

## BIBLIOGRAPHY

1. AGRICULTURE HANDBOOK No. 72 (1955), Wood Handbook, Prepared by the Forest Products Laboratory.
2. AMERICAN SOCIETY FOR TESTING AND MATERIALS, Standard Method of Testing Small Clear Specimens of Timber, Serial Designation D 143-50.
3. AMERICAN SOCIETY FOR TESTING AND MATERIALS, Standard Specification for Structural Wood Joist, Planks, Beams, Stringers and Posts, Serial Designation D 245-27.
4. F. BLEICH (1952), Buckling Strength of Metal Structures, McGrawhill Book Company, New York.
5. H. J. HANSEN (1948), Modern Timber Design, 2nd Edition, John Wiley & Sons.
6. J. A. NEWLIN AND J. M. GAHAGAN (1930), Test of Large Timber Columns and Presentation of the Forest Products Laboratory Column Formula, U. S. Department of Agriculture, Forest Products Laboratory.
7. J. A. NEWLIN AND G. W. TRAYER (1925), Stresses in Wood Members Subjected to Combined Column and Beam Action, U.S. Department of Agriculture, Forest Products Laboratory.
8. J. G. SUNLEY (1955), Strength of Timber Struts, Her Majesty's Stationary Office, London 1952.
9. O. P. JAIN AND B. K. JAIN, Theory and Analysis of Structures, Volume 1, Nem Chand & Bros; Roorkee (U.P.) 1967.
10. S. CHAROENPHAO, A. PHANICHKUL, V. CHOVIKIEN, Strength of Split Ring Connectors, Faculty of Civil Engineering, Chulalongkorn University 1974.

11. S. TIMOSHENKO, Theory of Elastic Stability, McGrawhill Book Company, 2nd Edition.
12. TIMBER ENGINEERING COMPANY, Timber Design and Construction Handbook, F. W. Dodge Corporation New York 1956.
13. พงศ์ โสโน, สายันท์ จารคม, สชาติ ไทยเพชร, สมหมาย เอื้อเจริญ,  
กลสมบัติของไม้ไทย (MECHANICAL PROPERTIES OF THAI TIMBERS),  
กองวิจัยผลิตภัณฑ์ไม้ เลขที่ ร 144 กรมป่าไม้, กระทรวงเกษตรและสหกรณ์ 2516

Appendix

Appendix A

**Sample of calculation.**

The calculation of Euler load in Table 5.7

For solid rectangular column of 4 x 18 x 150 cm.

From equation (4)

$$\sigma_e = \frac{\pi^2 E}{12(1/d)^2}$$

Therefore

$$\begin{aligned} P_e &= \frac{\pi^2 E}{12(1/d)^2} \times 4 \times 18 \\ &= \frac{\pi^2 \times 12.539 \times 10^4}{12(150/4)^2} \times 4 \times 18 \\ P_e &= 5284 \text{ kg.} \end{aligned}$$

The calculation of Euler load in Table 5.8

For solid squared column of 8.5 x 8.5 x 150 cm.

From equation (4)

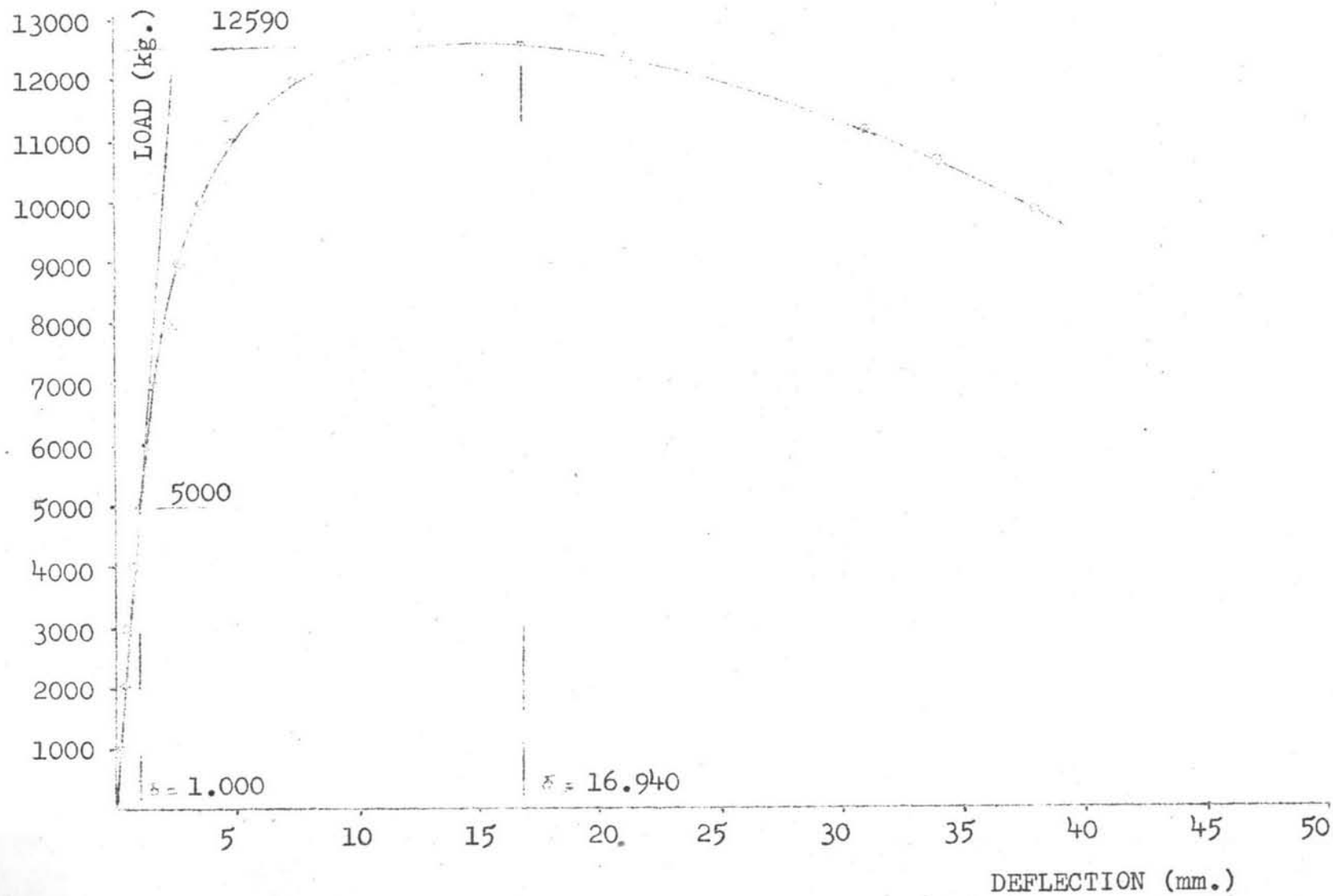
$$\sigma_e = \frac{\pi^2 E}{12(1/d)^2}$$

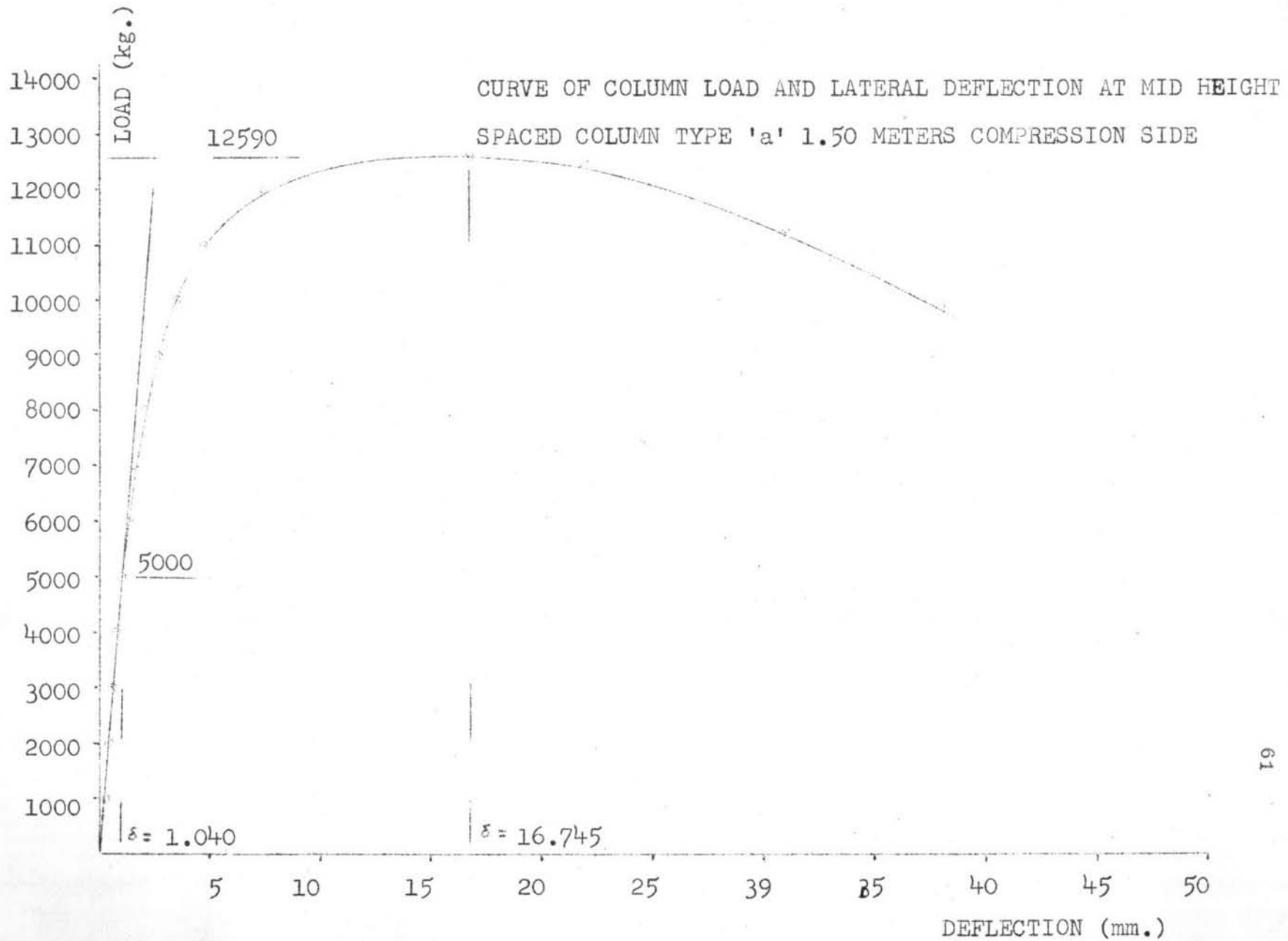
Therefore

$$\begin{aligned} P_e &= \frac{\pi^2 E}{12(1/d)^2} \times 8.5 \times 8.5 \\ &= \frac{\pi^2 \times 12.539}{12(150/8.5)^2} \times 8.5 \times 8.5 \times 10^4 \\ P_e &= 23945.53 \text{ kg.} \end{aligned}$$

Appendix B

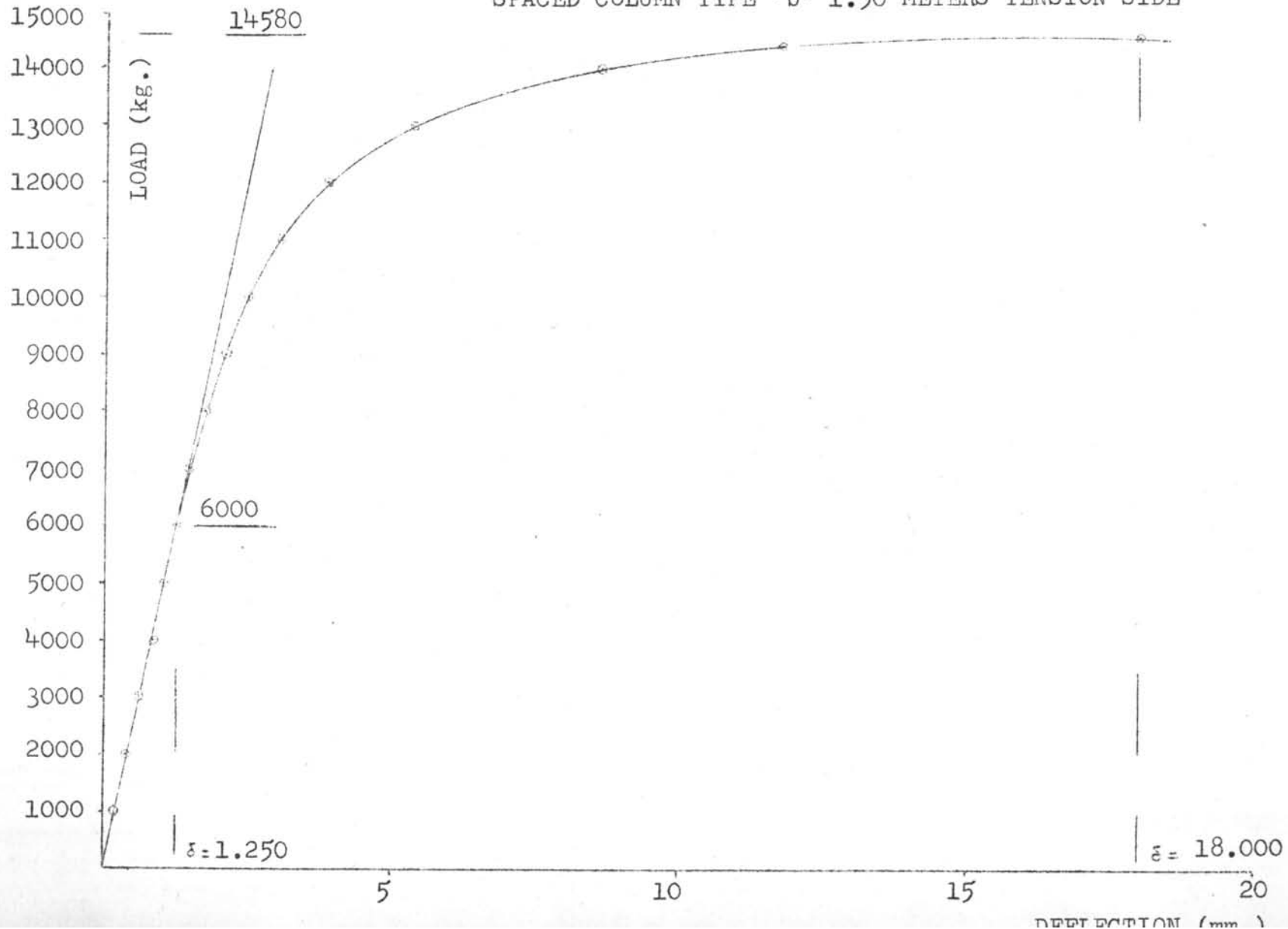
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'a' 1.50 METERS TENSION SIDE



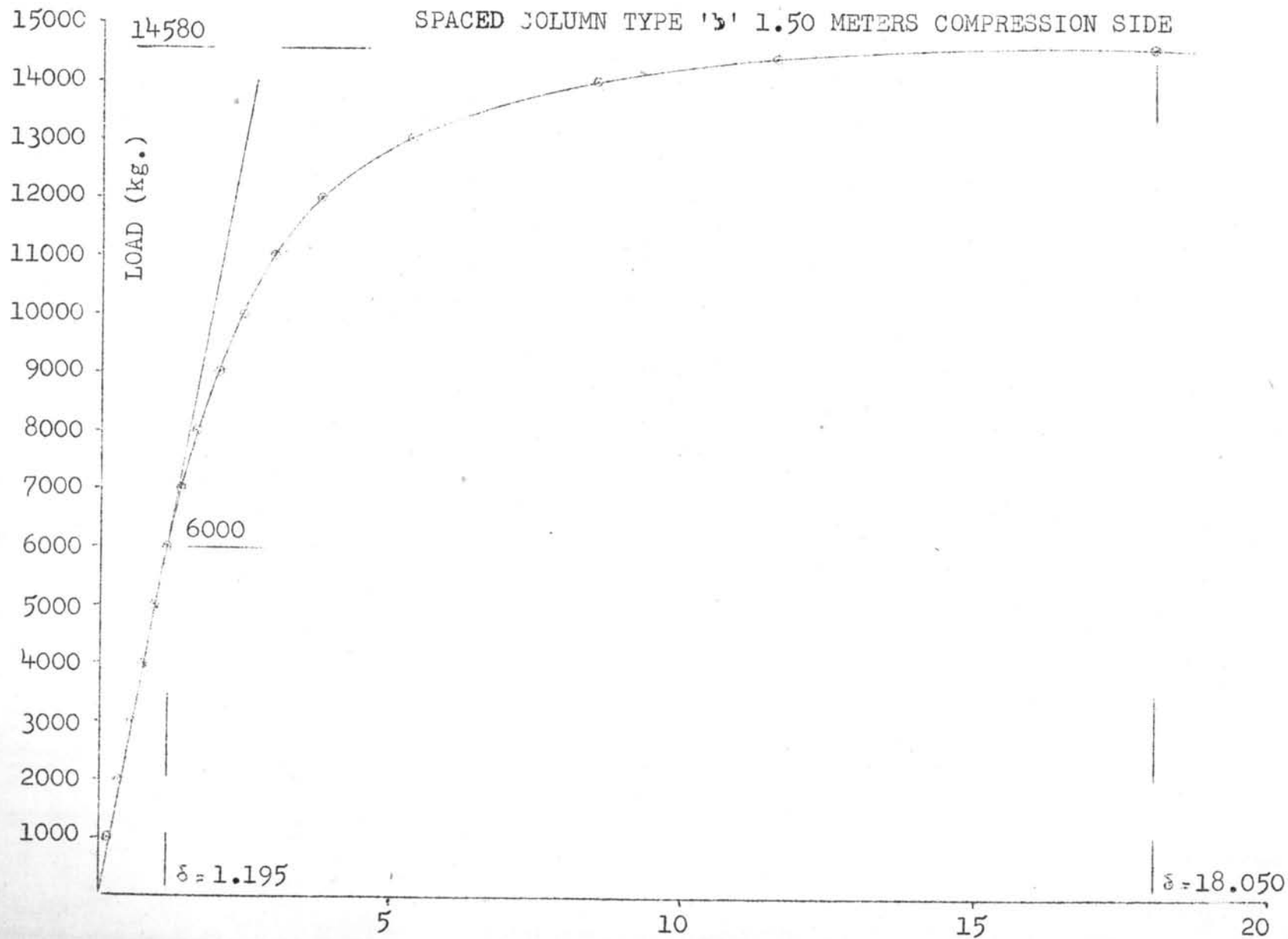




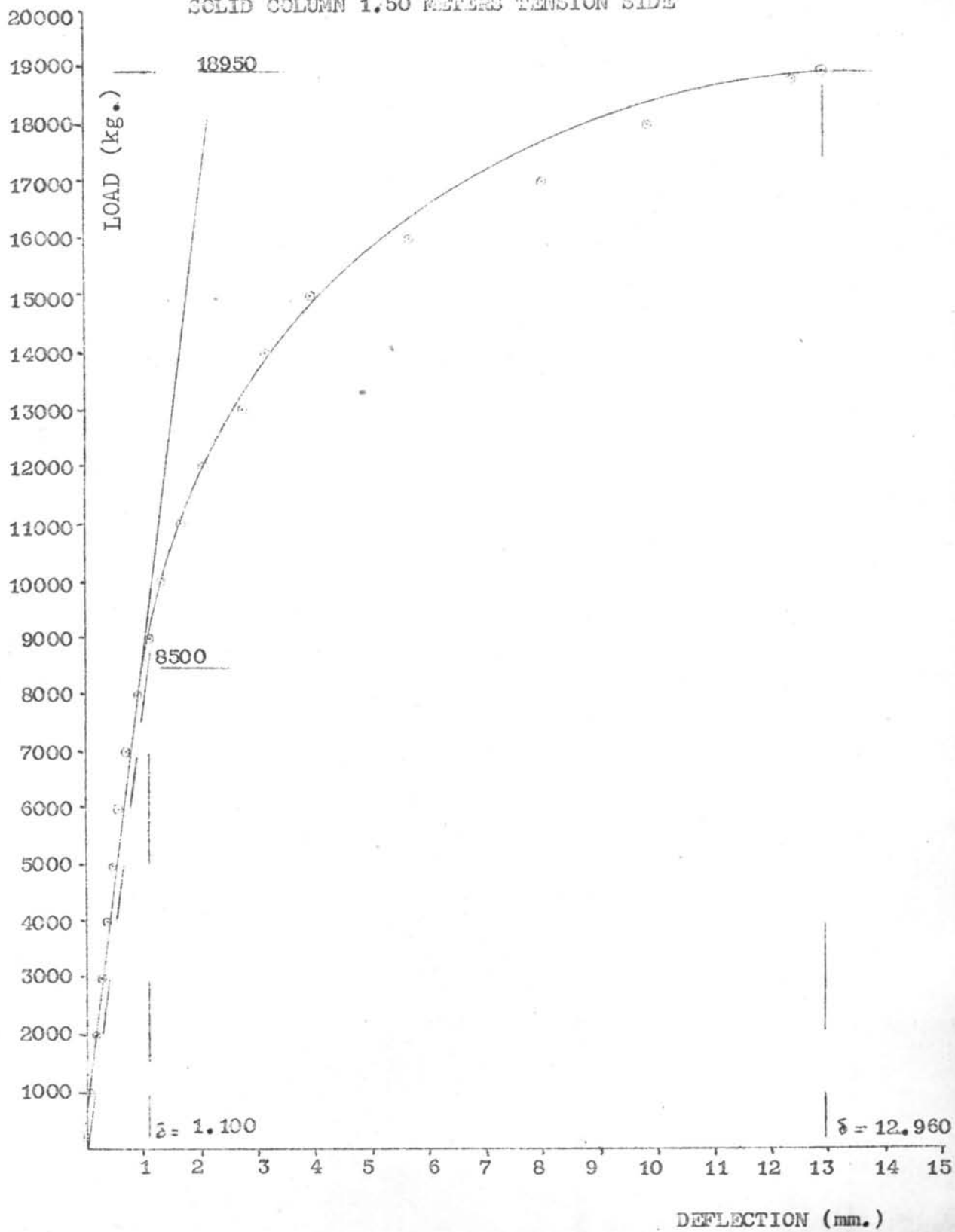
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'b' 1.50 METERS TENSION SIDE



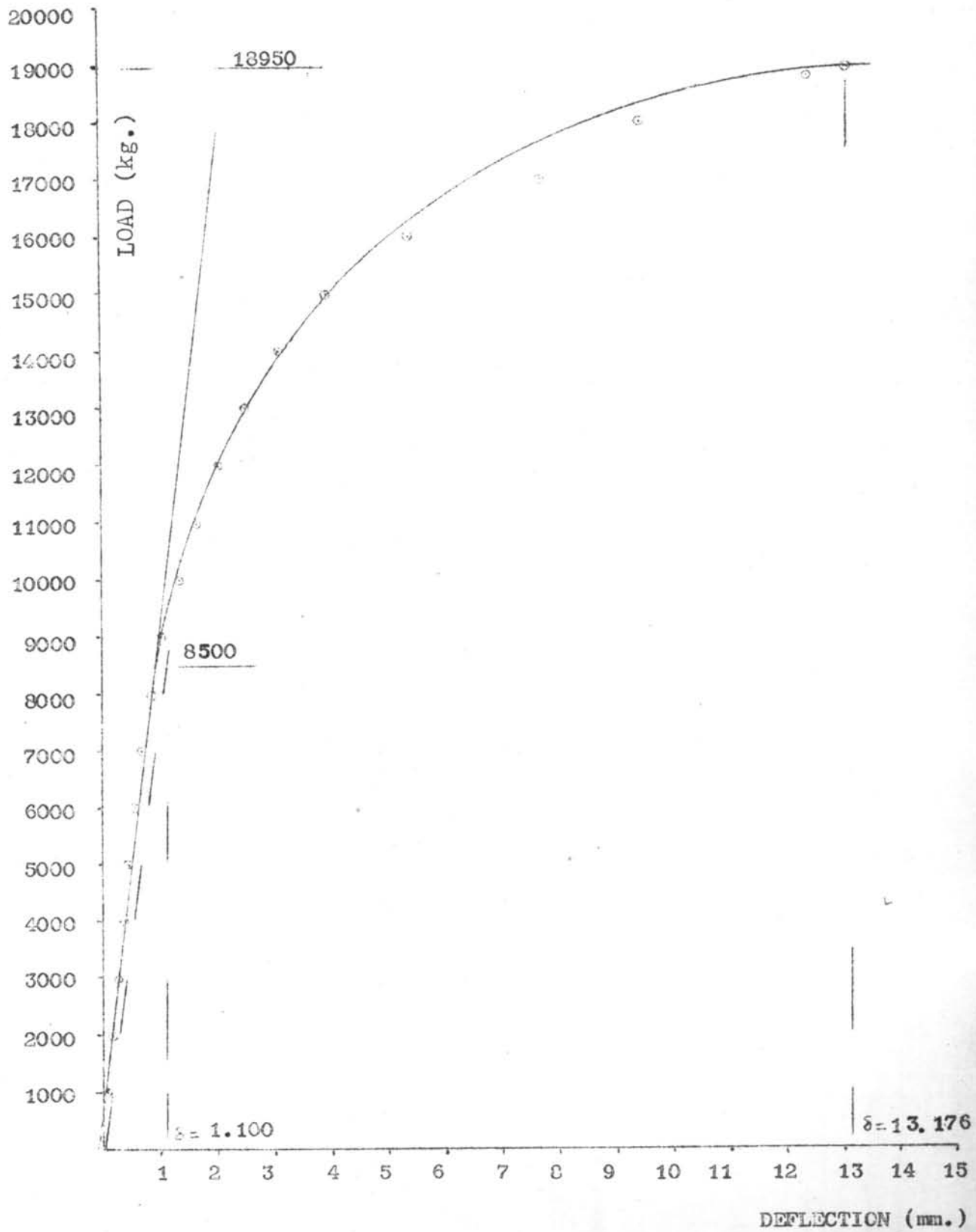
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'B' 1.50 METERS COMPRESSION SIDE



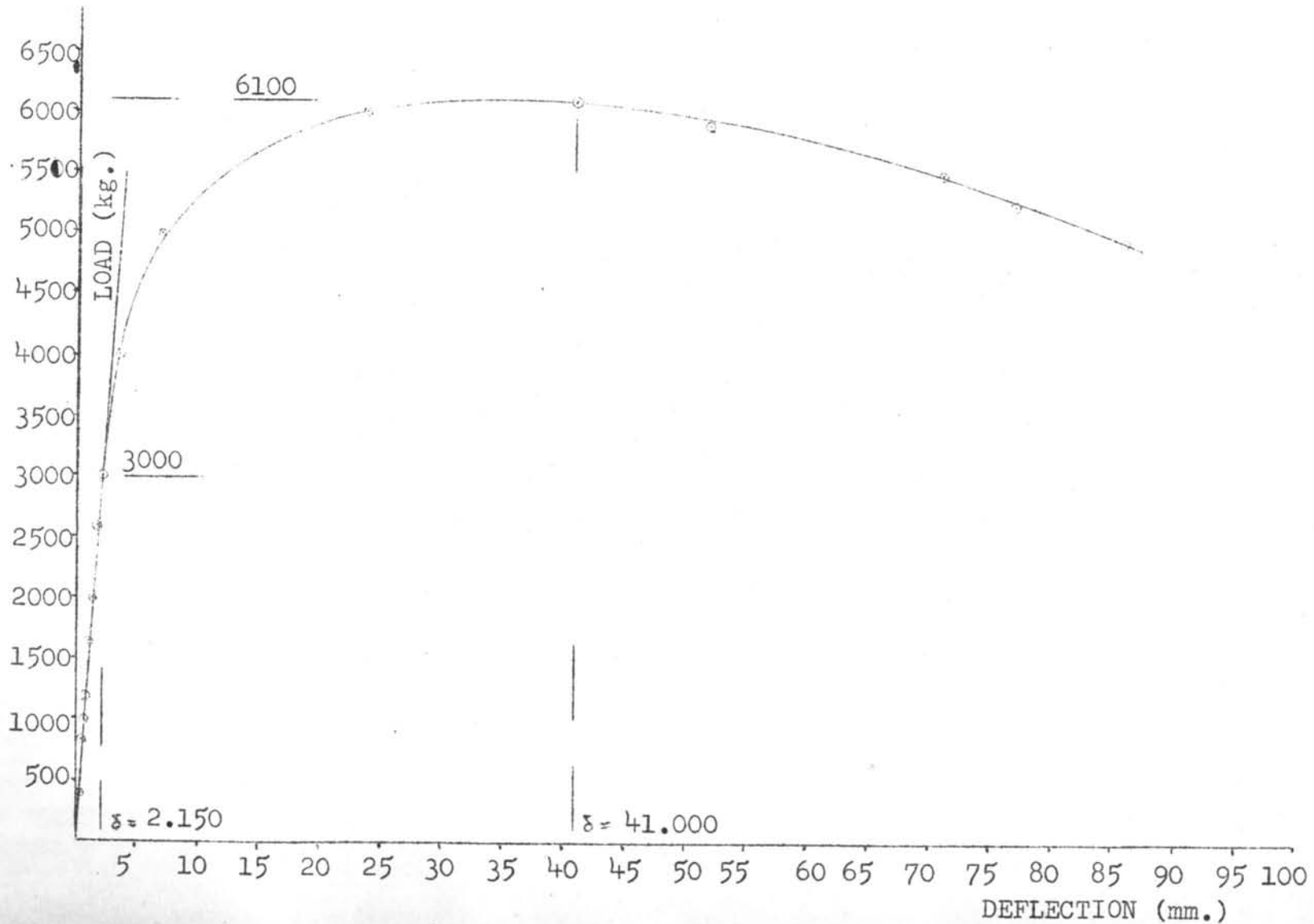
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SOLID COLUMN 1.50 METERS TENSION SIDE



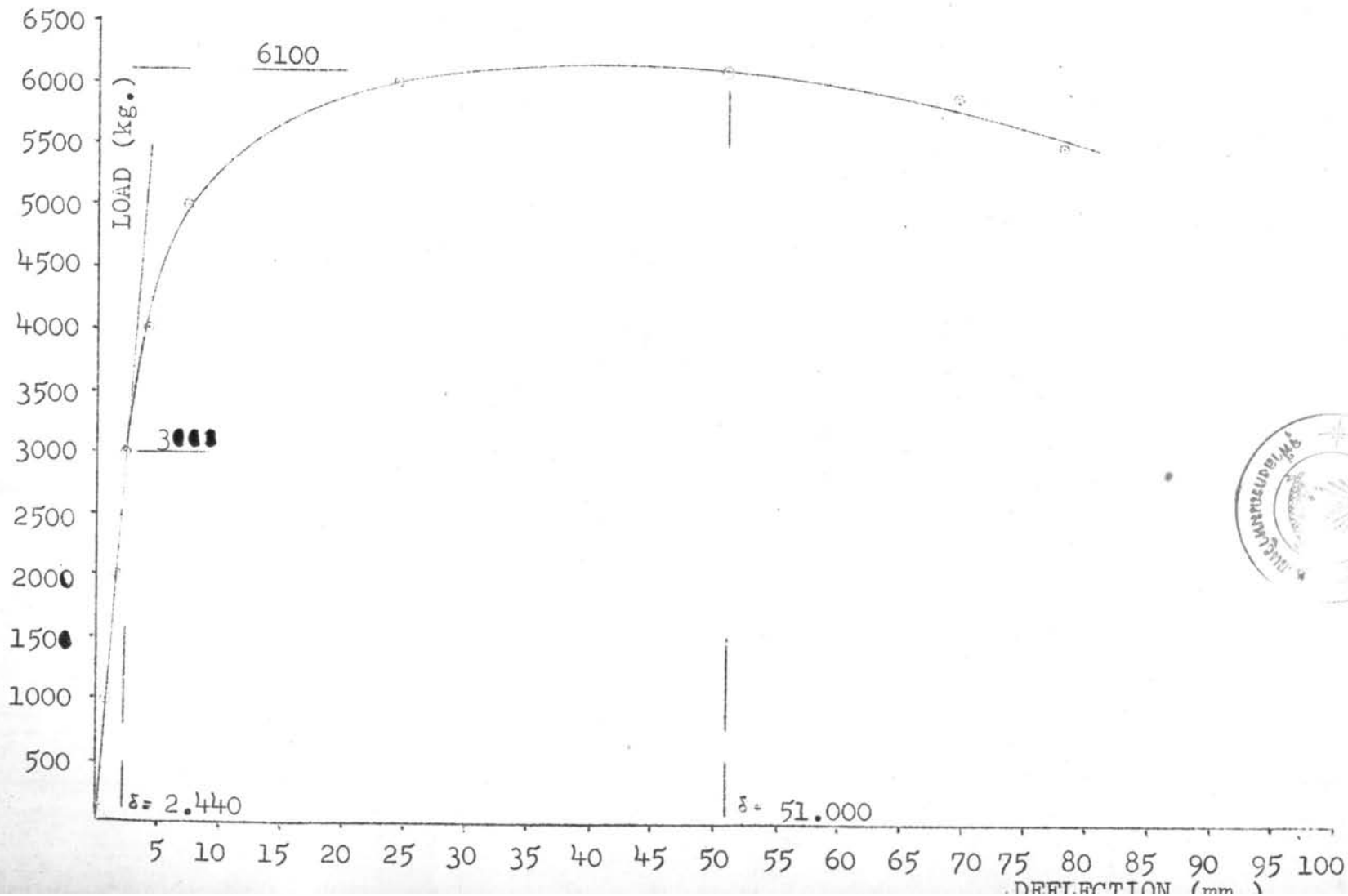
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SOLID COLUMN 1.50 METERS COMPRESSION SIDE



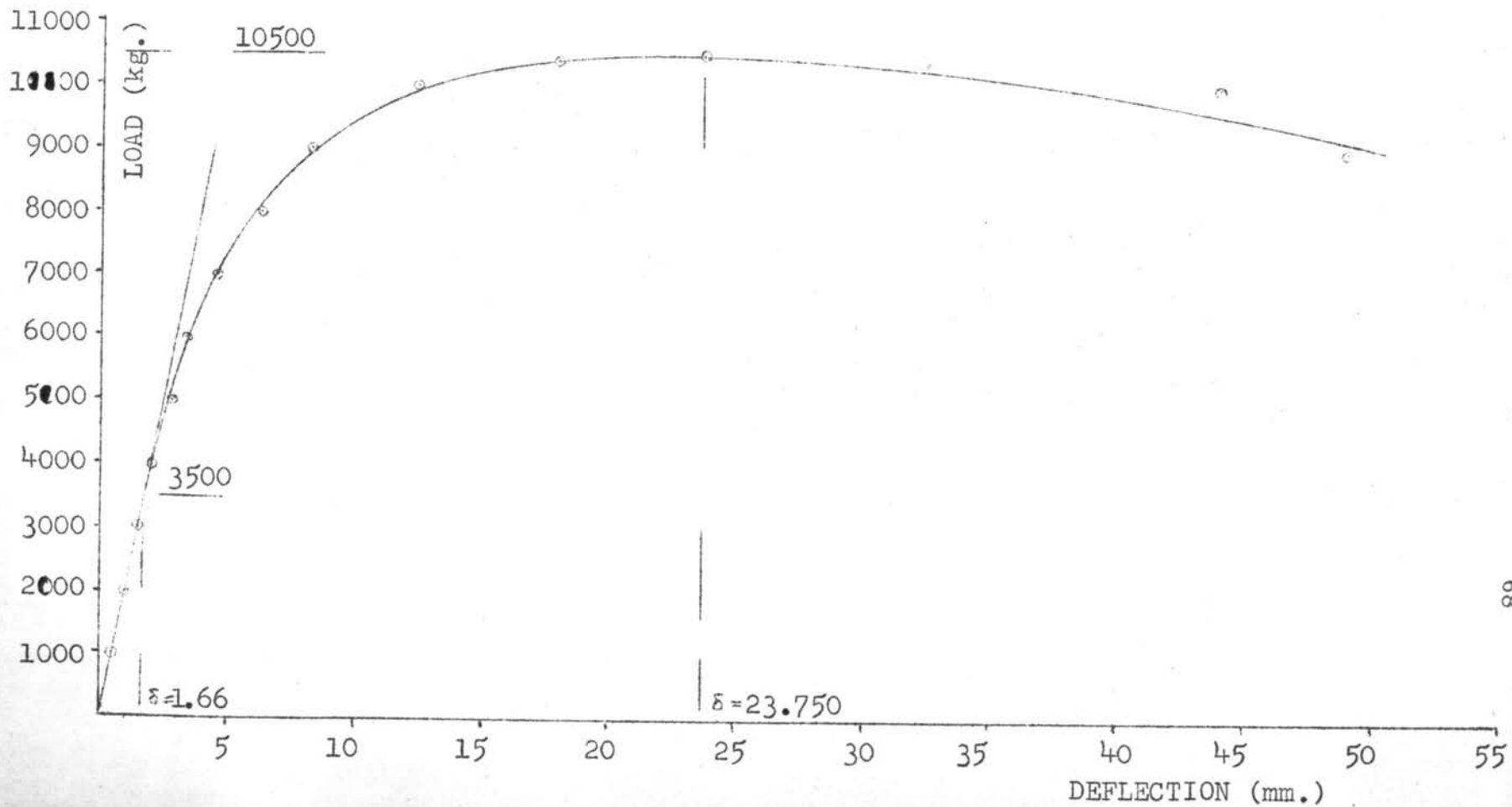
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'a' 2.00 METERS TENSION SIDE



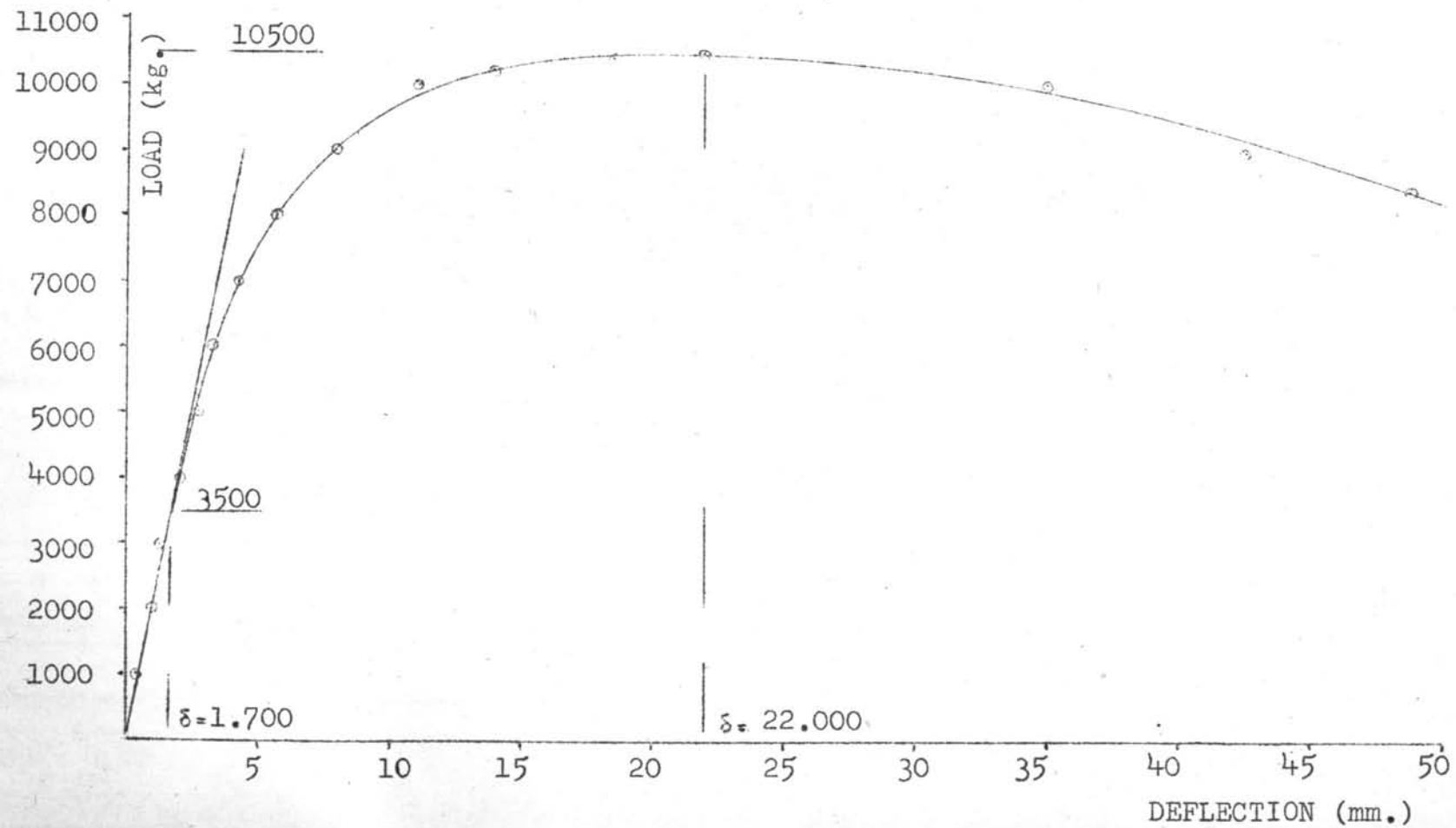
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'a' 2.00 METERS COMPRESSION SIDE



CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'b' 2.00 METERS TENSION SIDE

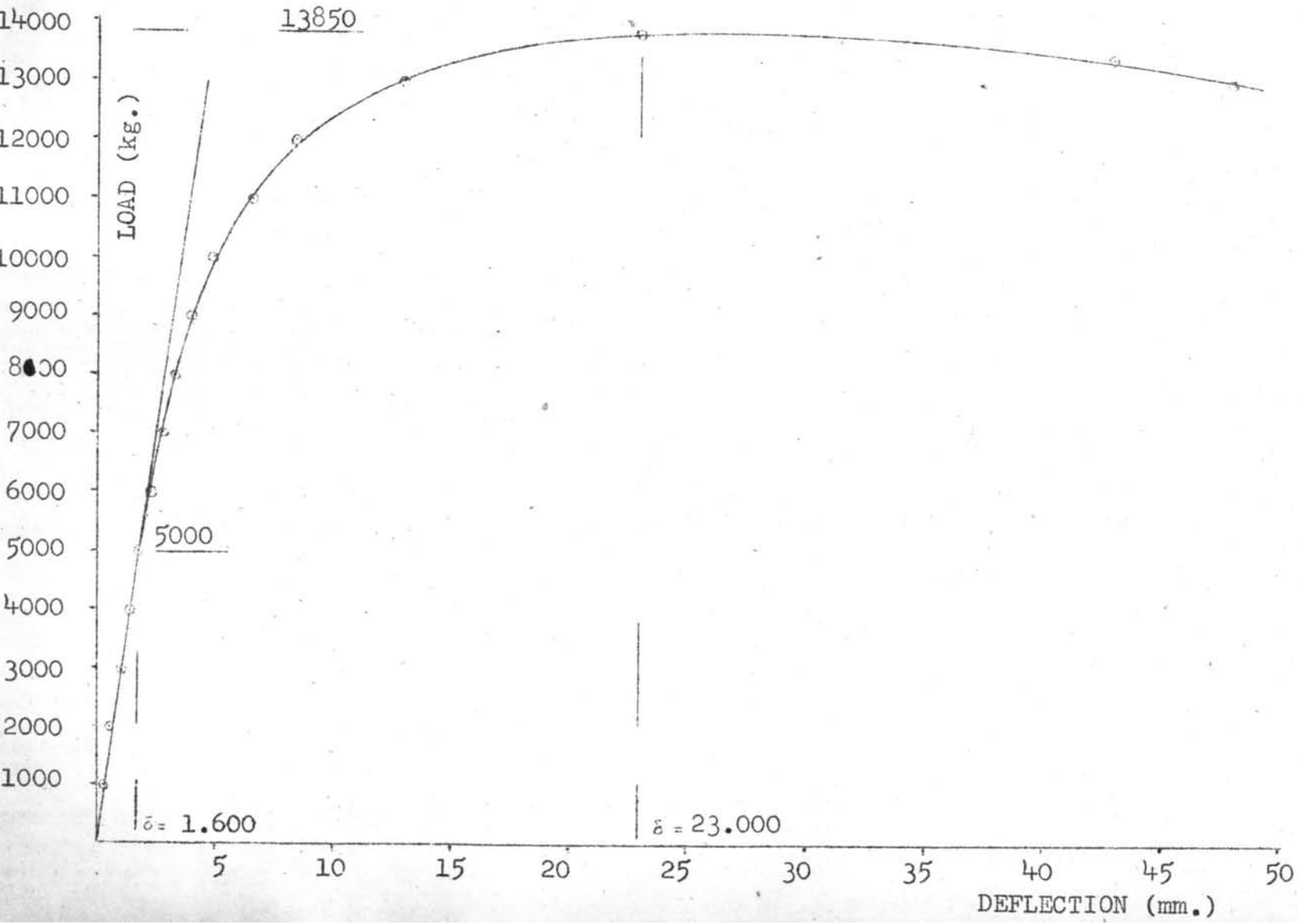


CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT.  
SPACED COLUMN TYPE 'b' 2.00 METERS COMPRESSION SIDE

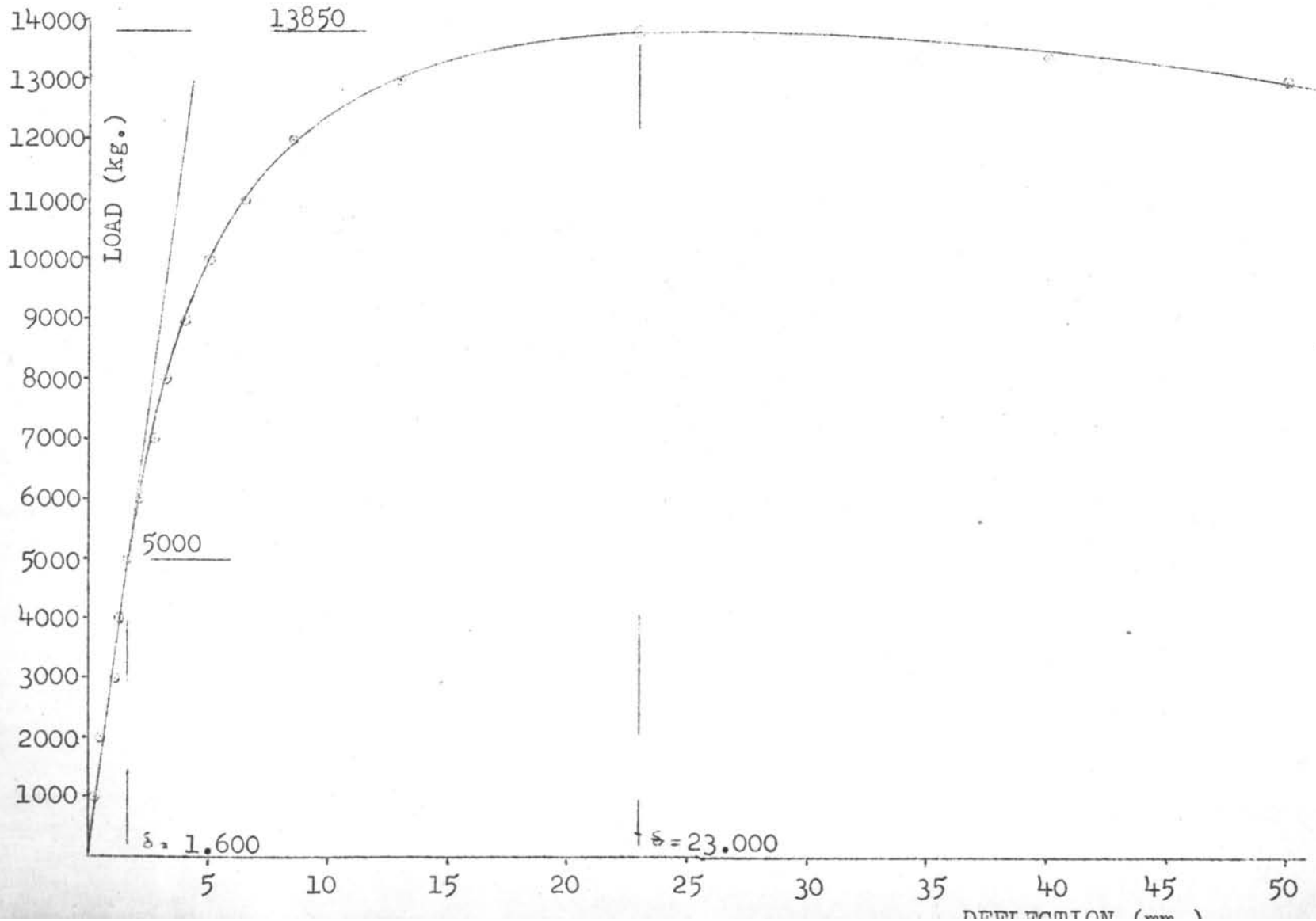




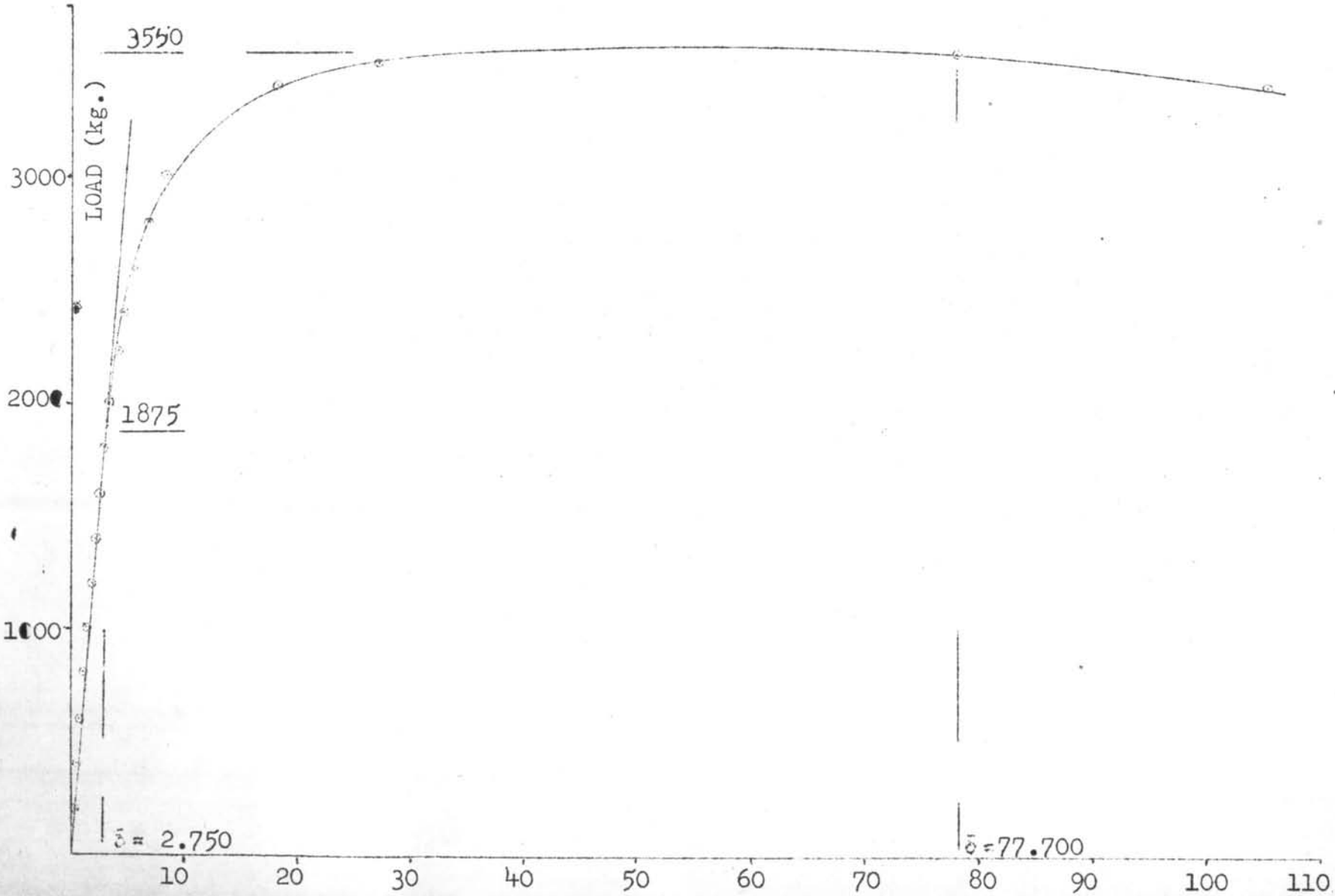
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SOLID COLUMN 2.00 METERS TENSION SIDE



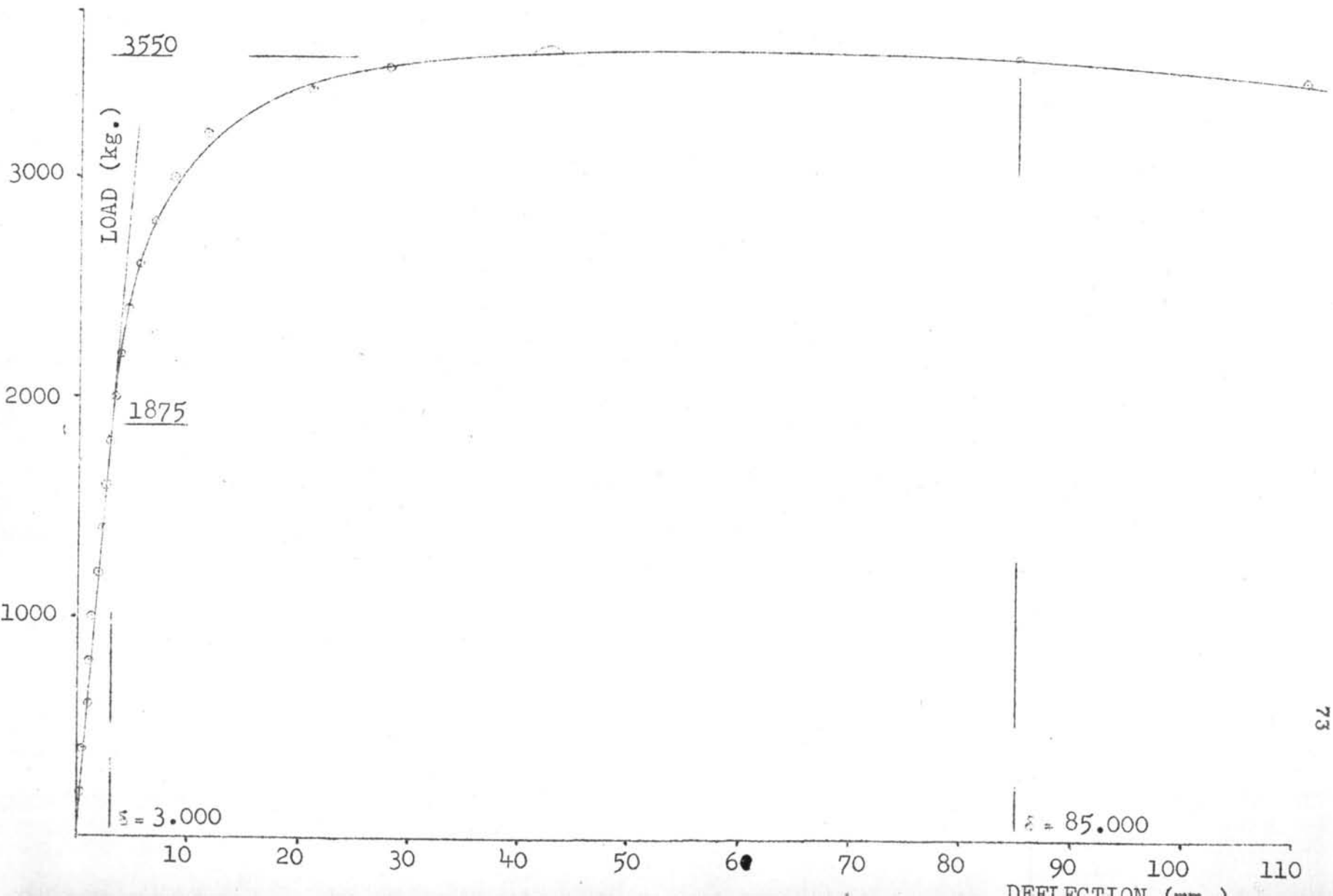
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SOLID COLUMN 2.00 METERS COMPRESSION SIDE



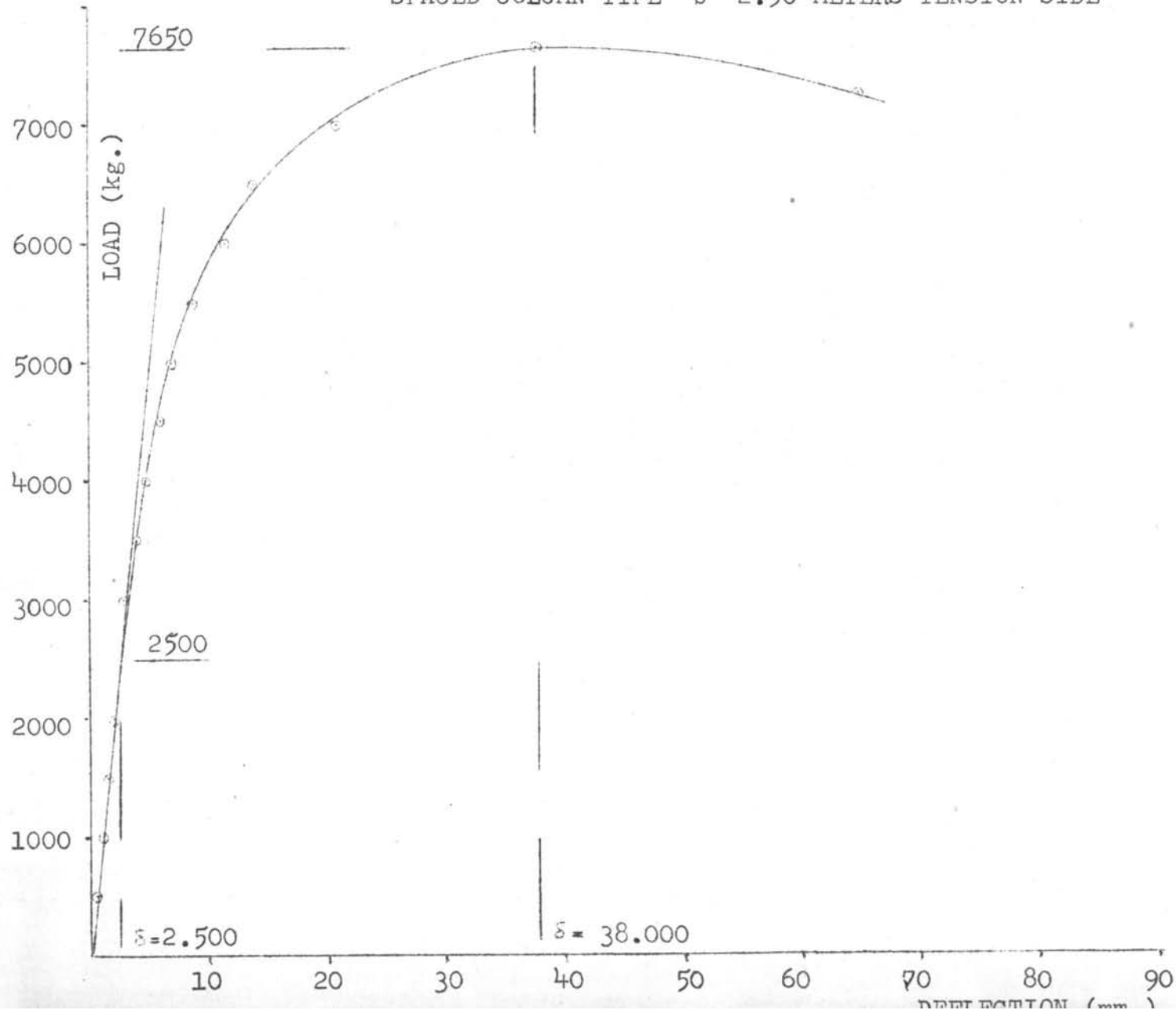
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'a' 2.50 METERS TENSION SIDE



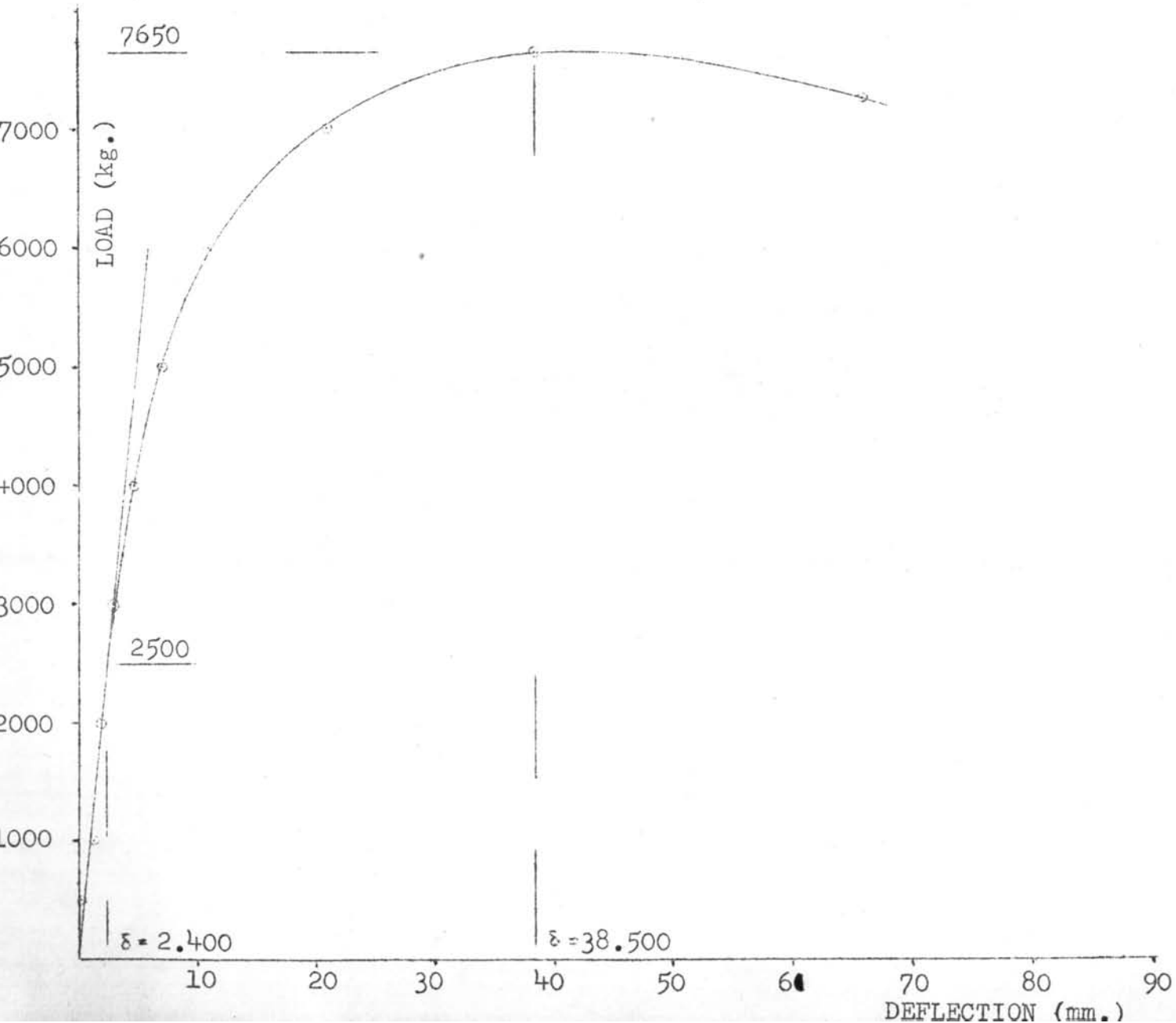
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'a' 2.50 METERS COMPRESSION SIDE



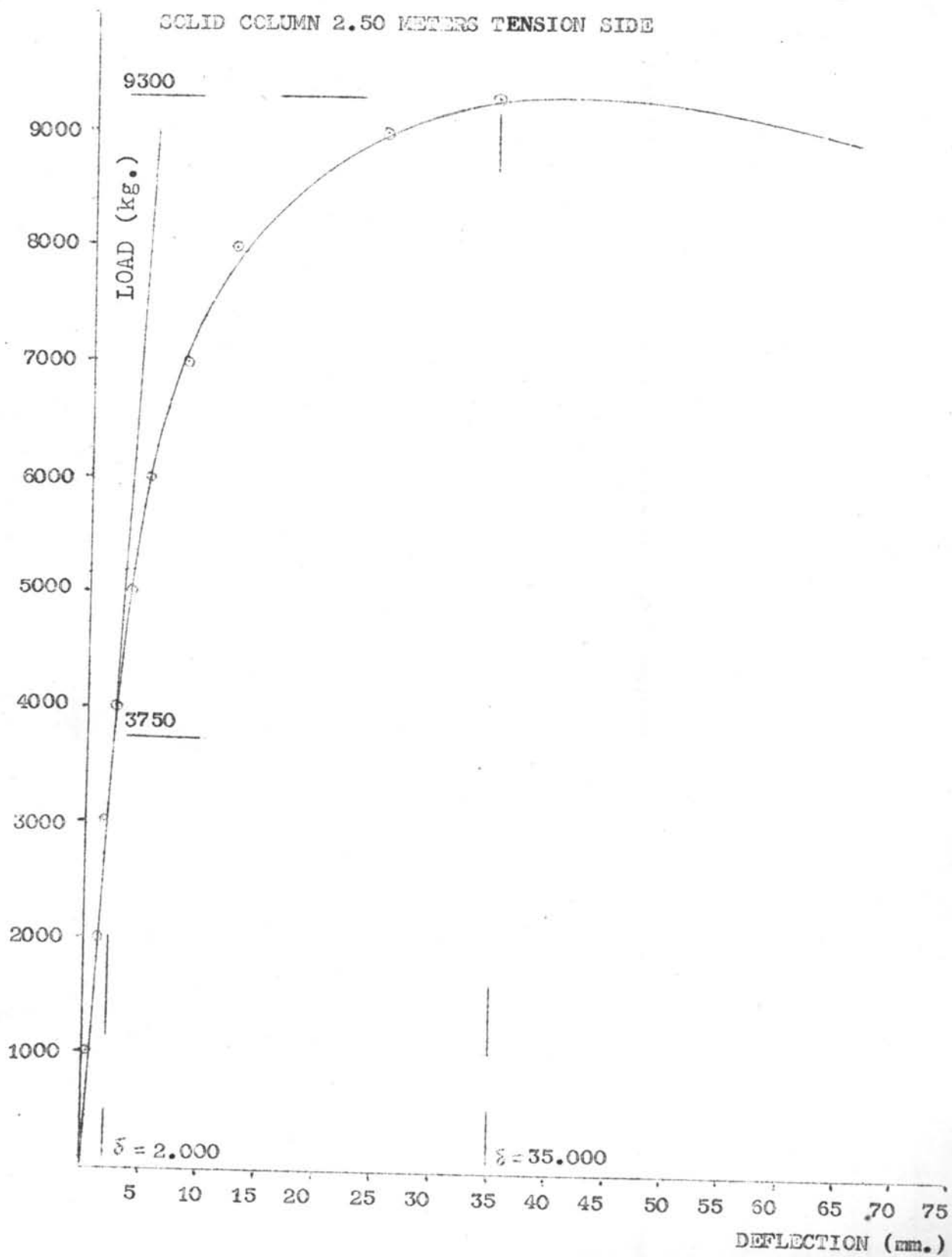
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'b' 2.50 METERS TENSION SIDE



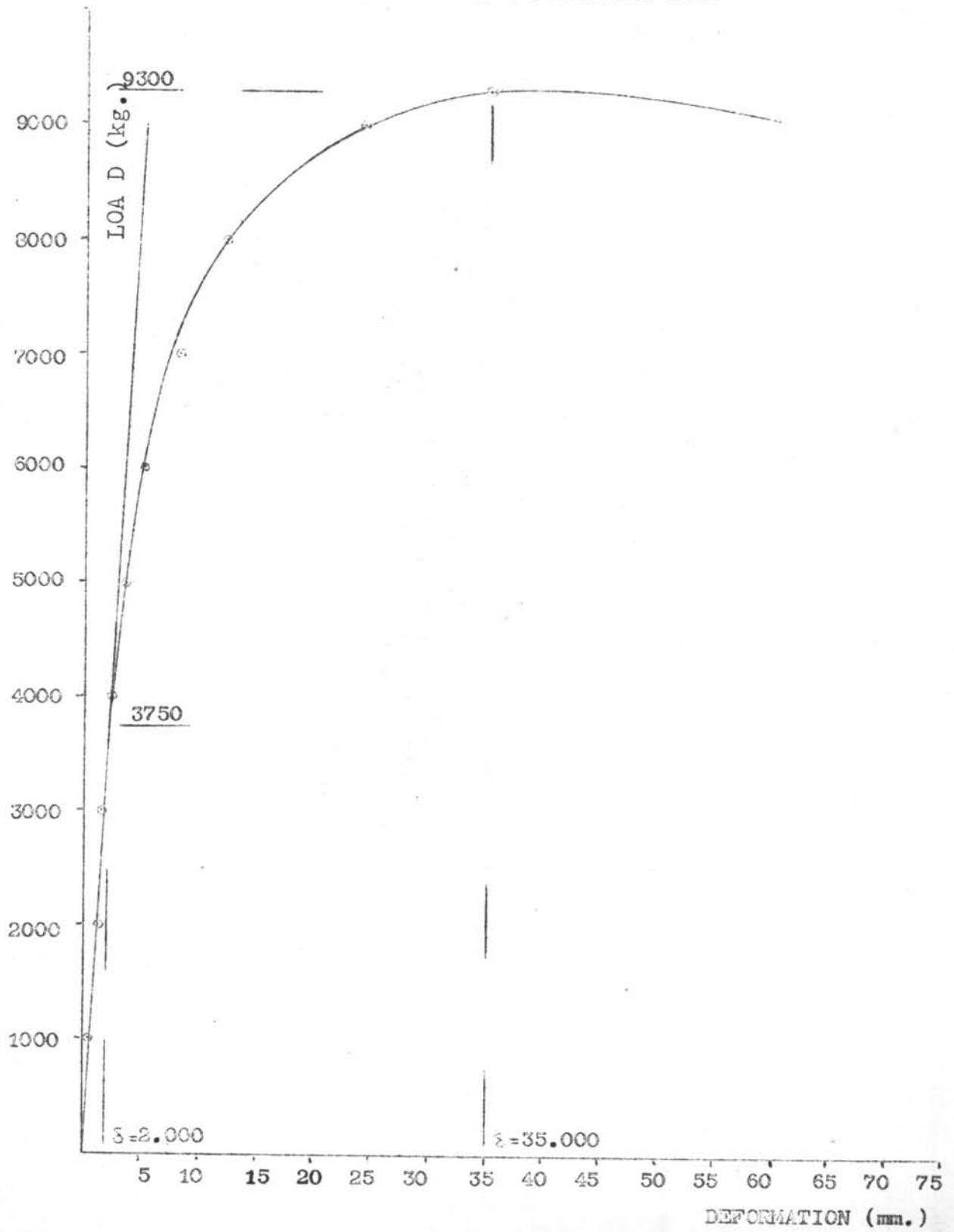
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'b' 2.50 METERS COMPRESSION SIDE



CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SOLID COLUMN 2.50 METERS TENSION SIDE

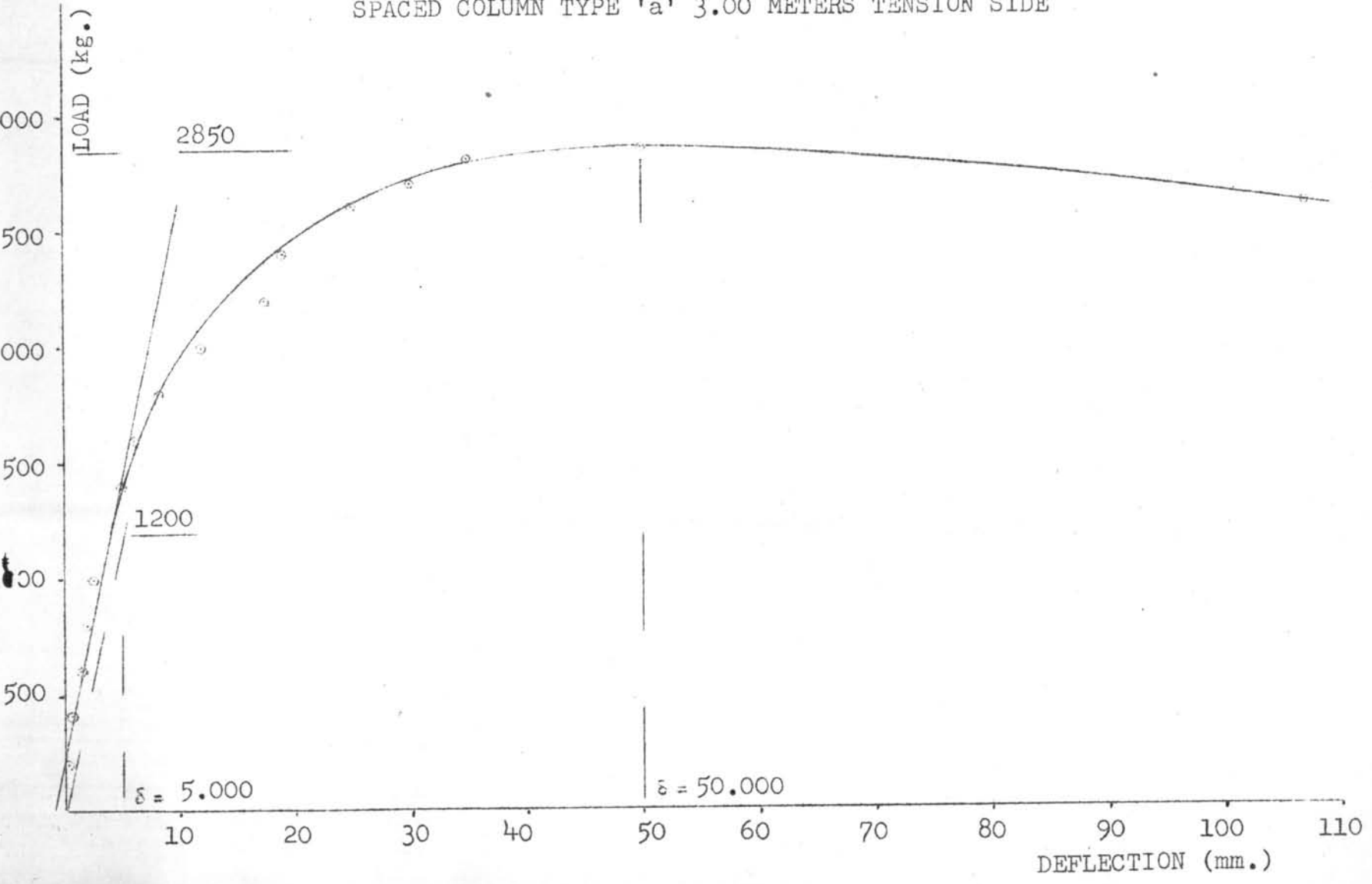


CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SOLID COLUMN 2.50 METERS COMPRESSION SIDE

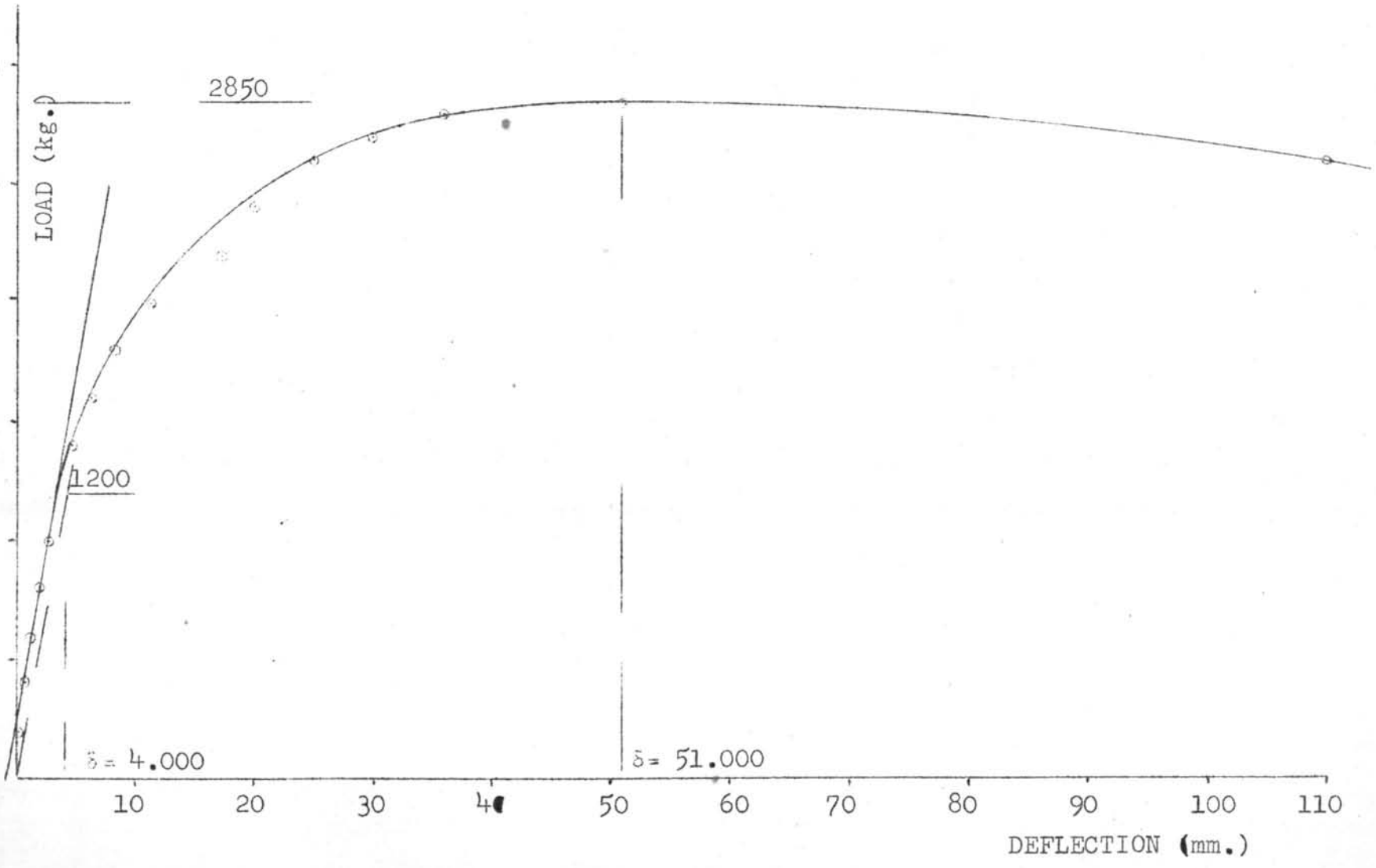




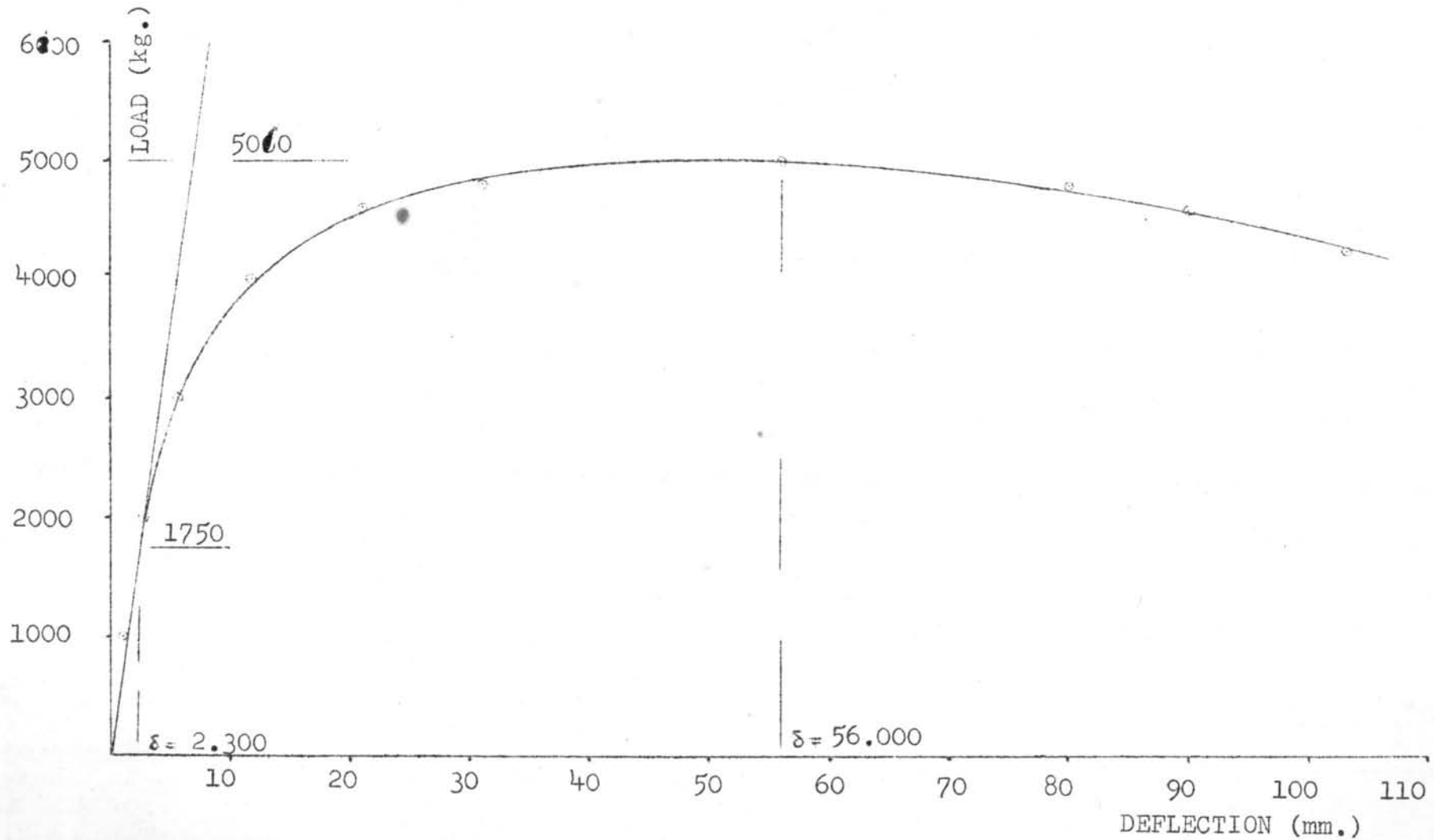
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'a' 3.00 METERS TENSION SIDE



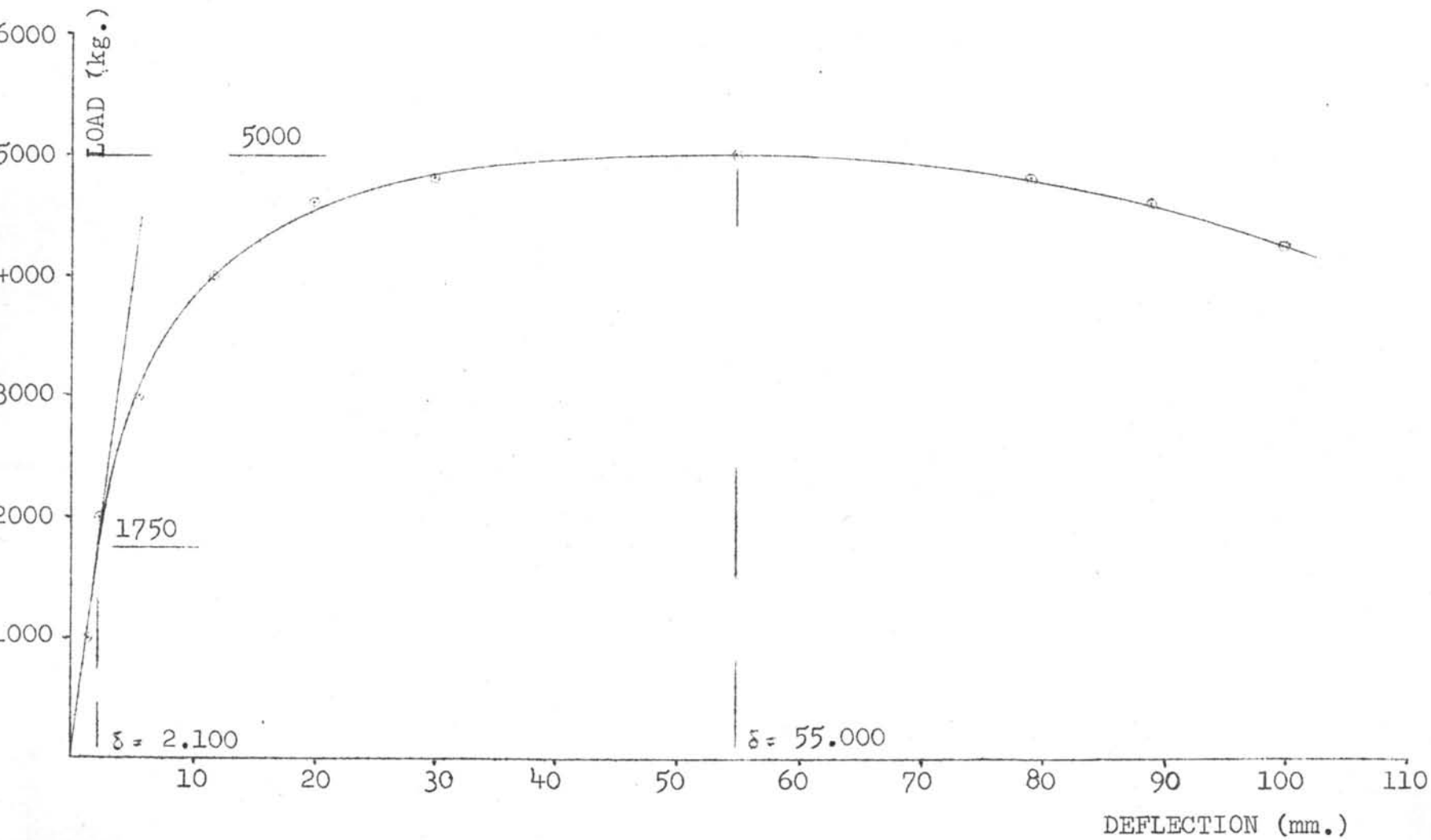
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'a' 3.00 METERS COMPRESSION SIDE



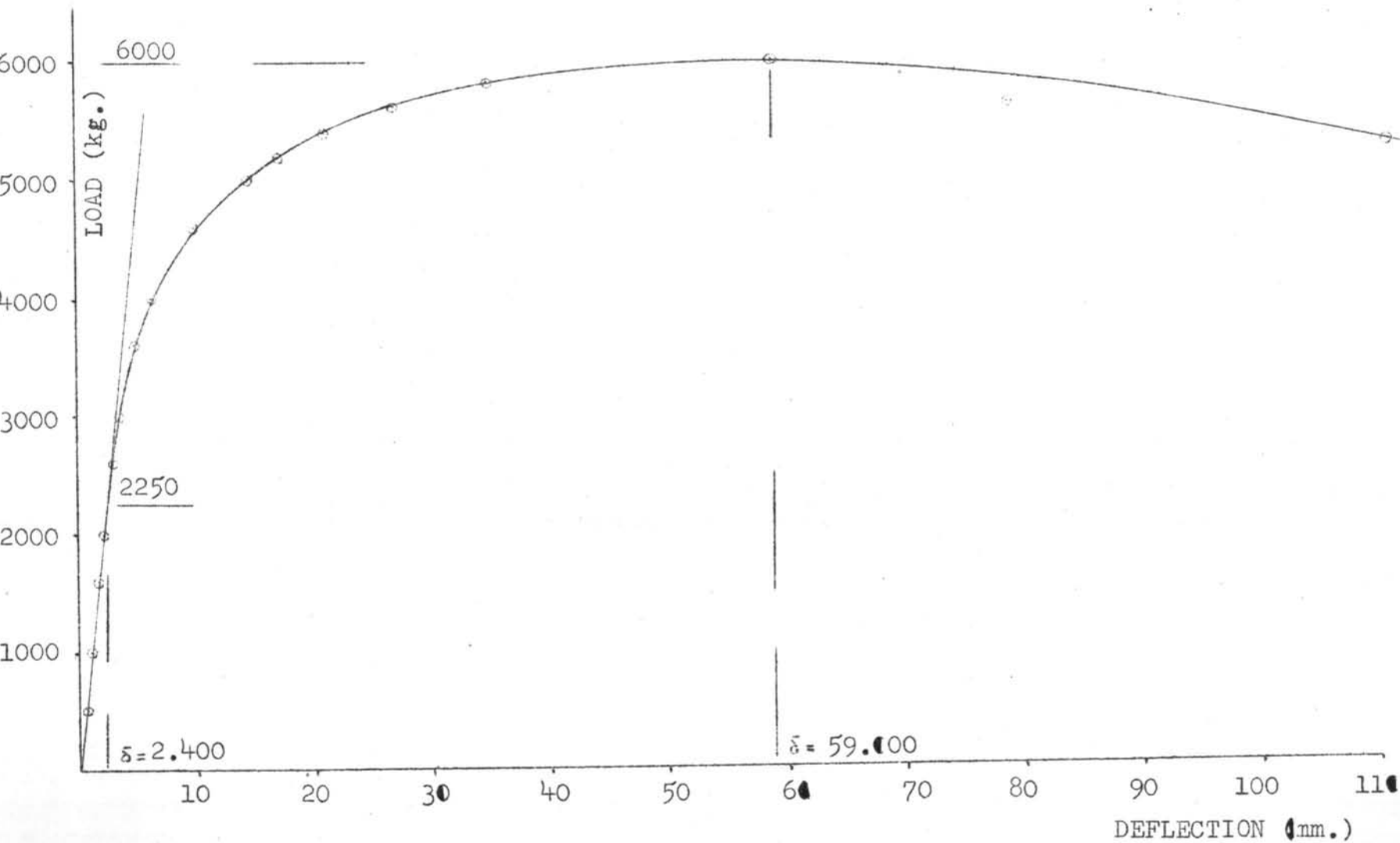
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'b' 3.00 METERS TENSION SIDE



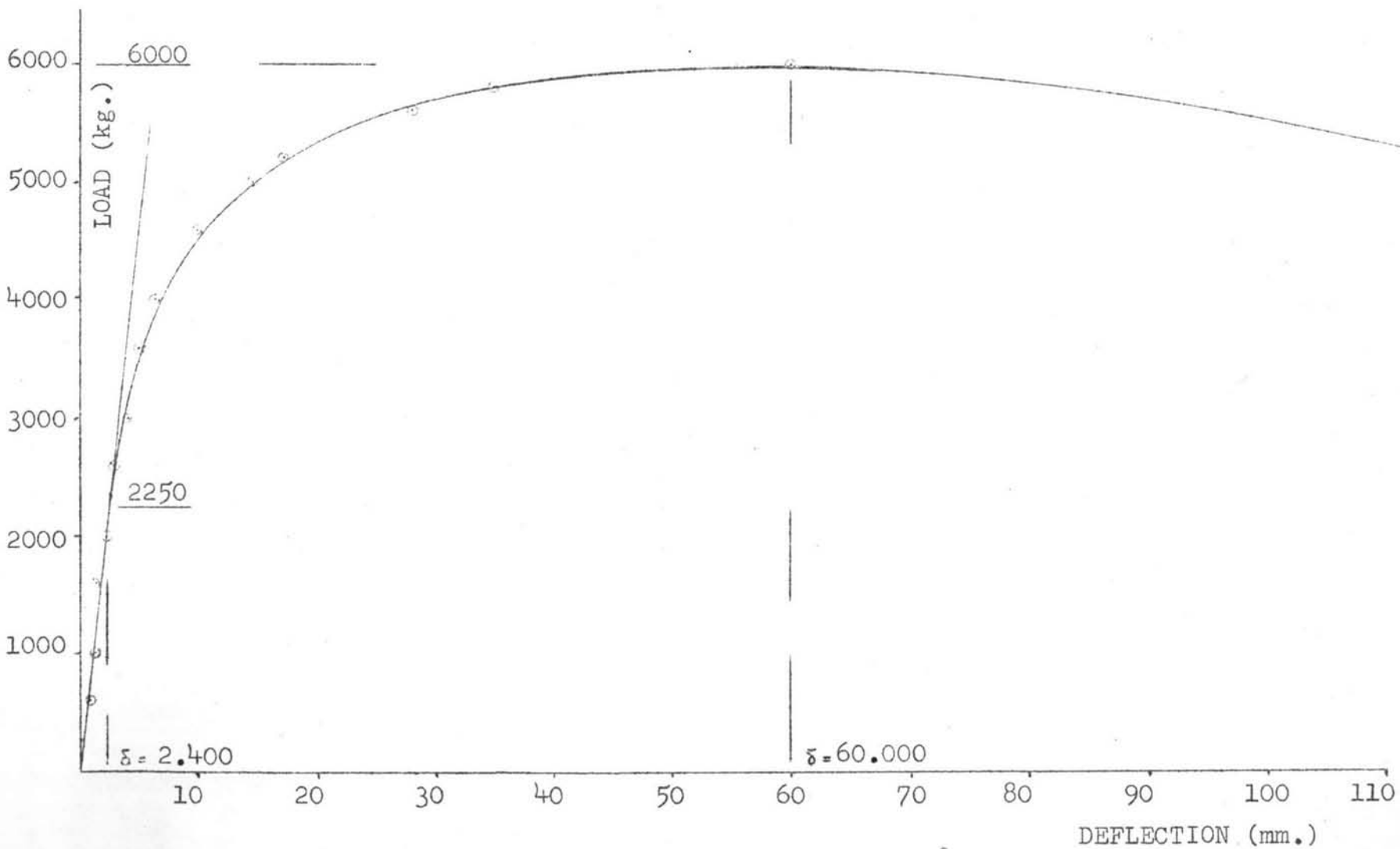
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'b' 3.00 METERS COMPRESSION SIDE



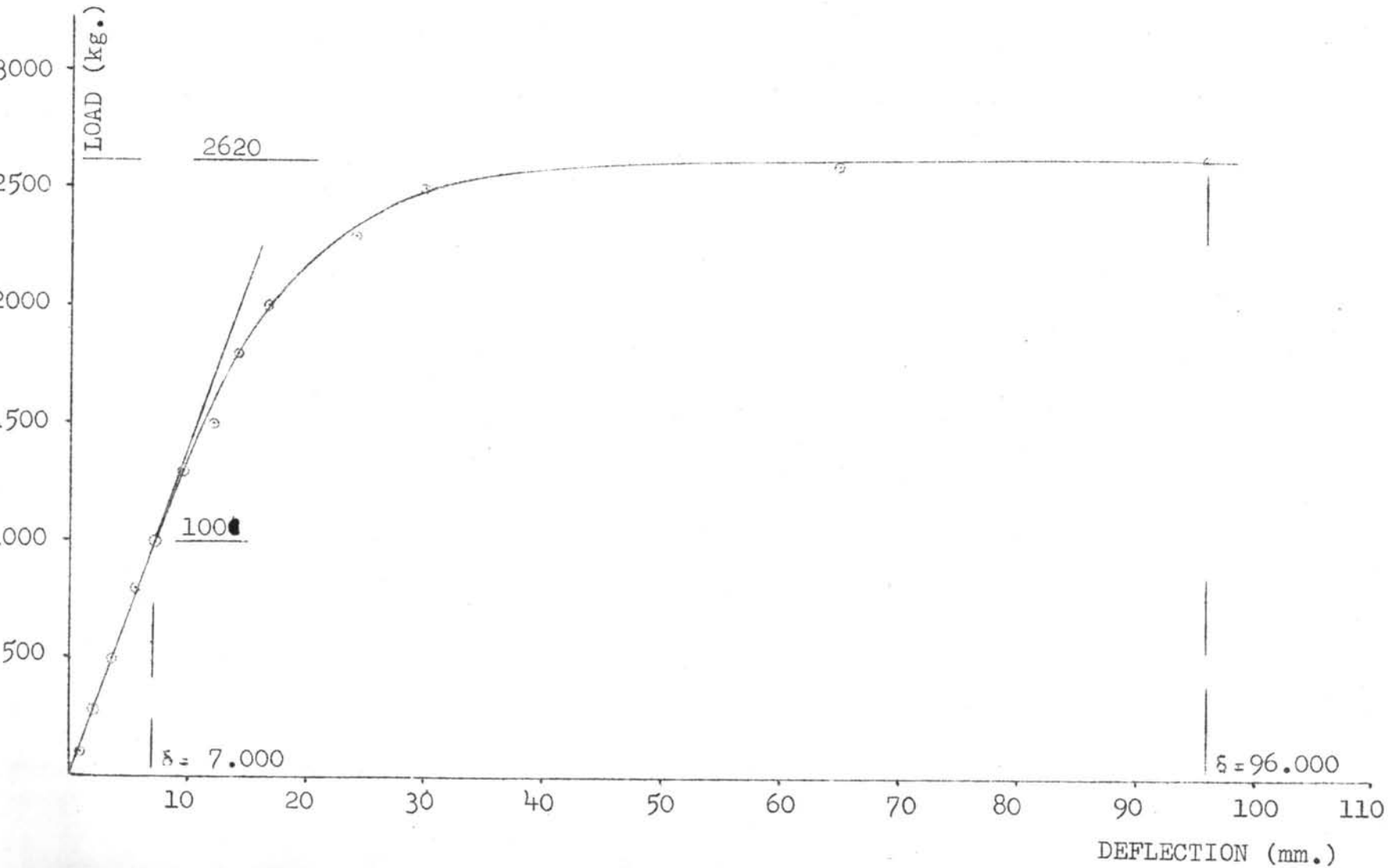
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SOLID COLUMN 3.00 METERS TENSION SIDE



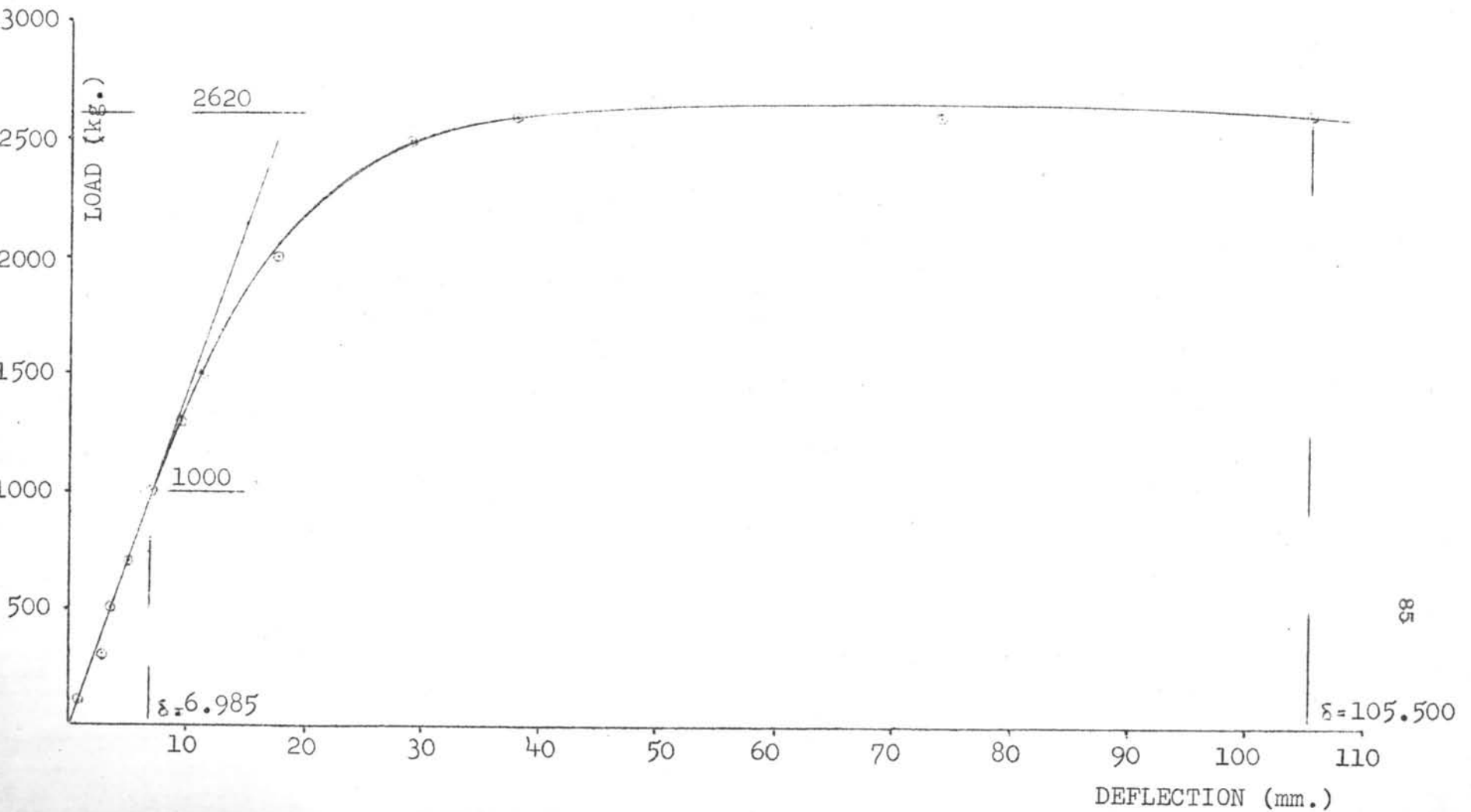
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SOLID COLUMN 3.00 METERS COMPRESSION SIDE



CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'a' 3.50 METERS TENSION SIDE

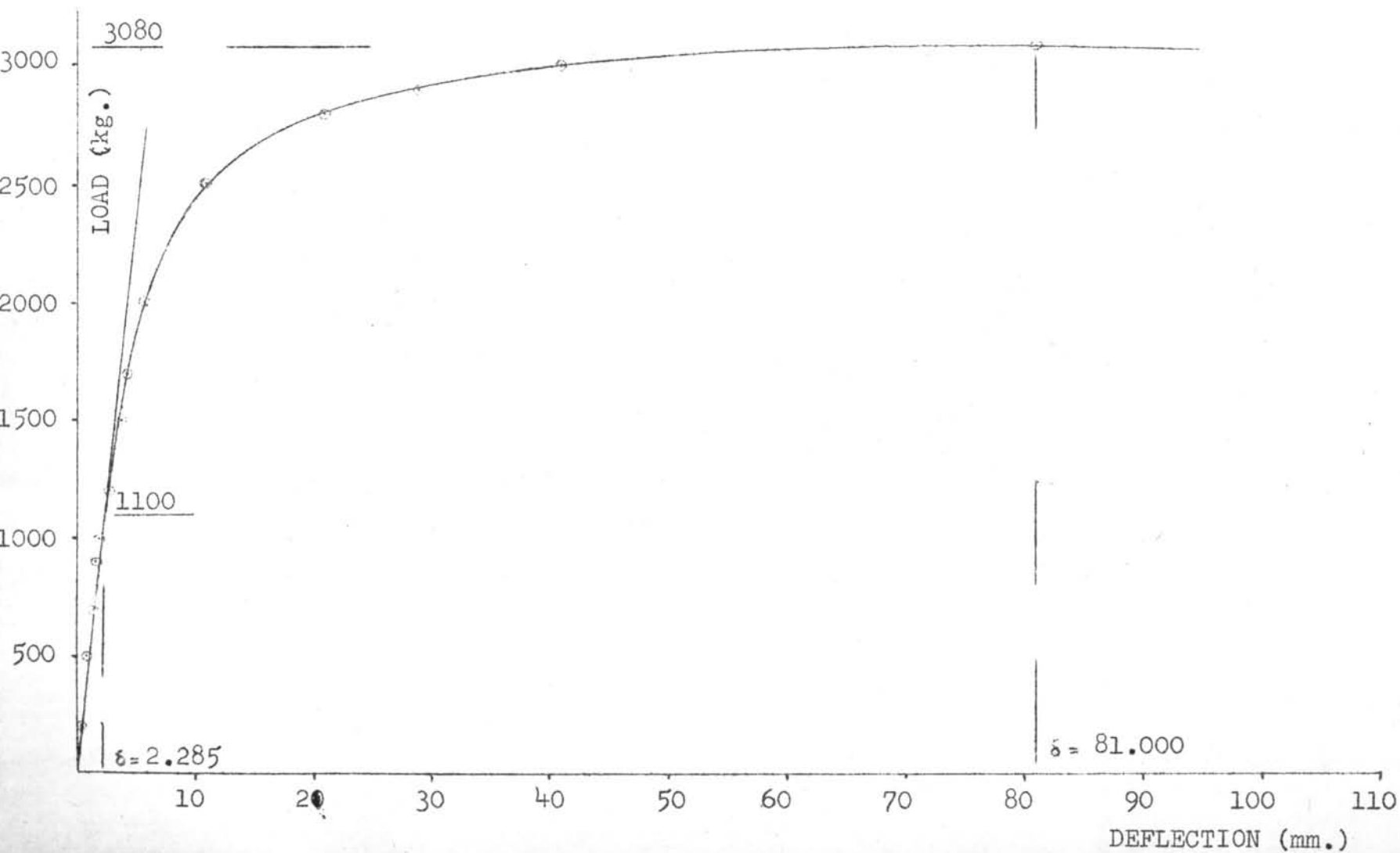


CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'a' 3.50 METERS COMPRESSION SIDE

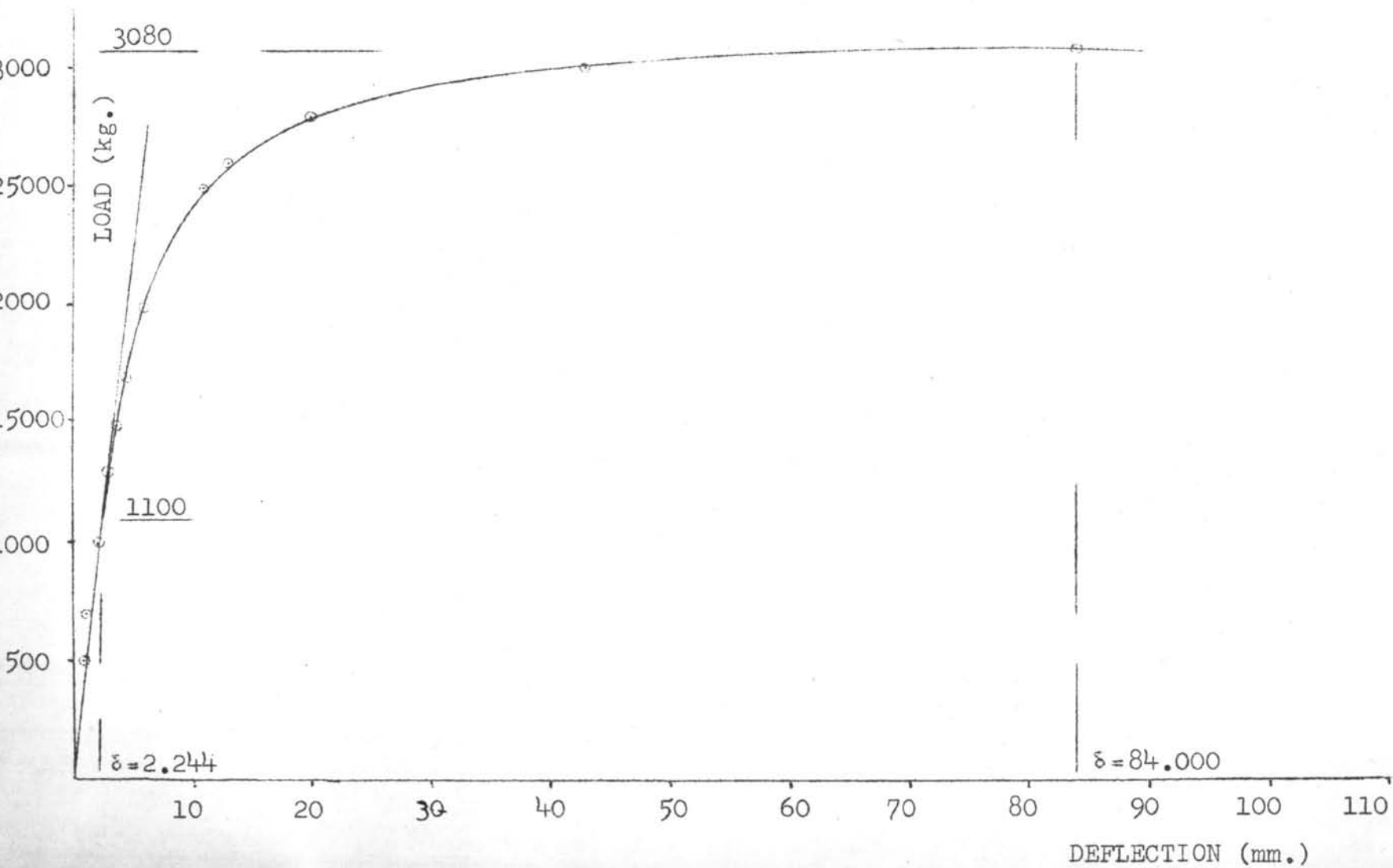




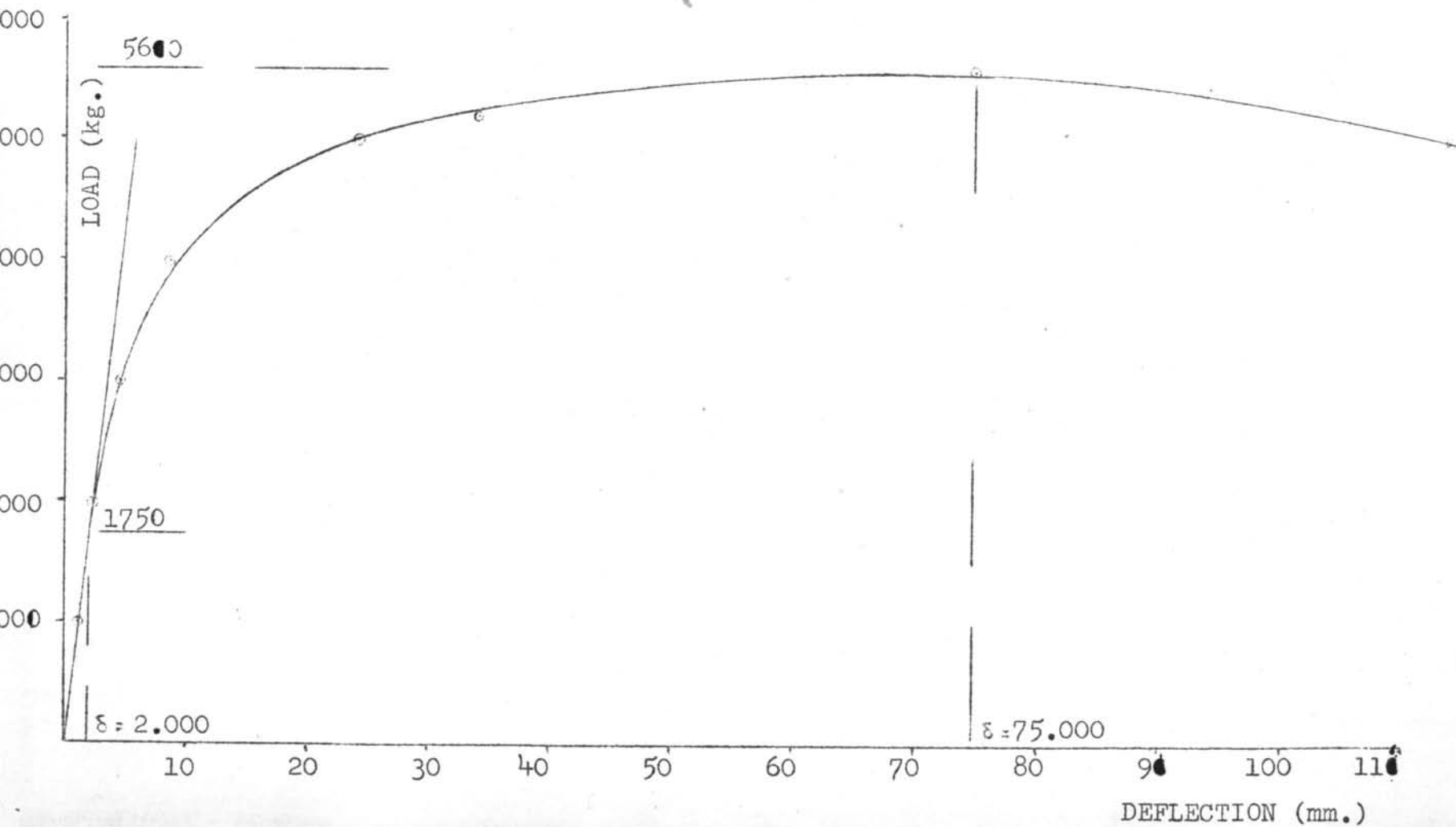
.CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'b' 3.50 METERS TENSION SIDE



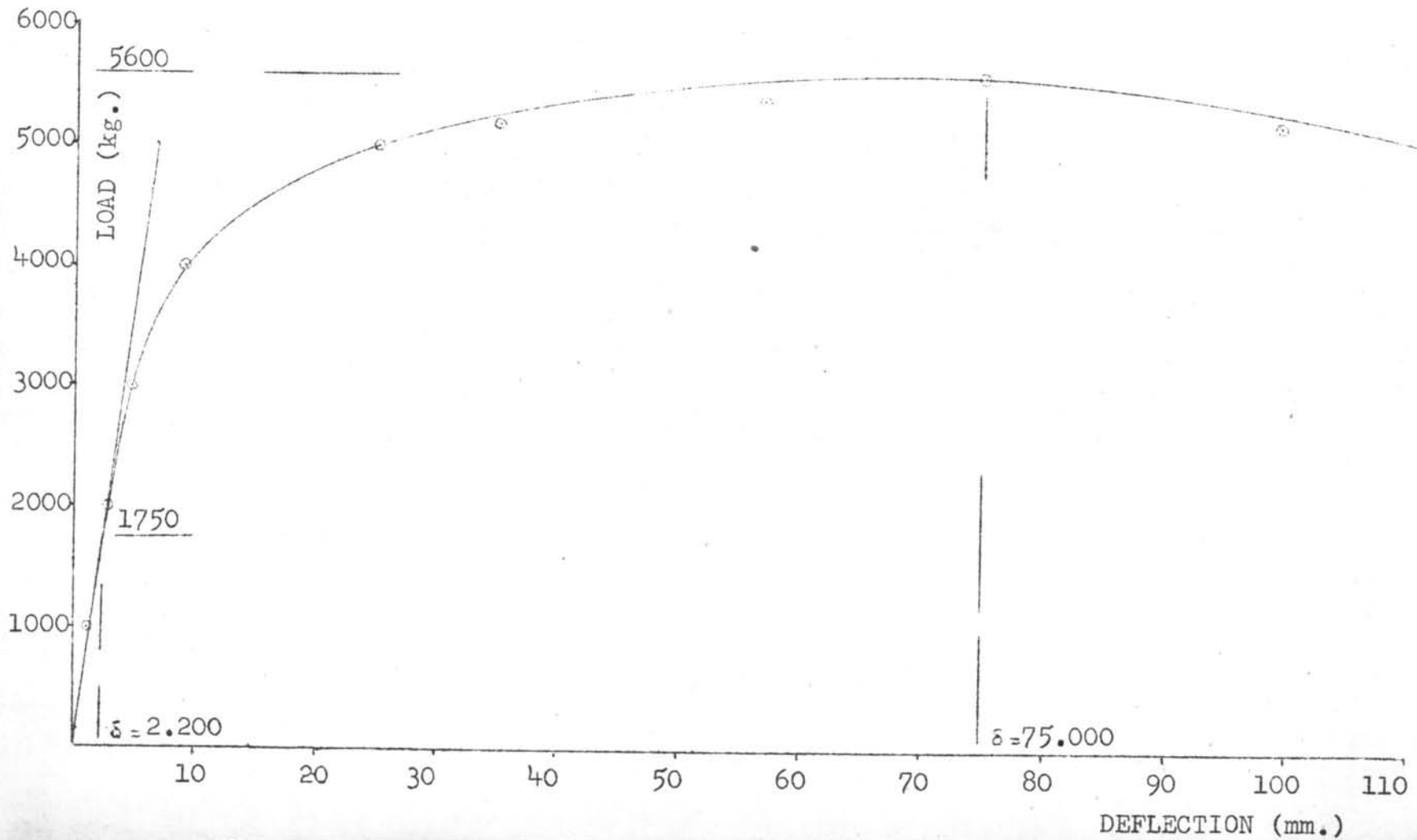
CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SPACED COLUMN TYPE 'b' 3.50 METERS COMPRESSION SIDE



CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SOLID COLUMN 3.50 METERS TENSION SIDE



CURVE OF COLUMN LOAD AND LATERAL DEFLECTION AT MID HEIGHT  
SOLID COLUMN 3.50 METERS COMPRESSION SIDE



## VITA

Mr. Sa-at Rengsirikul

B.S.C.E. Mapua Institute of Technology, 1969.

He joined the Faculty of Engineering, Khon Kaen University after graduation as a University lecturer up to now.