

Thatched Roof

Details

- Reported to be the only thatched roof in Ontario
- Made of phragmites reed
- Phragmites is a European invasive species choking out native plants
- Gathered locally, student builders went to ditches next to the highway and cut bunches of reeds
- The reeds were bundled and tied to the wooden frame

Advantages

- Highly renewable, we just can't get rid of this stuff (tar shingles use compounds derived from oil)
- Biodegradable (tar shingles are not biodegradable and only a small amount of them are recycled)
- Non-Toxic
- Locally harvested

Timber Frame

Details

- A traditional method of building a structure
- Uses large logs and simple carpentry joints and pegs to hold together
- These pieces are off-cuts from a local timber framing company, the wood would normally have been used as firewood or abandoned

Advantages

- If harvested properly, wood is a renewable resource
- Using wood in long-lasting structures sequesters the carbon stored in the tree that would otherwise be released through burning or rot
- Biodegradable
- Non-Toxic
- Uses materials that would otherwise be waste

Earthen Plaster

Details

- Made of a mixture of clay, sand and straw. Final coat includes rice flour paste and polyfibres
- First layer applied by hand, second finish layer applied with trowels

Advantages

- Chemical free
- Locally extracted materials, less transport means less GHG emissions
- Can safely be applied by hand
- Biodegradable
- Fire proof, pest proof

Site Built Straw Bale Walls

Details

- Non-load bearing (although this style can be load bearing)
- Top and bottom plates were installed and the door and window bucks (frames) attached to them
- Bales are stacked like bricks and beaten with a large wooden hammer (the persuader) to compress them
- The edges and corners are trimmed round
- Earthen plaster is applied directly to the bales

Advantages

- Locally sourced straw bales, less transport means less GHG emissions
- Straw is a highly renewable resource, it can re-grow within one year
- Non-toxic, natural materials
- Biodegradable

- Fire and pest proof
- Exceptional insulation ability, twice that of a conventional house, saving energy on heating

Reclaimed Materials

Details

- Bricks in the wall (1400 of them)
- Drywall
- Tiling (discontinued, surplus and damaged tiles from Turco)
- Slate
- Office door

Advantages

- Using materials that would otherwise be waste
- Most sourced from local retailers
- No GHG emissions for production
- No harvesting of virgin materials

Solar Hot Water

Details

- An non-toxic antifreeze fluid (glycol) is pumped through a panel mounted on the south wall
- The panel is designed to maximize heat collection and retention, as the fluid passes through it warms up
- The fluid pipes wind through a heat exchanger and the heat is passed to the water, the fluid and the water never mix
- The hot water is stored in a hot water tank with electric back-up

Advantages

- Solar energy is free, clean and never ending
- No GHG emissions

Cotton Bat Insulation

Details

- Denim off cuts from making jeans are processed, fluffed, made fire-resistant and bundled into bats
- Can be installed like fiberglass insulation, but without the necessary safety equipment

Advantages

- Biodegradable
- Non-Toxic
- Cotton is a renewable resource
- Uses materials that would otherwise be considered waste

Pre-Fab Straw Bale Walls

Details

- Each wall section has a header and footer made of wood
- A form is built to hold the plaster and bales, the wall is built on its side
- The first layer of plaster is applied
- The bales are fit into the form
- Plaster is hosed into the sides between the bales and the form
- The second layer of plaster is applied
- The unit dries, then the bottom and side forms are removed
- The unit is transported to the build site and craned into place
- These sections are load bearing, they hold up the roof

Advantages

- Building indoors means weather is not a concern
- The build is faster and easier
- Chemical free
- Biodegradable
- Fire proof, pest proof

Compressed Earth Blocks

Details

- Earth was compressed in a hydraulic press, the press is locally owned and brought in from Coburg
- Under this extreme pressure the earth knits together strongly
- Blocks are mortared much like a brick wall
- Can be used on external walls

Advantages

- Locally extracted materials
- Biodegradable
- Non-Toxic
- Hydraulic press uses much less energy than baking a brick would
- Low greenhouse gas emissions

Hempcrete

Details

- Hempcrete is a mixture of lime, water and hemp shives (core of the stem)
- The mixture packed and pounded into the wall cavities boarded with plywood forms
- Hempcrete can be molded by hand as can be seen on the bench top, the window sills and door frames
- When the hempcrete has dried (two to four weeks) protective plaster is applied

Advantages

- Rapidly renewable resource, especially when compared to the time needed to re-grow trees
- Biodegradable
- Uses materials that would otherwise be considered waste

Slipstraw Walls

Details

- Wall material is a combination of clay slip (mixture of clay and water) and chopped straw.
- The walls have double stud construction and are 12" wide
- A form was attached to the studs (inside and out) and the cavity filled with rammed straw-slip mix
- When the mixture had solidified, the form was moved up and the next layer rammed
- The wall sprouted grass, when the grass died the walls were dry
- Plaster was applied to the walls

Advantages

- Locally harvested materials, less transport means less GHG emissions
- Chemical free, Biodegradable
- Fire proof, pest proof
- Uses materials that would otherwise be waste
- Very high insulation value, equivalent to bale walls double that of a conventional house

Concrete

Details

- Concrete uses cement to bind its components, production of cement involves baking limestone and is therefore a huge energy consumer and GHG emitter

- All concrete used at CKEC has half the cement content of conventional concrete, it was replaced with slag
- Slag is a waste product of the steel industry that provides similar binding qualities as cement
- Overall concrete use was reduced (35%) by including voids in the poured concrete foundation, sono-tube sections were inserted into the concrete forms before pouring
- The floor thickness is reduced by including a thick layer of gravel
- Designing the building with a floating foundation instead of a basement dramatically reduced the need for concrete

Advantages

- Uses materials (slag) that would otherwise be waste
- Tremendous GHG savings compared to conventional concrete foundations

Earth Bag

Details

- Long tubes of “bag” are filled with gravel and earth, slag may be included
- The tubes are tamped down hard
- Barbed wire is laid between each layer to prevent slipping
- The earth bags are a load bearing foundation
- The round wall and the walls supporting the thatch roof are built on earth bag foundations

Advantages

- Makes great use of the low GHG emission technology of human labour
- Can use local materials
- Uses no cement (a big GHG producer)

Photo Voltaic Electricity

Details

- Photo (light) Voltaic (electricity), this refers to our solar electric panels
- This is a 4 Kilowatt system that will generate 12-14 kW-hr per day, or about 4400-5200 kW-hrs per year
- This is a grid attached system, whatever energy that is produced and not immediately used by the centre is put onto the grid and sold to the utility company, when more energy is needed than being produced, energy is bought from the grid

Advantages

- After construction the panels have no GHG emissions
- By being attached to the grid we have no need for batteries
- Decentralized energy production cuts down on line-loss
- Diversified energy sources reduce the impact of local disasters

Can and Bottle Wall

Details

- Wall is built from the ground up, cans and bottles are stacked like bricks with clay mortar holding them together
- Bottles were cut in half and butted together end to end
- Cans were stacked whole and do not extend through the wall
- Inspired by Michael Reynolds “The Garbage Warrior” and his books called Earthship manuals

Advantages

- Beautiful
- Uses materials that would otherwise be considered waste
- The air trapped in the cans and bottles acts as an insulator

Geothermal Heating

Details

- Copper pipes run deep into the earth (100 feet at this site) where the earth is always warm, the liquid in the pipes heats up

- The holes are filled with grout all the way to the surface, the solid grout fill maximizes heat conduction
- The liquid flows through a heat exchanger warming water in the tank The heated water is pumped through pipes in the floor to heat the building

Advantages

- Extremely efficient, uses very little electricity
- If the electricity is from a clean source (such as our PV panels) there are no GHG emissions
- Even if using electricity from the grid, the GHG emissions from geothermal is considerably lower than burning natural gas or oil for heat, electric heat is very inefficient
- The earth's heat is a constant, it won't run out

Green Roof

Details

- The roof is built on a very shallow pitch
- Over the plywood roof is layered a waterproof membrane, a dimple membrane and a drainage membrane to manage the water flow
- A 4" layer lightweight growing medium made of crushed brick and compost is put down
- Native plants are put in (wild strawberry, nodding onion, chives, cylindrical prairie fire), local seeds will blow in as well

Advantages

- Provides habitat for birds, butterflies and other species
- Plant transpiration cools the building and the neighborhood in the summer, conventional roofs heat up in the sun
- Produces oxygen, cleans the air
- High insulation value
- Can be used to grow food crops; in cities this technology can make local food available even in urban areas
- Soil retains water and releases it slowly preventing flooding