An Ecohouse for Waterloo County:
A Building of Ecological, Economic and Cultural Sustainability

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Buildings are the single most damaging polluters on the planet. According to Sue Roaf, author of *Ecohouse 2: A Design Guide*, “buildings alone consume half of the energy used in developed countries and produce half of all climate change gases.” (Roaf, 7) The composition of building materials, construction waste, and the energy demands required to keep these spaces comfortable throughout the year all contribute to this bleak reality. Today, the idea of human impact is clear: “the global environmental crisis is a question of survival. Never before in history have human beings had such an impact on the Earth.” (Behling 13) As designers, we need to initiate ecologically sustainable approaches to building. It is our responsibility to redesign the way that we build. We must reshape the way that humanity lives.

Initially, the movement towards ecodesign was in direct response to the threatened global condition. In the1970s, higher oil prices and anticipated shortages of fossil fuels resulted in the emergence of the solar powered home.

In the 1980s, it was identified that buildings were the main source of greenhouse gases that were rapidly depleting the ozone layer. Drastic changes in climate and projected global warming furthered the need for new and increased ecologically responsible architectural forms. (Roaf, 9) Fundamentally, ecobuilding saw the built form as a part of the larger ecology of the planet and the building itself as a part of the living habitat. It aimed to respond to the local and global environmental needs through the use of regionally appropriate technologies, local materials, and the reliance upon natural or renewable resources wherever possible. (Wines, 87)

In her most recent design guide for environmentally sound homes, Sue Roaf furthers the scope of ecological design and building. She speaks of the importance of connection with the planet, local climate and site as well as with the local economy, society and culture. (Roaf, 43) Roaf believes that sustainable design is a social architecture. A built embodiment of local society, it is a keystone of the immediate community. The traditions and values of this population are embodied in the building: in the material choices, the building process, and in the finished dwelling space. This new form of ecodesign is architecture of vitality and sustainability, environmental, but also social, cultural and economic.

The proposed ecohouse for Waterloo County is based on these broadened ideals for sustainable building. The building incorporates the most appropriate sustainable technologies for the local climate, utilizes local resources while enhancing the local economy, and is inspired by the culture and existing architecture of the local community. The proposed ecological design addresses

significant global environmental issues while fostering the unique architectural and cultural personality of Waterloo County.

The town of Breslau, Ontario is located in the heart of Waterloo County: Canada's traditional Mennonite Country. Mennonites settled Breslau in 1815 (MacNaughton, 35) and the architecture of these original settlers: stone houses, barns and storage silos still render the landscape today. Breslau's climate is diverse and experiences the extremes of four distinct seasons. In close proximity to the Canadian Great Lakes, Breslau's climate is humid with abundant precipitation in both the autumn and winter months. During snow filled winter days, temperatures can dip as low as -20C, while the hot and humid summer months can bring highs of 30C. The proposed ecodesign accounts for these temperature influxes and provides spaces of comfort and thermal delight throughout the changing seasons.

The settlers of Breslau, the Mennonites, are members of an historic peace church originating from the Anabaptists in Europe. They are rooted in the teachings of Jesus, adult baptism and pacifism. (Knowles 24) Within the close-knit community, quilting bees are a common social event among Mennonite women. At these events, friends and neighbors gather their worn fabrics, and carefully piece them together to create a renewed and functional tapestry. At another common social event in the community, the

barn raising bee, Mennonites of all ages and skills come together to build. For them, building together is a community event: a time to serve a neighbor in need and a chance to physically live out their faith. All ages and skills are vital in this unique building process: organizers, high-rise and grounds crews, heavy laborers, babysitters and cooks to feed the hungry workers. The Mennonites of Waterloo County aim to live simply and in harmony with each other and with their land. Mennonite farmers believe it is their responsibility to nurture, bring renewal and be good stewards of all that God has entrusted to them. (Hiebert, 125)

Today, twenty different sects of Mennonites reside in Waterloo County. (Hiebert, 121) The majority of Mennonites, like those in Breslau, have adopted a middle class urban lifestyle comparable to that lived by the general population. While not visibly different from their neighbors, they are still rooted in the faith traditions of their ancestors. They are Anabaptists, they value community and they strive to be good stewards of the earth's resources. The proposed ecohouse for Waterloo County embraces this tradition of quilt making and material renewal, the tradition of barn raising and community building, and operates in close relation to the earth and its resources. The proposed ecohouse for Waterloo County is an act of stewardship.

The ecohouse for Waterloo County is located on the southern edge of the village of Breslau. The along and narrow site addresses Menno Street to the north, open fields to the south, and neighboring houses to the east and west. Within the house, all living spaces are designed around a central silo feature, mimicking the local silo architecture but also serving various environmental functions. Living spaces are all oriented to the south of the building in order to take full advantage of passive solar heat gains. All services are located to the north of the building, and all moisture filled spaces are kept separate from the primary living envelope. This series of services to the north, combined with existing plantings, shelter the living spaces from cold Canadian northwest winds.

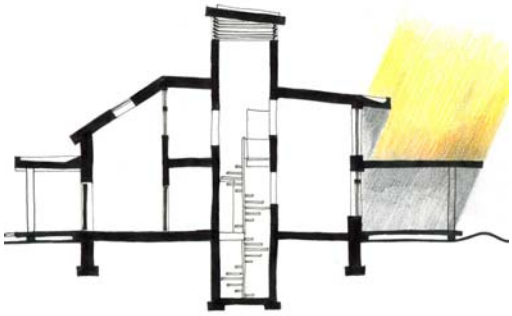
Inspired by the Mennonite tradition of the barn raising, the building process aims to involve as many members of the community as possible.

Experienced builders are required to assemble the salvaged timber structure, while local farm workers cultivate the straw bales for the building envelope. Once on site, the straw bale envelope is constructed by a group of people who arrange the bales and also apply the plaster finish. Collecting rocks from neighboring fields is a task for children and youth. Just like the traditional Waterloo County barn raising, the construction of the ecohouse is a community event. While bringing the community together, it ultimately is a culturally sustainable process, propelling traditions of the past into the modern building process.

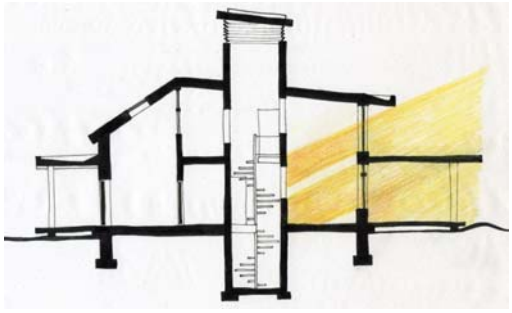
The use of local materials, both salvaged, cultivated or manufactured in the local area, enhance the building's economic, social and environmental value. Locally salvaged building materials reduce pollution involved in the material manufacturing process while also reducing travel distances to the site. Straw bales, reused railway ties, and stones gathered from farmer's fields all contribute to the economic quality of the building, and make use of existing and local materials. These materials contribute to the environmental quality of the building but also serve an important social purpose in the community. The farming roots, the forces that have shaped this unique region, are conveyed and celebrated in the architectural form of the building on several occasions. Salvaged timbers become the exposed structure and exist in a form similar to its barn predecessor. The character of the straw bale envelope is revealed on two occasions in the experience of the building. On the exterior, straw bales are visible through clear corrugated building sheeting, while on the interior; a 'truth' window in the dining area reveals the locally harvested farm material. The historical forms of the Breslau area also inspire the central circulation and ventilation silo structure. Shaped like a local storage silo, the structure is covered in stones from neighboring fields. These rocks are local, chosen by

hand and are pragmatic in their function. Not only are they are a physical reminder of the farming seasonal cycles and aesthetically pleasing, they provide for thermal mass in the building's central core. These various examples of reuse of local materials are environmentally responsible approaches to building. Furthermore, they support the local economy and strive to sustain the social and cultural roots of the area.

Various sustainable technologies are incorporated into the design in order to best utilize the local climate and resources. The proposed design takes full advantage of passive solar gains in combination with thermal mass characteristics in order to address the diverse climate and temperatures. In the



summer, roof overhangs and deciduous planting shade the ample south facing windows. Minimal sunshine enters the interior spaces during the summer, and breezes entering through operable windows are cooled by the exterior plantings. In the summer, the thermal masses in both the ground concrete floor and found stone of the central silo structure, serve as a



cooling device within the home. In the winter, the opposite effect occurs. Sun enters the home, providing both light and heat for the main living spaces, and is absorbed into both the floor and the silo structure, and is stored in these thermal masses until required. Other energy providers in the home include radiant floor heating system, rooftop photovoltaics

and a back-up wood boiler with water jacket for days of minimal sunshine. Without relying on fossil fuels, the home is place of thermal delight through the changing seasons.

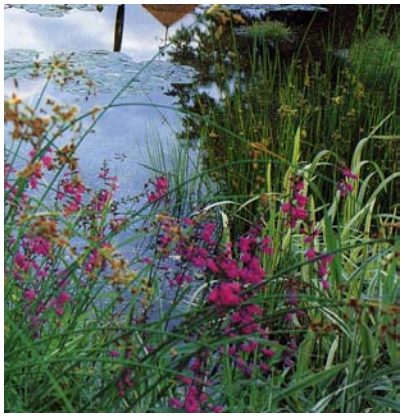
The central silo provides local architectural identity while facilitating natural and cross ventilation processes in the building. Air enters the building through

operable windows in the building envelope and travels into the central ventilation shaft. Inside the shaft, the stack effect occurs with warm air rising and exiting the building, and cool air dropping to the food storage area carved into the ground surface. Interior windows in the building encourage this natural cross ventilation process while also bringing natural light into the central area of the building. Operable windows in the bathrooms as well as over the main cooking area remove unwanted moisture from the building envelope.

As fresh water in one of the world's most precious resources and one whose supply is increasingly affected by pollution and global change as well as by escalating demand, (Wilhide 40) the ecohouse for Waterloo County approaches this issue with a sense of stewardship. The home is not only designed to reduce water demands within, but also to gather and reuse the abundant natural precipitation of the area. The roof gathers and guides the rainwater to storage spaces for their eventual re-use. Composed of recycled aluminum, a material that won't contaminate the water, it guides precipitation from the north side of the building to a collection space above the front porch,

before it is directed to an underground cistern. The water is stored in the cistern until required and then is treated in preparation for its re-use as laundry water or for exterior landscaping needs. Composting toilets located in both of the washrooms also reduce the water needs of the household drastically. Furthermore, their wastes are gathered, accessed in the ecoservice room and can eventually be used as natural fertilizer for the site landscape.

Like the energy devoted to the building composition and interior spaces of the ecohome, a sustainable approach is also taken towards the design of the surrounding landscape. While historically, an exterior garden has served as an immediate point of contact with the natural world, “domestic gardens have now evolved to an extent that they are highly unnatural places.” (Wilhide 42) In many situations, their upkeep actually contributes to global environmental ill health. The proposed site is home to native Canadian wildflower species, herbs, as well as local fruits and vegetables nurtured and consumed by the inhabitants. The plantings and water



features of the site invite animal and bird species to thrive in the environment, and no energy powered devices are necessary for its upkeep. Instead, food and human compost generated on the site are composted to support soil conditions, while gathered water nurtures the land in order that it may provide to its full potential.

The movement towards ecodesign originally grew in direct response to the threatened global condition and today, ecologically sound buildings continue to respond to the local and global needs of the environment. The proposed ecohouse for Waterloo County honors the environment in a similar manner, however, with equal devotion, it also aims to bring sustainable building to new levels. Not only incorporating appropriate technologies for the local climate, the proposed ecohouse also strives to encourage the local economy and physically honor the values and traditions of those who have shaped the place. In Waterloo County, ecological building is a continuum. It celebrates the environmental, economic and cultural foundations of the area, and strives not only to sustain these precedents, but also ultimately to propel these values and roots forward into a new generation of building.

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