CH2MHILL
Applied Sciences Laboratory

ANALYTICAL REPORT

For:
Honeywell Quanta

ASL Report #: L2898
Project ID: 428872.HW.40.43.FW
Attn: Kyle Block/BOS

Authorized and Released By:

Anthony Dalton-Atha
Laboratory Project Manager
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June 4, 2013

This data package meets standards requested by client and is not intended or implied to meet any other standard.

All analyses performed by CH2M HILL are clearly indicated. Any subcontracted analyses are included as appended reports as received from the subcontracted laboratory. The results included in this report only relate to the samples listed on the following Sample Cross-Reference page. This report shall not be reproduced except in full, without the written approval of the laboratory.

Any unusual difficulties encountered during the analysis of your samples are discussed in the attached case narratives.

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Core Sample Summary

Cores NZ03-01, 03-02, 04-01a&b, and 04-03a&b

Honeywell Quanta

Core Segment Results										Analyses Performed		
Sample Name	Sample Depth Range*, ft bgs	Bulk Volume, cm^3	Pore Volume (V_P), cm^3	Total Porosity, %	Grain Density, g/cm^3	Bulk Density, g/cm^3 dry	Air Saturation, % V_P	Water Saturation, % V_P	NAPL Saturation, % V_P	Dean-Stark Extraction	Water Drive	Particle Size with Hydrometer
Core NZ03-01										**Core NZ03-01**		
0301-F	19.83 - 20.00	70.2	26.4	37.6	2.25	1.41	< 0.33	61.4	38.6	x		x
0301-L	20.83 - 21.00	69.8	27.4	39.3	2.51	1.53	26.5	70.7	2.79	x		x
0301-R	21.83 - 22.00	70.9	26.1	36.8	2.76	1.74	18.1	77.2	4.62	x		x
0301-V	22.50 - 22.67	58.6	23.7	40.5	2.55	1.52	18.8	67.3	13.9	x		x
0301-X	22.83 - 23.00	--	--	--	--	--	--	--	--		test	
0301-Y	23.00 - 23.17	59.0	22.2	37.6	2.55	1.59	15.9	70.3	13.8	x		x
0301-Z **	23.17 - 23.33	71.1	21.5	30.3	2.51	1.75	4.25	72.9	22.9		x	
0301-AA **	23.33 - 23.50	70.8	26.4	37.4	2.51	1.57	< 0.33	62.7	37.3		x	
0301-AB	23.50 - 23.67	60.0	23.3	38.9	2.54	1.56	< 0.33	50.1	49.9	x		x
0301-AC **	23.67 - 23.83	70.7	23.2	32.8	2.53	1.70	< 0.33	72.9	27.1	x	x	
Core NZ03-02										**Core NZ03-02**		
0302-D	21.00 - 21.17	60.2	27.0	44.9	2.53	1.40	4.51	94.8	0.72	x		x
0302-G	21.50 - 21.67	62.9	23.4	37.2	2.54	1.59	< 0.33	94.8	5.17	x		x
0302-H **	21.67 - 21.83	70.4	28.2	40.1	2.60	1.56	8.26	91.7	< 0.33	x	x	
0302-J	22.00 - 22.17	61.7	23.7	38.5	2.71	1.67	9.83	88.3	1.83	x		x
0302-O	22.83 - 23.00	70.4	26.3	37.3	2.55	1.60	15.7	82.9	1.41	x		x
0302-R	23.33 - 23.50	69.8	25.2	36.1	2.58	1.65	5.35	94.7	< 0.33	x		x
0302-V	24.00 - 24.17	62.4	30.5	48.9	2.44	1.25	23.7	71.7	4.61	x		x
0302-Y	24.50 - 24.67	63.1	20.2	31.9	2.53	1.72	2.39	97.6	< 0.33	x		x
Core NZ04-01a&b										**Core NZ04-01a&b**		
0401-E **	10.17 - 10.33	67.8	38.3	56.4	1.95	0.85	8.49	61.6	29.9	x	x	
0401-F	10.33 - 10.50	70.2	35.0	49.9	1.89	0.95	31.2	57.9	10.9	x		x
0401-H	10.67 - 10.83	--	--	--	--	--	--	--	--		test	
0401-I	10.83 - 11.00	70.5	53.1	75.3	2.14	0.53	15.4	83.3	1.30	x		x
0401-L	15.33 - 15.50	70.5	36.5	51.8	2.50	1.21	42.6	55.8	1.56	x		x
Core NZ04-03a&b										**Core NZ04-03a&b**		
0403-A	13.00 - 13.17	61.4	42.4	69.0	2.47	0.77	56.5	43.1	0.38	x		x
0403-B **	13.17 - 13.33	69.1	35.9	52.0	2.14	1.03	11.9	87.3	0.81	x	x	
0403-D	15.00 - 15.17	61.7	44.6	72.2	2.60	0.72	34.7	64.5	0.81	x		x
0403-G	15.50 - 15.67	61.3	35.4	57.8	2.30	0.97	26.1	73.3	0.63	x		x

* Sample depths in cores with less than 80% recovery were adjusted based on comparison to field logs. See core sample index.

** Sample parameters measured post water drive.

Voids were observed in numerous samples and the effect of the voids are reflected in the results.

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NAPL Saturation by API RP40 (Dean-Stark)

Cores NZ03-01, 03-02, 04-01a&b, and 04-03a&b

Honeywell Quanta

Analysis By: SB

Reviewed By: DRVB/MN/SMB

Sample Name	Sample Depth Range* (ft bgs)	USCS Description by ASTM D2487	Applied			Saturation			Drained	Observations
			Darcy Flux (ft/d)	Pressure (psig)	Effective K (cm/s)	Air (% V_P)	Water (% V_P)	NAPL ** (% V_P)	NAPL	
Core NZ03-01										
0301-F	19.83 - 20.00	Well graded gravel with silt/clay fines and sand				< 0.33	61.4	38.6		
0301-L	20.83 - 21.00	Poorly graded sand with silt/clay fines				26.5	70.7	2.79		Large void
0301-R	21.83 - 22.00	Poorly graded sand with silt/clay fines				18.1	77.2	4.62		Small voids on top and bottom
0301-V	22.50 - 22.67	Poorly graded sand with silt/clay fines				18.8	67.3	13.9		Medium void on top
0301-X	22.83 - 23.00	--	0	0	--	Test Sample; Pore Fluid Saturation Not Determined			--	
			21.0	0.89	6.02E-04				none	50 mL water applied
			83.4	2.62	8.12E-04				none	50 mL water applied
			190	4.49	1.08E-03				none	50 mL water applied
0301-Y	23.00 - 23.17	Poorly graded sand with silt/clay fines				15.9	70.3	13.8		Medium void on top
0301-Z **	23.17 - 23.33	--	0	0	--	--	--	--	--	
			21.0	1.30	4.13E-04	--	--	--	none	50 mL water applied
			105	4.84	5.51E-04	--	--	--	sheen	50 mL water applied
			210	9.26	5.76E-04	4.25	72.9	22.9	sheen	50 mL water applied
0301-AA **	23.33 - 23.50	--	0	0	--	--	--	--	--	
			21.0	1.50	3.56E-04	--	--	--	sheen	50 mL water applied
			105	2.97	8.99E-04	--	--	--	blebs	50 mL water applied
			210	4.99	1.07E-03	0.00	62.7	37.3	blebs	600 mL water applied, until blebs stopped
0301-AB	23.50 - 23.67	Poorly graded sand with silt/clay fines				< 0.33	50.1	49.9		
0301-AC **	23.67 - 23.83	--	0	0	--	--	--	--	--	
			21.0	4.20	1.27E-04	--	--	--	blebs	50 mL water applied
			105	10.5	2.54E-04	--	--	--	blebs	50 mL water applied
			210	16.0	3.34E-04	< 0.33	72.9	27.1	blebs	50 mL water applied
Core NZ03-02										
0302-D	21.00 - 21.17	Silty, clayey sand with gravel				4.51	94.8	0.72		
0302-G	21.50 - 21.67	Silty sand				< 0.33	94.8	5.17		
0302-H **	21.67 - 21.83	--	0	0	--	--	--	--	--	
			21.0	1.38	3.85E-04	--	--	--	none	50 mL water applied
			105	2.49	1.07E-03	--	--	--	none	50 mL water applied
			210	4.58	1.17E-03	8.26	91.7	< 0.33	none	50 mL water applied
0302-J	22.00 - 22.17	Silty sand				9.83	88.3	1.83		
0302-O	22.83 - 23.00	Silty sand				15.7	82.9	1.41		Void passing through sample
0302-R	23.33 - 23.50	Poorly graded sand				5.35	94.7	< 0.33		Small void on bottom
0302-V	24.00 - 24.17	Silty sand				23.7	71.7	4.61		Large void on top
0302-Y	24.50 - 24.67	Sandy silt***				2.39	97.6	< 0.33		Small void on top

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NAPL Saturation by API RP40 (Dean-Stark)

Cores NZ03-01, 03-02, 04-01a&b, and 04-03a&b

Honeywell Quanta

Analysis By: SB

Reviewed By: DRVB/MN/SMB

Sample Name	Sample Depth Range* (ft bgs)	USCS Description by ASTM D2487	Applied			Saturation			Drained	Observations
			Darcy Flux (ft/d)	Pressure (psig)	Effective K (cm/s)	Air (% V_P)	Water (% V_P)	NAPL ** (% V_P)	NAPL	
Core NZ04-01a&b										
0401-E **	10.17 - 10.33	--	0	0	--	--	--	--		
			21.0	1.20	4.46E-04	--	--	--	none	50 mL water applied
			103	2.46	1.07E-03	--	--	--	none	50 mL water applied
			210	4.01	1.33E-03	8.49	61.6	29.9	none	50 mL water applied
0401-F	10.33 - 10.50	Silty sand with gravel				31.2	57.9	10.9		Small void on bottom
0401-H	10.67 - 10.83	--	0	0	--	Test Sample; Pore Fluid Saturation Not Determined			--	
			20.9	1.38	3.84E-04				none	50 mL water applied
			74.3	5.66	3.34E-04				none	50 mL water applied
			130	13.5	2.45E-04				none	50 mL water applied
0401-I	10.83 - 11.00	Sandy silt with gravel***				15.4	83.3	1.30		Medium void on bottom
0401-L	15.33 - 15.50	Poorly graded sand with silt and gravel				42.6	55.8	1.56		Medium void on bottom
Core NZ04-03a&b										
0403-A	13.00 - 13.17	Silty sand				56.5	43.1	0.38		Core only ~1/2 full
0403-B **	13.17 - 13.33	--	0	0	--	--	--	--	--	
			21.0	0.74	7.22E-04	--	--	--	none	50 mL water applied
			103	1.97	1.34E-03	--	--	--	none	50 mL water applied
			210	1.54	3.46E-03	11.9	87.3	0.81	none	50 mL water applied, sample channeled
0403-D	15.00 - 15.17	Silty sand				34.7	64.5	0.81		Core ~ 3/4 full
0403-G	15.50 - 15.67	Silty sand				26.1	73.3	0.63		Medium void

* Sample depths in cores with less than 80% recovery were adjusted based on comparison to field logs. See core sample index.

** NAPL volume estimates were converted from mass based on NAPL density measured at MW130B for NZ03 cores, and MW123 for NZ04 cores

*** Estimated as Atterberg limits were not measured for these fine-grained soils.

Voids were observed in numerous samples and the effect of the voids are reflected in the results.

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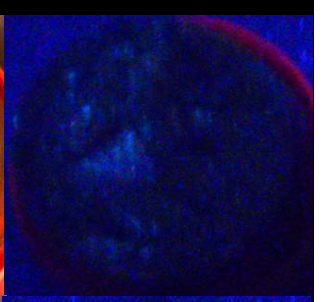
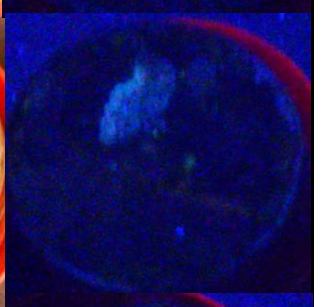
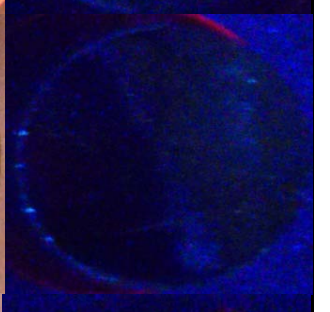
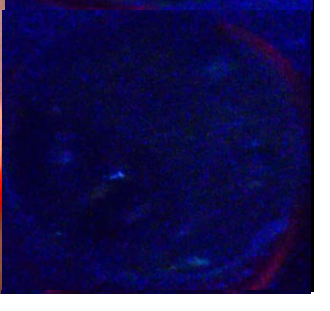
Water Flood = 4
PFS = 6
GSA = 6

Core Segment Index

Core NZ03-01 (19-24 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)	Top	White Light Photography	Black Light Photography
Length	Length	Depth			
in	ft	ft			
2	0.17	19.17	Poor Recovery		
4	0.33	19.33	Poor Recovery		
6	0.50	19.50	Poor Recovery		
8	0.67	19.67	D		
10	0.83	19.83	E		
12	1.00	20.00	F PFS GSA		
14	1.17	20.17	G		
16	1.33	20.33	H		

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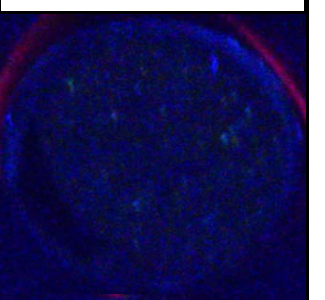
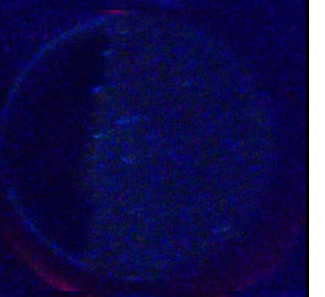
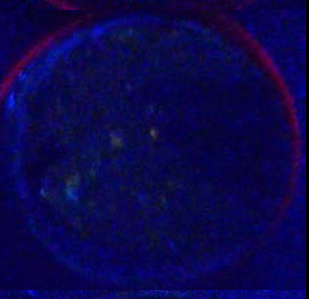
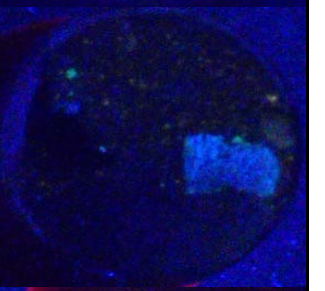
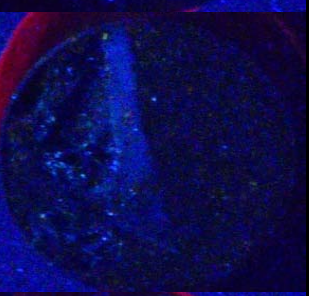
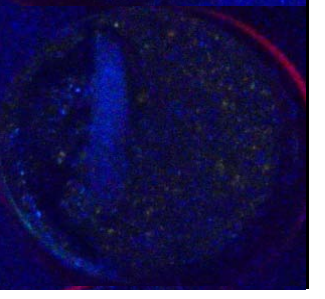
Water Flood = 4
PFS = 6
GSA = 6

Core Segment Index

Core NZ03-01 (19-24 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
18	1.50	20.50	I		
20	1.67	20.67	J		
22	1.83	20.83	K		
24	2.00	21.00	L PFS GSA		
26	2.17	21.17	M		
28	2.33	21.33	N		
30	2.50	21.50	O		
32	2.67	21.67	P		

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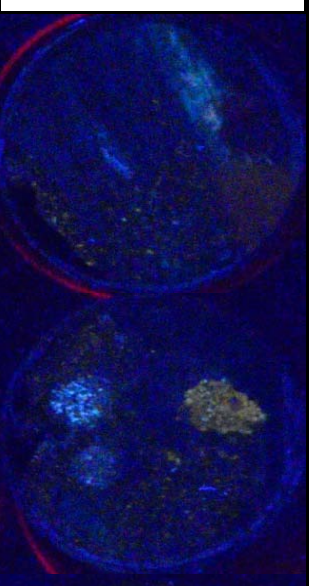
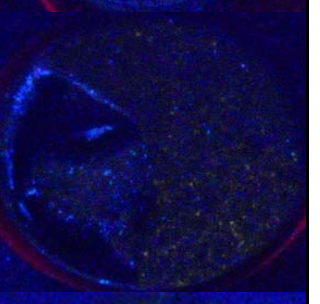
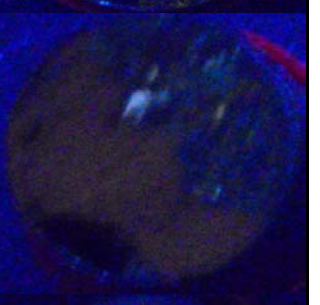
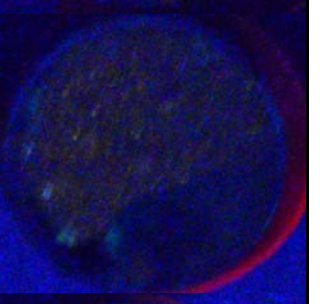
Water Flood = 4
PFS = 6
GSA = 6

Core Segment Index

Core NZ03-01 (19-24 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
34	2.83	21.83	Q		
36	3.00	22.00	R PFS GSA		
38	3.17	22.17	S		
40	3.33	22.33	T		
42	3.50	22.50	U		
44	3.67	22.67	V PFS GSA		
46	3.83	22.83	W		
48	4.00	23.00	X Water Flood w/o D-S		

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Water Flood =	4
PFS =	6
GSA =	6

Core Segment Index

Core NZ03-01 (19-24 feet bgs)

Honeywell Quanta

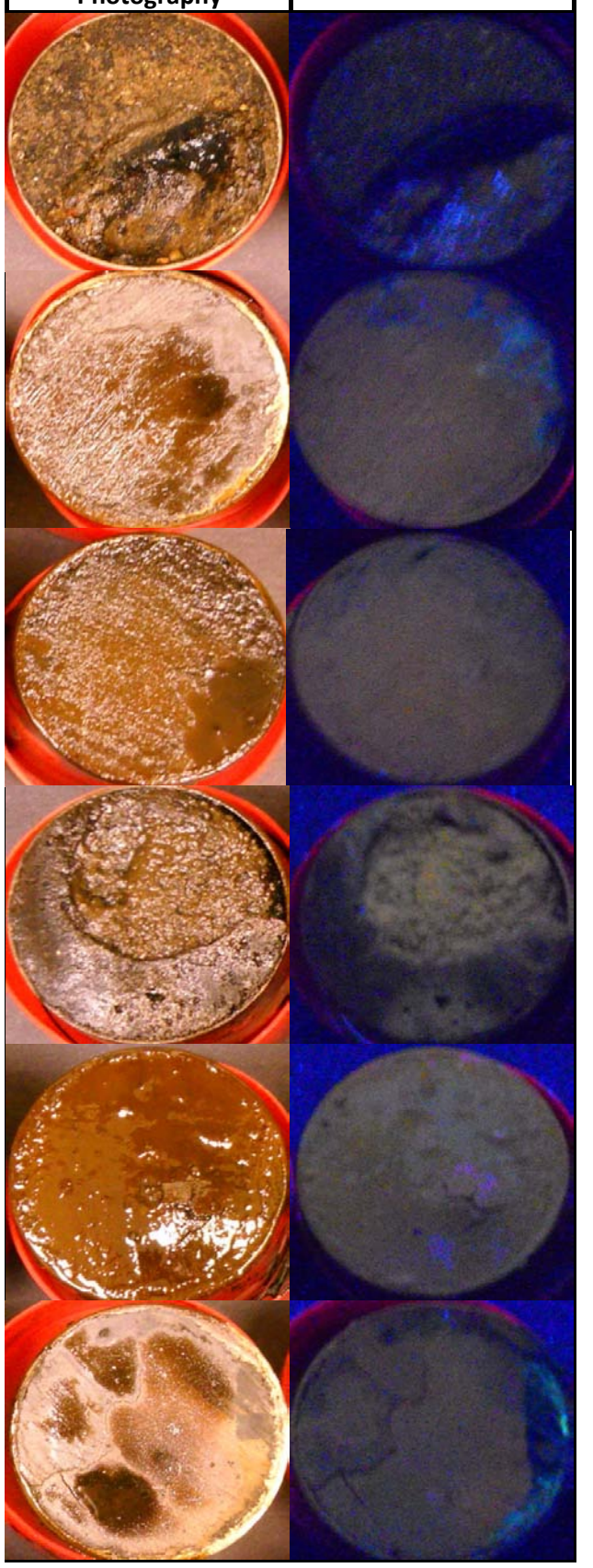
Sleeve		Core Segment (bottom)
Length	Length	Depth
in	ft	ft
50	4.17	23.17
52	4.33	23.33
54	4.50	23.50
56	4.67	23.67
58	4.83	23.83
60	5.00	24.00

Top

Y PFS GSA
Z Water Flood
AA Water Flood w/ additional flush
AB PFS GSA
AC Water Flood
AD

Bottom

White Light Photography	Black Light Photography



Sample Tube Length, in	60
Core Sample Length, in	54
Recovery, %	90.00%

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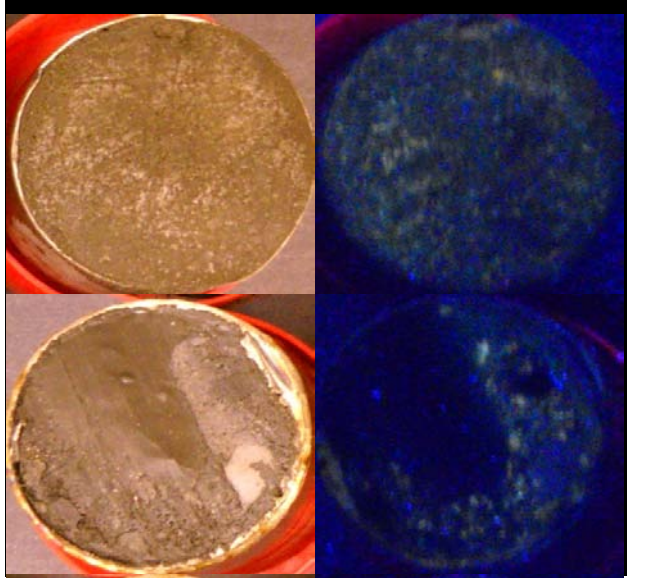
Water Flood = 1
PFS = 7
GSA = 7

Core Segment Index

Core NZ03-02 (20-25 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)	Top	White Light Photography	Black Light Photography
Length	Length	Depth			
in	ft	ft			
2	0.17	20.17	No Recovery	[redacted]	
4	0.33	20.33	No Recovery		
6	0.50	20.50	No Recovery		
8	0.67	20.67	Poor Recovery		
10	0.83	20.83	Poor Recovery		
12	1.00	21.00	Poor Recovery		
14	1.17	21.17	D PFS GSA		
16	1.33	21.33	E		

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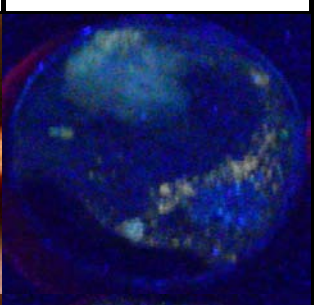
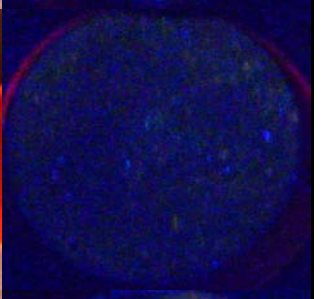
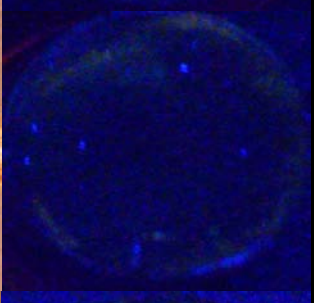
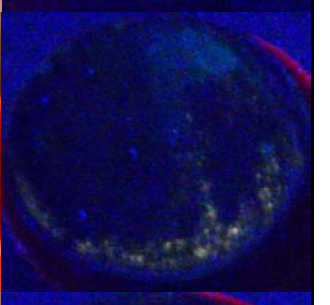
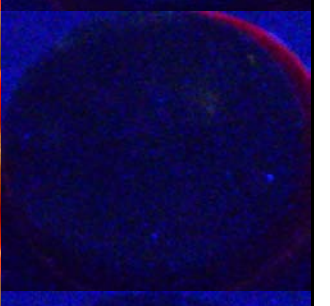
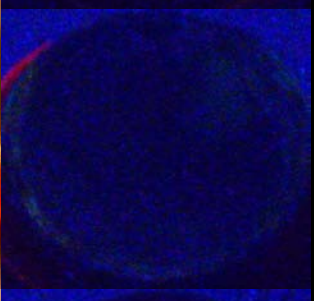
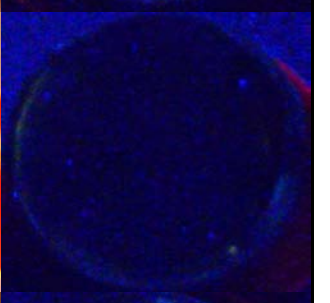
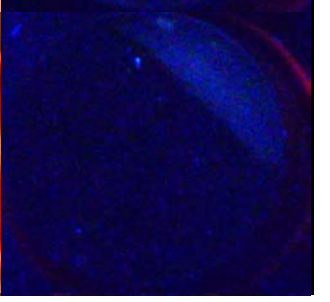
Water Flood = 1
PFS = 7
GSA = 7

Core Segment Index

Core NZ03-02 (20-25 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
18	1.50	21.50	F		
20	1.67	21.67	G PFS GSA		
22	1.83	21.83	H Water Flood		
24	2.00	22.00	I		
26	2.17	22.17	J PFS GSA		
28	2.33	22.33	K		
30	2.50	22.50	L		
32	2.67	22.67	M		

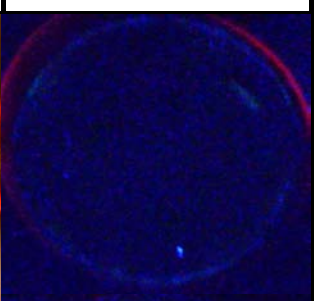
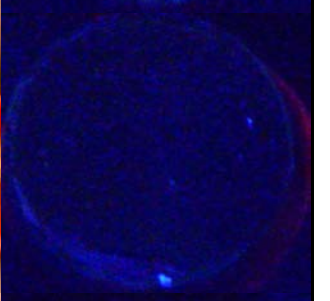
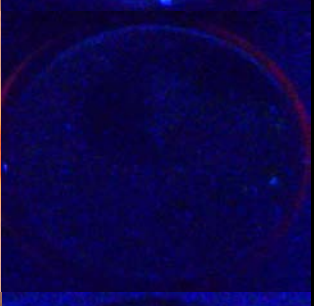
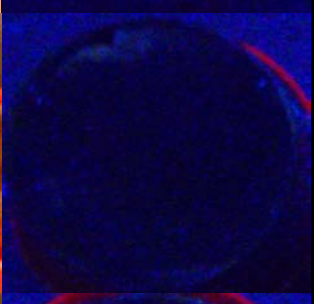
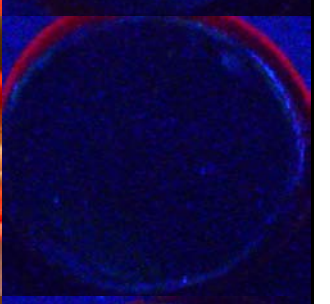
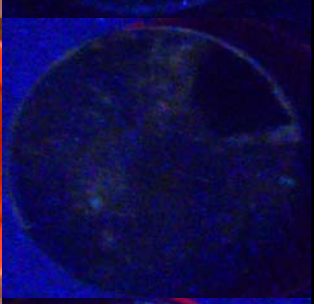
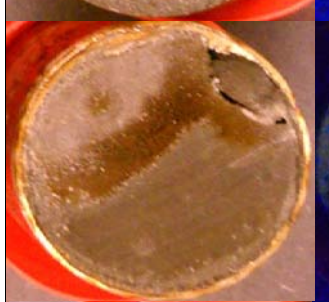
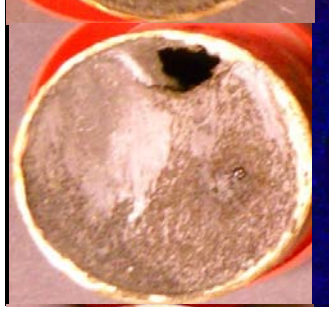
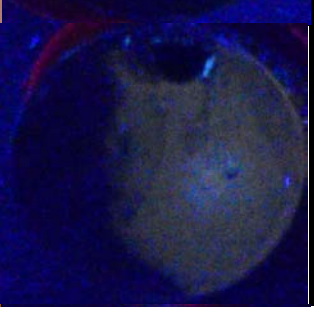
CH2MHILL

Water Flood = 1
PFS = 7
GSA = 7

Core Segment Index

Core NZ03-02 (20-25 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)	Top	White Light Photography	Black Light Photography
Length	Length	Depth			
in	ft	ft			
34	2.83	22.83	N		
36	3.00	23.00	O PFS GSA		
38	3.17	23.17	P		
40	3.33	23.33	Q		
42	3.50	23.50	R PFS GSA		
44	3.67	23.67	S		
46	3.83	23.83	T		
48	4.00	24.00	U		

CH2MHILL

Water Flood = 1
PFS = 7
GSA = 7

Core Segment Index

Core NZ03-02 (20-25 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)
Length	Length	Depth
in	ft	ft
50	4.17	24.17
52	4.33	24.33
54	4.50	24.50
56	4.67	24.67
58	4.83	24.83
60	5.00	25.00

Top

V
PFS
GSA

W

X

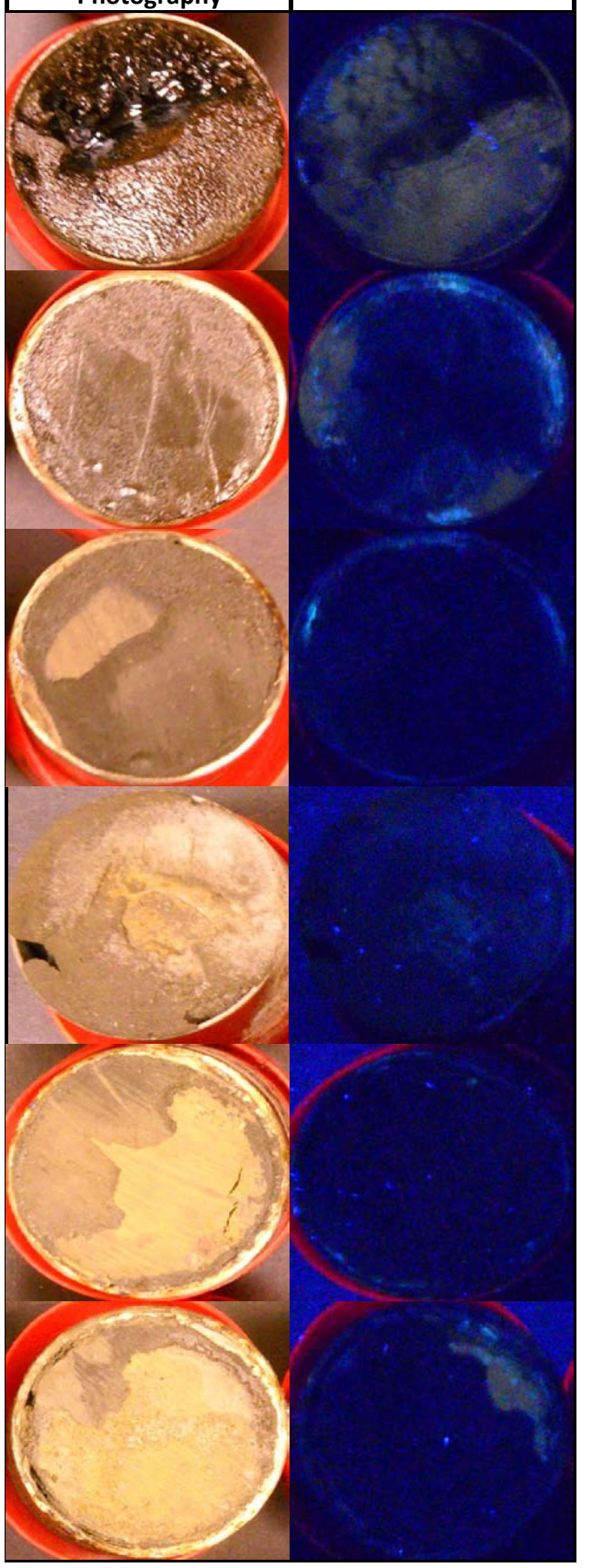
Y
PFS
GSA

Z

AA

Bottom

White Light Photography	Black Light Photography



Sample Tube Length, in	60
Core Sample Length, in	48
Recovery, %	80.0%

CH2MHILL

Water Flood = 1
PFS = 2
GSA = 2

Core Segment Index

Core NZ04-01a (10-15 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
2	0.17		No Recovery		
4	0.33		No Recovery		
6	0.50		No Recovery		
8	0.67		No Recovery		
10	0.83		No Recovery		
12	1.00		No Recovery		
14	1.17		No Recovery		
16	1.33		No Recovery		

CH2MHILL

Water Flood = 1
PFS = 2
GSA = 2

Core Segment Index

Core NZ04-01a (10-15 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)			
Length	Length	Depth	Top	White Light Photography	Black Light Photography
in	ft	ft			
18	1.50		No Recovery	[redacted]	
20	1.67		No Recovery		
22	1.83		No Recovery		
24	2.00		No Recovery		
26	2.17		No Recovery		
28	2.33		No Recovery		
30	2.50		No Recovery		
32	2.67		No Recovery		

CH2MHILL

Water Flood = 1
PFS = 2
GSA = 2

Core Segment Index

Core NZ04-01a (10-15 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
34	2.83		No Recovery		
36	3.00		No Recovery		
38	3.17		No Recovery		
40	3.33		No Recovery		
42	3.50		No Recovery		
44	3.67		Poor Recovery		
46	3.83		Poor Recovery		
48	4.00		Poor Recovery		

CH2MHILL

Water Flood = 1
PFS = 2
GSA = 2

Core Segment Index
Core NZ04-01a (10-15 feet bgs)
Honeywell Quanta

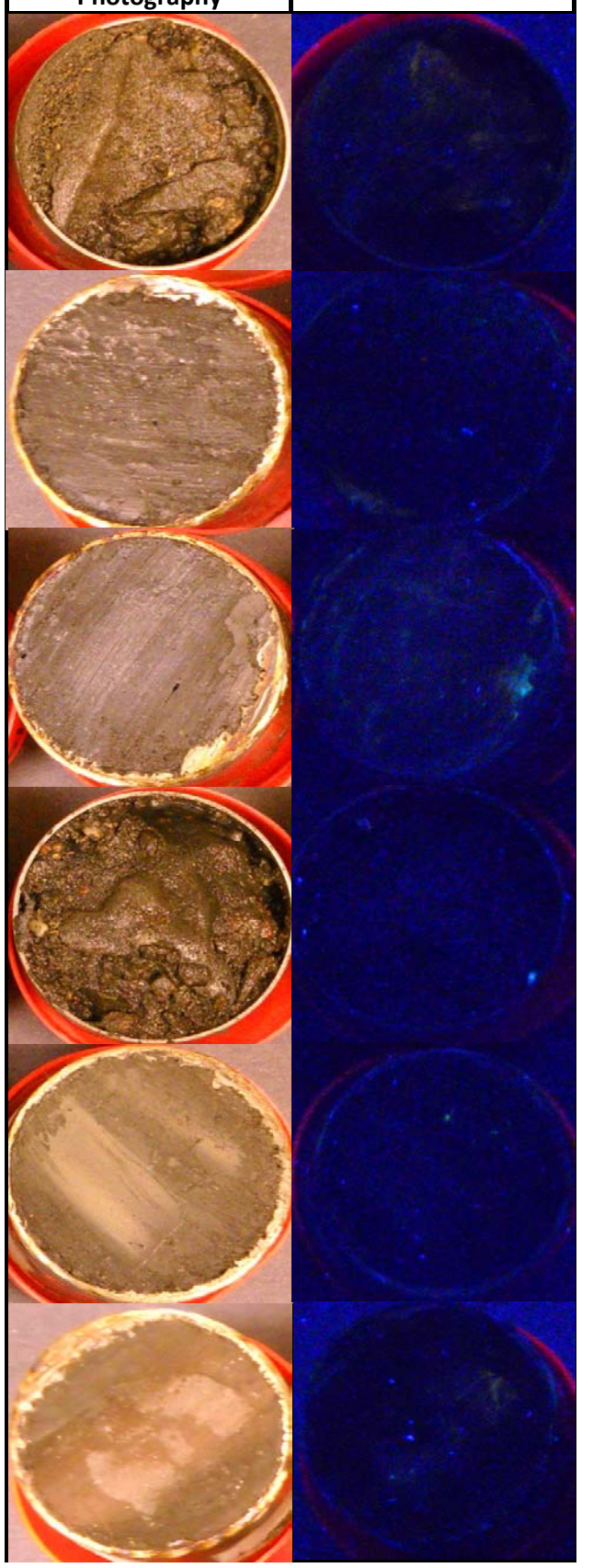
Sleeve		Core Segment (bottom)
Length	Length	Depth
in	ft	ft
50	4.17	10.17
52	4.33	10.33
54	4.50	10.50
56	4.67	10.67
58	4.83	10.83
60	5.00	11.00

Top

D
E Water Flood
F PFS GSA
G
H Water Flood w/o D-S
I PFS GSA

Bottom

White Light Photography	Black Light Photography



Sample Tube Length, in	60
Core Sample Length, in	12
Recovery, %	20.0%

CH2MHILL

Water Flood = 0
PFS = 1
GSA = 1

Core Segment Index

Core NZ04-01b (15-20 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
2	0.17		No Recovery		
4	0.33		No Recovery		
6	0.50		No Recovery		
8	0.67		No Recovery		
10	0.83		No Recovery		
12	1.00		No Recovery		
14	1.17		No Recovery		
16	1.33		No Recovery		

CH2MHILL

Water Flood = 0
PFS = 1
GSA = 1

Core Segment Index

Core NZ04-01b (15-20 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)			
Length	Length	Depth	Top	White Light Photography	Black Light Photography
in	ft	ft			
18	1.50		No Recovery	[redacted]	
20	1.67		No Recovery		
22	1.83		No Recovery		
24	2.00		No Recovery		
26	2.17		No Recovery		
28	2.33		No Recovery		
30	2.50		No Recovery		
32	2.67		No Recovery		

CH2MHILL

Water Flood = 0
PFS = 1
GSA = 1

Core Segment Index

Core NZ04-01b (15-20 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
34	2.83		No Recovery		
36	3.00		No Recovery		
38	3.17		No Recovery		
40	3.33		No Recovery		
42	3.50		No Recovery		
44	3.67		No Recovery		
46	3.83		No Recovery		
48	4.00		No Recovery		

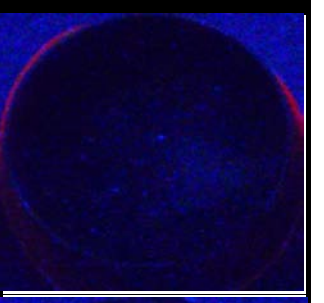
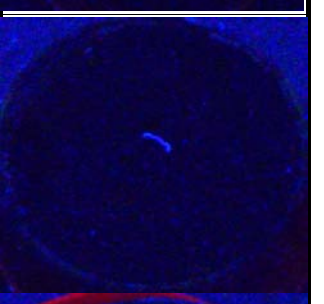
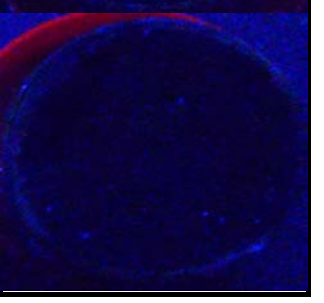
CH2MHILL

Water Flood = 0
PFS = 1
GSA = 1

Core Segment Index

Core NZ04-01b (15-20 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
50	4.17		Poor Recovery		
52	4.33		Poor Recovery		
54	4.50		Poor Recovery		
56	4.67	15.17	J		
58	4.83	15.33	K		
60	5.00	15.50	L PFS GSA		
			Bottom		

Sample Tube Length, in	60
Core Sample Length, in	6
Recovery, %	10.0%

CH2MHILL

Water Flood = 1
PFS = 1
GSA = 1

Core Segment Index
Core NZ04-03a (13-18 feet bgs)
Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
2	0.17		No Recovery		
4	0.33		No Recovery		
6	0.50		No Recovery		
8	0.67		No Recovery		
10	0.83		No Recovery		
12	1.00		No Recovery		
14	1.17		No Recovery		
16	1.33		No Recovery		

CH2MHILL

Water Flood = 1
PFS = 1
GSA = 1

Core Segment Index

Core NZ04-03a (13-18 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
18	1.50		No Recovery		
20	1.67		No Recovery		
22	1.83		No Recovery		
24	2.00		No Recovery		
26	2.17		No Recovery		
28	2.33		No Recovery		
30	2.50		No Recovery		
32	2.67		No Recovery		

CH2MHILL

Water Flood = 1
PFS = 1
GSA = 1

Core Segment Index
Core NZ04-03a (13-18 feet bgs)
Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
34	2.83		No Recovery	[redacted]	
36	3.00		No Recovery		
38	3.17		No Recovery		
40	3.33		No Recovery		
42	3.50		No Recovery		
44	3.67		No Recovery		
46	3.83		No Recovery		
48	4.00		No Recovery		

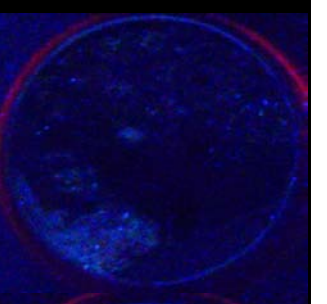
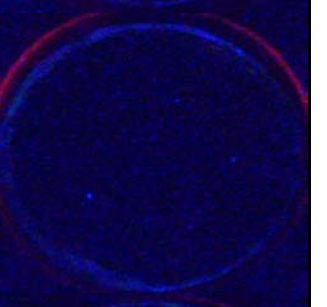
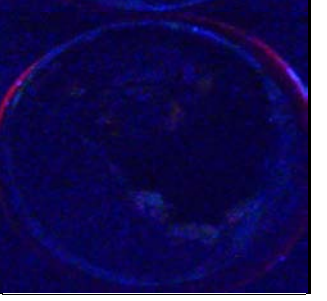
CH2MHILL

Water Flood = 1
PFS = 1
GSA = 1

Core Segment Index

Core NZ04-03a (13-18 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
50	4.17		No Recovery		
52	4.33		No Recovery		
54	4.50		No Recovery		
56	4.67	13.17	A PFS GSA		
58	4.83	13.33	B Water Flood		
60	5.00	13.50	C		
			Bottom		

Sample Tube Length, in	60
Core Sample Length, in	6
Recovery, %	10.00%

CH2MHILL

Water Flood = 0
PFS = 2
GSA = 2

Core Segment Index

Core NZ04-03b (15-20 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
2	0.17		No Recovery		
4	0.33		No Recovery		
6	0.50		No Recovery		
8	0.67		No Recovery		
10	0.83		No Recovery		
12	1.00		No Recovery		
14	1.17		No Recovery		
16	1.33		No Recovery		

CH2MHILL

Water Flood = 0
PFS = 2
GSA = 2

Core Segment Index

Core NZ04-03b (15-20 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
18	1.50		No Recovery		
20	1.67		No Recovery		
22	1.83		No Recovery		
24	2.00		No Recovery		
26	2.17		No Recovery		
28	2.33		No Recovery		
30	2.50		No Recovery		
32	2.67		No Recovery		

CH2MHILL

Water Flood = 0
PFS = 2
GSA = 2

Core Segment Index

Core NZ04-03b (15-20 feet bgs)

Honeywell Quanta

Sleeve		Core Segment (bottom)		White Light Photography	Black Light Photography
Length	Length	Depth	Top		
in	ft	ft			
34	2.83		No Recovery		
36	3.00		No Recovery		
38	3.17		No Recovery		
40	3.33		No Recovery		
42	3.50		No Recovery		
44	3.67		No Recovery		
46	3.83		No Recovery		
48	4.00		No Recovery		

CH2MHILL

Core Segment Index

Core NZ04-03b (15-20 feet bgs)

Honeywell Quanta

Water Flood =	0
PFS =	2
GSA =	2

Sleeve		Core Segment (bottom)
Length	Length	Depth
in	ft	ft
50	4.17	15.17
52	4.33	15.33
54	4.50	15.50
56	4.67	15.67
58	4.83	15.83
60	5.00	16.00

Top

D

PFS
GSA

E

F

G

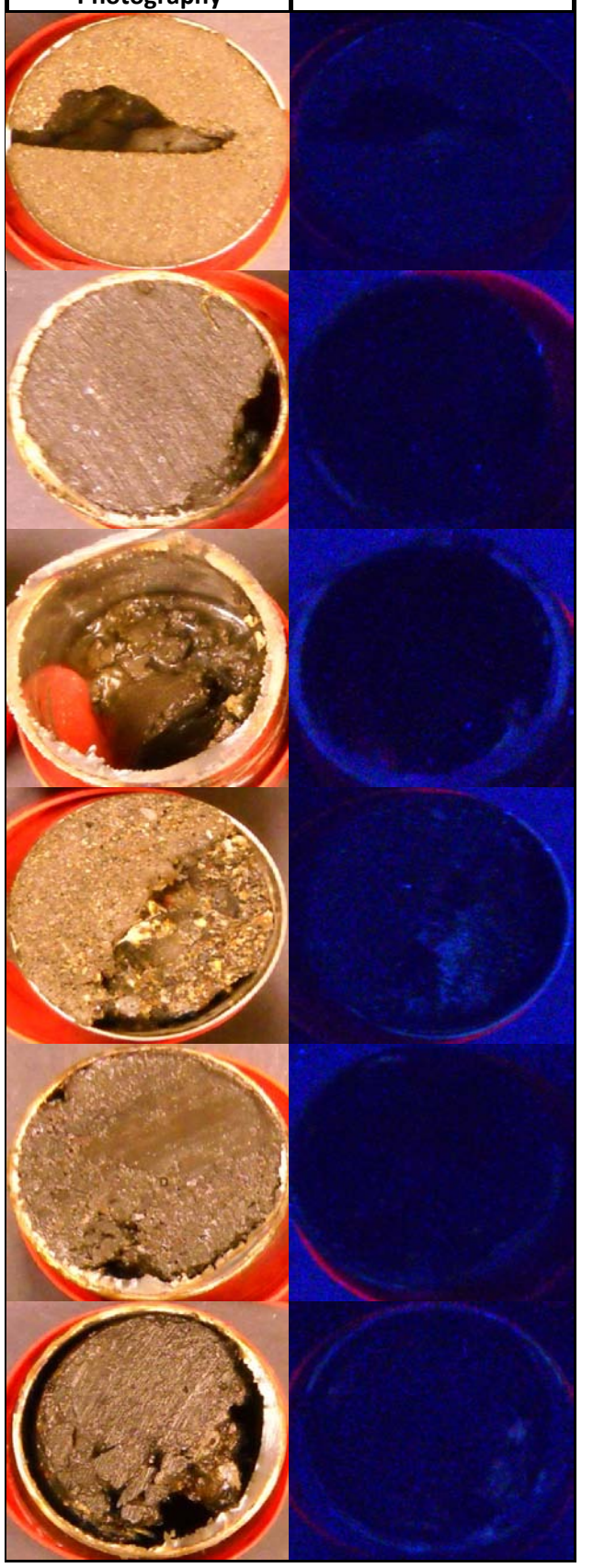
PFS
GSA

H

I

Bottom

White Light Photography	Black Light Photography



Sample Tube Length, in	60
Core Sample Length, in	12
Recovery, %	20.00%

CH2MHILL

Density and Specific Gravity by ASTM D1217 and Viscosity by ASTM D445

Honeywell Quanta

Analysis By: MB/SMB

Reviewed By: DRVB/MN

Sample Name	Matrix	Temperature	Specific Gravity	Density	Viscosity
		°F	-	g/mL	cP
MW123B	Water	50	0.99	0.99	1.06
		70.9	0.98	0.98	1.05
		100	0.97	0.96	0.89
MW130B	Water	50	1.03	1.03	1.13
		70.9	1.01	1.01	1.08
		100	1.00	0.99	0.95
MW123B-NP	NAPL	50	1.11	1.11	522
		70.9	1.11	1.11	244
		100	1.11	1.10	83.3
MW130B-NP	NAPL	50	1.06	1.06	15.4
		70.9	1.06	1.06	14.2
		100	1.06	1.05	12.2

Quality Control	
Density of millipore water measured at 70 ^{o} F	
Measured Density (g/mL):	0.9881
Published Density (g/mL):	0.9983
RPD:	-1.0278

CH2MHILL

Interfacial Tension by ASTM D971

Honeywell Quanta

Analysis By: MB

Reviewed By: DRVB/MN

Phase Pair					
Phase One		Phase Two		Temperature	Interfacial Tension
Sample ID	Matrix	Sample ID	Matrix	°F	Dynes/centimeter
MW123B	Water	Air	Air	70.9	71.2
MW123B-NP	NAPL	Air	Air	70.9	38.4
MW130B-NP	NAPL	MW123B	Water	70.9	23.2
MW130B	Water	Air	Air	70.9	55.6
MW130B-NP	NAPL	Air	Air	70.9	40.0
MW130B-NP	NAPL	MW130B	Water	70.9	30.8

Quality Control					
DI Water	Water	Air	Air	70	70.5
				Published Value:	72.8
				RPD:	4.04

CH2MHILL

Particle Size Distribution Summary, ASTM D422

Cores NZ03-01, 03-02, 04-01a&b, and 04-03a&b

Honeywell Quanta

Reported By: SB

Reviewed By: DRVB/SMB

Core Sample Information		USCS Description by ASTM D2487	Particle Size Distribution, weight %				
				Sand			
Sample Name	Sample Depth Range†, ft bgs		Gravel	Coarse	Medium	Fine	Silt/Clay
Core NZ03-01							
0301-F	19.83 - 20.00	Well graded gravel with silt/clay fines and sand	56.9	12.2	7.14	12.2	11.5
0301-L	20.83 - 21.00	Poorly graded sand with silt/clay fines	4.90	5.84	34.4	46.3	8.48
0301-R	21.83 - 22.00	Poorly graded sand with silt/clay fines	5.92	6.81	29.6	50.9	6.83
0301-V	22.50 - 22.67	Poorly graded sand with silt/clay fines	14.0	3.72	36.0	38.8	7.50
0301-Y	23.00 - 23.17	Poorly graded sand with silt/clay fines	0.00	8.42	39.3	44.3	7.97
0301-AB	23.50 - 23.67	Poorly graded sand with silt/clay fines	0.00	0.53	36.6	54.6	8.26
Core NZ03-02							
0302-D	21.00 - 21.17	Silty, clayey sand with gravel	16.3	13.4	23.7	28.6	18.0
0302-G	21.50 - 21.67	Silty sand	3.22	1.95	30.0	48.5	16.4
0302-J	22.00 - 22.17	Silty sand	6.32	0.49	19.3	58.7	15.2
0302-O	22.83 - 23.00	Silty sand	0.00	0.18	14.3	72.0	13.6
0302-R	23.33 - 23.50	Poorly graded sand	0.00	0.00	11.7	84.6	3.70
0302-V	24.00 - 24.17	Silty sand	0.00	0.00	13.5	74.2	12.3
0302-Y	24.50 - 24.67	Sandy silt*	0.64	0.83	4.34	30.7	63.5
Core NZ04-01a&b							
0401-F	14.33 - 14.50	Silty sand with gravel	21.3	17.5	16.4	24.6	20.2
0401-I	14.83 - 15.00	Sandy silt with gravel*	20.6	4.8	6.4	17.7	50.4
0401-L	19.83 - 20.00	Poorly graded sand with silt and gravel	25.4	23.5	22.8	19.2	9.1
Core NZ04-03a&b							
0403-A	17.50 - 17.67	Silty sand	5.53	33.2	19.4	28.1	13.8
0403-D	19.00 - 19.17	Silty sand	0.00	0.45	8.13	53.7	37.7
0403-G	19.50 - 19.67	Silty sand	5.90	19.7	28.8	29.3	16.2

*Estimated as Atterberg limits were not measured for these fine-grained soils.

† Represents the potential depth range of core segment. This range exceeds the segment height if recovery was less than 100%. See core sample index.

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0301-F

Honeywell Quanta

Analysis By: SB

Reviewed By: DRVB

Sample Weight, g	102.50

Sieve Analysis

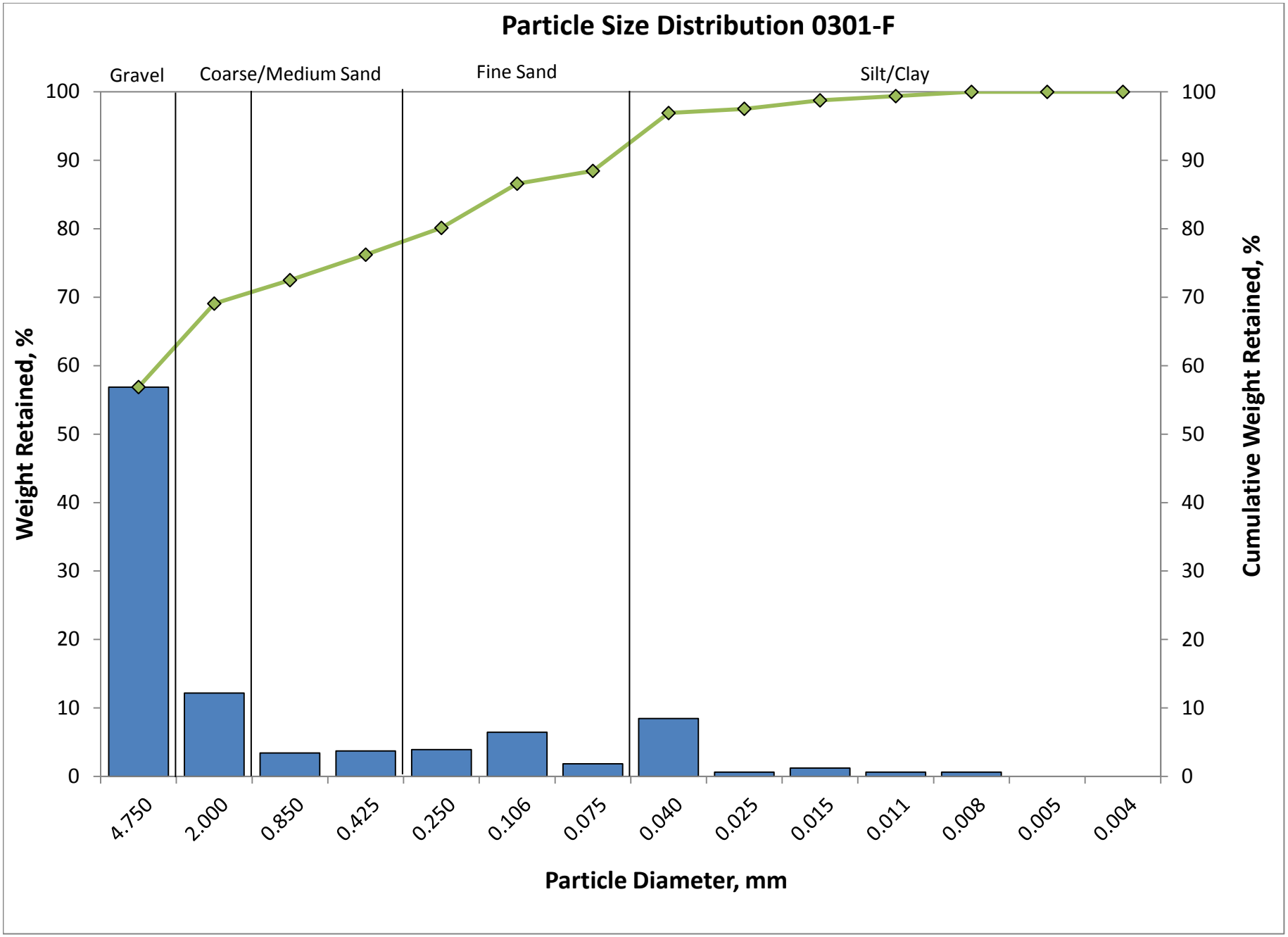
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	58.30	56.88	56.88	43.12
10	2.000	12.50	12.20	69.07	30.93
20	0.850	3.51	3.43	72.50	27.50
40	0.425	3.81	3.72	76.22	23.78
60	0.250	4.01	3.91	80.13	19.87
140	0.106	6.62	6.46	86.59	13.41
200	0.075	1.91	1.86	88.45	11.55
Pan	< 0.075	11.84	11.55	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	56.9
Coarse Sand	10	12.2
Medium Sand	40	7.1
Fine Sand	200	12.2
Silt/Clay	< 200	11.5

USCS Description by ASTM D2487
Well graded gravel with silt/clay fines and sand

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.040	8.67	8.46	96.91	26.74
5	0.025	0.63	0.62	97.53	21.39
15	0.015	1.27	1.24	98.76	10.69
30	0.011	0.63	0.62	99.38	5.35
60	0.008	0.63	0.62	100.00	0.00
120	0.005	0.00	0.00	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0301-F
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0301-L

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	106.20

Sieve Analysis

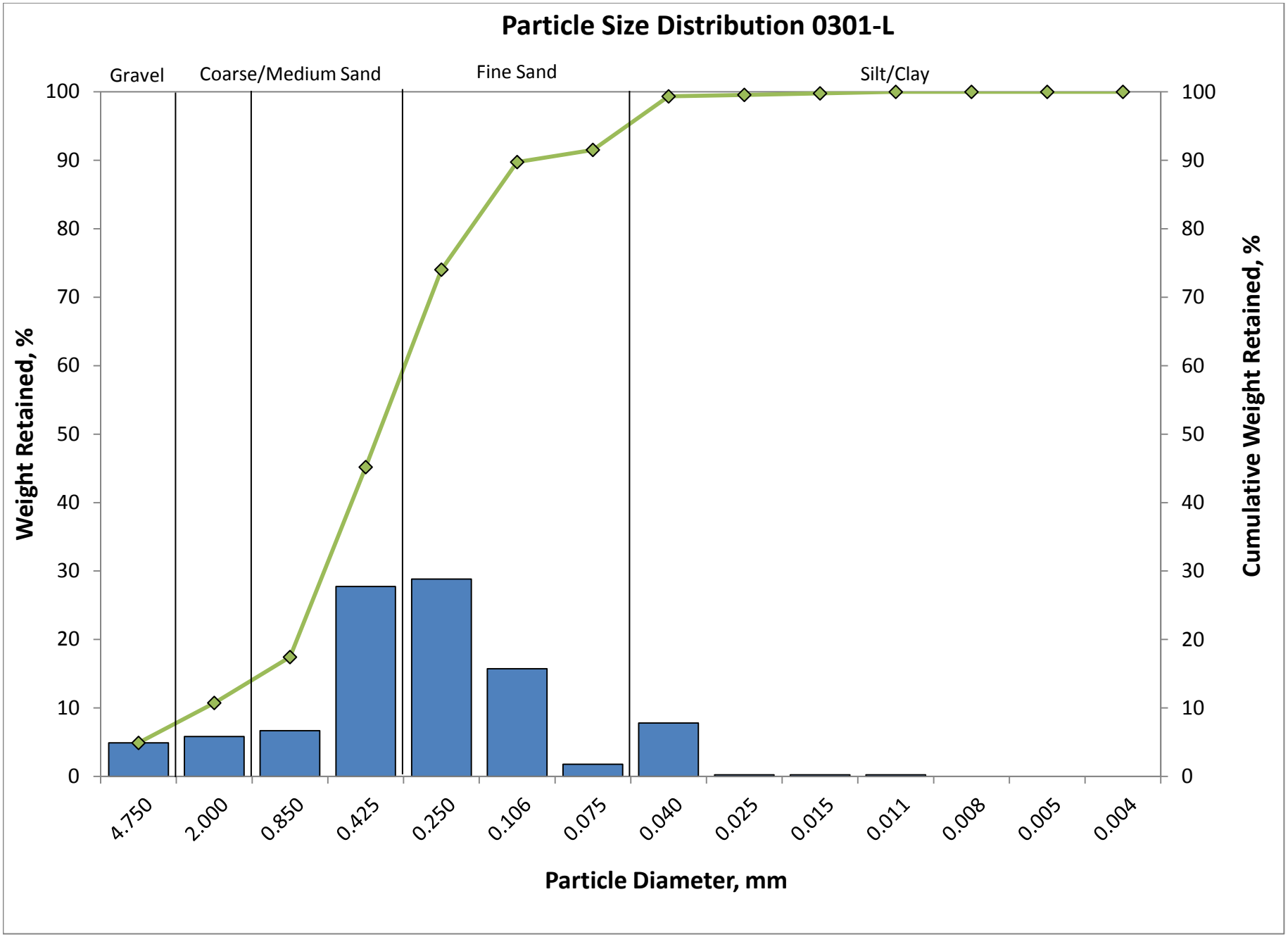
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	5.20	4.90	4.90	95.10
10	2.000	6.20	5.84	10.73	89.27
20	0.850	7.11	6.70	17.43	82.57
40	0.425	29.47	27.75	45.18	54.82
60	0.250	30.63	28.84	74.03	25.97
140	0.106	16.70	15.72	89.75	10.25
200	0.075	1.89	1.78	91.52	8.48
Pan	< 0.075	9.00	8.48	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	4.9
Coarse Sand	10	5.8
Medium Sand	40	34.4
Fine Sand	200	46.3
Silt/Clay	< 200	8.5

USCS Description by ASTM D2487
Poorly graded sand with silt/clay fines

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.041	8.30	7.82	99.34	7.76
5	0.026	0.23	0.22	99.56	5.18
15	0.015	0.23	0.22	99.78	2.59
30	0.011	0.23	0.22	100.00	0.00
60	0.008	0.00	0.00	100.00	0.00
120	0.005	0.00	0.00	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0301-L
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0301-R

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	123.30

Sieve Analysis

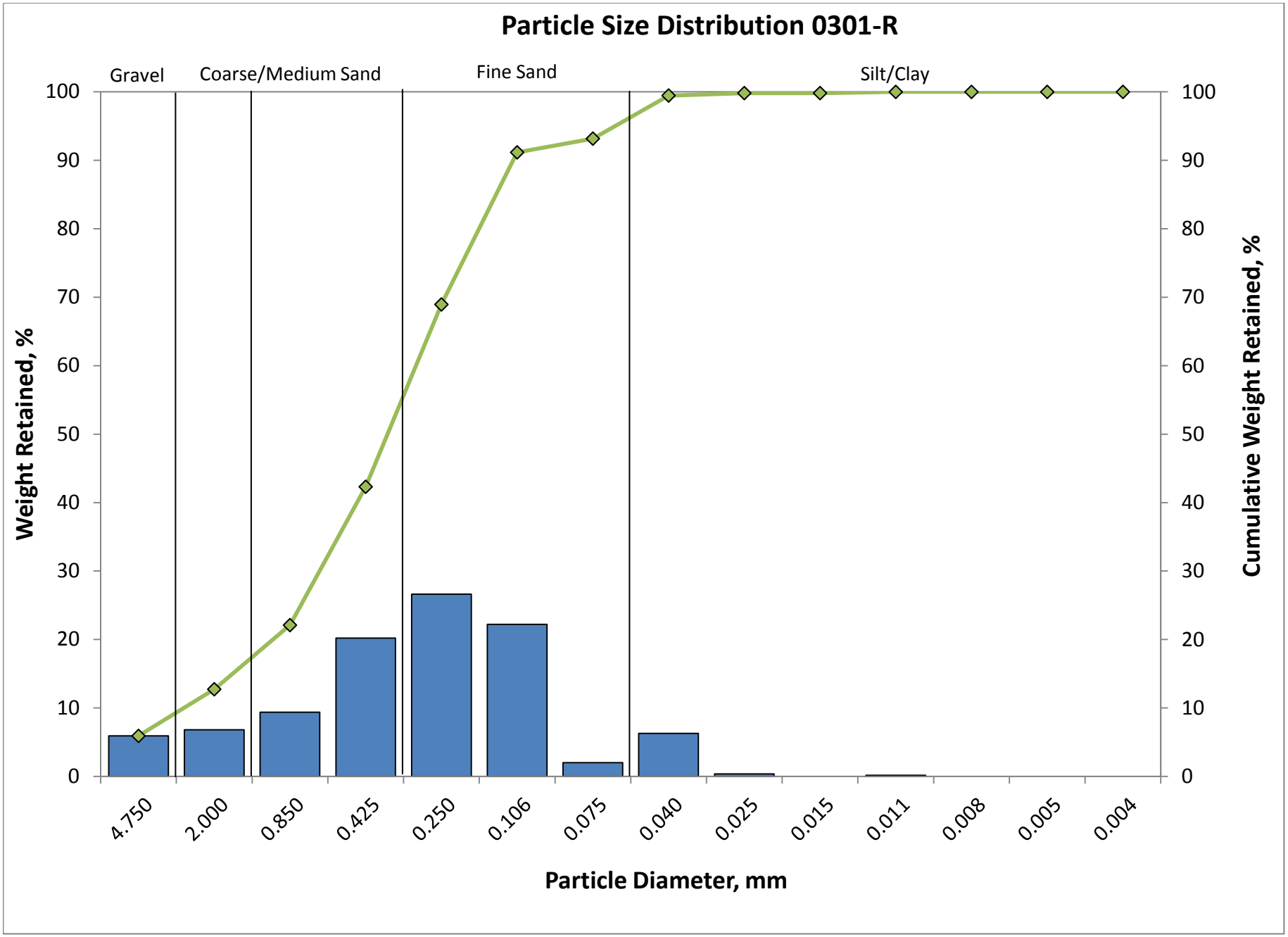
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	7.30	5.92	5.92	94.08
10	2.000	8.40	6.81	12.73	87.27
20	0.850	11.55	9.37	22.10	77.90
40	0.425	24.92	20.21	42.31	57.69
60	0.250	32.84	26.64	68.95	31.05
140	0.106	27.40	22.22	91.17	8.83
200	0.075	2.48	2.01	93.17	6.83
Pan	< 0.075	8.42	6.83	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	5.9
Coarse Sand	10	6.8
Medium Sand	40	29.6
Fine Sand	200	50.9
Silt/Clay	< 200	6.8

USCS Description by ASTM D2487
Poorly graded sand with silt/clay fines

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.041	7.76	6.30	99.47	7.77
5	0.026	0.44	0.35	99.82	2.59
15	0.015	0.00	0.00	99.82	2.59
30	0.011	0.22	0.18	100.00	0.00
60	0.008	0.00	0.00	100.00	0.00
120	0.005	0.00	0.00	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0301-R
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0301-V

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	88.70

Sieve Analysis

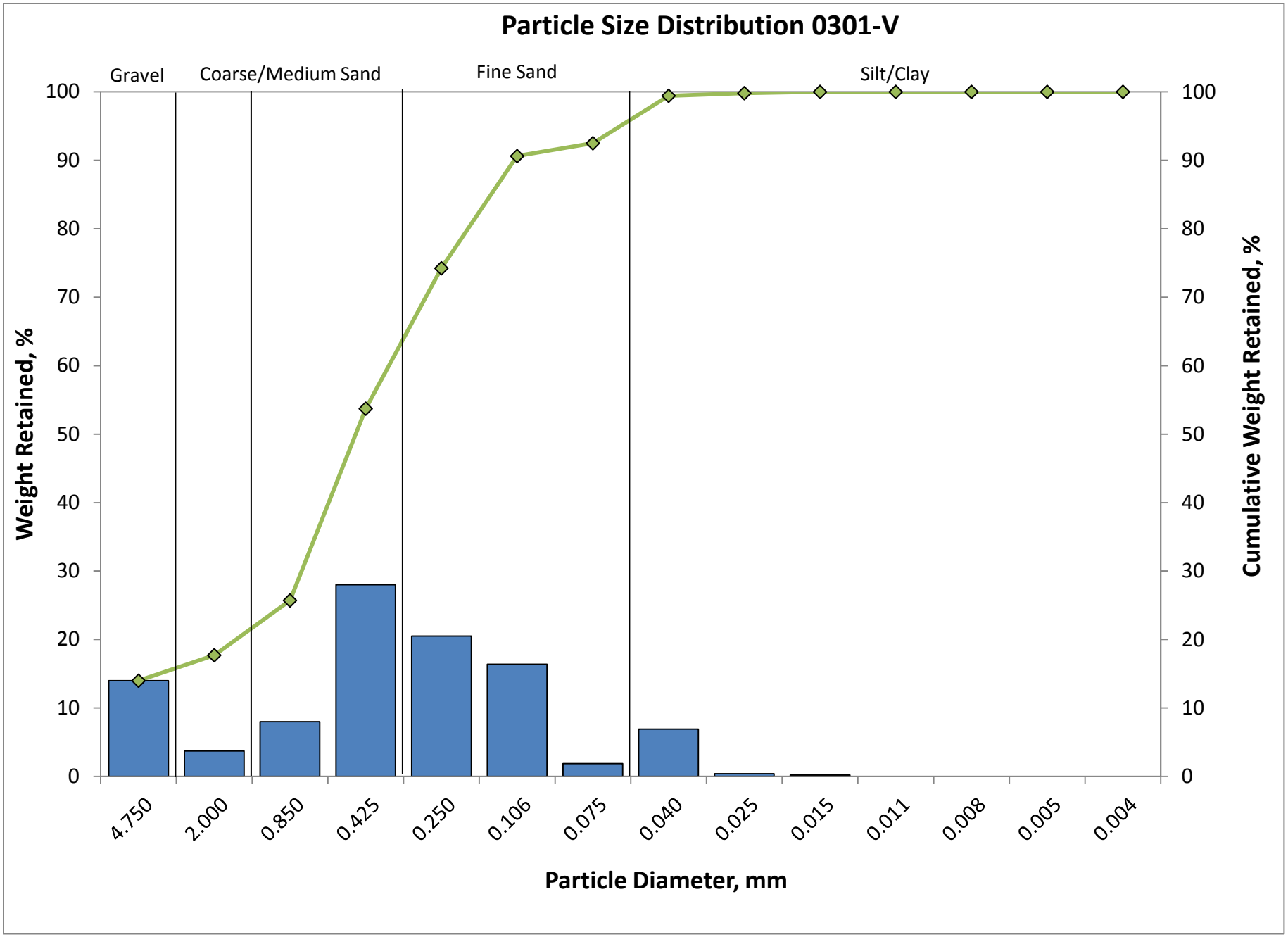
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	12.40	13.98	13.98	86.02
10	2.000	3.30	3.72	17.70	82.30
20	0.850	7.10	8.00	25.70	74.30
40	0.425	24.85	28.02	53.72	46.28
60	0.250	18.19	20.51	74.23	25.77
140	0.106	14.53	16.38	90.62	9.38
200	0.075	1.66	1.88	92.50	7.50
Pan	< 0.075	6.66	7.50	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	14.0
Coarse Sand	10	3.7
Medium Sand	40	36.0
Fine Sand	200	38.8
Silt/Clay	< 200	7.5

USCS Description by ASTM D2487
Poorly graded sand with silt/clay fines

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.041	6.14	6.93	99.42	7.70
5	0.026	0.34	0.39	99.81	2.57
15	0.015	0.17	0.19	100.00	0.00
30	0.011	0.00	0.00	100.00	0.00
60	0.008	0.00	0.00	100.00	0.00
120	0.005	0.00	0.00	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0301-V
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0301-Y

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	93.80

Sieve Analysis

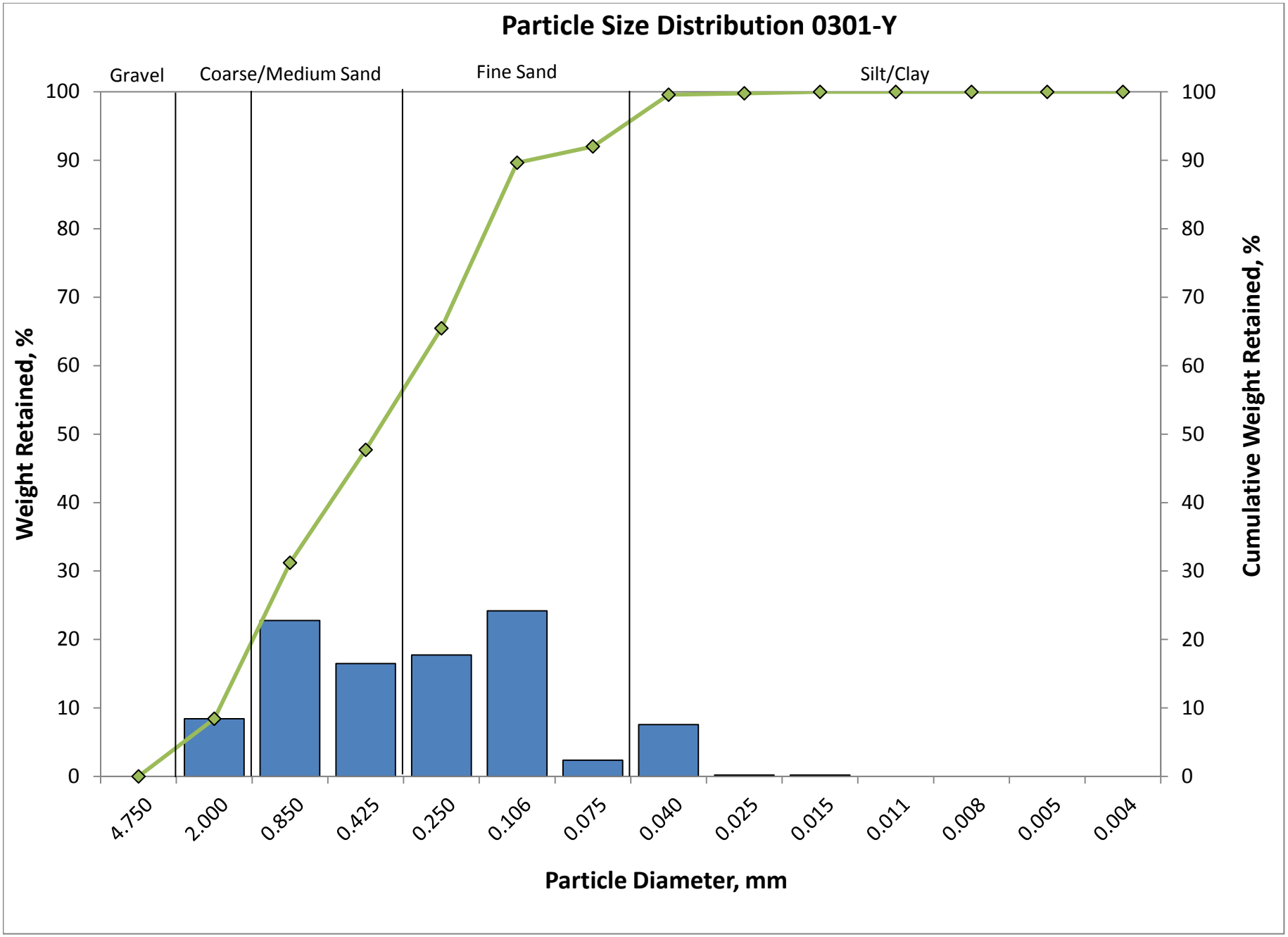
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	0.00	0.00	0.00	100.00
10	2.000	7.90	8.42	8.42	91.58
20	0.850	21.38	22.79	31.21	68.79
40	0.425	15.48	16.50	47.71	52.29
60	0.250	16.66	17.76	65.47	34.53
140	0.106	22.69	24.19	89.65	10.35
200	0.075	2.23	2.38	92.03	7.97
Pan	< 0.075	7.48	7.97	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	0.0
Coarse Sand	10	8.4
Medium Sand	40	39.3
Fine Sand	200	44.3
Silt/Clay	< 200	8.0

USCS Description by ASTM D2487
Poorly graded sand with silt/clay fines

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.041	7.09	7.56	99.59	5.16
5	0.026	0.19	0.21	99.79	2.58
15	0.015	0.19	0.21	100.00	0.00
30	0.011	0.00	0.00	100.00	0.00
60	0.008	0.00	0.00	100.00	0.00
120	0.005	0.00	0.00	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0301-Y
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0301-AB

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	93.50

Sieve Analysis

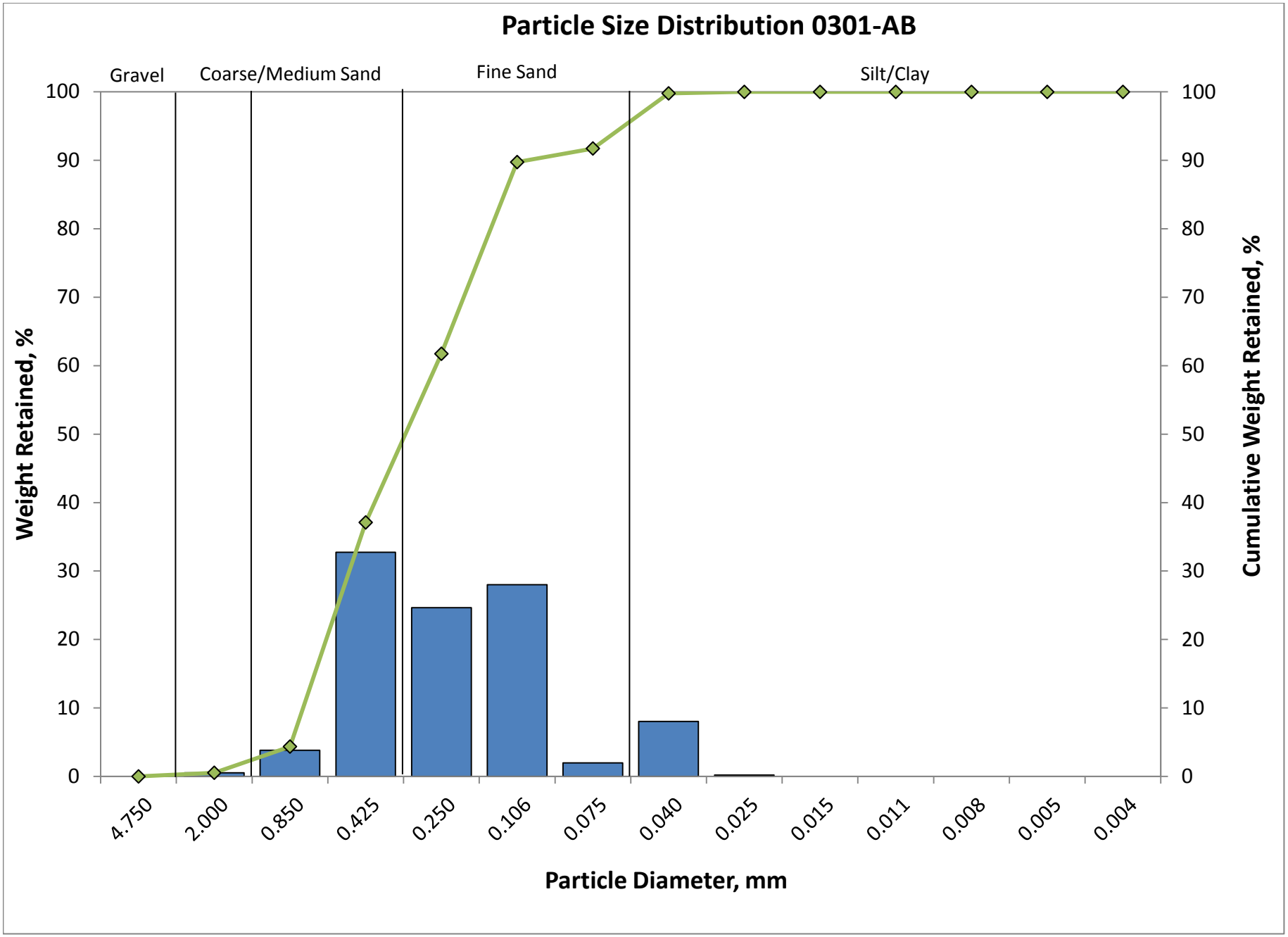
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.50	0.53	0.53	99.47
20	0.850	3.58	3.83	4.36	95.64
40	0.425	30.62	32.75	37.11	62.89
60	0.250	23.04	24.64	61.74	38.26
140	0.106	26.18	28.00	89.75	10.25
200	0.075	1.86	1.99	91.74	8.26
Pan	< 0.075	7.73	8.26	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	0.0
Coarse Sand	10	0.5
Medium Sand	40	36.6
Fine Sand	200	54.6
Silt/Clay	< 200	8.3

USCS Description by ASTM D2487
Poorly graded sand with silt/clay fines

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.041	7.53	8.05	99.79	2.60
5	0.026	0.20	0.21	100.00	0.00
15	0.015	0.00	0.00	100.00	0.00
30	0.011	0.00	0.00	100.00	0.00
60	0.008	0.00	0.00	100.00	0.00
120	0.005	0.00	0.00	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0301-AB
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0302-D

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	83.60

Sieve Analysis

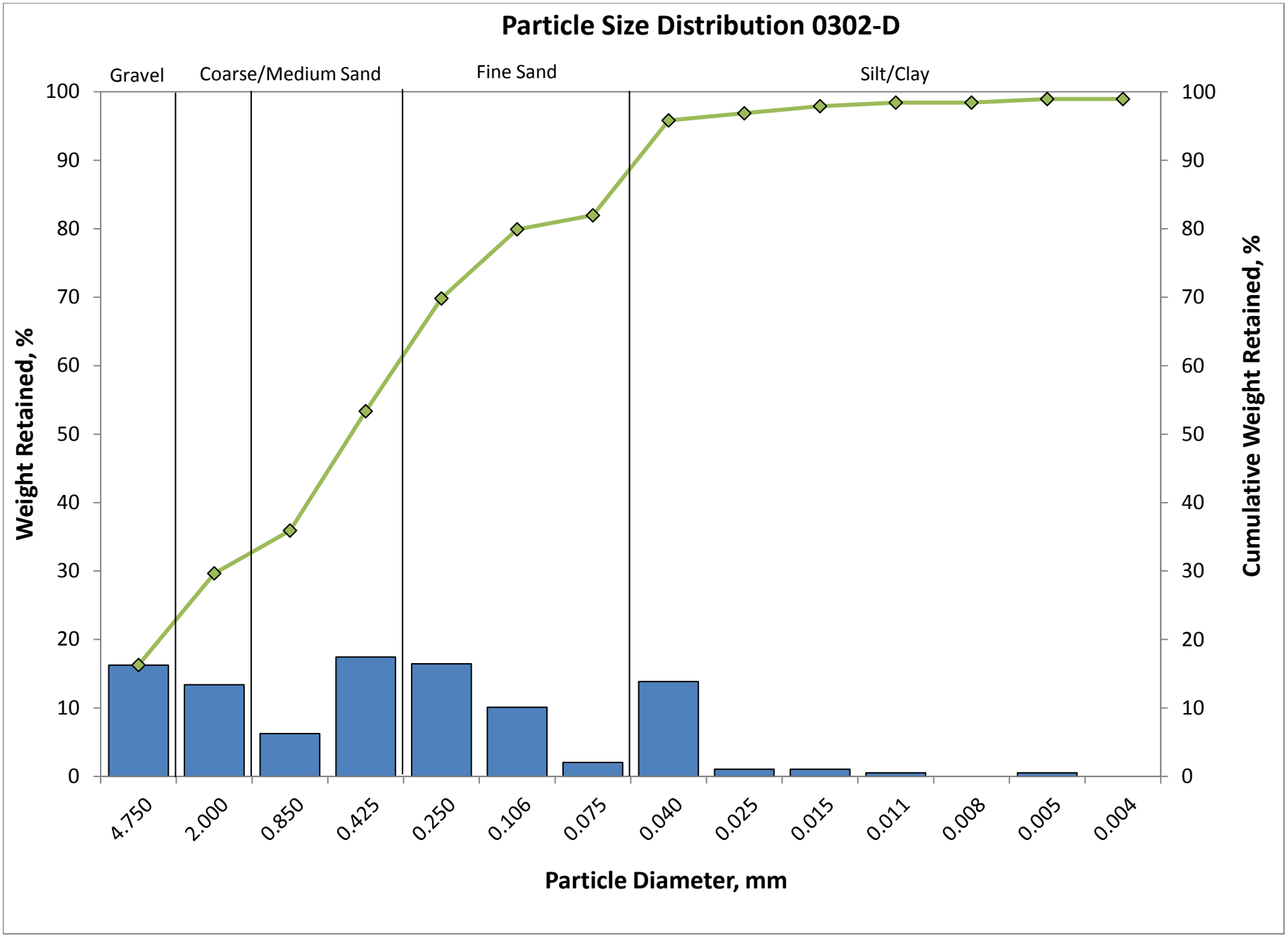
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	13.60	16.27	16.27	83.73
10	2.000	11.20	13.40	29.67	70.33
20	0.850	5.23	6.25	35.92	64.08
40	0.425	14.57	17.43	53.35	46.65
60	0.250	13.77	16.47	69.82	30.18
140	0.106	8.44	10.10	79.92	20.08
200	0.075	1.71	2.04	81.97	18.03
Pan	< 0.075	15.08	18.03	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	16.3
Coarse Sand	10	13.4
Medium Sand	40	23.7
Fine Sand	200	28.6
Silt/Clay	< 200	18.0

USCS Description by ASTM D2487
Silty, clayey sand with gravel

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.039	11.59	13.87	95.83	23.11
5	0.025	0.87	1.04	96.87	17.33
15	0.015	0.87	1.04	97.92	11.55
30	0.010	0.44	0.52	98.44	8.66
60	0.007	0.00	0.00	98.44	8.66
120	0.005	0.44	0.52	98.96	5.78
250	0.004	0.00	0.00	98.96	5.78
		0.87	1.04	100.00	


Particle Size Distribution 0302-D
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0302-G

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	102.50

Sieve Analysis

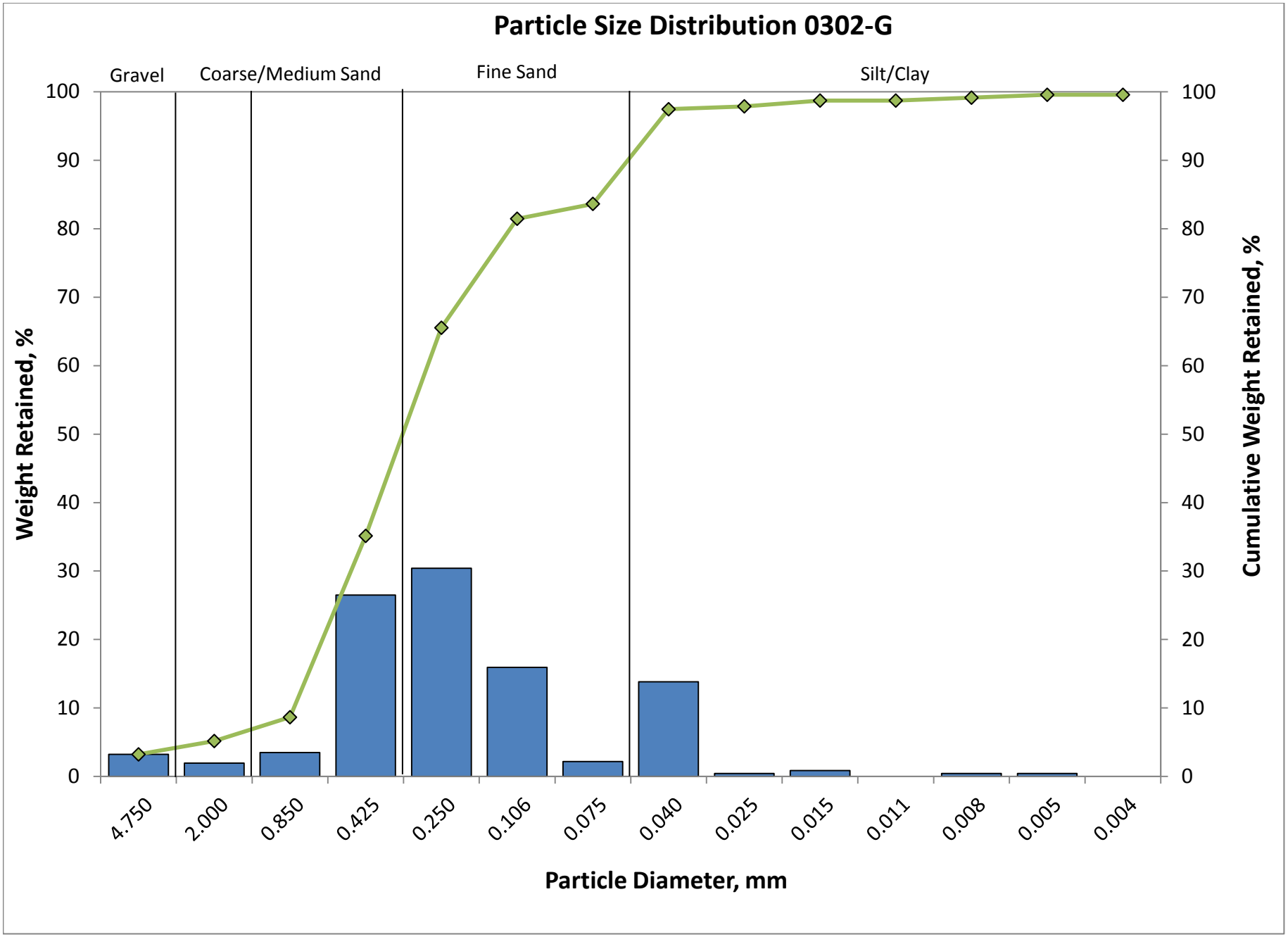
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	3.30	3.22	3.22	96.78
10	2.000	2.00	1.95	5.17	94.83
20	0.850	3.56	3.47	8.65	91.35
40	0.425	27.16	26.49	35.14	64.86
60	0.250	31.16	30.40	65.54	34.46
140	0.106	16.32	15.93	81.47	18.53
200	0.075	2.23	2.17	83.64	16.36
Pan	< 0.075	16.77	16.36	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	3.2
Coarse Sand	10	2.0
Medium Sand	40	30.0
Fine Sand	200	48.5
Silt/Clay	< 200	16.4

USCS Description by ASTM D2487
Silty sand

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.039	14.17	13.83	97.47	15.48
5	0.025	0.43	0.42	97.89	12.90
15	0.015	0.87	0.84	98.73	7.74
30	0.010	0.00	0.00	98.73	7.74
60	0.007	0.43	0.42	99.16	5.16
120	0.005	0.43	0.42	99.58	2.58
250	0.004	0.00	0.00	99.58	2.58
		0.43	0.42	100.00	


Particle Size Distribution 0302-G
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0302-J

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	102.90

Sieve Analysis

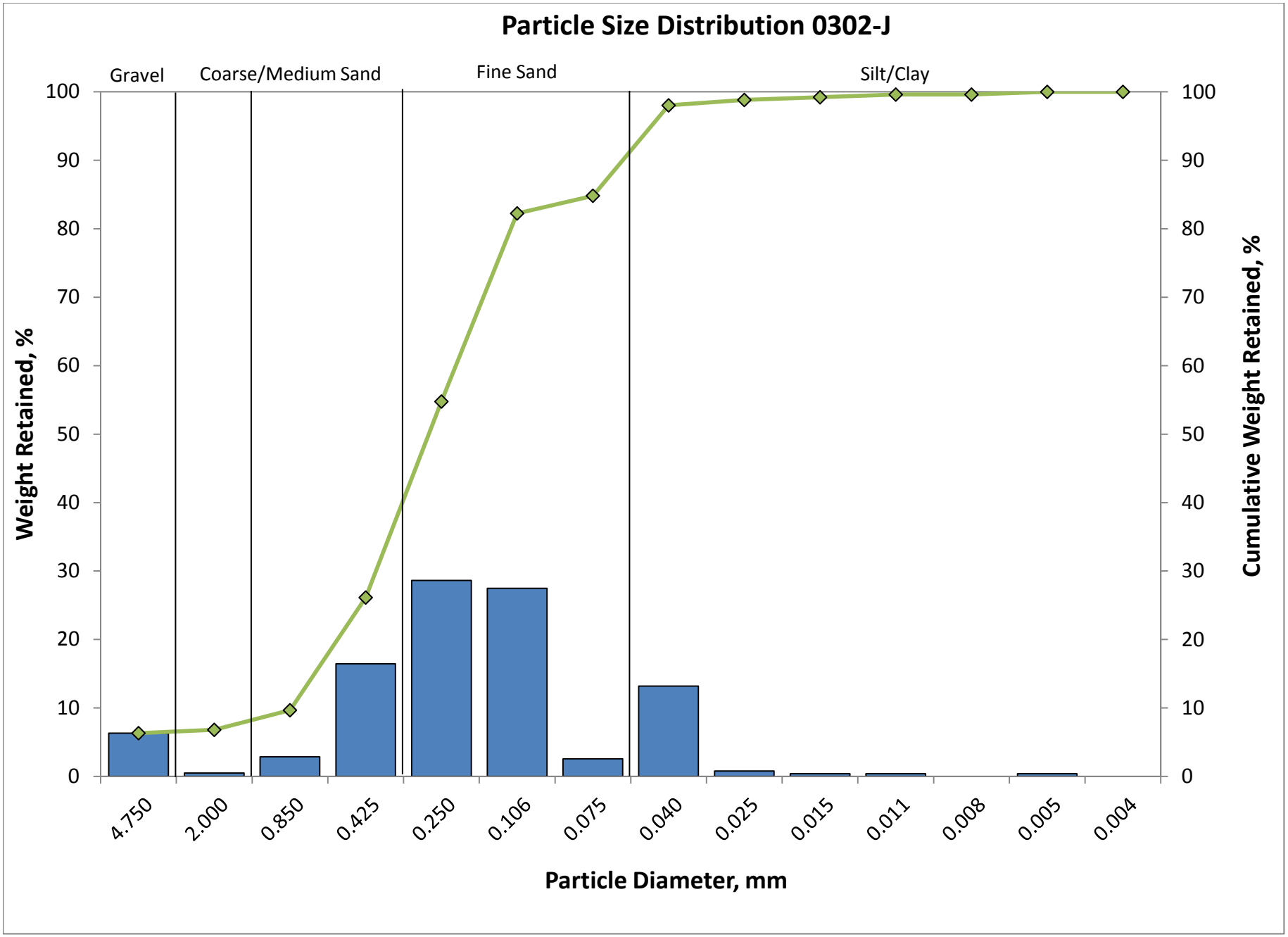
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	6.50	6.32	6.32	93.68
10	2.000	0.50	0.49	6.80	93.20
20	0.850	2.95	2.86	9.67	90.33
40	0.425	16.94	16.46	26.13	73.87
60	0.250	29.46	28.63	54.76	45.24
140	0.106	28.28	27.49	82.25	17.75
200	0.075	2.65	2.58	84.83	15.17
Pan	< 0.075	15.62	15.17	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	6.3
Coarse Sand	10	0.5
Medium Sand	40	19.3
Fine Sand	200	58.7
Silt/Clay	< 200	15.2

USCS Description by ASTM D2487
Silty sand

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.040	13.59	13.21	98.03	12.98
5	0.026	0.81	0.79	98.82	7.79
15	0.015	0.41	0.39	99.21	5.19
30	0.011	0.41	0.39	99.61	2.60
60	0.008	0.00	0.00	99.61	2.60
120	0.005	0.41	0.39	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0302-J
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0302-O

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	112.40

Sieve Analysis

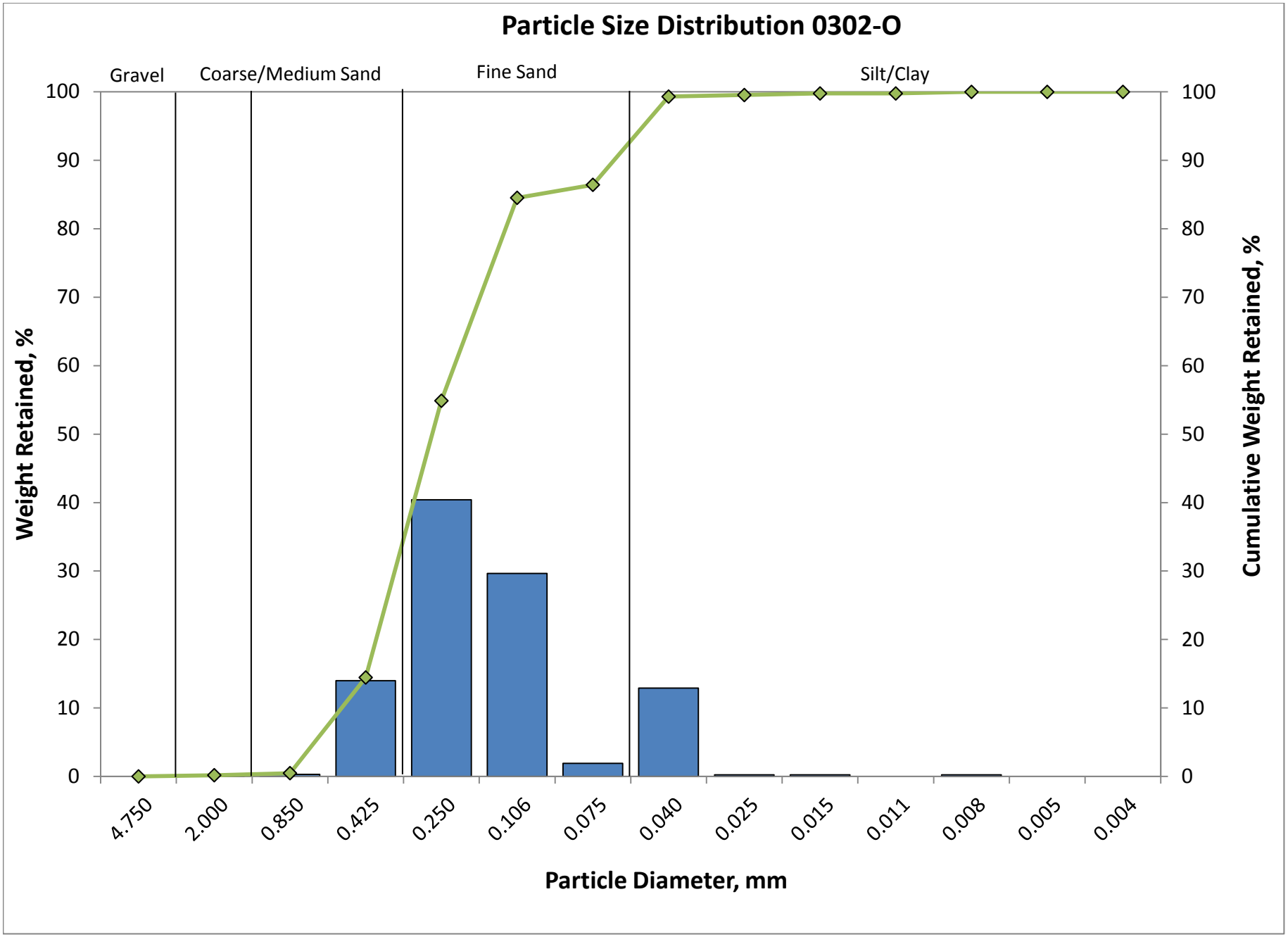
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.20	0.18	0.18	99.82
20	0.850	0.34	0.30	0.48	99.52
40	0.425	15.71	13.98	14.45	85.55
60	0.250	45.44	40.43	54.88	45.12
140	0.106	33.32	29.65	84.53	15.47
200	0.075	2.13	1.90	86.42	13.58
Pan	< 0.075	15.26	13.58	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	0.0
Coarse Sand	10	0.2
Medium Sand	40	14.3
Fine Sand	200	72.0
Silt/Clay	< 200	13.6

USCS Description by ASTM D2487
Silty sand

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.041	14.49	12.89	99.31	5.07
5	0.026	0.26	0.23	99.54	3.38
15	0.015	0.26	0.23	99.77	1.69
30	0.011	0.00	0.00	99.77	1.69
60	0.008	0.26	0.23	100.00	0.00
120	0.005	0.00	0.00	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0302-O
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0302-R

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	115.10

Sieve Analysis

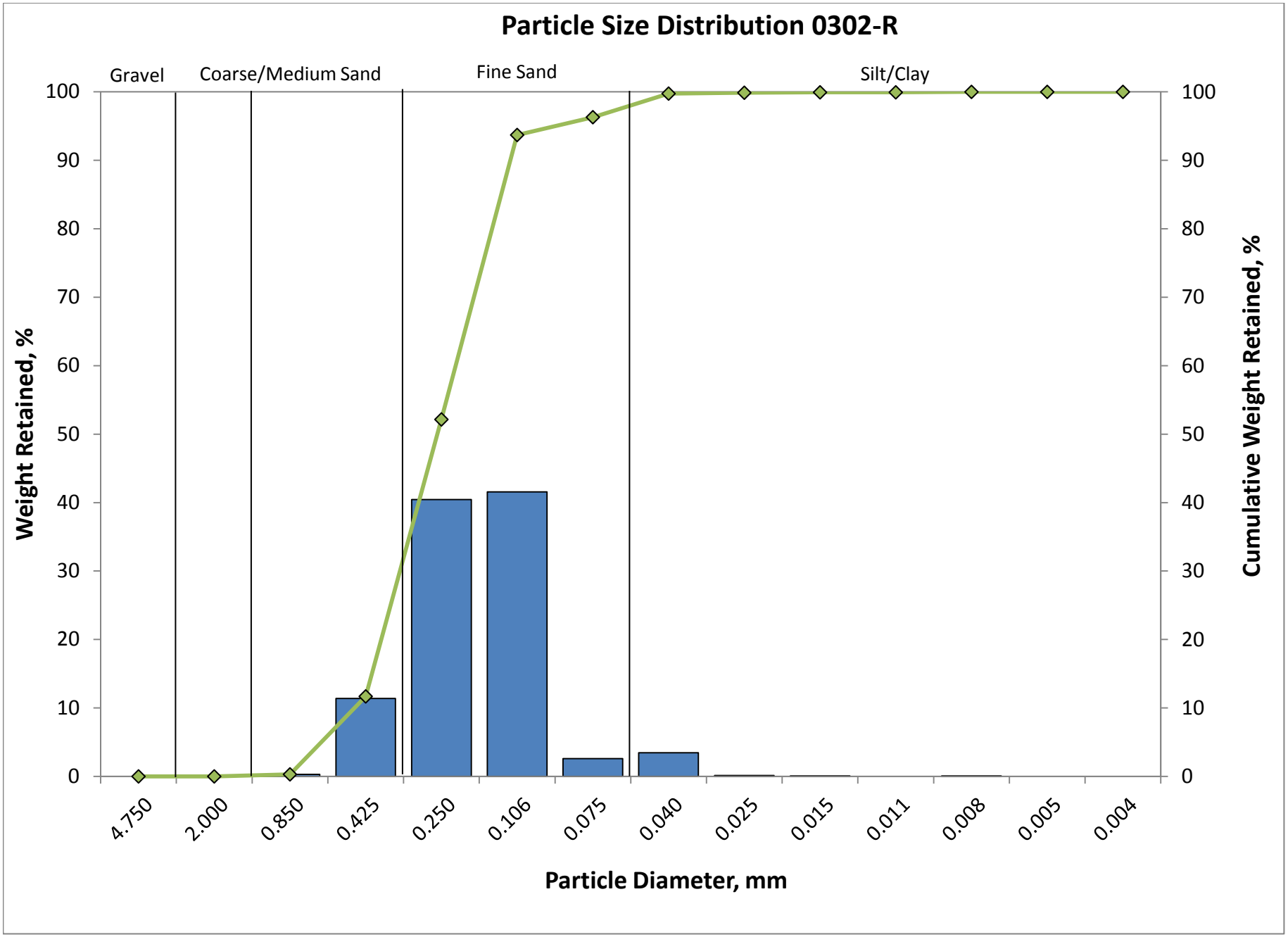
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.00	0.00	0.00	100.00
20	0.850	0.34	0.30	0.30	99.70
40	0.425	13.11	11.39	11.69	88.31
60	0.250	46.57	40.46	52.15	47.85
140	0.106	47.83	41.56	93.71	6.29
200	0.075	2.99	2.60	96.30	3.70
Pan	< 0.075	4.25	3.70	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	11.69
Fine Sand	200	84.62
Silt/Clay	< 200	3.70

USCS Description by ASTM D2487
Poorly graded sand

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.040	3.97	3.45	99.75	6.75
5	0.026	0.14	0.12	99.88	3.38
15	0.015	0.07	0.06	99.94	1.69
30	0.011	0.00	0.00	99.94	1.69
60	0.008	0.07	0.06	100.00	0.00
120	0.005	0.00	0.00	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0302-R
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0302-V

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	77.80

Sieve Analysis

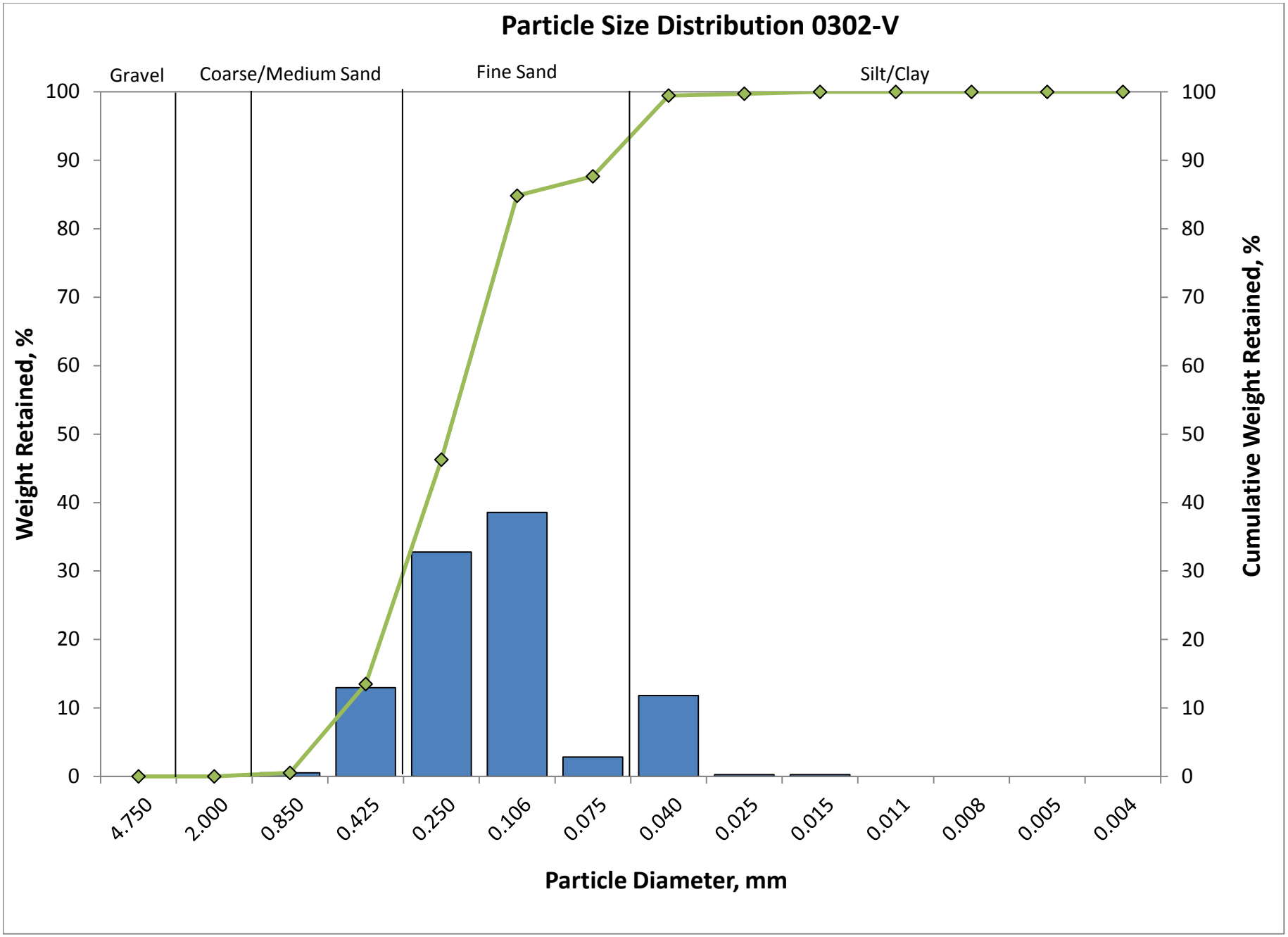
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.00	0.00	0.00	100.00
20	0.850	0.40	0.51	0.51	99.49
40	0.425	10.10	12.98	13.50	86.50
60	0.250	25.50	32.78	46.27	53.73
140	0.106	30.00	38.56	84.83	15.17
200	0.075	2.20	2.83	87.66	12.34
Pan	< 0.075	9.60	12.34	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	13.50
Fine Sand	200	74.16
Silt/Clay	< 200	12.34

USCS Description by ASTM D2487
Silty sand

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.041	9.18	11.80	99.46	4.34
5	0.026	0.21	0.27	99.73	2.17
15	0.015	0.21	0.27	100.00	0.00
30	0.011	0.00	0.00	100.00	0.00
60	0.008	0.00	0.00	100.00	0.00
120	0.005	0.00	0.00	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0302-V
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0302-Y

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	108.70

Sieve Analysis

#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	0.70	0.64	0.64	99.36
10	2.000	0.90	0.83	1.47	98.53
20	0.850	0.81	0.75	2.22	97.78
40	0.425	3.91	3.59	5.81	94.19
60	0.250	8.63	7.94	13.75	86.25
140	0.106	19.04	17.52	31.27	68.73
200	0.075	5.70	5.24	36.51	63.49
Pan	< 0.075	69.01	63.49	100.00	0.00

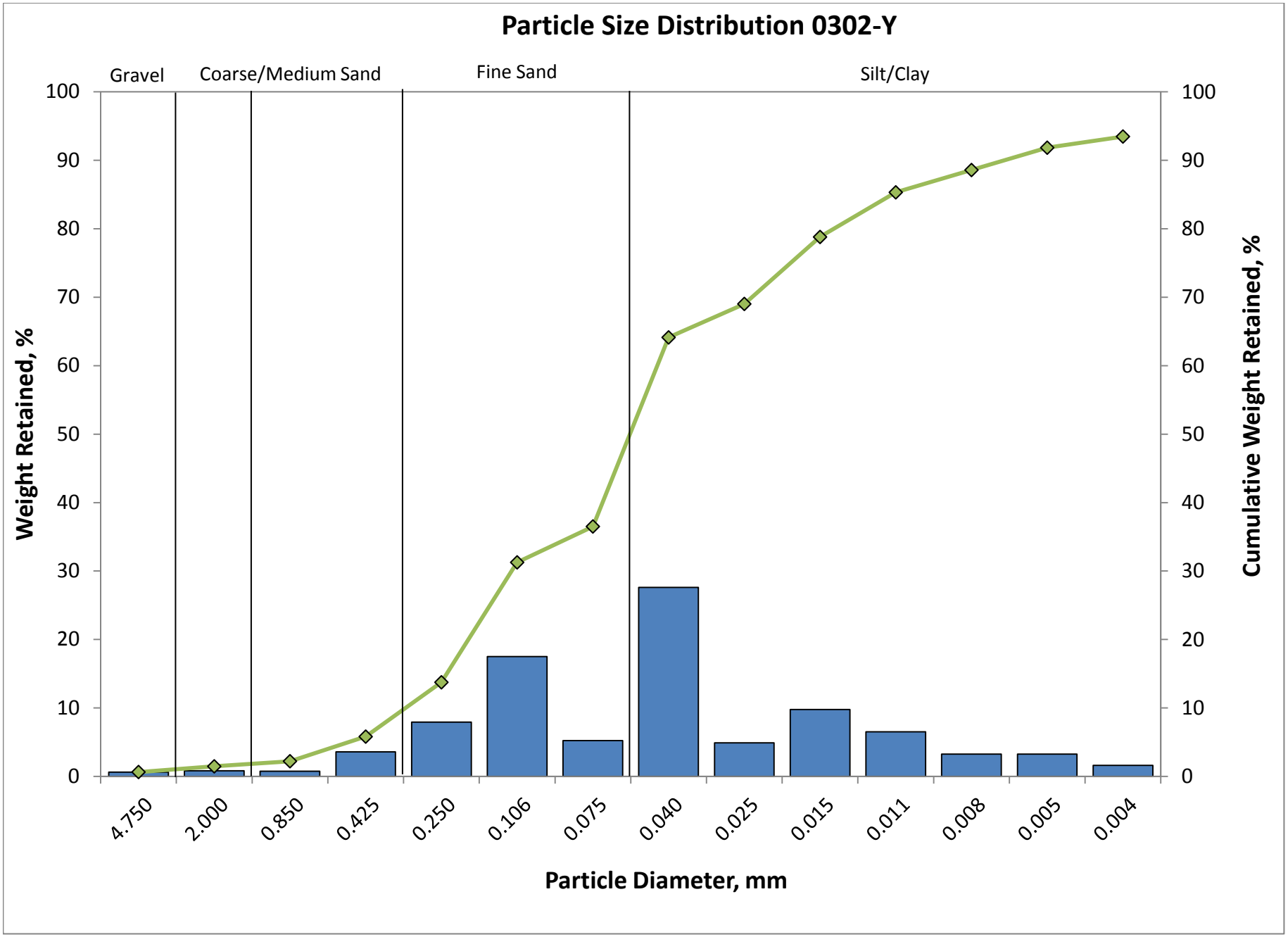
Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	0.64
Coarse Sand	10	0.83
Medium Sand	40	4.34
Fine Sand	200	30.70
Silt/Clay	< 200	63.49

USCS Description by ASTM D2487
Sandy silt*

*Estimated as Atterberg limits were not measured on this fine-grained soil

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.033	30.03	27.62	64.13	56.49
5	0.022	5.32	4.89	69.02	48.79
15	0.014	10.63	9.78	78.81	33.38
30	0.010	7.09	6.52	85.33	23.11
60	0.007	3.54	3.26	88.59	17.98
120	0.005	3.54	3.26	91.85	12.84
250	0.004	1.77	1.63	93.48	10.27
		7.09	6.52	100.00	


Particle Size Distribution 0302-Y
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0401-F

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	66.30

Sieve Analysis

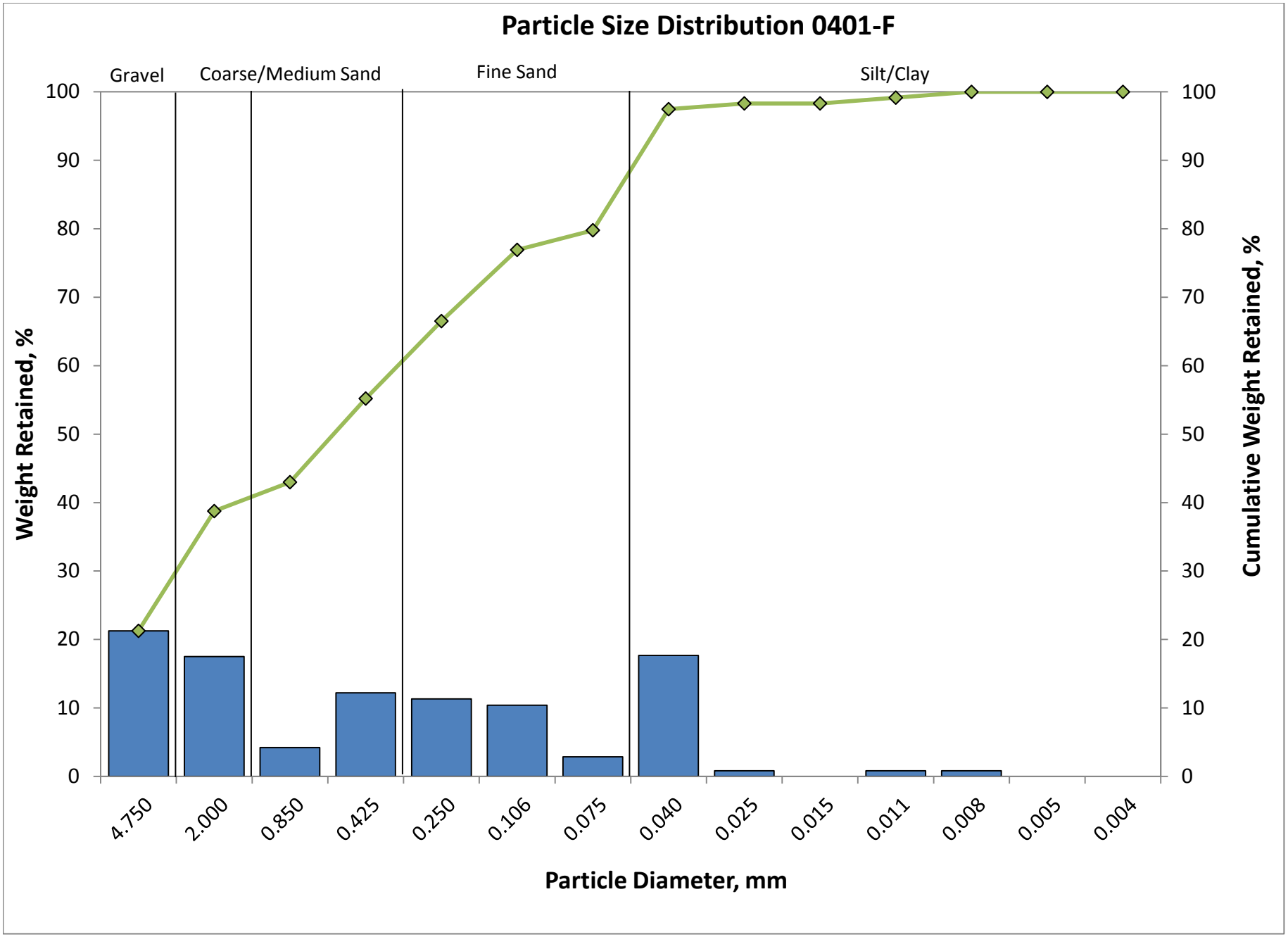
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	14.10	21.27	21.27	78.73
10	2.000	11.60	17.50	38.76	61.24
20	0.850	2.80	4.22	42.99	57.01
40	0.425	8.10	12.22	55.20	44.80
60	0.250	7.50	11.31	66.52	33.48
140	0.106	6.90	10.41	76.92	23.08
200	0.075	1.90	2.87	79.79	20.21
Pan	< 0.075	13.40	20.21	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	21.27
Coarse Sand	10	17.50
Medium Sand	40	16.44
Fine Sand	200	24.59
Silt/Clay	< 200	20.21

USCS Description by ASTM D2487
Silty sand with gravel

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.041	11.73	17.69	97.48	12.49
5	0.026	0.56	0.84	98.32	8.32
15	0.015	0.00	0.00	98.32	8.32
30	0.011	0.56	0.84	99.16	4.16
60	0.008	0.56	0.84	100.00	0.00
120	0.005	0.00	0.00	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0401-F
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0401-I

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	37.30

Sieve Analysis

#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	7.70	20.64	20.64	79.36
10	2.000	1.80	4.83	25.47	74.53
20	0.850	0.70	1.88	27.35	72.65
40	0.425	1.70	4.56	31.90	68.10
60	0.250	2.10	5.63	37.53	62.47
140	0.106	2.90	7.77	45.31	54.69
200	0.075	1.60	4.29	49.60	50.40
Pan	< 0.075	18.80	50.40	100.00	0.00

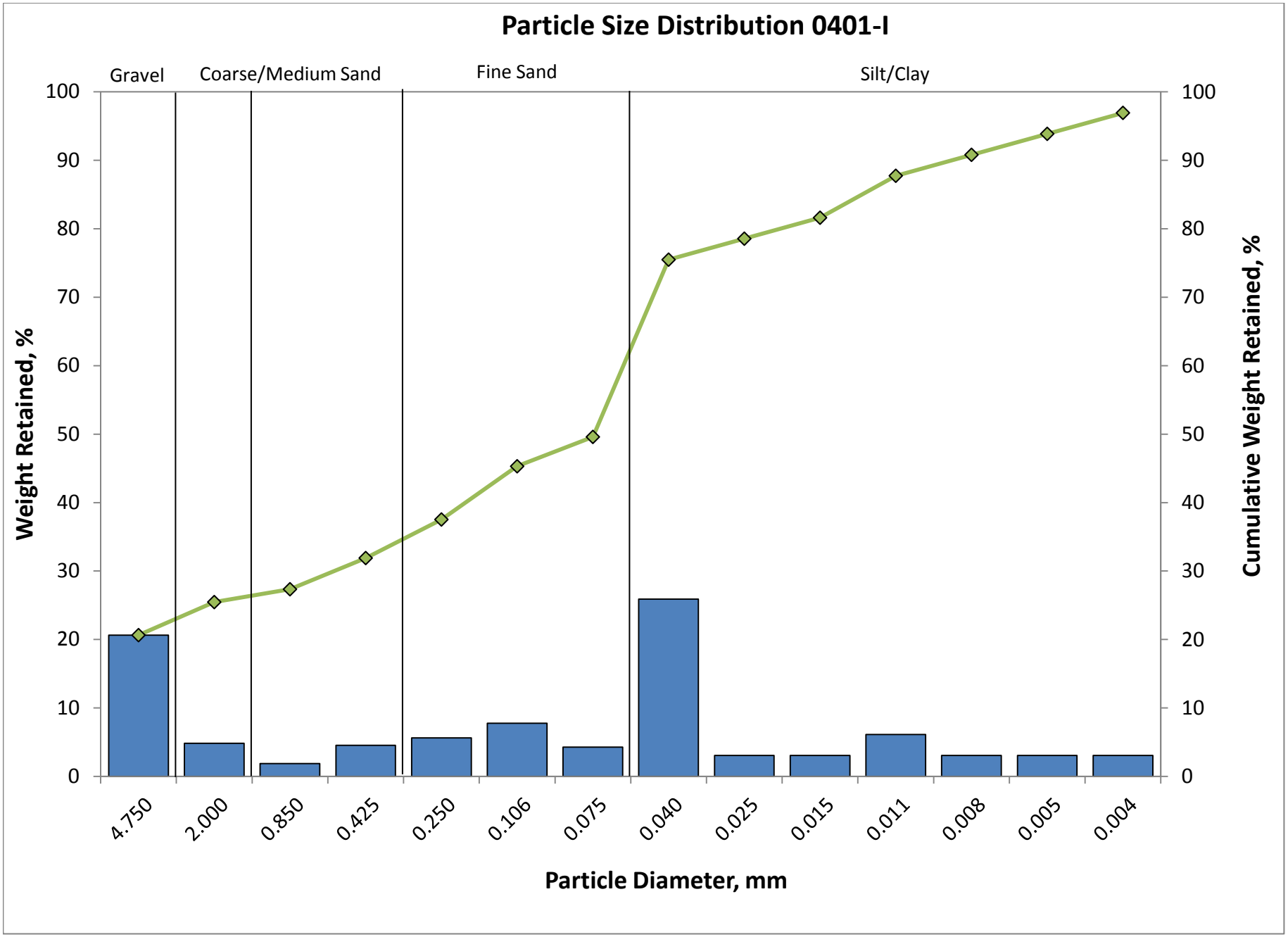
Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	20.64
Coarse Sand	10	4.83
Medium Sand	40	6.43
Fine Sand	200	17.69
Silt/Clay	< 200	50.40

USCS Description by ASTM D2487
Sandy silt with gravel*

*Estimated as Atterberg limits were not measured on this fine-grained soil

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.039	9.66	25.90	75.49	48.62
5	0.025	1.14	3.06	78.56	42.55
15	0.014	1.14	3.06	81.62	36.47
30	0.010	2.29	6.13	87.75	24.31
60	0.007	1.14	3.06	90.81	18.23
120	0.005	1.14	3.06	93.87	12.16
250	0.004	1.14	3.06	96.94	6.08
		1.14	3.06	100.00	


Particle Size Distribution 0401-I
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0401-L

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	84.70

Sieve Analysis

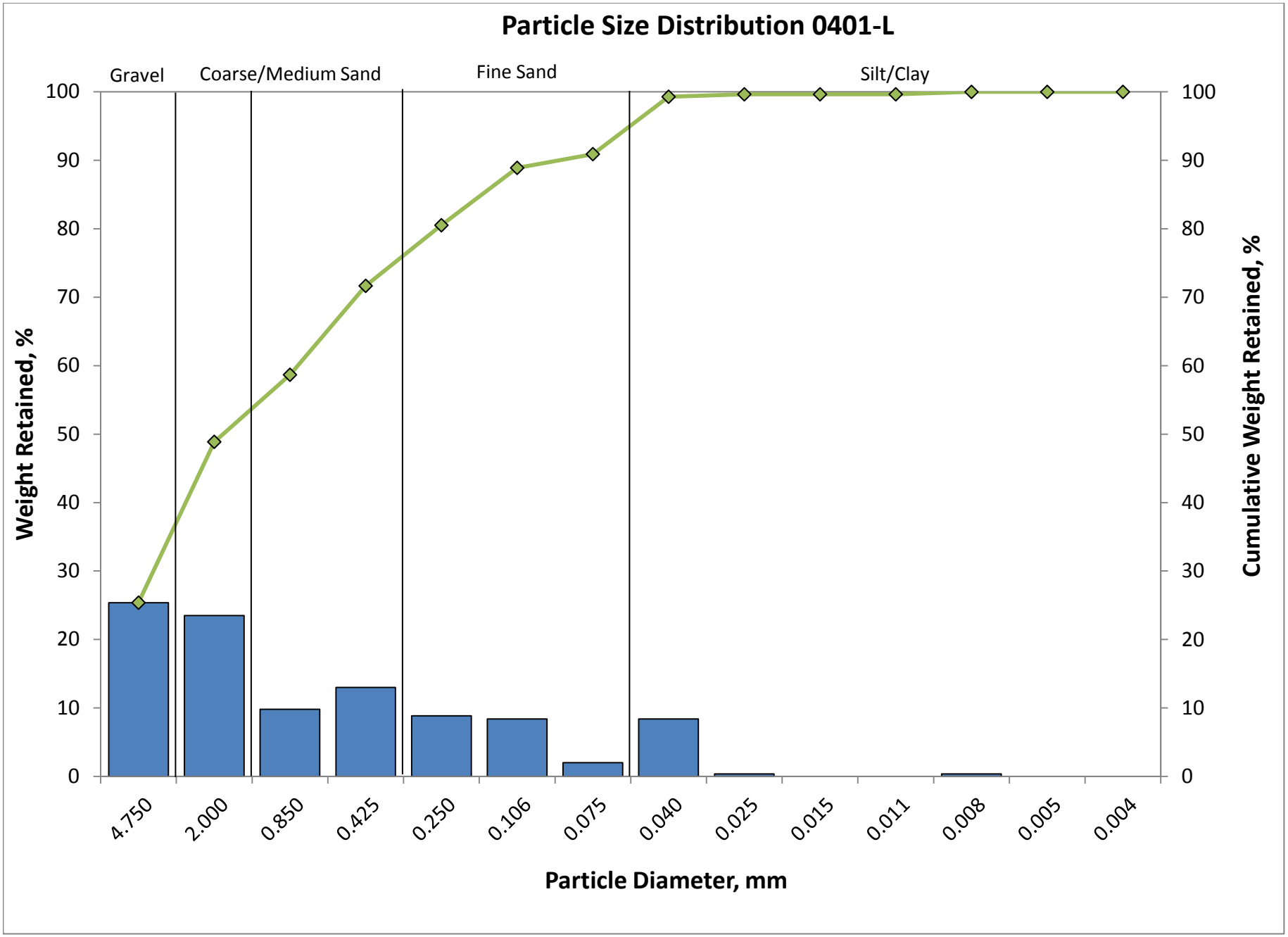
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	21.50	25.38	25.38	74.62
10	2.000	19.90	23.49	48.88	51.12
20	0.850	8.30	9.80	58.68	41.32
40	0.425	11.00	12.99	71.66	28.34
60	0.250	7.50	8.85	80.52	19.48
140	0.106	7.10	8.38	88.90	11.10
200	0.075	1.70	2.01	90.91	9.09
Pan	< 0.075	7.70	9.09	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	25.38
Coarse Sand	10	23.49
Medium Sand	40	22.79
Fine Sand	200	19.24
Silt/Clay	< 200	9.09

USCS Description by ASTM D2487
Poorly graded sand with silt and gravel

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.041	7.10	8.38	99.29	7.80
5	0.026	0.30	0.35	99.65	3.90
15	0.015	0.00	0.00	99.65	3.90
30	0.011	0.00	0.00	99.65	3.90
60	0.008	0.30	0.35	100.00	0.00
120	0.005	0.00	0.00	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0401-L
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
Particle Diameter, mm
0
10
20
30
40
50
60
70
80
90
100
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0403-A

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	47.00

Sieve Analysis

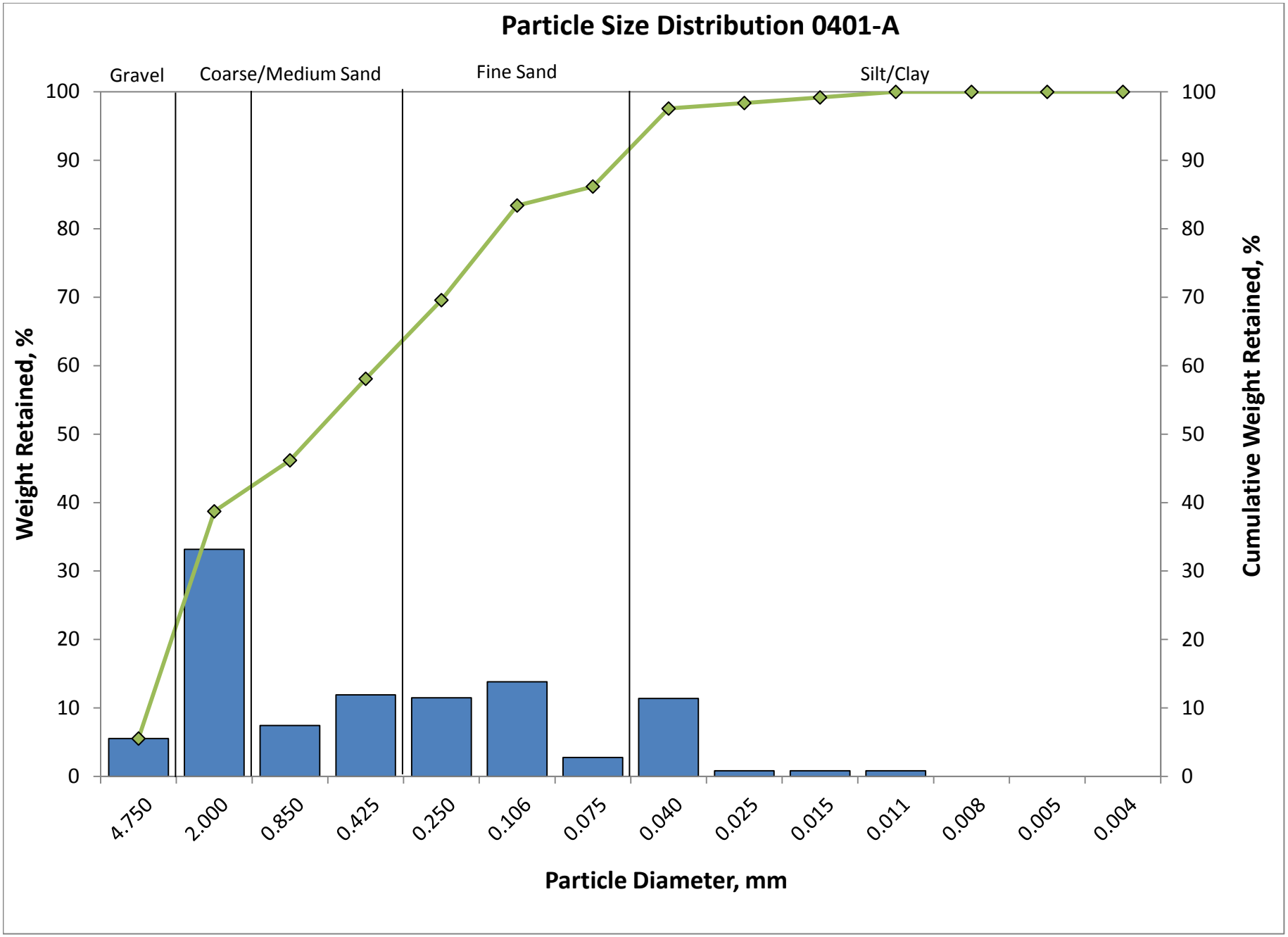
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	2.60	5.53	5.53	94.47
10	2.000	15.60	33.19	38.72	61.28
20	0.850	3.50	7.45	46.17	53.83
40	0.425	5.60	11.91	58.09	41.91
60	0.250	5.40	11.49	69.57	30.43
140	0.106	6.50	13.83	83.40	16.60
200	0.075	1.30	2.77	86.17	13.83
Pan	< 0.075	6.50	13.83	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	5.53
Coarse Sand	10	33.19
Medium Sand	40	19.36
Fine Sand	200	28.09
Silt/Clay	< 200	13.83

USCS Description by ASTM D2487
Silty sand

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.041	5.36	11.40	97.57	17.60
5	0.026	0.38	0.81	98.38	11.73
15	0.015	0.38	0.81	99.19	5.87
30	0.011	0.38	0.81	100.00	0.00
60	0.008	0.00	0.00	100.00	0.00
120	0.005	0.00	0.00	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0401-A
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0403-D

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	44.30

Sieve Analysis

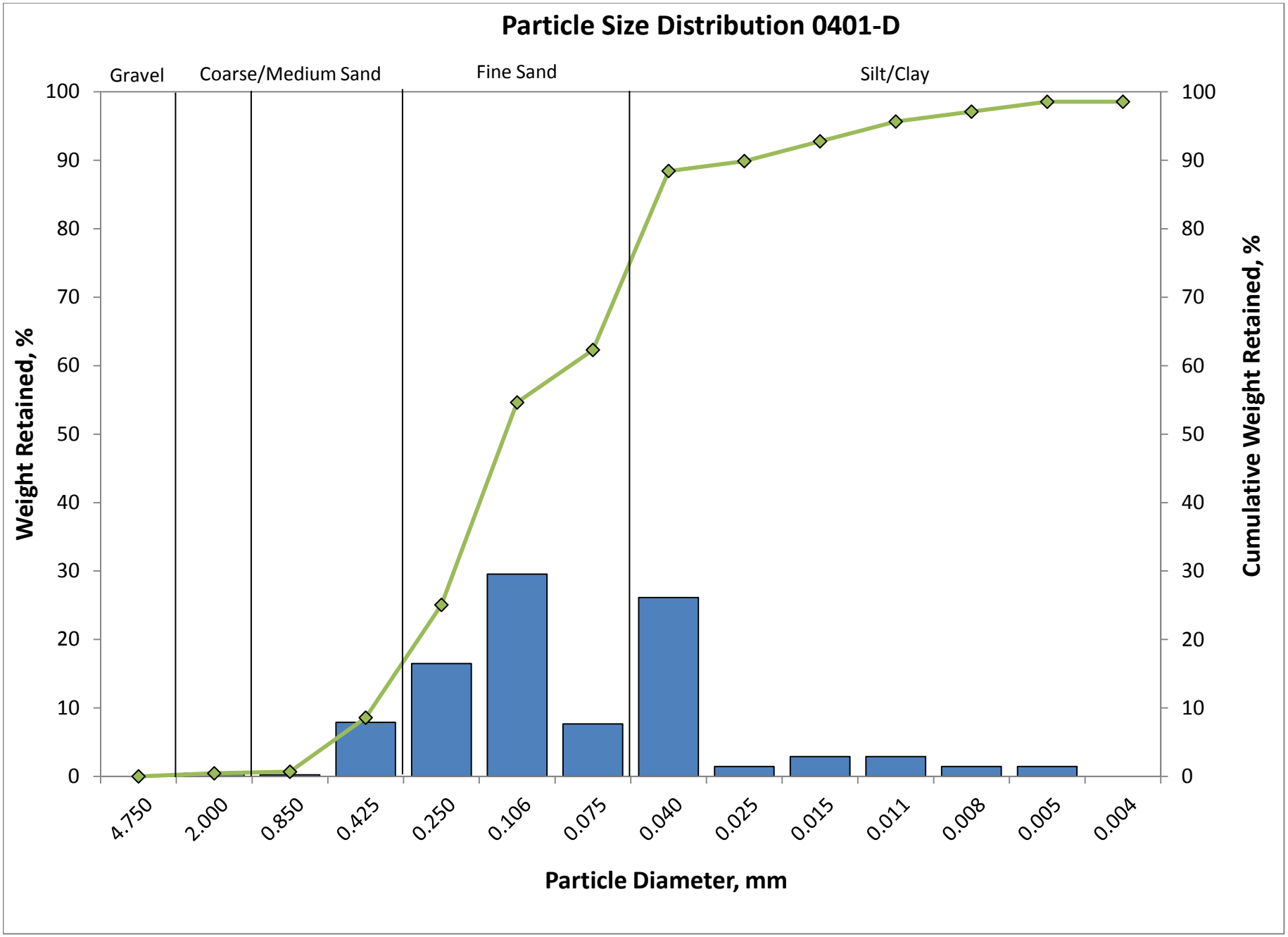
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	0.00	0.00	0.00	100.00
10	2.000	0.20	0.45	0.45	99.55
20	0.850	0.10	0.23	0.68	99.32
40	0.425	3.50	7.90	8.58	91.42
60	0.250	7.30	16.48	25.06	74.94
140	0.106	13.10	29.57	54.63	45.37
200	0.075	3.40	7.67	62.30	37.70
Pan	< 0.075	16.70	37.70	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	0.00
Coarse Sand	10	0.45
Medium Sand	40	8.13
Fine Sand	200	53.72
Silt/Clay	< 200	37.70

USCS Description by ASTM D2487
Silty sand

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.039	11.58	26.14	88.45	30.65
5	0.025	0.64	1.44	89.89	26.82
15	0.015	1.28	2.89	92.78	19.16
30	0.010	1.28	2.89	95.67	11.49
60	0.007	0.64	1.44	97.11	7.66
120	0.005	0.64	1.44	98.56	3.83
250	0.004	0.00	0.00	98.56	3.83
		0.64	1.44	100.00	


Particle Size Distribution 0401-D
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

CH2MHILL

Particle Size Distribution, ASTM D422

Segment: 0403-G

Honeywell Quanta

Analysis By: *SB*

Reviewed By: *DRVB*

Sample Weight, g	59.30

Sieve Analysis

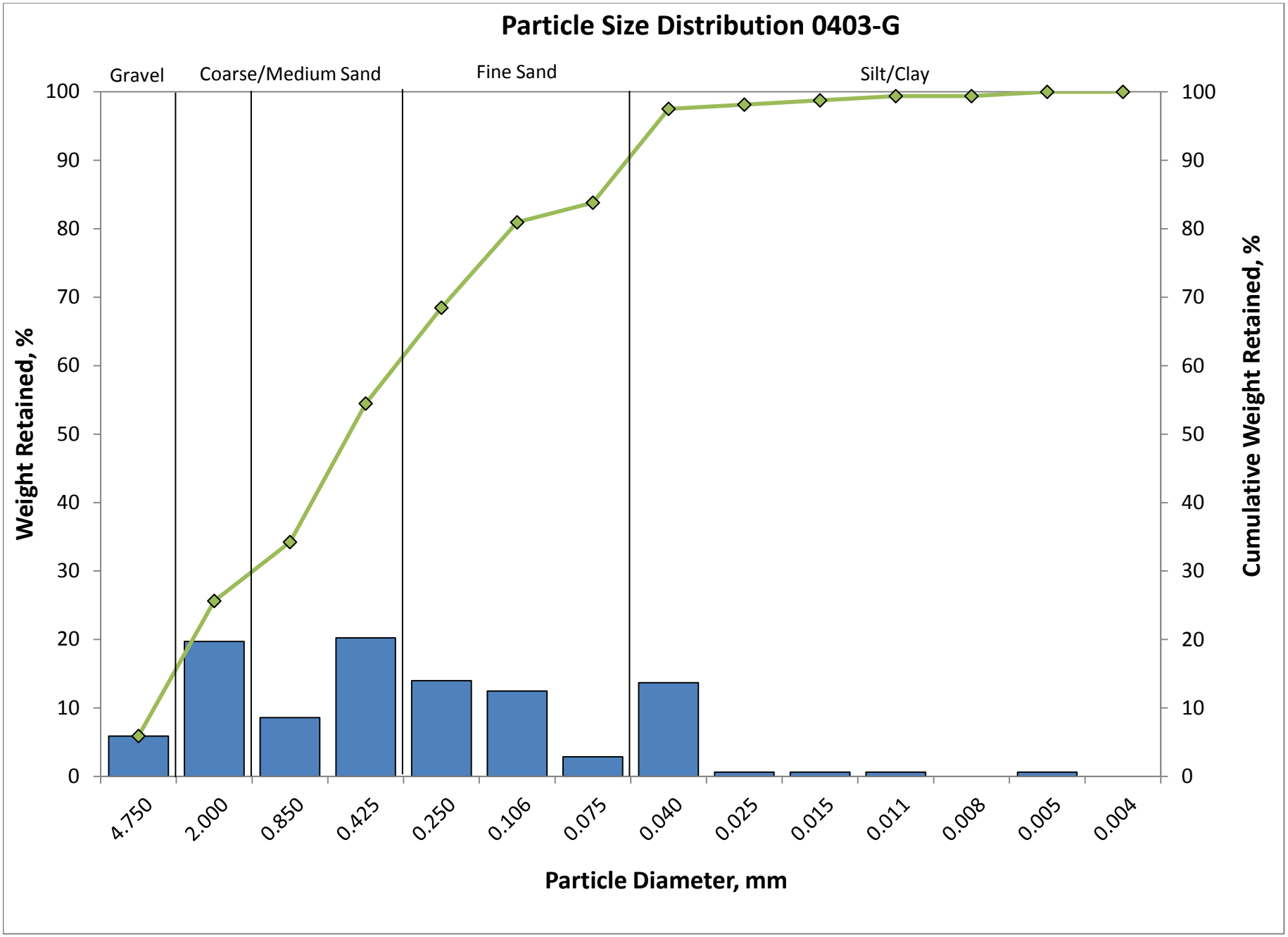
#	Particle Diameter mm	Weight Retained g	Weight Retained %	Cumulative Weight Retained %	Sieve Finer %
4	4.750	3.50	5.90	5.90	94.10
10	2.000	11.70	19.73	25.63	74.37
20	0.850	5.10	8.60	34.23	65.77
40	0.425	12.00	20.24	54.47	45.53
60	0.250	8.30	14.00	68.47	31.53
140	0.106	7.40	12.48	80.94	19.06
200	0.075	1.70	2.87	83.81	16.19
Pan	< 0.075	9.60	16.19	100.00	0.00

Soil Description	Retained on Sieve Sieve No.	Weight Percent %
Gravel	4	5.90
Coarse Sand	10	19.73
Medium Sand	40	28.84
Fine Sand	200	29.34
Silt/Clay	< 200	16.19

USCS Description by ASTM D2487
Silty sand

Hydrometer Analysis - 151H

Time mins	Particle Diameter mm	Calculated Weight g	Calculated Weight %	Cumulative Weight Retained %	Hydrometer Finer %
2	0.040	8.13	13.71	97.52	15.33
5	0.026	0.37	0.62	98.14	11.49
15	0.015	0.37	0.62	98.76	7.66
30	0.011	0.37	0.62	99.38	3.83
60	0.008	0.00	0.00	99.38	3.83
120	0.005	0.37	0.62	100.00	0.00
250	0.004	0.00	0.00	100.00	0.00
		0.00	0.00	100.00	


Particle Size Distribution 0403-G
Gravel
Coarse/Medium Sand
Fine Sand
Silt/Clay
Weight Retained, %
Cumulative Weight Retained, %
100
90
80
70
60
50
40
30
20
10
0
4.750
2.000
0.850
0.425
0.250
0.106
0.075
0.040
0.025
0.015
0.011
0.008
0.005
0.004
Particle Diameter, mm

L2898

116

LABORATORY NAME: ASL
Address
1100 NE Circle Blvd
Corvallis, OR

Honeywell Chain Of Custody / Analysis Request

AESI Ref: 38544.52162
COC # : 30916_112112
Lab Use Only
Lab Proj #
Lab ID LL

Privileged & Confidential
CDD To: Kyle Block - CH2M Hill
Site Name: Quanta Resources Corporation Superfund Site
Location of Site: Edgewater, New Jersey

Client Contact: (name, co., address)
Kyle Block - CH2M Hill
18 Tremont St, Suite 700
Boston, MA 02108

Sampler: Michael Murphy
P O # 428872.HW.40.43.FW
Analysis Turnaround Time: 10
Standard Y
Rush Charges Authorized for -
2 weeks -
1 week -
Next Day -

Hardcopy Report To: Kyle Block - CH2M Hill, 18 Tremont St, Suite 700, Boston, MA 02108
Invoice To: 428872.HW.40.43.FW

PAGE 1 of 1
Job No.

What is in the Text File? Mouse over here.

Written and maintained by AESI (Ver 3_7) 02-01-05
renesurgi@aol.com

	Sample Identification				Sample Date	Sample Time	Sample Type	Sample Matrix	Sample Purpose	# of Cont.	Grab/Composite	Field Filtered Sample?	Specific Gravity	Lab Sample Numbers
	Location ID	Start Depth (ft)	End Depth (ft)	Field Sample ID							Units			
1	MW	26.0-26.0		MW-130B-NAPL-1112	11/21/2012	11:57	NAPL	NAPL	REG	1	grab	N	X	1
2	MW	16.0-16.0		MW-123-NAPL-1112	11/21/2012	10:20	NAPL	NAPL	REG	1	grab	N	X	2
3														
4														
5														
6														

Relinquished by	Company	Date/Time	Received by	Company	Date/Time	Condition	Custody Seals Intact
[signature]	CH2M Hill	11/21/12 1500	FED EX	FED EX	11/21/12 1500	Cooler Temp	
Relinquished by	Company CH2M HILL		Received by	Company		Condition	Custody Seals Intact
	Date/Time		[signature]	Date/Time 11/26/12 [illegible]		Cooler Temp	

Preservatives: 0 = None; 1 = HCl; 2 = HNO3; 3 = H2SO4; 4 = NaOH; 5 = Na2S2O3; 6 = MeOH; 7 = NaHSO4; X = Other (specify)
Additional Preservative for all samples: 8 (Lo)