The present thesis tries to develop a numerical model to predict the behavior of asphalt mix. Asphalt mix is a composite material constituted with asphalt binder (also known as bitumen), stone aggregates and air voids. In this work small stone aggregates (i.e aggregates passing through 2.36 mm sieve), asphalt binder and air voids together is assumed to behave like a homogenous material and is referred as 'binder mix'.

The binder mix is modelled as an elastic-viscoplastic material and analyzed by Finite Element Method (FEM). The analysis results are then matched with the experimental results of binder mix. Asphalt mix samples are modeled as a two phased material with one continuous phase (i.e the matrix) of binder mix and another phase, dispersed in the matrix, constituting large aggregates (aggregates retained on 2.36 mm sieve).The large aggregates are considered to be rigid and elastic in nature. In this work asphalt mix samples are modeled with random elliptical aggregates. The elliptical aggregate samples are prepared by generating non overlapping ellipses of random shape and orientation. The meshing is done using a Finite Element software ANSYS. Figure 1 shows the sequence in which the FE model is developed.

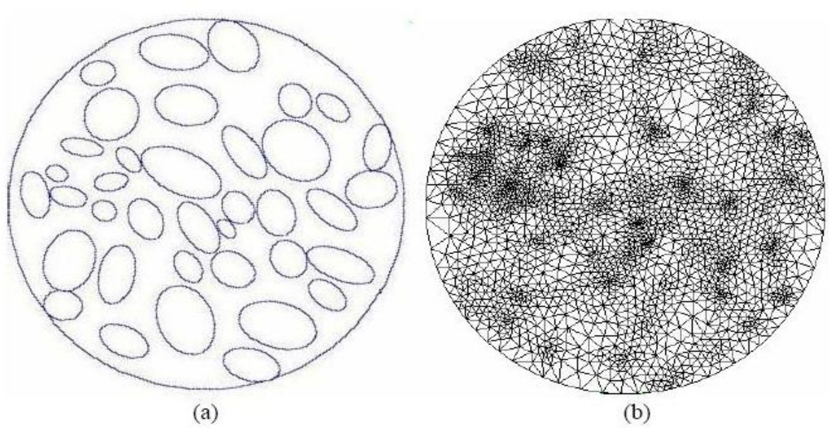

Figure 1: Mesh generation for elliptical aggregate sample (a) elliptical aggregate (b) final mesh

The overall behavior of the asphalt mix is studied for variations in constituent proportions and morphology using FEM analysis and the contact force per unit length versus time response are compared with the experiments performed on asphalt mix. Figure

2 shows the comparison of computational and experimental results.

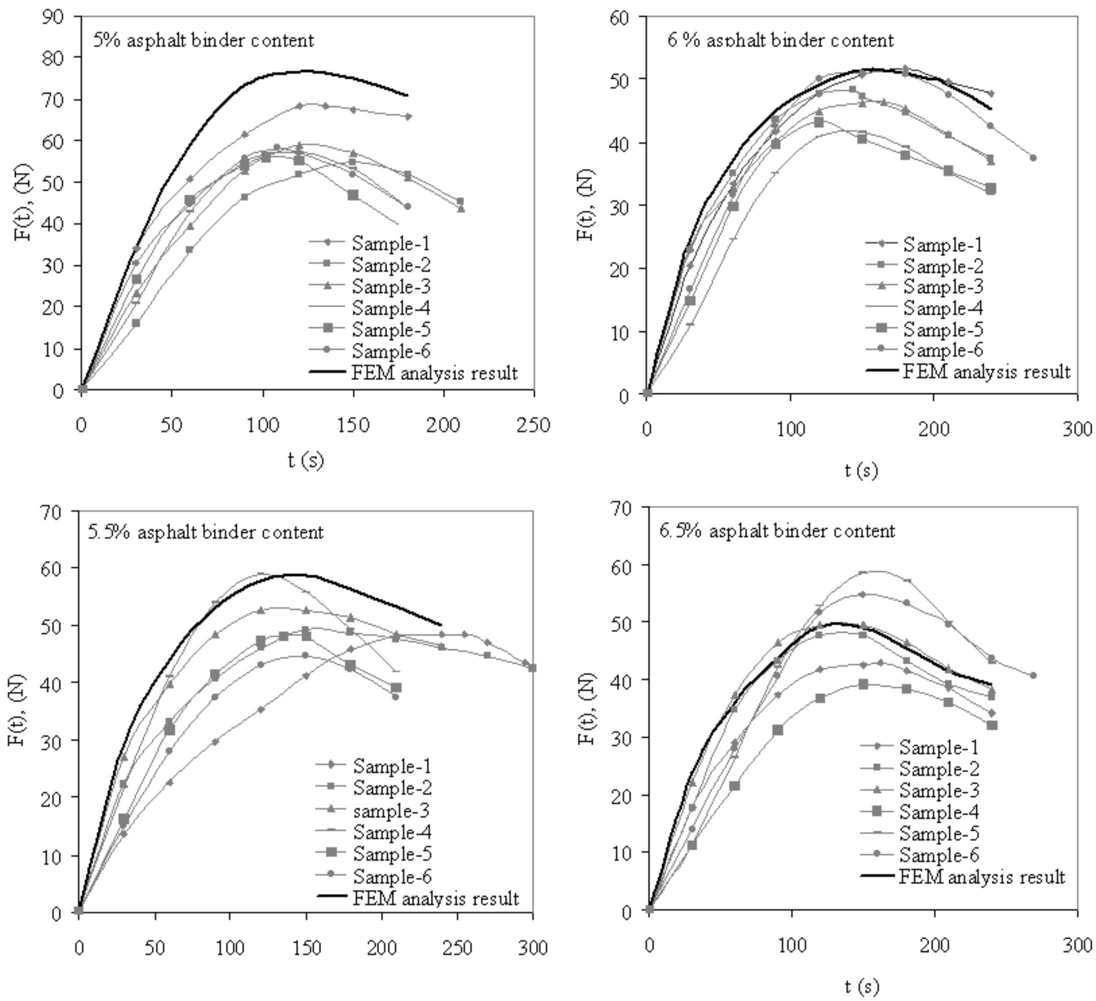

Figure 2: Comparison of experimental and simulated (elliptical aggregates) results for asphalt mix samples