5F-2 Flexible Pavement Design Nomograph

Figure 1 presents the nomograph used for determining the design structural number (SN) to withstand the projected level of axle load traffic. A summary of the required inputs are as follows:

1. The design serviceability loss, PSI = P_o-P_t (Section 5F-1, 1, a and b)
2. The estimated Traffic Equivalence Factors (W_{18}) (Section 5F-1, 2, b)
3. The reliability, R (Section 5F-1, 2, c)
4. The overall standard deviation, S_o (Section 5F-1, 2, d)
5. The effective resilient modulus of roadbed material, M_R (Section 5F-1, 3, a)

Once the design structural number (SN) for the pavement structure is determined from the nomograph, a set of pavement layer thickness, which when combined will provide the load-carrying capacity corresponding to the design SN, must be determined. The following equation provides the basis for converting the SN into actual thickness of surfacing, base and subbase:

$$SN = a_1D_1+a_2D_2m_2+a_3D_3m_3$$

where

a_1,a_2,a_3 = layer coefficients representative of surface, base, and subbase courses, respectively. (See Section 5F-1, Table 11)

D_1,D_2,D_3 = actual thicknesses (in inches) of surface, base, and subbase courses, respectively.

m_2,m_3 = drainage coefficients for base and subbase layers, respectively. (See Section 5F-1, Table 13)

The SN equation does not have a single unique solution; i.e., there are many combinations of layer thicknesses that are satisfactory solutions. The thickness of the flexible pavement layers should be rounded to the nearest 1/2 inch.

The Design Engineer should try several solutions and when the SN number determined from the layer analysis exceeds the nomograph SN determination the thickness for each layer is known.

For example, on the nomograph an SN of 5 was determined. Assume that for the first trial a 3 inch type B asphaltic concrete surface is to be used, with 11 inches of type B asphaltic concrete base Class 2 and a 6 inch granular subbase. Also, it was assumed for this example a drainage coefficients equal to 1.00.

$$SN = 0.40(3.0") + 0.30(11") (1.0) + (0.10)(6")(1.0)$$
$$= 5.1$$

Therefore, 14 inches of flexible pavement with 6 inches of granular subbase is one option to be used.

Figure 1: Design chart for flexible pavements based on using mean values for each input
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