The experiment report of the capillary drainage belt and the proposal of construction

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Main Content

1. Proposal
2. Process
3. Evaluation
4. The proposal of construction
1. **THE PROPOSAL**

Aims of the experiment

1. **Control water flow**;
2. **Avoid blockages, loss of water and soil erosion**

Planar graph
The design of the proposal

The detailed plan of the joints of the framework

Side-view plan
2. THE PROCESS OF THE EXPERIMENT
The process of the experiment

The process of the experiment consists of three steps

- First step: Installation of the drainage belt and collecting pipe, and construction of the lining wall
- Second step: Monitoring the water situation in the collecting pipe and recording the volume of water regularly; monitoring the water situation around the joint between lining wall and underground continuous wall, then determining the water flow direction and path under the condition of using drainage belt;
- Third step: Blocking the water collecting pipe to observe the seepage around the joint between the lining wall and underground continuous wall, and also comparing to the situation before

1. The Capillary drainage belt is placed vertically to completely cover the joint of FX4 end wall and underground continuous wall with slotted side facing the underground continuous wall. It is fixed on the wall extending downwards approximately 5M and 30 cm above the base board.
The process of the experiment

2. In order to prevent the blockages caused by cement getting into the slots of the drainage belt, a layer of non-woven cover needs to be placed and fixed right above the drainage belt.

3. A DN63-75PE collecting pipe is installed as the drainpipe on the base board along the underground continuous wall. One section is sealed, another section is open to drain. The bottom of the drainage belt is inserted into the slot that was cut in advance on the drain pipe. The water collected will be led to the drain pipe to be discharged.
The process of the experiment

In order to simulate the real anti-seepage effect of drainage belt on the joint of lining wall and underground continuous wall, a section of "lining wall" with the dimensions of 0.8m (w) x 0.3m (d) x 5m (h) was constructed with the drainage belt as the centre.

3. The Evaluation of the Effect
The effect of the drainage

We measured the volume of the water collected from the collecting pipe at certain time intervals on the 28th of June 2012. There was 500mL water collected in 75 minutes. The seepage rate calculated was 400ml per hour. The water collected was clear and had no turbidity.

The Effect of water diversion

Seal the water collecting pipe, observe the water flow at the joints and compare them.

Original Groove and wall joint

Under the condition of water diversion

Under the condition of non-water-diversion
The evaluation of the effect

- The effect of drainage is quite good. The capacity of the drainage reached 400mL/h when the height of the underground continuous wall is within 5 metres. The quality analysis of the diverted water showed that the water was clear and had no soil particle in it which indicated that the process of water diversion by the drainage belt does not cause soil erosion and is not easy to be blocked.

- The effect of water diversion is very good. Based on the comparison of the results from the third step, we can see that the amount of water at the joint of lining wall and underground continuous wall reduced significantly when the drainage belt was used for water diversion. Consequently the water pressure on the lining wall is reduced greatly and therefore enhance the quality of seepage control and effects.

4. THE PROPOSAL OF THE CONSTRUCTION
Key points of the construction

- The drainage belt is installed at the joint of underground continuous wall and lining wall. The slotted-side faces to the underground continuous wall.
- The drainage belt is installed downwards from the gap on the top of the horizontal of lining wall. The top is fixed and sealed by silicon glue.
- The collecting pipe is located 10cm above the bottom layer of reinforcement of the base board, laying on the underground continuous wall longitudinally along the tunnel wall. The water outlet is installed inside the working well, using steel brackets to fasten it to prevent from deformation and displacement.
- The bottom of the drainage belt is inserted into the slot on the collecting pipe and smooth surface is jointed and sealed by silicone.
- The drainage belt is covered by non-woven geotextile to prevent cement mortar from getting in and causing blockage to the pipe.

The design of the proposal

The longitudinal section plan of the drainage belt
The proposal of the drainage belt installation

The cross sectional plan of the drainage belt

The proposal of the water collecting pipe installation

The cross sectional plan of the drainage belt
The calculation of flow rate of the water collecting pipe

Based on the seepage rate of 400mL/h with the height of underground continuous wall is 5m, we calculated the flow rate of the collecting pipe is approximate 0.077 m³/h if the number of underground continuous walls is around 60, the average length of joint is around 16m in the upper section single side of Minhang shore. The water collecting pipe with the diameter around 63mm is recommended to use.

管径与流量关系

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