

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REPORT OF THE STANDARD TEST METHOD FOR SPECIFIC GRAVITY OF SOILS
Performed in General Accordance with ASTM D 854-06 (Method B)

PROJECT NAME: EXELON COL PROJECT (VICTORIA)

PROJECT NUMBER: 6468071777

DATE: 4/14/08

SAMPLE IDENTIFICATION: B-2304UD, UD-13

(A) Mass of oven-dried soil, grams:	49.87
(B) Mass of pycnometer filled with water at test temperature (T), grams:	655.75
(C) Mass of pycnometer, water and soil, grams:	687.21
(T) Temperature of pycnometer, water and soil, °C when mass (C) determined:	21.3
(G) Specific Gravity at observed temperature: $A / [B - (C - A)]$	2.709
(F) <i>Correction factor:</i>	0.99972
(G x F) SPECIFIC GRAVITY @ 20°C:	2.708

MATERIAL TESTED:

☒

- # 4

☐

- # 10

PREPARATION METHOD:

☒

DRY

☐

WET (dispersed)

REMARKS: Estimated % Passing # 4 : 99.9

Fat CLAY (CH)

EQUIPMENT USED

SCALES : 3.1.99

OVEN : 5.1.16

THERMOMETER : 5.1.01

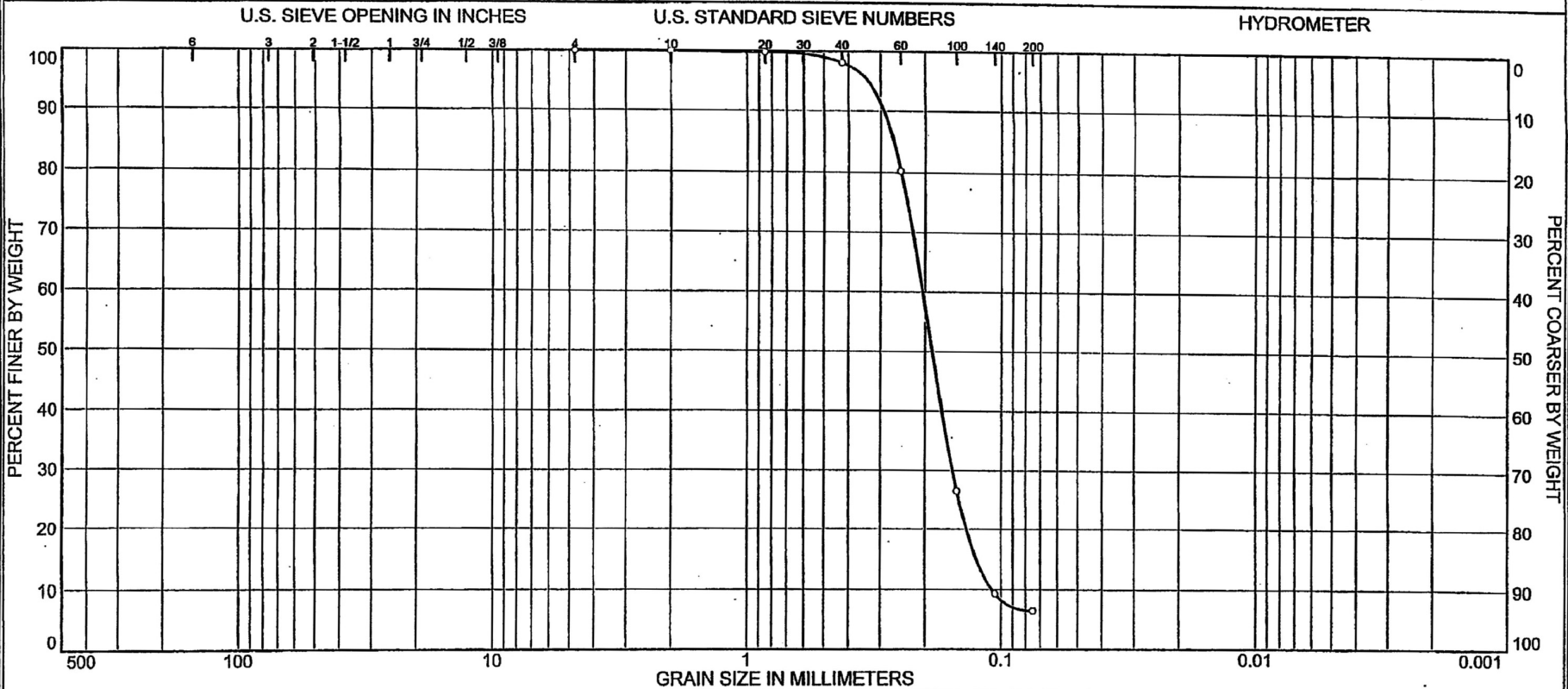
PYCNO METER : P-3

TESTED BY: CS

REVIEWED BY: Brian Johnson

KAW 5/8/08

Particle Size Distribution Report ASTM D6913-04 e1



% COBBLES	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	1.9	91.6	6.5	

SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
B-2304UD	UD-15	141-143.5 Ft	2/2/08	SP-SM	Pale Brown Poorly Graded SAND with Silt (Visual)	17.9	ND	ND

Client Bechtel		MACTEC ENGINEERING AND CONSULTING, INC.	Tested by: EH Reviewed by: HJ <i>HJ</i> Sieve Analysis Only NM value from average of strength tests performed. Specific Gravity = 2.68 (ASTM D 854-06) ND = Not Determined
Project Exelon Texas COL (Victoria)			
Project No. 6468-07-1777	Lab No. 8351		

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Bechtel
Project: Exelon Texas COL (Victoria)
Project Number: 6468-07-1777

Sample Data

Source: B-2304UD
Sample No.: UD-15
Elev. or Depth: 141-143.5 Ft **Sample Length(in./cm.):** ID#8351
Location: B-2304UD
Description: Pale Brown Poorly Graded SAND with Silt (Visual)
Date: 2/2/08 **PL:** ND **LL:** ND **PI:** ND
USCS Classification: SP-SM **AASHTO Classification:**
Testing Remarks: Tested by: EH Reviewed by: HJ

Sieve Analysis Only
NM value from average of strength tests performed.
Specific Gravity = 2.68 (ASTM D 854-06)
ND = Not Determined

Mechanical Analysis Data

	Initial
Dry sample and tare=	215.90
Tare =	87.87
Dry sample weight =	128.03
Tare for cumulative weight retained=	.00

Sieve	Cumul. Wt. retained	Percent finer
# 4	0.00	100.0
# 10	0.05	100.0
# 20	0.30	99.8
# 40	2.41	98.1
# 60	25.24	80.3
# 100	94.07	26.5
# 140	116.06	9.3
# 200	119.67	6.5

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = % GRAVEL =
% SAND = 93.5 (% coarse = 0.0 % medium = 1.9 % fine = 91.6)
% FINES = 6.5

D₈₅= 0.27 D₆₀= 0.20 D₅₀= 0.19
D₃₀= 0.16 D₁₅= 0.13 D₁₀= 0.11
C_c= 1.0882 C_u= 1.8737

MACTEC ENGINEERING AND CONSULTING, INC.

REPORT OF THE STANDARD TEST METHOD FOR SPECIFIC GRAVITY OF SOILS Performed in General Accordance with ASTM D 854-06 (Method B)

PROJECT NAME: EXELON COL PROJECT (VICTORIA)

PROJECT NUMBER: 6468071777

DATE: 4/7/08

SAMPLE IDENTIFICATION: B-2304UD, UD-15 @ 141-143.5 Ft.

(A) Mass of oven-dried soil, grams:	37.60
(B) Mass of pycnometer filled with water at test temperature (T), grams:	339.40
(C) Mass of pycnometer, water and soil, grams:	362.96
(T) Temperature of pycnometer, water and soil, °C when mass (C) determined:	24.2
(G) Specific Gravity at observed temperature:	$A / [B - (C - A)]$ 2.678
(F) Correction factor:	0.99904
(G x F) SPECIFIC GRAVITY @ 20°C:	2.675

MATERIAL TESTED:

☐

- # 4

☒

- # 10

PREPARATION METHOD:

☒

DRY

☐

WET (dispersed)

REMARKS: Estimated % Passing # 4 : 100

Poorly Graded SAND with Silt (SP-SM) - Visual

EQUIPMENT USED

SCALES : 418

OVEN : 144

THERMOMETER : 2759

PYCNO METER : 2053

TESTED BY: EH

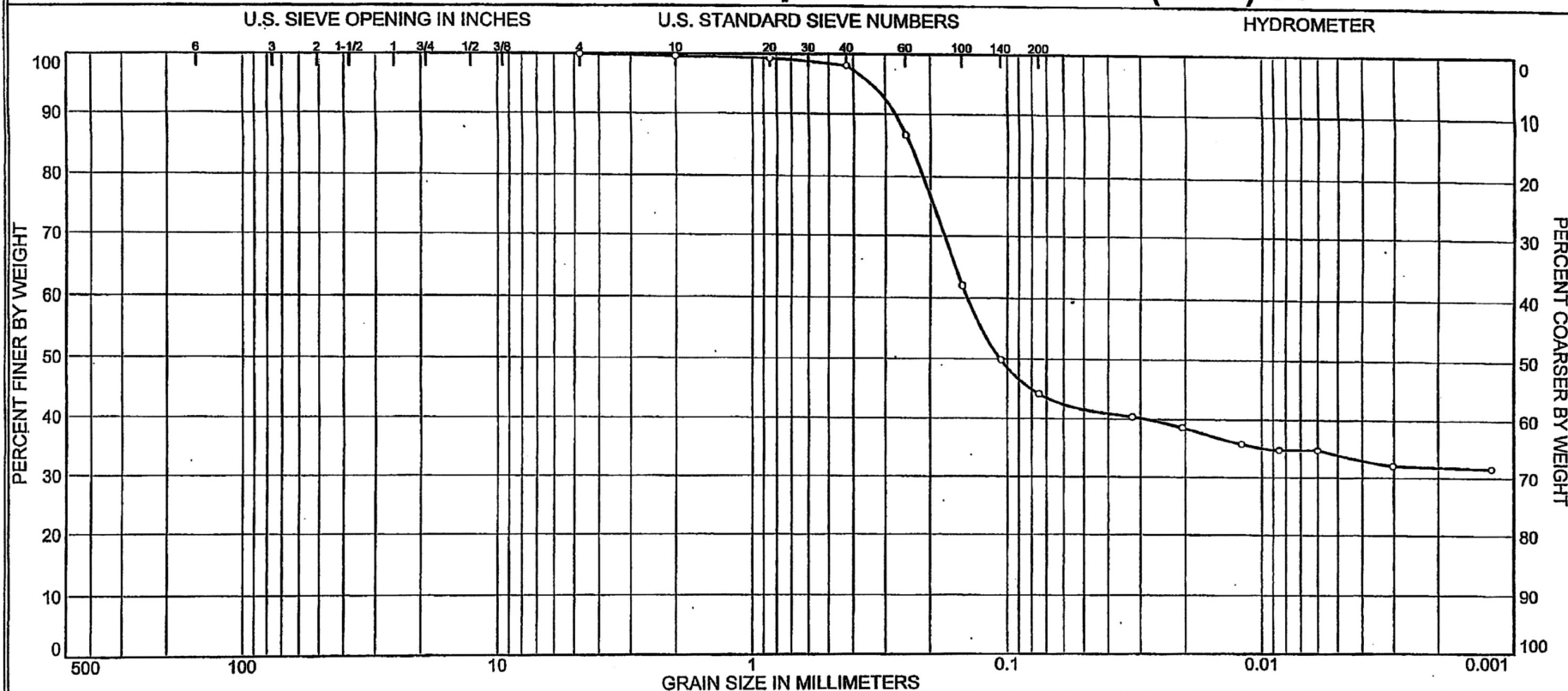
\\Test Reports\\Soils\\SPECIFIC GRAVITY(ref).xls

REVIEWED BY: Harry Johnson

HJ

KAW 4-15-08

Particle Size Distribution Report ASTM D 422-63 (2002) e1



% COBBLES	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.4	1.5	53.9	10.2	34.0

SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
B-2319UD	UD-2	5.5-7.5 Ft	2/2/08	SC	Grayish Brown Clayey SAND	13.7	37	16

Client Bechtel

Project Exelon Texas COL (Victoria)

Project No. 6468-07-1777

Lab No. 8352

**MACTEC ENGINEERING
AND
CONSULTING, INC.**

Tested by: EH Reviewed by: HJ

NM value from first strength test performed.
Specific Gravity = 2.73 (ASTM D 854-06)

KAW 4-15-08

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Bechtel
Project: Exelon Texas COL (Victoria)
Project Number: 6468-07-1777

Sample Data

Source: B-2319UD
Sample No.: UD-2
Elev. or Depth: 5.5-7.5 Ft Sample Length(in./cm.): ID#8352
Location: B-2319UD
Description: Grayish Brown Clayey SAND
Date: 2/2/08 PL: 15.5 LL: 36.6 PI: 21.1
USCS Classification: SC AASHTO Classification:
Testing Remarks: Tested by: EH Reviewed by: HJ

NM value from first strength test performed.
Specific Gravity = 2.73 (ASTM D 854-06)

Mechanical Analysis Data

	Initial	
Dry sample and tare=	68.56	
Tare =	15.77	
Dry sample weight =	52.79	
Tare for cumulative weight retained=	.00	
Sieve	Cumul. Wt. retained	Percent finer
# 4	0.00	100.0
# 10	0.22	99.6
# 20	0.36	99.3
# 40	0.98	98.1
# 60	6.93	86.9
# 100	20.05	62.0
# 140	26.47	49.9
# 200	29.48	44.2

Hydrometer Analysis Data

Separation sieve is #200
Percent -#200 based upon complete sample= 44.2
Weight of hydrometer sample: 23.31
Calculated biased weight= 52.74
Automatic temperature correction
Composite correction at 20 deg C = -5.4

Meniscus correction only= 0
Specific gravity of solids= 2.726
Specific gravity correction factor= 0.983
Hydrometer type: 152H
Effective depth L= $16.294964 - 0.164 \times R_m$

Elapsed time, min	Temp, Actual deg C reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer	
2.00	20.6	27.0	21.7	0.0132	27.0	11.9	0.0323	40.4
5.00	20.6	26.0	20.7	0.0132	26.0	12.0	0.0205	38.6
15.00	20.6	24.5	19.2	0.0132	24.5	12.3	0.0120	35.8
30.00	20.6	24.0	18.7	0.0132	24.0	12.4	0.0085	34.8
60.00	20.6	24.0	18.7	0.0132	24.0	12.4	0.0060	34.8
240.00	20.8	22.5	17.2	0.0132	22.5	12.6	0.0030	32.1
1440.00	21.7	22.0	16.9	0.0131	22.0	12.7	0.0012	31.6

Fractional Components

Gravel/Sand based on #4

Sand/Fines based on #200

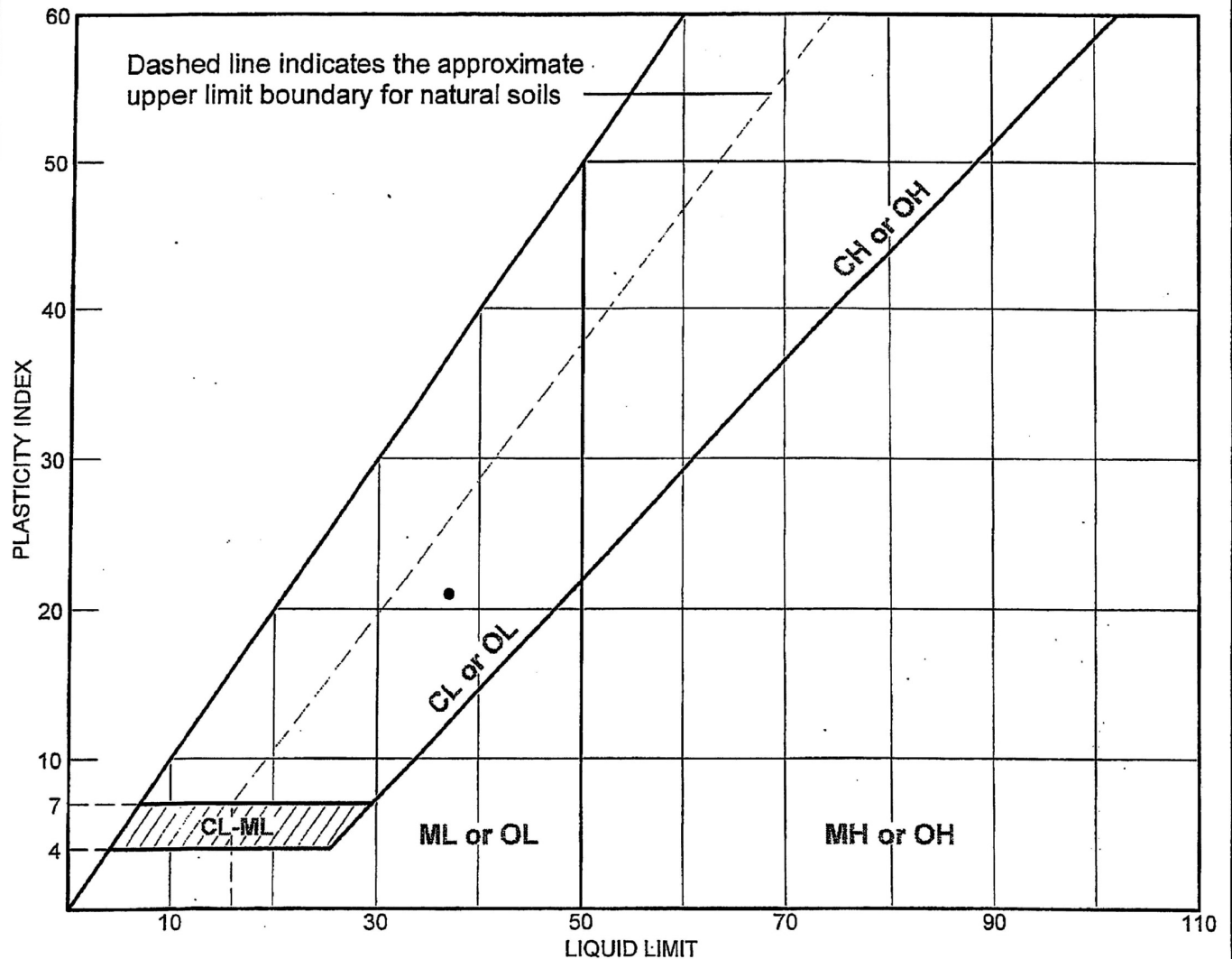
% COBBLES = % GRAVEL =

% SAND = 55.8 (% coarse = 0.4 % medium = 1.5 % fine = 53.9)

% SILT = 10.2 % CLAY = 34.0

D₈₅= 0.24 D₆₀= 0.14 D₅₀= 0.11

LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D4318 (05)



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
•	B-2319UD	UD-2	5.5-7.5 Ft	13.7	16	37	21	SC

**MACTEC ENGINEERING
AND
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Client: Bechtel
Project: Exelon Texas COL (Victoria)
Project No.: 6468-07-1777

Lab No. 8352

LIQUID AND PLASTIC LIMIT TEST DATA

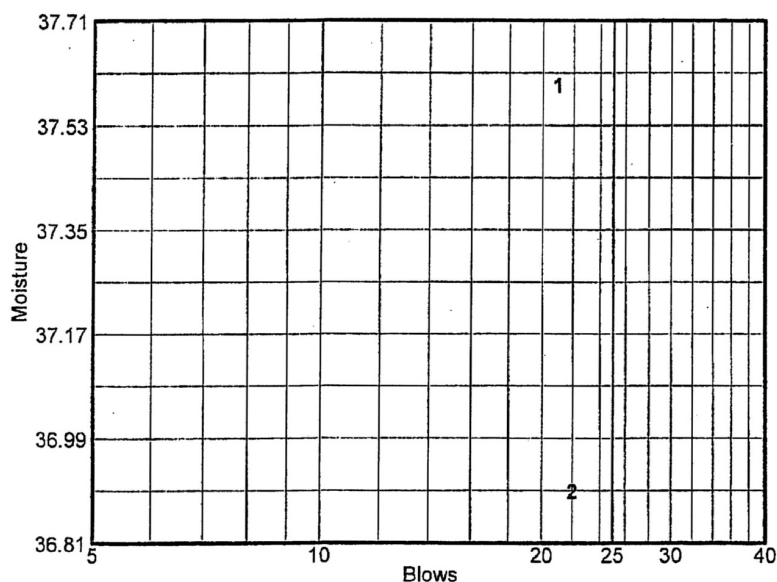
Client: Bechtel
 Project: Exelon Texas COL (Victoria)
 Project Number: 6468-07-1777

Sample Data

Source: B-2319UD
 Sample No.: UD-2
 Elev. or Depth: 5.5-7.5 Ft Sample Length(in./cm.): ID#8352
 Location: B-2319UD
 Description: Grayish Brown Clayey SAND
 Water Content: 13.7 USCS: SC AASHTO:

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	33.65	33.08				
Dry+Tare	30.01	29.62				
Tare	20.32	20.25				
# Blows	21	22				
Moisture	37.6	36.9				



Liquid Limit= 37
 Plastic Limit= 16
 Plasticity Index= 21

Plastic Limit Data

Run No.	1	2	3	4
Wet+Tare	27.95	31.36		
Dry+Tare	26.84	29.95		
Tare	19.69	20.83		
Moisture	15.5	15.5		

MACTEC ENGINEERING AND CONSULTING, INC.

REPORT OF THE STANDARD TEST METHOD FOR SPECIFIC GRAVITY OF SOILS Performed in General Accordance with ASTM D 854-06 (Method B)

PROJECT NAME: EXELON COL PROJECT (VICTORIA)

PROJECT NUMBER: 6468071777

DATE: 3/4/08

SAMPLE IDENTIFICATION: B-2319UD, UD-2 @ 5.5-7.5 Ft.

(A) Mass of oven-dried soil, grams:	36.24
(B) Mass of pycnometer filled with water at test temperature (T), grams:	343.10
(C) Mass of pycnometer, water and soil, grams:	366.05
(T) Temperature of pycnometer, water and soil, °C when mass (C) determined:	22.2
(G) Specific Gravity at observed temperature:	$A / [B - (C - A)]$ 2.727
(F)	Correction factor: 0.99952
(G x F)	SPECIFIC GRAVITY @ 20°C: 2.726

MATERIAL TESTED:

☐

- # 4

☒

- # 10

PREPARATION METHOD:

☒

DRY

☐

WET (dispersed)

REMARKS: Estimated % Passing # 4 : 100

Clayey SAND (SC)

EQUIPMENT USED

SCALES : 418

OVEN : 144

THERMOMETER : 2759

PYCNO METER : 2052

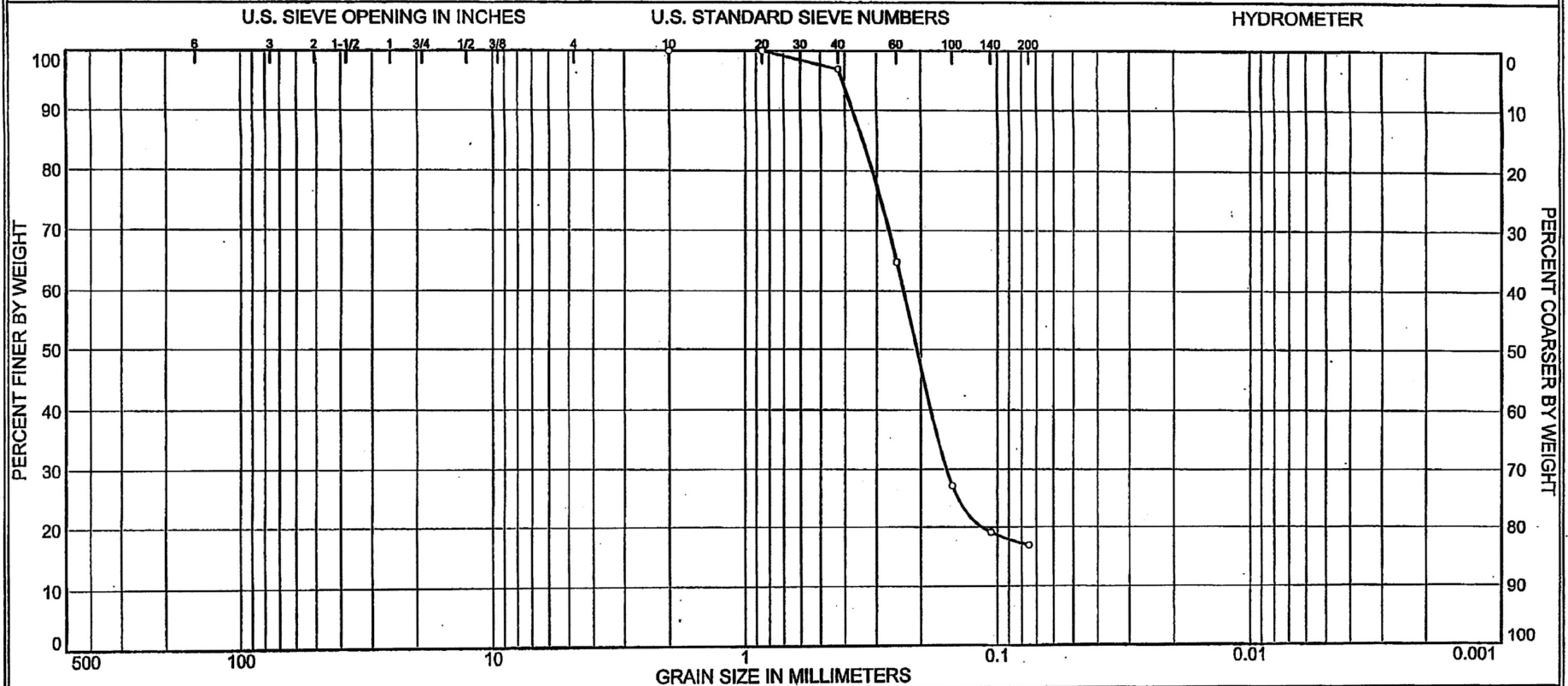
TESTED BY: EH

\\Test Reports\\Soils\\SPECIFIC GRAVITY(ref).xls

REVIEWED BY: Harry Johnson

KAW 4.15.06

Particle Size Distribution Report ASTM D6913-04 e1



% COBBLES	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	3.0	80.1	16.9	

SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
B-2319UD	UD-3	11-13 Ft (Bottom)	2/2/08	SM	Pale Yellow Silty SAND (Visual)	6.1	ND	ND

Client	Bechtel
Project	Exelon Texas COL (Victoria)
Project No.	6468-07-1777
Lab No.	8353

**MACTEC ENGINEERING
AND
CONSULTING, INC.**

Tested by: EH *EH* Reviewed by: HJ *HJ*

Sieve Analysis Only
NM value from strength test performed.
Specific Gravity = 2.72 (ASTM D 854-06)
ND = Not Determined

KAW 5/9/08

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Bechtel
Project: Exelon Texas COL (Victoria)
Project Number: 6468-07-1777

Sample Data

Source: B-2319UD
Sample No.: UD-3
Elev. or Depth: 11-13 Ft (Bottom) **Sample Length(in./cm.):** ID#8353
Location: B-2319UD
Description: Pale Yellow Silty SAND (Visual)
Date: 2/2/08 **Natural Moisture:** 6.1
Liquid Limit: ND **Plastic Limit:** ND **USCS Class.:** SM
Testing Remarks: Tested by: EH Reviewed by: HJ

Sieve Analysis Only
NM value from strength test performed.
Specific Gravity = 2.72 (ASTM D 854-06)
ND = Not Determined

Mechanical Analysis Data

	Initial	
Dry sample and tare=	215.43	
Tare =	111.18	
Dry sample weight =	104.25	
Tare for cumulative weight retained=	.00	
Sieve	Cumul. Wt. retained	Percent finer
# 10	0.00	100.0
# 20	0.00	100.0
# 40	3.10	97.0
# 60	36.70	64.8
# 100	75.94	27.2
# 140	84.30	19.1
# 200	86.62	16.9

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% COBBLES = **% GRAVEL =**
% SAND = 83.1 (% coarse = % medium = 3.0 % fine = 80.1)
% FINES = 16.9

D₈₅ = 0.34 D₆₀ = 0.24 D₅₀ = 0.21
D₃₀ = 0.16

MACTEC ENGINEERING AND CONSULTING, INC.

REPORT OF THE STANDARD TEST METHOD FOR SPECIFIC GRAVITY OF SOILS Performed in General Accordance with ASTM D 854-06 (Method B)

PROJECT NAME: EXELON COL PROJECT (VICTORIA)

PROJECT NUMBER: 6468071777

DATE: 4/8/08

SAMPLE IDENTIFICATION: B-2319UD, UD-3 @11-13 (bottom) Ft.

(A) Mass of oven-dried soil, grams:	37.51
(B) Mass of pycnometer filled with water at test temperature (T), grams:	366.15
(C) Mass of pycnometer, water and soil, grams:	389.89
(T) Temperature of pycnometer, water and soil, °C when mass (C) determined:	23.9
(G) Specific Gravity at observed temperature:	$A / [B - (C - A)]$ 2.724
(F) Correction factor:	0.99912
(G x F) SPECIFIC GRAVITY @ 20°C:	2.722

MATERIAL TESTED:

☐

- # 4

☒

- # 10

PREPARATION METHOD:

☒

DRY

☐

WET (dispersed)

REMARKS: Estimated % Passing #.4 : 100

Silty SAND (SM) - Visual

EQUIPMENT USED

SCALES : 418

OVEN : 144

THERMOMETER : 2759

PYCNO METER : 2192

TESTED BY: EH *EH*

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REVIEWED BY: Harry Johnson *H*

KAW 5/9/08

Particle Size Distribution Report / ASTM D422-63(2002)e1



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	19.6	22.1	58.2

Source	Sample #	Depth/Elev.	Date Sampled	USCS	Material Description	NM %	LL	PL
Boring B-2319UD	UD-4	25.0-27.0	2/2/08	CH	Light Yellowish Brown Fat CLAY with sand	20.3	61	16

Client Bechtel
Project Exelon Texas COL (Victoria Reservoir)

Project No. 6468071777

Figure *NA*

MACTEC, Inc.

Raleigh, North Carolina

○ Specific Gravity = 2.716 (ASTM D854-06)
NM is average of values obtained from consolidation and triaxial test specimens

KAW 5/8/08

Tested By: CS

Checked By: LBJ

GRAIN SIZE DISTRIBUTION TEST DATA

5/8/2008

Client: Bechtel

Project: Exelon Texas COL (Victoria Reservoir)

Project Number: 6468071777

Location: Boring B-2319UD

Depth: 25.0-27.0

Sample Number: UD-4

Material Description: Light Yellowish Brown Fat CLAY with sand

Date: 2/2/08

Natural Moisture: 20.3

Liquid Limit: 61

Plastic Limit: 16

USCS Class.: CH

Testing Remarks: Specific Gravity = 2.716 (ASTM D854-06)

NM is average of values obtained from consolidation and triaxial test specimens

Tested by: CS

Checked by: LBJ

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
258.57	0.00	0.00	#10	0.00	100.0
48.33	0.00	0.00	#20	0.00	100.0
			#40	0.03	99.9
			#60	0.15	99.7
			#100	1.98	95.9
			#140	6.22	87.1
			#200	9.53	80.3

Hydrometer Test Data

Hydrometer test uses material passing #10

Percent passing #10 based upon complete sample =100.0

Weight of hydrometer sample =48.33

Hygroscopic moisture correction:

Moist weight and tare = 29.22

Dry weight and tare = 28.72

Tare weight = 15.56

Hygroscopic moisture =3.8%

Table of composite correction values:

Temp., deg. C: 11.3 29.5

Comp. corr.: -8.0 -3.0

Meniscus correction only =1.0

Specific gravity of solids =2.716

Hydrometer type =152H

Hydrometer effective depth equation: $L = 16.294964 - 0.164 \times R_m$

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
2.00	21.4	39.0	33.8	0.0132	40.0	9.7	0.0290	71.5
5.00	21.4	37.0	31.8	0.0132	38.0	10.1	0.0187	67.3
15.00	21.5	35.0	29.8	0.0131	36.0	10.4	0.0109	63.1
30.00	21.5	34.0	28.8	0.0131	35.0	10.6	0.0078	61.0
60.00	21.5	33.0	27.8	0.0131	34.0	10.7	0.0056	58.8
250.00	21.8	31.0	25.9	0.0131	32.0	11.0	0.0028	54.8
1440.00	20.9	30.0	24.6	0.0132	31.0	11.2	0.0012	52.1

MACTEC, Inc.

Fractional Components

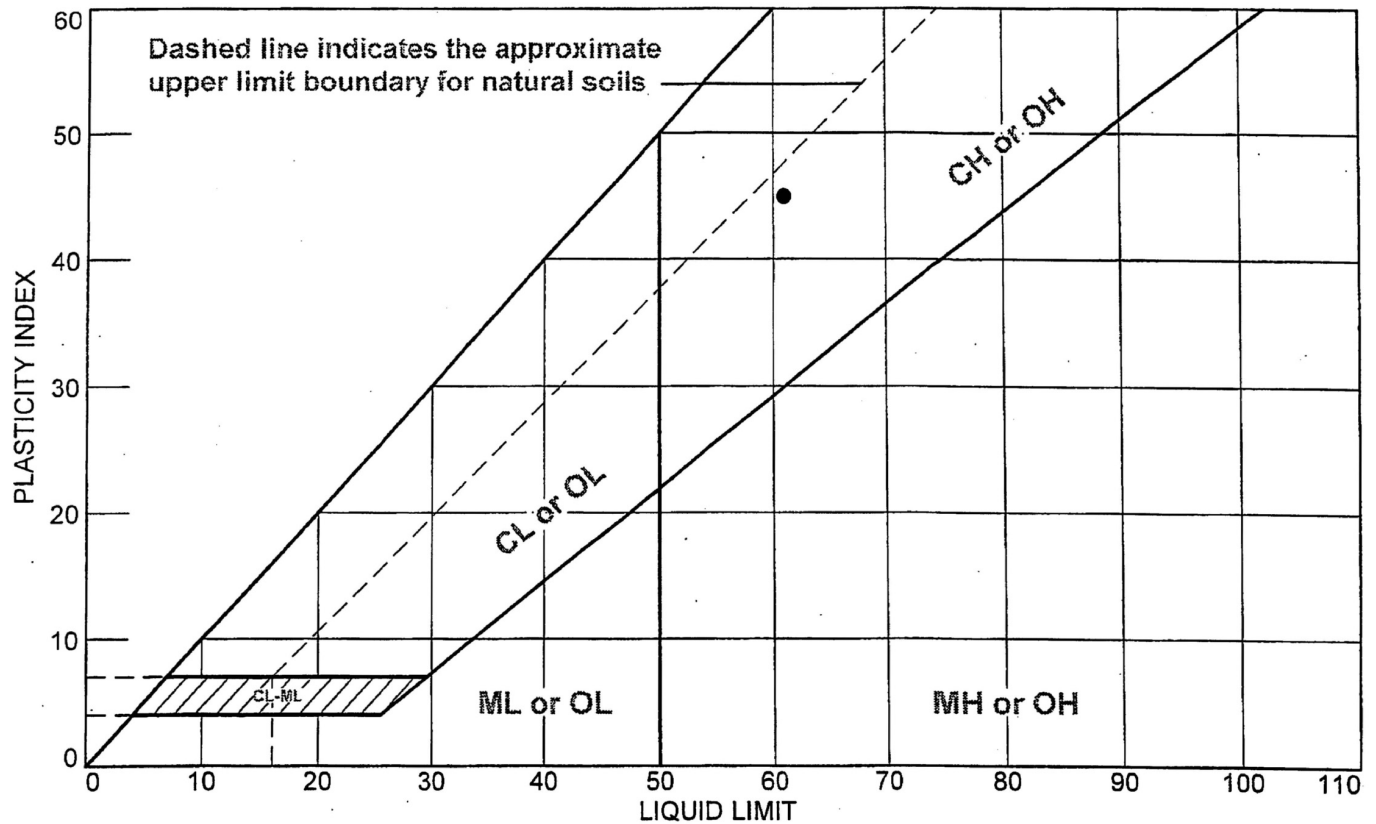
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.1	19.6	19.7	22.1	58.2	80.3

D ₁₀	D ₁₅	D ₂₀	D ₃₀	D ₅₀	D ₆₀	D ₈₀	D ₈₅	D ₉₀	D ₉₅
					0.0067	0.0736	0.0969	0.1181	0.1436

Fineness Modulus
0.04

MACTEC, Inc.

LIQUID AND PLASTIC LIMITS TEST REPORT ASTM D4318 (05)



SOIL DATA								
	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
•	Boring B-2319UD	UD-4	25.0-27.0	20.3	16	61	45	CH

MACTEC, Inc.

Raleigh, North Carolina

Client: Bechtel

Project: Exelon Texas COL (Victoria Reservoir)

Project No.: 6468071777

Figure NA

KAW 5/8/08

Tested By: CS

Checked By: LBJ

LIQUID AND PLASTIC LIMIT TEST DATA

5/7/2008

Client: Bechtel

Project: Exelon Texas COL (Victoria Reservoir)

Project Number: 6468071777

Location: Boring B-2319UD

Depth: 25.0-27.0

Sample Number: UD-4

Material Description: Light Yellowish Brown Fat CLAY with sand

USCS: CH

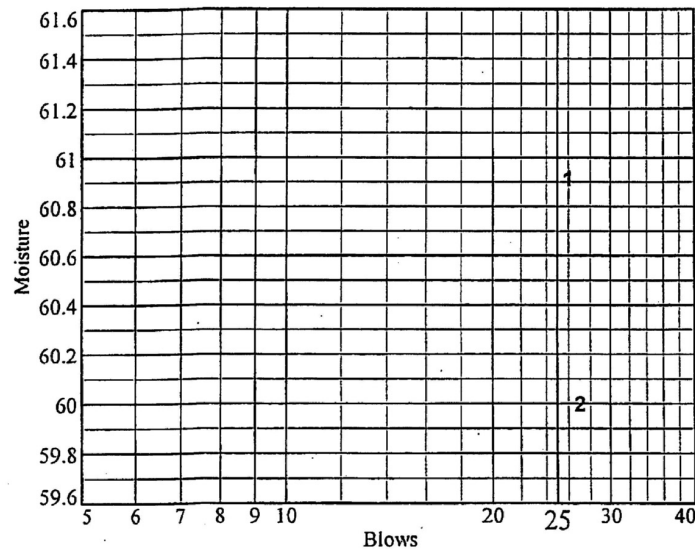
AASHTO: A-7-6(36)

Tested by: CS

Checked by: LBJ

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	24.65	24.28				
Dry+Tare	21.19	20.98				
Tare	15.51	15.48				
# Blows	26	27				
Moisture	60.9	60.0				



Liquid Limit= 61
 Plastic Limit= 16
 Plasticity Index= 45
 Natural Moisture= 20.3
 Liquidity Index= 0.1

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	22.67	21.99			
Dry+Tare	21.68	21.09			
Tare	15.47	15.28			
Moisture	15.9	15.5			

MACTEC, Inc.

MACTEC ENGINEERING AND CONSULTING, INC.
RALEIGH, NORTH CAROLINA

REPORT OF THE STANDARD TEST METHOD FOR SPECIFIC GRAVITY OF SOILS
Performed in General Accordance with ASTM D 854-06 (Method B)

PROJECT NAME: EXELON COL PROJECT (VICTORIA)

PROJECT NUMBER: 6468071777

DATE: 3/12/08

SAMPLE IDENTIFICATION: B-2319UD UD-4

(A) Mass of oven-dried soil, grams:	49.34
(B) Mass of pycnometer filled with water at test temperature (T), grams:	655.71
(C) Mass of pycnometer, water and soil, grams:	686.89
(T) Temperature of pycnometer, water and soil, °C when mass (C) determined:	21.6
(G) Specific Gravity at observed temperature:	$A / [B - (C - A)]$ 2.717
(F)	Correction factor: 0.99966
(G x F)	SPECIFIC GRAVITY @ 20°C: 2.716

MATERIAL TESTED:

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- # 4

☐

- # 10

PREPARATION METHOD:

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DRY

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WET (dispersed)

REMARKS: Estimated % Passing # 4 : 100

Fat CLAY with sand (CH)

EQUIPMENT USED

SCALES :3.1.99

OVEN :5.1.16

THERMOMETER :5.1.01

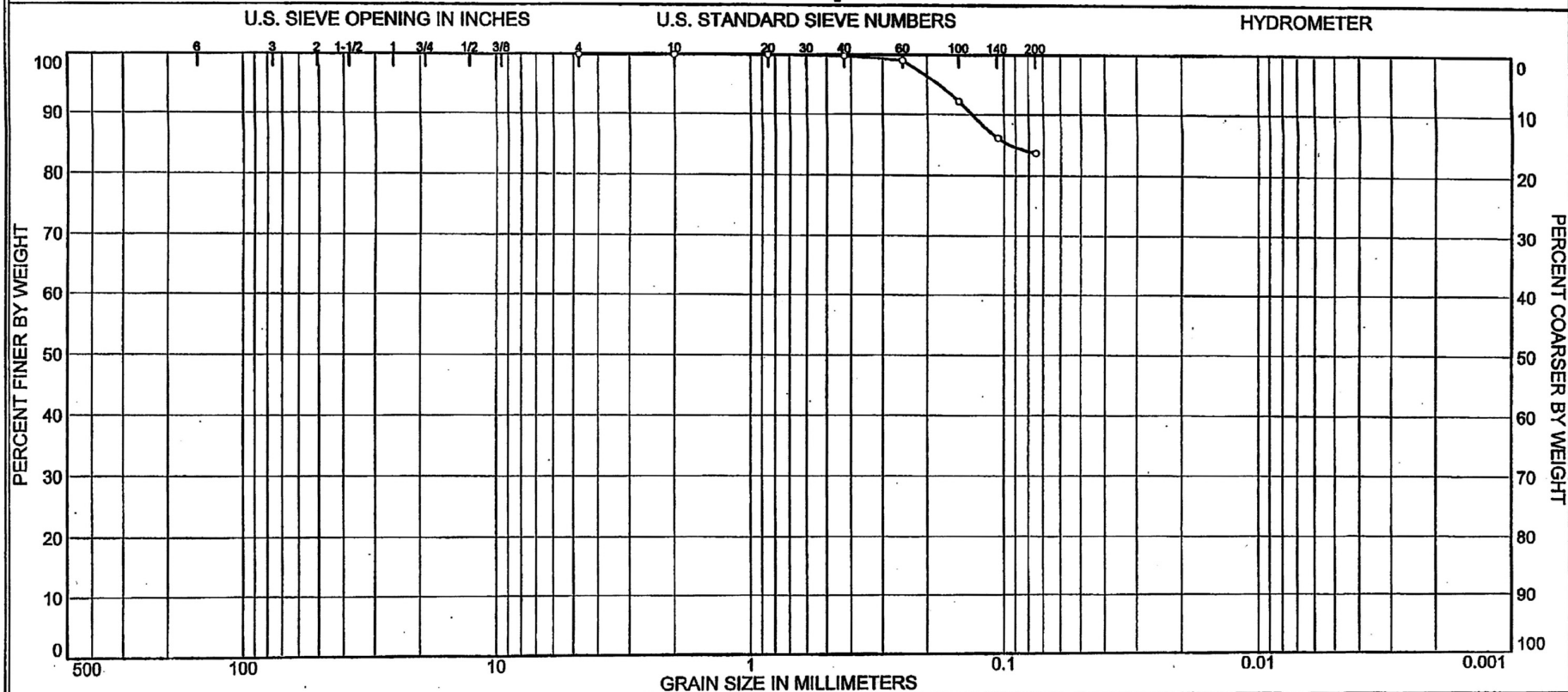
PYCNO METER :P-3

TESTED BY: CS

REVIEWED BY: Brian Johnson

KAW 5/8/08

Particle Size Distribution Report ASTM D6913-04 e1



% COBBLES	% GRAVEL		% SAND			% FINES	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.2	16.0	83.8	

SOURCE	SAMPLE #	DEPTH/ELEV.	DATE SAMPLED	USCS	MATERIAL DESCRIPTION	NM %	LL	PL
B-2319UD	UD-5	35-37 Ft	2/2/08	ML	Brownish Yellow Sandy SILT (Visual) with Sand 2H 5/12/08	18.8	ND	ND

Client Bechtel

Project Exelon Texas COL (Victoria)

Project No. 6468-07-1777

Lab No. 8354

**MACTEC ENGINEERING
AND
CONSULTING, INC.**

Tested by: EH *EH* / Reviewed by: HJ *HJ*

Sieve Analysis Only
NM Value from strength test performed.
Specific Gravity = 2.72 (ASTM D 854-06)
ND = Not Determined

KAW 5/9/08