Method of Test for Sieve Analysis

1. Scope:

This test is for determining sieve analysis of subbase, base course, mineral aggregate (Surface course materials), concrete aggregates, fillers, and similar materials.

2. Apparatus:

- 2.1 Scale or balance having the capacity to weigh any sample which may be tested utilizing this procedure and readable to the nearest 0.1 gram.
- 2.2 Sieves. Standard square opening, conforming to ASTM E 11.
- 2.3 Drying oven capable of maintaining a temperature of $230^{\circ} \pm 9^{\circ}$ F.
- 2.4 Pans, scoops, brushes, etc., for handling materials.
- 2.5 Unit weight bucket.
- 2.6 Mechanical sieve shaker.

3. Procedure:

Surface Course Materials:

- 3.1 Obtain a sample in accordance with SD 201. The sample shall be large enough to provide specimens for all required testing.
- 3.2 Reduce the sample to the size of the specimen needed for testing by splitting or quartering in accordance with SD 213.
- 3.3 Minimum sample size.

NOTE: Nominal maximum size of particle is denoted by the smallest sieve opening listed below, through which 90% or more of the sample being tested will pass.

Nominal	Minimum wt.
maximum size	of sample
of particle	(Grams)
#4	500
3/8"	1000
1/2"	2500
3/4"	5000
1"	10000
1 1/2"	15000
2"	20000
2 1/2"	35000
3"	60000
3 1/2"	100000
4"	150000

3.4 The sample shall be dried to a constant weight at a temperature of $230^{\circ} \pm 9^{\circ}$ F or in accordance with SD 108. Frequent stirring will expedite the drying procedure.

NOTE: Cool until the container can be handled comfortably with bare hands and the operation of balance or sieves on which sample is placed are not affected by heat convection from material/pan.

- 3.5 Determine loose weight, if required, in accordance with SD 205.
- 3.6 Weigh the sample and record the weight in the "Original dry sample weight" box of the DOT-3 worksheet to the nearest 0.1 gram.
- 3.7 Assemble a series of sieves that will furnish the information required by the specifications covering the material to be tested. Nest the sieves in order of decreasing size of opening from top to bottom and include a pan below the last sieve.
- 3.8 Pour the sample into the top sieve of the nest. Agitate the sieves by hand or on a mechanical shaker for a sufficient period of time, established by trial or checked by measurement on the actual test sample, to meet the criterion for adequacy of sieving.

NOTE: The adequacy of sieving can be checked by the hand method. Hand sieving is done by using an individual sieve with a cover and pan while rotating and tapping the sieve approximately two times per second for one minute. The end point for sieving is when not more than 0.5% by weight shall pass that sieve.

3.9 Remove any dirt adhering to the + #4 material. This can be accomplished by dumping the material from each individual sieve into a flat pan and rubbing it with a soft pine or rubber covered block. After the dirt has been removed, pour the contents of the pan back onto the sieves and complete the shaking.

An alternate method is to place the material retained on an individual sieve in a cement sample can. With the lid in place, agitate the aggregate using a circular motion. The material is then reintroduced to the sieve and sieved by hand.

- 3.10 Weigh the material retained on each sieve and the material in the pan to the nearest 0.1 gram and record the weights on the worksheet. Tabulate the total for these weights. The tabulated total should check within 0.3% of the "Original dry sample weight." If it does not, a backup sample shall be tested.
- 3.11 In the coarse sieve series, the weight retained on a sieve in kg at the completion of sieving shall not exceed the product of 2.5 times the sieve size opening in millimeters times the effective sieving area in m². In the fine sieve series (Openings smaller than #4) the weight retained on any sieve shall not be greater than 4 g/in.² (See Chart 1 below). If any sieve is overloaded, make a notation on the gradation sheet and sieve the material retained on that sieve by hand in split portions until the adequacy of sieving requirement is met. Prevent the occurrence of any further overloading of sieves by using one of the following: insert an additional sieve with an opening size in between the overloaded sieve size and

the next larger size in the sieve set, start with a smaller sample size to prevent the sieve from being overloaded, split the sample into two or more portions to sieve separately, or use a set of sieves having a larger frame size and providing greater sieving area. Sieve a sufficient amount of time so that the adequacy of sieving is met for all sieve sizes. Try approximately 10 minutes if using a mechanical sieve shaker and increase the time if the adequacy of sieving is not met for all sieve sizes.

	Maximum amount of material that may be retained in grams								
Sieve opening size (Inches)	8" dia. sieve	12" dia. sieve	13.8" x 13.8" sieve (14"x14" nominal)	14.6" x 22.8" sieve (16"x24" nominal)					
4"	N/A	N/A	30,600	53,900					
3 1/2"	N/A	15,100	27,600	48,500					
3"	N/A	12,600	23,000	40,500					
2 1/2"	N/A	10,600	19,300	34,000					
2"	3,600	8,400	15,300	27,000					
1 1/2"	2,700	6,300	11,500	20,200					
1"	1,800	4,200	7,700	13,500					
3/4"	1,400	3,200	5,800	10,200					
5/8"	1,100	2,700	4,900	8,600					
1/2"	890	2,100	3,800	6,700					
3/8"	670	1,600	2,900	5,100					
1/4"	450	1,100	1,900	3,400					
#4	330	800	1,500	2,600					
#6 thru #200	200	470	900	1,500					

Chart 1

- 3.12 Calculate the percentage of material retained on each sieve to the nearest 0.1% by dividing the weight of the retained material by the "Original dry sample weight" determined in 3.6.
- 3.13 Determine the accumulative percent passing each sieve by subtracting the retained percentage for the top sieve from 100.0 and continue subtracting the retained percentage for each sieve from the previous sieves accumulative passing percentage.
- 3.14 If the sample being tested requires a result for percentage of crushed particles, perform the test in accordance with SD 211 using a portion of the aggregate retained on the #4 sieve and above.

NOTE: If the material being tested requires a result for total - #200, the material from that test can be used to perform the percentage of crushed particles test.

3.15 If the sample being tested requires a result for percentage of particles less than 1.95 specific gravity for the + #4 sieve material, perform the test in accordance with SD 214 using a portion of the aggregate retained on the #4 sieve and above.

- 3.16 Using the material from the pan below the #4 sieve, split out samples in accordance with SD 213 to conduct the balance of the required testing. The number and size of samples to be split out will depend on the type of material being tested. Most surface course materials will require a sample to complete the fine portion of the sieve analysis (500 gram min) and one for liquid limit/plastic limit/plasticity index. (500 gram min) If you are testing uncoated mineral aggregate for asphalt concrete, a third sample will have to be split out for a particles less than 1.95 specific gravity test.
- 3.17 Weigh the sample to be used for the fine portion of the sieve analysis to the nearest 0.1 gram and record the weight on the "Weight before washing" line on the worksheet.
- 3.18 Place the sample in a pan and add enough water to cover it. Agitate the sample with sufficient vigor to result in complete separation of all particles finer than the #200 sieve from the coarser particles and bring the fine material into suspension. Pour the wash water containing the suspended and dissolved solids over a nest of 2 sieves. The lower sieve of the nest shall be a #200 and the upper shall be in a range of #8 to #16. Both of the sieves shall conform to the requirements of ASTM E 11. Repeat the process of adding water, agitating the sample, and pouring the water over the nest of sieves until the wash water is clear.
- 3.19 Dry the washed aggregate to a constant weight in an oven at $230^{\circ} \pm 9^{\circ}$ F, as per SD 108 and weigh to the nearest 0.1 gram. Record this weight on the "Weight after washing" line of the worksheet.

NOTE: Cool until the container can be handled comfortably with bare hands and the operation of balance or sieves on which sample is placed are not affected by heat convection from material/pan.

Subtract the weight of the sample after washing, from the weight of the sample before washing and record the result on the "Loss from washing (- #200)" line and on the "Pan wash" line below the #200 sieve on the sieve analysis.

- 3.20 Assemble a series of sieves that will furnish the information required by the specifications covering the material being tested. Nest the sieves in order of decreasing size of opening from top to bottom and include a pan below the last sieve.
- 3.21 Pour the aggregate into the top sieve of the nest, place the nest of sieves on a mechanical shaker and shake for a sufficient period of time (A minimum of 10 minutes). Adequacy of sieving can be checked as outlined in 3.8 above. The quantity of material retained on any sieve at the completion of the sieving operation shall not exceed 4 grams per in² of sieve surface area. This amounts to 200 grams for an 8" diameter sieve.
- 3.22 Weigh the material retained on each sieve and in the pan and record the weights on the worksheet to the nearest 0.1 gram. Add the retained weights including the "Pan dry" and "Pan wash" quantities below the #200 sieve. Record this weight on the "Total" line at the bottom of the worksheet. This weight must be within

0.3% of the weight of the sample before washing. If it is not, a new sample shall be tested.

NOTE: Correct brush to use when cleaning sieves.

3/8" to #16 - steel #20 to #50 - brass #80 to > - paint

- 3.23 Complete the calculations for the fine sieves, beginning by dividing the initial sample weight derived in 3.17 above into the retained weights for each sieve and record the results on the worksheet to the nearest 0.1%. Next, multiply these retained percentages times the accumulative percentage passing the #4 sieve determined in 3.13 above and record the results on the worksheet again to the nearest 0.1%. Finally, determine the accumulative percentage passing each of these sieves by subtracting the retained percentage from the previous sieves accumulative passing percentage.
- 3.24 The percentage of material passing each sieve in the coarse and fines portion of the analysis may now be rounded and reported on the worksheet to the nearest whole number except the #200 sieve shall be reported to the nearest 0.1%.
- 3.25 Prepare the sample of material split out earlier as outlined in SD 207 for liquid limit/plastic limit/plasticity index. testing.
- 3.26 Perform the liquid limit and plastic limit in accordance with SD 207, calculate the plasticity index, and report the results on the sieve analysis worksheet.
- 3.27 If the sample being tested requires a result for percentage of particles less Than 1.95 specific gravity for the #4 sieve material, perform the test on the 250 to 350 gram sample split out in 3.16 above in accordance with SD 208.

Process for determining total - #200 materials in asphalt concrete (excludes Class S):

3.28 Following completion of the coarse sieve analysis combine all materials which were retained on #4 sieve and above and split out a sample for total - #200 testing in accordance with SD 213 which meets the requirements shown in the following table.

Nominal maximum	Minimum weight of
size of particles	sample, grams
#4	500
3/8"	500
1/2"	700
3/4"	1000
1"	1500

- 3.29 Weigh the sample to the nearest 0.1 g and record the weight as "Weight before washing" in the box labeled "(A)" below the coarse sieve area as shown on the enclosed example DOT-3 worksheet.
- 3.30 Place the sample in a pan and add enough water to cover it. Agitate the sample with sufficient vigor to result in complete separation of all particles finer than the #200 sieve from the coarser particles and bring the fine material into suspension.

Pour the wash water containing the suspended and dissolved solids over a nest of 2 sieves. The lower sieve of the nest shall be a #200 and the upper shall be in a range of #8 to #16. Both of the sieves shall conform to the requirements of ASTM E 11. Repeat the process of adding water, agitating the sample, and pouring the water over the nest of sieves until the wash water is clear.

- 3.31 Following drying to a constant weight, weigh sample to nearest 0.1 g and record the weight as "Weight after wash" in the box labeled "(B)" below the coarse sieve area as shown on the enclosed example DOT-3 worksheet.
- 3.32 Calculate the percent passing the #200 Sieve (D) for the coarse aggregate by subtracting the "Weight after wash" (B) from the "weight before wash" (A) and dividing that result (C) by the "Weight before wash" (A). Multiply this result times 100. This is the percent #200 for the coarse aggregate which must be recorded in the two boxes labeled "(D)" on the DOT-3 worksheet.

6.3	1/4		354	.6	7.0	67.9	68	
4.75	#4	*	345.	.4	6.8	F) 61.1	61	57-67
Pan			3090).1	61.1	u wt. before) 1069.3	
TOTAL			5055	i.1	100.0	s wt. after w	3) 1058.5	
+ #4 Gradation Check:						C loss fro	m washind) 10.8
within 0.3% of original dry wt. 0.1%					h %	- #200 🛛 🕻) 1.01	

- 3.33 To complete the calculations for the total #200 material, four pieces of information are needed in the #200 box at the lower left corner of the DOT-3 worksheet. You have already provided one of these in step 3.32 above, ((D) which is the percent passing the #200 sieve on the coarse aggregate sample wash). The other three are: (E) The percent passing the #200 sieve on the fine sieve analysis (This includes the washed and sieved portion), (F) The percentage of material that passed the #4 sieve during the sieve analysis and (G) The percentage of material that was retained on the #4 Sieve. The amount of material retained on the #4 sieve (G) can be determined by subtracting the percent passing the #4 sieve (F) from 100.
- 3.34 Complete the calculations by multiplying the percent #200 on the coarse sieve aggregate (D) times the percent of material retained on the #4 sieve (G) and multiply the percent #200 on the fine sieves (E) times the percent of material that passed the #4 sieve (F) and divide each by 100. The result obtained when adding these 2 values is the "Total #200 material" for this sample.

Example:

The coarse sieve analysis had 61.1% passing the #4 sieve. 100.0% minus 61.1% passing = 38.9% retained on the #4 sieve.

1.01% passed the #200 sieve in the coarse aggregate sample that was washed (D) and 10.06% passed the #200 sieve on the fine sieve analysis (E).

PAN dry		2.5	<u>52</u> .	5 /	1	6.2	wt. before washing (0.1g)	521.8	
PAN wash		50.0	E)	10.1		0.2	wt. after washing (0.1g)	471.8	
TOTAL		521.5		loss from washing (- # 200)				50.0	
Coarse(D) 1.01	1 x % Re	tain/Desig	G)	38.9	=	0.39	- #4 Gradation check:		
Chip	x % Re	tain/Design	Ē		=		within 0.3% of the	0.1	
Fine (E) 10.0	6 x %Pas	ss/Design (F)	61.1	=	6.15	wt. before washing		
Total/Combined - #200					6.5				

Calculations:

Retained #4 sieve (G) $38.9\% \times (D) 1.01\%$ pass on coarse aggregate = 0.39%100

Passing #4 sieve (F) 61.1% x (E) 10.06% pass on fine sieve analysis = 6.15%100

0.39 + 6.15 = 6.54 or 6.5% total minus #200 for the sample.

Coarse Aggregate for Concrete:

- 3.35 Obtain a sample in accordance with SD 201. The sample shall be large enough to provide specimens for all required testing.
- 3.36 Reduce the sample to the size of the various specimens needed for testing by splitting or quartering in accordance with SD 213.

Two separate splits will be required:

One split for sieve analysis and particles less than 1.95 specific gravity and one separate split to wash for material finer than #200 sieve.

Most samples will require, as a minimum, a sieve analysis, material finer than #200 sieve and particles less than 1.95 specific gravity in coarse aggregate.

3.37 For the minimum size of samples for the various tests required, see 3.3 above for the sieve analysis, SD 206 for material finer than #200 sieve, SD 214 for particles less than 1.95 specific gravity in coarse aggregate.

Coarse aggregate for lightweight concrete specimens shall consist of 0.1 ft³ or more of the material.

- 3.38 Perform the sieve analysis following the procedure outlined in 3.4, 3.6, 3.7, 3.8, 3.10, 3.11, 3.12, and 3.13 above. Coarse aggregate for concrete has a specification on the #8 sieve, so it will be necessary to add that sieve to the nest of sieves.
- 3.39 Using the samples split out in 3.36 above, perform the test for material finer than #200 sieve in accordance with SD 206, particles less than 1.95 specific gravity in coarse aggregate in accordance with SD 214. Report the results of these tests on the worksheet in accordance with the guidelines provided by the applicable test procedure.

Fine Aggregate for Concrete:

- 3.40 Obtain a sample in accordance with SD 201. The sample shall be large enough to provide specimens for all required testing.
- 3.41 If the sample has free moisture on the particle surface, the entire sample may be dried or it may be split using a mechanical splitter with chute openings of 1 1/2" or more, to not less than 5000 grams and then dried.
- 3.42 Reduce the dried sample to the size of the various specimens needed for testing by splitting or quartering in accordance with SD 213. The number of specimens needed will depend on the testing required for the sample.

NOTE: If the sample received from the field does not have free moisture on the particle surface, it may be reduced to the various testing specimens by splitting or quartering in accordance with SD 213. It will, however, require drying before testing.

Most samples will require, as a minimum, a sieve analysis, inclusive of material finer than #200 sieve, and particles less than 1.95 specific gravity in fine aggregate.

The sample split out for the sieve analysis, inclusive of material finer than #200 sieve, must contain a minimum of 500 grams while the sample for the less than 1.95 specific gravity in fine aggregate test must contain between 250 and 350 grams.

The minimum sample specimen weight for the sieve analysis, inclusive of material finer than #200 sieve, for lightweight fine aggregate shall be as shown below:

Wt. of ([:] aggi lbs./f	regate t ³)	Min. weight of test specimen (grams)
5	to	15	50
15	to	25	100
25	to	35	150
35	to	45	200
45	to	55	250
55	to	65	300
65	to	75	350

3.43 Perform the sieve analysis, inclusive of material finer than #200 sieve, in accordance with procedure outlined in 3.17, 3.18, 3.19, 3.20, 3.21, and 3.22 above.

Fine aggregate for concrete has a specification on the 3/8" and #4 sieve, so it will be necessary to add these sieves to the nest of sieves.

- 3.44 Calculate the percentage of material retained on each sieve to the nearest 0.1% by dividing the weight of the retained material by the weight of the sample before washing. Material passing #200 should be calculated to 0.01% and rounded to 0.1%.
- 3.45 Determine the accumulative percent passing each sieve by subtracting the retained percentage for the top sieve from 100.0 and continue subtracting the retained percentage for each sieve from the previous sieves accumulative passing percentage.
- 3.46 The percentage of material passing each sieve may now be rounded and reported on the worksheet to the nearest whole number except the #200 sieve shall be reported to the nearest 0.1%.

Process for determining Fineness Modulus (F.M.)

- 3.47 Samples of fine aggregate for concrete require a result for fineness modulus (F.M.). The sieves used for determination of F.M. are identified on the DOT-3 worksheet by an (*). Calculate the F.M. as follows:
 - A. Subtract the percentage passing (before rounding) the sieves designated by the (*) from 100.0 and record the result in the column titled F.M. After this has been accomplished on each sieve designated, total the results and divide by 100.
 - B. Report the result to the nearest 0.01%.

Example:

		Percent	100.0 Minus
<u>Sieve Size</u>		<u>Passing</u>	Percent Passing
щл		00.0	0.0
#4		99.8	0.2
#8		91.5	8.5
#16		67.8	32.2
#30		49.9	50.1
#50		21.5	78.5
#100		3.9	<u>96.1</u>
			Total 265.6
Fineness modulus (F.M.)	=	<u>265.6</u> = 100	2.656 or 2.66

Process for Determining Combined Percentage of Material Passing the #200 sieve

3.48 The specifications for aggregates used in concrete require the combined mixture of fine and coarse aggregate be such that not more than a certain percent of the combined materials pass the #200 sieve.

To calculate this combined percentage of material passing the #200 sieve, multiply the percent passing the #200 sieve on the fine and coarse aggregate

times the percentage of the sand and rock used in the mix according to the design mix, divide each of the results by 100 and then add them together.

Example:

1.65% passing #200 sieve on coarse aggregate.0.95% passing #200 sieve on fine aggregate.Coarse aggregate is 64.4% of total aggregate used in the mix.Fine aggregate is 35.6% of total aggregate used in the mix.

Coarse aggregate	1.65%	х	64.4%	/	100	=	1.06%
Fine aggregate	0.95%	х	35.6%	/	100	=	0 <u>.34%</u>
Combined - #200 s	sieve					=	1.40 or 1.4%.

The final percentage shall be recorded to the nearest 0.1%.

3.49 Perform the test for particles less than 1.95 specific gravity in fine aggregates in accordance with SD 208 and report the results on the worksheet.

Class S, Microsurfacing, Asphalt Surface Treatments and Miscellaneous Fine Aggregate:

- 3.50 Obtain a sample in accordance with SD 201. The sample shall be large enough to provide specimens for all required testing.
- 3.51 Reduce the dried sample to the size of the various specimens needed for testing by splitting or quartering in accordance with SD 213. The number of specimens needed will depend on the testing required for the sample.
- 3.52 The minimum sample size shall be as outlined in 3.3 above.
- 3.53 If the sample being tested requires a result for flakiness index, perform the test in accordance with SD 203 using a portion of the aggregate retained on the #4 sieve and above.
- 3.54 If the sample being tested requires a result for percentage of crushed particles, perform the test in accordance with SD 211 using a portion of the aggregate retained on the #4 sieve and above.
- 3.55 If liquid limit/plastic limit/plasticity index is required by specifications, a sample of - #4 shall be obtained from a separate split. The sample split out for the liquid limit/plastic limit/plasticity index. must be of adequate size to produce at least 100 grams of - #40 sieve material.
- 3.56 The sample shall be oven dried to a constant weight at a temperature of $230^{\circ} \pm 9^{\circ}$ F or in accordance with SD 108.
- 3.57 Weigh the sample and record the weight in the "Weight before washing" line in the fine aggregate portion of the worksheet to the nearest 0.1 gram.
- 3.58 Perform wash as outlined in 3.18 above.

- 3.59 Dry the washed aggregate to a constant weight in an oven at 230° ± 9°F as per SD 108 and weight to the nearest 0.1 gram. Record this weight on the "Weight after washing" line in the fine aggregate portion of the worksheet to the nearest 0.1 gram.
- 3.60 Subtract the weight of the sample after washing, from the weight of the sample before washing and record the result on the "Loss from washing (- #200)" line and on the "Pan wash" line below the #200 sieve on the sieve analysis.
- 3.61 Assemble a series of sieves that will furnish the information required be the specifications covering the material being tested. The use of 12" diameter sieves is recommended to prevent sieve overloading.
- 3.62 Pour the aggregate into the top sieve of the nest, place the nest of sieves on a mechanical shaker and shake for a sufficient period of time (A minimum of 10 minutes). Adequacy of sieving can be checked as outlined in 3.8 above. The quantity of material retained on any sieve at the completion of the sieving operation shall not exceed the amount listed in "Chart 1" of 3.11 above.
- 3.63 Weigh the material retained on each sieve and in the pan and record the weights on the worksheet to the nearest 0.1 gram. Add the retained weights including the "Pan Dry" and "Pan Wash" quantities below the #200 sieve. Record this weight on the "Total" line at the bottom of the worksheet. This weight must be within 0.3% of the weight of the sample before washing. If it is not, a new sample shall be tested.
- 3.64 Calculate the percentage of material retained on each sieve to the nearest 0.1% by dividing the weight of the retained material by the weight of the sample before washing. Material passing #200 should be calculated to 0.01% and rounded to 0.1%.
- 3.65 Determine the accumulative percent passing each sieve by subtracting the retained percentage for the top sieve from 100.0 and continue subtracting the retained percentage for each sieve from the previous sieves accumulative passing percentage.
- 3.66 The percentage of material passing each sieve may now be rounded and reported on the DOT-3 to the nearest whole number except the #200 sieve shall be reported to the nearest 0.1%.

4. Report:

- 4.1 Test results will be reported on form DOT-3 or DOT-68 (These forms do not apply to the Central Lab). Use of the DOT-68 is limited to the following:
 - A. Concrete where 2 or more aggregate piles are being weighed during batching to meet a single gradation specification.
 - B. Asphalt for mineral aggregate samples on projects utilizing a batch type mixing plant.

- 4.2 Calculations for the DOT-68 are determined as follows:
 - A. Enter the "lbs./cu.yd." of rock and chip from the Mix Design on lines (H) and (I).
 - B. Divide the "lbs./cu.yd." of the rock and chip by the "Total" to obtain the "Total Agg. %" and multiply by 100 for lines (H) and (I).

	Total Agg %	lbs./cu. yd.;	Mix Batch Ticket,
(H)	77.6	1374.00	1" rock
	22.4	396.0	Chip
(•)	0		
	0		
	100.0	1770.0	Total

- C. Split a separate sample of rock and chip for gradation and a separate sample of each for wash ensuring that you meet the minimum sample size as per 3.3 and SD 206.
- D. Perform the gradation for each and calculate as per 3.12 3.13.

		1" r	ock		Chip				
	Sample Wt	. (0.1g)	10312.3		Sample Wt	(0.1g)	3098.8		
	Sieve Size	Retained (0.1g)	% total ret.(0.1%)	% pass. (0.1%)	Sieve Size	Retained (0.1g)	% total ret.(0.1%)	% pass. (0.1%)	
	2				2				
	1 1/2				1 1/2				
	1 1/4				1 1/4				
	1	0.0	0.0	100.0	1				
	3/4	1431.6	13.9	86.1	3/4				
	5/8	2964.8	28.8	57.3	5/8	0.0	0.0	100.0	
	1/2	1853.9	18.0	39.3	1/2	0.0	0.0	100.0	
(J)	3/8	2095.4	20.3	19.0	3/8	104.8	3.4	96.6	(J)
	1/4				1/4	1347.5	43.5	53.1	
	#4	1798.4	17.4	1.6	#4	935.3	30.2	22.9	
	#8	60.7	0.6	1.0	#8	616.2	19.9	3.0	
	Pan Dry	98.4			Pan Dry	90.5			
_	Pan Wash	0.0			Pan Wash	0.0			_
	TOTAL	10303.20			TOTAL	3094.30			-

E. Calculate the "Gradation Check" as per 3.10.

Gradation Check==> 0.09

Gradation Check==> 0.15

F. Perform the wash as per SD-206 and calculate lines (K) and (M).

- G. Multiply line (K) by "Total Agg %", line (H) divide by 100 and enter on line (L) for "Bin adj. -200".
- H. Multiply line (M) by "Total Agg %" line (I) divide by 100 and enter on line (N) for "Bin adj. -200".

3771.0	wt. before wash	2752.8	
3728.2	wt. after wash	2707.1	
42.8	loss from wash	45.7	
1.13 (K)	% - #200 ==>	1.66	(M)
0.877 (L)	Bin adj #200	0.372	(N)
	3771.0 <u>3728.2</u> 42.8 1.13 (K) 0.877 (L)	3771.0 wt. before wash 3728.2 wt. after wash 42.8 loss from wash 1.13 (K) 0.877 (L)	3771.0 wt. before wash 2752.8 3728.2 wt. after wash 2707.1 42.8 loss from wash 45.7 1.13 (K) % - #200 ==> 1.66 0.877 (L) Bin adj #200 0.372

I. Add lines (L) and (N) and enter on line (O) for "Total Combined -200" for the Coarse Aggregate.

Composite Coarse Aggregate										
Sieve Size	1" rock	Chip			Retained Total	Cumulative % Passing	Spec. Gradation	Job Mix Formula		
2					0.0	100.0	100			
1 1/2					0.0	100.0	100	100-100		
1 1/4					0.0	100.0	100			
1	0.0				0.0	100.0	100	95-100		
3/4	10.8				10.8	89.2	89			
5/8	22.4	0.0			22.4	66.9	67			
1/2	14.0	0.0			14.0	52.9	53	25-60		
3/8	15.8	0.8			16.5	36.4	36			
1/4		9.7			9.7	26.6	27			
#4	13.5	6.8			20.3	6.4	6	0-10		
#8	0.5	4.5			4.9	1.4	1	0-5		
Pan	0.7	0.7			1.4	0.1	0			
Total	77.6	22.4	0.0	0.0	99.9					

Total Combined - 200 ==> 1.25 (O)

J. The value from line (O) will then be carried to line (P) to calculate the "Total/Combined -200" with the Fine Aggregate.

Note: You must link the Fine Aggregate test with the Coarse Aggregate in MS&T for this calculation to occur.

K. You must enter the % of Fine Aggregate from the Mix Design on line (Q). Also enter the % of Coarse Aggregate from the Mix Design on line (P). The total of the column "% Retain/Design" must = 100. L. Calculate the "Total/Combined - #200" as per 3.48

Coarse	1.25%	x % Retain/Design	58.00 =	0.73	(P)
Chip		x % Retain/Design	=		
Fine	1.45%	x % Pass/Design	42.00 =	0.61	(Q)
04 Referenc	ed	Total/Combined	l - #200	1.3	

M. To calculate the Composite Coarse Aggregate "Retained Total" multiply the "% total ret." from the respective sieve by the "Total Aggregate %" on the Mix Batch Ticket.

Example: (See line (J)) For 3/8 1" Rock multiply $20.3 \times 0.776 = 15.75$, round to 15.8, and 3/8 Chip multiply $3.4 \times 0.224 = 0.76$ round to 0.8,

NOTE: you will round these numbers to report on the form but keep them at two decimal places to add in the next step.

Now add 15.75 + .76 = 16.51, round to 16.5, this is your "Retained Total" for 3/8.

- N. Calculate the "Cumulative % Passing" as per 3.13.
- O. If the sample being tested requires a result for percentage of particles less than 1.95 specific gravity for the + #4 sieve material, perform the test in accordance with SD 214 using a portion of the aggregate retained on the #4 sieve and above.

5. References:

AASHTO T 27 ASTM E 11 SD 108 SD 201 SD 204 SD 206 SD 207 SD 208 SD 211 SD 213 SD 214 DOT-3 DOT-68 DOT-69

Sample ID	2203565		5	Sieve A	nalysis	and F	P.I. V	Vorks	sheet DOT-3
File No.									3-19
PROJECT	PH 0066(00)1	5		COUN	ITY Auro	ora, Zieł	bach		PCN <u>B015</u>
Charge to (if	f not above p	roject)							
Field No.	01			Date Sar	npled 03	/10/201	9		Date Tested 03/10/2019
Sampled By	Brown, Ber	njamin		Tested B	y Test	er, One)		Checked By Tester, Two
Material Tvp	e Base Co	ourse							Source
indicinal typ	<u></u>								Lot No Sublot No
Weight Ticke	et Number or	Station							Lift of
[Wet Sample	e Weight (0.1g)	- Origir	nal Dry Sa	imple We	ight (0.1	1g7	7,318.0] / dry weight x 100 =% moisture
	Finances	Potningd	% total cot	% pace	ing % p:	rcina			
Sieve Size	Modulus	(0.1g)	(0.1g)	% pass (0.1g	ng %pa) (rou	inded)	Spec	Req.	
4 in.									the state of a party of the state of the state
3 in.									
2 1/2 m. 2 in.				+					A. Can number 40 19 P. Weight of each unst coil (0.01a) 20.87 28.34
1 1/2 in.									C. Weight of can + dry soil (0.01g) 28.14 27.11
1 1/4 in.		0.0	0.0	100.0	_	100	100	400	D. Weight of water (B - C) (0.01g) 1.73 1.23
1 IN. 3/4 in		167.6	2.3	97.7		98	80 -	100	E. Weight of can (0.01g) 19.92 20.17
5/8 in.		240.6	3.3	94.4		94			F. Weight of dry soil (C - E) (0.01g) 8.22 6.94
1/2 in.		351.7	4.8	89.6		90	68 .	91	G.Liquid Limit (D / F x J x 100 (0.1g) 21.2 N.P.
3/8 in.	 15.0 	338.8	4.6	85.0		85			H. Plastic Limit (D / F x 100) (0.1g) 17.7
1/4 in.	. 21.5	625.2	8.5	76.5		77	48	70	Liquid Limit N C (Grounded) 21 0 25
#4 Pan	- 31.5	5008.1	68.4	wth	efore washing	00 10)	40 .		Plasticity Index (I rounded) 4 0 - 6
Total	F	7,318.2		ar wt.	after washing	g (0.1g)		-+	J. Correction # Blows 26
	+ #4	Gradation Ch	leck	ist C	loss from v	vashing			22=0.9846, 23=0.9899, 24=0.9952, 25=1.0000, 26=1.0050, 27=1.0100, 28=1.0138
	within 0.3% of			ă	%	- #200			weight - #40 181.4 / weight - #4 611.2 x % passing #4 = 20.3
	original dry weight		0.00						(±3.0% VARIABLE of accumulative % passing (0.1%) on the #40)
	Fineness	Retained	% total ret.	% total x	% passing	% passi	ing od\	_	
Sieve Size	Modulus	(. 19)	(0.19)	70 pass. #4	(0.19)	(rounde	eu) Sp	pec Req.	Crushed Particles Test
#0 #0	• 46.3	136.5	21.6	14.8	53.7	54	3	4 58	447.0
#0		28.2	4.5	3.1	50.6	51			Weight of crushed particles 447.0 Weight of total + #4 sample 1,015.9
#12									Percent of crushed pieces 44
#16	 56.7 	67.1	10.6	7.3	43.3	43			Specification 1 or more FF, min. 30 100
#20		62.7	9.9	6.8	36.5	37			- #4 % Particles less than 1.95 Specific Gravity
#30	• 71.7	75.8	12.0	8.2	28.3	28	1	2 25	Specific gravity of solution (1.95 ± 0.01)
#40 #50	• 84.3	55.6	8.7	6.0	15.7	16		5.30	Weight of lightweight particles
#30		34.4	5.4	3.7	12.0	12			Weight of - #4 material
#100	 88.5 	4.8	0.8	0.5	11.5	12			% lightweight particles
#200		10.6	1.7	1.2	10.3	10.3	3 3.	.0 _ 12.0	0 Specification
Pan dry		1.7	95.1	10.3	wt before	washing (O).1g)	631.9	+ #4 % Particles less than 1.95 Specific Gravity
Pan wash		93.4	15.0		wt after	washing (0).1g)	538.5	Specific gravity of solution (1.95 ± 0.01)
lotal	3.94	032.2			ioss from w	asning(-#4	200)	83.4	Weight of lightweight particles (0.1g)
Coarse _	% x % Re	etain/Design	=		- #4 Grada	CON CHECK	`		Weight of + #4 material (0.1g)
Fine	<u></u> % x % Pa	Total/Coml	bined -#200	—	within 0.3% original dry	6 of weight		0.05	Specification
	U	0.00	-	L				1	
Fi	iier r. Rock	0.00 Cr. I 0.00 Ma.	Fines Sand	0.00	Natural San	0 d 0	0.00		
Na	a. Rock	0.00 Nati	ural Fines	0.00	Add Rock				

Comments

Sample ID	2203587		S	ieve An	alysis	and P.	I. Works	sheet DOT	ſ-3
File No.					•			3-	19
PROJECT	PH 0066(00) [,]	15		COUNT	TY Auro	ra, Zieba	ach	PCN B015	
- Charge to (i	if not above p	project)							_
Field No.	06			Date Sam	pled 03/	11/2019	1	Date Tested 03/11/2019	
Sampled By	Tester, On	e		Tested By	Teste	er, One	-	Checked By Tester, Two	
Material Typ	be AGGRE	GATE CO	MPOSITE					Source Jones Pit	_
	Class E	. Type 1						Lot No. 2 Sublot No. 1	-
Weight Tick	et Number o	Station	Ticket # 764	421, Sta. 1	165+55 L	.t		Lift 1.00 of 1.00	
[Wet Sample	e Weight (0.1 <u>c</u>	j) <u>5235</u> .	1 - Origin	al Dry Sar	nple Wei	ght (0.1g	5,058.2] / dry weight x 100 =3.5 % moisture	
Sieve Size	Fineness Modulus	Retained (0.1g)	% total ret. (0.1g)	% passin (0.1g)	ig % pa: (rour	ssing nded)	Spec Req.		
4 in.								Liquid Limit & Diastic Limit Liquid Plastic	
3 in. 2 1/2 in.								A.Can number	
2 in.								B. Weight of can + wet soil (0.01g)	
1 1/2 in. 1 1/4 in.					_			C. Weight of can + dry soil (0.01g)	
1 in.		0.0	0.0	100.0	1	00	0 _ 100	E. Weight of water (B - C) (0.01g)	
3/4 in.		30.3	0.6	99.4		99 9	97 - 100	F. Weight of dry soil (C - E) (0.01g)	
5/8 m. 1/2 in.		620.1	12.3	83.9		34	76 _ 90	G.Liquid Limit (D / F x J x 100 (0.1g) N.C N.P.	
3/8 in.	 25.1 	454.9	9.0	74.9	1	75		H. Plastic Limit (D / F x 100) (0.1g) N.P	
1/4 in.	+ 29.0	354.6	7.0	67.9	6	38	57 87	I. Plasticity Index (G - H) (0.1g) Specific Liquid Limit N.C. Z. (G rounded) 0	ation 25
#4 Pan	* 30.8	3090.1	61.1	wt. bef	ore washing	(0.1g)	1069.3	Plasticity Index (I rounded) N.C. 0	0
Total		5,055.1		wt.a	fter washing	(0.1g)	1058.5	J. Correction # Blows	
	+ #4	4 Gradation Cl	heck	lust (loss from wa	ashing #200	10.8	22=0.9846, 23=0.9899, 24=0.9952, 25=1.0000, 26=1.0050, 27=1.0100, 28=1.01	38
	within 0.3% of				/e ·	- #200	1.01	weight - #40 111.50 / weight - #4 321.60 x % passing #4 = 2	.2
	original dry weigh	t Referende	0.08				_	(±3.0% VARIABLE of accumulative % passing (0.1%) on the #40)	
Sieve Size	Modulus	(.1g)	(0.1g)	% total x * % pass. #4	(0.1g)	(rounded) Spec Req	۰ 	
#6								Crushed Particles Test	_
#8	• 51.1	104.1	20.0	12.2	48.9	49	42 - 52	2 Weight of crushed particles 78	6.4
#10 #12								Weight of total + #4 sample 1,00 Percent of crushed nieces	78
#16	• 60.9	83.4	16.0	9.8	39.1	39	32 . 42	2 Specification 2 or more FF, min. 70 1	00
#20								. #4 % Particles less than 1.95 Specific Gravity	ᆕ
#30	• 74.2	113.3	21.7	13.3	25.8	26	11. 21	Section and the solution (1.05 ± 0.01) 198	
#40		33.2	0.4	3.9	21.9	22	14 . 24	Weight of lightweight particles 5.2	
#30		44.6	8.5	5.2	16.7	17		Weight of - #4 material 304.1	
#100	•							% lightweight particles 1.7	
#200		90.4	17.3	10.6	6.1	6.1	4.0 _ 8.0	Specification 0.0 2 3.0	
Pan dry	. —	2.5	52.5	6.2	wt before w	vashing (0.1) vashing (0.1)	g) 521.8	+ #4 % Particles less than 1.95 Specific Gravity	
Pan wasr Total	י 	521.5	10.1	k	oss from wa	ashing (0.1)	g) 471.8 0) 50.0	Specific gravity of solution (1.95 ± 0.01) 1.96	
Coarse	1.01 % x % R	etain/Design	38.90 =	0.39	- #4 Gradati	on Check	,	Weight of lightweight particles (0.1g) 30.3 Weight of + #4 material (0.1g) 1921.4	
Fine	10.06 %×%P	assing/Design	61.10 =	6.15				% lightweight particles 1.6	
-		Total/Com	bined -#200	6.5	within 0.3% original dry	of weight	0.06	Specification 0.0 - 3.0	
A	dd Rock	15.00 Cr.	Rock	0.00 M	a. Sand	0.0	0	-	
Fi	iller	0.00 Nat	ural Fines	0.00 N	a. Rock	17.(00		
C	r. Fines	23.00		0.00 N	atural Sand	45.0	00		

Comments

Samp File N	le ID o.	220360	9		Gyrator	y Aggre	gate Wo	rksh	eet					DOT-69 3-19
PROJ	ECT	PH 0066(0	0)15		COUNT	YAurora, Z	iebach						PCI	N B015
Field I	No.	2C04			Date Sample	d03/12/20	19				C	ate Tes	sted 03/	12/2019
Sampl	ed By	Tester, O	ne		Tested B	y Tester, O	ne			Chec	ked By T	ester, T	wo	
Materi	al Tvo	e AGGRE	EGATE CO	MPOSITE			Sourc	ce Jo	nes Pit		_			
		Class C	22				_		Lot	t No.	1	Sublo	t No.	4
Weigh	t Tick	et Number	or Station	# 50855, S	ta. 625+15					l	.ift	1	of	1
% moist	. = (wet	wt	8616.4	- dry wt.) / dry	wt. × 100 =	3.9								
Origina	Dry S	ample Wt.	(.1g	3) 8	289.9									
Sieve mm	Size in	Retained (0.1g)	%total ret.(0.1%)	%pass. (0.1%)	%pass. (rounded)	Spec Req.								
100	4											-		
75 62.5	3						Sand Equin	v. Test	Sand Rdg.	Clay Rdg.	S.E.	-		
50	2 1/2						Reading	#2	3.10	6.50	48	-		
37.5	1 1/2											1		
31.5	1 1/4						Sand Equiva	alent Tes	sts Results		48	42	- 100	
25	1	0.0	0.0	100.0	100	100 - 100	Fine Accred	ata Ang	ularity Test Re	eulte	41.8	410	- 100.0	
16	5/8	7.3	0.0	99.9	100	100 - 100	THE Aggreg	ate Ang	dianty reactive	30113				•
12.5	1/2	501.4	6.0	93.9	94	89 - 100	Flat and Elo	ngated l	Particles Test	Results	0.0]	-	
9.5	3/8	890.3	10.7	83.2	83	79 - 93								
6.25	1/4	990.4	11.9	71.3	71									
4.75 Pa	#4	787.3 5116.7	9.5	01.8	02	700 30								
Tot	tal	8293.4		 wt. before wt. after v 	washing(0.1g)	707.10								
+ #4 Gr. within 0.	aduatio	on Check: orig dry wt.	0.04	c loss fro k %	m washing - #200	2.2 0.31								
Sieve Si mm	ize #	Retained (0.1g)	%total ret.(0.1%)	%total x %pass. #4	%pass. (0.1%)	%pass. (rounded)	Spec Req.							
3.35	6							+ #4 %	Particles les	s than 1.95	SP. GR.			
2.36	8	187.7	29.8	18.4	43.4	43	41 - 51	Specifi	ic gravity of so	lution (1	.95 ± 0.01)	1.95		
2.00	10							wt. of I weight	ightweight par of + #4 mater	ticles ial	(0.1 g) (0.1 g)	1824	0	
1.18	16	137.2	21.8	13.5	29.9	30	_	% light	tweight particle	25	(0.1 8)	1.0	<u> </u>	
0.850	20							SPECI	FICATION			0.0 -	3.0	
0.600	30	112.0	17.8	11.0	18.9	19	_	- #4 %	Particles les	s than 1.95	SP. GR.	4.05		
0.425	40 50	54.3 42.7	8.6	5.3	13.6	14		wt of l	ic gravity of so ightweight par	iution (1 ticles	(0.1 a) (0.1 a)	3.2	_	
0.180	80	12.7	0.0	7.6	0.4			weight	of - #4 materi	al	(0.1 g)	302.4	ł.	
0.150	100	35.0	5.6	3.5	5.9	6		% light	tweight particle	25		1.1		
0.075	200	10.5	1.7	1.1	4.8	4.8	2.9 - 6.9	SPECI	IFICATION			0.0 -	3.0	
Pan d	lry	4.8	49.2	4.8	wt before wash	ning (0.1g)	629.8							
Pan wa Total	sn	44.40 628.60	/.8		J wt atter washin	ng (U.1g) shing(-#200)	080.4 44.4							
Coarse	0.31	1 % x % Ret	ain/Design	38.20 =	0.12 - #4 Grad	ation check:		Crush	ed Particles 1	lest				
Fine	7.81	1% x % Ret	ain/Design Total/Combin	61.80 = ed - #200	4.83 within 0.3 5.0 before wa	% of the wt shing	0.2	weight weight percen	of crushed pa of total + #4 s t of crushed p	irticles ample articles		65 729 8	1.7 9.3 9	
Natural	Sand	0.00	Na. Ro	ock	31.00 Nat	ural Fines	25.00	SPECI		2 or n	nore FF, mir	n 65 -	100	
Natural	Sand	0.00	Natura	l Fines	0.00 Osc	ch Nat Fines	16.00							
Cr.Fines		28.00												

Weight of measure and glass p	late	327.1
Weight of measure, glass plate	& water	426.8
M = net mass of water		99.7
Water Temperature / Density	77 F	997.03
V = volume of cylinder, mL		100.0

Dry - #4 bulk specific gravity (Gsb)	2.	563	
Volume of cylinder, mL(V)	10	0.0	1
Weight of cylinder, g (A)	18	3.0	1
Wt of cylinder + aggregate, g (B)	332.5	332.2	1
Wt. aggregate, g (F=B-A)	149.5	149.2	Average
Uncompacted voids, (nearest 0.1%) U=((V-(F/Gsb))/V) × 100	41.7	41.8	41.8

	Sie Si	eve ize	Total Sample Weight on Sieve	Weight of Tested Portion	Weight of Flat/ Elongated Particles	Percent Flat/ Elongated Individual	Percent Flat/ Elongated Weighted
	mm	in				Sieve	Average
	50.0	2					
	37.5	1 1/2					
	25.0	1					
	19.0	3/4					
	12.5	1/2					
	9.5	3/8					
	4.75	#4					
0	Total sa Percent in the to comment	mple wt. t flat and e otal sample ts 12" sie	0.0 enlongated pa e (weighted a ves used	rticles verage) ro	bunded	0.0	

Sample ID File No.	2203613		Sieve A	Analysis and	P.I.	Works	sheet					DOT-3 3-19
PROJECT	PH 0066(00)1	15	COL	JNTY Aurora, Z	iebacł	h					PCN	B015
Charge to (i	if not above pro	oject)										
Field No.	03		Date Sa	mpled 03/12/2	2019			Date T	ested 03	/12/2019	÷	
Sampled By	/ Tester, One		Tested	Bv Tester, Or	ne			Check	ed By Te	ster. Two)	
Material Tvr	e COARSE	AGGREGATE	-				 Source	Hills M	aterials.	Rapid C	itv Quar	rv
	A-45. Brid	lae				_	Lot No		Su	iblot No.		<u> </u>
Weight Tick	et Number or S	Station				– Lift		of				
5						-				_		
[Wet Sampl	e Weight (0.1g)		Original Dry S	Sample Weight ().1g	10,414.8	B_]/dry we	eight x 10	0 =			
Sieve Size	Retained (0.1g)	% total ret. (0.1g)	% passing (0.1g)	% passing (rounded)	Spe	ec Req.	_					
4 in.							-					
2 1/2 in.								Total		Weight of	% Flat/	% Flat/
2 in.	0.0	0.0	100.0	100	100	100	-	Sample Weight on	Weight of Tested	Flat/ Elongated	Elongated Individual	Elongated Weighted
1 1/2 in. 1 1/4 in.	0.0	0.0	100.0	100	100	- 100	Sieve Size	Sieve	Portion	Particles	Sieve	Average
1 in.	286.0	2.7	97.3	97	95	- 100	2 in. 1 1/2 in.					
3/4 in.	1,720.7	16.5	80.8	81			1 in.					
5/8 in.	1,098.7	10.5	70.3	/0	25	00	- 3/4 in.					
1/2 IN.	1,407.0	13.5	50.8	5/	25	- 60	1/2 in.					
3/8 III. 1/4 in	2 492 5	23.9	41.2	17			3/8 in.					
#4	908.0	8.7	8.6	9	0	- 10	#4	0.0				0.0
Pan			·중 wt.	before washing (0.1g)			Iotai	0.0]		(rounded)	0.0
Total			v Che	vt. after washing (0.1g)						Sp	(rounded)	0.0 - 10.0
	+ #4 Grada	tion Check	ush	loss from washing			4			99.		
	within 0.3% of original dry weight	0.18	ő	% - #200			J 					
	Detained	N/ 4-4-1) //					С	rushed Pa	irticles Tes	t r	
Sieve Size	(0 1 g)	% total ret.	% passing	% passing (rounded)	Sne	ec Reg	Weight of cr	ushed parti tal + #4 san	cles		- F	
#6	(0.19)	(0.19)	86	9	JPC	ic neq.	Percent of c	rushed piec	xes			
#8	644.7	6.2	2.4	2	0	- 5	Specificatio	on .		or more FF	, min.	-
#10												
#12							- #4	4 % Particle	es less tha	n 1.95 Spe	cific Grav	ity
#16							Specific o	ravity of sol	ution (1.95	+0.01)		
#20 #30							Weight of	lightweight	particles	20.01)		
#40							Weight of	- #4 materi	al			
#50							% lightwe	ight particle	s			
#80							Specifica	tion				-
#100												
#200 Bop.dp/	217.0	217.0	wt	before washing (0.1g)	2	627.2	+#	4 % Particle	es less tha	an 1.95 Spe	cific Grav	ity
Pan wash	0.0	211.9		vt after washing (0.1g)	3	567.5	Specific g	ravity of sol	ution (1.95	± 0.01)		1.96
Total	10396.3		loss	from washing(-#200)		59.8	Weight of	lightweight	particles	(0	.1g)	0.1
Coarse	1.65 % x % Ret	ain/Design 64	.40 = 1.06	- #4 Gradation Cheo	:k		Weight of	+ #4 materi ight particle	e I	(0	.19) 18	0.0
Fine	0.95 % x % Pas		Specifica	tion	-		0.0	- 1.0				
03 Refere	nced	Total/Combined -	#200 1.4	within 0.3% of original dry weight			1				L	

Comments 13.8" x 13.8" sieves were used. The 1/4 sieve was overloaded. 1/4 sieve was split in half and sieved by hand.

Sample ID	220362	2		Scree	n Anal	ysis and	P.I. Worl	ksheet				DOT-3
File No.												3-19
PROJECTP	PH 0066(00)15		C	DUNTY	Aurora, Zie	bach				PCN	B015
 Charge to (if	f not above	project)										
Field No.	03			Date	Sampleo	d 03/12/201	19		Date Tested	03/12/2019		
Sampled By	Tester, O	ne	_	Teste	d By T	ester, One			Checked By	Tester, Two	_	
Material Typ	e FINE A	GGREGAT	ΓE	-	-			Source	Birdsall S 8	G Wasta		
	A-45 Br	idae						Lot No.		Sublot No.		
Weight Ticke	et Number	or Station							Lift	of		
-												_
[Wet Sample	e Weight (0.	1g)	- Or	iginal Dr	y Sampl	e Weight (0	.1g]] / dry we	eight x 100 = _	%	moistu	ire
Sieve Size	Fineness Modulus	Retained (0.1g)	% total (0.1g	ret. %)	oassing 0.1g)	% passing (rounded)	Spec Reg.		-			
4 in.		(, , 				1				
3 in.								1				
2 1/2 in.								-				
2 IN. 1 1/2 in			_					{				
1 1/4 in.												
1 in.]				
3/4 in.			_					-				
5/8 in.								-				
3/8 in. *	0.0	0.0	0.0		100.0	100	100 - 100					
1/4 in.]				
#4 *	0.2	1.2	0.2		99.8	100	95 - 100					
Pan _			_	춣	wt. before	washing (0.1g)						
TOLAT	+#4.6	radation Cho	ak	Ċ.	los	s from washing						
		radation che	un .	Dus		% - #200						
	within 0.3% of original dry wei	ght						·	Cruch	d Particles Test		
L	Fineness	Retained	% total ret	% total x	% nassi	na %nassin			Crushe	ed Farticles les		I
Sieve Size	Modulus	(.1g)	(0.1g)	% pass. #	4 (0.1g)	(rounded	a I) Spec Req.	Weight of c	rushed particles			
#6								Percent of c	crushed pieces			
#8	* 8.5	52.3	8.3		91.5	92		Specificati	on	or more FF	, min.	-
#10 #10												
#12 #16	* 32.2	149.0	23.7		67.8	68	45 - 85	- #4 9	% Particles less	than 1.95 Specif	fic Grav	ity
#20					-			Specific gra	wity of solution (1	.95 ± 0.01)	1	1.95
#30	* 50.1	112.8	17.9		49.9	50		Weight of light	ghtweight particle	s (0.1	g)	1.6
#40		79.4	12.6		37.3	37		Weight of -	#4 material	(0.1	g) 2	74.3
#50	* 78.5	99.3	15.8		21.5	22	10 - 30	% lightweig Specificati	ht particles			1
#80	*				-			opecinicau	011			
#100	* 96.1	110.6	17.6		3.9	4	2 - 10	+ #4	% Particles less	than 1.95 Speci	fic Grav	rity
#200 Pan dry		10.4	60		wt befo	re washing (0.1	 a) 629.4 	Specific gra	vity of solution (1	.95 ± 0.01)		
Pan wash		5.1	1.0		wt af	ter washing (0.1	g) 624.3	Weight of lig	ghtweight particles	s (0.1g	a)	
Total	2.66	629.0			loss from	n washing(-#20	0) 5.1	Weight of +	#4 material	(0.1	3)	
Coarse	1.65 % x % F	Retain/Design	64.40	= 1.06	- #4 G	iradation Chec	k	% lightweig	ht particles		-	
Fine 0	0.95 % x % F	Passing/Desig	gn 35.60	= 0.34		0.29/ -5		specificati	on			-
03 Reference	ed	Total/Cor	mbined -#200	1.4	origin	al dry weight	0.1					
								1				

Comments _____

												tal % pass 1%) (0.1%)														Π					
DOT-68	y Plant Mix 3-19					SE AGGREGATE			ľ	۹.	Sample Wt. (.1g)	Sieve Size Retained % to (.1g) ret(0.	2	1 1/2	1 1/4	-	3/4	5/8	1/2	3/8	1/4	#4	#8	Pan Dry	TOTAL	Gradation Check ==>	wt. before wash	wt. after wash	loss from wash	% - #200==>	Bin adj 200==>
e Analysis	Stationary	Number	6(00)15	3		iss and Type COAR	oled By Tester, One	d By Tester, One				% total % pass ret(0.1%) (0.1%)												1	24				10		
Siev	Aggregate	File	Project PH 006		ect)	Cu. Yd. Cla	Samp	Teste			ample Wt. (.1g)	ieve Size Retained (.1g)	2	1 1/2	1 1/4	-	3/4	5/8	1/2	3/8	1/4	#4	#8	an Dry	TOTAL	radation Check ==>	wt. before wash	wt. after wash	loss from wash	% - #200==>	Bin adj 200==>
2203625	Minera		121	a, Ziebach	not above proje	esents 1155.(03/13/2019	03/13/2019	Tester, Two Roads Inc		S	al % pass S %) (0.1%)						100.0	100.0	99.96	53.1	22.9	3.0			15 G	52.8	1.70	5.7	99	372
Sample ID		Test# 04	PCN B015	County Aurol	Charge to (if r	Sample Repre	Date Sampled	Date Tested	Checked By Contractor	Chip	.1g) 3098.8	(.1g) ret(0.1						0.0 0.0	0.0 0.0	104.8 3.4	1347.5 43.	935.3 30.	616.2 19.	90.5 2.9	3094.3	eck ==> 0.	re wash 275	er wash 27(m wash 45	200==> 1.	200==> 0.3
				tal Agg%	77.6	22.4			100.0		Sample Wt. (Sieve Size R	2	1 1/2	1 1/4	1	3/4	5/8	1/2	3/8	1/4	#4	8#	Pan Dry	TOTAL	Gradation Che	wt. befor	wt. aft	loss froi	# - %	Bin adj
				bs./cu. yd. To	1374.0	396.0			1770.0		12.3	% total % pass t(0.1%) (0.1%)				0.0 100.0	13.9 86.1	28.8 57.3	18.0 39.3	20.3 19.0		17.4 1.6	0.6 1.0	1.0		0.09	3771.0	3728.2	42.8	1.13	0.877
				c Batch Ticket	1" rock	Chip			Total	1" rock	Ne Wt. (.1g) 103	Size Retained (.1g) re		12	/4	0.0	4 1431.6	8 2964.8	2 1853.9	8 2095.4	4	1798.4	60.7	Dry 98.4	AL 10303.2	ation Check ==>	wt. before wash	wt. after wash	loss from wash	% - #200==>	in adj 200==>
				Mix							Samp	Sieve	2	11	11	-	3/1	5/6	11.	3/(11	7#	Ĵ#	Pan	TOT	Grada					8

	Job Mix Formula		100 - 100		95 - 100			25 - 60			0 - 10	0 - 5	5 X	
	Specification Gradation	100	100	100	100	<mark>89</mark>	67	53	36	27	9	1	0	
	Cumulative Passing	100.0	100.0	100.0	100.0	89.2	6.99	52.9	36.3	26.6	6.3	1.3	0.0	
Aggregate	Retained Total	0.0	0.0	0.0	0.0	10.8	22.3	14.0	16.6	9.7	20.3	5.0	1.4	100.1
posite Coarse														
Com													0	
	Chip						0.0	0.0	0.8	9.7	6.8	4.5	0.6	22.4
	1" rock				0.0	10.8	22.3	14.0	15.8		13.5	0.5	0.8	T.TT
	Sieve Size	2	1 1/2	1 1/4	-	3/4	5/8	1/2	3/8	1/4	#4	8#	Pan	Total

mso.mat 9-23

10.0	2
	î
0007	- #200
the state of the s	Complified
T	013

Coarse	% x % Retain/Design	58.00	ш
Fine	% x % Pass/Design	42.00	-
04 Referenced	Total/Comb	oined - #20	00

+ #4 % Particles less than 1.95 SP. GR.	1" rock	Chip	
Specific gravity of solution (1.95 ± 0.01)	1.96	1.95	
wt. of lightweight particles (0.1g)	25.0	11.0	
weight of + #4 material (0.1g)	1500.0	1430.0	
% lightweight particles	1.7	0.8	
Bin Adj. % lightweight particles	1.3	0.2	
Composite % lightweight particles	1.5		
SPECIFICATION	0.0 - 1.0		

		Siev	e Size inches	Total Sample Weight on Sieve	Weight of Tested Portion	Weight of Flat/Elongated Particles	Percent Flat/Elongated Individual Sieve	Percent Flat/Elongated Weighted Averag	
	Rock Size	50.0	2						
	1" rock	37.5	1 1/2						
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	% of Rock	25.0	-	0.0					
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	9.17	19.0	3/4	1,431.6	1431.6	6.0	0.1		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		12.5	1/2	4,818.7	809.3	6.7	0.8	0.4	
4.75 #4 1.798.4 96.7 0.9 0.9 0.2 Total sample wt. 10.144.1 Percent flat and enlongated particles in Total Rock: Percent flat and enlongated particles in Total Rock: 0.9 0.9 0.0 0.8 Rock Size Veght on Size Weight of the Sample wt. Weight of the Neight of Total Rock: 10 0.8 Stot Rock Size 50.0 2 Total Sample wt. Percent Released Flattellongated Particles in Total Rock: 10 0.8 % of Rock Size 50.0 2 11/2 Percent Released Flattellongated Particles in Total Rock: 10 0.8 % of Rock Size 50.0 2 10 0.0 0.0 0.0 0.0 0.6 12.5 1/2 1/2 1/1 2/3 2/3 1/1 2/3 2/4 2/3 2/4 2/3 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4 2/4		9.5	3/8	2,095.4	228.5	4.6	2.0	0.4	
Total sample wf_10,144.1 Percent flat and enlongated particles in: Total Rock: Percent flat and enlongated particles in: Total Rock: Percent flat and enlongated particles in: Total Rock: Total sample wf_10,144.1 Percent flat and enlongated particles in: Total Rock: Total sample wf_and enlongated particles in: Tested Partoles Rock Size Total Sample wf_and Percent flat and enlongated particles in: Tested Porton Percent % of Rock 22,4 0.0 0.0 0.0 0.0 0.0 9.5 3/8 104.8 75.0 0.0 0.0 0.0 9.5 3/8 104.8 75.0 0.0 0.0 0.0 9.5 3/8 104.8 75.0 0.0 0.0 0.0 9.5 3/8 104.8 75.0 0.0 0.0 0.0 9.5 3/8 104.8 75.0 0.0 0.0 0.0 125 1/2 2228 40.8 1.1 2.7 2.6 Meditor Size 50.0 2 2.08 1.1 2.7 2.6 No of Rock 25.0 1.1 2.7 2.6 9.0 3/4 1.1 <		4.75	#4	1,798.4	96.7	6.0	6.0	0.2	
Percent flat and enlongated particles in: Percent flat and elongated particles in Total Rock: Intel Server Total Server Total Rock: Intel Server Total Server Total Rock: Intel Server Total Server Total Server Total Server Total Server Total Rock: Intel Server Total Ser		Total s	sample v	vt. 10,144.1					
Percent flat and elongated particles in Total Rock: 0.0 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 <th <="" colspa="2" t<="" td=""><td></td><td></td><td></td><td>Percent flat and</td><td>enlongated </td><td>particles in:</td><td></td><td>1.0</td></th>	<td></td> <td></td> <td></td> <td>Percent flat and</td> <td>enlongated </td> <td>particles in:</td> <td></td> <td>1.0</td>				Percent flat and	enlongated	particles in:		1.0
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Pe	ercent fla	it and elongated	I particles in	Total Rock:		0.8	
Rock Size 50.0 2 11/2 11/2 11/2 11/2 11/2 11/2 11/2 11/2 11/2 11/2 11/2 11/2 11/2 11/2 11/2 11/2 11/2 11/2 11/2 12/2 11/2 <		Siev	e Size inches	Total Sample Weight on Sieve	Weight of Tested Portion	Weight of Flat/Elongated Particles	Percent Flat/Elongated Individual Sieve	Percent Flat/Elongated Weinhted Averan	
Chip 37.5 1 1/2	Rock Size	50.0	2						
% of Rock 25.0 1 1 1 2 1 1 2 2 3 <t< td=""><td>Chip</td><td>37.5</td><td>1 1/2</td><td></td><td></td><td></td><td></td><td></td></t<>	Chip	37.5	1 1/2						
22.4 19.0 3/4 0.0 </td <td>% of Rock</td> <td>25.0</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td>	% of Rock	25.0	-						
12.5 1/2 0.0 <td>22.4</td> <td>19.0</td> <td>3/4</td> <td></td> <td></td> <td></td> <td></td> <td></td>	22.4	19.0	3/4						
9.5 3/8 104.8 75.0 0.0 1.1 2.7 2.6 4.75 #4 2.282.8 40.8 1.1 2.7 2.6 Total sample wt. 2.387.6 1.1 2.7 2.6 Percent flat and enlongated particles in Total Rock: Percent flat and enlongated particles in Total Rock: 2.6 0.6 Rock Size Total Sample Weight on Sieve Fieldingated Fieldingated Individual Sieve Weight on Sieve Percent 0.6 8 of Rock 50.0 2 1 9 10 9 0.6		12.5	1/2	0.0	0.0	0.0			
4.75#42.282.840.81.12.72.6Total sample wt		9.6	3/8	104.8	75.0	0.0			
Total sample wt. 2,387.6 2.387.6 Percent flat and enlongated particles in: 2.6 Percent flat and enlongated particles in: 2.6 Reve size Total sample Weight of Kock: Sieve size Total Sample Weight of Kock: Sieve size Total Sample Weight of Kock: Meight on Sieve FartElongated FartElongated Mold Sieve size Total Sample Percent Minitial Sieve FartElongated FlatFElongated FartElongated Minitial Sieve FartElongated FartElongated FartElongated Minitial Sieve Farticles Farticles Meight Average Minitial Sieve 11/2 Portion Portion Portion Minitial Sieve 50.0 1 1 Portion Portion Minitial Sieve 12.5 1/2 1 Portion Po		4.75	#4	2,282.8	40.8	1.1	2.7	2.6	
Percent flat and enlongated particles in: 2.6 Percent flat and elongated particles in Total Rock: 2.6 Sieve Size Total Sample Weight of Veight of Veight of Veight of Percent Meight on Sieve Total Sample Weight on Sieve Flat/Elongated Rock Size Total Sample Weight on Sieve Veight of Sieve Veight on Sieve Percent % of Rock 50.0 2 Percent Percent Percent % of Rock 11/2 Percent flat Average Percent Percent % of Rock 25.0 1 Percent Percent Percent 19.0 3/4 11/2 Percent flat and enlongated particles in: Percent flat and enlongated particles in: 14.15 9.5 3/8 4.75 #4 Percent flat and enlongated particles in: 14.15 Percent flat and enlongated particles in: Total Rock: Percent flat and enlongated particles in: 14.15 Combined Percent Flat and elongated Particles in: Total Rock: 14.15 14.15		Total s	sample v	vt. 2,387.6					
Percent flat and elongated particles in Total Rock: 0.6 Sieve Size Total Sample Weight of Sieve Percent Flat/Elongated Flat/Elongated Flat/Elongated Percent Percent Mm inches Weight on Sieve Tested Portion Particles Percent Percent Weight on Sieve Tested Portion Particles Meight of Sieve Veight of Sieve Percent Percent Wold Rock 50.0 2 11/2 Percent Percent Percent % of Rock 25.0 1 10 3/4 Percent Percent Percent 19.0 3/4 19.0 3/4 Percent flat Percent flat Percent flat Percent 12.5 1/2 9.5 3/8 Percent flat Percent Per				Dercent flat and	enlongated	particles in:		2.6	
Sieve Size Total Sample Veright of Tested Weight of Flat/Elongated Percent Percent Mm inches Meight on Sieve Tested Flat/Elongated Flat/Elongated Rock Size 50.0 2 Neight on Sieve Portion Particles Individual Sieve % of Rock 37.5 1 1/2 Portion Particles Individual Sieve Weight of Particles Neight of Particles Neight of Particles Neight of Particles Percent % of Rock 25.0 1 Particles Particles Particles Particles % of Rock 25.0 1 Particles Particles Particles Particles % of Rock 25.0 1 Particles in Particles in Particles Particles % of Rock 4.75 #4 Particles in Particles in Particles Particles 10:0 3/4 Particles in Total Rock: Particles in Particles in: Particles % of Rock Particles in Total Rock: Particles in Total Rock: Particles		Pe	ercent fla	it and elongated	I particles in	Total Rock:		9.0	
mm inches mm inches Particles Individual Sieve Vierand Average % of Rock Size 50.0 2 11/2 Portion Particles Individual Sieve Weighted Average % of Rock 37.5 11/2 Portion Particles Individual Sieve Weighted Average % of Rock 25.0 1 Particles Individual Sieve Weighted Average % of Rock 25.0 1 Particles Individual Sieve Weighted Average % of Rock 25.0 1 Particles Particles Individual Sieve Weighted Average % of Rock 25.0 1 Particles Particles Individual Sieve Weighted Average % of Rock 25.0 1 Particles Individual Sieve Weighted Average 9.5 3/8 4.75 #4 Particles Individual Sieve 10tal sample Ministration Individual Sieve Metal And enlongated particles in Total Rock: Individual Sieve Percent Flat and Elongated Particles for Total Rock: Particles for Total Rock: Individual Sieve Individual Sieve		Siev	e Size	Total Sample	Weight of	Weight of	Percent	Percent	
Rock Size 50.0 2 11/2 11/2 11/2 % of Rock 25.0 1 <		mm	inches		Portion	Particles	Individual Sieve	Weighted Averag	
37.5 11/2 1 </td <td>Rock Size</td> <td>50.0</td> <td>2</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Rock Size	50.0	2						
% of Rock 25.0 1 <t< td=""><td></td><td>37.5</td><td>1 1/2</td><td></td><td></td><td></td><td></td><td></td></t<>		37.5	1 1/2						
19.0 3/4 19.0 3/4 19.0 3/4 12.5 1/2 12.5 1/2 12.5 1/2 12.5 1/2 12.5 1/2 12.5 1/2 12.5 1/2 12.5 1/2 12.5 1/2 12.5 1/2 12.5 1/2 12.5 1/2 12.5	% of Rock	25.0	-						
12.5 1/2 1/2 1/2 9.5 3/8 9.5 3/8 4.75 #4 1.4 Total sample wt. 1.4 Percent flat and enlongated particles in: Percent flat and elongated particles in Total Rock: Percent flat and elongated particles in Total Rock: Percent flat and Elongated Particles in Total Rock:		19.0	3/4						
9.5 3/8 9.5 3/8 4.75 #4 1.4 Total sample wt. Percent flat and enlongated particles in: Percent flat and enlongated particles in: Percent flat and elongated particles in: Total Rock: Total Rock: Percent flat and elongated particles in Total Rock: Combined Percent Flat and Elongated Particles for Total Rock: Rounded:		12.5	1/2						
4.75 #4 4.75 #4 101 Total sample wt. Percent flat and enlongated particles in: Percent flat and elongated particles in Total Rock: Total Rock: Combined Percent Flat and Elongated Particles in Total Rock: Total Rock: Rounded:		9.6	3/8						
Total sample wt. Percent flat and enlongated particles in: Percent flat and elongated particles in Total Rock: Combined Percent Flat and Elongated Particles for Total Rock: 1.4		4.75	#4					t	
Percent flat and enlongated particles in: Percent flat and elongated particles in Total Rock: Combined Percent Flat and Elongated Particles for Total Rock: 1.4		Total s	sample v	vt.					
Percent flat and elongated particles in Total Rock: Combined Percent Flat and Elongated Particles for Total Rock: 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4				Percent flat and	enlongated (particles in:			
Combined Percent Flat and Elongated Particles for Total Rock: 1.4 Rounded: 1		Pe	ercent fla	it and elongated	I particles in	Total Rock:			
Rounded: 1	Combined I	Percent	Flat an	d Elongated Pa	articles for T	otal Rock:		1.4	
						Rounded:		F	

Sample ID	220364	3		Screen Analysis and P.I. Work						sheet				DOT-3
File No.														3-19
PROJECT	PH 0066(00)15		COUNTY Aurora, Ziebach									PCN	B015
- Charge to (i	if not above	project)				-								
Field No.	04		_	D	ate S	ampled	03/16/20	19			Date Tested	03/16/20	19	
Sampled By	Tester, O	ne		Te	ested	By <u>Te</u>	ester, One				Checked By	Tester, T	wo	
Material Typ	e FINE AG	GGREGA	TE	-						Source	Pete Lein &	Sons, W	/asta	
	1155.0	cuvd, RT.	2805.0						-	Lot No.		Sublot N	0.	
Weight Tick	et Number	or Station	Belt						-		Lift	of		
DMat Campl	le Weight (0	10)		Original Day Sample Weight (0.4g)						1 / douw	aighty 100 -		0/ maist	
[wet Sampi	e weight (U.	IG)	- Or	- Original Dry 3			Sample Weight (0.1g]/ dry w	=		- moisu	ne
Sieve Size	Fineness Modulus	(0.1g)	(0.1g	ret.)	% pa (0.	ssing 1g)	% passing (rounded)	Spe	c Req.					
4 in.														
3 in.														
2 1/2 IN. 2 in														
1 1/2 in.														
1 1/4 in.														
1 in.														
3/4 in.														
5/8 IN.														
3/8 in.	* 0.0	0.0	0.0		10	0.0	100	100	- 100					
1/4 in.														
#4	* 0.1	0.8	0.1		99.9		100	95	- 100					
Pan [_	eck		wt.before	washing (0.1g) washing (0.1g)	<u> </u>						
IViai	+#4.6	radation Che	ck	_	5 5	loss from washing								
		radation one	UN		Dus	% - #200								
	original dry wei	ght		[10.01		
	Finances	Potningd	% total rot	% total ret. % total			x % passing % passing			Weight of crushed par			lest	
Sieve Size	Modulus	(.1g)	(0.1g)	% pa	ss. #4	(0.1g)	(rounded	n⊌ d) Sp	ec Req.	Weight of c	rushed particles			
#6										Persent of a	srushed sieses			
#8	* 5.4	31.0	5.3			94.6	95			Specificati	on	or more	FF, min.	-
#10								_						
#12 #16	* 27.2	129.2	21.0			72.7	72		5 . 95	- #4	% Particles less	than 1.95 Sp	ecific Grav	ity
#20	21.5	96.5	16.5			56.2	56	+	/ - 00	Specific gra	avity of solution (1	.95 ± 0.01)	1	1.95
#30	* 62.0	106.7	18.2			38.0	38	+		Weight of li	ghtweight particle	5	(0.1g)	0.0
#40		89.1	15.2			22.8	23	+		Weight of -	#4 material	((0.1g) 2	98.4
#50	* 87.2	58.7	10.0			12.8	13	1	0 - 30	% lightweig	ht particles			0.0
#80		49.0	8.4			4.4	4			Specificati	ion		0	- 1
#100	* 96.8	6.9	1.2			3.2	3		2 - 10	+ #4	% Particles less	than 1 95 Sr	ecific Grav	vitv
#200		10.6	1.8			1.4	1.4				A la lucies less	unan 1.00 op		il.y
Pan dry		0.8	8.5			wt befo	re washing (0.1	1g)	585.7	Specific gra Weight of li	avity of solution (1	.95±0.01) = /	0.10)	
Pan wash	0.70	7.7	1.5			wt an	er wasning (0.1	19)	578.0	Weight of +	· #4 material	-	(0.1g)	
	4.28 64 64 64	0.860	50.00		70	. #4 G	radation Cheel	k	1.1	% lightweig	ht particles		· •	
Coarse	1.30 % X % F	ketain/Desigr	n <u>58.00</u>	= 0.	24	- #4 0	coacion chec		I	Specificati	ion			-
Fine -	1.45 % X % F	assing/Desi	gn 42.00	- 0.0	51	within	0.3% of							
04 Referen	ced	Total/Co	mbined -#200	1.	4	origina	al dry weight		0.1					

Comments

Sample ID	2203623		S	ieve Ana	lysis	and I	P.I. V	Norks	sheet DOT	-3
File NO.				0.01117					5-	19
PROJECT	PH 0066(00)	15		COUNTY	Auro	ra, Zie	bach		PCN <u>B015</u>	_
Charge to (i	f not above p	project)								
Field No.	01		l	Date Sample	ed 03/	13/201	9		Date Tested 03/13/2019	
Sampled By	Tester, On	е		Tested By	Teste	er, One			Checked By Tester, Two	
Material Tvp	e Type 2A	Cover Ac	areaate						Source Spencer Quarry	-
	Takon (n 180 3 to	ne					-	Lat No Sublat No	-
Mainta Tint.	-t Niumban a	. Chatlan	# 40.4 . 04- 1	000.00				-		
vveight Tick	et Number of	Station	# 194, Sta	566+00						
[Wet Sample	e Weight (0.1g])	- Origin	al Dry Samp	le Weight (0.1g] / dry weight x 100 =% moisture	
	Fineness	Retained	% total ret.	% passing	% pa	ssing				
Sieve Size	Modulus	(0.1g)	(0.1g)	(0.1g)	(rou	nded)	Spec	Req.		
4 in.									Liquid Limit & Diactic Limit Liquid Plastic	
3 in. 2 1/2 in									A Can aumber	
2 in.									B. Weight of can + wet soil (0.01g)	
1 1/2 in.									C. Weight of can + dry soil (0.01g)	
1 1/4 IN. 1 in									D. Weight of water (B - C) (0.01g)	
3/4 in.									E. Weight of can (0.01g)	
5/8 in.									F. Weight of dry soil (C - E) (0.01g)	
1/2 in.	. 00	0.0	0.0	100.0	- 1	00	100	100	H. Plastic Limit (D / F x 100) (0.1g) N.A.	
3/8 IN. 1/4 in	- 0.0	235.5	19.2	80.8		81	100	- 100	I. Plasticity Index (G - H) (0.1g) Specifica	ition
#4	 ▲ 47.6 	349.1	28.4	52.4		52	0.	. 70	Liquid Limit N.C. Grounded)	
Pan				· wt. before	washing	(0.1g)			Plasticity Index (I rounded) N.A. 0 .	3
Total		Conduction O	haab	vt. after	washing	(0.1g) eshina			J. Correction # Blows	
	T #4	Gradation C	neck	Sng	%	- #200			weight - #40 / weight - #4 x % passing #4 =	0
	within 0.3% of original dry weigh								(±3.0% VARIABLE of accumulative % passing (0.1%) on the #40)	—
	Fineness	Retained	% total ret.	% total x % p	assing	% pass	ing			
Sieve Size	Modulus	(.1g)	(0.1g)	% pass. #4 (0.1g)	(round	ed) S	pec Req	۱	
#6									Crushed Particles Test	
#8	• 89.8	518.3	42.2	22.1	10.2	10	_	0 . 28	8 Weight of crushed particles 582	.6
#10		44.0	3.0	1.9	0.0		_		Weight of total + #4 sample 582	00
#12	•						-		Specification 2 or more FF, min. 50 _ 10	00
#20										ᆕ
#30	•								- #4 % Particles less than 1.55 Specific Gravity	
#40		66.0	5.4	2.8	1.2	1		0.4	Specific gravity of solution (1.95 ± 0.01)	
#50	-						_		Weight of igntweight particles	
#60 #100							+		% lightweight particles	
#200		12.2	1.0	0.5	0.2	0.2	0	0.0 _ 3.0	0 Specification	
Pan dry		1.1	4.7	0.2 w	t before v	washing (O	.1g)	1228.5	+ #4 % Particles less than 1.95 Specific Gravity	Γ
Pan wash	ו ו	3.6	0.2		wt after v	washing (O	.1g)	1224.9	Specific gravity of solution (1.95 ± 0.01)	
Total		1230.4		loss	from wa	ashing(-#	200)	3.6	Weight of lightweight particles (0.1g)	
Coarse	% x % R	etain/Design	=_		4 Gradati	ion Check			Weight of + #4 material (0.1g)	
Fine	0.30 % X % P	assing/Desig	n=	wit	thin 0.3%	of		0.45	Specification	
		Total/Con	1bined -#200	ori	ginal dry	weight		0.15		_
N	atural Fines	0.00 Ma	. Sand	0.00 Filler	r Devel	0	.00			
N	aturai Sand	0.00 Ad 0.00 Cr.	Rock	0.00 Na. 1 0.00 Cr. F	ines	C C	.00			

Comments 12" sieves were used. The #8 was split in two and shaken by hand. As per foot note #2, plasticy index was wavied as not more than 4.0% of the material passed the #40 sieve.