MO18
NASIS
TECHNICAL NOTES

June 1, 2005

MO18-T-6 Technical Note Number 6

Re: NASIS – Calculating Horizon Fragments and Adjusting Sieves

In the past you may be aware that during Manuscript edits of the Engineering tables, the tables were generated from Ames, and then modifications needed were penciled in for the manuscript to fit the conditions in the survey area. Many times these adjustments were only made for the texture changes to the Engineering table and corresponding adjustments were not made to the sieve values.

That procedure may have worked in the past, but now that these values are in the NASIS database, they drive the interpretations automatically from the values in the sieve data. These values must therefore; be corrected in the database or incorrect interpretations will result.

The following instructions and tables should help in correcting the amount of fragments and also the corresponding sieve values. If you are having trouble with these, work with your SDQS to make the appropriate changes.

Jim Haagen
MO-18 NASIS Data Steward

Soils 5 tables were originally designed with a given set of textures and ranges of included fragments. The sieve data was set to reflect the total range (low & high) of these textures and fragments. For example: The Crider A horizon lists only 1 texture which is silt loam. The corresponding sieve values show that there is 95-100 % passing the #10 sieve. That means that there is a possibility of up to 5% by wt. fine gravel with a size of 2 to 5 mm. It also shows a range of 85 to 100% passing the #200 sieve. This indicates that 0 up to 15% by wt. is sand between 2mm and .074 mm (half of the very fine sand passes the 200 sieve).

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT. >10 IN (PCT)	FRACT. 3-10IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	CLAY (PCT)
0-12	SIL	ML,CL,CL-ML	A-4,A-6	0	0	100	95-100	90-100	85-100	15-27
0-12	SICL	CL	A-7,A-6	0	0	100	95-100	90-100	85-100	27-35
12-38	SIL,SICL	CL,ML,CL-ML	A-7,A-6,A-4	0	0	100	95-100	90-100	85-100	18-35
38-80	SIC,C,SICL	CL,CH	A-7,A-6		0-5	85-100	75-100	70-100	60-100	30-60

The Baxter soil on the other hand shows the A horizon has a texture of cr-sil. The 3-10 inch column shows 0 to 10% fragments by wt. Since these fragments are larger than 3 inches, they are part of the whole soil, but not considered as part of the fine earth fraction which is shown in the remainder of the sieve data. The #10 column shows that 55-80% passes. This means that 20% to 45% by Wt. is gravel. Converting these values to Volume yields 13 to 31%. This range of values allows the combination of fragments larger than 3 inches and those smaller to comprise 15 to 35 % of the whole soil – producing the gravelly modifier to the texture.

DEPTH (IN.)	USDA TEXTURE	UNIFIED	AASHTO	FRACT. >10 IN (PCT)	FRACT. 3-10IN (PCT)	PERCENT OF MATERIAL LESS THAN 3" PASSING SIEVE NO. 4	10	40	200	CLAY (PCT)
0-9	CR-SIL	ML,GM,CL-ML,GM-GC	A-4		0-10	60-90	55-80	45-70	45-70	12-27
0-9	CR-SICL	CL	A-6		0-10	60-85	55-75	55-75	55-75	27-35
9-16	CR-SICL,CR-SIL	CL,SC-SM,GC,CL-ML	A-4,A-6		0-10	60-90	55-80	55-80	45-80	18-40
16-48	CR-SIC,CR-C	CH,CL,GC,SC	A-7		0-10	65-90	45-85	45-85	45-80	40-60
48-99	CR-C,CR-SIC	GC,CH,SC,CL	A-7		0-20	50-90	40-75	35-70	35-70	40-60

When textures are added to the list in any layer in the horizon table it may affect the sieve data that relates to these texture ranges. If there is only 1 texture, the sieve data should only reflect the various sieve fractions related to the particular texture. When 2 or more textures are listed; the range of the various size fractions must be widened to accommodate the variability of both or all textures. The following tables are provided to assist in determining the proper range of values for the various sieve sizes to accommodate the increased range when different textures are added into the mix.

When adjusting the sieves, it is best to make changes to the #10 sieve first, since this is be break between fragments and fines. Then go back and make adjustments to the #4 sieve values to distinguish between fine gravel and medium-coarse gravel. Then proceed

on to the #40 and #200 sieves. **ALWAYS KEEP IN MIND THAT SIEVE VALUES ARE BY WEIGHT. ALSO KEEP IN MIND THAT % FRAGMENTS >3 INCHES (75mm) IS CALCULATED ON WHOLE SOIL BASIS. Then fragment % < 3 inches (75mm) is determined on fine earth basis so you need to start over using 100% again.**

NASIS 5.3 release included a new set of columns for "Total Fragment Volume" in the Horizon table, so be aware that this will need to be populated as well, and may help to fix some of these problems. Be aware that these values are for VOLUME

When determining the sieve range, look at the textures and determine the smallest amount of fragments allowed for the textures listed and then the largest amount allowed. These values will determine the range. Remembering to convert from Vol. to Wt. if needed.

Next, determine low and high values for the % passing the #10 sieve. Then use the Blewitts Tables to determine the amounts passing the #40 and #200 sieves.

MO-18 NASIS Guide 1a

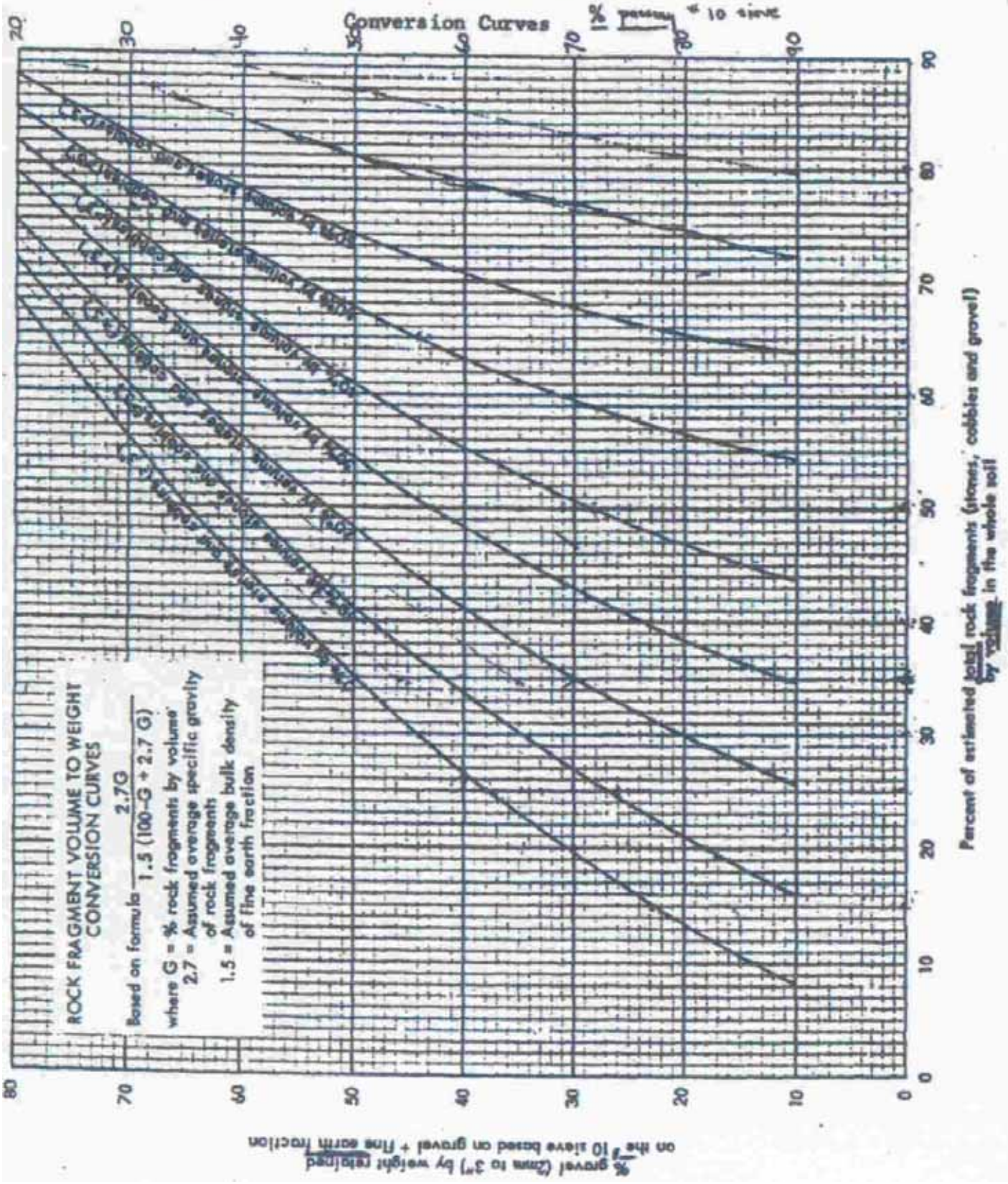
Conversion of Volume to Weight for Cobbles and Stones
And
Adjusting Percent Gravel by Volume to Materials Passing #10 Sieve

Cobbles & Stone Vol.		Gravel By Volume																
0		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80
	>3"	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	#10	100	90	85	75	70	60	55	50	45	40	35	30	25	25	20	15	10
5	>3"	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	#10	100	90	85	75	65	60	55	50	45	40	35	30	25	20	15	10	5
10	>3"	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	#10	100	90	80	75	65	60	50	45	40	35	30	25	20	15	10	10	5
15	>3"	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	
	#10	100	90	80	70	65	55	50	45	40	35	30	25	20	15	10	5	
20	>3″	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30		
	#10	100	90	80	70	60	55	50	40	35	30	25	20	15	10	5		
25	>3"	40	40	40	40	40	40	40	40	40	40	40	40	40	40			
	#10	100	90	80	70	60	50	45	40	35	25	20	15	10	5			
30	>3"	45	45	45	45	45	45	45	45	45	45	45	45	45				
	#10	100	85	75	65	55	50	45	35	30	25	20	15	10				
35	>3″	50	50	50	50	50	50	50	50	50	50	50	50					
	#10	100	85	75	65	55	45	40	35	25	20	15	10					
40	>3″	55	55	55	55	55	55	55	55	55	55	55						
	#10	100	85	70	60	50	45	35	30	20	15	10						
45	>3"	60	60	60	60	60	60	60	60	60	60							
	#10	100	85	70	55	45	40	30	20	10	5							
50	>3"	65	65	65	65	65	65	65	65	65								
	#10	100	85	70	55	45	35	30	20	10								
55	>3″	70	70	70	70	70	70	70	70									
	#10	100	80	65	55	40	30	20	10									
60	>3″	75	75	75	75	75	75	75										
	#10	100	75	60	50	35	25	15										
65	>3"	75	75	75	75	75	75											
	#10	100	70	55	40	25	15											
70	>3"	80	80	80	80	80												
	#10	100	60	40	30	15												
75	>3″	85	85	85	85													
	#10	100	50	30	15													
80	>3″	90	90	90														
	#10	100	30	15														

Bulk Density 1.5

MO-18 NASIS Guide 1b

Chart 1 - Rock Fragment Volume to Weight Conversion Curves



How to use MO-18 NASIS Guide 1b

Rock Fragment Volume to Weight Conversion Curves

The rock fragment conversion curves can be used for converting all rock fragments (stones, cobbles, and gravel) from volume to weight and obtain appropriate entries for the >3" fraction and percent of fine earth fraction passing the #10 sieve. These curves are based on the assumption the specific gravity of rock fragments is 2.7 and bulk density of the fine earth fraction is 1.5. They also take into account the two separate bases of 100% that must be used to make these computations: the first 100% base is the whole soil, and the second 100% base is gravel plus fine earth fraction.

Procedure:

1. Summate the estimated total rock fragment content of the whole soil in percent by volume (stones, cobbles, and gravel) of a major soil horizon and enter at the appropriate percent by volume value on the horizontal axis (abscissa) of the curves.

2. Move vertically along the percent by volume value line obtained in 1 above until intersecting the appropriate curve representing the percent by volume of rock fragments >3" (stones and cobbles) that are present in the whole soil. For soils having percent by volume values of rock fragments >3" ending in 5, interpolate between curves and along the vertical line.

3. Move horizontally from point obtained in 2 above to the vertical axis (ordinate) and read value. This value, in percent, is the amount of gravel by weight retained on the # 10 sieve, based on the gravel plus fine earth fraction. Subtract this value from 100 to obtain percent of fine earth fraction materials passing the #10 sieve.

4. To obtain the entry for percent by weight of rock fragments >3" present in the whole soil enter at the appropriate percent by volume of estimated rock fragments >3" on the horizontal axis (abscissa) of the curves.

5. Repeat steps 2 and 3 above but use 0 percent cobbles and stones curve. The value obtained is the percent by weight of >3" fraction (stones and cobbles) present in the whole soil. Enter this value in the >3" fraction column.

Example: A soil contains 35% by volume of stones and cobbles and 35% by volume of gravel. Determine entries for >3" fraction and fine earth fraction passing #10 sieve.

Solution:

a) Enter horizontal axis (abscissa) at 70% (estimated total rock fraction in the whole soil by volume)

b) Move vertically along 70% line to intersection of interpolated point % distance between 30% and 40% cobbles and stones by volume curves.

c) Move horizontally to the vertical axis (ordinate) and read value of 67%. This value is the percent by weight of gravel retained on the #10 sieve based on the gravel plus fine earth fraction. Subtract this value from 100%. The resultant value, 33% is the amount by weight of fine earth fraction passing the #10 sieve.

d) Enter horizontal axis (abscissa) at 35% (estimated total stones and cobbles in the whole soil). Move vertically along 35% line to intersection with 0% stones and cobbles curve. Move horizontally to vertical axis (ordinate) and read value of 50%. This is the percent by weight value entry for rock fragments >3" based on the whole soil.

Note: Weight values for % rock fragments >3" fraction and % gravel may often total in excess of 100 if appreciable stones, cobbles, and gravel are present in the whole soil

MO-18 NASIS Guide Chart 2

Coarse Fragment Conversion from Percentage, by Volume, to Percentage by Weight

% By Vol.	Percent By Weight Bulk Density of Soil											
	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.30	1.50	1.70	2.00
10	32	30	28	27	26	25	24	23	19	17	15	13
15	43	41	39	38	36	35	34	32	27	25	22	19
20	51	49	47	46	44	43	41	40	34	31	28	25
25	58	56	54	53	51	50	49	47	41	38	34	31
30	64	62	61	59	58	56	55	54	47	44	40	37
35	69	67	66	64	63	62	60	59	53	50	46	42
40	73	72	71	69	68	67	65	64	58	55	51	47
45	77	76	75	73	72	71	70	69	63	60	56	52
50	81	79	78	77	76	75	74	73	68	64	61	57
55	84	83	82	81	80	79	78	77	72	69	66	62
60	86	85	84	83	83	82	81	80	76	73	70	67
65	89	88	87	86	86	85	84	83	80	77	75	71
70	91	90	89	89	88	87	87	86	83	81	79	76

The above calculations were estimated using 2.7 average specific gravity for coarse fragments in the following formula:

$$\{2.7G / [D_b (100-G) + 2.7G]\} x 100$$

Where: G = % coarse fragments (by volume)
2.7 = assumed specific gravity of the coarse fragments
D_b = buld density of the fine earth fraction (less than 2 mm)

Similar adjustments for coarse fragment densities other than 2.7 (granitic equivalents) can be made by adjusting the above basic formula. For example, the specific gravity of basalt is approximately 2.8 to 2.9.

To use this table for conversion of material coarser than 3 inches, appropriate adjustment, generally upward, must be made in the assumed bulk density to include material, if any, between 2mm and 3 inches.

MO-18 NASIS Guide Chart 3

(Possible Absolute Values for ranges)
#40, #200 Sieves

Gravel Vol.	#10	COS #40	#200	#10	S #40	#200	#10	FS #40	#200	
0	100	0-75	0-40	100	0-90	0-40	100	75-100	0-40	non
5	90	0-70	0-35	90	0-80	0-35	90	70-90	0-35	gravelly
10	85	0-65	0-35	85	0-75	0-35	85	65-85	0-35	
15	75	0-55	0-30	75	0-70	0-30	75	60-75	0-30	
20	70	0-50	0-30	70	0-65	0-30	70	55-70	0-30	gravelly
25	60	0-45	0-25	60	0-55	0-25	60	45-60	0-25	
30	55	0-40	0-20	55	0-50	0-20	55	40-55	0-20	
35	50	0-40	0-20	50	0-45	0-20	50	40-50	0-20	
40	45	0-35	0-20	45	0-40	0-15	45	35-45	0-20	very
45	40	0-30	0-15	40	0-35	0-15	40	30-40	0-15	gravelly
50	35	0-25	0-15	35	0-30	0-15	35	25-35	0-15	
55	30	0-25	0-10	30	0-25	0-10	30	25-30	0-10	
60	25	0-20	0-10	25	0-25	0-10	25	20-25	0-10	
65	25	0-20	0-10	25	0-20	0-10	25	20-25	0-10	extremely
70	20	0-15	0-10	20	0-20	0-10	20	15-20	0-10	gravelly
75	15	0-15	0-5	15	0-15	0-5	15	10-15	0-5	
80	10	0-10	0-5	10	0-10	0-5	10	5-10	0-5	

Gravel Vol.	#10	VFS #40	#200	#10	LCOS #40	#200	#10	LS #40	#200	
0	100	50-100	25-55	100	10-75	10-50	100	10-90	10-50	non
5	90	45-90	25-50	90	10-70	10-45	90	10-80	10-45	gravelly
10	85	45-85	20-45	85	10-65	10-45	85	10-75	10-45	
15	75	40-75	20-40	75	10-60	10-40	75	10-70	10-40	
20	70	35-70	20-40	70	5-55	5-40	70	5-65	5-40	gravelly
25	60	30-60	15-35	60	5-45	5-35	60	5-55	5-35	
30	55	30-55	15-30	55	5-40	5-30	55	5-50	5-30	
35	50	25-50	15-30	50	5-40	5-25	50	5-45	5-30	
40	45	25-45	10-25	45	5-30	5-25	45	5-40	5-25	very
45	40	20-40	10-25	40	5-30	5-20	40	5-35	5-25	gravelly
50	35	20-35	10-20	35	5-25	5-20	35	5-30	5-20	
55	30	15-30	10-15	30	5-25	5-15	30	5-25	5-20	
60	25	15-25	5-15	25	5-20	5-15	25	5-25	5-15	
65	25	15-25	5-15	25	5-20	5-15	25	5-20	5-15	extremely
70	20	10-20	5-10	20	0-15	0-10	20	0-20	0-10	gravelly
75	15	10-15	5-10	15	0-15	0-10	15	0-15	0-10	
80	10	5-10	0-5	10	0-10	0-5	10	0-10	0-5	

(Possible Absolute Values for ranges)
#40, #200 Sieves

Gravel Vol.	LFS #10	LFS #40	LFS #200	LVFS #10	LVFS #40	LVFS #200	COSL #10	COSL #40	COSL #200	
0	100	75-100	10-55	100	60-100	35-65	100	15-75	15-65	non
5	90	70-90	10-50	90	55-90	30-60	90	10-70	10-60	gravelly
10	85	65-85	10-45	85	50-85	30-55	85	10-65	10-55	
15	75	60-75	10-40	75	45-75	25-50	75	10-60	10-50	
20	70	55-70	5-40	70	40-70	25-45	70	10-55	10-45	gravelly
25	60	45-60	5-35	60	35-60	20-40	60	10-45	10-40	
30	55	40-55	5-30	55	35-55	20-35	55	10-40	10-35	
35	50	40-50	5-30	50	30-50	20-35	50	10-40	10-35	
40	45	35-45	5-25	45	25-45	15-30	45	5-35	5-30	very
45	40	30-40	5-25	40	25-40	15-25	40	5-30	5-25	gravelly
50	35	20-35	5-20	35	20-35	10-25	35	5-25	5-25	
55	30	25-30	5-15	30	20-30	10-20	30	5-25	5-20	
60	25	20-25	5-15	25	15-25	15-15	25	5-20	5-15	
65	25	20-25	5-15	25	15-25	10-15	25	5-20	5-15	extremely
70	20	15-20	0-10	20	10-20	5-15	20	5-15	5-15	gravelly
75	15	10-15	0-10	15	10-15	5-10	15	0-15	0-10	
80	10	5-10	0-5	10	5-10	0-5	10	0-10	0-5	

Gravel Vol.	SL #10	SL #40	SL #200	FSL #10	FSL #40	FSL #200	VFSL #10	VFSL #40	VFSL #200	
0	100	55-90	15-70	100	55-90	15-70	100	85-100	30-80	non
5	90	50-80	10-65	90	50-80	10-65	90	75-90	25-70	gravelly
10	85	45-75	10-60	85	45-75	10-60	85	70-85	25-65	
15	75	40-70	10-55	75	40-70	10-55	75	65-75	25-60	
20	70	40-65	10-50	70	40-65	10-50	70	60-70	20-55	gravelly
25	60	35-55	10-40	60	35-55	10-40	60	50-60	20-50	
30	55	30-50	10-40	55	30-50	10-40	55	45-55	15-45	
35	50	30-45	10-35	50	30-45	10-35	50	45-50	15-40	
40	45	25-40	5-30	45	25-40	5-30	45	40-45	15-35	very
45	40	25-35	5-30	40	25-35	5-30	40	35-40	10-30	gravelly
50	35	20-30	5-25	35	20-30	5-25	35	30-35	10-30	
55	30	15-25	5-20	30	15-25	5-20	30	25-30	10-25	
60	25	15-25	5-20	25	15-25	5-20	25	20-25	10-20	
65	25	15-20	5-20	25	15-20	5-20	25	25-25	5-20	extremely
70	20	10-20	5-15	20	10-20	5-15	20	15-20	5-15	gravelly
75	15	10-15	0-10	15	10-15	0-10	15	10-15	5-10	
80	10	5-10	0-5	10	5-10	0-5	10	5-10	5-10	

(Possible Absolute Values for ranges)
#40, #200 Sieves

Gravel Vol.	L			SIL			SI			
	#10	#40	#200	#10	#40	#200	#10	#40	#200	
0	100	50-100	50-90	100	50-100	50-100	100	80-100	80-100	non
5	90	45-90	45-80	90	45-90	45-90	90	70-90	70-90	gravelly
10	85	45-85	45-75	85	45-85	45-85	85	65-85	65-85	
15	75	40-75	40-70	75	40-75	40-75	75	60-75	60-75	
20	70	35-70	35-65	70	35-70	35-70	70	55-70	55-70	gravelly
25	60	30-60	30-55	60	30-60	30-60	60	50-60	50-60	
30	55	30-55	30-50	55	30-55	30-55	55	45-55	45-55	
35	50	25-50	35-45	50	25-50	25-50	50	40-50	40-50	
40	45	25-45	25-40	45	25-45	25-45	45	35-45	35-45	very
45	40	20-40	20-35	40	20-40	20-40	40	30-40	30-40	gravelly
50	35	20-35	20-30	35	20-35	20-35	35	30-35	30-35	
55	30	15-30	15-25	30	15-30	15-30	30	25-30	25-30	
60	25	15-25	15-25	25	15-25	15-25	25	20-25	20-25	
65	25	15-25	15-20	25	15-25	15-25	25	20-25	20-25	extremely
70	20	10-20	10-20	20	10-20	10-20	20	15-20	15-20	gravelly
75	15	10-15	10-15	15	10-15	10-15	15	10-15	10-15	
80	10	5-10	5-10	10	5-10	5-10	10	5-10	5-10	

Gravel Vol.	SCL			CL			SICL			
	#10	#40	#200	#10	#40	#200	#10	#40	#200	
0	100	20-100	20-75	100	55-100	55-90	100	80-100	80-100	non
5	90	20-90	20-70	90	50-90	50-80	90	70-90	70-90	gravelly
10	85	20-85	20-65	85	45-85	45-75	85	65-85	65-85	
15	75	15-75	15-55	75	40-75	40-70	75	60-75	60-75	
20	70	15-70	15-50	70	40-70	40-65	70	55-70	55-70	gravelly
25	60	10-60	10-45	60	35-60	35-55	60	50-60	50-60	
30	55	10-55	10-40	55	30-55	30-50	55	45-55	45-55	
35	50	10-50	10-40	50	30-50	30-45	50	40-50	40-50	
40	45	10-45	10-35	45	25-45	25-40	45	35-45	35-45	very
45	40	10-40	10-30	40	25-40	25-35	40	30-40	30-40	gravelly
50	35	5-35	5-25	35	20-35	20-30	35	30-35	30-35	
55	30	5-30	5-25	30	15-30	15-25	30	25-30	25-30	
60	25	5-25	5-20	25	15-25	15-25	25	20-25	20-25	
65	25	5-25	5-20	25	15-25	15-20	25	20-25	20-25	extremely
70	20	5-20	5-15	20	10-20	10-20	20	15-20	15-20	gravelly
75	15	0-15	0-10	15	10-15	10-15	15	10-15	10-15	
80	10	0-10	0-5	10	5-10	5-10	10	5-10	5-10	

(Possible Absolute Values for ranges)
#40, #200 Sieves

Gravel Vol.	SC #10	SC #40	SC #200	SIC #10	SIC #40	SIC #200	#10	#40	#200	
0	100	35-100	35-75	100	80-100	80-100	100	55-100	55-100	non
5	90	30-90	30-70	90	70-90	70-90	90	50-90	50-90	gravelly
10	85	30-85	30-65	85	65-85	65-85	85	45-85	45-85	
15	75	25-75	25-55	75	60-75	60-75	75	40-75	40-75	
20	70	20-70	20-50	70	55-70	55-70	70	40-70	40-70	gravelly
25	60	20-60	20-45	60	50-60	50-60	60	35-60	35-60	
30	55	20-55	20-40	55	45-55	45-55	55	30-55	30-55	
35	50	20-50	20-40	50	40-50	40-50	50	30-50	30-50	
40	45	15-45	15-35	45	35-45	35-45	45	25-45	25-45	very
45	40	15-40	15-30	40	30-40	30-40	40	25-40	25-40	gravelly
50	35	15-35	15-25	35	30-35	30-35	35	20-35	20-35	
55	30	10-30	10-25	30	25-30	25-30	30	15-30	15-30	
60	25	10-25	10-20	25	20-25	20-25	25	15-25	15-25	
65	25	10-25	10-20	25	20-25	20-25	25	15-25	15-25	extremely
70	20	5-20	5-15	20	15-20	15-20	20	10-20	10-20	gravelly
75	15	5-15	5-15	15	10-15	10-15	15	10-15	10-15	
80	10	5-10	5-10	10	5-10	5-10	10	5-10	5-10	

Blewitts Tables
MO-18 NASIS Fragment Guide Chart 4

Table 4A. Normal Percent Passing **#40 Sieve**. Corrected for Various Percent Passing #10 Sieve

Soil Class Name	100	90	80	Percent 70	Passing 60	Number 50	10 Sieve 40	30	20	10	5
Silt	95-100	85-90	75-80	65-70	55-60	45-50	35-40	25-30	15-20	5-10	0-5
Silty Clay	95-100	85-90	75-80	65-70	55-60	45-50	35-40	25-30	15-20	5-10	0-5
Silty Clay Loam	95-100	85-90	75-80	65-70	55-60	45-50	35-40	25-30	15-20	5-10	0-5
Clay	90-100	80-90	70-80	65-70	55-60	45-50	35-40	25-30	15-20	5-10	0-5
Silt Loam	90-100	80-90	70-80	65-70	55-60	45-50	35-40	25-30	15-20	5-10	0-5
Clay Loam	90-100	80-90	70-80	65-70	55-60	45-50	35-40	25-30	15-20	5-10	0-5
Loam	85-95	75-85	65-75	60-65	50-55	40-50	35-40	25-30	15-20	5-10	0-5
Very Fine Sandy Loam	85-95	75-85	65-75	60-65	50-55	40-50	35-40	25-30	15-20	5-10	0-5
Sandy Clay	85-95	75-85	65-75	60-65	50-55	40-50	35-40	25-30	15-20	5-10	0-5
Loamy Very Fine Sand	90-95	80-85	70-75	60-65	50-55	45-50	35-40	25-30	15-20	5-10	0-5
Fine Sandy Loam	70-85	65-75	55-65	50-60	40-50	35-45	25-35	20-25	15-20	5-10	0-5
Sandy Clay Loam	80-90	70-80	65-75	55-65	50-55	40-45	30-35	25-30	15-20	5-10	0-5
Very Fine Sand	75-90	65-80	60-75	50-65	45-55	35-45	30-35	20-25	15-20	5-10	0-5
Sandy Loam	60-70	55-65	45-55	40-50	35-40	30-35	25-30	15-20	10-15	5-10	0-5
Fine Sand	65-80	55-70	50-65	45-55	35-45	30-40	25-30	20-25	10-15	5-10	0-5
Loamy Sand	50-75	45-70	40-60	35-50	30-45	25-30	20-30	15-20	10-15	5-10	0-5
Sand	50-70	45-65	40-55	35-50	30-45	25-35	20-30	15-20	10-15	5-10	0-5
Coarse Sand	50-70	45-65	40-55	35-50	30-45	30-45	20-30	15-20	10-15	5-10	0-5
Coarse Sandy Loam	60-70	55-65	45-55	40-50	35-40	30-35	25-30	15-20	10-15	5-10	0-5
Loamy Coarse Sand	50-75	45-70	40-60	35-50	30-45	25-30	20-30	15-20	10-15	5-10	0-5
Loamy Fine Sand	75-90	65-80	60-70	45-60	40-50	35-45	25-35	20-25	15-20	5-10	0-5

MO-18 NASIS Fragment Guide Chart 4

Blewitts Tables

Table 4B. Normal Percent Passing **#200 Sieve**. Corrected for Various Percent Passing #10 Sieve

Soil Class Name	100	90	80	Percent 70	Passing 60	Number 50	10 Sieve 40	30	20	10	5
Silt	90-100	80-90	70-80	60-70	55-60	45-50	35-40	25-30	15-20	5-10	0-5
Silty Clay	90-95	80-85	70-75	65-70	55-60	45-50	35-40	25-30	15-20	5-10	0-5
Silty Clay Loam	85-95	75-85	65-75	60-65	50-60	40-50	35-40	25-30	15-20	5-10	0-5
Clay	75-95	70-85	60-75	50-65	45-55	40-50	30-35	20-30	15-20	5-10	0-5
Silt Loam	70-90	65-80	55-70	50-65	40-55	35-45	30-35	20-25	15-20	5-10	0-5
Clay Loam	70-80	65-70	55-65	50-55	40-50	35-40	30-35	20-25	10-15	5-10	0-5
Loam	60-75	55-70	50-60	40-50	35-45	30-40	25-30	20-25	10-15	5-10	0-5
Very Fine Sandy Loam	50-65	45-55	40-50	35-45	30-40	25-30	20-25	15-20	10-15	5-10	0-5
Sandy Clay	45-60	40-55	30-45	30-40	25-35	20-30	20-25	15-20	10-15	5-10	0-5
Loamy Very Fine Sand	40-60	35-55	30-45	30-40	25-35	20-30	15-25	10-15	5-10	0-5	---
Fine Sandy Loam	40-55	35-50	30-45	30-40	25-35	20-30	10-15	10-15	5-10	0-5	---
Sandy Clay Loam	35-55	30-50	30-45	25-40	25-35	20-30	15-20	10-15	5-10	0-5	---
Very Fine Sand	35-55	30-50	30-45	25-35	20-30	20-25	15-20	10-15	5-10	0-5	---
Sandy Loam	30-40	25-35	25-30	20-30	15-25	15-20	10-15	10-15	5-10	0-5	---
Fine Sand	20-35	20-30	15-30	15-25	10-20	10-15	10-15	5-10	0-5	---	---
Loamy Sand	15-30	15-25	15-25	10-20	10-20	10-15	5-10	5-10	0-5	---	---
Sand	5-15	5-15	5-10	5-10	5-10	0-5	0-5	0-5	---	---	---
Coarse Sand	5-15	5-15	5-10	5-10	5-10	0-5	0-5	0-5	---	---	---
Coarse Sandy Loam	30-40	25-35	25-30	20-30	15-25	15-20	10-15	10-15	5-10	0-5	---
Loamy Coarse Sand	15-30	15-25	15-25	10-20	10-20	10-15	5-10	5-10	0-5	---	---
Loamy Fine Sand	30-50	25-40	20-30	20-30	15-25	15-20	10-15	5-10	0-5	---	---

SIEVE EDIT PROCEDURES NEEDED TO HAVE PHYSICAL PROPERTIES TABLES POPULATED WITH RANGES FOR ALL SEPARATES:

How To Populate High & Low Ranges for Sand and Silt in NASIS:

Should run Options, Standard Reports MO-18, CHECK-Horz. part. Size RV w/RV Texture-Totals only This gives you a report on all dmu's that you can look over for out of whack values.

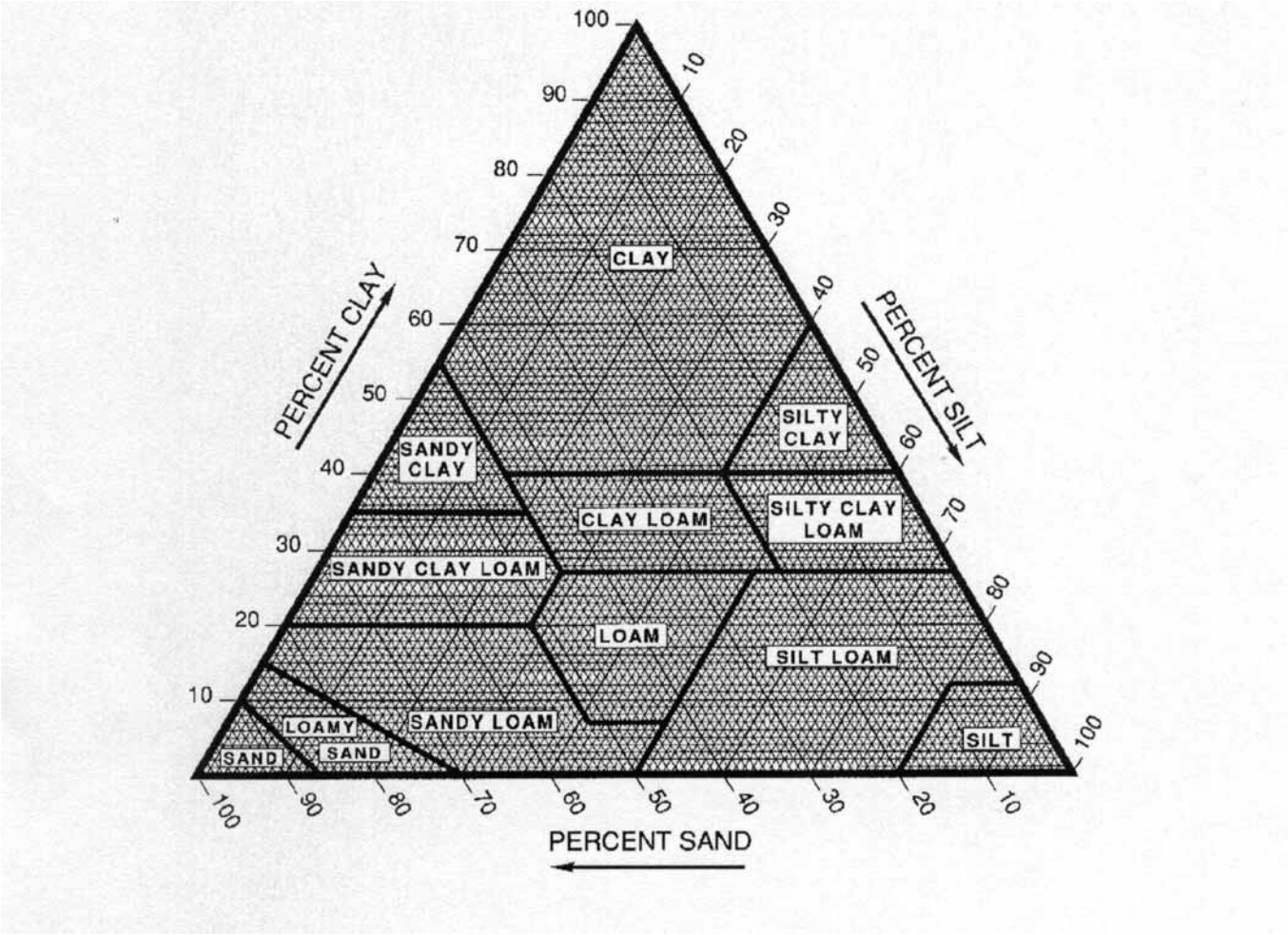
1. First you should have checked **Horizon, RV for %clay** on the above report, and looked at **Horizon, textural group** for the list of textures for this horizon and set RV to "yes" for your horizon tex. Delete any that are not in the range for the series or add any that you need.
2. Highlight the row and go to **Options, Calculate data elements**, run **particle size estimator**.
3. This populates the RVs for sand and silt only.
4. If you are happy with the ranges for clay, now you are ready to develop High/Low Ranges for sand and silt.
5. I use the textural triangle to determine the ranges for my sand and silt ranges, see lower table on handout.
6. For only one texture (ie silt loam) use the sand and silt ranges in table (Ap only) if you have a Bt, will need to adjust % sand to fit the ps family. An example is an H2 layer that is Bt in FSilty ps family } I know it needs to have <15% sand to meet fine-silty, so I will use 0 to 15% for sand as the range instead of the 20-50% shown.
7. If you have 2 or 3 allowable textures for the horizon: This gets tricky but you can do it with a little finageling. If the textural group lists: silt loam and silty clay loam, you will need to develop the sand and silt ranges for <u>both</u> textures, leaving the %clay alone. My ps family is fine-silty. %SAND -I have a low value of 0 and a high value of 19. These ranges cover silt loam and silty clay loam. %SILT- I have a low of 40 and a high of 80.
8. Next <u>highlight the row</u> you just finished. Run the **Options**, **Validate Data elements**, **Tex. class vs Part Size separates** and see if you get an error message, if not move to next layer and repeat.
9. This is the only way you will have the sand and silt ranges populated on your reports.

Texture Separates Chart

	PERCENTAGES			
TEXTURE CLASS	SAND	SILT	CLAY	EXAMPLES
Sand	+85	–15	–10	90–6–4
Loamy sand	70–90	–30	–15	85–10–5 or 80–12–8
Sandy loam	43–85	–50	–20	75–15–10 or 50–45–5
Sandy clay loam	45–80	–28	20–35	65–10–25
Clay loam	20–45	15–53	27–40	32–33–35
Sandy clay	45–65	–20	35–55	45–10–45
Loam	23–52	28–50	7–27	45–40–15
Silt loam,	20–50	50–80	12–27	25–55–20
or	—	50–80	–12	15–75–10
Silt	—	+80	–12	5–90–5
Silty clay loam	–20	40–73	27–40	10–55–35
Silty clay	–20	40–60	40–60	10–40–50
Clay	–45	–40	+40	10–30–60
	+ = more than – = less than			

USDA/SCS-SP STAMBURG, S.C. 1957 MR57-127

TEXTURE TRIANGLE



MO-18 NASIS Guide Chart 5

Bulk Density, 1/3 Bar

D_b Mineral:	Organic Carbon Percent															
	0.5	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20
0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.21	0.21	0.21	0.21	0.21
0.40	0.40	0.40	0.39	0.39	0.38	0.38	0.37	0.37	0.36	0.36	0.36	0.35	0.34	0.33	0.33	0.32
0.60	0.59	0.58	0.57	0.55	0.54	0.53	0.52	0.50	0.49	0.48	0.47	0.45	0.43	0.42	0.40	0.39
0.80	0.78	0.77	0.74	0.71	0.68	0.66	0.64	0.62	0.60	0.58	0.56	0.53	0.50	0.48	0.46	0.43
1.00	0.97	0.95	0.90	0.85	0.81	0.78	0.75	0.72	0.69	0.66	0.64	0.59	0.56	0.52	0.49	0.47
1.05	1.02	0.99	0.94	0.89	0.85	0.81	0.77	0.74	0.71	0.68	0.65	0.61	0.57	0.53	0.50	0.47
1.10	1.07	1.03	0.97	0.92	0.88	0.83	0.79	0.76	0.73	0.70	0.67	0.62	0.58	0.54	0.51	0.48
1.15	1.11	1.08	1.01	0.96	0.90	0.86	0.82	0.78	0.74	0.71	0.68	0.63	0.59	0.55	0.52	0.49
1.20	1.16	1.12	1.05	0.99	0.93	0.88	0.84	0.80	0.76	0.73	0.70	0.65	0.60	0.56	0.52	0.49
1.25	1.20	1.16	1.09	1.02	0.96	0.91	0.86	0.82	0.78	0.74	0.71	0.66	0.61	0.57	0.53	0.50
1.30	1.25	1.20	1.12	1.05	0.99	0.93	0.88	0.84	0.80	0.76	0.73	0.67	0.62	0.57	0.54	0.50
1.35	1.30	1.25	1.16	1.08	1.01	0.95	0.90	0.85	0.81	0.77	0.74	0.68	0.63	0.58	0.54	0.51
1.40	1.34	1.29	1.19	1.11	1.04	0.98	0.92	0.87	0.83	0.79	0.75	0.69	0.63	0.59	0.55	0.51
1.45	1.39	1.33	1.23	1.14	1.07	1.00	0.94	0.89	0.84	0.80	0.76	0.70	0.64	0.59	0.55	0.52
1.50	1.43	1.37	1.26	1.17	1.09	1.02	0.96	0.91	0.86	0.81	0.77	0.71	0.65	0.60	0.56	0.52
1.55	1.48	1.41	1.30	1.20	1.11	1.04	0.98	0.92	0.87	0.83	0.78	0.71	0.66	0.61	0.56	0.53
1.60	1.52	1.45	1.33	1.23	1.14	1.06	1.00	0.94	0.88	0.84	0.80	0.72	0.66	0.61	0.57	0.53
1.65	1.57	1.49	1.36	1.25	1.15	1.08	1.01	0.95	0.90	0.85	0.81	0.73	0.67	0.62	0.57	0.53
1.70	1.61	1.53	1.40	1.28	1.19	1.10	1.03	0.97	0.91	0.86	0.81	0.74	0.67	0.62	0.58	0.54
1.75	1.66	1.57	1.43	1.31	1.21	1.12	1.05	0.98	0.92	0.87	0.82	0.75	0.68	0.63	0.58	0.54
1.80	1.70	1.61	1.46	1.34	1.23	1.14	1.06	0.99	0.93	0.88	0.83	0.75	0.69	0.63	0.58	0.54
1.85	1.75	1.65	1.49	1.36	1.25	1.16	1.08	1.01	0.94	0.89	0.84	0.76	0.69	0.63	0.59	0.55
1.90	1.79	1.69	1.52	1.39	1.27	1.17	1.09	1.02	0.96	0.90	0.85	0.77	0.70	0.64	0.59	0.55
1.95	1.83	1.73	1.55	1.41	1.29	1.19	1.11	1.03	0.97	0.91	0.86	0.77	0.70	0.64	0.59	0.55
2.00	1.94	1.77	1.59	1.44	1.31	1.21	1.12	1.04	0.98	0.92	0.87	0.78	0.71	0.65	0.60	0.55
2.20	2.05	1.92	1.70	1.53	1.39	1.27	1.17	1.09	1.02	0.95	0.90	0.80	0.72	0.65	0.61	0.56
2.40	2.22	2.07	1.82	1.62	1.45	1.33	1.22	1.13	1.05	0.96	0.92	0.82	0.74	0.67	0.62	0.57

Units are Mg/m^3

Computed bulk density for combinations of bulk density of the mineral portion and organic carbon percentage.