

GET INSPIRED TO BUILD WITH US

SIREWALL INSPIRATION KIT

SIREWALL
STRUCTURAL INSULATED RAMMED EARTH

CONTENTS

<u>What is SIREWALL?</u>	-	1
<u>When / where to use it</u>	-	2
<u>SIREWALL capabilities</u>	-	14
<u>Drawing details</u>	-	16
<u>Background Information</u>	-	19
<u>Colour & Texture</u>	-	22
<u>Summary</u>	-	24

What is SIREWALL?

STRUCTURAL **I**NSULATED **R**AMMED **E**ARTH **W**ALL

- has been built to 51' tall, loadbearing
- minimum dynamic R value of R48 to R72
- compacted using pneumatic rammers
- carefully blended inorganic soils
- not a floor or roof

When to use it?

- Your client is **Environmentally Motivated**

No other product is as good in LEED and Living Building Challenge while sending the green message

- Your client wants to **Maximize use of Local Materials & Labour**, perhaps for political reasons

- Your client wants to **Mitigate Future Operational & Maintenance Costs**

- Your client insists on **Healthy Building Materials**

- Your client is **Tired of Concrete, Brick, Steel & Glass**

- Your client is **Concerned about Climate Change**

SIREWALLs are durable against flooding, fires, and extreme temperatures

Where to use it...

1. ART GALLERIES & MUSEUMS

These facilities **require a tight control over temperature and humidity**. Light weight structures require fast response times to changes in temperature and humidity, which is typically accomplished by adding more capacity (more moving parts, more maintenance, more upfront expense).

The hygrothermic properties of SIREWALL **reduce the mechanical equipment required and minimize risk of failure** as temperatures and humidity changes are much slower and easier to manage.



Where to use it...

2. WINERIES

These facilities also **require a tight control over temperature and humidity**. Wine that undergoes temperature and humidity swings while being stored gets increased “ullage” (space between top of wine and cork). This decreases the quality and value of the wine.

When a lot of wine is being stored this is a **large financial and reputational concern**. SIREWALLs can also be used in wineries to **impart the image of stability and timelessness** to the public.





Where to use it...

3. RECREATIONAL SPACES

The **visual appeal** of SIREWALL can enhance the appeal of the location and facility. People want to go to places that are **unique**, **beautiful**, and **memorable** in some way.

Where to use it...

4. LIBRARIES

Libraries have **a lot of paper** in them and if the moisture isn't managed well, mold will grow. The **hygrothermic properties of SIREWALL** are inhospitable to the growth of mold. The STC (Sound Transmission Class) of SIREWALL will eliminate almost all infiltration of external sound (traffic, planes, dogs, sirens, etc).

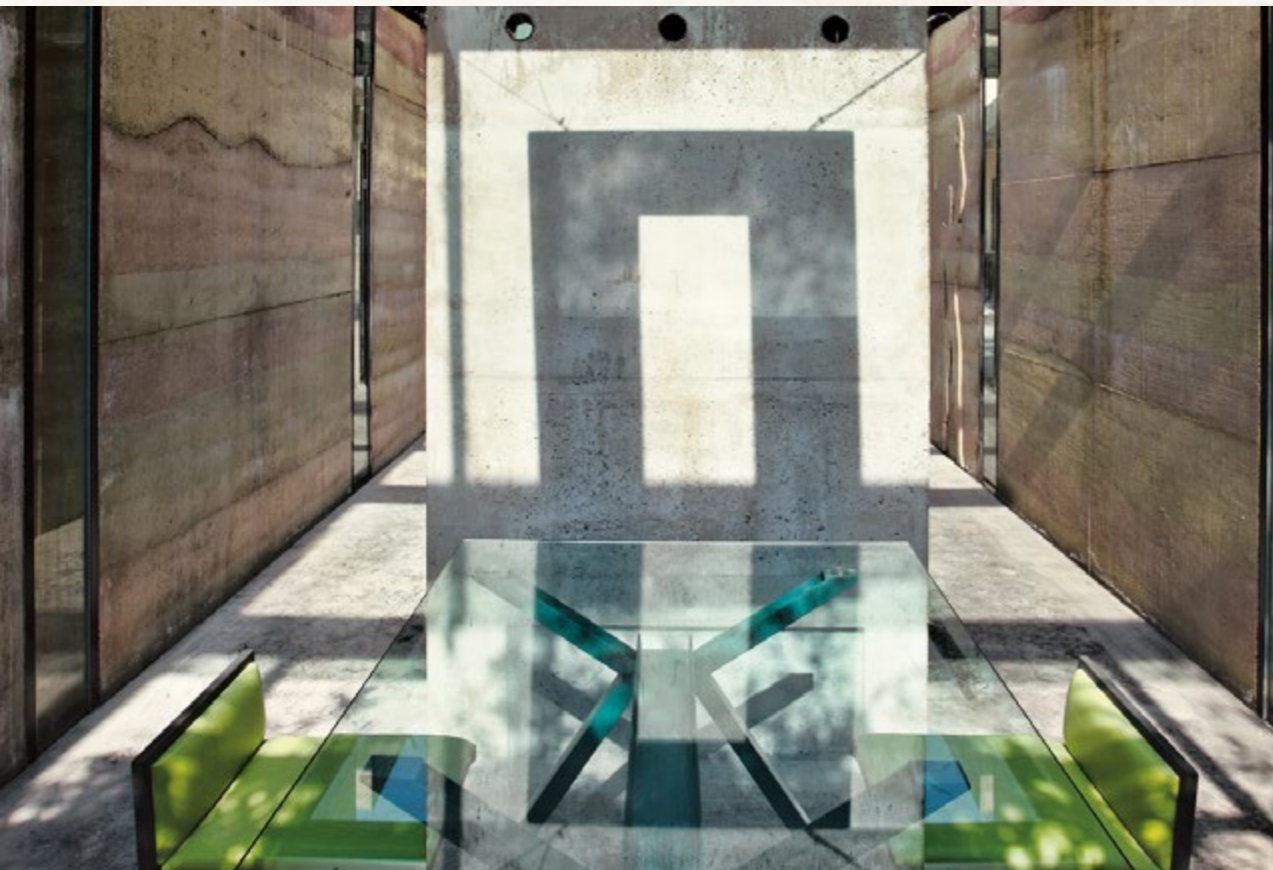
Careful attention to the texture of the finished wall (eg. a 600 micron finish) will **scatter the internal sound waves**, thereby **reducing echo** and **improving sound quality**.



Where to use it...

5. OFFICE SPACES

Working in **healthy, quiet** and beautiful spaces **improves productivity & morale** while **reducing sick days**.



Where to use it...

6. HOTELS

More and more, people are looking for something different than a Best Western style of accommodation. That may be due to health concerns or just wanting to broaden their experience and have something to share with friends.

This could be in a boutique setting - as in these **34 round cottages at Naked Stables** - or in a more shared format. Heating and cooling costs are dramatically reduced and acoustical attenuation between suites is excellent.



Where to use it...

7. MULTI-FAMILY DWELLING

The difficulty with multi-family dwellings' acceptance in the marketplace is due to **privacy, sound, and fire concerns**. All three can be addressed with SIREWALLs. Outdoor privacy can be achieved by running the SIREWALLs out into the landscape. The big advantages of multi-family are **more efficient use of real estate, reduced building costs** due to shared walls, and **reduced heating costs** due to reduce heat loss surface area per square foot of living space. The net result is buildings that have **lower initial cost than single family** and lower operating costs.

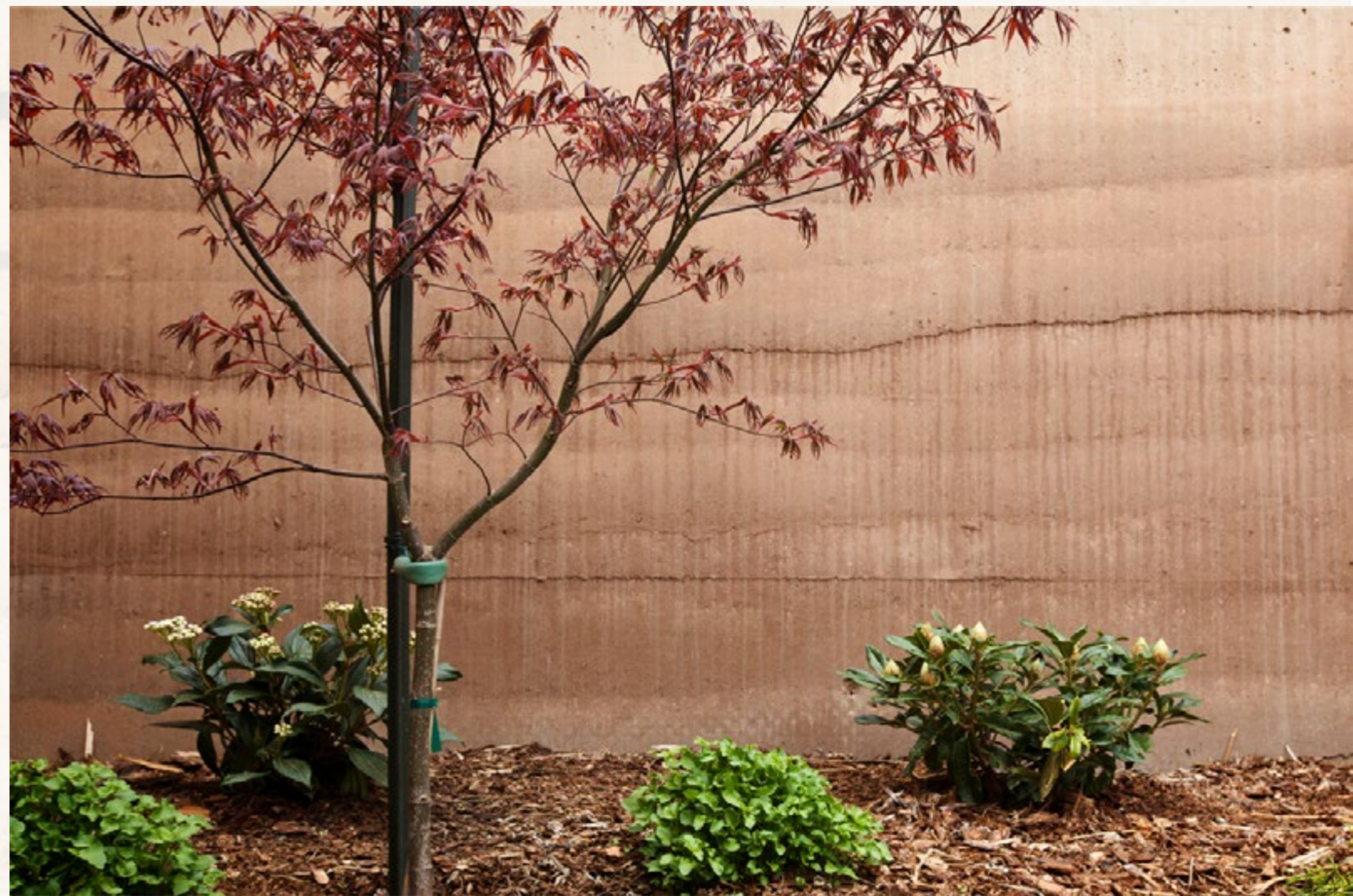


Where to use it...

8. LANDSCAPING

Tie-ing the hardscaping **into the structure** is easily done with SIREWALL, simply extend a wall out beyond the building's envelope. This is very useful with difficult grading situations.

South-facing landscaping elements **create a warm microclimate** in front of them, especially if there is insulation in the wall.



Where to use it...

9. BIOPHILIA (LOVE OF NATURE)

Quite frequently we're asked to have **our walls mimic the geology of the surrounding area**, be that the exposed bank of a river or exposed sedimentary colourations of nearby cliffs. Or the intent could be to mimic something far away, like the Grand Canyon composition.

We can now extend this **biomimicry** with our emerging control over texture.



Where to use it...

10. PUBLIC ASSEMBLY

When not surrounded by veneer and artifice, people's conversations seem to be more calm and real. The **fine acoustics and hygrothermal comfort augment the heft of the space**. People are drawn to be in such spaces.



Where else to use it?

10. MORE POSSIBILITIES - *JUST IMAGINE...*

SCHOOLS

- where health and a positive vision for the future are key

FIRE STATIONS

- set the example with a non-combustible building

THEATRES

- where acoustics are very important

EXTENDED CARE

- health, no impact from loud TVs, stable temp & humidity

MANUFACTURING

- interior noise stays inside, stable temp & humidity

FOOD STORAGE

- controlling temp and humidity can be very expensive

GREEN HOUSES

- heat storage in abundant insulated mass deals with climate change weather variability

RELIGIOUS BUILDINGS

- connecting the spirit with the earth

Where else to use it?

STILL MORE POSSIBILITIES...

INDIGENOUS STRUCTURES – a durable technology often aligned with traditional values

GOVERNMENT BUILDINGS – life cycle costing makes SIREWALL the best choice

PRIVACY WALLS – these stay beautiful and endure; life cycle costing again

SPECIFIC APPLICATIONS WE'D BE EXCITED TO DO:

- A **glass elevator** inside a SIREWALL elevator shaft
- An **outdoor fireplace** inside a gazebo where the rammed earth seats and SIREWALL seatbacks *thermosyphon* - they are heated by the fire
- A **passive solar greenhouse** that allows bananas to be grown in Wyoming

What can SIREWALL do?

- It has been **built successfully at 53° N latitude**, in the **rain forest**, in **monsoonal zones** and in the **desert**; in **high heat: 49.2°C (121°F)** and **extreme cold: -35°C (-31°F)**; in windy Wyoming, and in **humid coastal locations**
- **Suitable soils** have been found **everywhere** we have looked, including 9 locations off of North America
- To compare strength, Red brick is 1,100psi, generic concrete is 2,500 to 3,000psi, and **SIREWALL is typically 3,000 to 4,000psi**. SIREWALL can do most things concrete can and *some things concrete can't*
- SIREWALL has been **built to 51' tall** in a loadbearing application. There are much taller structures currently in design

More on SIREWALL performance:

- SIREWALL (with steel) has **spanned 47'** at the Edmonton Valley Zoo entrance
- SIREWALL has been **backfilled to over 30' depth** at Brinton Museum
- SIREWALL makes it possible to build ***durable* Passive House buildings**
- SIREWALL was originally **developed in a highly challenging geographic location** – where horizontal rain is common, by the ocean where there is salt in the air, where the seismicity is the same as LA, and where in winter there can be a dozen freeze/thaw cycles in a 24 hour period

How do I draw the details?

EVERY JOB IS UNIQUE, AND THE SELECTION OF DETAILS MUST RESPECT THAT. HOWEVER THERE ARE SOME RULES OF THUMB TO FOLLOW:

- Most popular is **12” interior wythe, 4” insulation, 8” exterior wythe**. This yields dynamic R values of R48 to R72, depending on solar access. Good insulated rammed earth detailing is found in [Rammed Earth Construction](#) – CRC Press
- **Passive House insulation** should be 8” in the center of two 8” wythes.
- **Elevated floors** can be either wood or concrete, supported on the inner wythe ensuring continuity of the thermal envelope.
- **SIREWALL window and door details excel**, and can be provided when the drawings are in design development.

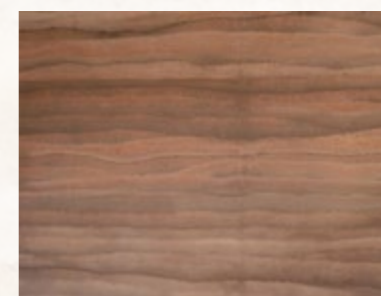
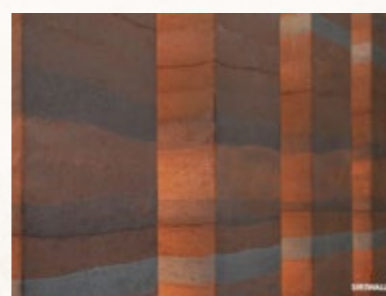
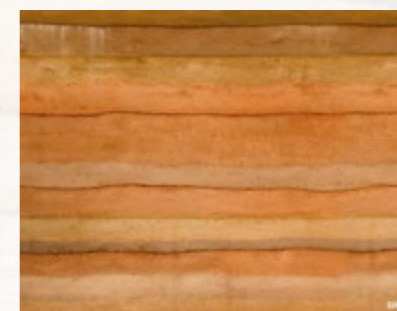
drawing details (cont.)

- **Electrical and plumbing conduits** go in as the wall is being built. Avoid horizontal conduit runs where possible. Have the horizontal conduits in the floor assembly, the attic, or in the crawl space.
- If possible **run the SIREWALLs right down to the footings**. With a deep frost depth, the SIREWALLs can be supported on double ICFs, which maintains support under each wythe and maintains the thermal envelope.
- Draw in **vertical control joints** every 20' horizontally

Getting Started

PLEASE DO NOT THINK OF OR USE SIREWALL AS A CLADDING!

SIREWALL has the strength of concrete and is intended to be used for *structure*. Draw exterior walls at 24", and interior walls at 10"-12". Use the wallpaper below and apply to your design. We have an engineering firm that we regularly work with, but can also support your preferred engineering team.

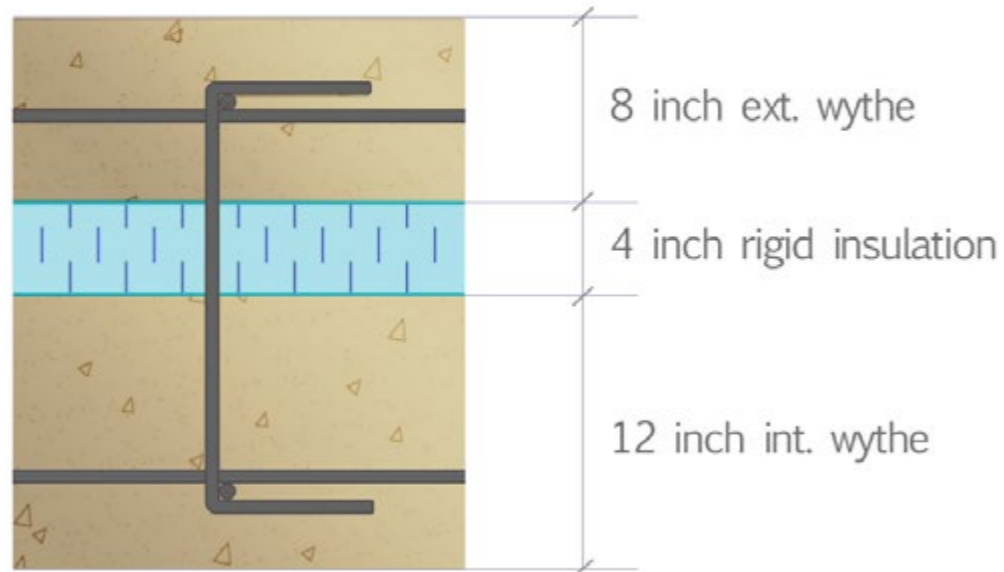


Background re: insulation

RIGID INSULATION HIDDEN IN THE MIDDLE OF THE WALL HELPS CREATE A DYNAMIC R48 – R72. OUTSIDE TEMPS IN RED, INSIDE IN BLUE. UNHEATED AND UNOCCUPIED STRUCTURES SHOWS ~10 °C OF FREE HEAT

SIREWALL DETAIL

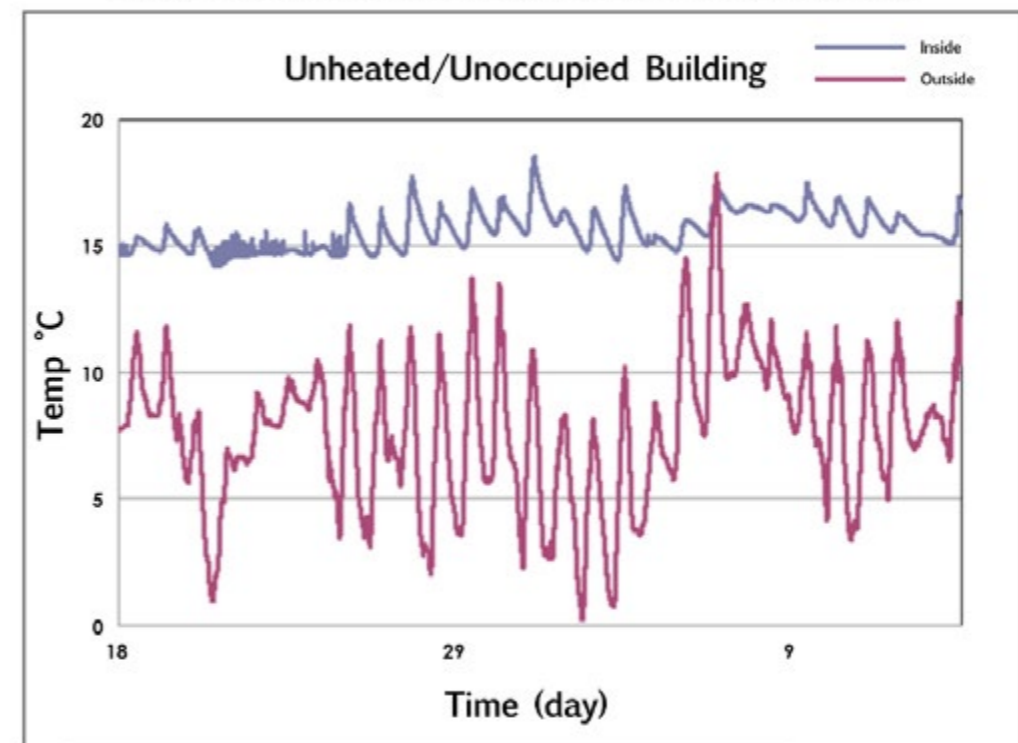
TYPICAL WALL & INSULATION THICKNESS



SIREWALL
STRUCTURAL INSULATED RAMMED EARTH

THERMAL PERFORMANCE

BCIT study of temperatures across the north wall of an unoccupied SIREWALL home



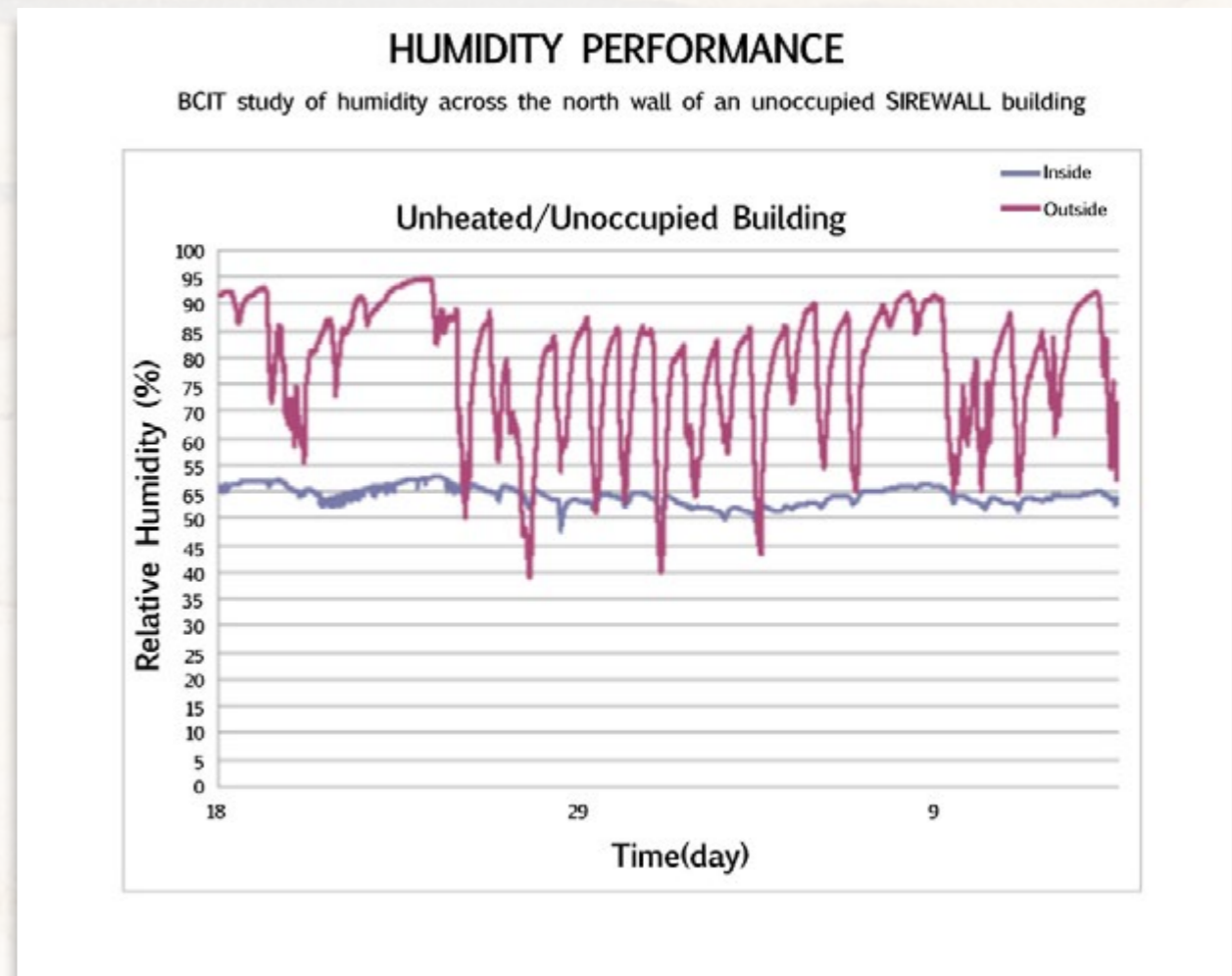
SIREWALL
STRUCTURAL INSULATED RAMMED EARTH

Background re: humidity

Most buildings have very little capability to absorb humidity, thereby leaving them vulnerable to fluctuations caused by more or less human traffic: making tea, opening and closing doors, etc.

No mold can grow if humidity is kept under 65%. This BCIT graph shows exterior humidity in red and interior humidity in blue. This is an unheated and unoccupied space. The outside humidity spikes up and down daily whereas the interior humidity is staying perfectly centered in the

human comfort range of 40 – 65% relative humidity, all achieved with no moving parts or energy consumption.



Background re: **structure**

SIREWALL'S STRENGTH IS COMPARABLE TO CONCRETE BUT THE REINFORCING DETAILS ARE *DIFFERENT FROM CONCRETE*.

For Seismic Zone 5, we use 15M (#5) bar in a 24" grid on both sides of the insulation with interwythe connectors at 24" each way.

Zone steel, beam hangers, lintels, slab support, etc **will need SIREWALL design support.**



SIREWALL Colours

SIREWALL CAN CREATE ALMOST ANY COLOUR BY COMBINING IRON OXIDES AND CEMENT COLOUR WITH THE NATURAL COLOUR OF THE LOCAL SOIL.

We avoid blues and greens as they are toxic. Single colour and single colour variegated are about the same price. Multi-colour costs about 10% more.



MULTI COLOURED



SINGLE COLOUR VARIEGATED

SIREWALL Textures

THIS IS AN EXCITING AND EVER EXPANDING TECHNIQUE THAT WE OFFER - AND COMES IN TWO FLAVOURS...

There is the **surface granular texture** that we have some control over (eg, bony, 300 micron or 600 micron finish). And then there are **broader texture options** such as pillowy, burlap, random or intentional dents and bumps, embeds, carvings, fabric forming, and curved, hard, chamfered or soft corners.

Talk to us about your design intent so we can get into detail about the custom and production finishes available.



Summary

We are a family based R&D company that makes our income from consulting with architects (and builders).

WE ARE THE BEST IN THE WORLD AT:

- Prospecting for suitable local soils
- Computerized mix design for optimal strength
- Control over texture and colour
- Technology for large projects, having created the longest, tallest, and strongest modern rammed earth ever.

PLEASE DON'T HESITATE TO CONTACT US TO DISCUSS CONSULTING POSSIBILITIES



SIREWALL®

STRUCTURAL INSULATED RAMMED EARTH

THE ART & SCIENCE OF RAMMED EARTH

SIREWALL Inc.

212 Cusheon Lake Road
Salt Spring Island, BC
V8K 2B9 CANADA

Office Monday to Friday: (250) 537-9355

email: office@sirewall.com | sirewall.com