RECOMMENDED DESIGN METHOD FOR FLEXIBLE PAVEMENTS IN VIRGINIA

by

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The sophisticated design techniques developed from the AASHO Road Test results and other investigations necessitated modification of the charts used for design of flexible pavements in Virginia. The increased knowledge of the materials now used in the construction of flexible pavements in Virginia (e.g., cement treated aggregate, soil cement, and soil lime) also needed to be properly incorporated in the design method.

Investigations* have been carried out and a new design method has been determined. While incorporating the latest design techniques and use of the materials discussed above, this method still permits present construction practices.

From the investigations referred to, the following were determined.

(I) Thickness equivalencies (i.e., the ratio of the strength of one inch of material in the layer to one inch of asphaltic concrete) of the materials in each layer. The values for Virginia are given in Table I.

(II) Soil Support Value = SSV = soil resiliency value x design CBR

On the basis of the investigations, Virginia was divided into five soil classification areas according to the soil resilience properties as shown in Figure (a). The following values were determined for each classification.

Soil Classification	Soil Resiliency Value
1	0.5
2	1.0
3	1.5
4	3.0
5	2.0

*Vaswani, N. K., "AASHO Road Test Findings Applied to Flexible Pavements in Virginia", Virginia Highway Research Council, Charlottesville, Virginia.

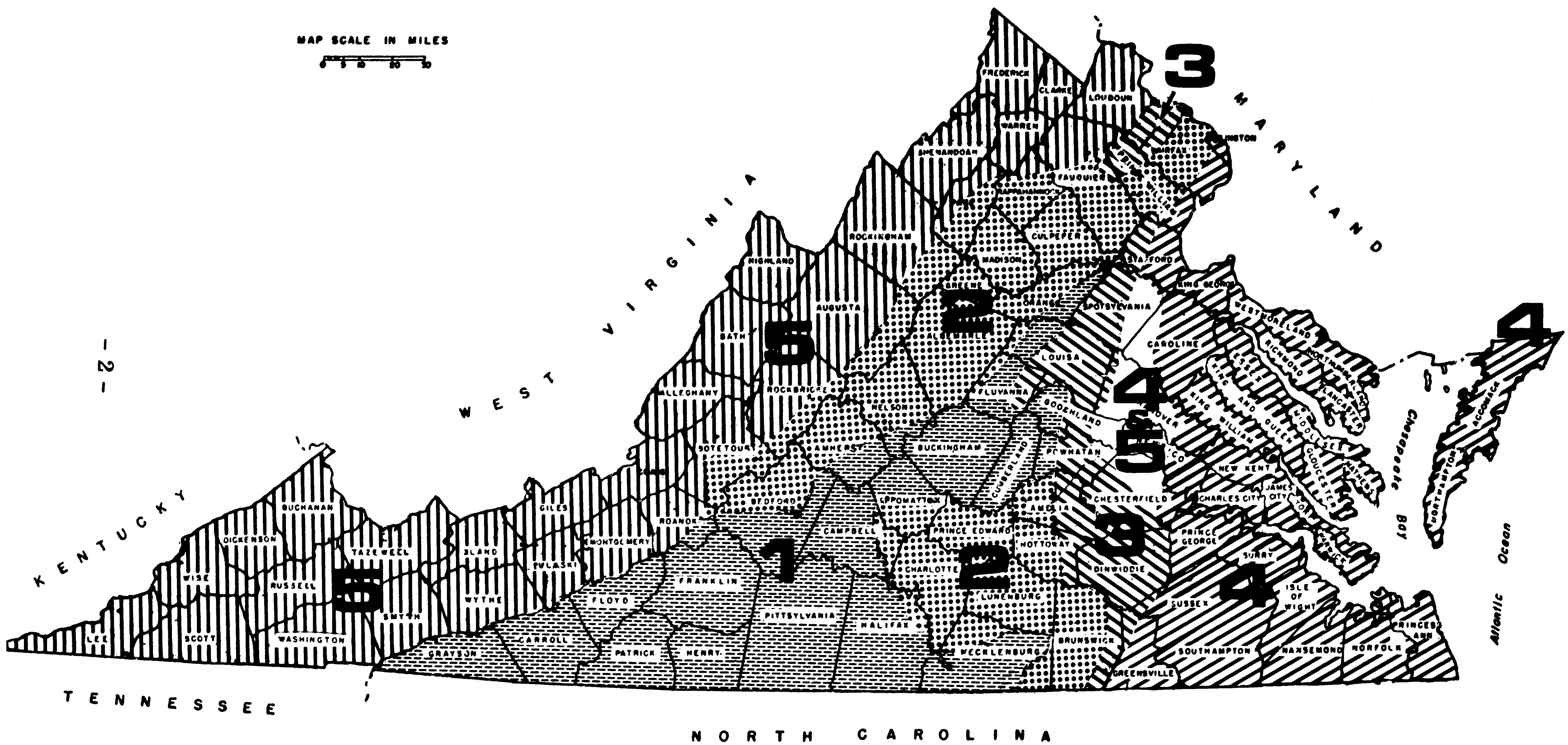

Figure (a). Virginia Soil Resiliency Classification.

(III) The design chart is given in Figure (b). This chart is based on design daily traffic in 18-kip equivalents (L) and on soil support values (SSV). From this chart the thickness index, D, of the pavement can be determined. After the value of D is determined, the thickness of each layer can be determined.

Examples — For a daily design traffic of three hundred and thirty 18-kip equivalents* and a CBR value of 7, design a pavement cross-section in (a) the Piedmont area (soil classification 1), (b) the Ridge and Valley, and (c) the Coastal Plain.

TABLE I

Soil No.	Material and Location			Notation	a	Value of a
1.	Surface		— Asphalt concrete	A.C.	a_1	1.0
2.	Base	(a)	Cement treated aggregate base material over untreated aggregate base or soil cement or soil lime and under A.C. mat.	CTA	a_{21}	1.0
		(b)	Untreated aggregate base material crushed or uncrushed. Spec. No. 20, 21 and 22.	Agg.	a_2	0.35
		(c)	Select material I directly under A.C. mat and over a subbase of a good quality (a > 0.2) subbase	Agg.	a_3	0.35
3.	Subbase	(a)	Select material type I, II & III.	Sel. Mat.	a_3	
			1. In Piedmont area		a_3	0.0
			2. In Valley & Ridge area and Coastal Plain		a_3	0.2
		(b)	Soil cement or soil lime	S.C.	a_4	0.4
		(c)	Cement treated aggregate base directly over subgrade.	CTA	a_{21}	0.6

*Daily design traffic in 18-kip equivalents for a road is available from the Traffic and Planning Division of the Virginia Highway Department.

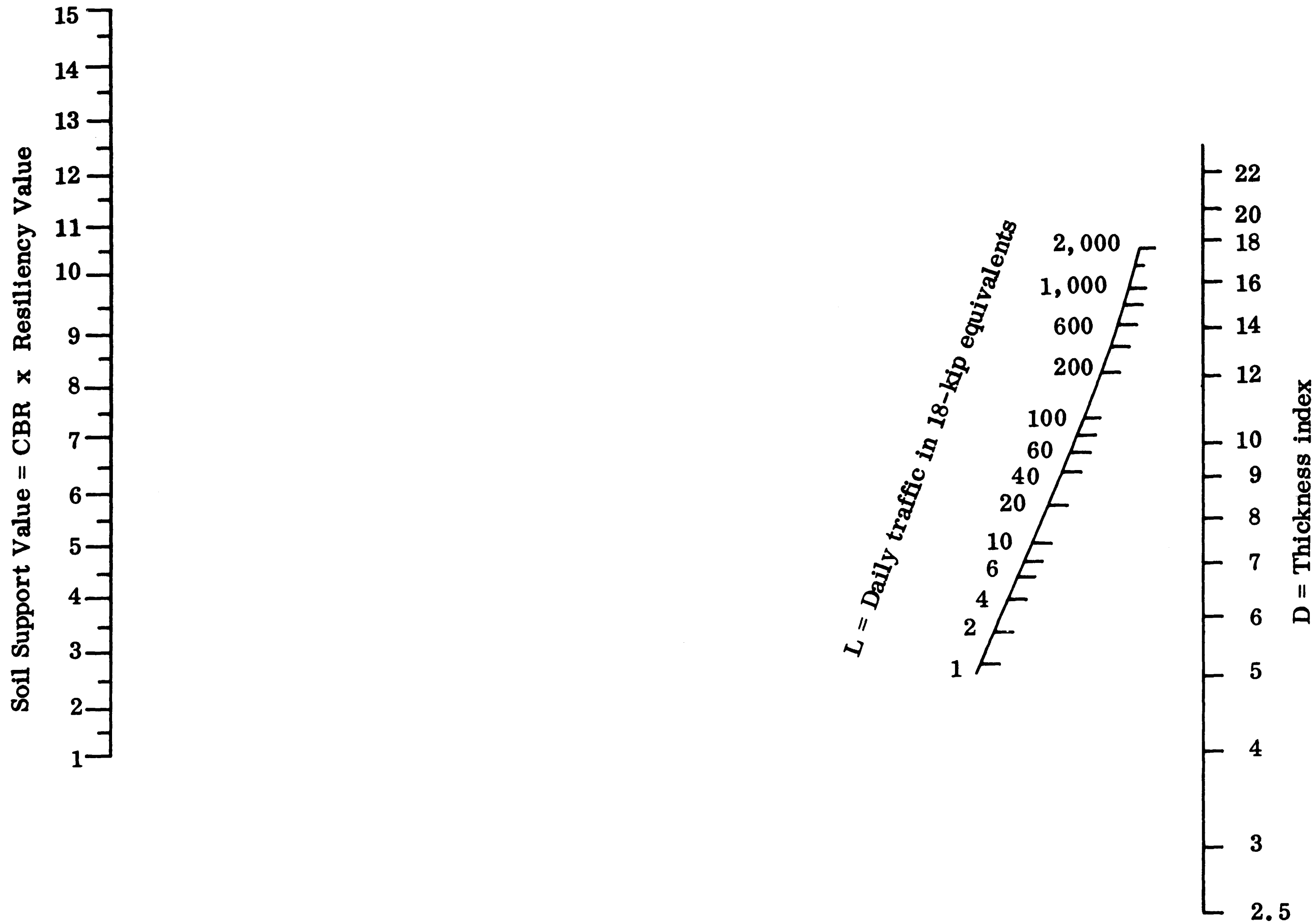

Figure (b). Nomograph correlating soil support value, traffic and thickness equivalencies (based on AASHO equation).

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(a) Design in the Piedmont area (soil classification 1)

(1) As per item (II) above, the SSV = soil resiliency x CBR = 0.5 x 7 = 3.5

(2) From the design chart in Figure (b), D for the pavement = 13.8

Some of the choices in pavement sections could be as shown in the following table.

Material	Choice I		Choice II		Choice III	
	h	hxa	h	hxa	h	hxa
A.C.	7"	7 x 1 = 7.0	9"	9 x 1 = 9.0	11"	11 x 1 = 11.0
CTA	0"	0 x 1 = 0.0	0"	0 x 1 = 0.0	0"	0 x 1 = 0.0
Agg.	10"	10 x 0.35 = 3.5	6"	6 x 0.35 = 2.1	0"	0 x 0 = 0.0
Sel. Mat.	0"	0 x 0 = 0.0	0"	0 x 0 = 0.0	0"	0 x 0 = 0.0
SC	8"	8 x 0.4 = 3.2	6"	6 x 0.4 = 2.4	6"	6 x 0.4 = 2.4
D		= 13.7		= 13.5		= 13.4

(b) Design in the Ridge and Valley area (soil classification 5)

(1) As per item (II) above, the SSV = soil resiliency x CBR = 2.0 x 7 = 14

(2) From the design chart in Figure (b), D for the pavement = 11.6

Choices in pavement sections for this design are shown in the following table.

Material	Choice I		Choice II		Choice III	
	h	hxa	h	hxa	h	hxa
A.C.	7"	7 x 1 = 7.0	8"	8 x 1 = 8.0	8.0"	8.0 x 1 = 8.0
CTA	0"	0 x 1 = 0.0	0"	0 x 1 = 0.0	0"	0 x 1 = 0.0
Agg.	6"	6 x 0.35 = 2.1	6"	6 x 0.35 = 2.1	0"	0 x 0.35 = 0.0
Sel. Mat.	0"	0 x 0.2 = 0.0	6"	6 x 0.2 = 1.2	0"	0 x 0.2 = 0.0
SC	6"	6 x 0.4 = 2.4	0"	0 x 0.4 = 0.0	0"	0 x 0.4 = 0.0
SC	0"	0 x 0.6 = 0.0	0"	0 x 0.6 = 0.0	6"	6 x 0.6 = 3.6
D		= 11.5		= 11.3		= 11.6

(c) Design in the Coastal Plain area (soil classification 4)

(1) As per item (II) above, the SSV = soil resiliency x CBR = 3.0 x 7 = 21 > 15

(2) From the design chart in Figure (b), D for the pavement = 11.6

Again, some of the choices in pavement sections are given in the following table.

Material	Choice I		Choice II		Choice III	
	h	hxa	h	hxa	h	hxa
A.C.	7"	7 x 1 = 7.0	8"	8 x 1 = 8.0	9"	9 x 1 = 9.0
CTA	0"	0 x 1 = 0.0	0"	0 x 1 = 0.0	0"	0 x 1 = 0.0
Agg.	6"	6 x 0.35 = 2.1	10"	10 x 0.35 = 3.5	6"	6 x 0.35 = 2.1
SC	6"	6 x 0.4 = 2.4	0"	0 x 0.4 = 0.0	0"	0 x 0.4 = 0.0
D		= 11.5		= 11.5		= 11.1