SECTION 5
HASTY CALCULATIONS

0501. Cutting charges for MS, timber and masonry can be assessed from Tables 12, 13 and 14. For examples of application see connected Figures 5-1, 5-2 and 5-3.

0502. Breaching charges for the removal of concrete obstacles or for making gaps in walls are set out in table 15. See also Figure 5-4.

0503. Pressure charges for RC structures such as RC bridges front change can be assessed from table 16. Most of the time required for preparing such a demolition is taken up with tamping. See also Figure 5-5. Where extreme speed is essential, the use of RDD (concrete), doesn't require any tamping, can be considered as it.

0504. Footing charges for masonry and plain concrete piers are set out in Table 17, and illustrated in Figure 5-6. Note that to be effective the the ground level on the downhill side of the pier must be at least 18 inches lower than that on the uphill side.

0505. Mined charges for road craters or for blowing out abutments are given in Table 18. See also Figure 5-7. Unless it is possible to place the charges by rapid means, eg, using the camouflet set, pneumatic drill, or beehive borehole, there will be ample time while the mine gallery is being driven to calculate the charges deliberately (see Table 23).

0506. Borehole charges are dealt with in Table 19 and Figure 5-8, while the various methods of making boreholes are compared in Table 20. Before using this method on standing timber make certain that the tree is not hollow.

0507. Concussion charges for buildings of light construction, eg, up to $13\frac{1}{2}$ inch brick in lime mortar, when it is not practicable to block the apertures should be V/50 pounds where V is the internal volume in cubic feet. The charge should be calculated for and divided between the ground floor rooms and passages. If it is possible to block all apertures efficiently the charges can be halved. If adjoining rooms have the same volume and walls of the same strength the charges should be unbalanced in the ratio of about 2:1 to ensure the collapse of the party wall, ie, an overcharge of 33 per cent in one room and an undercharge of 33 per cent in the other.

Table 12.-Cutting charges for Rectangular Section
Mild steel, Timber, and Masonry-
Hasty Formula

Ser No	Effective thickness			End section of charge (i)		Total Charge
	MS	Timber	Masonry	cartridges (ii)	Slabs (iii)	
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1	1´´	9´´	18´´	3 te	1 ie	To calculate total number of cartridges or slabs required Divide lengths of cut Face by lengths of cartridges or slabs shown in (ii) and (iii) and multiply by numbers in end sections
2	2´´	10´´	36´´	9 te	3 ie	
3(IV)	3´´	24´´	48´´	18 te	6 ie	

Note:

(i) The Charge must be continuous allow whole line of cut.
(ii) 14 oz of PE3A, 8 ins long.
(iii) 1Ib of CE/TNT, $4\frac{1}{2}$ ins long.
(iv) For thicker targets use charge demolition No 14 (hayrick) or borehole charges.

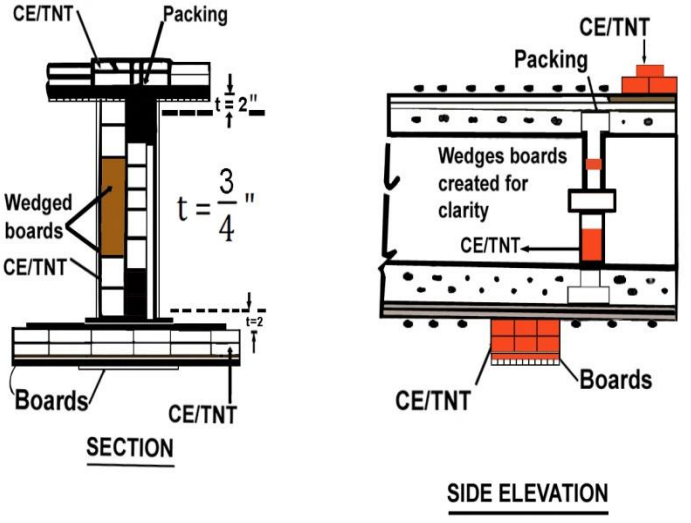


Figure 5-1: Cutting a built-up MS (girder-Hasty method (See figure 6-1 for alternative methods of placing charges)

Table 13–Cutting Charges for Mild Steel Bars and Wire Cables-Hasty Formulae

Ser No	Diameter MS bar	Charge	Circumference of wire cable
(a)	(b)	(c)	(d)
1.	Up to 1”	ONE cartridge or Slab on ONE side	Up to 4”
2.	Up to 1” to 2”	TWO cartridges or ONE slab on ONE side	From 4” to 6”
3.	From2‘‘to $2\frac{1}{2}$‘‘	TWO cartridges or ONE slab on TWO opposite sides	From 6” to 8”
4.	From $2\frac{1}{2}$‘‘ to 3‘‘	THREE cartridges or TWO slabs TWO opposite sides	From 8” to 10”

*Cartridges are 8 oz of PE3A: slabs are l lb of CE/TNT.

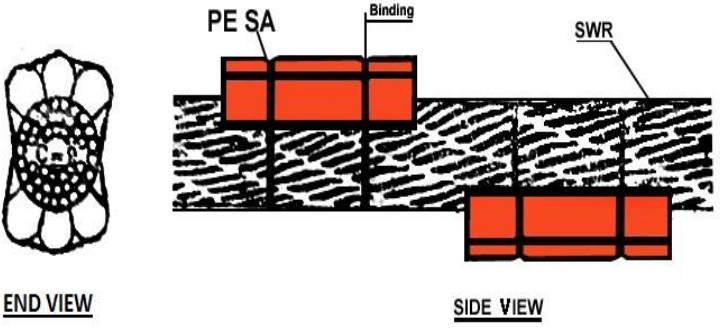


Figure 5-2: Cutting a steel wire rope-Hasty method

Table 14 -Cutting Charges for small Trees and Round Timber-Hasty Formulae

Ser No.	Diameter of tunber	Charge (PE3A or CE/TNT) (Ib)
1	Up to 6” …..	$\frac{1}{2}$
2	From 6” to 9” …..	1
3	From 9 “ to 12” …..	2
4	From 12” to 15” …..	4
5	From 15”to 18” …..	8

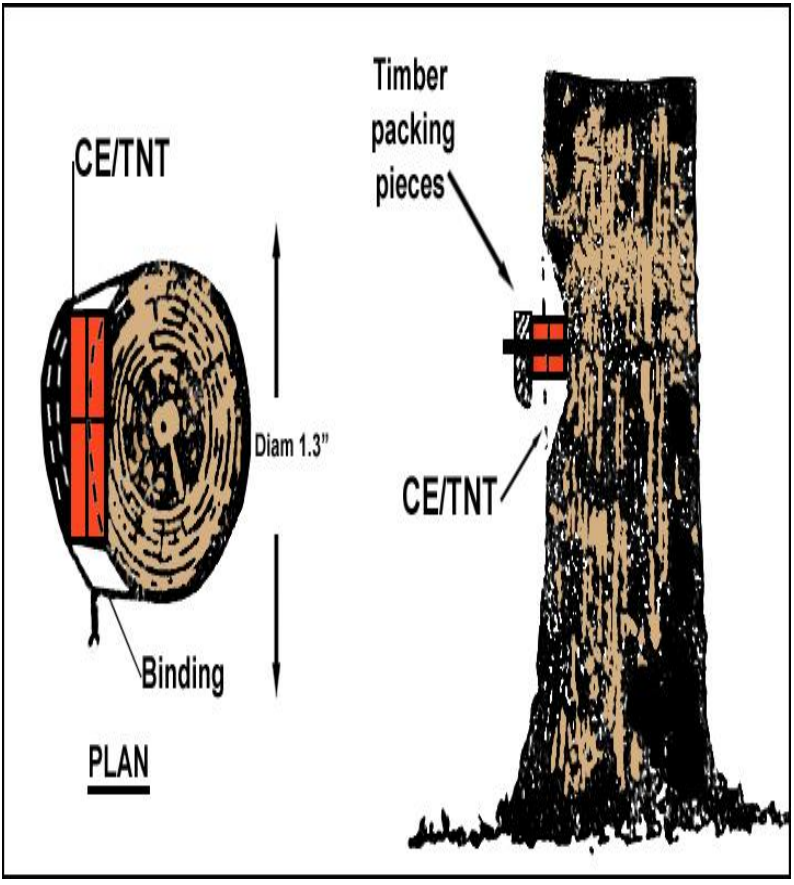


Figure 5-3: Gutting a small tree-Hasty method

Table 15- Breaching charges for Reinforced Concrete Obstacles and walls Hasty Formulae

Ser	Target	Weight of explosive per cu ft to be removed	Remarks
(a)	(b)	(c)	(d)
1.	RC obstacles, eg, blocks, dragons teeth, or cubes	1Ib	(i) Spread charges in direct contact with target, with ratio of width to thickness about 4:1, but limit thickness to 6" (ii) Centre of charge should be 1/3 height of target from ground (iii) If reinforcement is heavy double charge.
2.	Masonry walls with no reinforcement	1 Ib	(i) Length of wall attacked should not be less then height (ii) Use ¾ of charge to outline sides and bottom of required gap, with bottom of charge between 1´ and 2´ above ground level (as marked ABCD in Figure 5-4) (iii) Place the remainder of charge in the Centre of the required gap (as marked E in Figure 5-4) (iv) The ratio of width to thickness of the various parts of the charge should be about 4:1.
3.	RC walls with reinforcement not denser than 9‘‘spacing	2 Ib	As for Serial No. 2
4.	RC walls with reinforcement denser than 9‘‘ spacing	4 Ib	As for Serial No. 2

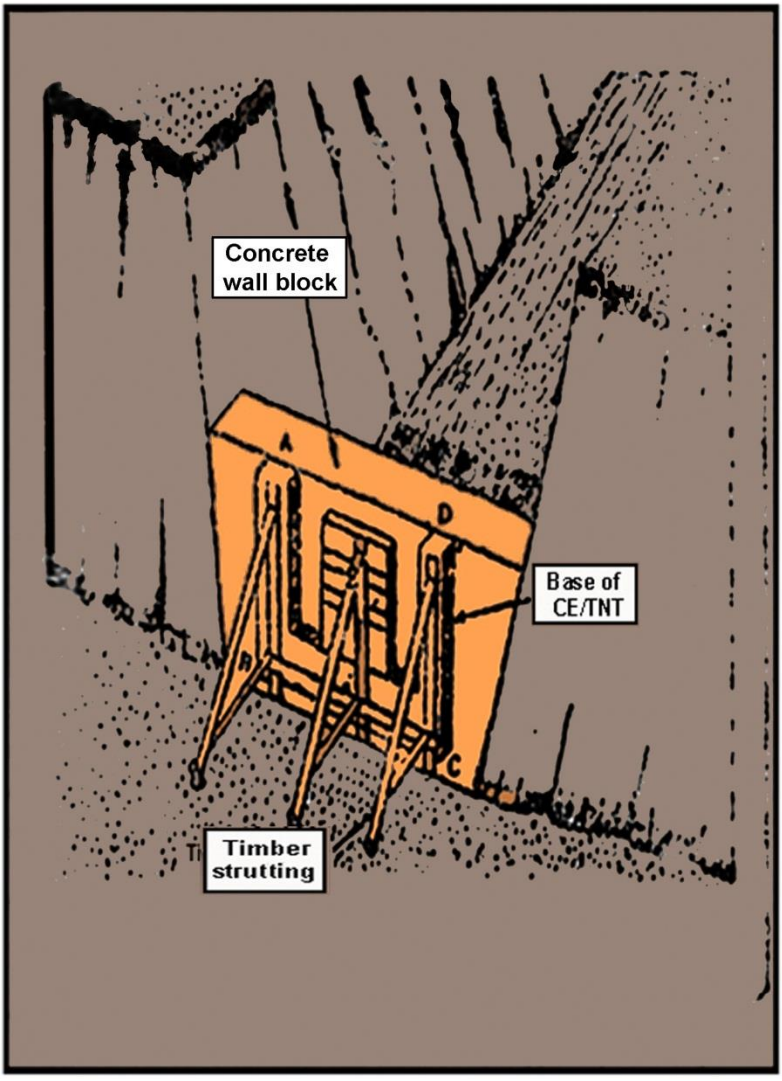


Figure 5-4: Breaching a lightly reinforced concrete wall block Hasty method.

Table 16- Pressure Charges for Reinforced Concrete Structures-Hasty Formulae

Ser	Target	Weight of charge (Ib)	Remarks
(a)	(b)	(c)	(d)
1	RC beam	20 times over-all depth of beam plus roadway in ft	Place over centre of beam
	RC slab	Each charge 20 times depth of slab plus roadway in ft	Place charges 4 ft apart across the middle of the slab

Notes:

(i) Shape charges so that height and breadth are approximately the same and length is about twice the height.

(ii) Tamp with sandbags round all the exposed sides, using at least one sandbag per lb of explosive.

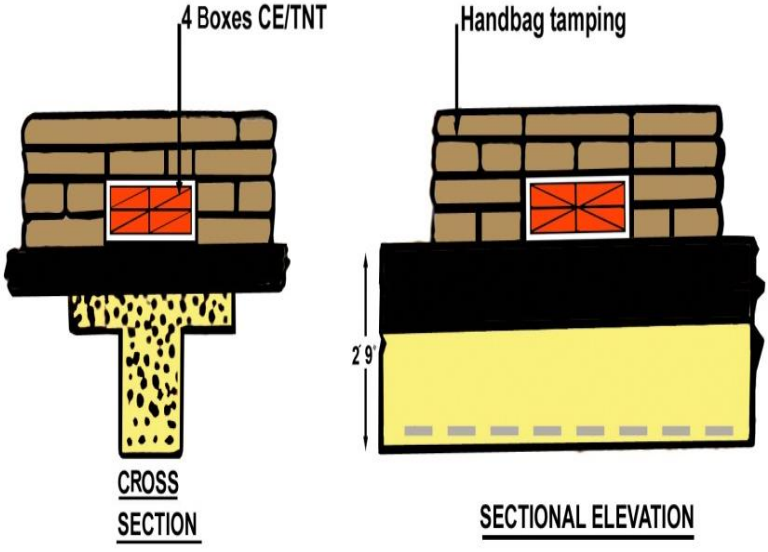


Figure 5-5: Pressure charge on T beam of RC bridge Hasty method

Table 17-Footing Charges for Masonry and Unreinforced Concrete piers-Hasty Formulae

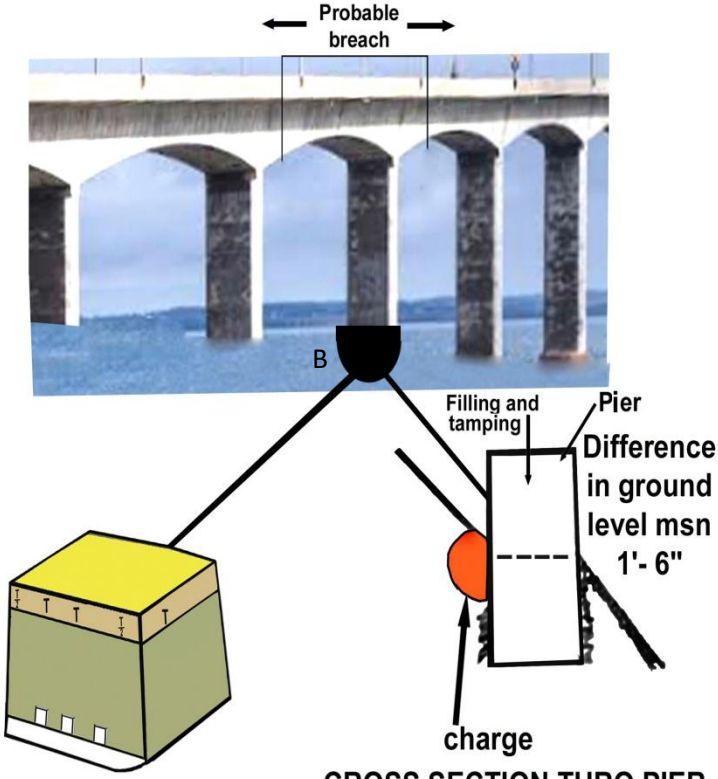
Serial No.	Target	Weight of charge (Ib)
(a)	(b)	(c)
1	piers up to 6‘ thick	Each charge 10 times the thickness of the pier in ft
2	Piers between 6‘ and 9‘ thick	Each charge 20 times the thickness of the pier in ft.

Notes.

(i) Charges should be spaced the thickness of the pier apart, the outer charges being no more than half this distance from the corners of the pier.

(ii) Charges should be in close contact with the pier and dug in just below ground level and well tamped (see Figure 5-6).

(iii) If tamping is not practicable double the charges.



ENLARGEMENT OF PIER ATB

Figure 5-6: Feeling Charges

Table 18.- Mined Charges- Hasty Formulae

Ser	Target	Weight and position of charges	Remarks
(a)	(b)	(c)	(d)
1.	Crater ….	70 Ib at depth of 7' gives a crater of 20' to 25' diam	(i) Using a standard camouflet set, in average soil a camouflet charge of 5 primers is required. (ii) To obstruct a road effectively, charges should be placed 10‘apart across the road, and lines of charges should be at 80‘intervals along the road.
2.	Abutment wall (NOT RC) up to 5' thick	70 Ib at depth of 7' and not more than 5' from the outer face of the wall	(i) A series of charges should be laid 10' apart. (ii) If the filling behind the wall permits, 20Ib charges spaced 5'apart and in contact with the inner face of the wall can be used.
3.	Abutment wall (NOT RC) from 5' to 6' thick	120 Ib at depth of 9' and not more than 6' from than outer face of the wall.	Charges should be spaced 12' apart.
4.	Abutment wall (NOT RC) from 6‘ to 8‘ thick	300 Ib at depth of 12‘ and not more than 8‘ from the outer face of the wall	Charges should be spaced 15‘ apart

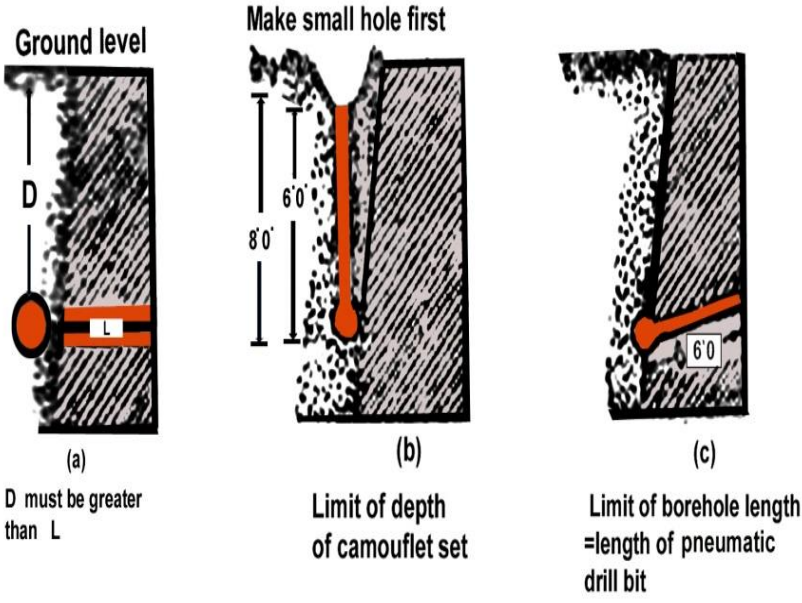


Figure 5-7: Mined charges behind abutments

Table 19 -Borehole Charges-Hasty Formulae (thickness of Target = T feet)

Ser	Target		Depth of holes (ft)	Number of rows of holes	Distance between rows(i) (ft)	Charge (PE-3A)
	Description	Thickness				
(a)	(b)	(c)	(d)	(e)	(f)	(g)
1	Brick or masonry pier	Up to 6‘	$\frac{2T}{3}$(ii)	2(iii)	$\frac{2T}{3}$	(v)
2	Brick or masonry pier	From 6‘ to 9‘	$\frac{2T}{3}$(ii)	3(iii)	$\frac{2T}{3}$	(v)
3	Brick or masonry pier	From 9‘ to 12‘	$\frac{T}{2}$(ii)	6(vi)	$\frac{T}{2}$	(v)
4	Unreinforced concrete pier	Up to 6‘	$\frac{2T}{3}$(ii)	3(iii)	$\frac{2T}{3}$(iv)	(v)
5	Unreinforced concrete pier	From 6‘ to 9‘	$\frac{2T}{3}$(ii)	3(iii)	$\frac{2T}{3}$	(v)
6	Unreinforced concrete pier	From 9‘ to 12‘	$\frac{T}{2}$(ii)	6(iv)	$\frac{T}{2}$	(v)
7	Timber baulks, piles, ctc	Up to 18‘‘	(vii)	One hole	-	(viii)
8	Timber baulks, piles, ctc	Over 18‘‘	(vii)	Two holes with axis at right angles and 2 ins apart	-	(viii)

Notes.

(i) In arch bridges all rows must be below the springing of the arch.

(ii) Make holes horizontal and at 3' centres in row. For size of drill see table 20, Note (iv).

(iii) On same side of pier. Stagger hole in adjacent rows.

(iv) Minimum 3'

(v) Every hole should be charged half-full, with remainder dry or slightly damp sand tamping. Capacity per inch length of borehole is: 2‘‘ hole, $2\frac{1}{2}$oz; $1\frac{3}{4}$‘‘ , 2 oz;$1\frac{1^{“}}{2}$, $1\frac{1}{2}$oz.

(vi) 3 rows on each side of pier, corresponding in level on opposite sides, but with holes staggered.

(vii) Use 2" auger (capacity 2½" oz per inch length) and adjust depth so that centre of charge is at centre of target.

(viii) Total charge in oz for circular section =$\frac{d^2}{24}$and for rectangular section $\frac{bt}{24}$ where d=diameter. b = breadth, t = thickness, all in inches.

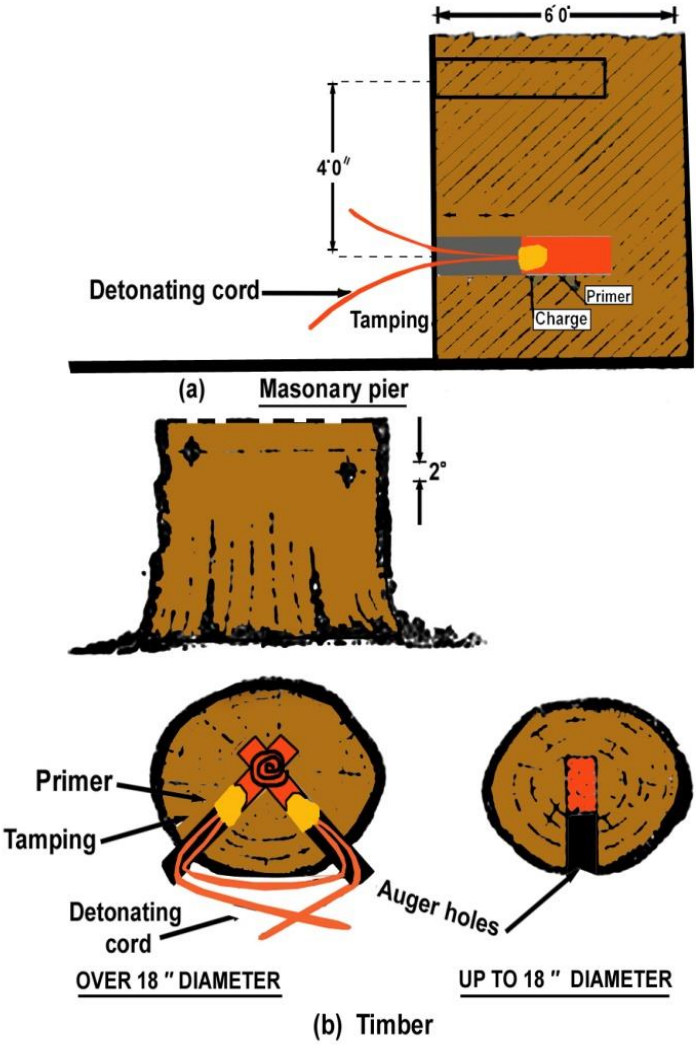


Figure 5-8: Borehole charges

Table 20 - Approximate Times Required for Making Holes and Cutting Channels in Piers, Abutments, etc

Ser	Task	Medium	Unit of calculation	Time (i)	
				Using hand tools	Using pneumatic tools
(a)	(b)	(c)	(d)	(e)	(f)
1	Cutting holes or channels in abutments or retaining walls	Good brick work	Hole 1 sqft (approx.), ie, $1\frac{1}{2}$bricks wide and 3 bricks high (ii)	1‘ deep….$\frac{3}{4}$hr 2‘ deep….$1\frac{1}{2}$hrs 3‘ deep….$2\frac{1}{2}$hrs 4‘ deep…4 hrs	1‘ deep….$\frac{1}{2}$hr 2‘ deep….$\frac{1}{2}$hrs 3‘ deep….$\frac{1}{2}$hrs 4‘ deep…$1\frac{1}{2}$hrs
2	Cutting holes or channels in abutments or retaining walls	Good stone masonry or hard concrete	Hole 1 sqft (iii)	1‘ deep….$3\frac{1}{2}$hr 2‘ deep….7 hrs 3‘ deep….11 hrs 4‘ deep….18 hrs	1‘ deep….$\frac{1}{2}$hr 2‘ deep….$1\frac{1}{2}$hrs 3‘ deep….$2\frac{1}{2}$hrs 4‘ deep…. 4 hrs
3	Drilling boreholes in piers, etc. (iv) (v)	Brickwork	Per ft run of horizontal hole up to 6 ft maximum	2‘‘ diameter...$1\frac{1}{4}$hrs	2‘‘ diameter…3 mins $1\frac{3''}{4}$diameter..3 mins $1\frac{1''}{2}$diameter.3 mins
4	Drilling boreholes in piers, etc. (iv) (v)	Concrete (vi)	Per ft run of horizontal hole up to 6 ft maximum	2‘‘ diameter…$2\frac{1}{2}$hrs $1\frac{3''}{4}$diameter..2 hrs $1\frac{1''}{2}$diameter. $1\frac{1}{4}$hrs	2‘ diameter.…7 mins $1\frac{3''}{4}$diameter..6 mins $1\frac{1''}{2}$diameter.5 mins
5.	Drilling boreholes in piers, etc. (iv) (v)	Sandstone (vii)	Per ft run of horizontal hole up to 6 fit maximum	2´´ diameter…3hrs $1\frac{3''}{4}$diameter..$2\frac{1}{2}$hrs $1\frac{1''}{2}$diameter.. $1\frac{3}{4}$ hrs	2´´ diameter…7 mins $1\frac{3''}{4}$diameter..6 mins $1\frac{1''}{2}$diameter..5 mins
6.	Cutting holes or channels in roads or floor surfaces	Concrete	per cu ft excavated	About $2\frac{1}{4}$ hrs	About $\frac{1}{4}$ hrs
7.	Cutting holes or channels in roads or floor surfaces	Metaled road surface	per cu ft excavated	About $\frac{1}{2}$ hrs	About 7 mins

Ser	Task	Medium	Unit of calculation	Time (i)	
				Using hand tools	Using pneumatic tools
(a)	(b)	(c)	(d)	(e)	(f)
8.	Making auger holes	Good easy soil	per ft run up to 10 ft	Using 6" earth auger about $7\frac{1}{2}$ mins; 9" auger cut type auger, about 12 mins (viii)	About 1 min (ix)
9.	Making auger holes	Green timber	per ft run up to 24 ins	Using 2" straight cut type auger, about 1 mins	About 5 secs
10.	Blowing craters with camouflet equipment	Average soils (not hard rocky or compacted gravel)	-	There craters in 2 hrs by one section	

Notes.

(i) Times for hand tools are based on a team or 3 men on the task; times with pneumatic tools, on one drill. Normally two drills can be worked together off one field engineer regiment compressor. All times allow for changing bits and normal stoppages, but not for setting up eg, erection of staging for holes more than 4 ft6 ins above ground level, nor for charging holes.

(ii) Horizontal cuts are along joints between courses. Times for larger holes are in proportion to the length of the vertical sides.

(iii) Times for larger holes are in proportion to the area.

(iv) The recommended sizes of drills are:-

For holes up to 40 ins long, 2" ; from 40 to 60 ins long, $1\frac{3''}{4}$; from 60 to 72 ins long $1\frac{1''}{2}$.

(v) The times for machine drilling are on the average 1/5 to 1/10 those for handwork; beehive drilling is usually slightly quicker than pneumatic drilling. Using the 6-in beehive (charge, demolition,No.1) the average diameter of a hole in 2 ins ; the approximate depth of penetration of one beehive is $2\frac{1}{2}$ft, of two in succession 4 ft and of three 5 ft.

(vi) For burning deep holes in concrete see ESPB No. 8B, Section 47.

(vii) For similar holes in limestone increase the times by 1/6, in slate by 1/3, and in granite by 1/2

(viii) These are the probable average rates of progress by two men with frequent reliefs and under entirely favorable conditions; in hard or stony ground the rates of progress will diminish rapidly.

(ix) Based on the performance of a commercial truck-mounted machine used for erecting telegraph and power-line poles.

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