



Trillium Lakelands Teachers' Union Office

Endeavour Centre SNC 2014 Project

Trillium Lakelands Teachers' Union Office

The 2014 Sustainable New Construction program at Endeavour saw us constructing our first-ever office building, for the Trillium Lakelands Elementary Teachers' Local (TLETL).

The 2400 square foot building is the result of TLETL's commitment to "leading by example" when it comes to caring for the environment. The union leadership and members wished to create a new building that had a meaningful mandate for high levels of energy efficiency and low environmental impact, combined with a completely non-toxic indoor environment. On the design side, there was a strong interest in having the main meeting room be circular in form, reflecting the inclusive nature of the relationship between the union leadership and the members.

To meet the goal of high energy efficiency, we designed the building using the Passive House Planning software with the intent of maximizing passive solar gain and meeting the Passive House standard of reducing heating energy by 80-90% better than current code requirements. This would allow the building to have a minimal heating load, trading off the investment in more insulation and better windows against lowered heating system costs.

Renewable energy in the form of photovoltaics should supply all the energy this building requires, as it was designed to meet a "net zero energy" performance level.

As a first for Endeavour, we combined two wall systems to create a super-efficient thermal wall. A conventional frame wall exterior with dense-packed cellulose insulation is twinning with a straw bale wall on the interior side.

A great crew of students, from several countries and across Canada, put this building together along with Endeavour's design and build teams.

We are proud of this innovative office space, and feel we met all of our goals and those of our clients. Enjoy your tour through the process...



The Endeavour crew spent their early days learning about sustainable building systems and constructing a scale model of the office building.

Wall Assembly Legend

	New Partition Wall 2"x4" studs @ 16" O.C. with 1/2" GWB on both sides to top of ceiling. Drywall screws @ 12" O.C. Where wall is located in washroom, provide moisture resistant GWB on washroom side and secure with drywall screws at 10" O.C. at panel edges and 12" O.C. at intermediate supports. Tape, plaster, sand, prime and apply 2 coats latex paint.
	New Partition Wall (GWB one side only) Similar construction to 1 with GWB on outside only.
	New Plumbing Wall 2"x4" studs @ 16" O.C. with 1/2" (15 mm) moisture resistant GWB on both sides to top of ceiling. Secure moisture resistant gypsum board to studs with drywall screws at 10" O.C. at panel edges and 12" O.C. at intermediate supports. Tape, plaster, sand, prime and apply 2 coats latex paint.

	New Exterior Loadbearing Wall (P66.5) <ul style="list-style-type: none"> Solid wood board and battin siding 3/4" horizontal strapping at 24" O.C. SGA Maxcell membrane 1/2" exterior grade wood fibre sheathing (H1.5) 2"x4" studs @ 16" O.C. with dense-packed cellulose insulation @ 4 PCF (R2) 1" stucco base with 1" clay plaster (R5)
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Floor Assembly Legend

	New Wood Floor <ul style="list-style-type: none"> 3/4" floor finish Min. 5/8" T&G plywood subfloor screws and glued to joists below SGA Majcell 5 vapour control layer 1 1/4" Triform open joist @ 16" O.C.
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Accessibility Signage Notes

All accessibility signage shall be located as indicated on the plan, mounted between 47 1/4" and 50" AFF, contain the International Symbol of Accessibility, and indicate graphically and/or with text information as outlined below.

S1 = Accessible entrance
 S2 = Accessible means of egress
 S3 = Accessible unisex washroom

Floor Plan Notes

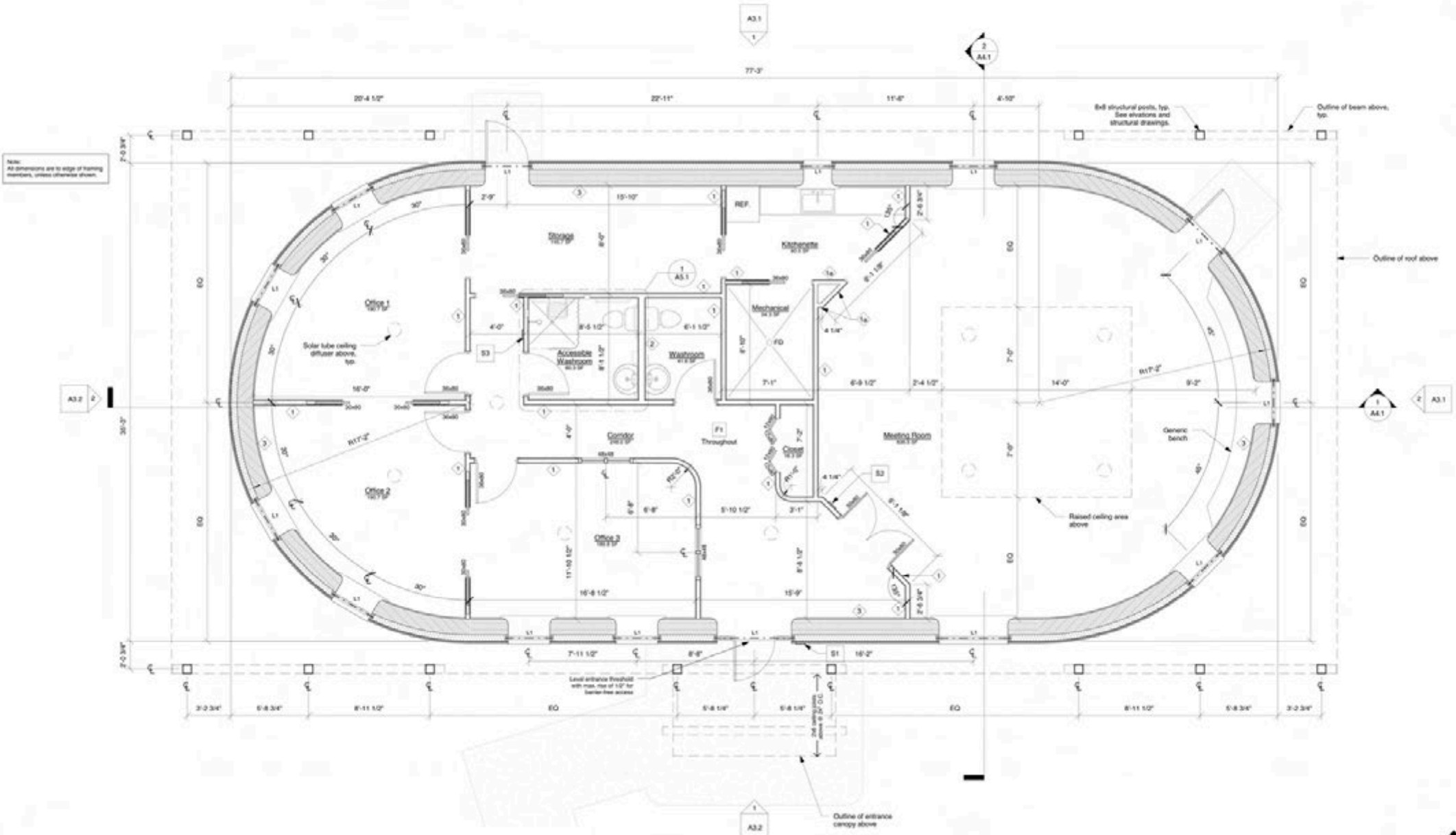
- Provide required wood blocking, grounds, turning and strapping, whether shown on drawings or not, for securement of fabricated items, closet equipment, washroom accessories, cabinets and built-in items.
- Ensure mechanical and electrical work is roughed in prior to installing gypsum board cover.
- Apply materials and finishes in strict compliance with manufacturer's instructions.

Lintel Schedule

Key	No.	Size in mm (Imperial Nominal)
Wood Built-Up Lintels		
L1	3	38 x 184 (2x4)

Lintel Notes

- Install wood lintels with even, level and solid bearing at end supports. Bearing shall not be less than 38mm (1 1/2") minimum at each support.
- Insulate cavity between lintel members.
- Install steel angle lintels with even, level and solid bearing at end supports. Bearing shall not be less than 150mm (6") minimum at each support.
- Prime paint steel angle lintels to prevent corrosion.



1 Main Floor Plan
Scale: 1/8" = 1'-0"

infinite

716 Mundy Crescent, C...
905.377.9455

These drawings and specifications and shall remain the sole property of the copyright of this Work. Specifications may not be reproduced or shared with third parties or used in or extensions to this project without the written consent of the Designer. Report any discrepancies to the Designer before proceeding with construction.

Do not commence the Work unless Construction.

Do not scale drawings.

The undersigned has reviewed and design, and has the qualifications set out in the Ontario Building Code.

Draw Johnson
QUALIFIED PERSON

Andrew Smith Productions
REGISTERED FIRM

Client Review
Permit and Construction

Revision B
No. Description

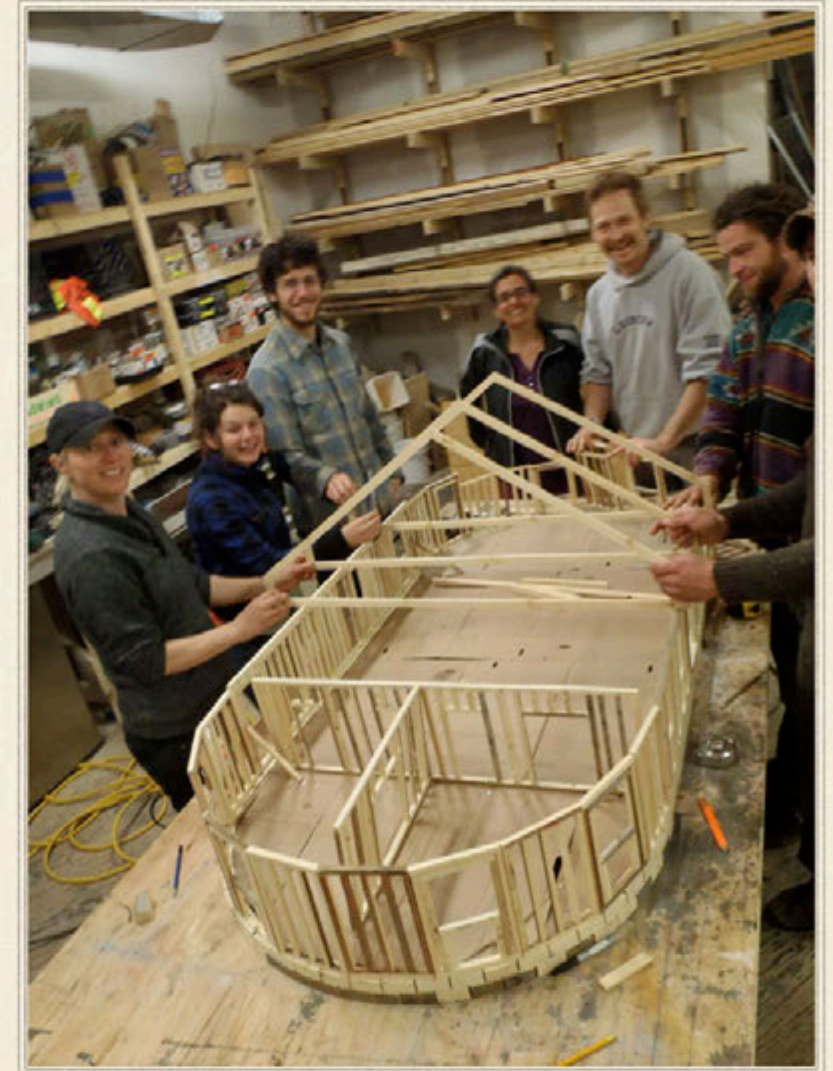
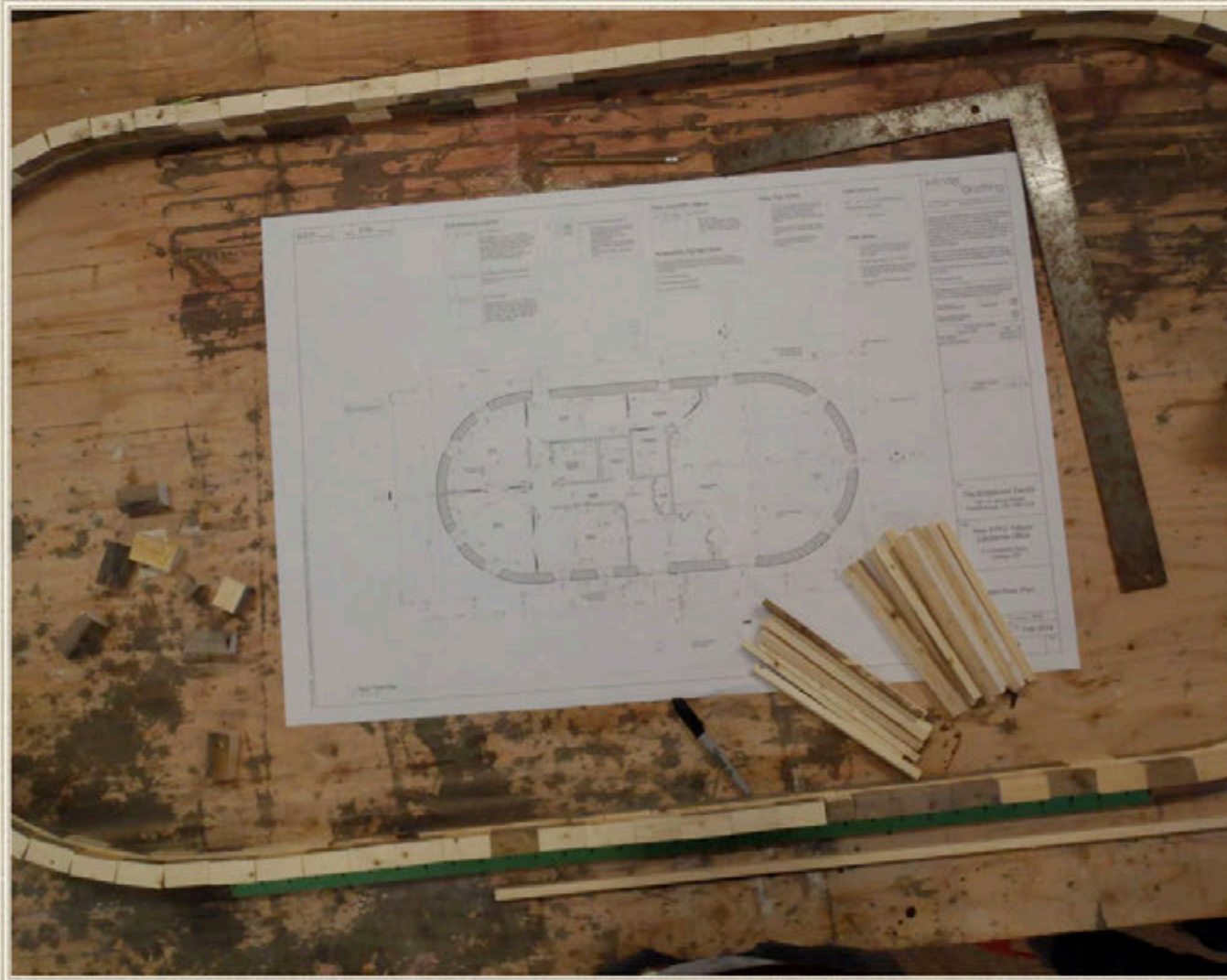
Client:
The Endeavor
136 1/2 Jane Street
Peterborough,

Project:
New ETF Office
Lakeland
9 Commerce Street
Lindsay,

Sheet:
Main Floor Plan

Drawn By: DJ
Project #: 14-015

A2.2



The building plans show the two rounded ends of the office. Timber frames at the four corners allowed us to keep the roof geometry rectangular and simple.



First things first: A renewable energy system is set up to run all the job site tools, and a composting outhouse is set up to handle the crew's output over the summer.

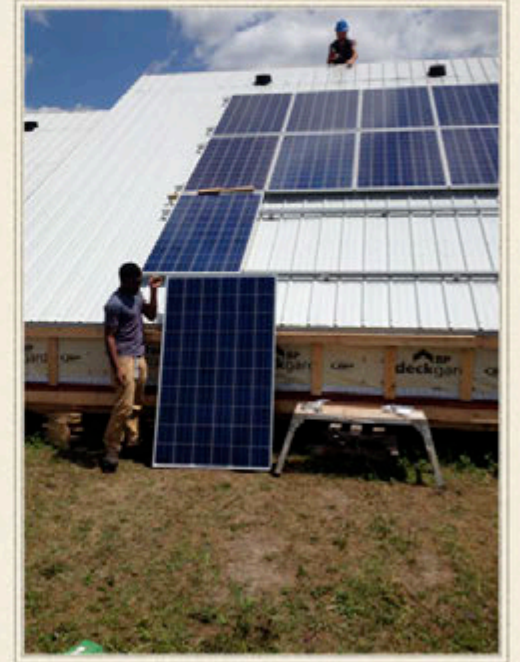


Site work begins with building the four timber frame sections for the corners of the building, using locally harvested and milled white pine timbers.



The roof for the building was constructed on the ground, with a plan to lift it onto the building in three sections with a crane.





The completed roof on the ground includes steel, solar light tubes and a 7.5 kilowatt photovoltaic array.



The concrete footing for the building was created using FastFoot forms. This is quicker and easier than typical wooden forms, especially for making curves.



Durisol insulated form blocks are dry stacked . Second course is 2 inches narrower than the first, creating a ledge for the floor joists.



Site-mixed hemcrete is used to fill in the gaps in the Durisol blocks at the rounded ends.



Helical piers are used to support the posts of the timber frame. These screw piers are wound into place with a small hydraulic driver.



A drainage sump is installed inside the foundation to remove water in extreme weather circumstances.



Parging for the exterior of the foundation and a 10 mil poly vapour barrier for the inside provide moisture protection in these two zones.



The first long tube of earthbag is prepared and installed onto the loader.



A gravel and homemade hydraulic lime mix is poured into the earthbags and tamped firmly to create a stable foundation wall.





Earthbags are levelled during tamping. Barbed wire goes between courses, and the ends of bags are folded under.



Open web floor joists rest on the Durisol ledge and the earthbag foundation. The vapour barrier is carefully tied in so it joins to the exterior walls.





Exterior frame walls are built with 2x6s, and will support the roof loads and carry the dense packed cellulose insulation.



The timber frames are installed at all four corners of the building.



The roof sections are lifted onto the frame walls with a large crane in a single day.



The roof sections are placed and the building is now covered.



Straw bales arrive from the farm. Poraver expanded glass beads are used to insulate the sill area, and everyone learns to tie slip knots to attach bales to framing.



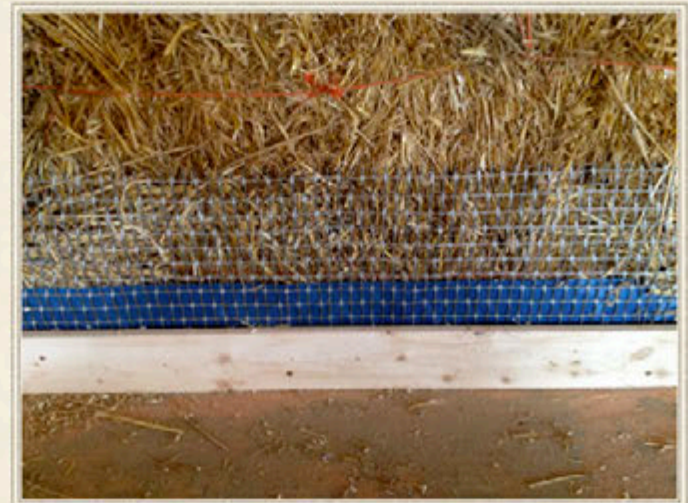
Raising straw bale walls is always a highlight of a build!



The bale walls go up quite quickly. They easily follow the curved form of the end walls.



Preparing bales walls for plastering takes much longer than stacking them. Trimming, stuffing gaps with straw/clay and plumbing them all take time.

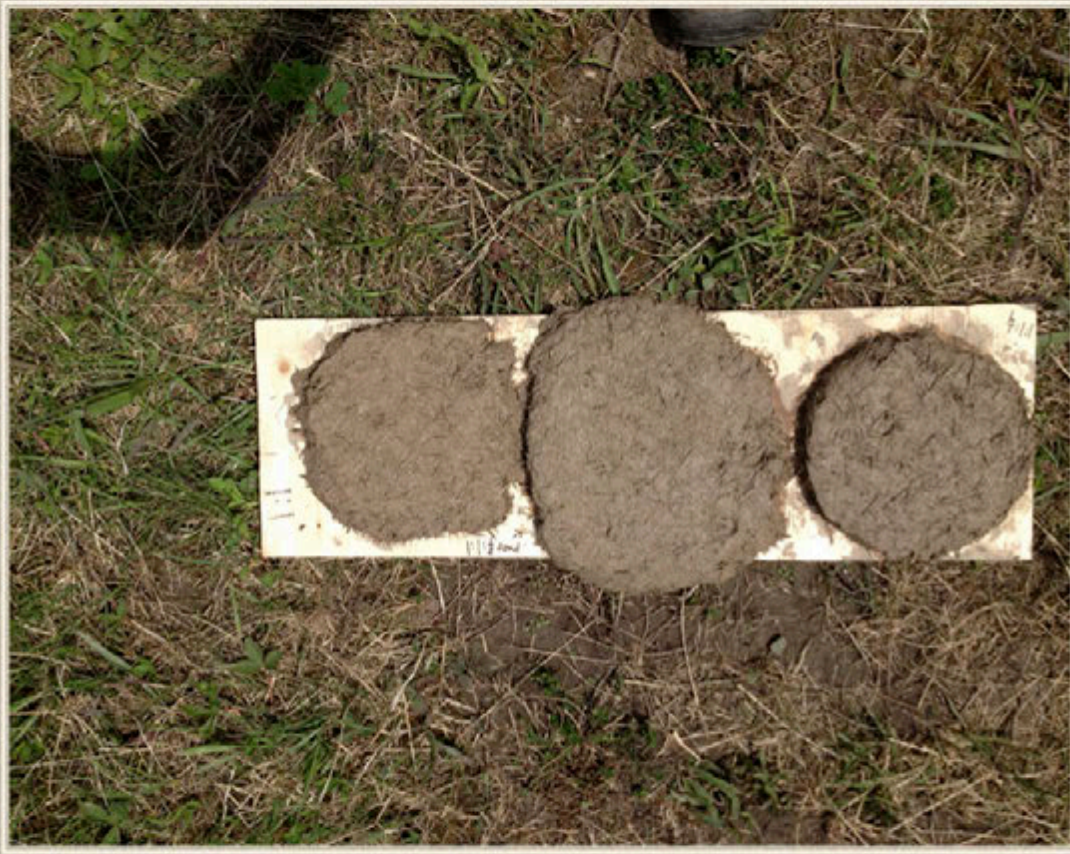


Detailing includes stuffing and lashing joints and taking care of air sealing at all seams using air barriers and mesh.



Our first experience using Siga tape to air seal at junctions was a success that we will repeat on future buildings.





Early tests with site soil showed that it would make great earthen plaster. As digging is done on site, a pile of clay soil is made at the plaster mixing area.



Earthen plaster is created by mixing site soil, sand, chopped straw and water.





Hand applied earthen plaster is placed in a single thick coat of 1-2 inches .



Coordinated team work gets a lot of plastering done in a reasonable amount of time, from push-in layer to floated finish.



Blowing cellulose insulation into the floor joists to achieve R-48.



The ceiling is furred down to allow wiring to stay under the ceiling air barrier. Interior walls are conventional 2x4 framing.



Cellulose is dense packed into the exterior wall cavities, and an insulated fiber board sheathing is applied.



Cellulose is blown into the attic to R-1000.



Between the exterior sheathing and interior air sealing, the building is on its way to being extremely air tight. Triple pane windows complete the high performance shell.



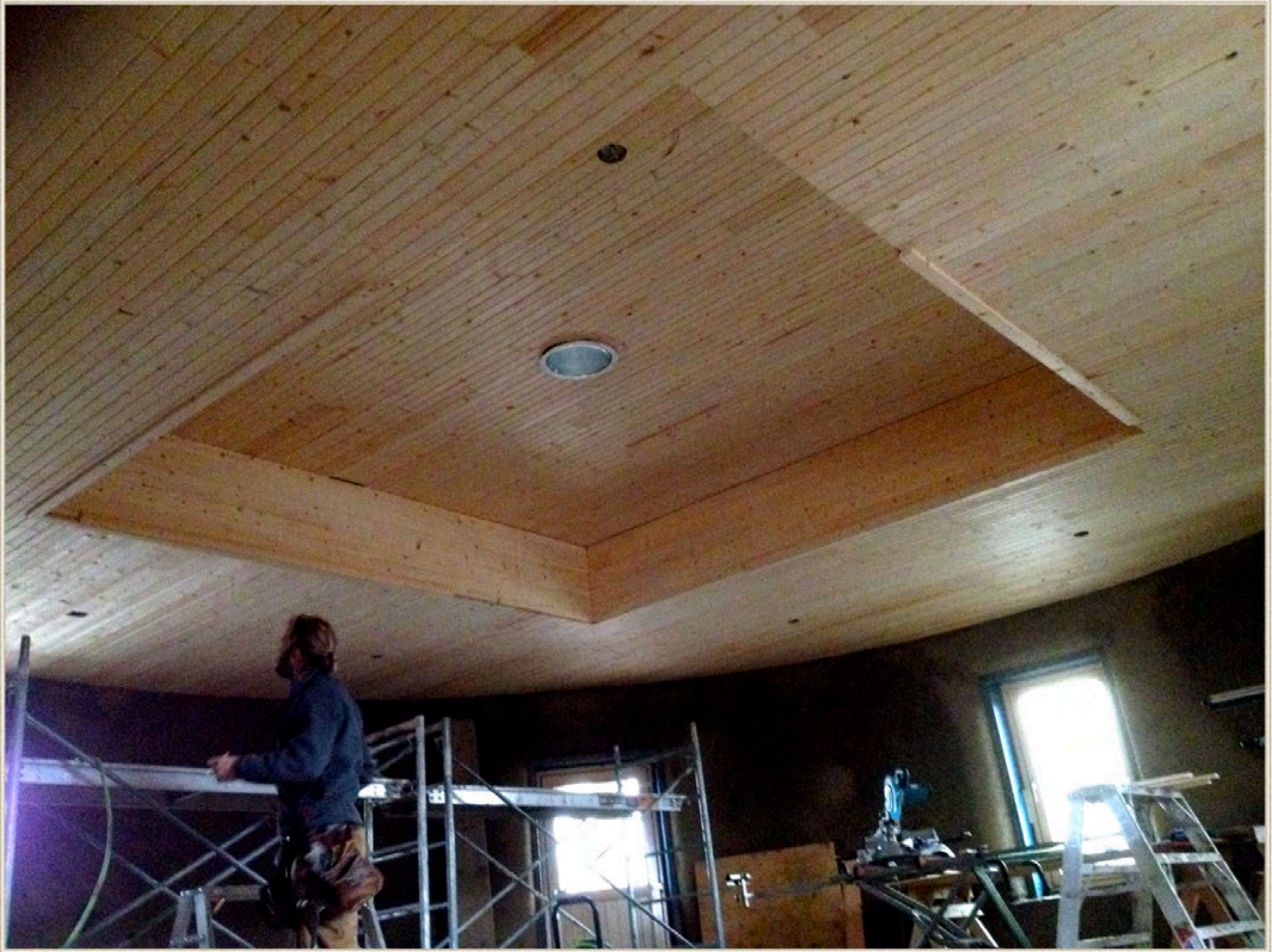
Glass bottles are cut and two ends attached together to create lit transoms above all the windows.



Hempcrete and glass bottles are used to make custom transoms above all the office doorways.



Hempcrete is also used to create a cordwood and bottle entryway to the main meeting room.



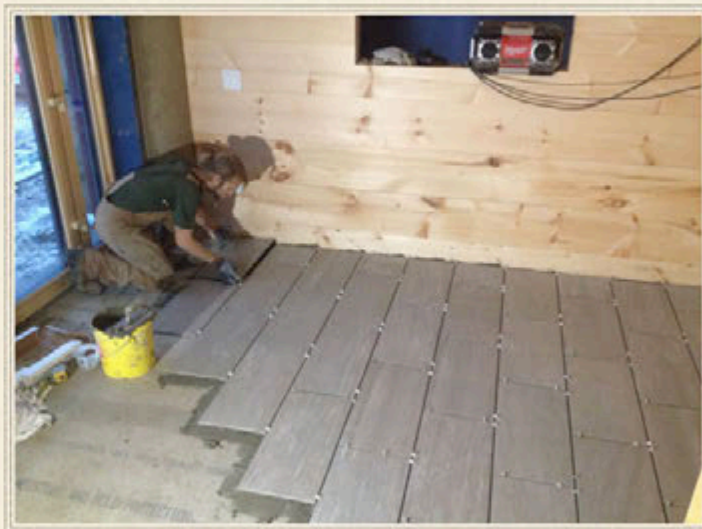
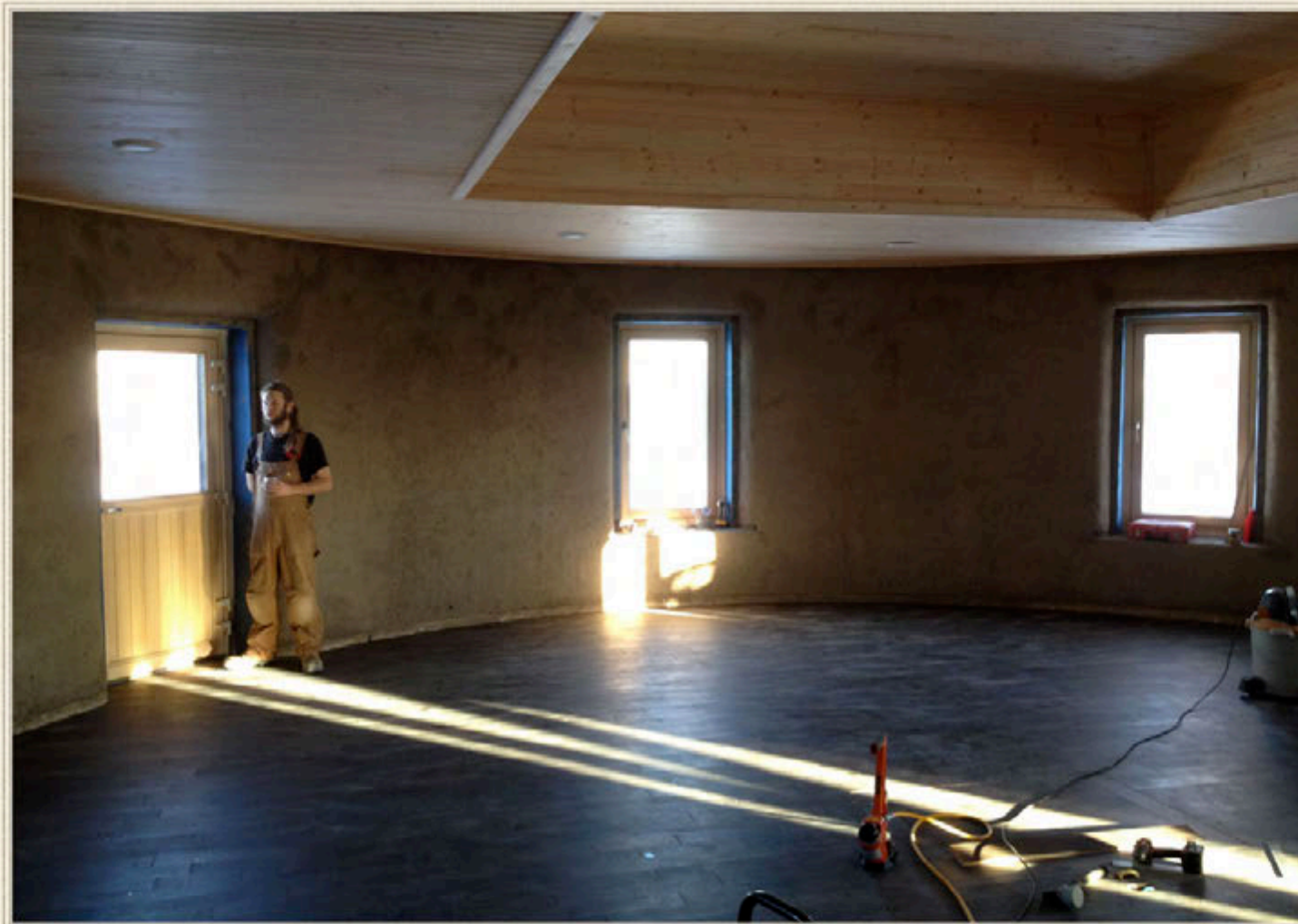
A coffered ceiling in the round meeting room is made from untreated pine.



Horizontal wooden siding is used to clad the straight sections of the exterior walls.



Solar light tubes are used throughout the building to increase natural light levels in an energy efficient way.



FSC certified ash flooring goes in the meeting room and offices, while tile is used in the hallway and bathrooms.



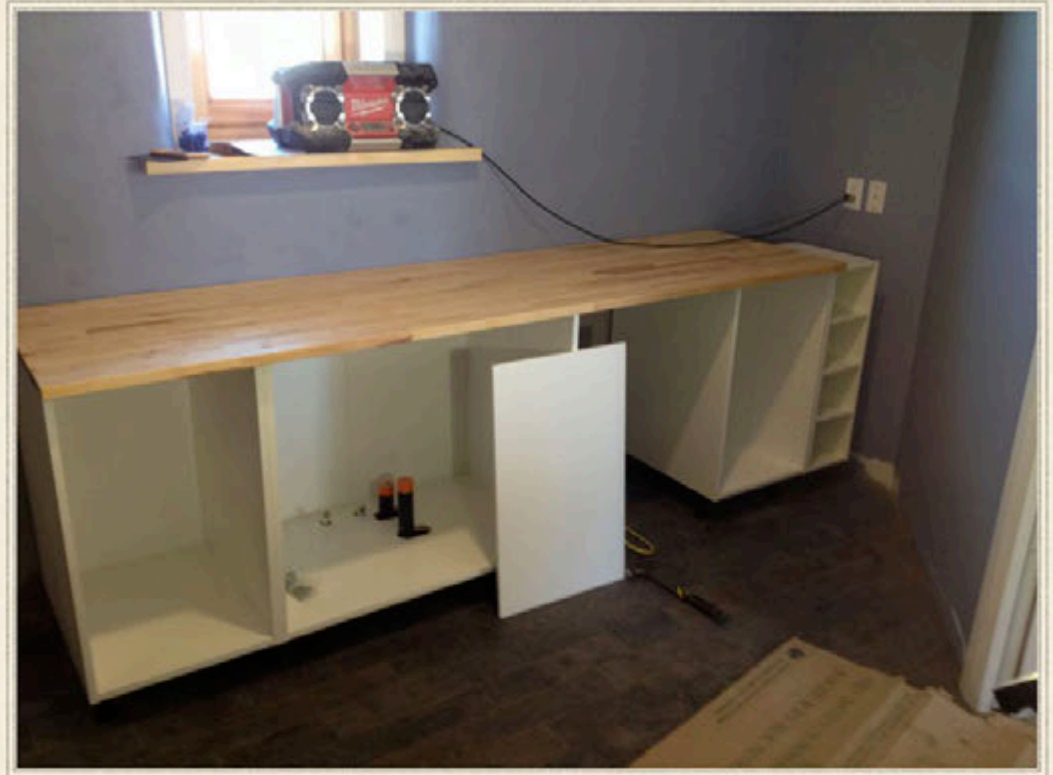
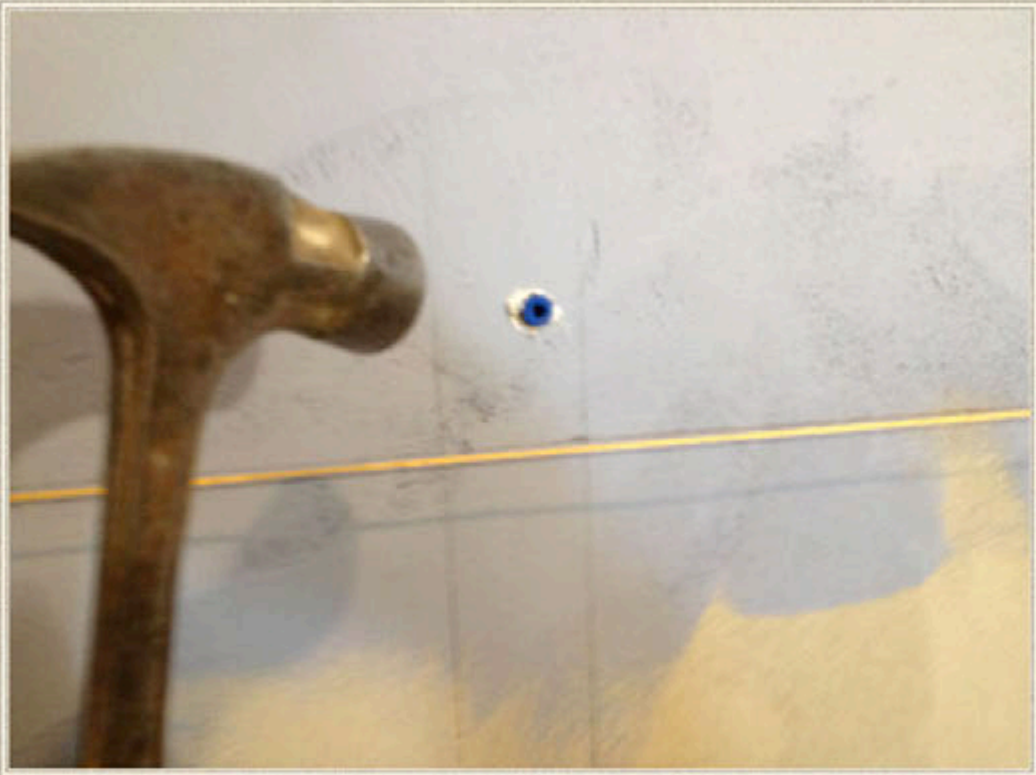
A thin finish coat of clay plaster is applied throughout the interior.



An air-sealed “truth window” provides a view into the straw bales.



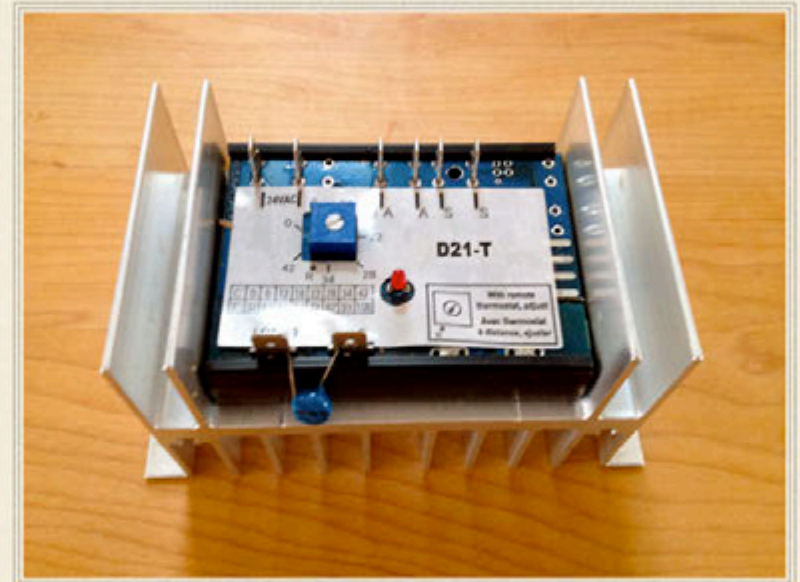
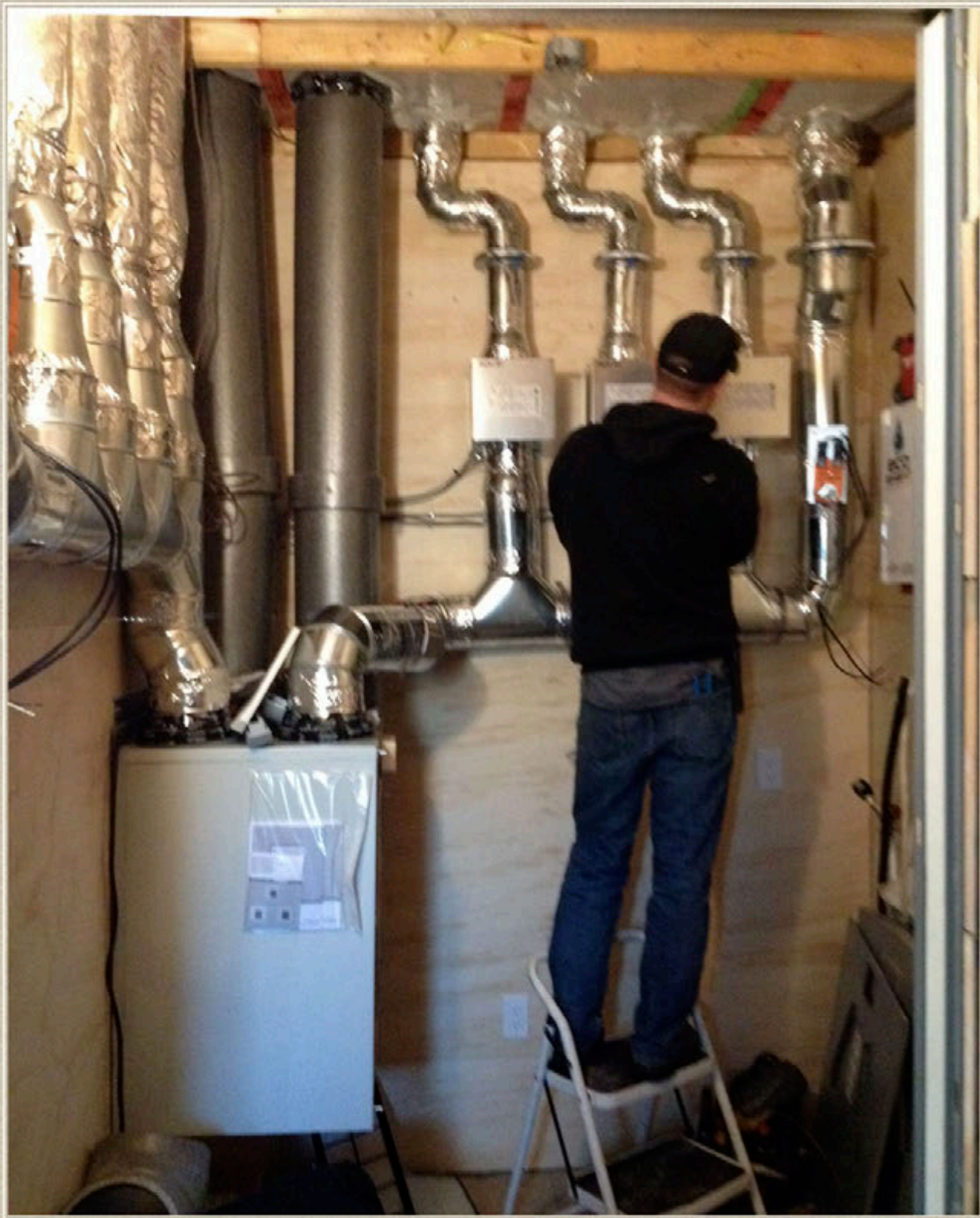
Natural clay paints are used over the clay plaster to provide a final colour.



The clay plaster is drilled, caulked and plugged to provide an air tight mounting for kitchen cabinets and counters.



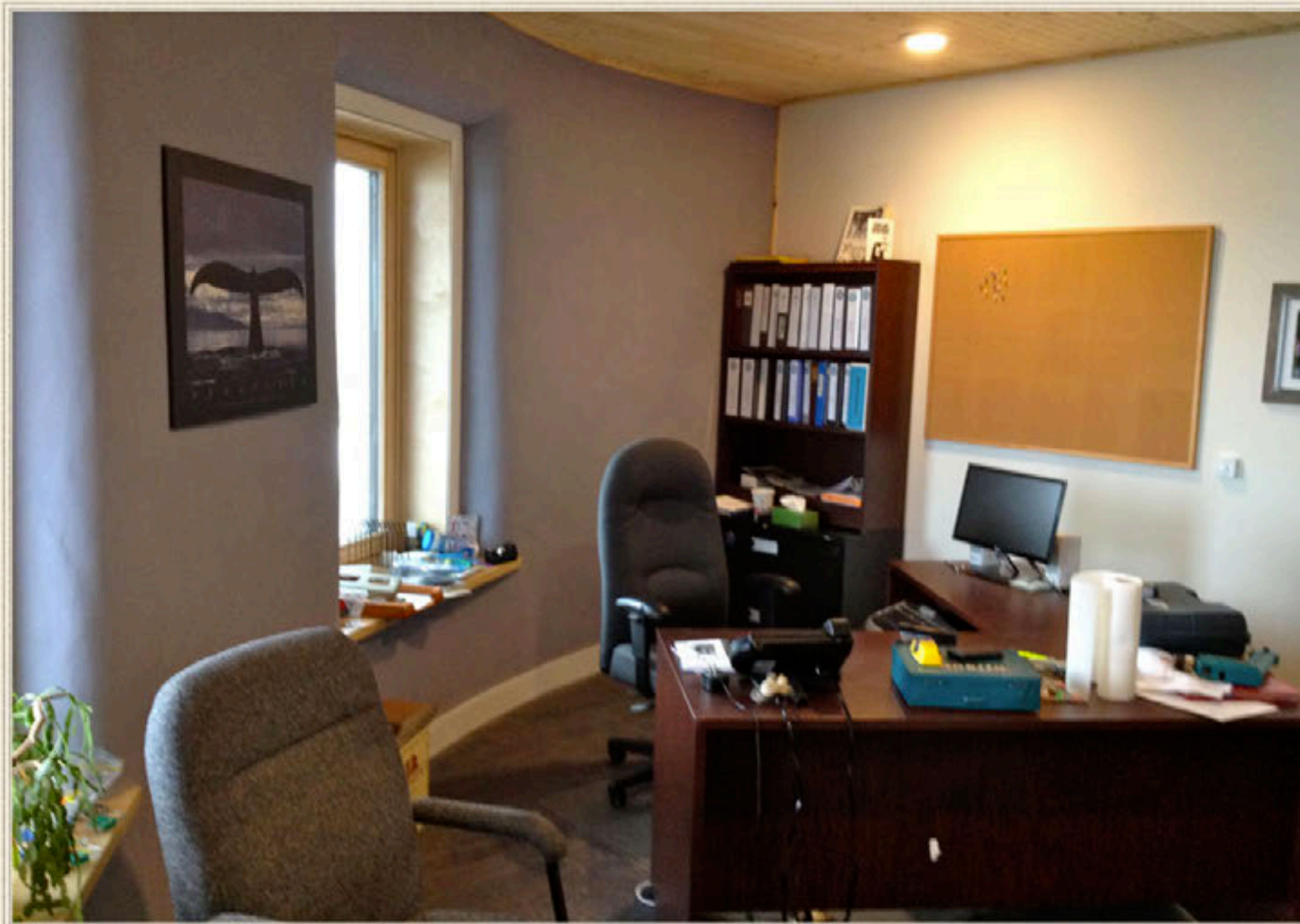
The PV system is made live, starting to produce as much energy as the building will consume over a year.



A super efficient HRV provides fresh air form the outside, and three 1 kilowatt duct heaters provide the main heat source for the whole building.



The round meeting room.



The rooms begin to get to get furnished.



The kitchen and main entry.



E.T.F.O. Trillium Lakelands
Elementary Teachers' Local

8



Sustainable New Construction Class of 2014

Ben Bowman

Neil Boyer

Andy Fisher

Lesley Fukumura

Daniaba Montesinos

Grayson Sherritt

Kathleen “Bean” Spencer

& Greg Roy, assistant instructor

Trades and Suppliers

We would like to thank all the trades and suppliers who made this project possible:

Tim Krahn, Building Alternatives, Structural design
Drew Johnson, Infinite Drafting, BCIN and drafting services
Rob Blakeney, Local Impact Design, PH modelling and HVAC design
Mike Davenport, MJ Davenport and Associates, site plan engineering
Coe Fisher Cameron, surveying
Greg Barber, SCS Gertley, HVAC installation
Mark Davidson, Whippetree Timber Frames, timber frame design and instruction
Sean Flanagan, Flanagan and Sun, PV design, installation and instruction
Steve Gourlie, Mariposa Electric Ltd, electrical installation
Morgan Fiene, NewEnergy, cellulose insulation supply and installation
Travis Baddeley, Plumbing Possibilities, plumbing installation

Post-tech Piers, helical pier supply and installation
Eco-Building Resource, solar light tubes, non-toxic caulking and other eco-materials
Glen Isle Farms, straw bales
Pinwheel Building Supplies, Zehnder HRV
Klearwall, triple pane windows and doors
Durisol, insulated concrete forms
Breezewood Flooring, FSC certified ash flooring
Tockay, Kreidezeit clay paint
FastFoot, fabric footing forms
SIGA, air sealing tapes and membranes
Cooper Lighting, LED lighting fixtures
Western Louisville, Sonoclimat fiber board sheathing