unit 4.7 12.4.20

* Methods of tunneling in Soft Rocks :-

Following methods can be adopted for tunneling in soft rocks :-

1. Forepoling Method
2. Needle Beam Method
3. Liner Plate Method
4. Shield Method.

(1) Forepoling Method :-

- It is an ancient method of tunneling through running ground, but now it has been replaced by compressed air method.
- It is slow and tedious method, but with ordinary care it is quite safe.
- For tunneling by this method very skilled labourers are required.
- It requires strict supervision
- There are not short cuts in this method.
- In this method, every move must follow in its correct order and every operation must be safely completed before next operation is started.
- This method needs large quantity of timber for supporting the ground, therefore, tunnelling by this method should be done carefully and systemetically.
- In this method a frame in the form of the letter A. is prepared and placed near the face of the tunnel covered with suitable planks as shown in the figure (a) below :-

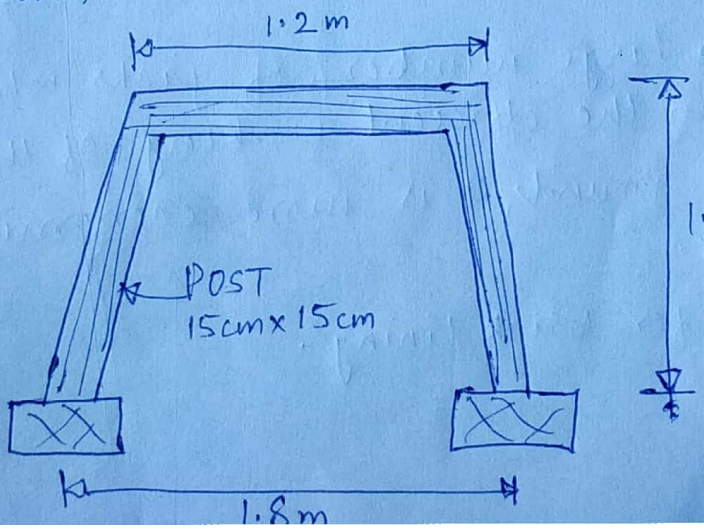

Fig. (a)

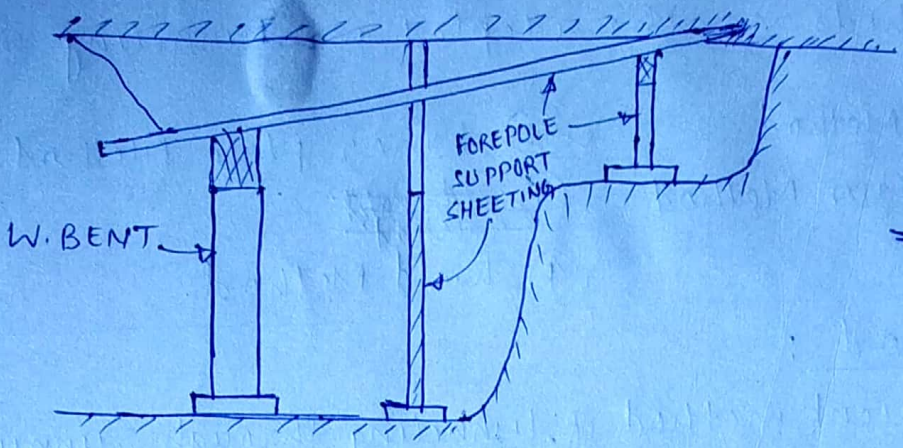

Fig. (b)

The poles are ~~tak~~ then inserted at top and continued to a depth upto which they can be easily taken up. These poles are supported by vertical posts. Now excavation can be done under the forepoles. The excavation is also done on sides and they are also supported suitably by timbering. In this way the full section of the tunnel is excavated. The process is repeated as the work progresses.

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(2) (b) Needle Beam Method :-

- This method is useful for tunnelling in soft ground whose roof soil can stand without support for few minutes.
- In this method 5 to 6 metres long R.S. Joists or timber beams are required in addition to other timber board and struts.
- This method requires large number of jacks which cause obstruction in the efficient working of the labourers.
- For tunnelling in soft ground, it is more economical than other methods.
- It is more suitable for brick lining.

Working Step of Needle Beam Method :-

(1) First of all a small drift of size of about 1 x 1m is prepared on the working face of the tunnel. It is also known as monkey drift.

(2) The needle beam consisting of two I girders are bolted together with a wooden block at the centres as shown in figure (a).

The needle beam is inserted in the drift and its roof is supported on laggings carried on the wooden segment.

These segments are supported by jacks.

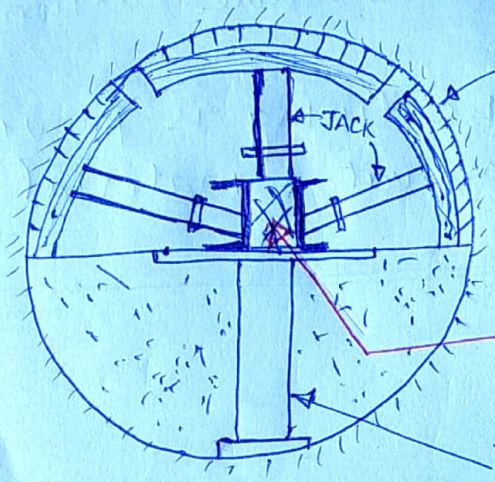

Figure (a)

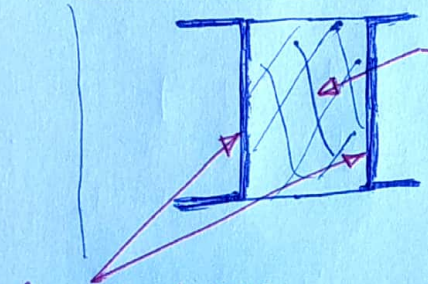

Figure (b) :- Needle Beam

(3) The needle beam is placed horizontally whose front end rests on the drift itself and the rear end is supported on vertical short post resting on the lining of the tunnel as shown in figure (c)

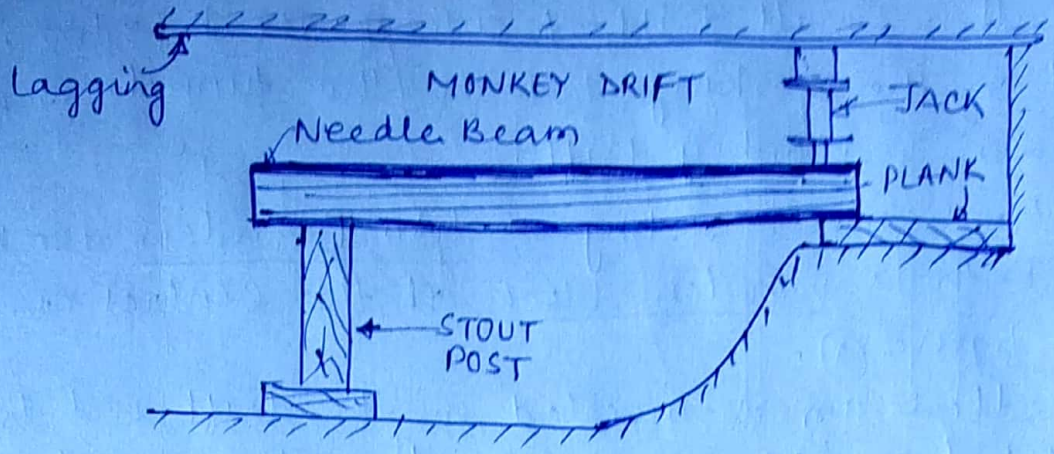

Figure ©

(4) The jack is placed on the top of the needle or beam to support the roof through lagging and the drift is widened side ways and the whole section is excavated.

After the excavation, the lining is provided to the tunnel section and excavated material is removed