

STANDARD BOMB DISPOSAL SHAFTS

1. The three standard shafts are designated by their templet sizes of 9 feet x 8 feet, 13 feet 6 inches x 8 feet and 14 feet x 12 feet 6 inches.
2. Paras 3 to 6 refer to the diagrams of the standard 9 feet x 8 feet shaft but the principles given apply equally to the two larger shafts. Additional information applicable only to these two shafts are contained in paras 7 and 8. A suggested tools and stores list is given in para 9 and timber requirements in Table 16.

Standard Members (Fig 45-1)

3.
 - a. The skin revetment is composed of runners which are supported against the inward press the soil by frames composed of walings. The inward thrust on two walings of each frame is taken by spreaders. The frames are kept at the desired spacing by eight vertical puncheons.
 - b. The walings are held in place by falding wedges. The remaining runners are pressed against earth by single wedges or passing wedges.
 - c. Spreaders are usually made a tight fit but folding wedges may be used at one end.
 - d. The runners are of two types known as leaders and followers. The heads of both types are bevelled to prevent splitting when driving. The leaders also have a chisel edge to assist penetration and to prevent toeing-in the sloping face of the cut being set to the center of the shaft.
 - e. In bad ground closures are used to eliminate gaps between the runners (Fig 47-2).
 - f. The templet boards used to control the size of the shaft also contribute to the strength of the structure and must be firmly staked.

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TABLE 16 - TIMBER REQUIREMENTS FOR STANDARD SHAFTS

Members	Dimensions	Quantities			Unit	Remarks
		9 ft x 8 ft	(f)13 ft 6 in x 8 ft	(g)14 ft x 12 ft 6 in		
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Runner	10 ft x 9 in x 2 in	42	54	68	For each 10 ft or part of 10 ft in depth	First 10 ft requires leaders (pointed) remainder as followers
Walings	7 ft 6 in x 6 in x 6 in	4	2	-	Each frame	
	12 ft x 9 in x 6 in	-	2	4		
Spreaders	6 ft x 4 in x 4 in	-	2	-	Each frame	If to be held with folding wedges, make 1 in shorter
	6 ft 6 in x 4 in x 4 in	2	-	-		
	10 ft 6 in x 6 in x 3 in	-	-	2		
Puncheons	2 ft 3 in x 6 in x 6 in	8 of one length			Between each pair of frames	Navy be 4 in x 4 in when used with the 9 ft x 8 ft shaft.
	3 ft 0 in x 6 in x 6 in					
	3 ft x 9 in x 6 in x 6 in					

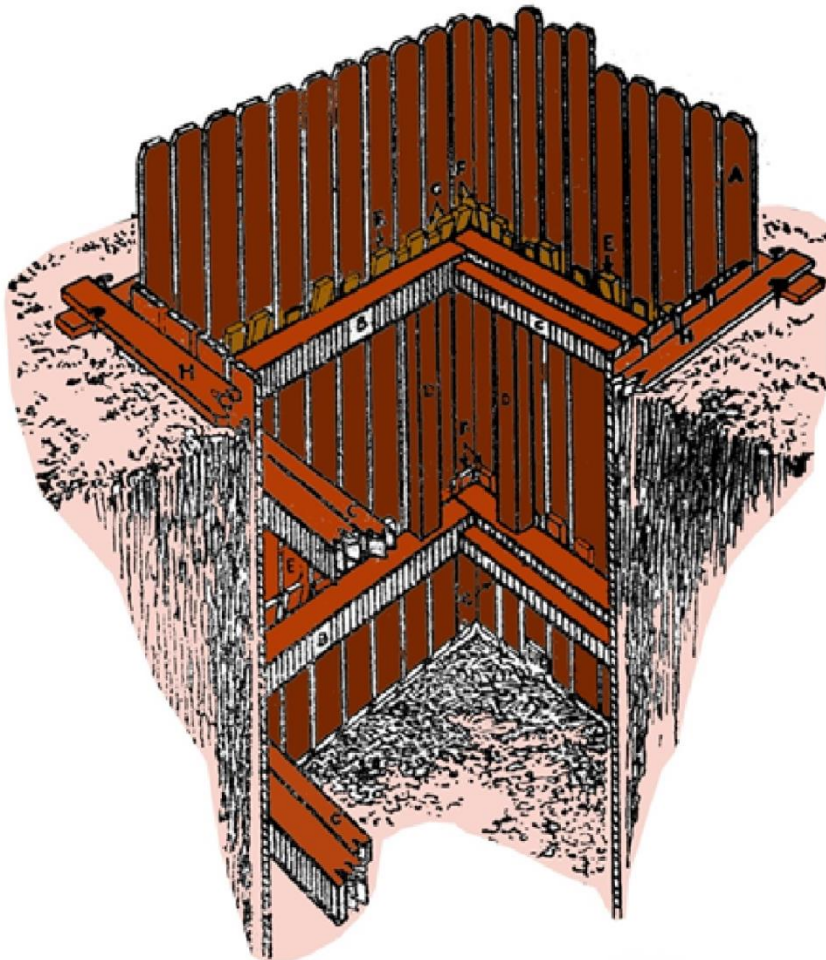
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TABLE 16 - TIMBER REQUIREMENTS FOR STANDARD SHAFTS - Contd.

Members	Dimensions	Quantities			Unit	Remarks
		9 ft x 8 ft	13 ft 6 in x 8 ft	14 ft x 12 ft 6 in		
(a)	(b)	(c)	(d)	(e)	(f)	(g)
Octagonal bracings					Each frame	Length of corner members from tip to tip. The ends are cut back at 45°.
(a) Fixed members	5 ft x 6 in x 4 in	-	-	2		
	3 ft 10 in x 6 in x 4 in	-	-	2		
(b) Corner members	4 ft 7 in x 6 in x 4 in	-	-	4		
Wedges	4 in x 4 in x 2 in narrowing to 4 in x $\frac{1}{4}$ in	70	80	100	Each frame	Also allow a good reserve.

Other Essential Members: Templet boards, berm boards.

Possible Requirements: Staging boards short, temporary runners, closures.



- | | |
|-------------|------------------|
| A—Runners | E—Single Wedges |
| B—Walings | F—Folding Wedges |
| C—Spreaders | G—Passing Wedges |
| D—Puncheons | H—Templet |

Fig 48D1-1: General View of Standard 9 ft x 8 ft Shaft

Principles of Construction

4.
 - a. Site the centre of the shaft over the estimated position of the bomb.
 - b. The shaft must be absolutely vertical and all frames must be horizontal and square.
 - c. No voids must be left behind the runners. Any which appear must be packed with filled sandbags.
 - d. If the work is to be left for a period no earth face must be left unsupported and the bottom frame must be propped up with chocks or dwarf puncheons.
 - e. Folding wedges should be in contact for at least two thirds of their length but the thin edge of one wedge should not project beyond the thick end of the other.

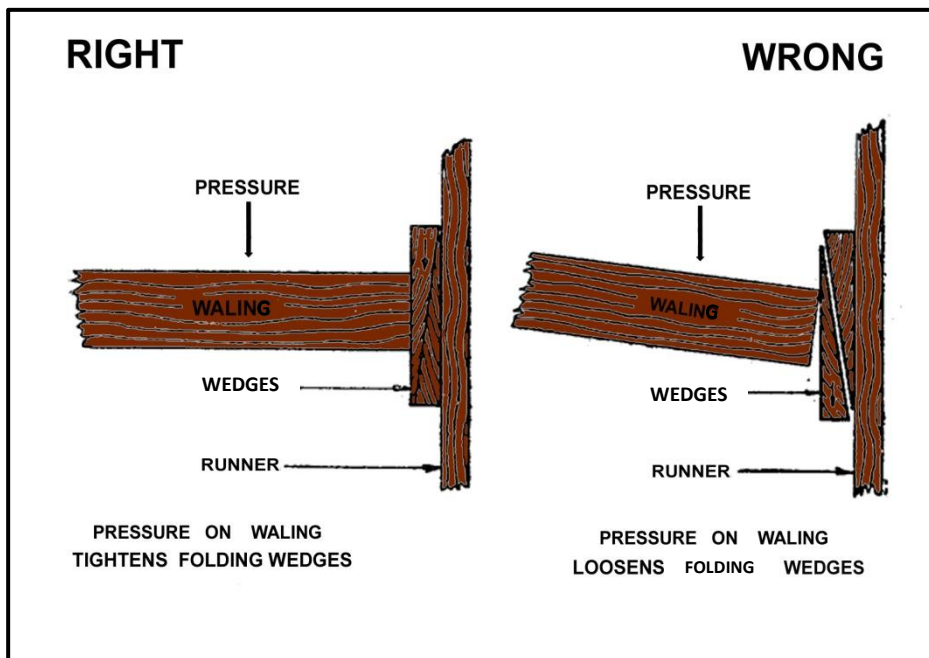


Fig 48D1-2: How to Fit Folding Wedges

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- f. It is possible to fit folding wedges in two ways, one of which is wrong and dangerous. The wedges must be fitted so that any force applied to the member they are supporting will tighten them and not cause them to slide apart. Force applied to a frame usually act downwards (Fig 48D1-2).
- g. Single wedges used to support runners are driven alternately upwards and downwards along each waling (Fig 48D1-4). If driven only in one direction they will tip the waling (Fig 48D1-3).
- h. The tightness for all wedges must be checked at the start and end of a shift and at frequent intervals while working.

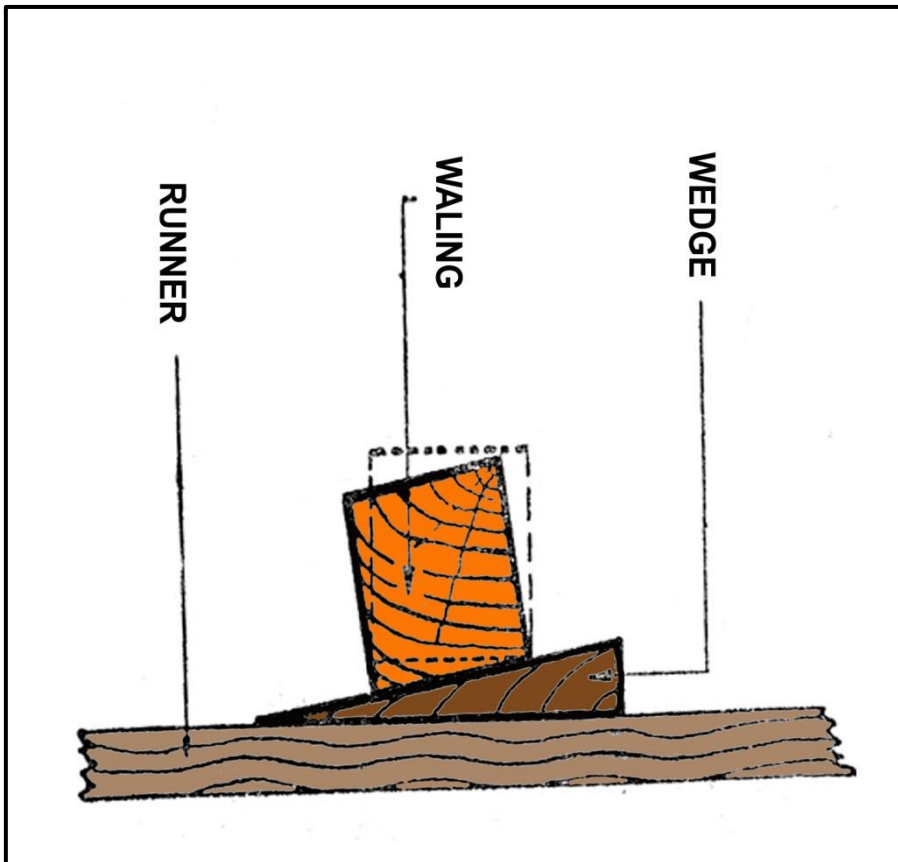


Fig 48D1-3: The Wrong Way to Use Single wedges

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k. Waling is tilted if all wedges between runners and walings are driven in from the top.

5. **Constructing the First Frame**

- a. Level, square and peg down the templet.
- b. Lay the berm boards.
- c. Excavate two to four feet as the state of the ground permits making the excavation a few inches less all round than the size of the templet.
- d. Shape down the corners and fit and plumb runners S_1 and S_2 . They must fit right into the corners of the templet. (The prefix S refers to the short side).
- e. Fit and plumb runners L_1 and L_2 (The prefix L, refers to the long side).
- f. Insert the waling on the short side between L_1 and L_2 one inch clear of S_1 and S_2 and about 18 inches below ground level. Fasten with folding wedges at each end.
- g. Fit the corner boards L_3 and L_4 and the waling at the other end of the shaft in the same manner.
- h. Fit the two walings on the long sides leaving one inch clearance from the long side runners. Fasten these walings with folding wedges placed between the two short side walings and runners S_1, S_2, S_3, S_4 .
- i. Level the complete frame with spirit level and tighten all wedges with a mash hammer.
- j. Fit and plumb runners L_5, L_6, L_7, L_8 and fasten with passing wedges.
- k. Hammer in the spreaders between the long side walings.
- m. Add runners $S_5, S_6, S_7, S_8, L_9, L_{10}, L_{11}, L_{12}$ and fasten with passing wedges.

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n. Add the remaining runners at open or close spacing as required and using closures if necessary. Employ a single wedge between each runner and the waling driving them alternately upwards and downwards (Fig 48D1-4). Short temporary runners may be used on one or more sides to make it easier to throw out the spoil. These must be replaced by full length runners one at a time as the shaft is deepened.

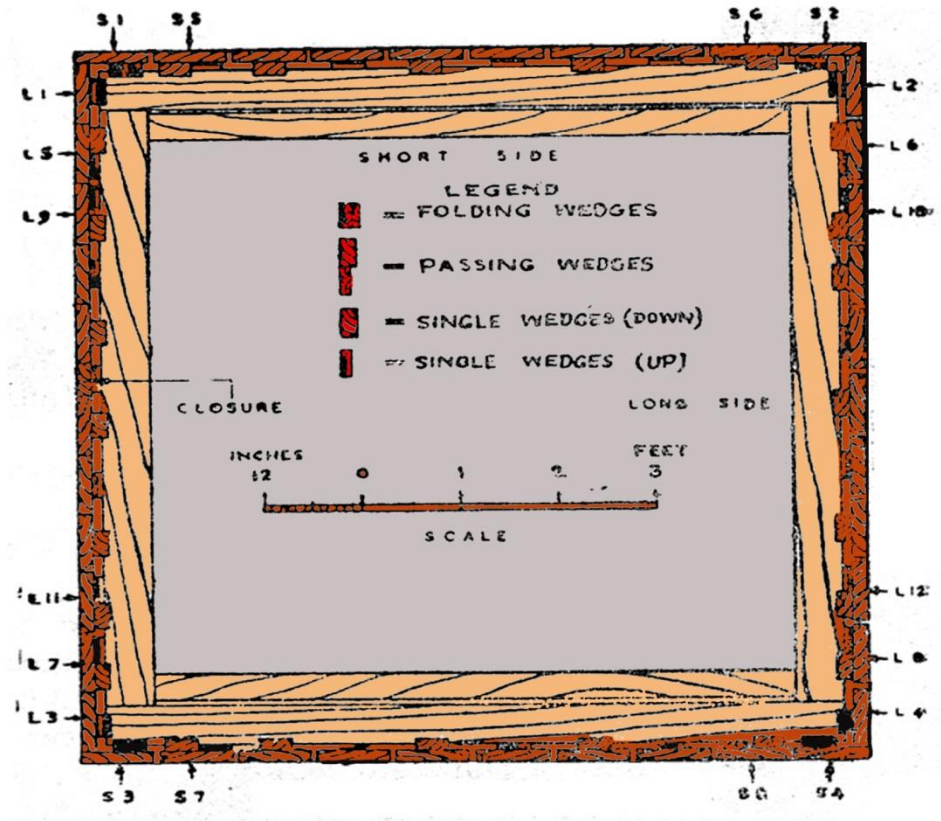


Fig 48D1-4: Plan of Standard 9 Foot x 8 Foot Shaft

Deepening the Shaft

6.
 - a. Good ground can be excavated a foot or two below the points of the leaders. In bad ground the runners must be driven so that the points are always deeper than the excavation, thus ensuring continuous support for the sides of the shaft. Driving is normally done with a maul but light improvised pile drivers may be used. If the leaders tend to toe in, they should be levered outwards with a crow bar while being driven.
 - b. Tighten the wedges on both sides before loosening those holding the runner to be driven. This is particularly important when driving any of the eight corner boards or one of the four boards L₅, L₆, L₇, L₈ (Fig 48D1-4).
 - c. Drive the runners and excavate about 18 inches lower than required to fit the next frame. When the ground pressure is particularly great, a temporary intermediate frame may have to be fitted.
 - d. Construct and level the new frame as before, spacing it at just less than puncheon length. Drive the puncheons in sideways with a mash hammer. Eight puncheons are used between each frame.
 - e. 3-foot 9-inch puncheons are usually employed between the first four frames the 3-foot puncheons for three frames before reducing to 2 foot 3 inch spacing. In good ground (eg, where runners can be used at open spacing), 3 foot 9 inch puncheons may be used to greater depth. In bad ground 2 foot 3-inch puncheons may be required throughout. If the walings still bend too much, it is uneconomical to reduce the spacing of the frames still further and spreaders should be used across the center of the shaft.

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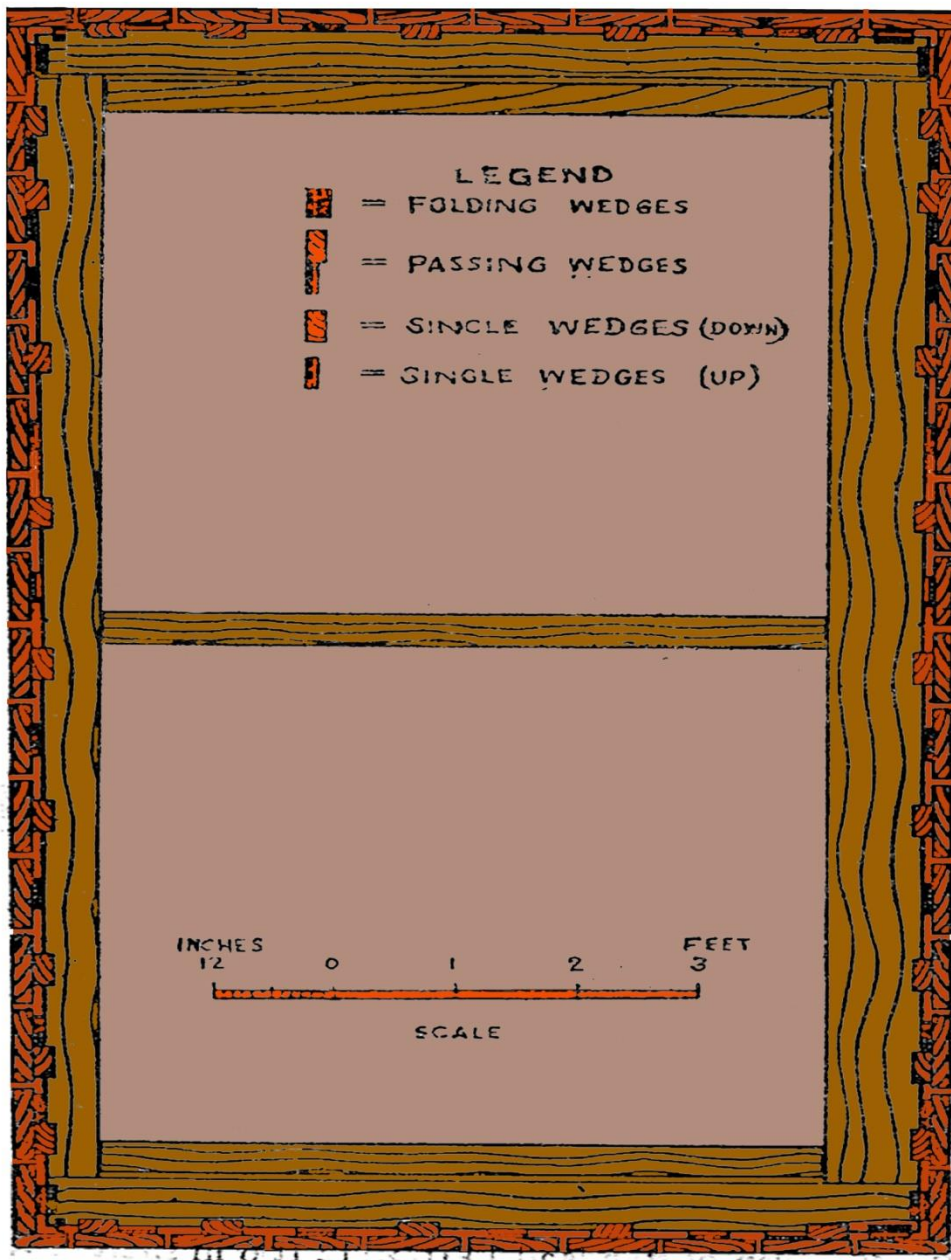


Fig 48D1-5: Plan of Standard 13 ft 6 in x 8 ft Shaft

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The 13 ft 6 inch s x 8 feet Standard Shaft (Fig 48D1-5)

7. Note that a spreader is used between the centres of the long walings and that the walings lie with the 6-inch face against the runners.

The 14 feet x 12 feet 6 inches Standard Shaft (Fig 48D1-6)

8. The octagonal bracing is used to give the maximum clear working space. Strutting across the center up the shaft is otherwise equally effective. Note that the walings lie with the 6-inch side against the runners.

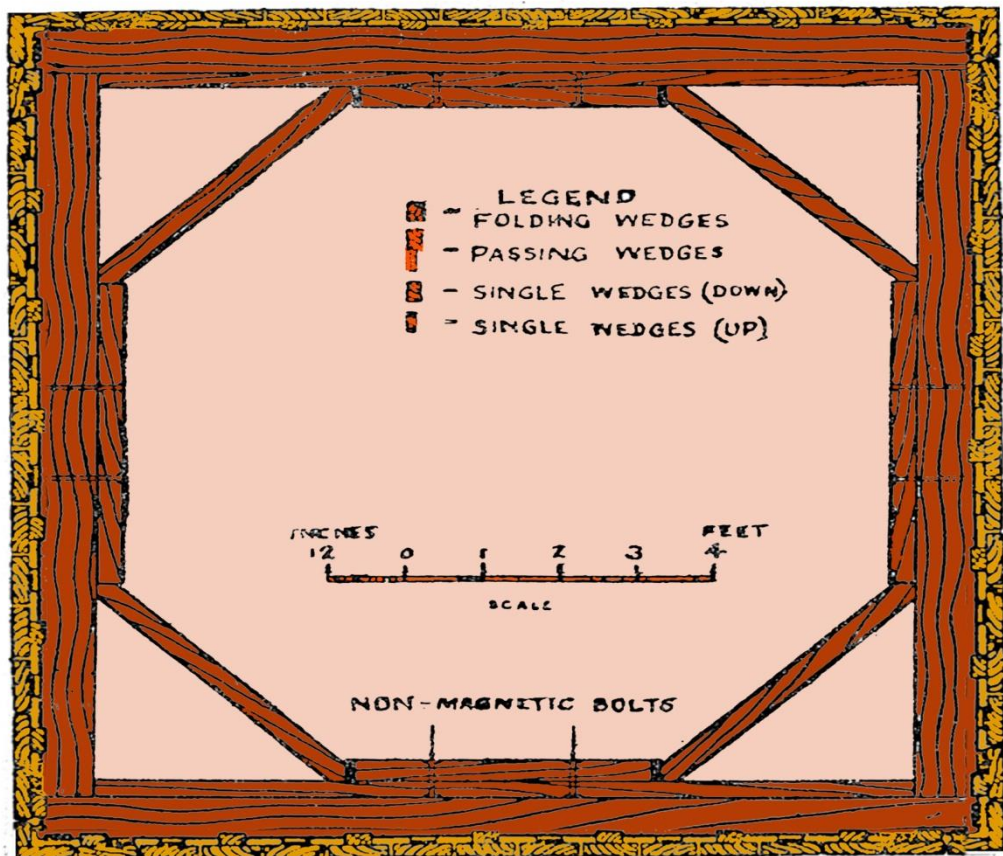


Fig 48D1-6: Plan of Standard 14 ft x 12 ft 6 in Shaft

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Suggested Tool and Store Requirements

	<u>Tool and Store</u>	<u>No suggested</u>
9.	a. Mauls for driving runners	3
	b. Mash hammers for driving wedges	3
	c. Shovels	according to shaft size
	d. Spades, GS	„
	e. Picks	„
	f. Trenching tools	1
	g. Crow bars	2
	h. Field levels	1
	j. Sandbags	100
	k. Ladders	1
	l. Lashings for safety lines and lowering stores	
	m. Compressor, pumps and cranes	
	n. Many also be acquire.	