SECTION 7
TREE BLASTING

0701.	As an alternative to pushing or pulling them down with dozers and tractors and then cutting them up on the ground, trees can be cleared from areas required for road, airfield, etc, construction by first felling the main trunk (by axe and saw or by explosive using the data in Tables 14 and 19) and then removing the stump by blasting, either alone or in combination with pulling.

0702.	In stump blasting the charges are loaded at the bottom of auger holes placed so as to make a crater to include all the stump. They must be heavy enough to lift the entire cone of soil and the stump into the air.

0703.	Factors that affect the calculation and application of charges are:

	a.	The size and type of root system, ie, tap root, lateral spreading roots, or both. Although generally oak and pine have deep tap roots, while poplar and spruce are examples that normally have shallow lateral roots, trees will adapt their root systems to their environment and it is safest to carry out a practical test when working in a new locality.

	b.	The condition of the stump; a green stump requires a heavier charge than a dead stump.

	c.	The consistency of the soil; stumps are easier to blast out of firm soils than out of loose sandy soils.

	d.	The nature of the soil ; sandy soil when wet makes good tamping, but when dry is exactly the opposite ; some clay soils become springy when wet and do not afford good tamping.

0704.	The detail in Table 26 and Figures 21 and 22 will serve as a guide for starting a task; the calculations and methods of application can be adjusted after practical experience. In each case green timber and medium soil are assumed.

Ser	Type of stump	Method	Formulae (i)
(a)	(b)	(c)	(d)
1	Tap root	See Figures 7-1 (a). Bore hole diagonally downward into and a little more than halfway through the tap root. Pack the charge into the hole and tamp well	For lifting the stump: $C_1 = \frac{2L}{3}$ lb (ii) For cutting the root : $C_2 = \frac{d2}{250}$ lb (iii) Total charge $= C_1 + C_2$ lb
2	Tap root	See Figure 7-1 (b). Bore or drive three or more holes into the ground immediately alongside the tap root. Divide the total charge equally among them, tamp well and fire simultaneously.	For lifting the stump: $C_1 = \frac{2L}{3}$ lb (ii) For cutting the root : $C_2 = \frac{d2}{40}$ lb (iii) Total charge $= C_1 + C_2$ lb
3	Small lateral root	See Figures 7-1 (c). Bore or drive hole diagonally downwards under the main part of the stump. Pack the charge in so that centre of charge comes under the middle of the stump. Tamp well	For lifting the stump: $C_1 = \frac{2L}{3}$ lb (ii)
4	Large lateral root	See Figure 7-2. Bore or drive hole for lifting charge under the main part of the stump as in Serial No 3, and another hole under each heavy hose (lateral) root for cutting charges. Tamp well and fire simultaneously.	For lifting the stump: $C_1 = \frac{2L}{3}$ lb For cutting one hose root : $C_2 = \frac{d2}{40}$ lb (iii) $= C_1 + C_2 + C_3$ …etc lb

Notes.

(i)   In the formulae, L= the depth of the centre of the charge below ground level in ft $= \frac{D}{3}$ where D is the diameter (in ft) of the crater required to contain the the root system. d= the diameter of the root member in ins.

(ii)   In loose sandy soil the hole should be driven up to 50 per cent deeper but the weight of the charge may be unaltered. In very hard soil, eg, sunbaked clay, the depth of the charge centre should remain unaltered. But the weight of the charge may have to be increased by up to 300 per cent.

(iii)   For dead stumps, two-thirds of the calculated cutting charge should suffice.
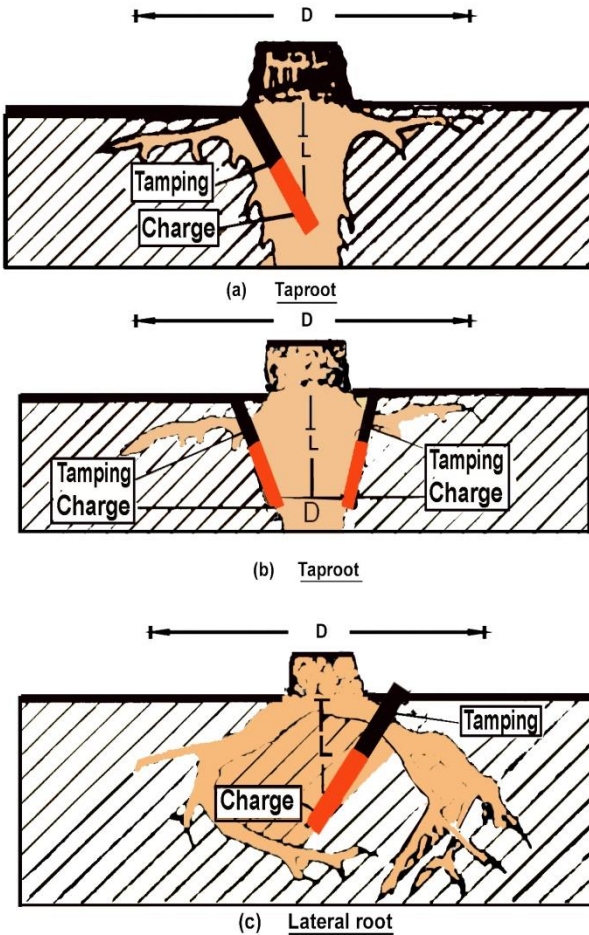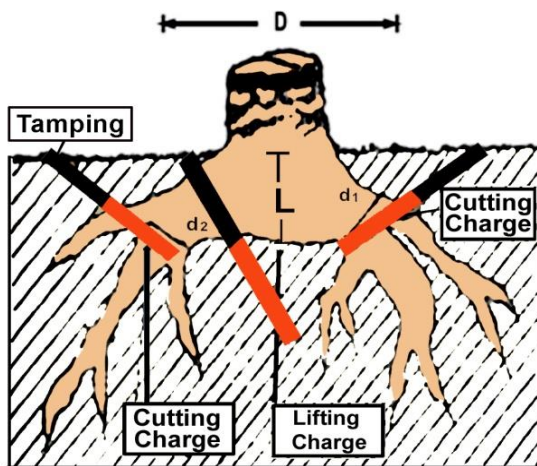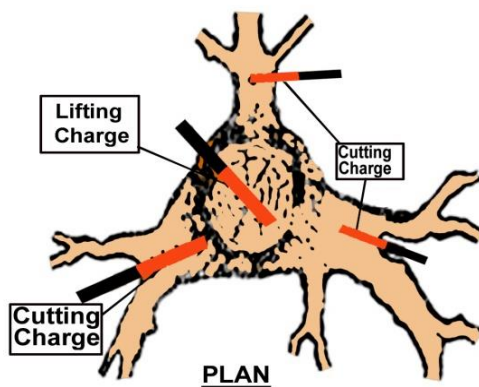
Figure 7-1: Tree stump blasting (1)

Figure 7-2: Tree stump blasting (2)