NORTHERN
Analytical Laboratories, Inc.

602 South 25th Street
P O Box 30315
Billings, MT 59107
Telephone: (406) 254-7226
Fax: (406) 254-1389

REPORT TO: ATTN: TOM CHAPEL
TETRA TECH MM
3801 AUTOMATION WAY; SUITE 100
FORT COLLINGS, CO 80524

DATE: March 26, 2008
JOB NUMBER: 07-933
PAGE: 1 of 2
INVOICE NO.: 8030150

REPORT OF: Soil Analysis

CASE NARRATIVE:

On March 21, 2008, these soil samples (laboratory numbers 2008030150-1 and -2) were received in our laboratory for analysis. The condition of the sample upon receipt at the laboratory is noted on the attached sample receipt checklist. Chain of custody documentation is enclosed. Tests were conducted in accordance with U.S. Department of Agriculture Handbook No. 60, *"Diagnosis and Improvement of Saline and Alkali Solids"*.

The results of the analysis are shown on the following page. A < sign indicates the value reported was the practical quantitation limit for this sample using the method described. Concentrations of analyte, if present, below this were not quantifiable. Sample results are not corrected for analyte blank concentrations. Values in brackets are the quality control limits for the associated quality control test.

Reviewed by _____
Kathleen A. Smit – Laboratory Manager

Attachments: Sample Receipt Checklist
Laboratory Test Summary

nct

Client Name: TETRA TECH MM
Project No.: 114-181750.4
Project Name: RFETS-OLF
Collected by: CLIENT
Date Received: 03/21/2008
Matrix: SOIL
Order No.: 2008030150

Sample Number	Description	Date Collected	Measured Value	Test Units	Test Method	PQL Value	Date of Analysis
Organic Matter dry basis							
1	TtP-2 @ 4	03/04/2008	0.91	%	24	0.10	03/25/2008
2	TtP-4 @ 6	03/04/2008	1.85	%	24	0.10	03/25/2008
3	DUPLICATE OF 2008030150-1	03/04/2008	1.05	%	24	0.10	03/25/2008
4	MATRIX SPIKE OF 2008030150-2	03/04/2008	77	% [75-125]	24	0.10	03/25/2008
5	METHOD BLANK	-----	<0.1	%	24	0.10	03/25/2008
6	LABORATORY CONTROL SAMPLE	-----	63	% [62-138]	24	0.10	03/25/2008

Samples to Billings

Walkley Black method

Rush

Due 3/24/08 By 10:00

2008 V CC
030150

Project Name: RFETS-OLF
Project No. 114-181750.4
Laboratory Testing Program-Test Pits
Date March 4, 2008

Boring ID/Depth	Depth	Moisture/Density	Atterberg	Gradation	200 WASH	organic content	std Proctor
TtP-1	7-8		x		x		
TtP-1	12		x		x		
TtP-2	4		x		x	x	
TtP-2	7		x		x		
TtP-2	11		x	x			
TtP-3	8		x		x		
TtP-3	11.5-12		x		x		
TtP-4	6		x	x		x	
TtP-4	10-11		x		x		
TtP-5	8		x		x		
TtP-5	9-10		x	x			
TtP-6	9		x		x		
TtP-6	10		x	x			
TtP-7	8		x	x			
TtP-8	4-6		x	x			
TtP-8	11-13		x	x			

1
2

Dup 1 3
Sph 2 4
MB 5
LOS 6

Relinquished by Glenn 3/21/08 @ 1000

Rec by MWalton

Notes: Please do laboratory tests as indicated.
No formal report is needed.
Only the amount of review necessary to assure test/calculation accuracy is needed.
Please send electronic file and 1 hard copy of results.
Please provide results by 3/14/08 or call to arrange alternate schedule.
Thanks!

Tom Chapel
970-223-9600
tom.chapel@tetratech.com

NORTHERN
Analytical Laboratories, Inc.

SAMPLE RECEIPT CHECKLIST

Dear Valued Client: This checklist documents the condition of your sample(s) as it (they) arrived at our lab. Please review it and familiarize yourself with its contents. Should you have any questions or comments, please contact us. Thank you for your use of our services.

Client Name: TT-Denver

Project: RFETS-OLF

Laboratory Number(s): 030150

Checklist Completed by: MW 3/21/08 (Initials / Date)

Date/Time Received: 3/21/08 1000 (Date / Time)

Received by: MW

Carrier Name: Hand

Sample Type: Soil

	YES	NO
1. Shipping container in good condition?	NA	
2. Custody seals present on shipping container? Condition: Intact ____ Broken ____	✓	
3. Chain of custody present?	✓	
4. Chain of custody signed when relinquished and received?	✓	
5. Chain of custody agrees with sample labels?	✓	
6. Custody seals on sample bottles? Condition: Intact ____ Broken ____		✓
7. Samples in proper container/bottle?*	✓	
8. Sample containers intact?*	✓	
9. Sufficient sample volume for indicated test?*	✓	
10. Ice/Frozen Blue Ice present in shipping container? (circle one)	NA	
container temperature 1.____ 2.____ 3.____ * (if <0 or>10)	✓	
11. All samples rec'd within holding time?*		
12. VOA vials have zero headspace? * (if contains >5mm headspace)		
13. Trip Blank received?	✓	

	YES	NO
14. pH check performed by: ____		
15. Metals bottle(s) pH <2?	NA	
16. Nutrient bottle(s) pH <2?		
17. Cyanide bottle(s) pH >12?		
18. Sulfide bottle(s) pH >9?		
19. TOC bottle(s) pH <2?		
20. Phenolics bottle(s) pH <2?		
21. Oil & grease bottle(s) pH <2? (checked by analyst)		
22. EPH/DRO bottle(s) pH <2? (checked by analyst)		
23. Volatiles (VOA) pH <2? (checked by analyst)		
24. Semivolatiles (525) pH <2? (checked by analyst)		
25. Other test types	✓	
26. Client contacted?		
27. Person contacted		
28. Date contacted		

NOTES: **Samples may be affected when not transported at the temperature recommended by the EPA for the test you've selected. Please contact the lab if you have concerns about the temperature of your samples.**

Critical item - if marked "NO" contact lab manager.

COMMENTS: _____

NORTHERN
Analytical Laboratories, Inc.

602 South 25th Street
P O Box 30315
Billings, MT 59107
Telephone: (406) 254-7226
Fax: (406) 254-1389

REPORT TO: ATTN: DAVID CASTELBAUM
TETRA TECH MM
3801 AUTOMATION WAY; SUITE 100
FORT COLLINGS, CO 80524

DATE: March 17, 2008
JOB NUMBER: 07-933
PAGE: 1 of 2
INVOICE NO.: 8030081

REPORT OF: Soil Analysis

CASE NARRATIVE:

On March 12, 2008, this soil sample (laboratory number 2008030081-1) was received in our laboratory for analysis. The condition of the sample upon receipt at the laboratory is noted on the attached sample receipt checklist. Chain of custody documentation is enclosed. Tests were conducted in accordance with U.S. Department of Agriculture Handbook No. 60, *"Diagnosis and Improvement of Saline and Alkali Solids"*.

The results of the analysis are shown on the following page. A < sign indicates the value reported was the practical quantitation limit for this sample using the method described. Concentrations of analyte, if present, below this were not quantifiable. Sample results are not corrected for analyte blank concentrations. Values in brackets are the quality control limits for the associated quality control test.

Reviewed by _____
Kathleen A. Smit – Laboratory Manager

Attachments: Sample Receipt Checklist
Laboratory Test Summary

nct

Client Name: TETRA TECH MM
Project No.: NONE GIVEN
Project Name: NONE GIVEN
Collected by: CLIENT
Date Received: 03/12/2008
Matrix: SOIL
Order No.: 2008030081

Sample Number	Description	Date Collected	Measured Value	Test Units	Test Method	PQL Value	Date of Analysis
Organic Matter dry basis							
1	COMPOSITE OF TT-TP4 @ 4' AND TT-TP6 @ 3', 114-181268	-----	0.85	%	24	0.10	03/17/2008
2	DUPLICATE OF 2008030081-1	-----	0.80	%	24	0.10	03/17/2008
3	METHOD BLANK	-----	<0.1	%	24	0.10	03/17/2008
4	LABORATORY CONTROL SAMPLE	-----	91	% [61-139]	24	0.10	03/17/2008

Due 3/17/08 @ 4:00

Gartner, George

From: Castelbaum, David
Sent: Tuesday, March 11, 2008 9:09 AM
To: Gartner, George
Subject: Soil sample

Walkley Black

RUSH Report & Invoice to Fort Collins office (07-9

George,

The sample for organic content is being sent priority mail today, and you shoud receive it tomorrow in the morning. We would like to have the results by next Monday.

Thanks

Dave

200803008 1-1 VCC
Composite -
TT-TP4 @ 4' & TT-TP6 @ 3'
114-181268

David Castelbaum, M.S., P.E. | Geotechnical Engineer
Main (970) 223-9600 ext.212
Direct (970) 206-4212
Fax (970) 223-7171
david.castelbaum@tetratech.com

Tetra Tech | Complex World, **Clear Solutions™**
3801 Automation Way | Suite 100 | Fort Collins, Colorado | 80524
www.tetratech.com

Relinquished by: [signature] 1300 3/12

Received by: Norma C. Frankl @1300
3/12/08

NORTHERN
Analytical Laboratories, Inc.

SAMPLE RECEIPT CHECKLIST

Dear Valued Client: This checklist documents the condition of your sample(s) as it (they) arrived at our lab. Please review it and familiarize yourself with its contents. Should you have any questions or comments, please contact us. Thank you for your use of our services.

Client Name: TT-St Collins

Date/Time Received: 3/12/08 1300 (Date / Time)

Project: NA

Received by: NT

Laboratory Number(s): 030081

Carrier Name: HAND (TT-Blgs)

Checklist Completed by: RW 3/12/08 (Initials / Date)

Sample Type: Soil

	YES	NO
1. Shipping container in good condition?	NA	
2. Custody seals present on shipping container? Condition: Intact ____ Broken ____	+	
3. Chain of custody present? e-mail		✓
4. Chain of custody signed when relinquished and received?	✓	
5. Chain of custody agrees with sample labels?		✓
6. Custody seals on sample bottles? Condition: Intact ____ Broken ____		✓
7. Samples in proper container/bottle?*	✓	
8. Sample containers intact?*	✓	
9. Sufficient sample volume for indicated test?*	✓	
10. Ice/Frozen Blue Ice present in shipping container? (circle one) container temperature 1.____ 2.____ 3.____ * (if <0 or>10)		✓
11. All samples rec'd within holding time?*	?	
12. VOA vials have zero headspace? * (if contains >5mm headspace)	NA	
13. Trip Blank received?	+	

	YES	NO
14. pH check performed by: ____		
15. Metals bottle(s) pH <2?	NA	
16. Nutrient bottle(s) pH <2?		
17. Cyanide bottle(s) pH >12?		
18. Sulfide bottle(s) pH >9?		
19. TOC bottle(s) pH <2?		
20. Phenolics bottle(s) pH <2?		
21. Oil & grease bottle(s) pH <2? (checked by analyst)		
22. EPH/DRO bottle(s) pH <2? (checked by analyst)		
23. Volatiles (VOA) pH <2? (checked by analyst)		
24. Semivolatiles (525) pH <2? (checked by analyst)		
25. Other test types	+	
26. Client contacted?		
27. Person contacted		
28. Date contacted		

NOTES: **Samples may be affected when not transported at the temperature recommended by the EPA for the test you've selected. Please contact the lab if you have concerns about the temperature of your samples.**

Critical item - if marked "NO" contact lab manager.

COMMENTS: added ID off of the Bag - no Sample date

Table 1 - Summary of Geotechnical Laboratory Test Results

Boring or Test Pit ID	Sample		Sample Description/Classification[2]		Atterberg Limits (%) LL/PL/PI[3]	Particle Sizes (%)[4]			Standard Laboratory Compaction[5]	
	Depth (ft)	Type[1]				Gravel	Sand	Fines	Maximum Dry Unit Weight (pcf)	Optimum Water Content (%)
Tt-TP1	4	Bulk	Fill: Clayey Gravel with Sand	GC	37/12/25	38.5	38.0	23.5	118.8 (130.2)	11.8 (8.1)
Composite: Tt-TP5 Tt-TP8 Tt-TP9	0 - 2 0 - 2 0 - 2	Bulk	Fill: Clayey Sand with Gravel	SC	43/12/31	27.9	40.3	31.8	113.3 (119.1)	14.5 (12.2)
Composite: Tt-TP4 Tt-TP6	4 3	Bulk	Fill: Sandy Lean Clay	CL	46/13/33	14.8	26.5	58.7	104.6 (110.6)	20.1 (17.1)

[1] Bulk = Bucket sample.
[2] ASTM D 2437 (Unified Soil Classification System, USCS) used for classification.
[3] LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (PI = LL - PL).
[4] Gravel = 4.75 mm to 75 mm, Sand = 0.074 mm to 4.758 mm, Fines (silt and clay) = less than 0.074 mm.
[5] Rock corrected values indicated in parentheses.

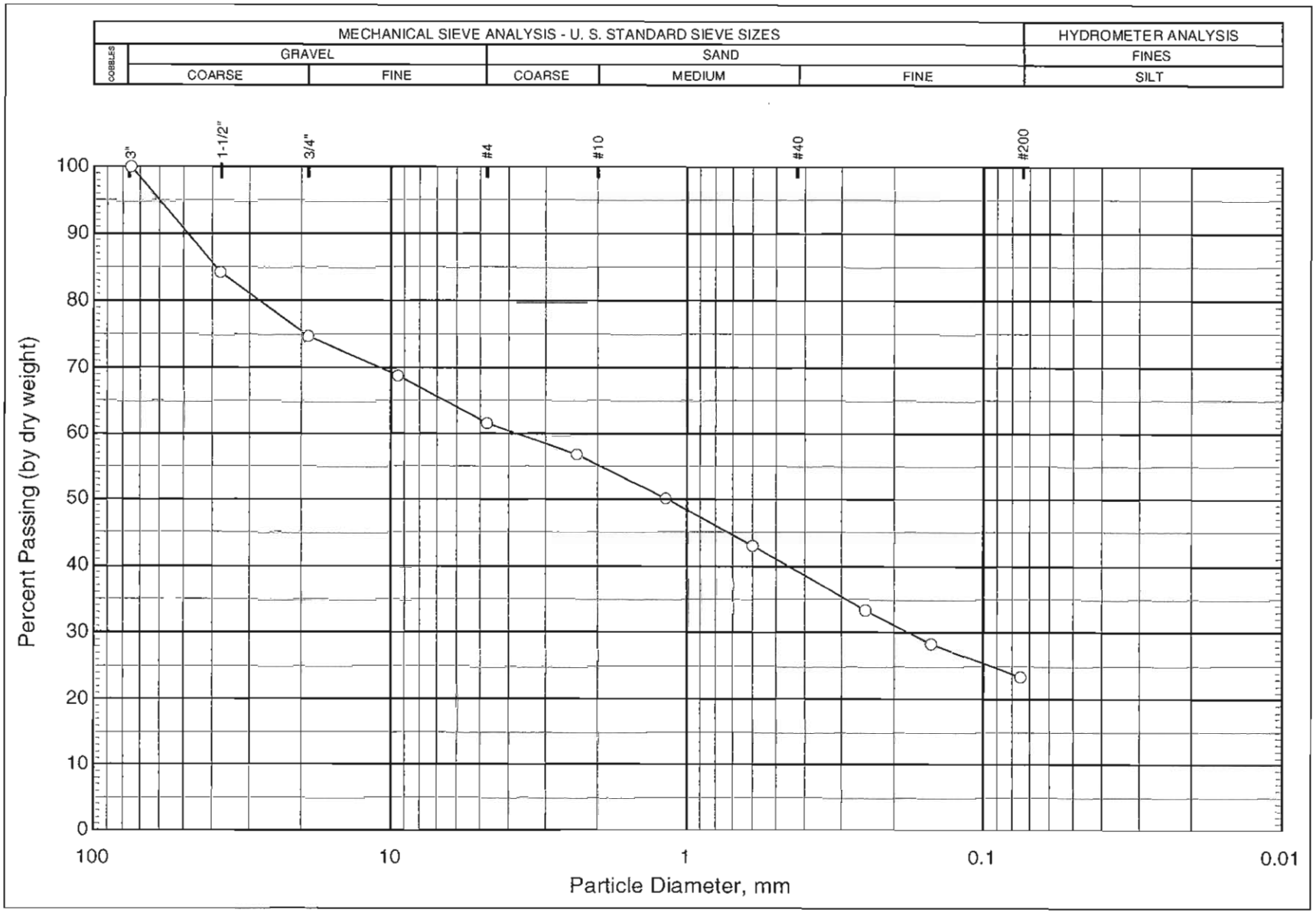


Figure G.1
Particle-size Distribution
Tt-TP1 at 4 feet

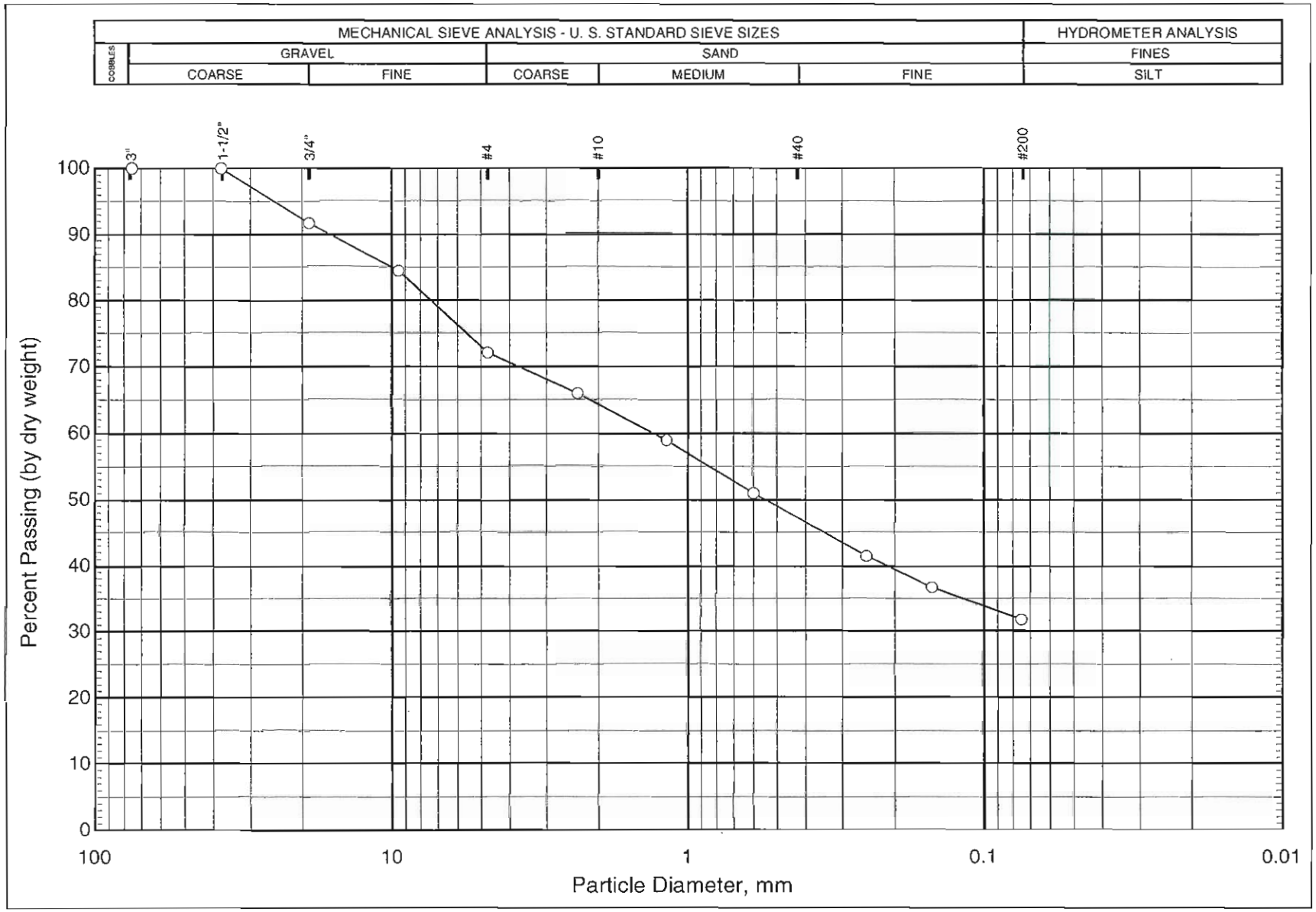


Figure G.8
Particle-size Distribution
Composite: Tt-TP5, 8, and 9 at 0 - 2 feet

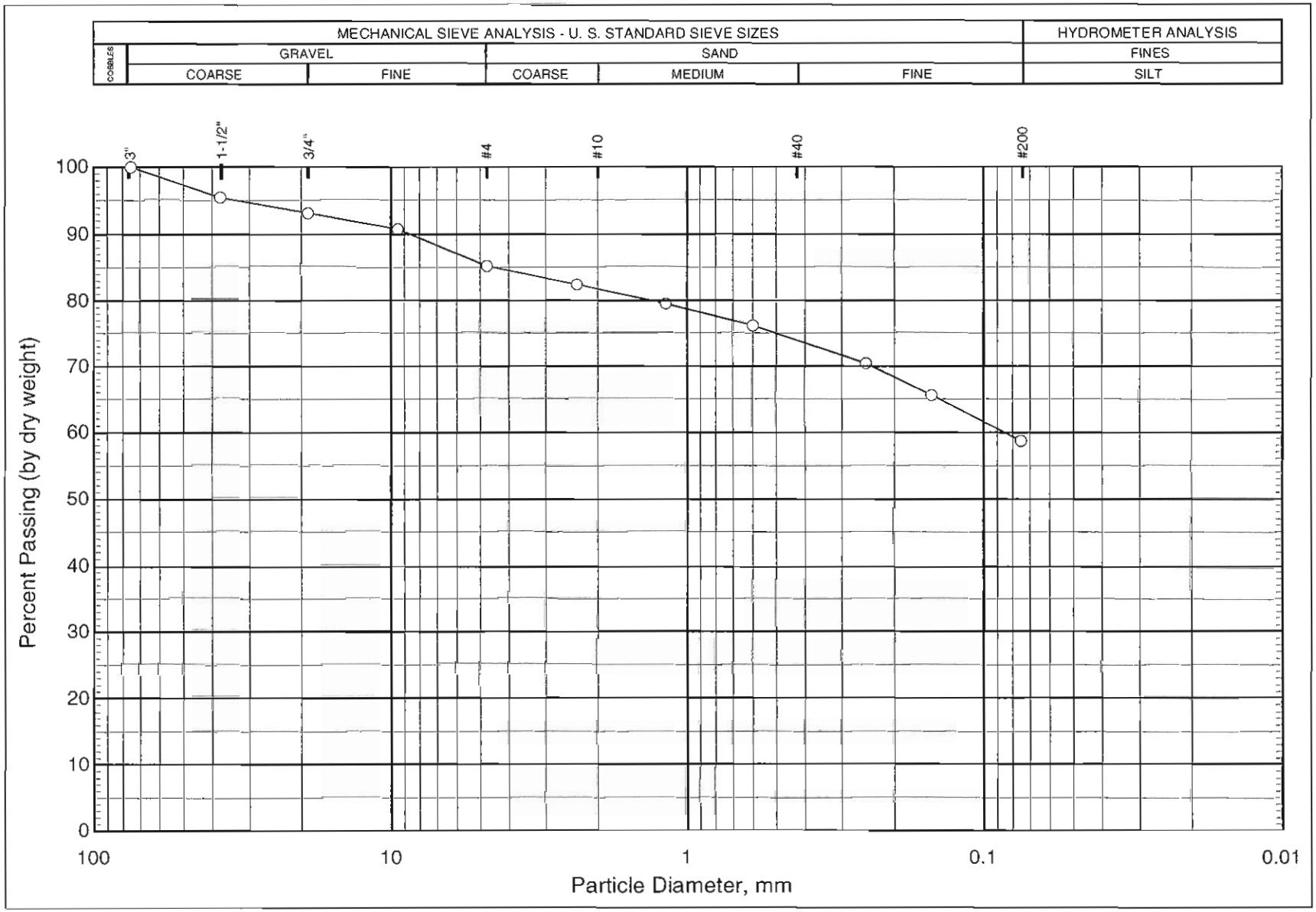


Figure G.3
Particle-size Distribution
Composite: Tt-TP4 at 4 feet and Tt-TP6 at 3 feet

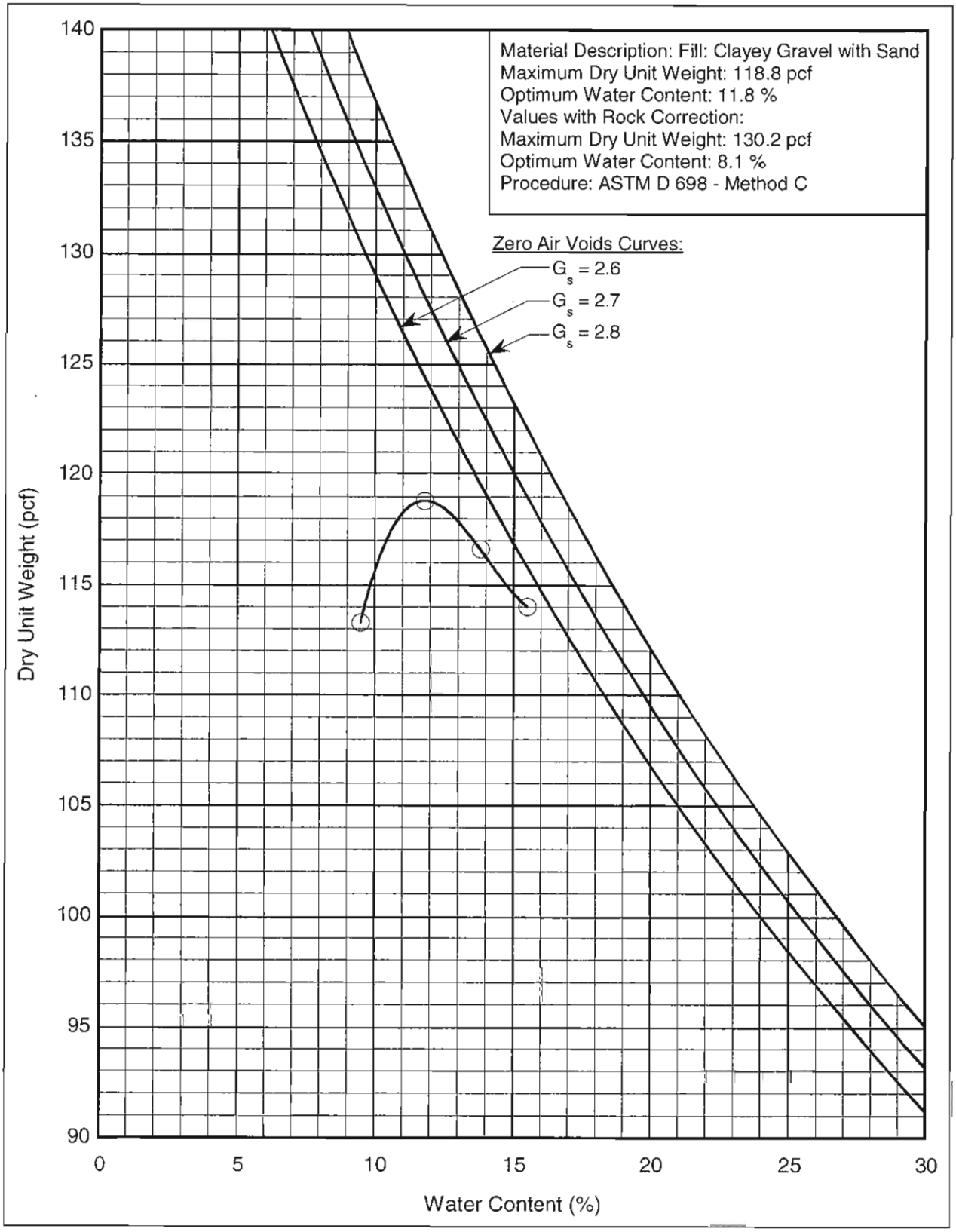


Figure C.1
Laboratory Compaction Curve
Tt-TP1 at 4 feet

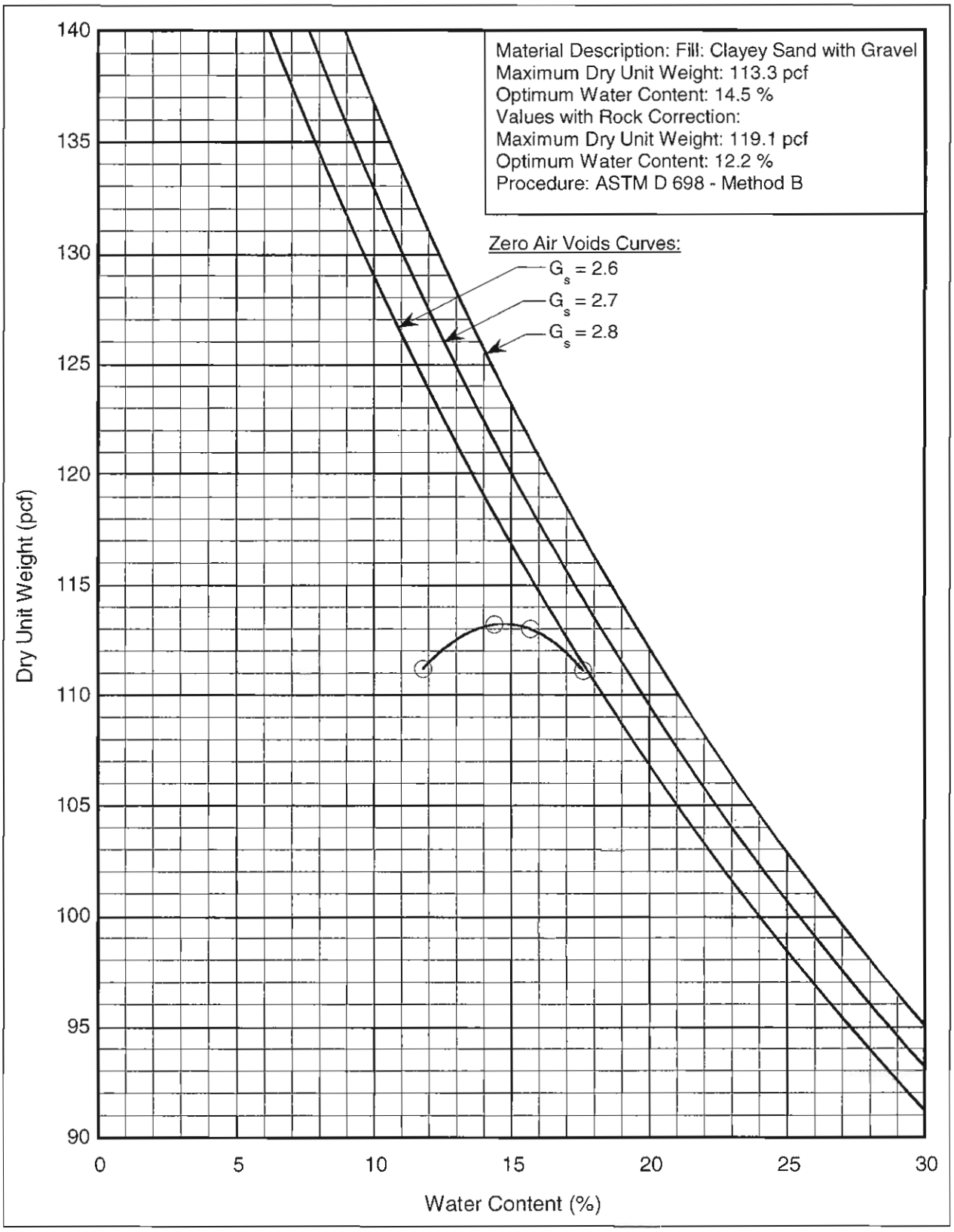


Figure C.2
Laboratory Compaction Curve
Composite: Tt-TP5, 8, and 9 at 0 - 2 feet

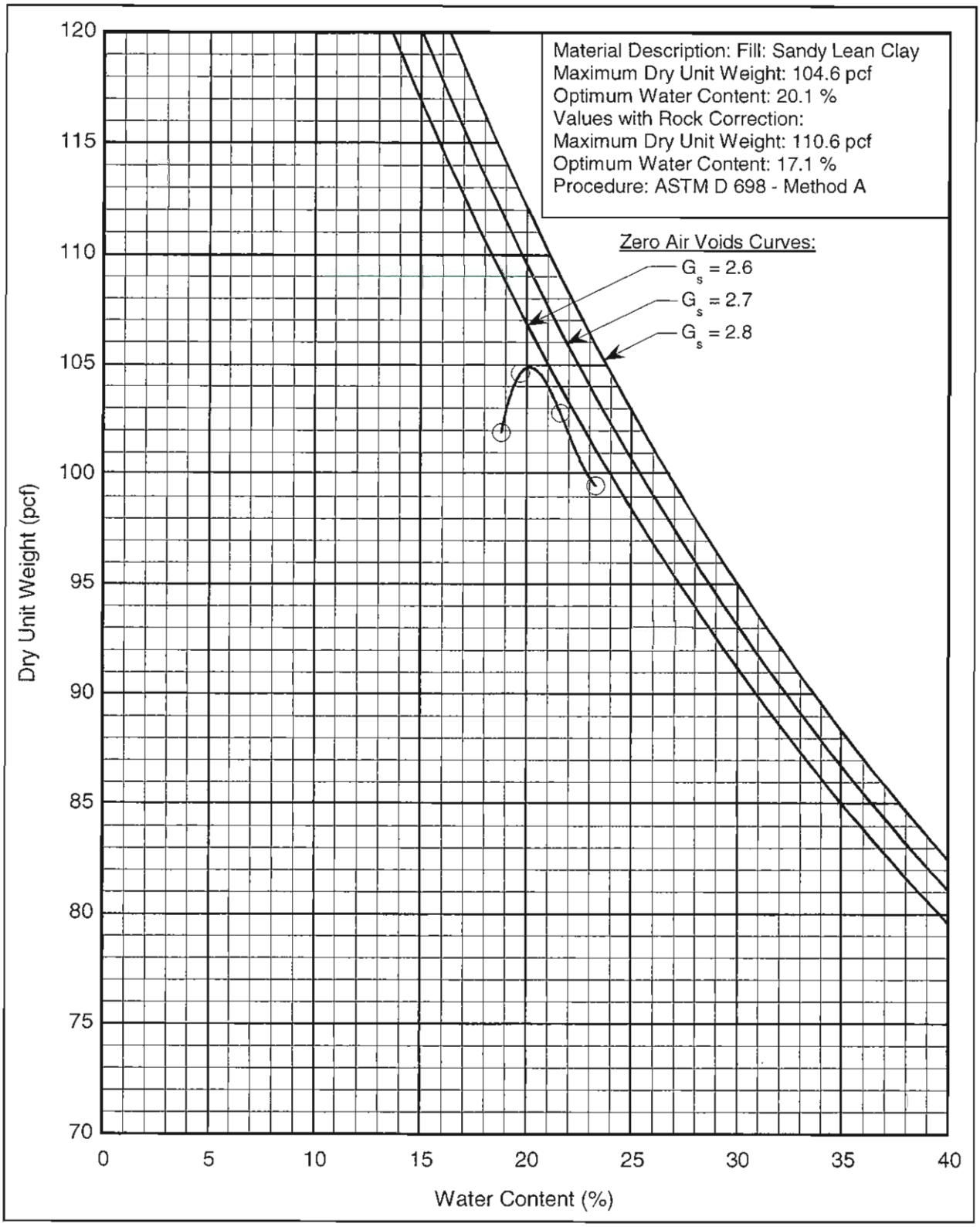


Figure C.3
Laboratory Compaction Curve
Composite: Tt-TP4 at 4 feet and Tt-TP6 at 3 feet

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-1
Depth: 7.0'-8.0'
Material Description: fat clay
Liquid Limit: 52 **Plastic Limit:** 23
USCS Classification: CH **AASHTO Classification:** A-7-6(28)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
160.10	0.00	0.00	#4	0.00	100.0
			#200	18.70	88.3

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	2.4	4.4	4.9	11.7			88.3

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
								0.1362	0.8044

Fineness Modulus
0.29

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-1
Depth: 12'
Material Description: fat clay
Liquid Limit: 50 **Plastic Limit:** 23
USCS Classification: CH **AASHTO Classification:** A-7-6(29)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
151.00	0.00	0.00	#4	0.00	100.0
			#200	6.00	96.0

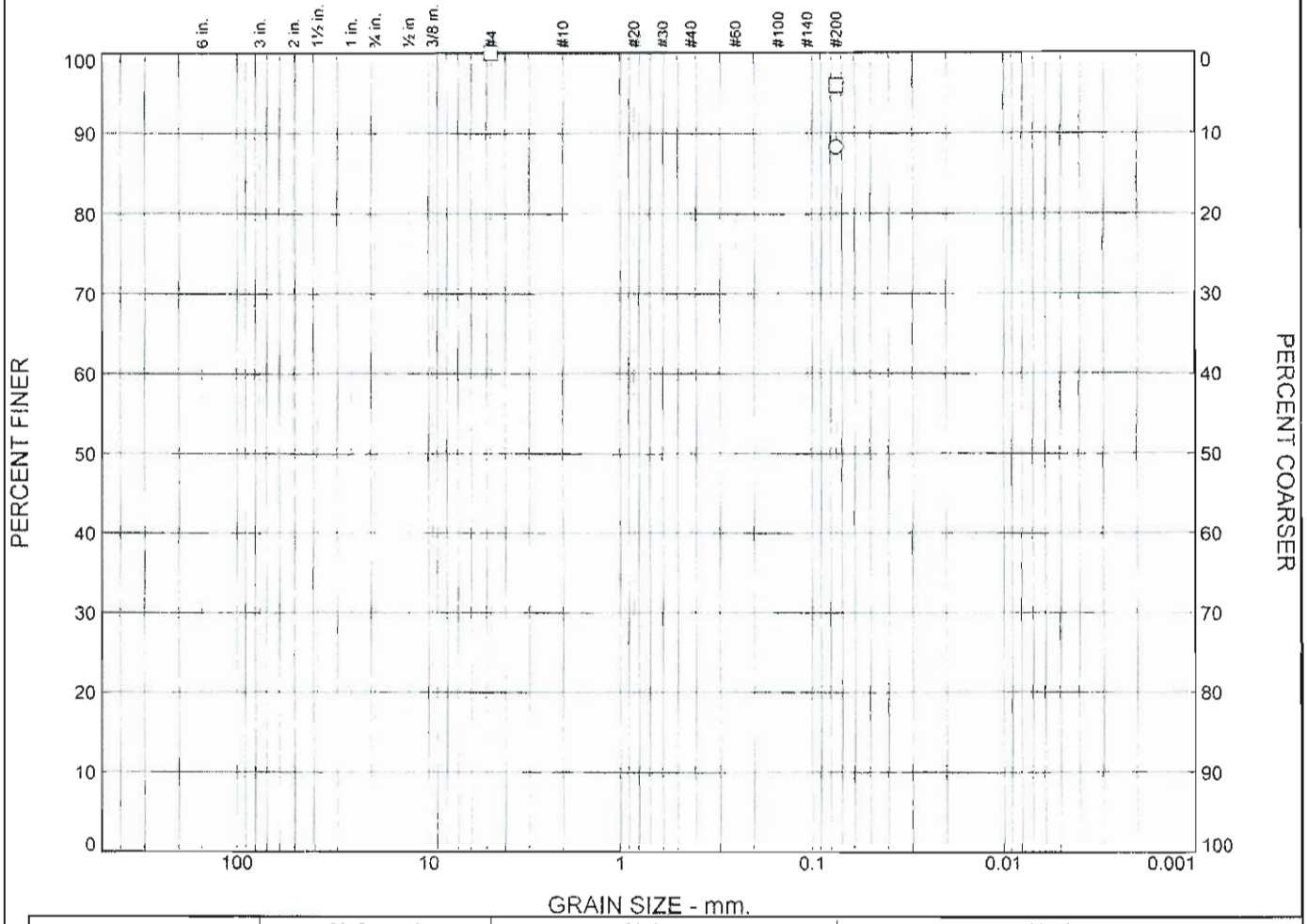
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.8	1.5	1.7	4.0			96.0

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}

Fineness Modulus
0.10

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	2.4	4.4	4.9	88.3	
□	0.0	0.0	0.0	0.8	1.5	1.7	96.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	52	23								
□	50	23								

	Material Description	USCS	AASHTO
○	fat clay	CH	A-7-6(28)
□	fat clay	CH	A-7-6(29)

Project No. 114- **Client:**

Project: RFETS-OLF

○ **Source of Sample:** TtP-1 **Depth:** 7.0'-8.0'

□ **Source of Sample:** TtP-1 **Depth:** 12'

Remarks:

Tetra Tech, Inc.

Billings, MT

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-2
Depth: 4'
Material Description: clayey sand with gravel
Liquid Limit: 38 Plastic Limit: 21
USCS Classification: SC AASHTO Classification: A-2-6(0)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
543.70	0.00	0.00	1	0.00	100.0
			3/4	90.20	83.4
			1/2	136.20	74.9
			3/8	173.70	68.1
			#4	228.40	58.0
			#10	294.10	45.9
			#20	370.20	31.9
			#40	429.50	21.0
			#80	445.50	18.1
			#100	451.50	17.0
			#200	460.50	15.3

Fractional Components

Cobbles	Gravel			Sand			Fines			
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	16.6	25.4	42.0	12.1	24.9	5.7	42.7			15.3

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.3701	0.7654	2.6187	5.6950	17.1106	19.7599	21.7141	23.5402

Fineness Modulus
4.43

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-2
Depth: 7'
Material Description: clayey sand
Liquid Limit: 61 **Plastic Limit:** 30
USCS Classification: SC **AASHTO Classification:** A-2-7(3)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
154.70	0.00	0.00	3/8	0.00	100.0
			#4	18.60	88.0
			#10	31.30	79.8
			#20	47.60	69.2
			#40	62.30	59.7
			#80	91.40	40.9
			#100	97.80	36.8
			#200	106.70	31.0

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	12.0	12.0	8.2	20.1	28.7	57.0			31.0

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.2637	0.4318	2.0481	3.6366	5.4710	7.3268

Fineness Modulus
2.03

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-2
Depth: 11'
Material Description: sandy lean clay
Liquid Limit: 39 **Plastic Limit:** 17
USCS Classification: CL **AASHTO Classification:** A-6(10)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
541.70	0.00	0.00	1/2	0.00	100.0
			3/8	10.80	98.0
			#4	15.90	97.1
			#10	20.80	96.2
			#20	28.60	94.7
			#40	45.10	91.7
			#80	136.20	74.9
			#100	164.00	69.7
			#200	214.70	60.4

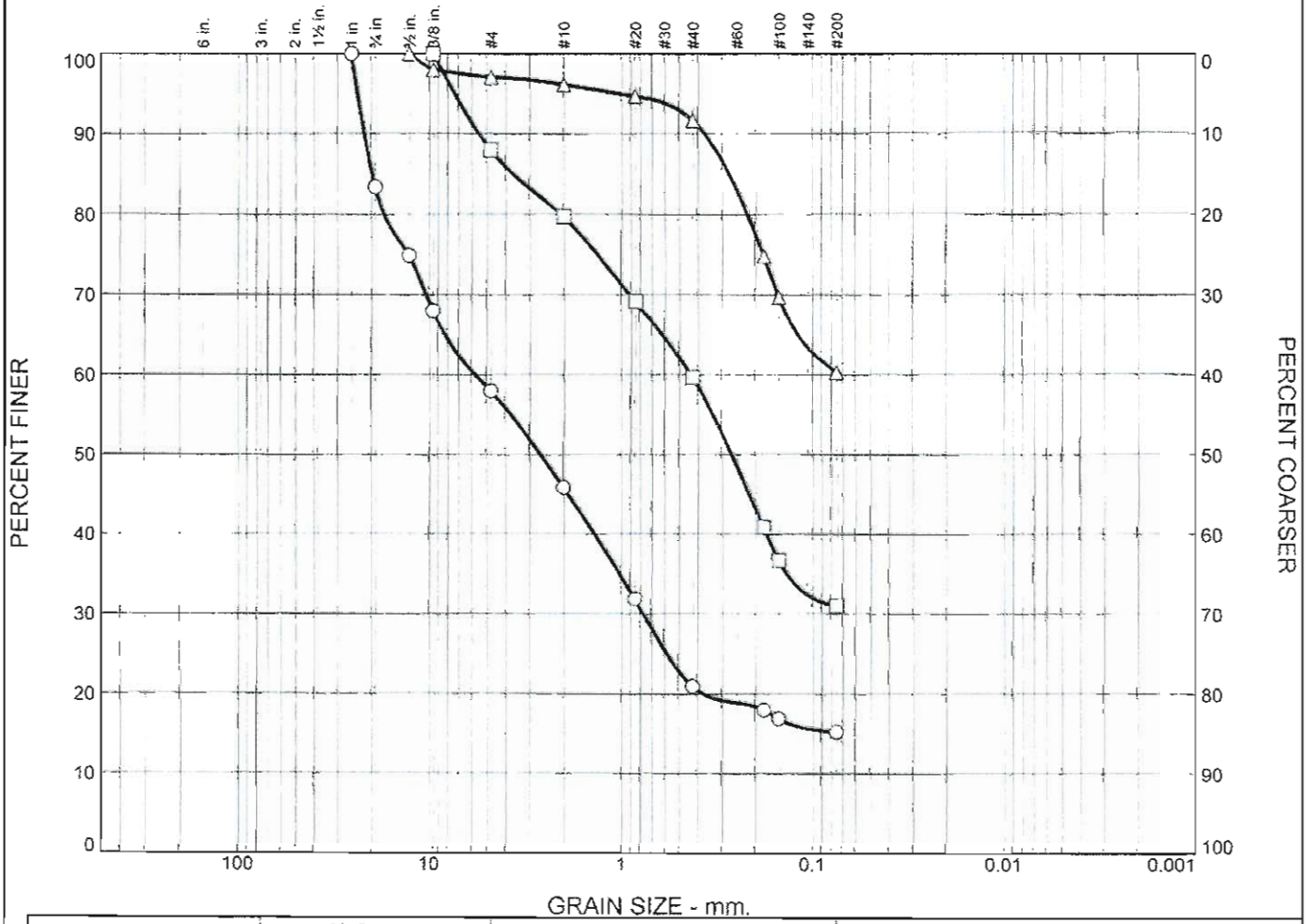
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.9	2.9	0.9	4.5	31.3	36.7			60.4

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
						0.2183	0.2729	0.3680	1.0038

Fineness Modulus
0.63

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	16.6	25.4	12.1	24.9	5.7	15.3	
□	0.0	0.0	12.0	8.2	20.1	28.7	31.0	
△	0.0	0.0	2.9	0.9	4.5	31.3	60.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	38	21	19.7599	5.6950	2.6187	0.7654				
□	61	30	3.6366	0.4318	0.2637					
△	39	17	0.2729							

	Material Description	USCS	AASHTO
○	clayey sand with gravel	SC	A-2-6(0)
□	clayey sand	SC	A-2-7(3)
△	sandy lean clay	CL	A-6(10)

Project No. 114- **Client:**

Project: RFETS-OLF

○ **Source of Sample:** TtP-2 **Depth:** 4'

□ **Source of Sample:** TtP-2 **Depth:** 7'

△ **Source of Sample:** TtP-2 **Depth:** 11'

Remarks:

Tetra Tech, Inc.

Billings, MT

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-3
Depth: 8'
Material Description: sandy lean clay
Liquid Limit: 40 **Plastic Limit:** 19
USCS Classification: CL **AASHTO Classification:** A-6(8)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
167.50	0.00	0.00	#4	0.00	100.0
			#200	78.00	53.4

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	9.7	17.4	19.5	46.6			53.4

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
					0.1346	0.7997	1.2484	1.9490	3.0426

Fineness Modulus
1.17

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-3
Depth: 11.5'-12.0'
Material Description: fat clay
Liquid Limit: 53 **Plastic Limit:** 27
USCS Classification: CH **AASHTO Classification:** A-7-6(31)

Sieve Test Data

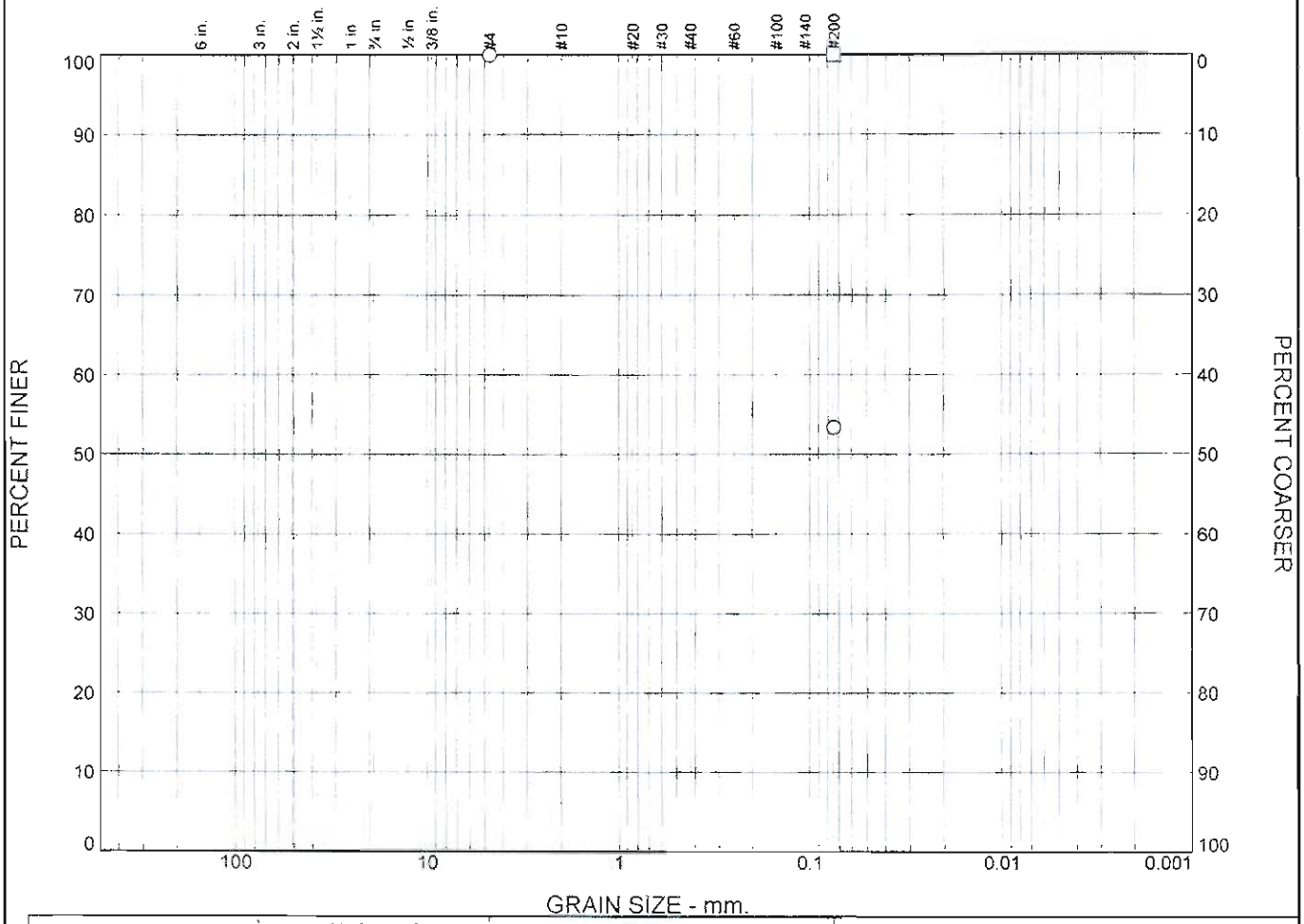
Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
201.40	0.00	0.00	#200	0.00	100.0

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	0.0	0.0	0.0			100.0

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	9.7	17.4	19.5	53.4	
□	0.0	0.0	0.0	0.0	0.0	0.0	100.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	40	19	1.2484	0.1346						
□	53	27								

	Material Description	USCS	AASHTO
○	sandy lean clay	CL	A-6(8)
□	fat clay	CH	A-7-6(31)

Project No. 114- **Client:**

Project: RFETS-OLF

○ **Source of Sample:** TtP-3 **Depth:** 8'

□ **Source of Sample:** TtP-3 **Depth:** 11.5'-12.0'

Tetra Tech, Inc.

Billings, MT

Remarks:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-4
Depth: 6'
Material Description: clayey sand with gravel
Liquid Limit: 39 **Plastic Limit:** 21
USCS Classification: SC **AASHTO Classification:** A-2-6(1)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
177.00	0.00	0.00	3/4	0.00	100.0
			1/2	12.40	93.0
			3/8	16.90	90.5
			#4	27.40	84.5
			#10	35.70	79.8
			#20	49.40	72.1
			#40	71.10	59.8
			#80	105.70	40.3
			#100	112.10	36.7
			#200	128.70	27.3

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	15.5	15.5	4.7	20.0	32.5	57.2			27.3

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
			0.0951	0.2764	0.4284	2.0618	5.0607	9.0002	14.5890

Fineness Modulus
2.13

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-4
Depth: 10'-11'
Material Description: clayey sand
Liquid Limit: 30 **Plastic Limit:** 19
USCS Classification: SC **AASHTO Classification:** A-6(0)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
134.60	0.00	0.00	#4	0.00	100.0
			#200	86.00	36.1

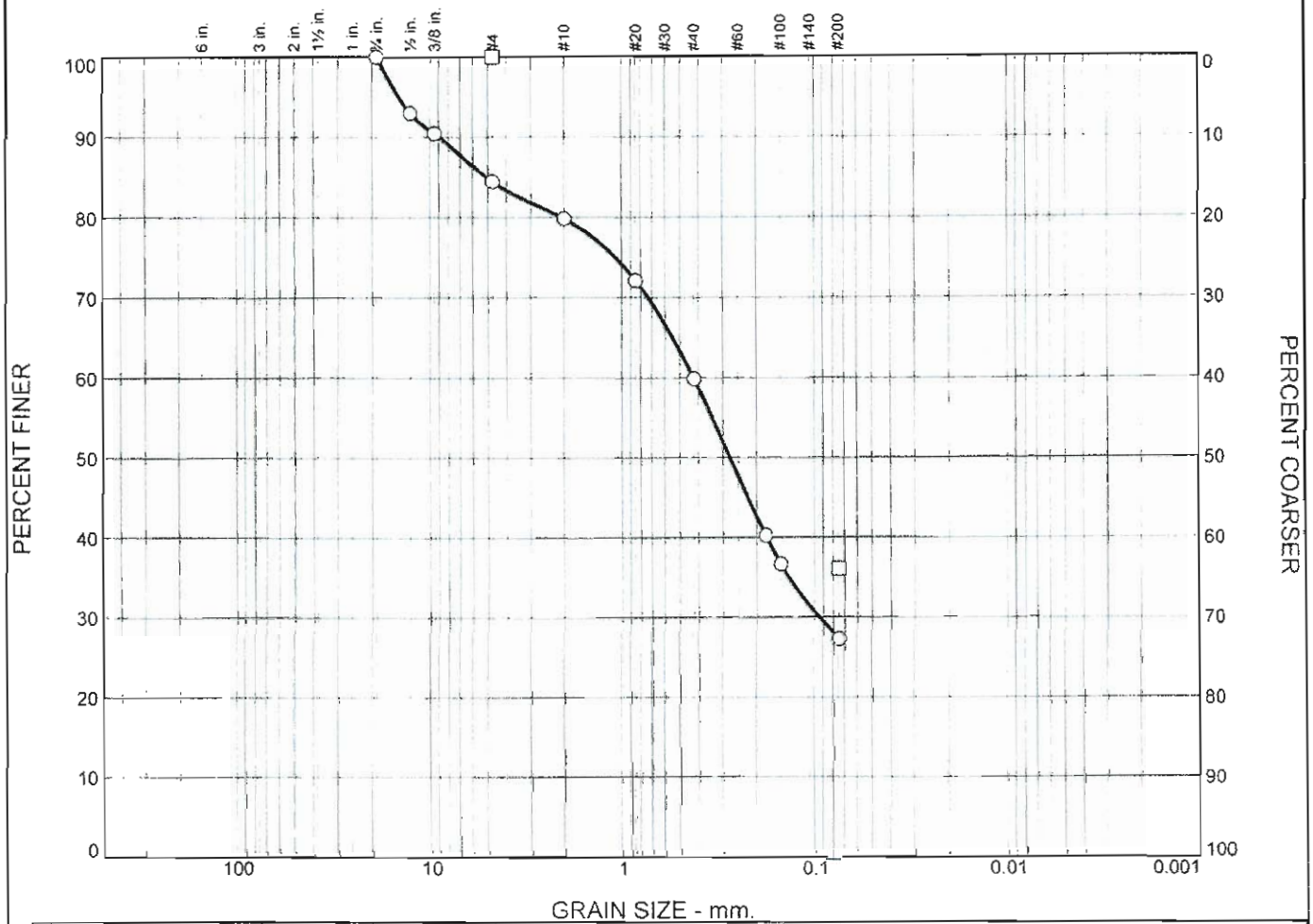
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	13.3	23.9	26.7	63.9			36.1

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.1848	0.3538	1.2964	1.7936	2.4815	3.4332

Fineness Modulus
1.60

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	15.5	4.7	20.0	32.5	27.3	
□	0.0	0.0	0.0	13.3	23.9	26.7	36.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	39	21	5.0607	0.4284	0.2764	0.0951				
□	30	19	1.7936	0.3538	0.1848					

	Material Description	USCS	AASHTO
○	clayey sand with gravel	SC	A-2-6(1)
□	clayey sand	SC	A-6(0)

Project No. 114- **Client:**

Project: RFETS-OLF

○ **Source of Sample:** TtP-4 **Depth:** 6'

□ **Source of Sample:** TtP-4 **Depth:** 10'-11'

Remarks:

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Figure

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-5
Depth: 8'
Material Description: clayey sand with gravel
Liquid Limit: 45 **Plastic Limit:** 22
USCS Classification: SC **AASHTO Classification:** A-2-7(0)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
137.60	0.00	0.00	1	0.00	100.0
			3/4	22.70	83.5
			1/2	27.40	80.1
			3/8	30.10	78.1
			#4	37.50	72.7
			#10	50.10	63.6
			#20	64.50	53.1
			#40	77.90	43.4
			#80	90.10	34.5
			#100	102.70	25.4
			#200	112.70	18.1

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	16.5	10.8	27.3	9.1	20.2	25.3	54.6			18.1

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.0899	0.1645	0.7094	1.4317	12.2435	19.7865	21.7904	23.5902

Fineness Modulus
3.31

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-5
Depth: 9'-10'
Material Description: clayey sand with gravel
Liquid Limit: 46 **Plastic Limit:** 21
USCS Classification: SC **AASHTO Classification:** A-7-6(6)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
438.70	0.00	0.00	1	0.00	100.0
			3/4	26.10	94.1
			1/2	37.60	91.4
			3/8	55.30	87.4
			#4	89.00	79.7
			#10	117.30	73.3
			#20	152.40	65.3
			#40	183.20	58.2
			#80	222.40	49.3
			#100	230.30	47.5
			#200	248.70	43.3

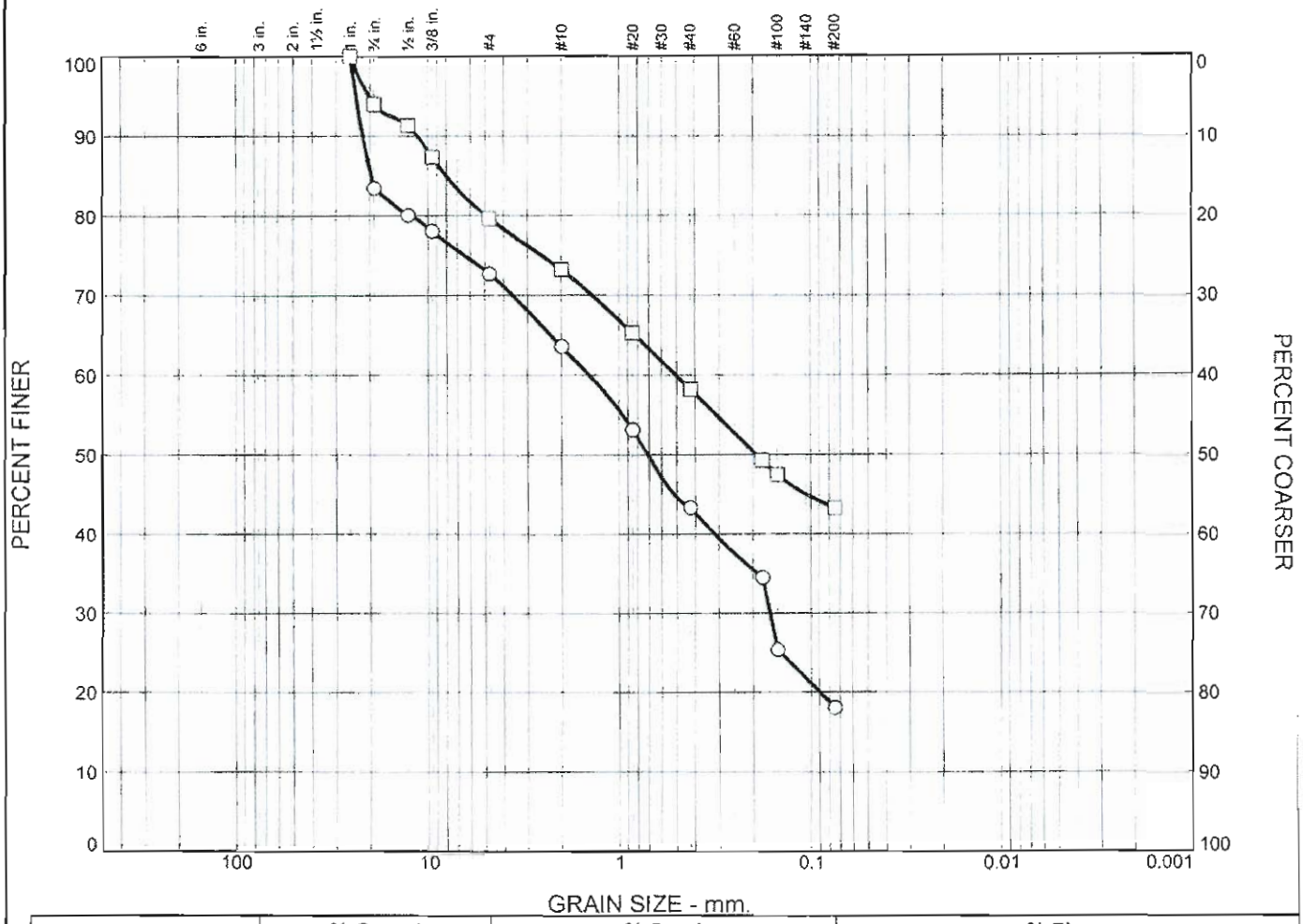
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	5.9	14.4	20.3	6.4	15.1	14.9	36.4			43.3

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.1925	0.5046	4.9192	8.0286	11.2770	20.2629

Fineness Modulus
2.32

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	16.5	10.8	9.1	20.2	25.3	18.1	
□	0.0	5.9	14.4	6.4	15.1	14.9	43.3	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	45	22	19.7865	1.4317	0.7094	0.1645				
□	46	21	8.0286	0.5046	0.1925					

	Material Description	USCS	AASHTO
○	clayey sand with gravel	SC	A-2-7(0)
□	clayey sand with gravel	SC	A-7-6(6)

Project No. 114- **Client:**

Project: RFETS-OLF

○ **Source of Sample:** TtP-5 **Depth:** 8'

□ **Source of Sample:** TtP-5 **Depth:** 9'-10'

Remarks:

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Billings, MT

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TP-6
Depth: 9'
Material Description: sandy lean clay with gravel
Liquid Limit: 49 **Plastic Limit:** 21
USCS Classification: CL **AASHTO Classification:** A-7-6(13)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
139.80	0.00	0.00	1	0.00	100.0
			3/8	12.40	91.1
			#4	21.60	84.5
			#10	27.40	80.4
			#20	33.70	75.9
			#40	39.50	71.7
			#80	51.20	63.4
			#100	53.50	61.7
			#200	59.40	57.5

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	2.5	13.0	15.5	4.1	8.7	14.2	27.0			57.5

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
					0.1183	1.8315	5.0393	8.5201	14.3193

Fineness Modulus
1.64

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-6
Depth: 10'
Material Description: lean clay
Liquid Limit: 40 **Plastic Limit:** 18
USCS Classification: CL **AASHTO Classification:** A-6(18)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
331.00	0.00	0.00	#10	0.00	100.0
			#20	2.00	99.4
			#40	5.30	98.4
			#80	10.90	96.7
			#100	20.40	93.8
			#200	50.00	84.9

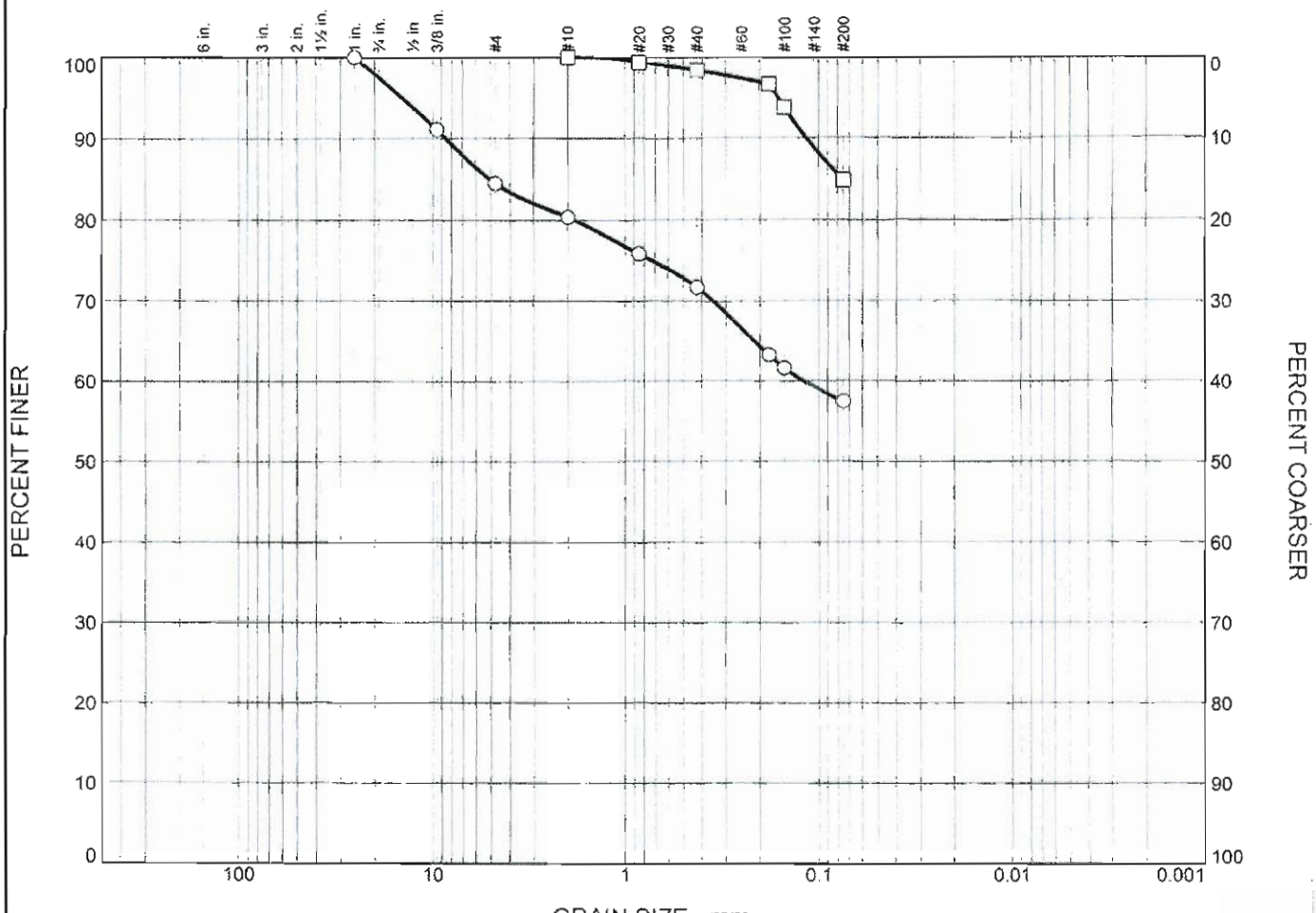
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	1.6	13.5	15.1			84.9

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
							0.0757	0.1153	0.1610

Fineness Modulus
0.10

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	2.5	13.0	4.1	8.7	14.2	57.5	
□	0.0	0.0	0.0	0.0	1.6	13.5	84.9	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	49	21	5.0393	0.1183						
□	40	18	0.0757							

	Material Description	USCS	AASHTO
○	sandy lean clay with gravel	CL	A-7-6(13)
□	lean clay	CL	A-6(18)

Project No. 114- **Client:**

Project: RFETS-OLF

○ **Source of Sample:** TtP-6 **Depth:** 9'

□ **Source of Sample:** TtP-6 **Depth:** 10'

Remarks:

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Billings, MT

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-7
Depth: 8'
Material Description: clayey sand with gravel
Liquid Limit: 34 Plastic Limit: 20
USCS Classification: SC AASHTO Classification: A-2-6(0)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
283.60	0.00	0.00	3/4	0.00	100.0
			1/2	9.80	96.5
			3/8	19.90	93.0
			#4	56.10	80.2
			#10	99.00	65.1
			#20	162.30	42.8
			#40	199.90	29.5
			#80	223.00	21.4
			#100	228.00	19.6
			#200	238.40	15.9

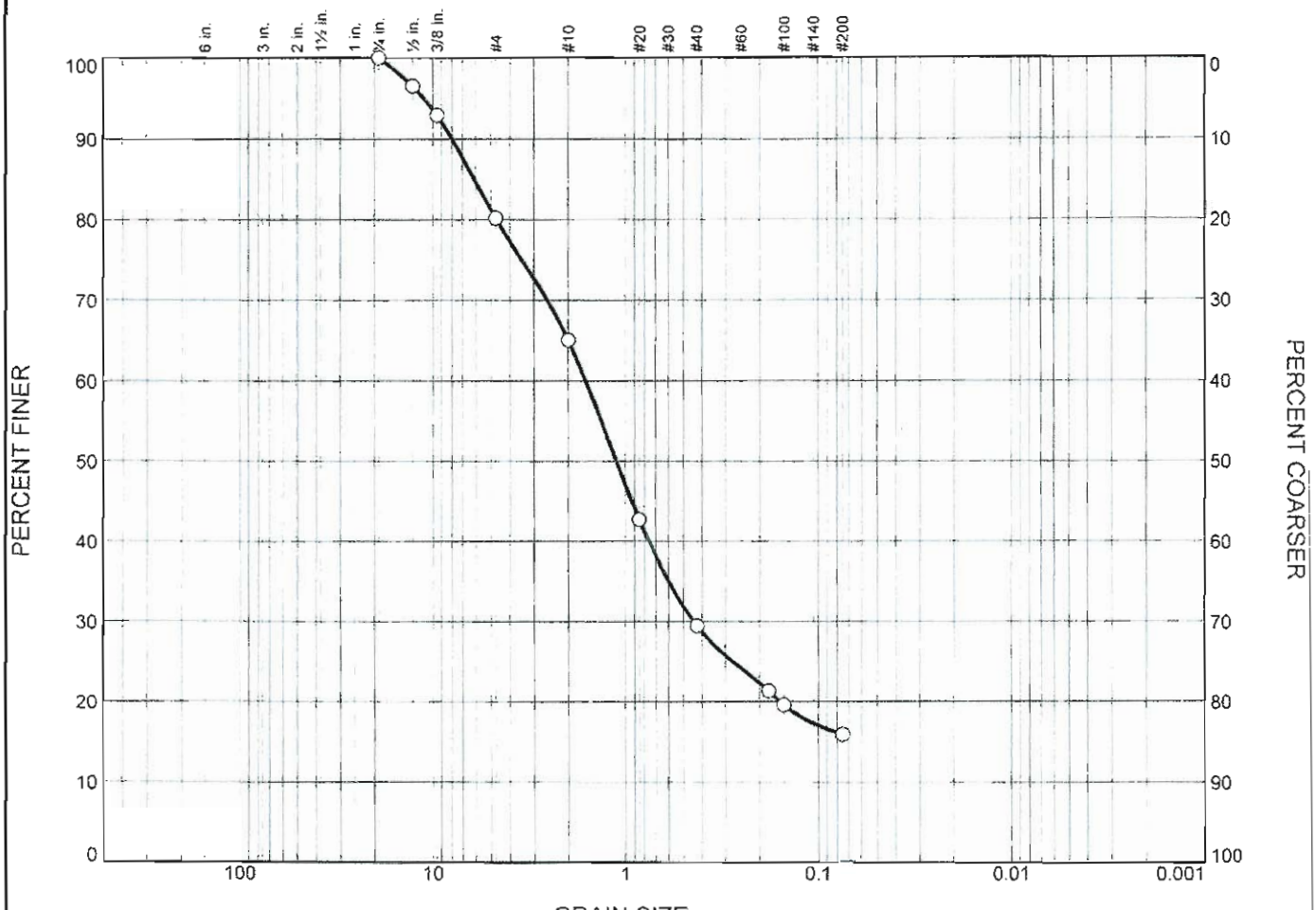
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	19.8	19.8	15.1	35.6	13.6	64.3			15.9

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.1565	0.4405	1.1182	1.6182	4.6921	6.1140	7.9562	11.0569

Fineness Modulus
3.26

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	19.8	15.1	35.6	13.6		15.9

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	34	20	6.1140	1.6182	1.1182	0.4405				

	Material Description	USCS	AASHTO
○	clayey sand with gravel	SC	A-2-6(0)

Project No. 114- **Client:**

Project: RFETS-OLF

○ **Source of Sample:** TtP-7 **Depth:** 8'

Remarks:

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Figure

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-8
Depth: 4'-6'
Material Description: fat clay with sand
Liquid Limit: 53 **Plastic Limit:** 22
USCS Classification: CH **AASHTO Classification:** A-7-6(26)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
341.70	0.00	0.00	3/8	0.00	100.0
			#4	2.90	99.2
			#10	10.50	96.9
			#20	22.30	93.5
			#40	34.10	90.0
			#80	49.50	85.5
			#100	53.40	84.4
			#200	63.60	81.4

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.8	0.8	2.3	6.9	8.6	17.8			81.4

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
							0.1660	0.4232	1.1980

Fineness Modulus
0.44

GRAIN SIZE DISTRIBUTION TEST DATA

3/21/2008

Project: RFETS-OLF
Project Number: 114-181750.4
Location: TtP-8
Depth: 11'-13'
Material Description: fat clay with sand
Liquid Limit: 59 **Plastic Limit:** 26
USCS Classification: CH **AASHTO Classification:** A-7-6(30)

Sieve Test Data

Dry Sample and Tare (grams)	Tare (grams)	Cumulative Pan Tare Weight (grams)	Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Finer
224.20	0.00	0.00	#4	0.00	100.0
			#200	38.10	83.0

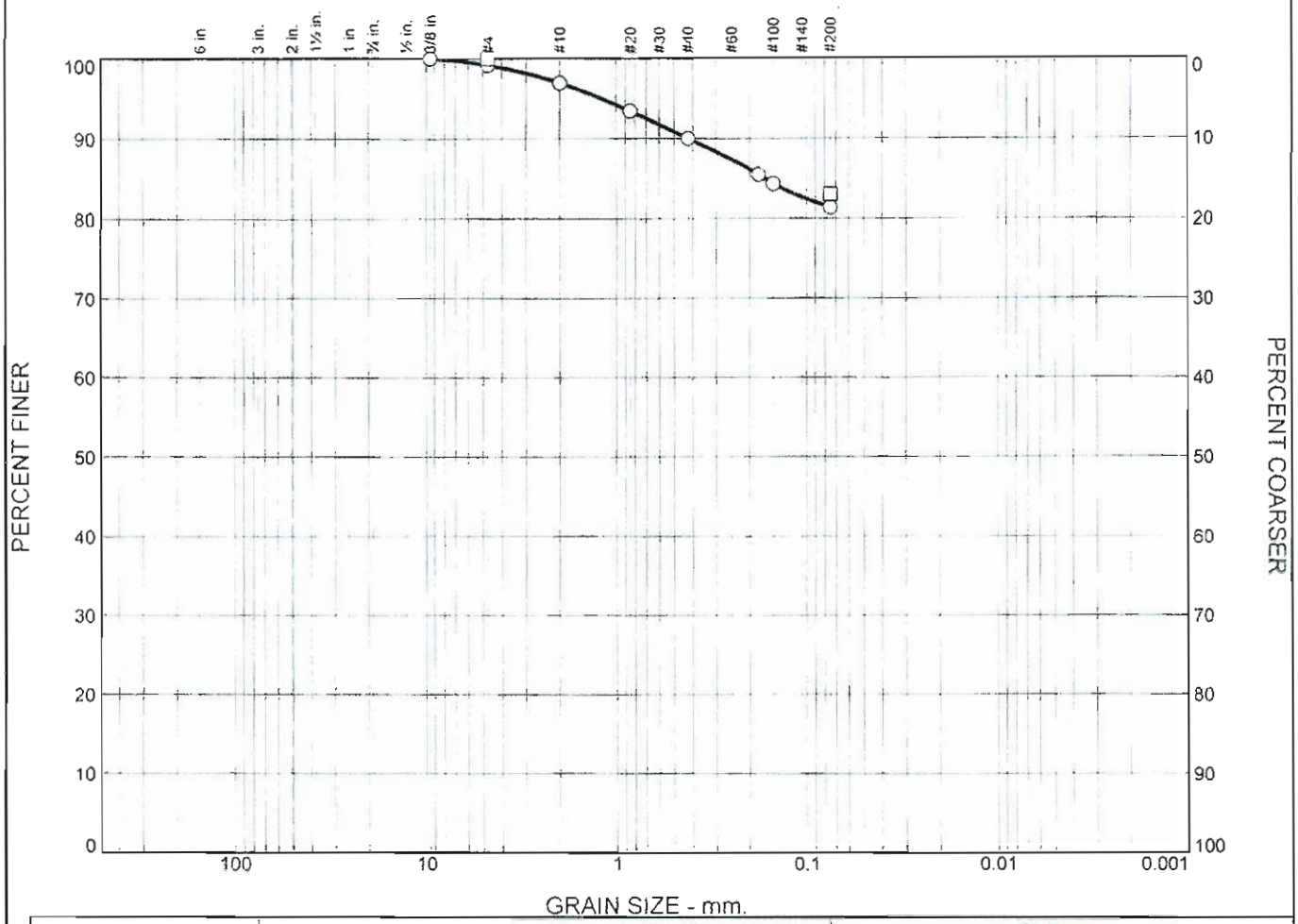
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	3.5	6.4	7.1	17.0			83.0

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
							0.1220	0.4135	1.4015

Fineness Modulus
0.43

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.8	2.3	6.9	8.6	81.4	
□	0.0	0.0	0.0	3.5	6.4	7.1	83.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	53	22	0.1660							
□	59	26	0.1220							

	Material Description	USCS	AASHTO
○	fat clay with sand	CH	A-7-6(26)
□	fat clay with sand	CH	A-7-6(30)

Project No. 114- Client:

Project: RFETS-OLF

○ **Source of Sample:** TtP-8 **Depth:** 4'-6'

□ **Source of Sample:** TtP-8 **Depth:** 11'-13'

Remarks:

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Figure