Rigid Pavement Example

We are going to design a limited-access highway in an exurban area. The predominate terrain is rolling hills. In order to accommodate expected commuter traffic of 20,000 to 30,000 vehicles/day, we require 3 traffic lanes in each direction. The two-way ADTT is expected to be 1000 trucks/day in the first year of operation. Based on statewide averages, the average LEF for rigid pavements is 0.98. It is assumed that truck traffic will grow at a rate of 3% per year over the 25-year design life.

Local practice is use a granular subbase that will drain within a few hours. The subbase has a resilient modulus of 15,000 psi when wet and 25,000 psi when dry. The roadbed soil has a resilient modulus of 3000 psi during the 7 months from November through May (the “wet” season) and 7000 psi the rest of the year. Based on rainfall data, we expect that the pavement will see moisture levels approaching saturation one week per month during the wet season.

According to local practice, the pavement will be designed as JPCP with tied concrete shoulders. The slab length will be 30 feet and dowel bars will provide load transfer at the joints. The concrete slab is designed for a compressive strength of 5500 psi. We will assume that the initial pavement serviceability index will be 4.5, which is the AASHO Road Test value for rigid pavements. Based on the high traffic volume, we will select a terminal serviceability level of 2.5.