While Full Depth Reclamation (FDR) has many potential cost and environmental benefits, especially over the lifetime of the pavement, it is necessary to be able to ensure that the recycled pavement will perform adequately. Pavement design is moving away from previous empirical methods toward more mechanistic approaches. The Mechanistic-Empirical Design Guide (MEPDG) was developed as an improvement from the previous 1993 AASHTO Design Guide. The MEPDG allows for more accurate performance prediction and material characterization by requiring specific material properties, climate data, and expanded traffic data as inputs. These performance models have been carefully calibrated for many regions, and distress models have been created for different material types based on much research. While this method of structural design has made considerable improvements from the 1993 AASHTO Design Guide, there is still much more work to be done.

Because FDR is a combination of several different layers of material pulverized, mixed, stabilized, and re-compacted, it does not fit neatly into any of these predetermined types of materials considered by the MEPDG. Research has indicated that the MEPDG does not currently consider the unique properties of the composite layer created by FDR. Current practice is to treat FDR as an unbound granular base layer, specifically as an in-place recycled asphalt pavement (RAP), but this does not account for the added stability of the selected stabilization technique. The MEPDG software does provide the option for a stabilized base course; however, the stabilization methods are only chemical additives, such as cement and lime. Therefore, FDR materials stabilized using asphalt emulsion, foamed asphalt, or some combination of additives are not directly considered. Previous research has proven that there is a significant difference in the performance prediction when FDR is treated as an unbound granular layer versus treating it as an asphalt concrete layer. Eventually, a new layer type will need to be created that considers the unique properties of these recycled, stabilized base courses. However, until then, the question remains as to how to use existing structural design tools to model FDR in a way that best captures its structural benefits.

In this research, both laboratory and field materials will be used to evaluate which layer type in the MEPDG best models actual FDR performance. Materials were taken from two Arkansas highways and a local quarry to create FDR mixtures stabilized with asphalt emulsion. Following the completion of the mix design procedure on each of these mixtures, necessary laboratory tests will be performed to obtain all of the required material inputs for both unbound granular materials and asphalt concrete layers by the MEPDG. These tests will include the Resilient Modulus (AASHTO T307) for the unbound granular layer characterization and the Indirect Tensile Creep Compliance (AASHTO T322) and Dynamic Modulus (AASHTO TP62-07) for asphalt concrete layer characterization. Upon obtaining all required material inputs, two models will be created in MEPDG for each of the three FDR mixtures: one with the FDR layer as an asphalt concrete layer and the other with the FDR layer as an unbound granular layer. The outputs of these analyses will be compared and analyzed in order to better understand how current MEPDG technology can be used for the design of pavements rehabilitated with FDR.