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EARTH WORK (CUTTING & FILLING)

5.1 INTRODUCTION

Construction of building foundation, Road construction, and construction of sewer lines, water supply lines involve the job of cutting and filling of earth. This job is called in general language “Earth-Work”.

5.2 OBJECTIVES

After going through this lesson you will be able to:

- explain shoring and timbering;
- describe the method of control of ground level for development work;
- explain different types of precautions needed for completion of earth work.

5.3 SHORING AND TIMBERING

The length, breadth and depth of trench should be as per the drawing and design given in the map. Where the soil is wet or cohesion less the side slopes are supported by the use of cross bars and side shutters (planks) in order to prevent the collapse of the trench. This is called shoring and timbering. The details of shoring and timbering are give in Figs. 5.1 and 5.2.

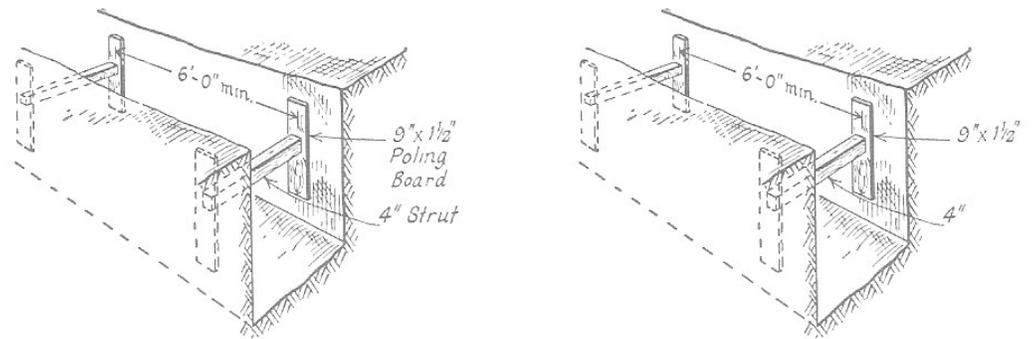


Fig. 5.1: Loose timbering

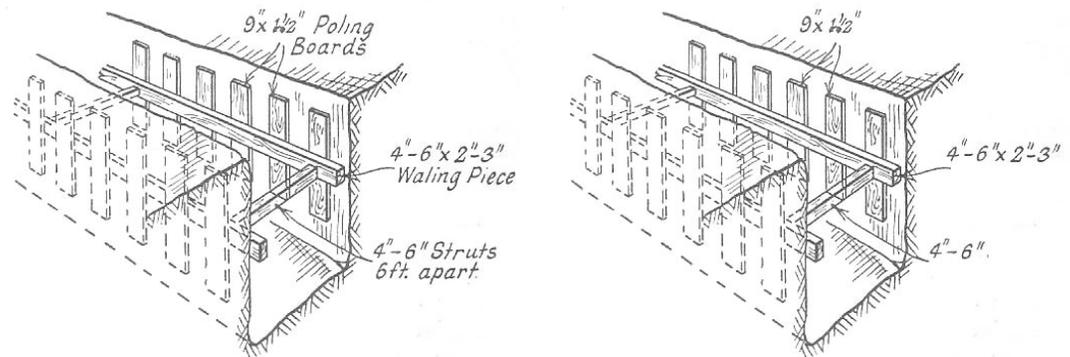


Fig. 5.2: Close timbering

Unit of measurement of earth-work

The unit of measurement of earth work is cubic meter (meter³). If the length of trench = 1 m, breadth 1 m and depth 1 m then the total earthwork is 1 m × 1 m × 1 m = 1 cub m. (length × breadth × depth)

If the shape of the trench is trapezoidal

$$\text{Vol. of earth work} = \frac{B_1 + B_2}{2} \times \text{height} \times \text{Length}$$

Base of the Trench

The base of the trench should be made flat and all loose soil should be removed from it.

If by mistake the depth of the trench becomes more than the required depth, it should not be filled by loose soil rather it should be filled with lean concrete 1 : 4 : 8 or 1 : 5 : 10 and made flat under the guidance of the site engineer.

If it is required to construct a soil embankment, at least 10% more soil should be added i.e. if the designed height of the embankment is 6.0 m, the embankment of 6.6 m height should be constructed initially to allow for the settlement of soil at a later stage.

In case of deep cutting or filling a side slope of 1 : 1 or 2 : 1 (i.e. 2 horizontal and 1 vertical) is usually maintained.

If it is required to put new soil over old soil, Benching is required to be done so that a perfect bonding between old and new soil is achieved. Benching means construction of steps.

Grass should be planted on the slope to check the soil erosion; in order to protect the slope of the embankment.

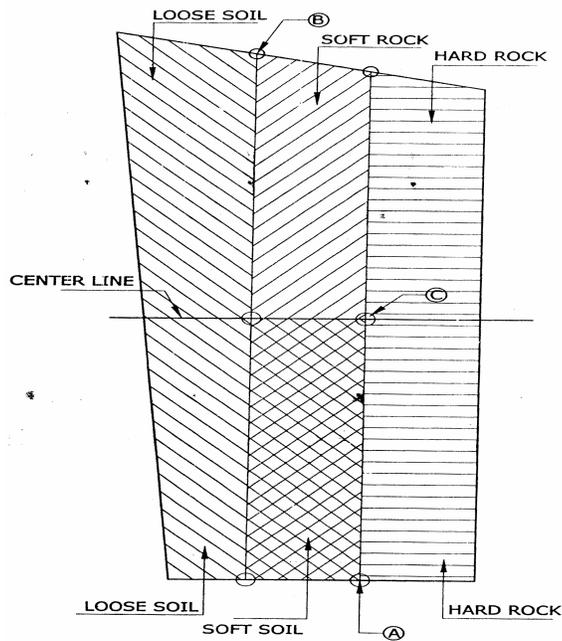


Fig. 5.3

Apart from the above earthwork is required to be carried out in the construction of roads. During construction of roads two types of situation can arise i.e. it may require either cutting or filling. During excavation we may get different types of soil layers. For this a reformed line is required to be made for controlling

the width and direction of the road/embankment. This helps in determining whether the cutting or filling has been done as per the drawing or not. Catch water drains are made on the sides of the cutting which takes out the water from the trench.

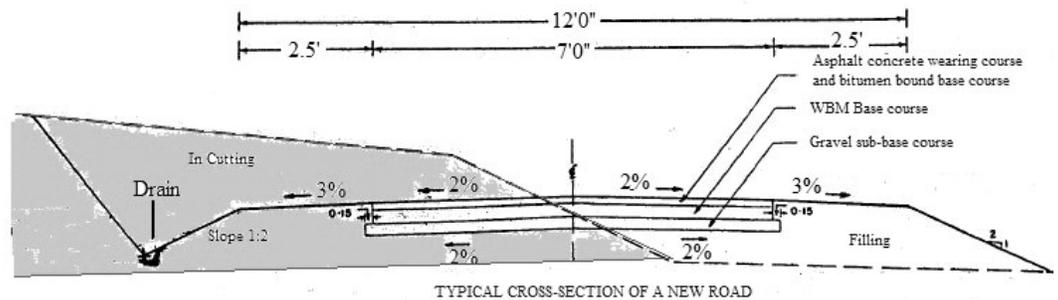


Fig. 5.4: Cross section of a road

Payment

The rate of payment for cutting/filling of earth is made by cubic m of the earth work and the lead distance for carriage of earth away from the site or to the site is also taken into account.

5.4 WHAT HAVE YOU LEARNT

- Precautions needed to check the collapse of the sides of the trench while cutting the soil for foundation etc.
- Shoring and timbering process
- Measures to be taken if the soil being cut for digging is wet

5.5 TERMINAL QUESTIONS

1. What do you understand by loose timbering?
 2. Where and why “Benching” is done?
 3. How the volume of cutting is measured?
 4. What is the importance of filling of earth for the construction of embankment?
 5. What is soil embankment?
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