

# Appendix B: Gradation and P.I. Determination

**SCREEN ANALYSIS AND P.I. WORKSHEET** DOT - 3

FILE NUMBER 12-99

1

COUNTY \_\_\_\_\_ PROJECT \_\_\_\_\_ PCBMS \_\_\_\_\_

SAMPLE NO. \_\_\_\_\_ DATE SAMPLED \_\_\_\_\_ DATE TESTED \_\_\_\_\_

SAMPLED BY \_\_\_\_\_ TESTED BY \_\_\_\_\_ CHECKED BY \_\_\_\_\_

MATERIAL TYPE \_\_\_\_\_ SOURCE \_\_\_\_\_

WEIGHT TICKET NUMBER OR STATION \_\_\_\_\_ LIFT \_\_\_\_\_

4

Sieve size		Retained	% total	% total x %	Acc. % pass	Acc. % pass	REQ.	L. L., P. L., and P. I.	
mm	in	(g)	(%)	(%)	(%)	(%)		L.L.	P.L.
50.0	2								
37.5	1 1/2								
31.5	1 1/4								
25.0	1								
19.0	3/4								
16.0	5/8								
12.5	1/2								
9.5	3/8								
6.3	1/4								
4.75	#4								
PAN									
TOTAL									

3

DESIGN Fines, % \_\_\_\_\_ x SAND = \_\_\_\_\_ - #4 Gradation check

MA. coarse, % \_\_\_\_\_ x ROCK = \_\_\_\_\_ within 0.3 % of the

Combined % Pass #200 based on design max: \_\_\_\_\_ wt. before washing

No. Rock	Natural Fines	Cr. Fines
Cr. Rock	Natural Sand	Ma. Sand
Filler	Spencer Add. Rock	

5

6

CRUSHED PARTICLES TEST

Weight of crushed pieces (0.1g) \_\_\_\_\_

Weight of total - #4 sample (0.1g) \_\_\_\_\_

Percent of crushed pieces (SW/Heil) \_\_\_\_\_

SPECIFICATED \_\_\_\_\_ of max. FF, min.

6

COMMENTS:

mso.mat 4-00

Figure 15: Standard Analysis Sheet from the South Dakota Department of Transportation (16)

## Key to Screen Analysis and P.I. Worksheet

1. This is important data, especially for the sake of others who may use the information in the future. Proper data when submitting the sample for testing is critical. Too often, certain information is missing from the heading of the analysis worksheet. Always check to see that the information is correct.
2. This section, along with the next section, gives the breakdown of size (gradation) of the material. This alone tells a lot about material. Is it too coarse or fine, or is the blend of stone, sand, and fines wrong? Notice that the top section of gradation shows all material retained on the #4 sieve and larger. This is the stone-size category.
3. The bottom left section gives the gradation breakdown of sand sized particles on the appropriate sieves from #8 through #80 as well as the percentage of fines which will pass the #100 or 200 sieves.
4. This section is important in determining the stability or strength that the material will have when used as a base material and also the "binding characteristic" that material will have as surface gravel. The PI or plasticity index is of particular importance. Surface gravel needs a minimum index of 3 to assure a small percentage of true clays for binder. Good base gravel needs no plasticity and ideally should be clean and drainable to retain strength for supporting the pavement above it.
5. This section is not as important for base or surface materials, but is critical in determining the quality of material for making asphalt concrete since it shows the durability or "soundness" of aggregate. However, in some regions where aggregate is known to be poor, this test is good even for surface gravel.
6. This final section is very important when testing material for use in asphalt or base. However, it can be very useful even in testing base or surface gravel because it shows what percentage of the stone has at least one fractured face. When crushing pit-run type gravels, many of the small, natural stones will go through the crushing plant without being fractured. Gravel has more strength when there are more crushed particles since they will interlock better with the particles surrounding them. Natural stone with a rounded shape will tend to shift and move under loads more easily.