

Full Depth Reclamation with Cement: Sample Collection and Preparation Procedures

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The success of any Full Depth Reclamation with Cement (FDR) project begins with the proper sampling and preparation of pavement, base and/or subgrade materials to be used in lab tests. Lab data from the sampled materials will ultimately provide the basis for an appropriate FDR mix design. If field samples are not obtained, and a mix design is not performed, it can lead to premature failure of the reclaimed layer and ultimately lead to costs that could have been avoided by following some simple procedures.

Materials that will be used in the FDR process can be sampled in two ways:

1. Field pulverization (using a special drill bit) and collection of materials to the expected reclamation depths.
2. Collection of materials by auger or manual methods (i.e. shovel, post hole digger, pick ,etc.). No field pulverization is performed.

Method 1:

Field pulverization and sample collection using a specialized drill bit mimics the pulverization done by reclaiming equipment used in FDR construction, and reduces lab preparation time. An example of a sampling drill bit used by the North Carolina DOT is seen in Figure 1. Samples should be collected to the expected reclamation depth (usually 6 to 12 inches). A minimum of 100 pounds of material is needed from each sample location to run the necessary lab tests needed for a mix design. [Note: one 5-gal bucket will hold about 50 lbs. of material).



Method 2:

If field pulverization methods are not used to obtain mix design samples, attention to sample collection is vital. Samples should be obtained from all layers expected to be reclaimed (asphalt, base, and possibly subgrade). The asphalt layer can be saw cut, or in most cases simply removed using hand tools such as picks and shovels. Underlying base and/or subgrade materials should be sampled to the expected reclamation depth. If the depth of reclamation is not known, the materials should be kept separate so that blending can be done in the lab. (For example, if it is not known if the subgrade will be included in the reclamation, it should be bagged separately so that the effect of including the subgrade material can be evaluated in the lab). As with the field pulverization sampling technique, a minimum of 100 pounds of material is needed for the necessary lab tests.

The asphalt sample obtained for lab testing is usually collected in large pieces. This material must be broken down to a size that is comparable to the pulverization that occurs during FDR construction. For instance, Summit Engineering (located in Charlotte, NC) places sampled asphalt in a drying oven and heats the material to approximately 110° F. By using just hand manipulation, the softened asphalt can be reduced to an appropriate size similar to that obtained during field pulverization.

Once a lab has prepared the material, testing will proceed using ASTM D558, "Standard Test Methods for Moisture Density (Unit Weight) Relationships of Soil-Cement Mixtures" and if unconfined compressive strength data is desired, ASTM D1633, "Test Method for Compressive Strength of Molded Soil-Cement Cylinders" is recommended.

The road to success with Full-depth Reclamation begins with proper sampling and preparation of materials for lab tests. With a few simple procedures in sampling and material preparation, an optimized mix design can be obtained that will contribute in part to the success of a Full-depth Reclamation project.