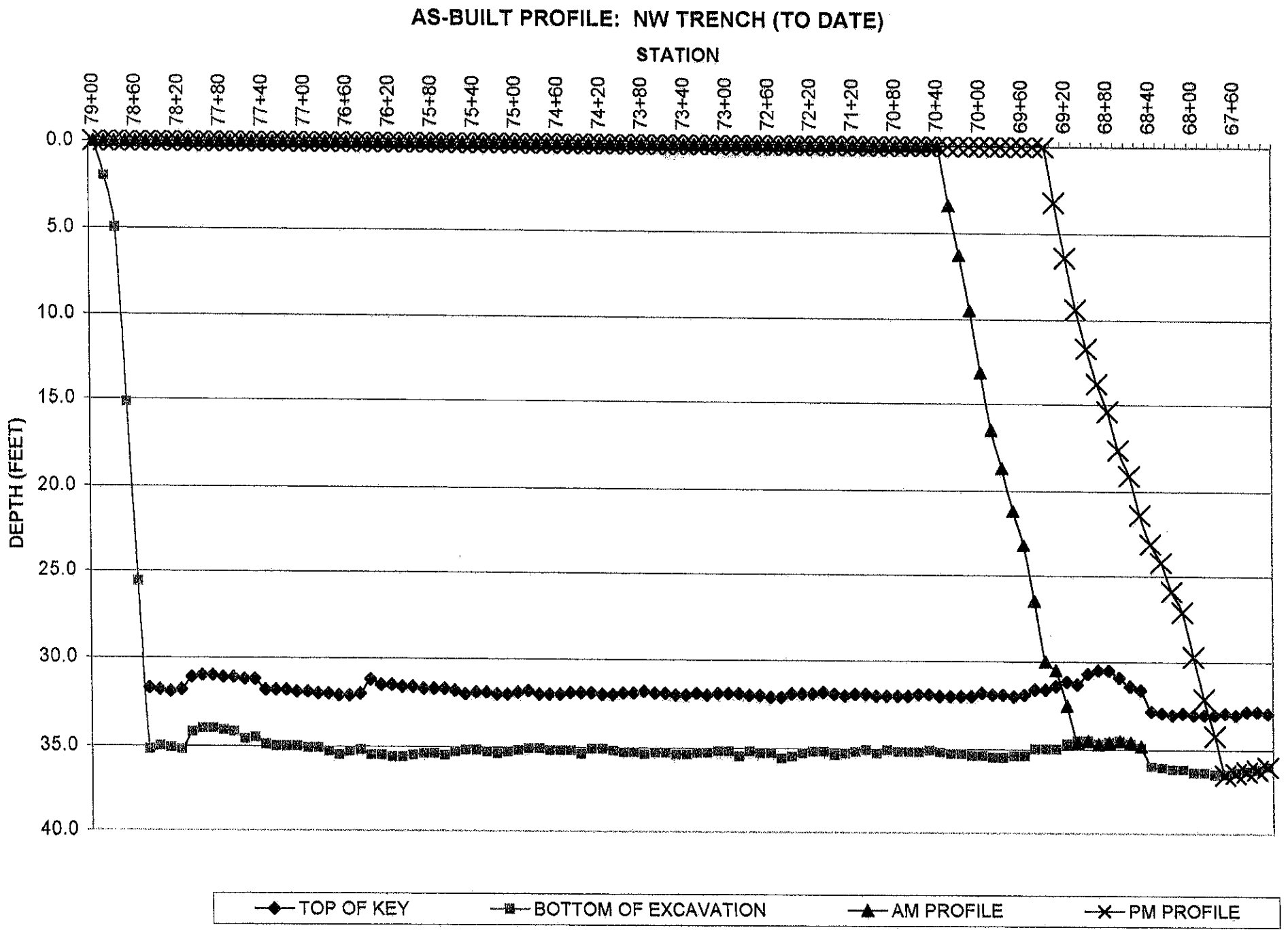
NW Trench

GEO-CON: Suzanne E. Sepic OWNER:


AS-BUILT PROFILE: SW TRENCH (12/16/03)
STATION
88+60
88+50
88+40
88+30
88+20
88+10
88+00
87+90
87+80
87+70
87+60
87+50
87+40
87+30
87+20
87+10
87+00
86+90
86+80
0
5
10
15
20
25
30
35
40
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SW TRENCH (TO DATE)
STATION
104+80
102+80
100+80
98+80
96+80
94+80
92+80
90+80
88+80
86+80
0
5
10
15
20
25
30
35
40
45
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (12/16/03)
STATION
70+20
69+70
69+20
68+70
68+20
67+70
67+20
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
79+00
78+60
78+20
77+80
77+40
77+00
76+60
76+20
75+80
75+40
75+00
74+60
74+20
73+80
73+40
73+00
72+60
72+20
71+20
70+80
70+40
70+00
69+60
69+20
68+80
68+40
68+00
67+60
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/16/03

SW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9:00	40	> 40 sec	64	> 64 pcf	8	6.5 - 10	9	< 20 cm^3	.5
PM	15:30	41	> 40 sec	64.5	> 64 pcf	8	6.5 - 10	10.5	< 20 cm^3	.5

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	11:30	44	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	14:30	42	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:00	87+80	2	56	40 - 90 sec	91	64 - 95 pcf	8	6.5 - 10	86.5	< 25 cm^3	5.0	30	MAX 30%
8:00	87+80	32	65	40 - 90 sec	94.5	64 - 95 pcf	8	6.5 - 10	86.5	< 25 cm^3	5.5	30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
14:15	86+90	2	81	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	45	< 25 cm^3	3.5	20	MAX 30%
16:15	86+90	31	84	40 - 90 sec	97.5	64 - 95 pcf	8	6.5 - 10	55	< 25 cm^3	3.5	20	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
88+50	3	2" to 6"	121	+15 pcf over trench slurry	2.83×10^{-7}	1.0×10^{-7} cm/sec
88+25	3	2" to 6"	123.5	+15 pcf over trench slurry	1.99×10^{-7}	1.0×10^{-7} cm/sec
88+00	3	2" to 6"	119.5	+15 pcf over trench slurry	1.04×10^{-7}	1.0×10^{-7} cm/sec
87+75	3	2" to 6"	120	+15 pcf over trench slurry	6.15×10^{-8}	1.0×10^{-7} cm/sec
87+50	3	2" to 6"	117	+15 pcf over trench slurry	1.26×10^{-7}	1.0×10^{-7} cm/sec
87+25	3	2" to 6"	124	+15 pcf over trench slurry	1.23×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 88+50, 88+25, 88+00 / 87+75, 87+50, 87+25

Technician: RF/MM/SM ✓ SES

Sample Area: A= πr^2 $(\pi)(3.85)^2$ = 46.56 cm²

Sample Height: L= 6.5cm, 6.0cm, 7.0cm / 7.0cm, 7.0cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. factor (1/14.65)
88+50	12/16/03	11:17-15:17	240	10	108.2128	559261.0644	–	38	2.83×10^{-7}	1.93×10^{-8}
88+25	12/16/03	11:17-15:17	240	10	117.2305	605865.9809	–	29	1.99×10^{-7}	1.36×10^{-8}
88+00	12/16/03	11:17-15:17	240	10	100.4833	519313.7717	–	13	1.04×10^{-7}	7.10×10^{-9}
87+75	12/16/03	18:00-6:00	720	10	100.4833	519313.7717	–	23	6.15×10^{-8}	4.20×10^{-9}
87+50	12/16/03	18:00-6:00	720	10	100.4833	519313.7717	–	47	1.26×10^{-7}	8.60×10^{-9}
87+25	12/16/03	18:00-6:00	720	10	100.4833	519313.7717	–	46	1.23×10^{-7}	8.40×10^{-9}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

DAILY QC TESTS

DATE 12/16/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

SW trench

Damaged

NW trench

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
10:30	68+50	2	35	40 - 90 sec	89	64 - 95 pcf	8	6.5 - 10	69	< 25 cm^3	2.0	10	MAX 30%
10:30	68+50	32	40	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	72.5	< 25 cm^3	2.5	11	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:00	67+40	2	40	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	80	< 25 cm^3	3.0	8	MAX 30%
16:00	67+40	34	42	40 - 90 sec	94.5	64 - 95 pcf	8	6.5 - 10	86	< 25 cm^3	3.0	10	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
70+25	3	2" to 6"	118.5	+15 pcf over trench slurry	3.29×10^{-7}	1.0×10^{-7} cm/sec
70+00	3	2" to 6"	115	+15 pcf over trench slurry	2.33×10^{-7}	1.0×10^{-7} cm/sec
69+75	3	2" to 6"	121.5	+15 pcf over trench slurry	1.49×10^{-7}	1.0×10^{-7} cm/sec
69+50	4	2" to 6"	123.5	+15 pcf over trench slurry	9.74×10^{-8}	1.0×10^{-7} cm/sec
69+25	4	2" to 6"	122	+15 pcf over trench slurry	1.02×10^{-7}	1.0×10^{-7} cm/sec
69+00	4	2" to 6"	120	+15 pcf over trench slurry	1.58×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: ~~89+50, 88+75, 88+00, 87+75, 87+50, 87+25~~ 70+25, 70+00, 69+75, 69+50, 69+25, 69+00

Technician: RF/MM/SM ✓ BY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 7.0cm, 6.5cm, 7.5cm, 6.5cm 7.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ conv. factor (1/14.65)
70+25 ~~88+50~~	12/16/03	11:17-15:17	240	10	100.4833	519313.7717	—	41	3.29×10^{-7}	2.24×10^{-8}
70+00 ~~88+25~~	12/16/03	11:17-15:17	240	10	100.4833	519313.7717	—	21	2.33×10^{-7}	1.59×10^{-8}
69+75 ~~88+00~~	12/16/03	11:17-15:17	240	10	108.2128	559261.0644	—	20	1.49×10^{-7}	1.02×10^{-8}
69+50 ~~87+75~~	12/16/03	18:00-6:00	720	10	93.7844	484692.7847	—	34	9.74×10^{-8}	6.65×10^{-9}
69+25 ~~87+50~~	12/16/03	18:00-6:00	720	10	108.2128	559261.0644	—	41	1.02×10^{-7}	6.96×10^{-9}
69+00 ~~87+25~~	12/16/03	18:00-6:00	720	10	93.7844	484692.7847	—	55	1.58×10^{-7}	1.08×10^{-8}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 17-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO: P01-048 | P.O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-032	SOIL ONLY	87+00	12/16/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-033	SOIL ONLY	68+00	12/16/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-040	SB BACKFILL**	88+00	12/16/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-041	SB BACKFILL**	69+50	12/16/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

LABORATORY ANALYSIS/ CERTIFICATION

P.O. Box 832 Cody, Wyoming 82414
307 765-4496

Date Tested: 12/12/2003

SOLD TO:	SHIP TO:
GEO-CON East Chicago, Indiana	SAME

SHIP DATE	RAILCAR OR TRUCK NUMBER	PLANT OF ORIGIN	PRODUCT
12/12/2003	Quality 7	Wyoben	Federal Gel 90

Note: Our data for the above shipment shows the following test results:

Test or Property	API Spec.	Result
Viscosity	30 min.	47
Plastic Viscosity (cP)	N/A	
Yield Point (# /100ft²)	N/A	
Filtrate Volume (cm³)	15.0 max.	12.4
>75 micron (wt. %)	4.0 max.	3.7

Test or Property	API Spec.	Result
Moisture (wt %)	10.0 max.	8.2
Y.P. / P.V. Ratio	3.0 max.	1.92

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13-A; Section 4 for "Drilling Grade Bentonite". Should you have any questions or require additional information please let us know 1-307-765-4496.

ORDER NUMBERS : HCTV 6048

TRUCK SHIP DATE : 12/12/2003

Marvin Williams 12/16/03

Signed Date

Arrived onsite 12/16/03
2000 # jumbo bags

LABORATORY ANALYSIS/ CERTIFICATION

P.O. Box 832 Greybull, Wyoming 02426
307 765-4496

Date Tested: 12/12/2003

SOLD TO:	SHIP TO:
GEO-CON East Chicago, Indiana	SAME

SHIP DATE	RAILCAR OR TRUCK NUMBER	PLANT OF ORIGIN	PRODUCT
12/12/2003	Montana Transport 5	Wyoben	Federal Gel 90

Note: Our data for the above shipment shows the following test results:

Test or Property	API Spec.	Result
Viscosity	30 min.	47
Plastic Viscosity (cP)	N/A	
Yield Point (#/100ft²)	N/A	
Filtrate Volume (cm³)	15.0 max.	12.4
>75 micron (wt. %)	4.0 max.	3.7

Test or Property	API Spec.	Result
Moisture (wt %)	10.0 max.	8.2
Y.P. / P.V. Ratio	3.0 max.	1.92

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13-A; Section 4 for "Drilling Grade Bentonite". Should you have any questions or require additional information please let us know 1-307-765-4496.

ORDER NUMBERS : HCIV 6049

TRUCK SHIP DATE : 12/12/2003

Marcie Williams 12/16/03

Signed Date

Arrived onsite 12/16/03

2000 # jumbo bags

LABORATORY ANALYSIS/ CERTIFICATION

P.O Box 852 Greybull, Wyoming 82426
307-765-4496

Date Tested: 12/12/2003

SOLD TO:	SHIP TO:
GEO-CON East Chicago, Indiana	SAME

SHIP DATE	RAILCAR OR TRUCK NUMBER	PLANT OF ORIGIN	PRODUCT
12/12/2003	Montana Transport 24	Wyoben	Federal Gel 90

Note: Our data for the above shipment shows the following test results:

Test or Property	API Spec.	Result
Viscosity	30 min.	47
Plastic Viscosity (cP)	N/A	
Yield Point (#/100ft²)	N/A	
Filtrate Volume (cm^3)	15.0 max.	12.4
>75 micron (wt. %)	4.0 max.	3.7

Test or Property	API Spec.	Result
Moisture (wt %)	10.0 max.	8.2
Y.P. / P.V. Ratio	3.0 max.	1.92

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13-A: Section 4 for "Drilling Grade Bentonite". Should you have any questions or require additional information please let us know 1-307-765-4496.

ORDER NUMBERS : HCIV 6050

TRUCK SHIP DATE : 12/12/2003

Marvin Williams 12/16/03

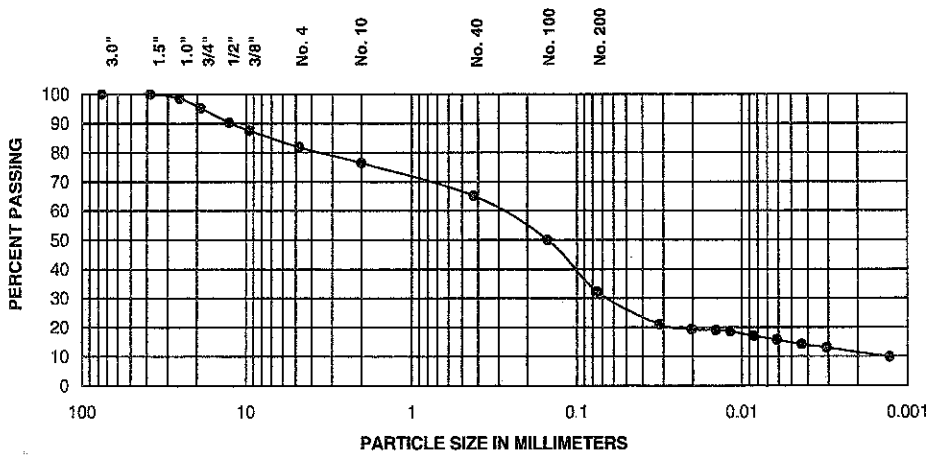
Signed Date

Arrived onsite 12/16/03
2000 # jumbo bags

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-040	**Date Tested**	12/22/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/17/2003
Sample Location	88+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	18.1	49.6	17.4	14.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.5
3/4"	95.2
1/2"	90.3
3/8"	87.5
No. 4	81.9
No. 10	76.4
No. 40	65.2
No. 100	50.1
No. 200	32.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
32	17	15

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

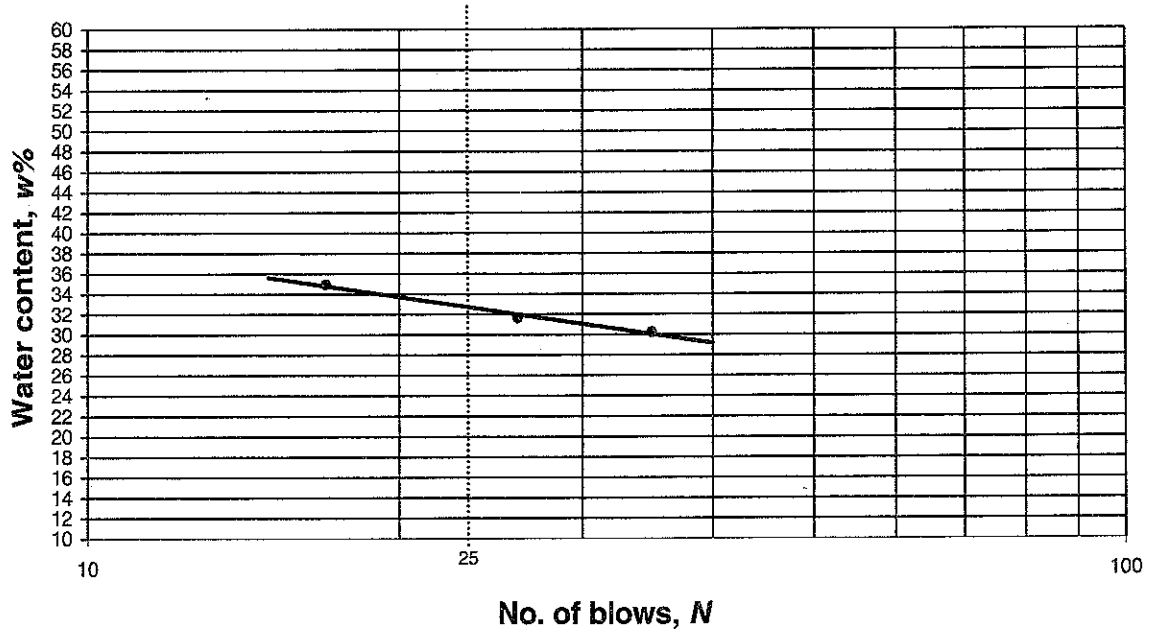
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-040	**Date Tested**	12/19/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/17/2003
Sample Location	88+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	32	**Plastic Limit, PL**	17	**Plasticity Index, PI**	15

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/22/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-040	Date Recd.	12/17/03	**Location**	88+00 (SW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.40	cm	Volume, V:	219.9	cu cm
Mass of Sample:	405.0	g	**Moisture Content:**	**23.3**	%
			Wet Density	114.9	**pcf**
			Dry Density	93.2	**pcf**

Final

Diameter:	6.97	cm	Area, A:	38.2	sq cm
Height, L:	4.83	cm	Volume, V:	184.3	cu cm
Mass of Sample:	394.10	g	**Moisture Content:**	**18.2**	%
			Wet Density	133.4	**pcf**
			Dry Density	112.9	**pcf**
			Deg of Saturation	96.1	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	23.4	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/22/2003	9:00 AM	0	0	3.28	5.98		20.0	---
12/22/2003	9:45 AM	2700	2700	3.40	5.88	1.2	20.0	3.39E-08
12/22/2003	10:30 AM	2700	5400	3.53	5.77	1.2	20.0	3.77E-08
12/22/2003	11:15 AM	2700	8100	3.64	5.68	1.2	20.0	3.12E-08
12/22/2003	12:00 PM	2700	10800	3.76	5.58	1.2	20.0	3.50E-08

Average Permeability = **3.4E-08** cm/sec

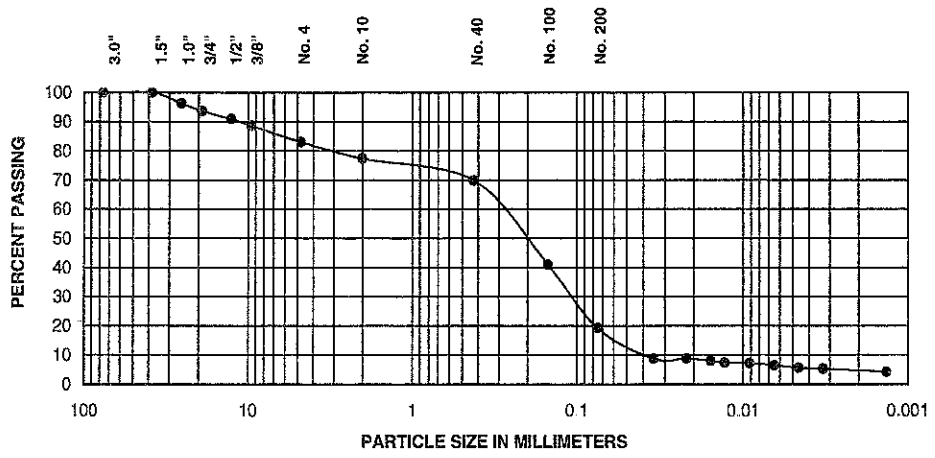
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-041	**Date Tested**	12/23/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/17/2003
Sample Location	69+50 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	% Gravel	% Sand	% Silt	% Clay
0.0	17.0	63.7	13.3	6.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	96.3
3/4"	93.6
1/2"	90.9
3/8"	88.6
No. 4	83.0
No. 10	77.4
No. 40	69.9
No. 100	40.9
No. 200	19.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
23	20	3

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

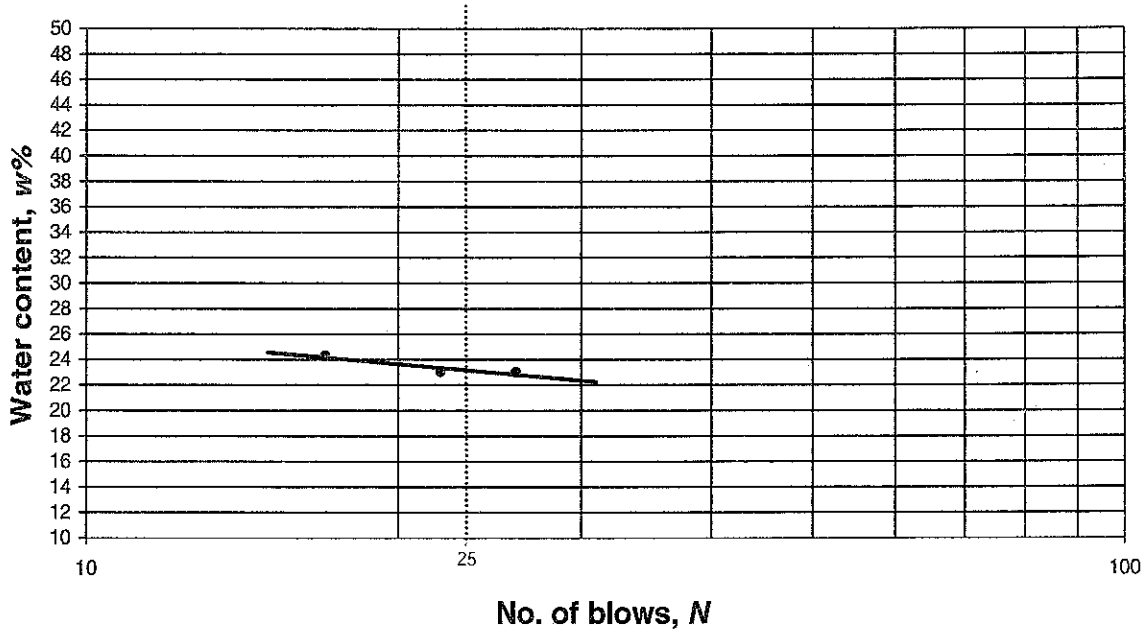
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-041	**Date Tested**	12/26/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/17/2003
Sample Location	69+50 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	23	**Plastic Limit, PL**	20	**Plasticity Index, PI**	3

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/22/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-041	Date Recd.	12/17/03	**Location**	69+50 (NW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.02	cm	Volume, V:	245.1	cu cm
Mass of Sample:	515.5	g	**Moisture Content:**	**22.9**	%
			Wet Density	131.2	**pcf**
			Dry Density	106.8	**pcf**

Final

Diameter:	7.01	cm	Area, A:	38.6	sq cm
Height, L:	5.95	cm	Volume, V:	229.6	cu cm
Mass of Sample:	494.40	g	**Moisture Content:**	**17.9**	%
			Wet Density	134.3	**pcf**
			Dry Density	113.9	**pcf**
			Deg of Saturation	97.4	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.0	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/22/2003	9:00 AM	0	0	3.42	5.98		20.0	---
12/22/2003	9:45 AM	2700	2700	3.70	5.75	1.2	20.0	8.82E-08
12/22/2003	10:30 AM	2700	5400	3.96	5.54	1.2	20.0	8.25E-08
12/22/2003	11:15 AM	2700	8100	4.19	5.35	1.2	20.0	7.64E-08
12/22/2003	12:00 PM	2700	10800	4.39	5.18	1.2	20.0	6.97E-08

Average Permeability = **7.9E-08** **cm/sec**

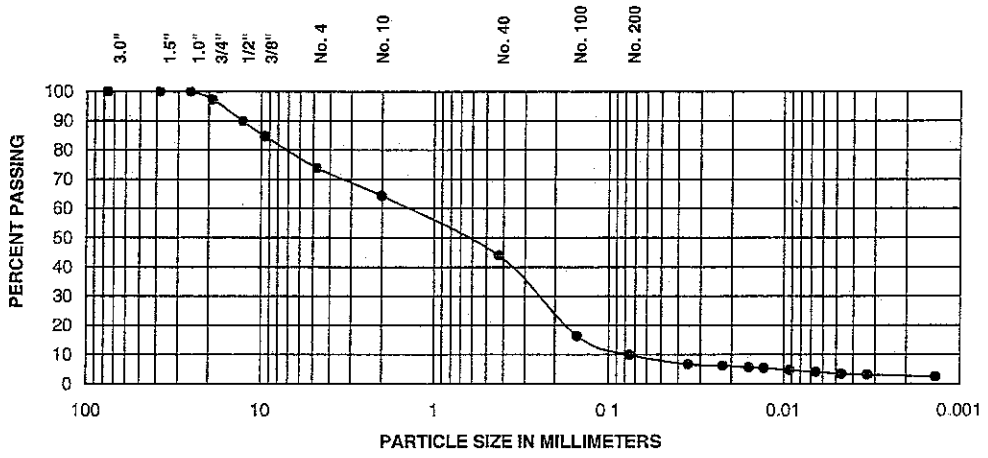
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-032	**Date Tested**	12/21/2003	**Tested by**	NP
						Qc by	SB

Date Sample Received:	12/17/2003
Sample Location	87+00 (SW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	26.1	64.0	6.3	3.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.44	0.25	0.08	19.1	0.58

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	97.3
1/2"	89.8
3/8"	84.7
No. 4	73.9
No. 10	64.4
No. 40	44.0
No. 100	16.4
No. 200	10.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

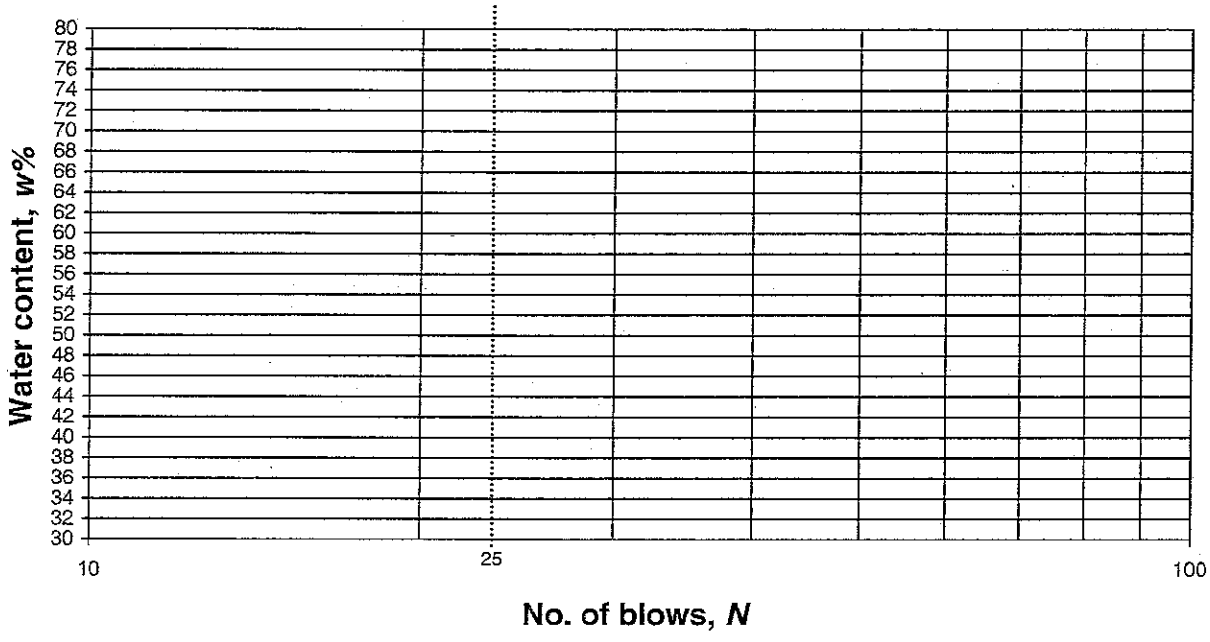
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn : Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-032	**Date Tested**	12/18/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/17/2003
Sample Location	87+00 (SW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	12	Date	12/17/2003	Sheet	1
				Date of weighing	12/18/2003	Tested by	NP

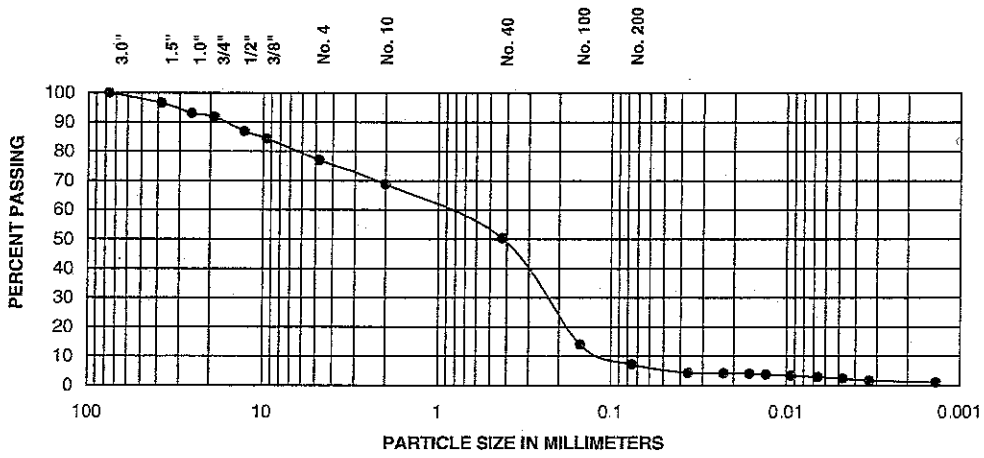
Boring No.	-	-				
Sample No.	BF-032	BF-033				
Location	87 + 00 (SW)	68 + 00 (NW)				
Tin No.	83A	38A				
Tin + Wet Soil	153.15	166.17				
Tin + Dry Soil	135.32	149.56				
Wt. of Tin	30.68	30.61				
Wt. of Dry Soil	104.6	119.0				
Wt. of Water	17.8	16.6				
Moisture, %	17.0	14.0				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-033	**Date Tested**	12/21/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/17/2003
Sample Location	68+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	22.9	69.8	4.8	2.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.95	0.24	0.10	9.6	0.60

Sieve Size	Percent Passing
3.0"	100.0
1.5"	96.5
1.0"	93.0
3/4"	91.9
1/2"	86.9
3/8"	84.4
No. 4	77.1
No. 10	68.8
No. 40	50.4
No. 100	14.0
No. 200	7.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

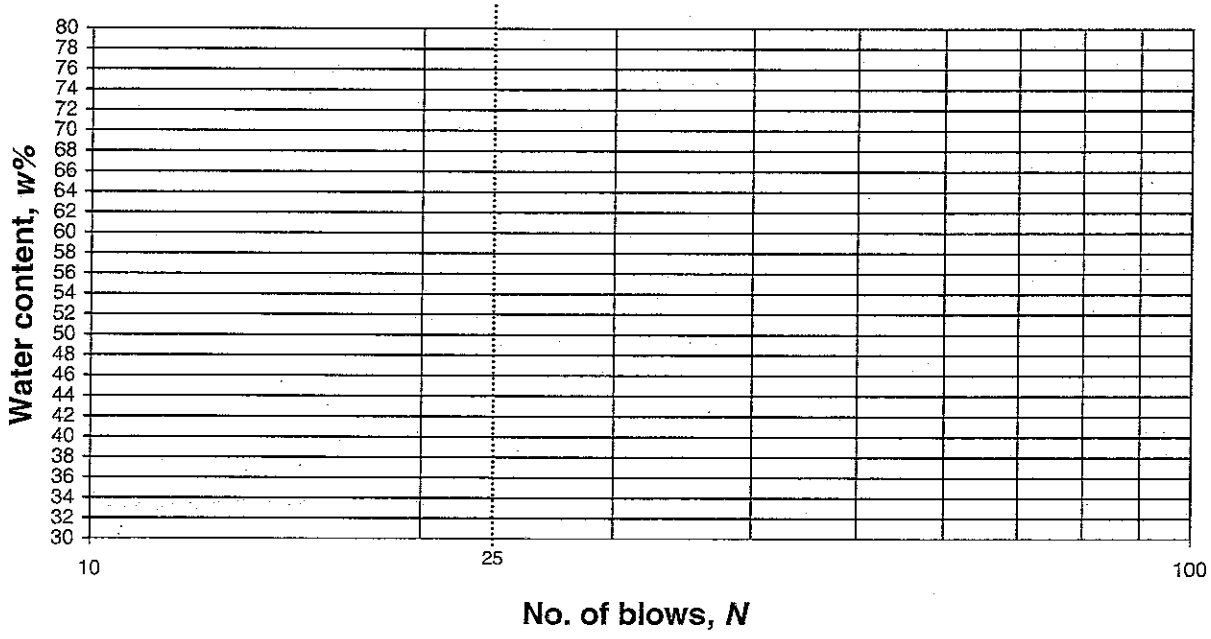
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-033	**Date Tested**	12/18/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/17/2003
Sample Location	68+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	12	Date	12/17/2003	Sheet	1
				Date of weighing	12/18/2003	Tested by	NP

Boring No.	-	-				
Sample No.	BF-032	BF-033				
Location	87 + 00 (SW)	68 + 00 (NW)				
Tin No.	83A	38A				
Tin + Wet Soil	153.15	166.17				
Tin + Dry Soil	135.32	149.56				
Wt. of Tin	30.68	30.61				
Wt. of Dry Soil	104.6	119.0				
Wt. of Water	17.8	16.6				
Moisture, %	17.0	14.0				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/17/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, AM flurries; 22 - 32 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
67+30	2.00	67.00	8.00	55.00	33.00	8
67+30	34.00	102.00	8.00	98.00	69.00	8
66+50	2.00	79.50	25.00	98.00	41.00	8
66+50	34.00	83.00	25.00	125.00	44.00	8

NW TRENCH

COMMENTS: Morning viscosity failed in the trench due to overnight rain and snow creating excess water at the top of the trench. **NO SLURRY WAS TESTED IN THE SW TRENCH BECAUSE THE TRENCH WAS FINISHED 1ST THING IN THE AM.**

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
67+00	LAB SAMPLE COLLECTED 12/17/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
69+25	3.00	N/A	N/A	N/A	2.97×10^{-7}	N/A
69+00	3.00	Sample collected	Sample collected	Sample collected	2.81×10^{-7}	yes
68+75	3.00	N/A	N/A	N/A	3.61×10^{-7}	N/A
68+50	3.00	N/A	N/A	N/A	2.98×10^{-7}	N/A
68+25	3.00	N/A	N/A	N/A	3.72×10^{-7}	N/A
68+00	3.00	N/A	N/A	N/A	2.85×10^{-7}	N/A
67+75	3.00	N/A	N/A	N/A	9.17×10^{-8}	N/A
67+50	3.00	N/A	N/A	N/A	1.56×10^{-7}	N/A
SW TRENCH						
87+00	3.00	Sample collected	Sample collected	Sample collected	1.74×10^{-7}	yes

COMMENTS

Filter cake: 1.0mm, 4.0mm, 2.0mm, and 1.7mm respectively.

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

Unit Weight:

69+25:	119.0 pcf	**SW TRENCH**	
69+00:	119.0 pcf	87+00:	116.0 pcf
68+75:	118.5 pcf		
68+50:	117.0 pcf		
68+25:	120.5 pcf		
68+00:	118.0 pcf		
67+75:	109.0 pcf		
67+50:	102.0 pcf		

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepi **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/17/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, AM flurries; 22 - 32 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
20+30	2.00	67.00	20.00	18.00	42.00	8
20+30	28.00	69.50	20.00	18.00	44.00	8

SE TRENCH

COMMENTS: No morning sample. Slurry line had froze up and could not pump slurry to the trench. Fixed and began lead-in trench first thing in the afternoon. Lead-in in perpendicular to trench on the west side. Finished one cut.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
20+20	LAB SAMPLE COLLECTED 12/17/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
NO BACKFILLING TODAY						

COMMENTS

Filter cake: .5mm and .5mm respectively.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepo OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/17/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH	
Military	lb/ft^3	seconds	cm^3	S.U.	
9:00	64.50	47.00	16.00	8	
11:15	-	40.00	-	-	
14:30	64.00	39.00	21.00	8	*HAVE TO RETEST. FAILING.
15:00	-	45.00	-	-	
16:30	64.50	44.00	17.00	8	
Filter cake is .3mm, 2.0mm, and .3mm, respectively.					

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/17/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, AM flurries; 22 - 32 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
EXCAVATION WAS FINISHED ON THE SW TRENCH 12/16/03							87+20	OUT	TOP OUT
							87+10	2.0	TOP OUT
							87+00	2.4	TOP OUT
							86+90	2.7	TOP OUT
							BACKFILLING WAS FINISHED ON THE SW TRENCH 12/17/03		
			SF TODAY	0.00					
			SF TO DATE	75142.40					

COMMENTS

SW Trench

SW Trench excavation and backfilling is complete.

GEO-CON: OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/17/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, AM flurries; 22 - 32 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
67+20	32.6	35.7	35.9	10.0	358.5	8.1	69+40	OUT	OUT
67+10	32.9	36.2	36.0	10.0	359.5	7.7	69+30	3.1	OUT
67+00	32.9	36.4	36.3	10.0	363.0	7.3	69+20	6.4	OUT
66+90	32.9	36.5	36.5	10.0	364.5	7.0	69+10	9.3	1.0
66+80	33.0	36.5	36.5	10.0	365.0	6.6	69+00	11.4	3.0
66+70	33.1	36.6	36.6	10.0	365.5	5.9	68+90	13.9	4.6
66+60	33.2	36.6	36.6	10.0	366.0	5.3	68+80	15.6	6.2
66+50	33.3	36.6	36.6	10.0	366.0	5.0	68+70	17.9	7.8
66+40	33.3	36.8	36.7	10.0	367.0	4.7	68+60	19.3	9.4
66+30	33.6	36.8	36.8	10.0	368.0	4.4	68+50	21.7	11.0
66+20	33.6	37.0	36.9	10.0	369.0	4.2	68+40	23.4	12.6
66+10	33.7	37.0	37.0	10.0	370.0	3.5	68+30	24.1	14.2
							68+20	26.0	15.8
							68+10	27.3	17.4
							68+00	29.5	19.0
							67+90	32.6	20.6
							67+80	34.7	22.2
							67+70	36.1	23.8
							67+60	36.3	25.4
							67+50	36.3	27.0
							67+40	36.2	28.6
							67+30	36.0	30.2
							67+20		31.8
							67+10		33.4
							67+00		33.9
							66+90		34.3
							66+80		34.7
							66+70		35.1
							66+60		35.7
							66+50		35.9
							66+40		36.5
							66+30		36.8
							66+20		37.0
							66+10		37.0
							66+00		12.1
							65+90		8.1

SF TODAY 4382.00

SF TO DATE 42401.50

COMMENTS

NW Trench

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/17/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, AM flurries; 22 - 32 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
19+83	LEAD-IN	0.0					NO BACKFILLING TODAY		
19+93	LEAD-IN	11.0	5.5	10.0	55.0	3.1			
20+03	LEAD-IN	20.4	15.7	10.0	157.0	3.0			
20+13	LEAD-IN	30.0	25.2	10.0	252.0	3.2			
20+15.9	30.0	33.2	31.6	3.0	94.8	3.4			
20+20	30.1	33.1	33.2	4.1	135.9	3.8			
20+30	30.3	34.0	33.6	10.0	335.5	3.8			
20+40	30.2	33.5	33.8	10.0	337.5	4.1			
20+50	30.1	34.0	33.8	10.0	337.5	4.5			

SF TODAY 1705.22

SF TO DATE 1705.22

COMMENTS

SE Trench

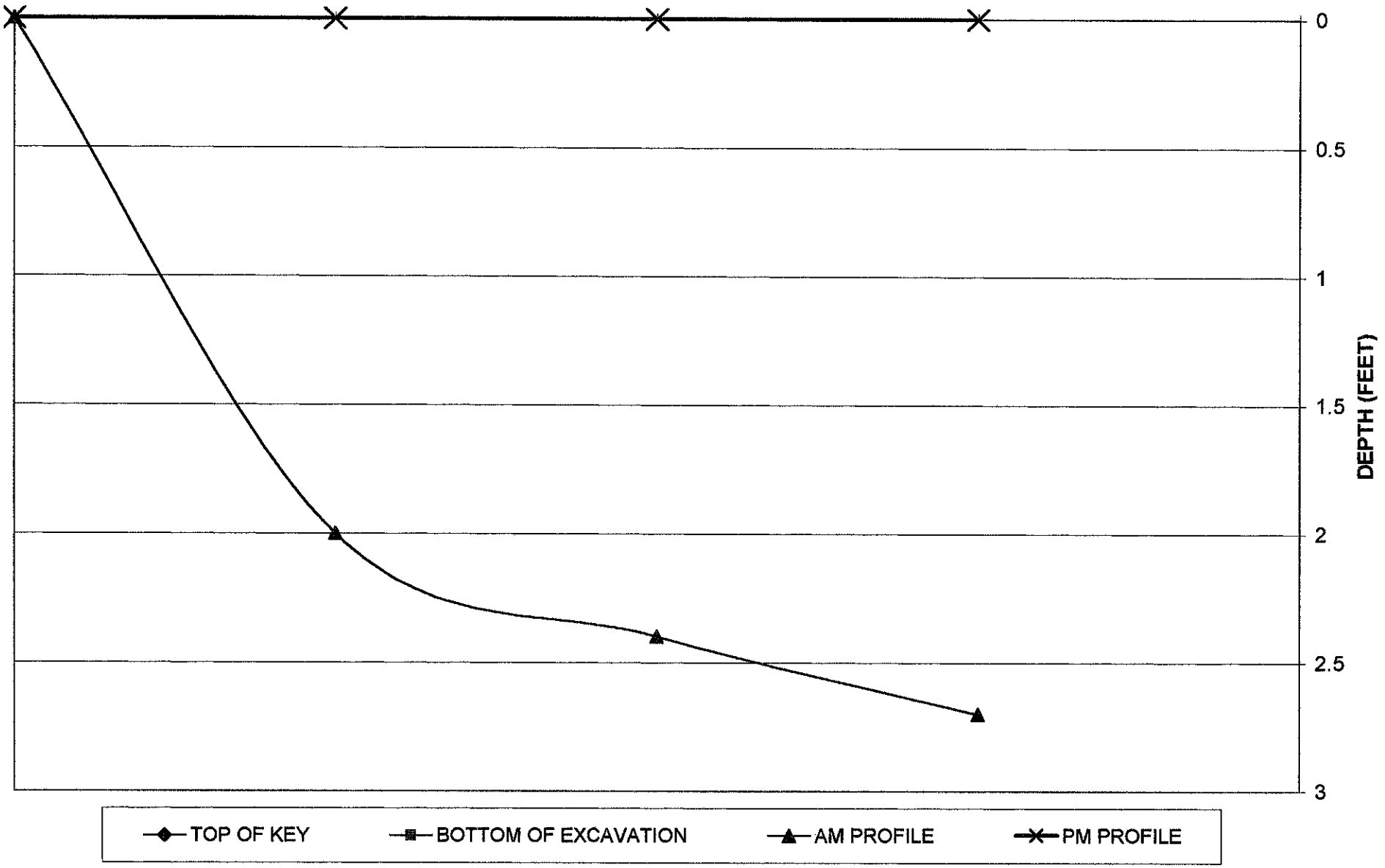
Lead-in trench is perpendicular to the SE trench on the west side.

To get the as-built to graph correctly lead-in 0+00, 0+10, 0+20, and 0+30 had to be changed as above respectively.

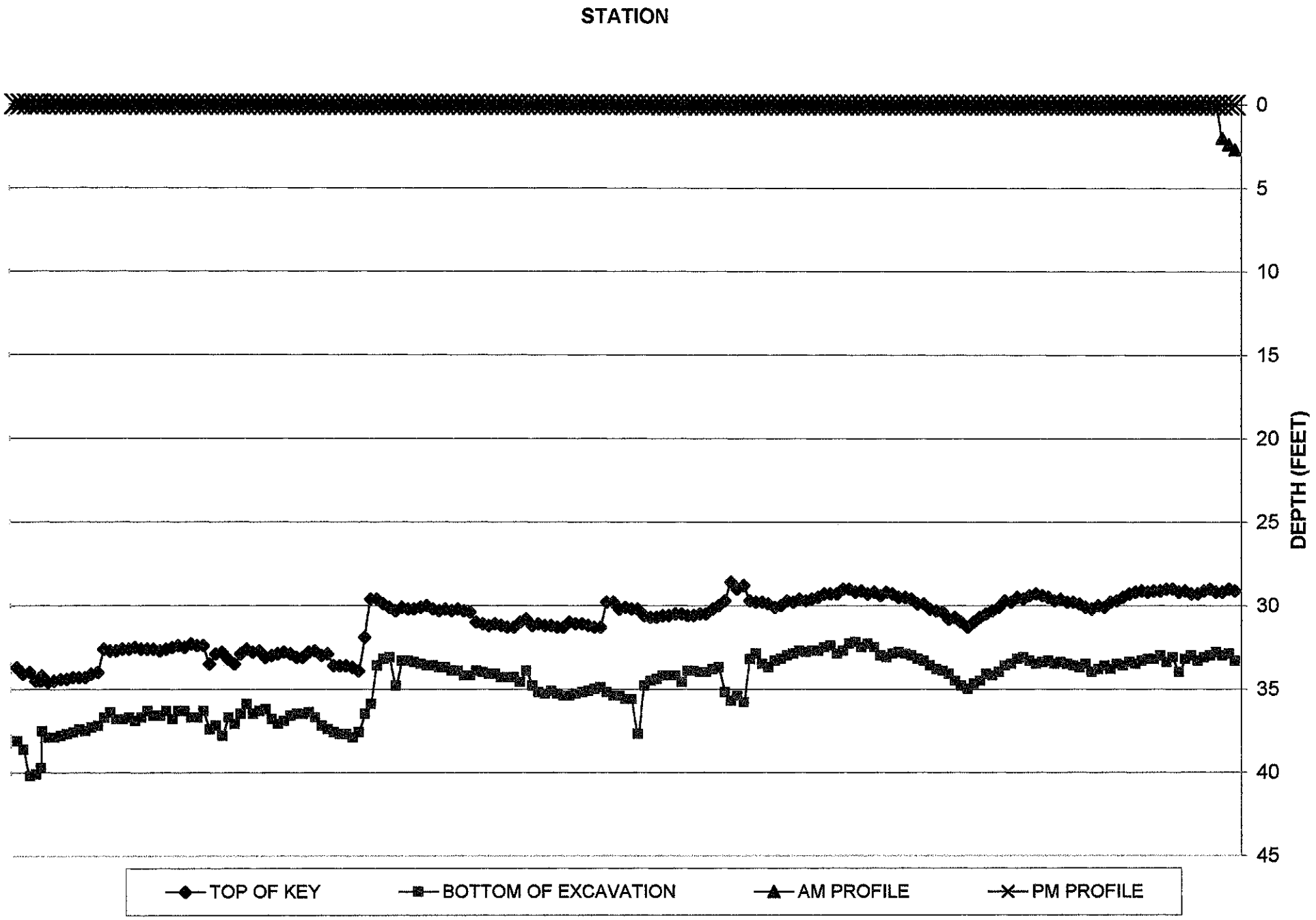
GEO-CON: Suzanne E. Sepic OWNER:

AS-BUILT PROFILE: SW TRENCH (12/17/03)

STATION

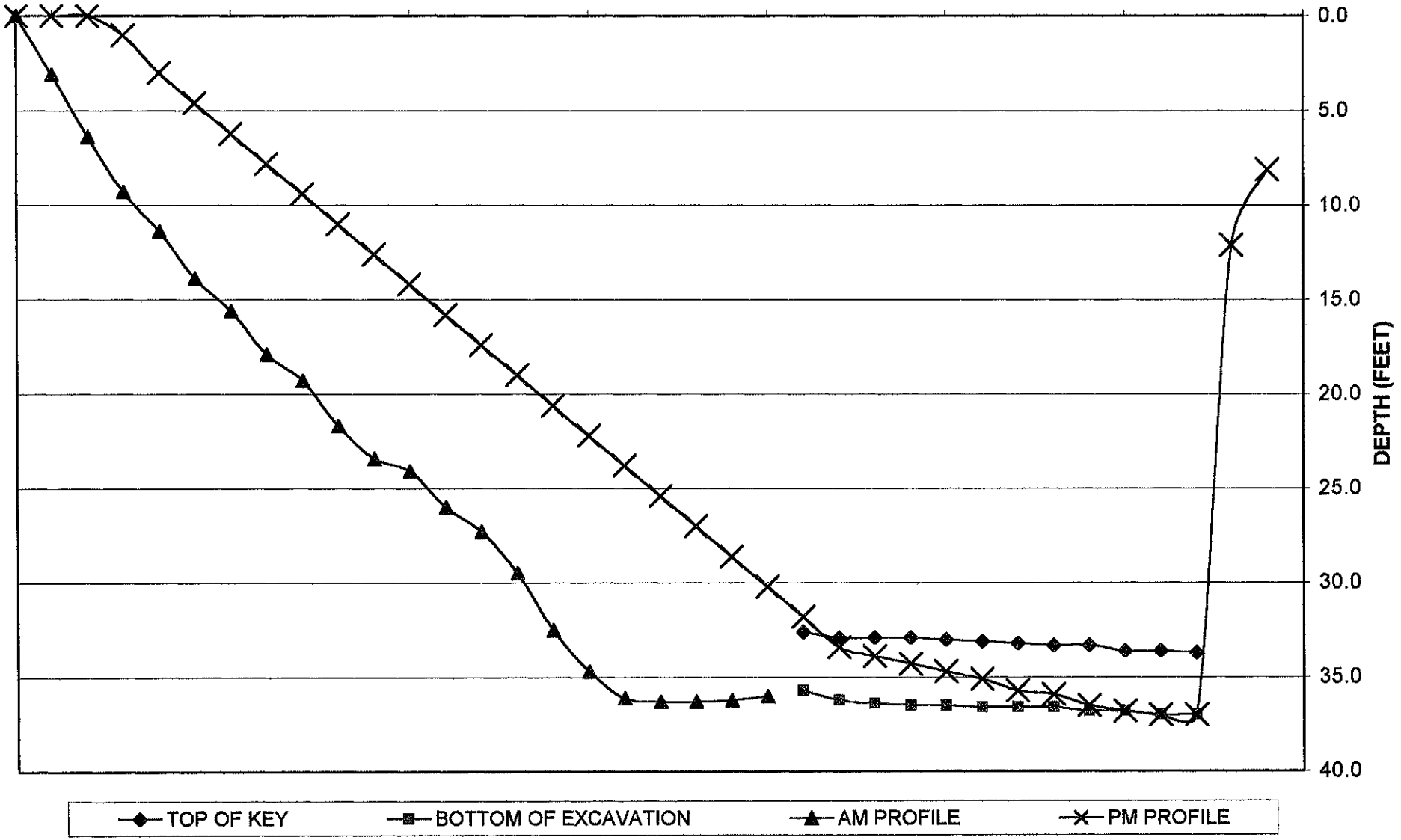


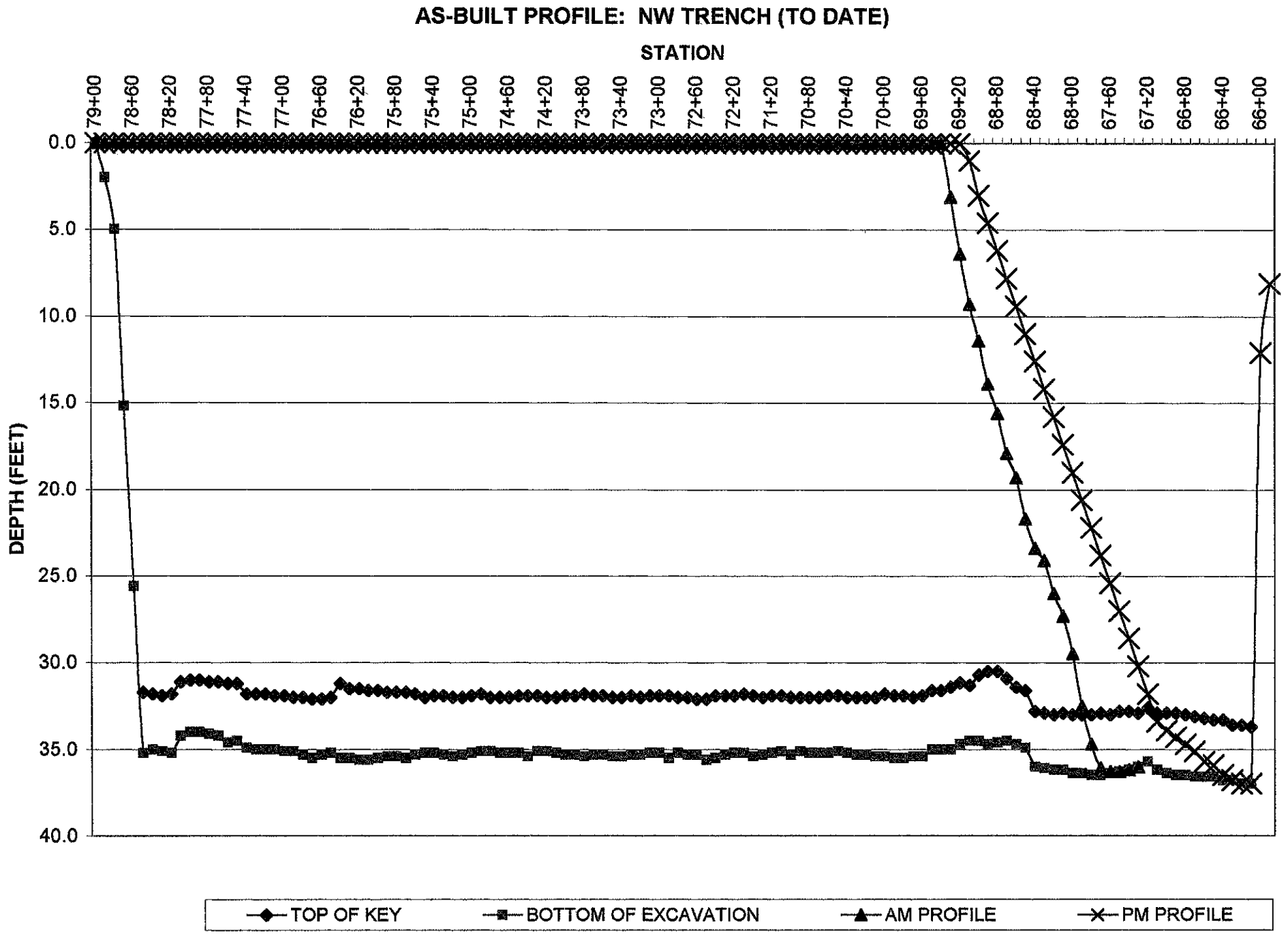
AS-BUILT PROFILE: SW TRENCH (TO DATE)

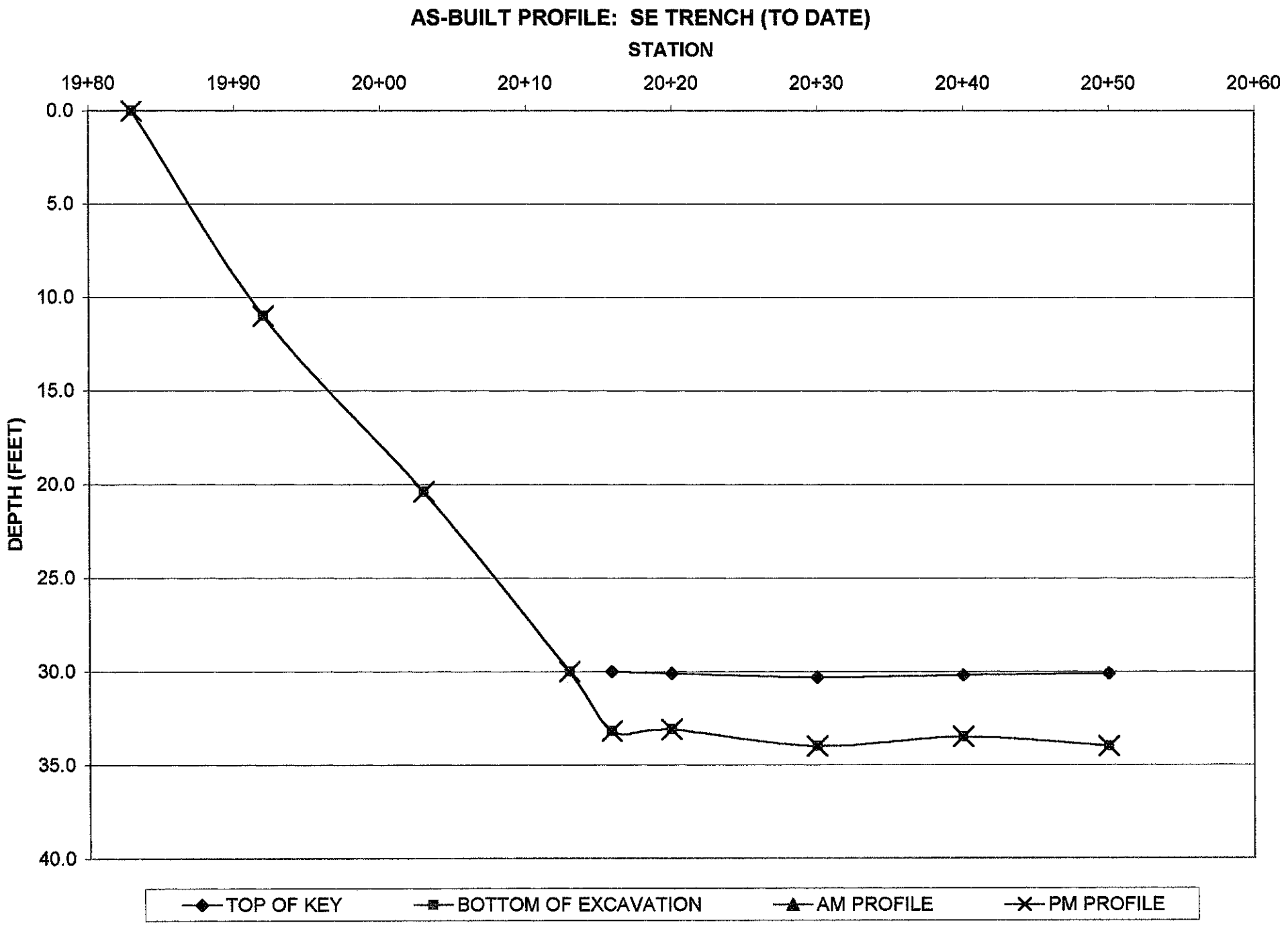


AS-BUILT PROFILE: NW TRENCH (12/17/03)

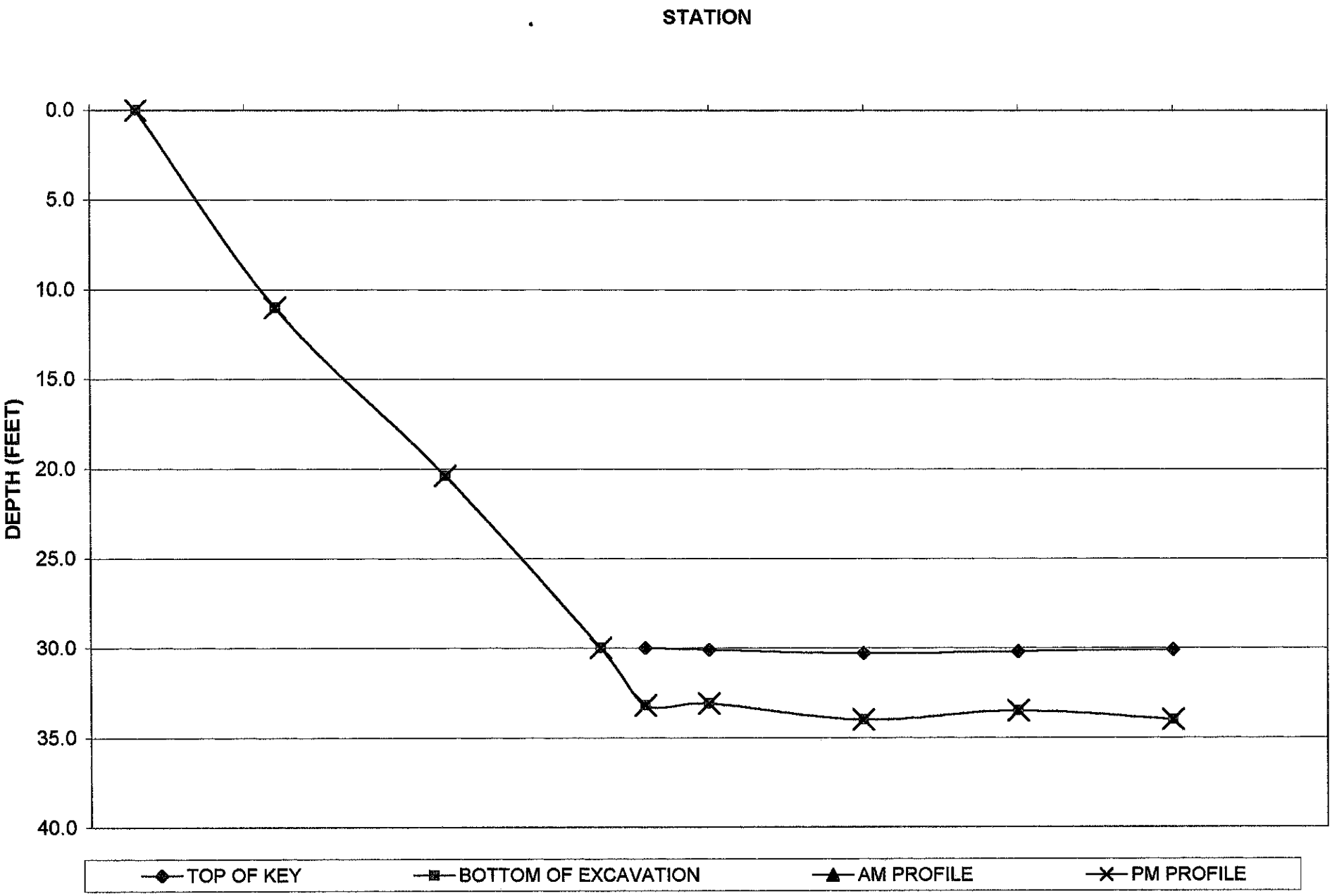
STATION




AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
79+00
78+60
78+20
77+80
77+40
77+00
76+60
76+20
75+80
75+40
75+00
74+60
74+20
73+80
73+40
73+00
72+60
72+20
71+20
70+80
70+40
70+00
69+60
69+20
68+80
68+40
68+00
67+60
67+20
66+80
66+40
66+00
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE)
STATION
19+80
19+90
20+00
20+10
20+20
20+30
20+40
20+50
20+60
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: SE TRENCH (12/17/03)



DAILY QC TESTS **DATE** 12/17/03

NW Trench

Page 1 of 2

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9:00	47	> 40 sec	64.5	> 64 pcf	8	6.5 - 10	16	< 20 cm^3	.3
PM	14:30	39	> 40 sec	64	> 64 pcf	8	6.5 - 10	21	< 20 cm^3	2.0 *

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	11:15	40	> 40 sec							
PM	15:00	45	> 40 sec							

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

See SG Trench for other test since results were failing

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:05	67+30	2	33	40 - 90 sec	67	64 - 95 pcf	8	6.5 - 10	55	< 25 cm^3	1.0	8	MAX 30%
9:05	67+30	34	69	40 - 90 sec	102	64 - 95 pcf	8	6.5 - 10	98	< 25 cm^3	4.0	8	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:03	66+50	2	41	40 - 90 sec	79.5	64 - 95 pcf	8	6.5 - 10	98	< 25 cm^3	2.0	25	MAX 30%
15:03	66+50	34	44	40 - 90 sec	83	64 - 95 pcf	8	6.5 - 10	125	< 25 cm^3	1.7	25	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
69+25	3	2" to 6"	119	+15 pcf over trench slurry	2.97×10^{-7}	1.0×10^{-7} cm/sec
69+00	3	2" to 6"	119	+15 pcf over trench slurry	2.81×10^{-7}	1.0×10^{-7} cm/sec
68+75	3	2" to 6"	118.5	+15 pcf over trench slurry	3.61×10^{-7}	1.0×10^{-7} cm/sec
68+50	3	2" to 6"	117	+15 pcf over trench slurry	2.98×10^{-7}	1.0×10^{-7} cm/sec
68+25	3	2" to 6"	120.5	+15 pcf over trench slurry	3.72×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS **DATE** 12/17/03

NW Trench

Page 2 of 2

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec	[redacted]						
PM			> 40 sec							

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
68+00	3	2" to 6"	118	+15 pcf over trench slurry	2.85×10^{-7}	1.0×10^{-7} cm/sec
67+~~75~~	3	2" to 6"	109 *	+15 pcf over trench slurry	9.17×10^{-8}	1.0×10^{-7} cm/sec
67+50	3	2" to 6"	102 *	+15 pcf over trench slurry	1.56×10^{-7}	1.0×10^{-7} cm/sec
SW TRENCH		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
87+00	3	2" to 6"	116	+15 pcf over trench slurry	1.74×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

* Used slurry weights from PM trench sample (+15pcf over 83pcf)

DAILY QC TESTS

DATE 12/17/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	~~16~~ –	—	> 40 sec	—	> 64 pcf	—	6.5 - 10	—	< 20 cm^3	—
PM	16:30	44	> 40 sec	64.5	> 64 pcf	8	6.5 - 10	17	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec							
PM			> 40 sec							

SE Trench

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

NO AM SAMPLE. JUST STARTED LEAD-IN

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:10	20+30	2	42	40 - 90 sec	67	64 - 95 pcf	8	6.5 - 10	18	< 25 cm^3	.5	20	MAX 30%
15:10	20+30	28	44	40 - 90 sec	69.5	64 - 95 pcf	8	6.5 - 10	18	< 25 cm^3	.5	20	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: 87+00 Technician: MM/RF/SM VBYSES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm² Sample Height: L= 7.0 cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	$K = \frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/ corr. f (1/14.6
87+00	12/17/03	18:00-6.00	720	10	100.4833	59313.777	—	65	1.74×10^{-7}	1.19×10

I= P (psi) / 0.014217 L (cm) R= Quick Test / Triaxial Test =

NW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 69+25, 69+00, 68+75, 68+50, 68+25, 68+00, 67+75, 67+50

Technician: RF/MM/SM VBY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 7.0cm, 7.0cm, 6.5cm, 6.5cm, 6.0cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. (1/14..
69+25	12/17/03	9:18-13:18	240	10	100.4833	519313.7717	—	37	2.97×10^{-7}	2.03x
69+00	12/17/03	9:18-13:18	240	10	100.4833	519313.7717	—	35	2.81×10^{-7}	1.92x1
68+75	12/17/03	9:18-13:18	240	10	100.4833	519313.7717	—	45	3.61×10^{-7}	2.46x1
68+50	12/17/03	9:18-13:18	240	10	108.2128	559261.0644	—	40	2.98×10^{-7}	2.03x1
68+25	12/17/03	9:18-13:18	240	10	108.2128	559261.0644	—	50	3.72×10^{-7}	2.54x1
68+00	12/17/03	9:18-13:18	240	10	100.4833	519313.7717	—	35.5	2.85×10^{-7}	1.94x1
67+75	12/17/03	18:00-6:00	720	10	117.2305	605865.9809	—	40	9.17×10^{-8}	6.26x
67+50	12/17/03	18:00-6:00	720	10	108.2128	559261.0644	—	63	1.56×10^{-7}	1.06x1

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 18-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-034 (SE20+20)	SOIL ONLY	20+20	12/17/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-035 (NW67+00)	SOIL ONLY	67+00	12/17/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-042 (SW87+00)	SB BACKFILL**	87+00	12/17/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-043 (NW69+00)	SB BACKFILL**	69+00	12/17/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

GP-19

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/3/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV006051	GEO-CON E CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-15-03	MONT TRANS #2	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	41
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max	13.2
> 75 micron (wt. %)	4.0 max	1.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.1
Y.P. / P.V. Ratio	3.0 max	1.15

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4498.

Signed 12/16/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev 2 (8/99)

Arrived onsite 12/17/03
100# Bags

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/12/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 9075 MONROEVILLE BLVD CORPORATE BUILDING SUITE 500 MONROEVILLE PA 15146	GEO-CON E CHICAGO IN 46312
SALES ORDER NO.: HCIV006024	

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-15-03	MONT TRANS #3	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	30
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.8
+ 75 micron (wt. %)	4.0 max.	1.6

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	9.3
Y.P. / P.V. Ratio	3.0 max.	1.97

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1.307.765.4895.

Signed 12/16/03 Date

Approved by: Plant Manager

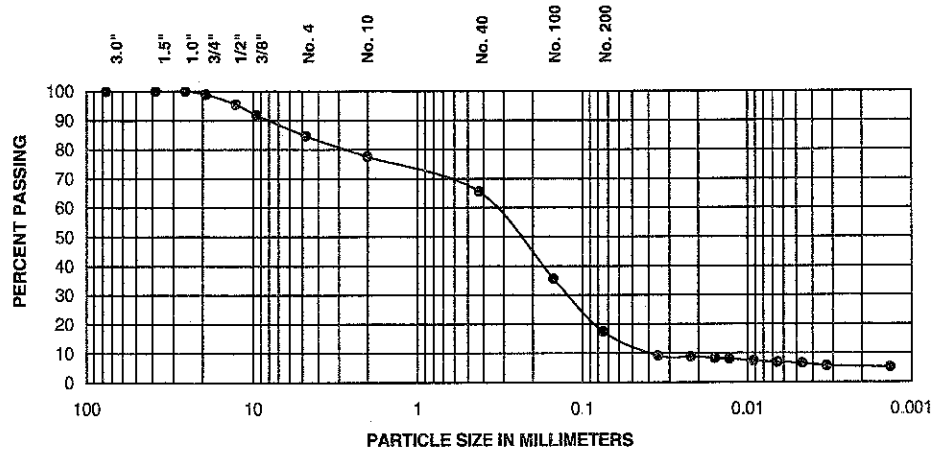
LabanalCert.doc (4/02/97)
Rev E (9/99)

Arrived onsite 12/17/03
4000 # jumbo bags

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB - 042	**Date Tested**	12/23/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/18/2003
Sample Location	87+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	15.3	67.1	11.0	6.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.0
1/2"	95.5
3/8"	91.8
No. 4	84.7
No. 10	77.6
No. 40	65.5
No. 100	35.6
No. 200	17.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
29	20	9

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

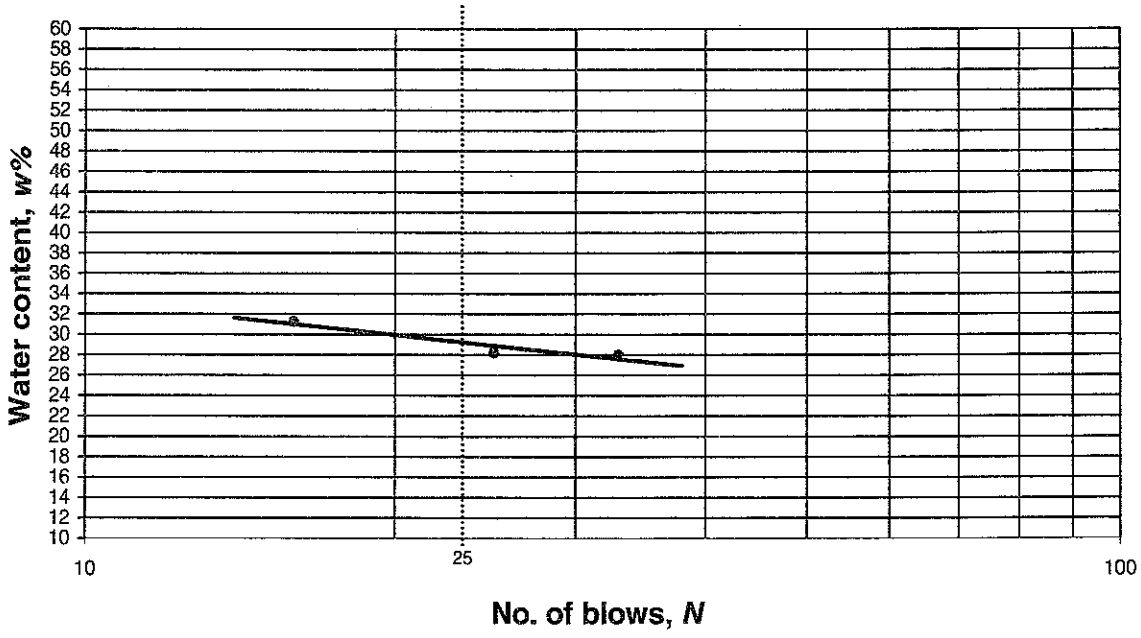
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB - 042	**Date Tested**	12/22/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/18/2003
Sample Location	87+00 (SW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	29	**Plastic Limit, PL**	20	**Plasticity Index, PI**	9

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/22/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB - 042	Date Recd.	12/18/03	**Location**	87+00 (SW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.64	cm	Volume, V:	229.6	cu cm
Mass of Sample:	433.4	g	**Moisture Content:**	**20.2**	%
			Wet Density	117.8	**pcf**
			Dry Density	98.0	**pcf**

Final

Diameter:	6.96	cm	Area, A:	38.0	sq cm
Height, L:	5.23	cm	Volume, V:	199.0	cu cm
Mass of Sample:	418.00	g	**Moisture Content:**	**21.1**	%
			Wet Density	131.1	**pcf**
			Dry Density	108.3	**pcf**
			Deg of Saturation	99.1	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	22.4	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/22/2003	9:00 AM	0	0	3.12	5.97		20.0	---
12/22/2003	9:45 AM	2700	2700	3.20	5.90	1.1	20.0	2.46E-08
12/22/2003	10:30 AM	2700	5400	3.31	5.81	1.2	20.0	3.19E-08
12/22/2003	11:15 AM	2700	8100	3.40	5.73	1.1	20.0	2.86E-08
12/22/2003	12:00 PM	2700	10800	3.49	5.65	1.1	20.0	2.88E-08

Average Permeability = **2.8E-08** **cm/sec**

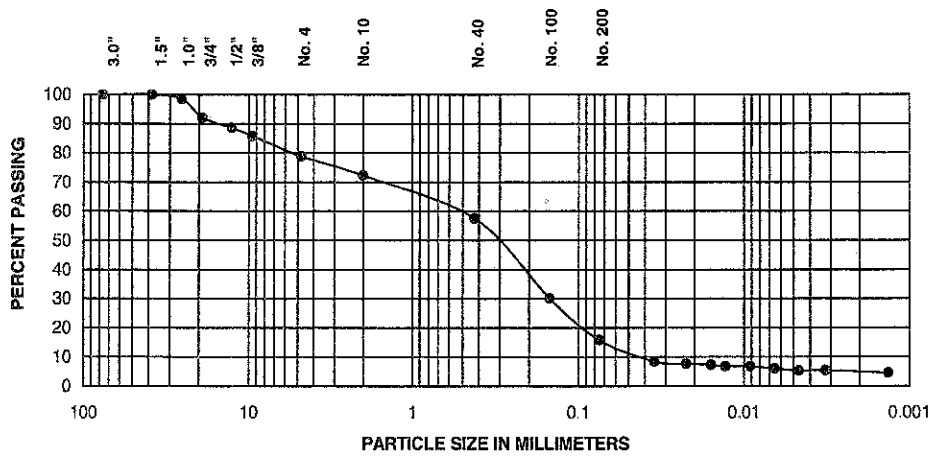
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB - 043	**Date Tested**	12/23/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/18/2003
Sample Location	69+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	21.2	63.0	10.2	5.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.5
3/4"	92.1
1/2"	88.6
3/8"	85.8
No. 4	78.8
No. 10	72.3
No. 40	57.6
No. 100	30.1
No. 200	15.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
28	21	7

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

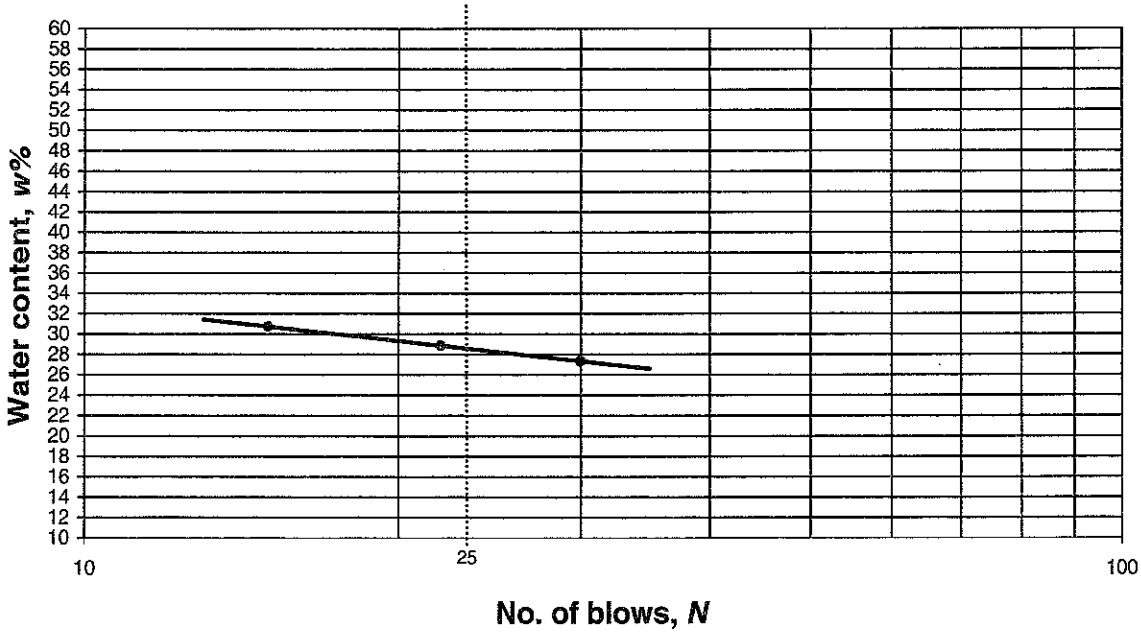
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB - 043	**Date Tested**	12/22/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/18/2003
Sample Location	69+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**28**	**Plastic Limit, PL**	**21**	**Plasticity Index, PI**	**7**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/22/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB - 043	Date Recd.	12/18/03	**Location**	69+00 (NW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.15	cm	Volume, V:	250.4	cu cm
Mass of Sample:	461.0	g	**Moisture Content:**	**21.7**	%
			Wet Density	**114.9**	**pcf**
			Dry Density	**94.4**	**pcf**

Final

Diameter:	7.02	cm	Area, A:	38.7	sq cm
Height, L:	5.37	cm	Volume, V:	207.8	cu cm
Mass of Sample:	443.50	g	**Moisture Content:**	**18.5**	%
			Wet Density	**133.1**	**pcf**
			Dry Density	**112.3**	**pcf**
			Deg of Saturation	**96.6**	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	76.8 psi
Gradient:	20.6

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/22/2003	9:00 AM	0	0	3.08	5.90		20.0	---
12/22/2003	9:45 AM	2700	2700	3.26	5.72	1.0	20.0	6.94E-08
12/22/2003	10:30 AM	2700	5400	3.46	5.55	1.2	20.0	6.67E-08
12/22/2003	11:15 AM	2700	8100	3.64	5.38	1.1	20.0	6.79E-08
12/22/2003	12:00 PM	2700	10800	3.80	5.23	1.1	20.0	6.09E-08

Average Permeability = **6.6E-08** cm/sec

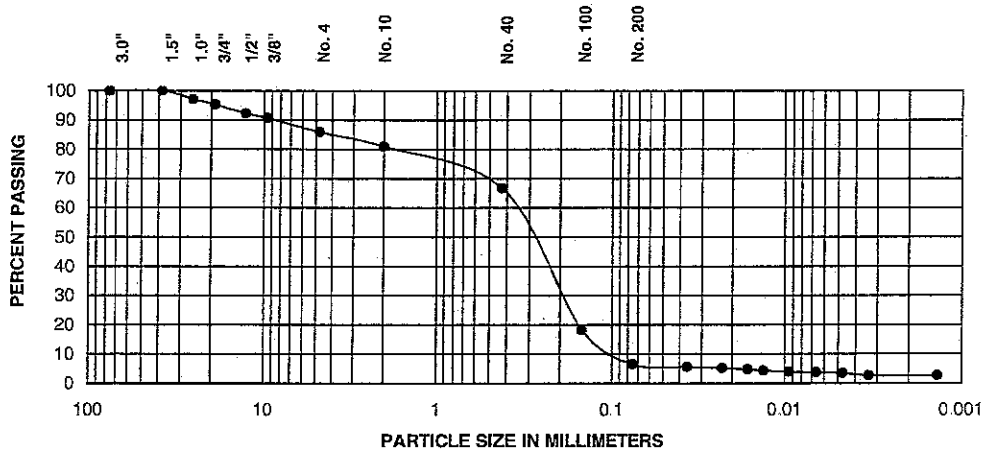
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-034	**Date Tested**	12/22/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/18/2003
Sample Location	20+20 (SE)
Sample Description	Gray poorly graded sand with clay, tr.of gr.& foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	14.1	79.4	3.0	3.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.37	0.19	0.09	4.0	1.10

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.1
3/4"	95.3
1/2"	92.3
3/8"	90.7
No. 4	85.9
No. 10	81.0
No. 40	66.7
No. 100	18.3
No. 200	6.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay
System:	USCS

Remarks:

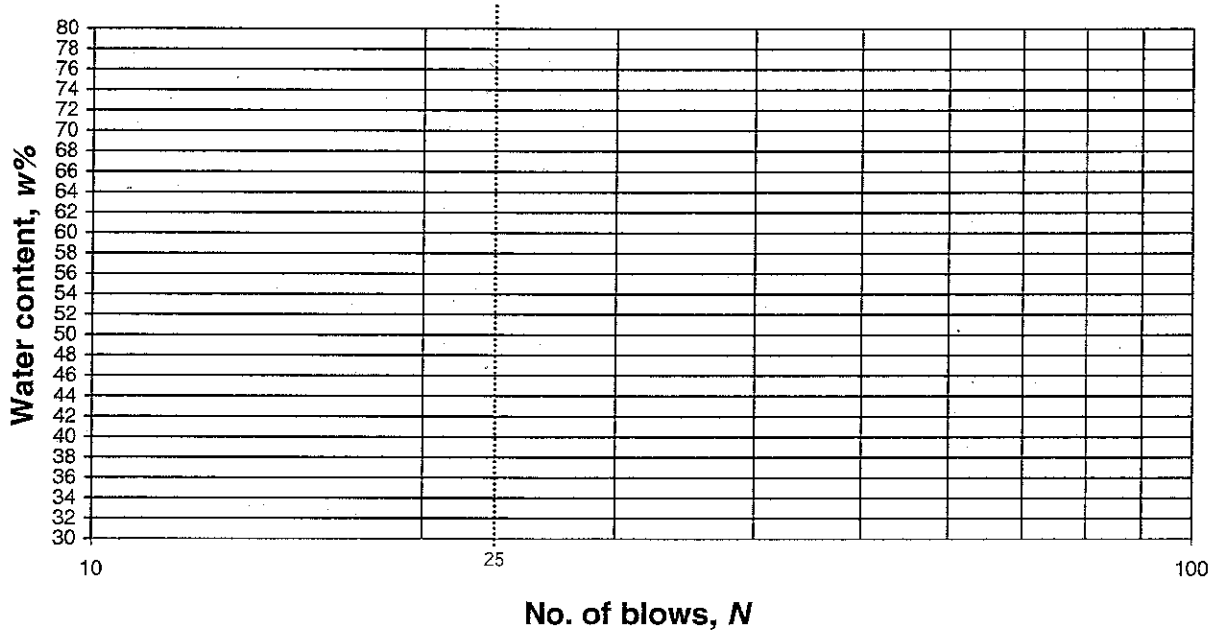
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn : Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-034	**Date Tested**	12/22/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/18/2003
Sample Location	20+20 (SE)
Sample Description	Gray poorly graded sand with clay, tr of gr.& foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	14	Date	12/19/2003	Sheet	1
				Date of weighing	12/20/2003	Tested by	ON

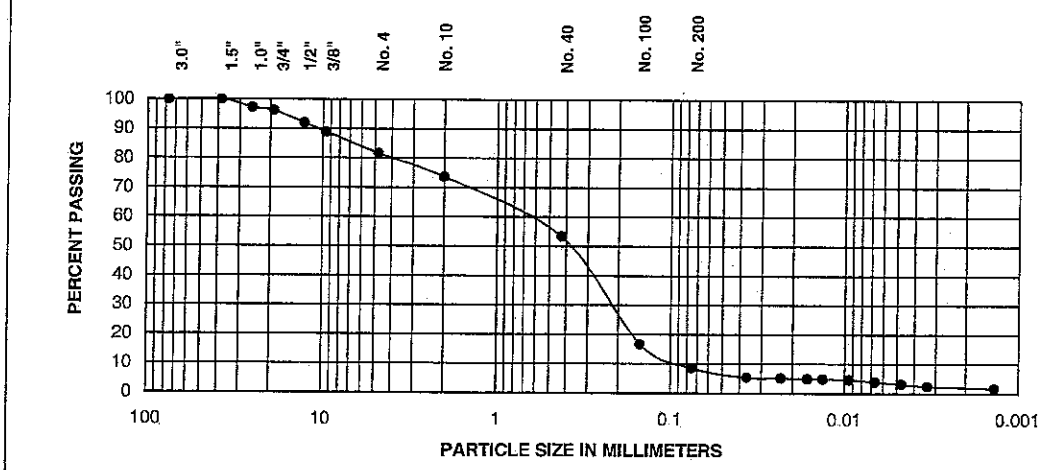
Boring No.	-	-				
Sample No.	BF-034	BF-035				
Location	20 + 20 (SE)	67 + 00 (NW)				
Tin No.	36C	1C				
Tin + Wet Soil	150.4	158.85				
Tin + Dry Soil	139.57	142.58				
Wt. of Tin	31.5	30.79				
Wt. of Dry Soil	108.1	111.8				
Wt. of Water	10.8	16.3				
Moisture, %	10.0	14.6				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-035	**Date Tested**	12/22/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/18/2003
Sample Location	67+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	18.4	73.0	5.1	3.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.70	0.22	0.08	8.3	0.81

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.3
3/4"	96.2
1/2"	92.0
3/8"	88.9
No. 4	81.6
No. 10	73.6
No. 40	53.4
No. 100	16.7
No. 200	8.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

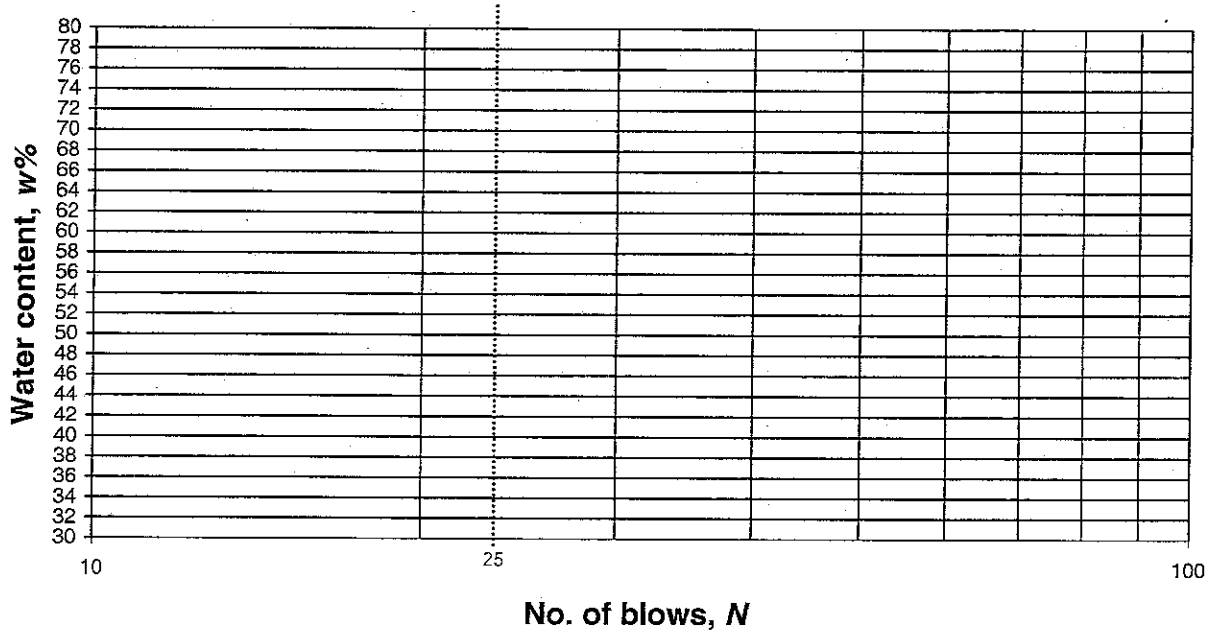
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-035	**Date Tested**	12/22/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/18/2003
Sample Location	67+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	14	Date	12/19/2003	Sheet	1
				Date of weighing	12/20/2003	Tested by	ON

Boring No.	-	-				
Sample No.	BF-034	BF-035				
Location	20 + 20 (SE)	67 + 00 (NW)				
Tin No.	36C	1C				
Tin + Wet Soil	150.4	158.85				
Tin + Dry Soil	139.57	142.58				
Wt. of Tin	31.5	30.79				
Wt. of Dry Soil	108.1	111.8				
Wt. of Water	10.8	16.3				
Moisture, %	10.0	14.6				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

INDIANA HARBOR CDF S-B CUTOFF

DATE: 12/18/03 JOB NAME: WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 24 - 34 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
66+00	2.00	73.00	12.00	40.00	35.00	8
66+00	35.00	83.00	20.00	36.00	41.00	8
65+40	2.00	92.00	20.00	117.00	44.00	8
65+40	35.00	93.00	20.00	118.00	46.00	8

NW TRENCH

COMMENTS: Morning viscosity failed in the trench due to overnight moisture creating excess water at the top of the trench. Trench filtrate losses are still high, but typical for trench slurry results.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
66+00	LAB SAMPLE COLLECTED 12/18/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
69+00	3.00	N/A	N/A	N/A	6.02×10^{-7}	N/A
68+75	3.00	N/A	N/A	N/A	2.89×10^{-7}	N/A
68+50	3.00	N/A	N/A	N/A	6.26×10^{-7}	N/A
68+25	3.00	N/A	N/A	N/A	1.79×10^{-7}	N/A
68+00	3.00	Sample collected	Sample collected	Sample collected	1.92×10^{-7}	yes
67+75	3.00	N/A	N/A	N/A	3.73×10^{-7}	N/A
67+50	3.00	N/A	N/A	N/A	4.13×10^{-7}	N/A
67+25	3.00	N/A	N/A	N/A	4.97×10^{-7}	N/A
67+00	3.00	Sample collected	Sample collected	Sample collected	5.96×10^{-7}	yes

COMMENTS

Filter cake: .5mm, 1.0mm, 4.0mm, and 3.4mm respectively.

Unit Weight:
69+00: 115.5 pcf
68+75: 111.0 pcf
68+50: 121.0 pcf
68+25: 115.0 pcf
68+00: 115.0 pcf
67+75: 114.5 pcf
67+50: 116.0 pcf
67+25: 112.0 pcf
67+00: 114.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/18/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 24 - 34 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
20+50	2.00	72.50	8.00	7.00	41.00	8
20+50	32.00	76.00	10.00	8.00	45.00	8
21+40	2.00	84.50	14.00	30.00	48.00	8
21+40	32.00	85.00	16.00	30.00	50.00	8

SE TRENCH

COMMENTS: Trench filtrate losses are becoming high, but typical for trench slurry results.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
21+00	LAB SAMPLE COLLECTED 12/18/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
20+03	2.50	N/A	N/A	N/A	1.04×10^{-7}	N/A
20+25	2.50	N/A	N/A	N/A	1.20×10^{-7}	N/A
20+50	2.50	Sample collected	Sample collected	Sample collected	1.31×10^{-7}	yes

COMMENTS

Filter cake: .4mm, .5mm, .7mm and 1.0mm respectively.

Unit Weight: 20+03: 118.0 pcf
20+25: 114.0 pcf
20+50: 110.5 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/18/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
8:00	65.00	40.00	6.00	8
10:05	-	42.00	-	-
14:17	65.00	41.00	14.00	8
15:10	-	43.00	-	-

Filter cake is .2mm, and .2mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Lepie OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/18/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 24 - 34 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
66+00	33.8	37.2	37.1	10.0	371.0	3.2	69+20	OUT	OUT
65+90	33.8	37.3	37.3	10.0	372.5	3.4	69+10	1.2	OUT
65+80	33.9	37.3	37.3	10.0	373.0	3.2	69+00	3.1	OUT
65+70	34.0	37.4	37.4	10.0	373.5	3.2	68+90	4.6	OUT
65+60	33.9	37.5	37.5	10.0	374.5	3.2	68+80	6.3	OUT
65+50	34.0	37.6	37.6	10.0	375.5	3.1	68+70	7.7	OUT
65+40	34.1	37.8	37.7	10.0	377.0	3.1	68+60	9.5	OUT
65+30	34.1	37.9	37.9	10.0	378.5	3.2	68+50	11.1	OUT
65+20	34.2	37.8	37.9	10.0	378.5	3.2	68+40	12.5	OUT
65+10	34.5	37.9	37.9	10.0	378.5	3.2	68+30	14.3	OUT
							68+20	15.8	OUT
							68+10	17.4	OUT
							68+00	19.0	OUT
							67+90	20.6	OUT
							67+80	22.2	OUT
							67+70	23.8	OUT
							67+60	25.4	OUT
							67+50	27.0	OUT
							67+40	28.6	OUT
							67+30	30.2	OUT
							67+20	31.8	OUT
							67+10	33.4	OUT
							67+00	33.9	OUT
							66+90	34.3	OUT
							66+80	34.7	OUT
							66+70	35.1	OUT
							66+60	35.7	OUT
							66+50	35.9	OUT
							66+40	36.5	3.4
							66+30	36.8	5.8
							66+20	37.0	7.7
							66+10	37.0	10.2
							66+00	12.1	12.3
							65+90	8.1	14.1
							65+80		16.8
							65+70		18.9

SF TODAY 3752.50

SF TO DATE 46154.00

COMMENTS

NW Trench

Profile con'td on Page 5

GEO-CON: Suzanne E. Sepio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/18/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 24 - 34 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
							65+60		21.1
							65+50		23.3
							65+40		25.6
							65+30		27.9
							65+20		30.1
							65+10		33.6

SF TODAY

SF TO DATE

COMMENTS

NW Trench

GEO-CON: Suzanne E. Sepio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/18/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 24 - 34 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
20+60	30.3	34.2	34.1	10.0	341.0	4.8	19+83	0.0	0.0
20+70	30.5	34.4	34.3	10.0	343.0	3.7	19+93	10.8	0.0
20+80	30.5	34.6	34.5	10.0	345.0	3.4	20+03	20.3	0.0
20+90	30.6	34.5	34.6	10.0	345.5	3.0	20+13	29.8	0.0
21+00	30.7	34.5	34.5	10.0	345.0	3.0	20+15.9	33.1	0.0
21+10	30.7	34.7	34.6	10.0	346.0	3.2	20+20	33.0	0.0
21+20	30.8	34.9	34.8	10.0	348.0	3.1	20+30	33.8	0.0
21+30	31.0	35.0	35.0	10.0	349.5	3.0	20+40	33.5	4.1
21+40	31.2	34.8	34.9	10.0	349.0	3.2	20+50	33.9	7.5
21+50	31.4	34.8	34.8	10.0	348.0	3.5	20+60		11.2
21+60	31.8	35.2	35.0	10.0	350.0	4.5	20+70		12.1
21+70	32.0	35.7	35.5	10.0	354.5	4.6	20+80		12.9
21+80	32.2	35.9	35.8	10.0	358.0	4.4	20+90		14.7
21+90	32.3	36.0	36.0	10.0	359.5	3.8	21+00		17.2
							21+10		19.3
							21+20		22.6
							21+30		24.4
							21+40		27.5
							21+50		29.8
							21+60		31.3
							21+70		34.0
							21+80		35.9
							21+90		36.0

SF TODAY 4882.00

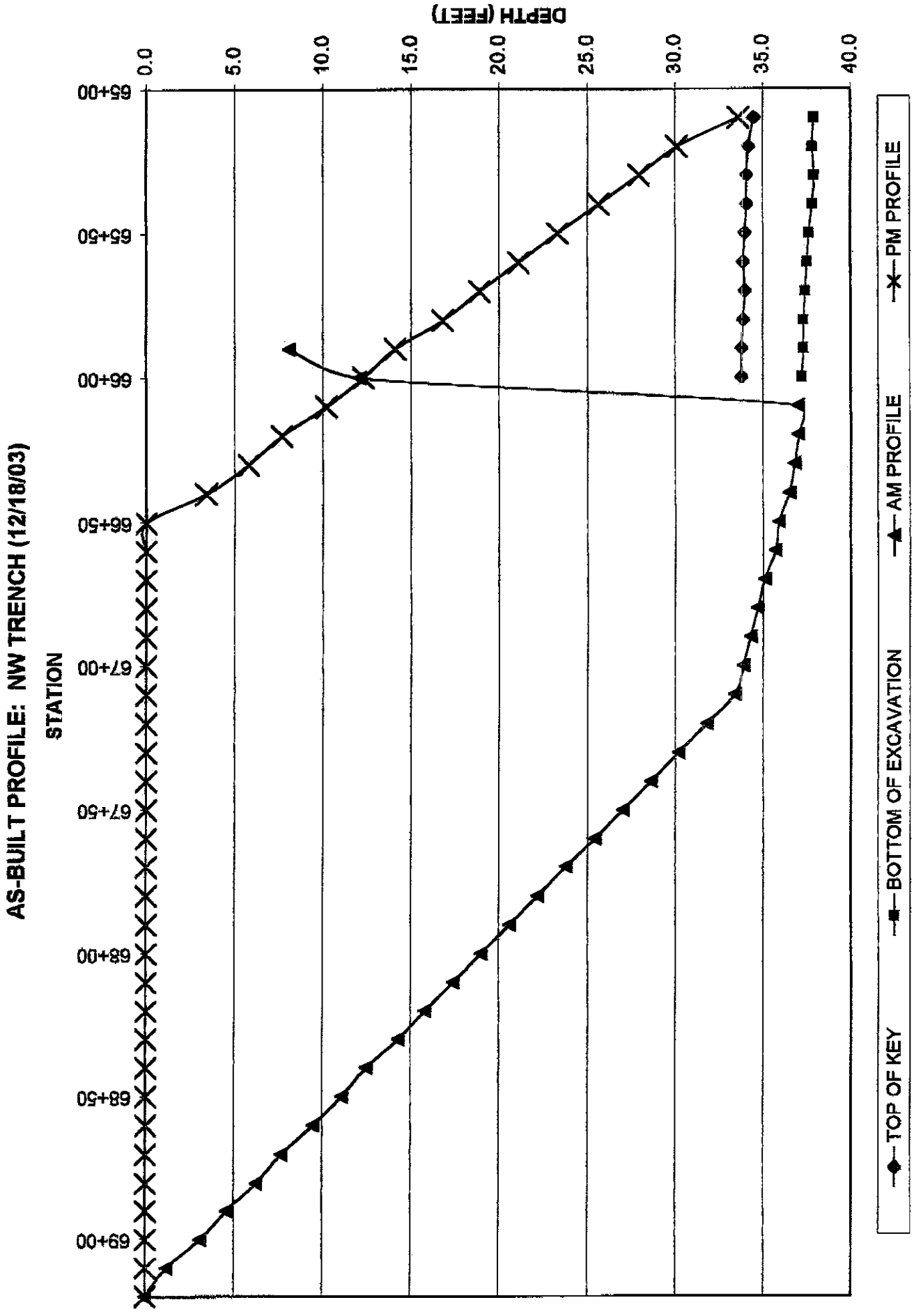
SF TO DATE 6587.22

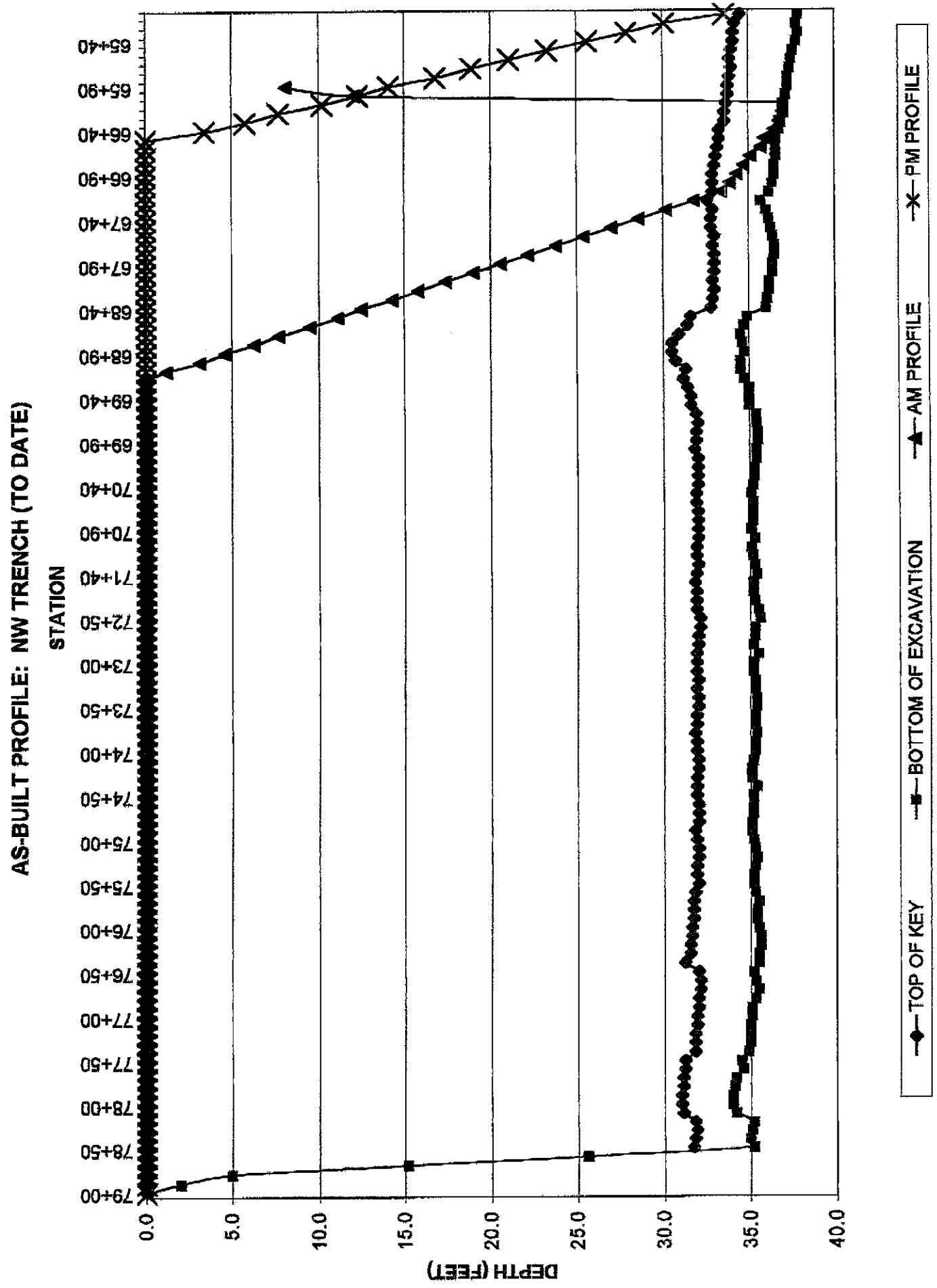
COMMENTS

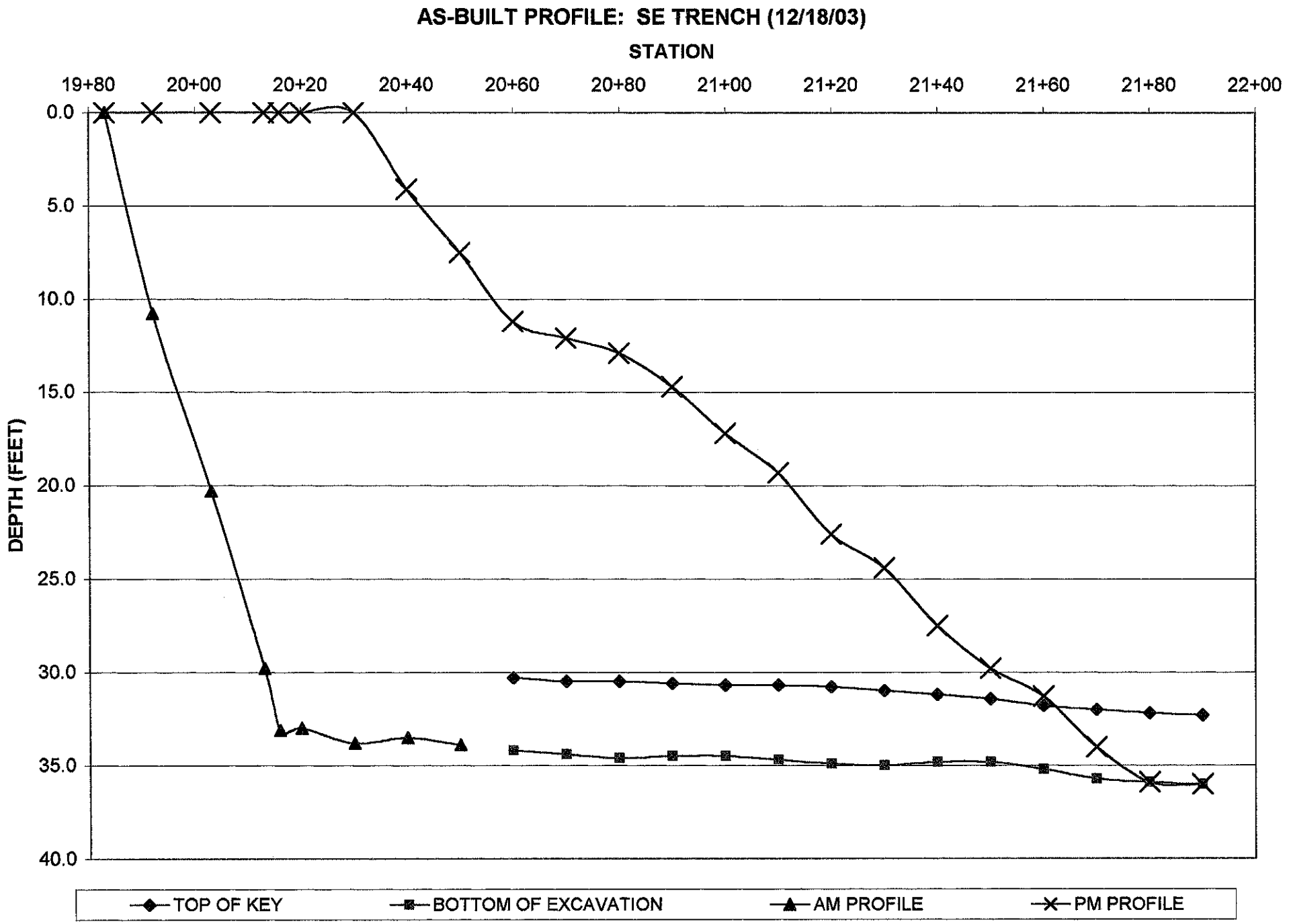
SE Trench

To get the as-built to graph correctly lead-in 0+00, 0+10, 0+20, and 0+30 had to be changed as above respectively.

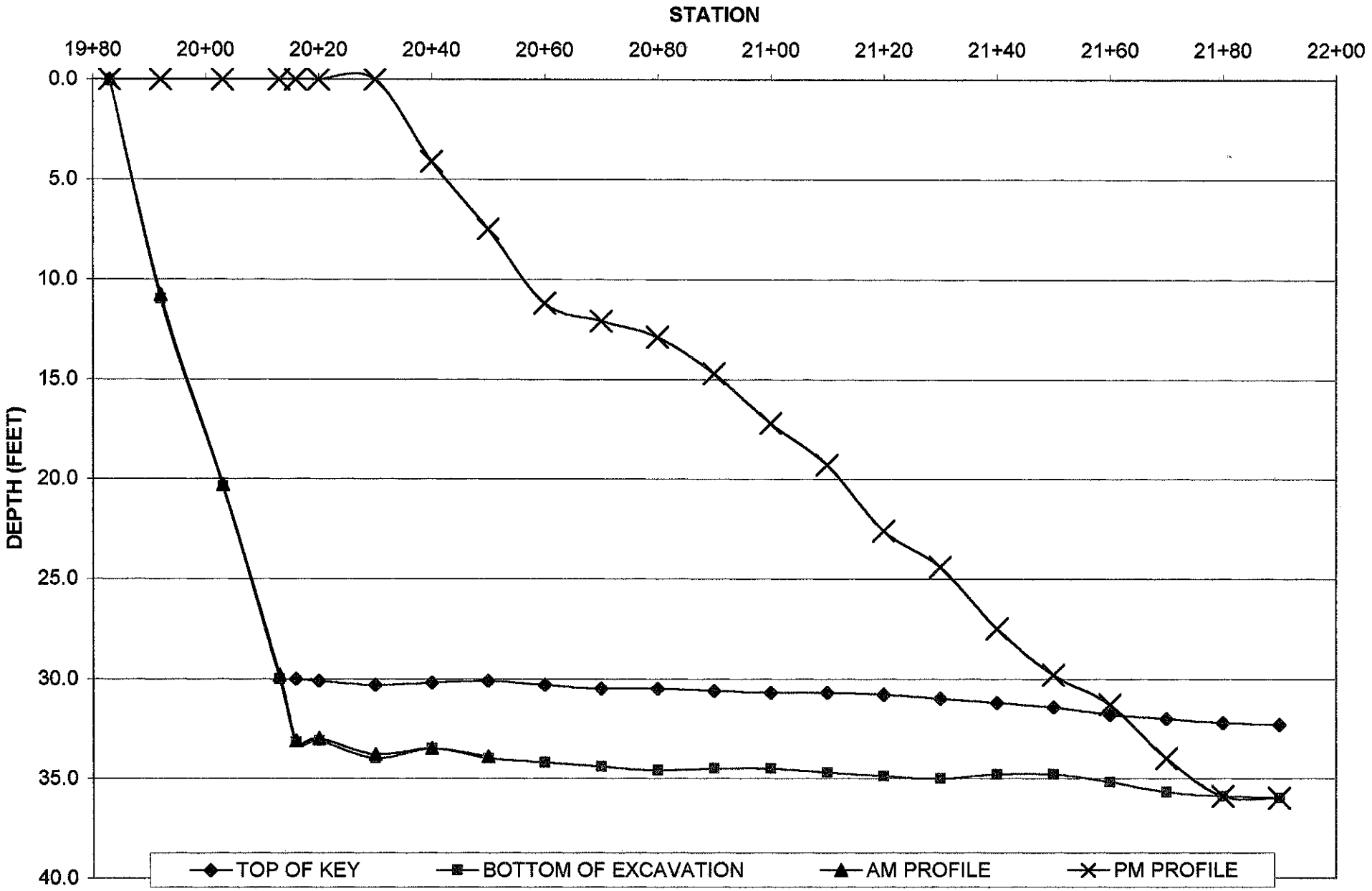
GEO-CON: Suzanne E. Sepac OWNER:


AS-BUILT PROFILE: NW TRENCH (12/18/03)
STATION
65+00
65+50
66+00
66+50
67+00
67+50
68+00
68+50
69+00
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
79+00
78+50
78+00
77+50
77+00
76+50
76+00
75+50
75+00
74+50
74+00
73+50
73+00
72+50
71+40
70+90
70+40
69+90
69+40
68+90
68+40
67+90
67+40
66+90
66+40
65+90
65+40
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (12/18/03)
STATION
19+80
20+00
20+20
20+40
20+60
20+80
21+00
21+20
21+40
21+60
21+80
22+00
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: SE TRENCH (TO DATE)



DAILY QC TESTS

DATE 12/18/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec							
PM			> 40 sec							

NW Trench

Page 1 of 2

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:30	66+00	2	35	40 - 90 sec	73	64 - 95 pcf	8	6.5 - 10	40	< 25 cm^3	0.5	12	MAX 30%
7:30	66+00	35	41	40 - 90 sec	83	64 - 95 pcf	8	6.5 - 10	36	< 25 cm^3	1.0	20	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:40	65+40	2	44	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	117	< 25 cm^3	4.0	20	MAX 30%
13:40	65+40	35	46	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	118	< 25 cm^3	3.4	20	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
69+00	3	2" to 6"	115.5	+15 pcf over trench slurry	6.02×10^{-7}	1.0×10^{-7} cm/sec
68+75	3	2" to 6"	111	+15 pcf over trench slurry	2.89×10^{-7}	1.0×10^{-7} cm/sec
68+50	3	2" to 6"	121	+15 pcf over trench slurry	6.26×10^{-7}	1.0×10^{-7} cm/sec
68+25	3	2" to 6"	115	+15 pcf over trench slurry	1.79×10^{-7}	1.0×10^{-7} cm/sec
68+00	3	2" to 6"	115	+15 pcf over trench slurry	1.92×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS **DATE** 12/18/03

NW Trench

Page 2 of 2

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec							
PM			> 40 sec							

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
67+75	3	2" to 6"	114.5	+15 pcf over trench slurry	3.73×10^{-7}	1.0×10^{-7} cm/sec
67+50	3	2" to 6"	116	+15 pcf over trench slurry	4.13×10^{-7}	1.0×10^{-7} cm/sec
67+25	3	2" to 6"	112	+15 pcf over trench slurry	4.97×10^{-7}	1.0×10^{-7} cm/sec
67+00	3	2" to 6"	114	+15 pcf over trench slurry	5.96×10^{-7}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 69+00, 68+75, 68+50, 68+25, 68+00, 67+75, 67+50, 67+25, 67+00

Technician: RF/MM/SM ✓ BY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 7.0cm, 6.5cm, 6.5cm, 7.0cm, 7.0cm, 6.0cm, 7.0cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. & (1/14.6
69+00	12/18/03	9:02-13:02	240	10	100.4833	519313.7717	—	75	6.02×10^{-7}	4.11x10
68+75	12/18/03	9:02-13:02	240	10	100.4833	519313.7717	—	36	2.89×10^{-7}	1.97x1
68+50	12/18/03	9:02-13:02	240	10	108.2128	559261.0644	—	84	6.26×10^{-7}	4.27x
68+25	12/18/03	9:02-13:02	240	10	108.2128	559261.0644	—	24	1.79×10^{-7}	1.22x1
68+00	12/18/03	9:02-13:02	240	10	100.4833	519313.7717	—	24	1.92×10^{-7}	1.31x1
67+75	12/18/03	9:02-13:02	240	10	100.4833	519313.7717	—	46.5	3.73×10^{-7}	2.30x
67+50	12/18/03	13:34-17:34	240	10	117.2305	605865.9809	—	60	4.13×10^{-7}	2.82x1
67+25	12/18/03	13:34-17:34	240	10	100.4833	519313.7717	—	62	4.97×10^{-7}	3.39x1
67+00	12/18/03	13:34-17:34	240	10	108.2128	559261.0644	—	80	5.96×10^{-7}	4.07x

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

DAILY QC TESTS

DATE 12/18/03

SE Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	8:00	40	> 40 sec	65	> 64 pcf	8	6.5 - 10	6	< 20 cm^3	.2
PM	14:17	42	> 40 sec	65	> 64 pcf	8	6.5 - 10	14	< 20 cm^3	.2

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:05	41	> 40 sec							
PM	15:10	43	> 40 sec							

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:00	20+50	2	41	40 - 90 sec	72.5	64 - 95 pcf	8	6.5 - 10	7	< 25 cm^3	.4	8	MAX 30%
8:00	20+50	32	45	40 - 90 sec	76	64 - 95 pcf	8	6.5 - 10	8	< 25 cm^3	.5	10	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
14:05	21+40	2	48	40 - 90 sec	84.5	64 - 95 pcf	8	6.5 - 10	30	< 25 cm^3	.7	14	MAX 30%
14:05	21+40	32	50	40 - 90 sec	85	64 - 95 pcf	8	6.5 - 10	30	< 25 cm^3	1.0	16	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
20+03	2.5	2" to 6"	118	+15 pcf over trench slurry	1.04×10^{-7}	1.0×10^{-7} cm/sec
20+25	2.5	2" to 6"	114	+15 pcf over trench slurry	1.20×10^{-7}	1.0×10^{-7} cm/sec
20+50	2.5	2" to 6"	110.5	+15 pcf over trench slurry	1.31×10^{-7}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: 20+03, 20+25, 20+50 Technician: RF/MM/SM ✓ ex SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm² Sample Height: L= 6.5cm, 7.0cm, 6.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/conu f (1/14.
20+03	12/18/03	13:34-17:34	240	10	108.2128	559261.0484	—	14	1.04×10^{-7}	7.10x1
20+25	12/18/03	13:34-17:34	240	10	100.4833	519313.7717	—	15	1.20×10^{-7}	8.19x1
20+50	12/18/03	13:34-17:34	240	10	117.2305	605865.9809	—	19	1.31×10^{-7}	8.94x

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 19-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL	SEND RESULTS TO:
333 SHORE DRIVE	Clients Name: SUE SEPIC
BURR RIDGE, IL 60527	Company: GEO-CON, INC.
Phone: (630) 321-0944	Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Attention: SANJEEV BANDI	Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO P01-048 | P O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-036 (SE21+00)	SOIL ONLY	21+00	12/18/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-037 (NW66+00)	SOIL ONLY	66+00	12/18/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-044 (SW20+50)	SB BACKFILL**	20+50	12/18/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-045 (NW68+00)	SB BACKFILL**	68+00	12/18/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 22-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
SB-046 (NW67+00)	SB BACKFILL**	67+00	12/18/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-047 (SE21+00)	SB BACKFILL**	21+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-048 (NW66+00)	SB BACKFILL**	66+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-049 (SE22+00)	SB BACKFILL**	22+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-050 (NW65+00)	SB BACKFILL**	65+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-051 (SE23+00)	SB BACKFILL**	23+00	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-052 (NW64+50)	SB BACKFILL**	64+50	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/15/2003

SOLD TO:	SHIP TO:
GEOCON INC 4005 MONROEVILLE BLVD CORPORATE WOODLAND SUITE 400 MONROEVILLE PA 15146	GEOCON E. CHICAGO IN 46312
SALES ORDER NO.: HCEV006C25	

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-16-03	QUALITY 86	GREYBULL	GEL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result	Test or Property	API Spec	Result
Viscosity	30 min.	45	Moisture (wt. %)	N/A	9.5
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max.	1.20
Yield Point (# / 100 ft2)	N/A				
Fill (L. Volume (cm3)	15.0 max.	12.0			
[illegible] (%)	4.0 max.	3.0			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4485.

Signed 12/22/03 Date

Approved by Plant Manager

LabanaCert.doc (4/22/97)
Rev E (8/99)

Arrived onsite 12/18/03

4000# jumbo bags

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/8/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146	GEO-CON E. CHICAGO IN 46312
SALES ORDER NO.: HGIV006635	

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-16-03	AMERICAN TRANS 125	GREYBULL	CEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	69
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.8
> 75 micron (wt. %)	4.0 max	1.7

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.5
Y.P. / P.V. Ratio	3.0 max.	1.75

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Signed 12/17/03 Date

Approved by Plant Manager

LabanaCert.doc (4/22/97)
Rev E (9/99)

Arrived onsite 12/18/03
100# Bags

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/16/2003

SOLD TO:	SHIP TO
[illegible] INC [illegible] BLVD [illegible] BUILDING 2 SUITE 210 MONROEVILLE PA 15146	GEOCON E. CHICAGO IN 46312
SALES ORDER NO.: HCY004036	

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
[illegible]	MS MOUTOR 413	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min	44
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.0
> 75 micron (wt. %)	4.0 max.	2.1

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	9.6
Y.P. / P.V Ratio	3.0 max.	1.14

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4426.

Signed 12/17/03 Date

Approved by Plant Manager

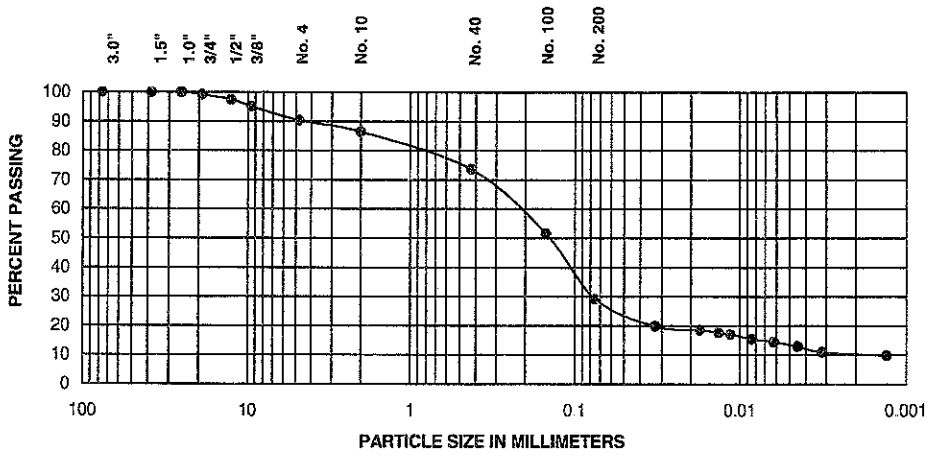
LabanalGel.doc (4/22/97)
Rev E (9/98)

Arrived onsite 12/18/03
100# Bags

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB - 044	**Date Tested**	12/23/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/19/2003
Sample Location	20+50 (SE)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	9.6	61.3	15.7	13.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.2
1/2"	97.5
3/8"	95.2
No. 4	90.4
No. 10	86.5
No. 40	73.7
No. 100	51.6
No. 200	29.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
30	21	9

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

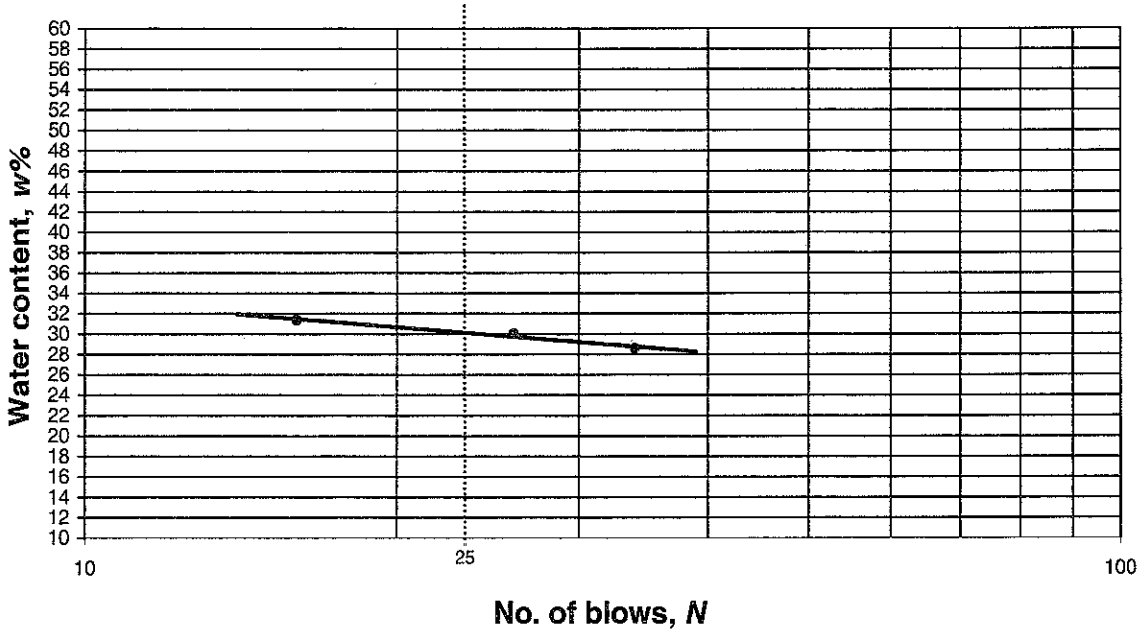
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB - 044	**Date Tested**	12/22/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/19/2003
Sample Location	20+50 (SE)
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**30**	**Plastic Limit, PL**	**21**	**Plasticity Index, PI**	**9**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/22/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB - 044	Date Recd.	12/19/03	**Location**	20+50 (SE)		
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.97	cm	Volume, V:	283.8	cu cm
Mass of Sample:	512.9	g	**Moisture Content:**	**25.1**	%
			Wet Density	**112.8**	**pcf**
			Dry Density	**90.1**	**pcf**

Final

Diameter:	7.11	cm	Area, A:	39.7	sq cm
Height, L:	6.13	cm	Volume, V:	243.4	cu cm
Mass of Sample:	494.00	g	**Moisture Content:**	**22.7**	%
			Wet Density	**126.7**	**pcf**
			Dry Density	**103.2**	**pcf**
			Deg of Saturation	**94.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	18.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/22/2003	9:00 AM	0	0	3.32	5.87		20.0	---
12/22/2003	9:45 AM	2700	2700	3.40	5.80	1.1	20.0	3.08E-08
12/22/2003	10:30 AM	2700	5400	3.48	5.73	1.1	20.0	3.10E-08
12/22/2003	11:15 AM	2700	8100	3.53	5.67	0.8	20.0	2.68E-08
12/22/2003	12:00 PM	2700	10800	3.57	5.62	0.8	20.0	2.24E-08

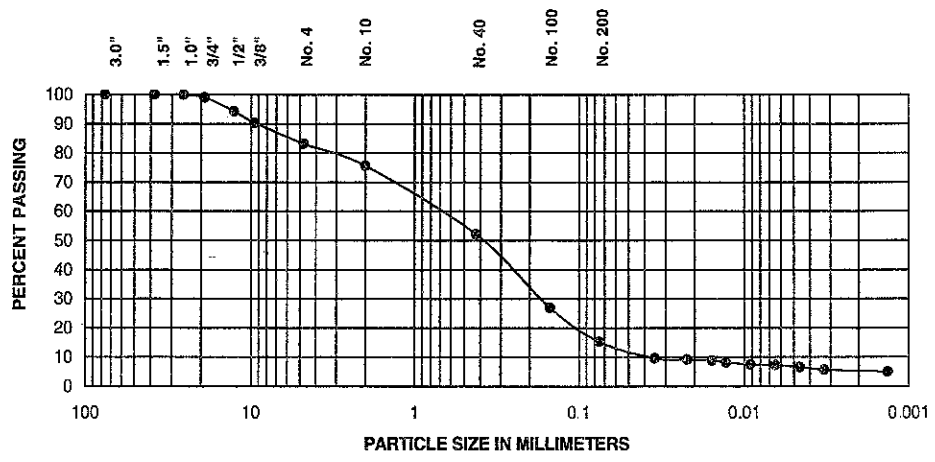
Average Permeability = **2.8E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB - 045	**Date Tested**	12/23/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/19/2003
Sample Location	68+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	16.8	67.8	8.6	6.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.1
1/2"	94.3
3/8"	90.4
No. 4	83.2
No. 10	75.7
No. 40	52.3
No. 100	26.9
No. 200	15.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
27	20	7

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

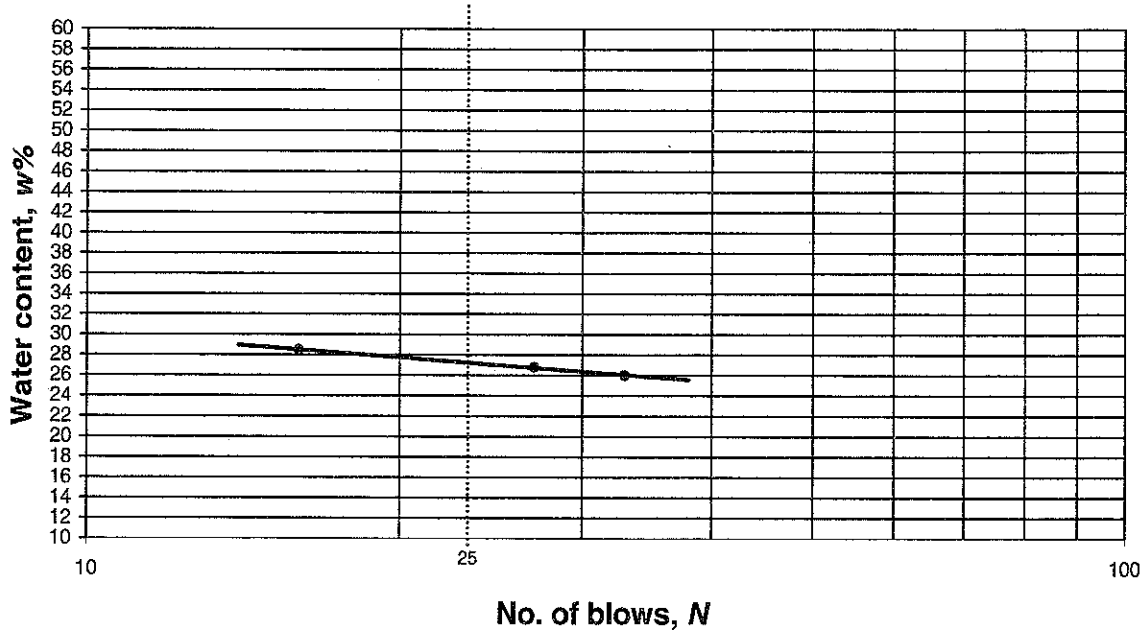
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB - 045	**Date Tested**	12/23/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/19/2003
Sample Location	68+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	27	**Plastic Limit, PL**	20	**Plasticity Index, PI**	7

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/22/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB - 045	Date Recd.	12/19/03	**Location**	68+00 (NW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.22	cm	Volume, V:	253.2	cu cm
Mass of Sample:	481.1	g	**Moisture Content:**	**28.8**	%
			Wet Density	**118.5**	**pcf**
			Dry Density	**92.0**	**pcf**

Final

Diameter:	6.85	cm	Area, A:	36.9	sq cm
Height, L:	5.70	cm	Volume, V:	210.1	cu cm
Mass of Sample:	434.00	g	**Moisture Content:**	**21.9**	%
			Wet Density	**128.9**	**pcf**
			Dry Density	**105.8**	**pcf**
			Deg of Saturation	**96.6**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	20.4	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/22/2003	9:00 AM	0	0	3.60	6.00		20.0	---
12/22/2003	9:45 AM	2700	2700	3.78	5.85	1.2	20.0	5.96E-08
12/22/2003	10:30 AM	2700	5400	4.01	5.66	1.2	20.0	7.70E-08
12/22/2003	11:15 AM	2700	8100	4.21	5.49	1.2	20.0	7.03E-08
12/22/2003	12:00 PM	2700	10800	4.36	5.35	1.1	20.0	5.88E-08

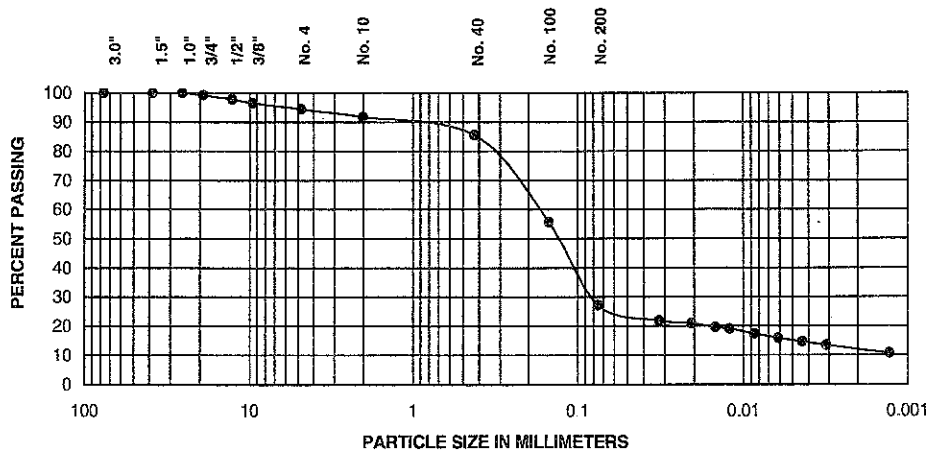
Average Permeability = **6.6E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-046	**Date Tested**	12/26/2003	**Tested by**	KM
						Qc by	NP

Date Sample Received:	12/22/2003
Sample Location	67 + 00 (NW)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	5.6	67.3	12.0	15.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.3
1/2"	97.8
3/8"	96.5
No. 4	94.4
No. 10	91.7
No. 40	85.5
No. 100	55.7
No. 200	27.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
32	22	10

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

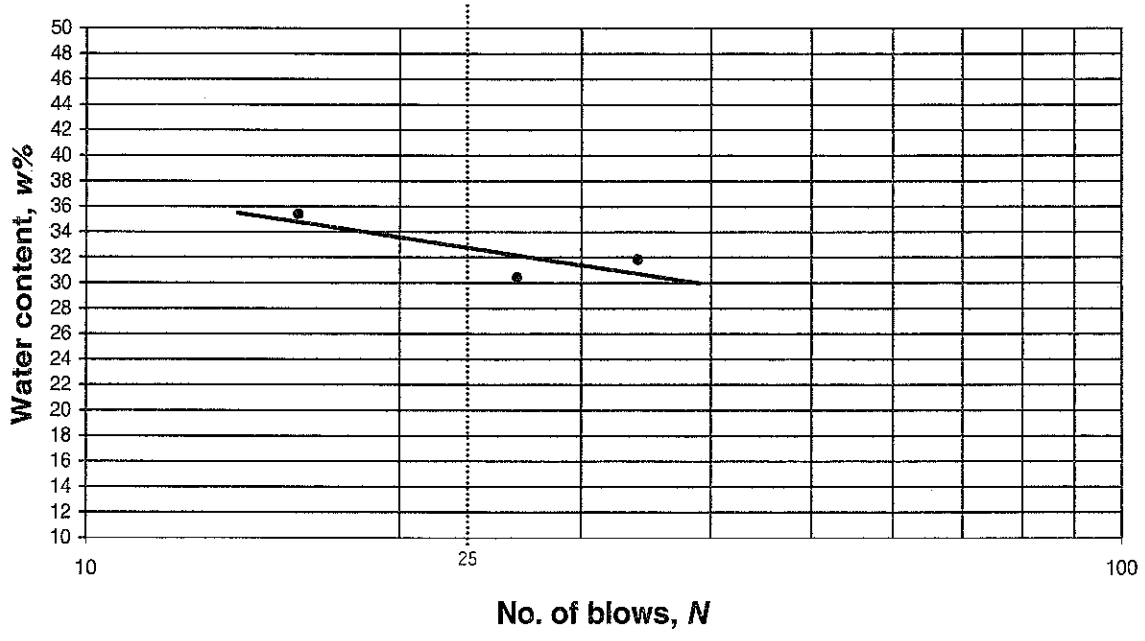
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-046	**Date Tested**	12/26/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/22/2003
Sample Location	67 + 00 (NW)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	32	**Plastic Limit, PL**	22	**Plasticity Index, PI**	10

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/26/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-046	Date Recd.	12/22/03	**Location**	67 + 00 (NW)		
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.77	cm	Volume, V:	234.9	cu cm
Mass of Sample:	413.5	g	**Moisture Content:**	**28.6**	%
			Wet Density	**109.8**	**pcf**
			Dry Density	**85.4**	**pcf**

Final

Diameter:	7.01	cm	Area, A:	38.6	sq cm
Height, L:	5.21	cm	Volume, V:	201.1	cu cm
Mass of Sample:	401.55	g	**Moisture Content:**	**27.3**	%
			Wet Density	**124.6**	**pcf**
			Dry Density	**97.9**	**pcf**
			Deg of Saturation	**99.6**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.9	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/26/2003	9:30 AM	0	0	2.90	6.01		20.0	---
12/26/2003	10:15 AM	2700	2700	3.02	5.89	1.0	20.0	4.27E-08
12/26/2003	11:00 AM	2700	5400	3.13	5.78	1.0	20.0	3.95E-08
12/26/2003	11:45 AM	2700	8100	3.24	5.67	1.0	20.0	4.00E-08
12/26/2003	12:30 PM	2700	10800	3.34	5.57	1.0	20.0	3.67E-08

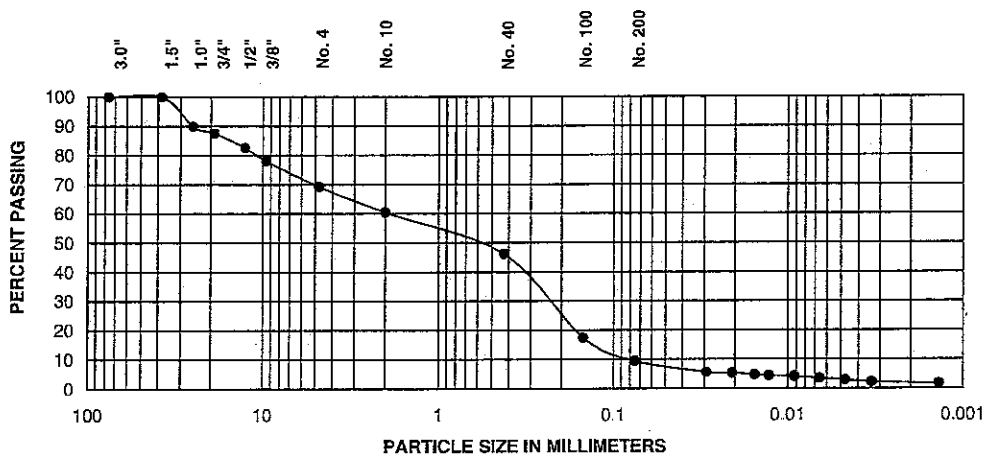
Average Permeability = **4.0E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF - 036	**Date Tested**	12/23/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/19/2003
Sample Location	21+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	30.8	59.7	6.4	3.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.91	0.24	0.08	24.3	0.37

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	89.8
3/4"	87.5
1/2"	82.5
3/8"	78.0
No. 4	69.2
No. 10	60.4
No. 40	46.1
No. 100	17.5
No. 200	9.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

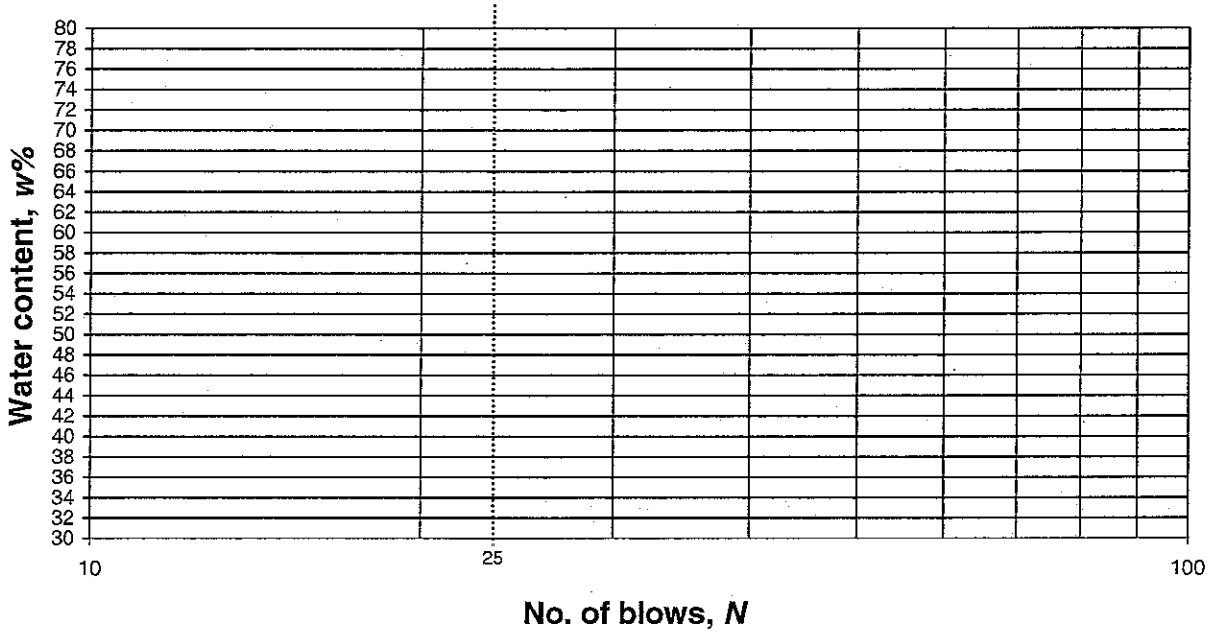
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF - 036	**Date Tested**	12/23/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/19/2003
Sample Location	21+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	15	Date	12/19/2003	Sheet	1
				Date of weighing	12/20/2003	Tested by	ON

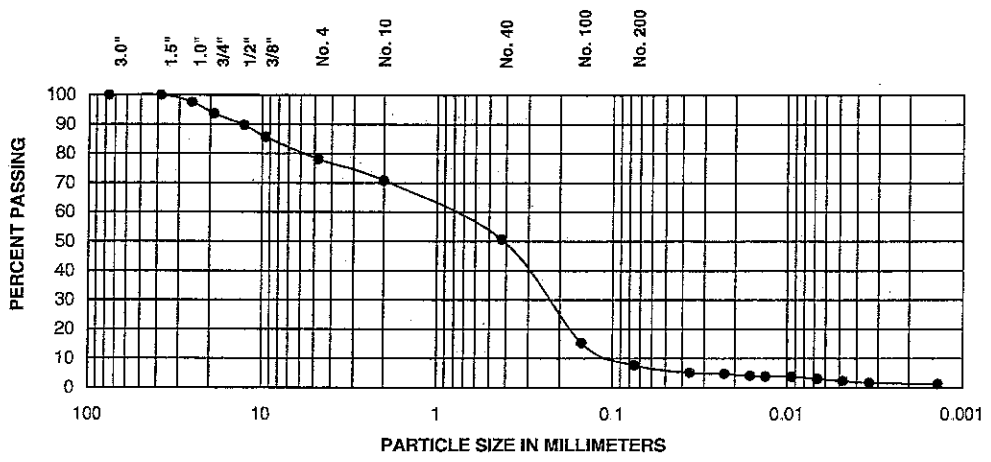
Boring No.	-	-				
Sample No.	BF-036	BF-037				
Location	21 + 00 (SE)	66 + 00 (NW)				
Tin No.	60A	7C				
Tin + Wet Soil	135.02	151.67				
Tin + Dry Soil	122.47	136.46				
Wt. of Tin	30.49	31.37				
Wt. of Dry Soil	92.0	105.1				
Wt. of Water	12.6	15.2				
Moisture, %	13.6	14.5				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF - 037	**Date Tested**	12/23/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/19/2003
Sample Location	66+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	21.9	70.4	5.1	2.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.87	0.23	0.09	9.4	0.66

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.6
3/4"	93.7
1/2"	89.7
3/8"	85.7
No. 4	78.1
No. 10	70.8
No. 40	50.7
No. 100	15.4
No. 200	7.7

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants Inc.
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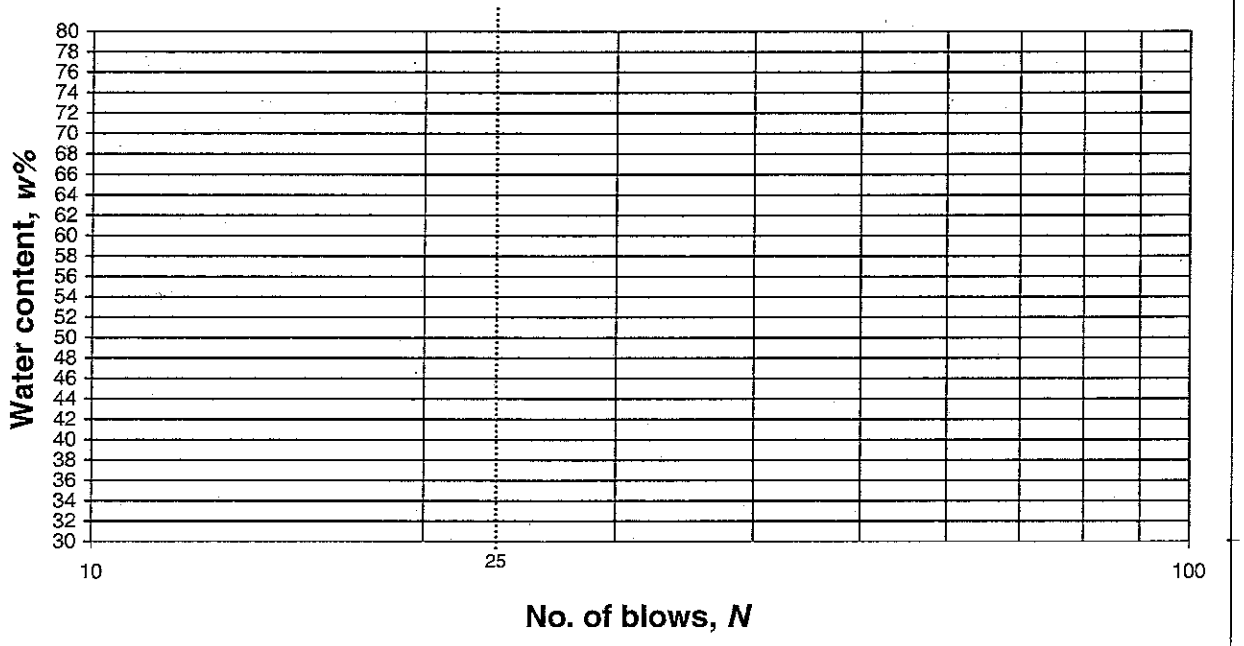
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF - 037	**Date Tested**	12/23/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/19/2003
Sample Location	66+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP·Non-plastic soil

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MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	15	Date	12/19/2003	Sheet	1
				Date of weighing	12/20/2003	Tested by	ON

Boring No.	-	-				
Sample No.	BF-036	BF-037				
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Tin No.	60A	7C				
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Wt. of Tin	30.49	31.37				
Wt. of Dry Soil	92.0	105.1				
Wt. of Water	12.6	15.2				
Moisture, %	13.6	14.5				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/19/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, some sun; 23 - 35 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
65+10	2.00	85.00	+30.00	95.00	40.00	8
65+10	33.00	101.00	+30.00	117.00	78.00	8
64+60	2.00	100.00	+30.00	8.00	60.00	8
64+60	36.00	99.00	+30.00	95.00	62.00	8

NW TRENCH

COMMENTS: Trench filtrate losses are still high, but typical for trench slurry results. Sand content is too high due to morning cave-in and cleaning. Fresh slurry was pumped continuously to this trench to try and bring the trench slurry back within specs.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
65+00	LAB SAMPLE COLLECTED 12/19/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
66+50	3.00	N/A	N/A	N/A	6.95×10^{-8}	N/A
66+25	3.00	N/A	N/A	N/A	1.24×10^{-7}	N/A
66+00	3.00	Sample collected	Sample collected	Sample collected	1.81×10^{-7}	yes

COMMENTS

Filter cake: 2.0mm, 5.2mm, 1.0mm, and 3.5mm respectively.

Unit Weight: 66+50: 115.5 pcf
66+25: 117.0 pcf
66+00: 117.5 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/19/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, some sun; 23 - 35 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
21+90	2.00	94.50	+30.00	32.00	59.00	8
21+90	34.00	97.00	+30.00	36.00	66.00	8
22+80	2.00	99.50	+30.00	43.00	75.00	8
22+80	33.00	105.00	+30.00	46.00	82.00	8

SE TRENCH

COMMENTS: Trench filtrate losses are becoming high, but typical for trench slurry results. Sand content results and some unit weights are too high. Fresh slurry will be pumped to this trench tomorrow to try and fix these problems.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
22+00	LAB SAMPLE COLLECTED 12/19/03			
23+00	LAB SAMPLE COLLECTED 12/19/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
20+50	3.00	N/A	N/A	N/A	2.81×10^{-7}	N/A
20+75	3.00	N/A	N/A	N/A	2.98×10^{-7}	N/A
21+00	3.00	Sample collected	Sample collected	Sample collected	5.57×10^{-7}	yes
21+25	2.00	N/A	N/A	N/A	2.28×10^{-7}	N/A
21+50	2.00	N/A	N/A	N/A	2.48×10^{-7}	N/A
21+75	2.00	N/A	N/A	N/A	2.24×10^{-7}	N/A

COMMENTS

Filter cake: 1.3mm, 1.5mm, 1.9mm and 1.8mm respectively.

Unit Weight:
- 20+50: 118.0 pcf
- 20+75: 115.5 pcf
- 21+00: 114.0 pcf
- 21+25: 115.5 pcf
- 21+50: 112.5 pcf*
- 21+75: 112.5 pcf*

*Had to retest weights. Slightly low. After retest, unit weights: 117.5 pcf and 116.0 pcf, respectively. (+15 pcf over shallow slurry used for mixing)

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/19/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH	
Military	lb/ft^3	seconds	cm^3	S.U.	
8:30	64.00	46.00	14.50	8	
10:45	-	45.00	-	-	
14:30	63.50	39.00	16.00	8	*FAILING RESULTS. RETEST.
16:30	-	42.00	-	-	
17:02	64.50	44.00	15.00	8	RETEST
Filter cake is .3mm, .2mm, and .2mm, respectively.					

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepio OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/19/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, some sun; 23 - 35 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
65+00	34.1	38.1	38.0	10.0	380.0	3.8	66+60	TOPOUT	
64+90	34.1	38.2	38.2	10.0	381.5	4.6	66+50	3.2	
64+80	34.0	38.1	38.2	10.0	381.5	5.5	66+40	4.4	
64+70	34.0	38.1	38.1	10.0	381.0	6.9	66+30	6.1	
64+60	33.9	38.3	38.2	10.0	382.0	7.5	66+20	8.8	
64+50	34.0	38.2	38.3	10.0	382.5	8.7	66+10	10.4	
							66+00	11.5	
							65+90	15.1	
							65+80	16.0	
							65+70	18.3	
							65+60	20.9	
							65+50	21.4	
							65+40	24.2	
							65+30	25.4	
							65+20	28.1	
							65+10	32.4	
							AFTER TRENCH CLEAN OUT		
							66+60	TOPOUT	TOPOUT
							66+50	2.8	TOPOUT
							66+40	4.1	TOPOUT
							66+30	6.9	TOPOUT
							66+20	9.1	TOPOUT
							66+10	11.8	TOPOUT
							66+00	14.2	TOPOUT
							65+90	16.9	TOPOUT
							65+80	19.2	4.0
							65+70	21.8	6.3
							65+60	23.4	10.0
							65+50	26.1	17.0
							65+40	29.2	22.0
							65+30	32.6	27.0
							65+20	35.2	31.0
							65+10	37.8	34.2
							65+00		36.4
							64+90		38.1

SF TODAY 2288.50

SF TO DATE 48442.50

COMMENTS

PM Profile cont'd on Page 5

NW Trench

MORNING SOUNDING SHOWED THAT THE TOP OF THE TRENCH CAVED IN SLIGHTLY. MATTED OUT AND CLEANED OUT THE BOTTOM OF THE TRENCH. CORRECT SOUNDINGS ARE NOTED AFTER CLEANOUT.

GEO-CON: Suzanne E. Sipio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/19/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, some sun; 23 - 35 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
							64+80		38.1
							64+70		38.2
							64+60		38.3
							64+50		38.2

SF TODAY

SF TO DATE

COMMENTS

NW Trench

MORNING SOUNDING SHOWED THAT THE TOP OF THE TRENCH CAVED IN SLIGHTLY. MATTED OUT AND CLEANED OUT THE BOTTOM OF THE TRENCH. CORRECT SOUNDINGS ARE NOTED AFTER CLEANOUT.

GEO-CON: Susanne E. Alpio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/19/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, some sun; 23 - 35 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
22+00	32.7	36.1	36.1	10.0	360.5	3.6	20+30	TOPOUT	TOPOUT
22+10	32.7	36.3	36.2	10.0	362.0	4.0	20+40	4.2	TOPOUT
22+20	32.9	36.7	36.5	10.0	365.0	3.8	20+50	7.7	TOPOUT
22+30	32.8	36.5	36.6	10.0	366.0	3.6	20+60	11.3	TOPOUT
22+40	32.8	36.5	36.5	10.0	365.0	3.4	20+70	12.3	TOPOUT
22+50	32.6	36.3	36.4	10.0	364.0	3.5	20+80	12.9	TOPOUT
22+60	32.5	36.1	36.2	10.0	362.0	3.7	20+90	14.8	TOPOUT
22+70	32.2	36.0	36.1	10.0	360.5	3.8	21+00	17.5	TOPOUT
22+80	31.9	35.9	36.0	10.0	359.5	3.7	21+10	19.4	TOPOUT
22+90	31.8	35.8	35.9	10.0	358.5	3.6	21+20	22.6	TOPOUT
23+00	31.6	35.6	35.7	10.0	357.0	3.2	21+30	24.3	TOPOUT
23+10	31.4	35.6	35.6	10.0	356.0	3.3	21+40	27.7	TOPOUT
23+20	31.5	35.4	35.5	10.0	355.0	3.5	21+50	29.9	TOPOUT
							21+60	32.0	TOPOUT
							21+70	33.6	5.6
							21+80	35.9	9.2
							21+90	36.0	12.7
							22+00		16.4
							22+10		19.7
							22+20		22.3
							22+30		25.9
							22+40		28.3
							22+50		29.1
							22+60		29.9
							22+70		30.4
							22+80		31.5
							22+90		33.2
							23+00		35.6
							23+10		35.6
							23+20		35.4

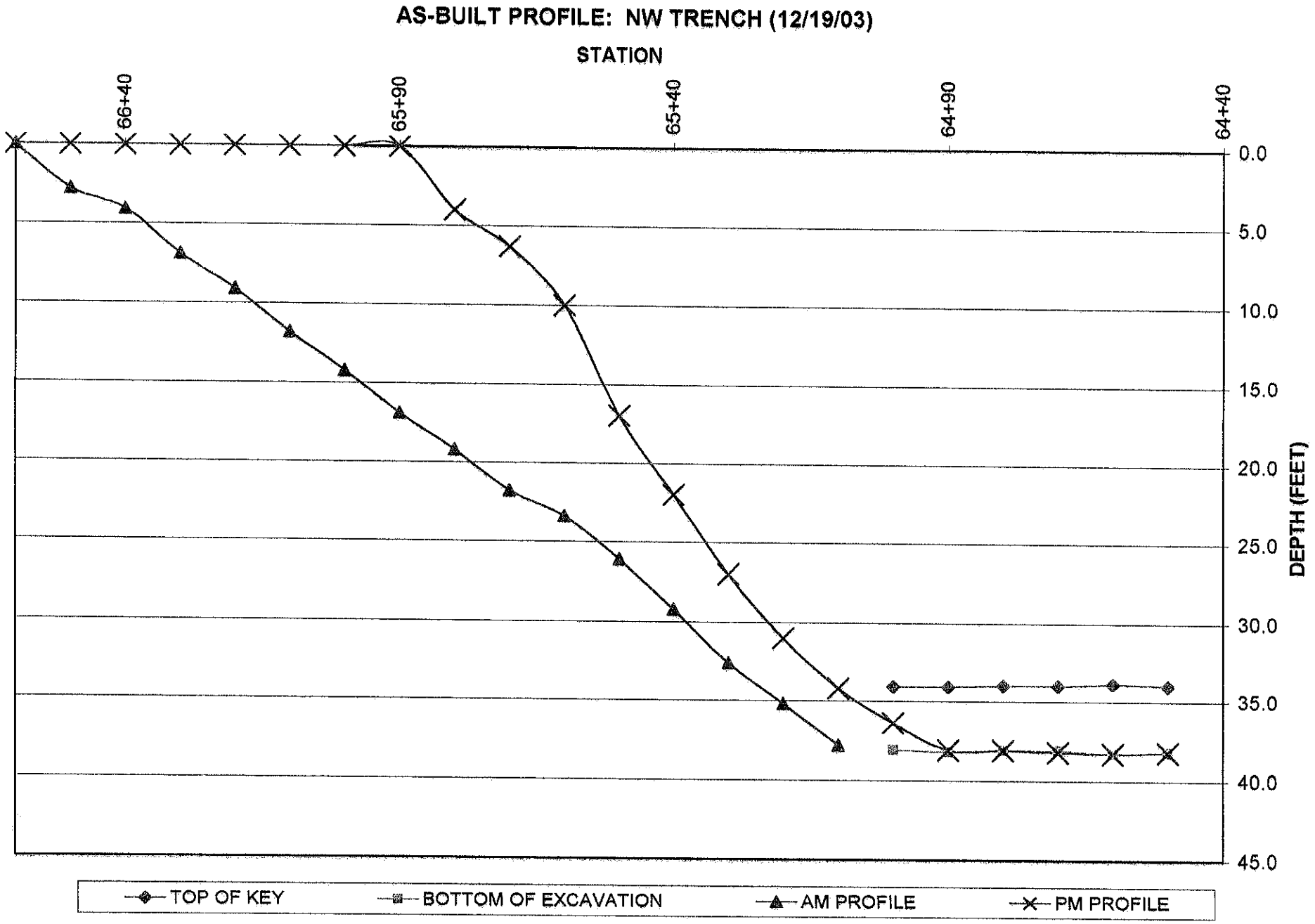
SF TODAY 4691.00

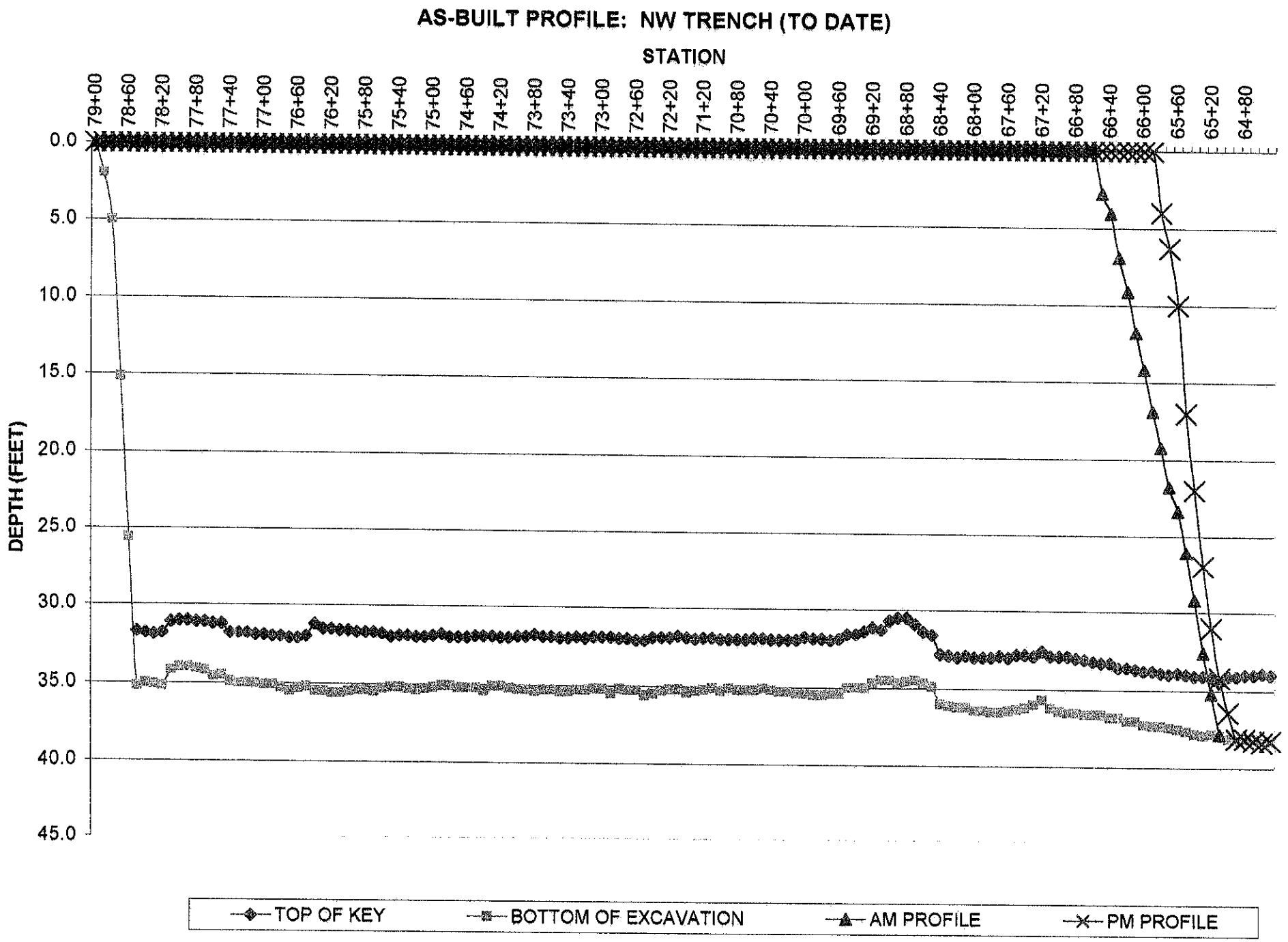
SF TO DATE 11278.22

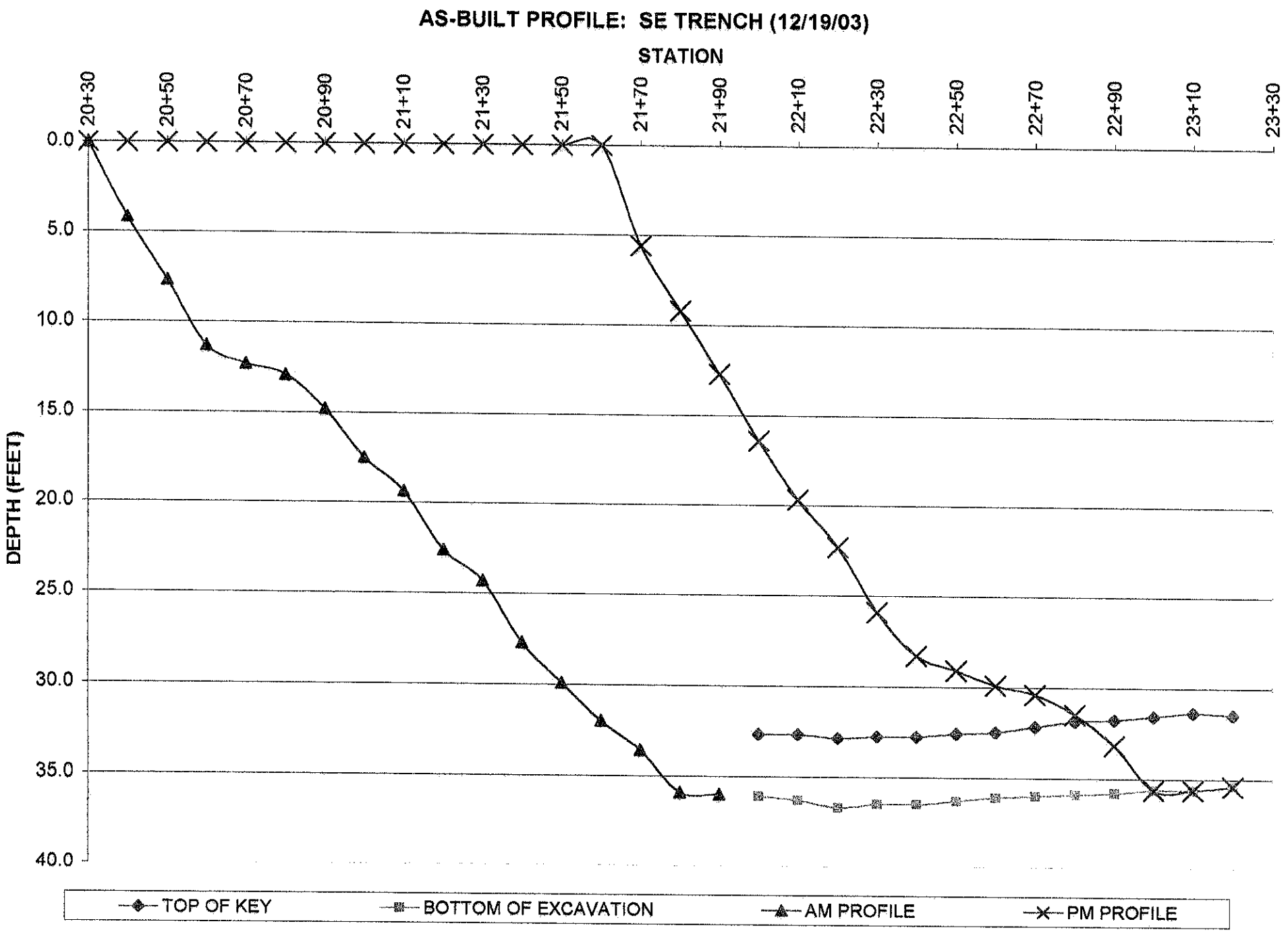
COMMENTS

SE Trench

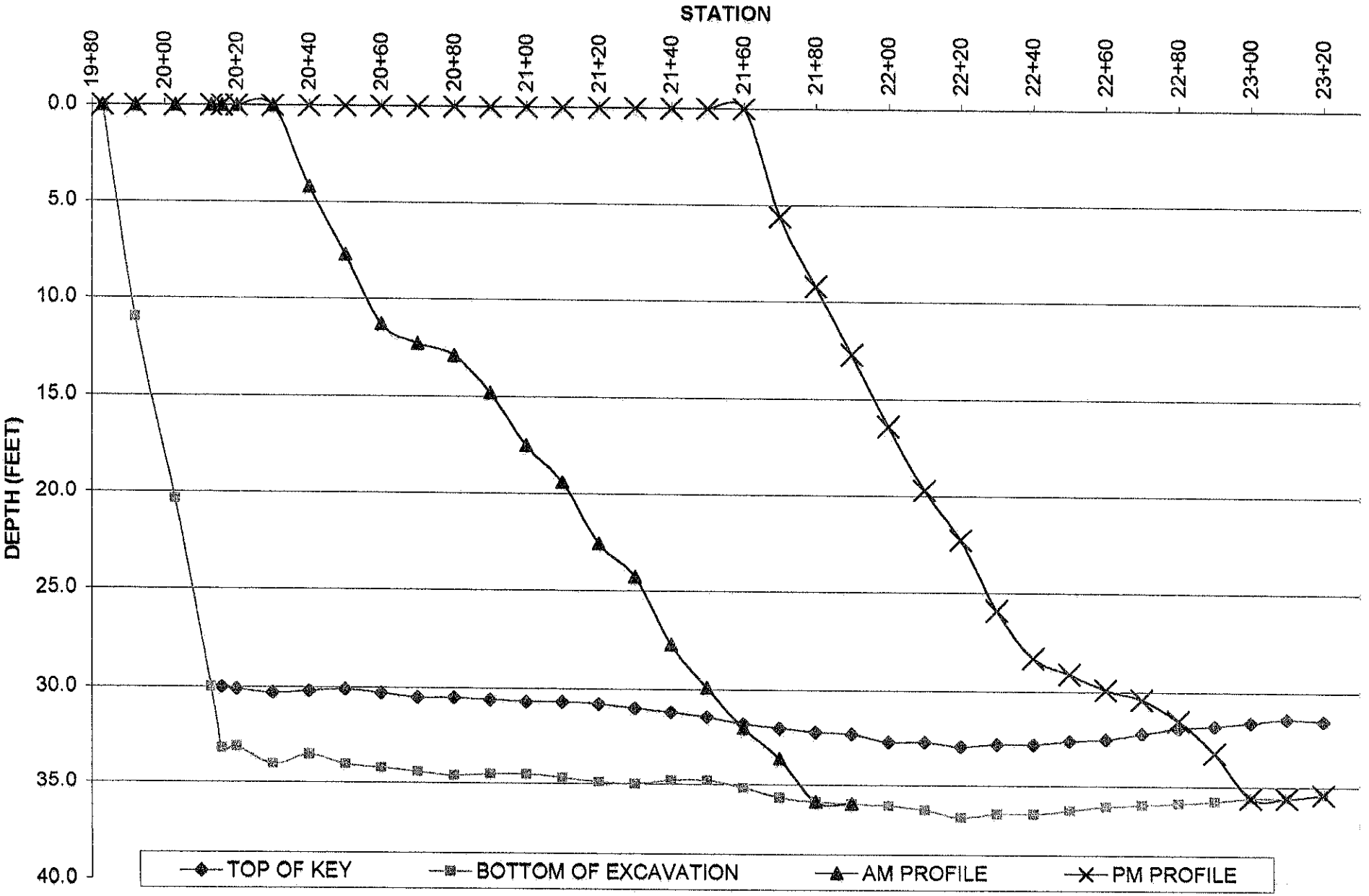
GEO-CON: Suzanne E. Sepo OWNER:


AS-BUILT PROFILE: NW TRENCH (12/19/03)
STATION
66+40
65+90
65+40
64+90
64+40
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
79+00
78+60
78+20
77+80
77+40
77+00
76+60
76+20
75+80
75+40
75+00
74+60
74+20
73+80
73+40
73+00
72+60
72+20
71+20
70+80
70+40
70+00
69+60
69+20
68+80
68+40
68+00
67+60
67+20
66+80
66+40
66+00
65+60
65+20
64+80
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (12/19/03)
STATION
20+30
20+50
20+70
20+90
21+10
21+30
21+50
21+70
21+90
22+10
22+30
22+50
22+70
22+90
23+10
23+30
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: SE TRENCH (TO DATE)



DAILY QC TESTS

DATE 12/19/03

BENTONITE SLURRY AT THE BATCH PLANT

NW Trench

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	8:30	46	> 40 sec	64	> 64 pcf	8	6.5 - 10	14.5	< 20 cm^3	.3
PM	14:30	39	> 40 sec	63.5	> 64 pcf	8	6.5 - 10	16	< 20 cm^3	.2

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:45	45	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	16:30	42	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

* Retest because results failed

Retest
Time: 17:02
Visc: 44 sec
Un.Wt: 64.5 pcf
pH: 8
Filtrate: 15 cm^3
Filter Cake: .2 mm

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
12:45	65+10	2	40	40 - 90 sec	85	64 - 95 pcf	8	6.5 - 10	95	< 25 cm^3	2.0	+30	MAX 30%
12:45	65+10	33	78	40 - 90 sec	101	64 - 95 pcf	8	6.5 - 10	117	< 25 cm^3	5.2	+30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
16:30	61+60	2	60	40 - 90 sec	100	64 - 95 pcf	8	6.5 - 10	8	< 25 cm^3	1.0	+30	MAX 30%
16:30	61+60	36	62	40 - 90 sec	99	64 - 95 pcf	8	6.5 - 10	95	< 25 cm^3	3.5	+30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
66+50	3	2" to 6"	115.5	+15 pcf over trench slurry	6.95×10^{-8}	1.0×10^{-7} cm/sec
66+25	3	2" to 6"	117	+15 pcf over trench slurry	1.24×10^{-9}	1.0×10^{-7} cm/sec
66+00	3	2" to 6"	117.5	+15 pcf over trench slurry	1.81×10^{-7}	1.0×10^{-7} cm/sec
—	[illegible]	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec
—	[illegible]	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

12/19/03 NW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: 66+50, 66+25, 66+00 Technician: RF/SM ✓ by SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm² Sample Height: L= 6.5cm, 7.0cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/conv factor (1/14.693)
66+50	12/19/03	18:00-6:00	720	10	108.2128 ~~559261.0644~~	559261.0644	—	28	6.95×10^{-8}	4.74×10^{-7}
66+25	12/19/03	18:00-6:00	720	10	100.4833 ~~519313.7717~~	519313.7717	—	46.5	1.24×10^{-7}	8.46×10^{-7}
66+00	12/19/03	18:00-6:00	720	10	108.2128 ~~559261.0644~~	559261.0644	—	73	1.81×10^{-7}	1.24×10^{-6}

I= $\frac{P\ (psi)}{0.014217\ L\ (cm)}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 12/19/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NW Trench

DAMAGED

SE Trench

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:06	21+90	2	59	40 - 90 sec	94.5	64 - 95 pcf	8	6.5 - 10	32	< 25 cm^3	1.3	+30	MAX 30%
9:06	21+90	34	66	40 - 90 sec	97	64 - 95 pcf	8	6.5 - 10	36	< 25 cm^3	1.5	+30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:07	22+80	2	75	40 - 90 sec	99.5	64 - 95 pcf	8	6.5 - 10	43	< 25 cm^3	1.9	+30	MAX 30%
15:07	22+80	33	82	40 - 90 sec	105	64 - 95 pcf	8	6.5 - 10	46	< 25 cm^3	1.8	+30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
20+50	3	2" to 6"	118.0	+15 pcf over trench slurry	2.81×10^{-7}	1.0×10^{-7} cm/sec
20+75	3	2" to 6"	115.5	+15 pcf over trench slurry	2.98×10^{-7}	1.0×10^{-7} cm/sec
21+00	3	2" to 6"	114.0	+15 pcf over trench slurry	5.57×10^{-7}	1.0×10^{-7} cm/sec
21+25	2	2" to 6"	115.5	+15 pcf over trench slurry	2.28×10^{-7}	1.0×10^{-7} cm/sec
21+50	2	2" to 6"	~~112.5~~ 117.5	+15 pcf over trench slurry	2.48×10^{-7}	1.0×10^{-7} cm/sec
21+75	2	2" to 6"	~~112.5~~ 116.0	+15 pcf over trench slurry	2.24×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

12/19/03 SE Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 20+50, 20+75, 21+00, 21+25, 21+50, 21+75

Technician: RF/SM / By SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0 cm, 6.5 cm, 6.0 cm; 6.5 cm, 6.5 cm, 6.5 cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/cc no. from (1/14.65)
20+50	12/19/03	9:42-13:42	240	10	100.4833	519313.7717	—	35	2.81×10^{-7}	1.92×10^{-8}
20+75	12/19/03	9:42-13:42	240	10	108.2128	559261.0644	—	40	2.98×10^{-7}	2.03×10^{-8}
21+00	12/19/03	9:42-13:42	240	10	117.2305	605865.9809	—	81	5.57×10^{-7}	3.80×10^{-8}
21+25	12/19/03	18:00-6.00	720	10	108.2128	559261.0644	—	92	2.28×10^{-7}	1.56×10^{-8}
21+50	12/19/03	18:00-6.00	720	10	108.2128	559261.0644	—	100	2.48×10^{-7}	1.69×10^{-8}
21+75	12/19/03	18:00-6.00	720	10	108.2128	559261.0644	—	90	2.24×10^{-7}	1.53×10^{-8}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 22-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
SB-046 (NW67+00)	SB BACKFILL**	67+00	12/18/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ SB-047 (SE21+00)	SB BACKFILL**	21+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ SB-048 (NW66+00)	SB BACKFILL**	66+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-049 (SE22+00)	SB BACKFILL**	22+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-050 (NW65+00)	SB BACKFILL**	65+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-051 (SE23+00)	SB BACKFILL**	23+00	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-052 (NW64+50)	SB BACKFILL**	64+50	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 22-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO P01-048 | P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
→ BF-038 (SE22+00)	SOIL ONLY	22+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-039 (NW65+00)	SOIL ONLY	65+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-040 (SE23+00)	SOIL ONLY	23+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-041 (NW64+00)	SOIL ONLY	64+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-042 (SE24+00)	SOIL ONLY	24+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-043 (NW63+00)	SOIL ONLY	63+00	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-044 (SE25+00)	SOIL ONLY	25+00	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

GR-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/15/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4071 MONROEVILLE BLVD CORPORATE I BUILDING2 SUITE 400 MONROEVILLE PA 15146	GEO-CON E. CHICAGO IN 46312
SALES ORDER NO.: MCIV006026	

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-16-03	NOLAN 23	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result	Test or Property	API Spec	Result
Viscosity	30 min.	41	Moisture (wt. %)	N/A	9.5
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max	1.20
Yield Point (# / 100 ft2)	N/A				
Filtrate Volume (cm3)	15.0 max.	12.0			
> 75 micron (wt. %)	4.0 max.	2.0			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4496.

Signed 12/17/03 Date

Approved by Plant Manager

LabraCert.doc (4/22/97)
Rev E (9/99)

Arrived onsite 12/19/03
4000# jumbo bags

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/17/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: 2C2V004627	GEO-CON S. CHICAGO IN 46322

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-17-03	QUALITY 25	GREYBULL	GEL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	46
Plastic Viscosity (cP)	N/A	
Yield Point (lb / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.4
> 75 micron (wt. %)	4.0 max.	1.7

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.9
Y.P. / P.V. Ratio	3.0 max.	1.29

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Spec 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-938-4486.

Signed 12/18/03 Date

Approved by Plant Manager

LabanaCert.doc (4/22/07)
Rev E (0/00)

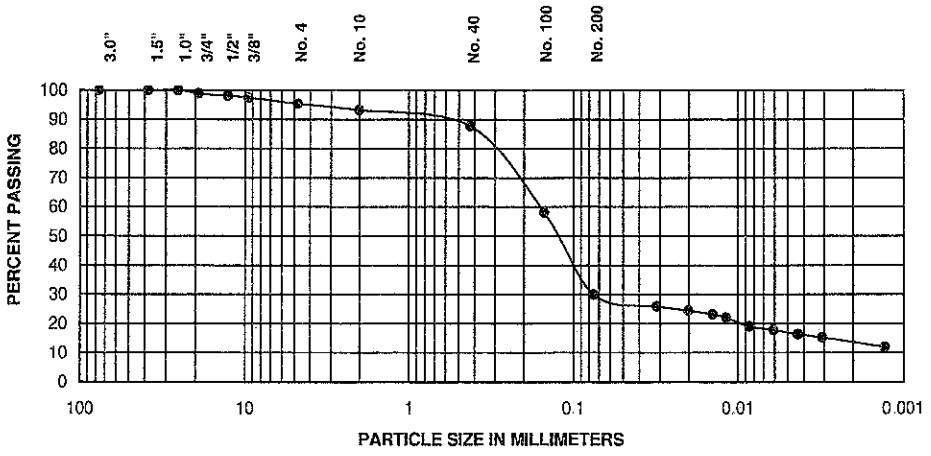
Arrived onsite 12/19/03

4000# jumbo bags

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-047	**Date Tested**	12/26/2003	**Tested by**	KM
						Qc by	NP

Date Sample Received:	12/22/2003
Sample Location	21 + 00 (SE)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	4.7	65.4	13.1	16.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.8
1/2"	98.1
3/8"	97.5
No. 4	95.3
No. 10	93.2
No. 40	87.7
No. 100	58.0
No. 200	29.9

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
33	20	13

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

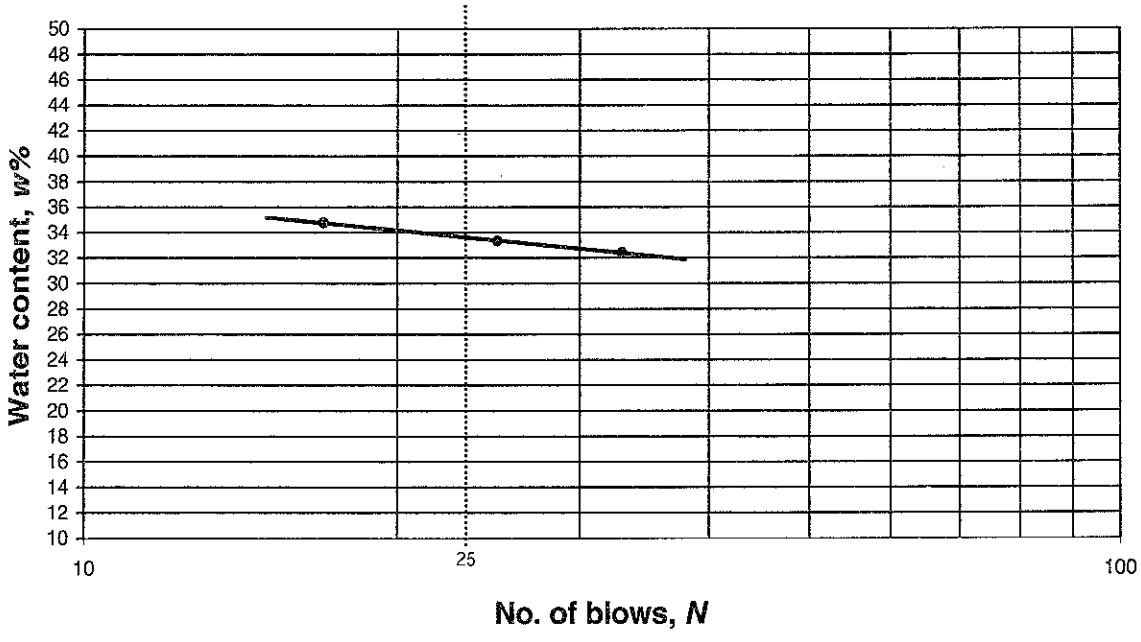
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-047	**Date Tested**	12/26/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/22/2003
Sample Location	21 + 00 (SE)
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**33**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**13**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/26/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-047	Date Recd.	12/22/03	**Location**	21 + 00 (SE)		
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.47	cm	Volume, V:	263.4	cu cm
Mass of Sample:	465.8	g	**Moisture Content:**	**28.3**	%
			Wet Density	**110.3**	**pcf**
			Dry Density	**86.0**	**pcf**

Final

Diameter:	6.92	cm	Area, A:	37.6	sq cm
Height, L:	5.92	cm	Volume, V:	222.7	cu cm
Mass of Sample:	446.90	g	**Moisture Content:**	**26.5**	%
			Wet Density	**125.2**	**pcf**
			Dry Density	**99.0**	**pcf**
			Deg of Saturation	**99.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	19.6	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/26/2003	9:30 AM	0	0	2.97	5.98		20.0	---
12/26/2003	10:15 AM	2700	2700	3.12	5.85	1.2	20.0	5.21E-08
12/26/2003	11:00 AM	2700	5400	3.26	5.73	1.2	20.0	4.88E-08
12/26/2003	11:45 AM	2700	8100	3.37	5.61	0.9	20.0	4.93E-08
12/26/2003	12:30 PM	2700	10800	3.50	5.50	1.2	20.0	4.58E-08

Average Permeability = **4.9E-08** **cm/sec**

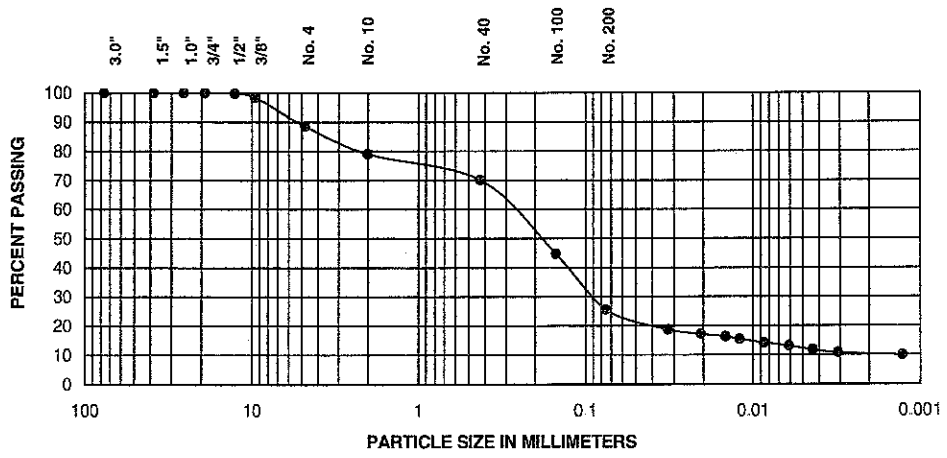
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-048	**Date Tested**	12/28/2003	**Tested by**	KM
						Qc by	NP

Date Sample Received:	12/22/2003
Sample Location	66 + 00 (NW)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.6	62.8	13.2	12.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	99.8
3/8"	98.4
No. 4	88.4
No. 10	79.1
No. 40	70.1
No. 100	44.8
No. 200	25.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
37	22	15

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

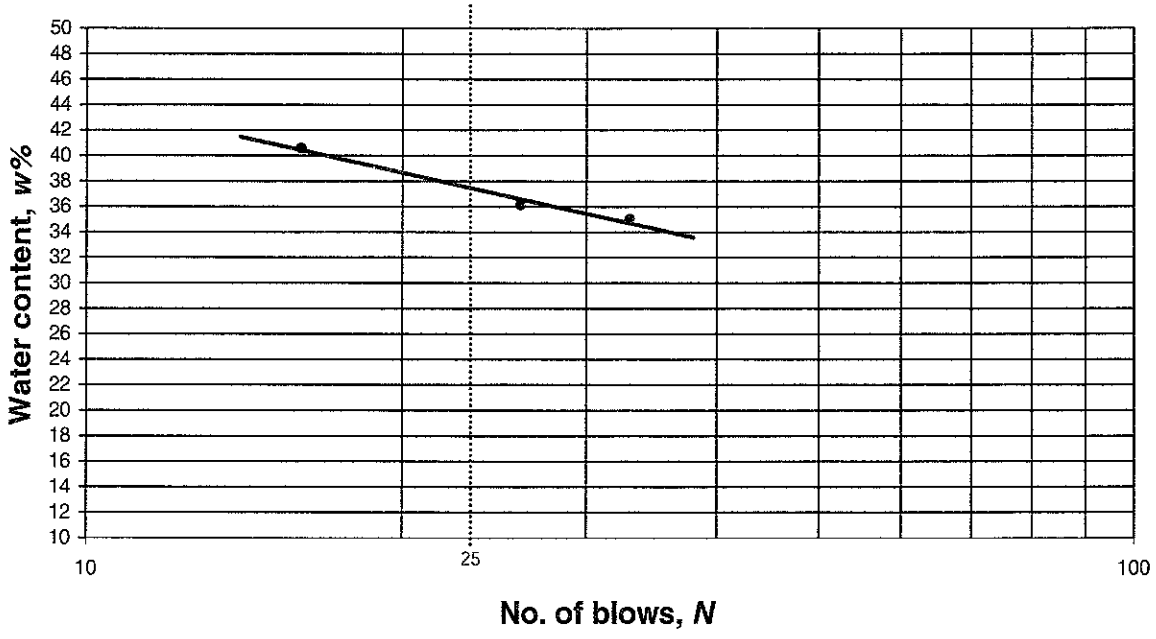
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-048	**Date Tested**	12/26/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/22/2003
Sample Location	66 + 00 (NW)
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**37**	**Plastic Limit, PL**	**22**	**Plasticity Index, PI**	**15**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/26/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-048	Date Recd.	12/22/03	**Location**	66 + 00 (NW)		
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.93	cm	Volume, V:	282.2	cu cm
Mass of Sample:	530.0	g	**Moisture Content:**	**28.7**	%
			Wet Density	**117.2**	**pcf**
			Dry Density	**91.0**	**pcf**

Final

Diameter:	6.93	cm	Area, A:	37.7	sq cm
Height, L:	6.32	cm	Volume, V:	238.4	cu cm
Mass of Sample:	493.20	g	**Moisture Content:**	**23.0**	%
			Wet Density	**129.1**	**pcf**
			Dry Density	**104.9**	**pcf**
			Deg of Saturation	**99.7**	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	76.8 psi
Gradient:	18.3

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/26/2003	9:30 AM	0	0	3.15	6.06		20.0	---
12/26/2003	10:15 AM	2700	2700	3.31	5.93	1.2	20.0	5.61E-08
12/26/2003	11:00 AM	2700	5400	3.44	5.82	1.2	20.0	4.81E-08
12/26/2003	11:45 AM	2700	8100	3.55	5.72	1.1	20.0	4.42E-08
12/26/2003	12:30 PM	2700	10800	3.65	5.63	1.1	20.0	4.02E-08

Average Permeability = **4.7E-08** **cm/sec**

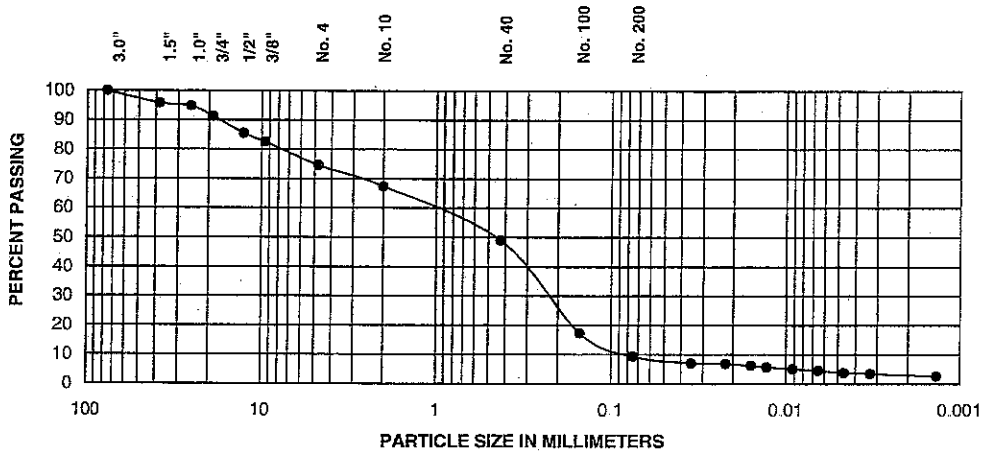
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF - 038	**Date Tested**	12/24/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/22/2003
Sample Location	22+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel &foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	25.3	65.2	5.4	4.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.07	0.23	0.08	13.6	0.61

Sieve Size	Percent Passing
3.0"	100.0
1.5"	95.8
1.0"	94.8
3/4"	91.4
1/2"	85.6
3/8"	82.6
No. 4	74.7
No. 10	67.4
No. 40	49.0
No. 100	17.4
No. 200	9.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

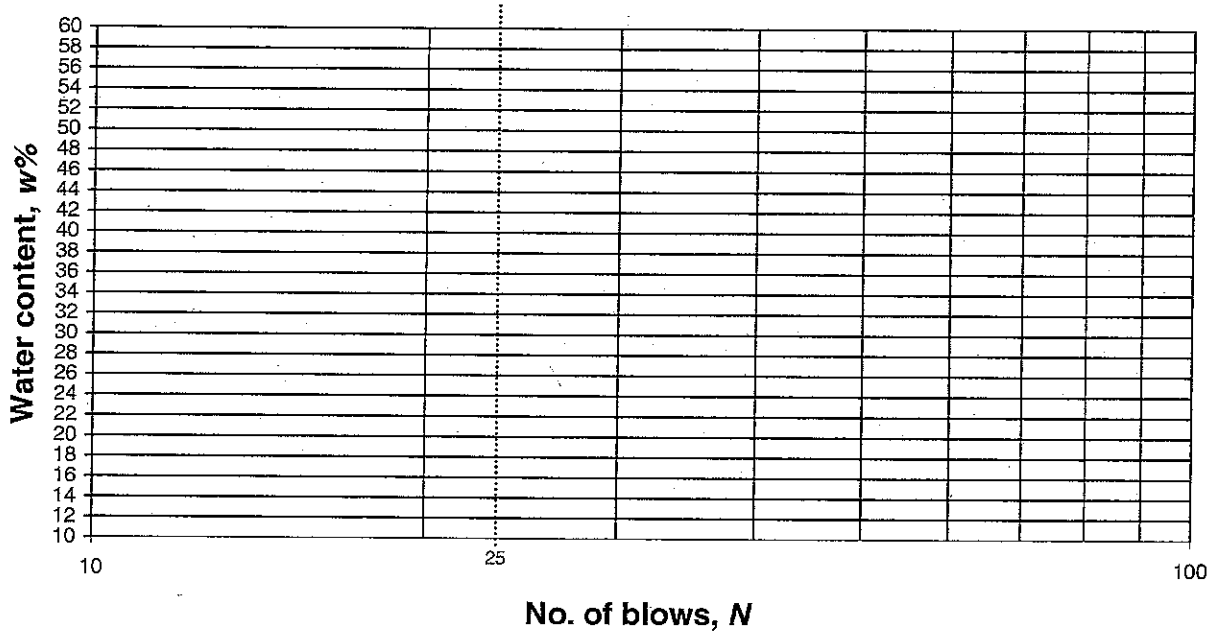
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF - 038	**Date Tested**	12/23/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/22/2003
Sample Location	22+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel &foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	16	Date	12/22/2003	Sheet	1
				Date of weighing	12/23/2003	Tested by	ON

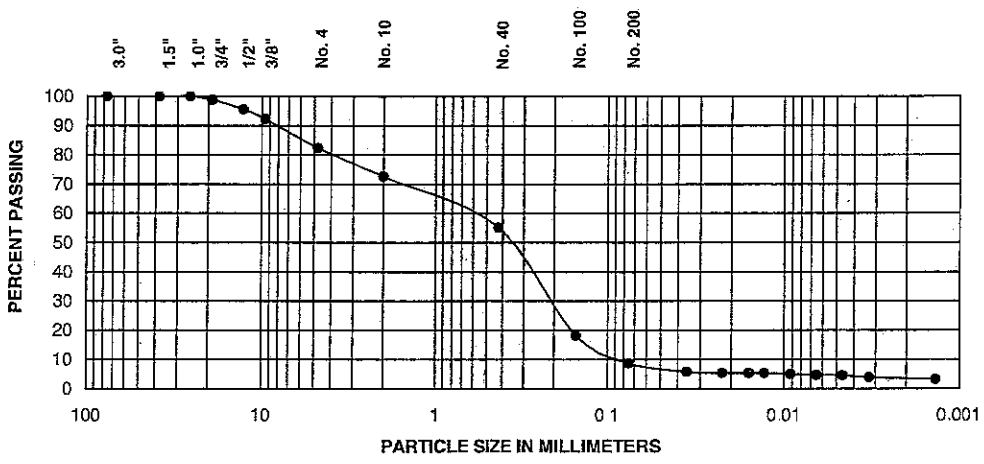
Boring No.	-	-				
Sample No.	BF-038	BF-039				
Location	22 + 00 (SE)	65 + 00 (NW)				
Tin No.	44C	47C				
Tin + Wet Soil	164.1	170.16				
Tin + Dry Soil	149.74	150.24				
Wt. of Tin	31.26	31.19				
Wt. of Dry Soil	118.5	119.1				
Wt. of Water	14.4	19.9				
Moisture, %	12.1	16.7				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF - 039	**Date Tested**	12/24/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/22/2003
Sample Location	65+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	17.6	73.5	4.3	4.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.65	0.21	0.08	8.0	0.82

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.9
1/2"	95.5
3/8"	92.3
No. 4	82.4
No. 10	72.6
No. 40	55.1
No. 100	18.2
No. 200	8.8

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

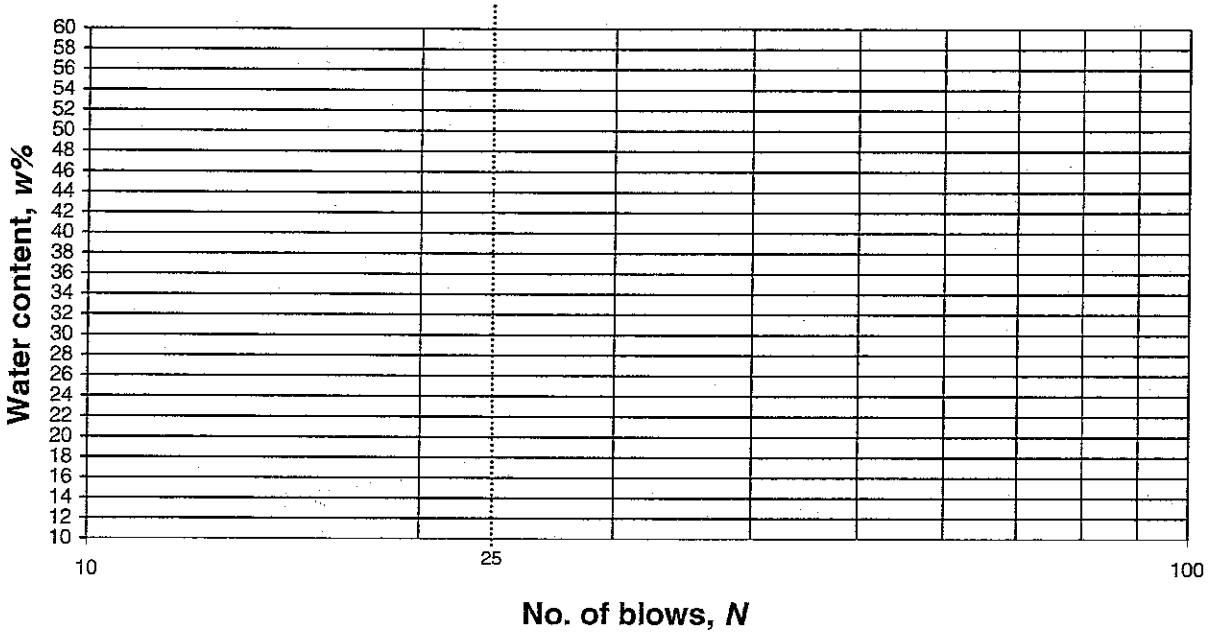
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn : Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF - 039	**Date Tested**	12/23/2003	**Tested By**	SS
						Qc By	NP

Date Sample Recd.	12/22/2003
Sample Location	65+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	16	Date	12/22/2003	Sheet	1
				Date of weighing	12/23/2003	Tested by	ON

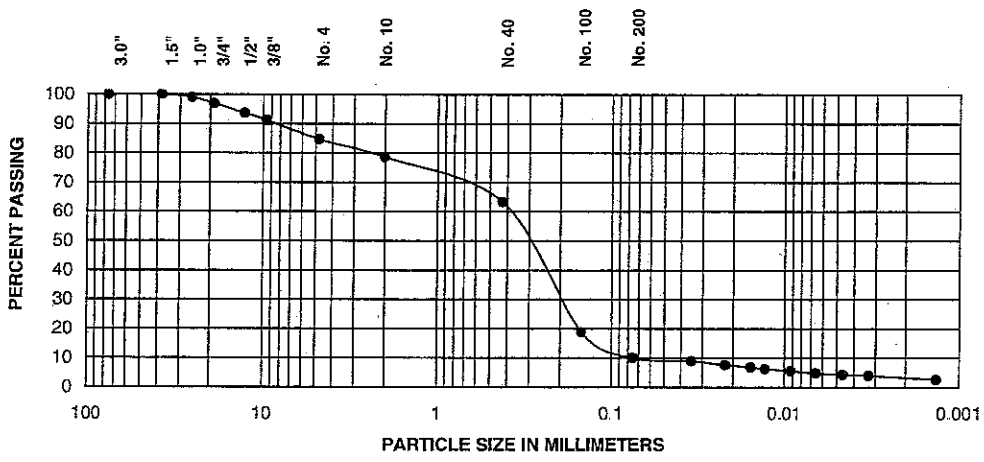
Boring No.	-	-				
Sample No.	BF-038	BF-039				
Location	22 + 00 (SE)	65 + 00 (NW)				
Tin No.	44C	47C				
Tin + Wet Soil	164.1	170.16				
Tin + Dry Soil	149.74	150.24				
Wt. of Tin	31.26	31.19				
Wt. of Dry Soil	118.5	119.1				
Wt. of Water	14.4	19.9				
Moisture, %	12.1	16.7				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-040	**Date Tested**	12/26/2003	**Tested by**	KM
						Qc by	NP

Date Sample Received:	12/23/2003
Sample Location	23 + 00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	15.3	74.6	5.6	4.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.39	0.19	0.07	5.6	1.37

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	99.1
3/4"	97.0
1/2"	93.7
3/8"	91.2
No. 4	84.7
No. 10	78.7
No. 40	63.3
No. 100	18.8
No. 200	10.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

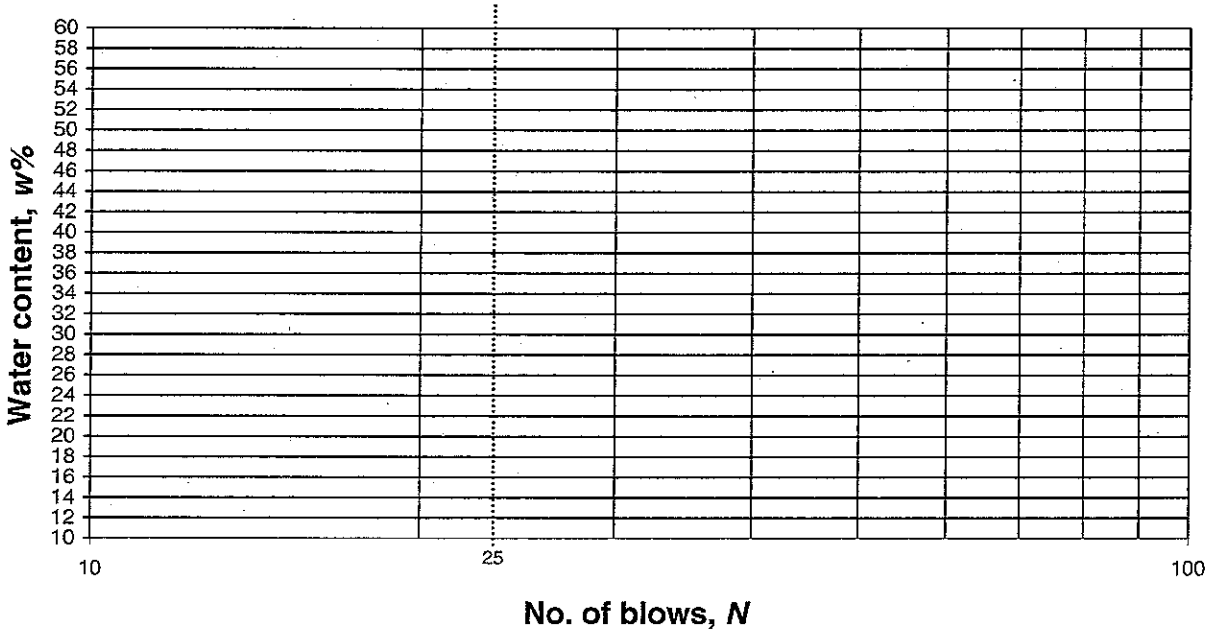
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-040	**Date Tested**	12/28/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/23/2003
Sample Location	23 + 00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	17	Date	12/23/2003	Sheet	1
				Date of weighing	12/24/2003	Tested by	ON

Boring No.	-	-				
Sample No.	BF-040	BF-041				
Location	23 + 00 (SE)	64 + 00 (NW)				
Tin No.	83A	24A				
Tin + Wet Soil	150.15	156.17				
Tin + Dry Soil	134.92	141.09				
Wt. of Tin	30.71	29.88				
Wt. of Dry Soil	104.2	111.2				
Wt. of Water	15.2	15.1				
Moisture, %	14.6	13.6				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/20/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, some sun; 22 - 38 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
64+50	2.00	92.50	+30.00	90.00	52.00	8
64+50	36.00	95.00	+30.00	80.00	72.00	8
64+20	2.00	86.50	+30.00	50.00	49.00	8
64+20	35.00	92.00	+30.00	72.00	55.00	8

NORTH TRENCH

COMMENTS: Trench filtrate losses are still high, but typical for trench slurry results. Sand content is too high due to trying to close up the trench for the Christmas break. Fresh slurry was pumped to this trench to try and bring the trench slurry back within specs.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
64+00	LAB SAMPLE COLLECTED 12/20/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
65+75	2.50	N/A	N/A	N/A	8.20×10^{-8}	N/A
65+50	2.50	N/A	N/A	N/A	7.22×10^{-8}	N/A
65+25	2.50	N/A	N/A	N/A	8.02×10^{-8}	N/A
65+00	3.00	Sample collected	Sample collected	Sample collected	7.74×10^{-8}	yes
64+75	3.00	N/A	N/A	N/A	7.45×10^{-8}	N/A
64+50	3.00	N/A	N/A	N/A	6.42×10^{-8}	N/A

COMMENTS

Filter cake: 3.7mm, 3.1mm, 2.0mm, and 1.2mm respectively.

Unit Weight: 65+75: 112.5 pcf
65+50: 114.0 pcf
65+25: 114.0 pcf
65+00: 115.5 pcf
64+75: 117.0 pcf
64+50: 117.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/20/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, some sun; 22 - 38 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
23+20	2.00	93.00	+30.00	25.00	85.00	8
23+20	33.00	95.00	+30.00	28.00	90.00	8
23+70	2.00	95.00	+30.00	50.00	72.00	8
23+70	33.00	97.00	+30.00	55.00	72.00	8

SE TRENCH

COMMENTS: Trench filtrate losses are becoming high, but typical for trench slurry results. Sand content results and some unit weights are too high. Fresh slurry was pumped to this trench today to try and fix these problems.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
24+00	LAB SAMPLE COLLECTED 12/20/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
21+75	3.00	N/A	N/A	N/A	1.16×10^{-7}	N/A
22+00	3.00	N/A	N/A	N/A	1.24×10^{-7}	N/A
22+25	3.00	N/A	N/A	N/A	8.02×10^{-8}	N/A
22+50	2.00	N/A	N/A	N/A	8.94×10^{-8}	N/A
22+75	2.00	N/A	N/A	N/A	4.01×10^{-7}	N/A
23+00	2.00	Sample collected	Sample collected	Sample collected	1.24×10^{-7}	yes

COMMENTS

Filter cake: 1.0mm, 1.7mm, 2.0mm and 2.1mm respectively.

Unit Weight:
- 21+75: 112.5 pcf
- 22+00: 114.0 pcf
- 22+25: 117.0 pcf
- 22+50: 114.0 pcf
- 22+75: 113.5 pcf
- 23+00: 116.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/20/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
10:15	65.00	46.00	20.00	8
11:15	-	42.00	-	-
14:00	64.00	47.00	20.00	8
15:30	-	41.00	-	-

Filter cake is .5mm, and .5mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepe OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/20/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, some sun; 22 - 38 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
64+40	33.8	37.4	37.8	10.0	378.0	9.5	65+90	TOPOUT	TOPOUT
64+30	34.0	37.4	37.4	10.0	374.0	10.6	65+80	4.5	TOPOUT
64+20	34.0	37.6	37.5	10.0	375.0	10.8	65+70	6.9	TOPOUT
64+10	34.0	37.4	37.5	10.0	375.0	11.0	65+60	10.4	TOPOUT
64+00	34.0	37.4	37.4	10.0	374.0	11.0	65+50	17.3	TOPOUT
63+90	33.9	37.3	37.4	10.0	373.5	12.0	65+40	22.4	TOPOUT
							65+30	27.0	TOPOUT
							65+20	31.0	3.1
							65+10	34.1	9.3
							65+00	36.2	14.4
							64+90	38.3	19.2
							64+80	38.3	23.9
							64+70	38.4	27.6
							64+60	38.4	31.0
							64+50	38.0	34.3
							64+40		35.8
							64+30		36.1
							64+20		37.1
							64+10		37.4
							64+00		37.4
							63+90		37.3

SF TODAY 2249.50

SF TO DATE 50692.00

COMMENTS

NW Trench

GEO-CON: Suzanne C. Clap

OWNER

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/20/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, some sun; 22 - 38 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
23+30	31.0	35.0	35.2	10.0	352.0	3.4	21+60	TOPOUT	TOPOUT
23+40	31.2	35.2	35.1	10.0	351.0	3.2	21+70	5.8	TOPOUT
23+50	31.1	35.2	35.2	10.0	352.0	3.0	21+80	9.5	TOPOUT
23+60	31.4	35.4	35.3	10.0	353.0	3.0	21+90	12.9	TOPOUT
23+70	31.3	35.5	35.5	10.0	354.5	3.1	22+00	16.5	TOPOUT
23+80	31.4	35.4	35.5	10.0	354.5	2.9	22+10	19.9	TOPOUT
23+90	31.3	35.6	35.5	10.0	355.0	3.0	22+20	22.5	TOPOUT
24+00	31.4	35.3	35.5	10.0	354.5	2.8	22+30	26.0	TOPOUT
24+10	31.5	35.5	35.4	10.0	354.0	2.9	22+40	28.4	TOPOUT
							22+50	29.0	TOPOUT
							22+60	29.3	5.1
							22+70	30.0	9.3
							22+80	30.8	12.7
							22+90	32.3	16.1
							23+00	34.0	18.7
							23+10	35.6	20.2
							23+20	35.4	21.4
							23+30		23.8
							23+40		25.5
							23+50		27.6
							23+60		29.9
							23+70		31.7
							23+80		33.8
							23+90		35.6
							24+00		35.3
							24+10		35.5

SF TODAY 3180.50

SF TO DATE 14458.72

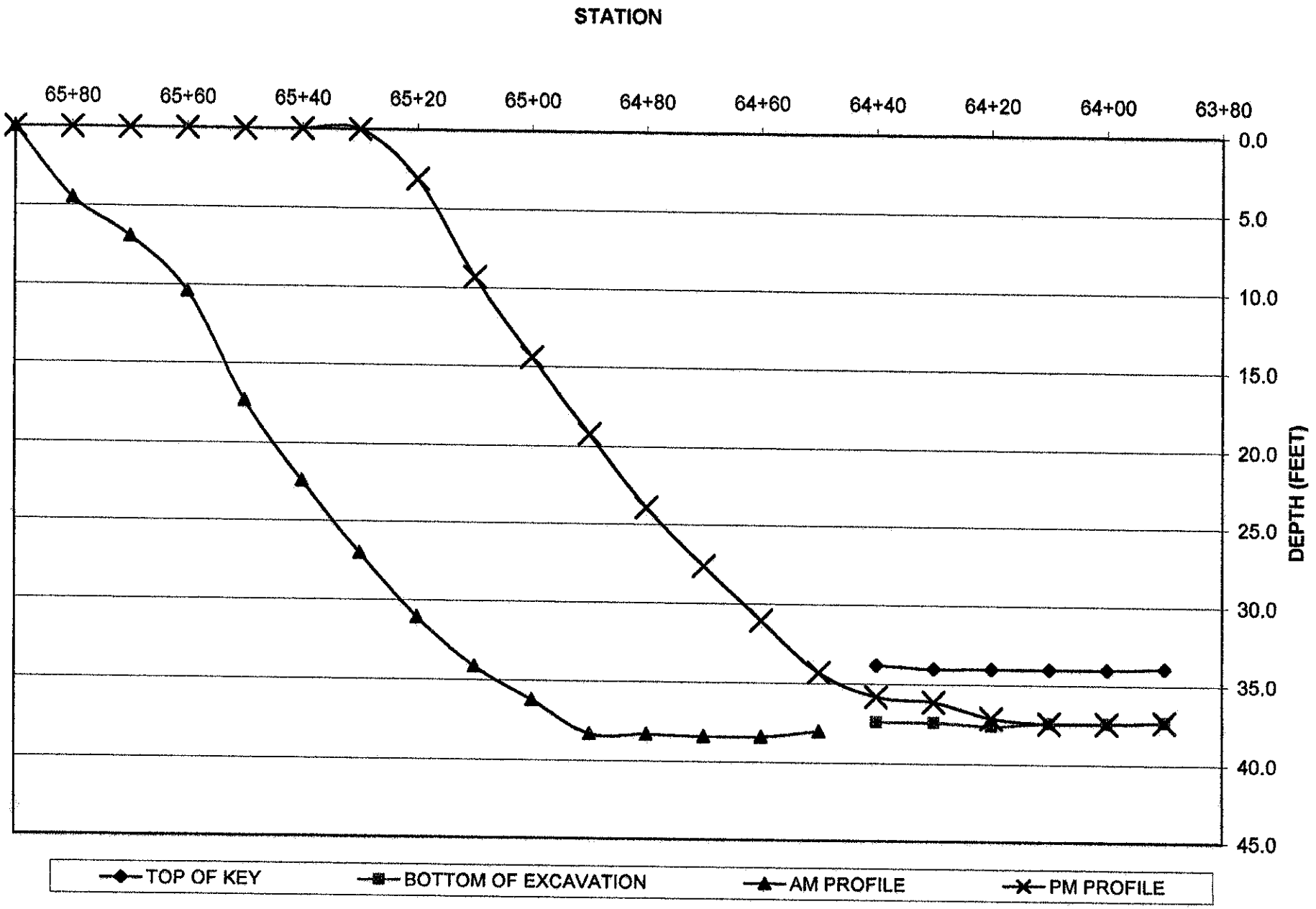
COMMENTS

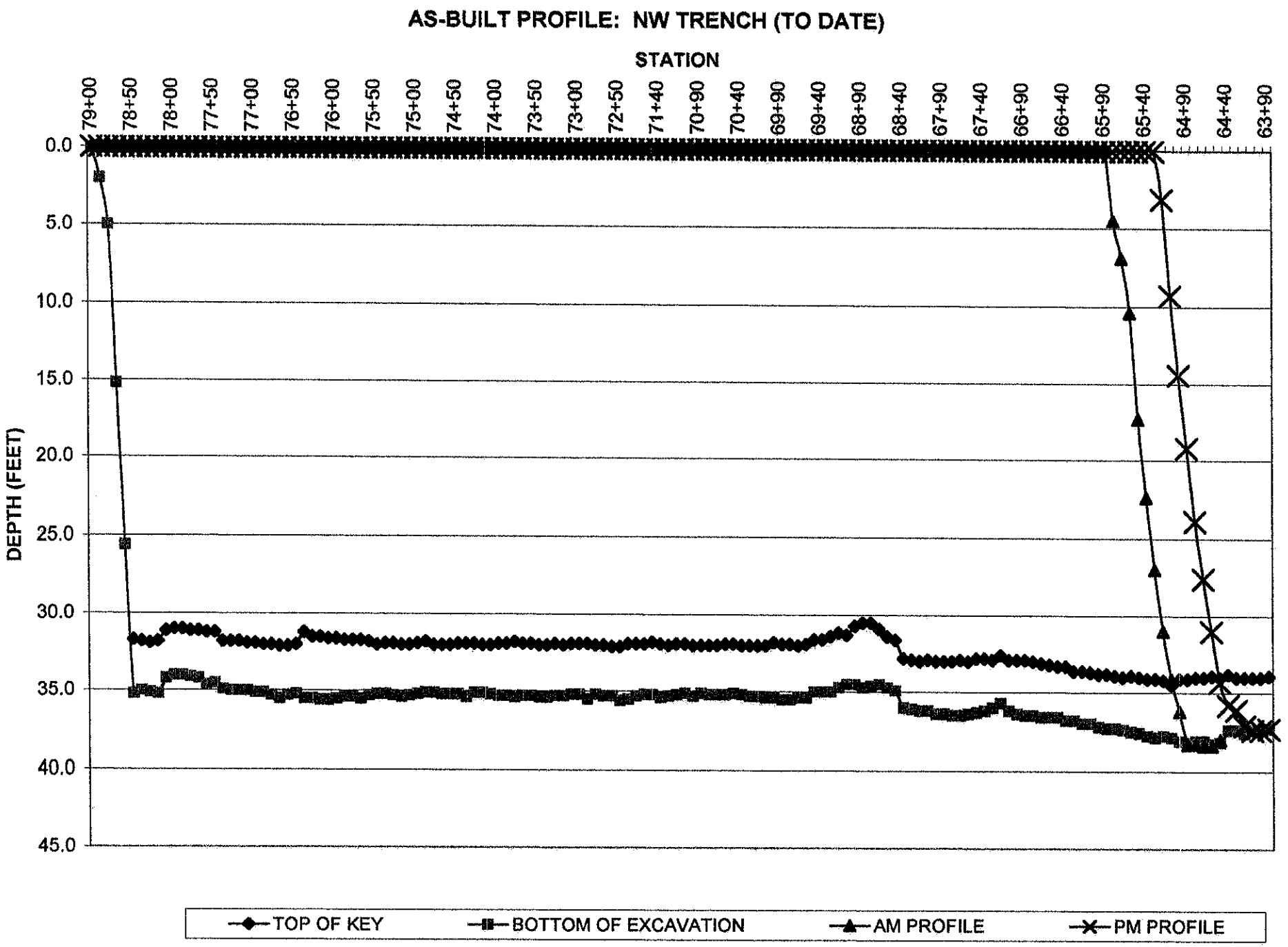
SE Trench

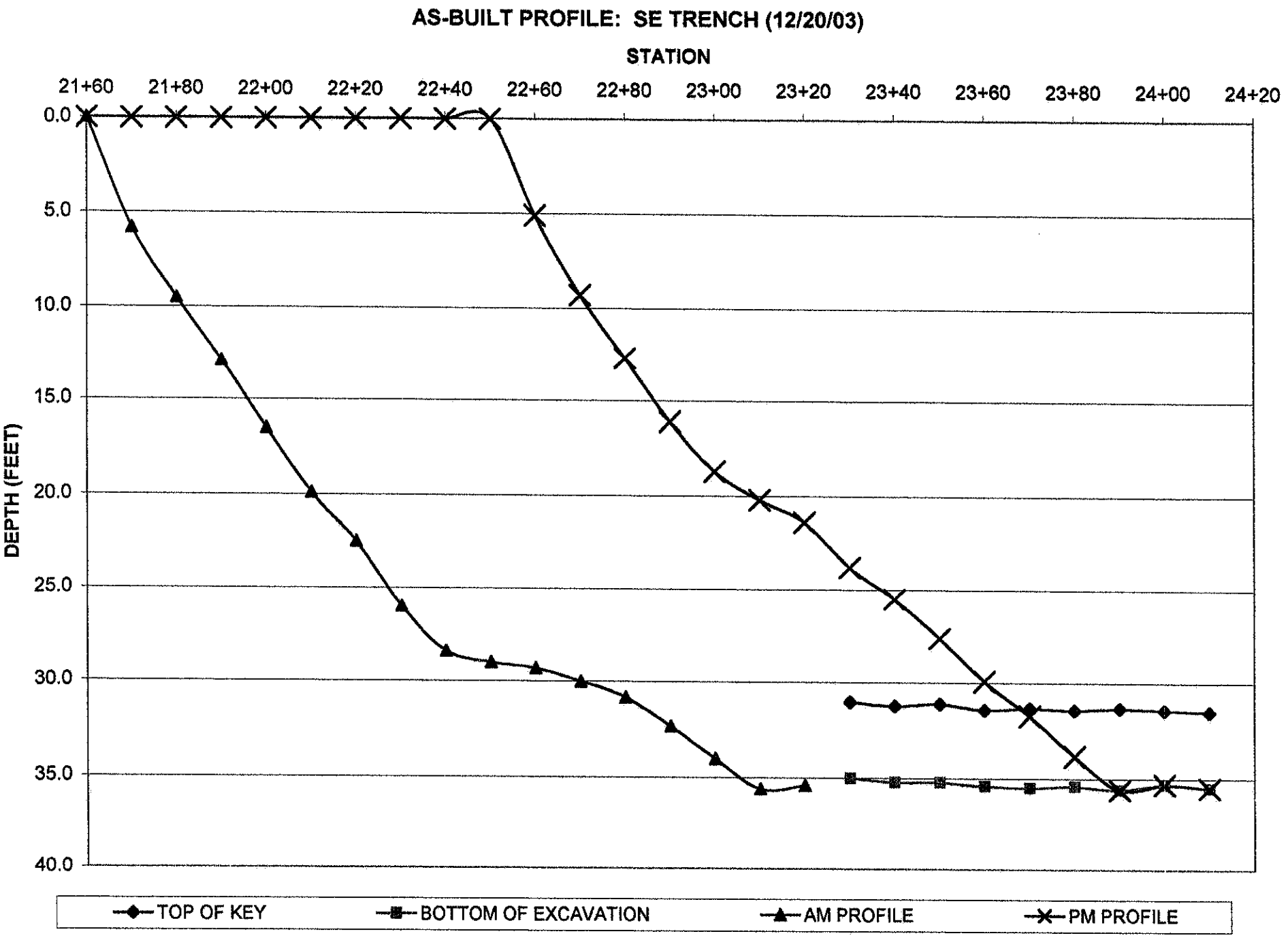
GEO-CON Suzanne C. Sepio

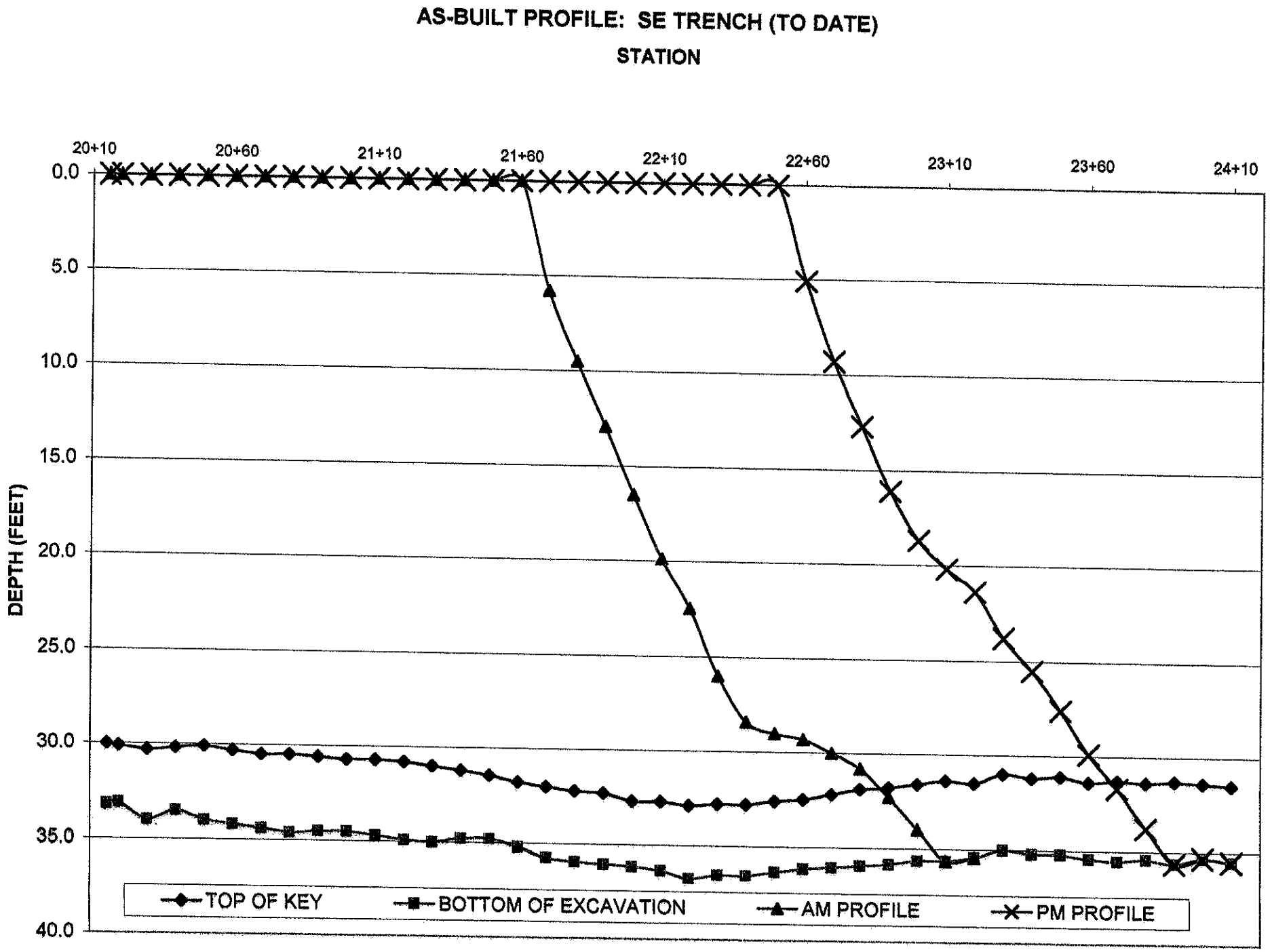
OWNER

AS-BUILT PROFILE: NW TRENCH (12/20/03)




AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
79+00
78+50
78+00
77+50
77+00
76+50
76+00
75+50
75+00
74+50
74+00
73+50
73+00
72+50
71+40
70+90
70+40
69+90
69+40
68+90
68+40
67+90
67+40
66+90
66+40
65+90
65+40
64+90
64+40
63+90
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (12/20/03)
STATION
21+60
21+80
22+00
22+20
22+40
22+60
22+80
23+00
23+20
23+40
23+60
23+80
24+00
24+20
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE)
STATION
20+10
20+60
21+10
21+60
22+10
22+60
23+10
23+60
24+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/20/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:15	46	> 40 sec	65	> 64 pcf	8	6.5 - 10	20	< 20 cm^3	.5
PM	14:00	47	> 40 sec	64	> 64 pcf	8	6.5 - 10	20	< 20 cm^3	.5

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	11:15	42	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	15:30	41	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NW Trench

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:47	64+50	2	52	40 - 90 sec	92.5	64 - 95 pcf	8	6.5 - 10	90	< 25 cm^3	3.7	+30	MAX 30%
9:47	64+50	36	72	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	80	< 25 cm^3	3.1	+30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
14:18	64+20	2	49	40 - 90 sec	86.5	64 - 95 pcf	8	6.5 - 10	50	< 25 cm^3	2.0	+30	MAX 30%
14:18	64+20	35	55	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	72	< 25 cm^3	1.2	+30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
65+75	2.5	2" to 6"	112.5	+15 pcf over trench slurry	8.20×10^{-8}	1.0×10^{-7} cm/sec
65+50	2.5	2" to 6"	114	+15 pcf over trench slurry	7.22×10^{-8}	1.0×10^{-7} cm/sec
65+25	2.5	2" to 6"	114	+15 pcf over trench slurry	8.02×10^{-8}	1.0×10^{-7} cm/sec
65+00	3	2" to 6"	115.5	+15 pcf over trench slurry	7.74×10^{-8}	1.0×10^{-7} cm/sec
64+75	3	2" to 6"	117	+15 pcf over trench slurry	7.45×10^{-8}	1.0×10^{-7} cm/sec
64+50	3	2" to 6"	117	+15 pcf over trench slurry	6.42×10^{-8}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 65+75, 65+50, 65+25, 65+00, 64+75, 64+50

Technician: RF/SM VBY SES

Sample Area: A= πr^2 $\pi(3.85)^2$ = 46.56 cm²

Sample Height: L= 6.5cm, 7.0cm, 7.0cm, 7.5cm, 6.5cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ conv. factor (1/14.65)
65+75	12/20/03	8:40-12:40	240	10	108.2128	559261.0644	—	11	8.20×10^{-8}	5.60×10^{-9}
65+50	12/20/03	8:40-12:40	240	10	100.4833	519313.7717	—	9	7.22×10^{-8}	4.93×10^{-9}
65+25	12/20/03	8:40-12:40	240	10	100.4833	519313.7717	—	10	8.02×10^{-8}	5.47×10^{-9}
65+00	12/20/03	13:27-17:27	240	10	93.7844	484692.7847	—	9	7.74×10^{-8}	5.28×10^{-9}
64+75	12/20/03	13:27-17:27	240	10	108.2128	559261.0644	—	10	7.45×10^{-8}	5.08×10^{-9}
64+50	12/20/03	13:27-17:27	240	10	100.4833	519337717	—	8	6.42×10^{-8}	4.38×10^{-9}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

DAILY QC TESTS

DATE 12/20/03

SE Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

Not used at trench

same as

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:30	23+20	2	85	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	25	< 25 cm^3	1.0	+30	MAX 30%
9:30	23+20	33	90	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	28	< 25 cm^3	1.7	+30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:00	23+70	2	72	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	50	< 25 cm^3	2.0	+30	MAX 30%
15:00	23+70	33	72	40 - 90 sec	97	64 - 95 pcf	8	6.5 - 10	55	< 25 cm^3	2.1	+30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
21+75	3	2" to 6"	112.5	+15 pcf over trench slurry	1.16×10^{-7}	1.0×10^{-7} cm/sec
22+00	3	2" to 6"	114	+15 pcf over trench slurry	1.24×10^{-7}	1.0×10^{-7} cm/sec
22+25	3	2" to 6"	117	+15 pcf over trench slurry	8.02×10^{-8}	1.0×10^{-7} cm/sec
22+50	2	2" to 6"	114	+15 pcf over trench slurry	8.94×10^{-8}	1.0×10^{-7} cm/sec
22+75	2	2" to 6"	113.5	+15 pcf over trench slurry	4.01×10^{-7}	1.0×10^{-7} cm/sec
23+00	2	2" to 6"	116	+15 pcf over trench slurry	1.24×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 21+75, 22+00, 22+25, 22+50, 22+75, 23+00

Technician: RF/SM ✓ by SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 7.0cm, 7.0cm, 6.5cm 7.0cm 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/ conv. factor (1/14.65)
21+75	12/20/03	8:40-12:40	240	10	100.4833	519313.7717	—	14.5	1.16×10^{-7}	7.92×10^{-9}
22+00	12/20/03	8:40-12:40	240	10	100.4833	519313.7717	—	15.5	1.24×10^{-7}	8.46×10^{-9}
22+25	12/20/03	8:40-12:40	240	10	100.4833	519313.7717	—	10	8.02×10^{-8}	5.47×10^{-9}
22+50	12/20/03	13:27-17:27	240	10	108.2128	559261.0644	—	12	8.94×10^{-8}	6.10×10^{-9}
22+75	12/20/03	13:27-17:27	240	10	100.4833	519313.7717	—	50	4.01×10^{-7}	2.74×10^{-8}
23+00	12/20/03	13:27-17:27	240	10	100.4833	519313.7717	—	15.5	1.24×10^{-7}	8.46×10^{-9}

I= $\frac{\text{P (psi)}}{0.014217\ \text{L (cm)}}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 22-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
SB-046 (NW67+00)	SB BACKFILL**	67+00	12/18/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-047 (SE21+00)	SB BACKFILL**	21+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-048 (NW66+00)	SB BACKFILL**	66+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ SB-049 (SE22+00)	SB BACKFILL**	22+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ SB-050 (NW65+00)	SB BACKFILL**	65+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-051 (SE23+00)	SB BACKFILL**	23+00	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-052 (NW64+50)	SB BACKFILL**	64+50	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 22-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-038 (SE22+00)	SOIL ONLY	22+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-039 (NW65+00)	SOIL ONLY	65+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-040 (SE23+00)	SOIL ONLY	23+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-041 (NW64+00)	SOIL ONLY	64+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-042 (SE24+00)	SOIL ONLY	24+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-043 (NW63+00)	SOIL ONLY	63+00	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-044 (SE25+00)	SOIL ONLY	25+00	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG

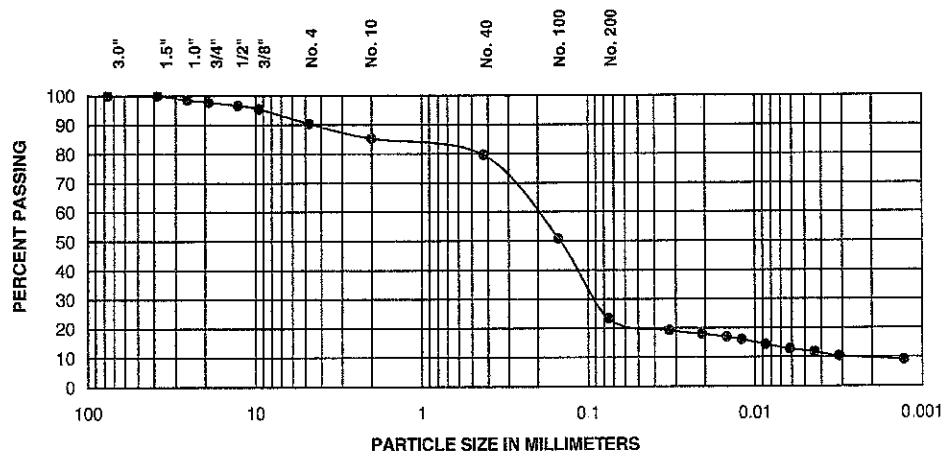
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-049	**Date Tested**	12/28/2003	**Tested by**	KM
						Qc by	NP

Date Sample Received:	12/22/2003
Sample Location	22 + 00 (SE)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	9.6	67.1	11.2	12.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	98.5
3/4"	97.8
1/2"	96.6
3/8"	95.4
No. 4	90.4
No. 10	85.3
No. 40	79.6
No. 100	50.9
No. 200	23.3

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
30	21	9

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

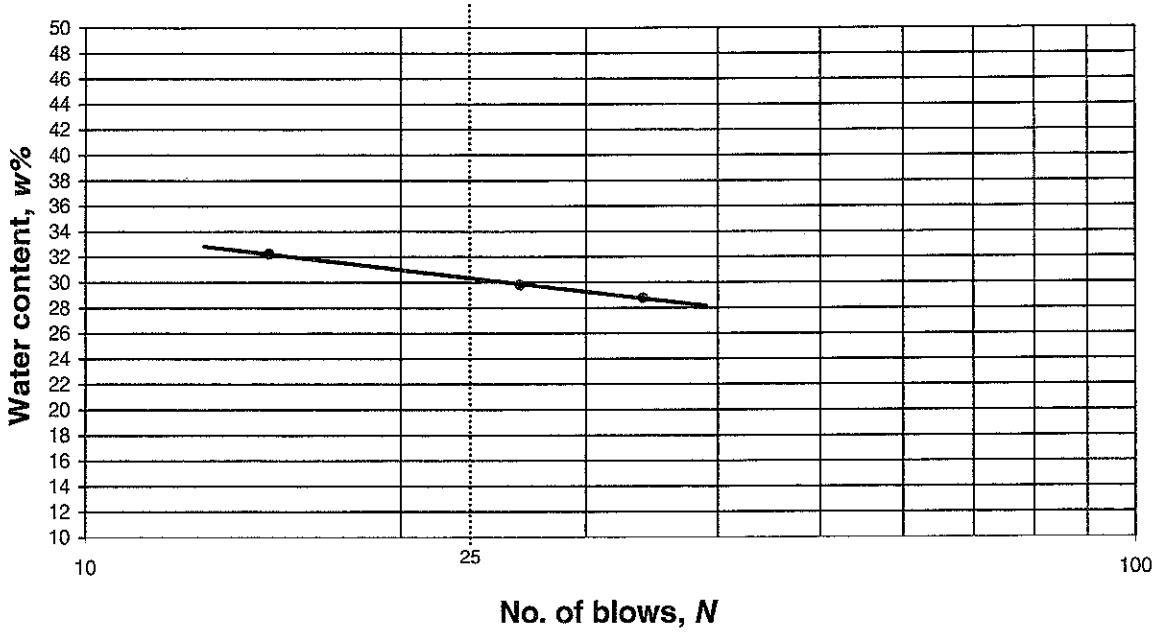
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-049	**Date Tested**	12/26/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/22/2003
Sample Location	22 + 00 (SE)
Sample Description	Gray silty, clayey sand with tr of gr. (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**30**	**Plastic Limit, PL**	**21**	**Plasticity Index, PI**	**9**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/26/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-049	Date Recd.	12/22/03	**Location**	22 + 00 (SE)		
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.01	cm	Volume, V:	244.7	cu cm
Mass of Sample:	457.8	g	**Moisture Content:**	**25.5**	%
			Wet Density	**116.7**	**pcf**
			Dry Density	**93.0**	**pcf**

Final

Diameter:	6.96	cm	Area, A:	38.0	sq cm
Height, L:	5.63	cm	Volume, V:	214.2	cu cm
Mass of Sample:	442.00	g	**Moisture Content:**	**23.2**	%
			Wet Density	**128.8**	**pcf**
			Dry Density	**104.5**	**pcf**
			Deg of Saturation	**99.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.1	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/26/2003	9:30 AM	0	0	2.92	6.03		20.0	---
12/26/2003	10:15 AM	2700	2700	2.99	5.96	1.0	20.0	2.59E-08
12/26/2003	11:00 AM	2700	5400	3.06	5.89	1.0	20.0	2.60E-08
12/26/2003	11:45 AM	2700	8100	3.13	5.82	1.0	20.0	2.62E-08
12/26/2003	12:30 PM	2700	10800	3.19	5.76	1.0	20.0	2.26E-08

Average Permeability = **2.5E-08** **cm/sec**

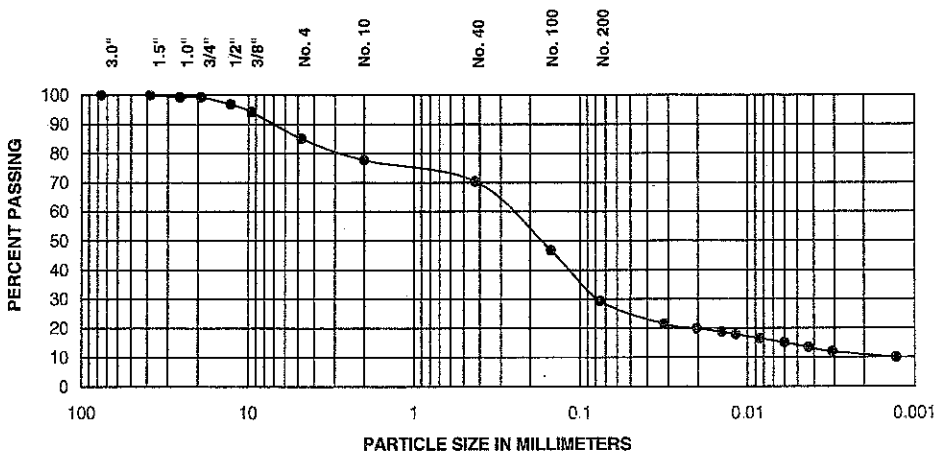
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-050	**Date Tested**	12/28/2003	**Tested by**	KM
						Qc by	NP

Date Sample Received:	12/23/2003
Sample Location	65 + 00 (NW)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	14.9	55.7	15.2	14.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	99.2
3/4"	99.2
1/2"	96.9
3/8"	94.2
No. 4	85.1
No. 10	77.7
No. 40	70.4
No. 100	46.7
No. 200	29.4

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
32	20	12

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

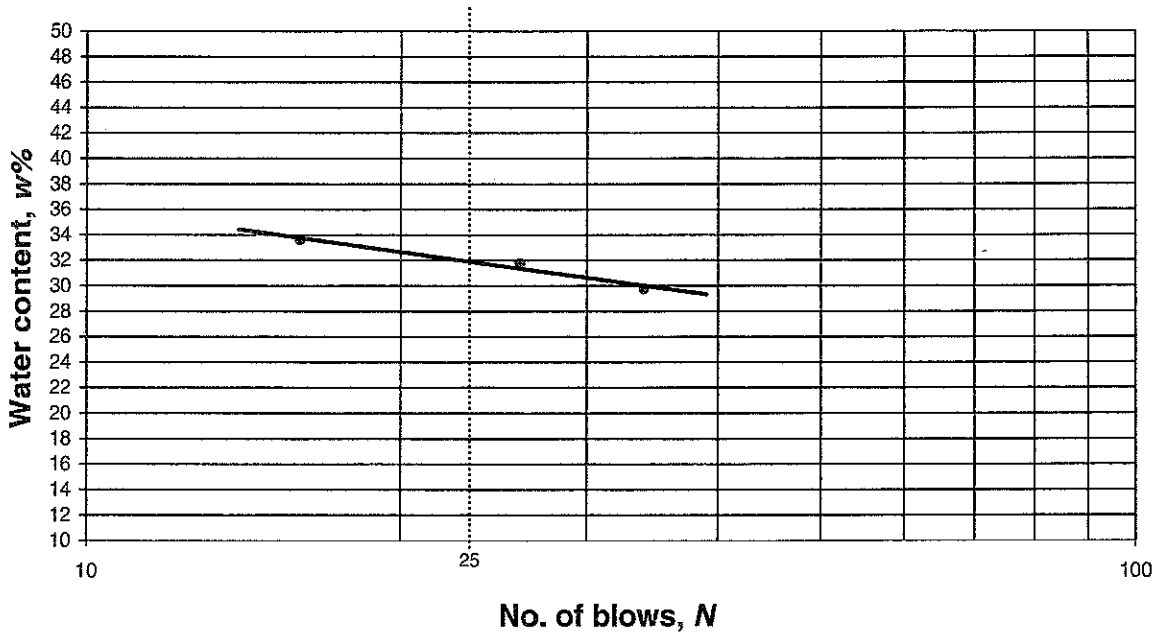
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-050	**Date Tested**	12/28/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/23/2003
Sample Location	65 + 00 (NW)
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**32**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**12**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/28/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-050	Date Recd.	12/23/03	**Location**	65 + 00 (NW)		
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.74	cm	Volume, V:	233.7	cu cm
Mass of Sample:	452.7	g	**Moisture Content:**	**26.6**	%
			Wet Density	**120.9**	**pcf**
			Dry Density	**95.5**	**pcf**

Final

Diameter:	6.91	cm	Area, A:	37.5	sq cm
Height, L:	5.31	cm	Volume, V:	199.1	cu cm
Mass of Sample:	425.20	g	**Moisture Content:**	**18.8**	%
			Wet Density	**133.2**	**pcf**
			Dry Density	**112.2**	**pcf**
			Deg of Saturation	**97.5**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	22.1	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/26/2003	9:30 AM	0	0	3.07	5.97		20.0	---
12/26/2003	10:15 AM	2700	2700	3.21	5.85	1.2	20.0	4.29E-08
12/26/2003	11:00 AM	2700	5400	3.34	5.73	1.1	20.0	4.34E-08
12/26/2003	11:45 AM	2700	8100	3.46	5.62	1.1	20.0	4.03E-08
12/26/2003	12:30 PM	2700	10800	3.56	5.52	1.0	20.0	3.70E-08

Average Permeability = **4.1E-08** cm/sec

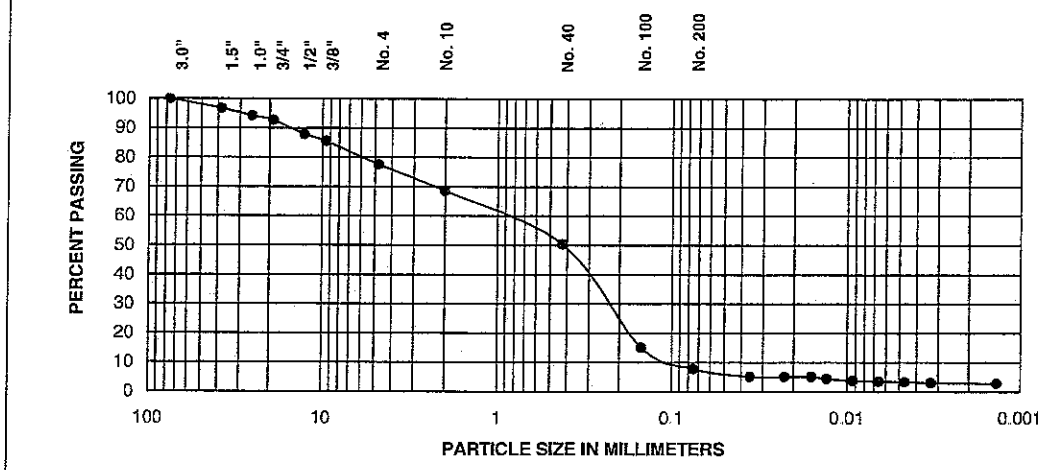
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF - 041	**Date Tested**	12/24/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/22/2003
Sample Location	64+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	22.4	69.8	4.4	3.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.96	0.23	0.09	10.5	0.61

Sieve Size	Percent Passing
3.0"	100.0
1.5"	96.8
1.0"	94.2
3/4"	92.7
1/2"	87.8
3/8"	85.5
No. 4	77.6
No. 10	68.6
No. 40	50.4
No. 100	15.1
No. 200	7.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

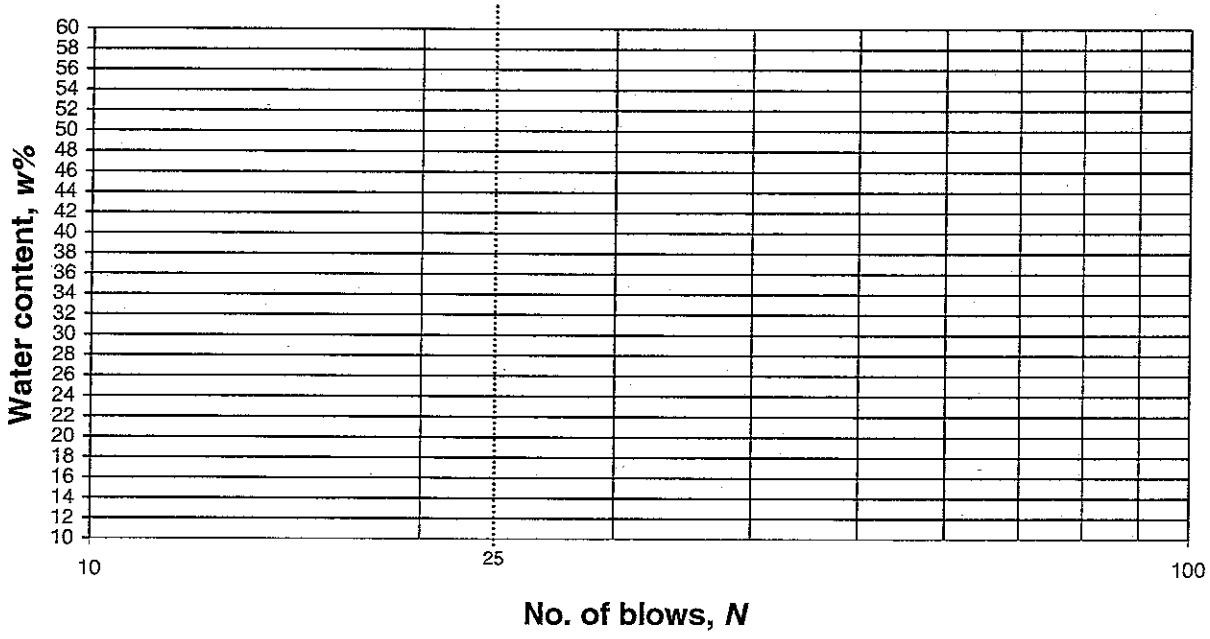
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF - 041	**Date Tested**	12/23/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/22/2003
Sample Location	64+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	17	Date	12/23/2003	Sheet	1
				Date of weighing	12/24/2003	Tested by	ON

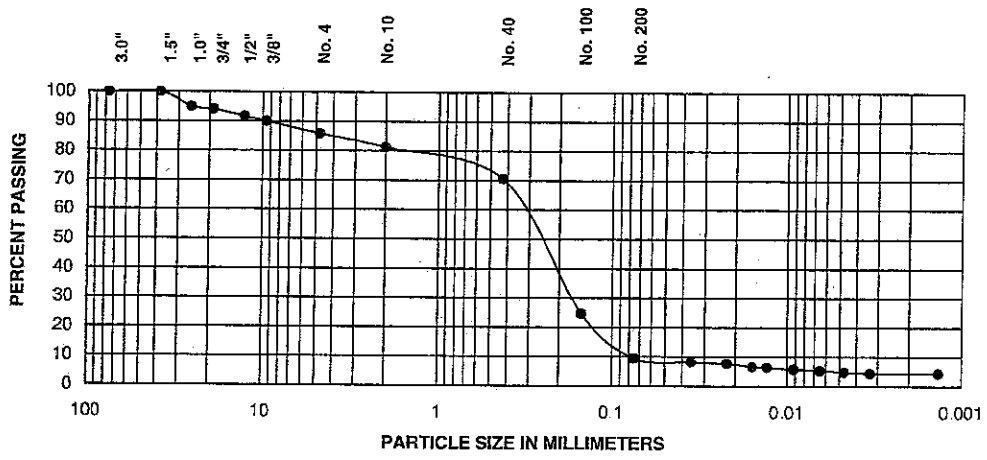
Boring No.	-	-				
Sample No.	BF-040	BF-041				
Location	23 + 00 (SE)	64 + 00 (NW)				
Tin No.	83A	24A				
Tin + Wet Soil	150.15	156.17				
Tin + Dry Soil	134.92	141.09				
Wt. of Tin	30.71	29.88				
Wt. of Dry Soil	104.2	111.2				
Wt. of Water	15.2	15.1				
Moisture, %	14.6	13.6				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF - 042	**Date Tested**	12/24/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/22/2003
Sample Location	24+00 (SE)
Sample Description	Gray poorly graded sand with clay, tr.of gr. & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	14.2	76.3	4.5	5.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.33	0.17	0.08	4.4	1.11

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	94.9
3/4"	94.1
1/2"	91.7
3/8"	90.0
No. 4	85.8
No. 10	81.3
No. 40	70.6
No. 100	24.7
No. 200	9.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay
System:	USCS

Remarks:

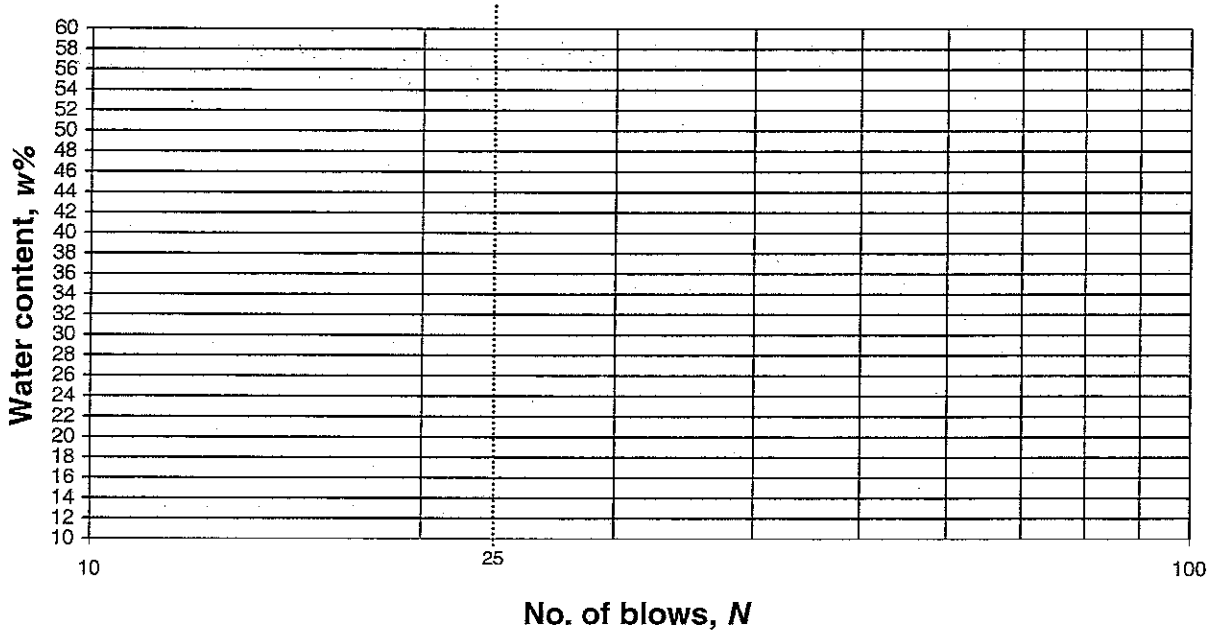
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF - 042	**Date Tested**	12/23/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/22/2003
Sample Location	24+00 (SE)
Sample Description	Gray poorly graded sand with clay, tr.of gr. & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945	**MOISTURE CONTENT DETERMINATION**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	18	Date	12/22/2003	Sheet	1
				Date of weighing	12/23/2003	Tested by	ON

Boring No.	-	-	-			
Sample No.	BF-042	BF-043	BF-044			
Location	24 + 00 (SE)	63 + 00 (NW)	25 + 00 (SE)			
Tin No.	79A	36C	97A			
Tin + Wet Soil	178.58	165.8	139.27			
Tin + Dry Soil	156.24	148.01	126.25			
Wt. of Tin	31.26	31.62	30.72			
Wt. of Dry Soil	125.0	116.4	95.5			
Wt. of Water	22.3	17.8	13.0			
Moisture, %	17.9	15.3	13.6			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/21/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 24 - 36 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
63+70	2.00	86.50	+30.00	45.00	49.00	8
63+70	35.00	92.00	+30.00	58.00	51.00	8
63+20	2.00	86.00	+30.00	47.00	51.00	8
63+20	35.00	92.00	+30.00	56.00	51.00	8

NORTH TRENCH

COMMENTS: Trench filtrate losses are still high, but typical for trench slurry results. Sand content is too high due to trying to close up the trench for the Christmas break. Fresh slurry was pumped to this trench to try and bring the trench slurry back within specs.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
63+00	LAB SAMPLE COLLECTED 12/21/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
65+25	4.00	N/A	N/A	N/A	1.03×10^{-7}	N/A
65+00	4.00	N/A	N/A	N/A	1.00×10^{-7}	N/A
64+75	4.00	N/A	N/A	N/A	1.30×10^{-7}	N/A
64+50	4.00	Sample collected	Sample collected	Sample collected	6.95×10^{-8}	yes
64+25	4.00	N/A	N/A	N/A	8.02×10^{-8}	N/A
64+00	4.00	N/A	N/A	N/A	5.08×10^{-8}	N/A

COMMENTS

Filter cake: 1.4mm, 1.9mm, 1.4mm, and 1.6mm respectively.

Unit Weight:
- 65+25: 115.0 pcf
- 65+00: 111.0 pcf
- 64+75: 114.0 pcf
- 64+50: 114.0 pcf
- 64+25: 112.5 pcf
- 64+00: 110.5 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sipe OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/21/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 24 - 36 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
24+30	2.00	94.00	+30.00	48.00	65.00	8
24+30	33.00	95.00	+30.00	51.00	69.00	8
24+80	2.00	92.00	+30.00	30.00	54.00	8
24+80	32.00	93.00	+30.00	34.00	56.00	8

SE TRENCH

COMMENTS: Trench filtrate losses are becoming high, but typical for trench slurry results. Sand content results are too high. Fresh slurry was pumped to this trench today to try and fix these problems.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
25+00	LAB SAMPLE COLLECTED 12/21/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
22+50	3.00	N/A	N/A	N/A	6.19×10^{-8}	N/A
22+75	3.00	N/A	N/A	N/A	9.62×10^{-8}	N/A
23+00	3.00	Sample collected	Sample collected	Sample collected	1.12×10^{-7}	yes
23+25	3.00	N/A	N/A	N/A	5.73×10^{-8}	N/A
23+50	3.00	N/A	N/A	N/A	8.56×10^{-8}	N/A
23+75	3.00	N/A	N/A	N/A	1.17×10^{-7}	N/A

COMMENTS

Filter cake: 1.2mm, 1.3mm, 1.2mm and 1.2mm respectively.

Unit Weight:
- 22+50: 113.0 pcf
- 22+75: 114.0 pcf
- 23+00: 111.0 pcf
- 23+25: 115.5 pcf
- 23+50: 112.0 pcf
- 23+75: 114.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/21/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
9:05	-	45.00	-	-
11:00	64.00	52.00	16.00	8
13:52	64.50	52.00	18.00	8
15:36	-	52.00	-	-

Filter cake is .3mm, and .4mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/21/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 24 - 36 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
63+80	34.0	37.3	37.3	10.0	373.0	10.0	65+30	TOPOUT	TOPOUT
63+70	34.0	37.4	37.4	10.0	373.5	10.0	65+20	3.2	TOPOUT
63+60	34.0	37.5	37.5	10.0	374.5	10.0	65+10	9.7	TOPOUT
63+50	34.0	37.5	37.5	10.0	375.0	10.0	65+00	14.6	TOPOUT
63+40	34.0	37.5	37.5	10.0	375.0	10.0	64+90	19.8	TOPOUT
63+30	34.0	37.4	37.5	10.0	374.5	10.0	64+80	24.1	TOPOUT
63+20	34.0	37.4	37.4	10.0	374.0	10.0	64+70	27.7	TOPOUT
63+10	34.0	37.4	37.4	10.0	374.0	10.0	64+60	31.1	TOPOUT
63+00	34.0	37.4	37.4	10.0	374.0	10.0	64+50	34.5	3.5
62+90	33.9	37.3	37.4	10.0	373.5	10.0	64+40	35.9	6.8
62+80	33.9	37.5	37.4	10.0	374.0	10.0	64+30	36.0	11.0
							64+20	36.9	15.2
							64+10	37.3	17.3
							64+00	37.4	19.4
							63+90	37.3	22.0
							63+80		23.4
							63+70		25.1
							63+60		26.5
							63+50		28.0
							63+40		29.8
							63+30		30.3
							63+20		32.7
							63+10		33.3
							63+00		36.2
							62+90		37.3
							62+80		37.5

SF TODAY 4115.00

SF TO DATE 54807.00

COMMENTS

NW Trench

GEO-CON: Suzanne C Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/21/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 24 - 36 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
24+20	31.5	35.6	35.6	10.0	355.5	2.9	22+50	TOPOUT	TOPOUT
24+30	31.3	35.2	35.4	10.0	354.0	3.0	22+60	5.5	TOPOUT
24+40	31.3	35.2	35.2	10.0	352.0	3.1	22+70	9.4	TOPOUT
24+50	31.1	35.1	35.2	10.0	351.5	2.9	22+80	12.9	TOPOUT
24+60	31.0	34.9	35.0	10.0	350.0	3.2	22+90	16.3	TOPOUT
24+70	30.9	34.8	34.9	10.0	348.5	3.6	23+00	18.9	TOPOUT
24+80	30.7	34.9	34.9	10.0	348.5	3.8	23+10	20.4	4.2
24+90	30.5	34.7	34.8	10.0	348.0	3.9	23+20	21.5	7.3
25+00	30.3	34.5	34.6	10.0	346.0	4.5	23+30	23.9	9.1
25+10	30.3	34.5	34.5	10.0	345.0	5.1	23+40	25.5	11.6
25+20	30.2	34.4	34.5	10.0	344.5	4.8	23+50	27.5	12.4
							23+60	29.7	15.2
							23+70	31.5	17.3
							23+80	33.5	19.1
							23+90	35.1	20.4
							24+00	35.3	21.7
							24+10	35.5	23.4
							24+20		24.8
							24+30		26.0
							24+40		27.2
							24+50		28.7
							24+60		29.9
							24+70		31.0
							24+80		33.2
							24+90		34.7
							25+00		34.5
							25+10		34.5
							25+20		34.4

SF TODAY 3843.50

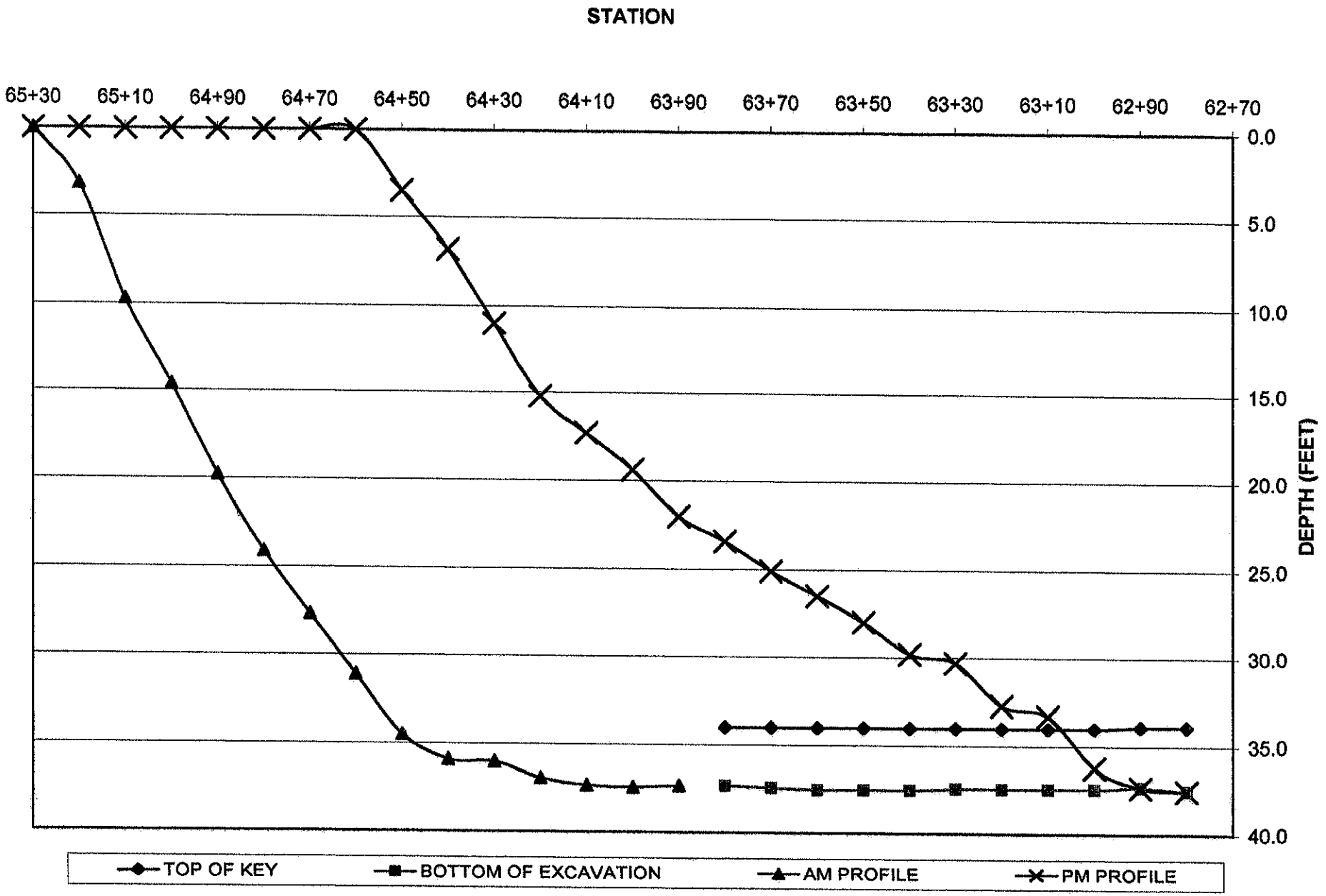
SF TO DATE 18302.22

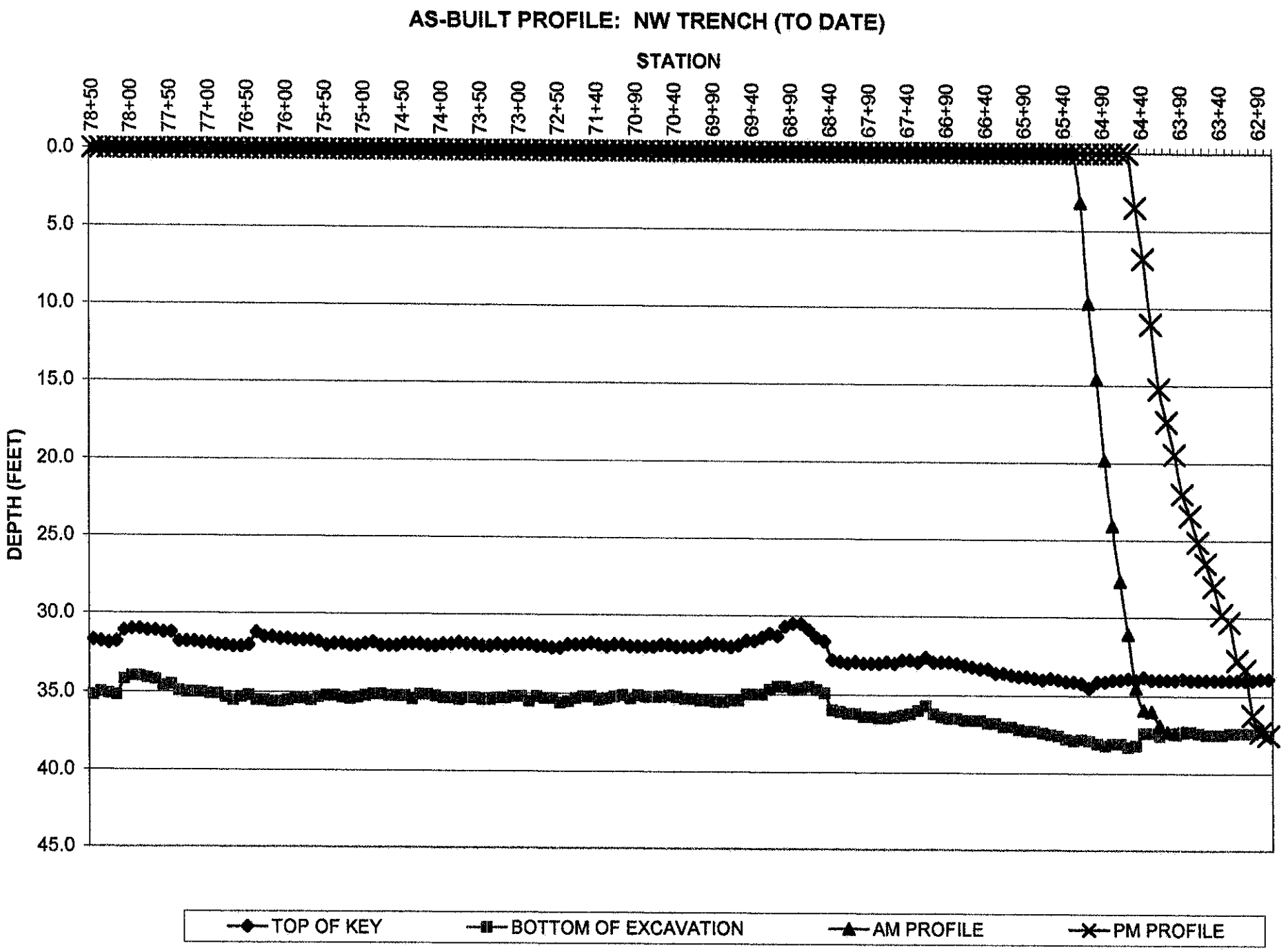
COMMENTS

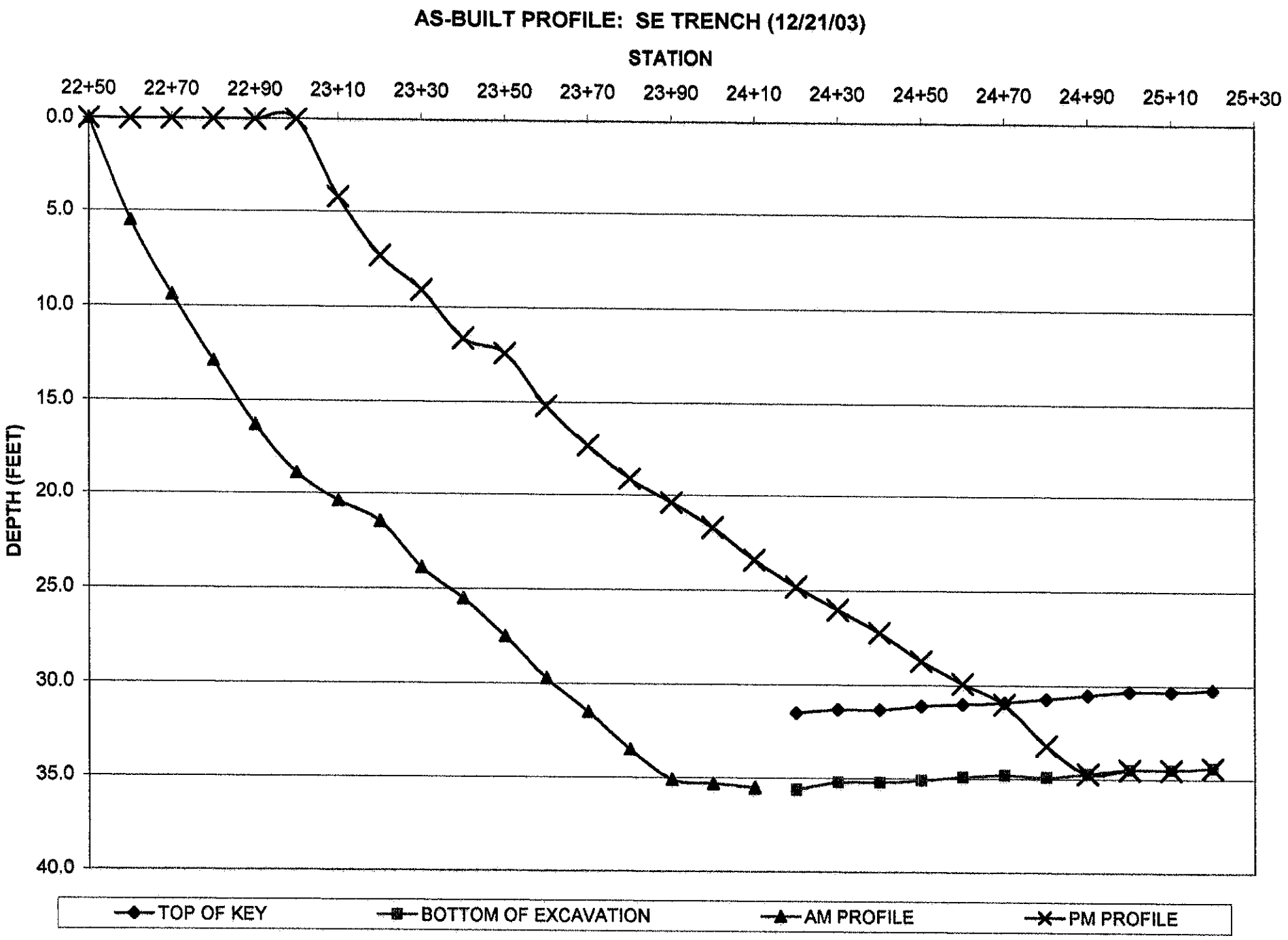
SE Trench

GEO-CON: Suzanne C. Sepic OWNER:

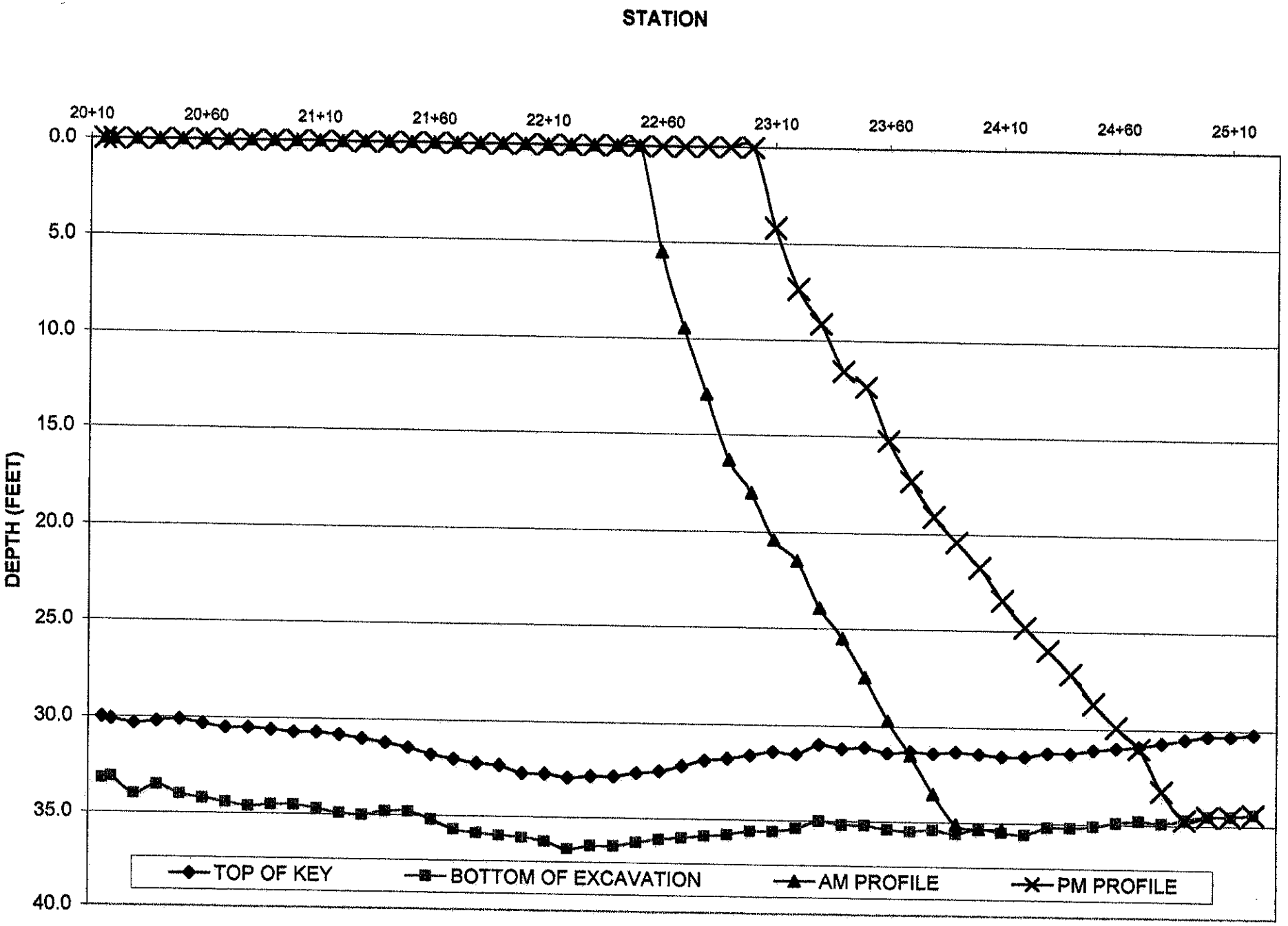
AS-BUILT PROFILE: NW TRENCH (12/21/03)




AS-BUILT PROFILE: NW TRENCH (TO DATE)
STATION
78+50
78+00
77+50
77+00
76+50
76+00
75+50
75+00
74+50
74+00
73+50
73+00
72+50
71+40
70+90
70+40
69+90
69+40
68+90
68+40
67+90
67+40
66+90
66+40
65+90
65+40
64+90
64+40
63+90
63+40
62+90
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (12/21/03)
STATION
22+50
22+70
22+90
23+10
23+30
23+50
23+70
23+90
24+10
24+30
24+50
24+70
24+90
25+10
25+30
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: SE TRENCH (TO DATE)



DAILY QC TESTS

DATE 12/21/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	11:00	52	> 40 sec	64	> 64 pcf	8	6.5 - 10	16	< 20 cm^3	.3
PM	13:52	52	> 40 sec	64.5	> 64 pcf	8	6.5 - 10	18	< 20 cm^3	.4

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9.05	45	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	15.36	52	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

NW Trench

Filtrate Checks

11:30 Shallow - 45 cm^3
Deep - 58 cm^3

14:00 Shallow - 38.5 cm^3
Deep - 42 cm^3

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:45	63+70	2	49	40 - 90 sec	86.5	64 - 95 pcf	8	6.5 - 10	45	< 25 cm^3	1.4	+30	MAX 30%
9:45	63+70	35	51	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	58	< 25 cm^3	1.9	+30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:30	63+20	2	51	40 - 90 sec	86	64 - 95 pcf	8	6.5 - 10	47	< 25 cm^3	1.4	+30	MAX 30%
15:30	63+20	35	51	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	56	< 25 cm^3	1.6	+30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
65+25	4	2" to 6"	115	+15 pcf over trench slurry	1.03×10^{-7}	1.0×10^{-7} cm/sec
65+00	4	2" to 6"	111	+15 pcf over trench slurry	1.00×10^{-7}	1.0×10^{-7} cm/sec
64+75	4	2" to 6"	114	+15 pcf over trench slurry	1.30×10^{-7}	1.0×10^{-7} cm/sec
64+50	4	2" to 6"	114	+15 pcf over trench slurry	6.95×10^{-8}	1.0×10^{-7} cm/sec
64+25	4	2" to 6"	112.5	+15 pcf over trench slurry	8.02×10^{-8}	1.0×10^{-7} cm/sec
64+00	4	2" to 6"	110.5	+15 pcf over trench slurry	5.08×10^{-8}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 65+25, 65+00, 64+75, 64+50, 64+25, 64+00

Technician: RF/SM Var SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.0cm, 7.0cm, 6.5cm 7.0cm, 7.0cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/ conv. factor (1/14.65)
65+25	12/21/03	10:00 - 14:00	240	10	117.2305	605865.9809	—	15	1.03×10^{-7}	7.03×10^{-9}
65+00	12/21/03	10:00 - 14:00	240	10	100.4833	519313.7717	—	12.5	1.00×10^{-7}	6.82×10^{-9}
64+75	12/21/03	10:00 - 14:00	240	10	108.2128	559261.0644	—	17.5	1.30×10^{-7}	8.87×10^{-9}
64+50	12/21/03	18:00 - 6:00	720	10	100.4833	519313.7717	—	26	6.95×10^{-8}	4.74×10^{-9}
64+25	12/21/03	18:00 - 6:00	720	10	100.4833	519313.7717	—	30	8.02×10^{-8}	5.47×10^{-9}
64+00	12/21/03	18:00 - 6:00	720	10	108.2128	559261.0644	—	19	5.08×10^{-8}	3.47×10^{-9}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 12/21/03

SE Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:15	24+30	2	65	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	48	< 25 cm^3	1.2	+30	MAX 30%
9:15	24+30	33	69	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	51	< 25 cm^3	1.3	+30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:03	24+80	2	54	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	30	< 25 cm^3	1.2	+30	MAX 30%
15:03	24+80	32	56	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	34	< 25 cm^3	1.2	+30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
22+50	3	2" to 6"	113	+15 pcf over trench slurry	6.19×10^{-8}	1.0×10^{-7} cm/sec
22+75	3	2" to 6"	114	+15 pcf over trench slurry	9.62×10^{-8}	1.0×10^{-7} cm/sec
23+00	3	2" to 6"	111	+15 pcf over trench slurry	1.12×10^{-7}	1.0×10^{-7} cm/sec
23+25	3	2" to 6"	115.5	+15 pcf over trench slurry	5.73×10^{-8}	1.0×10^{-7} cm/sec
23+50	3	2" to 6"	112	+15 pcf over trench slurry	8.56×10^{-8}	1.0×10^{-7} cm/sec
23+75	3	2" to 6"	114	+15 pcf over trench slurry	1.17×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 22+50, 22+75, 23+00, 23+25, 23+50, 23+75

Technician: RF/SM ✓BY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.5cm, 6.5cm, 6.5cm, 6.0cm, 7.0cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. factor (1/14.65)
22+50	12/21/03	10:00 - 14:00	240	10	108.2128	559261.0644	—	9	6.19×10^{-8}	4.22×10^{-9}
22+75	12/21/03	10:00 - 14:00	240	10	108.2128	559261.0644	—	12	9.62×10^{-8}	6.57×10^{-9}
23+00	12/21/03	10:00 - 14:00	240	10	108.2128	559261.0644	—	15	1.12×10^{-7}	7.64×10^{-9}
23+25	12/21/03	18:00 - 6:00	720	10	117.2503	605865.9809	—	25	5.73×10^{-8}	3.91×10^{-9}
23+50	12/21/03	18:00 - 6:00	720	10	100.4833	519313.7717	—	32	8.56×10^{-8}	5.84×10^{-9}
23+75	12/21/03	18:00 - 6:00	720	10	108.2128	559261.0644	—	47	1.17×10^{-7}	7.99×10^{-9}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 22-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
SB-046 (NW67+00)	SB BACKFILL**	67+00	12/18/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-047 (SE21+00)	SB BACKFILL**	21+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-048 (NW66+00)	SB BACKFILL**	66+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-049 (SE22+00)	SB BACKFILL**	22+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-050 (NW65+00)	SB BACKFILL**	65+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ SB-051 (SE23+00)	SB BACKFILL**	23+00	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ SB-052 (NW64+50)	SB BACKFILL**	64+50	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 22-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-038 (SE22+00)	SOIL ONLY	22+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-039 (NW65+00)	SOIL ONLY	65+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-040 (SE23+00)	SOIL ONLY	23+00	12/19/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-041 (NW64+00)	SOIL ONLY	64+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-042 (SE24+00)	SOIL ONLY	24+00	12/20/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-043 (NW63+00)	SOIL ONLY	63+00	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-044 (SE25+00)	SOIL ONLY	25+00	12/21/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG

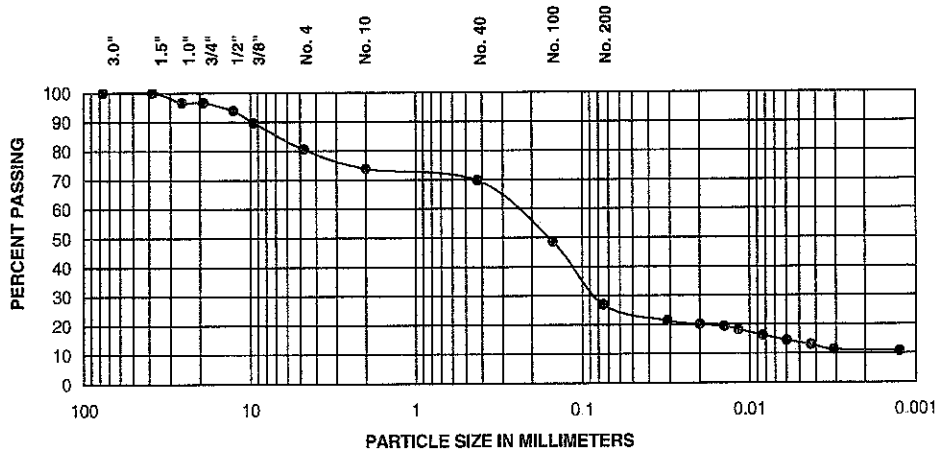
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-051	**Date Tested**	12/28/2003	**Tested by**	KM
						Qc by	NP

Date Sample Received:	12/22/2003
Sample Location	23 + 00 (SE)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	19.4	53.7	13.2	13.7

	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
For coarse-grained soils with <12% Fines					

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	96.6
3/4"	96.6
1/2"	93.9
3/8"	89.7
No. 4	80.6
No. 10	73.9
No. 40	69.7
No. 100	48.6
No. 200	26.9

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
31	20	11

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

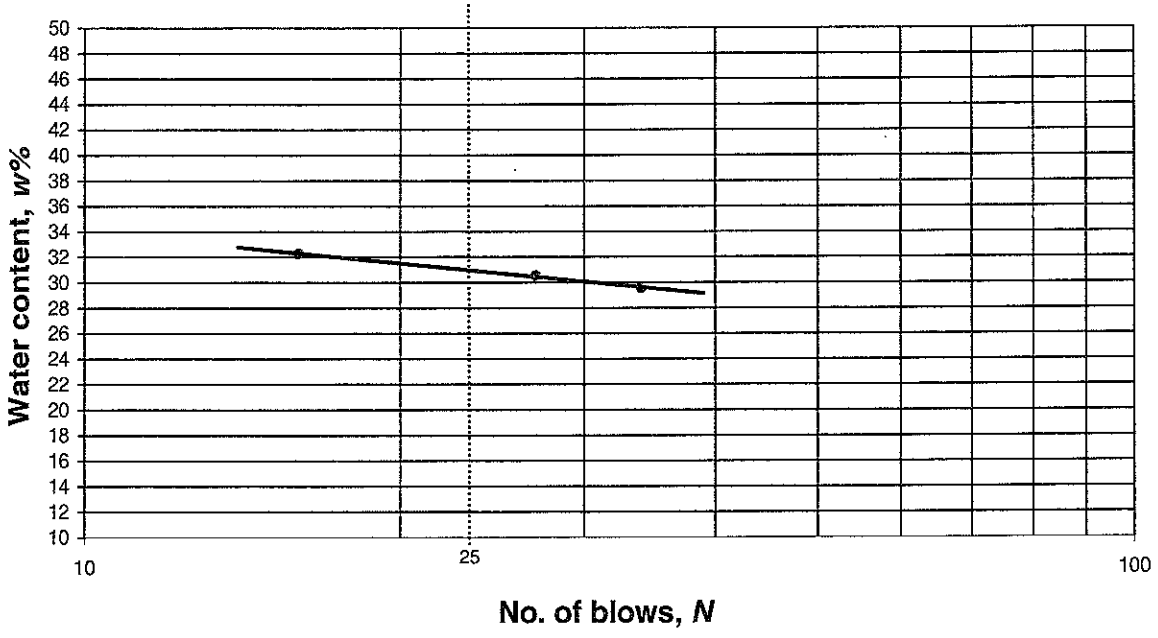
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn : Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-051	**Date Tested**	12/28/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/22/2003
Sample Location	23 + 00 (SE)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**31**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**11**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/26/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-051	Date Recd.	12/22/03	**Location**	23 + 00 (SE)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.84	cm	Volume, V:	237.8	cu cm
Mass of Sample:	449.5	g	**Moisture Content:**	**29.6**	%
			Wet Density	**118.0**	**pcf**
			Dry Density	**91.0**	**pcf**

Final

Diameter:	6.91	cm	Area, A:	37.5	sq cm
Height, L:	5.48	cm	Volume, V:	205.5	cu cm
Mass of Sample:	425.00	g	**Moisture Content:**	**22.9**	%
			Wet Density	**129.0**	**pcf**
			Dry Density	**105.0**	**pcf**
			Deg of Saturation	**99.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.7	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/26/2003	9:30 AM	0	0	3.03	5.99		20.0	---
12/26/2003	10:15 AM	2700	2700	3.10	5.92	1.0	20.0	2.53E-08
12/26/2003	11:00 AM	2700	5400	3.17	5.85	1.0	20.0	2.55E-08
12/26/2003	11:45 AM	2700	8100	3.24	5.78	1.0	20.0	2.57E-08
12/26/2003	12:30 PM	2700	10800	3.31	5.71	1.0	20.0	2.58E-08

Average Permeability = **2.6E-08** cm/sec

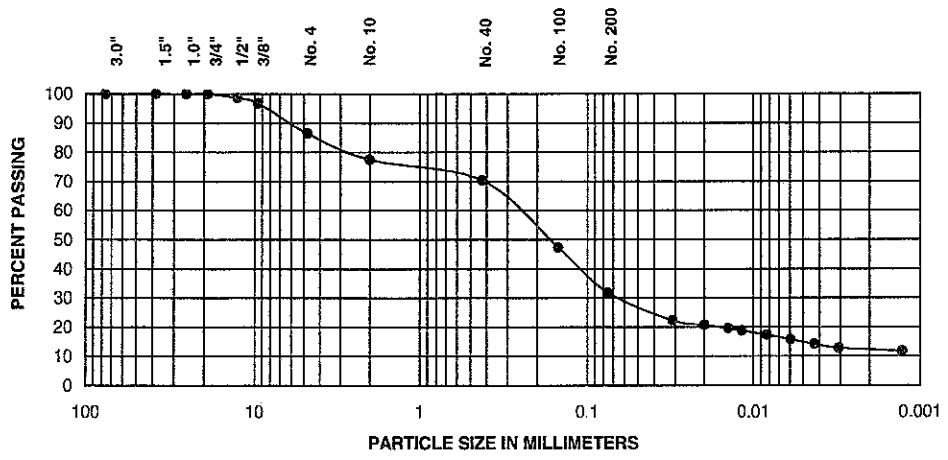
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-052	**Date Tested**	12/28/2003	**Tested by**	KM
						Qc by	NP

Date Sample Received:	12/23/2003
Sample Location	STA 64+50 (NW)
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	13.5	54.7	16.9	14.9

	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
For coarse-grained soils with <12% Fines					

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	98.6
3/8"	96.8
No. 4	86.5
No. 10	77.5
No. 40	70.4
No. 100	47.4
No. 200	31.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
28	18	10

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

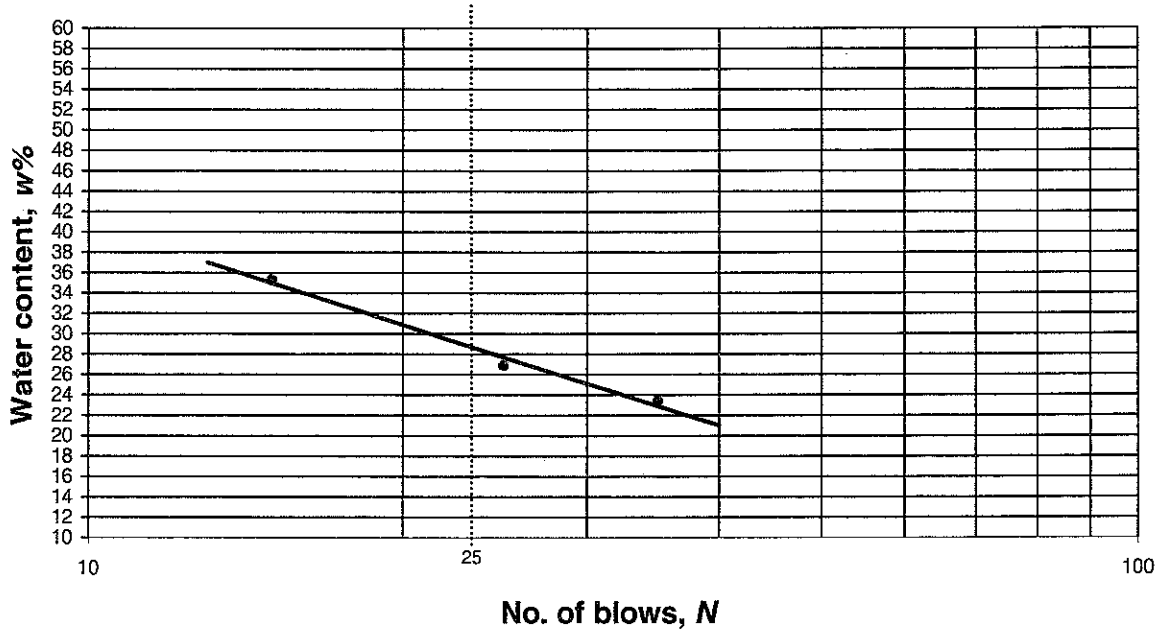
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-052	**Date Tested**	12/30/2003	**Tested By**	MA
						Qc By	SB

Date Sample Recd.	12/23/2003
Sample Location	STA 64+50 (NW)
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**28**	**Plastic Limit, PL**	**18**	**Plasticity Index, PI**	**10**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/29/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-052	Date Recd.	12/23/03	**Location**	STA 64+50 (NW)		
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.66	cm	Volume, V:	230.4	cu cm
Mass of Sample:	421.1	g	**Moisture Content:**	**25.5**	%
			Wet Density	**114.0**	**pcf**
			Dry Density	**90.9**	**pcf**

Final

Diameter:	6.95	cm	Area, A:	37.9	sq cm
Height, L:	5.19	cm	Volume, V:	196.9	cu cm
Mass of Sample:	401.60	g	**Moisture Content:**	**23.0**	%
			Wet Density	**127.3**	**pcf**
			Dry Density	**103.5**	**pcf**
			Deg of Saturation	**96.1**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	22.4	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/29/2003	8:30 AM	0	0	2.98	5.88		20.0	---
12/29/2003	9:15 AM	2700	2700	3.03	5.83	1.0	20.0	1.76E-08
12/29/2003	10:00 AM	2700	5400	3.08	5.78	1.0	20.0	1.76E-08
12/29/2003	10:45 AM	2700	8100	3.12	5.73	0.8	20.0	1.77E-08
12/29/2003	11:30 AM	2700	10800	3.16	5.69	1.0	20.0	1.42E-08

Average Permeability = **1.7E-08** cm/sec

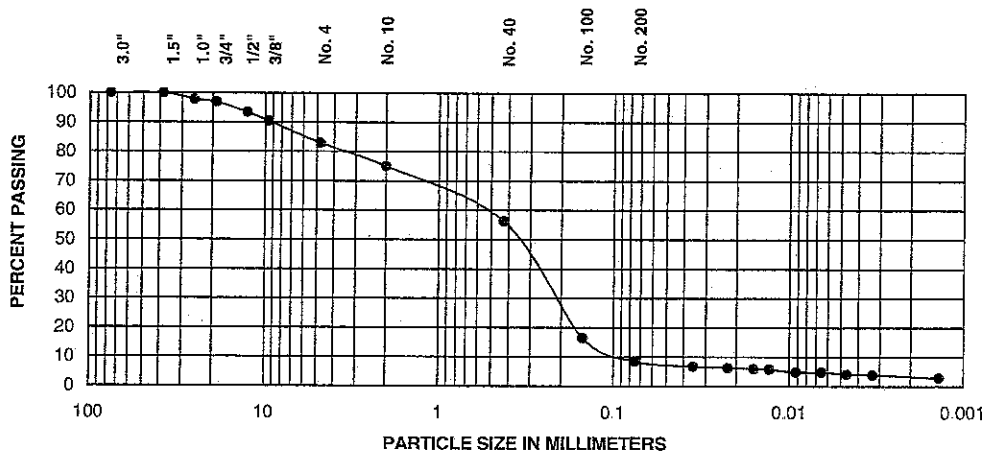
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF - 043	**Date Tested**	12/24/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/22/2003
Sample Location	63+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	17.1	74.3	4.3	4.3

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.58	0.21	0.08	6.8	0.93

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.8
3/4"	96.9
1/2"	93.5
3/8"	90.4
No. 4	82.9
No. 10	75.1
No. 40	56.3
No. 100	16.5
No. 200	8.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

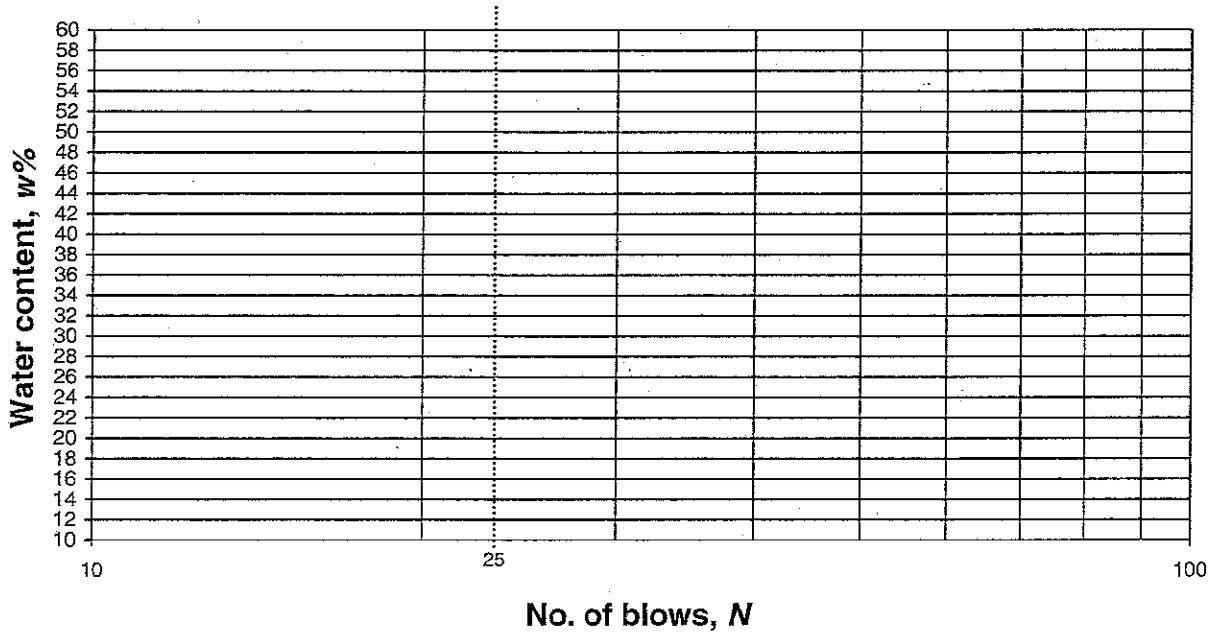
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	Atterberg Limits (ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF - 043	**Date Tested**	12/23/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/22/2003
Sample Location	63+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	18	Date	12/22/2003	Sheet	1
				Date of weighing	12/23/2003	Tested by	ON

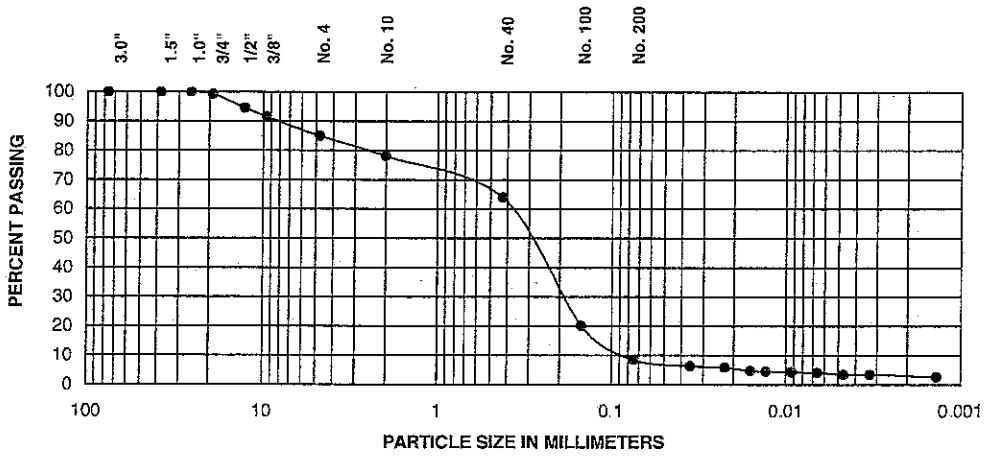
Boring No.	-	-	-			
Sample No.	BF-042	BF-043	BF-044			
Location	24 + 00 (SE)	63 + 00 (NW)	25 + 00 (SE)			
Tin No.	79A	36C	97A			
Tin + Wet Soil	178.58	165.8	139.27			
Tin + Dry Soil	156.24	148.01	126.25			
Wt. of Tin	31.26	31.62	30.72			
Wt. of Dry Soil	125.0	116.4	95.5			
Wt. of Water	22.3	17.8	13.0			
Moisture, %	17.9	15.3	13.6			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF - 044	**Date Tested**	12/24/2003	**Tested by**	MT
						Qc by	NP

Date Sample Received:	12/22/2003
Sample Location	25+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	15.0	76.4	4.8	3.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.39	0.19	0.08	4.7	1.13

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.3
1/2"	94.5
3/8"	91.5
No. 4	85.0
No. 10	78.2
No. 40	64.0
No. 100	20.2
No. 200	8.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

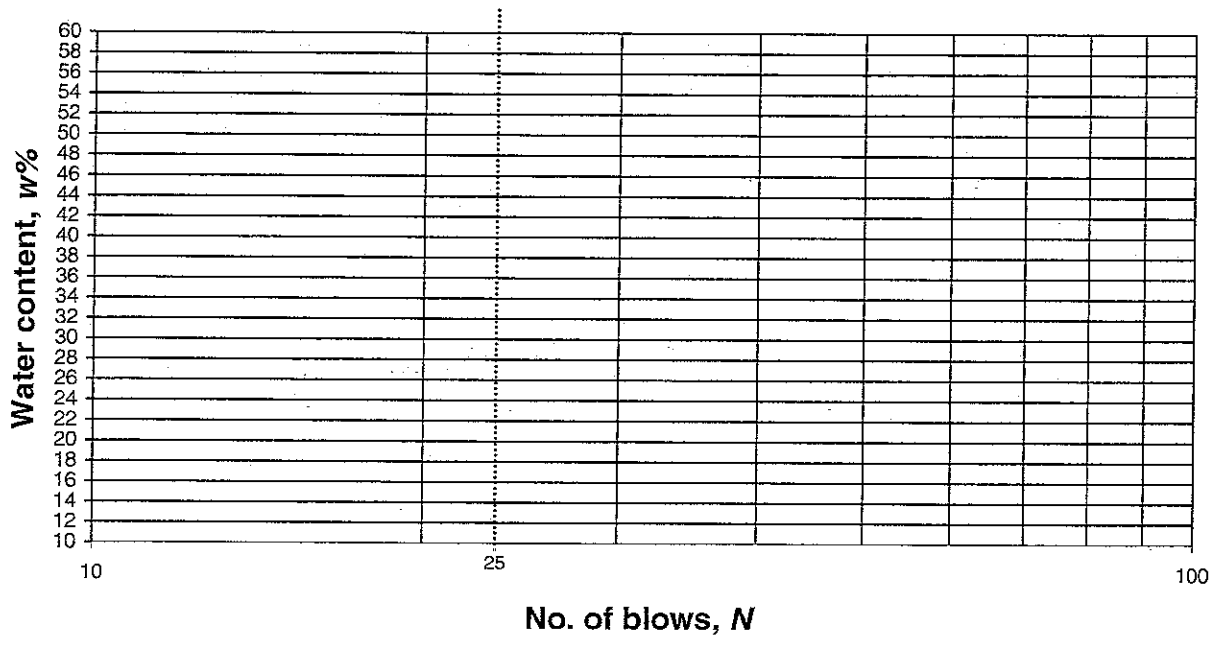
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF - 044	**Date Tested**	12/23/2003	**Tested By**	SS
						Qc By	NP

Date Sample Recd.	12/22/2003
Sample Location	25+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945	**MOISTURE CONTENT DETERMINATION**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	18	Date	12/22/2003	Sheet	1
				Date of weighing	12/23/2003	Tested by	ON

Boring No.	-	-	-			
Sample No.	BF-042	BF-043	BF-044			
Location	24 + 00 (SE)	63 + 00 (NW)	25 + 00 (SE)			
Tin No.	79A	36C	97A			
Tin + Wet Soil	178.58	165.8	139.27			
Tin + Dry Soil	156.24	148.01	126.25			
Wt. of Tin	31.26	31.62	30.72			
Wt. of Dry Soil	125.0	116.4	95.5			
Wt. of Water	22.3	17.8	13.0			
Moisture, %	17.9	15.3	13.6			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/22/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 25 - 39 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
62+40	2.00	94.00	+40.00	42.00	56.00	8
62+40	35.00	95.00	+40.00	44.00	63.00	8
62+00	2.00	104.00	+40.00	68.50	84.00	8
62+00	35.00	99.00	+40.00	55.00	84.00	8

NORTH TRENCH

COMMENTS: Trench filtrate losses are still high, but typical for trench slurry results. Sand content and PM unit weights are too high due to trying to close up the trench for the Christmas break. Fresh slurry was pumped to this trench to try & bring the trench slurry back within specs.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
62+00	LAB SAMPLE COLLECTED 12/22/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
64+50	2.00	N/A	N/A	N/A	3.72×10^{-8}	N/A
64+25	2.00	N/A	N/A	N/A	8.02×10^{-8}	N/A
64+00	2.00	Sample collected	Sample collected	Sample collected	7.45×10^{-8}	yes
63+75	3.00	N/A	N/A	N/A	1.15×10^{-7}	N/A
63+50	3.00	N/A	N/A	N/A	1.15×10^{-7}	N/A
63+25	3.00	N/A	N/A	N/A	5.35×10^{-8}	N/A

COMMENTS

Filter cake: 1.4mm, 1.8mm, 2.9mm, and 2.6mm respectively.

Unit Weight:
- 64+50: 118.5 pcf
- 64+25: 118.0 pcf
- 64+00: 118.5 pcf
- 63+75: 120.0 pcf
- 63+50: 119.0 pcf
- 63+25: 119.5 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne C Lipo OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/22/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 25 - 39 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
25+40	2.00	94.50	+40.00	32.00	58.00	8
25+40	32.00	94.00	+40.00	33.00	61.00	8
26+10	2.00	94.50	+40.00	41.00	53.00	8
26+10	32.00	94.50	+40.00	35.00	60.00	8

SE TRENCH

COMMENTS: Trench filtrate losses are becoming high, but typical for trench slurry results. Sand content results are too high. Fresh slurry was pumped to this trench today to try and fix these problems.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
26+00	LAB SAMPLE COLLECTED 12/22/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
23+25	3.00	N/A	N/A	N/A	2.38×10^{-7}	N/A
23+50	3.00	N/A	N/A	N/A	1.86×10^{-7}	N/A
23+75	3.00	N/A	N/A	N/A	3.35×10^{-7}	N/A
24+00	3.00	Sample collected	Sample collected	Sample collected	2.57×10^{-7}	yes
24+25	3.00	N/A	N/A	N/A	2.19×10^{-7}	N/A
24+50	3.00	N/A	N/A	N/A	2.83×10^{-7}	N/A

COMMENTS

Filter cake: 1.0mm, 1.3mm, 1.5mm and 2.0mm respectively.

Unit Weight:
23+25: 116.0 pcf
23+50: 116.0 pcf
23+75: 114.5 pcf
24+00: 115.0 pcf
24+25: 115.5 pcf
24+50: 115.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne C. Sepo **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/22/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:30	64.00	48.00	16.00	8
10:00	-	45.00	-	-
14:15	65.00	42.00	19.00	8

Filter cake is .3mm, and .5mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	yes
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/22/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 25 - 39 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
62+70	33.4	37.0	37.3	10.0	372.5	8.5	64+60	TOPOUT	TOPOUT
62+60	33.4	37.0	37.0	10.0	370.0	8.5	64+50	3.6	TOPOUT
62+50	33.3	37.1	37.1	10.0	370.5	9.0	64+40	6.6	TOPOUT
62+40	33.3	37.1	37.1	10.0	371.0	9.0	64+30	10.9	TOPOUT
62+30	33.7	37.2	37.2	10.0	371.5	8.5	64+20	15.0	TOPOUT
62+20	33.7	37.2	37.2	10.0	372.0	8.5	64+10	17.1	TOPOUT
62+10	33.6	37.1	37.2	10.0	371.5	8.0	64+00	19.3	TOPOUT
62+00	33.6	37.0	37.1	10.0	370.5	8.0	63+90	19.9	TOPOUT
61+90	33.5	37.0	37.0	10.0	370.0	8.0	63+80	23.2	TOPOUT
61+80	33.5	37.0	37.0	10.0	370.0	8.0	63+70	25.0	TOPOUT
61+70	33.4	37.0	37.0	10.0	370.0	8.0	63+60	26.4	TOPOUT
							63+50	28.1	TOPOUT
							63+40	29.8	TOPOUT
							63+30	30.3	3.3
							63+20	32.7	6.4
							63+10	33.4	9.7
							63+00	36.4	17.1
							62+90	37.3	21.4
							62+80	37.5	23.9
							62+70		26.1
							62+60		27.3
							62+50		28.9
							62+40		29.4
							62+30		30.2
							62+20		31.1
							62+10		32.0
							62+00		33.7
							61+90		34.9
							61+80		37.0
							61+70		37.0

SF TODAY 4079.50

SF TO DATE 58886.50

COMMENTS

NORTH TRENCH

GEO-CON: Suzanne C. Sepic

OWNER

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/22/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 25 - 39 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
25+30	30.3	34.4	34.4	10.0	344.0	4.9	23+00	TOPOUT	TOPOUT
25+40	30.3	34.5	34.5	10.0	344.5	5.2	23+10	4.8	TOPOUT
25+50	30.5	34.3	34.4	10.0	344.0	5.8	23+20	7.6	TOPOUT
25+60	30.6	34.6	34.5	10.0	344.5	6.4	23+30	9.5	TOPOUT
25+70	30.6	34.5	34.6	10.0	345.5	6.9	23+40	11.8	TOPOUT
25+80	30.7	34.3	34.4	10.0	344.0	7.2	23+50	12.7	TOPOUT
25+90	30.7	34.5	34.4	10.0	344.0	7.5	23+60	15.5	TOPOUT
26+00	30.8	34.8	34.7	10.0	346.5	7.3	23+70	17.4	TOPOUT
26+10	30.9	34.8	34.8	10.0	348.0	5.8	23+80	19.3	TOPOUT
26+20	31.1	34.9	34.9	10.0	348.5	6.0	23+90	20.5	TOPOUT
26+30	31.2	35.2	35.1	10.0	350.5	7.4	24+00	21.7	TOPOUT
26+40	31.2	35.3	35.3	10.0	352.5	7.0	24+10	23.2	TOPOUT
26+50	31.3	35.5	35.4	10.0	354.0	6.5	24+20	24.6	TOPOUT
26+60	31.3	35.4	35.5	10.0	354.5	5.8	24+30	25.9	TOPOUT
26+70	31.6	35.5	35.5	10.0	354.5	4.9	24+40	27.0	TOPOUT
							24+50	28.6	TOPOUT
							24+60	29.5	TOPOUT
							24+70	31.0	4.2
							24+80	33.0	7.3
							24+90	34.7	9.4
							25+00	34.5	10.2
							25+10	34.5	12.3
							25+20	34.4	14.8
							25+30		14.9
							25+40		15.3
							25+50		17.8
							25+60		18.5
							25+70		23.0
							25+80		25.8
							25+90		28.2
							26+00		29.9
							26+10		31.4
							26+20		33.8
							26+30		35.2
							26+40		35.3
							26+50		35.5
							26+60		35.4
							26+70		35.5

SF TODAY 5219.50

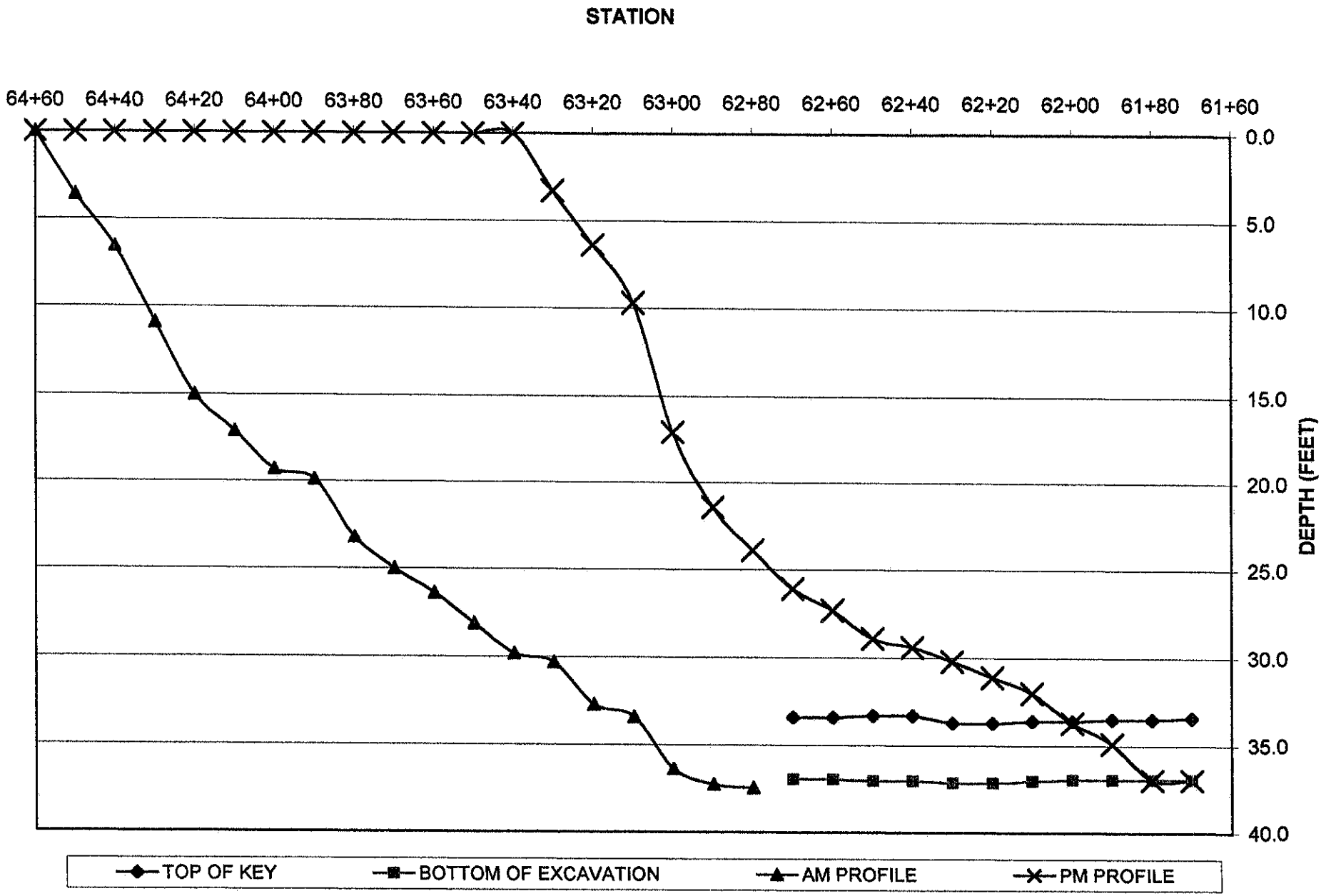
SF TO DATE 23521.72

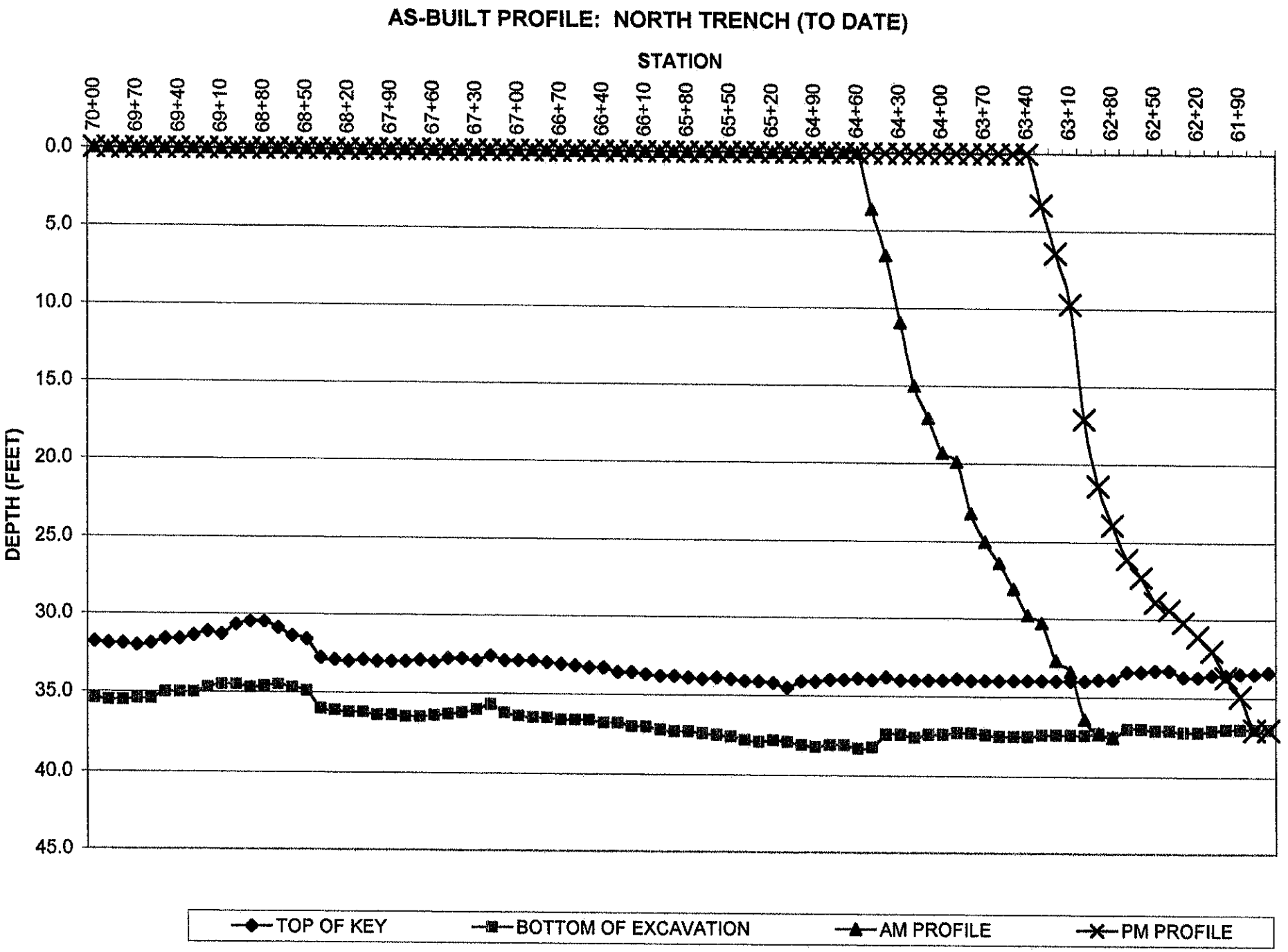
COMMENTS

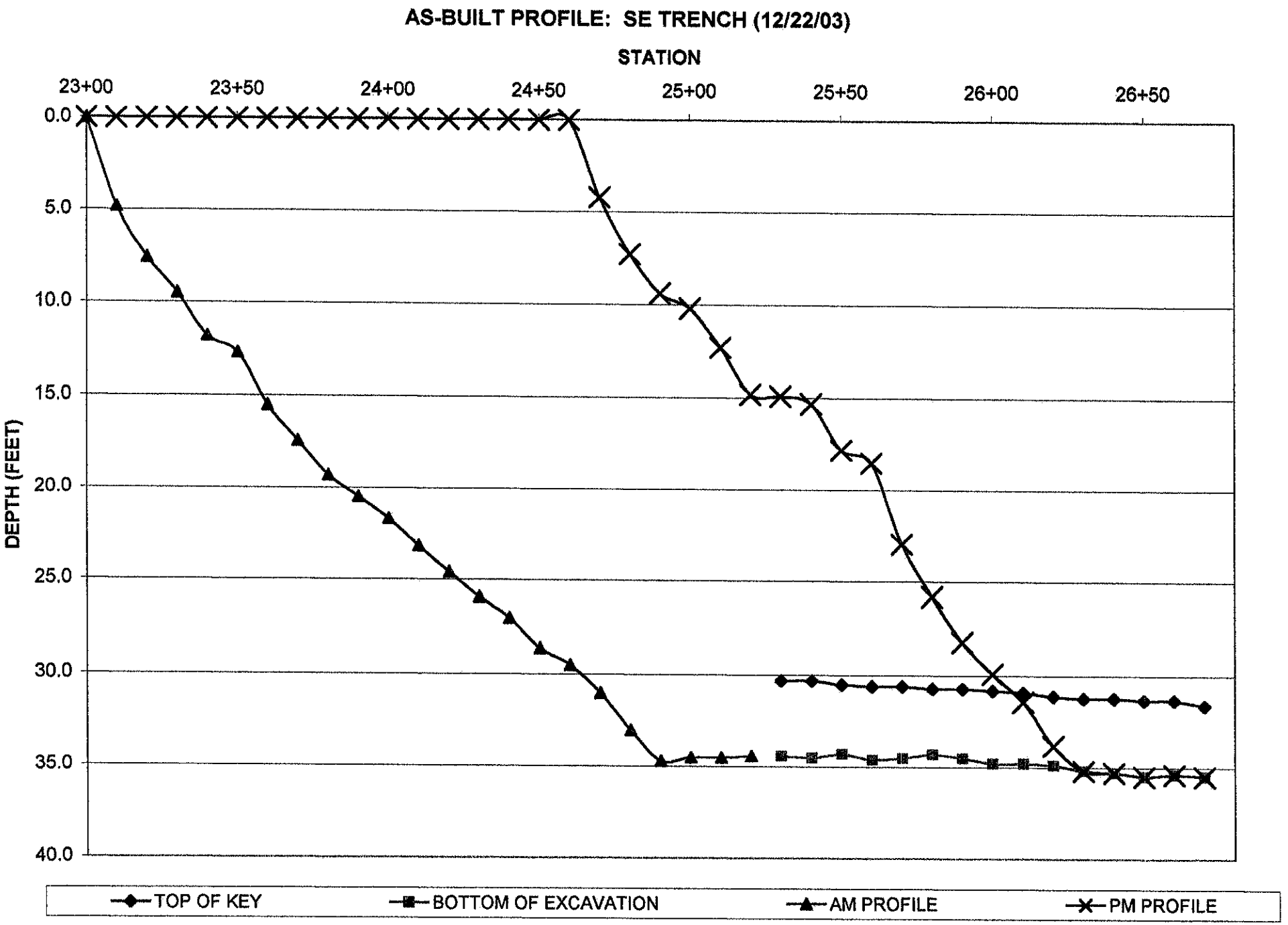
SE Trench

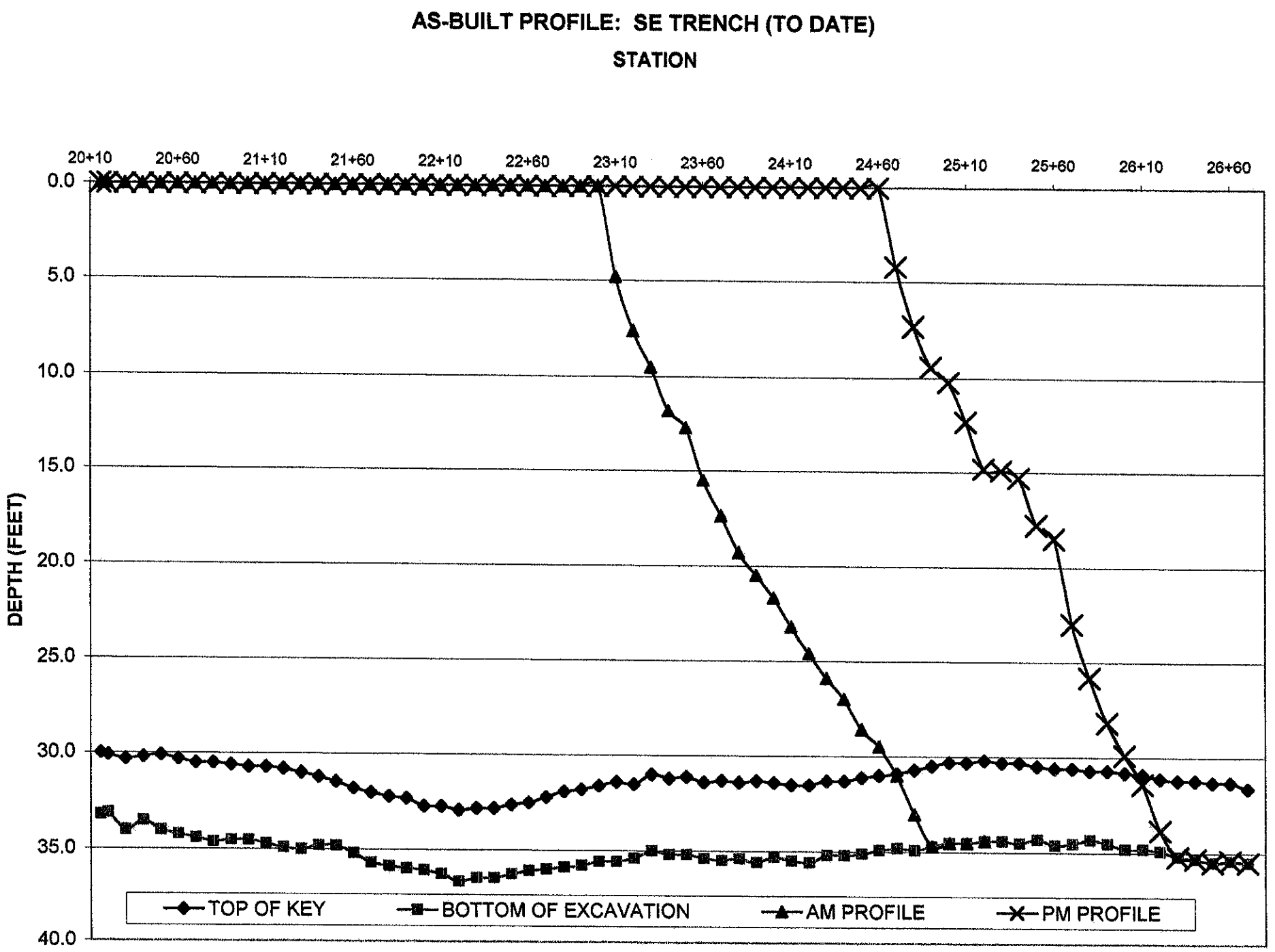
GEO-CON: Suzanne E. Sepic OWNER:

AS-BUILT PROFILE: NORTH TRENCH (12/22/03)




AS-BUILT PROFILE: NORTH TRENCH (TO DATE)
STATION
70+00
69+70
69+40
69+10
68+80
68+50
68+20
67+90
67+60
67+30
67+00
66+70
66+40
66+10
65+80
65+50
65+20
64+90
64+60
64+30
64+00
63+70
63+40
63+10
62+80
62+50
62+20
61+90
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (12/22/03)
STATION
23+00
23+50
24+00
24+50
25+00
25+50
26+00
26+50
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE)
STATION
20+10
20+60
21+10
21+60
22+10
22+60
23+10
23+60
24+10
24+60
25+10
25+60
26+10
26+60
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/22/03

NW Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	7:30	48	> 40 sec	64	> 64 pcf	8	6.5 - 10	16	< 20 cm^3	3
PM	14:15	42	> 40 sec	65	> 64 pcf	8	6.5 - 10	19	< 20 cm^3	5

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:00	45	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:15	62+40	2	56	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	42	< 25 cm^3	1.4	+40	MAX 30%
9:15	62+40	35	63	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	44	< 25 cm^3	1.8	+40	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:17	62+00	2	84	40 - 90 sec	104	64 - 95 pcf	8	6.5 - 10	68.5	< 25 cm^3	2.9	+40	MAX 30%
15:17	62+00	35	84	40 - 90 sec	99	64 - 95 pcf	8	6.5 - 10	55	< 25 cm^3	2.6	+40	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
64+50	2	2" to 6"	118.5	+15 pcf over trench slurry	3.72×10^{-8}	1.0×10^{-7} cm/sec
64+25	2	2" to 6"	118	+15 pcf over trench slurry	8.02×10^{-8}	1.0×10^{-7} cm/sec
64+00	2	2" to 6"	118.5	+15 pcf over trench slurry	7.45×10^{-8}	1.0×10^{-7} cm/sec
63+75	3	2" to 6"	120	+15 pcf over trench slurry	1.15×10^{-7}	1.0×10^{-7} cm/sec
63+50	3	2" to 6"	119	+15 pcf over trench slurry	1.15×10^{-7}	1.0×10^{-7} cm/sec
63+25	3	2" to 6"	119.5	+15 pcf over trench slurry	5.35×10^{-8}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NW Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 64+50, 64+25, 64+00, 63+75, 63+50, 63+25

Technician: RF/SM VBY SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.5cm, 7.0cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/conv. factor (1/14.65)
64+50	12/22/03	9:00-13:00	240	10	108.2128	559261.0644	—	5	3.72×10^{-8}	2.54×10^{-9}
64+25	12/22/03	9:00-13:00	240	10	100.4833	519313.7717	—	10	8.02×10^{-8}	5.47×10^{-9}
64+00	12/22/03	9:00-13:00	240	10	108.2128	559261.0644	—	10	7.45×10^{-8}	5.08×10^{-9}
63+75	12/22/03	18:00-6:00	720	10	117.2305	605865.9809	—	50	1.15×10^{-7}	7.85×10^{-9}
63+50	12/22/03	18:00-6:00	720	10	117.2305	605865.9809	—	50	1.15×10^{-7}	7.85×10^{-9}
63+25	12/22/03	18:00-6:00	720	10	100.4833	519313.7717	—	20	5.35×10^{-8}	3.65×10^{-9}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 12/22/03

SE Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

Trench

NU

DAMU

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:30	25+40	2	58	40 - 90 sec	94.5	64 - 95 pcf	8	6.5 - 10	32	< 25 cm^3	1.0	+40	MAX 30%
8:30	25+40	32	61	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	33	< 25 cm^3	1.3	+40	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
14:30	26+10	2	53	40 - 90 sec	94.5	64 - 95 pcf	8	6.5 - 10	41	< 25 cm^3	1.5	+40	MAX 30%
14:30	26+10	32	60	40 - 90 sec	94.5	64 - 95 pcf	8	6.5 - 10	35	< 25 cm^3	2.0	+40	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
23+25	3	2" to 6"	116	+15 pcf over trench slurry	2.38×10^{-7}	1.0×10^{-7} cm/sec
23+50	3	2" to 6"	116	+15 pcf over trench slurry	1.86×10^{-7}	1.0×10^{-7} cm/sec
23+75	3	2" to 6"	114.5	+15 pcf over trench slurry	3.35×10^{-7}	1.0×10^{-7} cm/sec
24+00	3	2" to 6"	115	+15 pcf over trench slurry	2.57×10^{-7}	1.0×10^{-7} cm/sec
24+25	3	2" to 6"	115.5	+15 pcf over trench slurry	2.19×10^{-7}	1.0×10^{-7} cm/sec
24+50	3	2" to 6"	115	+15 pcf over trench slurry	2.83×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

23+25, 23+50, 23+75,

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 24+00, 24+25, 24+50

Technician: RF/SM Rev SES

Sample Area: A= πr^2 $\pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.5cm, 6.0cm, 6.5cm 7.0cm, 7.0cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/conv. factor (1/14.60)
23+25	12/22/03	9:00-13:00	240	10	108.2128	559261.0644	—	32	2.38×10^{-7}	1.62×10^{-8}
23+50	12/22/03	9:00-13:00	240	10	117.2305	605865.9809	—	27	1.86×10^{-7}	1.27×10^{-8}
23+75	12/22/03	9:00-13:00	240	10	108.2128	559261.0644	—	45	3.35×10^{-7}	2.29×10^{-8}
24+00	12/22/03	18:00-6:00	720	10	100.4833	519313.7717	—	96	2.57×10^{-7}	1.75×10^{-8}
24+25	12/22/03	18:00-6:00	720	10	100.4833	519313.7717	—	82	2.19×10^{-7}	1.49×10^{-8}
24+50	12/22/03	18:00-6:00	720	10	100.4833	519313.7717	—	106	2.83×10^{-7}	1.93×10^{-8}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 23-Dec-03 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO P01-048 | P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
→ BF-045 (NW62+00)	SOIL ONLY	62+00	12/22/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-046 (SE26+00)	SOIL ONLY	26+00	12/22/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-047 (SE27+00)	SOIL ONLY	27+00	12/23/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ SB-053 (SE24+00)	SB BACKFILL**	24+00	12/22/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ SB-054 (NW64+00)	SB BACKFILL**	64+00	12/22/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

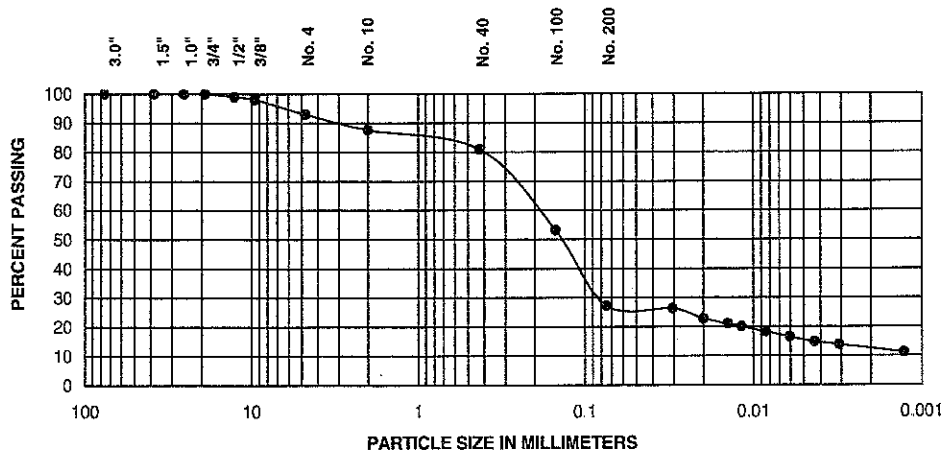
AM PICKUP

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-053	**Date Tested**	12/29/2003	**Tested by**	AK
						Qc by	SB

Date Sample Received:	12/23/2003
Sample Location	STA 24+00 (SE)
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	7.0	65.8	11.7	15.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	99.0
3/8"	98.1
No. 4	93.0
No. 10	87.7
No. 40	81.0
No. 100	53.2
No. 200	27.2

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
28	19	9

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

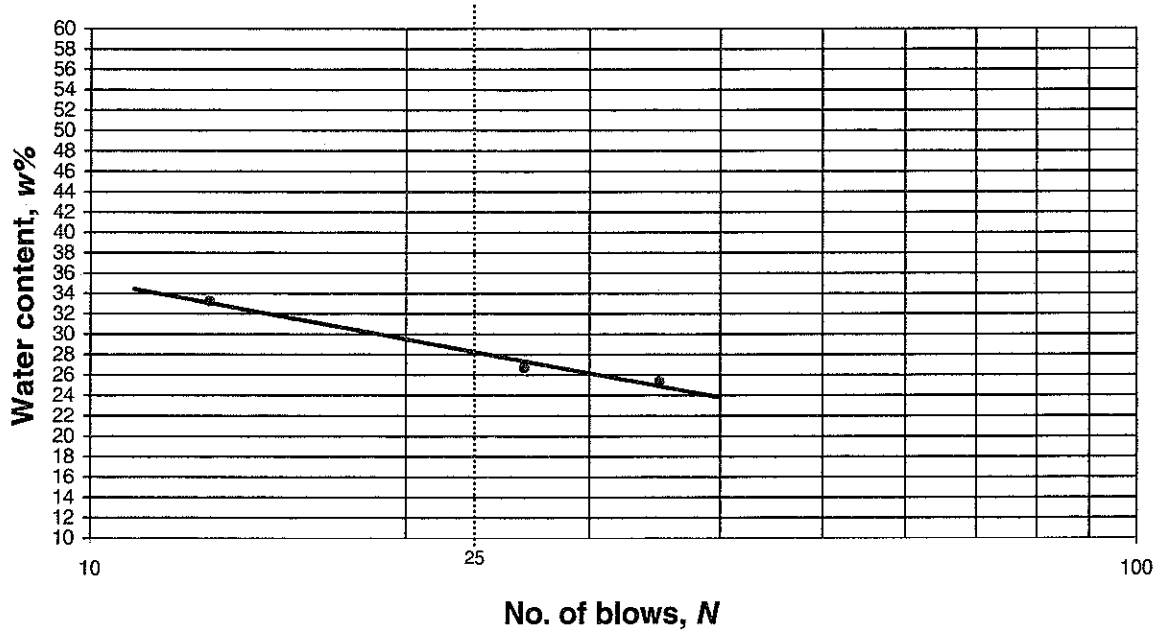
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.· Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-053	**Date Tested**	12/30/2003	**Tested By**	MA
						Qc By	SB

Date Sample Recd.	12/23/2003
Sample Location	STA 24+00 (SE)
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**28**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**9**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/29/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-053	Date Recd.	12/23/03	**Location**	STA 24+00 (SE)		
Sample Description	Gray silty, clayey sand, tr Gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.00	cm	Volume, V:	244.3	cu cm
Mass of Sample:	466.7	g	**Moisture Content:**	**25.4**	%
			Wet Density	**119.2**	**pcf**
			Dry Density	**95.0**	**pcf**

Final

Diameter:	7.04	cm	Area, A:	38.9	sq cm
Height, L:	5.42	cm	Volume, V:	211.0	cu cm
Mass of Sample:	442.70	g	**Moisture Content:**	**21.0**	%
			Wet Density	**130.9**	**pcf**
			Dry Density	**108.2**	**pcf**
			Deg of Saturation	**98.6**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.1	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/29/2003	8:30 AM	0	0	2.97	5.82		20.0	---
12/29/2003	9:15 AM	2700	2700	3.09	5.70	1.0	20.0	4.49E-08
12/29/2003	10:00 AM	2700	5400	3.18	5.61	1.0	20.0	3.40E-08
12/29/2003	10:45 AM	2700	8100	3.27	5.52	1.0	20.0	3.43E-08
12/29/2003	11:30 AM	2700	10800	3.35	5.44	1.0	20.0	3.08E-08

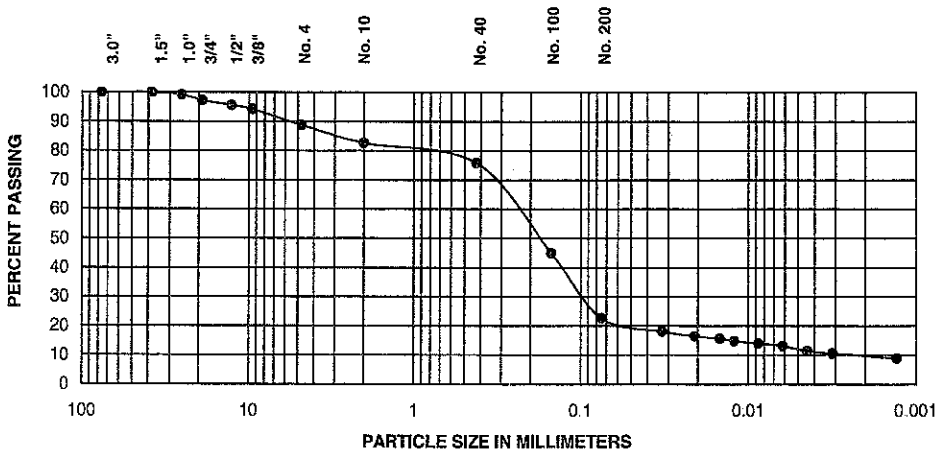
Average Permeability = **3.6E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-054	**Date Tested**	12/29/2003	**Tested by**	AK
						Qc by	SB

Date Sample Received:	12/23/2003
Sample Location	STA 64+00 (NW)
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.2	66.1	10.6	12.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	99.1
3/4"	97.3
1/2"	95.6
3/8"	94.2
No. 4	88.8
No. 10	82.6
No. 40	75.9
No. 100	44.9
No. 200	22.7

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
30	20	10

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

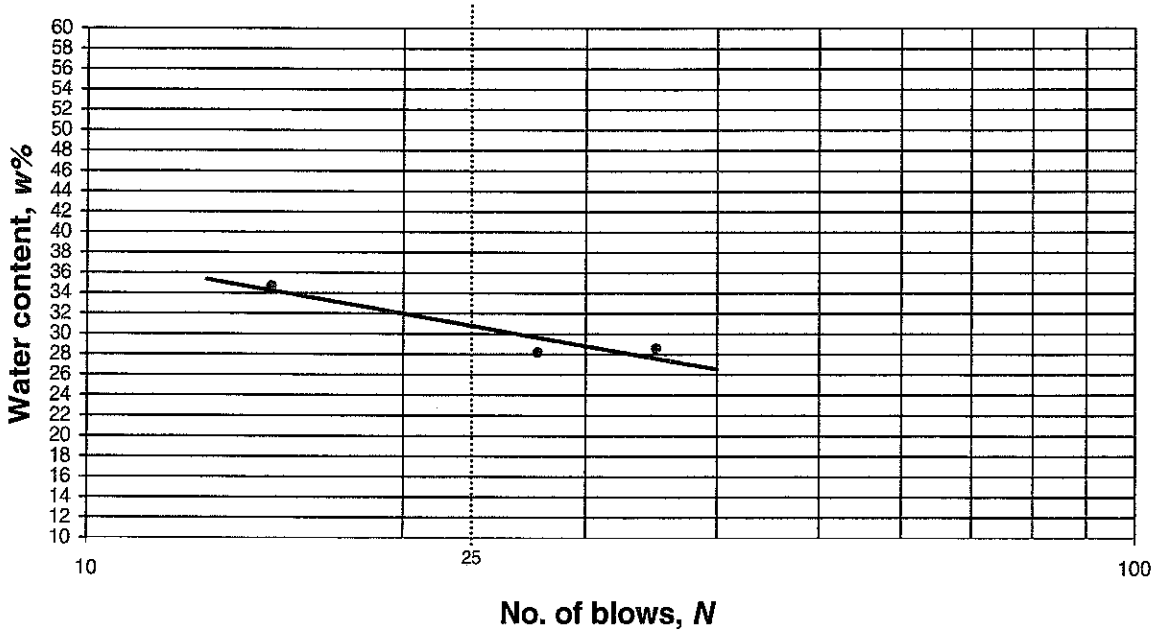
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-054	**Date Tested**	12/30/2003	**Tested By**	MA
						Qc By	SB

Date Sample Recd.	12/23/2003
Sample Location	STA 64+00 (NW)
Sample Description	Gray silty, clayey sand, tr Gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	30	**Plastic Limit, PL**	20	**Plasticity Index, PI**	10

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/29/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-054	Date Recd.	12/23/03	**Location**	STA 64+00 (NW)		
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.66	cm	Volume, V:	271.2	cu cm
Mass of Sample:	480.4	g	**Moisture Content:**	**24.3**	%
			Wet Density	**110.6**	**pcf**
			Dry Density	**88.9**	**pcf**

Final

Diameter:	6.96	cm	Area, A:	38.0	sq cm
Height, L:	5.71	cm	Volume, V:	217.2	cu cm
Mass of Sample:	457.10	g	**Moisture Content:**	**21.3**	%
			Wet Density	**131.3**	**pcf**
			Dry Density	**108.2**	**pcf**
			Deg of Saturation	**100.1**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	19.0	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/29/2003	8:30 AM	0	0	2.95	5.93		20.0	---
12/29/2003	9:15 AM	2700	2700	3.04	5.83	0.9	20.0	4.13E-08
12/29/2003	10:00 AM	2700	5400	3.12	5.75	1.0	20.0	3.33E-08
12/29/2003	10:45 AM	2700	8100	3.19	5.67	0.9	20.0	3.35E-08
12/29/2003	11:30 AM	2700	10800	3.26	5.59	0.9	20.0	3.38E-08

Average Permeability = **3.5E-08** cm/sec

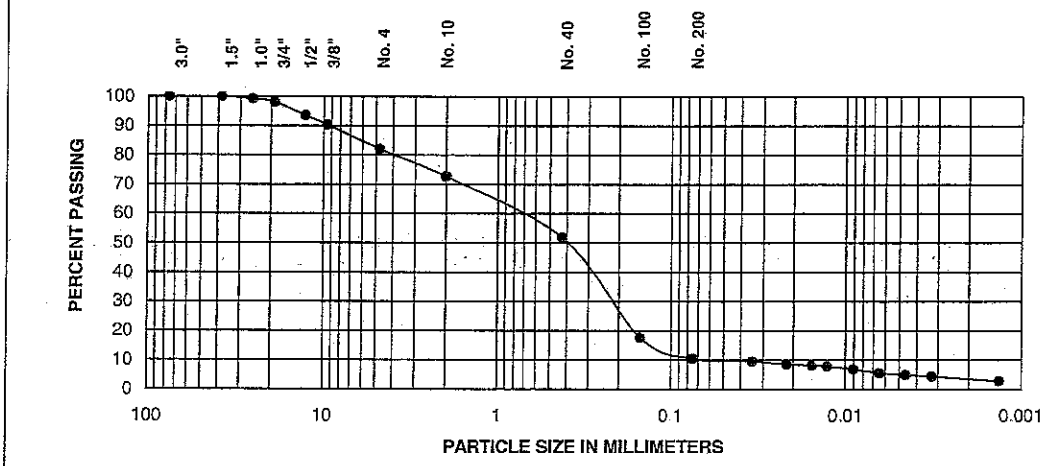
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-045	**Date Tested**	12/26/2003	**Tested by**	KM
						Qc by	NP

Date Sample Received:	12/23/2003
Sample Location	62 + 00 (NW)
Sample Description	Gray well graded sand with clay, gravel & foul smell (Soil only)



			Fines	
% +3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	18.0	71.6	5.3	5.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.77	0.22	0.05	14.8	1.17

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	99.3
3/4"	98.1
1/2"	93.6
3/8"	90.4
No. 4	82.0
No. 10	72.7
No. 40	51.9
No. 100	17.6
No. 200	10.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SW-SC
Soil Description:	Well-graded sand with clay and gravel
System:	USCS

Remarks:

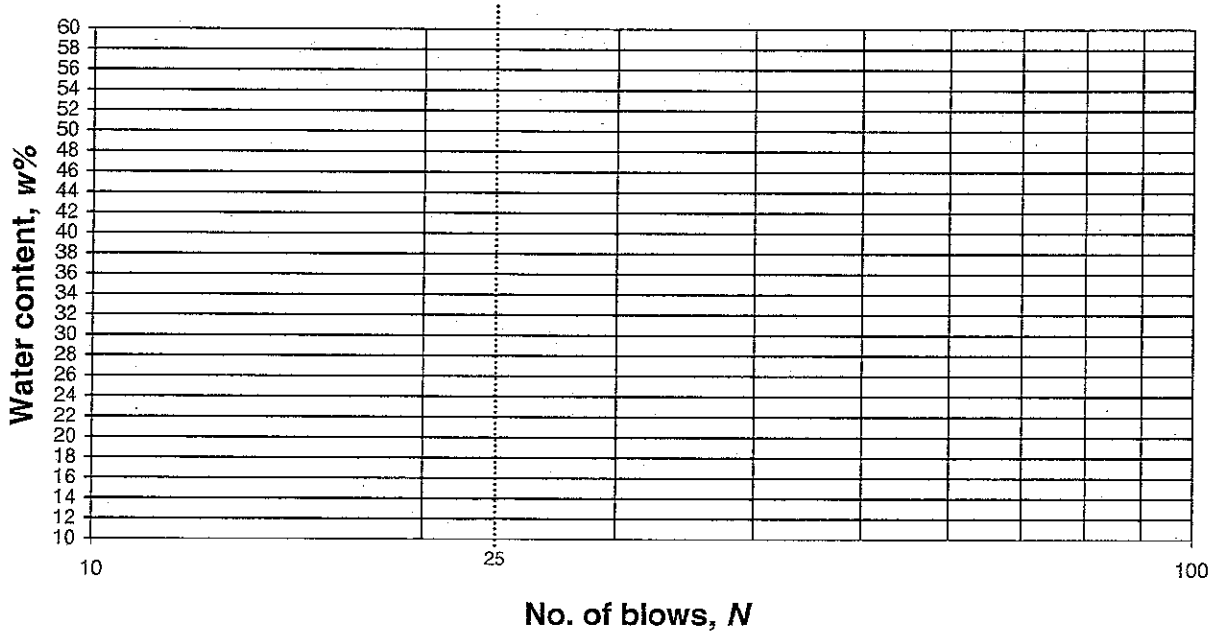
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-045	**Date Tested**	12/28/2003	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	12/23/2003
Sample Location	62 + 00 (NW)
Sample Description	Gray well graded sand with clay, gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	19	Date	12/23/2003	Sheet	1
				Date of weighing	12/24/2003	Tested by	ON

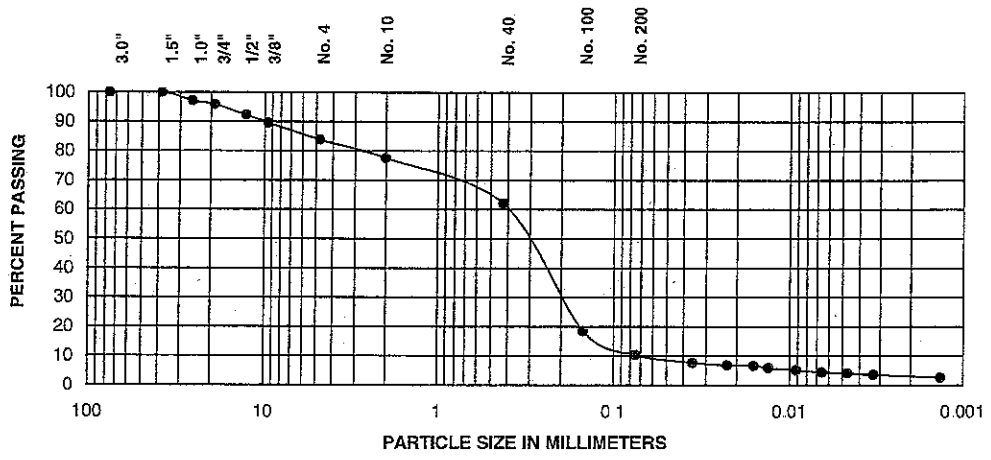
Boring No.	-	-	-			
Sample No.	BF-045	BF-046	BF-047			
Location	62 + 00 (NW)	26 + 00 (SE)	27 + 00 (SE)			
Tin No.	4C	73A	70A			
Tin + Wet Soil	137.92	138	137.5			
Tin + Dry Soil	123.98	124.69	123.35			
Wt. of Tin	31.38	30.09	30.32			
Wt. of Dry Soil	92.6	94.6	93.0			
Wt. of Water	13.9	13.3	14.2			
Moisture, %	15.1	14.1	15.2			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-046	**Date Tested**	12/26/2003	**Tested by**	KM
						Qc by	NP

Date Sample Received:	12/23/2003
Sample Location	26 + 00 (SE)
Sample Description	Gray well graded sand with clay, gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	16.1	73.5	6.2	4.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.40	0.20	0.07	6.0	1.43

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.2
3/4"	95.9
1/2"	92.3
3/8"	89.7
No. 4	83.9
No. 10	77.6
No. 40	62.1
No. 100	18.5
No. 200	10.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SW-SC
Soil Description:	Well-graded sand with clay and gravel
System:	USCS

Remarks:

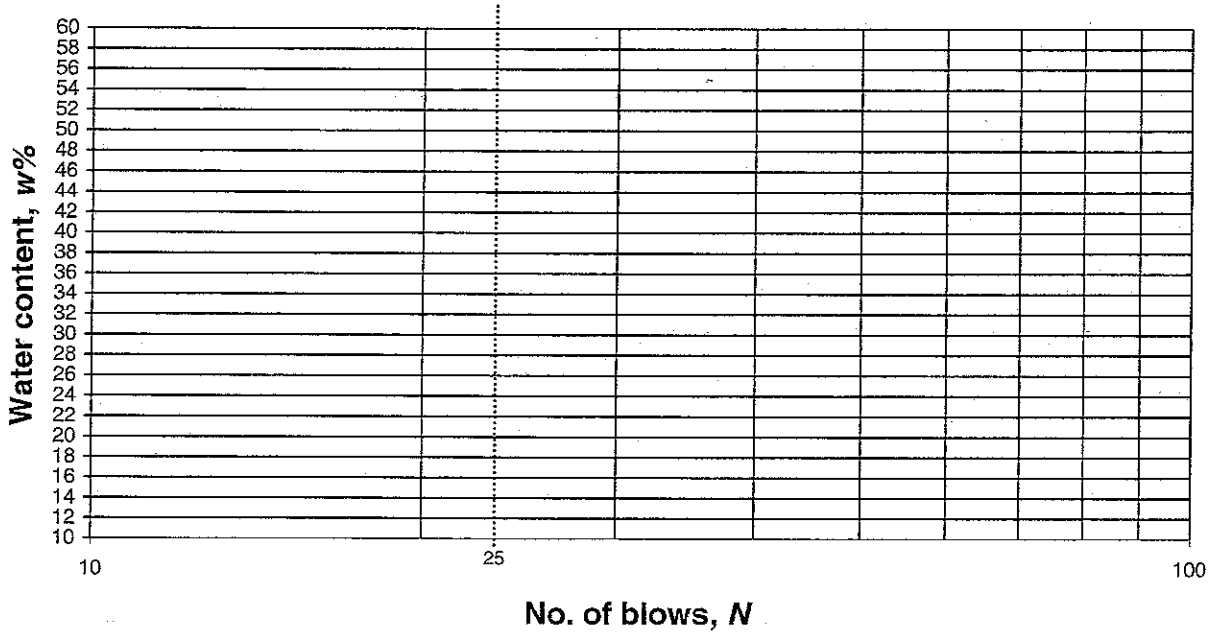
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-046	**Date Tested**	12/24/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/23/2003
Sample Location	26 + 00 (SE)
Sample Description	Gray well graded sand with clay, gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	19	Date	12/23/2003	Sheet	1
				Date of weighing	12/24/2003	Tested by	ON

Boring No.	-	-	-			
Sample No.	BF-045	BF-046	BF-047			
Location	62 + 00 (NW)	26 + 00 (SE)	27 + 00 (SE)			
Tin No.	4C	73A	70A			
Tin + Wet Soil	137.92	138	137.5			
Tin + Dry Soil	123.98	124.69	123.35			
Wt. of Tin	31.38	30.09	30.32			
Wt. of Dry Soil	92.6	94.6	93.0			
Wt. of Water	13.9	13.3	14.2			
Moisture, %	15.1	14.1	15.2			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

LABORATORY ANALYSIS CERTIFICATION

GP-101

GREYBULL PLANT

DATE TESTED 12/18/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HC1V006021	GEOCON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-19-03	YATES 9001	GREYBULL	OEL

Note Our data for the above shipment shown the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	55
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.4
> 75 micron (wt. %)	4.0 max.	1.8

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.5
Y.P. / P.V. Ratio	3.0 max.	1.23

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4696.

Signed 12/22/03 Date

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev E (8/99)

Arrived onsite 12/22/03
4000# jumbo bags

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/19/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146	GEO-CON E CHICAGO IN 46312
SALES ORDER NO.: 3C3V006029	

SHIPPING DATE:	RAIL CAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
12-19-03	FOWLER D4	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	48
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max	12.4
> 75 micron (wt. %)	4.0 max	1.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.9
Y.P. / P.V. Ratio	3.0 max.	1.30

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4004.

Signed 12/22/03 Date

Approved by: Plant Manager

LabanalCert.doc (4/22/97)
Rev E (2/99)

Arrived onsite 12/22/03

4000 # jumbo bags

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/23/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 24 - 41 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
61+70	2.00	93.00	+30.00	63.00	82.00	8
61+70	35.00	95.50	+30.00	73.00	88.00	8
61+50	2.00	93.00	+30.00	58.00	76.00	8
61+50	34.00	95.00	+30.00	69.00	85.00	8

NORTH TRENCH

COMMENTS: Trench filtrate losses are still high, but typical for trench slurry results. Sand content is too high due to trying to close up the trench for the Christmas break. Fresh slurry was pumped to this trench to try and bring the trench slurry back within specs.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
	NO SAMPLE COLLECTED TODAY. ONLY EXCAVATED ONE CUT.			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
63+25	3.00	N/A	N/A	N/A	3.72×10^{-8}	N/A
63+00	3.00	Sample collected	Sample collected	Sample collected	3.44×10^{-8}	yes
62+75	3.00	N/A	N/A	N/A	5.50×10^{-8}	N/A
62+50	3.00	N/A	N/A	N/A	1.15×10^{-7}	N/A
62+25	3.00	N/A	N/A	N/A	1.44×10^{-7}	N/A
62+00	3.00	Sample collected	Sample collected	Sample collected	1.68×10^{-7}	yes

COMMENTS

Filter cake: 3.7mm, 3.5mm, 3.1mm, and 3.2mm respectively.

Unit Weight:
63+25: 115.0 pcf
63+00: 119.0 pcf
62+75: 117.0 pcf
62+50: 114.5 pcf
62+25: 116.0 pcf
62+00: 115.5 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/23/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 24 - 41 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
26+70	2.00	89.00	+30.00	51.00	73.00	8
26+70	33.00	94.00	+30.00	58.50	84.00	8
27+00	2.00	89.00	+30.00	50.50	68.00	8
27+00	34.00	93.50	+30.00	55.00	77.00	8

SE TRENCH

COMMENTS: Trench filtrate losses are becoming high, but typical for trench slurry results. Sand content results and some unit weights are too high. Fresh slurry was pumped to this trench today to try and fix these problems.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
27+00	LAB SAMPLE COLLECTED 12/23/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
24+75	2.50	N/A	N/A	N/A	6.70×10^{-8}	N/A
25+00	2.50	Sample collected	Sample collected	Sample collected	1.23×10^{-7}	yes
25+25	2.50	N/A	N/A	N/A	1.12×10^{-7}	N/A
25+50	3.00	N/A	N/A	N/A	9.23×10^{-8}	N/A
25+75	3.00	N/A	N/A	N/A	1.27×10^{-7}	N/A
26+00	3.00	Sample collected	Sample collected	Sample collected	1.20×10^{-7}	yes

COMMENTS

Filter cake; 2.1mm, 3.0mm, 2.2mm and 2.9mm respectively.

Unit Weight:
- 24+75: 118.0 pcf
- 25+00: 118.5 pcf
- 25+25: 115.0 pcf
- 25+50: 117.0 pcf
- 25+75: 115.5 pcf
- 26+00: 114.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sipic **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/23/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
8:42	64.50	48.00	15.50	8

Filter cake is .3mm.

No PM samples were taken. Only a few batches of slurry were mixed to keep the slurry in the trench fresh over the holiday break. Trying to top out the trench with soil-bentonite backfill.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C Lepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/23/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 24 - 41 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
61+60	33.3	37.0	37.0	10.0	370.0	8.7	63+40	TOPOUT	TOPOUT
61+50	33.2	36.9	37.0	10.0	369.5	8.7	63+30	3.5	TOPOUT
61+40	33.3	36.9	36.9	10.0	369.0	8.4	63+20	6.8	TOPOUT
							63+10	9.9	TOPOUT
							63+00	17.5	TOPOUT
							62+90	21.6	TOPOUT
							62+80	24.1	TOPOUT
							62+70	26.4	TOPOUT
							62+60	27.6	TOPOUT
							62+50	29.1	TOPOUT
							62+40	29.9	TOPOUT
							62+30	30.5	TOPOUT
							62+20	31.6	TOPOUT
							62+10	32.3	12.2
							62+00	33.9	16.3
							61+90	35.1	18.1
							61+80	36.5	20.7
							61+70	36.9	21.8
							61+60		23.1
							61+50		23.7
							61+40		24.1

SF TODAY 1108.50

SF TO DATE 59995.00

COMMENTS

NORTH TRENCH

GEO-CON: Suzanne C. Sepo OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/23/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 24 - 41 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
26+80	31.9	35.8	35.7	10.0	356.5	5.2	24+60	TOPOUT	TOPOUT
26+90	31.8	35.8	35.8	10.0	358.0	7.0	24+70	4.6	TOPOUT
27+00	32.0	36.0	35.9	10.0	359.0	7.5	24+80	7.8	TOPOUT
27+10	32.1	36.2	36.1	10.0	361.0	7.1	24+90	9.2	TOPOUT
							25+00	10.5	TOPOUT
							25+10	12.4	TOPOUT
							25+20	15.0	TOPOUT
							25+30	15.1	TOPOUT
							25+40	15.5	TOPOUT
							25+50	17.9	TOPOUT
							25+60	18.7	TOPOUT
							25+70	23.1	TOPOUT
							25+80	25.7	TOPOUT
							25+90	28.0	TOPOUT
							26+00	29.5	TOPOUT
							26+10	31.0	TOPOUT
							26+20	33.2	TOPOUT
							26+30	35.2	TOPOUT
							26+40	35.3	TOPOUT
							26+50	35.5	TOPOUT
							26+60	35.4	TOPOUT
							26+70	35.5	9.8
							26+80		18.2
							26+90		27.4
							27+00		30.3
							27+10		34.6

SF TODAY 1434.50

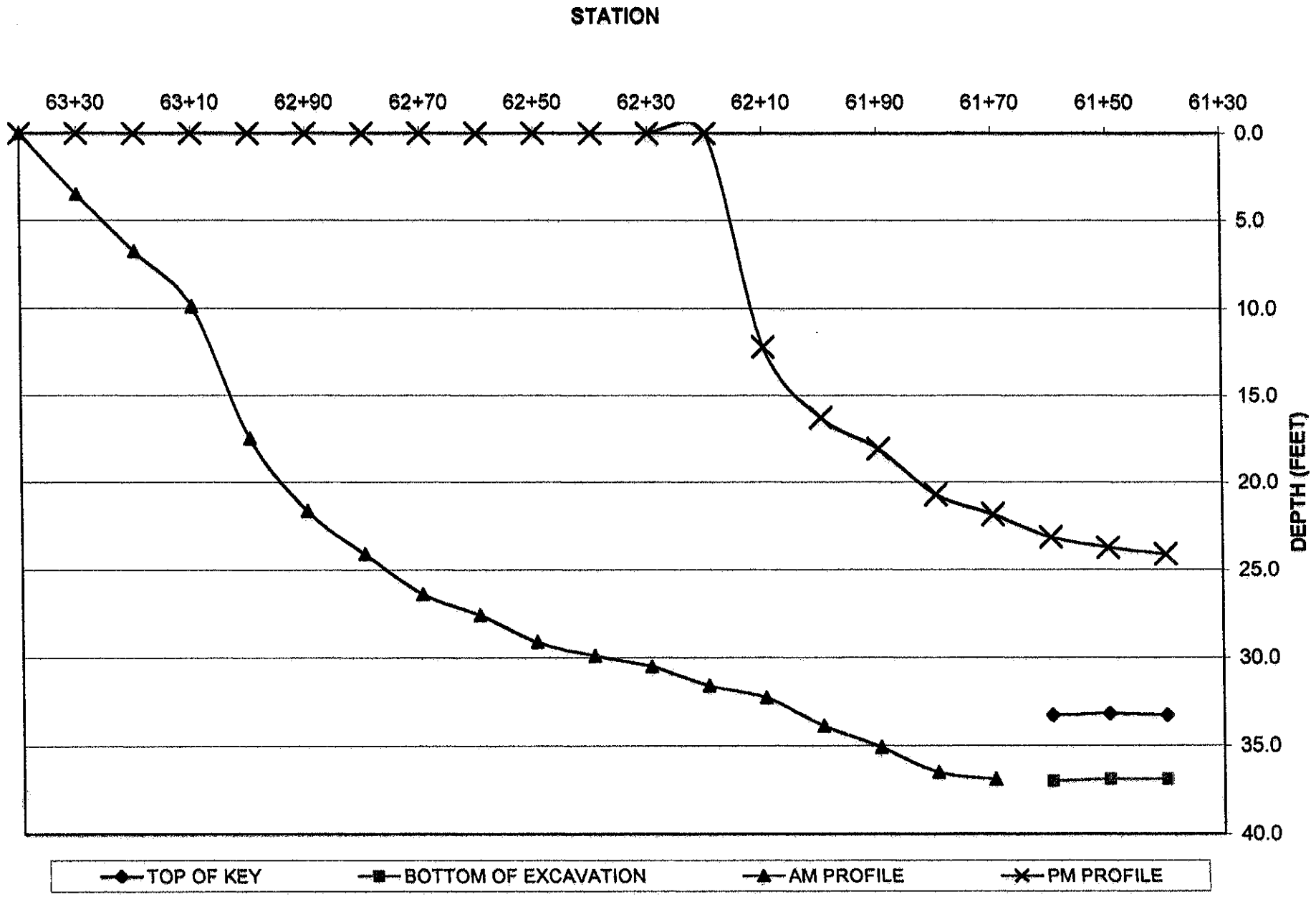
SF TO DATE 24956.22

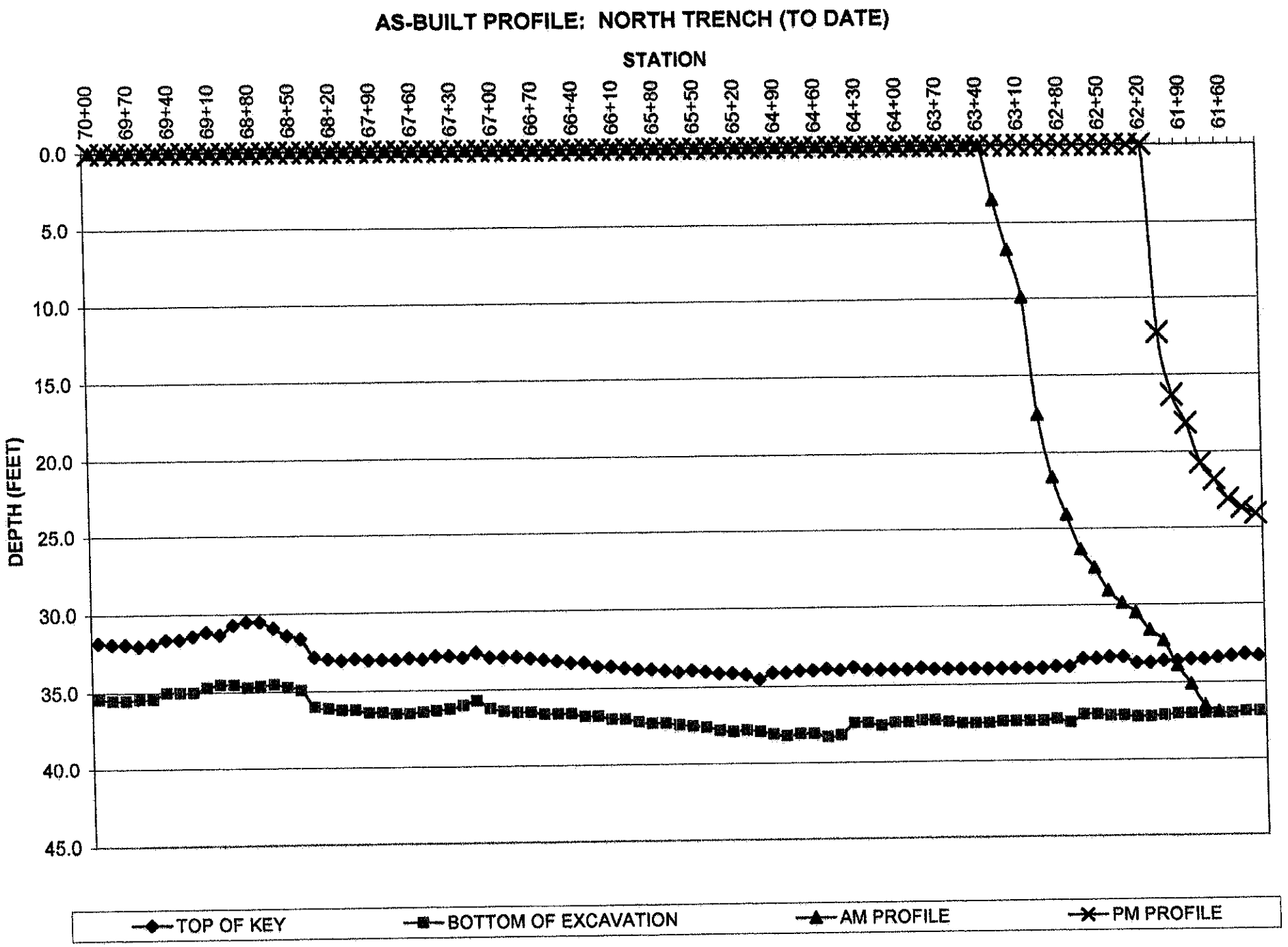
COMMENTS

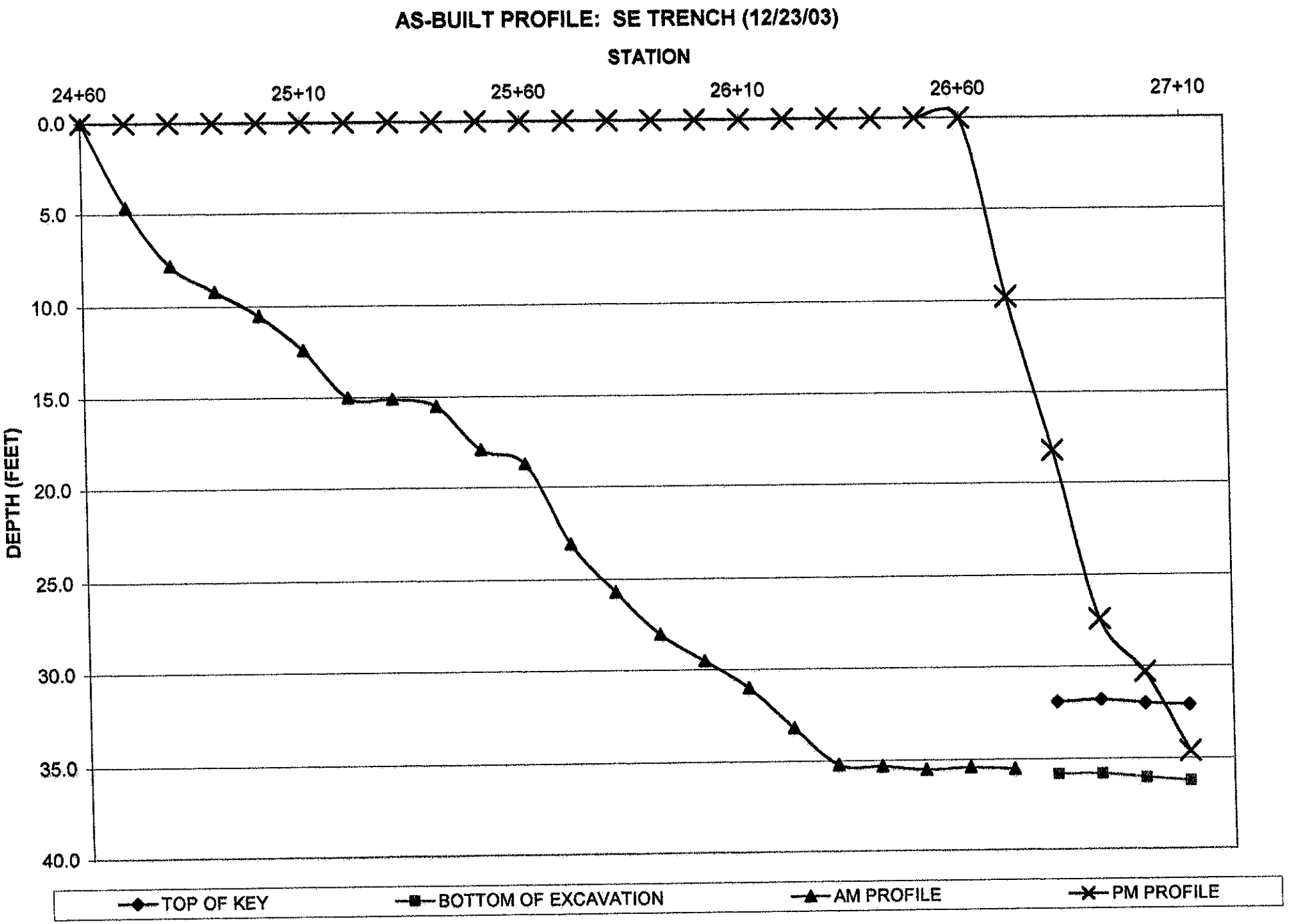
SE Trench

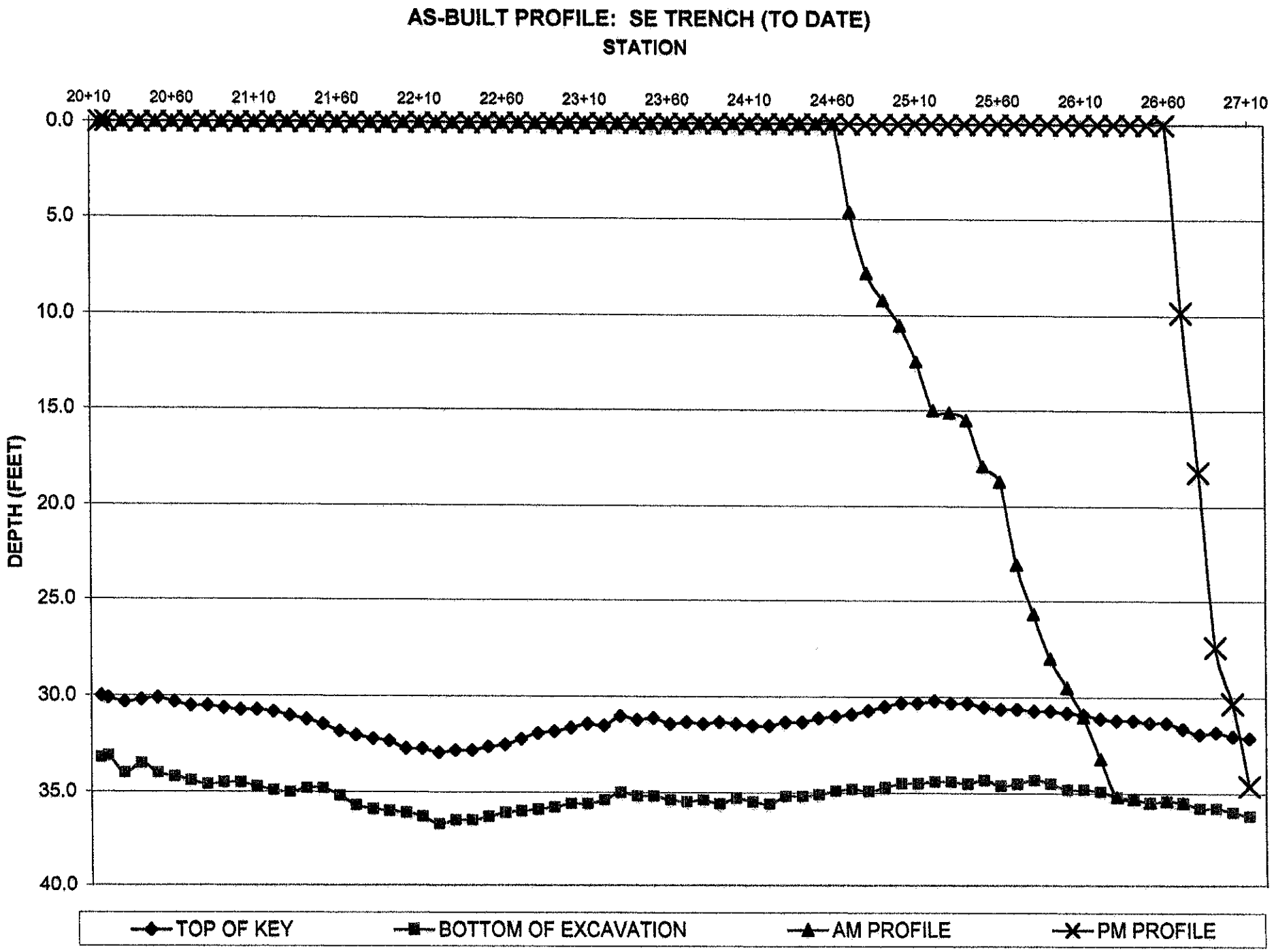
GEO-CON: Suzanne C. Sipe OWNER:

AS-BUILT PROFILE: NORTH TRENCH (12/23/03)




AS-BUILT PROFILE: NORTH TRENCH (TO DATE)
STATION
70+00
69+70
69+40
69+10
68+80
68+50
68+20
67+90
67+60
67+30
67+00
66+70
66+40
66+10
65+80
65+50
65+20
64+90
64+60
64+30
64+00
63+70
63+40
63+10
62+80
62+50
62+20
61+90
61+60
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (12/23/03)
STATION
24+60
25+10
25+60
26+10
26+60
27+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE)
STATION
20+10
20+60
21+10
21+60
22+10
22+60
23+10
23+60
24+10
24+60
25+10
25+60
26+10
26+60
27+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/23/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	8:42	48	> 40 sec	64.5	> 64 pcf	8	6.5 - 10	15.5	< 20 cm^3	.3
PM	—	—	> 40 sec	—	> 64 pcf	—	6.5 - 10	—	< 20 cm^3	—

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

N Trench

* No PM sample taken. Only a few batches of slurry mixed to keep slurry in the trench fresh over the holidays. Trying to top out trench with Backfill

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:05	61+70	2	82	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	63	< 25 cm^3	3.7	+30	MAX 30%
7:05	61+70	35	88	40 - 90 sec	95.5	64 - 95 pcf	8	6.5 - 10	73	< 25 cm^3	3.5	+30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
12:45	61+50	2	76	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	58	< 25 cm^3	3.1	+30	MAX 30%
12:45	61+50	34	85	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	69	< 25 cm^3	3.2	+30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
63+25	3	2" to 6"	115	+15 pcf over trench slurry	3.72×10^{-8}	1.0×10^{-7} cm/sec
63+00	3	2" to 6"	119	+15 pcf over trench slurry	3.44×10^{-8}	1.0×10^{-7} cm/sec
62+75	3	2" to 6"	117	+15 pcf over trench slurry	5.50×10^{-8}	1.0×10^{-7} cm/sec
62+50	3	2" to 6"	114.5	+15 pcf over trench slurry	1.15×10^{-7}	1.0×10^{-7} cm/sec
62+25	3	2" to 6"	116	+15 pcf over trench slurry	1.44×10^{-7}	1.0×10^{-7} cm/sec
62+00	3	2" to 6"	115.5	+15 pcf over trench slurry	1.68×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

N Trench

API QUICK PERMEABILITY TEST

63+25, 63+00, 62+75

Job: Indiana Harbor CDF S-B Cutoff Wall **Sta:** 62+50, 62+25, 62+00 **Technician:** SM/RF √BY SES

Sample Area: A = $\pi r^2 = \pi(3.85)^2 = 46.56$ **cm²** **Sample Height: L =** 6.5, 7.0, 7.0 (6.5, 6.0, 6.0) **cm**

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	Δ Q (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ conv factor (1/14.66)
63+25	12/23/03	7:00-11:00	240	10	108.2128	559261.0614	—	5	3.72×10^{-8}	$2.53 \times 10^{-}$
63+00	12/23/03	7:00-11:00	240	10	117.2305	605865.9809	—	5	3.44×10^{-8}	$2.35 \times 10^{-}$
62+75	12/23/03	7:00-11:00	240	10	117.2305	605865.9809	—	8	5.50×10^{-8}	$3.75 \times 10^{-}$
62+50	12/23/03	11:15-15:15	240	10	108.2128	559261.0614	—	15.5	1.15×10^{-7}	$7.85 \times 10^{-}$
62+25	12/23/03	11:15-15:15	240	10	100.4833	519313.7717	—	18	1.44×10^{-7}	9.83×10^{-7}
62+00	12/23/03	11:15-15:16	240	10	100.4833	519313.7717	—	21	1.68×10^{-7}	1.15×10^{-8}

$I = \frac{P\ (psi)}{0.014217\ L(cm)}$ $R = \frac{\text{Quick Test}}{\text{Triaxial Test}} = 1.85$

DAILY QC TESTS

DATE 12/23/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NW Trench

SE Trench

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:45	26+70	2	73	40 - 90 sec	89	64 - 95 pcf	8	6.5 - 10	51	< 25 cm^3	2.1	+30	MAX 30%
7:45	26+70	33	84	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	58.5	< 25 cm^3	3.0	+30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:00	27+00	2	68	40 - 90 sec	89	64 - 95 pcf	8	6.5 - 10	50.5	< 25 cm^3	2.2	+30	MAX 30%
13:00	27+00	34	77	40 - 90 sec	93.5	64 - 95 pcf	8	6.5 - 10	55	< 25 cm^3	2.9	+30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
24+75	2.5	2" to 6"	118	+15 pcf over trench slurry	6.70×10^{-8}	1.0×10^{-7} cm/sec
25+00	2.5	2" to 6"	118.5	+15 pcf over trench slurry	1.23×10^{-7}	1.0×10^{-7} cm/sec
25+25	2.5	2" to 6"	115	+15 pcf over trench slurry	1.12×10^{-7}	1.0×10^{-7} cm/sec
25+50	3	2" to 6"	117	+15 pcf over trench slurry	9.23×10^{-8}	1.0×10^{-7} cm/sec
25+75	3	2" to 6"	115.5	+15 pcf over trench slurry	1.27×10^{-7}	1.0×10^{-7} cm/sec
26+00	3	2" to 6"	114	+15 pcf over trench slurry	1.20×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE Trench

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff wall

Sta: 24+75, 25+00, 25+25, 25+50, 25+75, 26+00

Technician: RF/SM VBY SES

Sample Area: $A = \pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L = 6.5cm, 6.5cm, 7.0cm, 7.0cm, 6.5cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	$K = \frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/ correction factor (1/14.65)
24+75	12/23/03	7:00-11:00	240	10	108.2128	559261.0644	—	9	6.70×10^{-8}	4.57x10
25+00	12/23/03	7:00-11:00	240	10	108.2128	559261.0644	—	16.5	1.23×10^{-7}	8.40x10
25+25	12/23/03	7:00-11:00	240	10	100.4833	519313.7717	—	14	1.12×10^{-7}	7.64x10
25+50	12/23/03	11:15-15:15	240	10	100.4833	519313.7717	—	11.5	9.23×10^{-8}	6.30x10
25+75	12/23/03	11:15-15:15	240	10	108.2128	559261.0644	—	17	1.27×10^{-7}	8.67x10
26+00	12/23/03	11:15-15:15	240	10	100.4833	519313.7717	—	15	1.20×10^{-7}	8.19x10

$I = \frac{P\ (psi)}{0.014217\ L(cm)}$ $R = \frac{\text{Quick Test}}{\text{Triaxial Test}} = 1.85$

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 23-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-045 (NW62+00)	SOIL ONLY	62+00	12/22/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-046 (SE26+00)	SOIL ONLY	26+00	12/22/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ BF-047 (SE27+00)	SOIL ONLY	27+00	12/23/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-053 (SE24+00)	SB BACKFILL**	24+00	12/22/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-054 (NW64+00)	SB BACKFILL**	64+00	12/22/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

AM PICKUP

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 23-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
SB-055 (SE25+00)	SB BACKFILL**	25+00	12/23/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-056 (NW63+00)	SB BACKFILL**	63+00	12/23/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-057 (SE26+00)	SB BACKFILL**	26+00	12/23/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-058 (NW62+00)	SB BACKFILL**	62+00	12/23/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

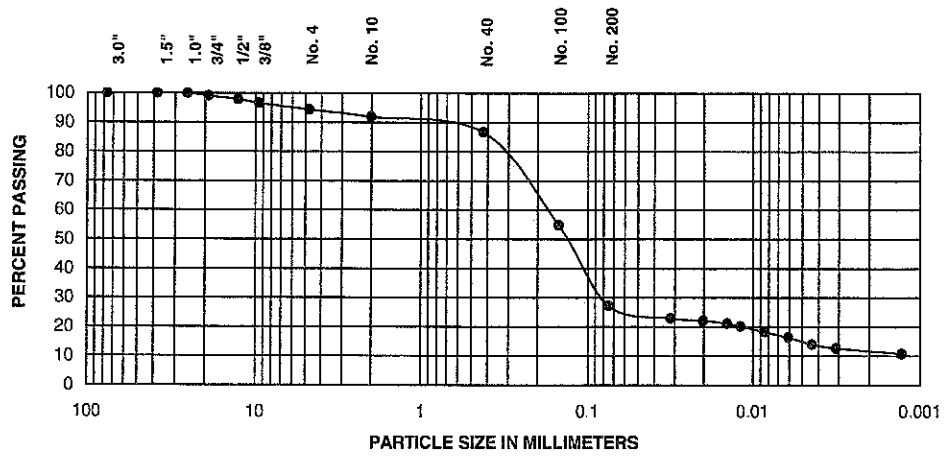
PM PICKUP

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-055	**Date Tested**	12/29/2003	**Tested by**	AK
						Qc by	SB

Date Sample Received:	12/24/2003
Sample Location	STA 25+00 (SE)
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	5.6	67.1	12.2	15.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.1
1/2"	97.9
3/8"	96.6
No. 4	94.4
No. 10	92.0
No. 40	86.7
No. 100	54.8
No. 200	27.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
28	18	10

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

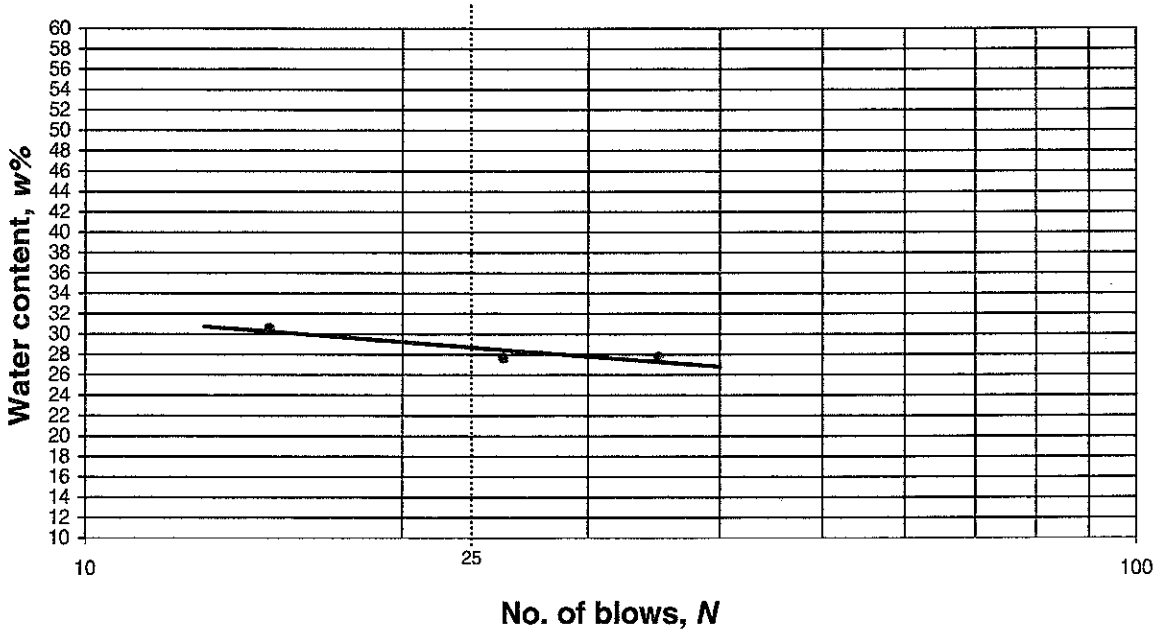
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-055	**Date Tested**	12/30/2004	**Tested By**	MA
						Qc By	SB

Date Sample Recd.	12/24/2003
Sample Location	STA 25+00 (SE)
Sample Description	Gray silty, clayey sand, tr Gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**28**	**Plastic Limit, PL**	**18**	**Plasticity Index, PI**	**10**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/29/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-055	Date Recd.	12/24/03	**Location**	STA 25+00 (SE)		
Sample Description	Gray silty, clayey sand, tr Gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	7.27	cm	Volume, V:	296.0	cu cm
Mass of Sample:	535.0	g	**Moisture Content:**	**24.9**	%
			Wet Density	**112.8**	**pcf**
			Dry Density	**90.3**	**pcf**

Final

Diameter:	6.97	cm	Area, A:	38.2	sq cm
Height, L:	6.57	cm	Volume, V:	250.7	cu cm
Mass of Sample:	522.40	g	**Moisture Content:**	**22.2**	%
			Wet Density	**130.0**	**pcf**
			Dry Density	**106.4**	**pcf**
			Deg of Saturation	**99.6**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	17.4	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/29/2003	8:30 AM	0	0	2.95	5.88		20.0	---
12/29/2003	9:15 AM	2700	2700	3.00	5.82	0.8	20.0	2.70E-08
12/29/2003	10:00 AM	2700	5400	3.05	5.76	0.8	20.0	2.72E-08
12/29/2003	10:45 AM	2700	8100	3.09	5.71	0.8	20.0	2.28E-08
12/29/2003	11:30 AM	2700	10800	3.13	5.67	1.0	20.0	1.83E-08

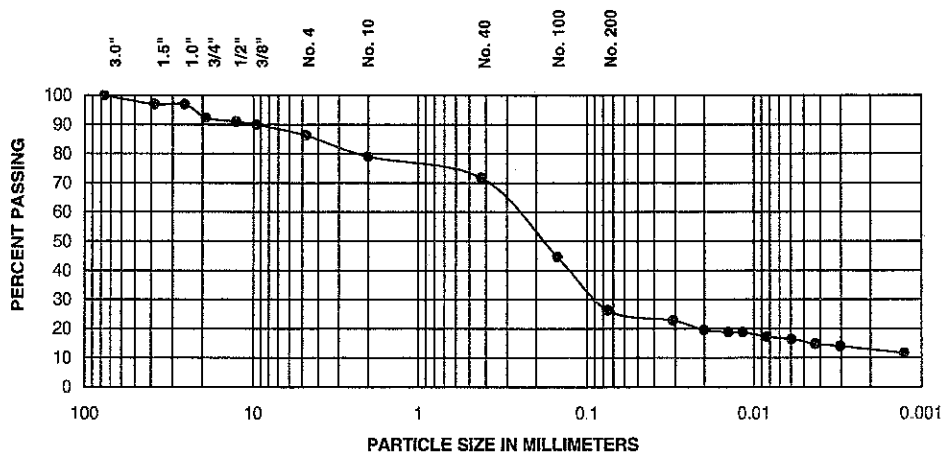
Average Permeability = **2.4E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-056	**Date Tested**	12/29/2003	**Tested by**	MA
						Qc by	SB

Date Sample Received:	12/24/2003
Sample Location	STA 63+00 (NW)
Sample Description	



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	13.8	59.9	10.9	15.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	97.0
1.0"	97.0
3/4"	92.3
1/2"	91.1
3/8"	90.0
No. 4	86.2
No. 10	79.1
No. 40	71.8
No. 100	44.6
No. 200	26.4

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
44	23	21

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

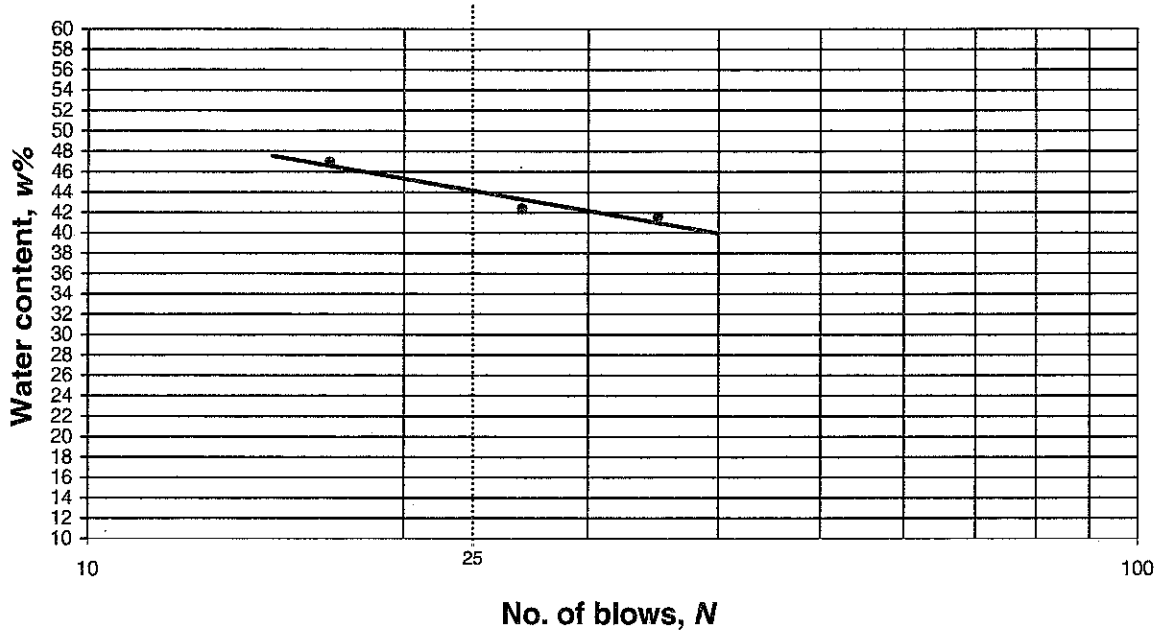
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-056	**Date Tested**	12/30/2004	**Tested By**	MA
						Qc By	SB

Date Sample Recd.	12/24/2003
Sample Location	STA 63+00 (NW)
Sample Description	

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**44**	**Plastic Limit, PL**	**23**	**Plasticity Index, PI**	**21**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/29/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-056	Date Recd.	12/24/03	**Location**	STA 63+00 (NW)		
Sample Description							

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	7.23	cm	Volume, V:	294.4	cu cm
Mass of Sample:	536.5	g	**Moisture Content:**	**29.1**	%
			Wet Density	**113.7**	**pcf**
			Dry Density	**88.1**	**pcf**

Final

Diameter:	6.99	cm	Area, A:	38.4	sq cm
Height, L:	6.80	cm	Volume, V:	260.9	cu cm
Mass of Sample:	526.50	g	**Moisture Content:**	**26.2**	%
			Wet Density	**125.9**	**pcf**
			Dry Density	**99.8**	**pcf**
			Deg of Saturation	**100.0**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	17.5	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/29/2003	8:30 AM	0	0	3.03	5.88		20.0	---
12/29/2003	9:15 AM	2700	2700	3.10	5.82	1.2	20.0	2.70E-08
12/29/2003	10:00 AM	2700	5400	3.16	5.76	1.0	20.0	2.72E-08
12/29/2003	10:45 AM	2700	8100	3.20	5.72	1.0	20.0	1.82E-08
12/29/2003	11:30 AM	2700	10800	3.24	5.68	1.0	20.0	1.83E-08

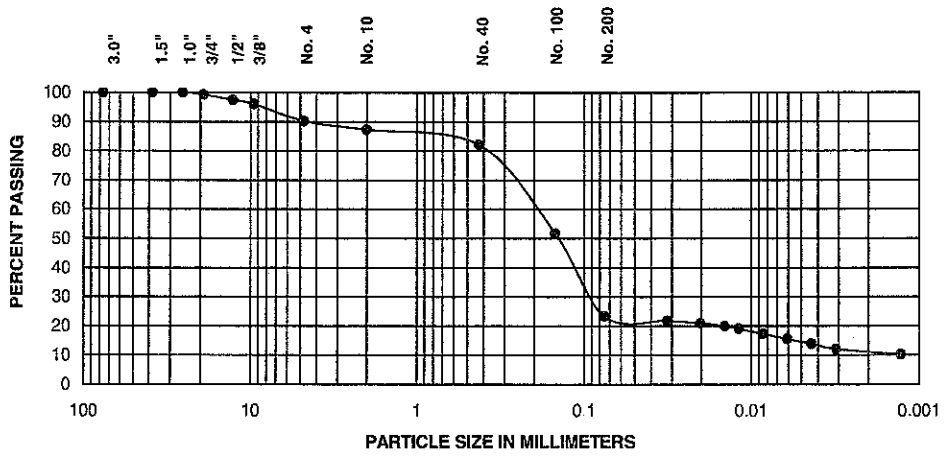
Average Permeability = **2.3E-08** **cm/sec**

Remarks:

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-057	**Date Tested**	12/29/2003	**Tested by**	MA
						Qc by	SB

Date Sample Received:	12/24/2003
Sample Location	STA 26+00 (SE)
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	9.7	66.9	8.8	14.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.3
1/2"	97.4
3/8"	96.1
No. 4	90.3
No. 10	87.3
No. 40	82.1
No. 100	51.8
No. 200	23.4

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
28	19	9

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

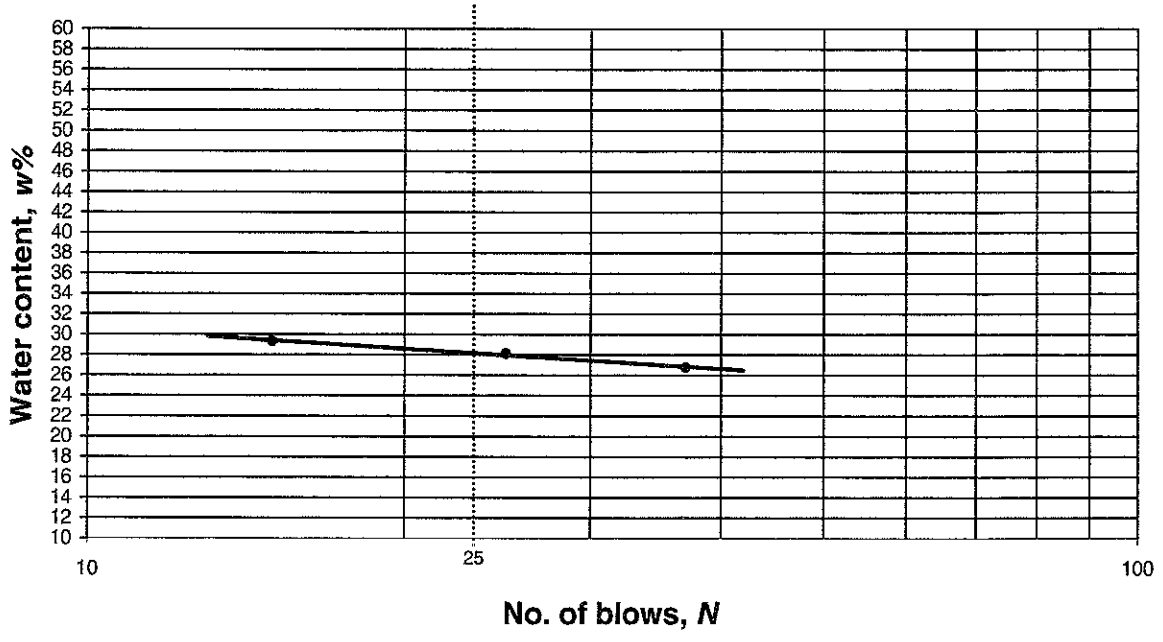
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-057	**Date Tested**	12/30/2003	**Tested By**	MA
						Qc By	SB

Date Sample Recd.	12/24/2003
Sample Location	STA 26+00 (SE)
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**28**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**9**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/29/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-057	Date Recd.	12/24/03	**Location**	STA 26+00 (SE)		
Sample Description	Gray silty, clayey sand, tr Gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.83	cm	Volume, V:	278.1	cu cm
Mass of Sample:	530.6	g	**Moisture Content:**	**23.1**	%
			Wet Density	119.1	pcf
			Dry Density	96.8	pcf

Final

Diameter:	6.99	cm	Area, A:	38.4	sq cm
Height, L:	6.42	cm	Volume, V:	246.4	cu cm
Mass of Sample:	513.50	g	**Moisture Content:**	**21.0**	%
			Wet Density	130.1	pcf
			Dry Density	107.5	pcf
			Deg of Saturation	96.8	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	18.5	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
12/29/2003	8:30 AM	0	0	2.99	5.91		20.0	---
12/29/2003	9:15 AM	2700	2700	3.03	5.87	1.0	20.0	1.69E-08
12/29/2003	10:00 AM	2700	5400	3.06	5.83	0.8	20.0	1.70E-08
12/29/2003	10:45 AM	2700	8100	3.10	5.79	1.0	20.0	1.70E-08
12/29/2003	11:30 AM	2700	10800	3.12	5.77	1.0	20.0	8.55E-09

Average Permeability = **1.5E-08** cm/sec

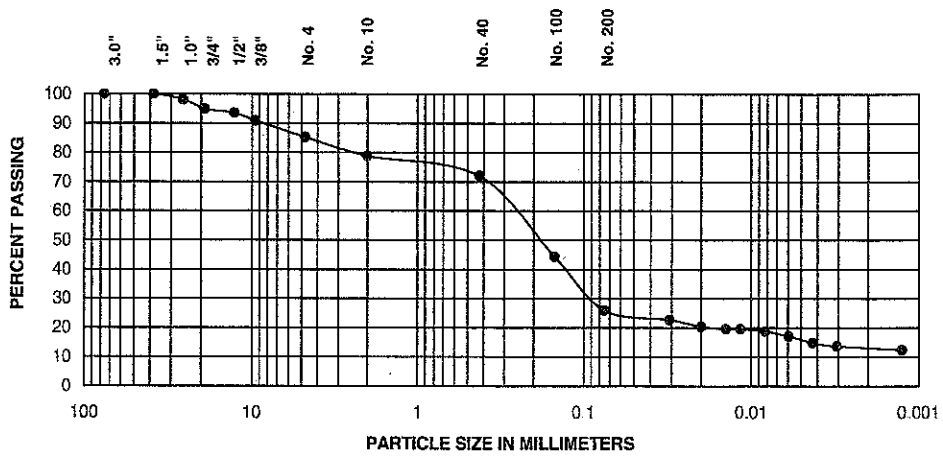
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-058	**Date Tested**	12/29/2003	**Tested by**	AK
						Qc by	SB

Date Sample Received:	12/24/2003
Sample Location	STA 62+00
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	14.7	59.3	10.0	16.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	98.1
3/4"	94.9
1/2"	93.6
3/8"	91.0
No. 4	85.3
No. 10	78.9
No. 40	72.1
No. 100	44.3
No. 200	26.0

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
48	21	27

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

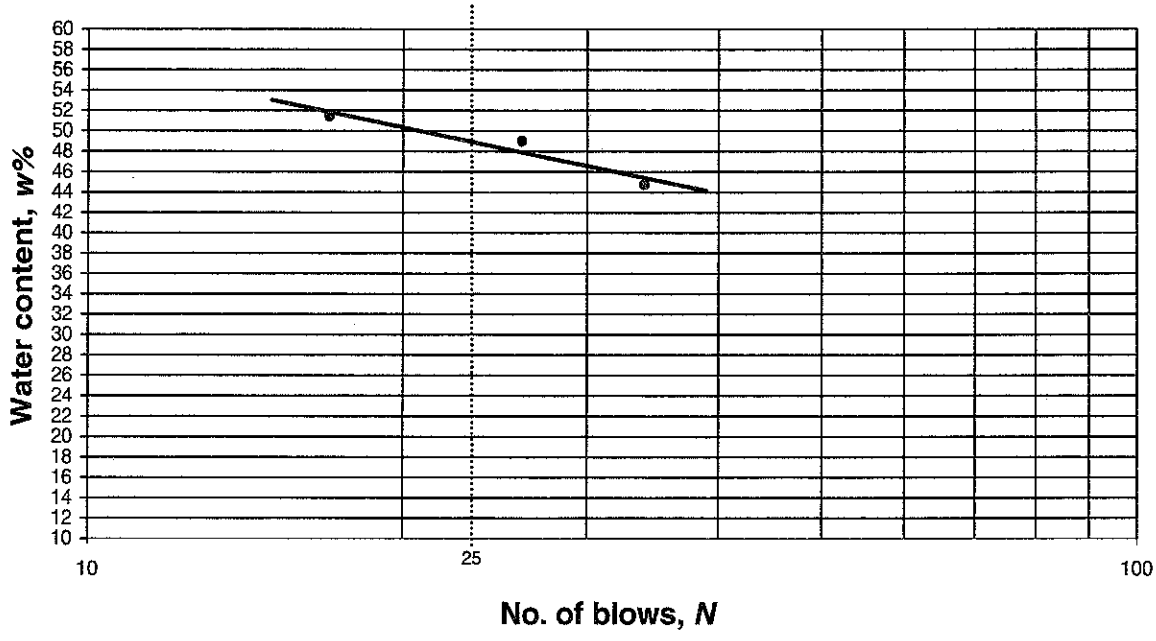
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-058	**Date Tested**	12/30/2004	**Tested By**	MP
						Qc By	SB

Date Sample Recd.	12/24/2003
Sample Location	STA 62+00
Sample Description	Gray silty, clayey sand, tr Gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**48**	**Plastic Limit, PL**	**21**	**Plasticity Index, PI**	**27**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	12/29/2003	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-058	Date Recd.	12/24/03	**Location**	STA 62+00		
Sample Description	Gray silty, clayey sand, tr Gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.12	cm	Volume, V:	249.2	cu cm
Mass of Sample:	440.3	g	**Moisture Content:**	**26.4**	%
			Wet Density	**110.3**	**pcf**
			Dry Density	**87.2**	**pcf**

Final

Diameter:	6.99	cm	Area, A:	38.4	sq cm
Height, L:	5.60	cm	Volume, V:	214.9	cu cm
Mass of Sample:	426.27	g	**Moisture Content:**	**29.6**	%
			Wet Density	**123.8**	**pcf**
			Dry Density	**95.5**	**pcf**
			Deg of Saturation	**102.1**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	20.7	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
12/29/2003	8:30 AM	0	0	3.07	6.00		20.0	---
12/29/2003	9:15 AM	2700	2700	3.25	5.85	1.2	20.0	5.72E-08
12/29/2003	10:00 AM	2700	5400	3.41	5.71	1.1	20.0	5.42E-08
12/29/2003	10:45 AM	2700	8100	3.55	5.58	1.1	20.0	5.10E-08
12/29/2003	11:30 AM	2700	10800	3.67	5.46	1.0	20.0	4.77E-08

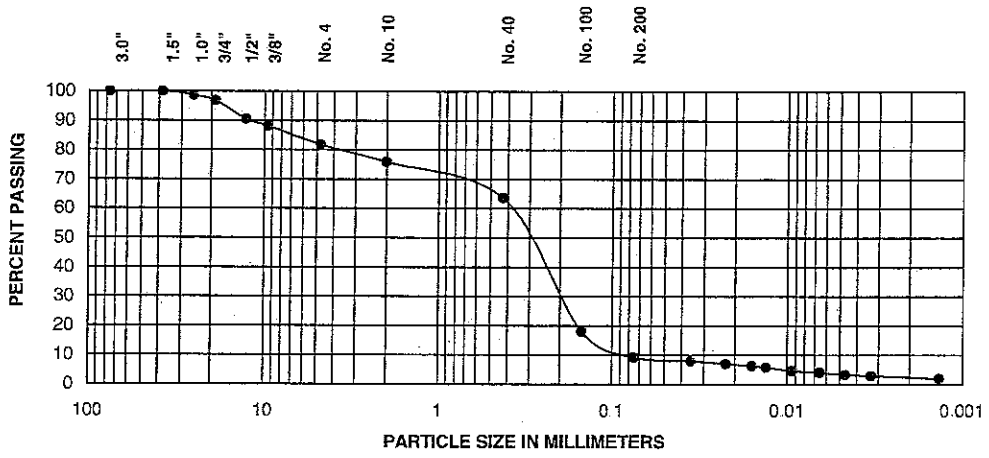
Average Permeability = **5.3E-08** cm/sec

Remarks:

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-047	**Date Tested**	12/26/2003	**Tested by**	KM
						Qc by	NP

Date Sample Received:	12/23/2003
Sample Location	27 + 00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	18.2	72.5	5.7	3.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.39	0.20	0.08	4.9	1.25

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.6
3/4"	96.8
1/2"	90.5
3/8"	88.2
No. 4	81.8
No. 10	75.9
No. 40	63.6
No. 100	18.1
No. 200	9.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

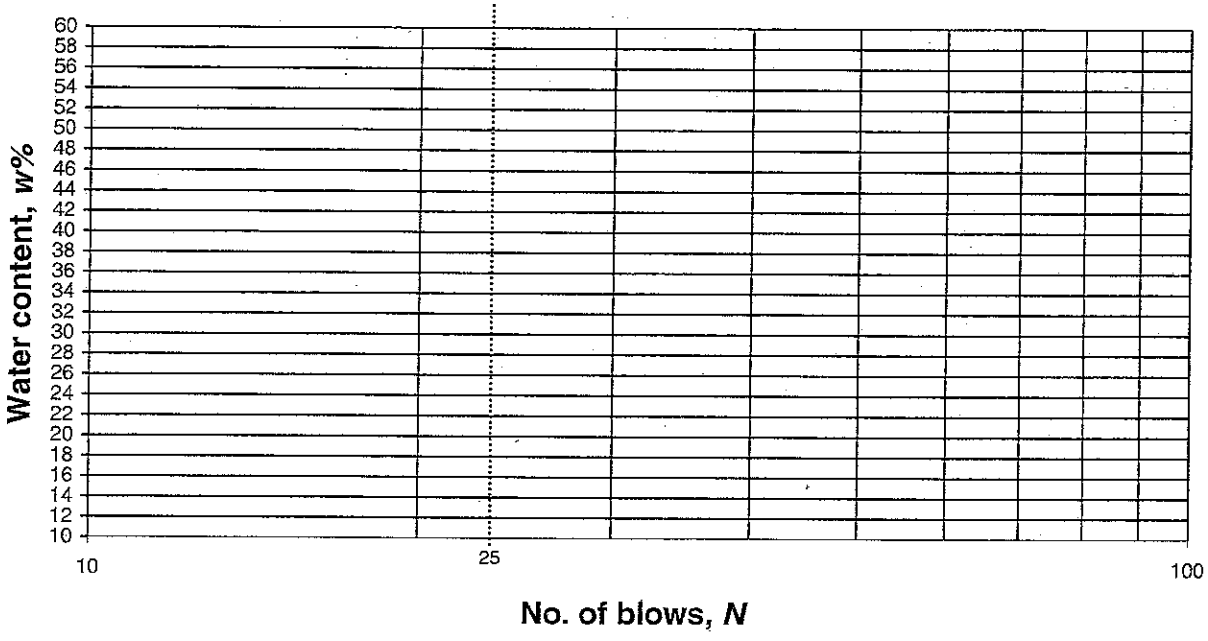
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-047	**Date Tested**	12/24/2003	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	12/23/2003
Sample Location	27 + 00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	19	Date	12/23/2003	Sheet	1
				Date of weighing	12/24/2003	Tested by	ON

Boring No.	-	-	-			
Sample No.	BF-045	BF-046	BF-047			
Location	62 + 00 (NW)	26 + 00 (SE)	27 + 00 (SE)			
Tin No.	4C	73A	70A			
Tin + Wet Soil	137.92	138	137.5			
Tin + Dry Soil	123.98	124.69	123.35			
Wt. of Tin	31.38	30.09	30.32			
Wt. of Dry Soil	92.6	94.6	93.0			
Wt. of Water	13.9	13.3	14.2			
Moisture, %	15.1	14.1	15.2			
Penetrometer	-	-	-			
Qu (tsf)	-	-	-			
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/29/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 26 - 42 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
61+30	2.00	96.50	+30.00	70.00	59.00	8
61+30	34.00	98.50	+30.00	74.00	74.00	8
61+10	2.00	96.50	25.00	34.00	57.00	8
61+10	36.00	98.00	+30.00	45.00	67.00	8

NORTH TRENCH

COMMENTS: Trench filtrate losses are still high, but typical for trench slurry results. Sand content and unit weights are too high. Fresh slurry was pumped to this trench to try and bring the trench slurry back within specs.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
61+00	LAB SAMPLE COLLECTED 12/29/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
62+00	4.00	Sample collected	Sample collected	Sample collected	6.88×10^{-7}	yes
61+75	4.00	N/A	N/A	N/A	4.26×10^{-7}	N/A
61+50	4.00	N/A	N/A	N/A	3.35×10^{-7}	N/A

COMMENTS

Filter cake: 2.5mm, 3.0mm, 1.2mm, and 1.6mm respectively.

Unit Weight: 62+00: 115.0 pcf
61+75: 118.0 pcf
61+50: 117.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepo OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/29/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 26 - 42 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
27+20	2.00	90.00	+30.00	34.00	79.00	8
27+20	34.00	101.00	+30.00	43.00	84.00	8
27+50	2.00	90.00	+30.00	33.00	64.00	8
27+50	34.00	95.00	+30.00	41.50	70.00	8

SE TRENCH

COMMENTS: Trench filtrate losses are becoming high, but typical for trench slurry results. Sand content results and some unit weights are too high. Fresh slurry was pumped to this trench today to try and fix these problems.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
27+50	LAB SAMPLE COLLECTED 12/29/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
26+75	3.00	N/A	N/A	N/A	1.24×10^{-7}	N/A
27+00	3.00	Sample collected	Sample collected	Sample collected	1.12×10^{-7}	yes
27+25	3.00	N/A	N/A	N/A	1.72×10^{-7}	N/A

COMMENTS

Filter cake: 1.0mm, 2.5mm, 1.0mm and 1.5mm respectively.

Unit Weight: 26+75: 118.0 pcf
27+00: 116.0 pcf
27+25: 120.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne C. Sepic **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/29/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
9:20	65.00	45.00	19.50	8
10:40	-	45.00	-	-
13:00	65.00	55.00	16.00	8
14:40	-	48.00	-	-

Filter cake is .2mm and .3mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	yes
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne C Sepe OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/29/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 26 - 42 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
61+30	32.9	36.8	36.9	10.0	368.5	8.1	62+20	TOPOUT	TOPOUT
61+20	33.0	36.7	36.8	10.0	367.5	7.9	62+10	14.3	8.2
61+10	32.9	38.2	37.5	10.0	374.5	6.8	62+00	17.0	12.8
61+00	33.0	39.8	39.0	10.0	390.0	6.7	61+90	18.9	18.3
							61+80	22.1	24.2
							61+70	23.0	27.3
							61+60	23.5	28.1
							61+50	23.7	29.5
							61+40	24.0	31.7
							61+30		33.2
							61+20		35.4
							61+10		38.2
							61+00		39.8

SF TODAY 1500.50

SF TO DATE 61495.50

COMMENTS

NORTH TRENCH

TRENCH BOTTOM AND BACKFILL SLOPE WERE CLEANED OUT THIS MORNING (LIKE EVERY MORNING) EXCESSIVELY WELL DUE TO SHUTDOWN OVER HOLIDAY.

GEO-CON: Suzanne C Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/29/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 26 - 42 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
27+20	32.2	36.0	36.1	10.0	361.0	5.2	26+60	TOPOUT	TOPOUT
27+30	32.2	36.1	36.1	10.0	360.5	4.0	26+70	12.4	TOPOUT
27+40	32.3	36.0	36.1	10.0	360.5	3.2	26+80	19.6	4.8
27+50	32.2	35.9	36.0	10.0	359.5	3.0	26+90	24.4	9.7
27+60	32.3	36.1	36.0	10.0	360.0	3.1	27+00	27.3	14.2
							27+10	29.9	18.3
							27+20		22.1
							27+30		28.7
							27+40		31.2
							27+50		34.9
							27+60		36.0

SF TODAY 1801.50

SF TO DATE 26757.72

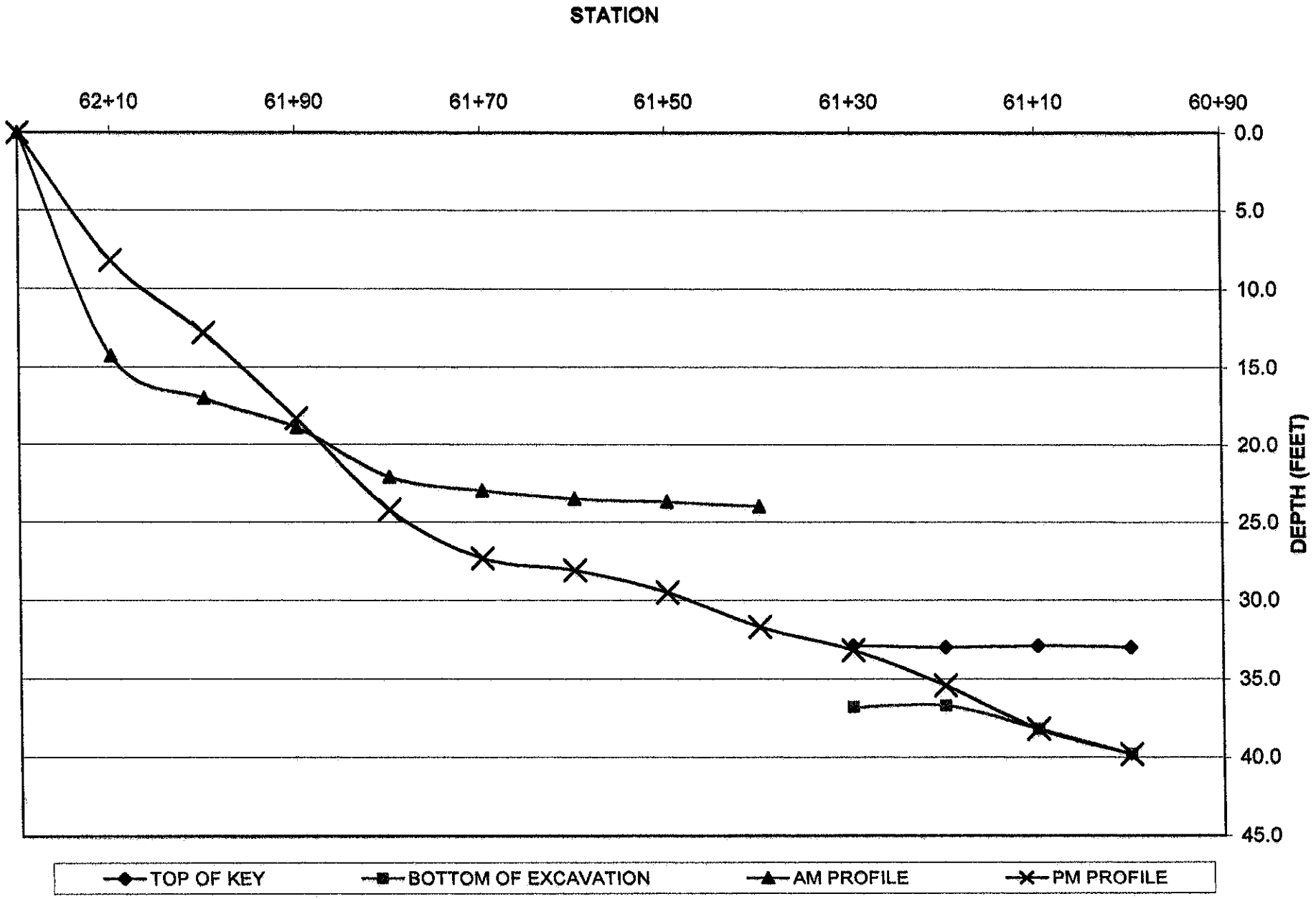
COMMENTS

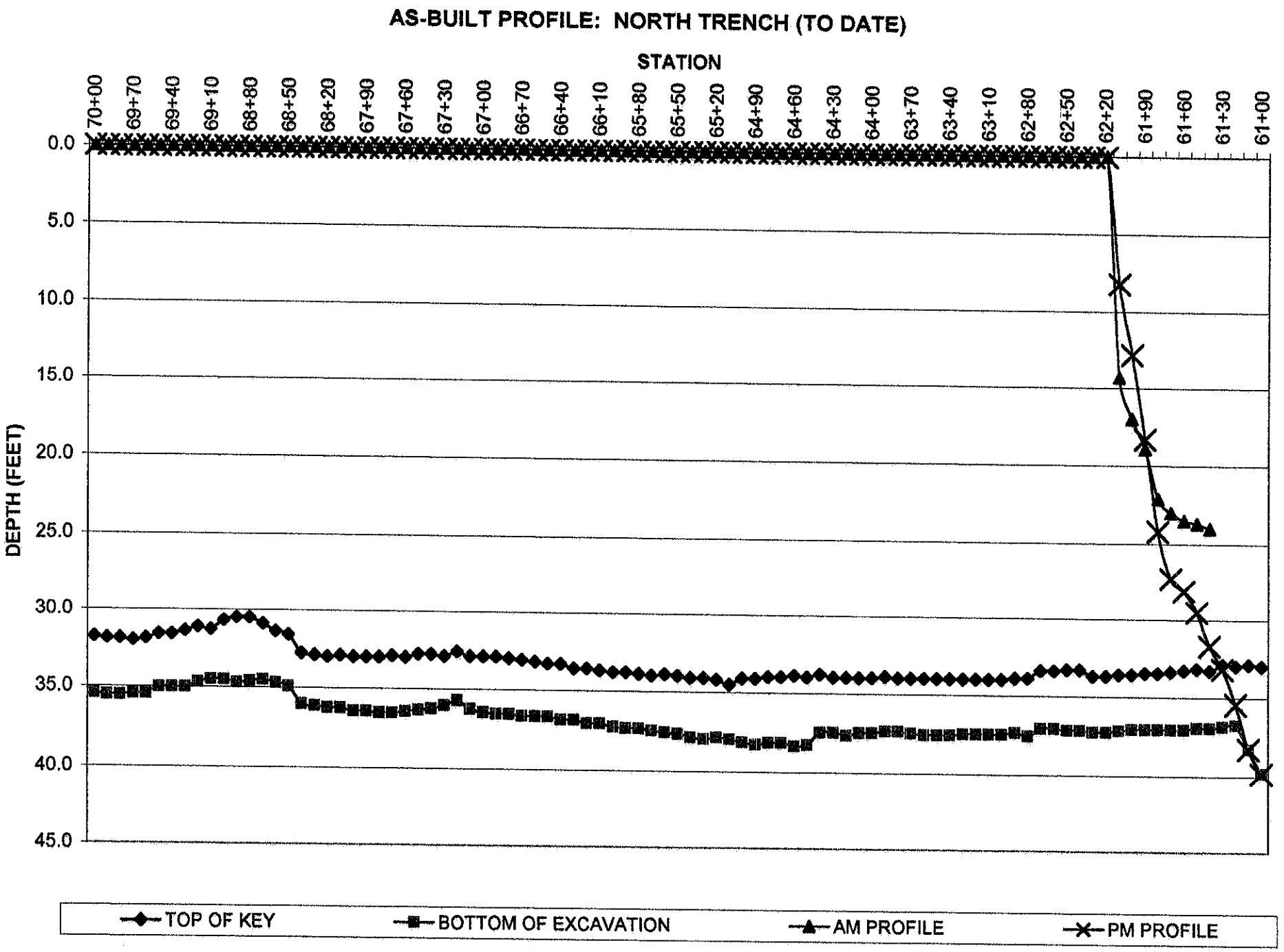
SE Trench

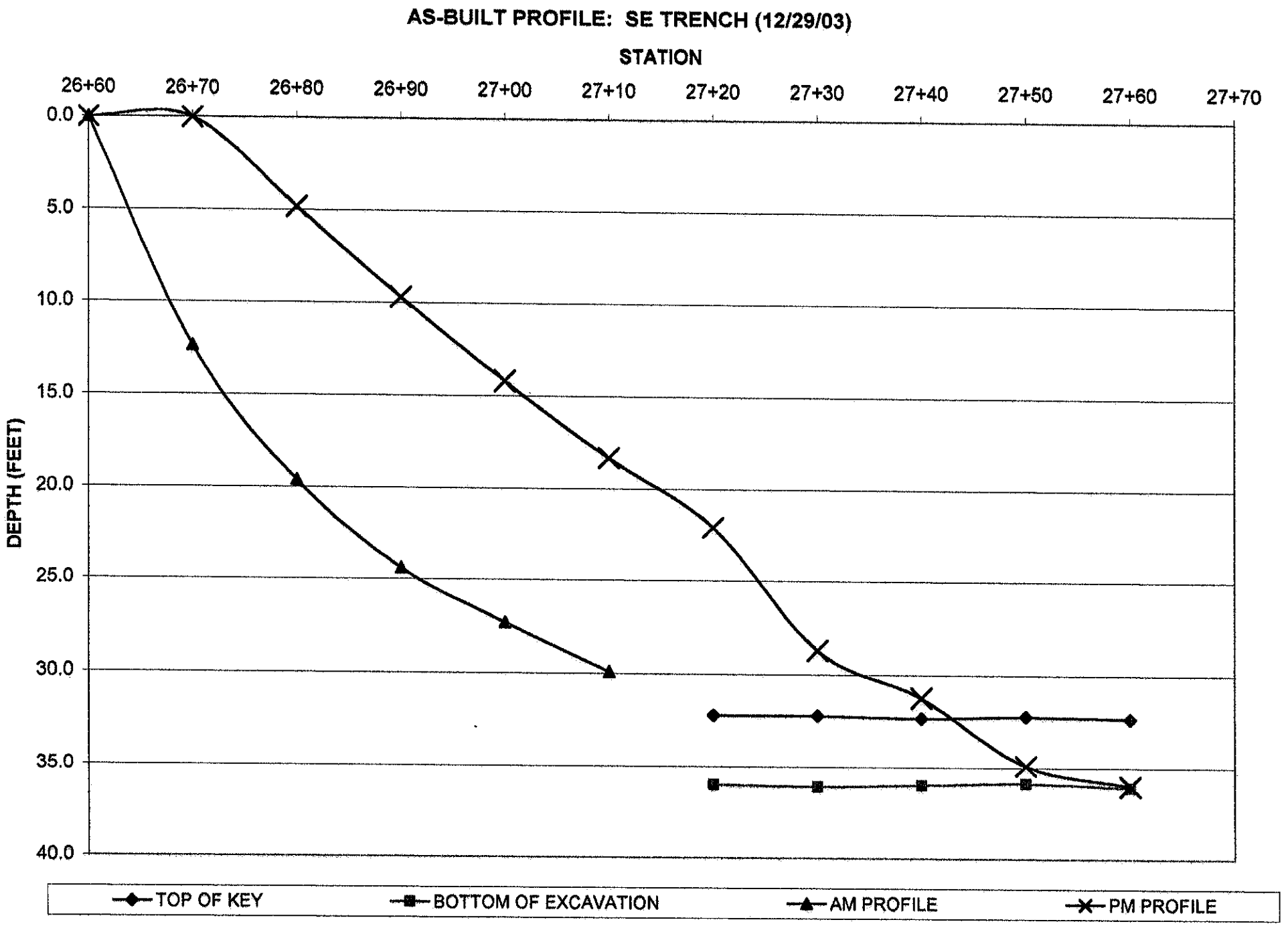
TRENCH BOTTOM AND BACKFILL SLOPE WERE CLEANED OUT THIS MORNING (LIKE EVERY MORNING) EXCESSIVELY WELL DUE TO SHUTDOWN OVER HOLIDAY.

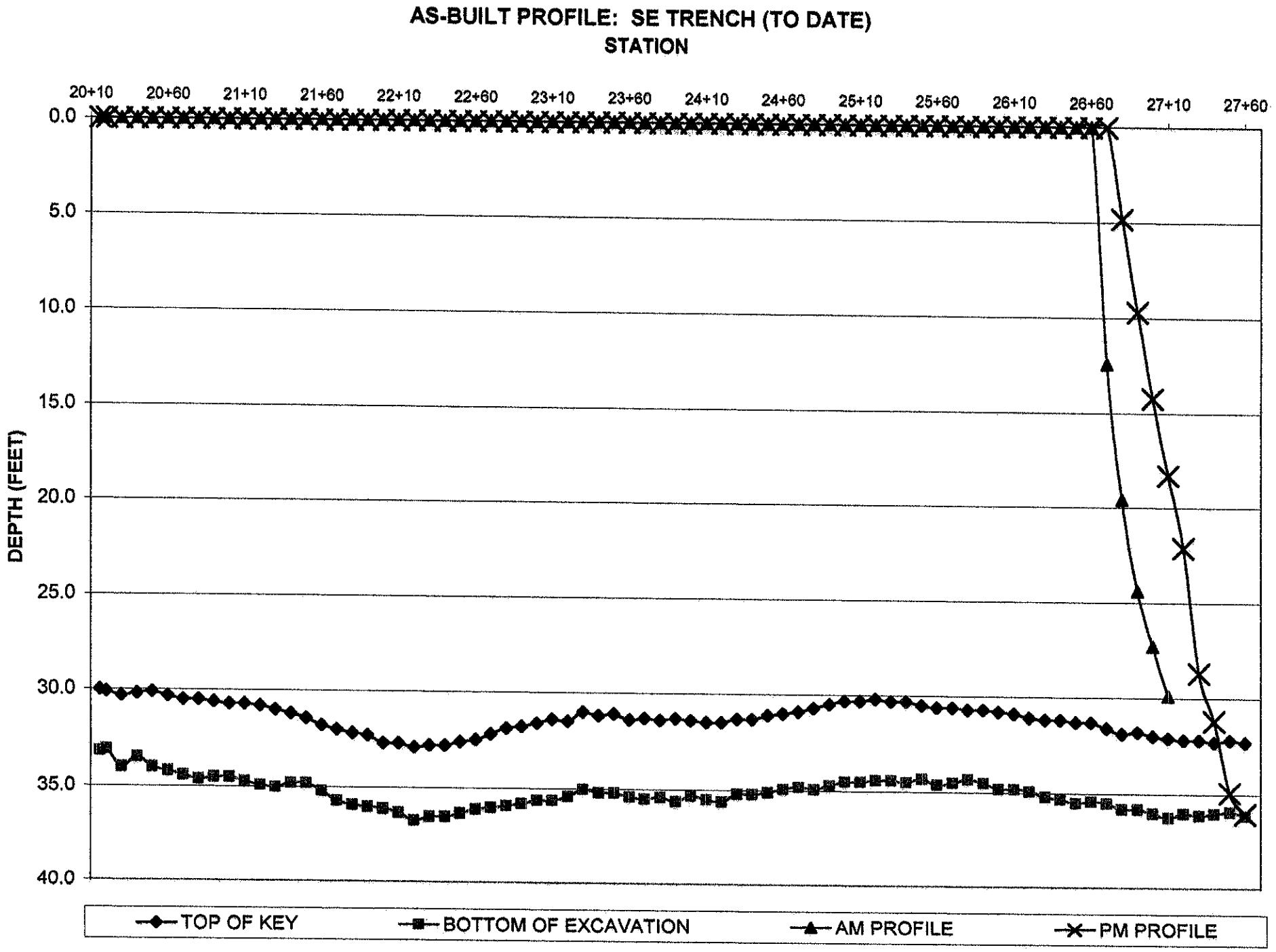
GEO-CON: Suzanne E. Sipic OWNER:

AS-BUILT PROFILE: NORTH TRENCH (12/29/03)




AS-BUILT PROFILE: NORTH TRENCH (TO DATE)
STATION
70+00
69+70
69+40
69+10
68+80
68+50
68+20
67+90
67+60
67+30
67+00
66+70
66+40
66+10
65+80
65+50
65+20
64+90
64+60
64+30
64+00
63+70
63+40
63+10
62+80
62+50
62+20
61+90
61+60
61+30
61+00
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (12/29/03)
STATION
26+60
26+70
26+80
26+90
27+00
27+10
27+20
27+30
27+40
27+50
27+60
27+70
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE)
STATION
20+10
20+60
21+10
21+60
22+10
22+60
23+10
23+60
24+10
24+60
25+10
25+60
26+10
26+60
27+10
27+60
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/29/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9:20	45	> 40 sec	65	> 64 pcf	8	6.5 - 10	19.5	< 20 cm^3	.2
PM	13:00	55	> 40 sec	65	> 64 pcf	8	6.5 - 10	16	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:40	45	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	14:40	48	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NEW Trench

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
11:45	61+30	2	59	40 - 90 sec	96.5	64 - 95 pcf	8	6.5 - 10	70	< 25 cm^3	2.5	+30	MAX 30%
11:45	61+30	34	74	40 - 90 sec	98.5	64 - 95 pcf	8	6.5 - 10	74	< 25 cm^3	3.0	+30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:11	61+10	2	57	40 - 90 sec	96.5	64 - 95 pcf	8	6.5 - 10	34	< 25 cm^3	1.2	25	MAX 30%
15:11	61+10	36	67	40 - 90 sec	98	64 - 95 pcf	8	6.5 - 10	45	< 25 cm^3	1.6	+30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
62+00	4	2" to 6"	115	+15 pcf over trench slurry	6.88×10^{-7}	1.0×10^{-7} cm/sec
61+75	4	2" to 6"	118	+15 pcf over trench slurry	4.26×10^{-7}	1.0×10^{-7} cm/sec
61+50	4	2" to 6"	117	+15 pcf over trench slurry	3.35×10^{-7}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

N ~~E~~ Trench

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall **Sta:** 62+00, 61+75, 61+50 **Technician:** SM / BY SES

Sample Area: A = $\pi r^2 = \pi(3.85)^2 = 46.56$ cm² **Sample Height:** L = 6.0cm, 6.0cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	Δ Q (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ conv. factor (1/14.65)
62+00	12/29/03	13:43-17:43	240	10	117.2305	605865.9809	—	100	6.88×10^{-7}	4.70×10^{-8}
61+75	12/29/03	13:43-17:43	240	10	117.2305	605865.9809	—	62	4.26×10^{-7}	2.91×10^{-8}
61+50	12/29/03	13:43-17:43	240	10	108.2128	559261.0614	—	45	3.35×10^{-7}	2.29×10^{-8}

I = P (psi) / 0.014217 L(cm) R = Quick Test / Triaxial Test = 1.85

DATE 12/29/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NW trench

Done

SE Trench

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
10:15	27+20	2	79	40 - 90 sec	90	64 - 95 pcf	8	6.5 - 10	34	< 25 cm^3	1.0	+30	MAX 30%
10:15	27+20	34	84	40 - 90 sec	101	64 - 95 pcf	8	6.5 - 10	43	< 25 cm^3	2.5	+30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
14:10	27+50	2	64	40 - 90 sec	90	64 - 95 pcf	8	6.5 - 10	33	< 25 cm^3	1.0	+30	MAX 30%
14:10	27+50	34	70	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	41.5	< 25 cm^3	1.5	+30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
26+75	3	2" to 6"	118	+15 pcf over trench slurry	1.24×10^{-7}	1.0×10^{-7} cm/sec
26 27+00	3	2" to 6"	116	+15 pcf over trench slurry	1.12×10^{-7}	1.0×10^{-7} cm/sec
27+25	3	2" to 6"	120	+15 pcf over trench slurry	1.72×10^{-7}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
						1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE Trench

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall **Sta:** 26+75, 27+00, 27+25 **Technician:** SM ✓BY SES

Sample Area: A = $\pi r^2 = \pi(3.85)^2 = 46.56$ cm² **Sample Height:** L = 6.0cm, 6.5cm, 6.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	Δ Q (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. factor (1/14.65)
26+75	12/29/03	13:43-17:43	240	10	117.2305	605865.9809	—	18	1.24×10^{-7}	8.46×10^{-9}
27+00	12/29/03	13:43-17:43	240	10	108.2128	559261.0614	—	~~25~~ 15	1.12×10^{-7}	7.64×10^{-9}
27+25	12/29/03	13:43-17:43	240	10	117.2305	605865.9809	—	25	1.72×10^{-7}	1.17×10^{-8}

I = P (psi) / 0.014217 L(cm) R = Quick Test / Triaxial Test = _____

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 30-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-048 (SE27+50)	SOIL ONLY	27+50	12/29/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-049 (NW61+00)	SOIL ONLY	61+00	12/29/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-059 (SE27+00)	SB BACKFILL**	27+00	12/29/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-060 (NW62+00)	SB BACKFILL**	62+00	12/29/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

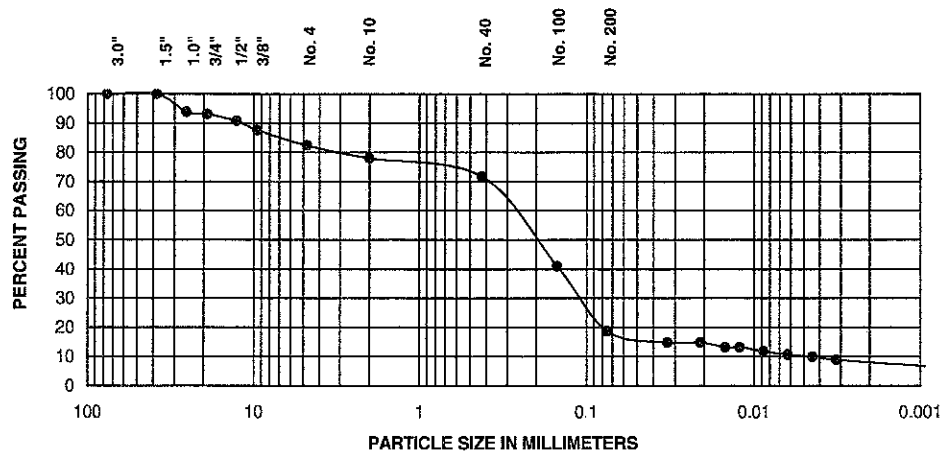
PM PICKUP

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-059	**Date Tested**	1/2/2004	**Tested by**	KM
						Qc by	SB

Date Sample Received:	12/30/2003
Sample Location	STA 27+00 (SE)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	17.6	63.6	8.6	10.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	93.8
3/4"	93.1
1/2"	90.8
3/8"	87.6
No. 4	82.4
No. 10	78.0
No. 40	71.8
No. 100	41.0
No. 200	18.7

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
26	19	7

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

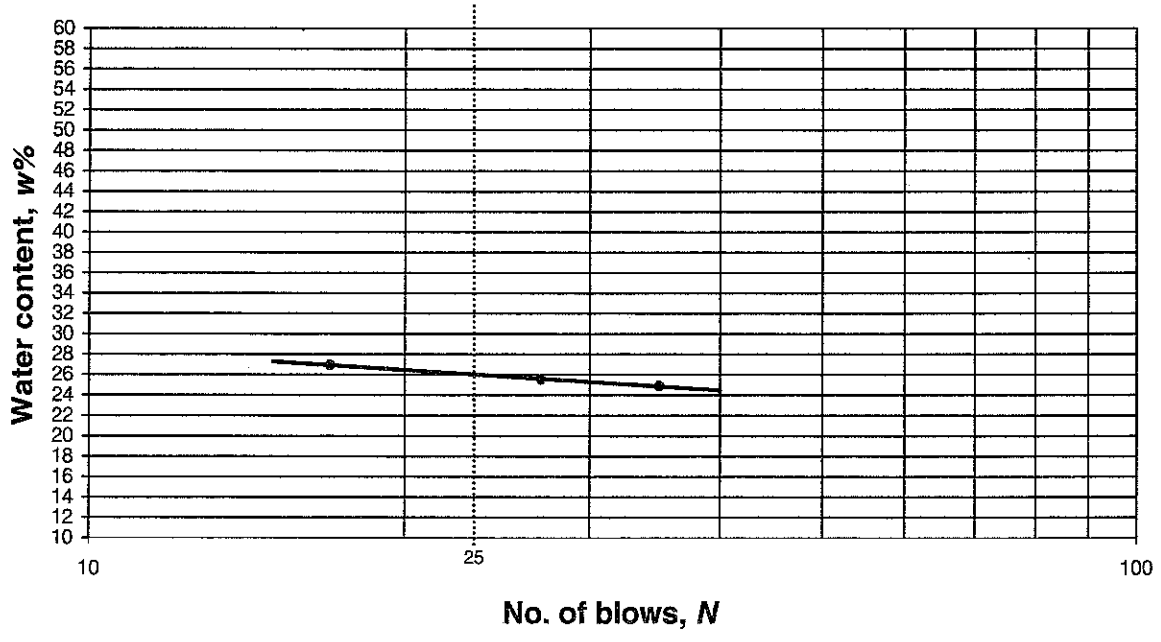
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-059	**Date Tested**	1/2/2004	**Tested By**	KM
						Qc By	SB

Date Sample Recd.	12/30/2003
Sample Location	STA 27+00 (SE)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**26**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**7**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/5/2004	**Tested by:**	SB	**QC by:**	
Sample ID:	SB-059	Date Recd.	12/30/03	**Location**	STA 27+00 (SE)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.91	cm	Volume, V:	240.6	cu cm
Mass of Sample:	451.1	g	**Moisture Content:**	**23.3**	%
			Wet Density	**117.0**	**pcf**
			Dry Density	**94.9**	**pcf**

Final

Diameter:	7.00	cm	Area, A:	38.5	sq cm
Height, L:	5.23	cm	Volume, V:	201.3	cu cm
Mass of Sample:	430.30	g	**Moisture Content:**	**21.4**	%
			Wet Density	**133.4**	**pcf**
			Dry Density	**109.9**	**pcf**
			Deg of Saturation	**104.9**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.4	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/5/2004	10:04 AM	0	0	3.01	5.95		20.0	---
1/5/2004	10:34 AM	1800	1800	3.11	5.85	1.0	20.0	5.50E-08
1/5/2004	11:04 AM	1800	3600	3.20	5.75	0.9	20.0	5.55E-08
1/5/2004	11:34 AM	1800	5400	3.30	5.67	1.2	20.0	4.48E-08
1/5/2004	12:04 PM	1800	7200	3.37	5.58	0.8	20.0	5.09E-08
1/5/2004	12:34 PM	1800	9000	3.45	5.51	1.1	20.0	3.99E-08

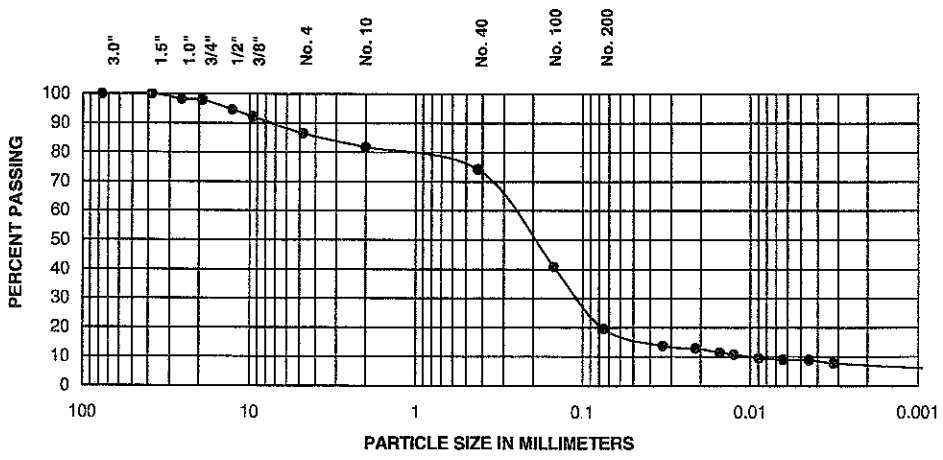
Average Permeability = **4.9E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-060	**Date Tested**	1/2/2004	**Tested by**	KM
						Qc by	SB

Date Sample Received:	12/30/2003
Sample Location	STA 62+00 (NW)
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	13.6	66.9	10.7	8.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	98.2
3/4"	97.9
1/2"	94.6
3/8"	92.2
No. 4	86.4
No. 10	81.8
No. 40	74.2
No. 100	40.8
No. 200	19.6

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
27	21	6

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

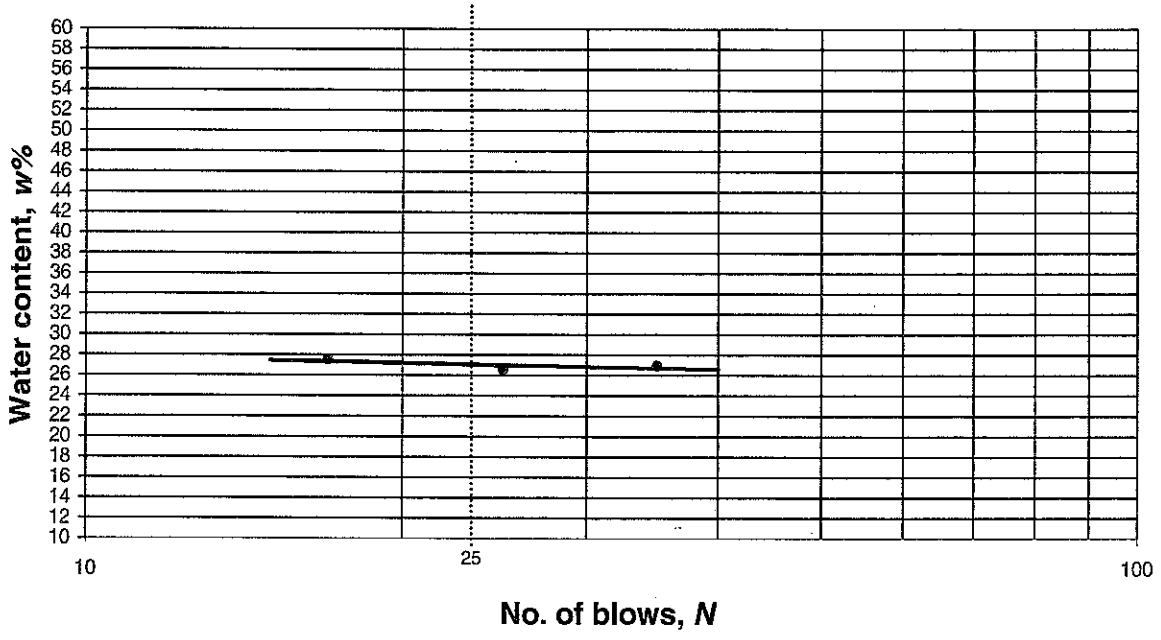
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-060	**Date Tested**	1/2/2004	**Tested By**	KM
						Qc By	SB

Date Sample Recd.	12/30/2003
Sample Location	STA 62+00 (NW)
Sample Description	Gray silty, clayey sand, tr Gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**27**	**Plastic Limit, PL**	**21**	**Plasticity Index, PI**	**6**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/5/2004	**Tested by:**	SB	**QC by:**	SB
Sample ID:	SB-060	Date Recd.	12/30/03	**Location**	STA 62+00 (NW)		
Sample Description	Gray silty, clayey sand, tr Gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.02	cm	Volume, V:	245.1	cu cm
Mass of Sample:	462.3	g	**Moisture Content:**	**25.7**	%
			Wet Density	117.7	pcf
			Dry Density	93.6	pcf

Final

Diameter:	6.88	cm	Area, A:	37.2	sq cm
Height, L:	5.29	cm	Volume, V:	196.7	cu cm
Mass of Sample:	431.20	g	**Moisture Content:**	**22.5**	%
			Wet Density	136.8	pcf
			Dry Density	111.7	pcf
			Deg of Saturation	115.3	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.0	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/5/2004	10:04 AM	0	0	3.06	5.95		20.0	---
1/5/2004	10:34 AM	1800	1800	3.23	5.80	1.1	20.0	8.45E-08
1/5/2004	11:04 AM	1800	3600	3.38	5.67	1.2	20.0	7.43E-08
1/5/2004	11:34 AM	1800	5400	3.53	5.55	1.3	20.0	6.95E-08
1/5/2004	12:04 PM	1800	7200	3.66	5.42	1.0	20.0	7.63E-08
1/5/2004	12:34 PM	1800	9000	3.78	5.31	1.1	20.0	6.54E-08

Average Permeability = **7.4E-08** cm/sec

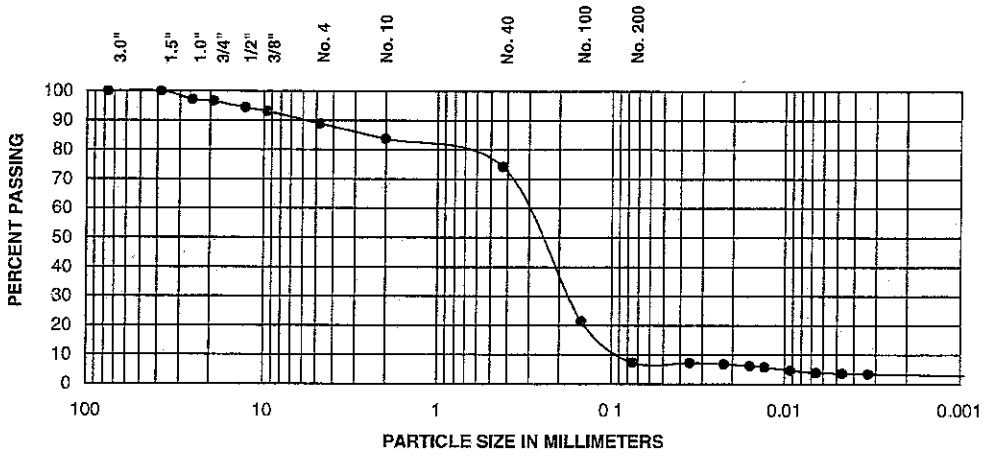
Remarks:

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)

333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-048	**Date Tested**	1/2/2004	**Tested by**	KM
						Qc by	SB

Date Sample Received:	12/30/2003
Sample Location	27+50 SE
Sample Description	Gray poorly graded sand with clay, tr. Gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.1	81.5	3.7	3.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.32	0.18	0.09	3.8	1.15

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.1
3/4"	96.5
1/2"	94.4
3/8"	93.2
No. 4	88.9
No. 10	83.7
No. 40	74.2
No. 100	21.5
No. 200	7.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay
System:	USCS

Remarks:

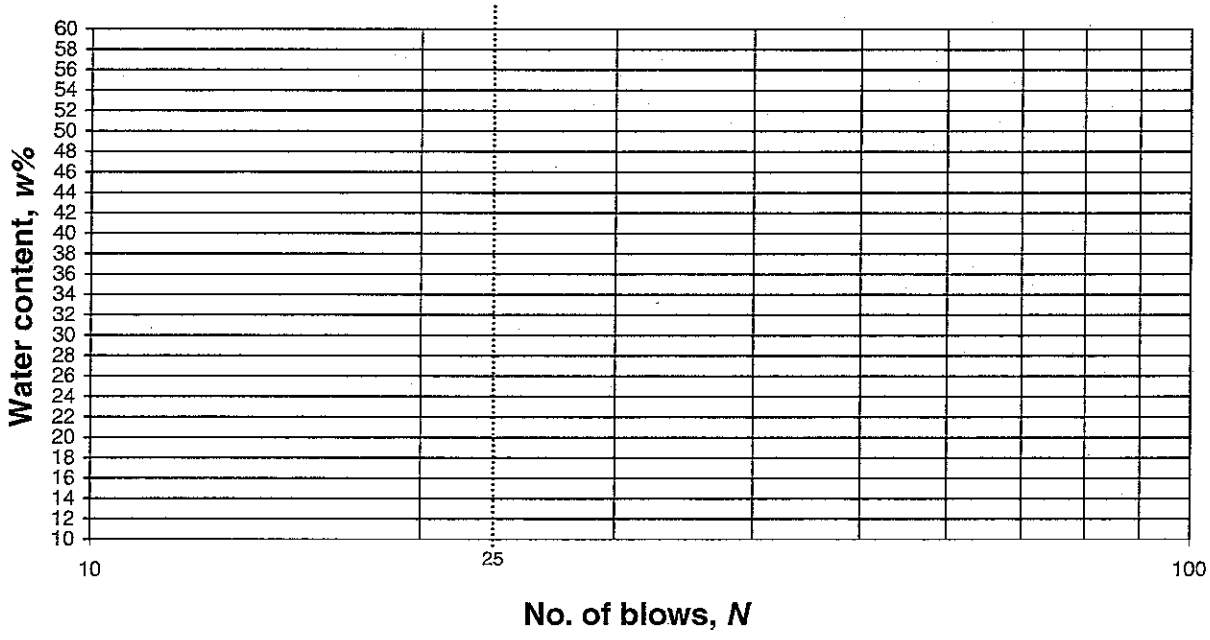
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-048	**Date Tested**	1/2/2004	**Tested By**	KM
						Qc By	SB

Date Sample Recd.	12/30/2003
Sample Location	27+50 SE
Sample Description	Gray poorly graded sand with clay, tr Gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	20	Date	12/31/2003	Sheet	1
				Date of weighing	12/31/2003	Tested by	KM

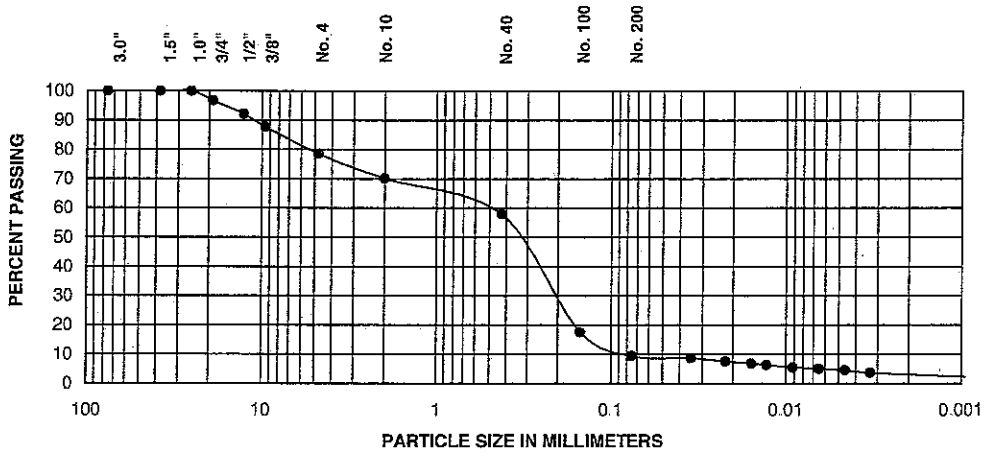
Boring No.	-	-	-	-	-	-
Sample No.	BF-048	BF-049	BF-050	BF-051	BF-052	BF-053
Location	27 + 50 (SE)	61 + 00 (NW)	28 + 00 (SE)	60 + 00 (NW)	29 + 00 (SE)	59 + 00 (NW)
Tin No.	79A	20C	2C	24A	68A	81A
Tin + Wet Soil	140.47	153.13	119.03	117.53	124.18	137.69
Tin + Dry Soil	126.8	133.2	106.6	105.4	112.5	122.9
Wt. of Tin	30.63	30.98	31.38	30.02	30.45	29.98
Wt. of Dry Soil	96.2	102.2	75.2	75.4	82.1	92.9
Wt. of Water	13.7	19.9	12.4	12.1	11.7	14.8
Moisture, %	14.2	19.5	16.5	16.1	14.2	15.9
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-054					
Location	30 + 00 (SE)					
Tin No.	71A					
Tin + Wet Soil	131.7					
Tin + Dry Soil	120.6					
Wt. of Tin	30.5					
Wt. of Dry Soil	90.1					
Wt. of Water	11.1					
Moisture, %	12.3					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-049	**Date Tested**	1/2/2004	**Tested by**	KM
						Qc by	SB

Date Sample Received:	12/30/2003
Sample Location	STA 61+00 (NW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	21.5	69.2	4.7	4.7

	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
For coarse-grained soils with <12% Fines	0.55	0.21	0.08	7.0	0.98

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	96.7
1/2"	92.2
3/8"	87.7
No. 4	78.5
No. 10	70.2
No. 40	57.9
No. 100	17.6
No. 200	9.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

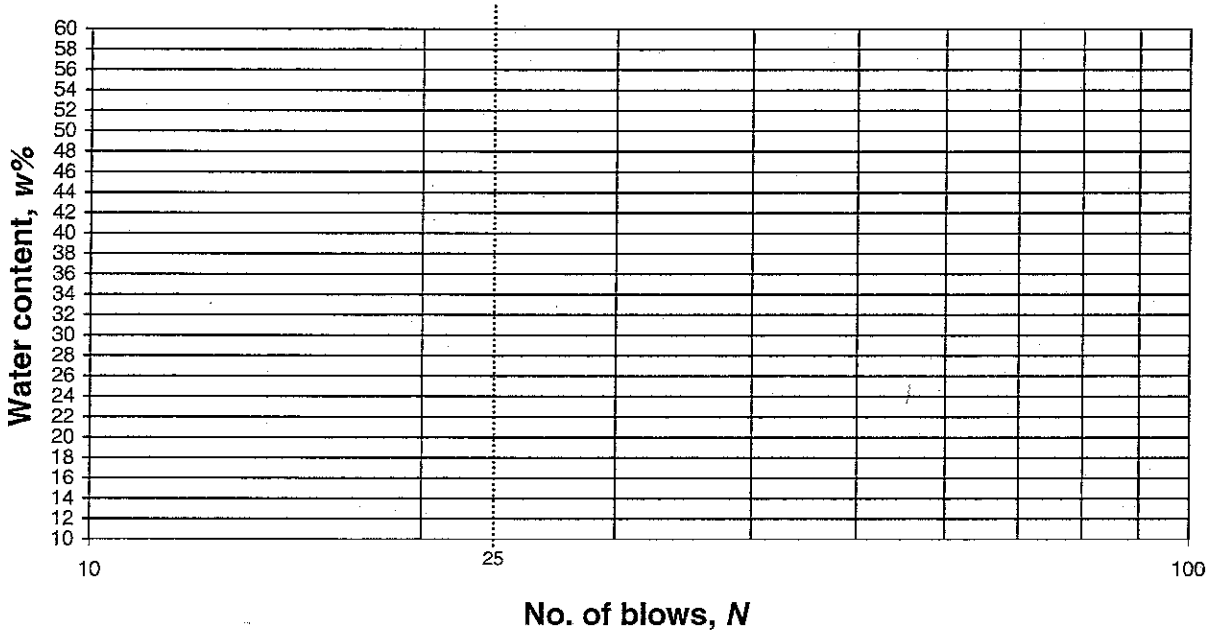
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn: Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-049	**Date Tested**	1/2/2004	**Tested By**	KM
						Qc By	SB

Date Sample Recd.	12/30/2003
Sample Location	STA 61+00 (NW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	20	Date	12/31/2003	Sheet	1
				Date of weighing	12/31/2003	Tested by	KM

Boring No.	-	-	-	-	-	-
Sample No.	BF-048	BF-049	BF-050	BF-051	BF-052	BF-053
Location	27 + 50 (SE)	61 + 00 (NW)	28 + 00 (SE)	60 + 00 (NW)	29 + 00 (SE)	59 + 00 (NW)
Tin No.	79A	20C	2C	24A	68A	81A
Tin + Wet Soil	140.47	153.13	119.03	117.53	124.18	137.69
Tin + Dry Soil	126.8	133.2	106.6	105.4	112.5	122.9
Wt. of Tin	30.63	30.98	31.38	30.02	30.45	29.98
Wt. of Dry Soil	96.2	102.2	75.2	75.4	82.1	92.9
Wt. of Water	13.7	19.9	12.4	12.1	11.7	14.8
Moisture, %	14.2	19.5	16.5	16.1	14.2	15.9
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-054					
Location	30 + 00 (SE)					
Tin No.	71A					
Tin + Wet Soil	131.7					
Tin + Dry Soil	120.6					
Wt. of Tin	30.5					
Wt. of Dry Soil	90.1					
Wt. of Water	11.1					
Moisture, %	12.3					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/30/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 29 - 44 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
60+80	2.00	84.00	+30.00	27.00	50.00	8
60+80	34.00	95.00	+40.00	41.00	63.00	8
60+20	2.00	94.00	+40.00	45.00	56.00	8
60+20	34.00	95.00	+40.00	47.00	58.00	8

NORTH TRENCH

COMMENTS: Trench filtrate losses are still high, but typical for trench slurry results. Sand content is too high. Fresh slurry was pumped to this trench to try and bring the trench slurry back within specs.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
60+00	LAB SAMPLE COLLECTED 12/30/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
62+00	3.50	N/A	N/A	N/A	1.24×10^{-7}	N/A
61+75	3.50	N/A	N/A	N/A	1.10×10^{-7}	N/A
61+50	3.50	Sample collected	Sample collected	Sample collected	2.48×10^{-7}	yes
61+25	3.00	N/A	N/A	N/A	2.04×10^{-7}	N/A
61+00	3.00	N/A	N/A	N/A	2.26×10^{-7}	N/A
60+75	3.00	N/A	N/A	N/A	2.21×10^{-7}	N/A

COMMENTS

Filter cake: 1.6mm, 1.2mm, 1.6mm, and 1.7mm respectively.

Unit Weight:
62+00: 121.0 pcf
61+75: 120.0 pcf
61+50: 121.0 pcf
61+25: 118.5 pcf
61+00: 117.0 pcf
60+75: 118.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/30/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 29 - 44 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
28+00	2.00	97.00	+40.00	41.50	83.00	8
28+00	34.00	98.00	+40.00	41.00	84.00	8
29+10	2.00	90.00	+30.00	30.00	59.00	8
29+10	33.00	94.00	+30.00	38.00	63.00	8

SE TRENCH

COMMENTS: Trench filtrate losses are becoming high, but typical for trench slurry results. Sand content results and some unit weights are too high. Fresh slurry was pumped to this trench today to try and fix these problems.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
28+00	LAB SAMPLE COLLECTED 12/30/03			
29+00	LAB SAMPLE COLLECTED 12/30/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
26+75	3.00	N/A	N/A	N/A	1.15×10^{-7}	N/A
27+00	3.00	N/A	N/A	N/A	6.70×10^{-8}	N/A
27+25	3.00	N/A	N/A	N/A	5.50×10^{-8}	N/A
27+50	3.50	Sample collected	Sample collected	Sample collected	2.65×10^{-7}	yes
27+75	3.50	N/A	N/A	N/A	3.12×10^{-7}	N/A
28+00	3.50	N/A	N/A	N/A	2.43×10^{-7}	N/A

COMMENTS

Filter cake: 1.8mm, 1.6mm, 1.1mm and 1.2mm respectively.

Unit Weight:
26+75: 119.0 pcf
27+00: 118.0 pcf
27+25: 118.0 pcf
27+50: 118.5 pcf
27+75: 118.0 pcf
28+00: 118.5 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepac OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/30/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH	
Military	lb/ft^3	seconds	cm^3	S.U.	
8:40	65.00	41.00	17.00	8	
9:45	-	43.00	-	-	
13:27	66.50	45.00	23.00*	8	*Failing filtrate result.
15:30	-	44.00	-	-	
16:51	65.00	48.00	18.00	8	RETEST

Filter cake is .3mm, .4mm, and .3mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/30/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 29 - 44 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
60+90	32.9	36.3	38.1	10.0	380.5	6.9	62+20	TOPOUT	TOPOUT
60+80	32.9	36.2	36.3	10.0	362.5	7.2	62+10	8.2	TOPOUT
60+70	33.0	36.4	36.3	10.0	363.0	6.8	62+00	12.8	TOPOUT
60+60	33.0	36.5	36.5	10.0	364.5	7.0	61+90	18.2	TOPOUT
60+50	33.0	36.5	36.5	10.0	365.0	7.0	61+80	24.2	TOPOUT
60+40	32.9	36.6	36.6	10.0	365.5	7.2	61+70	27.5	TOPOUT
60+30	32.9	36.6	36.6	10.0	366.0	7.2	61+60	28.7	TOPOUT
60+20	33.0	36.7	36.7	10.0	366.5	7.0	61+50	30.1	6.4
60+10	33.0	36.6	36.7	10.0	366.5	7.0	61+40	31.4	11.2
60+00	33.0	37.0	36.8	10.0	368.0	6.9	61+30	33.6	13.5
							61+20	35.8	16.4
							61+10	38.8	18.3
							61+00	39.1	20.1
							60+90		22.7
							60+80		25.3
							60+70		27.6
							60+60		28.7
							60+50		29.9
							60+40		32.8
							60+30		35.7
							60+20		36.7
							60+10		36.6
							60+00		37.0
							59+90		21.3
							59+80		17.6

SF TODAY 3668.00

SF TO DATE 65163.50

COMMENTS

NORTH TRENCH

GEO-CON: Suzanne E Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/30/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 29 - 44 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
27+70	32.4	35.8	36.0	10.0	359.5	3.3	26+70	TOPOUT	TOPOUT
27+80	32.4	35.9	35.9	10.0	358.5	3.6	26+80	9.2	TOPOUT
27+90	32.4	36.0	36.0	10.0	359.5	3.2	26+90	13.4	TOPOUT
28+00	32.5	36.3	36.2	10.0	361.5	3.4	27+00	15.7	TOPOUT
28+10	32.5	36.5	36.4	10.0	364.0	3.3	27+10	19.8	TOPOUT
28+20	32.5	36.7	36.6	10.0	366.0	3.6	27+20	24.1	TOPOUT
28+30	32.5	36.6	36.7	10.0	366.5	3.8	27+30	27.9	TOPOUT
28+40	32.2	36.9	36.8	10.0	367.5	4.0	27+40	30.6	TOPOUT
28+50	32.1	36.5	36.7	10.0	367.0	3.9	27+50	32.0	8.2
28+60	32.2	36.3	36.4	10.0	364.0	3.8	27+60	34.3	11.9
28+70	32.0	36.0	36.2	10.0	361.5	4.1	27+70		14.3
28+80	31.9	36.1	36.1	10.0	360.5	4.4	27+80		15.8
28+90	31.8	35.6	35.9	10.0	358.5	4.2	27+90		17.5
29+00	31.8	35.5	35.6	10.0	355.5	4.0	28+00		19.6
29+10	31.6	35.7	35.6	10.0	356.0	3.6	28+10		23.4
29+20	31.2	35.5	35.6	10.0	356.0	3.4	28+20		24.3
29+30	31.2	35.4	35.5	10.0	354.5	3.3	28+30		26.0
29+40	31.3	35.5	35.5	10.0	354.5	3.4	28+40		26.7
29+50	31.5	35.3	35.4	10.0	354.0	3.4	28+50		28.1
							28+60		29.2
							28+70		31.8
							28+80		32.4
							28+90		33.2
							29+00		34.0
							29+10		35.7
							29+20		35.5
							29+30		35.4
							29+40		35.5
							29+50		35.3

SF TODAY 6845.00

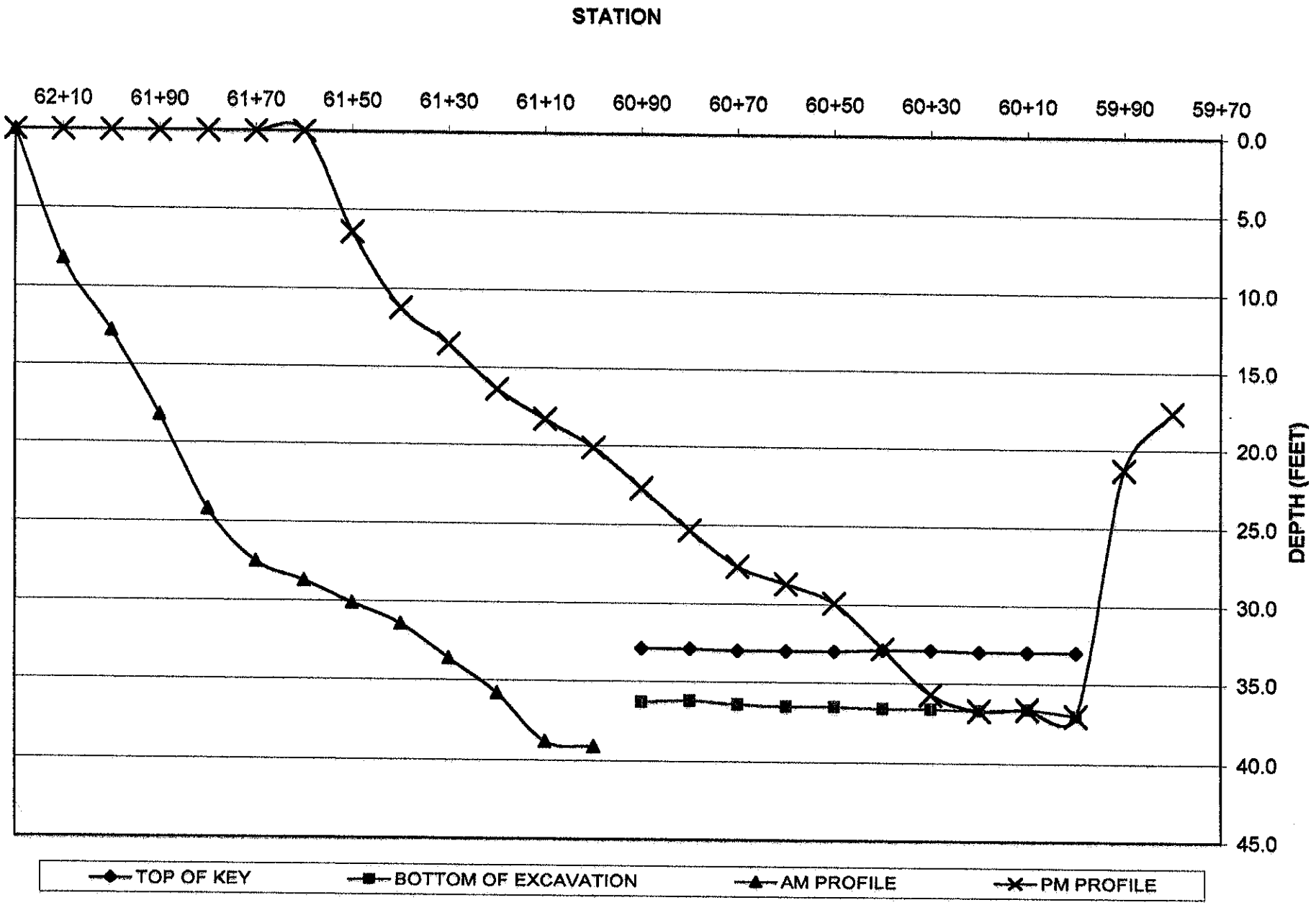
SF TO DATE 33602.72

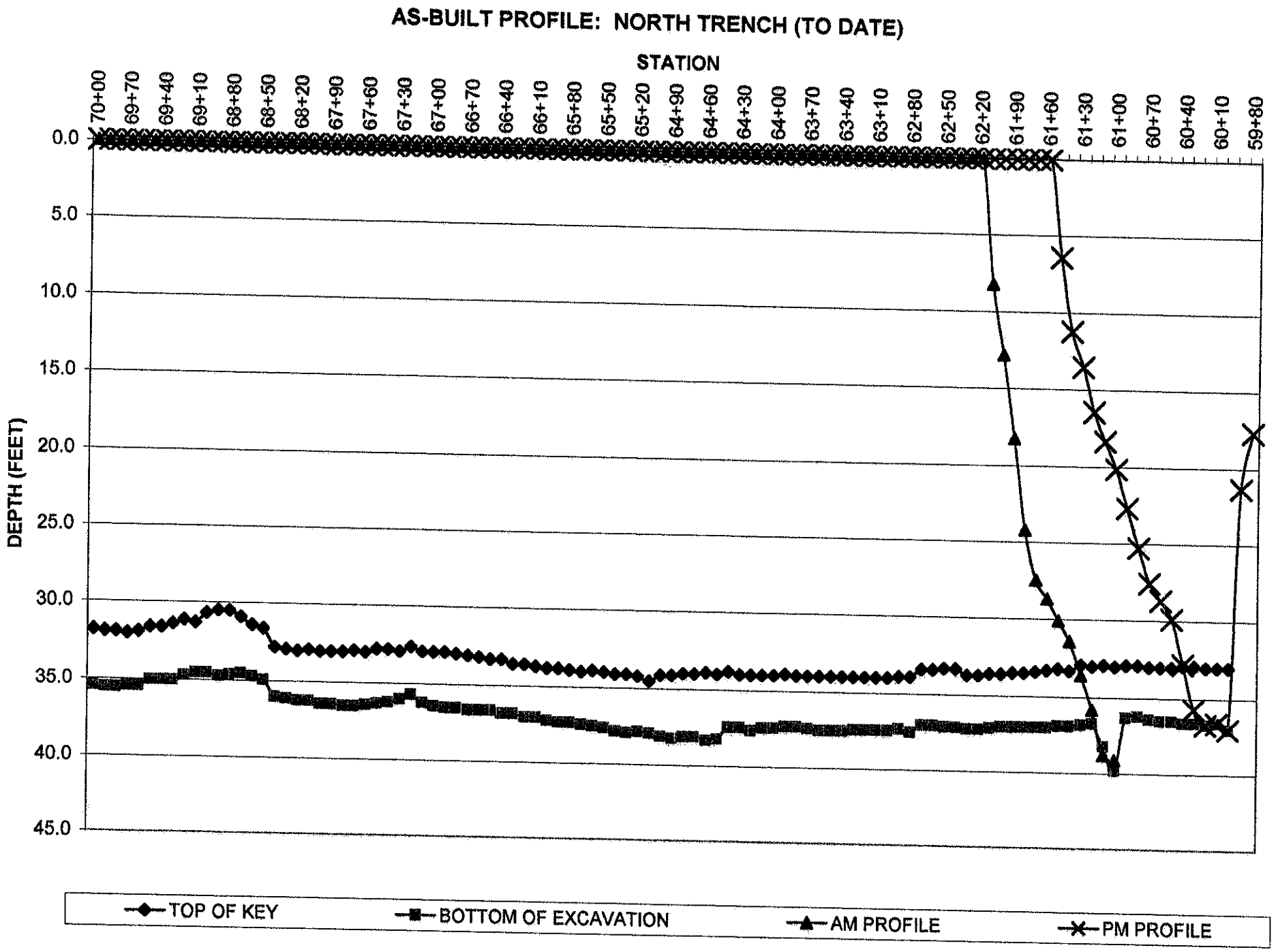
COMMENTS

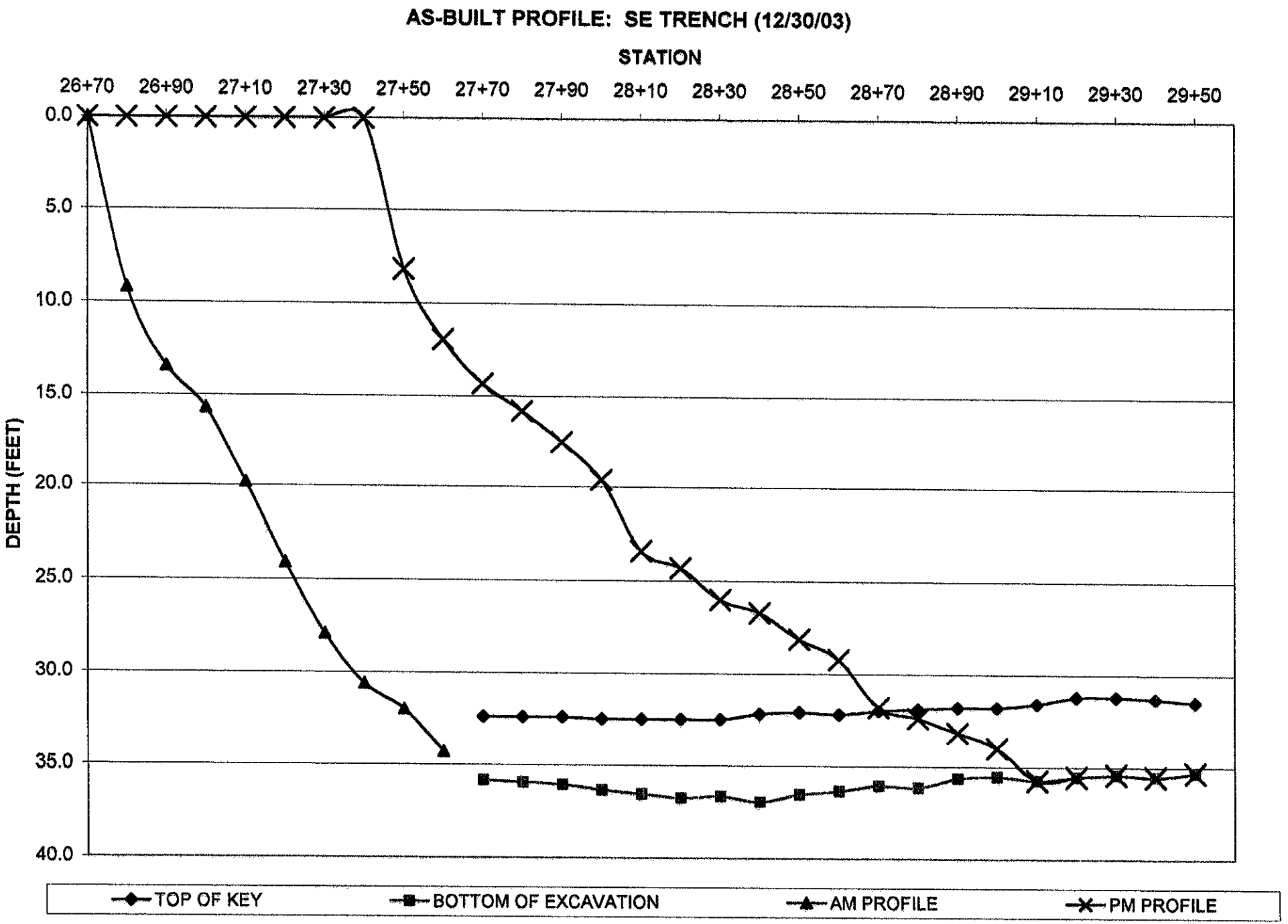
SE Trench

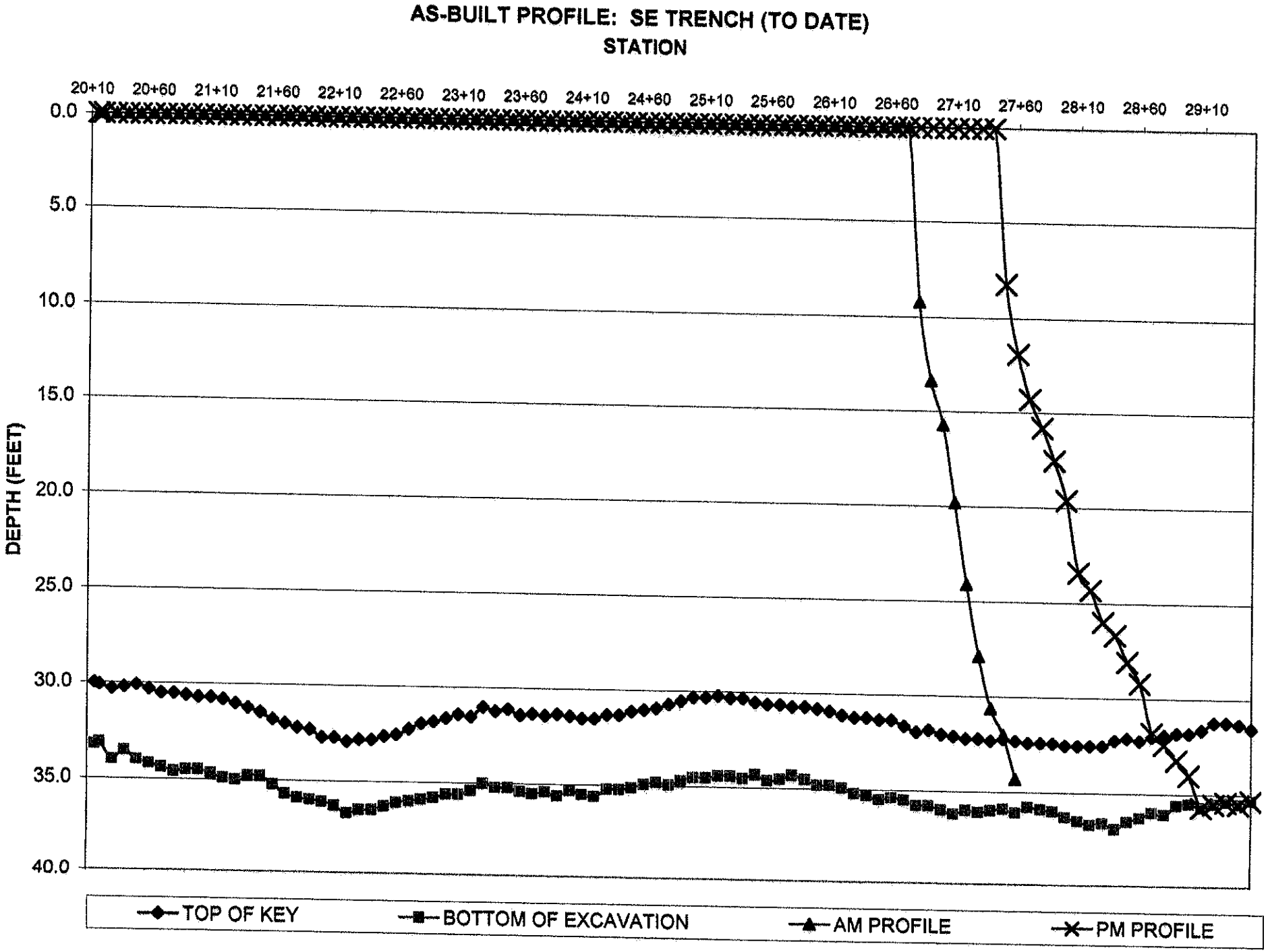
GEO-CON: Suzanne E Sepic OWNER:

AS-BUILT PROFILE: NORTH TRENCH (12/30/03)




AS-BUILT PROFILE: NORTH TRENCH (TO DATE)
STATION
70+00
69+70
69+40
69+10
68+80
68+50
68+20
67+90
67+60
67+30
67+00
66+70
66+40
66+10
65+80
65+50
65+20
64+90
64+60
64+30
64+00
63+70
63+40
63+10
62+80
62+50
62+20
61+90
61+60
61+30
61+00
60+70
60+40
60+10
59+80
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (12/30/03)
STATION
26+70
26+90
27+10
27+30
27+50
27+70
27+90
28+10
28+30
28+50
28+70
28+90
29+10
29+30
29+50
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE)
STATION
20+10
20+60
21+10
21+60
22+10
22+60
23+10
23+60
24+10
24+60
25+10
25+60
26+10
26+60
27+10
27+60
28+10
28+60
29+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/30/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	8:40	41	> 40 sec	65	> 64 pcf	8	6.5 - 10	17	< 20 cm^3	.3
PM	13:27	45	> 40 sec	66.5	> 64 pcf	8	6.5 - 10	23*	< 20 cm^3	.4

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9:45	43	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	15:30	44	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

N Trench

* Failing filtrate. Corrected + retested at 16:51.
Visc 48 sec
Unitwt 65 pcf
pH 8
Filtrate 18 cm^3
FilterCake .3mm

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:36	60+80	2	50	40 - 90 sec	84	64 - 95 pcf	8	6.5 - 10	27	< 25 cm^3	1.6	+30	MAX 30%
9:36	60+80	34	63	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	41	< 25 cm^3	1.2	+40	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
14:12	60+20	2	56	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	45	< 25 cm^3	1.6	+50	MAX 30%
14:12	60+20	34	58	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	47	< 25 cm^3	1.7	+40	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
62+00	3.5	2" to 6"	121	+15 pcf over trench slurry	1.24×10^{-7}	1.0×10^{-7} cm/sec
61+75	3.5	2" to 6"	120	+15 pcf over trench slurry	1.10×10^{-7}	1.0×10^{-7} cm/sec
61+50	3.5	2" to 6"	121	+15 pcf over trench slurry	2.48×10^{-7}	1.0×10^{-7} cm/sec
61+25	3	2" to 6"	118.5	+15 pcf over trench slurry	2.04×10^{-7}	1.0×10^{-7} cm/sec
61+00	3	2" to 6"	117	+15 pcf over trench slurry	2.26×10^{-7}	1.0×10^{-7} cm/sec
60+75	3	2" to 6"	118	+15 pcf over trench slurry	2.21×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

N [redacted] Trench

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall **Sta:** 62+00, 61+75, 61+50 / 61+25, 61+00, 60+75 **Technician:** SM √BY SES

Sample Area: A = $\pi r^2 = \pi(3.85)^2 = 46.56$ cm² **Sample Height:** L = 6.0cm, 6.0cm, 6.0cm / 6.5cm, 6.5cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	Δ Q (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ conv. factor (1/14.65)
62+00	12/30/03	9:05-13:05	240	10	117.2305	605865.9809	–	18	1.24×10^{-7}	8.46×10^{-9}
61+75	12/30/03	9:05-13:05	240	10	117.2305	605865.9809	–	16	1.10×10^{-7}	7.51×10
61+50	12/30/03	9:05-13:05	240	10	117.2305	605865.9809	–	36	2.48×10^{-7}	1.69×10^{-8}
61+25	12/30/03	18:00-6:00	720	10	108.2128	559261.0644	–	82	2.09×10^{-7}	1.39×10
61+00	12/30/03	18:00-6:00	720	10	108.2128	559261.0644	–	91	2.26×10^{-7}	1.54×10^{-9}
60+75	12/30/03	18:00-6:00	720	10	108.2128	559261.0644	–	89	2.21×10^{-7}	1.51×10^{-9}

$I = \frac{P\ (psi)}{0.014217\ L(cm)}$ $R = \frac{\text{Quick Test}}{\text{Triaxial Test}} = 1.85$

DAILY QC TESTS

DATE 12/30/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

SE Trench

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:00	28+00	2	83	40 - 90 sec	97	64 - 95 pcf	8	6.5 - 10	41.5	< 25 cm^3	1.8	+40	MAX 30%
9:00	28+00	34	84	40 - 90 sec	98	64 - 95 pcf	8	6.5 - 10	41	< 25 cm^3	1.6	+40	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:48	29+10	2	59	40 - 90 sec	90	64 - 95 pcf	8	6.5 - 10	30	< 25 cm^3	1.1	+30	MAX 30%
15:48	29+10	33	63	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	38	< 25 cm^3	1.2	+30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
26+75	3	2" to 6"	119	+15 pcf over trench slurry	1.15×10^{-7}	1.0×10^{-7} cm/sec
27+00	3	2" to 6"	118	+15 pcf over trench slurry	6.70×10^{-8}	1.0×10^{-7} cm/sec
27+25	3	2" to 6"	118	+15 pcf over trench slurry	5.50×10^{-8}	1.0×10^{-7} cm/sec
27+50	3.5	2" to 6"	118.5	+15 pcf over trench slurry	2.65×10^{-7}	1.0×10^{-7} cm/sec
27+75	3.5	2" to 6"	118	+15 pcf over trench slurry	3.12×10^{-7}	1.0×10^{-7} cm/sec
28+00	3.5	2" to 6"	118.5	+15 pcf over trench slurry	2.43×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall **Sta:** 26+75, 27+00, 27+25, 27+50, 27+75, 28+00 **Technician:** SM / BY SES

Sample Area: A = $\pi r^2 = \pi(3.85)^2 = 46.56$ cm² **Sample Height:** L = 6.5cm, 6.5cm, 6.0cm, 7.0cm, 6.0cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ conv. factor (1/14.65)
26+75	12/29/03	9:05-13:05	240	10	108.2128	559261.0644	—	15.5	1.15×10^{-7}	7.85×10^{-9}
27+00	12/29/03	9:05-13:05	240	10	108.2128	559261.0644	—	9	6.70×10^{-8}	4.57×10^{-9}
27+25	12/29/03	9:05-13:05	240	10	117.2305	605865.9809	—	8	5.50×10^{-8}	3.75×10^{-9}
27+50	12/29/03	18:00-6:00	720	10	100.4833	519313.7717	—	99	2.65×10^{-7}	1.81×10^{-8}
27+75	12/29/03	18:00-6:00	720	10	117.2305	605865.9809	—	136	3.12×10^{-7}	2.13×10^{-8}
28+00	12/29/03	18:00-6:00	720	10	100.4833	519313.7717	—	91	2.43×10^{-7}	1.66×10^{-8}

I = $\frac{\text{P (psi)}}{0.014217\ \text{L(cm)}}$ R = $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 31-Dec-03	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-050 (SE28+00)	SOIL ONLY	28+00	12/30/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-051 (NW60+00)	SOIL ONLY	60+00	12/30/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-052 (SE29+00)	SOIL ONLY	29+00	12/30/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-061 (SE27+50)	SB BACKFILL**	27+50	12/30/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-062 (NW61+50)	SB BACKFILL**	61+50	12/30/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

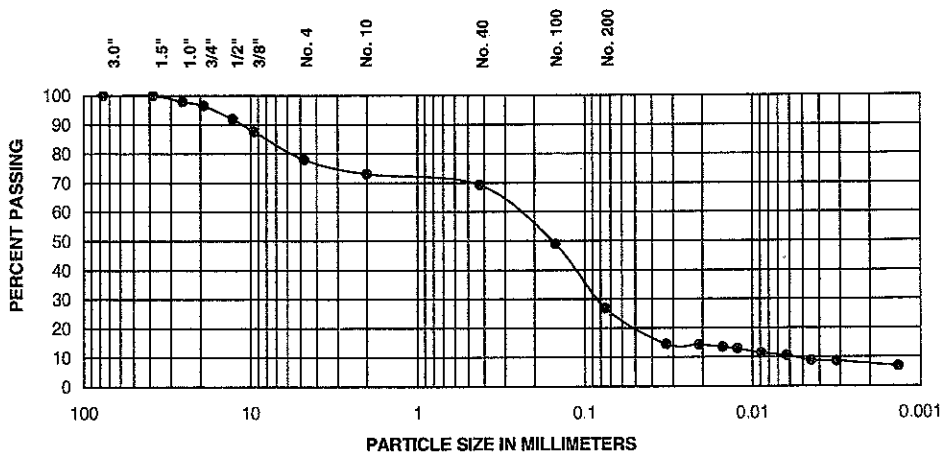
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-061	**Date Tested**	1/5/2004	**Tested by**	MT
						Qc by	SB

Date Sample Received:	12/31/2003
Sample Location	STA 27+50 (SE)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	22.0	51.2	17.4	9.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.9
3/4"	96.5
1/2"	92.0
3/8"	87.6
No. 4	78.0
No. 10	73.0
No. 40	69.2
No. 100	49.0
No. 200	26.9

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
27	20	7

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

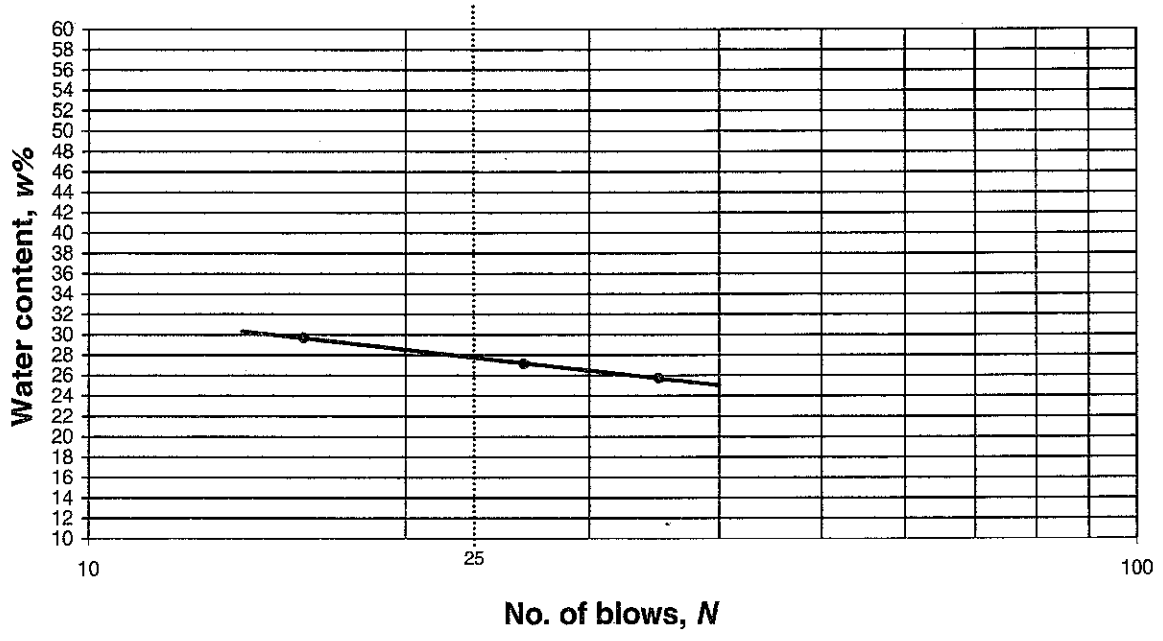
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-061	**Date Tested**	1/2/2004	**Tested By**	KM
						Qc By	SB

Date Sample Recd.	12/31/2003
Sample Location	STA 27+50 (SE)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	27	**Plastic Limit, PL**	20	**Plasticity Index, PI**	7

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/7/2004	**Tested by:**	KM	**QC by:**	SB
Sample ID:	SB-061	Date Recd.	12/31/03	**Location**	STA 27+50 (SE)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.74	cm	Volume, V:	274.4	cu cm
Mass of Sample:	509.3	g	**Moisture Content:**	**28.5**	**%**
			Wet Density	**115.8**	**pcf**
			Dry Density	**90.1**	**pcf**

Final

Diameter:	6.86	cm	Area, A:	37.0	sq cm
Height, L:	6.15	cm	Volume, V:	227.3	cu cm
Mass of Sample:	485.80	g	**Moisture Content:**	**18.8**	**%**
			Wet Density	**133.4**	**pcf**
			Dry Density	**112.3**	**pcf**
			Deg of Saturation	**97.8**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	18.8	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/7/2004	11:11 AM	0	0	3.45	5.59		20.0	---
1/7/2004	1:12 PM	7260	7260	3.96	5.15	1.2	20.0	7.25E-08
1/7/2004	3:06 PM	6840	14100	4.44	4.71	1.1	20.0	8.08E-08
1/7/2004	4:56 PM	6600	20700	4.90	4.32	1.2	20.0	7.79E-08
1/7/2004	5:26 PM	1800	22500	5.01	4.23	1.2	20.0	6.79E-08

Average Permeability = **7.5E-08** **cm/sec**

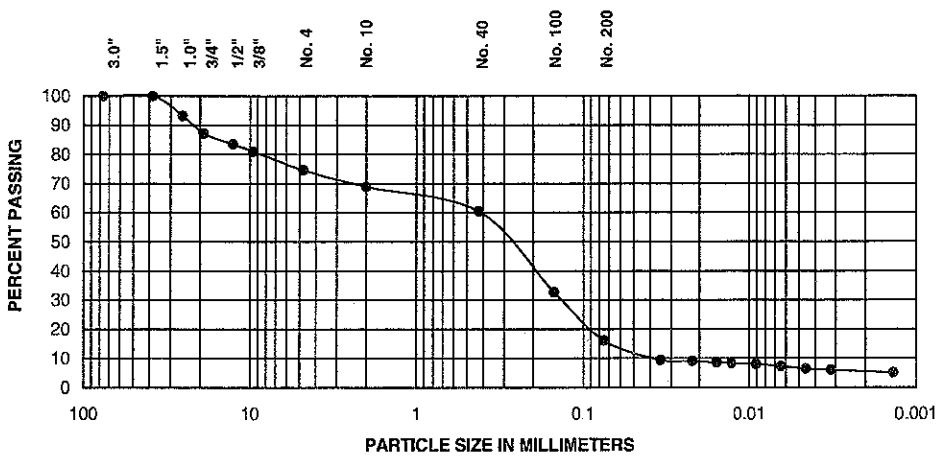
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-062	**Date Tested**	1/5/2004	**Tested by**	MT
						Qc by	SB

Date Sample Received:	12/31/2003
Sample Location	STA 61+50 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	25.4	58.4	9.4	6.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	93.2
3/4"	87.2
1/2"	83.5
3/8"	80.9
No. 4	74.6
No. 10	68.9
No. 40	60.5
No. 100	32.6
No. 200	16.2

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
27	19	8

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

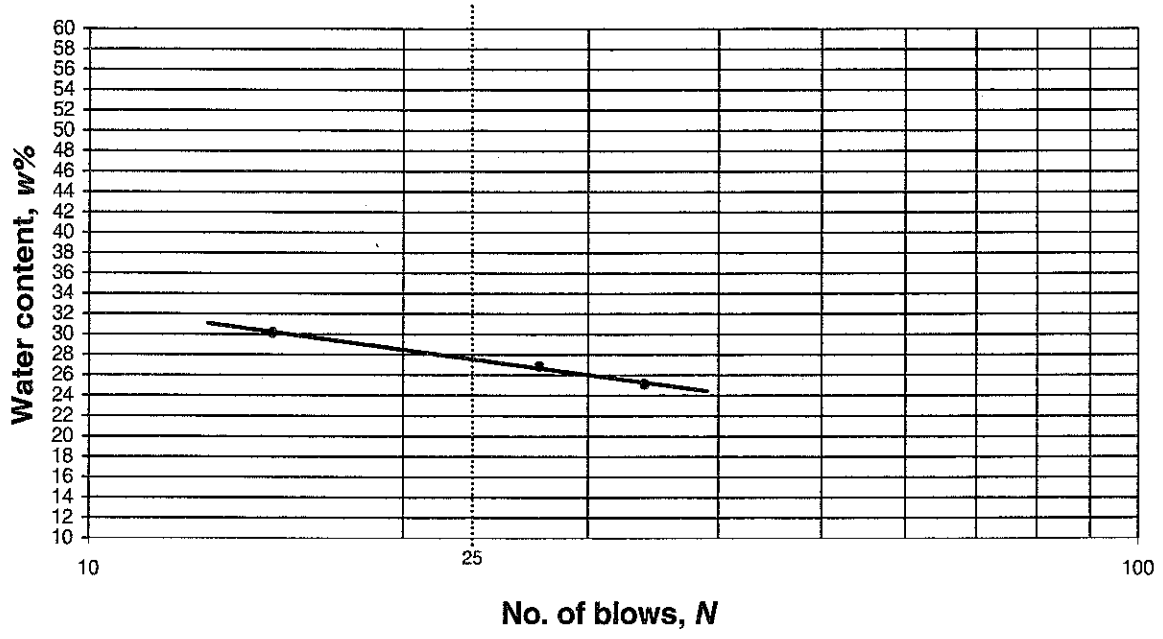
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-062	**Date Tested**	1/2/2004	**Tested By**	KM
						Qc By	SB

Date Sample Recd.	12/31/2003
Sample Location	STA 61+50 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	27	**Plastic Limit, PL**	19	**Plasticity Index, PI**	8

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/5/2004	**Tested by:**	SB	**QC by:**	SB
Sample ID:	SB-062	Date Recd.	12/31/03	**Location**	STA 61+50 (NW)		
Sample Description							

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.31	cm	Volume, V:	256.9	cu cm
Mass of Sample:	513.4	g	**Moisture Content:**	**21.2**	%
			Wet Density	**124.7**	**pcf**
			Dry Density	**102.8**	**pcf**

Final

Diameter:	6.95	cm	Area, A:	37.9	sq cm
Height, L:	5.90	cm	Volume, V:	223.8	cu cm
Mass of Sample:	497.40	g	**Moisture Content:**	**22.1**	%
			Wet Density	**138.7**	**pcf**
			Dry Density	**113.5**	**pcf**
			Deg of Saturation	**119.0**	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	76.8 psi
Gradient:	20.1

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/5/2004	10:04 AM	0	0	3.27	5.75		20.0	---
1/5/2004	10:34 AM	1800	1800	3.45	5.57	1.0	20.0	1.09E-07
1/5/2004	11:04 AM	1800	3600	3.62	5.42	1.1	20.0	9.20E-08
1/5/2004	11:34 AM	1800	5400	3.76	5.25	0.8	20.0	1.06E-07
1/5/2004	12:04 PM	1800	7200	3.88	5.12	0.9	20.0	8.22E-08

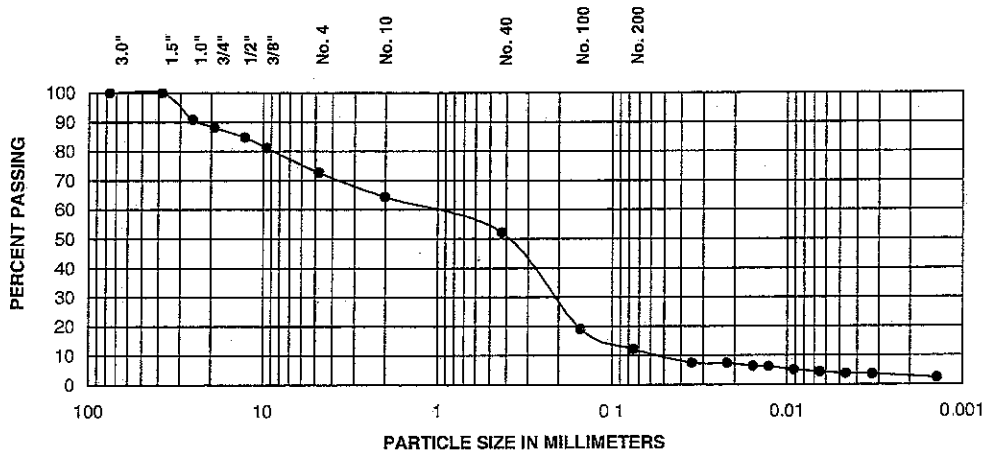
Average Permeability = **9.7E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-050	**Date Tested**	1/5/2004	**Tested by**	MA
						Qc by	SB

Date Sample Received:	12/31/2003
Sample Location	STA 28+00
Sample Description	Gray silty, clayey sand with gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	27.3	60.4	8.3	3.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	90.9
3/4"	88.1
1/2"	84.7
3/8"	81.2
No. 4	72.7
No. 10	64.4
No. 40	52.2
No. 100	19.2
No. 200	12.2

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

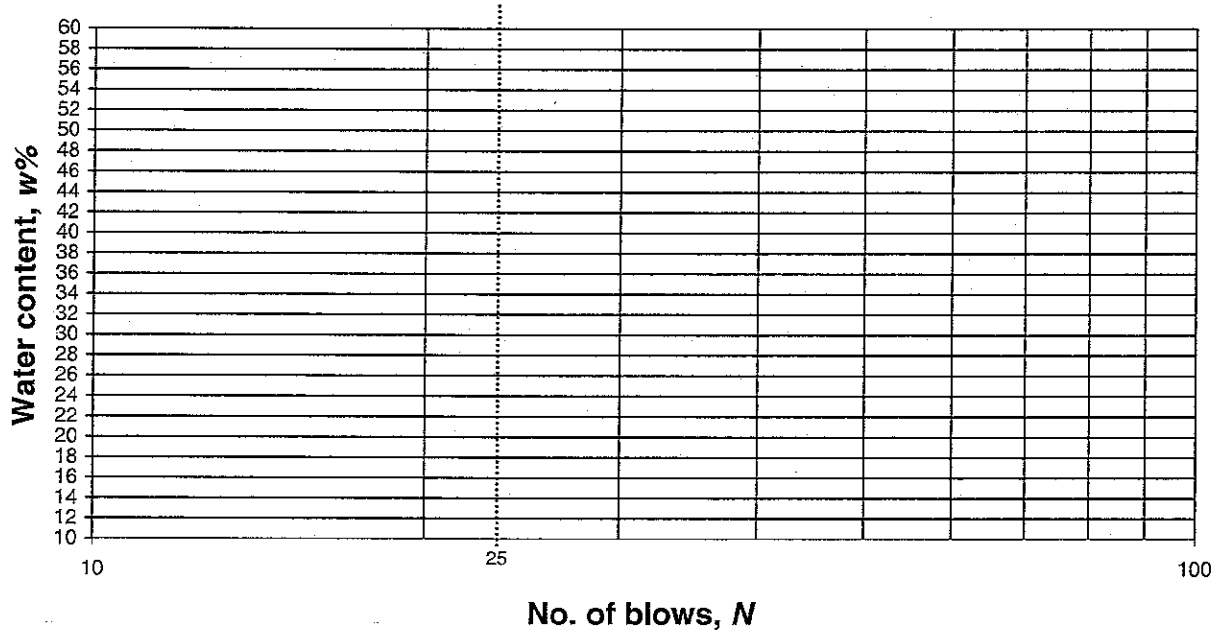
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-050	**Date Tested**	1/2/2004	**Tested By**	KM
						Qc By	SB

Date Sample Recd.	12/31/2003
Sample Location	STA 28+00
Sample Description	Gray silty, clayey sand with gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	20	Date	12/31/2003	Sheet	1
				Date of weighing	12/31/2003	Tested by	KM

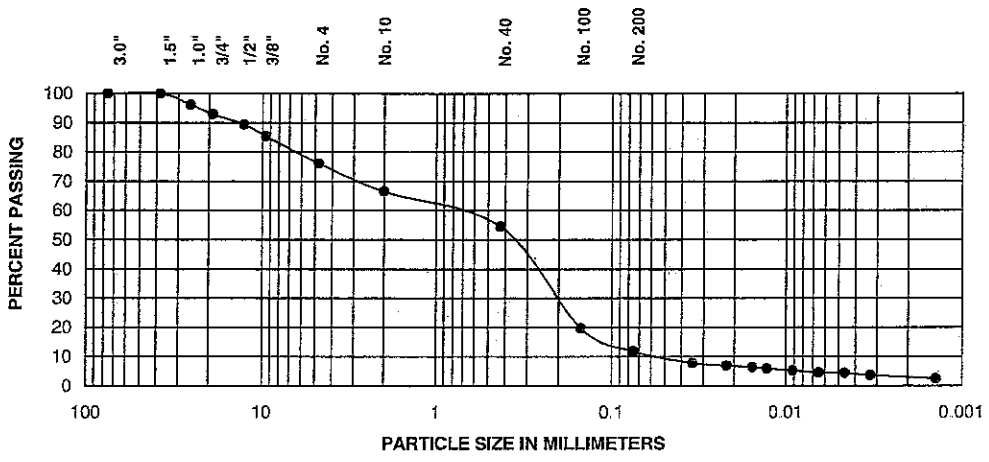
Boring No.	-	-	-	-	-	-
Sample No.	BF-048	BF-049	BF-050	BF-051	BF-052	BF-053
Location	27 + 50 (SE)	61 + 00 (NW)	28 + 00 (SE)	60 + 00 (NW)	29 + 00 (SE)	59 + 00 (NW)
Tin No.	79A	20C	2C	24A	68A	81A
Tin + Wet Soil	140.47	153.13	119.03	117.53	124.18	137.69
Tin + Dry Soil	126.8	133.2	106.6	105.4	112.5	122.9
Wt. of Tin	30.63	30.98	31.38	30.02	30.45	29.98
Wt. of Dry Soil	96.2	102.2	75.2	75.4	82.1	92.9
Wt. of Water	13.7	19.9	12.4	12.1	11.7	14.8
Moisture, %	14.2	19.5	16.5	16.1	14.2	15.9
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-054					
Location	30 + 00 (SE)					
Tin No.	71A					
Tin + Wet Soil	131.7					
Tin + Dry Soil	120.6					
Wt. of Tin	30.5					
Wt. of Dry Soil	90.1					
Wt. of Water	11.1					
Moisture, %	12.3					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-051	**Date Tested**	1/5/2004	**Tested by**	MT
						Qc by	SB

Date Sample Received:	12/31/2003
Sample Location	STA 60+00 (NW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	23.9	64.2	7.4	4.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.86	0.20	0.05	16.3	0.92

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	96.2
3/4"	92.9
1/2"	89.4
3/8"	85.4
No. 4	76.1
No. 10	66.5
No. 40	54.6
No. 100	19.8
No. 200	11.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

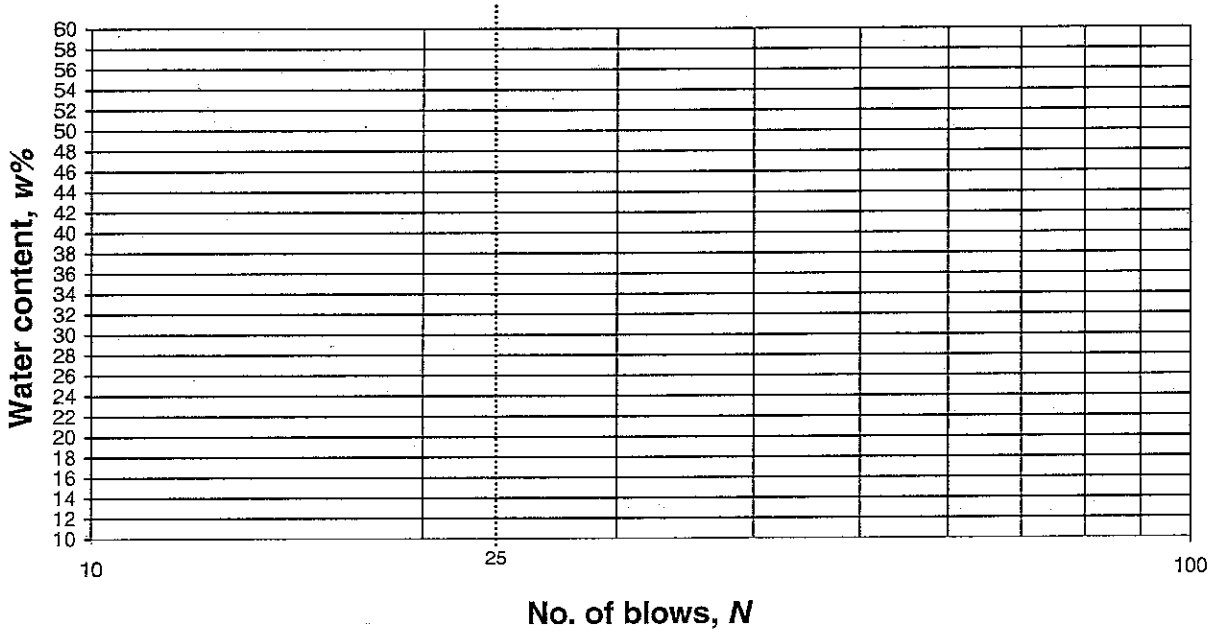
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-051	**Date Tested**	1/2/2004	**Tested By**	KM
						Qc By	SB

Date Sample Recd.	12/31/2003
Sample Location	STA 60+00 (NW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	20	Date	12/31/2003	Sheet	1
				Date of weighing	12/31/2003	Tested by	KM

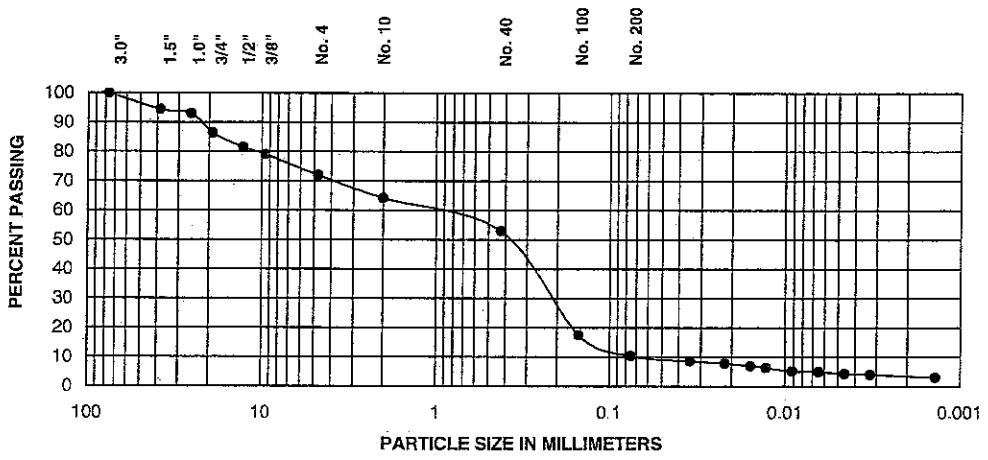
Boring No.	-	-	-	-	-	-
Sample No.	BF-048	BF-049	BF-050	BF-051	BF-052	BF-053
Location	27 + 50 (SE)	61 + 00 (NW)	28 + 00 (SE)	60 + 00 (NW)	29 + 00 (SE)	59 + 00 (NW)
Tin No.	79A	20C	2C	24A	68A	81A
Tin + Wet Soil	140.47	153.13	119.03	117.53	124.18	137.69
Tin + Dry Soil	126.8	133.2	106.6	105.4	112.5	122.9
Wt. of Tin	30.63	30.98	31.38	30.02	30.45	29.98
Wt. of Dry Soil	96.2	102.2	75.2	75.4	82.1	92.9
Wt. of Water	13.7	19.9	12.4	12.1	11.7	14.8
Moisture, %	14.2	19.5	16.5	16.1	14.2	15.9
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-054					
Location	30 + 00 (SE)					
Tin No.	71A					
Tin + Wet Soil	131.7					
Tin + Dry Soil	120.6					
Wt. of Tin	30.5					
Wt. of Dry Soil	90.1					
Wt. of Water	11.1					
Moisture, %	12.3					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-052	**Date Tested**	1/5/2004	**Tested by**	MA
						Qc by	SB

Date Sample Received:	12/31/2003
Sample Location	STA 29+00 (SE)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	28.0	61.7	5.9	4.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.11	0.22	0.06	17.2	0.65

Sieve Size	Percent Passing
3.0"	100.0
1.5"	94.4
1.0"	93.0
3/4"	86.3
1/2"	81.5
3/8"	79.1
No. 4	72.0
No. 10	64.2
No. 40	53.0
No. 100	17.6
No. 200	10.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

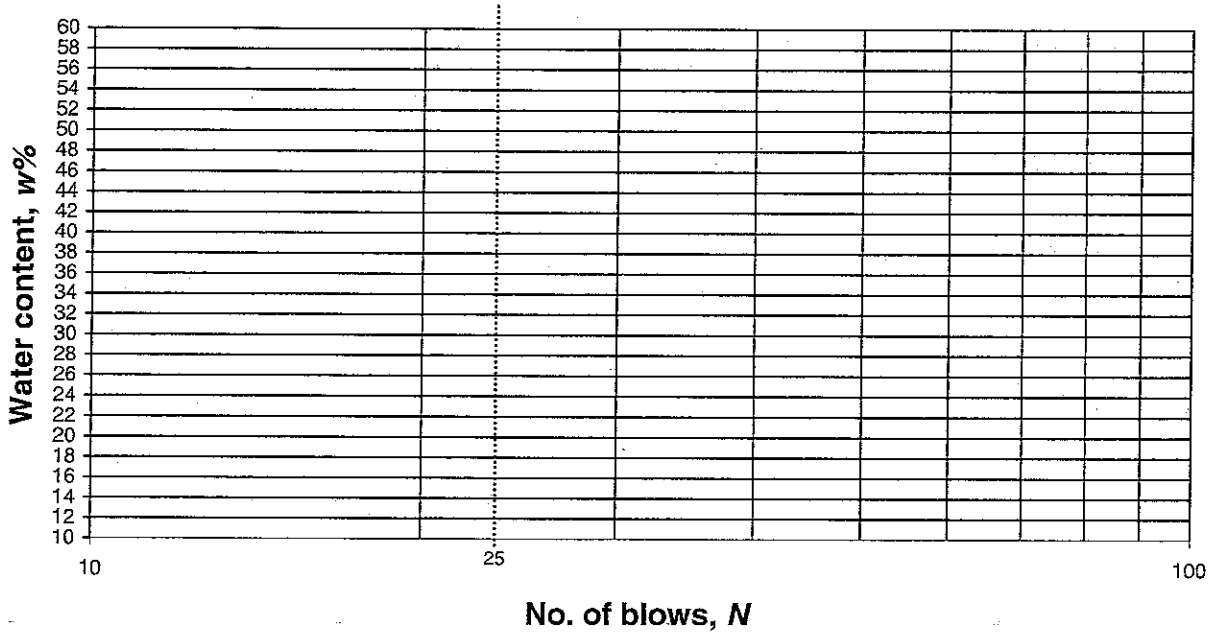
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-052	**Date Tested**	1/2/2004	**Tested By**	KM
						Qc By	SB

Date Sample Recd.	12/31/2003
Sample Location	STA 29+00 (SE)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	20	Date	12/31/2003	Sheet	1
				Date of weighing	12/31/2003	Tested by	KM

Boring No.	-	-	-	-	-	-
Sample No.	BF-048	BF-049	BF-050	BF-051	BF-052	BF-053
Location	27 + 50 (SE)	61 + 00 (NW)	28 + 00 (SE)	60 + 00 (NW)	29 + 00 (SE)	59 + 00 (NW)
Tin No.	79A	20C	2C	24A	68A	81A
Tin + Wet Soil	140.47	153.13	119.03	117.53	124.18	137.69
Tin + Dry Soil	126.8	133.2	106.6	105.4	112.5	122.9
Wt. of Tin	30.63	30.98	31.38	30.02	30.45	29.98
Wt. of Dry Soil	96.2	102.2	75.2	75.4	82.1	92.9
Wt. of Water	13.7	19.9	12.4	12.1	11.7	14.8
Moisture, %	14.2	19.5	16.5	16.1	14.2	15.9
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-054					
Location	30 + 00 (SE)					
Tin No.	71A					
Tin + Wet Soil	131.7					
Tin + Dry Soil	120.6					
Wt. of Tin	30.5					
Wt. of Dry Soil	90.1					
Wt. of Water	11.1					
Moisture, %	12.3					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/31/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 28 - 43 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
60+00	2.00	90.00	34.00	59.00	47.00	8
60+00	35.00	95.00	36.00	60.00	53.00	8
58+30	2.00	88.00	34.00	39.00	46.00	8
58+30	34.00	91.50	38.00	60.00	47.00	8

NORTH TRENCH

COMMENTS: Trench filtrate losses are still high, but typical for trench slurry results. Sand content is too high. Fresh slurry was pumped to this trench to try and bring the trench slurry back within specs.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
59+00	LAB SAMPLE COLLECTED 12/31/03			
	-			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
61+50	3.00	N/A	N/A	N/A	5.91×10^{-7}	N/A
61+25	3.00	N/A	N/A	N/A	1.51×10^{-7}	N/A
61+00	3.00	Sample collected	Sample collected	Sample collected	2.61×10^{-7}	yes
60+75	3.00	N/A	N/A	N/A	5.16×10^{-7}	N/A
60+50	3.00	N/A	N/A	N/A	3.37×10^{-7}	N/A
60+25	3.00	N/A	N/A	N/A	1.27×10^{-7}	N/A

COMMENTS

Filter cake: 1.9mm, 2.1mm, .9mm, and 1.3mm respectively.

Unit Weight:	61+50:	118.0 pcf		
	61+25:	119.0 pcf		
	61+00:	121.0 pcf		
	60+75:	119.0 pcf		
	60+50:	118.0 pcf		
	60+25:	118.0 pcf		

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/31/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 28 - 43 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
29+50	2.00	92.00	41.00	40.00	54.00	8
29+50	33.00	94.00	44.00	41.00	58.00	8
30+50	2.00	94.00	42.00	45.00	50.00	8
30+50	34.00	100.00	51.00	50.00	56.00	8

SE TRENCH

COMMENTS: Trench filtrate losses are becoming high, but typical for trench slurry results. Sand content results and some unit weights are too high. Fresh slurry was pumped to this trench today to try and fix these problems.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
30+00	LAB SAMPLE COLLECTED 12/31/03			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
27+75	3.00	N/A	N/A	N/A	1.38×10^{-7}	N/A
28+00	3.00	Sample collected	Sample collected	Sample collected	2.68×10^{-7}	yes
28+25	3.00	N/A	N/A	N/A	2.34×10^{-7}	N/A
28+50	3.00	N/A	N/A	N/A	1.92×10^{-7}	N/A
28+75	3.00	N/A	N/A	N/A	1.12×10^{-7}	N/A
29+00	3.00	Sample collected	Sample collected	Sample collected	3.58×10^{-7}	yes

COMMENTS

Filter cake: 1.0mm, 1.2mm, 1.8mm and 1.9mm respectively.

Unit Weight: 27+75: 117.0 pcf
28+00: 118.5 pcf
28+25: 118.0 pcf
28+50: 118.0 pcf
28+75: 118.0 pcf
29+00: 118.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/31/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH	
Military	lb/ft^3	seconds	cm^3	S.U.	
10:05	65.00	45.00	18.00	8	
11:00	-	41.00	-	-	
13:15	65.00	44.00	24.00*	8	*Failing filtrate result.
13:32	65.00	46.00	17.00	8	RETEST
14:40	-	45.00	-	-	

Filter cake is .4mm, .3mm, and .3mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/31/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 28 - 43 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
59+90	33.2	36.5	36.8	10.0	367.5	6.9	61+60	TOPOUT	TOPOUT
59+80	33.2	36.5	36.5	10.0	365.0	6.9	61+50	6.4	TOPOUT
59+70	33.1	36.4	36.5	10.0	364.5	7.2	61+40	11.1	TOPOUT
59+60	33.1	36.4	36.4	10.0	364.0	7.2	61+30	13.3	TOPOUT
59+50	33.2	36.5	36.5	10.0	364.5	7.0	61+20	16.9	TOPOUT
59+40	33.2	36.5	36.5	10.0	365.0	7.0	61+10	17.9	TOPOUT
59+30	33.2	36.6	36.6	10.0	365.5	6.8	61+00	19.9	TOPOUT
59+20	33.1	36.7	36.7	10.0	366.5	6.8	60+90	22.8	TOPOUT
59+10	33.0	37.0	36.9	10.0	368.5	6.8	60+80	25.5	TOPOUT
59+00	33.0	37.0	37.0	10.0	370.0	7.0	60+70	27.8	TOPOUT
58+90	33.0	37.0	37.0	10.0	370.0	6.5	60+60	28.5	TOPOUT
							60+50	29.8	6.5
							60+40	32.8	10.3
							60+30	35.6	12.6
							60+20	36.5	14.4
							60+10	36.6	17.3
							60+00	36.9	19.1
							59+90	21.4	21.2
							59+80	17.6	23.1
							59+70		25.3
							59+60		27.4
							59+50		29.7
							59+40		30.4
							59+30		35.1
							59+20		36.7
							59+10		37.0
							59+00		37.0
							58+90		37.0

SF TODAY 4031.00

SF TO DATE 69194.50

COMMENTS

NORTH TRENCH

Started to pull river rock 15' to 17' deep from Stations 59+70 to Station 58+90.

GEO-CON Suzanne E. Lepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 12/31/03 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 28 - 43 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
29+60	31.5	35.0	35.2	10.0	351.5	3.2	27+40	TOPOUT	TOPOUT
29+70	31.7	36.1	35.6	10.0	355.5	3.0	27+50	8.8	TOPOUT
29+80	31.7	36.0	36.1	10.0	360.5	3.1	27+60	12.1	TOPOUT
29+90	31.7	35.8	35.9	10.0	359.0	3.2	27+70	14.3	TOPOUT
30+00	31.8	35.9	35.9	10.0	358.5	3.1	27+80	15.9	TOPOUT
30+10	31.9	36.0	36.0	10.0	359.5	3.0	27+90	17.8	TOPOUT
30+20	32.0	36.3	36.2	10.0	361.5	3.3	28+00	19.7	TOPOUT
30+30	32.2	36.4	36.4	10.0	363.5	3.5	28+10	23.3	TOPOUT
30+40	32.3	36.3	36.4	10.0	363.5	3.6	28+20	24.2	TOPOUT
30+50	32.3	36.5	36.4	10.0	364.0	3.5	28+30	26.2	TOPOUT
30+60	32.2	36.3	36.4	10.0	364.0	3.5	28+40	26.8	TOPOUT
30+70	32.3	36.2	36.3	10.0	362.5	3.6	28+50	27.9	TOPOUT
30+80	32.2	36.0	36.1	10.0	361.0	3.4	28+60	28.9	TOPOUT
30+90	32.3	36.1	36.1	10.0	360.5	3.5	28+70	31.6	TOPOUT
							28+80	32.2	TOPOUT
							28+90	33.0	TOPOUT
							29+00	33.9	TOPOUT
							29+10	35.4	7.6
							29+20	35.5	10.2
							29+30	35.4	13.9
							29+40	35.5	15.4
							29+50	35.3	16.0
							29+60		19.5
							29+70		21.3
							29+80		23.7
							29+90		25.2
							30+00		26.1
							30+10		29.2
							30+20		30.8
							30+30		31.0
							30+40		32.8
							30+50		34.7
							30+60		36.3
							30+70		36.2
							30+80		36.0
							30+90		36.1

SF TODAY 5045.00

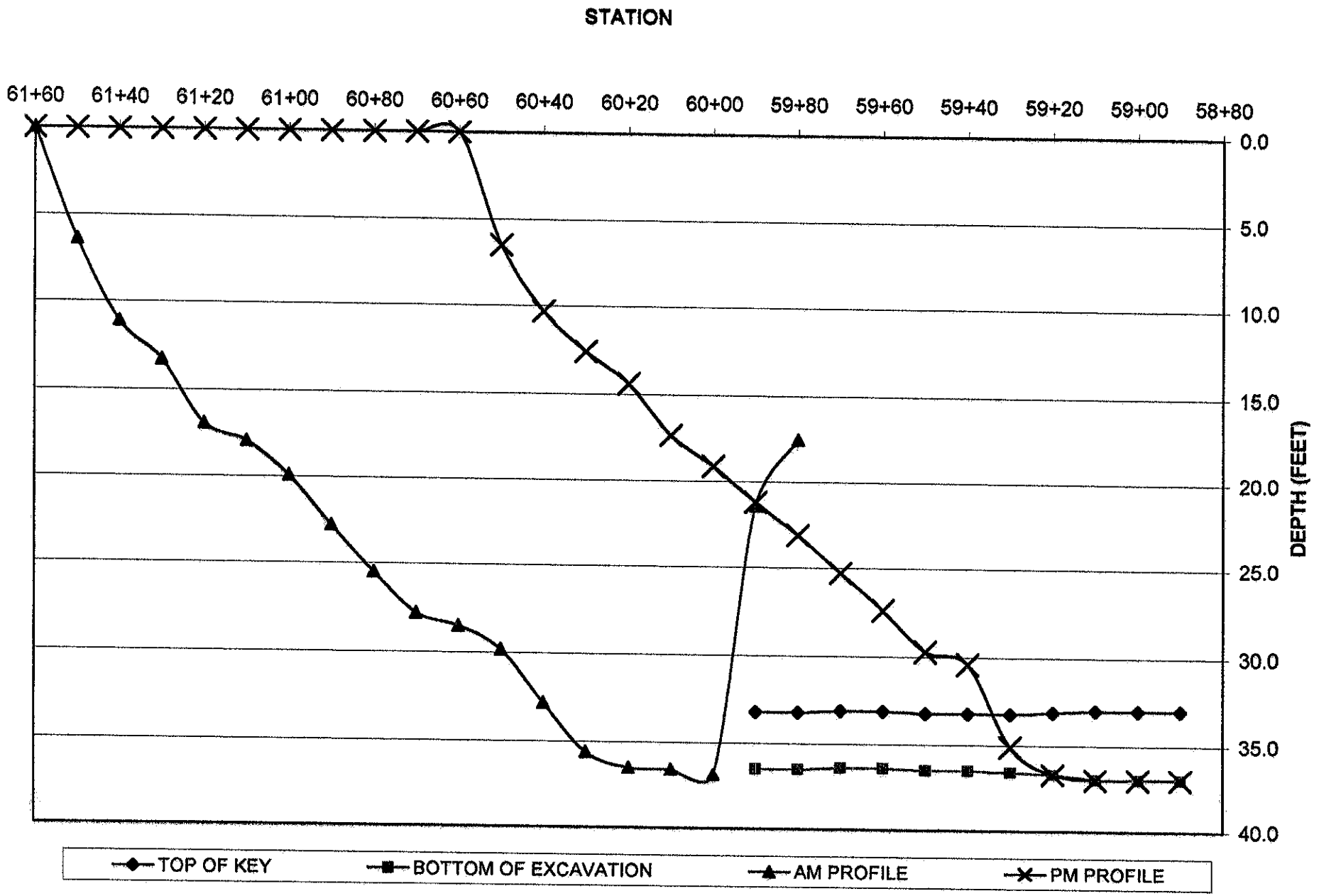
SF TO DATE 38647.72

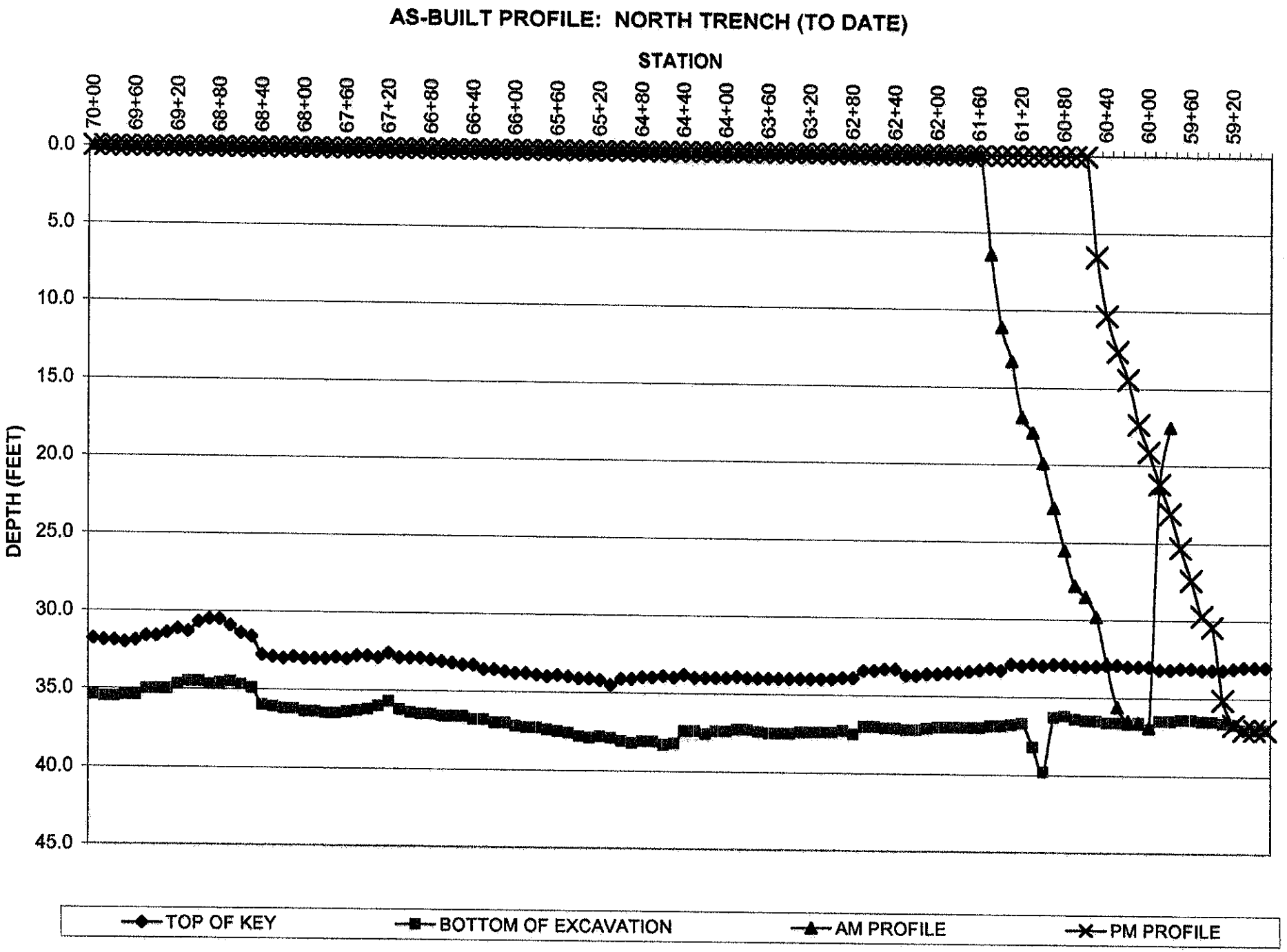
COMMENTS

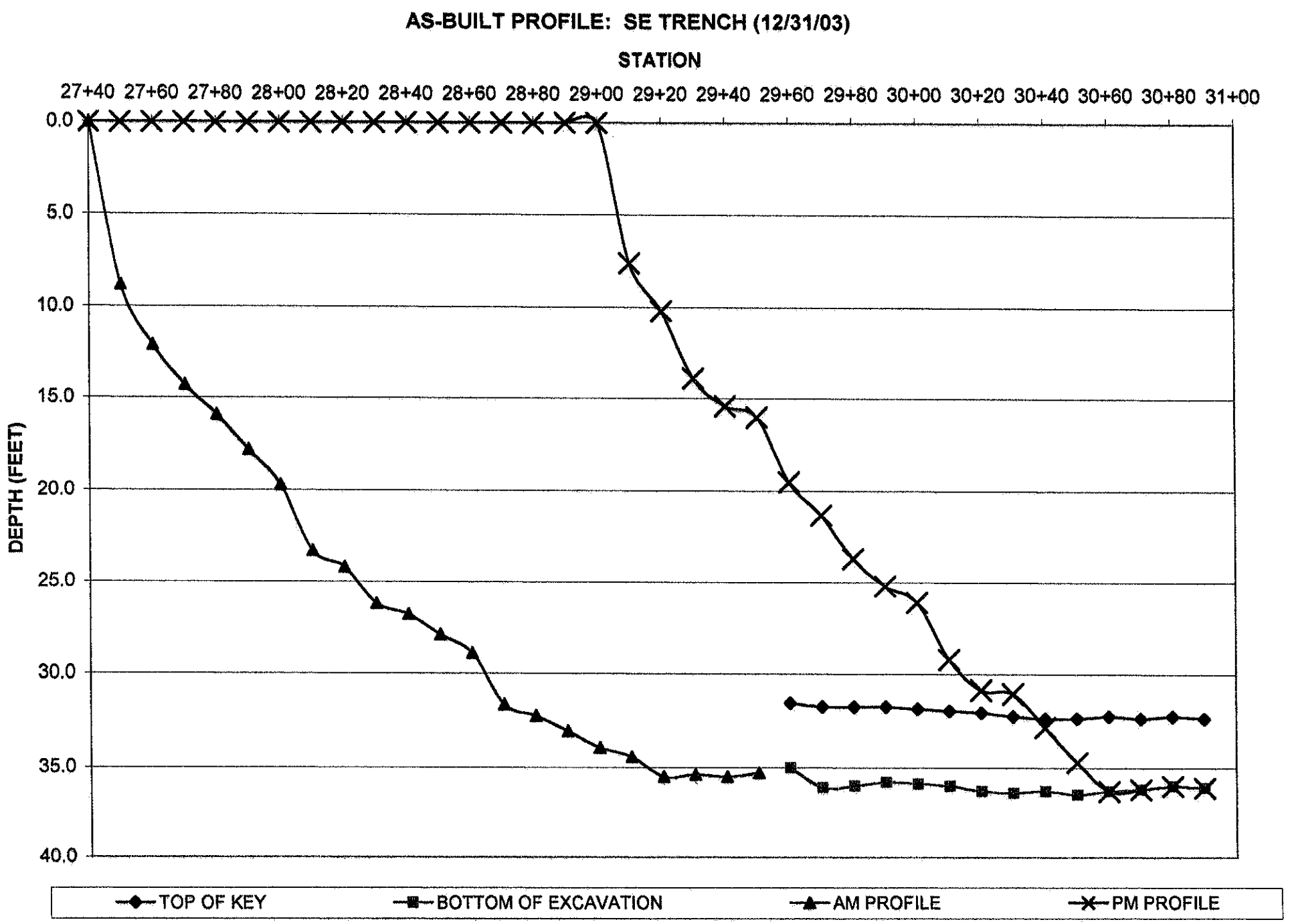
SE Trench

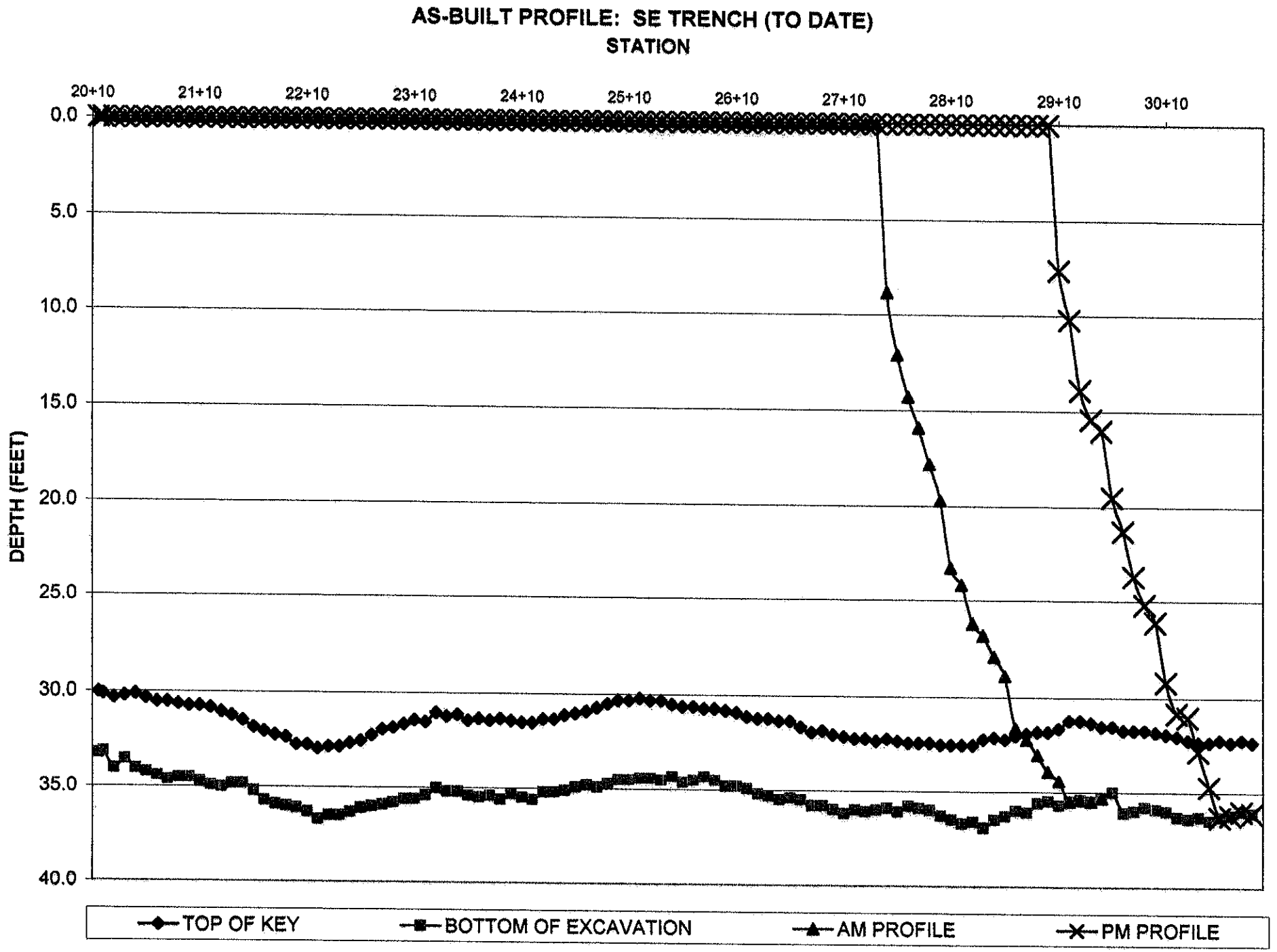
GEO-CON: Suzanne E. Sepic OWNER:

AS-BUILT PROFILE: NORTH TRENCH (12/31/03)




AS-BUILT PROFILE: NORTH TRENCH (TO DATE)
STATION
70+00
69+60
69+20
68+80
68+40
68+00
67+60
67+20
66+80
66+40
66+00
65+60
65+20
64+80
64+40
64+00
63+60
63+20
62+80
62+40
62+00
61+60
61+20
60+80
60+40
60+00
59+60
59+20
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (12/31/03)
STATION
27+40 27+60 27+80 28+00 28+20 28+40 28+60 28+80 29+00 29+20 29+40 29+60 29+80 30+00 30+20 30+40 30+60 30+80 31+00
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE)
STATION
20+10
21+10
22+10
23+10
24+10
25+10
26+10
27+10
28+10
29+10
30+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 12/31/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:05	45	> 40 sec	65	> 64 pcf	8	6.5 - 10	18	< 20 cm^3	.4
PM	13:15	44	> 40 sec	65	> 64 pcf	8	6.5 - 10	24 *	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	11:00	41	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	14:40	45	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

North Trench

* Filtrate failed. Retested at 13:32.
Visc. 46 sec
Unit wt. 65 pcf
pH 8
Filtrate 17 cm^3
Filter Cake .3 mm

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:10	60+00	2	47	40 - 90 sec	90	64 - 95 pcf	8	6.5 - 10	59	< 25 cm^3	1.9	34	MAX 30%
7:10	60+00	35	53	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	60	< 25 cm^3	2.1	36	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:01	58+30	2	46	40 - 90 sec	88	64 - 95 pcf	8	6.5 - 10	39	< 25 cm^3	.9	34	MAX 30%
15:01	58+30	34	47	40 - 90 sec	91.5	64 - 95 pcf	8	6.5 - 10	60	< 25 cm^3	1.3	38	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
61+50	3	2" to 6"	118	+15 pcf over trench slurry	5.91×10^{-7}	1.0×10^{-7} cm/sec
61+25	3	2" to 6"	119	+15 pcf over trench slurry	1.51×10^{-7}	1.0×10^{-7} cm/sec
61+00	3	2" to 6"	121	+15 pcf over trench slurry	2.61×10^{-7}	1.0×10^{-7} cm/sec
60+75	3	2" to 6"	119	+15 pcf over trench slurry	5.16×10^{-7}	1.0×10^{-7} cm/sec
60+50	3	2" to 6"	118	+15 pcf over trench slurry	3.37×10^{-7}	1.0×10^{-7} cm/sec
60+25	3	2" to 6"	118	+15 pcf over trench slurry	1.27×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

North trench

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff wall **Sta:** 61+50, 61+25, 61+00, 60+75, 60+50, 60+25 **Technician:** SM / RH SES

Sample Area: A = $\pi r^2 = \pi(3.85)^2 = 46.86 cm^2$ **Sample Height:** L = 6.0cm, 6.0cm, 6.5cm, 6.0cm, 6.0cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	Δ Q (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. factor (1/14.65)
61+50	12/31/03	9:40-13:40	240	10	117.2305	605865.9809	—	86	5.91×10^{-7}	4.03×10^{-8}
61+25	12/31/03	9:40-13:40	240	10	117.2305	605865.9809	—	22	1.51×10^{-7}	1.03×10^{-8}
61+00	12/31/03	9:40-13:40	240	10	108.2128	559261.0644	—	35	2.61×10^{-7}	1.78×10^{-8}
60+75	12/31/03	14:11-18:11	240	10	117.2305	605865.9809	—	75	5.16×10^{-7}	3.52×10^{-8}
60+50	12/31/03	14:11-18:11	240	10	117.2305	605865.9809	—	49	3.37×10^{-7}	2.30×10^{-8}
60+25	12/31/03	14:11-18:11	240	10	108.2128	559261.0644	—	17	1.27×10^{-7}	8.67×10^{-9}

I = P (psi) / 0.014217 L(cm) R = Quick Test / Triaxial Test = 1.85

DAILY QC TESTS

DATE 12/31/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

SE Trench

North Trench

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:50	29+50	2	54	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	40	< 25 cm^3	1.0	41	MAX 30%
7:50	29+50	33	58	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	41	< 25 cm^3	1.2	44	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:40	30+50	2	50	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	45	< 25 cm^3	1.8	42	MAX 30%
15:40	30+50	34	56	40 - 90 sec	100	64 - 95 pcf	8	6.5 - 10	50	< 25 cm^3	1.9	51	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
27+75	3	2" to 6"	117	+15 pcf over trench slurry	1.38×10^{-7}	1.0×10^{-7} cm/sec
28+00	3	2" to 6"	118.5	+15 pcf over trench slurry	2.68×10^{-7}	1.0×10^{-7} cm/sec
28+25	3	2" to 6"	118	+15 pcf over trench slurry	2.34×10^{-7}	1.0×10^{-7} cm/sec
28+50	3	2" to 6"	118	+15 pcf over trench slurry	1.92×10^{-7}	1.0×10^{-7} cm/sec
28+75	3	2" to 6"	118	+15 pcf over trench slurry	1.12×10^{-7}	1.0×10^{-7} cm/sec
29+00	3	2" to 6"	118	+15 pcf over trench slurry	3.58×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE Trench

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall **Sta:** 27+75, 28+00, 28+25, 28+50, 28+75, 29+00 **Technician:** SM ✓BY SES

Sample Area: $A = \pi r^2 = \pi(3.85)^2 = 46.56 cm^2$ **Sample Height:** L = 6.0cm, 6.5cm, 6.0cm, 6.0cm, 6.5cm, 6.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	Δ Q (cc)	$K = \frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/ conv. factor (1/14.65)
27+75	12/31/03	9:40-13:40	240	10	117.2305	605865.9809	—	20	1.38×10^{-7}	9.42×10^{-9}
28+00	12/31/03	9:40-13:40	240	10	108.2128	559261.0644	—	36	2.68×10^{-7}	1.83×10^{-8}
28+25	12/31/03	9:40-13:40	240	10	117.2305	605865.9809	—	34	2.34×10^{-7}	1.60×10^{-8}
28+50	12/31/03	14:11-18:11	240	10	117.2305	605865.9809	—	28	1.92×10^{-7}	1.31×10^{-8}
28+75	12/31/03	14:11-18:11	240	10	108.2128	559261.0644	—	15	1.12×10^{-7}	7.64×10^{-9}
29+00	12/31/03	14:11-18:11	240	10	117.2305	605865.9809	—	52	3.58×10^{-7}	2.44×10^{-8}

$I = \frac{P\ (psi)}{0.014217\ L(cm)}$ $R = \frac{\text{Quick Test}}{\text{Triaxial Test}} = 1.85$

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 2-Jan-04 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO P01-048 | P.O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-053 (NW59+00)	SOIL ONLY	59+00	12/31/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-054 (SE30+00)	SOIL ONLY	30+00	12/31/03		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-063 (SE28+00)	SB BACKFILL**	28+00	12/31/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-064 (NW61+00)	SB BACKFILL**	61+00	12/31/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-065 (SE29+00)	SB BACKFILL**	29+00	12/31/03		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

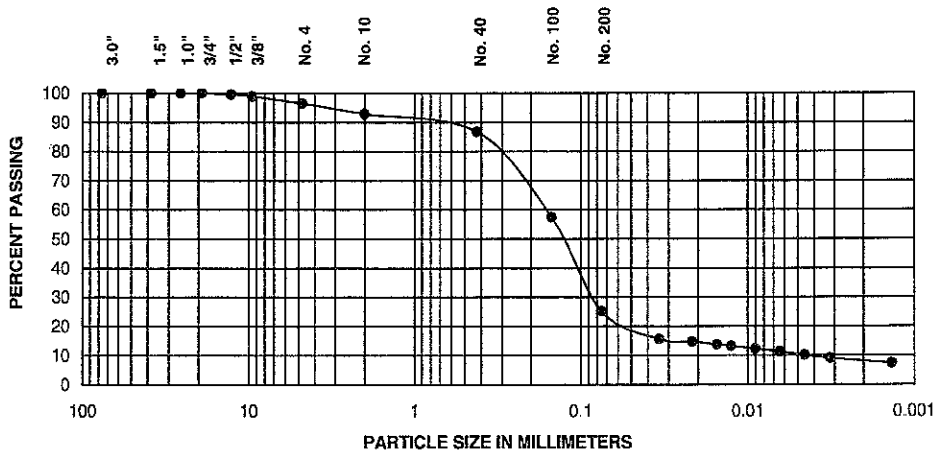
White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)

333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-063	**Date Tested**	1/5/2004	**Tested by**	MT
						Qc by	SB

Date Sample Received:	1/2/2004
Sample Location	STA 28+00 (SE)
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	3.5	71.4	14.6	10.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	99.6
3/8"	99.0
No. 4	96.5
No. 10	93.0
No. 40	86.8
No. 100	57.4
No. 200	25.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
27	19	8

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

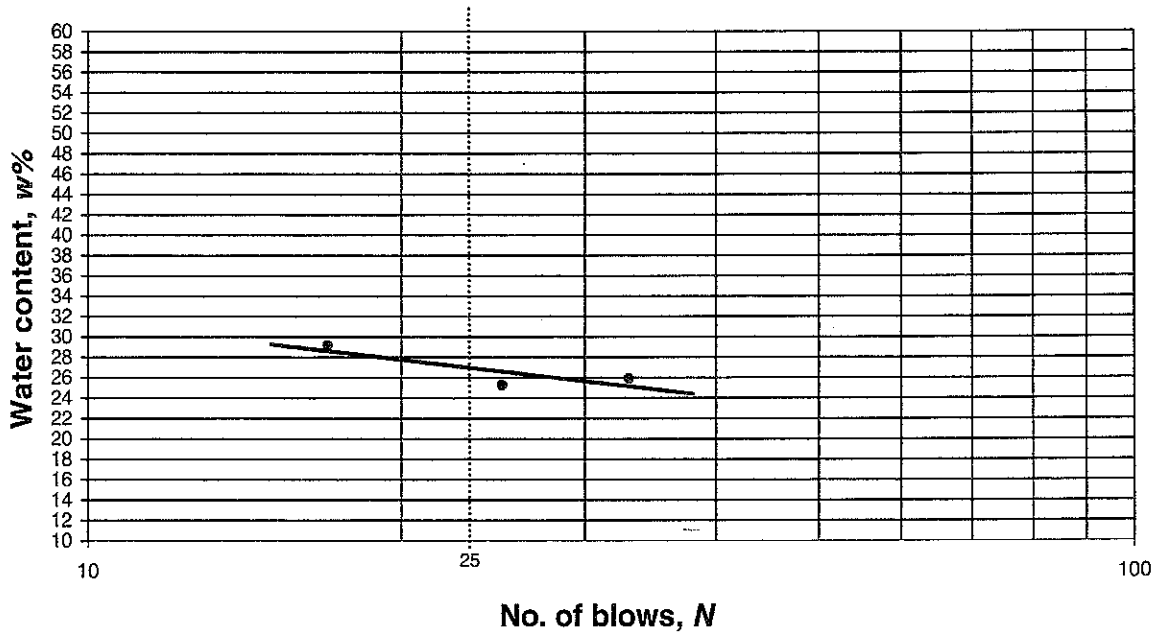
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-063	**Date Tested**	1/5/2004	**Tested By**	KM
						Qc By	SB

Date Sample Recd.	1/2/2004
Sample Location	STA 28+00 (SE)
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**27**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**8**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/7/2004	**Tested by:**	KM	**QC by:**	NP
Sample ID:	SB-063	Date Recd.	1/2/04	**Location**	STA 28+00 (SE)		
Sample Description	Gray silty, clayey sand, tr Gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.83	cm	Volume, V:	237.4	cu cm
Mass of Sample:	451.7	g	**Moisture Content:**	**26.2**	%
			Wet Density	**118.7**	**pcf**
			Dry Density	**94.1**	**pcf**

Final

Diameter:	6.93	cm	Area, A:	37.7	sq cm
Height, L:	5.43	cm	Volume, V:	204.8	cu cm
Mass of Sample:	432.10	g	**Moisture Content:**	**20.4**	%
			Wet Density	**131.6**	**pcf**
			Dry Density	**109.3**	**pcf**
			Deg of Saturation	**98.5**	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	76.8 psi
Gradient:	21.7

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/7/2004	11:11 AM	0	0	3.21	6.40		20.0	---
1/7/2004	1:12 PM	7260	7260	3.98	5.78	1.2	20.0	8.48E-08
1/7/2004	3:06 PM	6840	14100	4.74	5.13	1.2	20.0	1.01E-07
1/7/2004	4:03 PM	3420	17520	5.10	4.83	1.2	20.0	9.88E-08
1/7/2004	4:56 PM	3180	20700	5.43	4.56	1.2	20.0	9.91E-08

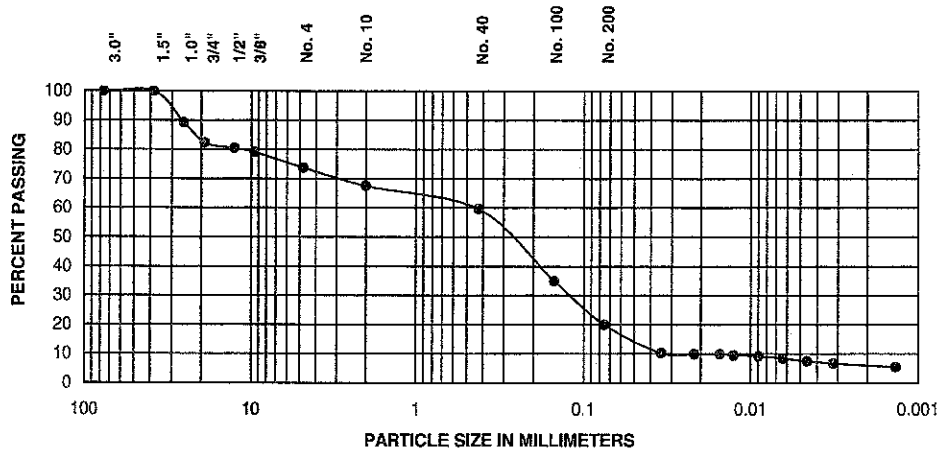
Average Permeability = **9.6E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-064	**Date Tested**	1/5/2004	**Tested by**	MT
						Qc by	SB

Date Sample Received:	1/2/2004
Sample Location	STA 61+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	26.2	53.8	12.1	7.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	89.3
3/4"	82.3
1/2"	80.5
3/8"	79.0
No. 4	73.8
No. 10	67.5
No. 40	59.7
No. 100	34.9
No. 200	20.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
29	22	7

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

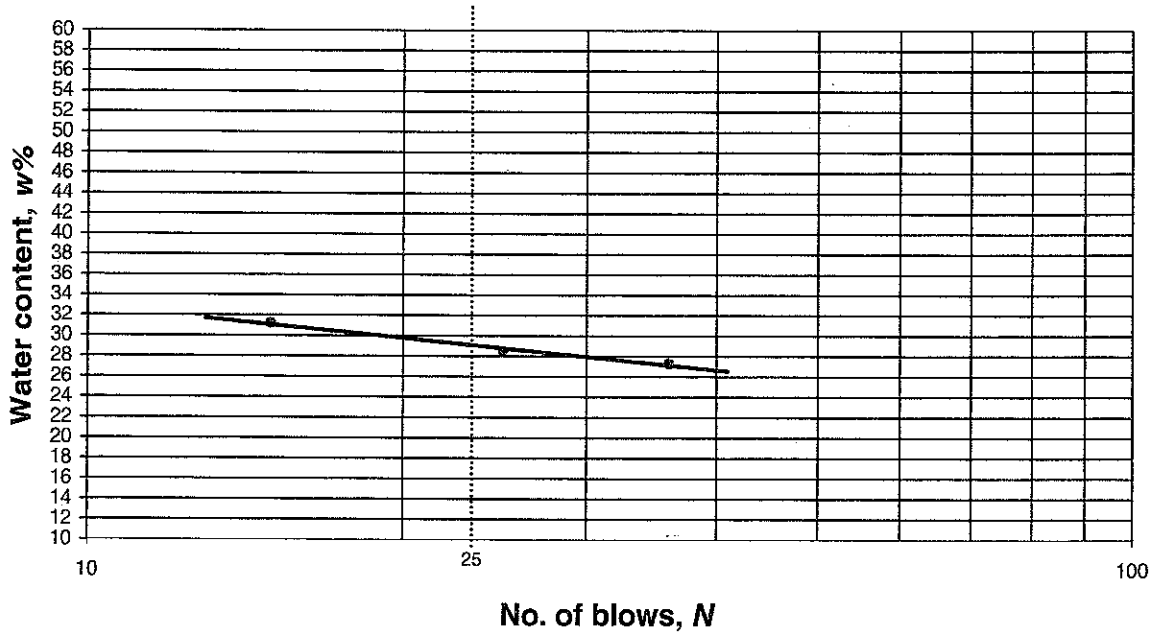
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-064	**Date Tested**	1/6/2004	**Tested By**	MA
						Qc By	SB

Date Sample Recd.	1/2/2004
Sample Location	STA 61+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	29	**Plastic Limit, PL**	22	**Plasticity Index, PI**	7

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/8/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-064	Date Recd.	1/2/04	**Location**	STA 61+00 (NW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.21	cm	Area, A:	40.8	sq cm
Height, L:	6.28	cm	Volume, V:	256.4	cu cm
Mass of Sample:	520.1	g	**Moisture Content:**	**25.2**	%
			Wet Density	**126.6**	**pcf**
			Dry Density	**101.1**	**pcf**

Final

Diameter:	7.10	cm	Area, A:	39.6	sq cm
Height, L:	6.13	cm	Volume, V:	242.7	cu cm
Mass of Sample:	516.60	g	**Moisture Content:**	**18.6**	%
			Wet Density	**132.8**	**pcf**
			Dry Density	**112.0**	**pcf**
			Deg of Saturation	**96.0**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	20.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/8/2004	9:45 AM	0	0	3.14	5.91		20.0	---
1/8/2004	10:30 AM	2700	2700	3.37	5.70	1.1	20.0	8.28E-08
1/8/2004	11:15 AM	2700	5400	3.57	5.50	1.0	20.0	8.05E-08
1/8/2004	12:00 PM	2700	8100	3.76	5.31	1.0	20.0	7.80E-08
1/8/2004	1:00 PM	3600	11700	3.99	5.07	1.0	20.0	7.55E-08

Average Permeability = **7.9E-08** cm/sec

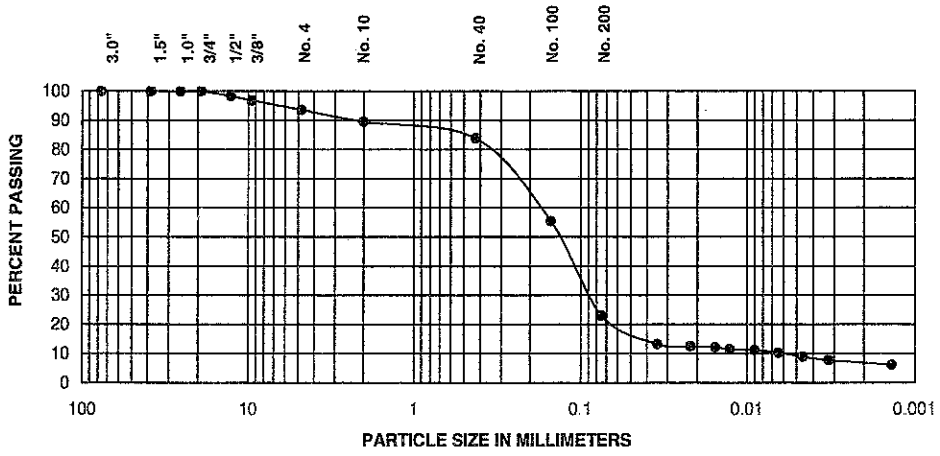
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-065	**Date Tested**	1/5/2004	**Tested by**	MT
						Qc by	SB

Date Sample Received:	1/2/2004
Sample Location	STA 29+00 (SE)
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	6.4	70.5	13.5	9.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	98.3
3/8"	96.8
No. 4	93.6
No. 10	89.6
No. 40	83.8
No. 100	55.4
No. 200	23.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
28	22	6

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

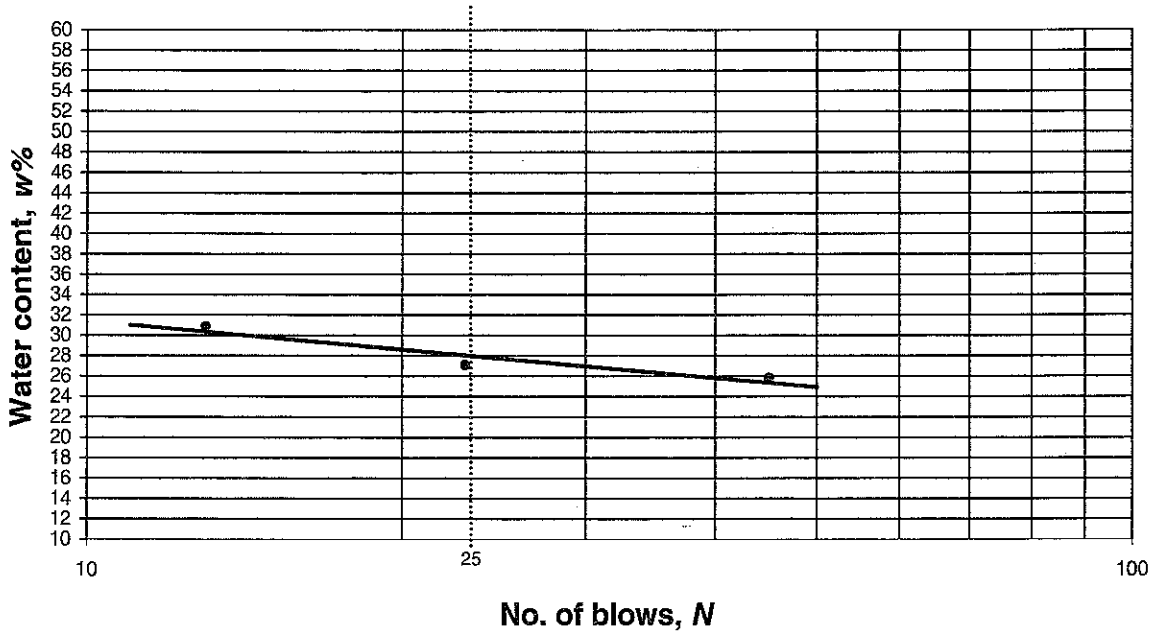
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-065	**Date Tested**	1/6/2004	**Tested By**	EM
						Qc By	SB

Date Sample Recd.	1/2/2004
Sample Location	STA 29+00 (SE)
Sample Description	Gray silty, clayey sand, tr. Gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**28**	**Plastic Limit, PL**	**22**	**Plasticity Index, PI**	**6**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/6/2004	**Tested by:**	KM	**QC by:**	SB
Sample ID:	SB-065	Date Recd.	1/2/04	**Location**	STA 29+00 (SE)		
Sample Description	Gray silty, clayey sand, tr Gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.79	cm	Volume, V:	235.7	cu cm
Mass of Sample:	487.8	g	**Moisture Content:**	**26.1**	%
			Wet Density	**129.1**	**pcf**
			Dry Density	**102.4**	**pcf**

Final

Diameter:	6.93	cm	Area, A:	37.7	sq cm
Height, L:	5.74	cm	Volume, V:	216.5	cu cm
Mass of Sample:	467.80	g	**Moisture Content:**	**17.2**	%
			Wet Density	**134.8**	**pcf**
			Dry Density	**115.1**	**pcf**
			Deg of Saturation	**96.1**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.9	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/6/2004	10:15 AM	0	0	3.08	5.81		20.0	---
1/6/2004	11:28 AM	4380	4380	3.29	5.53	0.8	20.0	6.31E-08
1/6/2004	1:06 PM	5880	10260	3.60	5.25	1.1	20.0	4.83E-08
1/6/2004	2:07 PM	3660	13920	3.79	5.08	1.1	20.0	4.82E-08
1/6/2004	3:22 PM	4500	18420	4.01	4.87	1.0	20.0	4.95E-08

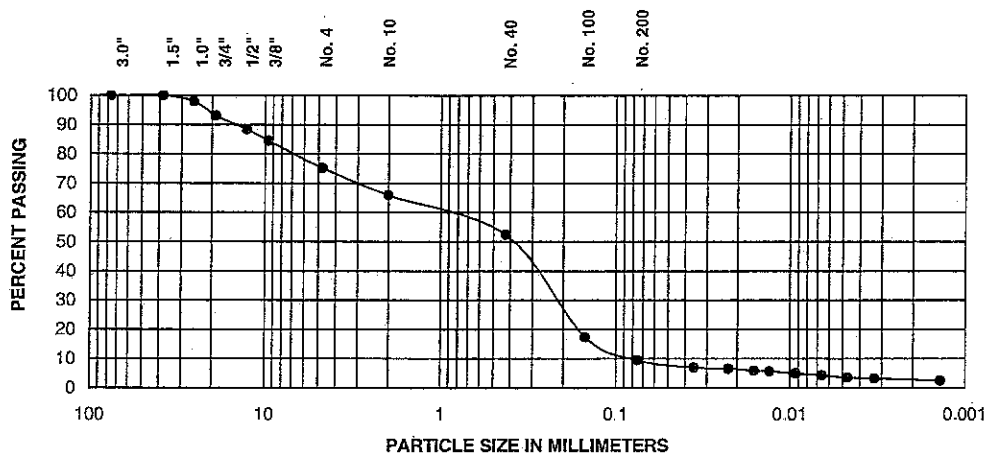
Average Permeability = **5.2E-08** **cm/sec**

Remarks:

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-053	**Date Tested**	1/5/2004	**Tested by**	MT
						Qc by	SB

Date Sample Received:	12/31/2003
Sample Location	STA 59+00 (NW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	24.8	65.7	5.7	3.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.01	0.22	0.08	12.8	0.60

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.0
3/4"	93.2
1/2"	88.4
3/8"	84.6
No. 4	75.2
No. 10	66.0
No. 40	52.5
No. 100	17.4
No. 200	9.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

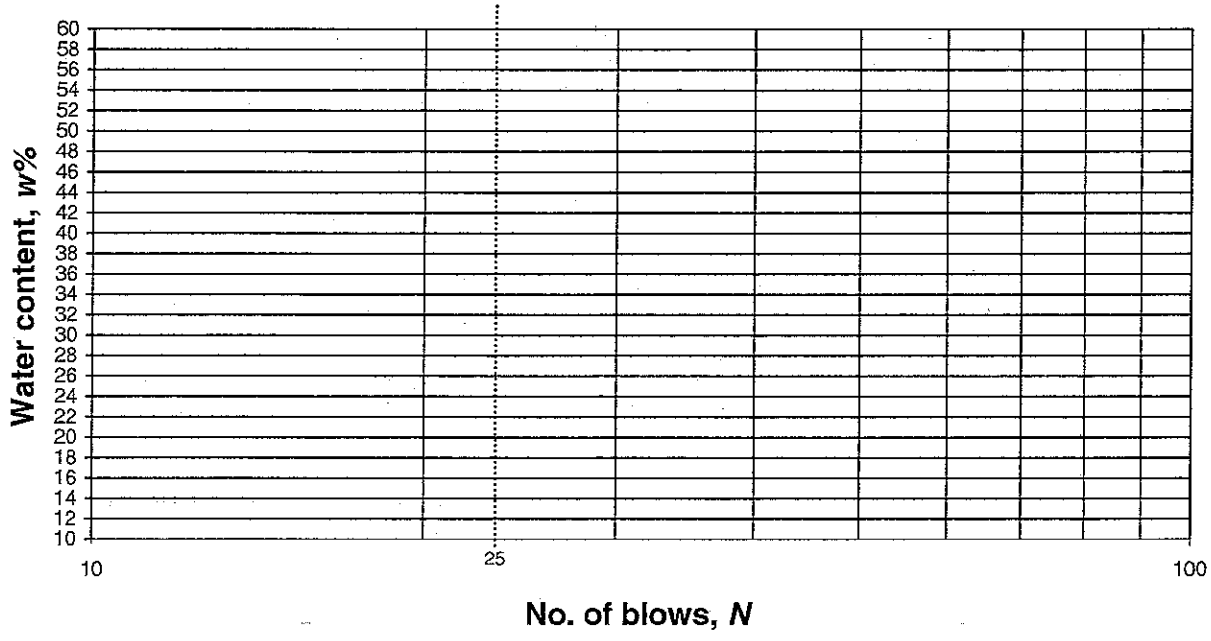
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-053	**Date Tested**	1/2/2004	**Tested By**	KM
						Qc By	SB

Date Sample Recd.	12/31/2003
Sample Location	STA 59+00 (NW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	20	Date	12/31/2003	Sheet	1
				Date of weighing	12/31/2003	Tested by	KM

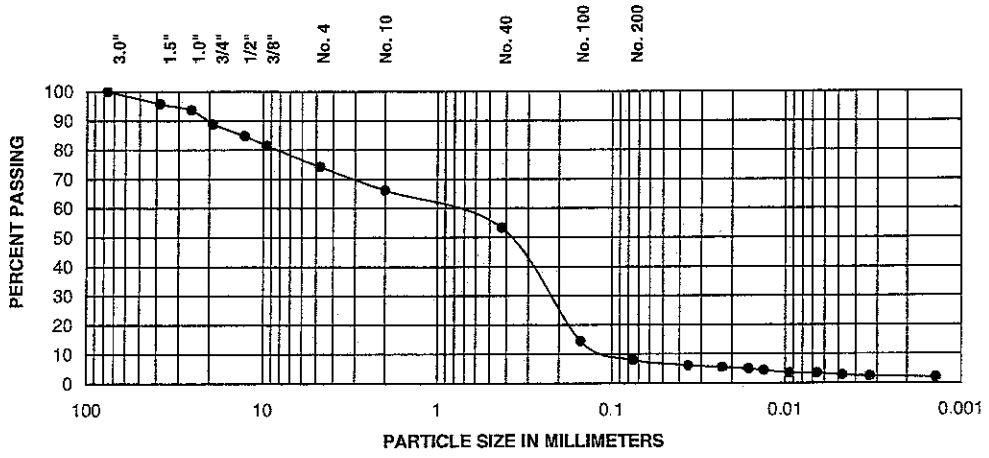
Boring No.	-	-	-	-	-	-
Sample No.	BF-048	BF-049	BF-050	BF-051	BF-052	BF-053
Location	27 + 50 (SE)	61 + 00 (NW)	28 + 00 (SE)	60 + 00 (NW)	29 + 00 (SE)	59 + 00 (NW)
Tin No.	79A	20C	2C	24A	68A	81A
Tin + Wet Soil	140.47	153.13	119.03	117.53	124.18	137.69
Tin + Dry Soil	126.8	133.2	106.6	105.4	112.5	122.9
Wt. of Tin	30.63	30.98	31.38	30.02	30.45	29.98
Wt. of Dry Soil	96.2	102.2	75.2	75.4	82.1	92.9
Wt. of Water	13.7	19.9	12.4	12.1	11.7	14.8
Moisture, %	14.2	19.5	16.5	16.1	14.2	15.9
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-054					
Location	30 + 00 (SE)					
Tin No.	71A					
Tin + Wet Soil	131.7					
Tin + Dry Soil	120.6					
Wt. of Tin	30.5					
Wt. of Dry Soil	90.1					
Wt. of Water	11.1					
Moisture, %	12.3					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-054	**Date Tested**	1/5/2004	**Tested by**	MT
						Qc by	SB

Date Sample Received:	12/31/2003
Sample Location	STA 30+00 (SE)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	25.6	66.3	5.1	2.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.95	0.23	0.09	10.2	0.59

Sieve Size	Percent Passing
3.0"	100.0
1.5"	95.8
1.0"	93.7
3/4"	88.9
1/2"	84.8
3/8"	81.5
No. 4	74.4
No. 10	66.2
No. 40	53.4
No. 100	14.4
No. 200	8.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

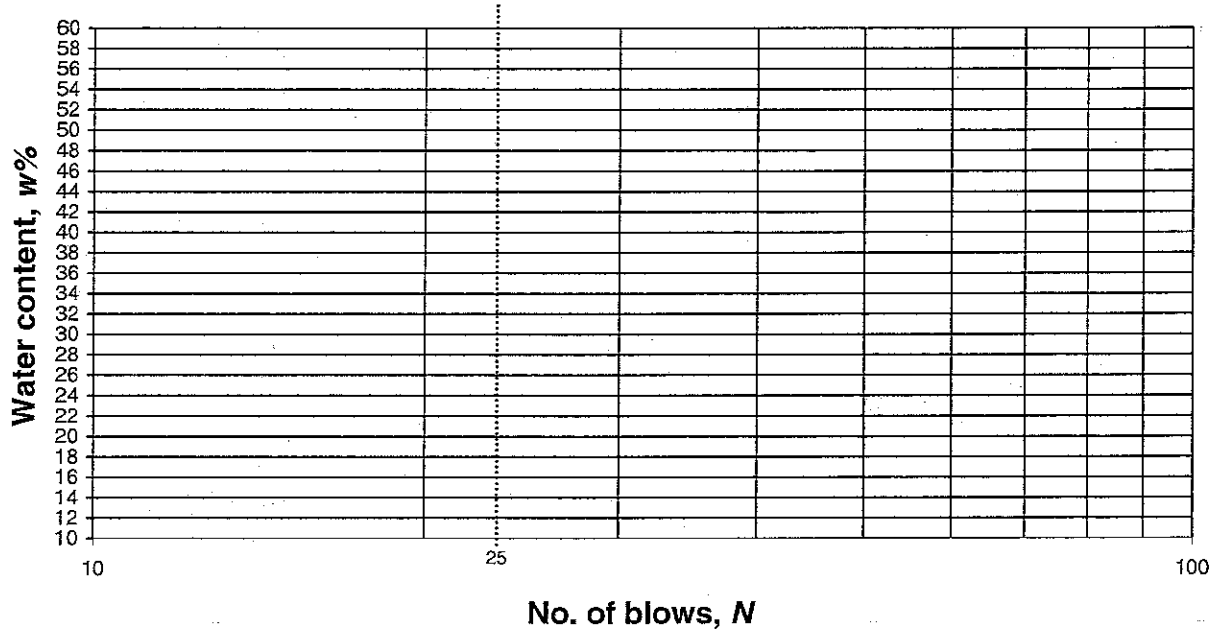
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-054	**Date Tested**	1/5/2004	**Tested By**	KM
						Qc By	SB

Date Sample Recd.	12/31/2003
Sample Location	STA 30+00 (SE)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	20	Date	12/31/2003	Sheet	1
				Date of weighing	12/31/2003	Tested by	KM

Boring No.	-	-	-	-	-	-
Sample No.	BF-048	BF-049	BF-050	BF-051	BF-052	BF-053
Location	27 + 50 (SE)	61 + 00 (NW)	28 + 00 (SE)	60 + 00 (NW)	29 + 00 (SE)	59 + 00 (NW)
Tin No.	79A	20C	2C	24A	68A	81A
Tin + Wet Soil	140.47	153.13	119.03	117.53	124.18	137.69
Tin + Dry Soil	126.8	133.2	106.6	105.4	112.5	122.9
Wt. of Tin	30.63	30.98	31.38	30.02	30.45	29.98
Wt. of Dry Soil	96.2	102.2	75.2	75.4	82.1	92.9
Wt. of Water	13.7	19.9	12.4	12.1	11.7	14.8
Moisture, %	14.2	19.5	16.5	16.1	14.2	15.9
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-054					
Location	30 + 00 (SE)					
Tin No.	71A					
Tin + Wet Soil	131.7					
Tin + Dry Soil	120.6					
Wt. of Tin	30.5					
Wt. of Dry Soil	90.1					
Wt. of Water	11.1					
Moisture, %	12.3					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/02/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Overcast; 35 - 55 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
59+00	2.00	98.00	5.00	35.00	37.00	8
59+00	35.00	103.00	12.00	53.00	65.00	8
58+00	2.00	80.00	25.00	20.00	47.00	8
58+00	35.00	82.50	30.00	23.00	47.00	8

NORTH TRENCH

SEE DAILY QC RESULTS SHEET (HANDWRITTEN)

COMMENTS: Trench filtrate losses are still high, but typical for trench slurry results. Sand content in morning was low due to settling of sand over the no work day. Trench bottom and slope were cleaned. Fresh slurry was pumped to this trench to try and bring the trench slurry back within specs.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
58+00	LAB SAMPLE COLLECTED 01/02/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
60+50	4.00	N/A	N/A	N/A	3.78×10^{-7}	N/A
60+25	4.00	N/A	N/A	N/A	4.92×10^{-7}	N/A
60+00	4.00	Sample collected	Sample collected	Sample collected	3.72×10^{-7}	yes
59+75	3.00	N/A	N/A	N/A	2.27×10^{-7}	N/A
59+50	3.00	N/A	N/A	N/A	2.45×10^{-7}	N/A

COMMENTS

Filter cake: 1.5mm, 2.0mm, .6mm, and .7mm respectively.

Unit Weight: 60+50: 118.0 pcf
60+25: 118.5 pcf
60+00: 118.0 pcf
59+75: 118.0 pcf
59+50: 116.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: [illegible] OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/02/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Overcast; 35 - 55 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
30+90	2.00	100.50	54.00	64.00	70.00	8
30+90	34.00	101.00	56.00	65.00	75.00	8
32+00	2.00	71.00	44.00	17.00	45.00	8
32+00	34.00	72.00	45.00	20.00	47.00	8

SE TRENCH

COMMENTS: Trench filtrate losses are high, but typical for trench slurry results. Sand content results and some unit weights are too high (am) Fresh slurry was pumped to this trench today to try and fix these problems. See the handwritten QC sheet for extra test results.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
31+00	LAB SAMPLE COLLECTED 01/02/04			
32+00	LAB SAMPLE COLLECTED 01/02/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
29+25	3.00	N/A	N/A	N/A	3.05×10^{-7}	N/A
29+50	3.00	N/A	N/A	N/A	3.87×10^{-7}	N/A
29+75	3.00	N/A	N/A	N/A	6.10×10^{-7}	N/A
30+00	3.00	Sample collected	Sample collected	Sample collected	2.06×10^{-7}	yes
30+25	3.00	N/A	N/A	N/A	2.34×10^{-7}	N/A
30+50	3.00	N/A	N/A	N/A	2.76×10^{-7}	N/A
30+75	3.00	N/A	N/A	N/A	2.14×10^{-7}	N/A

COMMENTS

Filter cake: 1.0mm, 1.2mm, 1.8mm and 1.9mm respectively.

Unit Weight:
29+25: 117.0 pcf
29+50: 119.0 pcf
29+75: 119.0 pcf
30+00: 118.0 pcf
30+25: 118.0 pcf
30+50: 118.0 pcf
30+75: 119.5 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C Sepe **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/02/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:30	81.00**	47.00**	26.00**	8**
11:05	65.00	46.00	-	-
13:14	64.00	40.00	18.00	8
14:42	65.00	44.00	16.00	8

**This test was taken from the the top part of the trench, from the excavator's bucket

Filter cake is .5mm, .3mm and .3mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Jeanne E Lopic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/02/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Overcast; 35 - 55 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
58+80	33.2	36.6	36.8	10.0	368.0	6.4	60+60	TOPOUT	TOPOUT
58+70	33.1	36.6	36.6	10.0	366.0	6.4	60+50	6.9	TOPOUT
58+60	33.0	36.6	36.6	10.0	366.0	6.5	60+40	10.8	TOPOUT
58+50	33.1	36.7	36.7	10.0	366.5	6.6	60+30	13.0	TOPOUT
58+40	33.1	36.7	36.7	10.0	367.0	6.8	60+20	14.8	TOPOUT
58+30	33.2	36.8	36.8	10.0	367.5	6.7	60+10	17.7	TOPOUT
58+20	33.2	36.7	36.8	10.0	367.5	7.0	60+00	19.8	TOPOUT
58+10	33.1	36.7	36.7	10.0	367.0	7.0	59+90	21.9	TOPOUT
58+00	33.1	36.8	36.8	10.0	367.5	6.9	59+80	23.9	TOPOUT
57+90	33.0	36.7	36.8	10.0	367.5	6.9	59+70	25.5	TOPOUT
57+80	33.1	36.7	36.7	10.0	367.0	6.8	59+60	27.1	TOPOUT
57+70	33.2	36.9	36.8	10.0	368.0	6.7	59+50	29.1	3.2
							59+40	30.1	8.4
							59+30	34.8	13.2
							59+20	36.3	15.6
							59+10	36.3	16.4
							59+00	36.4	19.3
							58+90	36.4	21.5
							58+80		23.4
							58+70		24.7
							58+60		26.1
							58+50		27.5
							58+40		28.7
							58+30		29.9
							58+20		31.2
							58+10		31.7
							58+00		32.4
							57+90		32.9
							57+80		34.3
							57+70		36.9
			SF TODAY	4405.50					
			SF TO DATE	73600.00					

COMMENTS

NORTH TRENCH

Started to pull river rock 15' to 17' deep from Stations 59+70 to Station 58+90.

GEO-CON: Suzanne C. Sapio OWNER:

GEO-CON

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/02/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Overcast; 35 - 55 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
31+00	32.2	36.0	36.1	10.0	360.5	3.7	29+00	TOPOUT	TOPOUT
31+10	32.3	36.0	36.0	10.0	360.0	3.9	29+10	7.8	TOPOUT
31+20	32.3	36.2	36.1	10.0	361.0	3.8	29+20	10.0	TOPOUT
31+30	32.2	36.1	36.2	10.0	361.5	4.0	29+30	13.7	TOPOUT
31+40	32.3	35.9	36.0	10.0	360.0	4.1	29+40	15.5	TOPOUT
31+50	32.4	35.8	35.9	10.0	358.5	4.4	29+50	16.1	TOPOUT
31+60	32.4	35.9	35.9	10.0	358.5	4.2	29+60	19.7	TOPOUT
31+70	32.5	36.0	36.0	10.0	359.5	3.9	29+70	21.5	TOPOUT
31+80	32.6	36.2	36.1	10.0	361.0	3.7	29+80	23.0	TOPOUT
31+90	32.6	36.3	36.3	10.0	362.5	3.5	29+90	24.9	TOPOUT
32+00	32.5	36.5	36.4	10.0	364.0	3.3	30+00	26.0	TOPOUT
32+10	32.6	36.2	36.4	10.0	363.5	3.4	30+10	28.9	TOPOUT
32+20	32.7	36.4	36.3	10.0	363.0	3.6	30+20	31.0	TOPOUT
							30+30	31.2	TOPOUT
							30+40	32.2	TOPOUT
							30+50	34.5	TOPOUT
							30+60	36.0	TOPOUT
							30+70	36.2	TOPOUT
							30+80	36.0	TOPOUT
							30+90	36.1	7.6
							31+00		11.5
							31+10		14.2
							31+20		15.3
							31+30		18.9
							31+40		20.0
							31+50		21.1
							31+60		23.9
							31+70		26.4
							31+80		27.4
							31+90		28.7
							32+00		30.8
							32+10		33.2
							32+20		36.4

SF TODAY 4693.50

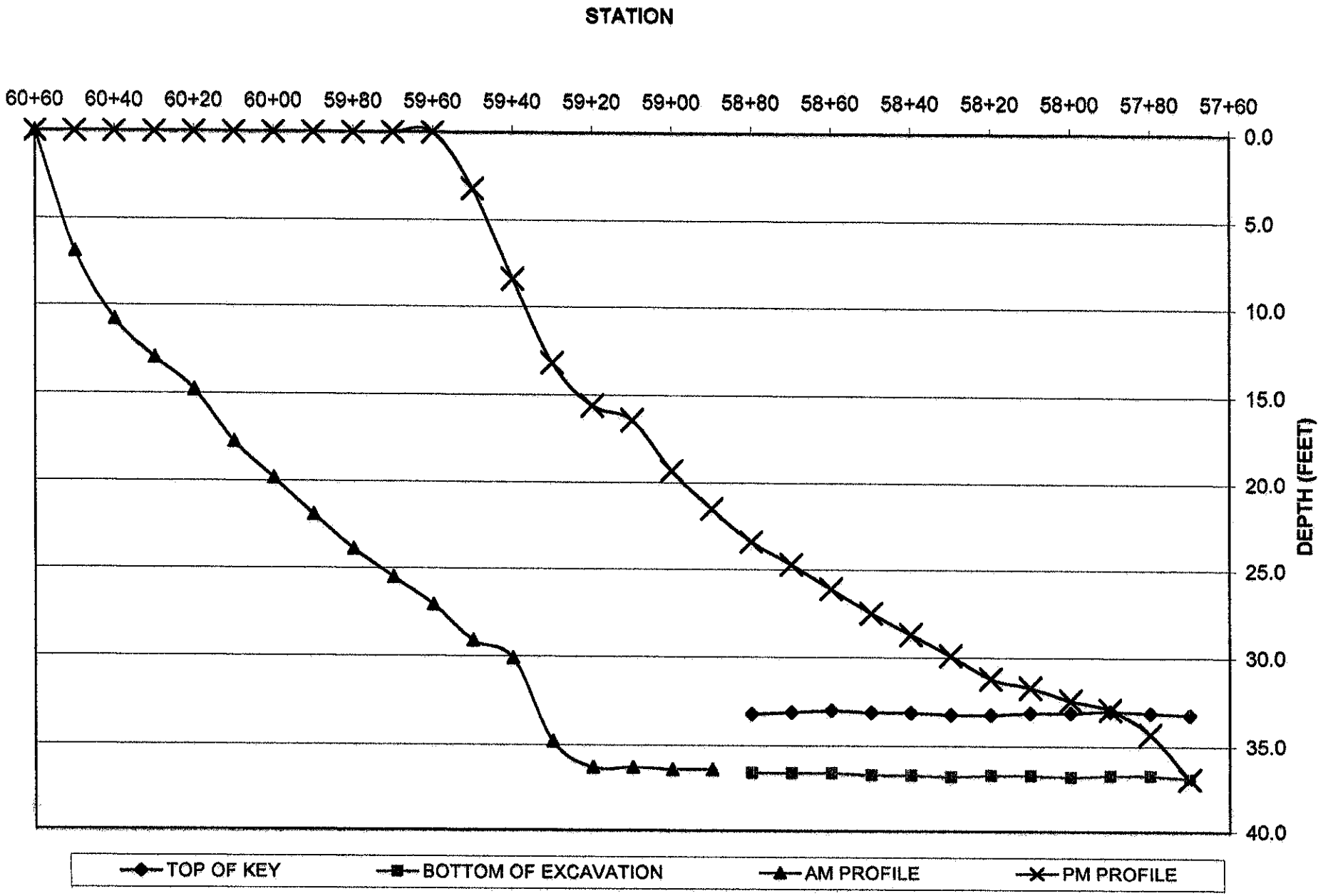
SF TO DATE 43341.22

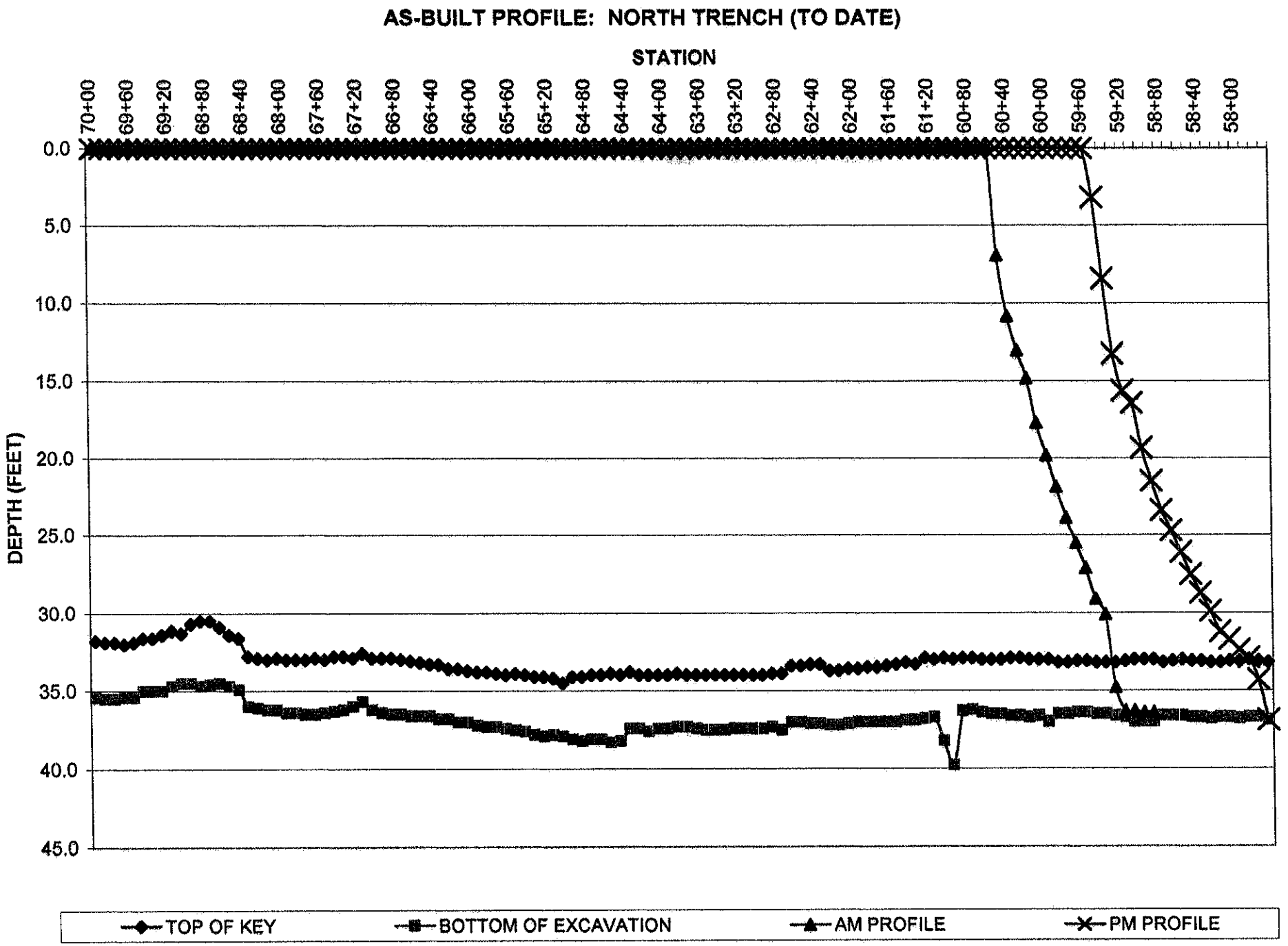
COMMENTS

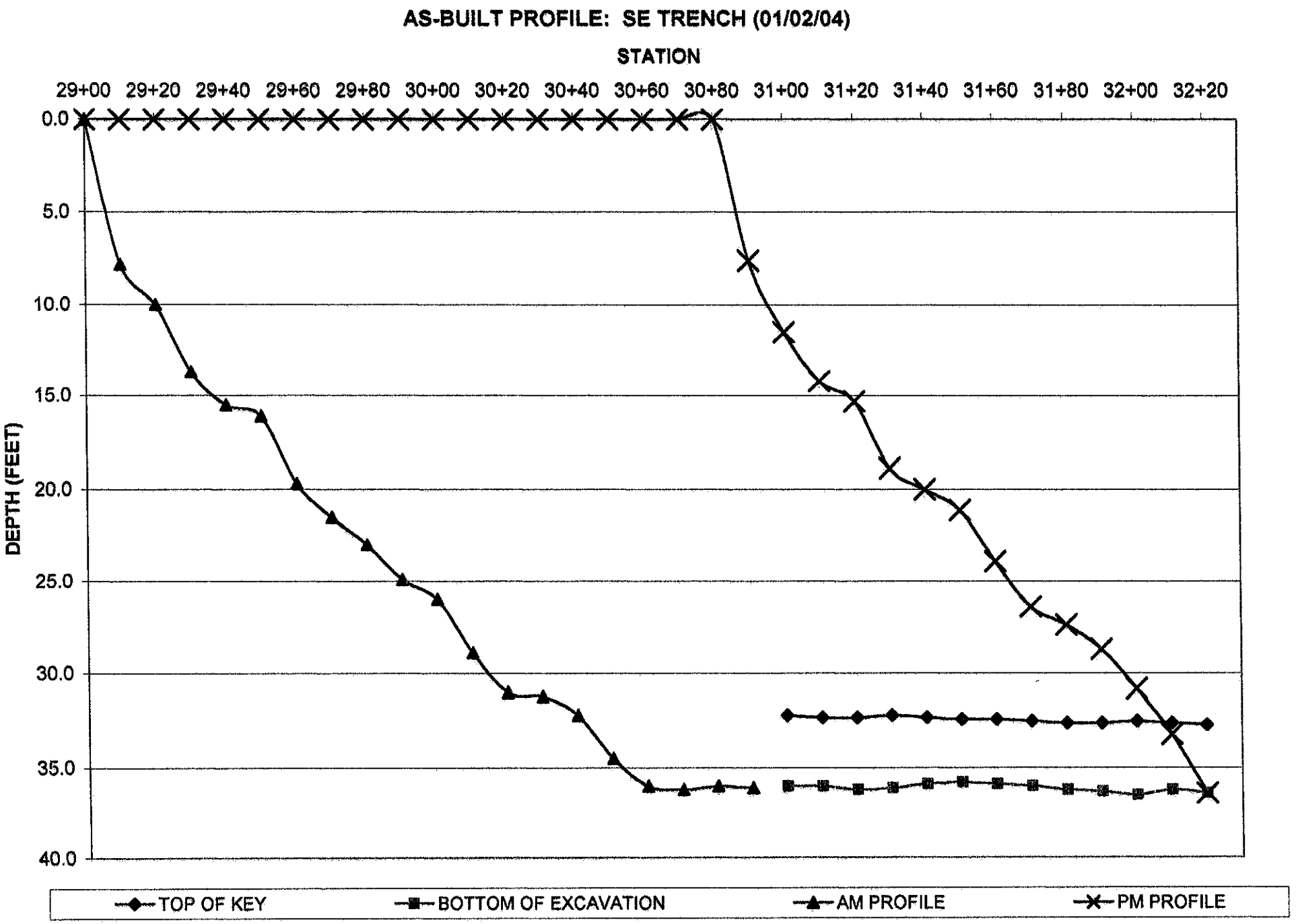
SE Trench

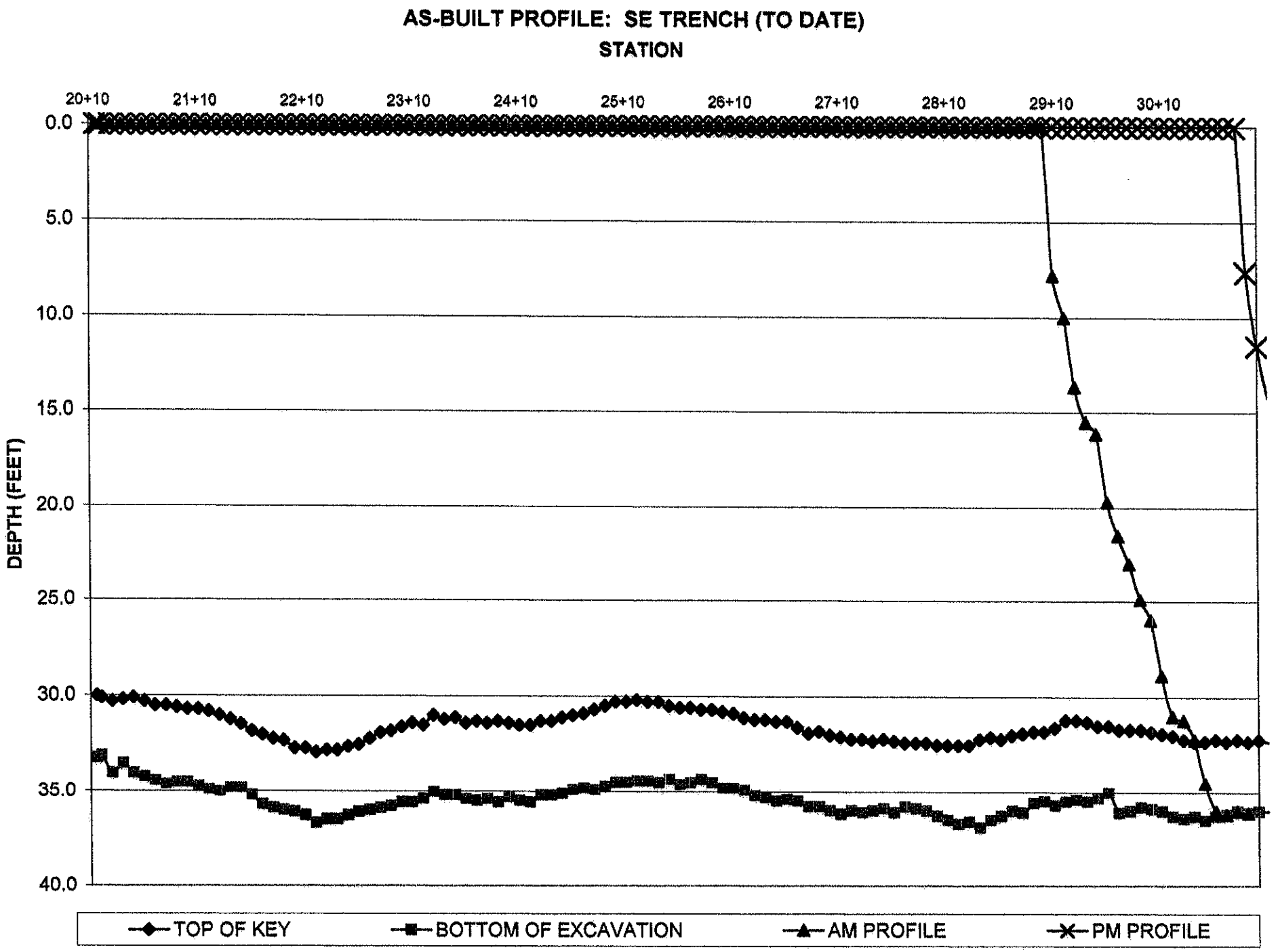
GEO-CON: Suzanne E. Sepe OWNER:

AS-BUILT PROFILE: NORTH TRENCH (01/02/04)




AS-BUILT PROFILE: NORTH TRENCH (TO DATE)
STATION
70+00
69+60
69+20
68+80
68+40
68+00
67+60
67+20
66+80
66+40
66+00
65+60
65+20
64+80
64+40
64+00
63+60
63+20
62+80
62+40
62+00
61+60
61+20
60+80
60+40
60+00
59+60
59+20
58+80
58+40
58+00
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (01/02/04)
STATION
29+00
29+20
29+40
29+60
29+80
30+00
30+20
30+40
30+60
30+80
31+00
31+20
31+40
31+60
31+80
32+00
32+20
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE)
STATION
20+10
21+10
22+10
23+10
24+10
25+10
26+10
27+10
28+10
29+10
30+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/02/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	7:30	47	> 40 sec	81	> 64 pcf	8	6.5 - 10	26	< 20 cm^3	.5
PM	14:42	44	> 40 sec	65	> 64 pcf	8	6.5 - 10	16	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	11:05	46	> 40 sec	65	> 64 pcf	—	6.5 - 10	—	< 20 cm^3	—
PM	13:14	40	> 40 sec	64	> 64 pcf	8	6.5 - 10	18	< 20 cm^3	.3

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

NORTH TRENCH

* THIS TEST WAS TAKEN FROM THE SLURRY AT THE TOP OF THE TRENCH VIA THE EXCAVATOR BUCKET. TEST AT 13:14 WAS A CHECK ON OTHER PARAMETERS.

FROM TRENCH

	STATION	DEPTH	VISC	UNIT WT	FILT	CAKE	SAND
10:15	58+50	0'	46sec	84pcf	35cm³	.8	25%
	58+50	35'	45sec	86pcf	39cm³	1.0	30%

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:27	59+00	2	37	40 - 90 sec	98	64 - 95 pcf	8	6.5 - 10	35	< 25 cm^3	1.5	5	MAX 30%
7:27	59+00	35	65	40 - 90 sec	103	64 - 95 pcf	8	6.5 - 10	53	< 25 cm^3	2.0	12	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:52	58+00	2	47	40 - 90 sec	80	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	.6	25	MAX 30%
15:52	58+00	35	47	40 - 90 sec	82.5	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	.7	30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
60+50	4	2" to 6"	118	+15 pcf over trench slurry	3.78×10^{-7}	1.0×10^{-7} cm/sec
60+25	4	2" to 6"	118.5	+15 pcf over trench slurry	4.92×10^{-7}	1.0×10^{-7} cm/sec
60+00	4	2" to 6"	118	+15 pcf over trench slurry	3.72×10^{-7}	1.0×10^{-7} cm/sec
59+75	3	2" to 6"	118	+15 pcf over trench slurry	2.27×10^{-7}	1.0×10^{-7} cm/sec
59+50	3	2" to 6"	116	+15 pcf over trench slurry	2.45×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: 59+75, 59+50 (60+50, 60+25, 60+00,) Technician: SM/MM ✓BY SES

Sample Area: A = $\pi r^2 = \pi (3.85)^2 = 46.56$ cm² Sample Height: L = 7.0cm 6.5cm (6.0cm, 6.5cm, 6.5cm) cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ cond Sach (1/14.65)
60+50	01/02/04	9:27-13:27	240	10	117.2305	605865.9809	–	55	3.78×10^{-7}	2.58×10
60+25	01/02/04	9:27-13:27	240	10	108.2128	559261.0644	–	66	4.92×10^{-7}	3.36×10
60+00	01/02/04	9:27-13:27	240	10	108.2128	559261.0644	–	50	3.72×10^{-7}	2.54×10
59+75	01/02/04	18:12-6:12	720	10	100.4833	519313.7717	–	85	2.27×10^{-7}	1.55×10
59+50	01/02/04	18:12-6:12	720	10	108.2128	559261.0644	–	98.5	2.45×10^{-7}	1.67×10

I = P (psi) / 0.014217 L(cm) R = Quick Test / Triaxial Test = 1.85

DAILY QC TESTS **DATE** 01/02/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

SE Trench

TRENCH SLURRY CHECKS

	STATION	DEPTH	VISC	UNIT WT	FILT	CAKE	SAND
8:34	31+10	2'	46sec	98pcf	57 cm^3	1.9	48%
	31+10	34	52sec	96pcf	63 cm^3	2.5	44%
10:59	31+40	2'	52sec	94pcf	37 cm^3	1.5	36
	31+40	34'	53sec	95pcf	41 cm^3	1.5	42

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
6:46	30+90	2	70	40 - 90 sec	100.5	64 - 95 pcf	8	6.5 - 10	64	< 25 cm^3	2.0	54	MAX 30%
6:46	30+90	34	75	40 - 90 sec	101	64 - 95 pcf	8	6.5 - 10	65	< 25 cm^3	2.3	56	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
14:52	32+00	2	45	40 - 90 sec	71	64 - 95 pcf	8	6.5 - 10	17	< 25 cm^3	.6	44	MAX 30%
14:52	32+00	34	47	40 - 90 sec	72	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	.7	45	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
29+25	3	2" to 6"	117	+15 pcf over trench slurry	3.05×10^{-7}	1.0×10^{-7} cm/sec
29+50	3	2" to 6"	119	+15 pcf over trench slurry	3.87×10^{-7}	1.0×10^{-7} cm/sec
29+75	3	2" to 6"	119	+15 pcf over trench slurry	6.10×10^{-7}	1.0×10^{-7} cm/sec
30+00	3	2" to 6"	118	+15 pcf over trench slurry	2.06×10^{-7}	1.0×10^{-7} cm/sec
30+25	3	2" to 6"	118	+15 pcf over trench slurry	2.34×10^{-7}	1.0×10^{-7} cm/sec
30+50	3	2" to 6"	118	+15 pcf over trench slurry	2.76×10^{-7}	1.0×10^{-7} cm/sec
30+75	3	2" to 6"	119.5	+15 pcf over trench slurry	2.14×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE Trench

API QUICK PERMEABILITY TEST

29+25, 29+50, 29+75,

Job: Indiana Harbor CDF S-B Cutoff Wall **Sta:** 30+00, 30+25, 30+50, 30+75 **Technician:** SM/MM ✓BY SES

Sample Area: $A = \pi r^2 = \pi(3.85)^2 = 46.56\ cm^2$ **Sample Height:** L = 7.0cm, 6.0cm, 6.5cm, 6.5cm, 6.5cm, 6.5cm, 7.5cm, 6.5cm, 6.3cm, 7.5cm, cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	K cond. factor (1114.6)
29+25	01/02/04	9:27-13:27	240	10	108.2128	559261.0644	—	41	3.05×10^{-7}	$2.08 \times 10^{-}$
29+50	01/02/04	9:27-13:27	240	10	108.2128	559261.0644	—	52	3.87×10^{-7}	2.64×10
29+75	01/02/04	9:27-13:27	240	10	93.7844	484692.7847	—	71	6.10×10^{-7}	4.16×10
30+00	01/02/04	18:12-6:12	720	10	100.4833	519313.7717	—	77	2.06×10^{-7}	$1.41 \times 10^{-}$
30+25	01/02/04	18:12-6:12	720	10	117.2305	605865.9809	—	102	2.34×10^{-7}	1.60×10
30+50	01/02/04	18:12-6:12	720	10	108.2128	559261.0644	—	111	2.76×10^{-7}	1.88×10
30+75	01/02/04	18:12-6:12	720	10	108.2128	559261.0644	—	86	2.14×10^{-7}	1.46×10

$I = \frac{P\ (psi)}{0.014217\ L(cm)}$ $R = \frac{\text{Quick Test}}{\text{Triaxial Test}} = 1.85$

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 5-Dec-04	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-055 (NW58+00)	SOIL ONLY	58+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-056 (SE31+00)	SOIL ONLY	31+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-057 (SE32+00)	SOIL ONLY	32+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-066 (NW60+00)	SB BACKFILL**	60+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-067 (SE30+00)	SB BACKFILL**	30+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
BF-058 (NW57+00)	SOIL ONLY	57+00	01/03/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-068 (NW59+00)	SB BACKFILL**	59+00	01/03/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
BF-059 (SE33+00)	SOIL ONLY	33+00	01/04/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-069 (SE31+00)	SB BACKFILL**	31+00	01/04/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

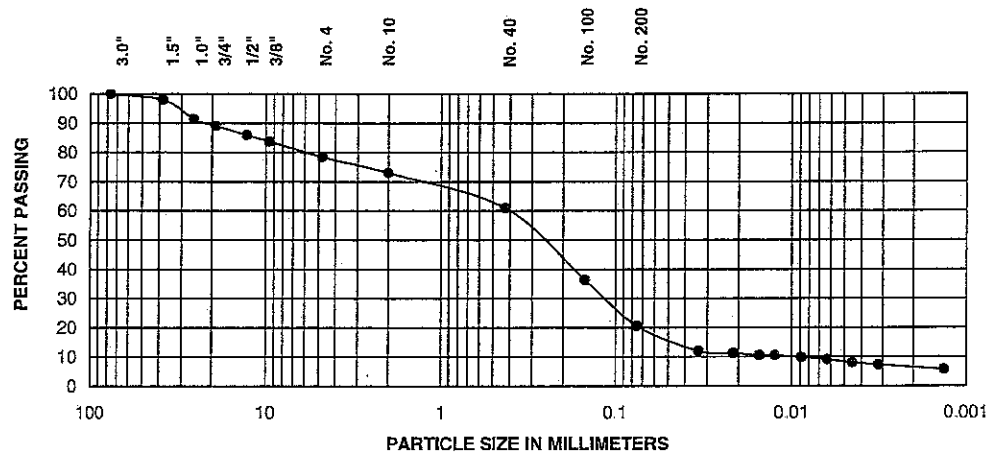
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-066	**Date Tested**	1/9/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/5/2004
Sample Location	60 + 00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	21.5	57.9	12.1	8.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	98.0
1.0"	91.5
3/4"	89.1
1/2"	86.0
3/8"	83.7
No. 4	78.5
No. 10	73.0
No. 40	61.0
No. 100	36.4
No. 200	20.6

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
29	23	6

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

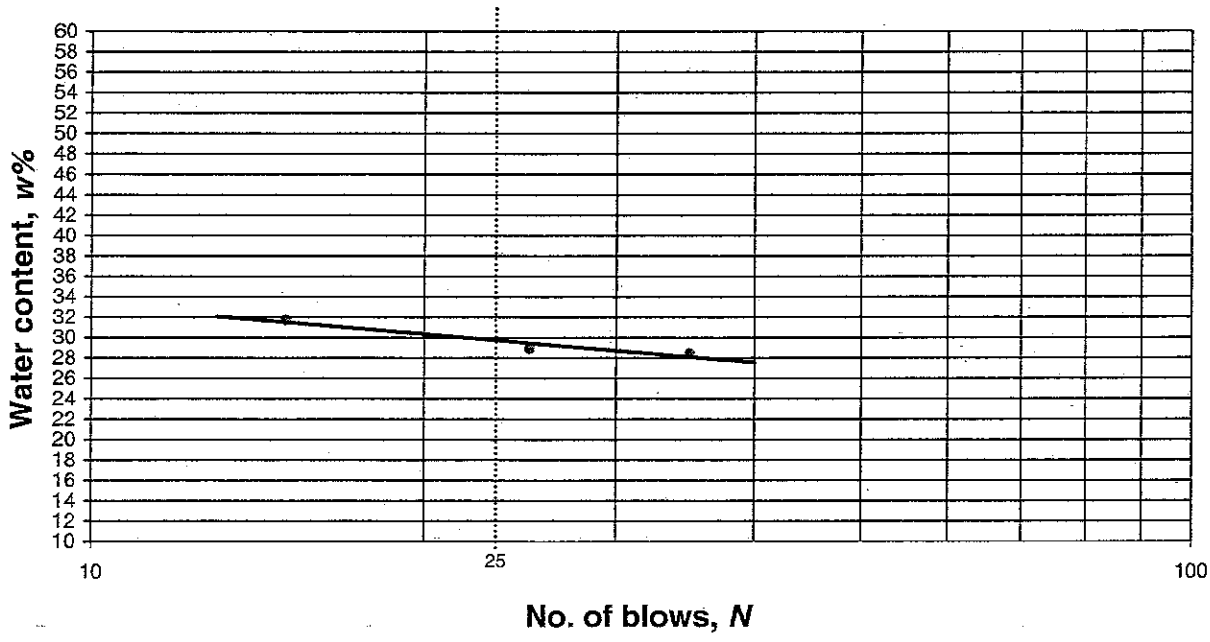
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-066	**Date Tested**	1/7/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/5/2004
Sample Location	60 + 00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	29	**Plastic Limit, PL**	23	**Plasticity Index, PI**	6

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/8/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-066	Date Recd.	1/5/04	**Location**	60 + 00 (NW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.33	cm	Volume, V:	217.0	cu cm
Mass of Sample:	416.0	g	**Moisture Content:**	**22.9**	%
			Wet Density	**119.6**	**pcf**
			Dry Density	**97.3**	**pcf**

Final

Diameter:	7.16	cm	Area, A:	40.3	sq cm
Height, L:	4.84	cm	Volume, V:	194.9	cu cm
Mass of Sample:	401.60	g	**Moisture Content:**	**20.2**	%
			Wet Density	**128.6**	**pcf**
			Dry Density	**106.9**	**pcf**
			Deg of Saturation	**92.1**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	23.8	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/8/2004	9:45 AM	0	0	3.10	6.05		20.0	---
1/8/2004	10:30 AM	2700	2700	3.40	5.78	1.1	20.0	9.01E-08
1/8/2004	11:15 AM	2700	5400	3.65	5.52	1.0	20.0	8.91E-08
1/8/2004	12:00 PM	2700	8100	3.90	5.27	1.0	20.0	8.78E-08
1/8/2004	1:00 PM	3600	11700	4.23	4.94	1.0	20.0	8.96E-08

Average Permeability = **8.9E-08** cm/sec

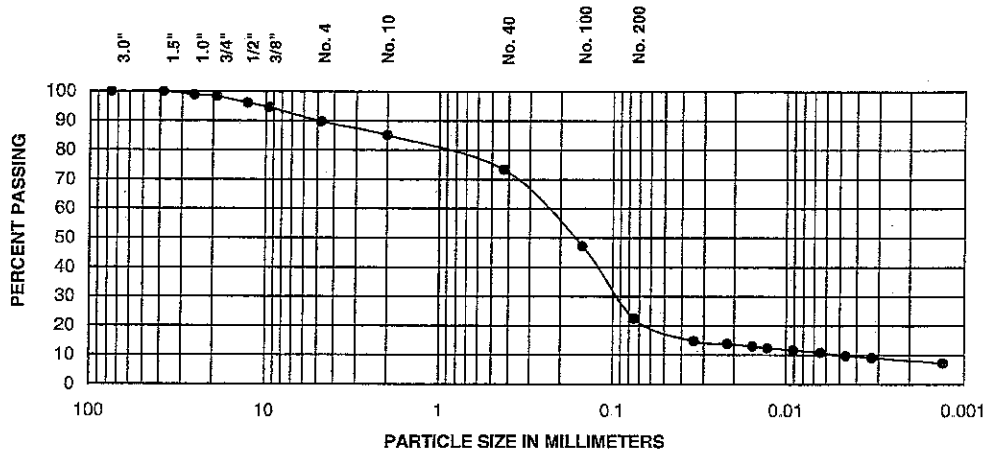
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-067	**Date Tested**	1/8/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/5/2004
Sample Location	30+00 (SE)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	10.3	67.1	12.4	10.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.8
3/4"	98.3
1/2"	96.1
3/8"	94.7
No. 4	89.7
No. 10	85.1
No. 40	73.4
No. 100	47.2
No. 200	22.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
24	19	5

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

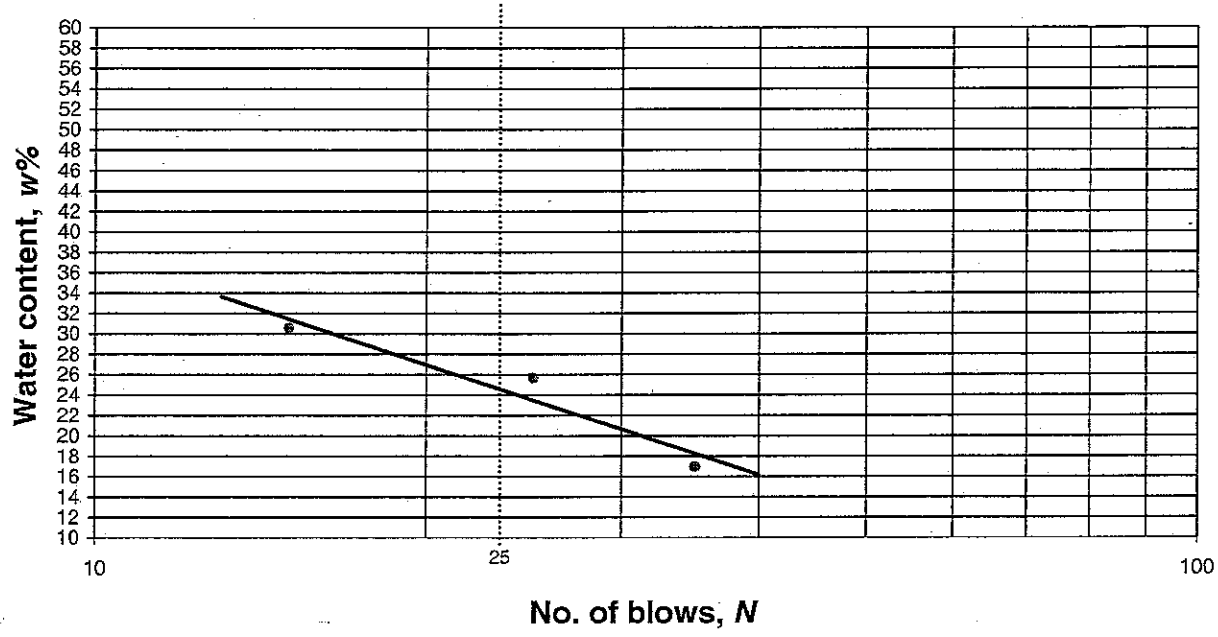
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-067	**Date Tested**	1/6/2004	**Tested By**	MA
						Qc By	SB

Date Sample Recd.	1/5/2004
Sample Location	30+00 (SE)
Sample Description	Gray silty, clayey sand with tr of gr. (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	24	**Plastic Limit, PL**	19	**Plasticity Index, PI**	5

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/8/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-067	Date Recd.	1/5/04	**Location**	30+00 (SE)		
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.59	cm	Volume, V:	227.6	cu cm
Mass of Sample:	438.9	g	**Moisture Content:**	**24.2**	**%**
			Wet Density	**120.3**	**pcf**
			Dry Density	**96.9**	**pcf**

Final

Diameter:	7.07	cm	Area, A:	39.3	sq cm
Height, L:	5.04	cm	Volume, V:	197.9	cu cm
Mass of Sample:	427.10	g	**Moisture Content:**	**17.8**	**%**
			Wet Density	**134.7**	**pcf**
			Dry Density	**114.3**	**pcf**
			Deg of Saturation	**97.8**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	22.6	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/8/2004	9:45 AM	0	0	2.96	5.88		20.0	---
1/8/2004	10:30 AM	2700	2700	3.27	5.60	1.1	20.0	9.82E-08
1/8/2004	11:15 AM	2700	5400	3.56	5.31	1.0	20.0	1.05E-07
1/8/2004	12:00 PM	2700	8100	3.82	5.06	1.0	20.0	9.27E-08
1/8/2004	1:00 PM	3600	11700	4.11	4.75	0.9	20.0	8.87E-08

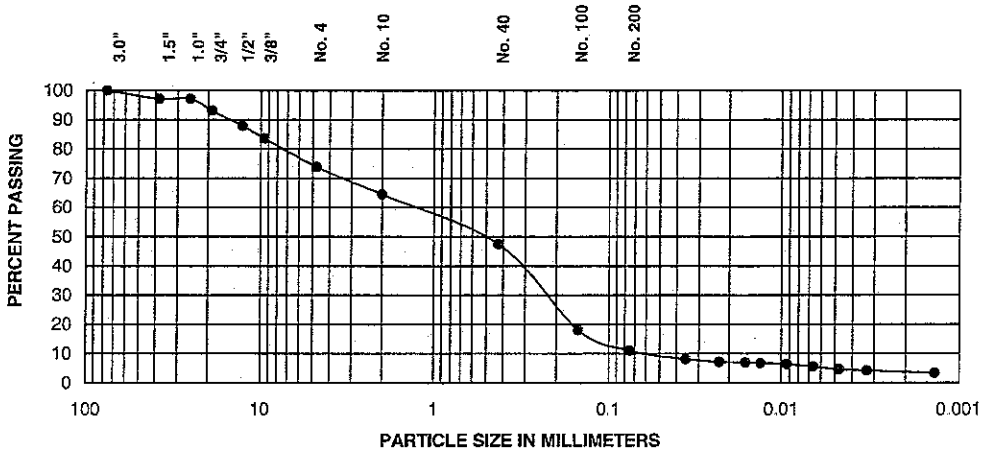
Average Permeability = **9.6E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-055	**Date Tested**	1/6/2004	**Tested by**	MT
						Qc by	SB

Date Sample Received:	1/5/2004
Sample Location	STA 58+00 (NW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	26.2	62.7	6.1	5.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.33	0.23	0.06	23.5	0.70

Sieve Size	Percent Passing
3.0"	100.0
1.5"	97.2
1.0"	97.2
3/4"	93.1
1/2"	87.9
3/8"	83.7
No. 4	73.8
No. 10	64.5
No. 40	47.6
No. 100	18.0
No. 200	11.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

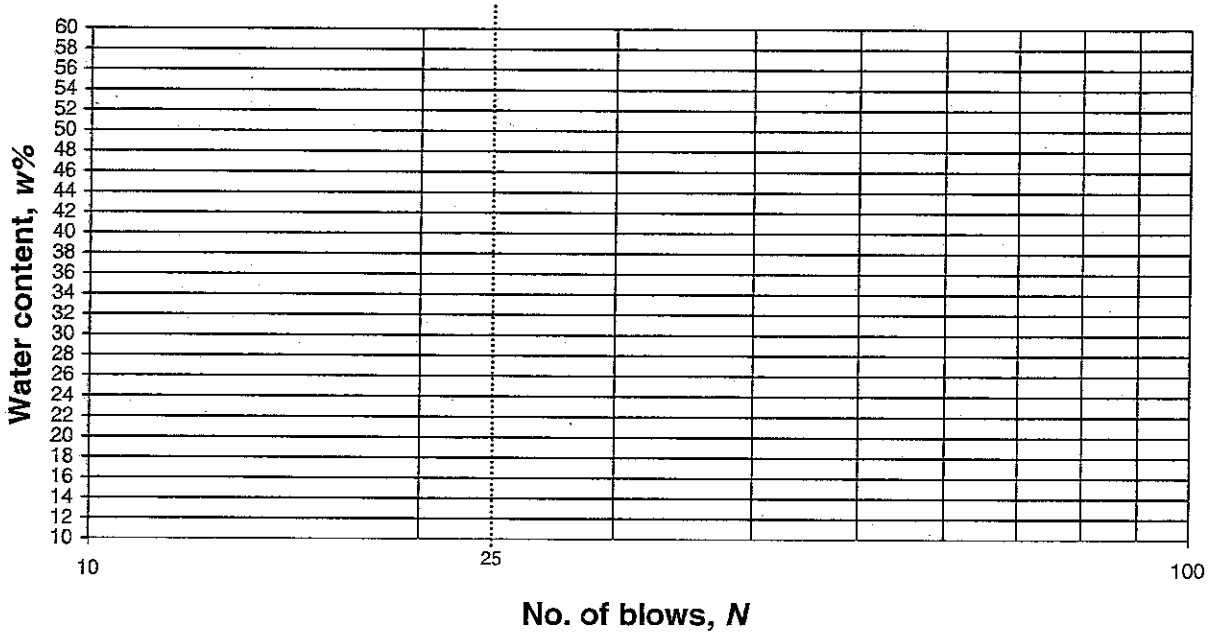
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-055	**Date Tested**	1/6/2004	**Tested By**	EM
						Qc By	SB

Date Sample Recd.	1/5/2004
Sample Location	STA 58+00 (NW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	21	Date	1/5/2004	Sheet	1
				Date of weighing	1/6/2004	Tested by	KM

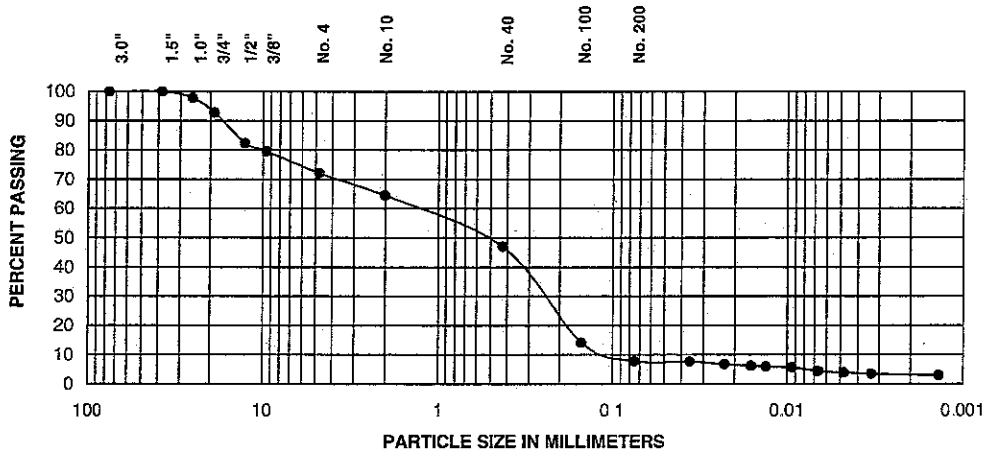
Boring No.	-	-	-	-	-	
Sample No.	BF-055	BF-056	BF-057	BF-058	BF-059	
Location	58 + 00 (NW)	31 + 00 (SE)	32 + 00 (SE)	57 + 00 (NW)	33 + 00 (SE)	
Tin No.	68A	19C	36C	73A	38A	
Tin + Wet Soil	151.5	157.3	181	174.5	145.4	
Tin + Dry Soil	135.7	142.5	166.3	156	131	
Wt. of Tin	30.5	31.4	31.3	30.1	31	
Wt. of Dry Soil	105.2	111.1	135.0	125.9	100.0	
Wt. of Water	15.8	14.8	14.7	18.5	14.4	
Moisture, %	15.0	13.3	10.9	14.7	14.4	
Penetrometer	-	-	-	-	-	
Qu (tsf)	-	-	-	-	-	
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-056	**Date Tested**	1/6/2004	**Tested by**	MT
						Qc by	SB

Date Sample Received:	1/5/2004
Sample Location	STA 31+00 (SE)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	27.9	64.2	3.8	4.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.34	0.25	0.10	14.1	0.48

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.8
3/4"	92.9
1/2"	82.3
3/8"	79.6
No. 4	72.1
No. 10	64.5
No. 40	47.0
No. 100	14.2
No. 200	7.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

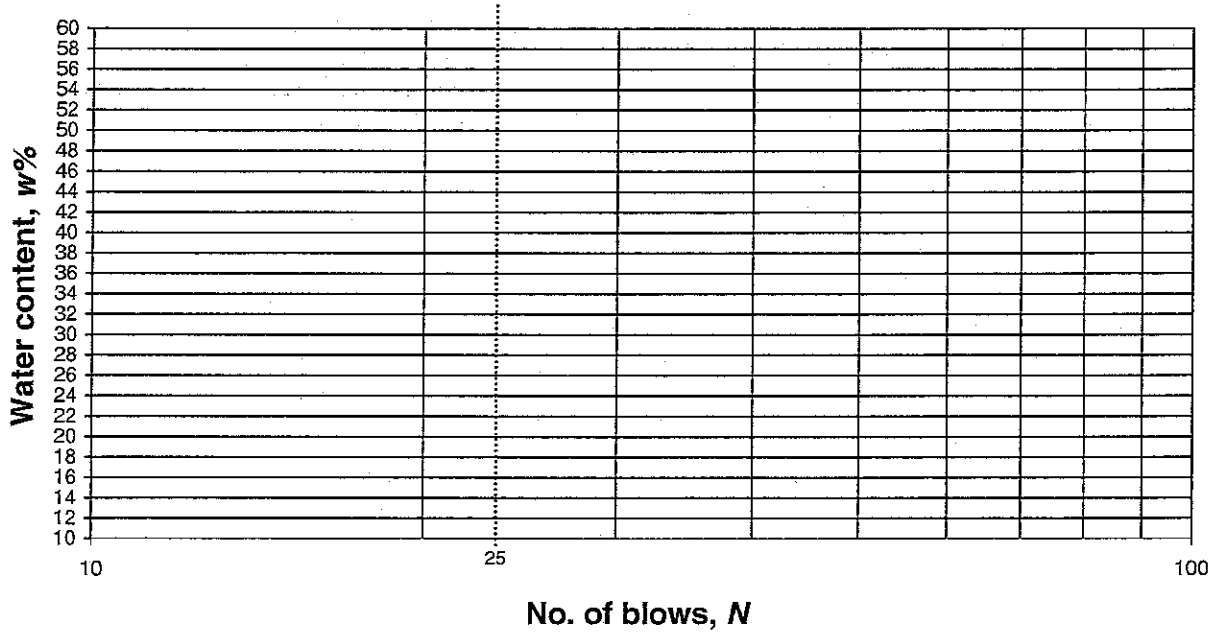
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-056	**Date Tested**	1/6/2004	**Tested By**	EM
						Qc By	SB

Date Sample Recd.	1/5/2004
Sample Location	STA 31+00 (SE)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	21	Date	1/5/2004	Sheet	1
				Date of weighing	1/6/2004	Tested by	KM

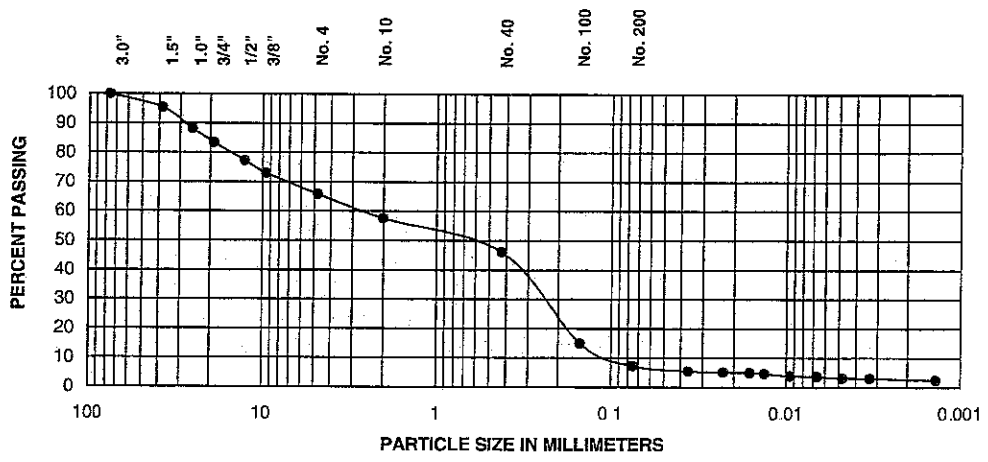
Boring No.	-	-	-	-	-	
Sample No.	BF-055	BF-056	BF-057	BF-058	BF-059	
Location	58 + 00 (NW)	31 + 00 (SE)	32 + 00 (SE)	57 + 00 (NW)	33 + 00 (SE)	
Tin No.	68A	19C	36C	73A	38A	
Tin + Wet Soil	151.5	157.3	181	174.5	145.4	
Tin + Dry Soil	135.7	142.5	166.3	156	131	
Wt. of Tin	30.5	31.4	31.3	30.1	31	
Wt. of Dry Soil	105.2	111.1	135.0	125.9	100.0	
Wt. of Water	15.8	14.8	14.7	18.5	14.4	
Moisture, %	15.0	13.3	10.9	14.7	14.4	
Penetrometer	-	-	-	-	-	
Qu (tsf)	-	-	-	-	-	
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-057	**Date Tested**	1/6/2004	**Tested by**	MT
						Qc by	SB

Date Sample Received:	1/5/2004
Sample Location	STA 32+00 (SE)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	34.1	58.6	4.0	3.3

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	2.56	0.25	0.10	26.8	0.25

Sieve Size	Percent Passing
3.0"	100.0
1.5"	95.3
1.0"	88.1
3/4"	83.4
1/2"	77.3
3/8"	73.0
No. 4	65.9
No. 10	57.7
No. 40	46.2
No. 100	15.0
No. 200	7.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

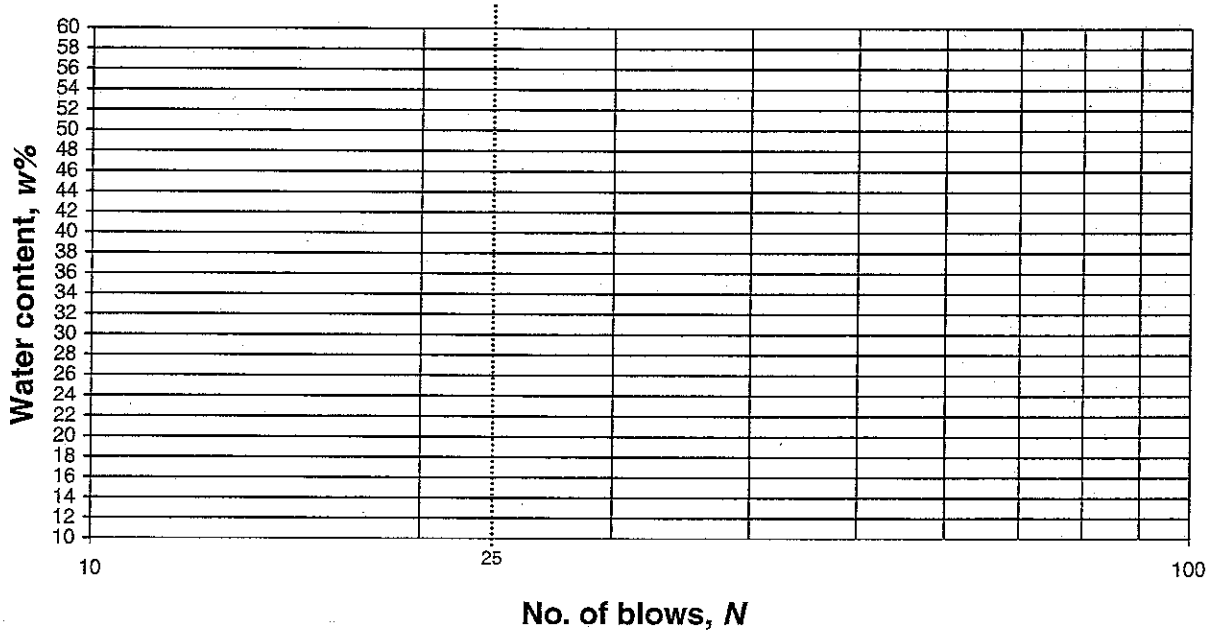
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-057	**Date Tested**	1/6/2004	**Tested By**	EM
						Qc By	SB

Date Sample Recd.	1/5/2004
Sample Location	STA 32+00 (SE)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	21	Date	1/5/2004	Sheet	1
				Date of weighing	1/6/2004	Tested by	KM

Boring No.	-	-	-	-	-	
Sample No.	BF-055	BF-056	BF-057	BF-058	BF-059	
Location	58 + 00 (NW)	31 + 00 (SE)	32 + 00 (SE)	57 + 00 (NW)	33 + 00 (SE)	
Tin No.	68A	19C	36C	73A	38A	
Tin + Wet Soil	151.5	157.3	181	174.5	145.4	
Tin + Dry Soil	135.7	142.5	166.3	156	131	
Wt. of Tin	30.5	31.4	31.3	30.1	31	
Wt. of Dry Soil	105.2	111.1	135.0	125.9	100.0	
Wt. of Water	15.8	14.8	14.7	18.5	14.4	
Moisture, %	15.0	13.3	10.9	14.7	14.4	
Penetrometer	-	-	-	-	-	
Qu (tsf)	-	-	-	-	-	
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/03/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 30 - 43 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
57+40	2.00	70.00	12.00	17.00	44.00	8
~~54+70~~ 57+40	34.00	72.00	12.00	17.00	46.00	8
56+80	2.00	85.00	31.00	33.00	45.00	8
56+80	34.00	86.00	29.00	34.00	45.00	8

COMMENTS: PM Trench filtrate losses are still high, but typical for trench slurry results. Fresh slurry was pumped to this trench to try and keep the slurry within the specs and to bring the trench slurry back within specs.

NORTH TRENCH

SEE DAILY QC RESULTS SHEET (HANDWRITTEN)

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
57+00	LAB SAMPLE COLLECTED 01/03/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
59+50	3.00	N/A	N/A	N/A	2.41×10^{-7}	N/A
59+25	3.00	N/A	N/A	N/A	8.94×10^{-8}	N/A
59+00	3.00	Sample collected	Sample collected	Sample collected	1.12×10^{-7}	yes
58+75	3.00	N/A	N/A	N/A	2.34×10^{-7}	N/A
58+50	3.00	N/A	N/A	N/A	1.58×10^{-7}	N/A
58+25	3.00	N/A	N/A	N/A	1.17×10^{-7}	N/A

COMMENTS

Filter cake: .3mm, .5mm, .5mm, and 1.0mm respectively.

Unit Weight: 59+50: 119.0 pcf
59+25: 118.5 pcf
59+00: 118.5 pcf
58+75: 118.0 pcf
58+50: 118.0 pcf
58+25: 118.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Snow OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/03/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 30 - 43 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
32+20	2.00	80.00	10.00	19.00	48.00	8
32+20	33.00	82.00	28.00	24.00	55.00	8

SE TRENCH

COMMENTS: Fresh slurry was pumped to this trench today in the morning to try and keep the slurry within the project specification. 375 excavator broke down in the AM. No production or backfill placing today

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
	No excavation today. 375 broke down in AM.			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
30+75	3.50	N/A	N/A	N/A	6.42×10^{-7}	N/A
31+00	3.50	N/A	N/A	N/A	6.93×10^{-7}	N/A
31+25	3.50	N/A	N/A	N/A	3.44×10^{-7}	N/A

COMMENTS

Filter cake: .2mm, and .5mm respectively.

Unit Weight: 30+75: 117.0 pcf
31+00: 119.0 pcf
31+25: 119.0 pcf

Since the 375 excavator broke down, there was no production today. No backfilling.
This backfill was mixing alongside of the trench in the mixing bed, but no backfill was placed. This area will be remixed once production starts on this trench again. No PM slurry sample because of the breakdown either.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Emmanuel Lopez **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/03/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
8:17	65.00	46.00	15.00	8
10:50	-	45.00	-	-
13:40	65.00	54.00	16.00	8
14:30	-	48.00	-	-

Filter cake is .2mm and .2mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E Sipio OWNER: _____

GEO-CON

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/03/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 30 - 43 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
57+60	33.0	36.5	36.7	10.0	367.0	6.8	59+60	TOPOUT	TOPOUT
57+50	33.0	36.6	36.6	10.0	365.5	6.8	59+50	4.0	TOPOUT
57+40	33.0	36.6	36.6	10.0	366.0	6.8	59+40	9.1	TOPOUT
57+30	33.0	36.5	36.6	10.0	365.5	6.9	59+30	13.6	TOPOUT
57+20	33.0	36.8	36.7	10.0	366.5	7.0	59+20	15.3	TOPOUT
57+10	33.0	36.8	36.8	10.0	368.0	7.1	59+10	16.1	TOPOUT
57+00	33.0	36.7	36.8	10.0	367.5	7.0	59+00	19.5	TOPOUT
56+90	33.0	36.7	36.7	10.0	367.0	7.0	58+90	21.6	TOPOUT
56+80	33.0	36.5	36.6	10.0	366.0	6.9	58+80	23.4	TOPOUT
56+70	33.0	36.5	36.5	10.0	365.0	6.8	58+70	24.7	TOPOUT
56+60	32.9	36.5	36.5	10.0	365.0	6.7	58+60	26.3	TOPOUT
56+50	32.9	36.6	36.6	10.0	365.5	6.7	58+50	27.5	TOPOUT
56+40	33.0	36.7	36.7	10.0	366.5	6.5	58+40	28.9	TOPOUT
							58+30	30.0	2.7
							58+20	31.4	5.6
							58+10	32.0	10.8
							58+00	32.9	14.2
							57+90	33.2	17.1
							57+80	34.5	19.9
							57+70	36.4	21.9
							57+60		22.5
							57+50		23.4
							57+40		24.2
							57+30		25.2
							57+20		27.6
							57+10		28.2
							57+00		29.0
							56+90		33.0
							56+80		35.0
							56+70		35.7
							56+60		36.5
				SF TODAY	4761.00		56+50		36.6
				SF TO DATE	78361.00		56+40		36.7

COMMENTS

NORTH TRENCH

Since the 375 excavator on the SE trench broke down this morning, tomorrow we will move the 375 excavator on the North trench to the SE to finish the portion of the trench located at the gate to allow access as soon as possible.

GEO-CON: Suzanne C Arpio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/03/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 30 - 43 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
N/A							30+80	TOPOUT	TOPOUT
							30+90	7.8	8.0
							31+00	11.8	11.9
							31+10	14.5	14.6
							31+20	15.5	15.4
							31+30	19.1	19.0
							31+40	20.3	20.4
							31+50	21.2	21.0
							31+60	23.5	23.6
							31+70	26.1	26.0
							31+80	27.0	26.9
							31+90	28.3	28.5
							32+00	30.5	30.7
							32+10	33.0	32.7
							32+20	35.5	35.3

SF TODAY 0.00

SF TO DATE 43341.22

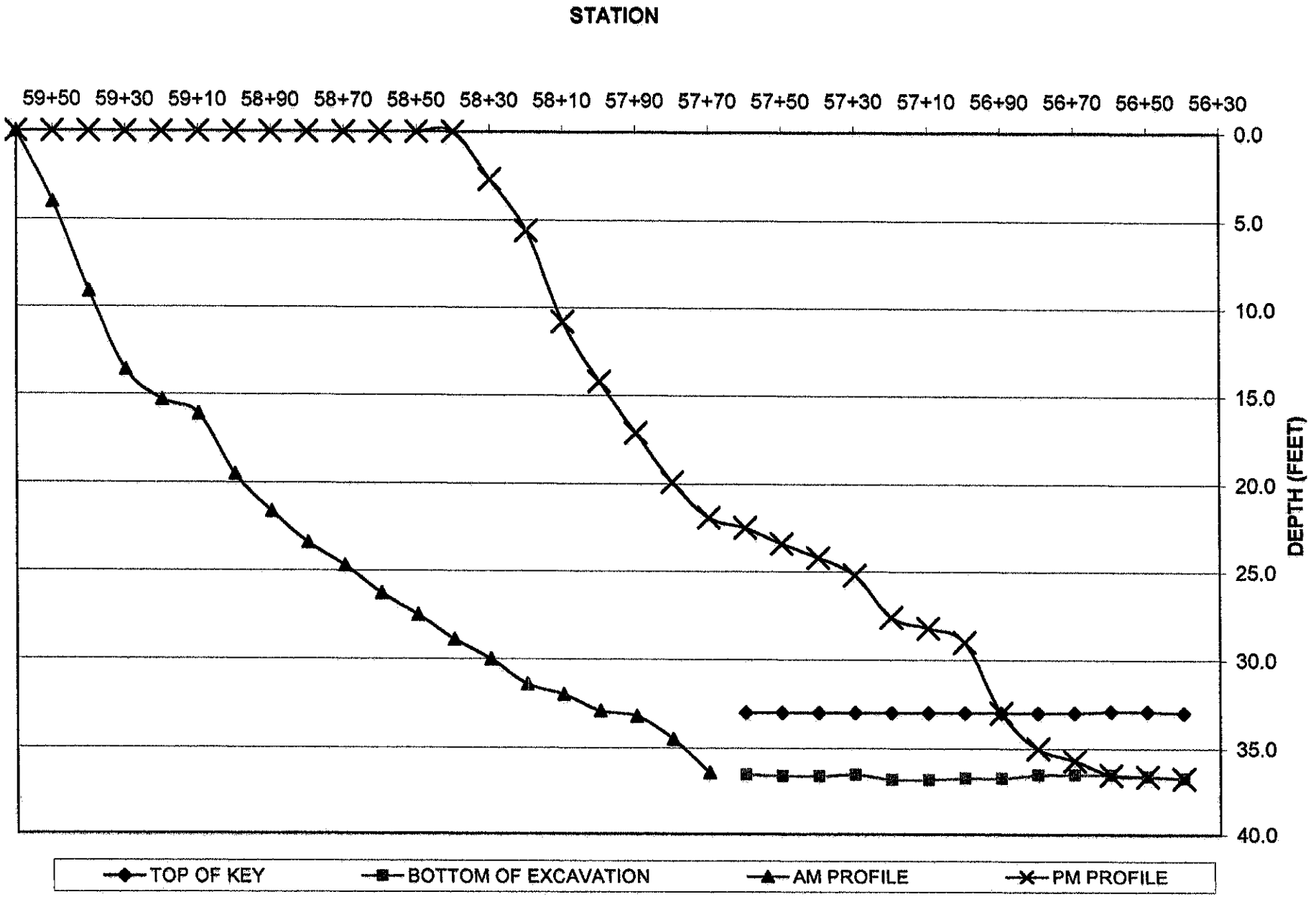
COMMENTS

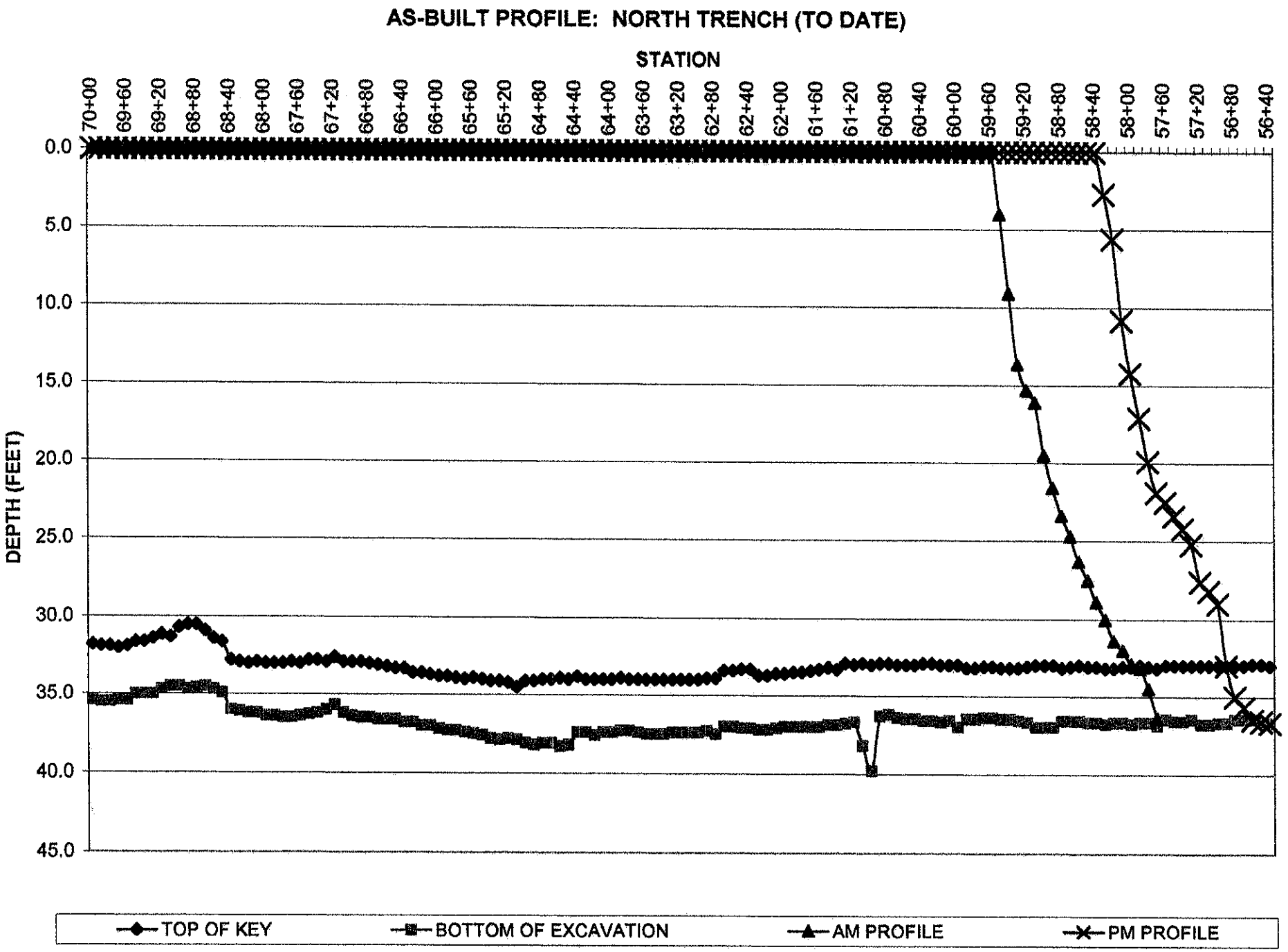
SE Trench

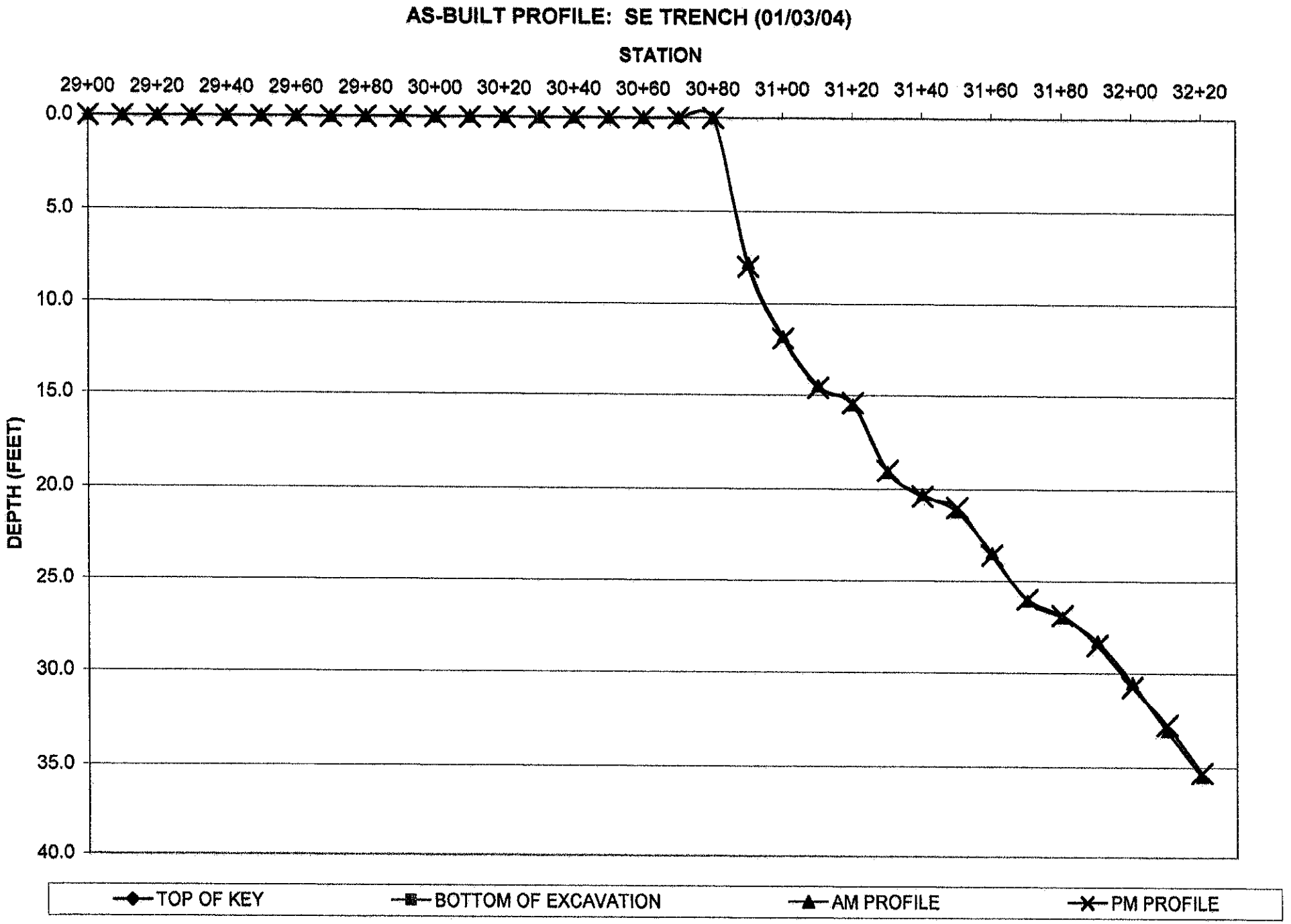
375 excavator broke down on the SE trench this morning. Therefore, no production or backfilling. 375 excavator from the North trench will move over to this trench and continue production tomorrow.

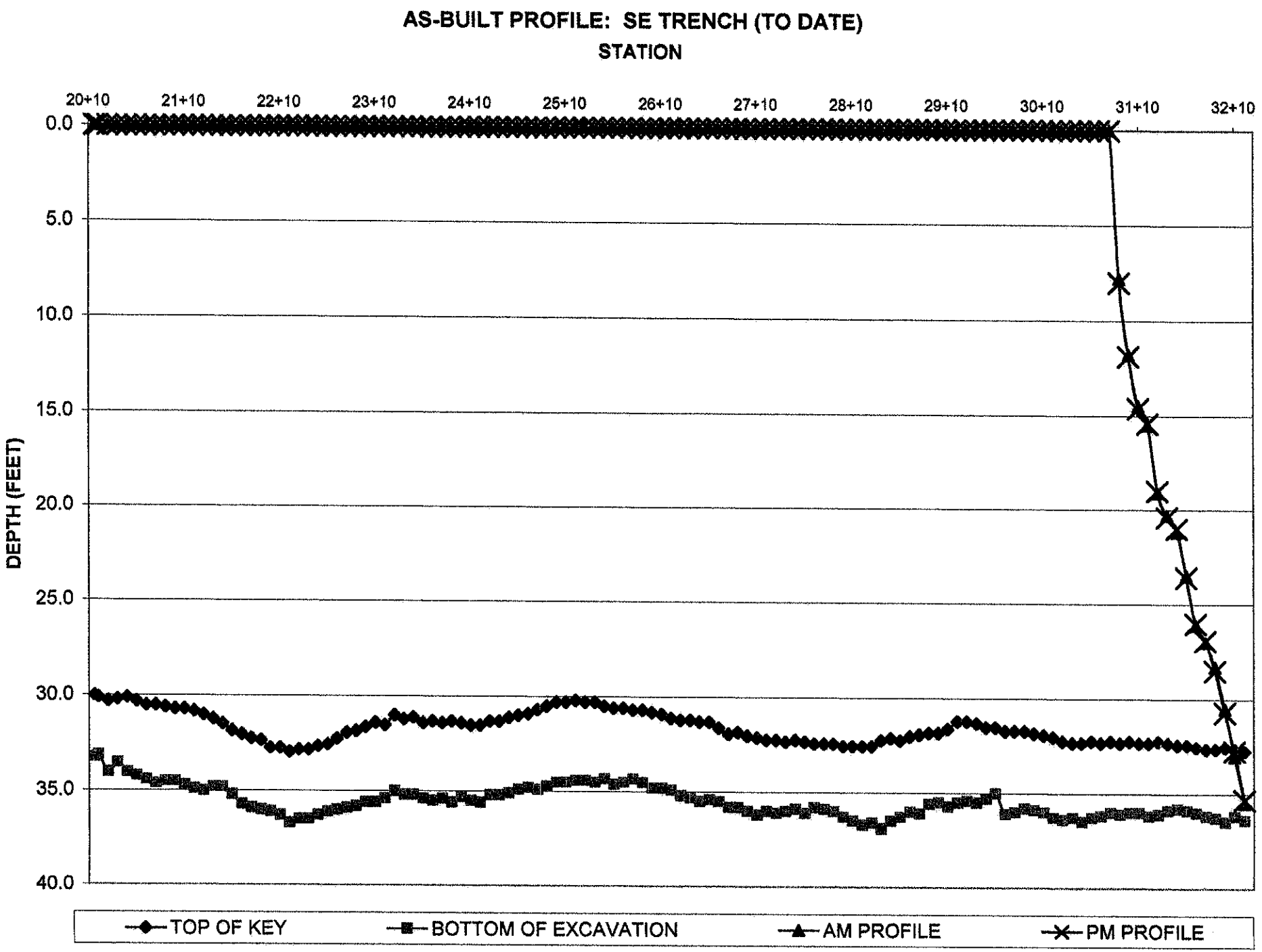
GEO-CON: Thomas C. Arnold OWNER:

AS-BUILT PROFILE: NORTH TRENCH (01/03/04)




AS-BUILT PROFILE: NORTH TRENCH (TO DATE)
STATION
70+00
69+60
69+20
68+80
68+40
68+00
67+60
67+20
66+80
66+40
66+00
65+60
65+20
64+80
64+40
64+00
63+60
63+20
62+80
62+40
62+00
61+60
61+20
60+80
60+40
60+00
59+60
59+20
58+80
58+40
58+00
57+60
57+20
56+80
56+40
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (01/03/04)
STATION
29+00
29+20
29+40
29+60
29+80
30+00
30+20
30+40
30+60
30+80
31+00
31+20
31+40
31+60
31+80
32+00
32+20
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE)
STATION
20+10
21+10
22+10
23+10
24+10
25+10
26+10
27+10
28+10
29+10
30+10
31+10
32+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/03/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	8:17	46	> 40 sec	65	> 64 pcf	8	6.5 - 10	15	< 20 cm^3	.2
PM	13:40	54	> 40 sec	65	> 64 pcf	8	6.5 - 10	16	< 20 cm^3	.2

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:50	45	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	14:30	48	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NORTH TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:40	57+40	2	44	40 - 90 sec	70	64 - 95 pcf	8	6.5 - 10	17	< 25 cm^3	.3	12	MAX 30%
7:40	57+40	34	46	40 - 90 sec	72	64 - 95 pcf	8	6.5 - 10	17	< 25 cm^3	.5	12	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:43	56+80	2	45	40 - 90 sec	85	64 - 95 pcf	8	6.5 - 10	33	< 25 cm^3	.5	37	MAX 30%
13:43	56+80	34	45	40 - 90 sec	86	64 - 95 pcf	8	6.5 - 10	34	< 25 cm^3	1.0	29	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
59+50	3	2" to 6"	119	+15 pcf over trench slurry	2.41×10^{-7}	1.0×10^{-7} cm/sec
59+25	3	2" to 6"	118.5	+15 pcf over trench slurry	8.94×10^{-8}	1.0×10^{-7} cm/sec
59+00	3	2" to 6"	118.5	+15 pcf over trench slurry	1.12×10^{-7}	1.0×10^{-7} cm/sec
58+75	3	2" to 6"	118	+15 pcf over trench slurry	2.34×10^{-7}	1.0×10^{-7} cm/sec
58+50	3	2" to 6"	118	+15 pcf over trench slurry	1.58×10^{-7}	1.0×10^{-7} cm/sec
58+25	3	2" to 6"	118	+15 pcf over trench slurry	1.17×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

North Trench

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall **Sta:** 59+50, 59+25, 59+00, 58+75, 58+50, 58+25 **Technician:** SM/MM / BY SES

Sample Area: A = $\pi r^2 = \pi(3.85)^2 = 46.56$ cm² **Sample Height:** L = 7.0cm, 6.5cm, 7.0cm; 6.0cm, 6.0cm, 6.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. factor (1/14.65)
59+50	01/03/04	10:30-14:30	240	10	100.4833	519313.7717	–	30	2.41×10^{-7}	1.64×10^{-8}
59+25	01/03/04	10:30-14:30	240	10	108.2128	559261.0644	–	12	8.94×10^{-8}	6.10×10^{-9}
59+00	01/03/04	10:30-14:30	240	10	100.4833	519313.7717	–	14	1.12×10^{-7}	7.64×10^{-9}
58+75	01/03/04	18:05-6.05	720	10	117.2305	605865.9809	–	102	2.34×10^{-7}	1.60×10^{-8}
58+50	01/03/04	18.05-6:05	720	10	117.2305	605865.9809	–	69	1.58×10^{-7}	1.08×10^{-8}
58+25	01/03/04	18:05-6.05	720	10	117.2305	605865.9809	–	51	1.17×10^{-7}	7.99×10^{-9}

$I = \frac{P\ (psi)}{0.014217\ L(cm)}$ $R = \frac{\text{Quick Test}}{\text{Triaxial Test}} = 1.85$

DAILY QC TESTS

DATE 01/03/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

SE Trench

375 excavator broke down in the AM. No production, no backfilling & no PM slurry sample.

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
10:52	32+20	2	48	40 - 90 sec	80	64 - 95 pcf	8	6.5 - 10	19	< 25 cm^3	.2	10	MAX 30%
10:52	32+20	33	55	40 - 90 sec	82	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	.5	28	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
30+75	3.5	2" to 6"	117	+15 pcf over trench slurry	6.42×10^{-7}	1.0×10^{-7} cm/sec
31+00	3.5	2" to 6"	119	+15 pcf over trench slurry	6.93×10^{-7}	1.0×10^{-7} cm/sec
31+25	3.5	2" to 6"	119	+15 pcf over trench slurry	3.44×10^{-7}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE Trench

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall **Sta:** 30+75, 31+00, 31+25 **Technician:** SM/MM /BY SES

Sample Area: A = $\pi r^2 = \pi(3.85)^2 = 46.56$ **cm²** **Sample Height: L =** 7.0cm 6.5cm 6.0cm **cm**

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	Δ Q (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. factor (1/14.65)
30+75	01/03/04	10:30-14:30	240	10	100.4833	519313.7717	–	80	6.42×10^{-7}	4.38×10^{-8}
31+00	01/03/04	10:30-14:30	240	10	108.2128	559261.0614	–	93	6.93×10^{-7}	4.73×10^{-8}
31+25	01/03/04	10:30-14:30	240	10	117.2305	605865.9809	–	50	3.44×10^{-7}	2.35×10^{-8}

$I = \frac{P\ (psi)}{0.014217\ L(cm)}$ $R = \frac{\text{Quick Test}}{\text{Triaxial Test}} = 1.05$

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 5-Dec-04 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO P01-048 | P O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-055 (NW58+00)	SOIL ONLY	58+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-056 (SE31+00)	SOIL ONLY	31+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-057 (SE32+00)	SOIL ONLY	32+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-066 (NW60+00)	SB BACKFILL**	60+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-067 (SE30+00)	SB BACKFILL**	30+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
→ BF-058 (NW57+00)	SOIL ONLY	57+00	01/03/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
→ SB-068 (NW59+00)	SB BACKFILL**	59+00	01/03/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
BF-059 (SE33+00)	SOIL ONLY	33+00	01/04/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-069 (SE31+00)	SB BACKFILL**	31+00	01/04/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

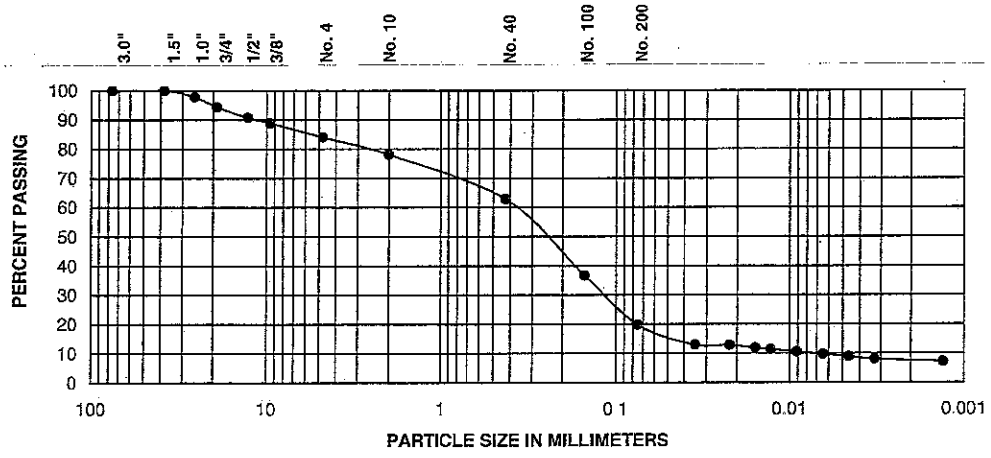
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-068	**Date Tested**	1/8/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/5/2004
Sample Location	59+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	15.9	64.3	10.6	9.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.8
3/4"	94.3
1/2"	90.8
3/8"	88.9
No. 4	84.1
No. 10	78.1
No. 40	62.9
No. 100	36.7
No. 200	19.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
27	22	5

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

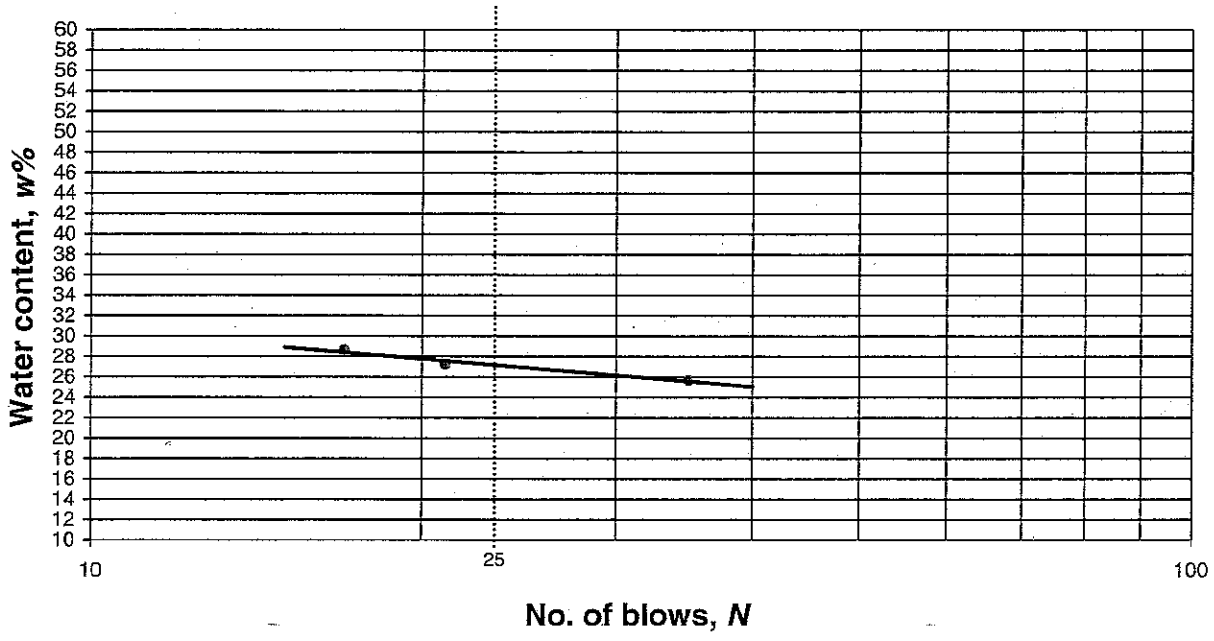
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-068	**Date Tested**	1/6/2004	**Tested By**	EM
						Qc By	SB

Date Sample Recd.	1/5/2004
Sample Location	59+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	27	**Plastic Limit, PL**	22	**Plasticity Index, PI**	5

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing							
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic							
File #	2746	**Date Tested**		1/8/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-068	Date Recd.	1/5/04	**Location**	59+00 (NW)			
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)							

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.34	cm	Volume, V:	258.1	cu cm
Mass of Sample:	496.6	g	**Moisture Content:**	**23.7**	**%**
			Wet Density	**120.0**	**pcf**
			Dry Density	**97.0**	**pcf**

Final

Diameter:	7.07	cm	Area, A:	39.3	sq cm
Height, L:	5.88	cm	Volume, V:	230.8	cu cm
Mass of Sample:	481.70	g	**Moisture Content:**	**21.1**	**%**
			Wet Density	**130.2**	**pcf**
			Dry Density	**107.5**	**pcf**
			Deg of Saturation	**97.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	20.0	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/8/2004	9:45 AM	0	0	2.95	5.93		20.0	---
1/8/2004	10:30 AM	2700	2700	3.20	5.73	1.3	20.0	7.90E-08
1/8/2004	11:15 AM	2700	5400	3.45	5.51	1.1	20.0	8.89E-08
1/8/2004	12:00 PM	2700	8100	3.66	5.32	1.1	20.0	7.84E-08
1/8/2004	1:00 PM	3600	11700	3.92	5.07	1.0	20.0	7.92E-08

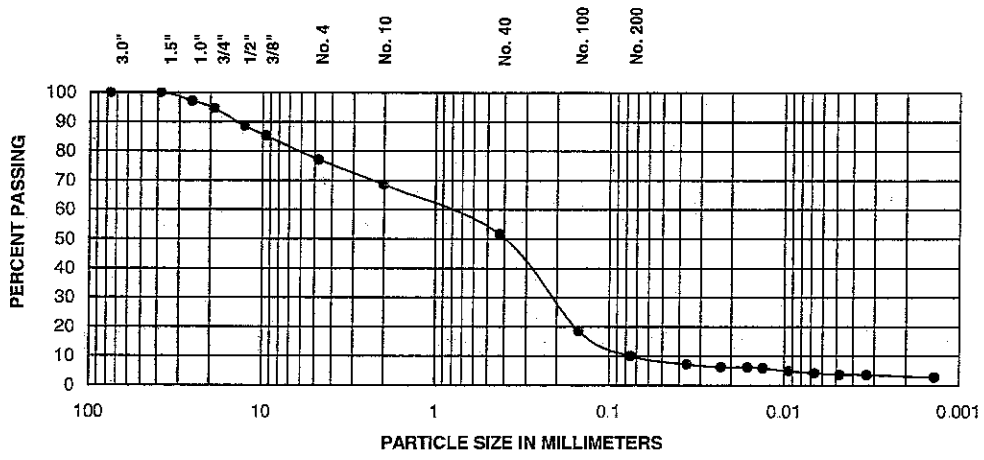
Average Permeability = **8.1E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-058	**Date Tested**	1/6/2004	**Tested by**	MT
						Qc by	SB

Date Sample Received:	1/5/2004
Sample Location	STA 57+00 (NW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	22.9	67.0	6.3	3.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.91	0.21	0.07	12.3	0.68

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.2
3/4"	94.6
1/2"	88.6
3/8"	85.2
No. 4	77.1
No. 10	68.6
No. 40	51.7
No. 100	18.6
No. 200	10.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

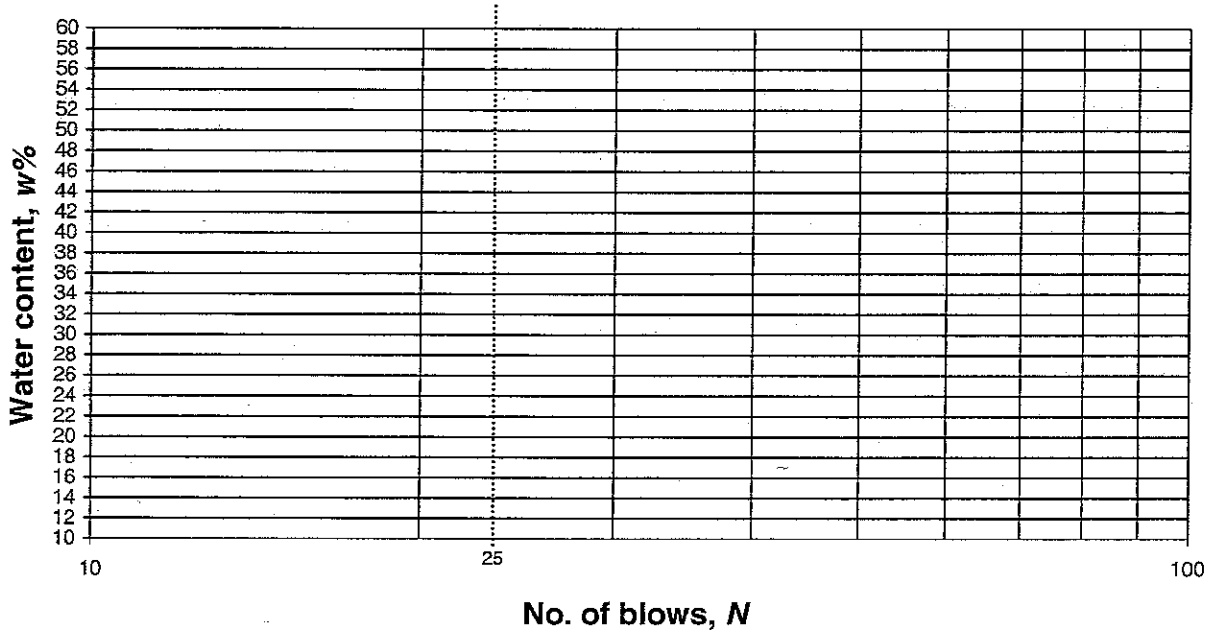
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn : Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-058	**Date Tested**	1/6/2004	**Tested By**	EM
						Qc By	SB

Date Sample Recd.	1/5/2004
Sample Location	STA 57+00 (NW)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	21	Date	1/5/2004	Sheet	1
				Date of weighing	1/6/2004	Tested by	KM

Boring No.	-	-	-	-	-	
Sample No.	BF-055	BF-056	BF-057	BF-058	BF-059	
Location	58 + 00 (NW)	31 + 00 (SE)	32 + 00 (SE)	57 + 00 (NW)	33 + 00 (SE)	
Tin No.	68A	19C	36C	73A	38A	
Tin + Wet Soil	151.5	157.3	181	174.5	145.4	
Tin + Dry Soil	135.7	142.5	166.3	156	131	
Wt. of Tin	30.5	31.4	31.3	30.1	31	
Wt. of Dry Soil	105.2	111.1	135.0	125.9	100.0	
Wt. of Water	15.8	14.8	14.7	18.5	14.4	
Moisture, %	15.0	13.3	10.9	14.7	14.4	
Penetrometer	-	-	-	-	-	
Qu (tsf)	-	-	-	-	-	
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/04/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Snow; 23 - 34 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.

NORTH TRENCH

COMMENTS: No production on this trench today. 375 excavator from this trench moved to the SE trench today (since it's 375 excavator is broke down) to try and complete the portion of the slurry wall that is in front of the main gate as soon as possible.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
	N/A			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						

COMMENTS

No production on this trench today. 375 excavator from this trench moved to the SE trench today (since it's 375 excavator is broke down) to try and complete the portion of the slurry wall that is front of the main gate as soon as possible. Tomorrow, we will begin backfilling again (after cleaning the trench with the 330 excavator) to try to close up the trench as much as possible for the anticipated shut down due to bad weather.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E Sipic **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/04/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Snow; 23 - 34 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
32+20	2.00	72.00	8.00	20.00	40.00	8
32+20	34.00	88.00	30.00	24.00	53.00	8
33+20	2.00	101.00	41.00	101.00	55.00	8
33+20	33.00	101.00	40.00	57.00	54.00	8

SE TRENCH

COMMENTS: Fresh slurry was pumped to this trench today to try and keep the slurry within the project specification

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
33+00	LAB SAMPLE COLLECTED 01/04/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
31+00	3.00	Sample collected	Sample collected	Sample collected	8.02×10^{-8}	yes
31+25	3.00	N/A	N/A	N/A	1.12×10^{-7}	N/A
31+50	3.00	N/A	N/A	N/A	8.60×10^{-8}	N/A
31+75	3.00	N/A	N/A	N/A	8.82×10^{-8}	N/A
32+00	3.00	N/A	N/A	N/A	1.07×10^{-7}	N/A
32+25	3.00	N/A	N/A	N/A	8.60×10^{-8}	N/A

COMMENTS

Filter cake: .2mm, 1.0mm, 1.7mm, and 2.3mm respectively.

Unit Weight: 31+00: 118.0 pcf
31+25: 118.0 pcf
31+50: 120.0 pcf
31+75: 118.0 pcf
32+00: 119.5 pcf
32+25: 118.0 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sope **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/04/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:34	67.00	46.00	12.50	8
9:22	-	44.00	-	-
13:13	-	49.00	-	-
15:40	69.00	57.00	14.00	8

Filter cake is .4mm and .1mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/04/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Snow; 23 - 34 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A							N/A		
				SF TODAY	0.00				
				SF TO DATE	78361.00				

COMMENTS

NORTH TRENCH

No production or backfilling on this trench today. 375 excavator from this trench moved to the SE trench to finish the portion of the trench located at the gate to allow access as soon as possible. We will clean out this trench tomorrow and resume backfilling to top out the trench as much as possible for the anticipated shutdown due to upcoming bad weather.

GEO-CON: Suzanne E. Sepo OWNER:

GEO-CON

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/04/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Snow; 23 - 34 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
32+30	32.7	37.0	36.7	10.0	367.0	3.0	30+80	TOPOUT	TOPOUT
32+40	32.6	36.8	36.9	10.0	369.0	3.2	30+90	9.1	TOPOUT
32+50	32.6	37.2	37.0	10.0	370.0	3.3	31+00	12.0	TOPOUT
32+60	32.5	37.1	37.2	10.0	371.5	3.1	31+10	14.6	TOPOUT
32+70	32.5	36.9	37.0	10.0	370.0	3.0	31+20	15.5	TOPOUT
32+80	32.6	36.7	36.8	10.0	368.0	2.9	31+30	19.2	TOPOUT
32+90	32.6	36.5	36.6	10.0	366.0	3.0	31+40	21.0	TOPOUT
33+00	32.5	36.3	36.4	10.0	364.0	3.2	31+50	21.3	TOPOUT
33+10	32.5	36.0	36.2	10.0	361.5	3.4	31+60	23.5	TOPOUT
33+20	32.4	35.9	36.0	10.0	359.5	3.6	31+70	25.8	TOPOUT
33+30	32.3	35.8	35.9	10.0	358.5	3.5	31+80	26.5	TOPOUT
33+40	32.3	35.9	35.9	10.0	358.5	3.5	31+90	28.0	8.2
							32+00	30.6	11.1
							32+10	32.5	14.3
							32+20	35.1	16.0
							32+30		16.3
							32+40		18.0
							32+50		19.4
							32+60		22.2
							32+70		22.8
							32+80		24.0
							32+90		24.9
							33+00		26.1
							33+10		28.9
							33+20		31.8
							33+30		34.7
							33+40		34.9

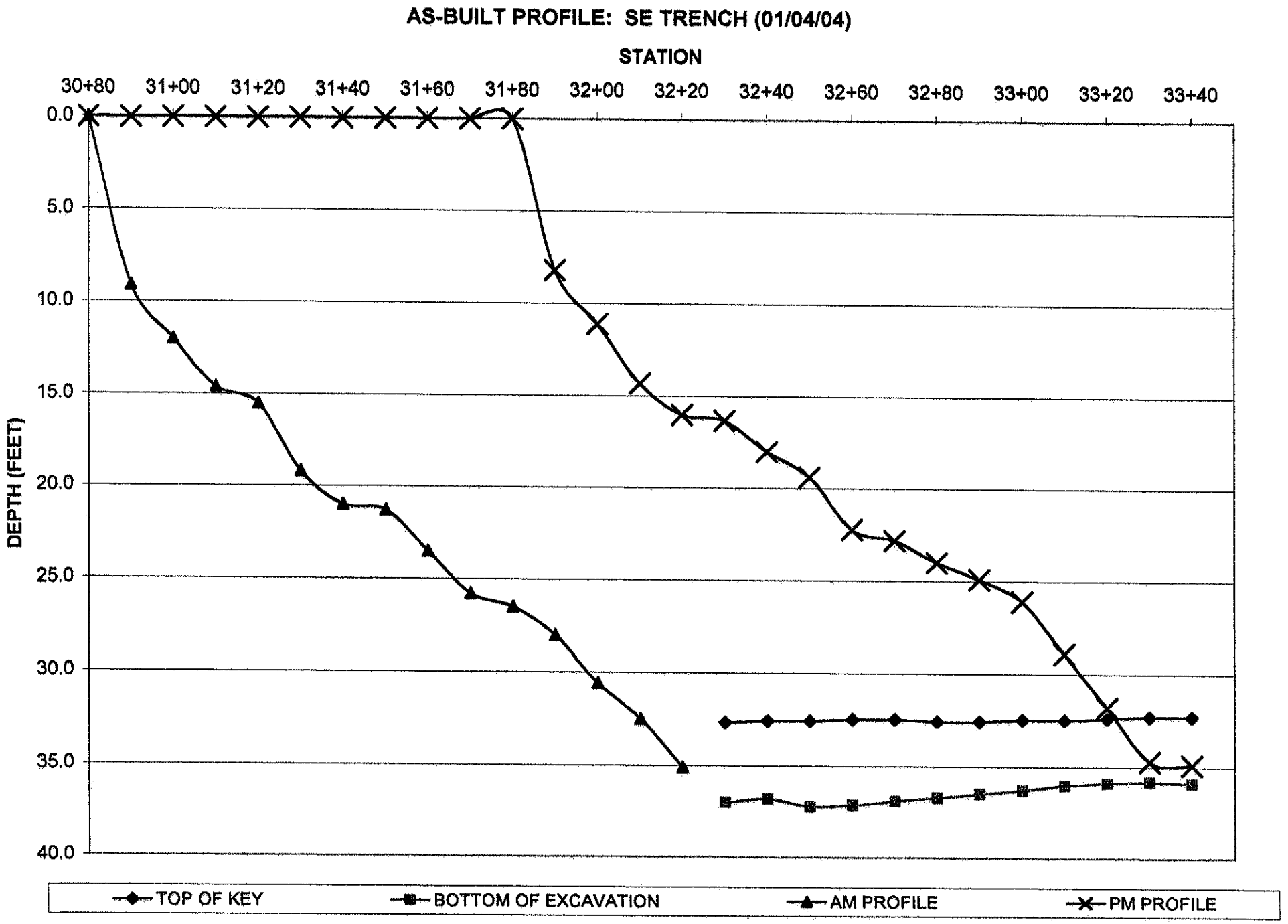
SF TODAY 4383.50

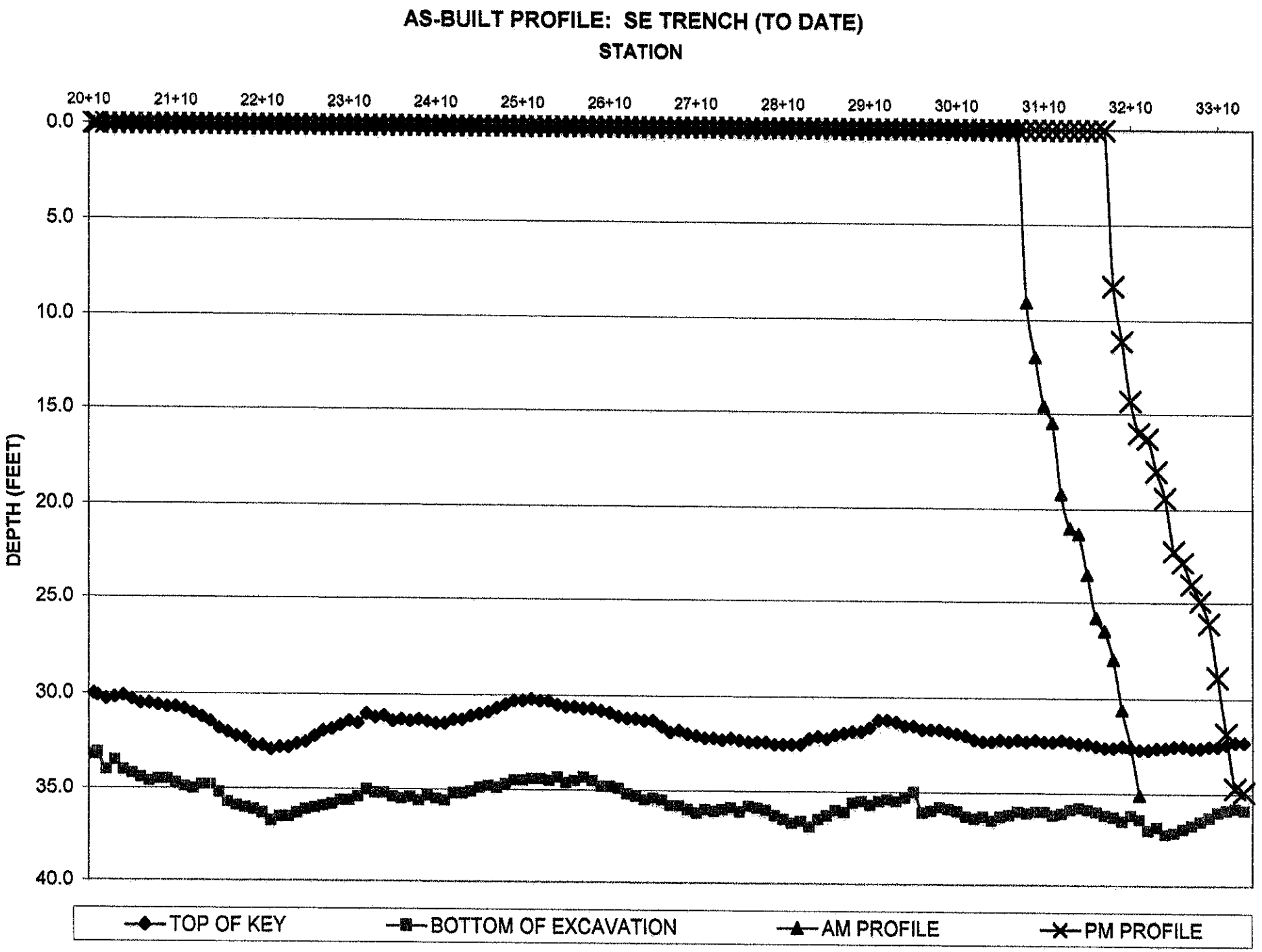
SF TO DATE 47724.72

COMMENTS

SE Trench

GEO-CON: Suzanne Sipe OWNER:


AS-BUILT PROFILE: SE TRENCH (01/04/04)
STATION
30+80
31+00
31+20
31+40
31+60
31+80
32+00
32+20
32+40
32+60
32+80
33+00
33+20
33+40
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE)
STATION
20+10
21+10
22+10
23+10
24+10
25+10
26+10
27+10
28+10
29+10
30+10
31+10
32+10
33+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS **DATE** 01/04/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	7:34	46	> 40 sec	67	> 64 pcf	8	6.5 - 10	12.5	< 20 cm^3	.4
PM	15:40	57	> 40 sec	69	> 64 pcf	8	6.5 - 10	14	< 20 cm^3	.1

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9:22	44	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	13:13	49	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

SE Trench

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
8:02	32+20	2	40	40 - 90 sec	72	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	.2	8	MAX 30%
8:02	32+20	34	53	40 - 90 sec	88	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.0	30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:40	33+20	2	55	40 - 90 sec	101	64 - 95 pcf	8	6.5 - 10	101	< 25 cm^3	1.7	41	MAX 30%
15:40	33+20	33	54	40 - 90 sec	101	64 - 95 pcf	8	6.5 - 10	57	< 25 cm^3	2.3	40	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
31+00	3	2" to 6"	118	+15 pcf over trench slurry	8.02×10^{-8}	1.0×10^{-7} cm/sec
31+25	3	2" to 6"	118	+15 pcf over trench slurry	1.12×10^{-7}	1.0×10^{-7} cm/sec
31+50	3	2" to 6"	120	+15 pcf over trench slurry	8.60×10^{-8}	1.0×10^{-7} cm/sec
31+75	3	2" to 6"	118	+15 pcf over trench slurry	8.82×10^{-8}	1.0×10^{-7} cm/sec
32+00	3	2" to 6"	119.5	+15 pcf over trench slurry	1.07×10^{-7}	1.0×10^{-7} cm/sec
32+25	3	2" to 6"	118	+15 pcf over trench slurry	8.60×10^{-8}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 31+00, 31+25, 31+50, 31+75, 32+00, 32+25

Technician: SM/MM ✓ SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56 cm^2$

Sample Height: L= 7.0cm, 7.0cm, 7.5cm, 7.0cm, 7.5cm, 7.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv. factor (1/14.65)
31+00	01/04/04	8:35-12:35	240	10	100.4833	519313.7717	—	10	8.02×10^{-8}	5.47×10^{-9}
31+25	01/04/04	8:35-12:35	240	10	100.4833	519313.7717	—	14	1.12×10^{-7}	7.64×10^{-9}
31+50	01/04/04	8:35-12:35	240	10	93.7844	484692.7847	—	10	8.60×10^{-8}	5.87×10^{-9}
31+75	01/04/04	8:35-12:35	240	10	100.4833	519313.7717	—	11	8.82×10^{-8}	6.02×10^{-9}
32+00	01/04/04	8:35-12:35	240	10	93.7844	484692.7847	—	12.5	1.07×10^{-7}	7.30×10^{-9}
32+25	01/04/04	8:35-12:35	240	10	93.7844	484692.7847	—	10	8.60×10^{-8}	5.87×10^{-9}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 5-Dec-04	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-055 (NW58+00)	SOIL ONLY	58+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-056 (SE31+00)	SOIL ONLY	31+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-057 (SE32+00)	SOIL ONLY	32+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-066 (NW60+00)	SB BACKFILL**	60+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-067 (SE30+00)	SB BACKFILL**	30+00	01/02/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
BF-058 (NW57+00)	SOIL ONLY	57+00	01/03/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-068 (NW59+00)	SB BACKFILL**	59+00	01/03/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
BF-059 (SE33+00)	SOIL ONLY	33+00	01/04/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-069 (SE31+00)	SB BACKFILL**	31+00	01/04/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

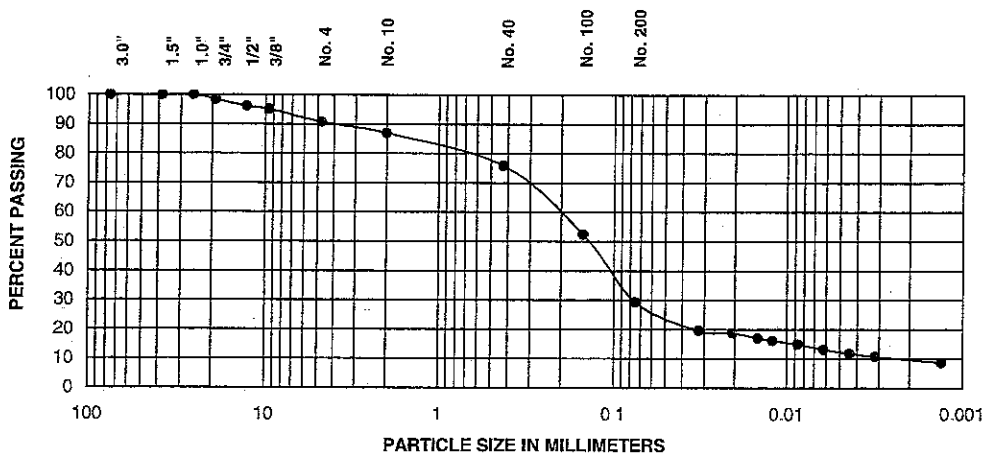
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-069	**Date Tested**	1/9/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/5/2004
Sample Location	31 + 00 (SE)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	9.2	61.4	17.0	12.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.5
1/2"	96.1
3/8"	95.1
No. 4	90.8
No. 10	87.0
No. 40	75.9
No. 100	52.4
No. 200	29.4

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
34	21	13

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

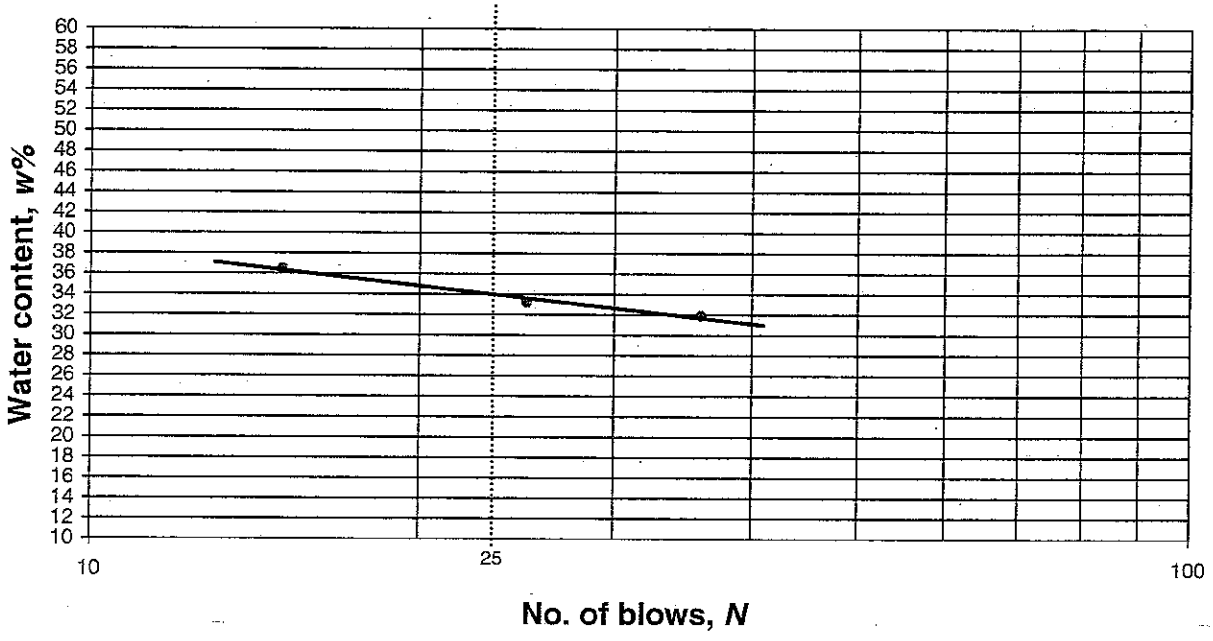
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-069	**Date Tested**	1/7/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/5/2004
Sample Location	31 + 00 (SE)
Sample Description	Gray silty, clayey sand with tr of gr. (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	34	**Plastic Limit, PL**	21	**Plasticity Index, PI**	13

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/8/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-069	Date Recd.	1/5/04	**Location**	31 + 00 (SE)		
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	4.92	cm	Volume, V:	200.3	cu cm
Mass of Sample:	392.1	g	**Moisture Content:**	**25.1**	**%**
			Wet Density	122.1	**pcf**
			Dry Density	97.6	**pcf**

Final

Diameter:	6.96	cm	Area, A:	38.0	sq cm
Height, L:	4.67	cm	Volume, V:	177.7	cu cm
Mass of Sample:	374.80	g	**Moisture Content:**	**20.0**	**%**
			Wet Density	131.6	**pcf**
			Dry Density	109.7	**pcf**
			Deg of Saturation	97.4	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	25.7	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/8/2004	9:45 AM	0	0	3.00	5.90		20.0	---
1/8/2004	10:30 AM	2700	2700	3.12	5.80	1.2	20.0	3.06E-08
1/8/2004	11:15 AM	2700	5400	3.23	5.68	0.9	20.0	3.71E-08
1/8/2004	12:00 PM	2700	8100	3.33	5.58	1.0	20.0	3.13E-08
1/8/2004	1:00 PM	3600	11700	3.46	5.45	1.0	20.0	3.08E-08

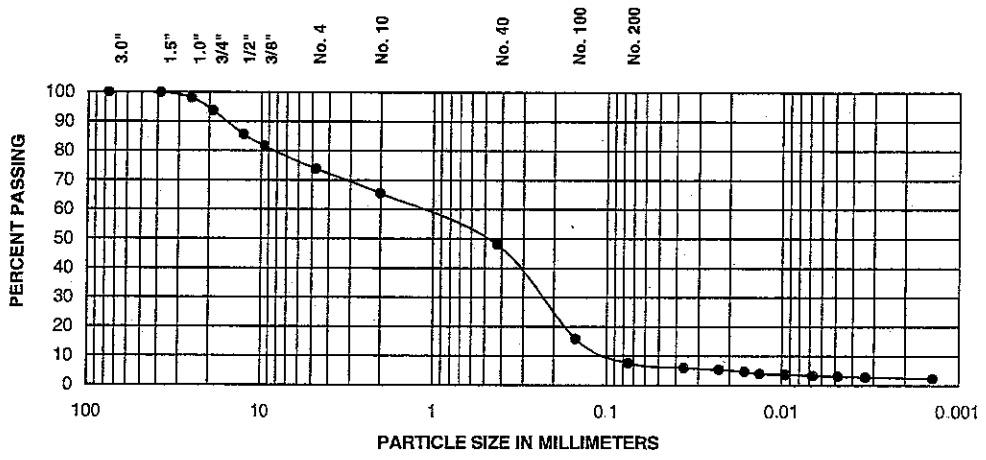
Average Permeability = **3.2E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-059	**Date Tested**	1/6/2004	**Tested by**	MT
						Qc by	SB

Date Sample Received:	1/5/2004
Sample Location	STA 33+00 (SE)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	26.1	66.3	4.4	3.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.22	0.24	0.09	13.3	0.50

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.1
3/4"	93.8
1/2"	85.6
3/8"	81.6
No. 4	73.9
No. 10	65.6
No. 40	48.1
No. 100	15.9
No. 200	7.6

Liquid Limit, L_L	Plastic Limit, P_L	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

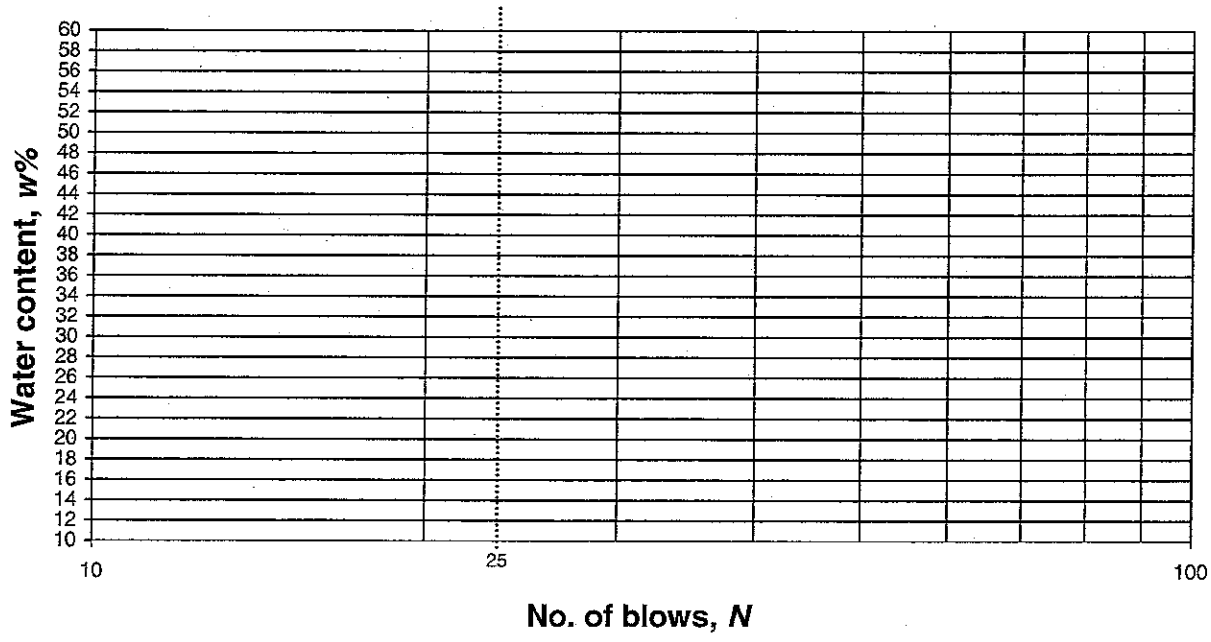
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-059	**Date Tested**	1/6/2004	**Tested By**	EM
						Qc By	SB

Date Sample Recd.	1/5/2004
Sample Location	STA 33+00 (SE)
Sample Description	Gray poorly graded sand with clay and gravel & foul smell (Soil only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	21	Date	1/5/2004	Sheet	1
				Date of weighing	1/6/2004	Tested by	KM

Boring No.	-	-	-	-	-	
Sample No.	BF-055	BF-056	BF-057	BF-058	BF-059	
Location	58 + 00 (NW)	31 + 00 (SE)	32 + 00 (SE)	57 + 00 (NW)	33 + 00 (SE)	
Tin No.	68A	19C	36C	73A	38A	
Tin + Wet Soil	151.5	157.3	181	174.5	145.4	
Tin + Dry Soil	135.7	142.5	166.3	156	131	
Wt. of Tin	30.5	31.4	31.3	30.1	31	
Wt. of Dry Soil	105.2	111.1	135.0	125.9	100.0	
Wt. of Water	15.8	14.8	14.7	18.5	14.4	
Moisture, %	15.0	13.3	10.9	14.7	14.4	
Penetrometer	-	-	-	-	-	
Qu (tsf)	-	-	-	-	-	
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/05/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, cold with falling temps.; 21 - 33 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
56+60	2.00	74.00	36.00	46.00	33.00	8
56+60	34.00	82.00	40.00	38.00	40.00	8
56+50	15.00	80.00	39.00	44.00	40.00	8

NORTH TRENCH

COMMENTS: PM Trench filtrate losses are still high, but typical for trench slurry results. No fresh slurry was pumped to this trench due to the fact we are trying to top out as much as possible due to the anticipated shutdown due to bad weather Slurry out of spec because of this.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A	NO EXCAVATION TODAY			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
58+25	4.00	N/A	N/A	N/A	2.41×10^{-7}	N/A
58+00	4.00	Sample collected	Sample collected	Sample collected	1.84×10^{-7}	yes
57+75	4.00	N/A	N/A	N/A	2.00×10^{-7}	N/A

COMMENTS

Filter cake: 1.3mm, .6mm, and 1.5mm respectively.

Unit Weight: 58+25: 117.0 pcf
58+00: 117.0 pcf
57+75: 117.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/05/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, cold with falling temps.; 21 - 33 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
33+40	2.00	99.00	38.00	85.00	47.00	8
33+40	33.00	95.00	36.00	76.00	49.00	8
33+70	2.00	95.00	37.00	84.00	46.00	8
33+70	34.00	97.00	39.00	78.00	47.00	8

SE TRENCH

COMMENTS: No fresh slurry pumped to this trench today due to the fact that we are trying to top out as much trench as possible due to anticipated shutdown due to bad weather (extreme cold). Slurry is out of spec because of this.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A	Only one cut excavated today.			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
32+00	3.00	Sample collected	Sample collected	Sample collected	6.70×10^{-8}	yes
32+25	3.00	N/A	N/A	N/A	7.22×10^{-8}	N/A
32+50	3.00	N/A	N/A	N/A	8.82×10^{-8}	N/A

COMMENTS

Filter cake: 3.5mm, 2.0mm 1.2mm, and 1.5mm respectively.

Unit Weight: 32+00: 118.0 pcf
32+25: 118.0 pcf
32+50: 120.5 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/05/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
NO FRESH SLURRY MIXED TODAY.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	yes
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/05/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, cold with falling temps.; 21 - 33 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
No excavation today.							58+40	TOPOUT	TOPOUT
							58+30	1.8	TOPOUT
							58+20	4.9	TOPOUT
							58+10	10.9	TOPOUT
							58+00	13.4	TOPOUT
							57+90	15.9	TOPOUT
							57+80	18.9	TOPOUT
							57+70	20.9	TOPOUT
							57+60	22.6	TOPOUT
							57+50	22.8	4.3
							57+40	23.6	7.2
							57+30	25.6	8.8
							57+20	28.0	9.6
							57+10	28.5	10.7
							57+00	28.8	12.5
							56+90	31.9	13.5
							56+80	34.1	14.6
							56+70	36.1	16.3
							56+60	36.4	17.1
							56+50	36.5	17.7
							56+40	36.6	22.1
				SF TODAY	0.00				
				SF TO DATE	78361.00				

COMMENTS

NORTH TRENCH

AM profile was compared to PM profile from 01/03/04. Trench was cleaned out and backfilling began to top out as much of the trench as possible for anticipated shutdown due to bad weather (cold).

GEO-CON: Suzanne E. Sepo OWNER:

GEO-CON

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/05/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, cold with falling temps.; 21 - 33 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
33+50	32.3	36.3	36.1	10.0	361.0	3.4	31+80	TOPOUT	TOPOUT
33+60	32.3	36.5	36.4	10.0	364.0	3.4	31+90	8.5	TOPOUT
33+70	32.2	36.7	36.6	10.0	366.0	3.5	32+00	11.3	TOPOUT
33+80	32.2	36.8	36.8	10.0	367.5	3.3	32+10	14.1	TOPOUT
							32+20	16.2	TOPOUT
							32+30	16.3	TOPOUT
							32+40	18.1	TOPOUT
							32+50	19.3	6.0
							32+60	22.3	7.1
							32+70	22.9	10.6
							32+80	24.1	11.7
							32+90	24.8	16.4
							33+00	26.0	16.6
							33+10	28.5	20.1
							33+20	31.5	26.3
							33+30	34.5	27.5
							33+40	34.7	30.3
							33+50		32.3
							33+60		34.5
							33+70		36.7
							33+80		36.8

SF TODAY 1458.50

SF TO DATE 49183.22

COMMENTS

SE Trench

Only one cut excavated today. Trying to top out as much of the trench as possible for anticipated shutdown due to bad weather (extreme cold).

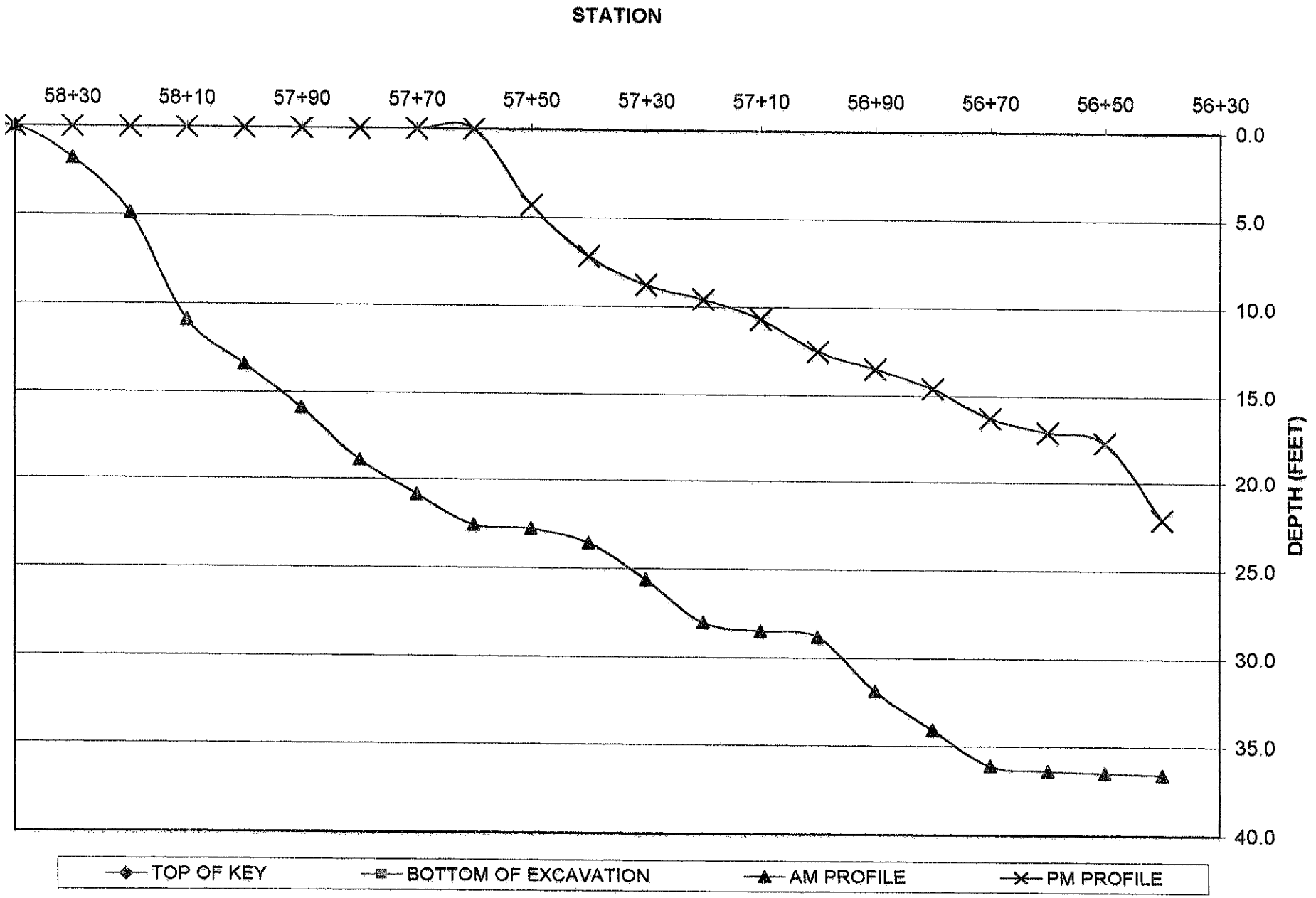
GEO-CON: Suzanne E. Sepic OWNER:

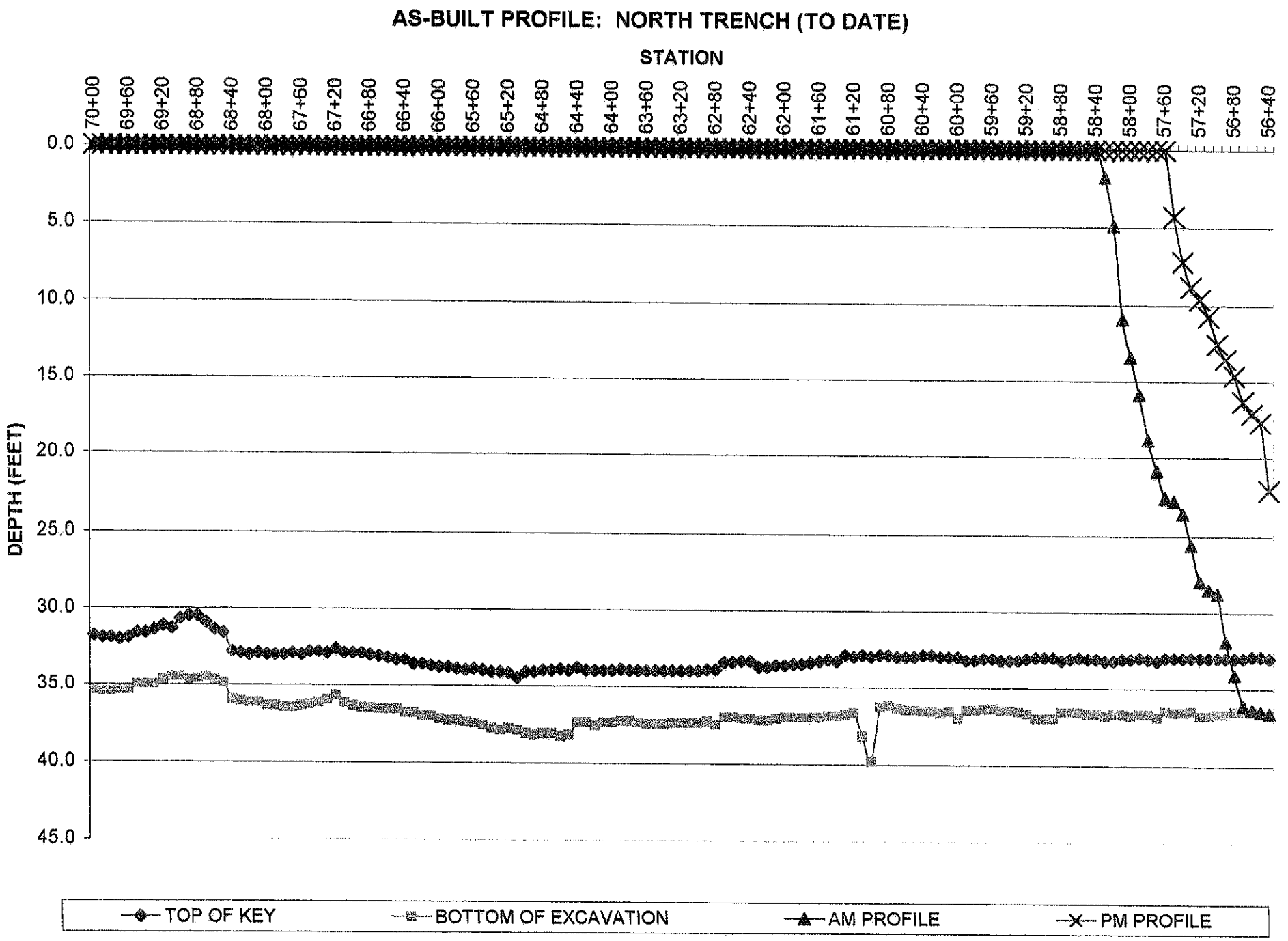
SE TRENCH
1-5-04

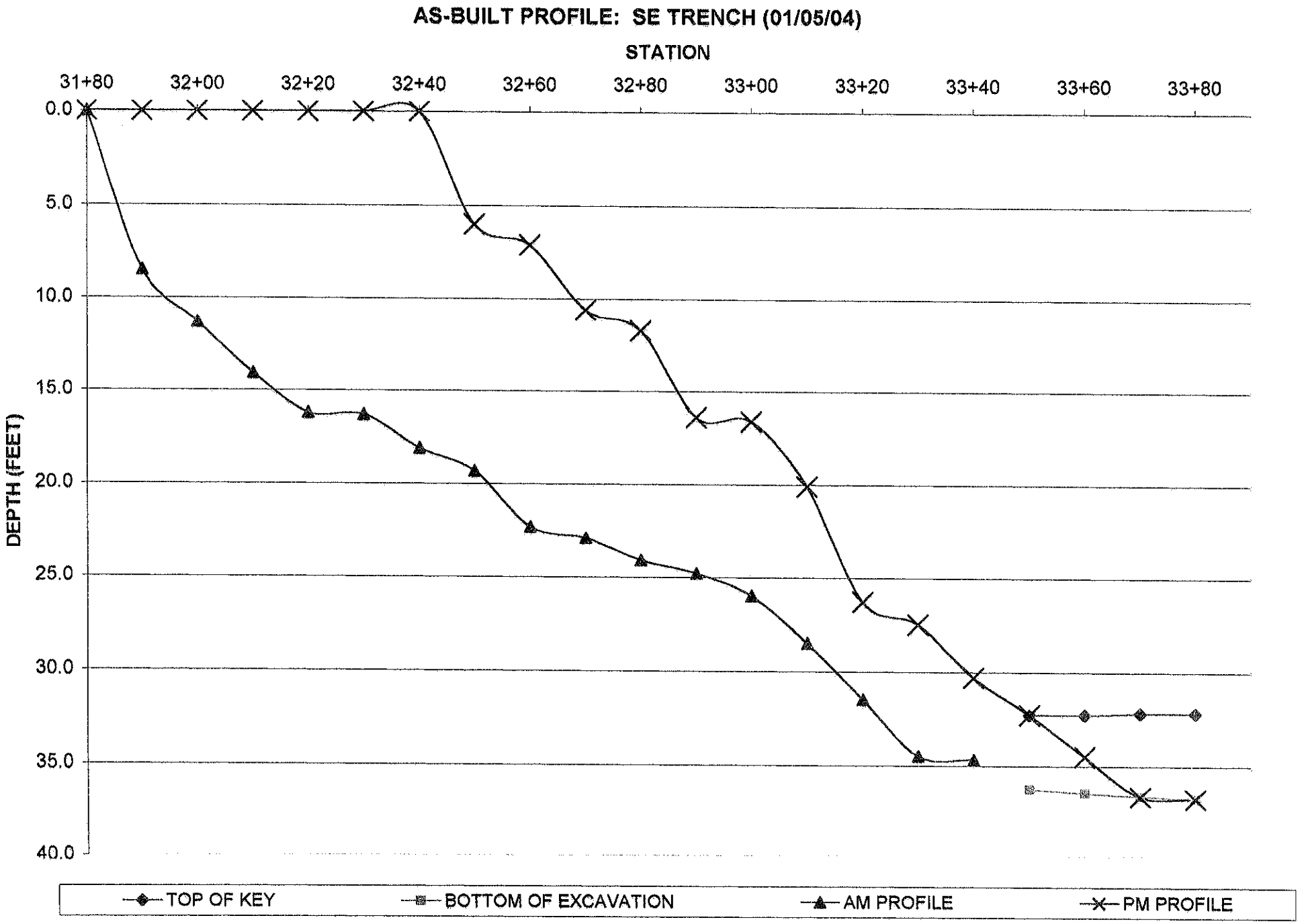
STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
33+50	587.8	587.5	32.3	555.2	36.3	551.2	3.4	5.1
33+60	587.8	587.4	32.3	555.1	36.5	550.9	3.4	5.1
33+70	587.8	587.3	32.2	555.1	36.7	550.6	3.5	5.3
33+80	587.8	587.4	32.2	555.2	36.8	550.6	3.3	5.0

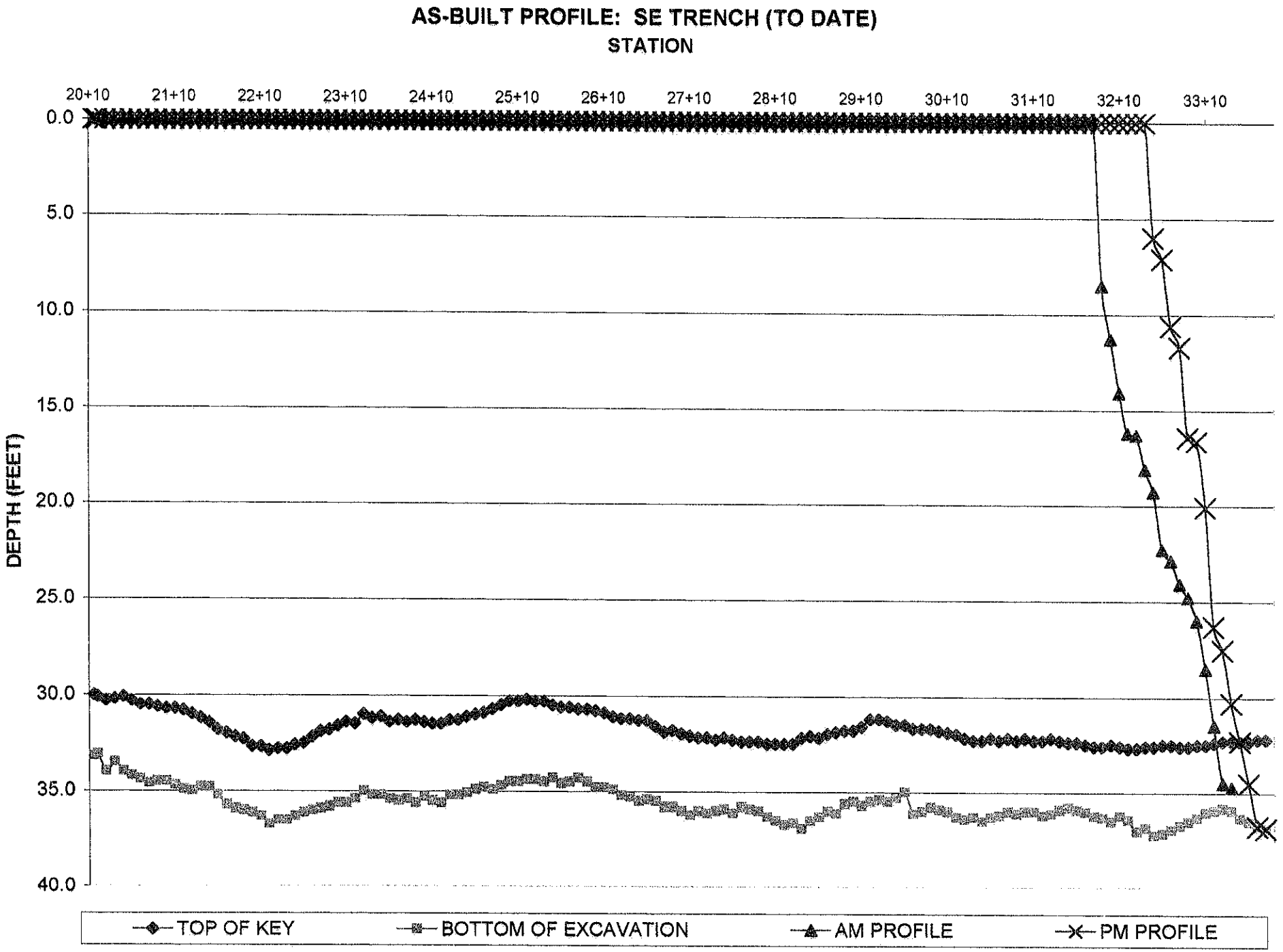
NOTE: DEPTH TO 30" WIDE WAS ESTIMATED WITH A 1:1.5 SLOPE

AS-BUILT PROFILE: NORTH TRENCH (01/05/04)




AS-BUILT PROFILE: NORTH TRENCH (TO DATE)
STATION
70+00
69+60
69+20
68+80
68+40
68+00
67+60
67+20
66+80
66+40
66+00
65+60
65+20
64+80
64+40
64+00
63+60
63+20
62+80
62+40
62+00
61+60
61+20
60+80
60+40
60+00
59+60
59+20
58+80
58+40
58+00
57+60
57+20
56+80
56+40
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (01/05/04)
STATION
31+80
32+00
32+20
32+40
32+60
32+80
33+00
33+20
33+40
33+60
33+80
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE)
STATION
20+10
21+10
22+10
23+10
24+10
25+10
26+10
27+10
28+10
29+10
30+10
31+10
32+10
33+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/05/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NO SLURRY MIXED TODAY

NORTH TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:00	56+60	2	33	40 - 90 sec	74	64 - 95 pcf	8	6.5 - 10	46	< 25 cm^3	1.3	36	MAX 30%
7:00	56+60	34	40	40 - 90 sec	82	64 - 95 pcf	8	6.5 - 10	38	< 25 cm^3	.6	40	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:10	56+50	15	40	40 - 90 sec	80	64 - 95 pcf	8	6.5 - 10	44	< 25 cm^3	1.5	39	MAX 30%
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
58+25	4	2" to 6"	117	+15 pcf over trench slurry	2.41×10^{-7}	1.0×10^{-7} cm/sec
58+00	4	2" to 6"	117	+15 pcf over trench slurry	1.84×10^{-7}	1.0×10^{-7} cm/sec
57+75	4	2" to 6"	117	+15 pcf over trench slurry	2.00×10^{-7}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: 58+25, 58+00, 57+75 Technician: SM/MM Var SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm² Sample Height: L= 7.0cm, 7.0cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{I}{X}$ (cm/sec)	w/conv factor (1/14.65)
58+25	01/05/04	10:28-14:28	240	10	100.4833	519313.7717	—	30	2.41×10^{-7}	1.64×10^{-8}
58+00	01/05/04	10:28-14:28	240	10	100.4833	519313.7717	—	23	1.84×10^{-7}	1.26×10^{-8}
57+75	01/05/04	10:28-14:28	240	10	100.4833	519313.7717	—	25	2.00×10^{-7}	1.36×10^{-8}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 01/05/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NO SLURRY MIXED TODAY

SE TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:15	33+40	2	47	40 - 90 sec	99	64 - 95 pcf	8	6.5 - 10	85	< 25 cm^3	3.5	38	MAX 30%
7:15	33+40	33	49	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	76	< 25 cm^3	2.0	36	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:21	33+70	2	46	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	84	< 25 cm^3	1.2	37	MAX 30%
13:21	33+70	34	47	40 - 90 sec	97	64 - 95 pcf	8	6.5 - 10	78	< 25 cm^3	1.5	39	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
32+00	3	2" to 6"	118	+15 pcf over trench slurry	6.70×10^{-8}	1.0×10^{-7} cm/sec
32+25	3	2" to 6"	118	+15 pcf over trench slurry	7.22×10^{-8}	1.0×10^{-7} cm/sec
32+50	3	2" to 6"	120.5	+15 pcf over trench slurry	8.82×10^{-8}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

St Trench

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: 32+00, 32+25, 32+50 Technician: MM/SM Vol SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm² Sample Height: L= 6.5cm, 7.0cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/cond. factor (1/14.65)
32+00	01/05/04	10:28-14:28	240	10	108.2128	559261044	—	9	6.70×10^{-8}	4.57×10^{-9}
32+25	01/05/04	10:28-14:28	240	10	100.4833	519313717	—	9	7.22×10^{-8}	4.93×10^{-9}
32+50	01/05/04	10:28-14:28	240	10	100.4833	519313717	—	11	8.82×10^{-8}	6.02×10^{-9}

I= P (psi) / 0.014217 L (cm) R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 6-Jan-04	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
SB-070 (NW58+00)	SB BACKFILL**	58+00	01/05/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-071 (SE32+00)	SB BACKFILL**	32+00	01/05/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

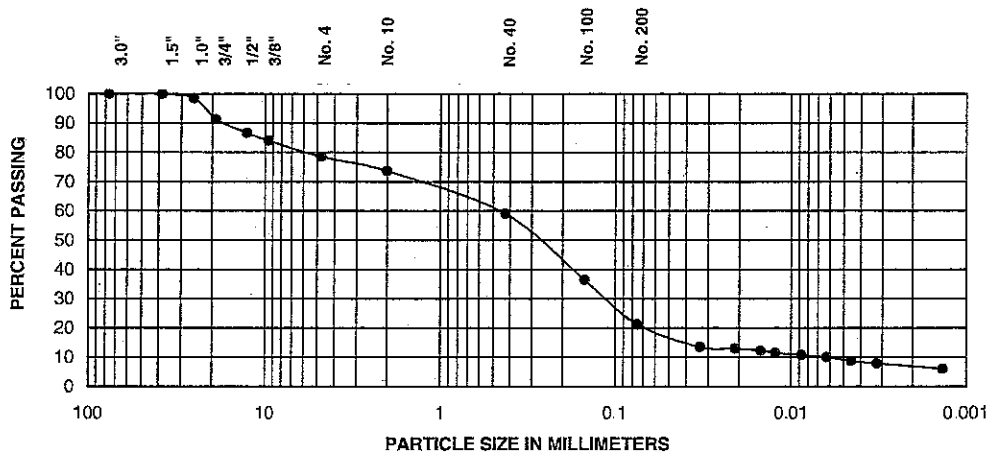
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-070	**Date Tested**	1/12/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/6/2004
Sample Location	58 + 00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	21.4	57.3	12.1	9.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.5
3/4"	91.3
1/2"	86.7
3/8"	84.0
No. 4	78.6
No. 10	73.7
No. 40	59.1
No. 100	36.5
No. 200	21.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
23	19	4

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

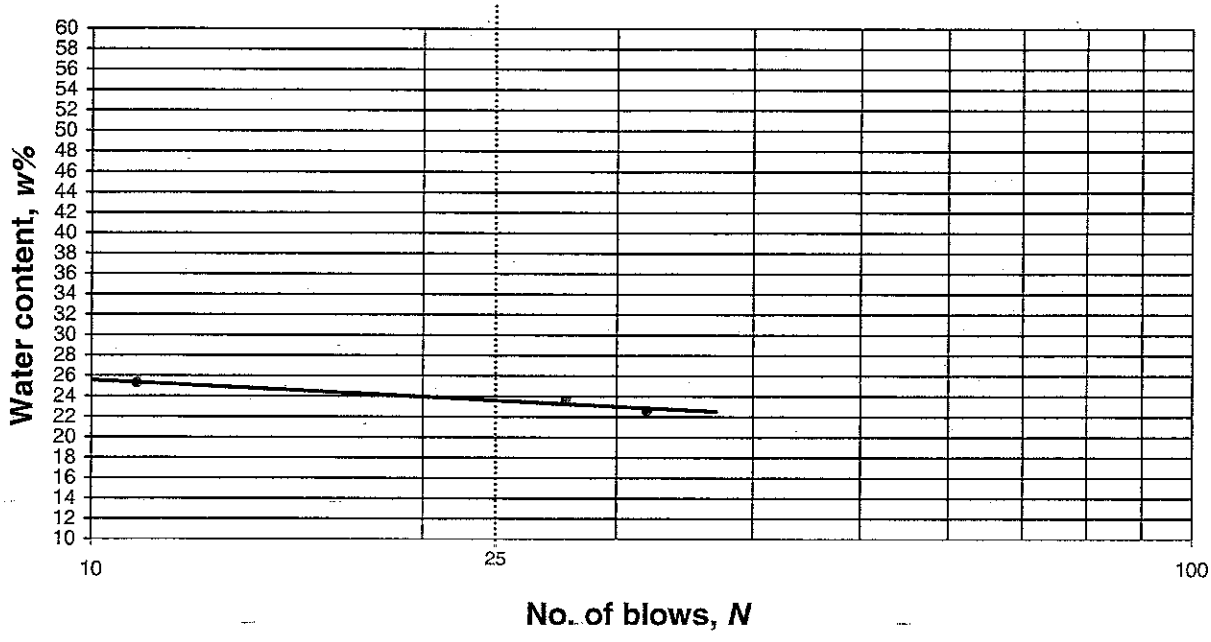
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-070	**Date Tested**	1/8/2004	**Tested By**	EM
						Qc By	NP

Date Sample Recd.	1/6/2004
Sample Location	58 + 00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	23	**Plastic Limit, PL**	19	**Plasticity Index, PI**	4

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/12/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-070	Date Recd.	1/6/04	**Location**	58 + 00 (NW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.72	cm	Volume, V:	232.9	cu cm
Mass of Sample:	462.9	g	**Moisture Content:**	**26.2**	%
			Wet Density	**124.0**	**pcf**
			Dry Density	**98.3**	**pcf**

Final

Diameter:	7.01	cm	Area, A:	38.6	sq cm
Height, L:	5.22	cm	Volume, V:	201.5	cu cm
Mass of Sample:	430.17	g	**Moisture Content:**	**18.1**	%
			Wet Density	**133.2**	**pcf**
			Dry Density	**112.8**	**pcf**
			Deg of Saturation	**95.7**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	22.1	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/12/2004	8:45 AM	0	0	3.11	5.77		20.0	---
1/12/2004	9:30 AM	2700	2700	3.38	5.53	1.1	20.0	8.70E-08
1/12/2004	10:15 AM	2700	5400	3.64	5.30	1.1	20.0	8.55E-08
1/12/2004	11:00 AM	2700	8100	3.90	5.07	1.1	20.0	8.76E-08
1/12/2004	11:45 AM	2700	10800	4.15	4.85	1.1	20.0	8.59E-08

Average Permeability = **8.7E-08** cm/sec

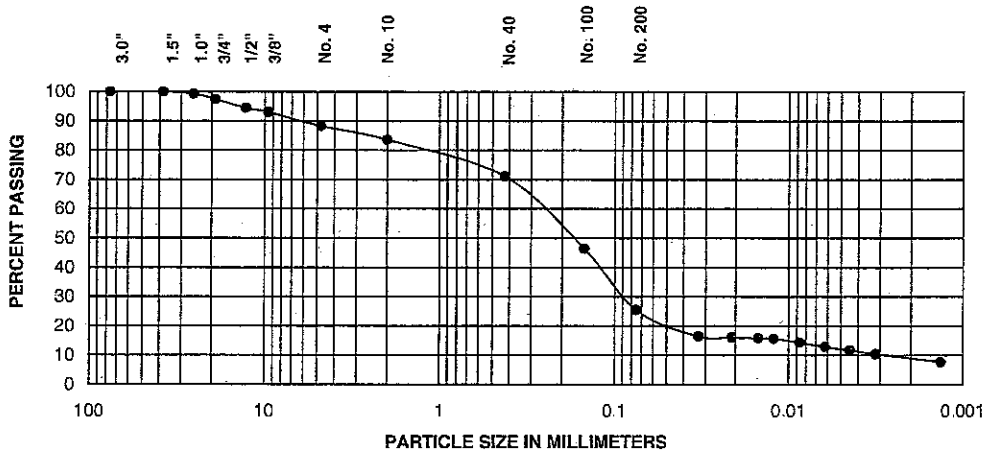
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-071	**Date Tested**	1/12/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/6/2004
Sample Location	32 + 00 (SE)
Sample Description	Gray silty, clayey sand with tr.of gr. (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.7	62.8	13.3	12.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	99.2
3/4"	97.5
1/2"	94.5
3/8"	93.0
No. 4	88.3
No. 10	83.7
No. 40	71.1
No. 100	46.4
No. 200	25.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
24	20	4

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

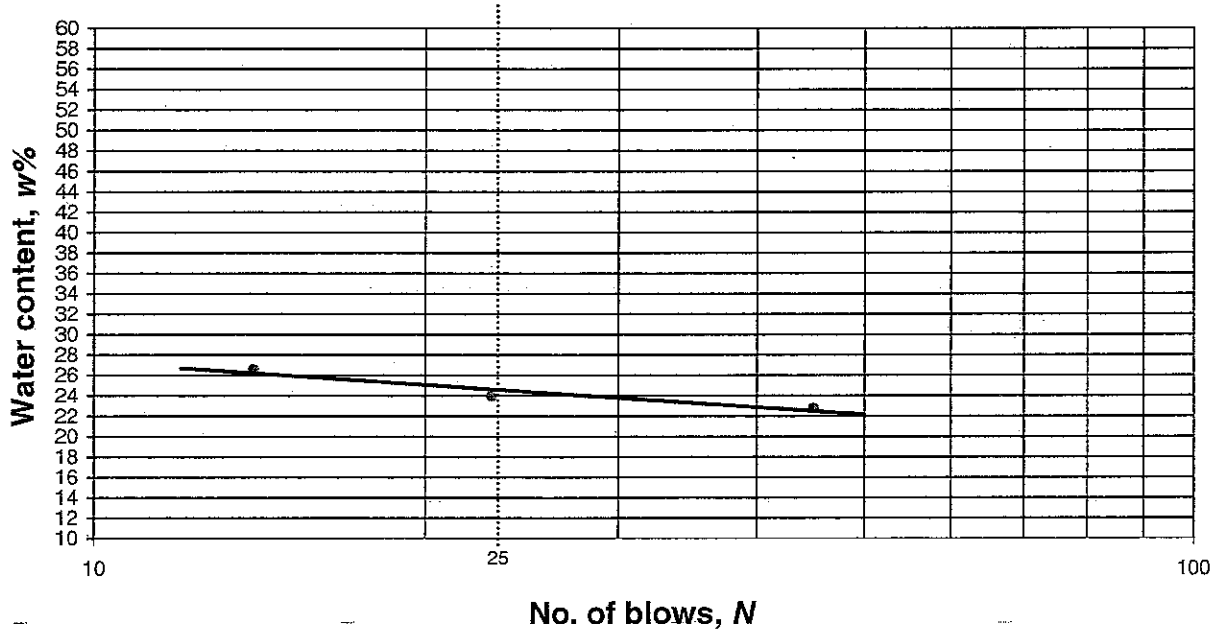
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-071	**Date Tested**	1/8/2003	**Tested By**	EM
						Qc By	NP

Date Sample Recd.	1/6/2004
Sample Location	32 + 00 (SE)
Sample Description	Gray silty, clayey sand with tr.of gr (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**24**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**4**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/12/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-071	Date Recd.	1/6/04	**Location**	32 + 00 (SE)		
Sample Description	Gray silty, clayey sand with tr of gr (SB Backfill)						

Specimen Data

Initial

Diameter	7.20	cm	Area, A:	40.7	sq cm
Height, L:	4.92	cm	Volume, V:	200.3	cu cm
Mass of Sample:	410.9	g	**Moisture Content:**	**24.9**	%
			Wet Density	**128.0**	**pcf**
			Dry Density	**102.5**	**pcf**

Final

Diameter	7.07	cm	Area, A:	39.3	sq cm
Height, L:	4.80	cm	Volume, V:	188.4	cu cm
Mass of Sample:	384.51	g	**Moisture Content:**	**20.8**	%
			Wet Density	**127.3**	**pcf**
			Dry Density	**105.4**	**pcf**
			Deg of Saturation	**91.0**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	25.7	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/12/2004	8:45 AM	0	0	3.18	5.85		20.0	---
1/12/2004	9:30 AM	2700	2700	3.28	5.73	0.8	20.0	3.71E-08
1/12/2004	10:15 AM	2700	5400	3.44	5.56	0.9	20.0	5.33E-08
1/12/2004	11:00 AM	2700	8100	3.60	5.41	1.1	20.0	4.78E-08
1/12/2004	11:45 AM	2700	10800	3.72	5.28	0.9	20.0	4.20E-08

Average Permeability = **4.5E-08** **cm/sec**

Remarks:

1/6/04 NO WORK
DOWN due to Cold TEMPS

1/7/04 NO WORK
DOWN due to Cold TEMPS
2 LOADS BENTONITE - CERTIFICATES ATTACHED.

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/19/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV005031	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-5-04	MONT TANS #10	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	49
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.4
> 75 micron (wt. %)	4.0 max.	1.9

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.9
Y.P. / P.V. Ratio	3.0 max	1.20

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4499.

Signed Date 1/6/04

Approved by: Plant Manager

LabanaCert.doc (4/22/97)
Rev 8 (8/99)

Arrived onsite
01/07/04
Unm# Jumbo Bags

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 12/23/2003

SOLD TO:	SHIP TO:
GEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCIV005030	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-5-04	MONT TRANS BM32	GREYBULL	GEL

Note Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	33
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.0
> 75 micron (wt. %)	4.0 max.	1.5

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.0
Y.P. / P.V. Ratio	3.0 max.	0.54

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Bentonite 12A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4426.

Signed Date

Approved by: Plant Manager

LabsmCert.doc (4/22/97)
Rev E (9/96)

Arrived onsite
01/07/04
LIMO # Jumbo Bags

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/08/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 23 - 30 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.

NORTH TRENCH

COMMENTS: No slurry sample today. No excavation from this trench. Morning work consisted of cleaning out the bottom of the trench and the slope of backfill since no work was done on this trench since 01/03/04.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A	NO EXCAVATION TODAY			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
57+50	3.00	N/A	N/A	N/A	1.71×10^{-7}	N/A

**Sample was collected for archiving. Will send to the lab if necessary. The area that was mixed and placed today will be reworked and placed again tomorrow (if we work that trench) or at later date.

COMMENTS

Only a few buckets of backfill were placed in the trench late in the afternoon. Only worked 8 hours.

Unit Weight: 57+50: 119.5 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/08/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 23 - 30 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
33+80	2.00	70.00	6.00	95.00	39.00	8
33+80	31.00	74.00	7.00	60.00	41.00	8
33+80	2.00	78.00	20.00	37.00	45.00	8
33+80	29.00	79.00	22.00	22.00	48.00	8

SE TRENCH

COMMENTS: Fresh slurry was pumped to this trench today to try and bring the slurry back into spec. Sand was low in the morning due to settling out to the bottom during shutdown. Trench bottom and slope was cleaned out this morning prior to starting work.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A	No cut completed today.			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
32+50	2.00	N/A	N/A	N/A	1.20×10^{-7}	N/A
32+75	2.00	N/A	N/A	N/A	7.22×10^{-8}	N/A
33+00	2.00	Sample collected	Sample collected	Sample collected	8.94×10^{-8}	yes

COMMENTS

Filter cake: .3mm, .7mm .5mm, and .8mm respectively.

Unit Weight: 32+50: 117.0 pcf
32+75: 120.0 pcf
33+00: 118.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

No work this morning except cleaning trench bottom. Water line to plant was broken and no slurry could be mixed. Had a few problems with the excavator. Hose blew and caused a couple hour stoppage of work. Only worked 8 hours today.

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Summer E Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/08/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
11:00	64.00	48.00	12.00	8
13:48	64.00	46.00	12.00	8

Filter cake is .2mm and .2mm, respectively.

Slurry was not mixed this morning due to the broken water line being unable to supply water for mixing. Line was fixed and mixing began. Only took two test due to short day of mixing.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E Sipe OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/08/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 23 - 30 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
No excavation today.							57+60	TOPOUT	TOPOUT
							57+50	5.2	TOPOUT
							57+40	6.9	6.2
							57+30	7.5	6.5
							57+20	9.5	9.3
							57+10	9.6	9.6
							57+00	11.6	11.6
							56+90	11.6	11.9
							56+80	14.7	14.5
							56+70	15.6	15.6
							56+60	16.7	16.6
							56+50	19.1	19.2
							56+40	21.1	21.3
				SF TODAY		0.00			
				SF TO DATE		78361.00			

COMMENTS

NORTH TRENCH

AM profile was compared to PM profile from 01/05/04. Topout of backfill had dropped back about 7', indicating that backfill had slide down the slope towards the toe. Trench was cleaned out prior to backfilling today.

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/08/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 23 - 30 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
No cut completed today.							32+40	TOPOUT	TOPOUT
							32+50	3.5	TOPOUT
							32+60	6.7	TOPOUT
							32+70	9.5	TOPOUT
							32+80	10.0	TOPOUT
							32+90	13.5	TOPOUT
							33+00	14.3	TOPOUT
							33+10	15.9	9.0
							33+20	19.9	16.0
							33+30	24.0	16.5
							33+40	26.5	20.1
							33+50	26.5	24.5
							33+60	27.0	25.7
							33+70	27.4	28.4
							33+80	33.6	30.9

SF TODAY 0.00

SF TO DATE 49183.22

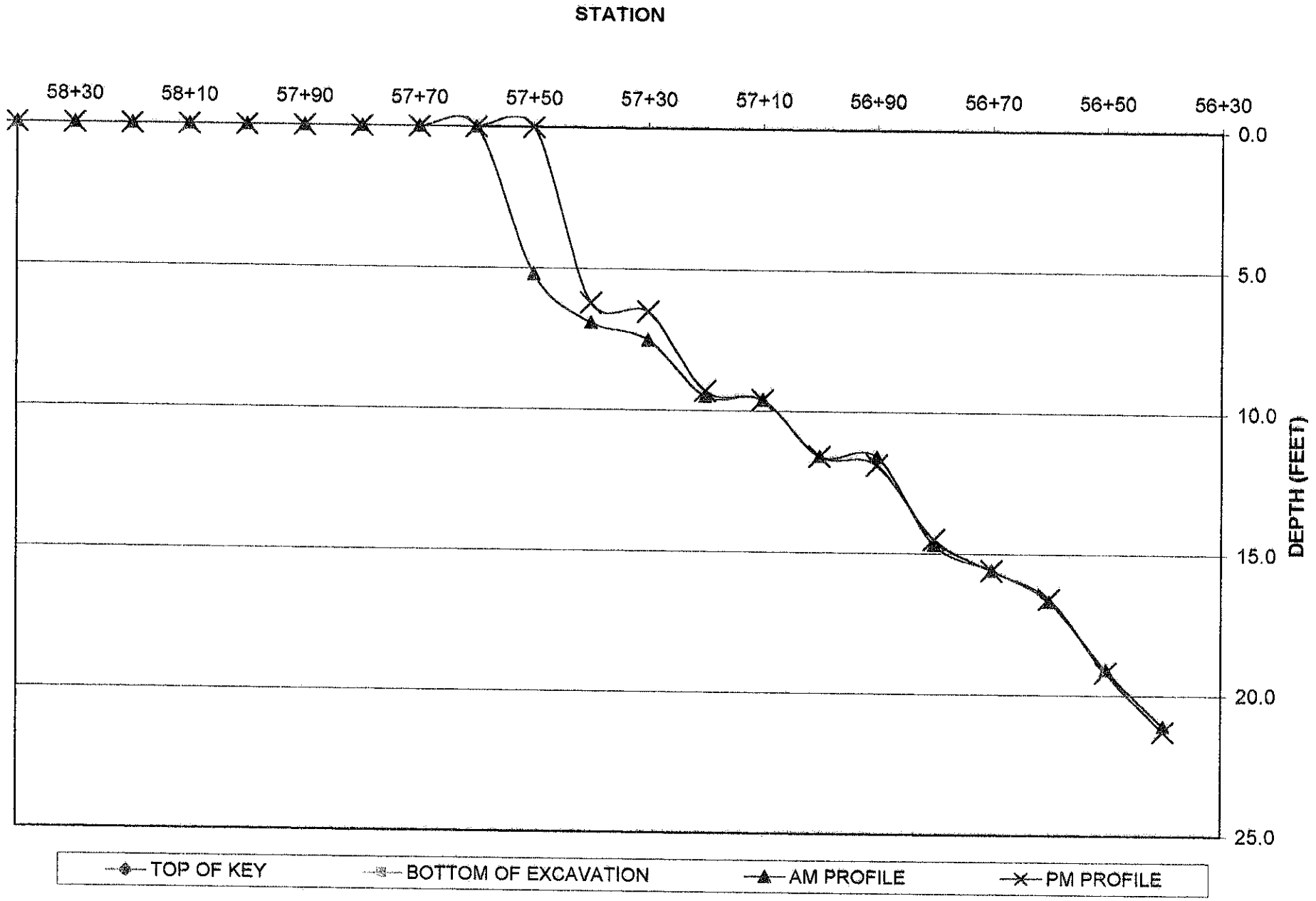
COMMENTS

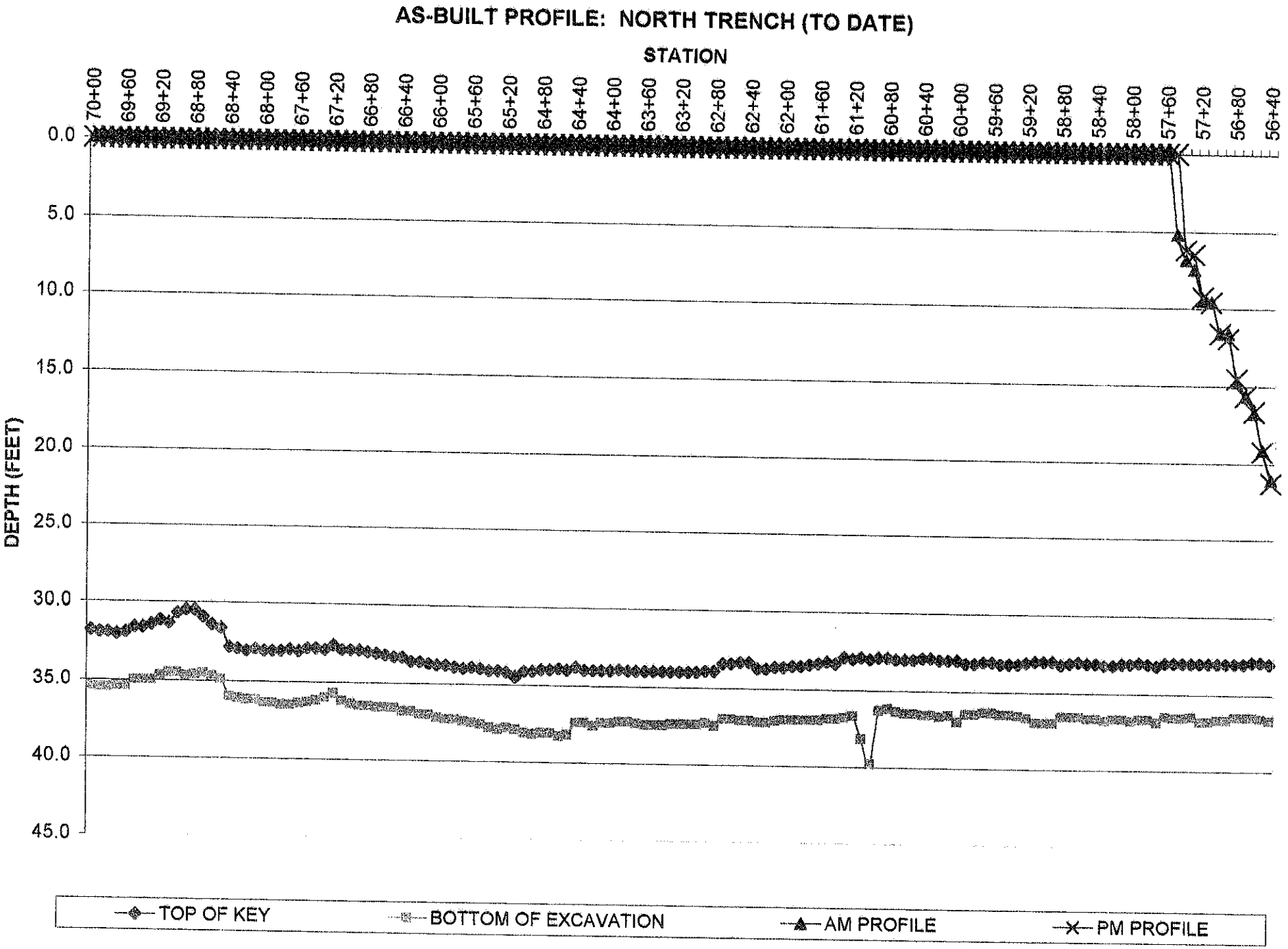
SE Trench

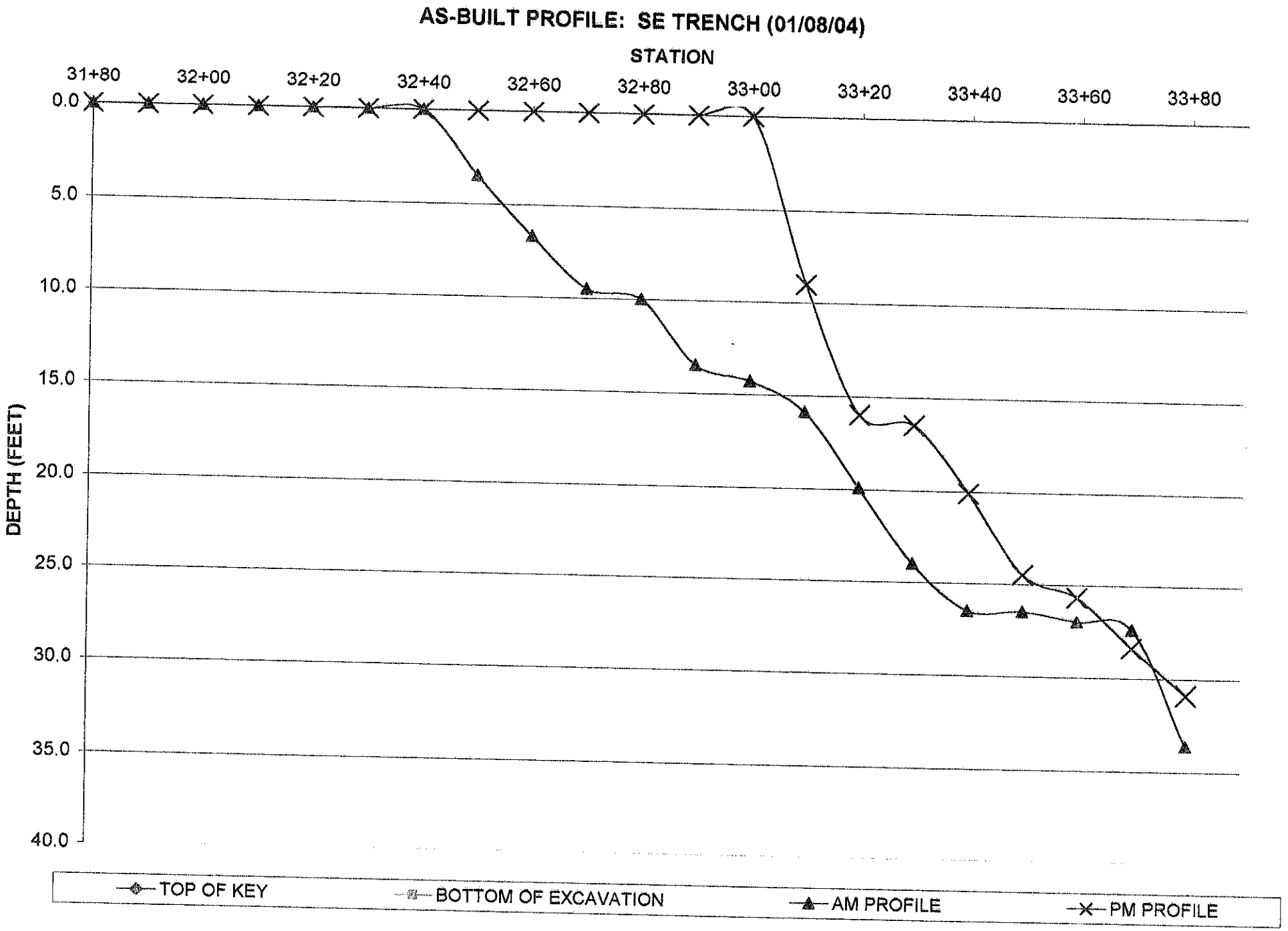
AM profile was compared to PM profile from 01/05/04. Topout of backfill had dropped back about 9', indicating that backfill had slide down the slope towards the toe. Trench was cleaned out prior to backfilling today.

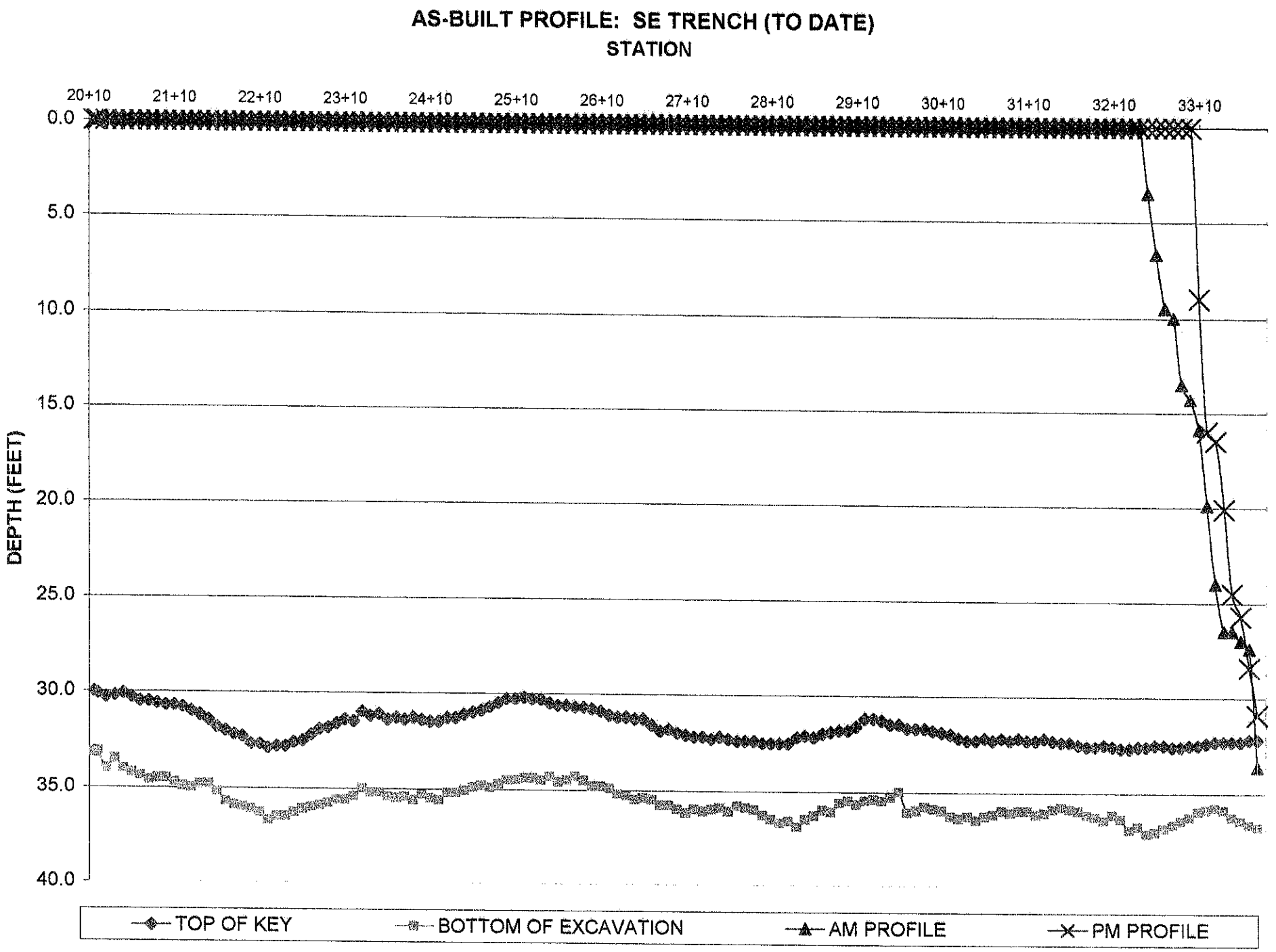
GEO-CON: Suzanne E Sepo OWNER:

AS-BUILT PROFILE: NORTH TRENCH (01/08/04)




AS-BUILT PROFILE: NORTH TRENCH (TO DATE)
STATION
70+00
69+60
69+20
68+80
68+40
68+00
67+60
67+20
66+80
66+40
66+00
65+60
65+20
64+80
64+40
64+00
63+60
63+20
62+80
62+40
62+00
61+60
61+20
60+80
60+40
60+00
59+60
59+20
58+80
58+40
58+00
57+60
57+20
56+80
56+40
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (01/08/04)
STATION
31+80
32+00
32+20
32+40
32+60
32+80
33+00
33+20
33+40
33+60
33+80
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE)
STATION
20+10
21+10
22+10
23+10
24+10
25+10
26+10
27+10
28+10
29+10
30+10
31+10
32+10
33+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/08/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	11:06	48	> 40 sec	64	> 64 pcf	8	6.5 - 10	12	< 20 cm^3	.2
PM	13:48	46	> 40 sec	64	> 64 pcf	8	6.5 - 10	12	< 20 cm^3	.2

NORTH TRENCH (1 QUICK PERM ONLY)

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

SE TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
6:40	33+80	2	39	40 - 90 sec	70	64 - 95 pcf	8	6.5 - 10	95	< 25 cm^3	.3	6	MAX 30%
6:40	33+80	31	41	40 - 90 sec	74	64 - 95 pcf	8	6.5 - 10	60	< 25 cm^3	.7	7	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:30	33+80	2	45	40 - 90 sec	78	64 - 95 pcf	8	6.5 - 10	37	< 25 cm^3	.5	20	MAX 30%
13:30	33+80	29	48	40 - 90 sec	79	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	.8	22	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
32+50	2	2" to 6"	117	+15 pcf over trench slurry	1.20×10^{-7}	1.0×10^{-7} cm/sec
32+75	2	2" to 6"	120	+15 pcf over trench slurry	7.22×10^{-8}	1.0×10^{-7} cm/sec
33+00	2	2" to 6"	118	+15 pcf over trench slurry	8.94×10^{-8}	1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
57+50	3	2" to 6"	119.5	+15 pcf over trench slurry	1.71×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH / SE TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 57+50 / 32+50, 32+75, 33+00

Technician: SM/MM ✓ BY SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.5cm / 7.0cm, 7.0cm, 6.5cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv factor (1/14.65)
57+50	01/08/04	14:00-18:00	240	10	108.2128	559261.0644	—	23	1.71×10^{-7}	1.17×10^{-8}
32+50	01/08/04	14:00-18:00	240	10	100.4833	519313.7717	—	15	1.20×10^{-7}	8.19×10^{-9}
32+75	01/08/04	14:00-18:00	240	10	100.4833	519313.7717	—	9	7.22×10^{-8}	4.93×10^{-9}
33+00	01/08/04	14:00-18:00	240	10	108.2128	559261.0644	—	12	8.94×10^{-8}	6.10×10^{-9}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 12-Jan-04	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO: P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
SB-072 (SE33+00)	SB BACKFILL**	33+00	01/08/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

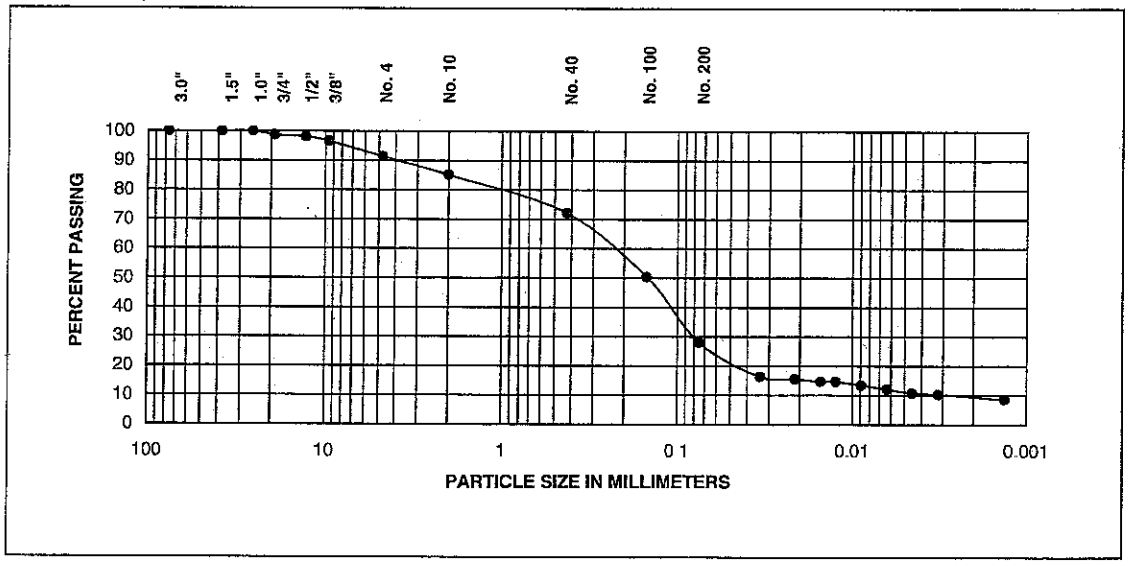
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-072 (SE 33+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	33+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	8.6	63.5	16.7	11.3

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.8
1/2"	98.1
3/8"	96.6
No. 4	91.4
No. 10	85.3
No. 40	72.2
No. 100	50.4
No. 200	28.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
24	19	5

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

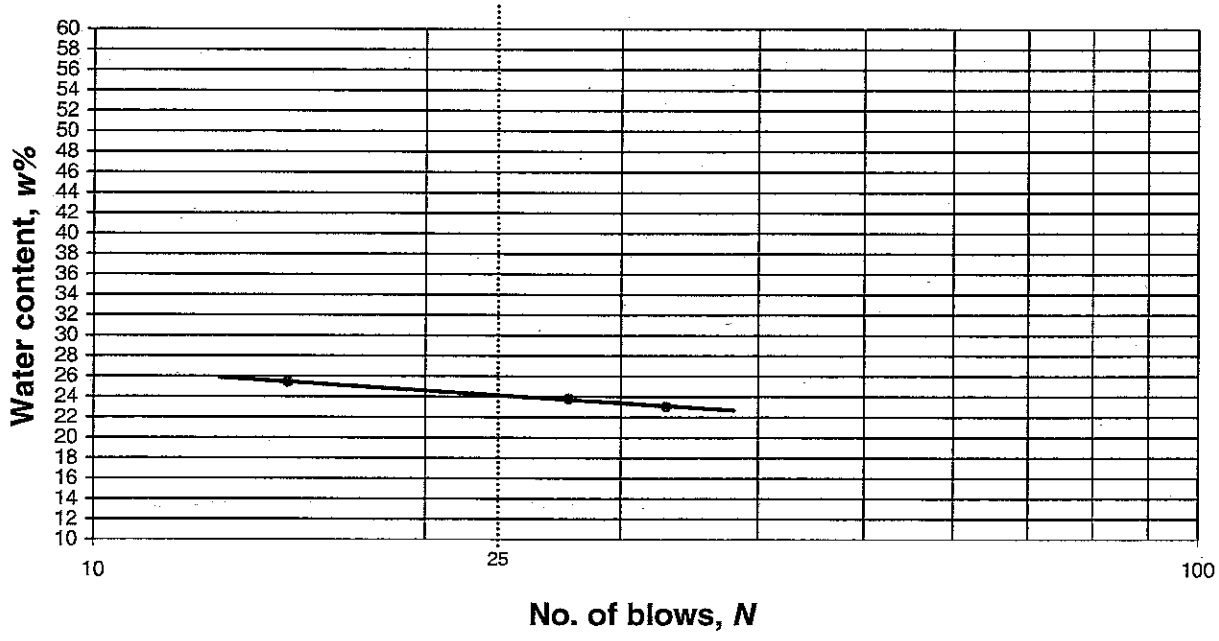
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-072 (SE 33+00)	**Date Tested**	1/15/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	33+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**24**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**5**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/14/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-072 (SE 33+00)	Date Recd.	1/12/04	**Location**	33+00 (SE)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.59	cm	Volume, V:	227.6	cu cm
Mass of Sample:	439.7	g	**Moisture Content:**	**26.6**	%
			Wet Density	120.6	**pcf**
			Dry Density	95.2	**pcf**

Final

Diameter:	6.98	cm	Area, A:	38.3	sq cm
Height, L:	5.24	cm	Volume, V:	200.5	cu cm
Mass of Sample:	415.00	g	**Moisture Content:**	**22.2**	%
			Wet Density	129.2	**pcf**
			Dry Density	105.7	**pcf**
			Deg of Saturation	98.0	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	22.6	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/14/2004	10:00 AM	0	0	2.95	5.85		20.0	---
1/14/2004	10:45 AM	2700	2700	3.12	5.63	0.8	20.0	7.68E-08
1/14/2004	11:30 AM	2700	5400	3.32	5.38	0.8	20.0	8.91E-08
1/14/2004	12:15 PM	2700	8100	3.50	5.18	0.9	20.0	7.28E-08
1/14/2004	1:00 PM	2700	10800	3.66	4.97	0.8	20.0	7.79E-08

Average Permeability = **7.9E-08** **cm/sec**

Remarks:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/09/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 20 -27 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
56+40	2.00	95.00	48.00	44.00	78.00	8
56+40	20.00	97.00	52.00	61.00	85.00	8
55+90	2.00	91.00	19.00	20.00	52.00	8
55+90	34.00	93.00	22.00	20.00	47.00	8

NORTH TRENCH

COMMENTS: AM sample of slurry was out of spec due to the fact that only backfilling has occurred at this trench the last couple of days (no new slurry pumped). Fresh slurry was pumped to this trench all day to try and bring the slurry back into specs. Took another sample midday to check for properties.

SEE HANDWRITTEN DAILY QC SHEET

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
56+00	LAB SAMPLE COLLECTED 01/09/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
57+50	3.00	N/A	N/A	N/A	2.89×10^{-7}	N/A
57+25	3.00	N/A	N/A	N/A	2.31×10^{-7}	N/A
57+00	3.00	Sample collected	Sample collected	Sample collected	2.57×10^{-7}	yes
56+75	3.00	N/A	N/A	N/A	1.04×10^{-7}	N/A
56+50	3.00	N/A	N/A	N/A	1.44×10^{-7}	N/A
56+25	3.00	N/A	N/A	N/A	1.31×10^{-7}	N/A

COMMENTS

Filter cake: 1.0mm, 1.0mm .4mm, and .5mm respectively.

Unit Weight: 57+50: 118.0 pcf
57+25: 117.0 pcf
57+00: 117.0 pcf
56+75: 118.0 pcf
56+50: 118.0 pcf
56+25: 118.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/09/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 20 -27 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
33+90	2.00	84.00	30.00	18.00	55.00	8
33+90	34.00	89.00	32.00	23.00	56.00	8
34+90	2.00	90.00	24.00	30.00	50.00	8
34+90	34.00	92.00	28.00	35.00	52.00	8

SE TRENCH

COMMENTS: Fresh slurry was pumped to this trench today to try and bring the slurry back into spec. Filtrate loss was slightly high in the PM, but still typical for trench slurry

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
34+00	LAB SAMPLE COLLECTED 01/09/04			
35+00	LAB SAMPLE COLLECTED 01/09/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
33+25	2.00	N/A	N/A	N/A	1.17×10^{-7}	N/A
33+50	2.00	N/A	N/A	N/A	1.42×10^{-7}	N/A
33+75	2.00	N/A	N/A	N/A	1.03×10^{-7}	N/A
34+00	3.00	Sample collected	Sample collected	Sample collected	8.02×10^{-8}	yes
34+25	3.00	N/A	N/A	N/A	1.47×10^{-7}	N/A
34+50	3.00	N/A	N/A	N/A	7.11×10^{-8}	N/A

COMMENTS

Filter cake: .3mm, .3mm 1.0mm, and 1.2mm respectively.

Unit Weight: 33+25: 118.0 pcf
33+50: 115.0 pcf
33+75: 118.5 pcf
34+00: 116.0 pcf
34+25: 117.0 pcf
34+50: 117.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Lopez **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/09/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
10:10	65.00	44.00	14.00	8
11:00	-	44.00	-	-
13:30	65.00	44.00	16.00	8
14:30	-	45.00	-	-

Filter cake is .2mm and .1mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/09/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 20 -27 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
56+30	33.0	36.5	36.6	10.0	366.0	6.5	57+60	TOPOUT	TOPOUT
56+20	33.0	36.5	36.5	10.0	365.0	6.5	57+50	1.0	TOPOUT
56+10	33.0	36.6	36.6	10.0	365.5	6.6	57+40	4.9	TOPOUT
56+00	33.0	36.6	36.6	10.0	366.0	6.6	57+30	7.1	TOPOUT
55+90	33.0	36.7	36.7	10.0	366.5	6.7	57+20	8.5	TOPOUT
55+80	33.0	36.6	36.7	10.0	366.5	6.7	57+10	9.5	TOPOUT
55+70	33.0	37.0	36.8	10.0	368.0	6.6	57+00	11.7	5.6
55+60	33.0	36.6	36.8	10.0	368.0	6.7	56+90	11.8	8.4
							56+80	14.6	11.1
							56+70	15.8	14.6
							56+60	16.9	24.6
							56+50	19.5	30.1
							56+40	21.2	30.6
							56+30		30.3
							56+20		32.6
							56+10		33.4
							56+00		33.6
							55+90		33.9
							55+80		36.5
							55+70		37.0
							55+60		36.5
				SF TODAY	2931.50				
				SF TO DATE	81292.50				

COMMENTS

NORTH TRENCH

Topout of backfill had dropped back one station, indicating that backfill had slide down the slope towards the toe.
Trench was cleaned out prior to backfilling today.

GEO-CON: Suzanne E Sepro OWNER:

Geo Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/09/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 20 -27 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
33+90	32.2	36.7	36.8	10.0	367.5	3.3	33+00	TOPOUT	TOPOUT
34+00	32.3	36.5	36.6	10.0	366.0	3.2	33+10	10.5	TOPOUT
34+10	32.3	36.3	36.4	10.0	364.0	3.2	33+20	16.5	TOPOUT
34+20	32.2	36.4	36.4	10.0	363.5	3.4	33+30	17.8	TOPOUT
34+30	32.2	36.5	36.5	10.0	364.5	3.5	33+40	21.2	TOPOUT
34+40	32.1	36.7	36.6	10.0	366.0	3.3	33+50	24.9	TOPOUT
34+50	32.1	36.8	36.8	10.0	367.5	3.1	33+60	28.0	TOPOUT
34+60	32.0	36.6	36.7	10.0	367.0	3.0	33+70	29.9	TOPOUT
34+70	32.1	36.3	36.5	10.0	364.5	3.2	33+80	31.2	TOPOUT
34+80	32.0	36.0	36.2	10.0	361.5	3.1	33+90		5.9
34+90	32.0	36.4	36.2	10.0	362.0	3.0	34+00		8.2
35+00	32.1	36.6	36.5	10.0	365.0	2.9	34+10		13.4
35+10	32.1	36.4	36.5	10.0	365.0	2.9	34+20		15.7
35+20	32.2	36.3	36.4	10.0	363.5	2.9	34+30		18.3
35+30	32.3	36.3	36.3	10.0	363.0	3.0	34+40		19.1
35+40	32.2	36.5	36.4	10.0	364.0	3.0	34+50		20.6
							34+60		22.8
							34+70		24.0
							34+80		26.1
							34+90		26.5
							35+00		28.7
							35+10		29.0
							35+20		30.1
							35+30		33.2
							35+40		36.5

SF TODAY 5834.50

SF TO DATE 55017.72

COMMENTS

SE Trench

GEO-CON: Suzanne C Sepic OWNER:

NW TRENCH
1-9-04

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
56+30	587.2	586.5	33.0	553.5	36.5	550.0	6.5	3.0
56+20	587.1	586.5	33.0	553.5	36.5	550.0	6.5	3.0
56+10	587.1	586.5	33.0	553.5	36.6	549.9	6.5	3.0
56+00	587.1	586.3	33.0	553.3	36.6	549.7	6.7	3.2
55+90	587.1	586.5	33.0	553.5	36.7	549.8	6.7	3.2
55+80	587.0	586.5	33.0	553.5	36.6	549.9	6.7	3.2
55+70	587.0	586.2	33.0	553.2	37.0	549.2	6.6	3.1
55+60	587.0	586.3	33.0	553.3	36.6	549.7	6.7	3.2

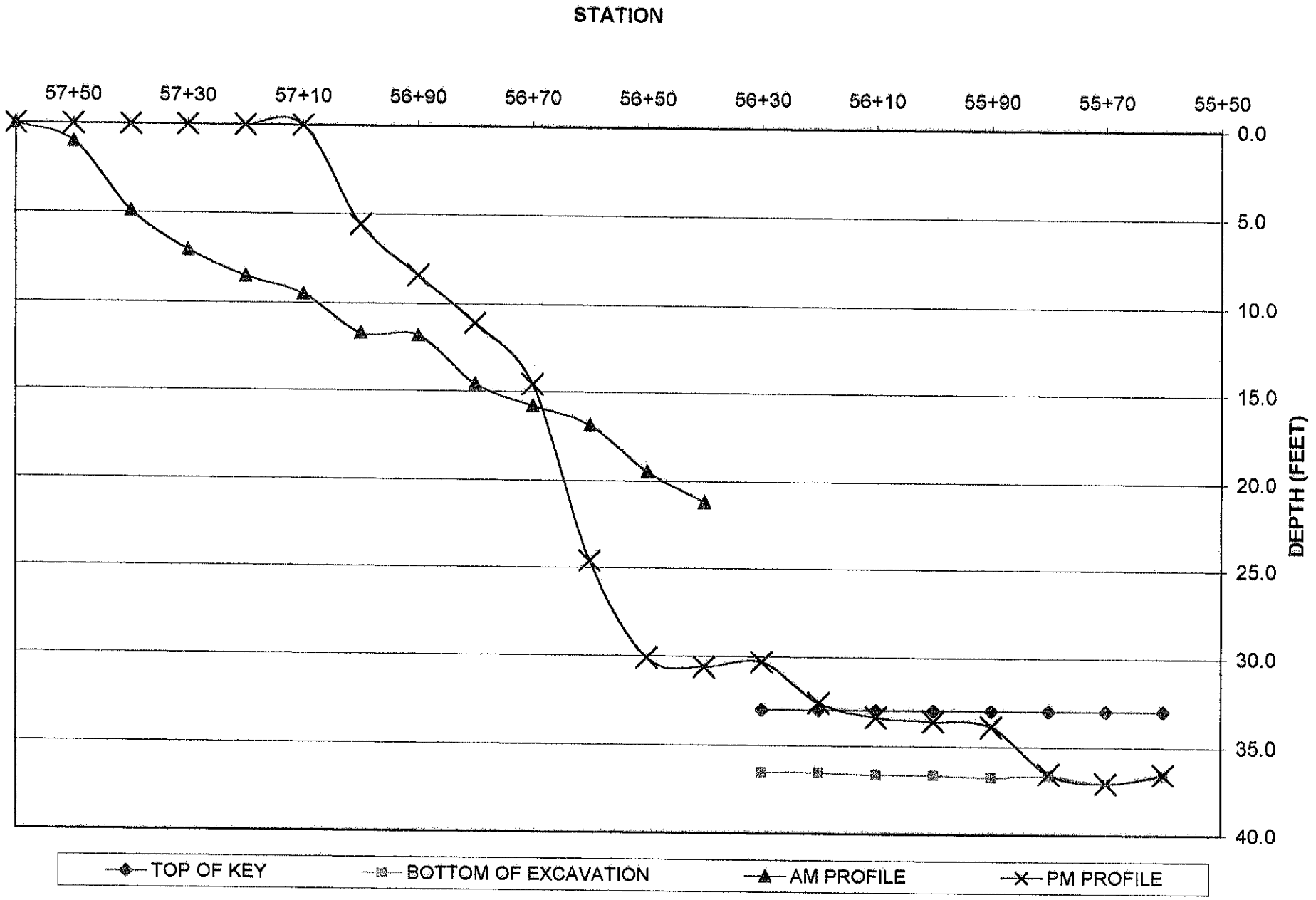
NOTE: DEPTH TO 30" WIDE WAS ESTIMATED ON A 1:1.5 SLOPE.

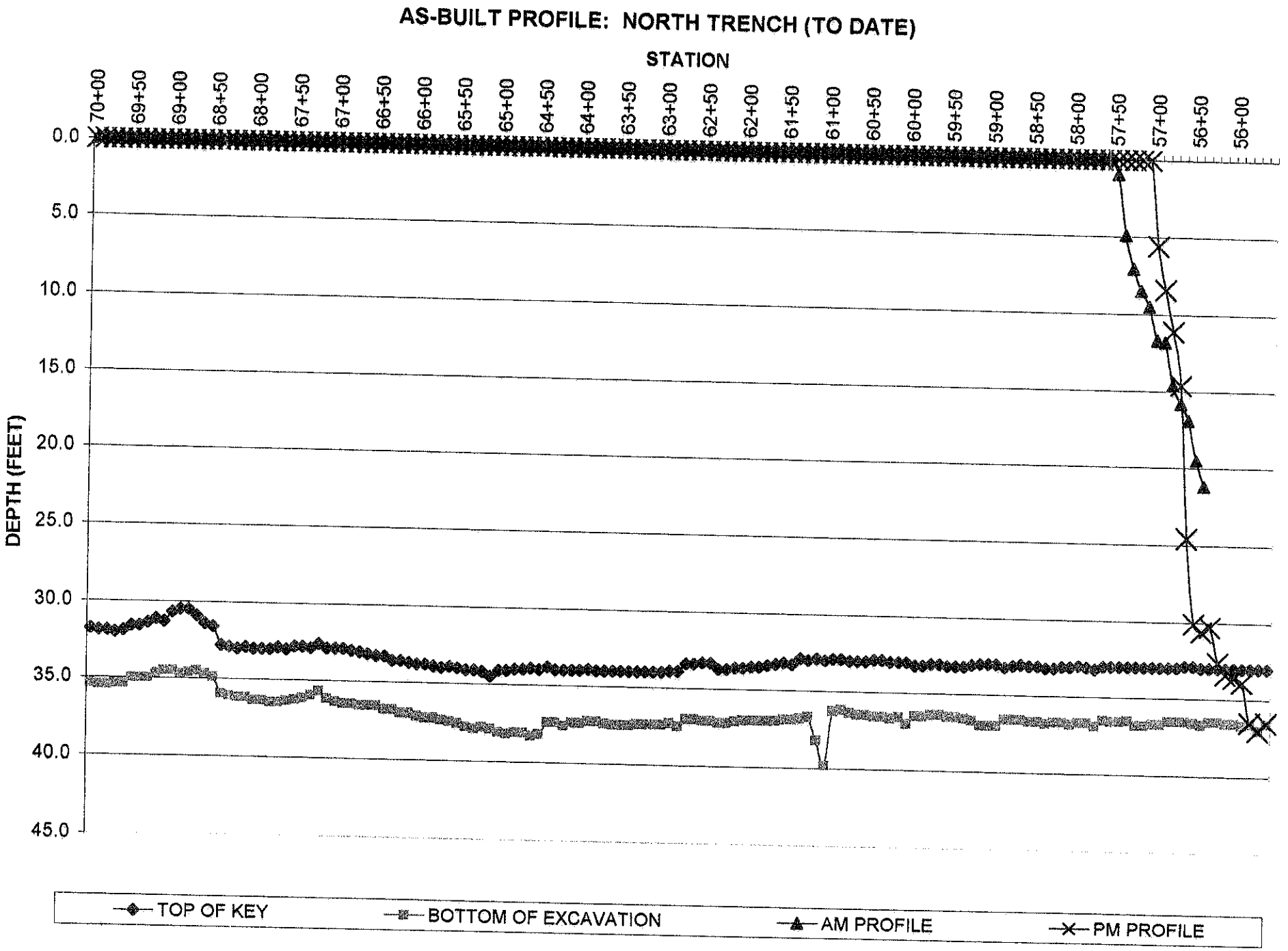
SE TRENCH
1-9-04

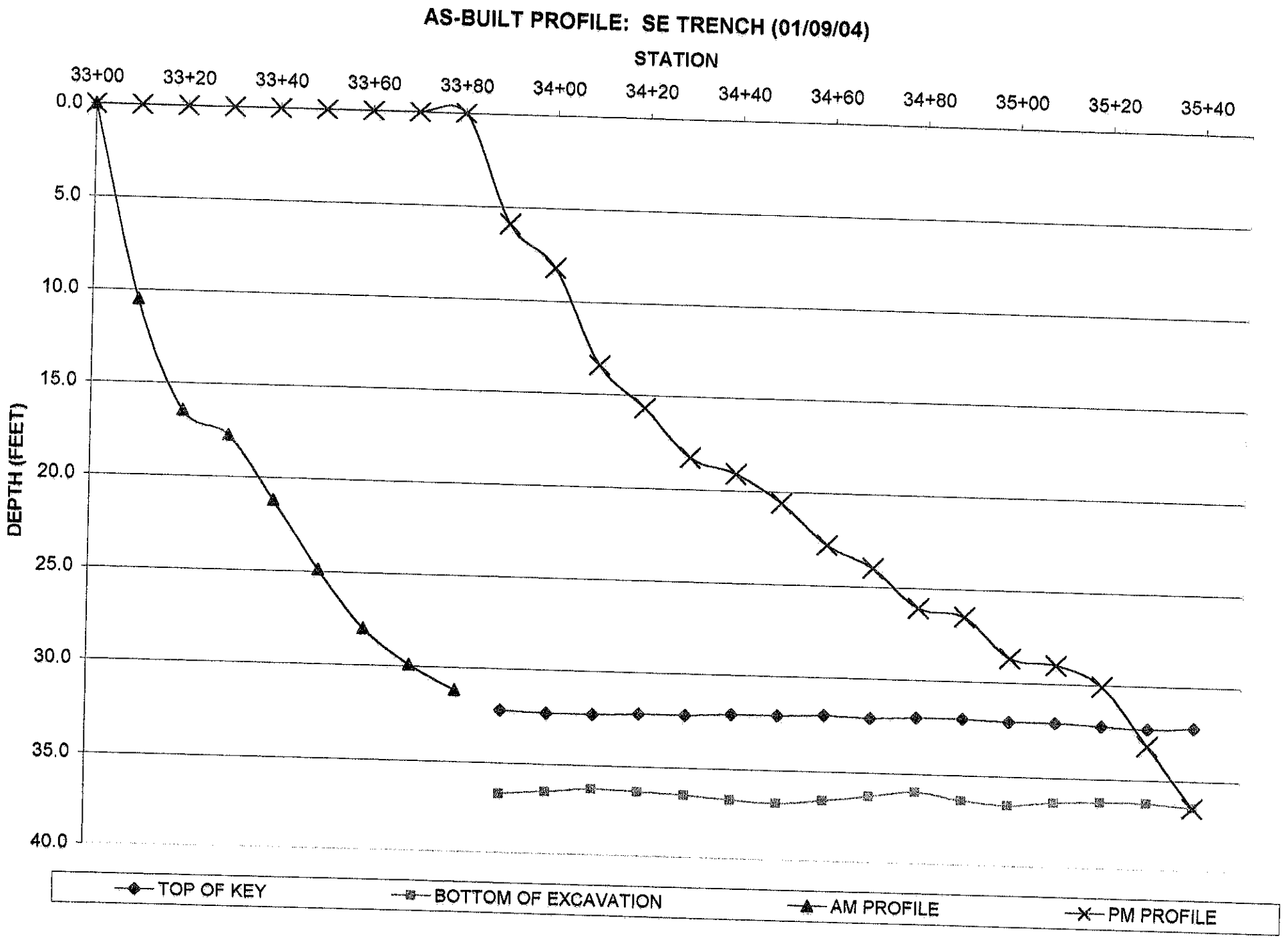
STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
33+90	587.8	587.9	32.2	555.7	36.7	551.2	3.3	5.0
34+00	587.8	587.9	32.3	555.6	36.5	551.4	3.2	4.8
34+10	587.8	588.0	32.3	555.7	36.3	551.7	3.2	4.8
34+20	587.8	587.9	32.2	555.7	36.4	551.5	3.4	5.1
34+30	587.8	588.1	32.2	555.9	36.5	551.6	3.5	5.3
34+40	587.7	587.9	32.1	555.8	36.7	551.2	3.3	5.0
34+50	587.7	587.7	32.1	555.6	36.8	550.9	3.1	4.7
34+60	587.7	587.7	32.0	555.7	36.6	551.1	3.0	4.5
34+70	587.7	587.9	32.1	555.8	36.3	551.6	3.2	4.8
34+80	587.6	587.2	32.0	555.2	36.0	551.2	3.1	4.7
34+90	587.6	587.0	32.0	555.0	36.4	550.6	3.0	4.5
35+00	587.5	587.0	32.1	554.9	36.6	550.4	2.9	4.4
35+10	587.5	586.9	32.1	554.8	36.4	550.5	2.9	4.4
35+20	587.4	586.9	32.2	554.7	36.3	550.6	2.9	4.4
35+30	587.4	586.9	32.3	554.6	36.3	550.6	3.0	4.5
35+40	587.4	586.7	32.2	554.5	36.5	550.2	3.0	4.5

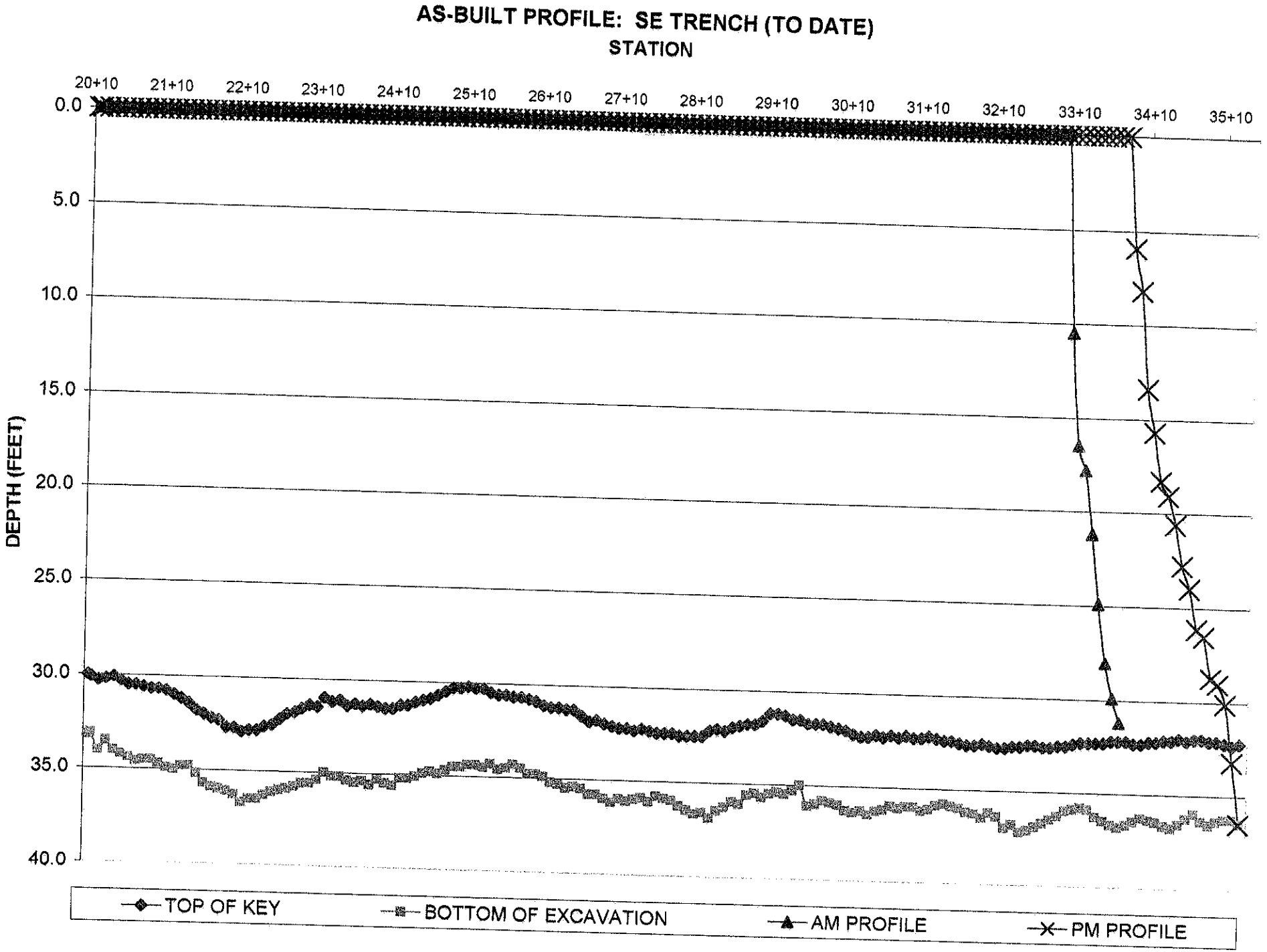
NOTE· DEPTH TO 30" WIDE WAS ESTIMATED WITH A 1·1 5 SLOPE

AS-BUILT PROFILE: NORTH TRENCH (01/09/04)




AS-BUILT PROFILE: NORTH TRENCH (TO DATE)
STATION
70+00
69+50
69+00
68+50
68+00
67+50
67+00
66+50
66+00
65+50
65+00
64+50
64+00
63+50
63+00
62+50
62+00
61+50
61+00
60+50
60+00
59+50
59+00
58+50
58+00
57+50
57+00
56+50
56+00
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (01/09/04)
STATION
33+00
33+20
33+40
33+60
33+80
34+00
34+20
34+40
34+60
34+80
35+00
35+20
35+40
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE)
STATION
20+10
21+10
22+10
23+10
24+10
25+10
26+10
27+10
28+10
29+10
30+10
31+10
32+10
33+10
34+10
35+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/09/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:10	44	> 40 sec	65	> 64 pcf	8	6.5 - 10	14	< 20 cm^3	.2
PM	13:30	44	> 40 sec	65	> 64 pcf	8	6.5 - 10	16	< 20 cm^3	.1

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	11:00	44	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	14:30	45	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

NORTH TRENCH

TRENCH SLURRY ✓

TIME	STATION	DEPTH	VISC	U.W	pH	FILT	CAKE	SAND
11:20	56+00	2	51	90	8	55	2.0	32
11:20	56+00	34	56	91	8	39	1.0	32

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:00	56+40	2	78	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	44	< 25 cm^3	1.0	48	MAX 30%
7:00	56+40	20	85	40 - 90 sec	97	64 - 95 pcf	8	6.5 - 10	61	< 25 cm^3	1.0	52	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:15	55+90	2	52	40 - 90 sec	91	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	.4	19	MAX 30%
13:15	55+90	34	47	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	.5	22	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
57+50	3	2" to 6"	118	+15 pcf over trench slurry	2.89×10^{-7}	1.0×10^{-7} cm/sec
57+25	3	2" to 6"	117	+15 pcf over trench slurry	2.31×10^{-7}	1.0×10^{-7} cm/sec
57+00	3	2" to 6"	117	+15 pcf over trench slurry	2.57×10^{-7}	1.0×10^{-7} cm/sec
56+75	3	2" to 6"	118	+15 pcf over trench slurry	1.04×10^{-7}	1.0×10^{-7} cm/sec
56+50	3	2" to 6"	118	+15 pcf over trench slurry	1.44×10^{-7}	1.0×10^{-7} cm/sec
56+25	3	2" to 6"	118	+15 pcf over trench slurry	1.31×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 57+50, 57+25, 57+00, 56+75, 56+50, 56+25

Technician: SM/MM ✓BY SES

Sample Area: A= $\pi r^2 = \pi (3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 6.5cm, 7.0cm, 7.0cm, 6.5cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/conversion (1/14.65)
57+50	01/09/04	11:15-15:15	240	10	100.4833	519313.7717	—	36	2.89×10^{-7}	1.97×10^{-8}
57+25	01/09/04	11:15-15:15	240	10	108.2128	559261.0614	—	31	2.31×10^{-7}	1.58×10^{-8}
57+00	01/09/04	11:15-15:15	240	10	100.4833	519313.7717	—	32	2.57×10^{-7}	1.75×10^{-8}
56+75	01/09/04	18:00-6.00	720	10	100.4833	519313.7717	—	39	1.04×10^{-7}	7.10×10^{-9}
56+50	01/09/04	18:00-6:00	720	10	108.2128	559261.0614	—	58	1.44×10^{-7}	9.83×10^{-9}
56+25	01/09/04	18:00-6.00	720	10	100.4833	519313.7717	—	49	1.31×10^{-7}	8.94×10^{-9}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 01/09/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

North Trench

SE TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
6:25	33+90	2	55	40 - 90 sec	84	64 - 95 pcf	8	6.5 - 10	18	< 25 cm^3	.3	30	MAX 30%
6:25	33+90	34	56	40 - 90 sec	89	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	.3	32	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:55	34+90	2	50	40 - 90 sec	90	64 - 95 pcf	8	6.5 - 10	30	< 25 cm^3	1.0	24	MAX 30%
13:55	34+90	34	52	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	35	< 25 cm^3	1.2	28	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
33+25	2	2" to 6"	118	+15 pcf over trench slurry	1.17×10^{-7}	1.0×10^{-7} cm/sec
33+50	2	2" to 6"	115	+15 pcf over trench slurry	1.42×10^{-7}	1.0×10^{-7} cm/sec
33+75	2	2" to 6"	118.5	+15 pcf over trench slurry	1.03×10^{-7}	1.0×10^{-7} cm/sec
34+00	3	2" to 6"	116	+15 pcf over trench slurry	8.02×10^{-8}	1.0×10^{-7} cm/sec
34+25	3	2" to 6"	117	+15 pcf over trench slurry	1.47×10^{-7}	1.0×10^{-7} cm/sec
34+50	3	2" to 6"	117	+15 pcf over trench slurry	7.11×10^{-8}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 33+25, 33+50, 33+75, 34+00, 34+25, 34+50

Technician: SM/MM Ver SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 6.0cm, 6.0cm, 6.0cm, 6.0cm, 6.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv.factor (1/14.65)
33+25	01/09/04	11:15 15:15	240	10	117.2305	605865.9809	—	17	1.17×10^{-7}	7.99×10^{-9}
33+50	01/09/04	11:15 - 15:15	240	10	108.2128	559261.0644	—	19	1.42×10^{-7}	9.69×10^{-9}
33+75	01/09/04	11:15 - 15:15	240	10	117.2305	605865.9809	—	15	1.03×10^{-7}	7.03×10^{-9}
34+00	01/09/04	18:00 - 6:00	720	10	100.4833	59313.7717	—	30	8.02×10^{-8}	5.47×10^{-9}
34+25	01/09/04	18:00 - 6:00	720	10	117.2305	605865.9809	—	64	1.47×10^{-7}	1.00×10^{-8}
34+50	01/09/04	18:00 - 6:00	720	10	117.2305	605865.9809	—	31	7.11×10^{-8}	4.85×10^{-9}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 12-Jan-04	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO: P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-060 (NW56+00)	SOIL ONLY	56+00	01/09/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-061 (SE34+00)	SOIL ONLY	34+00	01/09/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-062 (SE35+00)	SOIL ONLY	35+00	01/09/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-073 (NW57+00)	SB BACKFILL**	57+00	01/09/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-074 (SE34+00)	SB BACKFILL**	34+00	01/09/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

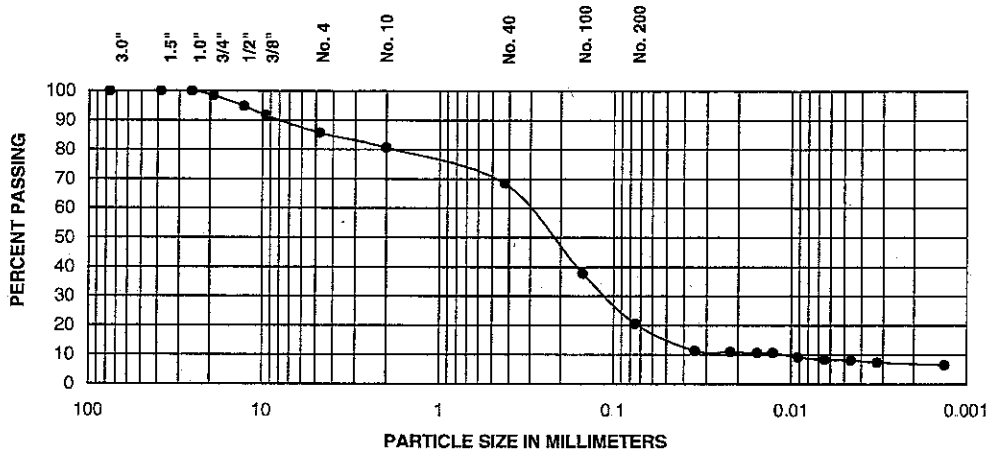
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-073 (NW 57+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	57+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	14.3	65.1	12.5	8.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.5
1/2"	94.8
3/8"	91.6
No. 4	85.7
No. 10	80.7
No. 40	68.5
No. 100	37.7
No. 200	20.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
30	22	8

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

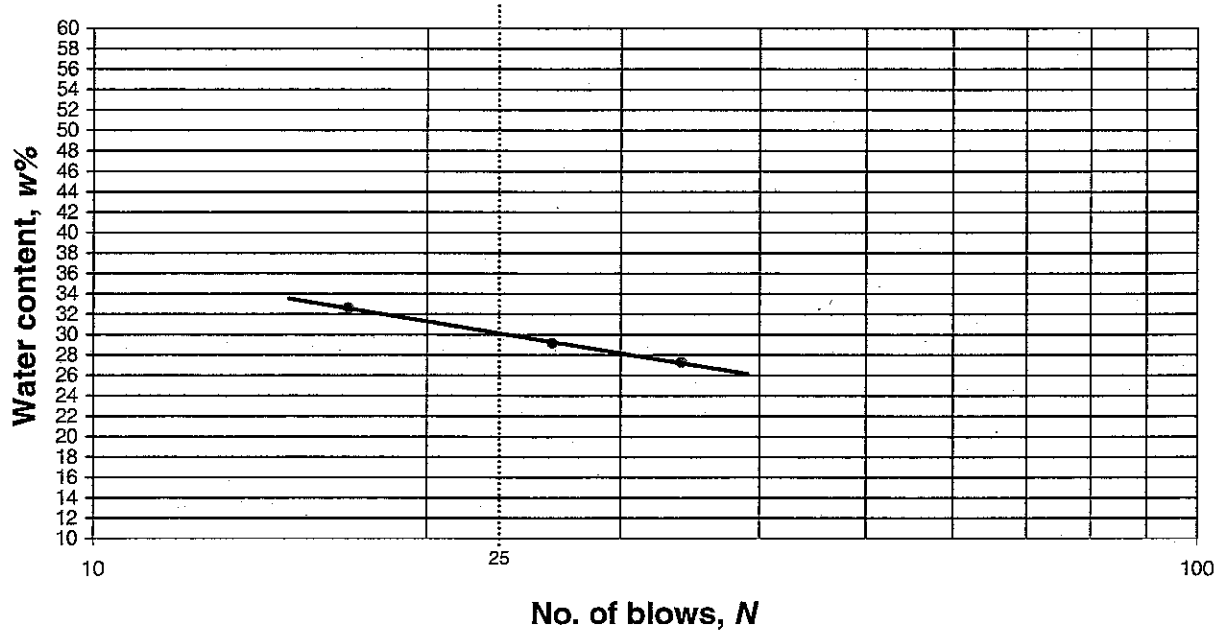
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-073 (NW 57+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	57+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**30**	**Plastic Limit, PL**	**22**	**Plasticity Index, PI**	**8**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
338 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/15/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-073 (NW 57+00)	Date Recd.	1/12/04	**Location**	57+00 (NW)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.51	cm	Volume, V:	224.3	cu cm
Mass of Sample:	424.7	g	**Moisture Content:**	**24.1**	%
			Wet Density	**118.1**	**pcf**
			Dry Density	**95.2**	**pcf**

Final

Diameter:	7.03	cm	Area, A:	38.8	sq cm
Height, L:	5.18	cm	Volume, V:	201.1	cu cm
Mass of Sample:	410.60	g	**Moisture Content:**	**22.8**	%
			Wet Density	**127.4**	**pcf**
			Dry Density	**103.8**	**pcf**
			Deg of Saturation	**95.9**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	23.0	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/15/2004	9:15 AM	0	0	3.16	5.93		20.0	---
1/15/2004	10:00 AM	2700	2700	3.31	5.78	1.0	20.0	5.18E-08
1/15/2004	10:45 AM	2700	5400	3.43	5.66	1.0	20.0	4.20E-08
1/15/2004	11:30 AM	2700	8100	3.58	5.50	0.9	20.0	5.68E-08
1/15/2004	12:15 PM	2700	10800	3.71	5.39	1.2	20.0	3.96E-08

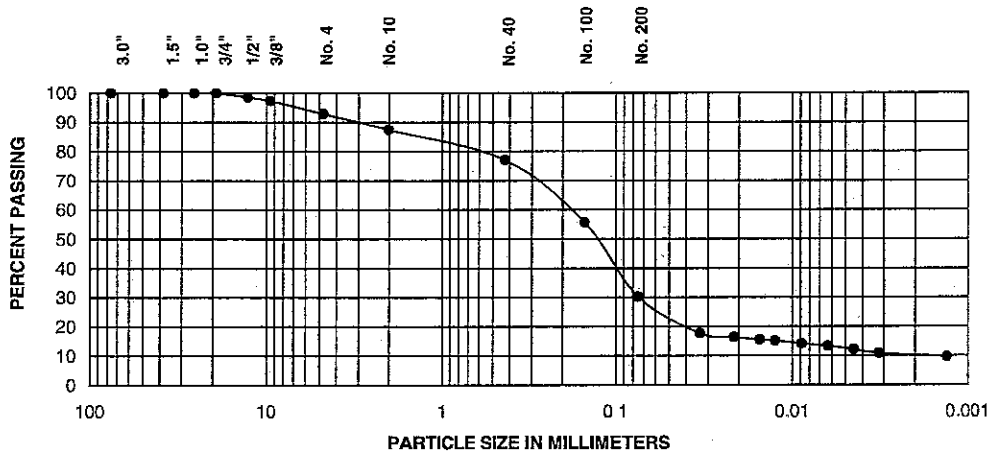
Average Permeability = **4.8E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-074 (SE 34+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	34+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	7.1	62.7	17.6	12.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	98.5
3/8"	97.3
No. 4	92.9
No. 10	87.5
No. 40	77.0
No. 100	55.7
No. 200	30.2

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
25	19	6

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

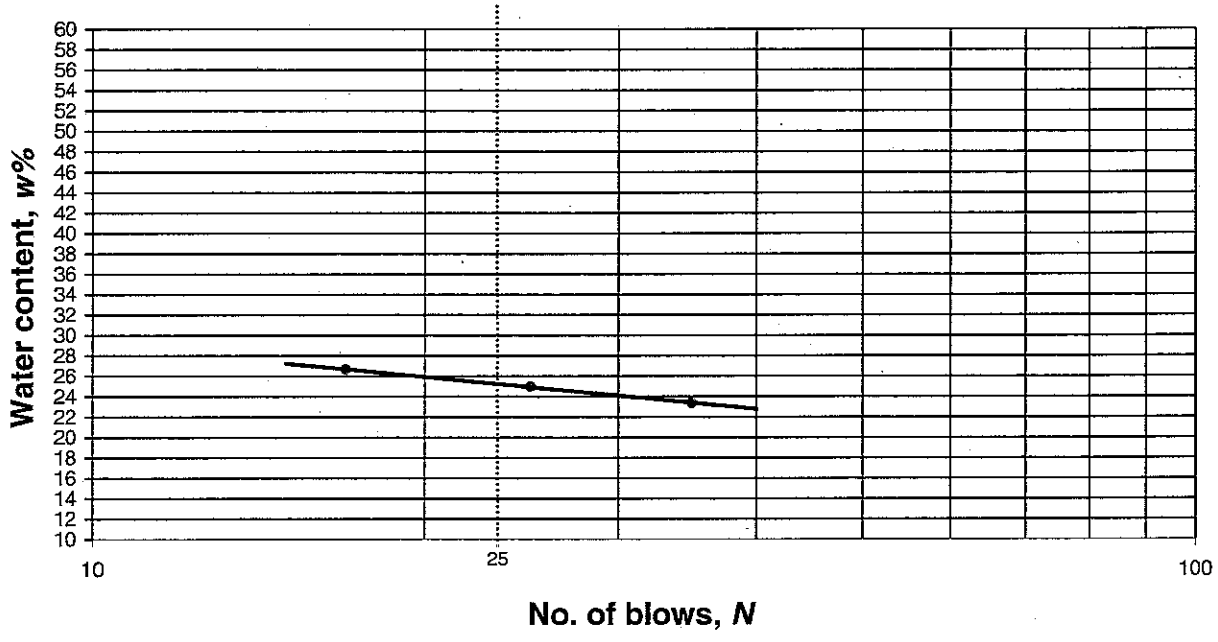
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-074 (SE 34+00)	**Date Tested**	1/16/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	34+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	25	**Plastic Limit, PL**	19	**Plasticity Index, PI**	6

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/14/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-074 (SE 34+00)	Date Recd.	1/12/04	**Location**	34+00 (SE)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.98	cm	Volume, V:	243.5	cu cm
Mass of Sample:	429.8	g	**Moisture Content:**	**24.9**	%
			Wet Density	**110.2**	**pcf**
			Dry Density	**88.2**	**pcf**

Final

Diameter:	6.99	cm	Area, A:	38.4	sq cm
Height, L:	5.15	cm	Volume, V:	197.6	cu cm
Mass of Sample:	417.90	g	**Moisture Content:**	**20.1**	%
			Wet Density	**131.9**	**pcf**
			Dry Density	**109.8**	**pcf**
			Deg of Saturation	**98.5**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/14/2004	10:00 AM	0	0	3.10	5.94		20.0	---
1/14/2004	10:45 AM	2700	2700	3.15	5.90	1.2	20.0	1.49E-08
1/14/2004	11:30 AM	2700	5400	3.19	5.86	1.0	20.0	1.49E-08
1/14/2004	12:15 PM	2700	8100	3.23	5.82	1.0	20.0	1.50E-08
1/14/2004	1:00 PM	2700	10800	3.27	5.78	1.0	20.0	1.51E-08

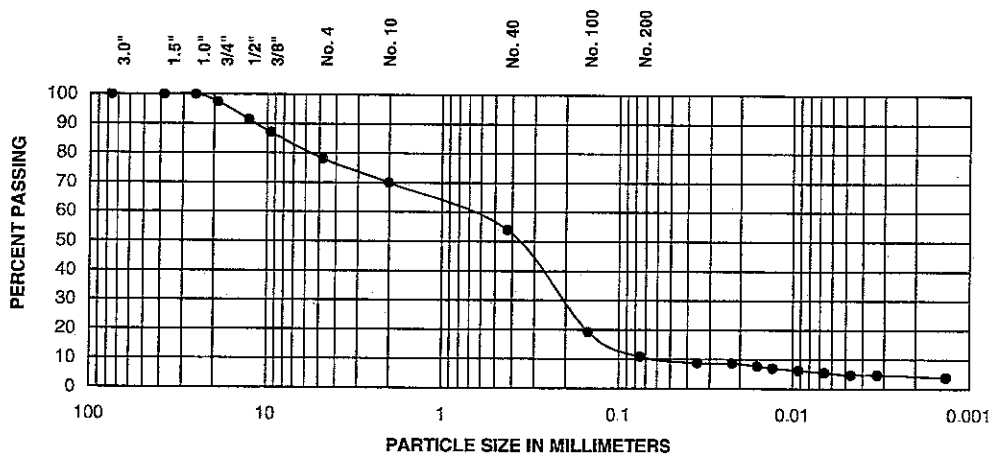
Average Permeability = **1.5E-08** **cm/sec**

Remarks:

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-060 (NW56+00)	**Date Tested**	1/15/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2003
Sample Location	56+00 (NW)
Sample Description	Gray well graded sand with clay, gravel &l foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	21.9	67.2	6.0	4.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.76	0.21	0.05	14.1	1.05

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	97.5
1/2"	91.4
3/8"	87.2
No. 4	78.1
No. 10	70.0
No. 40	54.0
No. 100	19.2
No. 200	10.9

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
NP	NP	NP

Soil Classification:	SW-SC
Soil Description:	Well-graded sand with clay and gravel
System:	USCS

Remarks:

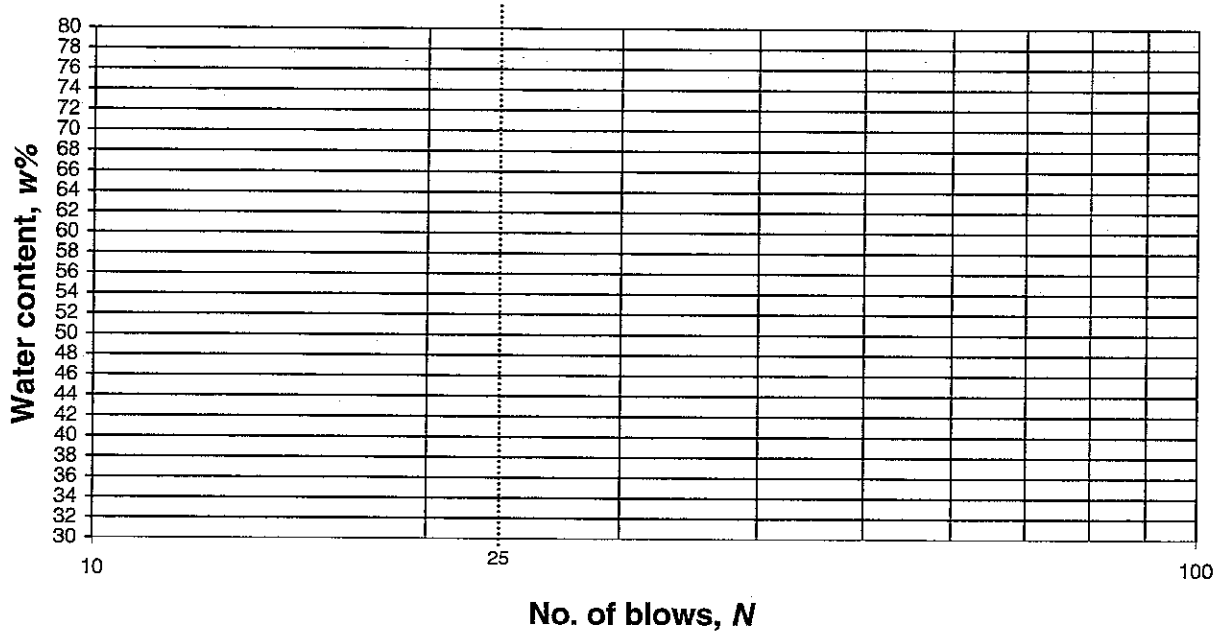
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.· Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-060 (NW56+00)	**Date Tested**	1/12/2004	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	1/12/2003
Sample Location	56+00 (NW)
Sample Description	Gray well graded sand with clay, gravel &l foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	22	Date	1/12/2004	Sheet	1
				Date of weighing	1/13/2004	Tested by	MT

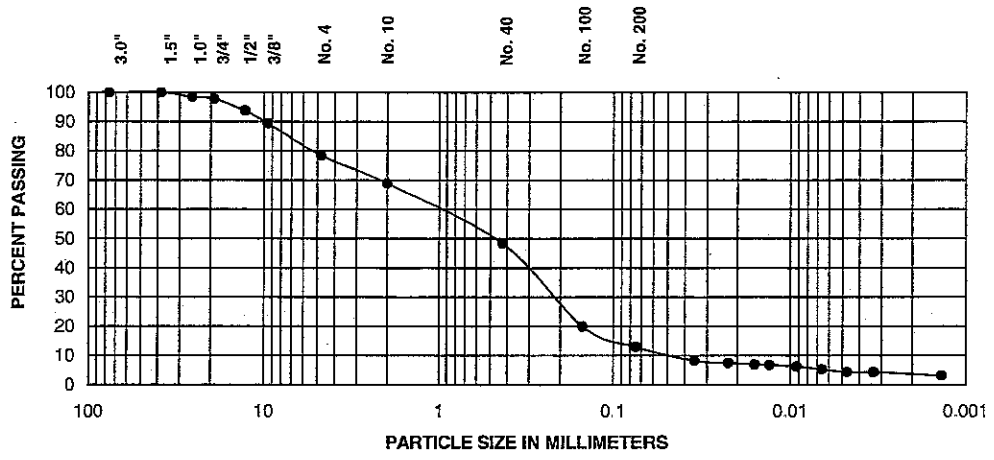
Boring No.	-	-	-	-	-	-
Sample No.	BF-060 (NW56+00)	BF-061(SE34+00)	BF-062 (SE35+00)	BF-063(NW55+00)	BF-064(SE36+00)	BF-065(NW54+00)
Location	56 + 00 (NW)	34 + 00 (SE)	35 + 00 (SE)	55 + 00 (NW)	36 + 00 (SE)	54 + 00 (NW)
Tin No.	70A	24C	31C	39C	22C	97A
Tin + Wet Soil	136.9	179.5	176.2	179.8	178.1	178.1
Tin + Dry Soil	124.25	160.39	160.69	162.76	160.54	156.68
Wt. of Tin	31.3	30.6	31.3	30.8	30.7	30.7
Wt. of Dry Soil	93.0	129.8	129.4	132.0	129.8	126.0
Wt. of Water	12.7	19.1	15.5	17.0	17.6	21.4
Moisture, %	13.6	14.7	12.0	12.9	13.5	17.0
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	BF-066 (SE37+00)	BF-067 (SE38+00)				
Location	37 + 00 (SE)	38 + 00 (SE)				
Tin No.	53A	98A				
Tin + Wet Soil	165.6	169.3				
Tin + Dry Soil	148.3	152.38				
Wt. of Tin	30.8	30.5				
Wt. of Dry Soil	117.5	121.9				
Wt. of Water	17.3	16.9				
Moisture, %	14.7	13.9				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-061 (SE34+00)	**Date Tested**	1/15/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	34+00 (SE)
Sample Description	Gray silty, clayey sand with gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	21.5	65.5	8.3	4.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.4
3/4"	97.8
1/2"	93.8
3/8"	89.4
No. 4	78.5
No. 10	69.0
No. 40	48.4
No. 100	19.9
No. 200	13.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

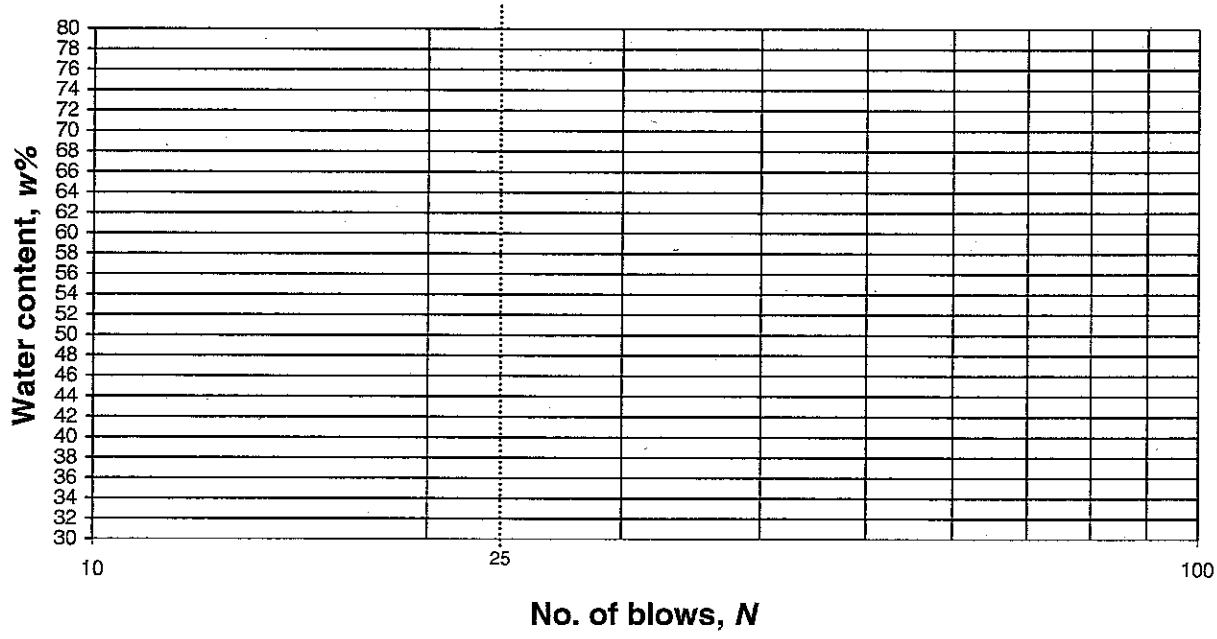
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn : Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-061 (SE34+00)	**Date Tested**	1/12/2004	**Tested By**	MD
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	34+00 (SE)
Sample Description	Gray silty, clayey sand with gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	22	Date	1/12/2004	Sheet	1
				Date of weighing	1/13/2004	Tested by	MT

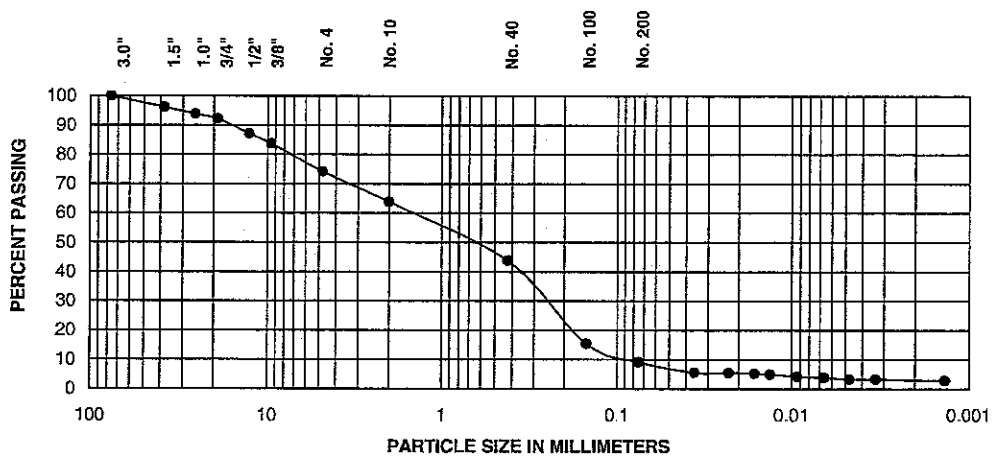
Boring No.	-	-	-	-	-	-
Sample No.	BF-060 (NW56+00)	BF-061(SE34+00)	BF-062 (SE35+00)	BF-063(NW55+00)	BF-064(SE36+00)	BF-065(NW54+00)
Location	56 + 00 (NW)	34 + 00 (SE)	35 + 00 (SE)	55 + 00 (NW)	36 + 00 (SE)	54 + 00 (NW)
Tin No.	70A	24C	31C	39C	22C	97A
Tin + Wet Soil	136.9	179.5	176.2	179.8	178.1	178.1
Tin + Dry Soil	124.25	160.39	160.69	162.76	160.54	156.68
Wt. of Tin	31.3	30.6	31.3	30.8	30.7	30.7
Wt. of Dry Soil	93.0	129.8	129.4	132.0	129.8	126.0
Wt. of Water	12.7	19.1	15.5	17.0	17.6	21.4
Moisture, %	13.6	14.7	12.0	12.9	13.5	17.0
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	BF-066 (SE37+00)	BF-067 (SE38+00)				
Location	37 + 00 (SE)	38 + 00 (SE)				
Tin No.	53A	98A				
Tin + Wet Soil	165.6	169.3				
Tin + Dry Soil	148.3	152.38				
Wt. of Tin	30.8	30.5				
Wt. of Dry Soil	117.5	121.9				
Wt. of Water	17.3	16.9				
Moisture, %	14.7	13.9				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-062 (SE 35+00)	**Date Tested**	1/15/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	35+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	25.8	65.0	5.8	3.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.49	0.26	0.08	18.2	0.54

Sieve Size	Percent Passing
3.0"	100.0
1.5"	96.2
1.0"	93.9
3/4"	92.1
1/2"	87.2
3/8"	83.7
No. 4	74.2
No. 10	63.8
No. 40	43.8
No. 100	15.4
No. 200	9.2

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

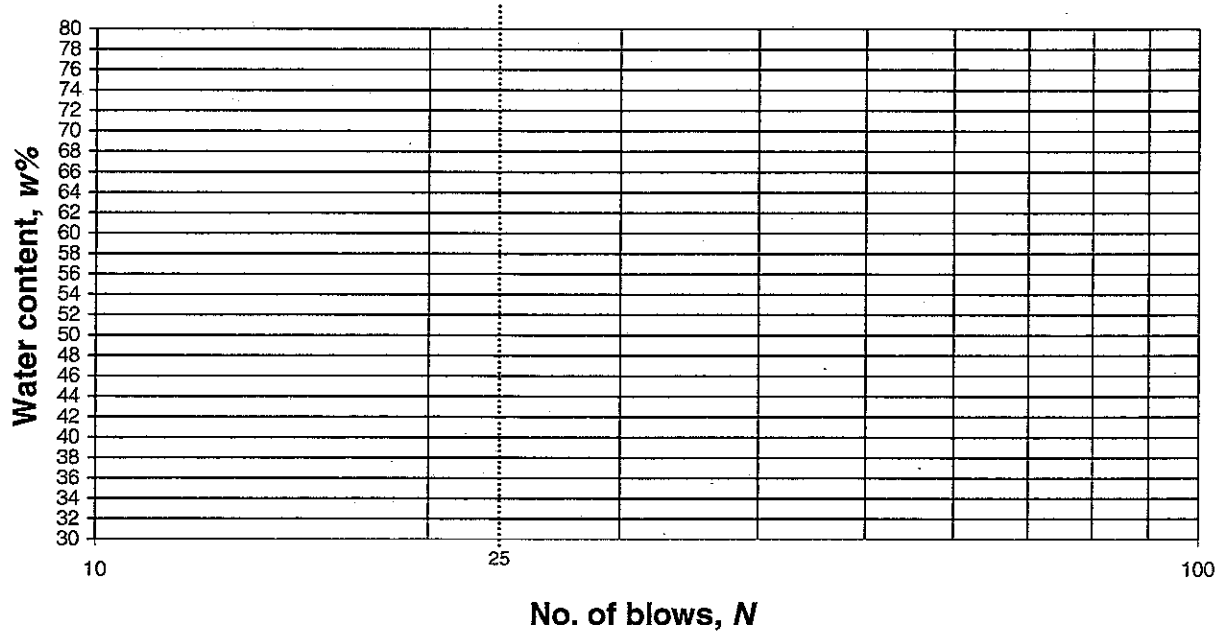
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-062 (SE 35+00)	**Date Tested**	1/13/2004	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	35+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	22	Date	1/12/2004	Sheet	1
				Date of weighing	1/13/2004	Tested by	MT

Boring No.	-	-	-	-	-	-
Sample No.	BF-060 (NW56+00)	BF-061(SE34+00)	BF-062 (SE35+00)	BF-063(NW55+00)	BF-064(SE36+00)	BF-065(NW54+00)
Location	56 + 00 (NW)	34 + 00 (SE)	35 + 00 (SE)	55 + 00 (NW)	36 + 00 (SE)	54 + 00 (NW)
Tin No.	70A	24C	31C	39C	22C	97A
Tin + Wet Soil	136.9	179.5	176.2	179.8	178.1	178.1
Tin + Dry Soil	124.25	160.39	160.69	162.76	160.54	156.68
Wt. of Tin	31.3	30.6	31.3	30.8	30.7	30.7
Wt. of Dry Soil	93.0	129.8	129.4	132.0	129.8	126.0
Wt. of Water	12.7	19.1	15.5	17.0	17.6	21.4
Moisture, %	13.6	14.7	12.0	12.9	13.5	17.0
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	BF-066 (SE37+00)	BF-067 (SE38+00)				
Location	37 + 00 (SE)	38 + 00 (SE)				
Tin No.	53A	98A				
Tin + Wet Soil	165.6	169.3				
Tin + Dry Soil	148.3	152.38				
Wt. of Tin	30.8	30.5				
Wt. of Dry Soil	117.5	121.9				
Wt. of Water	17.3	16.9				
Moisture, %	14.7	13.9				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/10/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL

WEATHER: Partly cloudy; 25 - 30 degrees JOB NUMBER: P01-048

RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
55+60	2.00	92.00	27.00	20.00	51.00	8
55+60	34.00	94.00	28.00	25.00	52.00	8
55+00	2.00	70.00	12.00	13.00	50.00	8
55+00	34.00	79.00	24.00	16.00	54.00	8

NORTH TRENCH

COMMENTS: Fresh slurry was pumped to this trench all day to try and bring the slurry back into specs.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
55+00	LAB SAMPLE COLLECTED 01/10/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
57+00	2.00	Sample collected	Sample collected	Sample collected	8.94×10^{-8}	yes
56+75	2.00	N/A	N/A	N/A	8.25×10^{-8}	N/A
56+50	2.00	N/A	N/A	N/A	1.12×10^{-7}	N/A

COMMENTS

Filter cake: 1.0mm, .9mm, .3mm, and .3mm respectively.

Unit Weight: 57+00: 118.0 pcf
56+75: 118.5 pcf
56+50: 118.0 pcf

Minimal backfilling today. Not enough materials.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E Sepic OWNER:

GEO-CON

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/10/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 25 - 30 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
35+50	2.00	72.00	18.00	16.00	46.00	8
35+50	34.00	86.00	28.00	20.00	64.00	8
36+20	2.00	77.00	16.00	20.00	48.00	8
36+20	34.00	87.00	24.00	25.00	52.00	8

SE TRENCH

COMMENTS: Fresh slurry was pumped to this trench today to try and bring the slurry back into spec.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
36+00	LAB SAMPLE COLLECTED 01/10/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
34+00	3.50	Sample collected	Sample collected	Sample collected	5.94×10^{-7}	yes
34+25	3.50	N/A	N/A	N/A	4.81×10^{-7}	N/A
34+50	3.50	N/A	N/A	N/A	4.01×10^{-7}	N/A

COMMENTS

Filter cake: .2mm, 1.0mm, .2mm, and .5mm respectively.

Unit Weight: 34+00: 116.0 pcf
34+25: 117.5 pcf
34+50: 117.0 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/10/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:30	64.00	46.00	17.00	8
11:00	-	44.00	-	-
13:30	65.00	45.00	16.00	8
14:00	-	45.00	-	-

Filter cake is .2mm and .1mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/10/04

JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL

JOB NUMBER: P01-048

WEATHER: Partly cloudy; 25 - 30 degrees

RIG NUMBER:

EXCAVATION

STATION	DEPTH TOP KEY	DEPTH BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH
55+50	33.0	36.5	36.6	10.0	365.5	6.5
55+40	32.9	36.5	36.5	10.0	365.0	6.4
55+30	32.9	36.6	36.6	10.0	365.5	6.4
55+20	33.0	36.6	36.6	10.0	366.0	6.2
55+10	33.0	36.4	36.5	10.0	365.0	6.2
55+00	33.0	36.3	36.4	10.0	363.5	6.0
54+90	33.0	36.4	36.4	10.0	363.5	6.0

BACKFILL SLOPE

STATION	START OF SHIFT	END OF SHIFT
57+10	TOPOUT	TOPOUT
57+00	5.8	1.3
56+90	8.4	6.8
56+80	11.3	10.8
56+70	14.5	13.0
56+60	24.7	15.5
56+50	29.9	22.3
56+40	30.0	22.4
56+30	31.0	22.1
56+20	32.6	23.2
56+10	33.2	25.4
56+00	33.4	26.6
55+90	33.9	27.6
55+80	36.5	27.9
55+70	37.1	28.0
55+60	36.4	30.0
55+50		30.7
55+40		31.1
55+30		33.8
55+20		33.1
55+10		34.1
55+00		34.6
54+90		29.1
54+80		21.0
54+70		17.1
54+60		16.5
54+50		5.6

SF TODAY 2554.00

SF TO DATE 83846.50

COMMENTS

NORTH TRENCH

GEO-CON: Suzanne E. Sepic

OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/10/04

JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL

JOB NUMBER: P01-048

WEATHER: Partly cloudy; 25 - 30 degrees

RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
35+50	32.2	36.6	36.6	10.0	365.5	2.9	33+80	TOPOUT	TOPOUT
35+60	32.1	36.4	36.5	10.0	365.0	2.8	33+90	7.1	TOPOUT
35+70	32.1	36.3	36.4	10.0	363.5	2.9	34+00	9.5	TOPOUT
35+80	32.2	36.5	36.4	10.0	364.0	3.2	34+10	12.0	3.2
35+90	32.2	36.7	36.6	10.0	366.0	3.3	34+20	14.9	7.8
36+00	32.3	36.6	36.7	10.0	366.5	3.3	34+30	18.0	11.3
36+10	32.3	36.6	36.6	10.0	366.0	3.4	34+40	18.8	13.5
36+20	32.2	36.5	36.6	10.0	365.5	3.2	34+50	19.9	15.4
36+30	32.3	36.4	36.5	10.0	364.5	3.2	34+60	21.9	16.0
36+40	32.2	36.6	36.5	10.0	365.0	3.1	34+70	23.8	18.1
36+50	32.2	36.7	36.7	10.0	366.5	3.0	34+80	26.0	18.9
36+60	32.3	36.6	36.7	10.0	366.5	3.1	34+90	26.5	19.8
36+70	32.2	36.4	36.5	10.0	365.0	3.2	35+00	28.8	21.0
							35+10	29.1	23.6
							35+20	30.0	24.2
							35+30	33.0	26.1
							35+40	35.4	28.0
							35+50		29.8
							35+60		31.6
							35+70		32.0
							35+80		32.7
							35+90		34.9
							36+00		36.6
							36+10		36.6
							36+20		36.5
							36+30		36.4
							36+40		36.6
							36+50		36.7
							36+60		36.6
							36+70		36.4

SF TODAY 4749.50

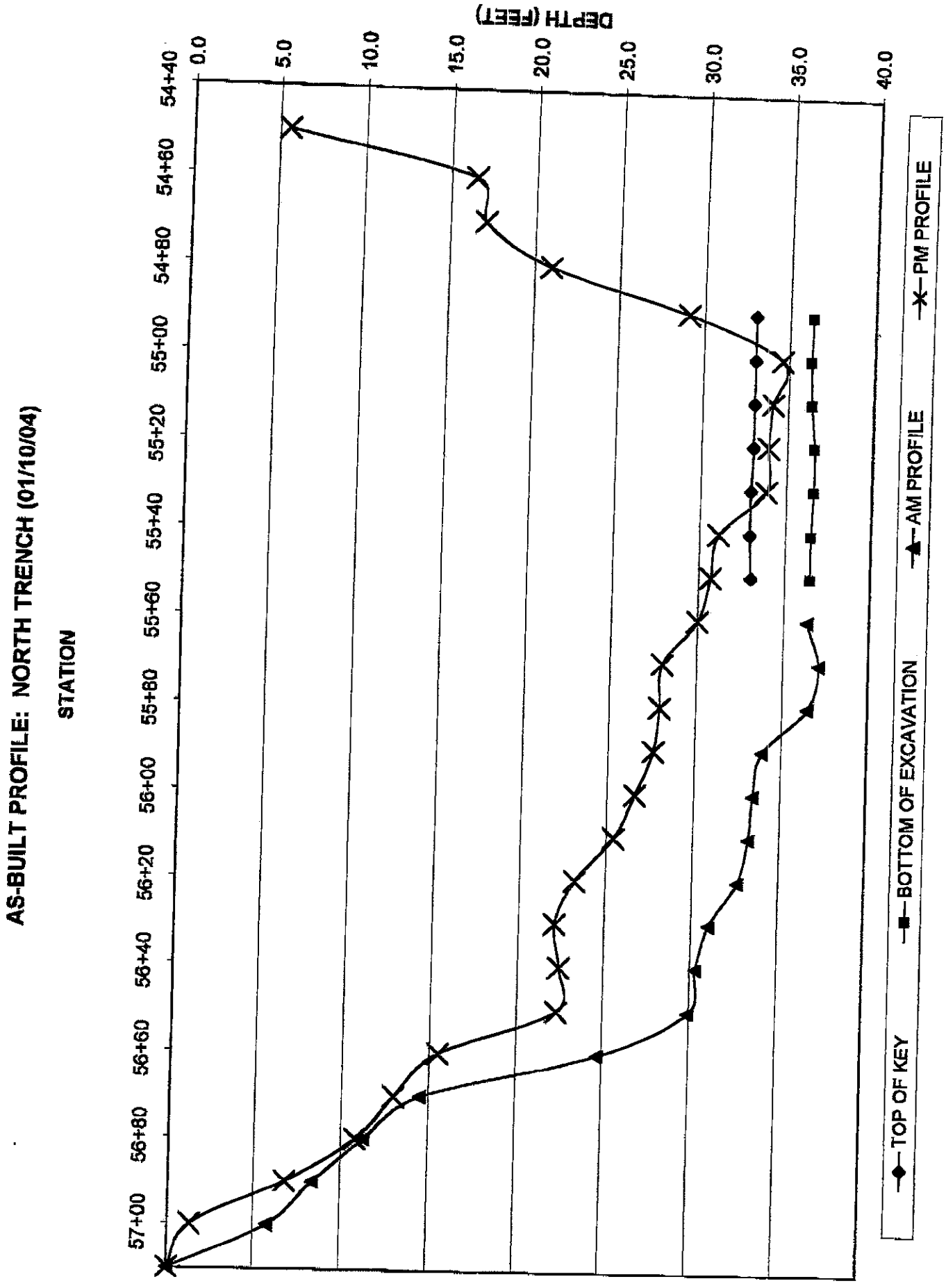
SF TO DATE 59767.22

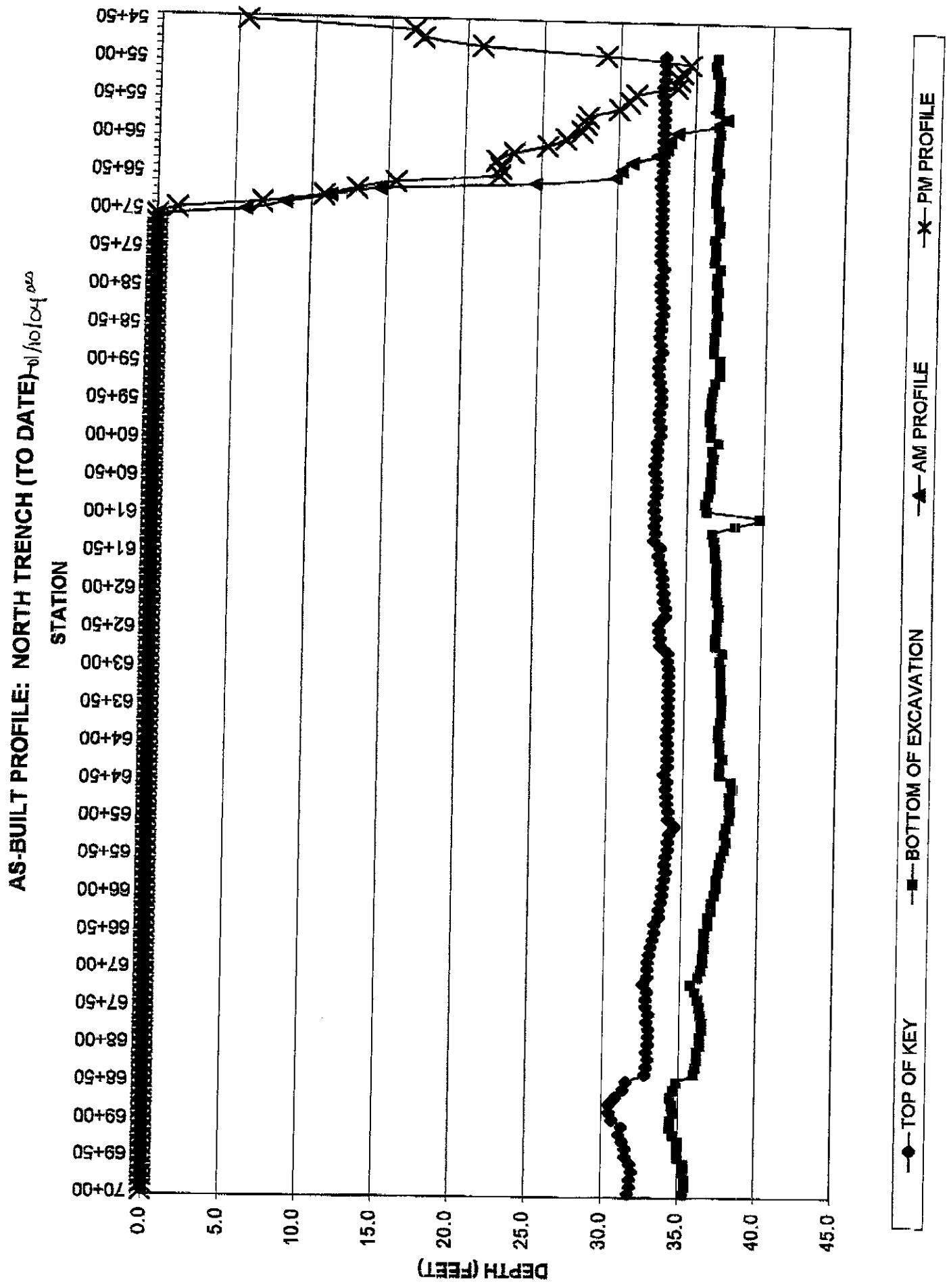
COMMENTS

SE Trench

GEO-CON: Suzanne E. Sepic

OWNER:


AS-BUILT PROFILE: NORTH TRENCH (01/10/04)
STATION
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
54+40
54+60
54+80
55+00
55+20
55+40
55+60
55+80
56+00
56+20
56+40
56+60
56+80
57+00
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NORTH TRENCH (TO DATE)
STATION
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
70+00
69+50
69+00
68+50
68+00
67+50
67+00
66+50
66+00
65+50
65+00
64+50
64+00
63+50
63+00
62+50
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60+50
60+00
59+50
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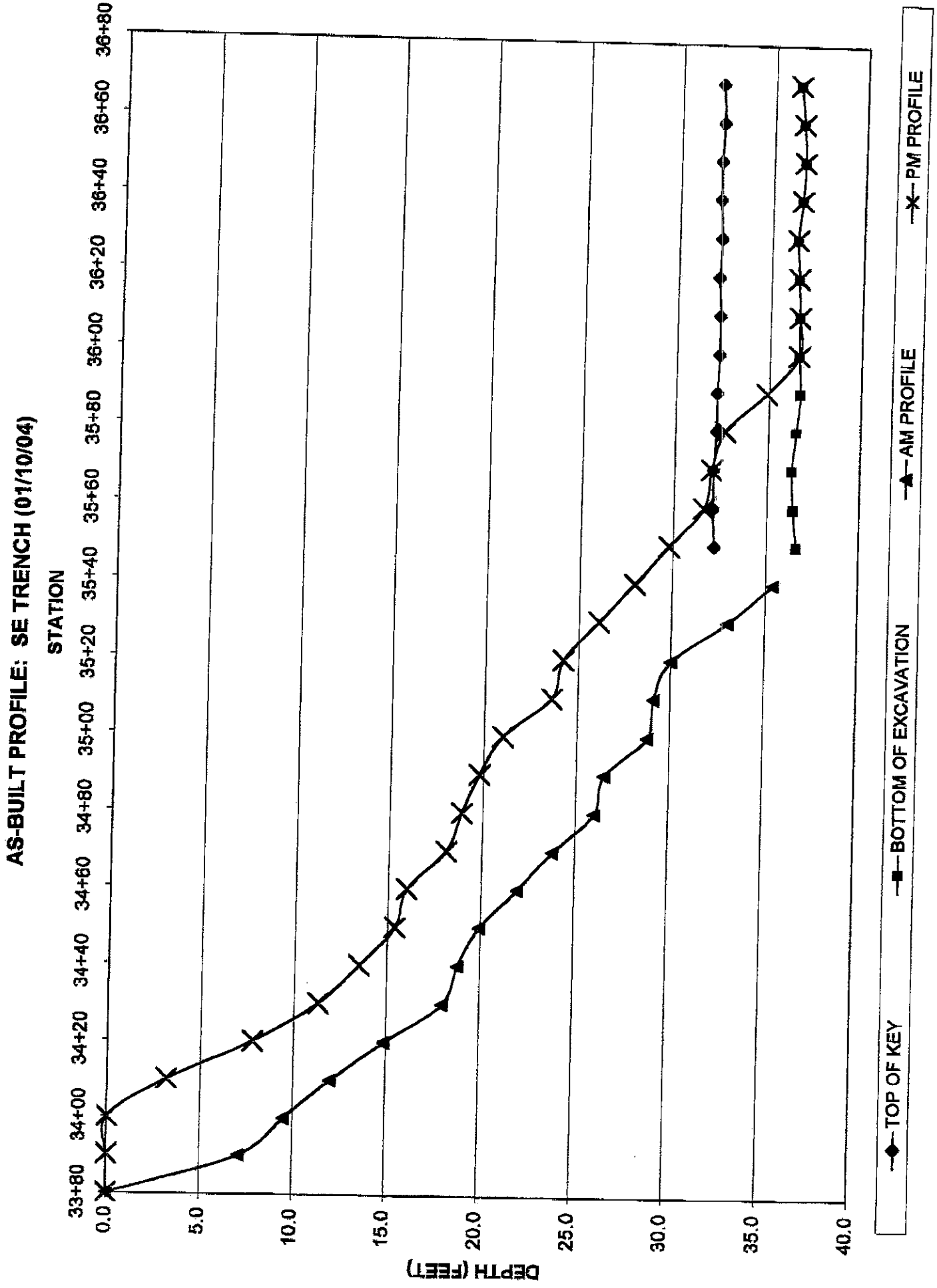
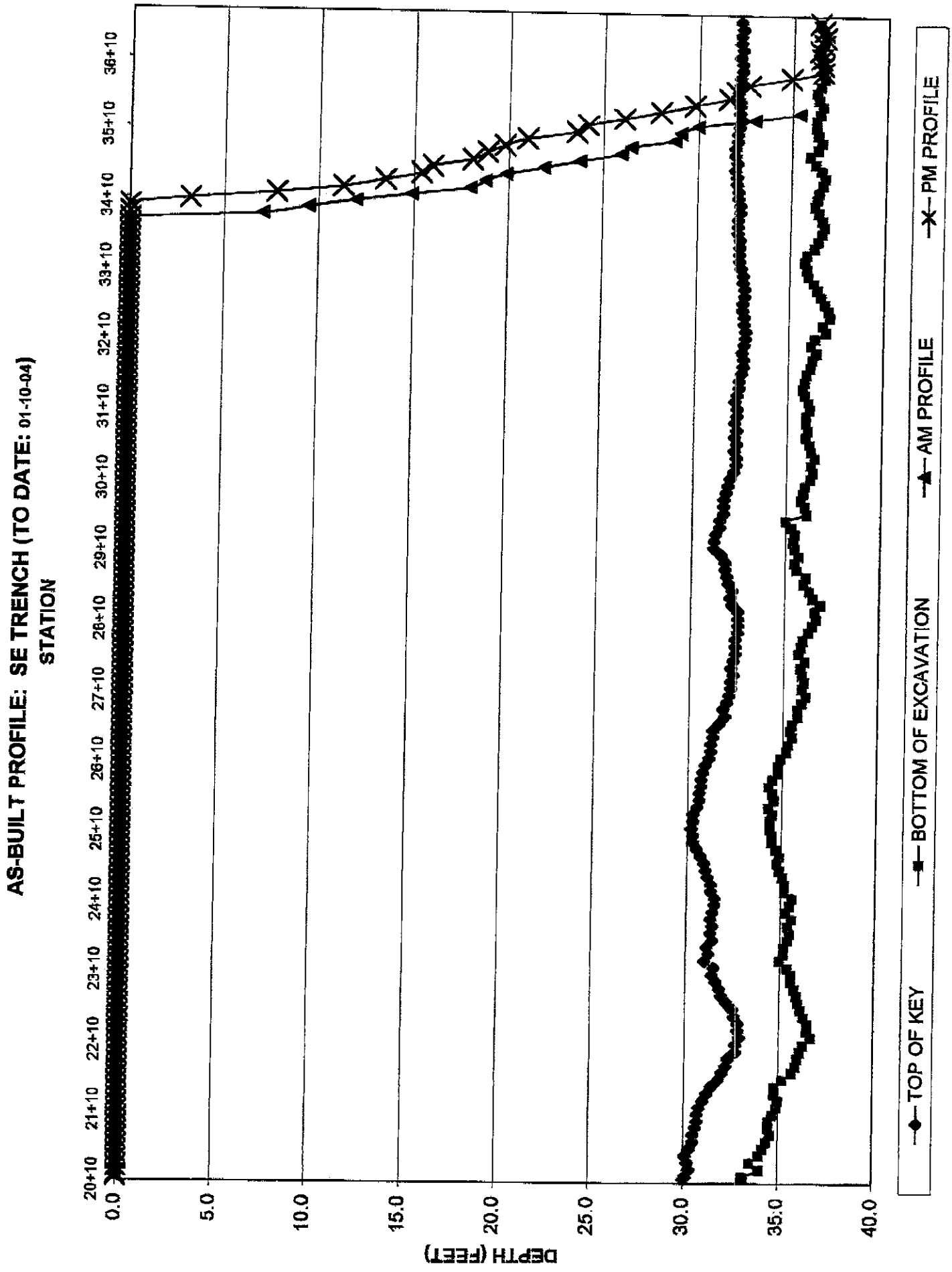
57+00
56+50
56+00
55+50
55+00
54+50
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (01/10/04)
STATION
33+80
34+00
34+20
34+40
34+60
34+80
35+00
35+20
35+40
35+60
35+80
36+00
36+20
36+40
36+60
36+80
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE: 01-10-04)
STATION
20+10
21+10
22+10
23+10
24+10
25+10
26+10
27+10
28+10
29+10
30+10
31+10
32+10
33+10
34+10
35+10
36+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/10/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	7:30	46	> 40 sec	64	> 64 pcf	8	6.5 - 10	17	< 20 cm^3	.2
PM	13:30	45	> 40 sec	65	> 64 pcf	8	6.5 - 10	16	< 20 cm^3	.1

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	11:00	44	> 40 sec	[redacted]						
PM	14:00	45	> 40 sec							

NORTH TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:00	55+60	2	51	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	1.0	27	MAX 30%
7:00	55+60	34	52	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	25	< 25 cm^3	.9	28	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:25	55+00	2	50	40 - 90 sec	70	64 - 95 pcf	8	6.5 - 10	13	< 25 cm^3	.3	12	MAX 30%
13:25	55+00	34	54	40 - 90 sec	79	64 - 95 pcf	8	6.5 - 10	16	< 25 cm^3	.3	24	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
57+00	2	2" to 6"	118	+15 pcf over trench slurry	8.94×10^{-8}	1.0×10^{-7} cm/sec
56+75	2	2" to 6"	118.5	+15 pcf over trench slurry	8.25×10^{-8}	1.0×10^{-7} cm/sec
56+50	2	2" to 6"	118	+15 pcf over trench slurry	1.12×10^{-7}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 57+00, 56+75, 56+50

Technician: SM/MM / SES

Sample Area: $A = \pi r^2 = \pi(3.85)^2 = 46.56 cm^2$

Sample Height: L= 6.5cm, 6.0cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	$K = \frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/ com (1/m)
57+00	01/10/04	8:30-12:30	240	10	108.2128	559261.0644	—	12	8.94×10^{-8}	6.10x
56+75	01/10/04	8:30-12:30	240	10	117.2305	605865.9809	—	12	8.25×10^{-8}	5.63
56+50	01/10/04	8:30-12:30	240	10	100.4833	519313.7717	—	14	1.12×10^{-7}	7.64x

$I = \frac{P\ (psi)}{0.014217\ L\ (cm)}$

$R = \frac{\text{Quick Test}}{\text{Triaxial Test}} = 1.85$

APR-28-2001 08:42 EQM 2193977285 P.12/17

DAILY QC TESTS

DATE 01/10/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec	[redacted]						
PM			> 40 sec							

NORTH TRENCH

DON

SE TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:30	35+50	2	46	40 - 90 sec	72	64 - 95 pcf	8	6.5 - 10	16	< 25 cm^3	.2	18	MAX 30%
7:30	35+50	34	64	40 - 90 sec	86	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	1.0	28	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:56	36+20	2	48	40 - 90 sec	77	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	.2	16	MAX 30%
13:56	36+20	34	52	40 - 90 sec	87	64 - 95 pcf	8	6.5 - 10	25	< 25 cm^3	.5	24	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
34+00	3.5	2" to 6"	116	+15 pcf over trench slurry	5.94×10^{-7}	1.0×10^{-7} cm/sec
34+25	3.5	2" to 6"	117.5	+15 pcf over trench slurry	4.81×10^{-7}	1.0×10^{-7} cm/sec
34+50	3.5	2" to 6"	117	+15 pcf over trench slurry	4.01×10^{-7}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: 34+00, 34+25, 34+50 Technician: SM/MM /BY SES

Sample Area: A=$\pi r^2 = \pi(3.85)^2 = 46.56$ cm² Sample Height: L= 7.0cm, 7.0cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/cem (1/1
34+00	01/10/04	8:30-12:30	240	10	100.4833	519313.7717	—	74	5.94×10^{-7}	4.05
34+25	01/10/04	8:30-12:30	240	10	100.4833	519313.7717	—	60	4.81×10^{-7}	3.28
34+50	01/10/04	8:30-12:30	240	10	100.4833	519313.7717	—	50	4.01×10^{-7}	2.74x

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

NORTH TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
55+50	587.0	586.5	33.0	553.5	36.5	550.0	6.5	4.0
55+40	586.9	586.4	32.9	553.5	36.5	549.9	6.4	4.0
55+30	586.9	582.2	32.9	549.3	36.6	545.6	6.4	4.0
55+20	586.9	586.2	33.0	553.2	36.6	549.6	6.2	4.0
55+10	586.9	586.3	33.0	553.3	36.4	549.9	6.2	4.0
55+00	586.8	586.4	33.0	553.4	36.3	550.1	6.0	4.0
54+90	586.8	586.5	33.0	553.5	36.4	550.1	6.0	4.0

NOTE: DEPTH TO 30" WIDE COMES FROM PROBING THE SIDEWALLS OF THE TRENCH TO SEE HOW DEEP THE WIDTH AT THE TOP OF THE TRENCH IS.

01/10/04
SE TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
35+50	587.4	586.7	32.2	554.5	36.6	550.1	2.9	4.4
35+60	587.3	586.9	32.1	554.8	36.4	550.5	2.8	4.2
35+70	587.3	587.1	32.1	555.0	36.3	550.8	2.9	4.4
35+80	587.2	586.9	32.2	554.7	36.5	550.4	3.2	4.8
35+90	587.2	586.7	32.2	554.5	36.7	550.0	3.3	5.0
36+00	587.2	587.0	32.3	554.7	36.6	550.4	3.3	5.0
36+10	587.2	587.2	32.3	554.9	36.6	550.6	3.4	5.1
36+20	587.1	587.3	32.2	555.1	36.5	550.8	3.2	4.8
36+30	587.1	587.1	32.3	554.8	36.4	550.7	3.2	4.8
36+40	587.1	586.8	32.2	554.6	36.6	550.2	3.1	4.7
36+50	587.1	586.7	32.2	554.5	36.7	550.0	3.0	4.5
36+60	587.1	586.7	32.3	554.4	36.6	550.1	3.1	4.7
36+70	587.1	586.8	32.2	554.6	36.4	550.4	3.2	4.8

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED WITH A 1.5:1 SLOPE.

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)

Date Shipped: 12-Jan-04

Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311

Airbill No: N/A

Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL

PROJECT NO P01-048

P.O.# 78406

Relinquished by: (Signature) — Received By: — Date / Time:

Relinquished by: (Signature) — Received By: — Date / Time:

Relinquished by: (Signature) — Received at lab by: — Date / Time:

Relinquished from lab by: (Signature) — Received By: — Date / Time:

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-063 (NW55+00)	SOIL ONLY	55+00	01/10/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-064 (SE36+00)	SOIL ONLY	36+00	01/10/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-075 (NW57+00)	SB BACKFILL**	57+00	01/10/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-076 (SE34+00)	SB BACKFILL**	34+00	01/10/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

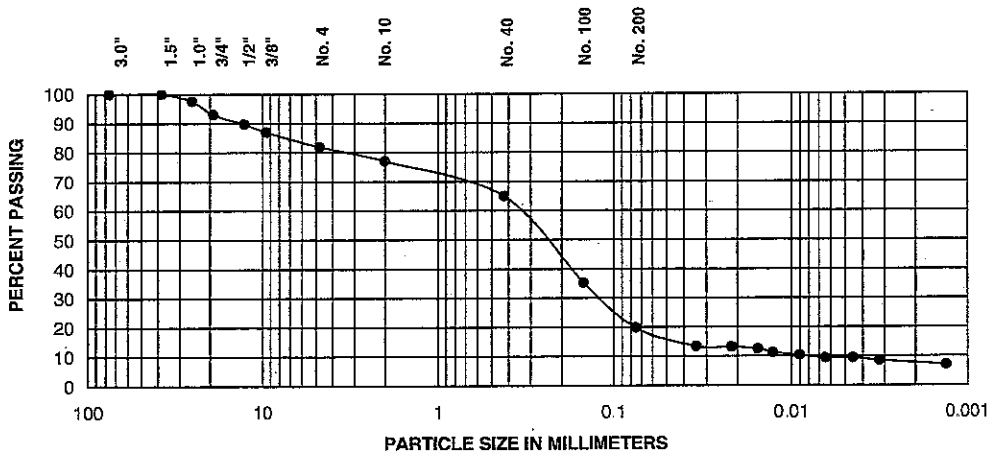
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-075 (NW 57+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	57+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	18.1	62.0	10.6	9.3

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.5
3/4"	93.0
1/2"	89.8
3/8"	87.0
No. 4	81.9
No. 10	77.0
No. 40	65.1
No. 100	35.3
No. 200	19.9

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
32	24	8

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

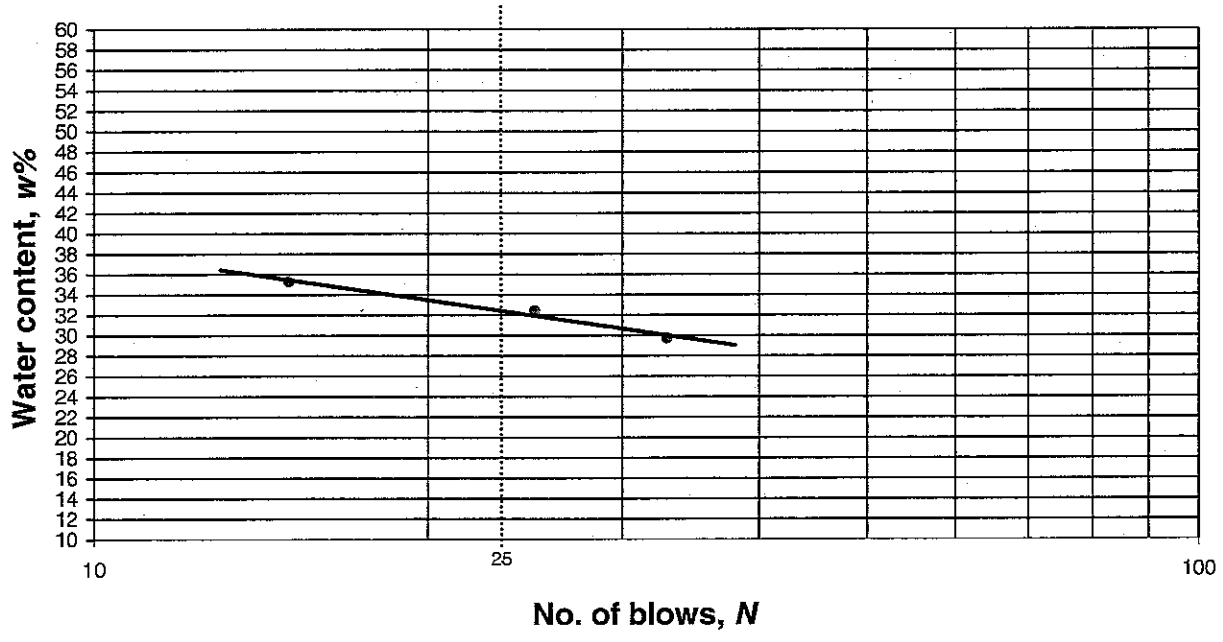
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-075 (NW 57+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	57+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**32**	**Plastic Limit, PL**	**24**	**Plasticity Index, PI**	**8**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/15/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-075 (NW 57+00)	Date Recd.	1/12/04	**Location**	57+00 (NW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.75	cm	Volume, V:	274.8	cu cm
Mass of Sample:	525.5	g	**Moisture Content:**	**23.7**	%
			Wet Density	119.3	**pcf**
			Dry Density	96.5	**pcf**

Final

Diameter:	7.07	cm	Area, A:	39.3	sq cm
Height, L:	6.38	cm	Volume, V:	250.5	cu cm
Mass of Sample:	512.00	g	**Moisture Content:**	**23.6**	%
			Wet Density	127.6	**pcf**
			Dry Density	103.2	**pcf**
			Deg of Saturation	97.9	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	18.8	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/15/2004	9:15 AM	0	0	3.35	6.05		20.0	---
1/15/2004	10:00 AM	2700	2700	3.41	6.00	1.2	20.0	2.11E-08
1/15/2004	10:45 AM	2700	5400	3.45	5.95	0.8	20.0	2.12E-08
1/15/2004	11:30 AM	2700	8100	3.50	5.90	1.0	20.0	2.13E-08
1/15/2004	12:15 PM	2700	10800	3.54	5.85	0.8	20.0	2.14E-08

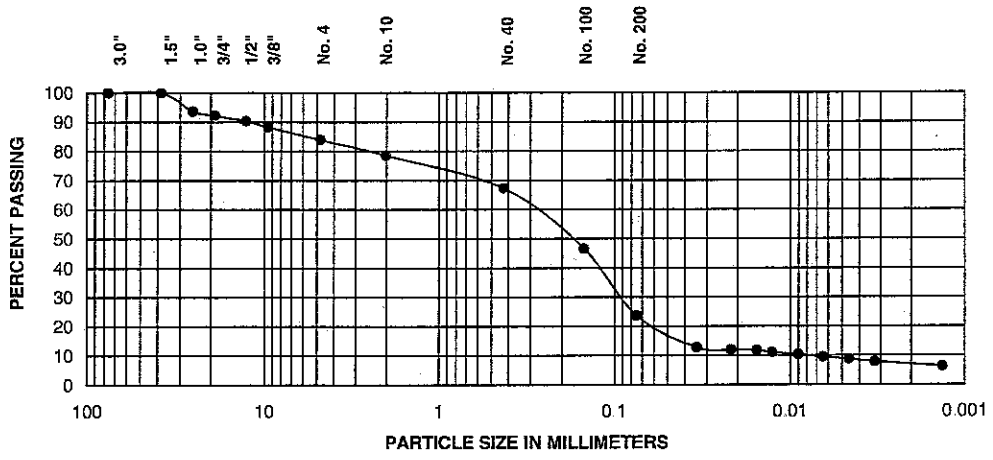
Average Permeability = **2.1E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-076 (SE 34+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	34+00 (SE)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	16.1	60.2	14.7	9.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	93.7
3/4"	92.3
1/2"	90.4
3/8"	88.3
No. 4	83.9
No. 10	78.6
No. 40	67.3
No. 100	46.7
No. 200	23.7

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
25	19	6

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

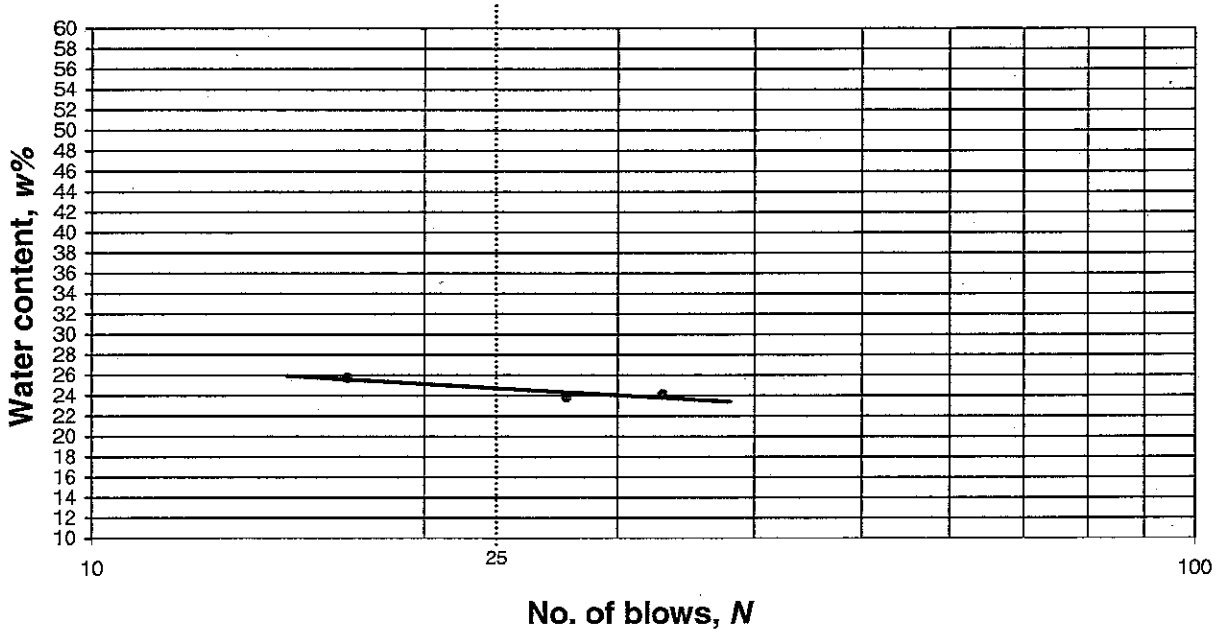
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-076 (SE 34+00)	**Date Tested**	1/16/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	34+00 (SE)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**25**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**6**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing							
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic							
File #	2746	**Date Tested**		1/15/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-076 (SE 34+00)	Date Recd.	1/12/04	**Location**	34+00 (SE)			
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)							

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.86	cm	Volume, V:	279.3	cu cm
Mass of Sample:	525.0	g	**Moisture Content:**	**25.0**	%
			Wet Density	**117.3**	**pcf**
			Dry Density	**93.8**	**pcf**

Final

Diameter:	7.08	cm	Area, A:	39.4	sq cm
Height, L:	6.16	cm	Volume, V:	242.5	cu cm
Mass of Sample:	509.80	g	**Moisture Content:**	**20.9**	%
			Wet Density	**131.2**	**pcf**
			Dry Density	**108.5**	**pcf**
			Deg of Saturation	**98.8**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	18.5	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/15/2004	9:15 AM	0	0	3.08	5.98		20.0	---
1/15/2004	10:00 AM	2700	2700	3.18	5.87	0.9	20.0	4.69E-08
1/15/2004	10:45 AM	2700	5400	3.25	5.79	0.9	20.0	3.44E-08
1/15/2004	11:30 AM	2700	8100	3.35	5.70	1.1	20.0	3.91E-08
1/15/2004	12:15 PM	2700	10800	3.44	5.62	1.1	20.0	3.50E-08

Average Permeability = **3.9E-08** **cm/sec**

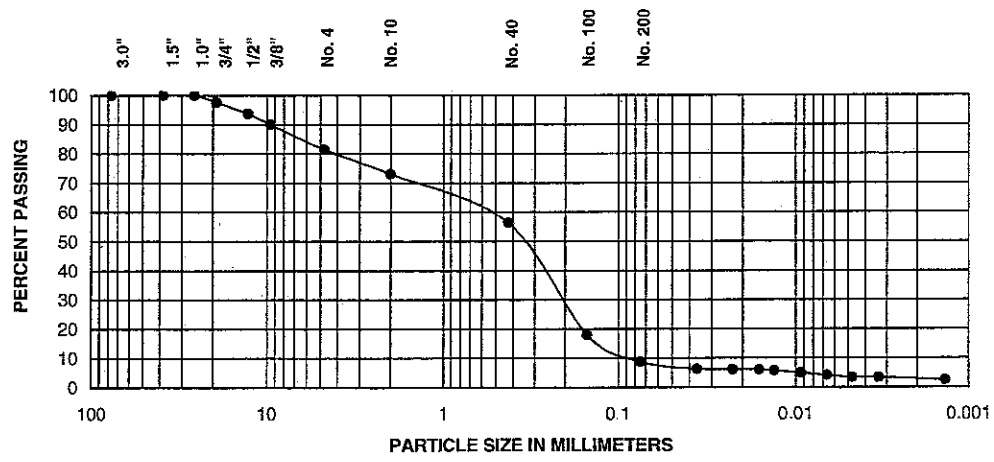
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-063 (NW 55+00)	**Date Tested**	1/15/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	55+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	18.5	72.7	5.2	3.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.59	0.21	0.08	7.2	0.88

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	97.7
1/2"	93.7
3/8"	90.0
No. 4	81.5
No. 10	73.1
No. 40	56.4
No. 100	18.0
No. 200	8.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

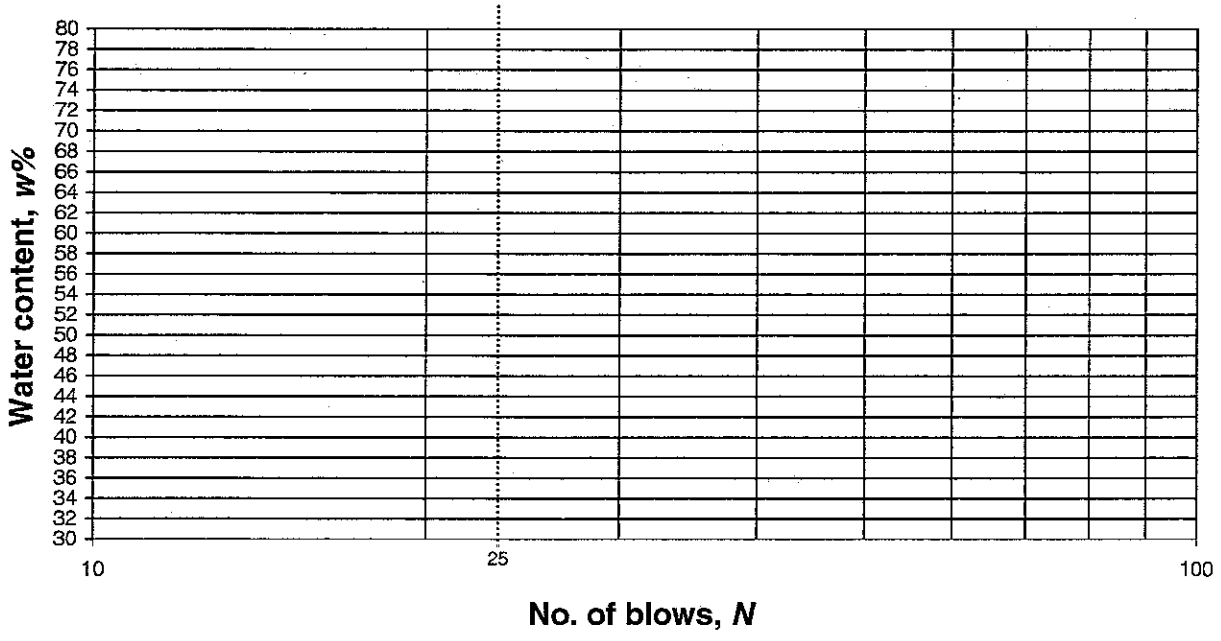
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-063 (NW 55+00)	**Date Tested**	1/13/2004	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	55+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	22	Date	1/12/2004	Sheet	1
				Date of weighing	1/13/2004	Tested by	MT

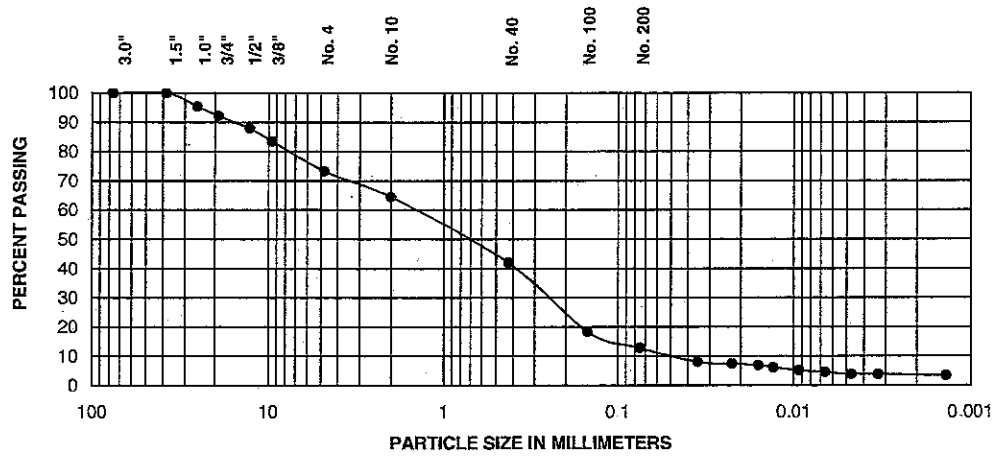
Boring No.	-	-	-	-	-	-
Sample No.	BF-060 (NW56+00)	BF-061(SE34+00)	BF-062 (SE35+00)	BF-063(NW55+00)	BF-064(SE36+00)	BF-065(NW54+00)
Location	56 + 00 (NW)	34 + 00 (SE)	35 + 00 (SE)	55 + 00 (NW)	36 + 00 (SE)	54 + 00 (NW)
Tin No.	70A	24C	31C	39C	22C	97A
Tin + Wet Soil	136.9	179.5	176.2	179.8	178.1	178.1
Tin + Dry Soil	124.25	160.39	160.69	162.76	160.54	156.68
Wt. of Tin	31.3	30.6	31.3	30.8	30.7	30.7
Wt. of Dry Soil	93.0	129.8	129.4	132.0	129.8	126.0
Wt. of Water	12.7	19.1	15.5	17.0	17.6	21.4
Moisture, %	13.6	14.7	12.0	12.9	13.5	17.0
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	BF-066 (SE37+00)	BF-067 (SE38+00)				
Location	37 + 00 (SE)	38 + 00 (SE)				
Tin No.	53A	98A				
Tin + Wet Soil	165.6	169.3				
Tin + Dry Soil	148.3	152.38				
Wt. of Tin	30.8	30.5				
Wt. of Dry Soil	117.5	121.9				
Wt. of Water	17.3	16.9				
Moisture, %	14.7	13.9				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-064 (36+00 SE)	**Date Tested**	1/15/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	36+00 (SE)
Sample Description	Gray silty, clayey sand with gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	26.8	60.4	8.9	4.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	95.5
3/4"	92.1
1/2"	87.9
3/8"	83.5
No. 4	73.2
No. 10	64.5
No. 40	42.1
No. 100	18.4
No. 200	12.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

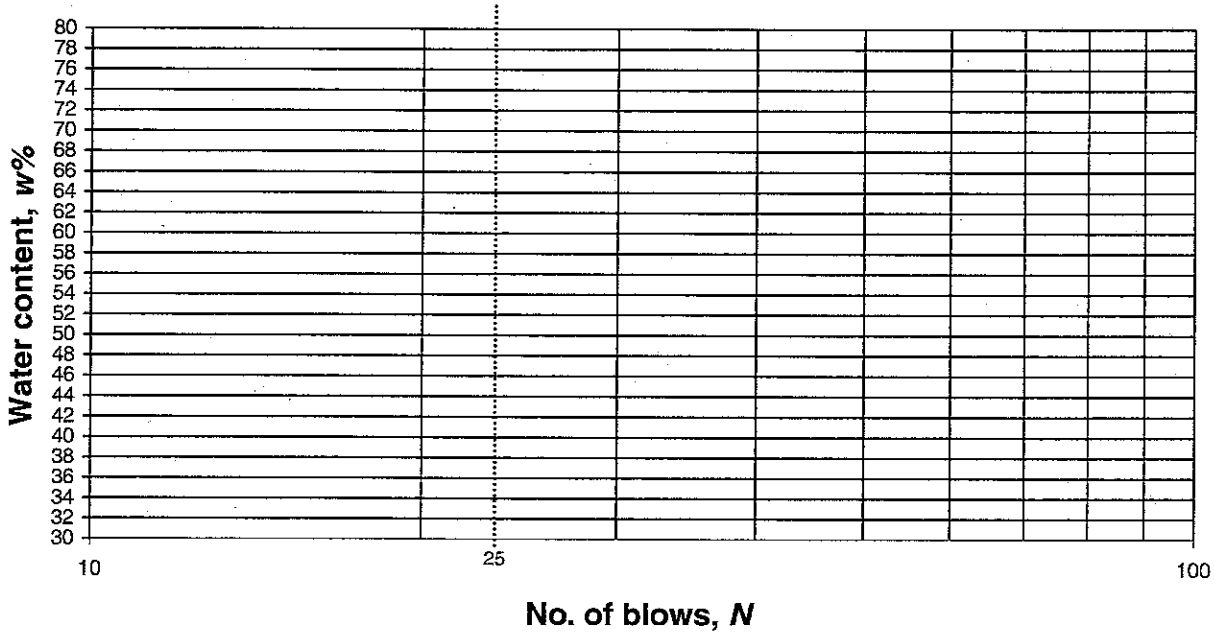
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn : Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-064 (36+00 SE)	**Date Tested**	1/13/2004	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	36+00 (SE)
Sample Description	Gray silty, clayey sand with gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	22	Date	1/12/2004	Sheet	1
				Date of weighing	1/13/2004	Tested by	MT

Boring No.	-	-	-	-	↓	-
Sample No.	BF-060 (NW56+00)	BF-061(SE34+00)	BF-062 (SE35+00)	BF-063(NW55+00)	BF-064(SE36+00)	BF-065(NW54+00)
Location	56 + 00 (NW)	34 + 00 (SE)	35 + 00 (SE)	55 + 00 (NW)	36 + 00 (SE)	54 + 00 (NW)
Tin No.	70A	24C	31C	39C	22C	97A
Tin + Wet Soil	136.9	179.5	176.2	179.8	178.1	178.1
Tin + Dry Soil	124.25	160.39	160.69	162.76	160.54	156.68
Wt. of Tin	31.3	30.6	31.3	30.8	30.7	30.7
Wt. of Dry Soil	93.0	129.8	129.4	132.0	129.8	126.0
Wt. of Water	12.7	19.1	15.5	17.0	17.6	21.4
Moisture, %	13.6	14.7	12.0	12.9	13.5	17.0
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	BF-066 (SE37+00)	BF-067 (SE38+00)				
Location	37 + 00 (SE)	38 + 00 (SE)				
Tin No.	53A	98A				
Tin + Wet Soil	165.6	169.3				
Tin + Dry Soil	148.3	152.38				
Wt. of Tin	30.8	30.5				
Wt. of Dry Soil	117.5	121.9				
Wt. of Water	17.3	16.9				
Moisture, %	14.7	13.9				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/11/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 24 - 39 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
54+90	2.00	74.00	12.00	23.00	53.00	8
54+90	28.00	82.00	14.00	15.00	54.00	8
53+90	2.00	84.00	21.00	25.00	51.00	8
53+90	34.00	85.00	24.00	24.00	54.00	8

NORTH TRENCH

COMMENTS: Fresh slurry was pumped to this trench all day to try and keep the slurry within specs.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
54+00	LAB SAMPLE COLLECTED 01/11/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
56+75	3.00	N/A	N/A	N/A	1.72×10^{-7}	N/A
56+50	3.00	N/A	N/A	N/A	2.06×10^{-7}	N/A
56+25	3.00	N/A	N/A	N/A	2.06×10^{-7}	N/A
56+00	2.00	Sample collected	Sample collected	Sample collected	4.55×10^{-8}	yes
55+75	2.00	N/A	N/A	N/A	1.34×10^{-7}	N/A
55+50	2.00	N/A	N/A	N/A	2.48×10^{-8}	N/A

COMMENTS

Filter cake: .4mm, .6mm, .4mm, and .8mm respectively.

Unit Weight:
56+75: 118.0 pcf
56+50: 116.5 pcf
56+25: 118.0 pcf
56+00: 112.0 pcf
55+75: 116.0 pcf
55+50: 116.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

INDIANA HARBOR CDF S-B CUTOFF

DATE: 01/11/04 JOB NAME: WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 24 - 39 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
36+70	2.00	72.00	10.00	21.00	48.00	8
36+70	34.00	81.00	18.00	17.00	52.00	8
37+80	2.00	91.00	24.00	20.00	53.00	8
37+80	34.00	93.00	25.00	18.00	60.00	8

SE TRENCH

COMMENTS: Fresh slurry was pumped to this trench today to try and keep the slurry in spec.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
37+00	LAB SAMPLE COLLECTED 01/11/04			
38+00	LAB SAMPLE COLLECTED 01/11/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
34+75	2.00	N/A	N/A	N/A	2.75×10^{-7}	N/A
35+00	2.00	Sample collected	Sample collected	Sample collected	2.68×10^{-7}	yes
35+25	2.00	N/A	N/A	N/A	3.28×10^{-7}	N/A
35+50	3.00	N/A	N/A	N/A	1.82×10^{-7}	N/A
35+75	3.00	N/A	N/A	N/A	1.86×10^{-7}	N/A
36+00	3.00	Sample collected	Sample collected	Sample collected	1.72×10^{-7}	yes

COMMENTS

Filter cake: .4mm, .6mm, .5mm, and .8mm respectively.

Unit Weight:
34+75: 119.0 pcf
35+00: 119.0 pcf
35+25: 119.5 pcf
35+50: 118.0 pcf
35+75: 116.0 pcf
36+00: 116.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/11/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
9:36	65.00	50.00	16.00	8
10:30	-	44.00	-	-
13:15	64.00	48.00	15.00	8

Filter cake is .1mm and .1mm, respectively.

Plant stopped pumping today at 13:30. Therefore, no 2nd PM test.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepe OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/11/04

JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL

JOB NUMBER: P01-D48

WEATHER: Mostly sunny; 24 - 39 degrees

RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH		AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION							
54+80	33.0	36.3	36.4	10.0	363.5	6.1	57+10	TOPOUT	TOPOUT
54+70	32.9	36.4	36.4	10.0	363.5	6.1	57+00	1.6	TOPOUT
54+60	32.9	37.0	36.7	10.0	367.0	6.2	56+90	6.9	TOPOUT
54+50	33.0	36.4	36.7	10.0	367.0	6.3	56+80	11.0	TOPOUT
54+40	33.0	36.5	36.5	10.0	364.5	6.2	56+70	13.4	TOPOUT
54+30	32.9	36.5	36.5	10.0	365.0	6.3	56+60	15.6	TOPOUT
54+20	33.0	36.5	36.5	10.0	365.0	6.4	56+50	21.9	TOPOUT
54+10	33.0	36.4	36.5	10.0	364.5	6.6	56+40	22.0	TOPOUT
54+00	33.0	36.5	36.5	10.0	364.5	6.5	56+30	22.6	TOPOUT
53+90	32.9	36.6	36.6	10.0	365.5	6.6	56+20	23.5	TOPOUT
53+80	32.9	36.6	36.6	10.0	366.0	6.7	56+10	24.9	TOPOUT
53+70	33.0	36.7	36.7	10.0	366.5	6.7	56+00	25.8	TOPOUT
53+60	33.0	36.6	36.7	10.0	366.5	6.8	55+90	26.9	TOPOUT
53+50	33.0	36.7	36.7	10.0	366.5	6.9	55+80	27.4	2.9
53+40	33.0	36.7	36.7	10.0	367.0	6.8	55+70	27.6	7.3
							55+60	29.5	9.0
							55+50	30.2	11.6
							55+40	30.9	12.9
							55+30	33.6	13.3
							55+20	33.8	14.1
							55+10	34.4	15.8
							55+00	34.5	18.2
							54+90	29.3	19.0
							54+80	21.0	19.2
							54+70	17.4	19.5
							54+60	16.0	20.9
							54+50	5.6	22.6
							54+40		22.7
							54+30		24.5
							54+20		26.4
							54+10		26.7
							54+00		27.1
							53+90		28.1

SF TODAY 5482.50

SF TO DATE 89329.00

COMMENTS

NORTH TRENCH

Excavating river rock approximately 10' to 15' deep.

GEO-CON: Suzanne E Sepac

OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/11/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 24 - 39 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
N/A							53+80		29.2
							53+70		31.1
							53+60		32.5
							53+50		36.6
							53+40		36.6
							53+30		27.1
							53+20		24.0
				SF TODAY		0.00			
				SF TO DATE		81292.50			

COMMENTS

NORTH TRENCH

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/11/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly sunny; 24 - 39 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
36+80	32.4	36.5	36.5	10.0	364.5	3.2	34+00	TOPOUT	TOPOUT
36+90	32.5	36.8	36.7	10.0	366.5	3.3	34+10	5.3	TOPOUT
37+00	32.5	36.7	36.8	10.0	367.5	3.2	34+20	8.2	TOPOUT
37+10	32.5	36.6	36.7	10.0	366.5	3.3	34+30	12.4	TOPOUT
37+20	32.6	36.6	36.6	10.0	366.0	3.3	34+40	13.9	TOPOUT
37+30	32.7	36.5	36.6	10.0	365.5	3.4	34+50	15.8	TOPOUT
37+40	32.6	36.7	36.6	10.0	366.0	3.4	34+60	16.6	TOPOUT
37+50	32.6	36.8	36.8	10.0	367.5	3.4	34+70	18.5	TOPOUT
37+60	32.7	36.9	36.9	10.0	368.5	3.3	34+80	19.2	TOPOUT
37+70	32.8	36.7	36.8	10.0	368.0	3.2	34+90	20.0	TOPOUT
37+80	32.9	36.8	36.8	10.0	367.5	3.2	35+00	21.4	TOPOUT
37+90	32.9	37.0	36.9	10.0	369.0	3.3	35+10	23.9	TOPOUT
38+00	33.0	37.0	37.0	10.0	370.0	3.2	35+20	24.7	TOPOUT
38+10	33.1	37.1	37.1	10.0	370.5	3.2	35+30	26.2	TOPOUT
38+20	33.2	37.1	37.1	10.0	371.0	3.1	35+40	28.1	TOPOUT
38+30	33.1	37.3	37.2	10.0	372.0	3.1	35+50	30.0	TOPOUT
38+40	33.1	37.2	37.3	10.0	372.5	3.0	35+60	31.6	TOPOUT
							35+70	32.3	TOPOUT
							35+80	32.9	TOPOUT
							35+90	35.0	TOPOUT
							36+00	36.3	TOPOUT
							36+10	36.6	7.5
							36+20	36.5	10.5
							36+30	36.4	11.2
							36+40	36.6	11.2
							36+50	36.7	14.0
							36+60	36.6	16.2
							36+70	36.4	19.4
							36+80		22.5
							36+90		23.8
							37+00		25.3
							37+10		27.9
							37+20		28.7
							37+30		29.0

SF TODAY 6259.00

SF TO DATE 66026.22

COMMENTS

SE Trench

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/11/04

JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL

JOB NUMBER: P01-048

WEATHER: Mostly sunny; 24 - 39 degrees

RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
N/A							37+40		30.0
							37+50		30.1
							37+60		30.1
							37+70		30.4
							37+80		30.7
							37+90		32.8
							38+00		32.8
							38+10		35.9
							38+20		37.1
							38+30		37.3
							38+40		37.2

SF TODAY 0.00

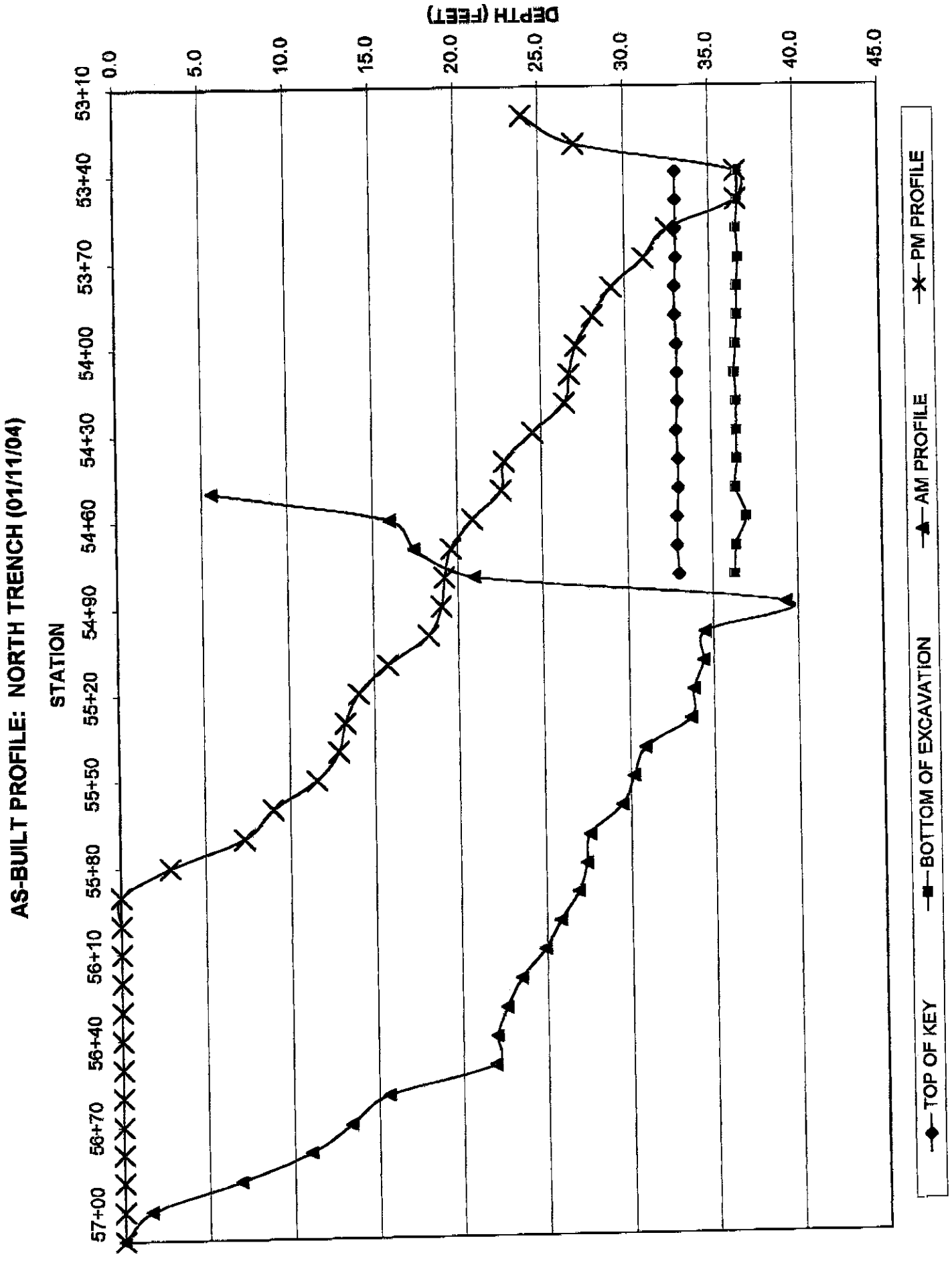
SF TO DATE 55017.72

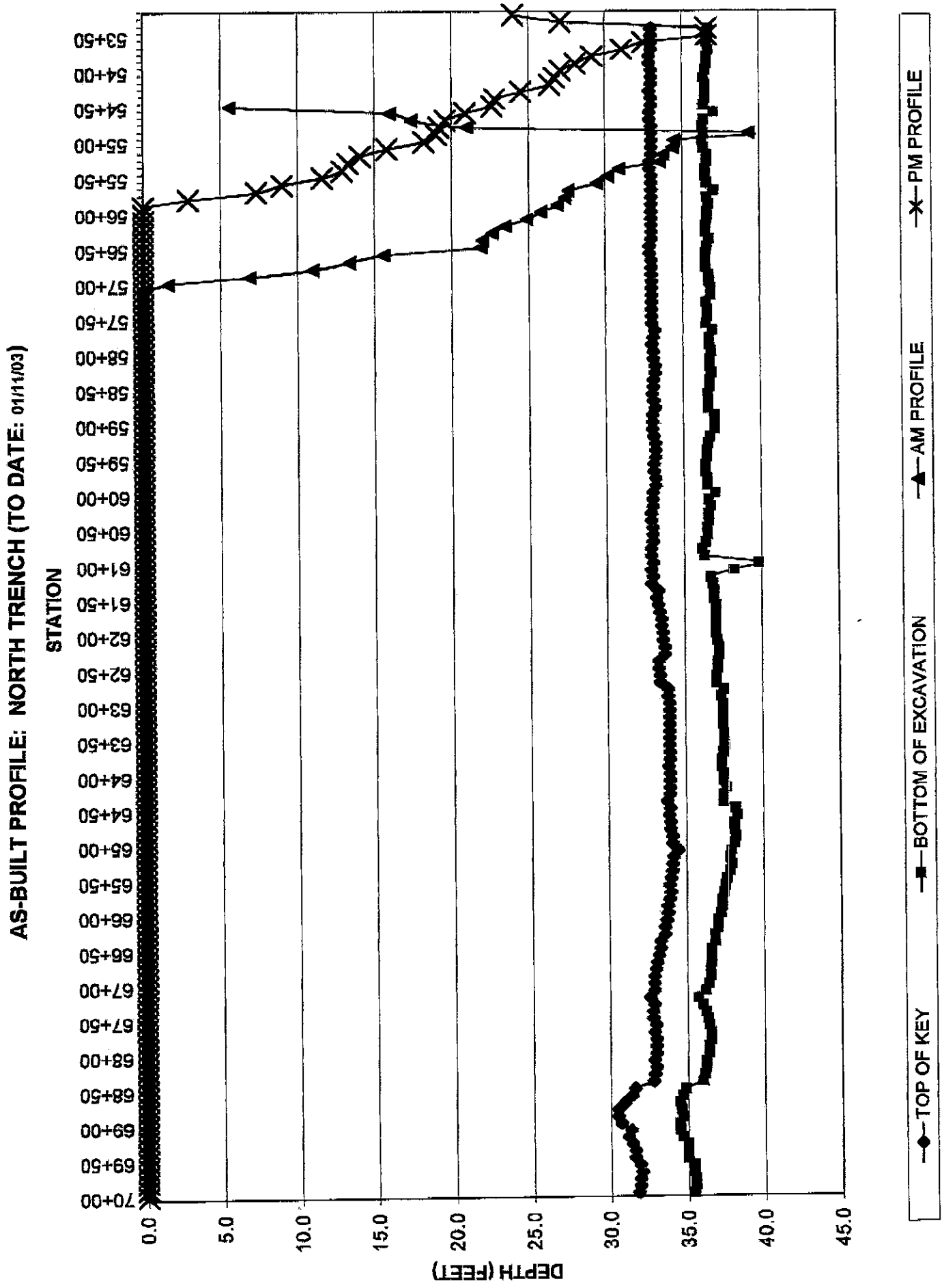
COMMENTS

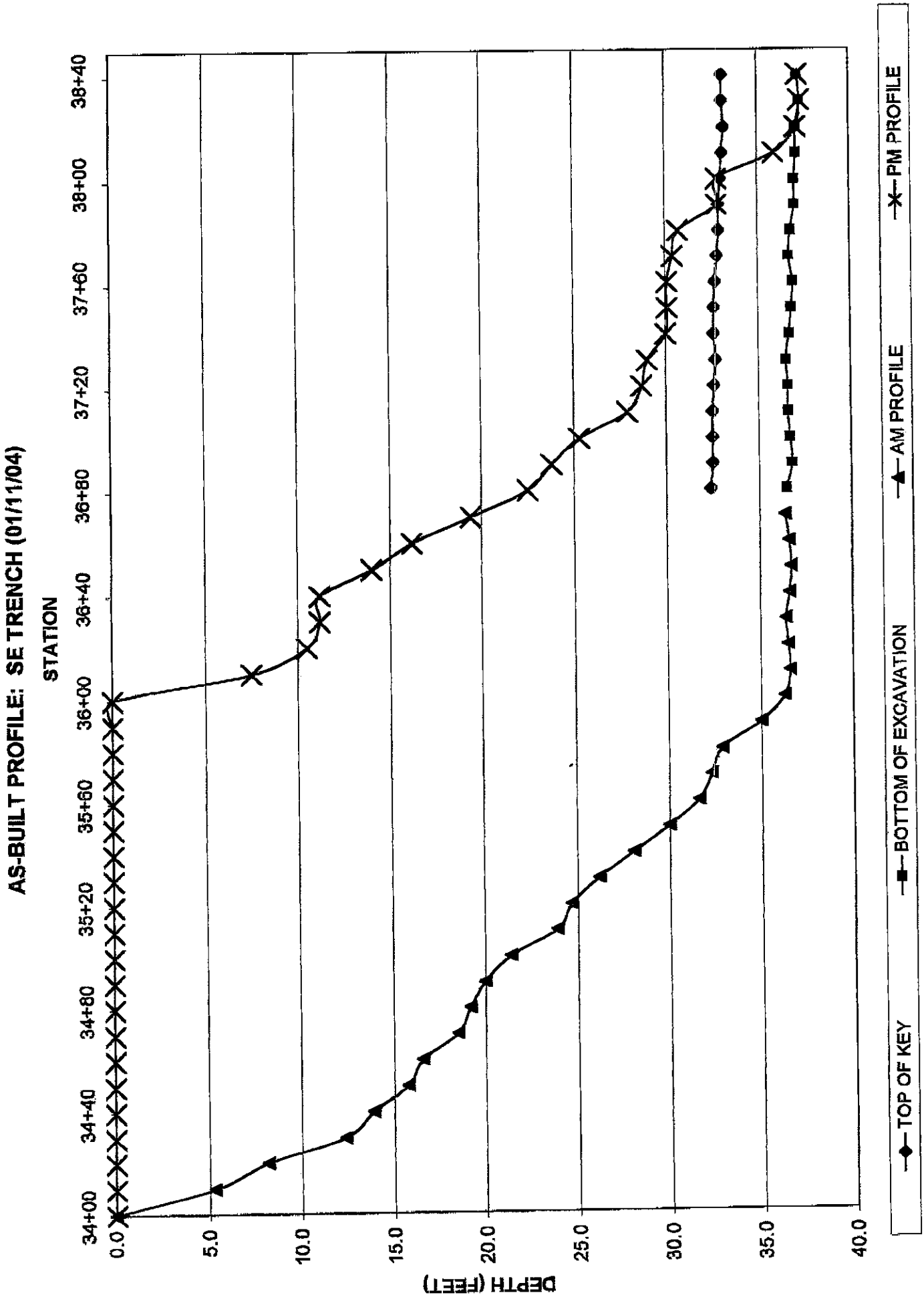
SE Trench

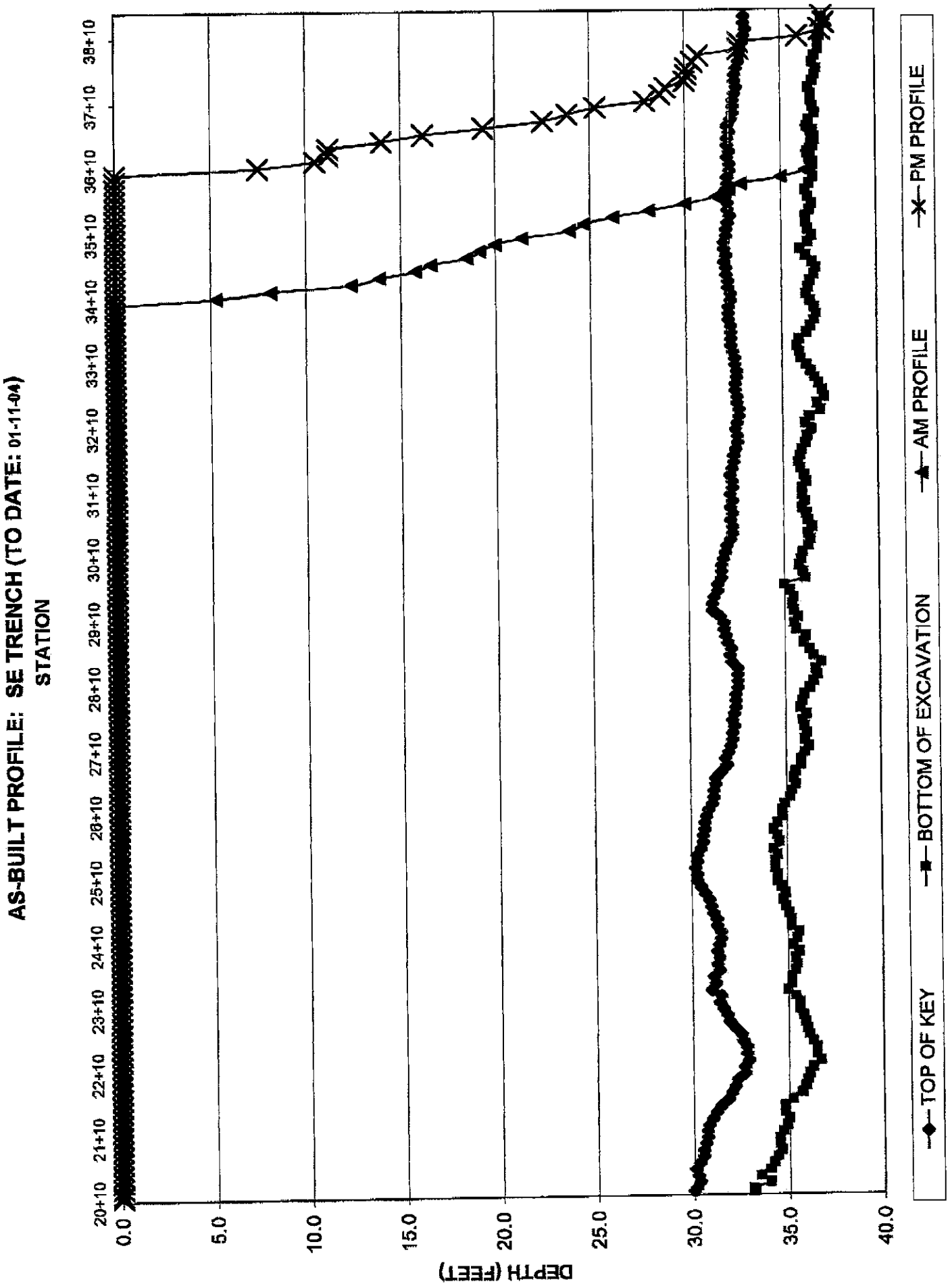
GEO-CON: Suzanne E. Sepic

OWNER:


AS-BUILT PROFILE: NORTH TRENCH (01/11/04)
STATION
53+10
53+40
53+70
54+00
54+30
54+60
54+90
55+20
55+50
55+80
56+10
56+40
56+70
57+00
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NORTH TRENCH (TO DATE: 01/11/03)
STATION
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
70+00
69+50
69+00
68+50
68+00
67+50
67+00
66+50
66+00
65+50
65+00
64+50
64+00
63+50
63+00
62+50
62+00
61+50
61+00
60+50
60+00
59+50
59+00
58+50
58+00
57+50
57+00
56+50
56+00
55+50
55+00
54+50
54+00
53+50
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (01/11/04)
STATION
34+00
34+40
34+80
35+20
35+60
36+00
36+40
36+80
37+20
37+60
38+00
38+40
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE: 01-11-04)
STATION
20+10
21+10
22+10
23+10
24+10
25+10
26+10
27+10
28+10
29+10
30+10
31+10
32+10
33+10
34+10
35+10
36+10
37+10
38+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/11/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9:36	50	> 40 sec	65	> 64 pcf	8	6.5 - 10	16	< 20 cm^3	.1
PM	13:15	48	> 40 sec	64	> 64 pcf	8	6.5 - 10	15	< 20 cm^3	.1

NORTH TRENCH

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:30	44	> 40 sec	[redacted]						
PM	—	—	> 40 sec	[redacted]						

* No PM slurry test for visc. because plant was done pumping at 13:30.

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
6:30	54+90	2	53	40 - 90 sec	74	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	.4	12	MAX 30%
6:30	54+90	28	54	40 - 90 sec	82	64 - 95 pcf	8	6.5 - 10	15	< 25 cm^3	.6	14	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:00	53+90	2	51	40 - 90 sec	84	64 - 95 pcf	8	6.5 - 10	25	< 25 cm^3	.4	21	MAX 30%
13:00	53+90	34	54	40 - 90 sec	85	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	.8	24	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (Inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
56+75	3	2" to 6"	118	+15 pcf over trench slurry	1.72×10^{-7}	1.0×10^{-7} cm/sec
56+50	3	2" to 6"	116.5	+15 pcf over trench slurry	2.06×10^{-7}	1.0×10^{-7} cm/sec
56+25	3	2" to 6"	118	+15 pcf over trench slurry	2.06×10^{-7}	1.0×10^{-7} cm/sec
56+00	2	2" to 6"	112	+15 pcf over trench slurry	4.55×10^{-8}	1.0×10^{-7} cm/sec
55+75	2	2" to 6"	116	+15 pcf over trench slurry	1.34×10^{-7}	1.0×10^{-7} cm/sec
55+50	2	2" to 6"	116	+15 pcf over trench slurry	2.48×10^{-8}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 56+75, 56+50, 56+25, 56+00, 55+75, 55+50

Technician: SM/MM ✓ by SES

Sample Area: $A = \pi r^2 = \pi (3.85)^2 = 46.56 cm^2$

Sample Height: L= 7.0cm, 7.0cm, 6.5cm, 6.0cm, 6.0cm, 6.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	$K = \frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/conv. (1/14)
56+75	01/11/04	8:00-12:00	240	10	117.2305	605865.9809	—	25	1.72×10^{-7}	1.17x
56+50	01/11/04	8:00-12:00	240	10	117.2305	605865.9809	—	30	2.06×10^{-7}	1.41x
56+25	01/11/04	8:00-12:00	240	10	117.2305	605865.9809	—	30	2.06×10^{-7}	1.41x
56+00	01/11/04	18:00-6:00	720	10	100.4833	519313.7717	—	17	4.55×10^{-8}	3.10x
55+75	01/11/04	18:00-6:00	720	10	100.4833	519313.7717	—	50	1.34×10^{-7}	9.15x
55+50	01/11/04	18:00-6:00	720	10	108.2628	559261.0614	—	10	2.48×10^{-8}	1.69x

$I = \frac{P\ (psi)}{0.014217\ L\ (cm)}$ $R = \frac{\text{Quick Test}}{\text{Triaxial Test}} = 1.85$

DAILY QC TESTS

DATE 01/11/04

SE TRENCH

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec	[redacted]						
PM			> 40 sec							

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
6:40	36+70	2	48	40 - 90 sec	72	64 - 95 pcf	8	6.5 - 10	21	< 25 cm^3	.4	10	MAX 30%
6:40	36+70	34	52	40 - 90 sec	81	64 - 95 pcf	8	6.5 - 10	17	< 25 cm^3	.6	18	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:15	37+80	2	53	40 - 90 sec	91	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	.5	24	MAX 30%
13:15	37+80	34	60	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	18	< 25 cm^3	.6	25	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
34+75	2	2" to 6"	119	+15 pcf over trench slurry	2.75×10^{-7}	1.0×10^{-7} cm/sec
35+00	2	2" to 6"	119	+15 pcf over trench slurry	2.68×10^{-7}	1.0×10^{-7} cm/sec
35+25	2	2" to 6"	119.5	+15 pcf over trench slurry	3.28×10^{-7}	1.0×10^{-7} cm/sec
35+50	3	2" to 6"	118	+15 pcf over trench slurry	1.82×10^{-7}	1.0×10^{-7} cm/sec
35+75	3	2" to 6"	116	+15 pcf over trench slurry	1.86×10^{-7}	1.0×10^{-7} cm/sec
36+00	3	2" to 6"	116	+15 pcf over trench slurry	1.72×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 34+75, 35+00, 35+25, 35+50, 35+75, 36+00

Technician: SM/MM √ by SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 6.5cm, 6.0cm, 6.0cm, 6.0cm, 6.5cm, 6.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	EQM (1/19.65)
34+75	01/11/04	8:00-12:00	240	10	117.2305	605865.9809	—	40	2.75×10^{-7}	1.88x10
35+00	01/11/04	8:00-12:00	240	10	117.2305	605865.9809	—	39	2.68×10^{-7}	1.83x10
35+25	01/11/04	8:00-12:00	240	10	108.2128	559261.0644	—	44	3.28×10^{-7}	2.24x10
35+50	01/11/04	18:00-6:00	720	10	100.4833	519313.7717	—	68	1.82×10^{-7}	1.24x10
35+75	01/11/04	18:00-6:00	720	10	108.2128	559261.0644	—	75	1.86×10^{-7}	1.27x10
36+00	01/11/04	18:00-6:00	720	10	117.2305	605865.9809	—	75	1.72×10^{-7}	1.17x10

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

SE TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
36+80	587.1	586.8	32.4	554.4	36.5	550.3	3.2	4.8
36+90	587.1	586.5	32.5	554.0	36.8	549.7	3.3	5.0
37+00	587.1	586.7	32.5	554.2	36.7	550.0	3.2	4.8
37+10	587.1	586.3	32.5	553.8	36.6	549.7	3.3	5.0
37+20	587.1	586.7	32.6	554.1	36.6	550.1	3.3	5.0
37+30	587.1	586.5	32.7	553.8	36.5	550.0	3.4	5.1
37+40	587.2	586.7	32.6	554.1	36.7	550.0	3.4	5.1
37+50	587.2	586.7	32.6	554.1	36.8	549.9	3.4	5.1
37+60	587.2	587.0	32.7	554.3	36.9	550.1	3.3	5.0
37+70	587.2	587.2	32.8	554.4	36.7	550.5	3.2	4.8
37+80	587.2	586.8	32.9	553.9	36.8	550.0	3.2	4.8
37+90	587.2	587.2	32.9	554.3	37.0	550.2	3.3	5.0
38+00	587.2	586.9	33.0	553.9	37.0	549.9	3.2	4.8
38+10	587.2	587.1	33.1	554.0	37.1	550.0	3.2	4.8
38+20	587.2	587.1	33.2	553.9	37.1	550.0	3.1	4.7
38+30	587.2	586.8	33.1	553.7	37.3	549.5	3.1	4.7
38+40	587.2	586.8	33.1	553.7	37.2	549.6	3.0	4.5

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED WITH A 1.5:1 SLOPE

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 12-Jan-04 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO P01-048 | P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-065 (NW54+00)	SOIL ONLY	54+00	01/11/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-066 (SE37+00)	SOIL ONLY	37+00	01/11/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-067 (SE38+00)	SOIL ONLY	38+00	01/11/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-077 (NW56+00)	SB BACKFILL**	56+00	01/11/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-078 (SE35+00)	SB BACKFILL**	35+00	01/11/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-079 (SE36+00)	SB BACKFILL**	36+00	01/11/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

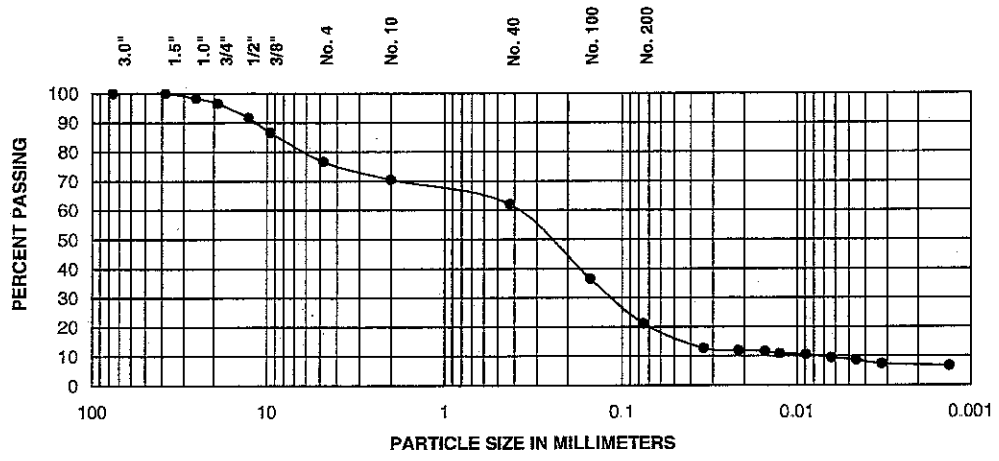
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-077 (NW 56+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	56+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	23.4	55.5	12.1	9.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	98.3
3/4"	96.6
1/2"	91.7
3/8"	86.6
No. 4	76.6
No. 10	70.5
No. 40	62.0
No. 100	36.5
No. 200	21.1

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
32	22	10

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

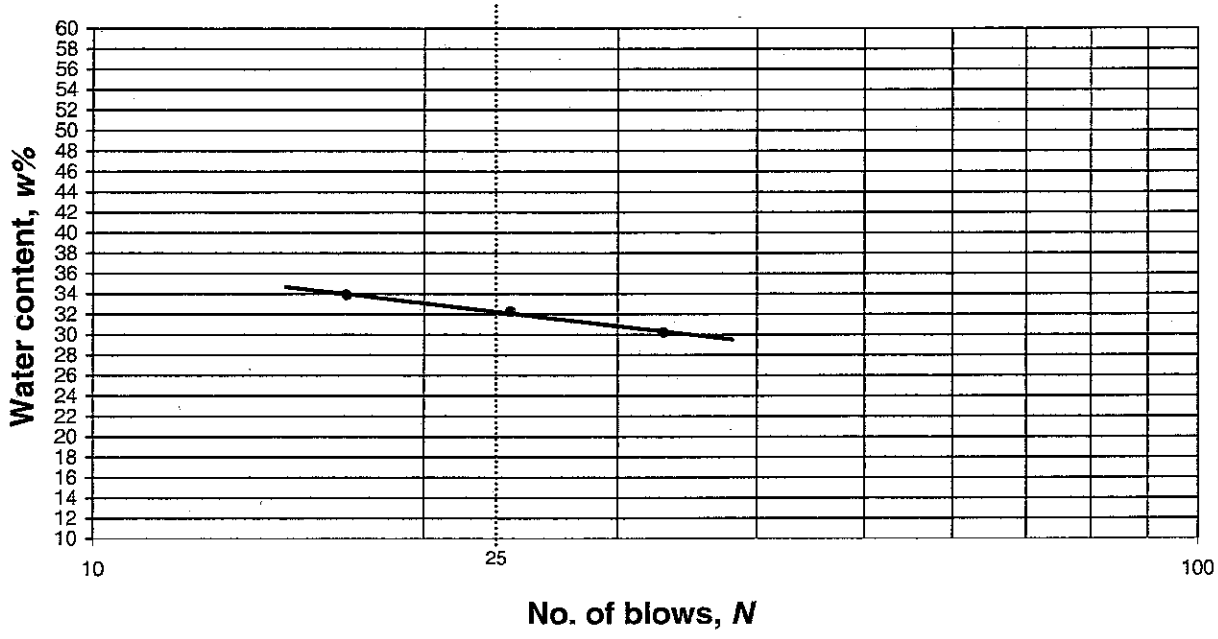
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-077 (NW 56+00)	**Date Tested**	1/13/2004	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	56+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**32**	**Plastic Limit, PL**	**22**	**Plasticity Index, PI**	**10**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/14/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-077 (NW 56+00)	Date Recd.	1/12/04	**Location**	56+00 (NW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.22	cm	Volume, V:	253.2	cu cm
Mass of Sample:	475.7	g	**Moisture Content:**	**24.7**	%
			Wet Density	**117.2**	**pcf**
			Dry Density	**94.0**	**pcf**

Final

Diameter:	7.02	cm	Area, A:	38.7	sq cm
Height, L:	5.64	cm	Volume, V:	218.3	cu cm
Mass of Sample:	464.30	g	**Moisture Content:**	**19.3**	%
			Wet Density	**132.7**	**pcf**
			Dry Density	**111.2**	**pcf**
			Deg of Saturation	**97.9**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	20.4	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/14/2004	10:00 AM	0	0	3.81	5.92		20.0	---
1/14/2004	10:45 AM	2700	2700	3.84	5.89	1.0	20.0	1.20E-08
1/14/2004	11:30 AM	2700	5400	3.88	5.85	1.0	20.0	1.61E-08
1/14/2004	12:15 PM	2700	8100	3.91	5.82	1.0	20.0	1.21E-08
1/14/2004	1:00 PM	2700	10800	3.94	5.79	1.0	20.0	1.21E-08

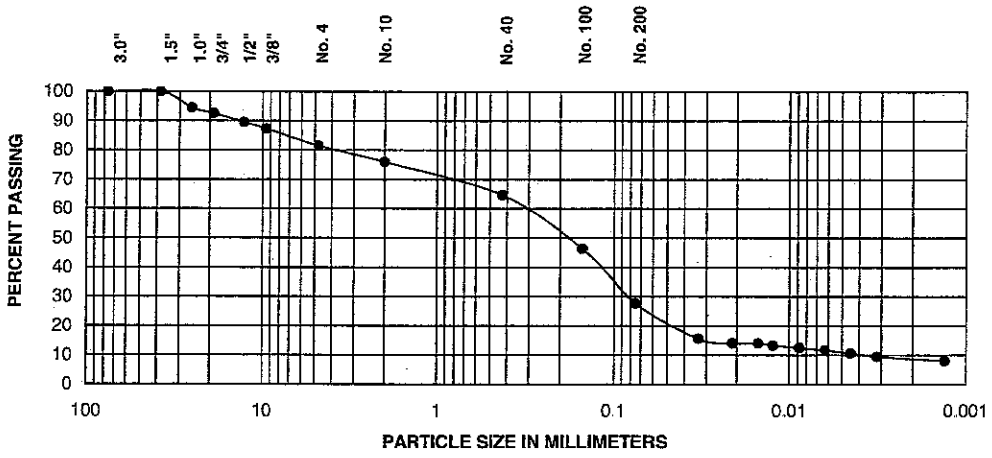
Average Permeability = **1.3E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-078 (SE 35+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	35+00 (SE)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	18.5	53.8	16.5	11.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	94.4
3/4"	92.6
1/2"	89.6
3/8"	87.3
No. 4	81.5
No. 10	76.0
No. 40	64.7
No. 100	46.4
No. 200	27.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
25	18	7

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

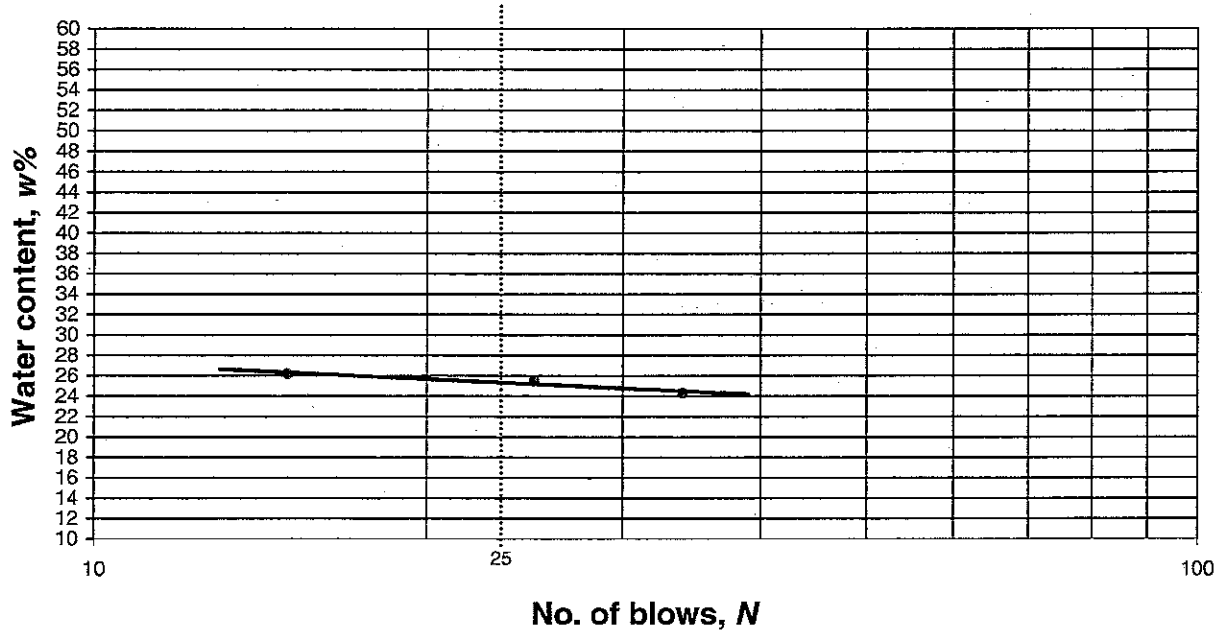
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-078 (SE 35+00)	**Date Tested**	1/13/2004	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	35+00 (SE)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	25	**Plastic Limit, PL**	18	**Plasticity Index, PI**	7

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/14/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-078 (SE 35+00)	Date Recd.	1/12/04	**Location**	35+00 (SE)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.46	cm	Volume, V:	263.0	cu cm
Mass of Sample:	463.3	g	**Moisture Content:**	**23.9**	%
			Wet Density	**109.9**	**pcf**
			Dry Density	**88.7**	**pcf**

Final

Diameter:	7.02	cm	Area, A:	38.7	sq cm
Height, L:	5.43	cm	Volume, V:	210.2	cu cm
Mass of Sample:	448.72	g	**Moisture Content:**	**19.0**	%
			Wet Density	**133.2**	**pcf**
			Dry Density	**112.0**	**pcf**
			Deg of Saturation	**98.1**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	19.6	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/14/2004	10:00 AM	0	0	3.10	6.00		20.0	---
1/14/2004	10:45 AM	2700	2700	3.30	5.79	1.0	20.0	8.48E-08
1/14/2004	11:30 AM	2700	5400	3.51	5.58	1.0	20.0	8.65E-08
1/14/2004	12:15 PM	2700	8100	3.70	5.38	1.0	20.0	8.41E-08
1/14/2004	1:00 PM	2700	10800	3.90	5.19	1.1	20.0	8.15E-08

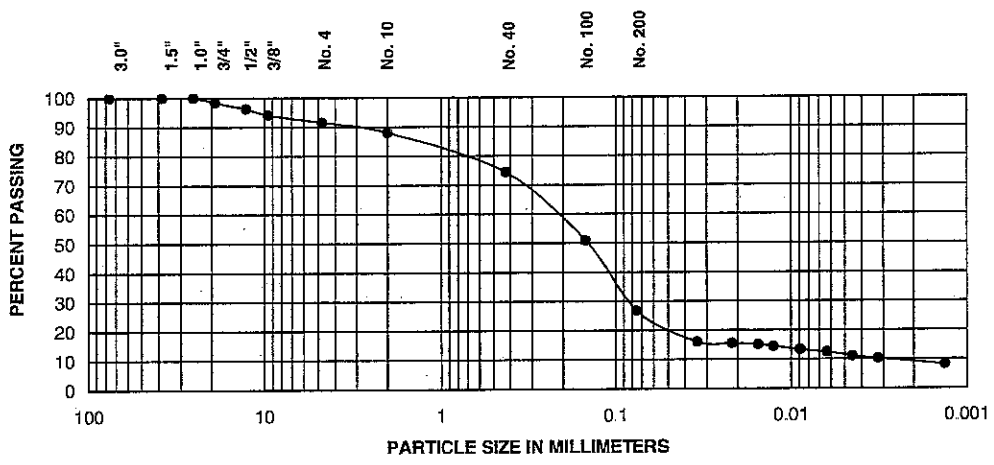
Average Permeability = **8.4E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-079 (SE 36+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	36+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	8.5	64.8	15.1	11.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.4
1/2"	96.3
3/8"	94.1
No. 4	91.5
No. 10	88.1
No. 40	74.4
No. 100	51.0
No. 200	26.7

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
24	19	5

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

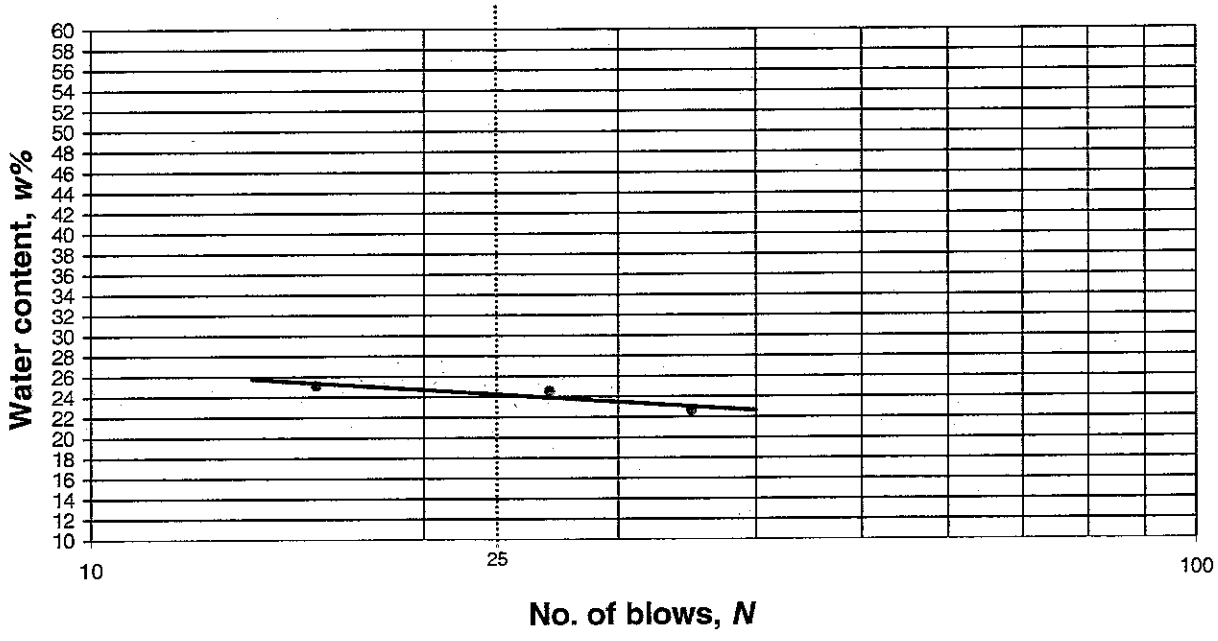
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-079 (SE 36+00)	**Date Tested**	1/16/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	36+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**24**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**5**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/15/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-079 (SE 36+00)	Date Recd.	1/12/04	**Location**	36+00 (SE)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	7.62	cm	Volume, V:	310.2	cu cm
Mass of Sample:	607.3	g	**Moisture Content:**	**26.6**	%
			Wet Density	**122.1**	**pcf**
			Dry Density	**96.5**	**pcf**

Final

Diameter:	7.09	cm	Area, A:	39.5	sq cm
Height, L:	7.26	cm	Volume, V:	286.6	cu cm
Mass of Sample:	581.30	g	**Moisture Content:**	**22.2**	%
			Wet Density	**126.6**	**pcf**
			Dry Density	**103.5**	**pcf**
			Deg of Saturation	**93.0**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	16.6	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/15/2004	9:15 AM	0	0	3.28	5.93		20.0	---
1/15/2004	10:00 AM	2700	2700	3.40	5.82	1.1	20.0	5.28E-08
1/15/2004	10:45 AM	2700	5400	3.49	5.74	1.1	20.0	3.88E-08
1/15/2004	11:30 AM	2700	8100	3.60	5.64	1.1	20.0	4.89E-08
1/15/2004	12:15 PM	2700	10800	3.68	5.57	1.1	20.0	3.46E-08

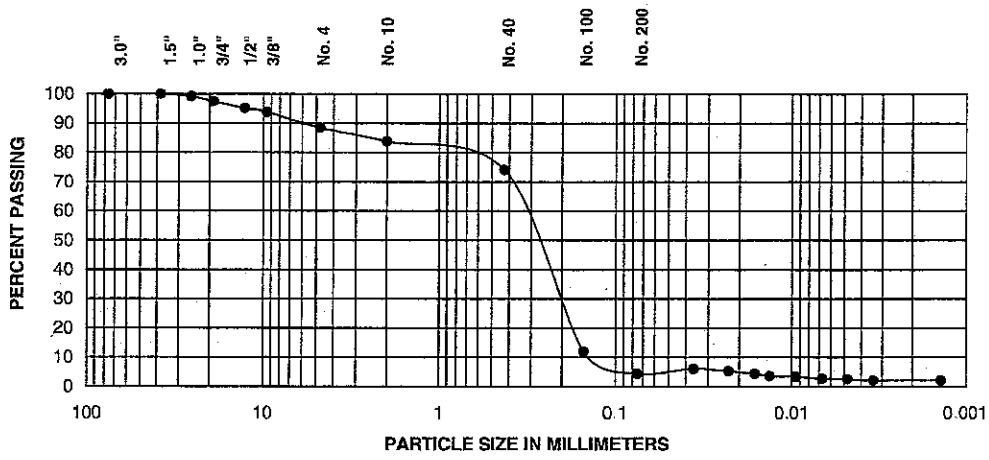
Average Permeability = **4.4E-08** **cm/sec**

Remarks:

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-065 (NW 54+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	54+00 (NW)
Sample Description	Gray poorly graded sand with clay, tr. of gr. & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.5	84.0	1.8	2.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.34	0.20	0.13	2.7	0.98

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	99.1
3/4"	97.4
1/2"	95.2
3/8"	93.8
No. 4	88.5
No. 10	83.8
No. 40	74.1
No. 100	12.0
No. 200	4.5

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
NP	NP	NP

Soil Classification:	SP
Soil Description:	Poorly graded sand
System:	USCS

Remarks:

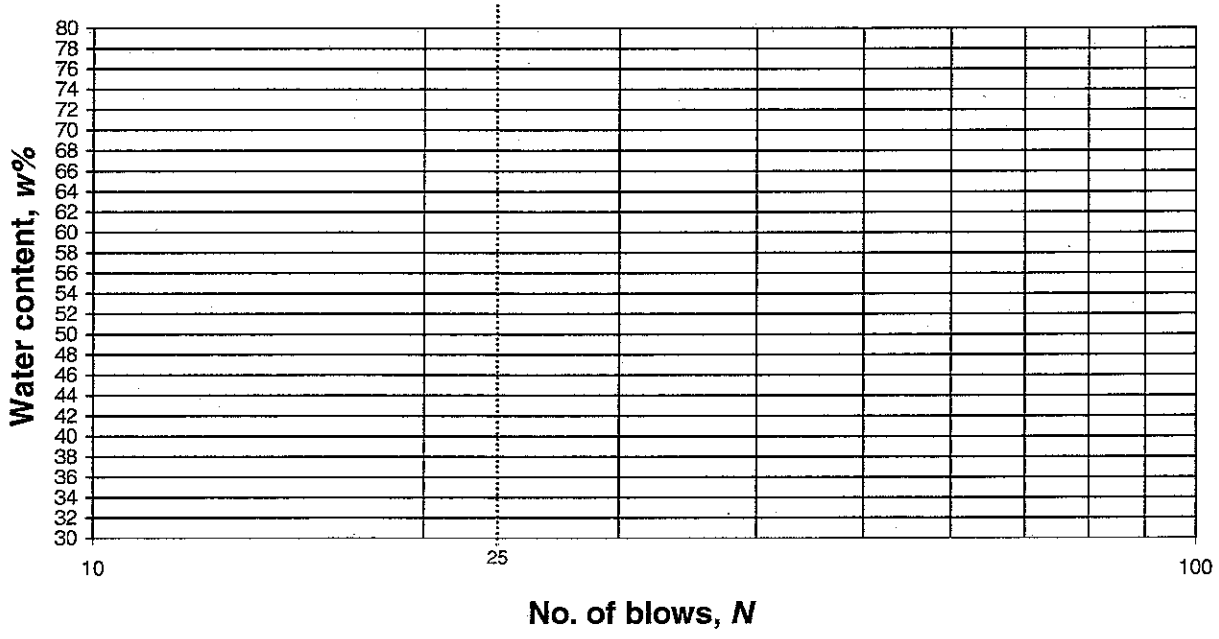
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-065 (NW 54+00)	**Date Tested**	1/13/2004	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	54+00 (NW)
Sample Description	Gray poorly graded sand with clay, tr of gr. & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	22	Date	1/12/2004	Sheet	1
				Date of weighing	1/13/2004	Tested by	MT

Boring No.	-	-	-	-	-	-
Sample No.	BF-060 (NW56+00)	BF-061(SE34+00)	BF-062 (SE35+00)	BF-063(NW55+00)	BF-064(SE36+00)	BF-065(NW54+00)
Location	56 + 00 (NW)	34 + 00 (SE)	35 + 00 (SE)	55 + 00 (NW)	36 + 00 (SE)	54 + 00 (NW)
Tin No.	70A	24C	31C	39C	22C	97A
Tin + Wet Soil	136.9	179.5	176.2	179.8	178.1	178.1
Tin + Dry Soil	124.25	160.39	160.69	162.76	160.54	156.68
Wt. of Tin	31.3	30.6	31.3	30.8	30.7	30.7
Wt. of Dry Soil	93.0	129.8	129.4	132.0	129.8	126.0
Wt. of Water	12.7	19.1	15.5	17.0	17.6	21.4
Moisture, %	13.6	14.7	12.0	12.9	13.5	17.0
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

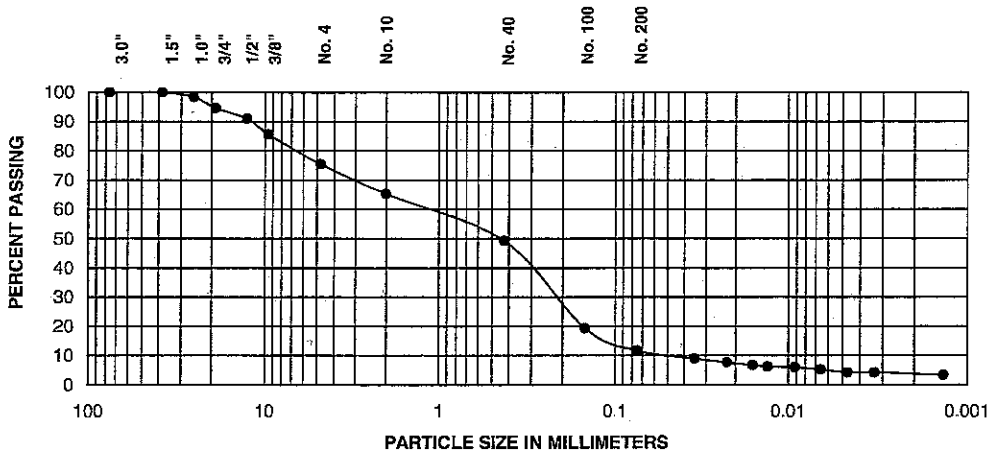
Boring No.	-	-				
Sample No.	BF-066 (SE37+00)	BF-067 (SE38+00)				
Location	37 + 00 (SE)	38 + 00 (SE)				
Tin No.	53A	98A				
Tin + Wet Soil	165.6	169.3				
Tin + Dry Soil	148.3	152.38				
Wt. of Tin	30.8	30.5				
Wt. of Dry Soil	117.5	121.9				
Wt. of Water	17.3	16.9				
Moisture, %	14.7	13.9				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)

333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-066 (SE 37+00)	**Date Tested**	1/15/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	37+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	24.5	63.8	7.0	4.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.20	0.22	0.05	25.8	0.85

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.3
3/4"	94.6
1/2"	91.0
3/8"	85.6
No. 4	75.5
No. 10	65.3
No. 40	49.2
No. 100	19.4
No. 200	11.7

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

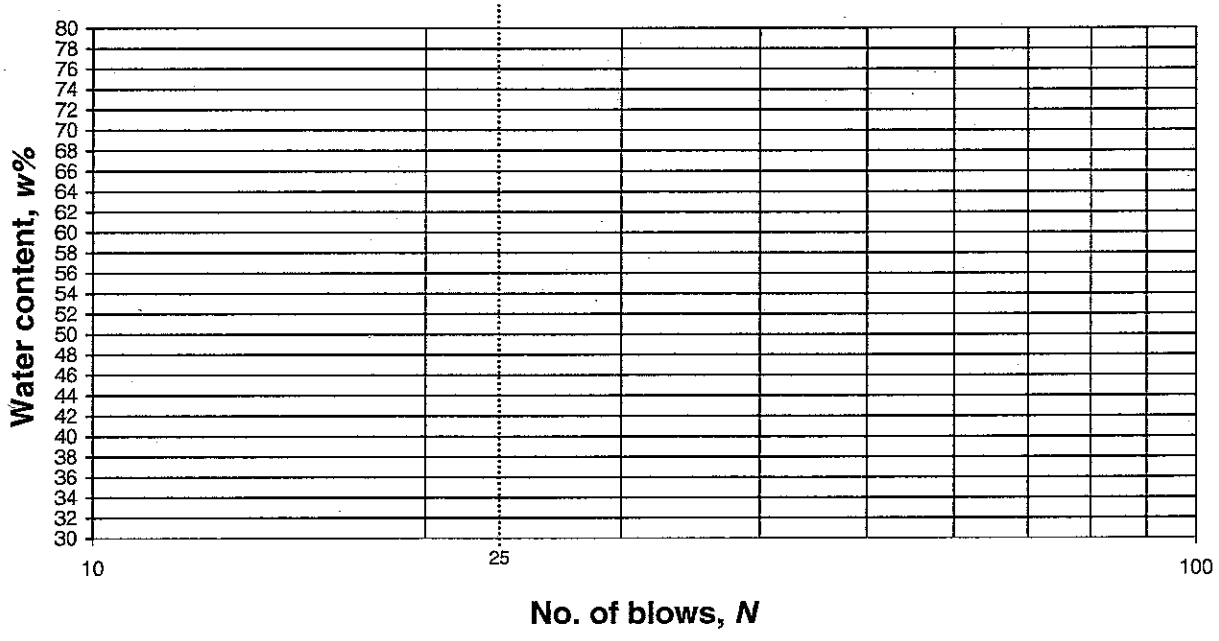
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-066 (SE 37+00)	**Date Tested**	1/13/2004	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	37+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	22	Date	1/12/2004	Sheet	1
				Date of weighing	1/13/2004	Tested by	MT

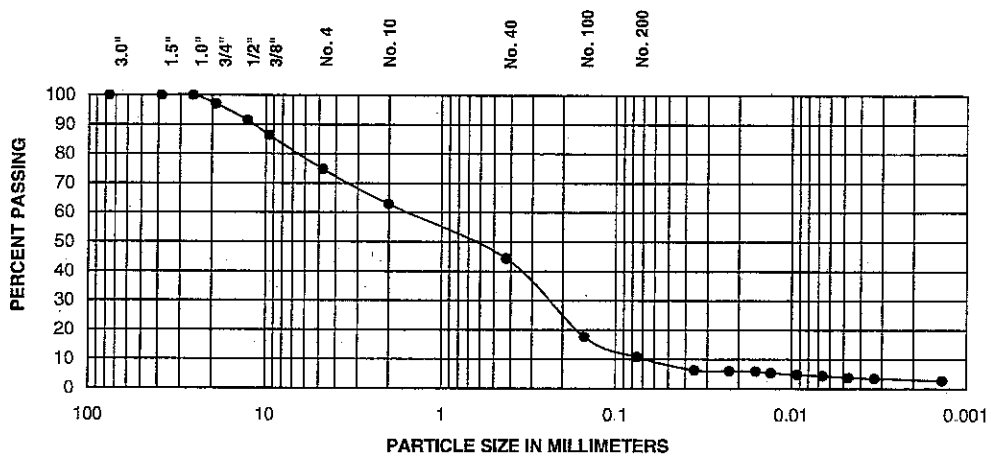
Boring No.	-	-	-	-	-	-
Sample No.	BF-060 (NW56+00)	BF-061(SE34+00)	BF-062 (SE35+00)	BF-063(NW55+00)	BF-064(SE36+00)	BF-065(NW54+00)
Location	56 + 00 (NW)	34 + 00 (SE)	35 + 00 (SE)	55 + 00 (NW)	36 + 00 (SE)	54 + 00 (NW)
Tin No.	70A	24C	31C	39C	22C	97A
Tin + Wet Soil	136.9	179.5	176.2	179.8	178.1	178.1
Tin + Dry Soil	124.25	160.39	160.69	162.76	160.54	156.68
Wt. of Tin	31.3	30.6	31.3	30.8	30.7	30.7
Wt. of Dry Soil	93.0	129.8	129.4	132.0	129.8	126.0
Wt. of Water	12.7	19.1	15.5	17.0	17.6	21.4
Moisture, %	13.6	14.7	12.0	12.9	13.5	17.0
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	BF-066 (SE37+00)	BF-067 (SE38+00)				
Location	37 + 00 (SE)	38 + 00 (SE)				
Tin No.	53A	98A				
Tin + Wet Soil	165.6	169.3				
Tin + Dry Soil	148.3	152.38				
Wt. of Tin	30.8	30.5				
Wt. of Dry Soil	117.5	121.9				
Wt. of Water	17.3	16.9				
Moisture, %	14.7	13.9				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-067 (SE 38+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/12/2004
Sample Location	38+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	25.1	64.2	6.7	4.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.57	0.24	0.07	23.8	0.57

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	97.1
1/2"	91.4
3/8"	86.4
No. 4	74.9
No. 10	62.9
No. 40	44.4
No. 100	17.6
No. 200	10.7

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

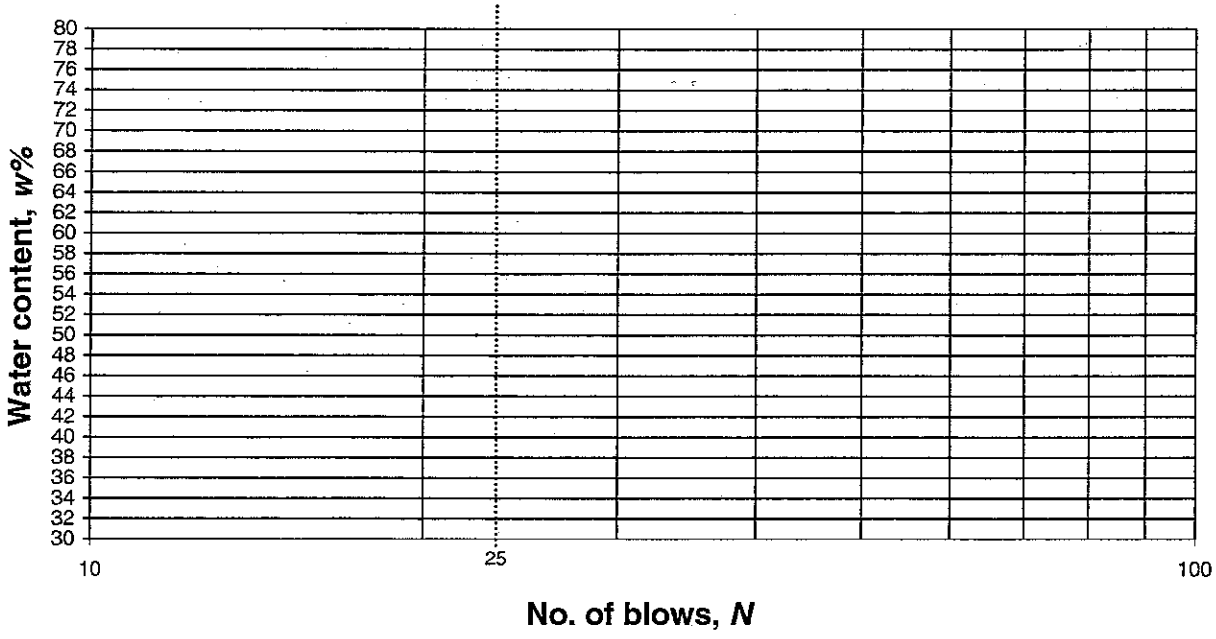
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-067 (SE 38+00)	**Date Tested**	1/13/2004	**Tested By**	KC
						Qc By	NP

Date Sample Recd.	1/12/2004
Sample Location	38+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	22	Date	1/12/2004	Sheet	1
				Date of weighing	1/13/2004	Tested by	MT

Boring No.	-	-	-	-	-	-
Sample No.	BF-060 (NW56+00)	BF-061(SE34+00)	BF-062 (SE35+00)	BF-063(NW55+00)	BF-064(SE36+00)	BF-065(NW54+00)
Location	56 + 00 (NW)	34 + 00 (SE)	35 + 00 (SE)	55 + 00 (NW)	36 + 00 (SE)	54 + 00 (NW)
Tin No.	70A	24C	31C	39C	22C	97A
Tin + Wet Soil	136.9	179.5	176.2	179.8	178.1	178.1
Tin + Dry Soil	124.25	160.39	160.69	162.76	160.54	156.68
Wt. of Tin	31.3	30.6	31.3	30.8	30.7	30.7
Wt. of Dry Soil	93.0	129.8	129.4	132.0	129.8	126.0
Wt. of Water	12.7	19.1	15.5	17.0	17.6	21.4
Moisture, %	13.6	14.7	12.0	12.9	13.5	17.0
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-	-				
Sample No.	BF-066 (SE37+00)	BF-067 (SE38+00)				
Location	37 + 00 (SE)	38 + 00 (SE)				
Tin No.	53A	98A				
Tin + Wet Soil	165.6	169.3				
Tin + Dry Soil	148.3	152.38				
Wt. of Tin	30.8	30.5				
Wt. of Dry Soil	117.5	121.9				
Wt. of Water	17.3	16.9				
Moisture, %	14.7	13.9				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/12/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, AM drizzle; 22 - 34 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
53+30	2.00	92.00	24.00	22.00	53.00	8
53+30	34.00	93.00	25.00	20.00	58.00	8
52+90	2.00	92.00	37.00	29.00	58.00	8
52+90	20.00*	93.50	38.00	30.00	59.00	8

NORTH TRENCH

COMMENTS: Fresh slurry was pumped to this trench today to try and keep the slurry in spec. Afternoon slurry properties were high due to backfilling to keep the level up. Could not pump fresh slurry because the plant had no electricity to run. PM deep was as deep as trench was when sample collected.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
53+00	LAB SAMPLE COLLECTED 01/12/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
55+75	4.50	N/A	N/A	N/A	4.02×10^{-7}	N/A
55+50	4.50	Sample collected	Sample collected	Sample collected	2.61×10^{-7}	yes
55+25	4.50	N/A	N/A	N/A	2.53×10^{-7}	N/A

COMMENTS

Filter cake: 1.5mm, 1.5mm, .8mm, and 1.0mm respectively.

Unit Weight: 55+75: 116.5 pcf
55+50: 116.0 pcf
55+25: 116.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E Yopic OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/12/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, AM drizzle; 22 - 34 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
38+50	2.00	92.00	25.00	20.00	54.00	8
38+50	35.00	94.00	28.00	25.00	58.00	8
39+40	2.00	93.00	30.00	28.00	55.00	8
39+40	21.00*	93.00	40.00	29.00	56.00	8

SE TRENCH

COMMENTS: Fresh slurry was pumped to this trench today to try and keep the slurry in spec. Afternoon slurry properties were high due to backfilling to keep the level up. Could not pump fresh slurry because the plant had no electricity to run. PM deep was as deep as trench was when sample collected.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
39+00	LAB SAMPLE COLLECTED 01/12/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
36+25	3.00	N/A	N/A	N/A	2.09×10^{-7}	N/A
36+50	3.00	Sample collected	Sample collected	Sample collected	2.15×10^{-7}	yes
36+75	3.00	N/A	N/A	N/A	8.20×10^{-8}	N/A

COMMENTS

Filter cake: 1.4mm, 1.5mm, .9mm, and 1.0mm respectively.

Unit Weight: 36+25: 115.0 pcf
36+50: 115.0 pcf
36+75: 116.5 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	yes
FUNNEL CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/12/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
8:40	64.00	51.00	17.00	8
10:55	-	48.00	-	-

Filter cake is .1mm.

Batch plant was shut down in the afternoon (right after lunch) because the electricity was shut off due to Hyre electric disconnecting the overhead line.

FUNNEL CALIBRATIONS PERFORMED TODAY?	yes
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	yes

GEO-CON: Suzanne C. Sepic OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/12/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, AM drizzle; 22 - 34 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
53+30	33.0	36.7	36.7	10.0	367.0	6.8	55+90	TOPOUT	TOPOUT
53+20	33.1	36.7	36.7	10.0	367.0	6.7	55+80	3.0	TOPOUT
53+10	33.0	36.6	36.7	10.0	366.5	6.7	55+70	7.6	TOPOUT
53+00	33.0	36.5	36.6	10.0	365.5	6.6	55+60	8.8	TOPOUT
52+90	32.9	36.4	36.5	10.0	364.5	6.5	55+50	11.6	TOPOUT
52+80	33.0	36.5	36.5	10.0	364.5	6.5	55+40	12.2	TOPOUT
							55+30	12.7	TOPOUT
							55+20	14.0	TOPOUT
							55+10	16.6	6.0
							55+00	18.9	7.3
							54+90	19.6	9.3
							54+80	19.8	12.0
							54+70	19.8	12.1
							54+60	21.3	14.1
							54+50	23.2	14.8
							54+40	23.6	17.1
							54+30	25.3	19.1
							54+20	27.1	20.4
							54+10	27.4	22.1
							54+00	28.0	22.5
							53+90	28.6	22.8
							53+80	29.6	23.5
							53+70	31.6	23.5
							53+60	32.8	25.5
							53+50	36.6	27.0
							53+40	36.7	28.9
							53+30	27.1	29.3
							53+20	24.0	30.8
							53+10		32.3
							53+00		34.3
							52+90		35.1
				SF TODAY	2195.00		52+80		36.6
				SF TO DATE	91524.00		52+70		29.1

COMMENTS
NORTH TRENCH

GEO-CON: Suzanne C Sepe OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/12/04

JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL

JOB NUMBER: P01-048

WEATHER: Partly cloudy, AM drizzle; 22 - 34 degrees

RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH TOP KEY	DEPTH BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A							52+60		23.0
							52+50		20.7
							52+40		20.0

SF TODAY 0.00

SF TO DATE 91524.00

COMMENTS

NORTH TRENCH

GEO-CON: Suzanne C. Sepo

OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/12/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, AM drizzle; 22 - 34 degrees RIG NUMBER:

EXCAVATION

STATION	DEPTH TOP KEY	DEPTH BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH
38+50	33.2	37.0	37.1	10.0	371.0	3.4
38+60	33.2	36.9	37.0	10.0	369.5	3.4
38+70	33.1	36.7	36.8	10.0	368.0	3.4
38+80	33.1	36.8	36.8	10.0	367.5	3.3
38+90	33.0	36.9	36.9	10.0	368.5	3.3
39+00	33.1	36.8	36.9	10.0	368.5	3.3
39+10	33.1	36.8	36.8	10.0	368.0	3.2
39+20	33.2	37.0	36.9	10.0	369.0	3.3
39+30	33.1	37.3	37.2	10.0	371.5	3.2
39+40	33.1	37.4	37.4	10.0	373.5	3.1

SF TODAY 3695.00

SF TO DATE 69721.22

BACKFILL SLOPE

STATION	START OF SHIFT	END OF SHIFT
36+00	TOPOUT	TOPOUT
36+10	8.1	TOPOUT
36+20	10.9	TOPOUT
36+30	11.4	TOPOUT
36+40	11.7	TOPOUT
36+50	14.3	TOPOUT
36+60	16.5	TOPOUT
36+70	19.5	TOPOUT
36+80	22.5	8.9
36+90	23.6	13.7
37+00	25.1	15.2
37+10	27.5	16.5
37+20	28.3	16.6
37+30	28.9	17.5
37+40	29.6	17.9
37+50	30.0	18.2
37+60	30.2	18.8
37+70	30.4	19.4
37+80	30.5	20.7
37+90	32.2	21.6
38+00	32.5	23.2
38+10	35.7	25.8
38+20	37.1	26.0
38+30	37.3	26.4
38+40	37.2	26.8
38+50	36.7	27.3
38+60	36.6	28.7
38+70	36.4	29.6
38+80		30.4
38+90		32.4
39+00		34.8
39+10		35.1
39+20		36.2
39+30		37.3

COMMENTS
SE Trench

GEO-CON: Suzanne E. Sepic OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/12/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy, AM drizzle; 22 - 34 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A							37+40		37.4

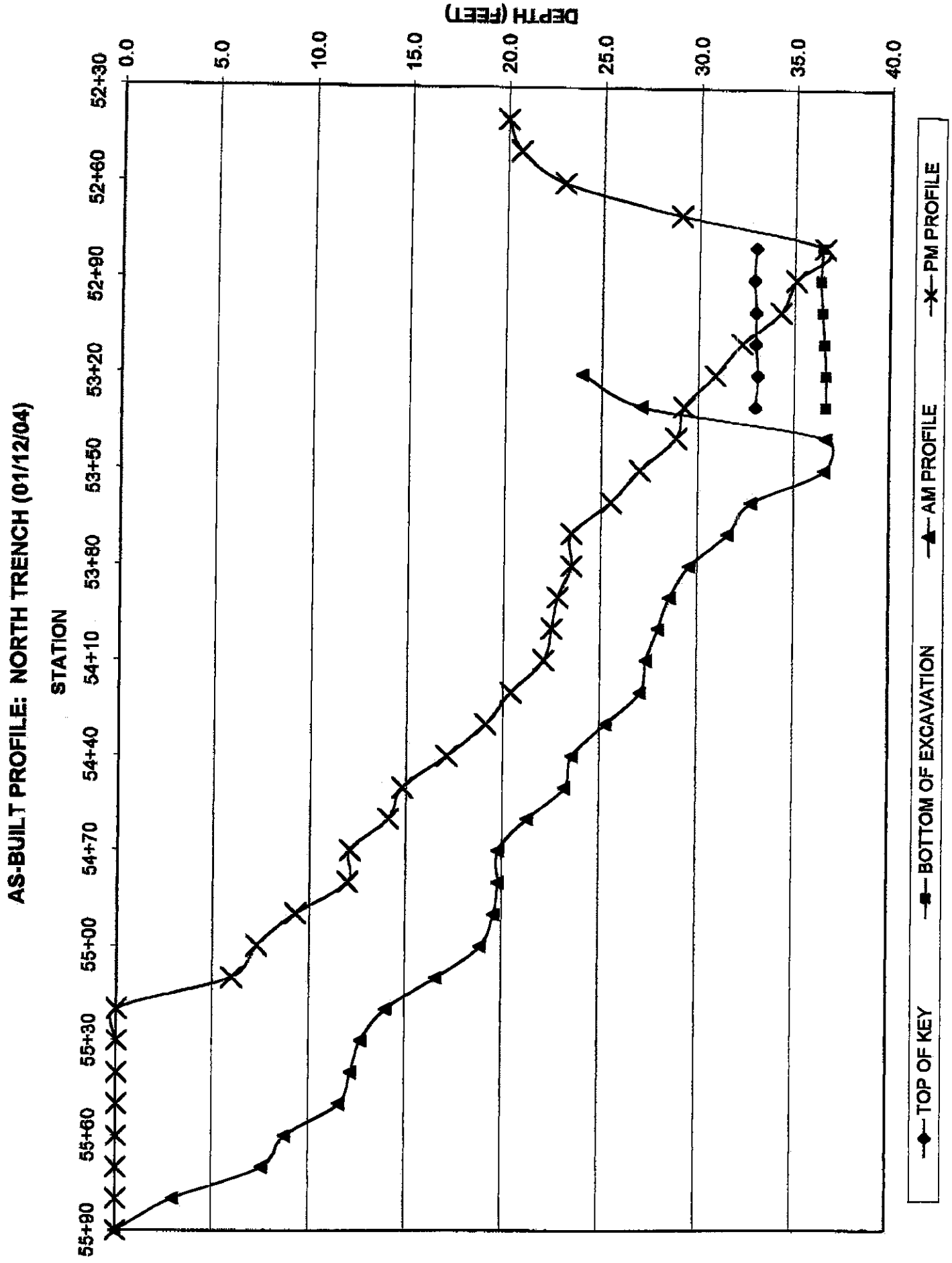
SF TODAY 0.00

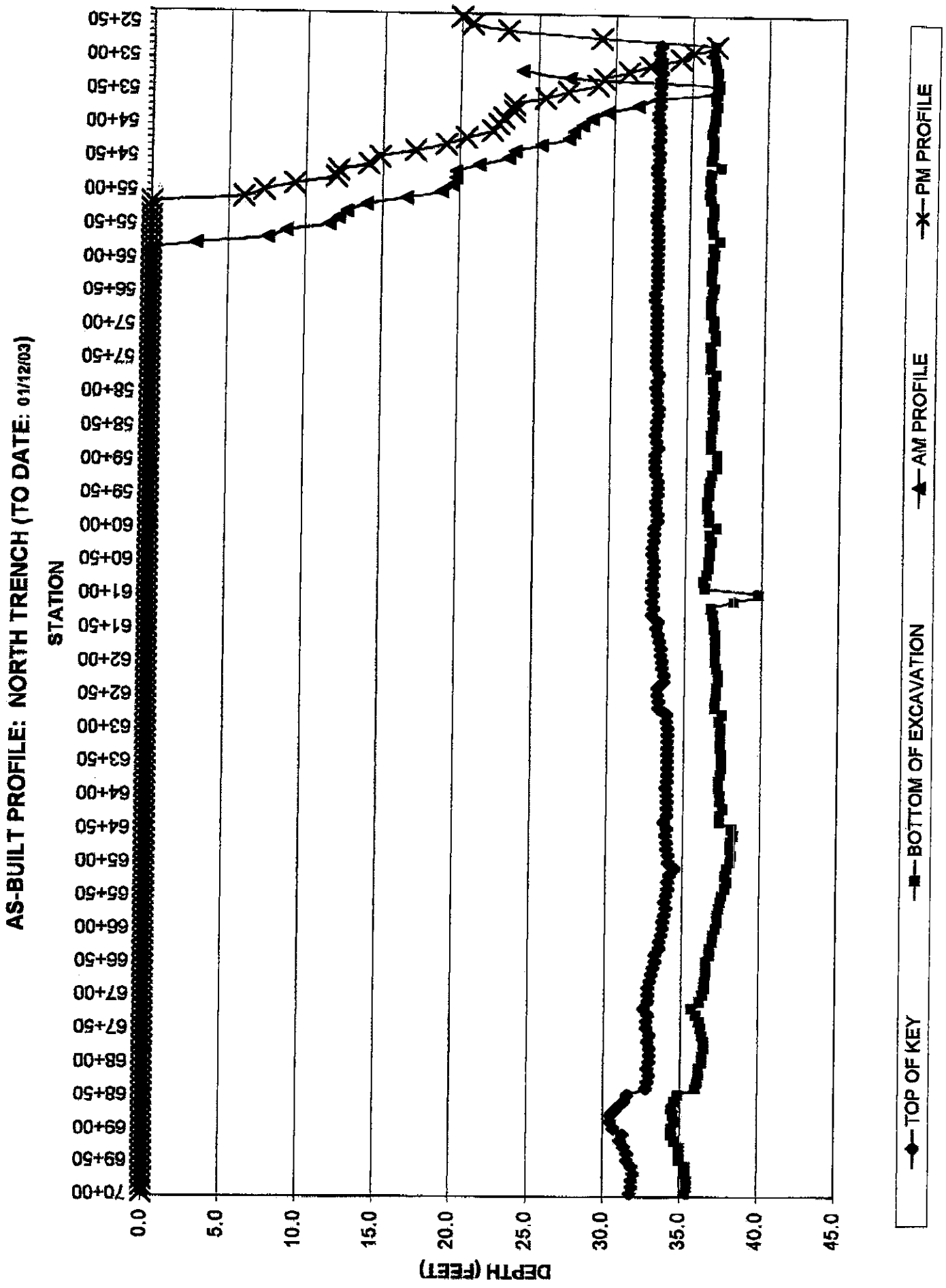
SF TO DATE 69721.22

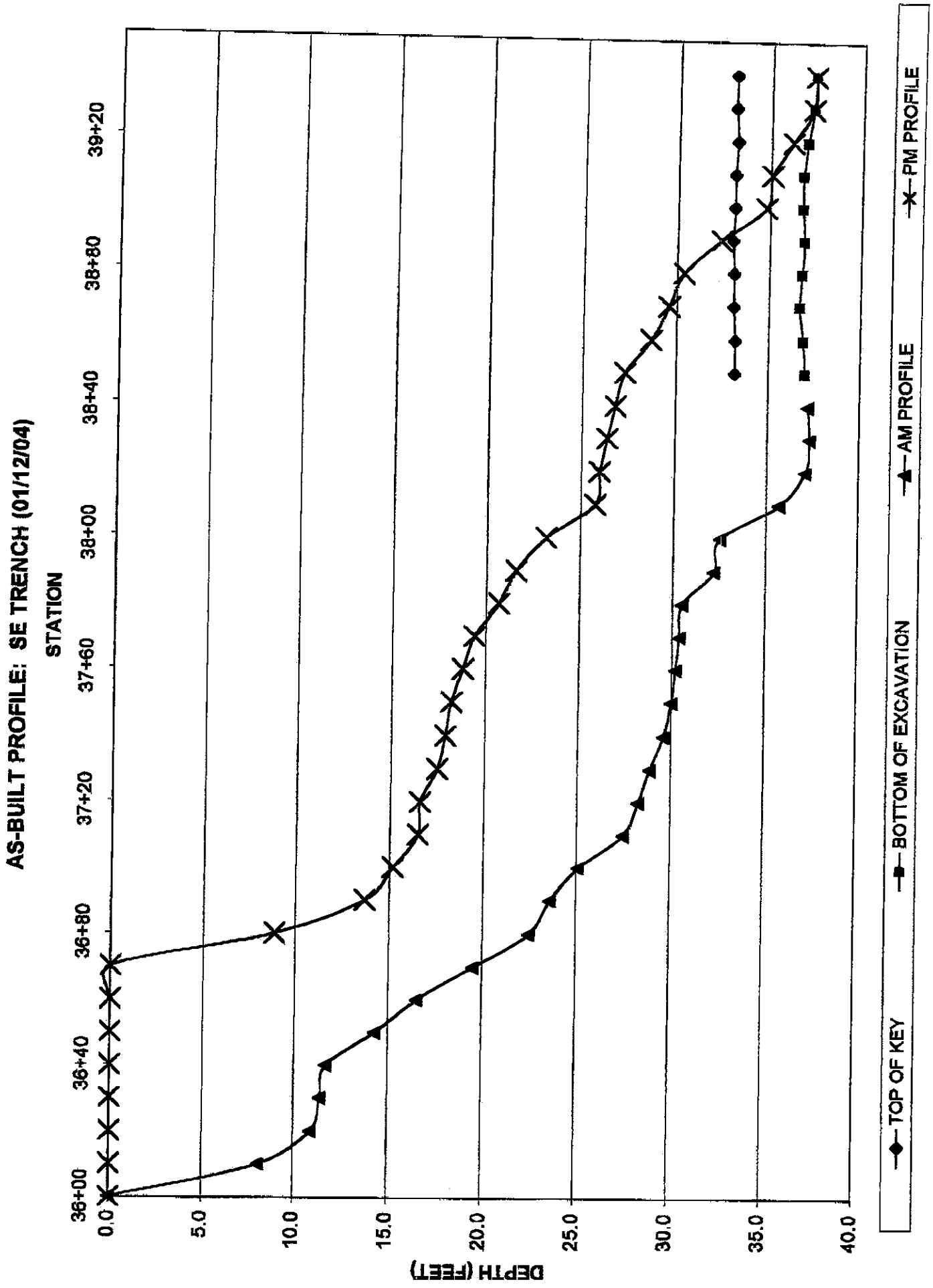
COMMENTS

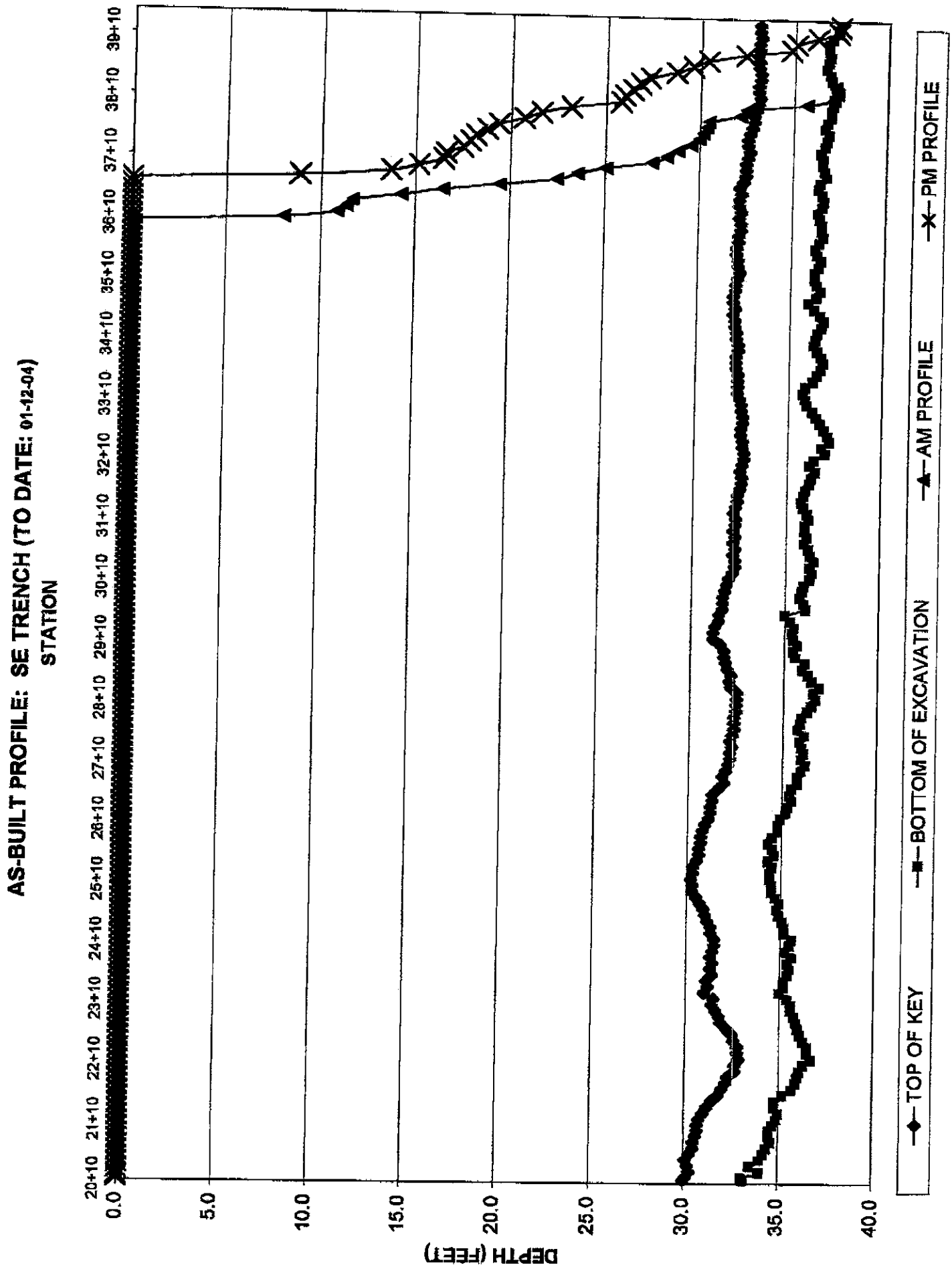
SE Trench

GEO-CON: Suzanne C. Sepic OWNER:


AS-BUILT PROFILE: NORTH TRENCH (01/12/04)
STATION
55+90
55+60
55+30
55+00
54+70
54+40
54+10
53+80
53+50
53+20
52+90
52+60
52+30
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NORTH TRENCH (TO DATE: 01/12/03)
STATION
70+00
69+50
69+00
68+50
68+00
67+50
67+00
66+50
66+00
65+50
65+00
64+50
64+00
63+50
63+00
62+50
62+00
61+50
61+00
60+50
60+00
59+50
59+00
58+50
58+00
57+50
57+00
56+50
56+00
55+50
55+00
54+50
54+00
53+50
53+00
52+50
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (01/12/04)
STATION
36+00
36+40
36+80
37+20
37+60
38+00
38+40
38+80
39+20
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE: 01-12-04)
STATION
20+10
21+10
22+10
23+10
24+10
25+10
26+10
27+10
28+10
29+10
30+10
31+10
32+10
33+10
34+10
35+10
36+10
37+10
38+10
39+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/12/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	8:40	51	> 40 sec	64	> 64 pcf	8	6.5 - 10	17	< 20 cm^3	.1
PM	—	—	> 40 sec	—	> 64 pcf	—	6.5 - 10	—	< 20 cm^3	—

NORTH TRENCH

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:55	48	> 40 sec	[redacted]						
PM	—	—	> 40 sec	[redacted]						

* BATCH PLANT SHUTDOWN IN AFTERNOON BECAUSE THE ELECTRICITY WAS SHUT OFF.

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
6:30	53+30	2	53	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	1.5	24	MAX 30%
6:30	53+30	34	58	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	1.5	25	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:53	52+90	2	58	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	29	< 25 cm^3	.8	37	MAX 30%
13:53	52+90	20*	59	40 - 90 sec	93.5	64 - 95 pcf	8	6.5 - 10	30	< 25 cm^3	1.0	38	MAX 30%

* Just started new cut. This was as deep as the trench was at sampling time.

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
55+75	4.5	2" to 6"	116.5	+15 pcf over trench slurry	4.02×10^{-7}	1.0×10^{-7} cm/sec
55+50	4.5	2" to 6"	116	+15 pcf over trench slurry	2.61×10^{-7}	1.0×10^{-7} cm/sec
55+25	4.5	2" to 6"	116	+15 pcf over trench slurry	2.53×10^{-7}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: 55+75, 55+50, 55+25 Technician: SM/MM √ SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm² Sample Height: L= 6.5cm 6.5cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/ co (1)
55+75	01/12/04	8:28-12:28	240	10	108.2128	559261.0644	–	54	4.02×10^{-7}	2.74
55+50	01/12/04	8:28-12:28	240	10	108.2128	559261.0644	–	35	2.61×10^{-7}	1.78
55+25	01/12/04	8:28-12:28	240	10	108.2128	559261.0644	–	34	2.53×10^{-7}	1.73

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 01/12/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec	[redacted]						
PM			> 40 sec							

SE TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:00	38+50	2	54	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	1.4	25	MAX 30%
7:00	38+50	35	58	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	25	< 25 cm^3	1.5	28	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:18	39+40	2	55	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	28	< 25 cm^3	.9	30	MAX 30%
13:18	39+40	21 OR	56	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	29	< 25 cm^3	1.0	40	MAX 30%

OR Just started new trench cut. This was as deep as the trench was at sampling time

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
36+25	3	2" to 6"	115	+15 pcf over trench slurry	2.09×10^{-7}	1.0×10^{-7} cm/sec
36+50	3	2" to 6"	115	+15 pcf over trench slurry	2.15×10^{-7}	1.0×10^{-7} cm/sec
36+75	3	2" to 6"	116.5	+15 pcf over trench slurry	8.20×10^{-8}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: 36+25, 36+50, 36+75 Technician: SM/MM ✓ SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm² Sample Height: L= 7.0cm, 7.5cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/cm (1/μ)
36+25	01/12/04	8:28-12:28	240	10	100.4833	519313.7717	–	26	2.09×10^{-7}	1.43
36+50	01/12/04	8:28-12:28	240	10	93.7844	484692.7847	–	25	2.15×10^{-7}	1.47
36+75	01/12/04	8:28-12:28	240	10	108.2188	559261.0614	–	11	8.20×10^{-8}	5.60

I= $\frac{\text{P (psi)}}{0.014217\ \text{L (cm)}}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

SE TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
38+50	587.2	586.6	33.2	553.4	37.0	549.6	3.4	5.1
38+60	587.2	586.7	33.2	553.5	36.9	549.8	3.4	5.1
38+70	587.2	586.6	33.1	553.5	36.7	549.9	3.4	5.1
38+80	587.3	586.5	33.1	553.4	36.8	549.7	3.3	5.0
38+90	587.3	586.8	33.0	553.8	36.9	549.9	3.3	5.0
39+00	587.3	587.1	33.1	554.0	36.8	550.3	3.3	5.0
39+10	587.3	586.9	33.1	553.8	36.8	550.1	3.2	4.8
39+20	587.3	587.0	33.2	553.8	37.0	550.0	3.3	5.0
39+30	587.3	586.6	33.1	553.5	37.3	549.3	3.2	4.8
39+40	587.4	586.9	33.1	553.8	37.4	549.5	3.1	4.7

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED WITH A 1.5:1 SLOPE.

NORTH TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
53+30	586.9	586.5	33.0	553.5	36.7	549.8	6.8	3.5
53+20	586.9	586.5	33.1	553.4	36.7	549.8	6.7	3.5
53+10	586.9	586.5	33.0	553.5	36.6	549.9	6.7	3.5
53+00	586.9	586.6	33.0	553.6	36.5	550.1	6.6	3.5
52+90	587.0	586.6	32.9	553.7	36.4	550.2	6.5	3.5
52+80	587.0	586.6	33.0	553.6	36.5	550.1	6.5	3.5

NOTE: DEPTH TO 30" WIDE COMES FROM PROBING THE SIDEWALLS OF THE TRENCH TO SEE HOW DEEP THE WIDTH AT THE TOP OF THE TRENCH IS.

NORTH TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
54+80	586.8	586.4	33.0	553.4	36.3	550.1	6.1	3.5
54+70	586.8	586.4	32.9	553.5	36.4	550.0	6.1	3.5
54+60	586.8	586.4	32.9	553.5	37.0	549.4	6.2	3.5
54+50	586.8	586.5	33.0	553.5	36.4	550.1	6.3	3.5
54+40	586.7	586.6	33.0	553.6	36.5	550.1	6.2	4.0
54+30	586.7	586.8	32.9	553.9	36.5	550.3	6.3	4.0
54+20	586.7	586.6	33.0	553.6	36.5	550.1	6.4	4.0
54+10	586.7	586.9	33.0	553.9	36.4	550.5	6.6	4.0
54+00	586.6	586.9	33.0	553.9	36.5	550.4	6.5	4.0
53+90	586.7	586.6	32.9	553.7	36.6	550.0	6.6	4.0
53+80	586.7	586.7	32.9	553.8	36.6	550.1	6.7	4.0
53+70	586.7	586.7	33.0	553.7	36.7	550.0	6.7	4.0
53+60	586.7	586.5	33.0	553.5	36.6	549.9	6.8	4.0
53+50	586.8	586.5	33.0	553.5	36.7	549.8	6.9	4.0
53+40	586.8	586.5	33.0	553.5	36.7	549.8	6.8	4.0

NOTE: DEPTH TO 30" WIDE COMES FROM PROBING THE SIDEWALLS OF THE TRENCH TO SEE HOW DEEP THE WIDTH AT THE TOP OF THE TRENCH IS.

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)

Date Shipped: 13-Jan-04

Carrier: DIRECT–LAB PICKUP

Phone: (724) 366-9311

Airbill No: N/A

Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL

PROJECT NO P01-048

P.O.# 78406

Relinquished by: (Signature) — Received By: — Date / Time:

Relinquished by: (Signature) — Received By: — Date / Time:

Relinquished by: (Signature) — Received at lab by: — Date / Time:

Relinquished from lab by: (Signature) — Received By: — Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-068 (NW53+00)	SOIL ONLY	53+00	01/12/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-069 (SE39+00)	SOIL ONLY	39+00	01/12/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-080 (NW55+50)	SB BACKFILL**	55+50	01/12/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-081 (SE36+50)	SB BACKFILL**	36+50	01/12/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

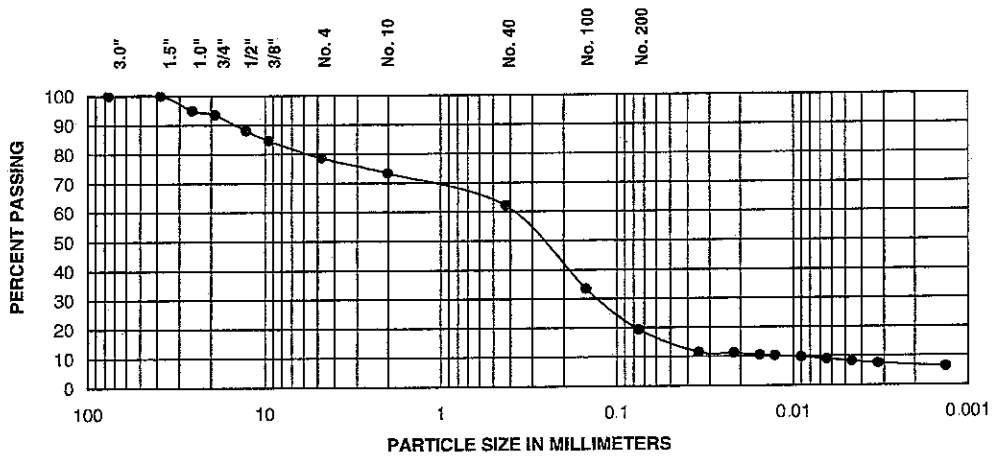
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-080 (NW 55+50)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/13/2004
Sample Location	55+50 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	21.3	59.2	11.0	8.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	94.9
3/4"	93.6
1/2"	88.1
3/8"	84.7
No. 4	78.7
No. 10	73.3
No. 40	62.1
No. 100	33.5
No. 200	19.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
25	20	5

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

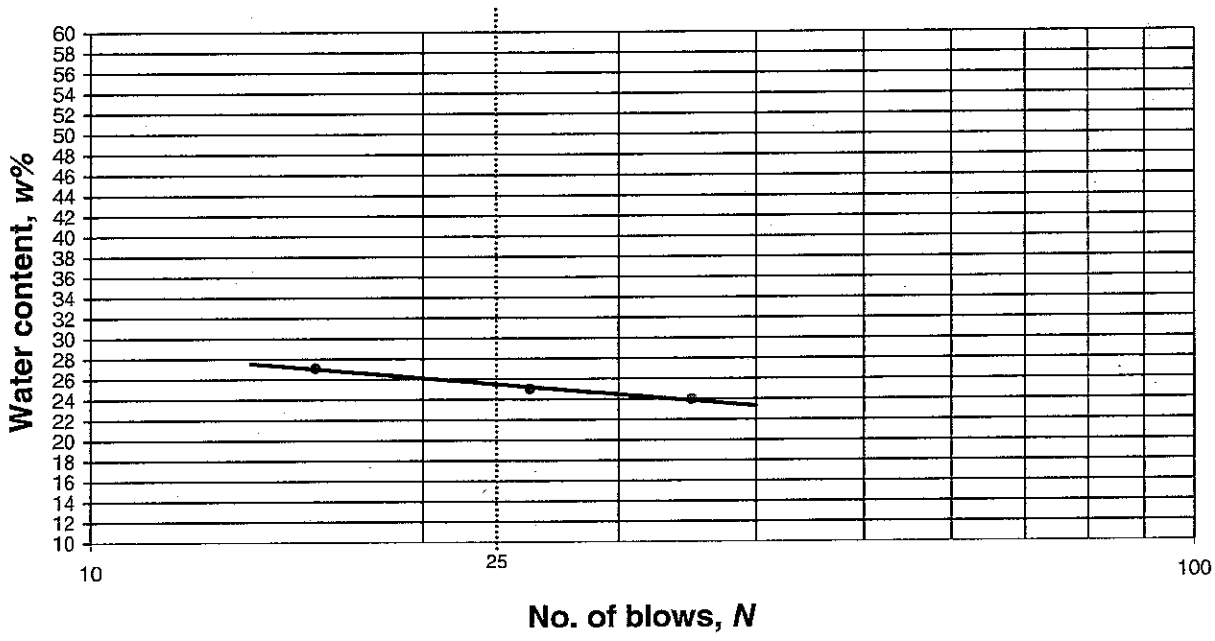
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-080 (NW 55+50)	**Date Tested**	1/16/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/13/2004
Sample Location	55+50 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	25	**Plastic Limit, PL**	20	**Plasticity Index, PI**	5

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/15/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-080 (NW 55+50)	Date Recd.	1/13/04	**Location**	55+50 (NW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.63	cm	Volume, V:	269.9	cu cm
Mass of Sample:	515.7	g	**Moisture Content:**	**26.6**	%
			Wet Density	**119.2**	**pcf**
			Dry Density	**94.2**	**pcf**

Final

Diameter:	7.03	cm	Area, A:	38.8	sq cm
Height, L:	6.02	cm	Volume, V:	233.7	cu cm
Mass of Sample:	498.50	g	**Moisture Content:**	**19.3**	%
			Wet Density	**133.1**	**pcf**
			Dry Density	**111.6**	**pcf**
			Deg of Saturation	**98.7**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	19.1	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/15/2004	9:15 AM	0	0	3.09	6.06		20.0	---
1/15/2004	10:00 AM	2700	2700	3.11	6.04	1.0	20.0	8.19E-09
1/15/2004	10:45 AM	2700	5400	3.15	6.00	1.0	20.0	1.64E-08
1/15/2004	11:30 AM	2700	8100	3.18	5.97	1.0	20.0	1.24E-08
1/15/2004	12:15 PM	2700	10800	3.22	5.93	1.0	20.0	1.65E-08

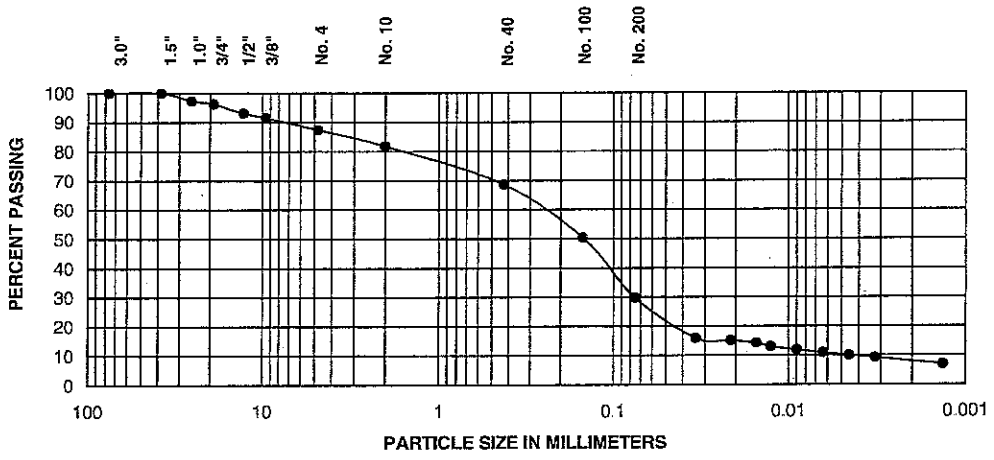
Average Permeability = **1.3E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-081 (SE 36+50)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/13/2004
Sample Location	36+50 (SE)
Sample Description	Gray silty clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	12.6	57.5	19.5	10.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.3
3/4"	96.3
1/2"	93.1
3/8"	91.6
No. 4	87.4
No. 10	81.9
No. 40	68.7
No. 100	50.4
No. 200	29.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
26	18	8

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

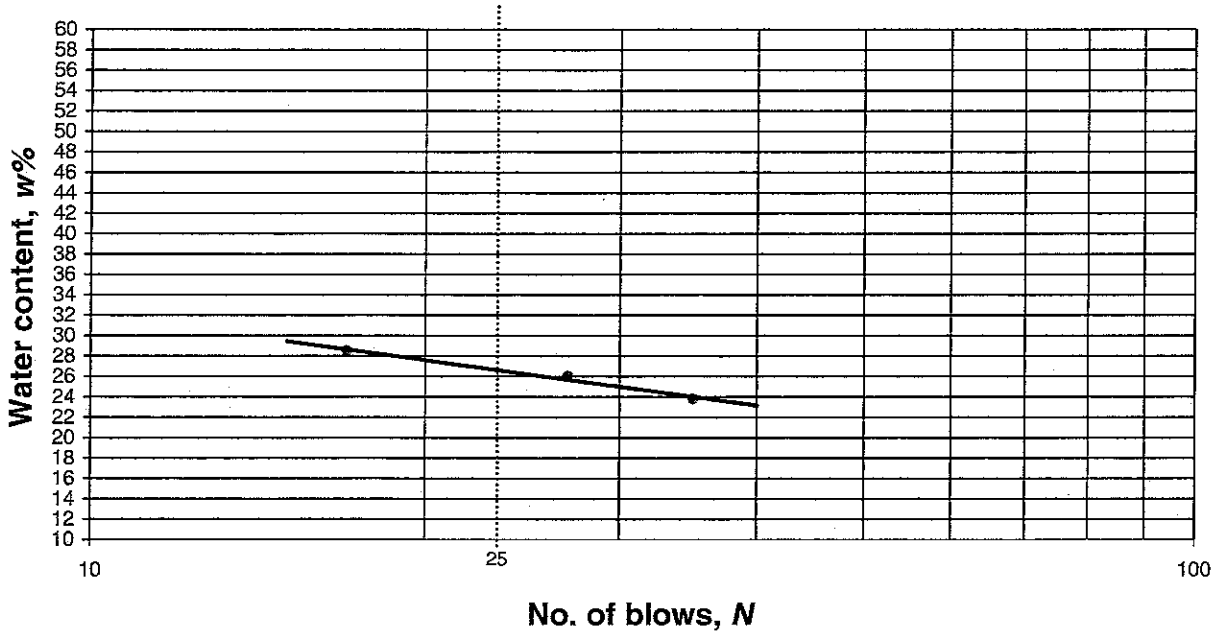
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-081 (SE 36+50)	**Date Tested**	1/16/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/13/2004
Sample Location	36+50 (SE)
Sample Description	Gray silty clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**26**	**Plastic Limit, PL**	**18**	**Plasticity Index, PI**	**8**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing							
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic							
File #	2746	**Date Tested**		1/15/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-081 (SE 36+50)	Date Recd.	1/13/04	**Location**	36+50 (SE)			
Sample Description	Gray silty clayey sand with traces of gravel (SB Backfill)							

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.95	cm	Volume, V:	242.3	cu cm
Mass of Sample:	465.1	g	**Moisture Content:**	**23.8**	%
			Wet Density	**119.8**	**pcf**
			Dry Density	**96.7**	**pcf**

Final

Diameter:	7.09	cm	Area, A:	39.5	sq cm
Height, L:	5.51	cm	Volume, V:	217.5	cu cm
Mass of Sample:	441.90	g	**Moisture Content:**	**22.3**	%
			Wet Density	**126.8**	**pcf**
			Dry Density	**103.6**	**pcf**
			Deg of Saturation	**93.6**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.3	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/15/2004	9:15 AM	0	0	3.58	5.97		20.0	---
1/15/2004	10:00 AM	2700	2700	3.68	5.88	1.1	20.0	3.41E-08
1/15/2004	10:45 AM	2700	5400	3.76	5.81	1.1	20.0	2.68E-08
1/15/2004	11:30 AM	2700	8100	3.86	5.72	1.1	20.0	3.47E-08
1/15/2004	12:15 PM	2700	10800	3.93	5.66	1.2	20.0	2.33E-08

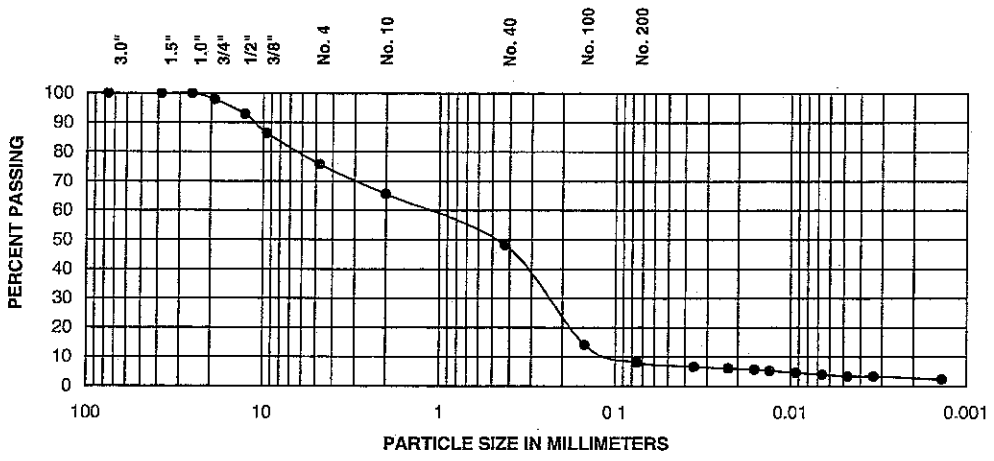
Average Permeability = **3.0E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-068 (NW 53+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/13/2004
Sample Location	53+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	24.2	67.6	4.7	3.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.21	0.24	0.09	13.1	0.53

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	97.9
1/2"	92.9
3/8"	86.3
No. 4	75.8
No. 10	65.7
No. 40	48.2
No. 100	14.2
No. 200	8.2

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

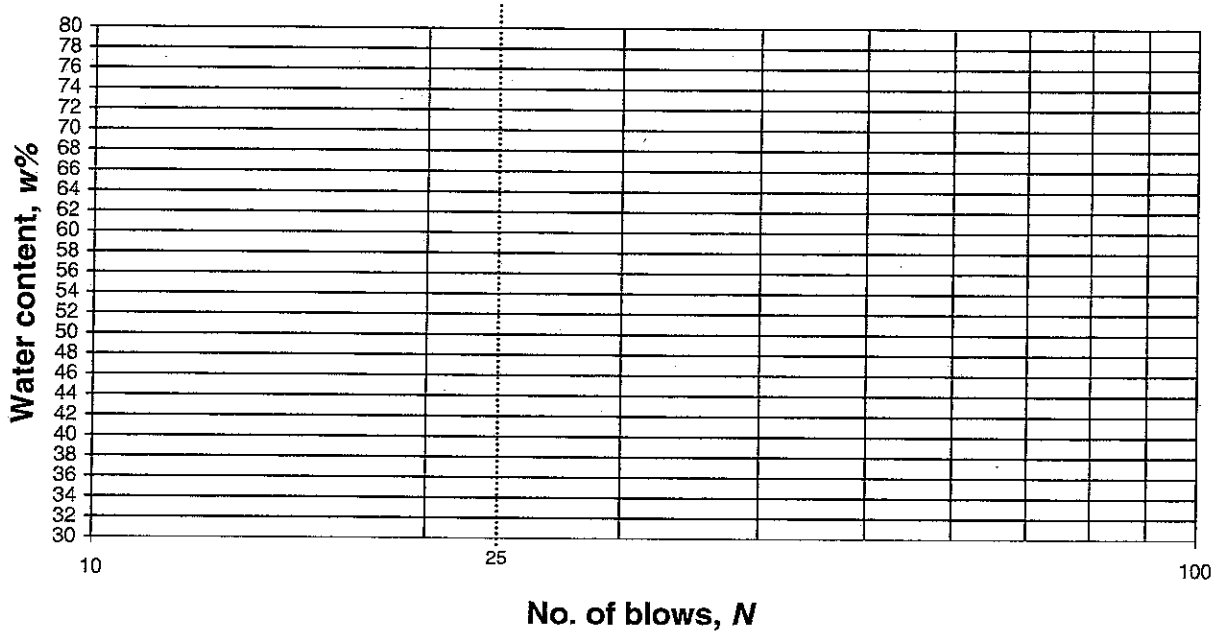
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-068 (NW 53+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/13/2004
Sample Location	53+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	23	Date	1/13/2004	Sheet	1
				Date of weighing	1/14/2004	Tested by	NP

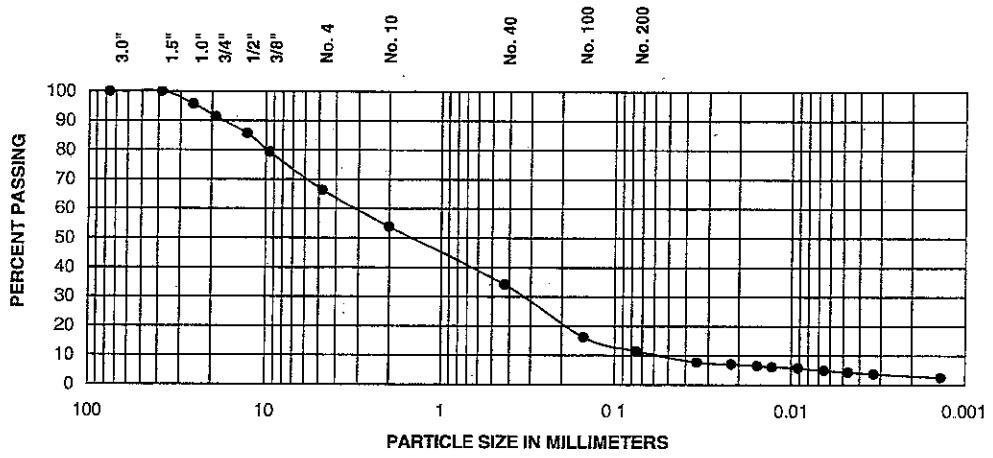
Boring No.	-	-				
Sample No.	BF-068 (SE35+00)	BF-069(SE39+00)				
Location	53 + 00 (NW)	39 + 00 (SE)				
Tin No.	30C	52A				
Tin + Wet Soil	199.56	163.39				
Tin + Dry Soil	176.85	146.13				
Wt. of Tin	31.1	30.12				
Wt. of Dry Soil	145.8	116.0				
Wt. of Water	22.7	17.3				
Moisture, %	15.6	14.9				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-069 (SE 39+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/13/2004
Sample Location	39+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foull smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	33.6	54.9	6.9	4.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	3.05	0.33	0.06	55.5	0.65

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	95.8
3/4"	91.5
1/2"	85.7
3/8"	79.4
No. 4	66.4
No. 10	53.9
No. 40	34.3
No. 100	16.3
No. 200	11.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

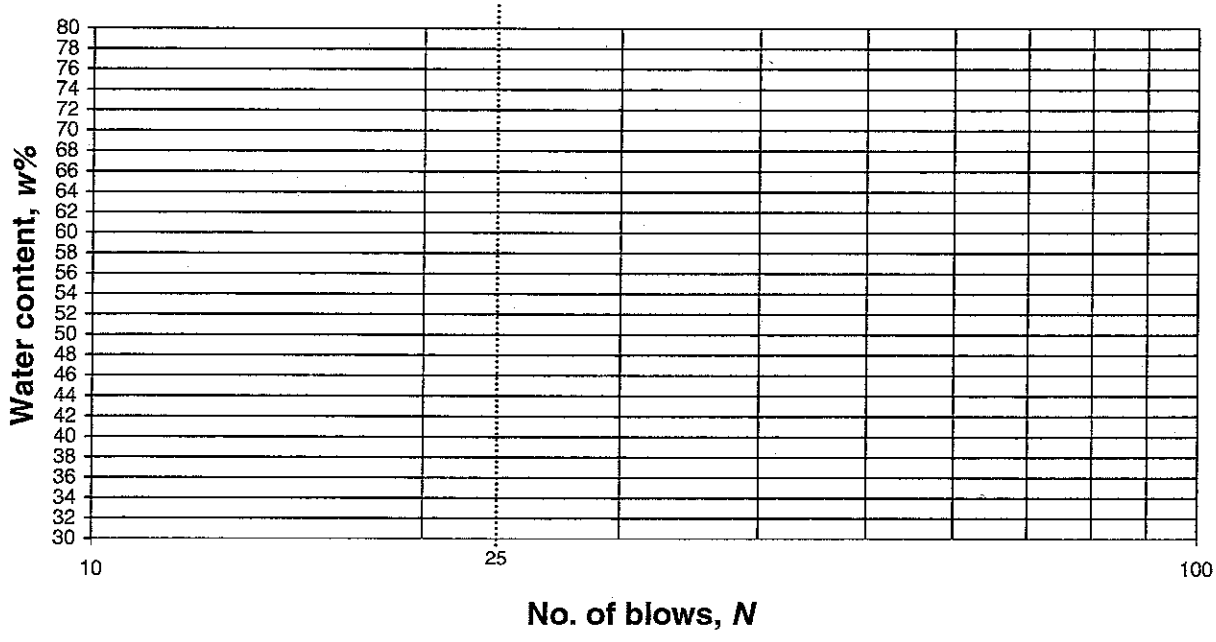
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-069 (SE 39+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/13/2004
Sample Location	39+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foull smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	23	Date	1/13/2004	Sheet	1
				Date of weighing	1/14/2004	Tested by	NP

Boring No.	-	-				
Sample No.	BF-068 (SE35+00)	BF-069(SE39+00)				
Location	53 + 00 (NW)	39 + 00 (SE)				
Tin No.	30C	52A				
Tin + Wet Soil	199.56	163.39				
Tin + Dry Soil	176.85	146.13				
Wt. of Tin	31.1	30.12				
Wt. of Dry Soil	145.8	116.0				
Wt. of Water	22.7	17.3				
Moisture, %	15.6	14.9				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/13/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 21 - 33 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
52+70	2.00	96.00	38.00	48.00	57.00	8
52+70	34.00	98.00	40.00	41.00	69.00	8
51+90	2.00	92.00	25.00	20.00	53.00	8
51+90	34.00	94.00	28.00	23.00	57.00	8

NORTH TRENCH

COMMENTS: Morning slurry properties were high due to backfilling to keep the level up and not pumping fresh slurry because we were cutting slurry line and fixing a minor problem on the pump. Fresh slurry was pumped to this trench today to try and keep the slurry in spec.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
52+00	LAB SAMPLE COLLECTED 01/13/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
55+00	3.00	Sample collected	Sample collected	Sample collected	1.04×10^{-7}	yes
54+75	3.00	N/A	N/A	N/A	1.00×10^{-7}	N/A
54+50	3.00	N/A	N/A	N/A	9.26×10^{-8}	N/A
54+25	3.00	N/A	N/A	N/A	1.12×10^{-7}	N/A

COMMENTS

Filter cake: 2.0mm, 2.0mm, .5mm, and .5mm respectively.

Unit Weight: 55+00: 116.0 pcf
54+75: 115.0 pcf
54+50: 115.0 pcf
54+25: 118.5 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

North trench stopped placing backfill at 12:00. Moved remaining jumbo bags to the SE trench.

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Susanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/13/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 21 - 33 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
39+50	2.00	92.00	32.00	23.00	60.00	8
39+50	35.00	93.00	38.00	24.00	61.00	8
40+40	2.00	93.00	36.00	19.00	62.00	8
40+40	34.00	94.00	38.00	21.00	62.00	8

SE TRENCH

COMMENTS: Morning slurry properties were high due to backfilling to keep the level up. Did not pump fresh slurry because we were cutting slurry line and fixing a minor problem on the pump. Fresh slurry was pumped to this trench today to try and keep the slurry in spec.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
40+00	LAB SAMPLE COLLECTED 01/13/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
36+75	2.00	N/A	N/A	N/A	5.16×10^{-8}	N/A
37+00	2.00	Sample collected	Sample collected	Sample collected	5.96×10^{-8}	yes
37+25	2.00	N/A	N/A	N/A	5.62×10^{-8}	N/A
37+50	2.00	N/A	N/A	N/A	1.44×10^{-7}	N/A
37+75	2.00	N/A	N/A	N/A	9.09×10^{-8}	N/A
38+00	2.00	Sample collected	Sample collected	Sample collected	1.02×10^{-7}	yes
38+25	2.00	N/A	N/A	N/A	1.63×10^{-7}	N/A
38+50	2.00	N/A	N/A	N/A	1.19×10^{-7}	N/A
38+75	2.00	N/A	N/A	N/A	1.23×10^{-7}	N/A

COMMENTS

Filter cake: 1.0mm, 1.2mm, .8mm, and 1.0mm respectively.

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

Unit Weight:

36+75:	116.0 pcf
37+00:	116.5 pcf
37+25:	116.0 pcf
37+50:	118.0 pcf
37+75:	116.5 pcf
38+00:	116.0 pcf
38+25:	117.0 pcf
38+50:	115.5 pcf
38+75:	118.0 pcf

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/13/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
15:00	64.00	55.00	20.00	8
15:50	-	48.00	-	-
Filter cake is .2mm.				
Batch plant was shut down in the morning because we were cutting slurry line and fixing a minor problem on the pump. Kept slurry level up with backfilling.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E Sepo OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/13/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 21 - 33 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
52+70	33.0	36.7	36.6	10.0	366.0	6.5	55+20	TOPOUT	TOPOUT
52+60	33.0	36.6	36.7	10.0	366.5	6.5	55+10	6.3	TOPOUT
52+50	33.0	36.5	36.6	10.0	365.5	6.4	55+00	7.8	TOPOUT
52+40	32.9	36.5	36.5	10.0	365.0	6.5	54+90	9.7	TOPOUT
52+30	32.9	36.5	36.5	10.0	365.0	6.4	54+80	11.2	TOPOUT
52+20	33.0	36.6	36.6	10.0	365.5	6.4	54+70	11.8	TOPOUT
52+10	33.0	36.7	36.7	10.0	366.5	6.3	54+60	13.4	TOPOUT
52+00	33.0	36.7	36.7	10.0	367.0	6.3	54+50	14.5	TOPOUT
51+90	33.0	36.5	36.6	10.0	366.0	6.2	54+40	16.9	TOPOUT
51+80	33.0	36.5	36.5	10.0	365.0	6.1	54+30	19.1	TOPOUT
51+70	33.0	36.5	36.5	10.0	365.0	6.0	54+20	20.0	TOPOUT
51+60	33.0	36.3	36.4	10.0	364.0	6.0	54+10	21.9	4.3
							54+00	22.0	5.1
							53+90	22.1	6.5
							53+80	23.5	8.2
							53+70	24.0	9.5
							53+60	25.1	12.5
							53+50	26.9	14.0
							53+40	28.8	16.8
							53+30	30.1	16.9
							53+20	30.8	18.2
							53+10	32.0	20.0
							53+00	34.0	23.0
							52+90	34.7	26.0
							52+80	36.0	27.8
							52+70	29.1	28.3
							52+60	23.0	31.1
							52+50	20.7	32.7
							52+40	20.0	33.3
							52+30		35.0
							52+20		36.5
				SF TODAY	4387.00		52+10		36.6
				SF TO DATE	95911.00		52+00		36.6

COMMENTS

NORTH TRENCH

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/13/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 21 - 33 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A							51+90		36.4
							51+80		36.4
							51+70		36.4
							51+60		36.2
							51+50		20.9
							51+40		10.1
				SF TODAY	0.00				
				SF TO DATE	95911.00				

COMMENTS

NORTH TRENCH

GEO-CON: Suzanne C. Depo OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/13/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 21 - 33 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
39+50	33.0	37.2	37.3	10.0	373.0	3.1	36+70	TOPOUT	TOPOUT
39+60	33.0	37.0	37.1	10.0	371.0	3.3	36+80	8.9	TOPOUT
39+70	33.1	37.1	37.1	10.0	370.5	3.4	36+90	13.8	TOPOUT
39+80	33.1	37.2	37.2	10.0	371.5	3.2	37+00	15.4	TOPOUT
39+90	33.2	37.1	37.2	10.0	371.5	3.2	37+10	16.6	TOPOUT
40+00	33.1	37.0	37.1	10.0	370.5	3.0	37+20	16.8	TOPOUT
40+10	33.1	36.8	36.9	10.0	369.0	3.1	37+30	17.5	TOPOUT
40+20	33.0	36.7	36.8	10.0	367.5	3.2	37+40	17.9	TOPOUT
40+30	33.0	36.8	36.8	10.0	367.5	3.2	37+50	18.4	TOPOUT
40+40	33.1	36.6	36.7	10.0	367.0	3.1	37+60	19.0	TOPOUT
40+50	33.1	36.5	36.6	10.0	365.5	3.1	37+70	19.6	TOPOUT
40+60	33.2	36.5	36.5	10.0	365.0	3.2	37+80	20.9	TOPOUT
40+70	33.1	36.7	36.6	10.0	366.0	3.1	37+90	21.8	TOPOUT
40+80	33.0	36.8	36.8	10.0	367.5	3.1	38+00	23.4	TOPOUT
							38+10	26.0	TOPOUT
							38+20	26.1	TOPOUT
							38+30	26.3	TOPOUT
							38+40	26.6	TOPOUT
							38+50	27.0	TOPOUT
							38+60	28.5	TOPOUT
							38+70	29.2	TOPOUT
							38+80	30.3	TOPOUT
							38+90	32.0	8.8
							39+00	34.5	10.5
							39+10	35.0	11.1
							39+20	36.0	13.2
							39+30	37.3	14.9
							39+40	37.4	16.8
							39+50		17.6
							39+60		18.9
							39+70		19.7
							39+80		21.2
							39+90		23.7
							40+00		25.1

SF TODAY 5163.00

SF TO DATE 74884.22

COMMENTS

SE Trench

GEO-CON: Suzanne C. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/13/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 21 - 33 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A							40+10		28.6
							40+20		33.3
							40+30		34.7
							40+40		35.4
							40+50		35.5
							40+60		36.5
							40+70		36.7
							40+80		36.8

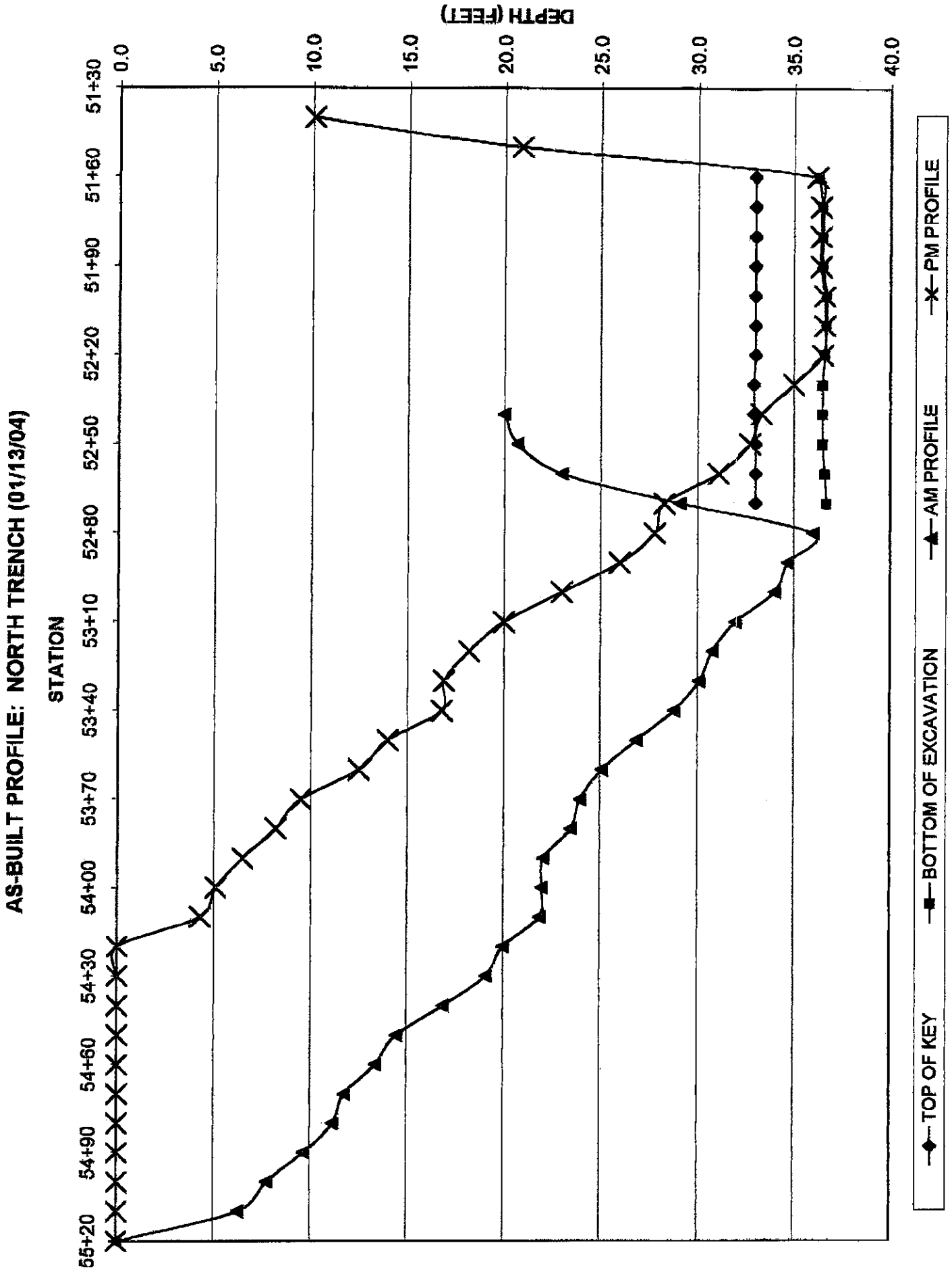
SF TODAY 0.00

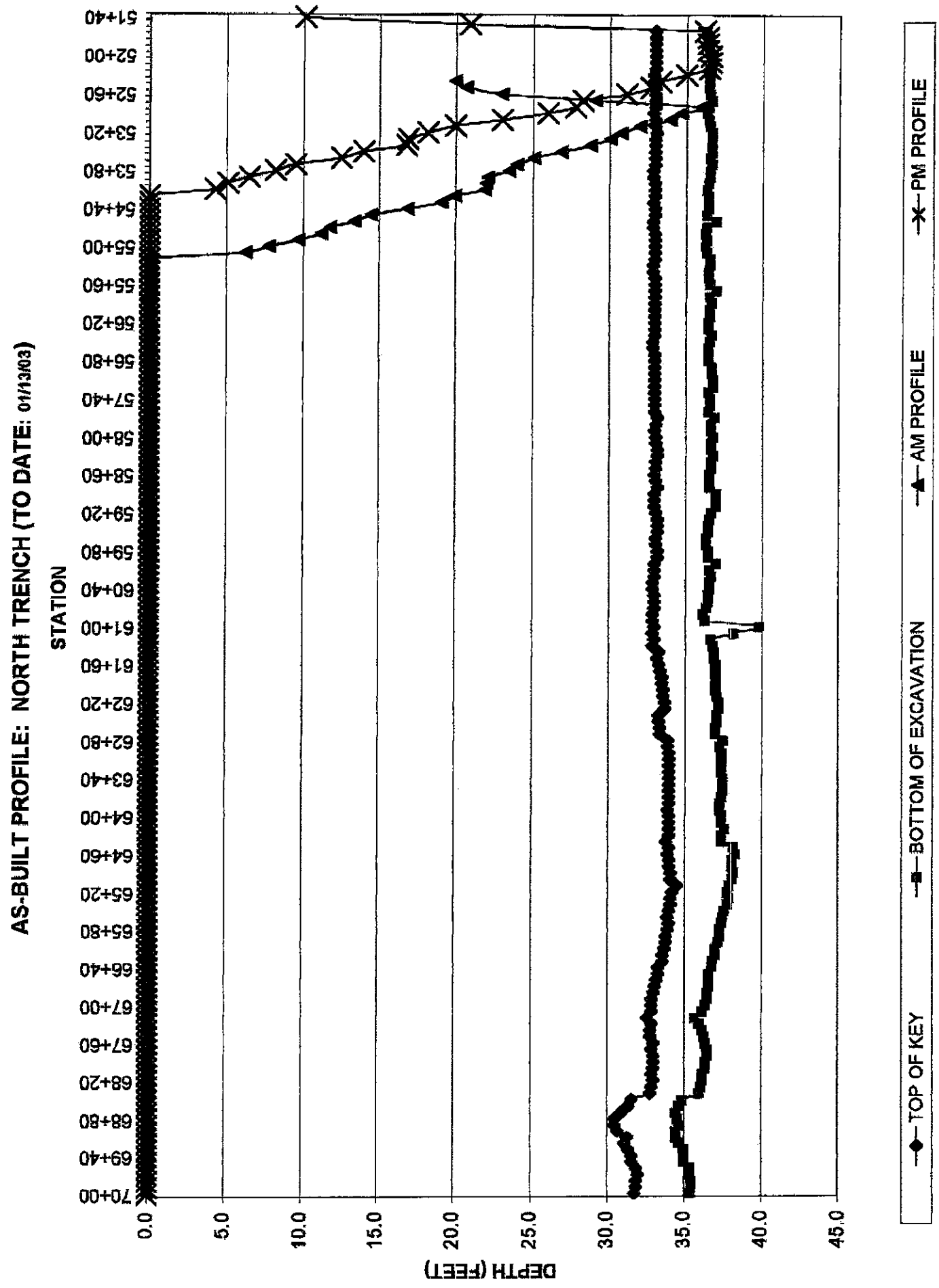
SF TO DATE 74884.22

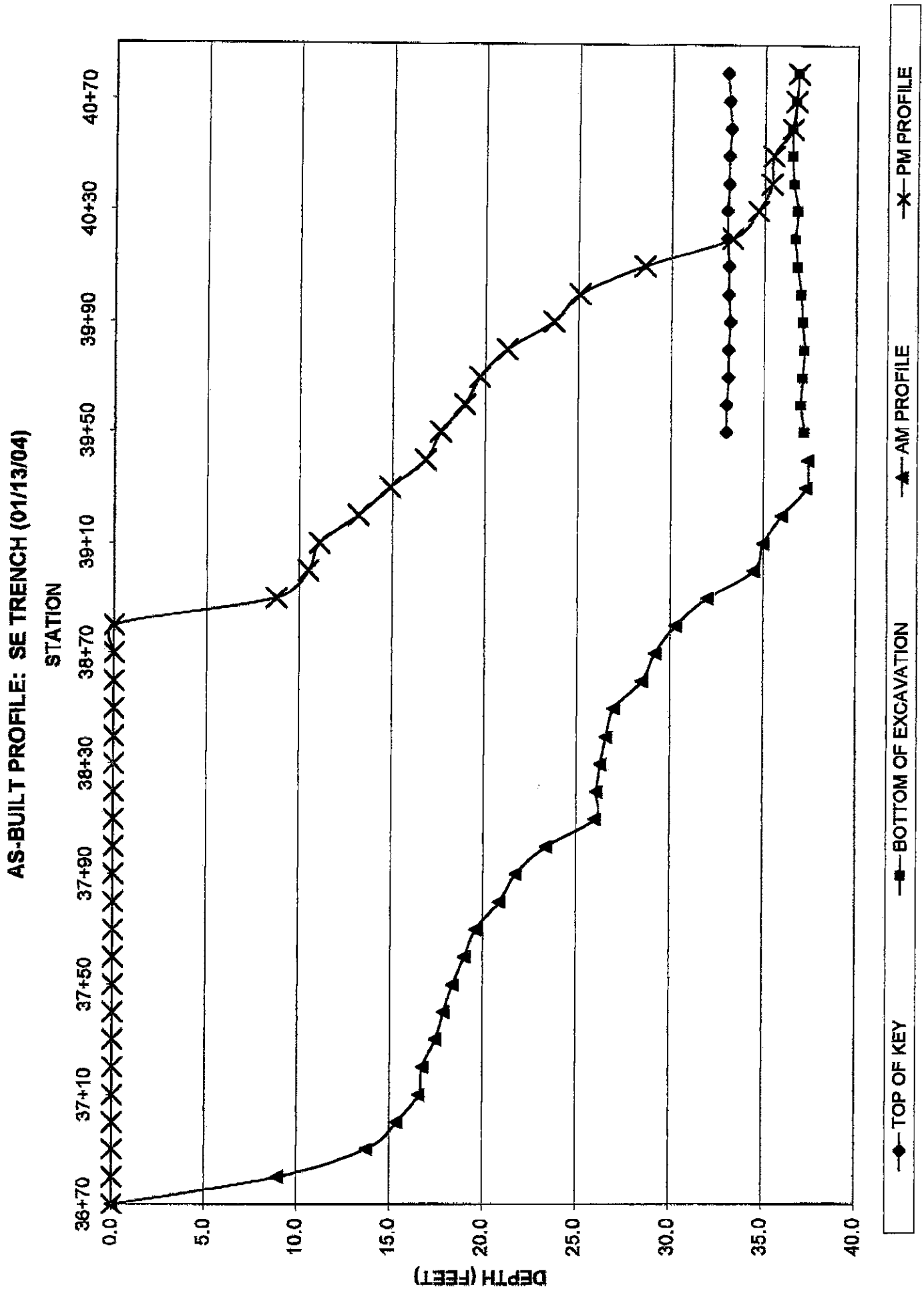
COMMENTS

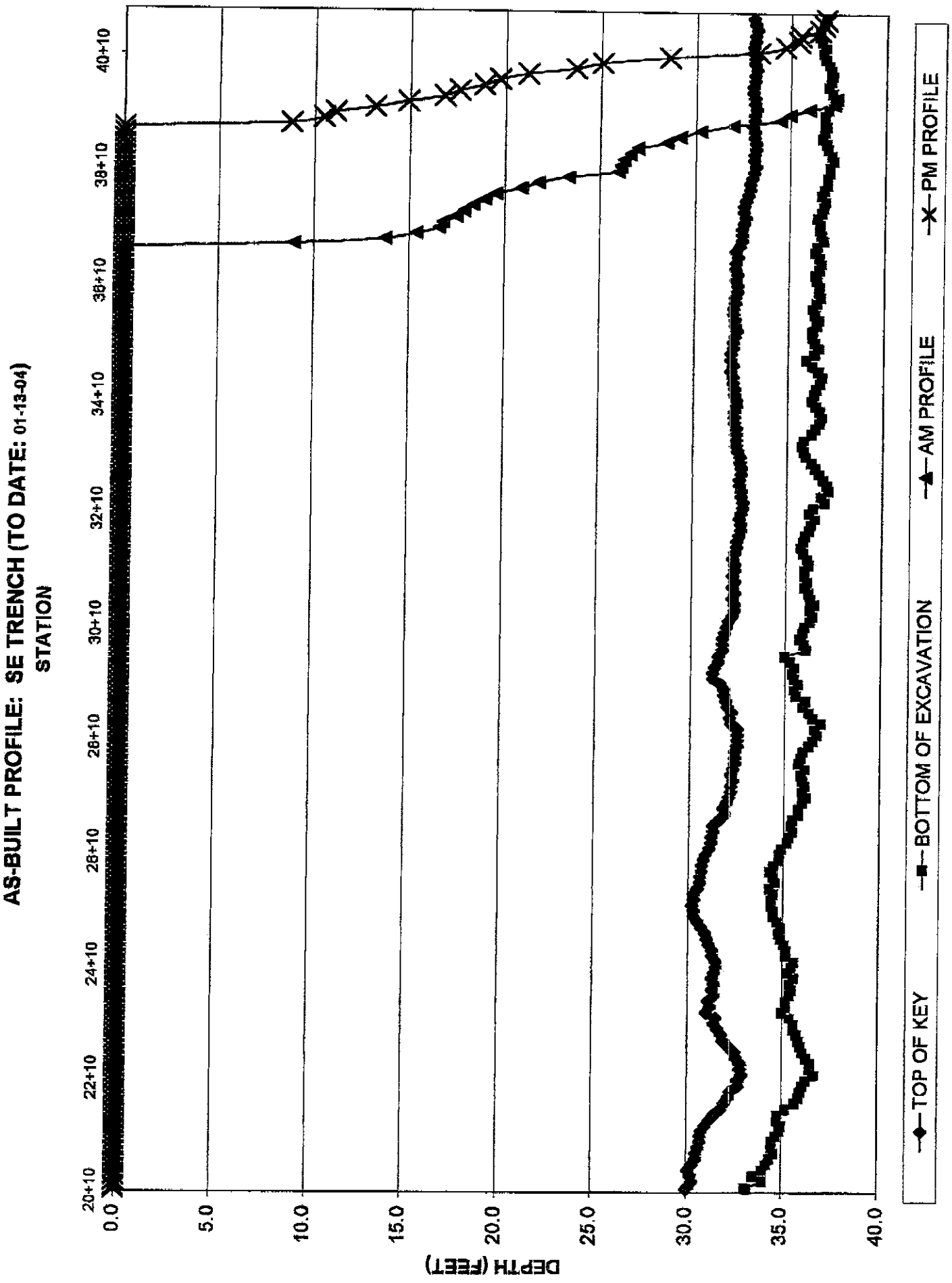
SE Trench

GEO-CON Suzanne E. Sepo OWNER:


AS-BUILT PROFILE: NORTH TRENCH (01/13/04)
STATION
55+20
54+90
54+60
54+30
54+00
53+70
53+40
53+10
52+80
52+50
52+20
51+90
51+60
51+30
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NORTH TRENCH (TO DATE: 01/13/03)
STATION
70+00
69+40
68+80
68+20
67+60
67+00
66+40
65+80
65+20
64+60
64+00
63+40
62+80
62+20
61+60
61+00
60+40
59+80
59+20
58+60
58+00
57+40
56+80
56+20
55+60
55+00
54+40
53+80
53+20
52+60
52+00
51+40
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (01/13/04)
STATION
36+70
37+10
37+50
37+90
38+30
38+70
39+10
39+50
39+90
40+30
40+70
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE: 01-13-04)
STATION
20+10
22+10
24+10
26+10
28+10
30+10
32+10
34+10
36+10
38+10
40+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/13/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	—	—	> 40 sec	—	> 64 pcf	—	6.5 - 10	—	< 20 cm^3	—
PM	15:00	55	> 40 sec	64	> 64 pcf	8	6.5 - 10	20	< 20 cm^3	.2

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	—	—	> 40 sec	[redacted]						
PM	15:50	48	> 40 sec							

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

North Trench

*No fresh slurry mixed or pumped in the morning because we were cutting slurry lines & fixing a small problem with the pump. Also, we were tr to close up some of the trenches so the backfill kept the slurry level up.

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
6:45	52+70	2	57	40 - 90 sec	96	64 - 95 pcf	8	6.5 - 10	48	< 25 cm^3	2.0	38	MAX 30%
6:45	52+70	34	69	40 - 90 sec	98	64 - 95 pcf	8	6.5 - 10	41	< 25 cm^3	2.0	40	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:15	51+90	2	53	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	.5	25	MAX 30%
15:15	51+90	34	57	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	.5	28	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

* North Trench stopped placing backfill at 1200*

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
55+00	3	2" to 6"	116	+15 pcf over trench slurry	1.04×10^{-7}	1.0×10^{-7} cm/sec
54+75	3	2" to 6"	115	+15 pcf over trench slurry	1.00×10^{-7}	1.0×10^{-7} cm/sec
54+50	3	2" to 6"	115	+15 pcf over trench slurry	9.28×10^{-8}	1.0×10^{-7} cm/sec
54+25	3	2" to 6"	116.5	+15 pcf over trench slurry	1.12×10^{-7}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: 55+00, 54+75, 54+50, 54+25 Technician: SM/MM √BY SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56 cm^2$ Sample Height: L= 7.0cm, 7.0cm, 6.0cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (i)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/conv (1/14.
55+00	01/13/04	9:54-13:54	240	10	100.4833	519313.7717	—	13	1.04×10^{-7}	7.10x
54+75	01/13/04	9:54-13:54	240	10	100.4833	519313.7717	—	12.5	1.00×10^{-7}	6.82x
54+50	01/13/04	9:54-13:54	240	10	117.2305	605865.9809	—	13.5	9.28×10^{-8}	6.33x
54+25	01/13/04	9:54-13:54	240	10	108.2128	559261.0641	—	15	1.12×10^{-7}	7.64x

I= P (psi) / 0.014217 L (cm) R= Quick Test / Triaxial Test = 1.85

DAILY QC TESTS **DATE** 01/13/04 PAGE 1 OF 2

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec	[redacted]						
PM			> 40 sec							

~~North trench~~ SE TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:20	39+50	2	60	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	1.0	32	MAX 30%
7:20	39+50	35	61	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.2	38	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:30	40+40	2	62	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	19	< 25 cm^3	.8	36	MAX 30%
15:30	40+40	34	62	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	21	< 25 cm^3	1.0	38	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
36+75	2	2" to 6"	116	+15 pcf over trench slurry	5.16×10^{-8}	1.0×10^{-7} cm/sec
37+00	2	2" to 6"	116.5	+15 pcf over trench slurry	5.96×10^{-8}	1.0×10^{-7} cm/sec
37+25	2	2" to 6"	116	+15 pcf over trench slurry	5.62×10^{-8}	1.0×10^{-7} cm/sec
37+50	2	2" to 6"	118	+15 pcf over trench slurry	1.44×10^{-7}	1.0×10^{-7} cm/sec
37+75	2	2" to 6"	116.5	+15 pcf over trench slurry	9.09×10^{-8}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS

DATE 01/13/04

SE TRENCH

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec	[redacted]						
PM			> 40 sec							

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
38+00	2	2" to 6"	116	+15 pcf over trench slurry	1.02×10^{-7}	1.0×10^{-7} cm/sec
38+25	2	2" to 6"	117	+15 pcf over trench slurry	1.63×10^{-7}	1.0×10^{-7} cm/sec
38+50	2	2" to 6"	115.5	+15 pcf over trench slurry	1.19×10^{-7}	1.0×10^{-7} cm/sec
38+75	2	2" to 6"	118	+15 pcf over trench slurry	1.23×10^{-7}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 36+75, 37+00, 37+25, 37+50, 37+75, 38+00, 38+25, 38+50, 38+75

Technician: SM/MM VBA SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 7.0cm, 6.0cm, 7.0cm, 6.0cm, 6.5cm, 6.0cm, 7.0cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/(cm). (1/14.
36+75	01/13/04	9:54-13:54	240	10	117.2305	605865.9809	—	7.5	5.16×10^{-8}	3.52
37+00	01/13/04	9:54-13:54	240	10	108.2128	559261.0644	—	8	5.96×10^{-8}	4.07 x
37+25	01/13/04	9:54-13:54	240	10	100.4833	519313.7717	—	7	5.62×10^{-8}	3.84x
37+50	01/13/04	18:00-6:00	720	10	100.4833	519313.7717	—	54	1.44×10^{-7}	9.83x1
37+75	01/13/04	18:00-6:00	720	10	100.4833	519313.7717	—	34	9.09×10^{-8}	6.20x
38+00	01/13/04	18:00-6:00	720	10	117.2305	605865.9809	—	44.5	1.02×10^{-7}	6.96x1
38+25	01/13/04	18:00-6:00	720	10	100.4833	519313.7717	—	61	1.63×10^{-7}	1.11x10
38+50	01/13/04	18:00-6:00	720	10	117.2305	605865.9809	—	52	1.19×10^{-7}	8.12x1
38+75	01/13/04	18:00-6:00	720	10	108.2128	559261.0644	—	49.5	1.23×10^{-7}	8.40x

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

NORTH TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
52+70	587.2	586.8	33.0	553.8	36.7	550.1	6.5	3.5
52+60	587.3	586.8	33.0	553.8	36.6	550.2	6.5	3.5
52+50	587.4	587.0	33.0	554.0	36.5	550.5	6.4	3.5
52+40	587.4	587.0	32.9	554.1	36.5	550.5	6.5	3.5
52+30	586.5	587.1	32.9	554.2	36.5	550.6	6.4	4.0
52+20	587.5	586.4	33.0	553.4	36.6	549.8	6.4	4.0
52+10	587.6	586.7	33.0	553.7	36.7	550.0	6.3	4.0
52+00	587.6	586.7	33.0	553.7	36.7	550.0	6.3	4.0
51+90	587.6	586.6	33.0	553.6	36.5	550.1	6.2	3.5
51+80	587.6	586.6	33.0	553.6	36.5	550.1	6.1	3.5
51+70	587.6	586.5	33.0	553.5	36.5	550.0	6.0	3.5
51+60	587.6	586.6	33.0	553.6	36.3	550.3	6.0	3.5

NOTE: DEPTH TO 30" WIDE COMES FROM PROBING THE SIDEWALLS OF THE TRENCH TO SEE HOW DEEP THE WIDTH AT THE TOP OF THE TRENCH IS.

SE TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
39+50	587.4	586.9	33.0	553.9	37.2	549.7	3.1	4.7
39+60	587.4	587.1	33.0	554.1	37.0	550.1	3.3	5.0
39+70	587.4	587.2	33.1	554.1	37.1	550.1	3.4	5.1
39+80	587.4	586.9	33.1	553.8	37.2	549.7	3.2	4.8
39+90	587.4	587.0	33.2	553.8	37.1	549.9	3.2	4.8
40+00	587.5	586.9	33.1	553.8	37.0	549.9	3.0	4.5
40+10	587.5	587.1	33.1	554.0	36.8	550.3	3.1	4.7
40+20	587.5	587.2	33.0	554.2	36.7	550.5	3.2	4.8
40+30	587.5	587.1	33.0	554.1	36.8	550.3	3.2	4.8
40+40	587.4	586.9	33.1	553.8	36.6	550.3	3.1	4.7
40+50	587.4	587.1	33.1	554.0	36.5	550.6	3.1	4.7
40+60	587.4	587.1	33.2	553.9	36.5	550.6	3.2	4.8
40+70	587.3	587.0	33.1	553.9	36.7	550.3	3.1	4.7
40+80	587.3	586.7	33.0	553.7	36.8	549.9	3.1	4.7

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED WITH A 1.5:1 SLOPE.

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 14-Jan-04 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO P01-048 | P.O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-070 (NW52+00)	SOIL ONLY	52+00	01/13/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-071 (SE40+00)	SOIL ONLY	40+00	01/13/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-082 (NW55+00)	SB BACKFILL**	55+00	01/13/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-083 (SE37+00)	SB BACKFILL**	37+00	01/13/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-084 (SE38+00)	SB BACKFILL**	38+00	01/13/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

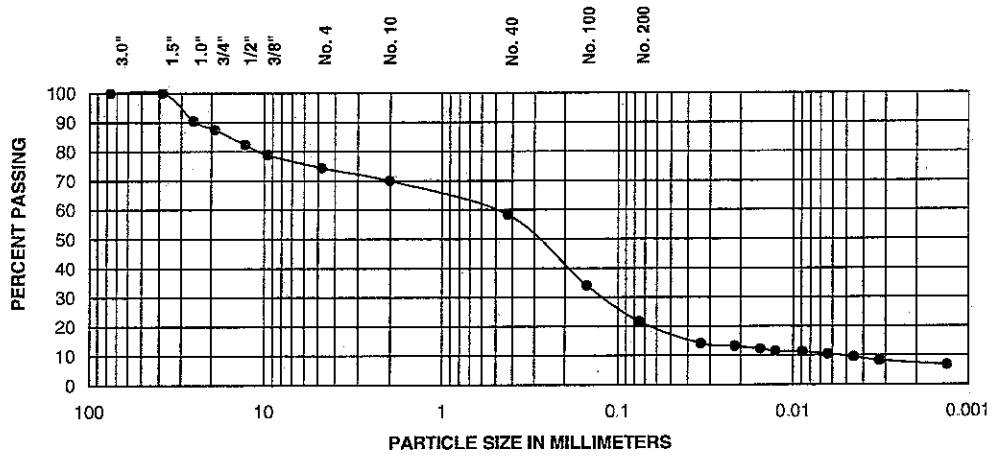
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-082 (NW 55+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/14/2004
Sample Location	55+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	25.6	52.8	11.7	9.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	90.5
3/4"	87.5
1/2"	82.4
3/8"	78.8
No. 4	74.4
No. 10	69.9
No. 40	58.4
No. 100	34.0
No. 200	21.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
24	20	4

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

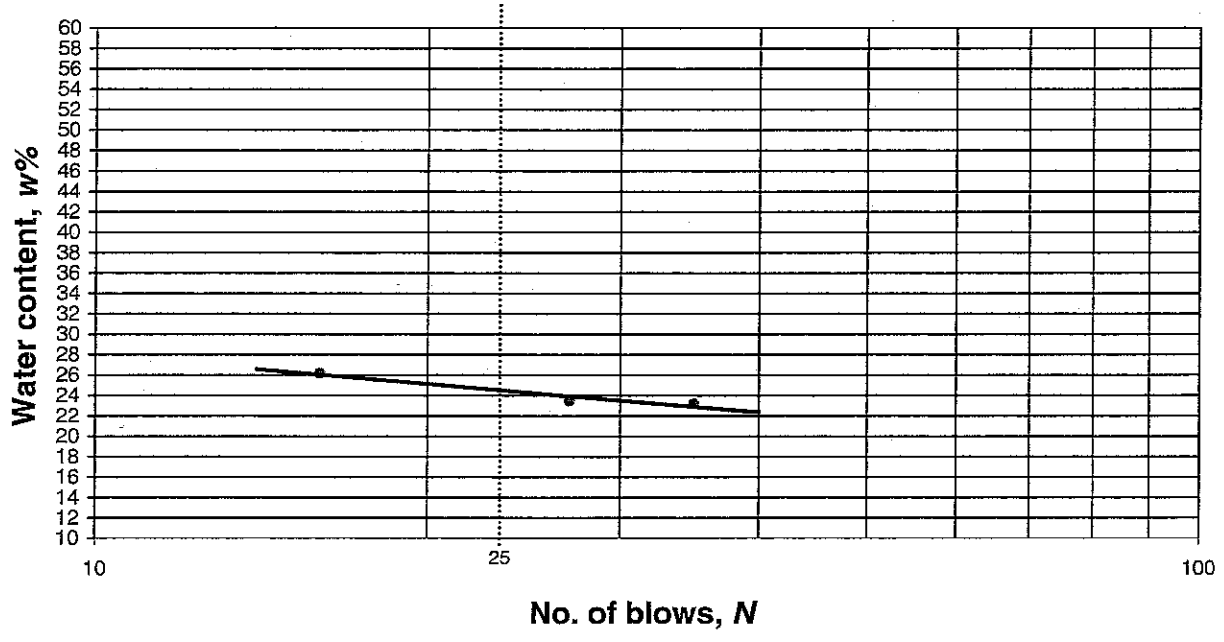
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-082 (NW 55+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/14/2004
Sample Location	55+00 (NW)
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**24**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**4**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/16/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-082 (NW 55+00)	Date Recd.	1/14/04	**Location**	55+00 (NW)		
Sample Description	Gray silty, clayey sand with gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.97	cm	Volume, V:	243.1	cu cm
Mass of Sample:	482.5	g	**Moisture Content:**	**25.4**	%
			Wet Density	123.9	**pcf**
			Dry Density	98.7	**pcf**

Final

Diameter:	6.98	cm	Area, A:	38.3	sq cm
Height, L:	5.54	cm	Volume, V:	212.0	cu cm
Mass of Sample:	458.80	g	**Moisture Content:**	**17.5**	%
			Wet Density	135.1	**pcf**
			Dry Density	114.9	**pcf**
			Deg of Saturation	97.6	

Test Data

Permeant:	De-aired Tap Water
Cell Pressure	80.0 psi
Top Pressure	75.0 psi
Bottom Pressure	76.8 psi
Gradient:	21.2

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	inflow cc			
1/16/2004	8:45 AM	0	0	3.97	5.92		20.0	---
1/16/2004	9:30 AM	2700	2700	4.10	5.81	1.2	20.0	4.28E-08
1/16/2004	10:15 AM	2700	5400	4.19	5.73	1.1	20.0	3.15E-08
1/16/2004	11:00 AM	2700	8100	4.29	5.65	1.2	20.0	3.18E-08
1/16/2004	11:45 AM	2700	10800	4.37	5.57	1.0	20.0	3.20E-08

Average Permeability = **3.5E-08** **cm/sec**

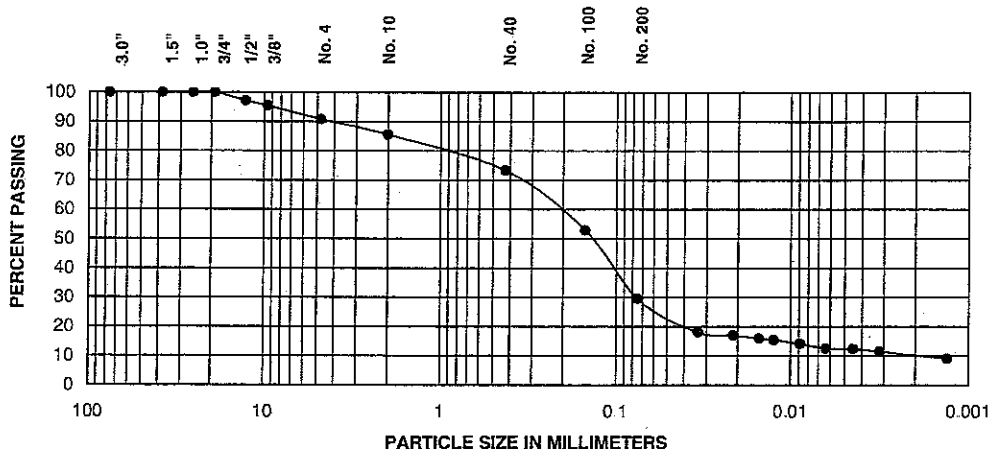
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-083 (SE 37+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/14/2004
Sample Location	37+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	9.2	61.2	17.2	12.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	97.2
3/8"	95.4
No. 4	90.8
No. 10	85.6
No. 40	73.4
No. 100	53.0
No. 200	29.6

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
29	22	7

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

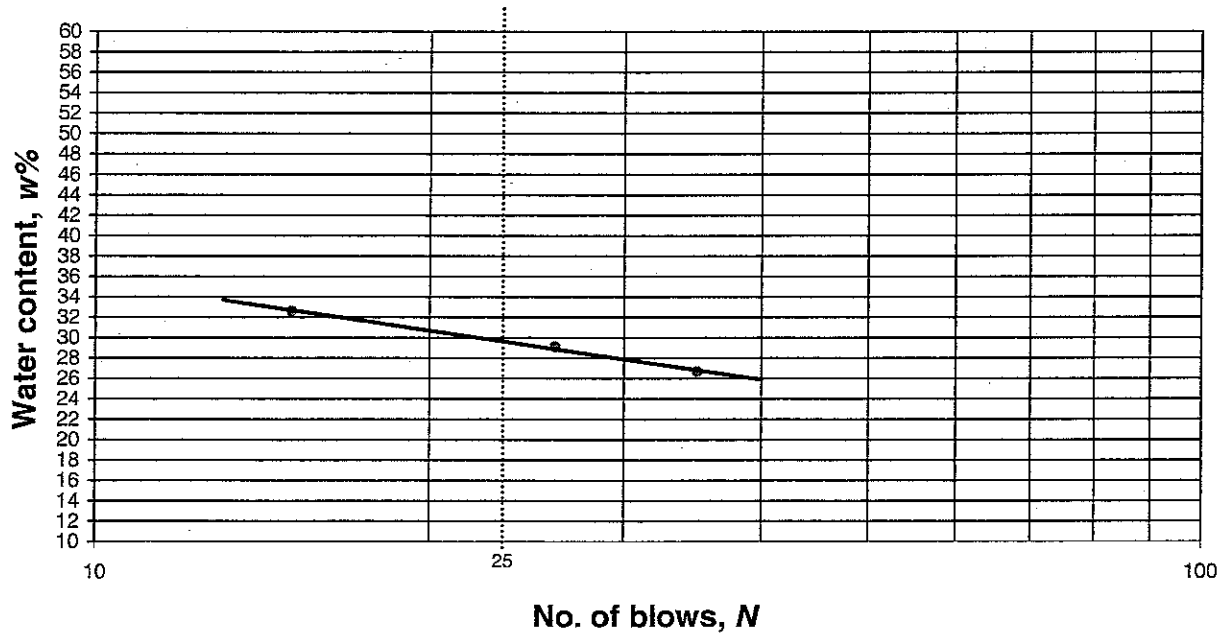
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-083 (SE 37+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/14/2004
Sample Location	37+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**29**	**Plastic Limit, PL**	**22**	**Plasticity Index, PI**	**7**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/16/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-083 (SE 37+00)	Date Recd.	1/14/04	**Location**	37+00 (SE)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	7.24	cm	Volume, V:	294.8	cu cm
Mass of Sample:	563.7	g	**Moisture Content:**	**25.5**	%
			Wet Density	**119.3**	**pcf**
			Dry Density	**95.1**	**pcf**

Final

Diameter:	7.01	cm	Area, A:	38.6	sq cm
Height, L:	6.73	cm	Volume, V:	259.7	cu cm
Mass of Sample:	548.50	g	**Moisture Content:**	**20.8**	%
			Wet Density	**131.8**	**pcf**
			Dry Density	**109.1**	**pcf**
			Deg of Saturation	**99.8**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	17.5	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/16/2004	8:45 AM	0	0	2.90	5.97		20.0	---
1/16/2004	9:30 AM	2700	2700	2.98	5.90	1.1	20.0	3.12E-08
1/16/2004	10:15 AM	2700	5400	3.05	5.84	1.2	20.0	2.69E-08
1/16/2004	11:00 AM	2700	8100	3.11	5.79	1.2	20.0	2.26E-08
1/16/2004	11:45 AM	2700	10800	3.18	5.73	1.2	20.0	2.73E-08

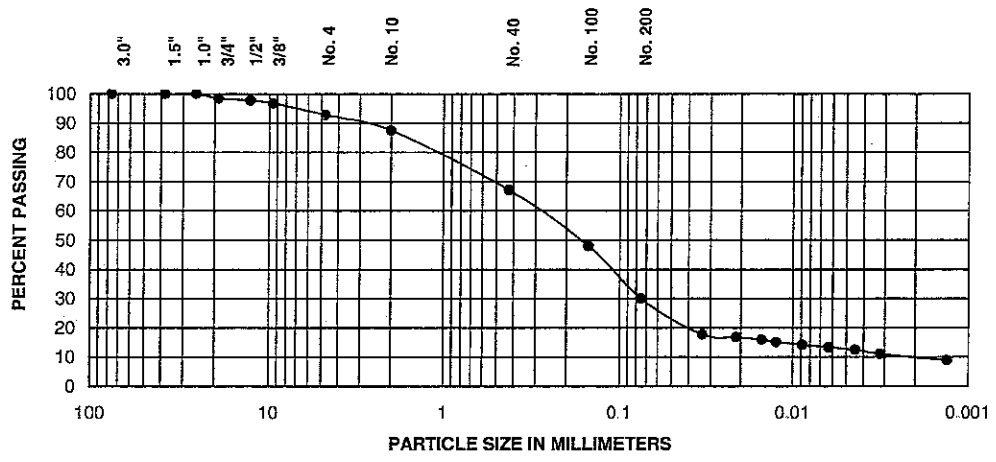
Average Permeability = **2.7E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-084 (SE 38+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/14/2004
Sample Location	38+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	7.2	62.8	17.3	12.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.6
1/2"	97.8
3/8"	96.8
No. 4	92.8
No. 10	87.5
No. 40	67.1
No. 100	48.0
No. 200	30.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
28	21	7

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

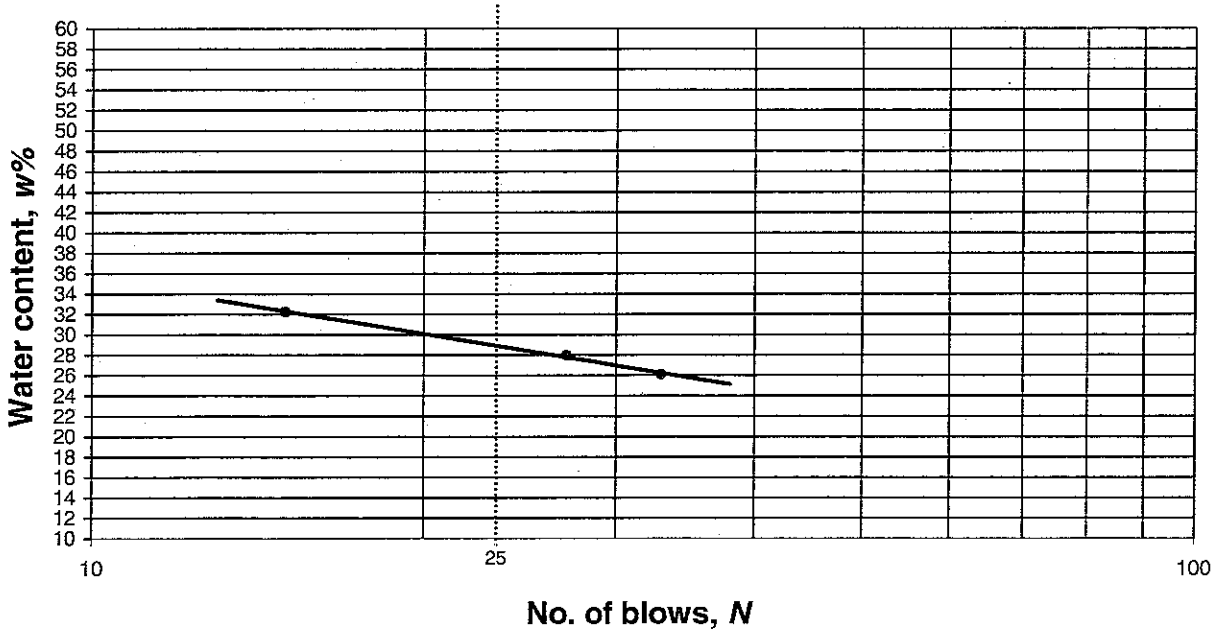
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-084 (SE 38+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/14/2004
Sample Location	38+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**28**	**Plastic Limit, PL**	**21**	**Plasticity Index, PI**	**7**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/16/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-084 (SE 38+00)	Date Recd.	1/14/04	**Location**	38+00 (SE)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.65	cm	Volume, V:	230.0	cu cm
Mass of Sample:	437.9	g	**Moisture Content:**	**25.4**	%
			Wet Density	**118.8**	**pcf**
			Dry Density	**94.7**	**pcf**

Final

Diameter:	6.97	cm	Area, A:	38.2	sq cm
Height, L:	5.28	cm	Volume, V:	201.5	cu cm
Mass of Sample:	427.10	g	**Moisture Content:**	**19.2**	%
			Wet Density	**132.3**	**pcf**
			Dry Density	**111.0**	**pcf**
			Deg of Saturation	**96.7**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	22.4	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/16/2004	8:45 AM	0	0	3.19	5.85		20.0	---
1/16/2004	9:30 AM	2700	2700	3.28	5.75	0.9	20.0	3.55E-08
1/16/2004	10:15 AM	2700	5400	3.36	5.65	0.8	20.0	3.59E-08
1/16/2004	11:00 AM	2700	8100	3.45	5.55	0.9	20.0	3.62E-08
1/16/2004	11:45 AM	2700	10800	3.54	5.45	0.9	20.0	3.65E-08

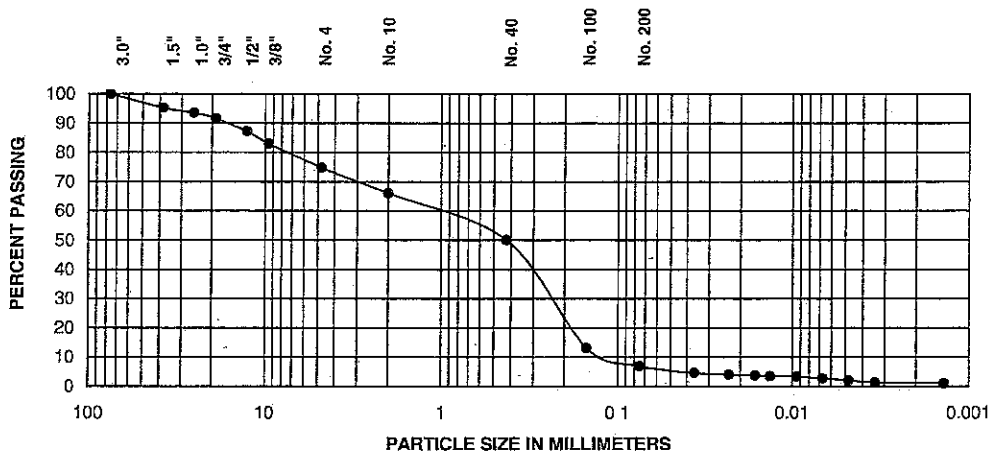
Average Permeability = **3.6E-08** cm/sec

Remarks:

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-070 (NW 52+00)	**Date Tested**	1/18/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/14/2004
Sample Location	52+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	25.2	67.8	4.7	2.3

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.11	0.24	0.10	10.6	0.50

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	95.2
1.0"	93.6
3/4"	91.6
1/2"	87.2
3/8"	83.0
No. 4	74.8
No. 10	66.1
No. 40	50.1
No. 100	13.2
No. 200	7.0

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

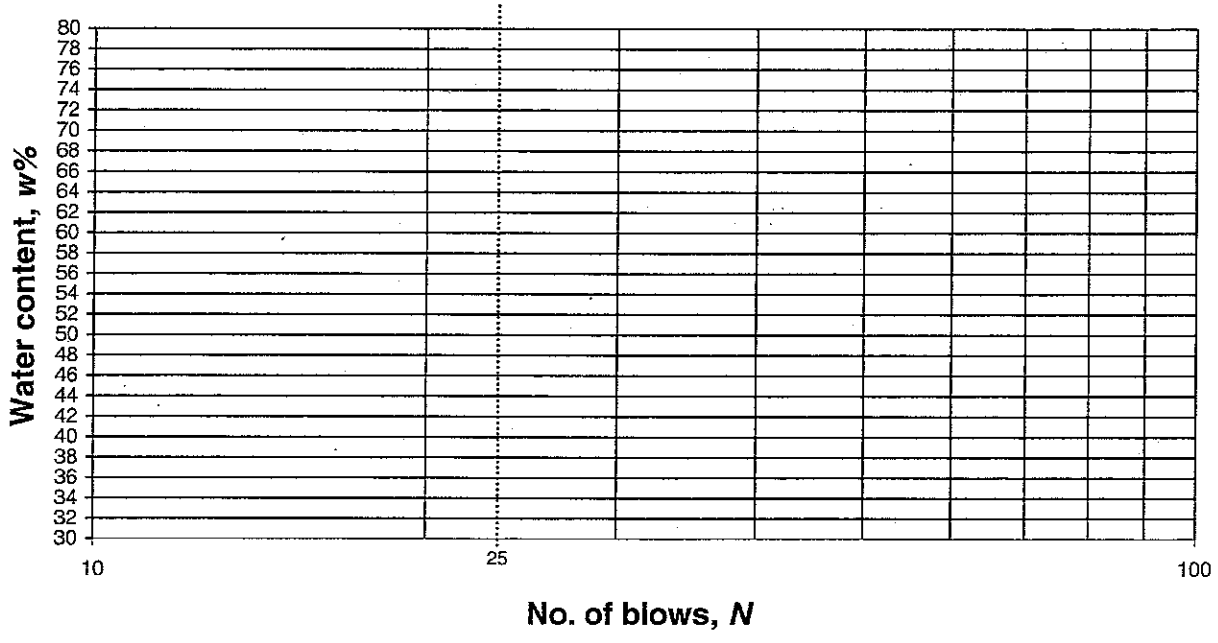
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-070 (NW 52+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/14/2004
Sample Location	52+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	24	Date	1/14/2004	Sheet	1
				Date of weighing	1/15/2004	Tested by	MT

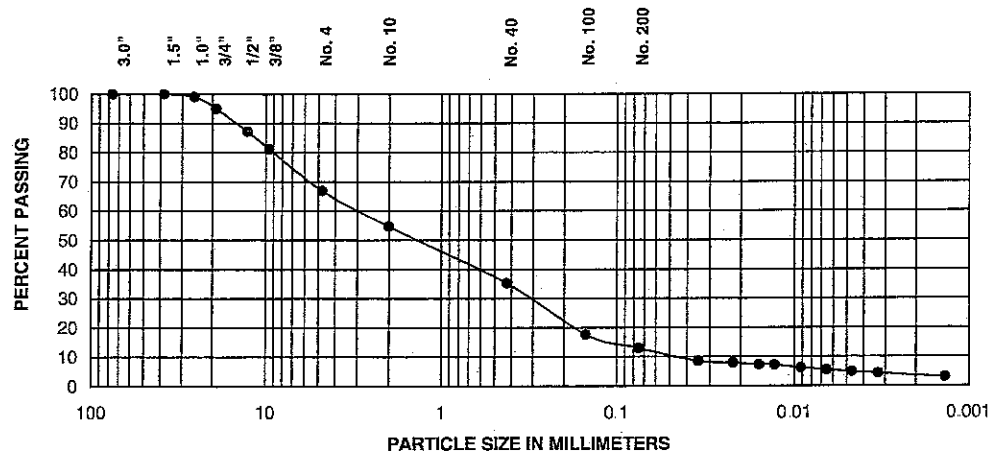
Boring No.	-	-				
Sample No.	BF-070 (NW52+00)	BF-071(SE40+00)				
Location	52 + 00 (NW)	40 + 00 (SE)				
Tin No.	24A	19C				
Tin + Wet Soil	148.96	143.43				
Tin + Dry Soil	135.03	130.17				
Wt. of Tin	30.01	31.4				
Wt. of Dry Soil	105.0	98.8				
Wt. of Water	13.9	13.3				
Moisture, %	13.3	13.4				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-071 (SE 40+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/14/2004
Sample Location	40+00 (SE)
Sample Description	Gray silty sand with gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	33.1	53.8	8.0	5.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	99.1
3/4"	95.0
1/2"	87.3
3/8"	81.2
No. 4	66.9
No. 10	54.7
No. 40	35.3
No. 100	17.6
No. 200	13.0

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
NP	NP	NP

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

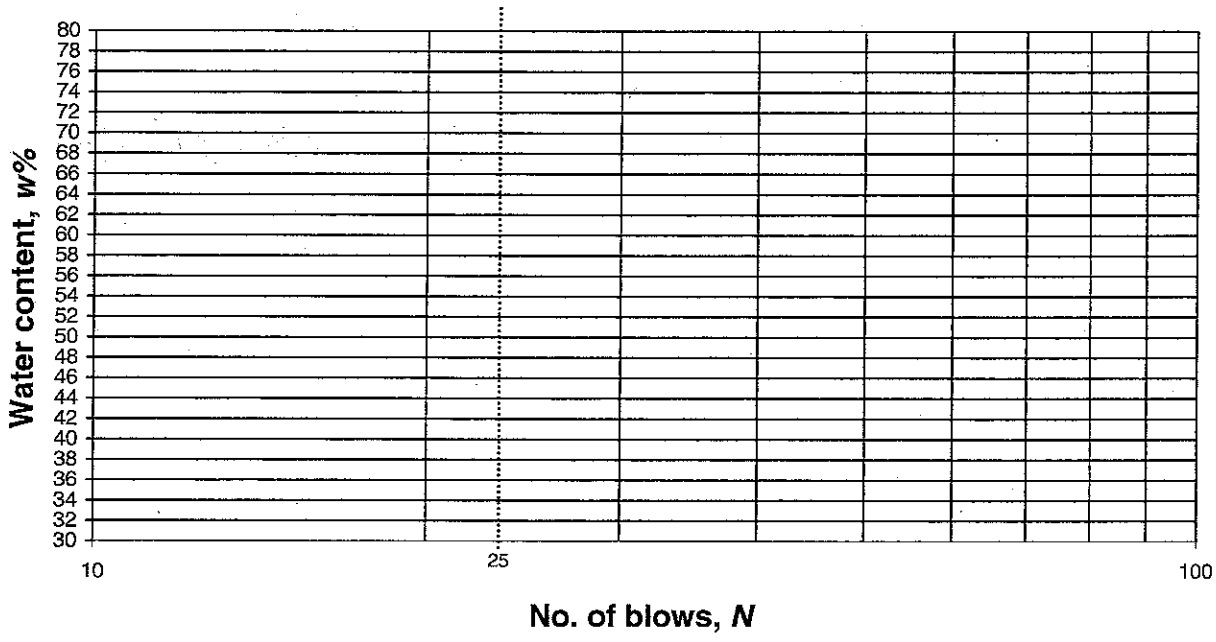
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-071 (SE 40+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/14/2004
Sample Location	40+00 (SE)
Sample Description	Gray silty sand with gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	24	Date	1/14/2004	Sheet	1
				Date of weighing	1/15/2004	Tested by	MT

Boring No.	-	-				
Sample No.	BF-070 (NW52+00)	BF-071(SE40+00)				
Location	52 + 00 (NW)	40 + 00 (SE)				
Tin No.	24A	19C				
Tin + Wet Soil	148.96	143.43				
Tin + Dry Soil	135.03	130.17				
Wt. of Tin	30.01	31.4				
Wt. of Dry Soil	105.0	98.8				
Wt. of Water	13.9	13.3				
Moisture, %	13.3	13.4				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

INDIANA HARBOR CDF S-B CUTOFF

DATE: 01/14/04 JOB NAME: WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 30 - 37 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
N/A						

NORTH TRENCH

COMMENTS: No work on this trench today Day was spent doing maintenance on the bucket cylinder of the 375 excavator.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						N/A

COMMENTS

N/A

No work was done on this trench today. Day consisted of maintenance work on the bucket cylinder of the 375 excavator.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Arsic **OWNER:**

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/14/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 30 - 37 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
40+90	2.00	73.00	11.00	18.00	51.00	8
40+90	34.00	91.00	25.00	22.00	63.00	8
41+60	2.00	74.00	24.00	17.00	50.00	8
41+60	34.00	92.00	25.00	26.00	56.00	8

SE TRENCH

COMMENTS: Fresh slurry was pumped to this trench today to try and keep the slurry in spec.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
41+00	LAB SAMPLE COLLECTED 01/14/04			
42+00	LAB SAMPLE COLLECTED 01/14/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
39+00	2.00	Sample collected	Sample collected	Sample collected	*	yes
39+25	2.00	N/A	N/A	N/A	*	N/A
39+50	2.00	N/A	N/A	N/A	*	N/A
39+75	2.00	N/A	N/A	N/A	*	N/A
40+00	2.00	N/A	N/A	N/A	*	N/A
40+25	2.00	N/A	N/A	N/A	*	N/A

*Quick perms were set up to run 12 hours overnight. When QC techs came onsite 01/15/04 (6:00 a.m.), they discovered that the 6-cylinder filter press unit used to run the quick perms had frozen overnight. The unit will be thawed and these quick perms listed above will be run as soon as the unit is working again. Results will be noted on the daily report submitted for 01/15/04.

COMMENTS

Filter cake: .5mm, .7mm, .6mm, and .9mm respectively.

Unit Weight:	
39+00:	115.0 pcf
39+25:	114.0 pcf
39+50:	119.0 pcf
39+75:	109.0 pcf
40+00:	115.0 pcf
40+25:	112.0 pcf

DRY BENTONITE ADDITION	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepic **OWNER:**

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/14/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
9:10	69.00	56.00	14.00	8
10:30	-	53.00	-	-
13:15	-	54.00	-	-
14:30	68.00	52.00	12.00	8

Filter cake is .3mm and .4mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E Sipes OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/14/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 30 - 37 degrees RIG NUMBER:

EXCAVATION							BACKFILL		
STATION	DEPTH							SLOPE	
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A									
				SF TODAY	0.00				
				SF TO DATE	95911.00				

COMMENTS

NORTH TRENCH

No work was done on this trench today. Day consisted of maintenance work, repairing the bucket cylinder on the 375 excavator.

GEO-CON: (signature) OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/14/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 30 - 37 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
40+90	32.9	36.7	36.8	10.0	367.5	3.0	38+80	TOPOUT	TOPOUT
41+00	32.9	36.8	36.8	10.0	367.5	2.9	38+90	8.9	TOPOUT
41+10	32.8	36.7	36.8	10.0	367.5	3.0	39+00	10.7	TOPOUT
41+20	32.8	36.6	36.7	10.0	366.5	3.0	39+10	11.5	TOPOUT
41+30	32.8	36.6	36.6	10.0	366.0	2.9	39+20	13.7	TOPOUT
41+40	32.7	36.7	36.7	10.0	366.5	2.8	39+30	14.9	TOPOUT
41+50	32.6	36.6	36.7	10.0	366.5	2.8	39+40	17.0	TOPOUT
41+60	32.6	36.7	36.7	10.0	366.5	2.9	39+50	17.9	8.5
41+70	32.7	36.8	36.8	10.0	367.5	3.0	39+60	19.0	10.0
41+80	32.6	36.6	36.7	10.0	367.0	3.0	39+70	19.8	11.6
41+90	32.6	36.5	36.6	10.0	365.5	2.9	39+80	21.5	12.0
42+00	32.5	36.6	36.6	10.0	365.5	2.8	39+90	23.4	13.4
							40+00	25.0	15.0
							40+10	28.4	17.8
							40+20	33.0	20.9
							40+30	33.9	21.1
							40+40	35.1	22.0
							40+50	35.3	22.5
							40+60	36.1	24.1
							40+70	36.7	25.2
							40+80	36.8	25.8
							40+90		26.3
							41+00		27.5
							41+10		28.6
							41+20		29.9
							41+30		31.9
							41+40		32.2
							41+50		32.5
							41+60		34.1
							41+70		36.8
							41+80		36.6
							41+90		36.5
							42+00		36.6

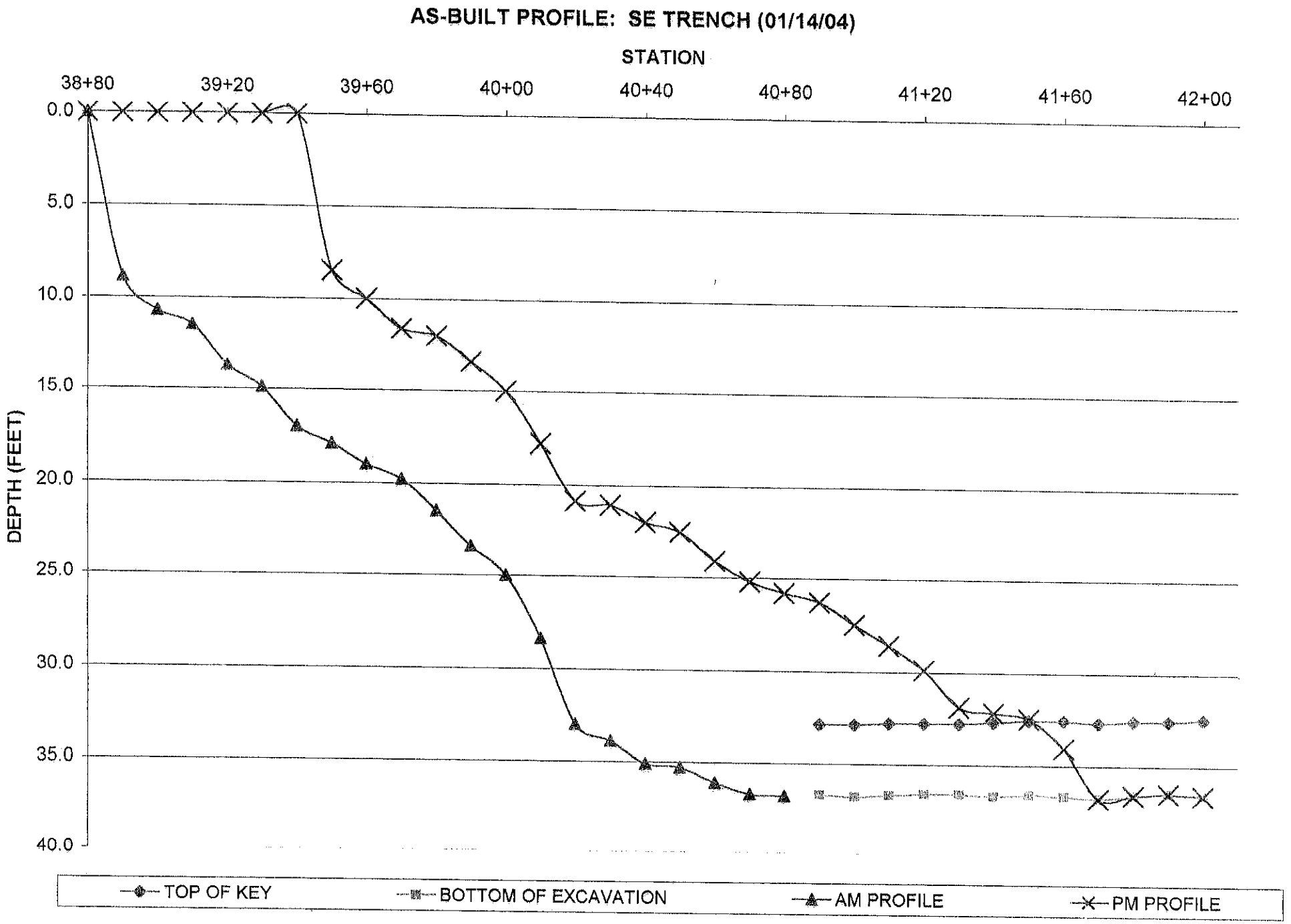
SF TODAY 4400.00

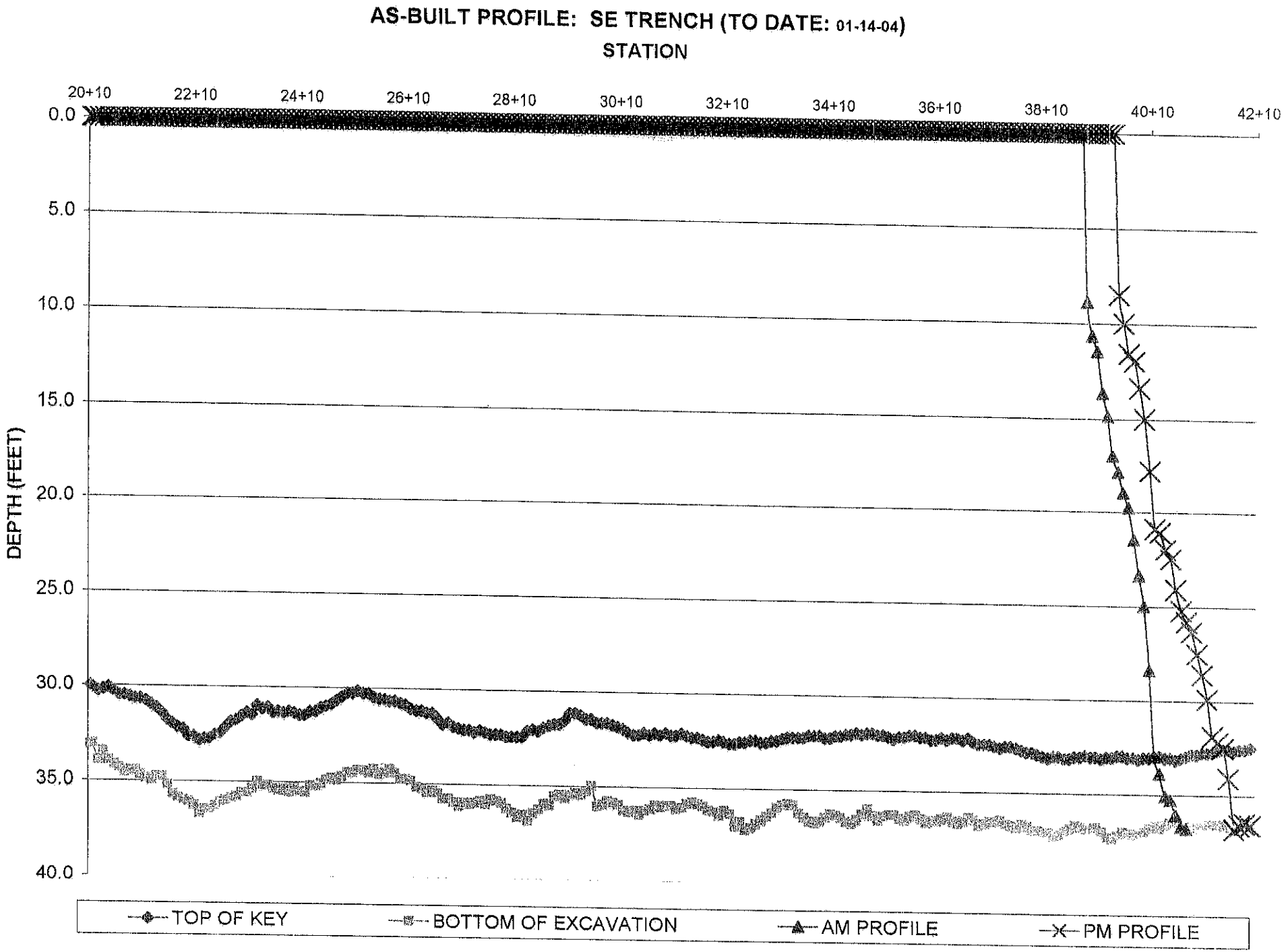
SF TO DATE 79284.22

COMMENTS

SE Trench

GEO-CON: Suzanne C. Arc OWNER:


AS-BUILT PROFILE: SE TRENCH (01/14/04)
STATION
38+80
39+20
39+60
40+00
40+40
40+80
41+20
41+60
42+00
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE: 01-14-04)
STATION
20+10
22+10
24+10
26+10
28+10
30+10
32+10
34+10
36+10
38+10
40+10
42+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/14/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9:10	56	> 40 sec	69	> 64 pcf	8	6.5 - 10	14	< 20 cm^3	.3
PM	14:30	52	> 40 sec	68	> 64 pcf	8	6.5 - 10	12	< 20 cm^3	.4

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:30	53	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	13:15	54	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NORTH TREATH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

NO WORK ON NORTH TRENCH TODAY

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: _____ Technician: _____

Sample Area: A= _____ cm^2 Sample Height: L= _____ cm

Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	$K = \frac{\Delta Q}{\Delta t} \times \frac{I}{X}$ (cm/sec)
01/14/03								

N/A. NO WORK ON THIS TRENCH TODAY

$I = \frac{P\ (psi)}{0.014217\ L\ (cm)}$ $R = \frac{\text{Quick Test}}{\text{Triaxial Test}}$ = _____

DAILY QC TESTS

DATE 01/14/03

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

~~North Trench~~

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

SE TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:10	40+90	2	51	40 - 90 sec	73	64 - 95 pcf	8	6.5 - 10	18	< 25 cm^3	.5	11	MAX 30%
9:10	40+90	34	63	40 - 90 sec	91	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	.7	25	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
14:00	41+60	2	50	40 - 90 sec	74	64 - 95 pcf	8	6.5 - 10	17	< 25 cm^3	.6	24	MAX 30%
14:00	41+60	34	56	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	26	< 25 cm^3	.9	25	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

* See SE Trench Quick Perm Report

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
39+00	2	2" to 6"	115	+15 pcf over trench slurry	*	1.0×10^{-7} cm/sec
39+25	2	2" to 6"	114	+15 pcf over trench slurry	*	1.0×10^{-7} cm/sec
39+50	2	2" to 6"	119	+15 pcf over trench slurry	*	1.0×10^{-7} cm/sec
39+75	2	2" to 6"	109	+15 pcf over trench slurry	*	1.0×10^{-7} cm/sec
40+00	2	2" to 6"	115	+15 pcf over trench slurry	*	1.0×10^{-7} cm/sec
40+25	2	2" to 6"	112	+15 pcf over trench slurry	*	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 39+00, 39+25, 39+50, 39+75, 40+00, 40+25

Technician: MM Via SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.5cm, 6.5cm, 7.0cm, 7.0cm, 6.5cm, 7.5cm cm

Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)
01/14/04	18:00-6.00	720	10	108.2128	559261.0644	—	?	*
01/14/04	18:00-6.00	720	10	108.2128	559261.0644	—	?	*
01/14/04	18:00-6.00	720	10	100.4833	519313.7717	—	?	*
01/14/04	18:00-6.00	720	10	100.4833	519313.7717	—	?	*
01/14/04	18:00-6.00	720	10	108.2128	559261.0644	—	?	*
01/14/04	18:00-6.00	720	10	93.7844	484692.9732	—	?	*

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

* Quick perms were set up to run 12 hours overnight. When the QC techs arrived onsite 01/15/04 (6.00am), they discovered that the 6-cylinder filter pressure unit used to run the quick perms had frozen overnight. The unit will be thawed & the quick perms listed above will be run as soon as the unit is working again. Results will be noted on the daily report submitted for review.

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
40+90	587.3	586.7	32.9	553.8	36.7	550.0	3.0	4.5
41+00	587.3	586.8	32.9	553.9	36.8	550.0	2.9	4.4
41+10	587.3	586.8	32.8	554.0	36.7	550.1	3.0	4.5
41+20	587.3	586.6	32.8	553.8	36.6	550.0	3.0	4.5
41+30	587.3	586.7	32.8	553.9	36.6	550.1	2.9	4.4
41+40	587.2	586.7	32.7	554.0	36.7	550.0	2.8	4.2
41+50	587.2	586.8	32.6	554.2	36.6	550.2	2.8	4.2
41+60	587.2	586.9	32.6	554.3	36.7	550.2	2.9	4.4
41+70	587.2	586.7	32.7	554.0	36.8	549.9	3.0	4.5
41+80	587.1	586.7	32.6	554.1	36.6	550.1	3.0	4.5
41+90	587.1	586.7	32.6	554.1	36.5	550.2	2.9	4.4
42+00	587.1	586.8	32.5	554.3	36.6	550.2	2.8	4.2

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED WITH A 1.5:1 SLOPE.

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)

Phone: (724) 366-9311

Airbill No: N/A

Date Shipped: 15-Jan-04

Carrier: DIRECT--LAB PICKUP

Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL

PROJECT NO P01-048

P O.# 78406

Relinquished by: (Signature) — Received By: — Date / Time:

Relinquished by: (Signature) — Received By: — Date / Time:

Relinquished by: (Signature) — Received at lab by: — Date / Time:

Relinquished from lab by: (Signature) — Received By: — Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-072 (SE41+00)	SOIL ONLY	41+00	01/14/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-073 (SE42+00)	SOIL ONLY	42+00	01/14/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-085 (SE39+00)	SB BACKFILL**	39+00	01/14/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

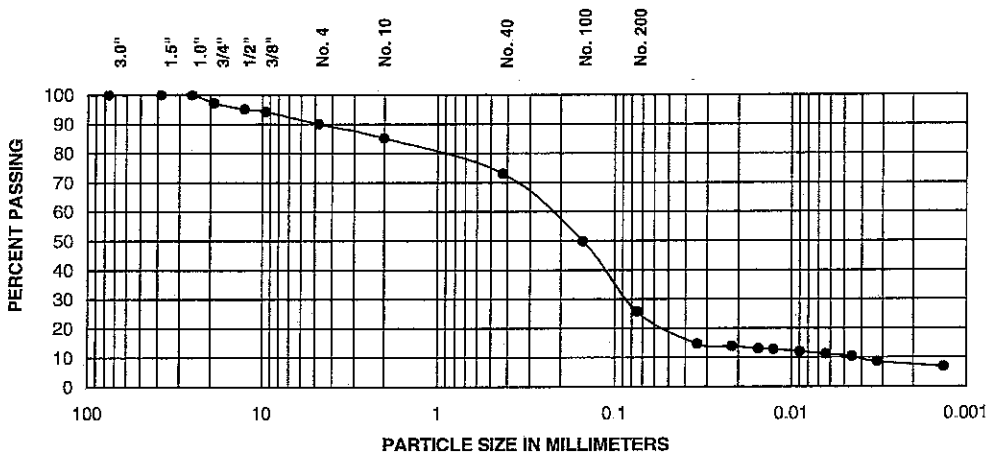
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-085 (SE 39+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/15/2004
Sample Location	39+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	9.9	64.3	15.1	10.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	97.2
1/2"	95.2
3/8"	94.3
No. 4	90.1
No. 10	85.2
No. 40	73.1
No. 100	49.7
No. 200	25.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
28	22	6

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

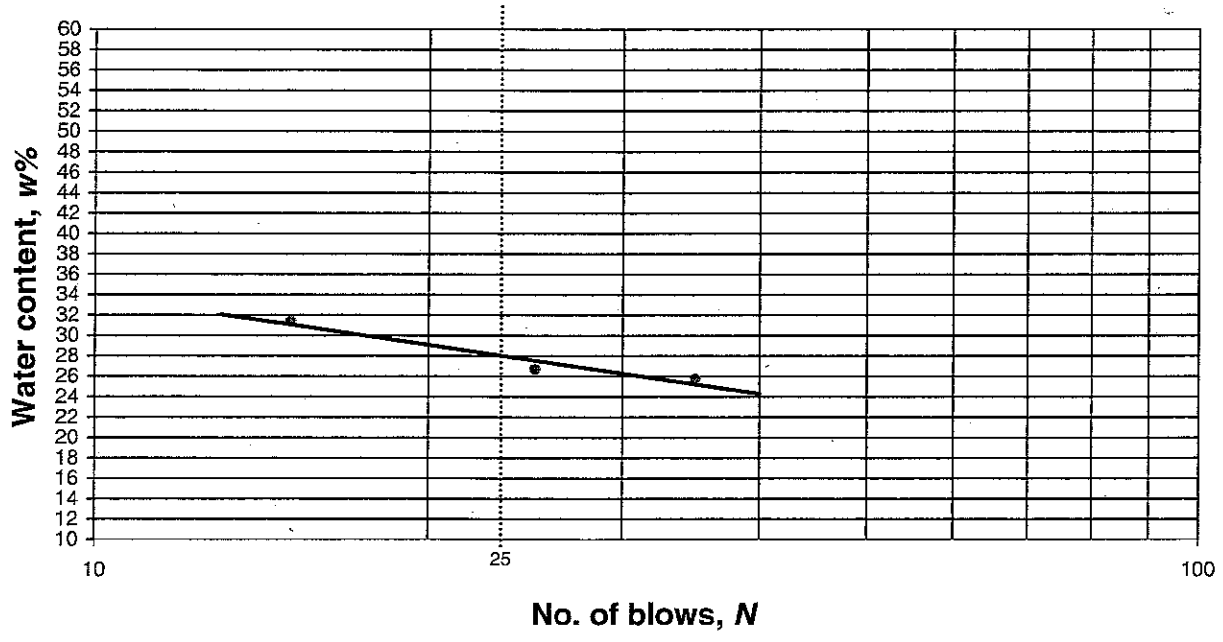
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-085 (SE 39+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/15/2004
Sample Location	39+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**28**	**Plastic Limit, PL**	**22**	**Plasticity Index, PI**	**6**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/19/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-085 (SE 39+00)	Date Recd.	1/15/04	**Location**	39+00 (SE)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.28	cm	Volume, V:	255.7	cu cm
Mass of Sample:	444.0	g	**Moisture Content:**	**23.3**	%
			Wet Density	**108.4**	**pcf**
			Dry Density	**87.9**	**pcf**

Final

Diameter:	7.02	cm	Area, A:	38.7	sq cm
Height, L:	5.24	cm	Volume, V:	202.8	cu cm
Mass of Sample:	428.70	g	**Moisture Content:**	**19.9**	%
			Wet Density	**131.9**	**pcf**
			Dry Density	**110.0**	**pcf**
			Deg of Saturation	**97.7**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	20.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/19/2004	3:15 PM	0	0	3.10	5.92		20.0	---
1/19/2004	3:45 PM	1800	1800	3.17	5.86	1.2	20.0	3.52E-08
1/19/2004	4:15 PM	1800	3600	3.24	5.80	1.2	20.0	3.54E-08
1/19/2004	4:45 PM	1800	5400	3.29	5.75	1.0	20.0	2.97E-08
1/19/2004	5:15 PM	1800	7200	3.36	5.69	1.2	20.0	3.58E-08

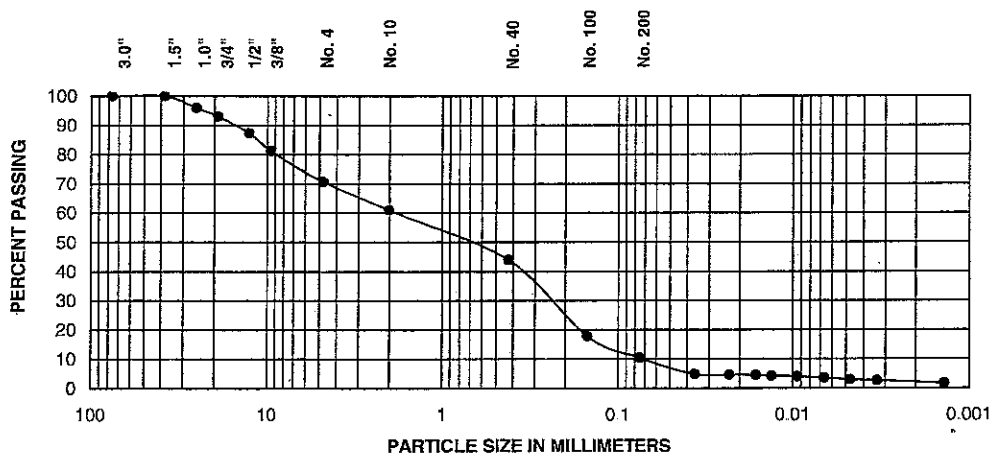
Average Permeability = **3.4E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-072 (SE 41+00)	**Date Tested**	1/18/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/15/2004
Sample Location	41+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	29.3	60.2	7.3	3.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.83	0.24	0.07	26.0	0.46

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	96.0
3/4"	93.1
1/2"	87.4
3/8"	81.3
No. 4	70.7
No. 10	61.0
No. 40	44.0
No. 100	17.8
No. 200	10.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

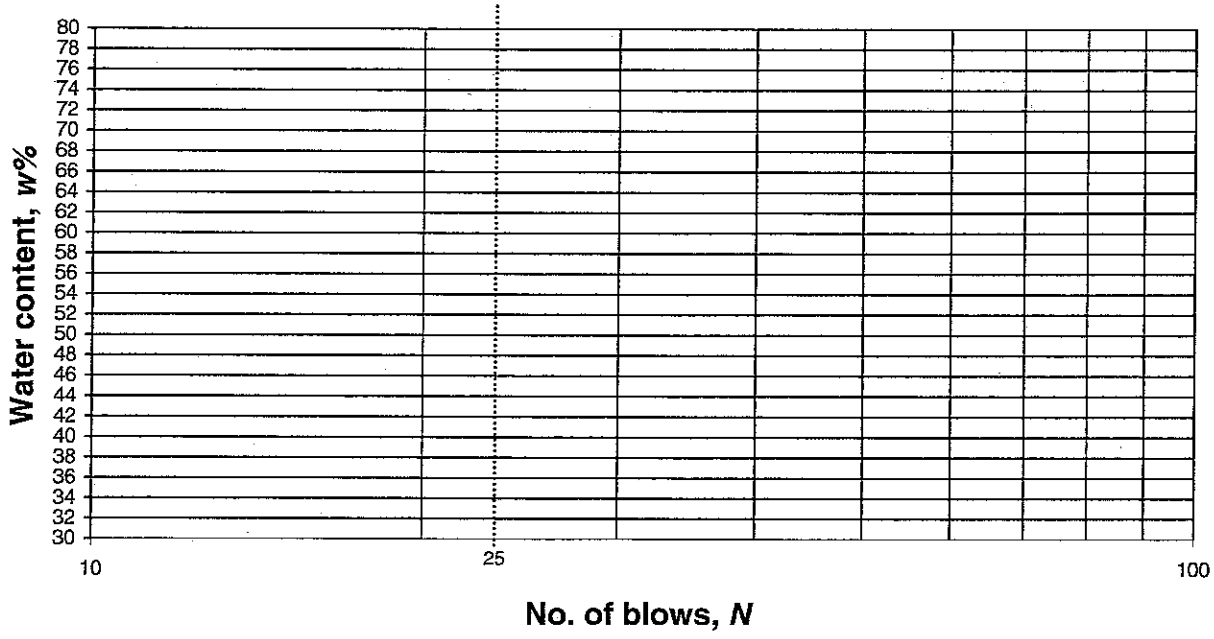
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-072 (SE 41+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/15/2004
Sample Location	41+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	25	Date	1/15/2004	Sheet	1
				Date of weighing	1/16/2004	Tested by	MT

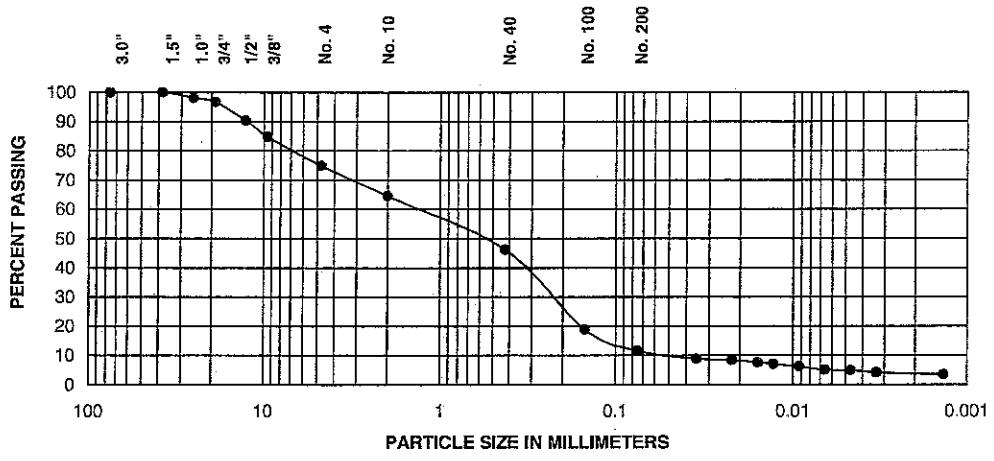
Boring No.	-	-				
Sample No.	BF-072 (NW52+00)	BF-073(SE42+00)				
Location	41 + 00 (NW)	42 + 00 (SE)				
Tin No.	95A	39C				
Tin + Wet Soil	123.51	139.7				
Tin + Dry Soil	110.89	124.6				
Wt. of Tin	30.29	30.92				
Wt. of Dry Soil	80.6	93.7				
Wt. of Water	12.6	15.1				
Moisture, %	15.7	16.1				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-073 (SE 42+00)	**Date Tested**	1/17/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/15/2004
Sample Location	42+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	25.1	63.3	6.8	4.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.36	0.23	0.05	28.2	0.80

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.1
3/4"	96.8
1/2"	90.4
3/8"	84.9
No. 4	74.9
No. 10	64.6
No. 40	46.3
No. 100	18.9
No. 200	11.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

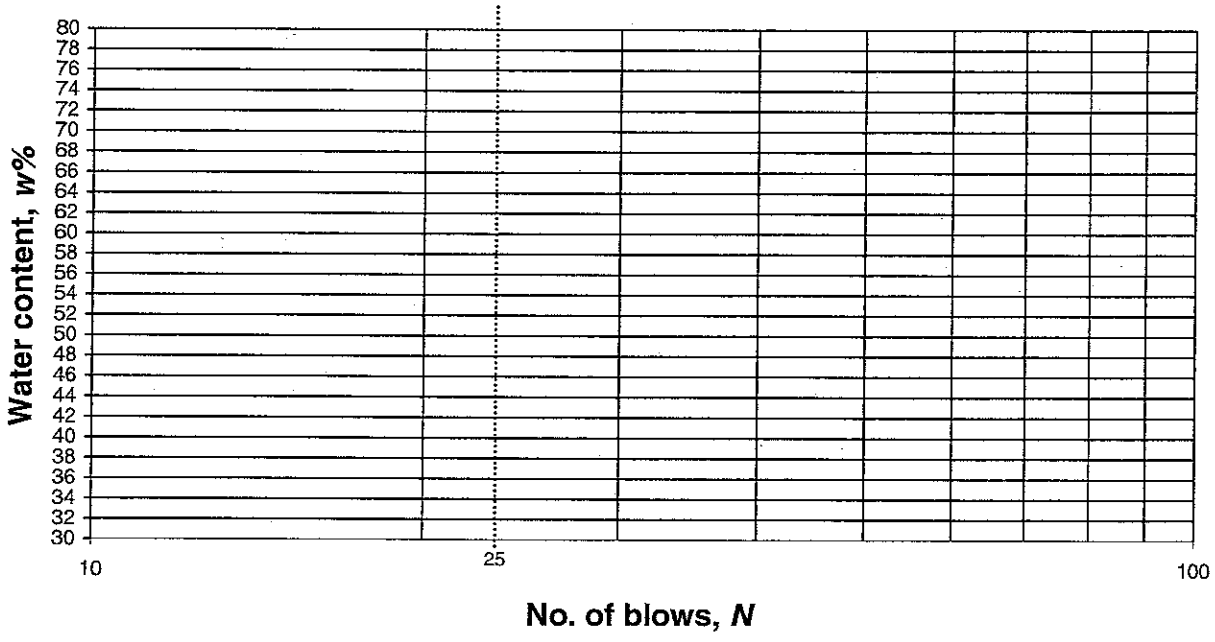
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-073 (SE 42+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/15/2004
Sample Location	42+00 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	25	Date	1/15/2004	Sheet	1
				Date of weighing	1/16/2004	Tested by	MT

Boring No.	-	-				
Sample No.	BF-072 (NW52+00)	BF-073(SE42+00)				
Location	41 + 00 (NW)	42 + 00 (SE)				
Tin No.	95A	39C				
Tin + Wet Soil	123.51	139.7				
Tin + Dry Soil	110.89	124.6				
Wt. of Tin	30.29	30.92				
Wt. of Dry Soil	80.6	93.7				
Wt. of Water	12.6	15.1				
Moisture, %	15.7	16.1				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

SW TRENCH

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date:	11/15/03 - 12/17/03	Job Number:	P01-048
Weather:		Job Name:	Indiana Harbor

Trench Excavated Sta.	106+50	to	86+90	=	1960	L.F.
Length:	1960	x Depth[1]:	33.8	=Square Feet	66248	
Square feet:	66248	x Width:	2.5	=Total Cubic Feet[3]	165620	
Cubic feet[3]:	166626.61	x Dry Unit Weight:	80	/2000=	6665.06 Tons of Soil	
Tons of Soil:	6665.06	x 0.75 (minus excess trench spoils of 25%)	=	Unit Addition Rate	4998.80 Tons of Soil	
Unit Rate:	4998.80	x Specified Rate:	6%	=Bentonite Required	299.93 Tons of Bentonite Required between these Stations to top out the trench.	
	Via Mixer	=	104	Tons of Bentonite		
	Via Backfill	=	315	Tons of Bentonite		
Total Tons of Bentonite Used[4]		=	419			

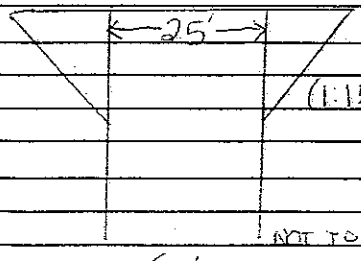
Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

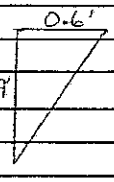
[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.

[4] Rework was done from Station 106+50 to 101+10. An additional 15 tons of bentonite was placed in this area.



Top of Trench Width (avg).[2] = 3.7'

3.7' - 2.5' = 1.2' → 0.6' overage on each side of trench



A = 1/2 b h = 1/2 (0.6) (0.9) = 0.27 SF

[3] CF = SF * L * 2 sides = 1006.61 CF

Note: Add to CF above

GEO-CON Suzanne C Sepe
Signature/Date

OWNER:
Signature/Date

NN ~ NORTH TRENCH

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date:	12/04/03 - 01/13/04	Job Number:	P01-048
Weather:		Job Name:	Indiana Harbor

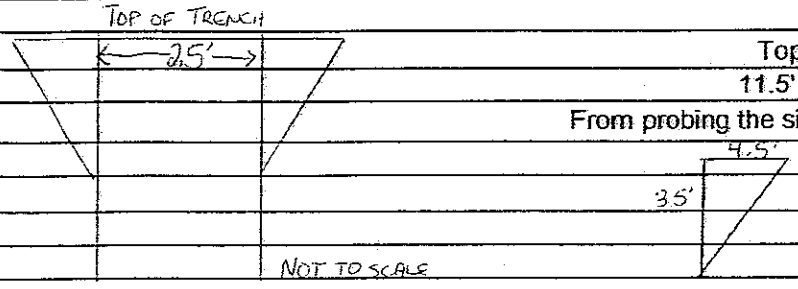
Trench Excavated Sta	78+50		to	54+20	=	2430	L.F.
Length:	2430	x Depth[1]:	35.2	=Square Feet		85536	
Square feet:	85536	x Width:	2.5	=Total Cubic Feet[3]		213840.00	
Cubic feet[3]:	252136.80	x Dry Unit Weight:	80	/2000=		10085.47 Tons of Soil	
Tons of Soil:	10085.47	x 0.75 (minus excess trench spoils of 25%)	=	Unit Addition Rate		7564.10 Tons of Soil	
Unit Rate:	7564.10	x Specified Rate:	6%	=Bentonite Required		453.85 Tons of Bentonite Required between these Stations to top out the trench.	
	Via Mixer	=	130	Tons of Bentonite			
	Via Backfill	=	444	Tons of Bentonite			
Total Tons of Bentonite Used		=	574				

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 11.5'

11.5' - 2.5' = 9.0' ▶ 4.5' overage on each side of trench

From probing the sidewalls for safety reasons, $D_{30''}$ = 3.5' (avg.)

A = 1/2 b h = 1/2 (4.5) (3.5) = 7.88 SF

[3] CF = SF * L * 2 sides = 38296.80 CF

Note: Add to CF above

GEO-CON Suzanne E. Sepic
Signature/Date

OWNER: _____
Signature/Date

SE TRENCH

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date:	12/17/03 - 01/13/04	Job Number:	P01-048
Weather:		Job Name:	Indiana Harbor

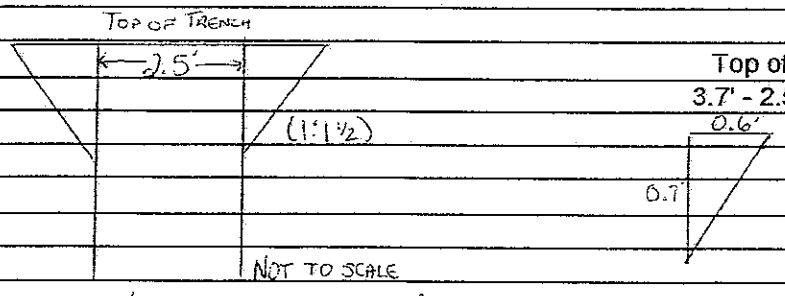
Trench Excavated Sta.	20+15.9		to	38+80		=	1864.1 L.F.
Length:	1864.1	x Depth[1]:		34.9	=Square Feet		65057.09
Square feet:	65057.09	x Width:		2.5	=Total Cubic Feet[3]		162642.73
Cubic feet[3]:	163649.34	x Dry Unit Weight:		80	/2000=		6545.97 Tons of Soil
Tons of Soil:	6545.97	x 0.75 (minus excess trench spoils of 25%)		=	Unit Addition Rate		4909.48 Tons of Soil
Unit Rate:	4909.48	x Specified Rate:		6%	=Bentonite Required		294.57 Tons of Bentonite Required between these Stations to top out the trench.
	Via Mixer	=		101	Tons of Bentonite		
	Via Backfill	=		292	Tons of Bentonite		
Total Tons of Bentonite Used		=		393			

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 3.7'

3.7' - 2.5' = 1.2' → 0.6' overage on each side of trench

A = 1/2 b h = 1/2 (0.6) (0.9) = 0.27 SF

[3] CF = SF * L * 2 sides = 1006.61 CF

Note: Add to CF above

GEO-CON Suzanne E Sipe
Signature/Date

OWNER:
Signature/Date

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 11/4/04
Weather: Mostly Cloudy 30 - 39 degrees

Job Number: P01-048
Job Name: Indiana Harbor

Trench Topped Out Sta 38+80 to 39+40 = 60 L.F.

Length: 60 x Depth[1]: 36'(avg) =Square Feet 2160

Square feet: 2160 x Width: 2.5 =Total Cubic Feet[3] 5400

Cubic feet[3]: 5421.6 x Dry Unit Weight: 85 (460.836) /2000= 230.42 Tons of Soil

Tons of Soil: 230.42 x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate 161.29 Tons of Soil

Unit Rate: 161.29 x Specified Rate: 6% =Bentonite Required 9.68 Tons of Bentonite Required between these Stations to top out the trench

Via Mixer = 6.00 (3.72%) Tons of Bentonite

Via Backfill = 12.00 (7.44%) Tons of Bentonite

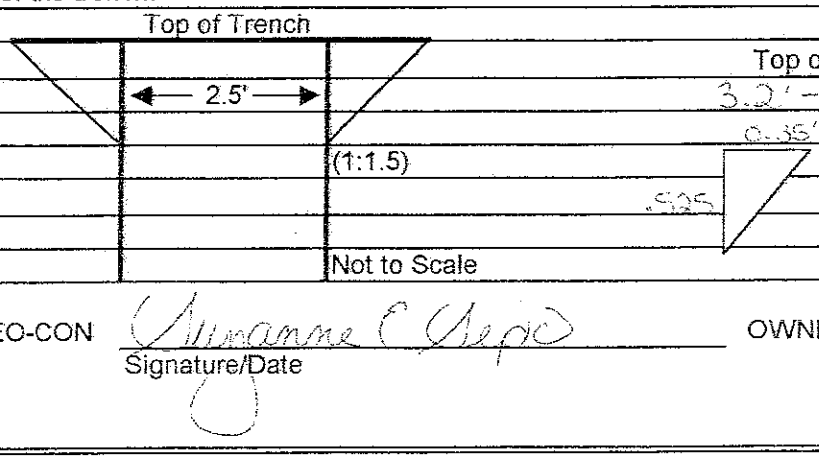
Total Tons of Bentonite Used = 18.00 (11.16%)

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 3.2'

3.2' - 2.5' = 0.7' → 0.35' average on each side

A = 1/2 b h = 1/2 (.35)(.525) = 0.18 SF

[3] CF = SF * L * 2 sides = 21.6 CF

Note: Add to CF above

GEO-CON Suzanne C Lepio
Signature/Date

OWNER
Signature/Date

LABORATORY ANALYSIS

CERTIFICATION

GREYBULL PLANT

DATE TESTED [illegible]

SOLD TO:	SHIP TO:
GEOCOR INC 4075 MONROEVILLE BLVD CORPORATE I BUILDING SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: [illegible]	GEOCOR S CHICAGO IL 60612

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-15-04	[illegible]	GREYBULL	GEL

Note that data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	37
Plastic Viscosity (cP)	N/A	
Yield Point lb / 100 ft2	N/A	
Filtrate Volume (cm3)	15.0 max.	13.6
> 75 micron (wt. %)	4.0 max.	1.1

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.6
Y.P. / P.V. Ratio	3.0 max.	1.08

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4400.

Signed [illegible] Date [illegible]

Approved by Plant Manager

LabanalCert.doc (4/12/07)
Rev E (3/09)

Arrived onsite 01/14/04
4000 # jumbo

LABORATORY ANALYSIS

CERTIFICATION

GREYBULL PLANT

DATE [illegible]

SOLD TO:	SHIP TO:
SIGCON INC.	[illegible]
[illegible] MONROEVILLE BLVD	
CORPORATE BUILDING SUITE [illegible]	
MONROEVILLE PA [illegible]	S. CHICAGO IL [illegible]
SALES ORDER NO.: NOTYOUR>	

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-13-04	QUALITY ID	GREYBULL	OIL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	37
Plastic Viscosity (cP)	N/A	
Yield Point (P / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.6
> 75 micron (wt. %)	4.0 max.	1.1

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	5.5
Y.P. / P.V. Ratio	3.0 max.	1.95

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4203.

Signed [illegible] Date 1/15/04

Approved by: Plant Manager

LaboratoryCert.doc (4/23/97)
Rev 2 (5/02)

Arrived onsite 01/14/04

4000 # jumbo

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/15/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 20 - 28 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
51+50	2.00	86.00	6.00	20.00	44.00	8
51+50	34.00	87.00	8.00	18.00	44.00	8
51+00	2.00	93.00	24.00	26.00	60.00	8
51+00	34.00	94.00	28.00	20.00	62.00	8

NORTH TRENCH

COMMENTS: Minimal slurry was pumped to this trench today to try and keep the slurry in spec. Sand Content in the AM was low because no work was done on the trench yesterday and it settled out of the slurry Bottom of trench and slope was cleaned before start of excavation today

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
51+00	LAB SAMPLE COLLECTED 01/15/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
54+00	4.00	Sample collected	Sample collected	Sample collected	2.06×10^{-7}	yes
53+75	4.00	N/A	N/A	N/A	1.16×10^{-7}	N/A
53+50	4.00	N/A	N/A	N/A	3.09×10^{-7}	N/A
53+25	4.00	N/A	N/A	N/A	1.19×10^{-7}	N/A
53+00	4.00	Sample collected	Sample collected	Sample collected	1.49×10^{-7}	yes
52+75	4.00	N/A	N/A	N/A	2.38×10^{-7}	N/A
52+50	4.00	N/A	N/A	N/A	1.64×10^{-7}	N/A
52+25	4.00	N/A	N/A	N/A	1.49×10^{-7}	N/A
52+00	4.00	N/A	N/A	N/A	1.68×10^{-7}	N/A

COMMENTS

Filter cake: .6mm, .6mm, .5mm, and .6mm respectively.

Unit Weight: 54+00: 109.0 pcf		
53+75: 112.0 pcf		
53+50: 113.0 pcf		
53+25: 116.0 pcf		
53+00: 118.0 pcf		
52+75: 118.0 pcf		
52+50: 116.5 pcf	pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
52+25: 114.0 pcf	BALANCE CALIBRATIONS PERFORMED TODAY?	no
52+00: 118.0 pcf	FUNNEL CALIBRATIONS PERFORMED TODAY?	no

DRY BENTONITE ADDITION		
	TONS	%
TODAY	38.00	6%
TO DATE	482.00	6%
BORROW %	CY	

GEO-CON: [illegible] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/15/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 20 - 28 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
42+10	2.00	92.00	27.00	23.00	65.00	8
42+10	34.00	93.00	29.00	20.00	67.00	8
42+70	2.00	92.00	27.00	23.00	61.00	8
42+70	34.00	94.00	30.00	19.00	63.00	8

SE TRENCH

COMMENTS: Minimal fresh slurry was pumped to this trench today to try and keep the slurry in spec.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
42+50	LAB SAMPLE COLLECTED 01/15/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
39+50	3.00	N/A	N/A	N/A	$5.76x10^{-7}$	N/A
39+75	3.00	N/A	N/A	N/A	$1.20x10^{-7}$	N/A
40+00	3.00	Sample collected	Sample collected	Sample collected	$1.20x10^{-7}$	yes
40+25	3.00	N/A	N/A	N/A	$4.25x10^{-7}$	N/A
40+50	3.00	N/A	N/A	N/A	$8.60x10^{-8}$	N/A
40+75	3.00	N/A	N/A	N/A	$1.25x10^{-7}$	N/A
41+00	2.00	Sample collected	Sample collected	Sample collected	$1.71x10^{-7}$	yes
41+25	2.00	N/A	N/A	N/A	$1.19x10^{-7}$	N/A
41+50	2.00	N/A	N/A	N/A	$2.17x10^{-7}$	N/A

COMMENTS

Filter cake: .5mm, .5mm, .4mm, and .4mm respectively.

Unit Weight:	39+50:	114.0 pcf
	39+75:	116.0 pcf
	40+00:	115.0 pcf
	40+25:	113.0 pcf
	40+50:	117.0 pcf
	40+75:	109.0 pcf
	41+00:	115.0 pcf
	41+25:	115.0 pcf
	41+50:	116.5 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY	30.00	6%
TO DATE	334.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/15/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
10:30	65.00	49.00	14.00	8
12:30	64.50	52.00	13.00	8
Filter cake is .2mm and .2mm, respectively.				
Minimal slurry mixed and pumped today. No viscosity checks for this reason.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/15/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 20 - 28 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
51+50	33.0	36.5	36.4	10.0	364.0	6.5	54+20	TOPOUT	TOPOUT
51+40	29.9	36.5	36.5	10.0	365.0	6.5	54+10	4.4	TOPOUT
51+30	33.0	36.6	36.6	10.0	365.5	6.5	54+00	5.1	TOPOUT
51+20	33.0	36.6	36.6	10.0	366.0	6.0	53+90	6.7	TOPOUT
51+10	33.0	36.5	36.6	10.0	365.5	6.0	53+80	8.4	TOPOUT
51+00	33.0	36.5	36.5	10.0	365.0	6.0	53+70	9.7	TOPOUT
50+90	33.0	36.6	36.6	10.0	365.5	6.0	53+60	12.5	TOPOUT
50+80	33.0	36.6	36.6	10.0	366.0	6.0	53+50	14.2	TOPOUT
							53+40	16.1	TOPOUT
							53+30	17.0	TOPOUT
							53+20	18.5	TOPOUT
							53+10	20.3	TOPOUT
							53+00	23.4	TOPOUT
							52+90	26.2	TOPOUT
							52+80	28.0	TOPOUT
							52+70	28.5	TOPOUT
							52+60	31.3	TOPOUT
							52+50	32.8	TOPOUT
							52+40	33.5	TOPOUT
							52+30	35.2	TOPOUT
							52+20	35.9	TOPOUT
							52+10	36.3	9.0
							52+00	36.6	11.5
							51+90	36.5	14.6
							51+80	36.5	18.7
							51+70	36.4	23.1
							51+60	36.2	24.5
							51+50	20.9	28.5
							51+40	10.1	30.1
							51+30		32.6
							51+20		33.9
				SF TODAY	2922.50		51+10		34.5
				SF TO DATE	98833.50		51+00		36.4

COMMENTS

NORTH TRENCH

AM Profile was compared to PM profile from 01/13/04.

GEO-CON: Suzanne F Sopic OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/15/04   JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL   JOB NUMBER: P01-048

WEATHER: Partly sunny; 20 - 28 degrees   RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH: TOP KEY	DEPTH: BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A							50+90		36.5
							50+80		36.5
							50+70		31.2
							50+60		23.2

SF TODAY: 0.00

SF TO DATE: 98833.50

COMMENTS

NORTH TRENCH

GEO-CON: [illegible signature]   OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/15/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 20 - 28 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
42+10	32.5	36.5	36.6	10.0	365.5	2.9	39+40	TOPOUT	TOPOUT
42+20	32.6	36.7	36.6	10.0	366.0	2.9	39+50	8.8	TOPOUT
42+30	32.6	36.8	36.8	10.0	367.5	2.8	39+60	10.2	TOPOUT
42+40	32.5	36.7	36.8	10.0	367.5	2.9	39+70	11.8	TOPOUT
42+50	32.6	36.6	36.7	10.0	366.5	2.8	39+80	12.4	TOPOUT
42+60	32.6	36.6	36.6	10.0	366.0	2.8	39+90	13.6	TOPOUT
42+70	32.7	36.8	36.7	10.0	367.0	3.0	40+00	15.1	TOPOUT
42+80	32.7	36.6	36.7	10.0	367.0	2.9	40+10	17.9	TOPOUT
42+90	32.7	36.5	36.6	10.0	365.5	2.9	40+20	21.0	TOPOUT
							40+30	21.5	TOPOUT
							40+40	22.3	TOPOUT
							40+50	22.8	TOPOUT
							40+60	24.0	TOPOUT
							40+70	25.1	TOPOUT
							40+80	25.3	TOPOUT
							40+90	26.0	TOPOUT
							41+00	27.3	TOPOUT
							41+10	28.4	8.3
							41+20	29.6	12.2
							41+30	31.7	14.0
							41+40	32.1	15.7
							41+50	32.3	18.5
							41+60	34.0	18.9
							41+70	36.6	19.6
							41+80	36.6	20.1
							41+90	36.5	21.8
							42+00	36.6	22.7
							42+10		23.9
							42+20		24.3
							42+30		25.0
							42+40		25.9
							42+50		28.1
							42+60		31.4
							42+70		34.2

SF TODAY 3298.50

SF TO DATE 82582.72

COMMENTS

SE Trench

GEO-CON: Suzanne E. Sepic OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/15/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny; 20 - 28 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A							42+80		36.6
							42+90		36.5

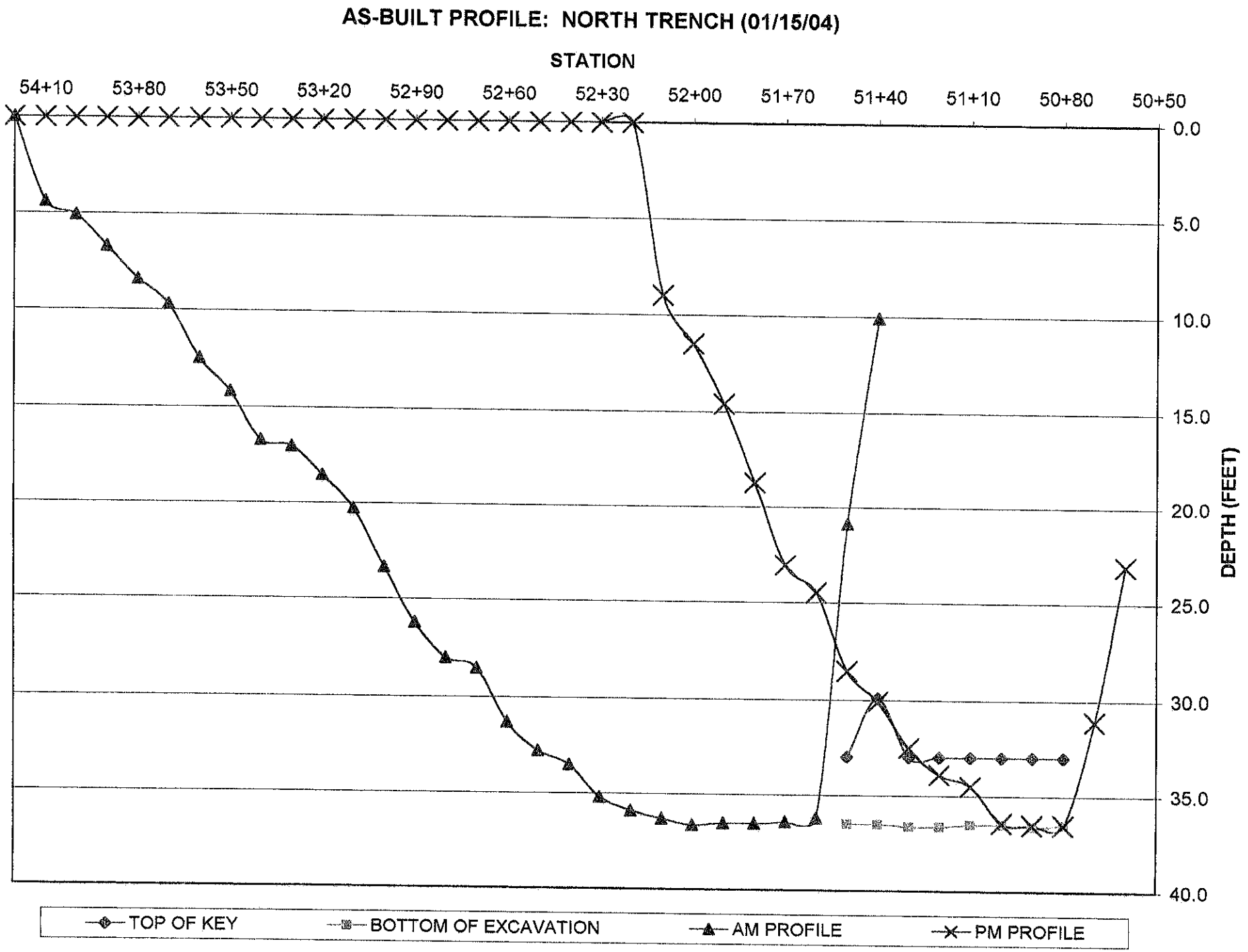
SF TODAY 0.00

SF TO DATE 82582.72

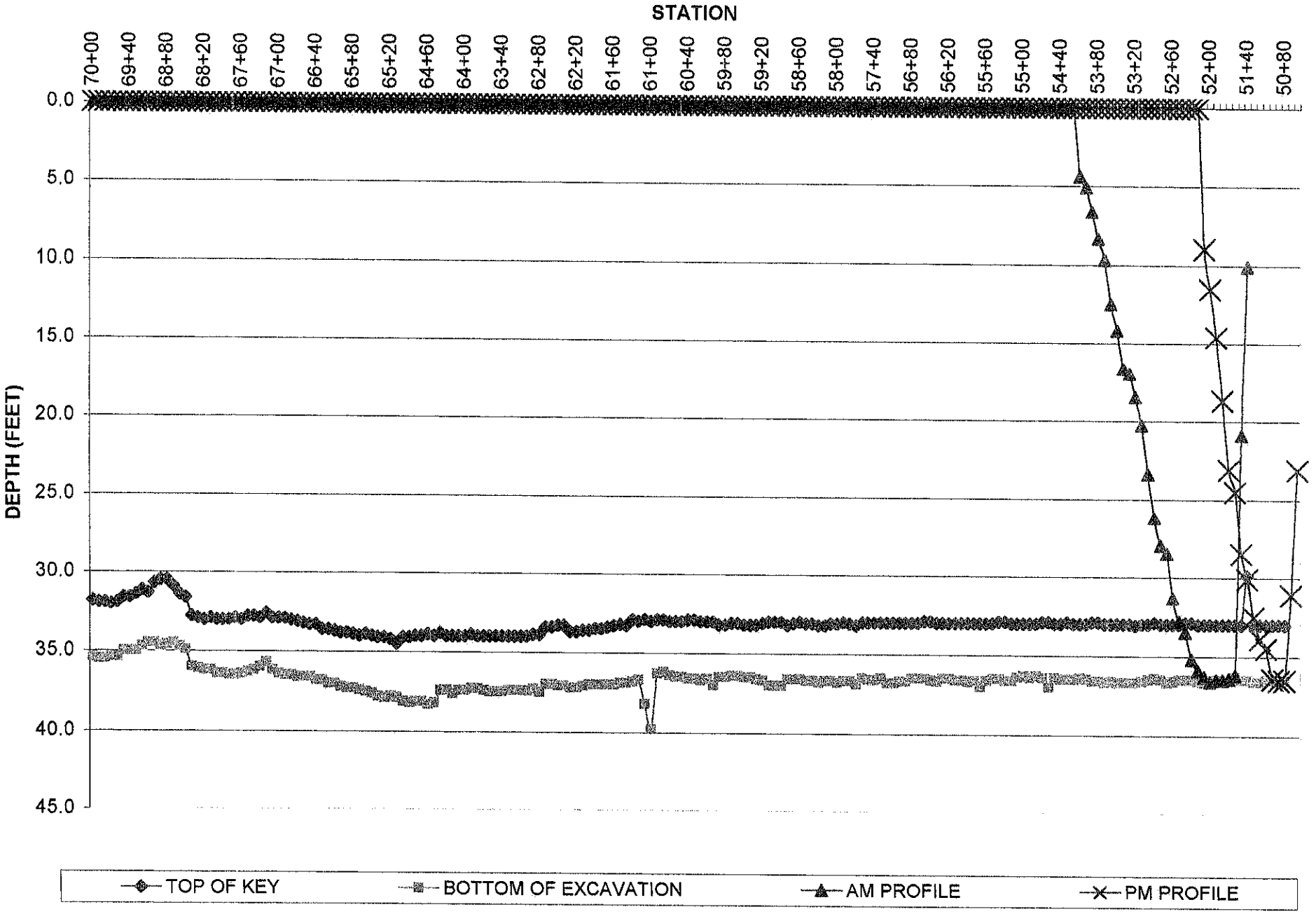
COMMENTS

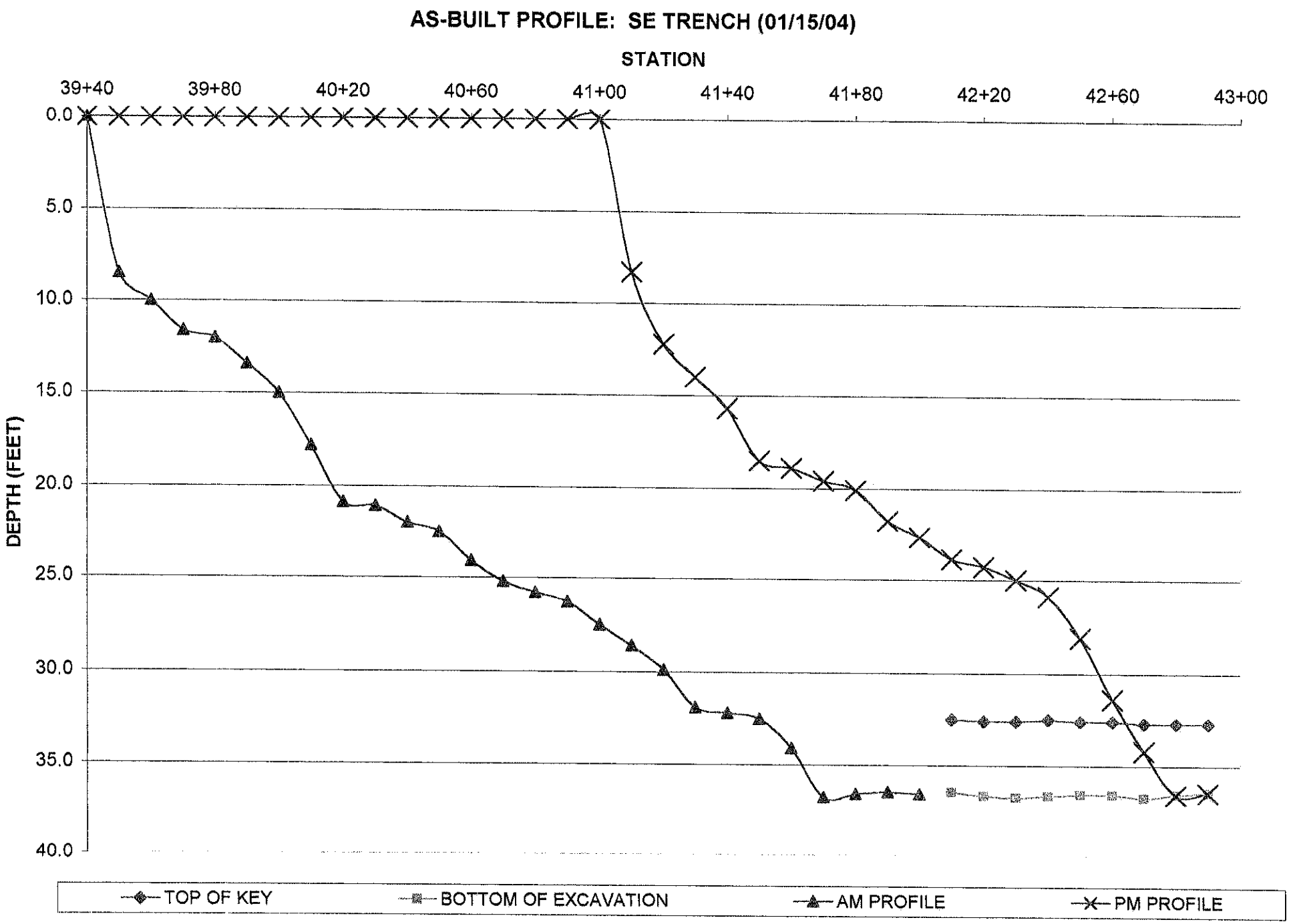
SE Trench

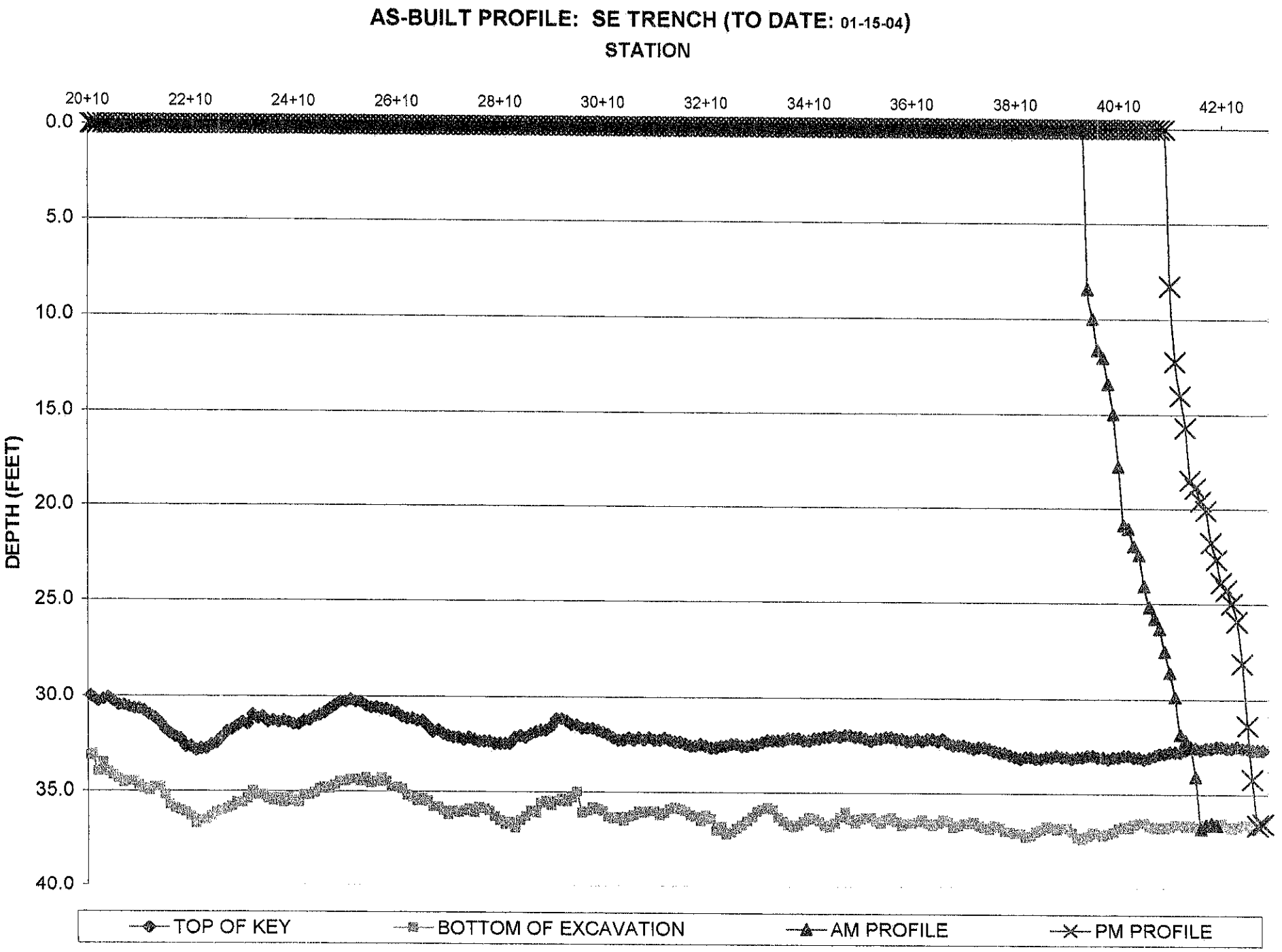
GEO-CON: Suzanne C. Sepio OWNER:


AS-BUILT PROFILE: NORTH TRENCH (01/15/04)
STATION
54+10
53+80
53+50
53+20
52+90
52+60
52+30
52+00
51+70
51+40
51+10
50+80
50+50
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: NORTH TRENCH (TO DATE: 01/15/03)




AS-BUILT PROFILE: SE TRENCH (01/15/04)
STATION
39+40
39+80
40+20
40+60
41+00
41+40
41+80
42+20
42+60
43+00
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE: 01-15-04)
STATION
20+10
22+10
24+10
26+10
28+10
30+10
32+10
34+10
36+10
38+10
40+10
42+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/15/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:30	49	> 40 sec	65	> 64 pcf	8	6.5 - 10	14	< 20 cm^3	.2
PM	12:30	52	> 40 sec	64.5	> 64 pcf	8	6.5 - 10	13	< 20 cm^3	.2

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NORTH TRENCH

* Minimal slurry mixed & pumped today

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:48	51+50	2	44	40 - 90 sec	86	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	.6	6	MAX 30%
7:48	51+50	34	44	40 - 90 sec	87	64 - 95 pcf	8	6.5 - 10	18	< 25 cm^3	.6	8	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
14:27	51+00	2	60	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	26	< 25 cm^3	.5	24	MAX 30%
14:27	51+00	34	62	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	.6	28	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
54+00	4	2" to 6"	109	+15 pcf over trench slurry	2.06×10^{-7}	1.0×10^{-7} cm/sec
53+75	4	2" to 6"	112	+15 pcf over trench slurry	1.16×10^{-7}	1.0×10^{-7} cm/sec
53+50	4	2" to 6"	113	+15 pcf over trench slurry	3.09×10^{-7}	1.0×10^{-7} cm/sec
53+25	4	2" to 6"	116	+15 pcf over trench slurry	1.19×10^{-7}	1.0×10^{-7} cm/sec
53+00	4	2" to 6"	118	+15 pcf over trench slurry	1.49×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS **DATE** 01/15/04

Page 2 of 2

North Trench

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
52+75	4	2" to 6"	118	+15 pcf over trench slurry	2.38×10^{-7}	1.0×10^{-7} cm/sec
52+50	4	2" to 6"	116.5	+15 pcf over trench slurry	1.64×10^{-7}	1.0×10^{-7} cm/sec
52+25	4	2" to 6"	114	+15 pcf over trench slurry	1.49×10^{-7}	1.0×10^{-7} cm/sec
52+00	4	2" to 6"	118	+15 pcf over trench slurry	1.68×10^{-7}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 54+00, 53+75, 53+50, 53+25, 53+00, 52+75, 52+50, 52+25, 52+00

Technician: SM/MM ✓BY SES

Sample Area: A= $\pi r^2 = \pi (3.85)^2 = 46.56$ cm²

Sample Height: L= 7.5cm, 7.5cm, 7.5cm, 6.5cm, 6.5cm, 6.5cm, 6.5cm, 6.5cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/cem. sacks (1/41.65)
54+00	01/15/04	10:57-14:57	240	10	93.7844	484692.9732	—	24	2.06×10^{-7}	1.41×10^{-7}
53+75	01/15/04	10:57-14:57	240	10	93.7844	484692.9732	—	13.5	1.16×10^{-7}	7.92×10^{-8}
53+50	01/15/04	10:57-14:57	240	10	93.7844	484692.9732	—	36	3.09×10^{-7}	2.11×10^{-7}
53+25	01/15/04	15:30-19:30	240	10	108.2128	559261.0644	—	16	1.19×10^{-7}	8.12×10^{-8}
53+00	01/15/04	15:30-19:30	240	10	108.2128	559261.0644	—	20	1.49×10^{-7}	1.02×10^{-7}
52+75	01/15/04	15:30-19:30	240	10	108.2128	559261.0644	—	32	2.38×10^{-7}	1.62×10^{-7}
52+50	01/15/04	15:30-19:30	240	10	108.2128	559261.0644	—	22	1.64×10^{-7}	1.12×10^{-7}
52+25	01/15/04	15:30-19:30	240	10	108.2128	559261.0644	—	20	1.49×10^{-7}	1.02×10^{-7}
52+00	01/15/04	15:30-19:30	240	10	100.4833	519313.7717	—	21	1.68×10^{-7}	1.15×10^{-7}

I= $\frac{P\ (psi)}{0.014217\ L\ (cm)}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 01/15/04

Page 1 of 2.

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NORTH TRENCH

SE TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:30	42+10	2	65	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	.5	27	MAX 30%
7:30	42+10	34	67	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	.5	29	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
15:05	42+70	2	61	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	23	< 25 cm^3	.4	27	MAX 30%
15:05	42+70	34	63	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	19	< 25 cm^3	.4	30	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
39+50	3	2" to 6"	114	+15 pcf over trench slurry	5.76×10^{-7}	1.0×10^{-7} cm/sec
39+75	3	2" to 6"	116	+15 pcf over trench slurry	1.20×10^{-7}	1.0×10^{-7} cm/sec
40+00	3	2" to 6"	115	+15 pcf over trench slurry	1.20×10^{-7}	1.0×10^{-7} cm/sec
40+25	3	2" to 6"	113	+15 pcf over trench slurry	4.25×10^{-7}	1.0×10^{-7} cm/sec
40+50	3	2" to 6"	117	+15 pcf over trench slurry	8.60×10^{-8}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS

DATE 01/15/04

BENTONITE SLURRY AT THE BATCH PLANT

SE TRENCH

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

N/A

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

N/A

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
40+75	3	2" to 6"	109	+15 pcf over trench slurry	1.25×10^{-7}	1.0×10^{-7} cm/sec
41+00	2	2" to 6"	115	+15 pcf over trench slurry	1.71×10^{-7}	1.0×10^{-7} cm/sec
41+25	2	2" to 6"	115	+15 pcf over trench slurry	1.19×10^{-7}	1.0×10^{-7} cm/sec
41+50	2	2" to 6"	116.5	+15 pcf over trench slurry	2.17×10^{-7}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

JE TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 39+50, 39+75, 40+00, 40+25, 40+50, 40+75, 41+00, 41+25, 41+50

Technician: SM/MM ✓ SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.5cm, 7.0cm, 7.0cm, 6.5cm, 7.5cm, 7.5cm, 6.5cm, 6.5cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	[illegible]
39+50	01/15/04	10:57-14:57	240	10	93.7844	484692.9732	–	67	5.76×10^{-7}	3.93×10^{-8}
39+75	01/15/04	10:57-14:57	240	10	100.4833	519313.7717	–	15	1.20×10^{-7}	$8.19 \times$ [illegible]
40+00	01/15/04	10:57-14:57	240	10	100.4833	519313.7717	–	15	1.20×10^{-7}	$8.19 \times$ [illegible]
40+25	01/15/04	10:57-14:57	240	10	108.2128	559261.0644	–	57	4.25×10^{-7}	2.90×10^{-8}
40+50	01/15/04	10:57-14:57	240	10	93.7844	484692.9732	–	10	8.60×10^{-8}	5.87×10^{-9}
40+75	01/15/04	10:57-14:57	240	10	93.7844	484692.9732	–	145	1.25×10^{-7}	8.53×10^{-9}
41+00	01/15/04	15:30-19:30	240	10	108.2128	559261.0644	–	23	1.71×10^{-7}	1.17×10^{-8}
41+25	01/15/04	15:30-19:30	240	10	108.2128	559261.0644	–	16	1.19×10^{-7}	8.12×10^{-9}
41+50	01/15/04	15:30-19:30	240	10	100.4833	519313.7717	–	27	2.17×10^{-7}	1.48×10^{-8}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

01/15/07

NORTH TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
51+50	587.6	587.7	33.0	554.7	36.5	551.2	6.5	4.5
51+40	587.6	587.2	29.9	557.3	36.5	550.7	6.5	4.5
51+30	587.6	587.2	33.0	554.2	36.6	550.6	6.5	4.5
51+20	587.6	587.6	33.0	554.6	36.6	551.0	6.0	4.0
51+10	587.6	587.3	33.0	554.3	36.5	550.8	6.0	3.5
51+00	587.6	587.8	33.0	554.8	36.5	551.3	6.0	3.5
50+90	587.7	587.6	33.0	554.6	36.6	551.0	6.0	3.5
50+80	587.7	587.6	33.0	554.6	36.6	551.0	6.0	3.5

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED ON A 1:1.5 SLOPE.

SE TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
42+10	587.1	587.1	32.5	554.6	36.5	550.6	2.9	4.4
42+20	587.1	587.1	32.6	554.5	36.7	550.4	2.9	4.4
42+30	587.1	587.0	32.6	554.4	36.8	550.2	2.8	4.2
42+40	587.1	587.2	32.5	554.7	36.7	550.5	2.9	4.4
42+50	587.1	587.0	32.6	554.4	36.6	550.4	2.8	4.2
42+60	587.1	586.9	32.6	554.3	36.6	550.3	2.8	4.2
42+70	587.1	586.9	32.7	554.2	36.8	550.1	3.0	4.5
42+80	587.2	586.9	32.7	554.2	36.6	550.3	2.9	4.4
42+90	587.2	586.9	32.7	554.2	36.5	550.4	2.9	4.4

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED WITH A 1:1.5 SLOPE

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 16-Jan-04 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO P01-048 | P O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-074 (NW51+00)	SOIL ONLY	51+00	01/15/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-075 (SE42+50)	SOIL ONLY	42+50	01/15/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-086 (NW54+00)	SB BACKFILL**	54+00	01/15/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-087 (SE40+00)	SB BACKFILL**	40+00	01/15/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-088 (NW53+00)	SB BACKFILL**	53+00	01/15/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-089 (SE41+00)	SB BACKFILL**	41+00	01/15/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

Special Instructions/Comments: **SB=SOIL BENTONITE

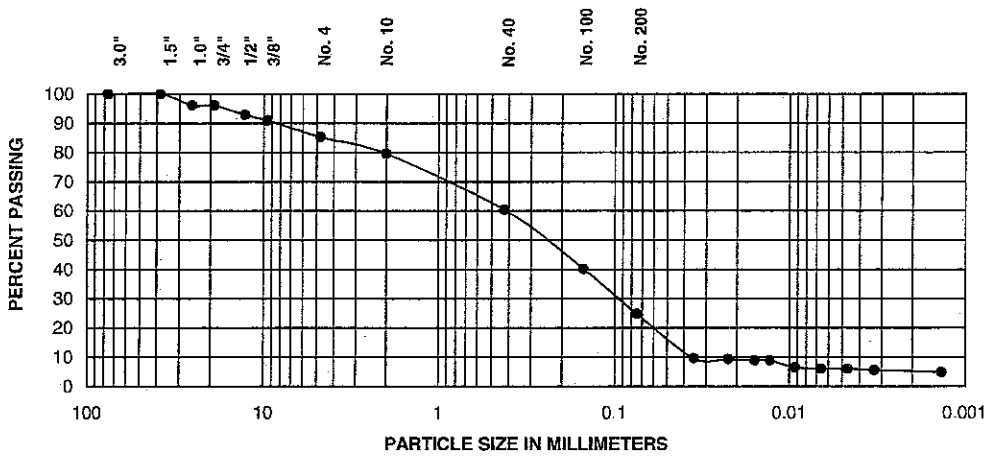
White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)

333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-086 (NW 54+00)	**Date Tested**	1/20/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/16/2004
Sample Location	54+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	14.7	60.4	19.2	5.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	96.1
3/4"	96.1
1/2"	92.9
3/8"	91.0
No. 4	85.3
No. 10	79.6
No. 40	60.5
No. 100	40.2
No. 200	24.9

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
27	22	5

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

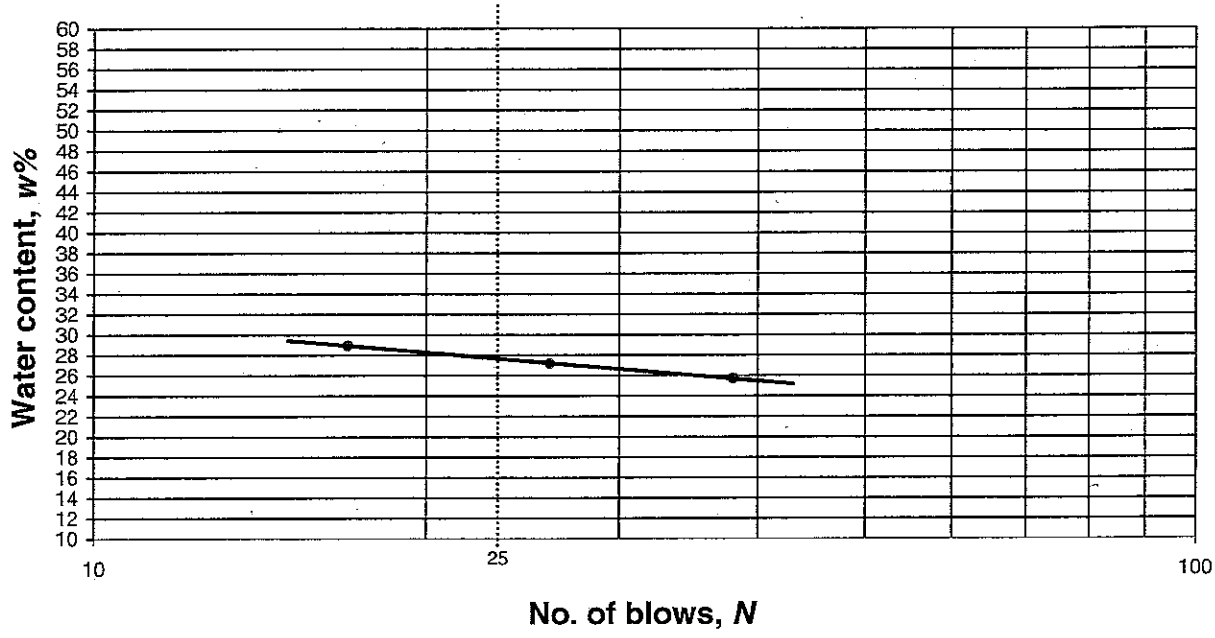
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-086 (NW 54+00)	**Date Tested**	1/19/2004	**Tested By**	EM
						Qc By	NP

Date Sample Recd.	1/16/2004
Sample Location	54+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**27**	**Plastic Limit, PL**	**22**	**Plasticity Index, PI**	**5**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/19/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-086 (NW 54+00)	Date Recd.	1/16/04	**Location**	54+00 (NW)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.59	cm	Volume, V:	268.3	cu cm
Mass of Sample:	494.7	g	**Moisture Content:**	**27.7**	**%**
			Wet Density	**115.0**	**pcf**
			Dry Density	**90.1**	**pcf**

Final

Diameter:	7.02	cm	Area, A:	38.7	sq cm
Height, L:	6.08	cm	Volume, V:	235.3	cu cm
Mass of Sample:	476.00	g	**Moisture Content:**	**24.9**	**%**
			Wet Density	**126.2**	**pcf**
			Dry Density	**101.1**	**pcf**
			Deg of Saturation	**98.0**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	19.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/19/2004	9:00 AM	0	0	3.08	5.92		20.0	---
1/19/2004	9:45 AM	2700	2700	3.18	5.84	1.3	20.0	3.29E-08
1/19/2004	10:30 AM	2700	5400	3.26	5.77	1.1	20.0	2.90E-08
1/19/2004	11:45 AM	4500	9900	3.37	5.67	1.1	20.0	2.51E-08
1/19/2004	12:30 PM	2700	12600	3.44	5.61	1.2	20.0	2.53E-08

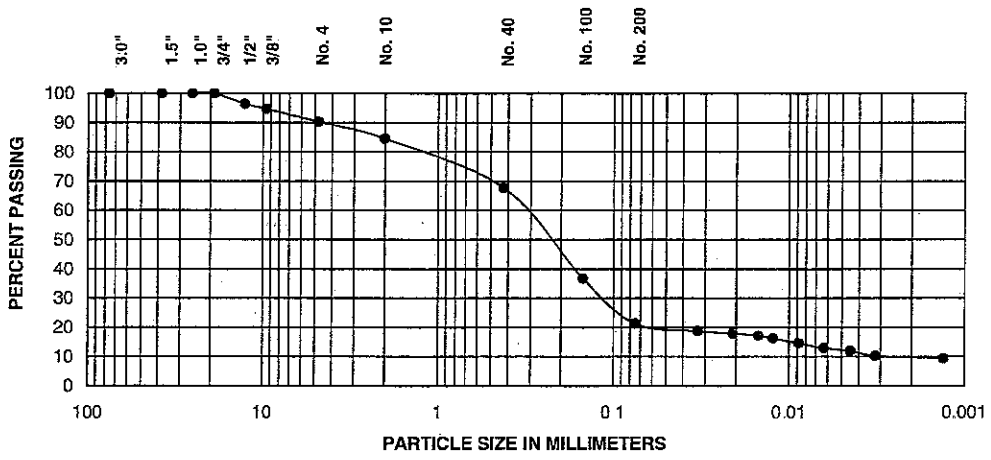
Average Permeability = **2.8E-08** **cm/sec**

Remarks:

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-087 (SE 40+00)	**Date Tested**	1/20/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/16/2004
Sample Location	40+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	9.8	68.8	9.1	12.3

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	96.4
3/8"	94.8
No. 4	90.2
No. 10	84.6
No. 40	67.8
No. 100	36.8
No. 200	21.4

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
36	21	15

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

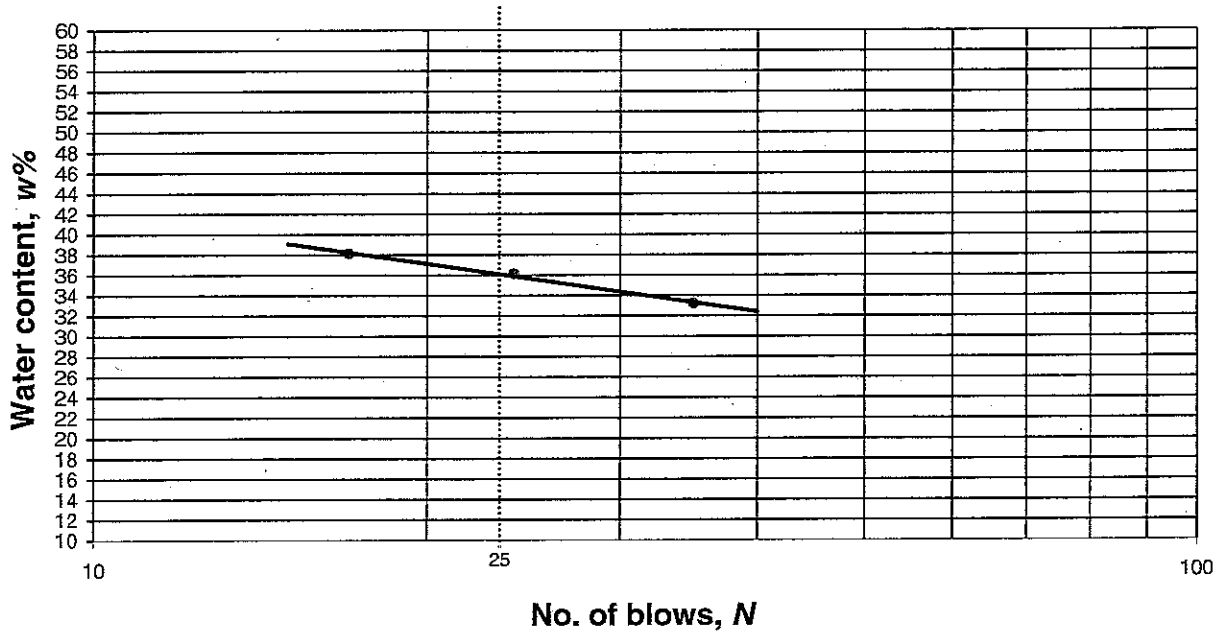
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-087 (SE 40+00)	**Date Tested**	1/19/2004	**Tested By**	EM
						Qc By	NP

Date Sample Recd.	1/16/2004
Sample Location	40+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**36**	**Plastic Limit, PL**	**21**	**Plasticity Index, PI**	**15**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/19/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-087 (SE 40+00)	Date Recd.	1/16/04	**Location**	40+00 (SE)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.99	cm	Volume, V:	243.9	cu cm
Mass of Sample:	443.1	g	**Moisture Content:**	**28.7**	%
			Wet Density	**113.4**	**pcf**
			Dry Density	**88.1**	**pcf**

Final

Diameter:	7.01	cm	Area, A:	38.6	sq cm
Height, L:	5.50	cm	Volume, V:	212.3	cu cm
Mass of Sample:	424.20	g	**Moisture Content:**	**27.2**	%
			Wet Density	**124.7**	**pcf**
			Dry Density	**98.0**	**pcf**
			Deg of Saturation	**99.8**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.1	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/19/2004	9:00 AM	0	0	3.00	5.99		20.0	---
1/19/2004	9:45 AM	2700	2700	3.06	5.93	1.0	20.0	2.22E-08
1/19/2004	10:30 AM	2700	5400	3.12	5.87	1.0	20.0	2.23E-08
1/19/2004	11:45 AM	4500	9900	3.20	5.80	1.1	20.0	1.57E-08
1/19/2004	12:30 PM	2700	12600	3.26	5.75	1.2	20.0	1.89E-08

Average Permeability = **2.0E-08** **cm/sec**

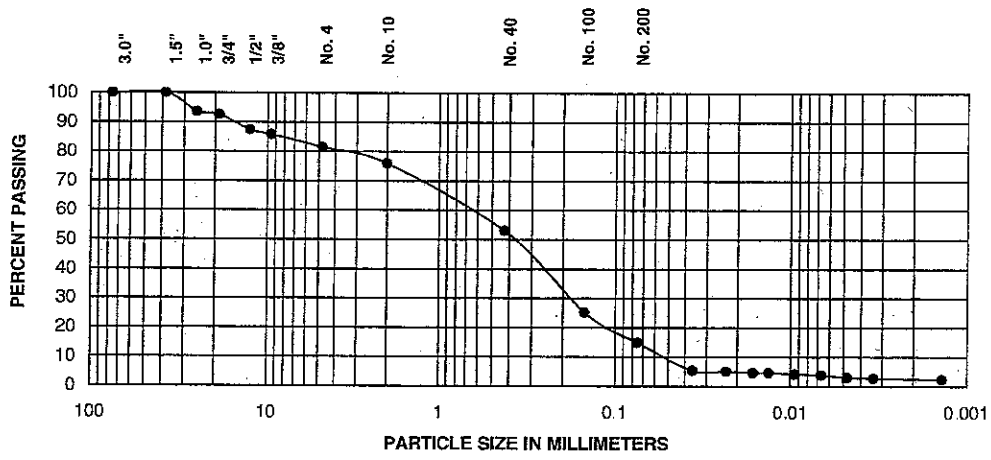
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-088 (NW 53+00)	**Date Tested**	1/20/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/16/2004
Sample Location	53+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	18.5	66.6	11.5	3.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	93.6
3/4"	92.6
1/2"	87.4
3/8"	85.9
No. 4	81.5
No. 10	76.0
No. 40	53.0
No. 100	25.3
No. 200	14.9

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
27	21	6

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

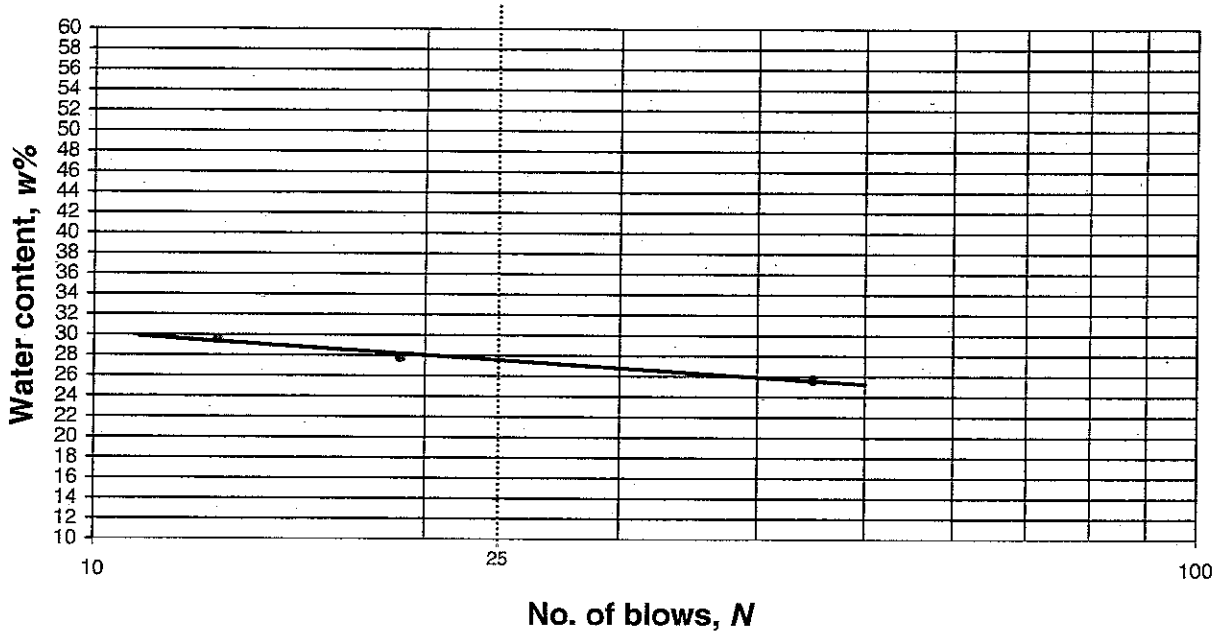
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-088 (NW 53+00)	**Date Tested**	1/19/2004	**Tested By**	EM
						Qc By	NP

Date Sample Recd.	1/16/2004
Sample Location	53+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**27**	**Plastic Limit, PL**	**21**	**Plasticity Index, PI**	**6**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/19/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-088 (NW 53+00)	Date Recd.	1/16/04	**Location**	53+00 (NW)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.93	cm	Volume, V:	282.2	cu cm
Mass of Sample:	506.0	g	**Moisture Content:**	**24.2**	**%**
			Wet Density	**111.9**	**pcf**
			Dry Density	**90.1**	**pcf**

Final

Diameter:	7.03	cm	Area, A:	38.8	sq cm
Height, L:	6.34	cm	Volume, V:	246.1	cu cm
Mass of Sample:	492.10	g	**Moisture Content:**	**25.9**	**%**
			Wet Density	**124.8**	**pcf**
			Dry Density	**99.1**	**pcf**
			Deg of Saturation	**97.5**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	18.3	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/19/2004	9:00 AM	0	0	3.07	5.88		20.0	---
1/19/2004	9:45 AM	2700	2700	3.18	5.78	1.1	20.0	4.33E-08
1/19/2004	10:30 AM	2700	5400	3.27	5.70	1.1	20.0	3.50E-08
1/19/2004	11:45 AM	4500	9900	3.41	5.57	1.1	20.0	3.45E-08
1/19/2004	12:30 PM	2700	12600	3.50	5.49	1.1	20.0	3.57E-08

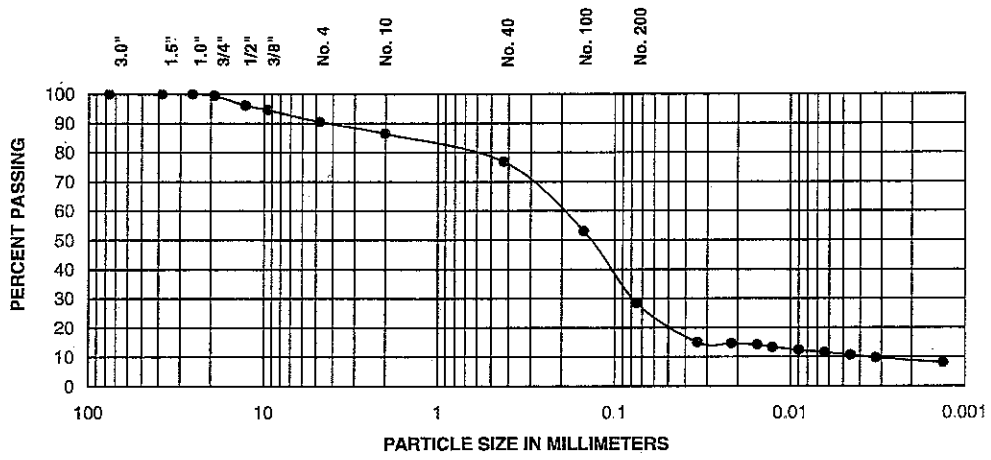
Average Permeability = **3.7E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-089 (SE 41+00)	**Date Tested**	1/19/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/16/2004
Sample Location	41+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	9.6	62.0	17.5	11.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.4
1/2"	96.1
3/8"	94.6
No. 4	90.4
No. 10	86.5
No. 40	76.9
No. 100	53.1
No. 200	28.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

Remarks:

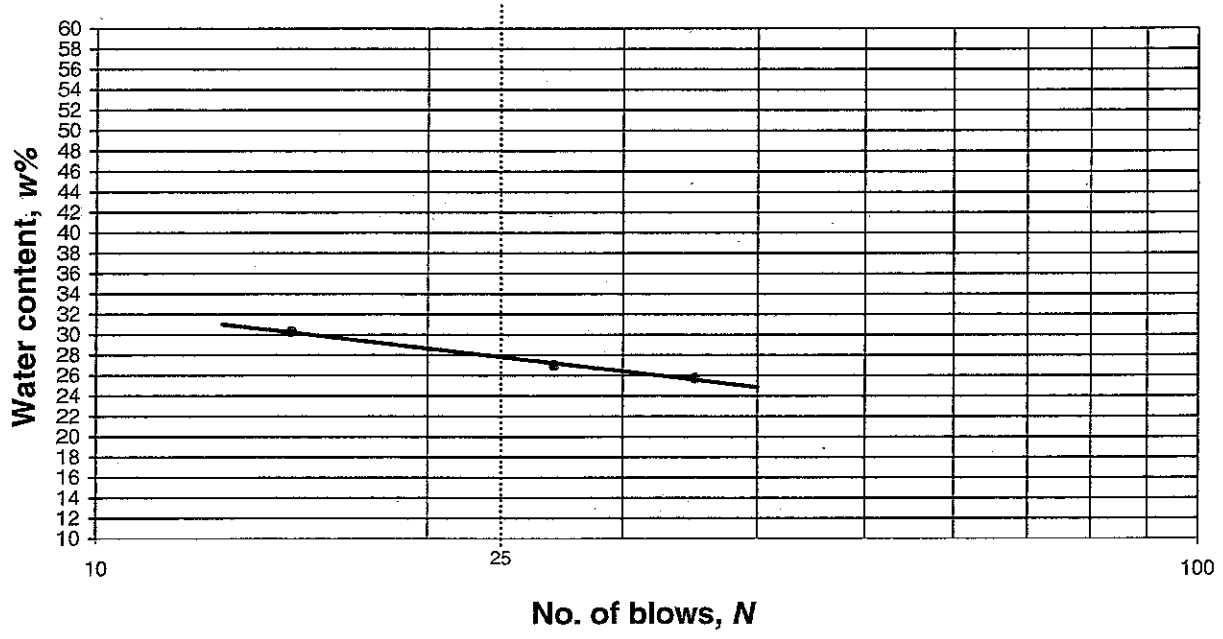
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-089 (SE 41+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/16/2004
Sample Location	41+00 (SE)
Sample Description	2746

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/19/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-089 (SE 41+00)	Date Recd.	1/16/04	**Location**	41+00 (SE)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.96	cm	Volume, V:	283.4	cu cm
Mass of Sample:	556.5	g	**Moisture Content:**	**30.7**	%
			Wet Density	**122.5**	**pcf**
			Dry Density	**93.8**	**pcf**

Final

Diameter:	6.93	cm	Area, A:	37.7	sq cm
Height, L:	6.47	cm	Volume, V:	244.0	cu cm
Mass of Sample:	522.50	g	**Moisture Content:**	**19.2**	%
			Wet Density	**133.6**	**pcf**
			Dry Density	**112.1**	**pcf**
			Deg of Saturation	**99.5**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	18.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/19/2004	9:00 AM	0	0	3.33	5.93		20.0	---
1/19/2004	9:45 AM	2700	2700	3.44	5.84	1.2	20.0	3.95E-08
1/19/2004	10:30 AM	2700	5400	3.55	5.75	1.2	20.0	3.99E-08
1/19/2004	11:45 AM	4500	9900	3.66	5.64	1.0	20.0	2.96E-08
1/19/2004	12:30 PM	2700	12600	3.72	5.58	1.0	20.0	2.71E-08

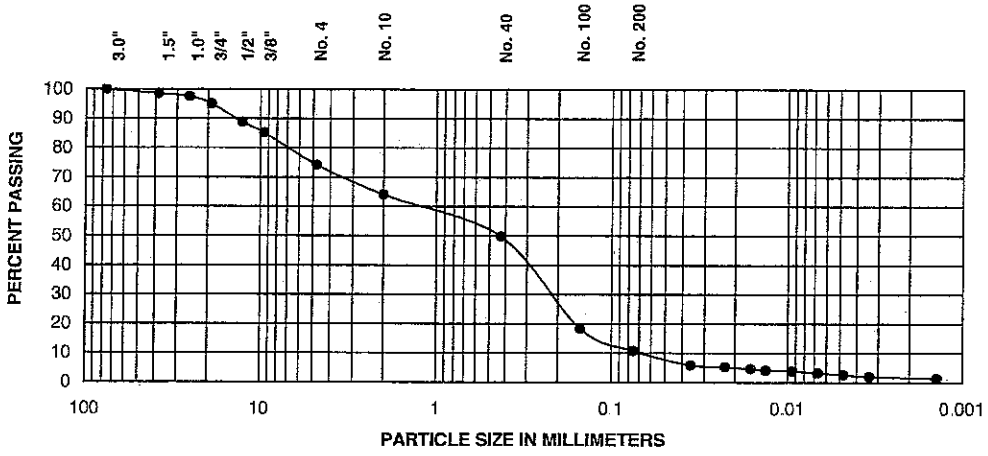
Average Permeability = **3.4E-08** cm/sec

Remarks:

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-074 (NW 51+00)	**Date Tested**	1/16/2004	**Tested by**	KM
						Qc by	NP

Date Sample Received:	1/16/2004
Sample Location	51+00 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	25.8	63.4	7.9	2.9

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.29	0.22	0.07	19.4	0.56

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	98.5
1.0"	97.5
3/4"	95.1
1/2"	88.8
3/8"	85.1
No. 4	74.2
No. 10	64.0
No. 40	49.7
No. 100	18.4
No. 200	10.8

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

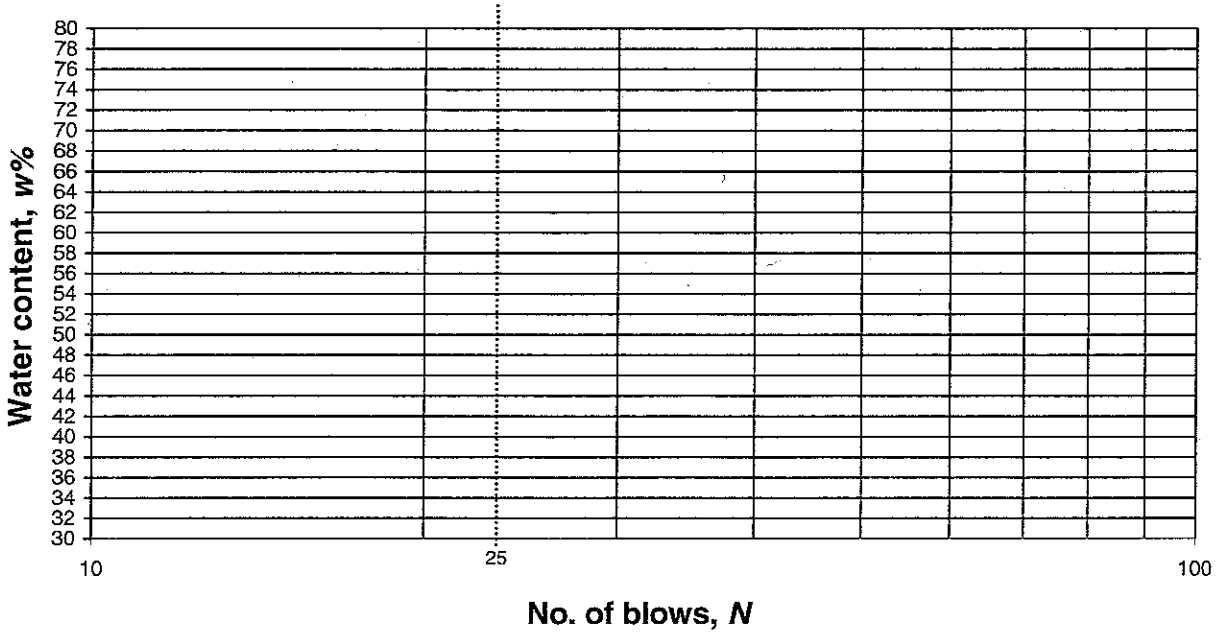
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-074 (NW 51+00)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/16/2004
Sample Location	51+00 (NW)
Sample Description	2746

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	26	Date	1/16/2004	Sheet	1
				Date of weighing	1/17/2004	Tested by	MT

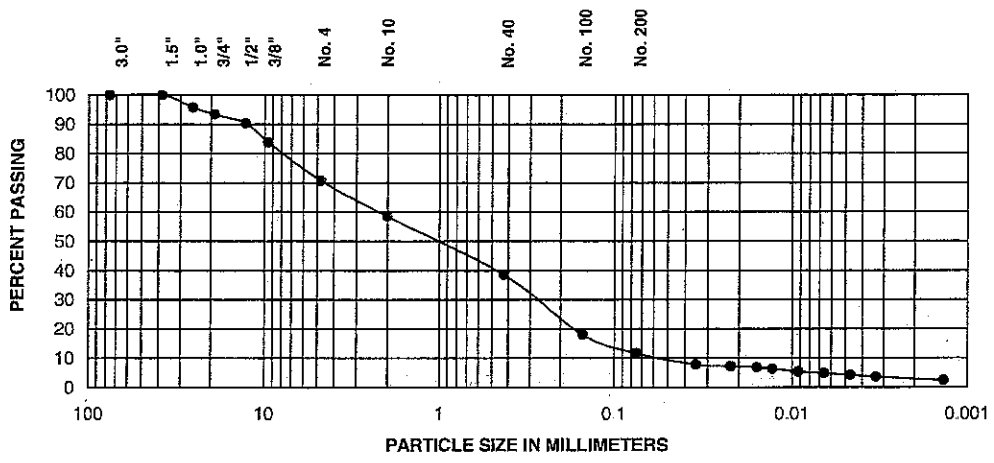
Boring No.	-	-				
Sample No.	BF-074 (NW51+00)	BF-075(SE42+50)				
Location	51 + 00 (NW)	42 + 50 (SE)				
Tin No.	70A	11C				
Tin + Wet Soil	130.96	146.06				
Tin + Dry Soil	120.2	130.81				
Wt. of Tin	30.36	31.2				
Wt. of Dry Soil	89.8	99.6				
Wt. of Water	10.8	15.3				
Moisture, %	12.0	15.3				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-075 (SE 42+50)	**Date Tested**	1/19/2004	**Tested by**	MT
						Qc by	NP

Date Sample Received:	1/16/2004
Sample Location	42+50 (SE)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	29.3	58.9	7.4	4.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	2.22	0.27	0.05	41.7	0.64

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	95.8
3/4"	93.4
1/2"	90.3
3/8"	83.9
No. 4	70.7
No. 10	58.6
No. 40	38.6
No. 100	18.1
No. 200	11.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

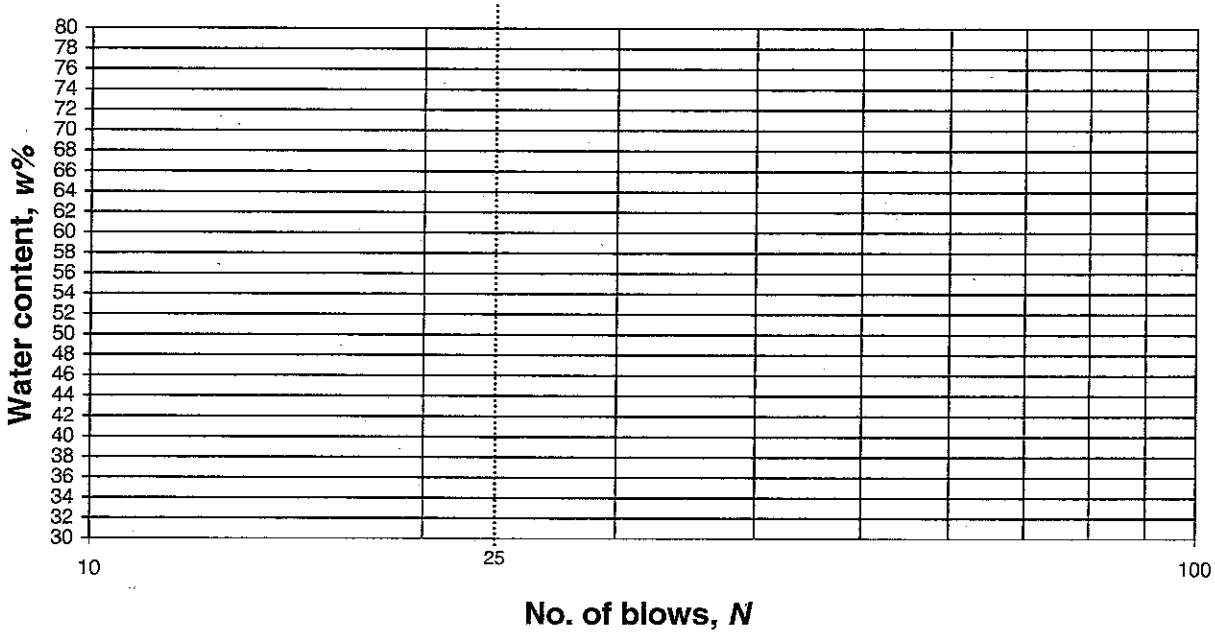
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-075 (SE 42+50)	**Date Tested**	1/18/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/16/2004
Sample Location	42+50 (SE)
Sample Description	2746

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	26	Date	1/16/2004	Sheet	1
				Date of weighing	1/17/2004	Tested by	MT

Boring No.	-	-				
Sample No.	BF-074 (NW51+00)	BF-075(SE42+50)				
Location	51 + 00 (NW)	42 + 50 (SE)				
Tin No.	70A	11C				
Tin + Wet Soil	130.96	146.06				
Tin + Dry Soil	120.2	130.81				
Wt. of Tin	30.36	31.2				
Wt. of Dry Soil	89.8	99.6				
Wt. of Water	10.8	15.3				
Moisture, %	12.0	15.3				
Penetrometer	-	-				
Qu (tsf)	-	-				
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/15/04
Weather: Partly sunny, 26 - 28 degrees

Job Number: P01-048
Job Name: Indiana Harbor

Trench Topped Out Sta. 54+20 to 52+20 = 200 L.F.

Length: 200 x Depth[1]: 35.6 (avg) =Square Feet 7120

Square feet: 7120 x Width: 2.5 =Total Cubic Feet[3] 17800

Cubic feet[3]: 19064 x Dry Unit Weight: 85 (1620440) /2000= 810.22 Tons of Soil

Tons of Soil: 810.22 x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate 567.15 Tons of Soil

Unit Rate: 567.15 x Specified Rate: 6% =Bentonite Required 34.03 Tons of Bentonite Required between these Stations to top out the trench

Via Mixer = 20.00 (3.53%) Tons of Bentonite

Via Backfill = 38.00 (6.70%) Tons of Bentonite

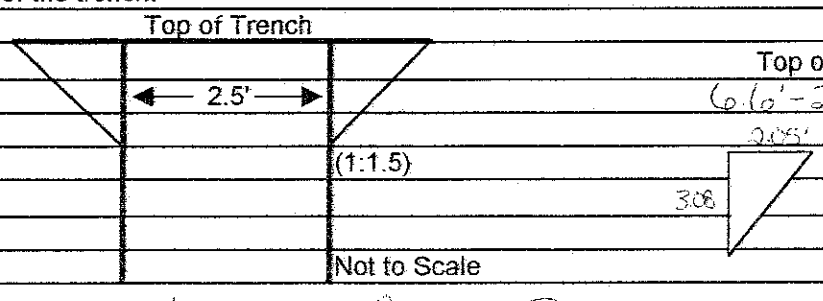
Total Tons of Bentonite Used = 58.00 (10.23%)

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 6.6'

6.6' - 2.5' = 4.1' → 2.05' average on each side

A = 1/2 b h = 1/2 (2.05)(3.08) = 3.16 SF

[3] CF = SF * L * 2 sides = 1264 CF

Note: Add to CF above

GEO-CON Suzanne C Sepe
Signature/Date

OWNER
Signature/Date

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/15/04
Weather: Partly Sunny, 20 - 28 degrees

Job Number: P01-048
Job Name: Indiana Harbor

Trench Topped Out Sta 39+40 to 41+00 = 160 L.F.

Length: 160 x Depth[1]: 35.9 (avg) =Square Feet 5744

Square feet: 5744 x Width: 2.5 =Total Cubic Feet[3] 14360

Cubic feet[3]: 143824 x Dry Unit Weight: 85 (122504) /2000= 611.25 Tons of Soil

Tons of Soil: 611.25 x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate 427.88 Tons of Soil

Unit Rate: 427.88 x Specified Rate: 6% =Bentonite Required 25.67 Tons of Bentonite Required between these Stations to top out the trench

Via Mixer = 16.00 (3.74%) Tons of Bentonite

Via Backfill = 30.00 (7.01%) Tons of Bentonite

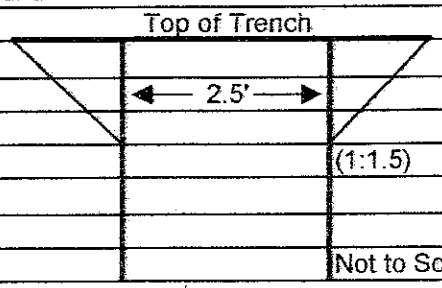
Total Tons of Bentonite Used = 46.00 (10.75%)

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

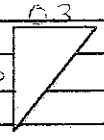
[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 3.1

3.1 - 2.5 = 0.6' → 0.3' average on each side



A = 1/2 b h = 1/2 (.3)(.45) = 0.075 SF

[3] CF = SF * L * 2 sides = 22.4 CF

Note: Add to CF above

GEO-CON: Suzanne E. Lopio
Signature/Date

OWNER:
Signature/Date

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 1/13/2004

SOLD TO:	SHIP TO:
GEO-CON INC 4075 MONROEVILLE BLVD CORPORATE 1 BUILDING SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: 2031V995149	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-13-04	MCNT TRANS 1942	GREYBULL	GBL

Note: Our data for the above shipment shows the following test results:

Test or Property	API Spec	Result	Test or Property	API Spec	Result
Viscosity	30 min.	35	Moisture (wt. %)	N/A	8.1
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max.	2.00
Yield Point (# / 100 ft2)	N/A				
Filtrate Volume (ml)	15.0 max.	11.4			
> 75 micron (wt. %)	4.0 max.	1.3			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-937-752-4455.

Signed Date 1/14/04

Approved by Plant Manager

LabrptCert.doc (4/22/97)
Rev E (9/99)

Arrived onsite 01/15/04

100 # Bags

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 1/6/004

SOLD TO:	SHIP TO:
GEO-CON INC 4071 MONROEVILLE BLVD CORPORATE 1 BUILDING SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: 3C0004131	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR VEHICLE NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-5-04	MONT TRANS 84	GREYBULL	GEL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	43
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	18.0 max.	13.6
> 75 micron (wt. %)	4.0 max.	1.4

Test or Property	API Spec	Results
Moisture (wt. %)	N/A	8.0
Y.P. / P.V. Ratio	3.0 max.	1.33

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-847-758-4488.

Signed 1/12/04 Date

Approved by: Plant Manager

LibertyCert.doc (4/23/97)
Rev 5 (3/03)

Aroad waste 01/12/04

4000# jumbos

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 1/6/2004

SOLD TO:	SHIP TO:
GRO-CON INC. 4974 MONROEVILLE BLVD CONFIDATE 1 BUILDING SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO. 20YX09119	GRO-CON E. CENTACC IN 46112

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-3-04	MONT TRANS 99	GREYBULL	GBL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	35 min.	39
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.6
> 75 micron (wt. %)	4.0 max.	1.1

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	10.2
Y.P. / P.V. Ratio	3.0 max.	1.00

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4483.

Signed 1/6/04 Date

Approved by Plant Manager

LaboratoryCert.doc (4/23/97)
Rev E (9/03)

Arrived onsite 01/12/04

4000# jumbos

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED: 1/8/04

SOLD TO:	SHIP TO:
OMC-CON INC. 4075 MONROEVILLE BLVD CORPORATE I BUILDING SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HOTVON112	GEO-CON S. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-8-04	QUALITY TRANS 875	GREYBULL	GEL

Write our data for the above shipment above the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	36
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	15.2
> 75 micron (wt. %)	4.0 max.	2.1

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.7
Y.P. / P.V. Ratio	3.0 max.	0.97

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-887-738-4626.

Signed 1/9/04
Date

Approved by: Plant Manager

LabanaCertLoss (4/2/97)
Rev 5 (3/06)

Arrived onsite 01/11/04

4000# sumbos

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 1/8/2004

SOLD TO:	SHIP TO:
CEMCON INC. 4013 MONROEVILLE BLVD CORPORATE 1 BUILDING SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: 20IV004117	CEMCON S. CHICAGO IL 60612

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-6-04	SMPW WAY 94403	GREYBULL	GEL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	43
Plastic Viscosity (cP)	N/A	
Yield Point (#/ 100 ft2)	N/A	
Filtrate Volume (cm3)	18.0 max.	13.5
> 75 micron (wt. %)	4.0 max.	1.4

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	9.0
Y.P. / P.V. Ratio	3.0 max.	1.33

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4488.

Signed 1/12/04
Date

Approved by: Plant Manager

LaboratoryCert.doc (4/23/97)
Rev B (8/99)

Arrived onsite 01/11/04

4000± jumbos

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED [illegible]

SOLD TO:	SHIP TO
GEO-CON INC 4013 MONROEVILLE BLVD CORPORATE 1 BUILDING SUITE 410 MONROEVILLE PA [illegible] SALES ORDER NO: NOT SUPPLIED	GEO-CON RICHMOND IN [illegible]

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-5-06	MONT TRANS 8452	GREYBULL	GEL

Now Our desk for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	33
Plastic Viscosity (cP)	N/A	
Yield Point (lb / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.0
> 75 mesh (wt. %)	5.0 max.	1.7

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.0
Y.P. / P.V. Ratio	3.0 max.	0.34

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4456.

Signed Date

Approved by: Plant Manager

LabanCert.doc (4/23/97)
Rev 6 (9/06)

4000# Tunnel Bags

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED: [illegible]

SOLD TO:	SHIP TO:
GEO-CON INC [illegible] MONROEVILLE BLVD CORPORATE I BUILDING SUITE 401 MONROEVILLE PA 15146 SALES ORDER NO.: [illegible]	GEO-CON [illegible] CHICAGO IL [illegible]

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-5-04	MONT TANK [illegible]	GREYBULL	OBL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	48
Fluid Density (#/	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	12.4
> 75 micron fat. %	4.0 max.	1.3

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	0.3
Y.P. / P.V. Ratio	3.0 max.	1.20

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4676.

Signed: [illegible] Date: [illegible]

Approved by: Plant Manager

LaboratoryCertificate (4/23/97)
Rev 8 (5/26)

4000# Tumbo Bags

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/14/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 30 - 37 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
N/A						

NORTH TRENCH

COMMENTS: No work on thjs trench today Day was spent doing maintenance on the bucket cylinder of the 375 excavator

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A				

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A						N/A

COMMENTS

N/A

No work was done on this trench today. Day consisted of maintenance work on the bucket cylinder of the 375 excavator.

DRY BENTONITE ADDITION		
	TONS	%
TODAY	0.00	0%
TO DATE	444.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C. Sepe **OWNER:**

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/14/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 30 - 37 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
40+90	2.00	73.00	11.00	18.00	51.00	8
40+90	34.00	91.00	25.00	22.00	63.00	8
41+60	2.00	74.00	24.00	17.00	50.00	8
41+60	34.00	92.00	25.00	26.00	56.00	8

SE TRENCH

COMMENTS: Fresh slurry was pumped to this trench today to try and keep the slurry in spec.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
41+00	LAB SAMPLE COLLECTED 01/14/04			
42+00	LAB SAMPLE COLLECTED 01/14/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
39+00	2.00	Sample collected	Sample collected	Sample collected	$1.34X10^{-7}$	yes
39+25	2.00	N/A	N/A	N/A	$9.63X10^{-8}$	N/A
39+50	2.00	N/A	N/A	N/A	$1.20X10^{-7}$	N/A
39+75	2.00	N/A	N/A	N/A	$2.01X10^{-7}$	N/A
40+00	2.00	N/A	N/A	N/A	$2.24X10^{-7}$	N/A
40+25	2.00	N/A	N/A	N/A	$1.64X10^{-7}$	N/A

*Samples for these quick perms were collected on 01/14/04. They were set up to run 12 hours overnight. When QC techs came onsite 01/15/04 (6:00 a.m.), they discovered that the 6-cylinder filter press unit used to run the quick perms had frozen overnight. The unit was thawed and these quick perms listed above were run on 01/15/04 from 6:30 to 10:30. Results will be noted on the daily report submitted for 01/15/04.

COMMENTS

Filter cake: .5mm, .7mm, .6mm, and .9mm respectively.

Unit Weight:
- 39+00: 115.0 pcf
- 39+25: 114.0 pcf
- 39+50: 119.0 pcf
- 39+75: 109.0 pcf
- 40+00: 115.0 pcf
- 40+25: 112.0 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY	10.00	6%
TO DATE	302.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C Sipe **OWNER:**

DAILY QC TESTS

DATE 01/14/04

SE TRENCH

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
9:10	40+90	2	51	40 - 90 sec	73	64 - 95 pcf	8	6.5 - 10	18	< 25 cm^3	.5	11	MAX 30%
9:10	40+90	34	63	40 - 90 sec	91	64 - 95 pcf	8	6.5 - 10	22	< 25 cm^3	.7	25	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
14:00	41+60	2	50	40 - 90 sec	74	64 - 95 pcf	8	6.5 - 10	17	< 25 cm^3	6	24	MAX 30%
14:00	41+60	34	56	40 - 90 sec	92	64 - 95 pcf	8	6.5 - 10	26	< 25 cm^3	.9	25	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

* SAMPLES COLLECTED 01/14/04. TESTS RUN 01/15/04

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
39+00	2	2" to 6"	115	+15 pcf over trench slurry	1.34×10^{-7}	1.0×10^{-7} cm/sec
39+25	2	2" to 6"	114	+15 pcf over trench slurry	9.63×10^{-8}	1.0×10^{-7} cm/sec
39+50	2	2" to 6"	119	+15 pcf over trench slurry	1.20×10^{-7}	1.0×10^{-7} cm/sec
39+75	2	2" to 6"	109	+15 pcf over trench slurry	2.01×10^{-7}	1.0×10^{-7} cm/sec
40+00	2	2" to 6"	115	+15 pcf over trench slurry	2.24×10^{-7}	1.0×10^{-7} cm/sec
40+25	2	2" to 6"	112	+15 pcf over trench slurry	1.64×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE TRENCH
FOR SAMPLES COLLECTED 01/14/04

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 39+00, 39+25, 39+50, 39+75, 40+00, 40+25

Technician: MM VGY SEB

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.5cm, 7.0cm, 7.0cm, 6.5cm, 6.5cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/ Corrections (1/14/04)
39+00	01/15/04	6:30-10:30	240	10	108.2128	559261.0644	—	18	1.34×10^{-7}	9.15×10^{-8}
39+25	01/15/04	6:30-10:30	240	10	100.4833	519313.7717	—	12	9.63×10^{-8}	6.57×10^{-8}
39+50	01/15/04	6:30-10:30	240	10	100.4833	519313.7717	—	15	1.20×10^{-7}	8.19×10^{-8}
39+75	01/15/04	6:30-10:30	240	10	108.2128	559261.0644	—	27	2.01×10^{-7}	1.37×10^{-7}
40+00	01/15/04	6:30-10:30	240	10	108.2128	559261.0644	—	30	2.24×10^{-7}	1.53×10^{-7}
40+25	01/15/04	6:30-10:30	240	10	108.2128	559261.0644	—	22	1.64×10^{-7}	1.12×10^{-7}

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

GEO-CON

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/16/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 25 -30 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
50+70	2.00	95.00	28.00	26.00	68.00	8
50+70	34.00	98.00	30.00	24.00	70.00	8
50+20	2.00	91.00	23.00	24.00	50.00	8
50+20	34.00	94.00	26.00	20.00	56.00	8

NORTH TRENCH

COMMENTS: Fresh slurry was pumped to this trench today to try and keep the slurry in spec.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
50+00	LAB SAMPLE COLLECTED 01/16/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
52+00	3.50	Sample collected	Sample collected	Sample collected	6.42×10^{-8}	yes
51+75	3.50	N/A	N/A	N/A	6.33×10^{-8}	N/A
51+50	3.00	N/A	N/A	N/A	7.62×10^{-8}	N/A

COMMENTS

Filter cake: 1.4mm, 1.0mm, .8mm, and .8mm respectively.

Unit Weight: 52+00: 118.0 pcf
51+75: 118.0 pcf
51+50: 118.0 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY	6.00	6%
TO DATE	488.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: [illegible] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/16/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 25 -30 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
43+10	2.00	100.00	30.00	24.00	75.00	8
43+10	34.00	101.00	35.00	20.00	90.00	8

SE TRENCH

COMMENTS: Slurry out of spec. Only AM sample taken. No more slurry will be pumped to this trench because we are in the process of topping it out. Excavation was completed on this trench today. Backfilling will be completed tomorrow

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
43+00	LAB SAMPLE COLLECTED 01/16/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
41+25	2.50	N/A	N/A	N/A	7.22×10^{-8}	N/A
41+50	2.50	N/A	N/A	N/A	8.02×10^{-8}	N/A
41+75	2.50	N/A	N/A	N/A	8.02×10^{-8}	N/A
42+00	2.00	Sample collected	Sample collected	Sample collected	1.04×10^{-7}	yes
42+25	2.00	N/A	N/A	N/A	8.94×10^{-8}	N/A
42+50	2.00	N/A	N/A	N/A	1.45×10^{-7}	N/A

COMMENTS

Filter cake: 1.3mm and 1.2mm respectively.

Unit Weight:
- 41+25: 116.0 pcf
- 41+50: 118.0 pcf
- 41+75: 118.0 pcf
- 42+00: 117.5 pcf
- 42+25: 119.0 pcf
- 42+50: 120.5 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY	26.00	6%
TO DATE	360.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: [illegible] **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/16/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 25 -30 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
44+60	2.00	74.00	16.00	20.00	49.00	8
44+60	22.00	78.00	22.00	18.00	52.00	8

EAST TRENCH

COMMENTS: Start of the East Trench today Did not complete a cut to depth. PM sample only

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
45+00	LAB SAMPLE COLLECTED 01/16/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
NO BACKFILL TODAY						N/A

COMMENTS

Filter cake: 1.0mm and 1.0mm respectively.

No backfilling today. Start of the East Trench. No cut completed today

DRY BENTONITE ADDITION		
	TONS	%
TODAY	0.00	0%
TO DATE	0.00	0%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/16/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:00	65.00	50.00	15.00	8
10:05	-	44.00	-	-
13:00	65.00	47.00	14.00	8
14:00	-	56.00	-	-

Filter cake is .3mm and .3mm, respectively.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepe OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/16/04

JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL

JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 25 -30 degrees

RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
50+70	33.0	36.6	36.6	10.0	366.0	6.0	52+20	TOPOUT	TOPOUT
50+60	33.0	36.6	36.6	10.0	366.0	6.0	52+10	9.4	TOPOUT
50+50	33.0	36.6	36.6	10.0	366.0	6.0	52+00	12.0	TOPOUT
50+40	32.9	36.7	36.7	10.0	366.5	6.0	51+90	14.1	6.0
50+30	33.0	36.7	36.7	10.0	367.0	6.0	51+80	18.9	12.1
50+20	33.0	36.6	36.7	10.0	366.5	5.8	51+70	23.4	16.9
50+10	32.9	36.6	36.6	10.0	366.0	5.8	51+60	24.7	20.0
50+00	33.0	36.7	36.7	10.0	366.5	5.8	51+50	28.8	20.9
49+90	33.0	36.5	36.6	10.0	366.0	5.8	51+40	30.6	22.9
							51+30	32.8	24.6
							51+20	34.0	25.0
							51+10	34.7	25.9
							51+00	36.3	27.7
							50+90	36.5	28.9
							50+80	36.5	30.0
							50+70	31.1	30.8
							50+60	23.1	31.1
							50+50		32.2
							50+40		33.3
							50+30		36.2
							50+20		36.4
							50+10		36.5
							50+00		36.6
							49+90		36.4
							49+80		24.6

SF TODAY 3296.50

SF TO DATE 102130.00

COMMENTS

NORTH TRENCH

GEO-CON: Suzanne E. Sepic

OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/16/04

JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL

JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 25 -30 degrees

RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
43+00	32.7	36.6	36.6	10.0	366.0	2.8	41+00	TOPOUT	TOPOUT
43+10	32.6	36.7	36.7	10.0	366.5	2.8	41+10	8.6	TOPOUT
43+20	32.7	36.7	36.7	10.0	367.0	2.9	41+20	12.5	TOPOUT
43+30	32.7	36.5	36.6	10.0	366.0	2.8	41+30	14.3	TOPOUT
							41+40	16.1	TOPOUT
							41+50	18.6	TOPOUT
							41+60	19.1	TOPOUT
							41+70	19.8	TOPOUT
							41+80	20.5	TOPOUT
							41+90	22.0	TOPOUT
							42+00	23.0	TOPOUT
							42+10	23.7	TOPOUT
							42+20	24.2	TOPOUT
							42+30	24.9	TOPOUT
							42+40	25.6	3.6
							42+50	27.8	7.3
							42+60	30.9	7.9
							42+70	33.7	12.4
							42+80	36.0	14.7
							42+90	36.5	15.0
							43+00		15.8
							43+10		18.7
							43+20		19.9
							43+30		20.5

SF TODAY 1465.50

SF TO DATE 84048.22

COMMENTS

SE Trench

GEO-CON: Suzanne E. Sepic

OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/16/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy; 25 -30 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
44+60		24.3					NO BACKFILLING TODAY		
44+70		23.8							
44+80		21.5							
44+90		17.8							
45+00		10.9							
**BOTTOM OF TRENCH DEPTH.									
NO TOP OF KEY YET.									

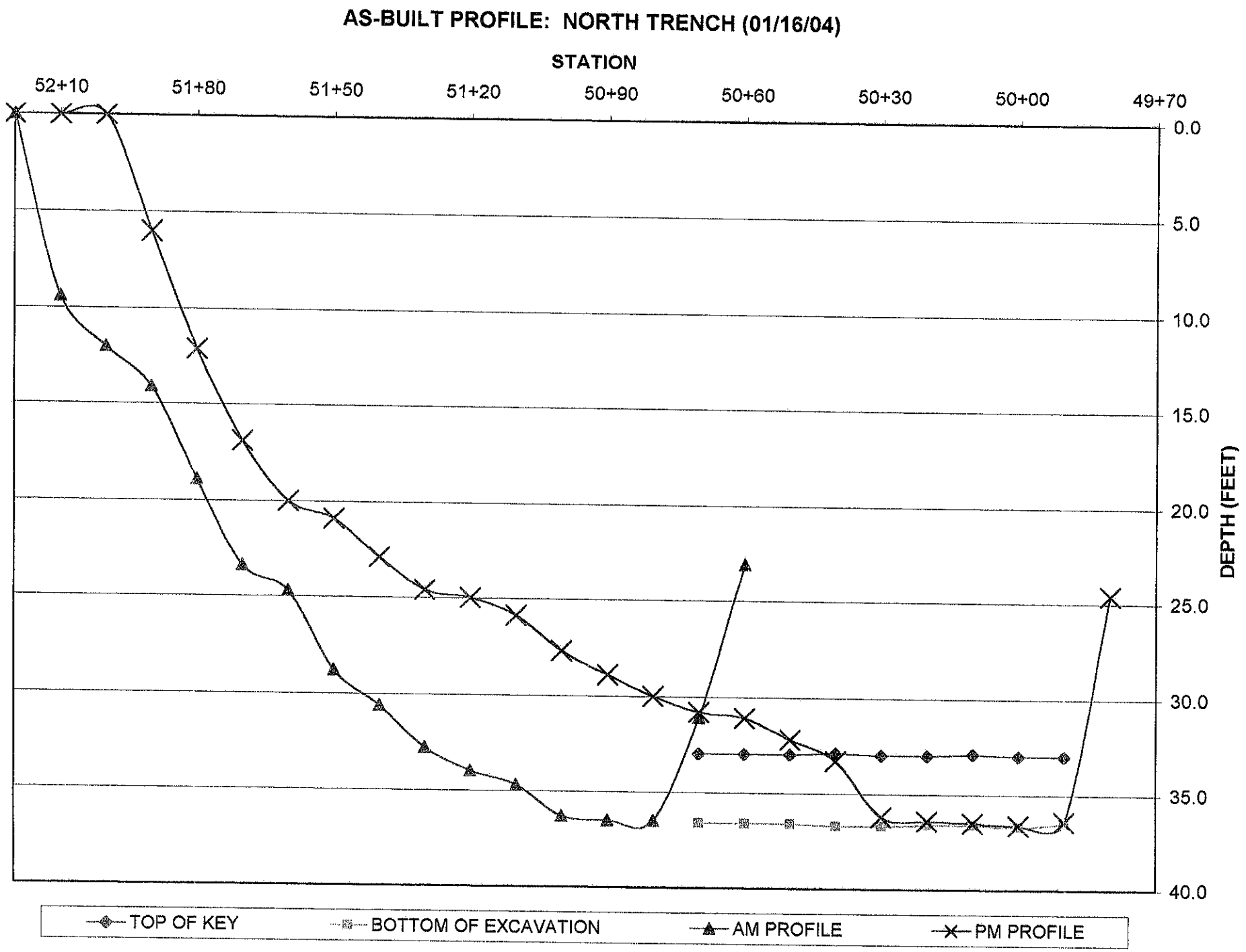
SF TODAY 0.00

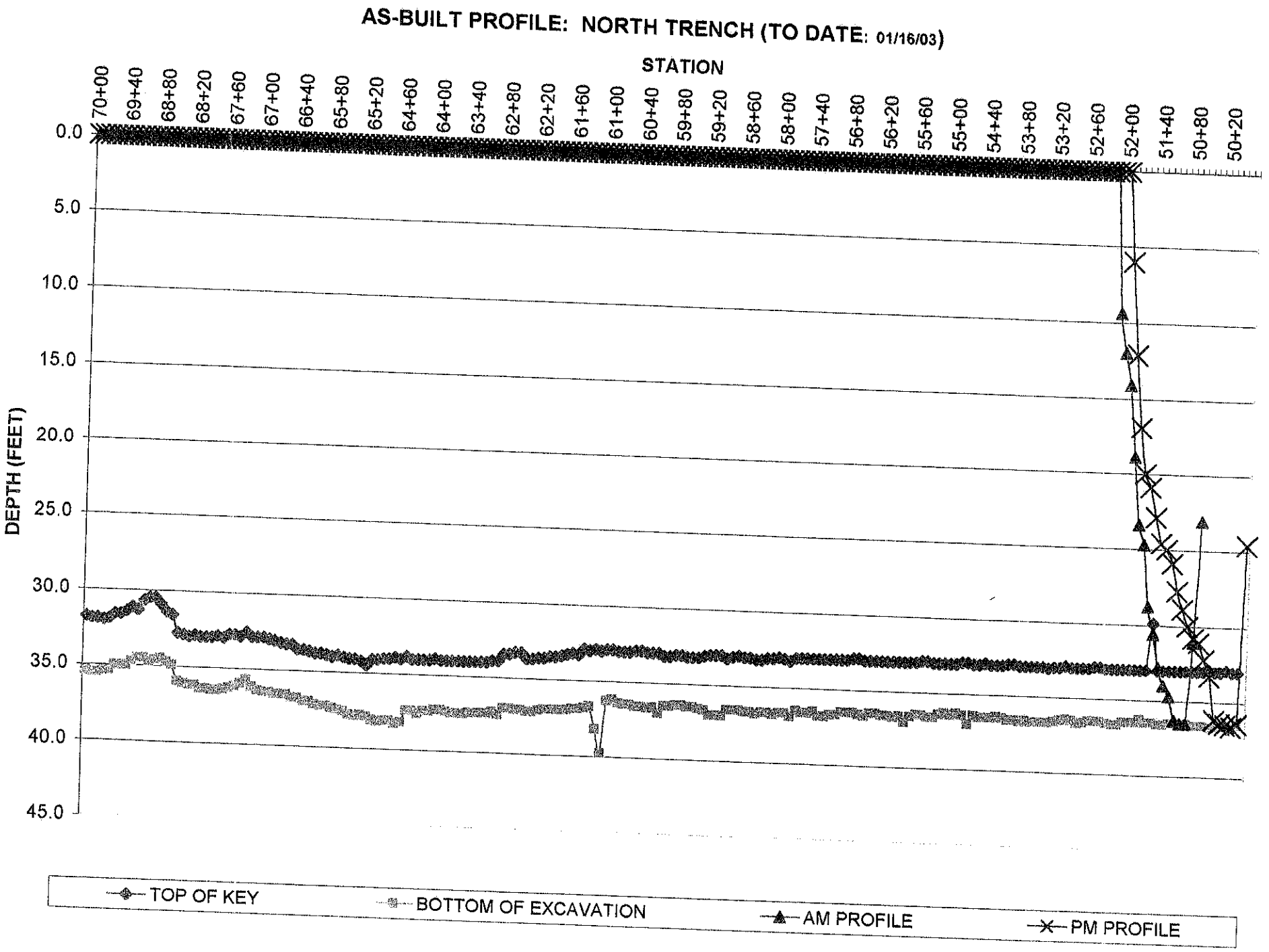
SF TO DATE 0.00

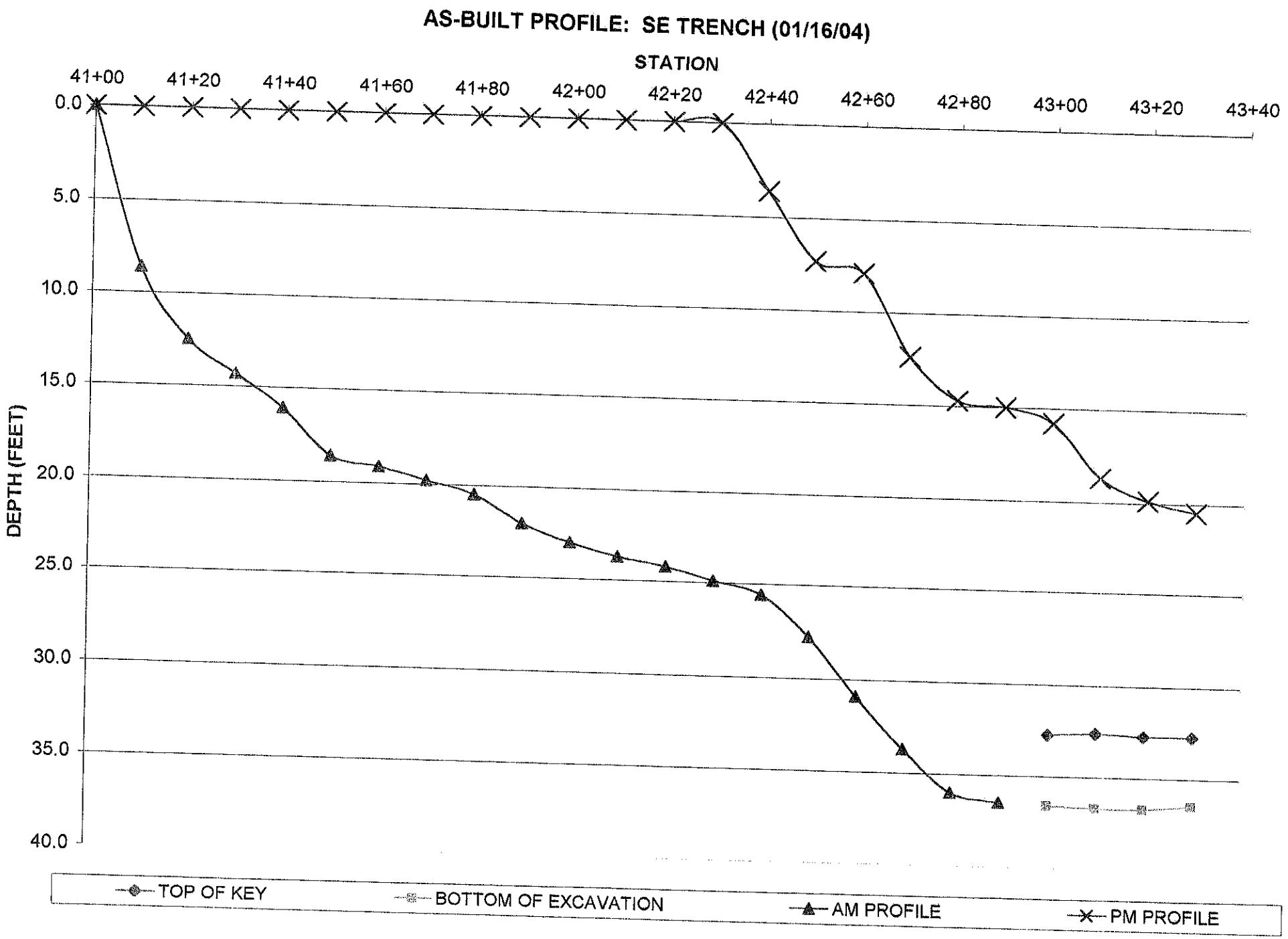
COMMENTS

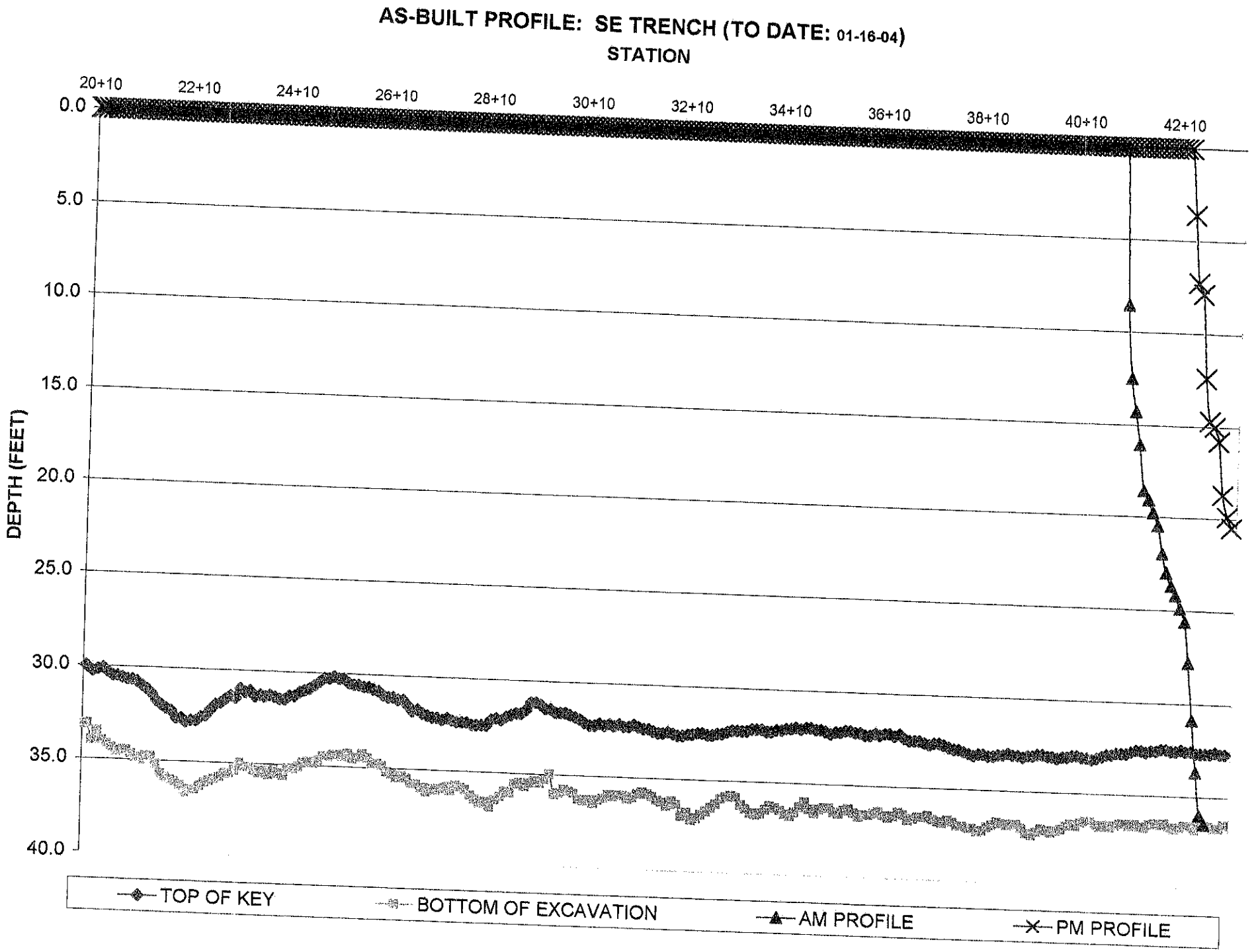
EAST Trench

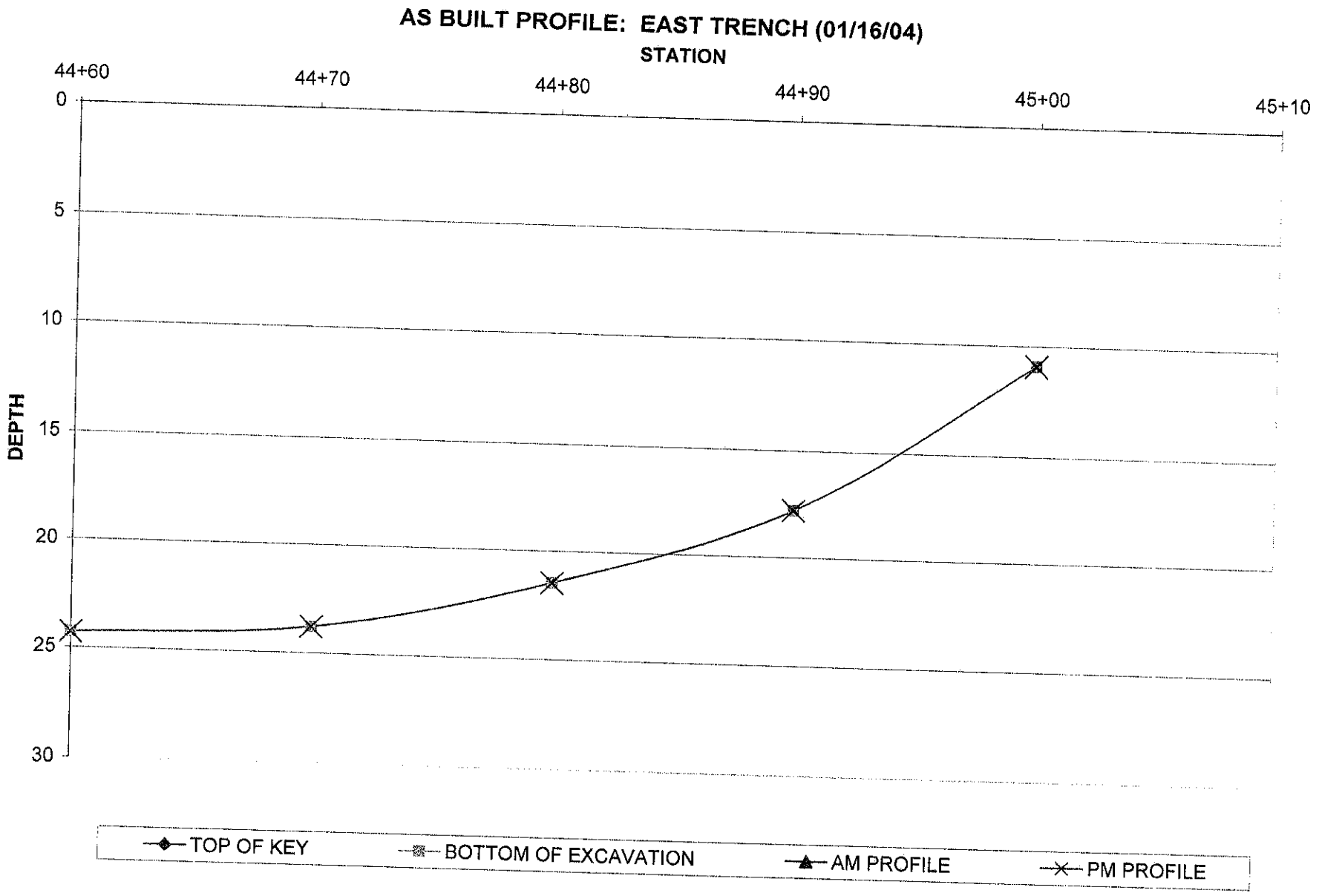
GEO-CON: Suzanne C. Sepic OWNER:

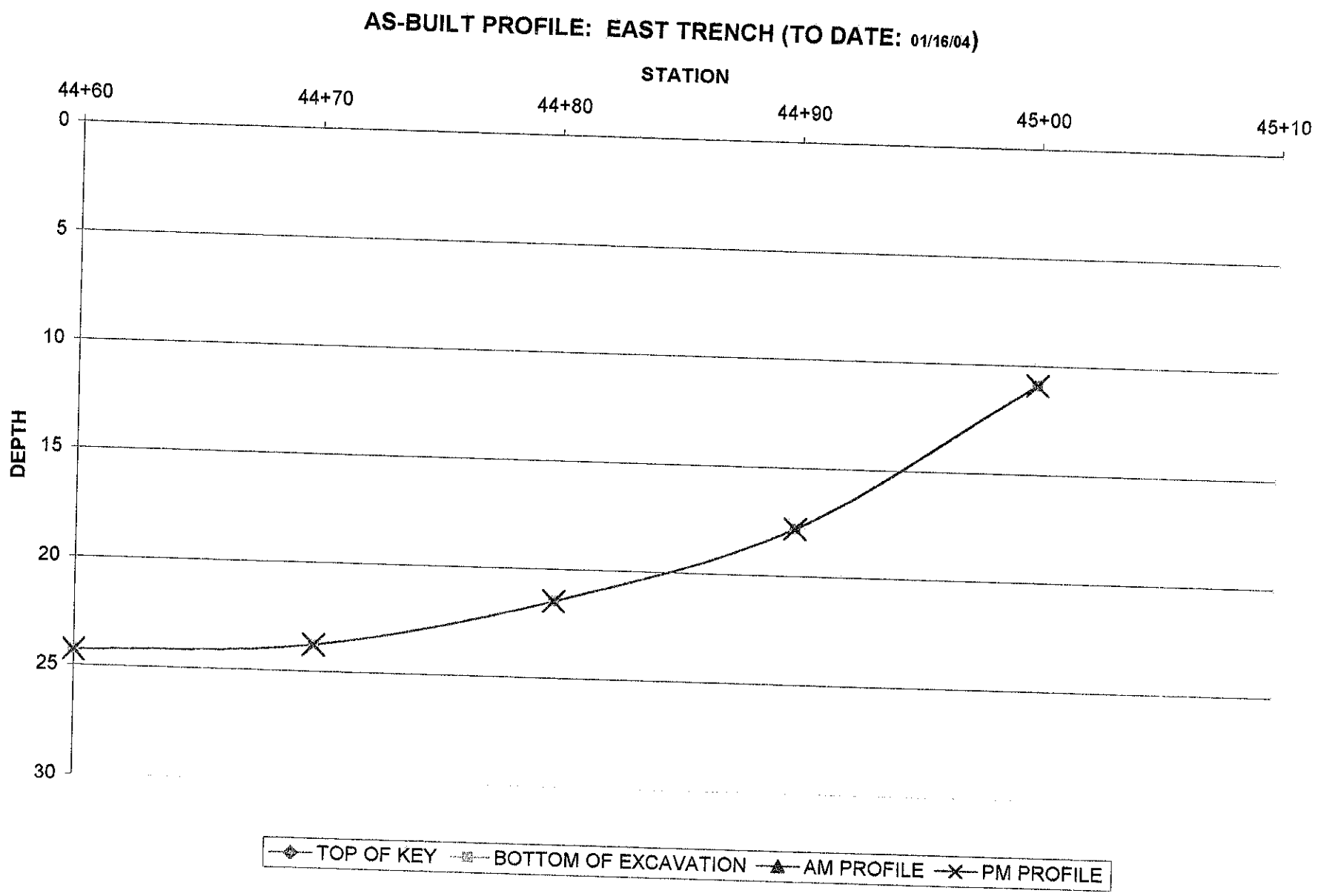

AS-BUILT PROFILE: NORTH TRENCH (01/16/04)
STATION
52+10
51+80
51+50
51+20
50+90
50+60
50+30
50+00
49+70
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NORTH TRENCH (TO DATE: 01/16/03)
STATION
70+00
69+40
68+80
68+20
67+60
67+00
66+40
65+80
65+20
64+60
64+00
63+40
62+80
62+20
61+60
61+00
60+40
59+80
59+20
58+60
58+00
57+40
56+80
56+20
55+60
55+00
54+40
53+80
53+20
52+60
52+00
51+40
50+80
50+20
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (01/16/04)
STATION
41+00
41+20
41+40
41+60
41+80
42+00
42+20
42+40
42+60
42+80
43+00
43+20
43+40
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE: 01-16-04)
STATION
20+10
22+10
24+10
26+10
28+10
30+10
32+10
34+10
36+10
38+10
40+10
42+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS BUILT PROFILE: EAST TRENCH (01/16/04)
STATION
44+60
44+70
44+80
44+90
45+00
45+10
DEPTH
0
5
10
15
20
25
30
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: EAST TRENCH (TO DATE: 01/16/04)
STATION
44+60
44+70
44+80
44+90
45+00
45+10
DEPTH
0
5
10
15
20
25
30
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/16/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	7:00	50	> 40 sec	65	> 64 pcf	8	6.5 - 10	15	< 20 cm^3	3
PM	13:00	47	> 40 sec	65	> 64 pcf	8	6.5 - 10	14	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:05	44	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	14:00	56	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NORTH TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:40	50+70	2	68	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	26	< 25 cm^3	1.4	28	MAX 30%
7:40	50+70	34	70	40 - 90 sec	98	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.0	30	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
3:14	50+20	2	50	40 - 90 sec	91	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	.8	23	MAX 30%
3:14	50+20	34	56	40 - 90 sec	94	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	.8	26	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
52+00	3.5	2" to 6"	118	+15 pcf over trench slurry	6.42×10^{-8}	1.0×10^{-7} cm/sec
51+75	3.5	2" to 6"	118	+15 pcf over trench slurry	6.33×10^{-8}	1.0×10^{-7} cm/sec
51+50	3.5	2" to 6"	118	+15 pcf over trench slurry	7.62×10^{-8}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

North Trench

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 52+00, 51+75, 51+50

Technician: SM/MM VBY SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 6.5cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/conv. fact. (1/14.65)
52+00	01/16/04	11:10-15:10	240	10	100.4833	519313.7717	–	8	6.42×10^{-8}	4.38×10^{-9}
51+75	01/16/04	11:10-15:10	240	10	108.2128	559261.0644	–	8.5	6.33×10^{-8}	4.32×10^{-9}
51+50	01/16/04	11:10-15:10	240	10	100.4833	519313.7717	–	9.5	7.62×10^{-8}	5.20×10^{-9}

I= $\frac{\text{P (psi)}}{0.014217\ \text{L (cm)}}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 01/16/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

SE TRENCH

No PM slurry from trench required. We are topping out this trench. Excavation was completed today.

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:45	43+10	2	75	40 - 90 sec	100	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.3	30	MAX 30%
7:45	43+10	34	90	40 - 90 sec	101	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	1.2	35	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
41+25	2.5	2" to 6"	116	+15 pcf over trench slurry	7.22×10^{-8}	1.0×10^{-7} cm/sec
41+50	2.5	2" to 6"	118	+15 pcf over trench slurry	8.02×10^{-8}	1.0×10^{-7} cm/sec
41+75	2.5	2" to 6"	118	+15 pcf over trench slurry	8.02×10^{-8}	1.0×10^{-7} cm/sec
42+00	2	2" to 6"	117.5	+15 pcf over trench slurry	1.04×10^{-7}	1.0×10^{-7} cm/sec
42+25	2	2" to 6"	119	+15 pcf over trench slurry	8.94×10^{-8}	1.0×10^{-7} cm/sec
42+50	2	2" to 6"	120.5	+15 pcf over trench slurry	1.45×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 41+25, 41+50, 41+75
42+00, 42+25, 42+50

Technician: SM/MM ✓BY SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 7.0cm, 7.0cm
6.5cm, 6.5cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{I}{X}$ (cm/sec)	w/conv. factor (1/14.65)
41+25	01/16/04	11:10-15:10	240	10	100.4833	519313.7717	—	9	7.22×10^{-8}	4.93×10^{-9}
41+50	01/16/04	11:10-15:10	240	10	100.4833	519313.7717	—	10	8.02×10^{-8}	5.47×10^{-9}
41+75	01/16/04	11:10-15:10	240	10	100.4833	519313.7717	—	10	8.02×10^{-8}	5.47×10^{-9}
42+00	01/16/04	14:00-18:00	240	10	108.2128	559261.0644	—	14	1.04×10^{-7}	7.10×10^{-9}
42+25	01/16/04	14:00-18:00	240	10	108.2128	559261.0644	—	12	8.94×10^{-8}	6.10×10^{-9}
42+50	01/16/04	14:00-18:00	240	10	108.2128	559261.0644	—	19.5	1.45×10^{-7}	9.90×10^{-9}

I= $\frac{\text{P (psi)}}{0.014217\ \text{L (cm)}}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 01/16/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

EAST TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
30	44+60	2	49	40 - 90 sec	74	64 - 95 pcf	8	6.5 - 10	20	< 25 cm^3	10	16	MAX 30%
30	44+60	22	52	40 - 90 sec	78	64 - 95 pcf	8	6.5 - 10	18	< 25 cm^3	1.0	22	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

N/A

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

EAST TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: _____ Technician: _____

Sample Area: A= _____ cm^2 Sample Height: L= _____ cm

Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)
01/16/04								

N/A. NO BACKFILL MIXED OR PLACED.

I= $\frac{P\ (psi)}{0.014217\ L\ (cm)}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = _____

01/16/04

NORTH TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
50+70	587.7	587.7	33.0	554.7	36.6	551.1	6.0	2.6
50+60	587.7	588.0	33.0	555.0	36.6	551.4	6.0	2.6
50+50	587.7	587.8	33.0	554.8	36.6	551.2	6.0	2.6
50+40	587.7	588.0	32.9	555.1	36.7	551.3	6.0	2.6
50+30	587.7	587.5	33.0	554.5	36.7	550.8	6.0	2.6
50+20	587.7	587.3	33.0	554.3	36.6	550.7	5.8	2.4
50+10	587.7	587.6	32.9	554.7	36.6	551.0	5.8	2.4
50+00	587.7	587.5	33.0	554.5	36.7	550.8	5.8	2.4
49+90	587.7	587.1	33.0	554.1	36.5	550.6	5.8	2.4

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED ON A 1:1.5 SLOPE.

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)

Phone: (724) 366-9311 | Date Shipped: 19-Jan-04 | Carrier: DIRECT--LAB PICKUP

Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO P01-048 | P.O.# 78406

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received By: | Date / Time:

Relinquished by: (Signature) | Received at lab by: | Date / Time:

Relinquished from lab by: (Signature) | Received By: | Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-076 (NW50+00)	SOIL ONLY	50+00	01/16/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-077 (SE43+00)	SOIL ONLY	43+00	01/16/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-078 (E45+00)	SOIL ONLY	45+00	01/16/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-090 (NW52+00)	SB BACKFILL**	52+00	01/16/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-091 (SE42+00)	SB BACKFILL**	42+00	01/16/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

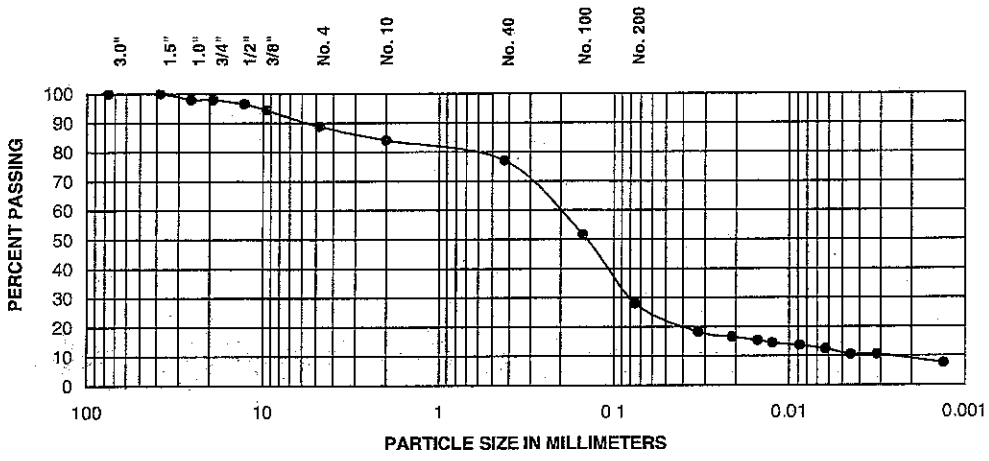
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-090 (NW 52+00)	**Date Tested**	1/22/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/19/2004
Sample Location	52+00 (NW)
Sample Description	Gray sitly, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.3	60.7	16.6	11.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.0
3/4"	98.0
1/2"	96.5
3/8"	94.4
No. 4	88.7
No. 10	84.1
No. 40	77.0
No. 100	51.7
No. 200	28.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
30	19	11

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

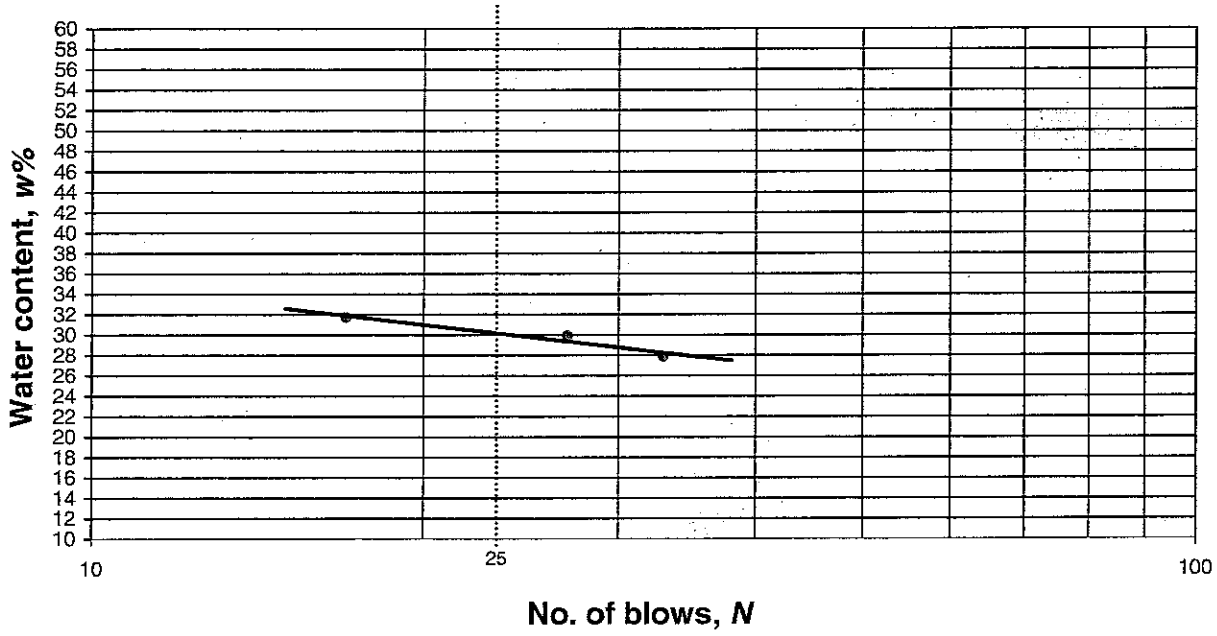
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-090 (NW 52+00)	**Date Tested**	1/22/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/19/2004
Sample Location	52+00 (NW)
Sample Description	Gray sitly, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**30**	**Plastic Limit, PL**	**19**	**Plasticity Index, PI**	**11**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing							
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic							
File #	2746	**Date Tested**		1/26/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-090 (NW 52+00)	Date Recd.	1/19/04	**Location**	52+00 (NW)			
Sample Description	Gray sitly, clayey sand with traces of gravel (SB Backfill)							

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.92	cm	Volume, V:	281.7	cu cm
Mass of Sample:	523.2	g	**Moisture Content:**	**29.3**	%
			Wet Density	**115.9**	**pcf**
			Dry Density	**89.6**	**pcf**

Final

Diameter:	6.93	cm	Area, A:	37.7	sq cm
Height, L:	6.37	cm	Volume, V:	240.3	cu cm
Mass of Sample:	499.20	g	**Moisture Content:**	**22.5**	%
			Wet Density	**129.6**	**pcf**
			Dry Density	**105.9**	**pcf**
			Deg of Saturation	**99.5**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	18.3	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/26/2004	9:00 AM	0	0	2.96	5.86		20.0	---
1/26/2004	9:45 AM	2700	2700	3.02	5.79	0.9	20.0	3.01E-08
1/26/2004	10:45 AM	3600	6300	3.08	5.72	0.9	20.0	2.27E-08
1/26/2004	11:45 AM	3600	9900	3.14	5.65	0.9	20.0	2.28E-08
1/26/2004	12:45 PM	3600	13500	3.20	5.58	0.9	20.0	2.30E-08

Average Permeability = **2.5E-08** **cm/sec**

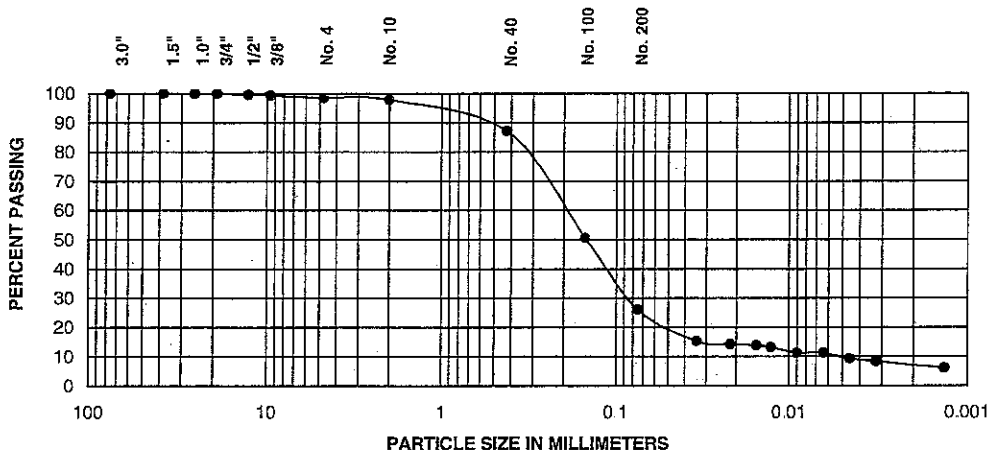
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-091 (SE 42+00)	**Date Tested**	1/22/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/19/2004
Sample Location	42+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	1.4	72.4	16.1	10.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	99.6
3/8"	99.4
No. 4	98.6
No. 10	97.8
No. 40	87.2
No. 100	50.7
No. 200	26.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
25	20	5

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

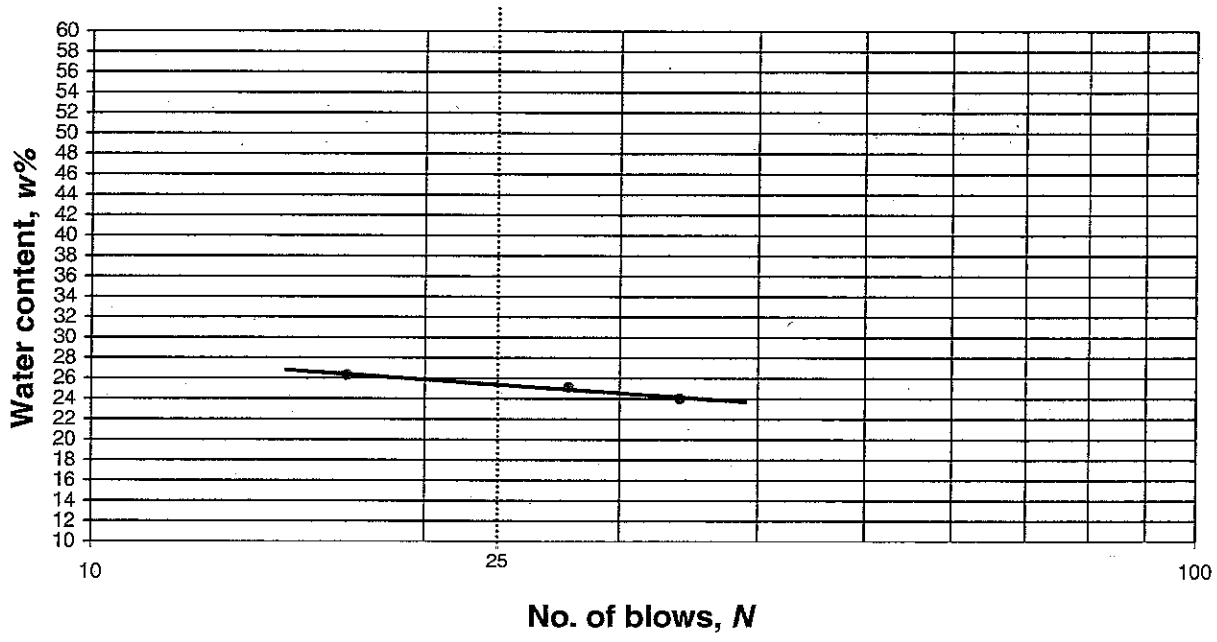
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-091 (SE 42+00)	**Date Tested**	1/22/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/19/2004
Sample Location	42+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**25**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**5**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/22/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-091 (SE 42+00)	Date Recd.	1/19/04	**Location**	42+00 (SE)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.81	cm	Volume, V:	236.6	cu cm
Mass of Sample:	433.9	g	**Moisture Content:**	**25.7**	%
			Wet Density	**114.5**	**pcf**
			Dry Density	**91.0**	**pcf**

Final

Diameter:	7.09	cm	Area, A:	39.5	sq cm
Height, L:	5.09	cm	Volume, V:	201.0	cu cm
Mass of Sample:	413.70	g	**Moisture Content:**	**23.7**	%
			Wet Density	**128.5**	**pcf**
			Dry Density	**103.9**	**pcf**
			Deg of Saturation	**99.8**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.8	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/22/2004	11:15 AM	0	0	3.07	5.96		20.0	---
1/22/2004	12:00 PM	2700	2700	3.27	5.76	1.0	20.0	7.27E-08
1/22/2004	12:45 PM	2700	5400	3.47	5.56	1.0	20.0	7.41E-08
1/22/2004	1:45 PM	3600	9000	3.67	5.31	0.8	20.0	7.09E-08
1/22/2004	2:45 PM	3600	12600	3.87	5.07	0.8	20.0	6.96E-08

Average Permeability = **7.2E-08** **cm/sec**

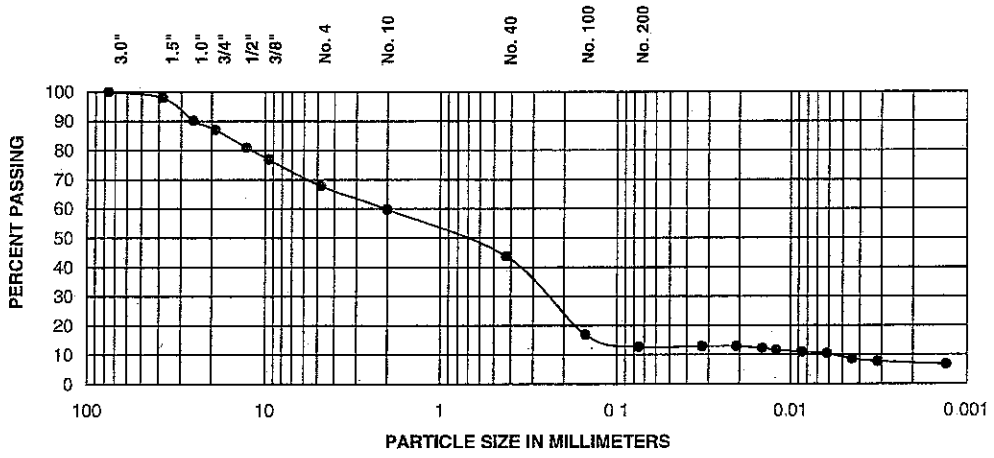
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-076 (NW 50+00)	**Date Tested**	1/20/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/19/2004
Sample Location	50+00 (NW)
Sample Description	Gray silty, clayey sand with gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	32.2	55.1	3.2	9.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	97.9
1.0"	90.1
3/4"	87.1
1/2"	81.0
3/8"	76.9
No. 4	67.8
No. 10	59.8
No. 40	43.8
No. 100	16.9
No. 200	12.7

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
NP	NP	NP

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

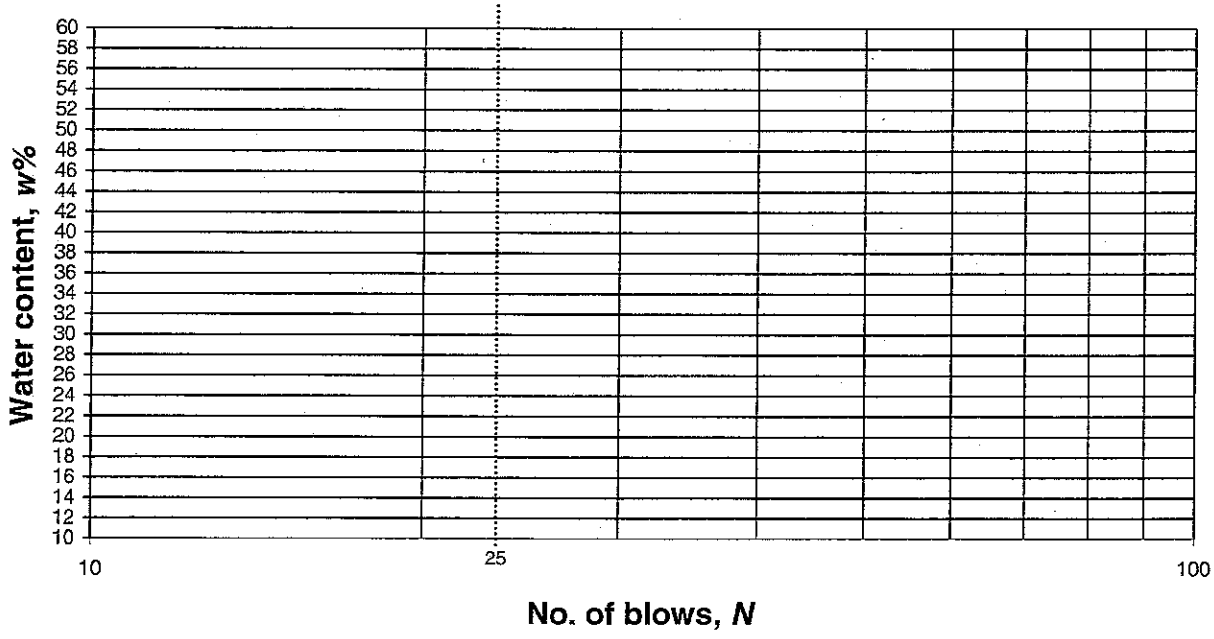
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-076 (NW 50+00)	**Date Tested**	1/20/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/19/2004
Sample Location	50+00 (NW)
Sample Description	Gray silty, clayey sand with gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	27	Date	1/19/2003	Sheet	1
				Date of weighing	1/20/2003	Tested by	MA

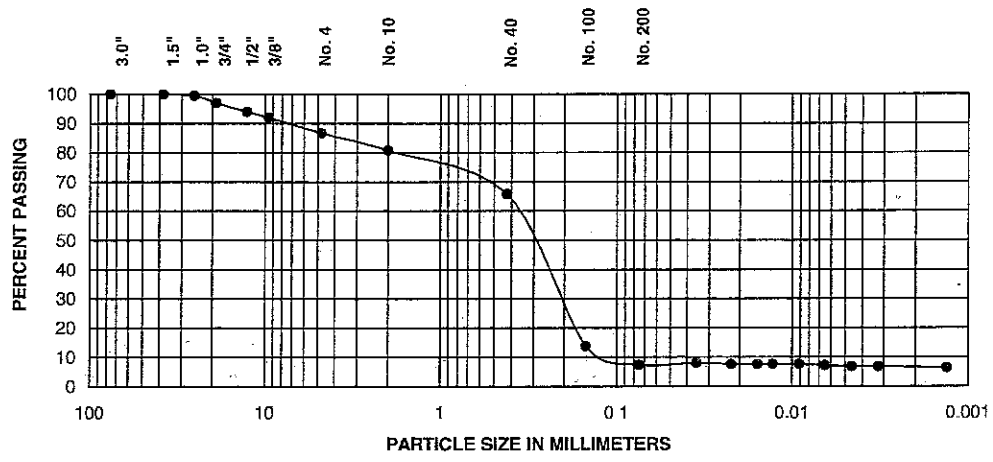
Boring No.	-	-	-	-	-	-
Sample No.	BF-076 (NW50+00)	BF-077(SE43+00)	BF-078 (E45+00)	BF-079(NW49+00)	BF-080(E45+50)	BF-081(NW48+60)
Location	50 + 00 (NW)	43 + 00 (SE)	45 + 00 (E)	49 + 00 (NW)	45 + 50 (E)	48 + 60 (NW)
Tin No.	73A	61A	36C	97A	63A	56A
Tin + Wet Soil	207.23	188.31	175.31	170.18	165.93	194.29
Tin + Dry Soil	181.2	164.86	163.96	152.92	146.9	177.59
Wt. of Tin	30.04	30.66	31.37	30.54	30.65	30.26
Wt. of Dry Soil	151.2	134.2	132.6	122.4	116.3	147.3
Wt. of Water	26.0	23.5	11.4	17.3	19.0	16.7
Moisture, %	17.2	17.5	8.6	14.1	16.4	11.3
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-082 (E46+00)					
Location	46 + 00 (E)					
Tin No.	71C					
Tin + Wet Soil	206.68					
Tin + Dry Soil	189.71					
Wt. of Tin	31.38					
Wt. of Dry Soil	158.3					
Wt. of Water	17.0					
Moisture, %	10.7					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-077 (SE 43+00)	**Date Tested**	1/21/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/19/2004
Sample Location	43+00 (SE)
Sample Description	Gray poorly graded sand with clay, tr. of gr. & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	13.3	79.4	0.4	7.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.38	0.21	0.10	3.8	1.14

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	99.4
3/4"	97.0
1/2"	94.0
3/8"	92.0
No. 4	86.7
No. 10	80.8
No. 40	65.9
No. 100	13.7
No. 200	7.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay
System:	USCS

Remarks:

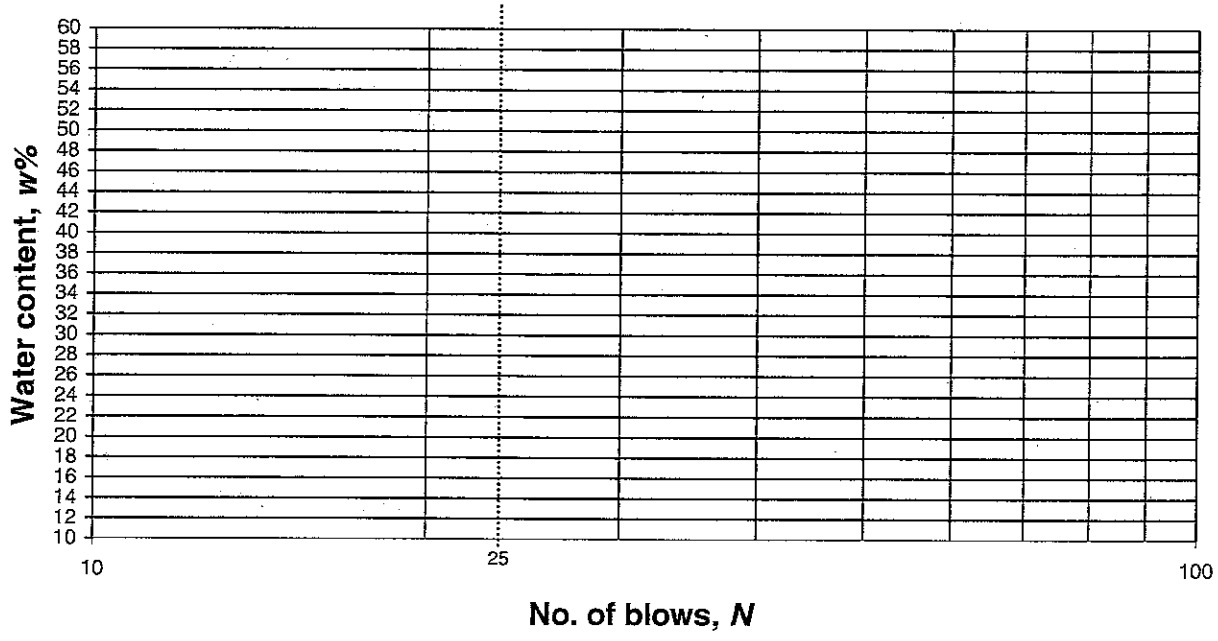
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-077 (SE 43+00)	**Date Tested**	1/20/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/19/2004
Sample Location	43+00 (SE)
Sample Description	Gray poorly graded sand with clay, tr of gr & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	27	Date	1/19/2003	Sheet	1
				Date of weighing	1/20/2003	Tested by	MA

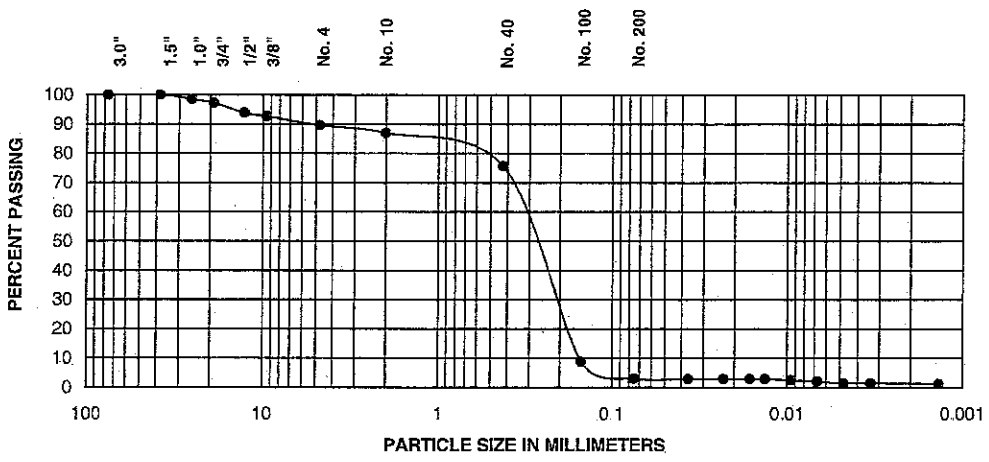
Boring No.	-	-	-	-	-	-
Sample No.	BF-076 (NW50+00)	BF-077(SE43+00)	BF-078 (E45+00)	BF-079(NW49+00)	BF-080(E45+50)	BF-081(NW48+60)
Location	50 + 00 (NW)	43 + 00 (SE)	45 + 00 (E)	49 + 00 (NW)	45 + 50 (E)	48 + 60 (NW)
Tin No.	73A	61A	36C	97A	63A	56A
Tin + Wet Soil	207.23	188.31	175.31	170.18	165.93	194.29
Tin + Dry Soil	181.2	164.86	163.96	152.92	146.9	177.59
Wt. of Tin	30.04	30.66	31.37	30.54	30.65	30.26
Wt. of Dry Soil	151.2	134.2	132.6	122.4	116.3	147.3
Wt. of Water	26.0	23.5	11.4	17.3	19.0	16.7
Moisture, %	17.2	17.5	8.6	14.1	16.4	11.3
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-082 (E46+00)					
Location	46 + 00 (E)					
Tin No.	71C					
Tin + Wet Soil	206.68					
Tin + Dry Soil	189.71					
Wt. of Tin	31.38					
Wt. of Dry Soil	158.3					
Wt. of Water	17.0					
Moisture, %	10.7					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

	Great Lakes Soil & Environmental Consultants, inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-078 (E 45+00)	**Date Tested**	1/19/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/19/2004
Sample Location	45+00 (E)
Sample Description	Gray poorly graded sand with tr.of gr. & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	10.3	86.6	1.5	1.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.33	0.21	0.15	2.2	0.86

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.5
3/4"	97.3
1/2"	93.9
3/8"	92.8
No. 4	89.7
No. 10	86.9
No. 40	75.7
No. 100	8.9
No. 200	3.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP
Soil Description:	Poorly graded sand
System:	USCS

Remarks:

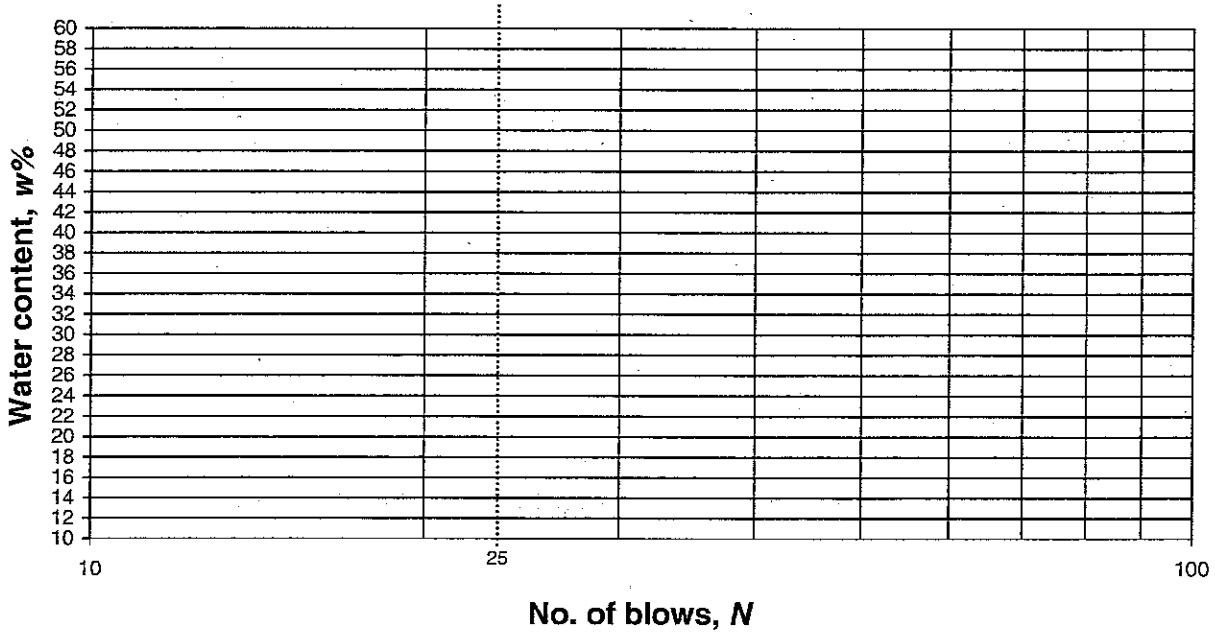
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-078 (E 45+00)	**Date Tested**	1/20/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/19/2004
Sample Location	45+00 (E)
Sample Description	Gray poorly graded sand with tr.of gr & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	27	Date	1/19/2003	Sheet	1
				Date of weighing	1/20/2003	Tested by	MA

Boring No.	-	-	-	-	-	-
Sample No.	BF-076 (NW50+00)	BF-077(SE43+00)	BF-078 (E45+00)	BF-079(NW49+00)	BF-080(E45+50)	BF-081(NW48+60)
Location	50 + 00 (NW)	43 + 00 (SE)	45 + 00 (E)	49 + 00 (NW)	45 + 50 (E)	48 + 60 (NW)
Tin No.	73A	61A	36C	97A	63A	56A
Tin + Wet Soil	207.23	188.31	175.31	170.18	165.93	194.29
Tin + Dry Soil	181.2	164.86	163.96	152.92	146.9	177.59
Wt. of Tin	30.04	30.66	31.37	30.54	30.65	30.26
Wt. of Dry Soil	151.2	134.2	132.6	122.4	116.3	147.3
Wt. of Water	26.0	23.5	11.4	17.3	19.0	16.7
Moisture, %	17.2	17.5	8.6	14.1	16.4	11.3
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-082 (E46+00)					
Location	46 + 00 (E)					
Tin No.	71C					
Tin + Wet Soil	206.68					
Tin + Dry Soil	189.71					
Wt. of Tin	31.38					
Wt. of Dry Soil	158.3					
Wt. of Water	17.0					
Moisture, %	10.7					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/16/04 | Job Number: P01-048
Weather: Mostly Cloudy, 25 - 30 degrees | Job Name: Indiana Harbor

Trench Topped Out Sta 52+20 to 52+00 = 20 L.F.

Length: 20 x Depth[1]: 35.7' (avg) =Square Feet 714

Square feet: 714 x Width: 2.5 =Total Cubic Feet[3] 1785

Cubic feet[3]: 1893.4 x Dry Unit Weight: 85 (160 PCF) /2000= 8.047 Tons of Soil

Tons of Soil: 8.047 x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate 5.633 Tons of Soil

Unit Rate: 5.633 x Specified Rate: 6% =Bentonite Required 3.38 Tons of Bentonite Required between these Stations to top out the trench.

Via Mixer = 2.00 (3.55%) Tons of Bentonite

Via Backfill = 6.00 (10.65%) Tons of Bentonite

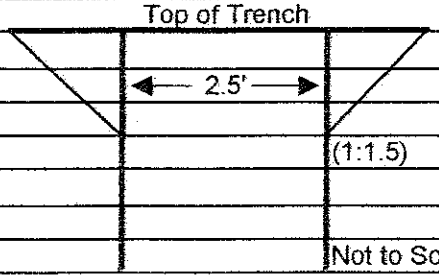
Total Tons of Bentonite Used = 8.00 (14.20%)

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

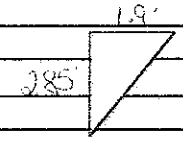
[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 6.3'

6.3 - 2.5 = 3.8 → 1.9' average on each side



A = 1/2 b h = 1/2 (1.9)(2.85) = 2.71 SF

[3] CF = SF * L * 2 sides = 108.4 CF

Note: Add to CF above

GEO-CON Suzanne E. Sepic
Signature/Date

OWNER
Signature/Date

GEO-CON

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/16/04
Weather: Mostly Cloudy, 25 - 30 degrees

Job Number: P01-048
Job Name: Indiana Harbor

Trench Topped Out Sta. 41+00 to 42+30 = 130 L.F.

Length: 130 x Depth[1]: 35.6' (avg) =Square Feet 4628

Square feet: 4628 x Width[2]: 2.5 =Total Cubic Feet[3] 11570

Cubic feet[3]: 11577.8 x Dry Unit Weight: 85 (984113) /2000= 492.06 Tons of Soil

Tons of Soil: 492.06 x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate 344.44 Tons of Soil

Unit Rate: 344.44 x Specified Rate: 6% =Bentonite Required 20.67 Tons of Bentonite Required between these Stations to top out the trench

Via Mixer = 13.00 (3.77%) Tons of Bentonite

Via Backfill = 26.00 (7.55%) Tons of Bentonite

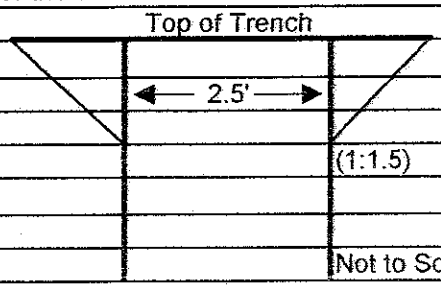
Total Tons of Bentonite Used = 39.00 (11.32%)

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

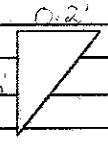
[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 2.9'

2.9 - 2.5 = 0.4' → 0.2' average on each side



A = 1/2 b h = 1/2 (.2)(.3) = 0.03SF

[3] CF = SF * L * 2 sides = 7.8CF

Note: Add to CF above

GEO-CON: Suzanne E. Hope
Signature/Date

OWNER:
Signature/Date

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/16/04
Weather: Mostly Cloudy, 25-30 degrees

Job Number: P01-048
Job Name: Indiana Harbor

Trench Topped Out Sta _____ to _____ = _____ L.F.

Length: _____ x Depth[1]: _____ =Square Feet _____

Square feet: _____ x Width: 2.5 =Total Cubic Feet[3] _____

Cubic feet[3]: _____ x Dry Unit Weight: 85 /2000= _____ Tons of Soil

Tons of Soil: _____ x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate _____ Tons of Soil

Unit Rate: _____ x Specified Rate: 6% =Bentonite Required _____ Tons of Bentonite Required between these Stations to top out the trench.

Via Mixer = _____ Tons of Bentonite

Via Backfill = _____ Tons of Bentonite

Total Tons of Bentonite Used = _____

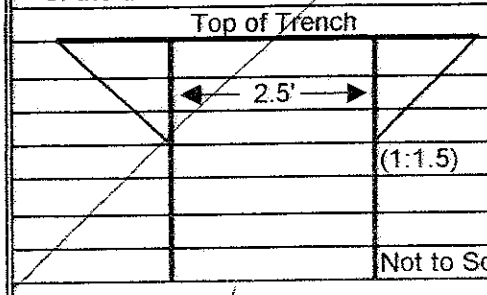
N/A. No Backfilling Today

Comments:

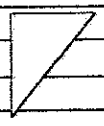
[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] =



A = 1/2 b h = 1/2

[3] CF = SF * L * 2 sides =

Note: Add to CF above

GEO-CON Suzanne E Sipo
Signature/Date

OWNER: _____
Signature/Date

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 1/13/2004

SOLD TO	SHIP TO:
OEGCON INC 4370 MONROEVILLE BLVD CORPORATE BUILDING SUITE 100 MONROEVILLE PA 15146 SALES ORDER NO.: 80700046146	OEGCON E. CHICAGO IN 46312

SHIPPING DATE:	SALES OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-13-04	DYEBMA 4777	GREYBULL	OBL

Note that data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	56
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (ml3)	15.0 max.	11.4
> 75 micron (vol. %)	4.0 max.	1.0

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	9.1
YP / P.V. Ratio	3.0 max.	3.00

This certified test on product released at the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please call us toll free 1-307-765-4400.

Signed

Date

Approved by Plant Manager

LaboratoryCert.doc (4/28/03)
Rev 2 (3/03)

Arrived onsite 01/16/04

11 Gal Bags

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 1/12/04

SOLD TO:	SHIP TO:
GEO-CON INC 4079 MONROEVILLE BLVD CORPORATE BUILDING SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: NEW1005123	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-13-04	FOWLER #04	GREYBULL	GEL

Note that data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	37
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.5
> 75 micron (wt. %)	4.0 max.	1.1

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.4
Y.P. / P.V. Ratio	3.0 max.	1.08

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4400.

Signature Date

Approved by: Plant Manager

LaboratoryLook (4/7/97)
Rev E (9/99)

Arrived onsite 01/16/04

4000# Jumbos

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED: 1/14/2004

SOLD TO:	SHIP TO:
CEDCON INC 4975 MONROEVILLE BLVD CORPORATE 1 BUILDING2 SUITE 450 MONROEVILLE PA 15146 SALES ORDER NO.: HOTV005127	CEDCON S. CHICAGO IN 46613

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-14-04	MONT TRANS #19	GREYBULL	GEL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	41
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.0
> 75 micron (wt. %)	4.0 max.	1.4

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	7.5
Y.P. / P.V. Ratio	3.0 max.	1.15

This certified that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A; Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please call us (307) 765-4400.

Signed 1/16/04
Date

Approved by: Plant Manager

LabAnalCert.doc (4/23/97)
Rev E (3/03)

Arrived onsite 01/16/04

HCCC # 3000

GEO-CON

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/17/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 22 - 30 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
49+80	2.00	86.00	18.00	24.00	49.00	8
49+80	35.00	89.00	22.00	19.00	50.00	8
49+30	2.00	93.00	26.00	25.00	62.00	8
49+30	34.00	96.00	29.00	21.00	68.00	8

NORTH TRENCH

COMMENTS: Fresh slurry was pumped to this trench today to try and keep the slurry in spec.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
49+00	LAB SAMPLE COLLECTED 01/17/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
51+75	2.50	N/A	N/A	N/A	4.01×10^{-8}	N/A
51+50	2.50	N/A	N/A	N/A	5.62×10^{-8}	N/A
51+25	2.50	N/A	N/A	N/A	4.84×10^{-8}	N/A
51+00	3.00	Sample collected	Sample collected	Sample collected	9.63×10^{-8}	yes
50+75	3.00	N/A	N/A	N/A	1.94×10^{-7}	N/A
50+50	3.00	N/A	N/A	N/A	2.41×10^{-7}	N/A

COMMENTS

Filter cake: .8mm, .8mm, 1.5mm, and 1.0mm respectively.

Unit Weight: 51+75: 116.0 pcf
51+50: 115.5 pcf
51+25: 115.5 pcf
51+00: 116.0 pcf
50+75: 115.5 pcf
50+50: 116.0 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY	24.00	6%
TO DATE	512.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Giovanni E. Segal OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/17/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 22 - 30 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
N/A						

SE TRENCH

COMMENTS: Will finish topping out this trench today. No slurry sample taken.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A	Excavation completed 01/16/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
42+50	2.00	N/A	N/A	N/A	5.50×10^{-8}	N/A
42+75	2.00	N/A	N/A	N/A	6.42×10^{-8}	N/A
43+00	2.00	Sample collected	Sample collected	Sample collected	5.22×10^{-8}	yes
43+25	2.00	N/A	N/A	N/A	8.60×10^{-8}	N/A

COMMENTS

Unit Weight: 42+50: 119.0 pcf
42+75: 118.0 pcf
43+00: 118.0 pcf
43+25: 117.5 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY	20.00	6%
TO DATE	380.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Shannon C. Aspo OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/17/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 22 - 30 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
44+70	2.00	69.00	7.00	14.00	48.00	8
44+70	35.00	70.00	8.00	13.00	51.00	8
45+40	2.00	77.00	16.00	15.00	53.00	8
45+40	34.00	81.00	22.00	13.00	54.00	8

EAST TRENCH

COMMENTS: Pumping fresh slurry to this trench today to keep slurry within the specs.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
45+50	LAB SAMPLE COLLECTED 01/17/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
44+75	2.00	N/A	N/A	N/A	4.81×10^{-8}	N/A
45+00	2.00	Sample collected	Sample collected	Sample collected	6.02×10^{-8}	yes
45+25	2.00	N/A	N/A	N/A	4.47×10^{-8}	N/A
45+50	2.00	N/A	N/A	N/A	4.13×10^{-8}	N/A

COMMENTS

Filter cake: .4mm, .5mm, .4mm and .6mm respectively.

Unit Weight: 44+75: 118.0 pcf
45+00: 117.5 pcf
45+25: 115.0 pcf
45+50: 115.0 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY	0.00	6%
TO DATE	0.00	6%
BORROW %	CY	

**No trench topped out today.
Therefore, no backfill noted as of yet.

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: [illegible] OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/17/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:50	65.00	46.00	15.00	8
9:20	-	44.00	-	-
13:30	65.00	51.00	14.00	8
Filter cake is .3mm and .2mm, respectively.				
Batch plant stopped mixing and pumping at 14:00.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/17/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 22 - 30 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
49+80	33.3	36.8	36.7	10.0	366.5	5.0	52+00	TOPOUT	TOPOUT
49+70	33.4	36.8	36.8	10.0	368.0	4.5	51+90	6.2	TOPOUT
49+60	33.4	36.7	36.8	10.0	367.5	4.5	51+80	12.4	TOPOUT
49+50	33.5	36.8	36.8	10.0	367.5	4.5	51+70	16.9	TOPOUT
49+40	33.4	36.8	36.8	10.0	368.0	4.5	51+60	20.3	TOPOUT
49+30	33.4	36.7	36.8	10.0	367.5	4.5	51+50	21.0	TOPOUT
49+20	33.3	36.7	36.7	10.0	367.0	4.5	51+40	22.9	TOPOUT
49+10	33.3	36.7	36.7	10.0	367.0	4.5	51+30	24.8	TOPOUT
49+00	33.2	36.7	36.7	10.0	367.0	5.0	51+20	25.3	TOPOUT
							51+10	26.0	TOPOUT
							51+00	27.9	TOPOUT
							50+90	29.1	TOPOUT
							50+80	30.2	10.4
							50+70	30.9	12.6
							50+60	31.5	13.9
							50+50	32.5	16.4
							50+40	33.7	18.6
							50+30	36.3	18.9
							50+20	36.1	21.3
							50+10	36.3	25.2
							50+00	36.6	27.1
							49+90	36.5	27.3
							49+80	24.4	28.0
							49+70		28.3
							49+60		29.0
							49+50		29.7
							49+40		30.5
							49+30		31.9
							49+20		32.2
							49+10		32.2
							49+00		32.2
							48+90		12.5
							48+80		12.4
				SF TODAY	3306.00		48+70		12.2
				SF TO DATE	105436.00		48+60		12.0

COMMENTS

NORTH TRENCH

GEO-CON: Lorraine C. Lodo OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/17/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 22 - 30 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
Excavation completed 01/16/04.							42+30	TOPOUT	TOPOUT
							42+40	4.2	TOPOUT
							42+50	7.6	TOPOUT
							42+60	8.0	TOPOUT
							42+70	12.6	TOPOUT
							42+80	14.5	TOPOUT
							42+90	15.0	TOPOUT
							43+00	15.7	TOPOUT
							43+10	18.5	TOPOUT
							43+20	19.0	TOPOUT
							43+30	19.3	TOPOUT

SF TODAY 0.00

SF TO DATE 84048.22

COMMENTS

SE Trench

GEO-CON: Indiana E Corp OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/17/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 22 - 30 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
44+60	33.0	36.5				4.8	44+60	24.1	21.4
44+70	33.1	36.9	36.7	10.0	367.0	6.2	44+70	23.7	22.3
44+80	33.0	36.7	36.8	10.0	368.0	5.7	44+80	21.5	24.1
44+90	32.9	36.5	36.6	10.0	366.0	3.2	44+90	17.6	24.5
45+00	32.9	36.4	36.5	10.0	364.5	3.8	45+00	10.7	25.0
45+10	33.0	36.5	36.5	10.0	364.5	4.3	45+10		25.4
45+20	33.2	36.6	36.6	10.0	365.5	4.7	45+20		26.2
45+30	33.1	36.8	36.7	10.0	367.0	4.2	45+30		27.0
45+40	33.0	36.7	36.8	10.0	367.5	4.0	45+40		29.9
45+50	33.0	36.9	36.8	10.0	368.0	3.9	45+50		31.9
45+60	33.1	37.0	37.0	10.0	369.5	3.8	45+60		33.3
45+70	33.0	36.9	37.0	10.0	369.5	3.8	45+70		33.5

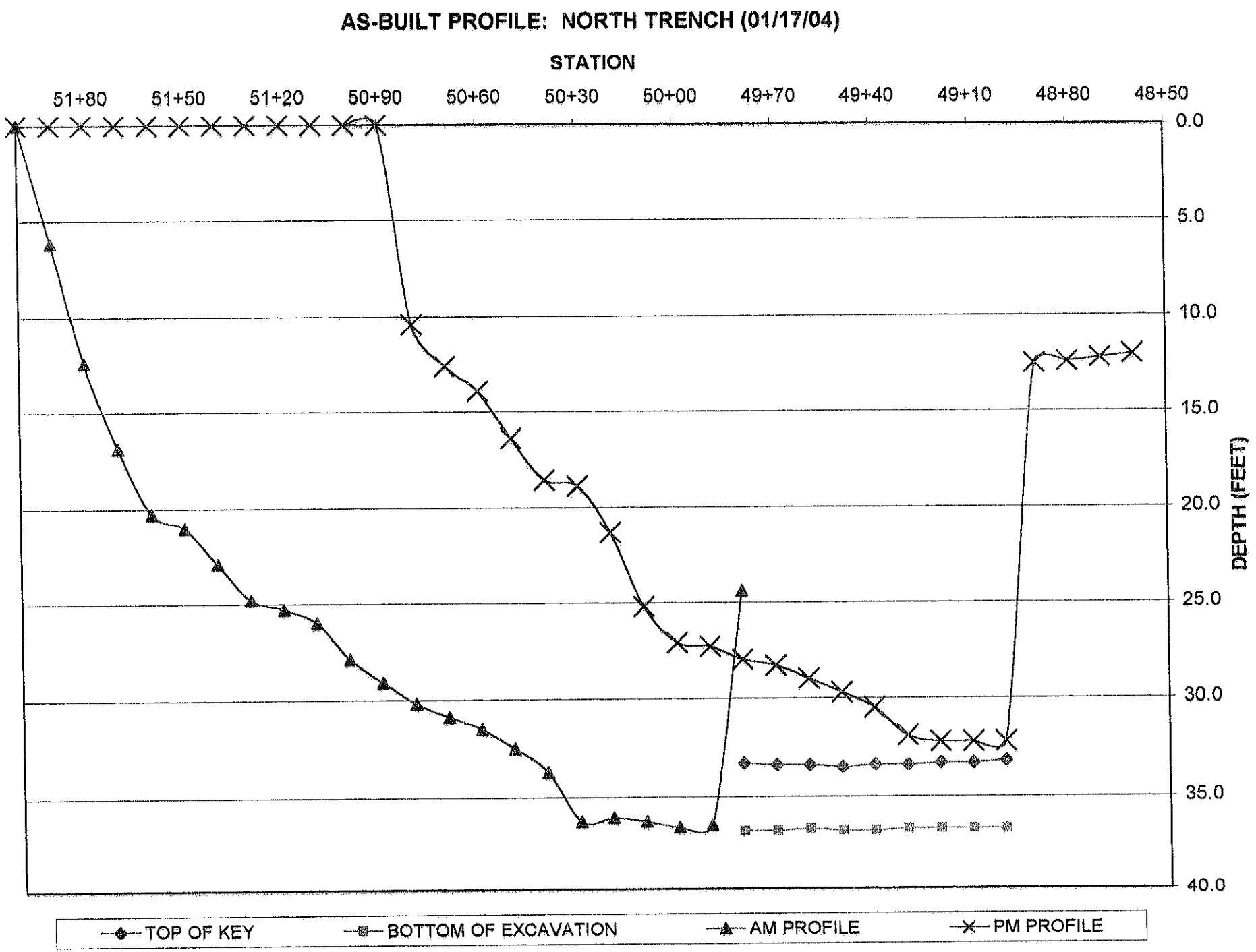
SF TODAY 4037.00

SF TO DATE 4037.00

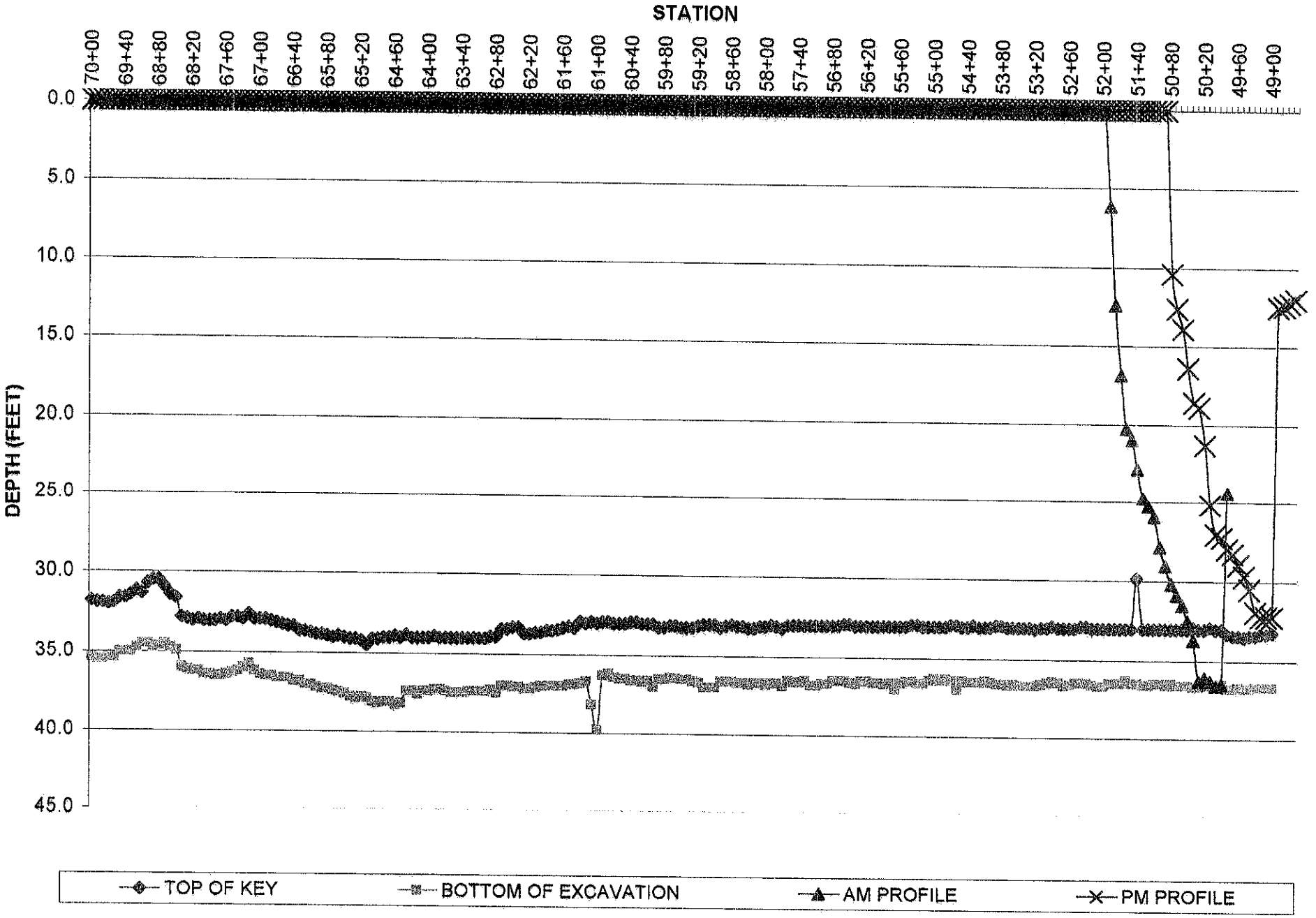
COMMENTS

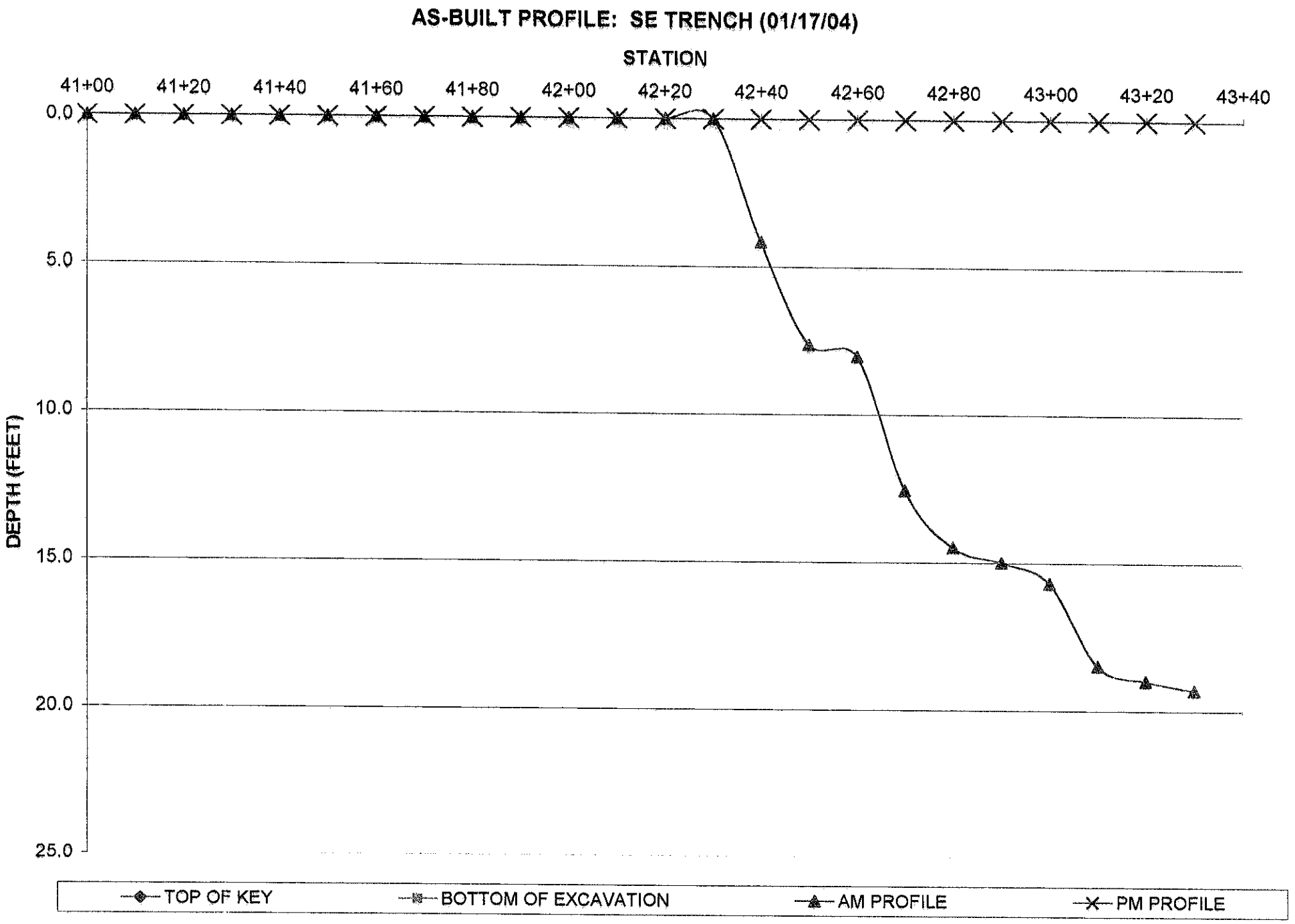
EAST Trench

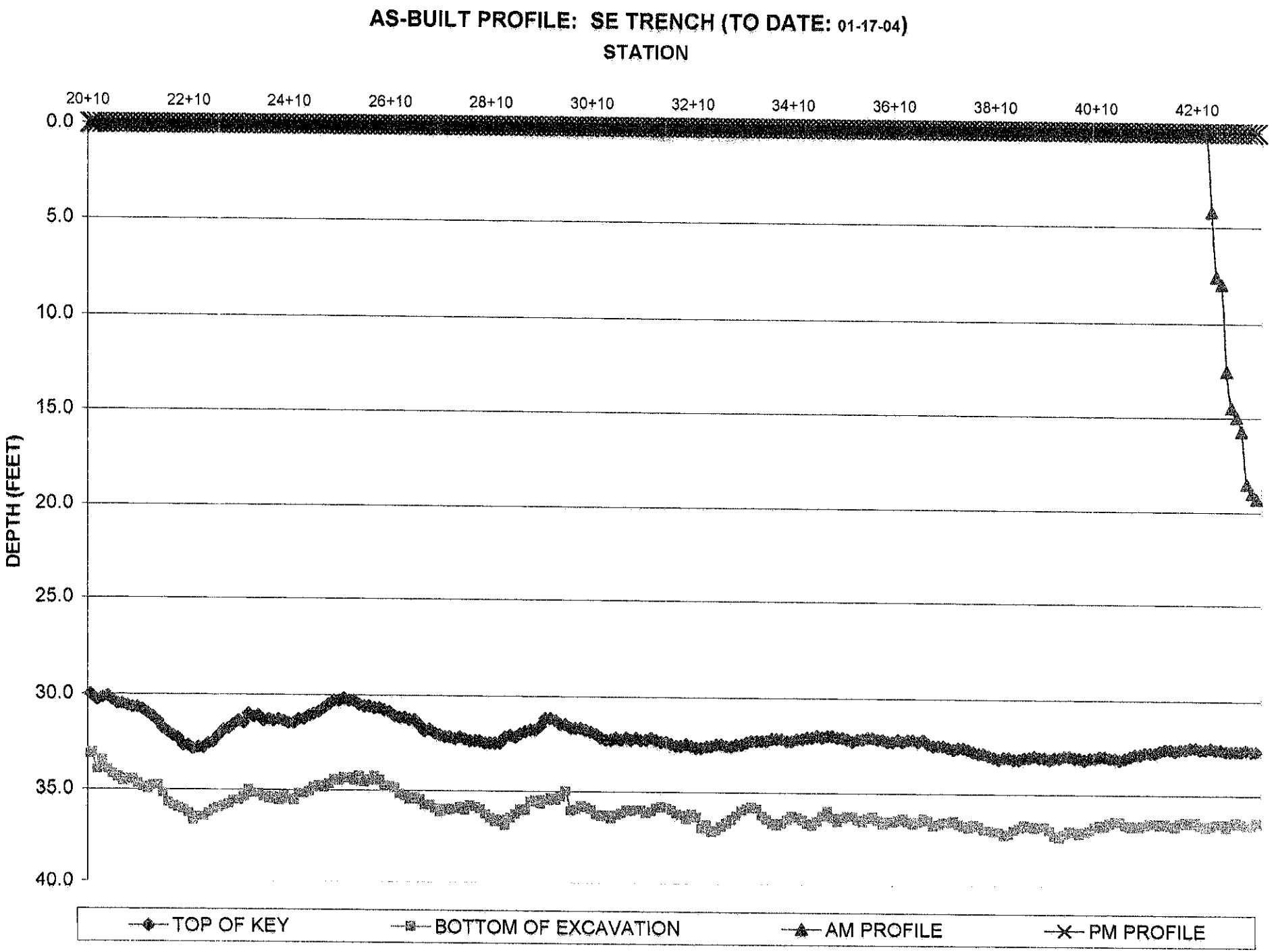
GEO-CON: Summit Geo OWNER:

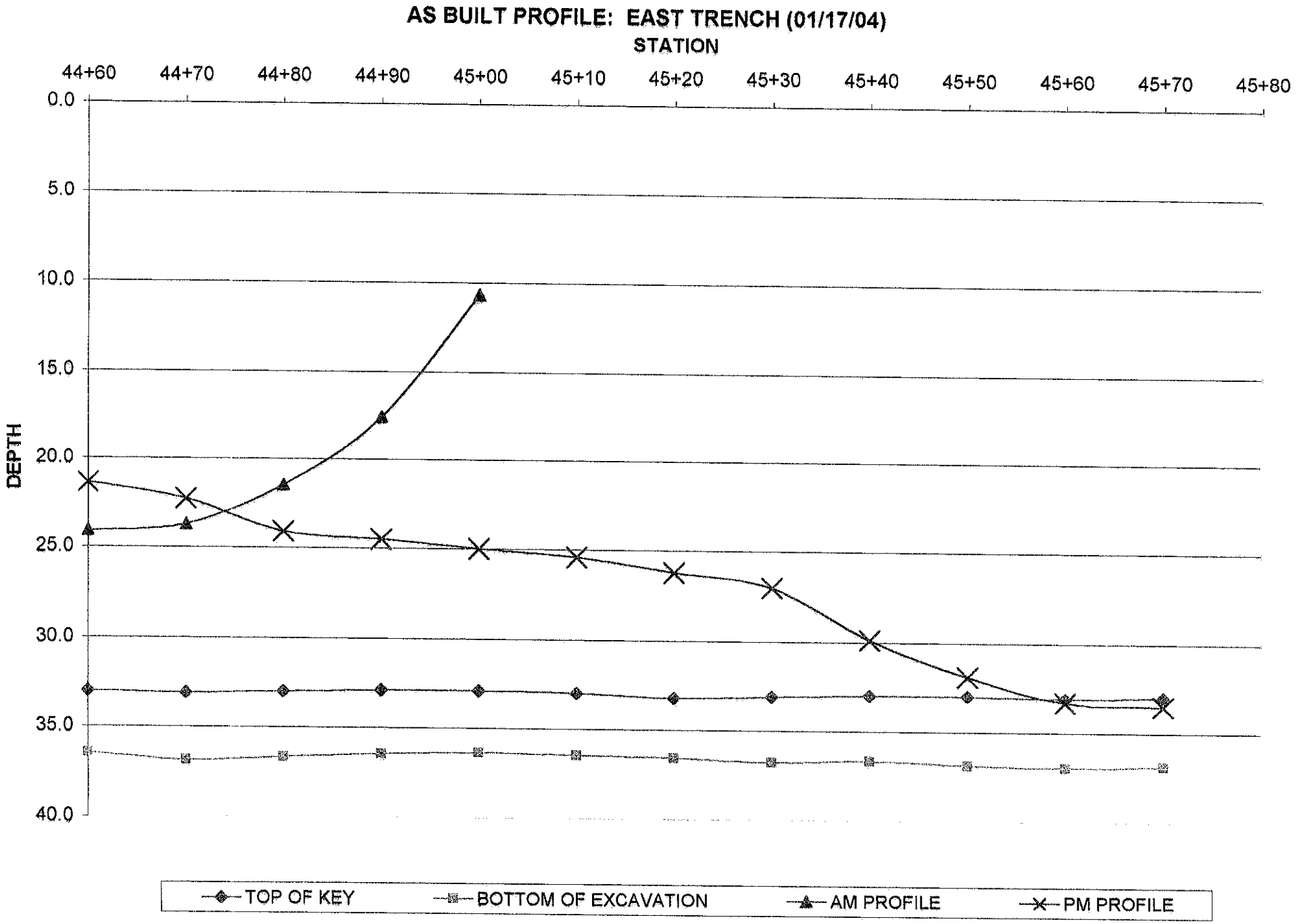

AS-BUILT PROFILE: NORTH TRENCH (01/17/04)
STATION
51+80
51+50
51+20
50+90
50+60
50+30
50+00
49+70
49+40
49+10
48+80
48+50
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

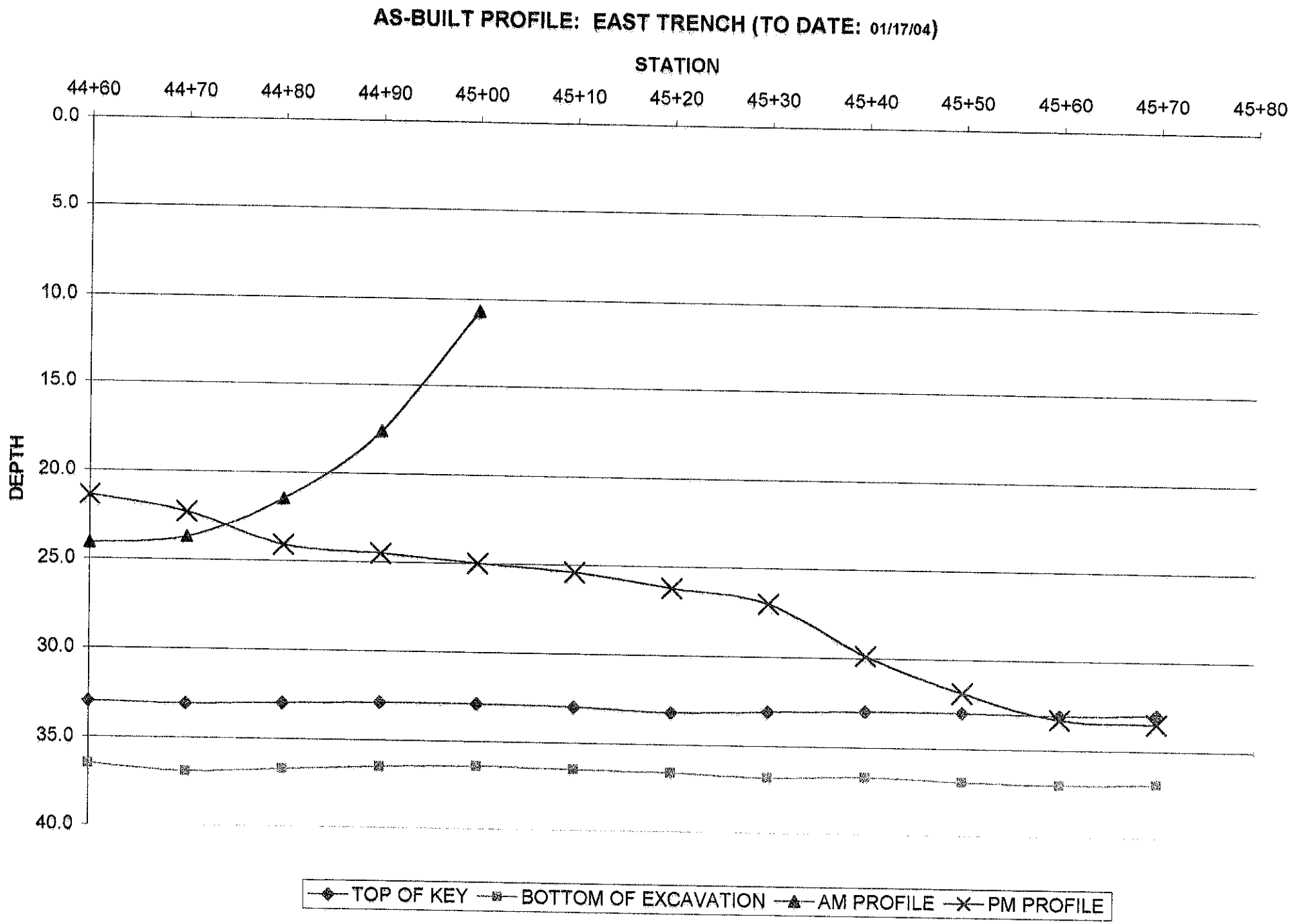
AS-BUILT PROFILE: NORTH TRENCH (TO DATE: 01/17/03)




AS-BUILT PROFILE: SE TRENCH (01/17/04)
STATION
41+00
41+20
41+40
41+60
41+80
42+00
42+20
42+40
42+60
42+80
43+00
43+20
43+40
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: SE TRENCH (TO DATE: 01-17-04)
STATION
20+10
22+10
24+10
26+10
28+10
30+10
32+10
34+10
36+10
38+10
40+10
42+10
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS BUILT PROFILE: EAST TRENCH (01/17/04)
STATION
44+60
44+70
44+80
44+90
45+00
45+10
45+20
45+30
45+40
45+50
45+60
45+70
45+80
DEPTH
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: EAST TRENCH (TO DATE: 01/17/04)
STATION
44+60
44+70
44+80
44+90
45+00
45+10
45+20
45+30
45+40
45+50
45+60
45+70
45+80
DEPTH
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/17/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	7:50	46	> 40 sec	65	> 64 pcf	8	6.5 - 10	15	< 20 cm^3	.3
PM	13:30	51	> 40 sec	65	> 64 pcf	8	6.5 - 10	14	< 20 cm^3	.2

North Trench

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9:20	44	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	—	—	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

*Batch Plant stopped mixing & pumping at 14:00

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
[illegible]	49+20	2	49	40 - 90 sec	86	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	.8	18	MAX 30%
[illegible]	49+20	25	50	40 - 90 sec	89	64 - 95 pcf	8	6.5 - 10	17	< 25 cm^3	.8	22	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
[illegible]	49+30	2	62	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	25	< 25 cm^3	1.5	26	MAX 30%
[illegible]	49+30	34	68	40 - 90 sec	96	64 - 95 pcf	8	6.5 - 10	21	< 25 cm^3	1.0	29	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
51+75	2.5	2" to 6"	116	+15 pcf over trench slurry	4.01×10^{-8}	1.0×10^{-7} cm/sec
51+50	2.5	2" to 6"	115.5	+15 pcf over trench slurry	5.62×10^{-8}	1.0×10^{-7} cm/sec
51+25	2.5	2" to 6"	115.5	+15 pcf over trench slurry	4.84×10^{-8}	1.0×10^{-7} cm/sec
51+00	3	2" to 6"	116	+15 pcf over trench slurry	9.63×10^{-8}	1.0×10^{-7} cm/sec
50+75	3	2" to 6"	115.5	+15 pcf over trench slurry	1.94×10^{-7}	1.0×10^{-7} cm/sec
50+50	3	2" to 6"	116	+15 pcf over trench slurry	2.41×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 51+00, 50+75, 50+50 (51+75, 51+50, 51+25)

Technician: SM/MM ✓BY SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.0cm, 6.5cm, 7.0cm (7.0cm, 7.0cm, 6.5cm) cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/corr. (1/14.6)
51+75	01/17/04	8:30 12:30	240	10	100.4833	519313.7717	—	5	4.01×10^{-8}	2.74x10
51+50	01/17/04	8:30 12:30	240	10	100.4833	519313.7717	—	7	5.62×10^{-8}	3.84x
51+25	01/17/04	8:30 12:30	240	10	108.2128	559261.0644	—	6.5	4.84×10^{-8}	3.3x
51+00	01/17/04	14:50 18:50	240	10	117.2305	605865.9809	—	14	9.63×10^{-8}	6.57x
50+75	01/17/04	14:50 18:50	240	10	108.2128	559261.0644	—	26	1.94×10^{-7}	1.32x
50+50	01/17/04	14:50 18:50	240	10	93.7844	484692.7847	—	28	2.41×10^{-7}	1.64x

$I = \frac{P\ (psi)}{0.014217\ L\ (cm)}$ $R = \frac{\text{Quick Test}}{\text{Triaxial Test}} = 1.85$

DAILY QC TESTS **DATE** 01/17/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

SE TRENCH

TOPPING OUT TRENCH.
NO SLURRY SAMPLE TAKEN

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
42+50	2	2" to 6"	119	+15 pcf over trench slurry	5.50×10^{-8}	1.0×10^{-7} cm/sec
42+75	2	2" to 6"	118	+15 pcf over trench slurry	6.42×10^{-8}	1.0×10^{-7} cm/sec
43+00	2	2" to 6"	118	+15 pcf over trench slurry	5.22×10^{-8}	1.0×10^{-7} cm/sec
43+25	2	2" to 6"	117.5	+15 pcf over trench slurry	8.60×10^{-8}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

SE TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 42+50, 42+75, 43+00, 43+25

Technician: SM/MM /AY SES

6.0cm, 7.0cm, 6.0cm

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm^2

Sample Height: L= 7.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	b/c [illegible]
42+50	01/17/04	8:30-12:30	240	10	117.2305	605865.9809	—	8	5.50×10^{-8}	3.75 [illegible]
42+75	01/17/04	8:30-12:30	240	10	100.4833	519313.7717	—	8	6.42×10^{-8}	4.3[illegible]
43+00	01/17/04	8:30-12:30	240	10	108.2128	559261.0614	—	7	5.22×10^{-8}	3.32[illegible]
43+25	01/17/04	8:30-12:30	240	10	93.7844	484692.7847	—	10	8.60×10^{-8}	5.9[illegible]

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

DAILY QC TESTS

DATE 01/17/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

EAST TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:50	44+70	2	48	40 - 90 sec	69	64 - 95 pcf	8	6.5 - 10	14	< 25 cm^3	4	7	MAX 30%
7:50	44+70	35	51	40 - 90 sec	70	64 - 95 pcf	8	6.5 - 10	12	< 25 cm^3	5	8	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:5[illegible]	45+40	2	53	40 - 90 sec	77	64 - 95 pcf	8	6.5 - 10	15	< 25 cm^3	4	16	MAX 30%
13:50	45+40	34	54	40 - 90 sec	81	64 - 95 pcf	8	6.5 - 10	13	< 25 cm^3	6	22	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
44+75	2	2" to 6"	118	+15 pcf over trench slurry	4.81×10^{-8}	1.0×10^{-7} cm/sec
45+00	2	2" to 6"	117.5	+15 pcf over trench slurry	6.02×10^{-8}	1.0×10^{-7} cm/sec
45+25	2	2" to 6"	115	+15 pcf over trench slurry	4.47×10^{-8}	1.0×10^{-7} cm/sec
45+50	2	2" to 6"	115	+15 pcf over trench slurry	4.13×10^{-8}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

EAST TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 44+75, 45+00, 45+25, 45+50

Technician: JM/MM

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.0cm (7.0cm, 7.5cm, 6.5cm) cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	
44+75	01/17/04	8:30-12:30	240	10	100.4833	519313.7717	–	6	4.81×10^{-8}	3.28x10
45+00	01/17/04	8:30-12:30	240	10	93.7844	484692.7847	–	7	6.02×10^{-8}	4.11x
45+25	01/17/04	14:50-18:50	240	10	108.2128	559260.0644	–	6	4.47×10^{-8}	3.0
45+50	01/17/04	14:50-18:50	240	10	117.2305	605865.7809	–	6	4.13×10^{-8}	2.8

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

NORTH TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
49+80	587.7	586.7	33.3	553.4	36.8	549.9	5.0	1.9
49+70	587.7	587.1	33.4	553.7	36.8	550.3	4.5	1.5
49+60	587.6	587.3	33.4	553.9	36.7	550.6	4.5	1.5
49+50	587.6	587.0	33.5	553.5	36.8	550.2	4.5	1.5
49+40	587.6	586.8	33.4	553.4	36.8	550.0	4.5	1.5
49+30	587.6	587.0	33.4	553.6	36.7	550.3	4.5	1.5
49+20	587.6	587.6	33.3	554.3	36.7	550.9	4.5	1.5
49+10	587.6	587.2	33.3	553.9	36.7	550.5	4.5	1.5
49+00	587.5	587.3	33.2	554.1	36.7	550.6	5.0	1.9

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED ON A 1:1.5 SLOPE.

East Trench

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
44+60	587.4	586.7	33.0	553.7	36.5	550.2	4.8	1.7
44+70	587.4	587.3	33.1	554.2	36.9	550.4	6.2	2.8
44+80	587.4	586.9	33.0	553.9	36.7	550.2	5.7	2.4
44+90	587.5	586.9	32.9	554.0	36.5	550.4	3.2	1.1
45+00	587.5	587.4	32.9	554.5	36.4	551.0	3.8	2.0
45+10	587.5	587.8	33.0	554.8	36.5	551.3	4.3	2.7
45+20	587.5	588.1	33.2	554.9	36.6	551.5	4.7	3.3
45+30	587.5	587.8	33.1	554.7	36.8	551.0	4.2	2.6
45+40	587.5	587.7	33.0	554.7	36.7	551.0	4.0	2.3
45+50	587.5	588.0	33.0	555.0	36.9	551.1	3.9	2.1
45+60	587.5	587.8	33.2	554.6	37.0	550.8	3.8	2.0
45+70	587.6	587.8	33.0	554.8	36.9	550.9	3.8	2.0

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED ON A 1:1.5 SLOPE

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature) | Date Shipped: 19-Jan-04 | Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311 | Airbill No: N/A | Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL | PROJECT NO P01-048 | P O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-079 (NW49+00)	SOIL ONLY	49+00	01/17/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-080 (E45+50)	SOIL ONLY	45+50	01/17/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-092 (NW51+00)	SB BACKFILL**	51+00	01/17/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-093 (SE43+00)	SB BACKFILL**	43+00	01/17/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-094 (E45+00)	SB BACKFILL**	45+00	01/17/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

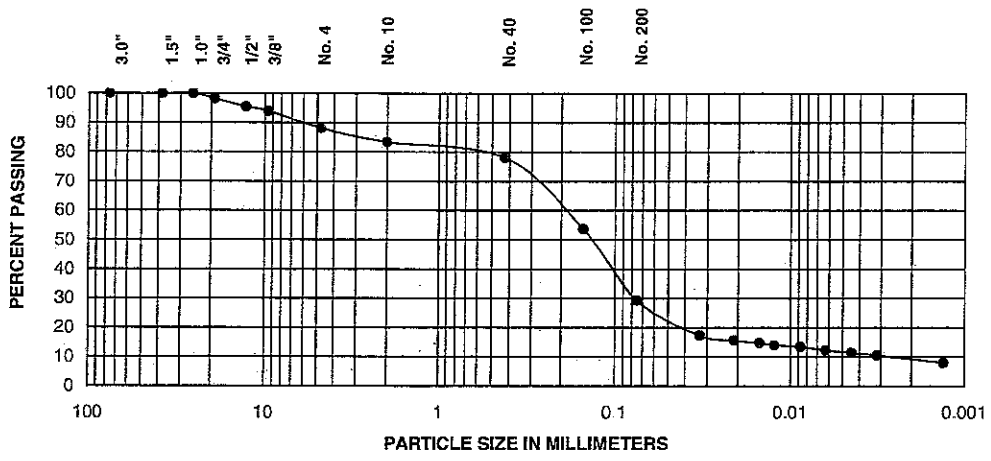
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-092 (NW 51+00)	**Date Tested**	1/23/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/19/2004
Sample Location	51+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	11.8	59.0	17.4	11.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.2
1/2"	95.5
3/8"	94.0
No. 4	88.2
No. 10	83.4
No. 40	78.1
No. 100	53.7
No. 200	29.2

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
28	20	8

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

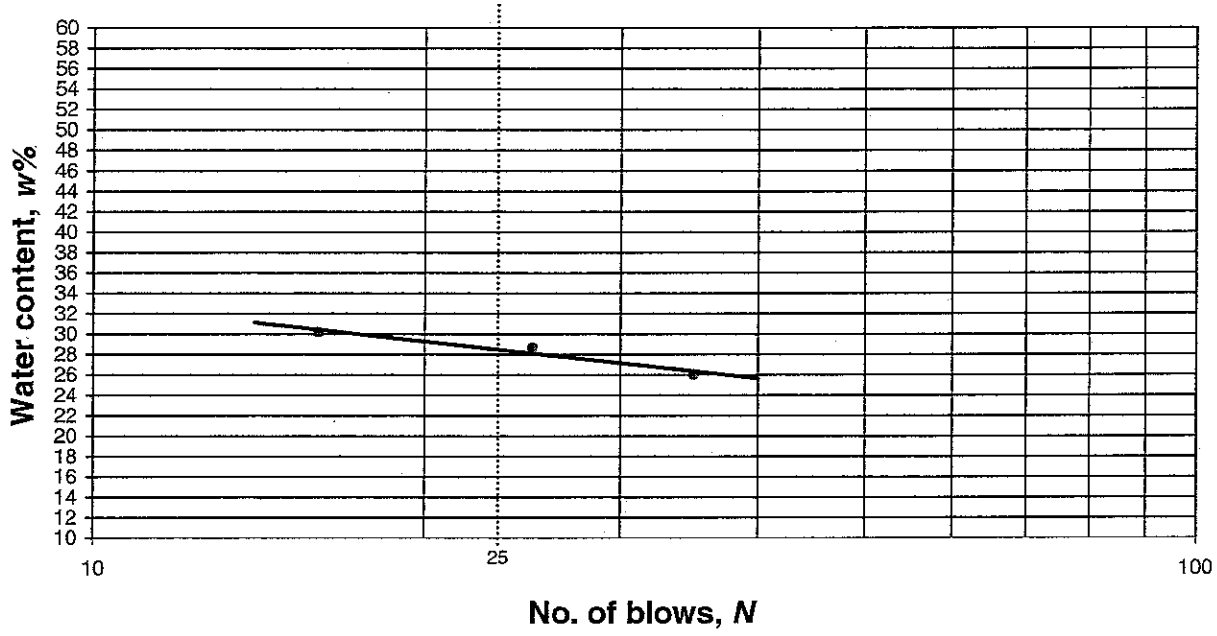
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-092 (NW 51+00)	**Date Tested**	1/22/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/19/2004
Sample Location	51+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**28**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**8**

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/22/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-092 (NW 51+00)	Date Recd.	1/19/04	**Location**	51+00 (NW)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.86	cm	Volume, V:	238.6	cu cm
Mass of Sample:	461.6	g	**Moisture Content:**	**31.0**	%
			Wet Density	**120.7**	**pcf**
			Dry Density	**92.2**	**pcf**

Final

Diameter:	6.99	cm	Area, A:	38.4	sq cm
Height, L:	5.43	cm	Volume, V:	208.4	cu cm
Mass of Sample:	430.09	g	**Moisture Content:**	**23.1**	%
			Wet Density	**128.8**	**pcf**
			Dry Density	**104.6**	**pcf**
			Deg of Saturation	**99.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.6	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/22/2004	11:15 AM	0	0	3.04	5.99		20.0	---
1/22/2004	12:00 PM	2700	2700	3.16	5.89	1.2	20.0	3.64E-08
1/22/2004	12:45 PM	2700	5400	3.28	5.76	0.9	20.0	4.78E-08
1/22/2004	1:45 PM	3600	9000	3.43	5.62	1.1	20.0	3.91E-08
1/22/2004	2:45 PM	3600	12600	3.57	5.50	1.2	20.0	3.40E-08

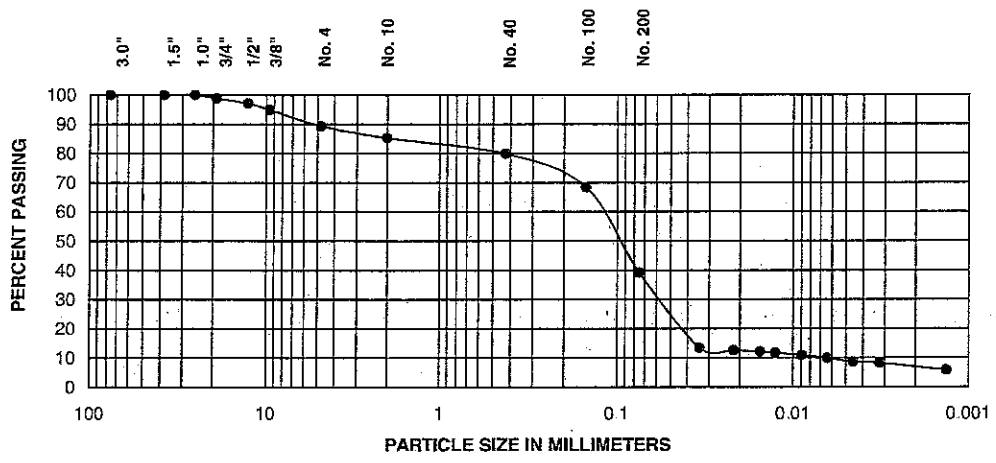
Average Permeability = **3.9E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-093 (SE 43+00)	**Date Tested**	1/22/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/19/2004
Sample Location	43+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	10.7	50.1	30.1	9.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.8
1/2"	97.2
3/8"	94.9
No. 4	89.3
No. 10	85.3
No. 40	79.9
No. 100	68.4
No. 200	39.3

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
27	20	7

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

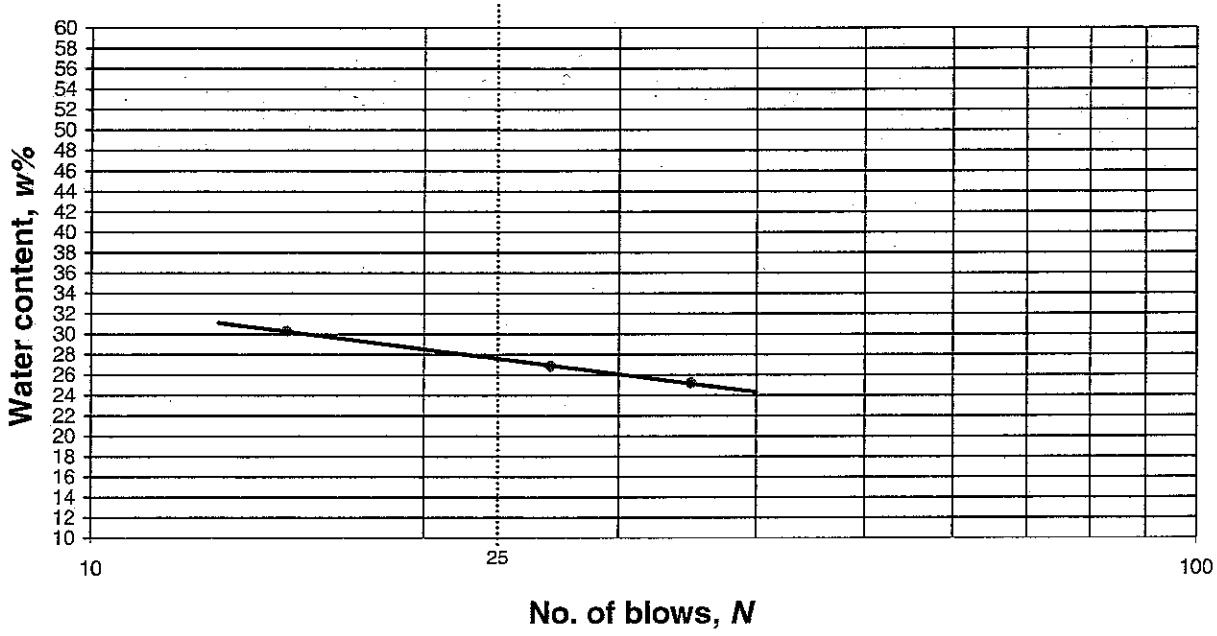
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-093 (SE 43+00)	**Date Tested**	1/29/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/19/2004
Sample Location	43+00 (SE)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**27**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**7**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/22/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-093 (SE 43+00)	Date Recd.	1/19/04	**Location**	43+00 (SE)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.79	cm	Volume, V:	235.7	cu cm
Mass of Sample:	450.1	g	**Moisture Content:**	**25.4**	%
			Wet Density	**119.1**	**pcf**
			Dry Density	**95.0**	**pcf**

Final

Diameter:	6.97	cm	Area, A:	38.2	sq cm
Height, L:	5.34	cm	Volume, V:	203.7	cu cm
Mass of Sample:	430.40	g	**Moisture Content:**	**20.5**	%
			Wet Density	**131.8**	**pcf**
			Dry Density	**109.4**	**pcf**
			Deg of Saturation	**99.2**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.9	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/22/2004	11:15 AM	0	0	3.02	5.99		20.0	---
1/22/2004	12:00 PM	2700	2700	3.09	5.93	1.2	20.0	2.15E-08
1/22/2004	12:45 PM	2700	5400	3.18	5.85	1.1	20.0	2.89E-08
1/22/2004	1:45 PM	3600	9000	3.29	5.76	1.2	20.0	2.46E-08
1/22/2004	2:45 PM	3600	12600	3.38	5.67	1.0	20.0	2.48E-08

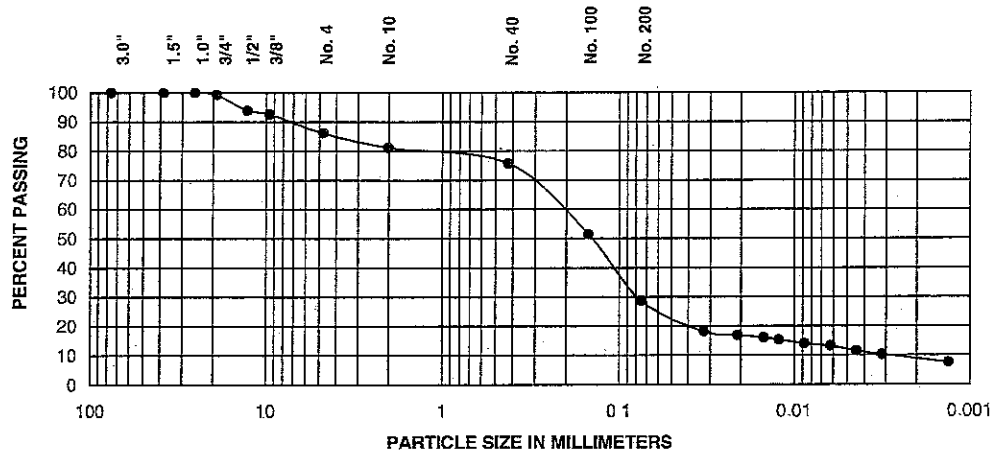
Average Permeability = **2.5E-08** **cm/sec**

Remarks:

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS** **(ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-094 (E 45+00)	**Date Tested**	1/22/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/19/2004
Sample Location	45+00 (E)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	13.8	57.4	16.6	12.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.3
1/2"	93.9
3/8"	92.7
No. 4	86.2
No. 10	81.2
No. 40	75.8
No. 100	51.5
No. 200	28.8

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
32	21	11

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

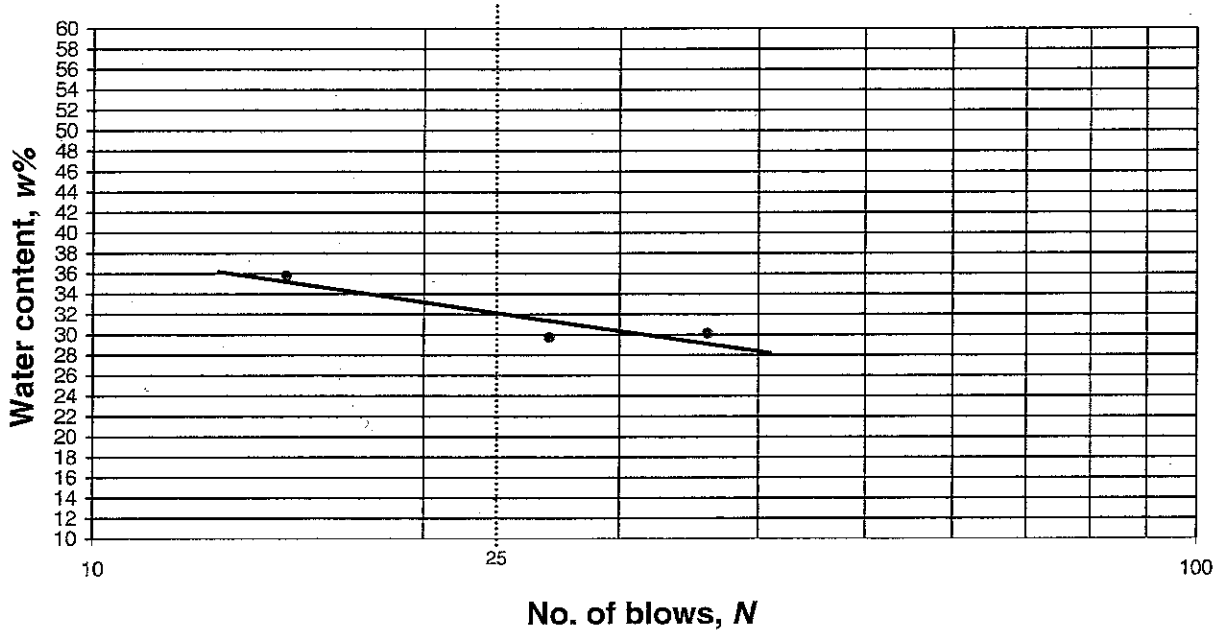
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-094 (E 45+00)	**Date Tested**	1/21/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/19/2004
Sample Location	45+00 (E)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**32**	**Plastic Limit, PL**	**21**	**Plasticity Index, PI**	**11**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/22/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-094 (E 45+00)	Date Recd.	1/19/04	**Location**	45+00 (E)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.82	cm	Volume, V:	277.7	cu cm
Mass of Sample:	524.9	g	**Moisture Content:**	**29.2**	%
			Wet Density	**118.0**	**pcf**
			Dry Density	**91.3**	**pcf**

Final

Diameter:	6.98	cm	Area, A:	38.3	sq cm
Height, L:	6.42	cm	Volume, V:	245.7	cu cm
Mass of Sample:	501.30	g	**Moisture Content:**	**23.5**	%
			Wet Density	**127.3**	**pcf**
			Dry Density	**103.1**	**pcf**
			Deg of Saturation	**97.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	18.6	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/22/2004	11:15 AM	0	0	3.13	6.00		20.0	---
1/22/2004	12:00 PM	2700	2700	3.20	5.94	1.2	20.0	2.54E-08
1/22/2004	12:45 PM	2700	5400	3.27	5.86	0.9	20.0	3.42E-08
1/22/2004	1:45 PM	3600	9000	3.37	5.77	1.1	20.0	2.91E-08
1/22/2004	2:45 PM	3600	12600	3.46	5.69	1.1	20.0	2.61E-08

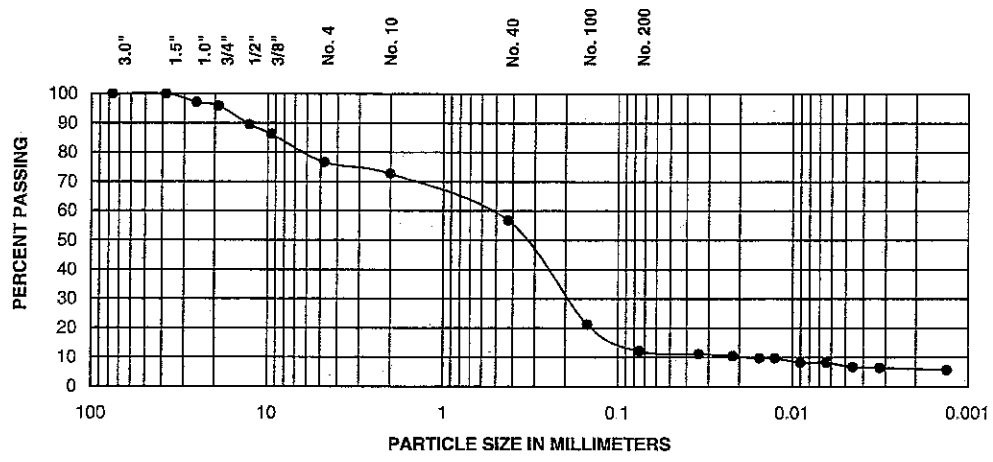
Average Permeability = **2.9E-08** **cm/sec**

Remarks:

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-079 (NW 49+00)	**Date Tested**	1/17/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/17/2004
Sample Location	49+00 (NW)
Sample Description	Gray sitly, clayey sand with gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	23.4	64.5	4.9	7.3

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	97.1
3/4"	95.8
1/2"	89.5
3/8"	86.3
No. 4	76.6
No. 10	72.8
No. 40	56.8
No. 100	21.2
No. 200	12.1

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
NP	NP	NP

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand with gravel
System:	USCS

Remarks:

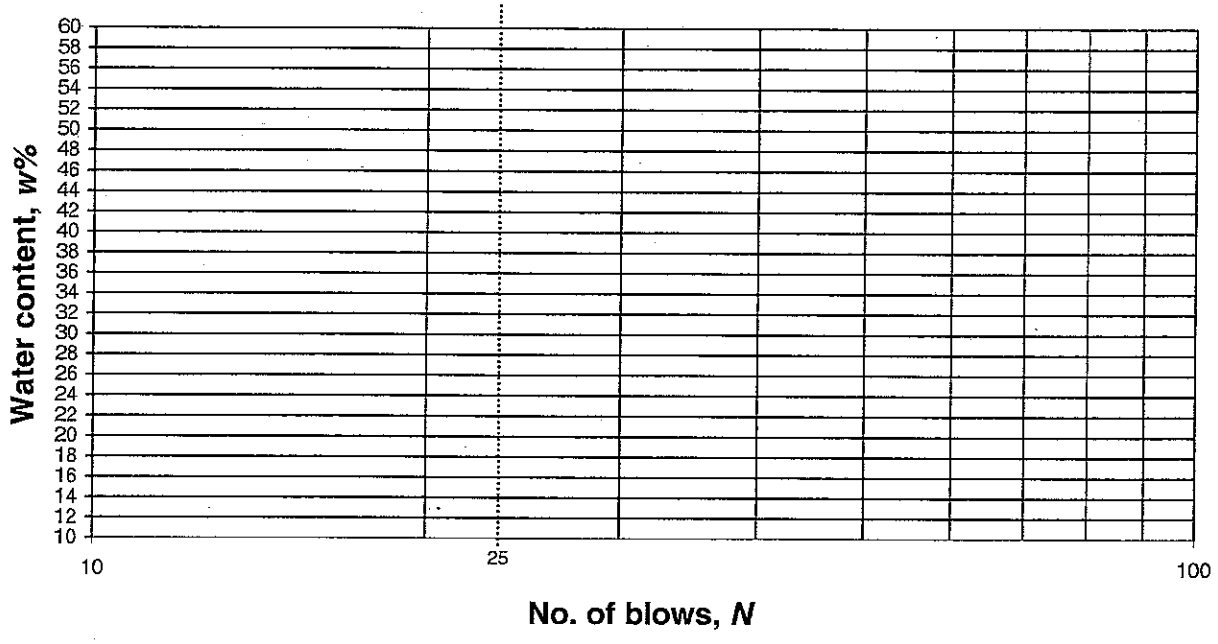
NP:Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-079 (NW 49+00)	**Date Tested**	1/20/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/17/2004
Sample Location	49+00 (NW)
Sample Description	Gray sitly, clayey sand with gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	27	Date	1/19/2003	Sheet	1
				Date of weighing	1/20/2003	Tested by	MA

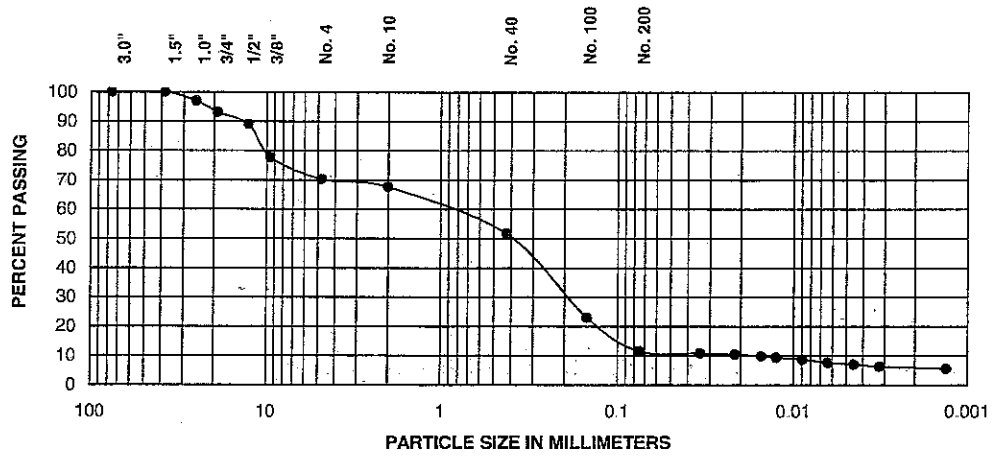
Boring No.	-	-	-	-	-	-
Sample No.	BF-076 (NW50+00)	BF-077(SE43+00)	BF-078 (E45+00)	BF-079(NW49+00)	BF-080(E45+50)	BF-081(NW48+60)
Location	50 + 00 (NW)	43 + 00 (SE)	45 + 00 (E)	49 + 00 (NW)	45 + 50 (E)	48 + 60 (NW)
Tin No.	73A	61A	36C	97A	63A	56A
Tin + Wet Soil	207.23	188.31	175.31	170.18	165.93	194.29
Tin + Dry Soil	181.2	164.86	163.96	152.92	146.9	177.59
Wt. of Tin	30.04	30.66	31.37	30.54	30.65	30.26
Wt. of Dry Soil	151.2	134.2	132.6	122.4	116.3	147.3
Wt. of Water	26.0	23.5	11.4	17.3	19.0	16.7
Moisture, %	17.2	17.5	8.6	14.1	16.4	11.3
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-082 (E46+00)					
Location	46 + 00 (E)					
Tin No.	71C					
Tin + Wet Soil	206.68					
Tin + Dry Soil	189.71					
Wt. of Tin	31.38					
Wt. of Dry Soil	158.3					
Wt. of Water	17.0					
Moisture, %	10.7					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-080 (E 45+50)	**Date Tested**	1/22/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/19/2004
Sample Location	45+50 (E)
Sample Description	Gray well-graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	29.7	58.6	4.4	7.3

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.95	0.19	0.02	56.4	2.33

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	97.0
3/4"	93.1
1/2"	89.1
3/8"	77.9
No. 4	70.3
No. 10	67.6
No. 40	51.8
No. 100	23.1
No. 200	11.7

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
NP	NP	NP

Soil Classification:	SW-SC
Soil Description:	Well-graded sand with clay and gravel
System:	USCS

Remarks:

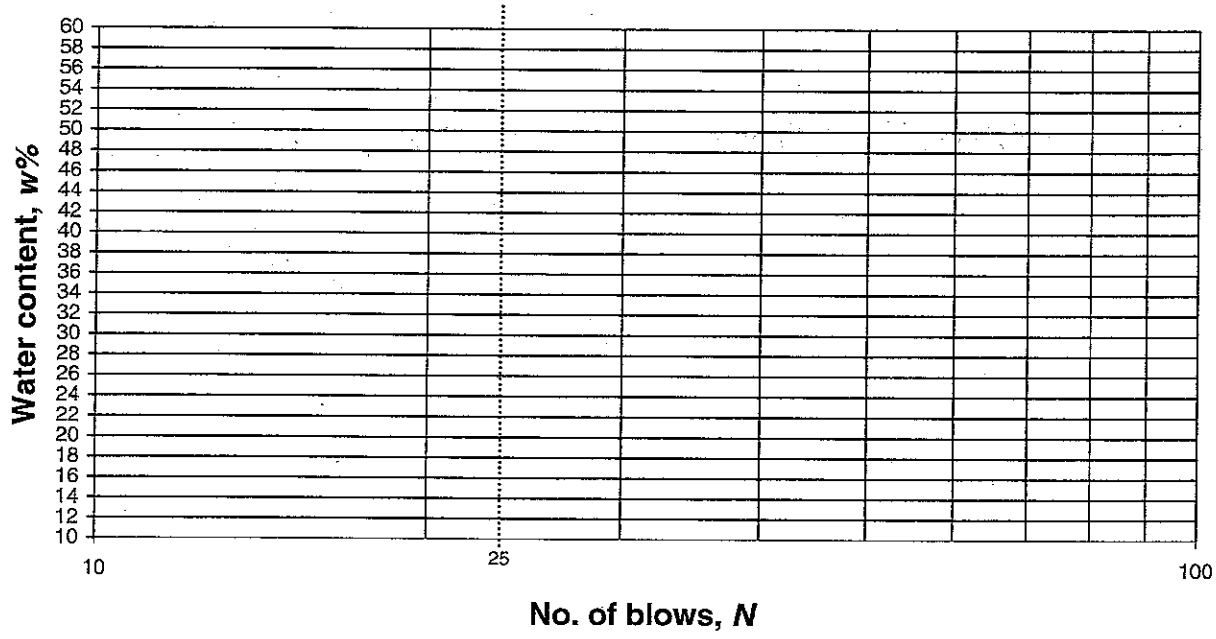
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-080 (E 45+50)	**Date Tested**	1/20/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/19/2004
Sample Location	45+50 (E)
Sample Description	Gray well-graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	NP	**Plastic Limit, PL**	NP	**Plasticity Index, PI**	NP

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	27	Date	1/19/2003	Sheet	1
				Date of weighing	1/20/2003	Tested by	MA

Boring No.	-	-	-	-	-	-
Sample No.	BF-076 (NW50+00)	BF-077(SE43+00)	BF-078 (E45+00)	BF-079(NW49+00)	BF-080(E45+50)	BF-081(NW48+60)
Location	50 + 00 (NW)	43 + 00 (SE)	45 + 00 (E)	49 + 00 (NW)	45 + 50 (E)	48 + 60 (NW)
Tin No.	73A	61A	36C	97A	63A	56A
Tin + Wet Soil	207.23	188.31	175.31	170.18	165.93	194.29
Tin + Dry Soil	181.2	164.86	163.96	152.92	146.9	177.59
Wt. of Tin	30.04	30.66	31.37	30.54	30.65	30.26
Wt. of Dry Soil	151.2	134.2	132.6	122.4	116.3	147.3
Wt. of Water	26.0	23.5	11.4	17.3	19.0	16.7
Moisture, %	17.2	17.5	8.6	14.1	16.4	11.3
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-082 (E46+00)					
Location	46 + 00 (E)					
Tin No.	71C					
Tin + Wet Soil	206.68					
Tin + Dry Soil	189.71					
Wt. of Tin	31.38					
Wt. of Dry Soil	158.3					
Wt. of Water	17.0					
Moisture, %	10.7					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/17/04
Weather: Partly Cloudy 22-30 degrees

Job Number: P01-048
Job Name: Indiana Harbor

Trench Topped Out Sta 52+00 to 50+90 = 110 L.F.

Length: 110 x Depth[1]: 35.5 (avg) =Square Feet 3905

Square feet: 3905 x Width: 2.5 =Total Cubic Feet[3] 9762.5

Cubic feet[3]: 10327.9 x Dry Unit Weight: 85 (877871.5) /2000= 438.94 Tons of Soil

Tons of Soil: 438.94 x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate 307.26 Tons of Soil

Unit Rate: 307.26 x Specified Rate: 6% =Bentonite Required 18.44 Tons of Bentonite Required between these Stations to top out the trench

Via Mixer = 11.00 (3.58%) Tons of Bentonite

Via Backfill = 24.00 (7.81%) Tons of Bentonite

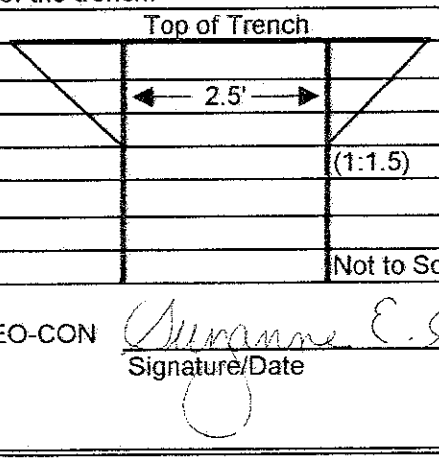
Total Tons of Bentonite Used = 35.00 (11.39%)

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

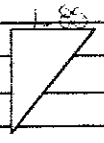
[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 6.2'

6.2 - 2.5' = 3.7 → 1.85' overage on each side



A = 1/2 b h = 1/2 (1.85)(2.78) = 2.57 SF

[3] CF = SF * L * 2 sides = 565.4 CF

Note: Add to CF above

GEO-CON: Suzanne E. Sepio
Signature/Date

OWNER:
Signature/Date

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/17/04 | Job Number: P01-048
Weather: Partly Cloudy 22 - 30 degrees | Job Name: Indiana Harbor

Trench Topped Out Sta 42+30 to 43+30 = 100 L.F.

Length: 100 x Depth[1] 35.6 (avg) =Square Feet 3560

Square feet: 3560 x Width 2.5 =Total Cubic Feet[3] 8900

Cubic feet[3] 8906 x Dry Unit Weight 85 (157010) /2000= 378.50 Tons of Soil

Tons of Soil: 378.50 x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate 264.95 Tons of Soil

Unit Rate 264.95 x Specified Rate 6% =Bentonite Required 15.90 Tons of Bentonite Required between these Stations to top out the trench.

Via Mixer = 10.00 (3.77%) Tons of Bentonite

Via Backfill = 20.00 (7.55%) Tons of Bentonite

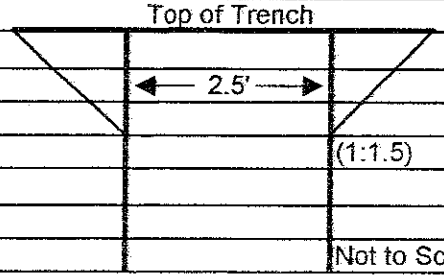
Total Tons of Bentonite Used = 30.00 (11.32%)

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 2.9

2.9 - 2.5 = 0.4' → 0.2 overage on each side

A = 1/2 b h = 1/2 (.2)(.3) = 0.03 SF

[3] CF = SF * L * 2 sides = 6 CF

Note: Add to CF above

GEO-CON: Suzanne E Aspo
Signature/Date

OWNER:
Signature/Date

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/17/04
Weather: Partly Cloudy, 22-30 degrees

Job Number: P01-048
Job Name: Indiana Harbor

Trench Topped Out Sta _____ to _____ = _____ L.F.

Length: _____ x Depth[1] _____ =Square Feet _____

Square feet _____ x Width 2.5 =Total Cubic Feet[3] _____

Cubic feet[3] _____ x Dry Unit Weight: 85 /2000= _____ Tons of Soil

Tons of Soil: _____ x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate _____ Tons of Soil

Unit Rate: _____ x Specified Rate: 6% =Bentonite Required _____ Tons of Bentonite Required between these Stations to top out the trench

Via Mixer = _____ Tons of Bentonite

Via Backfill = _____ Tons of Bentonite

Total Tons of Bentonite Used = _____

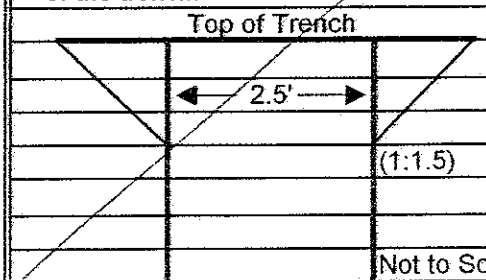
N/A. NO TRENCH TOPPED OUT TODAY.

Comments:

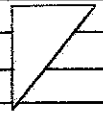
[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] =



A = 1/2 b h = 1/2

[3] CF = SF * L * 2 sides =

Note: Add to CF above

GEO-CON Suzanne E. Neal
Signature/Date

OWNER _____
Signature/Date

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 1/1/2004

SOLD TO:	SHIP TO:
CEO-CON INC. 4075 MONROEVILLE BLVD CORPORATE I BUILDING SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: 1107006133	CEO-CON S. CHICAGO IL 60612

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-13-04	QUALITY 9255	GREYBULL	DBL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result	Test or Property	API Spec	Result
Viscosity	30 min.	37	Moisture (wt. %)	N/A	2.4
Plastic Viscosity (cP)	N/A		Y.P. / P.V. Ratio	3.0 max.	1.08
Yield Point (# / 100 ft2)	N/A				
Filtrate Volume (ml3)	15.0 max.	12.4			
> 75 micron (wt. %)	4.0 max	1.1			

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-307-765-4400.

Signed Date

Approved by: Plant Manager

LabAnalCert.doc (4/22/97)
Rev 2 (9/98)

Arrived onsite 01/17/04

4000# Jumbos

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/18/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 20 - 24 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
48+80	2.00	102.00	34.00	28.00	68.00	8
48+80	34.00	103.00	35.00	24.00	72.00	8

NORTH TRENCH

COMMENTS: Batch plant did not operate today Only worked until 12:00 because of the weather (temperature dropped below 20 degrees). No PM sample Slurry properties are high because we are trying to top out the trench as much as possible for 2 day shutdown due to weather

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
48+60	LAB SAMPLE COLLECTED 01/18/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
50+75	2.00	N/A	N/A	N/A	8.94×10^{-8}	N/A
50+50	2.00	N/A	N/A	N/A	1.04×10^{-7}	N/A
50+25	2.00	N/A	N/A	N/A	9.63×10^{-8}	N/A
50+00	3.00	Sample collected	Sample collected	Sample collected	6.70×10^{-8}	yes
49+75	3.00	N/A	N/A	N/A	1.04×10^{-7}	N/A
49+50	3.00	N/A	N/A	N/A	8.82×10^{-8}	N/A

COMMENTS

Filter cake: 1.5mm, and 1.4mm respectively.

Unit Weight: 50+75: 118.0 pcf
50+50: 118.0 pcf
50+25: 118.5 pcf
50+00: 120.0 pcf
49+75: 122.5 pcf
49+50: 121.5 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY	22.00	6%
TO DATE	534.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sorg OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/18/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 20 - 24 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
45+80	2.00	83.00	25.00	16.00	75.00	8
45+80	34.00	85.00	25.00	14.00	76.00	8

EAST TRENCH

COMMENTS: Batch plant did not operate today. Only worked until 12:00 because of the weather (temperature dropped below 20 degrees). No PM sample. Trying to top out the trench as much as possible for 2 day shutdown due to weather

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
46+00	LAB SAMPLE COLLECTED 01/18/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
44+60	2.00	Sample collected	Sample collected	Sample collected	1.38×10^{-7}	yes
44+75	2.00	N/A	N/A	N/A	1.04×10^{-7}	N/A
45+00	2.00	N/A	N/A	N/A	8.94×10^{-8}	N/A

COMMENTS

Filter cake: .5mm and .5mm respectively.

Unit Weight: 44+60: 118.5 pcf
44+75: 116.5 pcf
45+00: 116.0 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY	0.00	6%
TO DATE	0.00	6%
BORROW %	CY	

**No trench topped out today.
Therefore, no backfill noted as of yet.
Keeping track of tons used though.

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/18/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
N/A				
No batch plant operation today.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/18/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 20 - 24 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
48+90	33.3	37.0	36.9	10.0	368.5	5.0	50+90	TOPOUT	TOPOUT
48+80	33.2	37.0	37.0	10.0	370.0	5.0	50+80	10.3	TOPOUT
48+70	33.0	37.0	37.0	10.0	370.0	5.0	50+70	11.5	TOPOUT
48+60	33.0	37.0	37.0	10.0	370.0	5.0	50+60	13.2	TOPOUT
							50+50	15.2	TOPOUT
							50+40	16.1	TOPOUT
							50+30	19.0	TOPOUT
							50+20	21.0	TOPOUT
							50+10	23.6	TOPOUT
							50+00	24.9	TOPOUT
							49+90	25.0	TOPOUT
							49+80	26.0	TOPOUT
							49+70	26.2	11.2
							49+60	26.5	14.7
							49+50	27.6	18.7
							49+40	28.5	22.0
							49+30	30.6	22.5
							49+20	32.8	24.6
							49+10	32.8	29.0
							49+00	32.8	33.0
							48+90	12.5	37.0
							48+80	12.4	37.0
							48+70	12.2	37.0
							48+60	12.0	37.0
				SF TODAY	1478.50				
				SF TO DATE	106914.50				

COMMENTS

NORTH TRENCH

Only worked until 12:00 today. Had to shut down due to temperature dropping below 20 degrees.

GEO-CON: Suzanne E Lepio OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/18/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 20 - 24 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
45+80	33.1	36.7	36.8	10.0	368.0	3.7	44+60	21.6	9.0
45+90	33.1	36.5	36.6	10.0	366.0	3.5	44+70	22.7	8.9
46+00	33.2	36.6	36.6	10.0	365.5	3.3	44+80	24.5	11.5
46+10	33.2	36.8	36.7	10.0	367.0	3.3	44+90	24.8	12.0
46+20	33.1	36.9	36.9	10.0	368.5	3.1	45+00	25.1	12.5
							45+10	25.2	12.9
							45+20	26.0	13.0
							45+30	26.8	13.2
							45+40	29.5	14.3
							45+50	31.6	15.0
							45+60	33.0	17.1
							45+70	33.2	17.4
							45+80		18.5
							45+90		20.1
							46+00		22.0
							46+10		24.4
							46+20		27.2

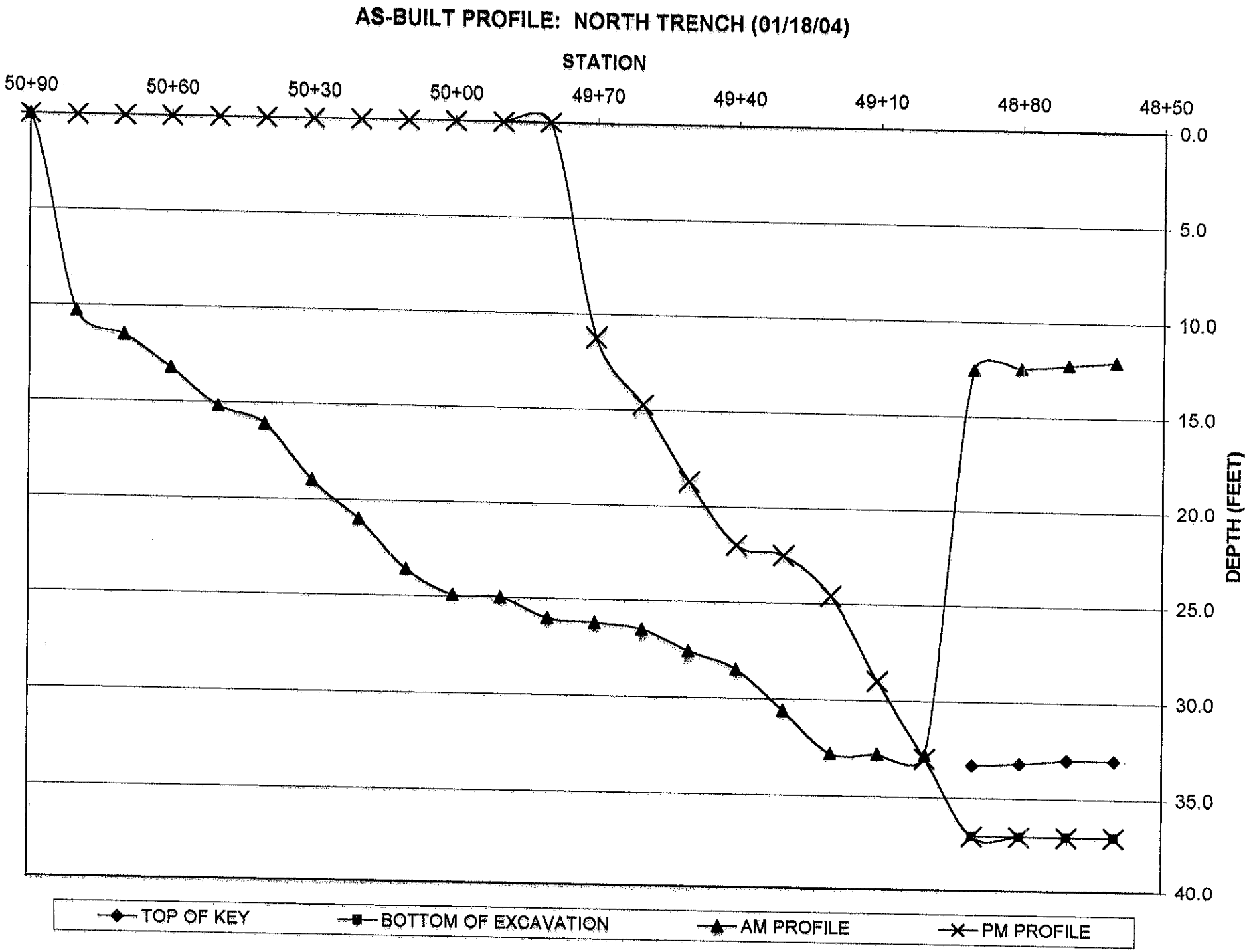
SF TODAY 1835.00

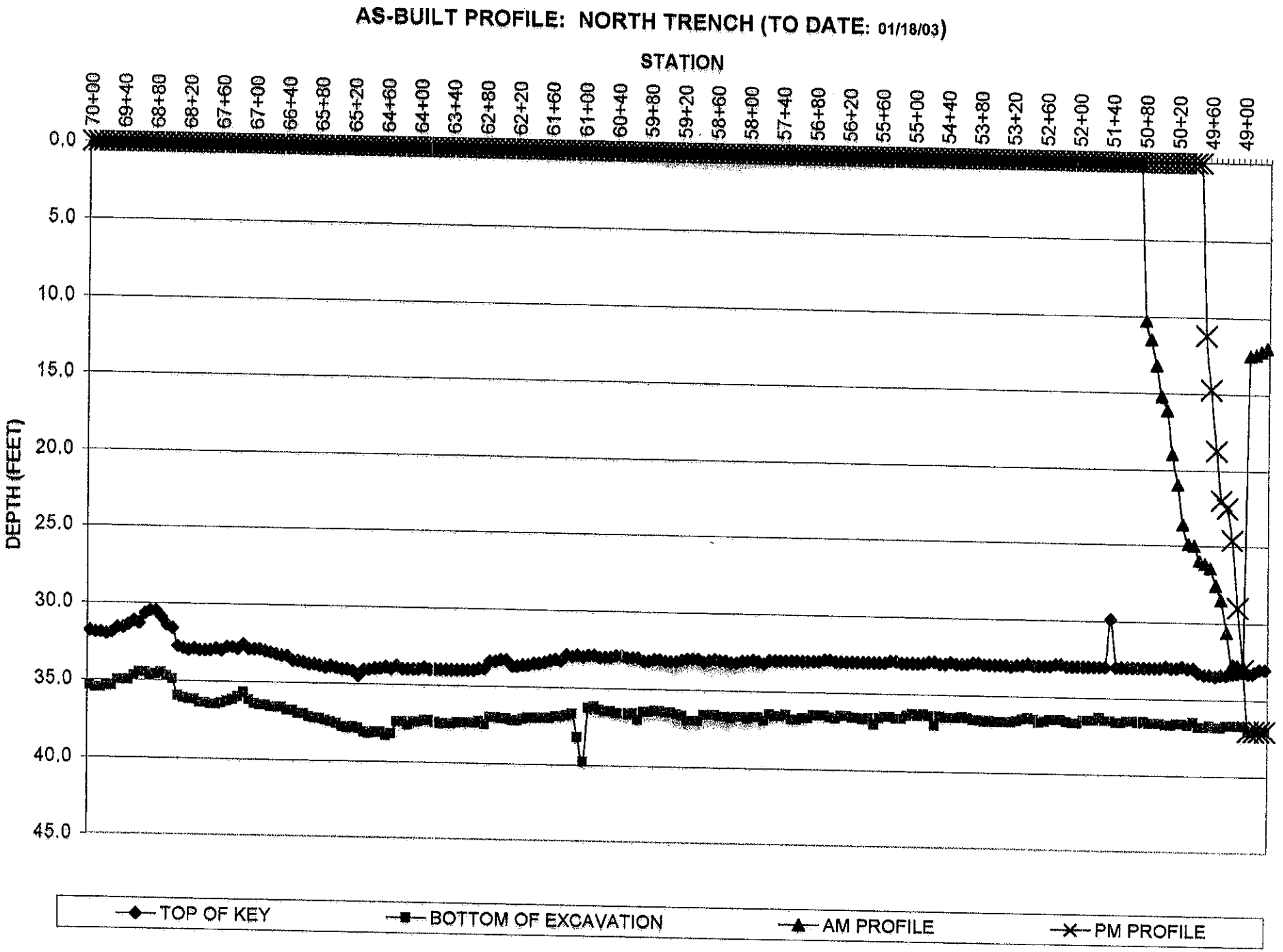
SF TO DATE 5872.00

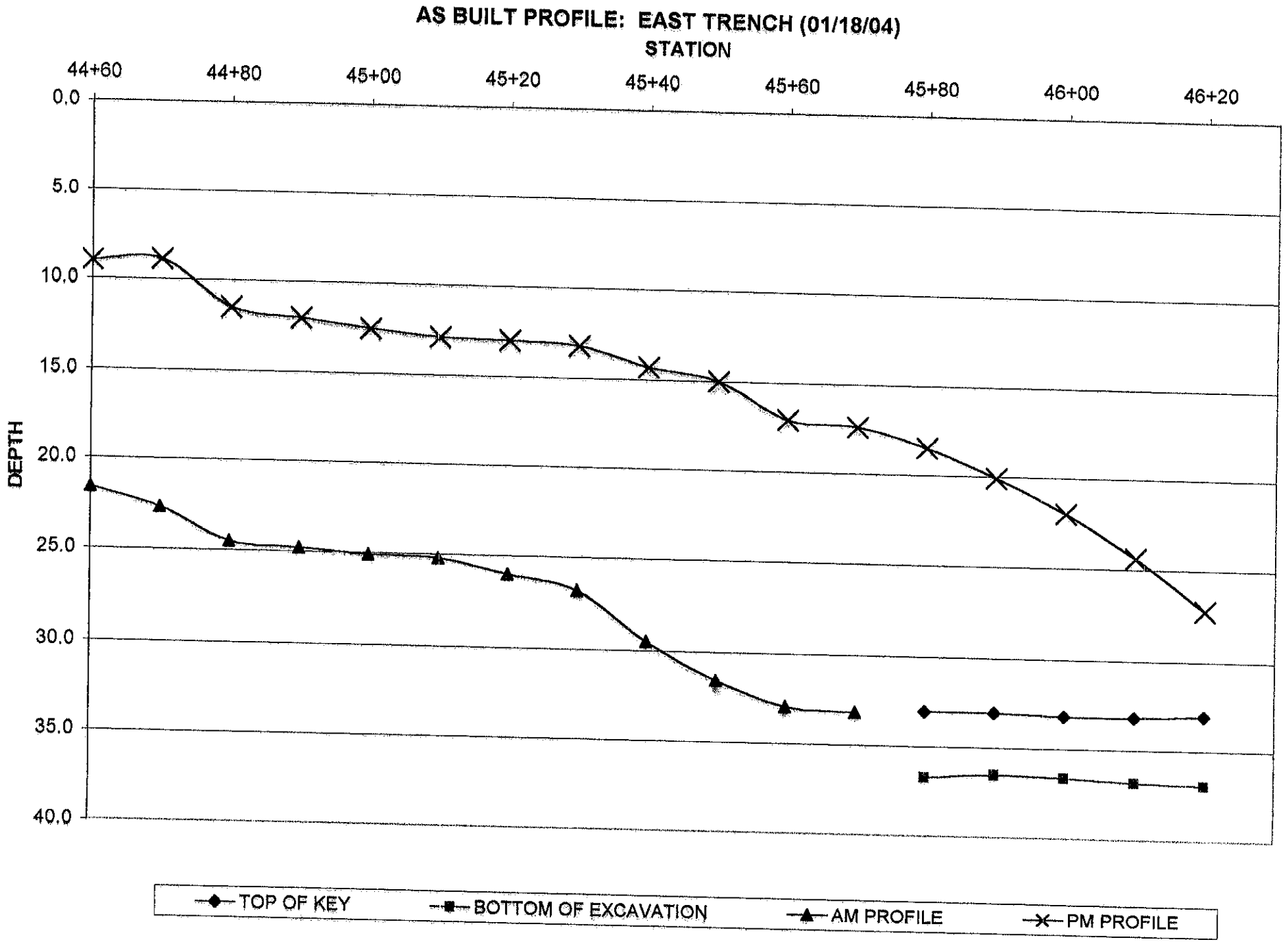
COMMENTS

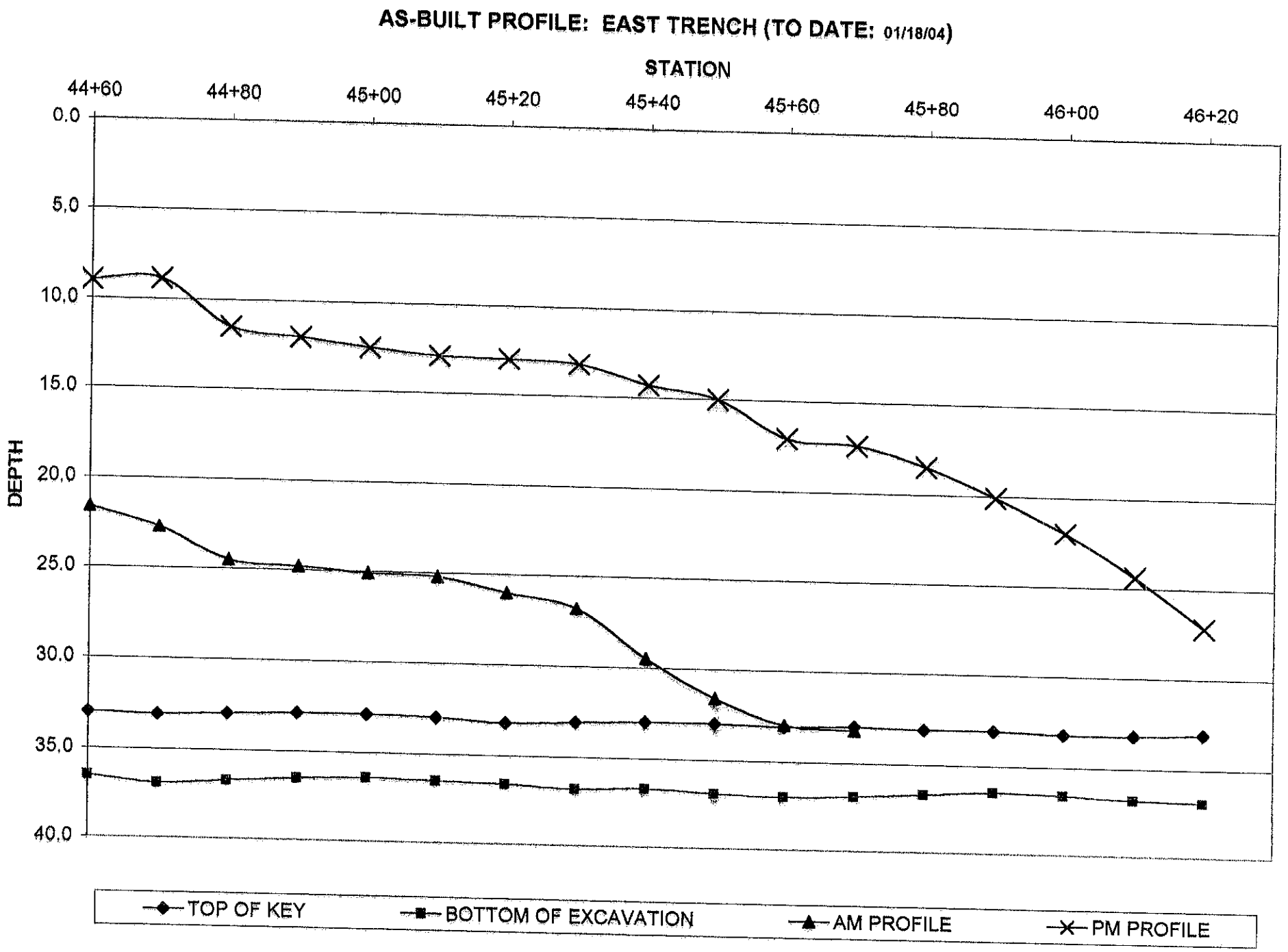
EAST Trench

GEO-CON: Suzanne E Sepic OWNER:


AS-BUILT PROFILE: NORTH TRENCH (01/18/04)
STATION
50+90
50+60
50+30
50+00
49+70
49+40
49+10
48+80
48+50
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NORTH TRENCH (TO DATE: 01/18/03)
STATION
70+00
69+40
68+80
68+20
67+60
67+00
66+40
65+80
65+20
64+60
64+00
63+40
62+80
62+20
61+60
61+00
60+40
59+80
59+20
58+60
58+00
57+40
56+80
56+20
55+60
55+00
54+40
53+80
53+20
52+60
52+00
51+40
50+80
50+20
49+60
49+00
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS BUILT PROFILE: EAST TRENCH (01/18/04)
STATION
44+60
44+80
45+00
45+20
45+40
45+60
45+80
46+00
46+20
DEPTH
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: EAST TRENCH (TO DATE: 01/18/04)
STATION
44+60
44+80
45+00
45+20
45+40
45+60
45+80
46+00
46+20
DEPTH
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DATE 01/18/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NO FRESH SLURRY MIXED TODAY

NORTH TRENCH

DID NOT MAKE ANY FRESH SLURRY TODAY.

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

*NO PM SAMPLE TODAY. SHUT DOWN AT 12:00 DUE TO COLD

M	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
50	48+80	2	68	40 - 90 sec	102	64 - 95 pcf	8	6.5 - 10	28	< 25 cm^3	1.5	34	MAX 30%
50	48+80	34	72	40 - 90 sec	103	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.4	35	MAX 30%

* M	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
0+75	2	2" to 6"	118	+15 pcf over trench slurry	8.94×10^{-8}	1.0×10^{-7} cm/sec
0+50	2	2" to 6"	118	+15 pcf over trench slurry	1.04×10^{-7}	1.0×10^{-7} cm/sec
0+25	2	2" to 6"	118.5	+15 pcf over trench slurry	9.63×10^{-8}	1.0×10^{-7} cm/sec
3+00	3	2" to 6"	120	+15 pcf over trench slurry	6.70×10^{-8}	1.0×10^{-7} cm/sec
9+75	3	2" to 6"	122.5	+15 pcf over trench slurry	1.04×10^{-7}	1.0×10^{-7} cm/sec
9+50	3	2"+06"	121.5	+15pcf over trenchslurry	8.82×10^{-8}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 50+75, 50+50, 50+25, 50+00, 49+75, 49+50

Technician: SM/MM ✓BY SES

Sample Area: A=$\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.0cm, 7.0cm, 7.0cm, 6.5cm, 6.5cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/conv. factor (1/14.65)
50+75	01/18/04	8:15-12:15	240	10	117.2305	605865.9809	–	13	8.94×10^{-8}	6.10×10^{-9}
50+50	01/18/04	8:15-12:15	240	10	100.4833	519313.7717	–	13	1.04×10^{-7}	7.10×10^{-9}
50+25	01/18/04	8:15-12:15	240	10	100.4833	519313.7717	–	12	9.63×10^{-8}	6.57×10^{-9}
50+00	01/18/04	9:00-13:00	240	10	108.2128	559261.0644	–	9	6.70×10^{-8}	4.57×10^{-9}
49+75	01/18/04	9:00-13:00	240	10	108.2128	559261.0644	–	14	1.04×10^{-7}	7.10×10^{-9}
49+50	01/18/04	9:00-13:00	240	10	100.4833	519313.7717	–	11	8.82×10^{-8}	6.02×10^{-9}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 01/18/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

Month Trend

same as

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

EAST TRENCH

BENTONITE SLURRY AT THE TRENCH

No PM SAMPLE. SHUT DOWN AT 12:00 DUE TO COLD.

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
6:30	45+80	2	75	40 - 90 sec	83	64 - 95 pcf	8	6.5 - 10	16	< 25 cm^3	.5	25	MAX 30%
6:30	45+80	34	76	40 - 90 sec	85	64 - 95 pcf	8	6.5 - 10	14	< 25 cm^3	.5	25	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%
—	—	—	—	40 - 90 sec	—	64 - 95 pcf	—	6.5 - 10	—	< 25 cm^3	—	—	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
44+60	2	2" to 6"	118.5	+15 pcf over trench slurry	1.38×10^{-7}	1.0×10^{-7} cm/sec
44+75	2	2" to 6"	116.5	+15 pcf over trench slurry	1.04×10^{-7}	1.0×10^{-7} cm/sec
45+00	2	2" to 6"	116	+15 pcf over trench slurry	8.94×10^{-8}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

EAST TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: 44+60, 44+75, 45+00 Technician: SM/MM ✓BY SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm² Sample Height: L= 6.0cm, 6.5cm, 6.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/conv. factor (1/14.65)
44+60	01/18/04	8:15-12:15	240	10	117.2305	605865.9809	—	20	1.38×10^{-7}	9.42×10^{-9}
44+75	01/18/04	8:15-12:15	240	10	108.2128	559261.0644	—	14	1.04×10^{-7}	7.10×10^{-9}
45+00	01/18/04	8:15-12:15	240	10	117.2305	605865.9809	—	13	8.94×10^{-8}	6.10×10^{-9}

I= $\frac{\text{P (psi)}}{\text{0.014217 L (cm)}}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

01/18/04

NORTH TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
48+90	587.5	587.5	33.3	554.2	37.0	550.5	5.0	1.9
48+80	587.5	587.7	33.2	554.5	37.0	550.7	5.0	1.9
48+70	587.5	587.0	33.0	554.0	37.0	550.0	5.0	1.9
48+60	587.5	587.3	33.0	554.3	37.0	550.3	5.0	1.9

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED ON A 1:1 5 SLOPE.

01/18/04

EAST TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
45+80	587.6	588.0	33.1	554.9	36.7	551.3	3.7	1.8
45+90	587.6	588.3	33.1	555.2	36.5	551.8	3.5	1.5
46+00	587.6	588.2	33.2	555.0	36.6	551.6	3.3	1.2
46+10	587.6	588.2	33.2	555.0	36.8	551.4	3.3	1.2
46+20	587.6	588.2	33.1	555.1	36.9	551.3	3.1	0.9

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED ON A 1:1.5 SLOPE.

Geo-Con

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)

Phone: (724) 366-9311 Airbill No: N/A

Date Shipped: 19-Jan-04 Carrier: DIRECT--LAB PICKUP

Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL PROJECT NO P01-048 P O.# 78406

Relinquished by: (Signature) Received By: Date / Time:

Relinquished by: (Signature) Received By: Date / Time:

Relinquished by: (Signature) Received at lab by: Date / Time:

Relinquished from lab by: (Signature) Received By: Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-081 (NW48+60)	SOIL ONLY	48+60	01/18/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
BF-082 (E46+00)	SOIL ONLY	46+00	01/18/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-095 (NW50+00)	SB BACKFILL**	50+00	01/18/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-096 (E44+60)	SB BACKFILL**	44+60	01/18/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

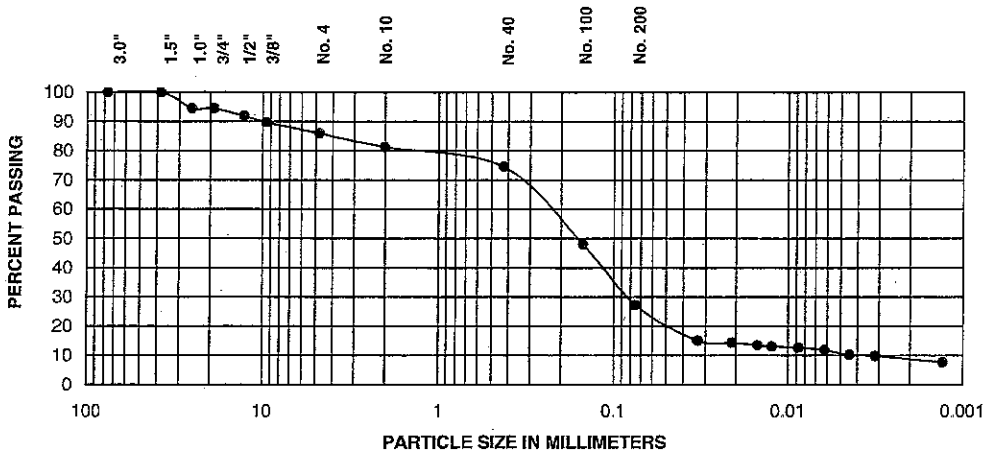
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-095 (NW 50+00)	**Date Tested**	1/25/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/19/2004
Sample Location	50+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	14.1	58.7	16.3	11.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	94.5
3/4"	94.5
1/2"	91.9
3/8"	89.7
No. 4	85.9
No. 10	81.3
No. 40	74.5
No. 100	48.0
No. 200	27.3

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
28	19	9

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

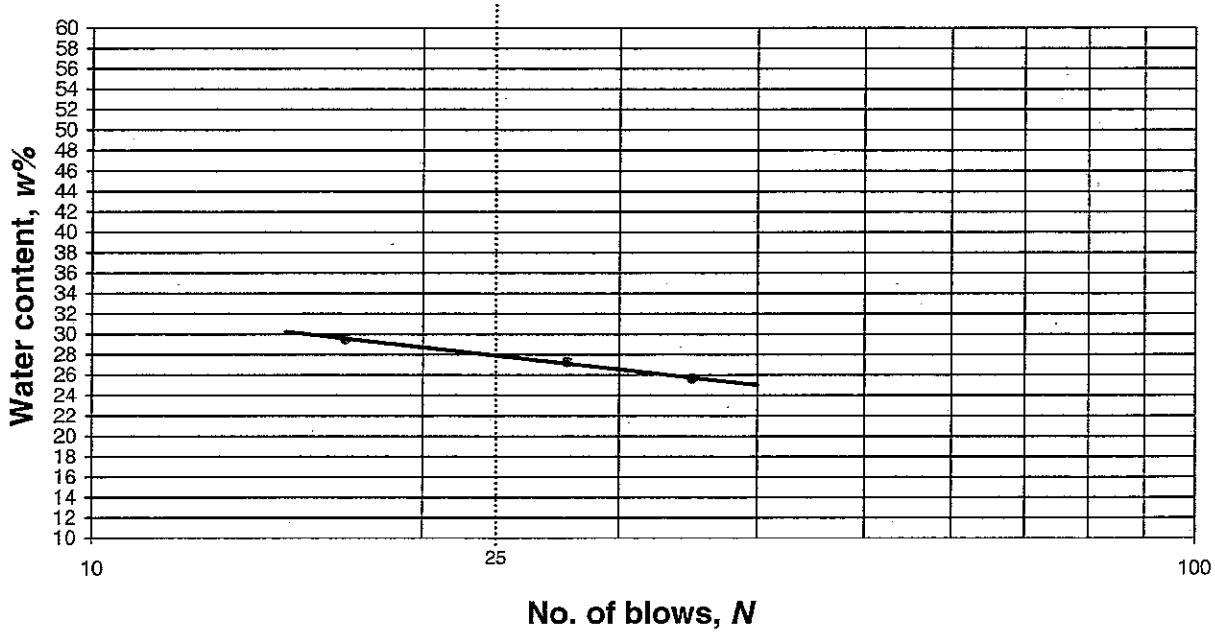
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-095 (NW 50+00)	**Date Tested**	1/22/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/19/2004
Sample Location	50+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	28	**Plastic Limit, PL**	19	**Plasticity Index, PI**	9

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/26/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-095 (NW 50+00)	Date Recd.	1/19/04	**Location**	50+00 (NW)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.53	cm	Volume, V:	225.2	cu cm
Mass of Sample:	400.2	g	**Moisture Content:**	**31.6**	%
			Wet Density	**110.9**	**pcf**
			Dry Density	**84.3**	**pcf**

Final

Diameter:	6.92	cm	Area, A:	37.6	sq cm
Height, L:	4.84	cm	Volume, V:	182.0	cu cm
Mass of Sample:	372.10	g	**Moisture Content:**	**24.5**	%
			Wet Density	**127.6**	**pcf**
			Dry Density	**102.5**	**pcf**
			Deg of Saturation	**99.8**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	22.9	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/26/2004	9:00 AM	0	0	3.06	5.88		20.0	---
1/26/2004	9:45 AM	2700	2700	3.16	5.76	0.8	20.0	4.14E-08
1/26/2004	10:45 AM	3600	6300	3.27	5.63	0.8	20.0	3.41E-08
1/26/2004	11:45 AM	3600	9900	3.44	5.49	1.2	20.0	3.72E-08
1/26/2004	12:45 PM	3600	13500	3.59	5.36	1.2	20.0	3.50E-08

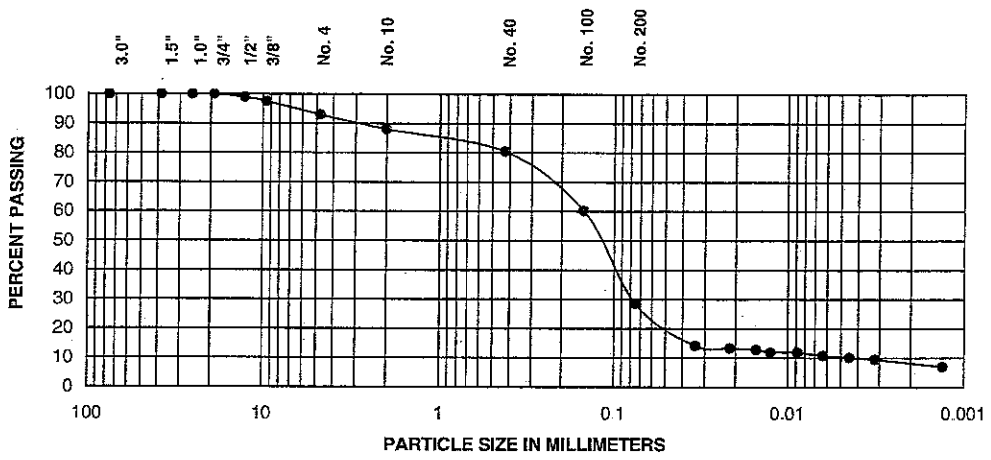
Average Permeability = **3.7E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-096 (E 44+60)	**Date Tested**	1/25/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/19/2004
Sample Location	44+60 (E)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	7.0	64.5	18.0	10.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	100.0
1/2"	99.0
3/8"	97.5
No. 4	93.0
No. 10	88.1
No. 40	80.4
No. 100	60.3
No. 200	28.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
24	18	6

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

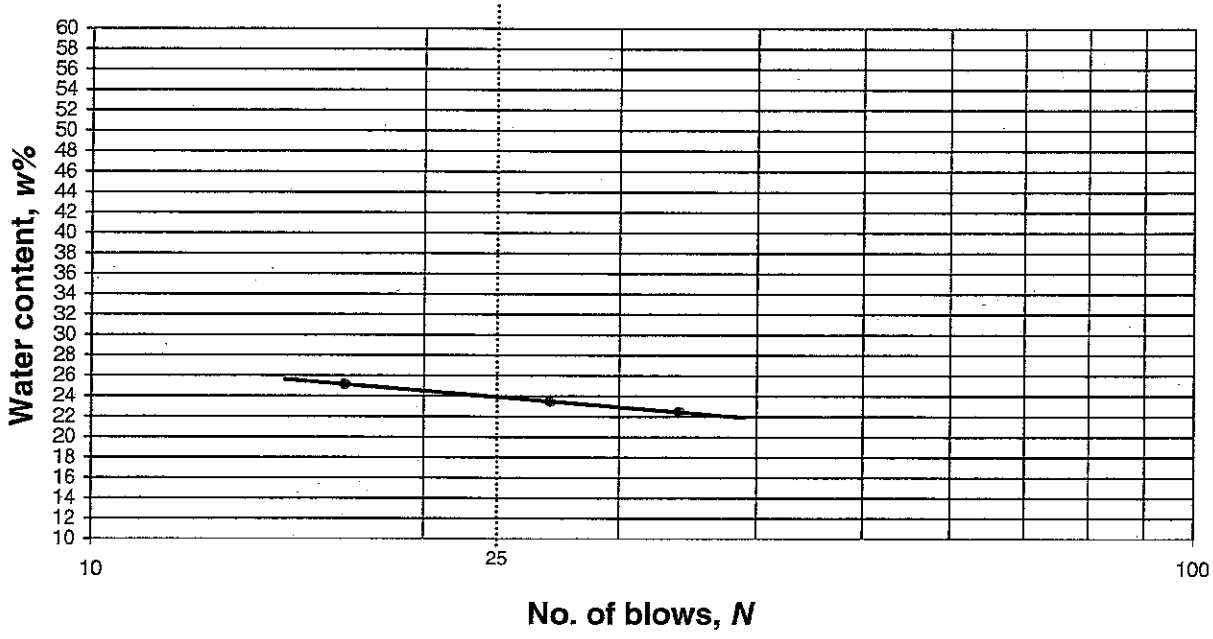
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-096 (E 44+60)	**Date Tested**	1/22/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/19/2004
Sample Location	44+60 (E)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	24	**Plastic Limit, PL**	18	**Plasticity Index, PI**	6

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing							
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic							
File #	2746	**Date Tested**		1/26/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-096 (E 44+60)	Date Recd.	1/19/04	**Location**	44+60 (E)			
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)							

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.62	cm	Volume, V:	269.5	cu cm
Mass of Sample:	527.5	g	**Moisture Content:**	**23.5**	%
			Wet Density	**122.1**	**pcf**
			Dry Density	**98.9**	**pcf**

Final

Diameter:	6.94	cm	Area, A:	37.8	sq cm
Height, L:	6.17	cm	Volume, V:	233.4	cu cm
Mass of Sample:	501.77	g	**Moisture Content:**	**18.6**	%
			Wet Density	**134.2**	**pcf**
			Dry Density	**113.1**	**pcf**
			Deg of Saturation	**98.9**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	19.1	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/26/2004	9:00 AM	0	0	3.02	5.84		20.0	---
1/26/2004	9:45 AM	2700	2700	3.16	5.68	0.9	20.0	6.63E-08
1/26/2004	10:45 AM	3600	6300	3.36	5.49	1.1	20.0	6.00E-08
1/26/2004	11:45 AM	3600	9900	3.55	5.29	0.9	20.0	6.44E-08
1/26/2004	12:45 PM	3600	13500	3.73	5.11	1.0	20.0	5.91E-08

Average Permeability = **6.2E-08** **cm/sec**

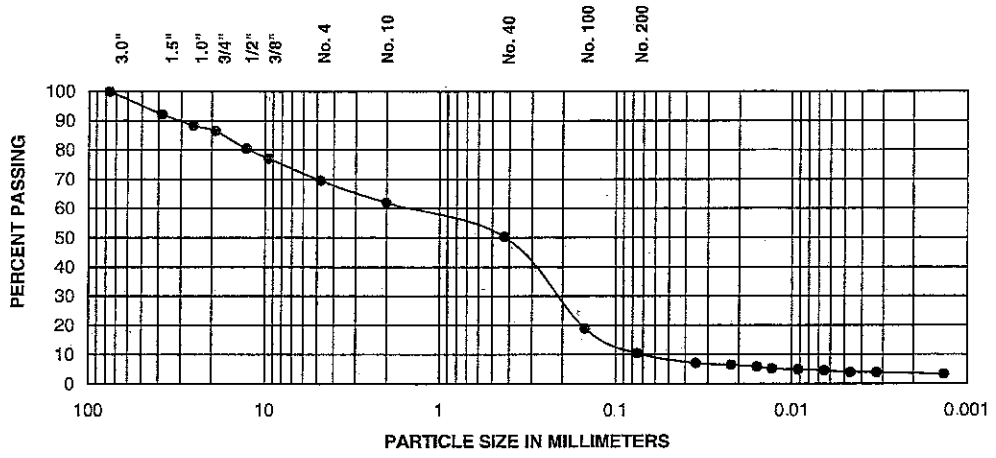
Remarks:

Quality, Service & Commitment

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-081 (NW 48+60)	**Date Tested**	1/21/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/19/2004
Sample Location	48+60 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	30.5	59.1	6.3	4.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	1.55	0.22	0.07	22.9	0.45

Sieve Size	Percent Passing
3.0"	100.0
1.5"	92.2
1.0"	88.4
3/4"	86.4
1/2"	80.4
3/8"	77.1
No. 4	69.5
No. 10	61.9
No. 40	50.3
No. 100	18.9
No. 200	10.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

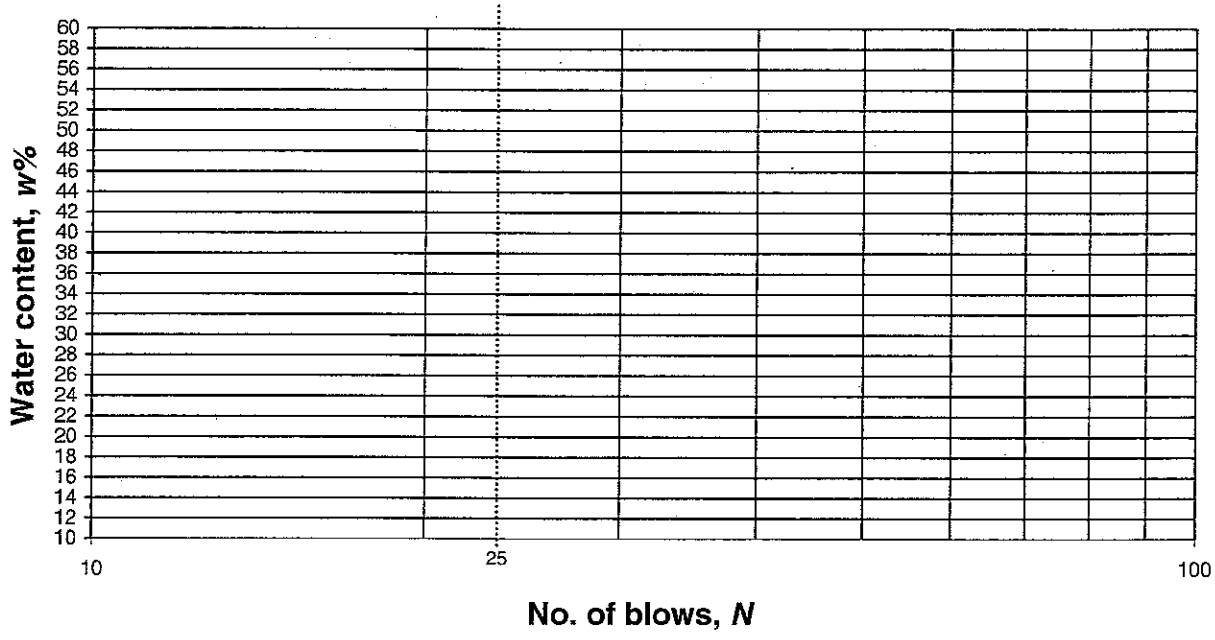
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-081 (NW 48+60)	**Date Tested**	1/20/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/19/2004
Sample Location	48+60 (NW)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	27	Date	1/19/2003	Sheet	1
				Date of weighing	1/20/2003	Tested by	MA

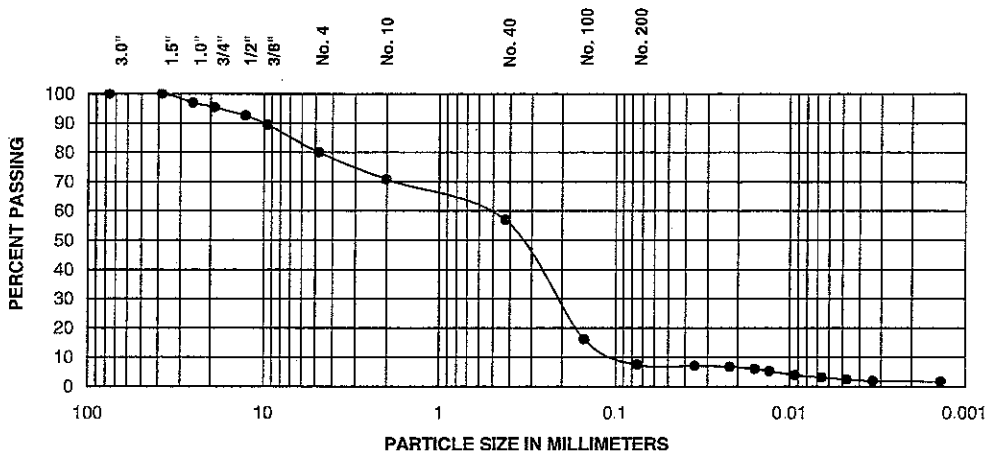
Boring No.	-	-	-	-	-	-
Sample No.	BF-076 (NW50+00)	BF-077(SE43+00)	BF-078 (E45+00)	BF-079(NW49+00)	BF-080(E45+50)	BF-081(NW48+60)
Location	50 + 00 (NW)	43 + 00 (SE)	45 + 00 (E)	49 + 00 (NW)	45 + 50 (E)	48 + 60 (NW)
Tin No.	73A	61A	36C	97A	63A	56A
Tin + Wet Soil	207.23	188.31	175.31	170.18	165.93	194.29
Tin + Dry Soil	181.2	164.86	163.96	152.92	146.9	177.59
Wt. of Tin	30.04	30.66	31.37	30.54	30.65	30.26
Wt. of Dry Soil	151.2	134.2	132.6	122.4	116.3	147.3
Wt. of Water	26.0	23.5	11.4	17.3	19.0	16.7
Moisture, %	17.2	17.5	8.6	14.1	16.4	11.3
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-082 (E46+00)					
Location	46 + 00 (E)					
Tin No.	71C					
Tin + Wet Soil	206.68					
Tin + Dry Soil	189.71					
Wt. of Tin	31.38					
Wt. of Dry Soil	158.3					
Wt. of Water	17.0					
Moisture, %	10.7					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

	Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**GRAIN SIZE ANALYSIS (ASTM D422)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-082 (E 46+00)	**Date Tested**	1/20/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/19/2004
Sample Location	46+00 (E)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	20.0	72.5	5.0	2.5

	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
For coarse-grained soils with <12% Fines	0.60	0.21	0.09	6.5	0.83

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.0
3/4"	95.4
1/2"	92.6
3/8"	89.4
No. 4	80.0
No. 10	70.8
No. 40	56.9
No. 100	16.1
No. 200	7.5

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

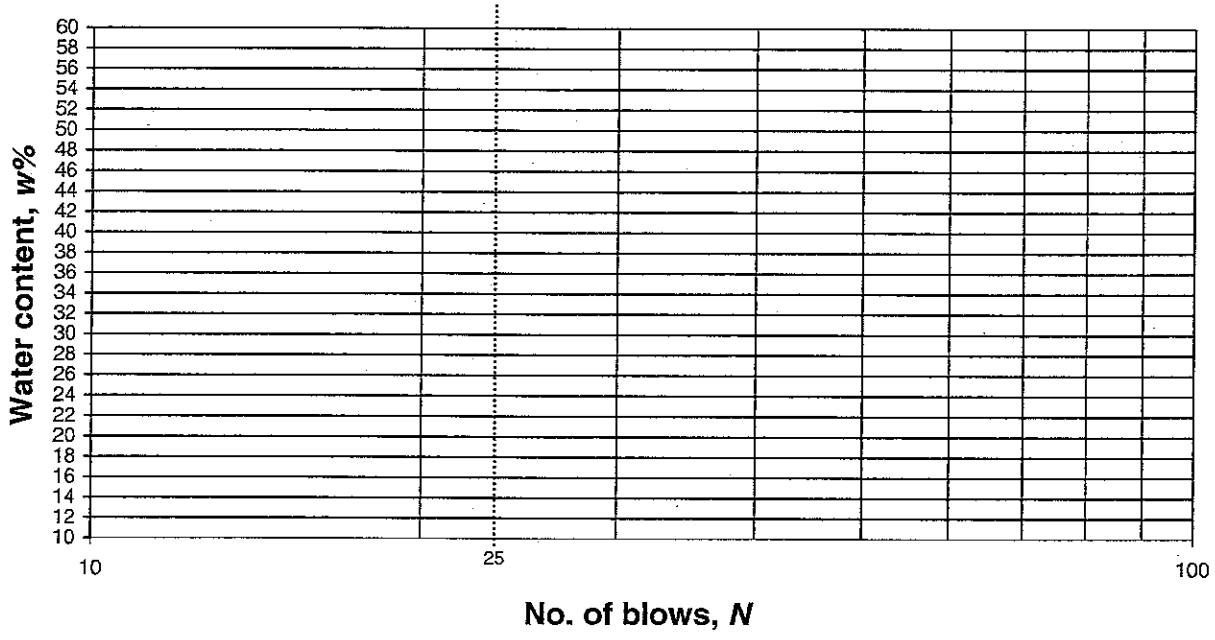
NP·Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-082 (E 46+00)	**Date Tested**	1/20/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/19/2004
Sample Location	46+00 (E)
Sample Description	Gray poorly graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP:Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	27	Date	1/19/2003	Sheet	1
				Date of weighing	1/20/2003	Tested by	MA

Boring No.	-	-	-	-	-	-
Sample No.	BF-076 (NW50+00)	BF-077(SE43+00)	BF-078 (E45+00)	BF-079(NW49+00)	BF-080(E45+50)	BF-081(NW48+60)
Location	50 + 00 (NW)	43 + 00 (SE)	45 + 00 (E)	49 + 00 (NW)	45 + 50 (E)	48 + 60 (NW)
Tin No.	73A	61A	36C	97A	63A	56A
Tin + Wet Soil	207.23	188.31	175.31	170.18	165.93	194.29
Tin + Dry Soil	181.2	164.86	163.96	152.92	146.9	177.59
Wt. of Tin	30.04	30.66	31.37	30.54	30.65	30.26
Wt. of Dry Soil	151.2	134.2	132.6	122.4	116.3	147.3
Wt. of Water	26.0	23.5	11.4	17.3	19.0	16.7
Moisture, %	17.2	17.5	8.6	14.1	16.4	11.3
Penetrometer	-	-	-	-	-	-
Qu (tsf)	-	-	-	-	-	-
Remarks						
Description of soil:						

Boring No.	-					
Sample No.	BF-082 (E46+00)					
Location	46 + 00 (E)					
Tin No.	71C					
Tin + Wet Soil	206.68					
Tin + Dry Soil	189.71					
Wt. of Tin	31.38					
Wt. of Dry Soil	158.3					
Wt. of Water	17.0					
Moisture, %	10.7					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date:	01/18/04	Job Number:	P01-048
Weather:	Partly Cloudy 60-24 degrees	Job Name:	Indiana Harbor

Trench Topped Out Sta. 50+90 to 49+80 = 110 L.F.

Length:	110	x Depth[1]:	35.6' (avg)	=Square Feet	3916
Square feet:	3916	x Width:	2.5	=Total Cubic Feet[3]	9790
Cubic feet[3]:	10241	x Dry Unit Weight:	85 (870485)	/2000=	435.24 Tons of Soil
Tons of Soil:	435.24	x 0.70 (minus excess trench spoils of 30%)	=	Unit Addition Rate	304.67 Tons of Soil
Unit Rate:	304.67	x Specified Rate:	6%	=Bentonite Required	18.28 Tons of Bentonite Required between these Stations to top out the trench.

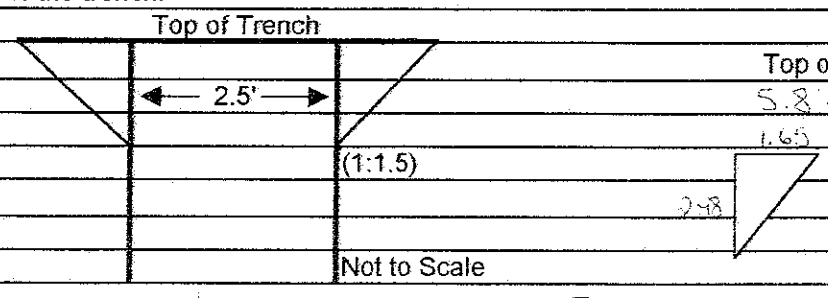
Via Mixer	=	11.00 (3.61 L)	Tons of Bentonite
Via Backfill	=	22.00 (7.22 L)	Tons of Bentonite
Total Tons of Bentonite Used	=	33.00 (10.83 L)	

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 5.8'

5.8' - 2.5' = 3.3' → 1.65 overage on each side

A = 1/2 b h = 1/2 (1.65)(2.48) = 2.05 SF

[3] CF = SF * L * 2 sides = 451 CF

Note: Add to CF above

GEO-CON Suzanne C. Sepic
Signature/Date

OWNER:
Signature/Date

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/18/04 Job Number: P01-048
Weather: Partly Cloudy 20-24 degrees Job Name: Indiana Harbor

Trench Topped Out Sta. _____ to _____ = _____ L.F.

Length: _____ x Depth[1]: _____ =Square Feet _____

Square feet: _____ x Width: 2.5 =Total Cubic Feet[3] _____

Cubic feet[3]: _____ x Dry Unit Weight: 85 /2000= _____ Tons of Soil

Tons of Soil: _____ x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate _____ Tons of Soil

Unit Rate: _____ x Specified Rate: 6% =Bentonite Required _____ Tons of Bentonite Required between these Stations to top out the trench

Via Mixer = _____ Tons of Bentonite

Via Backfill = _____ Tons of Bentonite

Total Tons of Bentonite Used = _____

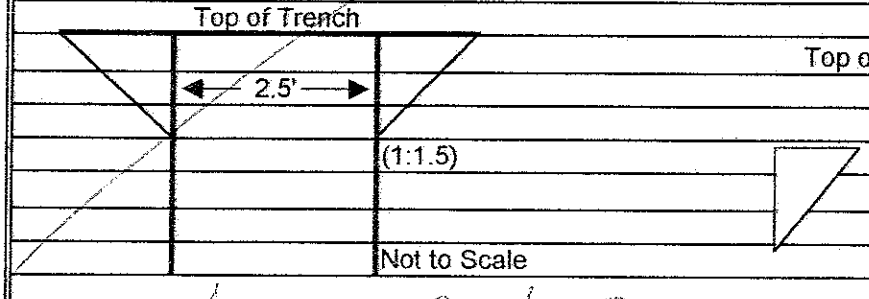
N/A. No TRENCH TOPOUT TODAY

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] =

A = 1/2 b h = 1/2

[3] CF = SF * L * 2 sides =

Note: Add to CF above

GEO-CON Suzanne E Lopo OWNER _____
Signature/Date Signature/Date

GP-101

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 1/14/2004

SOLD TO:	SHIP TO:
GEO-CON INC. 4079 MONROEVILLE BLVD CORPORATE I BUILDING SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: 3E7V004134	GEO-CON E. CHICAGO IN 46312

SHIPPING DATE:	BAXCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-14-04	MOELLER 846	GREYBULL	GEL

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	43
Plastic Viscosity (cP)	N/A	
Yield Point (#/ 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.0
> 75 micron (wt. %)	4.0 max.	1.4

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	7.8
Y.P. / P.V. Ratio	3.0 max.	1.15

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-281-756-4464.

Signed 1/15/04 Date

Approved by: Plant Manager

LaboratoryCertdoc (4/25/97)
Rev E (5/99)

Arrived onsite 01/18/04
4000# JumboBAGS

GEO-CON

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/21/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 21 - 41 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
N/A						

NORTH TRENCH

COMMENTS: Water line/hydrant connection broke today. Had to mix slurry most of the day by batch mixing with water trucks. This made it hard to keep the slurry level up in the trench. Most of the fresh slurry was pumped to the East trench where the CAT 375 was excavating. Therefore, no slurry sample.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A	No sample collected today. Only 1 10' section excavated.			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
49+75	3.00	N/A	N/A	N/A	1.20×10^{-7}	N/A
49+50	3.00	Sample collected	Sample collected	Sample collected	1.34×10^{-7}	yes
49+25	3.00	N/A	N/A	N/A	1.23×10^{-7}	N/A
49+00	3.00	N/A	N/A	N/A	1.51×10^{-7}	N/A

COMMENTS

Filter cake: N/A

Unit Weight: 49+75: 116.5 pcf
49+50: 119.0 pcf
49+25: 120.5 pcf
49+00: 119.0 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY	12.00	6%
TO DATE	546.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Seol OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/21/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 21 - 41 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
46+30	2.00	78.00	12.00	25.00	44.00	8
46+30	35.00	93.00	28.00	25.00	59.00	8
47+00	2.00	90.00	24.00	61.00	63.00	8
47+00	35.00	95.00	28.00	74.00	83.00	8

EAST TRENCH

COMMENTS: Water line/hydrant connection broke today. Had to mix slurry most of the day by batch mixing with water trucks. This made it hard to keep the slurry level up in the trench. Most of the fresh slurry was pumped to the East trench where the CAT 375 was excavating.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
47+00	LAB SAMPLE COLLECTED 01/21/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
44+75	2.00	N/A	N/A	N/A	9.68×10^{-8}	N/A
45+00	2.00	Sample collected	Sample collected	Sample collected	1.05×10^{-7}	yes
45+25	2.00	N/A	N/A	N/A	7.11×10^{-8}	N/A
45+50	2.00	N/A	N/A	N/A	8.63×10^{-8}	N/A

COMMENTS

Filter cake: .4mm, .7mm, 2.3mm and 5.0mm respectively.

Unit Weight: 44+75: 114.0 pcf
45+00: 118.0 pcf
45+25: 117.0 pcf
45+50: 119.5 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY	14.00	6%
TO DATE	14.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Marianne C Lepio **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/21/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
9:12	65.00	48.00	15.00	8
10:40	-	46.00	-	-
13:55	65.00	54.00	19.00	8
15:10	-	55.00	-	-
Filter cake was .2mm and .3 mm respectively.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/21/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 21 - 41 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
48+50	33.1	36.7	36.9	10.0	368.5	5.0	49+90	TOPOUT	TOPOUT
							49+80	6.9	TOPOUT
							49+70	11.3	TOPOUT
							49+60	15.0	TOPOUT
							49+50	19.1	TOPOUT
							49+40	22.7	TOPOUT
							49+30	23.1	12.7
							49+20	25.0	16.8
							49+10	28.5	19.2
							49+00	31.3	22.6
							48+90	35.7	28.0
							48+80	35.9	35.0
							48+70	36.6	36.7
							48+60	36.6	36.6
							48+50		36.7
							48+40		27.0
				SF TODAY	368.50				
				SF TO DATE	107283.00				

COMMENTS

NORTH TRENCH

AM profile top out moved back approximately 5' (slid down the slope overnight).

GEO-CON: [illegible] OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/21/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly cloudy; 21 - 41 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
46+30	33.1	37.0	37.0	10.0	369.5	3.2	44+60	9.0	TOPOUT
46+40	33.0	37.1	37.1	10.0	370.5	3.2	44+70	9.0	TOPOUT
46+50	33.1	36.9	37.0	10.0	370.0	3.1	44+80	11.6	TOPOUT
46+60	33.2	37.1	37.0	10.0	370.0	3.0	44+90	11.8	TOPOUT
46+70	33.2	36.9	37.0	10.0	370.0	3.1	45+00	12.0	TOPOUT
46+80	33.1	36.9	36.9	10.0	369.0	3.2	45+10	12.5	TOPOUT
46+90	33.1	37.1	37.0	10.0	370.0	3.3	45+20	13.2	TOPOUT
47+00	33.0	37.2	37.2	10.0	371.5	3.2	45+30	13.6	TOPOUT
47+10	33.1	36.6	36.9	10.0	369.0	3.3	45+40	14.7	9.8
47+20	33.1	36.6	36.6	10.0	366.0	3.2	45+50	15.2	12.0
47+30	33.0	36.7	36.7	10.0	366.5	3.2	45+60	18.3	14.0
							45+70	18.7	14.6
							45+80	19.5	14.7
							45+90	20.8	19.5
							46+00	21.8	21.6
							46+10	24.3	24.2
							46+20	27.4	27.7
							46+30		28.5
							46+40		28.5
							46+50		29.0
							46+60		29.4
							46+70		29.7
							46+80		33.0
							46+90		33.6
							47+00		34.3
							47+10		34.9
							47+20		36.6
							47+30		36.7

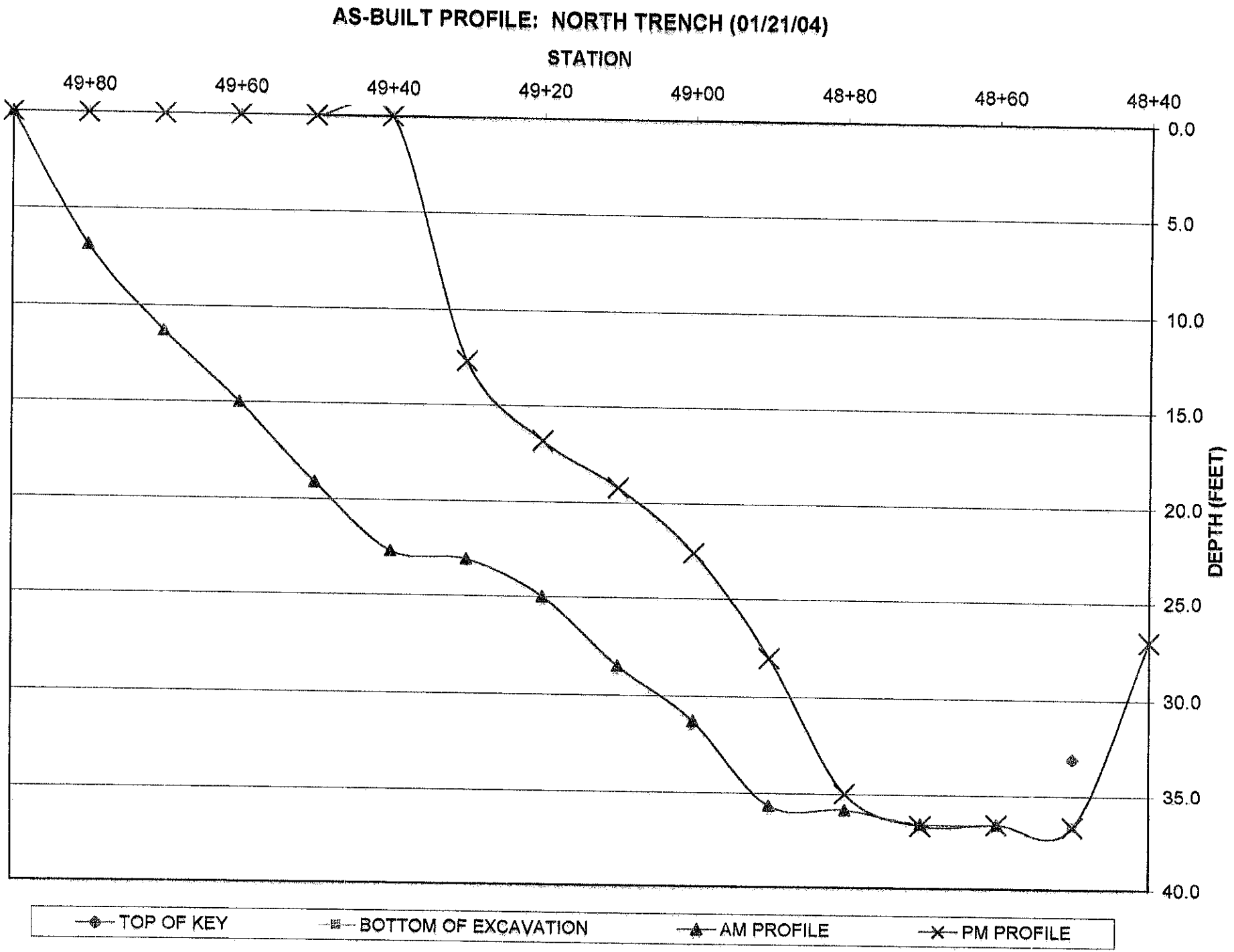
SF TODAY 4062.00

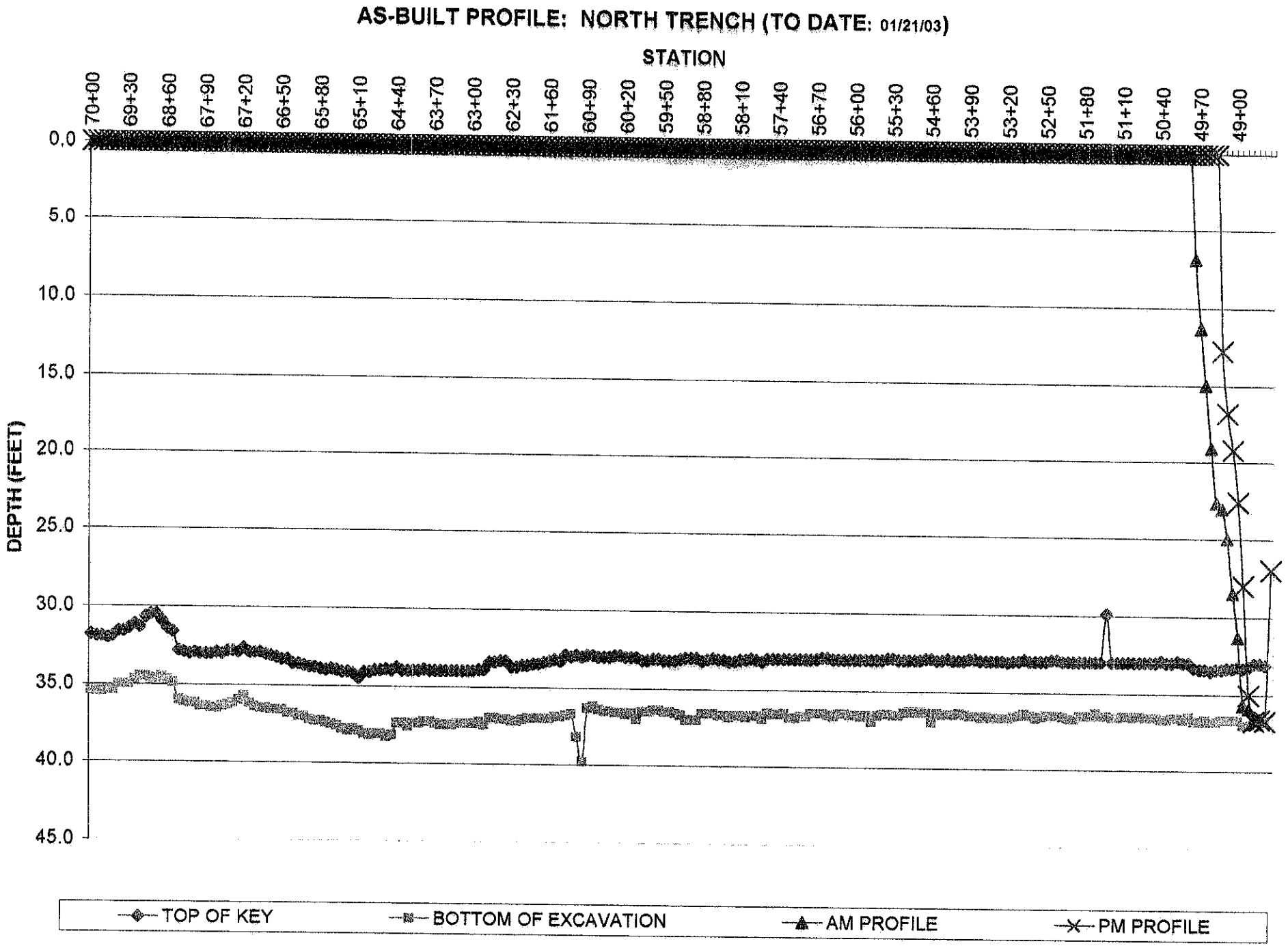
SF TO DATE 9934.00

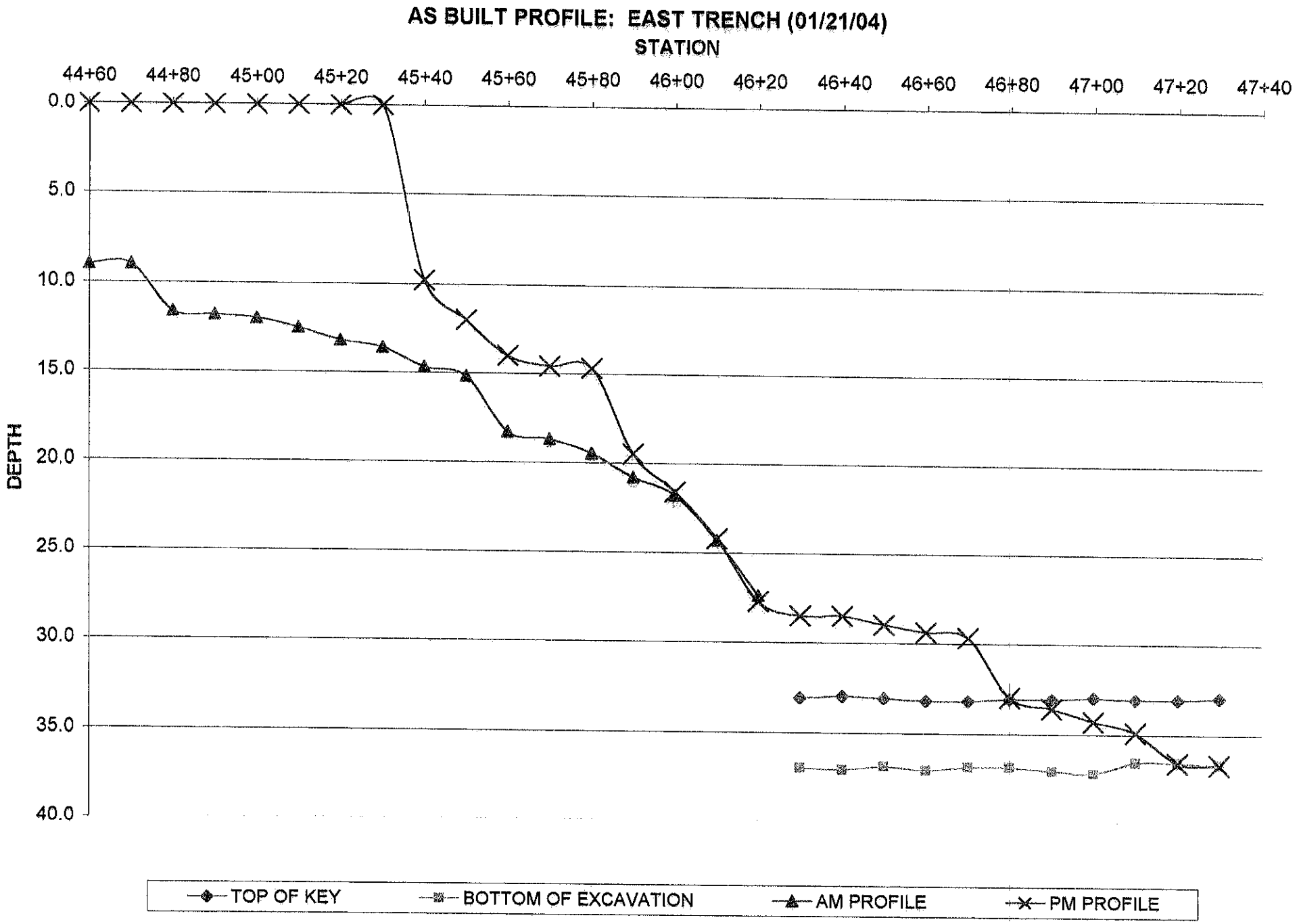
COMMENTS

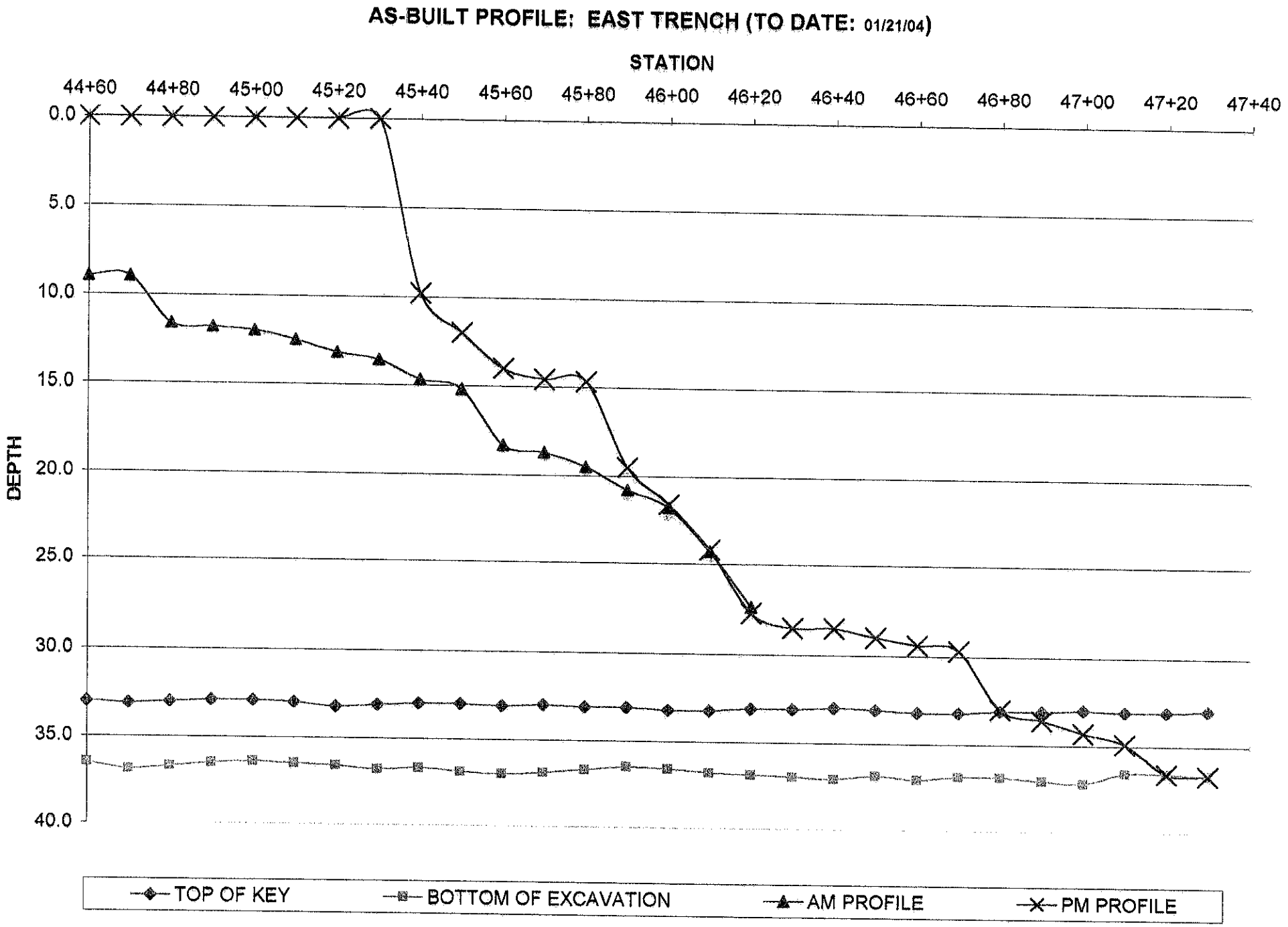
EAST Trench

GEO-CON: Suzanne C Sepe OWNER:


AS-BUILT PROFILE: NORTH TRENCH (01/21/04)
STATION
49+80
49+60
49+40
49+20
49+00
48+80
48+60
48+40
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: NORTH TRENCH (TO DATE: 01/21/03)
STATION
70+00
69+30
68+60
67+90
67+20
66+50
65+80
65+10
64+40
63+70
63+00
62+30
61+60
60+90
60+20
59+50
58+80
58+10
57+40
56+70
56+00
55+30
54+60
53+90
53+20
52+50
51+80
51+10
50+40
49+70
49+00
DEPTH (FEET)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS BUILT PROFILE: EAST TRENCH (01/21/04)
STATION
44+60
44+80
45+00
45+20
45+40
45+60
45+80
46+00
46+20
46+40
46+60
46+80
47+00
47+20
47+40
DEPTH
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: EAST TRENCH (TO DATE: 01/21/04)
STATION
44+60
44+80
45+00
45+20
45+40
45+60
45+80
46+00
46+20
46+40
46+60
46+80
47+00
47+20
47+40
DEPTH
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/21/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	9:12	48	> 40 sec	65	> 64 pcf	8	6.5 - 10	15	< 20 cm^3	.2
PM	13:55	54	> 40 sec	65	> 64 pcf		6.5 - 10	19	< 20 cm^3	.3

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:40	46	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	15:10	55	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

NORTH TRENCH

*WATER LINE/HYDRANT CONNECTION BROKE TODAY. HAD TO MIX SLURRY MOST OF THE DAY BY BATCH MIXING WITH WATER TRUCKS. THIS MADE IT HARD TO KEEP THE SLURRY LEVEL UP. MOST OF THE FRESH SLURRY WAS PUMPED TO THE EAST TRENCH (WHERE THE CAT 375 WAS EXCAVATING). THEREFORE NO SAMPLE WAS TAKEN FROM THE NORTH TRENCH.

BENTONITE SLURRY AT THE TRENCH

*MINIMAL EXCAVATION (1-10' CUT) IN NORTH TRENCH TODAY

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
49+75	3	2" to 6"	116.5	+15 pcf over trench slurry	1.20×10^{-7}	1.0×10^{-7} cm/sec
49+50	3	2" to 6"	119	+15 pcf over trench slurry	1.34×10^{-7}	1.0×10^{-7} cm/sec
49+25	3	2" to 6"	120.5	+15 pcf over trench slurry	1.23×10^{-7}	1.0×10^{-7} cm/sec
49+00	3	2" to 6"	119	+15 pcf over trench slurry	1.51×10^{-7}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 49+75, 49+50, 49+25, 49+00

Technician: SM/MM ✓BY JES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 7.0cm, 7.0cm, 6.5cm, 6.5cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{I}{X}$ (cm/sec)	[illegible] (1/min)
49+75	01/21/04	17:45-5:45	720	10	100.4833	519313.7717	—	45	1.20×10^{-7}	8.19×10^{-8}
49+50	01/21/04	17:45-5:45	720	10	100.4833	519313.7717	—	50	1.34×10^{-7}	9.15×10^{-8}
49+25	01/21/04	17:45-5:45	720	10	108.2128	559261.0644	—	49.5	1.23×10^{-7}	8.40×10^{-8}
49+00	01/21/04	17:45-5:45	720	10	108.2128	559261.0644	—	61	1.51×10^{-7}	1.0×10^{-7}

I= $\frac{P\ (psi)}{0.014217\ L\ (cm)}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

DAILY QC TESTS

DATE 01/21/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

EAST TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:17	46+30	2	44	40 - 90 sec	78	64 - 95 pcf	8	6.5 - 10	25	< 25 cm^3	.4	12	MAX 30%
7:17	46+30	35	59	40 - 90 sec	93	64 - 95 pcf	8	6.5 - 10	25	< 25 cm^3	.7	28	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
14:45	47+00	2	63	40 - 90 sec	90	64 - 95 pcf	8	6.5 - 10	61	< 25 cm^3	23	24	MAX 30%
14:15	47+00	35	83	40 - 90 sec	95	64 - 95 pcf	8	6.5 - 10	74	< 25 cm^3	5.0	28	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
44+75	2	2" to 6"	114	+15 pcf over trench slurry	9.68×10^{-8}	1.0×10^{-7} cm/sec
45+00	2	2" to 6"	118	+15 pcf over trench slurry	1.05×10^{-7}	1.0×10^{-7} cm/sec
45+25	2	2" to 6"	117	+15 pcf over trench slurry	7.11×10^{-8}	1.0×10^{-7} cm/sec
45+50	2	2" to 6"	119.5	+15 pcf over trench slurry	9.63×10^{-8}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

EAST TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 44+75, 45+00, 45+25, 45+50

Technician: SM/MM ✓BY SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.5cm, 6.0cm, 6.0cm, 6.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)	w/cm [illegible] 1/14 [illegible]
44+75	01/21/04	17:45-5:45	720	10	108.2128	5592610644	—	39	9.68×10^{-8}	6.6[illegible]
45+00	01/21/04	17:45-5:45	720	10	117.2305	6058659809	—	46	1.05×10^{-7}	7.17 [illegible]
45+25	01/21/04	17:45-5:45	720	10	117.2305	6058659809	—	31	7.11×10^{-8}	4.8[illegible]
45+50	01/21/04	17:45-5:45	720	10	117.2305	6058659809	—	42	9.63×10^{-8}	6.5[illegible]

I= $\frac{P\ (psi)}{0.014217\ L\ (cm)}$

R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = 1.85

NORTH TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
48+50	587.5	587.2	33.1	554.1	36.7	550.5	5.0	1.9

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED ON A 1:1.5 SLOPE

EAST TRENCH 4

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
46+30	587.6	588.0	33.1	554.9	37.0	551.0	3.2	1.1
46+40	587.6	588.3	33.0	555.3	37.1	551.2	3.2	1.1
46+50	587.6	588.1	33.1	555.0	36.9	551.2	3.1	0.9
46+60	587.6	588.2	33.2	555.0	37.1	551.1	3.0	0.8
46+70	587.6	588.0	33.2	554.8	36.9	551.1	3.1	0.9
46+80	587.6	588.3	33.1	555.2	36.9	551.4	3.2	1.1
46+90	587.6	588.1	33.1	555.0	37.1	551.0	3.3	1.2
47+00	587.5	588.1	33.0	555.1	37.2	550.9	3.2	1.1
47+10	587.5	588.0	33.1	554.9	36.6	551.4	3.3	1.2
47+20	587.5	588.0	33.1	554.9	36.6	551.4	3.2	1.1
47+30	587.5	588.0	33.0	555.0	36.7	551.3	3.2	1.1

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED ON A 1:1.5 SLOPE

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)

Date Shipped: 22-Jan-04

Carrier: DIRECT--LAB PICKUP

Phone: (724) 366-9311

Airbill No: N/A

Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL

PROJECT NO P01-048

P O.# 78406

Relinquished by: (Signature) — Received By: — Date / Time:

Relinquished by: (Signature) — Received By: — Date / Time:

Relinquished by: (Signature) — Received at lab by: — Date / Time:

Relinquished from lab by: (Signature) — Received By: — Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-083 (E47+00)	SOIL ONLY	47+00	01/21/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-097 (NW49+50)	SOIL ONLY	49+50	01/21/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-098 (E45+00)	SB BACKFILL**	45+00	01/21/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

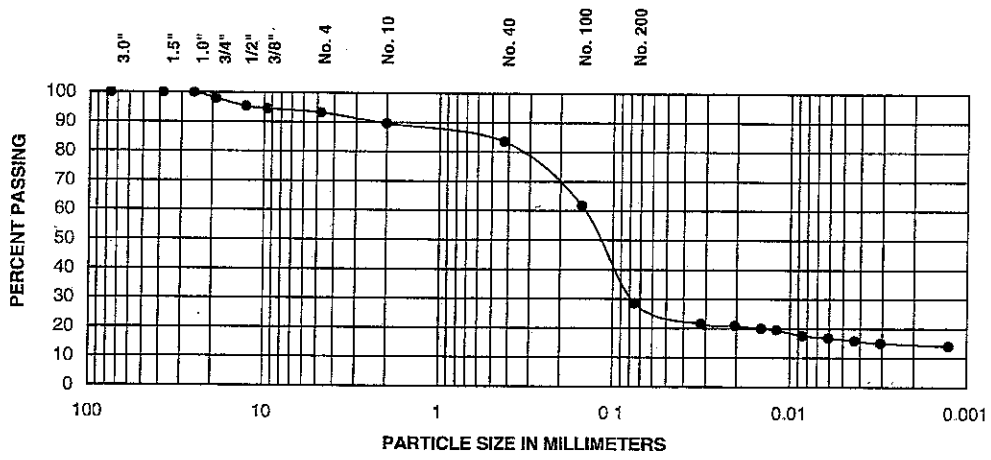
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-097 (NW 49+50)	**Date Tested**	1/25/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/22/2004
Sample Location	49+50 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	6.7	64.7	12.4	16.2

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.0
1/2"	95.3
3/8"	94.5
No. 4	93.3
No. 10	89.7
No. 40	83.7
No. 100	61.7
No. 200	28.6

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
26	20	6

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

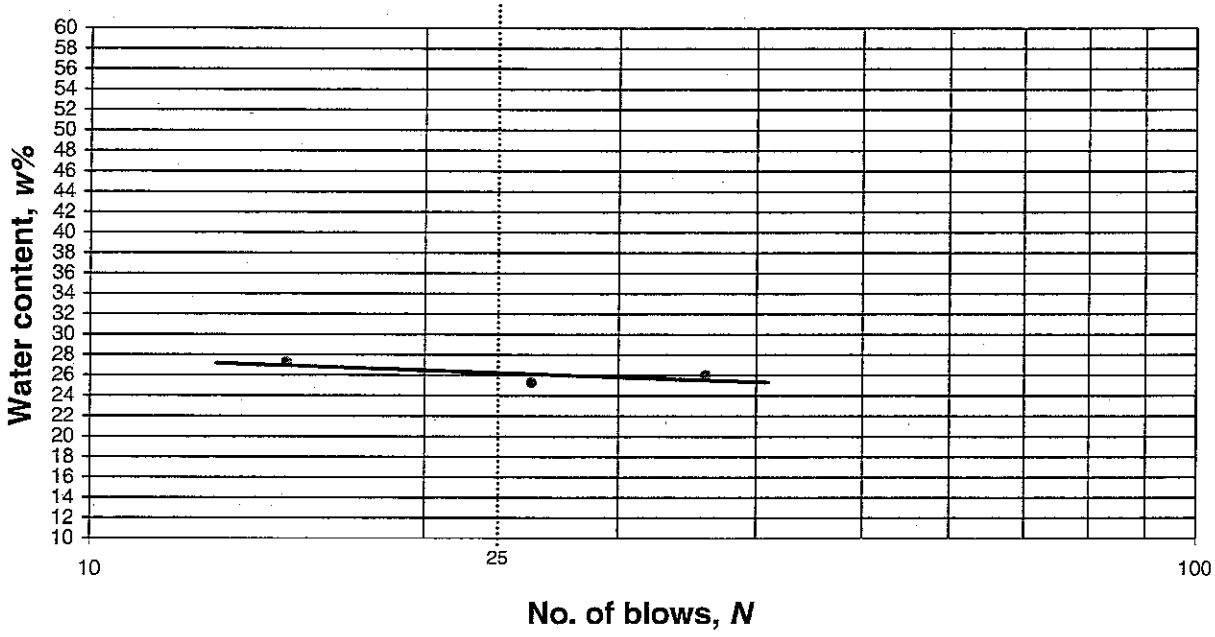
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-097 (NW 49+50)	**Date Tested**	1/23/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/22/2004
Sample Location	49+50 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	26	**Plastic Limit, PL**	20	**Plasticity Index, PI**	6

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/26/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-097 (NW 49+50)	Date Recd.	1/22/04	**Location**	49+50 (NW)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.99	cm	Volume, V:	243.9	cu cm
Mass of Sample:	482.7	g	**Moisture Content:**	**24.6**	**%**
			Wet Density	**123.5**	**pcf**
			Dry Density	**99.1**	**pcf**

Final

Diameter:	7.02	cm	Area, A:	38.7	sq cm
Height, L:	5.59	cm	Volume, V:	216.4	cu cm
Mass of Sample:	465.50	g	**Moisture Content:**	**18.3**	**%**
			Wet Density	**134.3**	**pcf**
			Dry Density	**113.5**	**pcf**
			Deg of Saturation	**98.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.1	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/26/2004	9:00 AM	0	0	3.21	5.85		20.0	---
1/26/2004	9:45 AM	2700	2700	3.27	5.80	1.2	20.0	1.88E-08
1/26/2004	10:45 AM	3600	6300	3.37	5.72	1.3	20.0	2.27E-08
1/26/2004	11:45 AM	3600	9900	3.47	5.64	1.3	20.0	2.29E-08
1/26/2004	12:45 PM	3600	13500	3.55	5.57	1.1	20.0	2.02E-08

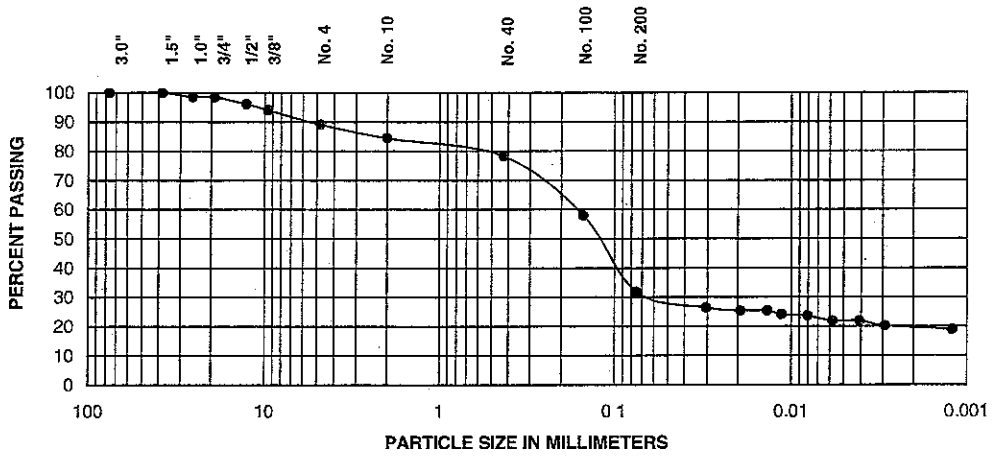
Average Permeability = **2.1E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-098 (E 45+00)	**Date Tested**	1/25/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/22/2004
Sample Location	45+00 (E)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	10.9	57.3	9.7	22.1

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.5
3/4"	98.5
1/2"	96.0
3/8"	94.0
No. 4	89.1
No. 10	84.5
No. 40	78.3
No. 100	58.1
No. 200	31.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
34	20	14

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

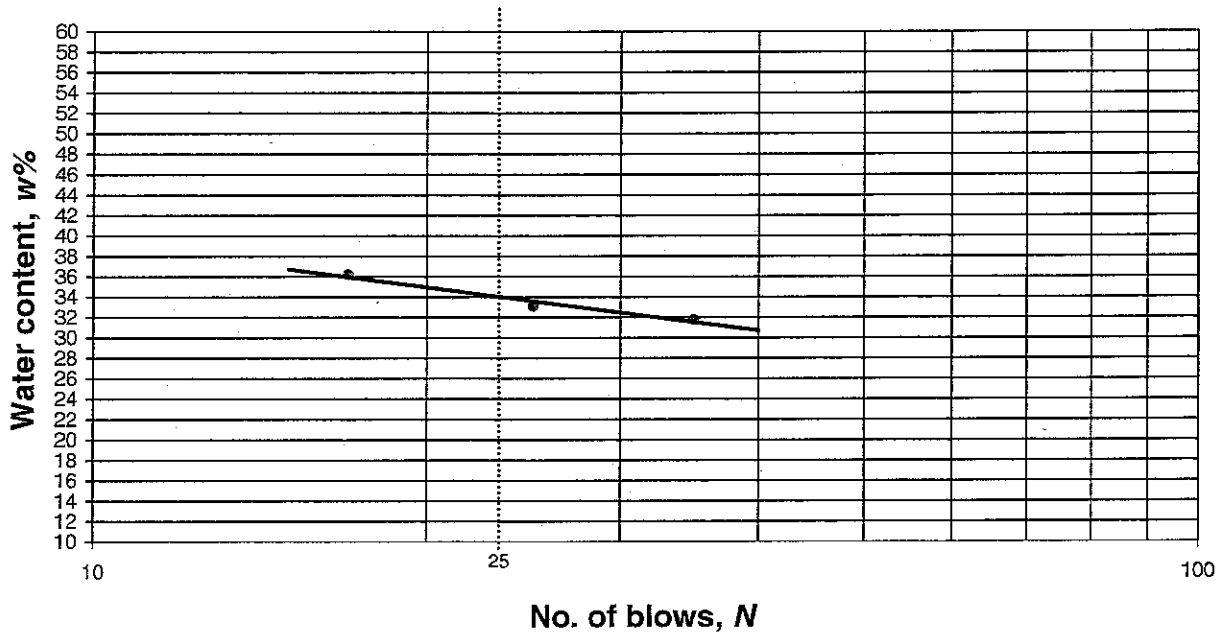
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-098 (E 45+00)	**Date Tested**	1/23/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/22/2004
Sample Location	45+00 (E)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	34	**Plastic Limit, PL**	20	**Plasticity Index, PI**	14

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing							
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic							
File #	2746	**Date Tested**		1/26/2004	**Tested by:**	NP	**QC by:**	SB
Sample ID:	SB-098 (E 45+00)	Date Recd.	1/22/04	**Location**	45+00 (E)			
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)							

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.20	cm	Volume, V:	252.4	cu cm
Mass of Sample:	454.9	g	**Moisture Content:**	**28.5**	%
			Wet Density	112.4	**pcf**
			Dry Density	87.5	**pcf**

Final

Diameter:	6.96	cm	Area, A:	38.0	sq cm
Height, L:	5.76	cm	Volume, V:	219.1	cu cm
Mass of Sample:	451.20	g	**Moisture Content:**	**23.7**	%
			Wet Density	128.5	**pcf**
			Dry Density	103.9	**pcf**
			Deg of Saturation	99.9	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	20.4	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/26/2004	9:00 AM	0	0	3.10	5.80		20.0	---
1/26/2004	9:45 AM	2700	2700	3.14	5.77	1.3	20.0	1.16E-08
1/26/2004	10:45 AM	3600	6300	3.18	5.73	1.0	20.0	1.17E-08
1/26/2004	11:45 AM	3600	9900	3.23	5.69	1.2	20.0	1.17E-08
1/26/2004	12:45 PM	3600	13500	3.28	5.65	1.2	20.0	1.18E-08

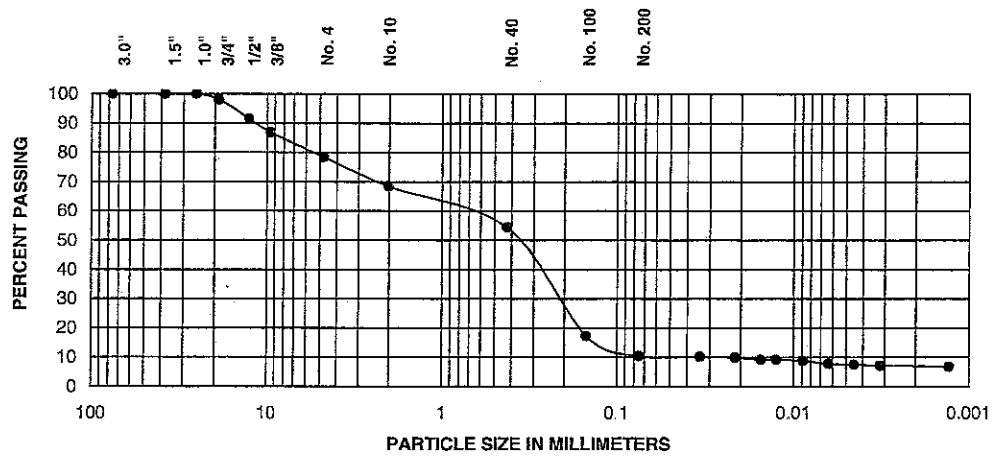
Average Permeability = **1.2E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-083 (E 47+00)	**Date Tested**	1/25/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/22/2004
Sample Location	47+00 (E)
Sample Description	Gray well graded sand with clay, gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	21.5	68.0	2.8	7.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	0.79	0.21	0.02	33.7	2.50

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	98.1
1/2"	91.6
3/8"	86.9
No. 4	78.5
No. 10	68.4
No. 40	54.5
No. 100	17.3
No. 200	10.4

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SW-SC
Soil Description:	Well-graded sand with clay and gravel
System:	USCS

Remarks:

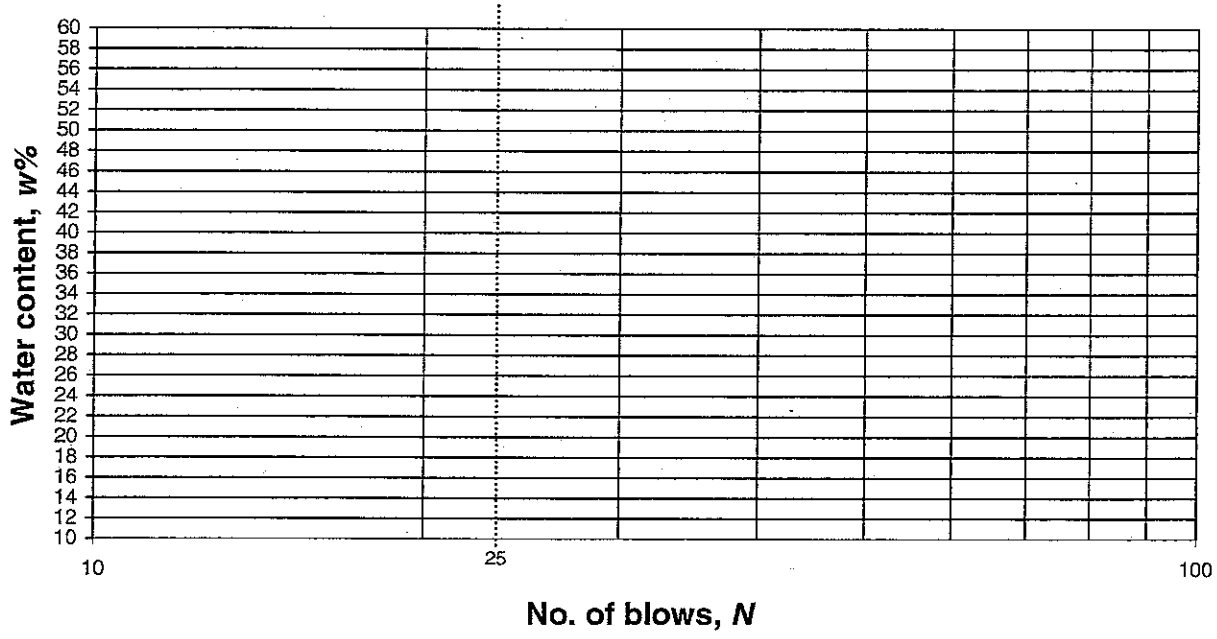
NP-Non-plastic soil

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-083 (E 47+00)	**Date Tested**	1/23/2004	**Tested By**	KM
						Qc By	NP

Date Sample Recd.	1/22/2004
Sample Location	47+00 (E)
Sample Description	Gray well graded sand with clay, gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP·Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	28	Date	1/22/2004	Sheet	1
				Date of weighing	1/23/2004	Tested by	MA

Boring No.	-					
Sample No.	BF-083 (E47+00)					
Location	47 + 00 (E)					
Tin No.	46C					
Tin + Wet Soil	130.02					
Tin + Dry Soil	118.01					
Wt. of Tin	31.96					
Wt. of Dry Soil	86.1					
Wt. of Water	12.0					
Moisture, %	14.0					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

North Trench

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/21/04
Weather: Partly Cloudy; 21-41 degrees

Job Number: P01-048
Job Name: Indiana Harbor

Trench Topped Out Sta 49+90 to 49+40 = 50 L.F.

Length: 50 x Depth[1]: 35.7 (avg) =Square Feet 1785

Square feet: 1785 x Width: 2.5 =Total Cubic Feet[3] 4462.5

Cubic feet[3]: 4462.5 x Dry Unit Weight: 85 (296142.5) /2000= 198.07 Tons of Soil

Tons of Soil: 198.07 x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate 138.65 Tons of Soil

Unit Rate: 138.65 x Specified Rate: 6% =Bentonite Required 8.32 Tons of Bentonite Required between these Stations to top out the trench.

Via Mixer = 5.00 (3.61%) Tons of Bentonite

Via Backfill = 12.00 (8.65%) Tons of Bentonite

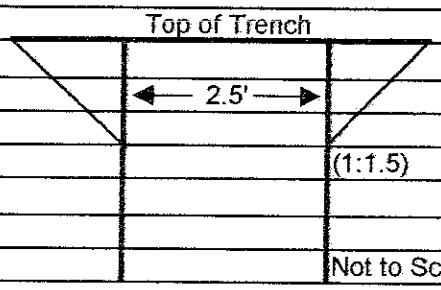
Total Tons of Bentonite Used = 17.00 (12.26%)

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

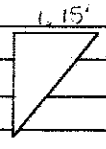
[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 4.8

4.8' - 2.5' = 2.3' → 1.15 overage on each side



A = 1/2 b h = 1/2 (1.15)(1.72) = 1.98 SF

[3] CF = SF * L * 2 sides = 198 CF

Note: Add to CF above

GEO-CON Amanda E. Lepo
Signature/Date

OWNER:
Signature/Date

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/21/04 | Job Number: P01-048
Weather: Partly Cloudy; 21-41 degrees | Job Name: Indiana Harbor

Trench Topped Out Sta. 44+60 to 45+30 = 70 L.F.

Length: 70 x Depth[1]: 35.6' (ave) =Square Feet 2492

Square feet: 2492 x Width: 2.5 =Total Cubic Feet[3] 6230

Cubic feet[3]: 6346.2 x Dry Unit Weight: 85 /2000= 269.71 Tons of Soil

Tons of Soil: 269.71 x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate 188.80 Tons of Soil

Unit Rate: 188.80 x Specified Rate: 6% =Bentonite Required 11.33 Tons of Bentonite Required between these Stations to top out the trench.

Via Mixer = 7.00 (3.71%) Tons of Bentonite

Via Backfill = 14.00 (7.42%) Tons of Bentonite

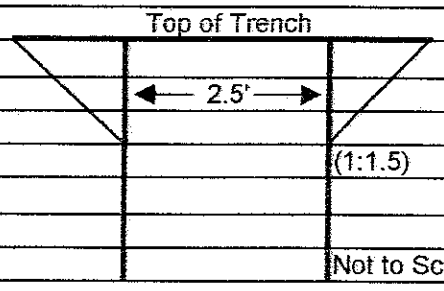
Total Tons of Bentonite Used = 21.00 (11.13%)

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

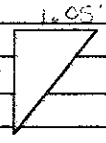
[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 4.6'

4.6' - 2.5' = 2.1' → 1.05' average on each side



A = 1/2 b h = 1/2 (1.05)(1.58) = 0.833 SF

[3] CF = SF * L * 2 sides = 116.2 CF

Note: Add to CF above

GEO-CON Suzanne E. Sepio
Signature/Date

OWNER
Signature/Date

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED: [illegible] DIVISION

SOLD TO:	SHIP TO:
[illegible] INC [illegible] CORPORATE [illegible] SUITE [illegible] MONROEVILLE PA [illegible] SALES ORDER NO.: [illegible]	[illegible] S CHICAGO IN 46112

TESTING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-14-04	[illegible]	GREYBULL	38

Note: Our data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	36
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max.	13.6
> 75 micron (wt. %)	4.0 max.	1.8

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.1
Y.P. / P.V. Ratio	3.0 max.	3.00

This certifies that the product delivered to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Fluids Materials." Should you have any questions or require additional information please let us know 1-307-765-4[illegible].

Signed [illegible] Date 1/19/04

Approved by: Plant Manager

LaboratoryCert.doc (4/22/97)
Rev 1 (3/03)

Arrived onsite 01/19/04

4000# jumbos

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED: [illegible]

SOLD TO:	SHIP TO:
[illegible] CORPORATE [illegible] SUITE 400 [illegible] PA [illegible]	[illegible] IN [illegible]
SALES ORDER NO. [illegible]	

SHIPPING DATE	RAILCAR OR TRUCK NUMBER	PLANT OF ORIGIN	PRODUCT ID#
1-16-04	ATLAS SPECIALIZED	GREYBULL	1281

Note the data for the above equipment across the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	37
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (cm3)	15.0 max	10.6
> 75 micron (wt. %)	4.0 max.	1.1

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.6
Y.P. / P.V. Ratio	3.0 max.	1.05

"This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-877-766-4998.

Signed Date

Approved by: Plant Manager

LabAnalCertJob (4/23/07)
Rev E (9/99)

Arrived onsite 01/19/04

4000+ miles

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED: 1/12/2004

SOLD TO:		SHIP TO:	
GRO-CON INC 4011 MONROEVILLE BLVD CORPORATE BUILDING [illegible] MONROEVILLE PA 15146 SALES ORDER NO. [illegible]		GRO-CON S. CHICAGO IN 46312	
SHIPPING DATE:	RAIL CAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-11-04	[illegible]	GREYBULL	GEL

Note: For tests for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	37
Plastic Viscosity (cP)	N/A	
Yield Point (lb / 100 ft2)	N/A	
Fluid Volume (cm3)	18.0 max.	13.5
+ 75 micron (wt. %)	4.0 max.	1.1

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	8.5
T.P. / P.V. Ratio	3.0 max.	1.08

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Fluids Bentonite." Should you have any questions or require additional information please let us know 1-877-755-4352.

Signed: [illegible] 1/16/04
Date

Approved by Plant Manager

LabAnalCertLOG (4/23/97)
Rev E (5/98)

Arrived onsite 01/19/04

4000# Sumbos

LABORATORY ANALYSIS CERTIFICATION

GREYBULL PLANT

DATE TESTED 1/14/2004

SOLD TO:	SHIP TO:
GEOCON INC. 1019 MONROEVILLE BLVD CORPORATE BUILDING SUITE 400 MONROEVILLE PA 15146 SALES ORDER NO.: HCP/AK120	GEOCON E. CHICAGO IN 46312

SHIPPING DATE:	RAILCAR OR TRUCK NUMBER:	PLANT OF ORIGIN:	PRODUCT ID:
1-14-04	HG BALL #13	GREYBULL	GEL

Rice Bar data for the above shipment shows the following test results.

Test or Property	API Spec	Result
Viscosity	30 min.	41
Plastic Viscosity (cP)	N/A	
Yield Point (# / 100 ft2)	N/A	
Filtrate Volume (ml3)	15.0 max.	13.0
+ 75 micron (wt. %)	8.0 max.	1.4

Test or Property	API Spec	Result
Moisture (wt. %)	N/A	7.8
Y.P. / P.V. Ratio	3.0 max.	1.15

This certifies that the product shipped to the location as stated above meets the requirements of A.P.I. Section 13A, Section 4 for "Drilling Grade Bentonite." Should you have any questions or require additional information please let us know 1-887-788-4444.

Signed 1/14/04 Date

Approved by Plant Manager

LabAnalCert.doc (4/22/97)
Rev E (9/98)

Arrived onsite 01/20/04
4000# jumbos

GEO-CON

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/22/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, windy, cold; 10 - 12 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
48+40	2.00	78.00	16.00	25.00	56.00	8
48+40	35.00	82.00	26.00	21.00	61.00	8
48+10	2.00	80.00	24.00	27.00	55.00	8
48+10	35.00	82.00	28.00	24.00	61.00	8

NORTH TRENCH

COMMENTS: East trench is no longer being excavated. All remaining excavation is being done in the North trench. Therefore, no more slurry samples will be taken from the East trench.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A	No sample collected today. Only (1) 40' cut excavated.			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A	TOO COLD TO BACKFILL TODAY.					N/A

COMMENTS

Filter cake: .7mm, .7mm, .7mm, and .9mm respectively.

No backfill placed today. Too cold.

DRY BENTONITE ADDITION		
	TONS	%
TODAY	0.00	0%
TO DATE	546.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne C Sepic OWNER:

No Samples Today.

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/22/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, windy, cold; 10 - 12 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
N/A						

EAST TRENCH

COMMENTS: East trench is no longer being excavated. All remaining excavation is being done in the North trench. Therefore, no more slurry samples will be taken from the East trench.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A	No more excavation from the East Trench			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
N/A	TOO COLD TO BACKFILL TODAY.					N/A

COMMENTS

No more excavation in the East trench. Only backfill.

No backfill placed today. Too cold.

DRY BENTONITE ADDITION		
	TONS	%
TODAY	0.00	0%
TO DATE	14.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/22/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
10:00	65.00	45.00	15.00	8
10:35	-	44.00	-	-
13:40	65.00	45.00	15.00	8
14:05	-	44.00	-	-
Filter cake was .2mm and .1mm respectively.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/22/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, windy, cold; 10 - 12 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
48+40	33.1	37.0	36.9	10.0	368.5	4.7	49+40	TOPOUT	TOPOUT
48+30	33.2	37.1	37.1	10.0	370.5	4.8	49+30	12.3	12.5
48+20	33.1	37.0	37.1	10.0	370.5	4.7	49+20	16.4	16.5
48+10	33.1	37.2	37.1	10.0	371.0	4.5	49+10	18.9	19.7
							49+00	22.2	22.1
							48+90	27.7	27.2
							48+80	34.5	27.5
							48+70	35.9	29.0
							48+60	36.7	36.7
							48+50	36.7	36.7
							48+40	26.9	37.0
							48+30		37.1
							48+20		37.0
							48+10		37.2
							48+00		25.4
				SF TODAY	1480.50				
				SF TO DATE	108763.50				

COMMENTS

NORTH TRENCH

Only worked 8 hours today. Could not place backfill. Too cold.

GEO-CON: [illegible] OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/22/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, windy, cold; 10 - 12 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
N/A							45+30	TOPOUT	TOPOUT
EXCAVATION COMPLETED IN THIS TRENCH. EXCAVATION OF NORTH TRENCH ONLY.							45+40	9.5	9.7
							45+50	11.3	11.4
							45+60	12.8	13.0
							45+70	13.5	13.5
							45+80	14.0	14.2
							45+90	18.1	17.9
							46+00	22.7	22.5
							46+10	25.1	25.4
							46+20	28.0	27.6
							46+30	28.3	27.9
							46+40	28.7	28.3
							46+50	29.0	29.0
							46+60	29.5	29.2
							46+70	29.8	30.0
							46+80	32.5	31.8
							46+90	33.9	33.7
							47+00	34.2	33.9
							47+10	34.5	34.0
							47+20	36.5	36.3
							47+30	36.7	36.5

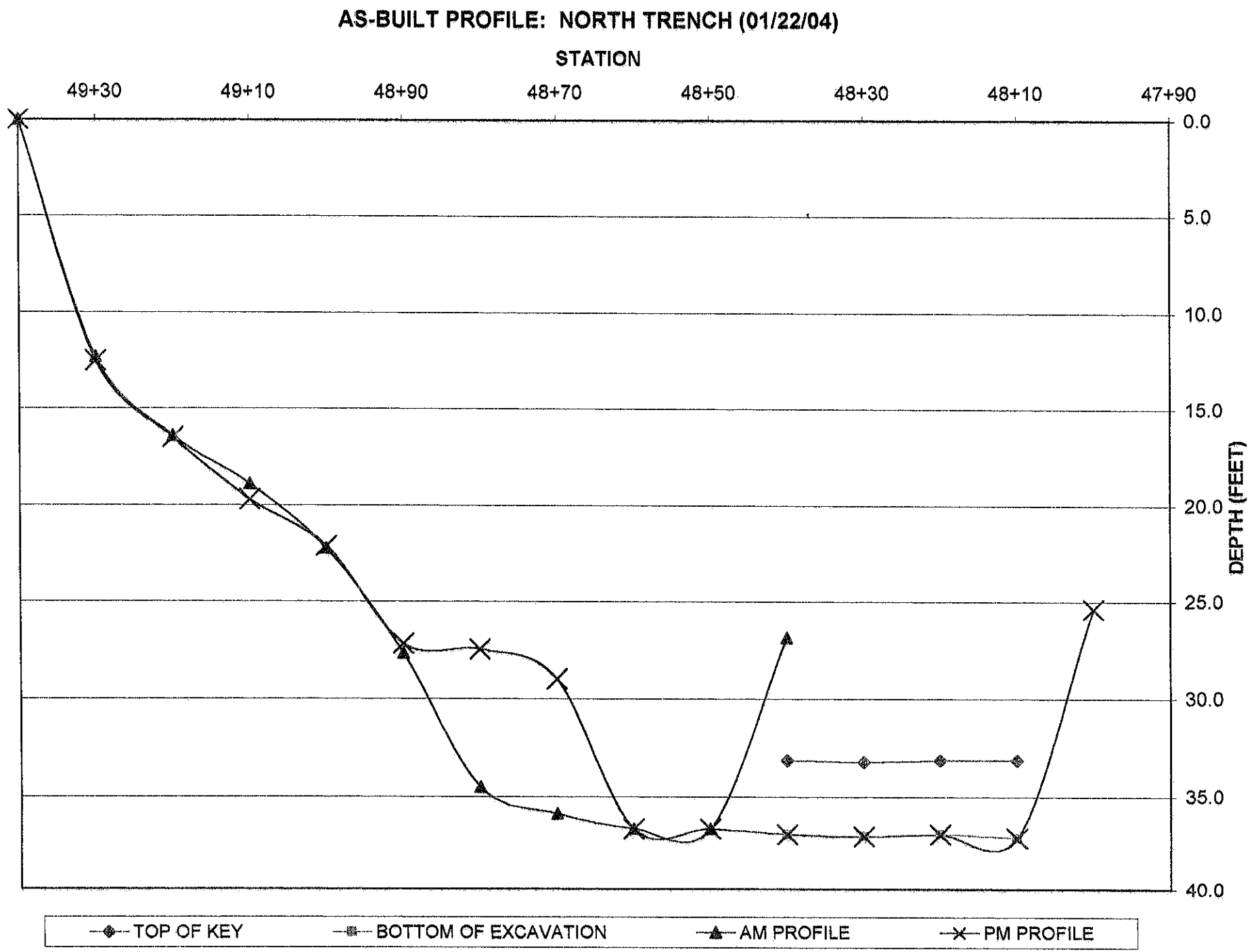
SF TODAY 0.00

SF TO DATE 9934.00

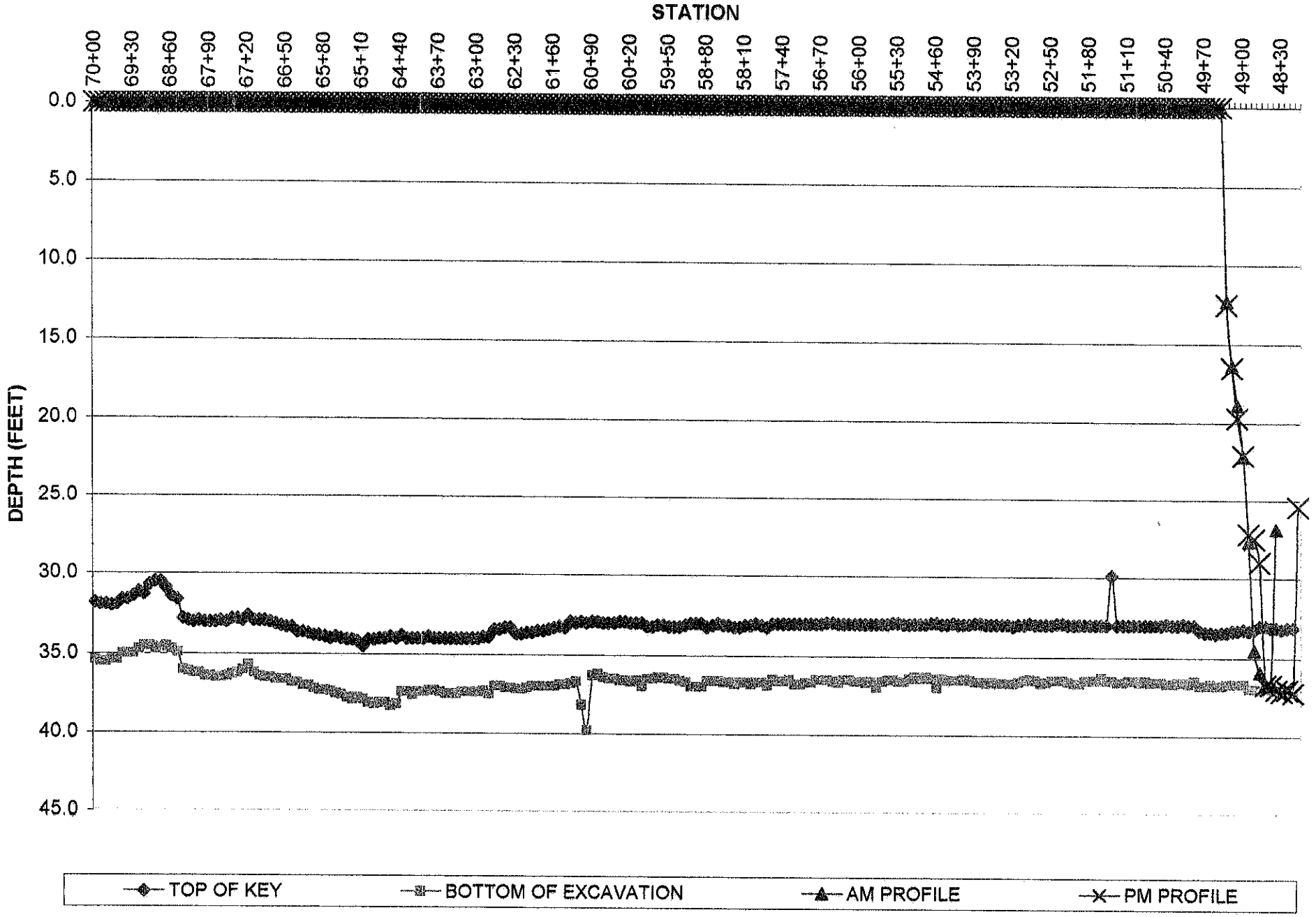
COMMENTS

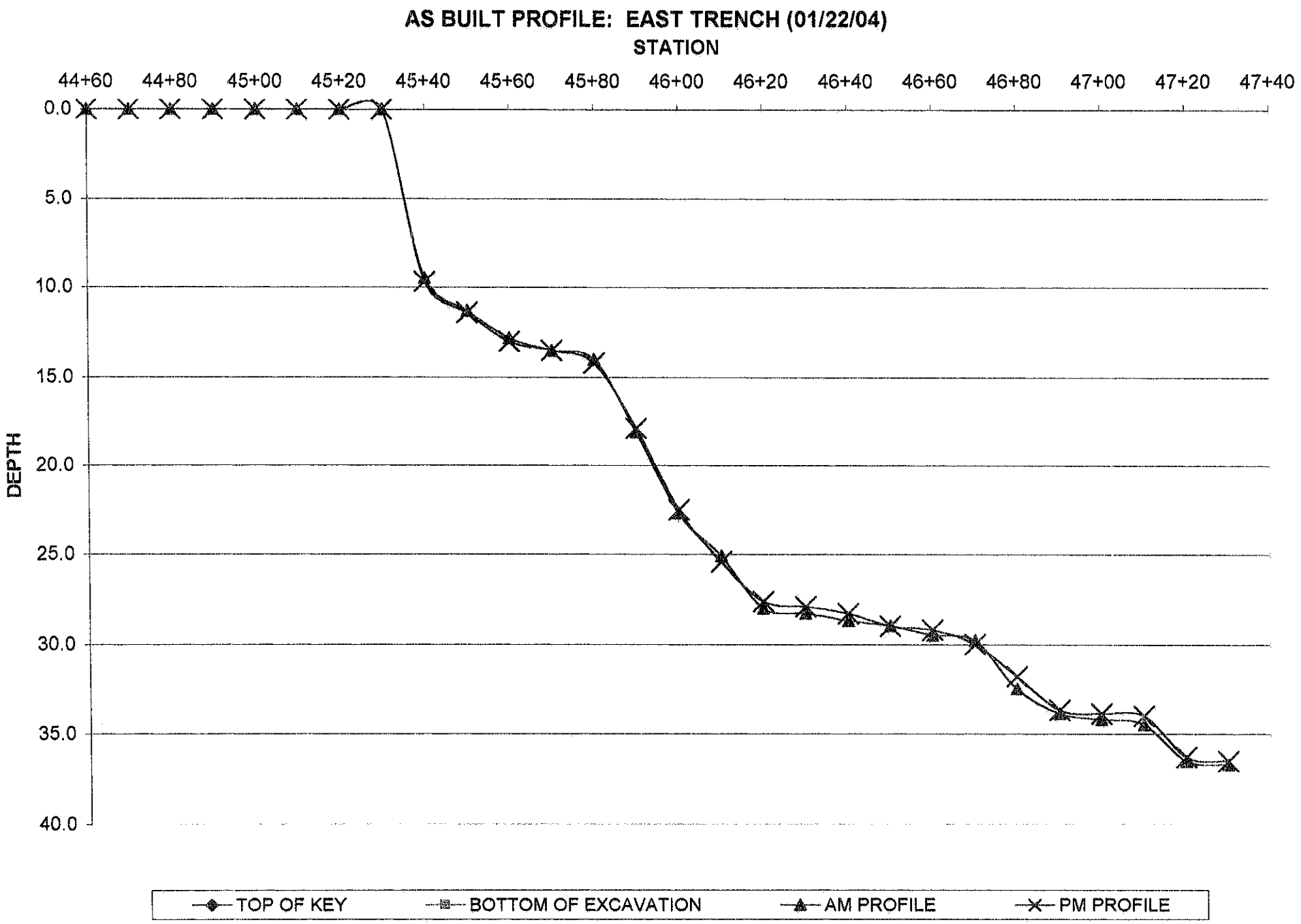
EAST Trench

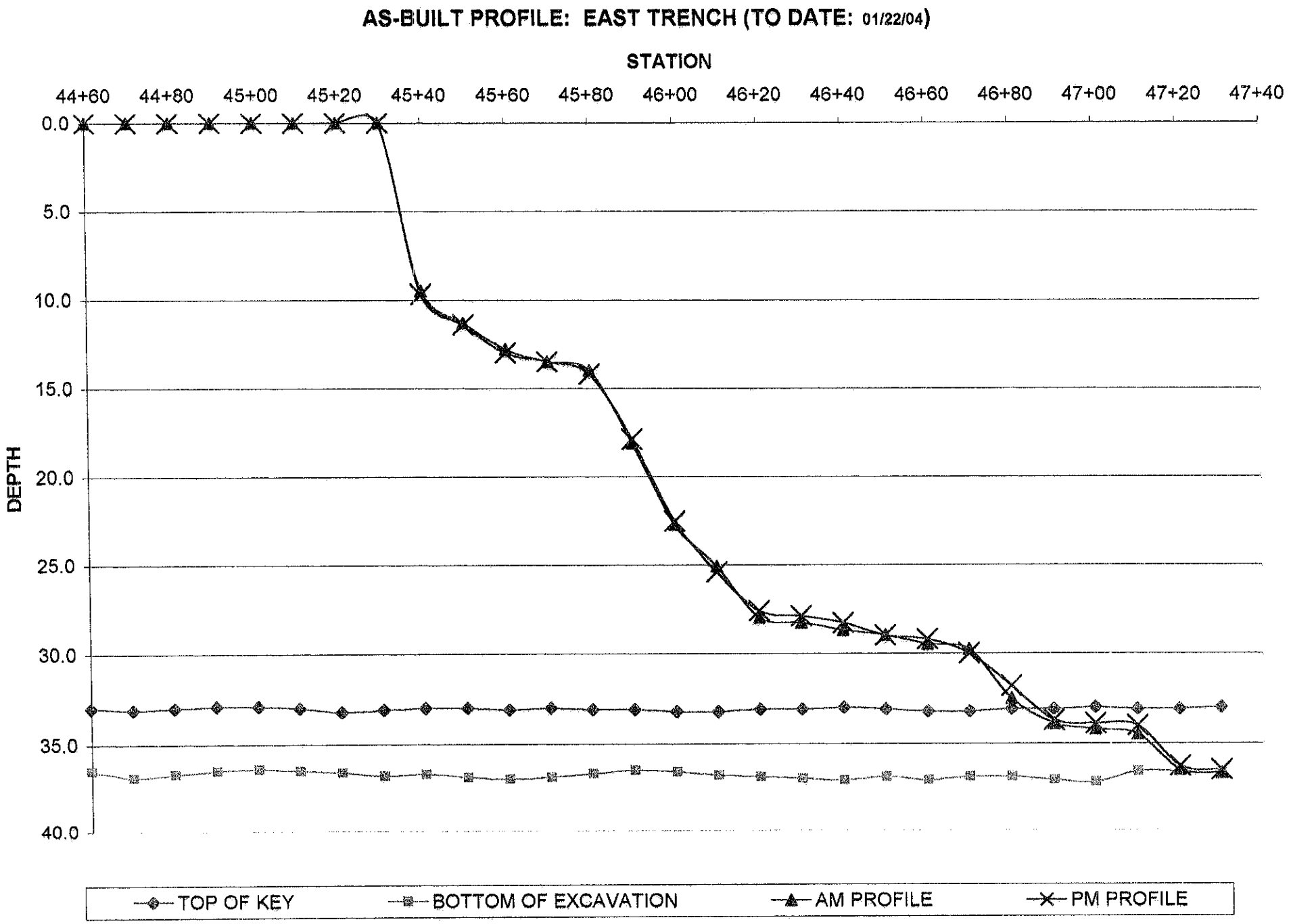
GEO-CON: Suzanne E. Sepo OWNER:


AS-BUILT PROFILE: NORTH TRENCH (01/22/04)
STATION
49+30
49+10
48+90
48+70
48+50
48+30
48+10
47+90
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: NORTH TRENCH (TO DATE: 01/22/03)




AS BUILT PROFILE: EAST TRENCH (01/22/04)
STATION
44+60
44+80
45+00
45+20
45+40
45+60
45+80
46+00
46+20
46+40
46+60
46+80
47+00
47+20
47+40
DEPTH
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: EAST TRENCH (TO DATE: 01/22/04)
STATION
44+60
44+80
45+00
45+20
45+40
45+60
45+80
46+00
46+20
46+40
46+60
46+80
47+00
47+20
47+40
DEPTH
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS **DATE** 01/22/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:00	45	> 40 sec	65	> 64 pcf	8	6.5 - 10	15	< 20 cm^3	.2
PM	13:40	45	> 40 sec	65	> 64 pcf	8	6.5 - 10	15	< 20 cm^3	.1

NORTH TRENCH

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM	10:35	44	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM	14:05	44	> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

TOO COLD TO PLACE BACKFILL TODAY.

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:00	48+40	2	56	40 - 90 sec	78	64 - 95 pcf	8	6.5 - 10	25	< 25 cm^3	.7	16	MAX 30%
7:00	48+40	35	61	40 - 90 sec	82	64 - 95 pcf	8	6.5 - 10	21	< 25 cm^3	.7	26	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
13:50	48+10	2	55	40 - 90 sec	80	64 - 95 pcf	8	6.5 - 10	27	< 25 cm^3	.7	24	MAX 30%
13:50	48+10	35	61	40 - 90 sec	82	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	.7	28	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

TOO COLD TO PLACE BACKFILL TODAY

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: _____ Technician: _____

Sample Area: A= _____ cm^2 Sample Height: L= _____ cm

Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)
01/22/04								

NO BACKFILL TODAY, TOO COLD TO PLACE.

I= $\frac{P\ (psi)}{0.014217\ L\ (cm)}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = _____

DAILY QC TESTS **DATE** 01/22/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NA

EAST TRENCH

** ONLY TRENCH BEING EXCAVATED NOW IS THE NORTH TRENCH. BACKFILL OPERATIONS WILL CONTINUE ON BOTH TRENCHES.

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

NA

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec
		2" to 6"		+15 pcf over trench slurry		1.0×10^{-7} cm/sec

NO BACKFILL TODAY. TOO COLD.

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

EAST TRENCH

API QUICK PERMEABILITY TEST

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: _____ Technician: _____

Sample Area: A= _____ cm^2 Sample Height: L= _____ cm

Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = $\frac{\Delta Q}{\Delta t} \times \frac{1}{X}$ (cm/sec)
01/22/04								

NO BACKFILL TODAY. TOO COLD TO PLACE.

I= $\frac{P\ (psi)}{0.014217\ L\ (cm)}$ R= $\frac{\text{Quick Test}}{\text{Triaxial Test}}$ = _____

NORTH TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
48+40	587.4	587.3	33.1	554.2	37.0	550.3	4.7	1.7
48+30	587.4	587.3	33.2	554.1	37.1	550.2	4.8	1.7
48+20	587.4	587.4	33.1	554.3	37.0	550.4	4.7	1.7
48+10	587.4	587.4	33.1	554.3	37.2	550.2	4.5	1.5

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED ON A 1:1.5 SLOPE.

NORTH TRENCH

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/22/04
Weather: Partly sunny, windy, cold; 10-12 degrees

Job Number: P01-048
Job Name: Indiana Harbor

Trench Topped Out Sta _____ to _____ = _____ L.F.

Length: _____ x Depth[1]: _____ =Square Feet _____

Square feet: _____ x Width: 2.5 =Total Cubic Feet[3] _____

Cubic feet[3]: _____ x Dry Unit Weight: 85 /2000= _____ Tons of Soil

Tons of Soil: _____ x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate _____ Tons of Soil

Unit Rate: _____ x Specified Rate: 6% =Bentonite Required _____ Tons of Bentonite Required between these Stations to top out the trench

Via Mixer = _____ Tons of Bentonite

Via Backfill = _____ Tons of Bentonite

Total Tons of Bentonite Used = _____

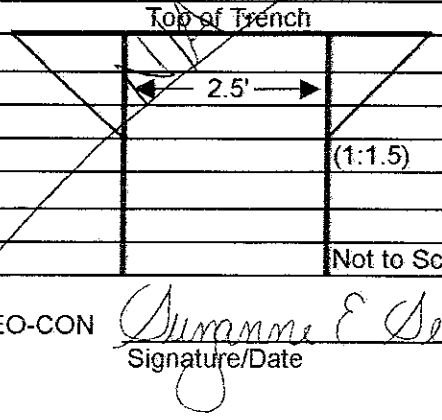
TOP BACKFILL PLACED TODAY TOO COLD

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] =

A = 1/2 b h = 1/2

[3] CF = SF * L * 2 sides =

Note: Add to CF above

GEO-CON Suzanne E Sepic
Signature/Date

OWNER: _____
Signature/Date

EAST TRENCH

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/22/04
Weather: Partly sunny, windy, cold; 10-12 degrees

Job Number: P01-048
Job Name: Indiana Harbor

Trench Topped Out Sta _____ to _____ = _____ L.F.

Length: _____ x Depth[1]: _____ =Square Feet _____

Square feet: _____ x Width: 2.5 =Total Cubic Feet[3] _____

Cubic feet[3]: _____ x Dry Unit Weight: 85 /2000= _____ Tons of Soil

Tons of Soil: _____ x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate _____ Tons of Soil

Unit Rate: _____ x Specified Rate: 6% =Bentonite Required _____ Tons of Bentonite Required between these Stations to top out the trench

Via Mixer = _____ Tons of Bentonite

Via Backfill = _____ Tons of Bentonite

Total Tons of Bentonite Used = _____

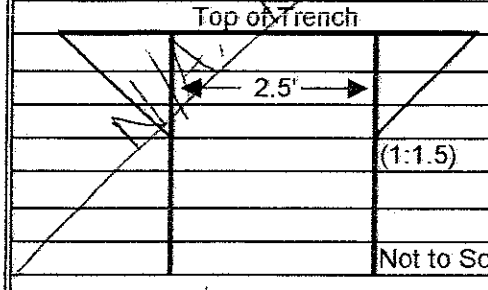
NO BACKFILL PLACED TODAY. TOO COLD.

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] =

A = 1/2 b h = 1/2

[3] CF = SF * L * 2 sides =

Note: Add to CF above

GEO-CON Simonne E. Sepio
Signature/Date

OWNER: _____
Signature/Date

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/23/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy, snow showers; 16 - 25 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
48+00	2.00	74.00	24.00	24.00	53.00	8
48+00	35.00	80.00	26.00	21.00	54.00	8
47+60	2.00	80.00	28.00	26.00	55.00	8
47+60	34.00	86.00	32.00	24.00	58.00	8

NORTH TRENCH

COMMENTS: North trench is the only trench being excavated. Excavation was completed today. No fresh slurry was pumped to the trench because of this reason. Backfilling will continue on both trenches until the slurry wall is topped out and completed.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
48+00	Lab sample collected 01/23/04			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
49+25	2.00	N/A	N/A	N/A	4.13×10^{-8}	N/A
49+00	2.00	Sample collected	Sample collected	Sample collected	4.81×10^{-8}	yes
48+75	2.00	N/A	N/A	N/A	5.62×10^{-8}	N/A
48+50	2.00	N/A	N/A	N/A	4.81×10^{-8}	N/A
48+25	2.00	N/A	N/A	N/A	5.22×10^{-8}	N/A
48+00	2.00	Sample collected	Sample collected	Sample collected	7.22×10^{-8}	yes

COMMENTS

Filter cake: .7mm, .8mm, 1.0mm, and 1.2mm respectively.

Unit weight:
- 49+25: 118.5 pcf
- 49+00: 119.0 pcf
- 48+75: 119.5 pcf
- 48+50: 118.0 pcf
- 48+25: 120.0 pcf
- 48+00: 121.5 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY	26.00	6%
TO DATE	572.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepo OWNER:

GEO-CON

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/23/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy, snow showers; 16 - 25 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
N/A						

EAST TRENCH

COMMENTS: East trench is no longer being excavated. All remaining excavation is being done in the North trench. Therefore, no more slurry samples will be taken from the East trench.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A	No more excavation from the East Trench			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
45+50	2.00	Sample collected	Sample collected	Sample collected	9.63×10^{-8}	yes
45+75	2.00	N/A	N/A	N/A	1.04×10^{-7}	N/A
46+00	2.00	N/A	N/A	N/A	1.28×10^{-7}	N/A

COMMENTS

No more excavation in the East trench. Only backfill.

Unit weight: 45+50: 118.0 pcf
45+75: 116.5 pcf
46+00: 116.0 pcf

DRY BENTONITE ADDITION		
	TONS	%
TODAY	12.00	6%
TO DATE	26.00	6%
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: [illegible] **OWNER:**

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/23/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
N/A				
No mixing anymore. Trench excavation is almost complete. The batch plant is done.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepe OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/23/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy, snow showers; 16 - 25 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
48+00	33.1	37.0	37.0	10.0	370.0	5.0	49+40	TOPOUT	TOPOUT
47+90	33.2	36.8	36.9	10.0	369.0	4.9	49+30	15.0	TOPOUT
47+80	33.1	36.7	36.8	10.0	367.5	4.9	49+20	17.6	TOPOUT
47+70	33.0	36.7	36.7	10.0	367.0	5.0	49+10	21.7	TOPOUT
47+60	33.0	36.7	36.7	10.0	367.0	4.9	49+00	26.6	TOPOUT
47+50	33.1	36.6	36.7	10.0	366.5	4.8	48+90	31.6	TOPOUT
47+40	33.1	36.7	36.7	10.0	366.5	4.7	48+80	32.0	TOPOUT
							48+70	32.5	TOPOUT
							48+60	32.5	TOPOUT
							48+50	36.5	TOPOUT
							48+40	37.0	TOPOUT
							48+30	37.1	TOPOUT
							48+20	37.0	TOPOUT
							48+10	37.2	TOPOUT
							48+00	25.0	TOPOUT
							47+90		17.5
							47+80		19.5
							47+70		28.9
							47+60		36.0
							47+50		36.5
							47+40		36.2

EXCAVATION OF THE NORTH TRENCH WAS COMPLETED 01/23/04. EXCAVATION OF THE ENTIRE SLURRY WALL IS NOW COMPLETE.

SF TODAY 2573.50

SF TO DATE 111337.00

COMMENTS

NORTH TRENCH

Top portion of slope slide and settled at 48+60. This explains the beginning of the trench drop & increase at this station.

GEO-CON: (Dwayne Chapo) OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/23/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Mostly cloudy, snow showers; 16 - 25 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
N/A							45+30	TOPOUT	TOPOUT
EXCAVATION COMPLETED IN THIS TRENCH. EXCAVATION OF NORTH TRENCH ONLY.							45+40	9.4	TOPOUT
							45+50	11.5	TOPOUT
							45+60	13.3	TOPOUT
							45+70	13.9	TOPOUT
							45+80	14.0	TOPOUT
							45+90	17.7	1.4
							46+00	22.7	2.0
							46+10	24.8	7.2
							46+20	27.3	9.5
							46+30	28.0	11.7
							46+40	28.5	13.4
							46+50	29.3	15.1
							46+60	29.6	15.2
							46+70	29.8	17.1
							46+80	30.8	19.2
							46+90	32.7	22.8
							47+00	32.8	25.0
							47+10	33.8	27.4
							47+20	35.5	28.6
							47+30	36.4	36.5

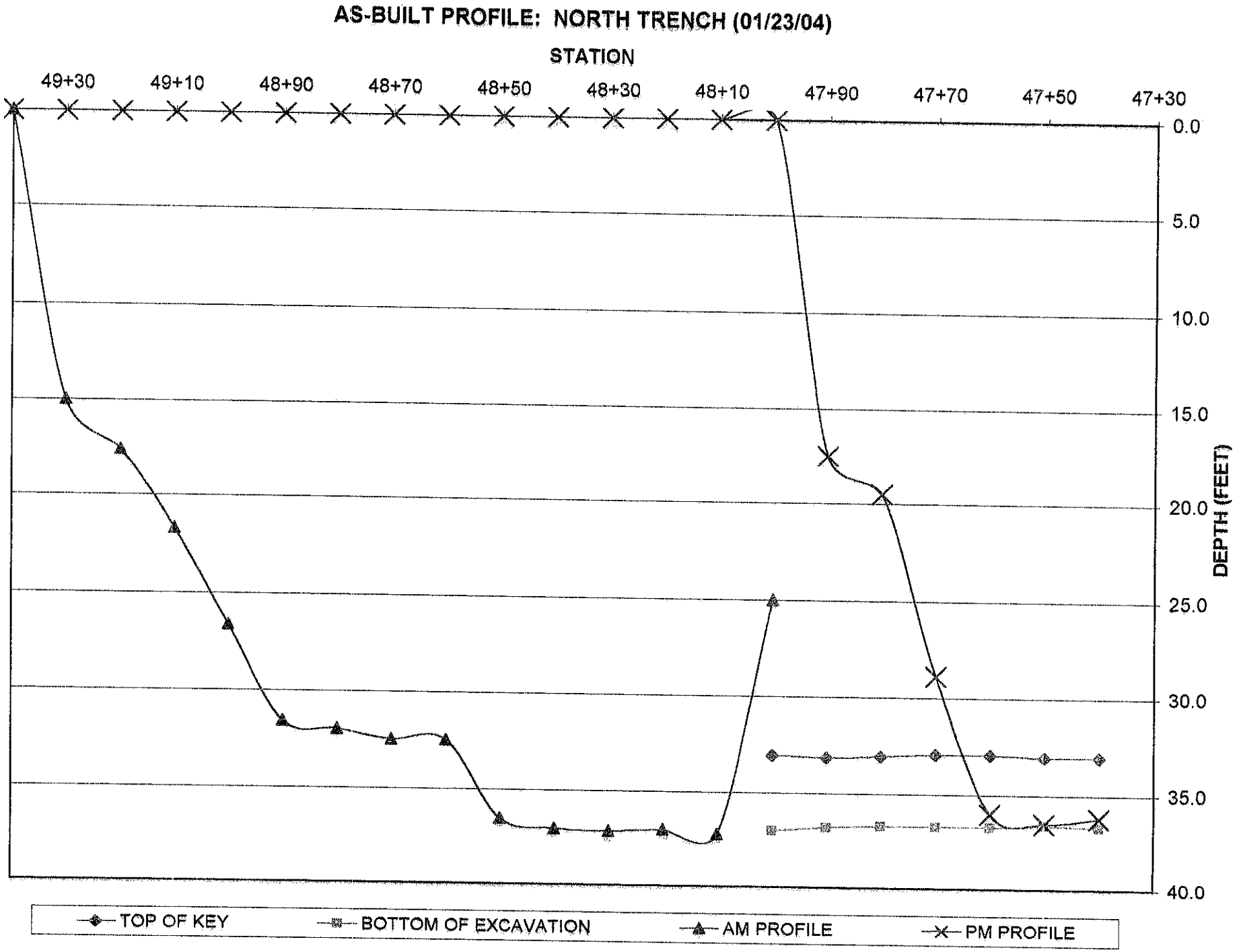
SF TODAY 0.00

SF TO DATE 9934.00

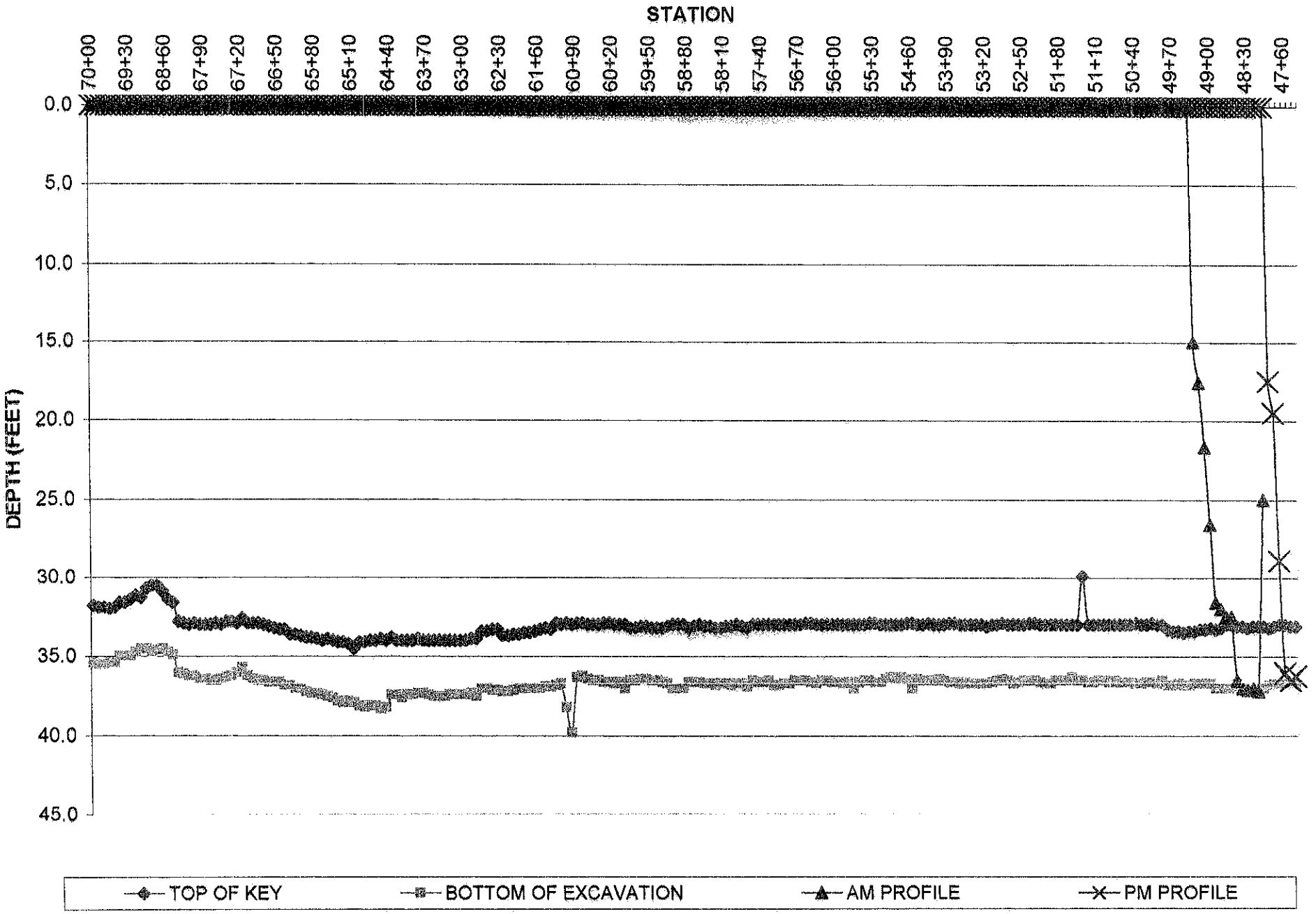
COMMENTS

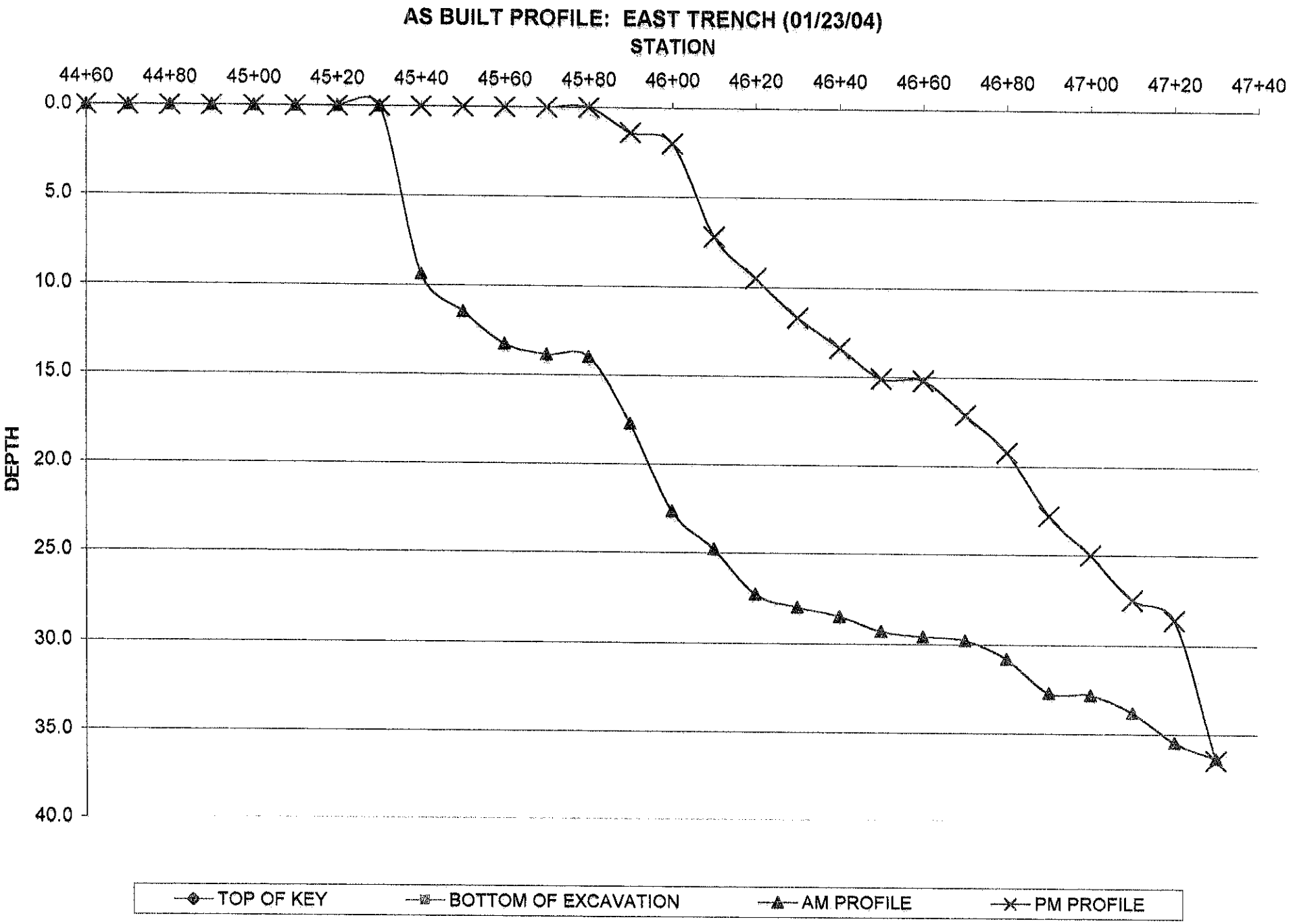
EAST Trench

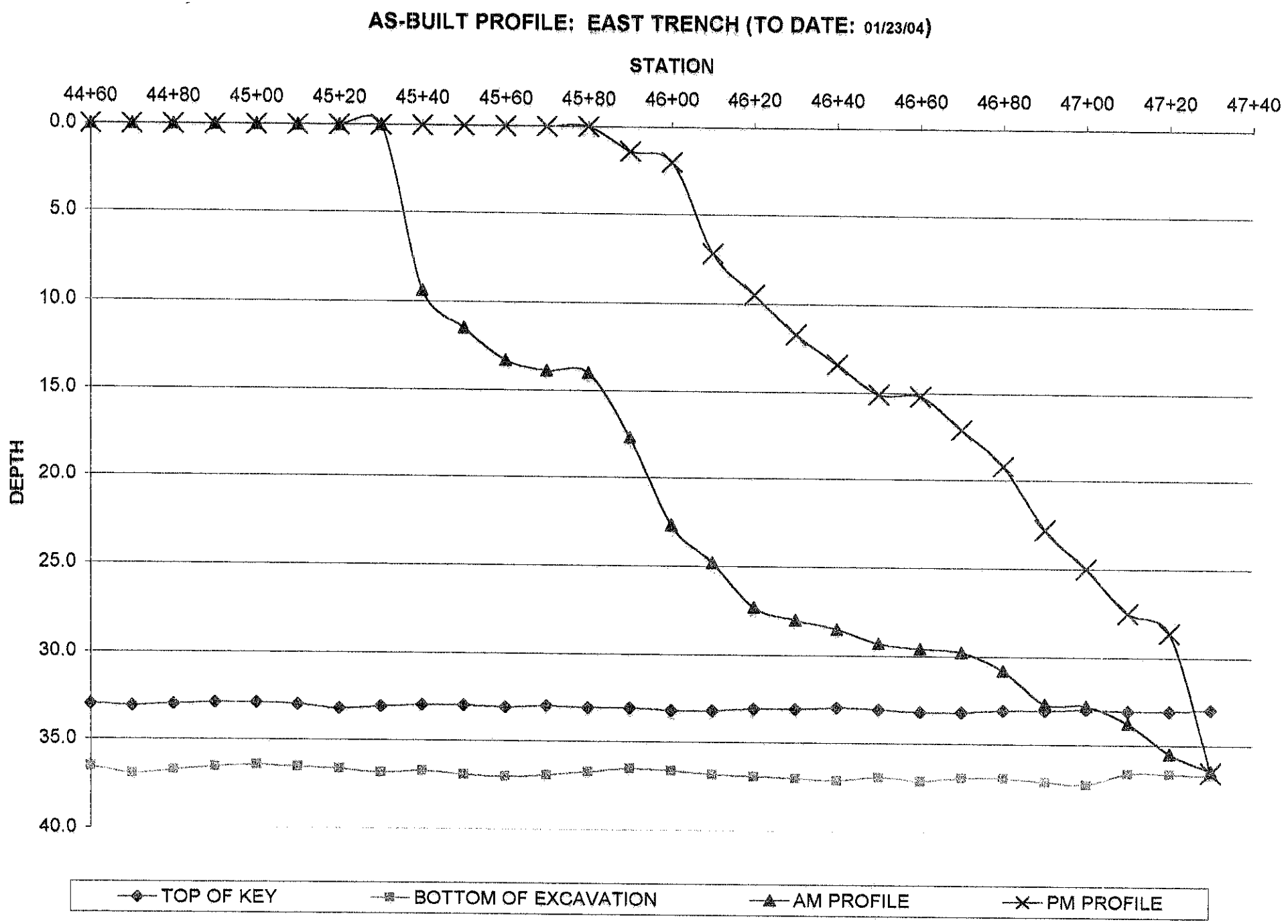
GEO-CON: [illegible] OWNER:


AS-BUILT PROFILE: NORTH TRENCH (01/23/04)
STATION
49+30
49+10
48+90
48+70
48+50
48+30
48+10
47+90
47+70
47+50
47+30
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
DEPTH (FEET)
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

AS-BUILT PROFILE: NORTH TRENCH (TO DATE: 01/23/03)




AS BUILT PROFILE: EAST TRENCH (01/23/04)
STATION
44+60
44+80
45+00
45+20
45+40
45+60
45+80
46+00
46+20
46+40
46+60
46+80
47+00
47+20
47+40
DEPTH
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE


AS-BUILT PROFILE: EAST TRENCH (TO DATE: 01/23/04)
STATION
44+60
44+80
45+00
45+20
45+40
45+60
45+80
46+00
46+20
46+40
46+60
46+80
47+00
47+20
47+40
DEPTH
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/23/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NORTH TRENCH

* NO MORE FRESH SLURRY NEEDED.

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
7:40	48+00	2	53	40 - 90 sec	74	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	.1	24	MAX 30%
7:40	48+00		54	40 - 90 sec	80	64 - 95 pcf	8	6.5 - 10	21	< 25 cm^3	.8	26	MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
14:00		2	55	40 - 90 sec	80	64 - 95 pcf	8	6.5 - 10	26	< 25 cm^3	1.0	28	MAX 30%
14:00			58	40 - 90 sec	86	64 - 95 pcf	8	6.5 - 10	24	< 25 cm^3	1.2	32	MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
49+25	2	2" to 6"	118.5	+15 pcf over trench slurry	4.13×10^{-8}	1.0×10^{-7} cm/sec
49+00	2	2" to 6"	119.0	+15 pcf over trench slurry	4.81×10^{-8}	1.0×10^{-7} cm/sec
48+75	2	2" to 6"	119.5	+15 pcf over trench slurry	5.62×10^{-8}	1.0×10^{-7} cm/sec
48+50	2	2" to 6"	118.0	+15 pcf over trench slurry	4.81×10^{-8}	1.0×10^{-7} cm/sec
48+25	2	2" to 6"	120.0	+15 pcf over trench slurry	5.22×10^{-8}	1.0×10^{-7} cm/sec
48+00	2	2" to 6"	121.5	+15 pcf over trench slurry	7.22×10^{-8}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

49+25, 49+00, 48+75

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 48+50, 48+25, 48+00

Technician: SM/MM ✓BY SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.0cm, 6.0cm, 7.0cm / 7.0cm, 6.5cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	w/correction factor (1.14)
49+25	01/23/04	9:30-13:30	240	10	117.2305	605865.9809	—	6	4.13×10^{-8}	2.83×10^{-8}
49+00	01/23/04	9:30-13:30	240	10	100.4833	519313.7717	—	6	4.81×10^{-8}	3.28×10^{-8}
48+75	01/23/04	9:30-13:30	240	10	100.4833	519313.7717	—	7	5.62×10^{-8}	3.84×10^{-8}
48+50	01/23/04	9:30-13:30	240	10	100.4833	519313.7717	—	6	4.81×10^{-8}	3.28×10^{-8}
48+25	01/23/04	9:30-13:30	240	10	108.2128	559261.0644	—	7	5.22×10^{-8}	$3.5[illegible] \times 10^{-8}$
48+00	01/23/04	9:30-13:30	240	10	100.4833	519313.7717	—	9	7.22×10^{-8}	$4.1[illegible] \times 10^{-8}$

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

DAILY QC TESTS

DATE 01/23/04

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

EAST TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM
TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH & NO EXCAVATION ON THIS TRENCH.

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
45+50	2	2" to 6"	118	+15 pcf over trench slurry	9.63×10^{-8}	1.0×10^{-7} cm/sec
45+75	2	2" to 6"	116.5	+15 pcf over trench slurry	1.04×10^{-7}	1.0×10^{-7} cm/sec
46+00	2	2" to 6"	116	+15 pcf over trench slurry	1.26×10^{-7}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

EAST TRENCH

Geo-Con

API QUICK PERMEABILITY TEST
45+50, 45+75, 46+00

Job: Indiana Harbor CDF S-B Cutoff Wall Sta: _____ Technician: SM/MM VAN SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm² Sample Height: L= 6.0cm, 6.5cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	4 cons factor 1/46.56
45+50	01/23/04	9:30-13:30	240	10	117.2305	605865.9809	—	14	9.63×10^{-8}	6.51×10^{-8}
45+75	01/23/04	9:30-13:30	240	10	108.2128	559261.0644	—	14	1.04×10^{-7}	7.10×10^{-8}
46+00	01/23/04	9:30-13:30	240	10	100.4833	519313.7717	—	16	1.28×10^{-7}	8.74×10^{-8}
	~~01/24/04~~									

I= P (psi) / 0.014217 L (cm) R= Quick Test / Triaxial Test = 1.85

NORTH TRENCH

STATION	TOP OF EXISTING GROUND SURFACE PRIOR TO ANY GRADING (ELEV)	TOP OF TRENCH PLATFORM/ GROUND SURFACE (ELEV)	TOP OF CLAY (FEET BELOW GROUND SURFACE)	TOP OF CLAY (ELEV)	BOTTOM OF TRENCH (FEET BELOW GROUND SURFACE)	BOTTOM OF TRENCH (ELEV)	W_T (WIDTH OF TRENCH, FEET)	D_{30} (DEPTH TO 30" WIDTH, FEET)
48+00	587.4	587.3	33.1	554.2	37.0	550.3	5.0	1.9
47+90	587.4	587.4	33.2	554.2	36.8	550.6	4.9	1.8
47+80	587.4	587.6	33.1	554.5	36.7	550.9	4.9	1.8
47+70	587.4	587.5	33.0	554.5	36.7	550.8	5.0	1.9
47+60	587.4	587.7	33.0	554.7	36.7	551.0	4.9	1.8
47+50	587.5	587.8	33.1	554.7	36.6	551.2	4.8	1.7
47+40	587.5	587.8	33.1	554.7	36.7	551.1	4.7	1.7

NOTE: DEPTH TO 30" WIDE WAS ESTIMATED ON A 1:1.5 SLOPE.

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)
Date Shipped: 26-Jan-04
Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311
Airbill No: N/A
Cooler No.

SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL
333 SHORE DRIVE
BURR RIDGE, IL 60527
Phone: (630) 321-0944
Attention: SANJEEV BANDI

SEND RESULTS TO:
Clients Name: SUE SEPIC
Company: GEO-CON, INC.
Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146
Phone: (412) 856-7700

PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL
PROJECT NO P01-048
P O.# 78406

Relinquished by: (Signature) — Received By: — Date / Time:
Relinquished by: (Signature) — Received By: — Date / Time:
Relinquished by: (Signature) — Received at lab by: — Date / Time:
Relinquished from lab by: (Signature) — Received By: — Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
BF-084 (NW48+00)	SOIL ONLY	48+00	01/23/04		ASTM D 422; ASTM D 4318; ASTM D 2216	1 GALLON BAG
SB-099 (NW49+00)	SB BACKFILL**	49+00	01/23/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-100 (E45+50)	SB BACKFILL**	45+50	01/23/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-101 (NW48+00)	SB BACKFILL**	48+00	01/23/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

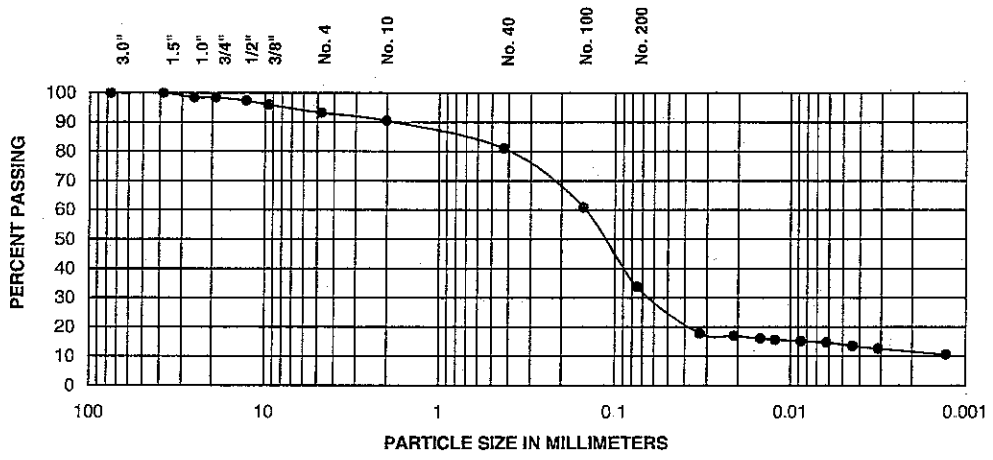
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-099 (NW 49+00)	**Date Tested**	1/29/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/26/2004
Sample Location	49+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	6.7	59.5	19.7	14.0

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	98.4
3/4"	98.4
1/2"	97.3
3/8"	95.9
No. 4	93.3
No. 10	90.5
No. 40	81.1
No. 100	60.9
No. 200	33.8

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
38	20	18

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

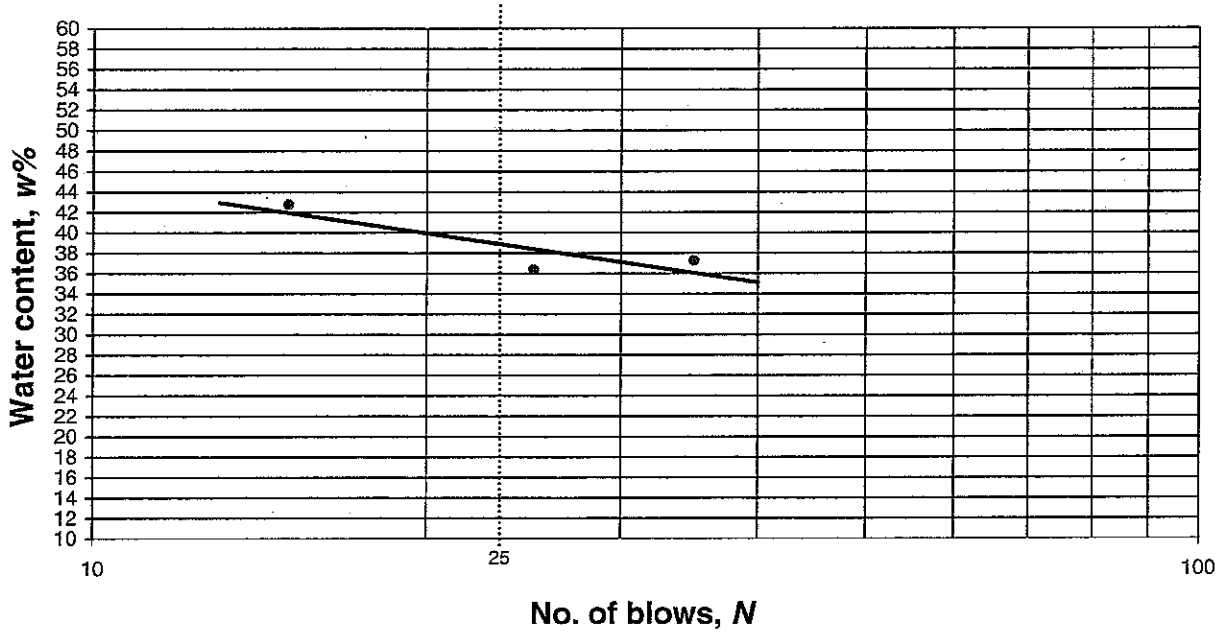
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph· (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-099 (NW 49+00)	**Date Tested**	1/28/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/26/2004
Sample Location	49+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	38	**Plastic Limit, PL**	20	**Plasticity Index, PI**	18

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/30/2004	**Tested by:**	MA	**QC by:**	NP
Sample ID:	SB-099 (NW 49+00)	Date Recd.	1/26/04	**Location**	49+00 (NW)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.70	cm	Volume, V:	272.8	cu cm
Mass of Sample:	536.6	g	**Moisture Content:**	**31.1**	%
			Wet Density	122.7	**pcf**
			Dry Density	93.6	**pcf**

Final

Diameter:	6.87	cm	Area, A:	37.1	sq cm
Height, L:	6.73	cm	Volume, V:	249.5	cu cm
Mass of Sample:	511.40	g	**Moisture Content:**	**23.1**	%
			Wet Density	127.9	**pcf**
			Dry Density	103.9	**pcf**
			Deg of Saturation	97.6	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	18.9	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/30/2004	8:45 AM	0	0	3.03	5.93		20.0	---
1/30/2004	9:30 AM	2700	2700	3.07	5.88	0.8	20.0	2.08E-08
1/30/2004	10:30 AM	3600	6300	3.12	5.83	1.0	20.0	1.57E-08
1/30/2004	11:15 AM	2700	9000	3.16	5.78	0.8	20.0	2.10E-08
1/30/2004	12:15 PM	3600	12600	3.22	5.72	1.0	20.0	1.90E-08

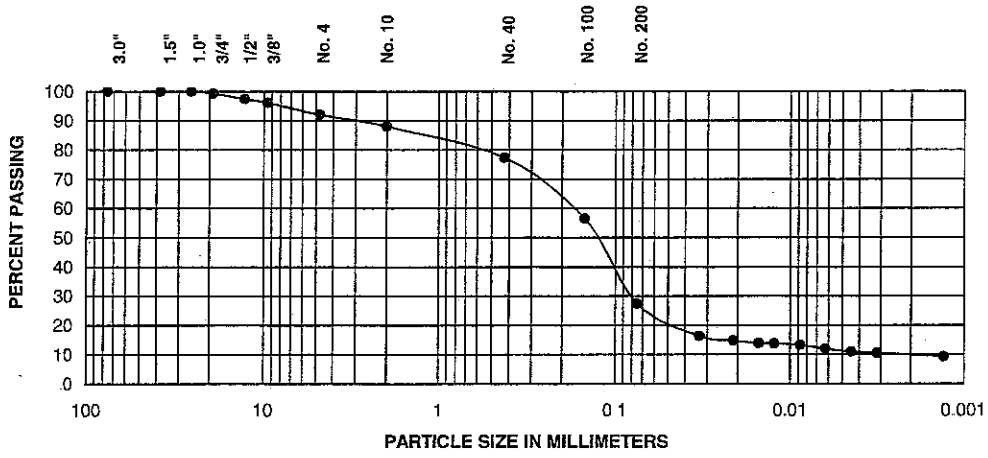
Average Permeability = **1.9E-08** **cm/sec**

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-100 (E 45+50)	**Date Tested**	1/29/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/26/2004
Sample Location	45+50 (E)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	7.9	64.6	16.0	11.5

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	**Percent Passing**
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.3
1/2"	97.5
3/8"	96.2
No. 4	92.1
No. 10	88.1
No. 40	77.4
No. 100	56.5
No. 200	27.5

Liquid Limit, L_L	**Plastic Limit, PL**	**Plasticity Index, PI**
26	21	5

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

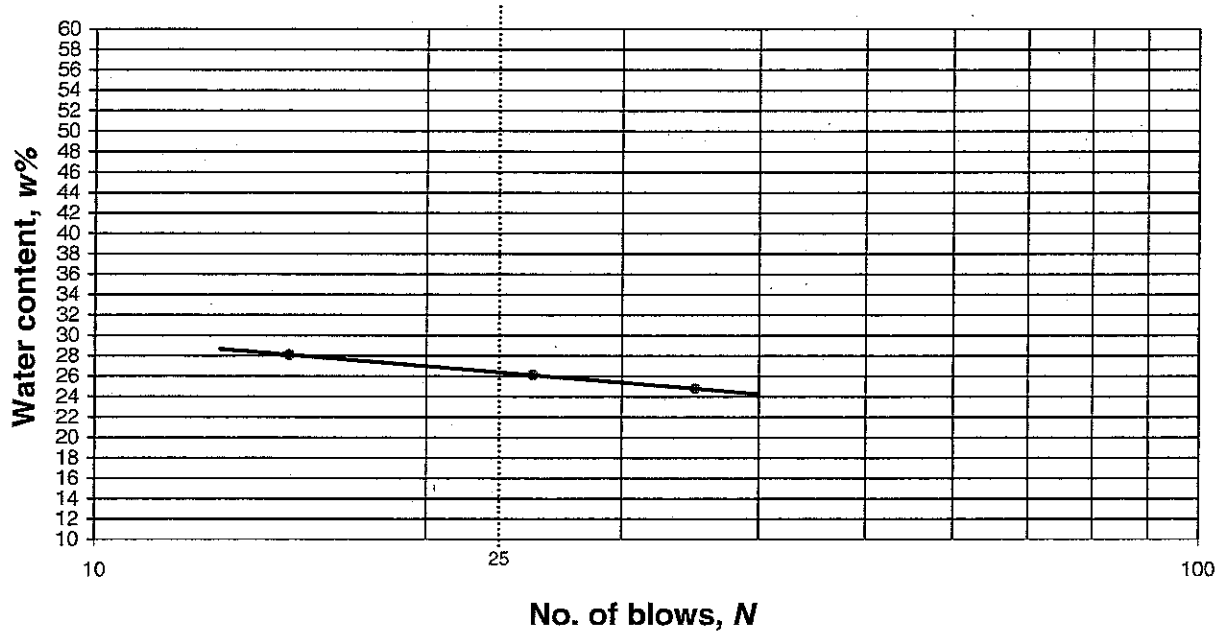
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-100 (E 45+50)	**Date Tested**	1/28/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/26/2004
Sample Location	45+50 (E)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**26**	**Plastic Limit, PL**	**21**	**Plasticity Index, PI**	**5**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/30/2004	**Tested by:**	MA	**QC by:**	NP
Sample ID:	SB-100 (E 45+50)	Date Recd.	1/26/04	**Location**	45+50 (E)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.59	cm	Volume, V:	268.3	cu cm
Mass of Sample:	522.3	g	**Moisture Content:**	21.6	%
			Wet Density	121.5	pcf
			Dry Density	99.9	pcf

Final

Diameter:	6.98	cm	Area, A:	38.3	sq cm
Height, L:	6.21	cm	Volume, V:	237.6	cu cm
Mass of Sample:	504.20	g	**Moisture Content:**	19.6	%
			Wet Density	132.4	pcf
			Dry Density	110.7	pcf
			Deg of Saturation	97.9	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	19.2	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/30/2004	8:45 AM	0	0	3.04	5.88		20.0	---
1/30/2004	9:30 AM	2700	2700	3.10	5.81	0.9	20.0	2.87E-08
1/30/2004	10:30 AM	3600	6300	3.17	5.72	0.8	20.0	2.79E-08
1/30/2004	11:15 AM	2700	9000	3.23	5.66	1.0	20.0	2.50E-08
1/30/2004	12:15 PM	3600	12600	3.31	5.59	1.1	20.0	2.20E-08

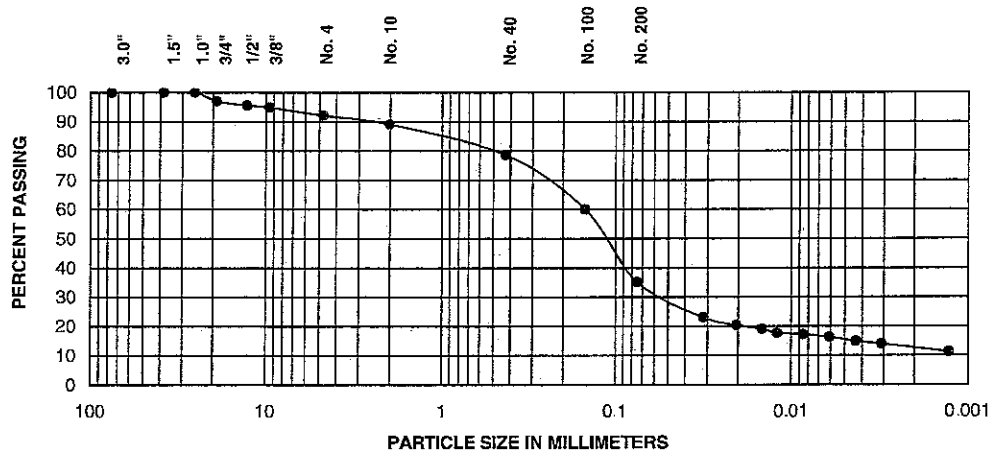
Average Permeability = **2.6E-08** cm/sec

Remarks:

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-101 (NW 48+00)	**Date Tested**	1/29/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/26/2004
Sample Location	48+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	7.8	57.0	19.6	15.6

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	97.1
1/2"	95.6
3/8"	94.9
No. 4	92.2
No. 10	89.1
No. 40	78.6
No. 100	60.0
No. 200	35.2

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
40	18	22

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

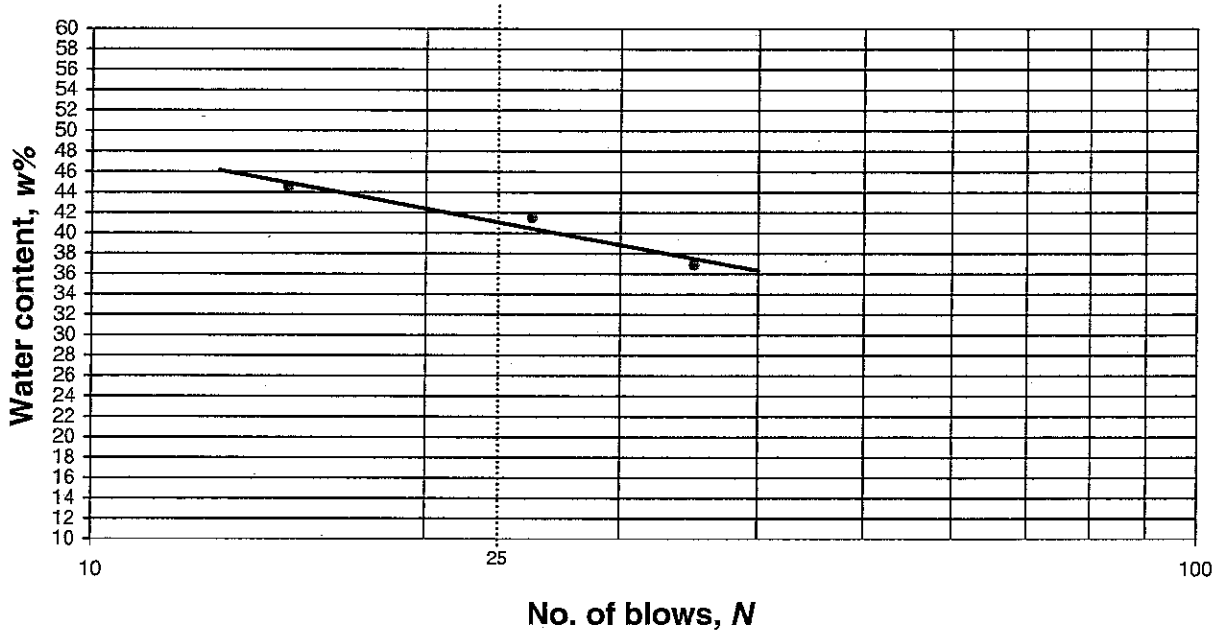
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn · Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-101 (NW 48+00)	**Date Tested**	1/28/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/26/2004
Sample Location	48+00 (NW)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**40**	**Plastic Limit, PL**	**18**	**Plasticity Index, PI**	**22**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/30/2004	**Tested by:**	MA	**QC by:**	NP
Sample ID:	SB-101 (NW 48+00)	Date Recd.	1/26/04	**Location**	48+00 (NW)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.51	cm	Volume, V:	224.3	cu cm
Mass of Sample:	417.1	g	**Moisture Content:**	**27.9**	%
			Wet Density	**116.0**	**pcf**
			Dry Density	**90.7**	**pcf**

Final

Diameter:	6.84	cm	Area, A:	36.7	sq cm
Height, L:	5.14	cm	Volume, V:	188.9	cu cm
Mass of Sample:	388.90	g	**Moisture Content:**	**23.4**	%
			Wet Density	**128.5**	**pcf**
			Dry Density	**104.1**	**pcf**
			Deg of Saturation	**99.3**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	23.0	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings Outflow cc	Burette Readings Inflow cc	Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
1/30/2004	8:45 AM	0	0	2.97	5.92		20.0	---
1/30/2004	9:30 AM	2700	2700	3.01	5.87	0.8	20.0	1.70E-08
1/30/2004	10:30 AM	3600	6300	3.07	5.80	0.9	20.0	1.80E-08
1/30/2004	11:15 AM	2700	9000	3.11	5.76	1.0	20.0	1.38E-08
1/30/2004	12:15 PM	3600	12600	3.17	5.71	1.2	20.0	1.30E-08

Average Permeability = **1.5E-08** cm/sec

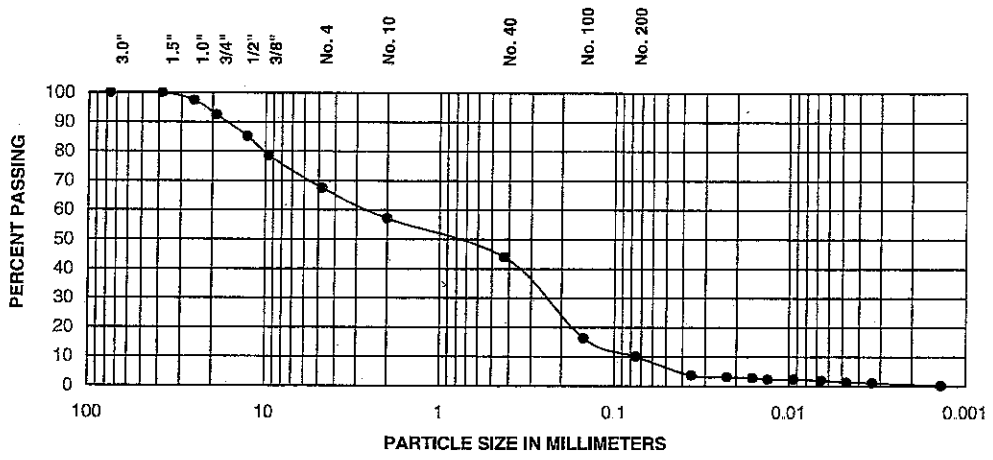
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	BF-084 (NW 48+00)	**Date Tested**	1/28/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/25/2004
Sample Location	48+00 (NW)
Sample Description	Gray silty sand with traces of gravel & foul smell (Soil Only)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	32.5	57.4	8.5	1.7

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc
	2.54	0.25	0.07	34.3	0.33

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.5
3/4"	92.5
1/2"	85.2
3/8"	78.7
No. 4	67.5
No. 10	57.1
No. 40	43.9
No. 100	16.4
No. 200	10.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
NP	NP	NP

Soil Classification:	SP-SC
Soil Description:	Poorly graded sand with clay and gravel
System:	USCS

Remarks:

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants Inc.
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

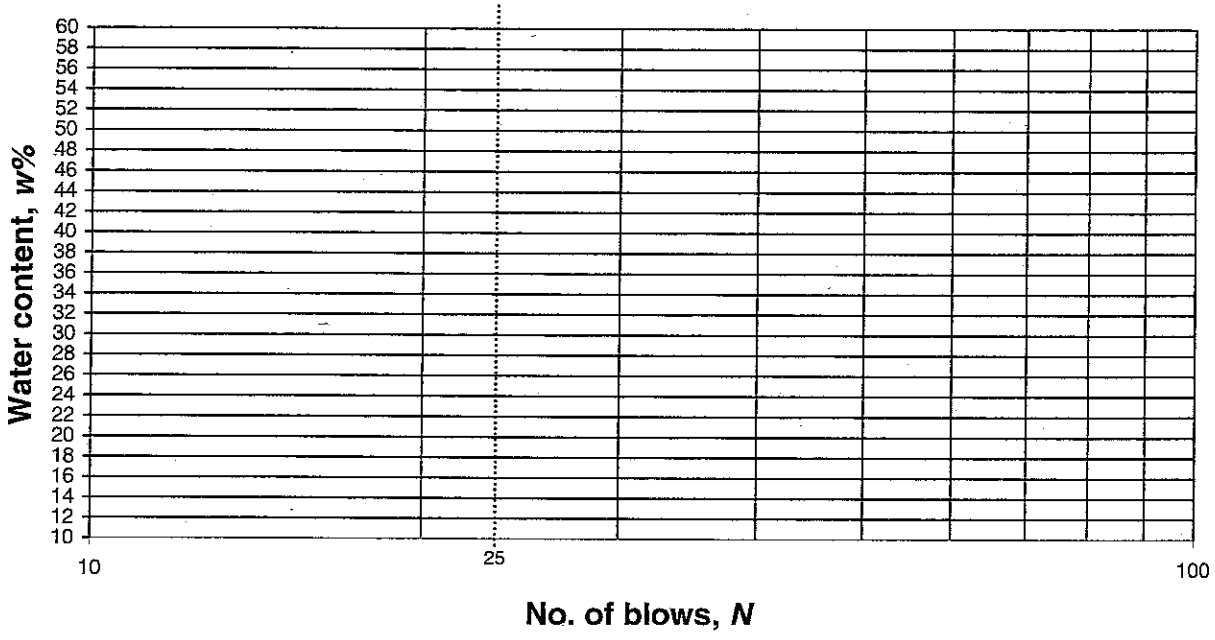
Atterberg Limits

(ASTM D4318)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd , Monroeville, PA 15146 Attn.: Ms Suzanne Sepic						
File No.	2746	**Sample #**	BF-084 (NW 48+00)	**Date Tested**	1/25/2004	**Tested By**	NP
						Qc By	SB

Date Sample Recd.	1/25/2004
Sample Location	48+00 (NW)
Sample Description	Gray silty sand with traces of gravel & foul smell (Soil Only)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**NP**	**Plastic Limit, PL**	**NP**	**Plasticity Index, PI**	**NP**

Remarks

NP-Non-plastic soil

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60527 Ph:(630) 321-0944 Fax:(630) 321-0945

MOISTURE CONTENT DETERMINATION

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146						
File No.	2746	Report No.	29	Date	1/26/2004	Sheet	1
				Date of weighing	1/27/2004	Tested by	MA

Boring No.	-					
Sample No.	BF-084 (NW48+00)					
Location	48 + 00 (NW)					
Tin No.	99A					
Tin + Wet Soil	177.22					
Tin + Dry Soil	159.7					
Wt. of Tin	30.57					
Wt. of Dry Soil	129.1					
Wt. of Water	17.5					
Moisture, %	13.6					
Penetrometer	-					
Qu (tsf)	-					
Remarks						
Description of soil:						

Boring No.						
Sample No.						
Location						
Tin No.						
Tin + Wet Soil						
Tin + Dry Soil						
Wt. of Tin						
Wt. of Dry Soil						
Wt. of Water						
Moisture, %						
Penetrometer						
Qu (tsf)						
Remarks						
Description of soil:						

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/23/04 | Job Number: P01-048
Weather: Mostly cloudy, snow showers, 16-25 degrees | Job Name: Indiana Harbor

Trench Topped Out Sta. 49+40 to 48+00 = 140 L.F.

Length: 140 x Depth[1]: 35.9 (avg.) =Square Feet 5026

Square feet: 5026 x Width: 2.5 =Total Cubic Feet[3] 12565

Cubic feet[3]: 12842.2 x Dry Unit Weight: 85 (109/5.87) /2000= 545.79 Tons of Soil

Tons of Soil: 545.79 x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate 382.05 Tons of Soil

Unit Rate: 382.05 x Specified Rate: 6% =Bentonite Required 22.92 Tons of Bentonite Required between these Stations to top out the trench.

Via Mixer = 14.00 (3.66%) Tons of Bentonite

Via Backfill = 26.00 (6.81%) Tons of Bentonite

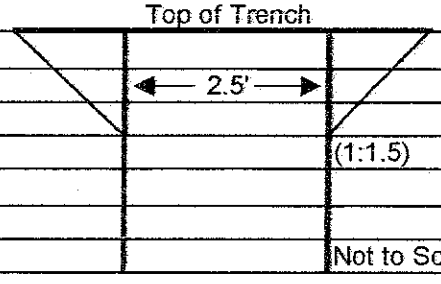
Total Tons of Bentonite Used = 40.00 (10.47%)

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

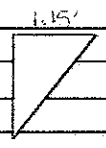
[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 4.8

4.8' - 2.5' = 2.3' → 1.15' overage on each side



A = 1/2 b h = 1/2 (1.15)(1.73) = 0.99 SF

[3] CF = SF * L * 2 sides = 277.2 CF

Note: Add to CF above

GEO-CON: Suzanne E. Sepic
Signature/Date

OWNER:
Signature/Date

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/23/04
Weather: Mostly cloudy, snow showers, 16-25 degrees

Job Number: P01-048
Job Name: Indiana Harbor

Trench Topped Out Sta. 45+30 to 45+80 = 50 L.F.

Length: 50 x Depth[1]: 35.8' (avg) =Square Feet 1790

Square feet: 1790 x Width: 2.5 =Total Cubic Feet[3] 4475

Cubic feet[3]: 4512 x Dry Unit Weight: 85 /2000= 191.76 Tons of Soil

Tons of Soil: 191.76 x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate 134.23 Tons of Soil

Unit Rate: 134.23 x Specified Rate: 6% =Bentonite Required 8.05 Tons of Bentonite Required between these Stations to top out the trench

Via Mixer = 5.00 (3.72%) Tons of Bentonite

Via Backfill = 12.00 (8.94%) Tons of Bentonite

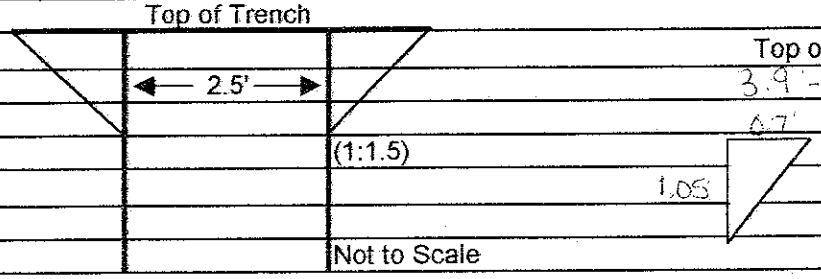
Total Tons of Bentonite Used = 17.00 (12.66%)

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] =
3.9' - 2.5 = 1.4' → 0.7' average on each side

0.7'

A = 1/2 b h = 1/2 (.7)(1.05') = 0.37 SF

[3] CF = SF * L * 2 sides = 37 CF

Note: Add to CF above

GEO-CON Suzanne E. Lepo
Signature/Date

OWNER:
Signature/Date

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/24/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, snow showers; 19 - 28 degrees RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
N/A						

NORTH & EAST TRENCH

COMMENTS: Excavation is completed. No slurry sample is needed from the trench today because the trench was topped out. Backfilling is now complete.

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	
N/A	Excavation was completed on 01/23/04.			

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?
47+75	2.00	N/A	N/A	N/A	6.88×10^{-8}	N/A
47+50	2.00	N/A	N/A	N/A	4.81×10^{-8}	N/A
47+25	2.00	N/A	N/A	N/A	5.62×10^{-8}	N/A
47+00	2.00	Sample collected	Sample collected	Sample collected	1.64×10^{-7}	yes
46+75	2.00	N/A	N/A	N/A	1.75×10^{-7}	N/A
46+50	2.00	N/A	N/A	N/A	1.79×10^{-7}	N/A
46+25	2.00	N/A	N/A	N/A	8.25×10^{-8}	N/A
46+00	2.00	Sample collected	Sample collected	Sample collected	4.81×10^{-8}	yes

COMMENTS

North trench and east trench were combined today. Backfilling from the north to east direction.

DRY BENTONITE ADDITION		
	TONS	%
TODAY	42.00	6%
TO DATE	614.00	6%
BORROW %	CY	

Unit weight:		
	47+75:	116.5 pcf
	47+50:	117.0 pcf
	47+25:	117.0 pcf
	47+00:	117.0 pcf
	46+75:	116.0 pcf
	46+50:	117.0 pcf
	46+25:	116.0 pcf
	46+00:	117.5 pcf

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepic OWNER:

Geo-Con

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/24/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
N/A				
No mixing anymore. Trench excavation is almost complete. The batch plant is done.				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

GEO-CON: Suzanne E. Sepo OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 01/24/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: P01-048

WEATHER: Partly sunny, snow showers; 19 - 28 degrees RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
N/A							48+00	TOPOUT	TOPOUT
							47+90	16.2	TOPOUT
							47+80	18.0	TOPOUT
							47+70	28.9	TOPOUT
							47+60	35.1	TOPOUT
							47+50	36.2	TOPOUT
							47+40	36.3	TOPOUT
							47+30	36.0	TOPOUT
							47+20	28.9	TOPOUT
							47+10	27.8	TOPOUT
							47+00	25.0	TOPOUT
EXCAVATION OF THE ENTIRE							46+90	22.9	TOPOUT
SLURRY WALL IS NOW							46+80	19.3	TOPOUT
COMPLETE.							46+70	17.1	TOPOUT
							46+60	15.9	TOPOUT
							46+50	15.6	TOPOUT
							46+40	13.7	TOPOUT
							46+30	12.1	TOPOUT
							46+20	9.9	TOPOUT
							46+10	7.7	TOPOUT
							46+00	4.0	TOPOUT
							45+90	3.2	TOPOUT
							45+80	TOPOUT	TOPOUT

SF TODAY

SF TO DATE 111337.00

COMMENTS

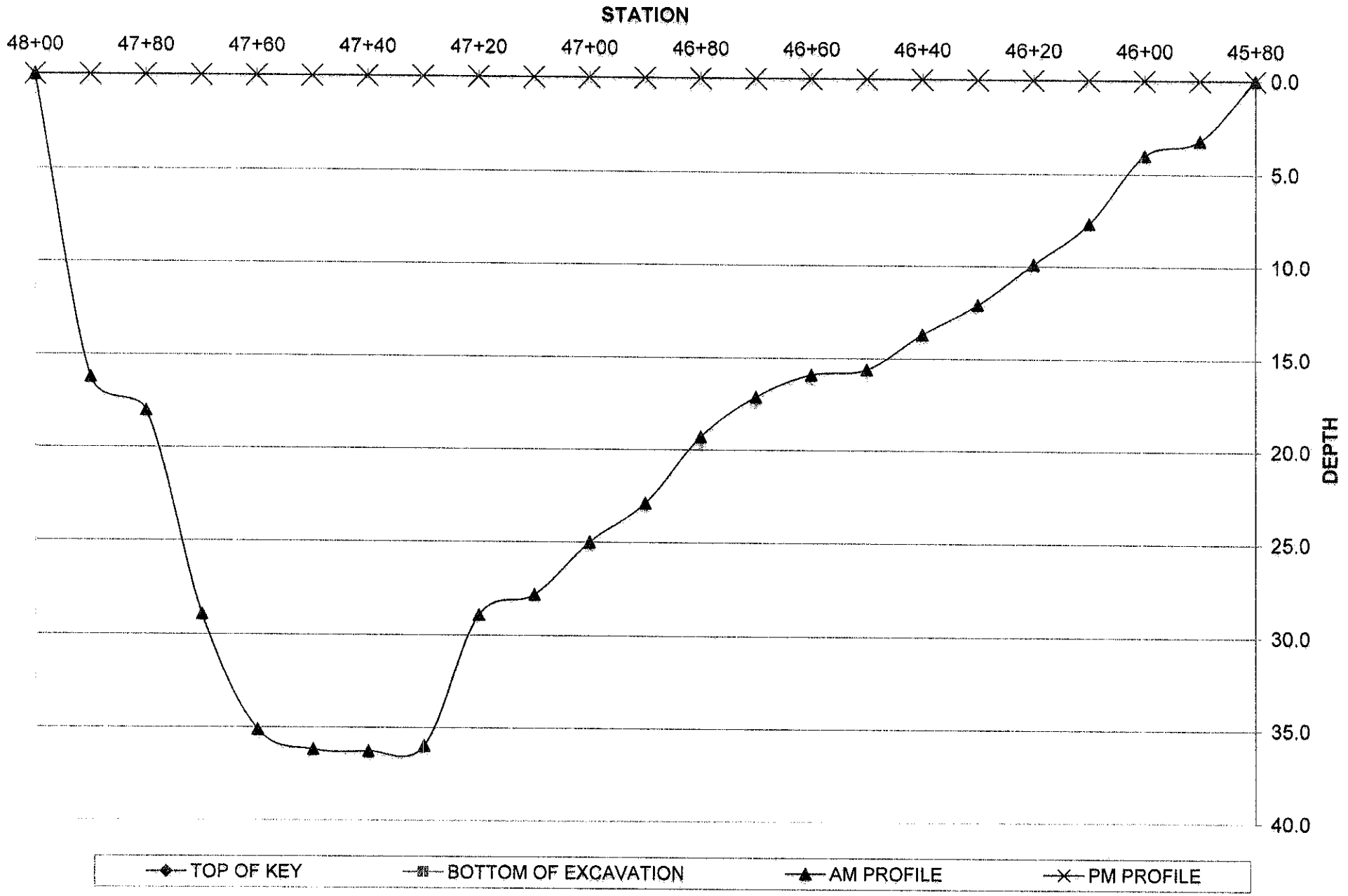
NORTH TRENCH and EAST TRENCH

Remainder of the North and East trench was topped out today.

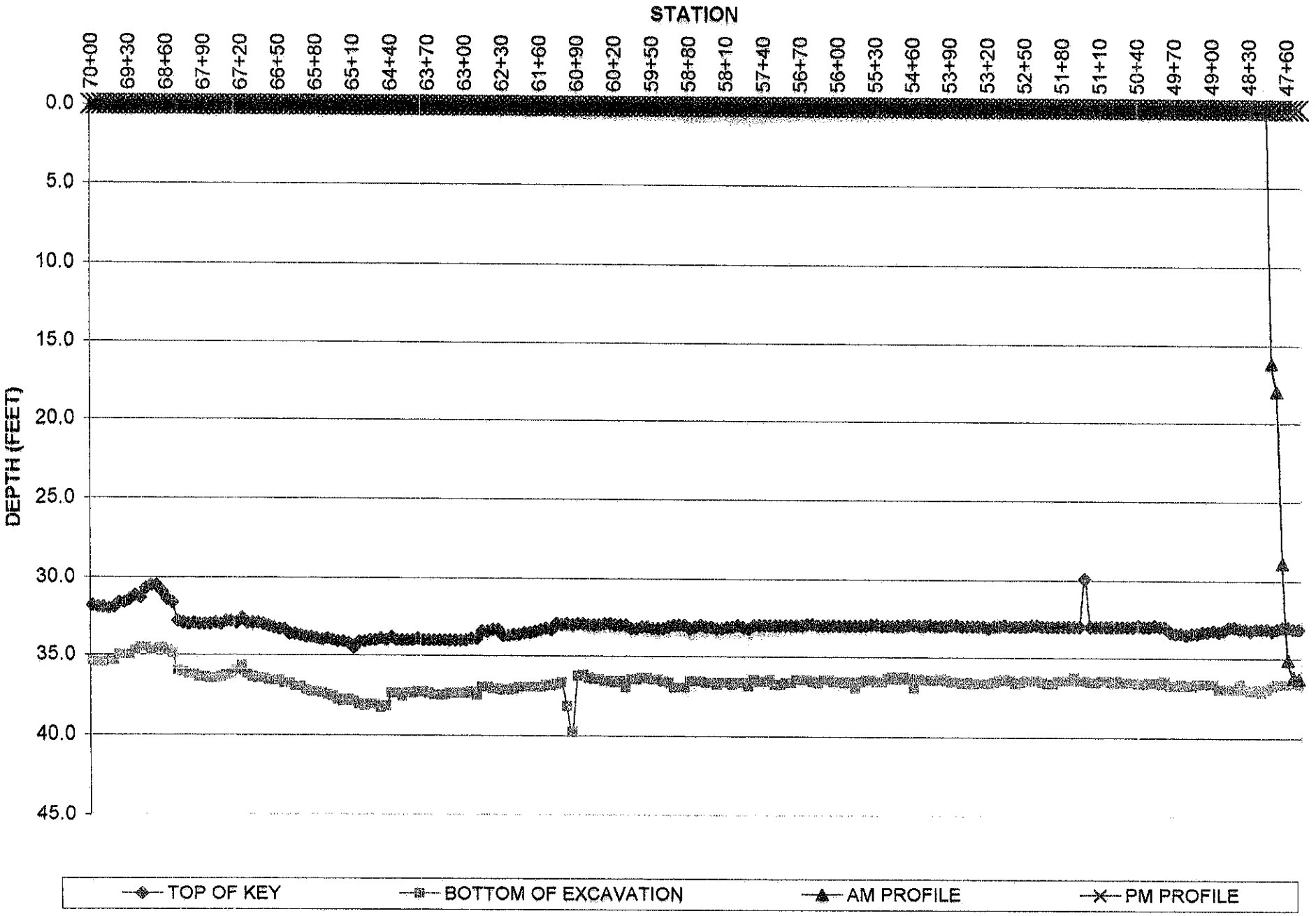
Top of slopes slide toward the middle overnight.

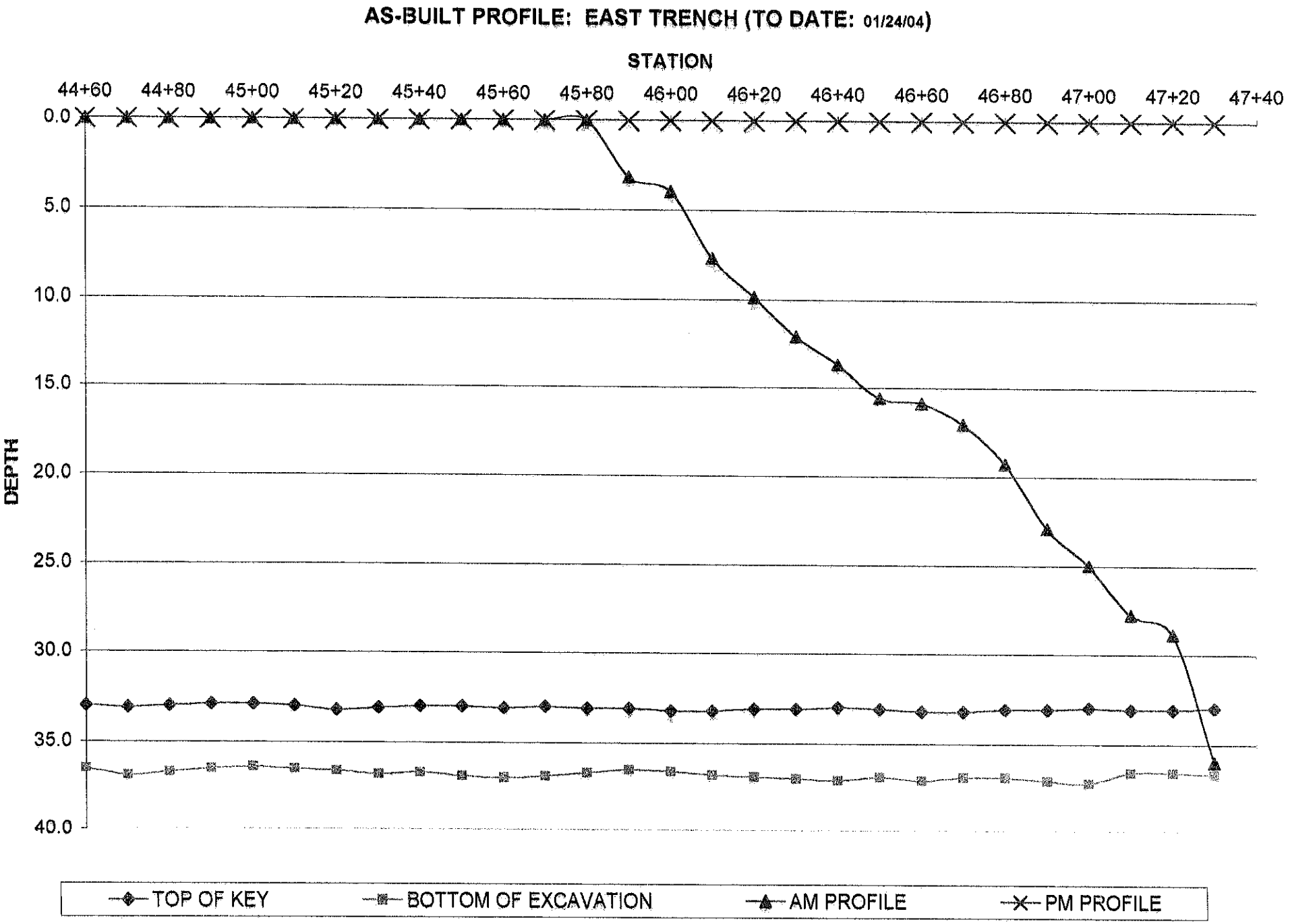
GEO-CON: Suzanne C. Sipo OWNER:

AS-BUILT PROFILE: NORTH TRENCH & EAST TRENCH (01/24/04)



AS-BUILT PROFILE: NORTH TRENCH (TO DATE: 01/24/03)




AS-BUILT PROFILE: EAST TRENCH (TO DATE: 01/24/04)
STATION
44+60
44+80
45+00
45+20
45+40
45+60
45+80
46+00
46+20
46+40
46+60
46+80
47+00
47+20
47+40
DEPTH
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
TOP OF KEY
BOTTOM OF EXCAVATION
AM PROFILE
PM PROFILE

DAILY QC TESTS

DATE 01/24/04 PAGE 1 OF 2

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

NORTH + EAST TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
47+75	2	2" to 6"	116.5	+15 pcf over trench slurry	6.88×10^{-8}	1.0×10^{-7} cm/sec
47+50	2	2" to 6"	117	+15 pcf over trench slurry	4.81×10^{-8}	1.0×10^{-7} cm/sec
47+25	2	2" to 6"	117	+15 pcf over trench slurry	5.62×10^{-8}	1.0×10^{-7} cm/sec
47+00	2	2" to 6"	117	+15 pcf over trench slurry	1.64×10^{-7}	1.0×10^{-7} cm/sec
46+75	2	2" to 6"	116	+15 pcf over trench slurry	1.75×10^{-7}	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

DAILY QC TESTS **DATE** 01/24/04

Page 2 of 2

BENTONITE SLURRY AT THE BATCH PLANT

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

	TIME	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)
AM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	
PM			> 40 sec		> 64 pcf		6.5 - 10		< 20 cm^3	

N/A

NORTH or EAST TRENCH

NOTE: TAKE THE VISCOSITY 4 TIMES A DAY; 2 TIMES IN AM; 2 TIMES IN PM

TAKE THE UNIT WEIGHT, pH, FILTRATE, & FILTER CAKE 2 TIMES A DAY; 1 TIME IN AM; 1 TIME IN PM

BENTONITE SLURRY AT THE TRENCH

AM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

PM	STATION	DEPTH	VISCOSITY (seconds)	Require	UNIT WEIGHT (pcf)	Require	pH	Require	FILTRATE (cm^3)	Require	FILTER CAKE (mm)	SAND CONTENT (%)	Require
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%
				40 - 90 sec		64 - 95 pcf		6.5 - 10		< 25 cm^3			MAX 30%

N/A

SOIL-BENTONITE BACKFILL TESTING

STATION	SLUMP (inches)	Require	UNIT WEIGHT (pcf)	Require	PERMEABILITY (cm/sec)	Require
46+50	2	2" to 6"	117	+15 pcf over trench slurry	1.79×10^{-7}	1.0×10^{-7} cm/sec
46+25	2	2" to 6"	116	+15 pcf over trench slurry	8.25×10^{-8}	1.0×10^{-7} cm/sec
46+50	2	2" to 6"	117.5	+15 pcf over trench slurry	4.81×10^{-8}	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec
—	—	2" to 6"	—	+15 pcf over trench slurry	—	1.0×10^{-7} cm/sec

TEST SLUMP AND UNIT WEIGHT EVERY 100 LINEAR FEET. TEST PERMEABILITY EVERY 25 LINEAR FEET. COLLECT SAMPLE OF EXCAVATED SOIL AND SB BACKFILL EVERY 100 LINEAR FEET FOR SEND OFF TO LAB.

NORTH + EAST TRENCH

Geo-Con

API QUICK PERMEABILITY TEST

47+75, 47+50, 47+25

Job: Indiana Harbor CDF S-B Cutoff Wall

Sta: 47+00, 46+75, 46+50, 46+25, 46+00

Technician: SM VBY SES

Sample Area: A= $\pi r^2 = \pi(3.85)^2 = 46.56$ cm²

Sample Height: L= 6.0cm, 7.0cm, 7.0cm, 7.0cm, 6.0cm, 6.5cm, 6.0cm, 7.0cm cm

	Date	Time	ΔT (min)	Pressure (psi)	Gradient (I)	X = 60 IAR	Q (cc)	ΔQ (cc)	K = ΔQ/Δt x 1/X (cm/sec)	
47+75	01/24/04	10:30-14:30	240	10	117.2305	605865.9809	—	10	6.88×10^{-8}	4.70
47+50	01/24/04	10:30-14:30	240	10	100.4833	519313.7717	—	6	4.81×10^{-8}	3.[illegible]
47+25	01/24/04	10:30-14:30	240	10	100.4833	519313.7717	—	7	5.62×10^{-8}	3.84
47+00	01/24/04	10:30-14:30	240	10	100.4833	519313.7717	—	20.5	1.64×10^{-7}	1.10
46+75	01/24/04	10:30-14:30	240	10	117.2305	605865.9809	—	25.5	1.75×10^{-7}	1.1[illegible]
46+50	01/24/04	10:30-14:30	240	10	108.2128	559261.0644	—	24	1.79×10^{-7}	1.2[illegible]
46+25	01/24/04	10:30-14:30	240	10	117.2305	605865.9809	—	12	8.25×10^{-8}	5.6
46+00	01/24/04	10:30-14:30	240	10	100.4833	519313.7717	—	6	4.81×10^{-8}	3.[illegible]

I= P (psi) / 0.014217 L (cm)

R= Quick Test / Triaxial Test = 1.85

CHAIN-OF CUSTODY RECORD

SAMPLER: (Signature)		Date Shipped: 26-Jan-04	Carrier: DIRECT--LAB PICKUP
Phone: (724) 366-9311	Airbill No: N/A		Cooler No.
SHIP TO: GREAT LAKES SOIL & ENVIRONMENTAL		SEND RESULTS TO:	
333 SHORE DRIVE		Clients Name: SUE SEPIC	
BURR RIDGE, IL 60527		Company: GEO-CON, INC.	
Phone: (630) 321-0944		Address: 4075 MONROEVILLE BLVD. BLDG II SUITE 400, MONROEVILLE, PA 15146	
Attention: SANJEEV BANDI		Phone: (412) 856-7700	
PROJECT NAME: INDIANA HARBOR CDF S.B. CUTOFF WALL		PROJECT NO P01-048	P.O.# 78406

Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received By:	Date / Time:
Relinquished by: (Signature)	Received at lab by:	Date / Time:
Relinquished from lab by: (Signature)	Received By:	Date / Time:

ANALYSIS REQUEST

Sample ID Number	Sample Description	Station / Depth Sampled	Date Sampled	Time Sampled	Analysis Requested	Sample Condition Upon Receipt
SB-102 (N47+00)	SB BACKFILL**	47+00	01/24/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG
SB-103 (E46+00)	SB BACKFILL**	46+00	01/24/04		ASTM D 422; ASTM D 4318; ASTM D 5084	1 GALLON BAG

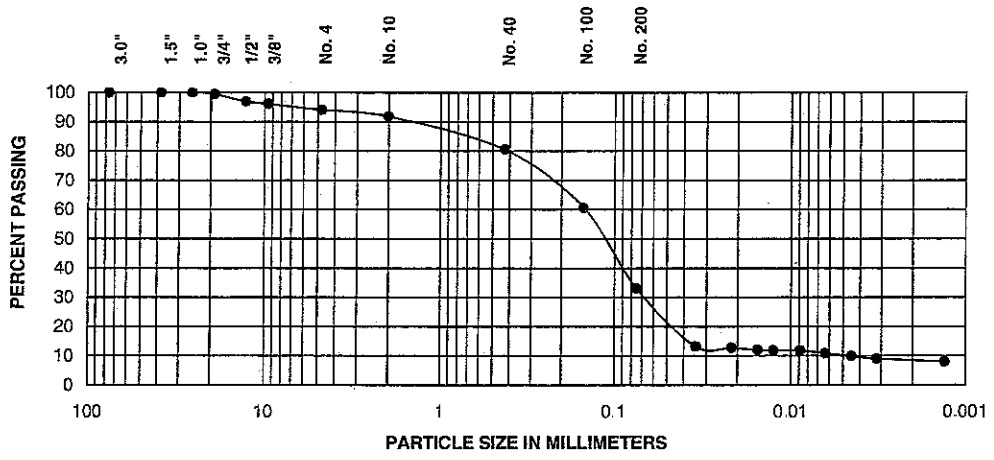
Special Instructions/Comments: **SB=SOIL BENTONITE

White - Carrier Green - Laboratory Yellow - Final Destination Pink - Project/Dept. File Gold -Site

Great Lakes Soil & Environmental Consultants, Inc.	GRAIN SIZE ANALYSIS (ASTM D422)
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-102 (N 47+00)	**Date Tested**	1/29/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/26/2004
Sample Location	47+00 (N)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	5.9	61.0	22.8	10.4

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	100.0
3/4"	99.5
1/2"	97.0
3/8"	96.1
No. 4	94.1
No. 10	91.9
No. 40	80.6
No. 100	60.7
No. 200	33.1

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
36	19	17

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

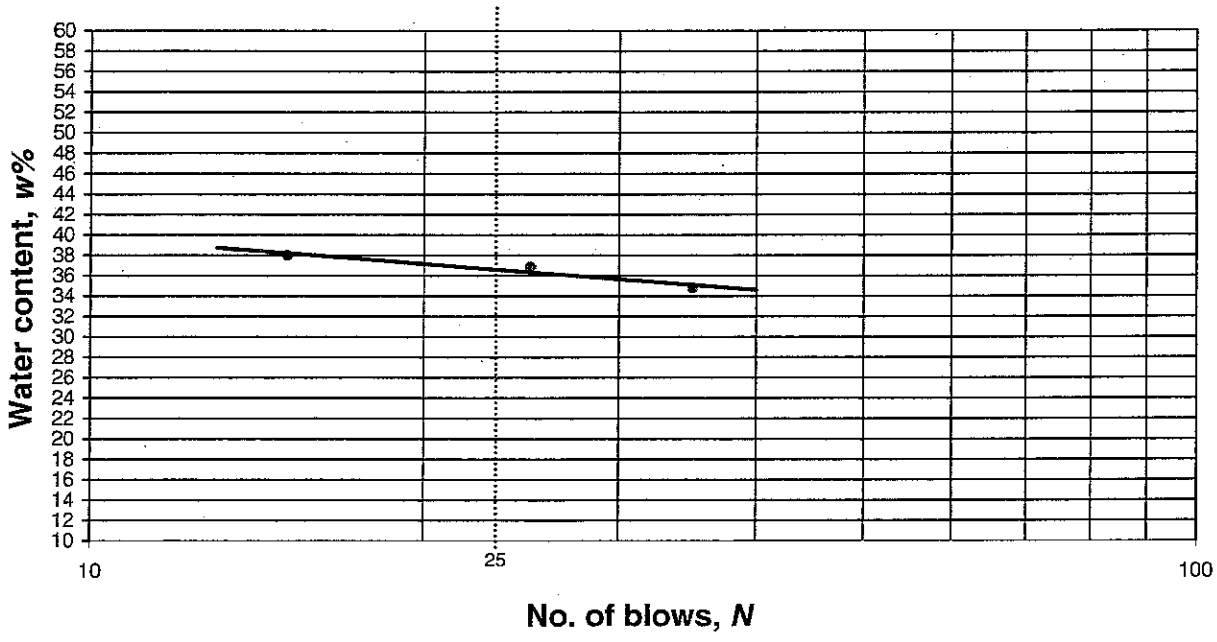
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn : Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-102 (N 47+00)	**Date Tested**	1/28/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/26/2004
Sample Location	47+00 (N)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	36	**Plastic Limit, PL**	19	**Plasticity Index, PI**	17

Remarks

	Great Lakes Soil & Environmental Consultants, Inc 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/10/2004	**Tested by:**	MA	**QC by:**	NP
Sample ID:	SB-102 (N 47+00)	Date Recd.	1/26/04	**Location**	47+00 (N)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	5.83	cm	Volume, V:	237.4	cu cm
Mass of Sample:	422.1	g	**Moisture Content:**	**32.4**	**%**
			Wet Density	**111.0**	**pcf**
			Dry Density	**83.8**	**pcf**

Final

Diameter:	6.84	cm	Area, A:	36.7	sq cm
Height, L:	5.29	cm	Volume, V:	194.4	cu cm
Mass of Sample:	399.10	g	**Moisture Content:**	**23.9**	**%**
			Wet Density	**128.1**	**pcf**
			Dry Density	**103.4**	**pcf**
			Deg of Saturation	**99.6**	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	21.7	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/30/2004	8:45 AM	0	0	3.06	5.90		20.0	---
1/30/2004	9:30 AM	2700	2700	3.10	5.85	0.8	20.0	1.81E-08
1/30/2004	10:30 AM	3600	6300	3.15	5.79	0.8	20.0	1.64E-08
1/30/2004	11:15 AM	2700	9000	3.19	5.75	1.0	20.0	1.46E-08
1/30/2004	12:15 PM	3600	12600	3.24	5.70	1.0	20.0	1.38E-08

Average Permeability = **1.6E-08** **cm/sec**

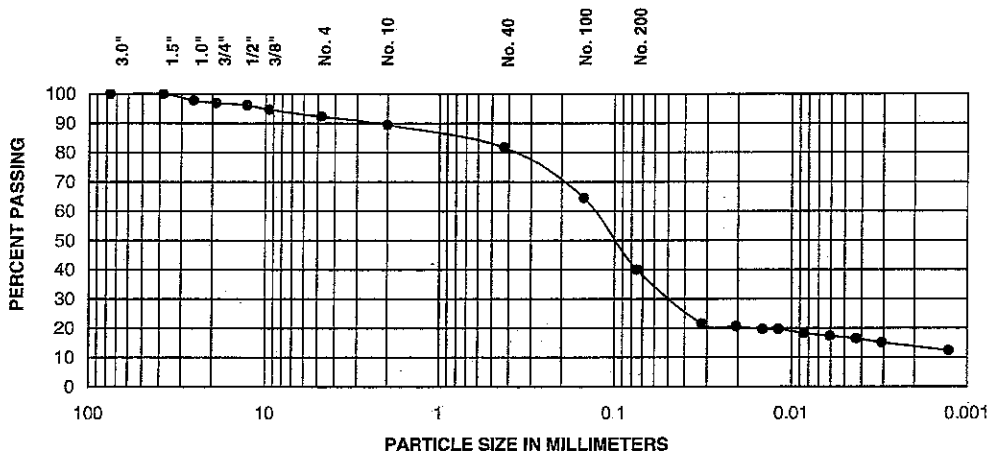
Remarks:

Quality, Service & Commitment

Great Lakes Soil & Environmental Consultants, Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	GRAIN SIZE ANALYSIS (ASTM D422)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File No.	2746	**Sample #**	SB-103 (E 46+00)	**Date Tested**	1/29/2004	**Tested by**	MA
						Qc by	NP

Date Sample Received:	1/26/2004
Sample Location	46+00 (E)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)



			Fines	
% + 3"	**% Gravel**	**% Sand**	**% Silt**	**% Clay**
0.0	7.7	52.3	23.2	16.8

For coarse-grained soils with <12% Fines	D60(mm)	D30(mm)	D10(mm)	Cu	Cc

Sieve Size	Percent Passing
3.0"	100.0
1.5"	100.0
1.0"	97.7
3/4"	97.0
1/2"	96.2
3/8"	94.8
No. 4	92.3
No. 10	89.5
No. 40	81.7
No. 100	64.5
No. 200	40.0

Liquid Limit, L_L	Plastic Limit, PL	Plasticity Index, PI
39	20	19

Soil Classification:	SC-SM
Soil Description:	Silty, clayey sand
System:	USCS

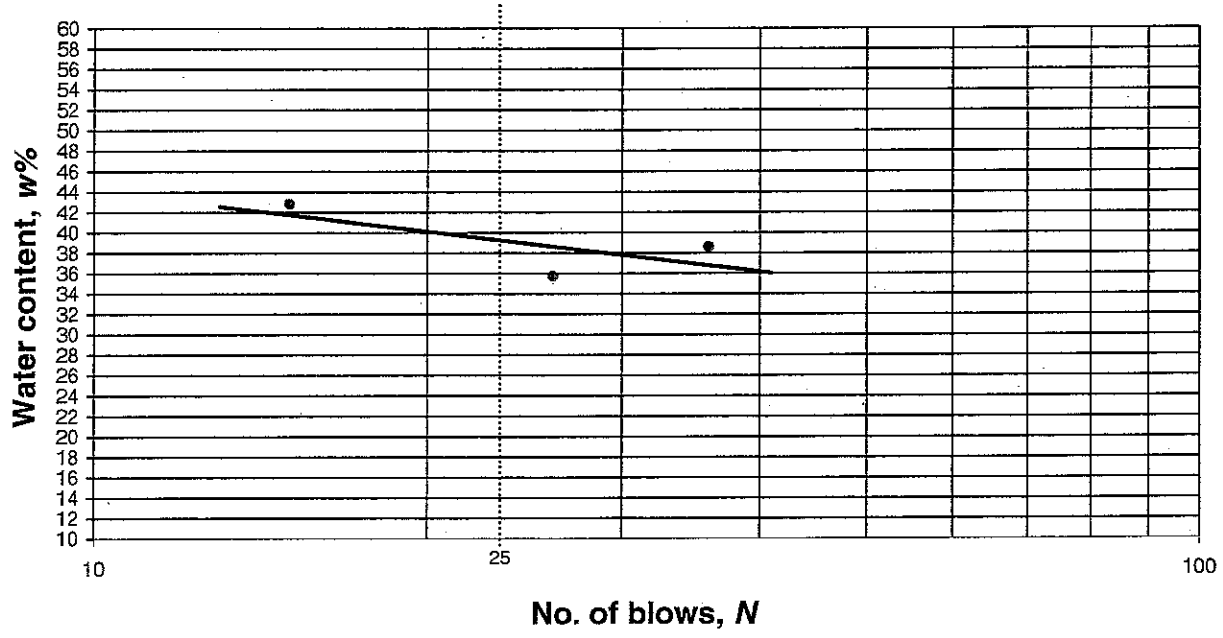
Remarks:

	Great Lakes Soil & Environmental Consultants Inc. 333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945	**Atterberg Limits** **(ASTM D4318)**

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms Suzanne Sepic						
File No.	2746	**Sample #**	SB-103 (E 46+00)	**Date Tested**	1/28/2004	**Tested By**	MA
						Qc By	NP

Date Sample Recd.	1/26/2004
Sample Location	46+00 (E)
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)

LIQUID LIMIT DETERMINATION



Results

Liquid Limit, LL	**39**	**Plastic Limit, PL**	**20**	**Plasticity Index, PI**	**19**

Remarks

Great Lakes Soil & Environmental Consultants, Inc
333 Shore Drive, Burr Ridge, IL 60521 Ph: (630) 321-0944 Fax: (630) 321-0945

COEFFICIENT OF PERMEABILITY - ASTM D5084 (FLEXIBLE WALL)

Project	Indiana Harbor and Canal CDF-Laboratory Testing						
Client	GEO-CON 4075 Monroeville Blvd., Monroeville, PA 15146 Attn.: Ms. Suzanne Sepic						
File #	2746	**Date Tested**	1/30/2004	**Tested by:**	MA	**QC by:**	NP
Sample ID:	SB-103 (E 46+00)	Date Recd.	1/26/04	**Location**	46+00 (E)		
Sample Description	Gray silty, clayey sand with traces of gravel (SB Backfill)						

Specimen Data

Initial

Diameter:	7.20	cm	Area, A:	40.7	sq cm
Height, L:	6.23	cm	Volume, V:	253.7	cu cm
Mass of Sample:	465.0	g	**Moisture Content:**	**33.2**	%
			Wet Density	114.4	**pcf**
			Dry Density	85.9	**pcf**

Final

Diameter:	6.91	cm	Area, A:	37.5	sq cm
Height, L:	5.92	cm	Volume, V:	222.0	cu cm
Mass of Sample:	447.30	g	**Moisture Content:**	**25.8**	%
			Wet Density	125.7	**pcf**
			Dry Density	100.0	**pcf**
			Deg of Saturation	98.9	

Test Data

Permeant:	De-aired Tap Water	
Cell Pressure	80.0	psi
Top Pressure	75.0	psi
Bottom Pressure	76.8	psi
Gradient:	20.3	

Date	Time	Elapsed Time (Sec)	Cumulative Time (Sec)	Burette Readings		Outflow/Inflow Ratio	Fluid Temp. oC	Permeability cm/sec
				Outflow cc	Inflow cc			
1/30/2004	8:45 AM	0	0	3.10	5.92		20.0	---
1/30/2004	9:30 AM	2700	2700	3.15	5.87	1.0	20.0	1.94E-08
1/30/2004	10:30 AM	3600	6300	3.20	5.81	0.8	20.0	1.75E-08
1/30/2004	11:15 AM	2700	9000	3.25	5.75	0.8	20.0	2.35E-08
1/30/2004	12:15 PM	3600	12600	3.31	5.69	1.0	20.0	1.77E-08

Average Permeability = **2.0E-08** **cm/sec**

Remarks:

North + East Trench

GEO-CON

SOIL-BENTONITE BACKFILL
QUALITY CONTROL

Date: 01/24/04 Job Number: P01-048
Weather: Partly sunny, snow showers, 19-28 degrees Job Name: Indiana Harbor

Trench Topped Out Sta. 48+00 to 45+80 = 220 L.F.

Length: 220 x Depth[1]: 35.8' (avg) =Square Feet 7876

Square feet: 7876 x Width: 2.5 =Total Cubic Feet[3] 19690

Cubic feet[3]: 19808.8 x Dry Unit Weight: 85 (1683748) /2000= 841.87 Tons of Soil

Tons of Soil: 841.87 x 0.70 (minus excess trench spoils of 30%) = Unit Addition Rate 589.31 Tons of Soil

Unit Rate: 589.31 x Specified Rate: 6% =Bentonite Required 35.36 Tons of Bentonite Required between these Stations to top out the trench.

Via Mixer = 22.00 (3.73%) Tons of Bentonite

Via Backfill = 42.00 (7.13%) Tons of Bentonite

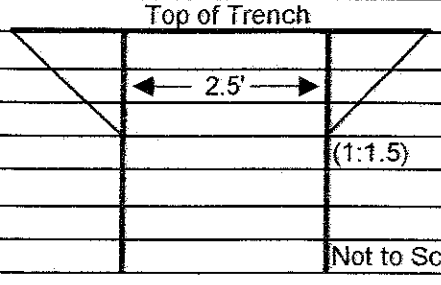
Total Tons of Bentonite Used = 64.00 (10.86%)

Comments:

[1] Depth of trench (avg.) is obtained by adding together the depths from the daily profiles for thes stations and dividing them by the number of stations.

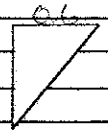
[2] Top of trench width (avg.) is obtained in the same manner as described above in footnote [1].

[3] Cubic foot is Total cubic feet for a width of 2.5' added to the cubic foot for the width overage on the top portion of the trench.



Top of Trench Width (avg).[2] = 3.7'

3.7' - 2.5' = 1.2' → 0.6' overage on each side



A = 1/2 b h = 1/2 (.6)(.9) = 0.27 SF

[3] CF = SF * L * 2 sides = 118.8 CF

Note: Add to CF above

GEO-CON Suzanne E Sepic
Signature/Date

OWNER:
Signature/Date

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 04/29/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Clear Windy RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
69+85	5.00	73.00	10.00	15.00	75.00	8.7

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

No Backfill Mixed or Placed Today

DRY BENTONITE ADDITION		
	TONS	%
TODAY	0.00	
TO DATE	0.00	
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

FOM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

ATE: 04/29/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
12:33	66.00	46.00	15.00	8

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 04/29/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear Windy RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
69+85	NA	0.0					NA		
			5.0	10.0	50.0				
69+75	NA	10.0							
			15.0	10.0	150.0				
69+65	NA	20.0							
			18.5	10.0	185.0				
69+55	NA	17.0							
			8.5	10.0	85.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				

SF TODAY 470.00

SF TO DATE

COMMENTS No Backfill Was Placed

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 04/30/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Cool overcast, some drizzle RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
69+60	2.00	86.00	22.00	12.00	89.00	8.8
69+50	2.00	80.50	20.00	See Note	89.00	8.8
69+50	34.00	91.00	22.00	See Note	89.00	8.8
69+20	2.00	86.00	22.00	See Note	56.00	8.8
69+20	34.00	86.00	22.00	See Note	76.00	8.8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

West Segment NW corner 69+50 to 68+00. No backfill was placed today.
The regulator on the filtrate loss meter malfunctioned. A new regulator is scheduled to be delivered on 050104.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

FOM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

ATE: 04/30/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:10	66.00	59.00	13.00	8.8
10:30	66.00	41.00	See Note	8.9
13:45	67.00	40.00	See Note	8.4
15:00	69.00	59.00	See Note	8.9

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 04/30/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Cool overcast, some drizzle RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
69+60		30.4							
			33.4	10.0	333.5				
69+50		36.3							
			36.3	10.0	362.5				
69+40		36.2							
			36.4	10.0	364.0				
69+30		36.6							
			36.5	10.0	364.5				
69+20		36.3							
			36.3	10.0	362.5				
69+10		36.2							
			36.2	10.0	362.0				
69+00		36.2							
			18.1	10.0	181.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				

SF TODAY 2330.00

SF TO DATE

COMMENTS

AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 04/30/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Cool overcast, some drizzle RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
69+90		0.0							
69+80		10.3							
69+70		20.5							
69+60		30.4							
69+50		36.3							
69+40		36.2							
69+30		36.5							
69+20		36.3							
69+10		36.2							
69+00		36.2							

SF TODAY 0.00

SF TO DATE

COMMENTS (CON'T ON PAGE 4)

PM Profile

FOM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/01/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Drizzle, cool RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
68+80	2.00	77.00	16.00	NA	59.00	8.8
	34.00	85.00	22.00	NA	61.00	8.8
68+40	2.00	84.00	22.00	21.00	52.00	8.8
	34.00	86.00	22.00	19.00	59.00	8.8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

FOM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

ATE: 05/01/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:30	65.00	40.00	NA	8.8

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/01/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Drizzle, cool RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
69+40		0.0							
69+30		5.4							
69+20		11.1							
69+10		12.2							
69+00		16.3							
68+90		23.1							
68+80		25.1							
68+70		27.2							
68+60		30.2							
68+50		31.6							
68+40		33.1							
68+30		34.6							
68+20		36.5							

SF TODAY 0.00

SF TO DATE

COMMENTS (CON'T ON PAGE 4)

FOM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/03/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Clear cool RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
68+20	2.00	93.00	25.00	22.00	62.00	8.8
	34.00	91.00	25.00	22.00	65.00	8.8
68+00	2.00	91.00	28.00	24.50	59.00	8.8
	34.00	93.00	32.00	29.00	61.00	8.8

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

FOM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

ATE: 05/03/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

No slurry produced today

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/03/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear cool RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
69+40		0.0							
			3.2	10.0	31.5				
69+30		6.3							
			8.8	10.0	87.5				
69+20		11.2							
			11.8	10.0	118.0				
69+10		12.4							
			14.4	10.0	144.0				
69+00		16.4							
			19.8	10.0	198.0				
68+90		23.2							
			24.3	10.0	242.5				
68+80		25.3							
			26.2	10.0	262.0				
68+70		27.1							
			28.6	10.0	285.5				
68+60		30.0							
			30.9	10.0	309.0				
68+50		31.8							
			32.7	10.0	327.0				
68+40		33.6							
			34.3	10.0	343.0				
68+30		35.0							
			35.6	10.0	355.5				
68+20		36.1							

SF TODAY 2703.50

SF TO DATE

COMMENTS AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/03/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear cool RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
69+10		0.0							
69+00		6.1							
68+90		9.8							
68+80		14.1							
68+70		16.2							
68+60		17.5							
68+50		19.8							
68+40		21.8							
68+30		22.6							
68+20		23.5							
68+10		24.8							
68+00		28.2							
67+90		28.2							

SF TODAY 0.00

SF TO DATE

COMMENTS (CON'T ON PAGE 4)

PM Profile

FOM OWNER:

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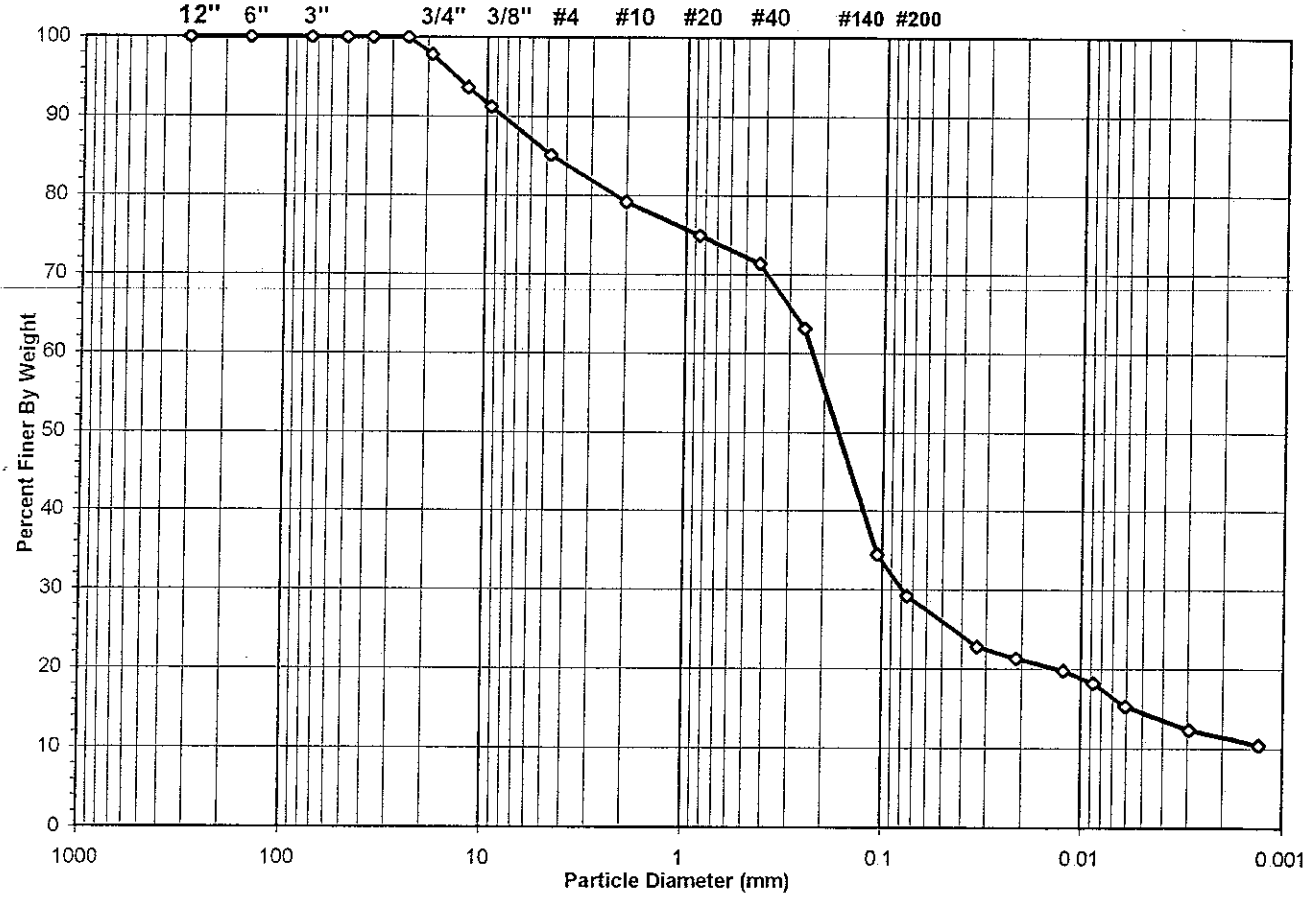
INTEGRITY IN TESTING

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/3/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-02	Sample No	69+50
Lab ID	2004-083-02-01	Soil Color	**GRAY**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay



USCS Summary		
Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	14.93
#4 To #200	*Sand*	55.84
Finer Than #200	*Silt & Clay*	29.24

USCS Symbol *SC, TESTED*

USCS Classification *CLAYEY SAND*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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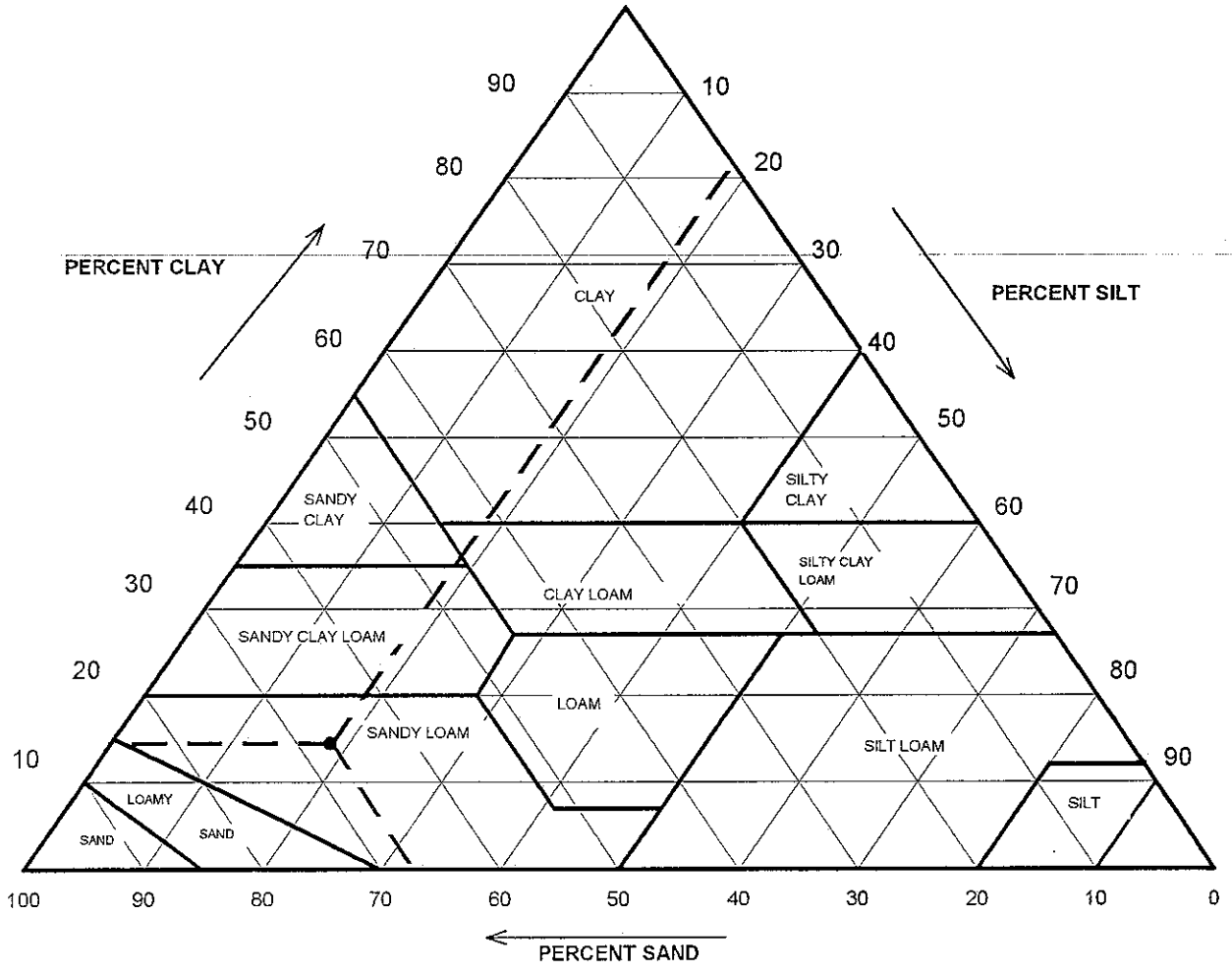
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	ENVIRONMENTAL QUALITY	Boring No	5/3/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-02	Sample No	69+50
Lab ID	2004-083-02-01	Soil Color	GRAY



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	20.85	**0.00**
2	79.15	*Sand*	53.13	**67.12**
0.05	26.02	*Silt*	14.59	**18.44**
0.002	11.43	*Clay*	11.43	**14.44**

USDA Classification *SANDY LOAM*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/3/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-02	Sample No.	69+50
Lab ID	2004-083-02-01	Soil Color	**GRAY**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No	863	Tare No.	NA
Wgt Tare + Wet Specimen (gm)	1015 68	Wgt.Tare + Wet Specimen (gm)	NA
Wgt Tare + Dry Specimen (gm)	828 40	Wgt.Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	103.40	Weight of Tare (gm)	NA
Weight of Water (gm)	187.28	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	725.00	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**25.8**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	725.00
Dry Weight - 3/4" Sample (gm)	497.32	Weight of minus #200 material (gm)	211 96
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	513.04
Dry Weight + 3/4" Sample (gm)	15.72		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0 00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0 00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37 5	0.00	0 00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19 0	15.72	2 17	2.17	97 83	**97.83**
1/2"	12.5	30.59	4 22	6.39	93.61	**93.61**
3/8"	9.50	17.73	2 45	8.83	91.17	**91.17**
#4	4.75	44 19	6.10	14 93	85 07	**85.07**
#10	2 00	42.92	5.92	20.85	79.15	**79.15**
#20	0.85	30.56	4.22	25.06	74.94	**74.94**
#40	0.425	25 95	3 58	28.64	71.36	**71.36**
#60	0 250	59.96	8.27	36.91	63 09	**63.09**
#140	0.106	207.64	28.64	65 55	34 45	**34.45**
#200	0.075	37.78	5.21	70.76	29.24	**29.24**
Pan	-	211.96	29.24	100.00	-	-

Tested By TMO Date 5/11/04 Checked By JLL Date 5-20-04

DCN- CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/3/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No.	2004-083-02	Sample No.	69+50
Lab ID	2004-083-02-01	Soil Color	**GRAY**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	22.0	22 0	21 5	6 98	15 0	78 0	0 01321	0 0333	**22.8**
5		21.0	21 5	6.98	14 0	72 8	0 01321	0.0212	**21.3**
15		20.0	21 5	6 98	13.0	67.6	0 01321	0 0123	**19.8**
30		19 0	21 5	6 98	12 0	62 4	0.01321	0 0088	**18.2**
64		17.0	21.7	6 91	10 1	52.4	0 01317	0 0061	**15.3**
277		15.0	21.8	6.87	8.1	42.2	0.01316	0.0029	**12.3**
1440		14 0	21.1	7.13	6.9	35.7	0.01327	0.0013	**10.4**

Soil Specimen Data		Other Corrections	
Tare No.	509		
Tare + Dry Material (gm)	128 29	a - Factor	0.99
Weight of Tare (gm)	104.22		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 200	29.24
Weight of Dry Material (gm)	19 07		
		Specific Gravity	2.7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material*

Tested By TO Date 5/18/04 Checked By JLC Date 5-20-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	ENVIRONMENTAL QUALITY	Boring No	5/3/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-02	Sample No.	69+50
Lab ID	2004-083-02-01	Soil Description	**GRAY LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

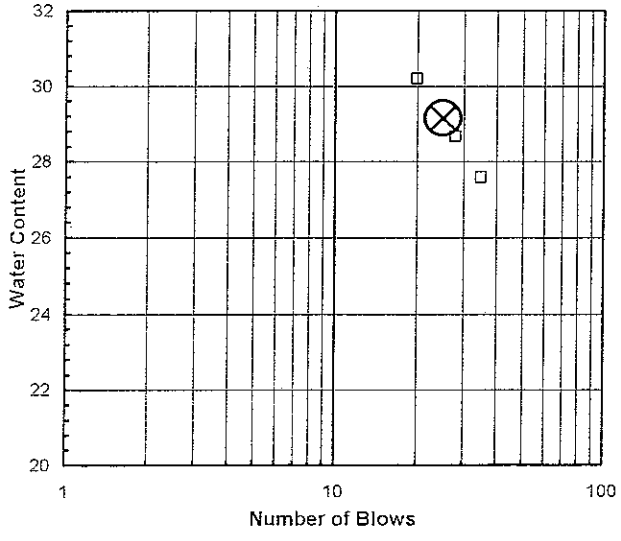
Liquid Limit Test	**1**	**2**	**3**	
				M
Tare Number	12	16	18	U
Wt. of Tare & WS (gm)	30.07	32.94	28.88	L
Wt. of Tare & DS (gm)	25 33	27.43	24 07	T
Wt of Tare (gm)	8.15	8.21	8.14	I
Wt of Water (gm)	4.7	5.5	4.8	P
Wt of DS (gm)	17 2	19.2	15 9	O
				I
Moisture Content (%)	**27.6**	**28.7**	**30.2**	N
Number of Blows	**35**	**28**	**20**	T

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	21	23	
Wt. of Tare & WS (gm)	14 47	14.66	
Wt. of Tare & DS (gm)	13 39	13.53	
Wt of Tare (gm)	8 19	8.11	
Wt. of Water (gm)	1 1	1 1	
Wt of DS (gm)	5.2	5.4	
Moisture Content (%)	**20.8**	**20.8**	**-0.1**

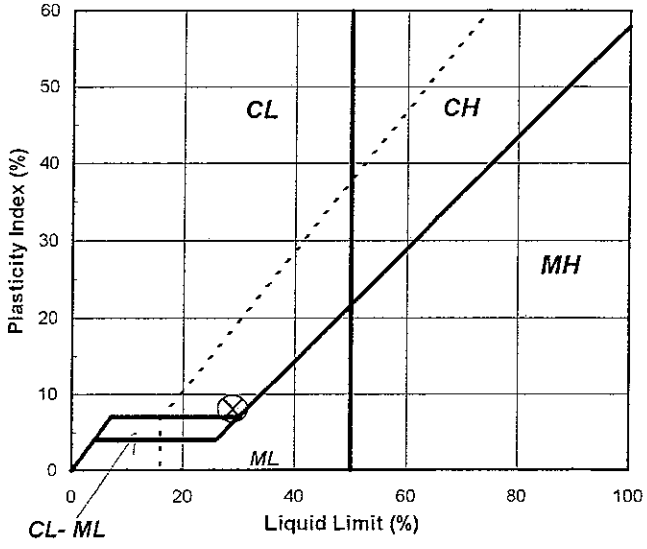
Note. The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**29**
Plastic Limit (%)	**21**
Plasticity Index (%)	**8**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By BS *Date* 5/12/04 *Checked By* JL *Date* 5-13-04

page 1 of 1 DCN: CT-S4B DATE: 10/8/01 REVISION: 2

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

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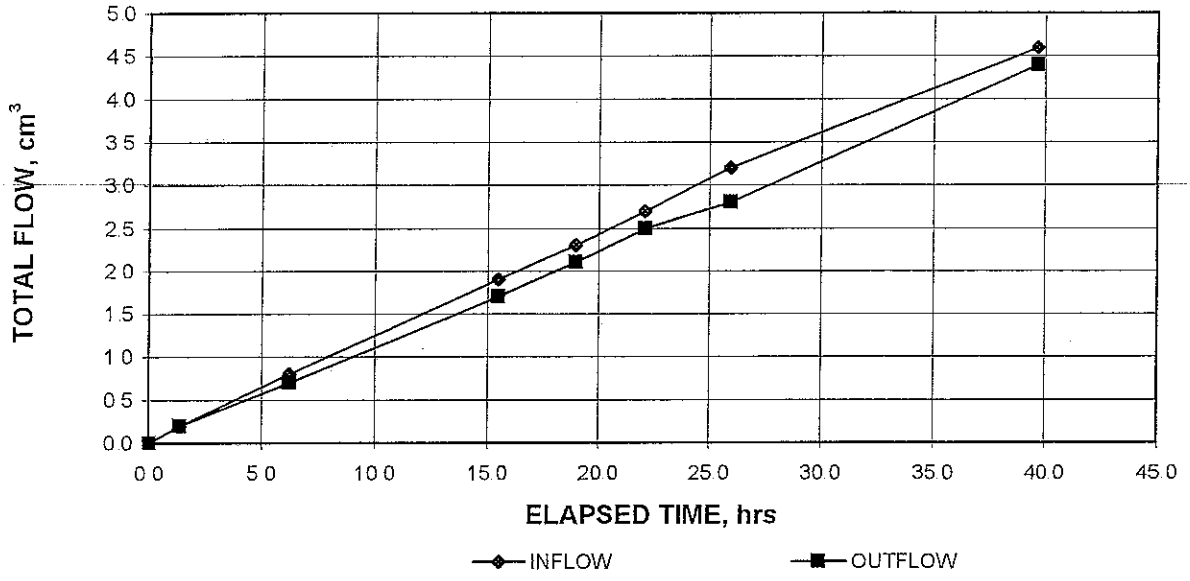
INTEGRITY IN TESTING

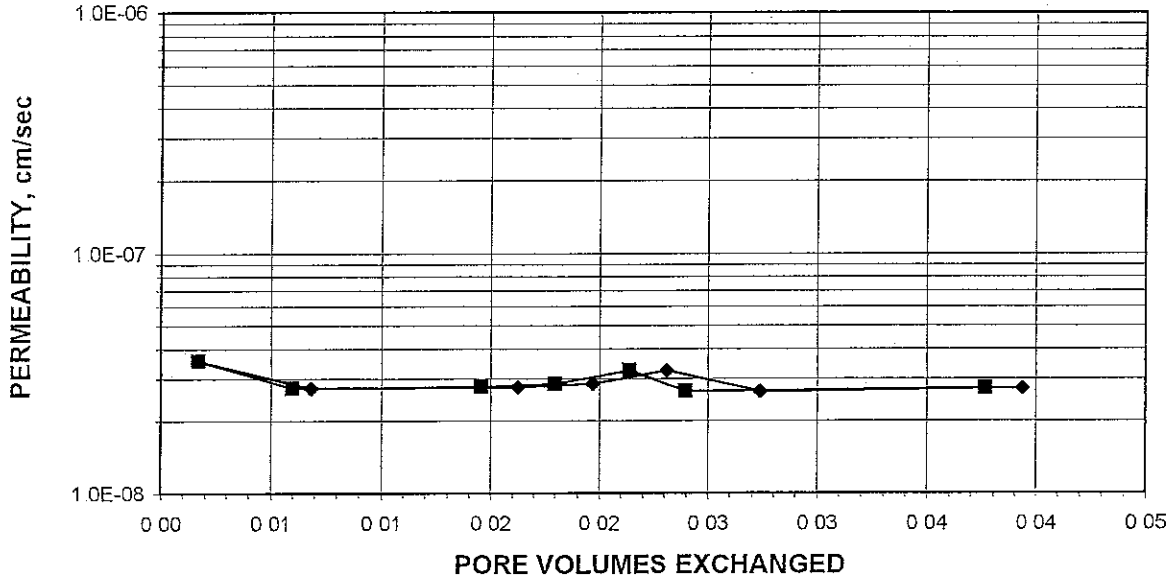
Client	ENVIRONMENTAL QUALITY	Boring No	5-3-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-02	Sample No	69+50
Lab ID No	2004-083-02-01		

AVERAGE PERMEABILITY = 2.9E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.9E-10 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: JCM Date: 05/07/04 Checked By: JL Date: 5-13-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P1.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

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INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-3-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-02	Sample No	69+50
Lab ID No	2004-083-02-01		
		Specific Gravity	2 70 Assumed
		Sample Condition	Remolded

Visual Description: GRAY SOIL BENTONITE BACKFILL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	503	ZY
Wt of Tare & WS (gm.)	534.39	378 85
Wt of Tare & DS (gm)	442 26	327 34
Wt of Tare (gm)	96.43	85 43
Wt. of Water (gm)	92 13	51.51
Wt of DS (gm)	345 83	241 91
Moisture Content (%)	**26.6**	**21.3**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm)	1215.02	NA
Wt. of Tube (gm)	534 39	NA
Wt. of WS (gm)	680.63	651 89
Length 1 (in)	3.234	2 983
Length 2 (in.)	3.287	2 999
Length 3 (in)	3 125	2.948
Top Diameter (in)	2.875	2 865
Middle Diameter (in.)	2 875	2 864
Bottom Diameter (in)	2 875	2 885
Average Length (in.)	3.22	2.98
Average Area (in ^{2})	6.49	6.48
Sample Volume (cm^3)	342 05	315 86
Unit Wet Wt (gm./ cm^3)	1 99	2.06
Unit Wet Wt (pcf)	124 2	128.8
Unit Dry Wt (pcf)	98.1	106.2
Unit Dry Wt (gm./ cm^3)	1.57	1 70
Void Ratio, e	0.72	0 59
Porosity, n	0 42	0.37
Pore Volume (cm^3)	143 0	116 8

Tested By: JCM Date: 05/07/04 Checked By: JL Date: 5-13-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P1.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

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INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-3-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-02	Sample No	69+50
Lab ID No	2004-083-02-01		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	67 5	Sample Length (cm), L	7 56
Bottom Cap (psi)	70.0	Sample Diameter (cm)	7 29
Cell (psi)	75 6	Sample Area (cm^2), A	41 78
Total Pressure Head (cm)	175 8	Inflow Burette Area (cm^2), a-in	0 874
		Outflow Burette Area (cm^2), a-out	0 872
		B Parameter (%)	95

AVERAGE PERMEABILITY = 2.9E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.9E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
05/10/04	15	40	0.0	0 0	0 0	198.5	0	21 0	NA
05/10/04	17	3	1 4	0 2	0.2	198 0	0	21 0	3 6E-08
05/10/04	21	55	6.3	0 8	0.7	196 8	0	22 0	2 7E-08
05/11/04	7	10	15 5	1.9	1 7	194.4	0	22 0	2 8E-08
05/11/04	10	40	19 0	2 3	2.1	193 5	0	21.5	2 8E-08
05/11/04	13	45	22 1	2.7	2 5	192.6	0	21 5	3 2E-08
05/11/04	17	35	25 9	3.2	2.8	191.6	0	21 0	2 7E-08
05/12/04	7	20	39.7	4 6	4 4	188 2	1	22.0	2 7E-08

Tested By: JCM Date: 05/07/04 Checked By: JL Date: 5-13-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P1.XLS]Sheet1

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DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/04/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Clear cool RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
63+10	2.00	66.00	1.00	15.00	40.00	8.9
	34.00	77.00	16.00	16.00	52.00	8.9
62+80	2.00	75.00	16.00	16.00	55.00	8.9
	34.00	76.00	16.00	16.00	59.00	8.9

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

EQM _____ **OWNER:** _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

\TE: 05/04/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:05	66.00	45.00	12.00	8.8
12:45	66.00	64.00	14.00	8.8

No slurry produced today	FUNNEL CALIBRATIONS PERFORMED TODAY?	no
	pH METER CALIBRATIONS PERFORMED TODAY?	N/A
	BALANCE CALIBRATIONS PERFORMED TODAY?	no

.M _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/04/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear cool RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
69+10		0.0							
			3.0	10.0	29.5				
69+00		5.9							
			7.8	10.0	77.5				
68+90		9.6							
			11.8	10.0	118.0				
68+80		14.0							
			15.1	10.0	150.5				
68+70		16.1							
			16.8	10.0	167.5				
68+60		17.4							
			18.6	10.0	186.0				
68+50		19.8							
			20.8	10.0	207.5				
68+40		21.7							
			22.2	10.0	221.5				
68+30		22.6							
			23.1	10.0	231.0				
68+20		23.6							
			24.3	10.0	243.0				
68+10		25.0							
			26.7	10.0	267.0				
68+00		28.4							
			28.4	10.0	284.0				
67+90		28.4							

SF TODAY 2183.00

SF TO DATE

COMMENTS AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/04/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear cool RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
68+85		0.0							
68+80		8.0							
68+80		9.4							
68+70		13.1							
68+60		15.2							
68+50		16.5							
68+40		19.8							
68+30		17.2							
68+20		18.8							
68+10		20.8							
68+00		23.2							
67+90		23.2							

SF TODAY 0.00

SF TO DATE

COMMENTS (CON'T ON PAGE 4)

PM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/04/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear cool RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
63+36		0.0							
63+30		6.1							
63+20		16.3							
63=10		26.1							
63+00		36.5							
62+90		36.5							
62+80		36.3							
62+70		36.4							
62+60		36.5							
62+50		36.2							

SF TODAY

SF TO DATE

COMMENTS

PM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/05/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Clear warm RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
62+70	2	84	24	14	81	No Battery
	34	82	23	18	73	No Battery
62+00	2	92	34	17	81	No Battery
	34	94	35	20	82	No Battery

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

ATE: 05/05/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
lurry Produced t				

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

.M _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/05/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
68+85		0.0							
			3.1	10.0	31.0				
68+80		6.2							
			8.1	10.0	80.5				
68+70		9.9							
68+60		13.5							
			11.7	10.0	117.0				
68+50		18.1							
			15.8	10.0	158.0				
68+40		19.3							
68+30		19.5							
			18.7	10.0	187.0				
68+20		19.9							
			19.4	10.0	194.0				
68+10		20.5							
68+00		22.2							
			19.7	10.0	197.0				
67+90		22.2							
			20.2	10.0	202.0				
			21.4	10.0	213.5				
			22.2	10.0	222.0				
			11.1	10.0	111.0				
			0.0	10.0	0.0				

SF TODAY 1713.00

SF TO DATE

COMMENTS AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/05/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
68+40		0.0							
68+30		8.0							
68+20		8.8							
68+10		13.0							
68+00		15.2							
67+90		15.2							

SF TODAY 0.00

SF TO DATE

COMMENTS (CON'T ON PAGE 4)

PM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/05/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
63+30		0.0							
63+20		23.2							
63+10		20.8							
63+00		28.7							
62+90		31.5							
62+80		32.5							
62+70		36.3							
62+60		36.3							

SF TODAY

SF TO DATE

COMMENTS

AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/05/04 JOB NAME: WALL JOB NUMBER: 30205

WEATHER: Clear warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
63+10		0.0							
63+00		8.0							
62+90		14.0							
62+80		15.2							
62+70		17.0							
62+60		21.4							
62+50		23.6							
62+40		25.4							
62+30		29.0							
62+20		30.0							
62+10		33.1							
62+00		35.5							
61+90		36.0							
61+80		32.0							

SF TODAY

SF TO DATE

COMMENTS

PM Profile

EQM OWNER

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INTEGRITY IN TESTING

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/5/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No.	2004-083-02	Sample No.	63+00
Lab ID	2004-083-02-02	Soil Color	GRAY

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

USCS Summary		
Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	17.71
#4 To #200	*Sand*	58.45
Finer Than #200	*Silt & Clay*	23.84

		D60 =	1.922		
USCS Symbol	*SP-SC, TESTED*	D30 =	0.169	CC =	0.19
USCS Classification	*POORLY GRADED SAND WITH CLAY AND GRAVEL*				
		D10 =	0.080	CU =	24.11

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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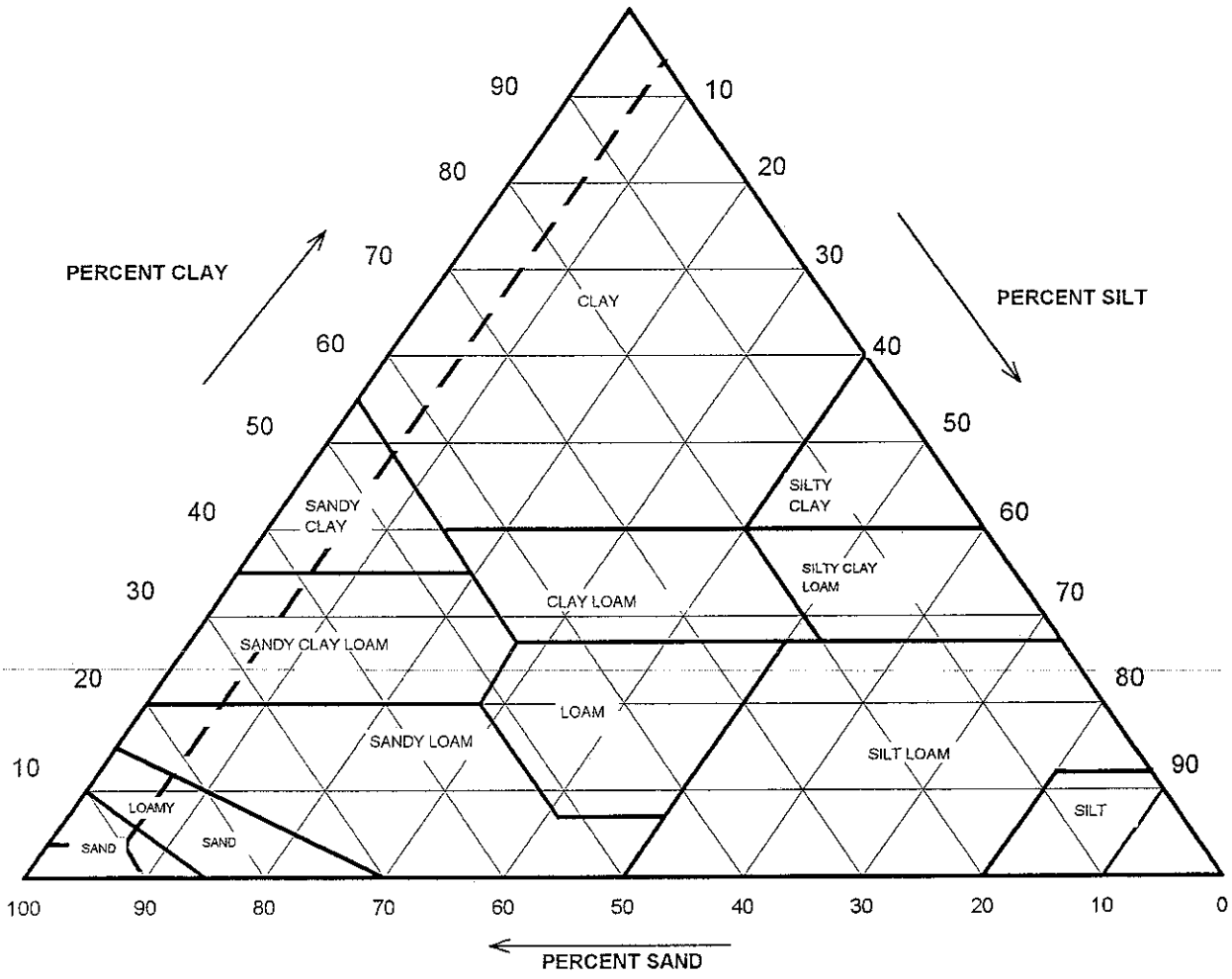
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	ENVIRONMENTAL QUALITY	Boring No	5/5/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No.	2004-083-02	Sample No	63+00
Lab ID	2004-083-02-02	Soil Color	GRAY



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	24 74	**0.00**
2	75.26	*Sand*	67.73	**89.99**
0 05	7 54	*Silt*	4 63	**6.16**
0 002	2 90	*Clay*	2 90	**3.86**

USDA Classification *SAND*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/5/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-02	Sample No.	63+00
Lab ID	2004-083-02-02	Soil Color	**GRAY**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	679	Tare No.	NA
Wgt Tare + Wet Specimen (gm)	945 11	Wgt Tare + Wet Specimen (gm)	NA
Wgt Tare + Dry Specimen (gm)	765 60	Wgt Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	99 35	Weight of Tare (gm)	NA
Weight of Water (gm)	179.51	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	666.25	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**26.9**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	666.25
Dry Weight - 3/4" Sample (gm)	459.75	Weight of minus #200 material (gm)	158 81
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	507 44
Dry Weight + 3/4" Sample (gm)	47.69		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0 00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0 00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37 5	0.00	0.00	0.00	100.00	**100.00**
1"	25 0	21.98	3.30	3.30	96.70	**96.70**
3/4"	19.0	25.71	3.86	7.16	92.84	**92.84**
1/2"	12.5	7.59	1.14	8.30	91.70	**91.70**
3/8"	9 50	17.75	2.66	10.96	89.04	**89.04**
#4	4 75	44 96	6.75	17.71	82.29	**82.29**
#10	2.00	46.82	7.03	24.74	75.26	**75.26**
#20	0.85	36 15	5.43	30.16	69.84	**69.84**
#40	0.425	31 05	4.66	34 82	65.18	**65.18**
#60	0.250	53.85	8.08	42.91	57.09	**57.09**
#140	0.106	176.99	26.57	69.47	30 53	**30.53**
#200	0.075	44.59	6.69	76.16	23.84	**23.84**
Pan	-	158.81	23.84	100.00	-	-

Tested By TMO Date 5/11/04 Checked By Date

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/5/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No.	2004-083-02	Sample No.	63+00
Lab ID	2004-083-02-02	Soil Color	**GRAY**

Elapsed Time (min)		R Measured	Temp. (° C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	19 5	19 5	21 5	6.98	12 5	71.2	0 01321	0.0338	**17.0**
6		19.0	21.5	6 98	12.0	68 4	0.01321	0.0196	**16.3**
15		17 5	21 5	6.98	10 5	59.9	0.01321	0.0125	**14.3**
32		16.5	21.5	6 98	9.5	54 2	0.01321	0 0086	**12.9**
67		15.5	21.7	6.91	8.6	48.9	0.01317	0 0060	**11.7**
280		13 5	21 8	6.87	6 6	37.7	0.01316	0.0030	**9.0**
1440		12.0	21 1	7.13	4 9	27.7	0.01327	0.0013	**6.6**

Soil Specimen Data		**Other Corrections**	
Tare No.	2355		
Tare + Dry Material (gm)	115 33	a - Factor	0 99
Weight of Tare (gm)	92.93		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 200	23.84
Weight of Dry Material (gm)	17.4		
		Specific Gravity	2 7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material*

Tested By TO Date 5/18/04 Checked By Date

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	ENVIRONMENTAL QUALITY	Boring No	5/5/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-02	Sample No	63+00
Lab ID	2004-083-02-02	Soil Description	**GRAY LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No 40 sieve material, Airdried)

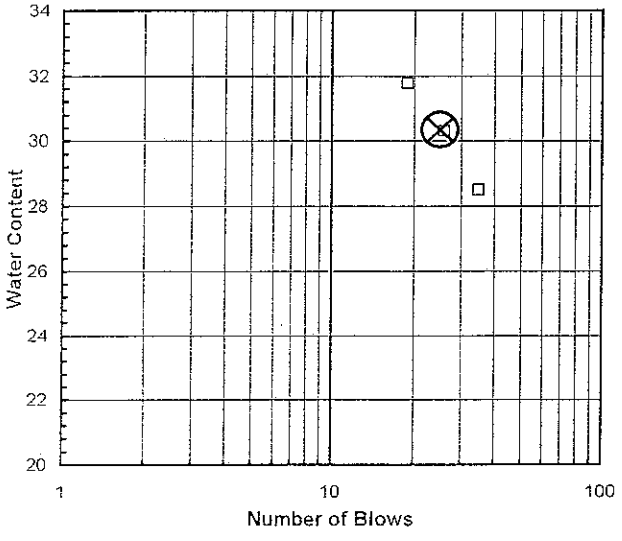
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	168	58	71	MULTIPOINT
Wt of Tare & WS (gm)	28 65	24 60	29.08	
Wt. of Tare & DS (gm)	25.78	22 93	26 46	
Wt. of Tare (gm)	15 71	17 42	18.21	
Wt of Water (gm)	2.9	1.7	2 6	
Wt of DS (gm)	10 1	5 5	8 3	
Moisture Content (%)	**28.5**	**30.3**	**31.8**	
Number of Blows	**35**	**26**	**19**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	AAA	245	
Wt of Tare & WS (gm)	23 22	26 11	
Wt of Tare & DS (gm)	22 12	25 05	
Wt. of Tare (gm)	17 02	20 03	
Wt of Water (gm)	1.1	1.1	
Wt. of DS (gm)	5.1	5 0	
Moisture Content (%)	**21.6**	**21.1**	**0.5**

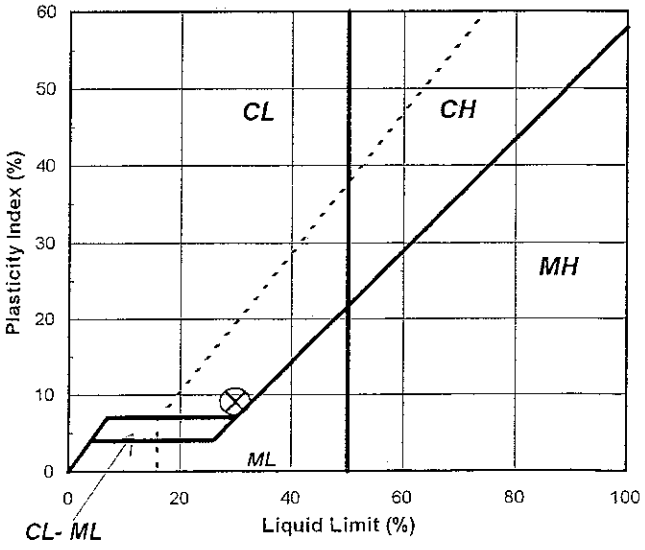
Note. The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**30**
Plastic Limit (%)	**21**
Plasticity Index (%)	**9**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By BS *Date* 5/12/04 *Checked By* JL *Date* 5-17-04

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PERMEABILITY TEST

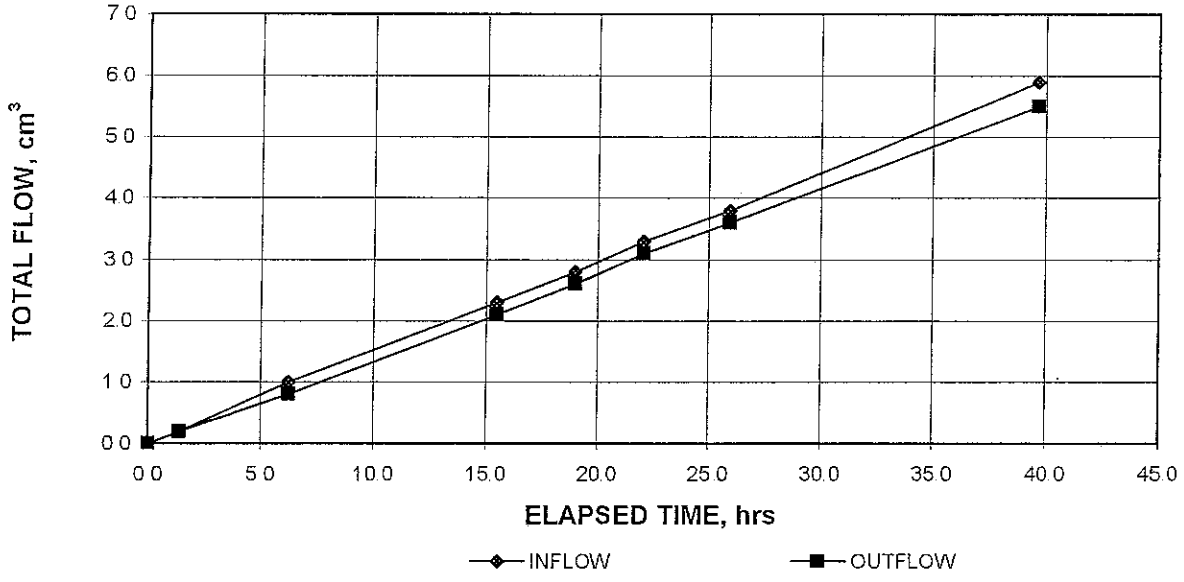
ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

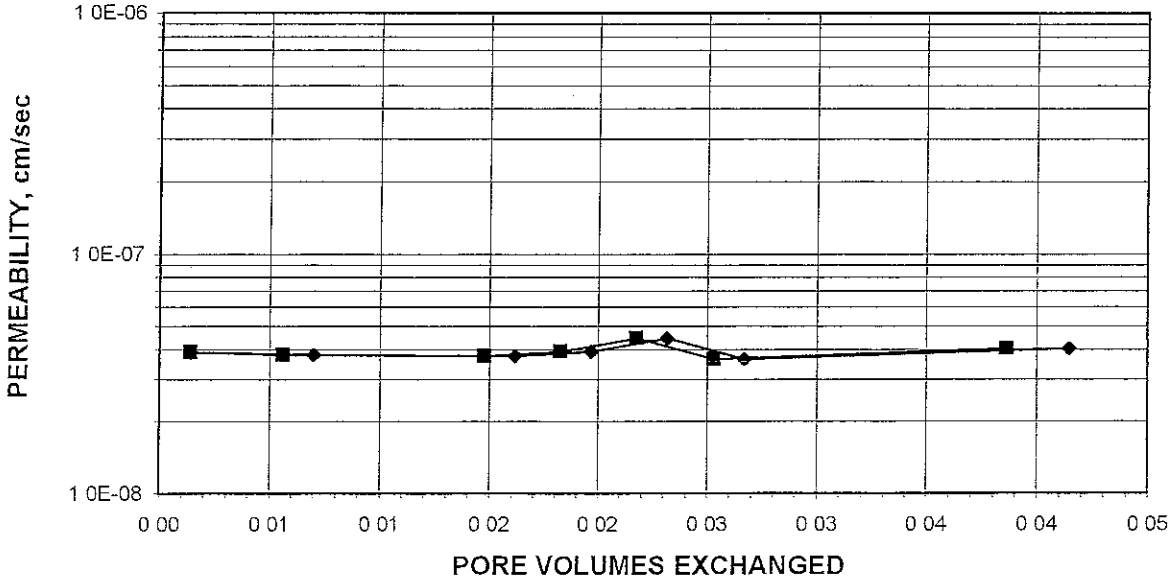
Client	ENVIRONMENTAL QUALITY	Boring No	5-5-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-02	Sample No	63+00
Lab ID No	2004-083-02-02		

AVERAGE PERMEABILITY = 4.0E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.0E-10 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: JCM Date: 05/07/04 Checked By: JL Date: 5-18-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P2.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-5-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-02	Sample No	63+00
Lab ID No	2004-083-02-02		
		Specific Gravity	2 70 Assumed
		Sample Condition	Remolded

Visual Description: GRAY SOIL BENTONITE BACKFILL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	708	277
Wt of Tare & WS (gm.)	310 63	493 70
Wt. of Tare & DS (gm)	262.66	420 52
Wt of Tare (gm)	98 91	100 94
Wt of Water (gm)	47 97	73 18
Wt of DS (gm)	163 75	319 58
Moisture Content (%)	**29.3**	**22.9**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt of Tube & WS (gm)	1083 31	NA
Wt. of Tube (gm.)	310.63	NA
Wt. of WS (gm)	772.68	734 46
Length 1 (in)	3 755	3 365
Length 2 (in)	3 690	3 367
Length 3 (in.)	3.702	3 332
Top Diameter (in)	2 875	2 900
Middle Diameter (in.)	2 875	2 893
Bottom Diameter (in)	2 875	2 914
Average Length (in)	3 72	3 35
Average Area (in ^{2})	6 49	6 62
Sample Volume (cm^3)	395 28	363 69
Unit Wet Wt (gm / cm^3)	1.95	2.02
Unit Wet Wt (pcf)	122 0	126 1
Unit Dry Wt. (pcf)	94 4	102 6
Unit Dry Wt (gm / cm^3)	1 51	1 64
Void Ratio, e	0 79	0 64
Porosity, n	0 44	0 39
Pore Volume (cm^3)	173 9	142 4

Tested By: JCM Date: 05/07/04 Checked By: JL Date: 5-18-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P2.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-5-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-02	Sample No	63+00
Lab ID No	2004-083-02-02		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	67.5	Sample Length (cm), L	8 52
Bottom Cap (psi)	70 0	Sample Diameter (cm)	7 37
Cell (psi)	75.6	Sample Area (cm^2), A	42 68
Total Pressure Head (cm)	175 8	Inflow Burette Area (cm^2), a-in	0 912
		Outflow Burette Area (cm^2), a-out	0 902
		B Parameter (%)	96

AVERAGE PERMEABILITY = 4.0E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.0E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
05/10/04	15	40	0 0	0 0	0 0	200 7	0	21 0	NA
05/10/04	17	3	1 4	0 2	0 2	200 3	0	21 0	3 9E-08
05/10/04	21	55	6.3	1 0	0 8	198 8	0	22 0	3 8E-08
05/11/04	7	10	15.5	2 3	2.1	195.9	0	22.0	3 8E-08
05/11/04	10	40	19 0	2 8	2 6	194 8	0	21 5	3.9E-08
05/11/04	13	45	22 1	3 3	3 1	193 7	0	21 5	4 5E-08
05/11/04	17	35	25 9	3 8	3 6	192 6	0	21 0	3 7E-08
05/12/04	7	20	39.7	5 9	5 5	188.2	1	22 0	4 0E-08

Tested By: JCM Date: 05/07/04 Checked By: JL Date: 5-18-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[063P2.XLS]Sheet1

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DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/06/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Clear warm RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
61+80	2	99	36	15	95	No Battery
	34	98	36	15	96	No Battery
61+20	2	101	34	37	111	No Battery
	34	100	36	37	102	No Battery

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

\TE: 05/06/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
13:58	65.00	36.00	19.00	No Battery

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

Slurry was only produced in the afternoon

\M _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/06/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
62+40		0.0							
62+30		8.1							
62+20		14.3							
62+10		19.4							
62+00		22.1							
61+90		24.3							
61+80		26.8							
61+70		29.1							
61+60		30.1							
61+50		33.0							

SF TODAY

SF TO DATE

COMMENTS

AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/06/04 JOB NAME: WALL JOB NUMBER: 30205

WEATHER: Clear warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
62+40		0.0							
62+30		8.1							
62+20		14.1							
62+10		19.5							
62+00		21.8							
61+90		24.1							
61+80		26.2							
61+70		29.3							
61+60		31.6							
61+50		33.1							

SF TODAY

SF TO DATE

COMMENTS

PM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/06/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
68+30		0.0							
68+20		7.8							
68+10		11.2							
68+00		15.0							
67+90		15.1							

SF TODAY 0.00

SF TO DATE

COMMENTS (CON'T ON PAGE 4)

AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/06/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
68+30		0.0							
			2.9	10.0	29.0				
68+20		5.8							
			8.0	10.0	79.5				
68+10		10.1							
			11.5	10.0	114.5				
68+00		12.8							
			14.0	10.0	139.5				
67+90		15.1							
			7.6	10.0	75.5				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				

SF TODAY 438.00

SF TO DATE

COMMENTS PM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/06/04 JOB NAME: WALL JOB NUMBER: 30205

WEATHER: Clear warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
20+15		36.2							
20=20		36.5							
20+30		36.4							
20+40		36.3							

SF TODAY

SF TO DATE

COMMENTS

PM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/07/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Rain, cool RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
20+30	2	82	19	19	89	No Battery
	34	89	20	15	85	No Battery
20+30	2	78	17	15	86	No Battery
	34	84	18	14	93	No Battery

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/07/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
9:30	76.00	83.00	19.00	No Battery
14:30		84.00	19.00	

Slurry was only produced in the afternoon	FUNNEL CALIBRATIONS PERFORMED TODAY?	no
	pH METER CALIBRATIONS PERFORMED TODAY?	N/A
	BALANCE CALIBRATIONS PERFORMED TODAY?	no

QM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/07/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Rain, cool RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
68+30		0.0							
			3.9	10.0	39.0				
68+20		7.8							
			9.6	10.0	95.5				
68+10		11.3							
			13.2	10.0	131.5				
68+00		15.0							
			15.1	10.0	150.5				
67+90		15.1							
			7.6	10.0	75.5				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				

SF TODAY 492.00

SF TO DATE

COMMENTS AM Profile, Trench was completely backfilled PM

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/07/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Rain, cool RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
62+40		0.0							
62+30		8.1							
62+20		14.3							
62+10		19.4							
62+00		22.1							
61+90		24.3							
61+80		26.8							
61+70		29.1							
61+60		30.1							
61+50		33.0							

SF TODAY

SF TO DATE

COMMENTS

AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/07/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Rain, cool RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
61+85		0.0							
61+80		5.8							
61+70		10.2							
61+60		16.8							
61+50		16.8							

SF TODAY 0.00

SF TO DATE

COMMENTS (CON'T ON PAGE 4)

PM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/07/04 JOB NAME: WALL JOB NUMBER: 30205

WEATHER: Rain, cool RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
20+15		36.2							
20+20		36.4							
20+30		36.4							
20+40		36.3							

SF TODAY

SF TO DATE

COMMENTS

PM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/07/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Rain, cool RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
20+15		36.2							
20+20		36.0							
20+30		36.4							
20+40		36.4							
20+50		36.4							
20+60		36.3							
20+70		36.1							
20+80		36.1							
20+90		36.1							
21+00		30.1							
21+10		23.5							
21+20		20.0							

SF TODAY

SF TO DATE

COMMENTS

PM Profile

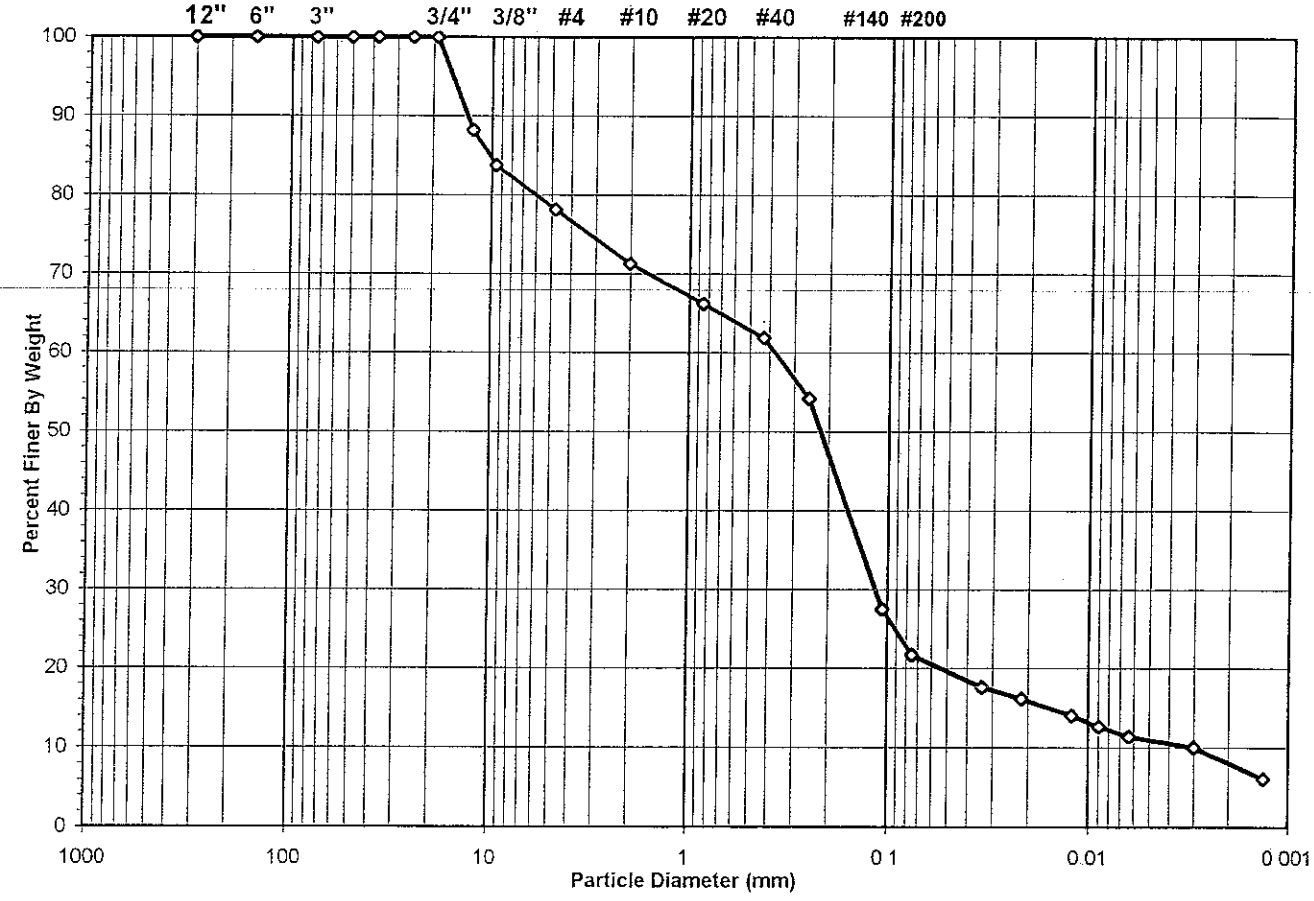
EQM OWNER:

geotechnics
INTEGRITY IN TESTING

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/7/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No	62+00
Lab ID	2004-083-03-01	Soil Color	**GRAY**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay



USCS Summary		
Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	21.89
#4 To #200	*Sand*	56.41
Finer Than #200	*Silt & Clay*	21.70

USCS Symbol *SC-SM, TESTED*

USCS Classification *SILTY, CLAYEY SAND WITH GRAVEL*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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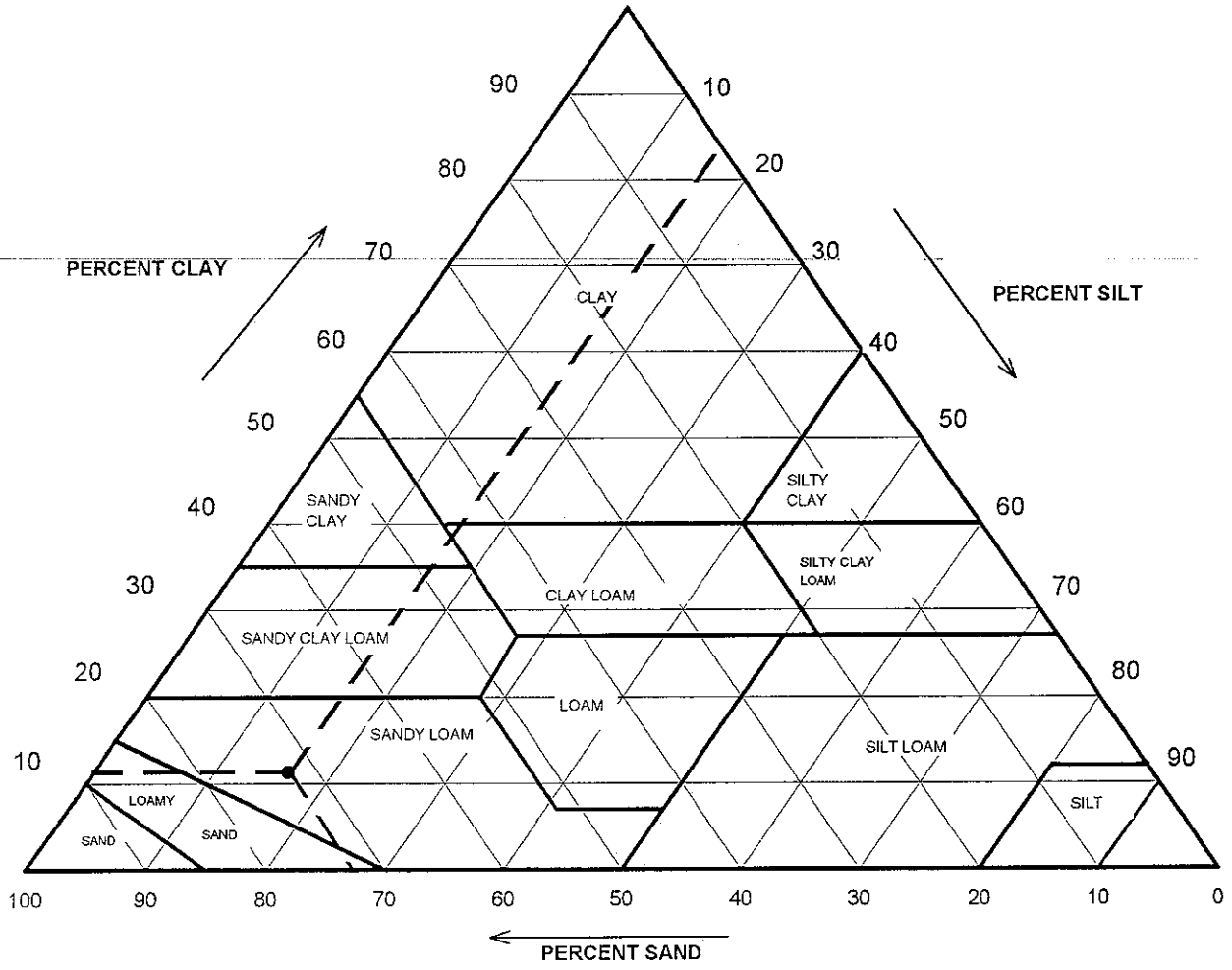
geotechnics
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	ENVIRONMENTAL QUALITY	Boring No	5/7/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No.	62+00
Lab ID	2004-083-03-01	Soil Color	GRAY



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	28 71	**0.00**
2	71.29	*Sand*	51 68	**72.50**
0 05	19.60	*Silt*	11.52	**16.16**
0 002	8 08	*Clay*	8 08	**11.33**

USDA Classification ***SANDY LOAM***

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/7/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No.	62+00
Lab ID	2004-083-03-01	Soil Color	**GRAY**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No	516	Tare No	NA
Wgt Tare + Wet Specimen (gm)	790.18	Wgt.Tare + Wet Specimen (gm)	NA
Wgt Tare + Dry Specimen (gm)	660 60	Wgt.Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	97.43	Weight of Tare (gm)	NA
Weight of Water (gm)	129.58	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	563.17	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**23.0**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	563.17
Dry Weight - 3/4" Sample (gm)	440.97	Weight of minus #200 material (gm)	122 20
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	440 97
Dry Weight + 3/4" Sample (gm)	0 00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0 00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100 00	**100.00**
3"	75	0.00	0.00	0 00	100.00	**100.00**
2"	50	0 00	0 00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25 0	0.00	0.00	0 00	100.00	**100.00**
3/4"	19 0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	66.21	11.76	11.76	88.24	**88.24**
3/8"	9 50	25.32	4.50	16.25	83.75	**83.75**
#4	4 75	31 75	5 64	21 89	78.11	**78.11**
#10	2.00	38.42	6 82	28.71	71.29	**71.29**
#20	0.85	28 76	5.11	33.82	66.18	**66.18**
#40	0.425	24 66	4.38	38 20	61.80	**61.80**
#60	0.250	42 91	7.62	45.82	54 18	**54.18**
#140	0 106	150.03	26.64	72.46	27.54	**27.54**
#200	0.075	32.91	5.84	78.30	21.70	**21.70**
Pan	-	122.20	21.70	100.00	-	-

Tested By TMO Date 5/14/04 Checked By JRL Date 5-20-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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Geotechnics
INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/7/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No.	62+00
Lab ID	2004-083-03-01	Soil Color	**GRAY**

Elapsed Time (min)		R Measured	Temp. (° C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	18.5	19 5	21.5	6.98	12.5	81.0	0.01321	0.0338	**17.6**
5		18.5	21 5	6.98	11.5	74 5	0 01321	0 0215	**16.2**
16		17.0	21.5	6 98	10 0	64.8	0.01321	0 0121	**14.1**
30		16 0	21.5	6.98	9.0	58.4	0.01321	0.0089	**12.7**
60		15 0	21 7	6.91	8 1	52.4	0 01317	0.0063	**11.4**
268		14.0	21.8	6 87	7 1	46.1	0.01316	0 0030	**10.0**
1440		11 5	21 1	7 13	4 4	28 3	0 01327	0 0013	**6.1**

Soil Specimen Data		**Other Corrections**	
Tare No.	1003		
Tare + Dry Material (gm)	117 59	a - Factor	0 99
Weight of Tare (gm)	97.29		
Weight of Deflocculant (gm)	5 0	Percent Finer than # 200	21.70
Weight of Dry Material (gm)	15.3		
		Specific Gravity	2.7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material*

Tested By TO Date 5/18/04 Checked By JU Date 5-20-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/7/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No.	62+00
Lab ID	2004-083-03-01	Soil Description	**GRAY SILTY CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No 40 sieve material, Airdried)

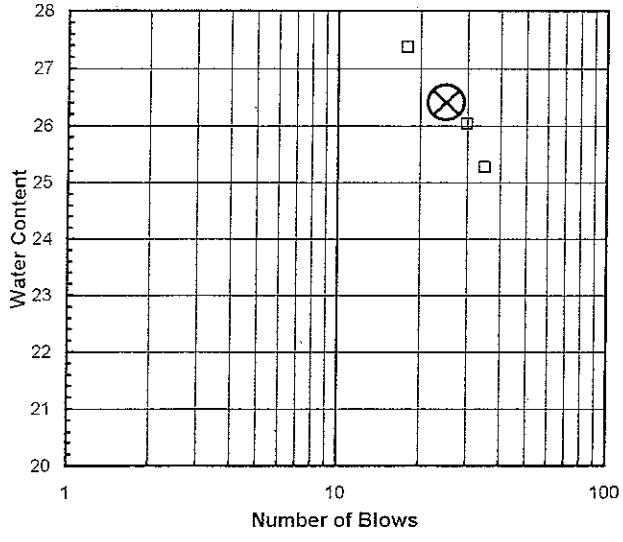
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	1	2321	261	MULTIPOINT
Wt. of Tare & WS (gm)	35.05	40.49	37.52	
Wt. of Tare & DS (gm)	30.76	35.77	33.10	
Wt. of Tare (gm)	13.78	17.64	16.95	
Wt. of Water (gm)	4.3	4.7	4.4	
Wt. of DS (gm)	17.0	18.1	16.2	
Moisture Content (%)	**25.3**	**26.0**	**27.4**	
Number of Blows	**35**	**30**	**18**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	2026	252	
Wt. of Tare & WS (gm)	26.59	24.99	
Wt. of Tare & DS (gm)	25.63	24.01	
Wt. of Tare (gm)	20.55	18.72	
Wt. of Water (gm)	1.0	1.0	
Wt. of DS (gm)	5.1	5.3	
Moisture Content (%)	**18.9**	**18.5**	**0.4**

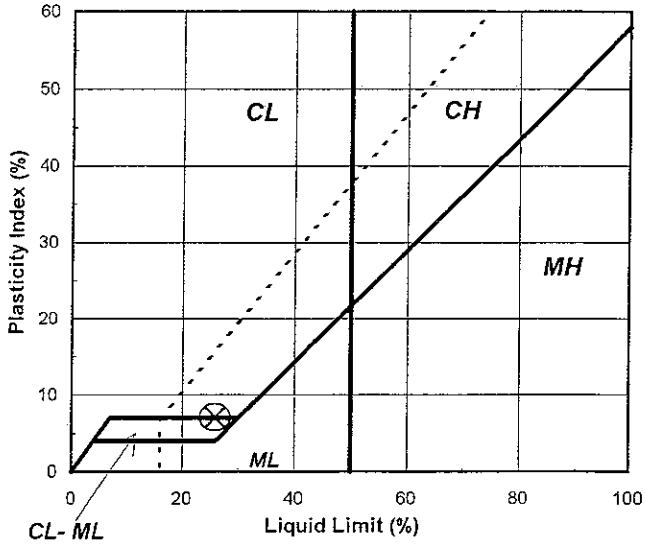
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**26**
Plastic Limit (%)	**19**
Plasticity Index (%)	**7**
USCS Symbol	**CL-ML**

Flow Curve



Plasticity Chart



Tested By TO *Date* 5/18/04 *Checked By* JU *Date* 5-20-04

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

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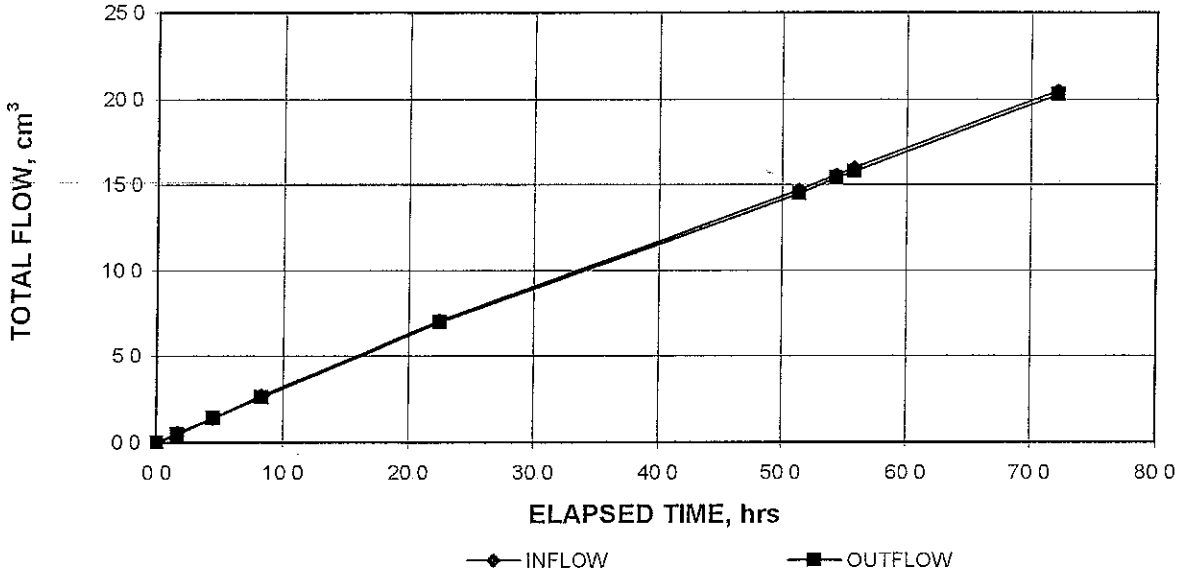
INTEGRITY IN TESTING

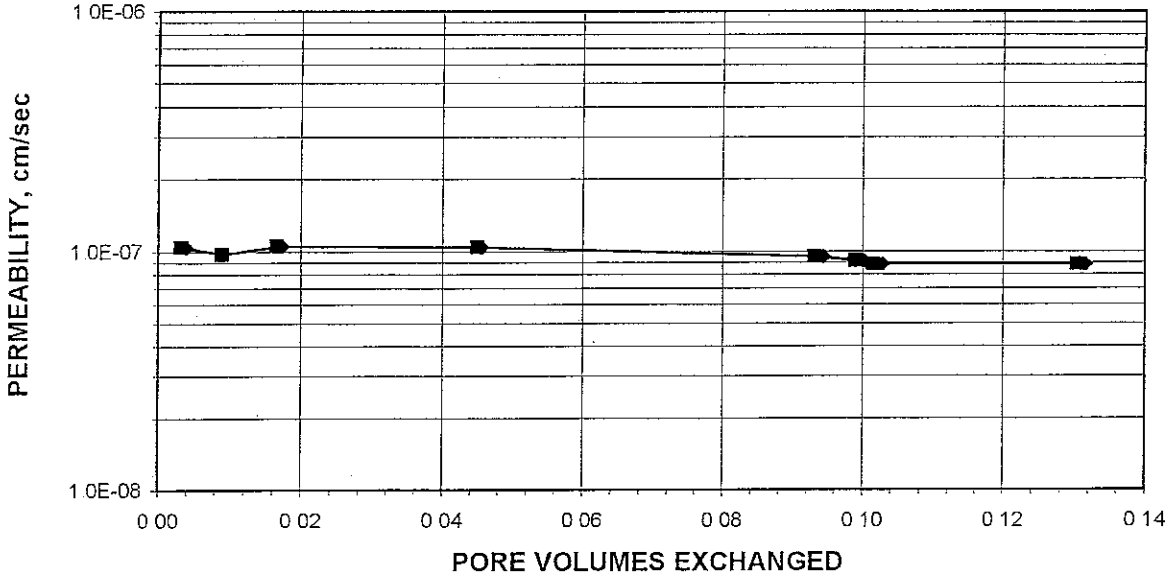
Client	ENVIRONMENTAL QUALITY	Boring No	5-7-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No	62+00
Lab ID No	2004-083-03-01		

AVERAGE PERMEABILITY = 9.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 9.1E-10 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: JCM Date: 05/12/04 Checked By: JU Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P3.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-7-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No	62+00
Lab ID No	2004-083-03-01		
		Specific Gravity	2 70 Assumed
		Sample Condition	Remolded

Visual Description: GRAY SOIL BENTONITE BACKFILL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	1680	562
Wt. of Tare & WS (gm.)	211.45	447 76
Wt of Tare & DS (gm)	187 69	385 21
Wt. of Tare (gm)	101 41	84 50
Wt. of Water (gm)	23.76	62 55
Wt. of DS (gm)	86 28	300 71
Moisture Content (%)	**27.5**	**20.8**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt of Tube & WS (gm)	1046 83	NA
Wt of Tube (gm)	211.45	NA
Wt. of WS (gm)	835 38	791.25
Length 1 (in)	4.001	3 748
Length 2 (in.)	4.097	3.745
Length 3 (in.)	4.080	3.764
Top Diameter (in)	2.875	2.847
Middle Diameter (in)	2 875	2 861
Bottom Diameter (in.)	2 875	2 907
Average Length (in)	4.06	3 75
Average Area (in ^{2})	6 49	6 48
Sample Volume (cm^3)	431.84	398 25
Unit Wet Wt (gm / cm^3)	1.93	1.99
Unit Wet Wt (pcf)	120 8	124 0
Unit Dry Wt. (pcf)	94.7	102 7
Unit Dry Wt (gm / cm^3)	1 52	1.64
Void Ratio, e	0 78	0 64
Porosity, n	0 44	0 39
Pore Volume (cm^3)	189.2	155 7

Tested By: JCM Date: 05/12/04 Checked By: JU Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P3.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

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INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-7-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-03	Sample No	62+00
Lab ID No	2004-083-03-01		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	67 5	Sample Length (cm), L	9 53
Bottom Cap (psi)	70 0	Sample Diameter (cm)	7 29
Cell (psi)	75 6	Sample Area (cm^2), A	41 79
Total Pressure Head (cm)	175 8	Inflow Burette Area (cm^2), a-in	0 877
		Outflow Burette Area (cm^2), a-out	0 882
		B Parameter (%)	98

AVERAGE PERMEABILITY = 9.1E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 9.1E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
05/14/04	9	24	0 0	0 0	0 0	191 8	0	21 8	NA
05/14/04	11	5	1.7	0 6	0 5	190 5	0	21 8	1 0E-07
05/14/04	13	53	4 5	1 4	1 4	188 6	0	21 8	9.7E-08
05/14/04	17	45	8.4	2 7	2 6	185 8	0	21 5	1 1E-07
05/15/04	7	55	22 5	7.1	7.0	175 7	0	22 0	1 0E-07
05/16/04	12	45	51 4	14.7	14.5	158 6	1	22.0	9 5E-08
05/17/04	11	17	51.4	14 7	14 5	196 5	0	22.0	NA
05/17/04	14	20	54 4	15 6	15.4	194.4	0	22 0	9 1E-08
05/17/04	15	45	55.8	16.0	15 8	193 5	0	22 0	8 8E-08
05/18/04	8	5	72 2	20 5	20 3	183 3	1	22 0	8 8E-08

Tested By: JCM Date: 05/12/04 Checked By: JM Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P3.XLS]Sheet1

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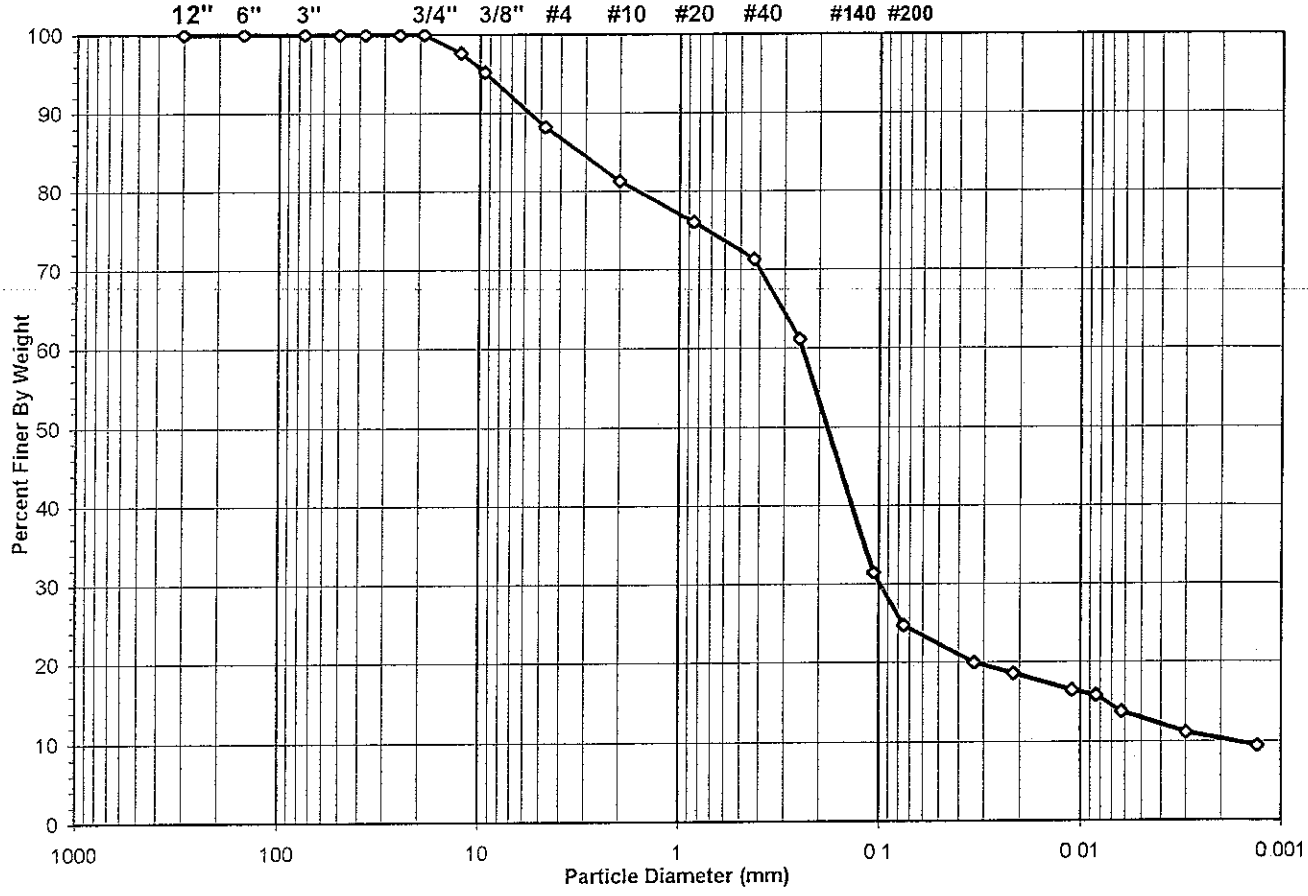
INTEGRITY IN TESTING

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/7/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No.	2004-083-03	Sample No.	68+50
Lab ID	2004-083-03-02	Soil Color	**GRAY**

	SIEVE ANALYSIS			*HYDROMETER*	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay



USCS Summary		
Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	11.76
#4 To #200	*Sand*	63 53
Finer Than #200	*Silt & Clay*	24 71

USCS Symbol *SC, TESTED*

USCS Classification *CLAYEY SAND*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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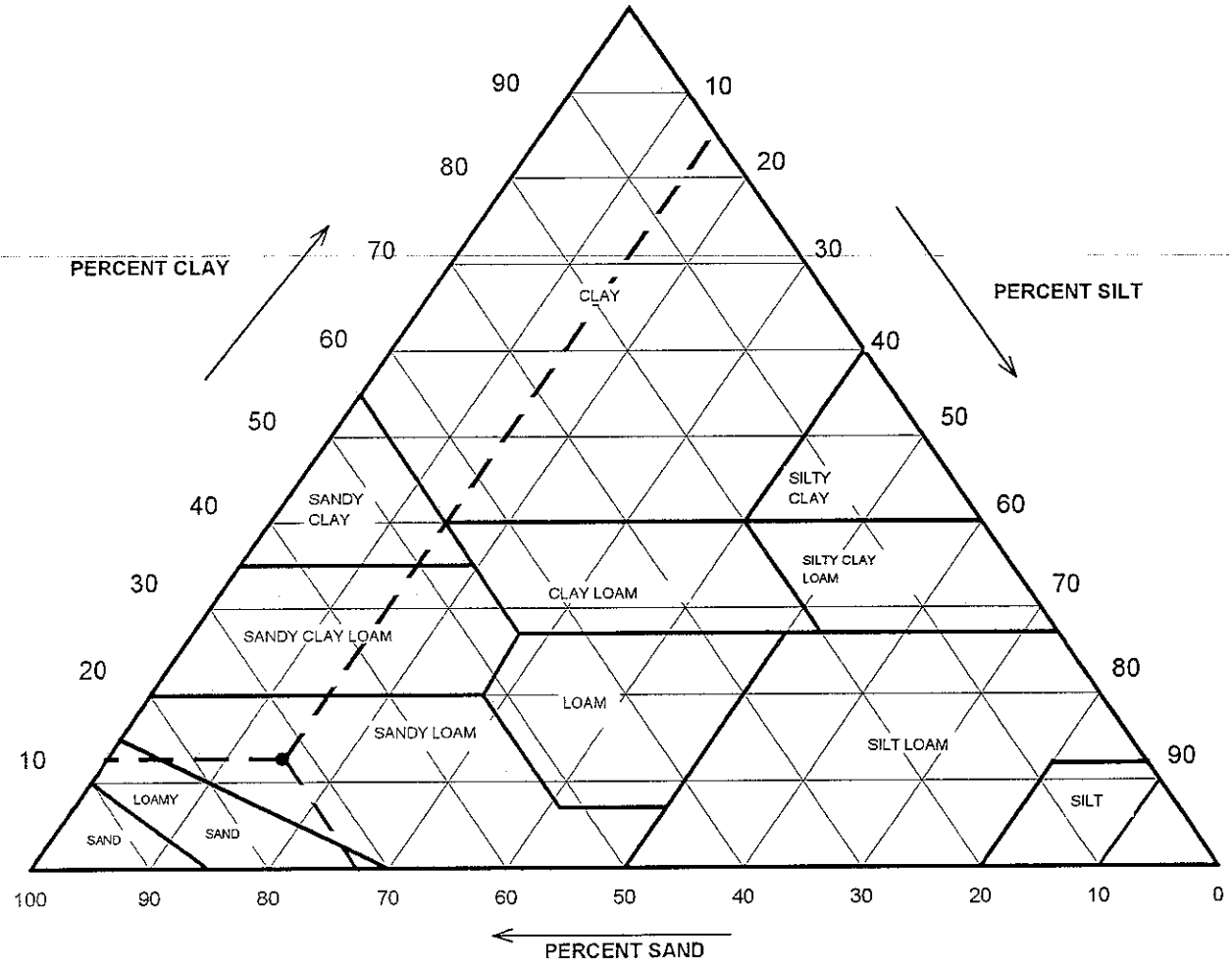
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	ENVIRONMENTAL QUALITY	Boring No	5/7/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No.	68+50
Lab ID	2004-083-03-02	Soil Color	GRAY



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	18.76	**0.00**
2	81.24	*Sand*	58.93	**72.54**
0.05	22.31	*Silt*	11.99	**14.76**
0.002	10.32	*Clay*	10.32	**12.70**

USDA Classification ***SANDY LOAM***

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/7/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No.	68+50
Lab ID	2004-083-03-02	Soil Color	**GRAY**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	1321	Tare No	NA
Wgt Tare + Wet Specimen (gm)	628 24	Wgt.Tare + Wet Specimen (gm)	NA
Wgt Tare + Dry Specimen (gm)	515.00	Wgt Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	100 10	Weight of Tare (gm)	NA
Weight of Water (gm)	113.24	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	414 90	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**27.3**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	414 90
Dry Weight - 3/4" Sample (gm)	312.37	Weight of minus #200 material (gm)	102.53
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	312.37
Dry Weight + 3/4" Sample (gm)	0 00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0 00	0 00	0.00	100.00	**100.00**
6"	150	0 00	0 00	0.00	100.00	**100.00**
3"	75	0.00	0 00	0 00	100 00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37 5	0 00	0.00	0.00	100.00	**100.00**
1"	25.0	0 00	0 00	0.00	100.00	**100.00**
3/4"	19 0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	9.65	2 33	2 33	97 67	**97.67**
3/8"	9.50	10.20	2.46	4.78	95.22	**95.22**
#4	4.75	28.94	6.98	11.76	88.24	**88.24**
#10	2 00	29.04	7.00	18.76	81.24	**81.24**
#20	0.85	21.51	5.18	23.94	76.06	**76.06**
#40	0 425	19.88	4.79	28 73	71 27	**71.27**
#60	0 250	42.09	10 14	38.88	61.12	**61.12**
#140	0.106	123.14	29.68	68.56	31.44	**31.44**
#200	0.075	27.92	6.73	75.29	24.71	**24.71**
Pan	-	102.53	24.71	100.00	-	-

Tested By TMO Date 5/14/04 Checked By JU Date 5-20-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/7/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No	68+50
Lab ID	2004-083-03-02	Soil Color	**GRAY**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	21 5	21 5	21 5	6 98	14 5	80.6	0 01321	0.0334	**19.9**
5		20 5	21.5	6.98	13.5	75.0	0.01321	0.0212	**18.5**
19		19.0	21 5	6 98	12.0	66.7	0 01321	0.0110	**16.5**
33		18.5	21 5	6.98	11.5	63.9	0 01321	0.0084	**15.8**
60		17 0	21.7	6 91	10 1	56.0	0.01317	0.0063	**13.8**
271		15 0	21.8	6.87	8.1	45.1	0.01316	0 0030	**11.1**
1440		14 0	21.1	7.13	6.9	38.1	0 01327	0.0013	**9.4**

Soil Specimen Data		Other Corrections	
Tare No.	691		
Tare + Dry Material (gm)	117 27	a - Factor	0 99
Weight of Tare (gm)	94.43		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 200	24 71
Weight of Dry Material (gm)	17 84		
		Specific Gravity	2.7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material.*

Tested By TO Date 5/18/04 Checked By JU Date 5-20-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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Geotechnics
INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/7/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No.	2004-083-03	Sample No	68+50
Lab ID	2004-083-03-02	Soil Description	**GRAY LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

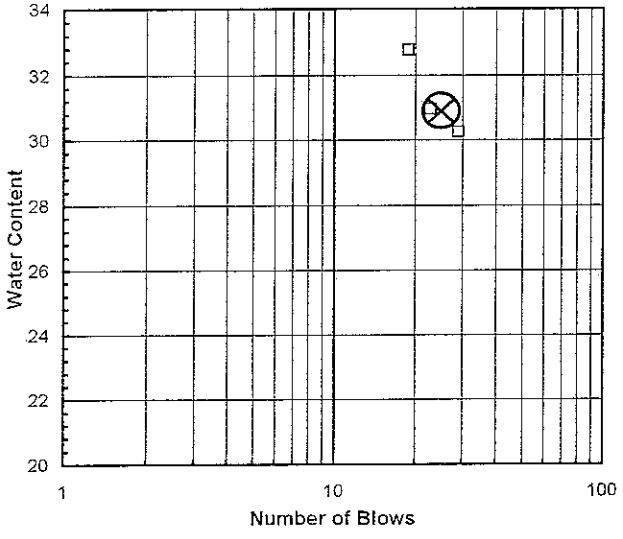
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	221	71	222	MULTIPOINT
Wt. of Tare & WS (gm)	40.57	39 50	42.49	
Wt. of Tare & DS (gm)	35.84	34 47	37.16	
Wt. of Tare (gm)	20 20	18.22	20.89	
Wt. of Water (gm)	4.7	5.0	5.3	
Wt. of DS (gm)	15.6	16.3	16 3	
Moisture Content (%)	**30.2**	**31.0**	**32.8**	
Number of Blows	**29**	**23**	**19**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	AAA	246	
Wt. of Tare & WS (gm)	23 27	23 94	
Wt. of Tare & DS (gm)	22 35	23 02	
Wt. of Tare (gm)	17 02	17.66	
Wt. of Water (gm)	0 9	0 9	
Wt. of DS (gm)	5.3	5 4	
Moisture Content (%)	**17.3**	**17.2**	**0.1**

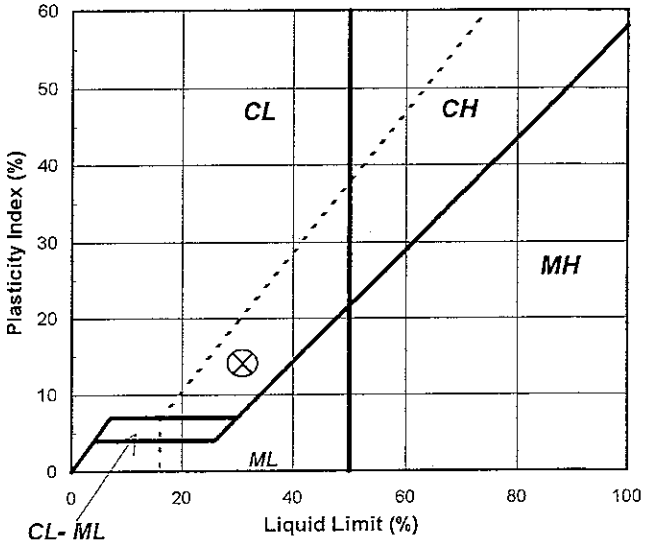
Note. The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**31**
Plastic Limit (%)	**17**
Plasticity Index (%)	**14**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 5/19/04 *Checked By* JU *Date* 5-20-04

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PERMEABILITY TEST

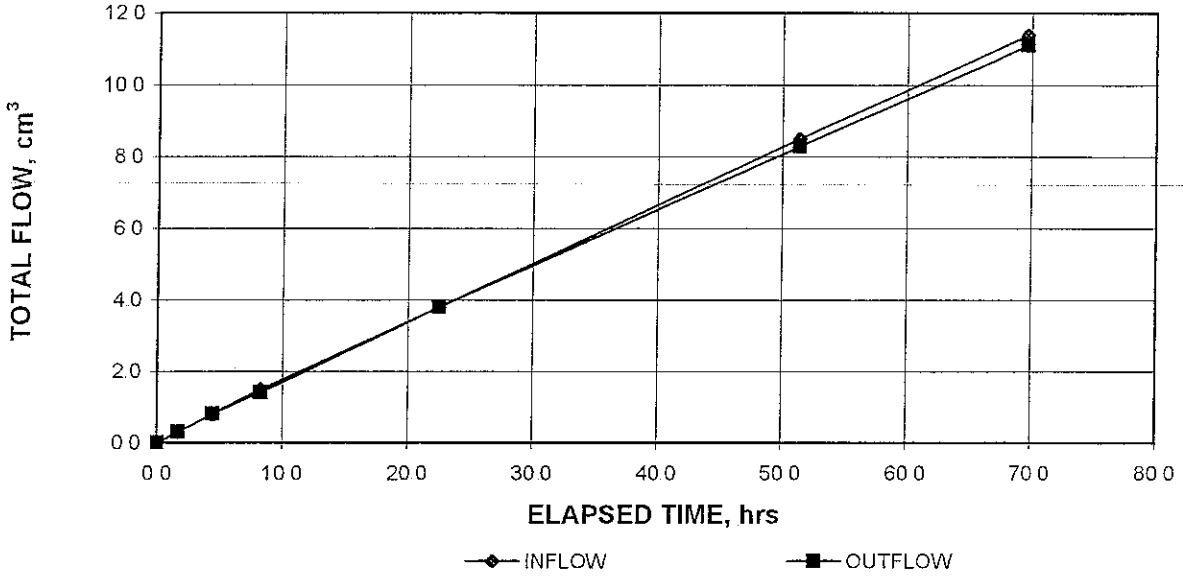
ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

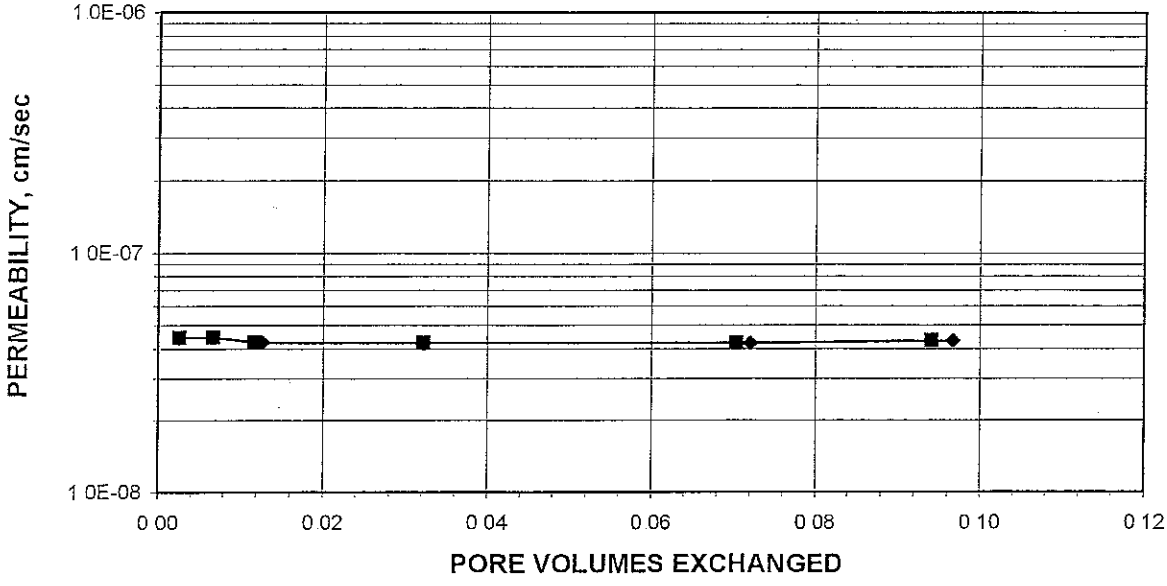
Client	ENVIRONMENTAL QUALITY	Boring No	5-7-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No	68+50
Lab ID No	2004-083-03-02		

AVERAGE PERMEABILITY = 4.3E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.3E-10 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: JCM Date: 05/12/04 Checked By: JCC Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P6.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-7-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No	68+50
Lab ID No	2004-083-03-02		
		Specific Gravity	2 70 Assumed
		Sample Condition	Remolded

Visual Description: GRAY SOIL BENTONITE BACKFILL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	2332	604
Wt of Tare & WS (gm.)	656.18	389.09
Wt of Tare & DS (gm.)	536 19	334.43
Wt. of Tare (gm.)	102.20	87 16
Wt of Water (gm)	119.99	54 66
Wt. of DS (gm)	433 99	247.27
Moisture Content (%)	**27.6**	**22.1**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt of Tube & WS (gm)	1320.22	NA
Wt. of Tube (gm)	656 18	NA
Wt of WS (gm)	664.04	635.21
Length 1 (in.)	3 169	2.966
Length 2 (in.)	3.198	2.969
Length 3 (in)	3.164	2 904
Top Diameter (in)	2 875	2 853
Middle Diameter (in.)	2 875	2.841
Bottom Diameter (in)	2.875	2.891
Average Length (in)	3 18	2.95
Average Area (in ^{2})	6.49	6 43
Sample Volume (cm^3)	337 97	310.54
Unit Wet Wt (gm / cm^3)	1.96	2.05
Unit Wet Wt (pcf)	122 6	127 7
Unit Dry Wt (pcf)	96 1	104.6
Unit Dry Wt (gm / cm^3)	1.54	1 68
Void Ratio, e	0 75	0 61
Porosity, n	0.43	0.38
Pore Volume (cm^3)	145 3	117 9

Tested By: JCM Date: 05/12/04 Checked By: JLL Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P6.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-7-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No	68+50
Lab ID No	2004-083-03-02		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	67 5	Sample Length (cm), L	7 48
Bottom Cap (psi)	70 0	Sample Diameter (cm)	7 27
Cell (psi)	75 6	Sample Area (cm^2), A	41 49
Total Pressure Head (cm)	175 8	Inflow Burette Area (cm^2), a-in	0 890
		Outflow Burette Area (cm^2), a-out	0 873
		B Parameter (%)	96

AVERAGE PERMEABILITY = 4.3E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 4.3E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP. (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
05/14/04	9	24	0 0	0.0	0 0	193.8	0	21 8	NA
05/14/04	11	5	1.7	0 3	0.3	193.1	0	21 8	4 4E-08
05/14/04	13	53	4 5	0.8	0 8	191 9	0	21 8	4 4E-08
05/14/04	17	45	8.4	1 5	1.4	190.5	0	21 5	4.2E-08
05/15/04	7	55	22 5	3 8	3 8	185.1	0	22 0	4.2E-08
05/16/04	12	45	51.4	8 5	8.3	174 7	0	22.0	4.2E-08
05/17/04	7	5	69.7	11 4	11.1	168.3	1	22 0	4 3E-08

Tested By: JCM Date: 05/12/04 Checked By: JU Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P6.XLS]Sheet1

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DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

ATE: 05/08/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:45	76.00	94.00	12.00	Meter Broke
13:30	66.00	41.00	19.00	

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

Slurry was only produced in the afternoon

AM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/08/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
21+00	2	83	21	3	95	No Battery
	34	86	23	3	107	No Battery
21+40	2	85	22	4	94	No Battery
	34	88	24	4	111	No Battery

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/08/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
61+85		0.0							
			3.0	10.0	29.5				
61+80		5.9							
			8.1	10.0	80.5				
61+70		10.2							
			13.5	10.0	135.0				
61+60		16.8							
			16.8	10.0	168.0				
61+50		16.8							
			8.4	10.0	84.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				

SF TODAY 497.00

SF TO DATE

COMMENTS AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/08/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
20+15		36.2							
20+20		36.4							
20+30		36.4							
20+40		36.3							
20+50		36.4							
20+60		36.6							
20+70		36.1							
20+80		36.1							
20+90		36.2							
21+00		30.1							
21+10		23.5							
21+20		20.0							

SF TODAY 0.00

SF TO DATE

COMMENTS (CON'T ON PAGE 4)

AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/08/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
21+00		36.3					20+15		0.0
21+10		36.5					20+20		4.0
21+20		36.4					20+30		7.5
21+30		36.5					20+40		13.4
21+40		36.4					20+50		16.4
21+50		36.4					20+60		18.1
21+60		36.3					20+70		19.2
21+70		36.2					20+80		21.4
21+80		36.8					20+90		22.9
							21+00		23.8
							21+10		25.1
							21+20		26.0
							21+30		28.1
							21+40		30.9
							21+50		33.4
							21+60		36.4
							21+70		36.3
							21+80		36.8
							21+90		29.0

SF TODAY

SF TO DATE

COMMENTS

PM Profile

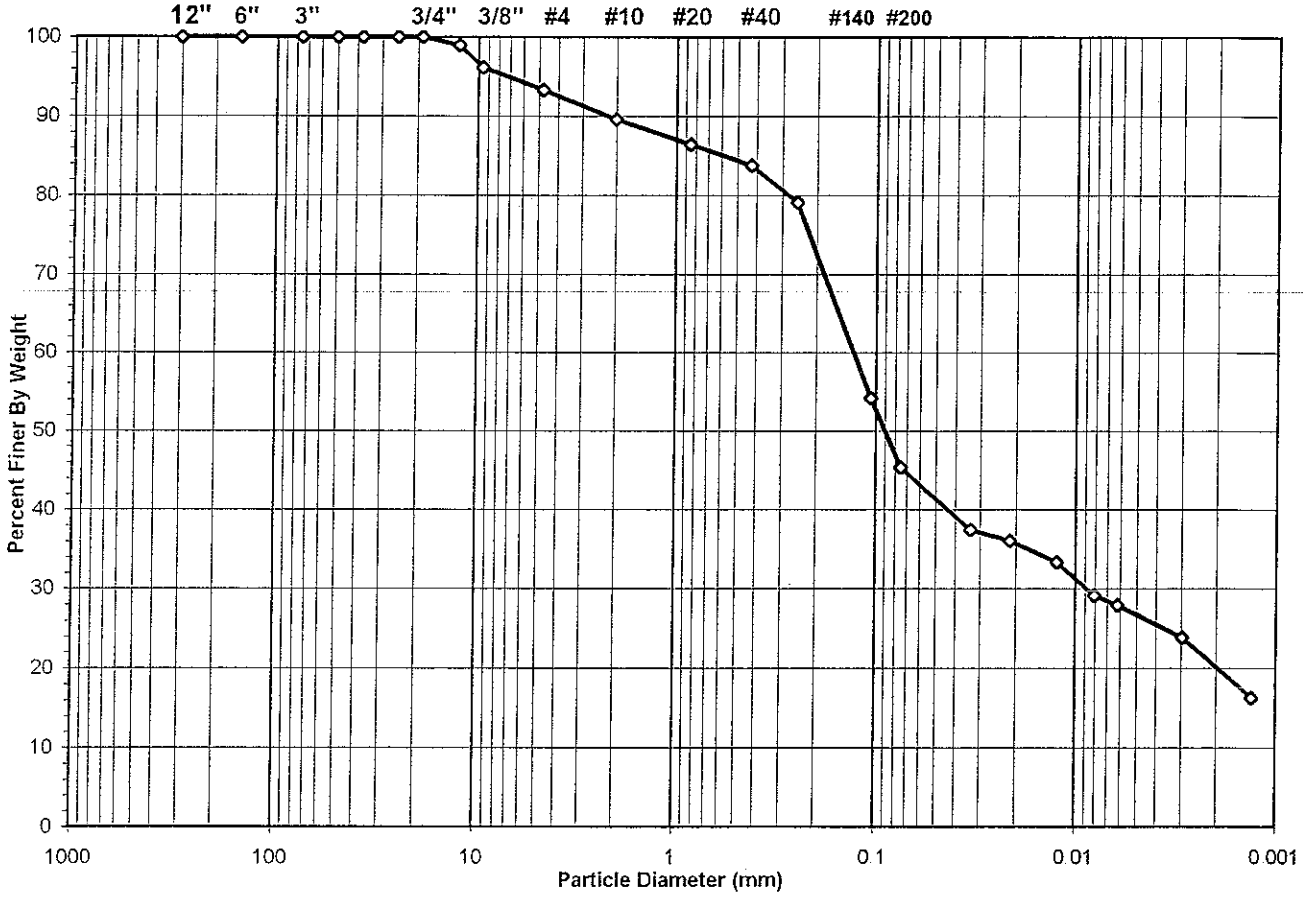
EQM OWNER:

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5/8/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No	20+15
Lab ID	2004-083-03-03	Soil Color	**GRAY**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay



USCS Summary		
Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	6.70
#4 To #200	*Sand*	47 97
Finer Than #200	*Silt & Clay*	45 33

USCS Symbol *SC, TESTED*

USCS Classification *CLAYEY SAND*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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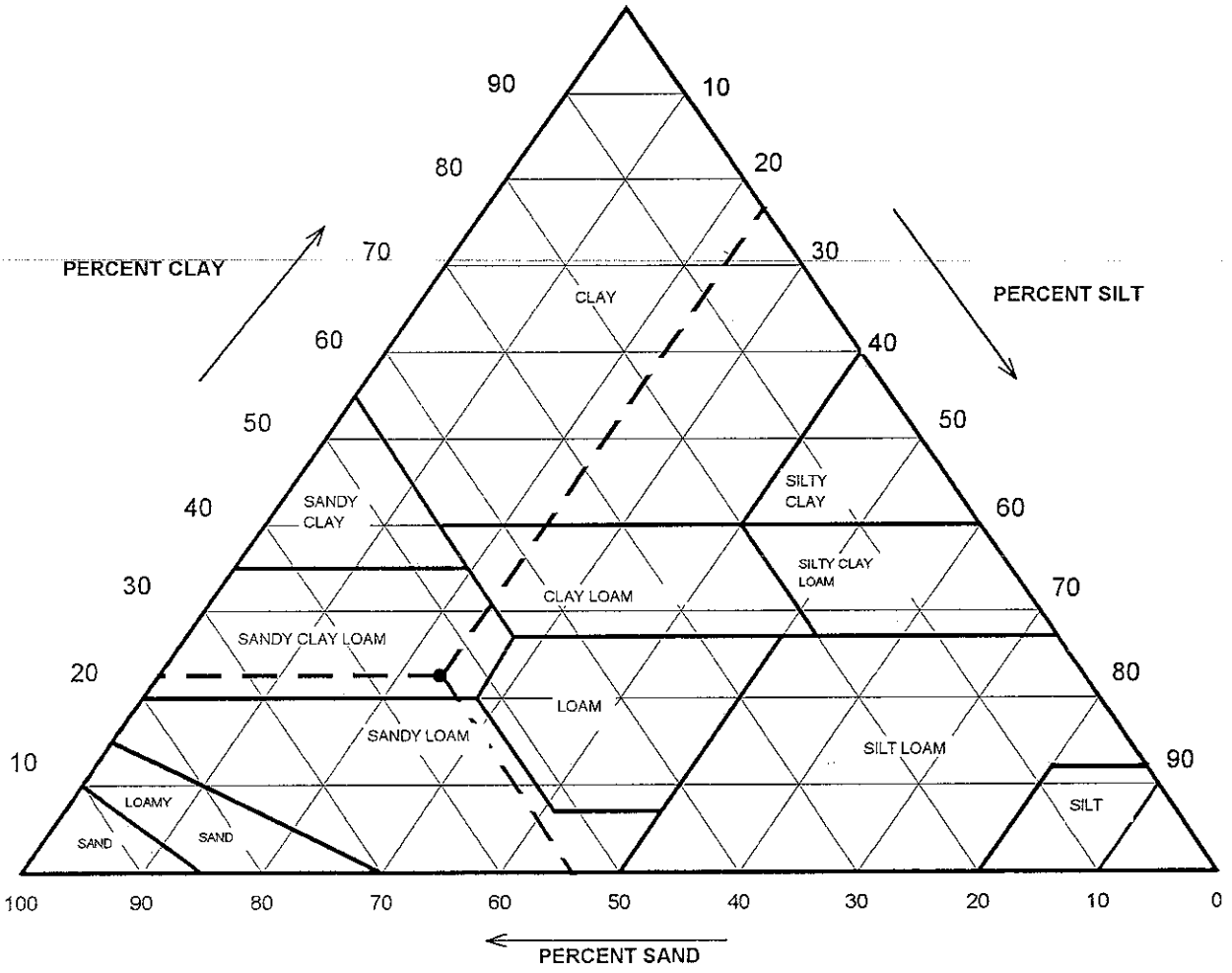
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	ENVIRONMENTAL QUALITY	Boring No.	5/8/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No.	20+15
Lab ID	2004-083-03-03	Soil Color	GRAY



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	10 40	**0.00**
2	89 60	*Sand*	48 25	**53.85**
0 05	41 35	*Silt*	21.12	**23.57**
0 002	20.23	*Clay*	20.23	**22.58**

USDA Classification ***SANDY CLAY LOAM***

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/8/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No.	20+15
Lab ID	2004-083-03-03	Soil Color	**GRAY**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No	2326	Tare No	NA
Wgt Tare + Wet Specimen (gm)	585.04	Wgt.Tare + Wet Specimen (gm)	NA
Wgt Tare + Dry Specimen (gm)	472 71	Wgt.Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	100.04	Weight of Tare (gm)	NA
Weight of Water (gm)	112.33	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	372.67	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**30.1**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	372.67
Dry Weight - 3/4" Sample (gm)	203.74	Weight of minus #200 material (gm)	168 93
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	203.74
Dry Weight + 3/4" Sample (gm)	0.00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0 00	0 00	100.00	**100.00**
6"	150	0 00	0.00	0.00	100.00	**100.00**
3"	75	0 00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0 00	0 00	100.00	**100.00**
1 1/2"	37 5	0 00	0 00	0 00	100.00	**100.00**
1"	25 0	0.00	0 00	0 00	100 00	**100.00**
3/4"	19 0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	4.02	1.08	1.08	98.92	**98.92**
3/8"	9.50	10 32	2.77	3.85	96.15	**96.15**
#4	4.75	10 63	2 85	6.70	93 30	**93.30**
#10	2 00	13.78	3.70	10.40	89.60	**89.60**
#20	0.85	11.70	3 14	13 54	86.46	**86.46**
#40	0 425	9.89	2.65	16.19	83.81	**83.81**
#60	0 250	17.47	4.69	20.88	79.12	**79.12**
#140	0.106	92.92	24.93	45 81	54.19	**54.19**
#200	0.075	33.01	8.86	54.67	45.33	**45.33**
Pan	-	168.93	45.33	100.00	-	-

Tested By TMO Date 5/14/04 Checked By JU Date 5-20-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/8/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No	20+15
Lab ID	2004-083-03-03	Soil Color	**GRAY**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	20 0	20 5	21 5	6 98	13 5	82.6	0 01321	0 0336	**37.5**
5		20 0	21 5	6 98	13.0	79 6	0.01321	0 0213	**36.1**
15		19 0	21.5	6.98	12.0	73.5	0 01321	0 0124	**33.3**
36		17.5	21 5	6 98	10 5	64 3	0.01321	0 0081	**29.1**
61		17 0	21 7	6 91	10.1	61 7	0.01317	0 0062	**28.0**
274		15.5	21 8	6 87	8.6	52 7	0.01316	0 0029	**23.9**
1440		13.0	21 1	7 13	5.9	35.9	0.01327	0 0013	**16.3**

Soil Specimen Data		Other Corrections	
Tare No.	707		
Tare + Dry Material (gm)	121.78	a - Factor	0.99
Weight of Tare (gm)	100.58		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 200	45.33
Weight of Dry Material (gm)	16 2		
		Specific Gravity	2 7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material.*

Tested By TO Date 5/18/04 Checked By JU Date 5-20-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	ENVIRONMENTAL QUALITY	Boring No	5/8/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No.	20+15
Lab ID	2004-083-03-03	Soil Description	**GRAY LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

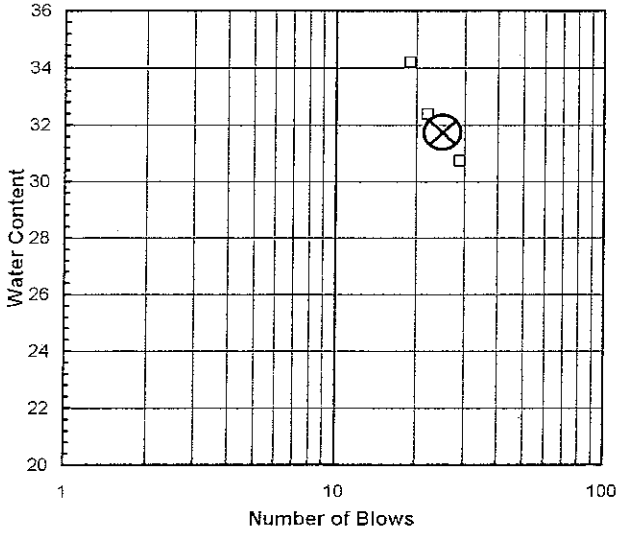
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	137	207	244	MULTIPOINT
Wt of Tare & WS (gm)	40 84	38 65	41.25	
Wt. of Tare & DS (gm)	35.60	33.44	36.00	
Wt. of Tare (gm)	18.54	17.35	20 64	
Wt of Water (gm)	5.2	5.2	5.3	
Wt. of DS (gm)	17.1	16 1	15.4	
Moisture Content (%)	**30.7**	**32.4**	**34.2**	
Number of Blows	**29**	**22**	**19**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	65	24	
Wt of Tare & WS (gm)	24.18	21 77	
Wt of Tare & DS (gm)	23 21	20 91	
Wt of Tare (gm)	17 60	15.58	
Wt of Water (gm)	1.0	0 9	
Wt. of DS (gm)	5.6	5.3	
Moisture Content (%)	**17.3**	**16.1**	**1.2**

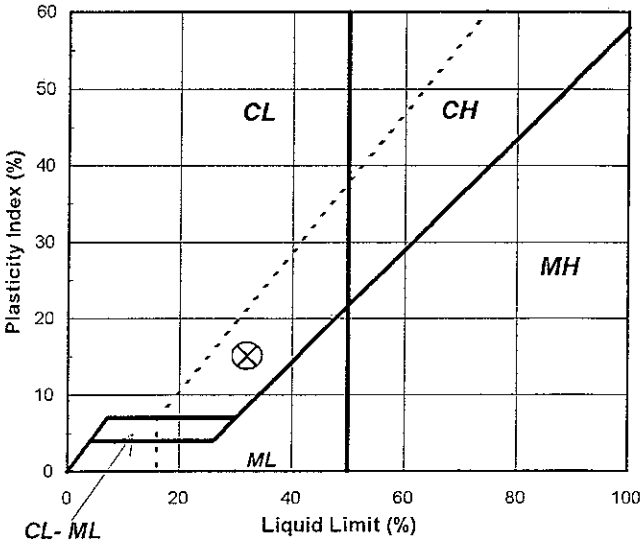
Note. The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**32**
Plastic Limit (%)	**17**
Plasticity Index (%)	**15**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 5/19/04 *Checked By* JLL *Date* 5-20-04

page 1 of 1 DCN: CT-S4B DATE: 10/8/01 REVISION: 2

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PERMEABILITY TEST

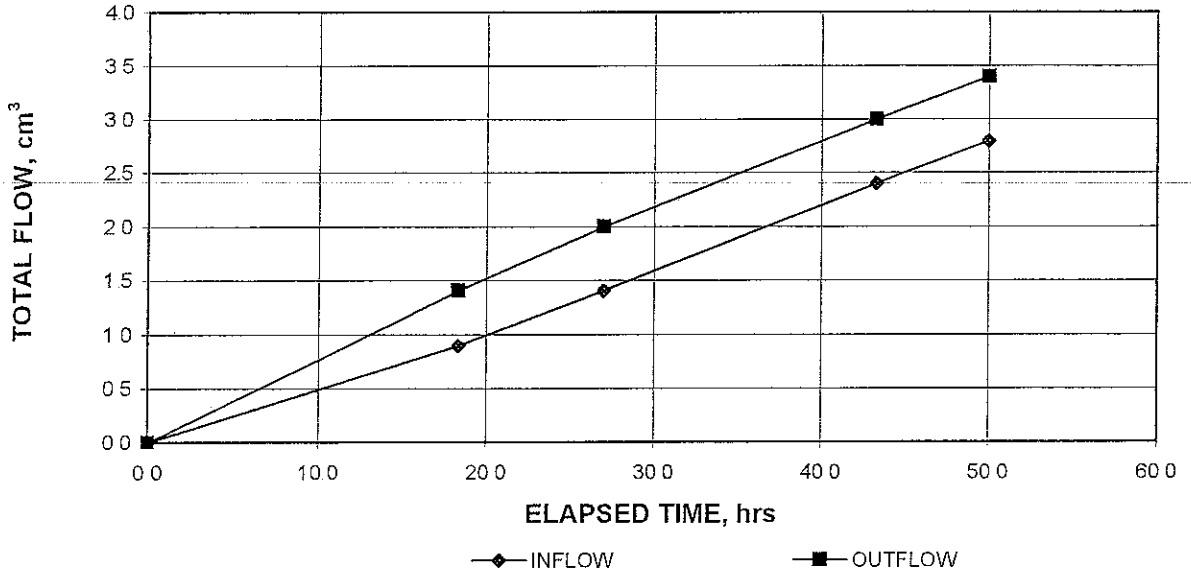
ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

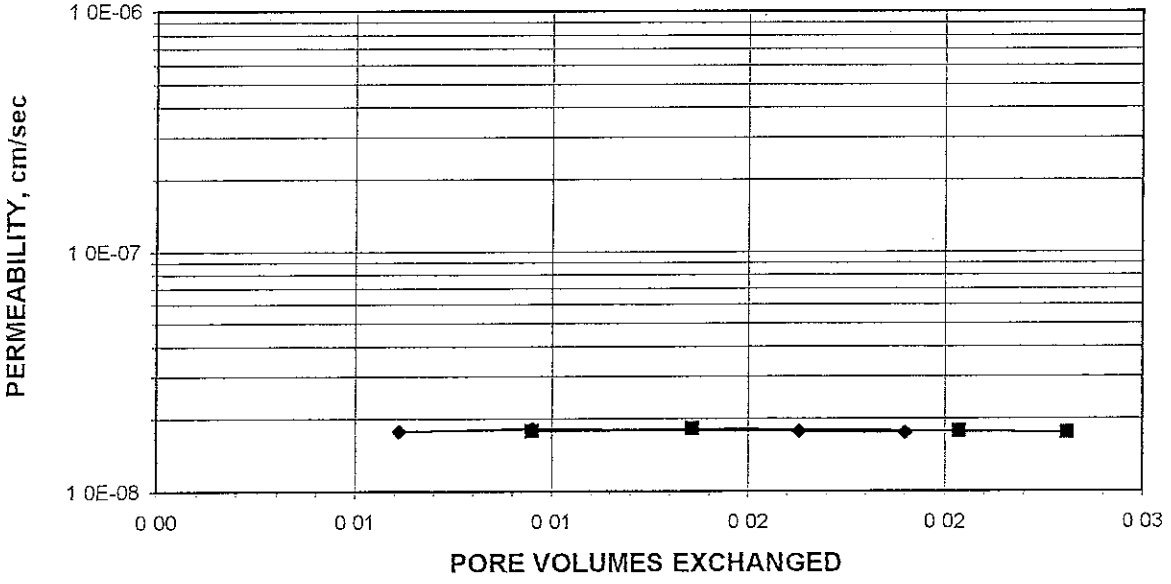
Client	ENVIRONMENTAL QUALITY	Boring No	5-8-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No	20+15
Lab ID No	2004-083-03-03		

AVERAGE PERMEABILITY = 1.8E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.8E-10 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: JCM Date: 05/12/04 Checked By: JLL Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P4.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-8-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No	20+15
Lab ID No	2004-083-03-03		
		Specific Gravity	2 70 Assumed
		Sample Condition	Remolded

Visual Description: GRAY SOIL BENTONITE BACKFILL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	1619	587
Wt of Tare & WS (gm.)	410 49	354 67
Wt of Tare & DS (gm)	325 90	296.63
Wt. of Tare (gm)	95 73	82.53
Wt. of Water (gm)	84 59	58 04
Wt of DS (gm.)	230 17	214 10
Moisture Content (%)	**36.8**	**27.1**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm)	1137 71	NA
Wt of Tube (gm)	410.49	NA
Wt. of WS (gm)	727.22	675.94
Length 1 (in)	3 770	3 333
Length 2 (in.)	3.751	3.386
Length 3 (in.)	3.765	3 395
Top Diameter (in)	2.875	2 774
Middle Diameter (in.)	2 875	2.800
Bottom Diameter (in)	2 875	2.875
Average Length (in)	3.76	3 37
Average Area (in ^{2})	6 49	6 23
Sample Volume (cm^3)	400 21	344 16
Unit Wet Wt. (gm./ cm^3)	1.82	1.96
Unit Wet Wt (pcf)	113 4	122 6
Unit Dry Wt (pcf)	82 9	96 5
Unit Dry Wt (gm / cm^3)	1 33	1 55
Void Ratio, e	1 03	0 75
Porosity, n	0 51	0 43
Pore Volume (cm^3)	203.3	147.2

Tested By: JCM Date: 05/12/04 Checked By: JW Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P4.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

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INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-8-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-03	Sample No	20+15
Lab ID No	2004-083-03-03		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	67 5	Sample Length (cm), L	8 56
Bottom Cap (psi)	70 0	Sample Diameter (cm)	7 15
Cell (psi)	75.6	Sample Area (cm^2), A	40 19
Total Pressure Head (cm)	175 8	Inflow Burette Area (cm^2), a-in	0 877
		Outflow Burette Area (cm^2), a-out	0 904
		B Parameter (%)	98

AVERAGE PERMEABILITY = 1.8E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.8E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
05/16/04	12	45	0.0	0 0	0 0	198.2	0	22 0	NA
05/17/04	7	5	18.3	0 9	1.4	195 6	0	22 0	1 8E-08
05/17/04	15	45	27 0	1 4	2.0	194 4	0	22.0	1 8E-08
05/18/04	8	5	43 3	2 4	3 0	192.2	0	22 0	1 8E-08
05/18/04	14	45	50 0	2 8	3.4	191.3	1	22 0	1 8E-08

Tested By: JCM Date: 05/12/04 Checked By: JL Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P4.XLS]Sheet1

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DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/10/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
21+70	2	84	21	16	79	Meter Broken
	34	88	26	18	103	Meter Broken
22+40	2	81	17	16	60	Meter Broken
	34	84	22	20	66	Meter Broken

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/10/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
9:00	66.00	60.00	18.00	Meter Broke
11:30		54.00		

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

Slurry was only produced in the afternoon

.QM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/10/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
20+15		0.0					20+15	0.0	
			1.9	10.0	19.0				
20+20		3.8					20+20	3.8	
			5.8	10.0	57.5				
20+30		7.7					20+30	7.7	
20+40		13.6					20+40	13.6	
			10.7	10.0	106.5				
20+50		16.5					20+50	16.5	
			15.1	10.0	150.5				
20+60		18.2					20+60	18.2	
20+70		19.2					20+70	19.2	
			17.4	10.0	173.5				
20+80		21.6					20+80	21.6	
			18.7	10.0	187.0				
20+90		23.0					20+90	23.0	
21+00		23.7					21+00	23.7	
			20.4	10.0	204.0				
21+10		25.1					21+10	25.1	
			22.3	10.0	223.0				
21+20		26.0					21+20	26.0	
21+30		28.2					21+30	28.2	
			23.4	10.0	233.5				
21+40		30.5					21+40	30.5	
			24.4	10.0	244.0				
21+50		33.6					21+50	33.6	
21+60		36.0					21+60	36.0	
			25.6	10.0	255.5				
21+70		36.0					21+70	36.0	
			27.1	10.0	271.0				
21+80		36.2					21+80	36.2	

SF TODAY 2125.00

SF TO DATE

COMMENTS AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/10/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
22+80		36.4					20+90		0.0
							21+00		2.0
							21+10		6.3
							21+20		10.0
							21+30		11.4
							21+40		13.1
							21+50		14.3
							21+60		15.7
							21+70		17.2
							21+80		
							21+90		20.1
							22+00		22.7
							22+10		24.5
							22+20		26.7
							22+30		27.2
							22+40		28.8
							22+50		29.3
							22+60		30.8
							22+70		33.7
							22+80		36.4

SF TODAY 0.00

SF TO DATE

COMMENTS

PM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/11/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
23+00	2	84	20	14	64	9
	34	88	24	18	76	9
23+60	2	87	24	18	85	9
	34	87	22	22	87	9

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

EQM _____ **OWNER:** _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/11/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
8:30	66	47	17	9
11:30	65	55	18	9

	FUNNEL CALIBRATIONS PERFORMED TODAY?	no
	pH METER CALIBRATIONS PERFORMED TODAY?	N/A
Slurry was only produced in the afternoon	BALANCE CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/11/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
21+00		36.3	36.4	10.0	364.0		20+90	0.0	
21+20		36.5	36.5	10.0	364.5		21+00	2.2	
21+30		36.4	36.5	10.0	364.5		21+10	6.5	
21+40		36.5	36.5	10.0	364.5		21+20	10.1	
21+50		36.4	36.5	10.0	364.5		21+30	11.6	
21+60		36.4	36.4	10.0	364.0		21+40	13.2	
21+70		36.3	36.4	10.0	363.5		21+50	14.5	
21+80		36.2	36.3	10.0	362.5		21+60	15.9	
			18.1	10.0	181.0		21+70	17.5	
			0.0	10.0	0.0		21+80	18.3	
			0.0	10.0	0.0		21+90	20.3	
			0.0	10.0	0.0		22+00	22.9	
			0.0	10.0	0.0		22+10	24.5	
							22+20	26.8	
							22+30	27.1	
							22+40	28.7	
							22+50	29.2	
							22+60	30.8	
							22+70	33.6	
							22+80	36.1	

SF TODAY 2728.50

SF TO DATE

COMMENTS AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/11/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
22+90		36.5					22+00		0.0
23+00		36.5					22+10		3.8
23+10		36.6					22+20		6.9
23+20		36.7					22+30		8.3
23+40		36.7					22+40		10.1
23+50		36.7					22+50		11.8
23+60		36.6					22+60		13.6
23+70		36.5					22+70		16.1
23+80		36.4					22+80		18.1
23+90		36.5					22+90		19.5
24+00		36.5					23+00		21.2
24+10		36.4					23+10		23.2
24+20		36.3					23+20		25.1
24+30		36.4					23+30		26.0
24+40		36.4					23+40		26.9
							23+50		28.8
							23+60		29.4
							23+70		29.9
							23+80		30.6
							23+90		31.4
							24+00		32.9
							24+10		34.0
							24+20		34.5
							24+30		34.9
							24+40		36.8

SF TODAY

SF TO DATE

COMMENTS

PM Profile

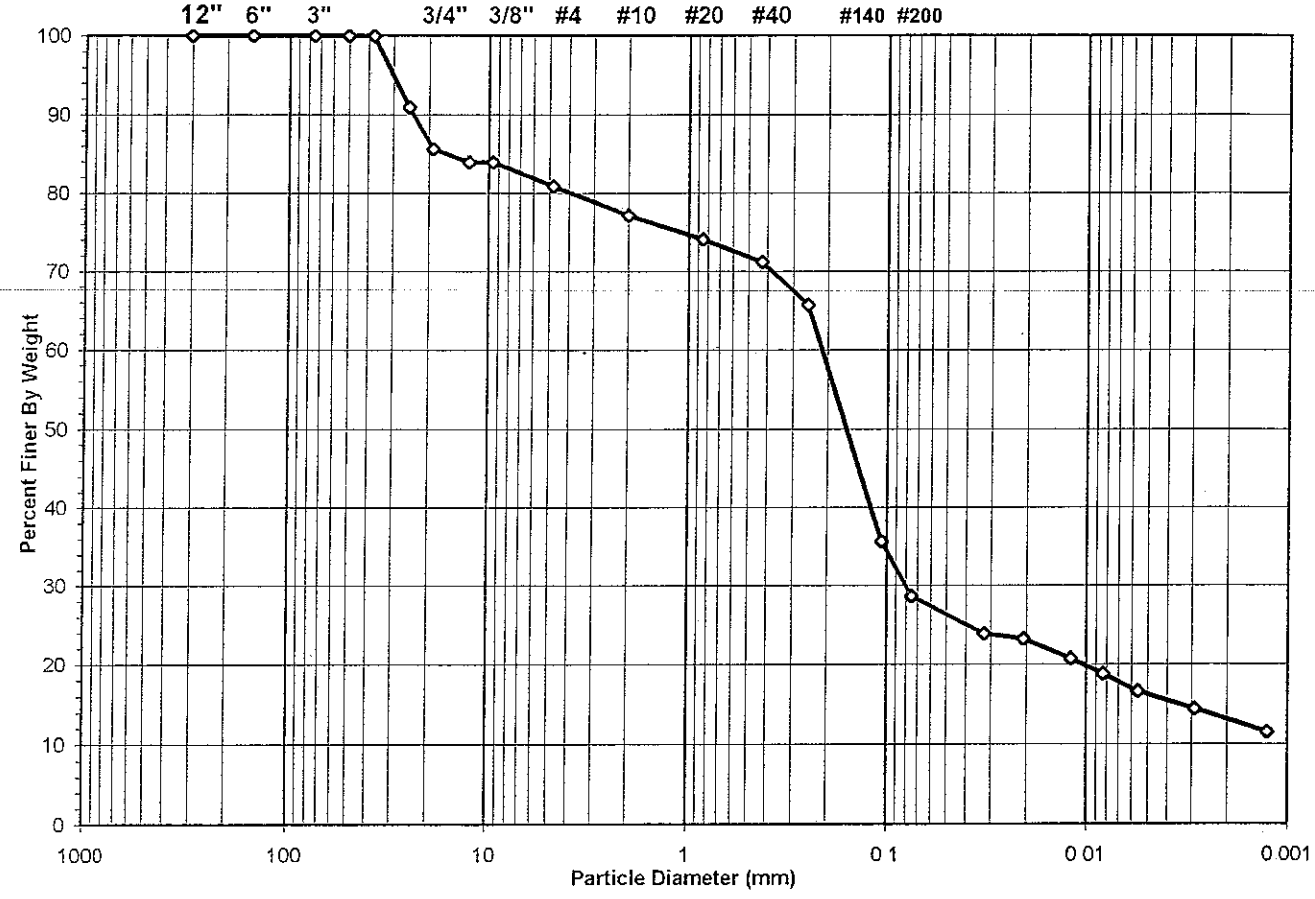
EQM OWNER:

geotechnics
INTEGRITY IN TESTING

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/11/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-04	Sample No.	21+00
Lab ID	2004-083-04-01	Soil Color	**GRAY**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay



USCS Summary		
Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	19.11
#4 To #200	*Sand*	52.25
Finer Than #200	*Silt & Clay*	28.64

USCS Symbol *SC, TESTED*

USCS Classification *CLAYEY SAND WITH GRAVEL*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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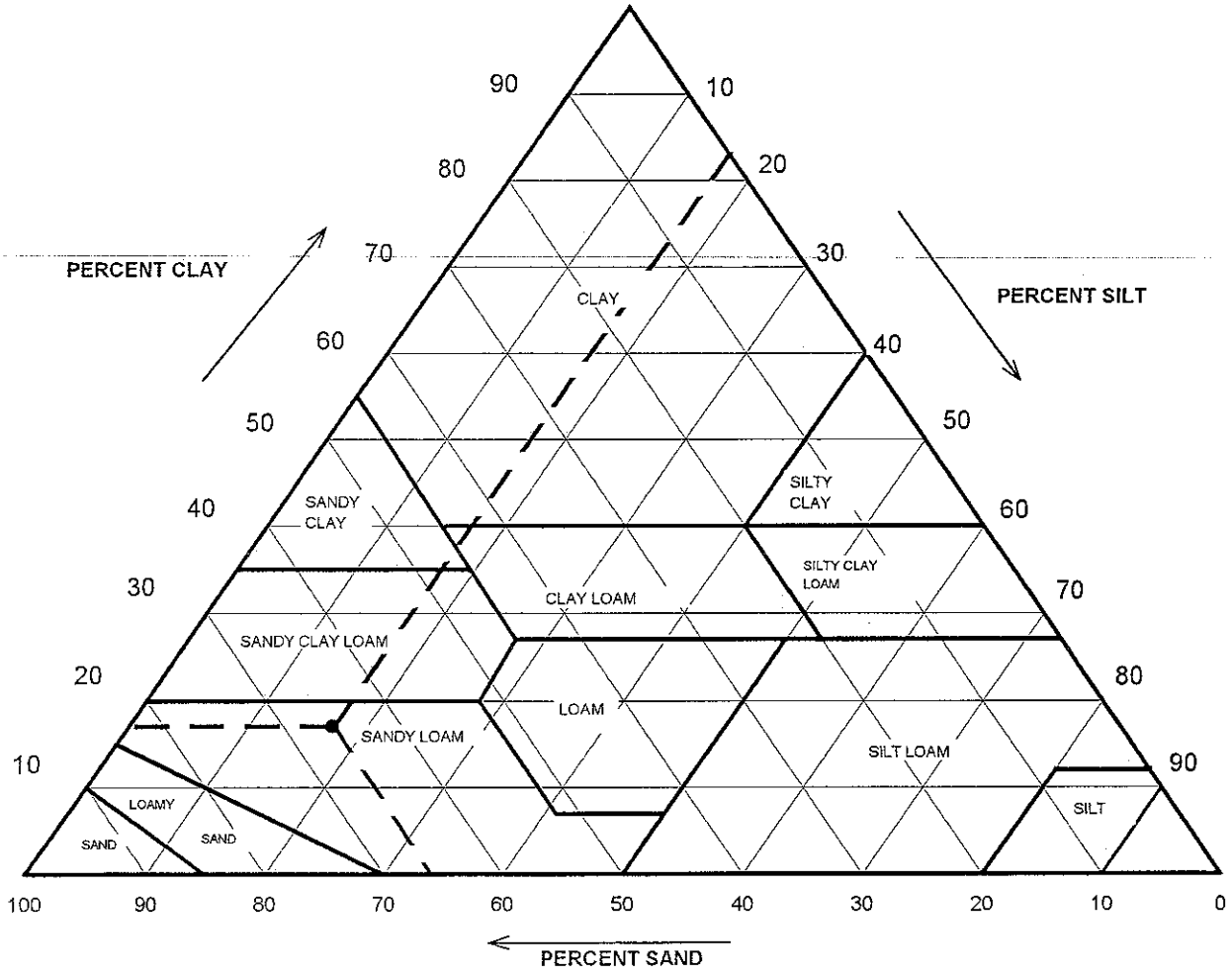
USDA CLASSIFICATION CHART

Client	ENVIRONMENTAL QUALITY	Boring No	5/11/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No.	2004-083-04	Sample No.	21+00
Lab ID	2004-083-04-01	Soil Color	GRAY



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	22.83	**0.00**
2	77.17	*Sand*	50.81	**65.84**
0.05	26.36	*Silt*	13.19	**17.09**
0.002	13.17	*Clay*	13.17	**17.06**

USDA Classification ***SANDY LOAM***

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/11/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-04	Sample No.	21+00
Lab ID	2004-083-04-01	Soil Color	**GRAY**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No	2353	Tare No	NA
Wgt.Tare + Wet Specimen (gm)	717 18	Wgt.Tare + Wet Specimen (gm)	NA
Wgt Tare + Dry Specimen (gm)	577 99	Wgt Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	99 53	Weight of Tare (gm)	NA
Weight of Water (gm)	139.19	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	478.46	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**29.1**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	478 46
Dry Weight - 3/4" Sample (gm)	272.78	Weight of minus #200 material (gm)	137.04
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	341 42
Dry Weight + 3/4" Sample (gm)	68 64		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0 00	0 00	0 00	100.00	**100.00**
6"	150	0 00	0 00	0.00	100.00	**100.00**
3"	75	0 00	0 00	0 00	100.00	**100.00**
2"	50	0 00	0.00	0 00	100.00	**100.00**
1 1/2"	37 5	0.00	0.00	0.00	100.00	**100.00**
1"	25 0	43 07	9.00	9.00	91.00	**91.00**
3/4"	19.0	25.57	5 34	14.35	85.65	**85.65**
1/2"	12.5	8.02	1.68	16.02	83 98	**83.98**
3/8"	9.50	0.00	0 00	16 02	83.98	**83.98**
#4	4 75	14.75	3.08	19.11	80.89	**80.89**
#10	2 00	17.84	3.73	22.83	77 17	**77.17**
#20	0.85	14.61	3 05	25 89	74.11	**74.11**
#40	0.425	13.96	2.92	28 80	71.20	**71.20**
#60	0.250	26 24	5.48	34.29	65.71	**65.71**
#140	0.106	143.69	30.03	64.32	35.68	**35.68**
#200	0.075	33.67	7.04	71.36	28.64	**28.64**
Pan	-	137.04	28.64	100.00	-	-

Tested By TMO Date 5/18/04 Checked By JU Date 5-21-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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HYDROMETER ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/11/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-04	Sample No.	21+00
Lab ID	2004-083-04-01	Soil Color	**GRAY**

Elapsed Time (min)		R Measured	Temp (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	25 5	25 5	22 1	6 76	18 7	83.4	0 01311	0.0323	**23.9**
5		25.0	22 1	6 76	18.2	81.2	0.01311	0.0205	**23.3**
15		23 0	22 1	6 76	16 2	72 3	0.01311	0 0120	**20.7**
32		21 5	22 1	6.76	14 7	65 6	0 01311	0 0083	**18.8**
73		20 0	21 6	6 94	13.1	58 1	0.01319	0 0056	**16.6**
273		18 0	22 4	6.65	11.3	50.5	0 01307	0.0029	**14.5**
1440		15.5	23 0	6 44	9.1	40 4	0 01297	0.0013	**11.6**

Soil Specimen Data		**Other Corrections**	
Tare No.	2495		
Tare + Dry Material (gm)	116 55	a - Factor	0 99
Weight of Tare (gm)	89.31		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 200	28.64
Weight of Dry Material (gm)	22 24		
		Specific Gravity	2.7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material.*

Tested By TO Date 5/18/04 Checked By JU Date 5-21-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	ENVIRONMENTAL QUALITY	Boring No	5/11/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-04	Sample No.	21+00
Lab ID	2004-083-04-01	Soil Description	**GRAY LEAN CLAY**

Note: ***The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.*** (Minus No 40 sieve material, Airdried)

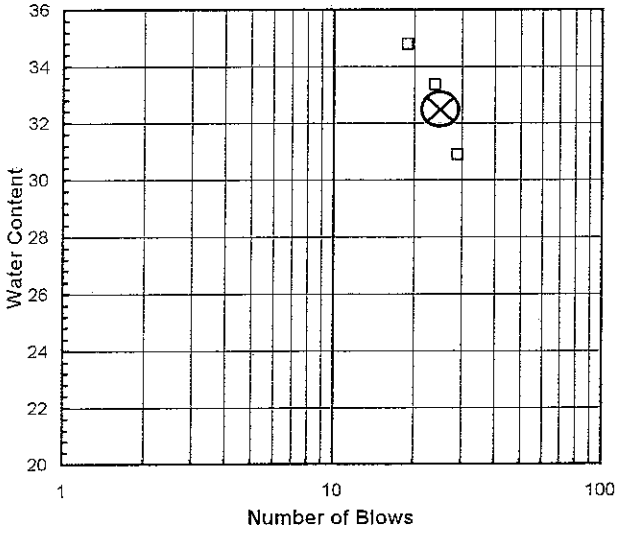
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	168	A104	219	M U L T I P O I N T
Wt of Tare & WS (gm)	39.12	39.53	40.61	
Wt. of Tare & DS (gm)	33 60	34.24	35.22	
Wt. of Tare (gm)	15.72	18.38	19 73	
Wt of Water (gm)	5.5	5.3	5.4	
Wt of DS (gm)	17.9	15 9	15.5	
Moisture Content (%)	**30.9**	**33.4**	**34.8**	
Number of Blows	**29**	**24**	**19**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	29	224	
Wt of Tare & WS (gm)	23.49	25.37	
Wt. of Tare & DS (gm)	22.59	24 46	
Wt. of Tare (gm)	17 24	19 16	
Wt of Water (gm)	0.9	0 9	
Wt. of DS (gm)	5.4	5.3	
Moisture Content (%)	**16.8**	**17.2**	**-0.3**

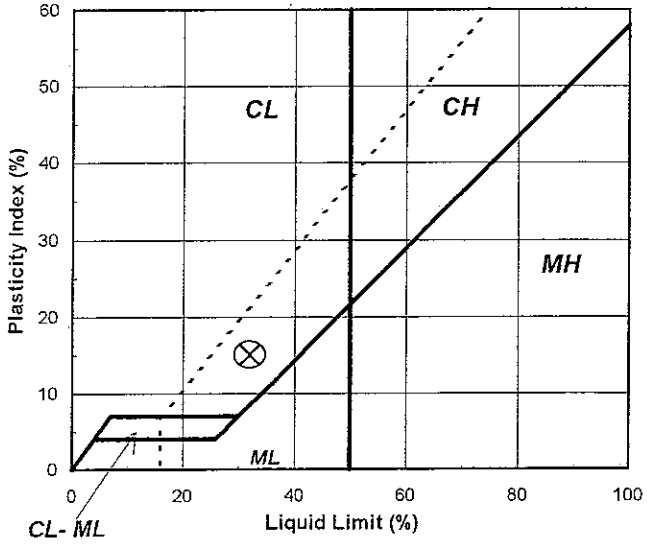
Note. The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**32**
Plastic Limit (%)	**17**
Plasticity Index (%)	**15**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 5/20/04 *Checked By* JL *Date* 5-21-04

page 1 of 1 DCN: CT-S4B DATE: 10/8/01 REVISION: 2

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PERMEABILITY TEST

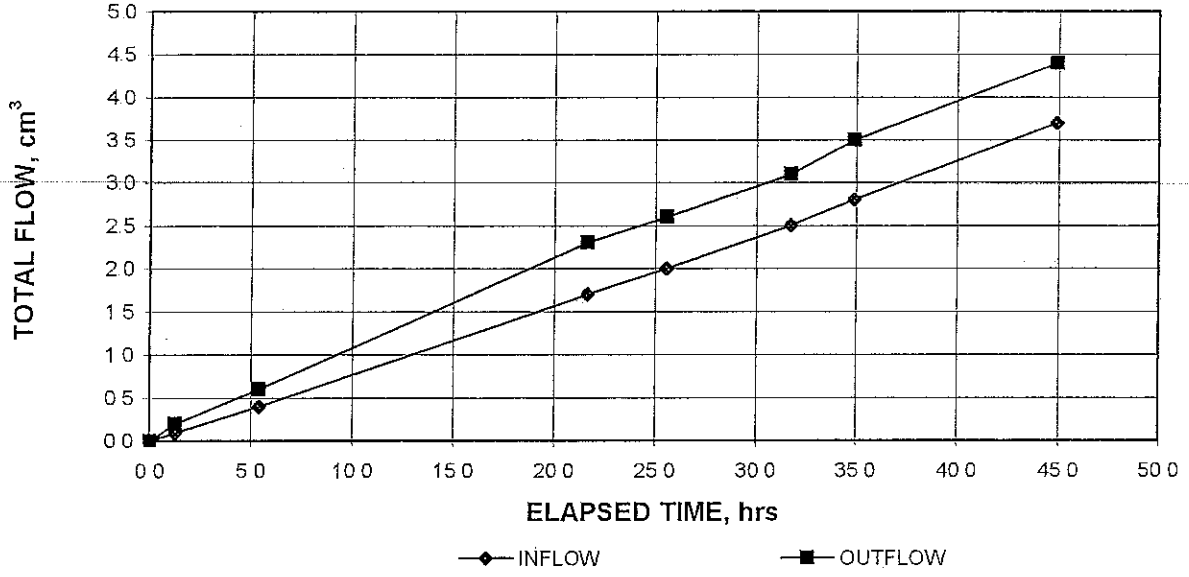
ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

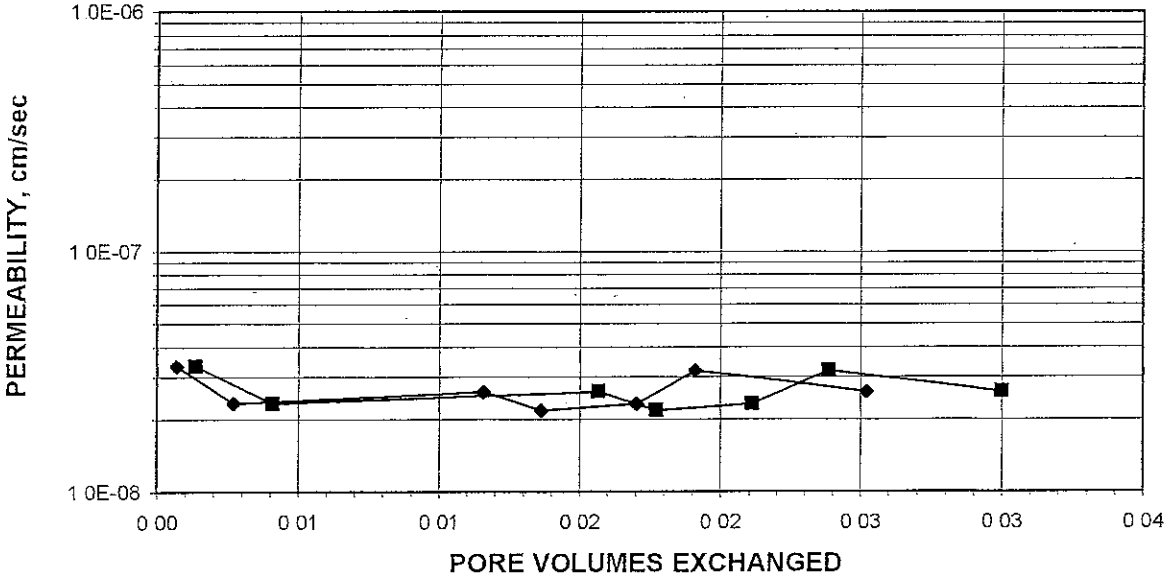
Client	ENVIRONMENTAL QUALITY	Boring No	5-11-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-04	Sample No	21+00
Lab ID No	2004-083-04-01		

AVERAGE PERMEABILITY = 2.6E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.6E-10 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: JCM Date: 05/13/04 Checked By: JU Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P8.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-11-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-04	Sample No	21+00
Lab ID No	2004-083-04-01		
		Specific Gravity	2 70 Assumed
		Sample Condition	Remolded

Visual Description: GRAY SOIL BENTONITE BACKFILL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	705	700
Wt of Tare & WS (gm.)	321.64	369.99
Wt of Tare & DS (gm.)	264.47	310.66
Wt of Tare (gm.)	101 79	75.78
Wt. of Water (gm.)	57 17	59.33
Wt of DS (gm.)	162 68	234 88
Moisture Content (%)	**35.1**	**25.3**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt of Tube & WS (gm.)	1065.28	NA
Wt of Tube (gm.)	321.64	NA
Wt. of WS (gm.)	743.64	689.26
Length 1 (in.)	3 702	3 367
Length 2 (in.)	3 690	3.303
Length 3 (in.)	3.691	3 318
Top Diameter (in.)	2 875	2 827
Middle Diameter (in.)	2 875	2.841
Bottom Diameter (in.)	2 875	2 912
Average Length (in.)	3 69	3 33
Average Area ($in.^2$)	6.49	6.42
Sample Volume (cm^3)	393.01	350 49
Unit Wet Wt. ($gm./cm^3$)	1.89	1.97
Unit Wet Wt. (pcf)	118 1	122 8
Unit Dry Wt. (pcf)	87 4	98 0
Unit Dry Wt. ($gm./cm^3$)	1 40	1 57
Void Ratio, e	0.93	0 72
Porosity, n	0 48	0 42
Pore Volume (cm^3)	189.2	146.7

Tested By: JCM Date: 05/13/04 Checked By: JLL Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P8.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

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INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-11-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-04	Sample No	21+00
Lab ID No	2004-083-04-01		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	67 5	Sample Length (cm), L	8 46
Bottom Cap (psi)	70 0	Sample Diameter (cm)	7 26
Cell (psi)	75 6	Sample Area (cm^2), A	41 45
Total Pressure Head (cm)	175 8	Inflow Burette Area (cm^2), a-in	0 875
		Outflow Burette Area (cm^2), a-out	0 875
		B Parameter (%)	97

AVERAGE PERMEABILITY = 2.6E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.6E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
05/17/04	10	25	0 0	0.0	0.0	194 5	0	22 0	NA
05/17/04	11	40	1 3	0.1	0 2	194.2	0	22 0	3.3E-08
05/17/04	15	50	5 4	0 4	0.6	193 4	0	22 0	2 3E-08
05/18/04	8	5	21 7	1 7	2 3	189 9	0	22 0	2 6E-08
05/18/04	12	0	25 6	2.0	2 6	189 2	0	22 0	2 2E-08
05/18/04	18	10	31.8	2 5	3.1	188.1	0	22 0	2 3E-08
05/18/04	21	20	34 9	2 8	3 5	187.3	0	22 0	3 2E-08
05/19/04	7	20	44 9	3 7	4 4	185 2	1	22 0	2.6E-08

Tested By: JCM Date: 05/13/04 Checked By: JU Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P8.XLS]Sheet1

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DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/12/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
24+50	2	69	8	13	41	9
	34	87	22	19	62	9
25+00	2	82	20	17	54	9
	34	88	30	22	71	9

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/12/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
11:00	64	40	19	9
13:50	65	41	23	9

FUNNEL CALIBRATIONS PERFORMED TODAY?	no
pH METER CALIBRATIONS PERFORMED TODAY?	N/A
BALANCE CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/12/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
			0.0	10.0	0.0		22+00	0.0	
			0.0	10.0	0.0		22+10	4.0	
			0.0	10.0	0.0		22+20	7.0	
			0.0	10.0	0.0		22+30	8.5	
			0.0	10.0	0.0		22+40	10.2	
			0.0	10.0	0.0		22+50	11.9	
			0.0	10.0	0.0		22+60	13.8	
			0.0	10.0	0.0		22+70	16.2	
			0.0	10.0	0.0		22+80	18.3	
			0.0	10.0	0.0		22+90	19.7	
			0.0	10.0	0.0		23+00	21.5	
			0.0	10.0	0.0		23+10	23.4	
			0.0	10.0	0.0		23+20	25.1	
			0.0	10.0	0.0		23+30	26.1	
			0.0	10.0	0.0		23+40	27.0	
			0.0	10.0	0.0		23+50	28.6	
			0.0	10.0	0.0		23+60	29.1	
			0.0	10.0	0.0		23+70	29.9	
							23+80	30.5	
							23+90	31.2	
							24+00	32.6	

SF TODAY 0.00

SF TO DATE

24+10	33.9
24+20	34.3
24+30	34.5

COMMENTS

AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/12/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
24+50		26.4					22+70		0.0
24+60		36.5					22+80		2.1
24+70		36.4					22+90		3.8
24+80		36.3					23+00		5.9
24+90		36.6					23+10		7.2
25+00		36.4					23+20		8.4
25+10		36.1					23+30		10.1
25+20		36.2					23+40		12.4
25+30		36.3					23+50		13.8
25+40		36.3					23+60		15.1
							23+70		16.9
							23+80		18.3
							23+90		20.2
							24+00		22.4
							24+10		24.3
							24+20		25.1
							24+30		26.2
							24+40		27.9
							24+50		29.5
							24+60		31.2
							24+70		32.2
							24+80		32.9
							24+90		33.1
							25+00		33.2
							25+10		34.1
							25+20		34.4
							25+30		35.3
							25+40		36.1

SF TODAY

SF TO DATE

COMMENTS

PM Profile

EQM OWNER:

geotechnics
INTEGRITY IN TESTING

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/12/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-04	Sample No.	22+00
Lab ID	2004-083-04-02	Soil Color	**GRAY**

	SIEVE ANALYSIS				HYDROMETER	
USCS	cobbles	gravel	sand		silt and clay fraction	
USDA	cobbles	gravel	sand		silt	clay

USCS Summary		
Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	7.09
#4 To #200	*Sand*	57.80
Finer Than #200	*Silt & Clay*	35.11

USCS Symbol *SC, TESTED*

USCS Classification *CLAYEY SAND*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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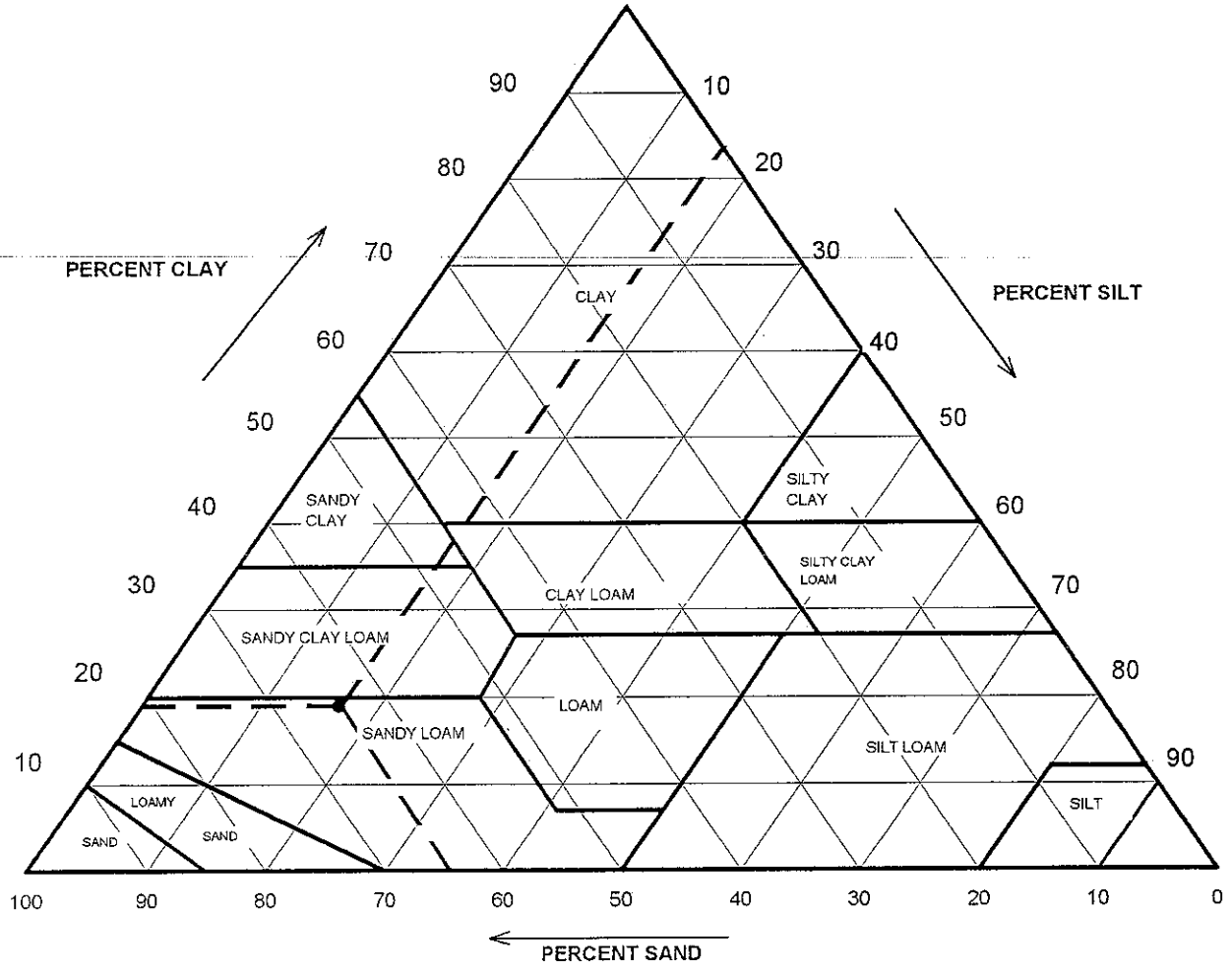
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	ENVIRONMENTAL QUALITY	Boring No	5/12/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-04	Sample No	22+00
Lab ID	2004-083-04-02	Soil Color	GRAY



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	10.55	**0.00**
2	89.45	*Sand*	57.58	**64.36**
0.05	31.88	*Silt*	14.84	**16.59**
0.002	17.04	*Clay*	17.04	**19.05**

USDA Classification ***SANDY LOAM***

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/12/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-04	Sample No	22+00
Lab ID	2004-083-04-02	Soil Color	**GRAY**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No	670	Tare No	NA
Wgt Tare + Wet Specimen (gm)	557 19	Wgt Tare + Wet Specimen (gm)	NA
Wgt Tare + Dry Specimen (gm)	431 62	Wgt Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	97.44	Weight of Tare (gm)	NA
Weight of Water (gm)	125.57	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	334 18	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**37.6**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	334.18
Dry Weight - 3/4" Sample (gm)	216.84	Weight of minus #200 material (gm)	117.34
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	216 84
Dry Weight + 3/4" Sample (gm)	0 00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0 00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0 00	0 00	100 00	**100.00**
1 1/2"	37.5	0 00	0 00	0 00	100.00	**100.00**
1"	25 0	0.00	0.00	0 00	100.00	**100.00**
3/4"	19.0	0.00	0 00	0 00	100.00	**100.00**
1/2"	12.5	14.75	4.41	4.41	95.59	**95.59**
3/8"	9 50	2 36	0.71	5.12	94.88	**94.88**
#4	4 75	6.58	1 97	7.09	92.91	**92.91**
#10	2.00	11 55	3 46	10.55	89.45	**89.45**
#20	0 85	9 45	2.83	13.37	86.63	**86.63**
#40	0 425	8.91	2.67	16.04	83.96	**83.96**
#60	0 250	20 94	6.27	22.31	77.69	**77.69**
#140	0.106	103.58	31 00	53.30	46.70	**46.70**
#200	0.075	38.72	11.59	64.89	35.11	**35.11**
Pan	-	117.34	35.11	100.00	-	-

Tested By TMO Date 5/18/04 Checked By JU Date 5-21-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/12/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-04	Sample No	22+00
Lab ID	2004-083-04-02	Soil Color	**GRAY**

Elapsed Time (min)		R Measured	Temp. (° C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	26 0	26.0	22 1	6 76	19 2	80.8	0.01311	0 0322	**28.4**
5		25.0	22 1	6 76	18.2	76 6	0 01311	0 0205	**26.9**
15		24 0	22 1	6 76	17 2	72.4	0.01311	0 0119	**25.4**
30		22 5	22 1	6 76	15.7	66.1	0 01311	0.0085	**23.2**
70		21.0	21.6	6 94	14.1	59.0	0 01319	0.0057	**20.7**
270		19 0	22 4	6 65	12 3	51 8	0.01307	0 0029	**18.2**
1440		17 0	23 0	6.44	10 6	44.4	0.01297	0.0013	**15.6**

Soil Specimen Data		Other Corrections	
Tare No.	656		
Tare + Dry Material (gm)	125.26	a - Factor	0 99
Weight of Tare (gm)	96.68		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 200	35 11
Weight of Dry Material (gm)	23 58		
		Specific Gravity	2.7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material*

Tested By TO Date 5/19/04 Checked By JM Date 5-21-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	ENVIRONMENTAL QUALITY	Boring No	5/12/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No.	2004-083-04	Sample No.	22+00
Lab ID	2004-083-04-02	Soil Description	**GRAY LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

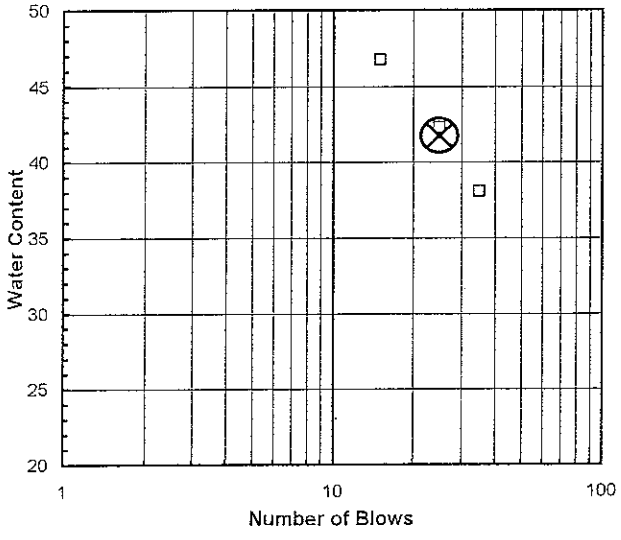
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	209	69	89	MULTIPOINT
Wt. of Tare & WS (gm)	39.01	38.37	39.37	
Wt. of Tare & DS (gm)	33.06	32.20	32.27	
Wt. of Tare (gm)	17.43	17.61	17.09	
Wt. of Water (gm)	6.0	6.2	7.1	
Wt. of DS (gm)	15.6	14.6	15.2	
Moisture Content (%)	**38.1**	**42.3**	**46.8**	
Number of Blows	**35**	**25**	**15**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	4000	217	
Wt. of Tare & WS (gm)	27.14	26.28	
Wt. of Tare & DS (gm)	26.28	25.50	
Wt. of Tare (gm)	20.44	19.95	
Wt. of Water (gm)	0.9	0.8	
Wt. of DS (gm)	5.8	5.6	
Moisture Content (%)	**14.7**	**14.1**	**0.7**

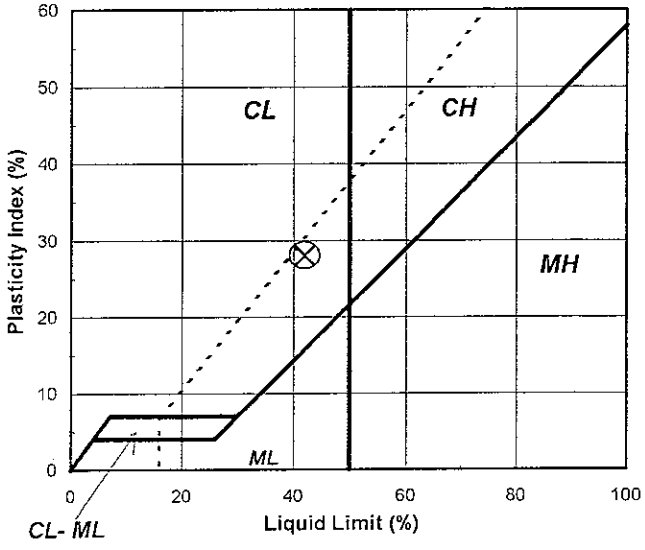
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**42**
Plastic Limit (%)	**14**
Plasticity Index (%)	**28**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 5/19/04 *Checked By* JLL *Date* 5-20-04

page 1 of 1 DCN: CT-S4B DATE: 10/8/01 REVISION: 2

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PERMEABILITY TEST

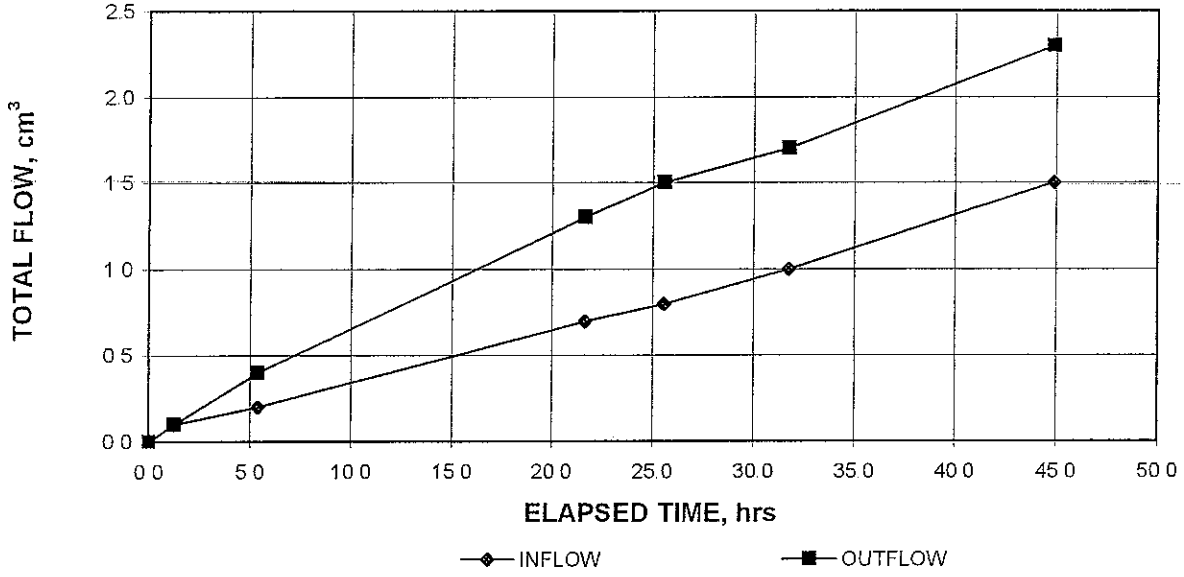
ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

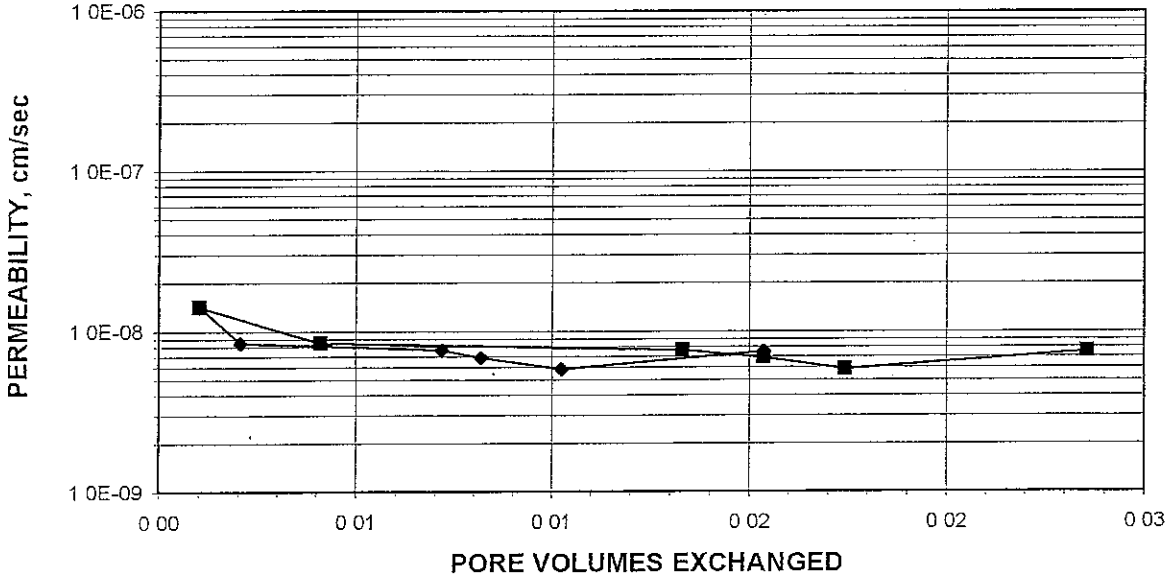
Client	ENVIRONMENTAL QUALITY	Boring No	5-12-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-04	Sample No	22+00
Lab ID No	2004-083-04-02		

AVERAGE PERMEABILITY = 7.0E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 7.0E-11 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: JCM Date: 05/12/04 Checked By: JU Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P7.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-12-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-04	Sample No	22+00
Lab ID No	2004-083-04-02		
		Specific Gravity	2 70 Assumed
		Sample Condition	Remolded

Visual Description: GRAY SOIL BENTONITE BACKFILL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	642	728
Wt. of Tare & WS (gm.)	585 33	481 89
Wt. of Tare & DS (gm.)	447.67	391.24
Wt. of Tare (gm.)	98 98	86 45
Wt. of Water (gm.)	137 66	90 65
Wt. of DS (gm.)	348 69	304 79
Moisture Content (%)	**39.5**	**29.7**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	1012.61	NA
Wt. of Tube (gm.)	585.33	NA
Wt. of WS (gm.)	427.28	397 45
Length 1 (in.)	2.215	2 089
Length 2 (in.)	2.193	2 035
Length 3 (in.)	2.274	2 063
Top Diameter (in.)	2.875	2 804
Middle Diameter (in.)	2.875	2 804
Bottom Diameter (in.)	2.875	2 850
Average Length (in.)	2.23	2 06
Average Area (in^2)	6 49	6.24
Sample Volume (cm^3)	236 95	210 98
Unit Wet Wt. (gm / cm^3)	1.80	1.88
Unit Wet Wt. (pcf)	112.6	117.6
Unit Dry Wt. (pcf)	80 7	90.6
Unit Dry Wt. (gm / cm^3)	1.29	1.45
Void Ratio, e	1 09	0 86
Porosity, n	0.52	0.46
Pore Volume (cm^3)	123.5	97 5

Tested By: JCM Date: 05/12/04 Checked By: JLL Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P7.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-12-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-04	Sample No	22+00
Lab ID No	2004-083-04-02		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	67 5	Sample Length (cm), L	5 24
Bottom Cap (psi)	70 0	Sample Diameter (cm)	7 16
Cell (psi)	75 6	Sample Area (cm^2), A	40 28
Total Pressure Head (cm)	175 8	Inflow Burette Area (cm^2), a-in	0 876
		Outflow Burette Area (cm^2), a-out	0 884
		B Parameter (%)	98

AVERAGE PERMEABILITY = 7.0E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 7.0E-11 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
05/17/04	10	25	0.0	0.0	0.0	193 8	0	22 0	NA
05/17/04	11	40	1.3	0 1	0 1	193 6	0	22 0	1 4E-08
05/17/04	15	50	5 4	0 2	0 4	193 1	0	22 0	8 5E-09
05/18/04	8	5	21.7	0 7	1 3	191 5	0	22 0	7 7E-09
05/18/04	12	0	25.6	0 8	1 5	191 2	0	22 0	6.9E-09
05/18/04	18	10	31.8	1 0	1 7	190 7	0	22.0	5 8E-09
05/19/04	7	20	44 9	1 5	2.3	189 5	1	22 0	7 5E-09

Tested By: JCM Date: 05/12/04 Checked By: JCL Date: 5-20-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P7.XLS]Sheet1

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DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/13/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
25+30	2	90	22	22	70	9
	34	92	24	21	69	9
25+80	2	90	22	21	67	9
	34	100	31	21	69	9

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

QM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/13/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.
7:30	65	48	31	9

Slurry was not mixed in the afternoon	FUNNEL CALIBRATIONS PERFORMED TODAY?	no
	pH METER CALIBRATIONS PERFORMED TODAY?	N/A
	BALANCE CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/13/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
24+70		32.9	33.1	10.0	331.0		22+70	0.0	
24+80		33.3	33.6	10.0	336.0		22+80	2.3	
24+90		33.9	34.1	10.0	341.0		22+90	3.9	
25+00		34.3	34.5	10.0	345.0		23+00	6.0	
25+10		34.7	35.1	10.0	351.0		23+10	7.5	
25+20		35.5	35.9	10.0	358.5		23+20	8.4	
25+30		36.2	36.4	10.0	364.0		23+30	10.2	
25+40		36.6	36.6	10.0	365.5		23+40	12.6	
25+50		36.5	36.3	10.0	363.0		23+50	13.8	
25+60		36.1	36.3	10.0	363.0		23+60	15.1	
25+70		36.5	36.6	10.0	365.5		23+70	16.7	
25+80		36.6	36.6	10.0	365.5		23+80	18.2	
25+90		36.5					23+90	20.3	
26+00		36.7					24+00	22.5	
26+10		36.5					24+10	24.1	
26+20		36.3					24+20	25.0	
26+30		36.5					24+30	26.4	
26+40		36.7					24+40	28.0	
26+50		36.7					24+50	29.5	
26+60		36.7					24+60	31.5	
26+70		36.5					24+70	31.4	

SF TODAY 4249.00

SF TO DATE

COMMENTS

AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/13/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH						STATION	START OF SHIFT	END OF SHIFT
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH			
							24+80		31.9
							24+90		32.2
							25+00		32.5
							25+10		32.1
							25+20		33.2
							25+30		33.5
							25+40		31.5

SF TODAY 0.00

SF TO DATE

OMMENTS

M Profile (continued)

QM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/13/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
							24+40		0.0
							24+50		0.0
							24+60		3.1
							24+70		8.4
							24+80		12.2
							24+90		14.8
							25+00		16.4
							25+10		18.1
							25+20		19.6
							25+30		21.4
							25+40		22.4
							25+50		23.8
							25+60		24.9
							25+70		26.8
							25+80		27.7
							25+90		28.5
							26+00		29.0
							26+10		29.3
							26+20		30.4
							26+30		1.2
							26+40		32.6
							26+50		33.0
							26+60		34.8
							26+70		35.1

SF TODAY

SF TO DATE

COMMENTS

PM Profile

QM OWNER:

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No.	23+00
Lab ID	2004-083-05-03	Soil Color	**GRAY**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

USCS Summary		
Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	12.37
#4 To #200	*Sand*	56.66
Finer Than #200	*Silt & Clay*	30.97

USCS Symbol *SC, TESTED*

USCS Classification *CLAYEY SAND*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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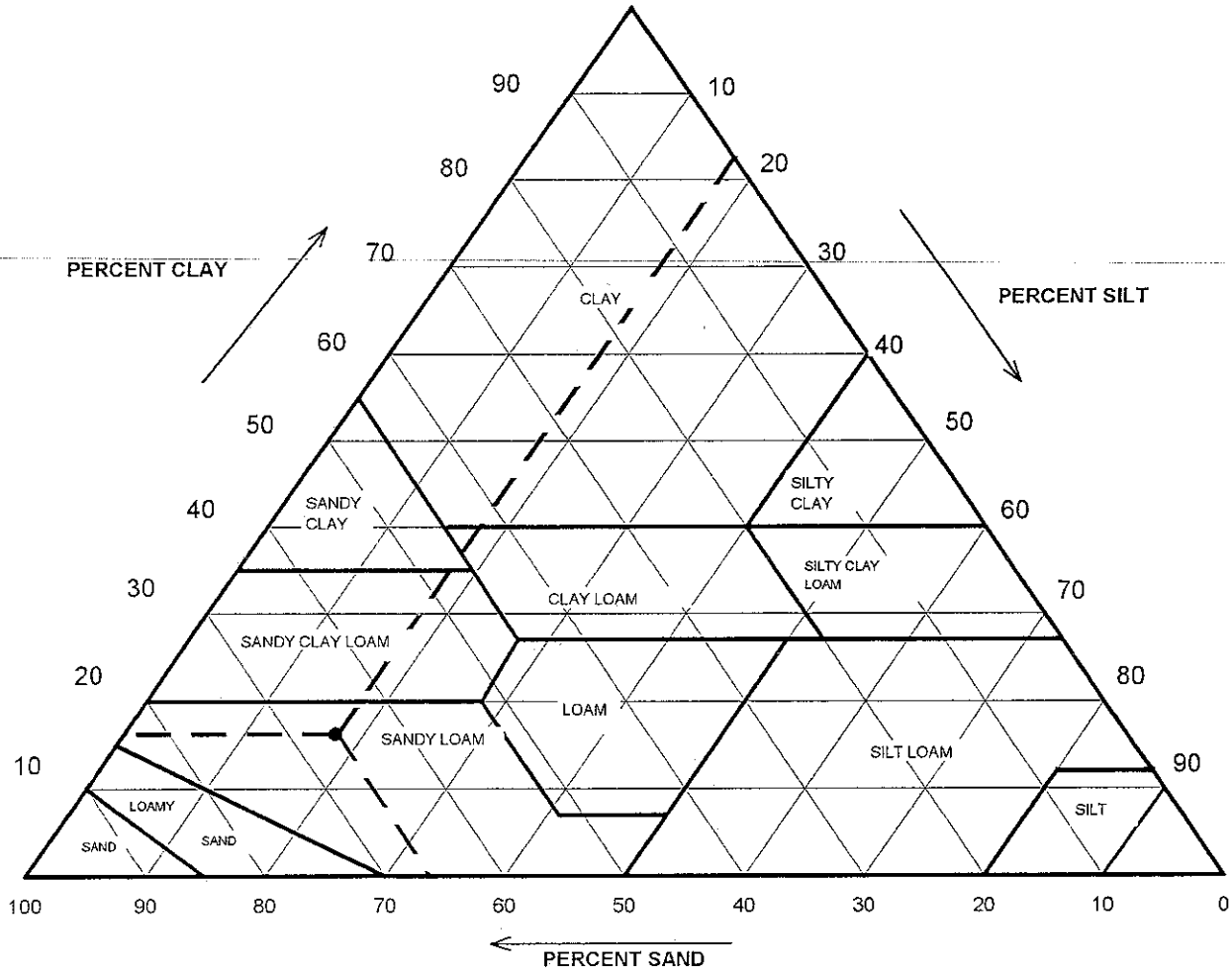
geotechnics
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	23+00
Lab ID	2004-083-05-03	Soil Color	GRAY



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	15.75	**0.00**
2	84.25	*Sand*	55.68	**66.09**
0.05	28.57	*Silt*	14.87	**17.64**
0.002	13.70	*Clay*	13.70	**16.27**

USDA Classification ***SANDY LOAM***

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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geotechnics
INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No.	23+00
Lab ID	2004-083-05-03	Soil Color	**GRAY**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No.	701	Tare No.	NA
Wgt Tare + Wet Specimen (gm)	758.48	Wgt Tare + Wet Specimen (gm)	NA
Wgt.Tare + Dry Specimen (gm)	603 19	Wgt.Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	100.62	Weight of Tare (gm)	NA
Weight of Water (gm)	155.29	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	502 57	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**30.9**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	502.57
Dry Weight - 3/4" Sample (gm)	313.72	Weight of minus #200 material (gm)	155.65
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	346 92
Dry Weight + 3/4" Sample (gm)	33 20		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt. of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0 00	0 00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100 00	**100.00**
2"	50	0 00	0 00	0.00	100 00	**100.00**
1 1/2"	37.5	0.00	0 00	0.00	100.00	**100.00**
1"	25.0	33.20	6.61	6.61	93 39	**93.39**
3/4"	19 0	0 00	0.00	6.61	93.39	**93.39**
1/2"	12.5	7.10	1.41	8.02	91.98	**91.98**
3/8"	9 50	4.45	0 89	8.90	91 10	**91.10**
#4	4.75	17.42	3.47	12.37	87 63	**87.63**
#10	2 00	16.96	3.37	15.75	84.25	**84.25**
#20	0 85	13 67	2.72	18 47	81.53	**81.53**
#40	0.425	12 77	2.54	21.01	78 99	**78.99**
#60	0 250	31.36	6.24	27 25	72.75	**72.75**
#140	0 106	155.41	30 92	58.17	41 83	**41.83**
#200	0.075	54.58	10.86	69.03	30.97	**30.97**
Pan	-	155.65	30.97	100.00	-	-

Tested By TMO Date 5/24/04 Checked By Jur Date 5-27-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	23+00
Lab ID	2004-083-05-03	Soil Color	**GRAY**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	21 0	21 0	22 8	6 51	14 5	84.3	0.01300	0 0330	**26.1**
5		20.0	22 8	6.51	13 5	78.5	0.01300	0 0210	**24.3**
18		18.5	22 8	6 51	12.0	69 8	0.01300	0.0112	**21.6**
30		18 0	22.8	6 51	11.5	66.9	0 01300	0 0087	**20.7**
73		16 5	22.8	6 51	10.0	58.2	0.01300	0.0056	**18.0**
250		15 0	23.0	6 44	8.6	49 8	0 01297	0.0031	**15.4**
1440		13.0	23 1	6 40	6 6	38.4	0.01296	0 0013	**11.9**

Soil Specimen Data		Other Corrections	
Tare No.	658		
Tare + Dry Material (gm)	119 39	a - Factor	0.99
Weight of Tare (gm)	97.38		
Weight of Deflocculant (gm)	5 0	Percent Finer than # 200	30 97
Weight of Dry Material (gm)	17.01		
		Specific Gravity	2 7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material.*

Tested By TO. Date 5/25/04 Checked By JU Date 5-27-04

DCN- CT-S3A DATE:1/30/04 REVISION- 6

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	23+00
Lab ID	2004-083-05-03	Soil Description	**GRAY LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No 40 sieve material, Airdried)

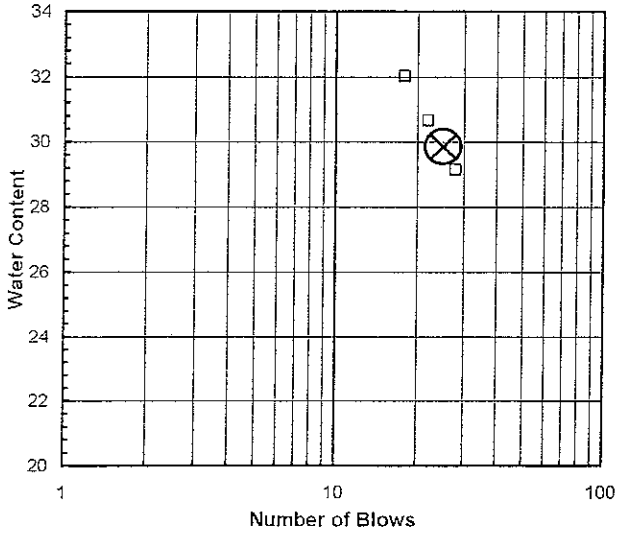
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	102	244	189	MULTIPOINT
Wt of Tare & WS (gm)	39.63	43.19	42.30	
Wt. of Tare & DS (gm)	34.10	37 90	36 81	
Wt. of Tare (gm)	15 13	20.64	19.66	
Wt of Water (gm)	5.5	5.3	5.5	
Wt. of DS (gm)	19.0	17.3	17 2	
Moisture Content (%)	**29.2**	**30.6**	**32.0**	
Number of Blows	**28**	**22**	**18**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	225	181	
Wt. of Tare & WS (gm)	25.59	24.55	
Wt. of Tare & DS (gm)	24.83	23 78	
Wt. of Tare (gm)	19 58	18 40	
Wt. of Water (gm)	0.8	0.8	
Wt. of DS (gm)	5 3	5.4	
Moisture Content (%)	**14.5**	**14.3**	**0.2**

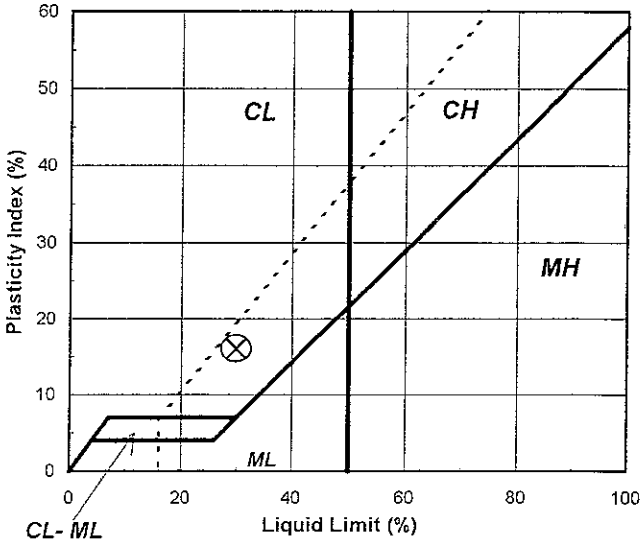
Note. The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**30**
Plastic Limit (%)	**14**
Plasticity Index (%)	**16**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 5/26/04 *Checked By* JU *Date* 5-26-04

page 1 of 1 DCN: CT-S4B DATE: 10/8/01 REVISION: 2

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PERMEABILITY TEST

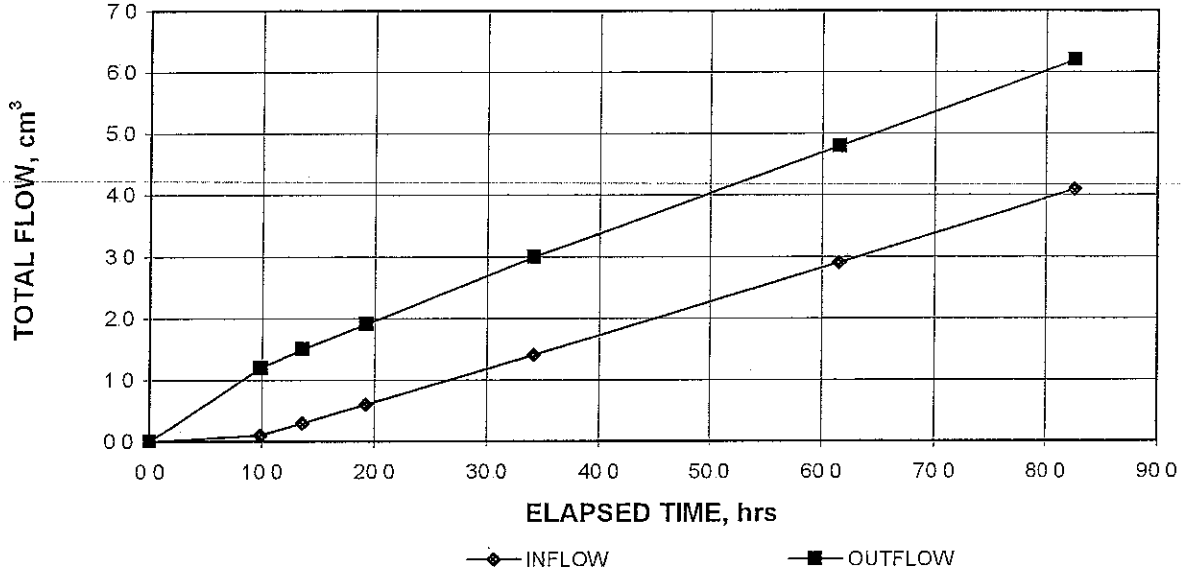
ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

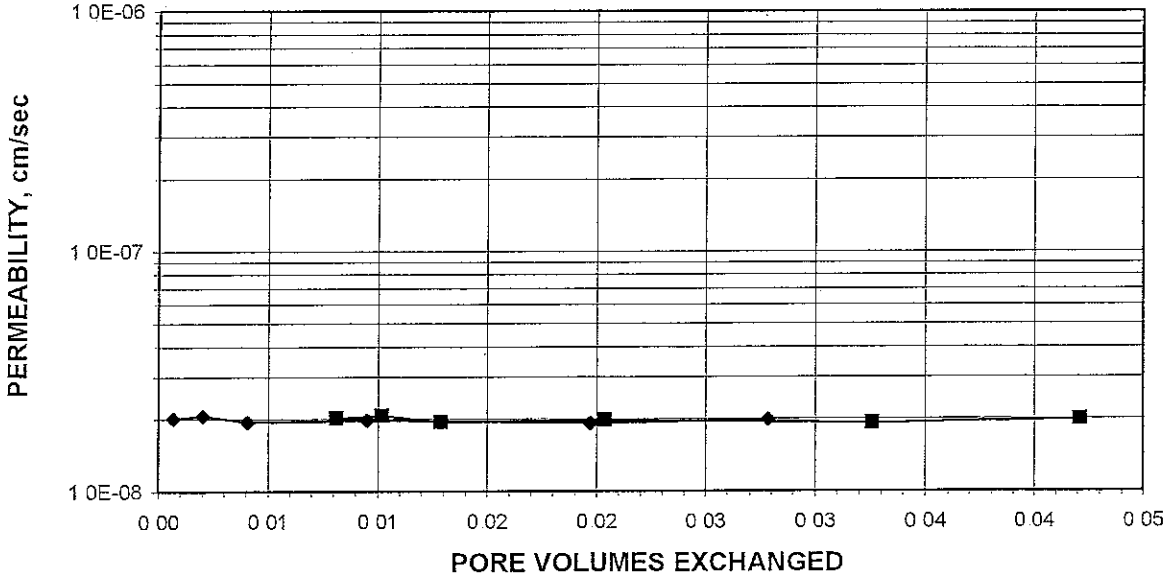
Client	ENVIRONMENTAL QUALITY	Boring No	5-13-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-05	Sample No	23+00
Lab ID No	2004-083-05-03		

AVERAGE PERMEABILITY = 2.0E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.0E-10 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: JCM Date: 05/18/04 Checked By: JU Date: 5-25-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P12.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-13-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-05	Sample No	23+00
Lab ID No.	2004-083-05-03		
		Specific Gravity	2 70 Assumed
		Sample Condition	Remolded

Visual Description: GRAY SOIL BENTOINITE BACKFILL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	1301	1695
Wt of Tare & WS (gm.)	431.17	387 67
Wt of Tare & DS (gm)	349 35	328 00
Wt of Tare (gm.)	100.56	81.24
Wt. of Water (gm.)	81 82	59 67
Wt of DS (gm)	248 79	246 76
Moisture Content (%)	**32.9**	**24.2**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt of Tube & WS (gm)	1234.11	NA
Wt. of Tube (gm)	431 17	NA
Wt. of WS (gm.)	802.94	750 34
Length 1 (in)	4.000	3 613
Length 2 (in.)	4 004	3.606
Length 3 (in)	4 032	3 556
Top Diameter (in.)	2.875	2 840
Middle Diameter (in)	2 875	2.827
Bottom Diameter (in)	2 875	2 832
Average Length (in)	4 01	3.59
Average Area (in ^{2})	6.49	6 30
Sample Volume (cm^3)	426.80	371 01
Unit Wet Wt (gm / cm^3)	1.88	2.02
Unit Wet Wt (pcf)	117.4	126 2
Unit Dry Wt (pcf)	88 4	101 7
Unit Dry Wt (gm./ cm^3)	1 42	1 63
Void Ratio, e	0 91	0 66
Porosity, n	0 48	0 40
Pore Volume (cm^3)	203 0	147.2

Tested By: JCM Date: 05/18/04 Checked By: JCL Date: 5-25-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P12.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-13-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	23+00
Lab ID No	2004-083-05-03		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	67 5	Sample Length (cm), L	9 12
Bottom Cap (psi)	70 0	Sample Diameter (cm)	7 20
Cell (psi)	75 6	Sample Area (cm^2), A	40 67
Total Pressure Head (cm)	175 8	Inflow Burette Area (cm^2), a-in	0 914
		Outflow Burette Area (cm^2), a-out	0 915
		B Parameter (%)	100

AVERAGE PERMEABILITY = 2.0E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 2.0E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
05/20/04	21	15	0 0	0 0	0 0	191.7	0	22.0	NA
05/21/04	7	10	9.9	0.1	1.2	190 3	0	22 0	2 0E-08
05/21/04	10	55	13 7	0 3	1 5	189.7	0	22 0	2 1E-08
05/21/04	16	30	19 3	0 6	1.9	189 0	0	22 0	1 9E-08
05/22/04	7	30	34 3	1.4	3.0	186 9	0	22 0	2.0E-08
05/23/04	10	45	61 5	2 9	4 8	183.3	0	22 0	1 9E-08
05/24/04	7	50	82 6	4 1	6 2	180 5	1	22 0	2.0E-08

Tested By: JCM Date: 05/18/04 Checked By: JU Date: 5-25-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P12.XLS]Sheet1

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	24+00
Lab ID	2004-083-05-04	Soil Color	GRAY

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

USCS Summary		
Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	7.73
#4 To #200	*Sand*	60.15
Finer Than #200	*Silt & Clay*	32 12

USCS Symbol *SC, TESTED*

USCS Classification *CLAYEY SAND*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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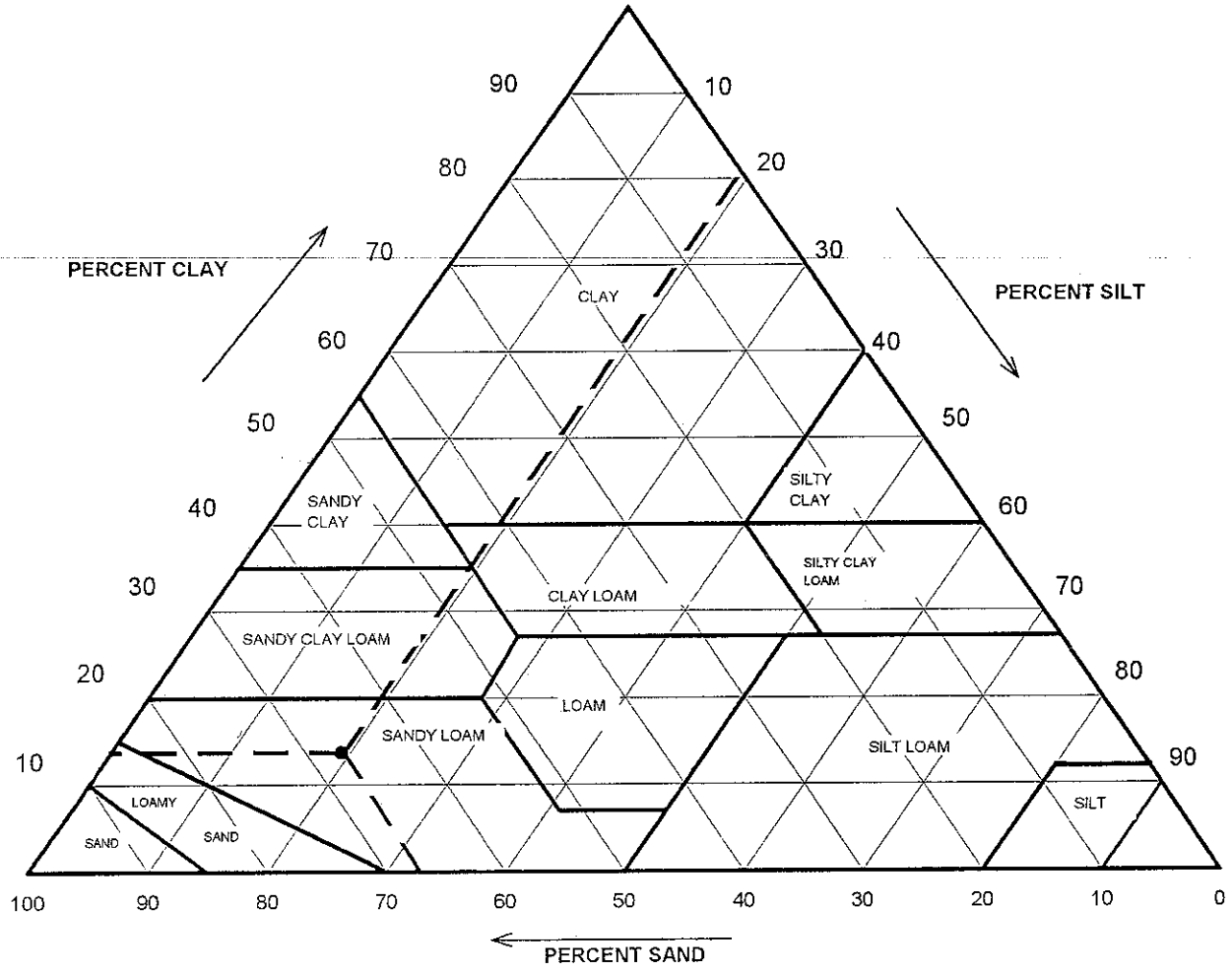
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	24+00
Lab ID	2004-083-05-04	Soil Color	GRAY



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	11.33	**0.00**
2	88 67	*Sand*	59.38	**66.96**
0.05	29 29	*Silt*	17.13	**19.32**
0 002	12.16	*Clay*	12 16	**13.71**

USDA Classification ***SANDY LOAM***

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	24+00
Lab ID	2004-083-05-04	Soil Color	**GRAY**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No	1084	Tare No	NA
Wgt Tare + Wet Specimen (gm)	752.98	Wgt Tare + Wet Specimen (gm)	NA
Wgt Tare + Dry Specimen (gm)	600 95	Wgt Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	97.56	Weight of Tare (gm)	NA
Weight of Water (gm)	152 03	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	503.39	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**30.2**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	503 39
Dry Weight - 3/4" Sample (gm)	325.34	Weight of minus #200 material (gm)	161.71
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	341 68
Dry Weight + 3/4" Sample (gm)	16.34		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0 00	0 00	100 00	**100.00**
6"	150	0 00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0 00	0 00	0.00	100.00	**100.00**
1 1/2"	37 5	0.00	0.00	0.00	100.00	**100.00**
1"	25 0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	16.34	3 25	3.25	96.75	**96.75**
1/2"	12.5	7.77	1.54	4.79	95.21	**95.21**
3/8"	9.50	2.47	0.49	5.28	94.72	**94.72**
#4	4.75	12 33	2.45	7.73	92 27	**92.27**
#10	2.00	18.12	3.60	11.33	88.67	**88.67**
#20	0.85	14.66	2.91	14.24	85.76	**85.76**
#40	0 425	14 32	2.84	17 09	82 91	**82.91**
#60	0.250	31.31	6.22	23.31	76.69	**76.69**
#140	0 106	173.13	34.39	57.70	42.30	**42.30**
#200	0.075	51.23	10.18	67.88	32.12	**32.12**
Pan	-	161.71	32.12	100.00	-	-

Tested By TMO Date 5/24/04 Checked By JU Date 5-27-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	24+00
Lab ID	2004-083-05-04	Soil Color	**GRAY**

Elapsed Time (min)		R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	23 5	23 5	22 8	6 51	17 0	81.8	0 01300	0 0324	**26.3**
5		22 5	22.8	6.51	16 0	77 0	0 01300	0.0206	**24.7**
15		20 5	22.8	6 51	14 0	67.3	0.01300	0 0121	**21.6**
31		19.0	22 8	6 51	12.5	60.1	0 01300	0 0085	**19.3**
79		17 5	22.8	6 51	11 0	52.9	0.01300	0.0054	**17.0**
250		15 5	23 0	6.44	9.1	43.6	0 01297	0.0030	**14.0**
1440		13 0	23.1	6 40	6 6	31.8	0.01296	0.0013	**10.2**

Soil Specimen Data		Other Corrections	
Tare No.	1003		
Tare + Dry Material (gm)	123 05	a - Factor	0.99
Weight of Tare (gm)	97.48		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 200	32 12
Weight of Dry Material (gm)	20 57		
		Specific Gravity	2 7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material.*

Tested By TO Date 5/25/04 Checked By JU Date 5-27-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	24+00
Lab ID	2004-083-05-04	Soil Description	**GRAY LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

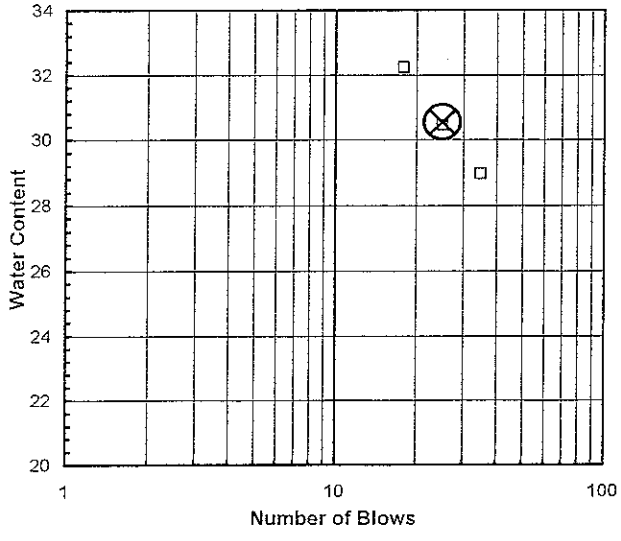
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	1	174	235	MULTIPOINT
Wt. of Tare & WS (gm)	35.90	37.14	41.40	
Wt. of Tare & DS (gm)	30.93	32.12	35.57	
Wt. of Tare (gm)	13.77	15.64	17.48	
Wt. of Water (gm)	5.0	5.0	5.8	
Wt. of DS (gm)	17.2	16.5	18.1	
Moisture Content (%)	**29.0**	**30.5**	**32.2**	
Number of Blows	**35**	**25**	**18**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	2305	2042	
Wt. of Tare & WS (gm)	27.13	23.88	
Wt. of Tare & DS (gm)	26.38	23.10	
Wt. of Tare (gm)	20.97	17.45	
Wt. of Water (gm)	0.8	0.8	
Wt. of DS (gm)	5.4	5.7	
Moisture Content (%)	**13.9**	**13.8**	**0.1**

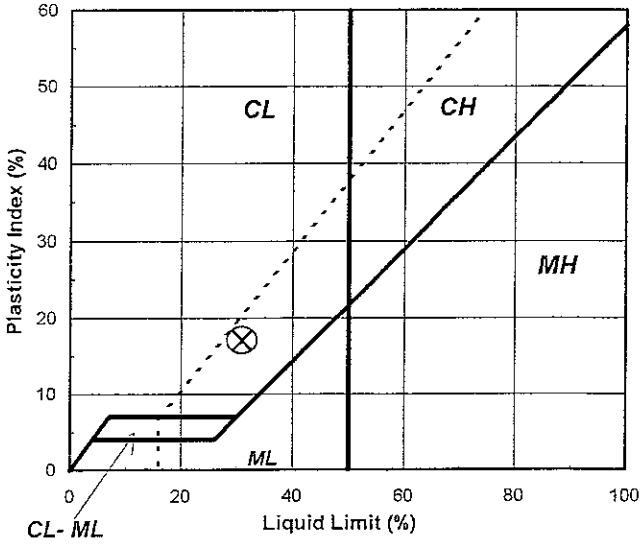
Note. The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**31**
Plastic Limit (%)	**14**
Plasticity Index (%)	**17**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 5/26/04 *Checked By* JU *Date* 5-26-04

page 1 of 1 DCN: CT-S4B DATE: 10/8/01 REVISION: 2

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

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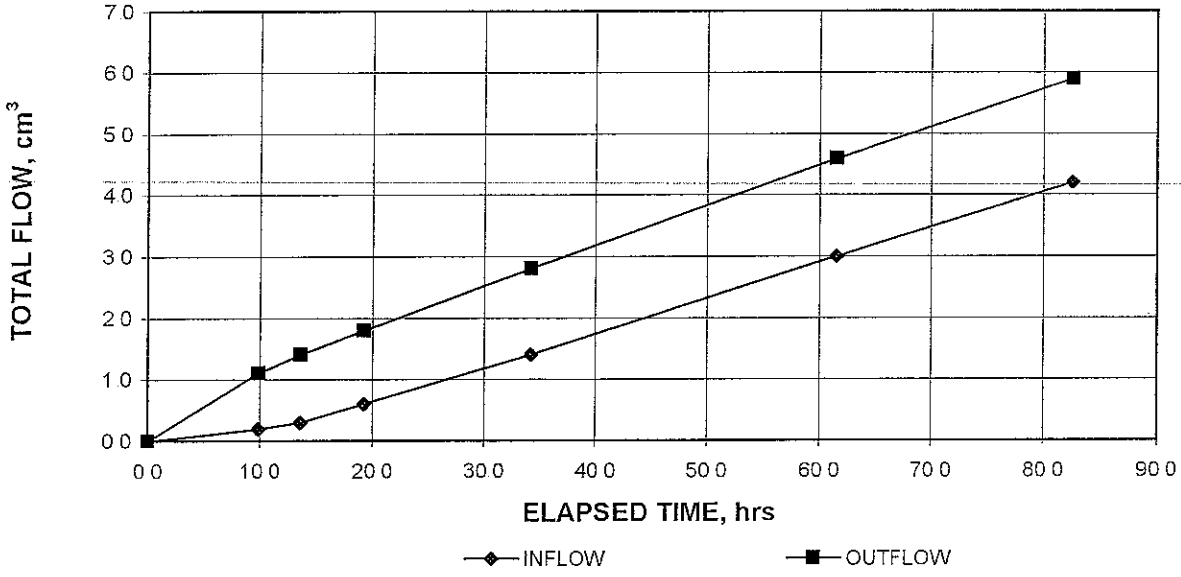
INTEGRITY IN TESTING

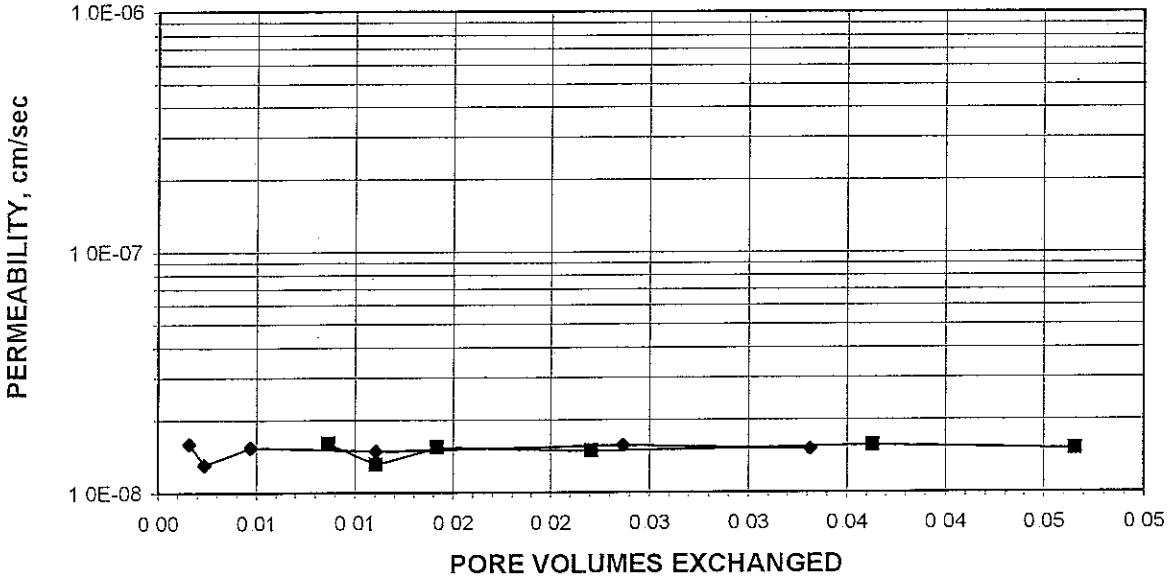
Client	ENVIRONMENTAL QUALITY	Boring No	5-13-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-05	Sample No	24+00
Lab ID No	2004-083-05-04		

AVERAGE PERMEABILITY = 1.5E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.5E-10 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: JCM Date: 05/18/04 Checked By: JLL Date: 5-25-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P11.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-13-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	24+00
Lab ID No	2004-083-05-04		
		Specific Gravity	2 70 Assumed
		Sample Condition	Remolded

Visual Description: GRAY SOIL BENTOINITE BACKFILL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	666	552
Wt. of Tare & WS (gm.)	485.33	405.48
Wt. of Tare & DS (gm)	390.67	341 38
Wt of Tare (gm)	97 44	81 72
Wt. of Water (gm)	94 66	64 10
Wt. of DS (gm)	293 23	259.66
Moisture Content (%)	**32.3**	**24.7**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm)	1134.65	NA
Wt of Tube (gm)	485 33	NA
Wt of WS (gm)	649 32	612.04
Length 1 (in.)	3.147	2 877
Length 2 (in)	3 168	2.901
Length 3 (in)	3.202	2.948
Top Diameter (in)	2 875	2 847
Middle Diameter (in)	2.875	2 856
Bottom Diameter (in.)	2.875	2 909
Average Length (in)	3 17	2 91
Average Area (in ^{2})	6 49	6.47
Sample Volume (cm^3)	337 48	308 50
Unit Wet Wt. (gm / cm^3)	1.92	1.98
Unit Wet Wt. (pcf)	120 1	123 8
Unit Dry Wt. (pcf)	90.8	99 3
Unit Dry Wt (gm / cm^3)	1 45	1 59
Void Ratio, e	0.86	0 70
Porosity, n	0 46	0.41
Pore Volume (cm^3)	155 7	126 7

Tested By: JCM Date: 05/18/04 Checked By: JLL Date: 5-25-04

DCN: CT-22C DATE: 04-09-03 REVISION:4
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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-13-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No.	2004-083-05	Sample No	24+00
Lab ID No.	2004-083-05-04		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	67.5	Sample Length (cm), L	7 39
Bottom Cap (psi)	70 0	Sample Diameter (cm)	7 29
Cell (psi)	75.6	Sample Area (cm^2), A	41 76
Total Pressure Head (cm)	175 8	Inflow Burette Area (cm^2), a-in	0 911
		Outflow Burette Area (cm^2), a-out	0 911
		B Parameter (%)	97

AVERAGE PERMEABILITY = 1.5E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.5E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
05/20/04	21	15	0.0	0.0	0.0	190.4	0	22.0	NA
05/21/04	7	10	9.9	0 2	1 1	189.0	0	22 0	1.6E-08
05/21/04	10	55	13.7	0.3	1 4	188 5	0	22.0	1 3E-08
05/21/04	16	30	19 3	0 6	1 8	187 8	0	22 0	1 5E-08
05/22/04	7	30	34 3	1 4	2.8	185 8	0	22 0	1 5E-08
05/23/04	10	45	61.5	3.0	4.6	182 1	0	22 0	1 6E-08
05/24/04	7	50	82 6	4.2	5.9	179 4	1	22 0	1.5E-08

Tested By: JCM Date: 05/18/04 Checked By: JU Date: 5-25-04

DCN: CT-22C DATE: 04-09-03 REVISION:4
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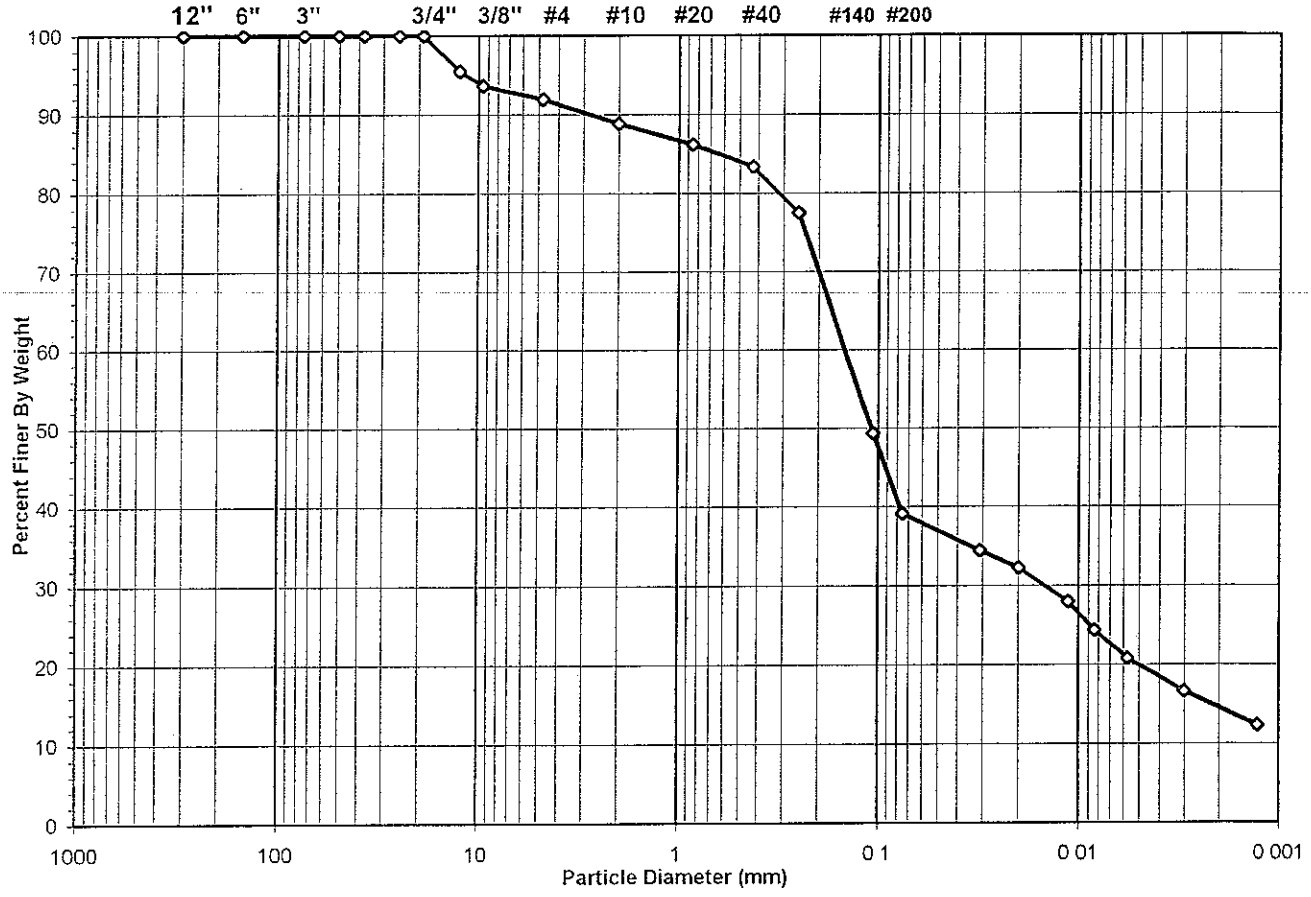
SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	25+00
Lab ID	2004-083-05-05	Soil Color	GRAY

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay



USCS Summary

Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	8.10
#4 To #200	*Sand*	52.72
Finer Than #200	*Silt & Clay*	39 18

USCS Symbol *SC, TESTED*

USCS Classification *CLAYEY SAND*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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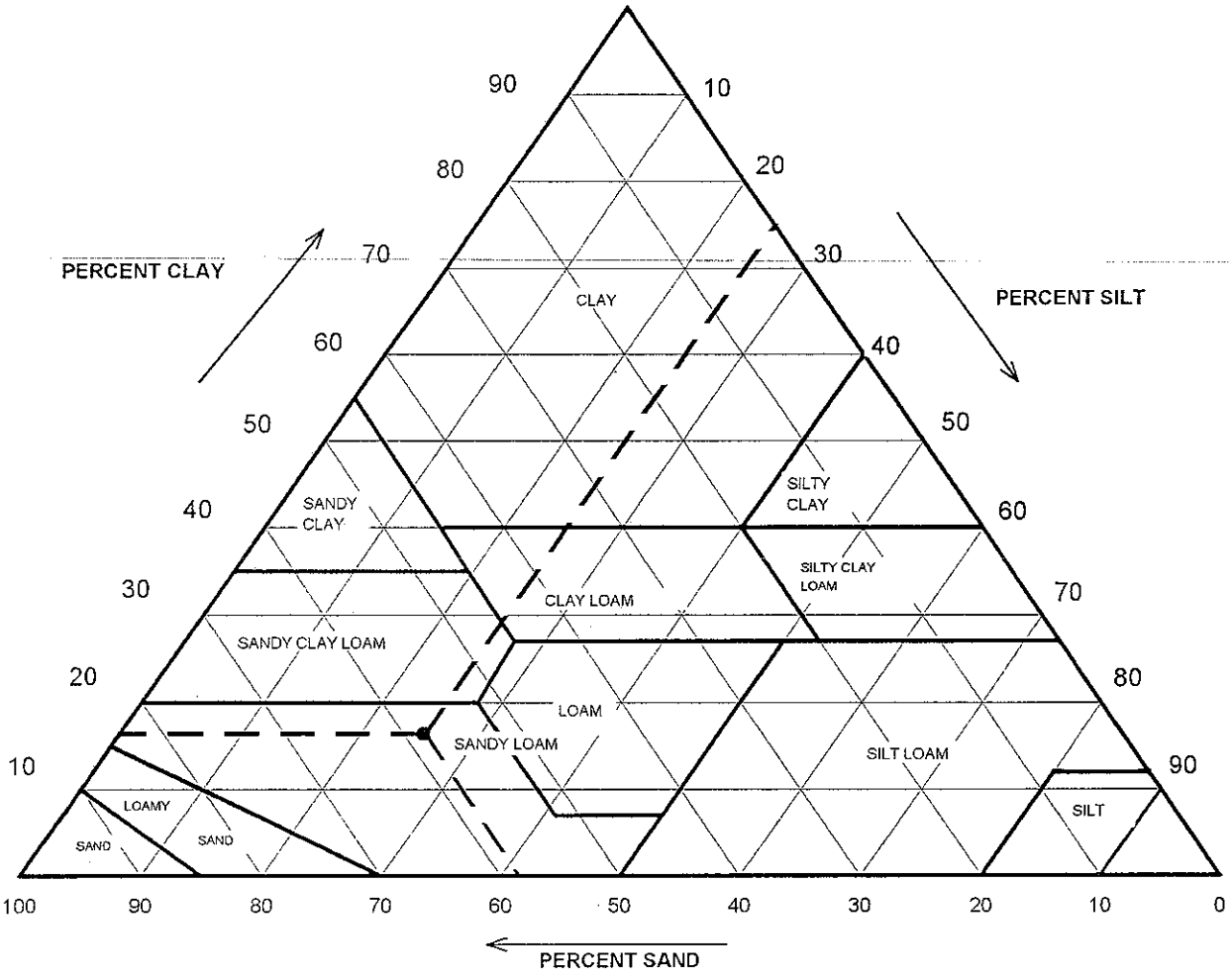
geotechnics
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No.	25+00
Lab ID	2004-083-05-05	Soil Color	GRAY



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	11 16	**0.00**
2	88.84	*Sand*	51 83	**58.34**
0.05	37 02	*Silt*	22 42	**25.23**
0 002	14.60	*Clay*	14 60	**16.43**

USDA Classification *SANDY LOAM*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No.	25+00
Lab ID	2004-083-05-05	Soil Color	**GRAY**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No	686	Tare No	NA
Wgt Tare + Wet Specimen (gm)	550 30	Wgt Tare + Wet Specimen (gm)	NA
Wgt Tare + Dry Specimen (gm)	442 29	Wgt Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	99.41	Weight of Tare (gm)	NA
Weight of Water (gm)	108 01	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	342 88	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**31.5**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	342.88
Dry Weight - 3/4" Sample (gm)	208.53	Weight of minus #200 material (gm)	134 35
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	208 53
Dry Weight + 3/4" Sample (gm)	0 00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0 00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0 00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0 00	0.00	100 00	**100.00**
3/4"	19 0	0.00	0 00	0.00	100.00	**100.00**
1/2"	12.5	15.42	4.50	4.50	95.50	**95.50**
3/8"	9 50	6 45	1 88	6.38	93.62	**93.62**
#4	4 75	5.91	1.72	8.10	91 90	**91.90**
#10	2.00	10 47	3.05	11.16	88.84	**88.84**
#20	0.85	9 12	2.66	13.82	86.18	**86.18**
#40	0.425	9.51	2.77	16.59	83 41	**83.41**
#60	0.250	20 24	5.90	22 49	77.51	**77.51**
#140	0.106	96 67	28.19	50.69	49 31	**49.31**
#200	0.075	34.74	10.13	60.82	39.18	**39.18**
Pan	-	134.35	39.18	100.00	-	-

Tested By TMO Date 5/24/04 Checked By JW Date 5-27-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	25+00
Lab ID	2004-083-05-05	Soil Color	**GRAY**

Elapsed Time (min)		R Measured	Temp. (° C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	29.5	30 5	22 8	6.51	24 0	87.9	0 01300	0.0309	**34.4**
5		29.0	22 8	6 51	22.5	82 4	0.01300	0 0198	**32.3**
16		26 0	22 8	6 51	19 5	71.4	0.01300	0 0113	**28.0**
30		23 5	22 8	6.51	17.0	62.3	0 01300	0.0084	**24.4**
67		21 0	22 8	6.51	14.5	53.1	0 01300	0.0057	**20.8**
250		18.0	23 0	6 44	11.6	42.4	0.01297	0 0030	**16.6**
1440		15 0	23 1	6.40	8 6	31.5	0 01296	0.0013	**12.3**

Soil Specimen Data		Other Corrections	
Tare No.	698		
Tare + Dry Material (gm)	132 88	a - Factor	0.99
Weight of Tare (gm)	100.86		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 200	39 18
Weight of Dry Material (gm)	27 02		
		Specific Gravity	2 7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material*

Tested By TO Date 5/25/04 Checked By JW Date 5-27-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No.	2004-083-05	Sample No.	25+00
Lab ID	2004-083-05-05	Soil Description	**GRAY LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

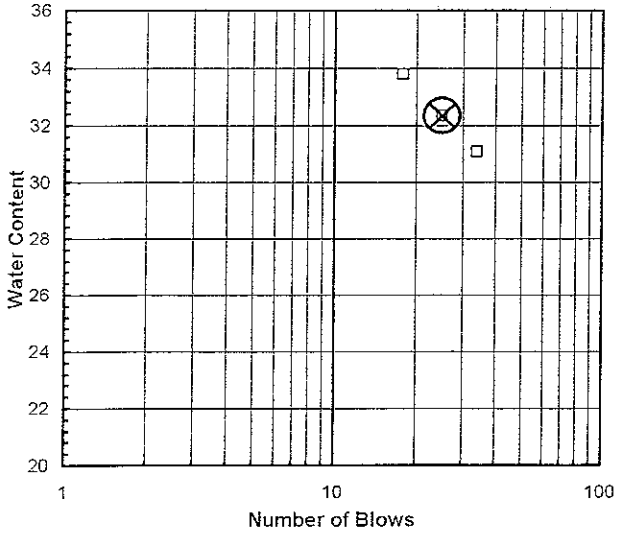
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	65	2184	219	M U L T I P O I N T
Wt. of Tare & WS (gm)	43.03	45.71	42.41	
Wt. of Tare & DS (gm)	37.00	39.48	36.68	
Wt. of Tare (gm)	17.60	20.22	19.71	
Wt. of Water (gm)	6.0	6.2	5.7	
Wt. of DS (gm)	19.4	19.3	17.0	
Moisture Content (%)	**31.1**	**32.3**	**33.8**	
Number of Blows	**34**	**25**	**18**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	240	182	
Wt. of Tare & WS (gm)	25.89	24.73	
Wt. of Tare & DS (gm)	25.16	24.02	
Wt. of Tare (gm)	19.89	18.57	
Wt. of Water (gm)	0.7	0.7	
Wt. of DS (gm)	5.3	5.5	
Moisture Content (%)	**13.9**	**13.0**	**0.8**

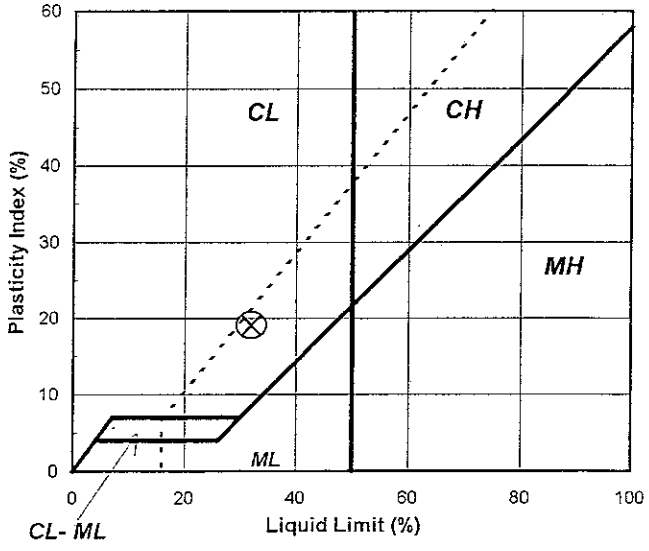
Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**32**
Plastic Limit (%)	**13**
Plasticity Index (%)	**19**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 5/26/04 *Checked By* JLL *Date* 5-27-04

page 1 of 1 DCN: CT-S4B DATE: 10/8/01 REVISION: 2

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PERMEABILITY TEST

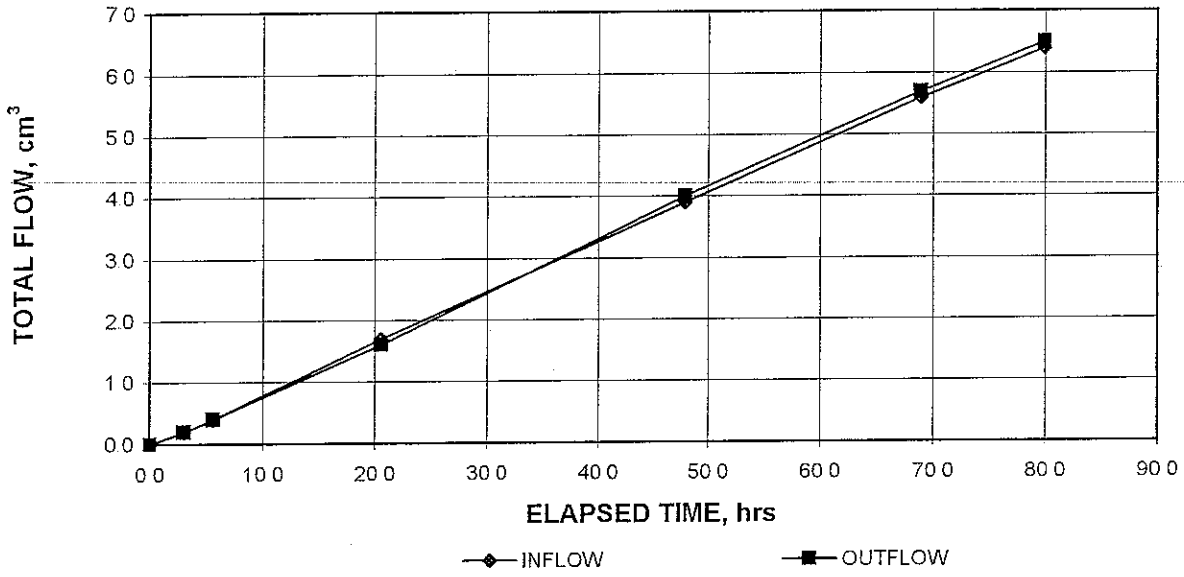
ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

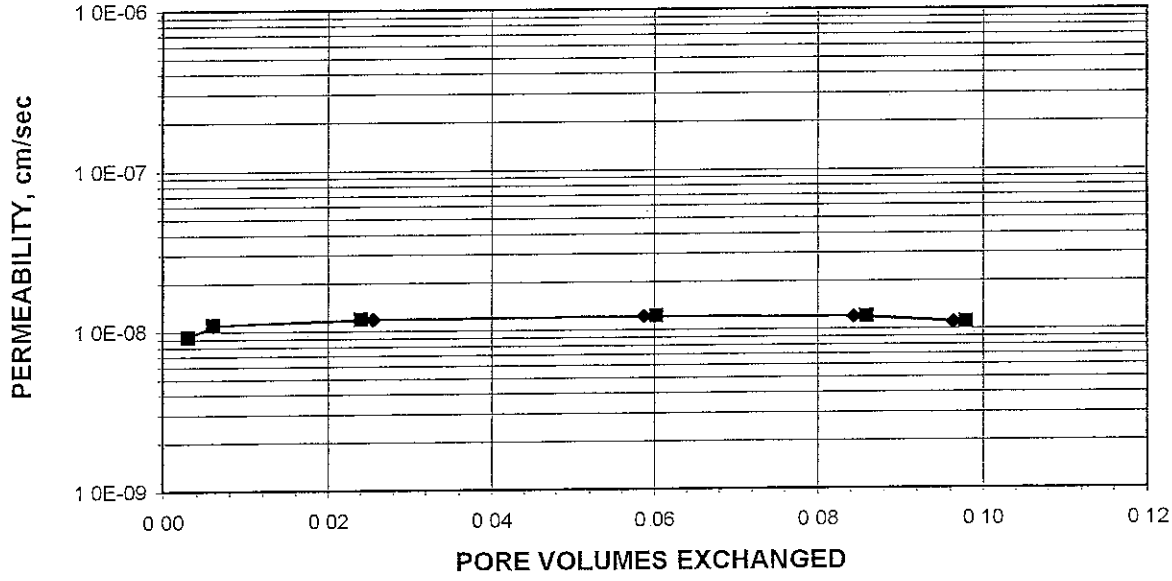
Client	ENVIRONMENTAL QUALITY	Boring No	5-13-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-05	Sample No	25+00
Lab ID No	2004-083-05-05		

AVERAGE PERMEABILITY = 1.2E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.2E-10 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: JCM Date: 05/19/04 Checked By: JLL Date: 5-25-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P10.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-13-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-05	Sample No	25+00
Lab ID No	2004-083-05-05		
		Specific Gravity	2 70 Assumed
		Sample Condition	Remolded

Visual Description: GRAY SOIL BENTOINITE BACKFILL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	2332	580
Wt. of Tare & WS (gm.)	527 37	423 75
Wt. of Tare & DS (gm)	420 83	356 98
Wt. of Tare (gm)	102 18	84 51
Wt of Water (gm)	106.54	66 77
Wt of DS (gm)	318 65	272 47
Moisture Content (%)	**33.4**	**24.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm)	896.44	NA
Wt. of Tube (gm)	527.37	NA
Wt. of WS (gm)	369.07	344.37
Length 1 (in)	1 790	1 644
Length 2 (in)	1.789	1 526
Length 3 (in.)	1 798	1 664
Top Diameter (in)	2.875	2.875
Middle Diameter (in.)	2 875	2 825
Bottom Diameter (in)	2.875	2 859
Average Length (in)	1 79	1 61
Average Area (in^2)	6 49	6.39
Sample Volume (cm^3)	190.67	168 80
Unit Wet Wt. (gm / cm^3)	1.94	2.04
Unit Wet Wt (pcf)	120 8	127 3
Unit Dry Wt (pcf)	90 6	102 3
Unit Dry Wt ($gm./cm^3$)	1.45	1.64
Void Ratio, e	0 86	0 65
Porosity, n	0.46	0 39
Pore Volume (cm^3)	88 2	66.4

Tested By: JCM Date: 05/19/04 Checked By: JM Date: 5-25-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P10.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

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INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-13-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-05	Sample No	25+00
Lab ID No	2004-083-05-05		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	67 5	Sample Length (cm), L	4 09
Bottom Cap (psi)	70 0	Sample Diameter (cm)	7 25
Cell (psi)	75 6	Sample Area (cm^2), A	41 24
Total Pressure Head (cm)	175 8	Inflow Burette Area (cm^2), a-in	0 990
		Outflow Burette Area (cm^2), a-out	0 959
		B Parameter (%)	99

AVERAGE PERMEABILITY = 1.2E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.2E-10 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
05/21/04	10	55	0 0	0.0	0.0	186 8	0	22 0	NA
05/21/04	13	57	3 0	0.2	0.2	186 4	0	22 0	9 2E-09
05/21/04	16	30	5.6	0 4	0 4	186 0	0	22.0	1 1E-08
05/22/04	7	30	20 6	1 7	1.6	183 4	0	22 0	1 2E-08
05/23/04	10	46	47 9	3.9	4 0	178 7	0	22.0	1 2E-08
05/24/04	7	50	68 9	5.6	5 7	175 3	0	22 0	1 2E-08
05/24/04	18	50	79 9	6 4	6 5	173 6	1	21.5	1 1E-08

Tested By: JCM Date: 05/19/04 Checked By: JCL Date: 5-25-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P10.XLS]Sheet1

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SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	26+00
Lab ID	2004-083-05-06	Soil Color	GRAY

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay

USCS Summary		
Sieve Sizes (mm)		Percentage
Greater Than #4	*Gravel*	7.52
#4 To #200	*Sand*	61.12
Finer Than #200	*Silt & Clay*	31.36

USCS Symbol *SC, TESTED*

USCS Classification *CLAYEY SAND*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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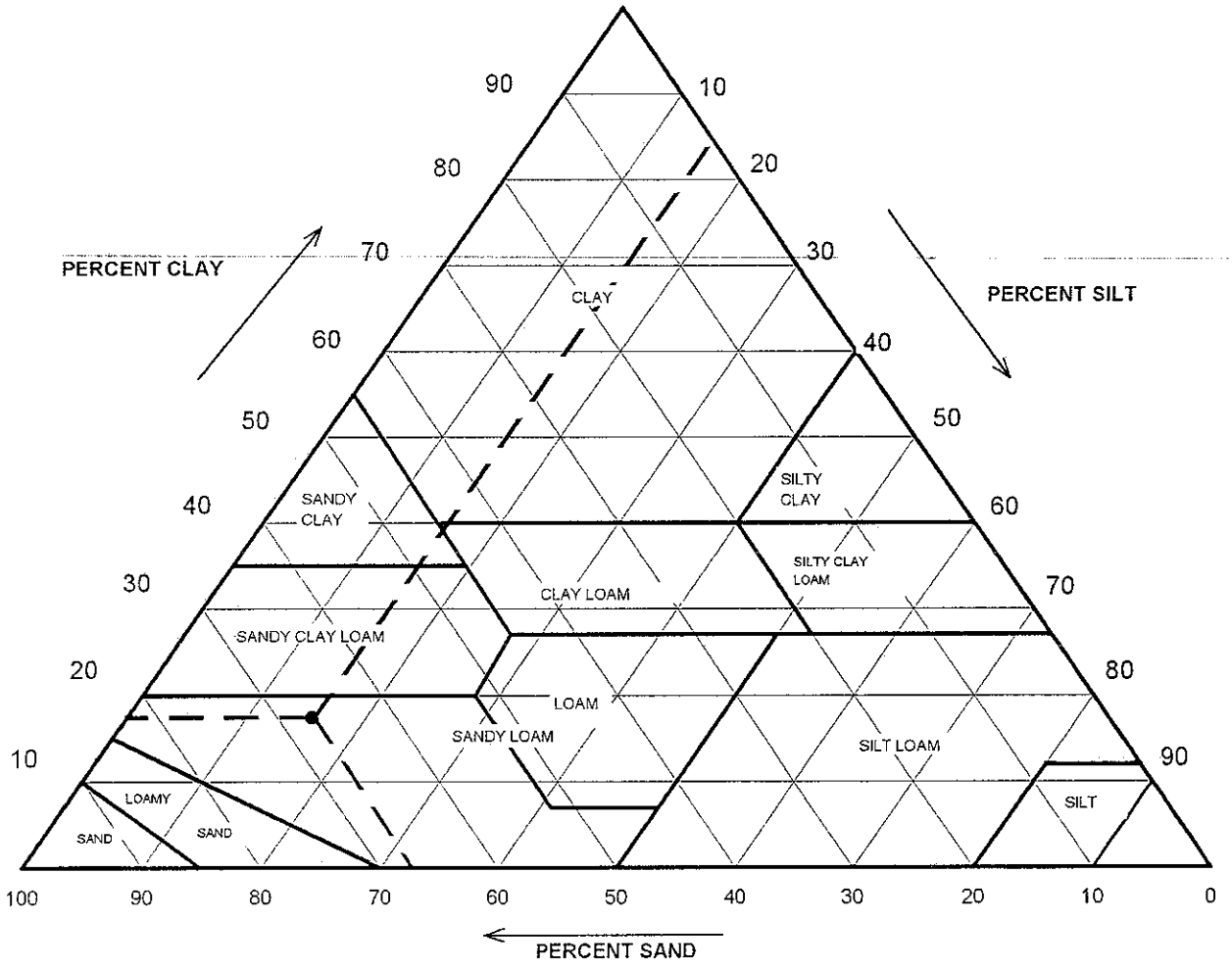
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No.	26+00
Lab ID	2004-083-05-06	Soil Color	GRAY



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	10.80	**0.00**
2	89.20	*Sand*	59.82	**67.06**
0.05	29.38	*Silt*	13.86	**15.53**
0.002	15.52	*Clay*	15.52	**17.40**

USDA Classification *SANDY LOAM*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	26+00
Lab ID	2004-083-05-06	Soil Color	**GRAY**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No	678	Tare No.	NA
Wgt Tare + Wet Specimen (gm)	591 85	Wgt Tare + Wet Specimen (gm)	NA
Wgt Tare + Dry Specimen (gm)	451.83	Wgt Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	98 25	Weight of Tare (gm)	NA
Weight of Water (gm)	140 02	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	353.58	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**39.6**	**Moisture Content (%)**	NA

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	353.58
Dry Weight - 3/4" Sample (gm)	230.51	Weight of minus #200 material (gm)	110 89
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	242 69
Dry Weight + 3/4" Sample (gm)	12.18		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0 00	0 00	100.00	**100.00**
6"	150	0 00	0 00	0.00	100.00	**100.00**
3"	75	0 00	0 00	0.00	100.00	**100.00**
2"	50	0 00	0 00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0 00	0.00	100.00	**100.00**
1"	25 0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19 0	12.18	3 44	3 44	96.56	**96.56**
1/2"	12.5	0 00	0.00	3.44	96.56	**96.56**
3/8"	9 50	4.55	1 29	4 73	95.27	**95.27**
#4	4.75	9.85	2.79	7.52	92.48	**92.48**
#10	2 00	11.61	3 28	10.80	89 20	**89.20**
#20	0.85	10 92	3.09	13 89	86.11	**86.11**
#40	0.425	11.66	3.30	17.19	82.81	**82.81**
#60	0 250	26.15	7.40	24.58	75.42	**75.42**
#140	0.106	120.13	33.98	58 56	41.44	**41.44**
#200	0.075	35.64	10.08	68.64	31.36	**31.36**
Pan	-	110.89	31.36	100.00	-	-

Tested By TMO Date 5/24/04 Checked By JLL Date 5-27-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No.	2004-083-05	Sample No.	26+00
Lab ID	2004-083-05-06	Soil Color	**GRAY**

Elapsed Time (min)		R Measured	Temp (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	26.5	26.5	22.8	6.51	20.0	86.6	0.01300	0.0318	**27.2**
5		25.5	22.8	6.51	19.0	82.3	0.01300	0.0202	**25.8**
15		23.5	22.8	6.51	17.0	73.6	0.01300	0.0118	**23.1**
30		22.5	22.8	6.51	16.0	69.3	0.01300	0.0084	**21.7**
70		21.0	22.8	6.51	14.5	62.8	0.01300	0.0056	**19.7**
250		19.0	23.0	6.44	12.6	54.4	0.01297	0.0030	**17.1**
1440		16.5	23.1	6.40	10.1	43.8	0.01296	0.0013	**13.7**

Soil Specimen Data		Other Corrections	
Tare No.	2461		
Tare + Dry Material (gm)	122.09	a - Factor	0.99
Weight of Tare (gm)	94.24		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 200	31.36
Weight of Dry Material (gm)	22.85		
		Specific Gravity	2.7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material*

Tested By TO Date 5/25/04 Checked By JLL Date 5-27-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	ENVIRONMENTAL QUALITY	Boring No	5/13/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	26+00
Lab ID	2004-083-05-06	Soil Description	**GRAY LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No 40 sieve material, Airdried)

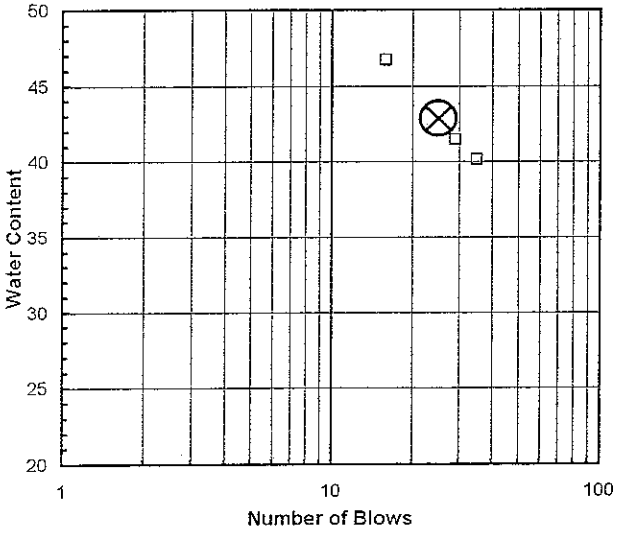
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	AG	95	183	MULTIPOINT
Wt. of Tare & WS (gm)	37.08	38.34	43.13	
Wt. of Tare & DS (gm)	30 66	31.87	36.05	
Wt. of Tare (gm)	14.67	16.26	20.89	
Wt. of Water (gm)	6.4	6.5	7.1	
Wt. of DS (gm)	16 0	15 6	15.2	
Moisture Content (%)	**40.2**	**41.4**	**46.7**	
Number of Blows	**35**	**29**	**16**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	68	2277	
Wt. of Tare & WS (gm)	22 92	25 88	
Wt of Tare & DS (gm)	22 14	25.13	
Wt of Tare (gm)	16 42	19.35	
Wt of Water (gm)	0 8	0 8	
Wt. of DS (gm)	5 7	5 8	
Moisture Content (%)	**13.6**	**13.0**	**0.7**

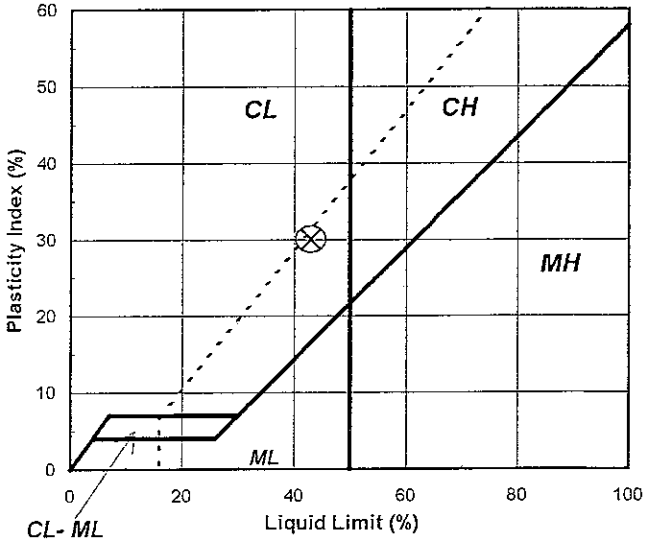
Note. The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**43**
Plastic Limit (%)	**13**
Plasticity Index (%)	**30**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 5/26/04 *Checked By* JU *Date* 5-27-04

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PERMEABILITY TEST

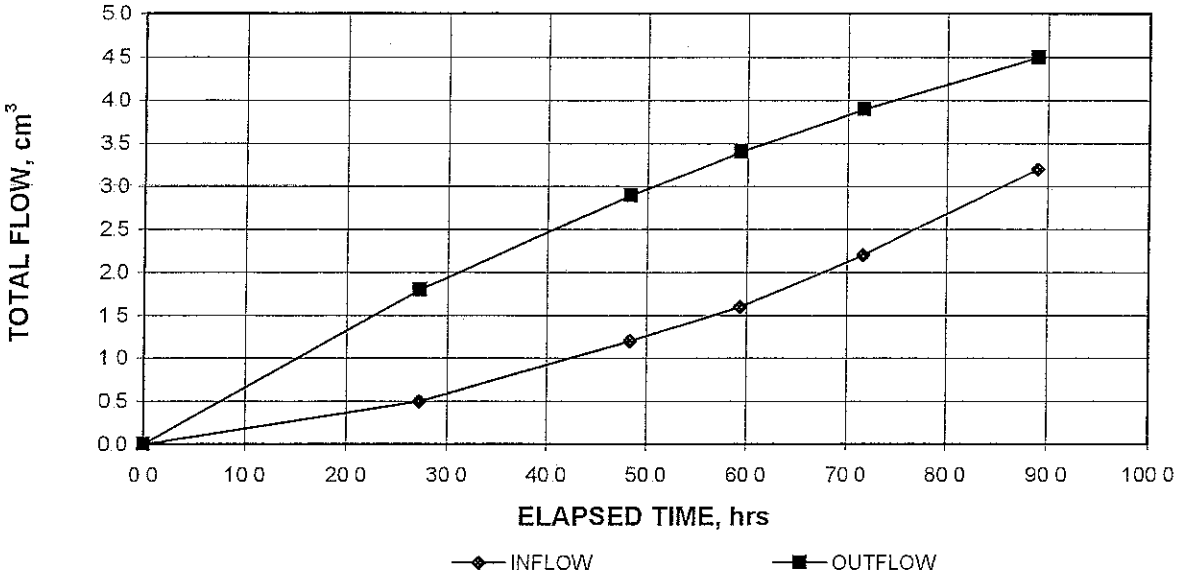
ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

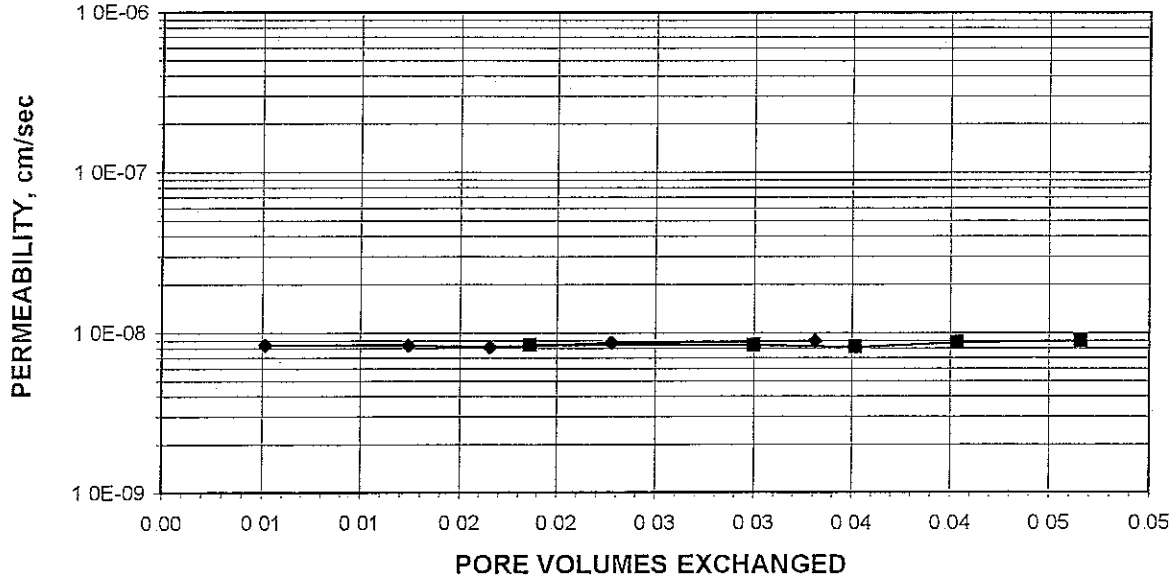
Client	ENVIRONMENTAL QUALITY	Boring No	5-13-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	26+00
Lab ID No	2004-083-05-06		

AVERAGE PERMEABILITY = 8.6E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 8.6E-11 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: JCM Date: 05/19/04 Checked By: JW Date: 5-27-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P13.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-13-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	26+00
Lab ID No	2004-083-05-06		
		Specific Gravity	2 70 Assumed
		Sample Condition	Remolded

Visual Description: GRAY SOIL BENTOINITE BACKFILL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	1682	1739
Wt of Tare & WS (gm.)	428.54	482 81
Wt of Tare & DS (gm.)	334.26	391 84
Wt. of Tare (gm.)	101 57	83.76
Wt of Water (gm)	94.28	90 97
Wt. of DS (gm.)	232 69	308 08
Moisture Content (%)	**40.5**	**29.5**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt. of Tube & WS (gm.)	863.16	NA
Wt of Tube (gm)	428 54	NA
Wt. of WS (gm)	434.62	400 63
Length 1 (in)	2 227	2.108
Length 2 (in.)	2.276	2 069
Length 3 (in.)	2.302	2 080
Top Diameter (in)	2.875	2.775
Middle Diameter (in)	2 875	2 790
Bottom Diameter (in.)	2 875	2 850
Average Length (in.)	2.27	2 09
Average Area (in ^{2})	6 49	6 18
Sample Volume (cm^3)	241.31	211.20
Unit Wet Wt (gm / cm^3)	1.80	1.90
Unit Wet Wt (pcf)	112.4	118.4
Unit Dry Wt (pcf)	80.0	91 4
Unit Dry Wt (gm / cm^3)	1 28	1 46
Void Ratio, e	1.11	0.84
Porosity, n	0 53	0 46
Pore Volume (cm^3)	126.8	96 6

Tested By: JCM Date: 05/19/04 Checked By: JW Date: 5-27-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P13.XLS]Sheet1

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PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-13-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-05	Sample No	26+00
Lab ID No	2004-083-05-06		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	67 5	Sample Length (cm), L	5 30
Bottom Cap (psi)	70 0	Sample Diameter (cm)	7 12
Cell (psi)	75 6	Sample Area (cm^2), A	39 87
Total Pressure Head (cm)	175 8	Inflow Burette Area (cm^2), a-in	0 984
		Outflow Burette Area (cm^2), a-out	0 842
		B Parameter (%)	98

AVERAGE PERMEABILITY = 8.6E-09 cm/sec @ 20°C
AVERAGE PERMEABILITY = 8.6E-11 m/sec @ 20°C

DATE (mm/dd/yy)	TIME (hr)	TIME (min)	ELAPSED TIME t (hr)	TOTAL INFLOW (cm^3)	TOTAL OUTFLOW (cm^3)	TOTAL HEAD h (cm)	FLOW (0 flow) (1 stop)	TEMP (°C)	INCREMENTAL PERMEABILITY @ 20°C (cm/sec)
05/22/04	7	30	0.0	0.0	0 0	185 0	0	22 0	NA
05/23/04	10	46	27.3	0 5	1 8	182 4	0	22 0	8 4E-09
05/24/04	7	50	48.3	1.2	2.9	180.4	0	22 0	8.4E-09
05/24/04	18	50	59 3	1 6	3 4	179 4	0	21 5	8 2E-09
05/25/04	7	10	71 7	2 2	3 9	178.2	1	22 0	8 7E-09
05/25/04	13	50	71.7	2.2	3.9	177.9	0	22 0	NA
05/26/04	7	15	89 1	3.2	4 5	176 1	1	22 0	9 0E-09

Tested By: JCM Date: 05/19/04 Checked By: JW Date: 5-27-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P13.XLS]Sheet1

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DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/14/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
See Note						

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

Samples were collected and analyzed. All results were in compliance. However, the report form was inadvertantly destroyed by the lab techinician.

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/14/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.

Samples were collected and analyzed.	FUNNEL CALIBRATIONS PERFORMED TODAY?	no
All results were in compliance. However,	pH METER CALIBRATIONS PERFORMED TODAY?	N/A
the report form was inadvertantly destroyed.	BALANCE CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/14/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
			0.0	10.0	0.0		24+50	0.0	
			0.0	10.0	0.0		24+60	3.0	
			0.0	10.0	0.0		24+70	8.3	
			0.0	10.0	0.0		24+80	12.4	
			0.0	10.0	0.0		24+90	14.6	
			0.0	10.0	0.0		25+00	16.2	
			0.0	10.0	0.0		25+10	18.0	
			0.0	10.0	0.0		25+20	19.4	
			0.0	10.0	0.0		25+30	21.2	
			0.0	10.0	0.0		25+40	22.3	
			0.0	10.0	0.0		25+50	23.4	
			0.0	10.0	0.0		25+60	24.9	
			0.0	10.0	0.0		25+70	26.8	
			0.0	10.0	0.0		25+80	27.6	
			0.0	10.0	0.0		25+90	28.5	
			0.0	10.0	0.0		26+00	29.3	
			0.0	10.0	0.0		26+10	29.6	
			0.0	10.0	0.0		26+20	30.0	
							26+30	31.1	
							26+40	32.4	
							26+50	33.0	

SF TODAY 0.00 26+60 34.6

SF TO DATE 26+70 35.0

COMMENTS

AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/14/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
							26+10		0.0
							26+20		2.0
							26+30		6.4
							26+40		7.9
							26+50		12.4
							26+60		18.1
							26+70		24.5

SF TODAY

SF TO DATE

COMMENTS

PM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/15/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL REWORK JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

SLURRY

WITHIN TRENCH

STATION	DEPTH	DENSITY	SAND	FILTRATE LOSS	VISCOSITY	pH
	feet	lb/ft^3	%	cm^3	seconds	S.U.
See Note						

BACKFILL

STATION	MOISTURE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG
	%		%	

SOIL-BENTONITE BACKFILL

STATION	SLUMP CONE	FULL GRAIN SIZE	#200 SIEVE FINES	ATTERBURG	PERMEABILITY	PERM. DUPLICATE
	inches		%		API	TAKEN FOR D5084?

COMMENTS

No slurry sampling or analysis was performed since there was only 50 feet of trench to close

DRY BENTONITE ADDITION		
	TONS	%
TODAY		
TO DATE		
BORROW %	CY	

pH CALIBRATIONS PERFORMED TODAY?	N/A (paper)
BALANCE CALIBRATIONS PERFORMED TODAY?	no
FUNNEL CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/15/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

SLURRY BATCH PLANT

TIME	DENSITY	VISCOSITY	FILTRATE LOSS	pH
Military	lb/ft^3	seconds	cm^3	S.U.

No slurry was made today	FUNNEL CALIBRATIONS PERFORMED TODAY?	no
	pH METER CALIBRATIONS PERFORMED TODAY?	N/A
	BALANCE CALIBRATIONS PERFORMED TODAY?	no

EQM _____ OWNER: _____

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/15/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION							BACKFILL SLOPE		
STATION	DEPTH								
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH	STATION	START OF SHIFT	END OF SHIFT
			0.0	10.0	0.0		26+10	0.0	
			0.0	10.0	0.0		26+20	2.0	
			0.0	10.0	0.0		26+30	6.6	
			0.0	10.0	0.0		26+40	7.9	
			0.0	10.0	0.0		26+50	12.3	
			0.0	10.0	0.0		26+60	17.8	
			0.0	10.0	0.0		26+70	23.8	
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				
			0.0	10.0	0.0				

SF TODAY 0.00

SF TO DATE

COMMENTS

AM Profile

EQM OWNER:

DAILY SOIL-BENTONITE SLURRY WALL QUALITY CONTROL FORM

DATE: 05/15/04 JOB NAME: INDIANA HARBOR CDF S-B CUTOFF WALL JOB NUMBER: 30205

WEATHER: Clear, warm RIG NUMBER:

EXCAVATION								BACKFILL SLOPE		
STATION	DEPTH									
	TOP KEY	BOT EXCAVATION	AVG DEPTH	LENGTH	AREA	WIDTH		STATION	START OF SHIFT	END OF SHIFT

SF TODAY

SF TO DATE

COMMENTS

PM Profile. Note the trench was completely topped out in the PM.

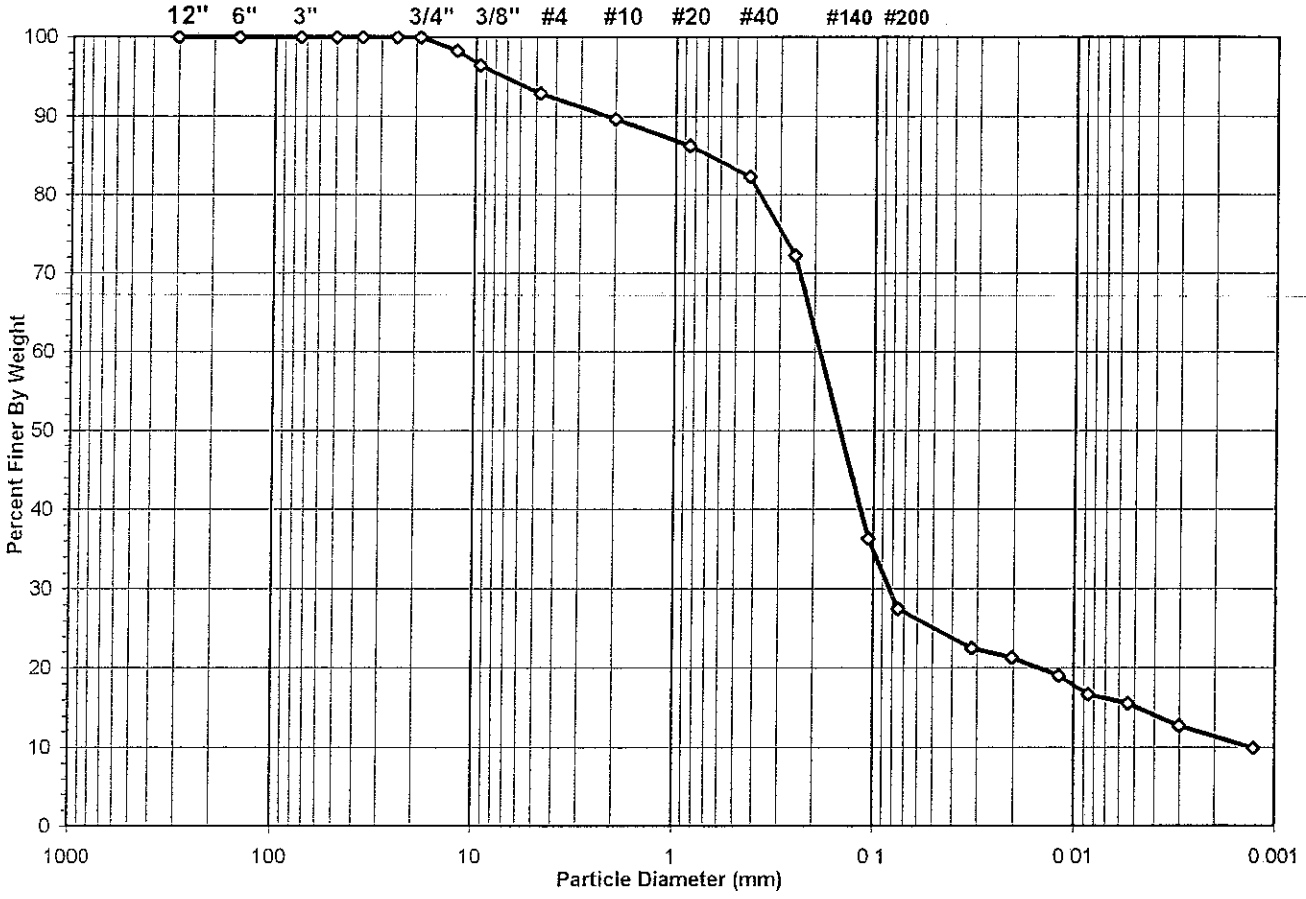
EQM OWNER:

SIEVE AND HYDROMETER ANALYSIS
ASTM D 422-63/AASHTO T88-00 (SOP-S3)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5/15/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	26+10
Lab ID	2004-083-05-01	Soil Color	**GRAY**

	SIEVE ANALYSIS			HYDROMETER	
USCS	cobbles	gravel	sand	silt and clay fraction	
USDA	cobbles	gravel	sand	silt	clay



USCS Summary		
Sieve Sizes (mm)		**Percentage**
Greater Than #4	*Gravel*	7.07
#4 To #200	*Sand*	65 38
Finer Than #200	*Silt & Clay*	27 55

USCS Symbol *SC, TESTED*

USCS Classification *CLAYEY SAND*

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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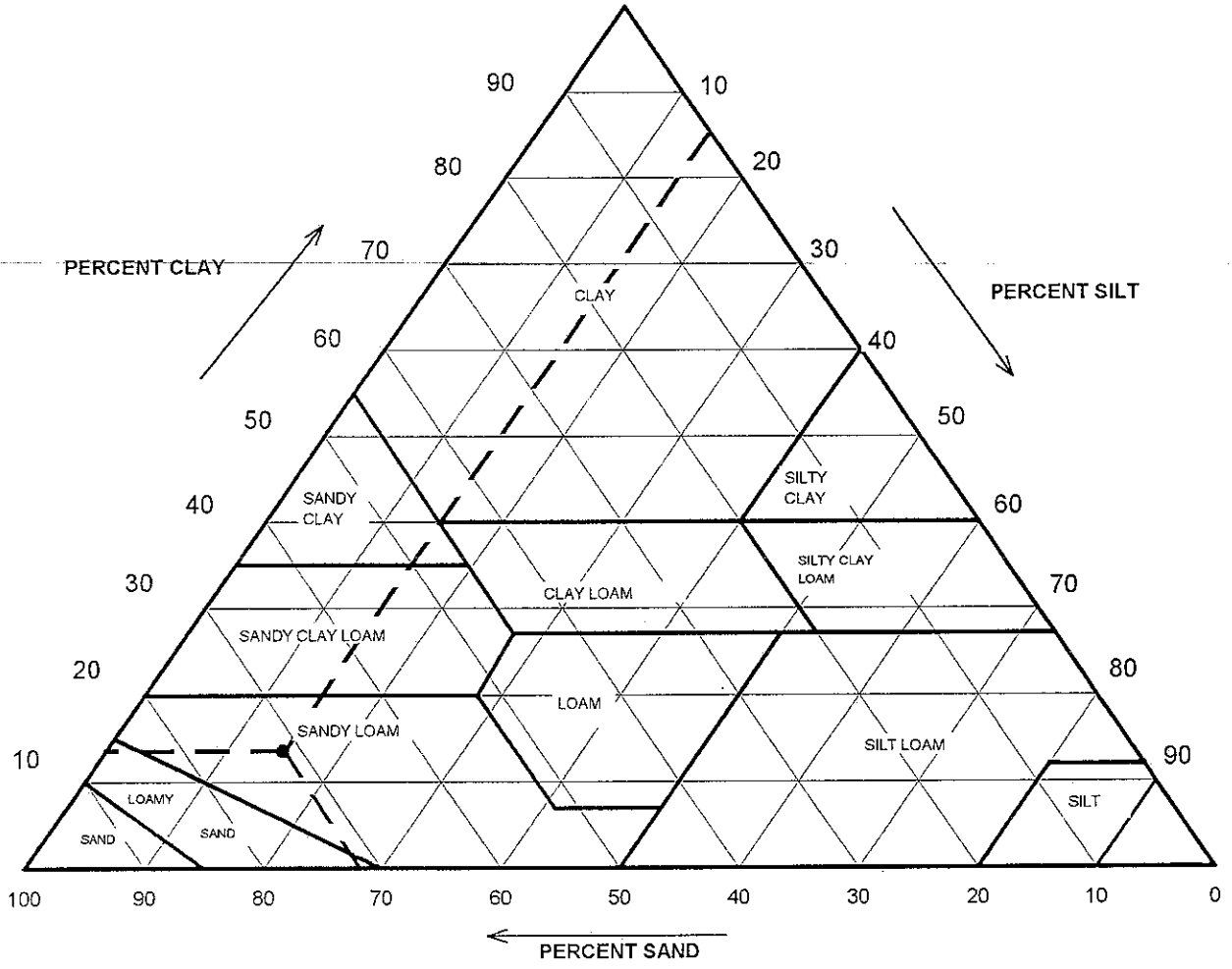
INTEGRITY IN TESTING

USDA CLASSIFICATION CHART

Client	ENVIRONMENTAL QUALITY	Boring No	5/15/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	26+10
Lab ID	2004-083-05-01	Soil Color	GRAY



Particle Size (mm)	Percent Finer	USDA SUMMARY	Actual Percentage	Corrected % of Minus 2.0 mm material for USDA Classificat.
		Gravel	10.33	**0.00**
2	89.67	*Sand*	64.24	**71.65**
0.05	25.42	*Silt*	13.23	**14.75**
0.002	12.19	*Clay*	12.19	**13.60**

USDA Classification ***SANDY LOAM***

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

WASH SIEVE ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No	5/15/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	26+10
Lab ID	2004-083-05-01	Soil Color	**GRAY**

Moisture Content of Passing 3/4" Material		Water Content of Retained 3/4" Material	
Tare No	667	Tare No	NA
Wgt Tare + Wet Specimen (gm)	865 67	Wgt Tare + Wet Specimen (gm)	NA
Wgt Tare + Dry Specimen (gm)	676 82	Wgt.Tare + Dry Specimen (gm)	NA
Weight of Tare (gm)	96 03	Weight of Tare (gm)	NA
Weight of Water (gm)	188 85	Weight of Water (gm)	NA
Weight of Dry Soil (gm)	580 79	Weight of Dry Soil (gm)	NA
Moisture Content (%)	**32.5**	**Moisture Content (%)**	**NA**

Wet Weight -3/4" Sample (gm)	NA	Weight of the Dry Specimen (gm)	580 79
Dry Weight - 3/4" Sample (gm)	420.79	Weight of minus #200 material (gm)	160 00
Wet Weight +3/4" Sample (gm)	NA	Weight of plus #200 material (gm)	420.79
Dry Weight + 3/4" Sample (gm)	0 00		
Total Dry Weight Sample (gm)	NA		

Sieve Size	Sieve Opening (mm)	Wgt of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0 00	0 00	100.00	**100.00**
6"	150	0 00	0.00	0 00	100.00	**100.00**
3"	75	0 00	0 00	0 00	100.00	**100.00**
2"	50	0.00	0 00	0 00	100.00	**100.00**
1 1/2"	37 5	0 00	0.00	0.00	100.00	**100.00**
1"	25 0	0 00	0.00	0.00	100 00	**100.00**
3/4"	19 0	0.00	0 00	0.00	100.00	**100.00**
1/2"	12.5	9.65	1.66	1 66	98.34	**98.34**
3/8"	9 50	11.11	1.91	3.57	96.43	**96.43**
#4	4 75	20 29	3.49	7.07	92 93	**92.93**
#10	2 00	18.97	3.27	10.33	89.67	**89.67**
#20	0 85	19 87	3 42	13.76	86 24	**86.24**
#40	0 425	22.65	3.90	17 66	82.34	**82.34**
#60	0.250	58 90	10.14	27 80	72.20	**72.20**
#140	0 106	208.55	35.91	63.70	36.30	**36.30**
#200	0.075	50.80	8.75	72.45	27.55	**27.55**
Pan	-	160.00	27.55	100.00	-	-

Tested By TMO Date 5/24/04 Checked By JU Date 5-26-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

HYDROMETER ANALYSIS

ASTM D 422-63/AASHTO T88-00 (SOP-S3)

Client	ENVIRONMENTAL QUALITY	Boring No.	5/15/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	26+10
Lab ID	2004-083-05-01	Soil Color	**GRAY**

Elapsed Time (min)		R Measured	Temp. (° C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
0	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	25 5	26 0	22 8	6.51	19 5	81 7	0 01300	0 0319	**22.5**
5		25 0	22 8	6.51	18.5	77 5	0.01300	0 0203	**21.3**
15		23 0	22.8	6 51	16.5	69 1	0.01300	0 0119	**19.0**
30		21 0	22 8	6 51	14 5	60.7	0.01300	0 0085	**16.7**
76		20 0	22.8	6 51	13.5	56 5	0.01300	0 0054	**15.6**
250		17.5	23 0	6 44	11.1	46.4	0.01297	0 0030	**12.8**
1440		15.0	23 1	6 40	8 6	36.0	0 01296	0.0013	**9.9**

Soil Specimen Data		**Other Corrections**	
Tare No.	2327		
Tare + Dry Material (gm)	127 71	a - Factor	0.99
Weight of Tare (gm)	99.08		
Weight of Deflocculant (gm)	5.0	Percent Finer than # 200	27 55
Weight of Dry Material (gm)	23 63		
		Specific Gravity	2 7 Assumed

Note: *Hydrometer test is performed on - # 200 sieve material.*

Tested By TO Date 5/25/04 Checked By JU Date 5-26-04

DCN: CT-S3A DATE:1/30/04 REVISION: 6

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INTEGRITY IN TESTING

ATTERBERG LIMITS

ASTM D 4318-98 / AASHTO T89 (SOP - S4A)

Client	ENVIRONMENTAL QUALITY	Boring No	5/15/04
Client Reference	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	26+10
Lab ID	2004-083-05-01	Soil Description	**GRAY LEAN CLAY**

Note: The USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description. (Minus No. 40 sieve material, Airdried)

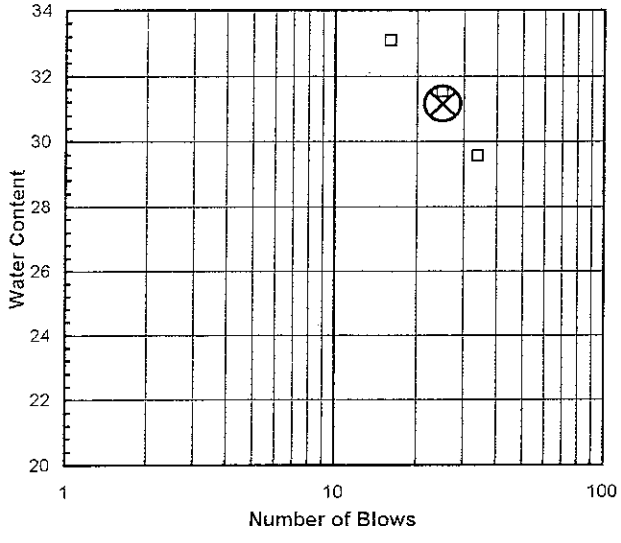
Liquid Limit Test	**1**	**2**	**3**	
Tare Number	2306	250	232	MULTIPOINT
Wt of Tare & WS (gm)	40 26	39 15	38.32	
Wt of Tare & DS (gm)	34 69	33 97	33.25	
Wt of Tare (gm)	15 84	17.54	17.92	
Wt of Water (gm)	5.6	5.2	5.1	
Wt of DS (gm)	18.9	16.4	15.3	
Moisture Content (%)	**29.5**	**31.5**	**33.1**	
Number of Blows	**34**	**25**	**16**	

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	119	253	
Wt of Tare & WS (gm)	24 02	24 06	
Wt. of Tare & DS (gm)	23 05	23 16	
Wt. of Tare (gm)	17.70	17 87	
Wt of Water (gm)	1.0	0 9	
Wt of DS (gm)	5.4	5 3	
Moisture Content (%)	**18.1**	**17.0**	**1.1**

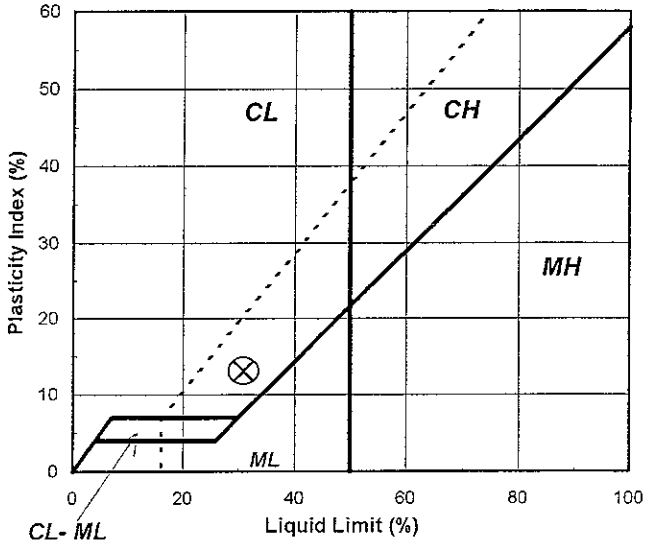
Note. The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**31**
Plastic Limit (%)	**18**
Plasticity Index (%)	**13**
USCS Symbol	**CL**

Flow Curve



Plasticity Chart



Tested By TO *Date* 5/26/04 *Checked By* JLL *Date* 5-26-04

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PERMEABILITY TEST

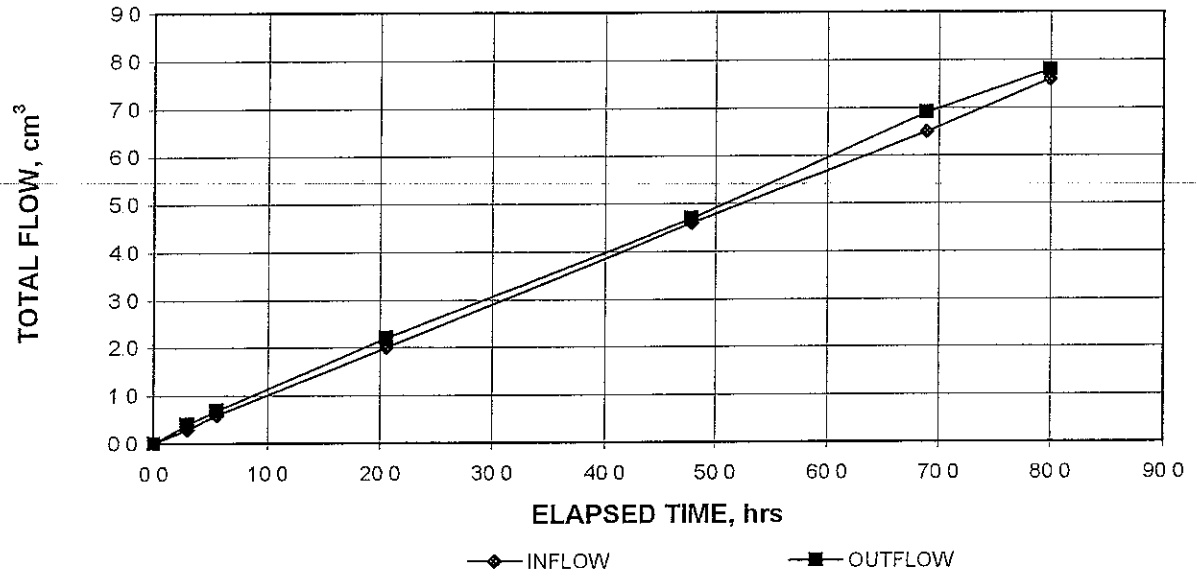
ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

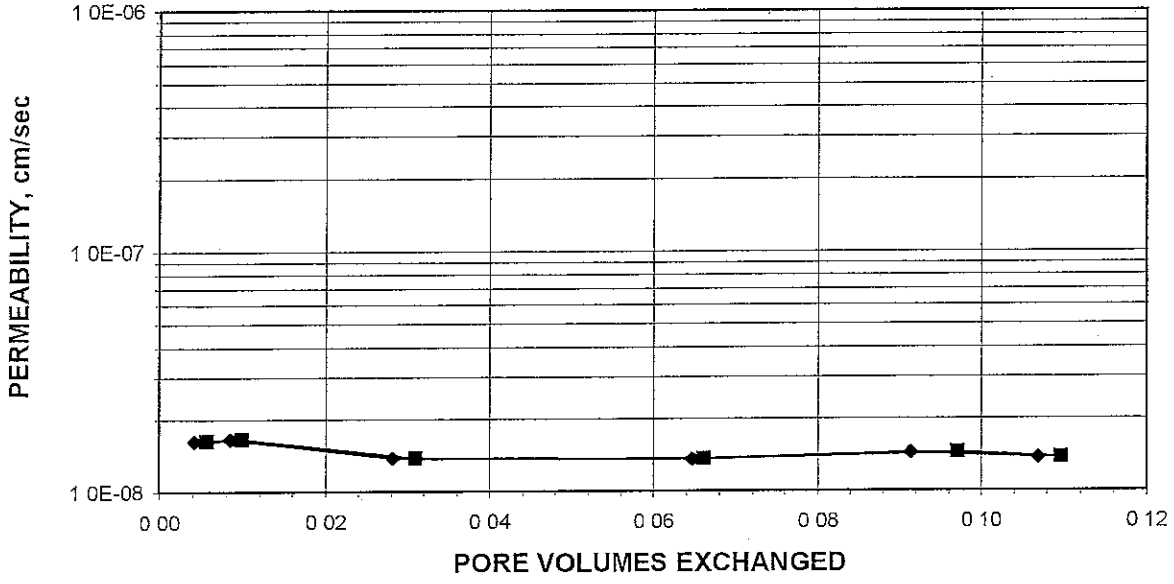
Client	ENVIRONMENTAL QUALITY	Boring No	5-15-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-05	Sample No	26+10
Lab ID No	2004-083-05-01		

AVERAGE PERMEABILITY = 1.4E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.4E-10 m/sec @ 20°C

TOTAL FLOW vs. ELAPSED TIME



PORE VOLUMES EXCHANGED vs. PERMEABILITY



Tested By: JCM Date: 05/19/04 Checked By: JU Date: 5-25-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P9.XLS]Sheet1

544 Braddock Avenue • East Pittsburgh, PA 15112 • Phone (412) 823-7600 • Fax (412) 823-8999

PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-15-04
Client Project	INDIANA HARBOR 030205	Depth (ft.)	NA
Project No	2004-083-05	Sample No	26+10
Lab ID No.	2004-083-05-01		
		Specific Gravity	2 70 Assumed
		Sample Condition	Remolded

Visual Description: GRAY SOIL BENTOINITE BACKFILL

MOISTURE CONTENT:	BEFORE TEST	AFTER TEST
Tare Number	1619	1723
Wt of Tare & WS (gm.)	430 15	397 55
Wt of Tare & DS (gm)	339 10	332 40
Wt. of Tare (gm)	95 65	83 47
Wt. of Water (gm)	91 05	65.15
Wt of DS (gm)	243 45	248 93
Moisture Content (%)	**37.4**	**26.2**

SPECIMEN:	BEFORE TEST	AFTER TEST
Wt of Tube & WS (gm)	774 36	NA
Wt of Tube (gm)	430 15	NA
Wt. of WS (gm)	344.21	316.08
Length 1 (in)	1 806	1 665
Length 2 (in.)	1.822	1 587
Length 3 (in)	1.813	1 629
Top Diameter (in.)	2 875	2 770
Middle Diameter (in)	2.875	2.772
Bottom Diameter (in)	2 875	2.850
Average Length (in)	1.81	1.63
Average Area (in ^{2})	6 49	6 15
Sample Volume (cm^3)	192.94	163 86
Unit Wet Wt. (gm./ cm^3)	1 78	1.93
Unit Wet Wt (pcf)	111 4	120 4
Unit Dry Wt (pcf)	81.0	95 4
Unit Dry Wt. (gm./ cm^3)	1 30	1 53
Void Ratio, e	1 08	0 77
Porosity, n	0 52	0 43
Pore Volume (cm^3)	100.2	71 1

Tested By: JCM Date: 05/19/04 Checked By: JU Date: 5-25-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P9.XLS]Sheet1

544 Braddock Avenue • East Pittsburgh, PA 15112 • Phone (412) 823-7600 • Fax (412) 823-8999

PERMEABILITY TEST

ASTM D 5084-90(Reapproved 1997)
(SOP-S22A & S22B)

geotechnics
INTEGRITY IN TESTING

Client	ENVIRONMENTAL QUALITY	Boring No	5-15-04
Client Project	INDIANA HARBOR 030205	Depth (ft)	NA
Project No	2004-083-05	Sample No	26+10
Lab ID No	2004-083-05-01		

Pressure Heads (Constant)		Final Sample Dimensions	
Top Cap (psi)	67 5	Sample Length (cm), L	4 13
Bottom Cap (psi)	70 0	Sample Diameter (cm)	7 11
Cell (psi)	75 6	Sample Area (cm^2), A	39 65
Total Pressure Head (cm)	175 8	Inflow Burette Area (cm^2), a-in	0 980
		Outflow Burette Area (cm^2), a-out	0 976
		B Parameter (%)	99

AVERAGE PERMEABILITY = 1.4E-08 cm/sec @ 20°C
AVERAGE PERMEABILITY = 1.4E-10 m/sec @ 20°C

DATE	TIME		ELAPSED TIME t	TOTAL INFLOW	TOTAL OUTFLOW	TOTAL HEAD h	FLOW	TEMP	INCREMENTAL PERMEABILITY @ 20°C
(mm/dd/yy)	(hr)	(min)	(hr)	(cm^3)	(cm^3)	(cm)	(0 flow) (1 stop)	(°C)	(cm/sec)
05/21/04	10	55	0 0	0 0	0.0	195 1	0	22 0	NA
05/21/04	13	57	3 0	0 3	0.4	194.4	0	22 0	1 6E-08
05/21/04	16	30	5.6	0.6	0 7	193 7	0	22 0	1 7E-08
05/22/04	7	30	20 6	2 0	2.2	190 8	0	22 0	1 4E-08
05/23/04	10	46	47.9	4 6	4 7	185 6	0	22 0	1 4E-08
05/24/04	7	50	68 9	6.5	6 9	181 4	0	22.0	1 5E-08
05/24/04	18	50	79 9	7 6	7.8	179 4	1	22 0	1 4E-08

Tested By: JCM Date: 05/19/04 Checked By: JM Date: 5-25-04

DCN: CT-22C DATE: 04-09-03 REVISION:4 C:\MSOFFICE\Excel\Perms\May2004\[083P9.XLS]Sheet1

544 Braddock Avenue • East Pittsburgh, PA 15112 • Phone (412) 823-7600 • Fax (412) 823-8999

Appendix I

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 NORTH CANAL STREET
CHICAGO, IL 60606-7206

REPLY TO
ATTENTION OF

July 30, 2002

Project Management Branch

Indiana Department of Environmental Management
Office of Air Quality
Compliance Data Section
100 North Senate Avenue
P.O. Box 6015
Indianapolis, IN 46206-6015

SUBJECT: Indiana Harbor and Canal Dredging and Disposal Project, Quarterly Air Monitoring Report for April – June 2002

To Whom It May Concern:

Please reference the following letter with respect to the construction and operation of the confined disposal facility (CDF) at the former ECI site in East Chicago, Indiana:

- Indiana Dept. of Environmental Management (P. Dubenetzky) letter dated June 19, 2002 to East Chicago Waterway Management District (C. Brooks), Re: Registered Construction and Operation Status, 089-15320-00471

Based on the above-referenced letter, the said project is classified as registered, with a Registration Number 089-15320-00471. Condition 9 of the registration letter requires the Permittee, East Chicago Waterway Management District (ECWMD), to submit a Quarterly Air Monitoring Report during construction and operation of the CDF. The U.S. Army Corps of Engineers, Chicago District, on behalf of ECWMD, hereby submits the enclosed quarterly report for the period of April-June 2002.

Although the registration letter does not require the Permittee to provide raw data for air monitoring performed during the monitoring period, any such data will be provided to IDEM upon request. If you have any questions or concerns regarding this quarterly report, please contact me at (312) 353-6400, ext. 3016.

Sincerely,

ORIGINAL SIGNED
Monica Ott, P.E.
Project Manager

Enclosure

Copy Furnished:
Christine Brooks, ECWMD

QUARTERLY AIR MONITORING REPORT FOR REPORTING PERIOD APRIL – JUNE 2002

Update of Air Monitoring Activities:
A contract for the first phase of CDF construction, an underground inspection trench and cutoff wall, has been awarded to Environmental Quality Management (EQ). However, construction activities at the ECI site were not yet initiated during the reporting period for calendar quarter April-June 2002. As such, no construction emissions monitoring was required. However, EQ did initiate background air monitoring in June 2002, in accordance with paragraph 7(c) of the IDEM registration letter, which states that "*background air monitoring shall be conducted daily for at least fourteen (14) days prior to the start of earth moving, groundbreaking, or other construction, operation, or placement activities*". The background air monitoring was performed daily at one location at the ECI site, as shown in Figure A, from June 19 – July 2, 2002. Samples were collected as follows:

Benzene - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to the Simalabs in Cincinnati, Ohio, for analysis using NIOSH Method 1501. Benzene was not detected in any of the samples.

PCBs - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to Simalabs in Cincinnati, Ohio, for PCB Aroclor analysis using NIOSH Method 5503. PCBs were not detected in any of the samples.

Real-Time Volatile Monitoring – Real-time volatile readings were taken at the background monitoring location once every two hours for a given day, for roughly five minutes during each reading, using a Multi-RAE monitoring device. Once construction activities begin, the action level is a 5 ppm sustained reading for 15 minutes. It should be noted that most of the background readings were less than 1 ppm, but there were several instances where there were sustained readings above 1 ppm over five minutes, and one instance where the readings were above 5 ppm over five minutes. Although these readings do not exceed any action levels, and indeed there is no action level for background monitoring, it is unclear why these relatively high readings were measured during a background monitoring period. This data may indicate the presence of sources of volatile emissions near the ECI site other than construction activities.

Real-Time Particulate Monitoring – The air registration letter specifies visual observation to ensure that fugitive dust does not migrate away from work areas during construction. Such monitoring is not applicable to the background monitoring.

Failure to Perform Monitoring
There were no instances during the monitoring period where the required air monitoring was not performed.

Action Level Exceedances
Given that no construction activities took place during the monitoring period, there were no exceedances of construction emissions action levels.

Corrective Actions
No corrective actions were required during this monitoring period.

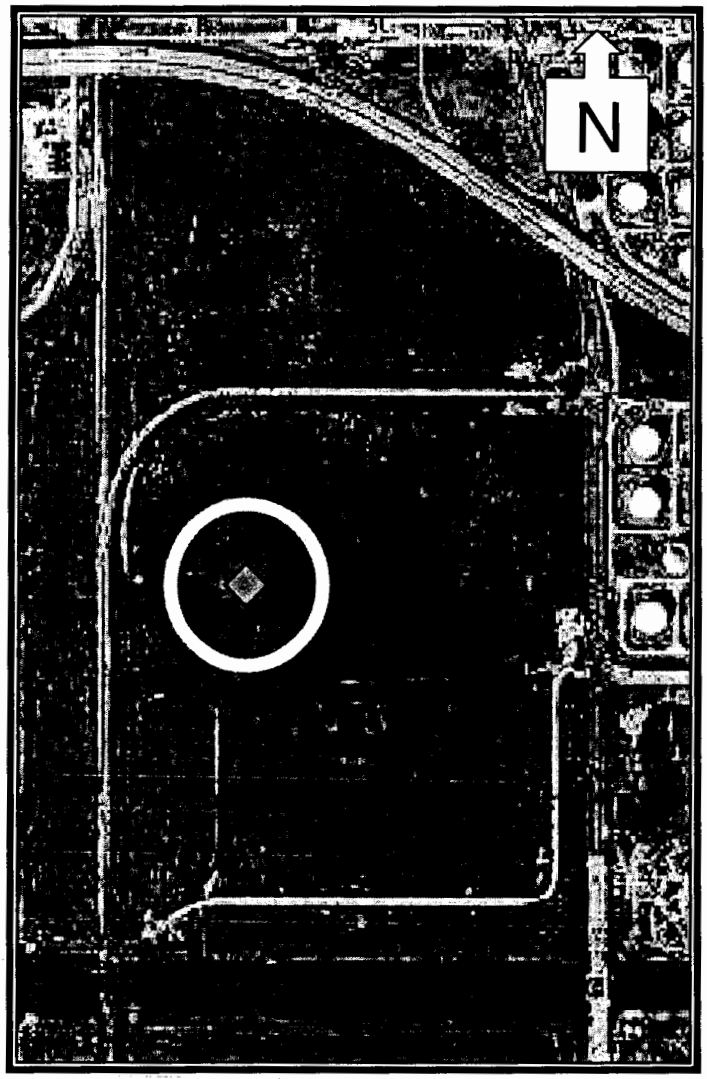


Figure 1: Approximate Location of Background Air Monitoring Station at ECI Site

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 N. Canal Street, Suite 600
Chicago, Illinois 60606-7206

REPLY TO
ATTENTION OF

Planning, Programs, & Project Management Division
Project Management Branch

October 25, 2002

Compliance Data Section
Office of Air Quality
Indiana Dept. of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

RE: Quarterly Air Monitoring Report for Indiana Harbor and Canal Dredging and Disposal Project, July – September 2002.

To Whom It May Concern:

Please reference the following letter with respect to the construction and operation of a confined disposal facility (CDF) at the former ECI site in East Chicago, Indiana.

- Indiana Dept. of Environmental Management (Dubenetzky) letter to East Chicago Waterway Management District (C. Brooks), RE: Registered Construction and Operation Status (089-15320-00471), June 19, 2002.

Based on the above referenced letter, the said project is classified as registered, with a Registration # 089-15320-00471. The registration letter requires the permittee (East Chicago Waterway Management District – ECWMD) to submit a Quarterly Air Monitoring Report during all phases of construction and operation of the CDF. The U.S. Army Corps of Engineers, Chicago District, on behalf of ECWMD, hereby submits the attached quarterly report for the period of July – September 2002.

Although the registration letter does not require the Permittee to provide raw data for air monitoring performed during the monitoring period, any such data will be provided to IDEM upon request. If you have any questions or concerns regarding this quarterly report, please contact me at (312) 353-6400 x 3151.

Sincerely,

William G. White
Project Manager

cc: Christine Brooks (ECWMD)

Indiana Harbor and Canal Dredging and Disposal Project

Quarterly Air Monitoring and Fugitive Dust Report for Reporting Period July - Sept. 2002

1. Introduction

To control emissions during construction and operations and ensure that air emissions resulting from construction, operation or other contract work activities do not impact the surrounding community, an air monitoring program is required for each phase of fieldwork. A contract for the first phase of Confined Disposal Facility (CDF) construction, an underground inspection trench and cutoff wall, has been awarded to Environmental Quality Management (EQ). This quarter included the last two days of the background air monitoring that was required to "...be conducted daily for at least fourteen (14) days prior to the start of earth moving, groundbreaking, or other construction, operation, or placement activities." (Note that preconstruction air monitoring was discussed in the previous quarterly report.)

The air monitoring program this quarter also included the initial evaluation (14 days) for clearing and grubbing activities during the construction phase. Specific sampling dates are shown in Table 1. Air monitoring was conducted using both real-time methods (volatile organic compounds, VOCs, and particulate matter, PM), and laboratory analysis methods (benzene and polychlorinated biphenyls, PCBs). The background air monitoring was performed daily at one location at the ECI site. Construction phase air monitoring was performed at both upwind and downwind locations, with specific sampling stations situated according to where construction activities were expected to be most likely to cause emissions from contaminated soil. An example of sample station locations during clearing and grubbing activities (8/6/02) is shown in Figure 1.

2. Air Monitoring Results

Benzene - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to the SIMALABS International in Cincinnati, Ohio, for analysis using NIOSH Method 1501. Benzene was detected in two of the samples at concentrations of 0.051 ppm and 0.11 ppm on 9/4/02 and 9/5/02, respectively.

PCBs - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to SIMALABS International in Cincinnati, Ohio, for PCB Aroclor analysis using NIOSH Method 5503. PCBs were not detected in any of the samples.

Real-Time Volatile Monitoring - Real-time volatile readings were taken at all of the monitoring locations at least once every two hours for a given day, for roughly five minutes during each reading, using a Multi-RAE monitoring device. During construction activities, the action level is a 5 ppm sustained reading for 15 minutes. None of the readings exceed the action level, although there were some relatively high readings measured during both the background

monitoring and construction phases. For example, during preconstruction (background) monitoring on 7/1/02, VOCs ranged from 1.4 to 1.7 ppm for run 1. These data may indicate the presence of sources of volatile emissions near the ECI site other than construction activities. Similarly, for the construction emissions monitoring during the clearing and grubbing operations, many of the readings were less than 1 ppm, but there were a number of runs with sustained readings above 1 ppm over five minutes, and one instance where the reading was 5.4 ppm.

Real-Time Particulate Monitoring - The air registration letter specifies visual observation to ensure that fugitive dust does not migrate away from work areas during construction. No visible dust plumes moving from the work area were observed.

3. Reporting Requirements

Air Monitoring

Failure to Perform Monitoring – Except for an occasional equipment malfunction, there were no instances during the monitoring period when the required air monitoring was not performed.

Action Level Exceedances - There were no exceedances of construction emissions action levels during the monitoring period. (See Table 2 for specific action levels.)

Corrective Actions - No corrective actions were required during this monitoring period.

Fugitive Dust

Dates Control Measures not Implemented - There were no days when any required control measures were not implemented.

Required Control Measures - Not applicable, because there were no days when any required control measures were not implemented.

Reasons Control Measures not Implemented - Not applicable.

Corrective Actions - Not applicable.

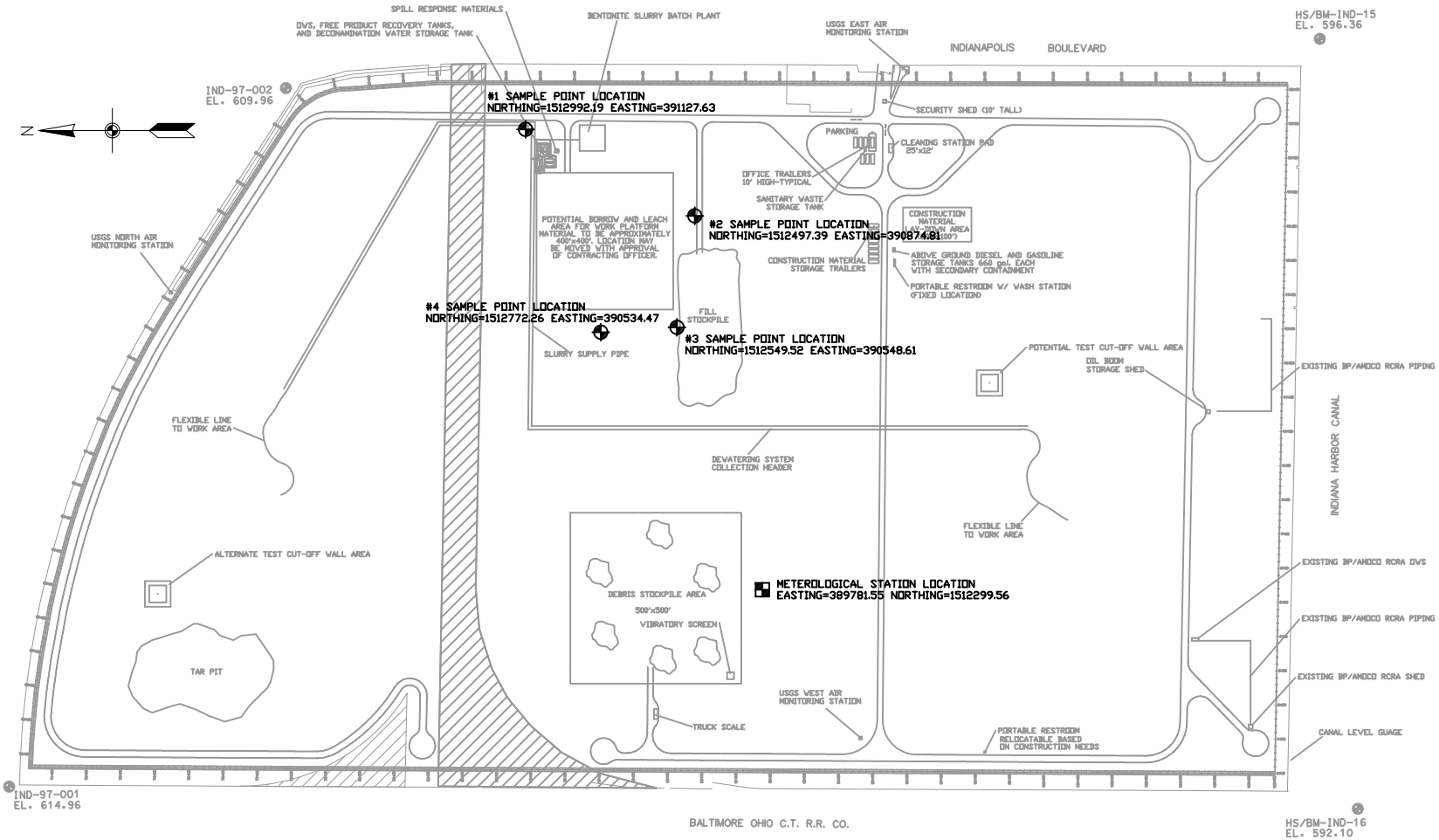
Table 1. Sampling Dates for Construction Emissions Air Monitoring During July-Sept. 2002 Quarter

Phase	**Date**
Pre-construction	7/1/02
	7/2/02
During construction:	8/6/02
clearing and grubbing	8/7/02
	8/9/02
	8/12/02
	8/13/02
	8/27/02
	8/28/02
	9/3/02
	9/4/02
	9/5/02
	9/6/02
	9/9/02
	9/10/02
	9/11/02

Table 2. Action Levels and Corrective Actions to Control Emissions Based on Results of Construction Air Monitoring

	Sampling/ Analytical Method(s)	Action Level	Basis for Corrective Action
Low-Volume Benzene Monitoring	NIOSH Method 1501	0.5 ppm above background	action level exceedance for 5 consecutive days or twice weekly
Low-Volume PCB Monitoring	NIOSH Method 5503	0.1 mg/m3 above background	action level exceedance for 5 consecutive days or twice weekly
Real-Time Volatile Monitoring	PID, FID, OVA or other approved field unit	5 ppm total VOCs	sustained reading for 15 minutes
Real-Time Particulate Monitoring	visual observations	visible dust plume moving from the work area	

Figure 1. Sample Point Locations during Construction Air Monitoring on August 6, 2002



LEGEND

METEROLOGICAL STATION LOCATION

SAMPLE POINT LOCATION

O:\Tomo\SAMPLE TEMPLATES INDIANA HARBOR\temp.dwg, Default Views, 08/16/02 10:38:42 AM

REV	DESCRIPTION	DATE	APPROVED

REVISIONS

ENVIRONMENTAL QUALITY MANAGEMENT, INC.
1800 CARILLON BLVD.
CINCINNATI, OHIO 45240
P (513)825-7500
F (513)825-7495

DRAWN	D.TOMO	
CHECKED	J.WENTZ	
APPROVED	F.HALL	
SCALE:	NONE	

INDIANA HARBOR CDF
CONSTRUCTION AIR MOINTORING
LOCATION 080602

ORIGINAL SIZE	PROJECT NO.	DWG NO.	REV
A	030205	CAML080602	0

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 N. Canal Street, Suite 600
Chicago, Illinois 60606-7206

REPLY TO
ATTENTION OF

Planning, Programs, & Project Management Division
Project Management Branch

January 29, 2003

Compliance Data Section
Office of Air Quality
Indiana Dept. of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

RE: Quarterly Air Monitoring Report for Indiana Harbor and Canal Dredging and Disposal Project, October – December 2002.

To Whom It May Concern:

Please reference the following letter with respect to the construction and operation of a confined disposal facility (CDF) at the former ECI site in East Chicago, Indiana.

- Indiana Dept. of Environmental Management (Dubenetzky) letter to East Chicago Waterway Management District (C. Brooks), RE: Registered Construction and Operation Status (089-15320-00471), June 19, 2002.

Based on the above referenced letter, the said project is classified as registered, with a Registration # 089-15320-00471. The registration letter requires the permittee (East Chicago Waterway Management District – ECWMD) to submit a Quarterly Air Monitoring Report during all phases of construction and operation of the CDF. The U.S. Army Corps of Engineers, Chicago District, on behalf of ECWMD, hereby submits the attached quarterly report for the period of October – December 2002.

Although the registration letter does not require the Permittee to provide raw data for air monitoring performed during the monitoring period, any such data will be provided to IDEM upon request. If you have any questions or concerns regarding this quarterly report, please contact me at (312) 353-6400 x 3151.

Sincerely,

William G. White
Project Manager

cc: Christine Brooks (ECWMD)

Indiana Harbor and Canal Dredging and Disposal Project

Quarterly Air Monitoring and Fugitive Dust Report for Reporting Period Oct. - Dec. 2002

1. Introduction

A contract for the first phase of Confined Disposal Facility (CDF) construction, an underground inspection trench and cutoff wall, has been awarded to Environmental Quality Management (EQ). A construction emissions air monitoring program has been initiated to control emissions during construction and operations and ensure that air emissions resulting from contract work activities do not impact the surrounding community.

The air monitoring program this quarter included at least twice weekly measurements during trenching and obstruction removal activities, which began on 10/10/02. Specific sampling dates are shown in Table 1. Air monitoring was conducted using both real-time methods (volatile organic compounds, VOCs, and particulate matter, PM), and laboratory analysis methods (benzene and polychlorinated biphenyls, PCBs). Construction phase air monitoring was performed at both upwind and downwind locations, with specific sampling stations situated according to where construction activities were expected to be most likely to cause emissions. An example of sample station locations during trenching and obstruction removal activities (10/10/02) is shown in Figure 1. Air monitoring results were compared to the Action Levels in Table 2.

2. Air Monitoring Results

Benzene - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to the SIMALABS International in Cincinnati, Ohio, for analysis using NIOSH Method 1501. Benzene was detected twice during the monitoring period, 0.33 ppm on 10/25/02 and 0.76 ppm on 11/12/02 (0.87 ppm for the corresponding duplicate sample). All other samples were non-detect.

PCBs - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to SIMALABS International in Cincinnati, Ohio, for PCB Aroclor analysis using NIOSH Method 5503. PCBs were not detected in any of the samples.

Real-Time Volatile Monitoring - Real time volatile (VOC) readings were taken at all of the monitoring locations at least once every two hours for a given day, for roughly five minutes during each reading, using a Multi-RAE monitoring device. During construction activities, the action level is a 5 ppm sustained reading for 15 minutes. Although instantaneous VOC readings occasionally exceeded 5 ppm, none of the readings were sustained for 15 minutes. As such, none of the runs on any day exceeded the action level criteria. In general, most of the readings were less than 1 ppm.

Real-Time Particulate Monitoring - The air registration letter specifies visual observation to ensure that fugitive dust does not migrate away from work areas during construction. No visible dust plumes moving from the work area were observed.

3. Reporting Requirements

Air Monitoring

Failure to Perform Monitoring – There were no instances during the monitoring period when the required air monitoring was not performed.

Action Level Exceedances – There was an exceedance of the construction emissions action level concentration for benzene at one downwind location on 11/12/02. Corrective action is required if the action level concentration (0.5 ppm above background, see Table 2) is exceeded on five consecutive days or twice weekly. Since the action level was not exceeded on the sampling event following the exceedance (i.e. 11/14/02), no corrective action was required.

Corrective Actions - No corrective actions were required during this monitoring period. See preceding paragraph.

Fugitive Dust

Dates Control Measures not Implemented - There were no days when any required control measures were not implemented.

Required Control Measures - Not applicable, because there were no days when any required control measures were not implemented.

Reasons Control Measures not Implemented - Not applicable.

Corrective Actions - Not applicable.

Table 1. Sampling Dates for Construction Emissions Air Monitoring During Oct.-Dec. 2002 Quarter

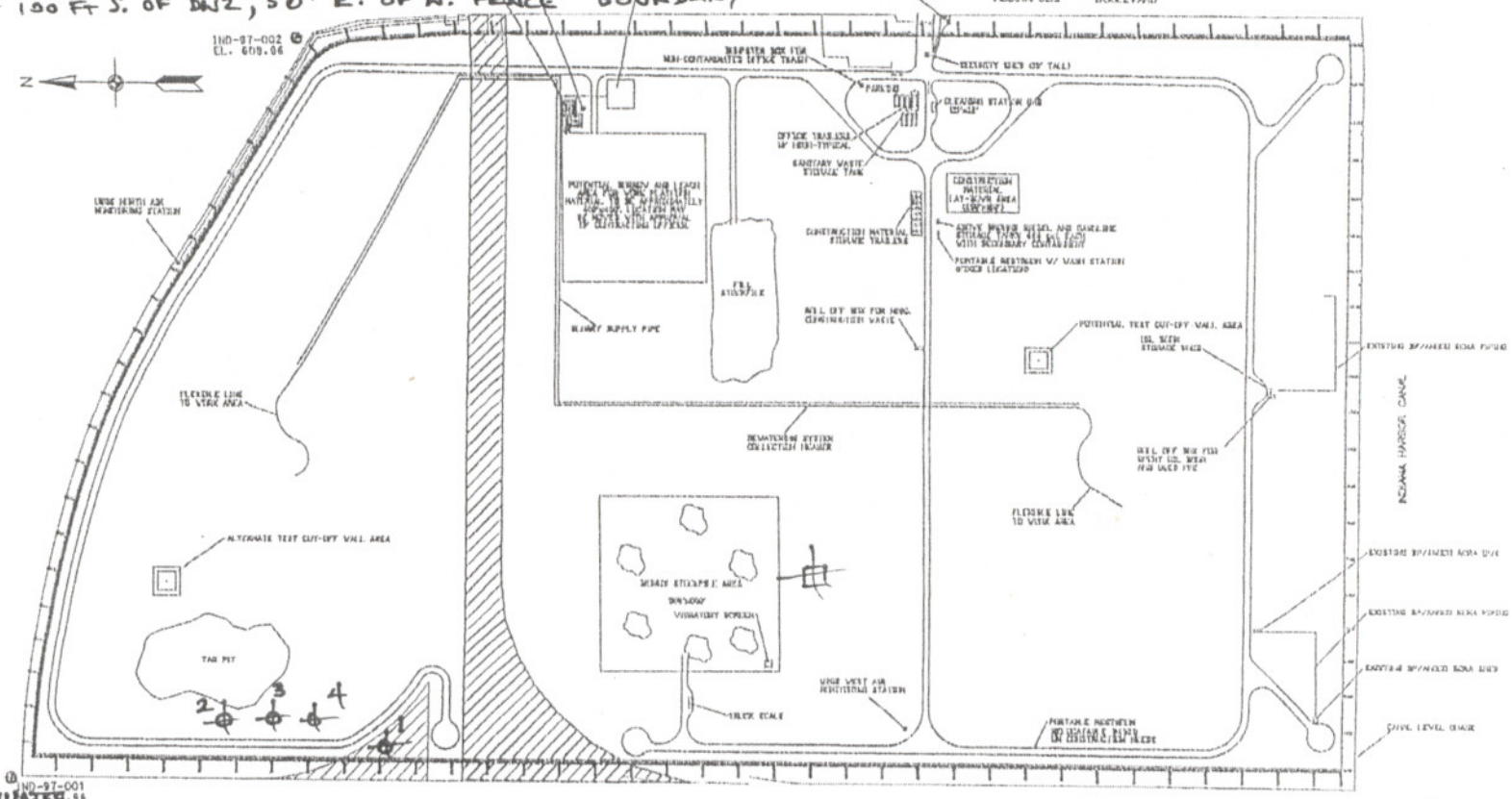
Phase	Date
Construction: trenching/	10/10/02
obstruction removal	10/11/02
(except where noted)	10/14/02
	10/15/02
	10/17/02
	10/18/02
	10/21/02
	10/22/02
	10/23/02
	10/24/02
	10/25/02
	10/28/02
	10/29/02
	10/30/02
	11/4/02
	11/6/02
Clearing and grubbing	11/7/02
Clearing and grubbing	11/8/02
	11/12/02
	11/14/02
	11/18/02
	11/20/02
	11/26/02
	12/5/02
	12/6/02
	12/10/02
	12/13/02

Table 2. Action Levels and Corrective Actions to Control Emissions Based on Results of Construction Air Monitoring

	Sampling/ Analytical Method(s)	Action Level	Basis for Corrective Action
Low-Volume Benzene Monitoring	NIOSH Method 1501	0.5 ppm above background	action level exceedance for 5 consecutive days or twice weekly
Low-Volume PCB Monitoring	NIOSH Method 5503	0.1 mg/m3 above background	action level exceedance for 5 consecutive days or twice weekly
Real-Time Volatile Monitoring	PID, FID, OVA or other approved field unit	5 ppm total VOCs	sustained reading for 15 minutes
Real-Time Particulate Monitoring	visual observations	visible dust plume moving from the work area	

Figure 1. Sample Point Locations during Construction Air Monitoring on October 10, 2002

STATION 1 — 25' SW OF BEND IN ROAD; 20' E OF W. FENCE BOUNDARY
BACKGROUND BG
STATION 2 — 550' S. OF N. FENCE BOUNDARY; 50' E. OF W. FENCE BOUNDARY
DOWNWIND 1
STATION 3 — 100 FT S. OF DW1; 50' E. OF W. FENCE BOUNDARY
DOWNWIND 2
STATION 4 — 100 FT S. OF DW2; 50' E. OF W. FENCE BOUNDARY
DOWNWIND 3



GPS COORDINATES

BG - N41° 39' 16.5"
W087° 29' 19.3"

DW1 - N41° 39' 20.8"
W 087° 29' 18.3"

DW2 - N41° 39' 19.8"
W 087° 29' 18.1"

DW3 - N41° 39' 18.7"
W 087° 29' 18.4"

LEGEND
METEROLOGICAL STATION LOCATION
SAMPLE POINT LOCATION

REV	DESCRIPTION	DATE	APPROVED
	REVISIONS		

ENVIRONMENTAL QUALITY MANAGEMENT, INC.
1800 CARILLON BLVD.
CINCINNATI, OHIO 45240
P (513)825-7500
F (513)825-7495

DRAWN	D.TOMO
CHECKED	J.WENTZ
APPROVED	F.HALL
SCALE:	NONE

INDIANA HARBOR CDF
CONSTRUCTION AIR MOINTORING
LOCATION 10/10/02

ORIGINAL SIZE	PROJECT NO.	DWG NO.	REV
A	030205	CAML 10/002	0

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
111 NORTH CANAL STREET
CHICAGO IL 60606-7206

REPLY TO
ATTENTION OF

April 2, 2003

Planning, Programs, & Project Management Division
Project Management Branch

Compliance Data Section
Office of Air Quality
Indiana Department of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

RE: Quarterly Air Monitoring Report for Indiana Harbor and Canal Dredging and Disposal Project, January – March, 2003.

To Whom It May Concern:

Please reference the following letter with respect to the construction and operation of a confined disposal facility (CDF) at the former ECI site in East Chicago, Indiana.

- Indiana Dept. of Environmental Management (Dubenetzky) letter to East Chicago Waterway Management District (C. Brooks), RE: Registered Construction and Operation Status (089-15320-00471), June 19, 2002.

Based on the above referenced letter, the said project is classified as registered, with a Registration #089-15320-00471. The registration letter requires the permittee (East Chicago Waterway Management District – ECWMD) to submit a Quarterly Air Monitoring Report during all phases of construction and operation of the CDF. The U.S. Army Corps of Engineers, Chicago District, on behalf of the ECWMD, hereby submits this letter report in fulfillment of the requirement for the period of January – March 2003.

During the period of January – March 2003, no construction or operation activities occurred on the ECI site in connection with this project. Therefore, no air monitoring was conducted. It is anticipated that construction will commence during April 2003, and air monitoring activities will begin at the same time.

If you have any questions or concerns regarding this quarterly report, please contact me at 312-846-5563.

Sincerely,

William G. White
Project Manager

cc: Christine Brooks (ECWMD)

jam/5502

TS-HE 4/2/03

DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 N. Canal Street, Suite 600
Chicago, Illinois 60606-7206

REPLY TO
ATTENTION OF

Planning, Programs, & Project Management Division
Project Management Branch

July 14, 2003

Compliance Data Section
Office of Air Quality
Indiana Dept. of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

RE: Quarterly Air Monitoring Report for Indiana Harbor and Canal Dredging and Disposal Project, April – June 2003.

To Whom It May Concern:

Please reference the following letter with respect to the construction and operation of a confined disposal facility (CDF) at the former ECI site in East Chicago, Indiana.

- Indiana Dept. of Environmental Management (Dubenetzky) letter to East Chicago Waterway Management District (C. Brooks), RE: Registered Construction and Operation Status (089-15320-00471), June 19, 2002.

Based on the above referenced letter, the said project is classified as registered, with a Registration # 089-15320-00471. The registration letter requires the permittee (East Chicago Waterway Management District – ECWMD) to submit a Quarterly Air Monitoring Report during all phases of construction and operation of the CDF. The U.S. Army Corps of Engineers, Chicago District, on behalf of ECWMD, hereby submits the attached quarterly report for the period of April – June 2003.

Although the registration letter does not require the Permittee to provide raw data for air monitoring performed during the monitoring period, any such data will be provided to IDEM upon request. If you have any questions or concerns regarding this quarterly report, please contact me at (312) 353-6400 x 3151.

Sincerely,

William G. White
Project Manager

cc: Christine Brooks (ECWMD)

Indiana Harbor and Canal Dredging and Disposal Project

Quarterly Air Monitoring and Fugitive Dust Report for Reporting Period Apr. – Jun. 2003

1. Introduction

A contract for the first phase of Confined Disposal Facility (CDF) construction, an underground inspection trench and cutoff wall, has been awarded to Environmental Quality Management (EQ). A construction emissions air monitoring program has been initiated to control emissions during construction and operations and ensure that air emissions resulting from contract work activities do not impact the surrounding community.

The air monitoring program this quarter included at least twice weekly measurements during test cell trenching and obstruction removal activities, which began late in the quarter on 6/17/03. Specific sampling dates are shown in Table 1. Air monitoring was conducted using both real-time methods (volatile organic compounds, VOCs, and particulate matter, PM), and laboratory analysis methods (benzene and polychlorinated biphenyls, PCBs). Construction phase air monitoring was performed at both upwind and downwind locations, with specific sampling stations situated according to where construction activities were expected to be most likely to cause emissions. An example of sample station locations during trenching and obstruction removal activities (6/17/03) is shown in Figure 1. Air monitoring results were compared to the Action Levels in Table 2.

2. Air Monitoring Results

Benzene - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to the SIMALABS International in Cincinnati, Ohio, for analysis using NIOSH Method 1501. Benzene was not detected in any of the samples.

PCBs - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to SIMALABS International in Cincinnati, Ohio, for PCB Aroclor analysis using NIOSH Method 5503. PCBs were not detected in any of the samples.

Real-Time Volatile Monitoring - Real time volatile (VOC) readings were taken at all of the monitoring locations at least once every two hours for a given day, for roughly five minutes during each reading, using a Multi-RAE monitoring device. During construction activities, the action level is a 5 ppm sustained reading for 15 minutes. Although instantaneous VOC readings occasionally exceeded 5 ppm, none of the readings were sustained for 15 minutes. As such, none of the runs on any day exceeded the action level criteria. In general, most of the readings were less than 1 ppm.

Real-Time Particulate Monitoring - The air registration letter specifies visual observation to ensure that fugitive dust does not migrate away from work areas during construction. No visible dust plumes moving from the work area were observed.

3. Reporting Requirements

Air Monitoring

Failure to Perform Monitoring – There were no instances during the monitoring period when the required air monitoring was not performed.

Action Level Exceedances – There were no exceedances of construction emissions action levels during the monitoring period. (See Table 2 for specific action levels.)

Corrective Actions - No corrective actions were required during this monitoring period.

Fugitive Dust

Dates Control Measures not Implemented - There were no days when any required control measures were not implemented.

Required Control Measures - Not applicable, because there were no days when any required control measures were not implemented.

Reasons Control Measures not Implemented - Not applicable.

Corrective Actions - Not applicable.

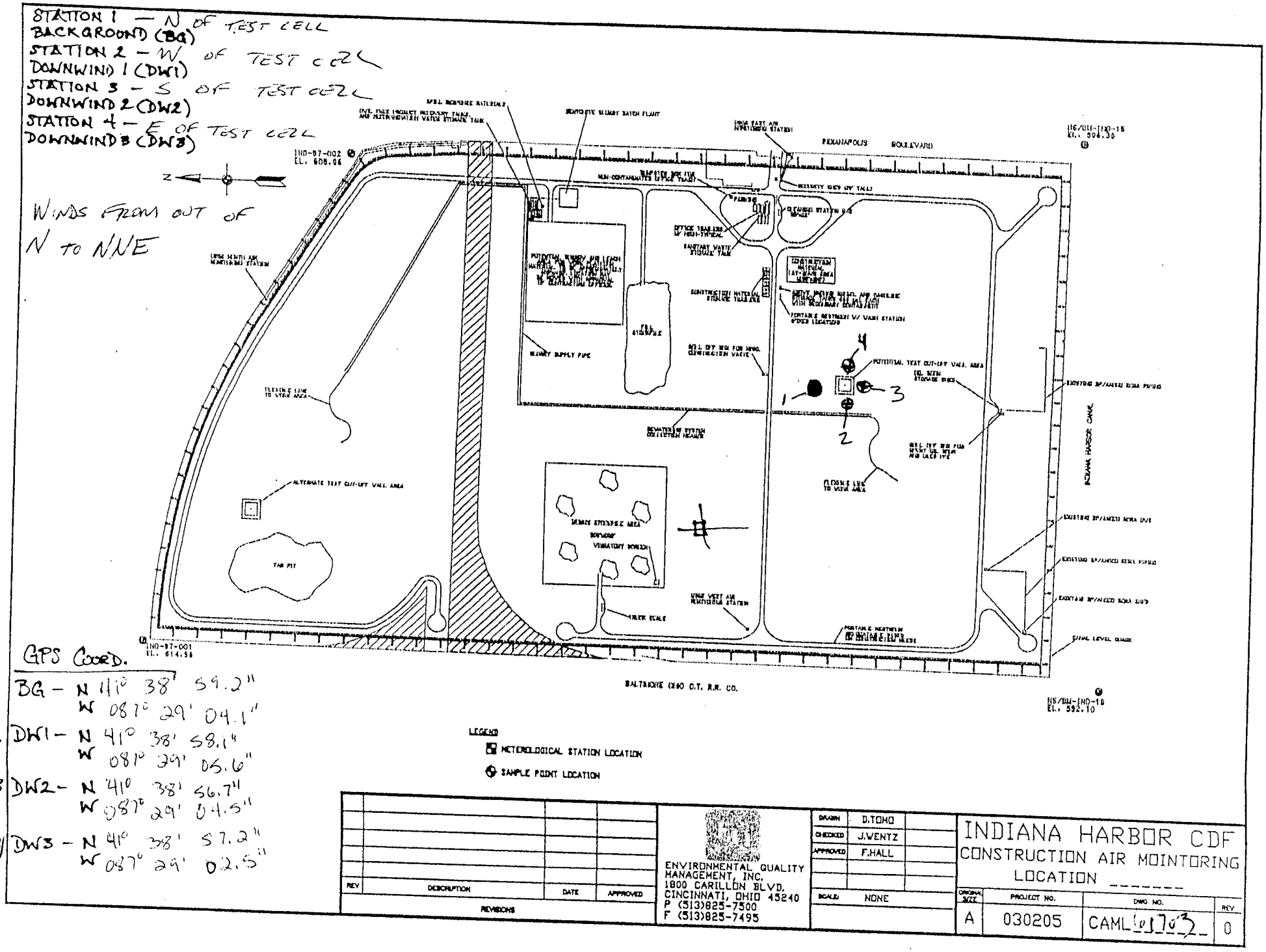
Table 1. Sampling Dates for Construction Emissions Air Monitoring During Apr.-Jun. 2003 Quarter

Phase	Date
Construction: trenching/	06/17/03
obstruction removal	06/18/03
	06/19/03
	06/20/03
	06/23/03
	06/24/03
	06/25/03
	06/26/03
	06/27/03

Table 2. Action Levels and Corrective Actions to Control Emissions Based on Results of Construction Air Monitoring

	Sampling/ Analytical Method(s)	Action Level	Basis for Corrective Action
Low-Volume Benzene Monitoring	NIOSH Method 1501	0.5 ppm above background	action level exceedance for 5 consecutive days or twice weekly
Low-Volume PCB Monitoring	NIOSH Method 5503	0.1 mg/m3 above background	action level exceedance for 5 consecutive days or twice weekly
Real-Time Volatile Monitoring	PID, FID, OVA or other approved field unit	5 ppm total VOCs	sustained reading for 15 minutes
Real-Time Particulate Monitoring	visual observations	visible dust plume moving from the work area	

Figure 1. Sample Point Locations during Construction Air Monitoring on June 17, 2003



DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 N. Canal Street, Suite 600
Chicago, Illinois 60606-7206

REPLY TO
ATTENTION OF

Planning, Programs, & Project Management Division
Project Management Branch

October 14, 2003

Compliance Data Section
Office of Air Quality
Indiana Dept. of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

RE: Quarterly Air Monitoring Report for Indiana Harbor and Canal Dredging and Disposal Project, July – September 2003.

To Whom It May Concern:

Please reference the following letter with respect to the construction and operation of a confined disposal facility (CDF) at the former ECI site in East Chicago, Indiana.

- Indiana Dept. of Environmental Management (Dubenetzky) letter to East Chicago Waterway Management District (C. Brooks), RE: Registered Construction and Operation Status (089-15320-00471), June 19, 2002.

Based on the above referenced letter, the said project is classified as registered, with a Registration # 089-15320-00471. The registration letter requires the permittee (East Chicago Waterway Management District – ECWMD) to submit a Quarterly Air Monitoring Report during all phases of construction and operation of the CDF. The U.S. Army Corps of Engineers, Chicago District, on behalf of ECWMD, hereby submits the attached quarterly report for the period of July – September 2003.

Although the registration letter does not require the Permittee to provide raw data for air monitoring performed during the monitoring period, any such data will be provided to IDEM upon request. If you have any questions or concerns regarding this quarterly report, please contact me at (312) 353-6400 x 3151.

Sincerely,

William G. White
Project Manager

cc: Christine Brooks (ECWMD)

Indiana Harbor and Canal Dredging and Disposal Project

Quarterly Air Monitoring and Fugitive Dust Report for Reporting Period July – Sept. 2003

1. Introduction

A contract for the first phase of Confined Disposal Facility (CDF) construction, an underground inspection trench and cutoff wall, has been awarded to Environmental Quality Management (EQ). A construction emissions air monitoring program has been initiated to control emissions during construction and operations and ensure that air emissions resulting from contract work activities do not impact the surrounding community.

The air monitoring program this quarter included at least twice weekly measurements during construction of the test cell cutoff wall, which began in this quarter in late July (i.e., air monitoring data was collected during the entire construction work period, which was considerably shorter than the 3-month reporting period). Specific sampling dates are shown in Table 1. Air monitoring was conducted using both real-time methods (volatile organic compounds, VOCs, and particulate matter, PM), and laboratory analysis methods (benzene and polychlorinated biphenyls, PCBs). Construction phase air monitoring was performed at both upwind and downwind locations, with specific sampling stations situated according to where construction activities were expected to be most likely to cause emissions. An example of sample station locations during trenching and obstruction removal activities (7/29/03) is shown in Figure 1. Air monitoring results were compared to the Action Levels in Table 2.

2. Air Monitoring Results

Benzene - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to the SIMALABS International in Cincinnati, Ohio, for analysis using NIOSH Method 1501. Benzene was not detected in any of the samples.

PCBs - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to SIMALABS International in Cincinnati, Ohio, for PCB Aroclor analysis using NIOSH Method 5503. PCBs were not detected in any of the samples.

Real-Time Volatile Monitoring - Real time volatile (VOC) readings were taken at all of the monitoring locations at least once every two hours for a given day, for roughly five minutes during each reading, using a Multi-RAE monitoring device. During construction activities, the action level is a 5 ppm sustained reading for 15 minutes. Although instantaneous VOC readings occasionally exceeded 5 ppm, none of the readings were sustained for 15 minutes. As such, none of the runs on any day exceeded the action level criteria. In general, most of the readings were less than 1 ppm.

Real-Time Particulate Monitoring - The air registration letter specifies visual observation to ensure that fugitive dust does not migrate away from work areas during construction. No visible dust plumes moving from the work area were observed.

3. Reporting Requirements

Air Monitoring

Failure to Perform Monitoring – There were no instances during the monitoring period when the required air monitoring was not performed.

Action Level Exceedances – There were no exceedances of construction emissions action levels during the monitoring period. (See Table 2 for specific action levels.)

Corrective Actions - No corrective actions were required during this monitoring period.

Fugitive Dust

Dates Control Measures not Implemented - There were no days when any required control measures were not implemented.

Required Control Measures - Not applicable, because there were no days when any required control measures were not implemented.

Reasons Control Measures not Implemented - Not applicable.

Corrective Actions - Not applicable.

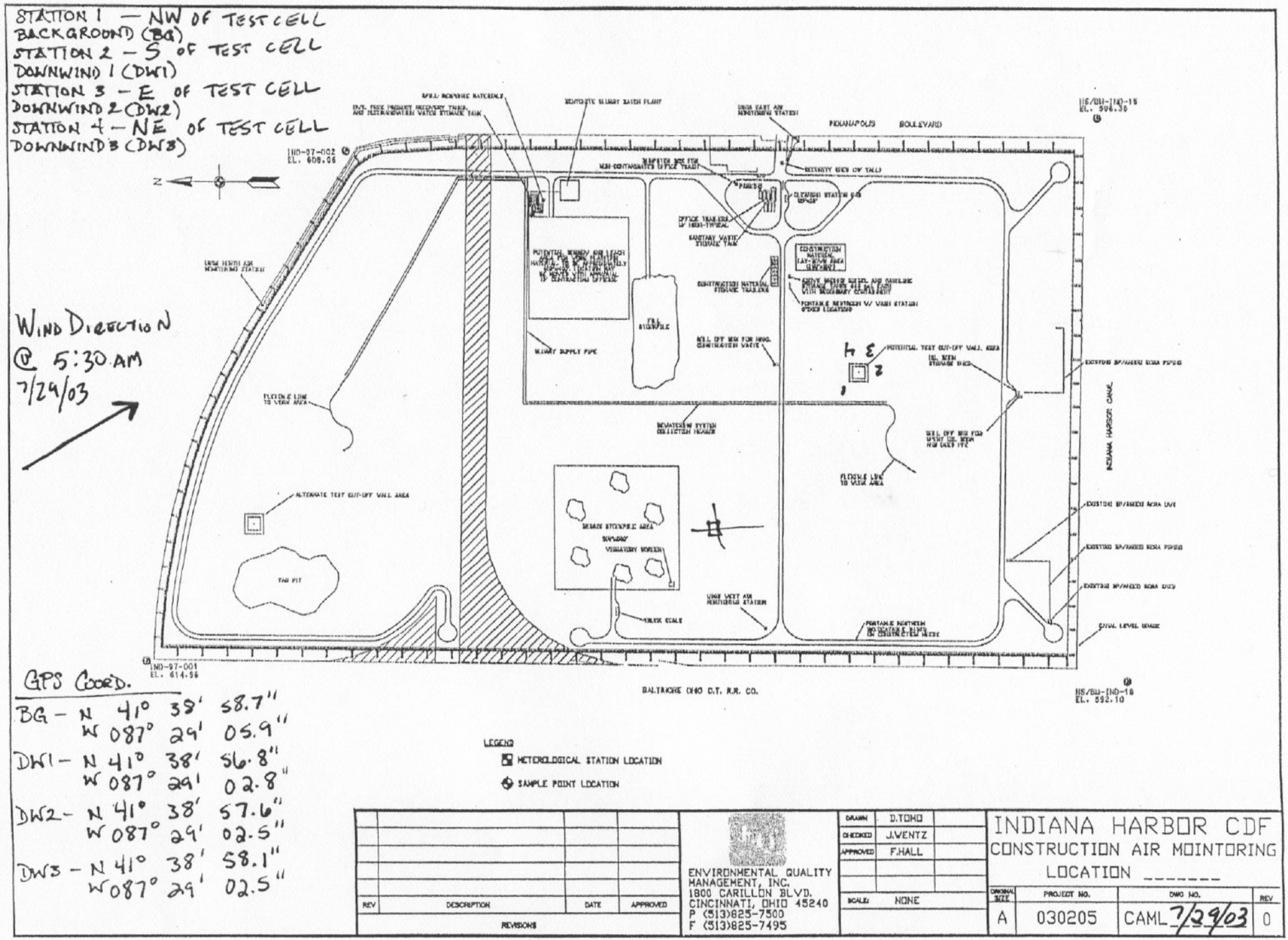
Table 1. Sampling Dates for Construction Emissions Air Monitoring During July-Sept. 2003 Quarter

Phase	Date
Construction: test cell	07/29/03
cutoff wall	07/30/03
	07/31/03
	08/01/03
	08/02/03
	08/06/03
	08/13/03
	08/15/03
	08/19/03
	09/24/03
	09/26/03

Table 2. Action Levels and Corrective Actions to Control Emissions Based on Results of Construction Air Monitoring

	Sampling/ Analytical Method(s)	Action Level	Basis for Corrective Action
Low-Volume Benzene Monitoring	NIOSH Method 1501	0.5 ppm above background	action level exceedance for 5 consecutive days or twice weekly
Low-Volume PCB Monitoring	NIOSH Method 5503	0.1 mg/m3 above background	action level exceedance for 5 consecutive days or twice weekly
Real-Time Volatile Monitoring	PID, FID, OVA or other approved field unit	5 ppm total VOCs	sustained reading for 15 minutes
Real-Time Particulate Monitoring	visual observations	visible dust plume moving from the work area	

Figure 1. Sample Point Locations during Construction Air Monitoring on July 29, 2003



DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 N. Canal Street, Suite 600
Chicago, Illinois 60606-7206

REPLY TO
ATTENTION OF

Planning, Programs, & Project Management Division
Project Management Branch

January 23, 2004

Compliance Data Section
Office of Air Quality
Indiana Dept. of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

RE: Quarterly Air Monitoring Report for Indiana Harbor and Canal Dredging and Disposal Project, October – December 2003.

To Whom It May Concern:

Please reference the following letter with respect to the construction and operation of a confined disposal facility (CDF) at the former ECI site in East Chicago, Indiana.

- Indiana Dept. of Environmental Management (Dubenetzky) letter to East Chicago Waterway Management District (C. Brooks), RE: Registered Construction and Operation Status (089-15320-00471), June 19, 2002.

Based on the above referenced letter, the said project is classified as registered, with a Registration # 089-15320-00471. The registration letter requires the permittee (East Chicago Waterway Management District – ECWMD) to submit a Quarterly Air Monitoring Report during all phases of construction and operation of the CDF. The U.S. Army Corps of Engineers, Chicago District, on behalf of ECWMD, hereby submits the attached quarterly report for the period of October – December 2003.

Although the registration letter does not require the Permittee to provide raw data for air monitoring performed during the monitoring period, any such data will be provided to IDEM upon request. If you have any questions or concerns regarding this quarterly report, please contact me at (312) 353-6400 x 3151.

Sincerely,

William G. White
Project Manager

cc: Christine Brooks (ECWMD)

Indiana Harbor and Canal Dredging and Disposal Project

Quarterly Air Monitoring and Fugitive Dust Report for Reporting Period Oct. – Dec. 2003

1. Introduction

A contract for the first phase of Confined Disposal Facility (CDF) construction, an underground inspection trench and cutoff wall, has been awarded to Environmental Quality Management (EQ). A construction emissions air monitoring program has been initiated to control emissions during construction and operations and ensure that air emissions resulting from contract work activities do not impact the surrounding community.

The air monitoring program this quarter included at least twice weekly measurements during construction of the test cell cutoff wall, which in this quarter was mostly during November and December (i.e., air monitoring data was collected during the entire construction work period, which was considerably shorter than the 3-month reporting period). Specific sampling dates are shown in Table 1. Air monitoring was conducted using both real-time methods (volatile organic compounds, VOCs, and particulate matter, PM), and laboratory analysis methods (benzene and polychlorinated biphenyls, PCBs). Construction phase air monitoring was performed at both upwind and downwind locations, with specific sampling stations situated according to where construction activities were expected to be most likely to cause emissions. An example of sample station locations during trenching and obstruction removal activities (10/8/03) is shown in Figure 1. Air monitoring results were compared to the Action Levels in Table 2.

2. Air Monitoring Results

Benzene - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to the SIMALABS International in Cincinnati, Ohio, for analysis using NIOSH Method 1501. Benzene was not detected in any of the samples.

PCBs - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to SIMALABS International in Cincinnati, Ohio, for PCB Aroclor analysis using NIOSH Method 5503. PCBs were not detected in any of the samples.

Real-Time Volatile Monitoring - Real time volatile (VOC) readings were taken at all of the monitoring locations at least once every two hours for a given day, for roughly five minutes during each reading, using a Multi-RAE monitoring device. During construction activities, the action level is a 5 ppm sustained reading for 15 minutes. Although instantaneous VOC readings occasionally exceeded 5 ppm, none of the readings were sustained for 15 minutes. As such, none of the runs on any day exceeded the action level criteria. In general, most of the readings were less than 1 ppm.

Real-Time Particulate Monitoring - The air registration letter specifies visual observation to ensure that fugitive dust does not migrate away from work areas during construction. No visible dust plumes moving from the work area were observed.

3. Reporting Requirements

Air Monitoring

Failure to Perform Monitoring – There were no instances during the monitoring period when the required air monitoring was not performed.

Action Level Exceedances – There were no exceedances of construction emissions action levels during the monitoring period. (See Table 2 for specific action levels.)

Corrective Actions - No corrective actions were required during this monitoring period.

Fugitive Dust

Dates Control Measures not Implemented - There were no days when any required control measures were not implemented.

Required Control Measures - Not applicable, because there were no days when any required control measures were not implemented.

Reasons Control Measures not Implemented - Not applicable.

Corrective Actions - Not applicable.

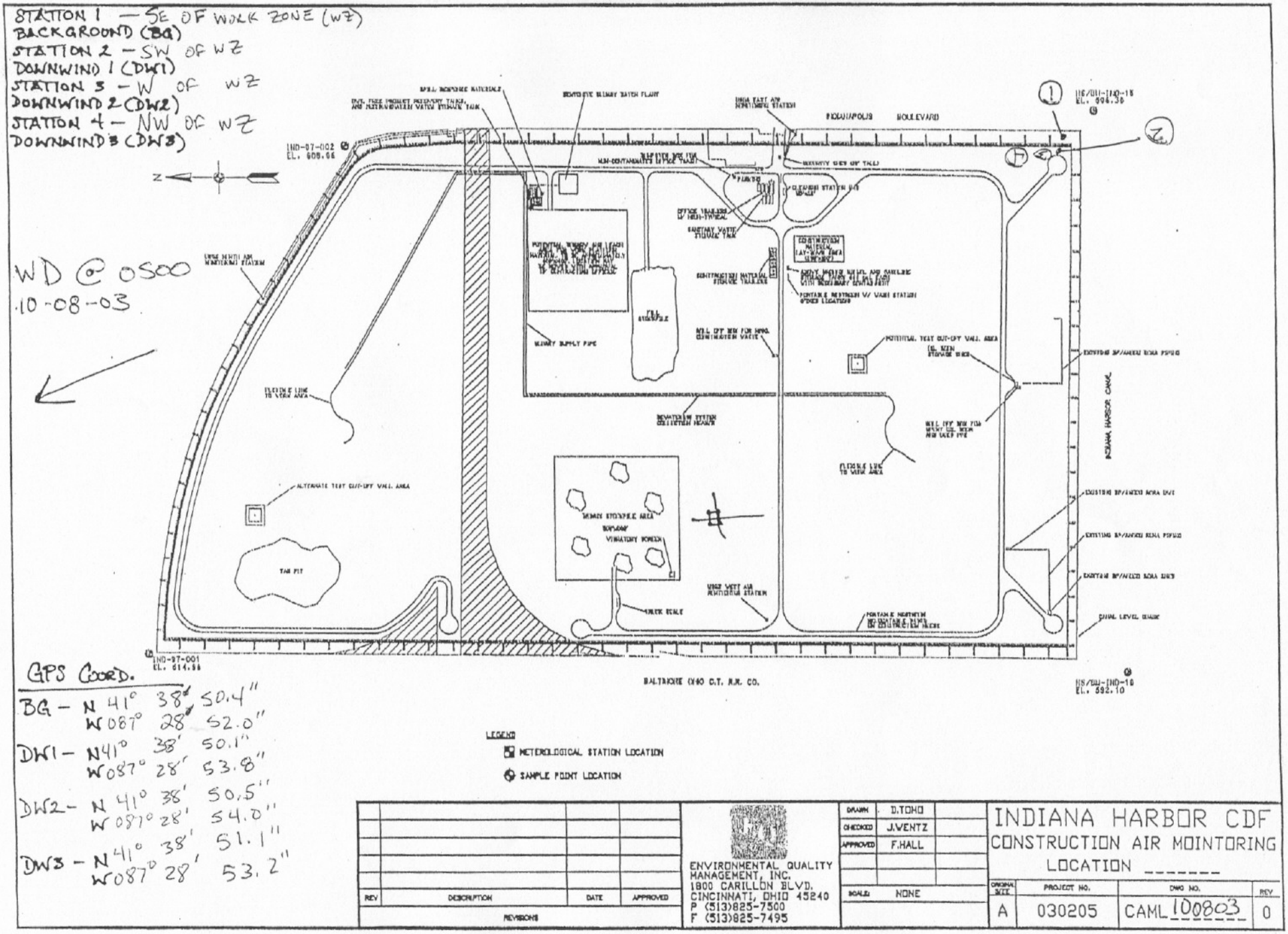
Table 1. Sampling Dates for Construction Emissions Air Monitoring During Oct.-Dec. 2003 Quarter

Phase	Date
Construction: test cell	10/08/03
cutoff wall	11/10/03
	11/12/03
	11/13/03
	11/15/03
	11/17/03
	11/19/03
	11/20/03
	11/21/03
	11/22/03
	11/24/03
	11/25/03
	12/01/03
	12/02/03
	12/03/03
	12/11/03
	12/13/03
	12/17/03
	12/21/03

Table 2. Action Levels and Corrective Actions to Control Emissions Based on Results of Construction Air Monitoring

	Sampling/ Analytical Method(s)	Action Level	Basis for Corrective Action
Low-Volume Benzene Monitoring	NIOSH Method 1501	0.5 ppm above background	action level exceedance for 5 consecutive days or twice weekly
Low-Volume PCB Monitoring	NIOSH Method 5503	0.1 mg/m3 above background	action level exceedance for 5 consecutive days or twice weekly
Real-Time Volatile Monitoring	PID, FID, OVA or other approved field unit	5 ppm total VOCs	sustained reading for 15 minutes
Real-Time Particulate Monitoring	visual observations	visible dust plume moving from the work area	

Figure 1. Sample Point Locations during Construction Air Monitoring on October 8, 2003



DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 N. Canal Street, Suite 600
Chicago, Illinois 60606-7206

REPLY TO
ATTENTION OF

Planning, Programs, & Project Management Division
Project Management Branch

Compliance Data Section
Office of Air Quality
Indiana Dept. of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

RE: Quarterly Air Monitoring Report for Indiana Harbor and Canal Dredging and Disposal Project, January – March 2004.

To Whom It May Concern:

Please reference the following letter with respect to the construction and operation of a confined disposal facility (CDF) at the former ECI site in East Chicago, Indiana.

- Indiana Dept. of Environmental Management (Dubenetzky) letter to East Chicago Waterway Management District (C. Brooks), RE: Registered Construction and Operation Status (089-15320-00471), June 19, 2002.

Based on the above referenced letter, the said project is classified as registered, with a Registration # 089-15320-00471. The registration letter requires the permittee (East Chicago Waterway Management District – ECWMD) to submit a Quarterly Air Monitoring Report during all phases of construction and operation of the CDF. The U.S. Army Corps of Engineers, Chicago District, on behalf of ECWMD, hereby submits the attached quarterly report for the period of January – March 2004.

Although the registration letter does not require the Permittee to provide raw data for air monitoring performed during the monitoring period, any such data will be provided to IDEM upon request. If you have any questions or concerns regarding this quarterly report, please contact me at (312) 353-6400 x 3151.

Sincerely,

William G. White
Project Manager

cc: Christine Brooks (ECWMD)

Indiana Harbor and Canal Dredging and Disposal Project

Quarterly Air Monitoring and Fugitive Dust Report for Reporting Period Jan. – Mar. 2004

1. Introduction

A contract for the first phase of Confined Disposal Facility (CDF) construction, an underground inspection trench and cutoff wall, has been awarded to Environmental Quality Management (EQ). A construction emissions air monitoring program has been initiated to control emissions during construction and operations and ensure that air emissions resulting from contract work activities do not impact the surrounding community.

The air monitoring program this quarter included at least twice weekly measurements during construction of the test cell cutoff wall, which in this quarter was only during the first half of January (i.e., air monitoring data was collected during the entire construction work period, which was much shorter than the 3-month reporting period). Specific sampling dates are shown in Table 1. Air monitoring was conducted using both real-time methods (volatile organic compounds, VOCs, and particulate matter, PM), and laboratory analysis methods (benzene and polychlorinated biphenyls, PCBs). Construction phase air monitoring was performed at both upwind and downwind locations, with specific sampling stations situated according to where construction activities were expected to be most likely to cause emissions. An example of sample station locations during trenching and obstruction removal activities (1/11/04) is shown in Figure 1. Air monitoring results were compared to the Action Levels in Table 2.

2. Air Monitoring Results

Benzene - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to the SIMALABS International in Cincinnati, Ohio, for analysis using NIOSH Method 1501. Benzene was not detected in any of the samples.

PCBs - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to SIMALABS International in Cincinnati, Ohio, for PCB Aroclor analysis using NIOSH Method 5503. PCBs were not detected in any of the samples.

Real-Time Volatile Monitoring - Real time volatile (VOC) readings were taken at all of the monitoring locations at least once every two hours for a given day, for roughly five minutes during each reading, using a Multi-RAE monitoring device. During construction activities, the action level is a 5 ppm sustained reading for 15 minutes. Although instantaneous VOC readings occasionally exceeded 5 ppm, none of the readings were sustained for 15 minutes. As such, none of the runs on any day exceeded the action level criteria. All of the readings were less than 1 ppm and most were 0 ppm.

Real-Time Particulate Monitoring - The air registration letter specifies visual observation to ensure that fugitive dust does not migrate away from work areas during construction. No visible dust plumes moving from the work area were observed.

3. Reporting Requirements

Air Monitoring

Failure to Perform Monitoring – There were no instances during the monitoring period when the required air monitoring was not performed.

Action Level Exceedances – There were no exceedances of construction emissions action levels during the monitoring period. (See Table 2 for specific action levels.)

Corrective Actions - No corrective actions were required during this monitoring period.

Fugitive Dust

Dates Control Measures not Implemented - There were no days when any required control measures were not implemented.

Required Control Measures - Not applicable, because there were no days when any required control measures were not implemented.

Reasons Control Measures not Implemented - Not applicable.

Corrective Actions - Not applicable.

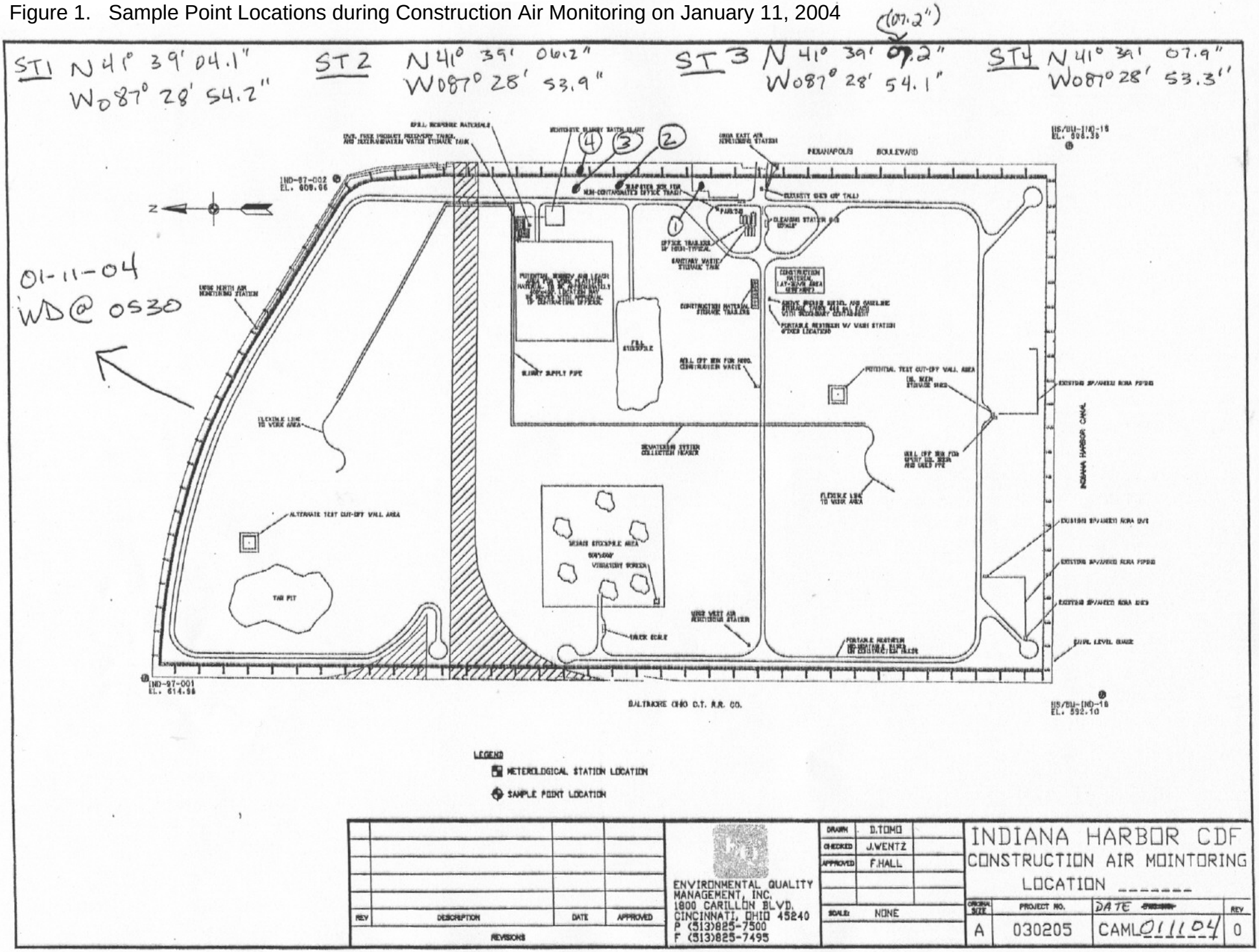
Table 1. Sampling Dates for Construction Emissions Air Monitoring During Jan.-Mar. 2004 Quarter

Phase	Date
Construction: test cell	01/04/04
cutoff wall	01/11/04
	01/16/04

Table 2. Action Levels and Corrective Actions to Control Emissions Based on Results of Construction Air Monitoring

	Sampling/ Analytical Method(s)	Action Level	Basis for Corrective Action
Low-Volume Benzene Monitoring	NIOSH Method 1501	0.5 ppm above background	action level exceedance for 5 consecutive days or twice weekly
Low-Volume PCB Monitoring	NIOSH Method 5503	0.1 mg/m3 above background	action level exceedance for 5 consecutive days or twice weekly
Real-Time Volatile Monitoring	PID, FID, OVA or other approved field unit	5 ppm total VOCs	sustained reading for 15 minutes
Real-Time Particulate Monitoring	visual observations	visible dust plume moving from the work area	

Figure 1. Sample Point Locations during Construction Air Monitoring on January 11, 2004



DEPARTMENT OF THE ARMY
CHICAGO DISTRICT, CORPS OF ENGINEERS
111 N. Canal Street, Suite 600
Chicago, Illinois 60606-7206

REPLY TO
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Planning, Programs, & Project Management Division
Project Management Branch

Compliance Data Section
Office of Air Quality
Indiana Dept. of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

RE: Quarterly Air Monitoring Report for Indiana Harbor and Canal Dredging and Disposal Project, April – June 2004.

To Whom It May Concern:

Please reference the following letter with respect to the construction and operation of a confined disposal facility (CDF) at the former ECI site in East Chicago, Indiana.

- Indiana Dept. of Environmental Management (Dubenetzky) letter to East Chicago Waterway Management District (C. Brooks), RE: Registered Construction and Operation Status (089-15320-00471), June 19, 2002.

Based on the above referenced letter, the said project is classified as registered, with a Registration # 089-15320-00471. The registration letter requires the permittee (East Chicago Waterway Management District – ECWMD) to submit a Quarterly Air Monitoring Report during all phases of construction and operation of the CDF. The U.S. Army Corps of Engineers, Chicago District, on behalf of ECWMD, hereby submits the attached quarterly report for the period of April – June 2004.

Although the registration letter does not require the Permittee to provide raw data for air monitoring performed during the monitoring period, any such data will be provided to IDEM upon request. If you have any questions or concerns regarding this quarterly report, please contact me at (312) 353-6400 x 3151.

Sincerely,

William G. White
Project Manager

cc: Christine Brooks (ECWMD)

Indiana Harbor and Canal Dredging and Disposal Project

Quarterly Air Monitoring and Fugitive Dust Report for Reporting Period Apr. – Jun. 2004

1. Introduction

A contract for the first phase of Confined Disposal Facility (CDF) construction, an underground inspection trench and cutoff wall, has been awarded to Environmental Quality Management (EQ). A construction emissions air monitoring program has been initiated to control emissions during construction and operations and ensure that air emissions resulting from contract work activities do not impact the surrounding community.

The air monitoring program this quarter included weekly measurements during construction of the test cell cutoff wall, which in this quarter was only during the first half of May (i.e., air monitoring data was collected during the entire construction work period, which was much shorter than the 3-month reporting period). Specific sampling dates are shown in Table 1. Air monitoring was conducted using both real-time methods (volatile organic compounds, VOCs, and particulate matter, PM), and laboratory analysis methods (benzene and polychlorinated biphenyls, PCBs). Construction phase air monitoring was performed at both upwind and downwind locations, with specific sampling stations situated according to where construction activities were expected to be most likely to cause emissions. An example of sample station locations during trenching and obstruction removal activities (5/4/04) is shown in Figure 1. Air monitoring results were compared to the Action Levels in Table 2.

2. Air Monitoring Results

Benzene - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to the SIMALABS International in Cincinnati, Ohio, for analysis using NIOSH Method 1501. Benzene was not detected in any of the samples.

PCBs - Samples were collected using low-flow sampling pumps for a period of 8 hours during the day. Samples were then sent to SIMALABS International in Cincinnati, Ohio, for PCB Aroclor analysis using NIOSH Method 5503. PCBs were not detected in any of the samples.

Real-Time Volatile Monitoring - Real time volatile (VOC) readings were taken at all of the monitoring locations at least once every two hours for a given day, for roughly five minutes during each reading, using a Multi-RAE monitoring device. During construction activities, the action level is a 5 ppm sustained reading for 15 minutes. None of the runs on 5/4/04 exceeded the action level criteria; all of the readings were 0 ppm. On 5/12/04, because the VOC monitoring devices malfunctioned and could not be calibrated, VOC data are not available for that day.

Real-Time Particulate Monitoring - The air registration letter specifies visual observation to ensure that fugitive dust does not migrate away from work areas during construction. No visible dust plumes moving from the work area were observed.

3. Reporting Requirements

Air Monitoring

Failure to Perform Monitoring – There were no instances during the monitoring period when the required air monitoring was not performed.

Action Level Exceedances – There were no exceedances of construction emissions action levels during the monitoring period. (See Table 2 for specific action levels.)

Corrective Actions - No corrective actions were required during this monitoring period.

Fugitive Dust

Dates Control Measures not Implemented - There were no days when any required control measures were not implemented.

Required Control Measures - Not applicable, because there were no days when any required control measures were not implemented.

Reasons Control Measures not Implemented - Not applicable.

Corrective Actions - Not applicable.

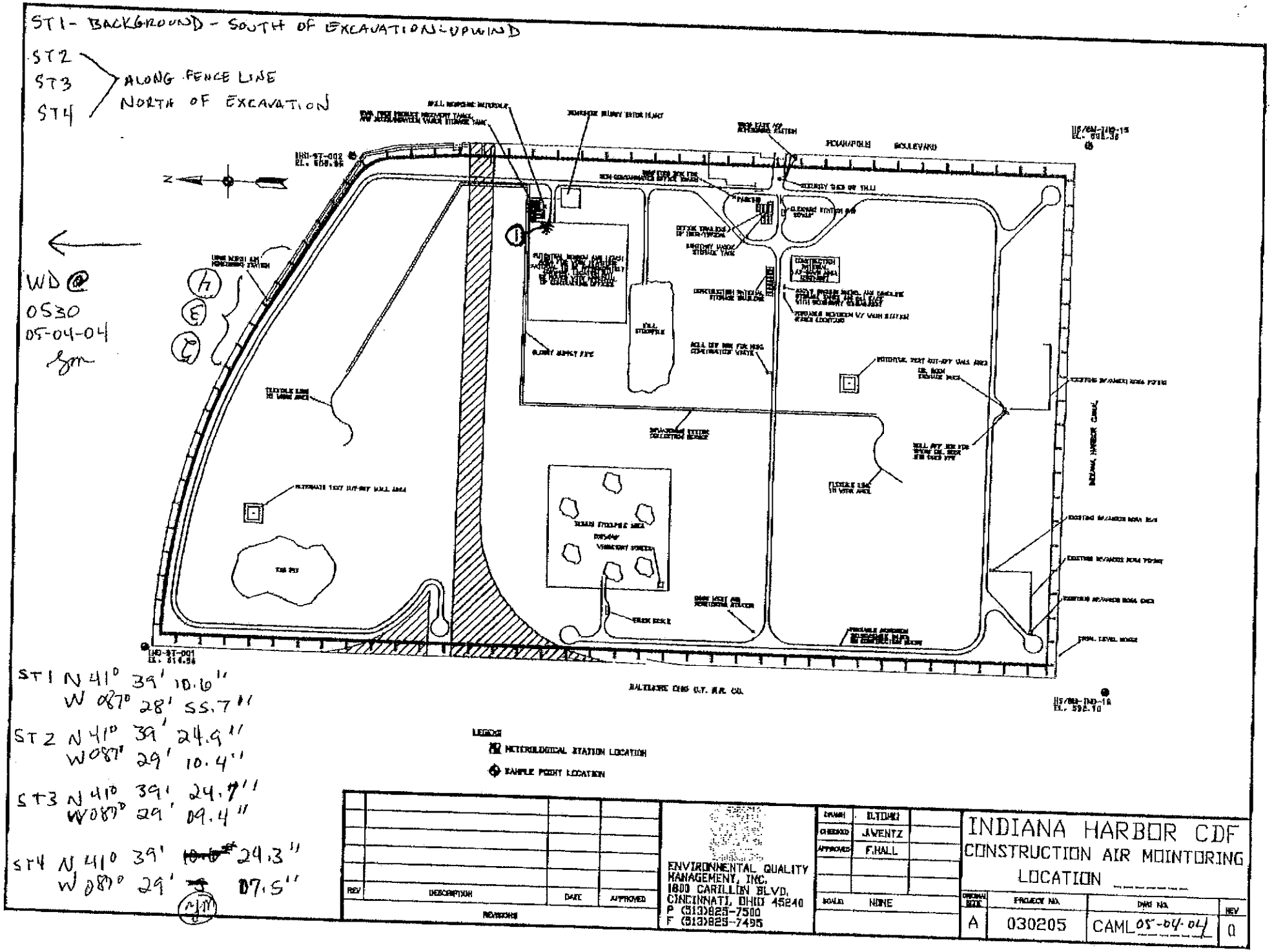
Table 1. Sampling Dates for Construction Emissions Air Monitoring During Apr.-Jun. 2004 Quarter

Phase	Date
Construction: test cell	05/04/04
cutoff wall	05/12/04

Table 2. Action Levels and Corrective Actions to Control Emissions Based on Results of Construction Air Monitoring

	Sampling/ Analytical Method(s)	Action Level	Basis for Corrective Action
Low-Volume Benzene Monitoring	NIOSH Method 1501	0.5 ppm above background	action level exceedance for 5 consecutive days or twice weekly
Low-Volume PCB Monitoring	NIOSH Method 5503	0.1 mg/m3 above background	action level exceedance for 5 consecutive days or twice weekly
Real-Time Volatile Monitoring	PID, FID, OVA or other approved field unit	5 ppm total VOCs	sustained reading for 15 minutes
Real-Time Particulate Monitoring	visual observations	visible dust plume moving from the work area	

Figure 1. Sample Point Locations during Construction Air Monitoring on May 4, 2004



P.05/07
MAY-04-2004 12:35