SABHomes

SUSTAINABLE ARCHITECTURE & BUILDING IN CANADA

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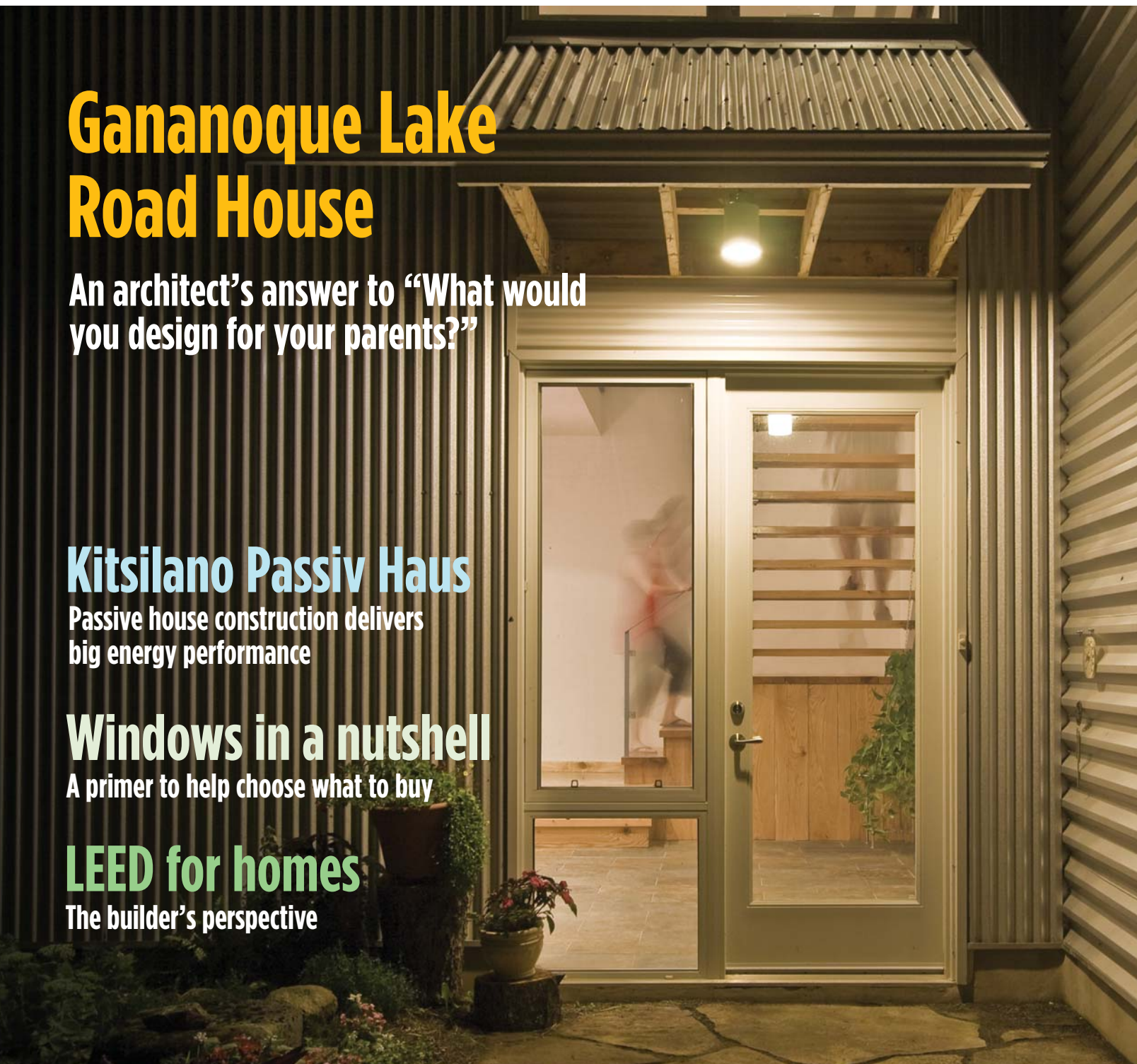

Gananoque Lake Road House

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LEED for homes

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Gananoque Lake Road House

An architect's answer to "What would you design for your parents?"

CHRISTINE LOLLEY

A sustainable home should first and foremost be built to last using high-quality materials. Its design must take into account site conditions and take advantage of passive solar design strategies.

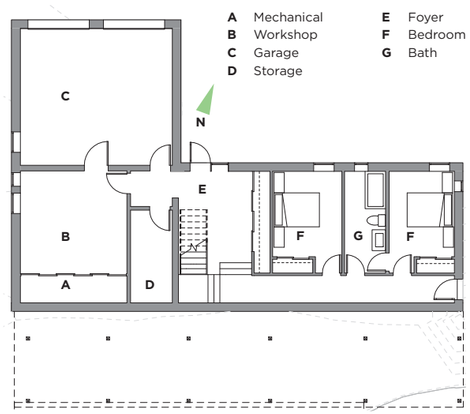
The walls, roof and windows must work together to provide a high-performance envelope. The materials and products used in the home should be durable, locally sourced, healthy and non-toxic. The systems in the home must be as energy efficient as possible. Finally, the design must be affordable and easy to construct.

We cannot rely on cutting-edge, state of the art technology to ensure sustainability. It must come from a common-sense approach to design. This belief informed many of the decisions we took when designing the Gananoque Lake Road House.

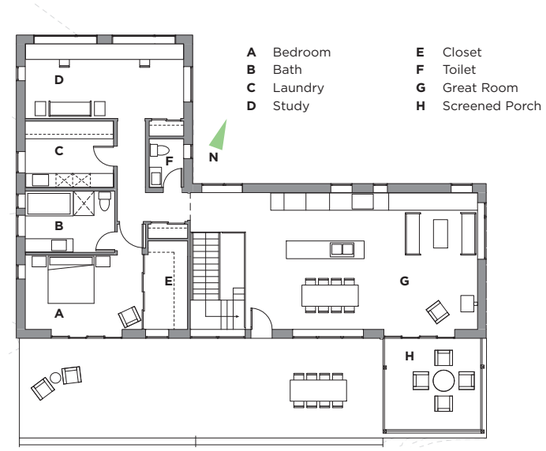
Designed for my parents, the 2775sf [256sq.m], 2-storey house was built beside a flat-topped bedrock outcropping that overlooks the large rural property in eastern Ontario. The main design goal was to create a direct connection between the house and the rock. To do this, we located the main living spaces such as the great room, master suite and study on the second floor with the entry foyer, garage and guest bedrooms located on the ground floor.

The main living spaces on the second floor face south and feature large windows that capture dramatic views across the property.

These windows admit low-angle winter sun



Floor plan, level one



Floor plan, level two

Left Ground floor entrance lobby. Windows and doors are triple glazed and have insulated fiberglass frames **Above** A large wood deck bridges between the rock and the house making a seamless transition between interior and exterior.

providing a free heat source in the colder months. The roof over these windows projects 4ft [1.2m] shading the south facade from the high-angle summer sun, which helps to keep the house cool. All the windows and doors in the home are triple-glazed units with insulated fiberglass frames. The glazing units have low-emissivity coatings dependent on orientation [see Windows in a Nutshell article in this issue] that further reduce heat loss.

The exterior walls of the home were built using a locally manufactured, recycled content ICF [insulated concrete form] block system. The blocks are dry-stacked with reinforcing steel inserted into the cavities. They are then braced and concrete is poured into the cavities to provide an extremely durable and strong structure.

Both floors are also concrete: the ground floor is a conventional concrete slab-on-grade and the second floor is an elevated concrete slab incorporated with an open web steel joist system.

These concrete floors and walls act as thermal mass, absorbing and releasing heat to regulate the indoor temperature. As a result,

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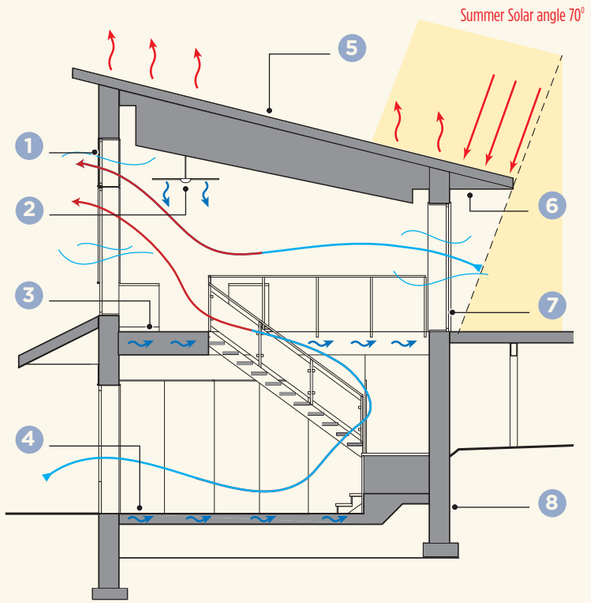


NATURAL VENTILATION PATTERNS

Building close-up

1. High level awning windows for cross ventilation
2. Ceiling fan moves air
3. Concrete slab maintains cool temperature underfoot
4. Stack effect draws cool air up through the house
5. Highly reflective galvalume steel roofing reflects unwanted heat
6. 48" Roof overhang shades south facing windows
7. Glazing provides natural lighting
8. Thermal mass of lower level maintains cool temperature in summer

Visit www.sabmagazine.com,
go to the **SAB Homes Winter 2010** issue to see the **Winter Solar drawing.**

Above The windows on the west, north and east walls are small, to minimize heat loss and capture the more intimate views of the surrounding forest.

Material listing

Wall construction: Durisol blocks
Insulation: Spray-applied polyurethane
Windows and Doors: Thermotech
Steel roofing and siding: Vic West Steel
Interior: Boomerang recycled paint, low flush toilets

Construction details

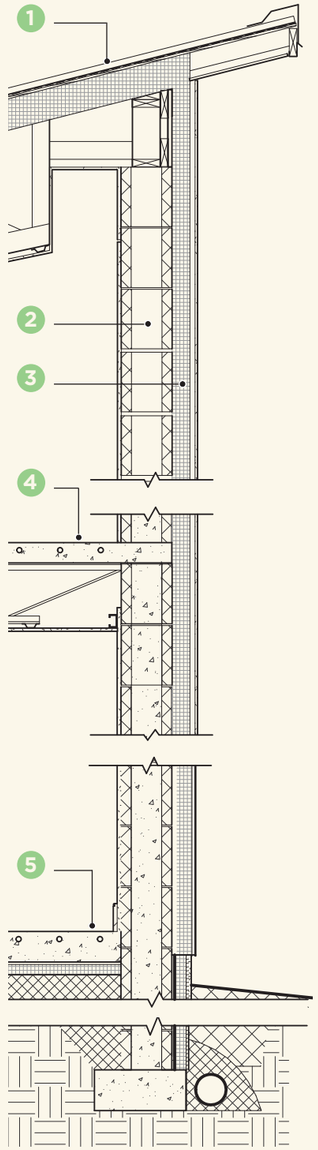
1 Roof: Flat trusses support a roof assembly of sheet metal on plywood sheathing with 6" [150mm] polyurethane foam insulation [R50] spray-applied to underside.

2 Wall: 10" [250mm] concrete-filled Durisol blocks with drywall finish applied to the interior face. Metal Z-bars and wood strapping fixed to the exterior face provide fastening points for the metal cladding.

3 Wall Insulation: 3" [75mm] of polyurethane insulation spray-applied to the blocks achieves R25. The spray application – which connects to the roof insulation – also achieves a complete air barrier.

4 First Floor: Hambro 12" [300mm] floor joists support a 4" [100mm] concrete slab poured over radiant floor heating tubes.

5 Ground Floor: 4" [100mm] concrete slab poured over R15 insulation and radiant heating tubes, then polished to achieve a durable, maintenance free floor finish.



ROOF AND WALL CONSTRUCTION

the house stays at a steady temperature all year round eliminating the need for air-conditioning in the summer and greatly reducing heating needs in the winter.

Three inches [75mm] of polyurethane foam sprayed on the outside of the structure provides a level of insulation that greatly exceeds building code requirements, and also acts as a total air barrier preventing heat loss through air leakage. The same approach has been used to insulate the roof, spraying insulation against the underside of the roof sheathing. This creates a 'warm roof' that does not require ventilation at the eaves and ridge. The walls and roof of the home are clad in corrugated sheet steel. The finish is light in colour which reflects unwanted solar heat gain and provides a durable, low-maintenance finish.

Healthy and non-toxic materials were used inside the house as much as possible. The drywall was painted with low VOC [volatile organic compounds] paint. The cabinetry in the kitchen and bathrooms is formaldehyde free. The window sills, baseboards, stair treads and all the interior doors were made by the home owner using wood harvested on the property.

Water is drawn from a 300ft [90m] deep well that provides enough capacity to serve both the domestic water needs and the geothermal heat pump. The heat pump takes the latent heat out of the well water and uses it to drive the in-floor heating system. A secondary well returns the slightly cooler water from the heat pump back into the aquifer.

An HRV [heat recovery ventilator] provides fresh air to the home. Domestic hot water needs are supplemented by roof-mounted solar panels. A super high efficiency wood stove provides additional heating in the winter months. ❖

CHRISTINE LOLLEY IS A PARTNER IN SOLARES DESIGN BUILD INC, TORONTO

Credits listing

Client: James and Brenda Lolley [Christine's Parents].

Designer: Christine Lolley and Tomislav Knezic, Solares Design Build Inc.

Structural Engineer: Kharyn Chau, C+C Engineers Inc.

Mechanical Engineer: Richard Lay, Enermodal Engineering.

Construction Manager: Tomislav Knezic, Solares Design Build Inc.

Photography: Andrea Hunniford and Dan Malka.

Great Room (Top) and Master Bedroom (Above) : Throughout the house interior finishes are predominantly white, with a few darker accent walls. White is a better reflector of light, and typically white paint contains fewer VOCs than darker colours.