ATT-54/96, DRY STRENGTH, Non-Plastic Aggregates

1.0 SCOPE

This method describes the procedure for determining the relative degree of cohesiveness of the fines portion of an aggregate by relating it to the dry strength of the -315 Fm fraction. The dry strength can be used to assess the plasticity of the fines.

2.0 EQUIPMENT

drying pan
rubber tipped pestle
2 wash basins (stainless steel)
water wash bottle
small 300 g ball peen hammer

3.0 PROCEDURE

3.1 General

This test is a relatively simple procedure that can provide an estimate of the plasticity of the fines portion of an aggregate. The test is not a replacement for the Atterberg Limits test which is more complex, requires specialized equipment and considerable experience especially for low plasticity materials. The results of the dry strength test can be used to identify a need for confirmatory Atterberg Limit testing.

3.2 Sample Preparation

1. Obtain a representative sample of aggregate as directed in ATT-38, SAMPLING, Gravel and Sand.

   NOTE: A separate sample is not required if this test is done in conjunction with ATT-25, SIEVE ANALYSIS, 80 000 Fm Minus or ATT-26, SIEVE ANALYSIS, 20 000 Fm Minus. In this case, split the dry moisture content sample down to 1000 to 1500 g and proceed to step 7.

2. Sieve the entire sample through the 80 000 Fm sieve and discard the material retained on the 80 000 Fm.

3. Sieve the -80 000 Fm aggregate through the 16 000 Fm sieve.

4. Brush off the fines adhering to the +16 000 Fm rocks into the -16 000 Fm aggregate.

5. Use the sample divider to successively split the -16 000 Fm material, until a sample of 1 000 g to 1 500 g is obtained.

6. Dry the sample to a constant weight as directed in ATT-14, MOISTURE CONTENT, Open Pan Method or ATT-15, Oven Method. Do not overheat the sample if using the open pan method as it may alter the characteristics of the sample.

7. Sieve the sample on the 315 Fm sieve into a wash basin, retaining all the -315 Fm material.

8. Place the material retained on the 315 Fm into another stainless steel wash basin.

9. Use the rubber covered pestle to break up the +315 Fm soil. Continue until all the fine soil particles are removed from the rocks and all lumps are broken down.

10. Repeat steps 7 to 9 until all the -315 Fm soil is obtained.

11. Take a representative sample weighing about 60 g from the thoroughly mixed portion of the -315 Fm material.

12. Place the soil sample in the palm of the hand and gradually add water with the wash bottle. Mix the soil and water by working the sample until there is enough water in the soil so that the soil can be easily formed into a ball.

13. Form the wet soil into a ball with a diameter between 25 to 30 mm.

14. Place the ball in the drying pan and oven dry the ball at 110˚C ±5˚C for at least 12 hours and let cool for at least 1/2 hour.

3.2 Dry Strength

1. The comparative resistance to crushing of the dried soil as judged by the finger pressure required, is the basis for classifying the relative degree of cohesiveness of the soil. Classify the relative degree of cohesiveness of the soil as follows:

   a) If the dry ball crumbles under slight finger pressure, classify the sample as "non-plastic friable".

   b) If the dry ball crumbles under moderate finger pressure and can then be easily pulverized, classify as "non-plastic low".

c) If the dry ball crumbles under considerable finger pressure, classified as "non-plastic medium".

If the dry ball does not crumble under considerable finger pressure but breaks after a moderate hit with a hammer while held in the palm, and the broken piece crumbles under considerable finger pressure, then the sample is classified as "non-plastic medium".

d) If the dry ball cannot be broken by finger pressure but breaks only after a solid hit with a hammer while held in the palm and if a piece of the broken sample does not break under considerable finger pressure, classify the sample as "non-plastic high".

The moderate or solid hit of the hammer to break the ball aids in determining the classification of "non-plastic medium" or "non-plastic high". However, the resistance of the broken piece of ball to crumble under finger pressure is the final determining factor for classification.

2. If the result is classified as "non-plastic high", further additional confirmatory Atterberg Limit testing may be required.

4.0 REPORTING

Report the results of the test on the Daily Gradation Report (MAT 6-72).