

Cob

Cob consists of clay, straw, sand, lime and water, which is mixed and becomes stiff when cured. The final product resembles a form of concrete. While the material can be load bearing for single story/low-rise structures, it is typically used as infill for timber post and beam walls.

Hazard Resilience

Wildfire



Fire-resistant
(2-4 hours of exposure)

Rain and Floods



Vulnerable to flood damage

Windy



Little information available about wind resistance

Extreme temperatures



Excellent thermal mass supports temperature regulation. Little insulation.

Seismic



Needs reinforcements for seismic resilience

Cob is a natural, sustainable building material.

- It can be constructed using locally available materials.
- It is relatively beginner-friendly and cost-effective.

However, cob is absent in the Building Codes and Regulations, which can make its use more complicated.

As of 2025, recent and credible public estimates of costs were not available. Estimates may be available through local suppliers. Generally, cob is made with relatively low-cost materials but is labour-intensive to work with.



Climate Resilience

Component	Straw Bale
Fire	<p>✔ Good fire resistance. Cob's clay, sand, and straw composition makes it naturally fire-resistant, especially with thick walls and earth or lime plasters. Straw within the cob acts as fiber reinforcement and is not present in high enough quantities to sustain combustion.</p>
Floods	<p>⚠ Low flood resilience. Well-compacted, straw-reinforced cob walls resist initial short-term immersion but overall are vulnerable to long-term flooding, which leads to deterioration, erosion, and potential failure if saturation persists; proper foundations and moisture detailing (sealing gaps) can help.</p>
Moisture	<p>⚠ Moisture-sensitive. Cob's high clay and straw content allow for some moisture vapor diffusion, but the wall will degrade if subjected to persistent wetting or poor drying. Breathable, thick plasters and good site drainage are essential for longevity.</p>
Extreme Temperatures	<p>✔ Excellent thermal mass. Cob walls absorb and slowly release heat, stabilizing interior temperatures.</p> <p>⚠ However, cob's insulation value is low, so thick walls are needed in cold climates for comfort. With the right mix (added lime, appropriate wall thickness), cob is resilient to freeze-thaw conditions.</p>
Wind	<p>⚠ Excellent against wind-driven surface erosion. There is less evidence for high wind load (hurricane) resistance. Thick, well-plastered cob walls do not erode significantly, but their lateral strength under extreme wind loads is undocumented; structural reinforcements may improve this.</p>
Seismic	<p>⚠ Low inherent seismic resilience but can be improved. Unreinforced cob is brittle under earthquakes, but affordable, natural reinforcements (bamboo, wire mesh, wooden grids) can substantially increase resilience, making cob viable in some seismic regions with appropriate design.</p>



Benefits & Risks

Aspect	Benefit of Cob	Risk of Cob
Environmental	Made from natural, locally available soil, sand, clay, straw. Low carbon footprint, especially with site-sourced/repurposed materials. Non-toxic, recyclable, renewable, and compatible with circular economic approaches.	Impacts depend on site sourcing and soil transport. Vulnerable to local soil depletion if over-harvested. Without proper design, walls may require periodic repair or rebuilding.
Durability	Durable for centuries when built and detailed properly, especially with thick walls, overhangs, and regular maintenance. Resistant to surface erosion, pests, and fire.	Prone to degradation from flooding, persistent moisture, or poor foundations. Regular maintenance needed, including plaster repair and moisture management.
Energy Efficiency	High thermal mass moderates temperature swings. Provides a cool building in heat and warmth retention in winter with thick walls. Locally sourced materials reduce embodied energy	Requires thick walls for adequate insulation in cold climates. R-value is lower than most modern insulations; meaning perhaps it is not ideal for cold climates.
Economic	Low-cost where soil and sand can be harvested onsite. Simple construction methods reduce reliance on specialized labor and consequently reduce costs.	Labor-intensive, with long building and drying times. Local soil and sand quality may require supplementation. Permitting and approval can be a challenge.
Regulation & Codes	Interest and use is high among alternative building communities. Long historical use and growing body of contemporary research and BC-based consultants is making cob construction more accessible.	Not formally recognized in BC Building Code, making it an 'alternative solution' which requires an engineer to sign off on construction of cob structures.



Technical Feasibility

Materials:

Cob is made by mixing clay, subsoil, sand, straw, and water in specific ratios (typically 15–25% clay, 2% straw by mass, with sand/gravel as the bulk). Sometimes lime is added (especially for increased water resistance). Cob can be mixed by hand or mechanically, using local soil, with straw as reinforcement.

Lifespan:

Cob houses are durable when designed with adequate site drainage, proper overhangs, and maintained plasters. The flexible, vapor-permeable nature of cob supports healthy indoor air quality. Key risks include long-term water exposure/flooding and improper plaster maintenance.

Materials:

- Mixed in batches.
- Walls are hand-shaped or packed, allowing for sculpted or curved forms.
- Requires thick walls (often 12–24 inches) for structural strength and comfort.
- Buildings can be constructed entirely with cob or as hybrid designs (with post-and-beam frames).
- Exterior plaster (lime or earth) applied for weather protection.
- Construction timeline depends on wall thickness, drying conditions, and size; walls must dry thoroughly between courses for best structural properties

Barrier: Building Codes

Cob is considered an 'alternative solution' under the BC Building Code, necessitating performance testing and approvals from engineers. However, there are several BC-based consultants who are experienced with cob construction, as well as many beginner-friendly guides online, which make cob construction quite accessible to inexperienced builders, so long as they are aware of the regulatory hurdles.



Construction Methods

Cob may be:

Hand-formed into a **unreinforced, thick, sculpted wall**. This approach is best suited to dry climates or mild seismic zones.

Layered “in formwork”, meaning cob is poured or packed into forms, layer by layer. This approach allows for more conventional wall shapes.

Used in a **hybrid post-and-beam** with cob infill. The structural frame supports roof and loads, while the cob provides insulation, mass, and finish.

Structural Limitations & Flood Risk

Cob lacks the compressive and tensile strength of reinforced concrete or masonry; load-bearing capacity depends on wall thickness, soil quality, and (when used) reinforcement. Flood and persistent wet climates can cause long-term damage, which makes site and moisture detailing critical.

Reinforcement Options

Priority: Moisture Reinforcement

The general goal of moisture retrofits is to prevent moisture from moving into the building.

- Raising the foundation can prevent flood damage.
- Capillary breaks can stop water from moving into the building.
- Breathable lime or clay plasters, as shown in the photo below, can also provide moisture protection.

Priority: Seismic Reinforcement

The general goal of reinforcements is to strengthen the material and structure. Confining bands and wire mesh can help reduce the risk of collapse and promote strength because they connect roofs and foundational structures into the walls.

*Exterior cob covered with lime plaster.
Photo credit: Valentijn Helmus*



Example: Cob House, Stanley Park (Vancouver, BC)

The Cob House was constructed in 2004 at the miniature train yard in Stanley Park. It was designed by a team from UBC Civil Engineering and the BCIT Green Roof research facility. The structure won an Innovation Award from the Vancouver Regional Construction Association. It continues to be used now for Stanley Park Ecology's popcorn stand.

More information about the house and its construction can be found on the Stanley Park Ecology's [website](#).

Note Space: *Community & Personal Knowledge*



Photo credit: Stanley Park Ecology and Patricia Thompson