

Video number 12: Molehills

The result of excavation using the Deep Underground concept is a vast amount of excavated material in the form of small particles or dust, depending on the method of excavation. This kind of material is difficult or impossible to dump.

We have to find ways to use this material. The answer is the quality mix of new and ancient technologies.

Let's first look at the difference between two constructions: the tower and the well.

Classical stone towers are often circular constructions that are not particularly high, as the weight of the tower causes high shear and tensile overload on the tower construction at the bottom. Wells, another circular construction, can be very deep because surrounding rock or soil supports the well structure by applying compression force to the well boundaries. The well as a structure is substantially more robust than any standalone tower because the compressive strength of the materials is much higher than shear or tension strength.

So, if we put some material around a standalone tower, we should have a similar stress state as in a well, and such a buried tower could be high and stable.

Such constructions don't need to be constructed from stone. There are other materials that are able to sustain the pressure load.

One possibility is cob.

Cob allows building from clay, straw, and water. Numerous combinations give the construction material solid properties, which creates an opportunity for mixing the excavated dense material from tunnels with clay and using it as construction material for towers.

3D printers can also be used for tower construction, as with this house, which was built from local material with a 3D printer, in Ravenna, Italy.

The next picture shows a structure called a forest of towers. It's a bunch of buried towers positioned one by one in lines. There are smaller towers in between and bigger ones as well, serving as elevator shafts for connection to the underground.

We can separate towers and create rooms that are connected by horseshoe profile tunnels with a small tower in the middle. The result is an array of four-room apartments with a service shaft and an exit to the hallway.

As we mentioned at the beginning, we have a problem with waste material from excavation in the form of dust and small particles.

Now, here is a solution: a huge subterranean settlement, using dust mixed with clay for a cob construction of towers. Small particles are ideal for filling the space between towers, making the construction stable.

A combination of pure underground construction and a forest of towers is reminiscent of a molehill, where the upper part serves as flats with instant access to the surface by foot and underground via elevators, and the underground part serves for work, transport, schools, shopping, and all support infrastructure one may need.

In terms of functionality, the proposed construction does not substantially differ from ordinary multi-level constructions or even skyscrapers, where transport is driven by elevators, and supply is driven by service shafts, with one important difference: that the rest of the city must support the living in houses, constructions, or skyscrapers.

A molehill has its infrastructure underground, which saves a lot of space on the surface.

But it's still underground.

The question is: What would the quality of life be in such a structure?