PTS Laboratories, Inc.

8100 Secura Way • Santa Fe Springs, CA 90670
Telephone (562) 347-2500 • Fax (562) 907-3610

September 27, 2011

Pamela Moss
Shaw E & I
7604 Technology Way, Suite 300
Denver, CO 80237

Re: PTS File No: 41655
Physical Properties Data
KAFBBFF; 667917

Dear Ms. Moss:

Please find enclosed report for Physical Properties analyses conducted upon samples received from your KAFBBFF; 667917 project. All analyses were performed by applicable ASTM, EPA, or API methodologies. An electronic version of the report has previously been sent to your attention via the internet. The samples are currently in storage and will be retained for thirty days past completion of testing at no charge. Please note that the samples will be disposed of at that time. You may contact me regarding storage, disposal, or return of the samples.

PTS Laboratories appreciates the opportunity to be of service. If you have any questions or require additional information, please contact Rachel Spitz at (562) 347-2504.

Sincerely,
PTS Laboratories

for Rachel Spitz

Michael Mark Brady, P.G.
District Manager

Encl.

PTS Laboratories

Project Name: KAFBBFF
Project Number: 667917

PTS File No: 41655
Client: Shaw E & I

TEST PROGRAM - 20110913

CORE ID	Depth ft.	Core Recovery ft.	Grain Size Analysis ASTM D4464	Hydraulic Conductivity API RP40/EPA 9100	Effective Porosity Mod. ASTM D425			Notes
		Plugs:	Grab	Remold 1"	Remold 1.5"			
Date Received: 20110913								
106107-515	N/A	N/A	X	X	X			
106105-483	N/A	N/A	X	X	X			
106083-477	N/A	N/A	X	X	X			
106035-475	N/A	N/A	X	X	X			
TOTALS:	4 pails		4	4	4			4

Laboratory Test Program Notes
Standard TAT for basic analysis is 10-15 business days.
Effective Porosity: Includes Total Porosity.

PTS File No: 41655
Client: Shaw E & I

PHYSICAL PROPERTIES DATA - DRAINAGE (EFFECTIVE) POROSITY

PROJECT NAME: KAFBBFF
PROJECT NO: 667917

			METHODS:	Mod. ASTM D425	Mod. ASTM D425
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	ANALYSIS DATE	TOTAL POROSITY, %Vb	EFFECTIVE POROSITY, %Vb
106107-515	N/A	R	20110919	32.5	27.5
106105-483	N/A	R	20110919	31.3	18.0
106083-477	N/A	R	20110919	36.2	29.0
106035-475	N/A	R	20110919	38.7	31.9

(1) Sample Orientation: H = horizontal; V = vertical; R = remold; Vb = Bulk Volume

PTS File No: 41655
Client: Shaw E & I

PHYSICAL PROPERTIES DATA - HYDRAULIC CONDUCTIVITY

PROJECT NAME: KAFBBFF
PROJECT NO: 667917

		METHODS:	API RP 40; EPA 9100	
			25 PSI CONFINING STRESS	
SAMPLE ID.	DEPTH, ft.	SAMPLE ORIENTATION (1)	EFFECTIVE (2,3) PERMEABILITY TO WATER, millidarcy	HYDRAULIC CONDUCTIVITY (2,3), cm/s
106107-515	N/A	R	2343	2.28E-03
106105-483	N/A	R	43.6	4.20E-05
106083-477	N/A	R	3692	3.55E-03
106035-475	N/A	R	1263	1.21E-03

(1) Sample Orientation: H = horizontal; V = vertical; R = remold
(2) Native State or Effective = With as-received pore fluids in place
(3) Permeability to water and hydraulic conductivity measured at saturated conditions

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Shaw E & I
PTS File No: 41655

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

PROJECT NAME: KAFBBFF
PROJECT NO: 667917

Sample ID	Depth, ft.	Mean Grain Size Description (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
106107-515	N/A	Medium sand	0.684	11.34	14.59	48.13	24.71	(2)	(2)	1.22
106105-483	N/A	Medium sand	0.612	14.74	4.31	53.64	23.87	(2)	(2)	3.44
106083-477	N/A	Coarse sand	1.133	21.23	15.03	45.38	17.73	(2)	(2)	0.64
106035-475	N/A	Medium sand	0.428	0.00	0.00	50.84	42.33	3.75	3.08	6.83

(1) Based on Mean from Trask
(2) Mechanical sieve does not differentiate silt/clay fractions

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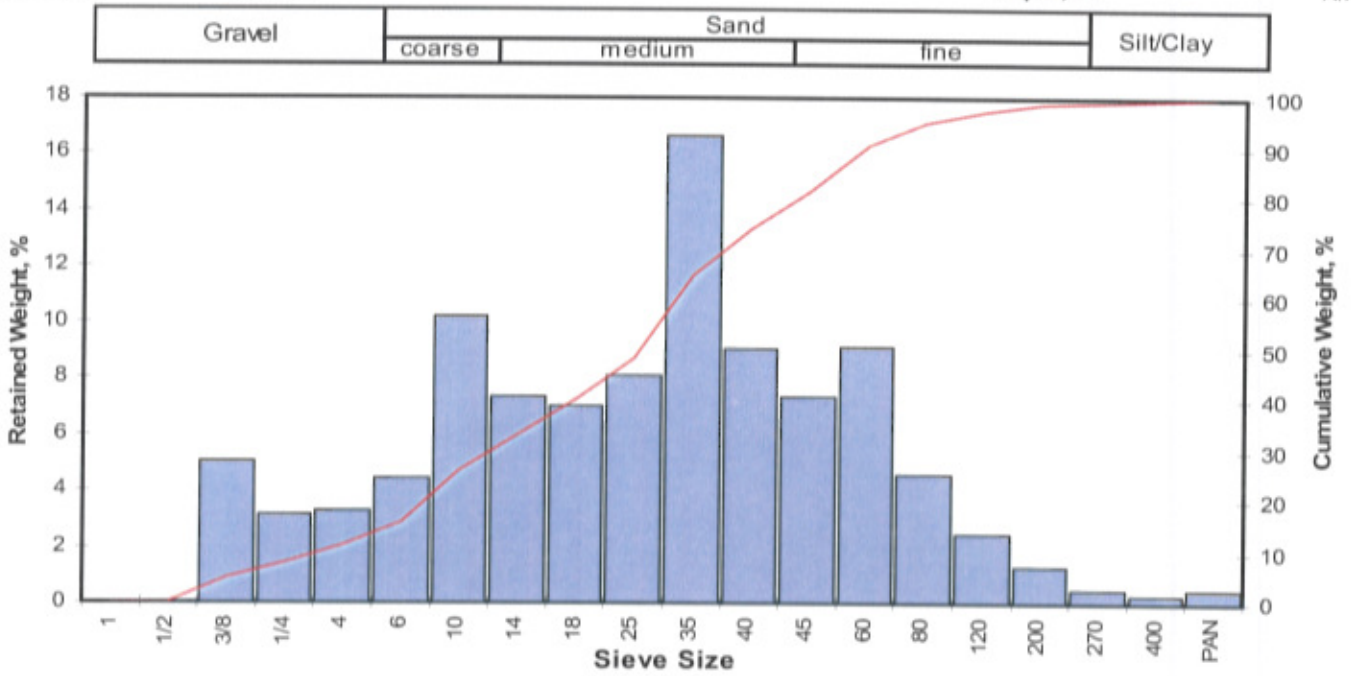
Particle Size Analysis - ASTM D422M

Client:	Shaw E & I	**PTS File No:**	41655
Project:	KAFBBFF	**Sample ID:**	106107-515
Project No:	667917	**Depth, ft:**	N/A



Opening		Phi of	U.S. Sieve	Sample Weight	Incremental Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	3.68	4.99	4.99
0.2500	6.351	-2.67	1/4	2.29	3.11	8.10
0.1873	4.757	-2.25	4	2.39	3.24	11.34
0.1324	3.364	-1.75	6	3.25	4.41	15.76
0.0787	2.000	-1.00	10	7.50	10.18	25.93
0.0557	1.414	-0.50	14	5.43	7.37	33.30
0.0394	1.000	0.00	18	5.16	7.00	40.30
0.0278	0.707	0.50	25	5.96	8.09	48.39
0.0197	0.500	1.00	35	12.28	16.66	65.06
0.0166	0.420	1.25	40	6.64	9.01	74.07
0.0139	0.354	1.50	45	5.41	7.34	81.41
0.0098	0.250	2.00	60	6.73	9.13	90.54
0.0070	0.177	2.50	80	3.36	4.56	95.10
0.0049	0.125	3.00	120	1.78	2.42	97.52
0.0029	0.074	3.75	200	0.93	1.26	98.78
0.0021	0.053	4.25	270	0.35	0.47	99.25
0.0015	0.037	4.75	400	0.19	0.26	99.51
			PAN	0.36	0.49	100.00
TOTALS				73.69	100.00	100.00

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	-3.25	0.3737	9.493
10	-2.42	0.2111	5.363
16	-1.73	0.1308	3.322
25	-1.07	0.0826	2.098
40	-0.02	0.0400	1.015
50	0.55	0.0269	0.684
60	0.85	0.0219	0.555
75	1.28	0.0162	0.411
84	1.64	0.0126	0.320
90	1.97	0.0100	0.255
95	2.49	0.0070	0.178

Measure	Trask	Inman	Folk-Ward
Median, phi	0.55	0.55	0.55
Median, in.	0.0269	0.0269	0.0269
Median, mm	0.684	0.684	0.684
Mean, phi	-0.33	-0.05	0.15
Mean, in.	0.0494	0.0406	0.0354
Mean, mm	1.254	1.032	0.900
Sorting	2.258	1.687	1.713
Skewness	1.358	-0.352	-0.338
Kurtosis	0.165	0.700	1.000

Grain Size Description (ASTM-USCS Scale)	Medium sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	11.34
Coarse Sand	10	14.59
Medium Sand	40	48.13
Fine Sand	200	24.71
Silt/Clay	<200	1.22
	Total	100

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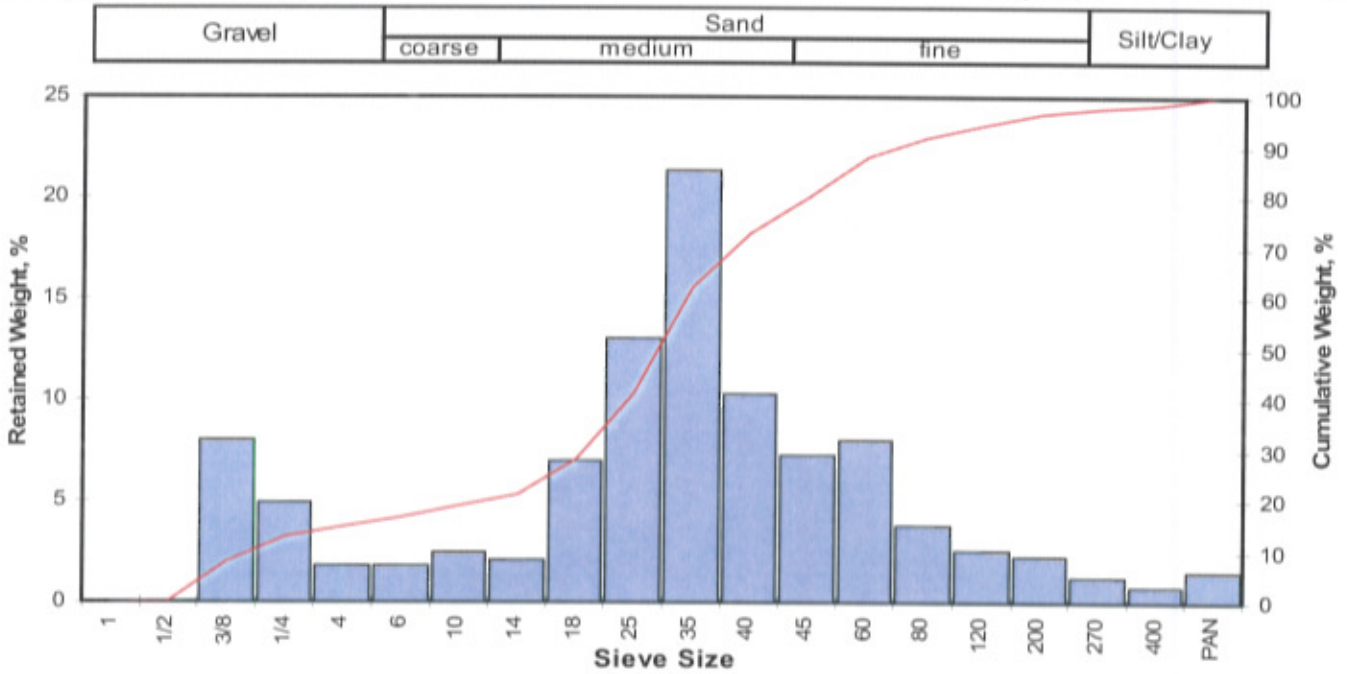
Particle Size Analysis - ASTM D422M

Client: Shaw E & I
Project: KAFBBFF
Project No: 667917

PTS File No: 41655
Sample ID: 106105-483
Depth, ft: N/A



Opening		Phi of	U.S. Sieve	Sample Weight	Incremental Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	0.00	0.00	0.00
0.3740	9.500	-3.25	3/8	4.42	8.00	8.00
0.2500	6.351	-2.67	1/4	2.71	4.91	12.91
0.1873	4.757	-2.25	4	1.01	1.83	14.74
0.1324	3.364	-1.75	6	1.00	1.81	16.55
0.0787	2.000	-1.00	10	1.38	2.50	19.05
0.0557	1.414	-0.50	14	1.16	2.10	21.15
0.0394	1.000	0.00	18	3.85	6.97	28.12
0.0278	0.707	0.50	25	7.17	12.98	41.11
0.0197	0.500	1.00	35	11.77	21.31	62.42
0.0166	0.420	1.25	40	5.67	10.27	72.69
0.0139	0.354	1.50	45	4.01	7.26	79.95
0.0098	0.250	2.00	60	4.43	8.02	87.98
0.0070	0.177	2.50	80	2.06	3.73	91.71
0.0049	0.125	3.00	120	1.41	2.55	94.26
0.0029	0.074	3.75	200	1.27	2.30	96.56
0.0021	0.053	4.25	270	0.66	1.20	97.75
0.0015	0.037	4.75	400	0.40	0.72	98.48
			PAN	0.84	1.52	100.00
TOTALS				55.22	100.00	100.00

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	-3.40	0.4146	10.531
10	-3.01	0.3175	8.065
16	-1.90	0.1472	3.738
25	-0.22	0.0460	1.168
40	0.46	0.0287	0.728
50	0.71	0.0241	0.612
60	0.94	0.0205	0.520
75	1.33	0.0157	0.398
84	1.75	0.0117	0.297
90	2.27	0.0082	0.207
95	3.24	0.0042	0.106

Measure	Trask	Inman	Folk-Ward
Median, phi	0.71	0.71	0.71
Median, in.	0.0241	0.0241	0.0241
Median, mm	0.612	0.612	0.612
Mean, phi	0.35	-0.08	0.19
Mean, in.	0.0308	0.0415	0.0346
Mean, mm	0.783	1.053	0.879
Sorting	1.713	1.827	1.919
Skewness	1.114	-0.429	-0.333
Kurtosis	0.049	0.816	1.751

Grain Size Description (ASTM-USCS Scale)	Medium sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	14.74
Coarse Sand	10	4.31
Medium Sand	40	53.64
Fine Sand	200	23.87
Silt/Clay	<200	3.44
	Total	100

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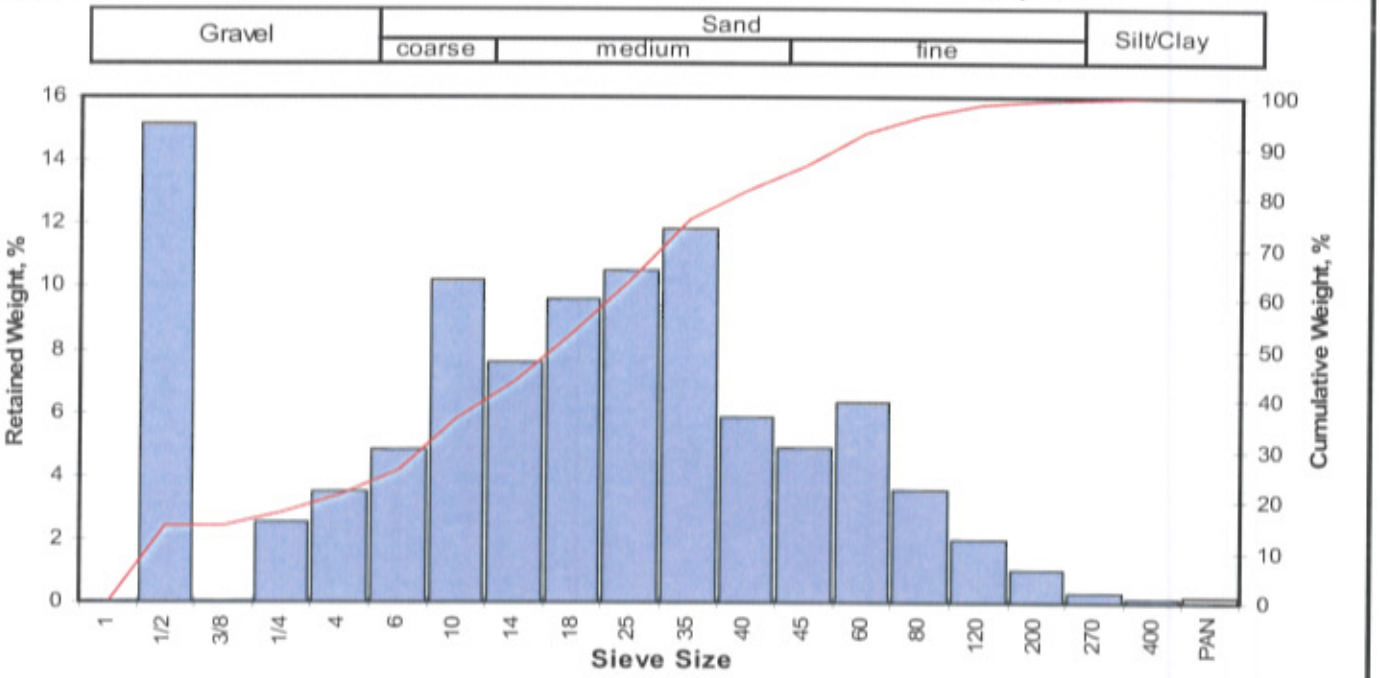
Particle Size Analysis - ASTM D422M

Client:	Shaw E & I	**PTS File No:**	41655
Project:	KAFBBFF	**Sample ID:**	106083-477
Project No:	667917	**Depth, ft:**	N/A



Opening		Phi of	U.S. Sieve	Sample Weight	Incremental Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.9844	25.002	-4.64	1	0.00	0.00	0.00
0.4922	12.501	-3.64	1/2	13.12	15.16	15.16
0.3740	9.500	-3.25	3/8	0.00	0.00	15.16
0.2500	6.351	-2.67	1/4	2.21	2.55	17.72
0.1873	4.757	-2.25	4	3.04	3.51	21.23
0.1324	3.364	-1.75	6	4.18	4.83	26.06
0.0787	2.000	-1.00	10	8.82	10.19	36.26
0.0557	1.414	-0.50	14	6.57	7.59	43.85
0.0394	1.000	0.00	18	8.33	9.63	53.48
0.0278	0.707	0.50	25	9.07	10.48	63.96
0.0197	0.500	1.00	35	10.23	11.82	75.79
0.0166	0.420	1.25	40	5.06	5.85	81.63
0.0139	0.354	1.50	45	4.21	4.87	86.50
0.0098	0.250	2.00	60	5.47	6.32	92.82
0.0070	0.177	2.50	80	3.07	3.55	96.37
0.0049	0.125	3.00	120	1.71	1.98	98.35
0.0029	0.074	3.75	200	0.88	1.02	99.36
0.0021	0.053	4.25	270	0.26	0.30	99.66
0.0015	0.037	4.75	400	0.13	0.15	99.82
			PAN	0.16	0.18	100.00
TOTALS				86.52	100.00	100.00

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	-4.18	0.7155	18.173
10	-3.72	0.5200	13.209
16	-3.06	0.3279	8.327
25	-1.86	0.1429	3.630
40	-0.75	0.0664	1.686
50	-0.18	0.0446	1.133
60	0.31	0.0317	0.806
75	0.97	0.0201	0.512
84	1.37	0.0152	0.386
90	1.78	0.0115	0.292
95	2.31	0.0080	0.202

Measure	Trask	Inman	Folk-Ward
Median, phi	-0.18	-0.18	-0.18
Median, in.	0.0446	0.0446	0.0446
Median, mm	1.133	1.133	1.133
Mean, phi	-1.05	-0.84	-0.62
Mean, in.	0.0815	0.0706	0.0606
Mean, mm	2.071	1.794	1.539
Sorting	2.664	2.215	2.091
Skewness	1.202	-0.299	-0.266
Kurtosis	0.121	0.465	0.941

Grain Size Description (ASTM-USCS Scale)	Coarse sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	21.23
Coarse Sand	10	15.03
Medium Sand	40	45.38
Fine Sand	200	17.73
Silt/Clay	<200	0.64
	Total	100

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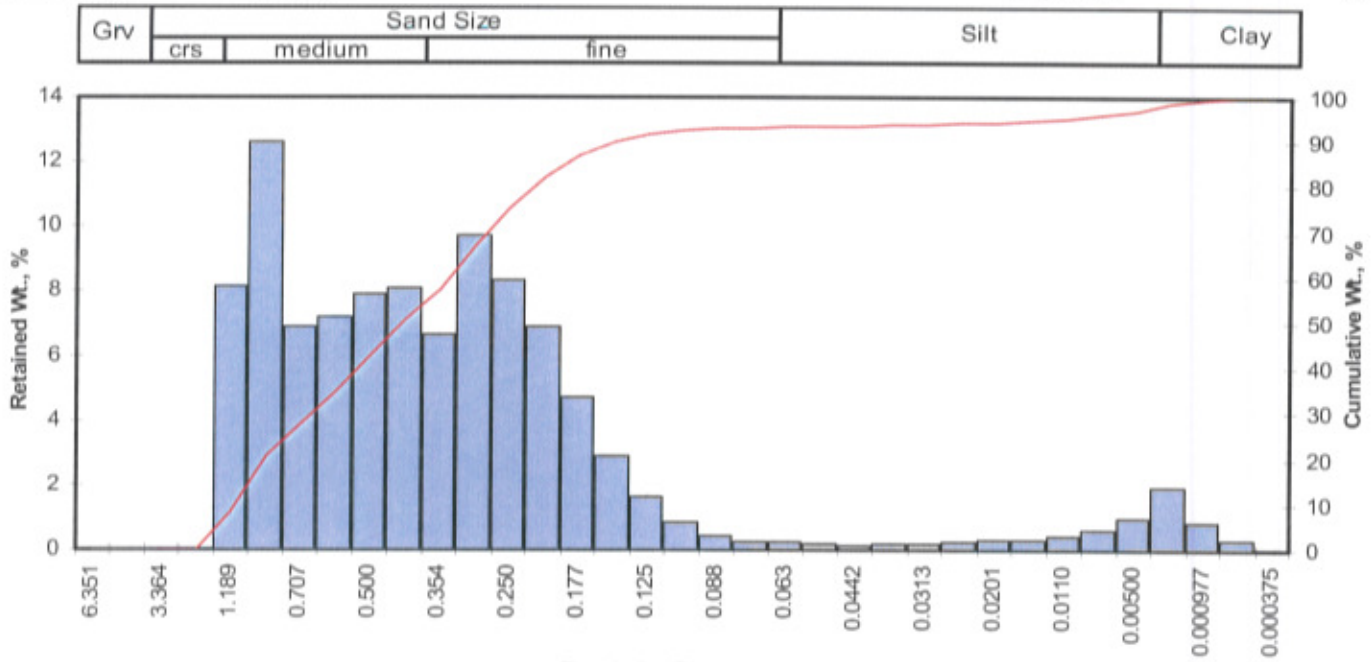
Particle Size Analysis - ASTM D4464M

Client:	Shaw E & I	**PTS File No:**	41655
Project:	KAFBBFF	**Sample ID:**	106035-475
Project No:	667917	**Depth, ft:**	N/A



Opening		Phi of	U.S.	Sample Weight,	Increment Weight,	Cumulative Weight,
Inches	Millimeters	Screen	No.	grams	percent	percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	8.17	8.17	8.17
0.0331	0.841	0.25	20	12.60	12.60	20.76
0.0278	0.707	0.50	25	6.91	6.91	27.67
0.0234	0.595	0.75	30	7.17	7.17	34.84
0.0197	0.500	1.00	35	7.93	7.93	42.77
0.0166	0.420	1.25	40	8.08	8.08	50.84
0.0139	0.354	1.50	45	6.67	6.67	57.51
0.0117	0.297	1.75	50	9.70	9.70	67.21
0.0098	0.250	2.00	60	8.30	8.30	75.51
0.0083	0.210	2.25	70	6.89	6.89	82.40
0.0070	0.177	2.50	80	4.72	4.72	87.11
0.0059	0.149	2.75	100	2.88	2.88	89.99
0.0049	0.125	3.00	120	1.63	1.63	91.62
0.0041	0.105	3.25	140	0.84	0.84	92.46
0.0035	0.088	3.50	170	0.44	0.44	92.90
0.0029	0.074	3.75	200	0.27	0.27	93.17
0.0025	0.063	4.00	230	0.23	0.23	93.40
0.0021	0.053	4.25	270	0.18	0.18	93.58
0.00174	0.0442	4.50	325	0.15	0.15	93.73
0.00146	0.0372	4.75	400	0.16	0.16	93.89
0.00123	0.0313	5.00	450	0.17	0.17	94.06
0.000986	0.0250	5.32	500	0.23	0.23	94.29
0.000790	0.0201	5.64	635	0.28	0.28	94.57
0.000615	0.0156	6.00		0.32	0.32	94.89
0.000435	0.0110	6.50		0.45	0.45	95.34
0.000308	0.00781	7.00		0.63	0.63	95.97
0.000197	0.00500	7.65		0.95	0.95	96.92
0.000077	0.00195	9.00		1.92	1.92	98.84
0.000038	0.000977	10.00		0.85	0.85	99.69
0.000019	0.000488	11.00		0.29	0.29	99.98
0.000015	0.000375	11.38		0.02	0.02	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight	Phi	Particle Size	
percent	Value	Inches	Millimeters
5	-0.54	0.0573	1.455
10	-0.18	0.0445	1.131
16	0.06	0.0377	0.959
25	0.40	0.0298	0.756
40	0.91	0.0209	0.531
50	1.22	0.0169	0.428
60	1.56	0.0133	0.338
75	1.98	0.0099	0.253
84	2.34	0.0078	0.198
90	2.75	0.0058	0.149
95	6.12	0.0006	0.014

Measure	Trask	Inman	Folk-Ward
Median, phi	1.22	1.22	1.22
Median, in.	0.0169	0.0169	0.0169
Median, mm	0.428	0.428	0.428
Mean, phi	0.99	1.20	1.21
Mean, in.	0.0199	0.0172	0.0171
Mean, mm	0.504	0.436	0.433
Sorting	1.730	1.137	1.578
Skewness	1.021	-0.023	0.224
Kurtosis	0.256	1.929	1.726

Grain Size Description (ASTM-USCS Scale)	Medium sand (based on Mean from Trask)

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	50.84
Fine Sand	200	42.33
Silt	>0.005 mm	3.75
Clay	<0.005 mm	3.08
	Total	**100**

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41655

CHAIN OF CUSTODY

Ref. Document # 140705-GEOID

Page 1 of 1

Shaw Shaw E & I

Project Contact: Pamela Moss (Name & phone #)

Send Report To: Pamela Moss
Phone/Fax Number:
Address: pamela.moss@shawgrp.com
City:

Project Number: 140705
Project Name / Location: KAFB BFF
Purchase Order #: 667917

Shipment Date: 9/12/11
Waybill/Airbill Number: 488306615370 FedEx
Lab Destination: PTS Labs
Lab Contact Name / ph. #: Rachel Spitz
rspitz@ptslabs.com

Sampler's Name(s):

Sample ID Number	Sample Description	Collection Information: Date	Time	G/C	Matrix	# of containers	Container type	Preservative: HCL	NaOH	HNO_3	H_2SO_4	Ice	None	Analyses Requested: Remold samples	ASTM 422/D4464	API RP40, EPA9100	ASTM 425	Turn Around Time Requested
106107-515	Soil From Screened Int	8/24/11	1200	G	SO	1	250z						X	X	X	X	X	
106105-483	" "	8/16/11	1620	G	SO	1	250z						X	X	X	X	X	
RWD 106083-477	" "	8/2/11	1220	G	SO	1	250z						X	X	X	X	X	
106035-475	" "	8/6/11	1420	G	SO	1	250z						X	X	X	X	X	

RCD 9/12/11

Special Instructions:

QC/Data Package Level Required: I II III IV/Project Specific:

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Rachel Daly	9/12/11	1600	PTS	9-13-11	1634
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

G/C Codes
C = Composite G = Grab

Matrix Codes
DW = Drinking Water SO = Soil
GW = Ground Water SL = Sludge
WW = Waste Water CP = Chip Samples
SW = Surface Water WP = Wipe Samples
LIQ = Other Liquid SOL = Other Solid
AS = Air Sample SED = Sediment