

WBV14C.2 Tiger Team Investigation - Extreme Grab Samples Taken 27-28 Sept 2011

USACE Quality Assurance Laboratory Data

Trench Data	Depth (ft)	Type Sample	Lab No.	⁽¹⁾Wet Weight (gms)	⁽⁶⁾ASTM D2216 MC%	Total Dry Weight (gms)	⁽⁵⁾Dry Plus No. 4 (gms)	% by dry weight Plus No.4 Wood or Debris	⁽⁷⁾ASTM D2974 %Organic
EW_FS_Sta 140_51' Offset	0 - 3	"Extreme"	MVN Lab	6789.6	38.98	4885.5	25.9	0.53	5.3
EW_CL_Sta 48	4 - 5	"Extreme"	B2/2227	3490.0	35.62	2573.3	5.8	0.23	5.5
EW_PS_Sta 48_90' Offset	2 - 3	"Extreme"	B2/2228	3080.0	24.78	2468.3	15.8	0.64	5.1
EW_CL_Sta 150	5 - 6	"Extreme"	B2/2229	6233.3	40.79	4427.4	12.3	0.28	7.4
EW_CL_Sta 170	2 - 3	"Extreme"	B2/2230	4637.0	35.84	3413.6	7.3	0.21	6.1
EW_CL_Sta 170	2 - 3	"Clean"	B2/2231	1410.0	40.16	1006.0	0.0	0.00	5.5
EW_PS_Sta 170_137' Offset	0 - 3	"Extreme"	B2/2232	3987.1	58.85	2510.0	0.5	0.02	10.2
EW_PS_Sta 170_137' Offset	0 - 3	"Clean"	B2/2233	1150.0	38.89	828.0	0.0	0.00	5.3

The samples were hand selected grab samples taken as the worst (most fibrous woody debris) blend of finer wood pieces with clay. These samples do not represent the total trench excavation. All samples were: (1) weighed as-received moist condition, (2) photographed, (3) processed over a No. 4 sieve (4.76 mm), (4) retaining the plus No. 4 wood & debris, (5) rinsing, oven drying & weighing the dry plus No. 4 wood & debris, (6) determining moisture content on minus No. 4 sample (ASTM D2216), and (7) determining organic content of minus No. 4 sample (ASTM D2974 Method C).

USACE, Savannah District, Environmental & Materials Unit, Marietta, GA



EW_CL_Sta 48 – Tiger Team “Extreme” Sample taken 28 Sept 2011



EW_PS_Sta 48_90' Offset – Tiger Team “Extreme” Sample taken 28 Sept 2011



EW_FS_Sta 140_51' Offset – Tiger Team “Extreme” Sample taken 27 Sept 2011



EW_CL_Sta 150 – Tiger Team “Extreme” Sample taken 28 Sept 2011



EW_CL_Sta 170 – Tiger Team “Extreme” Sample taken 28 Sept 2011



EW_PS_Sta 170_137' Offset – Tiger Team “Extreme” Sample taken 28 Sept 2011

Moisture Determination
ASTM D2216 - Oven Drying @ 110 ± 5°C (230 ± 9°F)

Date
 5-6 Oct 2011

Sample No.		B2/2227	B2/2228	B2/2229	B2/2230	B2/2231	
A	Initial	Wet Weight + Tare (gms)	4582	4344	7878	6824	2252
B	Final	Dry Weight + Tare (gms)	3668	3736	6084	5604	1848
D=(A-B)	Weight of Water (gms)		914	608	1794	1220	404
C	Tare Weight (gms)		1102	1282	1686	2200	842
E=(B-C)	Dry Weight Soil (gms)		2566	2454	4398	3404	1006
100x(D/E)	Moisture Content %		35.62	24.78	40.79	35.84	40.16

Sample No.		B2/2232	B2/2233			
A	Initial	Wet Weight + Tare (gms)	5340	2002		
B	Final	Dry Weight + Tare (gms)	3864	1680		
D=(A-B)	Weight of Water (gms)		1476	322		
C	Tare Weight (gms)		1356	852		
E=(B-C)	Dry Weight Soil (gms)		2508	828		
100x(D/E)	Moisture Content %		58.85	38.89		

Sample No.		+No. 4 Wood with soil coating →	B2/2227	B2/2228	B2/2229	B2/2230	
A	Initial	Wet Weight + Tare (gms)	48.75	58.51	84.23	53.60	
B	Final	Dry Weight + Tare (gms)	After wash & dry → 44.59	56.35	55.17	47.86	
D=(A-B)	Weight of Water (gms)		—	—	—	—	
C	Tare Weight (gms)			38.80	40.56	42.91	40.58
E=(B-C)	Dry Weight Soil (gms)		Dry Wood (gms)	5.79	15.79	12.26	7.28
100x(D/E)	Moisture Content %			—	—	—	

Sample No.		+No. 4 Wood with soil coating →	B2/2232			
A	Initial	Wet Weight + Tare (gms)	With soil coating → 41.98			
B	Final	Dry Weight + Tare (gms)	After wash and dry → 39.36			
D=(A-B)	Weight of Water (gms)					
C	Tare Weight (gms)			38.89		
E=(B-C)	Dry Weight Soil (gms)		Dry Wood (gms)	0.47		
100x(D/E)	Moisture Content %			—		

Test Method: () Method A (✓) Method B	Maximum Particle Size	Method A Recorded to ±1%		Method B Recorded to ±0.1%	
Oven Used: Greve # 57857	(100% Passing)	Minimum Mass	Readability (gms)	Minimum Mass	Readability (gms)
In Oven - Date & Time: 5 Oct 1045	3 inch	5 kg	10	50 kg	10
Out Oven - Date & Time: 6 Oct 0730	1-½ inch	1 kg	10	10 kg	10
Scale or Balance Used: α 532A 1040156	¾ inch	250 gms	1	2.5 kg	1
Technician(s): JP, AB	½ inch	50 gms	0.1	500 gms	0.1
Remarks: other scale # 50003, oven # 11253	No. 4	20 gms	0.1	100 gms	0.1
	No. 10	20 gms	0.1	20 gms	0.01

Organic Determination ASTM D2974 – Organic Content @ 440 ± 22°C							Date
							5-6 Oct 2011
		Sample No.	B2/2227	2228	2229	2230	2231
A	Initial	Oven Dry Weight + Tare (gms)	125.24	124.09	120.41	122.20	133.44
B	Final	Furnace Dry Weight + Tare (gms)	121.93	121.08	116.06	118.48	129.67
D=(A-B)		Loss on Ignition (gms)	3.31	3.01	4.35	3.72	3.77
C		Tare Weight (gms) ^(Tare #)	⑩ 64.99	⑥ 65.04	⑧ 61.60	④ 61.30	① 65.23
E=(A-C)		Oven Dry Weight (gms)	60.25	59.05	58.81	60.90	68.21
100x(D/E)		Organic Content %	5.49	5.10	7.40	6.11	5.53
		Sample No.	B2/2232	2233			
A	Initial	Oven Dry Weight + Tare (gms)	122.31	126.29			
B	Final	Furnace Dry Weight + Tare (gms)	116.45	122.92			
D=(A-B)		Loss on Ignition (gms)	5.86	3.47			
C		Tare Weight (gms) ^(Tare #)	② 64.97	⑤ 60.36			
E=(A-C)		Oven Dry Weight (gms)	57.34	65.93			
100x(D/E)		Organic Content %	10.22	5.26			
		Sample No.					
A	Initial	Oven Dry Weight + Tare (gms)					
B	Final	Furnace Dry Weight + Tare (gms)					
D=(A-B)		Loss on Ignition (gms)					
C		Tare Weight (gms)					
E=(A-C)		Oven Dry Weight (gms)					
100x(D/E)		Organic Content %					
		Sample No.					
A	Initial	Oven Dry Weight + Tare (gms)					
B	Final	Furnace Dry Weight + Tare (gms)					
D=(A-B)		Loss on Ignition (gms)					
C		Tare Weight (gms)					
E=(A-C)		Oven Dry Weight (gms)					
100x(D/E)		Organic Content %					
Test Method: <input checked="" type="checkbox"/> Method A <input checked="" type="checkbox"/> Method C			8.2.1 Test Method C				
Furnace: Thermolyne 128507/287670			8.2.1.1 Determine the mass of a covered high-silica or porcelain dish to nearest 0.01 g.				
In Furnace - Date & Time: 5 Oct 10 15 / 6 Oct 0800			8.2.1.2 Place a part of or all of the oven-dried test specimen (Method A - 50 gm sample) from a moisture determination in the dish and determine the mass of the dish and specimen.				
Out Furnace - Date & Time: 5 Oct 15 19 / 6 Oct 1200			8.2.1.3 Remove the cover and place the dish in a muffle furnace. Gradually bring the temperature in the muffle furnace to 440 °C ± 22 °C and hold until the specimen is completely ashed (no change of mass occurs after a further period of heating).				
Scale or Balance Used: # 5245732			8.2.1.4 Cover with the retained aluminum foil cover, cool in a desiccator, and determine the mass to the nearest 0.01 g.				
Technician(s): JP, AB							
Remarks: Furnace Model F48015 Oven Greave # 57857							

WBV14C.2 Tiger Team Investigation - Bulk Samples Using ASTM D4914 Density by Sand in Test Pit

USACE Quality Assurance Laboratory Data

Bulk Sample Data	Depth (ft)	Lab No.	⁽¹⁾ Hole Volume (cu.ft.)	⁽²⁾ Wet Weight (lbs)	⁽³⁾ ASTM D2216 MC%	⁽¹⁾ Wet Density (pcf)	⁽¹⁾ Dry Density (pcf)	Total Dry Weight (lbs)	⁽⁷⁾ Dry Wt Plus No. 4 (lbs)	% by dry weight + No.4 Wood or Debris	⁽⁸⁾ Volume +No. 4 Wood (cu.ft.)	% by Volume + No.4 Wood or Debris	⁽⁹⁾ ASTM D2974 %Organic
Sta 27+46_FS_81' Offset	3 - 4	B2/2299	1.467	160.2	44.5	109.2	75.6	110.9	0.20	0.18	0.0090	0.61	4.6
Sta 29+04_FS_16' Offset	1 - 2	B2/2298	1.693	184.2	43.8	108.8	75.7	128.1	0.60	0.47	0.0100	0.59	6.2
Sta 40+34_FS_41' Offset	1 - 2	B2/2300	1.220	148.6	32.8	121.8	91.7	111.9	0.13	0.12	0.0055	0.45	5.6
Sta 120+38_PS_84' Offset	0.5 - 1.5	B2/2239	1.215	154.8	16.2	127.4	109.6	133.2	0.01	0.01	0.0006	0.05	3.6
Sta 162+68_CL	4 - 5	B2/2302	1.581	169.6	42.8	107.3	75.1	118.8	0.33	0.28	0.0207	1.31	5.8
Sta 170+00_PS_137' Offset	2 - 3	B2/2301	2.460	285.5	32.7	116.1	87.5	215.1	0.53	0.25	0.0312	1.27	5.1

The samples do not represent the total trench excavation but do represent selected sampling sites adjacent to trenches. All samples were: (1) taken in-place selected locations per ASTM D4914, (2) weighed as-received moist sample from bulk sampling, (3) determining moisture content on minus No. 4 sample (ASTM D2216), (4) photographed, (5) processed over a No. 4 sieve (4.76 mm), (6) retaining the plus No. 4 wood & debris, (7) rinsing, oven drying & weighing the dry plus No. 4 wood & debris, (8) determining wood and debris volume by in-house procedure for Wood Volume Determination by Densified Sand Method, and (9) determining organic content of minus No. 4 sample (ASTM D2974 Method C).

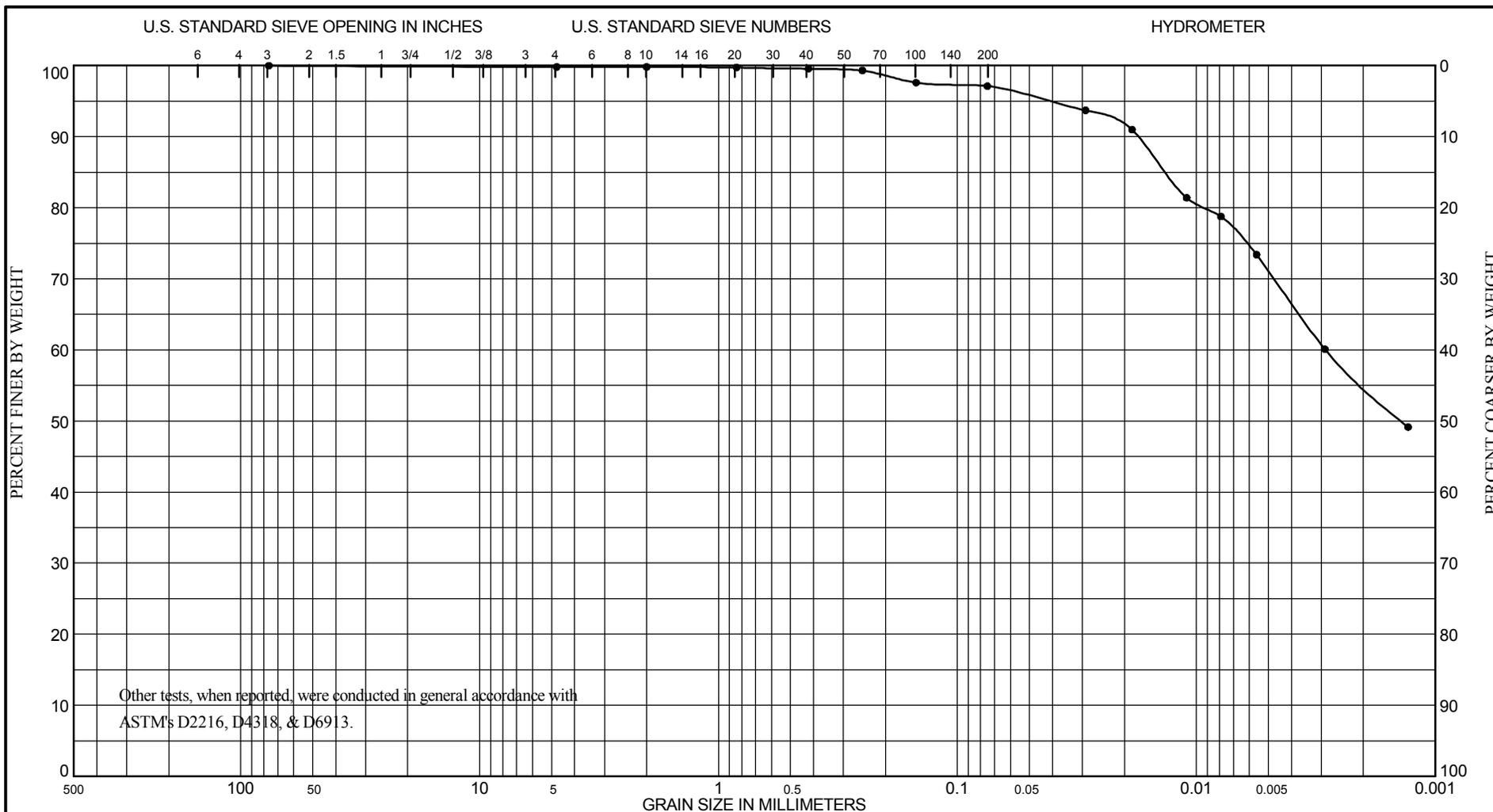
USACE, Savannah District, Environmental & Materials Unit, Marietta, GA

SUMMARY OF MATERIAL PROPERTIES

PROJECT: WBV14C.2 Tiger Team Investigation **LOCATION:** New Orleans, LA
REQUISITION NO: W33SJG12591648 **WORK ORDER:** 698e

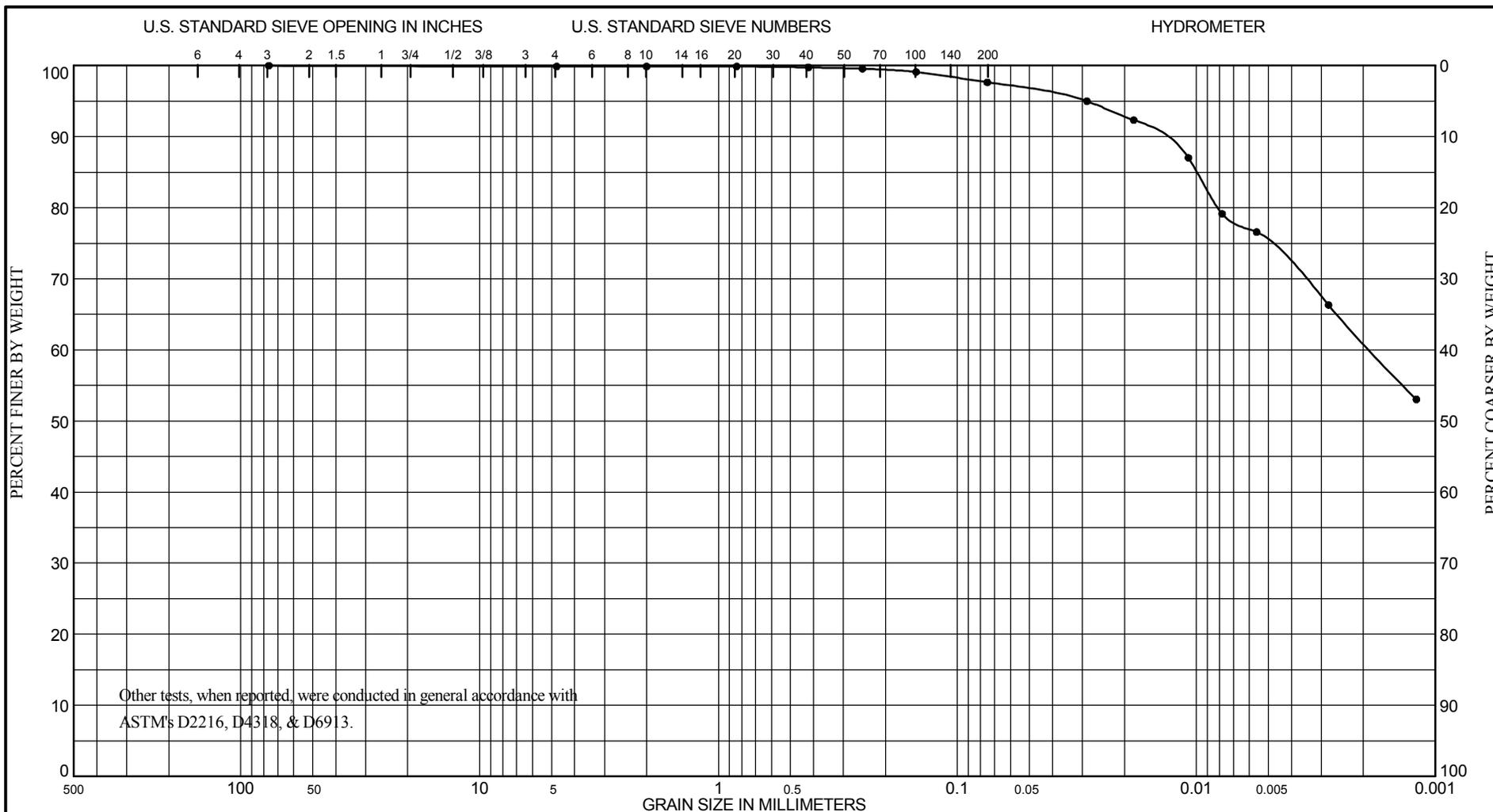
Lab Number	Hole Number	Sample Number	Depth (ft)	D422 %Passing		D4318 Atterberg Limits			D2216 MC%	D2974 Organic %	Color	D2487 Unified Soil Classification
				No.4 %	No 200 %	LL	PL	PI				
B2/2299	STA_27+46_FS_81' Offset	Bulk Sample	3.0 to 4.0	99.8	97.1	83	24	59	44.5	4.6	Very Dark Gray	Fat Clay (CH-4), with a trace of sand sizes.
B2/2298	STA_29+04_FS_16' Offset	Bulk Sample	1.0 to 2.0	99.5	89.4	104	28	76	43.8	6.2	Very Dark Gray	Fat Clay (CH-4), with a little sand sizes.
B2/2300	STA_40+34_FS_41' Offset	Bulk Sample	1.0 to 2.0	99.9	97.7	91	23	68	32.8	5.6	Very Dark Gray	Fat Clay (CH-4), with a trace of sand sizes.
B2/2241	STA_70+20.38_CL	Grab Sample		100.0	95.0	69	19	50	26.0		Very Dark Gray	Fat Clay (CH-3), with a trace of sand sizes.
B2/2240	STA_111+46_PS_118' Offset	Grab Sample		99.8	98.1	68	22	46	22.5		Very Dark Gray	Fat Clay (CH-3), with a trace of sand sizes.
B2/2239	STA_120+38_PS_84' Offset	Bulk Sample	0.5 to 1.5	100.0	90.8	71	20	51	16.2	3.6	Very Dark Gray	Fat Clay (CH-3), with a trace of sand sizes.
B2/2302	STA_162+68_CL	Bulk Sample	4.0 to 5.0	99.7	90.3	100	28	72	42.8	5.8	Very Dark Gray	Fat Clay (CH-4), with a trace of sand sizes.
B2/2301	STA_170_PS_137' Offset	Bulk Sample	2.0 to 3.0	99.8	97.5	91	26	65	32.7	5.1	Very Dark Gray	Fat Clay (CH-4), with a trace of sand sizes.

US Army Corps of Engineers - Marietta, Ga 30062
10-Jan-12



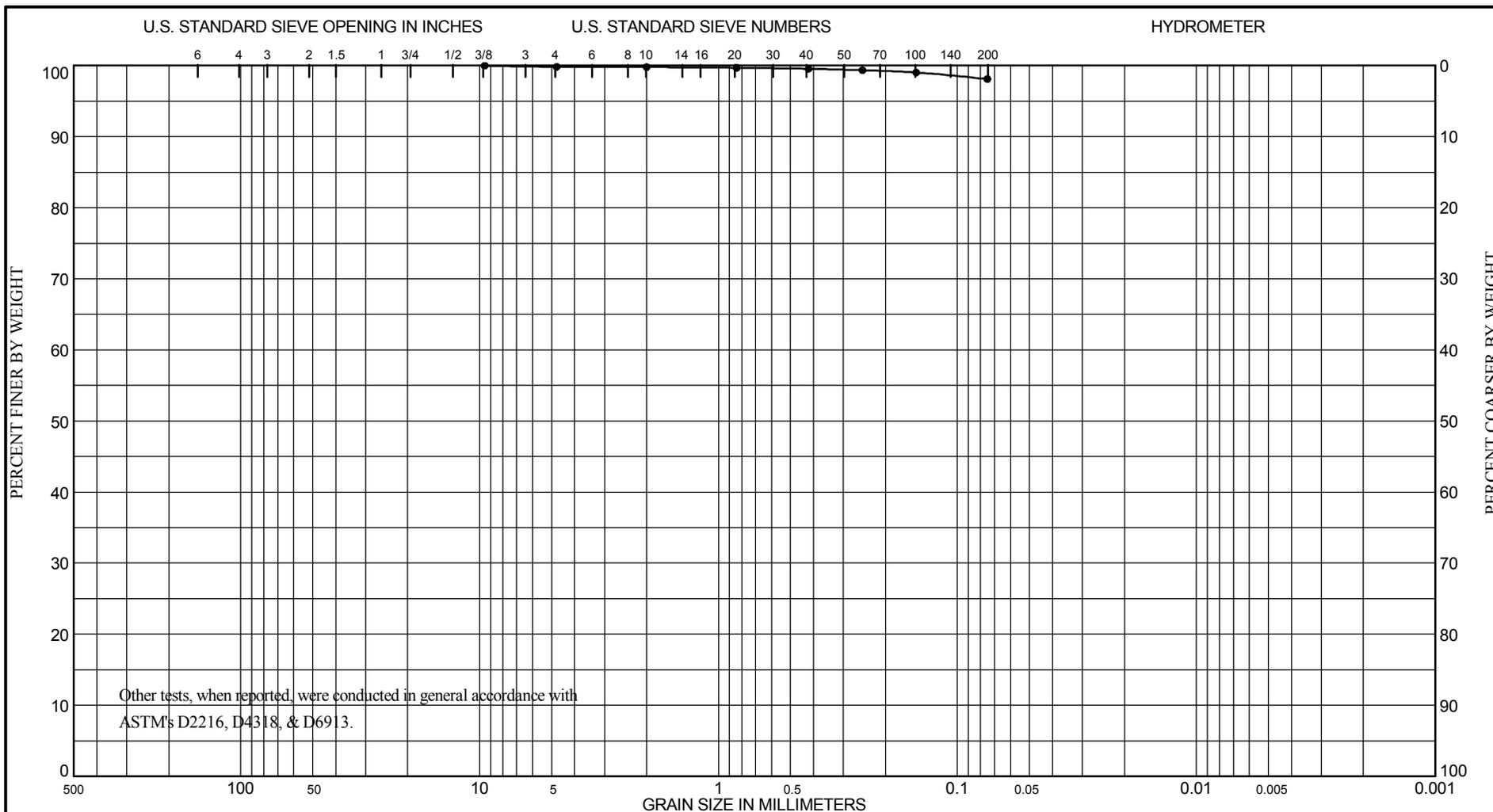
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Depth (ft)	ASTM D2487	Classification	Nat w%	LL	PL	PI	Project
Bulk Sample	3.0 to 4.0		Very Dark Gray, Fat Clay (CH-4), with a trace of sand sizes.	44.5	83	24	59	WBV14C.2 Tiger Team Investigation
								Bulk Samples New Orleans, LA
								Lab No. B2/2299
								Hole No. STA 27+46 FS 81' Offset
GRADATION CURVES								Date 1/11/12



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

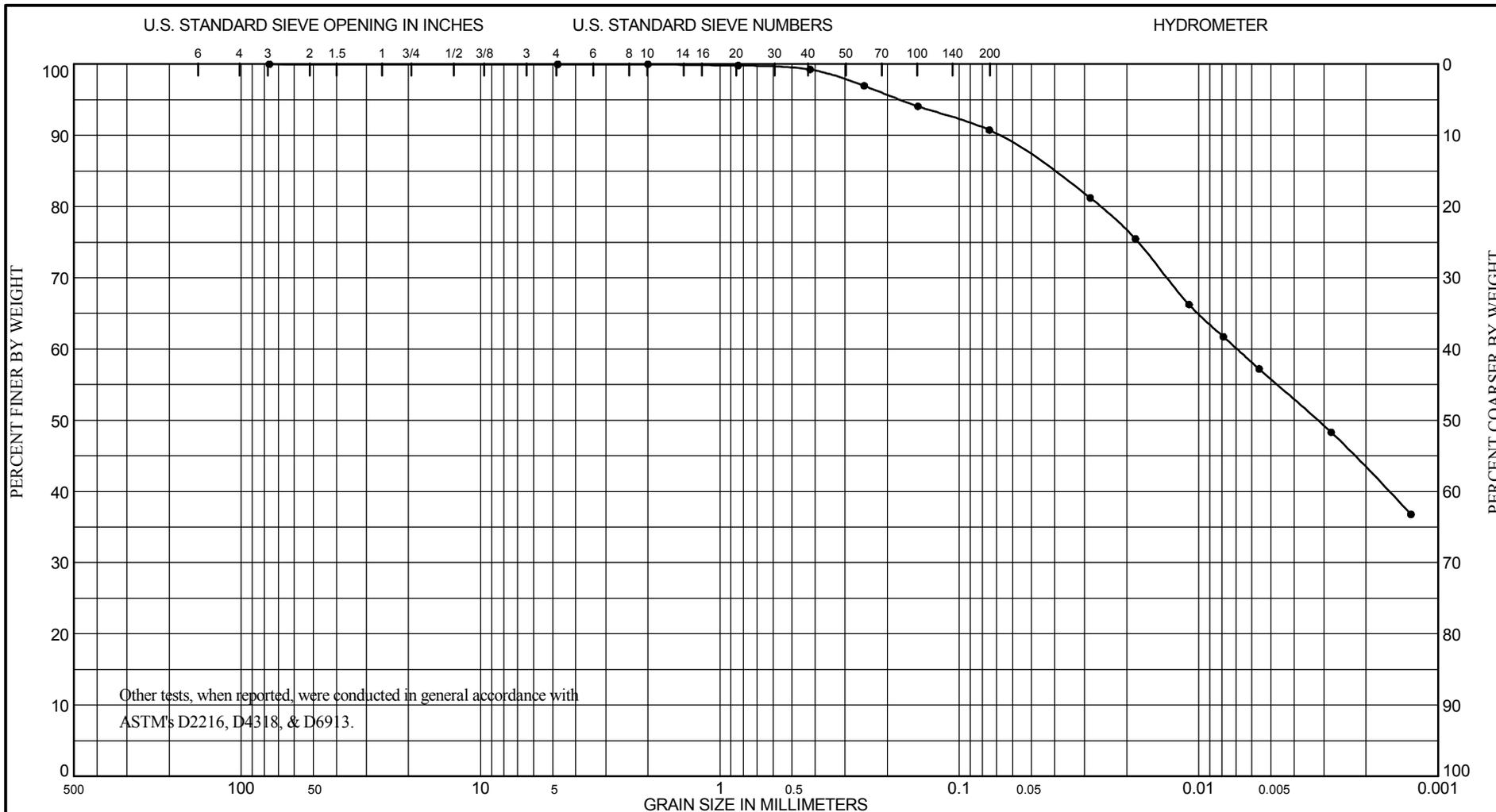
Sample No.	Depth (ft)	ASTM D2487 Classification	Nat w%	LL	PL	PI	Project	
Bulk Sample	1.0 to 2.0	Very Dark Gray, Fat Clay (CH-4), with a trace of sand sizes.	32.8	91	23	68	WBV14C.2 Tiger Team Investigation	
							Bulk Samples New Orleans, LA	
							Lab No. B2/2300	
							Hole No. STA_40+34 FS_41' Offset	
GRADATION CURVES							Date	1/11/12



Other tests, when reported, were conducted in general accordance with
 ASTM's D2216, D4318, & D6913.

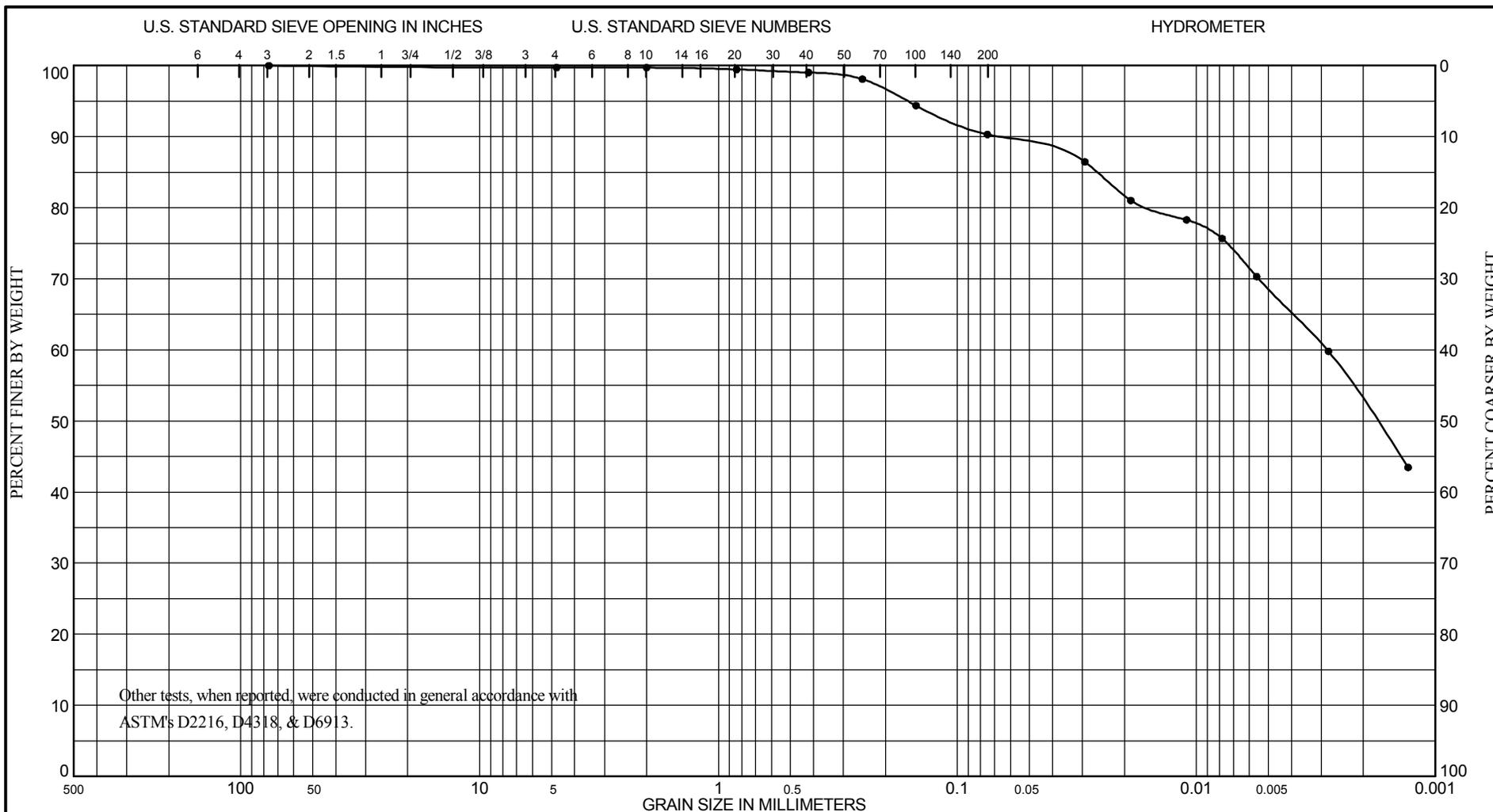
COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Depth (ft)	ASTM D2487	Classification	Nat w%	LL	PL	PI	Project
Grab Sample			Very Dark Gray, Fat Clay (CH-3), with a trace of sand sizes.	22.5	68	22	46	WBV14C.2 Tiger Team Investigation
								Bulk Samples New Orleans, LA
								Lab No. B2/2240
								Hole No. STA_111+46_PS_118' Offset
GRADATION CURVES								Date 1/11/12



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Depth (ft)	ASTM D2487	Classification	Nat w%	LL	PL	PI	Project
Bulk Sample	0.5 to 1.5		Very Dark Gray, Fat Clay (CH-3), with a trace of sand sizes.	16.2	71	20	51	WBV14C.2 Tiger Team Investigation
								Bulk Samples New Orleans, LA
								Lab No. B2/2239
								Hole No. STA_120+38_PS_84' Offset
GRADATION CURVES								Date 1/11/12



Other tests, when reported, were conducted in general accordance with ASTM's D2216, D4318, & D6913.

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Depth (ft)	ASTM D2487	Classification	Nat w%	LL	PL	PI	Project
Bulk Sample	4.0 to 5.0		Very Dark Gray, Fat Clay (CH-4), with a trace of sand sizes.	42.8	100	28	72	WBV14C.2 Tiger Team Investigation
								Bulk Samples New Orleans, LA
								Lab No. B2/2302
								Hole No. STA_162+68_CL
								Date 1/11/12

GRADATION CURVES

STA 27+46 FS B1' offset

Wood Volume Determination

Tested By: A Bacon, M Wielputz Date: 20 Dec 2011

Equipment Used: Scale 121606, Kango hammer with round plate
B2/2299

Volume Measure (a) (cu.ft.): 0.2497 Mass of Measure (b) (lbs): 8.30

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8		0.2497
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8		8.30
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure		105.13
(d)	Mass of Sample Wood	lbs.	As-received moist wood dry weight		0.20
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure		33.80
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)		26.25
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)		25.30
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)		0.00904
(i)	Volume Excavated Hole	cu.yds.	(i) X 27	cu.ft.	1.467
(j)	Volume of Wood	%	100 x (h) / (i)		0.616

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

STA 29+04 FS 16' offset

Wood Volume Determination

Tested By: ABacon, MWielputz Date: 20 Dec 2011

Equipment Used: scale 121606, kango hammer with round plate
B2/ 2298

Volume Measure (a) (cu.ft.): 0.2497 Mass of Measure (b) (lbs): 8.30

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.2497	
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	8.30	
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	105.13	
(d)	Mass of Sample Wood	lbs.	As-received moist wood weight	0.60	
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	34.10	
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	26.25	
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	25.20	
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.00999	
(i)	Volume Excavated Hole	cu.yds.	(i) X 27	cu.ft.	1.693
(j)	Volume of Wood	%	100 x (h) / (i)	0.590	

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

STA 40+34 FS 41' offset

Wood Volume Determination

Tested By: A Bacon, M Wielputz Date: 20. Dec 2011

Equipment Used: Scale 121606, Kango hammer with round plate
B2 / 2300

Volume Measure (a) (cu.ft.): 0.2497 Mass of Measure (b) (lbs): 8.30

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.2497
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	8.30
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	105.13
(d)	Mass of Sample Wood	lbs.	As received moist wood dry weight	0.13
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	34.10
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	26.25
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	25.67
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.58 0.005517
(i)	Volume Excavated Hole	cu.yds.	(i) X 27	1.55 1.220
(j)	Volume of Wood	%	100 x (h) / (i)	0.477 0.452

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

STA 120+38 PS 84' offset

Wood Volume Determination

Tested By: A Bacon, M Wielputz Date: 20 Dec 2011

Equipment Used: scale 121606, Kango hammer with round plate
82/2239

Volume Measure (a) (cu.ft.): 0.2497 Mass of Measure (b) (lbs): 8.30

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.2497	
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	8.30	
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	105.13	
(d)	Mass of Sample Wood	lbs.	As-received moist wood dry weight	0.01	
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	34.50	
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	26.25	
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	26.19	
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.000571	
(i)	Volume Excavated Hole	cu.yds.	(i) X 27	cu.ft.	1.215
(j)	Volume of Wood	%	100 x (h) / (i)		0.047

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

STA 162+68 CL

Wood Volume Determination

Tested By: A Bacon, M Wielp Date: 20 Dec 2011

Equipment Used: Scale 121606, kango hammer w/round plate
Bz/2302

Volume Measure (a) (cu.ft.): 0.2497 Mass of Measure (b) (lbs): 8.30

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.2497
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	8.30
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	105.13
(d)	Mass of Sample Wood	lbs.	As-received moist wood dry weight	0.33
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	32.70
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	26.25
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	24.07
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.0207
(i)	Volume Excavated Hole	cu.yds.	(i) X 27	cu.ft. 1.581
(j)	Volume of Wood	%	100 x (h) / (i)	1.309

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

STA 170 PS 137' offset

Wood Volume Determination

Tested By: M. Wiliputa Abacan Date: 20 Dec 2011

Equipment Used: 0.25 cu.ft. measure, Kango hammer with (B2/2301) round end plate Scale # 121606

Volume Measure (a) (cu.ft.): 0.2497 Mass of Measure (b) (lbs): 8.30

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.2497
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	8.30
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	105.13
(d)	Mass of Sample Wood	lbs.	As-received moist wood DM weight	0.53
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	31.8
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	26.25
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	22.97
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.0312
(i)	Volume Excavated Hole	cu.yds.	(i) X 27	cu.ft.
(j)	Volume of Wood	%	100 x (h) / (i)	1.268

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

Densified Sand Using Kango Hammer & Unit Measure

Verified By: M Wielputz Date: 20 Dec 2011

Equipment: Unit Measure 0.25 cu.ft.

Identification No. _____ Verification Frequency: Daily (in use)

Previous Verification Date: _____ Next Due Date: _____

Verification Equipment Used: Kango Hammer Type 638S with round end plate, Scale # 121606, strike-off bar,

Verification Procedure: In-house Procedure

Density Sand Supply		Ottawa Sand from Durham Geo			
Measurement of Densified Sand in a Calibrated Unit Measure		Units	Trial #1	Trial #2	Trial #3
Weight of container filled with densified sand	A	(lbs)	34.50	34.60	34.55
Weight of container empty	B	(lbs)	8.30	→	→
Weight of densified sand used to fill container	C = (A - B)	(lbs)	26.20	26.30	26.25
Volume of Container	D	(cf)	0.2497	→	→
Densified Unit Weight of Sand	C (lbs) / D	(pcf)	104.93	105.33	105.13
Average Weight (Mass) of Densified Sand		(lbs)	26.25		
Average Densified Unit Weight of Sand		(pcf)	105.13		

Action: Repair _____ Replace _____ In Service ✓
 Remarks: _____

UNIT WEIGHT DETERMINATION "VOLUME OF HOLE" METHODS		DATE
PROJECT WBV14C.2 N506551.6 E3656645.0	TEST SITE STA 27+46 FS 81' offset 5.1 top elev. cut 3' depth 3-4' elev. 2.1-1.1	SAMPLE NUMBER B2/2299
ADDITIONAL SPECIFICATIONS		ASTM D4914
$\begin{array}{r} 12.60 - 0.02 \\ 14.09 - 0.02 \\ \hline 14.26 - 13.01 \\ 40.95 - 14.65 = \end{array} \rightarrow \begin{array}{r} 1.02 - 0.66 = 1.16 \\ 26.30 \\ \hline 1.16 \\ 25.14 \end{array}$		
CONVERSION FACTORS		
1 in. = 2.54 cm. 1 gm./cc. or 62.4 lb./cu. ft. = Unit weight of water 1 lb. = 453.6 gm. 1 cu. ft. = 1728 cu. in.		
CALIBRATION OF STANDARD MATERIAL	STANDARD MATERIAL (Check one) <input checked="" type="checkbox"/> SAND <input type="checkbox"/> OIL <input type="checkbox"/> OTHER (Specify)	
APPARATUS OR TARE NUMBER	UNITS	
1. WEIGHT OF APPARATUS OR TARE FILLED		
2. WEIGHT OF APPARATUS OR TARE EMPTY		
3. WEIGHT OF MATERIAL (1.-2.)		
4. VOLUME OF APPARATUS OR TARE		
5. UNIT WEIGHT OF MATERIAL ($\frac{3.}{4.}$)		
6. AVERAGE UNIT WEIGHT OF MATERIAL	LB./CU. FT.	96.05
CALIBRATION OF APPARATUS	TEMPLATE NUMBER	CONE NUMBER
7. INITIAL WEIGHT OF APPARATUS + SAND	UNITS	
8. FINAL WEIGHT OF APPARATUS + SAND		
9. WEIGHT OF SAND IN TEMPLATE AND/OR CONE	lbs.	25.14
"VOLUME OF HOLE"		
10. INITIAL WEIGHT OF APPARATUS + MATERIAL	UNITS	
11. FINAL WEIGHT OF APPARATUS + MATERIAL		
12. WEIGHT OF MATERIAL RELEASED (10.-11.)	lbs.	167.22
13. WEIGHT OF MATERIAL IN HOLE (For oil, same as 12. For sand, 12.-9.)	lbs.	142.08
14. VOLUME OF HOLE ($\frac{13.}{6.}$)	cu. ft.	1.4670

WATER CONTENT DETERMINATION

B2/2299

	UNITS					
TARE NUMBER						
15. WEIGHT WET SOIL & TARE						
16. WEIGHT DRY SOIL & TARE						
17. WEIGHT WATER (15.-16.)						
18. WEIGHT TARE						
19. WEIGHT DRY SOIL (16.-18.)						
20. WATER CONTENT ($\frac{17.}{19.} \times 100$)						
21. AVERAGE WATER CONTENT	PERCENT	44.51				

UNIT WEIGHT DETERMINATION

	UNITS			
TARE NUMBER				
22. WEIGHT WET SOIL & TARE	lbs.	167.31		
23. WEIGHT TARE	lbs.	7.12		
24. WEIGHT WET SOIL (22.-23.)	lbs.	160.19		
25. WET UNIT WEIGHT (24./14.)	LB./CU. FT.	109.20		
26. DRY UNIT WEIGHT ($25. \times \frac{100}{100+21.}$)	LB./CU. FT.	75.56		

REMARKS

13.01
14.76
13.93
14.07
14.30
13.83
13.10
14.52
14.22
12.69
13.97
13.64
14.05

= 180.09
- 10.66 [0.02x3]

169.43
- 2.21

167.22

2.87
0.66

2.21 leftover

TECHNICIAN (Signature)

JP, MW

COMPUTED BY (Signature)

MW

CHECKED BY (Signature)

MW

UNIT WEIGHT DETERMINATION "VOLUME OF HOLE" METHODS		DATE
PROJECT WBV 14 C.2	TEST SITE STA 29+04 FS 16' offset N 506585.2 1-2' depth E 3656812.9 elev 8.7-7.7 top elev 10.6	SAMPLE NUMBER B2/2298
ADDITIONAL SPECIFICATIONS $\begin{array}{r} 14.25 \quad 0.82 \\ 14.09 \quad 0.82 \\ \hline 14.80 \quad 0.82 \\ 43.14 - 2.46 = 40.68 - 7.44 = 33.24 \end{array}$		ASTM D4914
CONVERSION FACTORS 1 in. = 2.54 cm. 1 gm./cc. or 62.4 lb./cu. ft. = Unit weight of water 1 lb. = 453.6 gm. 1 cu. ft. = 1728 cu. in.		
CALIBRATION OF STANDARD MATERIAL	STANDARD MATERIAL (Check one) <input checked="" type="checkbox"/> SAND <input type="checkbox"/> OIL <input type="checkbox"/> OTHER (Specify)	
APPARATUS OR TARE NUMBER	UNITS	
1. WEIGHT OF APPARATUS OR TARE FILLED		
2. WEIGHT OF APPARATUS OR TARE EMPTY		
3. WEIGHT OF MATERIAL (1.-2.)		
4. VOLUME OF APPARATUS OR TARE		
5. UNIT WEIGHT OF MATERIAL ($\frac{3}{4}$.)		
6. AVERAGE UNIT WEIGHT OF MATERIAL	LB./CU. FT. / 96.85	
CALIBRATION OF APPARATUS	TEMPLATE NUMBER	CONE NUMBER
7. INITIAL WEIGHT OF APPARATUS + SAND	UNITS	
8. FINAL WEIGHT OF APPARATUS + SAND		
9. WEIGHT OF SAND IN TEMPLATE AND/OR CONE	lbs. 33.24	
"VOLUME OF HOLE"		
10. INITIAL WEIGHT OF APPARATUS + MATERIAL	UNITS	
11. FINAL WEIGHT OF APPARATUS + MATERIAL		
12. WEIGHT OF MATERIAL RELEASED (10.-11.)	lbs. 197.21	
13. WEIGHT OF MATERIAL IN HOLE (For oil, same as 12. For sand, 12.-9.)	lbs. 163.97	
14. VOLUME OF HOLE ($\frac{13}{6}$.)	cu. ft. 1.6930	

WATER CONTENT DETERMINATION

B2/2298

TARE NUMBER	UNITS					
15. WEIGHT WET SOIL & TARE						
16. WEIGHT DRY SOIL & TARE						
17. WEIGHT WATER (15.-16.)						
18. WEIGHT TARE						
19. WEIGHT DRY SOIL (16.-18.)						
20. WATER CONTENT ($\frac{17.}{19.} \times 100$)						
21. AVERAGE WATER CONTENT	PERCENT	43.79				

UNIT WEIGHT DETERMINATION

TARE NUMBER	UNITS			
22. WEIGHT WET SOIL & TARE	lbs.	193.08		
23. WEIGHT TARE	lbs.	0.90		
24. WEIGHT WET SOIL (22.-23.)	lbs.	194.18		
25. WET UNIT WEIGHT (24./14.)	LB./CU. FT.	108.79		
26. DRY UNIT WEIGHT (25. $\times \frac{100}{100+21.}$)	LB./CU. FT.	75.66		

REMARKS

14.53
 14.34
 14.10
 14.58
 13.40
 14.05
 13.10
 13.88
 14.62
 14.29
 13.01
 14.52
 14.14

 182.56
 28.15

 210.71

14.20
 13.95

 28.15

210.71
 -(0.82 x 15)

 198.41
 -1.20

 197.21

1.06
 -0.66

 1.20 left over

TECHNICIAN (Signature)

JP, MW

COMPUTED BY (Signature)

MW

CHECKED BY (Signature)

MW

UNIT WEIGHT DETERMINATION "VOLUME OF HOLE" METHODS		DATE 2 Nov 2011	
PROJECT WBV14C.2	TEST SITE STA 40+34 FS 41' offset	SAMPLE NUMBER B2/2300	
ADDITIONAL SPECIFICATIONS $21.55 - 0.82 = 20.73$ $14.63 - 4.88 = 9.75$ $\frac{30.48}{-8.46}$ $\underline{22.02}$ $9.11 - 0.65 = 8.46$ left over ASTM D4914			
CONVERSION FACTORS 1 in. = 2.54 cm. 1 lb. = 453.6 gm. 1 gm./cc. or 62.4 lb./cu. ft. = Unit weight of water 1 cu. ft. = 1728 cu. in.			
CALIBRATION OF STANDARD MATERIAL		STANDARD MATERIAL (Check one) <input checked="" type="checkbox"/> SAND <input type="checkbox"/> OIL <input type="checkbox"/> OTHER (Specify)	
APPARATUS OR TARE NUMBER		UNITS	
1. WEIGHT OF APPARATUS OR TARE FILLED			
2. WEIGHT OF APPARATUS OR TARE EMPTY			
3. WEIGHT OF MATERIAL (1.-2.)			
4. VOLUME OF APPARATUS OR TARE			
5. UNIT WEIGHT OF MATERIAL ($\frac{3}{4}$)			
6. AVERAGE UNIT WEIGHT OF MATERIAL		LB./CU. FT.	96.05
CALIBRATION OF APPARATUS		TEMPLATE NUMBER	CONE NUMBER
7. INITIAL WEIGHT OF APPARATUS + SAND		UNITS	
8. FINAL WEIGHT OF APPARATUS + SAND			
9. WEIGHT OF SAND IN TEMPLATE AND/OR CONE		lbs.	22.02
"VOLUME OF HOLE"			
		UNITS	
10. INITIAL WEIGHT OF APPARATUS + MATERIAL			
11. FINAL WEIGHT OF APPARATUS + MATERIAL			
12. WEIGHT OF MATERIAL RELEASED (10.-11.)		lbs.	140.13
13. WEIGHT OF MATERIAL IN HOLE (For oil, same as 12. For sand, 12.-9.)		lbs.	118.11
14. VOLUME OF HOLE ($\frac{13}{6}$)		cu. ft.	1.2195

WATER CONTENT DETERMINATION

B2/2300

TARE NUMBER	UNITS					
15. WEIGHT WET SOIL & TARE						
16. WEIGHT DRY SOIL & TARE						
17. WEIGHT WATER (15.-16.)						
18. WEIGHT TARE						
19. WEIGHT DRY SOIL (16.-18.)						
20. WATER CONTENT ($\frac{17.}{19.} \times 100$)						
21. AVERAGE WATER CONTENT	PERCENT		32.82			

UNIT WEIGHT DETERMINATION

TARE NUMBER	UNITS			
22. WEIGHT WET SOIL & TARE	lbs		155.68	
23. WEIGHT TARE	lbs		7.12	
24. WEIGHT WET SOIL (22.-23.)	lbs		148.56	
25. WET UNIT WEIGHT (24./14.)	LB./ FT.		121.82	
26. DRY UNIT WEIGHT ($25. \times \frac{100}{100+21.}$)	LB./CU. FT.		91.72	

REMARKS

14.31
 13.75
 14.55
 14.12
 14.44
 9.22
 14.74
 14.51
 13.75
 14.62
 14.31

 152.32
 - 9.02 [0.82x11]

 143.30
 + 5.69

 148.99

14.55
 - 8.86

 + 5.69

9.51
 - 0.65

 - 8.86 left over

148.99
 - 8.86

 140.13

TECHNICIAN (Signature)

JP

COMPUTED BY (Signature)

MW

CHECKED BY (Signature)

MW

**UNIT WEIGHT DETERMINATION
"VOLUME OF HOLE" METHODS**

DATE

27 Oct 2011

PROJECT

WBV 14 C.2

TEST SITE

STA 120+30 PS 04' offset
0.5-1.5'

SAMPLE NUMBER

B2/2239

ADDITIONAL SPECIFICATIONS

14.12	1400	10.29
-0.83	-0.83	-4.95
13.29	13.17	5.34
31.80		

left over
6.57
-0.66
-5.91 = 25.89

143.27
-25.89
117.38 / 96.62 =
1.2149
cu. ft.

ASTM D4914

CONVERSION FACTORS

1 in. = 2.54 cm.
1 lb. = 453.6 gm.

1 gm./cc. or 62.4 lb./cu. ft. = Unit weight of water
1 cu. ft. = 1728 cu. in.

CALIBRATION OF STANDARD MATERIAL

STANDARD MATERIAL (Check one)

SAND OIL OTHER (Specify)

APPARATUS OR TARE NUMBER	UNITS			
1. WEIGHT OF APPARATUS OR TARE FILLED				
2. WEIGHT OF APPARATUS OR TARE EMPTY				
3. WEIGHT OF MATERIAL (1.-2.)				
4. VOLUME OF APPARATUS OR TARE				
5. UNIT WEIGHT OF MATERIAL (3./4.)				
6. AVERAGE UNIT WEIGHT OF MATERIAL	LB./CU. FT.	96.62		

CALIBRATION OF APPARATUS

TEMPLATE NUMBER

CONE NUMBER

7. INITIAL WEIGHT OF APPARATUS + SAND	UNITS			
8. FINAL WEIGHT OF APPARATUS + SAND				
9. WEIGHT OF SAND IN TEMPLATE AND/OR CONE	lbs.	25.89		

"VOLUME OF HOLE"

10. INITIAL WEIGHT OF APPARATUS + MATERIAL	UNITS			
11. FINAL WEIGHT OF APPARATUS + MATERIAL				
12. WEIGHT OF MATERIAL RELEASED (10.-11.)	lbs	143.27		
13. WEIGHT OF MATERIAL IN HOLE (For oil, same as 12. For sand, 12.-9.)	lbs.	117.38		
14. VOLUME OF HOLE (13./12.)	cu. ft.	1.2149		

WATER CONTENT DETERMINATION

B2 / 2239

	UNITS					
TARE NUMBER						
15. WEIGHT WET SOIL & TARE						
16. WEIGHT DRY SOIL & TARE						
17. WEIGHT WATER (15.-16.)						
18. WEIGHT TARE						
19. WEIGHT DRY SOIL (16.-18.)						
20. WATER CONTENT ($\frac{17.}{19.} \times 100$)						
21. AVERAGE WATER CONTENT	PERCENT	16.15				

UNIT WEIGHT DETERMINATION

	UNITS			
TARE NUMBER				
22. WEIGHT WET SOIL & TARE	lbs.	161.91		
23. WEIGHT TARE	lbs	7.12		
24. WEIGHT WET SOIL (22.-23.)	lbs	154.79		
25. WET UNIT WEIGHT (24./14.)	LB./CU. FT.	127.41		
26. DRY UNIT WEIGHT ($25. \times \frac{100}{100+21.}$)	LB./CU. FT.	109.69		

REMARKS

17.88
 13.46
 14.34
 13.96
 13.72
 13.44
 14.43
 14.35
 14.57
 14.15
 10.44

 154.74 - 9.13 = 145.61
 - 2.34 left over

 143.27

- (0.83 x 11)
 3.00
 - 0.66

 2.34

(Arrow pointing from 2.34 to the subtraction above)

TECHNICIAN (Signature)

JP, MW

COMPUTED BY (Signature)

MW

CHECKED BY (Signature)

MW

UNIT WEIGHT DETERMINATION "VOLUME OF HOLE" METHODS		DATE 4 Nov 2011
PROJECT	TEST SITE STA 162+68 CL top elev. 13.5 elev. 9.5-8.5' depth 4-5'	SAMPLE NUMBER B2/2302
ADDITIONAL SPECIFICATIONS		ASOM D 4914
$14.15 - 0.82 = 13.33$ $14.48 - 11.47 = 3.01$ $\frac{16.34}{-0.89}$ $\hline 15.45$		$1.55 - 0.66 = 0.89$ double check surface $= 15.47$
CONVERSION FACTORS		
1 in. = 2.54 cm. 1 gm./cc. or 62.4 lb./cu. ft. = Unit weight of water 1 lb. = 453.6 gm. 1 cu. ft. = 1728 cu. in.		
CALIBRATION OF STANDARD MATERIAL	STANDARD MATERIAL (Check one) <input checked="" type="checkbox"/> SAND <input type="checkbox"/> OIL <input type="checkbox"/> OTHER (Specify)	
APPARATUS OR TARE NUMBER	UNITS	
1. WEIGHT OF APPARATUS OR TARE FILLED		
2. WEIGHT OF APPARATUS OR TARE EMPTY		
3. WEIGHT OF MATERIAL (1.-2.)		
4. VOLUME OF APPARATUS OR TARE		
5. UNIT WEIGHT OF MATERIAL ($\frac{3}{4}$.)		
6. AVERAGE UNIT WEIGHT OF MATERIAL	LB./CU. FT. /	96.85
CALIBRATION OF APPARATUS	TEMPLATE NUMBER	CONE NUMBER
7. INITIAL WEIGHT OF APPARATUS + SAND	UNITS	
8. FINAL WEIGHT OF APPARATUS + SAND		
9. WEIGHT OF SAND IN TEMPLATE AND/OR CONE	lbs	15.45
"VOLUME OF HOLE"		
10. INITIAL WEIGHT OF APPARATUS + MATERIAL	UNITS	
11. FINAL WEIGHT OF APPARATUS + MATERIAL		
12. WEIGHT OF MATERIAL RELEASED (10.-11.)		168.52
13. WEIGHT OF MATERIAL IN HOLE (For oil, same as 12. For sand, 12.-9.)		193.07
14. VOLUME OF HOLE ($\frac{13}{6}$.)		1.5805

WATER CONTENT DETERMINATION

TARE NUMBER	UNITS					
15. WEIGHT WET SOIL & TARE						
16. WEIGHT DRY SOIL & TARE						
17. WEIGHT WATER (15.-16.)						
18. WEIGHT TARE						
19. WEIGHT DRY SOIL (16.-18.)						
20. WATER CONTENT ($\frac{17.}{19.} \times 100$)						
21. AVERAGE WATER CONTENT	PERCENT	42.81				

UNIT WEIGHT DETERMINATION

TARE NUMBER	UNITS			
22. WEIGHT WET SOIL & TARE	lbs	178.49		
23. WEIGHT TARE	lbs	8.90		
24. WEIGHT WET SOIL (22.-23.)	lbs	169.59		
25. WET UNIT WEIGHT (24./14.)	LB./ FT.	107.30		
26. DRY UNIT WEIGHT (25. $\times \frac{100}{100+21.}$)	LB./CU. FT.	75.14		

REMARKS

$$\begin{array}{r}
 22.63 \\
 14.20 \\
 14.10 \\
 13.55 \\
 14.11 \\
 14.64 \\
 14.15 \\
 14.11 \\
 14.79 \\
 13.99 \\
 14.56 \\
 13.04 \\
 \hline
 14.16 - 7.90 = 6.26
 \end{array}$$

$$\begin{array}{r}
 = 177.87 \\
 - 9.04 \quad [12 \times 0.82] \\
 \hline
 168.03 \\
 + 6.26 \\
 \hline
 174.29 \\
 - 5.77 \\
 \hline
 168.52
 \end{array}$$

$$\begin{array}{r}
 6.43 \\
 - 0.66 \\
 \hline
 5.77 \quad \text{left over}
 \end{array}$$

TECHNICIAN (Signature)

JP

COMPUTED BY (Signature)

JP, MC

CHECKED BY (Signature)

MW

UNIT WEIGHT DETERMINATION "VOLUME OF HOLE" METHODS		DATE
PROJECT WBV 14 C.2	TEST SITE STA 170 PS 137' offset 2-3' depth River Grch	SAMPLE NUMBER B2/2301
ADDITIONAL SPECIFICATIONS $\begin{array}{r} 15.81 \\ - 0.03 \\ \hline 14.98 \\ + 12.33 \\ \hline 27.31 \end{array}$ $\begin{array}{r} 13.16 \\ - 0.03 \\ \hline 12.33 \end{array}$ $27.31 - 9.39 = 17.92$		"17.90" weighed after ASOM D4914
CONVERSION FACTORS 1 in. = 2.54 cm. 1 gm./cc. or 62.4 lb./cu. ft. = Unit weight of water 1 lb. = 453.6 gm. 1 cu. ft. = 1728 cu. in.		
CALIBRATION OF STANDARD MATERIAL	STANDARD MATERIAL (Check one) <input checked="" type="checkbox"/> SAND <input type="checkbox"/> OIL <input type="checkbox"/> OTHER (Specify)	
APPARATUS OR TARE NUMBER	UNITS	
1. WEIGHT OF APPARATUS OR TARE FILLED		
2. WEIGHT OF APPARATUS OR TARE EMPTY		
3. WEIGHT OF MATERIAL (1.-2.)		
4. VOLUME OF APPARATUS OR TARE		
5. UNIT WEIGHT OF MATERIAL ($\frac{3}{4}$.)		
6. AVERAGE UNIT WEIGHT OF MATERIAL	LB./CU. FT.	96.62
CALIBRATION OF APPARATUS	TEMPLATE NUMBER	CONE NUMBER
7. INITIAL WEIGHT OF APPARATUS + SAND	UNITS	
8. FINAL WEIGHT OF APPARATUS + SAND		
9. WEIGHT OF SAND IN TEMPLATE AND/OR CONE	lbs	17.90
"VOLUME OF HOLE"		
10. INITIAL WEIGHT OF APPARATUS + MATERIAL	UNITS	
11. FINAL WEIGHT OF APPARATUS + MATERIAL		
12. WEIGHT OF MATERIAL RELEASED (10.-11.)	lbs	255.56
13. WEIGHT OF MATERIAL IN HOLE (For oil, same as 12. For sand, 12.-9.)	lbs	237.66
14. VOLUME OF HOLE ($\frac{13}{6}$.)	cu. ft.	2.4597

WATER CONTENT DETERMINATION

B2/2301

	UNITS					
TARE NUMBER						
15. WEIGHT WET SOIL & TARE						
16. WEIGHT DRY SOIL & TARE						
17. WEIGHT WATER (15.-16.)						
18. WEIGHT TARE						
19. WEIGHT DRY SOIL (16.-18.)						
20. WATER CONTENT ($\frac{17.}{19.} \times 100$)						
21. AVERAGE WATER CONTENT	PERCENT	32.72				

UNIT WEIGHT DETERMINATION

	UNITS			
TARE NUMBER				
22. WEIGHT WET SOIL & TARE	lbs	285.54		
23. WEIGHT TARE	lbs.	0.00		
24. WEIGHT WET SOIL (22.-23.)	lbs	285.54		
25. WET UNIT WEIGHT (24./14.)	LB./ FT.	116.09		
26. DRY UNIT WEIGHT (25. $\times \frac{100}{100+21.}$)	LB./CU. FT.	87.47		

REMARKS

13.92
 15.11
 14.57
 13.32
 15.37
 14.09
 15.00
 14.63
 14.00
 14.47
 13.95
 13.84
 14.40
 12.33
 13.72
 14.05
 13.98
 13.88
 15.43

$$\begin{array}{r}
 = 270.06 \\
 + 2.66 \\
 \hline
 272.72 \\
 - 17.16 \left\{ \begin{array}{l} [0.83 \times 20] \\ - (0.56) \end{array} \right. \\
 \hline
 255.56
 \end{array}$$

TECHNICIAN (Signature)

JP MW

COMPUTED BY (Signature)

MW

CHECKED BY (Signature)

MW

Bulk Density Determination/Sand Calibration

Verified By: Pohly Date: 25 Oct 11

Equipment: Density Sand

Identification No. _____ Verification Frequency: 14 Days (in use)

Previous Verification Date: _____ Next Due Date: _____

Verification Equipment Used: scale 0026579-6DH, O.I. with unit wt bucket, straightedge

Verification Procedure: ASTM D1556

Density Sand Supply		Units	Trial #1	Trial #2	Trial #3
Measurement of sand-cone & plate on a flat surface					
Weight of container filled with sand	A	(gms/lbs)	13.65	13.67	13.68
Weight of container empty	B	(gms/lbs)	3.86	3.86	3.86
Weight of sand used to fill container	C = (A - B)	(gms/lbs)	9.79	9.81	9.82
Volume of Container	D	(cf)	.1015	.1015	.1015
Bulk Density of Sand	C (lbs) / D	(pcf)	96.45	96.65	96.75
Average Bulk Density of Sand		(pcf)	96.62		

Action: Repair _____ Replace _____ In Service

Remarks: _____

Bulk Density Determination/Sand Calibration

Verified By: Pohlig Date: 11/2/11

Equipment: Density Sand

Identification No. _____ Verification Frequency: 14 Days (in use)

Previous Verification Date: _____ Next Due Date: _____

Verification Equipment Used: Scale 0026579-6DH
0.1 cu.ft. unit (wt. buckets), Straightedge

Verification Procedure: ASTM D1556

Density Sand Supply					
Measurement of sand-cone & plate on a flat surface		Units	Trial #1	Trial #2	Trial #3
Weight of container filled with sand	A	(gms/lbs)	13.70	13.67	13.67
Weight of container empty	B	(gms/lbs)	3.85	3.85	3.85
Weight of sand used to fill container	C = (A - B)	(gms/lbs)	9.85	9.82	9.82
Volume of Container	D	(cf)	.1015	.1015	.1015
Bulk Density of Sand	C (lbs) / D	(pcf)	97.04	96.75	96.75
Average Bulk Density of Sand		(pcf)	96.85		

Action: Repair _____ Replace _____ In Service ✓

Remarks: _____



Sta 27+46_FS_81' Offset, 3 - 4' Depth, B2/2299 – Tiger Team Bulk Sample taken 3 Nov 2011



Sta 29+04_FS_16' Offset, 1 – 2' Depth, B2/2298 – Tiger Team Bulk Sample taken 3 Nov 2011



Sta 40+34_FS_41' Offset, 1 - 2' Depth, B2/2300 – Tiger Team Bulk Sample taken 2 Nov 2011



Sta 120+38_PS_84' Offset, 0.5-1.5' Depth, B2/2239 – Tiger Team Bulk Sample taken 27 Oct 2011



Sta 162+68_CL, 4 - 5' Depth, B2/2302 – Tiger Team Bulk Sample taken 4 Nov 2011



Sta 170+00_PS_137' Offset, 2 - 3' Depth, B2/2301 – Tiger Team Bulk Sample taken 26 Oct 2011

WBV14C.2 Tiger Team Investigation - UD Tube Samples from Verification Borings - Wood Volume Determination

USACE Quality Assurance Laboratory Data

Undisturbed Sample Data	Depth (ft)	Lab No.	⁽¹⁾ Tube Sample	⁽²⁾ Wet	⁽³⁾ ASTM	⁽¹⁾ Wet	⁽¹⁾ Dry	Total Dry	⁽⁶⁾ Dry Wt	% by dry weight	⁽⁷⁾ Volume +No.	% by Volume +	⁽⁸⁾ ASTM
			Volume	Weight	D2216	Density	Density	Weight	Plus No. 4	+ No.4 Wood or	4 Wood (cu.ft.)	No.4 Wood or	D2974
			(cu.ft.)	(lbs)	MC%	(pcf)	(pcf)	(lbs)	(lbs)	Debris		Debris	%Organic
VWW4-B-1D, Sta 27+25 FS 80'	3 - 4	B2/2305	0.114	11.97	24.3	105.3	84.7	9.63	0.02	0.20	0.0013	1.18	3.7
VWW5-B-2A, Sta 29+50 FS 16'	2 - 3	B2/2306 ⁽⁹⁾	0.080	7.86	27.0	98.3	77.4	6.19	0.07	1.10	0.0009	1.08	6.6
VWW8-B-1B, Sta 40+51 FS 38'	1 - 2	B2/2307 ⁽⁹⁾	0.100	11.00	28.7	110.0	85.5	8.55	0.07	0.88	0.0001	0.10	4.4
VWW19-2A, Sta 120+39 PS 63'	4 - 5	B2/2308	0.089	9.70	28.8	109.3	84.9	7.53	0.24	3.19	0.0008	0.86	6.8
VWW20-B-1A	0 - 1	B2/2309	0.087	11.02	20.5	126.7	105.1	9.14	0.10	1.08	0.0010	1.10	5.4
VWW28-B-3A, Sta 162+00 CL	4 - 5	B2/2310	0.085	8.95	36.0	105.1	77.3	6.58	0.02	0.23	0.0008	0.90	6.3
VWW29-B-3A, Sta 170+00 PS 137'	2 - 3	B2/2311	0.084	9.47	31.0	112.5	85.9	7.23	0.04	0.60	0.0004	0.46	5.7
VWW30-2A, Sta 174+50 CL	4 - 5	B2/2312	0.101	10.29	29.7	102.2	78.8	7.93	0.03	0.39	0.0010	0.95	5.5
VWW31-2A, Sta 179+80 CL	2 - 3	B2/2313 ⁽¹⁰⁾	0.090	10.96	31.8	121.9	92.5	8.32	0.52	6.25	0.0076	8.48	4.8
VWW1, Sta 4+42 PS 34'	2 - 2.5	B2/2337 ⁽⁹⁾	0.100	11.00	33.0	110.0	82.7	8.27	0.04	0.45	0.0012	1.15	4.5
VWW19-1B, Sta 120+39 PS 63'	1.0	B2/2338	0.108	13.22	35.3	122.8	90.8	9.77	0.05	0.52	0.0008	0.71	3.8
VWW21-5B, Sta 139+00 CL	8.8	B2/2339	0.106	12.68	31.24	119.4	91.0	9.66	0.06	0.63	0.0007	0.63	4.2

The samples represent undisturbed soil specimens from 5 inch diameter design verification borings. All samples were: (1) selected from extruded 5 inch diameter shelly tubes, (2) weighed as-received moist sample from tube samples, (3) determining moisture content on minus No. 4 sample (ASTM D2216), (4) processed over a No. 4 sieve (4.76 mm), (5) retaining the plus No. 4 wood & debris, (6) rinsing, oven drying & weighing the dry plus No. 4 wood & debris, (7) determining wood and debris volume by in-house procedure for Wood Volume Determination by Densified Sand Method, and (8) determining organic content of minus No. 4 sample (ASTM D2974 Method C). Note(9): Cells highlighted in yellow with red text identified data that was estimated due to the lack of determining those dimension and weights needed for % weight and %volume calculations. Note(10): This particular sample resulted in a calculated % by volume >8% and was the result of a large chunk of wood captured within the tube that broke up during removal and processing. Such a large piece or pieces of wood would have been more accurately represented by a much larger sampling size.

USACE, Savannah District, Environmental & Materials Unit, Marietta, GA

Wood Volume Determination

B2/2305

Tested By: A. Bacon Date: 20 Mar 2012

Equipment Used: 0.5 cu.ft. measure

Volume Measure (a) (cu.ft.): 0.5002 Mass of Measure (b) (lbs): 12.51

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.5002
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	12.51
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	104.09
(d)	Mass of Sample Wood	lbs.	As-received moist wood weight	8.81 gms 0.019422 lbs
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	64.46
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	52.07
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	51.93
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.0013449
(i)	Volume Excavated Hole Sample	cu.yds.	(i) X 27 cu.ft.	0.113628
(j)	Volume of Wood	%	100 x (h) / (i)	1.18%

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

Wood Volume Determination

B2/2306

Tested By: A. Bacon Date: 20 Mar 2012

Equipment Used: 0.5 cu.ft. measure

Volume Measure (a) (cu.ft.): 0.5002 Mass of Measure (b) (lbs): 12.51

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.5002
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	12.51
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	104.09
(d)	Mass of Sample Wood	lbs.	As-received moist wood weight	30.83 gms 0.067967
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	64.56
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	52.07
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	51.98
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.0008646
(i)	Volume Excavated Hole Sample	cu.yds.	(h) X 27 cu.ft.	0.023300 0.08 <i>Est. material</i>
(j)	Volume of Wood	%	100 x (h) / (i)	1.05% 1.08%

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

Wood Volume Determination

B2/2307

Tested By: A. Bacon Date: 20 Mar 2012

Equipment Used: 0.5 cu.ft. measure

Volume Measure (a) (cu.ft.): 0.5002 Mass of Measure (b) (lbs): 12.51

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.5002
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	12.51
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	104.09
(d)	Mass of Sample Wood	lbs.	As-received moist wood weight	34 gms 0.074957 lbs
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	64.64
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	52.07
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	52.06
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.000096
(i)	Volume Excavated Hole Sample	cu.yds.	(h) X 27	0.107947 estimated 0.1000
(j)	Volume of Wood	%	100 x (h) / (i)	0.09% 0.10%

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

B2/2308

Wood Volume Determination

Tested By: A. Bacon Date: 5/9/2012

Equipment Used: 0.5 cu.ft. measure

Volume Measure (a) (cu.ft.): 0.5002 Mass of Measure (b) (lbs): 12.57

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.5002
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	12.57
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	105.06
(d)	Mass of Sample Wood	lbs.	As-received moist wood weight	0.24
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	65.28
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	52.55
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	52.47
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.0007614
(i)	Volume Excavated Hole Sample	cu.yds.	(i) X 27 cu.ft.	0.000745
(j)	Volume of Wood	%	100 x (h) / (i)	0.86%

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

B2/2309

Wood Volume Determination

Tested By: ABacon Date: 20 Mar 2012

Equipment Used: 0.5 cu.ft. Vit wt. measure

Volume Measure (a) (cu.ft.): 0.5002 Mass of Measure (b) (lbs): 104.09

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.5002
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	12.51
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	104.09
(d)	Mass of Sample Wood	lbs.	As-received moist wood weight	44.64 gms 0.0984 lbs
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	64.58
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	52.07
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	51.97
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.0009607
(i)	Volume Excavated Hole <u>Sample</u>	cu.yds.	(h) X 27 cu.ft.	0.087006
(j)	Volume of Wood	%	100 x (h) / (i)	1.10%

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

Wood Volume Determination

B2/2310

Tested By: A. Bacon Date: 20 Mar 2012

Equipment Used: 0.5 cu.ft. measure

Volume Measure (a) (cu.ft.): 0.5002 Mass of Measure (b) (lbs): 12.51

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.5002
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	12.51
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	104.09
(d)	Mass of Sample Wood	lbs.	As-received moist wood weight	6.90 gms 0.052116 lbs
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	64.52
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	52.07
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	51.99
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.0007685
(i)	Volume Excavated Hole Sample	cu.yds.	(h) X 27 cu.ft.	0.085123
(j)	Volume of Wood	%	100 x (h) / (i)	0.90%

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

Wood Volume Determination

B2/2311

Tested By: A. Bacon Date: 20 Mar 2012

Equipment Used: 0.5 cu. ft. measure

Volume Measure (a) (cu.ft.): 0.5002 Mass of Measure (b) (lbs): 12.51

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.5002
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	12.51
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	104.09
(d)	Mass of Sample Wood	lbs.	As-received moist wood weight	19.61 gms 0.043232 lbs
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	64.58
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	52.07
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	52.03
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.0003842
(i)	Volume Excavated Hole Sample	cu.yds.	(i) x 27 cu.ft.	0.004187
(j)	Volume of Wood	%	100 x (h) / (i)	0.46%

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

B2/2312

Wood Volume Determination

Tested By: A. Bacon Date: 20 Mar 2012

Equipment Used: 0.5 cu. ft. measure

Volume Measure (a) (cu.ft.): 0.5002 Mass of Measure (b) (lbs): 12.51

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.5002
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	12.51
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	104.09
(d)	Mass of Sample Wood	lbs.	As-received moist wood weight	13.97 gms 0.030798 lbs
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	64.51
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	52.07
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	51.97
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.0009607
(i)	Volume Excavated Hole Sample	cu.yds.	(i) X 27 cu.ft.	0.100673
(j)	Volume of Wood	%	100 x (h) / (i)	0.95 %

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

Wood Volume Determination

B2/2313

Tested By: A. Bacon Date: 5/10/2012

Equipment Used: 0.5 cu.ft measure

Volume Measure (a) (cu.ft.): 0.5002 Mass of Measure (b) (lbs): 12.57

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.5002
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	12.57
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	104.87
(d)	Mass of Sample Wood	lbs.	As-received moist wood weight	0.52 lbs
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	64.75
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	52.46
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	51.66
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.0076284
(i)	Volume Excavated Hole Sample	cu.yds.	(i) X 27 cu.ft.	0.089946
(j)	Volume of Wood	%	100 x (h) / (i)	8.48%

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

B2/2337

Wood Volume Determination

Tested By: A. Bacon Date: 20 Mar 2012

Equipment Used: 0.5 cu. ft. Measure

Volume Measure (a) (cu.ft.): 0.5002 Mass of Measure (b) (lbs): 12.51

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.5002
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	12.51
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	104.09
(d)	Mass of Sample Wood	lbs.	As-received moist wood weight	16.89 gms 0.0372354 lbs
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	64.50
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	52.07
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	51.95
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.001528
(i)	Volume Excavated Hole Sample	cu.yds.	(i) X 27	cu.ft. 0.10 <i>estimated</i>
(j)	Volume of Wood	%	100 x (h) / (i)	1.15%

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

02/2338

Wood Volume Determination

Tested By: A. Bacon Date: 20 Mar 2012

Equipment Used: 0.5 cu ft measure

Volume Measure (a) (cu.ft.): 0.5002 Mass of Measure (b) (lbs): 12.51

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.5002
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	12.51
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	104.09
(d)	Mass of Sample Wood	lbs.	As-received moist wood weight	23.05 gms 0.050705 lbs
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	64.55
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	52.07
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	51.99
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.0007685
(i)	Volume Excavated Hole Sample	cu.yds.	(i) x 27 cu.ft.	0.1076
(j)	Volume of Wood	%	100 x (h) / (i)	0.71 %

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

Wood Volume Determination

B2/2339

Tested By: A. Bacon Date: 20 March 2012

Equipment Used: 0.5 cu. ft. measure

Volume Measure (a) (cu.ft.): 0.5002 Mass of Measure (b) (lbs): 12.51

Verification Procedure: In House Wood Volume Determination Procedure

(a)	Volume of Measure	cu.ft.	Determined annually ASTM C29 paragraph 8	0.5002
(b)	Mass of Measure	lbs.	Determined annually ASTM C29 paragraph 8	12.51
(c)	Average Densified Sand in Measure	pcf	Minimum 2 determinations from Step 4) of Procedure	104.09
(d)	Mass of Sample Wood	lbs.	As-received moist wood weight	27.70 gms 0.061067 lbs
(e)	Densified Sand, Wood, and Measure	lbs.	Step 5) of Procedure	64.57
(f)	Densified Sand Mass Only (no wood)	lbs.	(c) X (a)	52.07
(g)	Densified Sand Mass Only (with wood)	lbs.	(e) - (b) - (d)	52.00
(h)	Volume of Wood	cu.ft.	[(f) - (g)] / (c)	0.0006724
(i)	Volume Excavated Hole Sample	cu.yds.	(i) X 27 cu.ft.	0.10 0.106 ^{estimated}
(j)	Volume of Wood	%	100 x (h) / (i)	0.67% 0.63%

- (a) Selected Measure Volume => cubic feet (cu.ft.)
- (b) Selected Measure Mass (weight) => pounds (lbs.)
- (c) Average mass per unit volume of densified sand only => pound/cubic feet (pcf)
- (d) Mass of Sample Wood Pieces => lbs
- (e) Determined densified sand, wood, & measure mass => lbs
- (f) Densified sand only mass (no wood) = (c) x (a) => lbs
- (g) Densified sand only mass (with wood) = (e) - (b) - (d) => lbs
- (h) Volume of wood (from densified sand test) = [(f) - (g)] / (c) => cu.ft.
- (i) Volume of excavated hole (*determined*) => cu.yds. x 27 => cu.ft.
- (j) % tested volume wood = 100 x (h) / (i) => %

Remarks: _____

Densified Sand Using Kango Hammer & Unit Measure

Verified By: Ai Bacon Date: 20 MAR 12

Equipment: Unit Measure 0.5 cu ft

Identification No. _____ Verification Frequency: Daily (in use)

Previous Verification Date: _____ Next Due Date: _____

Verification Equipment Used: Kango Hammer Type 638S with end plate,
Scale # 28679-6DH D. Haus Champ

Verification Procedure: In-house Procedure

Density Sand Supply		Ottawa Sand from Durham Geo			
Measurement of Densified Sand in a Calibrated Unit Measure		Units	Trial #1	Trial #2	Trial #3
Weight of container filled with densified sand	A	(lbs)	64.69	64.51	64.52
Weight of container empty	B	(lbs)	12.51	12.51	12.51
Weight of densified sand used to fill container	C = (A - B)	(lbs)	52.18	52.0	52.01
Volume of Container	D	(cf)	0.5002	0.5002	0.5002
Densified Unit Weight of Sand	C (lbs) / D	(pcf)	104.32	103.96	103.99
Average Weight (Mass) of Densified Sand		(lbs)	52.06		
Average Densified Unit Weight of Sand		(pcf)	104.09		

Action: Repair _____ Replace _____ In Service ✓
Remarks: _____

B2/2313

Densified Sand Using Kango Hammer & Unit Measure

Verified By: A. Bacon Date: 5/10/2012

Equipment: Unit Measure 0.5 cu.ft.

Identification No. CT-15 Verification Frequency: Daily (in use)

Previous Verification Date: _____ Next Due Date: _____

Verification Equipment Used: Kango Hammer Type 638S with end plate,
Scale # ^{SN} 1018 Thurman, Digital Scale

Verification Procedure: In-house Procedure

Density Sand Supply		Ottawa Sand from Durham Geo			
Measurement of Densified Sand in a Calibrated Unit Measure		Units	Trial #1	Trial #2	Trial #3
Weight of container filled with densified sand	A	(lbs)	64.76	65.06	65.25
Weight of container empty	B	(lbs)	12.57	12.57	12.57
Weight of densified sand used to fill container	C = (A - B)	(lbs)	52.19	52.49	52.68
Volume of Container	D	(cf)	0.5002	0.5002	0.5002
Densified Unit Weight of Sand	C (lbs) / D	(pcf)	104.34	104.94	105.37
Average Weight (Mass) of Densified Sand		(lbs)	52.45		
Average Densified Unit Weight of Sand		(pcf)	104.87		

Action: Repair _____ Replace _____ In Service _____

Remarks: _____

B2/2308

Densified Sand Using Kango Hammer & Unit Measure

Verified By: A. Bacon Date: 5/9/2012

Equipment: Unit Measure ~~0.5 cu ft~~ 0.5 cu ft

Identification No. CT-15 Verification Frequency: Daily (in use)

Previous Verification Date: _____ Next Due Date: _____

Verification Equipment Used: Kango Hammer Type 638S with end plate,
Scale # SN/1018 Thurman Scale

Verification Procedure: In-house Procedure

Density Sand Supply		Ottawa Sand from Durham Geo			
Measurement of Densified Sand in a Calibrated Unit Measure		Units	Trial #1	Trial #2	Trial #3
Weight of container filled with densified sand	A	(lbs)	65.03	64.90	65.43
Weight of container empty	B	(lbs)	12.57	12.57	12.57
Weight of densified sand used to fill container	C = (A - B)	(lbs)	52.46	52.33	52.86
Volume of Container	D	(cf)	0.5002	0.5002	0.5002
Densified Unit Weight of Sand	C (lbs) / D	(pcf)	104.88	104.62	105.68
Average Weight (Mass) of Densified Sand		(lbs)	52.55		
Average Densified Unit Weight of Sand		(pcf)	105.06		

Action: Repair _____ Replace _____ In Service ✓
Remarks: _____

ORGANIC CONTENT
ASTM D 2974, Method C

PROJECT NUMBER WBV 14.C2

JOB NO.

DATE

ASTM D 2974, Method C

Boring/Sample No.	B 2 / 2306	B 2 / 2602	B 2 / 2307	B 2 / 2307	B 2 / 2308	B 2 / 2308	B 2 / 2309	B 2 / 2309
Tare No.	H 1	H 2	H 3	H 4	H 5	H 6	H 7	H 8
Tare + Dry Soil g	64.59	64.28	59.16	60.86	58.70	61.87	59.19	61.11
Tare Wt. g	29.80	26.06	28.29	29.25	28.67	29.42	30.21	29.51
Dry Soil "B"	34.79	38.22	30.87	31.61	30.03	32.45	28.98	31.60
Tare + Ashed Soil g	62.29	61.76	57.81	59.49	56.68	59.67	57.63	59.38
Ashed Soil "C"	32.49	35.70	29.52	30.24	28.01	30.25	27.42	29.87
Weight Lost	2.30	2.52	1.35	1.37	2.02	2.20	1.56	1.73
Percent Ash "D" %	93.4%	93.4%	95.6%	95.7%	93.3%	93.2%	94.6%	94.5%
Organic Matter %	6.6%	6.6%	4.4%	4.3%	6.7%	6.8%	5.4%	5.5%
	6.6%		4.4%		6.8%		5.4%	

ASTM D 2974, Method C

Boring/Sample No.	B 2 / 2310	B 2 / 2310	B 2 / 2311	B 2 / 2311	B 2 / 2312	B 2 / 2312	B 2 / 2313	B 2 / 2313
Tare No.	H 9	H 10	H 11	H 12	H 13	H 14	H 15	H 16
Tare + Dry Soil g	63.12	62.10	60.60	57.40	62.33	58.55	57.57	60.14
Tare Wt. g	27.56	28.75	28.87	26.20	30.73	28.48	27.74	28.51
Dry Soil "B"	35.56	33.35	31.73	31.20	31.60	30.07	29.83	31.63
Tare + Ashed Soil g	60.90	59.99	58.82	55.61	60.59	56.91	56.13	58.61
Ashed Soil "C"	33.34	31.24	29.95	29.41	29.86	28.43	28.39	30.10
Weight Lost	2.22	2.11	1.78	1.79	1.74	1.64	1.44	1.53
Percent Ash "D" %	93.8%	93.7%	94.4%	94.3%	94.5%	94.5%	95.2%	95.2%
Organic Matter %	6.2%	6.3%	5.6%	5.7%	5.5%	5.5%	4.8%	4.8%
	6.3%		5.7%		5.5%		4.8%	

ASTM D 2974, Method C

Boring/Sample No.	B 2 / 2305	B 2 / 2305	B 2 / 2337	B 2 / 2337	B 2 / 2338	B 2 / 2338	B 2 / 2339	B 2 / 2339
Tare No.	F 1	F 2	F 3	F 4	F 5	F 6	F 7	F 8
Tare + Dry Soil g	60.41	60.02	62.57	66.29	60.99	62.24	61.14	57.80
Tare Wt. g	29.27	29.34	27.73	29.14	29.57	28.46	29.55	27.21
Dry Soil "B"	31.14	30.68	34.84	37.15	31.42	33.78	31.59	30.59
Tare + Ashed Soil g	59.25	58.89	61.01	64.62	59.81	60.91	59.81	56.50
Ashed Soil "C"	29.98	29.55	33.28	35.48	30.24	32.45	30.26	29.29
Weight Lost	1.16	1.13	1.56	1.67	1.18	1.33	1.33	1.30
Percent Ash "D" %	96.3%	96.3%	95.5%	95.5%	96.2%	96.1%	95.8%	95.8%
Organic Matter %	3.7%	3.7%	4.5%	4.5%	3.8%	3.9%	4.2%	4.2%
	3.7%		4.5%		3.8%		4.2%	

Furnace: WiseTherm #1

Balance: Mettler AE160 # B94650

D = Ash Content (%) = (C/B)100

Organic Matter, (%) = 100-D

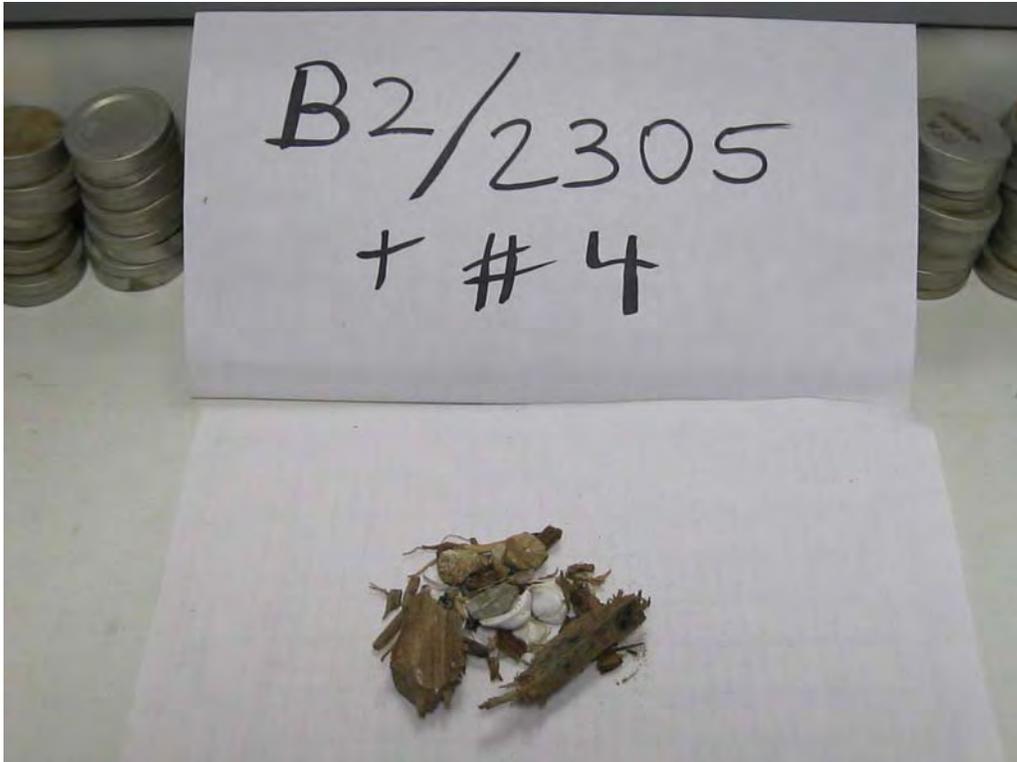
Remarks: _09MAR12 ORGANIC CONTENT SAMPLES TIME IN THE FURNACE 1522HRS _____

_10MAR 12 ORGANIC CONTENT TAKEN OUT OF FURNANCE AT 1200HRS. _____

Recorded By: _ECS_____

Computed By: _ECS_____

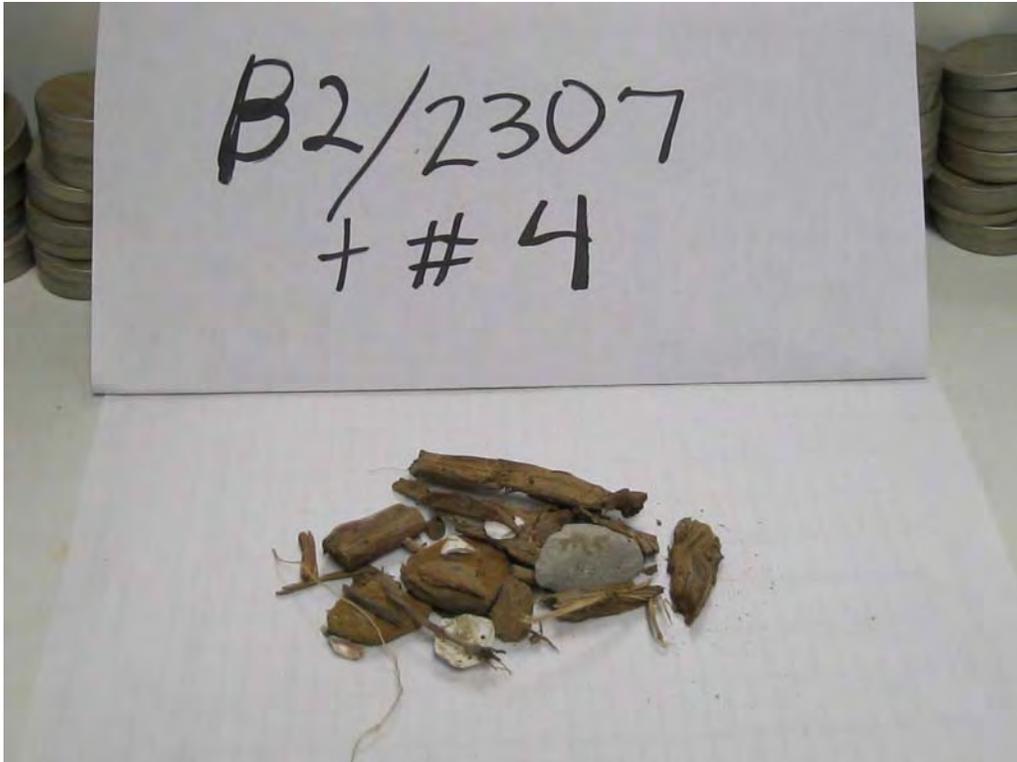
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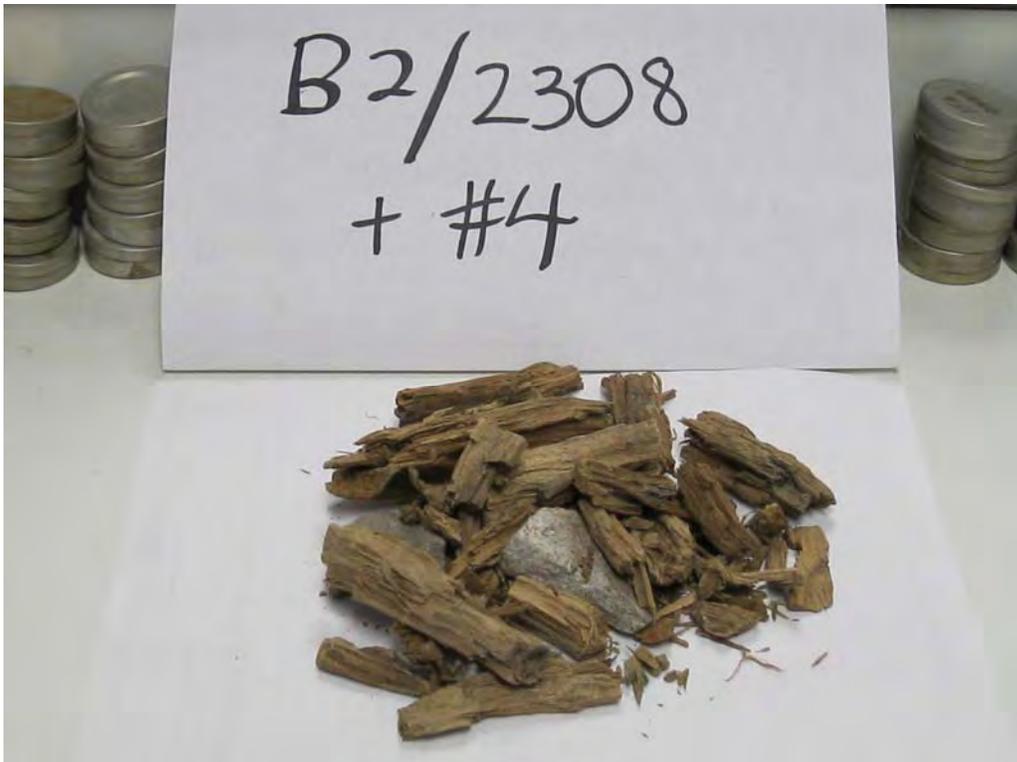
VWW4-B-1D, Sta 27+25 FS 80' – Tiger Team "Undisturbed" Sample +No. 4 Debris May 2012



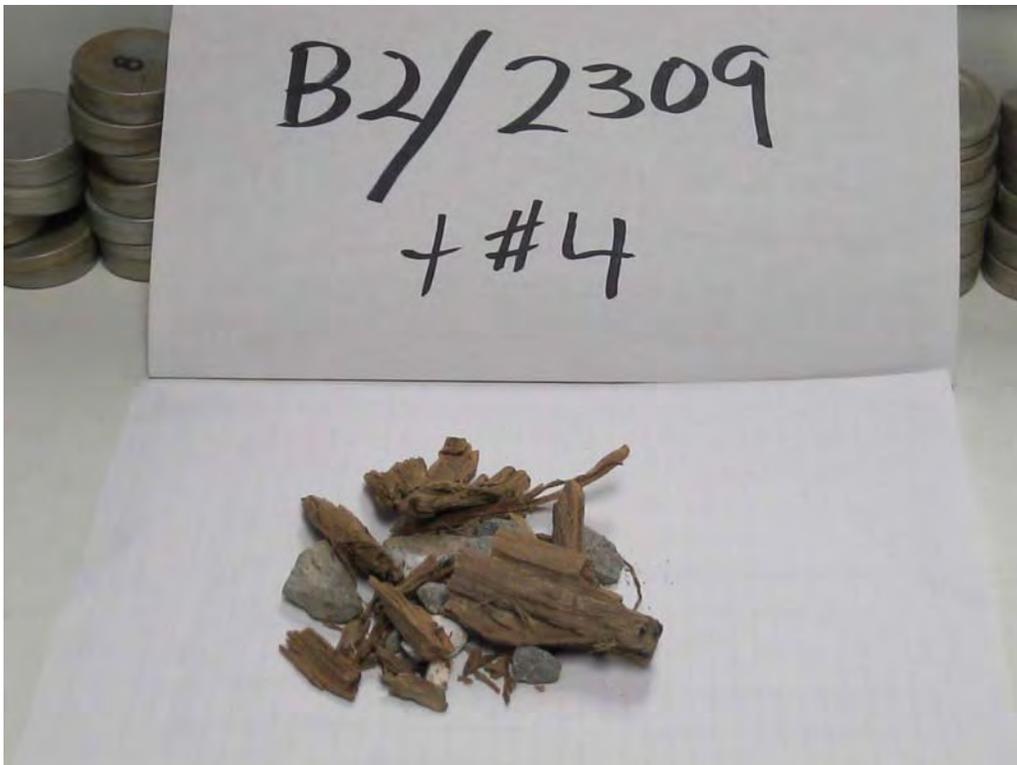
VWW5-B-2A, Sta 29+50 FS 16' – Tiger Team "Undisturbed" Sample +No. 4 Debris May 2012



VWW8-B-1B, Sta 40+51 FS 38' – Tiger Team "Undisturbed" Sample +No. 4 Debris May 2012



VWW19-2A, Sta 120+39 PS 63' – Tiger Team "Undisturbed" Sample +No. 4 Debris May 2012



VWW20-B-1A – Tiger Team “Undisturbed” Sample +No. 4 Debris May 2012



VWW28-B-3A, Sta 162+00 CL – Tiger Team “Undisturbed” Sample +No. 4 Debris May 2012



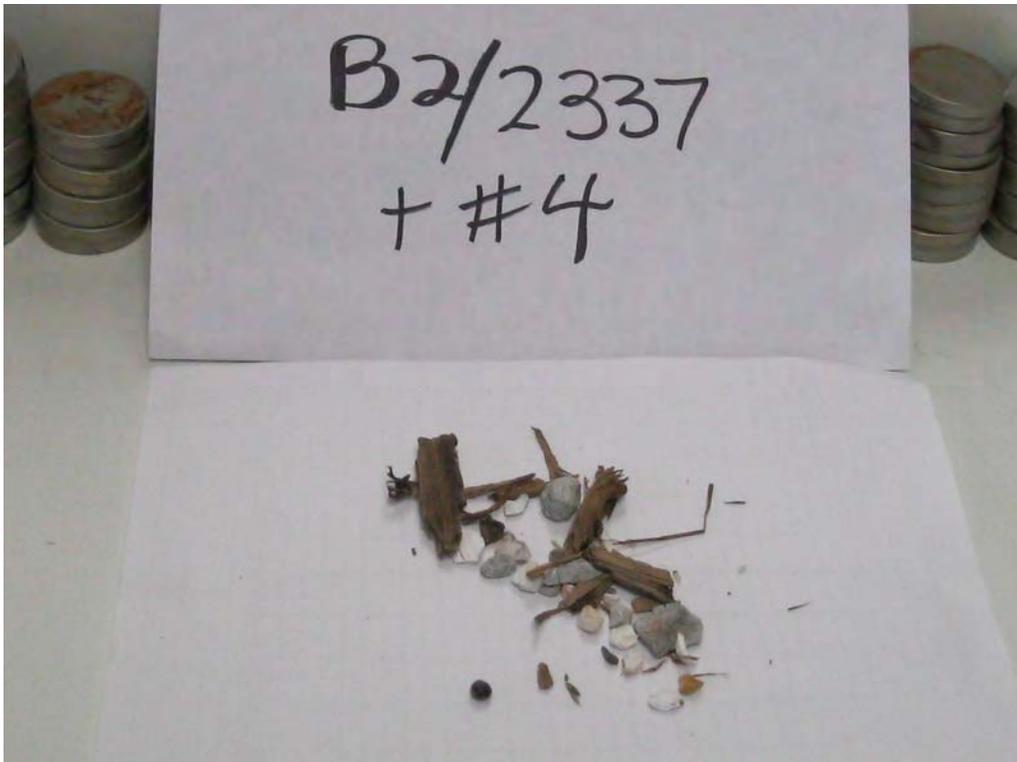
VWW29-B-3A, Sta 170+00 PS 137' – Tiger Team "Undisturbed" Sample +No. 4 Debris May 2012



VWW30-2A, Sta 174+50 CL – Tiger Team "Undisturbed" Sample +No. 4 Debris May 2012



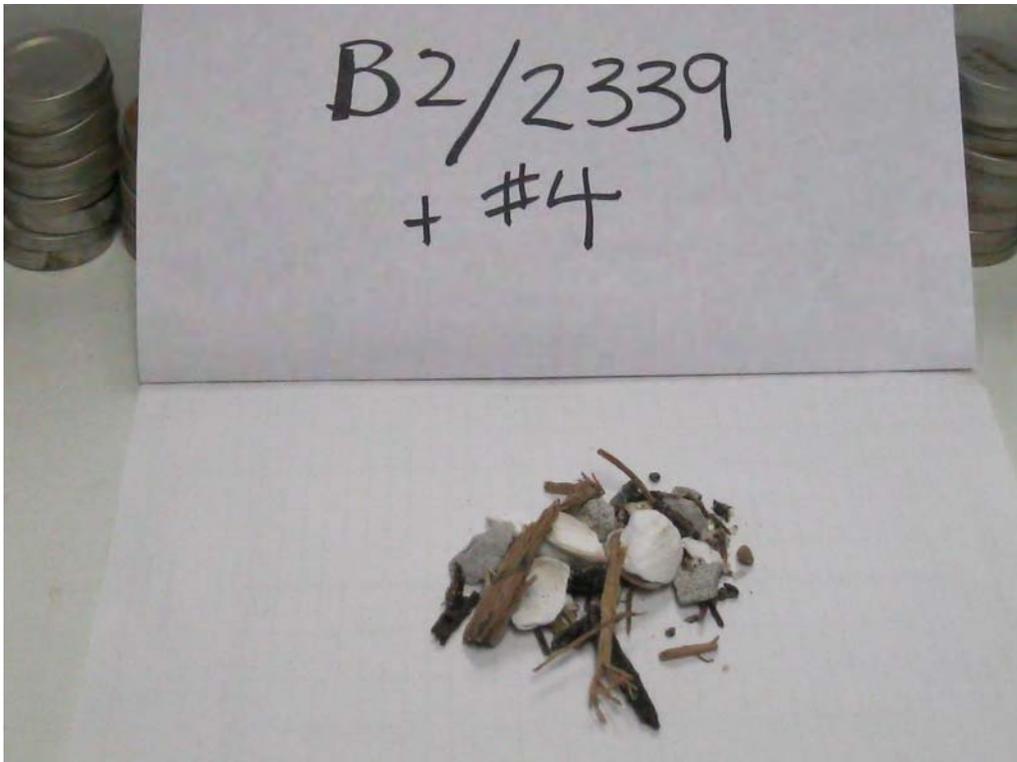
VWW31-2A, Sta 179+80 CL – Tiger Team “Undisturbed” Sample +No. 4 Debris May 2012



VWW1, Sta 4+42 PS 34' – Tiger Team “Undisturbed” Sample +No. 4 Debris May 2012



VWW19-1B, Sta 120+39 PS 63' – Tiger Team “Undisturbed” Sample +No. 4 Debris May 2012



VWW21-5B, Sta 139+00 CL – Tiger Team “Undisturbed” Sample +No. 4 Debris May 2012