ARIZ 248
September 1, 1993
(14 Pages)

ALTERNATE PROCEDURES FOR SIEVING OF COARSE AND FINE GRADED SOILS AND AGGREGATES

(An Arizona Method)

SCOPE

1. (a) This test method contains five alternate procedures for sieving and determining the sieve analysis of fine and coarse graded soils and aggregates.

(b) This test method must be used in conjunction with Arizona Test Method 201. In general, the method for sample preparation, sieving, and calculation of the sieve analysis as described in Arizona Test Method 201 will be followed, with the changes and additional information being outlined and described herein for each alternate procedure shown below.

1) Alternate #1 (Section 2) - Fine screening of aggregate which contains a small amount of Plus No. 4 (100% pass 3/8") material, e.g., fine aggregate for concrete.

2) Alternate #2 (Section 3) - Utilizing a No. 8 screen in the coarse sieving, and a fine sieve analysis not being required.

3) Alternate #3 (Section 4) - Subjecting the entire sample to washing, and a minus No. 4 split for fine screening is not required.

4) Alternate #4 (Section 5) - Subjecting the entire sample to washing, and a minus No. 4 split for fine screening is required.

5) Alternate #5 (Section 6) - Washing of coarse aggregate (Plus No. 4) to remove clinging particles and adjusting the fine sieve analysis.

ALTERNATE #1

2. Fine screening of aggregate which contains a small amount of Plus No. 4 (100% pass 3/8") material, e.g., fine aggregate for concrete. An example of this procedure is shown in Figure 1.

ARIZONA DEPARTMENT OF TRANSPORTATION
SOIL AND AGGREGATE TABULATION

LAB NUMBER	PROJ CODE	ORG NUMBER	MATL	TYPE	PURPOSE	TEST LAB	SIZE	SIZE %
93-2222	7777	8888	FA	+	A	P	-	+

TEST NO.	LOT OR SUFFIX	SAMPLED BY	MO	DAY	YEAR	TIME
18	+	A. JONES	12	08	93	1135 AM ☒ / PM ☐

SAMPLED FROM: STOCKPILE
LIFT NO.: + | RDWY: + | STATION: — | PLUS: + (IF MILEPOST, INPUT DECIMAL)

ORIGINAL SOURCE	PROJECT ENGINEER / SUPERVISOR	PROJECT NUMBER	TRACS NUMBER
PIT # 5555	B. SMITH	F-099-9 (99)	H999901C

REMARKS:
EXAMPLE FOR FINE SCREENING WHEN FINE AGGREGATE CONTAINS A SMALL AMOUNT OF PLUS No. 4 MATERIAL - (ALTERNATE #1)

ARIZ 201

% OVERSIZE: +3" ☐ | +6" ☐
COARSE FACTOR: 177936

WET SAMPLE PREWEIGHT = —
WET WT. OF -#4 = —
-#4 SPLIT WET WT. = —

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	CUMULATIVE % RET. FINENESS MODULUS
3" ☐					
2 1/2"					
2"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"	0		100	100	
1/4"	8	1	99		
#4	15	3			
-#4	—				
Total	—		96	95-100	

IF TOTAL SAMPLE IS WASHED:
UNWASHED WT. = 562
WASHED WT. = 547
ELUTRIATION = 15

DRY WT. OF -#4 SPLIT: + | FINE FACTOR: —

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.
#8	13	2	94	
#10	42	8	86	
#16	91	16	70	45-80
#30	67	12	58	
#40	123	22	36	
#50	41	7	29	0-30
#100	121	22	7	0-10
#200	24	4		
-#200	2	✓	3.0	0-4
Total	547 Dry Weight			
Elutriation	15			

T = AASHTO Tests

		SPECS.
Liquid Limit (LL)	T - 89	
Plastic Limit (PL)	T - 90	
Plasticity Index (PI) = LL - PL	T - 90	
Abrasion Method (A,B,C,D)	T - 96	
@ 100 Revolutions	%	%
@ 500 Revolutions	%	%
Absorption, H_2O	T - 85 ARIZ 211	%
Specific Gravity, SSD	T - 85 ARIZ 211	
Specific Gravity, OD	T - 85 ARIZ 211	
Proctor Method		A - ARIZ 225; C - ARIZ 226; D - ARIZ 226; AD - ARIZ 245; AI - ARIZ 232; ADI - ARIZ 246
Optimum Moisture	%	
Max. Dry Density	PCF	
Sand Equivalent	T - 176 ARIZ 242 (MAFC)	
Fractured Faces Weight (Wf)		
Total Sample Weight (Wa)		
Fractured Faces (FF) = Wf/Wa x 100	ARIZ 212	%
Wet Weight (W)	g	
Dry Weight (D)	g	
Moisture Content = (W-D)/D x 100	T - 255 T - 265	%
Flakiness Index	ARIZ 233	%
Carbonates	ARIZ 238	%
pH	ARIZ 236 OR 237	
Resistivity (ohm-cm)	ARIZ 236	
Soluble Salts (PPM)	ARIZ 237	

FINENESS MODULUS = TOTAL CUMULATIVE % RET. / 100

WHITE ☒
YELLOW ☐
BLUE ☐

12-08-93 — RECEIVED DATE
Joe Dogood 12-08-93 — TEST OPERATOR & DATE
Ted Headman 12-08-93 — SUPERVISOR & DATE

44-0333 R9/93

FIGURE 1

(a) A representative minimum 500 gram sample is obtained and dried to constant weight. Allow the sample to cool, and record the weight to the nearest gram as the "Unwashed Wt", (562 in the example).

(b) Subject the sample to either mechanical or hand washing.

(c) Dry the sample to constant weight and allow to cool. Record weight to the nearest gram as "Washed Wt" and also as the fine sieve "Total Dry Weight", (547).

(d) Determine and record "Elutriation" by subtracting the "Washed Wt" from the "Unwashed Wt", (562 - 547 = 15).

(e) Additional sieves (Plus No. 4) as required are added to the nest of sieves used in the fine screening.

(f) The sample is subjected to screening and the weight retained on each sieve and in the pan is recorded.

(g) The sum of the individual weights retained for each sieve is compared to the weight of sample prior to sieving (Washed Wt. or fine sieve Total Dry Weight). Adjust or resieve as necessary.

(h) Determine the sieve analysis of the material. The factor for calculating the sieve analysis is determined by dividing 100 by the "Unwashed Wt", (100/562 = 0.177936). The calculation of the percent passing each sieve is continuous through the entire sieve analysis.

ALTERNATE #2

3. Utilizing a No. 8 screen in the coarse sieving, and a fine sieve analysis not being required. An example is given in Figure 2.

(a) A representative sample is obtained and the weight recorded as the "Coarse Sieve Total", (14683 in the example).

(b) Subject the sample to coarse sieving using the No. 8 as the smallest sieve. If desired, the material may be screened using a No. 4 as the smallest sieve, and the pass No. 4 material further separated into No. 8 and pass No. 8 fractions.

ARIZONA DEPARTMENT OF TRANSPORTATION
SOIL AND AGGREGATE TABULATION

LAB NUMBER	PROJ CODE	ORG NUMBER	MATL TYPE	PURPOSE	TEST LAB	SIZE	SIZE %
93-3333	7777	8888	CA 57	A	P	-	+

TEST NO.	LOT OR SUFFIX	SAMPLED BY	MO DAY YEAR	TIME
6	+	A. JONES	12 02 93	2:40 ☐ AM ☒ PM

SAMPLED FROM: STOCKPILE
LIFT NO.: + | RDWY: + | STATION: — | PLUS: + (IF MILEPOST, INPUT DECIMAL)

ORIGINAL SOURCE	PROJECT ENGINEER / SUPERVISOR	PROJECT NUMBER	TRACS NUMBER
PIT # 5555	B. SMITH	F-099-9(99)	H999901C

REMARKS: EXAMPLE FOR USING A No. 8 SIEVE IN THE COARSE SIEVING AND NO FINE SIEVE ANALYSIS REQUIRED - (ALTERNATE #2).

ARIZ 201

% OVERSIZE: +3" ☐ +6" ☐ COARSE FACTOR: 006811

WET SAMPLE PREWEIGHT = _____
WET WT. OF -#4 = _____
-#4 SPLIT WET WT. = _____

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	CUMULATIVE % RET. FINENESS MODULUS
3" ☐					
2 1/2"					
2"					
1 1/2"	0		100	100	
1"	505	3	97	95-100	
3/4"	2850	20	77		
1/2"	4410	30	47	25-60	
3/8"	2350	16	31		
1/4"	1915	13	18		
#4	1325	9			
-#4	—		9	0-10	
Total	14683				

IF TOTAL SAMPLE IS WASHED:
UNWASHED WT. = _____
WASHED WT. = _____
ELUTRIATION = _____

DRY WT. OF -#4 SPLIT: + | FINE FACTOR: —

-#8

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	
#8	1255	9	—		
#10	73	—	0	0-5	✓
#16					
#30					
#40					
#50					
#100					
#200					
-#200					
Total				0-1.0	
Beaker					

Dry Weight: _____

FINENESS MODULUS = TOTAL CUMULATIVE % RET. / 100

T = AASHTO Tests

			SPECS.
Liquid Limit (LL)	T - 89		
Plastic Limit (PL)	T - 90		
Plasticity Index (PI) = LL - PL	T - 90		
Abrasion Method (A,B,C,D)	T - 96		
@ 100 Revolutions		%	%
@ 500 Revolutions		%	%
Absorption, H_2O	T - 85 ARIZ 211	%	
Specific Gravity, SSD	T - 85 ARIZ 211		
Specific Gravity, OD	T - 85 ARIZ 211		
Proctor Method			A - ARIZ 225 C - ARIZ 226 D - ARIZ 226 AD - ARIZ 245 AI - ARIZ 232 ADI - ARIZ 246
Optimum Moisture		%	
Max. Dry Density		PCF	
Sand Equivalent	T - 176 ARIZ 242 (MAFC)		
Fractured Faces Weight (Wf)			
Total Sample Weight (Wa)			
Fractured Faces (FF) = Wf/Wa x 100	ARIZ 212	%	%
Wet Weight (W)		g	
Dry Weight (D)		g	
Moisture Content = (W-D)/D x 100	T - 255 T - 265	%	
Flakiness Index	ARIZ 233	%	%
Carbonates	ARIZ 238	%	%
pH	ARIZ 236 OR 237		
Resistivity (ohm-cm)	ARIZ 236		
Soluble Salts (PPM)	ARIZ 237		

WHITE ☒
YELLOW ☐
BLUE ☐

12-02-93 RECEIVED DATE
Joe DoGood 12-03-93 TEST OPERATOR & DATE
Ted Headman 12-03-93 SUPERVISOR & DATE

44-9363 R9/93

FIGURE 2

(c) The weight of material retained on each of the sieves No. 8 and larger, and the weight of pass No. 8 material is recorded on the laboratory sieve analysis card, modifying the card for the pass No. 8 material as shown in the example.

(d) The sum of the individual weights retained for each sieve is compared to the weight of the sample prior to sieving (Coarse Sieve Total). Adjust or resieve as needed.

(e) Determine the sieve analysis of the material. The coarse sieve factor is determined by dividing 100 by the "Coarse Sieve Total", (100/14683 = 0.006811). The calculation of the percent passing each sieve is continuous through the entire sieve analysis.

ALTERNATE #3

4. Subjecting the entire sample to washing, and a minus No. 4 split for fine screening is <u>not</u> required. An example of this procedure is given in Figure 3.

(a) A representative sample is be obtained, dried to constant weight, allowed to cool, and the weight recorded as the "Coarse Sieve Total" and also as the "Unwashed Weight", (1137 in the example).

(b) Subject the sample to hand washing.

(c) Dry the sample to constant weight and allow to cool. The weight of the sample is recorded as the "Washed Wt", (1118).

(d) Determine "Elutriation" by subtracting the "Washed Wt" from the "Unwashed Wt", (1137 - 1118 = 19).

(e) Subject the sample to coarse screening and record the weight retained on each sieve and in the pan, except the weight of pass No. 4 material is not recorded in the coarse sieve area, but rather as the fine sieve "Total Dry Weight", (468).

(f) Determine and record the weight of pass No. 4 for coarse sieve analysis by adding the "elutriation" and the fine sieve "Total Dry Weight", (468 + 19 = 487).

(g) The sum of the individual weights retained for each sieve is compared to the weight of sample prior to sieving (Washed Wt.). Adjust or resieve as necessary.

ARIZONA DEPARTMENT OF TRANSPORTATION
SOIL AND AGGREGATE TABULATION

LAB NUMBER	PROJ CODE	ORG NUMBER	MATL	TYPE	PURPOSE	TEST LAB	SIZE	SIZE %
93-5555	7777	8888	AA	FC	A	P	-	+

TEST NO.	LOT OR SUFFIX	SAMPLED BY	MO	DAY	YEAR	TIME
3	+	A. JONES	10	07	93	12:10 ☐ AM ☒ PM

SAMPLED FROM	LIFT NO.	RDWY	STATION	PLUS
COLD FEED	+	+		IF MILEPOST, INPUT DECIMAL

ORIGINAL SOURCE	PROJECT ENGINEER / SUPERVISOR	PROJECT NUMBER	TRACS NUMBER
PIT # 4444	B. SMITH	F-099-9(99)	H999901C

REMARKS: EXAMPLE WHEN ENTIRE SAMPLE IS WASHED AND A MINUS No. 4 SPLIT FOR FINE SIEVING IS NOT REQUIRED - (ALTERNATE # 3).

ARIZ 201

% OVERSIZE: +3" ☐ +6" ☐ COARSE FACTOR 087951

WET SAMPLE PREWEIGHT = —
WET WT. OF -#4 = —
-#4 SPLIT WET WT. = —

468 + 19 = 487

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	CUMULATIVE % RET. FINENESS MODULUS
3" ☐					
2 1/2"					
2"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"	0		100	100	
1/4"	269	24	76		
#4	381	33			
-#4	487	43	33-45		
Total	1137				

IF TOTAL SAMPLE IS WASHED:
UNWASHED WT. = 1137
WASHED WT. = 1118
ELUTRIATION = 19

DRY WT. OF -#4 SPLIT: + ☐ FINE FACTOR —

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	
#8	342	30	13	6-18	
#10	23	2	11		
#16	34	3	8		
#30	11	1	7		
#40	22	2	5		
#50	12	1	4		
#100	10	1	3		
#200	13	1			
-#200	1	✓	1.8	0-3.8	
Total	468				
Elutriation	19				

Dry Weight

T = AASHTO Tests

		SPECS.
Liquid Limit (LL)	T - 89	
Plastic Limit (PL)	T - 90	
Plasticity Index (PI) = LL - PL	T - 90	
Abrasion Method (A,B,C,D)	T - 96	
@ 100 Revolutions	%	%
@ 500 Revolutions	%	%
Absorption, H_2O	T - 85 ARIZ 211	%
Specific Gravity, SSD	T - 85 ARIZ 211	
Specific Gravity, OD	T - 85 ARIZ 211	
Proctor Method		
Optimum Moisture	%	
Max. Dry Density	PCF	
Sand Equivalent	T - 176 ARIZ 242 (MAFC)	
Fractured Faces Weight (Wf)		
Total Sample Weight (Wa)		
Fractured Faces (FF) = $\frac{Wf}{Wa}$ x 100	ARIZ 212	% %
Wet Weight (W)	g	
Dry Weight (D)	g	
Moisture Content = $\frac{W-D}{D}$ x 100	T - 255 T - 265	%
Flakiness Index	ARIZ 233	% %
Carbonates	ARIZ 238	% %
pH	ARIZ 236 OR 237	
Resistivity (ohm-cm)	ARIZ 236	
Soluable Salts (PPM)	ARIZ 237	

A - ARIZ 225
C - ARIZ 226
D - ARIZ 226
AD - ARIZ 245
AI - ARIZ 232
ADI - ARIZ 246

FINENESS MODULUS = TOTAL CUMULATIVE % RET. / 100

WHITE ☒
YELLOW ☐
BLUE ☐

10-07-93 RECEIVED DATE

Joe Dogood 10-07-93 TEST OPERATOR & DATE

Ted Headman 10-08-93 SUPERVISOR & DATE

44-0353 R9/93

FIGURE 3

(h) Sieve the pass No. 4 material and record the weight retained for each sieve and in the pan.

(i) The sum of the individual weights retained for each sieve is compared to the weight of sample prior to sieving (fine sieve Total Dry Weight). Adjust or resieve as necessary.

(j) Determine the sieve analysis of the material. The coarse sieve factor is determined by dividing 100 by the "Coarse Sieve Total", (100/1137 = 0.087951). A fine sieve factor is not determined. The calculation of the percent passing each sieve is continuous through the entire sieve analysis.

ALTERNATE #4

5. Subjecting the entire sample to washing, and a minus No. 4 split for fine screening is required. An example of this procedure is given in Figure 4.

(a) A representative sample is obtained, dried to constant weight, allowed to cool, and the weight recorded as the "Coarse Sieve Total" and also as the "Unwashed Weight", (4893 in the example).

(b) Subject the sample to hand washing.

(c) Dry the sample to constant weight and allow to cool. The weight of the sample is recorded as the "Washed Wt", (4674).

(d) The elutriation of the total sample is determined by subtracting the "Washed Wt" from the "Unwashed Wt", (4893 - 4674 = 219).

(e) The sample shall be subjected to coarse screening and the weight retained on each sieve and in the pan is recorded, except the weight of pass No. 4 material is not recorded in the coarse sieve area, but rather as "Wt. of - #4" (2521).

(f) The sum of the individual weights retained for each sieve is compared to the weight of sample prior to sieving (Washed Wt.). Adjust or resieve as necessary.

(g) The passing No. 4 weight for coarse sieve analysis is the combination of the weight of pass No. 4 and the elutriation of the total sample, (2521 + 219 = 2740).

(h) The weight of the passing No. 4 material split for fine sieving is recorded as the fine sieve "Total Dry Weight", (665).

ARIZONA DEPARTMENT OF TRANSPORTATION
SOIL AND AGGREGATE TABULATION

LAB NUMBER: 93-1111 | PROJ CODE: 7777 | ORG NUMBER: 8888 | MATL TYPE: TS | PURPOSE: A | TEST LAB: P | SIZE: - | SIZE %: +
TEST NO.: 8 | LOT OR SUFFIX: + | SAMPLED BY: A. JONES | MO DAY YEAR: 12 28 93 | TIME: 9:30 ☒ AM ☐ PM
SAMPLED FROM: STOCKPILE | LIFT NO.: + | RDWY: + | STATION: + | PLUS: IF MILEPOST, INPUT DECIMAL
ORIGINAL SOURCE: PIT # 3333 | PROJECT ENGINEER / SUPERVISOR: B. SMITH | PROJECT NUMBER: F-099-9(99) | TRACS NUMBER: H999901C
REMARKS: EXAMPLE WHEN ENTIRE SAMPLE IS WASHED AND A MINUS No. 4 SPLIT FOR FINE SIEVING IS REQUIRED - (ALTERNATE # 4).

ARIZ 201

% OVERSIZE: +3" ☐ +6" ☐ | COARSE FACTOR: .020437

WET SAMPLE PREWEIGHT = —
WET WT. OF -#4 = 2521
-#4 SPLIT WET WT. = —

2521 + 219 = 2740

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	CUMULATIVE % RET. FINENESS MODULUS
3" ☐					
2 1/2"					
2"				100	
1 1/2"					
1"					
3/4"	0		100		
1/2"	270	6	94	85-100	
3/8"	613	12	82		
1/4"	928	19	63		
#4	342	7			
-#4	2740	✓	56		
Total	4893	IF TOTAL SAMPLE IS WASHED:			

UNWASHED WT. = 4893
WASHED WT. = 4674
ELUTRIATION = 219

DRY WT. OF -#4 SPLIT: 723 | FINE FACTOR: .077455

852 x 219 = 812 x 1252 / 596

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.
#8	65	5	51	
#10	26	2	49	
#16	104	8	41	
#30	27	2	39	
#40	39	3	36	35-100
#50	181	14	22	
#100	117	9	13	
#200	103	8		
-#200	3	✓	4.7	
Total	665			
Elutriation	58			

Dry Weight

T = AASHTO Tests

			SPECS.
Liquid Limit (LL)	T - 89		
Plastic Limit (PL)	T - 90		
Plasticity Index (PI) = LL - PL	T - 90		
Abrasion Method (A,B,C,D)	T - 96		
@ 100 Revolutions		%	%
@ 500 Revolutions		%	%
Absorption, H_2O	T - 85 ARIZ 211	%	
Specific Gravity, SSD	T - 85 ARIZ 211		
Specific Gravity, OD	T - 85 ARIZ 211		
Proctor Method			A - ARIZ 225 C - ARIZ 226 D - ARIZ 226 AD - ARIZ 245 AI - ARIZ 232 ADI - ARIZ 248
Optimum Moisture		%	
Max. Dry Density		PCF	
Sand Equivalent	T - 176 ARIZ 242 (MAFC)		
Fractured Faces Weight (Wf)			
Total Sample Weight (Wa)			
Fractured Faces (FF) = Wf/Wa x 100	ARIZ 212	%	%
Wet Weight (W)		g	
Dry Weight (D)		g	
Moisture Content = (W-D)/D x 100	T - 255 T - 265	%	
Flakiness Index	ARIZ 233	%	%
Carbonates	ARIZ 236	%	%
pH	ARIZ 236 OR 237		
Resistivity (ohm-cm)	ARIZ 238		
Soluble Salts (PPM)	ARIZ 237		

FINENESS MODULUS = TOTAL CUMULATIVE % RET. / 100

WHITE ☒
YELLOW ☐
BLUE ☐

12-28-93 — RECEIVED DATE
Joe Dogood 12-28-93 — TEST OPERATOR & DATE
Ted Heidman 12-28-93 — SUPERVISOR & DATE

44-0333 R8/93

FIGURE 4

(i) The elutriation value for fine sieve analysis is determined as follows:

$$\text{Elutriation for Fine Sieve Analysis} = \frac{\left[\begin{array}{l}\text{Wt. of Passing No. 4 Material Split for Fine Sieving, (Fine Sieve "Total Dry Weight"}\end{array}\right]}{\left[\text{Wt. of - \#4}\right]} \times \left[\begin{array}{c}\text{Elutriation of Total Sample}\end{array}\right]$$

In the example in Figure 4:

Elutriation for Fine Sieve Analysis = (665/2521) x 219 = 58

(j) The "Dry Wt. of Pass #4 Split" is determined by adding the fine sieve total dry weight and the calculated elutriation for fine sieve analysis, (665 + 58 = 723).

(k) The pass No. 4 material is sieved and the weight retained for each sieve and in the pan is recorded.

(l) The sum of the individual weights retained for each sieve is compared to the weight of sample prior to sieving (fine sieve Total Dry Weight). Adjust or resieve as necessary.

(m) Determine the sieve analysis of the material.

ALTERNATE #5

6. Washing of coarse aggregate (Plus No. 4) to remove clinging particles and adjusting the fine sieve analysis. An example of this procedure is shown in Figures 5 and 6.

(a) A representative sample shall be prepared, screened, and the sieve analysis calculated as described in Arizona Test Method 201. (When this alternate procedure is used as a referee method, the sample shall be dried to constant weight prior to sieving.)

ARIZONA DEPARTMENT OF TRANSPORTATION
SOIL AND AGGREGATE TABULATION

LAB NUMBER	PROJ CODE	ORG NUMBER	MATL	TYPE	PURPOSE	TEST LAB	SIZE	SIZE %
93-9999	7777	8888	SB	+	A	P	-	+

TEST NO.	LOT OR SUFFIX	SAMPLED BY	MO	DAY	YEAR	TIME
12	+	A. JONES	11	15	93	4:25 ☐AM ☒PM

SAMPLED FROM: SITE
LIFT NO.: +
RDWY: EB
STATION: 11 52+50 (IF MILEPOST, INPUT DECIMAL)

ORIGINAL SOURCE	PROJECT ENGINEER / SUPERVISOR	PROJECT NUMBER	TRACS NUMBER
PIT # 3333	B. SMITH	F-099-9(99)	H999901C

REMARKS
EXAMPLE OF WASHING COARSE (PLUS No. 4) AGGREGATE
AND ADJUSTING FINE SIEVE ANALYSIS - (ALTERNATE #5).

ARIZ 201

% OVERSIZE: +3" ☐ +6" ☐
COARSE FACTOR: .004418

WET SAMPLE PREWEIGHT = 22960
WET WT. OF -#4 = 11400
-#4 SPLIT WET WT. = 558

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	CUMULATIVE % RET. FINENESS MODULUS
3" ☐				100	
2 1/2"	0		100		
2"	240	11	89		
1 1/2"	138	6	83		
1"	102	4	79		
3/4"	290	13	66	60-100	
1/2"	110	5	61		
3/8"	44	2	59		
1/4"	134	6	53		
#4	92	4			
-#4	1073	✓	49		
Total	2263				

IF TOTAL SAMPLE IS WASHED:
UNWASHED WT. = —
WASHED WT. = —
ELUTRIATION = —

DRY WT. OF -#4 SPLIT: 542
FINE FACTOR: .090406

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	
#8	101	9	40	35-80	
#10	20	2	38		
#16	53	5	33		
#30	87	8	25		
#40	46	4	21		
#50	42	4	17		
#100	33	3	14		
#200	35	2	12		
-#200	2	✓	H:3	0-12	
Total	419	Dry Weight	11.6		
Elutriate	123				

	T = AASHTO Tests		SPECS.
Liquid Limit (LL)	T - 89		
Plastic Limit (PL)	T - 90		
Plasticity Index (PI) = LL - PL	T - 90		
Abrasion Method (A,B,C,D)	T - 96		
@ 100 Revolutions		%	%
@ 500 Revolutions		%	%
Absorption, H_2O	T - 85 ARIZ 211	%	
Specific Gravity, SSD	T - 85 ARIZ 211	*	
Specific Gravity, OD	T - 85 ARIZ 211	*	
Proctor Method			A - ARIZ 225 C - ARIZ 226 D - ARIZ 228 AD - ARIZ 245 AI - ARIZ 232 ADI - ARIZ 246
Optimum Moisture		%	
Max. Dry Density		PCF	
Sand Equivalent	T - 176 ARIZ 242 (MAFC)		
Fractured Faces Weight (Wf)			
Total Sample Weight (Wa)			
Fractured Faces (FF) = $\frac{Wf}{Wa}$ x 100	ARIZ 212	%	%
Wet Weight (W)		g	
Dry Weight (D)		g	
Moisture Content = $\frac{W-D}{D}$ x 100	T - 255 T - 265	%	
Flakiness Index	ARIZ 233	%	%
Carbonates	ARIZ 238	%	%
pH	ARIZ 236 OR 237		
Resistivity (ohm-cm)	ARIZ 236		
Soluble Salts (PPM)	ARIZ 237		

FINENESS MODULUS = TOTAL CUMULATIVE % RET. / 100

WHITE ☒
YELLOW ☐
BLUE ☐

11-15-93 RECEIVED DATE
Joe Dasood 11-16-93 TEST OPERATOR & DATE
Ted Headman 11-16-93 SUPERVISOR & DATE

44-0353 R9/93

FIGURE 5

DETERMINATION OF PERCENT MINUS NO. 200 ON COARSE AGGREGATE AND TOTAL PERCENT PASS NO. 200 IN SAMPLE

Project No. F-099-9(99) / H999901C Lab. No. 93-9999

Unwashed Weight of Plus No. 4 = 4967

Washed Weight of Plus No. 4 = 4941

Calculate the "Percent Minus No. 200 on Coarse Aggregate" by the following, and record result to the nearest 0.01%:

$$\left[\text{Percent Minus No. 200 on Coarse Aggregate}\right] = \frac{\left[\text{Unwashed Weight of Plus No. 4}\right] - \left[\text{Washed Weight of Plus No. 4}\right]}{\left[\text{Unwashed Weight of Plus No. 4}\right]} \times 100$$

$$= \frac{(\ 4967\ ) - (\ 4941\ )}{(\ 4967\ )} \times 100$$

Percent Minus No. 200 on Coarse Aggregate = 0.52

Calculate the "Total Percent Pass No. 200 in Sample" by the following, and record result to the nearest 0.1%:

$$\left[\text{Total Percent Pass No. 200 in Sample}\right] = \left[\text{\% Pass No. 200 from Fine Sieving}\right] + \left[\frac{\left[100 - \left[\text{\% Pass No. 4}\right]\right] \times \left[\text{Percent Minus No. 200 on Coarse Aggregate}\right]}{100}\right]$$

$$= (\ 11.3\ ) + \left[\frac{\left[100 - (\ 49\ )\right] \times (\ 0.52\ )}{100}\right]$$

Total Percent Pass No. 200 in Sample = 11.6

FIGURE 6

(b) Either the entire amount, or a representative sample of approximately 5000 grams, whichever is less, of the Plus No. 4 material from screening shall be combined, dried to constant weight, allowed to cool, and the weight recorded as the "Unwashed Weight of Plus No. 4", (4967 in the example in Figure 6).

(c) Subject the sample to hand washing.

(d) Dry the sample to constant weight and allow to cool. Record the weight to at least the nearest gram as the "Washed Weight of Plus No. 4", (4941 in the example in Figure 6).

(e) Utilizing the equations shown in Figure 6, determine and record the "Percent Minus No. 200 on Coarse Aggregate" to the nearest 0.01%, (0.52); and the "Total Percent Pass No. 200 in Sample" to the nearest 0.1%, (11.6).

(f) Compare the percent Pass No. 200 from fine sieving with the "Total Percent Pass No. 200 in Sample". If the difference is less than or equal to 1.0, replace the percent Pass No. 200 from fine sieving with the "Total Percent Pass No. 200 in Sample" and, if necessary, adjust the value for percent retained on the No. 200 sieve. (In the example in Figure 5, the 11.3 percent Pass No. 200 from fine sieving has been replaced with the 11.6 "Total Percent Pass No. 200 in Sample", and the percent retained on the No. 200 sieve has been adjusted from 3 to 2.) If the difference is greater than 1.0, another sample shall be obtained and the entire sample subjected to washing and the gradation determined as specified in Section 4 or 5.

REPORT

7. (a) The sieve analysis shall be reported as shown in Figures 1 through 5 for the particular example which is applicable.

(b) When applicable, the determination of "Percent Minus No. 200 on Coarse Aggregate" and "Total Percent Pass No. 200 in Sample" is reported as shown in the example given in Figure 6.

(c) A blank Soils and Aggregate Tabulation laboratory card is provided in Figure 7.

(d) A blank form for the determination of "Percent Minus No. 200 on Coarse Aggregate" and "Total Percent Pass No. 200 in Sample" is provided in Figure 8.

ARIZONA DEPARTMENT OF TRANSPORTATION
SOIL AND AGGREGATE TABULATION

LAB NUMBER | PROJ CODE | ORG NUMBER | MATL. | TYPE | PURPOSE | TEST LAB | SIZE | SIZE %

TEST NO. | LOT OR SUFFIX | SAMPLED BY | MO | DAY | YEAR | TIME | AM | PM

SAMPLED FROM | LIFT NO. | RDWY | STATION | PLUS
IF MILEPOST, INPUT DECIMAL

ORIGINAL SOURCE | PROJECT ENGINEER / SUPERVISOR | PROJECT NUMBER | TRACS NUMBER

REMARKS

ARIZ 201

% OVERSIZE: +3" ☐ | +6" ☐ | COARSE FACTOR

WET SAMPLE PREWEIGHT = _____
WET WT. OF -#4 = _____
-#4 SPLIT WET WT. = _____

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	CUMULATIVE % RET. FINENESS MODULUS
3" ☐					
2 1/2"					
2"					
1 1/2"					
1"					
3/4"					
1/2"					
3/8"					
1/4"					
#4					
-#4					
Total					

IF TOTAL SAMPLE IS WASHED:
UNWASHED WT. = _____
WASHED WT. = _____
ELUTRIATION = _____

DRY WT. OF-#4 SPLIT | FINE FACTOR

	WEIGHTS RETAINED	% RET.	% PASS	SPECS.	
#8					
#10					
#16					
#30					
#40					
#50					
#100					
#200					
-#200					
Total					
Elutriation					

Dry Weight

FINENESS MODULUS = TOTAL CUMULATIVE % RET. / 100

T = AASHTO Tests

			SPECS.
Liquid Limit (LL)	T - 89		
Plastic Limit (PL)	T - 90		
Plasticity Index (PI) = LL - PL	T - 90		
Abrasion Method (A,B,C,D)	T - 96		
@ 100 Revolutions		%	%
@ 500 Revolutions		%	%
Absorption, H_2O	T - 85 ARIZ 211	%	
Specific Gravity, SSD	T - 85 ARIZ 211		
Specific Gravity, OD	T - 85 ARIZ 211		
Proctor Method			A - ARIZ 225 C - ARIZ 226 D - ARIZ 226 AD - ARIZ 245 AI - ARIZ 232 ADI - ARIZ 246
Optimum Moisture		%	
Max. Dry Density		PCF	
Sand Equivalent	T - 176 ARIZ 242 (MAFC)		
Fractured Faces Weight (Wf)			
Total Sample Weight (Wa)			
Fractured Faces (FF) = $\frac{Wf}{Wa} \times 100$	ARIZ 212	%	%
Wet Weight (W)		g	
Dry Weight (D)		g	
Moisture Content = $\frac{W-D}{D} \times 100$	T - 255 T - 265	%	
Flakiness Index	ARIZ 233	%	%
Carbonates	ARIZ 238	%	%
pH	ARIZ 236 OR 237		
Resistivity (ohm-cm)	ARIZ 236		
Soluable Salts (PPM)	ARIZ 237		

WHITE ☐
YELLOW ☐
BLUE ☐

RECEIVED DATE | TEST OPERATOR & DATE | SUPERVISOR & DATE

44-0363 R9/93

FIGURE 7

DETERMINATION OF PERCENT MINUS NO. 200 ON COARSE AGGREGATE AND TOTAL PERCENT PASS NO. 200 IN SAMPLE

Project No. _____ Lab. No. _____

Unwashed Weight of Plus No. 4 = _____

Washed Weight of Plus No. 4 = _____

Calculate the "Percent Minus No. 200 on Coarse Aggregate" by the following, and record result to the nearest 0.01%:

$$\text{Percent Minus No. 200 on Coarse Aggregate} = \frac{\text{Unwashed Weight of Plus No. 4} - \text{Washed Weight of Plus No. 4}}{\text{Unwashed Weight of Plus No. 4}} \times 100$$

$$= \frac{(\quad) - (\quad)}{(\quad)} \times 100$$

Percent Minus No. 200 on Coarse Aggregate = _____

Calculate the "Total Percent Pass No. 200 in Sample" by the following, and record result to the nearest 0.1%:

$$\text{Total Percent Pass No. 200 in Sample} = \text{\% Pass No. 200 from Fine Sieving} + \frac{\left[100 - \text{\% Pass No. 4}\right] \times \text{Percent Minus No. 200 on Coarse Aggregate}}{100}$$

$$= (\quad) + \frac{\left[100 - (\quad)\right] \times (\quad)}{100}$$

Total Percent Pass No. 200 in Sample = _____

FIGURE 8