

Estimated Spring Load-Carrying Capacity [in accordance with Investigation 603]

1. Obtain at least ten deflection tests in each mile of road.
2. Convert the FWD deflections to Benkelman Beam equivalents, BB_{eq} .

$$BB_{eq} = 5.15 + 1.05 \times D1_{(9k)}$$

Where: BB_{eq} = Equivalent Benkelman Beam deflection, in mils
 $FWD_{D1(9k)}$ = FWD No.1 sensor deflection normalized to 9,000 lbs, in mils

3. Average the ten deflections in each mile
4. Calculate the standard deviation for each mile

$$\text{Standard Deviation} = \sqrt{\frac{(BB - \overline{BB})^2}{(n - 1)}}$$

5. Correct the average of the individual deflections, \overline{BB} to 80 °F
6. Calculate the "Present Design Deflection", $\overline{BB} + 2sd$, by adding two standard deviations to the average deflection corrected for temperature.
7. Convert the "Present Design Deflection" to "Design Spring Deflection", SBB by multiplying by the appropriate deflection ratio.
8. Find the "Allowable Spring Deflection", ABB for the particular pavement.
9. Compute the "Allowable Spring Axle Load".

$$L_A = L_D * \frac{ABB}{SBB}$$

Where: L_A = Allowable Spring Axle Load, tons
 L_D = axle load used for deflection testing, tons
 ABB = Allowable Spring Deflection, mils
 SBB = Design Spring Deflection, mils

Benkelman Beam deflection corrections to 80 °F

Range of Deflection (mils)	Temperature °F				
	to 35	36 - 45	46 - 55	56 - 65	66 - 75
0 - 10	5	4	3	2	1
10 - 20	7	6	4	3	1
20 - 30	10	8	6	4	2
30 - 40	10	8	6	4	2
40 - 50	12	10	7	5	2
50 - 60	15	12	9	6	3

Allowable Spring Deflections

Traffic	Two-Way HCADT	< 50	50 - 100	100 - 150	> 150
	Two-Way ADT	< 500	500 - 1000	1000 - 3000	> 3000
Bituminous Surface Thickness		Allowable Deflection (mils)			
	< 3 in.	75	70	60	45
	3 to 6 in.	65	60	50	40
	> 6 in.	55	50	40	35

**Deflection ratios to calculate critical spring deflections from
deflections taken during other non-frozen times of the year (1983 Revision)**

PLASTIC EMBANKMENTS									
Asphalt Surface Thickness	Date of Test								
	5/1	5/16	6/1	6/16	7/1	7/16	8/1	8/16	Sept.
	5/15	5/31	6/15	6/30	7/15	7/31	8/15	8/31	
≤ 2 in.	1.12	1.29	1.44	1.53	1.60	1.65	1.69	1.73	1.79
> 2 ≤ 3½	1.17	1.34	1.50	1.59	1.63	1.67	1.71	1.73	1.75
> 3½ ≤ 5½	1.14	1.24	1.37	1.43	1.50	1.58	1.64	1.70	1.71
> 5½ ≤ 8 in.	1.17	1.25	1.25	1.25	1.26	1.30	1.41	1.50	1.55
> 8 in. Conventional Construction	1.13	1.18	1.16	1.13	1.15	1.18	1.29	1.37	1.45
> 8 in. Full-Depth Construction	1.12	1.16	1.16	1.10	1.09	1.15	1.33	1.46	1.55

SEMI-PLASTIC EMBANKMENTS									
Asphalt Surface Thickness	Date of Test								
	5/1	5/16	6/1	6/16	7/1	7/16	8/1	8/16	Sept.
	5/15	5/31	6/15	6/30	7/15	7/31	8/15	8/31	
≤ 5 in.	1.16	1.35	1.40	1.50	1.52	1.51	1.48	1.46	1.45
> 5 in.	1.29	1.40	1.46	1.50	1.54	1.58	1.64	1.69	1.71

NON-PLASTIC EMBANKMENTS									
Asphalt Surface Thickness	Date of Test								
	5/1	5/16	6/1	6/16	7/1	7/16	8/1	8/16	Sept.
	5/15	5/31	6/15	6/30	7/15	7/31	8/15	8/31	
≤ 2 in.	1.30	1.41	1.72	1.79	1.83	1.83	1.88	1.88	1.88
> 2 ≤ 5½	1.21	1.36	1.47	1.53	1.58	1.56	1.52	1.49	1.44
> 5½ ≤ 8 in.	1.00	1.02	0.98	1.00	1.05	1.05	1.07	1.11	1.11