Solar Nova Scotia

volume 20, number 2
Fall 2010

www.SolarNS.ca

Historic Building Energy Issues – Foundations, Basements and Crawl Spaces

Article four in energy series on historic buildings.
By Bill Hockey – Architectural Conservation Services

Heat loss and water entry through a foundation, crawl space or basement are the main concern for owners of a historic building. This element can contribute to up to 30 % of the heat loss of a historic building. Excessive moisture and water entry through this element can quickly lead to failure of the wood elements in the building as well as cause environmental problems in the structure. One needs to address the moisture entry problem through the foundation or floor of the crawl space or basement before considering insulating this building element. (Continued on page 3)

The Halifax Seaport Farmers Market – Efficient from the Ground Up

Article by Aaron Smith on Page two.

Tour the new home of the **Halifax Farmers Market** on the Halifax Seaport **on Tuesday, September 21 from 7:00 to 8:30 pm.** This new environmentally friendly location showcases solar and geothermal heating, advanced natural ventilation, wind energy, daylight responsive lighting, a vegetative roof and rainwater collection among many other features. The building is registered in the Leadership in Energy and Environmental Design (LEED) program from the Canada Green Building Council. **Please confirm your attendance by writing info@solarNS.ca**

Corporate Members

ABRI Sustainable Design & Consulting
Andy O'Brien Solar Home Design
Advanced Heating Solutions
Annapolis Valley Home Builders Association
Appleseed Energy
Atlantic Solar Systems
Aztek Solar Ltd.
BDR Research Ltd.
Bfreehomes
Cansolair Inc.
CEF Consultants Ltd.
Clean Nova Scotia
Creative Solar
Crowell Construction Inc.
Doctor Solar
Don Roscoe, Solar Designer/Builder
EnCom Group
FreeFuelForever
Green Power Labs
Halifax Heating Residential
Harris Atlantic
Independent Power Systems
Island Earth Solar
Kassner Goodspeed Architects Ltd.
MaManna Energy
Nodding Marine
NovaPro Builders Limited
Nova Sun Power
Pelican Engineering
Sage Energy Inc.
Solterre Design
Stoneridge Properties
Sun Ross Energy Systems Limited
Sustainable Housing and Education Consultants
Thermo Dynamics Ltd.

As of September 7, 2010

The Halifax Seaport Farmers Market – Efficient from the Ground Up

Some of you reading this article may have already visited the new home of the Halifax Farmers Market but you may not have realized what was on the roof, in the floor or under the building. The following are some examples of what you would find.

Ten meters below the earth's surface, the ground temperature remains constant throughout the year. In Nova Scotia, this temperature is approximately 8°C which is warmer than the outdoor air during much of the winter but not warm enough to heat buildings. To take advantage of this, there is over seven kilometres of piping buried deep under the former seaport terminal. Fluid flows through the piping capturing stored solar energy and providing the main source of heat to the market. Heat pumps are then used to extract heat from the fluid and provide warm 40°C water for heating. Typical homes and buildings require water at 70°C to supply sufficient heat but the market's heating system includes expansive concrete floor slabs and radiant heaters specially designed for low water temperatures.

Earth energy (sometimes called geothermal energy) is not its only source of heating. When approaching the building you notice large, tall windows that allow sunlight to penetrate deep into the floor plate during winter months. This heats the exposed concrete slab without the use of mechanical energy thus providing the most efficient heating source. At the same time, solar energy is also captured on the rooftop by thirty solar collectors and is stored in a large tank where it can be circulated throughout the building as needed. When the sun isn't bright enough, the heat pumps are turned on to tap into the constant earth temperature.

To reduce the amount of tubing beneath the ground and the number of solar collectors on the roof, the building is well insulated – a thick layer of insulation covers the walls, roof and under the floor slab. As well, high performance double-pane windows have low-e coatings, argon gas and special coatings to control heat gain in summertime but allow the passage of daylight.

Typical retail stores use large rooftop fans and air-conditioning units for ventilation and cooling. A different strategy was selected at the new farmers market to reduce energy consumption. Ten centimetres of soil and drought resistant plants cover much of the $3000m^2$ roof preventing the hot summer sun from warming the roof and therefore the inside of the building. Large vents were placed in the building facing the Halifax Harbour where cool air can enter; get warmed up by occupants as well as equipment before leaving the space at ceiling level. During the heating season, the vents are closed and fans supply air to the occupants which is heated by exhaust air before it leaves the building. The fan speeds are controlled by a series of indoor air quality sensors reducing energy usage while at the same time optimizing indoor air quality.

The vegetated roof not only reduces the cooling requirement during the summer months but it also captures rainwater therefore reducing the demands on the city storm system. The water that gets through the soil is captured in a fibreglass cistern mounted on the mezzanine level of the building. From this high level, it flows with the help of gravity to most of the toilets in the building reducing the need to use water from the municipal system.

The large windows surrounding the building also allow natural light to enter the space. As the sunlight level increases, light bulbs dim to maintain a consistent brightness, reduce electricity usage and reduce heat gain. Motion sensors are also installed in many of the spaces to automatically turn off the lights when they are not needed.

Even with all of the building systems being optimized, the building still uses electricity. To help reduce the amount of electricity required to run the building, four wind turbines are mounted on its roof and spin in the ocean breezes.

The Halifax Seaport Farmers Market is registered in the Canada Green Building Council's Leadership in Energy and Environmental Design (LEED) program. For more information, please visit the market this fall at its grand opening.

--- END ---

Foundations, Basements and Crawl Spaces Continued)

Foundations can range from simple mud sills to full depth basements of dressed stone and heat loss through this element is 20 to 25% of the total for the building heat loss. Foundations often are combinations of several stages of construction. The materials vary, as well as the potential for problems where they join each other. Here, as with other areas, it is critical to resolve moisture problems before sealing or insulating this element. This includes providing positive drainage away from the building. A dirt floor of a basement or in a crawl space can produce one litre of water a day for every square meter of area; therefore, one should control this moisture by placing a polyethylene vapour barrier on the floor and covering it with stones or sand. It has no real impact on the building, is inexpensive, and prevents a lot of woes caused by moisture transmission.

Floors over crawl spaces in a wood frame building are easily insulated with blankets or batts, providing that the material is held tightly against the floor boards, with a wire mesh, and there is a vapour barrier on the conditioned side of the insulation. When insulating crawl spaces where the joists are embedded in masonry, one should avoid this approach. During investigation of a joist surrounded on three sides by stone masonry which had no air barrier or insulation it was found that the wood was very punky and very easy to penetrate with a knife. The wood was exposed by removing stone. Twenty-four hours later, this wood had considerably hardened up with a fair recovery of strength. This is another reason that a crawl space must be capable of being vented as the humidity in the space in an unvented space will build up to inappropriate levels. In this case one should insulate below the joists, rather than between them, with the vapour barrier isolating the wood from the dampness of the crawl space.

Most of the heat loss through foundations occurs from 600mm, (24"), below grade to the underside of the ground floor. Heat loss is largely caused by air leakage, and the sources of leakage should be identified and sealed on the interior before considering adding any insulation to the assembly. The main source of leakage is generally the junction between the wood plate and the foundation. Once the foundation has been sealed, there are usually very few options open to add insulation. If one adds insulation on the exterior and seals the foundation against the entry of water, the moisture will wick further up the wall looking for avenues of escape. If one insulates on the exterior there is the loss of the heritage appearance of the basement. If one is excavating for other reasons, then one can consider adding insulation to the exterior; or, if one is installing new interior finishes related to use of the building, one can consider installing insulation in the new assembly, which must have an air space between it and the wall.

In adding insulation to historic buildings it will be found that each case is different. The approach taken will depend on the importance of the appearance, how one is going to use the building, and ensuring that the approach will not lead to additional deterioration of the fabric.

If you have specific questions about energy issues in attics and roofs of historic buildings, please write bill@archconserve.ca for a response.

--- END ---

REBATE NEWS:

For those members ready to get started on a new home build over the next few months where solar thermal will be an integral part of the plan, the province's new *Performance Plus* program may be of interest. Offering a $200 rebate for 'solar ready' and $1000 for a solar appliance, the program is a welcome step forward in what has been a notable void in support for solar: the new home market. However, there are only a limited number of homes that will be accepted and, not surprisingly, there are terms of reference that must be met. Best part is, you can still qualify for the Conserve NS and the NSPC rebates @ $1250 for a grand total of $3500 towards a solar appliance. Combine that with the $5000 interest free loan from Conserve NS, and, voila, you have the potential for an $8500 package! For the full lowdown, check out the details at www.conservens.ca/performanceplus.

Upcoming Solar Shelter Courses

Solar Nova Scotia is offering practical, how-to courses on designing and building Solar Shelters, including Greenhouses, Solariums, additions and especially Solar Homes. Topics include Solar Basics, Climate Control, Site Designing, Shelter Designing, Solar Construction, and Making it Happen. This course is intended for the general public and for those in design and construction.

Registration: for courses with a phone number for registration... please register by phone!

There's a course outline at http://solarns.ca/course.php .

HALIFAX: Bloomfield Center, Agricola St., Thursdays 7-10:00pm October 14 to November. Register with Solar NS, by phone at 852-4758 or email at solardon.ns@gmail.com

BRIDGEWATER: 25 Register with Solar NS at 852-4758 at Bridgewater High School on Tuesdays from 6:45-9:45 pm Oct 26 > Nov 30. Register with Sandy Mair at 543-2274.

The cost of the course is $90.00 for an individual, $150.00 couples, which includes handouts. An optional textbook, the Canadian Solar Home Design Manual is offered at $35.00.

We are currently **PLANNING a course for CAPE BRETON**. See www.solarns.ca for additional information and updates, regarding all courses and locations.

solar nova scotia membership

mail to: Solar Nova Scotia, 83 Old Scotts Road, McGraths Cove, NS B3Z 3V2

name: ______________________________

co. name: ______________________________

address: ______________________________

____

postal code: ______________

phone: ______________________________

email: ______________________________

web: ______________________________

membership fees:

- ❑ $10.00 unwaged / retired / student
- ❑ $20.00 waged
- ❑ $200.00 corporate
- ❑ $_______ donation

Tell us what you are interested in:

- ❑ active solar
- ❑ networking
- ❑ promotion
- ❑ other: ______________
- ❑ education
- ❑ passive solar
- ❑ technical support