

## SUBGRADE CHEMICAL STABILIZATION TEST

1. SCOPE: The following test method shall be used to determine the percent chemical that will be added to a soil subgrade for stabilization. The type chemical (cement or lime) will be determined in accordance with Federal Highway's manual FHWA-IP-80-2, "Soil Stabilization in Pavement Structures-A User's Manual".
2. MOISTURE-DENSITY:
  - 2.1. A minimum of 2 moisture-density tests shall be performed on each sample. One test shall be performed on the natural soil and another with 5 percent chemical added based on dry weight.
  - 2.2. The test shall be performed in accordance with Kentucky Method KM 64-511 with the following additions:
    - 2.2.1. Add to the soil for test no. 2 the required amount of chemical prior to adding water and mix thoroughly to a uniform color.
    - 2.2.2. When the test is performed with a lime additive, the sample shall be allowed to mellow for one hour in a covered pan after adding water prior to compaction.
3. UNCONFINED COMPRESSION:
  - 3.1. Apparatus:
    - 3.1.1. Specimen molds: The molds shall be cylindrical in shape and made of rigid metal with a inside diameter of  $2.80 \pm 0.01$  in. The height-to-diameter ratio shall be between 2 and 2.5. Refer to Figures 1 and 2 for details of the compaction equipment.
    - 3.1.2. Balance: A balance that has a 0.1 g. readability.
    - 3.1.3. Oven: A thermostatically controlled drying oven capable of maintaining a temperature of  $230^{\circ} \pm 9^{\circ}\text{F}$  for drying moisture samples and  $120^{\circ} \pm 9^{\circ}\text{F}$  for curing samples.
    - 3.1.4. Mixing Tools: Mixing pans, spoons, trowels, etc. and a device for measuring increments of water.
  - 3.2. Sample Preparation: Samples shall be compacted for unconfined compression testing with varying percentages of chemical additive. Four samples are recommended for lime (0,4,5

and 6%) and 3 for cement (0,4, and 6%). The samples shall be compacted at 95% of maximum density and at optimum moisture. The density test with 5% additive shall be used for all samples for preparing test specimens for unconfined testing. Samples shall be prepared as follows:

- 3.2.1. One specimen shall be prepared for each percentage. Prepare a predetermined weight of the uniformly mixed soil or soil-chemical to provide a specimen of the designed density. When using lime the mixture shall mellow for one hour prior to compacting in the mold.
- 3.2.2. The mixture shall be compacted in the mold in four equal layers by tapping the piston with a rubber mallet. One sleeve shall be added to the piston for each layer.
- 3.2.3. The sample shall be removed from the mold and weighed. Unconfined compression tests shall be performed on untreated samples after weighing. Treated samples shall be placed in a sealed plastic bag. This bag is placed in another bag, approximately 3 ounces of water added for a moisture barrier, sealed, and placed in an oven at  $120^{\circ}\text{F} \pm 9^{\circ}\text{F}$ . The sample is cured for 48 hours and then tested.
- 3.2.4. Unconfined Compression tests shall be in accordance with AASHTO T-208.

4. CALCULATION: When the unconfined compressive strengths have been determined a plot shall be made of  $Q_u$  (psi) verses percent chemical.
5. REPORT: The recommended percentage of chemical shall be determined and reported as follows:
  - 5.1. The percentage at which a 50 psi increase occurs above the untreated soil strength, but with a unconfined compressive strength not less than 100 psi.
  - 5.2. The percentage at which the peak strength occurs when 5.1.1 is not obtained.

APPROVED

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DIRECTOR  
DIVISION OF MATERIALS

DATE

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