

Earthen Architecture

Cob Structures in Dufferin Grove Park, Toronto



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What's Cob?

Cob is a building material made by mixing clay, sand, and straw by foot, and forming it by hand into walls. The word “cob” is an Old English word and means “lump” or “loaf”, and the lumps that the material is formed into before being integrated into the walls often do resemble loaves of bread.

This building method lends itself to curvy, sculptural shapes, and invites the participation of any and all who are interested in giving it a try. Cob buildings have been called “ecstatic”, in that they seem alive to the people who enter them.

They exist all over the world, especially in parts of Africa and the Middle East, but there are also hotspots of cob activity in Oregon, Wisconsin, California, Mexico, New Zealand, Wales, Vancouver, and now, Toronto.



Stanley Park, Vancouver

Cob walls can last for a long time (there are buildings in the UK that have been continuously inhabited for 500 years). Because cob is susceptible to damage if it gets wet too often and for too long, there are two building features that usually accompany cob to help alleviate concerns about water. Generous roof overhangs protect the wall from getting too much direct rain, and a high foundation stemwall keeps the cob up off the ground and away from most flooding. Many people also plaster their walls to add extra protection and help prevent excessive moisture from being absorbed by the walls.



Cob bench on Mayne Island, BC

Foundation:

The **foundation** usually consists of some kind of stone work, either dry laid, or mortared together. Other foundation systems include rammed earth tire foundations and earth bag foundations. People often employ a rubble trench system for the underground portion of the foundation, which usually combines foundation and drainage functions.

The foundation in these cases consists of concrete pavers with a layer of brick arranged in the shape of the intended bench, filled in with gravel. This founda-



tion is easy to do with locally available materials, and keeps the cob sufficiently up off the ground.



Cob is a mixture of sand, straw and clay, usually mixed together by foot and applied by hand.

First goes the sand, then the soaked clay. These are mixed until they're fully integrated with each other. Then in go handfuls of straw.

Once the cob is flattened out pancake-style, you grab a corner of the tarp, walk backwards over the mix, and roll the mix up. Once you've created that 'burrito', then you can 'pancake' it again.



Mixing clay in Texas

Applying cob to the foundation



Cob is applied to the outside first, to form a concave shape. Then a stick called cobber's thumb integrates the straw from one level to the next. The next lift goes on immediately. No drying time required!



Once a level (or lift) of cob is put on, the straw is integrated between each level by pushing a thumb-sized stick into the cob from every direction, from one level to the other.



A bench can go together quickly when lots of help is available



Shaping the bench



Plastering:

Cob walls need to breathe. It is essential that air and water be able to permeate both sides of the wall, and that moisture be able to work its way out without running into any barriers.

There have been reported failures of cob walls, usually restorations, that have been coated with a layer of Portland cement. The cement traps moisture in the wall and, instead of migrating in and out, the water gets trapped between the cement and the cob. Over time, it builds up, the cob becomes soaked, and the wall suddenly collapses.

There are at least two options for protecting a cob structure without resorting to Portland cement: **Earthen plaster** and **Lime plaster**.



1. Earthen plaster

Many people use a clay plaster, which is simply a refined version of cob: fine clay, fine sand and short straw
Sand for plaster must be free of debris and chunks of rock.



Mixing up dried clay for earthen plaster



Earthen plaster continues:



First coat



Scratch-layer



By the end of the summer, these benches were complete. Thanks to everyone who help create them.



Golden Mean pattern

Earthen plastered wall in Texas



The other is called **2. Roman Concrete** or **Lime plaster**

For a more robust covering that is still vapour permeable, some people plaster with lime.

There are many lime plaster recipes, but the one that Cob in the Park is using consists of:

- One part soaked builder's lime (limestone that has been crushed, burnt, slaked, dried out and then soaked)

- two to three parts sand

- a small amount of Pozzolanic additive to help the lime set faster. The Romans added volcanic

ash to speed up reaction time. A common additive these days is powdered burnt clay.



Lime plaster sets much more slowly than Portland cement, which means that we can spend a whole day leisurely mortaring stones together. It sets by slowly absorbing CO₂ from the atmosphere, and may take as long as 100 years to fully cure. It is self-healing in that small cracks can eventually heal over as the concrete cures, and it reportedly remains more flexible than Portland, increasing its ability to withstand shocks.

Whether mortaring the foundation or plastering the walls, the mix is the same, except that usually the plaster has some fibre like chopped up straw added to it.



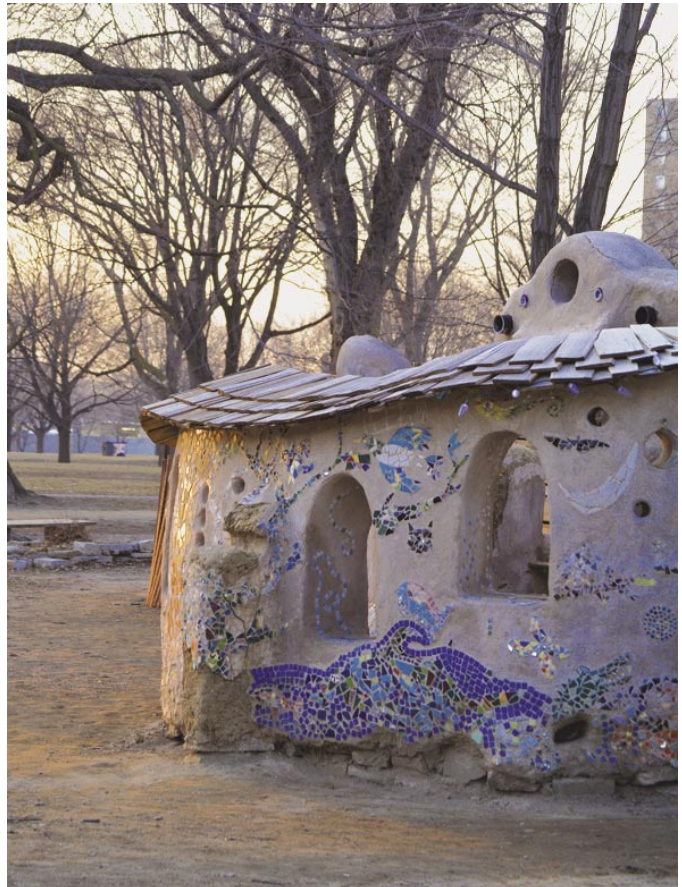
This is another bench in Dufferin Grove Park, made of earth bags and cob, and plastered with lime.



People find all kinds of things to do on the benches, including what they were meant for, connecting with others.

Mosiacs can be incorporated anywhere and everywhere in lime plaster

The tiles get glued with mortar onto the first layer of plaster, the scratch layer, and embedded into the second layer.



For more information:
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