Flexible Pavement Overlays
[According to TONN]

1. Convert the FWD deflections to Benkelman Beam equivalents, BB.

   For Conventional Pavements:

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

   For Fulldepth Pavements:

   $BB = 3.8 + D1_{(9k)}$

   Where: BB = Equivalent Benkelman Beam deflection, in mils
   $D1_{(9k)}$ = FWD No.1 sensor deflection normalized to 9,000 lbs, in mils

2. Correct the individual deflections, BB to 80° F

   Temperature ≥ 80°F

   Temperature Correction = 0

   Temperature < 80°F

   - BB < 25 mils:

     Temperature Correction = [16 - 0.2 x Temperature (°F)] x [0.375 + 0.025 x BB]

   - 25 ≤ BB ≤ 35 mils:

     Temperature Correction = [16 - 0.2 x Temperature (°F)]

   - BB > 35 mils:

     Temperature Correction = [16 - 0.2 x Temperature (°F)] x [0.125 + 0.025 x BB]

   BB_{80} = BB + Temperature Correction

3. Convert the "Present Deflection" to "Spring Deflection", **BBS** by multiplying **BB_{80}** by the appropriate deflection ratio. *{from Deflection Ratios Tables – coffn.dat}*

Procedure 1 – Find the Allowable Load for a given overlay thickness

4. Compute new "Spring Deflection" , **BBS_{new}** by multiplying original "Spring Deflection" , **BBS_{orig}** by the appropriate reduction factor.

$$BBS_{new} = BBS_{orig} \times (1 - R)^{ol} \qquad \{Compound\ Rate\}$$

where :

$$R = \text{Re}duction\ Rate \qquad \{typ\ 0.11\}$$
$$ol = Overlay\ Thickness$$

5. Find the "Allowable Deflection" for the particular pavement and Traffic.

$$AD = 0.9 \times Allowable\ Spring\ Deflection$$ *{from Allowable Spring Deflections Table}*

6. Compute the "Allowable Spring Axle Load".

$$Allowable\ Spring\ Axle\ Load, \quad L_A$$

$$L_A = 10 \times \frac{AD}{BBS_{new}}$$

Procedure 2 – Find the Overlay Thickness for a given allowable load

4 Input New Allowable Load Limit, L_A

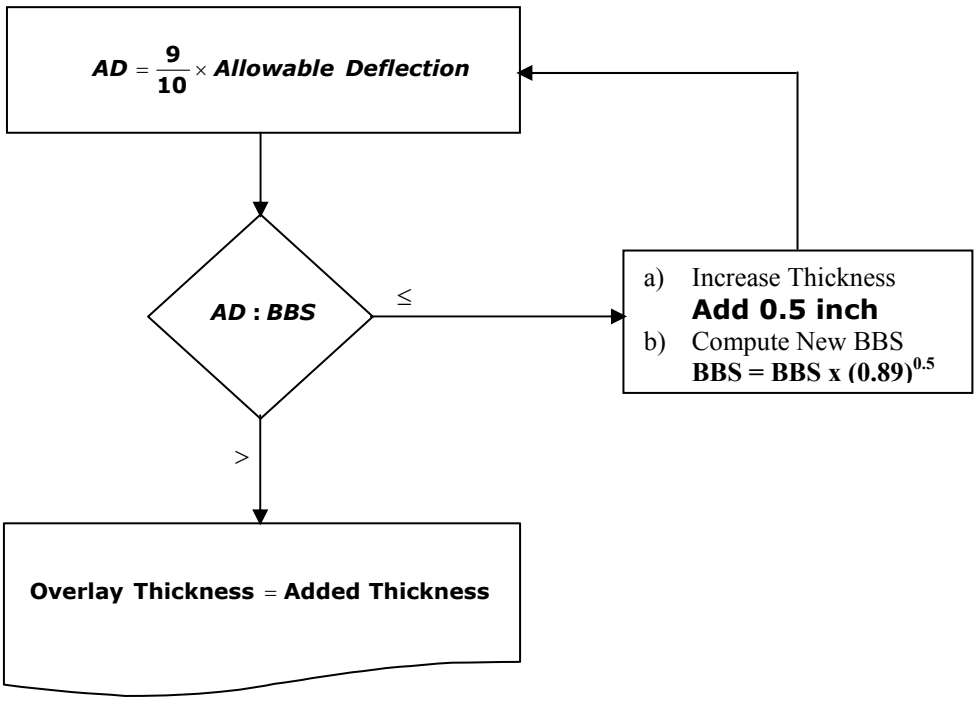
$$\textbf{Allowable Load, } L_A = 10 \times \frac{\textit{Allowable Deflection, AD}}{\textit{BBS}}$$

5 Find the "Allowable Deflection" for the particular pavement and Traffic.
{from Allowable Spring Deflections Table – (coffn.dat)}

$$\textbf{AD} = 0.9 \times \textbf{Allowable Spring Deflection}$$

6 Compare Allowable Deflection to BBS
a) AD > BBS ok
b) AD ≤ BBS
   i) Increase Thickness
   ii) Compute New BBS
   iii) Find New Allowable Deflection, AD
   iv) Compare AD to New BBS
   v) Continue until AD > BBS

7 Overlay Thickness = Total Added Thickness



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**

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**