SUB-ATTACHMENT B

LABORATORY TEST RESULTS

LABORATORY TEST RESULTS

PROJECT: Flood Protection Project **DATE:** Jun.2008

AREA: Huntington, VA

TEST: Natural Moisture Contents (ASTM D2216) & Atterberg Limits (ASTM D 4318)

Hole No.	Sample No.	Depth (ft.)	Moisture Content, %	LL	PL	PI	Atterberg Classification	Symbol
DH-1	Jar-4	3.0-4.5	31.7	52	23	29	Fat Clay	CH
DH-1	Jar-9	10.5-12.0	25.4	50	20	30	Fat Clay	CH
DH-1	Jar-11	15.0-16.5	21.9	36	21	15	Lean Clay	CL
DH-1	Jar-14	22.5-24.0	23.7	44	21	23	Lean Clay	CL
DH-1	Jar-15	25.0-26.5	21.8	48	22	26	Lean Clay	CL
DH-2	Jar-3	1.5-3.0	41.1	61	32	29	Elastic Silt	MH
DH-2	Jar-7	7.5-9.0	16.6					
DH-2	Jars 8&9	9.0-11.6						
DH-2	Jar-11	12.5-14.0	26.3	53	21	32	Fat Clay	CH
DH-2	Jar-18	30.0-31.5	36.7	70	34	36	Elastic Silt	MH
DH-2	Jar-23	40.0-41.5	19.9	36	20	16	Lean Clay	CL
DH-3	Jar-4	5.0-6.5	6.9	Not Enough Sample to Test.				
DH-3	Jars 6-8	10.0-16.5	11.2	27	23	4	Silt	ML
DH-3	Jar-10	20.0-21.5	24.3	44	22	22	Lean Clay	CL
DH-3	Jar-16	35.0-36.5	26.3	54	26	28	Fat Clay	CH
DH-3	Jar-20	45.0-46.5	24.0	43	20	23	Lean Clay	CL
DH-4	Jar-3	2.5-4.0	21.8					
DH-4	Jar-5	7.5-8.8	36.5	75	22	53	Fat Clay	CH
DH-4	Jar-7	10.0-11.5	40.4	81	31	50	Fat Clay	CH
DH-4	Jar-13	25.0-26.5	22.4	42	19	23	Lean Clay	CL
DH-4	Jar-21	45.0-46.5	25.6					
DH-4	Jar-23	55.0-56.5	28.4	66	30	36	Fat Clay	CH
DH-5	Jar-4	3.0-4.5	5.3					
DH-5	Jars 6-9	6.0-12.0	10.3					
DH-5	Jar-13	20.0-21.5	25.2	47	20	27	Lean Clay	CL
DH-5	Jar-17	30.0-31.5	23.5					
DH-5	Jar-21	40.0-41.5	29.1	58	27	31	Fat Clay	CH
DH-6	Jar-3	1.5-3.0	21.5	61	25	36	Fat Clay	CH
DH-6	Jar-6	6.0-7.5	23.3	53	25	28	Fat Clay	CH
DH-6	Jars 7-11	7.5-16.5						
DH-6	Jar-14	22.5-24.0	25.1	67	24	43	Fat Clay	CH
DH-6	Jar-18	32.5-34.0	26.5	50	23	27	Fat Clay	CH

Note: The Atterberg Limits test is only performed on minus No. 40 material portion of a sample and does not represent the entire sample. Refer to the Visual Classification or the Gradation Analysis for the complete classification.

LABORATORY TEST RESULTS

PROJECT: Flood Protection Project **DATE:** Jun.2008

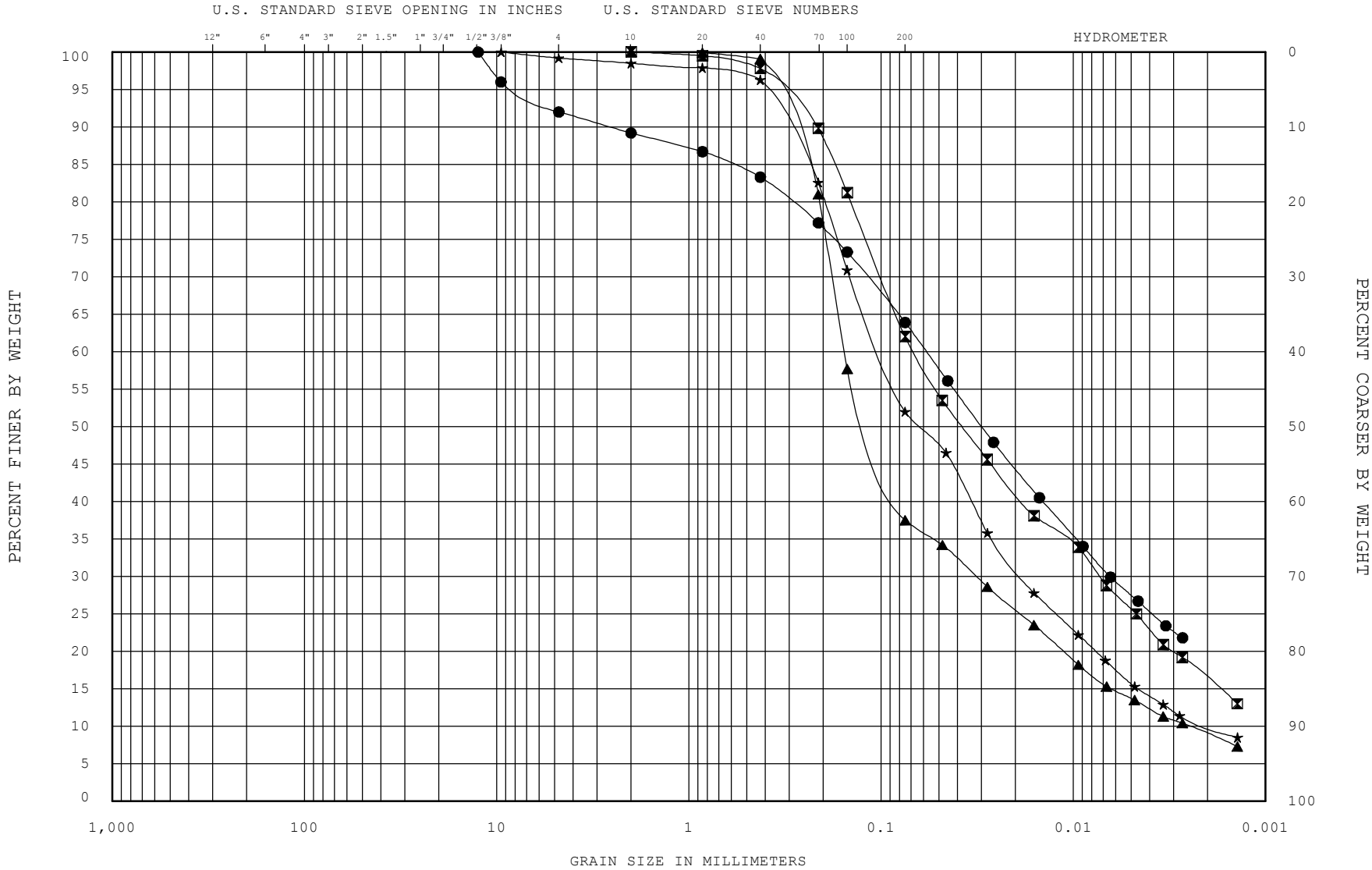
AREA: Huntington, VA

TEST: Natural Moisture Contents (ASTM D2216) & Atterberg Limits (ASTM D 4318)

Hole No.	Sample No.	Depth (ft.)	Moisture Content, %	LL	PL	PI	Atterberg Classification	Symbol
DH-7	Jar-4	3.0-4.5	27.4					
DH-7	Jar-6	6.0-7.5	17.5					
DH-7	Jar-8	9.0-10.5						
DH-7	Jars 9-11	10.5-16.5						
DH-7	Jar-12	17.5-18.0						
DH-7	Jar-15	22.5-24.0	33.5	59	29	30	Fat Clay	CH
DH-7	Jar-20	35.0-36.5	23.0	44	18	26	Lean Clay	CL
DH-8	Jar-6	4.5-6.0	60.8	83	42	41	Elastic Silt	MH
DH-8	Jars 9-11	9.0-14.0						
DH-8	Jar-12	15.0-16.5						
DH-8	Jar-14	20.0-21.5	28.0	63	27	36	Fat Clay	CH
DH-8	Jar-19	32.5-34.0	24.5	51	24	27	Fat Clay	CH
DH-8	Jar-23	40.0-41.5	27.7	54	29	25	Fat Clay	CH
DH-9	Jars 5&6	4.5-7.5	19.4					
DH-9	Jar-9	10.5-12.0						
DH-9	Jar-10	12.5-14.0						
DH-9	Jars 11-12	15.0-18.6						
DH-9	Jar-15	22.5-24.0	25.9	62	28	34	Fat Clay	CH
DH-9	Jar-23	42.5-44.0	21.9	50	21	29	Fat Clay	CH
DH-10	Jar-7	7.5-9.0	43.9	68	33	35	Elastic Silt	MH
DH-10	Jar-12	15.0-16.5	12.0					
DH-10	Jars 14&15	20.0-24.0	13.0					
DH-10	Jar-17	27.5-29.0	21.7	42	21	21	Lean Clay	CL
DH-10	Jar-19	32.5-34.0	24.0	54	26	28	Fat Clay	CH

Note: The Atterberg Limits test is only performed on minus No. 40 material portion of a sample and does not represent the entire sample. Refer to the Visual Classification or the Gradation Analysis for the complete classification.

GRADATION CURVES



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-4	3.0-4.5	SANDY FAT CLAY	CH	31.7	52	23	29
—⊠—	Jar-9	10.5-12.0	SANDY FAT CLAY	CH	25.4	50	20	30
—▲—	Jar-11	15.0-16.5	CLAYEY SAND	SC	21.9	36	21	15
—★—	Jar-14	22.5-24.0	SANDY LEAN CLAY	CL	23.7	44	21	23

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

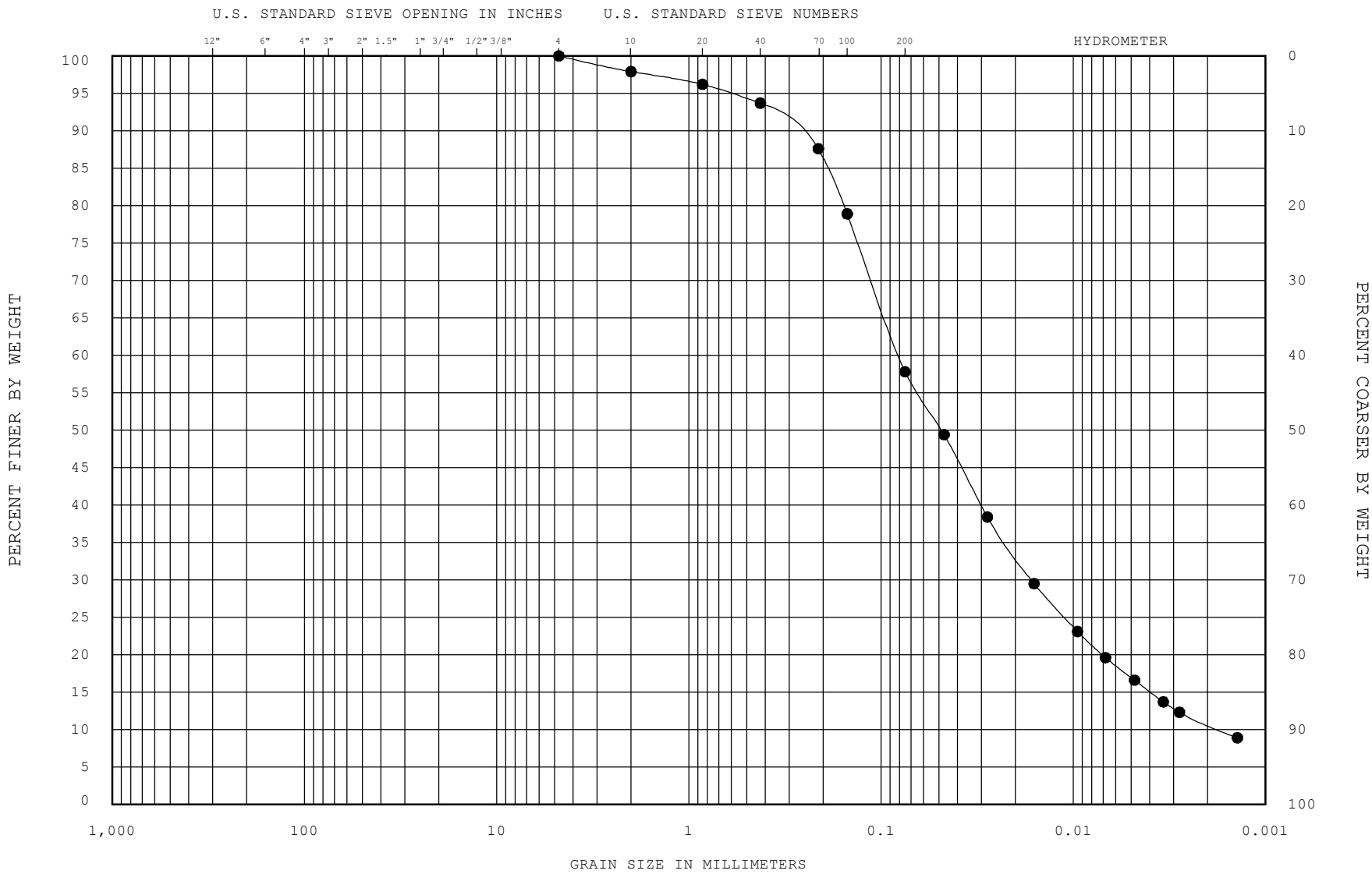
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-1*

DATE: *May 2008*



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)	Nat wc%	LL	PL	PI
—●—	Jar-15	25.0-26.5	SANDY LEAN CLAY CL	21.8	48	22	26
— —							
— —							
— —							

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

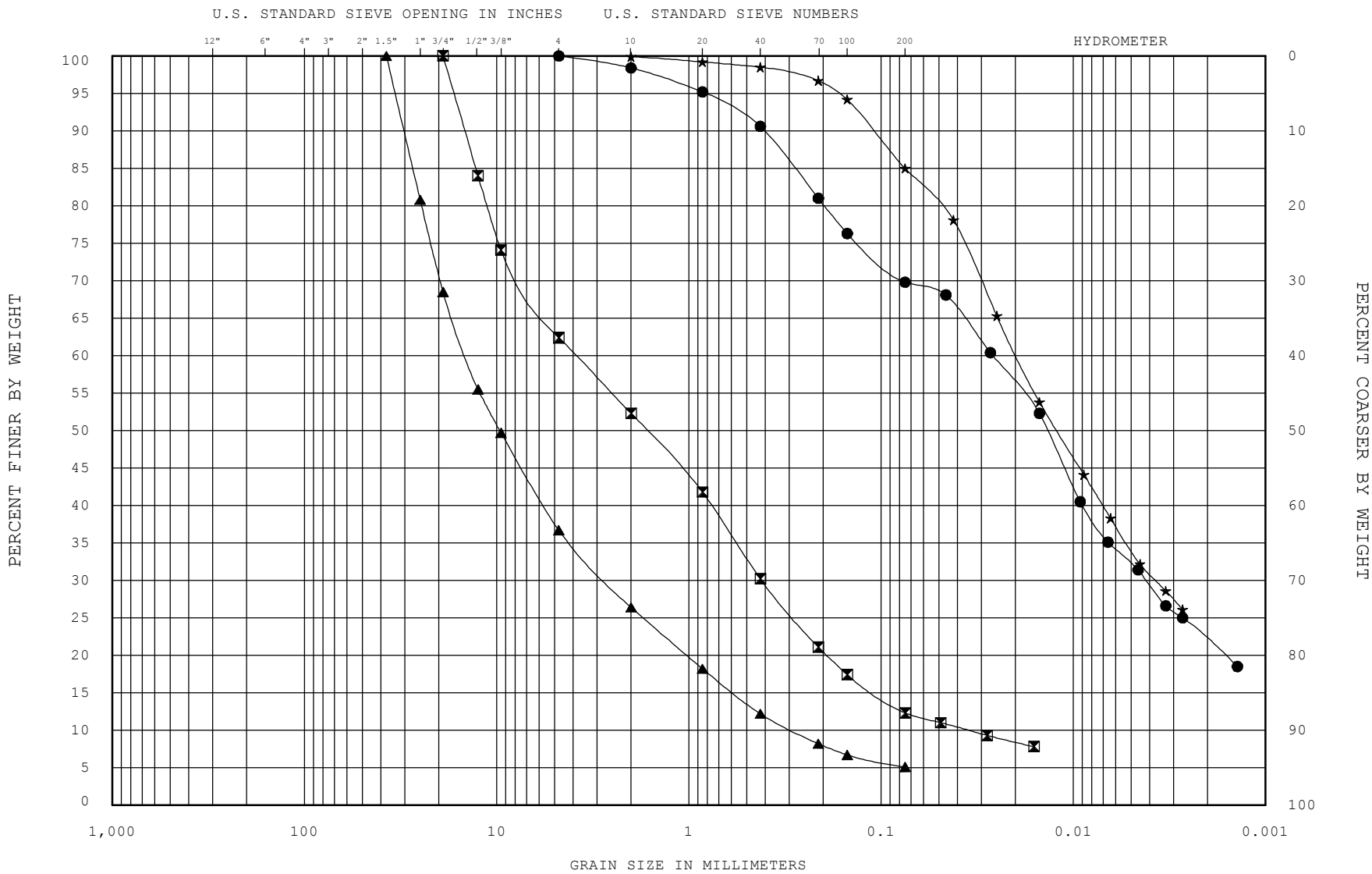
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-1*

DATE: *May 2008*



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-3	1.5-3.0	SANDY ELASTIC SILT	MH	41.1	61	32	29
—⊠—	Jar-7	7.5-9.0	SILTY SAND with GRAVEL	SM	16.6			
—▲—	Jars 8&9	9.0-11.6	WELL-GRADED GRAVEL with SILT and SAND	GW-GM				
—★—	Jar-11	12.5-14.0	FAT CLAY with SAND	CH	26.3	53	21	32

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

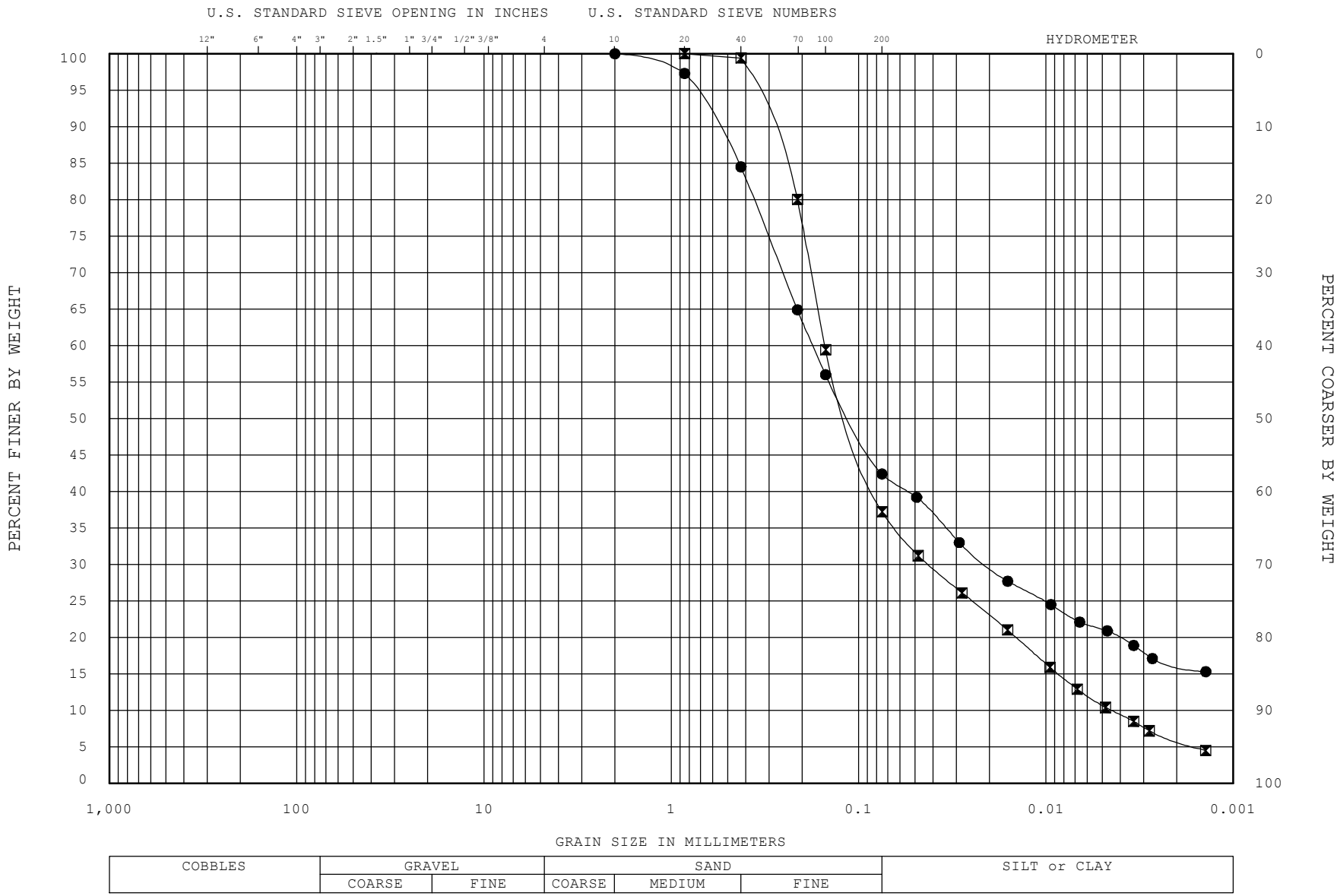
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-2*

DATE: *May 2008*



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-18	30.0-31.5	SILTY SAND	SM	36.7	70	34	36
—⊠—	Jar-23	40.0-41.5	CLAYEY SAND	SC	19.9	36	20	16
— —								
— —								

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

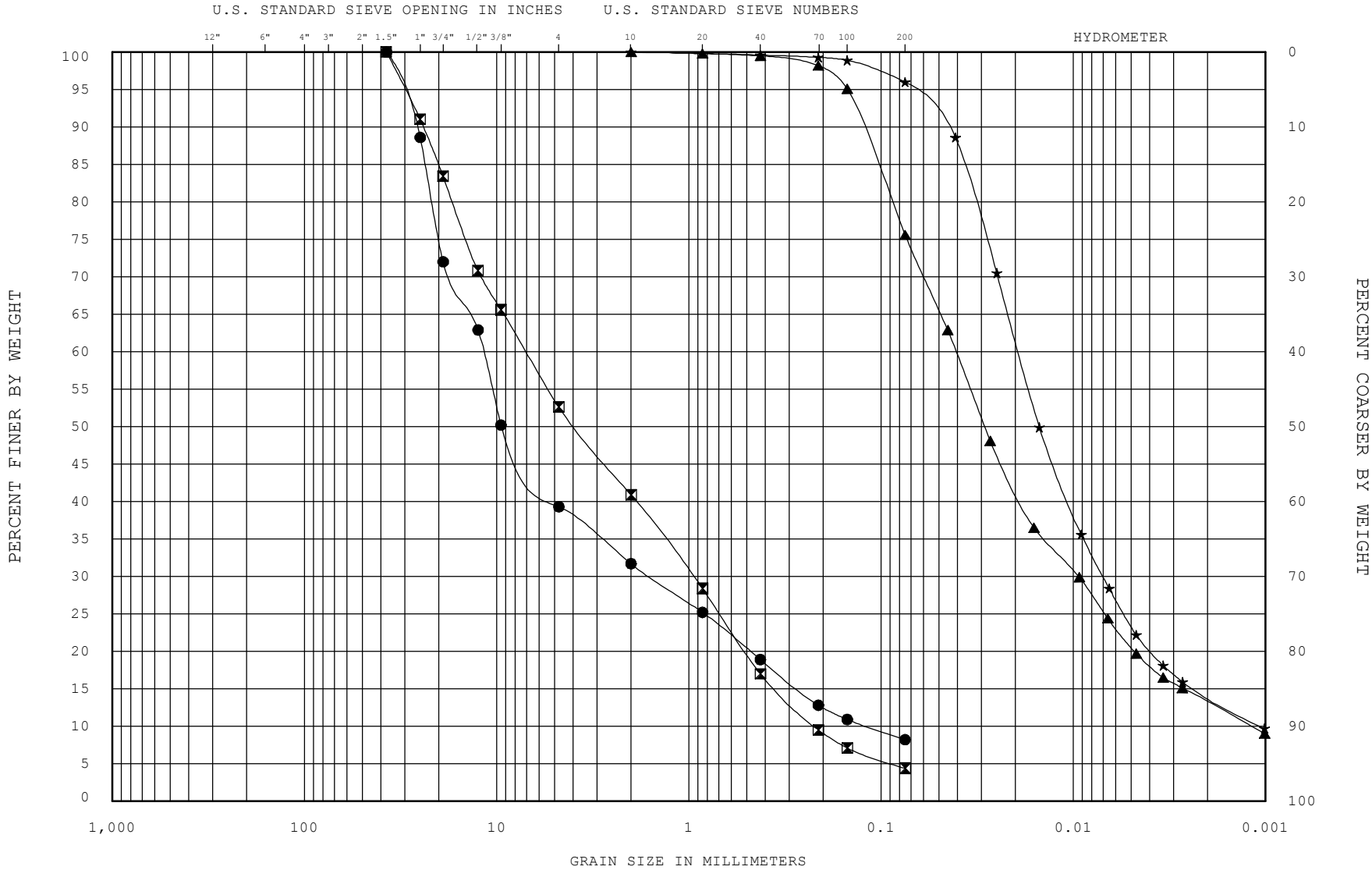
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-2*

DATE: *May 2008*



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-4	5.0-6.5	WELL-GRADED GRAVEL with SILT and SAND	GW-GM	6.9			
—⊠—	Jars 6-8	10.0-16.5	POORLY GRADED SAND with GRAVEL	SP	11.2	27	23	4
—▲—	Jar-10	20.0-21.5	LEAN CLAY with SAND	CL	24.3	44	22	22
—★—	Jar-16	35.0-36.5	FAT CLAY	CH	26.3	54	26	28

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

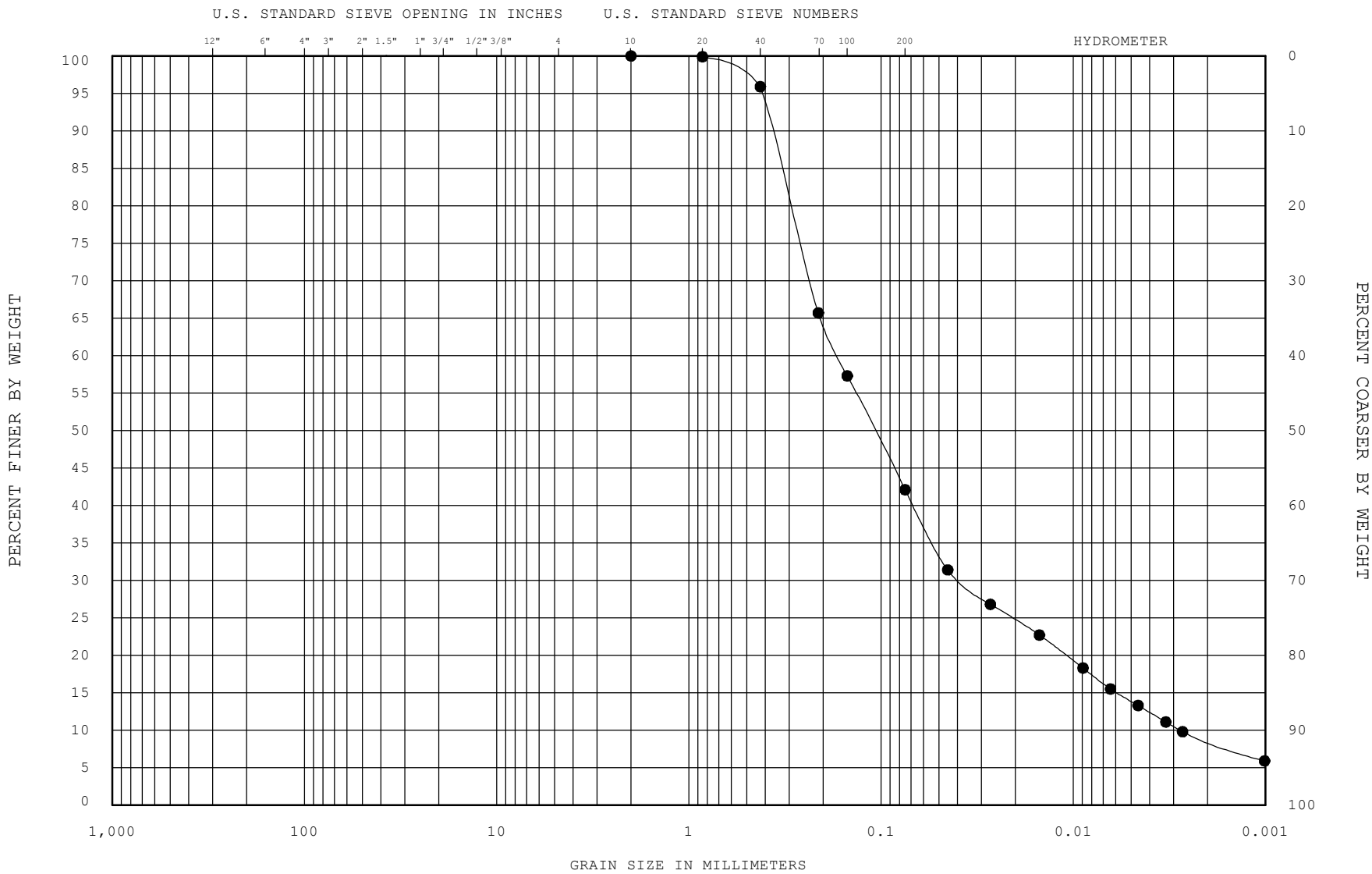
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-3*

DATE: *May 2008*



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-20	45.0-46.5	CLAYEY SAND	SC	24.0	43	20	23
— —								
— —								
— —								

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

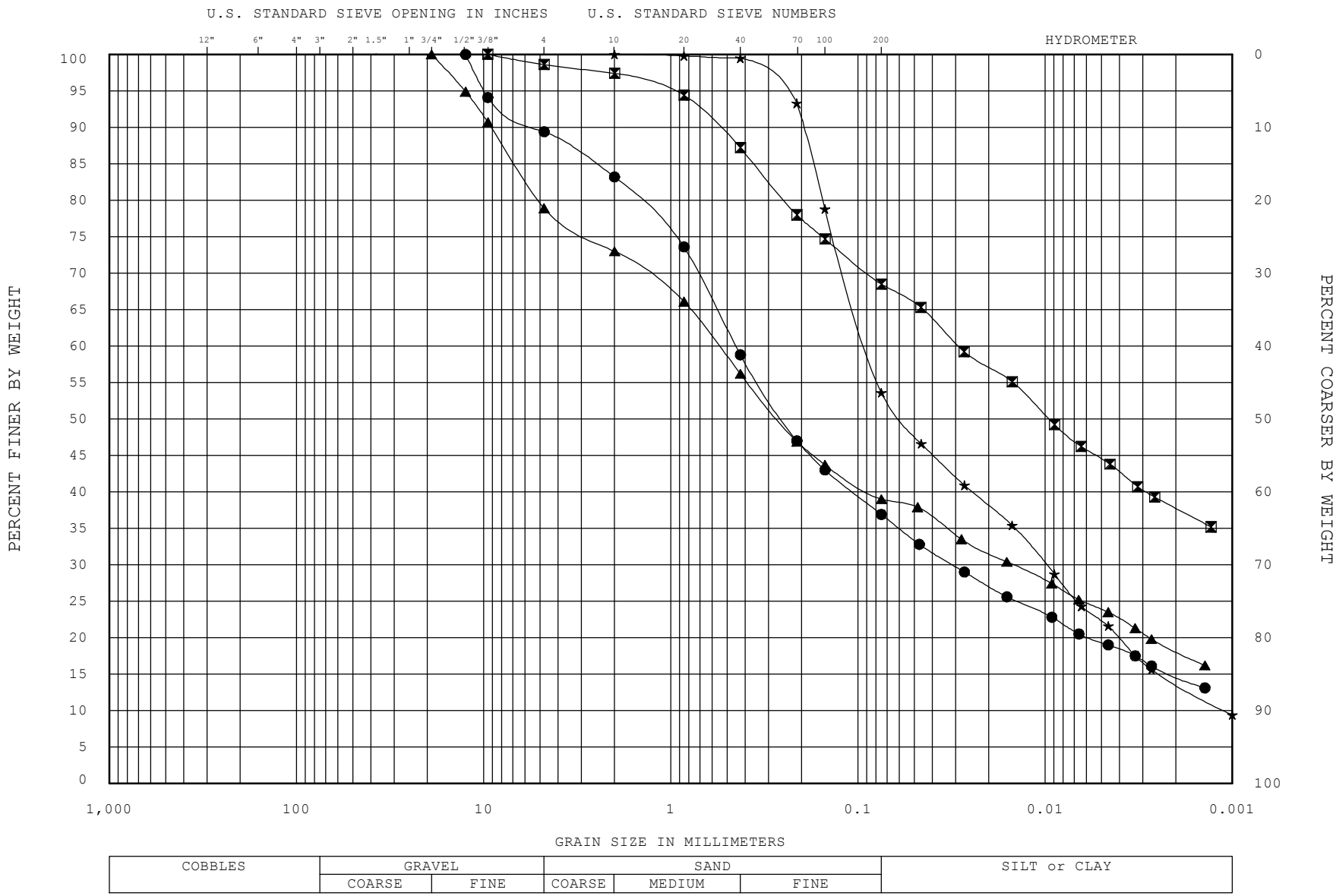
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-3*

DATE: *May 2008*



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-3	2.5-4.0	CLAYEY SAND	SC	21.8			
—⊠—	Jar-5	7.5-8.8	SANDY FAT CLAY	CH	36.5	75	22	53
—▲—	Jar-7	10.0-11.5	CLAYEY SAND with GRAVEL	SC	40.4	81	31	50
—★—	Jar-13	25.0-26.5	SANDY LEAN CLAY	CL	22.4	42	19	23

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

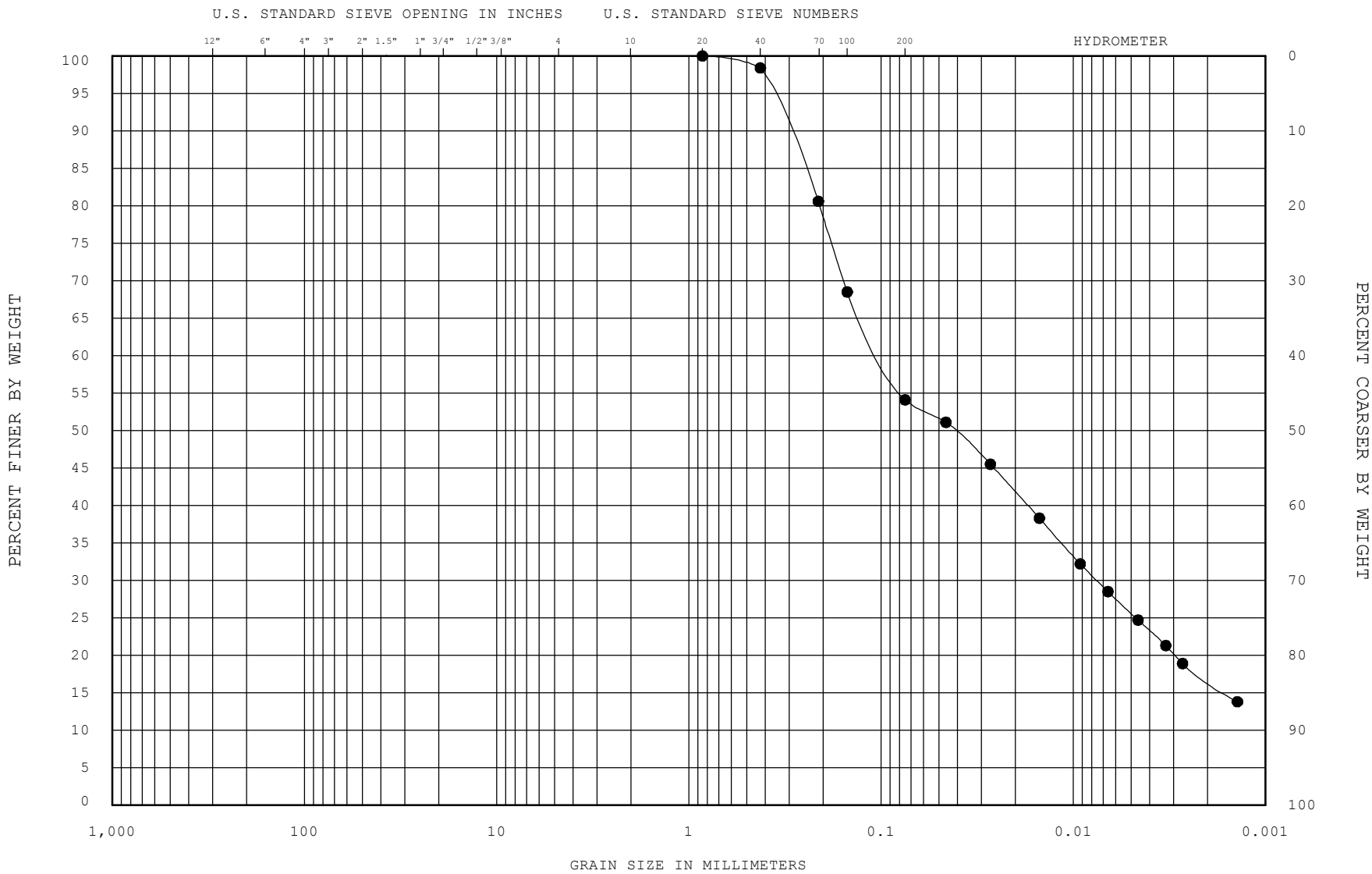
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-4*

DATE: *May 2008*



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)	Nat wc%	LL	PL	PI
—●—	Jar-21	45.0-46.5	SANDY FAT CLAY CH	25.6			
— —							
— —							
— —							

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

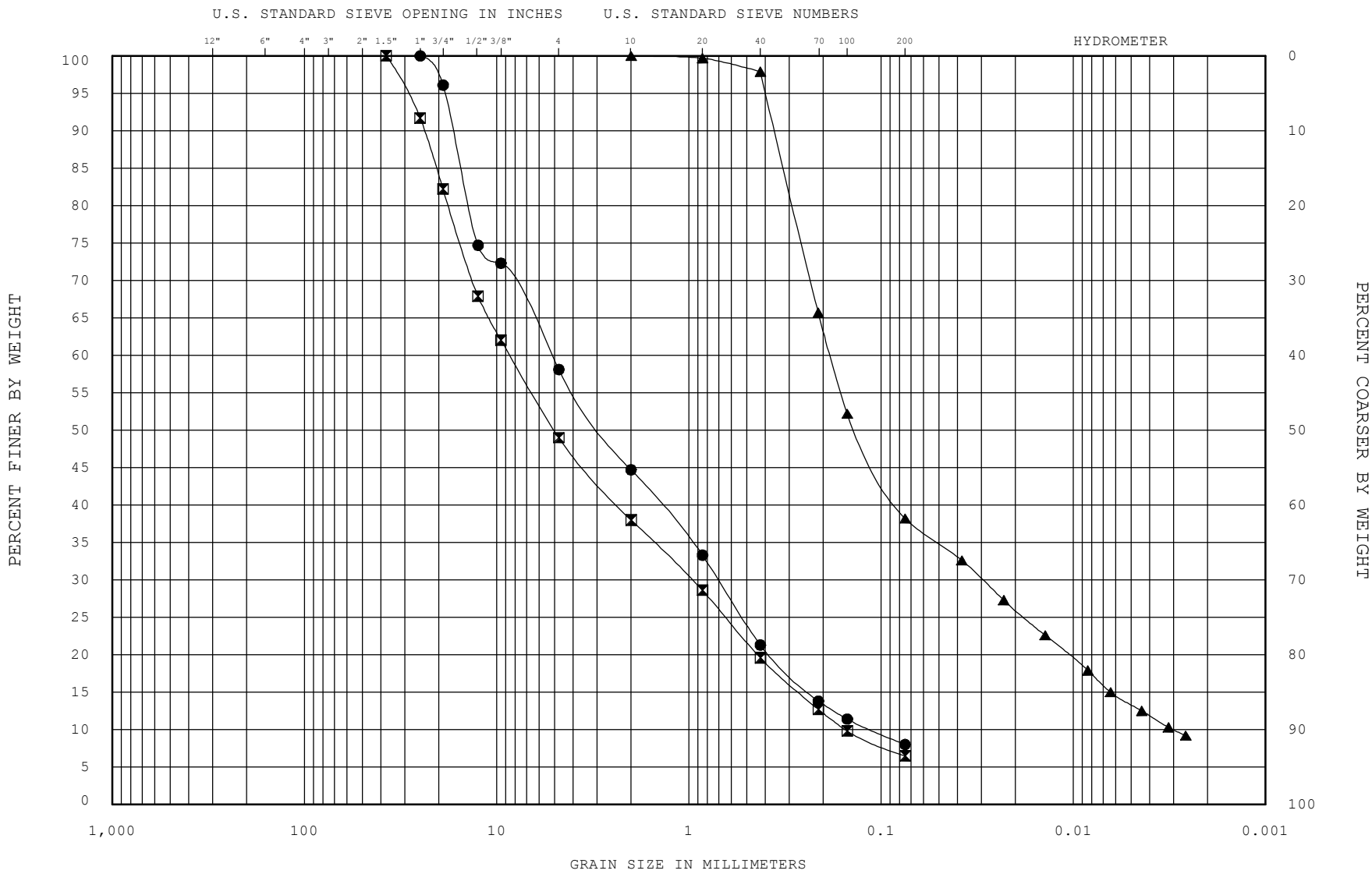
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-4*

DATE: *May 2008*



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)	Nat wc%	LL	PL	PI
—●—	Jar-4	3.0-4.5	POORLY GRADED SAND with SILT and GRAVEL SP-SM	5.3			
—⊠—	Jars 6-9	6.0-12.0	POORLY GRADED GRAVEL with SILT and SAND GP-GM	10.3			
—▲—	Jar-17	30.0-31.5	CLAYEY SAND SC	23.5			
— —							

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

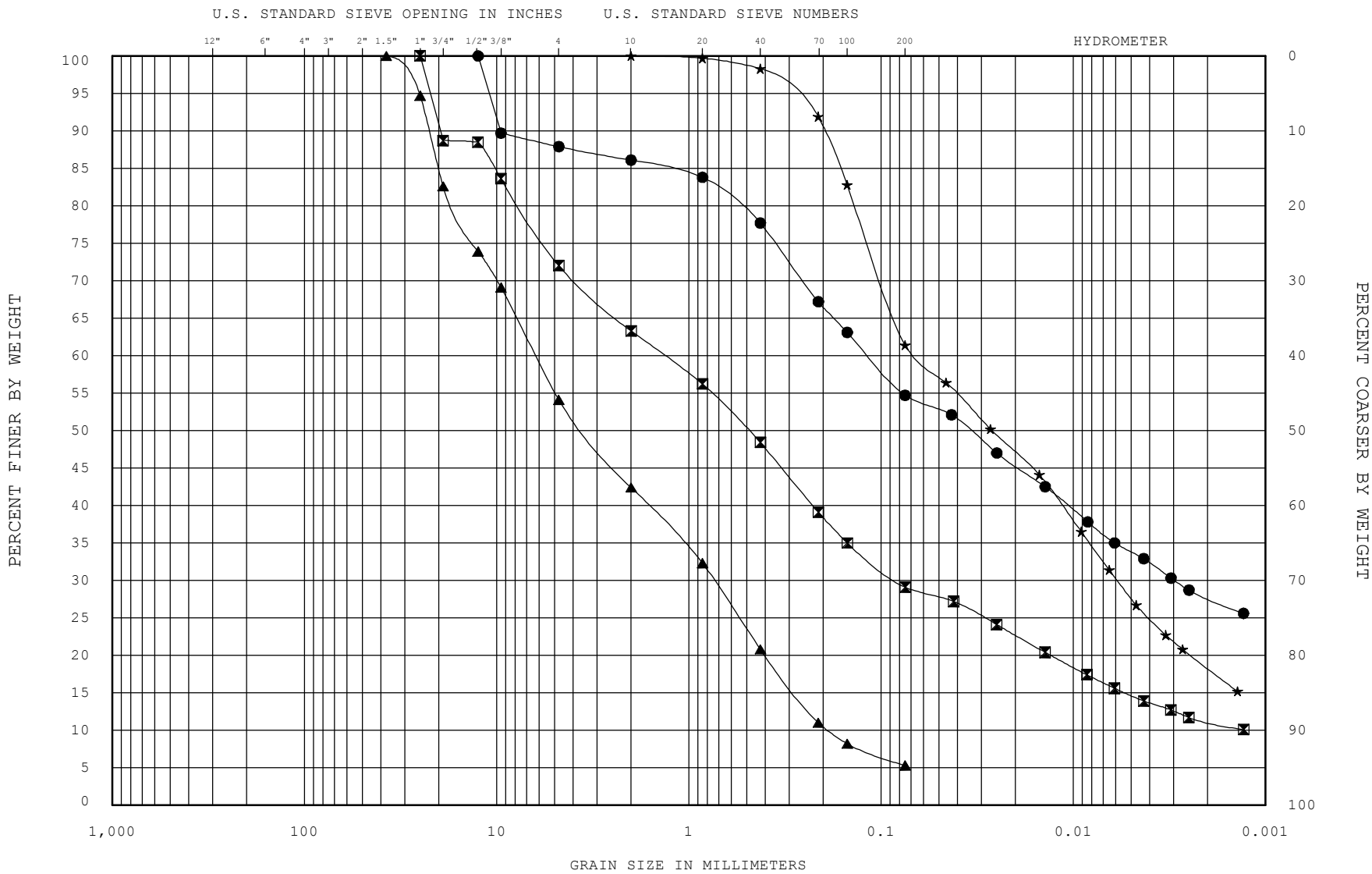
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-5*

DATE: *May 2008*



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-3	1.5-3.0	SANDY FAT CLAY	CH	21.5	61	25	36
—⊠—	Jar-6	6.0-7.5	CLAYEY SAND with GRAVEL	SC	23.3	53	25	28
—▲—	Jars 7-11	7.5-16.5	POORLY GRADED SAND with SILT and GRAVEL	SP-SM				
—★—	Jar-18	32.5-34.0	SANDY FAT CLAY	CH	26.5	50	23	27

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

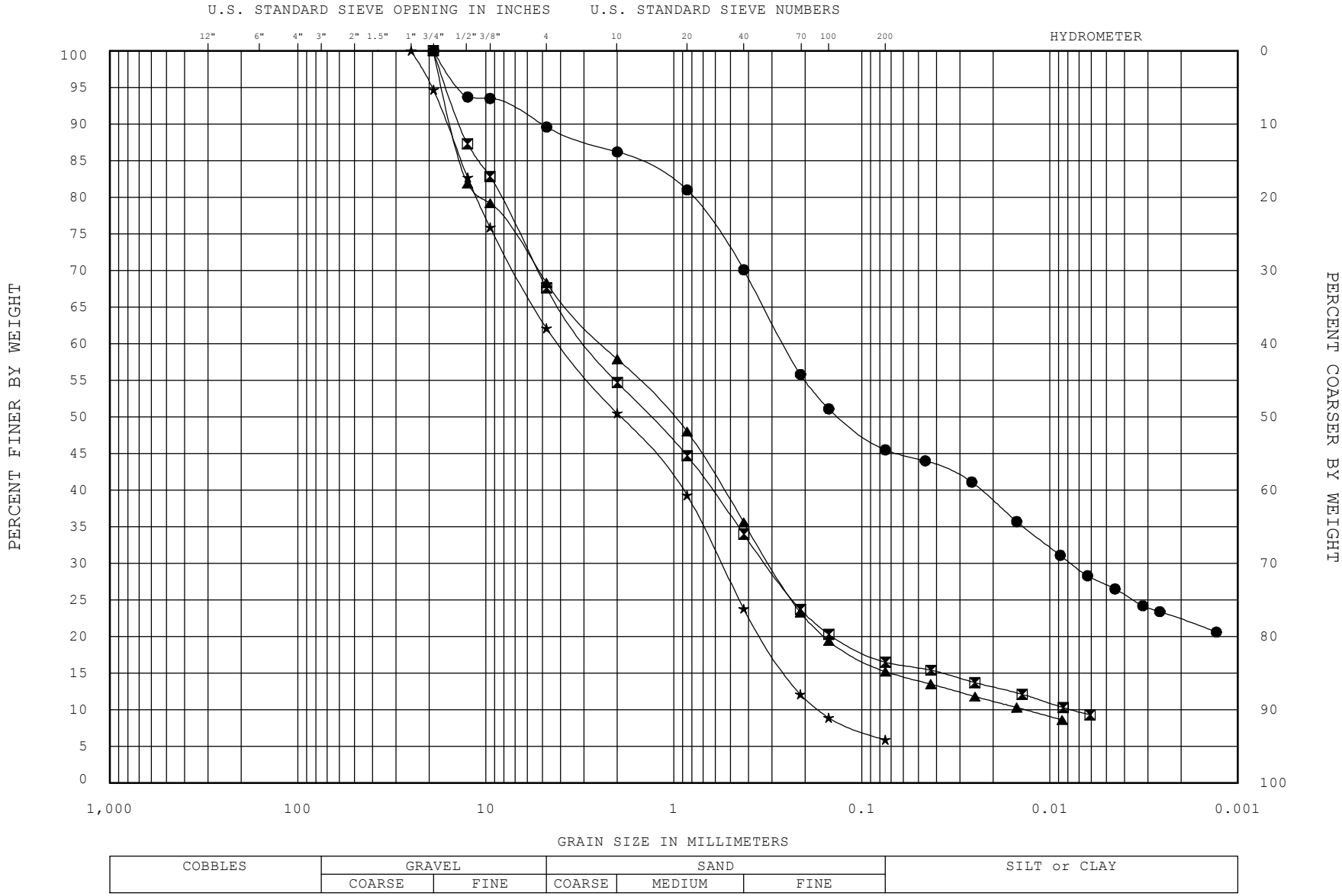
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-6*

DATE: *May 2008*



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-4	3.0-4.5	CLAYEY SAND	SC	27.4			
—⊠—	Jar-6	6.0-7.5	CLAYEY SAND with GRAVEL	SC	17.5			
—▲—	Jar-8	9.0-10.5	CLAYEY SAND with GRAVEL	SC				
—★—	Jars 9-11	10.5-16.5	POORLY GRADED SAND with SILT and GRAVEL	SP-SM				

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

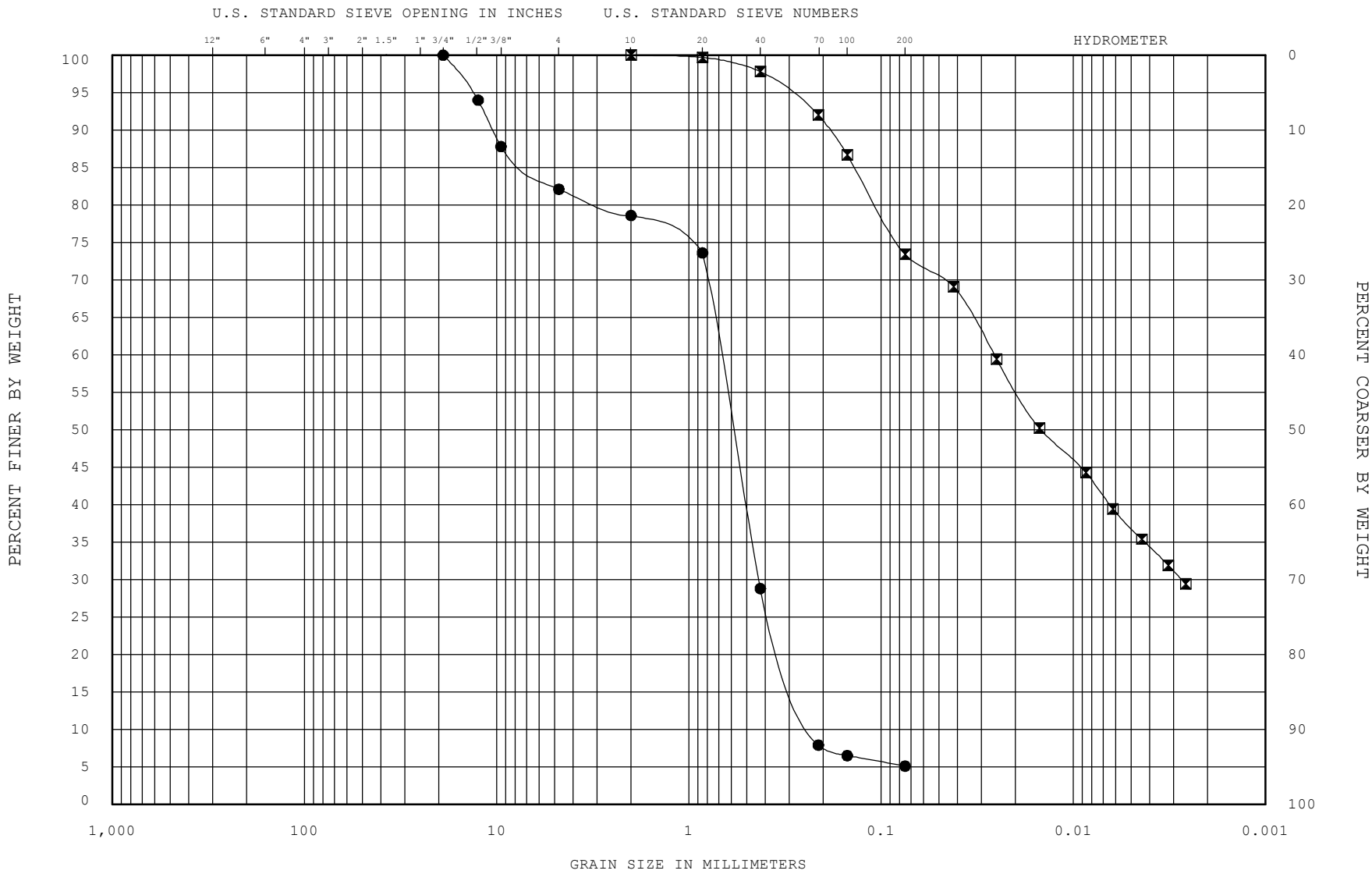
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-7*

DATE: *May 2008*



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)	Nat wc%	LL	PL	PI
—●—	Jar-12	17.5-18.0	POORLY GRADED SAND with SILT and GRAVEL SP-SM				
—⊠—	Jar-15	22.5-24.0	FAT CLAY with SAND CH	33.5	59	29	30
— —							
— —							

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

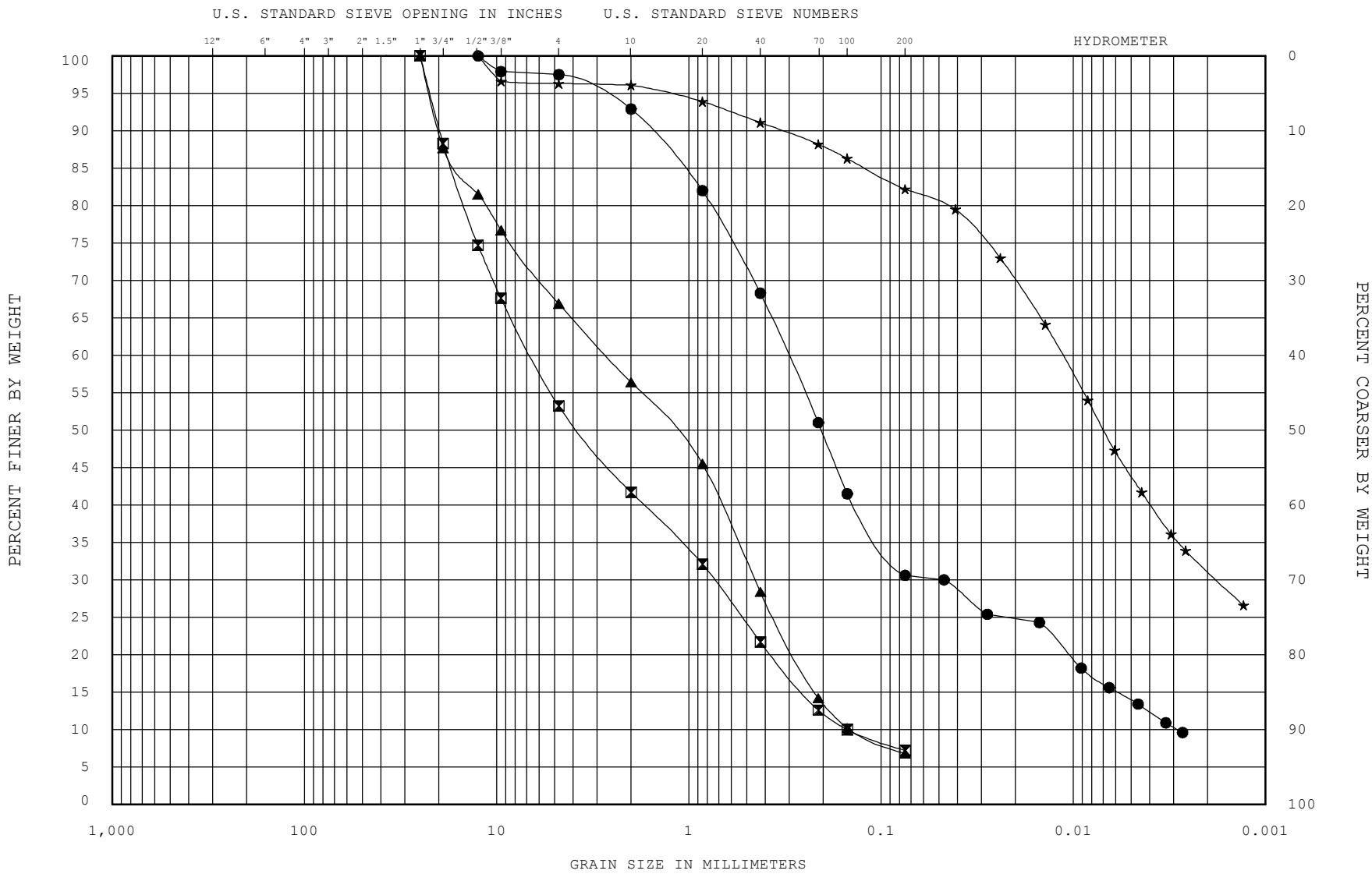
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-7*

DATE: *May 2008*



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-6	4.5-6.0	SILTY SAND	SM	60.8	83	42	41
—⊠—	Jars 9&11	9.0-14.0	POORLY GRADED GRAVEL with SILT and SAND	GP-GM				
—▲—	Jar-12	15.0-16.5	POORLY GRADED SAND with SILT and GRAVEL	SP-SM				
—★—	Jar-14	20.0-21.5	FAT CLAY with SAND	CH	28.0	63	27	36

REMARKS :

PROJECT: *Huntington, VA*

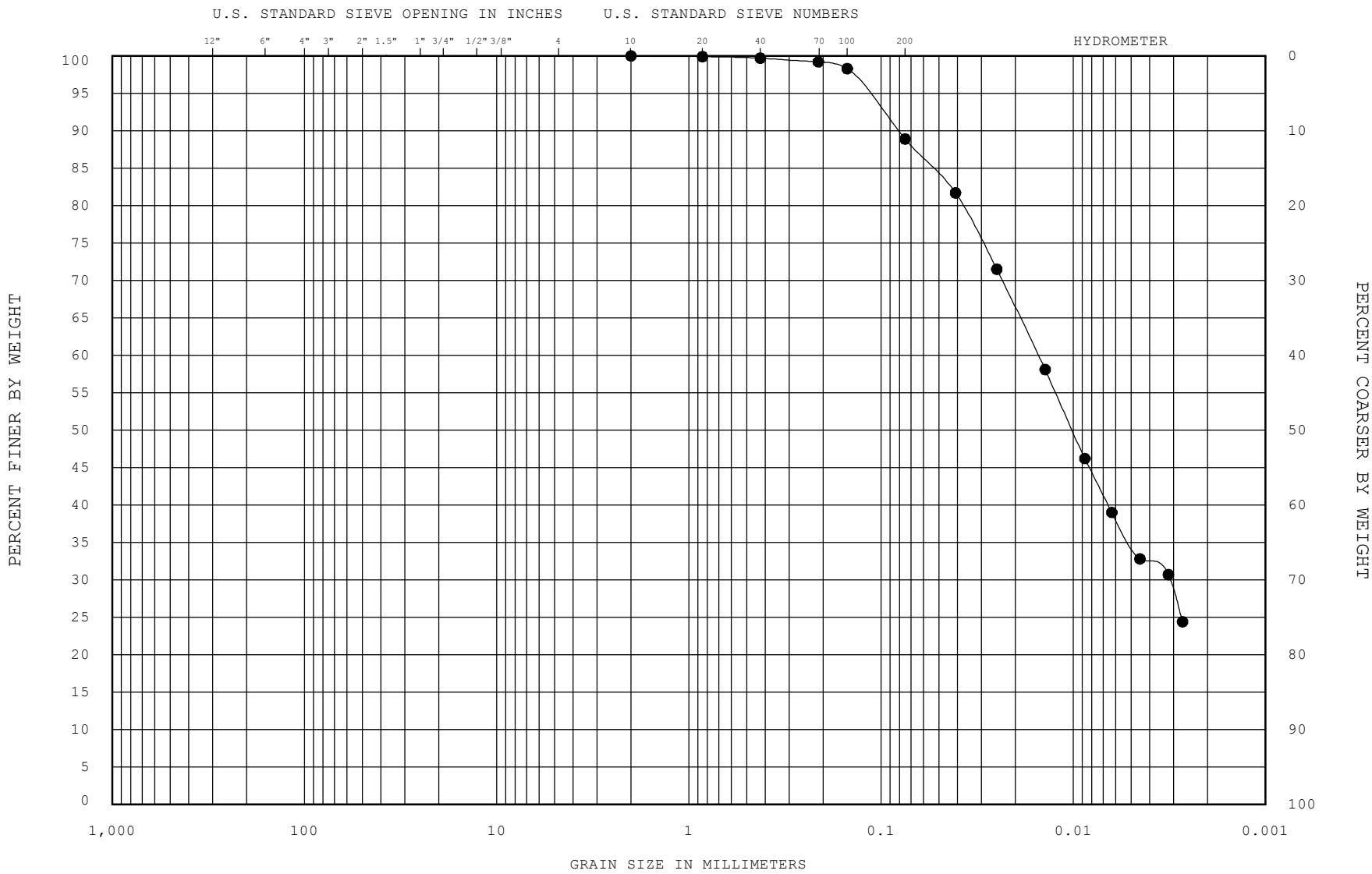
AREA: *Flood Protection Project*

BORING NO.: *DH-8*

DATE: *May 2008*

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-19	32.5-34.0	FAT CLAY	CH	24.5	51	24	27
— —								
— —								
— —								

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

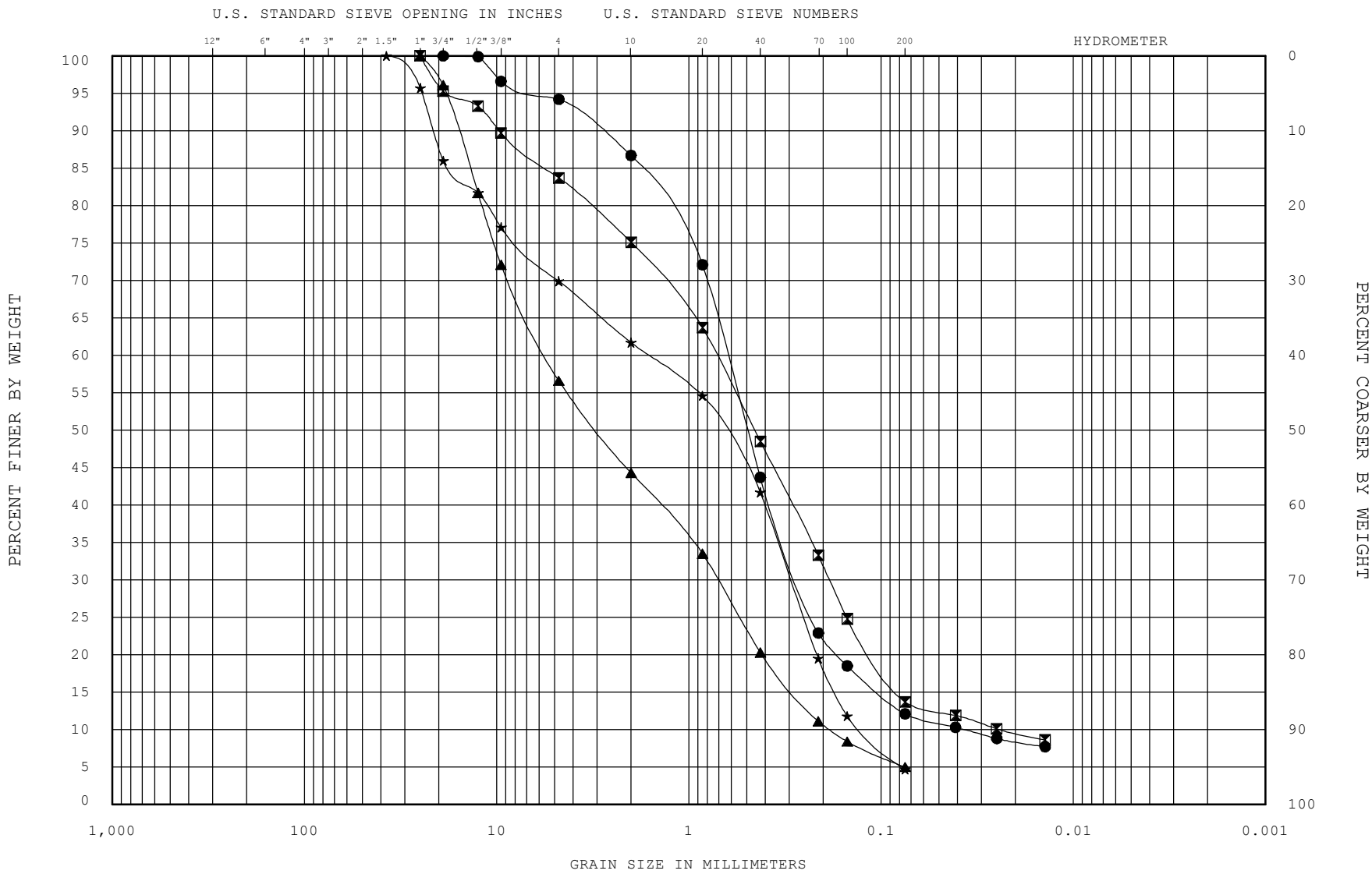
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-8*

DATE: *May 2008*



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jars 5&6	4.5-7.5	SILTY SAND	SM	19.4			
—⊠—	Jar-9	10.5-12.0	SILTY SAND with GRAVEL	SM				
—▲—	Jar-10	12.5-14.0	POORLY GRADED SAND with SILT and GRAVEL	SP-SM				
—★—	Jars 11&12	15.0-18.6	POORLY GRADED SAND with GRAVEL	SP				

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

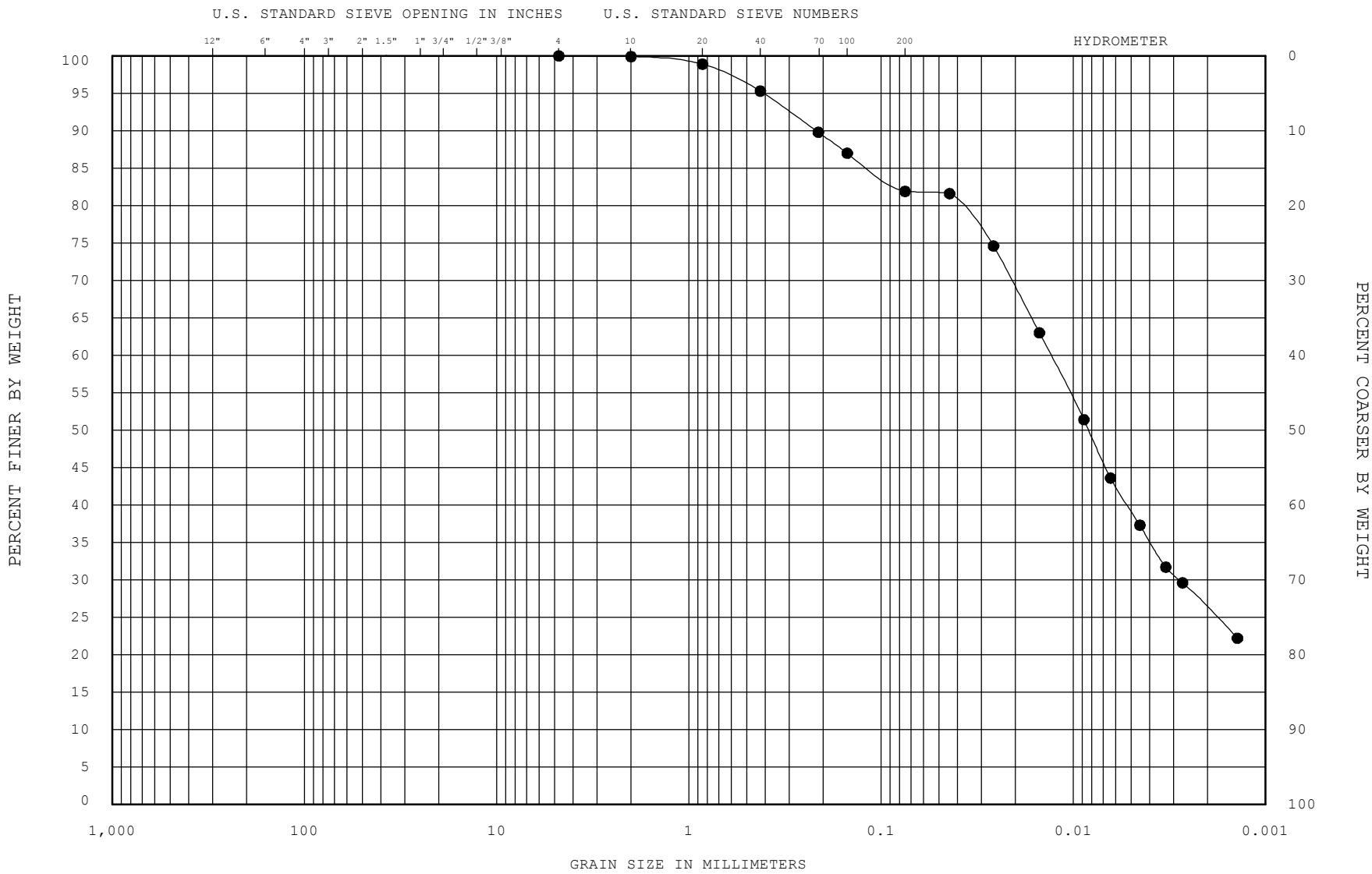
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-9*

DATE: *May 2008*



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-15	22.5-24.0	FAT CLAY with SAND	CH	25.9	62	28	34
— —								
— —								
— —								

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

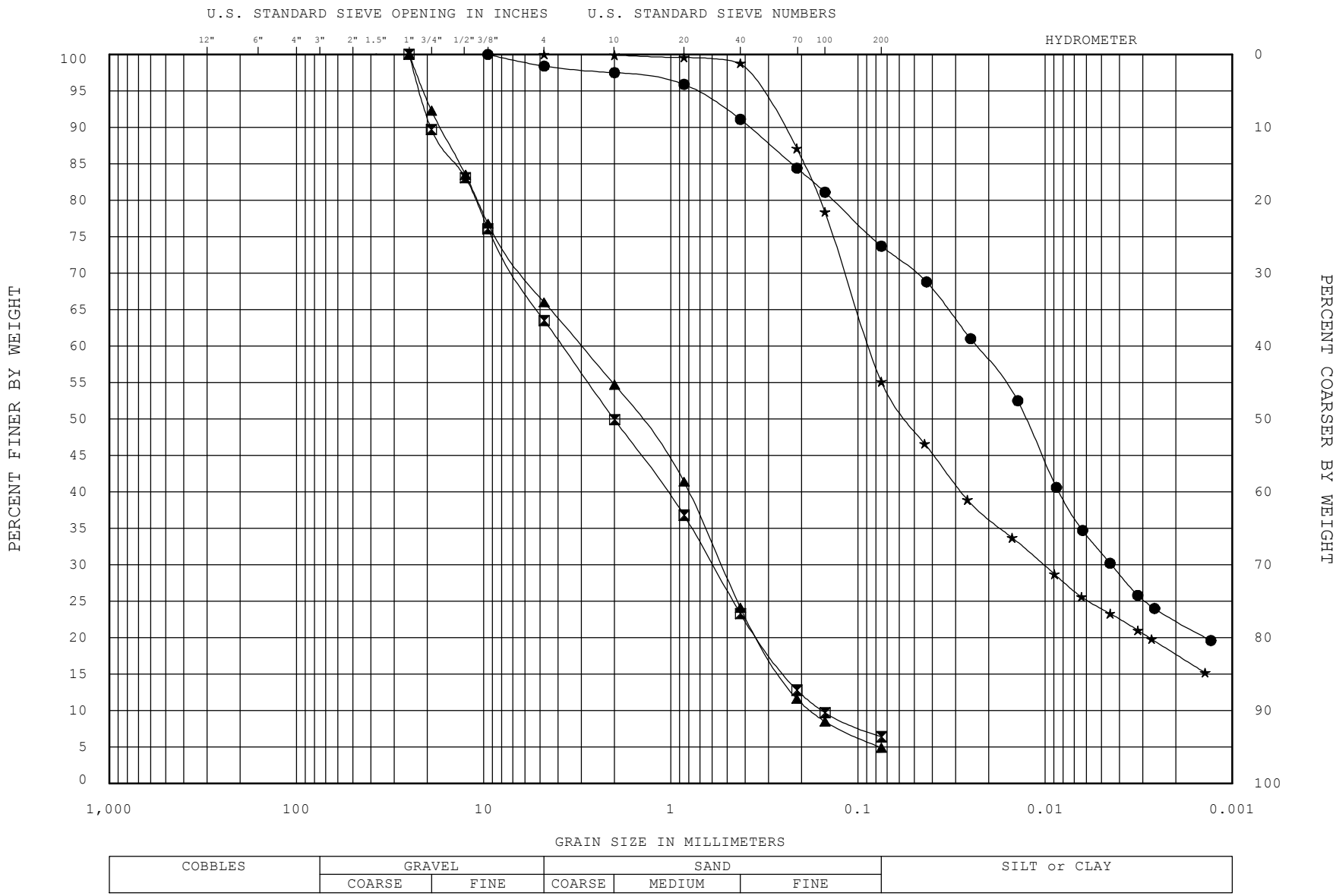
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-9*

DATE: *May 2008*



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Jar-7	7.5-9.0	ELASTIC SILT with SAND	MH	43.9	68	33	35
—⊠—	Jar-12	15.0-16.5	POORLY GRADED SAND with SILT and GRAVEL	SP-SM	12.0			
—▲—	Jars 14&15	20.0-24.0	POORLY GRADED SAND with GRAVEL	SP	13.0			
—★—	Jar-17	27.5-29.0	SANDY LEAN CLAY	CL	21.7	42	21	21

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

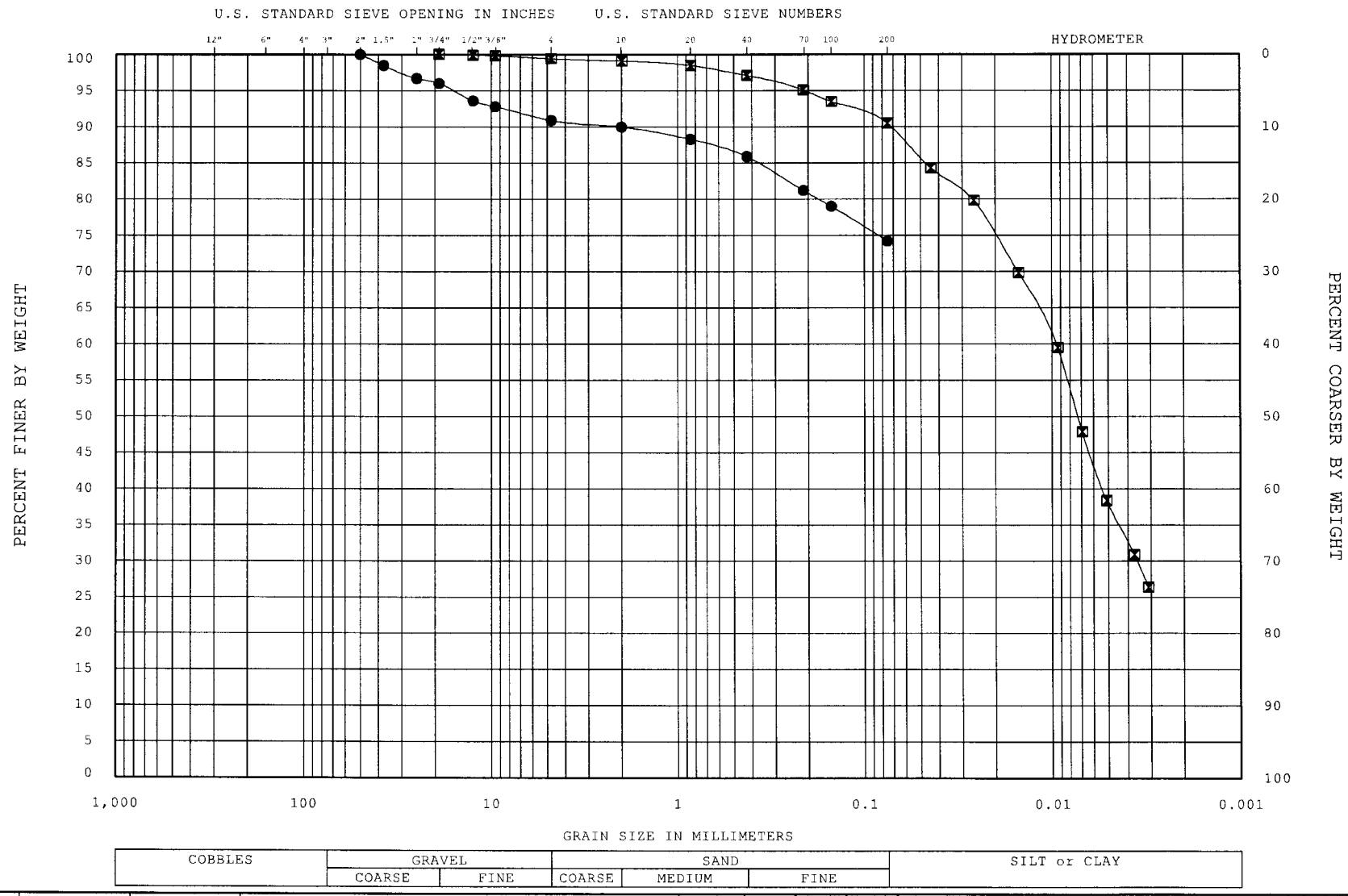
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

AREA: *Flood Protection Project*

BORING NO.: *DH-10*

DATE: *May 2008*



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Bucket-1	0.50-4.00	CLAY with SAND (Visual-Manual Class)	CH				
—⊠—	Bucket-1	4.00-5.00	ELASTIC SILT	MH	57.4	59	36	23
— —	Bucket-1	4.00-5.00	Organic Content: 8.3%					
— —								

REMARKS :

ENG FORM ENG2087HUNTINGTON FLOOD REDUCTION PROJECT.GPJ

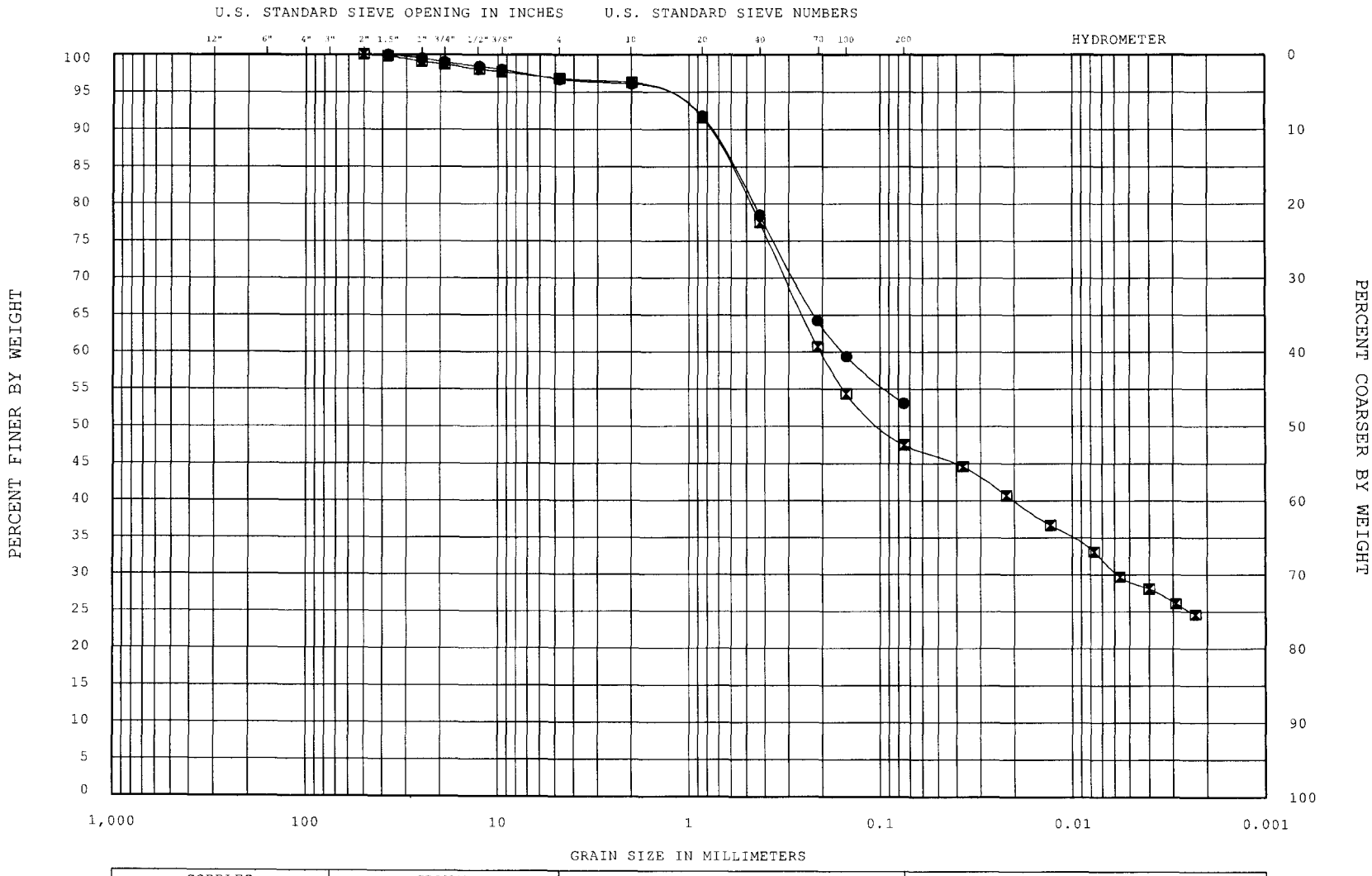
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington Flood Reduction Project*

AREA: *Huntington, VA*

BORING NO.: *TP-1*

DATE: *Oct 2007*



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Bucket-1	0.50-3.00	SANDY CLAY (Visual-Manual Class)	CH				
—⊠—	Bucket-1	3.00-4.50	CLAYEY SAND (Visual-Manual Class)	SC-H				
— —								
— —								

REMARKS :

ENG FORM ENG2087HUNTINGTON FLOOD REDUCTION PROJECT.GPJ

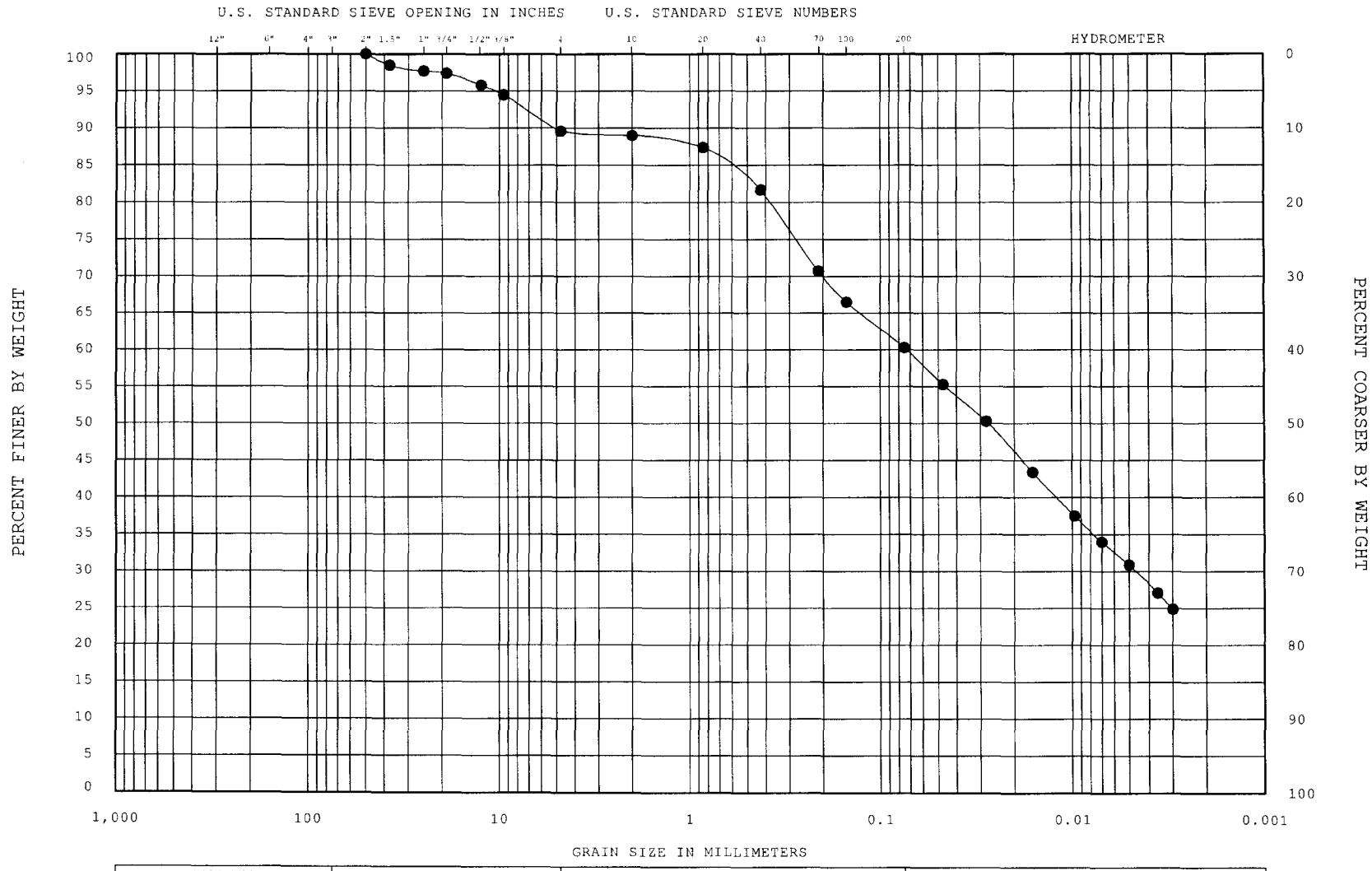
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington Flood Reduction Project*

AREA: *Huntington, VA*

BORING NO.: *TP-2*

DATE: *Oct 2007*



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)	Nat wc%	LL	PL	PI
—●—	Bucket-1	2.10-4.50	SANDY CLAY (Visual-Manual Class) CH				
— —							
— —							
— —							

REMARKS :

ENG FORM ENG2087HUNTINGTON FLOOD REDUCTION PROJECT.GPJ

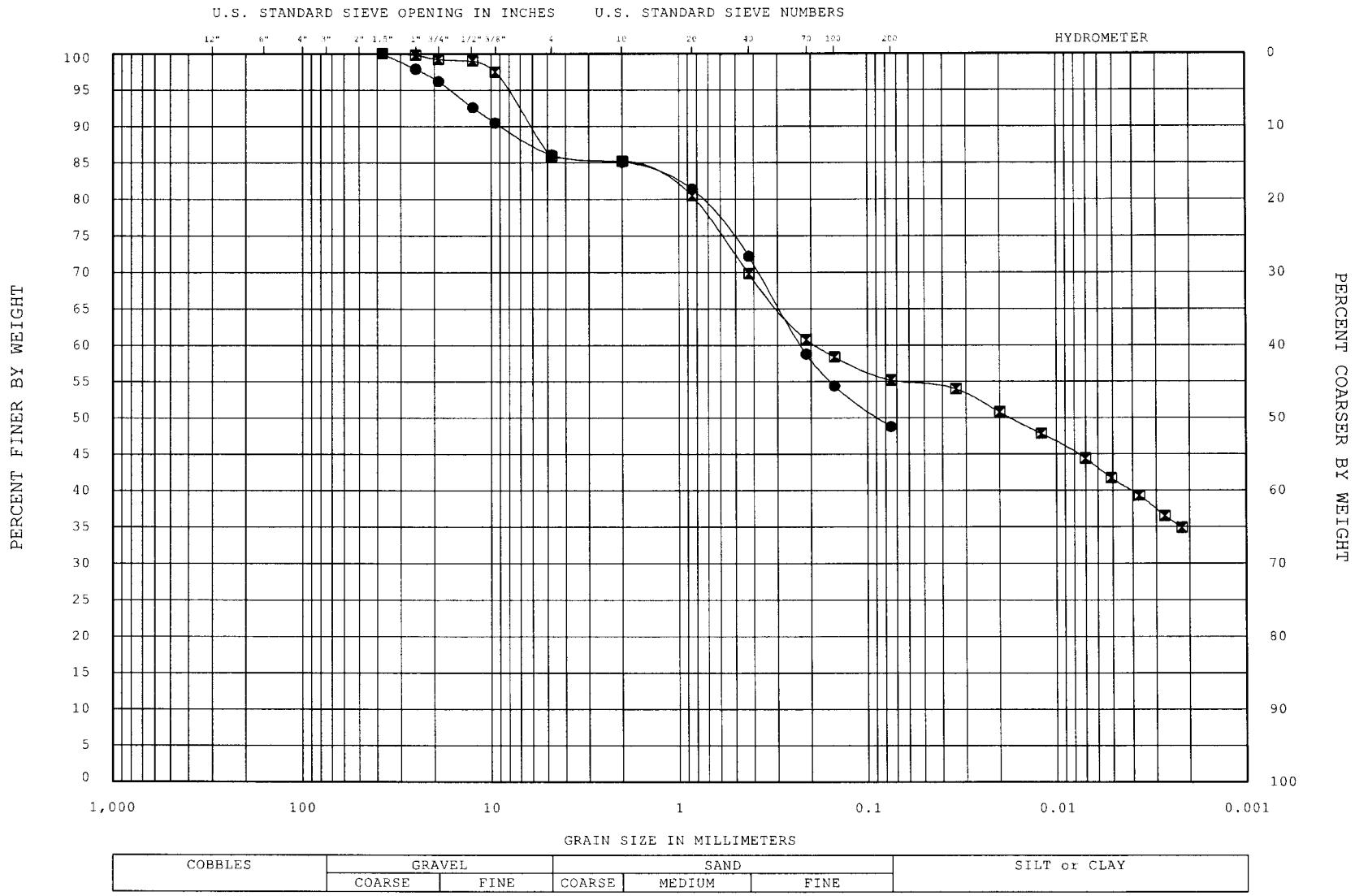
GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington Flood Reduction Project*

AREA: *Huntington, VA*

BORING NO.: *TP-3*

DATE: *Oct 2007*



Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Bucket-1	0.50-4.00	CLAYEY SAND (Visual-Manual Class)	SC-H				
—⊠—	Bucket-1	5.50-6.00	SANDY FAT CLAY	CH	32.9	78	23	55
— —	Bucket-1	5.50-6.00	Organic Content: 6.9%					
— —								

REMARKS :

ENG FORM ENG208/HUNTINGTON FLOOD REDUCTION PROJECT.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington Flood Reduction Project*

AREA: *Huntington, VA*

BORING NO.: *TP-4*

DATE: *Oct 2007*

UNCONFINED COMPRESSION & DIRECT SHEAR TEST REPORTS

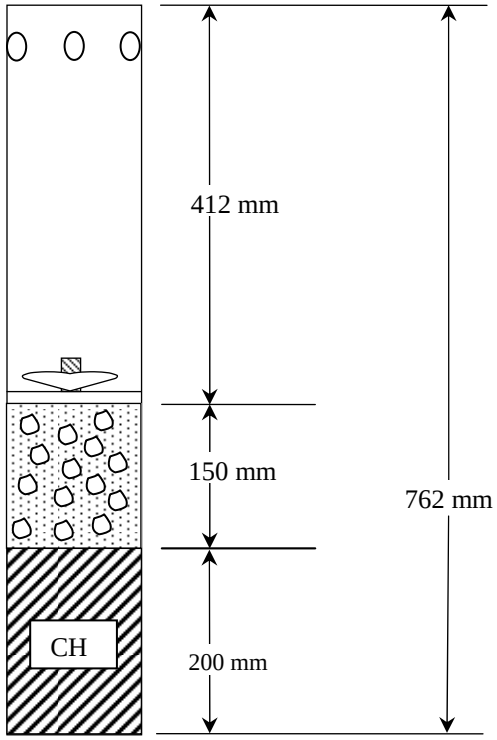
PROJECT: **Flood Reduction Project** Date: Jun 2008
AREA: **Huntington, VA**

Hole No.	Sample No.	Depth (ft)
DH-4B	Shelby-1	22.0-24.0

Tube plug & void

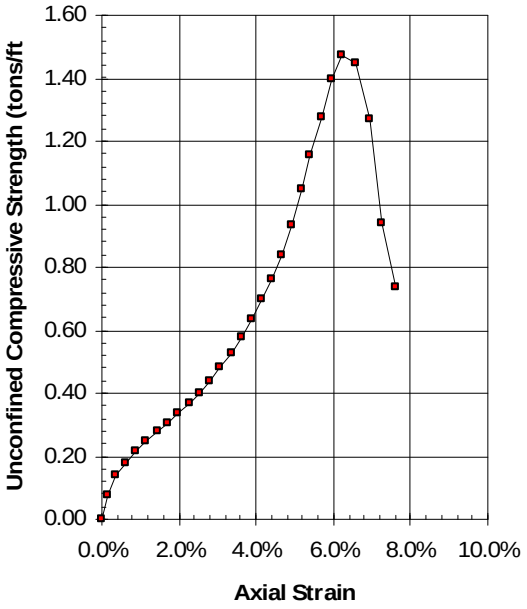
Wet, lt. olive brown, poorly graded GRAVEL w/ silt & sand (GP-GM)

Moist, brown & greenish gray, hard, FAT CLAY (CH) Unconfined Compression



UNCONFINED COMPRESSION TEST

FAILURE PICTURE



CONTROLLED STRAIN

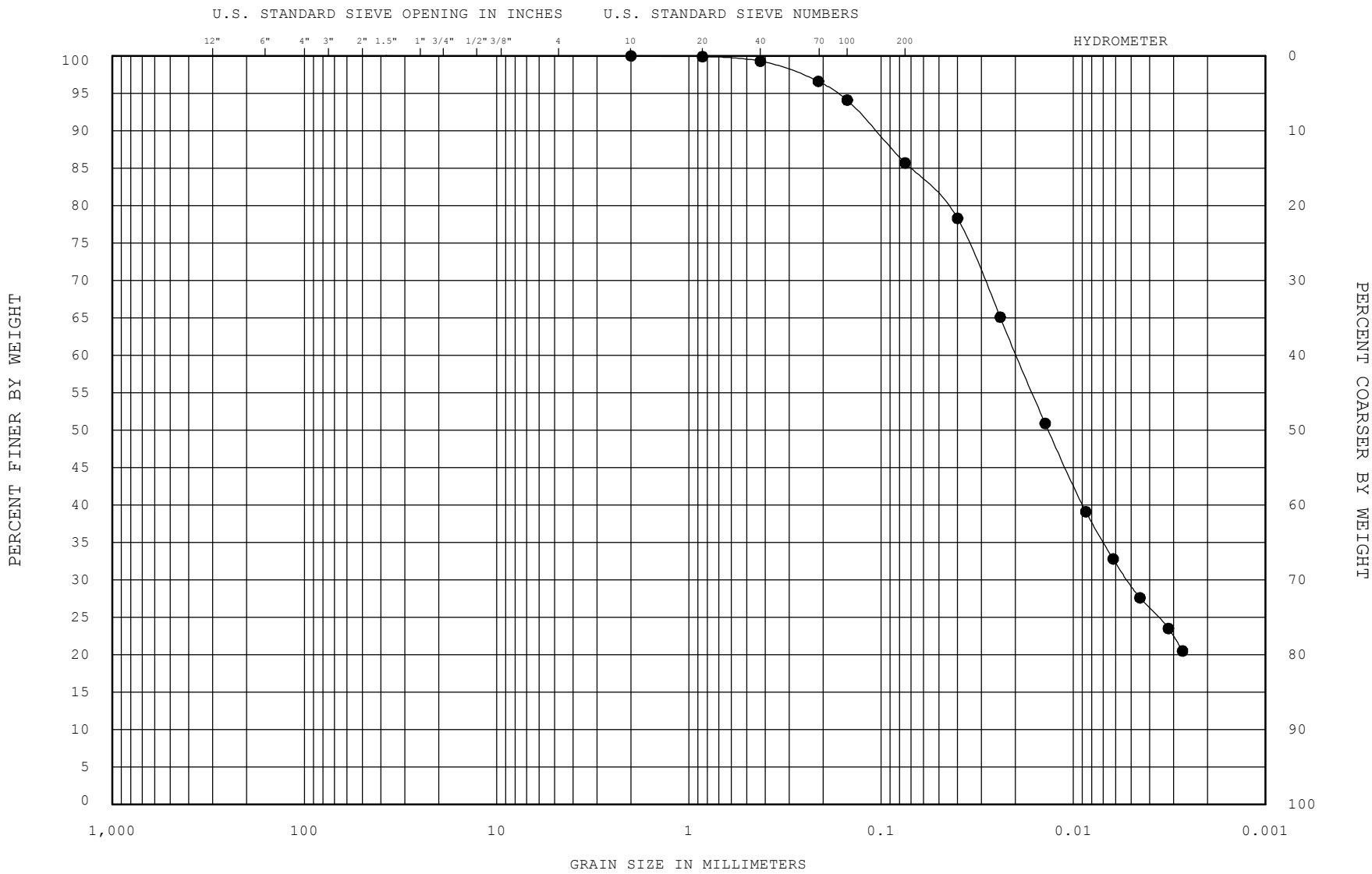
TEST NO.		1	2	3	4
TYPE OF SPECIMEN		Undisturbed			
WATER CONTENT, %	w_o	25.3			
VOID RATIO	e_o	0.816			
SATURATION, %	S_o	86.3			
DRY UNIT WEIGHT, LB./CU.FT.	γ_d	95.5			
TIME TO FAILURE, MIN.	t_f	6.00			
UNCONFINED COMPRESSIVE STRENGTH, TSF	q_u	1.48			
UNDRAINED SHEAR STRENGTH, TSF	s_u	0.74			
SENSITIVTY RATIO	S_t	------			
INITIAL SPECIMEN DIAMETER, IN.	D_o	2.87			
INITIAL SPECIMEN HEIGHT, IN.	H_o	7.40			

CLASSIFICATION: (ASTM D2487)

Moist, brown & greenish gray, hard, FAT CLAY (CH)

LL= 50	PL= 24	PI= 26 (ASTM D4318)	G_S= 2.78 (ASTM D854)

REMARKS:	PROJECT:	**Flood Reduction Project**	
	AREA:	**Huntington, VA**	
	Hole No.:	DH-4B	**Sample No.:** Shelby-1
	Depth (ft.):	22.0-24.0	**Date:** Oct.2008
ENG FORM 3659 (Test method: ASTM D2166)	**UNCONFINED COMPRESSION TEST REPORT**		



COBBLES	GRAVEL		SAND			SILT or CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Legend	Sample No.	Depth (ft)	Classification (ASTM D 2487)		Nat wc%	LL	PL	PI
—●—	Shelby-1	22.0-24.0	FAT CLAY	CH	25.3	50	24	26
— —								
— —								
— —								

REMARKS :

ENG FORM ENG2087HUNTINGTON VA FPP.GPJ

GRADATION CURVES TEST METHODS: ASTM D 422, D4318, D2216

PROJECT: *Huntington, VA*

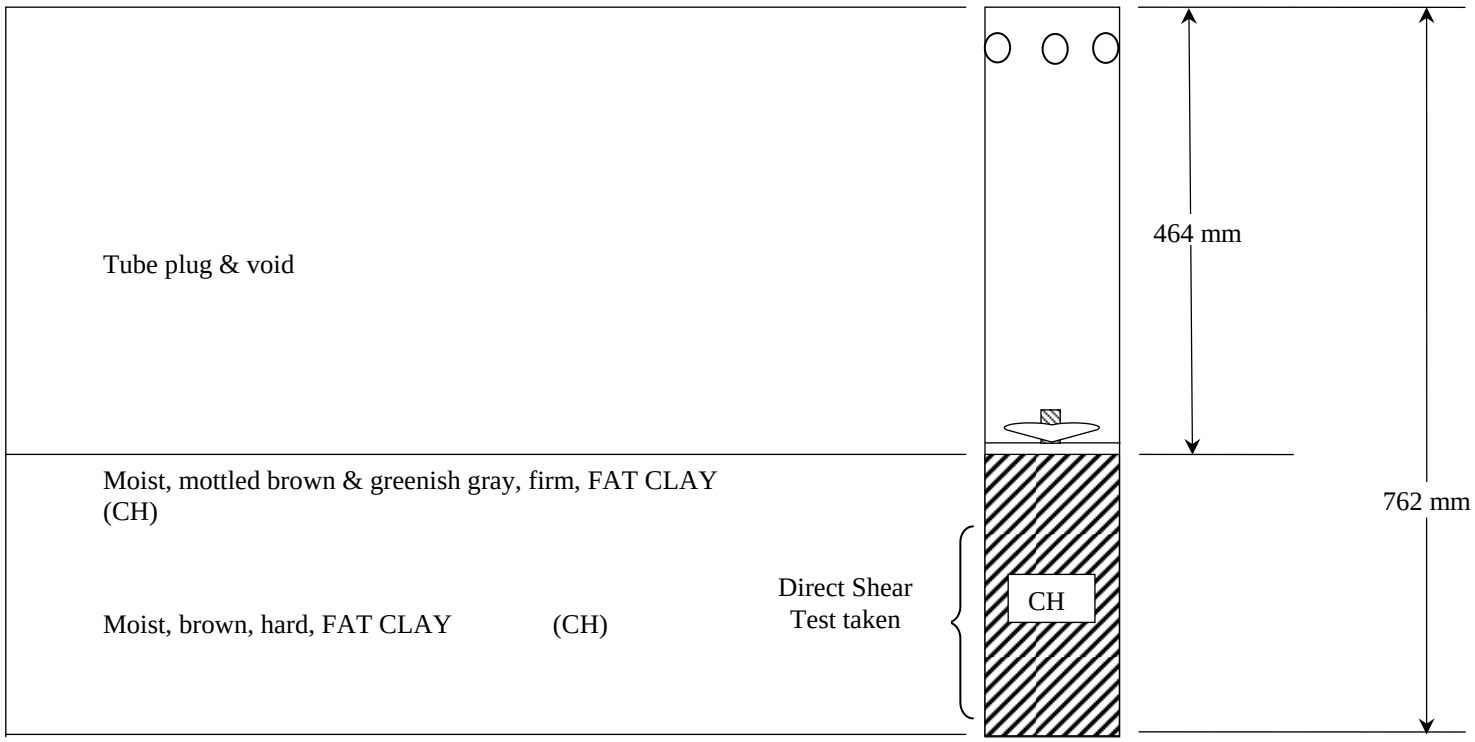
AREA: *Flood Protection Project*

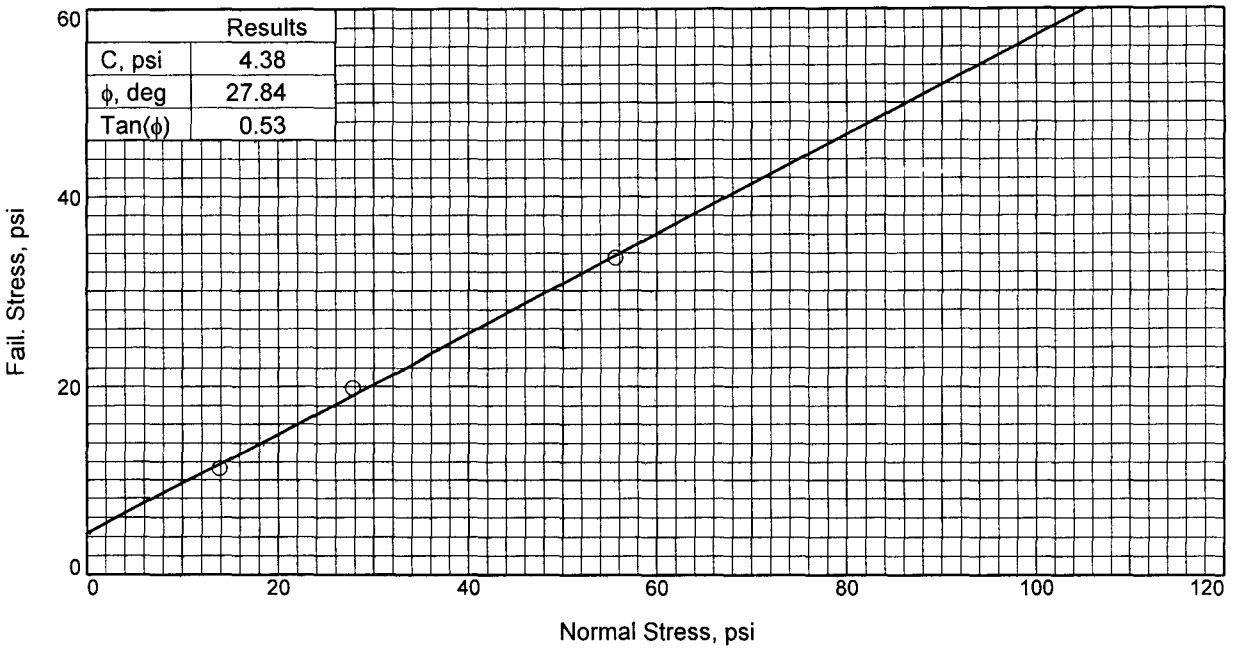
BORING NO.: *DH-4B*

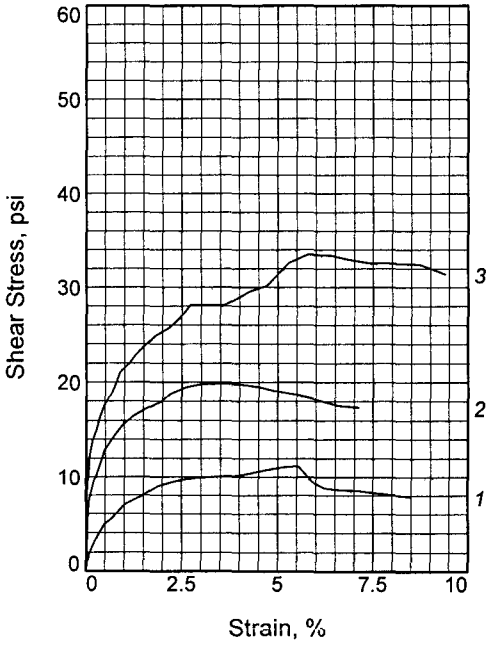
DATE: *Jun 2008*

PROJECT: **Flood Reduction Project** Date: Jun 2008
AREA: **Huntington, VA**

Hole No.	Sample No.	Depth (ft)
DH-4B	Shelby-2	28.0-30.0







Sample No.		1	2	3
Initial	Water Content, %	28.6	29.1	27.0
	Dry Density, pcf	95.9	94.1	96.6
	Saturation, %	101.6	98.6	97.5
	Void Ratio	0.7636	0.7988	0.7516
	Diameter, in.	2.50	2.50	2.50
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	38.0	40.9	34.8
	Dry Density, pcf	95.9	94.1	96.6
	Saturation, %	135.0	138.8	125.6
	Void Ratio	0.7636	0.7988	0.7516
	Diameter, in.	2.50	2.50	2.50
	Height, in.	1.00	1.00	1.00
Normal Stress, psi		13.90	27.80	55.60
Fail. Stress, psi		11.20	19.84	33.49
Strain, %		5.5	3.5	5.8
Ult. Stress, psi				
Strain, %				
Strain rate, in./min.		0.03	0.03	0.02

Sample Type: Shelby Tube
Description: Tan Fat Clay

LL= 59 **PL=** 28 **PI=** 31
Specific Gravity= 2.71
Remarks: Undisturbed Sample

Client: US ARMY CORP OF ENGINEERS

Project: US ARMY CORP OF ENGINEERS-FLOOD REDUCTION PROJECT HUNTINGTON,VA
Sample Number: ST DH-4B **Depth:** 28'-30'

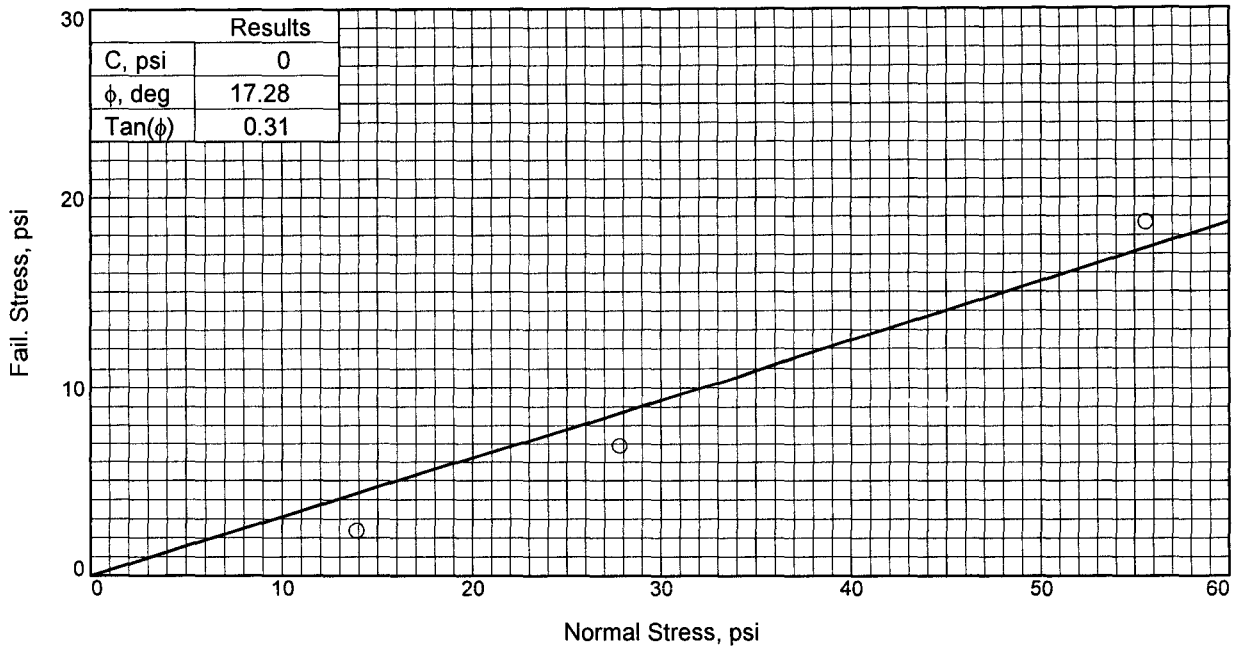
Proj. No.: 80001930 **Date:** 6/13/08

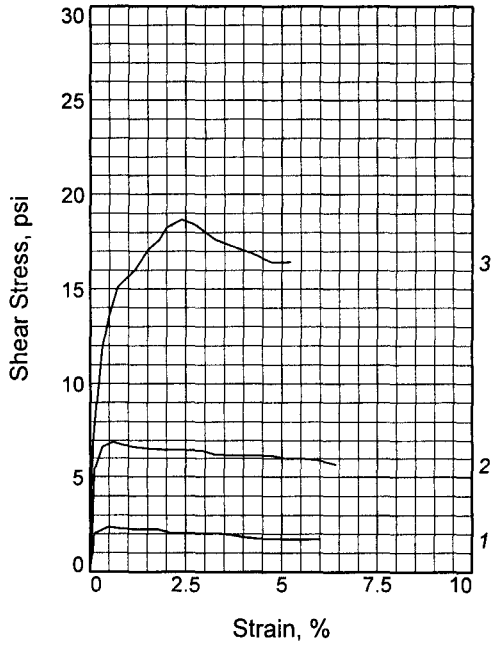
DIRECT SHEAR TEST REPORT

PENNIMAN & BROWNE, INC.

Figure 1

Tested By: Alex **Checked By:** TCS





Sample No.		1	2	3
Initial	Water Content, %	28.6	29.1	27.0
	Dry Density, pcf	95.9	94.1	96.6
	Saturation, %	101.6	98.6	97.5
	Void Ratio	0.7636	0.7988	0.7516
	Diameter, in.	2.50	2.50	2.50
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	38.0	40.9	34.8
	Dry Density, pcf	95.9	94.1	96.6
	Saturation, %	135.0	138.8	125.6
	Void Ratio	0.7636	0.7988	0.7516
	Diameter, in.	2.50	2.50	2.50
	Height, in.	1.00	1.00	1.00
Normal Stress, psi		13.90	27.80	55.60
Fail. Stress, psi		2.36	6.89	18.66
Strain, %		0.5	0.6	2.4
Ult. Stress, psi				
Strain, %				
Strain rate, in./min.		0.03	0.03	0.02

Sample Type: Shelby Tube
Description:

LL= 59 **PL=** 28 **PI=** 31
Specific Gravity= 2.71
Remarks: Reshear Testing

Figure 1 Reshear

Client: US ARMY CORP OF ENGINEERS

Project: US ARMY CORP OF ENGINEERS-FLOOD REDUCTION PROJECT HUNTINGTON,VA
Sample Number: ST DH-4B **Depth:** 28'-30'

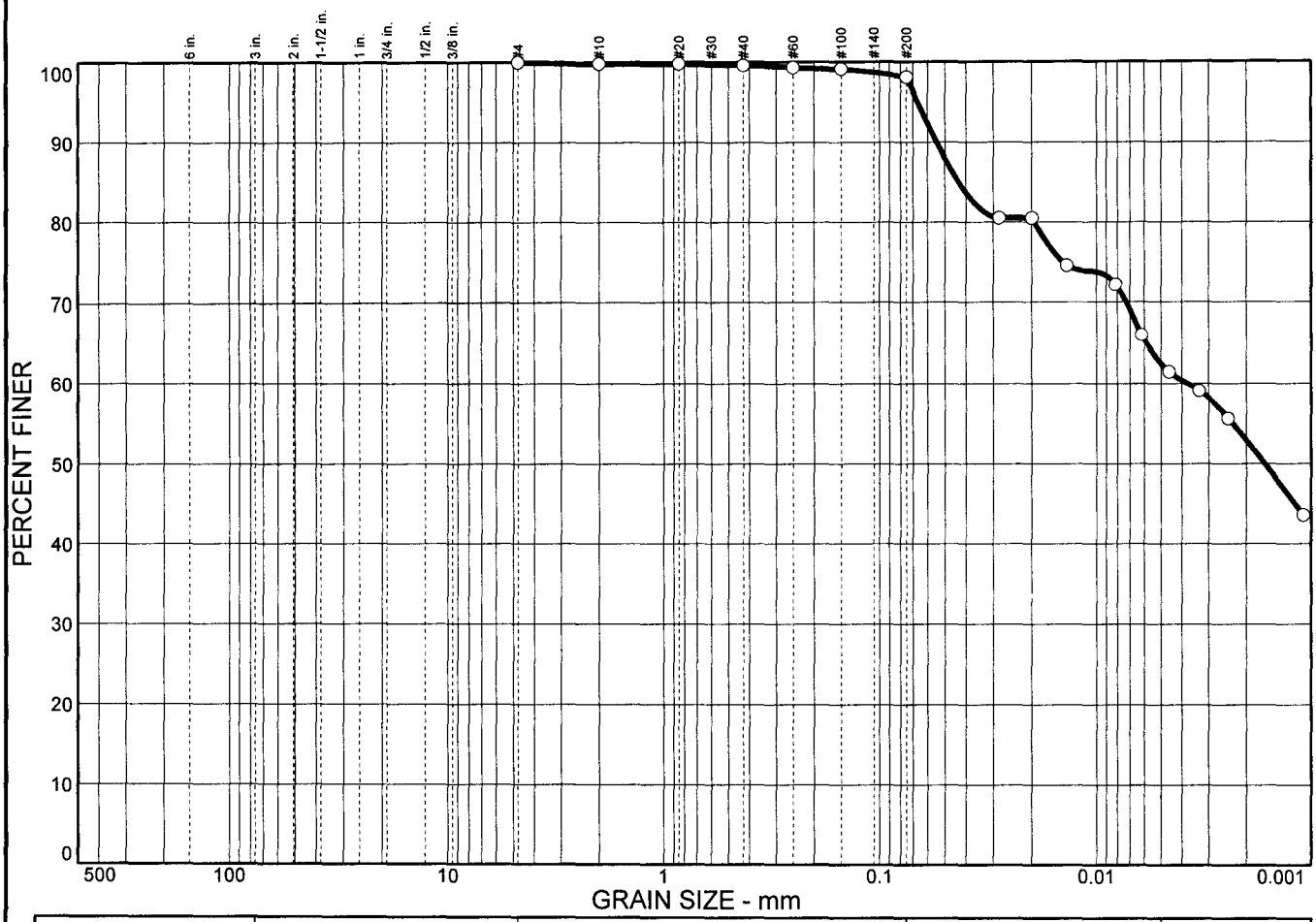
Proj. No.: 80001930 **Date:** 6/13/08

DIRECT SHEAR TEST REPORT

PENNIMAN & BROWNE, INC.

Tested By: Alex **Checked By:** TCS

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	0.0	1.9	35.6	62.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.8		
#20	99.8		
#40	99.6		
#60	99.3		
#100	99.1		
#200	98.1		

* (no specification provided)

Material Description

Brown Clay(USDA),Brown Fat clay(USCS)

Atterberg Limits

PL= 28 LL= 59 PI= 31

Coefficients

D_{85}= 0.0434 D_{60}= 0.0038 D_{50}= 0.0016
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CH AASHTO=

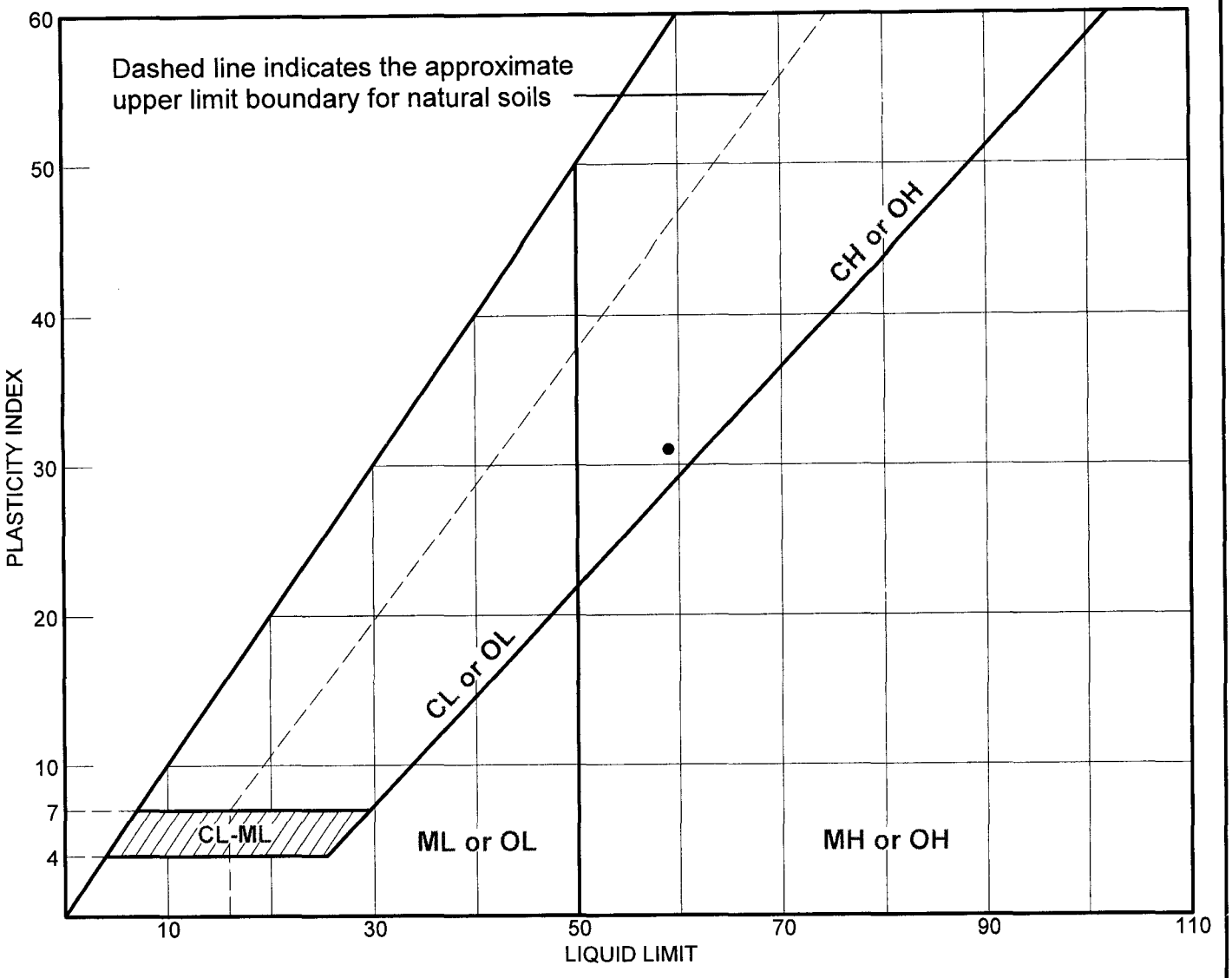
Remarks

Sample No.: ST DH-4B **Source of Sample:** **Date:** 6/24/08
Location: **Elev./Depth:** 28'-30'

PENNIMAN & BROWNE, INC.

Client: US ARMY CORP OF ENGINEERS
Project: US ARMY CORP OF ENGINEERS-FLOOD REDUCTION PROJECT HUNTINGTON,VA
Project No: 80001930 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●		ST DH-4B	28'-30'		28	59	31	CH

LIQUID AND PLASTIC LIMITS TEST REPORT **PENNIMAN & BROWNE, INC.**	**Client:** US ARMY CORP OF ENGINEERS **Project:** US ARMY CORP OF ENGINEERS-FLOOD REDUCTION PROJECT HUNTINGTON, VA **Project No.:** 80001930 **Figure**