[Document Name] Claims

[Claim 1]

An installing method of an underground structure comprising, as a protecting work when a concrete box body to be installed as an underground structure is to be jacked, a box-shaped roof in which box-shaped cylindrical steel pipes each having a rectangular section are arrayed so as to match an outer edge of the concrete box body scheduled to be installed,

in the box-shaped roof, a unit cylindrical body is press-fitted one by one, a joint flange for bolt joint is formed at an end portion, and a required length is buried by extending the joint flanges in a length direction one by one by fastening the joint flanges with a bolt and a nut,

the fastening with the bolt and the nut is made at a portion where an end-portion corner angle of the unit cylindrical body is made a box-out by opening the same outward,

in the box-shaped roof, hook-shaped or flat-plate shaped joints are formed on a side surface continuously in a longitudinal direction,

this box-shaped roof is pushed in and penetrated between a starting vertical shaft and an arriving vertical shaft which is an entire length of a traverse section in advance, the concrete box body is installed at a rear end thereof, the box-shaped roof is pushed out and the concrete box body is jacked, and the box-shaped roof and the concrete box body are replaced and installed.

[Claim 2]

The installing method of an underground structure according to claim 1, wherein

the box-shaped roof is pushed in and penetrated between the starting vertical shaft and the arriving vertical shaft by placing a friction cut plate made of a band-shaped steel plate on an outer side surface, this friction cut plate is fixed at an end portion to the starting vertical shaft side and left as it is at pushing-out of the box-shaped roof, the concrete box body is excavated inside the friction cut plate, and the friction cut plate forms a friction cut with a rock mass when the concrete box body is jacked.

[Claim 3]

The installing method of an underground structure according to any one of claims 1 to 2, wherein

in the box-shaped roof, a jack accommodating pipe accommodating a small jack is disposed on a concrete box body installation side.

[Claim 4]

The installing method of an underground structure according to any one of claims 1 to 3, wherein

the box-shaped roof is arranged in a flat-plate shape so as to correspond to an upper floor plate of the concrete box body to be jacked, a cutting edge which is a cutting-face excavating work space made of steel is installed at a distal end of the concrete box body installed on the rear thereof, and the box-shaped roof is pushed out while the cutting face is being excavated in the cutting edge, and the concrete box body is jacked.

[Claim 5]

The installing method of an underground structure according to claim 4, wherein

a small jack is arranged between the box-shaped roof rear end and the concrete box body, and jacking of the box-shaped roof with the small jack using the concrete box body as a reaction force and jacking of the concrete box body are performed alternately.

[Claim 6]

The installing method of an underground structure according to any one of claims 1 to 3, wherein

the box-shaped roof is arranged having a square shape so as to correspond to an outer shape of the concrete box body to be jacked, an earth-retaining member is disposed in the cutting face portion surrounded by the box-shaped roof, and earth and sand of the portion surrounded by the box-shaped roof are pushed out at the same time without excavating the cutting face portion when the box-shaped roof is pushed out.