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 will need 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 3% per year over the 25-year design life.

Local practice is to lay the concrete slab on a granular subbase that will drain within a few hours.

The granular 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 5000 psi during the 7 months from November through May (the “wet” season) and 6500 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.

The concrete for this job has an average 28-day compressive strength of 5430 psi and an average 28-day modulus of rupture of 578 psi.

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. We will assume that the initial serviceability index of the pavement 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.