Chapter 16

# Design of Rigid Airport Pavements

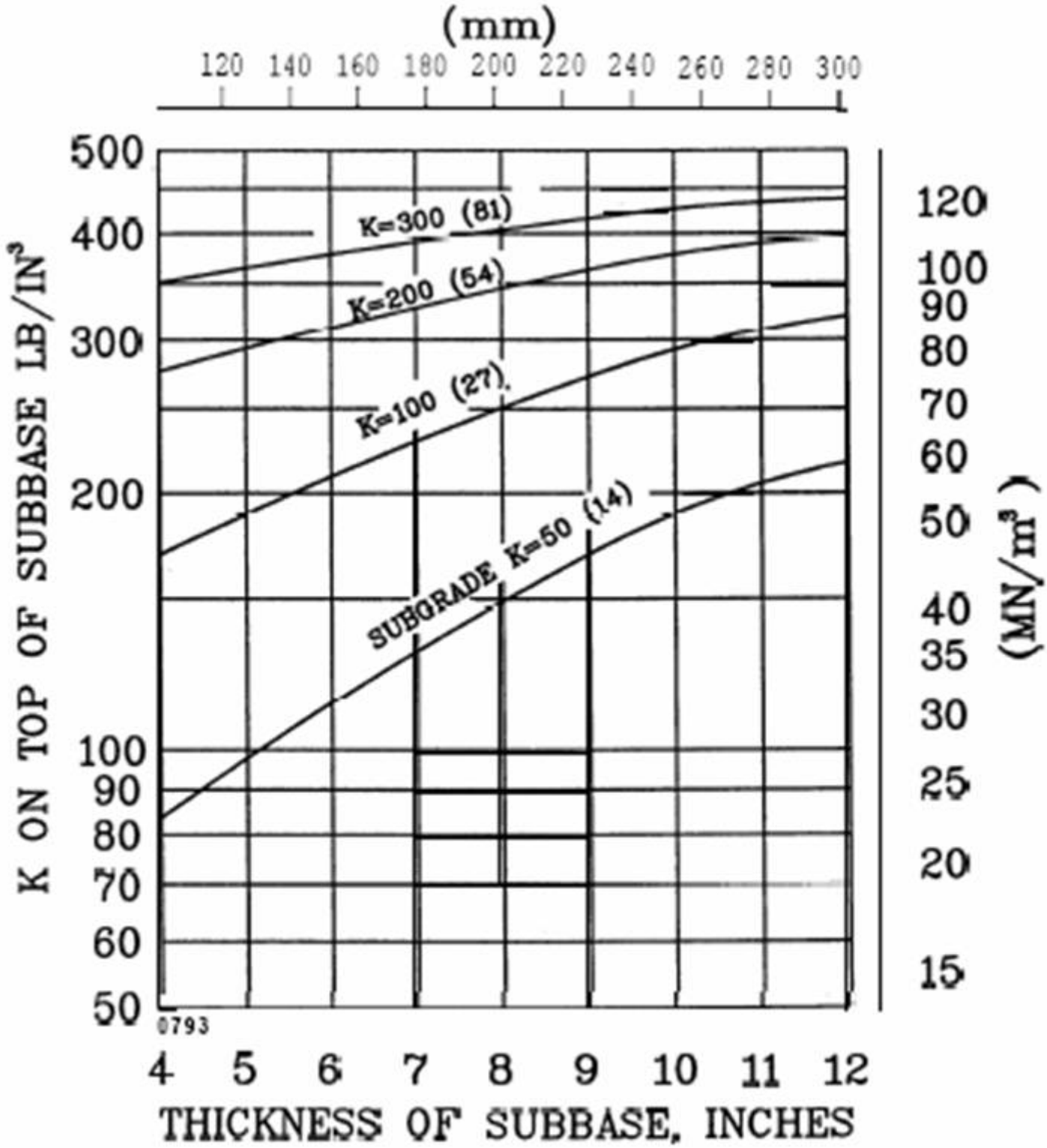
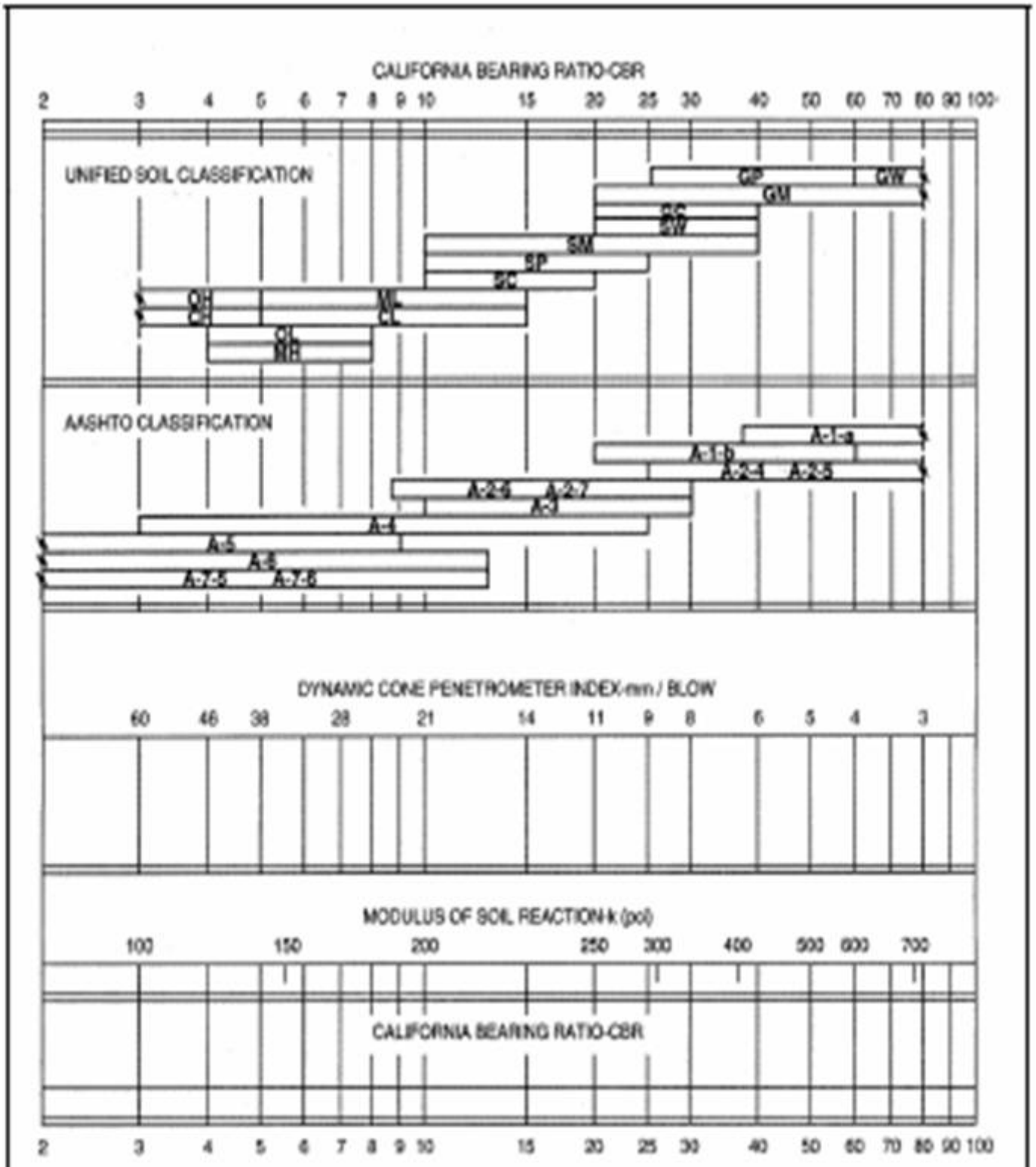



FIGURE 3-16 EFFECT OF STABILIZED SUBBASE ON SUBGRADE MODULUS

**SUBBASE QUALITY.**

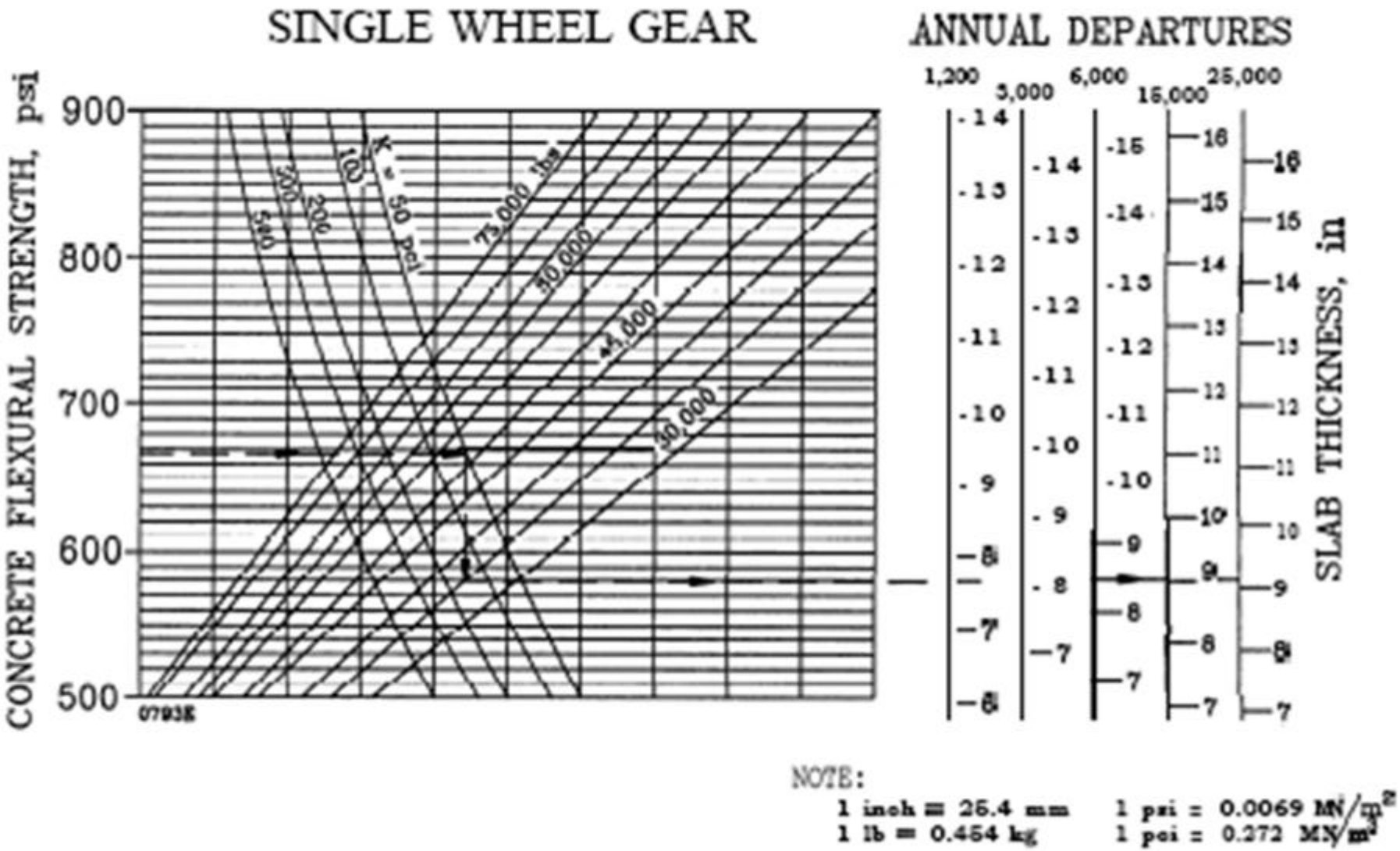
The standard FAA subbase for rigid pavements is 4 inches (100 mm) of Item P-154, Subbase Course. In some instances it may be desirable to use higher quality materials or thicknesses of P-154 greater than 4 inches (100 mm). The following materials are acceptable for use as subbase under rigid pavements:

Item P- 154 - Subbase Course
Item P-208 - Aggregate Base Course
Item P-209 - Crushed Aggregate Base Course
Item P-21 1 - Lime Rock Base Course
Item P-304 - Cement Treated Base Course
Item P-306 - Econocrete Subbase Course
Item P-401 - Plant Mix Bituminous Pavements




NOTE: CORRELATIONS NOT TO BE USED FOR DESIGN. AFTER PORTLAND CEMENT ASSOCIATION "THICKNESS DESIGN FOR CONCRETE HIGHWAY AND STREET PAVEMENTS" PACKARD, ROBERT G., 1984. DESIGN LIMIT FOR k IS 500.

Figure 5-3. Approximate relationships of soil classification and soil strength




NOTE:

1 inch = 25.4 mm
1 lb = 0.454 kg
1 psi = 0.0069 MN/m²
1 pci = 0.272 MN/m³

FIGURE 3-17. RIGID PAVEMENT DESIGN CURVES, SINGLE WHEEL GEAR

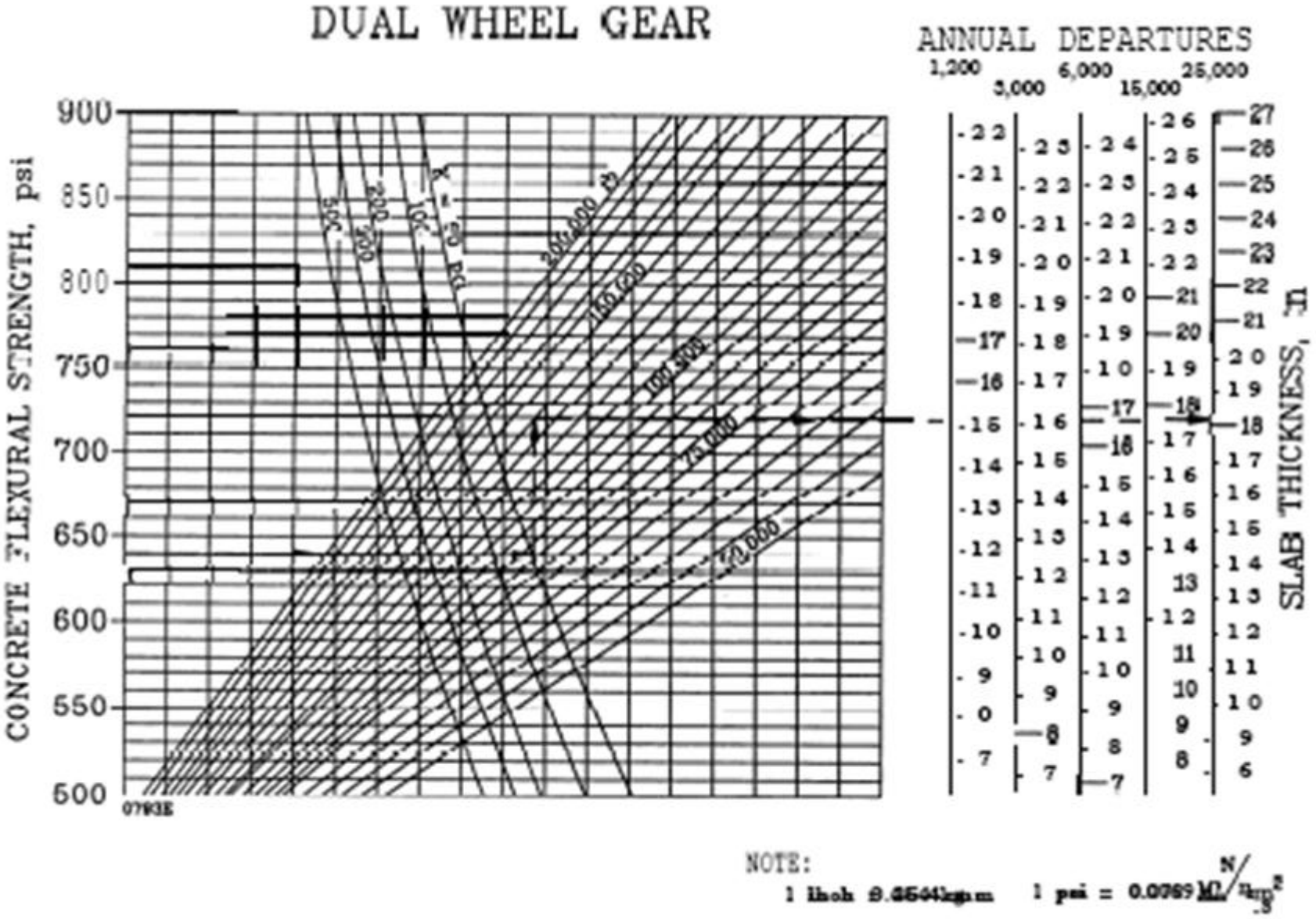



FIGURE 3-18. RIGID PAVEMENT DESIGN CURVES, DUAL WHEEL GEAR

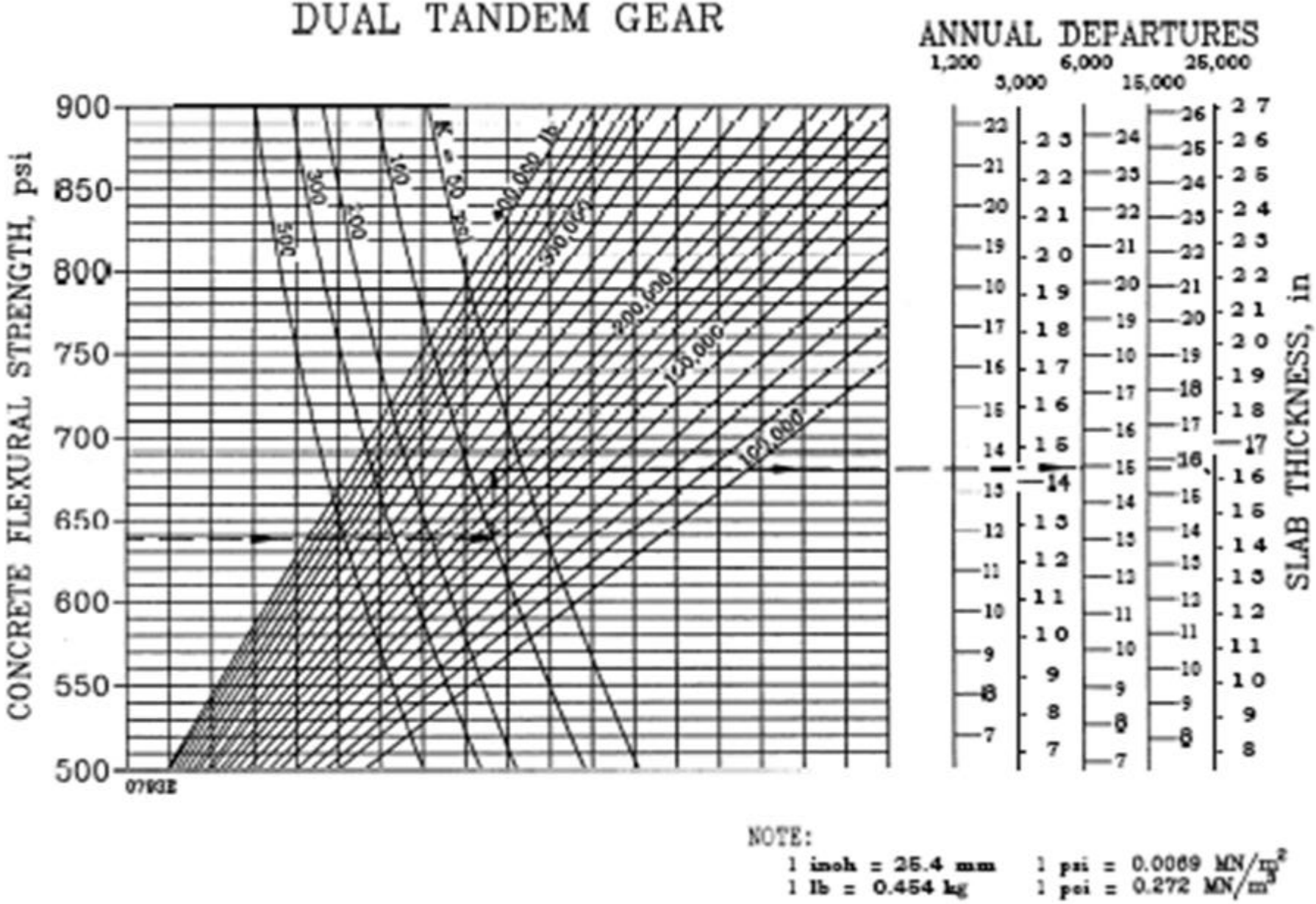



FIGURE 3-19. RIGID PAVEMENT DESIGN CURVES, DUAL TANDEM GEAR

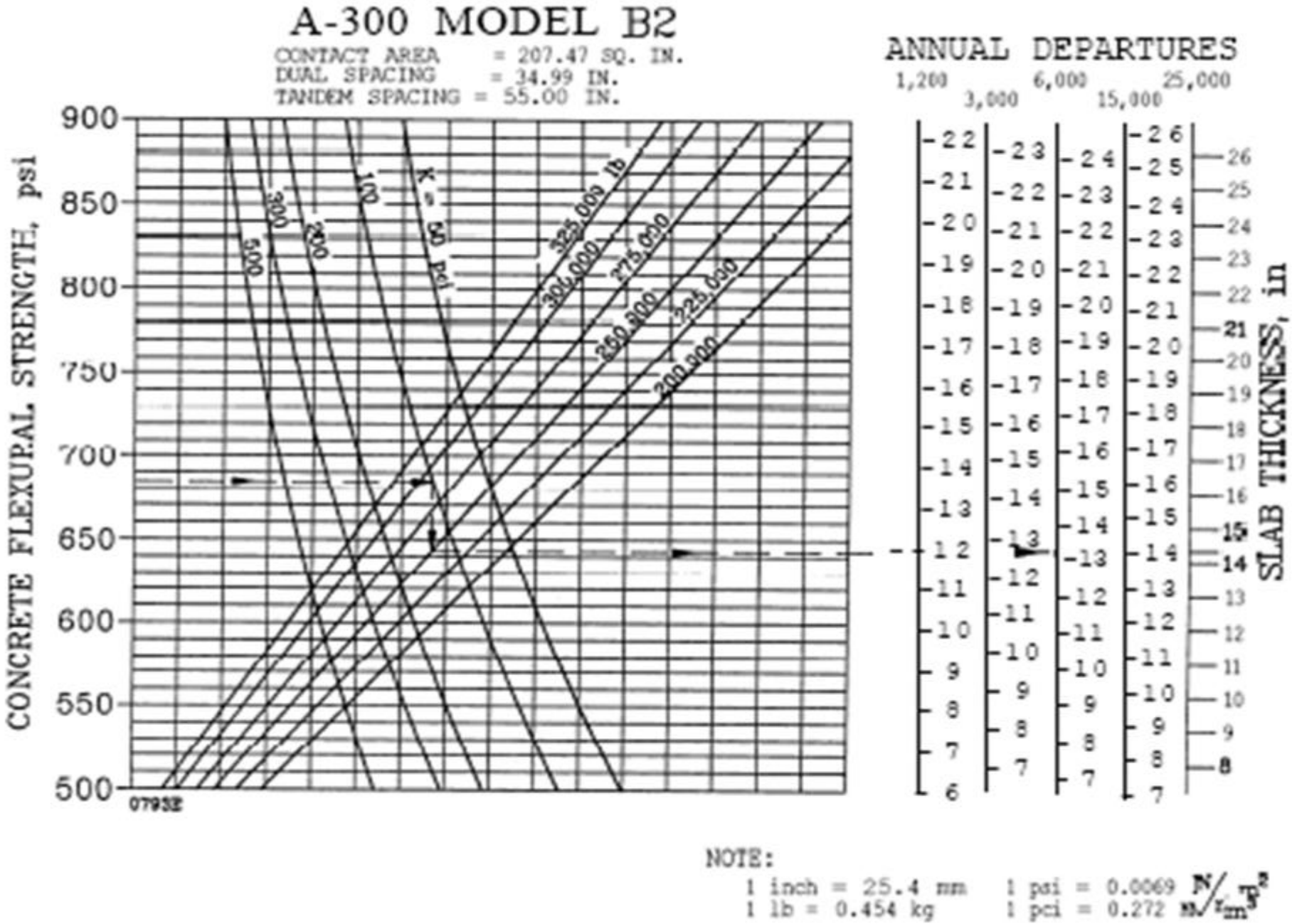
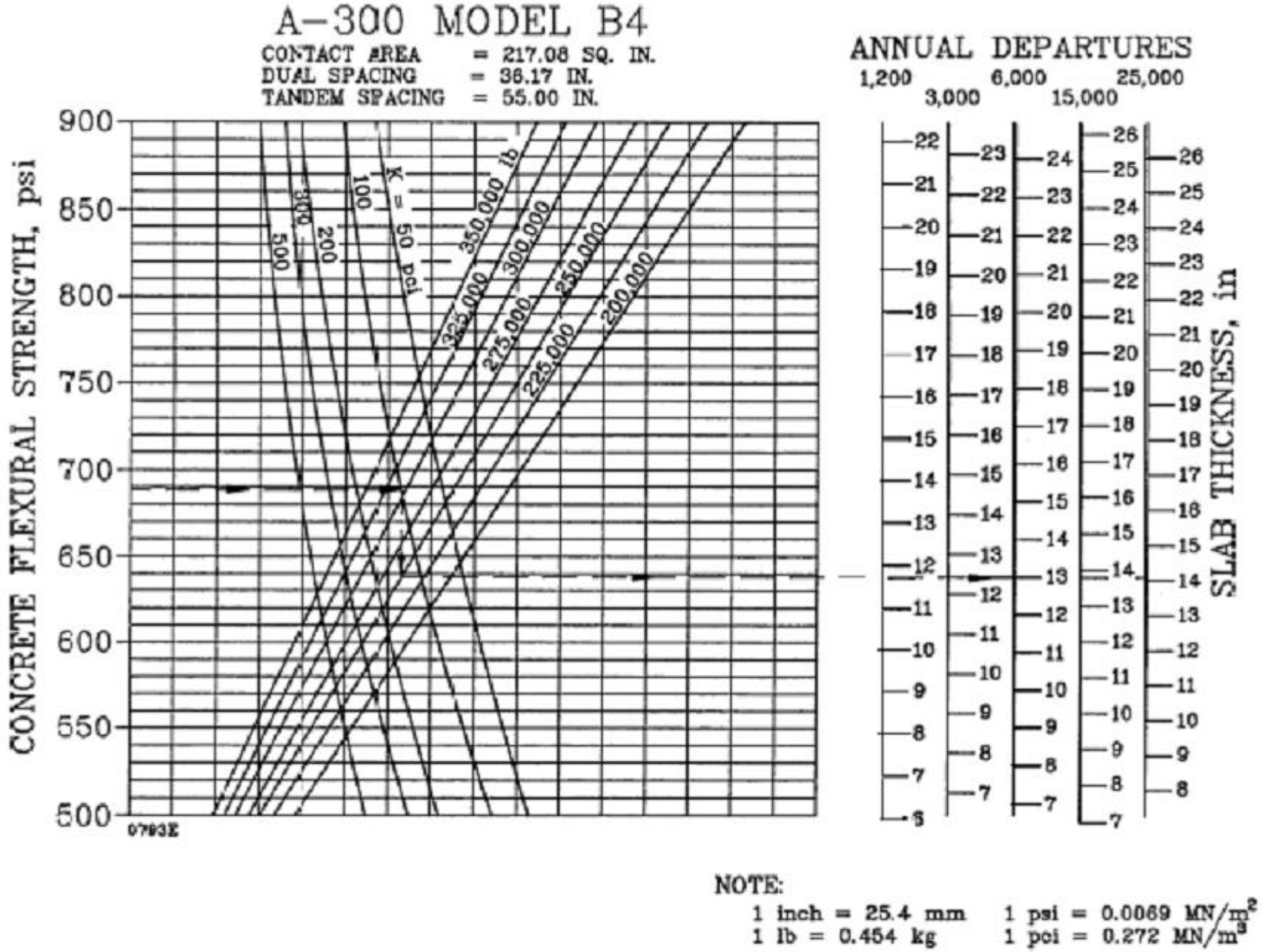



FIGURE 3-20. RIGID PAVEMENT DESIGN CURVES, A-300 MODEL B2




NOTE:

1 inch = 25.4 mm
1 lb = 0.454 kg
1 psi = 0.0069 $MN/m^2$
1 pci = 0.272 $MN/m^3$

FIGURE 3-21. RIGID PAVEMENT DESIGN CURVES, A-300 MODEL B4

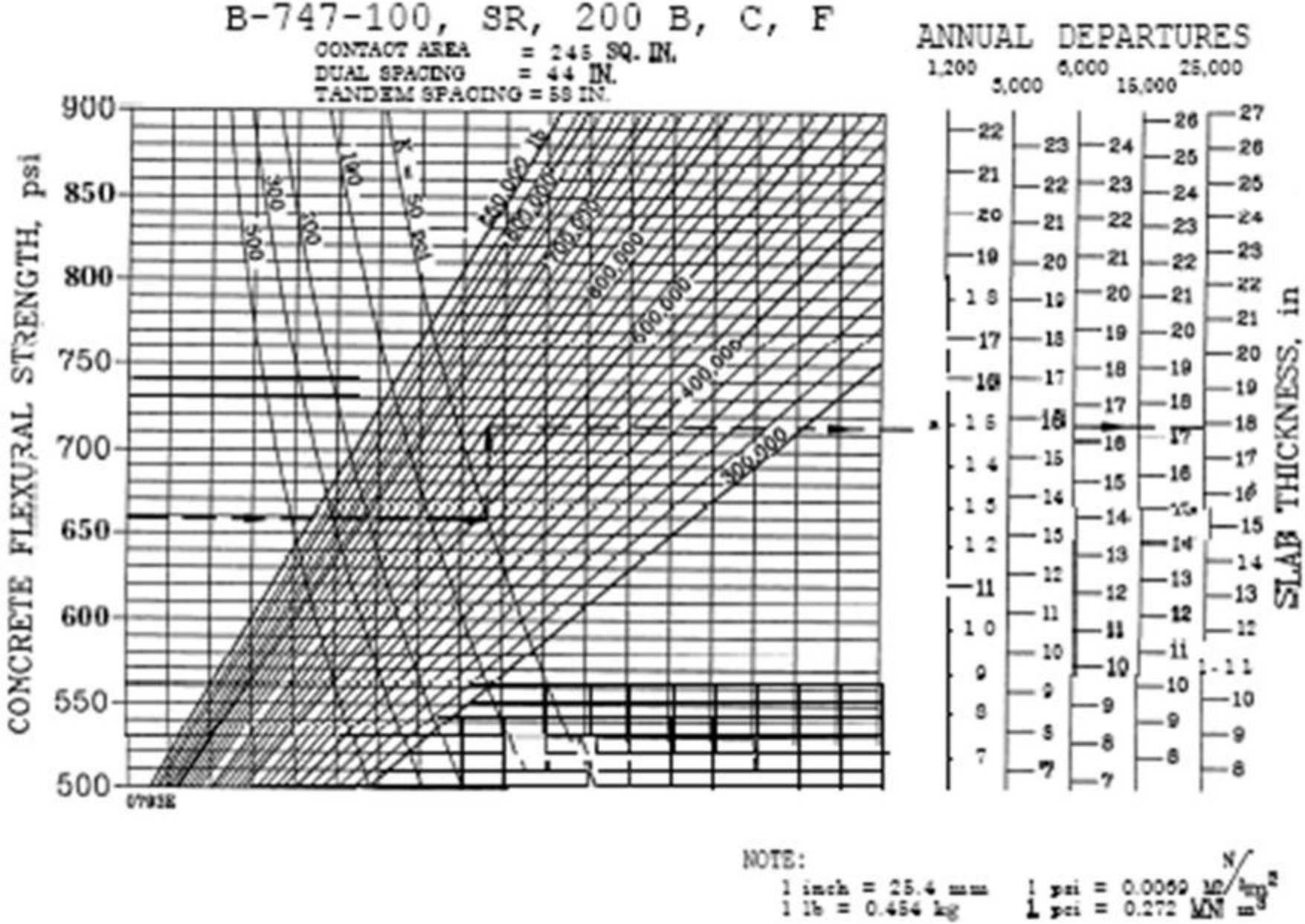
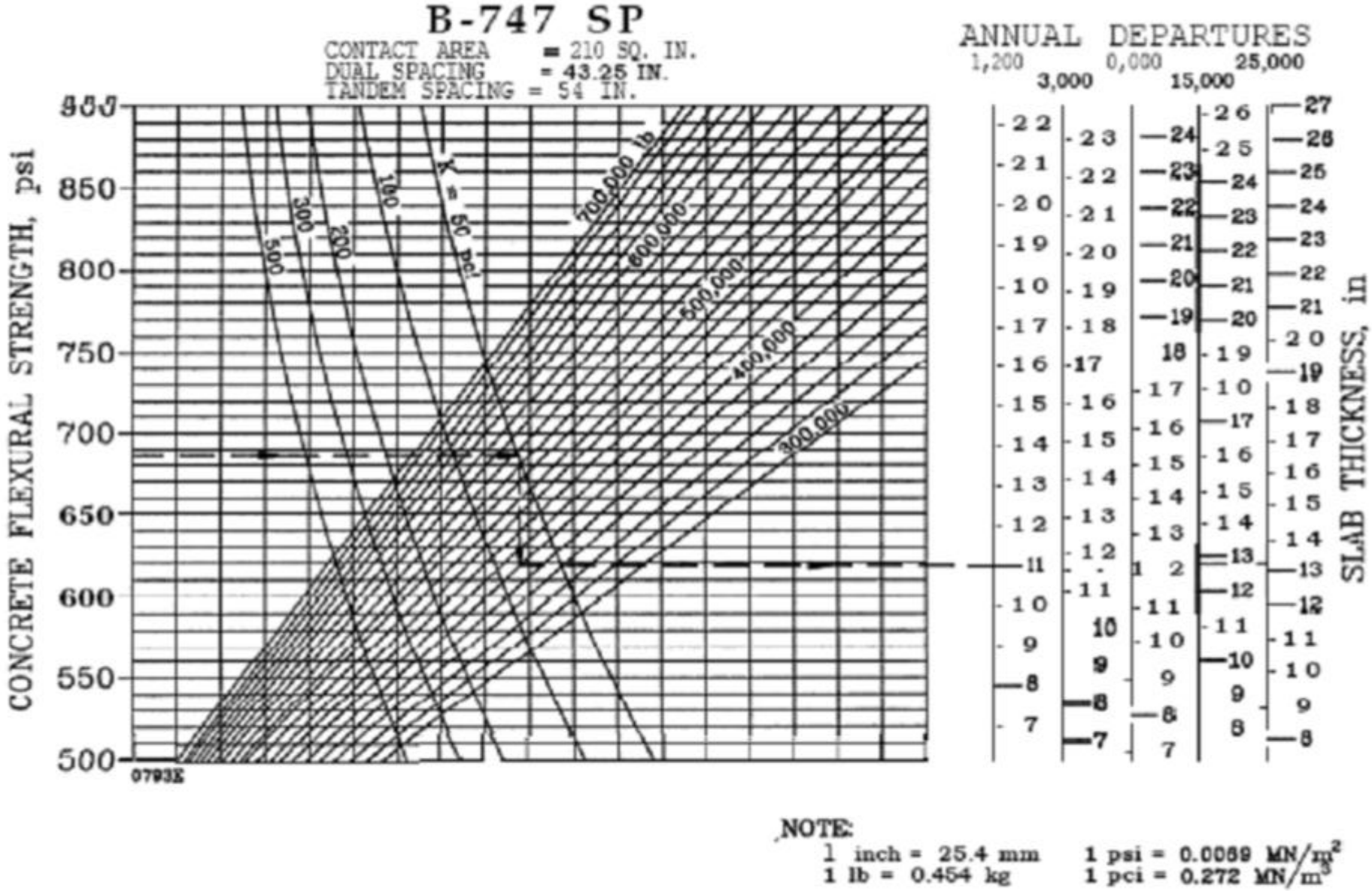


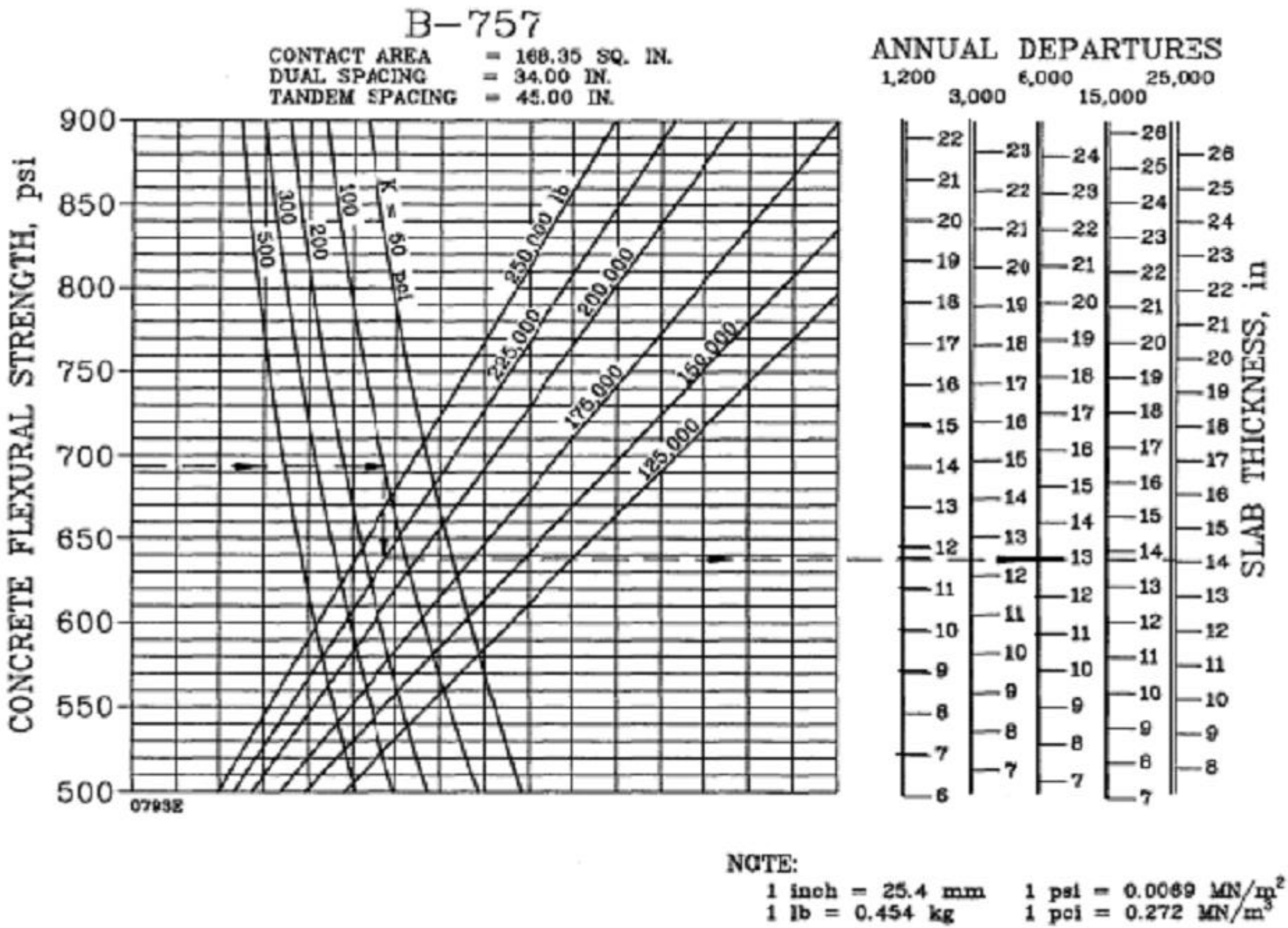

FIGURE 3-22. RIGID PAVEMENT DESIGN CURVES, B-747-100, SR, 200 B, C, F




NOTE:

1 inch = 25.4 mm
1 lb = 0.454 kg
1 psi = 0.0069 $MN/m^2$
1 pci = 0.272 $MN/m^3$

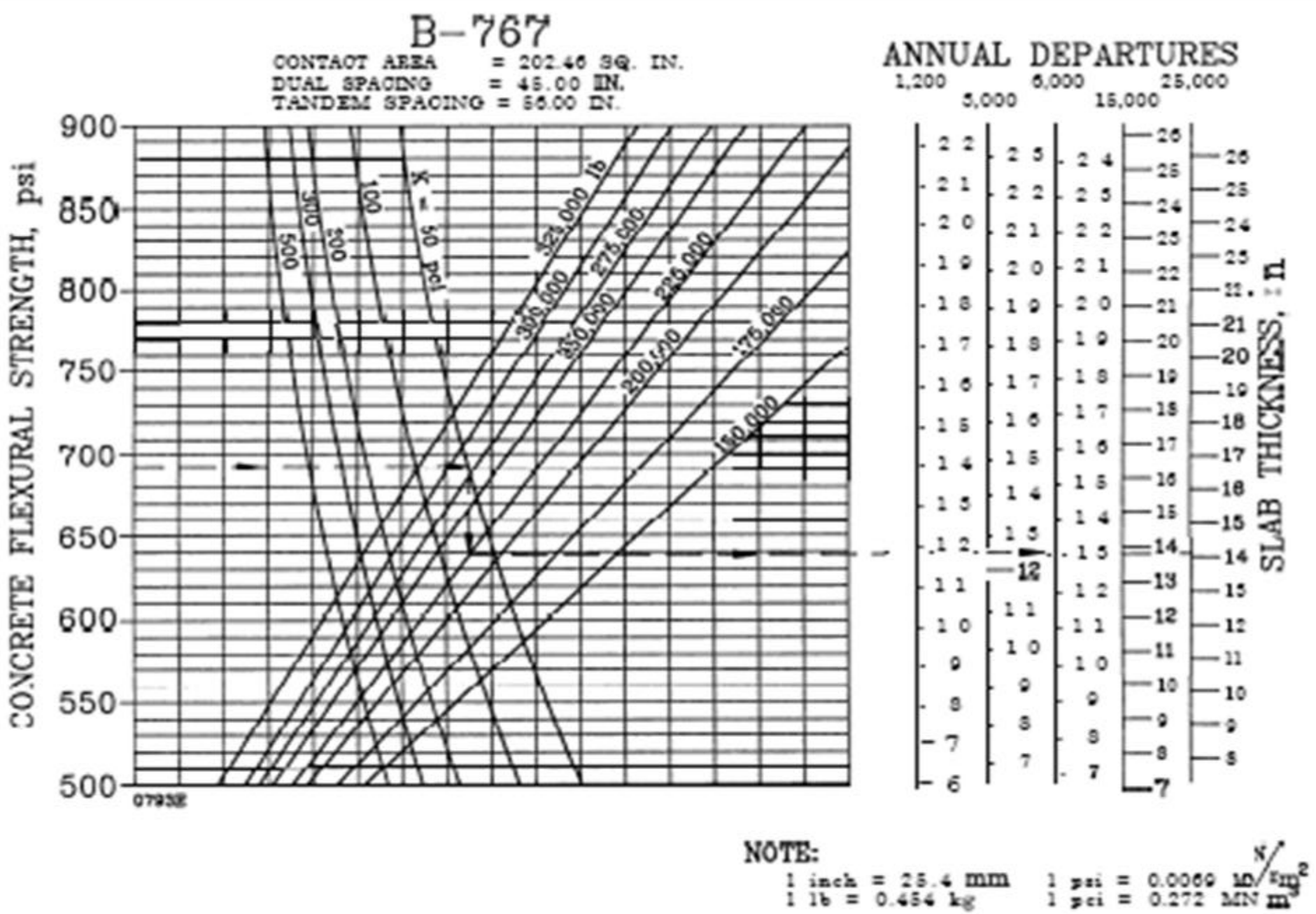
FIGURE 3-23. RIGID PAVEMENT DESIGN CURVES, B-747-SP




NOTE:

1 inch = 25.4 mm
1 lb = 0.454 kg
1 psi = 0.0069 $MN/m^2$
1 pci = 0.272 $MN/m^3$

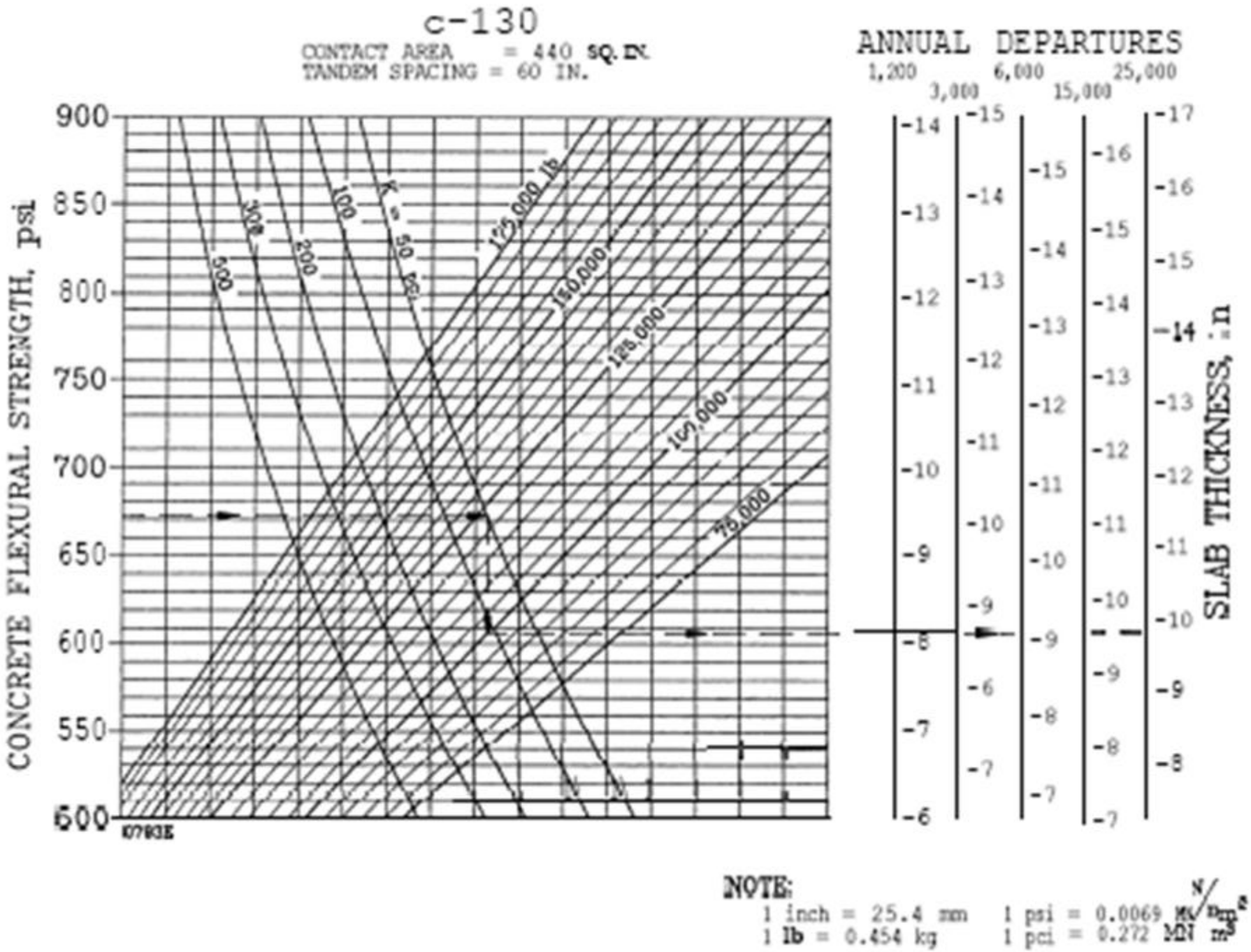
FIGURE 3-24. RIGID PAVEMENT DESIGN CURVES, B-757




NOTE:

1 inch = 25.4 mm
1 lb = 0.454 kg
1 psi = 0.0069 $MN/m^2$
1 pci = 0.272 $MN/m^3$

FIGURE 3-25. RIGID PAVEMENT DESIGN CURVES, B-767




NOTE:
1 inch = 25.4 mm
1 lb = 0.454 kg
1 psi = 0.0069 MN/m²
1 pci = 0.272 MN/m³

FIGURE 3-26. RIGID PAVEMENT DESIGN CURVES, C-130

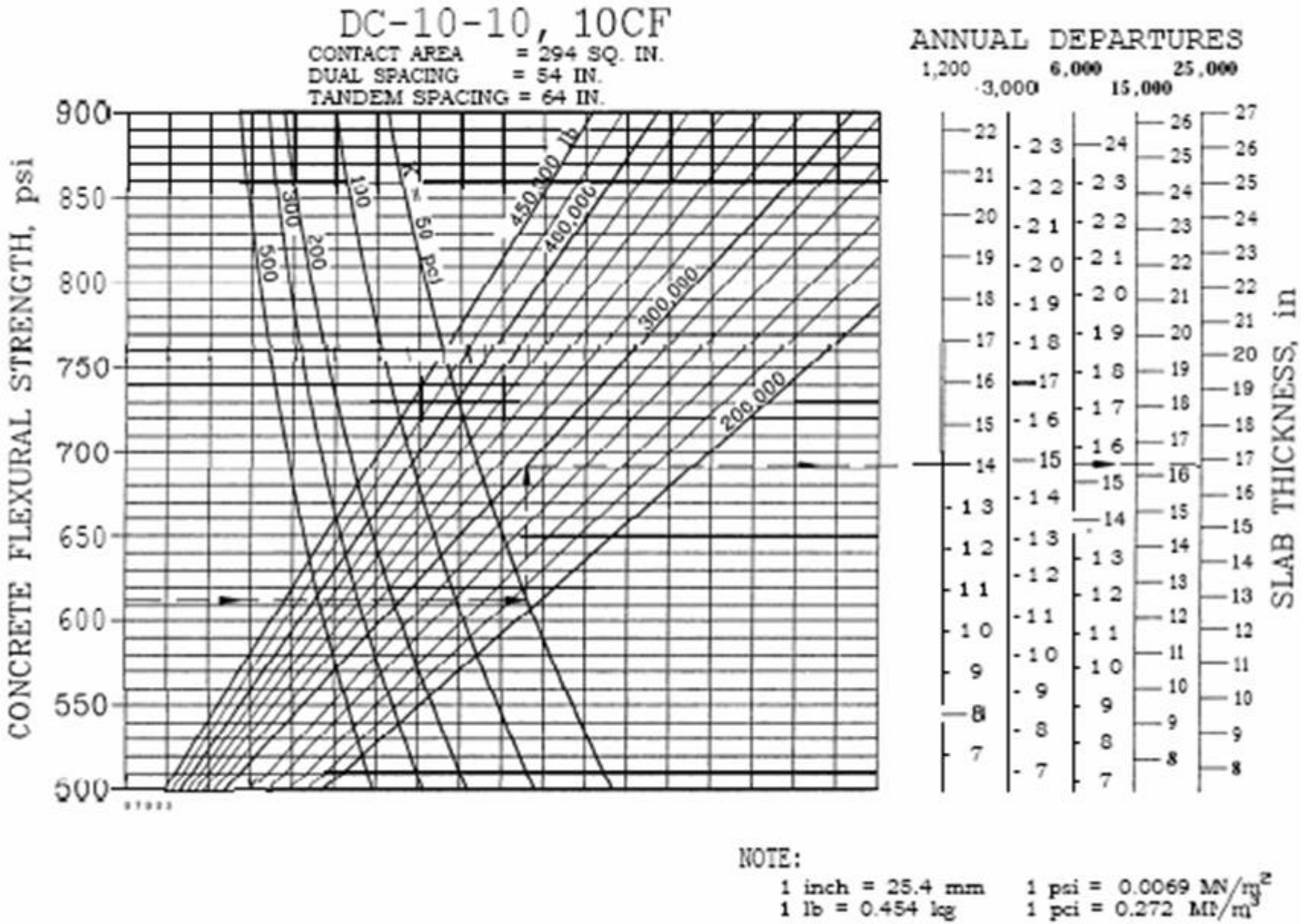
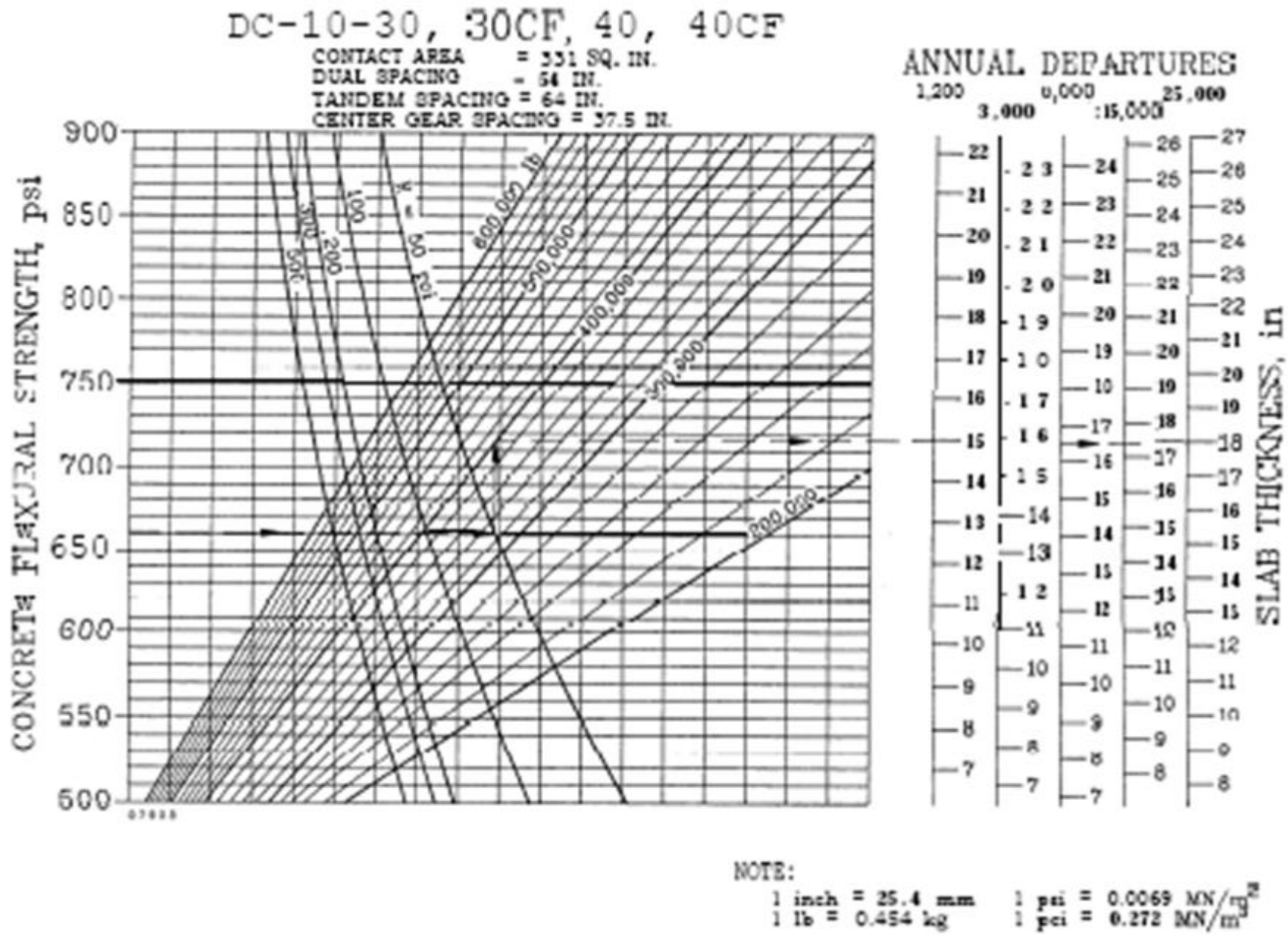


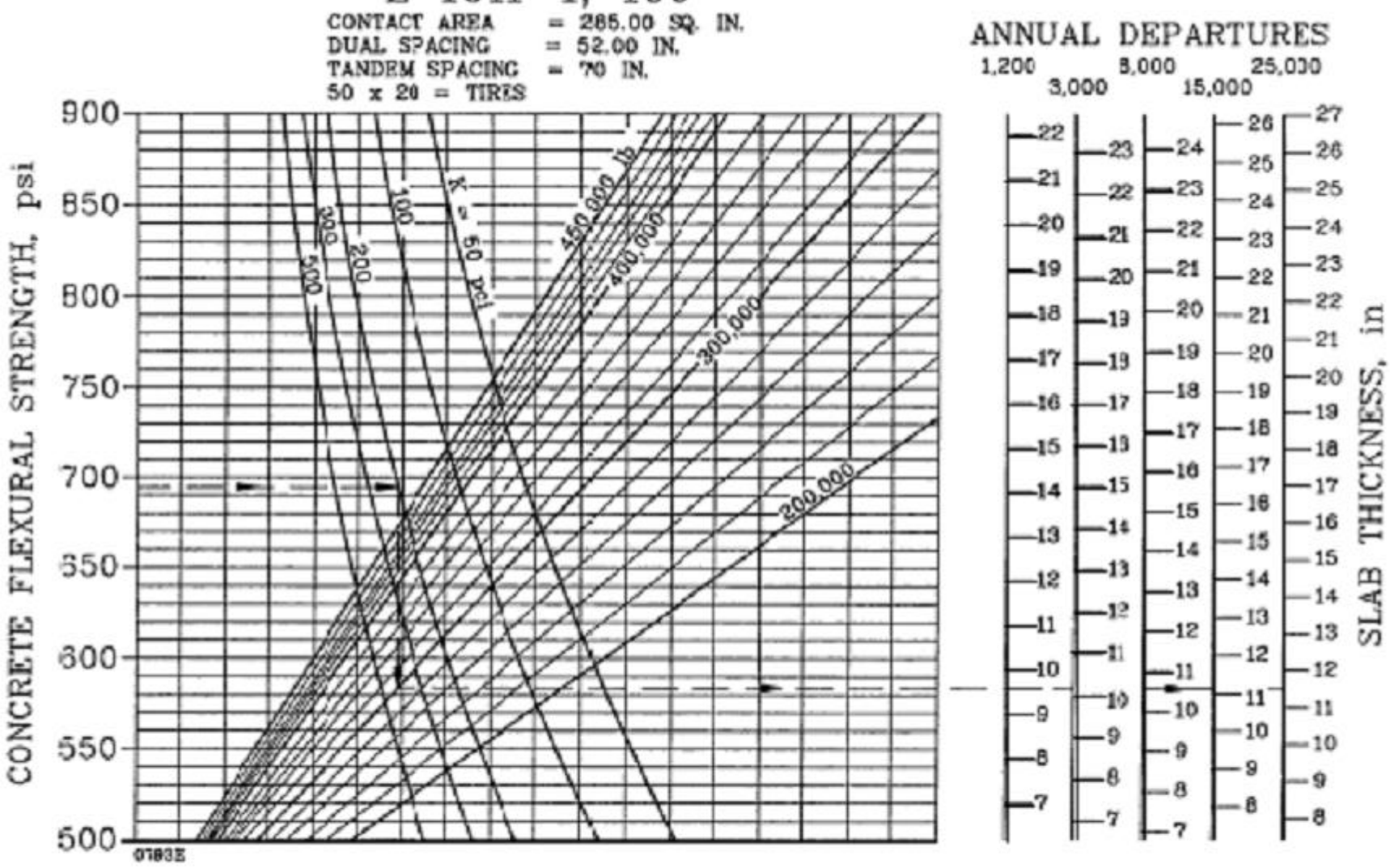

FIGURE 3-27. RIGID PAVEMENT DESIGN CURVES, DC 10-10, 10CF




NOTE:

1 inch = 25.4 mm
1 lb = 0.454 kg
1 psi = 0.0069 $MN/m^2$
1 pci = 0.272 $MN/m^3$

FIGURE 3-28. RIGID PAVEMENT DESIGN CURVES, DC 10-30, 30CF, 40, 40CF




NOTE:

1 inch = 25.4 mm
1 lb = 0.454 kg
1 psi = 0.0069 $MN/m^2$
1 pci = 0.272 $MN/m^3$

**FIGURE 3-29. RIGID PAVEMENT DESIGN CURVES, L-1011-1, 100**

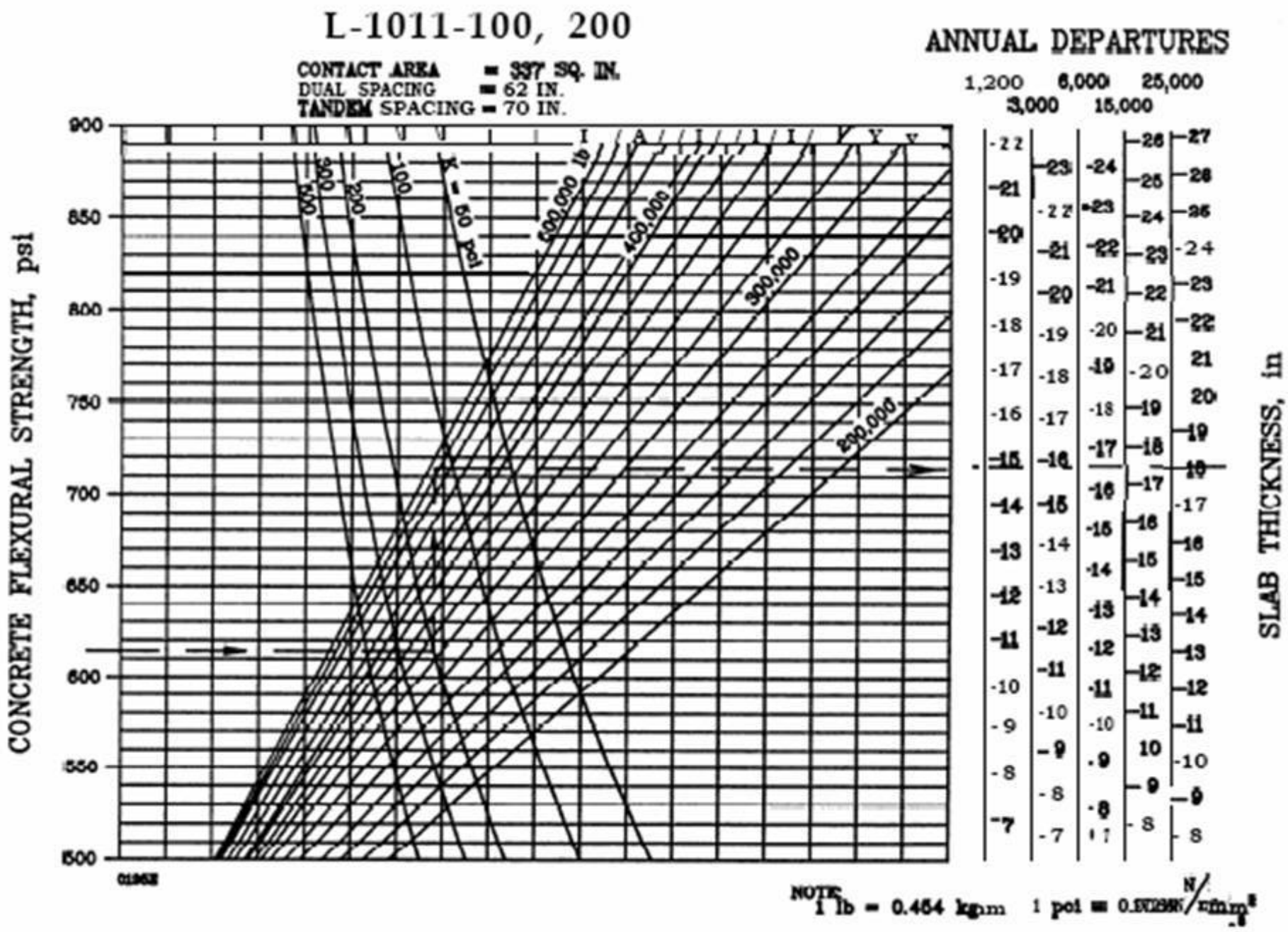



FIGURE 3-30. RIGID PAVEMENT DESIGN CURVES, L-1011-100,200

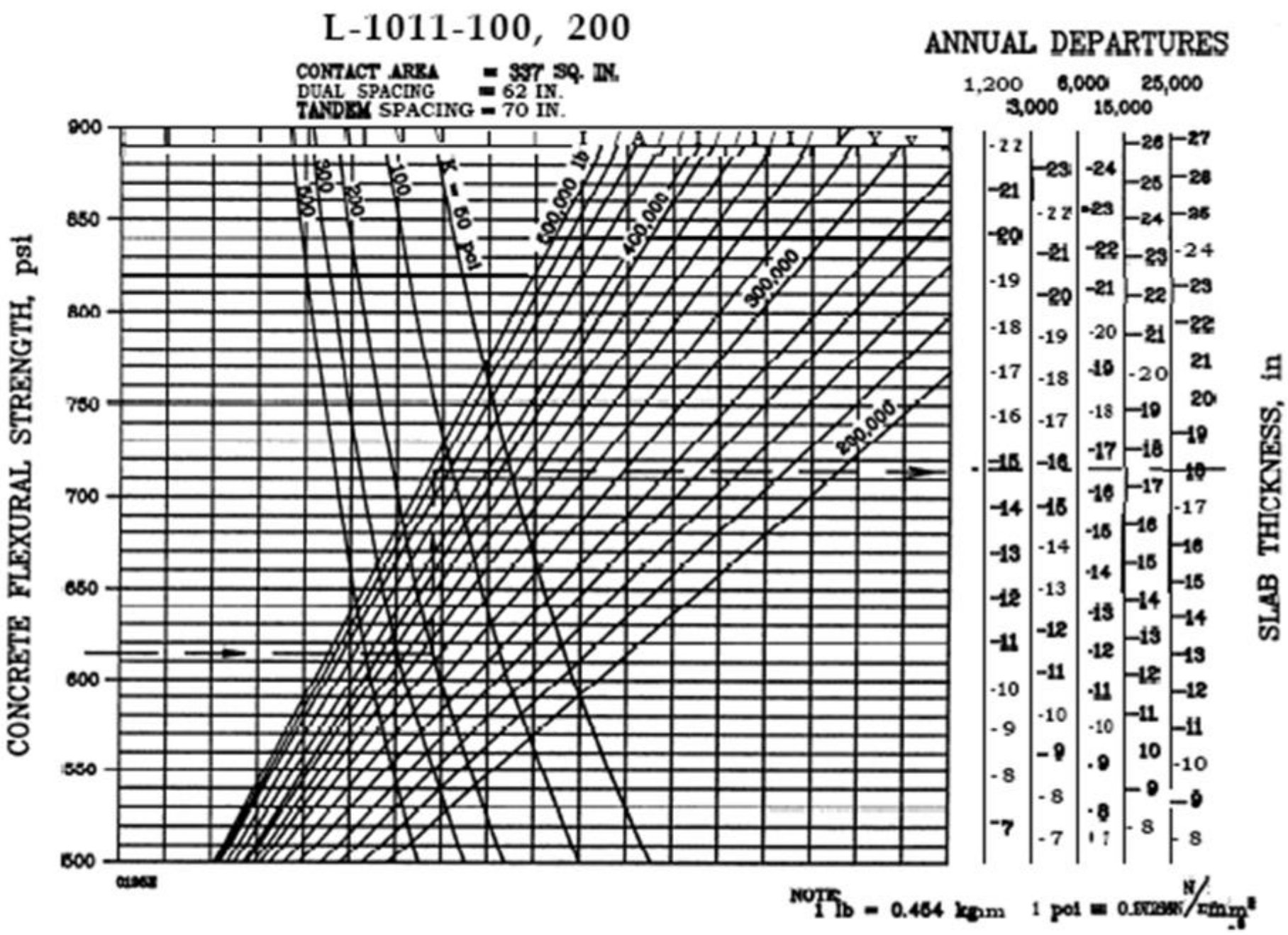



FIGURE 3-30. RIGID PAVEMENT DESIGN CURVES, L-1011-100,200

## DESIGN EXAMPLE.

a rigid pavement is to be designed for dual tandem aircraft having a gross weight of 350,000 pounds (160 000 kg) and for 6,000 annual equivalent departures of the design aircraft. The equivalent annual departures of 6,000 include 1,200 annual departures of B-747 aircraft weighing 780,000 pounds (350 000 kg) gross weight. The subgrade modulus of 100 PC1 (25 MN/m3) with poor drainage and frost penetration is 18 inches (460 mm). The feature to be designed is a primary runway and requires 100 percent frost protection. The subgrade soil is CL. Concrete mix designs indicate a flexural strength of 650 PSI (4.5 MN/m*) can be readily produced with locally available aggregates. The gross weight of the design aircraft dictates the use of a stabilized subbase. Several thicknesses of stabilized subbases should be tried to determine the most economical section. Assume a stabilized subbase of P-304 will be used. Try a subbase thickness of 6 inches (150 mm). Using

Figure 3-16, a 6-inch (150 mm) thickness of P-304 would likely increase the foundation modulus from 100 PC1 (25 MN/m') to 210 PC1 (57 MN/m3). Using Figure 3-19, dual tandem design curve, with the assumed design data, yields a concrete pavement thickness of 16.6 inches (422 mm). This thickness would be rounded off to 17 inches (430 mm). Since the frost penetration is only 18 inches (460 mm) and the combined thickness of concrete pavement and stabilized subbase is 23 inches (585 mm), no further frost protection is needed. Even though the wide body aircraft did not control the thickness of the slab, the wide bodies would have to be considered in the establishment of jointing requirements and design of drainage structures. Other stabilized subbase thicknesses should be tried to determine the most economical section.