

TECHNIQUES OF JACKING

Necessity of this technique

When the increasing demands for various forms of transport infra structure to be constructed in congested locations or below existing facilities the need to be able to install large structures without destruction is a growing need.

The jacking of large boxes to create an underpass below a railway track or road without destruction

For around 30 years this box jacking techniques has found wide use Europe and India

Types of structures under jacking

Box jacking

Arch jacking

Pipe jacking

OPERATIONS

The box shaped tunnel structures are pre fabricated units which are pushed into soil by hydraulic jack

Soil is excavated at the advancing face by manual means or by excavators

To avoid settlements of over laying roads or rail track soil is excavated after it enters the cutting heads

Excavation ahead of the cutting is avoided the cutting head is moved forward in small increments to avoid any having of the road or rail track

In addition to that, without stabilizing the soil, the box technique would cause the super structure to settle the threatening structure failure so the ground ahead of tunnel boxes needed to be frozen

PIPE JACKING

In tunnels of diameters above 2m men and machines worked the tunnel phase excavating and providing soil support to the excavator soil by erecting the lining. The tunnel diameter becomes small it becomes difficult for workers to carry out soil excavation of in erect the tunnel lining system with in the tunnel shield

For diameter in the range of 0.5m to 1.5m it is more efficient to excavate the soil by drilling systems controlled from a shaft or a pit to push the tunnel lining segment from the shaft or pit these techniques are often referred to us pipe jacking or micro tunneling techniques and equipments

Pipe jacking refers to a technique in which a man in a sitting or crouch position, user's pick and shovels to excavate tunnel face and the pipe is jacked forward from a shaft using hydraulic jacking system

Horizontal auguring refers to a similar technique in which the man is replaced by a horizontal continuous flight helical auger

INSTALLATION

The pipe sections are moved forward by hydraulic jacking and the miniature TBM derive its reaction from these section

Pipe segments of length 1 to 3 diameters 0.5 to 2m can be jacked into the soil using reaction from the concrete wall erected at the rear of jacking pit.

DIAPHRAGM WALL

In structural engineering, a **diaphragm** is a structural system used to transfer lateral loads to shear walls or frames primarily through in-plane shear stress

. These lateral loads are usually wind and earthquake loads, but other lateral loads such as lateral earth pressure or hydrostatic pressure can also be resisted by diaphragm action.

The diaphragm of a structure often does double duty as the floor system or roof system in a building or the deck of a bridge, which simultaneously supports gravity loads.

Diaphragms are usually constructed of plywood or oriented strand board in timber construction;

Metal deck or composite metal deck in steel construction; or concrete slab in concrete construction.

The two primary types of diaphragm are flexible and rigid. Flexible diaphragms resist lateral forces depending on the tributary area, irrespective of the flexibility of the members that they are transferring force to

. On the other hand, rigid diaphragms transfer load to frames or shear walls depending on their flexibility and their location in the structure.

Parts of a diaphragm include:

- the membrane, used as a shear panel to carry in-plane shear
- the drag strut member, used to transfer the load to the shear walls or frames
- The chord, used to resist the tension and compression forces that develop in the diaphragm, since the membrane is usually incapable of handling these loads alone.